SVANTEK

USER MANUAL

SV 106

VIBRATION METER

Warsaw, June 2015

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Notice: *On account of continuous product improvement SVANTEK reserves the right to make changes to product specifications without notice. To download the most up to date user's manual please visit our web site at www.svantek.com.*

This user's manual presents the firmware revision named 3.32.3 (see the ***Unit Label*** *review to check version details).*

This user's manual presents some aspects of SUPERVISOR software revision named 1.4.4 (see the software start-up splash screen).

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

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

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1. INTRODUCTION

The SV 106 is a new six-channel human vibration meter and analyser. The instrument meets the ISO 8041:2005 standard and it is an ideal choice for measurements according to ISO 2631-1,2&5 and ISO 5349.

This small-size instrument performs simultaneous measurements with two triaxial accelerometers (e.g. both-hands vibration or triaxial SEAT transmission measurements are possible).The **RMS**, **VDV**, **CRF**, **OVL**, **PEAK**, **P–P**, **MTVV**, **MAX**, **VECTOR**, **A(8)**, **ELV**, **EAV** results with all required weighting filters for the HVM measurements are available with this instrument.

Using the computational power of its digital signal processor the **SVAN 106** instrument can, simultaneously to the broad band meter mode, perform real time **1/1 Octave** or **1/3 Octave** analysis.

Advanced time-history logging and time-domain signal recording (according to ISO 2631-5) to the built-in Micro SD flash card give almost unlimited capabilities of data storage. Results can be easily downloaded to PC using the high speed USB interface and the Supervisor software.

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

Evaluation of the grip force is possible with the dedicated “integrated adapter” SV 105 AF.

Fast USB 1.1 interface (12 MHz) creates real time link for the PC "front-end" application of the **SVAN 106** instrument. The measurement results can be downloaded to PC using the above mentioned interfaces.

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

1.1. SV106 main features

- Human Vibration measurements meeting ISO 8041:2005,
- ISO 2631-1,2&5 (including VDV and MTVV) and ISO 5349-1 & 2
- Six channels for acceleration (IEPE type) and two channels for force measurements
- Whole-Body measurements:
  - Low-cost and low power seat accelerometer SV 38V
- Hand-Arm measurements:
  - SV 105A integrated triaxial accelerometer including hand straps
  - SV 105AF integrated triaxial accelerometer including hand straps and grip force sensor
- - SV 150 triaxial accelerometer with adapter for direct attaching to hand-held power toolsTime-domain signal waveform recording (meeting ISO 2631-5) as option

- 1/1 octave and 1/3 octave spectral calculations (as option)
- Advanced data logger including spectral analysis
- Micro SD flash card for almost unlimited mass data storage
- USB 1.1 Client interface
- A(8) daily exposure automatic calculation
- Integration time programmable up to 24 h
- Supervisor software for easy instrument setup and data download
- Easy to use, operator friendly interface with high contrast full colour display
- Pocket size (140 x 83 x 33 millimetres – 5.5 x 3.3 x 1.3 inches)
- Light weight (only 390 grams – 13.9 oz) including 4 x AA batteries

1.2. Accessories included

The **SV 106** set consist of the following parts:

- **SV 106** instrument with 4 AA batteries installed.
- **SC 56** mini USB 1.1 cable
- **SA 62** micro SD card 4 GB

1.3. Accessories available

-
- **SV 38V** triaxial accelerometer for Whole—Body measurements (MEMS type)
- **SV 105A** integrated triaxial Hand-Arm accelerometer (MEMS type) with adapter
- **SV 105AF** integrated triaxial H-A accelerometer (MEMS type) with adapter & grip force sensor
- **SV 111** vibration calibrator for HVM
- **SV 150** triaxial accelerometer sensitivity 6mV/g, Hand-Arm, direct fixing to the tool
- **SV 151** triaxial accelerometer
- **SV 207B** Building Vibration Measurements set (SV 84 outdoor accelerometer, adapter)
- **SC 118** LEMO 5 pin to LEMO 4 pin connector
- **SC 125** LEMO 5 pin to LEMO 5 pin extension cable (5 m)
- **SC 139P** LEMO 5 pin (plug) to 3 x BNC sockets cable (0.7 m)
- **SC 149** LEMO 5 pin (plug) to 3 x TNC sockets (0.7 m)
- **SA 38** calibration adapter for SV 38/38V
- **SA 40** calibration adapter for SV 207A and Dytran 3233A, 3143M1, SV 150, SV 151
- **SA 54** power supply unit by USB interface using cables SC 16 or SC 56 (without cables)
- **SA 47** carrying bag and accessories (fabric material)
- **SA 89** carrying belt-bag (fabric material)
- **SA 105A** calibration adapter for SV 105A and SV105
- **SA 111** calibration adapter for SV 38/38V to be used with SV 111 (included in SV 111 set)
-

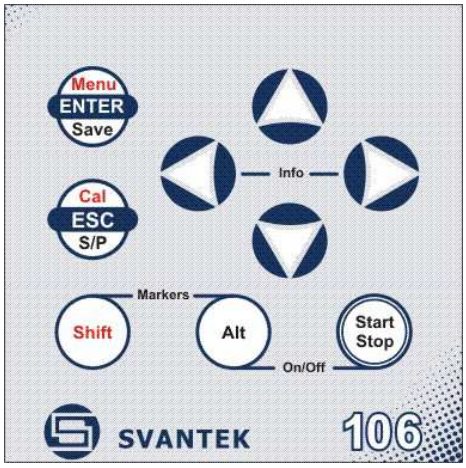
2. MANUAL CONTROL OF THE INSTRUMENT

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

2.1 Control push-buttons on the front panel

The following control push-buttons are located on the front panel of the instrument:

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



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

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

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

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

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

<Start/Stop> This push-button enables the user to start the measurement process when the instrument is not measuring or to stop it when the instrument is in course of the measurement. It is

also possible to set the mode of this push-button such that in order to start or stop the measurements the user has to press it simultaneously with the **<Shift>** push-button.

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

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

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

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

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

[<S/P>] This push-button enables the user to jump to pause or break the measurement process temporarily. If there is no current running measurement in progress this push-button opens the Setup Manager menu

< ◂ >, < ▸ > These push-buttons enable the user specifically to:

- select the column in a multi column parameter list;
- select the parameter value in an active position (e.g. filter Z, A or C, Integration period: 1s, 2s, 3s, … etc.);
- control the cursor in Spectrum and Logger modes of result's presentation;
- select the position of the character in the text editing mode;
- activate markers 2 and 3
- speed up changing the numerical values of the parameters when pressed and held.

(< ◂ >, < ▸ >) The **< ◂ >**, **< ▸ >** push-buttons pressed in conjunction (or in sequence) with **<Shift>** enable the user specifically to:

- speed up changing the numerical values of the parameters (i.e. the step is increased from 1 to 10 in the setting of **Start Delay** - *path: Menu / Measurement / General Settings / Start Delay*);
- jump to the last or first character of an edited text line in the text edition modes,

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

- select the parameters value in the multi column list,
- insert or delete a character in the text editing screen.

<▲>, <▼> The **<▲>**, **<▼>** push-buttons enable the user specifically to:

- select lines in the list;
- select the correct character from the list in the text edition screen;
- activate markers 1 and 4

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

- change relationship between the Y-axis and X-axis of all plots presented on the screen

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

- change the mode of result's presentation;
- programme the Real Time Clock (**RTC**) and **Timer**;

[Info] The **<Info>** push-button (simultaneous pressing the **<◄>**, **<►>** push-buttons) opens the window with the help information in the measurement display modes.

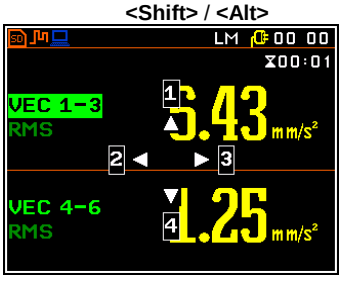
[Markers] The **Markers** combination buttons enable the user to mark special events which occurred during the performed measurements. Event function is active only when the Logger is active. In order to activate the markers the logger has to be switched on (*path: <Menu> / Measurement / General Settings / Logger Mode = Logger*) and one or more logger results (**PEAK**, **P–P**, **MAX**, **RMS**, **VDV**) in profiles have to be activated (*path: <Menu> / Measurement / Data Logging / Logger Results*).

In order to enter the marker mode the user must press **<Shift>** and **<Alt>** push-buttons simultaneously during the measurement (available when instrument operates in Advanced Mode). Then four available markers appear on the screen. To choose marker number 1 the user must press **<▲>** push button (number 2 - **<◄>**, number - 3 **<►>** and number 4 - **<▼>**).

The markers disappear automatically and the chosen marker is activated (after pressing **<Shift>** + **<Alt>** again, the active marker number will be highlighted). In order to switch off the marker, the user has to press **<Shift>** + **<Alt>** and press the arrow push-button, which refers to the marker to be switched off.

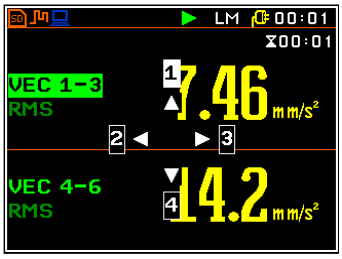
The current state of the markers is indicated in the logger file (cf. App. B for details) and can be used to show them with the help of the dedicated presentation software.

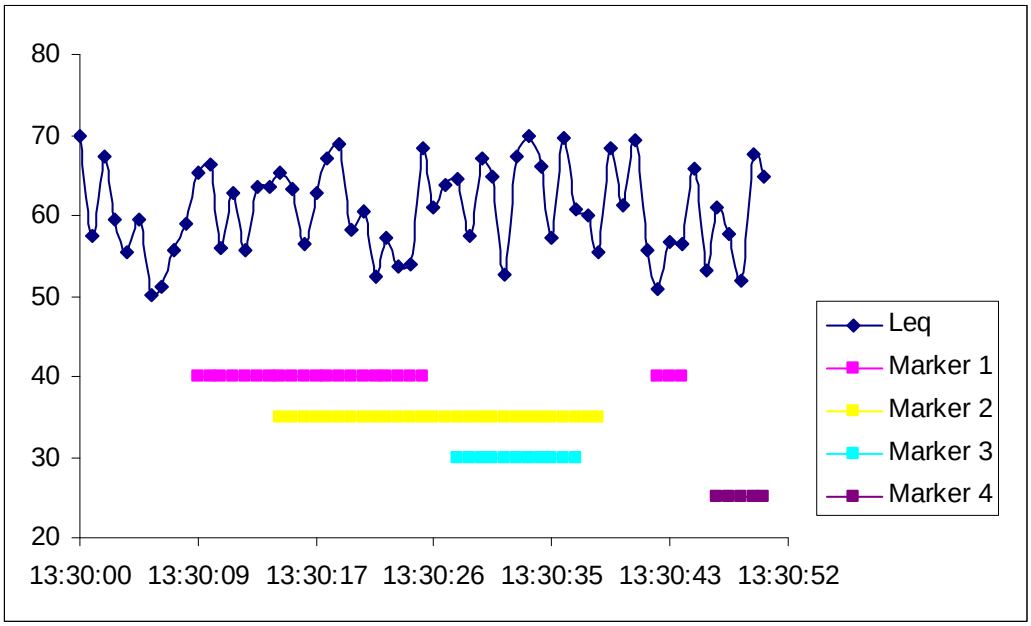
<Shift> / <Alt>



<▲>

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





2.2 Input and output sockets of the instrument

Top cover of the instrument

The measurement inputs are placed on the top cover of the instrument: two 5-pin Lemo compatible sockets type ENB.0B.304 for **Channels 1–3** and **Channels 4-6**, all with IEPE power supply for the accelerometers.

Bottom cover of the instrument

In the bottom cover there are two sockets, placed from the left to the right as follows: **USB** Device 1.1 interface and multi-purpose input / output socket **I/O**.

The **USB** Device 1.1 interface is the serial interface working with 12 MHz clock. Thanks to its speed, it is widely used in all PCs. In the instrument, the standard 4-pin socket is used described in more detail in Appendix C.

The additional multi-purpose input / output socket, called **I/O**, is a two-pin jack socket. On this socket, in the case when the Analogue Output functionality is selected, the signal from the input of the analogue / digital converter (before any frequency correction) is available. This signal can be recorded using a magnetic recorder or observed on an oscilloscope. The Digital Input as another functionality serves as the external trigger, while the Digital Output is used to generate the trigger pulse or alarm pulse from the instrument.

3. SETTING THE INSTRUMENT

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

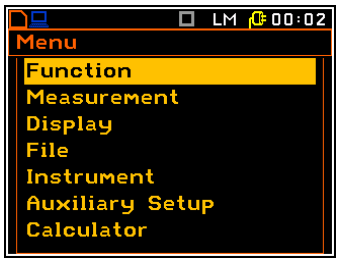
3.1. Basics of the instrument's control

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

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

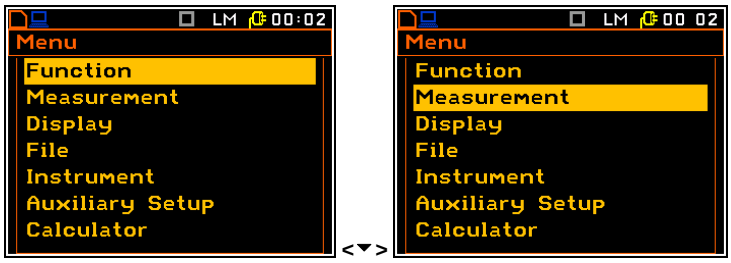
Main menu

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



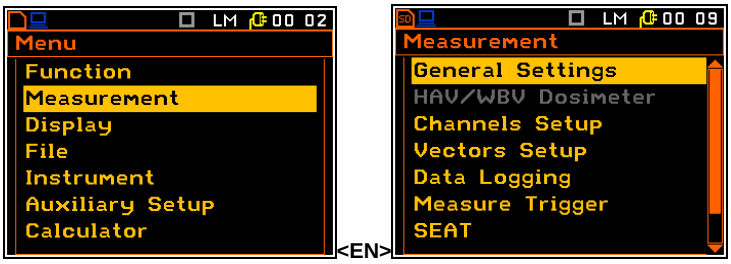
Position selection

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



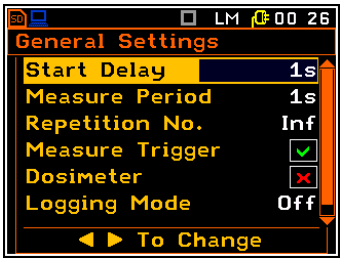
Entering position

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



List of parameters

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



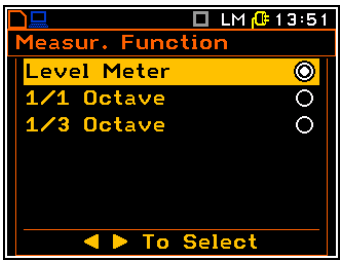
- The desired position in a list is accessed after pressing the **<▲>** or **<▼>** push-button.
- The change of the value in a selected position is performed by the **<◄>** or **<►>** push-buttons (or pressed together with **<Shift>**).

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

starts to change automatically until the user releases the pressed buttons.

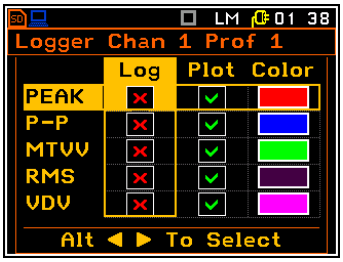
The user may change the numerical parameter value with a larger step (usually 10, 20) by means of the **<◄>** or **<►>** push-buttons pressed together with **<Alt>**.

Option list



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

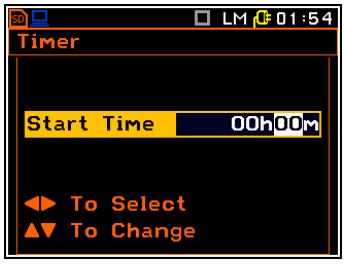
Matrix of parameters

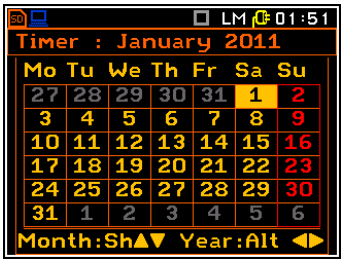


When the list of parameters consists of more than one column the user may change:

- column by means of **<◄>** or **<►>**
- line in the same column by means of **<▲>** or **<▼>**
- value in a selected position by means of **<◄>** or **<►>** with **<Alt>**
- all values in the same column by means of **<▲>** or **<▼>** with **<Shift>**
- all values in the same line by means of **<◄>** or **<►>** with **<Shift>**.

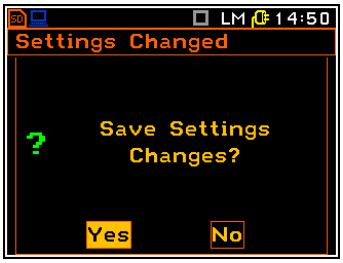
Complex parameters





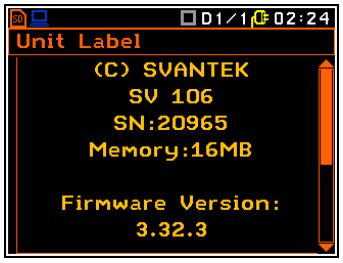
Some parameters like **Start Hour**, **Start Day** etc. are complex (consisting of more than one value field). The selection of values for such parameters is performed in a special window, which is opened with the **<◄>** or **<►>** push-buttons. In the special window the value is selected with the **<◄>**, **<►>** or **<▲>**, **<▼>** push-buttons and then is confirmed by pressing **<ENTER>**.

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



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

Information window



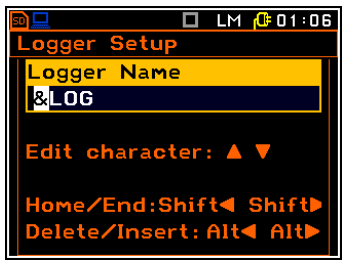
Some windows inform the user about the state of the instrument, available memory, none existing files or loggers, standards fulfilled by the unit, etc. In order to scroll through the list, the user has to use the **<▲>** or **<▼>** push-buttons. In order to close such a window, the user has to press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

Text edition window

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

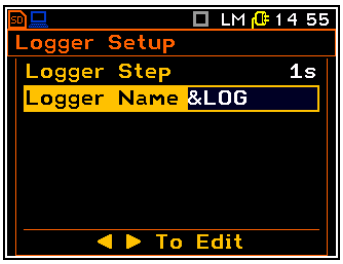
- One can select the position of the character in the edited text using the <◀>, <▶> push-buttons.
- The available ASCII characters can be changed using the <▲> or <▼> push-button. The subsequent digits, underline, upper case letters and space appear on the display in the inversely displayed position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

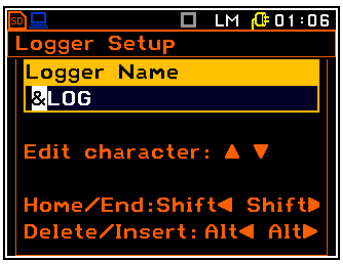
<▶>



Help information

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

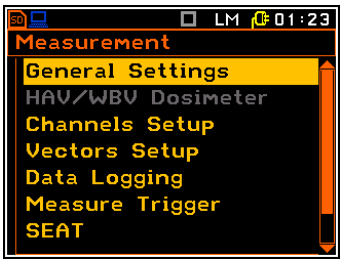


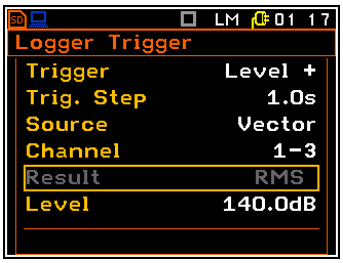


Inactive parameters

If some functions or parameters are not available, the positions in the menu or parameter lists linked with this function or parameter become inactive (their colour became grey). For example, if ***Dosimeter*** (*path: <Menu> / Measurement / General Settings / Dosimeter: Off)* is switched off the **HAV/WBV Dosimeter** line is **not** active!

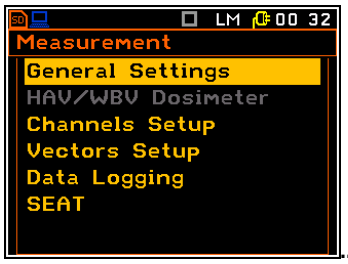
The Grey colour of a position means that this parameter has a single value and it is not possible to change it.

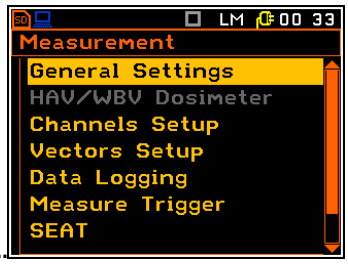




Simple and advanced menu modes

There are two instrument modes, which define the scope of available functions: **Simple Mode** and **Advanced Mode**. These modes can be selected in the **Instrument Mode** window of the **Auxiliary Setup** menu. **Simple Mode** defines the basic instrument functions, while the **Advanced Mode** defines the full scope of functions. Many windows can have different views. To the right is an example of the **Measurement** window for



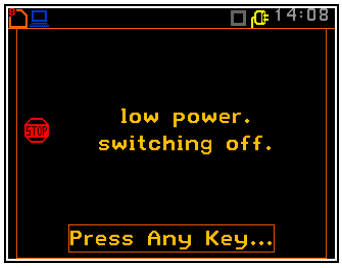


simple and advanced modes.

3.2. Powering of the instrument

The **SV106** can be powered by one of the following sources:

- Four AA standard size internal batteries. In the case of alkaline type, a new fully charged set can operate more than 12 h (6.0 V / 1.6 Ah). Instead of the ordinary alkaline cells, four AA rechargeable batteries can be used (a separate external charger is required for charging them). In this case, using the best NiMH type, the operation time can be increased up to 16 h (4.8 V / 2.6 Ah)
- **USB** interface – 500 mA HUB



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

When the instrument is powered from its internal batteries, the **"Battery"** icon is presented on the top line of the display. When voltage of the batteries is too low for reliable measurements, the icon flashes or during attempt to switch the instrument on the **Low power** message occurs on the display for 2 seconds and the instrument switches off by itself. To change the batteries the user has to switch off the instrument, take off the black bottom cover of the instrument, unscrew battery cover, slide the battery tubes out, change the batteries taking care to observe the correct polarity and reassemble the parts of the instrument. Fully charged set of 4 batteries ensure more than 12 hours of continuous operation of the instrument (with **Dim** LCD switched on). The battery condition can be checked by means of the **Battery** function. It is also presented continuously on the top line of display by means of the **"Battery"** icon.

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

Prolonging the internal source of the instrument's power can be achieved by reducing the brightness of the screen when possible. The settings of **Brightness** and power saver function may be done in the **Screen Setup** window (*path: <Menu> / Display / Screen)*.

3.3. Initial Setup of the instrument

Switching the instrument on

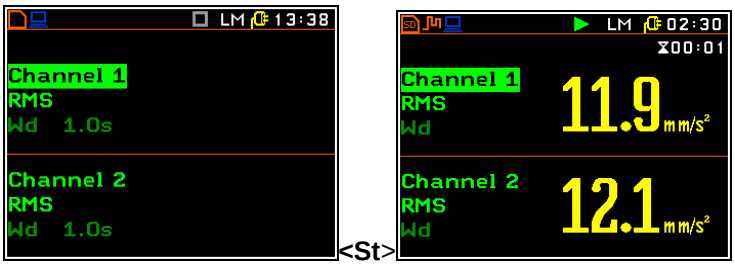
To switch the power on the user should press the **<Alt>** and **<Start/Stop>** push-buttons at the same time. The instrument goes the self-test routine after switching on (displaying the manufacturer and the name of the instrument) and then it enters the **Select Setup** window. This window enables the user to select the predefined setup for specific measurements. To ignore the selection press the **<Esc>** push-button.

After selecting or skipping the predefined setup the unit has to warm-up

for one minute and then the measurement screen with two results appears. Press **<ESC>** to bypass the warm up time and go straight to the measurement start if required.

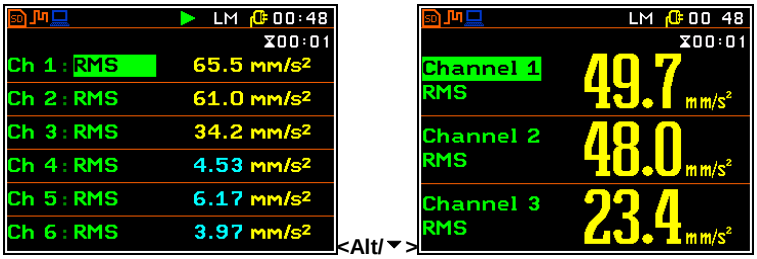
Starting measurement

To start a measurement the user has to press the **<Start/Stop**> push-button. The result of the measurement is displayed with the unit of the measurement in so-called two profile mode. Two results mode is always available for most Functions of the instrument.



Presentation modes

The results of the measurements can be also presented in the **6 Channels** or **3 Profiles** modes. In these modes the results for six channels or three profiles are presented on the screen. The user can switch the presentation modes by means of the **<Alt>** and **<▲>**, **<▼>** push-buttons pressed simultaneously.



Default settings measurements:

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

- signal type: **Type: IEPE**;
- weighting filter in channels 1-6: **Filter: Wd**; **Wd**, **Wk**, **Wh**, **Wh**, **Wh**;
- type of the RMS detector: **1.0s**;
- dose meter: **1-3 Dosimeter: WBV**; **4-6 Dosimeter: HAV**.

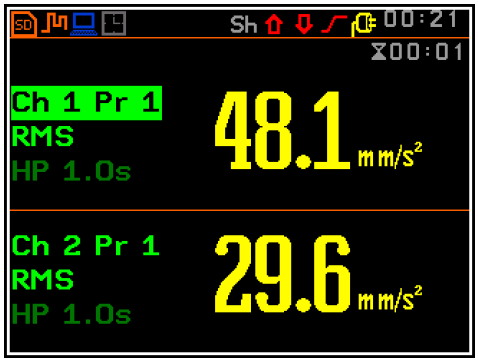
The user can change all the above mentioned settings using the **Measurement** list. The instrument remembers all made changes. Return to the default settings (set up by the manufacturer) is possible after the execution of the **Factory Settings** position available in the **Auxiliary Setup** list.

3.4. Icons description

Description of the instrument state

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

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



The meanings of the icons are as follows:

	“play” icon is displayed when the measurement is started		**“plug”** icon is displayed when the instrument is powered from the external source.
	“stop” icon is displayed when the measurement is stopped.		**“Internal memory”** icon is displayed when internal memory is assigned for file saving.
	“pause” icon is displayed when the measurement is paused.		“**SD Card**” icon is displayed when external micro SD card memory is assigned for file saving. Micro SD card is connected.
	“computer” icon is displayed when there is a successful USB connection with the PC.		**“Trigger Level +”** icon is displayed when the trigger condition is set up to “**Level+**”. The icon appears alternately with the “play” icon.
	“curve” icon is presented when the current measurement results are logged into the instrument’s logger file.		**“Trigger Level –“** icon is displayed when the trigger condition is set up to “**Level-**”.
	“arrow up” icon is displayed when overload appears.		**“Trigger Slope +”** icon is displayed when the trigger condition is set up to “**Slope+**”.
	“arrow down” icon is displayed when under-range appears.		**“Trigger Slope –“** icon is displayed when the trigger condition is set up to “**Slope-**”
	“tone” icon is displayed during wave recording and event recording.		**“Alt”** icon is displayed when the **<Alt>** push-button is pressed.
	“clock” icon is displayed when timer is **On**. Is active when the instrument is waiting for the measurement start up. When the measurement start up is close, the icon changes its colour to green and starts to blink.		**“battery”** icon is displayed when the instrument is powered from the internal batteries. Icon corresponds to the status of the batteries (three, two, one or none vertical bars inside the icon). When voltage of batteries is too low, the icon becomes red.
	“Shift” icon is displayed when the **<Shift>** push-button is pressed.		“**contact force sensor**” icon is displayed when SV 105AF with force sensor is connected. In case force sensor readouts from any of the connected SV 105AF go below 0 N it will change colour to yellow and in case within the last 30 s the readouts were below 0 N for more than 15 s it will change to red, alerting on possible bad calibration or hand strap loose mounting.

3.5. Memory organisation

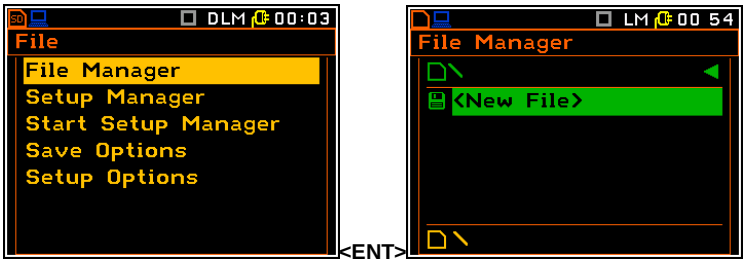
All available measurement results as well as measurement and device settings can be stored in the internal FLASH type memory of the instrument (16 MB) or in the external Memory (**micro SD Card**). Logger, wave and event results can be saved only in the external micro SD Memory.

The **SD Card** external memory is activated automatically after insertion of the card. The **SD Card** memory is organised as standard memory with directories and sub-directories. It is possible to create and to delete

the directory.

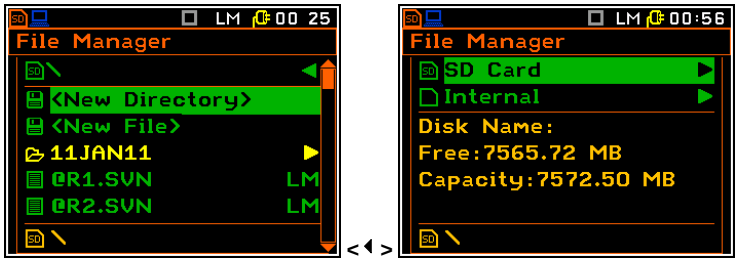
The content of each memory type can be checked with the help of the **File Manager** or **Setup Manager** function of the **File** menu.

The **File Manager** is used for checking the contents of the memory and for operating on result and logger files such as: open, delete, copy, move, rename, create new files or catalogues and display file and catalogue information.



Memory selection

To change the memory type one should press the <◄> push-button in the **File Manager** window then select the memory type by means of the <▲>, <▼> push-buttons and finally press <►>.



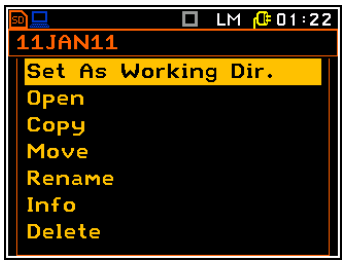
The files are saved in the Memory and in the catalogue which was set up as the working directory. The working Memory type is displayed as the icon in the left position of the icon line.

"Internal" memory icon is displayed when internal memory was assigned for file saving.

"SD Card" icon is displayed when external micro SD card memory was assigned for file saving. The micro SD card needs to be inserted.

The working directory is described in the top line of the **File Manager** window.

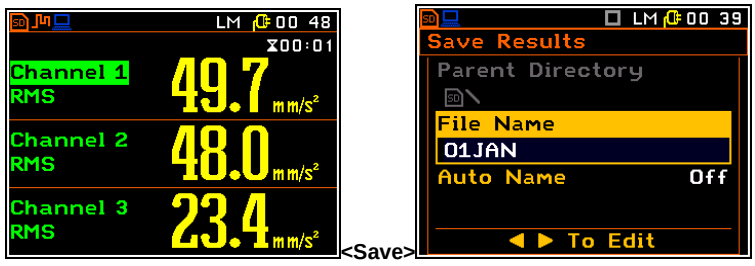
To change the working directory and/or working memory the user should select the Memory type and in case of the **micro SD Card** the desired directory and press the **<ENTER>** push-button. Then in the opened window with the command list to select the **Set Working Directory** position and press the **<ENTER>** push-button again. The icon on the upper line and the directory path on the bottom line will be changed accordingly. The same method is applied for changing directory for **micro SD Card** memory.



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

After pressing the **<Save>** push-button the **Save Results** window appears.

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

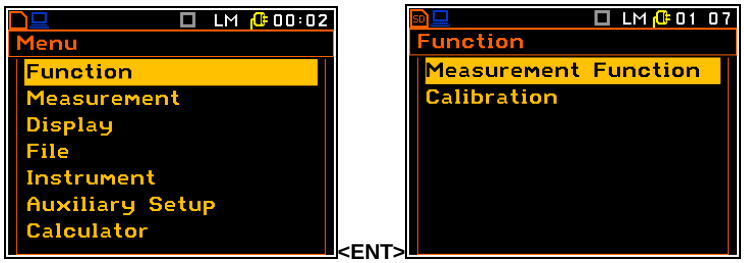


The measurement configuration Setup files can also be stored by means of the **<S/P>** push-button and by

creating the **<New File>** in the **Setup Manager** list. The logger, wave and event files are created automatically in the assigned directory on the external memory drive.

4. FUNCTIONS OF THE INSTRUMENT – Function

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



The **Function** list consists of:

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

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

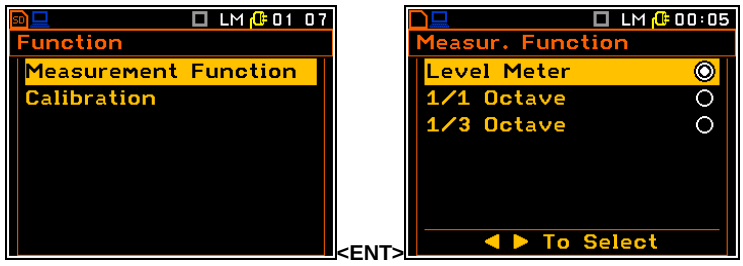
4.1. Measurement functions of the instrument - Measurement Function

The main function of the instrument is the measurement of broad band Vibration level (**Level Meter**) meeting the ISO 8041:2005 standard. The instrument can also be used for medium to long-term vibration monitoring using the huge capacity data logger in which all the measurement results are stored.

The user may also use 1/1 and 1/3 real time octave band analysis functions. These functions broaden the main Level Meter functions of the instrument, because 1/1 and 1/3 octave analysis is performed together with all calculations of Level Meter functions.

In all the above functions it is additionally possible to perform vibration dose measurements. Dose parameters are setting up in **HAV/WBV Dosimeter** window (path: <Menu>/ Measurement).

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



The type of measurement function and the measurement mode is displayed at the upper line of the screen:

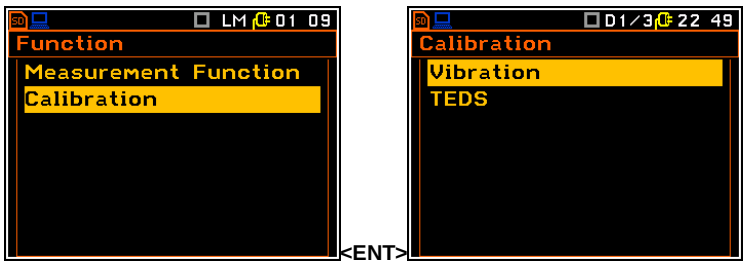
- ***LM***	***Level Meter***,	- ***DLM***	***Dose & Level Meter***,
- ***1/1***	***1/1 Octave***,	- ***D1/1***	***Dose & 1/1 Octave***,
- ***1/3***	***1/3 Octave***,	- ***D1/3***	***Dose & 1/3 Octave***.

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

Notice: *It is not possible to change the measurement function during a measurement run. In this case the instrument displays for about 3 seconds the text:* ***"Measurement in Progress"****. In order to change the mode of the instrument the current measurement in progress must be finished!*

4.2. Instrument's calibration – Calibration

The instrument is factory calibrated with the supplied accelerometers. In case of using other transducers calibration of the measurement channels should be performed by the user. Periodic calibration of standard accelerometers is also required. In order to select the calibration function the user has to enter the **Calibration** sub-list.

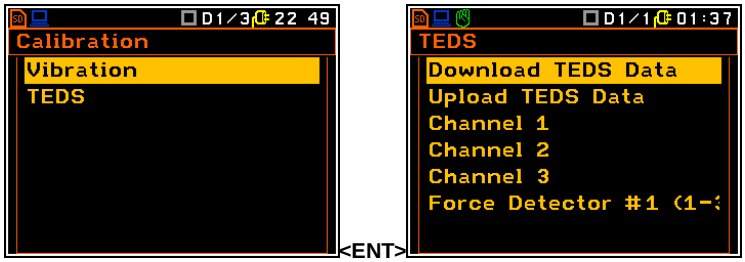


The **Calibration** list consists of two positions: **Vibration** and **TEDS**. In case SV 105AF transducer is used, also **Force** option will be available.

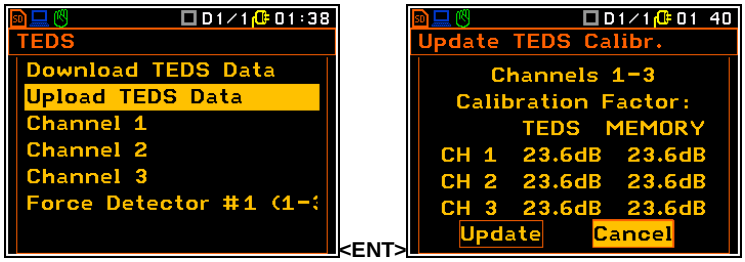
4.2.1. Downloading and uploading TEDS data – TEDS

If an accelerometer with new TEDS data is connected during switching the instrument on the TEDS data are downloaded automatically. TEDS data usually include: serial number, manufacturer name, calibration factor, etc.

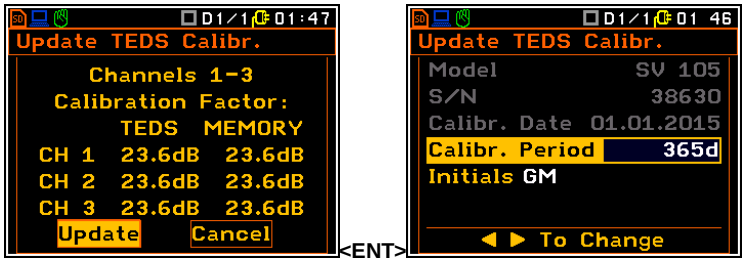
The **TEDS** position enables the user to **Download TEDS Data**, when the accelerometer is connected during instrument's working session. It enables also to **Upload TEDS Data** from the instrument to the accelerometer's TEDS memory - calibration results, performed by user.



After entering the **Upload TEDS Data** option the instrument will show a table of calibration factors stored in transducer's memory (**TEDS**) and calibration factors in instrument's memory (**MEMORY**), accordingly with last calibration performed or TEDS data download. The user may **Update** calibration factors in transducer's memory or **Cancel** TEDS data upload.

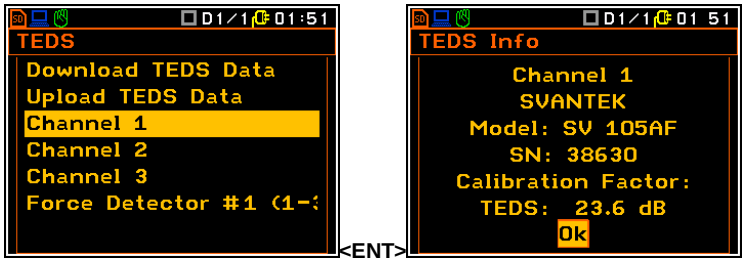


When updating TEDS with calibration factor, it will be possible to provide additional information on the **Calibration Period** and **Initials** of the person responsible for the calibration. Press the **<ENTER>** push-button to finally confirm TEDS upload or the **<ESC>** push-button to cancel the process.

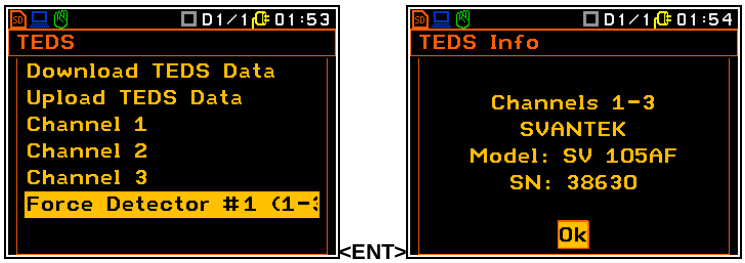


Upon entering **Channel #** menu option, the instrument will display information on identification and calibration factor of the transducer. Press the **<ENTER>** push-button to close the view.

(**Загрузка данных TEDS**).

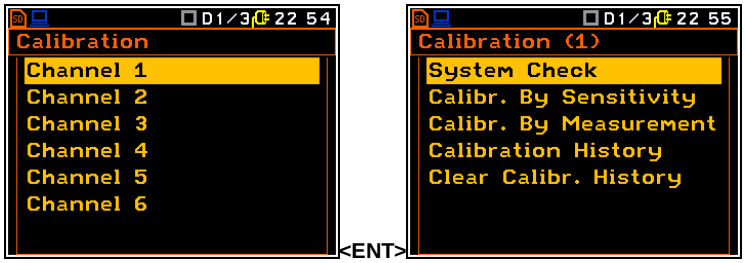


In case SV 105AF is used, an additional entry will be available in the view: **Force Detector** with following **TEDS Info** sub-view.



4.2.2. Calibration of the instrument channels – Channel x

The **Channel x** sub-list appear after entering the **Vibration** option in **Calibration** menu. It consists of four positions: **Calibr. By Sensitivity**, **Calibr. By Measurement**, which are used to perform the calibration, **Calibration History** used for checking the parameters of the previous calibrations and **Clear Calibr. History** to delete previous calibration information.



Notice: *The calibration factor is always added to the results in the **Level Meter**, **1/1 Octave**, **1/3 Octave**, **FFT** modes.*

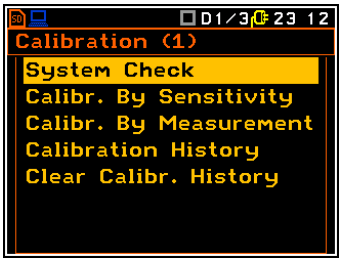
Notice: *The calibration level and the calibration result are expressed in different units depending on the settings of the instrument. The metric or non-metric Vibration units are set in the **Vibration Units** window (path: <Menu> / Auxiliary Setup / Vibration Units). Additionally, the linear or logarithmic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

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

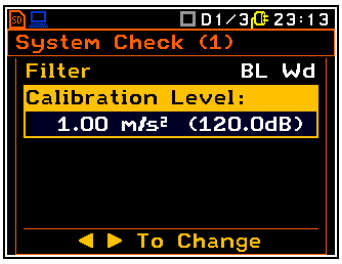
4.2.3. In-situ System Check

ISO 8041 standard advises users to perform in-situ checks of measurement instrumentation. Checking should be carried out immediately before and after measurements are made.

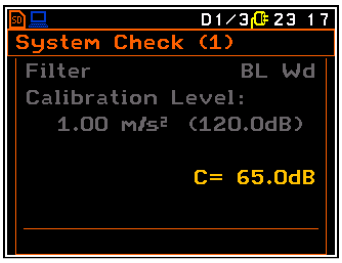
1. Select **System Check** from **Calibration** sub-list and press the **<ENTER>** push-button.



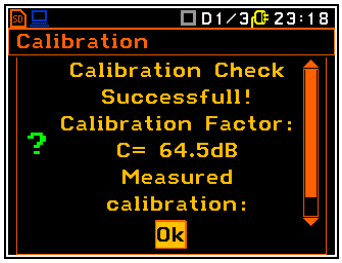
2. Select appropriate filter: for hand-arm transducer – **BL Wh**, for whole-body transducer – **BL Wk** or equivalent.
3. Select the calibrator signal level.
4. Attach the vibration calibrator to the instrument's accelerometer.
5. Switch on the calibrator and wait approximately 30 seconds before starting the system check measurement.
6. Start the calibration measurement by pressing the **<Start/Stop>** push-button.

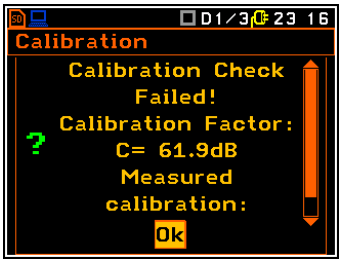


The measurement starts after 5 seconds delay. The system check measurement time is also predefined to 5 seconds. During the calibration period the **<ESC>** and **<Pause>** push-buttons do not operate but it is possible to stop the measurement using the **<Start/Stop>** push-button. Waiting for the calibration measurement to begin, a **Delay** is counted down.



Measurement results in relationship with calibrator level will be compared against current calibration factor and the instrument will assess whether the system check was successful or failed, displaying relevant message together with current calibration factor and measured calibration.





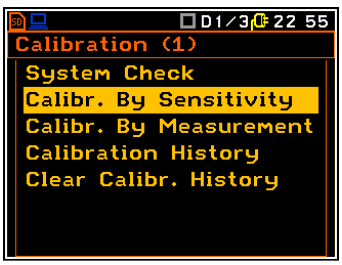
System check is considered successful in case its result is not more than 2 dB different than the current calibration factor.

Press **<ENTER>** to exit System Check.

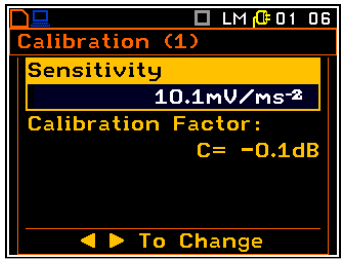
4.2.4. Calibration by transducer's sensitivity – Calibr. By Sensitivity

Calibration by introducing the accelerometer's individual sensitivity can be performed in the following way:

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

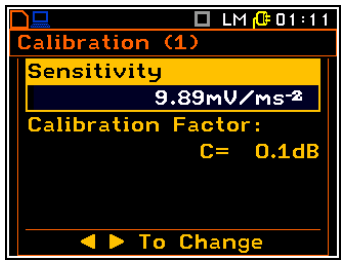


2. Set the sensitivity of the accelerometer using information taken from its calibration certificate using the **< ▲ >, < ▶ >** push-buttons (or combination of the **<Shift>** and **< ▲ >, < ▶ >** push-buttons).



The calibration factor is calculated, after pressing the **< ▲ >, < ▶ >** push-buttons, in the relation to 10.0 mV / ms^{-2}. For the sensitivity of the accelerometer higher than 10.0 mV / ms^{-2} the calibration factor will always be negative.

For the sensitivity of the accelerometer lower than 10.0 mV / ms^{-2} the calibration factor will always be positive.



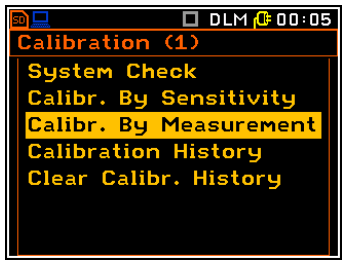
The lowest applicable value of the sensitivity to be introduced is equal to 10.0 µV / ms^{-2} (it conforms to the calibration factor equal to 60.0 dB) and the highest one is equal to 10.0 V / ms^{-2} (calibration factor equal to -60.0 dB).

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

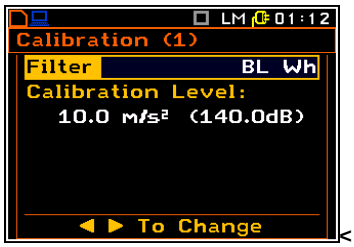
4.2.5. Calibration by measurement – Calibr. By Measurement

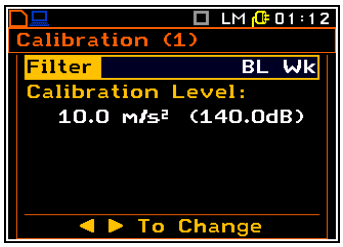
Calibration by actual measurements can be done in the following way:

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

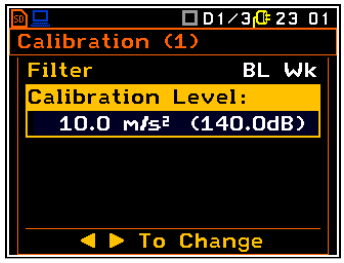


2. Select required filter: for hand-arm transducer – **BL Wh**, for whole-body transducer – **BL Wk** or equivalent.

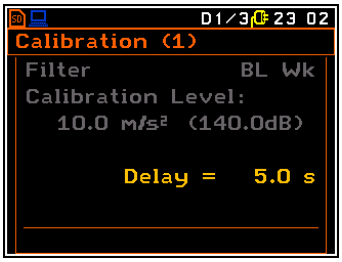


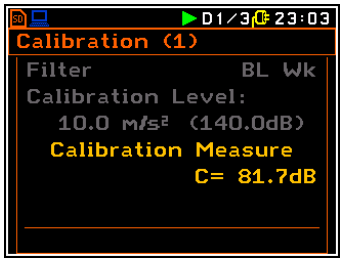


3. Select the calibrator signal level.
4. Attach the vibration calibrator to the instrument's accelerometer.
5. Switch on the calibrator and wait approximately 30 seconds before starting the calibration measurement.
6. Start the calibration measurement by pressing the **<Start/Stop>** push-button.



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



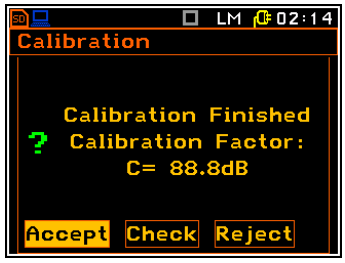


It is recommended to repeat the calibration measurement a few times to ensure the integrity of the calibration. The obtained results should be almost identical (with ±0.1 dB difference). Some possible reasons for unstable results are as follows:

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

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

7. Select **Accept** by pressing **<ENTER>** in order to store the calibration measurement result.

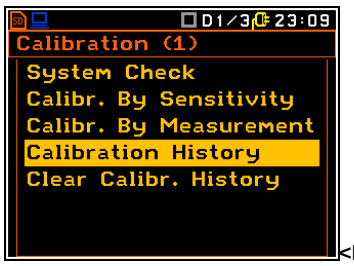


Select **Check** in order to run sample measurement simulating usage of the newly calculated calibration factor, assuming that still the same excitation level is applied to the transducer. In case calibration factor is correct, the measured level should be in proper correspondence with calibrator level.

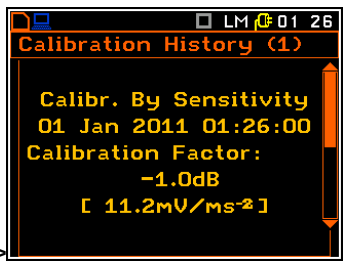
Select **Reject** in order to cancel calibration procedure.

4.2.6. History of the calibrations – Calibration History

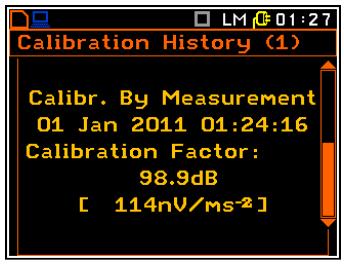
The **Calibration History** window displays up to ten last calibration records.



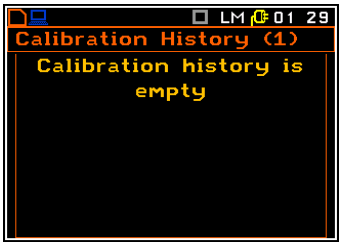
<ENT>



In order to review the calibration record, the user has to use the **<▲>**, **<▼>** push-buttons. The opened window will contain the date and time of the performed calibration measurement, the way the calibration was done (**Calibr. By Measurement** or **Calibr. By Sensitivity**) and the calibration factor (**Calibration Factor**) that was obtained.

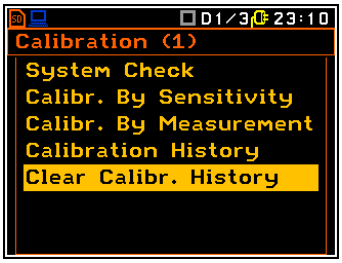


If calibration measurements were not performed the **Calibration History** window does not contain any records. The content of this window is cleared after the **Clear Calibr. History** operation.



4.2.7. Clear calibration records - Clear Calibr. History

The user can clear all stored calibrations records. In order to do this the user has to choose the position **Clear Calibr. History** in the **Calibration** sub-list and press **<ENTER>** to perform this operation.



The instrument requests confirmation of the operation. The next pressing of the **<ENTER>** push-button, when the **No** option is selected closes the window and returns the instrument to the **Calibration** sub-list. If **Yes** is selected the pressing **<ENTER>** will delete the history and return the instrument to the previous menu.

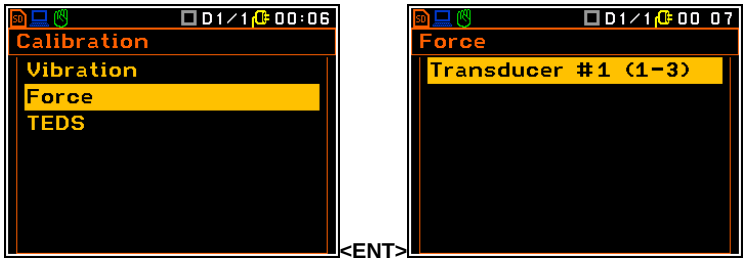
After **Clear Calibr. History** operation has been performed the **Calibration History** window does not contain any more records.

4.2.8. Contact force sensor calibration - Force

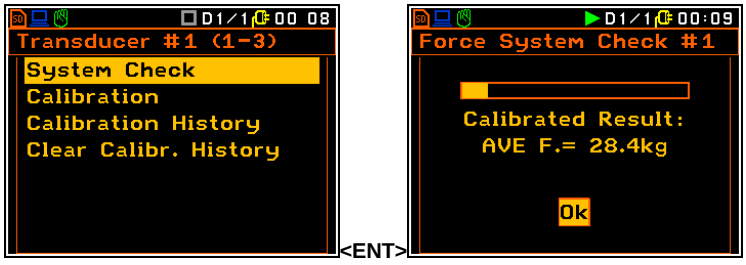
In case SV 105AF transducer is connected, **Force** calibration option becomes available. After entering it, the instrument will present a list of connected transducers with contact force sensors.

A typical bathroom scale is sufficient for contact force sensor calibration.

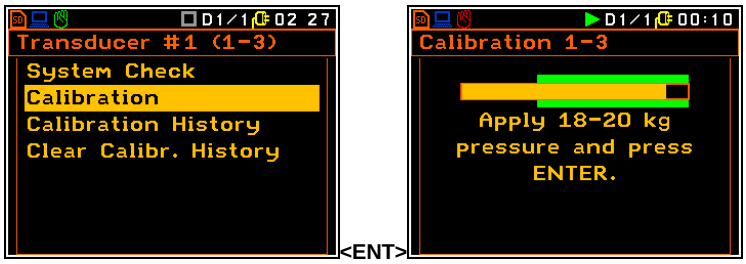
This calibration should be performed every time the hand straps are changed.



System Check allows user to compare force level detected by SV 105AF against the indication on the scale it is pressed against. Force level detected is expressed in kg. In case the difference between force detected by the instrument and the one indicated by the scale at the same time is significant, it is advised to perform force sensor calibration.

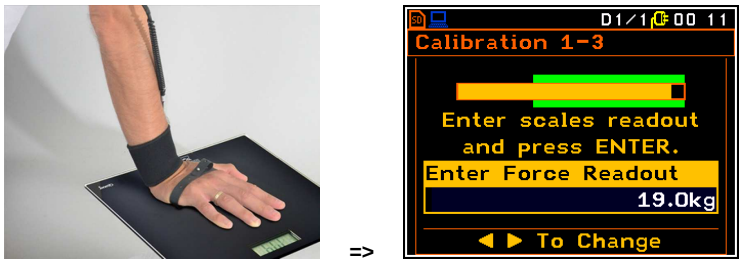


After entering the **Calibration** option, user will be asked to press SV 105AF sensor with hand straps against a scale so that this scale indicates between 18 and 20 kg.

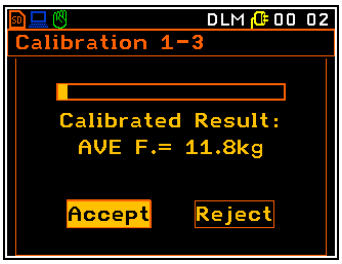


Please press the **<ENTER>** push-button when the scale indicates a value within the range that instrument asked for. Next please enter this value indicated by the scale in the Enter Force Readout box. Please press the **<ENTER>** push-button to proceed.

In the next steps, instrument will ask to apply **9-11 kg pressure** and **no pressure** (please put the sensor flat on a surface). Please follow instructions displayed.

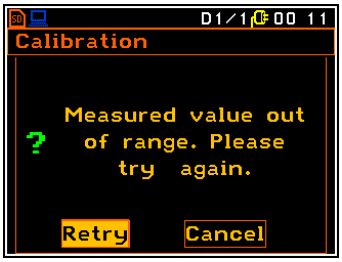


At the end of the contact force sensor calibration procedure the instrument will switch into displaying the current force applied to the sensor, similarly as in **System Check** mode. Please compare displayed values against those indicated by the scale used for calibration and **Accept** or **Reject** new calibration of the contact force sensor. Please note that contact force sensor's purpose is to detect the occurrence of contact between a hand and a tool and for that purpose it does not need to follow scale's indications perfectly.

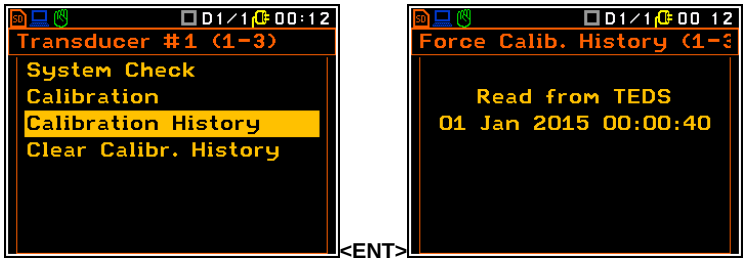


In case the instrument cannot continue with contact force detection sensor, it displays the following message. It may occur e.g. in the second step (9-11 kg) in case the readings from sensor indicate higher pressure than recorded in the first step (18-20 kg).

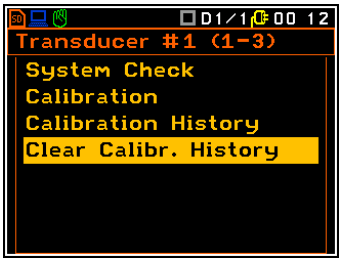
Choose Retry in order to repeat current step of the procedure or Cancel to exit.



After entering the **Calibration History**, it will be possible to browse list of entries on calibrations performed or read from TEDS with the **<▲>**, **<▼>** push-buttons. Please press the **<ENTER>** or the **<ESC>** push-button to exist the list.



The user can clear all stored calibrations records of contact force sensor. In order to do this the user has to choose the position **Clear Calibr. History** and press **<ENTER>** to perform this operation.

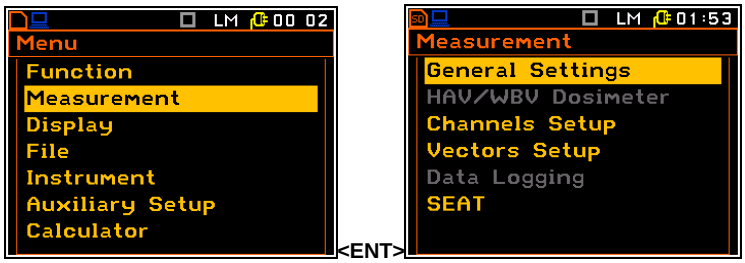


The instrument requests confirmation of the operation. The next pressing of the **<ENTER>** push-button, when the **No** option is selected closes the window. If **Yes** is selected the pressing **<ENTER>** will delete the history and return the instrument to the previous menu.

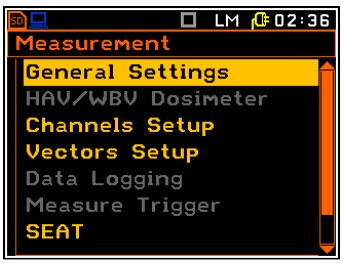
After **Clear Calibr. History** operation has been performed the **Calibration History** window does not contain any more records.

5. MEASUREMENT PARAMETERS SETTING – Measurement

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

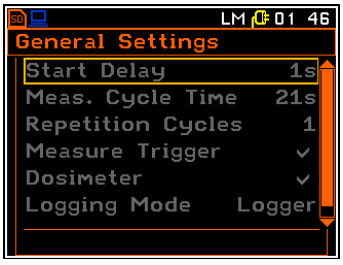


The **Measurement** list and some of sub list (**General Settings** and **Data Logging**) contents depend on **Instrument Mode** selection from menu **Auxiliary Setup**: **Simple Mode** or **Advanced Mode**. In **Advanced Mode** some additional functions like triggering, markers, event and wave recording appear.



The **Measurement** list consists of:

General Settings	enables the user to select the general measurement parameters for all channels;
HAV/WBV Dosimeter	enables the user to set up the parameters for vibration dose measurements;
Channels Setup	enables the user to program the individual parameters for channels;
Vectors Setup	enables the user to program the individual parameters for vectors calculations;
Data Logging	enables the user to program the logger functions – measurements logging and signal recording;
Measure Trigger	enables the user to set the parameters of measure trigger. Position appears only in the advanced instrument mode;
SEAT	enables the user to program the measurements with the use of special SEAT accelerometer.

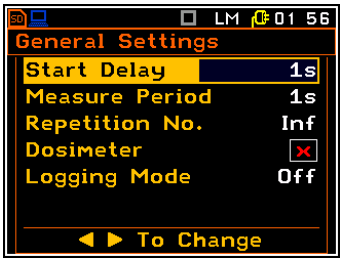


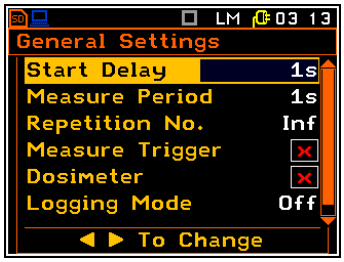
Notice: *Any parameter in the lists of the* ***Measurement*** *menu can be changed only when the instrument is not making a measurement. The parameters are displayed with different colour and any marker movement is impossible. The blinking "▶" icon in the top line indicates that the instrument is performing the measurements.*

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

5.1 Selection of measurement parameters - General Settings

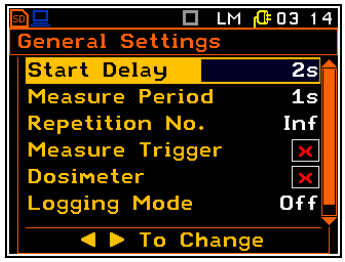
The **General Settings** list consists of the following parameters: the delay of the start of measurements (**Start Delay**), the integration period / measurement run time (**Meas. Period**) and the repetition of the measurement cycles (**Repetition No.**). In the **Advanced Mode** (*path: <Menu> / Auxiliary Setup / Instrument Mode*) there are three additional parameters: **Measure Trigger**, **Logging Mode** and **Event Recording**.





Setting time delay before the start of measurements

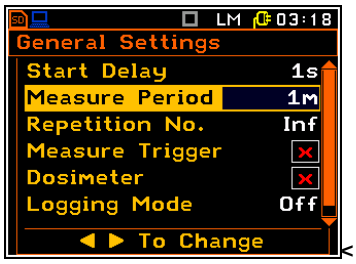
The **Start Delay** parameter defines the delay period from the moment the **<Start/Stop>** push-button is pressed to the start of the actual measurement (the digital filters of the instrument constantly analyse the input signal even when the measurement is stopped). This delay period can be set from **0 second** to **60 seconds** (with 1 second step by means of the **<◀ >**, **<▶>** push-buttons and with 10 seconds step with the **<◀ >**, **<▶>** push-buttons pressed together with **<Shift>**).

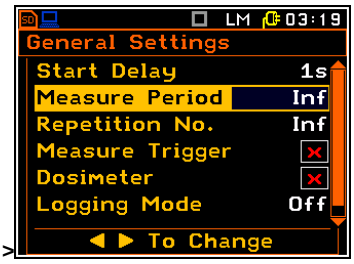


Notice: *The minimum delay period is equal to 0 second. In the* ***Calibration*** *mode, the delay period is always equal to 5 seconds.*

Setting the integration period

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





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

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

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

- from **1 h** to **24 h** (with **1 hour** or **10 hours** step).

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

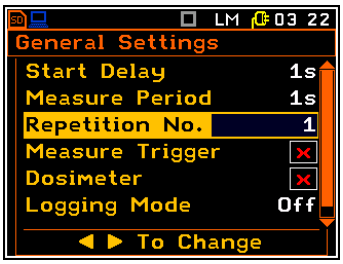
Additionally, the predefined periods: **1 m**, **5 m**, **15 m**, **1 h**, **8 h**, **24 h** and **Inf**, which are enumerated in the standards, are also available (by pressing the **<◀ >** push-button or **<◀ >** with **<Shift>**; these values are placed in the sequence mentioned above on the left in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

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

If the user would like to switch on the **Auto Save** option *(path: Menu / File / Save Options)* the integration period value has to be greater or equal than 10 seconds. When the **Auto Save** option was switched on and a just entered integration period value is less than 10 seconds the **Auto Save** option switches off and the message "**Integration Period Too Short / Autosave Not Available**" appears on the display.

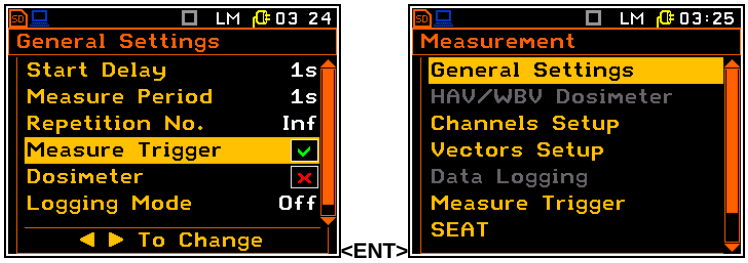
Setting the number of repetition of measurement cycles

The **Repetition No.** parameter defines the number of cycles (with the measurement period defined by **Meas. Period**) to be performed by the instrument. The **Repetition No.** number values are within the limits [1, 1000].



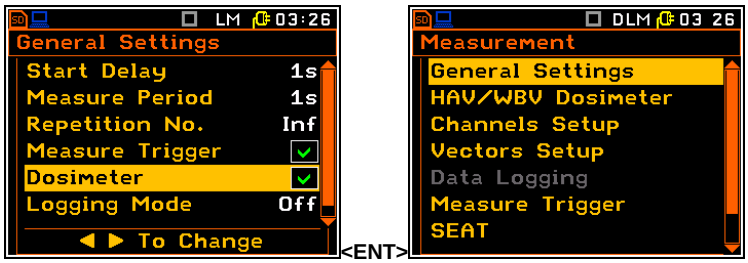
Activation of the measure trigger

The **Measure Trigger** position activates or deactivates the measure trigger function. This position doesn't appear in the **Simple Mode** (*path: <Menu> / Auxiliary Setup / Instrument Mode*). If the **Measure Trigger** function is switched off, then the **Measure Trigger** position in the **Measurement** list will be not active.



Activation of the dose meter function

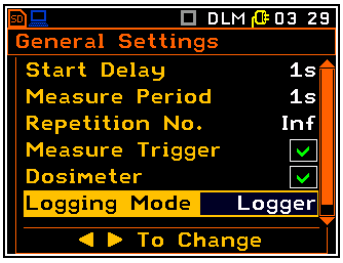
The **Dosimeter** position activates or deactivates the dose meter function. If the **Dosimeter** function is switched on, then all channels will be assigned for the whole-body (**WBV**) or hand-arm (**HAV**) dose measurement for ease of operation by the user.



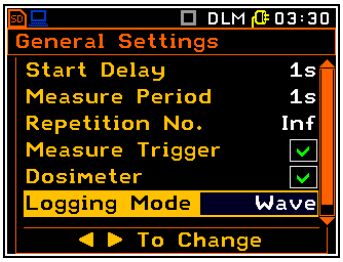
Dosimeter parameters can be setup in the **HAV/WBV Dosimeter** window, opened from the **Measurement** list. If the **Dosimeter** function is switched on, then the **HAV/WBV Dosimeter** position in the **Measurement** list will be active and **DLM**, **D1/1** or **D1/3** function abbreviations appear in the top line of the display.

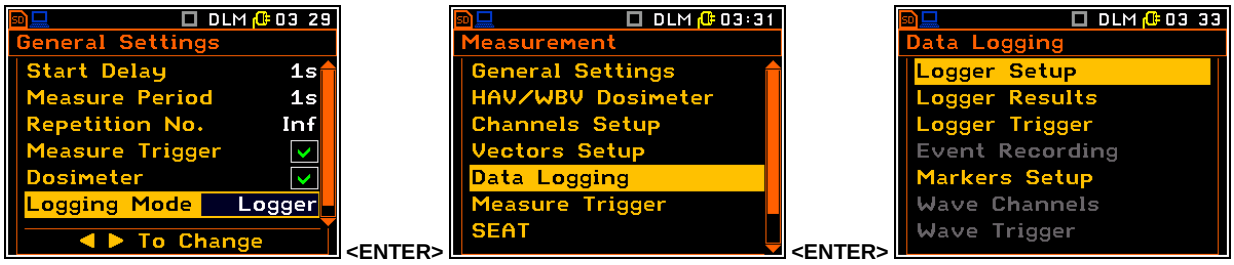
Setting the Logger mode

The **Logger Mode** position enables the user to deactivate the logger function (**Off**) or to activate this function by choosing the logger mode (**Logger** or **Wave**). The **Wave** option doesn't appear in the **Simple Mode** (*path: <Menu> / Auxiliary Setup / Instrument Mode*). In case the **Logger** is selected the time history of regular results will be saved in the logger file.

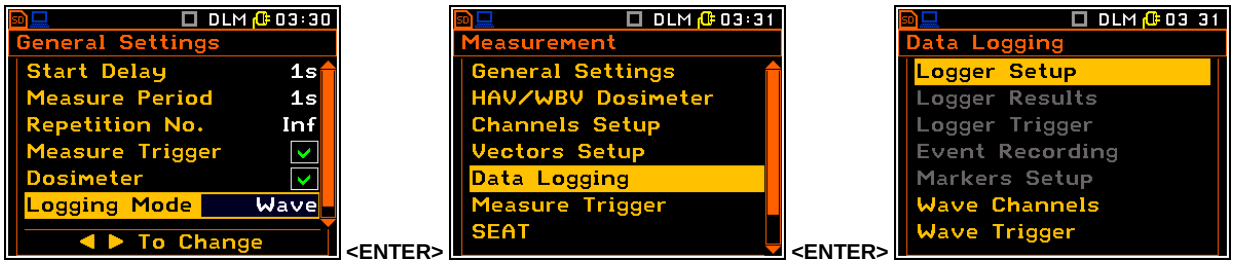


In case the **Wave** option is selected the time wave signals for the channels, selected in the window **Wave Channels**, will be recorded in the logger file. The file name is defined in the **Logger Setup** window and for history results will have predefined name **&LOG#**, and for wave recording - **&REC#**. Depending on what parameter of **Logger Mode** was chosen some positions in the **Measurement** and **Data Logging** lists are not active.



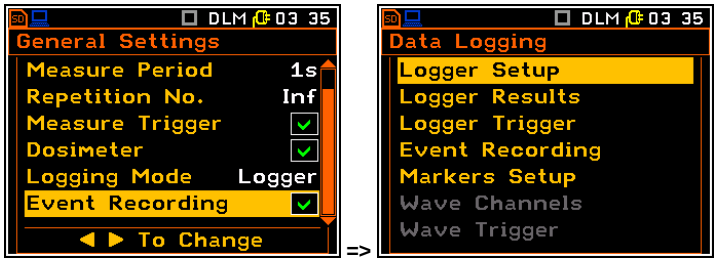


Data Logging screen view when Logger mode is switched on



Data Logging screen view when Wave mode is switched on

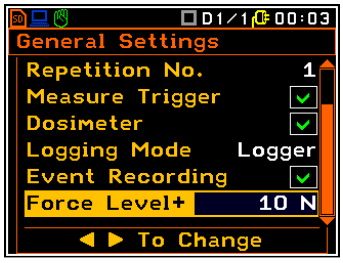
Activation of the event recording function



The **Event Recording** position enables the user to activate the event recording function. This position doesn't appear in the **Simple Mode** (*path: <Menu> / Auxiliary Setup / Instrument Mode*).

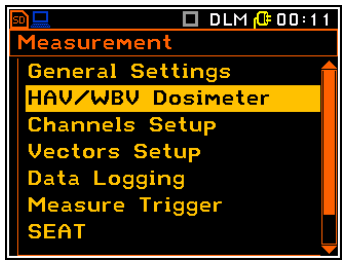
If the **Event Recording** function is switched off, then the **Event Recording** position in the **Data Logging** list will be not active.

In case the SV 105AF with contact force sensor is used, the **Force Level+** parameter is available. It allows to set the threshold above which the instrument will assume presence of contact force and account the time of contact with the tool. Please adjust the threshold by pressing the **<◀>** or **<▶>** push-buttons. **Level+** time will be available during measurement in Dosimeter presentation mode.



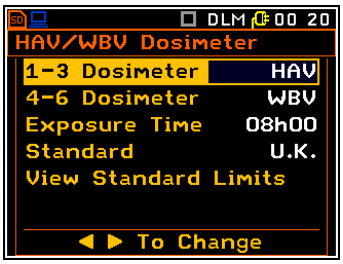
5.2 Setting the parameters for dose measurements – HAV/WBV Dosimeter

The **HAV/WBV Dosimeter** list is opened from the **Measurement** menu. This list enables the user to set up the parameters for vibration dose measurements, like: exposure period, type of measurement (whole body or hand arm), performed in channels 1-3 and 4-6, vibration action limits, used for some standards (**U.K.**, **Italy**, **Poland**, **France**, **Germany China**, **Brasil**), as well as specific limits, defined by the user (**User**).



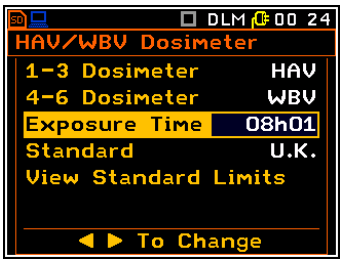
Setting the measurement type for channels 1-3 and 4-6

Positions **1-3 Dosimeter** and **4-6 Dosimeter** enable the user to set the desired type of the measurement, performed with the use of channels 1,2,3 and 4,5,6 – hand-arm (**HAV**) or whole-body (**WBV**) vibration.



Setting the exposure time

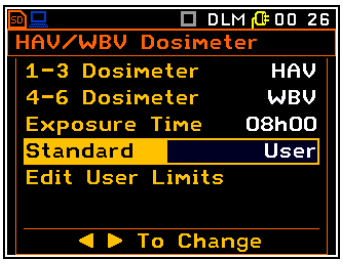
The **Exposure Time** enables the user to set the desired value of the exposure time that is used for the calculation of the **HAV/WBV Dose** results. The **Exposure Time** values are within the range [**00h01**, **24h00**].



Setting the standard for dose measurements

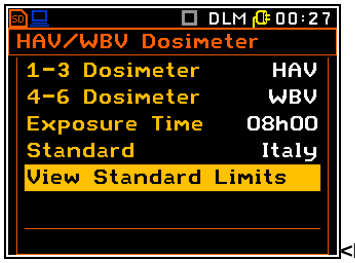
The **Standard** position enables the user to set the standards for the measurements of the **HAV/WBV Dosimeter**. The available values of this position are **U.K.**, **Italy**, **Poland**, **France**, **Germany** and **User**.

Depending of settings in the position **Standard** it is possible to view (**U.K.**, **Italy**, **Poland**, **French** and **Germany**) or edit (**User**) limits for dose calculation.

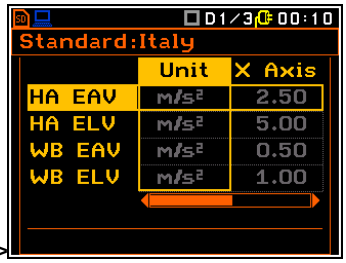


View or editing of the limits for dose calculation

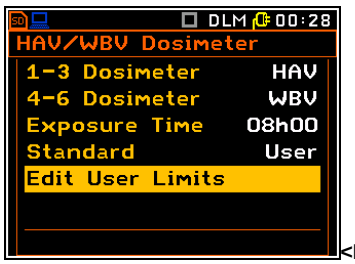
The **View Standard Limits** position opens the window with the coefficients for the selected standard for the given axis. Use the <◀>, <▶> push-buttons to browse displayed axis..



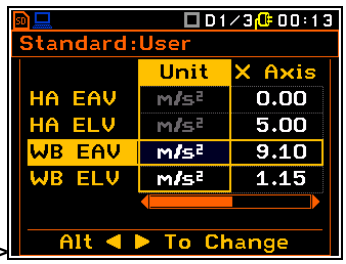
<ENT>



When **User** is selected in the **Standard** position then the **Edit User Limits** position appears on the screen where the user can set up its own specific coefficients for each axis.

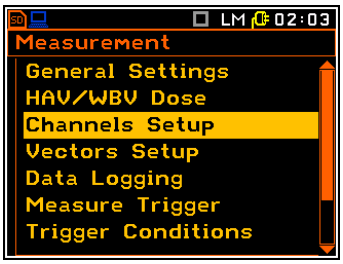


<ENT>



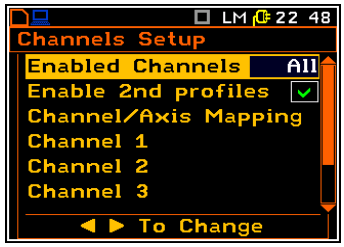
5.3 Setting parameters in a channels – Channels Setup

The **Channels Setup** position enables the user to assign the axis of three-axial accelerometer for the specific channels, switch on or off channels or second profiles, and to program the channel's parameters: transducer type (**Type**) and weighting filter (**Filter**). The measurement range cannot be changed and is displayed for information purpose only. The **Channels Setup** list is opened from the **Measurement** list.



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

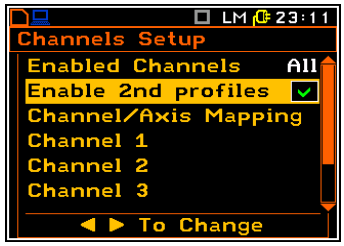
Activation of channels



The first two positions enable one to switch on or off some channels and the second profile from the calculation process.

In the **Enabled Channels** the user may select **All**, **1-3** or **4-6** channels to be active during measurement. Other channels will be disabled and will not be displayed.

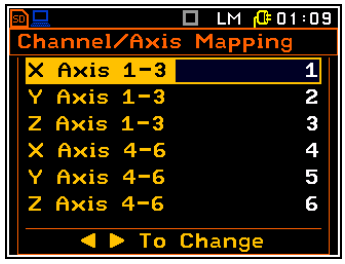
Activation of second profiles



In the **Enabled 2nd profiles** position the user may switch on or off result calculations for the second profiles.

If second profiles are switched off no calculations will be performed and displayed in different presentation modes and all positions with settings for second profiles will be not active.

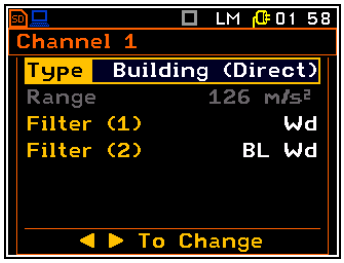
5.3.1 Assignment channels for the accelerometer axis - Channel/Axis Mapping

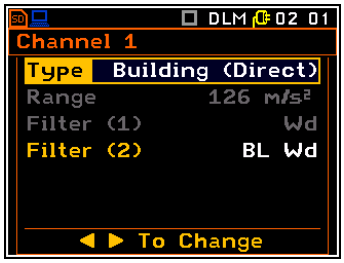


The **Channel/Axis Mapping** position enables the user to assign channels to the transducer's axis. The user can assign channels **1**,**2**,**3** to the axis X, Y, Z of the first transducer, connected to the Lemo compatible type ENB.0B.304 socket for **Channels 1–3** and channels **4**,**5**,**6** to the axis X, Y, Z of the second transducer, connected to the Lemo compatible type ENB.0B.304 socket for **Channels 4-6**.

If same channel is assigned to the more than one axis there will be error detected and the user will be prompted to reassign the channels.

5.3.2 Setting parameters for channels – Channel x

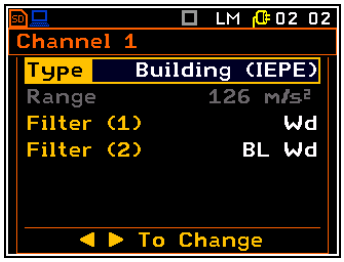




The **Channel x** positions enable one to set up or display parameters for the individual channel, like input type and filters for profiles.

If Dosimeter is active the first profile filter is set by default and it cannot be changed. When second profile is switched off the filter for second profile doesn't appear as parameter in the list.

Input type and range selection

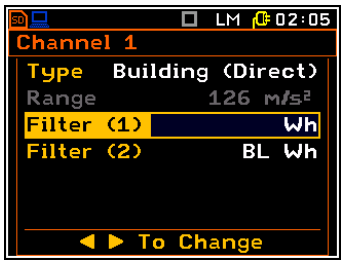


The following inputs are available: **Direct**, **IEPE, Building (Direct)** and **Building (IEPE)**.

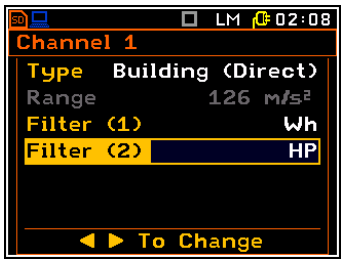
The **Range** value cannot be changed; it always depends on the filter type and calibration factor. If calibration factor is equal to zero the range is equal to **126 m/s²**.

Weighting filter selection

The following weighting filters are available for the first profile of the instrument: **KB**, **Wh**, **Wk**, **Wd**, **Wc**, **Wj**, **Wm**, **Wg**, **Wb**, **Wf** and **BL Wc**. The characteristics of the filters are given in App. D.



The set of filters for the second profile depends on the filter selected for the first profile. There are always available **HP** and **Vel3** filters for second profile with all combinations of filters for the first profile. Second available filter for profile 2 is one of the following: **BL Wh**, **BL Wk**, **BL Wd**, **BL Wc**, **BL Wj**, **BL Wm**, **BL Wg**, **BL Wb** and **BL Wf**; according to the rule – if **Wh** filter is selected in the profile 1 then apart from **HP** and **Vel3** only the **BL Wh** filter is available for profile 2. If **Wk** filter is selected in the profile 1 then apart from **HP** and **Vel3** only the **BL Wk** filter is available for profile 2. And so on for the other channels.



When **Dosimeter** function is active the filters for first profiles are predefined and depend on the type of dosimeter measurements for the channels – **WBV** or **HAV**.

If **WBV** measurements are performed in channels **1-3** or **4-6** the filters defined for channels are as follows:

Channel 1 or 4: **Wd**, Channel 2 or 5: **Wd**, Channel 3 or 6: **Wk**.

If **HAV** measurements are performed in channels **1-3** or **4-6** the filters defined for channels are as follows:

Channel 1 or 4: **Wh**, Channel 2 or 5: **Wh**, Channel 3 or 6: **Wh**.

If second profile is active during **Dosimeter** measurements, the filter can be **HP**, **Vel3** or one of: **BL Wd**, **BL Wk** or **BL Wh** depending on which filter was predefined for the first profile of the chosen channel, according to the rule described above.

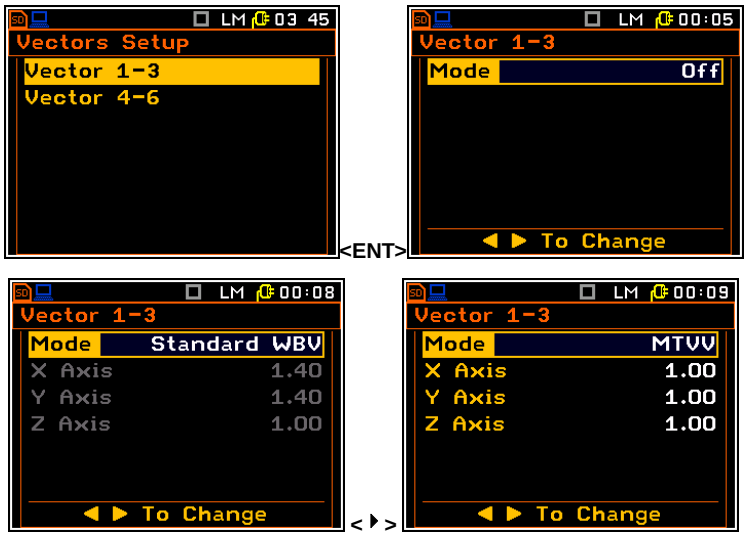
RMS detector

The only one **1.0s** RMS detectors is available in the instrument.

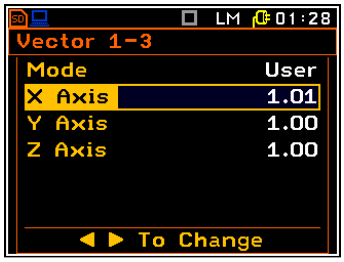
5.4 Setting the vector parameters – Vectors Setup

The **Vectors Setup** position enables the user to select the coefficients to calculate the vector for channels 1, 2, 3 and 4, 5, 6.

Vector is calculated based on different set of coefficients for three axis (X, Y, Z), which may be selected in the **Mode** position: for hand-arm measurements (**Standard H-A**), for whole body measurements (**Standard WBV**), for measurements with user defined coefficients (**User**), for MTVV (**MTVV**) and for PPV (**PPV**) measurements. For **Standard H-A** and **Standard WBV** modes coefficients are predefined. For the **User**, **MTVV** and **PPV** modes it is possible to define coefficients for vector calculation.



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



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

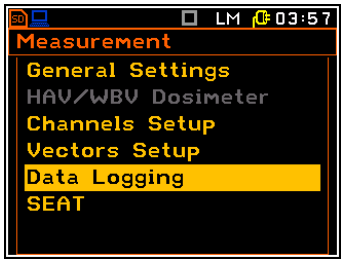
$$VECTOR = \sqrt{k_1^2 x_1^2 + k_2^2 x_2^2 + k_3^2 x_3^2}$$

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

5.5 Setting the data logging functionality – Data Logging

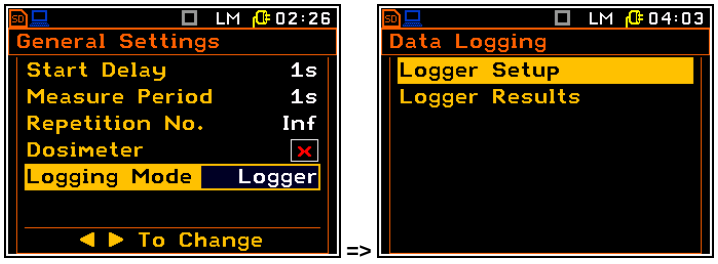
The **Data Logging** list enables the user to program the logger functions: the recording of the measurement, events and signal (wave) recording for all six channels.

The **Data Logging** list content depends on **Instrument Mode** selection from the **Auxiliary Setup** menu: **Simple Mode** or **Advanced Mode**. Some additional functions like triggering, markers, event and wave recording appear only in **Advanced Mode**.



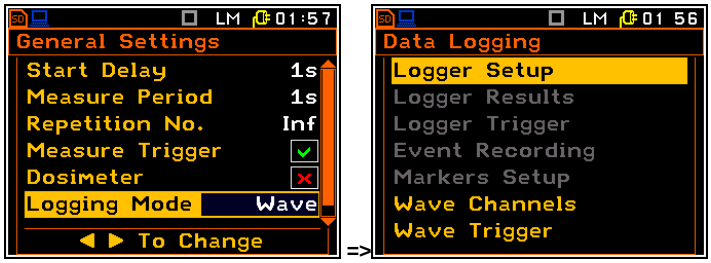
Depending on the selection of **Logging Mode** (**Logger** or **Wave**), set up in the **General Settings** list, the **Data Logging** window will have a different view.

This is an example of **Data Logging** window in **Simple Mode** and **Logging Mode** = **Logger**.



Wave recording is enabled only in the advanced instrument mode.

When **Wave** function is chosen for the **Logging Mode**, the **Data Logging** list consists of three active positions: **Logger Setup**, **Wave Channels** and **Wave Trigger**.



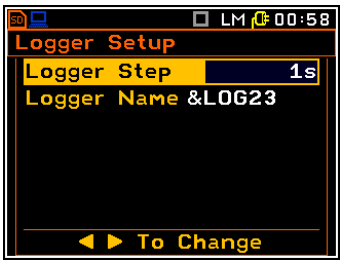
5.6 The results history logging

When the **Logger** function is chosen for the **Logging Mode**, the **Data Logging** list enables the user to program the history of results recording in the logger file.

Depending on the **Instrument Mode**, the **Data Logging** list consists of two positions in case of **Simple Mode**: **Logger Setup**, **Logger Results**; or the list consists of four to five active positions in the case of **Advanced Mode**: **Logger Setup**, **Logger Results**, **Logger Trigger**, **Event Recording** (which in turn is active when **Event Recording** position in the **General Settings** list is also active) and **Marker Setup**.

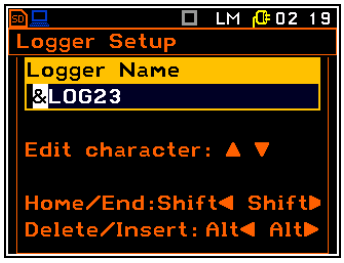
5.6.1 Data logger programming – Logger Setup

The **Logger Setup** list enables the user to edit the name of the logger file (history of results measurements or wave records) and to set other general parameters. Depending on what **Logging Mode** was selected (**Logger** or **Wave**) in the **General Settings** window the **Logger Setup** window has different view.



When **Logger** mode is selected the user may also define the interval of the data logging in a file (**Logger Step**). The **Logger Step** can be set from 100 milliseconds to 1 hour.

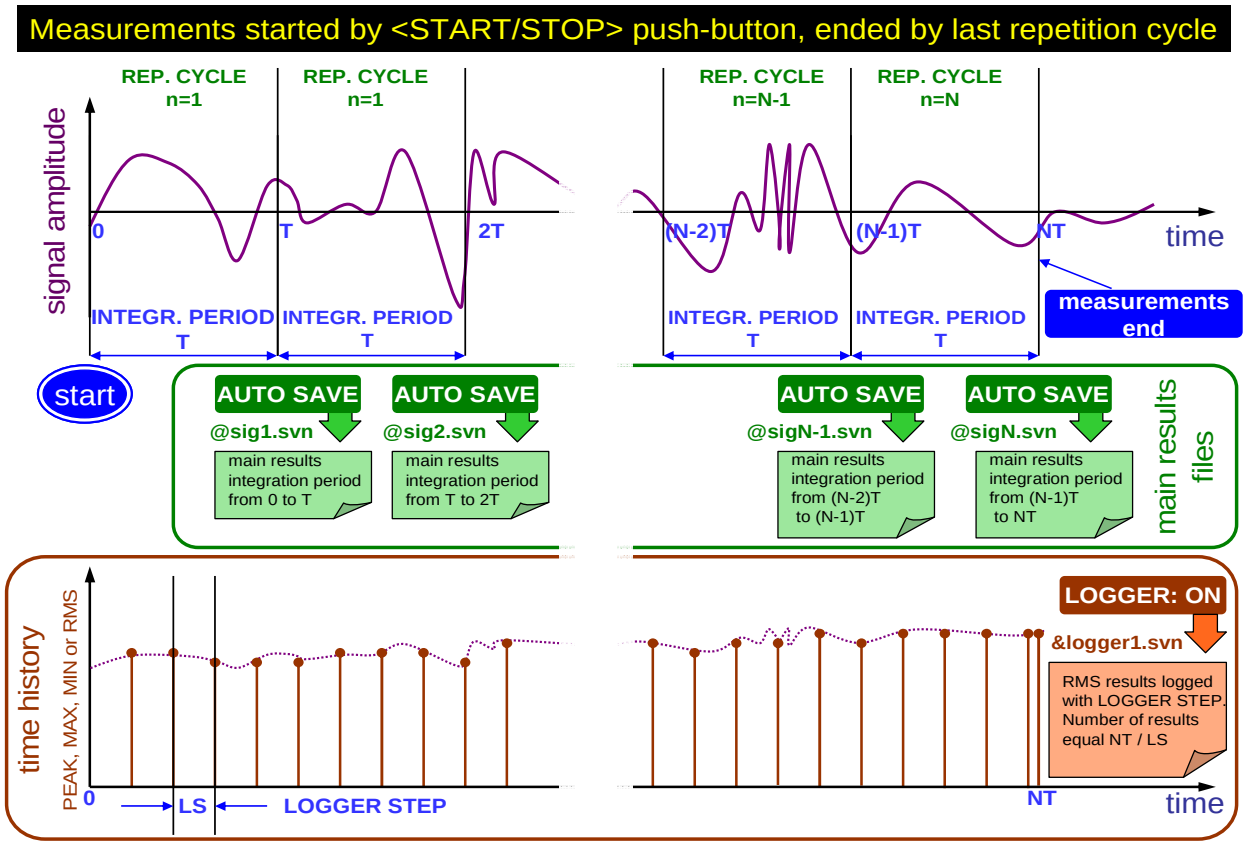
The **Logger Name** enables the user to name the logger file. The default name is **LOG#** for **Logger** files and **&REC#** for **Wave** files. The name can be up to eight characters long. After pressing the **<◀>**, **<▶>** push-buttons, the special window with text editor function is opened for editing.



The edited name is accepted and saved after pressing **<ENTER>**. The special warning is displayed in case a file with the edited name already exists in the memory. The instrument waits then for a reaction of the user (any push-button should be pressed except **<Shift>** or **<Alt>**).

The main measurement results (cf. App. B) are calculated in the period set on in the **Meas. Period** position. These results can be saved in the result files in the instrument or external memory. If **Meas. Period** is greater than 9 seconds, the saving can be done also by means of the **Auto Save** operation. If the **Repetition No.** is greater than one, the **Auto Save** operation will be performed after the period set on in the **Meas. Period** position. The name of the file with the main results is increased by one after each saving.

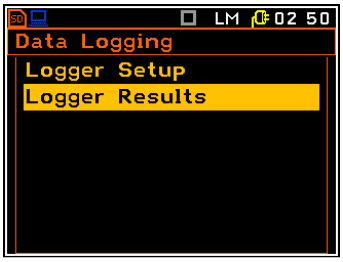
When **Logger Mode** is switched on (**On**), the partial measurement results are calculated in the period interval set on in the **Logger Step** position. Up to 60 results can be logged simultaneously from all channels and profiles of the instrument (**PEAK** / **P–P**/ **MAX** / **RMS** / **VDV**) and two vectors (**VEC13** and **VEC46**) with time step down to 100 ms. These results are saved in one logger file. The name of the file is set in the **Logger Name** position. The recording in the logger's memory is stopped after the period, which is equal to **Meas. Period** multiplied by **Repetition No.**, or after pressing the **<Start/Stop>** push-button or after stopping the measurements remotely.

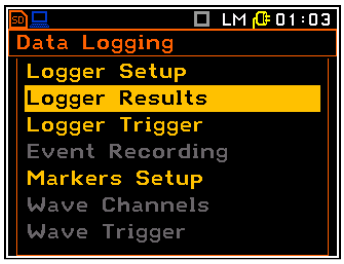


Relations between Measurement Cycle (Integration Period) and Logger Step

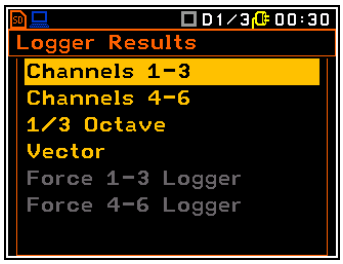
5.6.2 Results selection – Logger Results

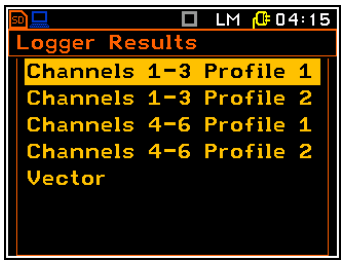
The **Logger Results** list enables the user to activate the results for all channels and profiles (**Channel x Profile x**) and for vectors (**Vector**) to be recorded in the logger file as time history.



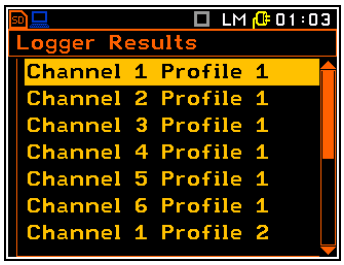


The view of the **Logger Results** list depends on the settings of the **Enabled Channels** and **Enabled 2nd profiles** parameters (*path: <Menu> / Measurement / Channels Setup*).



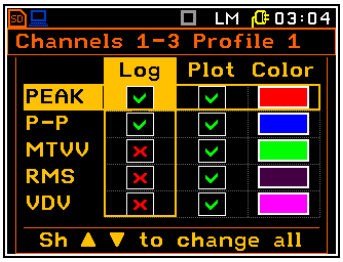


In **Advanced Mode** it is possible to define logger results for each channel and profile individually.



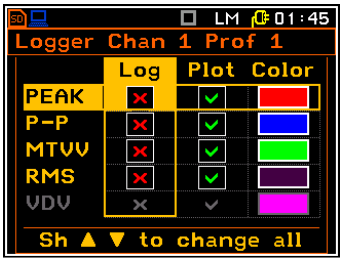
Selection results for channels and profiles

Depending on **Instrument Mode** and the **Enable 2nd profiles** parameter the user may activate the results for channels and profiles (**PEAK**, **P-P**, **MAX**, **RMS** and **VDV**), which will be recorded to the logger file (column **Log**), activate plot (column **Plot**) and select its colour (column **Color**) in the windows with names: **Channels x-y / Channels x-y Profile z / Channel x / Channel x Profile y**.

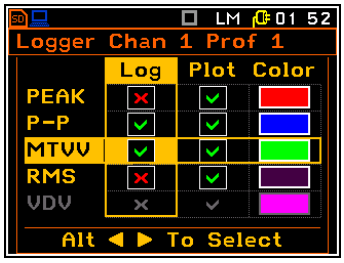


The **VDV** history will not be recorded if **Wh** filer is chosen in this profile.

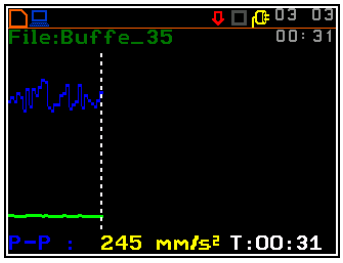
Activation / deactivation can be done by means of the **<◀>**, **<▶>** push-buttons pressed together with **<Shift>**. The position is changing by means of the **<◀>**, **<▶>** and **<▲>**, **<▼>** push-buttons.



The example display of Logger with two selected results is attached.

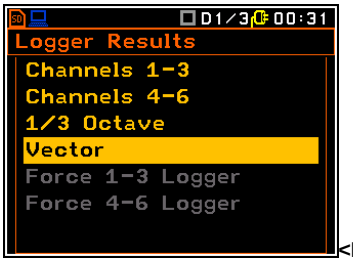


=>

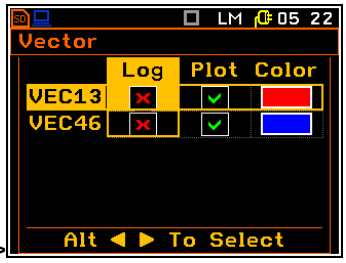


Selection vectors for logging

The **Vector** list enables the user to activate the vectors (**VEC13** and **VEC46**), which will be recorded to the logger file, activate plot and select its color.



<ENT>

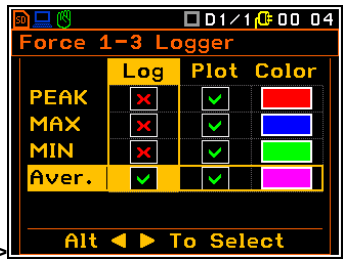


Contact force level logging

In case SV 105AF is used it is possible to log and display force levels. The **Force 1-3/4-6 Logger** list enables the user to select which parameters of force level will be recorded to the logger file, available in the plot and to select its colours.

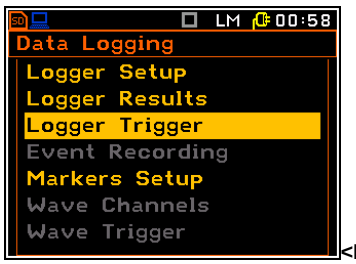
The force results in Newtons will be visible in Logger and Dosimeter presentation modes.

<ENT>

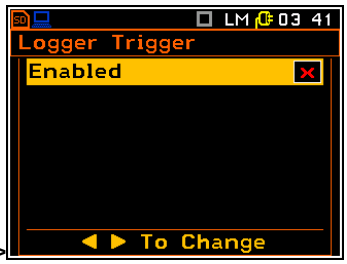


5.6.3 Logger trigger parameters setup – Logger Trigger

The **Logger Trigger** position appears only in the advanced instrument mode (*path: <Menu> / Auxiliary Setup / Instrument Mode: Advanced Mode*).

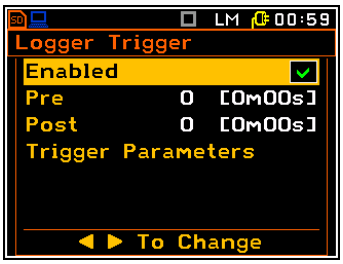


<ENT>



The **Logger Trigger** parameters define the way the measurement results are saved in the logger. The **Logger Trigger** switches on the result logging.

The logger triggering of the measurements (**Enabled**) can be switched on by means of the **< ▶ >** push-button.

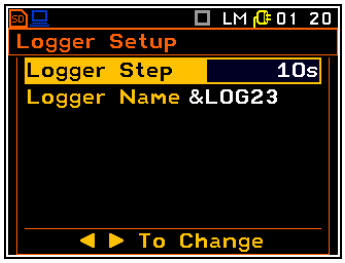


In the **Logger Trigger** sub-list the user may switch off or on (**Enabled**) the logger triggering, determine the parameters of the triggering signal (**Trigger Parameters**), select the number of the results saved in the logger before the fulfilment of the triggering condition (**Pre**) and the number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

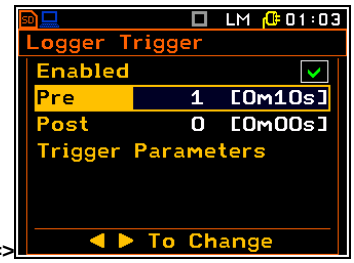
- the measurement results registered directly before the fulfilment of the triggering condition. Time of this recording can be calculated by multiplying the value set in the **Pre** position by the time period taken from the **Logger Step** position (*path: Menu / Measurement / Data Logging / Logger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

Pre and post trigger recording

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

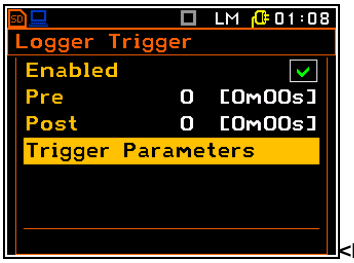


=>

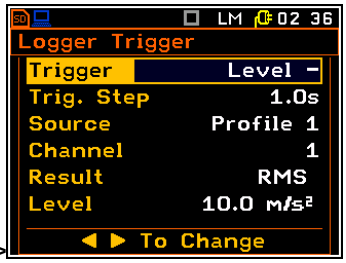


Trigger parameters setting

The position **Trigger Parameters** enables the user to define the parameters of the triggering signal. To open this position the user should select it and press **<ENTER>**.



<ENT>



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

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

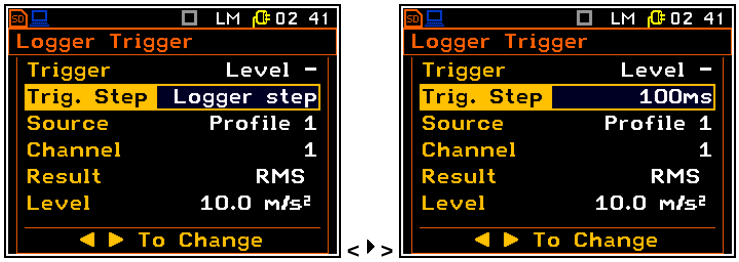
- if **Level +** is selected, the triggering condition is fulfilled only when **Source** has the greater value than determined by **Level**, otherwise the triggering condition is not fulfilled.
- if **Level –** is selected, the triggering condition is fulfilled only when **Source** has the lower value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

this determined by **Level**, otherwise the triggering condition is not fulfilled.

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

Step for checking the triggering condition

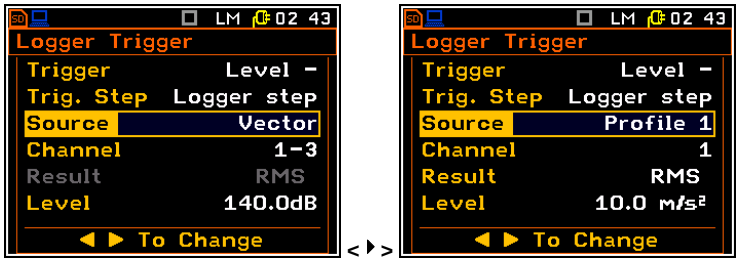
The **Trig. Step** position enables the user to select time (integration period) for condition evaluation: equal to **Logger step** (*path: <Menu> / Measurement / Data Logging / Logger Setup*), **100ms**, **1.0s**, and equal to **Meas. Period** (*path: <Menu> / Measurements / General Settings*). If **Meas.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



Source for triggering condition and channel of triggering signal

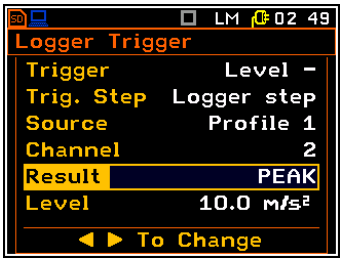
The **Source** position enables the user to select the type of source for triggering condition calculation: **Vector**, **Profile 1** or **Spectrum** (available for **1/1 Octave** and **1/3 Octave** functions).

The **Channel** position enables the user to select the channel of triggering source. Depending on value of the **Source** parameter, the value of **Channel** will be different.



Function for triggering condition definition and threshold

The **Result** position enables the user to select the result for triggering condition: **PEAK**, **P-P**, **MAX**, **MIN**, **RMS** or **VDV**. When **Vector** is selected as a **Source** the only one result is available – **RMS**. In case of **Spectrum** source, the user may select octave or 1/3rd octave band frequency, depending on which **Measurement Function** is active, and also **Total Level** results with appropriate filters.

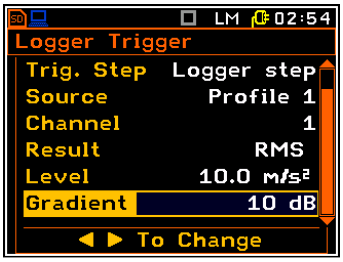


The **Level** position enables the user to select the value of threshold for

triggering condition. The level of the triggering source can be set in a range from **60 dB** to **200 dB** or from **1.00 mm/s²** to **10.0 km/s²**, depending on what scale type was selected in the **Scal**e position (*path: <Menu> / Display / Results Scale*).

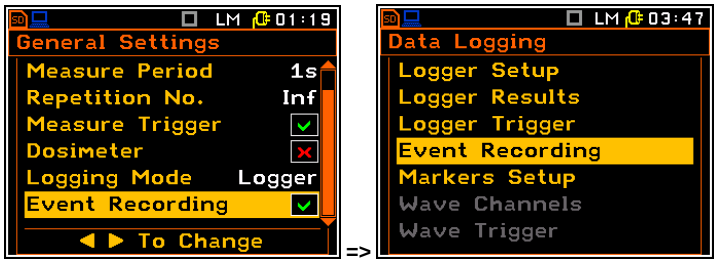
Speed of the triggering signal change

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



5.6.4 Event recording setup – Event Recording

The **Event Recording** position appears only in **Advanced Mode** (*path: <Menu> / Auxiliary Setup / Instrument Mode*) and becomes active when **Event Recording** parameter in the **General Settings** list is switched on.

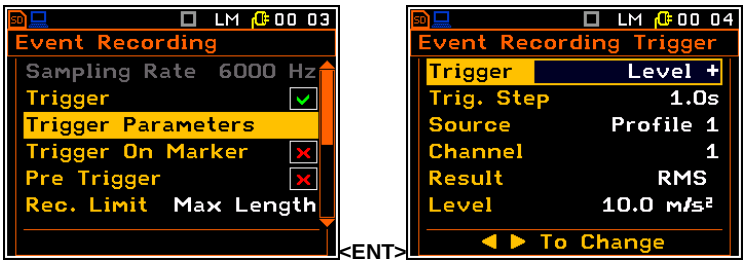


The **Event Recording** enables the user to activate recording of events and to set the parameters of event signal recording in the same logger file as for the regular time results history.

The **Sampling Rate** position displays the sampling frequency of event recording – **6000 Hz**.

When the **Trigger** position is selected then event recording will start by trigger.

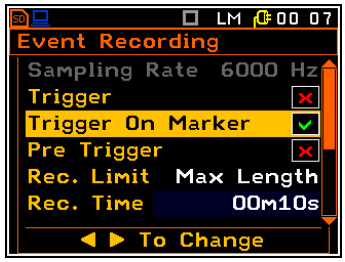
Trigger condition is set up in the window opened by pressing **<ENTER>** on the **Trigger Parameters** position. This position appears on the list after activating the **Trigger**. The setup for Event Recording Trigger is similar to the Logger Trigger setup.



When **Trigger On Marker** is switched on then event recording will start by initiation of one of the markers. Markers for triggering are defined in the **Markers Setup** window.

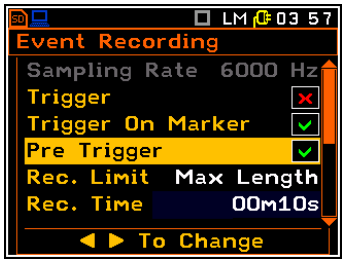
When **Trigger** and **Trigger On Marker** are chosen then event recording will start when one of these triggering conditions are fulfilled.

When **Trigger** or **Trigger On Marker** is chosen then additional positions appears on the list. These positions enable the user to programme



additional parameters of event recording.

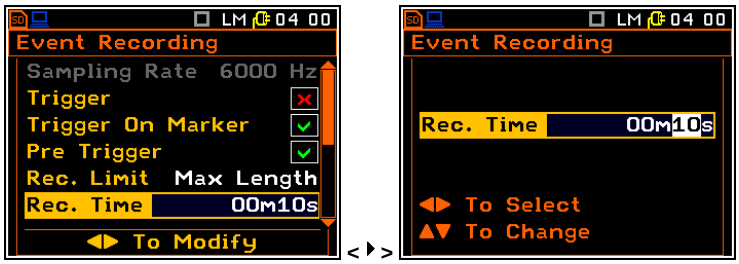
When **Pre Trigger** is switched on then the signal starts to record before the triggering condition. Time length of this additional record is 1 s in case of recording in 1 or 2 channels, 0.5 s in case of recording in 3 or 4 channels and 0.25 s in other cases.



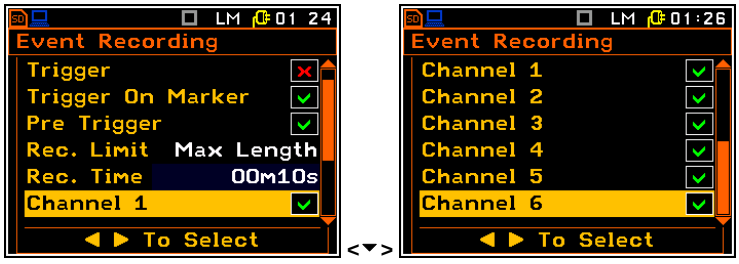
In the **Rec. Limit** position the user may select time of event signal recording after triggering. If the triggering condition appears then the signal will be recorded during the period defined in **Rec. Time**. The available values of **Rec. Limit** are: **Max Length**, **Fixed Len.** or **Off**.

When **Off** is chosen then the event signal will be recorded until the memory is full or while the trigger condition is fulfilled. When **Max Length** is chosen then the signal will be recorded for the period defined by **Rec. Time**, but can be stopped earlier if trigger condition is not fulfilled. When **Fixed Len.** is chosen then the signal will be recorded for the period defined by **Rec. Time**, even when the trigger condition ceases.

In the **Rec. Time** position the user may select the time of signal recording after triggering occurs. If the next triggering condition appears then the signal will be recorded for an additional period defined by **Rec. Time**.



The **Channel x** positions allow the user to switch on or off the channels to be used for event recording.

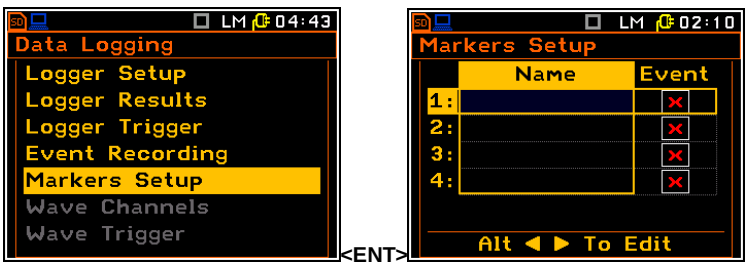


5.6.5 The marker setup – Marker Setup

Marker is used to mark special events during the measurement such as not typical vibration impact and is nothing but an indication of the beginning and end of the block of logger results in which the event occurred. In case of point markers there is no start and end of the marker, but only one record in the logger file. Markers are activated in the result presentation window by pressing the arrow keys.

The **Marker Setup** position appears only in the advanced instrument mode (*path: <Menu> / Auxiliary Setup / Instrument Mode: Advanced Mode*).

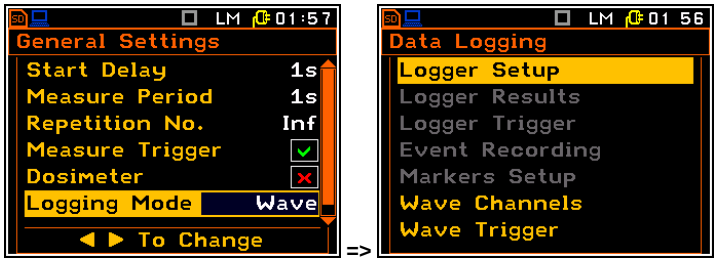
The **Marker Setup** enables the user to assign a specific name for each marker and define markers for event recording. The specific name can be edited in the



window that is opened by means of the **<◀ >**, **< ▶>** push-buttons pressed together with **<Shift>** or **<Alt>** while the cursor is on the **Name** position.

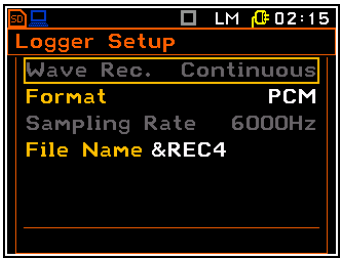
5.7 Wave recording

All positions connected with wave recording in the **Data Logging** list appear only in the advanced instrument mode (*path: <Menu> / Auxiliary Setup / Instrument Mode: Advanced Mode*).



When the **Wave** function is chosen in the **Logging Mode** position, the **Data Logging** list consists of three active positions: **Logger Setup**, **Wave Channels** and **Wave Trigger**.

Setting-up the Wave recorder function



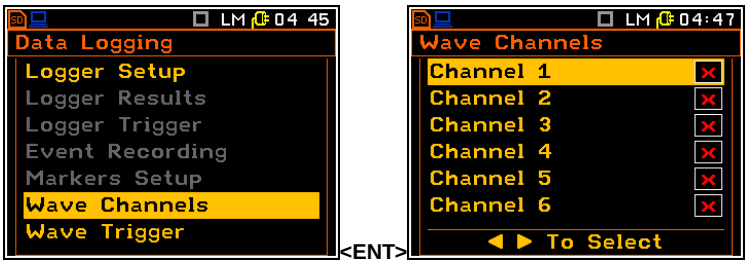
The **Logger Setup** list enables the user to edit the name of the logger file (history of results measurements or wave records) and to set other general parameters.

The **Wave Rec.** position is not active. It only indicates the fixed type of wave recording: **Continuous**.

The user may define the format of the wave file header (**Format**). Format of the wave file header may be **PCM** or **Extensible**.

The **Sampling Rate** position is inactive. It indicates the fixed sampling rate: **6000Hz**.

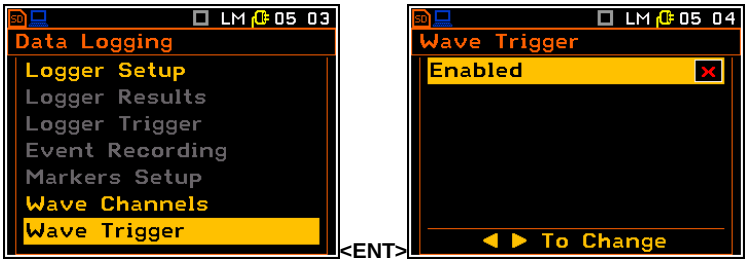
Selecting the channels for Wave recording



The **Wave Channels** position appears only in the advanced instrument mode (*path: <Menu> / Auxiliary Setup / Instrument Mode: Advanced Mode*).

The **Channel x** positions enable the user to select the channels to be recorded.

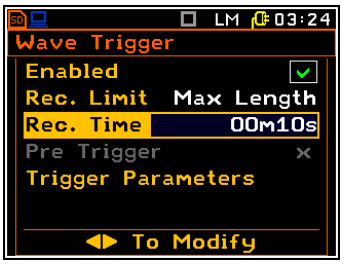
Wave recorder trigger setup



The **Wave Trigger** position appears only in the advanced instrument mode (*path: <Menu> / Auxiliary Setup / Instrument Mode: Advanced Mode*).

The **Wave Trigger** enables the user to activate and programme the wave recorder trigger.

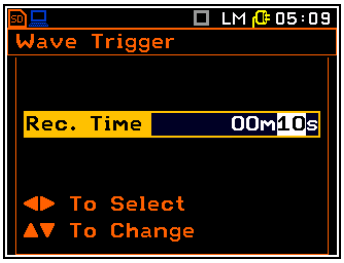
The **Enabled** position switches on/off the **Wave Trigger**.



In the **Rec. Limit** position the user may select time of signal recording after triggering. If the triggering condition appears then the signal will be recorded during the period defined in **Rec. Time**. The available values of **Rec. Limit** are: **Max Length**, **Fixed Len.** or **Off**.

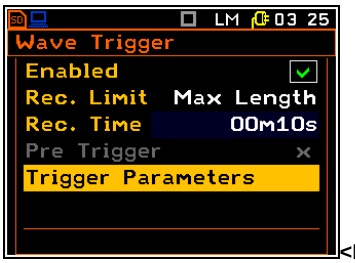
When **Off** is chosen then the event signal will be recorded until the memory is filled or while the trigger condition is fulfilled. When **Max Length** is chosen then the signal will be recorded for the period defined by **Rec. Time**, but can be stopped earlier, if trigger condition is not fulfilled any more. When **Fixed Len.** is chosen then the signal will be recorded for the period defined by **Rec. Time**, even when the trigger condition ceases.

< ▸ >

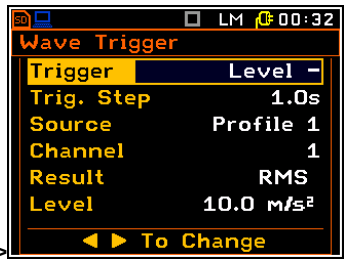


In the **Rec. Time** position the user may select the time of event signal recording after triggering. If next triggering condition appears then the signal will be recorded for an additional period defined by **Rec. Time**.

The **Trigger Parameters** position enables the user to define the parameters of the triggering signal. To open this position and the user should press **<ENTER>**.



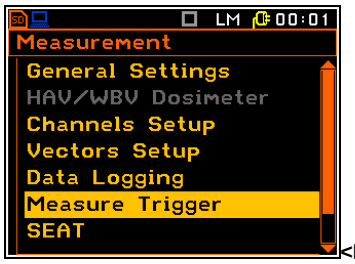
<ENT>



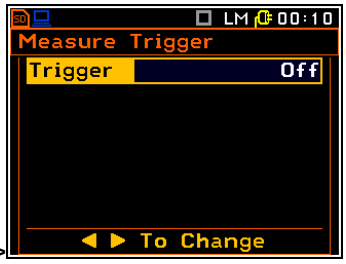
The **Trigger Parameters** window and meaning of all positions are identical as for **Logger Trigger** case described above.

5.8 Measure trigger parameters selection – Measure Trigger

The **Measure Trigger** position appears only in the advanced instrument mode (*path: <Menu> / Auxiliary Setup / Instrument Mode: Advanced Mode*).

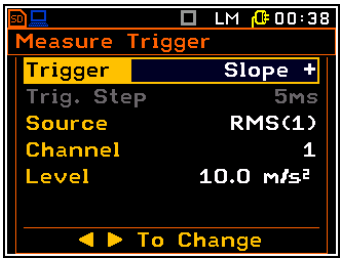


<ENT>



The **Measure Trigger** sub-list enables the user to set the parameters of measure trigger.

The **Measure Trigger** is a contexts sub-list in which the triggering can be switched off or on (**Trigger**), when on it can be determined the source of the triggering signal (**Source**), the channel of source signal (**Channel**), its level (**Level**) and sometimes also the speed of changes (**Gradient**). If **RTC** is selected as trigger type, start time (**RTC Start**) and repetition of triggering (**Repeat Every**) is defined.



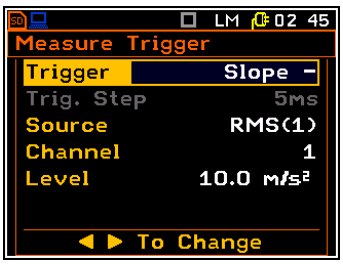
Switching the triggering on and off

The triggering of the measurements (**Trigger**) can be switched off by means of the **< ◂ >** push-buttons.

The triggering is switched on if one of its six available modes is selected: **Slope +**, **Slope –**, **Level +**, **Level –**, **Grad +** or **RTC**. If the instrument works with the switched on triggering, the appropriate icon appears on the display when the instrument is waiting for triggering (triggering condition is not fulfilled). The

triggering condition is checked every 5 miliseconds.

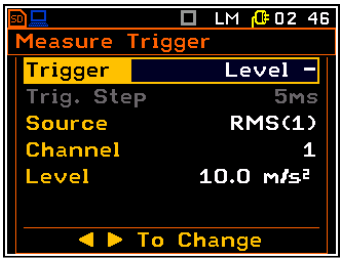
Switching the triggering by means of measured result - Slope/Level/Grad



In case when **Slope +** is selected, the measurement starts when the arising result value (**Source**) passes above the level determined by the **Level** position value. When **Slope –** is selected, the measurement starts when the falling down result value (**Source**) passes below the level determined by the **Level** position value.

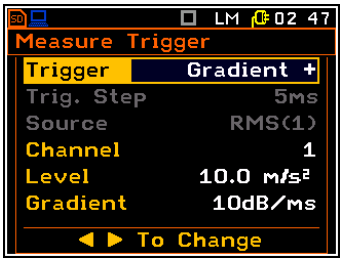
The measurement is stopped when the conditions set in the **General Settings** sub-list are fulfilled or after pressing the **<Start/Stop>** push-button or after receiving the proper control code remotely.

The next sources of the triggering signal are available: **RMS(1)**, **VEC46**, **VEC13** or **External**. **External** source means that the triggering will be initiated by the positive or negative slope of the signal on the input/output socket (**I/O**).



When **Level +** or **Level –** is selected the triggering condition is checked every 5 millisecond and the measurement is recorded only when the result value (**Source**) has the greater / lower level than that determined in the **Level** position, otherwise the measurement result is skipped.

The next sources of the triggering signal are available: **RMS(1)**, **VEC46** or **VEC13**.

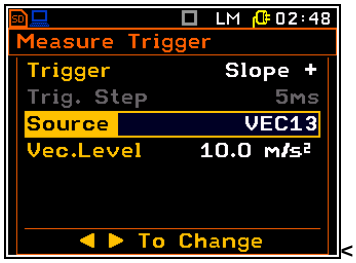


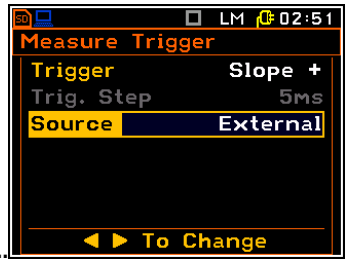
When the **Gradient +** is selected, the triggering condition is checked every 5 millisecond and the measurement is recorded only when the result value (**Source**) has a greater level than determined in the **Level** position and the gradient of the signal is greater than determined in the **Gradient** position. Otherwise the measurement result is skipped. Only one source of the triggering signal is available: **RMS(1)**.

Checking the triggering condition

The triggering condition is checked every 5 millisecond. The position **Trig. Step** indicates this.

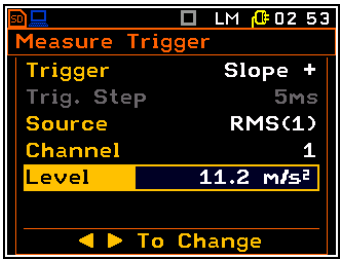
Selection of the triggering signal





The user can select several sources for the trigger signal: vectors (**VEC13** and **VEC46**), RMS of the first profile (**RMS(1)**) and external signal of the I/O socket (**External**).

Setting the channel of the triggering signal



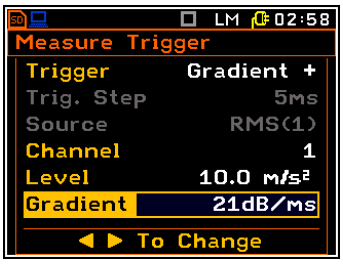
The **Channel** parameter denotes the channel of the triggering signal.

Setting the level of the triggering signal

The **Level** position enables the user to select the value of the threshold for triggering condition. The level of the triggering source can be set in a range from **60 dB** to **200 dB** or from **1.00 mm/s²** to **10.0 km/s²**, depending on the scale type selected in the **Scal**e position (*path: <Menu> / Display / Results Scale*).

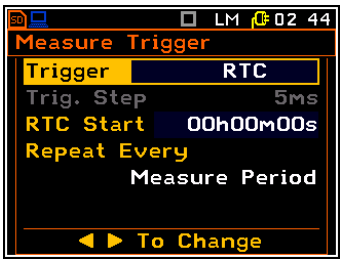
Setting the speed of the triggering signal changes

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

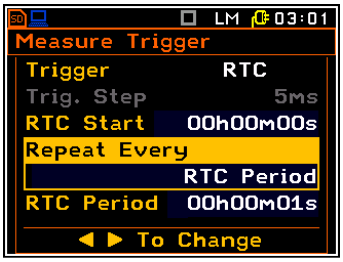


Switching the triggering by means of RTC

When the **RTC** (Real Time Clock) is selected the triggering starts at the time set up by **RTC Start**. The user has to press the **<Start>** push-button and the measurement will be triggered at the time selected in **RTC Start**.



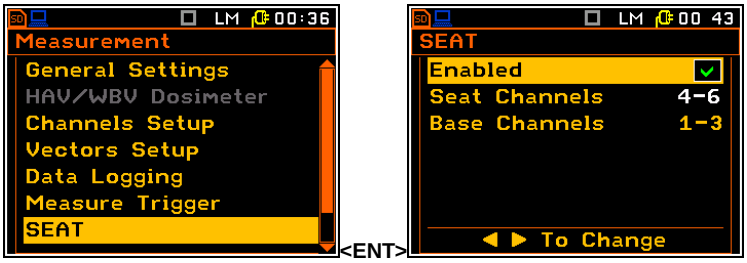
The measurement is repeated with the step selected in the **Repeat Every** position. The **Repeat Every** parameter can have values: **Measurement Cycle** or **Period**. If **Period** is selected then additional position **RTC Period** appears.



Notice: *The triggering condition fulfilment every time starts one measurement with measurement time defined by the* ***Measure Period*** *parameter (path: <Menu> / Measurement / General Settings). When trigger is active the* ***Repetition No.*** *parameter (path: <Menu> / Measurement / General Settings) means the maximum number of trigger repetitions. For each triggered measurement will be created separate result file, but the history file will still be one.*

5.9 Settings whole body measurements with the use of seat accelerometer – SEAT

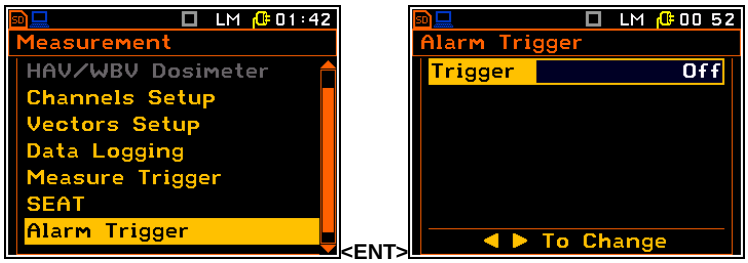
The **SEAT** window enables the user to switch on SEAT (Seat Effective Amplitude Transmissibility) measurements and to assign channels 1-3 / 4-6 for the triaxial seat accelerometer (**Seat channels**) or the accelerometer for base measurements (**Base channels**).



5.10 The alarm trigger setting– Alarm Trigger

The **Alarm Trigger** position appears only in **Advanced Mode** (*path: <Menu> / Auxiliary Setup / Instrument Mode*).

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

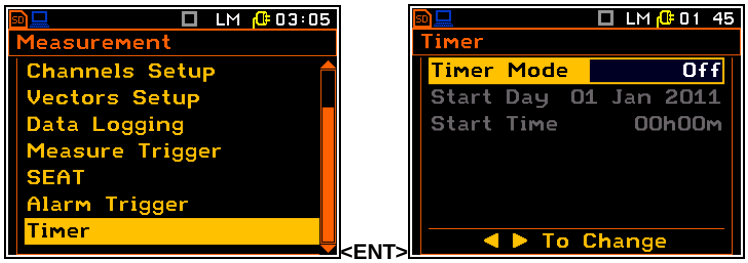


The **Alarm Trigger** window and meaning of all positions is identical as for **Logger Trigger** case.

5.11 Programming the instrument's internal timer – Timer

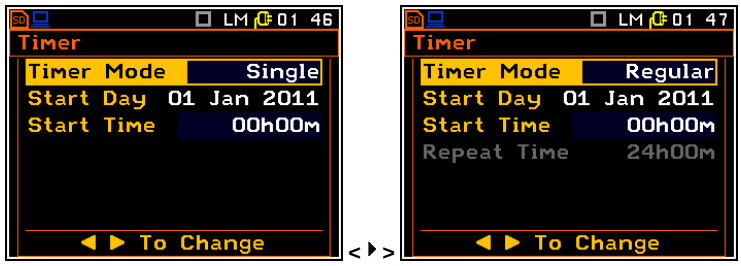
The **Timer** position appears only in **Advanced Mode** (*path: <Menu> / Auxiliary Setup / Instrument Mode*).

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



Selecting the mode of the timer function

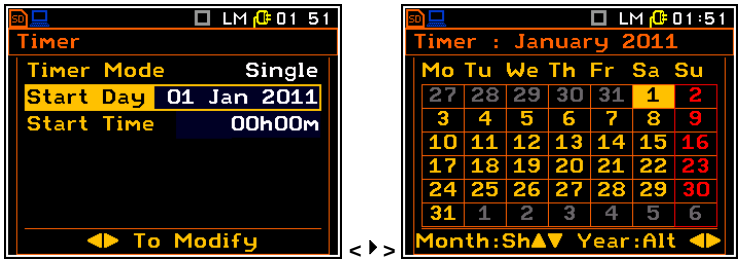
The timer can be switched off (**Off**), switched on only once (**Single**), or switched on many times regularly (**Regular**) with the period between two consecutive measurements set in the **Repeat Time** line as 24 hours. It means that the instrument will be switched on once a day at the same time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



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

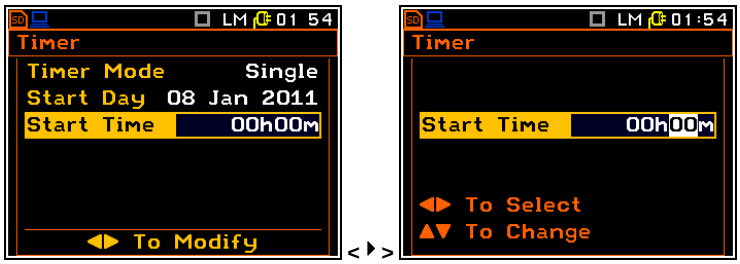
Setting the day for the measurement to start

The **Start Day** position determines the date for the measurement to start. The timer can be programmed up to one month ahead and during the date setting the current state of the **R**eal **T**ime **C**lock is taken into account. The required date can be selected in the special window, which is opened by means of the **< ◀ >**, **< ▶ >** push-buttons.



Setting the time for the measurement to start

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



5.11.1 Description of an example timer function execution

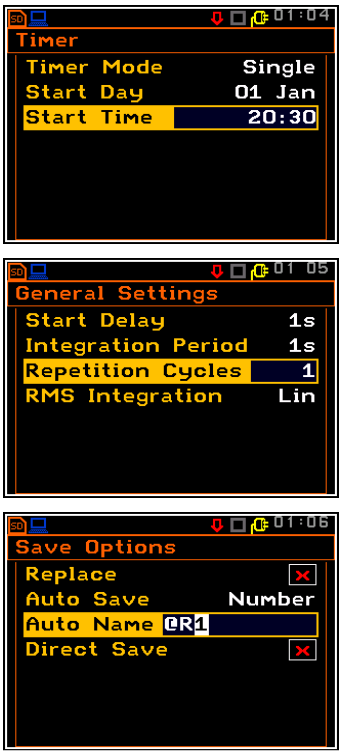
The **Timer** function is used to programme the instrument to switch on at the desired time and perform the measurements with the parameters set in the **Measurement** sub-list.

Let us assume that the user wants to switch on the instrument on the 1st of January, at 20:30, measure the vibration during 10 seconds without using logger and save the results in a file named @R1.

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

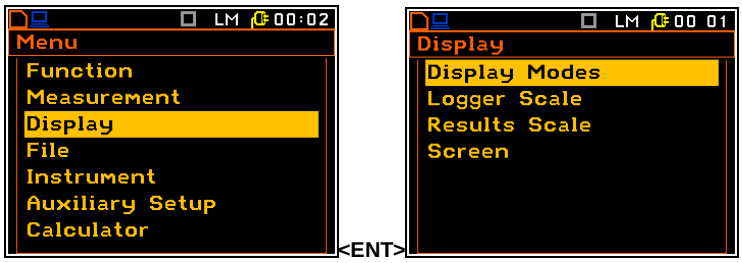
The instrument will be switched on the 1st of January at 20:30 and will be warmed up for the period of 60 seconds decrementing the counter visible on the display by one after each second.

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



6. DATA AVAILABLE ON THE DISPLAY – Display

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



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

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

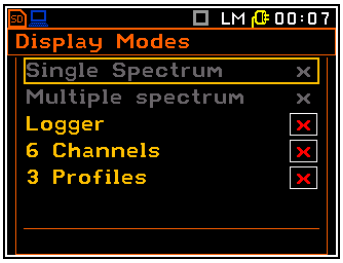
Logger Scale enables the user to change the scale of the history plot;

Results Scale enables the user to change the scale of result's presentation;

Screen enables the user to set the brightness and t switch on/off the display screen saver.

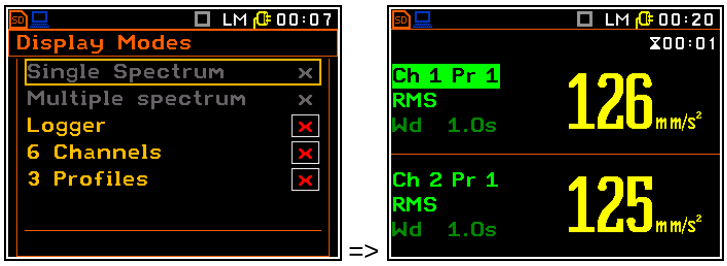
6.1 Selection of the modes of measurement results presentation - Display Modes

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

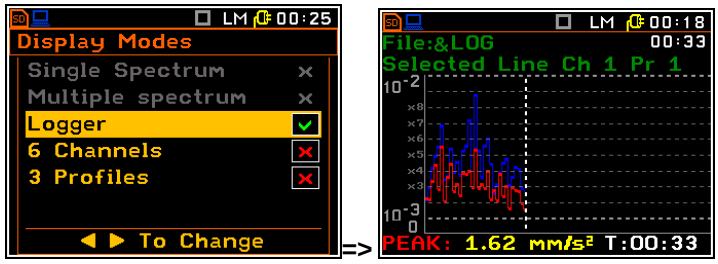


When all display modes in the **Display Modes** list are switch off only the main presentation mode with two results is available. Any attempt to switch to another mode by means of the **<Alt>** and **<▲>**, **<▼>** push-buttons gives no results.

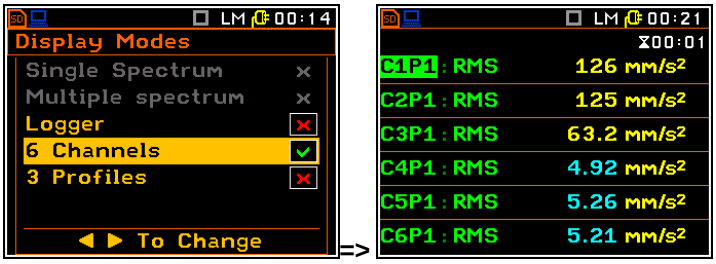
Two results of main presentation mode



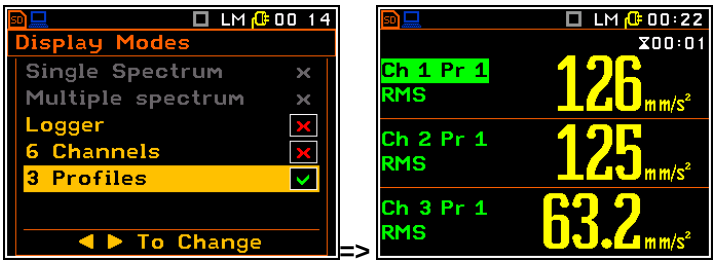
Logger presentation mode



6 Channels presentation mode



3 Profiles presentation mode



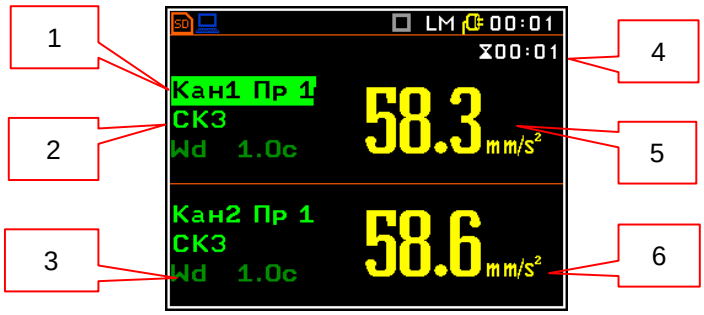
When all display modes in the **Display Modes** list are switched on they all are available and can be selected by means of the **<Alt>** and **<▲>**, **<▼>** push-buttons.

6.1.1 Main presentation mode

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

The main presentation mode is always active and it is not possible to switch it off.

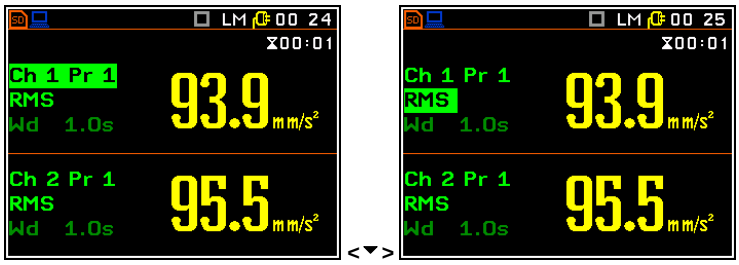
1. Channel and Profile number.
2. Function name: **RMS**, **VDV**, **CRF**, **OVL**, **PEAK**, **P–P**, **MTVV**.



3. The name of the implemented filter: **KB**, **Wh**, **Wk**, **Wd**, **Wc**, **Wj**, **Wm**, **Wg**, **Wb**, **Wf** (for first profiles) and **HP**, **BL Wh**, **BL Wk**, **BL Wd**, **BL Wc**, **BL Wj**, **BL Wm**, **BL Wg**, **BL Wb**, **BL Wf** (for second profiles); and detector time constant: **1.0 s**.
4. Elapsed time shows the current second of the measurement. The value presented there belongs to the range [**1**, **Meas. Period**].
5. The value of measured function.
6. Units of measured value.

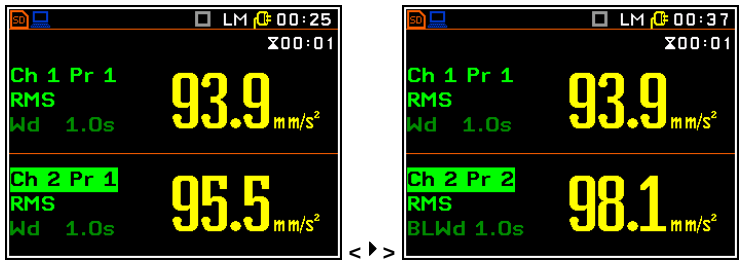
Changing the active fields

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



Changing the field content

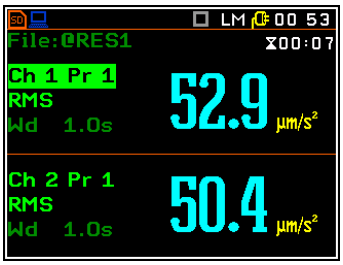
When Profile or Function position is chosen, then the profile number or function name is changed by means of the <◄> and <►> push-buttons.



Changing the presentation mode

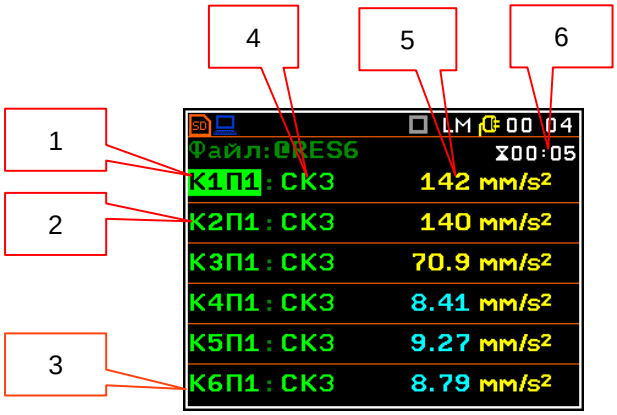
The presentation mode is changed after pressing the <▲> or <▼> push-buttons pressed together with **<Alt>**.

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



Presentation mode for all channels

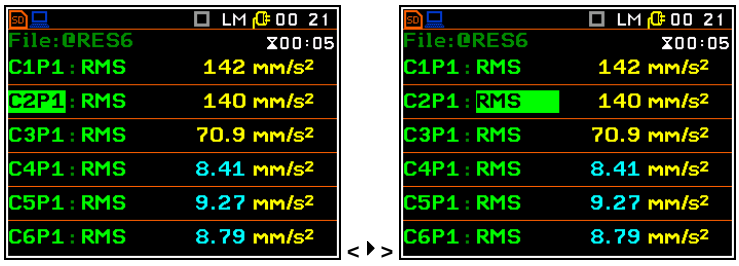
The six channels measurement result's presentation mode (**6 Channels**) shows simultaneously results for six channels. If **All** channels is not enabled in the **Channel Activation** window (path: <Menu> / Measurement / Channels Setup) the **6 Channels** mode is not active.



1. Result line for Channel 1.
2. Result line for Channel 2.
3. Result line for Channel 6.
4. Function name: **RMS**, **VDV**, **CRF**, **OVL**, **TIME**, **PEAK**, **P–P** and **MTVV**.
5. The value of measured function and units of measured value. See Appendix D for definitions.
6. Elapsed time shows the current second of the measurement in the range [**1**, **Meas. Period**].

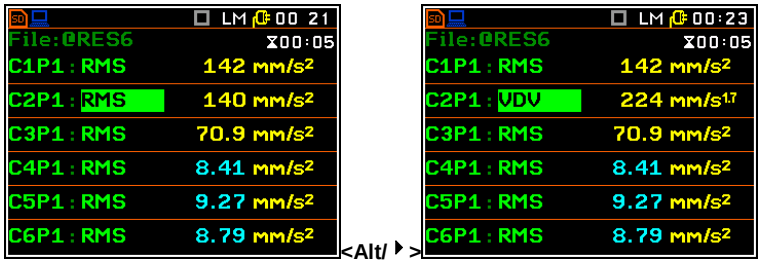
Changing the active fields

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



Changing the field content

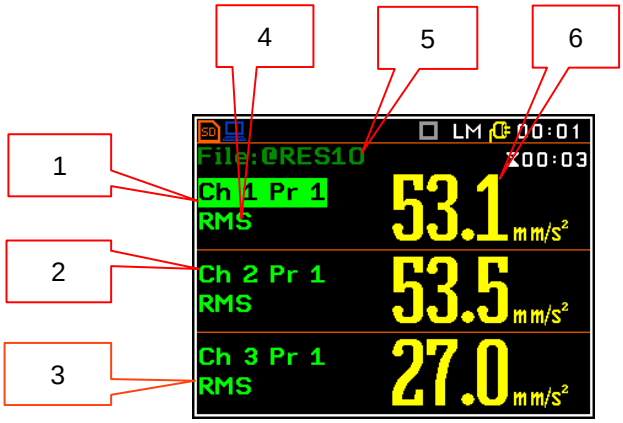
When Channel or Function position is chosen, then the profile number or function name is changed by means of the <◄> or <►> push-buttons together with **<Alt>**.



Presentation mode for three results

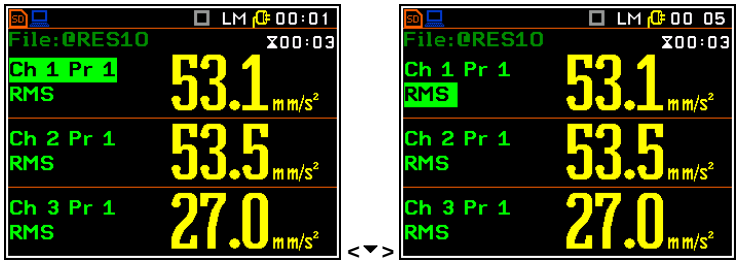
The three profiles measurement result's presentation mode (**3 Profiles**) shows results for three profiles simultaneously.

1. Line for the first result.
2. Line for the second result.
3. Line for the third result.
4. Function name: **RMS**, **VDV**, **CRF**, **OVL**, **TIME**, **PEAK**, **P–P** and **MTVV**.
5. File name when the **Auto Save** function is active (*path: <Menu> / File / Save Options*)
6. The value of measured function and units of measured value.
7. Elapsed time shows the current second of the measurement. The value presented there belongs to the range [**1**, **Integration Period**].



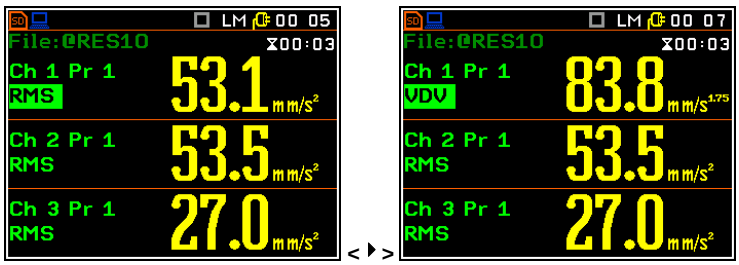
Changing the active fields

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



Changing the field content

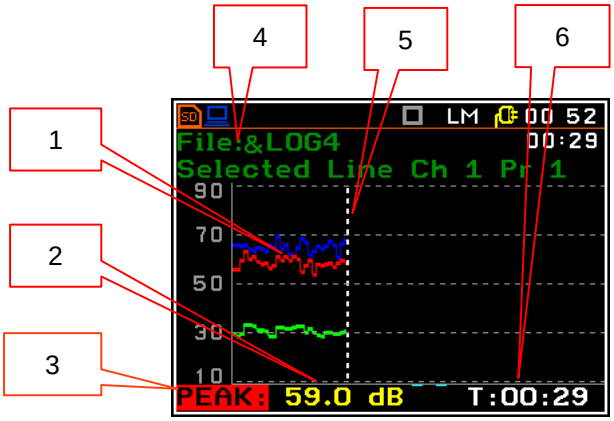
When Profile or Function position is chosen, then the profile number or function name is changed by means of the <◄> and <►> push-buttons.



Presentation mode for logger view

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

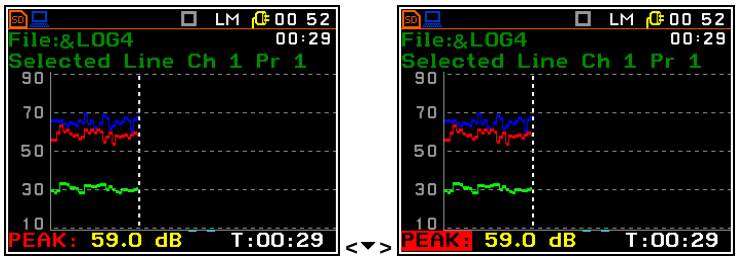
1. Logger plot



2. Result value for the cursor position
3. Name and colour of the logged result
4. Name of the logger file
5. Cursor
6. Cursor position.

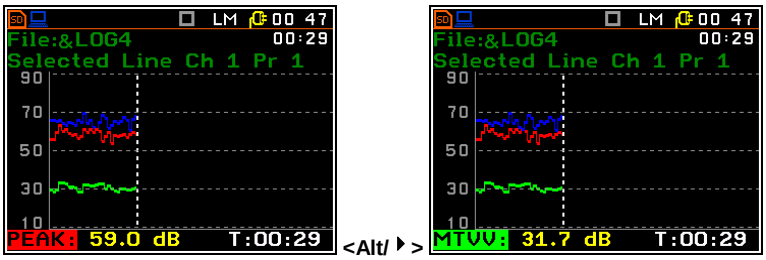
Changing the active fields

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



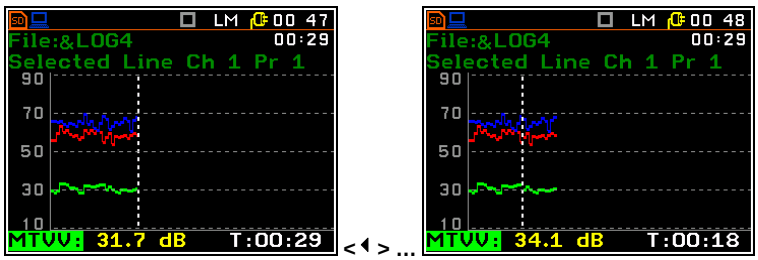
Changing the field content

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

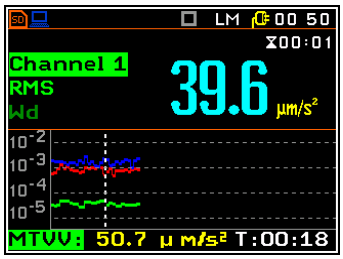


Changing the cursor position

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

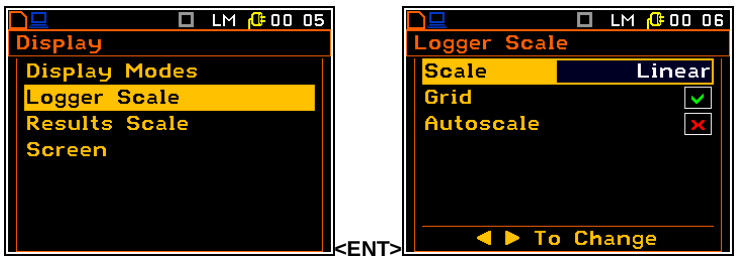


When the **Logger** presentation mode is switched on a combined view of the logger plot and the result presentation is available.



6.2 Setting the logger presentation parameters – Logger Scale

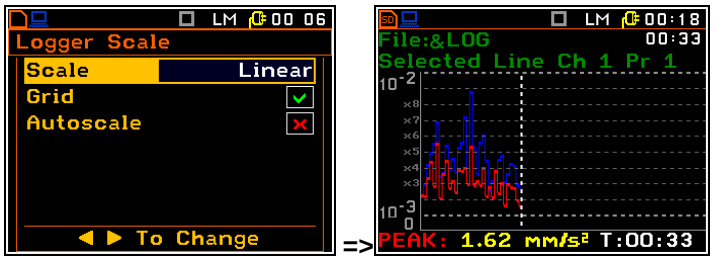
The **Logger Scale** sub-list enables the user to change the Y-axis scale of the result history plot and switch on/off the grid.

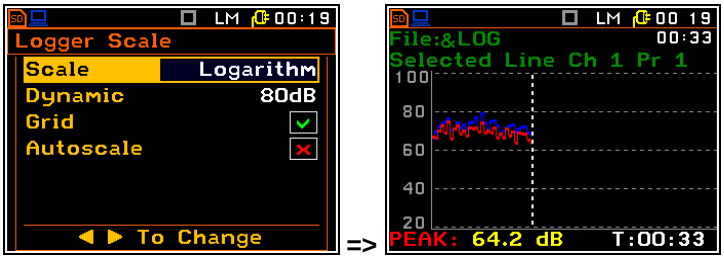


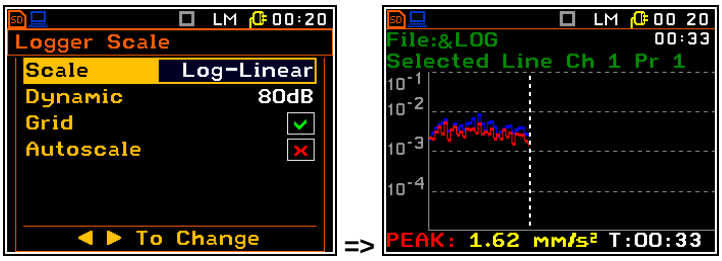
Setting the scale of the logger presentation

Three options are available for the **Scale** position: **Linear**, **Logarithm** and **Log-Linear**. In case of **Linear** the graphical presentation and the units are linear. In case of **Logarithm** the graphical presentation is given in the logarithmic scale and the measurement results are expressed in decibels (the results are related to the values set up in the **Reference Levels** sub-list (*path: Menu / Auxiliary Setup / Reference Levels*). In case of **Log-Linear** Y-scale is logarithmic, but result units are linear.

Same spectrum with different **Scale** is as presented here.



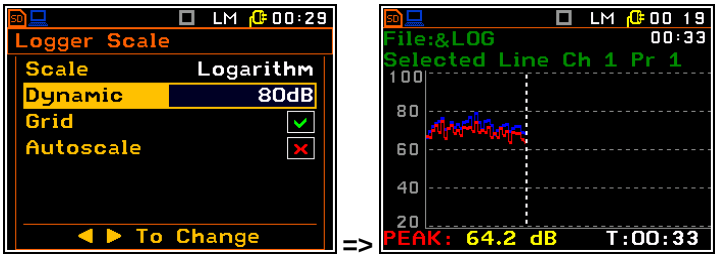


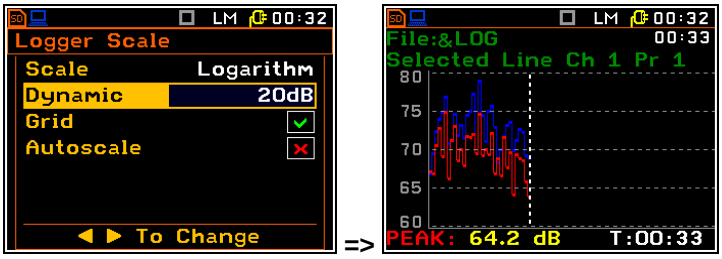


Scaling the vertical axis

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

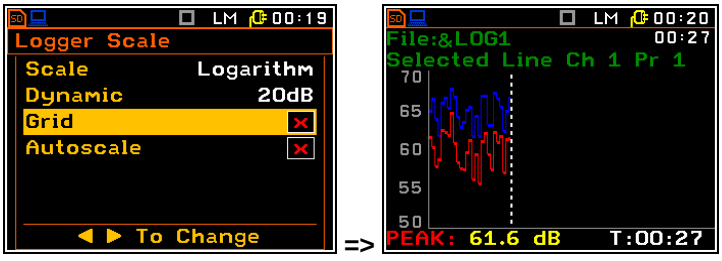
Displays with the logger results and different Dynamic ranges (80 and 20 dB) are as presented here.





Switching the grid on/off

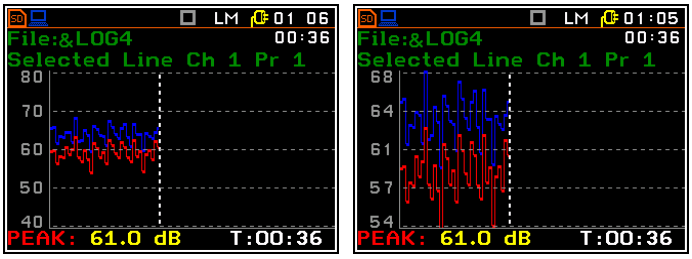
The **Grid** position enables the user to switch on or off the horizontal grid lines in any graphical presentation modes.



Switching the automatic Y-scale adjustment on/off

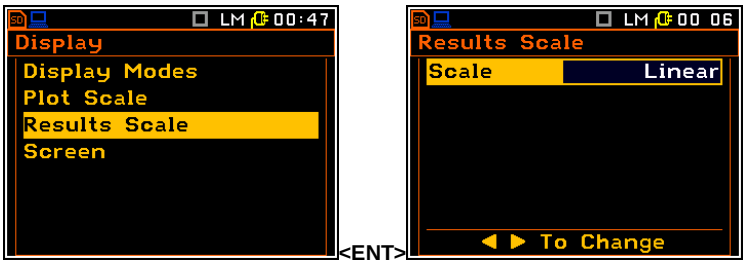
The **Autoscale** position switches on or off the automatic adjustment of the Y axis scale to the full display view. The adjustment is performed automatically every time the spectrum is displayed.

Displays with the autoscale switched off and on are as presented here.

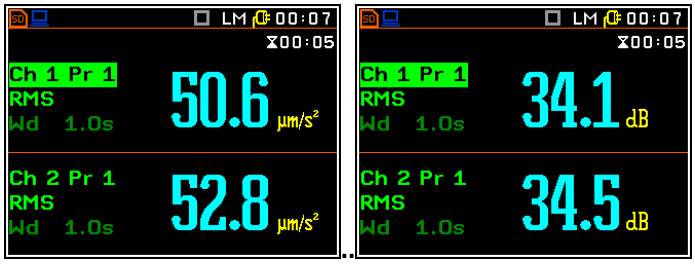


6.3 Setting the result presentation scale – Results Scale

The **Results Scale** sub-list enables the user to change the scale in the available modes of the measurement result presentation.



There are two options for the **Scale** parameter: **Linear** and **Logarithm**. In the case of **Linear** all the results are shown in linear units. In case of **Logarithm** the measurement results are expressed in decibels (the results are related to the values set in the **Reference Level** window (*path: <Menu> / Auxiliary Setup / Reference Levels*).

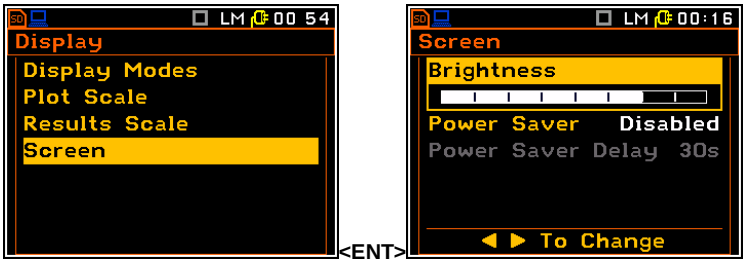


6.4 Setting the display brightness and power saver- Screen

The **Screen** window enables the user to set the brightness of the display and to switch on the screen saver.

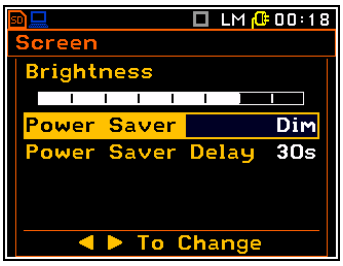
Setting the brightness of the display

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



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

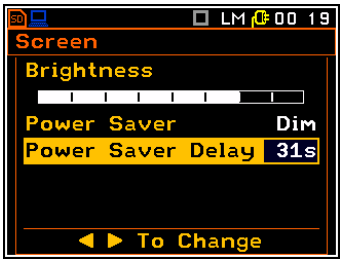
Setting the power saver function



The saving of the internal source of the instrument's power can be achieved by means of reducing the brightness of the screen when possible.

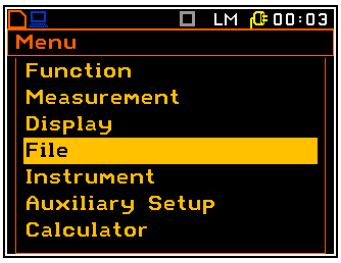
It is possible to set the **Power Saver** automatically. The screen may be switched off (**Screen Off**) or dimmed (**Dim**). When either of these options is selected, after number of seconds, defined in the line **Power Saver Delay**, from pressing **any push-button** the screen is switched off or dimmed. If it has been set, the first press of any push-button will cause the switch-on of the screen. The **Power Saver** function may also be deactivated if the **Disabled** parameter is selected and the screen will stay on all the time.

Setting the power saver delay



The **Power Saver Delay** parameter defines the delay period from last use of any push-button to enter the Power saver mode. This delay period can be set from **5 s** to **60 s**.

7. SAVING THE MEASUREMENT RESULTS – File



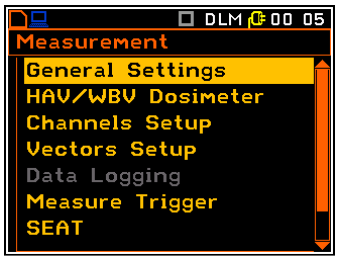
The **File** list contains the elements that enable the user to manage the data files that are created and saved in the internal memory of the instrument or in the external memory (micro SD) card fitted behind the bottom cover of the instrument.

The recording of the measurement results is an essential task for the efficient use of the instrument. All available measurement results and also instrument's settings are stored as a file in the internal FLASH type memory of the instrument or on the external micro **SD Card** memory.

Instrument's files contain data:

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

Notice: *Because of limited internal memory capacity of the instrument the logger and wave files can be saved on the external memory only. So, if there is no* ***SD Card*** *connected to the instrument there is no any possibility to create any logger file. In such cases the* ***Logging*** *position in the* ***Measurement*** *list is not active. The* ***Logging*** *position became inactive if the internal memory was set as a working directory (see below).*



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

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

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

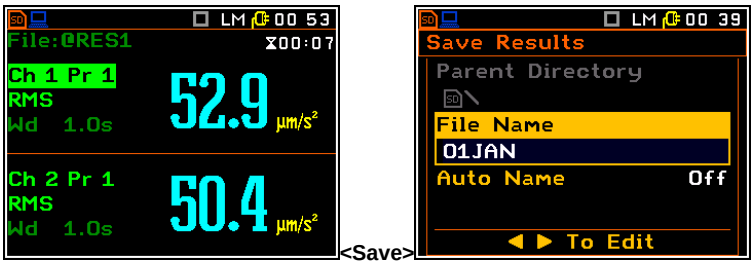
The **File** list contains the following items:

File Manager	enables the user to manage the files saved in the instrument or on external memory card;
Setup Manager	enables the user to manage the Setup files;
Start Setup Manager	allows to select Setup files to be displayed at **Select Setup** menu shows upon instrument start;
Save Options	enables the user to set the options for the measurement result savings;
Setup Options	enables the user to set the options for the setup savings.

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

There are two options for storing result data in the internal or external memory. One option is to press the **<Save>** push-button right after the measurement performance. Another option is to create **<New File>** in the **File Manager** window.

After pressing the **<Save>** push-button the **Save Results** window appears.



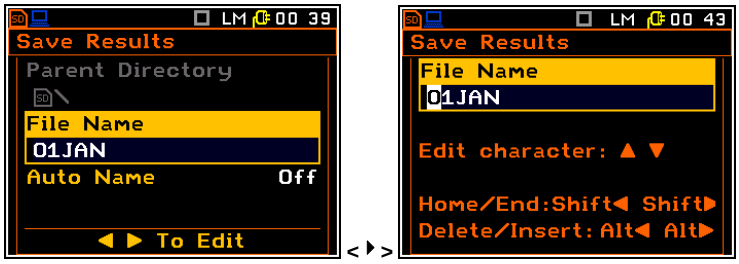
There are two available options for saving files: with the edited name, or with the name automatically changed with the name increased by one. These options can be selected in the position **Auto Name**. If **Auto Name** is switched off (**Off**) the name of the saved file is as selected in the position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

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

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

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

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

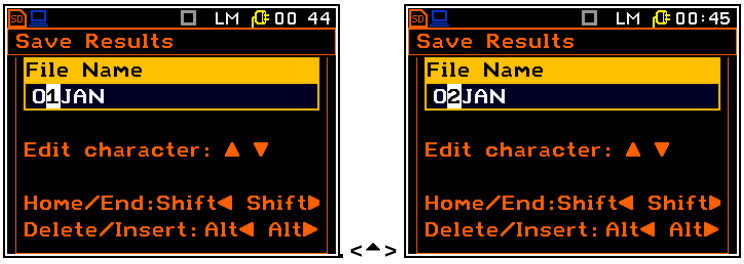


Selection of the character's position to be edited

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

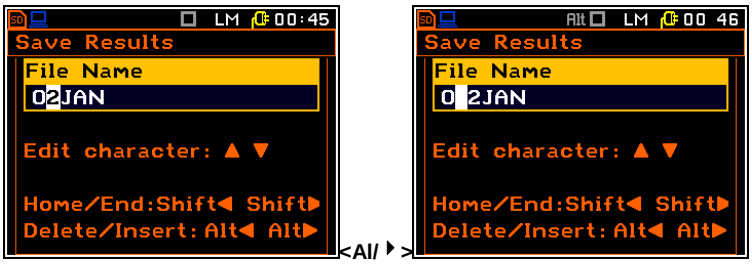
Changing the edited character

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



Position insertion, deletion

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



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

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

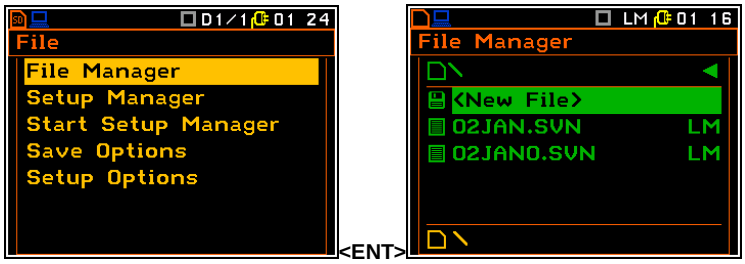
Saving is not possible when the instrument is measuring the signal. The message “Measurement in progress!” is displayed for about 3 seconds.

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

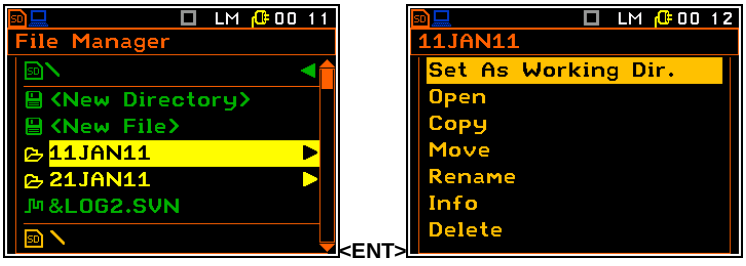
Notice: *Direct access to the* ***Save Results*** *window is possible after pressing the* ***<ENTER>*** *and* ***<Alt>*** *push-buttons simultaneously if the* ***Auto Save*** *option is switched off (path: Menu / File / Save Options). Otherwise (****Auto Save*** *option is switched on), the results are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

7.2 Managing the files saved in the internal and external memory – File Manager

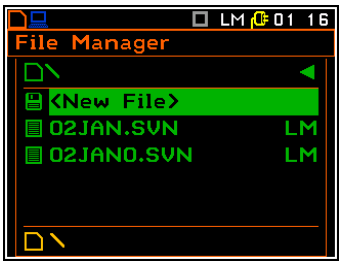
The **File Manager** is used for checking the contents of the memory and performing operations on result and logger files such as: open, delete, copy, move, rename, create new files or catalogues and displaying file and catalogue information.



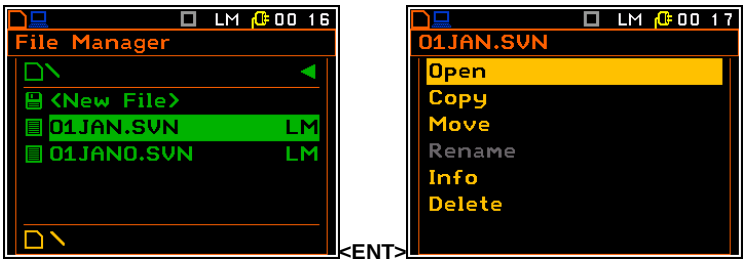
The list of files, catalogues and memory devices is presented in the **File Manager** window. Files are stored in catalogues, which are organised hierarchically. Catalogue names are of capital letters and have no extensions. By pressing the **<ENTER>** push-button the window with the list of available operations is opening for the marked (highlighted) position.



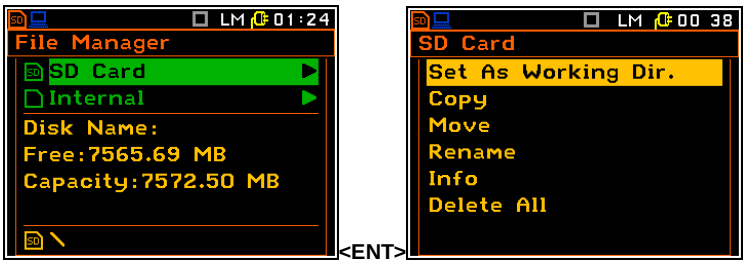
When **SD Card** is selected the first two positions **<New Directory>** and **<New File>** can be used to create new elements. When **Internal** memory is selected only the **<New File>** position is available.



The list of operations on files saved in the **Internal** memory differs from **SD Card** by one position. It is not possible to rename the files saved in the **Internal** memory and thus the **Rename** position in this list is not active.

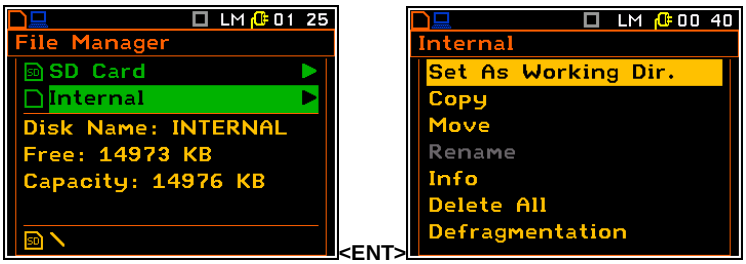


When the memory disk is selected after pressing the **<ENTER>** push-button the list of operations on disk appears.

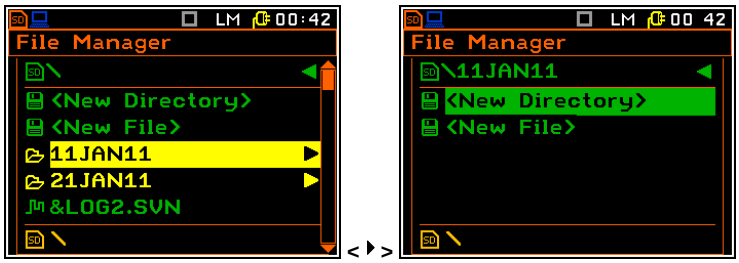


If **SD Card** is not installed its position in the **File Manager** window is unavailable.

The list of operations on the **Internal** memory differs from that one for the **SD Card** by one position. It is not possible to rename the **Internal** memory and thus **Rename** position in this list is not active. The **Internal** memory can be also defragmented and this is performed by operation **Defragmentation**.

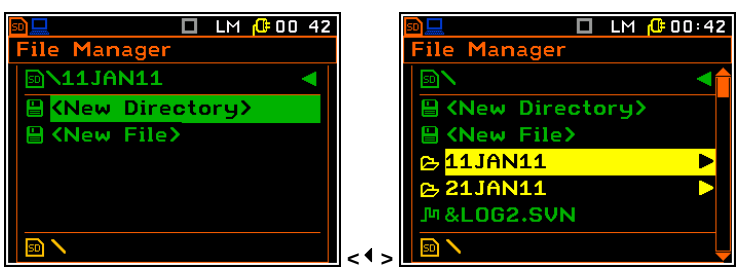


The selected catalogue can be opened in two ways: after pressing the **< ▶ >** push-button or after opening the operation list by means of the **<ENTER>** push-button, then selecting the **Open** position and pressing the **<ENTER>** push-button once again. The **File Manager** window is closed and the instrument returns to the **File** list after pressing **<ESC>**.



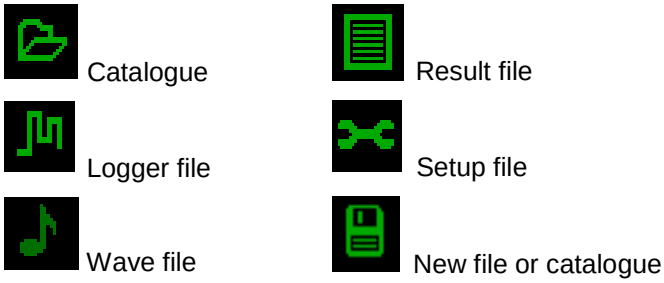
To return to the upper catalogue in the hierarchy the user has to press **< ◀ >**.

The upper (highest) catalogue contains the names and icons of memories available for files: **SD Card** and **Internal**. The description of the memory is presented below the memories list: **Disk Name**, **Free** memory and **Capacity** (total memory



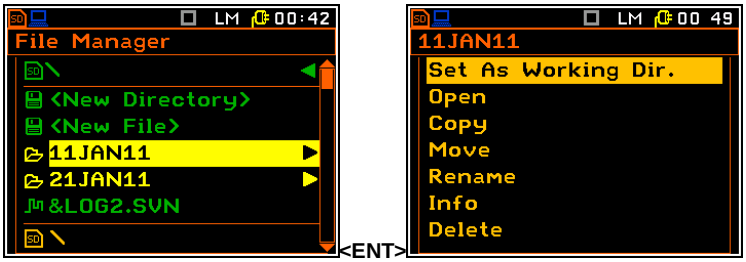
space).

In the **File Manager** window files are described by their file name with an extension (**SVN** or **WAV**) as well as an additional icon and measurement abbreviation (**SLM**, **S:1/1** etc.). The names in which the first character is @ come from the **Auto Save** function. The table with the description of icons is presented at the right.



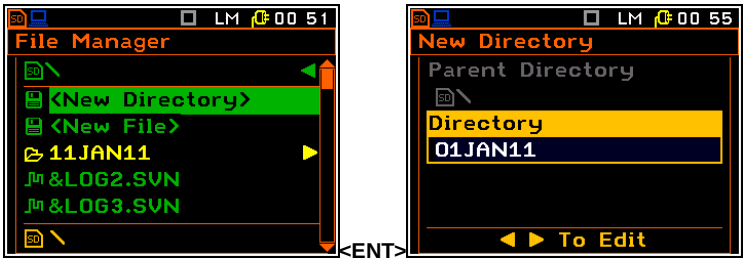
7.2.1 Setting the directory for saving files – Set Working Directory

It is possible to assign the catalogue for automatic saving logger files and result files. In order to do this the user should choose the required catalogue and press the **<ENTER>** push-button. After opening the list of operations the user should select **Set Working Directory** and press **<ENTER>** again. The new catalogue name will appear at the bottom line of the display. Starting from this moment all files will be saved in this catalogue.

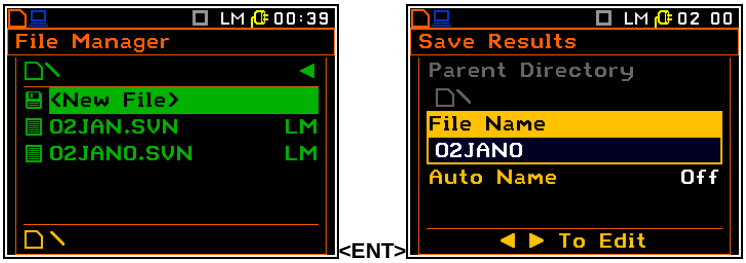


7.2.2 Creating new catalogue and new file

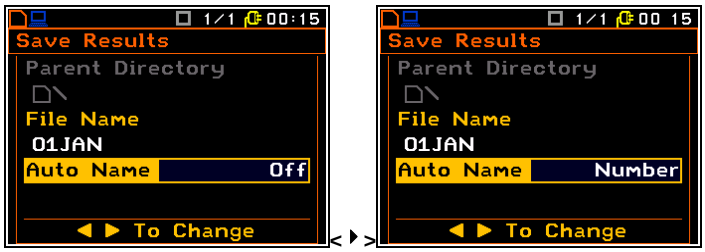
It is possible to create a new catalogue in the file system on **SD Card**. The user should enter the catalogue in which the new one will be created and press the **<ENTER>** push-button at the **<New Directory>** position. The suggested new catalogue name will appear at the bottom line of the display. If a directory already exists there with the same name the warning message will appear. Otherwise this operation will be performed.



There is another way of saving results as a file in the internal or external memory than pressing the **<Save>** push-button. This can be done in the **File Manager** window by creating new file in the file system. To perform this function the user should enter the catalogue in which the new file will be created and press the **<ENTER>** push-button at the **<New File>** position.

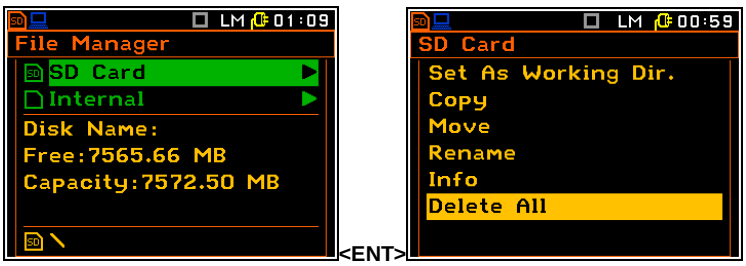


There are two available functions: saving a setup file with the name increased by one (**Auto Name=Number**), and– saving a setup file with the edited name (**Auto Name=Off**).

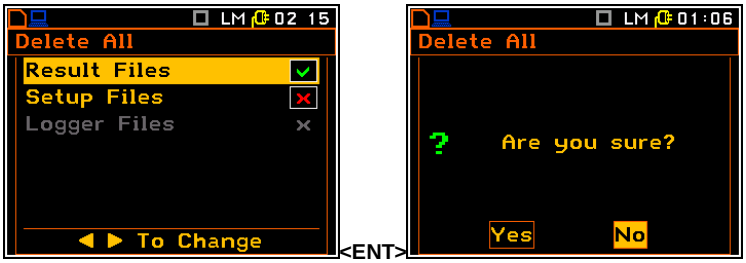


7.2.3 Deleting all files from Internal memory – Delete All

It is possible to delete all result and/or setup files from the instrument's memory. To do this the user should select the memory type and press the **<ENTER>** push-button. After opening the list of operations select the **Delete All** position with the **<▲>, <▼>** push-buttons and press the **<ENTER>** push-button again.



To delete files from the **Internal** memory the user has to mark the desired file type then press the **<ENTER>** push-button. The **Delete All** window with the list of file types will be opened. The user will be asked to confirm the deletion of the selected file type. Select **Yes** then press **<ENTER>** to delete otherwise press **<ESC>** to continue without deletion.



7.2.4 Merging result and setup files memory – Defragmentation

The **Defragmentation** option is used to make the **Internal** memory space contiguous. All new files are saved starting from the beginning of the free memory space. The memory occupied by the deleted file, assuming that the file was not the last one, remains unused for the next files saving. After the removing a file the memory space becomes discontinuous, with unused parts, which cannot be utilized in the future.

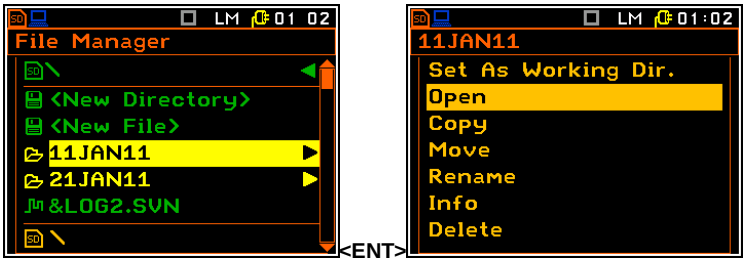
The situation changes after the process called defragmentation. During this process the files saved in the files memory are moved in order to obtain minimum continuous occupied space.

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

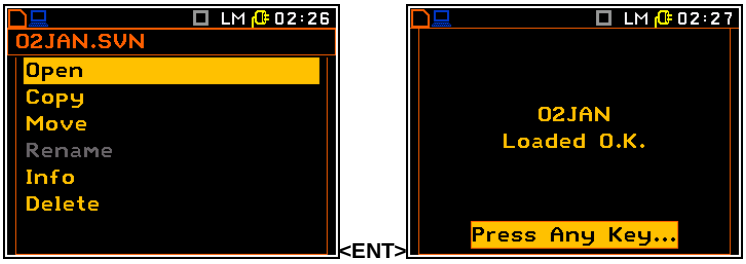
If there are conditions to execute the **Defragmentation** operation the current progress of defragmentation is shown on the display. After successful defragmentation, the special message is displayed and the instrument waits for the reaction of the user. Any push-button should be then pressed except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

7.2.5 Opening file/catalogue – Open

It is possible to open file or catalogue from the file/catalogue list. The user should select the file/catalogue and press the **<ENTER>** push-button. After opening the list of operations select the **Open** position with the **<▲>, <▼>** push-buttons and press **<ENTER>** again. The effect of such operation for the catalogue is the same as opening the catalogue by means of the **<▶>** push-button.

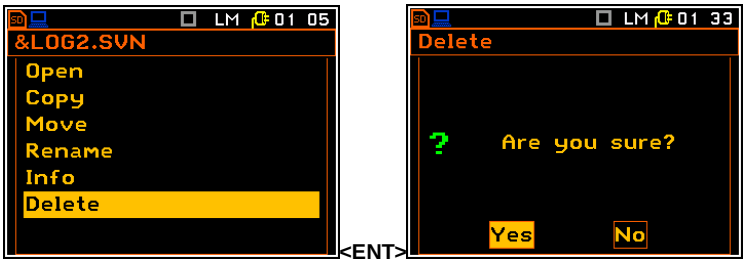


Opening the measurement file means that the measurement results saved in this file will be loaded to the instrument's operation memory and may be reviewed on the screen.



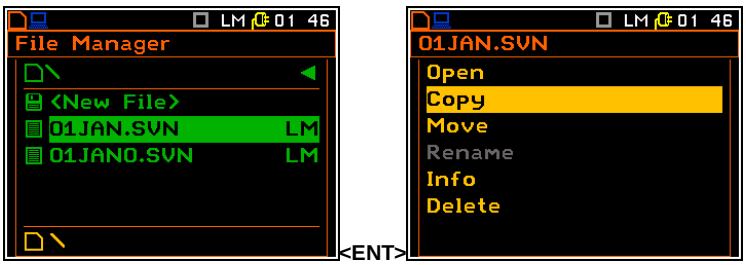
7.2.6 Deleting file/catalogue – Delete

It is possible to delete a file or catalogue from the file/catalogue list. The user should select the file/catalogue and press the **<ENTER>** push-button. After opening the list of operations select the **Delete** position and press the **<ENTER>** push-button again.

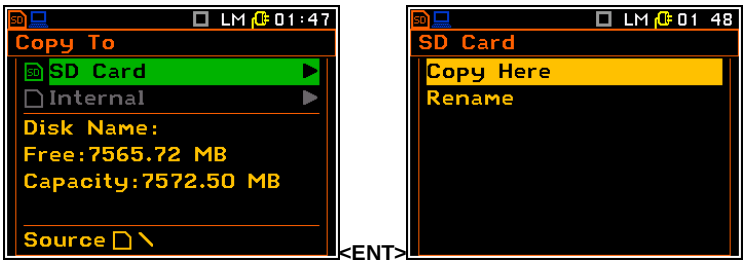


7.2.7 Copying file/catalogue – Copy

It is possible to copy a file or catalogue from the file/catalogue list in one memory type to another or from one catalogue of external memory to another catalogue in the same memory. It is not possible to copy logger files to the **Internal** memory since this type of memory does not support catalogues of files.

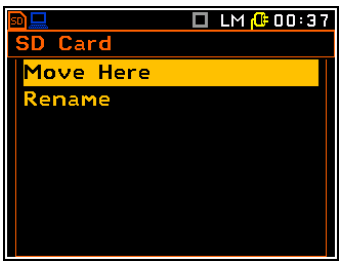


In order to perform this operation select the file/catalogue and press the **<ENTER>** push-button. After opening the list of operations select the **Copy** position and press the **<ENTER>** push-button again. The instrument then will propose to choose the target catalogue for copying. After selection of the target catalogue the user should press the **<ENTER>** push-button. The window with two options will appear: **Copy Here** and **Rename**.



7.2.8 Moving file/catalogue – Move

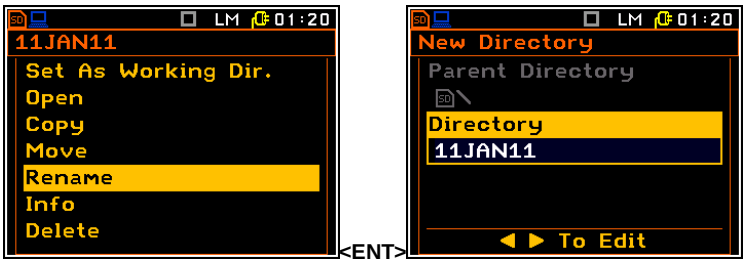
It is possible to move file or catalogue from the file/catalogue list in one memory type to another or from one catalogue of external memory to another catalogue in the same memory. It is not possible to move logger files to the **Internal** memory since this type of memory does not accept such files.



In order to perform this operation select the file/catalogue and press the **<ENTER>** push-button. After opening the list of operations select the **Move** position and press the **<ENTER>** push-button again. The instrument then will propose to choose the target catalogue for copying. After selection of the target catalogue press the **<ENTER>** push-button. The window with two options will appear: **Move Here** and **Rename**.

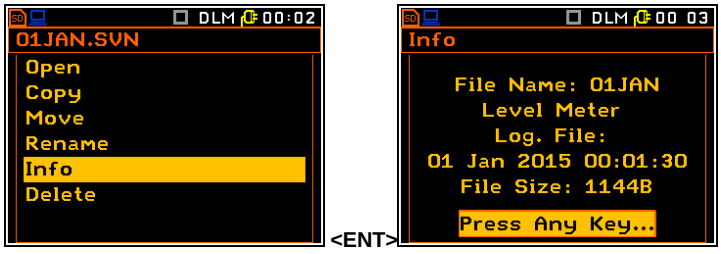
7.2.9 Renaming file/catalogue – Rename

It is possible to rename a file or catalogue. In order to do this the user should select the file/catalogue and press the **<ENTER>** push-button. After opening the list of operations select the **Move** position and press the **<ENTER>** push-button again. The window with text editor function will appear.



7.2.10 Information about file/catalogue – Info

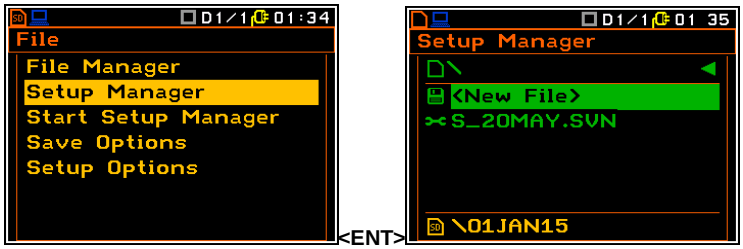
It is possible to get information about a file or catalogue. The user should select the file/catalogue and press the **<ENTER>** push-button. After opening the list of operations select the **Info** position and press the **<ENTER>** push-button again. The instrument then will display the information about the selected file/catalogue.



7.3 Managing the setup files – Setup Manager

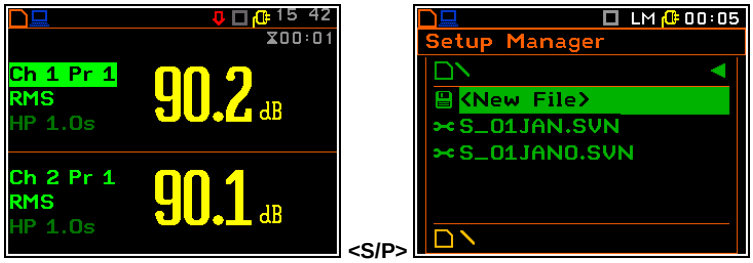
The **Setup Manager** is used for checking the contents of the memory and operating on Setup files such as: open, delete, copy, move, rename files, create new files and display file information.

In the **Setup Manager** window only setup files are displayed. Setup files have extension **SVN** and icon attribute .

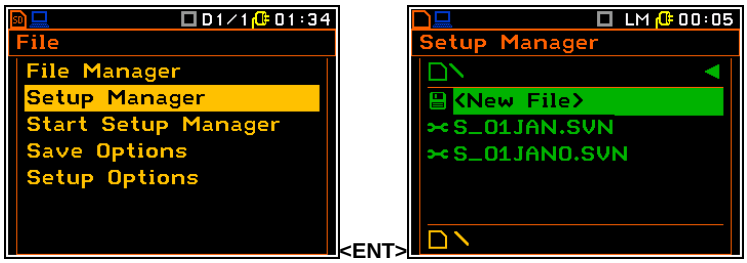


7.3.1 Saving the setup files

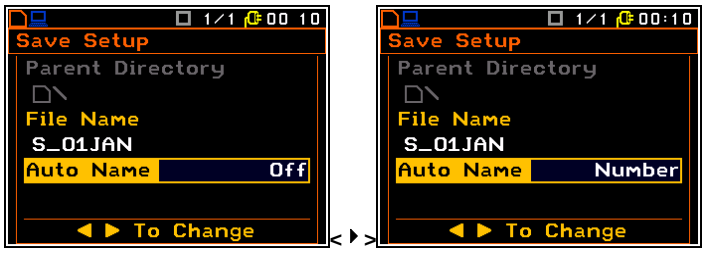
There are two options to open the **Setup Manager** window. One option is to press **<S/P>** push-button when a measurement is not being performed. Another option is to open the **Setup Manager** position from the **File** menu.



In order to save the setup file the user should enter the catalogue in which the new file will be created and press the **<ENTER>** push-button at the **<New File>** position. **Save Setup** window is then opened.

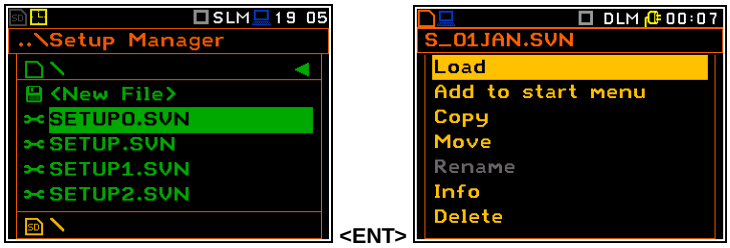


There are two available functions: saving a setup file with the name increased by one (**Auto Name=Number**), and– saving a setup file with the edited name (**Auto Name=Off**).

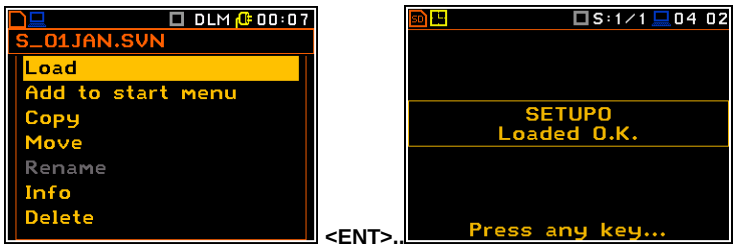


7.3.2 Operations on the setup files

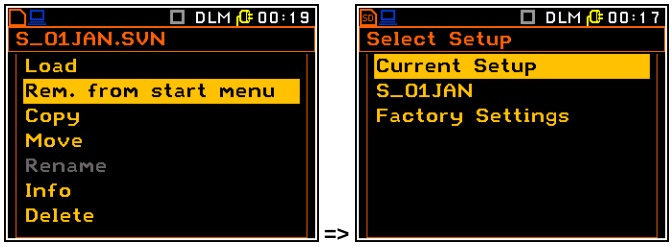
The **Setup Manager** enables the user to perform operations on the setup files in the same way as it was described above for the **File Manager** position. To perform any of the operations like: **Load**, **Add to start menu**, **Copy**, **Move**, **Rename**, **Info** and **Delete** the user should choose the file for which this operation will be applied and press the **<ENTER>** push-button. The list of operations then will open.



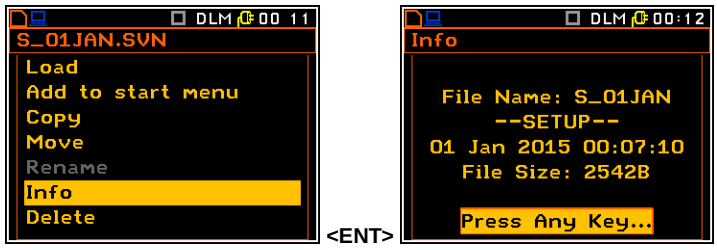
Loading the setup file means that the settings saved in this file will be loaded to the instrument's operation memory. So if the user presses the **<Start/Stop>** push-button the instrument will start the measurement with the newly loaded settings.



Operation **Add to start menu** adds the current setup file to the list of setups the user may choose in the **Select Setup** window (see chapter 3.3).

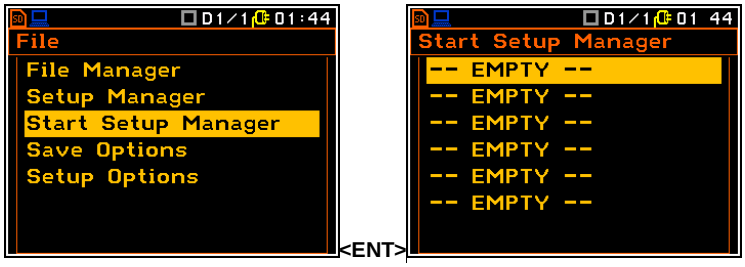


To get information about the setup file the user should select the file and press the **<ENTER>** push-button. After opening the list of operations select the **Info** position and press the **<ENTER>** push-button again.

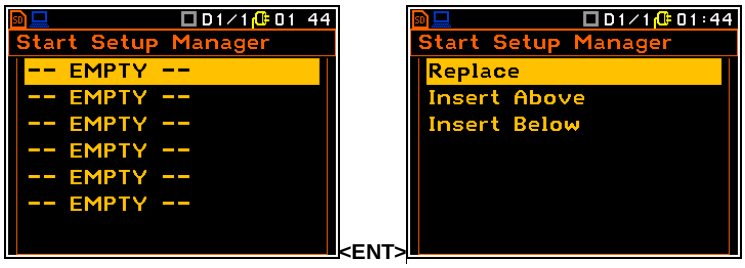


7.4 Options for Select Setup menu – Start Setup Manager

The **Start Setup Manager** sub-list is used for the selection of the setup files for the **Select Setup** menu appearing at instrument start-up. Setups from this list can be quickly selected and loaded at instrument start-up.

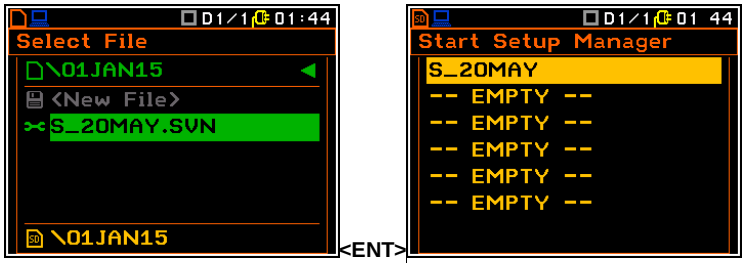


In order to select setup file the **Select Setup** menu, please press the **<ENTER>** push-button at any of the positions in the list, initially marked as empty. Please select **Replace**, **Insert Above** or **Insert Below** to add new setup file in desired position against the previously selected entry of the list.

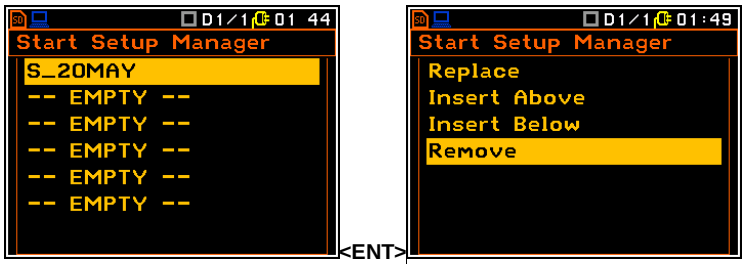


Please select setup file from the instrument memory and press the **<ENTER>** push-button to assign it to the desired position in the **Select Setup** menu.

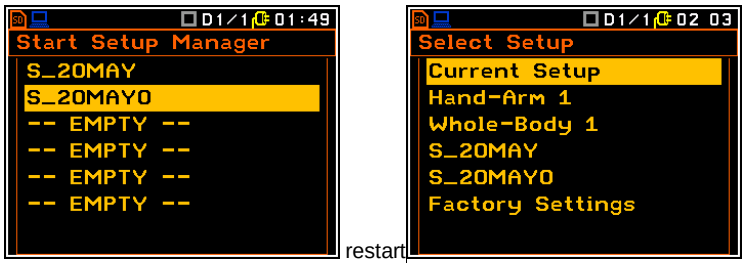
Repeat this procedure to assign more setup files at other positions of this list, if desired.



In case of pressing the **<ENTER>** push-button on an existing assignment, the **Remove** option will also be available. Please use it to remove the assignment. The setup file itself will not be removed.



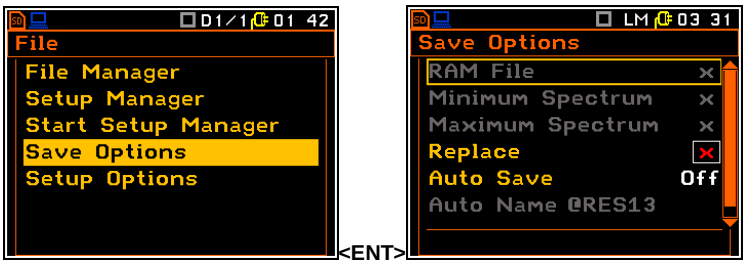
When instrument is restarted, it will show entries from the user-edited list of **Start Setup Manager** in between the **Whole-Body 1** and **Factory Settings** options. Selected setup will be loaded upon pressing the **<ENTER>** push-button.



7.5 Controlling data storing in the instrument's memory - Save Options

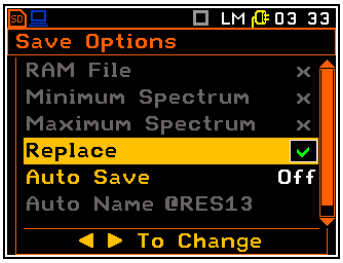
The **Save Options** sub-list is used for the selection of the options for storing data in the instrument's files.

It is possible to replace an existing file in the memory by a new file with the same name (**Replace**), to save automatically the results of the measurements (**Auto Save**), to save the results with the automatically incremented name (**Direct Save**).



Replacement of the existing files by the new ones

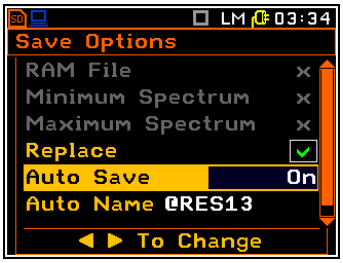
This option is used in remote mode and for the files created with the use of **Auto Save** function. The result of an attempt to save a file with a name, which already exists in the memory, depends on the setting of the **Replace** parameter. If the position is active then the old file will be erased and the new file will be saved with the same name.



The message is displayed that such operation is not available in case this position is not active – cf. the description of the **Save**. Otherwise, the existing file is overwritten.

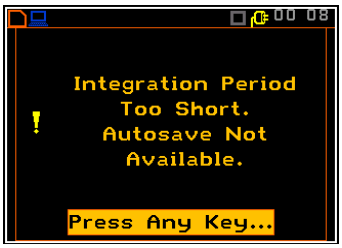
Controlling the measurement results savings

Using the **Auto Save** the user can set the self-saving of the measurement results with automatic name number increment (**Number)** or without it (**Off**). This position was established in order not to waste too much memory of the instrument when the self-saving is not necessary. The **Auto Name** position appears after switching on the **Auto Save** function.



Notice: *The* ***Auto Save*** *function can be performed only in case when the* ***Meas. Period*** *value (path: Menu / Measurement / General Settings) is not less than 10 seconds. If it is less than 10 seconds, the measurement results are not saved* and this is indicated with the message*! There is only one exception - when the* ***Repetition Cycles*** *number (path: Menu / Measurement / General Settings) is equal to one, the* ***Auto Save*** *function is executed disregarding of the value of the integration period.*

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

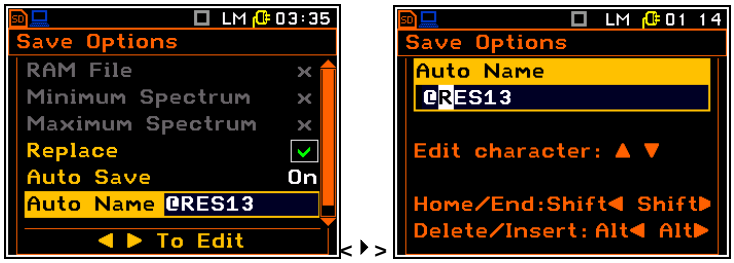


When the **Auto Save** option is active, after starting the measurements by pressing the **<Start/Stop>** push-button the results are saved in the file with the selected name.

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

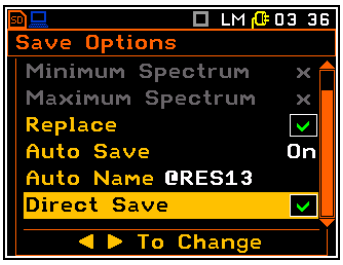
Edition the name of the Auto Save file

The **Auto Name** enables the user to edit the name of the Auto Save file. To edit the file name the user has to press the **<▸>** push-button. The text editing window is opened.



Direct access to the Save function

The **Direct Save** option enables the user to select the instrument's next operation after simultaneously pressing the **<ENTER>** and **<Alt>** push-buttons at the end of a measurement. If this option is not active, after pressing these push-buttons, the **Save** 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.

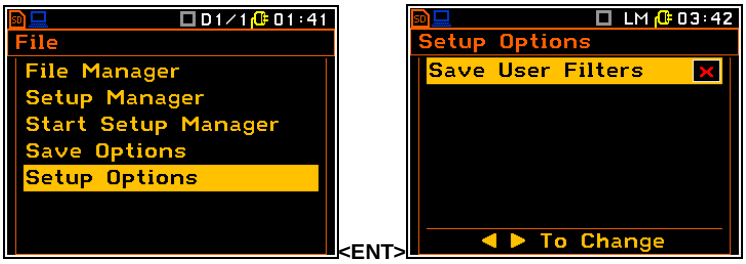


Press the **<ENTER>** and **<Alt>** push-buttons during the execution of a measurement causes, disregarding the option set in the **Direct Save** position, the message "Measurement in Progress" to be displayed.

7.6 Options for setup files - Setup Options

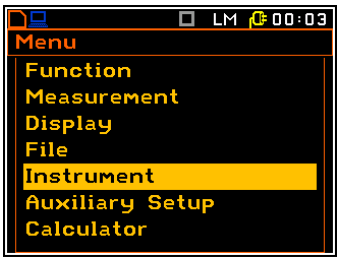
The **Setup Options** sub-list is used for the selection of the options for storing setup files.

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

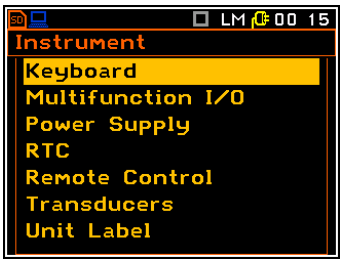


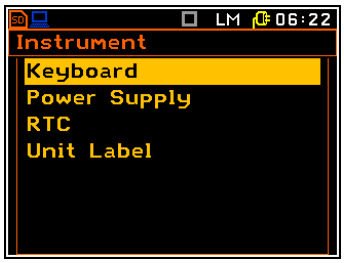
8. SETTINGS OF THE INSTRUMENT PARAMETERS – Instrument

The **Instrument** list contains different sub-lists and positions, which are directly related to the settings of the hardware components of the instrument. In order to open the **Instrument** list the user has to press the **<Menu>** push-button, select the **Instrument** position and press **<ENTER>**.



The **Instrument** list content depends on **Instrument Mode** selection from the **Auxiliary Setup** menu: **Simple Mode** or **Advanced Mode**.



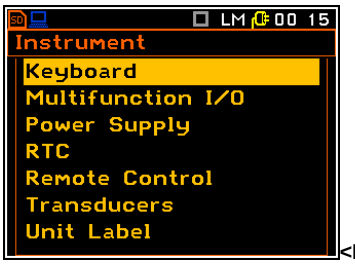


In the **Instrument** list is used for setting the various parameters, which are primarily dedicated to control of the instrument hardware and contains the following items:

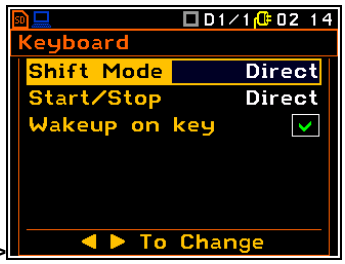
Keyboard	enables the user to set the operating mode of the **<Shift>** and the **<Start/Stop>** push-buttons.
Multifunction I/O	enables the user to select the available functionality of the I/O port.
Power Supply	enables the user to check the power source of the instrument.
RTC	enables the user to set the Real Time Clock.
Remote Control	enables the user to activate or deactivate error confirmation function.
Transducers	enables the user to activate or deactivate the transducer's compensation.
Unit Label	enables the user to check the type of the instrument, its serial number and the current software version installed and the standards the instrument fulfils.

8.1 Selection of keyboard modes – Keyboard

The **Keyboard** sub-list enables the user to programme the operation mode of the **<Shift>**, **<Alt>** and **<Start/Stop>** push-buttons and options for instrument wakeup upon pressing key when it is in screen saving mode.

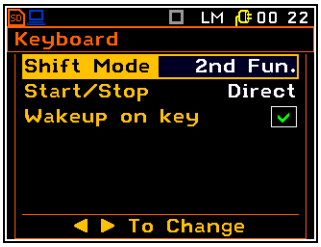


<ENT>



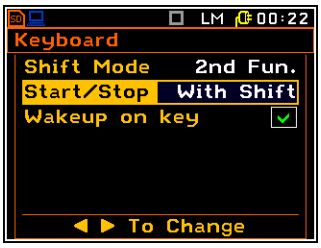
<Shift> / <Alt> push-button mode

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



instrument.

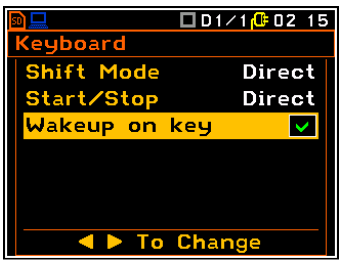
<Start/Stop> push-button working mode selection



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

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

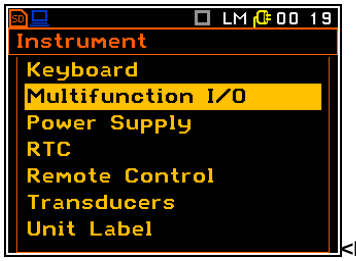
Wakeup on key switch



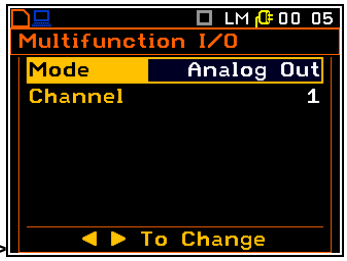
This option decides on instrument wakeup behaviour upon pressing key when it is in screen saving mode. In case the option is **On**, any button pressed will only wakeup the instrument without additional actions. In case the option is **Off**, the instrument will wake up as well as the action of the key will be executed.

8.2 Setting parameters of the I/O port - Multifunction I/O

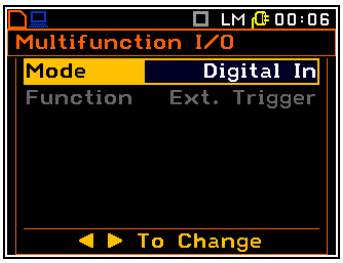
The **Multifunction I/O** sub-list enables the user to select the available functionality of the **I/O** port.



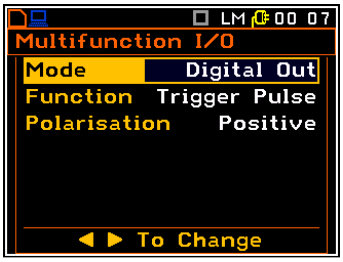
<ENT>



Mode selection of the I/O port



<▸>



In the **Mode** position it is possible to select the function of the instrument's socket named as **I/O**. This socket can be used as:

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

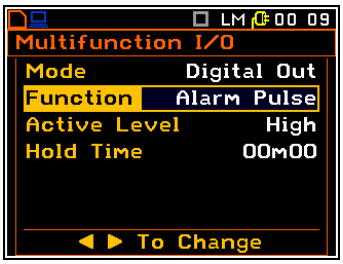
The more detailed description of the **I/O** operation is given in App. C.

Selection the channel for analogue output

The **Channel** position enables the user to select which channel signal is assigned to the analogue out.

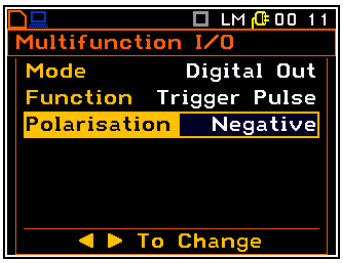
Digital output function selection of the I/O socket

The **Function** position enables the user to set the function of the digital output of the **I/O** instrument's socket. The socket can be used as the source of the trigger pulse (**Trig. Pulse**) which starts the measurement in another "slave instrument" linked to the "master instrument" or as an alarm signal which appears there after fulfilling certain measurement conditions (**Alarm Pulse**).



Polarisation selection of the digital output signal

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

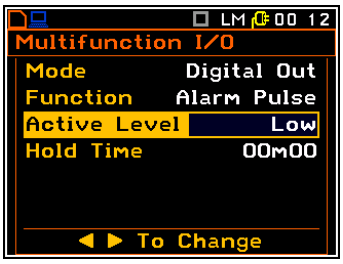


Active level selection of the digital output signal

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

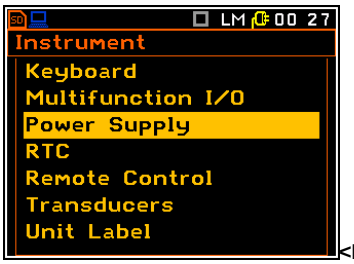
Alarm duration selection

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

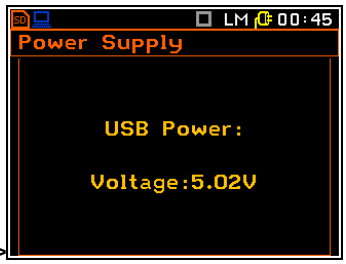


8.3 Checking the powering of the instrument – Power Supply

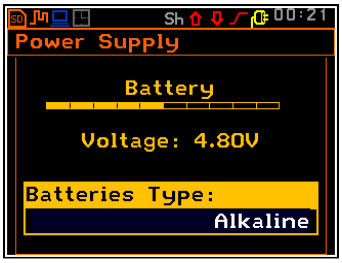
The **Power Supply** position enables the user to check the power source of the instrument: internal battery condition, source and voltage of the external power supply, and also set the battery type for checking their condition.



<ENT>



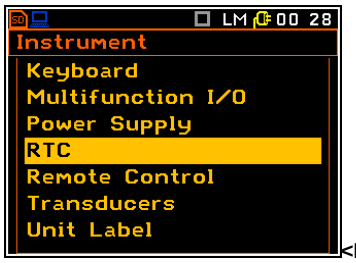
The instrument can be powered from four AA rechargeable or standard alkaline batteries or from the USB interface when its USB Device socket is connected by means of the cable to a PC or USB power supply such as the SA 54. The view presented on the display for each powering sources is different. The current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



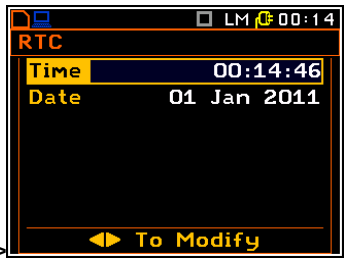
8.4 Programming the instrument's internal Real Time Clock – RTC

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

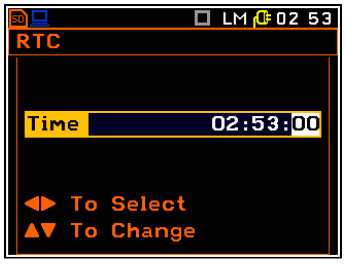
The window is closed and the instrument returns to the **Instrument** list after pressing the **<ENTER>** or **<ESC>** push-button.



<ENT>

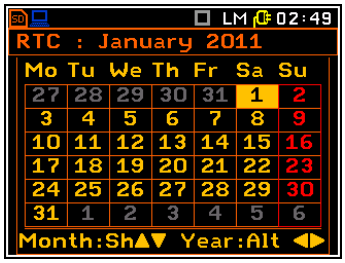


Editing the time is performed in the special window, which is opened after pressing the **<►>** push-button. The selection of the correct parameter (hour, minute, second, and also day, month and year) is performed using the **<◄>**, **<►>** push-buttons and the change of its value – using the **<▲>,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



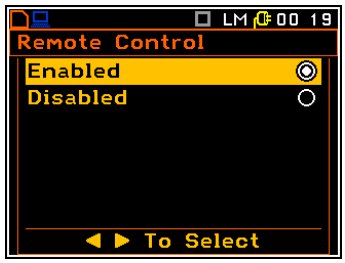
The required date can be selected in a special window, which is opened after pressing the **<◄>**, **<►>** push-buttons when the **Start Day** text is displayed inversely in the **Timer** sub-list.

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



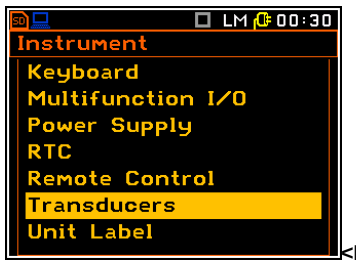
8.5 Activating the remote control error confirmation - Remote Control

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

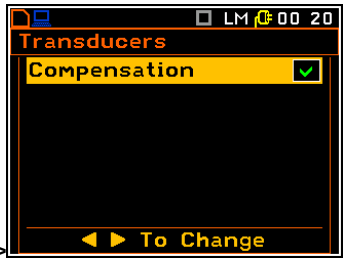


8.6 Transducer's compensation activation – Transducers

The **Transducers** position enables the user to activate or deactivate the transducer's electrical noise compensation.



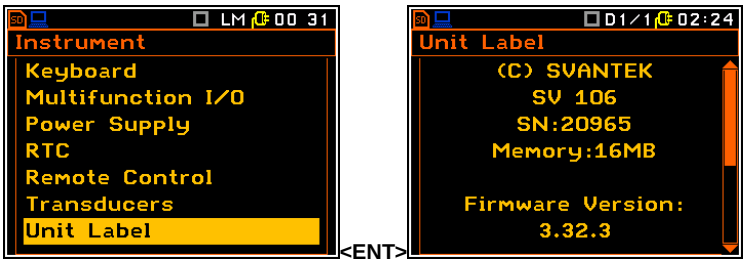
<ENT>



8.7 Checking the specification of the instrument - Unit Label

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

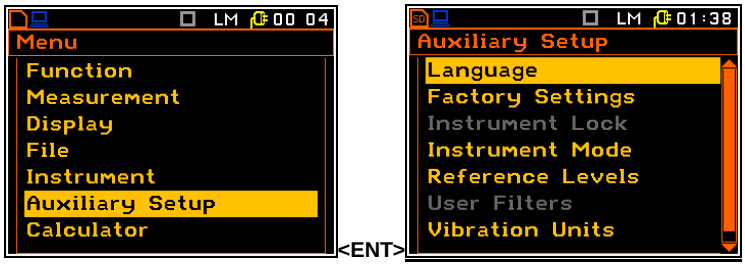
The displayed text is scrolled on the display after pressing **<▲>** and **<▼>**.



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

9. AUXILIARY SETTINGS – Auxiliary Setup

The **Auxiliary Setup** list contains positions directly related with measurements and not related with the hardware components of the instrument. In order to open the **Auxiliary Setup** list the user has to press the **<Menu>** push-button, select the **Auxiliary Setup** position and press **<ENTER>**.



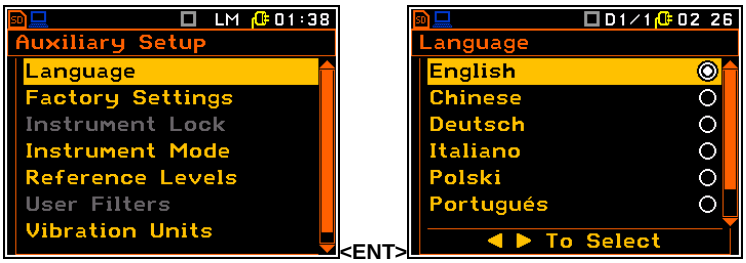
In the **Auxiliary Setup** list the following items are available:

Language	enables the user to select the language of the user interface.
Factory Settings	enables the user to return to the default, factory settings.
Instrument Lock	enables the user to lock the menu and to reduce the access to the program functions of the instrument (function is under development).
Instrument Mode	enables the user to define the scope of available instrument functions and adjust accordingly the lists in some menu windows.
Reference Levels	enables the user to program the user filters.
User Filters	enables the user to define customized frequency filters
Vibration Units	enables the user to select the Vibration units in which the results of the measurements are to be given.
Warnings	enables the user to switch the warnings on or off that can be displayed during the normal operation of the instrument.

9.4. Setting the language of the user interface – Language

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

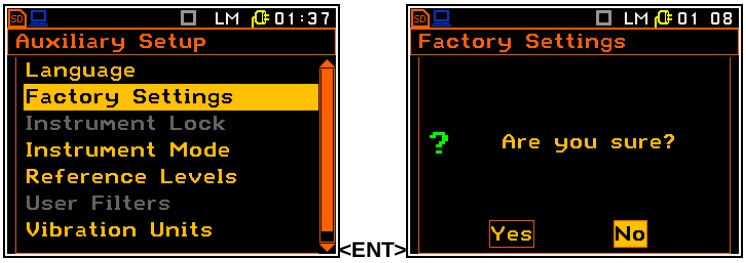
For activation of the Russian version of the user interface, a special code has to be entered.



9.5. Return to the factory settings – Factory Settings

The **Factory Settings** sub-list enables the user to return to the default setup of the instrument.

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

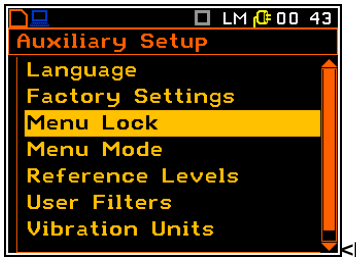


During the clearing process the message **WAIT...** is displayed. The following message is displayed after return to the default settings and the instrument waits for the user's reaction to press any key to continue.

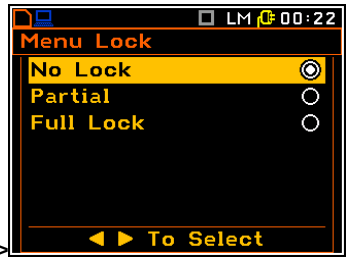
9.6. Locking the menu - Instrument Lock

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

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



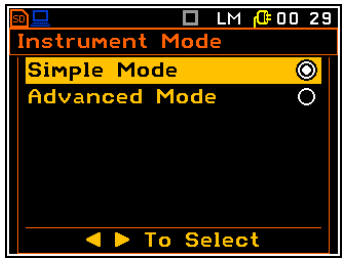
<ENT>



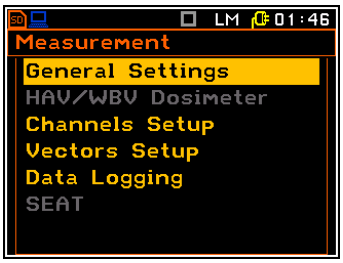
The activation of **Partial** results in locking access to the **Menu** options, which are responsible for measurement parameters. In the case of **Full Lock** no one position from the **Menu** lists is accessible and after attempt of enter **Menu** the **Menu Lock** window appears on the display. The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

9.7. Setting the scope of instrument's functions — Instrument Mode

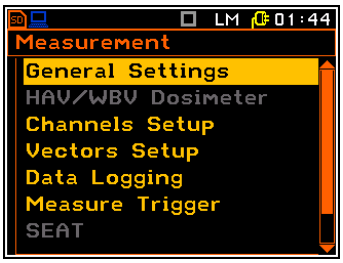
The **Instrument Mode** sub-list enables the user to set the scope of instrument's available functions. There are two possible modes of the instrument: **Simple Mode** and **Advanced Mode**. **Advanced Mode** defines the full scope of available functions, while **Simple Mode** defines a limited scope of available functions, excluding functions which are not so common in use, like trigger, wave and event recording, user filters etc. Thus some menu lists will have different view/content for different instrument modes.



Below are some windows showing the differences between simple and advanced modes.

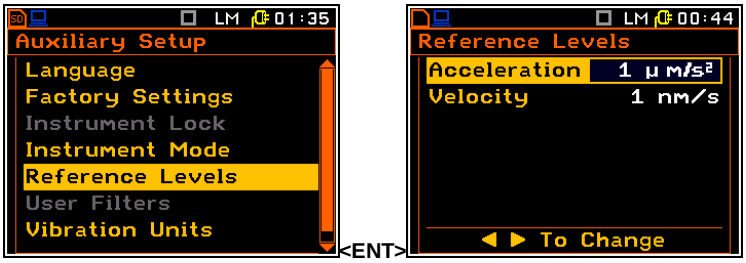


<=>



9.8. Reference signal in vibration measurements - Reference Levels

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



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

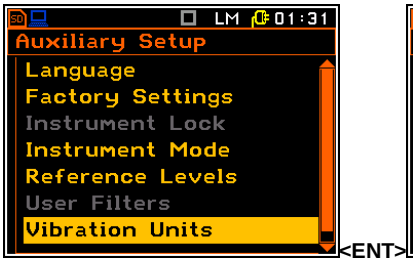
9.9. User filter setting – User Filters

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

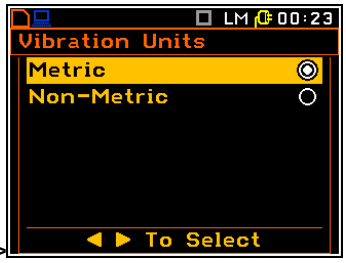
9.10. Selection of the Vibration units - Vibration Units

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

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

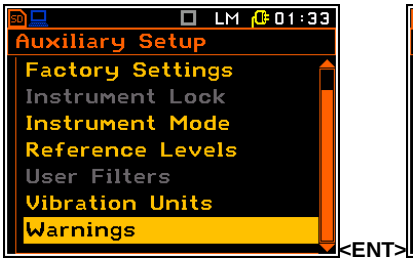


<ENT>

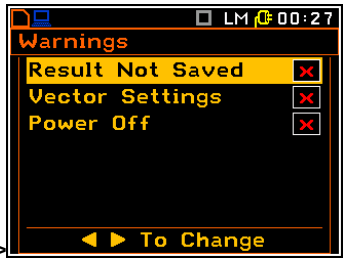


9.11. Warnings selection – Warnings

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

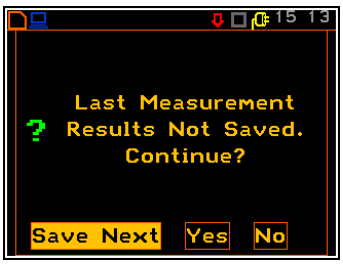


<ENT>



The measurement results are not saved in a file

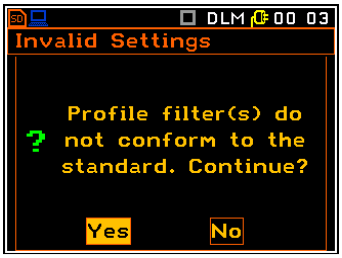
When the **Results Not Saved** position is switched on the special warning is displayed after pressing the **<Start/Stop>** push-button if the result of the previous measurement was not saved in a file.



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

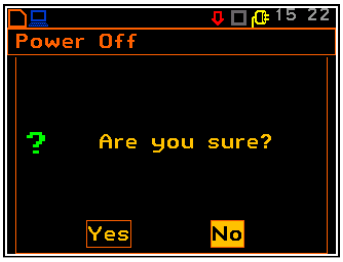
The vector settings warning

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



Confirmation of the instrument switch off

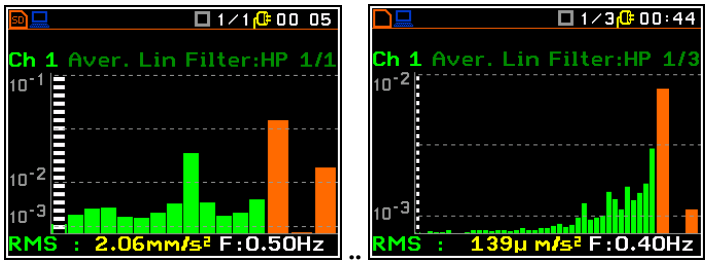
When the **Power Off** position switched on the warning message appears after pressing the **<On/Off>** push-button to switch off the instrument.



10. 1/1 AND 1/3 OCTAVE ANALYSER

The instrument operates as the **1/1 Octave** or **1/3 Octave** analyser in a very similar way to the **Level Meter** mode and, in addition, 1/1-octave or 1/3-octave analysis is performed in parallel with the **Level Meter** operations. All 1/1-octaves (with the centre frequencies from 2 kHz down to 0.5 Hz; in base two system) and 1/3-octaves (with the centre frequencies from 2.50 kHz down to 0.40 Hz; in base two system) digital pass-band filters work in real-time with the **HP** weighting filter (type 1 according to the IEC 61672-1 standard; the filter characteristics are given in Appendix D) and the linear RMS detector.

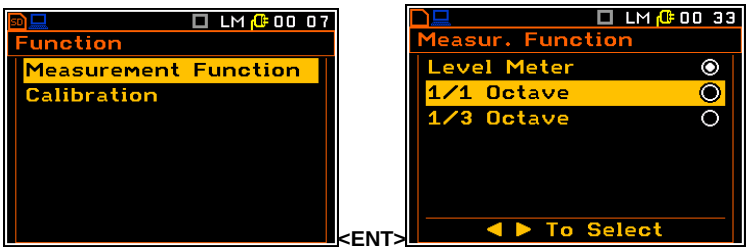
The results of **1/1 Octave** and **1/3 Octave** analysis (also called spectrum analysis) can be examined by the user on a display in the **Spectrum** presentation mode. The availability of this mode can be switched on or off by the user (*path: <Menu> / Display / Display Modes*).



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

10.1. Selection of 1/1 Octave or 1/3 Octave analysis mode

In order to select the **1/1 Octave** or **1/3 Octave** analysis mode the user has to enter the **Function** list by pressing the **<Menu>** push-button, then select the **Measurement Function** text and press **<ENTER>**.



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

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

The execution of **1/1 Octave** or **1/3 Octave** analysis depends on settings of the **General Settings** list: **Measure Period** and **Repetition No.**. Other parameters are set up by default: weighing filter (**HP**), frequency range (from 0.5 Hz up to 2 kHz for 1/1-octave analysis and from 0.40 Hz up to 2.50 kHz for 1/3-octave analysis) and measurement range (**126 m/s^2**). In every 1/1 octave or 1/3 octave pass band the **RMS** result is measured.

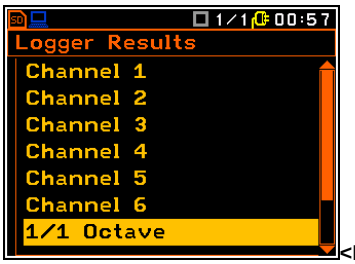
Additionally to the pass band RMS results three Total values are measured during 1/1 and 1/3 octave analysis. Total values parameters (weighting filter, type of integration filer for acceleration, velocity or displacement results and additional calibration factor) are setting up in the **Total Values**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

The output of a selected **1/1 Octave** or **1/3 Octave** filter can be also used as a triggering signal for different trigger applications: triggering the logger, triggering the event recording, triggering the wave recording and alarms.

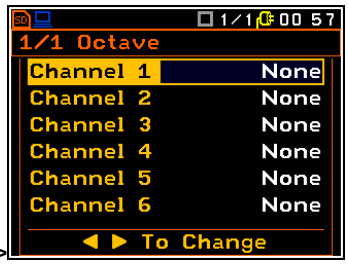
10.3. Saving of 1/1 Octave and 1/3 Octave analysis results in the logger's file -

Logger Results

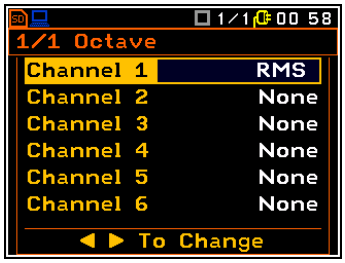
The **RMS** results from **1/1 Octave** or **1/3 Octave** analysis can be saved in the logger file. Spectrum saving in the logger file can be activated for each channel in the appropriate window (*path: <Menu> / Measurement / Data logging / Logger Results / 1/1 Octave or 1/3 Octave*).



<ENT>



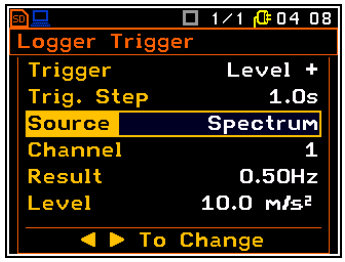
If the **None** value is selected in the **Channel x** position then spectrum data will not be saved in the logger file. If **RMS** value is selected, then RMS spectrum will be saved in the logger file for this channel.



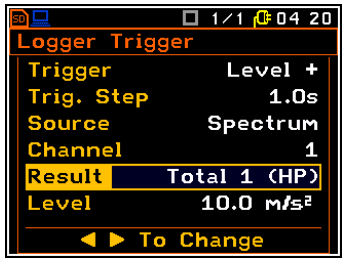
10.4. Selection of 1/1 Octave and 1/3 Octave bandpass results as triggering source

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

The trigger conditions for the above applications can be programmed in the windows: **Logger Trigger**, **Event Recording Trigger**, **Wave Trigger** and **Alarm Trigger**. In these sub-lists the user should select **Spectrum** in the **Source** position and select required central frequency of the bandpass in the **Result** position.

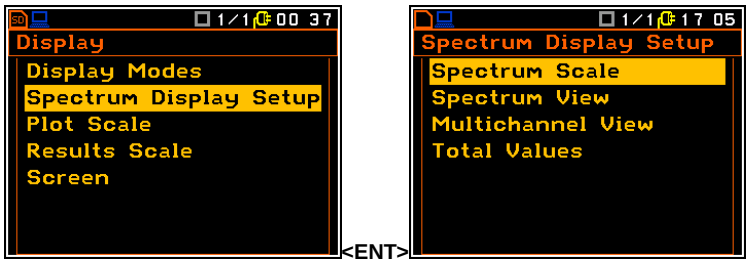


The trigger condition can be defined for the selected RMS result in the **Result** position calculated for **1/1 Octave** filters (**0.50 Hz**, **1.00 Hz**, **2.00 Hz**, **4.00 Hz**, **8.00 Hz**, **16.0 Hz**, **31.5 Hz**, **63.0 Hz**, **125 Hz**, **250 Hz**, **500 Hz**, **1.00 kHz** and **2.00 kHz**), or **1/3 Octave** filters (**0.40 Hz**, **0.50 Hz**, **0.63 Hz**, **0.80 Hz**, **1.00 Hz**, **1.25 Hz**, **1.60 Hz**, **2.00 Hz**, **2.50 Hz**, **3.15 Hz**, **4.00 Hz**, **5.00 Hz**, **6.30 Hz**, **8.00 Hz**, **10.0 Hz**, **12.5 Hz**, **16.0 Hz**, **20.0 Hz**, **25.0 Hz**, **31.5 Hz**, **40.0 Hz**, **50.0 Hz**, **63.0 Hz**, **80.0 Hz**, **100 Hz**, **125 Hz**, **160 Hz**, **200 Hz**, **250 Hz**, **315 Hz**, **400 Hz**, **500 Hz**, **630 Hz**, **800 Hz**, **1.00 kHz**, **1.25 kHz**, **1.60 kHz**, **2.00 kHz**, and **2.50 kHz**), and also **Total Level** results with appropriate filters: **Total 1 (HP)**, **Total 2 (**filtr defined for the profile 1 of the channel**)**, **Total 3 (**filtr defined for the profile 2 of the channel**)**.



10.5. Display options in 1/1 Octave and 1/3 Octave analysis mode

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



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

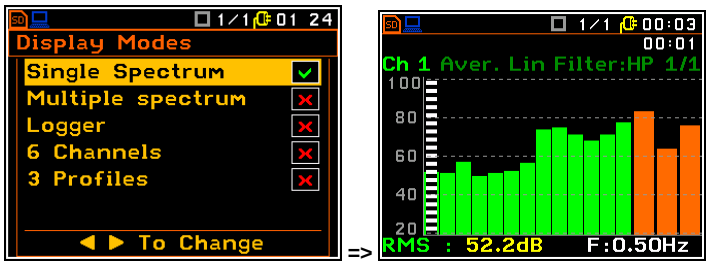
Spectrum Display Setup enables the user to select options for spectrum presentation:

- **Spectrum Scale** to change the scale of the vertical axis of the graphical presentation, switch on or off the grid, switch on or off auto scale;
- **Spectrum View** to choose the type of the spectrum to be presented;
- **Multichannel View** to select how many channels will be displayed simultaneously,
- **Total Values** to select parameters for **Total Values** presentation.

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

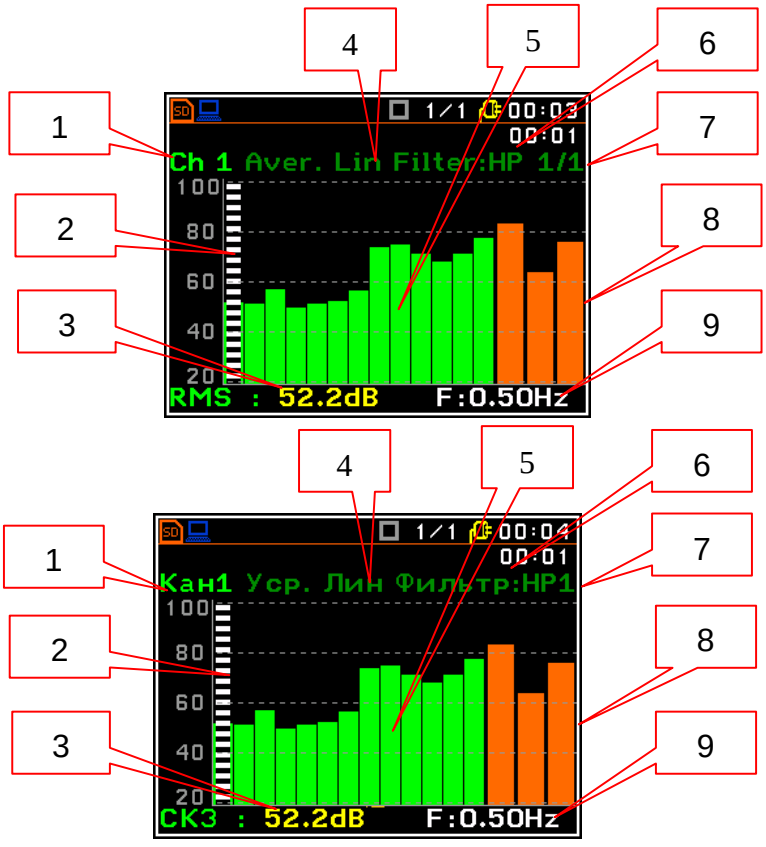
The **Single Spectrum** and **Multiple spectrum** positions of the **Display Modes** list are accessible only for **1/1 Octave** and **1/3 Octave** functions.

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

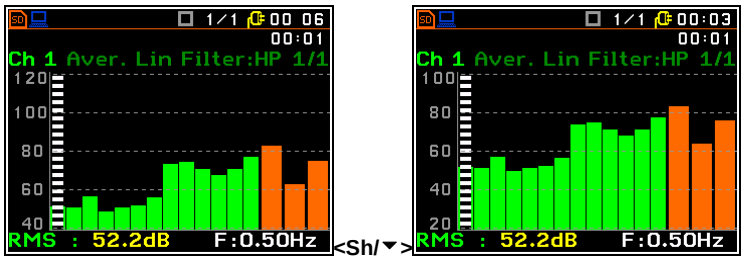


Field description of the Spectrum view

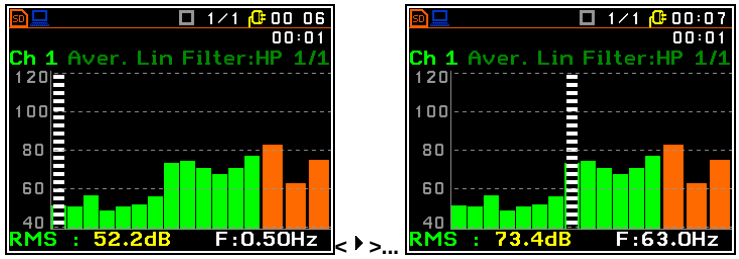
1. Channel number
2. Cursor position
3. Value for the cursor position
4. Used averaging
5. Spectrum plot
6. Used weighting filter
7. Type of spectrum
8. Total values
9. Central frequency for the cursor position



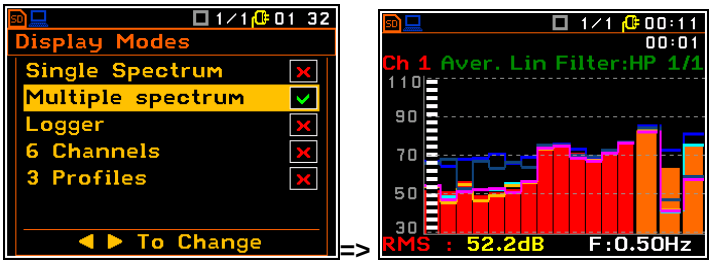
The user may shift the Y-axis during the spectrum presentation by means of the **<Shift>** and **<▲>** (or the **<Shift>** and **<▼>**) push-buttons.



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

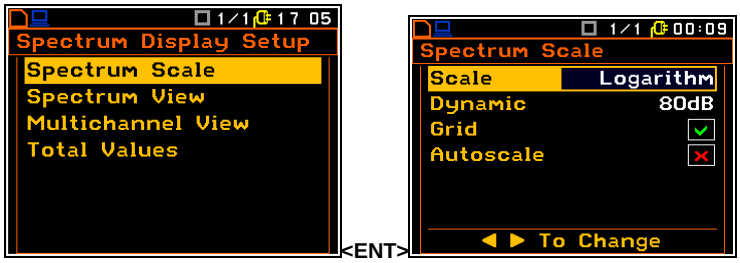


When the **Multiple spectrum** mode is switched on the measurement screen in the **Spectrum** visualisation mode is as shown here.



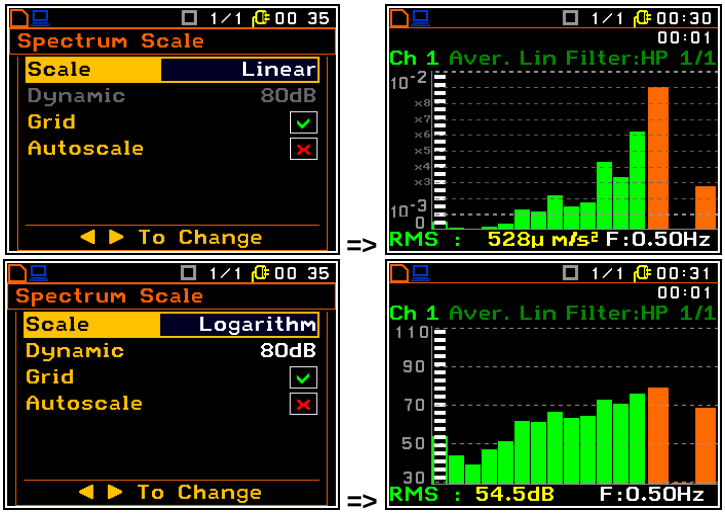
10.7. Setting the scale of the spectrum results presentation – Spectrum Scale

The **Spectrum Scale** sub-list enables the user to change the Y-axis scale in the spectrum presentation mode and switch on/off the grid.

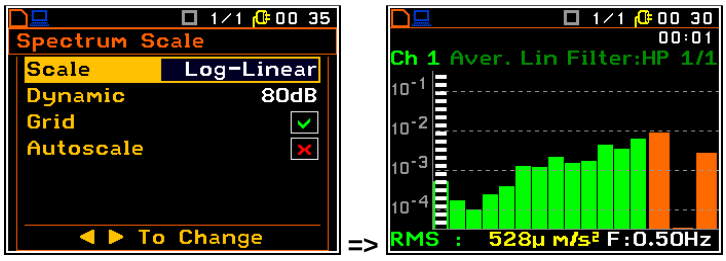


Setting the scale of the measurement results presentation

Three options are available for the **Scale** position: **Linear**, **Logarithm** and **Log-Linear**. In case of **Linear** the graphical presentation and the units are linear. In case of **Logarithm** the graphical presentation is given in the logarithmic scale and the measurement results are expressed in decibels (the results are related to the values set up in the **Reference Level** sub-list (*path: <Menu> / Auxiliary Setup / Reference Levels*). In case of **Log-Linear** Y-scale is logarithmic, but result units are linear.



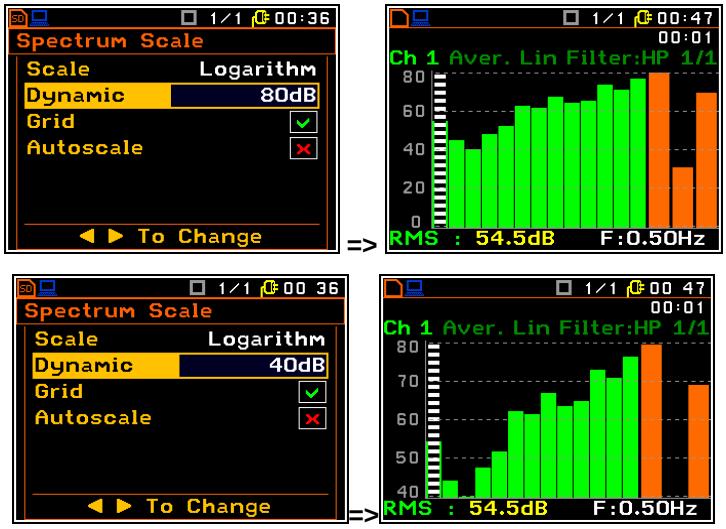
Same spectrum with different **Scale** is as presented here.



Scaling the vertical axis

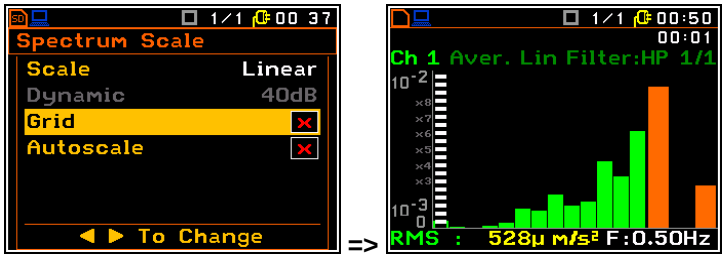
If **Scale** is set to **Logarithmic** or **Log-Linear** then the **Dynamic** position enables the user to select the required dynamic range scaling of the graphical presentation mode. The user can obtain double, four and eight times expansion of the vertical axis (the default vertical axis corresponds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

Displays with the 1/1 Octave results and different Dynamic ranges (80 and 40 dB) are as presented here.



Switching the grid on/off

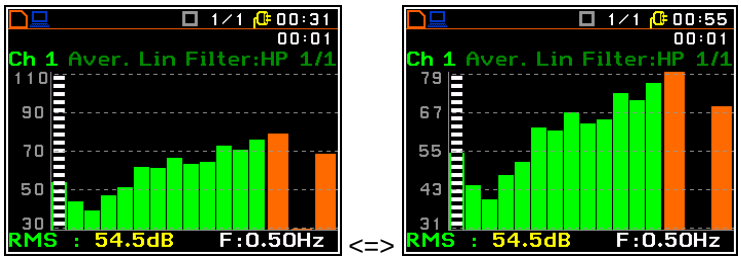
The **Grid** position enables the user to switch on or off the horizontal grid lines for spectrum presentation.



Switching the automatic Y-scale adjustment on/off

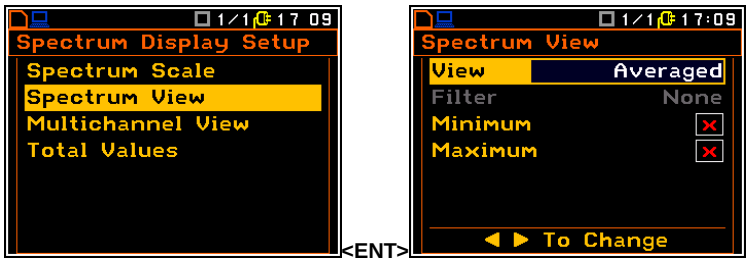
The **Autoscale** position switches on or off the automatic adjustment of the Y axis scale to the full display view. The adjustment is performed automatically every time the spectrum is displayed.

Displays with the autoscale switched off and on are as presented here.

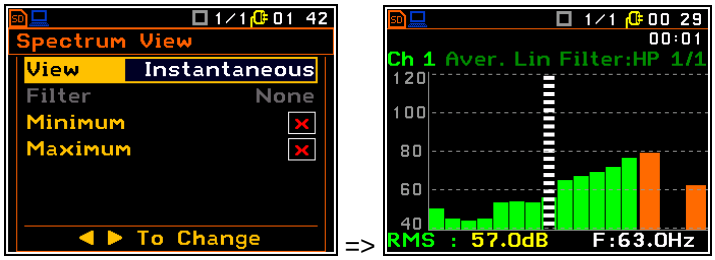


10.8. Setting parameters of the spectrum presentation - Spectrum View

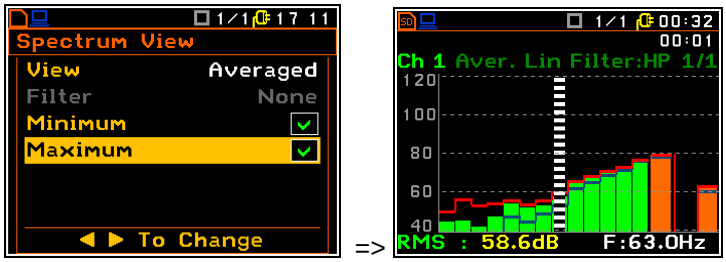
In the **Spectrum View** window the user can program the screen view in the **Single spectrum** and **Multi spectrum** presentation modes and to set: spectrum type to view (**View**), minimum and maximum spectrum (**Minimum** and **Maximum**).



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

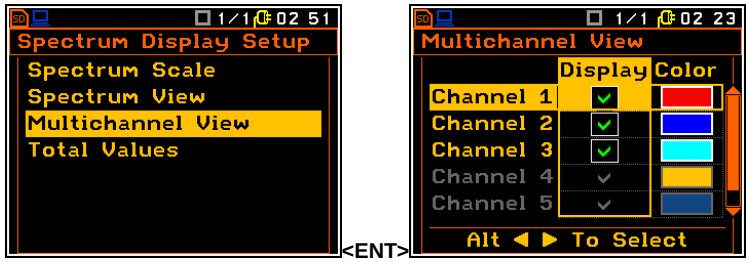


When the **Averaged** or **Instantaneous** spectrum is selected the user can additionally switch on the presentation of the **Max** and/or **Min** spectrum.



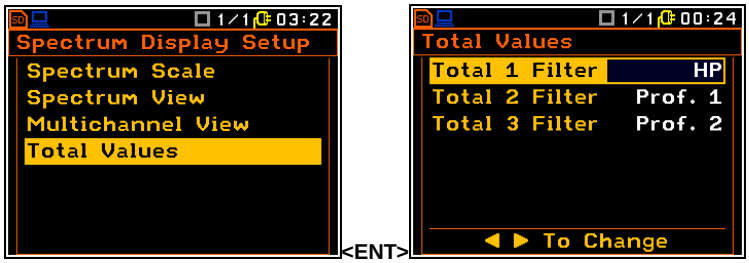
10.9. Selection of channels for presentation – Multichannel View

The **Multichannel View** window enables the user to select for which channels spectra will be viewed during multi spectrum display mode and to assign a special color for the spectrum bars.



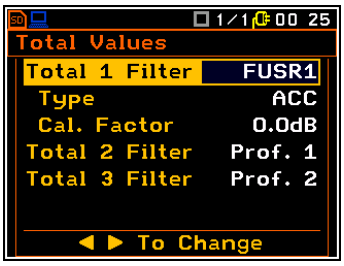
10.10. Setting parameters for total values – Total Values

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



By default **HP** filter is denote for the first Total value. Second and third Totals have same filters as were set up for profiles (**Prof. 1** and **Prof. 2**) in the **Channels** window (*path: <Menu> / Measurement / Channels*).

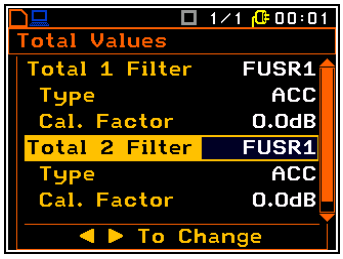
It is also possible to select three user filters: **FUSR1**, **FUSR2** and **FUSR3**. When user filter is selected, two additional positions appear: **Type** and **Cal. Factor**.



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

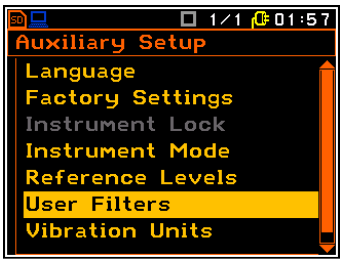
In the **Cal. Factor** position the user can define any additional calibration factor which will be applied to the calculation of Total value.

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



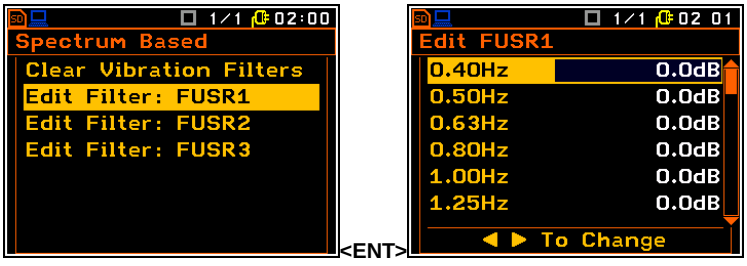
10.11. Setting user filter coefficients for 1/1 Octave and 1/3 Octave analysis – User Filters

The **User Filters** position (*path: <Menu> / Auxiliary Settings / User Filters*) enables the user to introduce the values of the user frequency filters coefficients. This position is active only in **1/1 Octave** and **1/3 Octave** modes. The **User Filters** position opens the window in which the user can clear (**Clear Vibration Filters**) or edit (**Edit Filter**) the filter coefficients for selected user filter **FUSR1**, **FUSR2** and **FUSR3**.



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

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



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

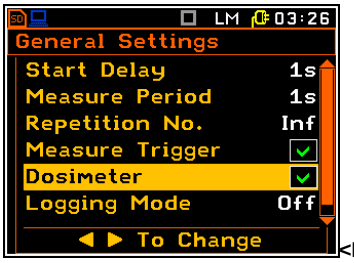
- **0.40 Hz:** available values for 0.4 Hz centre frequency filter: **-100.0dB ... 100.0dB**
- **0.50 Hz:** available values for 0.5 Hz centre frequency filter: **-100.0dB ... 100.0dB**
- **0.63 Hz:** available values for 0.63 Hz centre frequency filter: **-100.0dB ... 100.0dB**
- **0.80 Hz:** available values for 0.8 Hz centre frequency filter: **-100.0dB ... 100.0dB**
- **1.00 Hz:** available values for 1Hz centre frequency filter: **-100.0dB ... 100.0dB**

- **...**
- **2.50kHz:** available values for 2.50 kHz centre frequency filter: **-100.0dB ... 100.0dB**

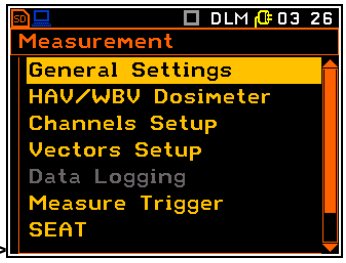
11. DOSIMETER FUNCTION

Activation of the dose meter function

The **Dosimeter** position activates or deactivates the dose meter function. If the **Dosimeter** function is switched on, then all channels will be assigned for whole-body (**WBV**) or hand-arm (**HAV**) dose measurement.



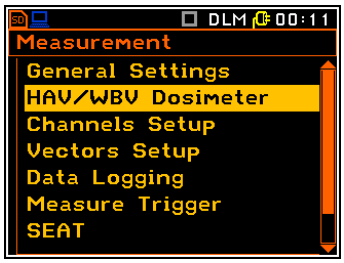
<ENT>



Dosimeter parameters can be setup in the **HAV/WBV Dosimeter** window, opened from the **Measurement** list. If the **Dosimeter** function is switched on, then the **HAV/WBV Dosimeter** position in the **Measurement** list will became active and **DLM**, **D1/1** or **D1/3** function abbreviations appear in the upper line.

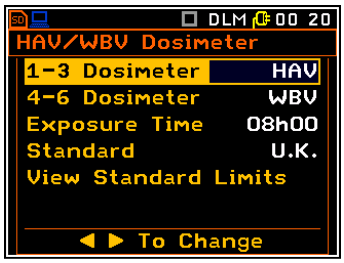
11.1. Setting parameters for dose measurements – HAV/WBV Dosimeter

The **HAV/WBV Dosimeter** list is opened from the **Measurement** menu. This list enables the user to set up the parameters for human vibration dose measurements, like: exposure period, type of measurement (whole body or hand arm), performed in channels 1-3 and 4-6, action limits used for some standards (**U.K.**, **Italy**, **Poland**, **France**, **Germany**, **China**, **Brasil**), as well as limits, defined by the user (**User**).



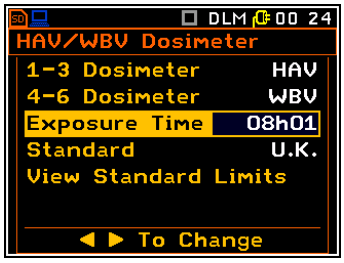
Setting the measurement type for channels 1-3 and 4-6

Positions **1-3 Dosimeter** and **4-6 Dosimeter** enable the user to set the desired type of the measurement, performed with the use of channels 1,2,3 and 4,5,6 – hand-arm (**HAV**) or whole-body (**WBV**) vibration.



Setting the exposure time

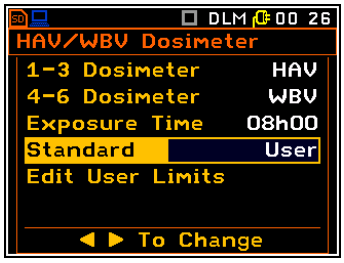
The **Exposure Time** position enables the user to set the desired value of the exposure time that is used for the calculation of the **HAV/WBV Dose** results. The **Exposure Time** values are within the range [**00h01**, **24h00**].



Setting the standard for dose measurements

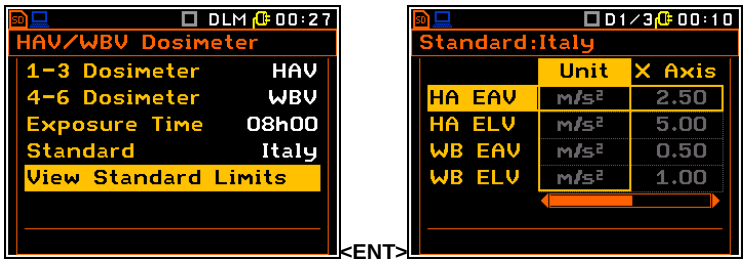
The **Standard** position enables the user to set the standards for the measurements of the **HAV/WBV Dosimeter**. The available values of this position are **U.K.**, **Italy**, **Poland**, **France**, **Germany**, **China**, **Brasil** and **User**.

Depending on the settings in the position **Standard** it is possible to view (**U.K.**, **Italy**, **Poland**, **France**, **Germany**, **China**, **Brasil**) or edit (**User**) limits for dose calculation.

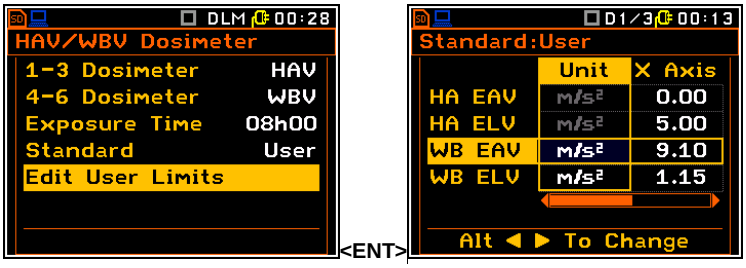


View or editing of the limits for dose calculation

The **View Standard Limits** position opens the window with the coefficients for the selected standard for the given axis. Use the <◀>, <▶> push-buttons to browse displayed axis.



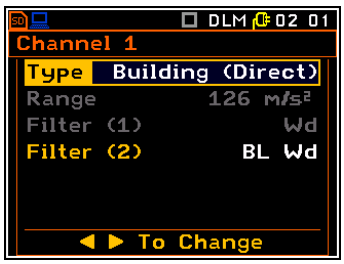
When **User** is selected in the **Standard** position then the **Edit User Limits** position appears on the screen where the user can set up its own specific coefficients for each axis.



11.2. Setting parameters for channels – Channel x

The **Channel x** positions enable the user to set up or display parameters for the individual channel, like input type and filters for profiles.

If **Dosimeter** function is active the first profile filter is set by default and it cannot be changed. When second profile is switched off the filter for second profile doesn't appear as a parameter in the list.Позиции **Канал x** позволяют задавать параметры для отдельных каналов: тип входа и фильтры для профилей.



When **Dosimeter** function is active the filters for first profiles are predefined and depend on the type of dosimeter measurements for the channels – **WBV** or **HAV**.

If **WBV** measurements are performed in channels **1-3** or **4-6** the filters defined for channels are as follows:

Channel 1 or 4: **Wd**, Channel 2 or 5: **Wd**, Channel 3 or 6: **Wk**.

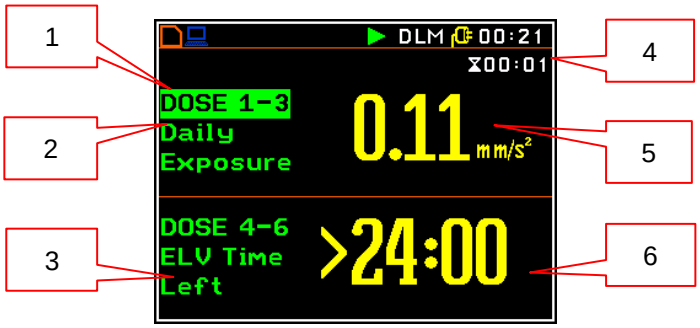
If **HAV** measurements are performed in channels **1-3** or **4-6** the filters defined for channels are as follows:

Channel 1 or 4: **Wh**, Channel 2 or 5: **Wh**, Channel 3 or 6: **Wh**.

If second profile is active during **Dosimeter** measurements, the filter can be **HP** or one of **BL Wd**, **BL Wk** or **BL Wh** depending on what filter was predefined for the first profile of the chosen channel, according to the rule described above.

11.3. Dosimeter presentation mode

The dosimeter presentation mode is always active when **Dosimeter** is switched on.

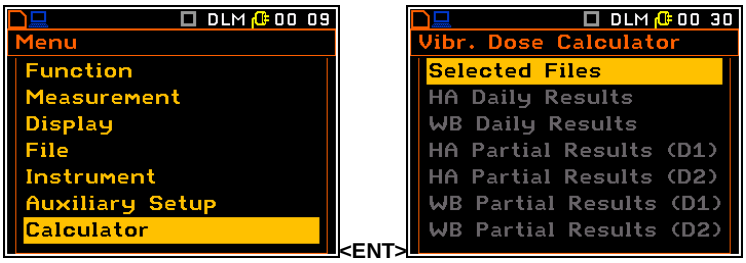


Fields description of the dosimeter view

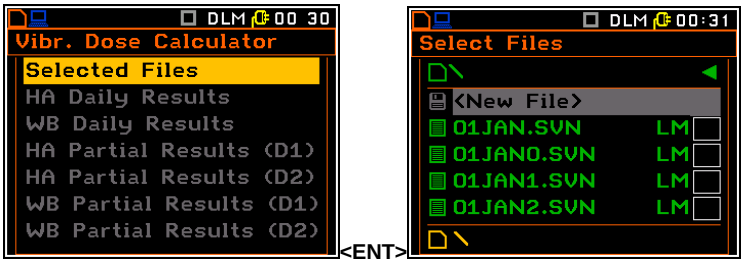
1. Channels used for dose calculation. In case SV 105AF is used, also **FORCE 1-3/4-6** may be available here.
2. Function name which may include: **Daily Exposure**, **Vector**, **MAX(VDV)**, **Currrent Exposure**, **AEQ**, **MAX(RMS)**, **EAV Total Time**, **EAV Time Left**, **ELV Total Time**, **ELV Time Left, FORCE** results (**AVE, MAX, MIN, PEAK, LEVEL+** time).
1.
3. Second field for dose results measurement.
4. Elapsed time shows the current second of the measurement. The value presented there belongs to the range [**1**, **Meas. Period**].
5. The value of measured function.
6. The value of measured function in the second field.

11.4. Calculation of hand-arm and whole-body daily results – Calculator

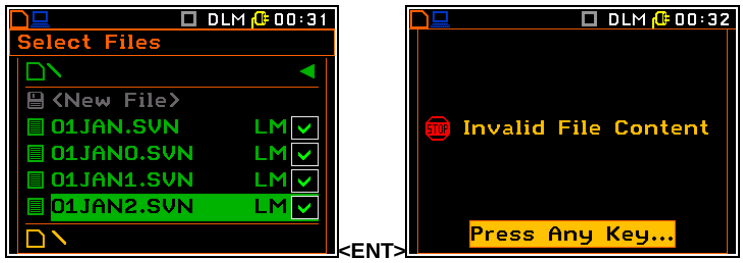
The **Calculator** position is used to calculate the various parameters, which are dedicated to the dosimeter measurements. This position opens the **Vibr. Dose Calculator** menu, which is based on **Selected Files** selected files with partial (**Selected Files**) HA and WB daily results.



The **Selected Files** position is used to load data from the files with dosimeter results. It is possible to select up to 10 files for the calculations. The files are marked and loaded after pressing the **<ENTER>** push-button. The name of this file appears in a list as it is presented here.



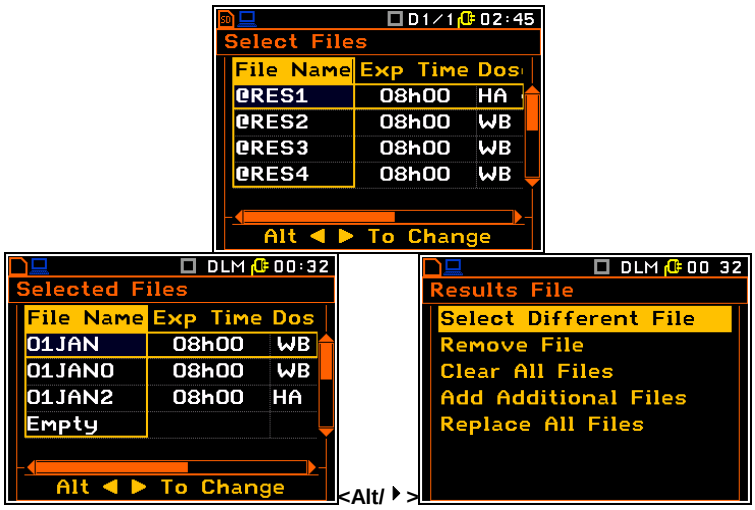
The **Invalid File Content** message is displayed when the selected file does not contain dosimeter data. The instrument waits for the reaction of the user by pressing any push-button except **<Shift>** and **<Alt>**. After that, it returns to the **Selected Files** list.



In the **Selected Files** window the user can change the content of the table.

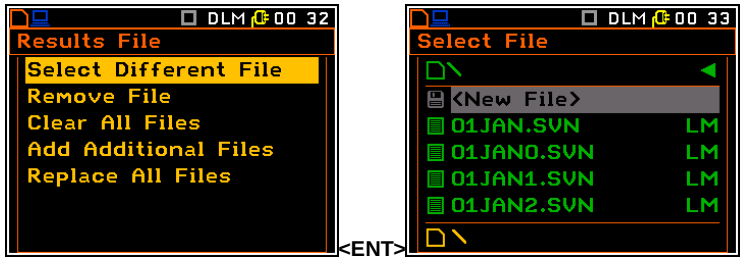
Change the file

After pressing the **<◄>**, **<►>** push-buttons together with **<Alt>**, the **Result File** list is opened. This allows the user to perform some operation with the file.



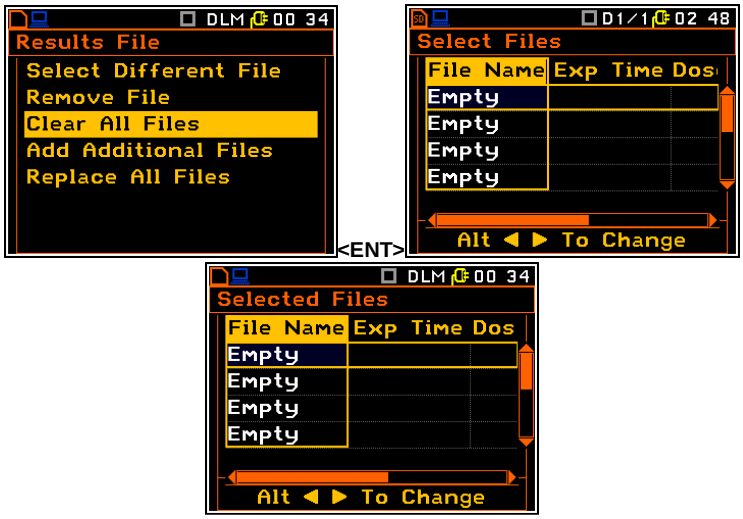
Select Different File

To select a different file the user should press the **<ENTER>** push-button on this position, select new file and press **<ENTER>** again.



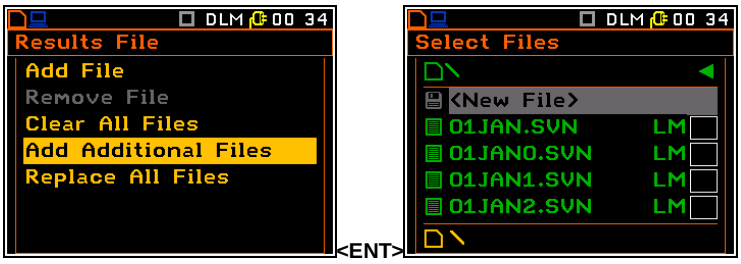
Remove File/ Clear All Files

To remove file/all files the user should press the **<ENTER>** push-button on this position. Selected file and all files from the table will be deleted.



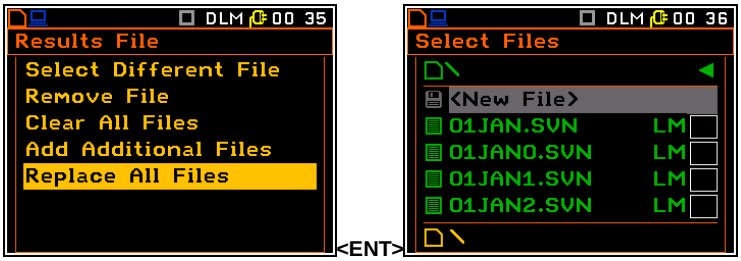
Add Additional Files

To add additional files the user should press the **<ENTER>** push-button on this position, select the new files and press **<ENTER>** again.



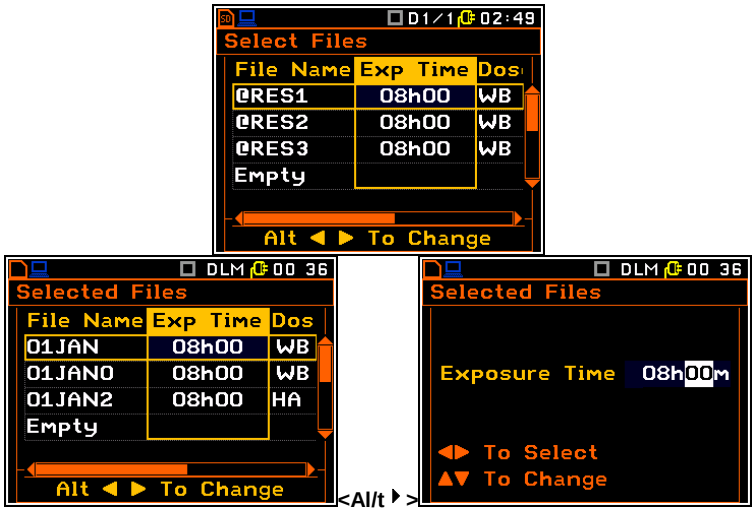
Replace All Files

To replace all files the user should press the **<ENTER>** push-button on this position, select new files and press **<ENTER>** again.



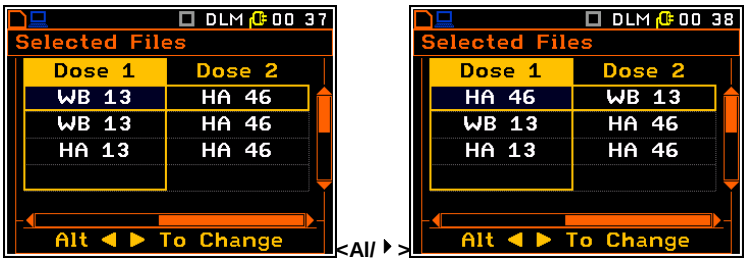
Exposure Time

The **Exp Time** (Exposure Time) defines the period during which the measurement results are extrapolated. The required value can be set in the special window, which is opened by means of the **< ◀ >**, **< ▶ >** push-buttons pressed together with **<Alt>**. The Exposure Time can be set from **00h00m** to **24h00m**. The user can set the Exposure Time for each file separately.



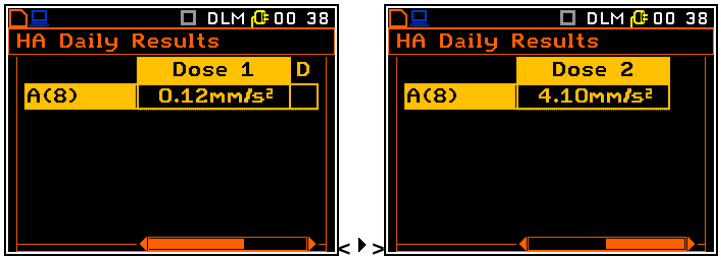
Selection of dose results

Dose results calculated with the use of channels 1,2,3 or 4,5,6 can be assigned for the calculation of **Dose 1** or **Dose 2** results. **Dose 1** or **Dose 2** results will be calculated for HA and WB measurements based on set of appropriate selections (files).



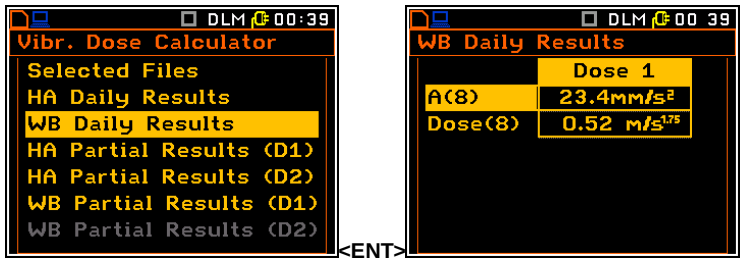
Hand-Arm daily dose results

The **HA Daily Results** position is used to display daily HA dose calculations for all selected files.



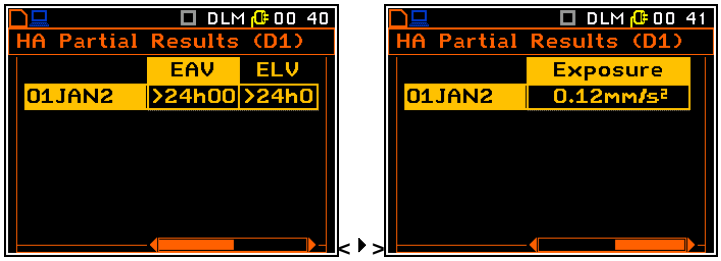
Whole-Body daily dose results

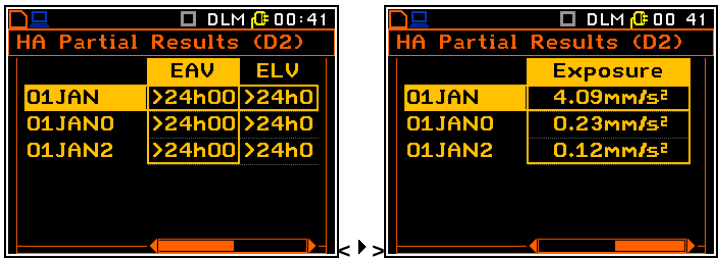
The **HA WB Daily Results** position is used to display daily WB dose calculations for all selected files.



Hand-Arm partial results

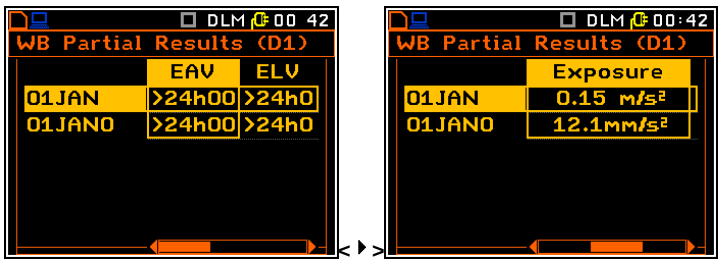
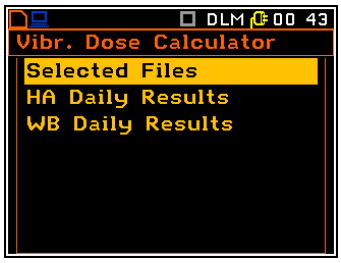
The **HA Partial Results** position is used to display daily HA dose results for all selected files.





Whole-body partial results

The **WB Partial Results** position is used to display daily WB dose results for all selected files.



When **Simple Mode** function is selected in the **Instrument Mode** sub-list, then **Vibr. Dose Calculator** list consists of the first three positions only.