SVANTEK

USER MANUAL

SVAN 974

VIBRATION ANALYSER

Warsaw, 2017-03-26
Rev. 1.01

Note: *Because of continuous product improvement SVANTEK reserves the right to make changes to product specifications without notice. To download the most up to date user's manual please visit our web site at www.svantek.com. This user's manual presents the firmware revision named 1.21.1 and bootstrap revision named 2.05 (see the* ***Unit Label*** *review to check version details).*
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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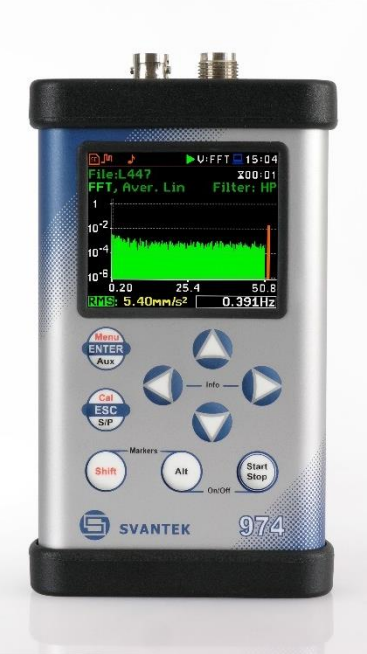
1. INTRODUCTION



The **SVAN 974** is an all-digital Vibration level meter (VLM) as well as a real time 1/1 or 1/3 octave and FFT analyser. The instrument is designed for general vibration measurements, industrial machinery monitoring, occupational health and safety monitoring. The accelerometer input supports different types of vibration sensors, including IEPE, Charge and Direct. Parallel to the vibration measurement, the RPM measurement with dedicated tachometer can be performed.

Three vibration user configurable profiles allow parallel measurements with independently defined frequency filters and RMS detector time constants. Each profile provides significant number of results (like **RMS**, **Ovl**, **Peak**, **P-P** and **MTVV**). Advanced time history logging for each profile provides complete information about the measured signal using the SD-card fitted in the bottom of the meter and can be easy downloaded to any PC using the USB interface and SvanPC++ software.

All required weighting filters: **HP1**, **HP3**, **HP10**, **Vel1**, **Vel3**, **Vel10**, **VelMF**, **Dil1**, **Dil3**, **Dil10** and **Wh** for general vibration measurements (like acceleration, velocity and displacement), including the latest ISO 20816-1:2016 standard, are available with this instrument.

Using the computational power of its digital signal processor the SVAN 974 instrument can, simultaneously to the meter mode, perform the real time **1/1 Octave** or **1/3 Octave** analysis including calculations of statistical levels.

Time domain waveform signal recording on the SD-card is available as an option and advanced trigger and alarm functions are available in the standard version of this instrument.

A fast USB 1.1 interface (12 MHz) creates a real-time link for the PC "front-end" application of the SVAN 974 instrument. The measurement results can be downloaded to PC using all the interfaces mentioned above.

The instrument is powered from four AA standard alkaline or rechargeable batteries (i.e. NiMH – a separate charger is required) or from the USB interface. Robust and lightweight design enhances the exceptional features of this instrument.

1.1. SVAN 974 - Vibration Level Meter & Analyser

- General Vibration measurements (acceleration, velocity and displacement) and optionally HVM meeting ISO 20816-1:2016 standard in the frequency range depending on the parameters of the attached accelerometer, i.e. with SV 80 general purpose transducer is equal to 0.5 Hz ÷ 14 kHz.
- Parallel **RMS**, **MTVV** or **Max**, **Peak**, **Peak–Peak** measurements.
- **HP**, **HP1**, **HP3**, **HP10**, **Vel1**, **Vel3**, **Vel10**, **VelMF**, **Dil1**, **Dil3**, **Dil10** and **Wh** weighting filters.
- **1/1 Octave** and **1/3 Octave** real time analysis - 15 filters with centre frequencies 1 Hz ÷16 kHz, and 45 filters with centre frequencies 0.8 Hz ÷ 20 kHz, Type 1 IEC 61260-1: 2014.

1.2. General features of SVAN 974

- Advanced **Data Logger** function
- FFT analyser
- 1/1 and 1/3 octave band analyser (option)
- Time domain waveform signal recording (option)
- Advanced trigger and alarm functions
- **USB 1.1 Client interface** (real time PC "front end" application supported)
- Integration time programmable up to **24 h**
- Power supply by **four AA** rechargeable or standard batteries
- Hand held, light weight and robust case
- Easy to use with menu driven user interface
- Dedicated input for a Tachometer

1.3. Accessories included

- **SV 80** general purpose vibration accelerometer 100 mV/g (10 mV/ms^{-2})
- **SA 27** mounting magnet for the accelerometer
- **SC 27** TNC (plug) to TNC (plug) coil cable (2 m)
- **SA 74** waterproof carrying case
- **SC 56** USB cable
- **SA 62** 8 GB micro SD card
- **SV 974_4** FFT analysis option
- **four AA** alkaline batteries
- **SvanPC++** download and viewing software.

1.4. Accessories available

- **SVRPM_PROB** Laser Tachometer with SC 69 cable
- **SA 47** carrying bag for SVAN 95x and accessories (fabric material)
- **SA 54** Power supply unit by USB interface using cables SC 16 or SC 56 (cables not included)
- **SA 31** external charger for four AA rechargeable batteries.

1.5. Software options available

- **SV 974_1** 1/1 & 1/3 octave analysis option
- **SV 974_8** Rotation measurement option without Laser Tachometer
- **SV 977_15** Time domain waveform signal recording (to the micro SD card: *.srt or *.wav format).

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

1.6. General parameters

Input	IEPE, Charge amplifier or Direct with TNC connector
IEPE Current	Selectable: 1.5 mA, 3.0 mA, 4.5 mA
Dynamic Range	More than 100 dB in single range
Internal Noise Level	Less than 10 µV RMS (IEPE input & HP1 filter)
Frequency Range (-3 dB)	0.7 Hz ÷ 22.6 kHz, sampling rate 48 kHz
Display	Colour OLED 2.4”, 320 x 240 pixels
Memory	MicroSD flash card slot (supports 4 GB ÷ 16 GB cards)
Interfaces	USB 1.1 Client, Extended I/O - AC output 1 V RMS Sine (1.41 V Peak) or Digital Input/Output (Trigger - Pulse)
Power Supply	Four AA batteries (alkaline) operation time > 12 h (6.0 V / 1.6 Ah)1
	Four AA rechargeable batteries (not included) operation time > 16 h (4.8 V / 2.6 Ah)1
	USB interface 500 mA HUB
Environmental Conditions	Temperature from -10 oC to 50 oC
	Humidity up to 90 % RH, non-condensed
Dimensions	140 x 83 x 33 mm (without accelerometer)
Weight	Approx. 390 grams including batteries (without accelerometer)

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 push-buttons for control 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 with 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 activate 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. To select the third function, the user must press the **<Alt>** and the second push-button simultaneously.

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

<Start/Stop> This push-button enables the user to start the measurement process when the instrument is not measuring or to stop it when the instrument is in course of the measurement. It is also possible to set the mode of this push-button such that to start or stop the measurements the user should press it simultaneously with the **<Shift>** push-button. This can prevent accidentally starting or stopping a measurement at the wrong time by just brushing against the Start/Stop button on its own.

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

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

<Menu> This push-button (**<ENTER>** pressed together with **<Shift>**) enables the user to enter the main list containing seven sub-lists: **Function**, **Measurement**, **Display**, **File**, **Instrument** and **Auxiliary Setup**. Each of the above-mentioned 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 the control of the instrument as the user has faster access to the most frequently used sub-lists for easy navigation.

<Save> This push-button (**<ENTER>** pressed together with **<Alt>**) enables the user to save the measurement results (see description in chapter 3.5).

<ESC> This push-button closes the control lists, sub-lists or windows. It acts in an opposite way 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 (**<ESC>** pressed together with **<Shift>**) opens the **Calibration** sub-list.

<S/P> This push-button (**<ESC>** pressed together with **<Alt>**) enables the user to pause or break the measurement process temporarily during the measurement or to save the setup file if the instrument is not running the measurement.

◄, ► These push-buttons enable the user specifically to:

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

(◄, ►) The ◄ or ► push-buttons pressed together with **<Shift>** enable the user specifically to:

- change the parameters value with double step (e.g. **Start Delay** period: form **1s** to 11**s**, **21s**, … etc.);
- to shift cursor from the first to the last position and back on the graphical view mode.

[◄, ►] The ◄ or ► push-buttons pressed together with **<Alt>** enable the user specifically to:

- select the parameters value in an active position in the matrix parameter list;
- scroll the parameters in an active field on the result view screen;
- insert or delete a character in the text edition screen.

▲, ▼ These push-buttons enable the user specifically to:

- select line in the list;
- select the active field on the result view screen;
- select the correct character from the list in the text edition screen;
- activate markers 1 and 4.

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

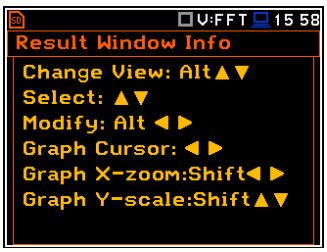
- shift the cursor from the first to the last position and back on the menu list;
- change the relationship between the Y-axis and X-axis of all plots presented on the screen.

[▲, ▼] The ▲ or ▼ push-buttons pressed together with **<Alt>** enable the user specifically to:

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

[Info]

The **<Info>** push-button (simultaneous pressing the ◄ and ► push-buttons) opens the window with the help information in the measurement display modes. Press **<ESC>** or <**ENTER**> to exit the Info screen.

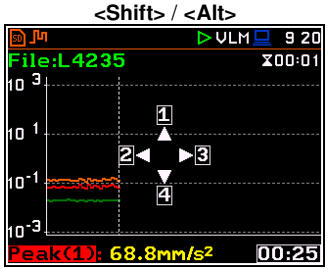


<Markers>

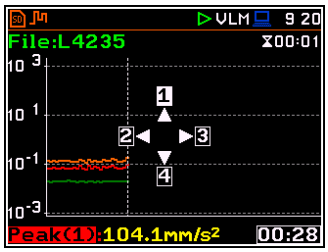
The <**Markers**> push-button (**<Alt>** pressed together with **<Shift>**) enables the user to mark special events, which occurred during the performed measurements. To activate the markers, the logger should be switched on (*path: <Menu> / Measurement / Logging / Logger Setup*) and one or more logger results (**Peak**, **P–P**, **Max**, **RMS**) in profiles have to be activated (*path: <Menu> / Measurement / Logging / Logger Results).*

To enter the marker mode, the user must press **<Shift>** and **<Alt>** push-buttons simultaneously during the measurement. Then four available markers appear on the screen. To switch on marker number 1 the user must press ▲ push button (number 2 - ◄, number 3 - ► and number 4 - ▼). Active marker number will be highlighted. To switch off the marker the user should press the appropriate arrow-button second time.

<Shift> / <Alt>



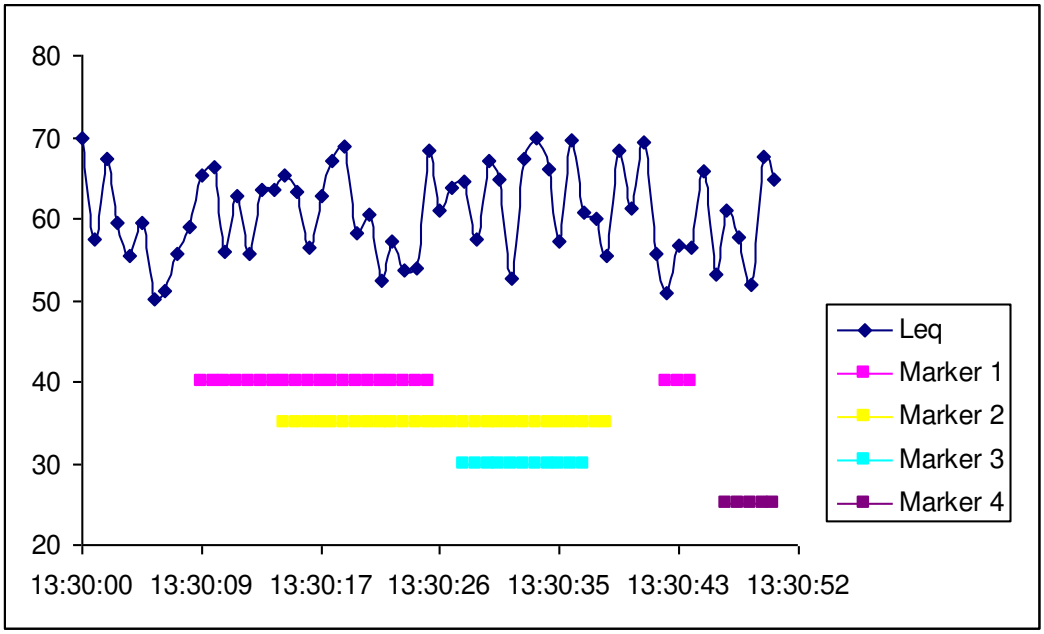
▲



The markers disappear from the screen after pressing **<Shift>** and **<Alt>**, but the status of markers doesn't change. To continue working with the markers, the user should press **<Shift>** and **<Alt>** again.

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

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



2.2 Input and output sockets of the instrument

Top cover of the instrument

The instrument inputs, called **Accelerometer** and **Probe** are placed in the centre of the instrument's top cover. The Accelerometer **Input** may work in three modes (**Acceler. IEPE**, **Acceler. Charge** and **Acceler. Voltage**) and the user should connect proper accelerometer to this input or voltage using TNC connector. The **Probe** input is dedicated for connection with the tachometer.

The accelerometers should be connected to the instrument using the TNC connector. After connecting the preamplifier or the accelerometer cable to the measurement input, the screw should be tightened to light resistance only. Do not over tighten this connector. The full description of the signals connected to the sockets is given in Appendix C.

Bottom cover of the instrument

In the bottom cover, there are two sockets, placed from the right to the left as follows: **I/O** and **USB**.

The **USB** socket is the USB Device 1.1 interface – a 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.

The additional multi-purpose input / output socket, called **I/O**, is a 3.5 mm jack socket. On this socket, in 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 that serves as the external trigger to the instrument, while the Digital Output is used to generate the trigger pulse or alarm pulse from the instrument.

There is a memory micro SD-card slot under the bottom cover of the instrument and spaces for the 4 x AA batteries.

All sockets are described in detail in the Attachment C for this manual.

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

3. GENERAL INFORMATION

To perform measurements using the instrument the user only should connect the proper vibration transducer and to switch the power on by pressing the **<Alt>** and **<Start/Stop>** push-buttons at the same time. Hold both buttons down for 1 or 2 seconds and release to switch on.

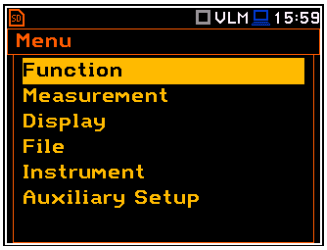
3.1. Basis of the instrument's control

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.

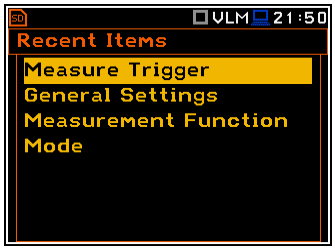
Main menu

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



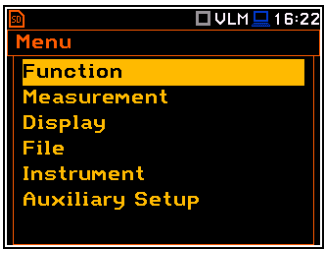
Recent Items list

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

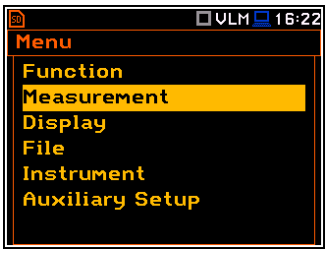


Position selection

The desired position in menu list is selecting using the ▲ or ▼ push-buttons.

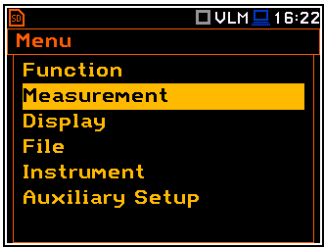


▼

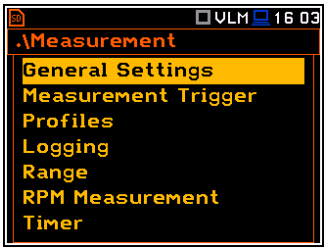


Entering position

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

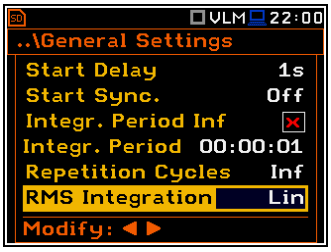


<ENT>



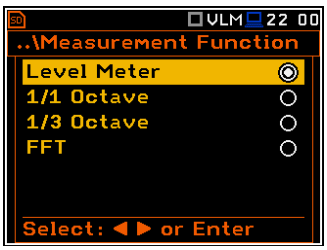
List of parameters

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-list.



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

Option list

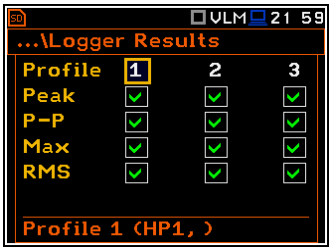


The option list consists of different choices, from which only one may be selected. The selection of the option is performed as follows. The user should highlight the desired option by means of the ▲ or ▼ push-buttons and then press **<ENTER>**. This option becomes active and the list is closed. When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

If the parameter has a numerical value, the user may keep pressing the ◄ or ► push-buttons 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) by means of the ◄ or ► push-buttons pressed together with **<Shift>**.

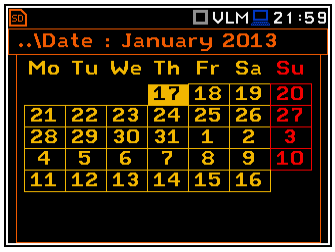
Matrix of parameters



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>**.

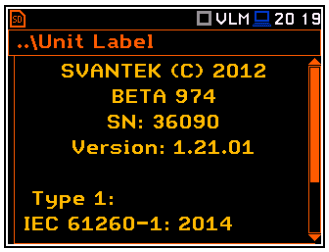
Complex parameters



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 ► or ▲ or ▼ push-buttons and then confirmed by pressing **<ENTER>**.

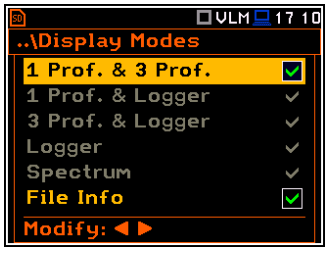
In all cases the **<ENTER>** push-button is used for confirmation of the selection in a position and for closing the opened sub-list. The sub-list is closed ignoring any changes made in the list by pressing the **<ESC>** push-button and the user returns to the previous menu.

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. To scroll through the list, the user should use the ▲ or ▼ push-buttons. To close such a window, the user should press **<ESC>**.

Inactive parameters



If some functions or parameters are not available, the positions in the menu or parameter lists linked with this function or parameter became inactive (their colour becomes grey). For example, i*f **Logger*** (*path: <Menu> / Measurement / Logging / Logger Setup)* is switched off, the **Logger** view mode is **not** active!

Text editor window

In the text editor windows, the user may edit text lines (file names, directory name etc.) The text editor window is opened by pressing the ◄ or ► push-button when the position with the text parameter is selected.

These windows contain help information to guide the user on how to edit the text.

The edited text is displayed in the upper line and the character which is displayed inversely may be changed, deleted or space may be incerted before it.

- The user can select the position of the character in the edited text using the ◄ or ► push-buttons.
- The user can insert or delete the position in the edited text using the ◄ or ► push-buttons pressed together with **<Alt>**.
- The user can change the character of the selected position with the use of virtual keyboard with available ASCII characters.

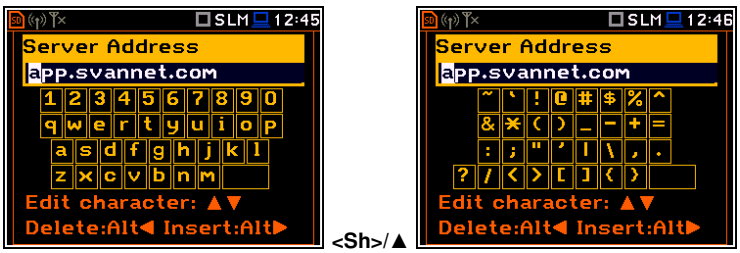
To make a keyboard active the user should press the ▲ or ▼ push-button.

- To insert new character to the kursor position in the edited text the user should select the character of the virtual keyboard with the ◄ / ► or ▲ / ▼ push-buttons ard press **<ENTER>**.

Cursor of the edited text will be shifted to the next right position.

- To confirm changed text the user should exit the virtual keybord with the ▲ / ▼ push-buttons ard press **<ENTER>**.

The above example shows the edition of the file name, which may consist only uppercase letters. Some texts can be written with the lowercase letters and use special characters. In such cases, the keyboard can be switched with the use of ▲ or ▼ push-buttons pressed together with **<Shift>**.



Help information

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

3.2. Powering of the instrument

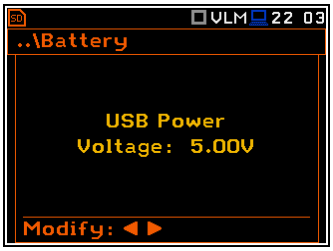
The **SVAN 974** can be powered by one of the following sources:

- Four AA standard size internal batteries. In case of alkaline type, with a new fully charged set, the instrument 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

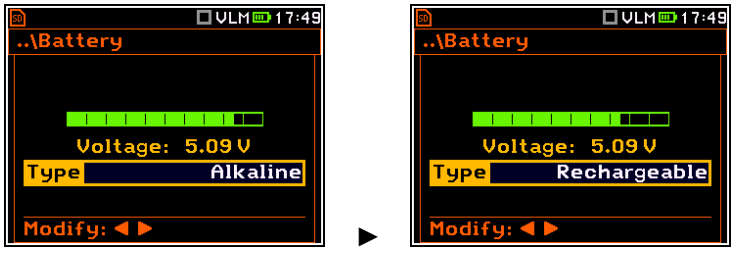
For each of possible power source there is a different view presented in the **Battery** window of the **Instrument** list.

When the instrument is powered from its internal batteries, the **"Battery"** icon is presented on the top line of the display. When the voltage of the batteries is too low for reliable measurements, the icon is red or during attempt to switch the instrument on the **Low Battery!** message occurs on the display for 2 seconds and the instrument switches off by itself. A fully charged set of 4 batteries ensures more than 12 hours of continuous operation of the instrument (with display **Dim** switched on). The battery condition can be checked by means of the **Battery** function. It is also presented continuously on the top line of the 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), the **"computer"** icon is presented on the top of the display and in the **Battery** window there is the **USB Power: Voltage: x.xxV** message.



When the instrument is powered from the internal batteries, the **"battery"** icon is displayed on the top of the screen and the **Battery** window presents the battery status scale and battery voltage: **Voltage: x.xxV**. The colour of the battery and the scale reflects the battery capacity: green (>75%), yellow (>25%), red (<25%).



To have right indication of the battery status the user should select the battery type in the **Type** position: **Alkaline** or **Rechargeable**.

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

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 Setup).*

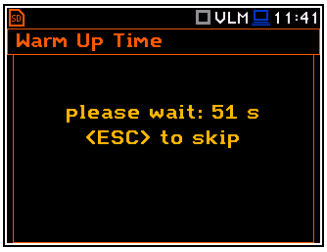
3.3. Getting started

Turning the instrument on

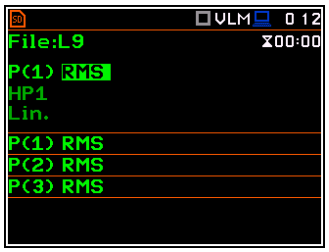
To switch the power on the user should press the **<Alt>** and **<Start/Stop>** push-buttons at the same time.

The instrument goes through the self-test routine after switching on, displaying during this time: manufacturer logo and name of the instrument.

...



After the self-test the instrument displays the last result view which was used just before the unit had been switched off.

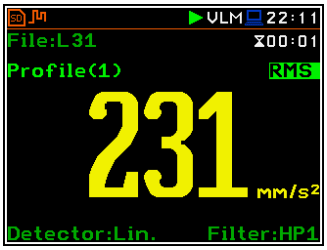


or

Starting measurement

To start the measurements the user should press the **<Start/Stop>** push-button. The measurement will be performed with the current instrument settings, which are preserved in the internal memory of the instrument.

<Start>



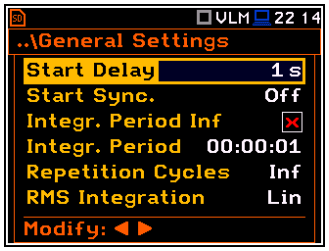
Setting up the measurement parameters

The instrument as sold has default settings which the user may change, but always return to them with the use of **Factory Settings** option in the **Auxiliary Setup** menu.

Next chapters of the manual will describe in detail what each parameter means and how to change the instrument settings.

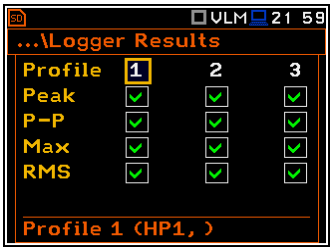
Main default settings

With default settings, the instrument will measure vibration level by virtual meters, so called profiles (Measurement **Mode: Acceler. IEPE**; **Measurement Function: Level Meter**) with 1 second delay from the **<Start>** push-button pressure (**Start Delay: 1 s**), 1 second integration time (**Integration Period: 00:00:01**), infinitive repetition till press **<Stop>** push-button (**Repetition Cycle: Inf**), linear integration (**RMS Integration: Lin**), active logging of the selected results with 1 sek step (**Logger: On**; **Logger Step: 1 s**; **Logger Results: Peak**, **P-P**, **Max** and **RMS** for all profiles).

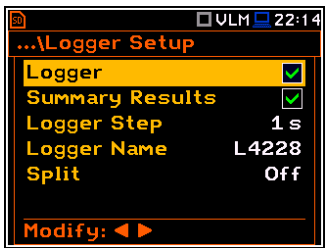


Other functions are switched off like:

- measurement trigger (**Measurement Trigger: Off**),
- logger trigger (**Logger Trigger: Off**),
- event recording (**Events: Off**)
- wave recording (**Wave Rec.: Off**),
- timer (Timer **Mode: Off**).



The logger and summary results will be automatically saved in the file with the name defined by the instrument and presented in the **Logger Setup** sub-list (**Logger Name: LLxx**).

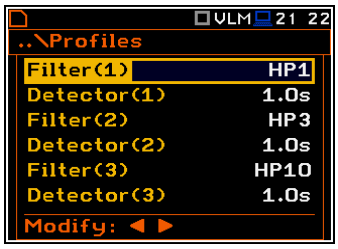


Default profiles settings:

Profile 1 - **HP1** weighting filter (**Filter(1)=HP1**); **1.0s** RMS detector (**Detector(1)=1.0s**);

Profile 2 - **HP3** weighting filter (**Filter(2)=HP3**), **1.0s** RMS detector (**Detector(2)=1.0s**);

Profile 3 - **HP10** weighting filter (**Filter(3)=HP10**), **1.0s** RMS detector (**Detector(3)=1.0s**).

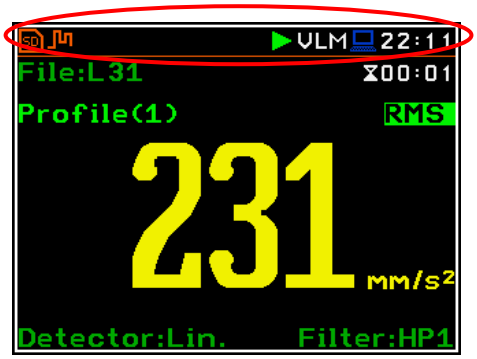


3.4. Description of icons

Description of the instrument state

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

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



Meanings of the icons are as follows:

	**"play"** icon is displayed when the measurement is running.		**"memory warning"** icon is displayed when there is no SD memory card inserted.
	**"stop"** icon is displayed when the measurement is stopped.		"**SD Card**" icon is displayed when the micro SD card memory is inserted.
	**"pause"** icon is displayed when the measurement is paused.		**"computer"** icon is displayed when there is a successful USB connection with the PC.
	**"clock"** icon is displayed when the timer is **On**. It is active when the instrument is waiting for the measurement start up to occur. When the measurement start 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.
	**"curve"** icon is presented when the current measurement results are logged into the instrument's logger file.		**"Trigger Level +"** icon is displayed when the "**Level+**" trigger is waiting for fulfilment condition. The icon appears alternately with the "play", "curve" or "note" icons.

	**"note"** icon is displayed when the wave recording is active (wave files with extension WAV are saved automatically)		**"Trigger Level –"** icon is displayed when the "**Level-**" trigger is waiting for fulfilment condition. The icon appears alternately with the "play", "curve" or "note" icons.
	**"arrow up"** icon is displayed when overload appears.		**"Trigger Slope +"** icon is displayed when the "**Slope+**" trigger is waiting for fulfilment condition. The icon appears alternately with the "play", "curve" or "note" icons.
	**"arrow down"** icon is displayed when under range appears.		**"Trigger Slope –"** icon is displayed when the "**Slope-**" trigger is waiting for fulfilment condition. The icon appears alternately with the "play", "curve" or "note" icons.
	**"Alt" icon** is displayed when the **<Alt>** push-button is pressed.		**"trigger"** icon is displayed when other than Level or Slope trigger is waiting for fulfilment condition. The icon appears alternately with the "play", "curve" or "note" icons.
	**"Shift"** icon is displayed when the **<Shift>** push-button is pressed.		

3.5. Data saving

Memory type

All available measurement results and settings can be stored in the memory (micro **SD Card**) as files in the predefined or assigned directories. The setup files are stored in the predefined directory SETUP. The predefined directories can be changed by the user or renamed.

The **SD Card** memory is activated automatically after insertion of the card.

The "**SD Card**" icon is displayed when the micro SD card memory is inserted in the memory slot.

If the SD card is removed from the memory slot the **"memory warning"** icon appears instead of "SD card" icon.

The **SD Card** memory is organised as a standard memory with directories and sub-directories (FAT32 file system). It is possible to create and delete the directories.

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

In the **File Manager** or **Setup Manager** windows data files are described by their file name with an extension (**SVL**, **SVT** or **WAV**) as well as additional icon and size (**2KB** etc.).

 Directory

 New file or directory

 Logger file .SVL

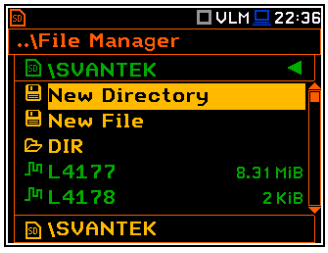
 Wave file .WAV

 Setup file .SVT

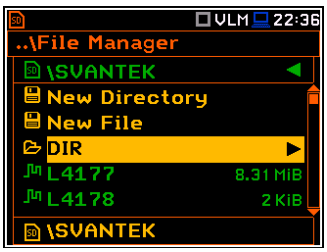
Directories and files management

The user can manage the files saved on SD card with the help of the **File Manager** or **Setup Manager** function of the **File** menu.

<ENT>



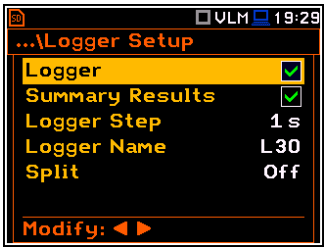
The files are saved in the directory, which was set up as a working directory. The working directory is displayed in the bottom line of the **File Manager** window together with the memory icon.



Directories are created manually with the use of **<New Directory>** position.

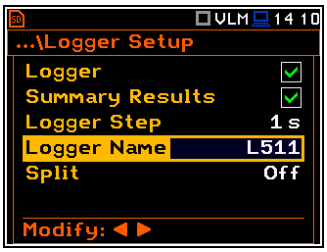
In more details, **File** menu is described in chapter 7.

Automatic logger files saving



Files which contain the logger data are saved automatically in the **SD Card** memory with an extension .SVL. To enable automatic saving several conditions should be fulfilled:

1. SD card should be inserted and there should be enough space on it.
2. The **Logger** (*path: <Menu> / Measurement / Logging / Logger Setup*) should be switched on.

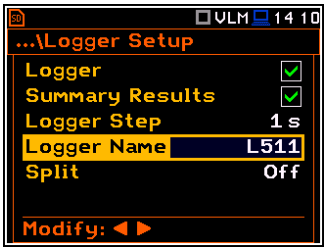


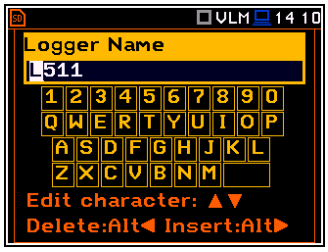
The logger file name is defined automatically using a pattern **LLdd**, where **LL** is the string of letters (so called **prefix**) and **dd** is a string of digits that forms a number (*path: <Menu> / Measurement / Logging / Logger Setup / Logger Name*). Up to 8 characters can be used to name a file.

The default prefix for the logger files is **L**.

The individual counter is assigned to every prefix of files the user has created and saved in the working directory and is equal to the maximum number of these files. So, the next saved file will always have a number higher than the counter.

The user can change the automatically generated file name in the special screen, which is opened after pressing the ◄ or ► push-buttons.





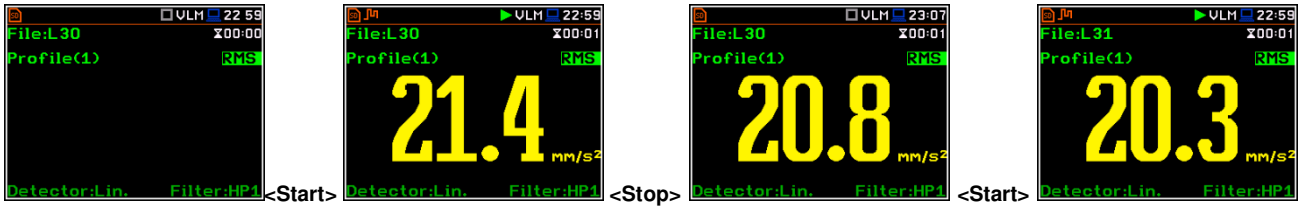
If the user changes number of the name, the instrument will accept only that names which number is higher than the counter, assigned to the file prefix.

After changing file name number and pressing **<Enter>** the counter will be adjusted to the new number.

The user can change the prefix. In such case the instrument assigns the new counter to the new prefix.

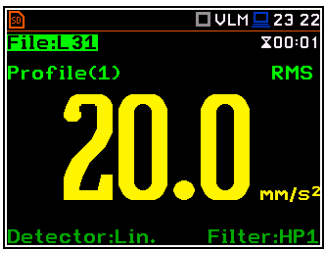
The file number automatically increases after every saving operation.

The screens below show the automatic file saving during two subsequent measurements. Before and during first measurement the file name **L30** is displayed. This file is saved automatically in the SD card memory after the measurement stop. After start of second measurement the instrument automatically changes the file name to **L31** and this file is saved after stop of the second measurement and so on.



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

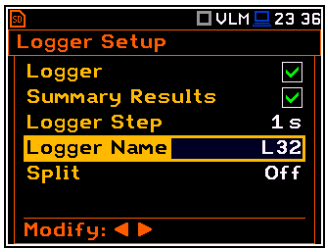
The user can quickly jump to the directory where files were saved. To do this the user should make the field with file name active by means of ▲ or ▼ push-buttons and press **<Enter>**.



<ENT>

If the user presses **<Save>** (**<Alt>+<ENTER>**) after the measurement the instrument opens the **Logger Setup** window (*path: <Menu> / Measurement / Logging / Logger Setup*) with the selected **Logger Name** position and the file name with the increased number. Pressing **<Enter>** will return the instrument to the measurement screen with no results of the previous measurement and new file name in the file field.

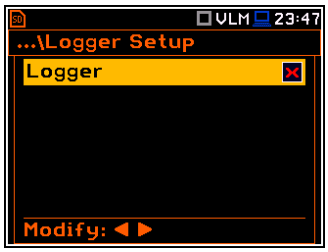
<Save>



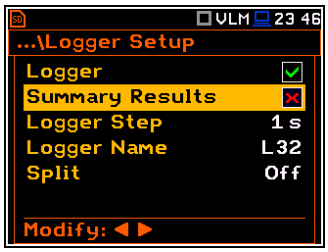
<ENT>

Manual saving of Summary Results

If **Logger** or the **Summary Results** option is switched off in the **Logger Setup** list (*path: <Menu> / Measurement / Logging / Logger Setup*) the automatic saving of result data (so called **Summary Results**) is switched off too. In such a case **Summary Results** can be saved only manually.



or



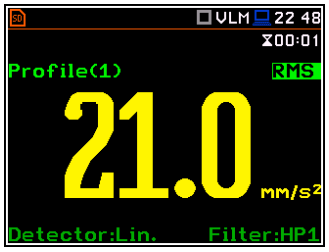
***Note:** If **Logger** is Off, the field with file name is empty!*

There are two options for saving manually **Summary Results** data. One option is to press **<Save>** push-button (**<Alt>+<ENTER>**) right after the measurement finishes. Another option is to create **<New File>** in the **File Manager**.

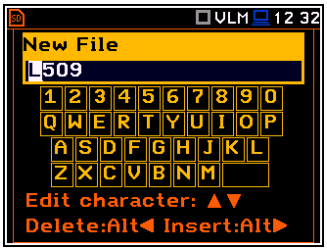
After pressing the **<Save>** push-button the **New File** window appears with the predefined name which has number increased by one to the latest saved. In the **New File** window the user can enter a new name for the file.

After edition of the automatically proposed name, the user should press **<ENTER>**.

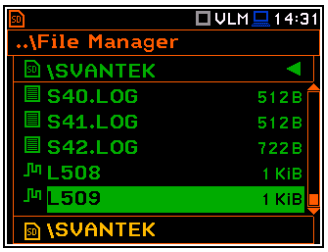
File with the proposed or created by the user name will be saved in the working directory on the SD card.



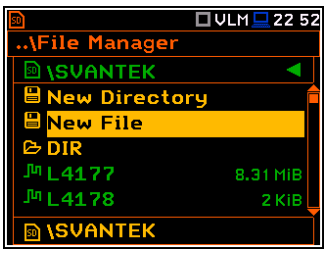
<Save>



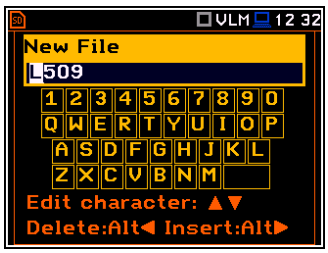
<ENT>



Another option is to open the **File Manager** window (*path: <Menu> / File / File Manger*), select **New File** and press **<ENTER>**.



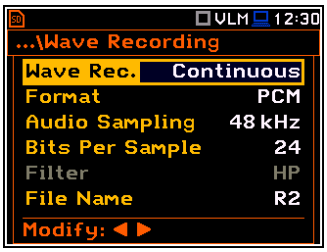
<ENT>



Note: *Saving is not possible when the instrument is measuring the signal. The message "**Measurement in progress!**" is displayed for about 3 seconds.*

Note: *When no measurements were performed and there are no results to be saved all save functions are disabled.*

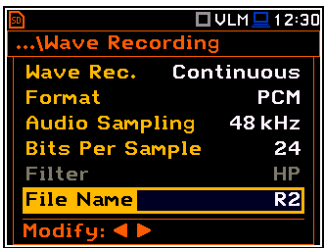
Automatic Wave files saving



Wave files contain signal recording data and are also saved automatically in the **SD Card** memory with an extension .WAV. To enable automatic saving several conditions should be fulfilled:

1. SD card should be inserted and there should be enough space on it.
2. The wave recording should be switched on (*path: <Menu> / Measurement / Logging / Wave Recording / Wave Rec.: Continuous or On Trigger*).

The wave file name is defined automatically using the same rules as for the logger files. The default prefix for the wave files is **R**.

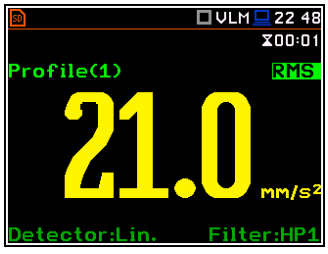


Note: *During the measurement run with wave recording to the wave file the "note" icon is displayed.*

Note: *The wave files usually are big in size and may use enormous memory space. Since the wave name is not displayed on the result view screen, the user should remember that wave recording function is active and switch it off always when wave recording is not required.*

Saving the setup files

The measurement configuration setup files can be stored in the **SD Card** memory with an extension .SVT either by means of **<S/P>** push-button or by creating the **<New File>** in the **Setup Manager** list.



<S/P>

There is no automatic option for the setup files saving, but the instrument always generates new setup name automatically with default prefix **SET**.

<ENT>

3.6. Files downloading and uploading

Downloading files

All files stored in the memory (micro SD Card) can be downloaded to the PC. There are two ways to download files.

First way is to extract the micro SD Card and use it directly in the PC.

Second way is to use SvanPV++ software, which enables the user download and upload functions as well as data view and data processing options. In this case the instrument should be connected to the PC via SC 56 USB cable.

***Note**: Description of SvanPC++ is given in the "SvanPC++ User Manual".*

Uploading files

Same approach is used for uploading files (usually setup files).

Files can be upload via micro SD Card or via SvanPC++ software.

3.7. Activation of the optional functions

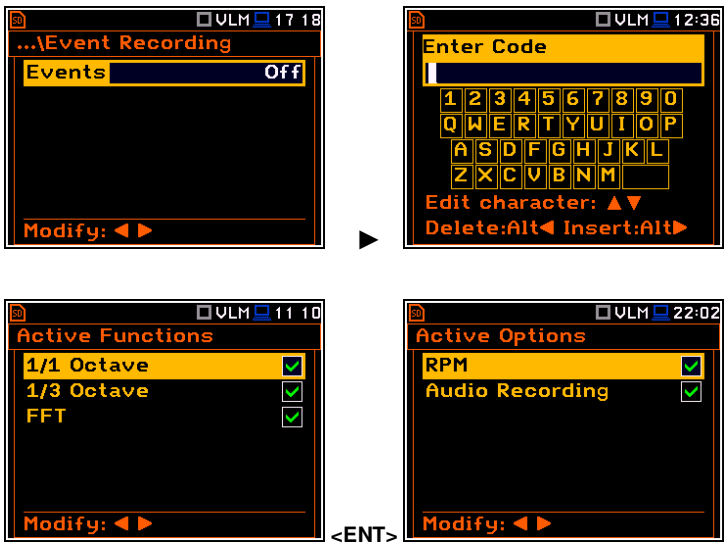
Standard instrument firmware contains all basic functions to perform measurements in accordance with most international standards and methods. For more complex tasks the user has the possibility of expanding the basic functions of the instrument with additional functions. These features include 1/1 and 1/3 octave analyzer, signal recording and others.

If additional functions were not supplied in the instrument kit and were not unblocked by supplier, such a task is in respomsibility of the user who decides to buy additional functions later.

The optional function is activated when the user uses it at the first time. For example, if time signal recording (Wave or Event) was blocked, but the user purchased this option later, then during the first attempt to switch it on the instrument will ask to enter the special code that will unblock this function. Once unblocked this option will be ready to use permanently.

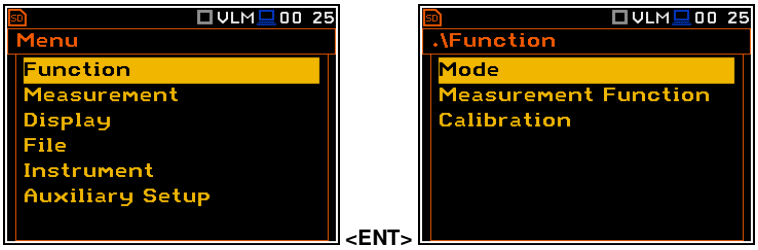
Pressing **<Shift>** and ◄ right after turning on the instrument enables the user to check and to lock back early unlocked options.

To select other options the user should press the **<ENTER>** push-button, which opens another page of the **Active Functions** list.



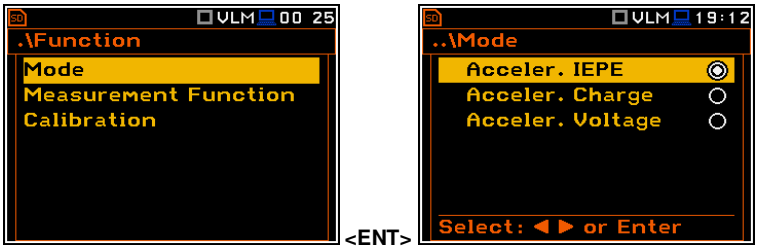
4. FUNCTIONS OF THE INSTRUMENT – Function

To select the **Function** list, the user should press the **<Menu>** push-button, select the **Function** text and press **<ENTER>**. The **Function** list contains three elements: **Mode**, **Measurement Function** and **Calibration**.



4.1. Selection of the instrument mode – Mode

The device can work with different types of accelerometers. The accelerometer type is selected in the **Mode** list as: **Acceler. IEPE**, **Acceler. Charge** and **Acceler. Voltage**.



4.2. Measurement functions of the instrument - Measurement Function

The main function of the instrument is the measurement of Vibration broad band level (**Level Meter**). The Vibration Level Meter (VLM) meeting the standard ISO 20816-1:2016. The instrument can also be used for medium to the 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 frequency and FFT analysis functions. These functions extend the main Level Meter functionality of the instrument, because the selected 1/1 and 1/3 octave analysis is performed together with all calculations of Level Meter.

To select the required function, the user should enter the **Measurement Function** list. After entering the **Measurement Function** list, the list of the available functions appears on the display: **Level Meter**, **1/1 Octave**, **1/3 Octave** and **FFT** (in case of Sound modes). The currently active function is marked.

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

- ***VLM*** ***Vibration Level Meter***,
- ***V:1/1*** ***Vibration 1/1 Octave***,
- ***V:1/3*** ***Vibration 1/3 Octave***,
- ***V:FFT*** ***Vibration FFT***.

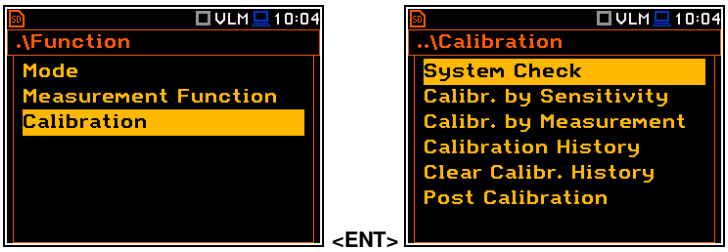
Optional measurement functions that broaden the application of the instrument can be easily installed. These options can be initially supplied by the manufacturer or purchased later and added by the user.

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

4.3. 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. To select the calibration function, the user should enter the **Calibration** sub-list.

The **Calibration** sub-list consists of positions which are used to perform the in-situ checks and calibration (**System Check**, **Calibr. by Sensitivity**, **Calibr. by Measurement**), check and clear the calibration records (**Calibration History** and **Clear Calibr. History**) as well as perform additional calibration after the measurement session and add the results to the file (**Post Calibration**).



Note: *The calibration factor is always added to the results and measurement range limits in the* ***Level Meter****,* ***1/1 Octave****,* ***1/3 Octave*** *modes.*

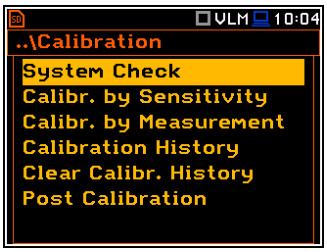
Note: *It is advised to perform the system check of the instrument each time before the measurements begin. If system check shows negative result, then it is necessary to perform calibration.*

Note: *The calibration level and the calibration result are expressed in different units depending on the settings of the instrument. The metric or non-metric Vibration units are set in the* ***Vibration Units*** *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).*

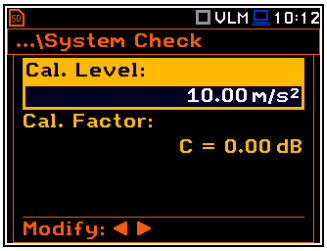
Note: *It is not possible to check and calibrate the instrument during the execution of live measurements. It is possible to open different lists and sub-lists but the positions in these lists are displayed greyed out inversely and so - not accessible. The flashing "►" icon on the top line indicates that the instrument is in the measurement process. To change the sensitivity, the current measurement in progress must be finished!*

4.3.1. System Check

ISO 20816-1:2016 standard advises users to perform in-situ checks of measurement instrumentation. Checking should be carried out immediately before and after measurements are made.

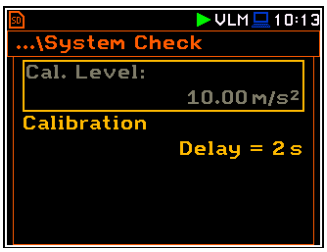


1. Select **System Check** in the **Calibration** sub-list and press the **<ENTER>** push-button.



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

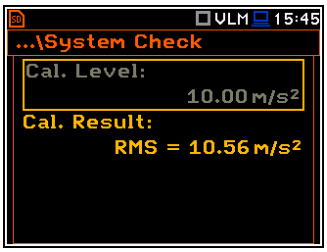
The measurement starts after 3 second delay. The system check measurement time is also predefined to 5 seconds. During the calibration period, the **<ESC>** and **<Pause>** push-buttons do not operate but it is possible to stop the measurement using the **<Start/Stop>** push-button. Waiting for the calibration 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.

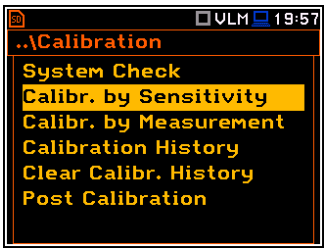
Press **<ENTER>** to exit **System Check**.



4.3.2. Calibration by Sensitivity

The calibration by using the accelerometer's published sensitivity information can be performed in the following way:

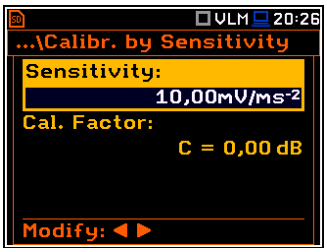
1. Select the **Calibr. by Sensitivity** position in the **Calibration** sub-list and press the **<ENTER>** push-button.



2. Set the sensitivity of the accelerometer taken from its calibration certificate using the **<Shift>** with ◄ or ► push-buttons.

The calibration factor is calculated every time after pressing the◄ or ► push-buttons, in relation to the nominal value of 10.0 mV / ms^{-2}.

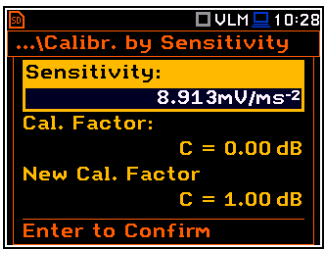
To confirm the new calibration factor, press **<ENTER>**.



For an accelerometer with sensitivity higher than 10.0 mV / ms^{-2} the calibration factor will always be negative.

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

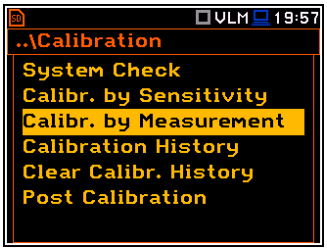
The lowest available value of the sensitivity that can be introduced is equal to 10.0 µV / ms^{-2} (it conforms to the calibration factor equal to 60.0 dB) and the highest value is equal to 10.0 V / ms^{-2} (calibration factor is equal to -60.0 dB).



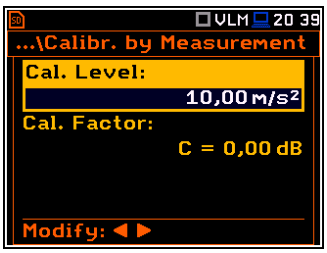
4.3.3. Calibration By Measurement

Calibration by measurement for the vibration measurements can be done in the following way:

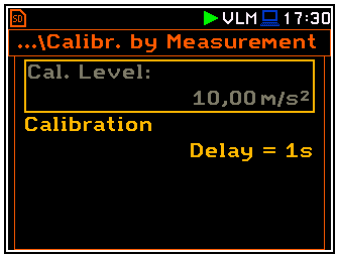
1. Select the calibration by measurement (highlight the **Calibr. by Measurement** text) from the **Calibration** sub-list and press the **<ENTER>** push-button.
2. Set the calibration level appropriate to the used calibrator. The default level for calibration in the vibration mode is 10 m/s^2 at 159.2 Hz. Remember to change this level if using an alternative vibration calibration signal source.



3. Attach the instrument's accelerometer to the vibration calibrator using an appropriate or recommended fixing method.
4. Switch on the calibrator and wait approximately 30 seconds before starting the calibration measurement.
5. Start the calibration measurement by pressing the **<Start/Stop>** push-button.



The calibration measurement starts after 3 second delay. Waiting for the calibration measurement the **Delay** is counted down on the display. The measurement lasts 5 second. After the end of the measurement, its result is displayed in the bottom line.



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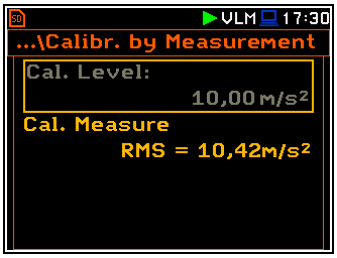


6. Save new calibration factor by pressing **<Enter>**, or **<Esc>** to exit calibration without saving.

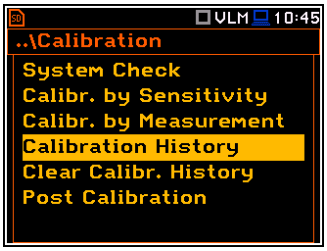
It is recommended to repeat the calibration measurement a few times to ensure the integrity of the calibration. The obtained results should be almost identical (with ±0.1 dB difference). Some possible reasons for unstable results are as follows:

- 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.

Note: *During the calibration measurement, the external disturbances (vibrations or acoustic noise) should not exceed a value of 1/10 of the level of the calibration level signal being used.*

4.3.4. History of performed calibrations – Calibration History

The **Calibration History** window displays records of performed calibrations.



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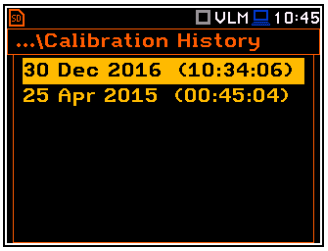
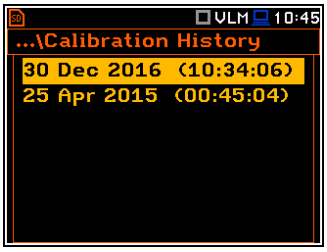


To review the calibration records, the user should select the required line in the **Calibration History** window and press **<ENTER>**.

The calibration record window contains the information regarding the performed calibration.



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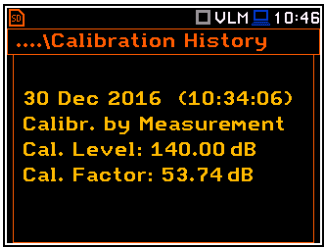
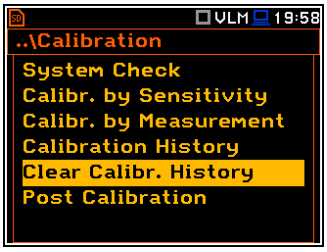


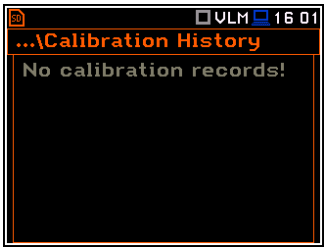
4.3.5. Clearing calibration records - Clear Calibr. History

The user can clear all stored vibration calibration 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.



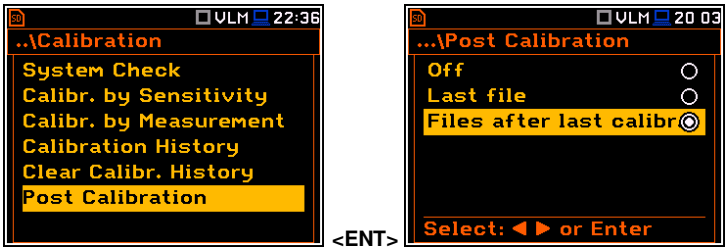
The instrument requests the confirmation of the operation. The next pressing of the **<ENTER>** push-button, when the **No** option is selected, closes the window and returns the instrument to the **Calibration** sub-list.

After this operation, the **Calibration History** window will not contain any previous calibration records. The content of this window is also cleared after the **Factory Settings** operation.



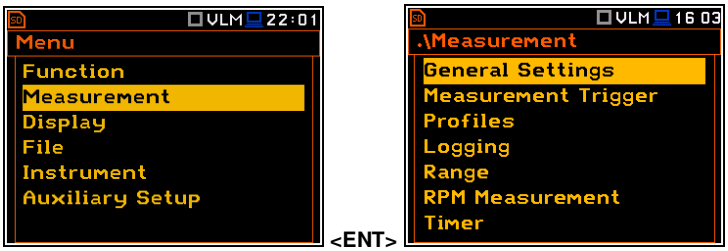
4.3.6. Post measurement calibration – Post Calibration

Sometimes it is required to perform so called post-calibration of the instrument. Position **Post Calibration** enables the user to perform additional calibration after a measurement session and add the results to the file saved in the memory. The **Post Calibration** list includes three options for saving post-calibration results: not to save (**Off**), save in the last file (**Last file**) or save in the files which will be created after the last calibration (**Files after last calibr**).



5. SETTING UP THE MEASUREMENT – Measurement

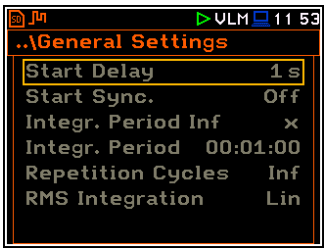
The **Measurement** list contains the elements that enable the user to set up the measurement parameters. To open the **Measurement** list, the user has to press the **<Menu>** push-button, select the **Measurement** text and press **<ENTER>**.



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

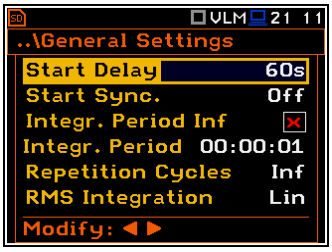
General Settings	enables the user to set up various general measurement parameters;
Measurement Trigger	enables the user to set up the measurement trigger;
Profiles	enables the user to program the profile parameters;
Logging	enables the user to program the logging function;
Spectrum	enables the user to set up spectrum parameters;
Range	enables the user to check the applied measurement range;
RPM Measurement	enables the user to set up the RPM measurements parameters;
Timer	enables the user to program the internal timer.

Any parameter in the **Measurement** list can be changed only when the instrument is not currently executing a measurement. The parameters are displayed with grey colour. The blinking "►" icon on the top row indicates that the instrument is performing a measurement.



5.1 Setting up the main measurement parameters - General Settings

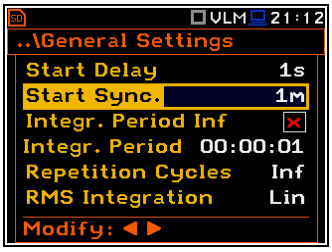
Delay before the measurement start



The **Start Delay** position defines the delay period from the moment the **<Start/Stop>** push-button is pressed to the start of the actual measurements (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 ◄ or ► push-buttons and with 10 second step by means of the ◄ or ► push-buttons pressed together with **<Shift>**).

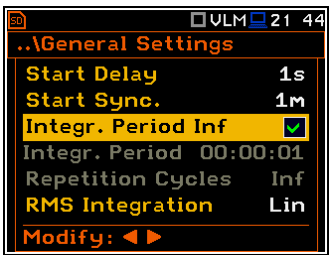
Note: *The minimum delay period is equal to 0 second. In the* ***Calibration*** *mode, the delay period is always equal to 3 seconds.*

Synchronisation of the measurement start



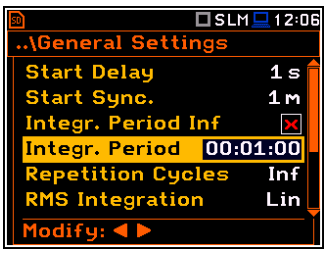
The **Start Sync.** position defines maximum delay period from pressing the **<Start/Stop>** push-button to the start of the measurements to allow synchronisation with the instrument's RTC. The **Start Sync.** parameter can be set as: **Off**, **1m**, **15m**, **30m** and **1h**. For example, if **1h** was selected, then each measurement starts from the first second of next real time hour after pressing **<Start/Stop>** push-button, and then each hour after **Integr. Period**, if **Rep. Cycles** is greater than one. The default value is set to **Off**.

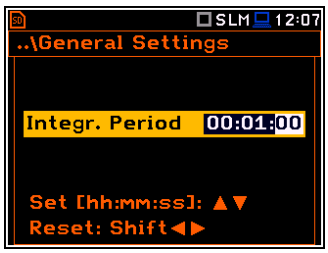
Disabling the measurement period definition



The integration period can be set as infinite or can be defined together with the **Repetition Cycles** number. The **Integr. Period Inf** position defines if the period during which the signal is being measured is infinite or not. If the **Integr. Period Inf** parameter is switched on then the signal will be averaged all the time until the **<Stop>** push-button is pressed and the measurement is stopped. If integration period is infinite, then two next positions become inactive.

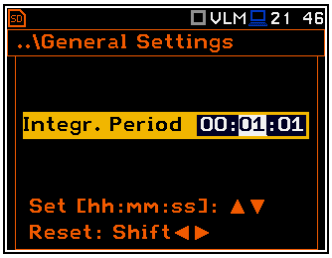
Measurement period





The **Integr. Period** position (integration period) defines the period during which the signal is being measured (integrated) and stored as the **Summary Results**. The integration period can be set in the special window, which is opened by pressing the ◄ or ► push- buttons.

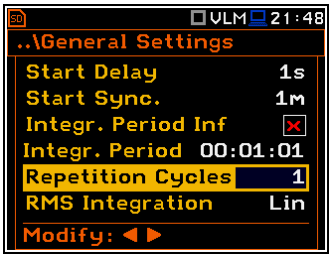
The measurement will stop automatically after this period, or the measurement will start again when the selected **Repetition Cycle** is greater than one. The definitions of the measurement results in which the integration period is used is given in App. D.



To set the integration period the user should define the required hours, minutes and seconds fields.

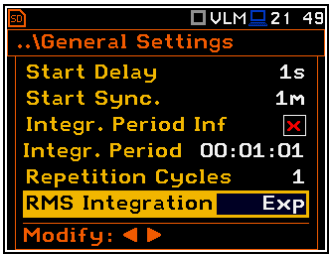
- The appropriate field may be selected by pressing the ◄ or ► push-buttons.
- Value of hour, minute and second is changing by means of the ▲ or ▼ push- buttons.

Number of measurement repetitions



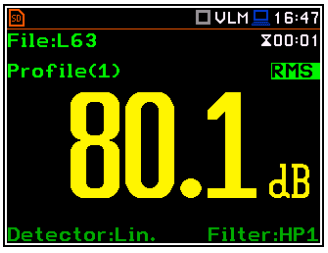
The **Repetition Cycles** position defines the number of cycles (with the measurement period defined by **Integration Period**) to be performed by the instrument. The **Repetition Cycles** number values are within the limits [1, 1000].

Detector type



The **RMS Integration** position defines the detector type for the calculations of the **RMS** function. Two options are available: linear (**Lin**) and exponential (**Exp**). The formulae used for the **RMS** calculation are given in Appendix D.

Selecting **Lin** is required to obtain the true RMS value of the measured signal.



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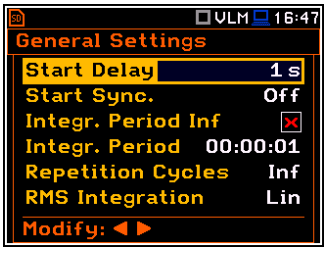
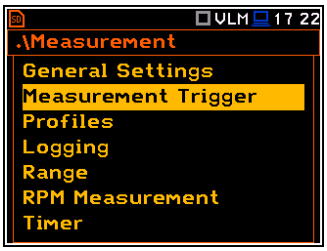


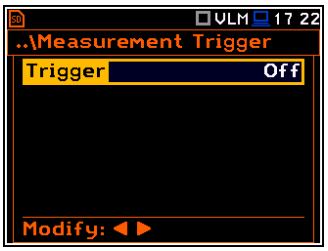
The user can easily get into the **General Settings** screen during the measurement performance from the result view. It is necessary to enter some result field (for example, **RMS**) with the use of ▲ / ▼ or ◄ / ► push-buttons and press **<ENTER>**.

5.2 Setting up the measurement trigger – Measurement Trigger

The **Measurement Trigger** sub-list enables the user to set up parameters of the measurement trigger. The **Measurement Trigger** is a context sub-list in which the triggering can be switched off or on (**Trigger**), when on the source of the triggering signal (**Source**) can be determined, its level (**Level**) and sometimes also the speed of changes (**Gradient**). Triggering of the measurement (**Trigger**) can be switched off using the ◄ push-buttons.



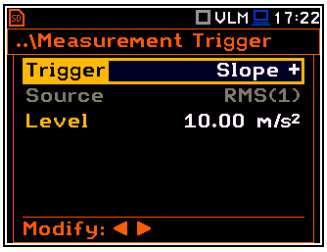
<ENT>



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

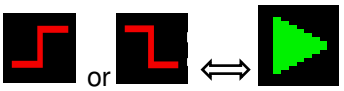
The triggering condition is checked every 0.5 millisecond.

Slope type trigger

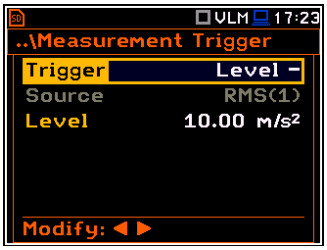


In case when **Slope +** is selected, the measurement starts when the rising result value (**Source**) passes above the level determined by the selected **Level** value. When **Slope –** is selected, the measurement starts when the falling result value (**Source**) passes below the level determined by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

Note: *When measurement is waiting for the slope trigger the "trigger slope" icon appears alternatively with the „play" icon.*

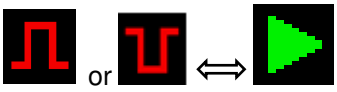


Level type trigger

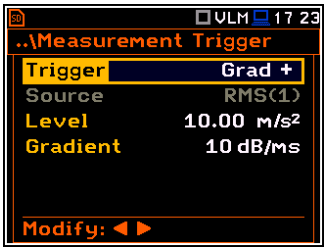


When **Level +** or **Level –** is selected for the measurement the triggering condition is checked every 0.5 millisecond. The measurement is recorded only when the result value (**Source**) has the greater / lower level than that determined in the **Level** position otherwise the measurement result is skipped.

Note: *When measurement is waiting for the level trigger the "trigger level" icon appears alternatively with the „play" icon.*

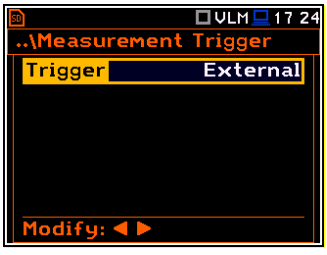


Gradient type trigger



When **Grad +** is selected, the triggering condition is checked every 0.5 millisecond of the measurement. The measurement is recorded only when the result value (**Source**) has a level greater than that determined by the selected decibel **Level** and the gradient of the signal is greater than determined in the **Gradient** position. Otherwise the measurement result is skipped.

External type trigger



When **External** is selected, the triggering is done by the signal on the **I/O** socket. In this case, it is necessary to set up the **I/O Mode** parameter as **Digital In** (*path: <Menu> / Instrument / Multifunction I/O*). In the other case the measurement result is skipped.

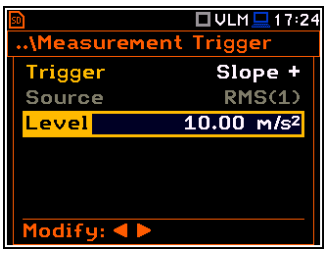
Note: *When measurement is waiting for the gradient or external trigger the "trigger" icon appears alternatively with the „play" icon.*

Source of the triggering signal

Only one measured result can be used as a source of the triggering signal in the **Level Meter** mode, namely the output signal from the RMS detector coming from the first profile which is denoted here as **Leq(1)**. This position does not become active (it is not displayed inversely) and the text stated here remains unchanged.

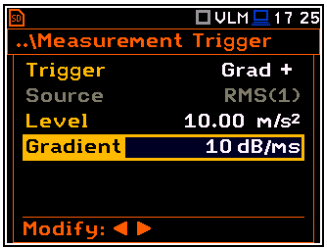
Level of the triggering signal

The level of the triggering signal (**Level**) can be set with 1 dB step steps in the range from 64dB (1.585mm/s^2) to 176dB (631 m/s^2). The **Level** value of the triggering signal refers to the instantaneous value of the RMS result from the first profile calculated during the period depending on selected **Detector** (path: <Menu> / Measurement / Profiles).



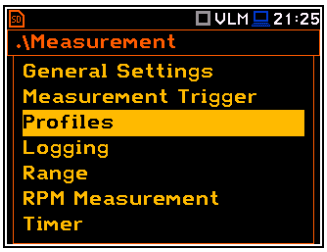
Speed of the triggering signal changes

This position appears when the **Grad+** trigger is chosen. The speed of change of the triggering signal (**Gradient**) can be set within the range from **1 dB/ms** to **100 dB/ms**.

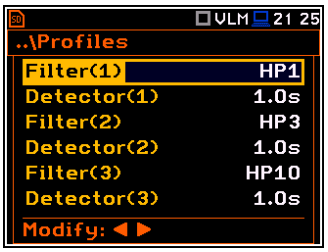


5.3 Setting up the parameters for profiles – Profiles

In the **Profiles** sub-list, the following parameters can be programmed independently for each user defined profile: weighting filter (**Filter**) and RMS detector type (**Detector**).

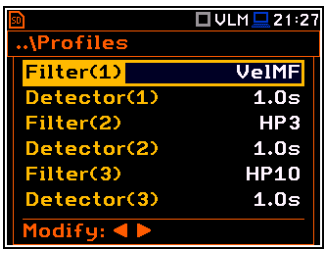


<ENT>



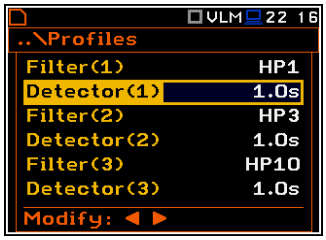
Weighting filter selection

- acceleration measurements: **HP**, **HP1**, **HP3**, **HP10**, **Wh**,
- velocity measurements: **Vel1**, **Vel3**, **Vel10** and **VelMF**,
- displacement measurements: **Dil1**, **Dil3** and **Dil10**.

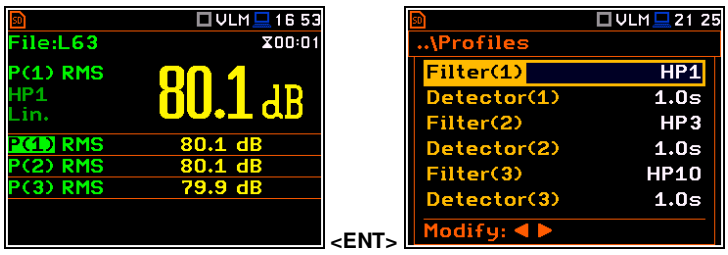


RMS detector selection

The following RMS detectors are available in the instrument: **100ms**, **125ms**, **200ms**, **500ms**, **1.0s**, **2.0s**, **5.0s**, **10.0s**.



The user can easily get into the **Profiles** screen during the measurement performance from the result view. It is necessary to enter some profile field (for example, **P(1)**) with the use of ▲ / ▼ or ◄ / ► push-buttons and press **<ENTER>**.



5.4 Setting up the data logging – Logging

Main measurement results or summary results (**RMS**, **Peak**, **P–P**, **MTVV**) are measured and saved in the file with the step defined by **Integration Period** parameter as many times as defined by the **Repetition Cycles** parameter.

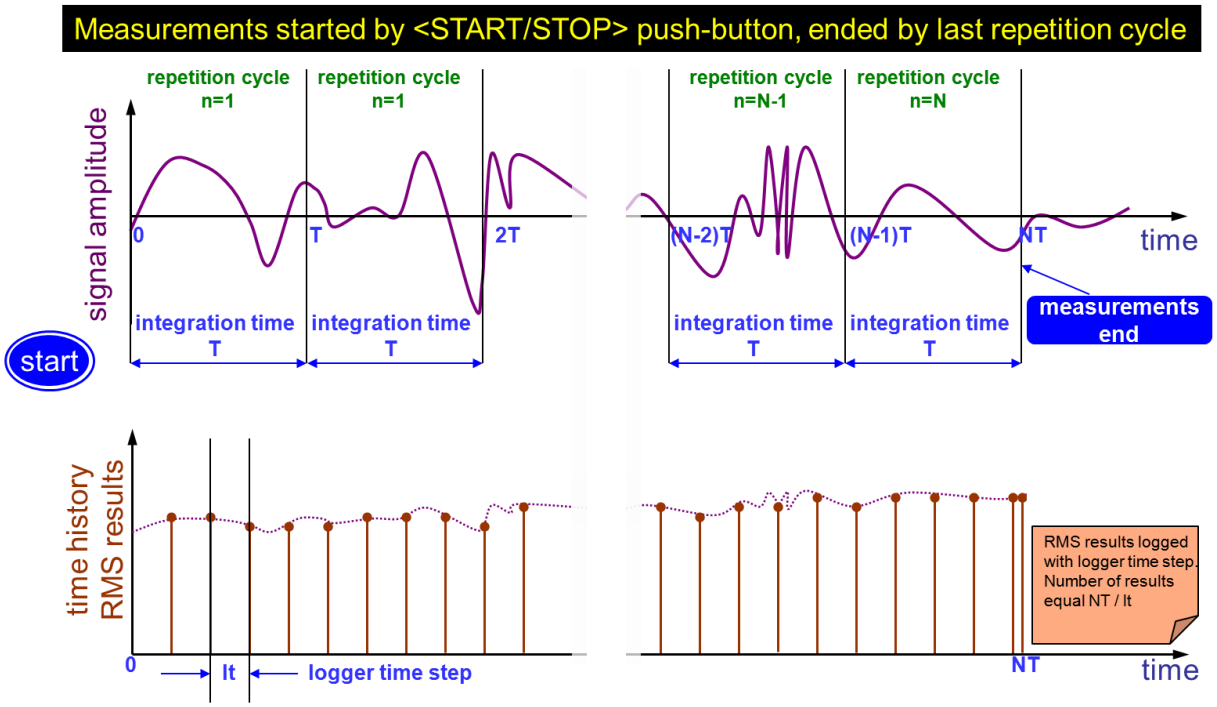
The **Logger** function proposes additional registration of some parameters with different step defined by the **Logger Step** parameter. Therefore, in fact it can be possible to save to sequences of measured results – one for summary results and another for logger results.

When the **Logger** is switched on up to 12 logger results can be saved simultaneously from three independent profiles of the instrument (**Peak** / **P-P** / **Max** / **RMS**) with time step down to **2ms**. The recording of logger results to the file is stopped after the period, which is equal to **Integration Period** multiplied by **Repetition Cycles** or after pressing the **<Stop>** push-button or after stopping the measurements remotely.

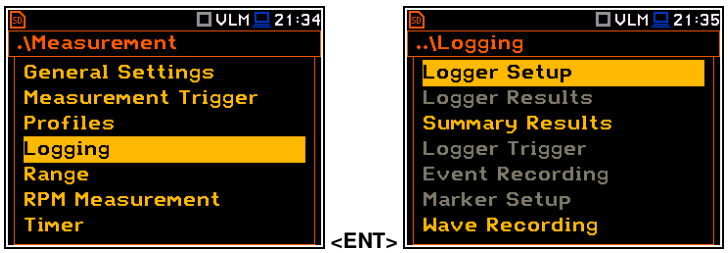
The summary results are saved in the same file that the logger results. The whole block of the summary results is added to the file in the end of every measurement cycle.

The figure below illustrates described principles of saving results of the measurement.

Relations between Integration Period and Logger Step

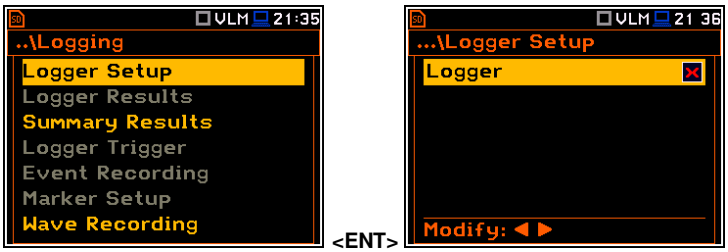


The **Logging** list enables the user to program the logger functionality - recording of the measurement time history results; and program markers and parameters of the signal recording (event or wave). The **Logging** list consists of seven positions: **Logger Setup**, **Logger Results**, **Summary Results**, **Logger Trigger**, **Event Recording**, **Marker Setup** and **Wave Recording**.



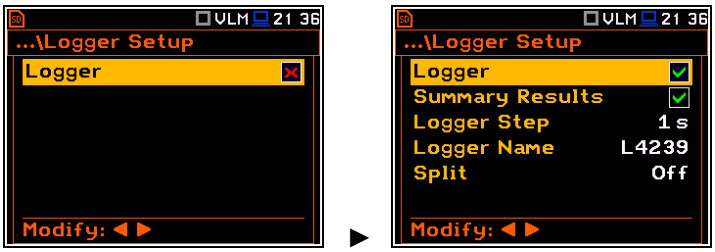
5.4.1 Setting up the logger general parameters – Logger Setup

The **Logger Setup** list enables the user to activate logger functionality. If **Logger** position is switched off only **Summary Result**s and **Wave Recording** positions are accessible in the **Logging** list.

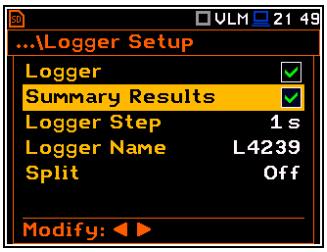


***Note:** If **Logger** is **Off**, logger files are not created automaticallyand measurement results of the time history changes are not saved!*

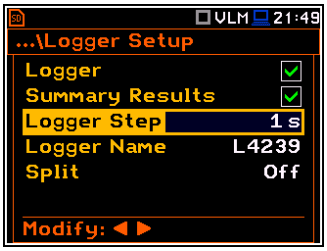
The **Logger** position switches on the functionality, which enables the user to save selected results from the three profiles and spectra with the defined interval selected in the **Logger Step** position.



The **Summary Results** position allows the user to select or deselect the saving of the full set of profile results that the instrument generates during total measurement time and which are not belonged to the time history data. These results are: **RMS**, **Ovl, Peak**, **P-P**, **MTVV** as well as spectra in the analyzer function. In addition to above mentioned results it is possible to add additional data from the **Summary Results** list.

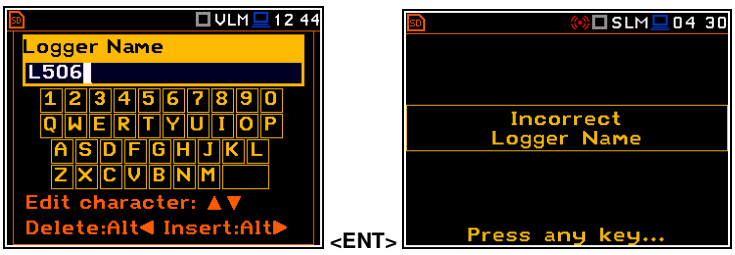


The **Logger Step** defines the step of the data logging in a file. It can be set from 2 milliseconds to 1 second or the values from 1 second to 59 seconds or the values from 1 minute to 59 minute and up to 1 hour.



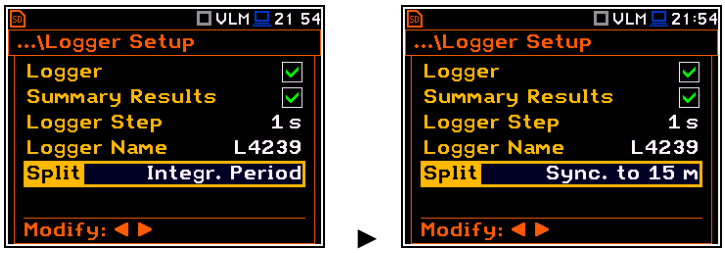
The **Logger Name** position enables the user to define the logger file name. The default name is **L**. The name can be up to eight characters long. After pressing the ◄ or ► push-buttons, the special window with text editing function is opened.

The edited name is accepted and saved after pressing the **<ENTER>** push-button. 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 **Split** position enables the user to split the logger registration data into separate files. If **Split** parameter is **Off** the registration of time history data will be continuously performed in one logger file with the name defined in the **Logger Name** position.

In other cases, the registration is performed in separate files and the registration in the new file will start: after integration period time (**Integr. Period**), or every quarter of the RTC (**Sync. to 15m**), or every half an hour of the RTC (**Sync. to 30m**), or every hour of the RTC (**Sync. to 1h**), or at specified by the user times (**Spec. Time**).

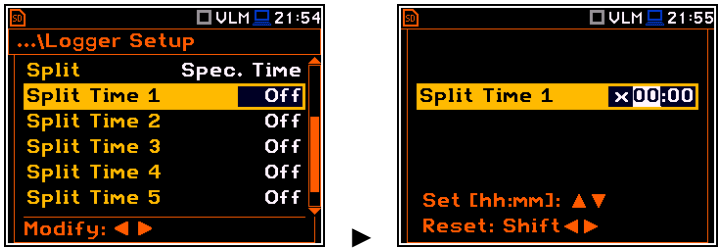


Every time when the split time is achieved the logger file is closed and new file with the increased by one number is opened for subsequent measurement data.

If **Spec. Time** is selected 6 additional lines appear in the end of the **Logger Setup** list.

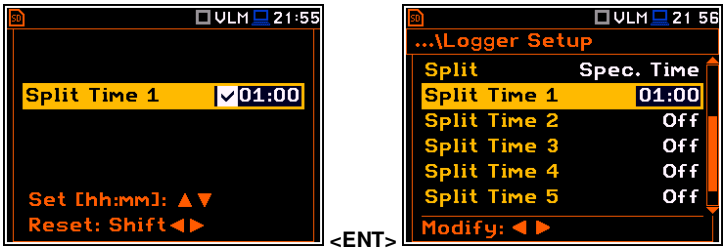
Opening each line the user can define the time of the day when the split will take place.

The special screen with time edition is opened after pressing the ► push-button.



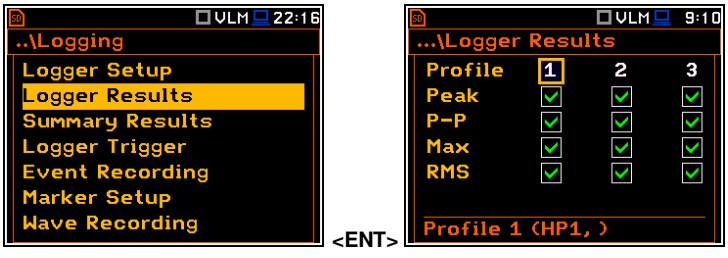
In the time edition line the user may define hour and minute of the split operation and also switch on (☑) or off (☒) the current split.

After pressing **<ENTER>** the **Split Time** list will show the active times of the day when the logger will be split.



5.4.2 Selection of results for logging – Logger Results

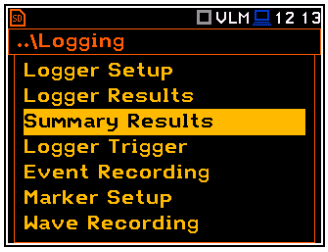
The **Logger Results** list enables the user to activate the results for three independent user defined profiles (**Peak**, **P-P**, **Max** and **RMS**). Activation / deactivation can be done by means of the ◄ or ► push-buttons pressed together with **<Alt>**. The position is changed by means of the ◄ or ► and ▲ or ▼ push-buttons.



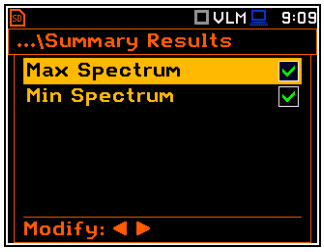
Note: *When* ***Logger*** *is switched off or there are no results for logging, the logger plot cannot be activated in* ***Display Modes*** *and accordingly doesn't appear on the display.*

5.4.3 Selection of additional summary results for saving – Summary Results

The **Summary Results** list enables the user to activate additional to the main results saving in the logger file: **Max Spectrum** and **Min Spectrum**.

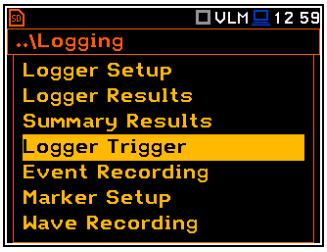


<ENT>

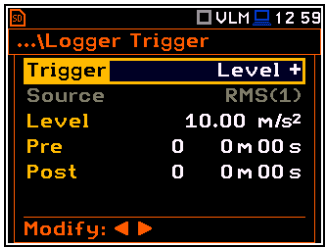


5.4.4 Setting up the logger trigger parameters – Logger Trigger

The **Logger Trigger** parameters influence the way the measurement results are saved in the logger. It is a context sub-list in which: the trigger can be switched off or it's type selected (**Trigger**), the source of the triggering signal can be determined (**Source**), it's level can be selected (**Level**), as well as 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**) defined.

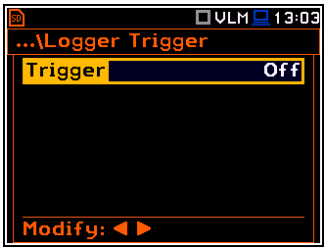


<ENT>

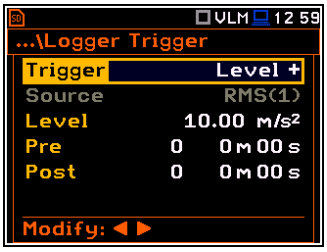


Trigger disabling

The logger triggering of the measurements (**Trigger**) can be switched off using the ◄ or ► push-button. The triggering is switched on if the **Level +** or **Level –** mode is selected.



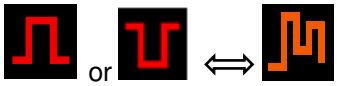
Level type trigger



If the triggering signal is greater than the selected in **Level +** or less than **Level -** , the logger contains:

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

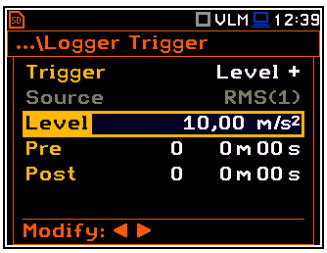
Note: *When logger is waiting for the level trigger the "trigger level" icon appears alternatively with the „curve" icon.*



Source of the triggering signal

When the **Level Meter** mode is chosen only one measured result can be used as a source of the triggering signal in the logger, namely the output signal from the RMS detector coming from the first profile which is denoted here as **RMS(1)**. This position does not become active (it is shown greyed out) and the text stated here remains unchanged.

Level of the triggering signal



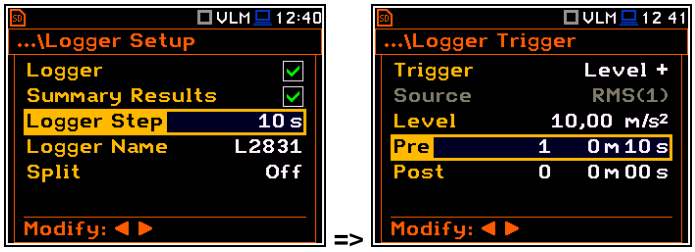
The level of triggering signal for logging (**Level**) can be set with 1 dB steps in the range from 1mm/s^2 (60 dB) to 10 km/s^2 (200 dB). The **Level** value of the triggering signal for the logger refers to the instantaneous value of the RMS result from the first profile calculated during the period depending on selected **Detector (1)** (*path: <Menu> / Measurement / Profiles*).

Pre and Post trigger registration

In the **Pre** position, the number of the results registered in the logger's file before the fulfilment of the triggering condition can be set. This number is within the limits 0..50.

In the **Post** position, the number of the results registered in the logger's file after the fulfilment of the triggering condition can be set. This number is within the limits 0..200.

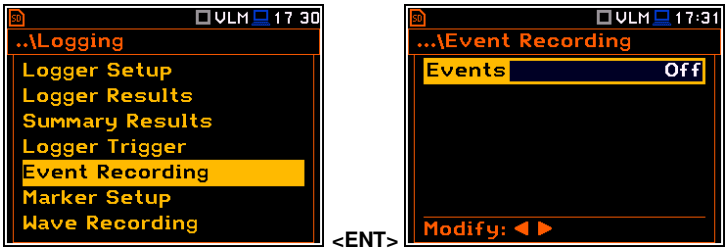
The period of the measurements that are saved in the logger before or after the fulfilment of the triggering condition can be calculated by multiplying the value set in the **Pre** or **Post** positions by the value set in the **Logger Step** position (*path: <Menu> / Measurement / Logging / Logger Setup*). The result of the calculation is presented in the same line, at the right side of the display.



5.4.5 Setting up the event recording – Event Recording

The **Event Recording** position enables the user to activate and set the parameters of event waveform signal recording in the logger file.

The **Events** position, if it is not **Off**, defines the type of events recording: **Continuous** or **On Trigger**.



***Note:** The **Event Recording** function is optional and should be unlocked by entering the activation code in the text editor screen, opened by the ► push-button. Once unlocked this option will be ready to use permanently.*

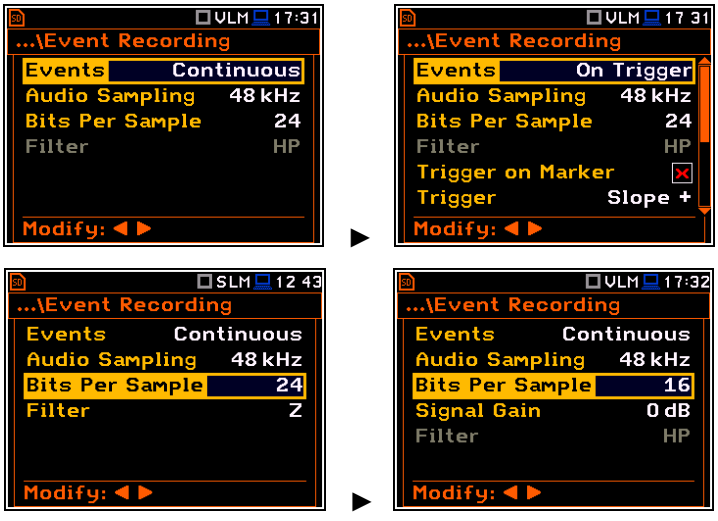
***Note: Event Recording** and **Wave Recording** are related functions and form one option, so unlocking one function automatically unlocks the other one.*

When **On Trigger** event recording is chosen then additional positions appear which enable the user to programme the trigger conditions for the event recording.

The **Audio Sampling** position enables the user to select the sampling frequency of the event recording: **12KHz**, **24kHz** and **48kHz**.

The **Bits Per Sample** position enables the user to select the number of recorded bits per sample: **16** or **24**.

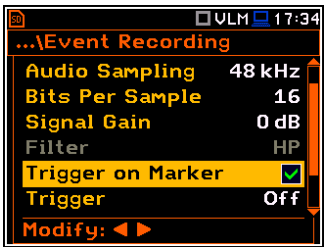
The **Signal Gain** position enables the user to select the gain of the recorded signal, when 16 bits per sample was selected: **0dB** … **40dB**.



The **Filter** position displays the used weighting filter (**HP**) during event signal recording.

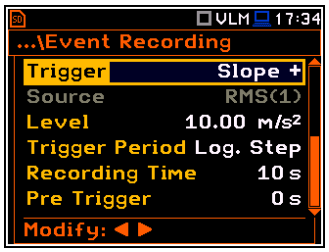
The **Trigger on Marker** position switches on or off the triggering by marker.

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



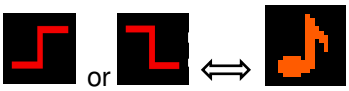
In the **Trigger** position the following options are available: **Off**, **Slope +**, **Slope –**, **Level +**, **Level –**, **External** and **Integr. Period**.

All triggers except **Integr. Period** were described in the chapter 5.2.

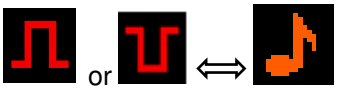


▶...

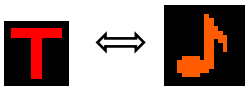
Note: *When event recording is waiting for the slope trigger the "trigger slope" icon appears alternatively with the „note" icon.*



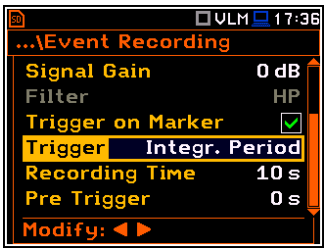
Note: *When event recording is waiting for the level trigger the "trigger level" icon appears alternatively with the „note" icon.*



Note: *When event recording is waiting for the "external" or "integration period" trigger the "trigger" icon appears alternatively with the „note" icon.*

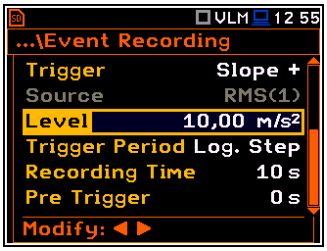


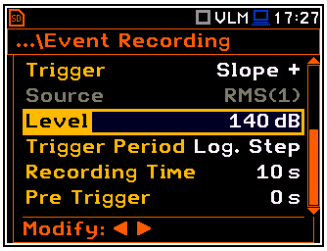
If the **Integr. Period** trigger was defined, the signal is recorded every time the measurement starts and ended after the **Integration Period** time, defined in the **General Settings** window (*path: <Menu> / Measurement / General Settings*).



The **Source** position indicates the triggering signal source. Only one measured result can be used as a source of the triggering signal in all modes, namely the output signal from the RMS detector coming from the first profile which is denoted here as **RMS(1)**. This position does not become active.

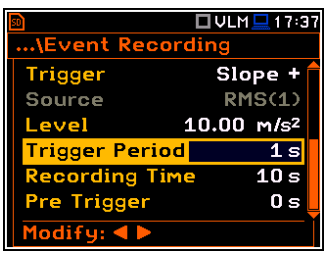
The level of triggering signal for the event recording (**Level**) can be set with 1 dB steps in the range from 1mm/s^2 (60 dB) to 10 km/s^2 (200 dB). The level can be expressed not only in linear units, but also in decibels. The vibration unit scale can be set in the **Display Scale** window (*path: Menu / Display / Display Scale / Scale*).





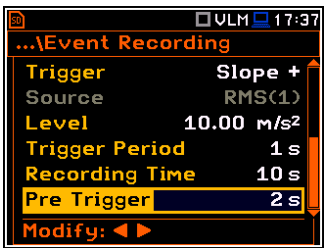
In the **Trigger Period** position, it is possible to select the time interval of checking the triggering conditions. This parameter can be set at: **Log. Step** (same as **Logger Step** value), **0.5ms**, **100.0ms** and **1s**.

In the **Rec. Time** position, it is possible to select the time of signal recording after triggering. If another triggering condition that satisfies the selected conditions appears, then the signal will be recorded for an additional **Rec. Time**. The available values can be selected from **1s** to **8h**.



When **Pre Trigger** is higher than 0 then the event signal start to be recorded before the triggering condition moment. The period of such recording depends on the sample frequency and bits per sample. The maximum pre trigger period is:

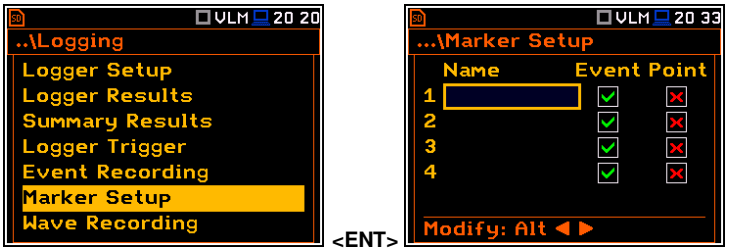
- for 24 bits per sample: **2s** for 48 kHz, **4s** for 24 kHz and **8s** for 12 kHz.
- for 16 bits per sample: **4s** for 48 kHz, **8s** for 24 kHz and **16s** for 12 kHz.



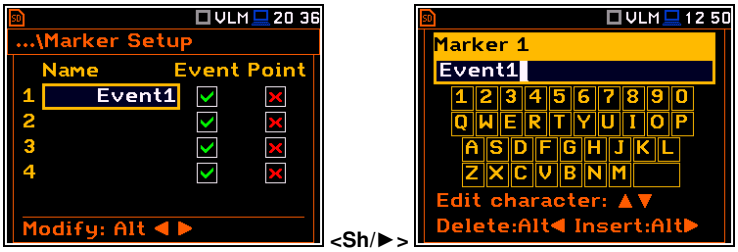
5.4.6 Setting up the markers – Marker Setup

Marker is used to mark (or highlight) special events during the measurement (not typical vibration, ect.) 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.

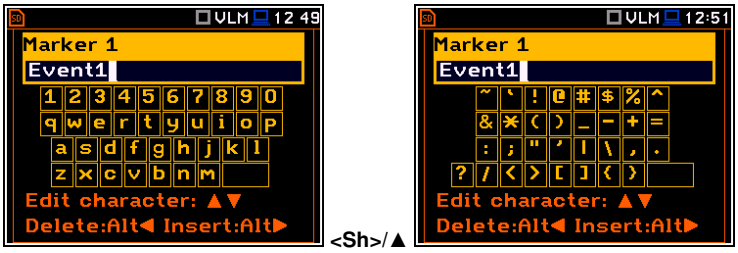
The **Marker Setup** enables the user to assign a specific name for each marker, select its type (normal or **Point**) and define markers for event recording.



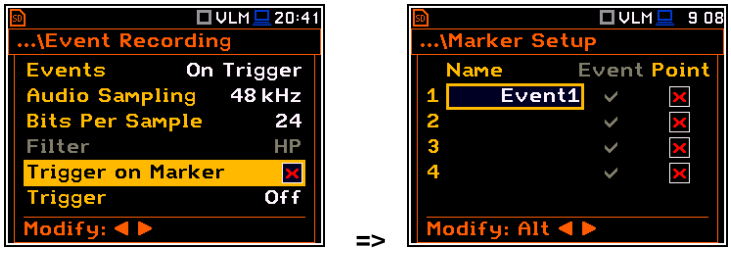
Name edition is performed in a special text edition window after pressing the ► push-button together with **<Shift>**.



In the Marker text editor window, the user can switch the keybord from uppercase letters to lowercase letters and special characters with the use of ▲ or ▼ push-buttons pressed together with **<Shift>**.

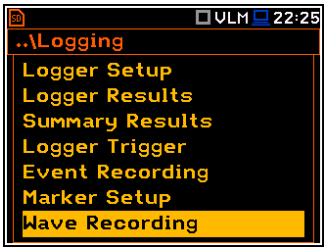


The **Event** column is active only when **Trigger on Marker** (*path: <Menu> / Measurement / Logging / Event Recording*) is switched on.



5.4.7 Setting up the wave recording – Wave Recording

The **Wave Recording** position enables the user to activate and to set the parameters of the raw time waveform recording in the special file with the extension **WAV**. The WAV files are saved automatically in the working directory on the memory (**SD Card**).



<ENT>

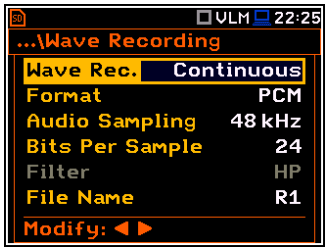
The **Wave Rec.** position, if it is not **Off**, defines the type of the wave recording: **Continuous** or **On Trigger**.

Note: *The* ***Wave Recording*** *function is optional and should be unlocked by entering the activation code in the text editor screen, opened by the ► push-button. Once unlocked this option will be ready to use permanently.*

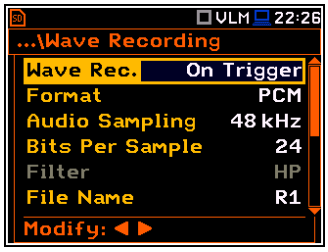
Note: Event Recording *and* ***Wave Recording*** *are related functions and form one option, so unlocking one function automatically unlocks the other one.*

The **Format** parameter enables the user to select the format of the wave file header: **PCM** or **Extensible**.

The **Audio Sampling** position enables the user to select the sampling frequency of the wave recording: **12 kHz**, **24 kHz** and **48 kHz**.



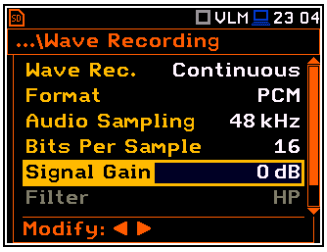
►



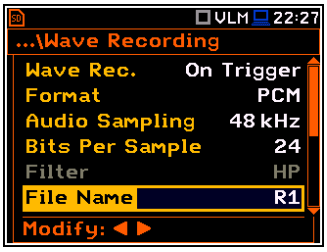
The **Bits Per Sample** position enables the user to select the number of recorded bits per sample: **16** or **24**.

The **Signal Gain** position enables the user to select the gain of the recorded signal, when 16 bits per sample was selected: **0dB** … **40dB**.

The **Filter** position displays the used weighting filter (**HP**) during wave signal recording.



The **File Name** position enables the user to edit the name of the wave file.

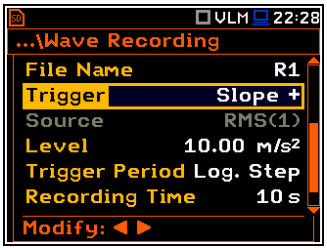


►

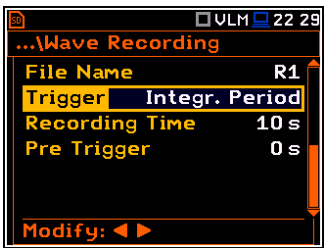
The **Wave Recording** enables the user to activate and programme the wave recorder trigger. This option became active only when the value of the **Wave Rec.** parameter was set as **On Trigger**.

In the **Trigger** position the following options are available: **Slope +**, **Slope –**, **Level +**, **Level –**, **External** and **Integr. Period**.

All triggers except **Integr. Period** were described in the chapter 5.2.



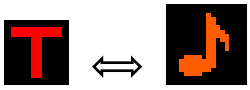
If the **Integr. Period** trigger was defined, the signal is recorded every time the measurement starts and ended after the **Integration Period** time, defined in the **General Settings** window (*path: <Menu> / Measurement / General Settings*).



Note: *When wave recording is waiting for the slope trigger the "trigger slope" icon appears alternatively with the „ note" icon.*

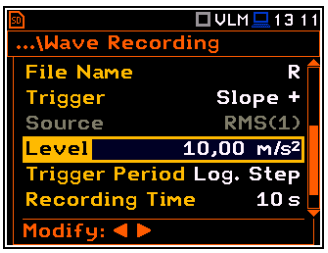
Note: *When wave recording is waiting for the level trigger the "trigger level" icon appears alternatively with the „note" icon.*

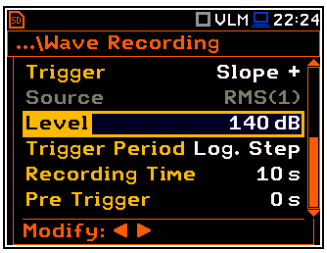
Note: *When wave recording is waiting for the "external" or "integration period" trigger the "trigger" icon appears alternatively with the „note" icon.*



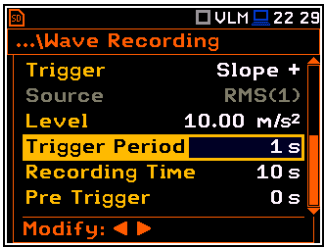
The **Source** position indicates the triggering signal source. Only one measured result can be used as a source of the triggering signal in all modes, namely the output signal from the RMS detector coming from the first profile which is denoted here as **RMS(1)**. This position does not become active.

The level of triggering signal for the wave recording (**Level**) can be set with 1 dB steps in the range from 1mm/s^2 (60 dB) to 10 km/s^2 (200 dB). In case of Vibration measurements, the level can be expressed not only in decibels but also in linear units. The vibration unit scale can be set in the **Display Scale** window (*path: <Menu> / Display / Display Scale / Scale*).



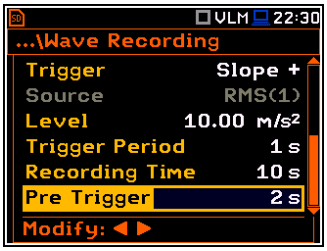


In the **Trigger Period** position, it is possible to select the time interval of checking the triggering conditions. This parameter can be set at: **Log. Step** (same as **Logger Step** value), **0.5ms**, **100.0ms** and **1s**.



In the **Recording Time** position, it is possible to select the time of signal recording after triggering starts. If another triggering condition that satisfies the selected conditions appears then the signal will be recorded for an additional **Recording Time**. The available values can be selected from **1s** to **8h**.

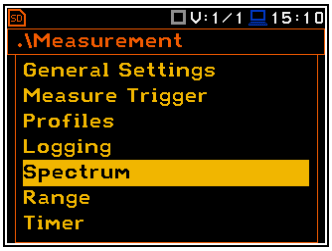
When **Pre Trigger** is higher than 0 then the wave signal start to be recorded before the triggering condition moment. The period of such recording depends on the sample frequency and bits per sample. The maximum pre trigger period is:



- for 24 bits per sample: **2s** for 48 kHz, **4s** for 24 kHz and **8s** for 12 kHz.
- for 16 bits per sample: **4s** for 48 kHz, **8s** for 24 kHz and **16s** for 12 kHz.

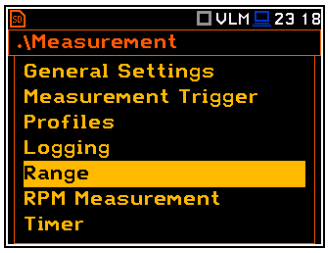
5.5 Setting up the 1/1 Octave and 1/3 Octave spectra – Spectrum

The **Spectrum** position appears in the **Measurement** list when the **1/1 Octave** or **1/3 Octave** function is selected in the **Measurement Function** list (*path: <Menu> / Function / Measurement Function / 1/1 Octave or 1/3 Octave*). See section 10 for more details.

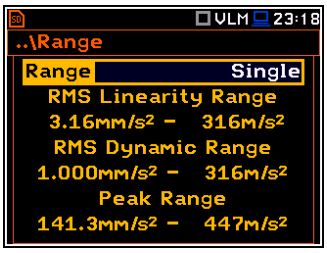


5.6 Checking the measurement range – Range

The **Range** position enables the user to check the available measurement range in the instrument.

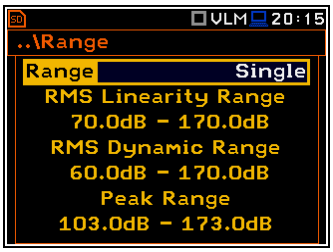


<ENT>

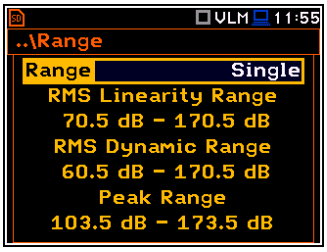


There is one available measurement range: **Single**. The detailed description of the measurement range is given in Appendix C.

Depending on the settings of the **Scale** parameter (*path: <Menu> / Display / Display Scale*) the range will be presented in absolute or logarithmic units (dB).



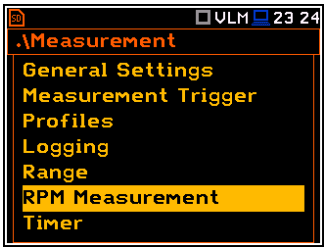
Note: *The calibration factor is always added to the range limits. For example, if calibration factor is equal to 0.5 dB, the range will be changed automatically (lower and upper limits will be increased by 0.5).*



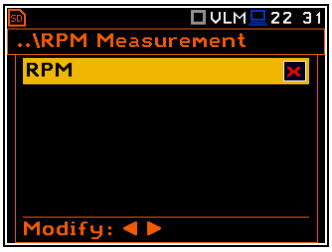
5.7 Setting up the RPM measurements – RPM

To perform the RPM measurement the user should connected the RPM probe to the **Probe** input socket.

The **RPM Measurement** position enables the user to programme the measurements of rotational speed, measured by tacho probe. The RPM function usually is an optional function and should be activated during first attempt to switch it on.



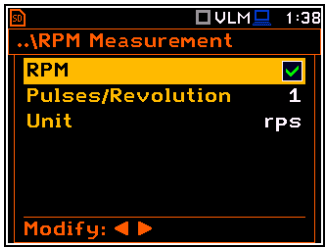
<ENT>

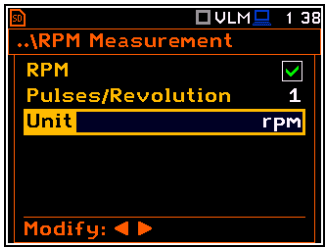


Note: *The **RPM** function is optional and should be unlocked by entering the activation code in the text editor screen, opened by the ► push-button. Once unlocked this option will be ready to use permanently.*

The **Pulse/Rot.** position enables the user to select the number of pulses per one rotation. Available values are in the range: **1**..**360**.

The **Unit** position enables the user to select the unit of the measurement. Two option are available: revolutions per minute (**rpm**) and revolutions per second **(rps**).

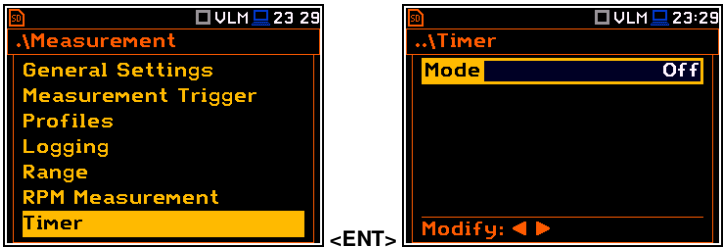




Note: *The RPM results are always registered in the logger file as a logger results (with the logger step) and as a summary results (with the intergration period step).*

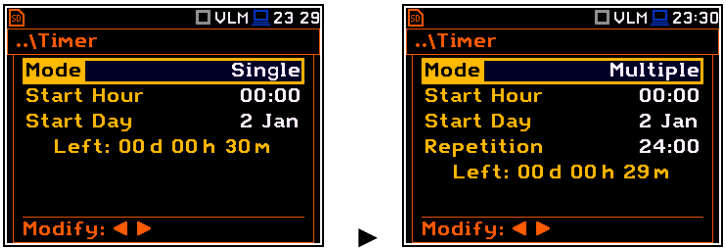
5.8 Programming the instrument's internal timer – Timer

The **Timer** position 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 at the pre-selected programmed time and perform the measurement with the same settings used before the instrument was switched off.



Modes of the timer function

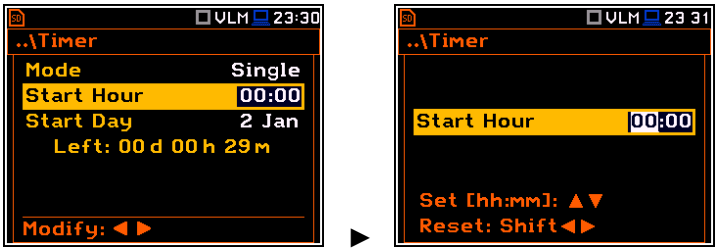
The timer can be switched off (**Off**), switched on only once (**Single**), or switched on many times regularly (**Multiple**) with the period between two consecutive measurements (**Repetition**).



In case the timer function is active (**Single** or **Multiple**) and the instrument is switched on the "**clock**" icon appears until finishing the programmed measurements.

Time of the measurement start

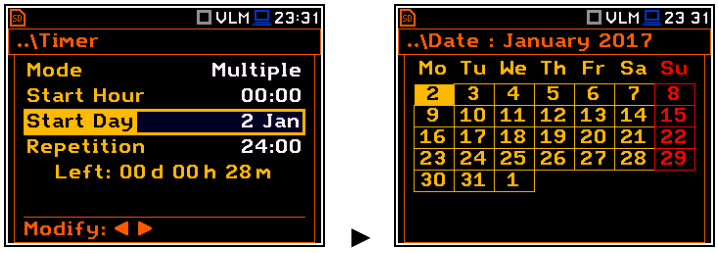
The **Start Hour** position determines the time for the measurement to start. The required hour and minute can be selected in a special window, which is opened by means of the ◄ or ► push-buttons.



To set hours or minutes the user should enter the left or right field by pressing the ◄ or ► push button and then select the proper value by means of the ▲ or ▼ push-buttons and finally to press **<ENTER>**.

Day of the measurement start

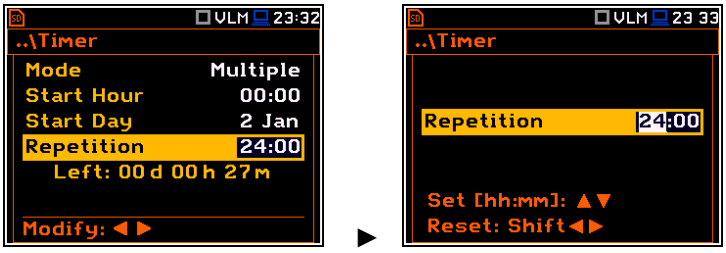
The **Start Day** position determines the date for the measurement to start. The timer can be programmed up to one month ahead and during the date setting the current state of the **R**eal-Time **C**lock (**RTC**) is considered. The required date can be selected in a special window, which is opened by means of the ◄ or ► push-buttons.



To set date, the user should select its position by means of the ◄ or ► and ▲ or ▼ push button and then press **<ENTER>**.

Period between two consecutive measurements starts

The **Repetition** position is displayed when the **Multiple** mode is selected. This parameter can be programmed in the range from **00:00** up to **96:00**. The required date can be selected in a special window, which is opened by means of the ◄ or ► push-buttons analogously to the **Start Hour** position.



Note: *The* ***Timer*** *function can be used for multiple measurements (at the programmed day and time with the selected repetition number). The first start of the instrument must be within one month ahead. Make sure that the RTC is configured correctly before setting up the* ***Timer****.*

Note: *Make sure that there is sufficient power available for the instrument to carry out the required measurement when it wakes up and starts the recording.*

5.8.1 Example of timer execution

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

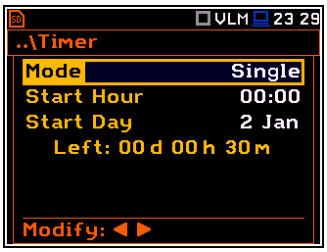
Let us assume that the user wants to switch on the instrument on the 2nd of January, at 00:00, measure the sound for 1 minute and save the results in a file named **L4239**.

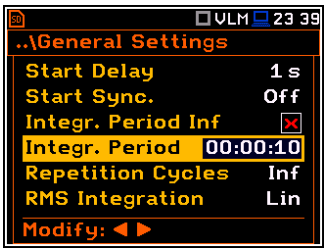
To do this the user should set the parameters of the **Timer** function, the measurement parameters (*path: <Menu> / Measurement / General Settings*), name the file (*path: <Menu> / Measurement / Logger / Logger Setup*) and finally – switch off the instrument.

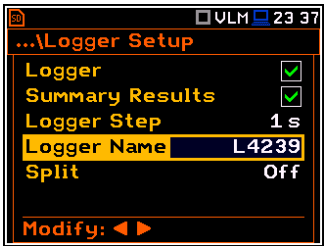
The instrument will be switched on the 2nd of January at 00:00 and will be warmed up for the period of 60 seconds decrementing the counter visible on the display by one after each second.

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

In this example the delayed start time on the meter can be configured any time during the previous month. It is recommended that for simplicity the **Start Delay** time is set to 0 seconds for use with the **Timer** function.



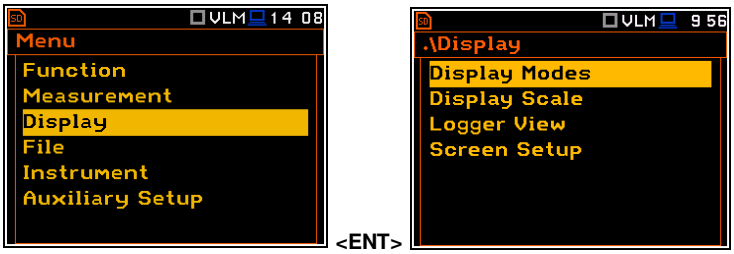




6. SETTING UP THE DATA VIEW – Display

The **Display** list contains the elements that enable the user to independently programme the display parameters.

The content of the **Display** list is different for the spectrum analyser functions (**1|1 Octave**, **1/3 Octave** and **FFT**) in regards to the **Level Meter** function.



The **Display** list is used for setting the various parameters, which are dedicated to the control of the LCD screen display, and contains the following items:

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

Display Scale enables the user to change the scale in the graphical modes of result's presentation;

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

Spectrum View enables the user to change the type of the spectrum and to activate the **Max** and **Min** spectrum. This position appears only in spectrum analyser functions;

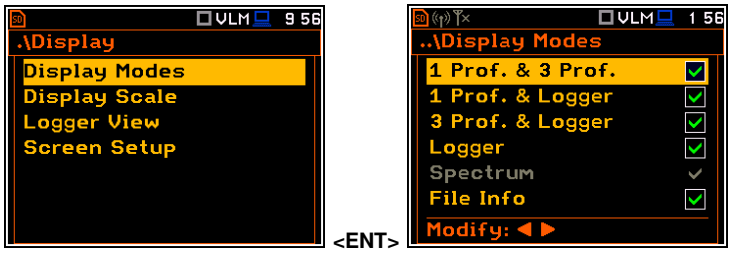
Spectrum Type enables the user to change the spectrum type presented on the display: **Acceleration**, **Velocity** and **Displacement**. This position appears only in spectrum analyser functions;

Screen Setup enables the user to set up the brightness and the switch on/off the energy saver function.

6.1 Selection of the view modes - Display Modes

The One Result view is always available in all measurement modes. Other view modes can be switched on or off in the **Display Modes** sub-list.

The mode of the results presentation is related to the selection of the instrument's function (**VLM**, **1/1 Octave**, **1/3 Octave**, etc.).

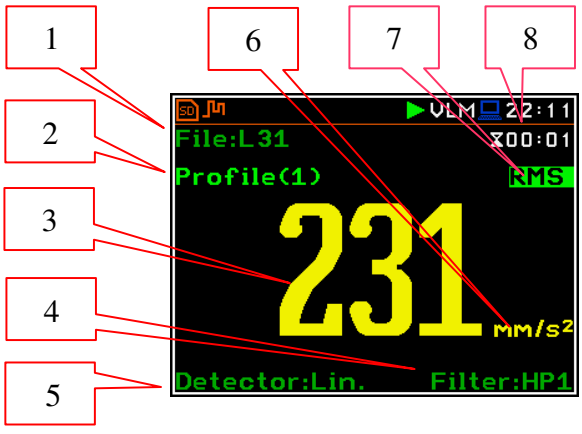


In case of **Level Meter**, following optional views are available: **1 Prof. & 3 Prof.**, **1 Prof. & Logger**, **3 Prof. & LoggerB, Logger** and **File Info**.

One Result view

The One Result view is always available in all measurement modes. In this view, only one measured value is displayed in large letters.

Field description of the One Result view



1. File name when **Logger** is active (*path: <Menu> / Measurement / Logging / Logger Setup / Logger:*☑)
2. Profile number
3. The value of the measured function
4. The name of the implemented filter: **HP**, **HP1**, **HP3**, **HP10**, **Vel1**, **Vel3**, **Vel10**, **VelMF**, **Dil1**, **Dil3**, **Dil10**, **Wh**
5. Detector type: **Lin** when the **RMS Integration** is linear *(path: <Menu> / Measurement / General Settings)* or: **100 ms**, **125 ms**, **.. 10.0 s**,

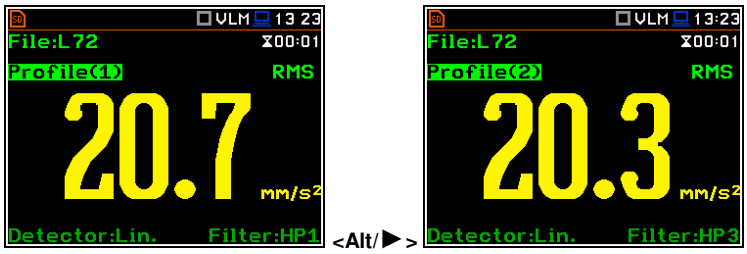
when the **RMS Integration** is exponential *(path: <Menu> / Measurement / General Settings)*

6. Units of the measured value
7. Function name: **RMS**, **Ovl**, **Peak**, **P–P**, **MTVV**
8. Elapsed time shows the current second of the measurement. The value presented there belongs to the range [**1**, **Integration Period**]

Notice: *There is no displayed indication of the detector in case of* ***Peak***, ***P-P*** *and* ***Ovl*** *results.*

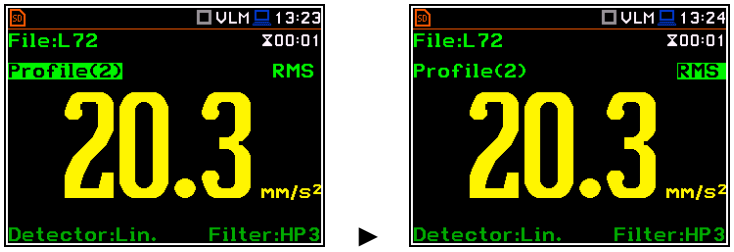
Changing the field content

The content of some fields can be changed after pressing the ◄ and ► push-buttons together with **<Alt>**.



Changing the active fields

The change of the active field is made by pressing the ◄ or ► push-buttons.

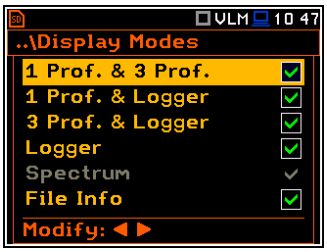


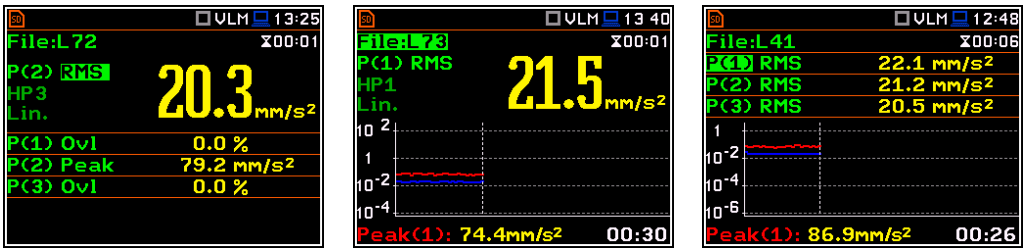
Changing the view mode

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

Combined views

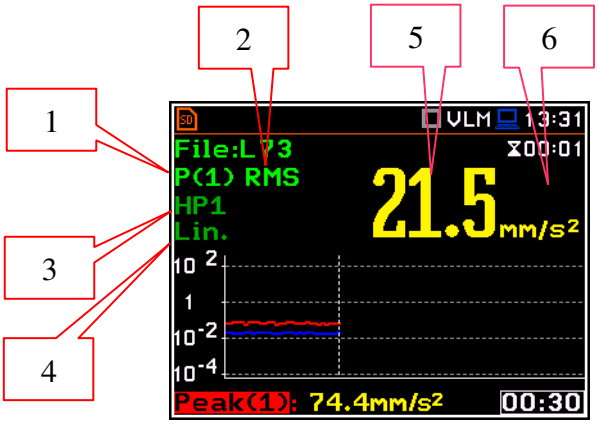
There are three display modes, that combine two views and can be activated or not: **1 Prof. & 3 Prof.**, **1 Prof. & Logger**, **3 Prof. & Logger**. These combined views allow the user to compare results for profiles and to follow the history of measured results, saved in the logger file.



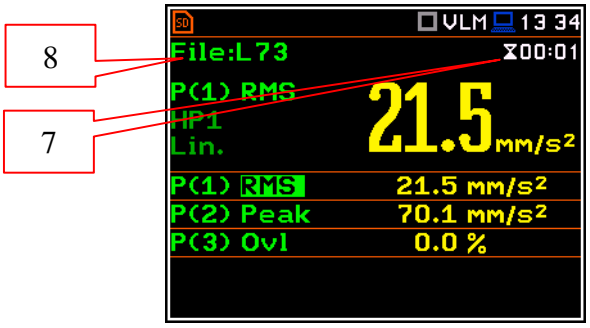


Fields description of the One Result view

1. Profile number.
2. Function name: **RMS**, **Ovl**, **Peak**, **P–P**, **MTVV**.
3. The name of the implemented filter: **HP**, **HP1**, **HP3**, **HP10**, **Vel1**, **Vel3**, **Vel10**, **VelMF**, **Dil1**, **Dil3**, **Dil10**, **Wh** in case of Vibration measurements.
4. Detector type: **Lin** when **RMS Integration** is **Lin** *(path: <Menu> / Measurement / General Settings)* or: **100 ms**, **125 ms**, **..** **10.0 s**, when **RMS Integration** is **Log**.
5. The value of the measured function.



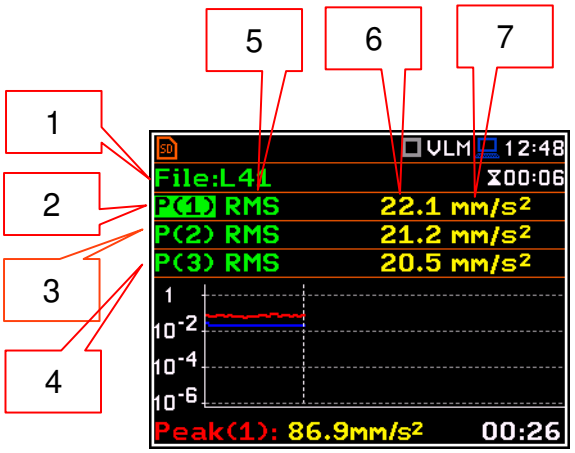
6. Units of the measured value.
7. Elapsed time shows the current second of the measurement. The value presented there belongs to the range [**1**, **Integration Period**].
8. File name when **Logger** is active (*path: <Menu> / Measurement / Logging / Logger Setup / Logger:*☑).



Notice: *There is no displayed indication of the detector in case of* ***Peak***, ***P-P*** *and* ***Ovl*** *results.*

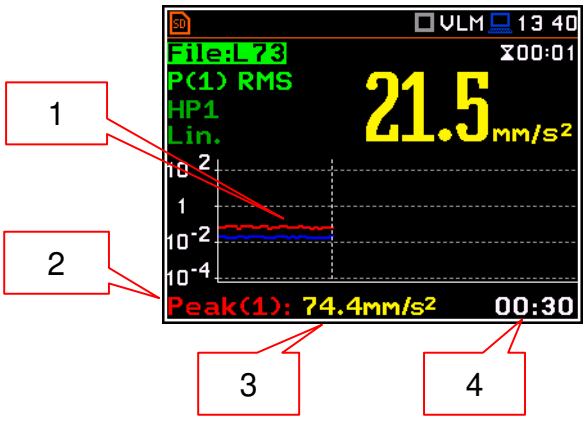
Fields description of the 3 Profiles view

1. File name.
2. Result line for Profile 1.
3. Result line for Profile 2.
4. Result line for Profile 3.
5. Function name: **RMS**, **Ovl**, **Peak**, **P–P**, **MTVV**.
6. The value of the measured function.
7. Units of the measured value.



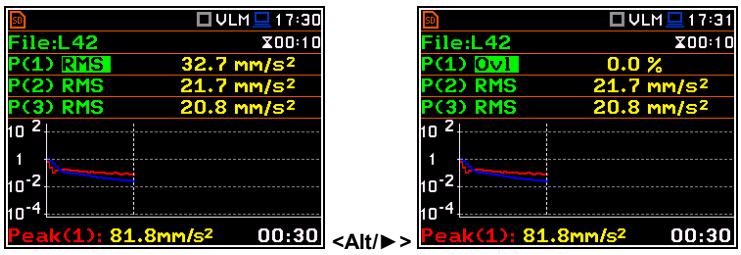
Fields description of the Logger view

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



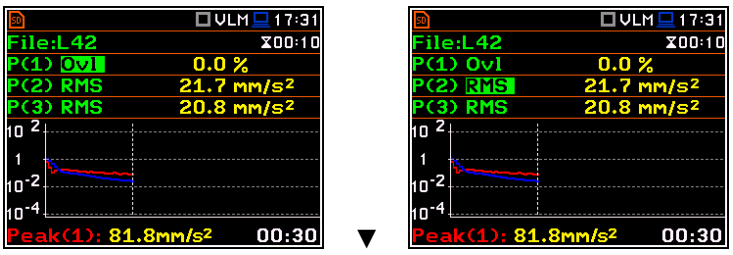
Changing the field content

The content of some fields can be changed after pressing the ◄ and ► push-buttons together with **<Alt>**.



Changing the active fields

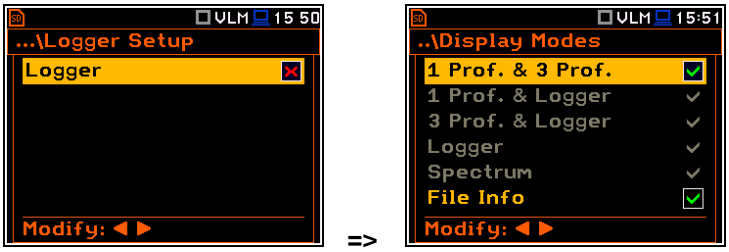
Changing the active field is made by pressing the ▲ / ▼ (vertically) or ◄ or ► (horizontally) push-buttons.



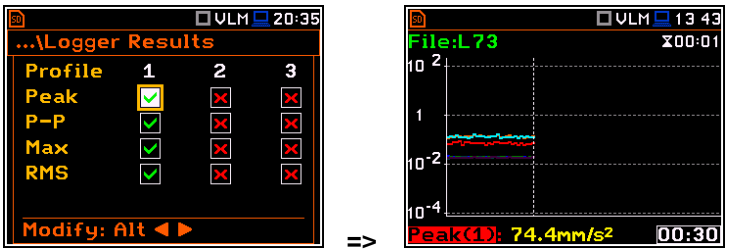
Logger view

The **Logger** view mode depends on the settings made in the **Logging** list (*path: <Menu> / Measurement / Logging).* If **Logger** (*path: <Menu> / Measurement / Logging / Logger Setup)* is switched off the **Logger** view mode is **not** active!

So, to have this view mode active, the user should switch the **Logger** on!

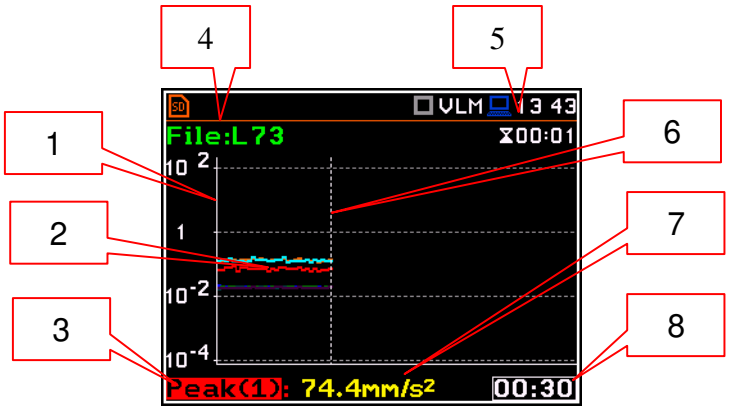


When **Logger** is On and some results have been selected for logging the logger plot can be viewed.

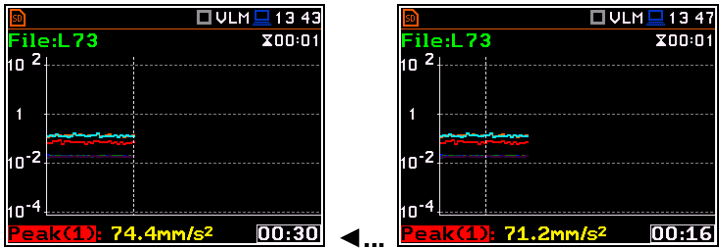


Fields description of the Logger view

1. Y-scale
2. Logger plot
3. Name of the logged result and profile number
4. Name of the file
5. Real Time Clock
6. Cursor position
7. Result value for the cursor position
8. Cursor time position



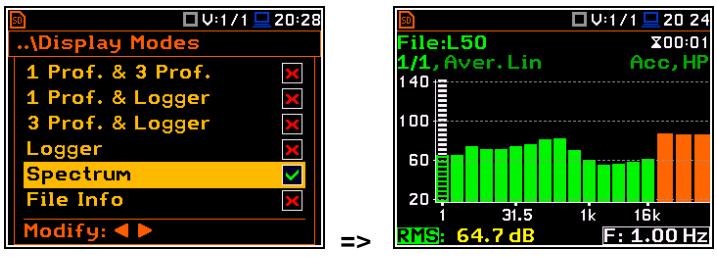
The user can change the cursor position by means of the ◄ or ► push-buttons.



Spectrum view

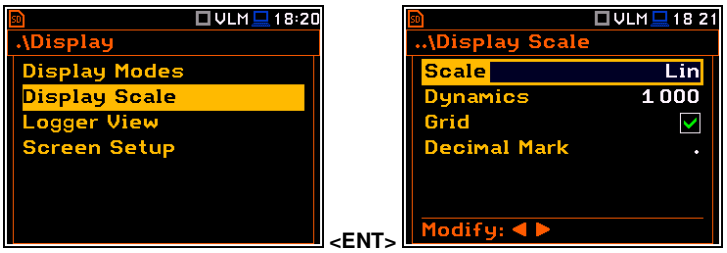
The **Spectrum** position is accessible only for active **1/1 Octave**, **1/3 Octave** or **FFT** functions (*path: <Menu> / Function / Measurement Function*).

The spectra views are described in chapters dedicated to the analyzer functions.



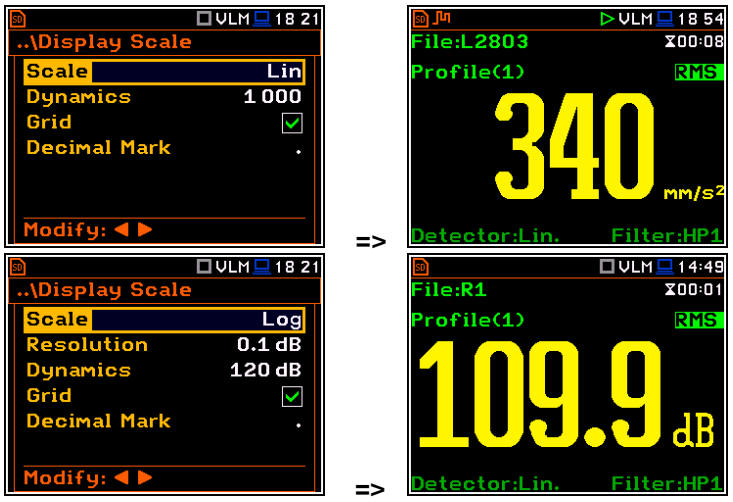
6.2 Setting up the units and scale of results presentation - Display Scale

The **Display Scale** sub-list enables the user to define the result units (absolute or logarithmic), adjust scale of plots and switch the grid on/off.



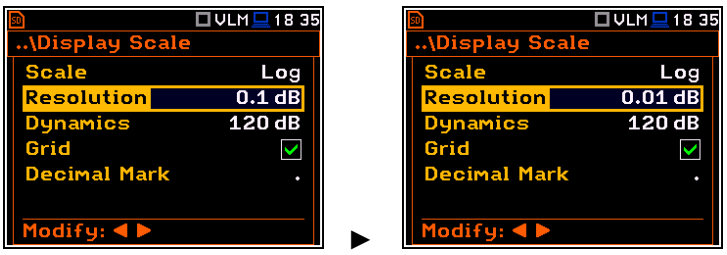
Scale of results presentation

The **Scale** position defines the units of results: **Lin** (linear) and **Log** (logarithmic). In case of **Log** the graphical presentation is given in the logarithmic scale and the measurement results are expressed in decibels (the result is related to the values set in the **Reference Levels** window (*path: <Menu> / Auxiliary Setup / Reference Levels*).



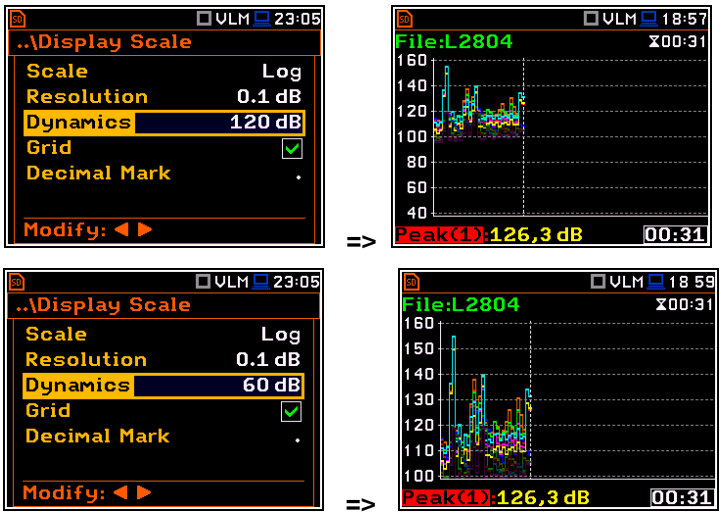
Note: *The parameters can be presented in* ***Logarithmic*** *(dB) or* ***Linear*** *(for example, m/s²) units. It depends on the* ***Scale*** *parameter value. For example, 10 m/s² can be presented as 140 dB.*

The **Resolution** position defines the number of digits after the decimal point in the presented results: one digit after the decimal point (**0.1 dB**) or two digits after the decimal point (**0.01 dB**).



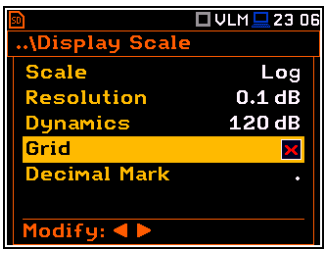
Scaling the vertical axis of the plot

The **Dynamic** position enables the user to select the required dynamic range scaling of the plot. It is possible to select the range from the set: **10dB**, **20dB**, **40dB**, **80dB**, **100dB** and **120dB**.

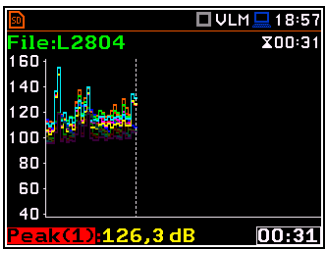


Switching the grid on/off

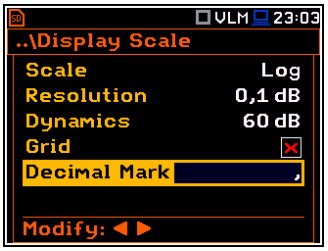
The **Grid** position enables the user to switch on or off the horizontal grid lines in any graphical presentation – history plot or spectrum.



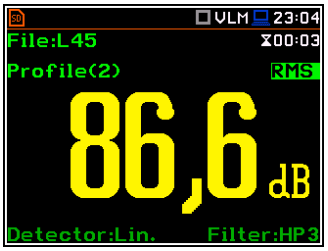
=>



The **Decimal Mark** position enables the user to select type of decimal mark: point or comma. The selected decimal mark will be used in all displayed numbers.

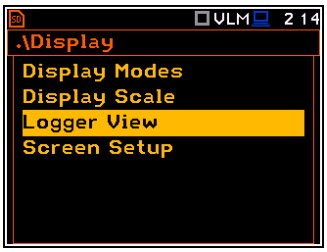


=>

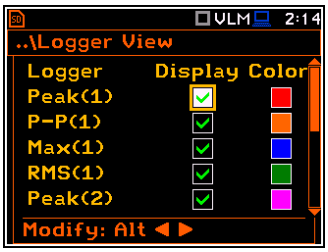


6.3 Setting up the view of the logger plot - Logger View

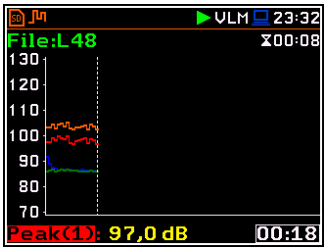
The **Logger View** position enables the user to change the colour of the logger curves. Every logger curve shows the history of one result measured in a profile, like **Peak(1)**. It is possible to include or exclude the curve from the logger plot, and define the colour of this curve.



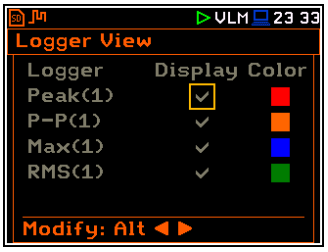
<ENT>



The view of the logger screen can be adjusted quickly without stopping the measurement. Highlight the function field in the bottom left hand corner, then press the **<ENTER>** push-button and the **Logger View** list will be displayed. The user can make necessary adjustments and return to the **Logger** view after confirmation of the performed changes by means of the **<ENTER>** push-button.

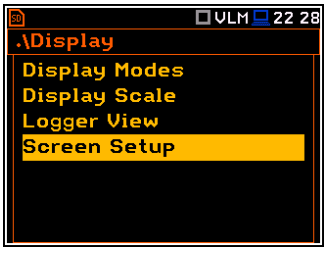


<ENT>

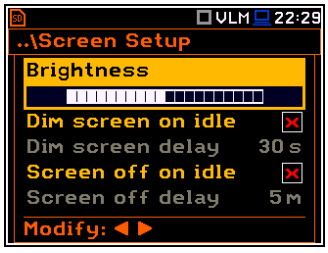


6.4 Setting up the display brightness and power saver - Screen Setup

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

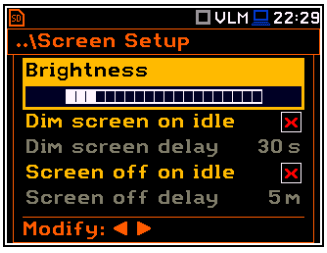


<ENT>

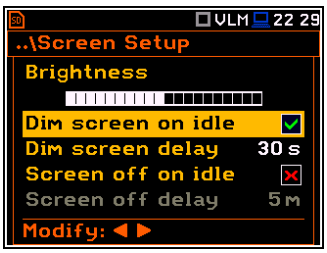


Brightness of the display

The **Brightness** position enables the user to set the proper brightness of the display by means of the ◄ or ► push-buttons. The user can select 20 different values of this parameter. The new value of the brightness level is confirmed after each press of the ◄ or ► push-buttons.



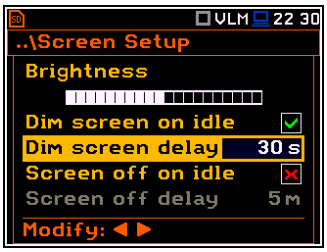
Power saver function



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

There are two options for the power saver function. The screen may be switched off (**Screen off on idle**) and/or dimmed (**Dim screen on idle**). When either of these options are set, after a delay from pressing any push-button, defined by the parameters **Dim screen delay** or **Screen off delay**, the screen is dimmed or switched off. If it has happened, the first press of any push-button will cause the screen to switch back on again.

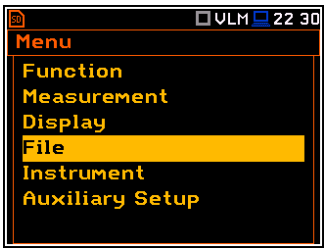
Power saver delay



The power saver delay defines the delay period from last use of any push-button to the power saver mode. This delay period can be set for **Dim screen on idle** from **5 s** to **60 s** and for **Screen off on idle** from **1 m** to **60 m**. The **<ENTER>** push-button must be pressed for confirmation of the selection, which then also closes the **Screen Setup** window.

7. MANAGING THE FILES – File

The **File** list enable the user to manage the data and setup files saved in the memory (micro **SD Card**).



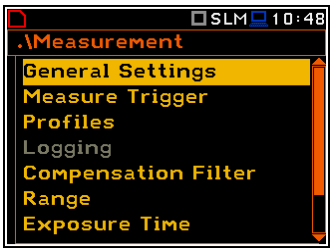
<ENT>

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

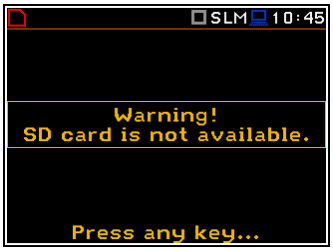
File Manager enables the user to manage the files saved on the SD card;

Setup Manager enables the user to manage the Setup files saved on the SD card.

Note: *Because of limited internal memory capacity of the instrument all files are saved in the external memory. So, if there is no* ***SD Card*** *inserted into the card slot, there is no any possibility to create any files. In such cases the* ***Logging*** *position in the* ***Measurement*** *list is not available.*



Note: *Positions in the* ***File*** *list are active only when an* ***SD Card*** *is inserted into the card slot under the bottom cover of the instrument. If there is no SD card, after user's attempt to enter any position in the* ***File*** *list, the instrument will generate warning.*



There are three types of files that the instrument generates:

- Logger files with measured data (extension **.SVL**),
- WAV files with time waveform recordings (extension **.WAV**);
- Setup files with measurement configuration setups (extension **.SVT**).

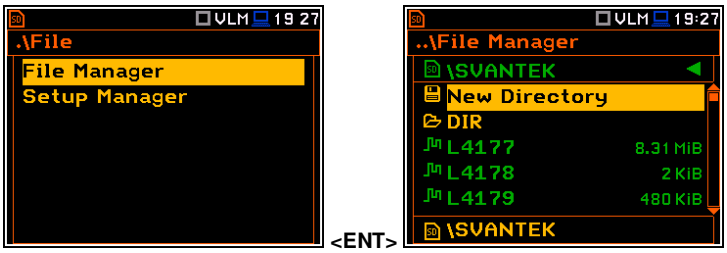
The detailed description of all types of file structures is given in the Appendix B.

The logger file (.SVL) structure depends on the selected function (**Level Meter**, **1/1 Octave**, **1/3 Octave**, etc.) and logging settings. These elements are as follows:

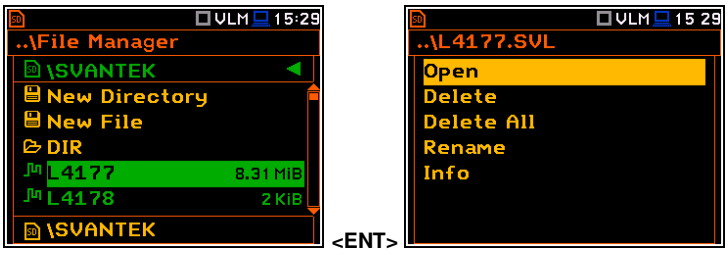
- main results,
- time histories of measured results,
- audio time waveform recording for events,
- marker recording,
- results of **1/1 Octave** analysis,
- results of **1/3 Octave** analysis,
- results of **FFT** analysis.

7.1 Managing files saved in the memory – File Manager

The **File Manager** is used for checking the memory content, create new directories and files, select directory for saving files, delete files and directories.



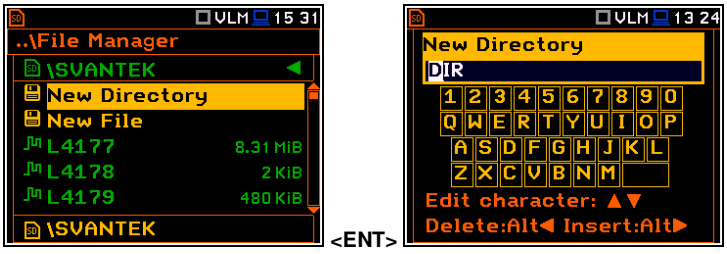
The list of files and directories is presented in the **File Manager** window. Files are stored in directories, which are organised hierarchically. By pressing the **<ENTER>** push-button the window with the list of available commands for the marked (highlighted) position is opening.



Creating new directory or file

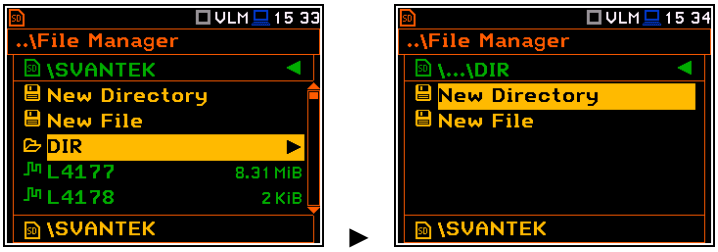
The first position of the File **Manager** list is **New Directory**, which enables the user to create the new directory.

To do this, the user should enter the directory in which the new one will be created and press the **<ENTER>** push-button at the **New Directory** position.



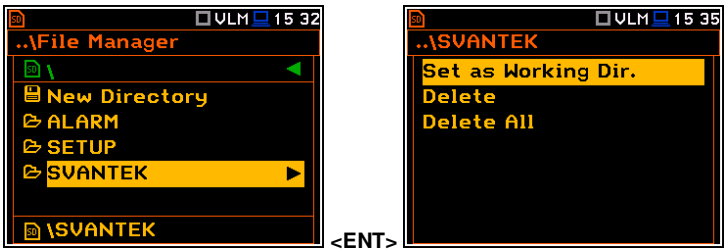
The marked directory can be opened by means of the ► push-button.

To return to the upper directory the user should press the ◄ push-button.



7.1.1 Assigning the directory for files saving – Set as Working Dir.

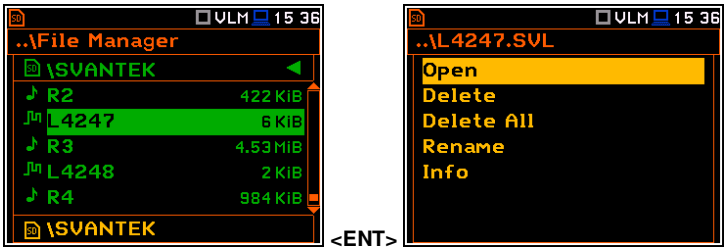
The user can assign the directory for automatically saved logger files. To do this the user should choose the required directory and press the **<ENTER>** push-button. After opening the command list, the user should select **Set as Working Dir.** and press the **<ENTER>** push-button.



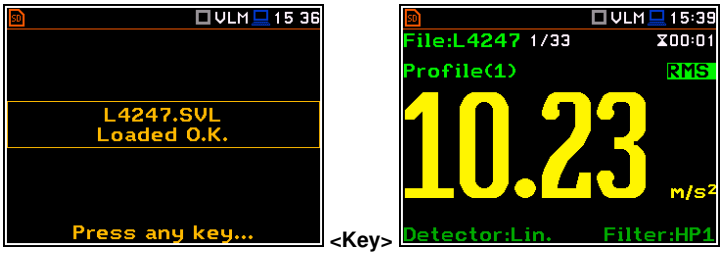
Note: *The working directory name is displayed on the bottom line of the screen.*

7.1.2 Opening file – Open

The user can open logger file from the file list. To do this the user should select the file and press the **<ENTER>** push-button. After opening the command list select the **Open** position and press **<ENTER>** again.



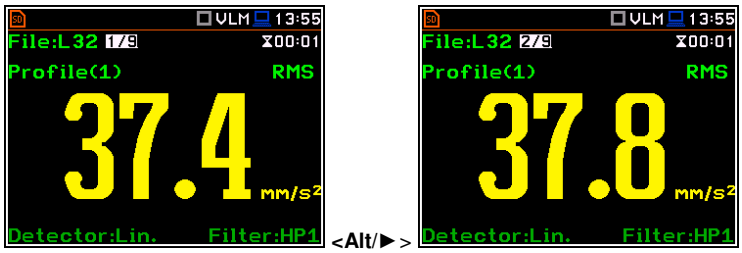
Opening of the logger file means that the measurement results saved in this file will be loaded to the instrument's operation memory and may be reviewed on the screen. The results are loaded together with **Mode** and **Measurement Function** settings, but other measurement settings are as before opening the measurement file.



After loading the file, only summary results saved in the logger file as records can be viewed at the display. Each record contains measurement data for one cycle (measured with integration time step).

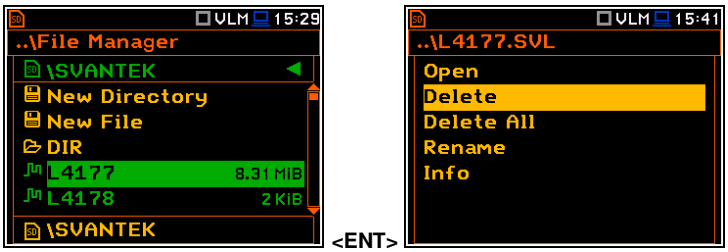
The record counter is displayed in the same line with the file name.

To see next cycle data the user should select the record counter position by means of ▲ or ▼ push-button and then change the record number by means of the ◄ or ► push-button pressed together with **<Alt>**.



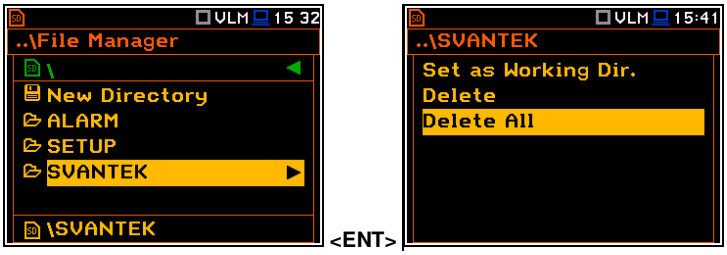
7.1.3 Deleting file/directory – Delete

The user can to delete a file or directory from the file/directory list. To do this the user should select the file/directory and press the **<ENTER>** push-button. After opening the command list, select the **Delete** position and press **<ENTER>**. The instrument will ask for confirmation of this action since it cannot be undone once a file/directory has been deleted.

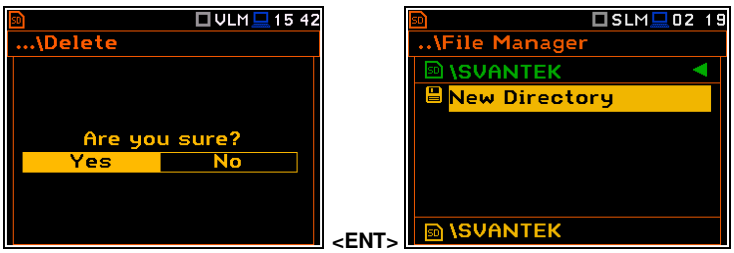


7.1.4 Erasing all files in a directory – Delete All

The user can delete all elements from the directory. To do this the user should select the desired directory and open it by means of the ► push-button. Then select any file or subdirectory and press **<ENTER>**. In the command list select the **Delete All** command and press **<ENTER>**. The instrument will ask for confirmation of this action since it cannot be undone once files have been erased.

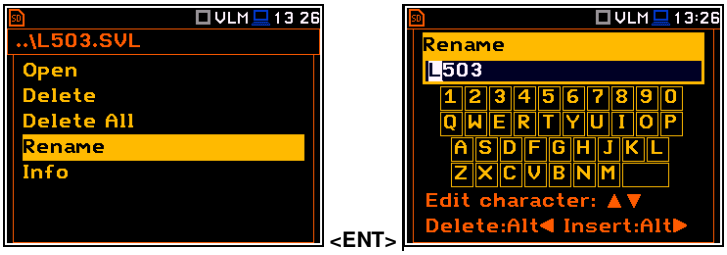


If the **Delete All** command is performed in a root directory, then all files and directories will be erased except three directories: **ALARM**, **SETUP** and **SVANTEK**. These directories are always presented on a SD-disc.

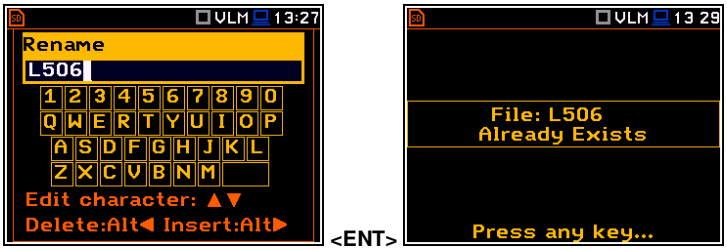


7.1.5 Renaming files – Rename

The user can rename files or directories. To do this the user should select the desired file and press the **<ENTER>** push-button. In the command list select the **Rename** command and press **<ENTER>**. The special window with editor function will be opened.

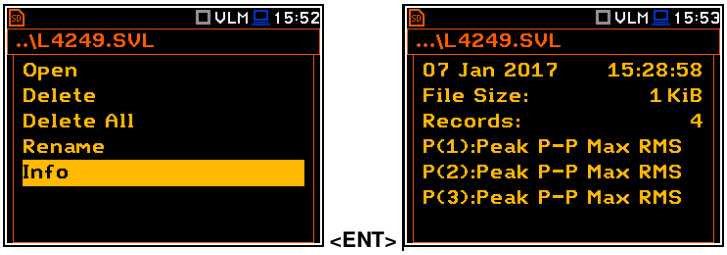


If file with the new name is already in the directory, the warning will be generated and rename command will not be performed. After pressing any key the instrument will return to the editor window.



7.1.6 Viewing information about files – Info

The user can view information about file. To do this the user should select the desired file and press the **<ENTER>** push-button. In the command list select the **Info** command and press **<ENTER>**. The information window will be opened.

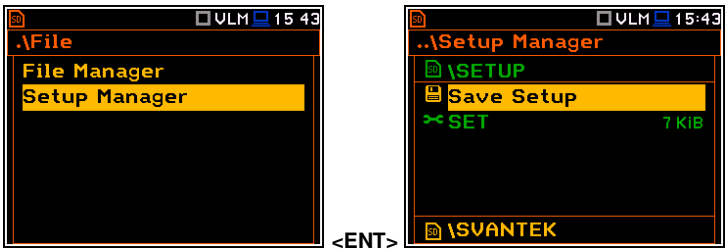


The file Info window contains information about: date and time of file creation, file size, number of records with summary results and results saved with the logger step for three profiles.

7.2 Managing the setup files – Setup Manager

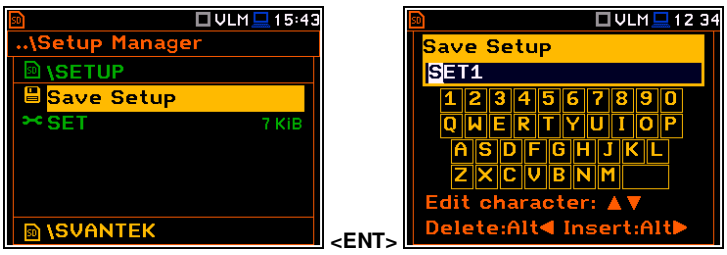
The **Setup Manager** position enables the user to save a new setup file or to load saved setup.

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



Saving the setup files

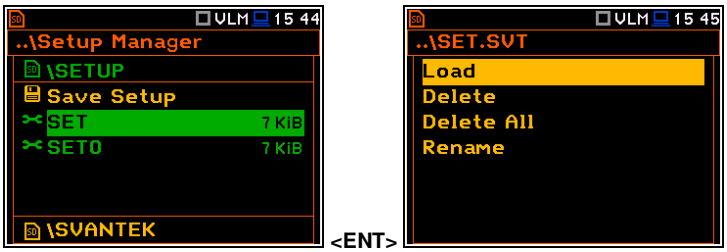
It is possible to save only current instrument's settings. To save current settings in the setup file the user should press **<ENTER>** on the **Save Setup** position and to edit the setup file name in the special window. Up to 8 characters can be used to name a setup.



Loading the setup files

To load settings saved in the setup directory the user should press **<ENTER>** on the selected file. Then the user should confirm the loading in the opened window by pressing the **<ENTER>** push-button.

After loading the setup file the instrument will be reconfigured.



Deleting the setup files

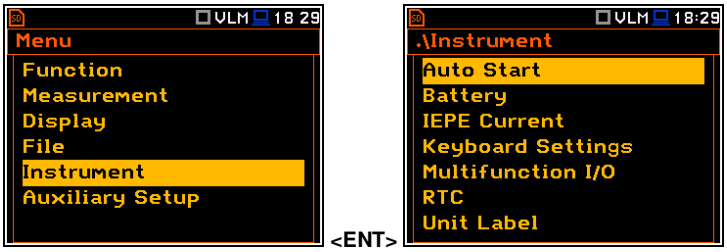
Deleting the setup files is performing in the same way as deleting of files from the **File Manager** list.

Renaming the setup files

Renaming the setup files is performing in the same way as renaming of files from the **File Manager** list.

8. SETTING UP THE HARDWARE PARAMETERS – Instrument

The **Instrument** list is directly related to the settings of the hardware components of the instrument. To open the **Instrument** list, the user should press the **<Menu>** push-button, select the **Instrument** position and press **<ENTER>**.

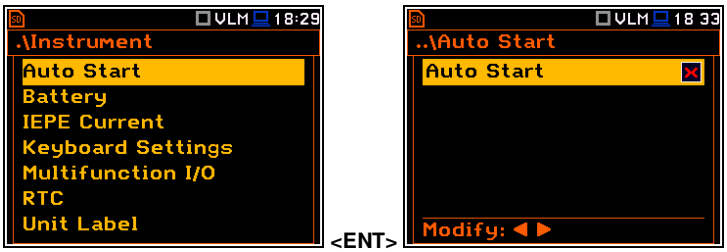


The **Instrument** list contains the following items:

Auto Start	enables the user to start the measurement just after switching the instrument on;
Battery	enables the user to get information about current power source;
IEPE Current	enables the user to choose the correct IEPE current supply for vibration transducers;
Keyboard Settings	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;
RTC	enables the user to set up the Real-Time Clock;
Unit Label	enables the user to check information about the type of the instrument, its serial number, the current software versions installed and the standards, the instrument fulfils.

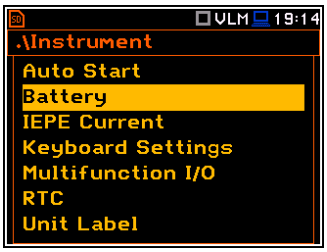
8.1. Measurement auto start - Auto Start

The **Auto Start** position enables the user to start the measurement just after the switching the instrument on without pressing the **<Start>** push-button.



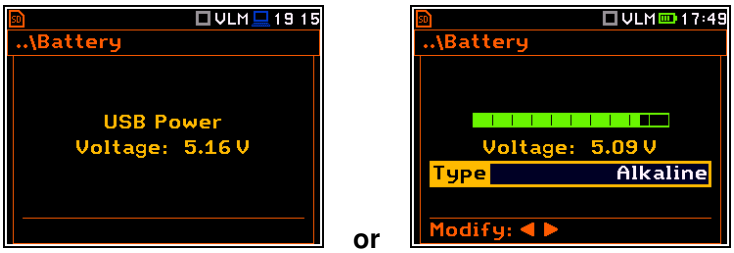
8.2. Checking the instrument powering – Battery

The **Battery** position enables the user to check the power source of the instrument: internal battery condition, source and voltage of the external power supply; and to define the battery type for corrct checking of their condition. The instrument can be powered from internal four AA rechargeable or standard alkaline batteries or from the USB interface when its USB Device socket is connected via the SC 56 cable to a PC or other USB power.



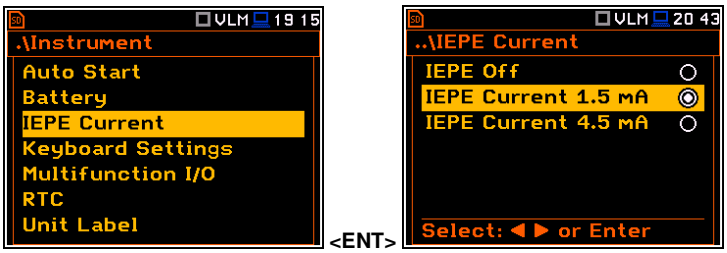
The view presented on the display for each power source is different.

When the instrument is powered from a set of internal batteries the user should select the correct battery type (**Alkaline** and **Rechargeable**). It is essential for the right detection of the capacity of the battery pack.



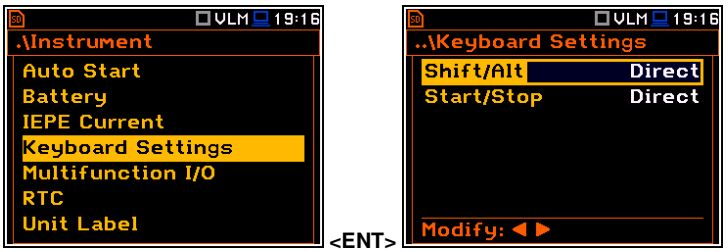
8.3. Selection of the IEPE current supply - IEPE Current

The **IEPE Current** position enables the user to choose the correct IEPE current supply: **IEPE Off** or **IEPE Current 1.5 mA** and **IEPE Current 4.5 mA**



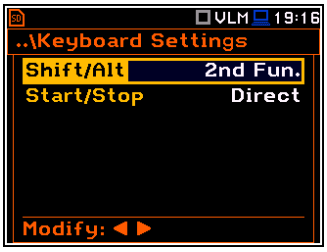
8.4. Programming the keyboard – Keyboard Settings

The **Keyboard Settings** position enables the user to programme the functionality of the **<Shift>**, **<Alt>** and **<Start/Stop>** push-buttons. The default settings are **Direct** for both items shown on the display screen.



<Shift> / <Alt> push-button mode

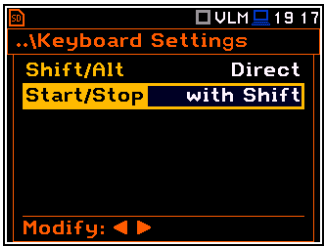
In the **Shift/Alt** position the user can choose between **2nd Fun.** and **Direct**. When the **Direct** option is selected, the **<Shift>** and **<Alt>** push-buttons operate as in the keyboard of a computer – to achieve the desired result, the second push-button should be pressed at the same time with **<Shift>**/**<Alt>**. When the **2nd Fun.** option is selected the **<Shift>**/**<Alt>** push-buttons operate in 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

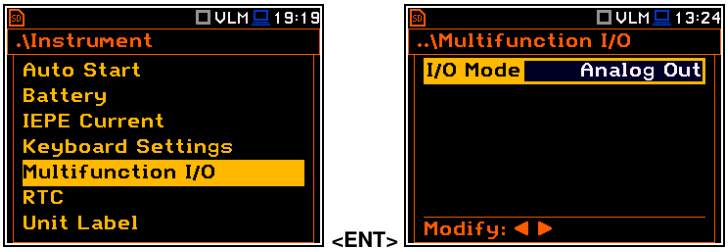
In the **Start/Stop** position the user can choose between **Direct** and **With Shift**. When the **Direct** option is selected, the instrument reacts on each of the **<Start/Stop>** push-button press, starting or stopping the measurements.

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



8.5. Setting up the parameters of the I/O port - Multifunction I/O

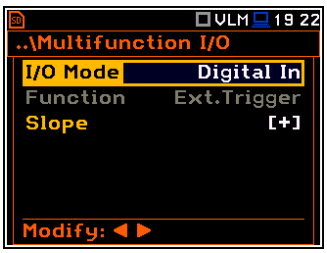
The **Multifunction I/O** enables the user to select the available functionality of the **I/O** port (3.5 mm jack socket).



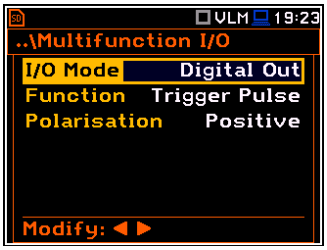
The **I/O** jack socket can be used as:

- 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**). The instrument is acting in this case as so called "slave instrument",
- the digital output (**Digital Out**) used for triggering other "slave instrument(s)" (the instrument is acting in this case as a "master instrument"), or as a source of any alarm signal in case of certain circumstances occurred during the measurements (i.e. the level of the input signal was higher than a user selected trigger alarm setting).

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

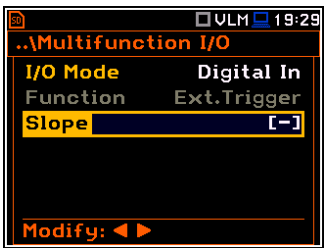


►



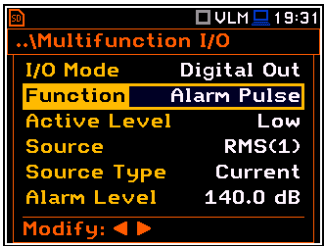
Slope parameter for the Digital In mode (Ext.Trigger function)

In case of **Digital In** the signal appeared on the **I/O** socket will be be treated as the external trigger if **External** is chosen as a trigger (*path: <Menu> / Measurement / Measurement Trigger / Trigger: External*). For the **Digital In** mode only the **Ext.Trigger** value is available for the parameter **Function**. It is possible to set up **Slope** as positive **[+]** or negative **[-]** by means of the ◄ or ► push-buttons.



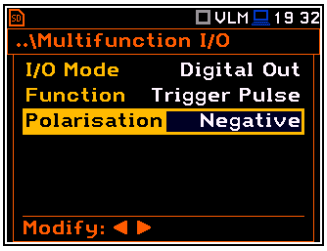
Digital output function of the I/O socket

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 (**Trigger Pulse**) which starts the measurement in another "slave instrument" linked to the "master instrument" or the alarm signal, which appears there after fulfilling certain measurement conditions (**Alarm Pulse**).



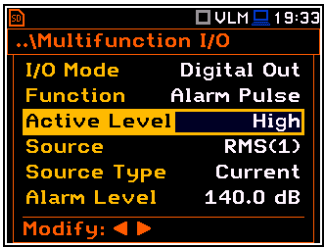
Polarisation of the digital output signal

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



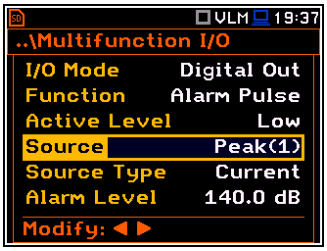
Active level for the alarm pulse generation

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**.

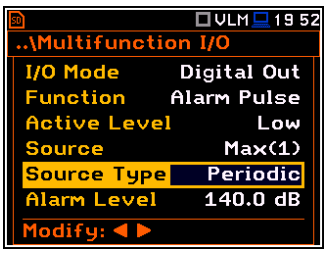


Source signal for the alarm pulse generation

The **Source** position enables the user to select the level of which measurement result should be checked. If the measured result level is greater than selected alarm level (**Alarm Level**), the instrument will generate alarm signal on the **I/O** socket. The measurement results from the first profile: **Peak(1)**, **Spl(1)**, **Max(1)** or **Leq(1)** can be used for the purpose described above.



Alarm source type

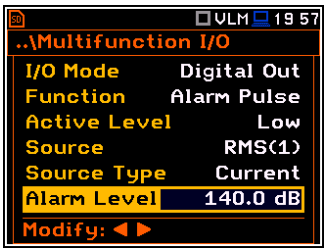


The **Source Type** position enables the user to select the type of alarm source. Available types are: **Current** and **Periodic**.

In case of **Current**, the alarm pulse will be generated all time when the instantaneous result of the function selected in the **Source** position (measured with 1 second step) is over the **Alarm Level** value.

In case of **Periodic**, the alarm pulse will be generated all time when the result of the function selected in the **Source** position and measured with the integration period step, is over the **Alarm Level** value.

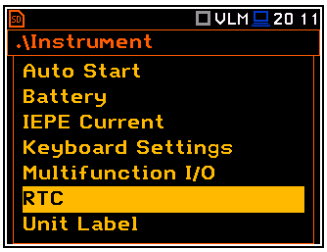
Alarm level



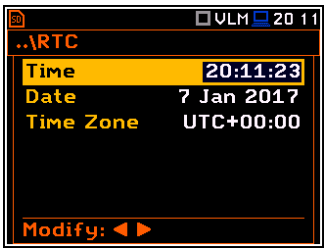
The **Alarm Level** position enables the user to set the level of the result to be monitored during the measurements. If the result is greater than the alarm level, the instrument will generate the alarm signal in the selected logic. The available levels are within the range [60.0 dB, 180 dB].

8.6. Setting up the instrument's internal Real Time Clock – RTC

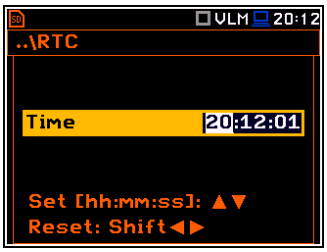
The **RTC** position enables the user to programme the internal **Real Time Clock**. This clock is displayed in the different places of the display depending on the selected view mode.



<ENT>

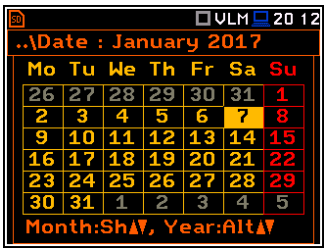


The required **Time** (hour, minute and second) can be selected in a special window, which is opened by means of the ◄ or ► push-buttons.



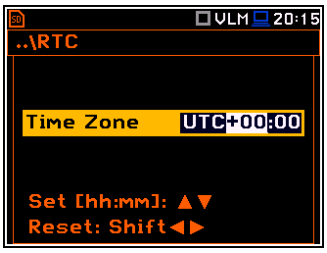
To set hours, minutes or seconds the user should enter the relevant field position by pressing the ◄ or ► push button and then select the correct value by means of the ▲ or ▼ push-buttons. To confirm the selection the user should press the **<ENTER>** push-button.

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



To set the correct date, the user should select its position in the calendar by means of the ◄, ► or ▲,▼ push buttons and then press **<ENTER>** to confirm the selection.

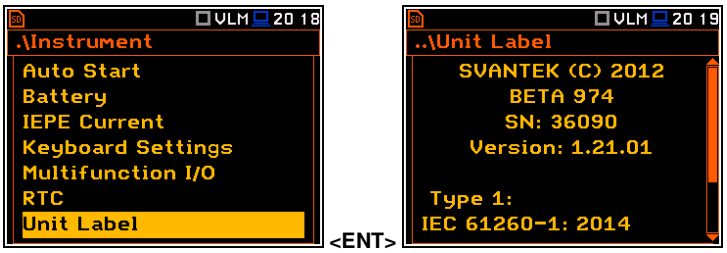
Time Zone can be selected in a special window, which is opened by means of the ◄ or ► push-buttons.



8.7. Checking of the instrument specification - Unit Label

The **Unit Label** position enables the user to check information about the instrument type, its serial number, the current software version installed and the relevant standards, which the instrument fulfils.

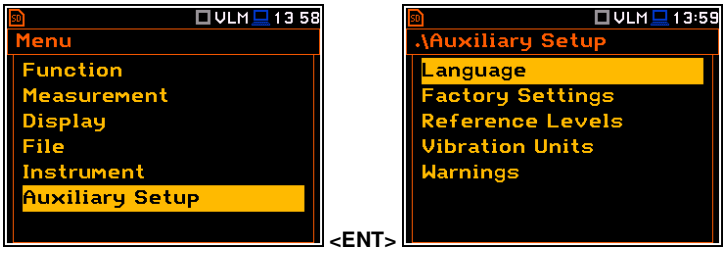
The displayed text is scrolled on the display after pressing ▲ and ▼.



Note: *The contents of the* ***Unit Label*** *window should be always sent to Svantek 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 provides the user with additional features that allow, for instance, customize the interface device to a specific user and are not directly related to the hardware components of the instrument. To open the **Auxiliary Setup** list, the user should press the **<Menu>** push-button, select the **Auxiliary Setup** text and press **<ENTER>**.



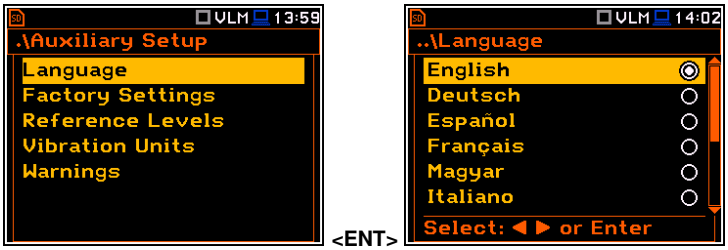
The **Auxiliary Setup** list contains the following items:

Language	enables the user to select the language of the user interface.
Factory Settings	enables the user to return to the default, factory settings.
Reference Levels	enables the user to select the reference level for the Vibration measurements.
Vibration Units	enables the user to select the Vibration units in which the results of the measurements are to be viewed.
Warnings	enables the user to switch the warnings on or off that can be displayed during the normal operation of the instrument.

9.1. Selecting the language of the user interface – Language

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

If after turn on the instrument an unknown language interface appears on the display the user can reset the instrument by means of the four <**Shift**/**Enter**/**Alt**/**Start**> push-buttons pressed together. After this, the instrument will come back to the default setup with the English interface.



9.2. Restoring the factory settings – Factory Settings

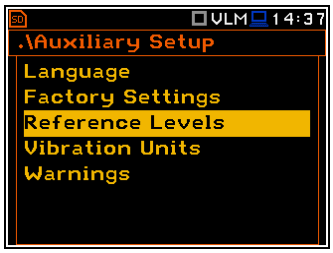
The **Factory Settings** sub-list enables the user to restore the default settings of the instrument.

Select **Yes** in the **Factory Settings** window and press **<ENTER>**. After restoration process the instrument will inform the user that "**Settings restored**".

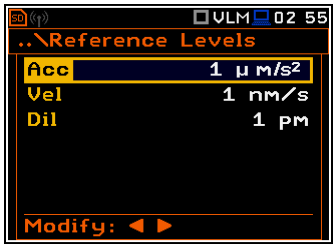
The factory setup can be installed also by means of the four **<Shift**/**Enter**/**Alt**/**Start>** push-buttons pressed together.

9.3. Setting up the reference levels - Reference Levels

The **Reference Levels** sub-list enables the user to set the reference levels of the vibration signal for acceleration (**Acc**), velocity (**Vel**) and displacement (**Dil**). The selected values will be considered during the calculations of the measurement results expressed in the Logarithmic scale (dB).



<ENT>



Reference levels for vibration measurements

In the **Acc** position the user can set the reference level of the acceleration signal in the range from 1 μms^{-2} to 100 μms^{-2}.

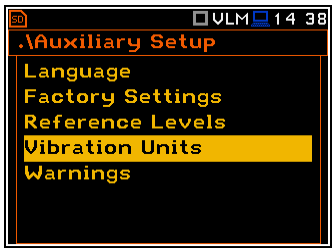
In the **Vel** position the user can set the reference level of the velocity signal in the range from 1 nms^{-1} to 100 nms^{-1}.

In the **Dil** position the user can set the reference level of the displacement signal in the range from 1 pm to 100 pm.

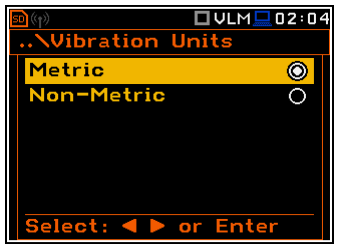
9.4. Selection of the units for vibration results - Vibration Units

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.).

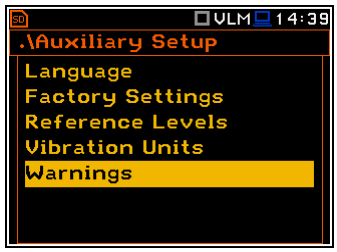


<ENT>



9.5. Warnings setup – Warnings

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

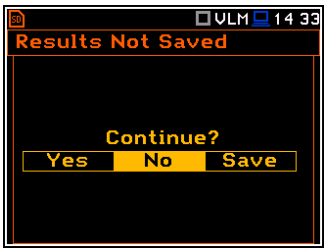


<ENT>

Saving the measurement results in a file

When the **Results Not Saved** position is On, a special warning will be displayed after pressing the **<Start/Stop>** push-button in a case when the result of the previous measurement was not saved.

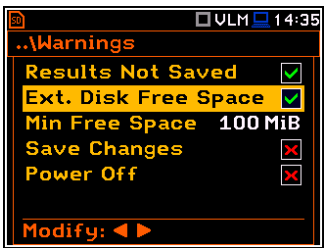
The should select one of three answers to the question **Continue?**: **Yes**, **No** or **Save**. If **Yes** is chosen, the instrument returns to the active mode of result presentation and starts the new measurement process. If **No** is chosen, the instrument returns to the active mode of measurement result's presentation without starting the new measurement process. If **Save** option is chosen, then the measurement results are saved.



Checking free space on the external disk

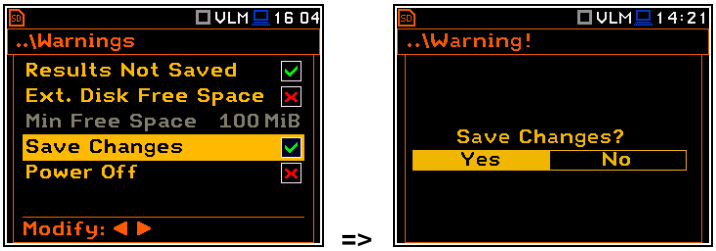
The **Ext. Disk Free Space** position switches on or off the verification of free space on the SD card and generates the warning when the space is lower than **Min Free Space**.

The selected limit should be within the range [1 MB, 1024 MB].



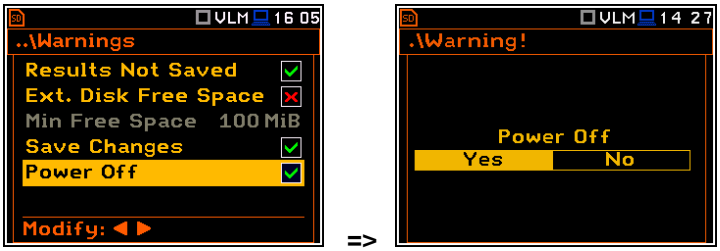
Confirmation of parameters changes

If the **Save Changes** position is On, the instrument displays the warning message in case some parameters were changed, but the window with parameter list was exit by means of the **<ESC>** push-button.



Confirmation of the instrument turn off

If the **Power Off** position is On, the instrument displays the warning message in case the user is switching the instrument off.

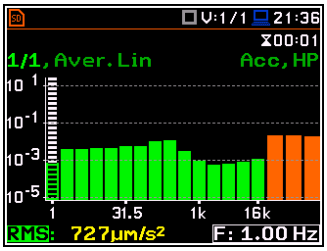


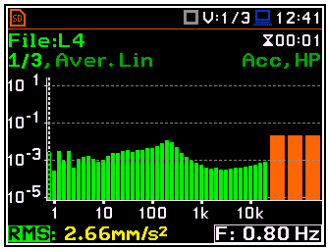
10. 1/1 AND 1/3 OCTAVE ANALYSER

The instrument operates as a real time **1/1 Octave** or **1/3 Octave** analyser (RTA) in a very similar way to the **Level Meter**. Moreover, **1/1 Octave** or **1/3 Octave** analysis is performed in parallel with the **Level Meter** operations. All 1/1-octave (with 15 centre frequencies from 16kHz down to 1.0Hz; in base two system) and 1/3-octave (with 45 centre frequencies from 20kHz down to 0,8Hz; in base two system) digital pass-band filters are working in real-time with the **HP** weighting filter (class 1 in accordance with IEC 61672-1) and the linear RMS detector.

Note: *The TOTAL RMS results are measured with the weighting filters (**HP**, **HP3** and **HP10**) regardless of what settings were selected in the profiles for Level Meter calculations**.** The spectra are always linearly averaged. Thus, the **Total** values for **1/1 Octave** or **1/3 Octave** analysis can be different from those obtained for the profiles (if the **RMS Integration** was set as **Exp**).*

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

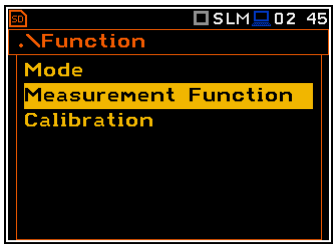




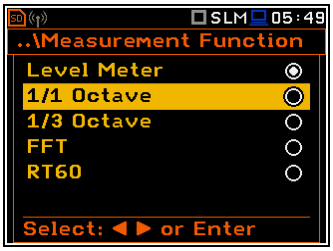
The **1/1 Octave** and **1/3 Octave** spectra are presented for all centre frequencies of pass-band filters together with the **Total** overall values measured with preselected frequency weighting filters. The read-out of the spectrum value can be done using a vertical cursor.

10.1. Selection of 1/1 Octave or 1/3 Octave functions

To select the **1/1 Octave** or **1/3 Octave** analysis function the user should enter the **Function** list by pressing the **<Menu>** push-button, then select the **Function** text and press **<ENTER>**. In the **Measurement Function** window select required (**1/1 Octave** or **1/3 Octave**) position and press **<ENTER>**.



<ENT>



Note: *The **1/1 Octave** and **1/3 Octave** functions are optional and should be unlocked by entering the activation code in the text editor screen, which is opened after first attempt to select them. Once unlocked these options will be ready to use permanently.*

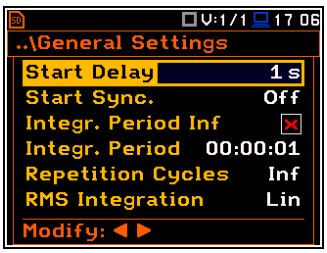
Note: *It is not possible to change the current function during a measurement. In this case, the instrument displays for about 2 seconds the text: **"Measurement in Progress"**. To change the current function, the measurement must be stopped!*

10.2. Configuring 1/1 Octave or 1/3 Octave analyser

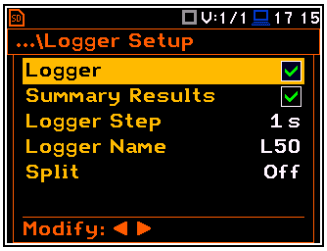
Execution of **1/1 Octave** or **1/3 Octave** analysis depends on a certain number of parameters, which can be set in the different windows of the **Measurement** list. Some parameters are fixed: filter (**HP**), frequency range (from **1.0 Hz to 16 kHz** for octave and from **0.8 Hz to 16 kHz** for the third octave), and the measurement range.

The **1/1 Octave** or **1/3 Octave** analysis is performed based on the parameters selected in the **General Settings** list of **Measurement** menu: **Integration Period** and **Repetition Cycles**.

The spectra are stored as main results in a results file with the same step (**Integr. Period**) as the other main results, measured by the **Level Meter** function.



The user can switch on or off the history of spectra recording in the logger file (*path: <Menu> / Measurement / Logging / Logger Results / Spectrum: ☑*). If spectra history is switched on, the spectra will be logged also with the step, defined by the **Logger Step** parameter (*path: <Menu> / Measurement / Logging / Logger Setup / Logger Step*).



For each octave or one-third octave band the RMS result is calculated and presented as a bar on the spectrum plot.

Besides the RMS results for the bands three **Total** values are measured and displayed as an additional three bars. Parameters for Total (filters) are set by default and can not be changed.

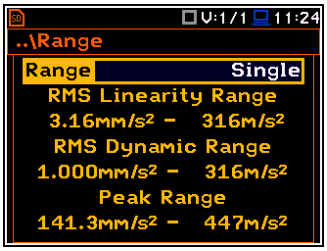
The output of the selected octave or third-octave band result can also be used to trigger an alarm, saving logger results, recording time history signal and the event.

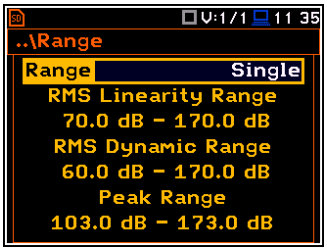
10.2.1. Checking the measurement range for 1/1 Octave and 1/3 Octave - Range

For the **1/1 Octave** or **1/3 Octave** functions there is only one (**Single**) input range specified in Appendix C.

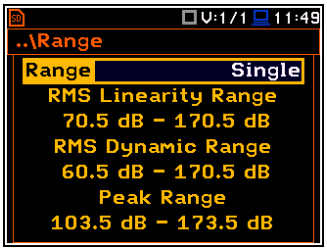
The user can check it in the **Range** window of the **Measurement** list.

Depending on the settings of the **Scale** parameter (*path: <Menu> / Display / Display Scale*) the range will be presented in absolute or logarithmic units (dB).



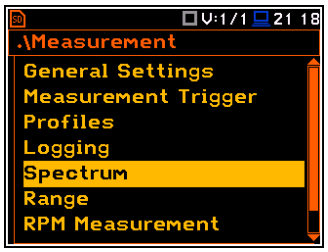


Note: *The calibration factor is always added to the range limits. For example, if calibration factor is equal to 0.5 dB, the range will be changed automatically (lower and upper limits will be increased by 0.5).*

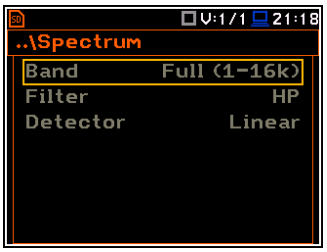


10.2.2. Setting up the parameters of 1/1 Octave and 1/3 Octave analysis - Spectrum

The **Spectrum** position, which appears in **1/1 Octave** or **1/3 Octave** analysis, opens the window with predefined parameters: frequency band (**Band**), pre-weighting broadband frequency filter (**Filter**) and RMS detector type (**Detector**).

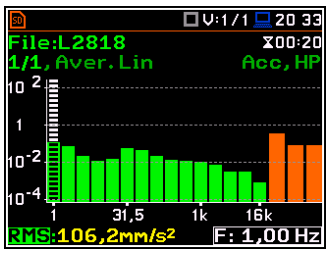


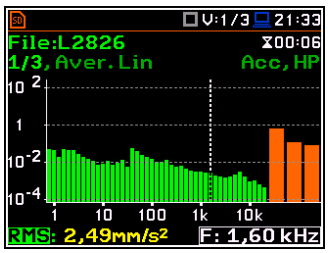
<ENT>



The **Band** position defines the applied band of **1/1 Octave** or **1/3 Octave** analysis:

- **1/1 Octave**: **Full (1-16k)** - 15 filters with centre frequencies 1 Hz ÷16 kHz,
- **1/3 Octave**: **Full (0.8-20k) -** 45 filters with centre frequencies 0.8 Hz ÷20 kHz.





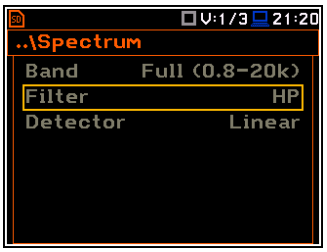
Weighting filter

For vibration analysis one **HP** filter is used (type 1, according to the IEC 61672-1 standard).

The characteristic of the filter is given in Appendix C.

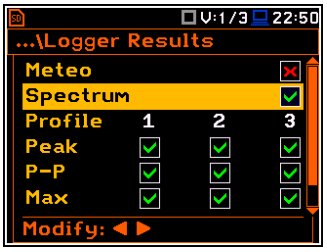
RMS detector

Only one **Linear** detector is used



10.3. Saving the 1/1 or 1/3 Octave spectra as a time history – Logger Results

The **RMS** results from **1/1 Octave** or **1/1 Octave** analysis can be saved in the logger file together with the logger results and with the step defined by the **Logger Step** parameter (*path: <Menu> / Measurement / Logging / Logger Setup*). The spectrum saving in the logger file is defined by activation the **Spectrum** position in the **Logger Results** window by means of the ◄ or ► push-buttons.

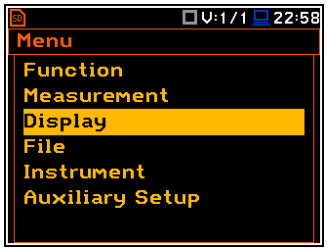


Note: *The spectra are always saved together with the summary results with integration period step.*

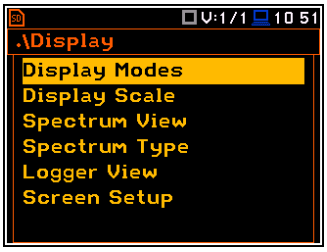
10.4. Setting up the 1/1 Octave and 1/3 Octave spectra view

The **Display** list is used for setting the various parameters, which are mainly dedicated for the control of the spectrum view.

The following positions are used for setting the presentation of the 1/**1 Octave** and **1/3 Octave** results:



<ENT>



Display Modes enables the user to select the **Spectrum** view;

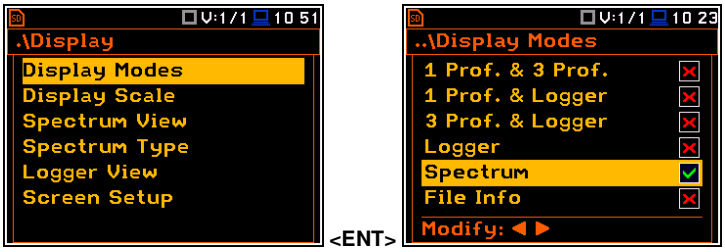
Display Scale enables the user to change the scale of the vertical and horizontal axis of the spectrum plot, switch on or off the grid;

Spectrum View enables the user to choose the spectrum (**Average**, **Instantaneous**, **Min**, **Max**) to be viewed;

Spectrum Type enables the user to change the viewed spectrum: **Acceleration**, **Velocity** or **Displacement**.

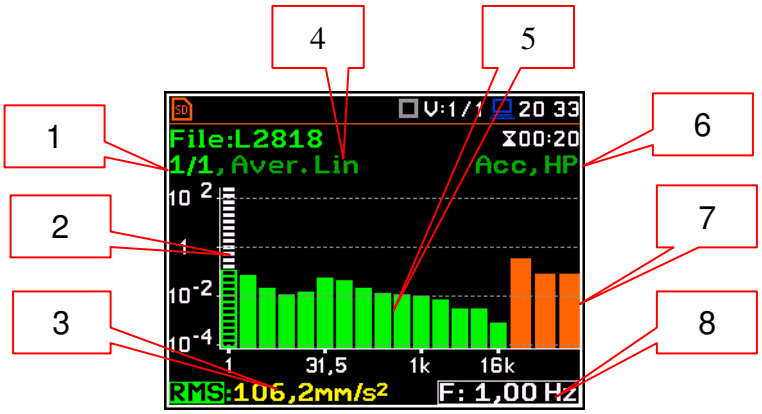
10.4.1. Presentation of 1/1 Octave and 1/3 Octave spectra

The **Spectrum** position of the **Display Modes** list becomes available for the **1/1 Octave** and **1/3 Octave** functions and enables the user to switch on or off the spectrum view.

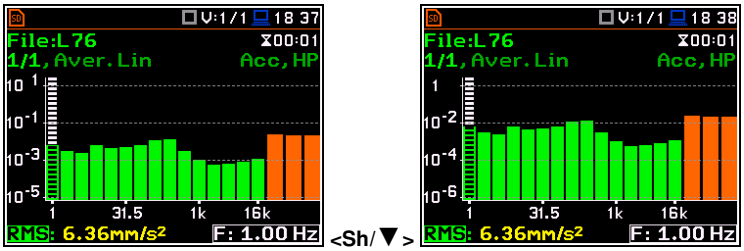


Fields description of the Spectrum view

1. Type of spectrum
2. Cursor position
3. Value for the cursor position
4. Averaging used
5. Spectrum plot
6. Frequency weighting filter used
7. Total values
8. Central frequency for the cursor position

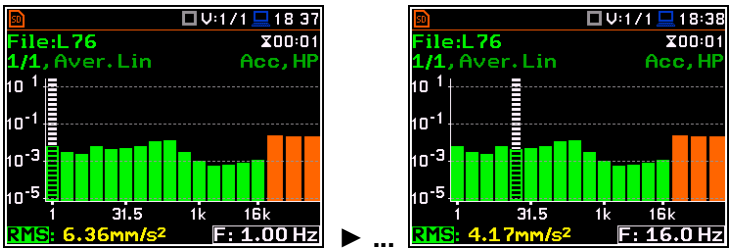


The user can shift the Y-axis during the spectrum view after pressing the **<Shift>** and ▲ (or **<Shift>** and ▼) push-buttons.



The user can change the cursor position by means of the ◄ or ► push-buttons. The user can change quickly to the first or last spectrum line by simultaneously pressing the ◄ or ► buttons with <**Shift**>.

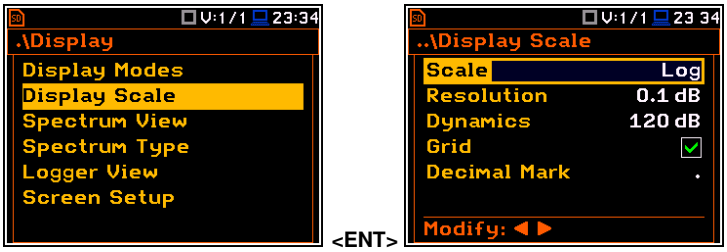
The band central frequency and the appropriate value are presented in the line below the plot.



10.4.2. Setting up the scale of the spectrum plot - Scale

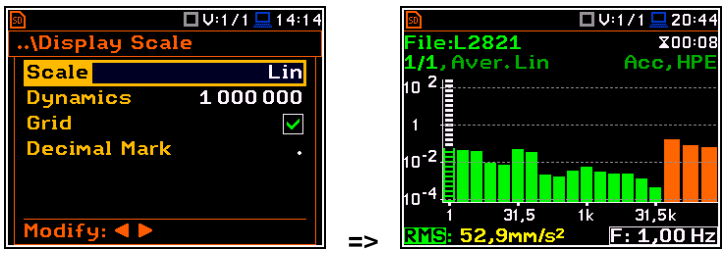
The **Display Scale** sub-list enables the user to change the scale of the spectrum plot, switch the grid on or off.

The user can also define **Decimal Mark** (point or comma) and number of digits after the decimal mark (**Resolution**) for logarithmic values.



Scale of results presentation

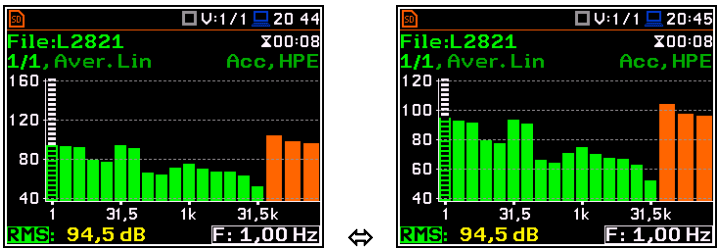
The **Scale** position defines the units of results: **Lin** (linear) and **Log** (logarithmic). In case of **Log** the graphical presentation is given in the logarithmic scale and the measurement results are expressed in decibels (the result is related to the values set in the **Reference Levels** window (*path: <Menu> / Auxiliary Setup / Reference Levels*).



Scaling the plot vertical axis

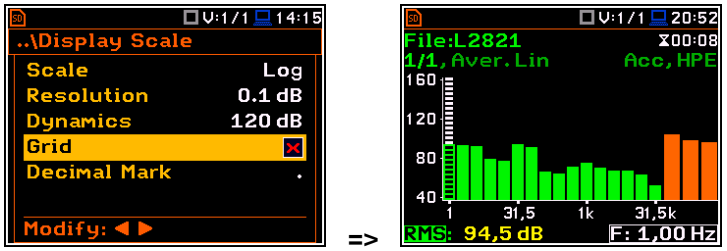
The **Dynamic** position enables the user to select the required dynamic range scaling of the spectrum plot. It is possible to select the range from the set: **10dB**, **20dB**, **40dB**, **80dB**, **100dB** and **120dB**.

The presented views of the same octave spectrum are made for the dynamics of the axis 40 and 80 dB.



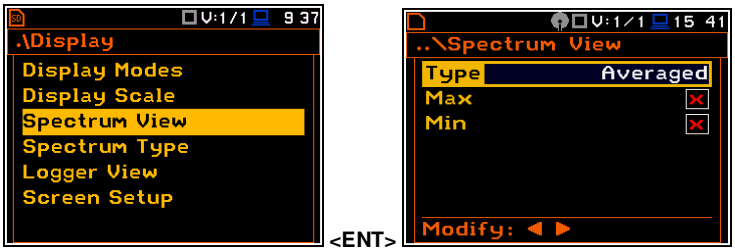
Switching the grid on/off

The **Grid** enables the user to switch on or off the horizontal grid lines in the spectrum view.

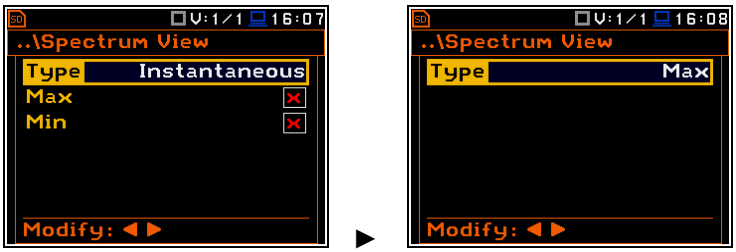


10.4.3. Selection of the spectra to be viewed - Spectrum View

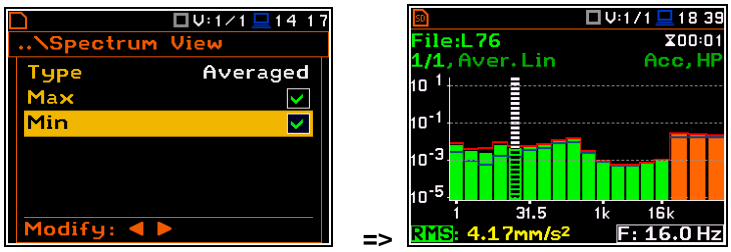
In the **Spectrum View** window, the user can select the different spectra to be visible on the display. In the **Spectrum View** window the following spectrum types may be selected: **Averaged**, **Instantaneous**, **Max** or **Min**.



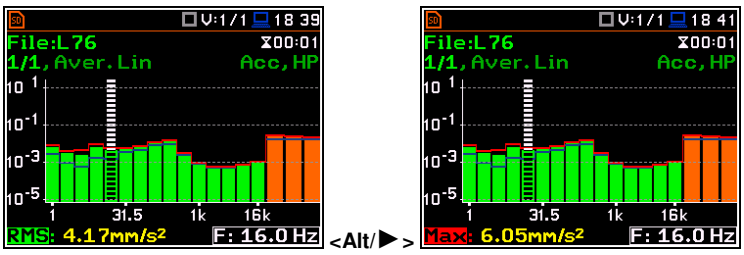
In the **Type** position the user may choose the following different spectrum type to be presented on the display in the graphical view modes: **Averaged**, **Instantaneous**, **Max** and **Min**.



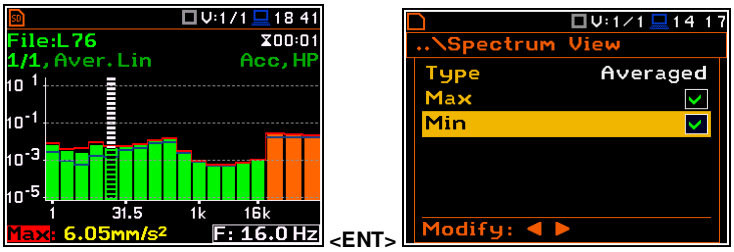
When the **Averaged** or **Instantaneous** spectrum is selected, the user can additionally switch on or off the presentation of the **Max** and/or **Min** values for every displayed spectrum band by switching the **Max** or **Min** parameters on.



To enable the cursor to read the **Max** or **Min** values the user should select the field in the lower left hand corner of the display by means of the ▲ or ▼ push-buttons. Then select the appropriate value by means of the ◄ or ► push-buttons pressed together with **<Alt>**.

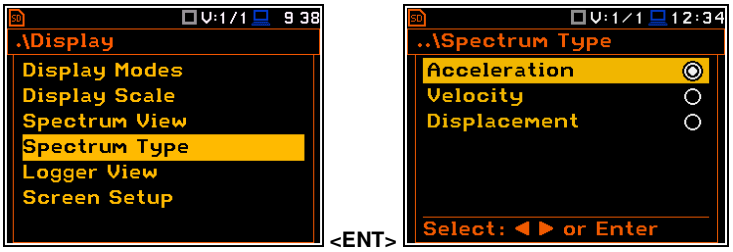


The user can easily get into the **Spectrum View** screen from the spectrum view. It is necessary to enter the result field (**RMS**) with the use of ▲ or ▼ push-buttons and press **<ENTER>**.



10.4.4. Selection of the spectrum type - Spectrum Type

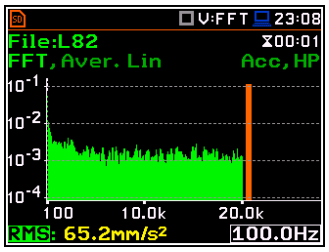
In the **Spectrum Type** window, the user can select the different types of vibration spectra to be presented on the display: **Acceleration**, **Velocity** or **Displacement**.



11. FFT ANALYSER

The instrument operates as **FFT** analyser in a very similar way to the **Level Meter**. Moreover, **FFT** analysis is performed in parallel with the **Level Meter** operations.

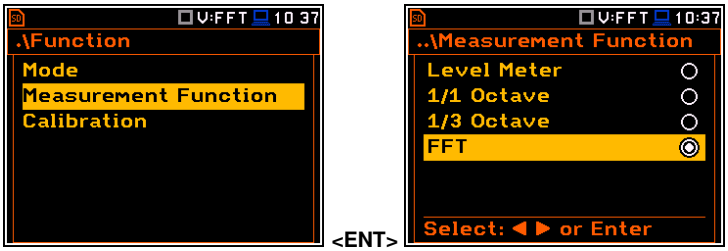
The results of **FFT** analysis (spectra) can be examined by the user on a display in the **Spectrum** view. The availability of this mode can be switched on or off by the user (*path: <Menu> / Display / Display Modes)*.



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

11.1. Selection of FFT function

To select the **FFT** analysis function the user should enter the **Function** list by pressing the **<Menu>** push-button, then select the **Function** text and press **<ENTER>**. In the **Measurement Function** window select the **FFT** position and press **<ENTER>**.

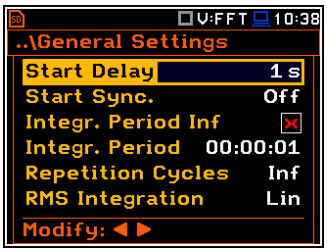


Note: *It is not possible to change the current function during a measurement. In this case, the instrument displays for about 2 seconds the text:* ***"Measurement in Progress"****. To change the current function, the measurement must be stopped!*

11.2. Configururing FFT analyser

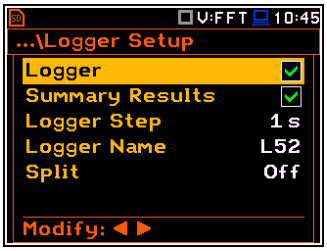
Execution of the **FFT** analysis depends on a certain number of parameters, which can be set in the different windows of the **Measurement** list. Some parameters are fixed: filter (**HP**) and the measurement range.

The **FFT** analysis is performed based on the parameters selected in the **General Settings** list of **Measurement** menu: **Integration Period** and **Repetition Cycles**.



The spectra are stored as main results in a results file with the same step (**Integr. Period**) as the other main results, measured by the **Level Meter** function.

The user can switch on or off the history of spectra recording in the logger file (*path: <Menu> / Measurement / Logging / Logger Results / Spectrum:* ☑). If spectra history is switched on, the spectra will be logged also with the step, defined by the **Logger Step** parameter (*path: <Menu> / Measurement / Logging / Logger Setup / Logger Step*).

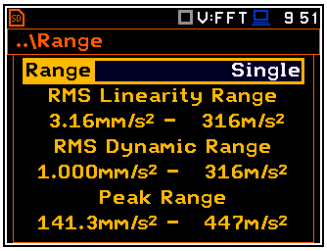


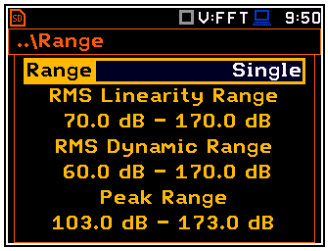
11.2.1. Checking the measurement range of FFT analisys - Range

For the **FFT** function there is only one (**Single**) input range specified in Appendix C.

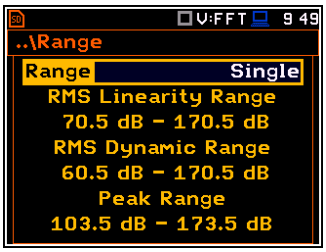
The user can check it in the **Range** window of the **Measurement** list.

Depending on the settings of the **Scale** parameter (*path: <Menu> / Display / Display Scale*) the range will be presented in absolute or logarithmic units (dB).



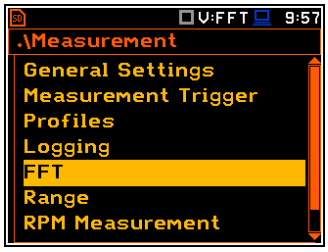


***Note:** The calibration factor is always added to the range limits. For example, if calibration factor is equal to 0.5 dB, the range will be changed automatically (lower and upper limits will be increased by 0.5).*



11.2.2. Setting up the parameters of FFT analysis - FFT

The **FFT** position, which appears in **FFT** analysis, opens the window in which the user can select the parameters of the FFT analysis: frequency band (**Band**), weighting window (**Window**), number of lines (**Lines**) averaging type (**Averaging**) and detection od Peak (**Peak detection**).



<ENT>

In the **Band** position the user can select the band in which the **FFT** analysis should be performed. The user can select: **20 kHz**, **10 kHz**, **5 kHz**, **2.5 kHz**, **1.25 kHz**, **625 Hz**, **312 Hz**, **156 Hz** and **78 Hz**.

Only one **HP** weighting filter is available for the **FFT** analysis of vibration. The characteristics of the filters are given in Appendix C.

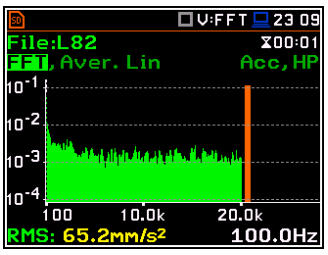
In the **Window** position the user can select the weighting window for the **FFT** analysis of the signal. The user can select **Hanning**, **Rectangle**, **Flat Top** and **Kaiser-Bessel** weighting windows.

In the **Lines** position the user can select the number of lines for the **FFT** analysis of the signal. The user can select **1600**, **800** and **400** lines.

There are two averaging options: **Linear** and **Exponential**. In case of **Exponential** averaging an additional position appears in this window: **Time Constant**. The **Time Constant** parameter can be selected from the values: **100ms**, **125ms**, **200ms**, **500ms**, **1.0s**, **2.0s**, **5.0s** and **10.0s**.

▶

The user can easily get into the **FFT** screen from the spectrum view. It is necessary to enter the function field (**FFT**) with the use of ▲ or ▼ push-buttons and press **<ENTER>**.

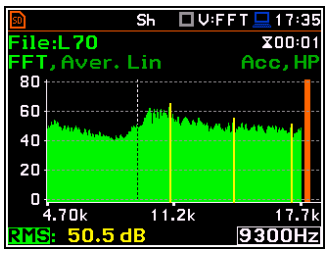


<ENT>

Peak detection

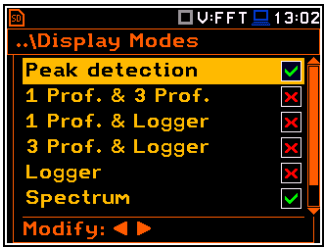
The peak detection is designed to find peaks in the FFT spectrum. The algorithm considers a given value of spectrum as a peak, if it is larger than its predecessor at 60dB. The number of predecessors, who must meet the condition of 60dB depends on the depth of the search (**Seek criterion**). The number of found peaks is not greater than the value specified by the user in the position **Peaks number**.

<Start>

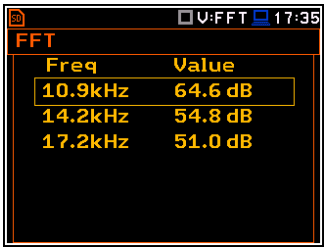


Found peaks are marked in yellow FFT spectrum.

The user can activate additional view, which includes a list of all the peaks found in the form of a table. The first column indicates the frequency of the peak and the second its value.

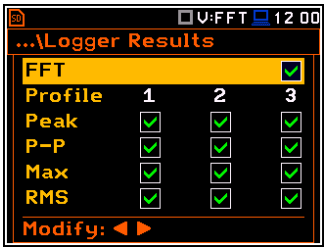


=>



11.3. Saving the FFT spectra as a time history - Logger Results

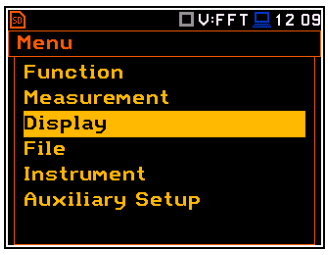
The **FFT** analysis results can be saved in the logger file together with the logger results and with the step defined by the **Logger Step** parameter (*path: <Menu> / Measurement / Logging / Logger Setup*). The spectrum saving in the logger file is defined by activation the **FFT** position in the **Logger Results** window by means of the ◄ or ► push-buttons.



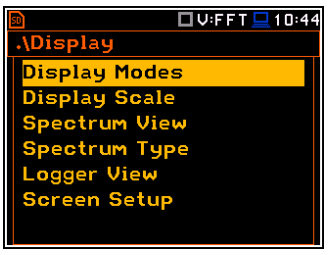
Note: *The spectra are always saved together with the summary results with integration period step.*

11.4. Setting up the FFT spectra view

The **Display** list is used for setting the various parameters, which are mainly dedicated for the control of the spectrum view.



<ENT>



The following positions are used for setting the presentation of the **FFT** results:

Display Modes enables the user to select the **Spectrum** view;

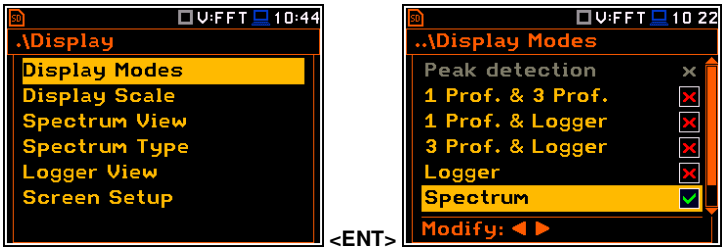
Display Scale enables the user to change the scale of the vertical and horizontal axis of the spectrum plot, switch on or off the grid;

Spectrum View enables the user to choose the spectrum (**Average**, **Instantaneous**, **Min**, **Max**) to be viewed;

Spectrum Type enables the user to change the viewed spectrum: **Acceleration**, **Velocity** or **Displacement**.

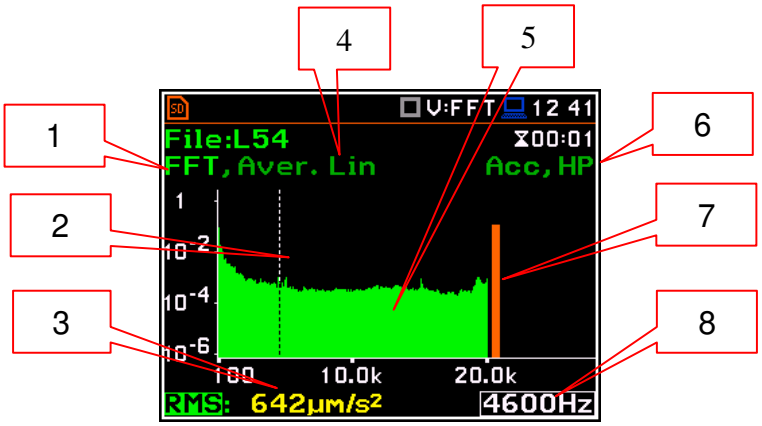
11.4.1. Presentation of FFT spectra

The **Spectrum** position of the **Display Modes** list becomes available in the **FFT** function and enables the user to switch on or off the spectrum view.

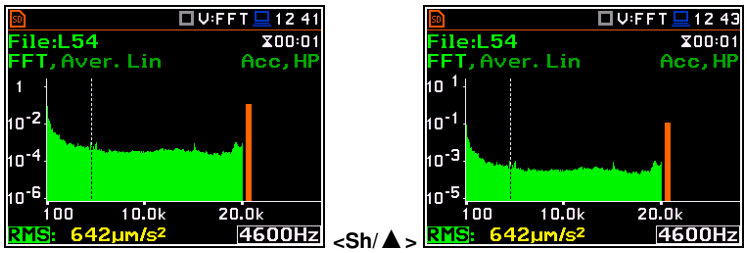


Fields description of the Spectrum view

1. Type of spectrum
2. Cursor position
3. Value for the cursor position
4. Averaging used
5. Spectrum plot
6. Frequency weighting filter used
7. Total value
8. Central frequency for the cursor position

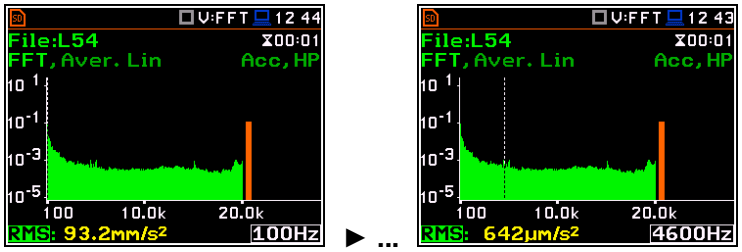


The user can shift the Y-axis during the spectrum presentation after pressing the **<Shift>** and ▲ (or the **<Shift>** and ▼) push-buttons.

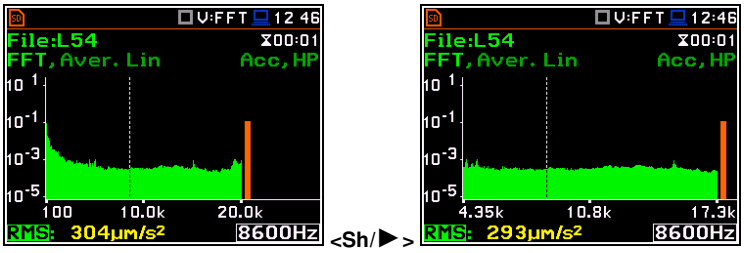


The user can change the cursor position by means of the ◄ or ► push-buttons.

The frequency and appropriate value are presented in the line below the plot.



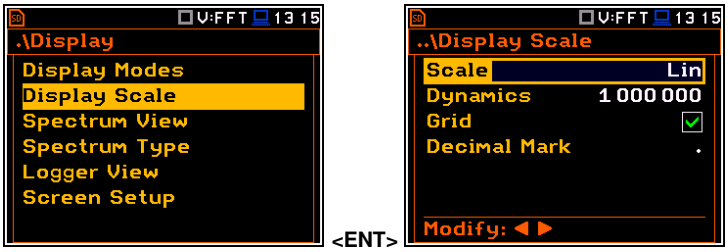
The user can zoom in/out the frequency scale at the cursor position by means of the ◄ or ► push-buttons, pressed with **<Shift>**.



11.4.2. Setting up the scale of spectrum plot - Scale

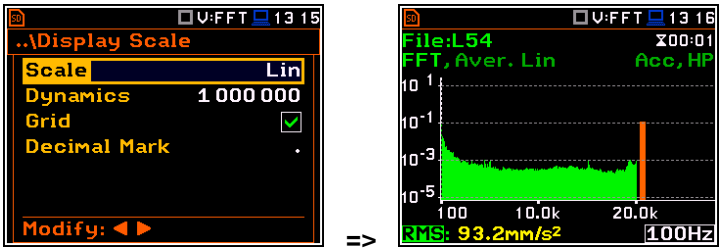
The **Display Scale** sub-list enables the user to change the scale of the spectrum plot, switch the grid on or off.

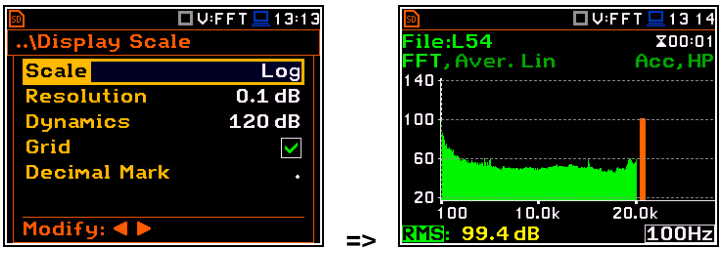
The user can also define **Decimal Mark** (point or comma) and number of digits after the decimal mark (**Resolution**) for logarithmic values.



Scale of results presentation

The **Scale** position defines the units of results: **Lin** (linear) and **Log** (logarithmic). In case of **Log** the graphical presentation is given in the logarithmic scale and the measurement results are expressed in decibels (the result is related to the values set in the **Reference Levels** window (*path: <Menu> / Auxiliary Setup / Reference Levels*).

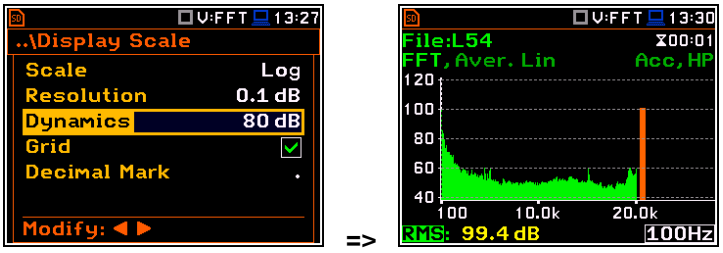


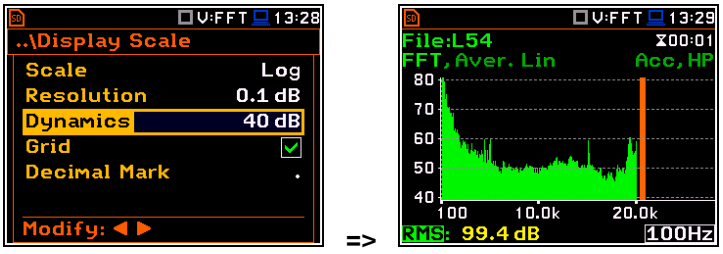


Scaling the plot vertical axis

The **Dynamic** position enables the user to select the required dynamic range scaling of the spectrum plot. It is possible to select the range from the set: **10dB**, **20dB**, **40dB**, **80dB**, **100dB** and **120dB**.

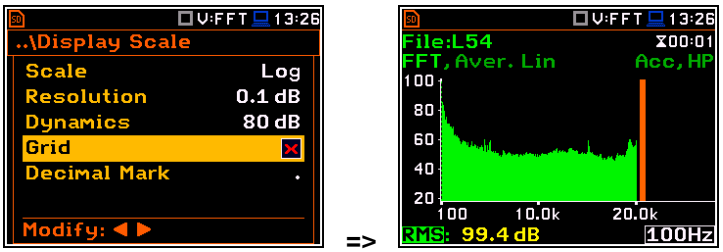
The presented views of the same octave spectrum are made for the dynamics of the axis 40 and 80 dB.





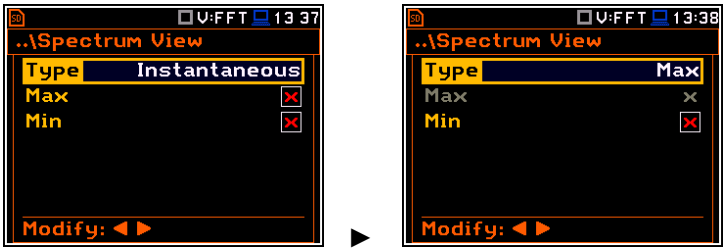
Switching the grid on/off

The **Grid** enables the user to switch on or off the horizontal grid lines in the spectrum view.

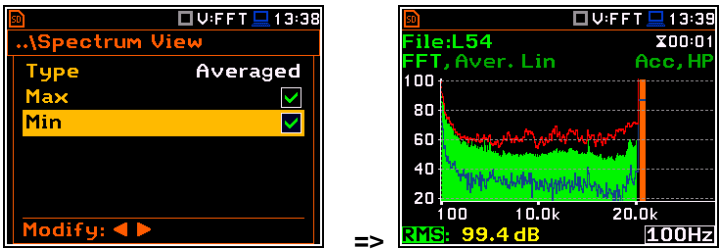


11.4.3. Selection of the spectra to be viewed - Spectrum View

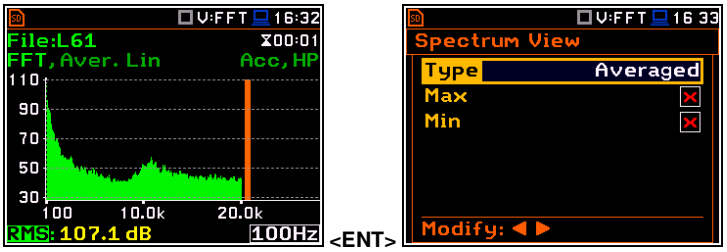
In the **Spectrum View** window, the user can select the different spectra to be visible on the display. In the **Spectrum View** window the following spectrum types may be selected: **Averaged**, **Instantaneous**, **Max** or **Min**.



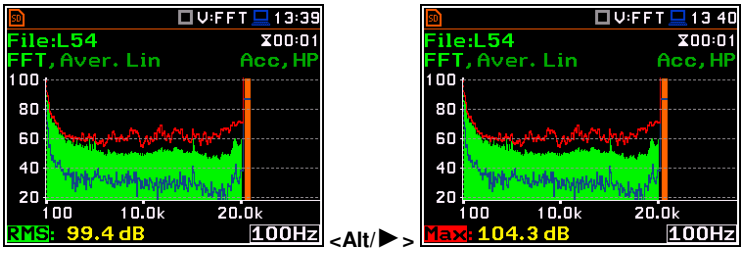
When the **Averaged** or **Instantaneous** spectrum is selected, the user can additionally switch on or off the presentation of the **Max** and/or **Min** values for every displayed spectrum band by switching the **Max** or **Min** parameters on.



The user can easily get into the **Spectrum View** screen from the spectrum view. It is necessary to enter the result field (**RMS**) with the use of ▲ or ▼ push-buttons and press **<ENTER>**.

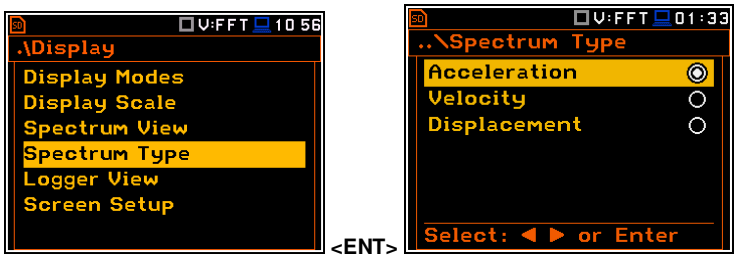


To enable the cursor to read the **Max** or **Min** values the user should select the field in the lower left hand corner of the display by means of the ▲ or ▼ push-buttons. Then select the appropriate value by means of the ◄ or ► push-buttons pressed together with **<Alt>**.

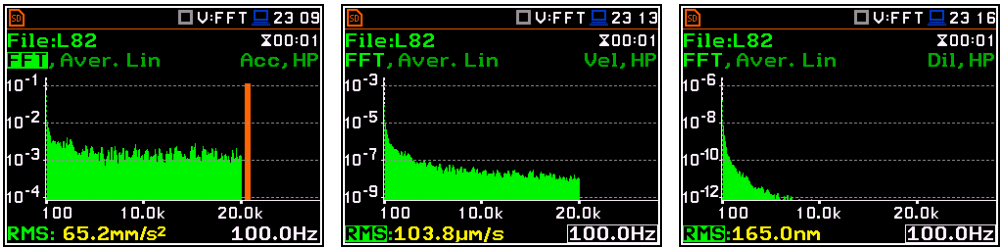


11.4.4. Selection of the spectrum type - Spectrum Type

In the **Spectrum Type** window (*path: <Menu> / Display / Spectrum Type*), the user can select the different types of vibration spectra to be presented on the display: **Acceleration**, **Velocity** or **Displacement**.



As an example, three spectrum types are presented for the same measurement – **Acceleration**, **Velocity** and **Displacement**.



12. MAINTENANCE

12.1. Powering the instrument

The **SVAN 974** can be powered by one of the following sources:

- Four AA standard size internal batteries. In case of alkaline type, with a new fully charged set, the instrument 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

SVAN 974 is delivered with four AA alkaline batteries, but the user may also use AA rechargeable batteries.

The "**battery**" icon shows the condition of the internal batteries.

The instrument is not equipped with an internal charger; therefore, the rechargeable batteries can be charged only after removal them out of the instrument with the use of optionally provided charger (**SA 31**).

To change or charge the batteries the user should switch off the instrument, unscrew the bolt, take off the black bottom cover of the instrument and slide the battery tubes out.

***Note*:** *While changing the batteries, observe the correct polarity.*

Powering the instrument from the USB interface is performed by connecting its **USB** socket to the PC or other USB power source via the **SC 56** cable.

When the instrument is powered from the USB source the internal batteries are automatically disconnected. Once disconnected from the external power source, the instrument will automatically switch powering to the internal batteries.

***Note*:** *Use only high quality USB cables, such as **SC 16**. Many poor-quality cables do not ensure low resistance of the cable, thus disabling proper operating of the instrument.*

12.2. Memory card extraction and insertion

SVAN 974 is delivered with 4GB micro SD-card.

The user may exchange it with the high capacity card (up to 32GB), but before insertion the card must be formatted as FAT32.

Note: *If the user would like to use card with higher capacity, he must call to the local distributer.*

To extract the memory card from the card-slot, the user should switch off the instrument, unscrew the bolt and take off the black bottom cover of the instrument.

The card is installed in the slot. To extract the card the user should push on the card and then pull it out of the slot.

While insertion the SD-card, a click sound indicates that the card is inserted properly. If necessary, use a tool (e.g. pen) to push the card right in.

12.3. Transducers

SVAN 974 is equipped with the TNC connector as an input of the measured signal taken from the vibration transducer.

Another connector is used for the tacho probe.

Accelerometer

The **SV 80** general purpose vibration accelerometer 100 mV/g (10 mV/ms^{-2}) with a coiled cable for accelerometer 2 m (**SC 27**) is included in the standard SVAN 974 set.

This an industry standard IEPE accelerometer is an ideal choice for walk-around vibrations measurement in the rugged environments of industrial machinery monitoring, such as pumps, motors or fans. The accelerometer is mounted on a vibrating surface with the mounting magnet.

The design of SV 80 features the low electronic noise and wide temperature operating range.

The connection of the accelerometer to the instrument is performed with the use of TNC connector. TNC connector has a ring which should be tighten to the screw thread.

Second input connector is a BNC type and is used for tacho probe.

12.4. Resetting the instrument

- **SYSTEM RESET:** internal software reset clears any setup configuration, and brings back the default factory settings. See **Factory Settings** (*path: <Menu> / Auxiliary Setup*).
- **HARDWARE RESET:** internal hardware reset, no user data is changed. Make sure the battery is not exhausted, and the unit is turned off. Hold down the **<Alt>** and **<Start/Stop>** push-buttons for more than 15 seconds, and then release it. Turn on the instrument as usually.

Note: *Hardware reset is only to be used in extreme situations such as an instrument hang-up.*

Be aware, that a hardware reset:
- will stop any pre-programmed auto-run modes,
- will stop measurement run!

12.5. Firmware upgrade

SVANTEK is committed to continuous innovation path of development, and as such reserves the right to provide firmware enhancements based on user's feedback.

To update the instrument firmware:

- Unpack the provided firmware package. (provided as a suitable compressed file).
- Make sure the unit is turned off.
- Connect SC 16 cable to the computer and SV 974 instrument (USB interface).
- Keeping pressed the **<ENTER>** and ▲ push-buttons switch on the instrument - the following message should appear on the unit's screen: BOOTSTRAP v1.06 (or higher).
- Wait for the message **<USB>** on the unit's screen and start from the PC: **go-usb.bat**.
- The changing number and final message: "..... o.k." should appear on the computer screen.
- Successful firmware update will be indicated by the message: *Program loaded!*
- Switch off the instrument.

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

12.6. Storing the instrument

- To preserve the life of the internal batteries, it is recommended that the instrument is turned off when it is stored. In case of alkaline batteries, it is recommended to extract them out of the instrument.
- Do not store the instrument permanently connected to the USB port. It shortens battery lifecycle.
- When the instrument is turned off, it still draws a small amount of battery power. Therefore, it is recommended to charge the cell every few months if it is not going to be used regularly.

12.7. Transportation and carrying

For transportation or storage purpose, we recommend using the packaging provided by the manufacturer. In a potentially dirty industrial environment it is advisable to use the carrying case provided by the manufacturer such as the fabric material case (**SA 47**), lightweight case (**SA 143**) or waterproof case (**SA 79**), which ensures excellent mechanical and environmental protection and long term storage conditions.

12.8. Cleaning

Clean the surface of the instrument with damp soft cloth.

The instrument sockets should be cleaned with the use of compressed air.

Note: *In cases of larger dirt, such as oil or grease, contact your Local Authorized Distributor or Svantek Service Office.*

12.9. Troubleshooting

- In case your instrument does not respond proceed with hardware reset of the instrument (see chapter 12.4).
- In case the reset does not help call your Local Authorized Distributor or Svantek Service Office.

Should your SVANTEK professional measurement equipment need to be returned for repair or for calibration, please contact the service office at the following number or contact via the SVANTEK's website.

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

Office hours are 8:00 a.m. to 4:00 p.m. Central European Time.

- E-mail at office@svantek.com
- Internet at www.svantek.com
- Address:

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04-872 Warszawa,
Poland