SV 102+

DUAL-CHANNEL ACOUSTIC DOSIMETER

USER MANUAL

SVANTEK Sp. z o.o.

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Notice: *This user manual presents the software revision named 1.04.1 (cf. the description of the* ***Unit Label*** *position of the* ***Instrument*** *list). Newer software revisions (higher numbers) can slightly change the view of some displays presented in the text of the manual.*

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1 INTRODUCTION

The **SV 102+** is digital, Class 2 dual-channel dosimeter dedicated for occupational health and safety acoustic monitoring task. The binaural dose measurements and the 1/1 & 1/3 real-time octave analysis are simultaneously performed. Octave analysis provides direct data for the design of the ear-protectors. Together with audio events recording option, these functionalities show the new reference standard on the acoustic dose measurement field, now commonly available in compact size instrument.

Dosimeter is offered with one or two dedicated **SV 25D** ceramic microphones in ½" housing. It ensures the very easy calibration by direct usage of commonly available acoustic calibrators. Moreover, **SV 25D** smart sensor, with built-in **TEDS** (**T**ransducer **E**lectronic **D**ata **S**heet), offers automatic calibration function. The very robust casing of **SV 25D**, together with the special mounting clip and dedicated headband, make that microphones can be very easy attached in extremely short distance from the human ears.

SV 25S smart sensor with **TEDS**, is dedicated for the measurements under headphones or earmuffs using **MIRE** technique (**M**icrophone-**I**n-**R**eal-**E**ar). With a special adapter, it can be also calibrated with commonly available acoustic calibrators. The **SV 102+** together with **SV 25S** are designed for individual real-world test of the earmuffs noise reduction ratio.

The **SV 102+** can be also used as a dual-channel Class 2 sound level meter providing broad band results with all required frequency weighting filters plus real-time 1/1 octave & 1/3 octave analyser. Three acoustic profiles per channel allow parallel measurements with independently defined filters and RMS detector time constants.

The instrument enables huge time history logging capability providing broad band results and spectra with adjustable double (long and short) logging steps. Audio recording on user selectable trigger conditions complete the logging functionality. Data are stored on a microSD memory card and can be easily downloaded to PC (with the provided SvanPC++ software) over USB interface.

Instrument is powered from two AA standard or rechargeable batteries (separate charger is required) as well as the USB interface.

The instrument can be easily calibrated in the field using an acoustic calibrator. A built-in algorithm automatically activates the calibration process whenever an acoustic calibrator is installed on microphone and the calibration history is saved for later inspection.

The **SV 102+** comes with Supervisor software for data download, visualization, basic post-processing and exporting to commonly used office software applications.

1.1 SV 102+ as Dose Meter / SLM / Analyser

- Standards: IEC 61252-1993; ANSI S1.25-1991, Class 2 : IEC 61672:2002
- Acoustic dosimeter mode: **Leq**, **Spl**, **Peak**, **SEL**, **DOSE**, **D_8h**, **LAV**, **SEL8**, **PSEL**, **E**, **E_8h**, **"Peaks Counter"** and more
- Measurement simultaneous to the 1/1 & 1/3 octave analysis
- SLM Mode: **Leq**, **Spl**, **LAF**, **LEPd**, **Lden**, **Ltm3**, **Ltm5**, Statistics - **Ln** (**L1-L99**), **Lmax**, **Lmin**, **Lpeak**
- Simultaneous measurement in three profiles with independent set of filters and detectors
- Weighting filters: **A**, **C** and **Z**

- RMS Detector: Digital True RMS detector with Peak detection, resolution 0.1 dB
- Time Constants: **Slow**, **Fast**, **Impulse**
- Microphone: **SV 25D**, Class 2, ceramic microphone, 1/2" casing with built-in preamplifier & integrated cable
- **SV 25S**, Class 2, ceramic microphone, special version of the **SV 25D** for measurements in real ear - under ear-protectors (option)
- **SV 25D** and **SV 25S** have built-in **TEDS** functionality for the automatic calibration
- Measurement range: **45 dBA RMS ÷ 141 dBA** Peak
- Frequency range: **20 Hz ÷ 20 kHz**, sampling rate 48 kHz
- Dynamic range: **100 dB**
- Data Logger: Time-history logging of **Leq** / **Lav** / **Max** / **Min** / **Peak** results to internal memory with time step down to 100 miliseconds, up to 30 measurement results logged simultaneously (plus 1/1 & 1/3 spectra)
- Audio Recorder: Time-domain-signal events recorder (option)
- Dual-channel measurement mode with second microphone **SV 25D** or **SV 25S** (option)
- Dual-channel 1/1 octave & 1/3 octave real-time analysis meeting Class 1 requirements of IEC 61260 and spectra logging (option).

1.2 Accessories included

- **SV 25D_B** - Dosimeter microphone with integrated preamplifier, TEDS and cable for SV 102+-BLACK
- **SA 25 windscreen**
- **SC 56 -** micro USB cable
- **MicroSD** memory card 4 GB capacity
- **Two AA** batteries
- **CD** with instruction
- **Supervisor software** for Windows XP/VISTA7/ operating system.

1.3 Available optional accessories

- **SV 34** Class 2 acoustic calibrator: 1000 Hz/114 dB
- **SC 122** Preamplifier extension cable Lemo 2-pin socket to Lemo 2-pin plug
- **SA 142** Carrying case for SVAN 102+ and accessories
- **SA 54** Power supply by USB using SC 56 USB cable

1.4 Available instrument firmware options

- **SF 102+ OCT** 1/1 octave analysis option (single and dual channel instrument version)
- **SF 102+ 3OCT** 1/1 & 1/3 octave analysis option (single and dual channel instrument versions) statistics in 1/3 octave band not available
- **SF 102+ REC** audio events recording

Notice: *The software options listed above can be purchased at any time, as only the entry of a special unlocks code is required for their activation.*

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 screen **Menu** list. Thanks to that, the number of the control push-buttons of the instrument has been reduced to four 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:

Button	Direct function	Pressed with **<Shift>**	If held
Shift	**<Shift>**		**comment**
	<◄>	**<▲>**	
	<►>	**<▼>**	
Esc Enter	**<ENTER>**	**<Esc>**	**<On/Off>**

<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 together with **<Esc>** or **<Enter>**. This push-button can be used in two different ways:

- as **Direct** like in a computer keyboard (e.g. while typing the filename); both **<Shift>** and the second push-button must be pressed simultaneously;
- as **2nd Function**; this push-button can be pressed and released before pressing the second push-button.

The operation of this push button can be set as **Direct** or **2nd Function** in the **Shift** position of the **Keyboard** list (*path: <Menu> / Instrument / Keyboard*).

Notice: *The **<Enter>** push-button held for at least 5 seconds switches the instrument on and off*

<Start/Stop> The **Start/Stop** (**<◄>** pressed together with **<Enter>**) 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.

<ENTER> This push-button enables the user to enter the selected position shown on the screen Menu list, 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 (**<◄>** and **<►>** pressed together) enables the user to enter the main list containing six sub-lists: **Function**, **Measurement**, **Display**, **File**, **Instrument** and **Auxiliary Setup**. Each of the mentioned above sub-lists consists of other 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 the 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 frequently used sub-lists for easy navigation.

<Esc> This push-button (**<Shift>** pressed together with **<Enter>**) 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 just made are ignored. In result

presentation view the **<Esc>** push-button enables the user to switch the views of the result presentation modes.

<◄>, <►> These push-buttons enable the user, in particular, to:

- select the column in a matrix list;
- select the parameters value in an active position (e.g. filter **Z**, **A** or **C**, Integration period: **1s**, **2s**, **3s**, … etc.);
- control the cursor in **Spectrum**, **Logger** and **Statistics** modes of result presentation;
- select the measurement result to be displayed (e.g. **Leq**, **Lmax**, **Lmin**, etc.) in One Profile, **3 Profiles** and **2 Channels** modes of result's presentation),
- select the position of the character in text edition screens;
- speed up the changing of numerical values of the parameters when pressed and held.

<▲>, <▼> The **<▲>**, **<▼>** push-buttons (**<◄>**, **<►>** pressed together with **<Shift>**) enable the user, in particular, to:

- select lines in a list;
- select the correct character from the list in the text editing mode;
- change the presentation mode of the results.

<Shift> Pressing and hold the **<Shift>** push button initiates recording of a voice signal as a comment (see. Paragraph 9.3 "Voice comments").

<Shift> + **<Enter>** Pressing and hold the **<Shift>** and **<Enter>** push buttons at the same time blocks the keyboard

2.2 Input and output sockets of the instrument

Top cover of the instrument

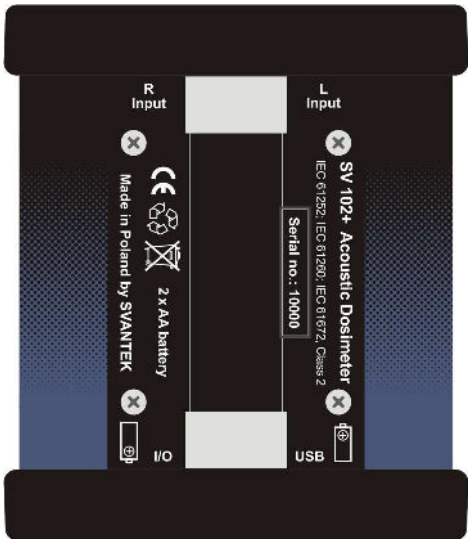
The microphone inputs are placed on the instrument's top cover. In the case of one-channel operation, the user should use left microphone input. The user should plug Lemo connector until it clicks. The full description of the signals connected to the sockets is given in the Appendix C.

Bottom cover of the instrument

In the bottom cover, there are two sockets: **USB** and **I/O**. The clamping screw is between the two sockets.

The **USB Device** 1.1 interface is the serial interface working with 12 MHz clock. Thanks to its speed, it is widely used in all PCs.

The additional multi-purpose input / output socket, called **I/O** port, is a RCA Jack socket. The functionality of this socket is defined in **Multifunction I/O** list (*path: <Menu> / Instrument / Multifunction I/O*). In case of **Analog Out** functionality, the signal from the input of the analogue / digital converter (before the correction) is available. This signal can be registered using magnetic recorder or observed on the oscilloscope. The **Digital Out** is used to generate the trigger pulse or alarm pulse from the instrument.



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

3 SETTING THE INSTRUMENT

In order to perform measurements using the instrument the user only has to plug-in the microphones already screwed on and to switch the power on. The user has to press the **<Enter>** push-button and hold it for at least 5 seconds in order to switch the power On/Off.

3.1. Basis of the instrument's control

The instrument is controlled by means of four push-buttons on the keypad. Using these push-buttons one 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 shown on the high contrast graphic colour display.

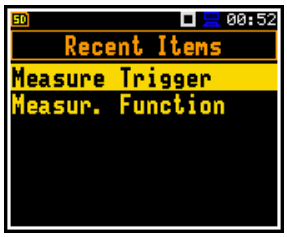
The instrument's menu consists of different type of windows, which include: main menu list, sub-menu list, option list, parameter list, text editor window, information window and file manager window with file command list.

Main menu

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

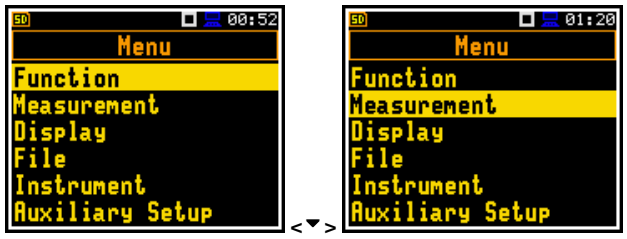
Recent Items list

The 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.



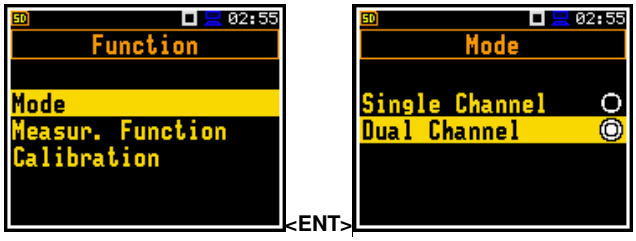
Position selection

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



Entering position

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

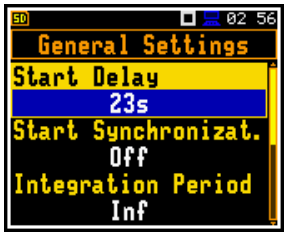


List of parameters

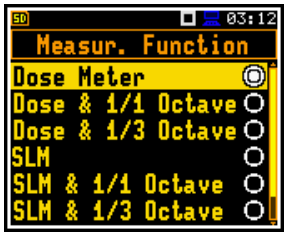
The parameter list contains parameters for which the user may select the value from the available range. The next press of the **<Enter>** push-button enables the user to access the sub-lists as mentioned above.

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

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



Option list



The option list consists of different options, from which only one may be selected. The selection of the option is performed in the following way. The user has to highlight the desired option by means of the <▲>, <▼> 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.

Activation of options

Some option or functions of the instrument are not supplied as a standard and are blocked. To unbloke such functions the user should know the special code, which is submitted to him separately. During the first access to the blocked function the special window appears with the prompt to key in the unblocking code in the **Enter Code** position.

Ones function has been unblocked the window with **Enter Code** never ever appears.

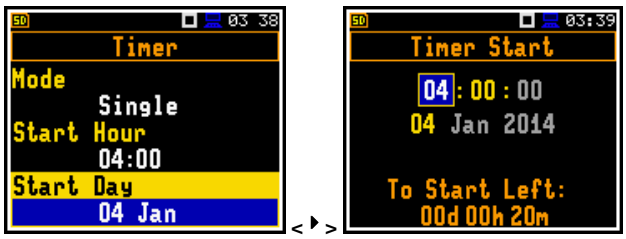
If the parameter has a numerical value the user may speed up selection by pressing the <◄>, <►> push-buttons for longer than 2 seconds. In this case, the parameter starts to change automatically until the user releases the pressed buttons.

Matrix of parameters

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

- column by means of <►>,
- line in the column by means of <▲>, <▼>,
- value in a selected position by means of <◄>,
- value in a line if line is active by means of <◄>,
- value in a column, if the cursor is on one of Profile positions, by means of <◄>,
- value in a matrix, if the cursor is on one of **Left** or **Right** channel positions, by means of <◄>.

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 <►> push-button. In the special, window the value is selected with the <►>, <◄> or <▲>, <▼> push-buttons and then is confirmed by pressing **<Enter>**.

In all cases the **<Enter>** push-button is used for confirmation of the selection in a position and for closing the opened sub-list. The sub-list is closed, ignoring any changes made in thr list by pressing the **<Esc>** push-button.

Information window

Some windows inform the user about the state of the instrument, available memory, not existing files or loggers, standards fulfilled by the unit, etc. In order to scroll through the list, the user has to use the <►>, <◄> or <▲>, <▼> push-buttons. In order to close such a window, the user has to press the **<Esc>** push-button.

Text editing window

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

- The user may select the position of the character in the edited text using the < ▸ >, < ◂ > push-buttons.
- The available ASCII characters can be changed using the <▲>, <▼>push-buttons. The subsequent digits, underline, upper case letters and space appear on the display in the inversely displayed position after each press of the push-buttons mentioned above.
- The user may insert the position in the edited text with the < ▸ >, < ◂ > push-buttons pressed simultaneously.
- The user may delete the position in the edited text with the <▲>, <▼>push-buttons pressed simultaneously.

< ▸ >

The last two lines inform the user how to select or modify the text line.

Inactive parameters

If some functions or parameters are not available, the positions in the menu or parameter lists linked with this function or parameter becomes inactive (the selected line field will be in frame with black background, not yellow). For example, if **Logger** is **Off** (*path: <Menu> / Measurement / Logging / Logger Setup)* the positions **Logger Result** and **Logger Recording** are inactive!

3.2. Powering of the instrument

The **SV 102+** can be powered by one of the following sources:

- Two AA standard size batteries fitted internally. In the case of alkaline type, a new fully charged set can operate more than 16 h (3.0 V / 1.6 Ah) in a single channel mode and non active display. Instead of the ordinary alkaline cells, two 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 longer than 20 h (2.4 V / 2.6 Ah) in a single channel mode and non active display;
- **USB** interface – 150 mA HUB

For each 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 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. To change the batteries the user has to switch off the instrument, take off the black bottom cover of the instrument, unscrew battery cover, slide the battery tubes out, change the batteries taking care to observe the correct polarity and reassemble the parts of the instrument. 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.

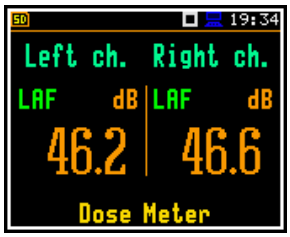
When there is a connection to the USB interface (**USB Device** socket is connected by means of the SC56 cable to a PC), the **"Computer"** icon is presented on the top of the display and in the **Battery** window, there is the **USB Power: Voltage: 5.00V** message.

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

Prolonging the internal source of the instrument's power can be achieved by means of the OLED screen **Dim Mode**. The settings of power saver function (**Dim Mode**) may be selected in the **Screen Set.** window (*path: <Menu> / Display / Screen Set.)*.

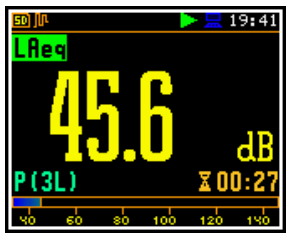
3.3. Initial Setup of the instrument

Switching the instrument on



To switch the power on the user should press the **<Start/Stop>** push-button and hold it during 2 seconds. The instrument goes the self-test routine after switching on (in this time the manufacturer's logo and the name of the instrument is displayed) and then it enters the two channel view mode.

Starting measurement



To start the measurements the user has to press the **<Start/Stop**> push-button. The results of the measurement are displayed in the last used result's display view mode. As an example one profile mode is displayed.

One profile mode is always available for most Functions of the instrument. The results of the measurements can also be presented in other display modes, which can be switch on and off and adjusted to the user's needs.

Pausing measurement

To pause the measurements the user has to press the **<Enter**> and **<Menu>** push-buttons together. The **Pause** screen wth information of the paused time of the measurement is then displayed. To continue the measurement the user has to press **<Enter>**.

Default Profile settings for Sound and Dose measurements:

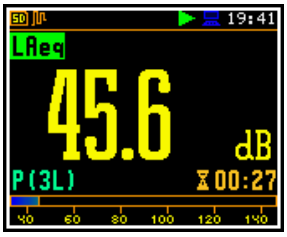
Profile 1,2 **Filter=A**, **Filter (Peak)=C**, **Detector=Fast**, **Criterion Level=80dB**, **Threshold Level=None**, **Exchange Rate=3**, **ULT Threshold Level=115dB**, **PTC Threshold Level=115dB**;

Profile 3 **Filter=A**, **Filter (Peak)=Z**, **Detector=Fast**, **Criterion Level=80dB**, **Threshold Level=None**, **Exchange Rate=5**, **ULT Threshold Level=115dB**, **PTC Threshold Level=115dB**;

The user can change all the above mentioned settings using **Profiles** sub-list of the **Measurement** list. The instrument remembers all changes for the next time it is used. Return to the default settings (set up by the manufacturer) is possible after the selection of the **Factory Settings** position available in the **Auxiliary Setup** list.

3.4. Icons description

Description of the instrument state



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

The real time clock (RTC) is also displayed in the same line together with icons.

The meanings of the icons are as follows:

"play" icon is displayed, when the measurement is started by the instrument.

"stop" icon is displayed when the measurement is stopped by the instrument.

"pause" icon is displayed when the measurement is paused.

"computer" icon is displayed when there is USB connection with the PC.

"curve" icon is presented when the current measurement results are logged into the instrument's logger file.

"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.

"Trigger Slope +" icon is displayed when the trigger condition is set up to „**Slope+**".

"Shift" icon is displayed when the **<Shift>** push-button is pressed.

"tone" icon is displayed during wave recording and event recording.

"Internal memory" icon is displayed when there is no external SD memory card inserted.

"**SD Card**" icon is displayed when the external SD card memory is connected.

"Trigger Level - " icon is displayed when the trigger condition is set up to „**Level -**". The icon appears alternately with the „play" icon.

"Trigger Level + " icon is displayed when the trigger condition is set up to „**Level +**". The icon appears alternately with the „play" icon.

"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.

"Trigger Slope –" icon is displayed when the trigger condition is set up to „**Slope-**"

3.5. Memory organisation

All available measurement results and settings can be stored in the external Memory (micro **SD Card**) as files.

The **SD Card** external memory is activated automatically after insertion of the card. The presence of an **SD Card** is signalled by the memory icon with SD letters at the top left hand corner of the display.

- SD card is inserted

- no SD card

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 **File Manager** is used for checking the contents of the memory and operation on files and catalogues such as: rename, delete, display information and also to create new catalogues.

The **SD Card** memory is organised as standard memory with directories and sub-directories. It is possible to create and to delete the directory structure.

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

<>

Files are saved automatically to the SD card. To enable automatic saving several conditions should be

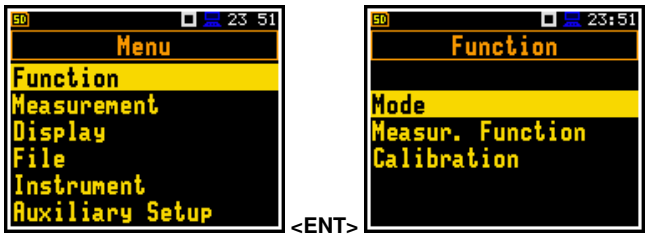
fulfilled:

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.
3. The selected should be defined with a unique name (*path: <Menu> / Measurement / Logging / Logger Setup / Logger File Name*).

The files are saved in the catalogue, which was set up as the working catalogue. The default working catalogue, after using **Factory Settings** function, is called **SVANTEK**.

4 FUNCTIONS OF THE INSTRUMENT – Function

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

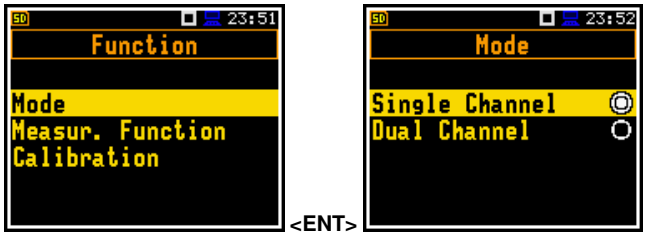


4.1 Selecting the mode of the instrument – Mode

The device can work in two modes: **Single Channel** and **Dual Channel**.

The main default mode of the **SV 102+** instrument is the **Single Channel** mode.

Dual channel option can be initially supplied by the manufacturer or purchased later and added by the user.

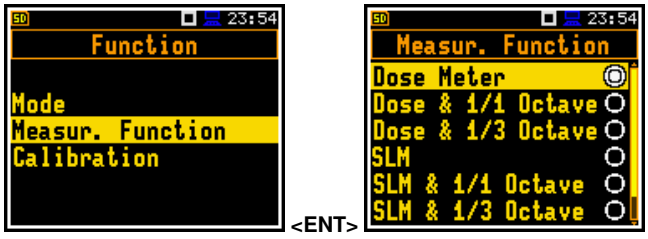


4.2 Measurement functions of the instrument - Measurement Function

The main function of the instrument is the Sound Dose measurement (**Dose Meter**). The Sound Level Meter (**SLM**) function provides the user with functions meeting the standard IEC 61672:2002 for Type 2 accuracy.

The user may also use 1/1 and 1/3 real time octave band frequency analysis functions. These functions extend the main functions of the instrument, because the selected 1/1 and 1/3 octave analysis is performed together with all calculations of **Dose Meter** or **SLM** functions.

In order to select the required function the user has to enter the **Measurement Function** list. After entering the **Measurement Function** list, the set of the available functions appears on the display: **Dose Meter**, **Dose & 1/1 Octave**, **Dose & 1/3 Octave**, **SLM**, **SLM & 1/1 Octave**, **SLM & 1/3 Octave** and **Running LEQ**. The currently active function is marked as active.



Standard instrument configuration contains functions: **Dose Meter**, **SLM** and **Running LEQ**. The main default function of the instrument is **Dose Meter**.

Optional measurement functions (1/1 octave and 1/3 octave) that broaden the application of the instrument can be easily installed. These options can be initially supplied by the manufacturer or purchased later and added by the user.

The **Dose Meter** mode provides the user with the dosimeter functions meeting the IEC 61252, ANSI S1.25-1991 and IEC 61672:2002 standards for Class 2 accuracy.

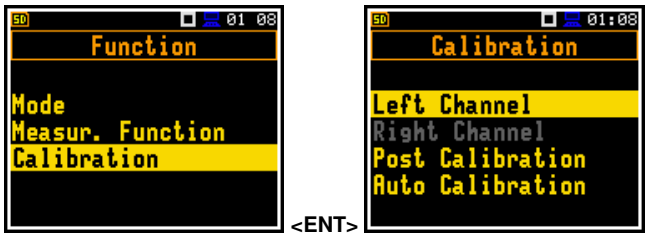
The **S**ound **L**evel **M**eter (**SLM**) mode provides the user with the **SLM** functions meeting the IEC 61672:2002 standard for Class 2 accuracy.

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

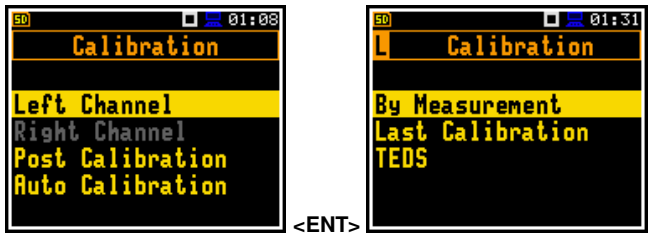
4.3 Instrument's calibration – Calibration

The instrument is factory calibrated with the supplied microphones for the standard environmental conditions. Because the microphone sensitivity is a function of the temperature, ambient pressure and humidity, when the absolute sound pressure level value is important, the absolute calibration of the measurement channel should be performed. In order to select the calibration function the user has to enter the **Calibration** sub-list.

The **Calibration** list consists of four positions: **Left Channel**, **Right Channel**, which are used to perform the actual calibration of the channels, **Post Calibration**, which enables the user to perform additional calibration after the measurement session is over and add the results to the saved file and **Auto Calibration**, which enables the user to switch on the auto calibration function.



The **Left Channel** and **Right Channel** lists contains three positions: **By Measurement**, which allows to perform the calibration of the channels, **Last Calibration**, which contains the list of calibration measurements performed earlier and **TEDS**, which allows to operate with microphone's TEDS data: serial number, manufacturer name, calibration factor, etc..



Notice: *The calibration factor is always added to the results in the* ***Dose Meter****,* ***SLM****,* ***1/1 Octave****,* ***1/3 Octave*** *and* ***Running LEQ*** *modes.*

Notice: *It is advised to perform the calibration of the instrument each time before the measurements begin. A single calibration at the start of each day is usually sufficient for most regulations.*

Notice: *It is not possible to 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. In order to change the sensitivity the current measurement in progress must be finished!*

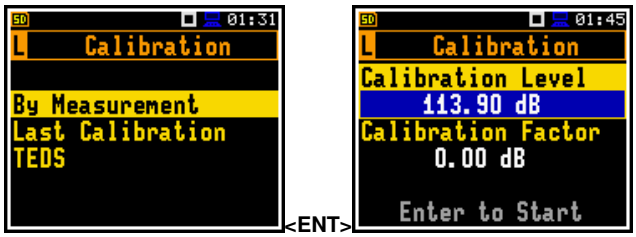
Notice: *The manufacturers recommended factory calibration interval is every 12 months for this instrument to be confident in its continuing accuracy and compliance with the international specifications. Please contact your local Svantek distributor for further details.*

4.3.1 Calibration By Measurement

Calibration by measurement can be done in the following way:

1. Select the calibration **By Measurement** from the **Calibration** list and press **<Enter>**.

2. Attach the acoustic calibrator SV 30A (or equivalent **114 dB** / **1000 Hz**) carefully over the microphone of the instrument.



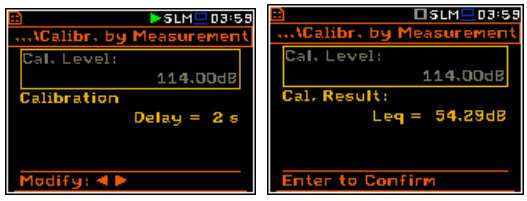
Notice: *It is also possible to use an electro-mechanical pistonphone, which generates a signal (ca 124 dB) or different type of acoustic calibrator dedicated for ½" microphones. In any case, before starting the calibration measurement, the user has to set the level of the signal generated by the given calibrator (****Cal. Level*** *position of* ***Calibr. by Measurement*** *sub-list), which is stated in the calibration certificate of the unit (the value of the* ***Cal. Level*** *set by the manufacturer of SVAN 102+ is equal to 114 dB).*

3. Switch on the calibrator and wait approximately 30 seconds for the tone to stabilise before starting the calibration measurement.

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

5. The calibration measurement is stopped automatically after stabilisation of the calibration measurement result (±0,05dB)

The calibration delay time is set to 3 seconds Waiting for the start of the measurement the **Delay** is counted down on the display. After the end of the measurement, the result is displayed in the bottom line. The measurement is running until the user presses the **<Start/Stop>** push-button.



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

- the calibrator is not properly attached to the instrument,
- there are external acoustic disturbances such as high noise levels close by,
- the calibrator or the measurement channel (the microphone, the preamplifier or the instrument itself) are damaged.

Notice: *During the calibration measurement, any external disturbances (acoustic noise or vibrations) should not exceed a value of 100 dB (when using a calibrator that generates a level of 114 dB).*

6. Press the **<Enter>** push-button to accept the calibration measurement result.

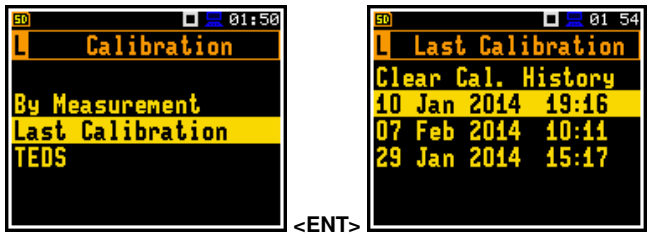
The calibration factor is calculated, stored and displayed (cf. next Figure) after pressing the **<Enter>** push-button.

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

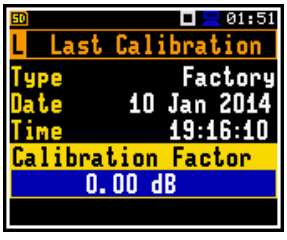
4.3.2 History of the calibration - Last Calibration

The **Last Calibration** window displays records from up to the ten last calibrations and enables to clear all stored calibration records (**Clear Cal. History**).

In order to review the calibration record, the user has to select the required line in the **Last Calibration** window and press **<Enter>**.



The opened window will contain the type, date and time of the performed calibration measurement and the obtained calibration factor.

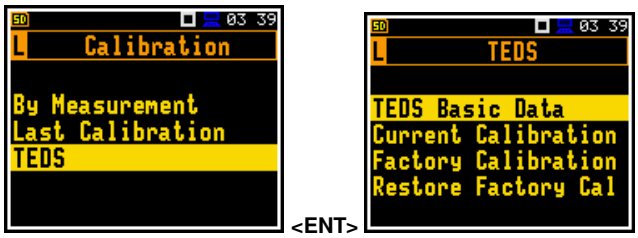


The user can clear stored calibration records. In order to do this the user has to choose the position **Clear Cal. History** in the **Calibration** sub-list and press **<Enter>** to perform this operation. The instrument requests the confirmation of the operation.

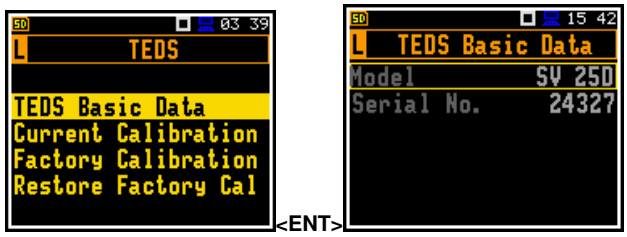
After **Clear Cal. History** operation has been performed the **Last Calibration** window contains only last calibration records.

4.3.3 Calibration information in the TEDS memory - TEDS

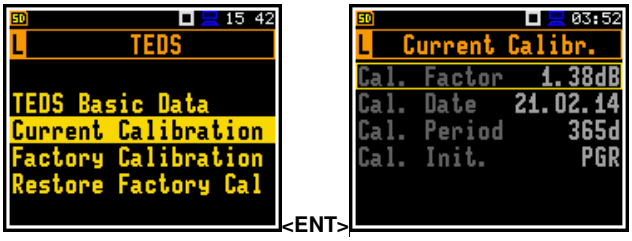
The **TEDS** window displays information, saved in the transducer's memory - TEDS.



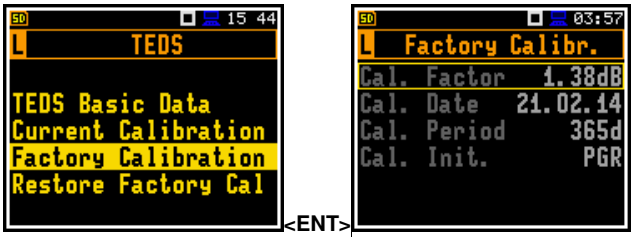
The **TEDS Basic Data** window displays the basic microphone data: **Model** and **Serial No.**.



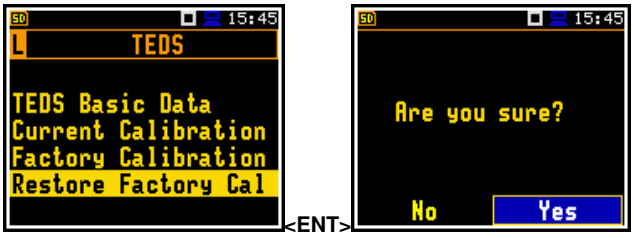
The **Current Calibration** window displays current calibration information, saved in the microphone memory: calibration factor (**Cal. Factor**), calibration date (**Cal. Date**), period the calibration is valid (**Cal. Period**) and the initials of the cpecialist, who performed this calibration (**Cal. Init.**)..



The **Factory Calibration** window displays factory calibration information, saved in the microphone memory.

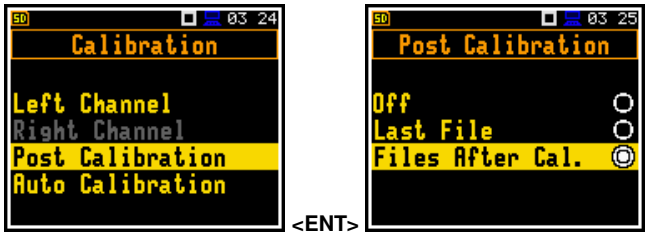


This operation enables the user to rewrite the current calibration with the factory calibration data.



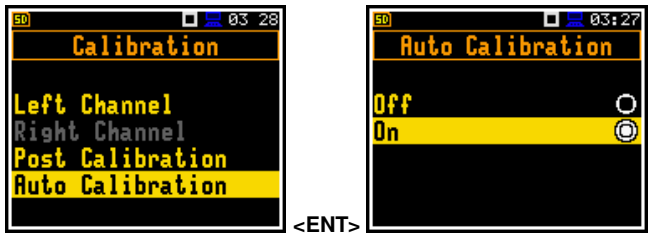
4.3.4 Post measurement calibration – Post Calibration

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. In the opened window, there are three options for saving results: not to save (**Off**), save in the last file (**Last File**) or save in the files which will be created after last calibration (**Files After Cal.**).



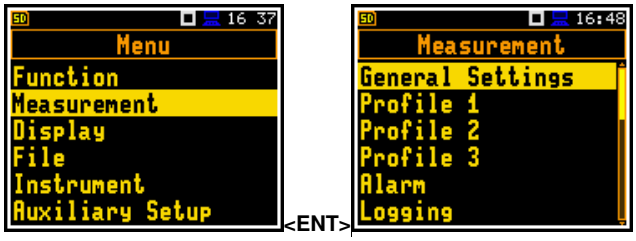
4.3.5 Automatic calibration – Auto Calibration

Position **Auto Calibration** enables the user to perform automatic calibration when the sound calibrator is attached. In this case the window **Calibration** will appear automatically. If **Auto Calibration** is switched off, the user should enter this window through the **Menu**.

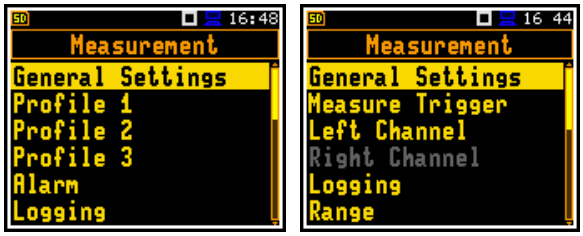


5 MEASUREMENT PARAMETERS SETTING – Measurement

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



The content of the **Measurement** list is different for different modes and functions. As an example two screens are presented for **Dose Meter** and **SLM** modes.

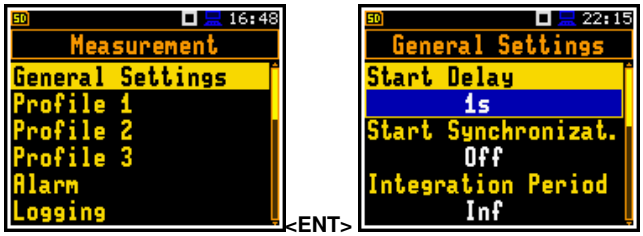


The **Measurement** list is used for setting the various measurement parameters and contains the following items:

General Setings	enables the user to set some general measurement parameters;
Measure Trigger	enables the user to set up the measurement trigger. This position appears only in the **SLM** function;
Profile 1 (2,3)	enables the user to program the profile parameters for both channel in the **Dose Meter** function. These positions appear only in the **Dose Meter** function;
Left Channel	enables the user to program the profile parameters for the left channel in the **SLM** function. This position appears only in the **SLM** function;
Right Channel	enables the user to program the profile parameters for the right channel in the **SLM** function. This position appears only in the **SLM** function;
Alarm	enables the user to program the alarm function. This position appears only in the **Dose Meter** function;
Logging	enables the user to program the logging parameters;
Spectrum	enables the user to set spectrum parameters. This position becomes available only in the **1/1 Octave** and **1/3 Octave** functions;
Range	enables the user to get information about measurement range;
Compensation Filter	enables the user to switch on required microphone compensation filter.
Statistical Levels	enables the user to define ten statistical levels;
Exposure Time	enables the user to set the exposure time duting dose measurements. This position appears only in the **Dose Meter** function;
MIRE	enables the user to select the parameters of the microphone **SV25S**;
Timer	enables the user to program the internal timer.

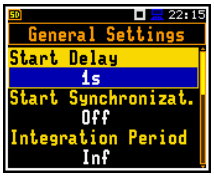
5.1 Selection of measurement parameters - General Settings

The **General Settings** list enables the user to set the general measurement parameters: measurement start delay (**Start Delay**), synchronization of measurement start with the real time (**Start Synchronizat.**), integration period / measurement run time (**Integration Period**), the repetition of the



measurement cycles (**Repetition Cycles**), automatic pauses (**Pause 1.**, **Pause 2.**), the intervals for day time period (**Day Time Limits**) and the LEQ detector type (**Leq Integration**).

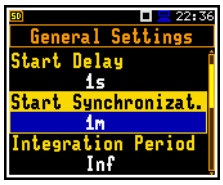
Setting time delay before the start of measurements



The **Start Delay** defines the delay period from the pressing the **<Start/Stop>** push-button to the actual start of the measurements (the digital filters of the instrument constantly analyse the input signal even when the measurements are stopped). This delay period can be set from **0 second** to **60 minutes**. Its value by default is set to **1s**.

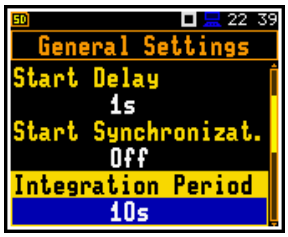
Notice: *The minimum delay period is equal to 0 second. In the* ***Calibration*** *mode, the delay period is always equal to 5 seconds.*

Setting synchronisation of the measurement start



The **Start Synchronizat.** defines maximum delay period from pressing the **<Start/Stop>** push-button pressing to the start of the measurementsto allow synchronisation with the instrument's RTC. The **Start Synchronizat.** 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. The default value is set to **Off**.

Setting the integration period

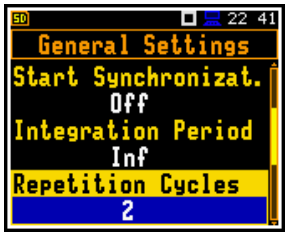


The integration period defines the period during which the signal is being measured. The integration period (**Integration Period**) can be set as infinite (**Inf**) or for a fixed interval by pressing the **< ▸ >** push- button: **24h**, **8h**, **1h**, **15m**, **5m**, **1m**, from **1s** to **59s** with 1s step, from **1m** to **59m** with 1m step, from **1h** to **24h** with 1h step. **Inf**.

The measurement will stop automatically after this period, or the measurement will start again when the selected **Repetition Cycles** is greater than one. The whole block of summary results will be added to the logger file at the end of measurement cycle.

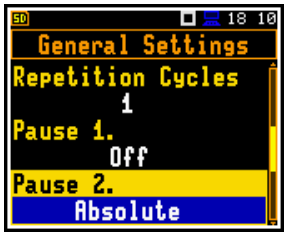
The definitions of the measurement results in which the integration period is used are given in App. D.

Setting the number of repetition of measurement cycles



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

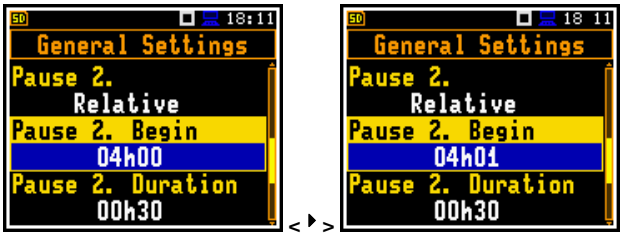
Programming pauses



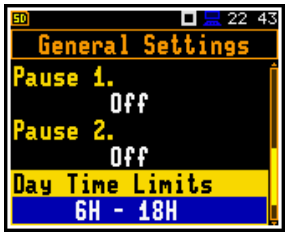
In case of **Dose Meter** it is possible to program two automatic pauses.

Pause can be switched off (**Off**) or can be programm based on absolute time (**Absolute**) or time from the measurement start (**Relative**).

In both two cases two additional positions appear with time of pause start (**Begin**) and pause duration (**Duration**).

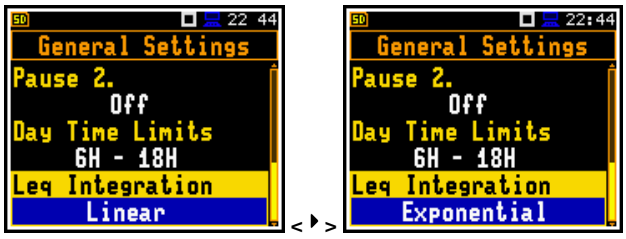


Day time limits selection



The **Day Time Limits** enables the user to select the definition of the day and night required by the local standards. These limits are used for the calculation of the **Le** function (cf. App. D for the definition). Two options are available: **6H–18H** and **7H–19H**. Its value by default is set to **6H–18H**.

The Leq Integration

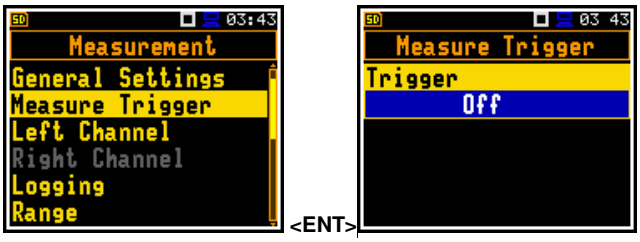


The **Leq Integration** defines the detector type for the calculations of the **Leq**, **Le**, **LEPd**, **Lxx** and **Sel** functions. Two options are available: **Exponential** and **Linear**. The formulae used for the **Leq** calculation are given in Appendix D. Its value by default is set to **Linear**.

Setting **Linear** is required for getting the true LEQ value of the measured signal. When this option is selected the value of the **Leq**, **Le**, **LEPd**, **Lxx** and **Sel** functions do not depend on the detector time constant: **Fast**, **Slow** or **Imp.** (the results are displayed without the indicator of the detectors selected in the profiles). In this case, the indicator **Lin.** (or **L**) is displayed in the different modes of the result presentation.

Setting **Exponential** enables the user to fulfil the requirements of another standard for the time averaged **Leq** measurements. When this option is selected the value of the **Leq, Le, LEPd, Lxx** and **Sel** function depends on the detector time constant. The results are displayed with the indicator of the detectors selected in the profiles (*path: <Menu> / Measurement / Profiles*).

5.2 Measure triggering parameters selection – Measure Trigger



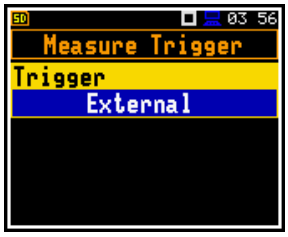
The **Measure Trigger** sub-list enables the user to set the triggering parameters. This position appears only in the **SLM** function.

The **Measure Trigger** is a contexts sub-list in which the triggering can be switched off or on (**Trigger**), in the case when on - the source of the triggering signal can be determined (**Trigger Source**), its level (**Trigger Level**) and sometimes also the speed of changes (**Trigger Gradient**).

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

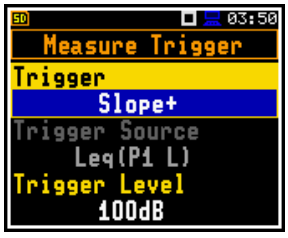
The triggering condition is checked every 0,5 mili seconds.

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 in the right channel as **Digital In** (*path: <Menu> / Instrument / Multifunction I/O / Right Cahnnel*). In the other case the measurement result is skipped.

Slope type trigger

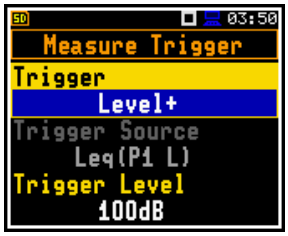


In the case when **Slope+** is selected, in each second the triggering condition is checked. The measurement starts only when the **Trigger Source** passes the level determined by **Trigger Level** in the direction of increase the **Trigger Source**. In other cases the measurement start is skipped.

In the case, when **Slope–** is selected, in each second the triggering condition is

checked. The measurement starts only when the **Trigger Source** passes the level determined by **Trigger Level** in the direction of decrease the **Trigger Source**. In other cases the measurement start is skiped.

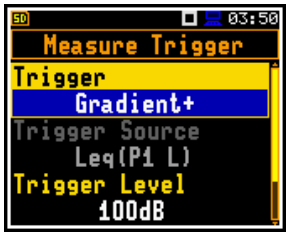
Level type trigger



In the case when **Level+** is selected, in each second the triggering condition is checked. The measurement starts when the **Trigger Source** has the level greater than determined by the selected decibel **Trigger Level**. In other cases the measurement start is skipped.

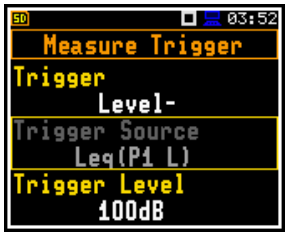
In the case, when **Level–** is selected, in each second the triggering condition is checked. The measurement starts when the **Trigger Source** has level lower than determined by **Trigger Level**. In other cases the measurement start is skipped.

Gradient type trigger



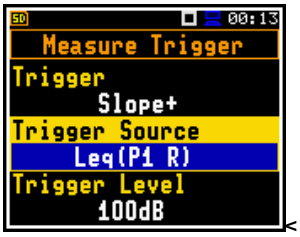
In the case when **Gradient +** is selected, in each second the triggering condition is checked. The measurement starts when the **Trigger Source** has the level greater than determined by **Trigger Level** and the gradient of the signal is greater than determined by **Trigger Gradient** position. In other cases the measurement start is skipped.

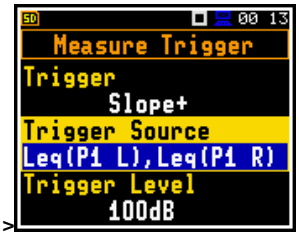
Trigger source selection



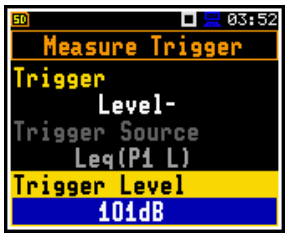
In one channel mode only one measured result can be used as a source of the triggering signal in the **SLM** function, namely the output signal from the Leq detector coming from the first profile of the left channel, which is denoted here as **Leq(P1 L)**. This position does not become active and the text stated here remains unchanged.

In two channel mode it is possible to choose the Leq from left (**Leq(P1 L)**), right (**Leq(P1 R)**)or from both channels (**Leq(P1 L), Leq(P1 R)**).



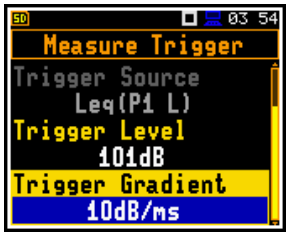


Setting the level of the triggering signal



The level of the triggering signal (**Trigger Level**) can be set in the 24 dB to 136 dB range. The **Trigger Level** value of the triggering signal refers to the instantaneous value of the LEQ result from the first profile calculated during the period depending on selected **Detector** (*path: <Menu> / Measurement / Profile x*).

Setting the speed of the triggering signal changes



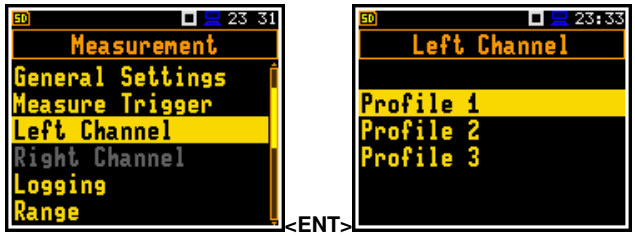
This position appears when the **Gradient+** trigger is chosen. The speed of the triggering signal changes (**Trigger Gradient**) can be set from 1 dB/ms to 100 dB/ms range.

5.3 Setting parameters in the profiles

The parameters of the profile **x** can be set in the **Profile x** sub-list, which in case of **Dose Meter** is opened from the **Measurement** list, and in case of **SLM** from one of channel sub-list (**Left Channel** or **Right Channel**).

The following parameters can be programmed independently for each profile in the **Profile x** sub-list: weighting filter (**Filter**), peack filter (**Filter (Peak)**) and LEQ detector type (**Detector**).

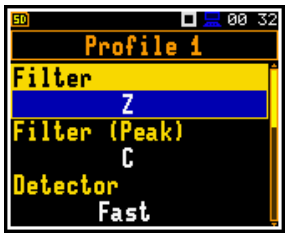
For **Dose Meter** function some additional parameters can be set in the **Profile x** list: **Criterion Level**, **Threshold Level**, **Exchange Rate**, **ULT Threshold Level** and **PTC Threshold Level**.



Weighting filter selection

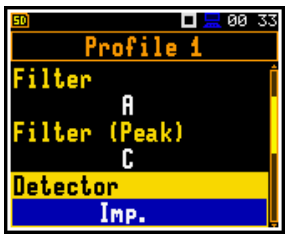
There are three filters available:

- **Z** according to IEC 61672-1 standard,
- **A** according to IEC 651 and IEC 61672-1 standards,
- **C** according to IEC 651 and IEC 61672-1 standards.



LEQ detector selection

The following LEQ detectors are available in the instrument: **Imp.**, **Fast** and **Slow**



The **Dose Meter** specific parameters can be set as follows (in to IEC 61252 and ANSI 1.25-1991)

Criterion Level: **60dB**, **65dB**, **70dB**, **75dB**, **80dB**, **84dB**, **85dB**, **87dB**, **90dB**;

Threshold Level: **None**, **60dB**, **65dB**, **70dB**, **75dB**, **80dB**, **85dB**, **90dB**;

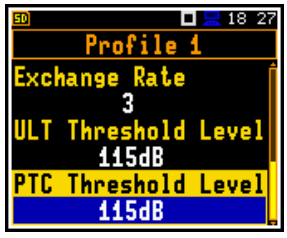
Exchange Rate: **2**, **3**, **4**, **5**, **6**;

ULT Threshold Level: **70dB** – **140dB**;

PTC Threshold Level: **70dB** – **140dB**

Where:

ULT – upper limit time (based on SPL value) time above the threshold
PTC - peak threshold counter – number of peaks that exceeded set value



5.4 Setting the alarm thresholds for dose meter functions – Alarm

The **Alarm** position is active only in the **Dose Meter** function and enables the user to program the alarm thresholds for three profiles (**Threshold Profile 1 (2,3)**).

Alarm appears as a flashing od diode in the right upper corner of the instrument. Pressing of any key stops alarm.

The thresholds can be set for the next measurement functions of the **Dose Meter** in the ranges:

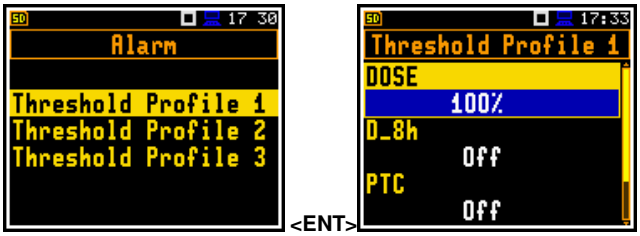
Dose: 1-200%;

D_8h: 1-200%;

PTC: 1-1000;

ULT: 1-60s.

If the **Off** value is selected the alarm for the measurement function is swithed off.



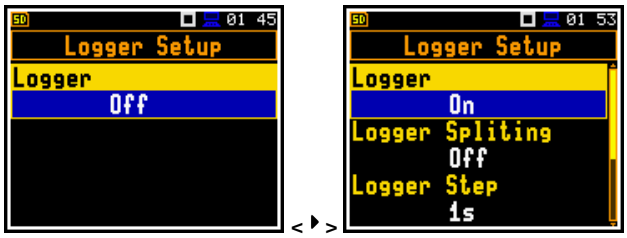
5.5 Setting the data logging functionality – Logging

The **Logging** list enables the user to program the logger functions: the recording of the measurement history and program parameters of the event and wave recording. The **Logging** list consists of four positions: **Logger Setup**, **Logger Results**, **Event Recording** and **Wave Recording**.

5.5.1 Setting the Logger – Logger Setup

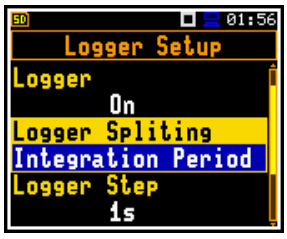
The **Logger Setup** list enables the user to activate logger functionality, set logger step, edit the name of the logger file and swith on/off the logging of summary results.

The **Logger** position switches on and off the functionality, which enables the user to save selected results from three profiles of one or both channels with the selected logger step interval into a file stored on the SD memory card.



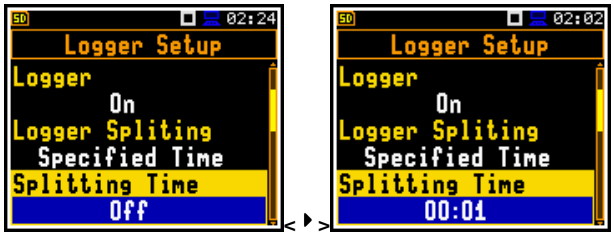
Notice: *If* ***Logger*** *is* ***Off****, files are not created and measurement results of the time history changes are not saved!*

The **Logger Splitting** position enables the user to split the logger registration data into separate files. If **Logger Splitting** parameter is **Off** the registration of time history data will be continuously performed in one logger file with the name defined in the **Logger File Name** position.



In other cases the registration is performed in separate files and the registration period may be equal to: integration period (**Integration Period**), 15 minute (**Sync. to full 15m**), 30 min (**Sync. to full 30m**), 1 hour (**Sync. to full hour**) or user defined up to six periods (**Specified Time**). Every time when registration period is achieved the logger file is closed and new file with the increased by one name number is opened for subsequent measurement data.

If **Specified Time** is selected in the **Logger Splitting** position, then six additional (**Splitting Time**) positions appear on the list. The position may be swithed off if **Off** is selected.

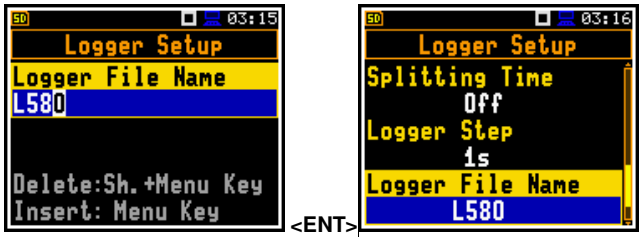


After pressing the **< ▸ >** push-button while being on the one of **Splitting Time** position the **Off** is changing to time format value. Further use of the **< ▸ >** push-button enables the user to set the desired time (hh:mm) of splitting the record.

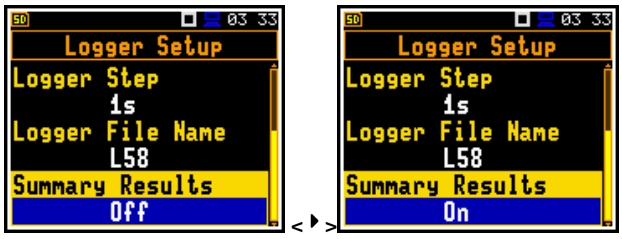
The **Logger Step** defines the period of the data logging in a file. It can be set from **100ms** to **1h**. Its value by default is set to **1s**.

The **Logger File Name** position enables the user to define the logger file name. The name can be up to eight characters long. After pressing the **< ◂ >**, **< ▸ >** push-buttons, the special window with text editor function is opened for editing.

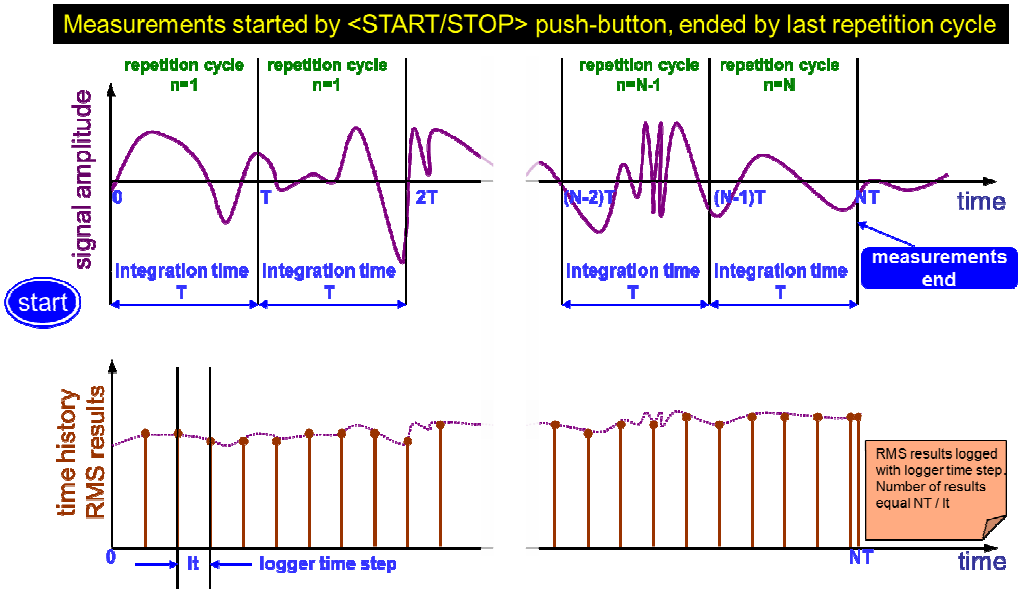
The edited name is accepted and saved after pressing the **<Enter>** push-button. The special warning is displayed in case a file with the edited name already exists in the memory. The instrument waits then for a reaction of the user (any push-button should be pressed except **<Shift>**



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: **SPL**, **LEQ, SEL**, **Lden**, **LEPd**, **Ltm3**, **Ltm5, LN%**, **PEAK**, **MAX**, **MIN**.



When the **Logger** is switch on and the logging results have been defined, then in parallel with measurements during **Integration Period** the results, the partial measurement results are saved in the file with the interval step, defined by **Logger Step** parameter. Up to 42 results can be logged simultaneously from three independent user defined profiles of the instrument (**Lpeak**, **Lmax**, **Lmin**, **Leq**, **Lav**, **LR15**, **LR60**) with time step down to **100ms**. These results are saved in the logger file in the external memory in all modes and functions of the instrument. The recording in the logger's memory is stopped after the period, which is equal to **Integration Period** multiplied by **Repetition Cycles** or after pressing the **<Start/Stop>** push-button or after stopping the measurements remotely. The whole block of summary results will be added to the logger file at the end of the measurement cycle.



Relations between Integr. Per and Logger Step

5.5.2 Results selection – Logger Results

The **Logger Results** list enables the user to activate the results for three independant profiles of two channels, which will be recorded to the logger file during measurement. Activation / deactivation can be done by means of the <◄> push-button. The position is changed by means of <►> and <▲>, <▼> push-buttons.

Notice: *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.*

5.5.3 Logger trigger parameters setup – Logger Trigger

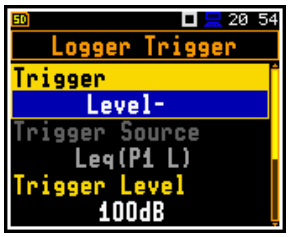
The **Logger Trigger** position becames available in the **SLM** function.

The **Logger Trigger** parameters influence the way the measurement results are saved in the logger. It is a contexts sub-list in which: the trigger can be switched off or its type selected (**Trigger**), the source of the triggering signal can be determined (**Trigger Source**), it's level can be selected (**Trigger Level**), the number of the results saved in the logger before the fulfilment of the triggering condition (**Pre Trigger**) and the number of the results saved in the logger after the fulfilment of the triggering condition (**Post Trigger**).

Trigger disabling

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

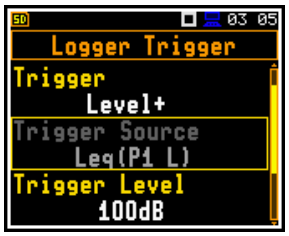
Level type trigger



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

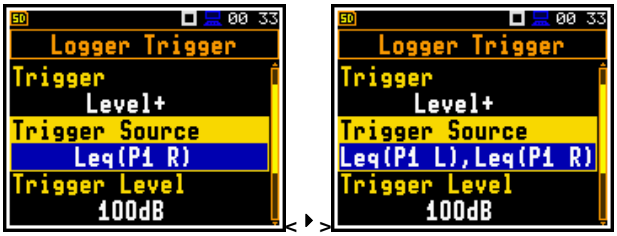
- the measurement results registered directly before the fulfilment of the triggering condition; time of the recording can be calculated by multiplying the value set in the **Pre Trigger** by the time period taken from the **Logger Step** (*path: <Menu> / Measurement / Logging / Logger Setup*);
- all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

Trigger source selection

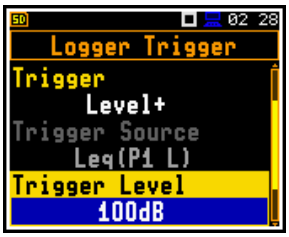


In one channel mode only one measured result can be used as a source of the triggering signal, namely the output signal from the Leq detector coming from the first profile of the left channel, which is denoted here as **Leq(P1 L)**. This position does not become active and the text stated here remains unchanged.

In two channel mode it is possible to choose the Leq from left (**Leq(P1 L)**), right (**Leq(P1 R)**)or from both channels (**Leq(P1 L), Leq(P1 R)**).

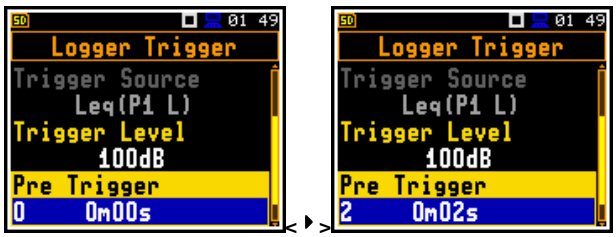


Level of the triggering signal



The level of the triggering signal in logger (**Trigger Level**) can be set in 1 dB step from 24 dB to 136 dB range. The **Trigger Level** value of the triggering signal refers to the instantaneous value of the Leq result from the first profile of the left channel calculated during the period depending on selected **Detector** (*path: <Menu> / Measurement / Profile x*).

Pre and post trigger recording



In the **Pre Trigger** line the number of results recorded in the logger's file before the fulfilment of the triggering condition can be achieved. This number is within the limits 0..10.

In the **Post Trigger** line the number of results recorded in the logger's file after the fulfilment of the triggering condition can be achieved. This number is within the limits 0..200.

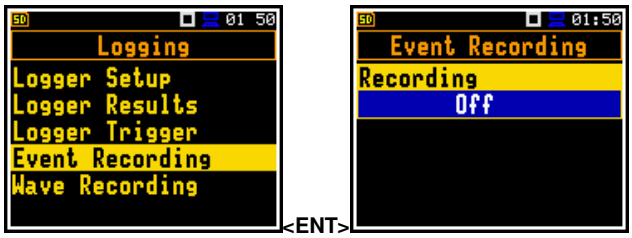
The period of the measurements that are saved in the logger before or after the fulfilment of the triggering condition can be calculated by multiplying the value set in the **Pre** or **Post** by the value set in the **Logger Step** (*path: <Menu> / Measurement / Logging / Logger Setup*). The result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

presented in the same line, at the right side of the display.

5.5.4 Event recording setup – Event Recording

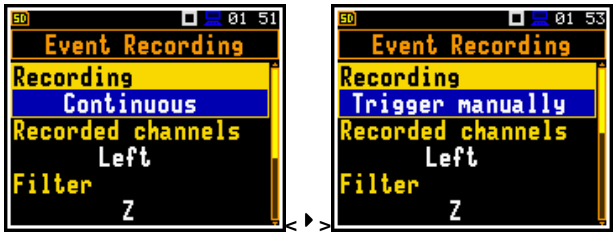
The **Event Recording** position enables the user to activate and set the parameters of event signal recording in the external memory (**SD Card**).

This function normally is not included in the instrument, but can be purchased separately as an option.



Definition of record triggering

The **Recording** position, if it is not **Off**, defines the the recording mode: **Continuous**, **Slope +**, **Slope -**, **Level +**, **Level -**, **Gradient +**, **External**, **Integration Period** or **Trigger manually**.



Definition of channel to be recorded

The **Record channels** position enables the user to choose which signal from the left, right or both channlels will be recorded as an event (**Left**, **Right** or **Left and Right**).

Definition of filter

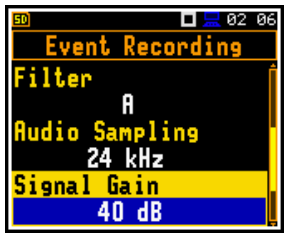
The **Filter** position enables the user to choose the broadband frequency filter during event recording: **A**, **C** or **Z**.

Sampling frequency of event recording

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

Signal gain

The **Signal Gain** position enables the user to select the gain of the recorded signal in the range from 0 to 40dB.



Checking the triggering condition

In the **Trigger Period** position it is possible to select the time interval for checking the triggering condition. This parameter can be set as: **Logger Step**, **0.5ms**, **100.0ms** and **1s**.

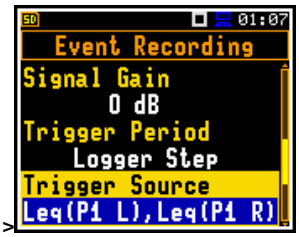
This position is active when **Recording** is set to: **Slope +**, **Slope -**, **Level +** and **Level -**.

Trigger source selection

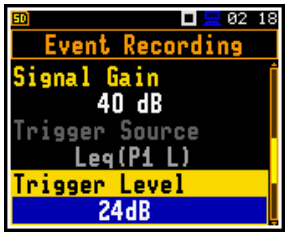
This position is active when **Recording** is set to: **Slope +**, **Slope -**, **Level +** and **Level -** and **Gradient +**.

In one channel mode only one measured result can be used as a source of the triggering signal, namely the output signal from the Leq detector coming from the first profile of the left channel, which is denoted here as **Leq(P1 L)**. This position does not become active and the text stated here remains unchanged.

In two channel mode it is possible to choose the Leq from left (**Leq(P1 L)**), right (**Leq(P1 R)**)or from both channels (**Leq(P1 L), Leq(P1 R)**).



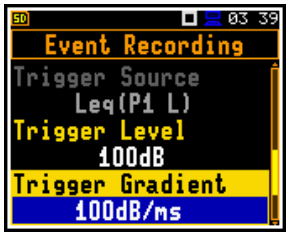
Level of the triggering signal



The level of the triggering signal for recording (**Trigger Level**) can be set in a range from 24 dB to 136 dB with 1 dB step.

This position is active when **Recording** is set to: **Slope +**, **Slope -**, **Level +** and **Level -** and **Gradient +**.

Gradient of the triggering sygnal



The gradient of the triggering signal for recording (**Trigger Gradient**) can be set in a range from 1dB/ms to 100dB/ms.

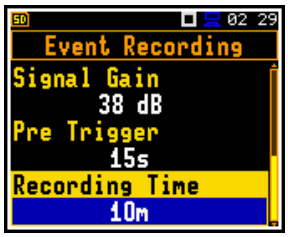
This position is active when **Recording** is set to **Gradient +**.

Recording before triggering condition

When **Pre Trigger** position is switched on then the event signal is recorded immediately before the triggering condition. The range of such recording depends on the sample frequency and number of recorded channels. For example, with 12 kHz sample frequency and record of one channel the **Pre Trigger** can be set from the range 1s-30s. If signals from both channels are recerded the range is 1s-30s.

This position is active when **Recording** is set to: **Slope +**, **Slope -**, **Level +** and **Level -** and **Gradient +**, **External**, **Integration Period** and **Trigger manually**.

Time of signal recording



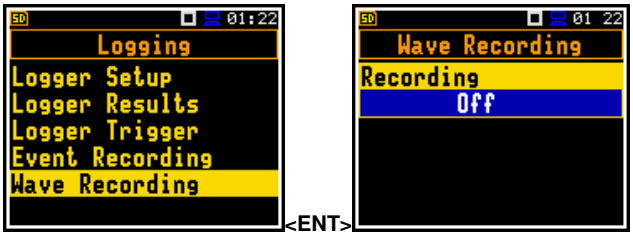
In the **Recording Time** position it is possible to select the time of signal recording after triggering starts. If the next triggering condition appears then the signal will be recording for additional **Recording Time**. The available values are from **1s** to **8h**, or **Inf**.

This position is active when **Recording** is set to: **Slope +**, **Slope -**, **Level +** and **Level -** and **Gradient +**., **External**, **Integration Period** and **Trigger manually**.

5.5.5 Wave recording setup – Wave Recording

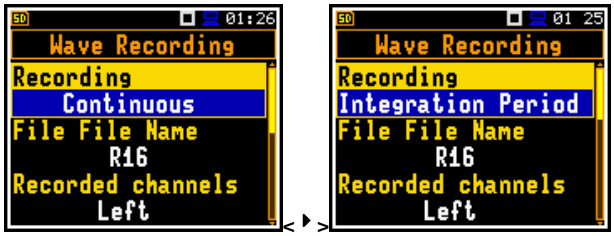
The **Wave Recording** position enables the user to activate and set the parameters of signal recording in the external memory (**SD Card**).

This function normally is not included in the instrument, but can be purchased separately as an option.



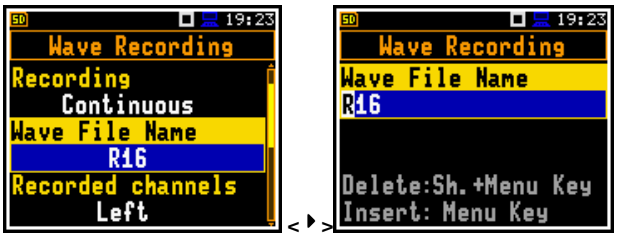
Definition of record triggering

The **Recording** position, if it is not **Off**, defines the recording mode: **Continuous**, **Slope +**, **Slope -**, **Level +**, **Level -**, **Gradient +**, **External** or **Integration Period**.



Wave file name definition

The **Wave File Name** position enables the user to define the file name with wave record. The name can be up to eight characters long. After pressing the < ◀ >, < ▶ > push-buttons, the special window with text editor function is opened for editing).



Definition of channel to be recorded

The **Record channels** position enables the user to choose which signal from the left, right or both channlels will be recorded as an event (**Left**, **Right** or **Left and Right**).

Definition of file format

The **Format** position enables the user to define the format of the file: **PCM** or **Extensible**.

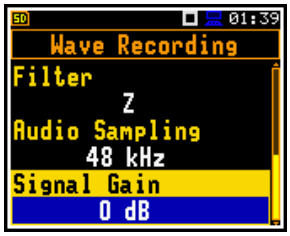
Definition of filter

The **Filter** position enables the user to choose the broadband frequency filter during event recording: **A**, **C** or **Z**.

Sampling frequency of event recording

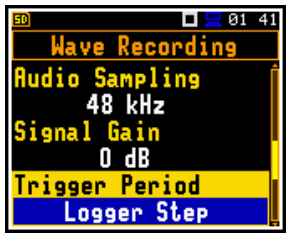
The **Audio Sampling** position enables the user to select the sampling frequency of event recording: **12KHz**, **24KHz** or **48KHz**.

Signal gain



The **Signal Gain** position enables the user to select the gain of the recorded signal in the range from 0 to 40dB.

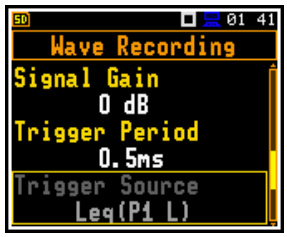
Checking the triggering condition



In the **Trigger Period** position it is possible to select the time interval for checking the triggering condition. This parameter can be set as: **Logger Step**, **0.5ms**, **100.0ms** and **1s**.

This position is active when **Recording** is set to: **Slope +**, **Slope -**, **Level +** and **Level -**.

Trigger source selection



This position is active when **Recording** is set to: **Slope +**, **Slope -**, **Level +** and **Level -** and **Gradient +**.

In one channel mode only one measured result can be used as a source of the triggering signal, namely the output signal from the Leq detector coming from the first profile of the left channel, which is denoted here as **Leq(P1 L)**. This position does not become active and the text stated here remains unchanged.

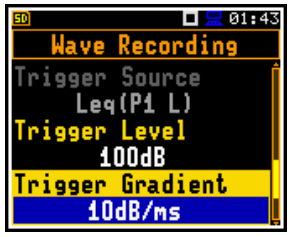
In two channel mode it is possible to choose the Leq from left (**Leq(P1 L)**), right (**Leq(P1 R)**)or from both channels (**Leq(P1 L), Leq(P1 R)**).

Level of the triggering signal

The level of the triggering signal for recording (**Trigger Level**) can be set in a range from 24 dB to 136 dB with 1 dB step.

This position is active when **Recording** is set to: **Slope +**, **Slope -**, **Level +** and **Level -** and **Gradient +**.

Gradient of the triggering sygnal



The gradient of the triggering signal for recording (**Trigger Gradient**) can be set in a range from 1dB/ms to 100dB/ms.

This position is active when **Recording** is set to **Gradient +**.

Recording before triggering condition

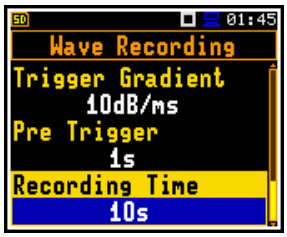
When **Pre Trigger** position is switched on then the wave signal is recorded immediately before the triggering condition. The range of such recording depends on the sample frequency and number of recorded channels. For example, with 12 kHz sample frequency and record of one channel the **Pre Trigger** can be set from the range 1s-30s. If signals from both channels are recerded the range is 1s-30s.

This position is active when **Recording** is set to: **Slope +**, **Slope -**, **Level +** and **Level -** and **Gradient +**,

External and **Integration Period**.

Time of signal recording

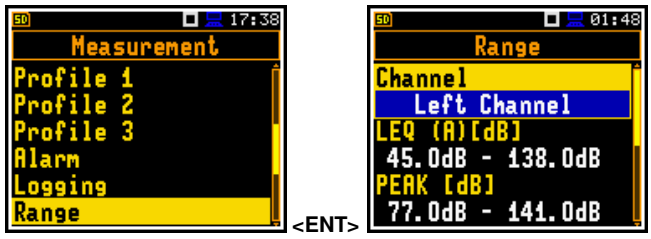
In the **Recording Time** position it is possible to select the time of signal recording after triggering starts. If the next triggering condition appears then the signal will be recording for additional **Recording Time**. The available values are from **1s** to **8h**, or **Inf**. This position is active when **Recording** is set to: **Slope +**, **Slope -**, **Level +** and **Level -** and **Gradient +**., **External** and **Integration Period**.



5.6 Measurement range setting – Range

The **Range** is used to view the measurement ranges for the channels of the instrument.

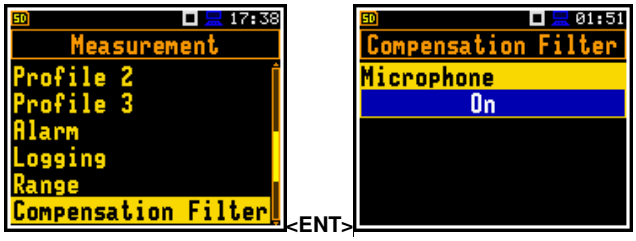
The absolute range values changes due to the calibration factor.



The detailed description of the measurement ranges parameters is given in App. C.

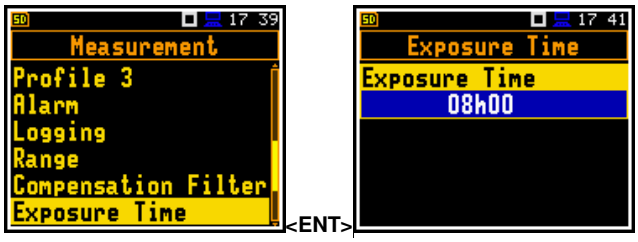
5.7 Deactivation of the microphone compensation filter – Compensation Filter

The **Compensation Filter** position enables the user to swith on/off the compensation filter of the microphone. The compensation of microphone internal noise is factory switched on, however it is possible to switch off the microphone compensation filter for electrical measurements (e.g. for laboratory calibration measurements).



5.8 Exposure time setting – Exposure Time

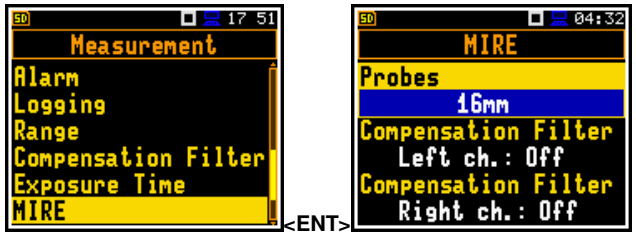
The **Exposure Time** enables the user to set the desired value of the workday exposure time that is used for the calculation of **LEPd** (cf. App. D for the definitions of the functions). This sub-list is available only in the **Dose Meter** function.



5.9 Settings of the MIRE microphone – MIRE

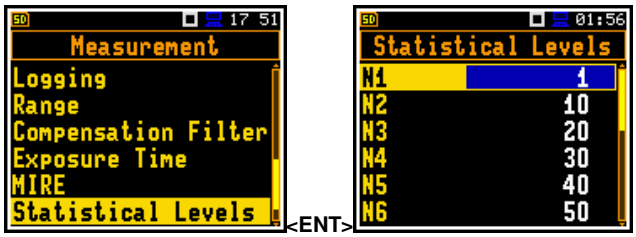
The **MIRE** position enables the user to select the length of the probe (**Probes**) of the **SV25S** microphone. The length of the probe can be **16mm**, **20mm** and **25mm**.

The **Compensation Filter** positions inform the user about the state of compensation filters in case when the instrument identifies the **SV25S**



microphone.

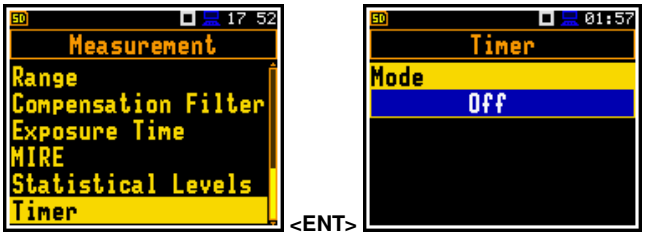
5.10 Setting ten statistical levels – Statistical Levels



In the **Statistical Levels** window it is possible to define ten statistical levels, named from **N1** to **N10**, to be calculated, displayed and saved in the files together with the Summary results.

The default statistical levels have the following settings: **1**, **10**, **20**, **30**, **40**, **50**, **60**, **70**, **80** and **90**. All values have to be within the integer range [1, 99]. Each one value can be set independently from the others.

5.11 Programming the instrument's internal timer – Timer



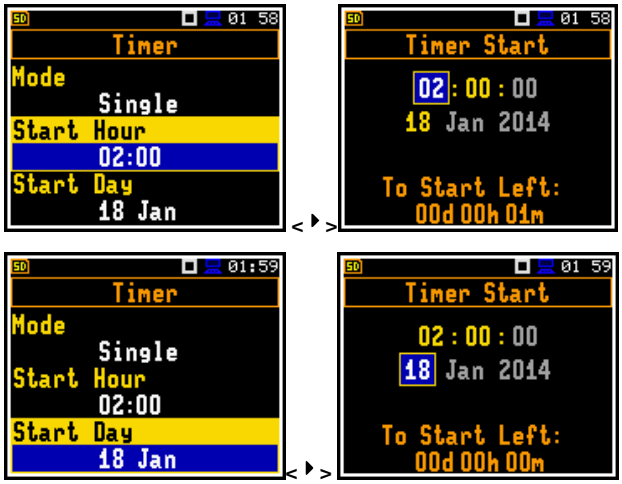
The **Timer** enables the user to program the internal real time clock to act as a delayed start and stop timer. The instrument can be switched on by itself at the pre-selected programmed time and it can then perform the measurement, which was used before it was last switched off.

Selecting the mode of the timer function

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

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

Setting hour and day of the measurement's switch on



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

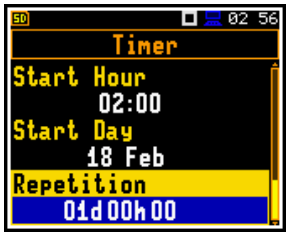
The **Start Day** determines the date of the measurement start. The timer can be programmed up to one month ahead and during the date setting the current state of the **R**eal **C**lock is taken into account. The required date can be selected in a special window, which is opening after pressing the <◀>, <▶> push-buttons. Make sure to check that the real time clock settings are correct before beginning a delayed timer measurement.

In order to set hour and day one has to select the position for changing with the <◀>, <▶> / <▲>, <▼> push-buttons and then select the proper value by means of the <▲>, <▼> push-buttons pressed together

with **<Shift>** and then to press the **<ENTER>** push-button.

The bottom line reflects the time to wait for the measurement to start.

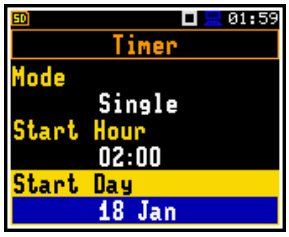
Selecting the period between two consecutive measurements



The **Repetition** position is displayed when **Multiple** mode is selected and defines period between two consecutive measurements. This parameter can be programmed from **5m** up to **28d**.

Notice: *The instrument's* ***Timer*** *function can be used for multiple measurements (at the programmed day and time with the selected repetition number). The first switch on of the instrument must be within one month ahead.*

5.12 Description of an exemple timer function execution



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

Let us assume that the user wants to switch on the instrument the 18th of January at 02:00, measure the sound for 10 seconds and save the results in a file named R1.

In order to do this the user has to set the parameters of the **Timer** function, the measurement parameters (*path: <Menu> / Measurement / General Settings*), name the file.

The instrument will start the measurement on the 18th of January at 02:00.

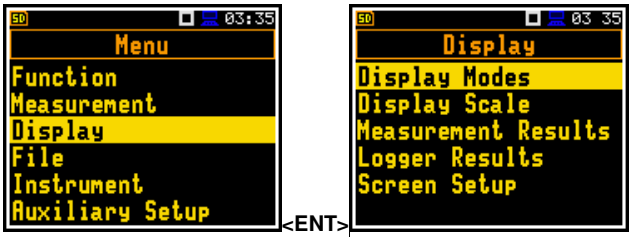
If the instrument was switched off it will switch on 5 minute prior to **Start Delay** time to warm up, the measurements will be performed for a period of ten seconds. Then, the results will be saved in the previously named file and finally – the instrument will switch off.

If the instrument was not switched off, it will start the measurement at the **Start Delay** time and after the measurement will stay switched on.

6 DATA AVAILABLE ON THE DISPLAY – Display

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

The content of the **Display** list depends on selected function.



The **Display** list is used for setting the various parameters, which are dedicated to the display control, 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;
Spectrum View	enables the user to change the type of the spectrum and to activate the **Max** and/or **Min** spectrum. This position only becomes available in the **1/1 Octave** and **1/3 Octave** modes;
Measurement Results	enables the user to select results to be displayed;
Logger Results	enables the user to select and present the results stored in the logger's files;
Screen Setup	enables the user to set the contrast and energy save function.

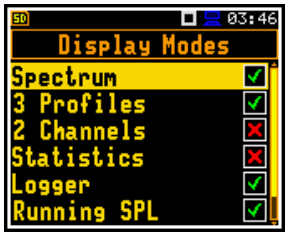
6.1 Selection of the modes of measurement results presentation – Disp. Modes

The Two Channel mode is always available in all measurement modes. Other presentation 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 (**Dose Meter**, **SLM**, **1/1 Octave**, **1/3 Octave**, etc.).

For the **Dose Meter** or **SLM** functions the following possibilities of the measurement results presentation are available: **3 Profiles**, **2 Channels**, **Statistics**, **Logger**, **Running SPL** and **File Info**.

For **1/1 Octave** and **1/3 Octave** functions additional position **Spectrum** becomes available.



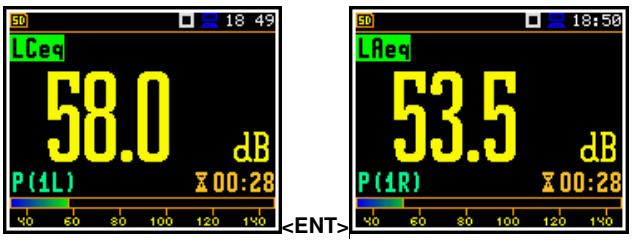
Notice: *The user may change one presentation mode to another one by pressing* ***<Esc>*** *push-button.*

6.1.1 One profile presentation mode

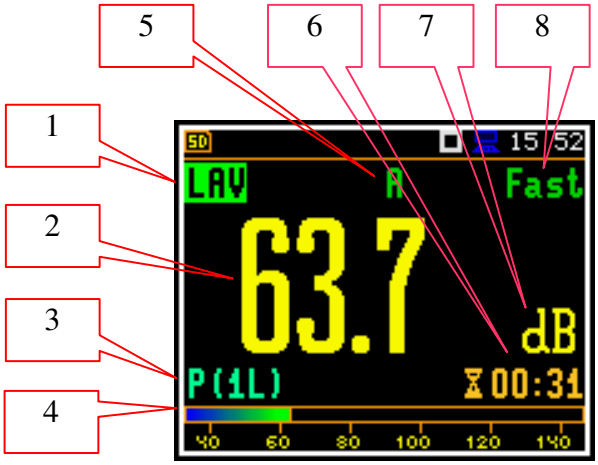
The One profile view is always available in all measurement modes. In one result mode any measurement result, selected in **Measurement Results**, may be presented.

The profile numer, which result is displayed, is changed by the <▲>, <▼> push-buttons.

The channel is changed by the **<Enter>** push-button.



Field description of the 1 Profile view



1. Function name:
   - for **Dose Meter**: **LAV**, **L(A/C/Z)eq**, **L(A/C/Z)E**, **SEL8**, **E**, **E_8h**, **LEPd**, **PSEL**, **Ltm3**, **Ltm5**, **LN%**, **PTC**, **PTP**, **ULT**, **TWA**, **PrTWA**, **Lc-a**, **OVL**, **L(A,C,Z)peak**, **L(A,C,Z)(F/S/I)max**, **L(A/C/Z)(F/S/I)min**, **L(A,C,Z)(F/S/I)**, **DOSE**, **D_8h**, **PrDOSE**;
   - for **SLM**: **L(A/C/Z)eq**, **L(A/C/Z)E**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **LN%**, **Lc-a**, **OVL**, **L(A,C,Z)peak**, **L(A,C,Z)(F/S/I)max**, **L(A/C/Z)(F/S/I)min**, **L(A,C,Z)(F/S/I)**.
2. The value of measured function.
3. Profile number and channel (**L**=left, **R**=right).
4. Quasi analogue value indicator.
5. The name of the implemented filter: **Z**, **A**, **C**.
6. Elapsed time, showing the current second of the measurement. The value presented there belongs to the range [**1**, **Integration Period**].
7. Units of measured value.
8. Detector time constant, when the detector is exponential: **Imp.**, **Fast**, **Slow** or **Lin** when the detector is linear.

Notice: *The **(A/C/Z)(F/S/I)** means, that the measurement function like **Leq**, **LE**, **Lpeak**, **Lmax**, **Lmin**, **L** are measured with filter **A**, **C** or **Z** and with detector **Fast** (**F**), **Slow** (**S**) or **Impulse** (**I**).*

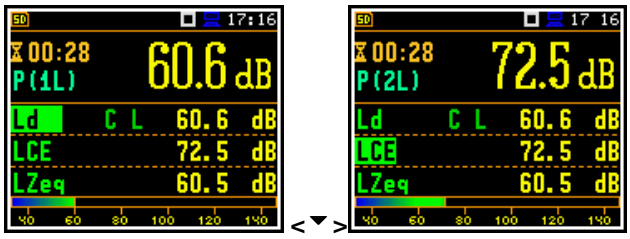
Notice: *There is no displayed indication of the detector in the case of **PEAK** and **OVL** results.*

6.1.2 3 profile presentation mode – 3 Profile

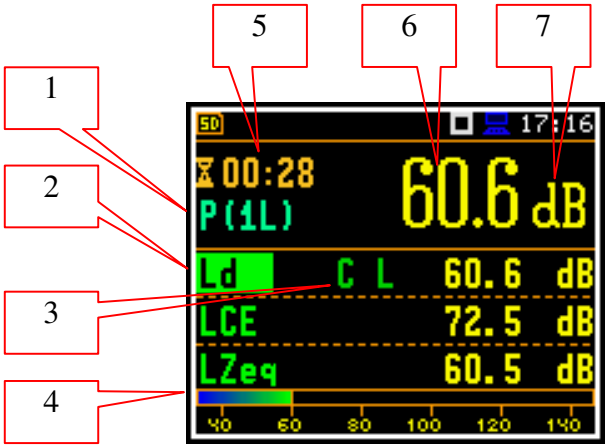
In the **3 Profile** mode any three measurement results, selected in **Display Results**, may be presented for tree profiles of the selected channel.

The profile numer, which result is displayed in the upper field of the display, is changed by the <▲>, <▼> push-buttons.

The channel is changed by the **<Enter>** push-button.

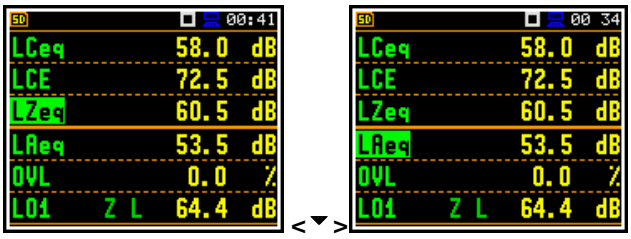


Field description of the 3 Profiles view



1. Selected profile numer and channel (**L**=left, **R**=right).
9. Function name:
   - for **Dose Meter**: **LAV**, **L(A/C/Z)eq**, **L(A/C/Z)E**, **SEL8**, **E**, **E_8h**, **LEPd**, **PSEL**, **Ltm3**, **Ltm5**, **LN%**, **PTC**, **PTP**, **ULT**, **TWA**, **PrTWA**, **Lc-a**, **OVL**, **L(A,C,Z)peak**, **L(A,C,Z)(F/S/I)max**, **L(A/C/Z)(F/S/I)min**, **L(A,C,Z)(F/S/I)**, **DOSE**, **D_8h**, **PrDOSE**;
   - for **SLM**: **L(A/C/Z)eq**, **L(A/C/Z)E**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **LN%**, **Lc-a**, **OVL**, **L(A,C,Z)peak**, **L(A,C,Z)(F/S/I)max**, **L(A/C/Z)(F/S/I)min**, **L(A,C,Z)(F/S/I)**.
2. The name of the implemented filter: **A**, **C**, **Z**; and detector time constant, when the detector is exponential: **Imp. (I)**, **Fast (F)**, **Slow (S)** or **Lin (L)** when the detector is linear.
3. Quasi analogue value indicator.
4. Elapsed time, showing the current second of the measurement. The value presented there belongs to the range [1, Integration Period].
5. The value of measured function for the selected profile.
6. Units of measured value.

6.1.3 Presentation mode for all profiles of both channels – 2 Channels

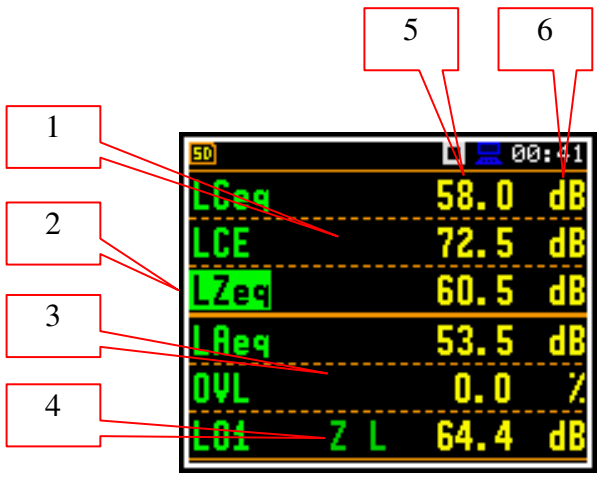


In the **2 Channels** mode any six measurement results, selected in **Display Results**, may be presented for tree profiles of both channel.

The screen is divided horizontaly in two parts with three lines in each. Upper part reflects the left channel profiles, and bottom part reflects the right channels profiles.

The user may select the profile line by the <▲>, <▼> push-buttons.

Field description of the 2 Channels view



1. Left channel profiles.
10. Function name:
   - for **Dose Meter**: **LAV**, **L(A/C/Z)eq**, **L(A/C/Z)E**, **SEL8**, **E**, **E_8h**, **LEPd**, **PSEL**, **Ltm3**, **Ltm5**, **LN%**, **PTC**, **PTP**, **ULT**, **TWA**, **PrTWA**, **Lc-a**, **OVL**, **L(A,C,Z)peak**, **L(A,C,Z)(F/S/I)max**, **L(A/C/Z)(F/S/I)min**, **L(A,C,Z)(F/S/I)**, **DOSE**, **D_8h**, **PrDOSE**;
   - for **SLM**: **L(A/C/Z)eq**, **L(A/C/Z)E**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **LN%**, **Lc-a**, **OVL**, **L(A,C,Z)peak**, **L(A,C,Z)(F/S/I)max**, **L(A/C/Z)(F/S/I)min**, **L(A,C,Z)(F/S/I)**.
2. Right channel profiles.
3. The name of the implemented filter: **A**, **C**, **Z**;

and detector time constant, when the detector is exponential: **Imp. (I)**, **Fast (F)**, **Slow (S)** or **Lin (L)** when the detector is linear.

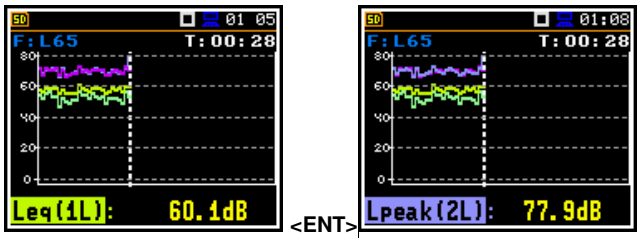
4. The value of measured function for the selected profile.
5. Units of measured value.

6.1.4 Logger presentation mode

In the **Logger** mode logger results, as selected in the **Logger Results** list are displayed.

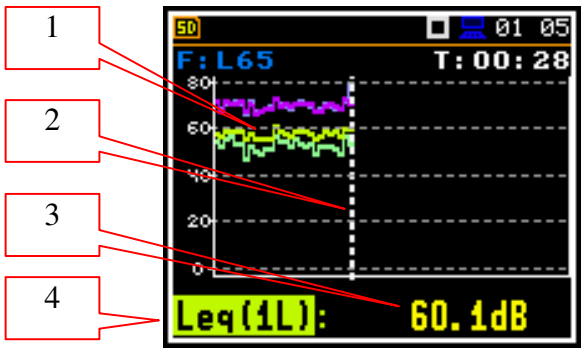
The user may switch results for reading its value by pressing the **<Enter>** push-button.

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



Field description of the Logger view

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

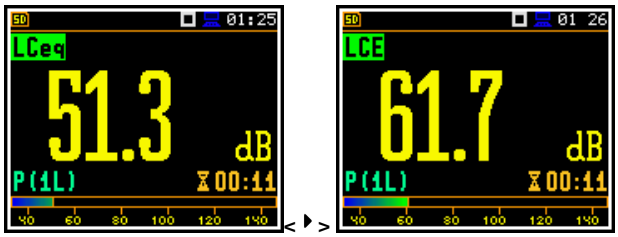


Notice: *If* ***Logger*** *(path: <Menu> / Measurement / Logging /Logger Setup) is switched off the* ***Logger*** *presentation mode is* ***not*** *active! So, to have this presentation mode active, the user has to switch the* ***Logger*** *on!*

Notice: *When* ***Logger*** *is enabled, but results were not selected for logging the* ***Logger*** *presentation mode is* ***not*** *active!*

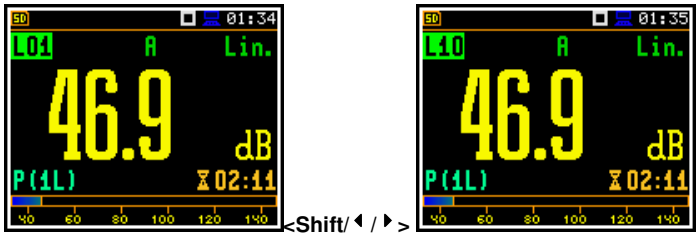
Changing the measurement function

The measurement function can be changed by pressing the **< ◂ >** and **< ▸ >** push-buttons.



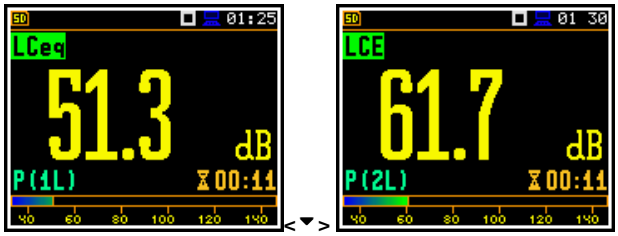
Changing the LN%

The statistical levels, which are defined in the **Statistical Level** list (*path: <Menu> / Measurement / Stat. Lev.*), can be changed after pressing simultaneously three buttons: **< ◂ >**, **< ▸ >** and **<Shift>**.



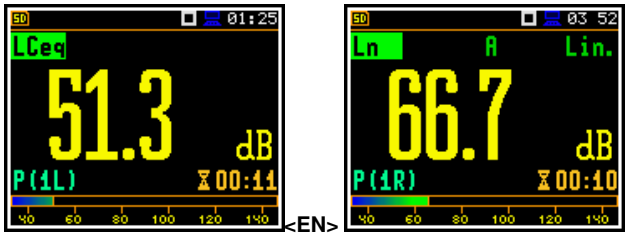
Changing the profile

The profile can be changed by pressing the <▲> / <▼> push-buttons.



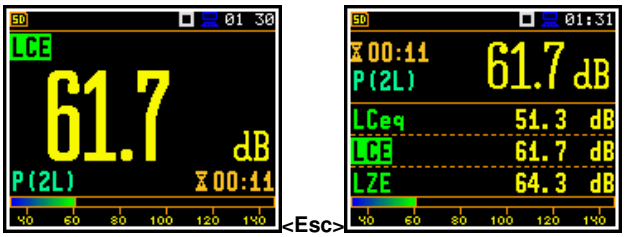
Changing the channel

The channel can be changed by pressing the **<Enter** push-button.



Changing the presentation mode

The presentation mode is changed after pressing the **<Esc>** push-button.

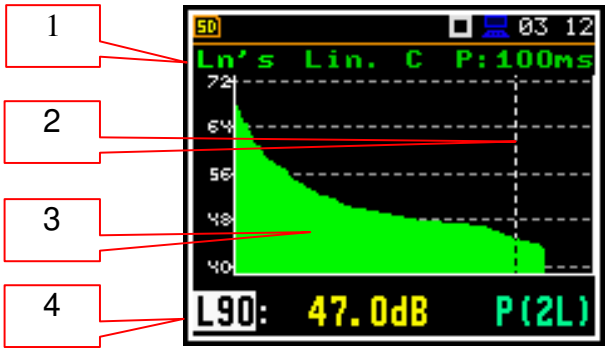


6.1.5 Statistics presentation mode

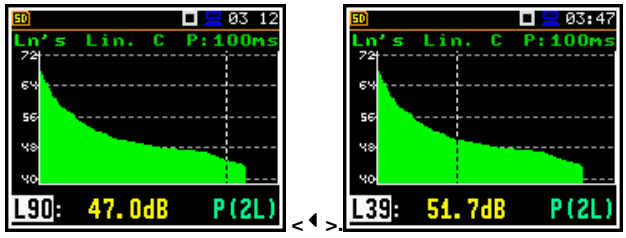
Statistics is the cumulative probability density function of exceeding the noise level during the measurement period. The X axis defines the probability of exceeding the noise level, statistical level **LN%**, and the axis Y defines the calculated noise level in dB.

Field description of the Statistics view

1. Function name, active profile, LEQ detector (**L**inear, **F**ast, **S**low or **I**mpulse), used averaging filter name (**A**, **C** or **Z**)
2. Cursor position
3. Statistics plot
4. Value of the selected statistical level **LN%** and units (dB)



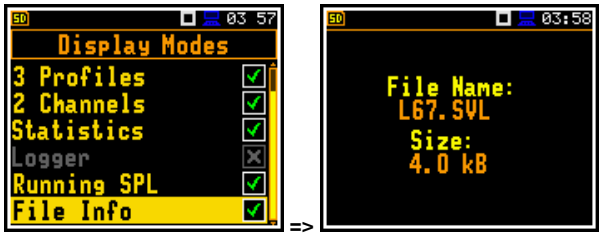
The user may change the cursor position by means of the <◄>, <►> push-buttons. The statistical level and appropriate value are presented in the line below the plot.



6.1.6 File information presentation mode

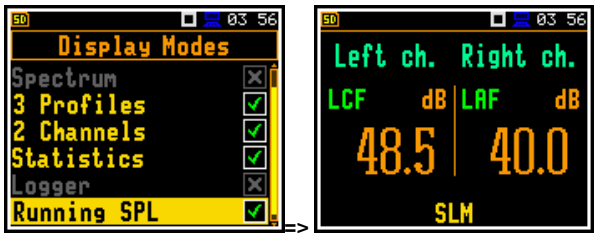
The **File Info** position switches on or off the additional file information during the measurement.

The **File Info** window indicates the file name and its size. When **Logger** is **Off** (*path: <Menu> / Measurement / Logging / Logger Setup*) **File Info** position is inactive.



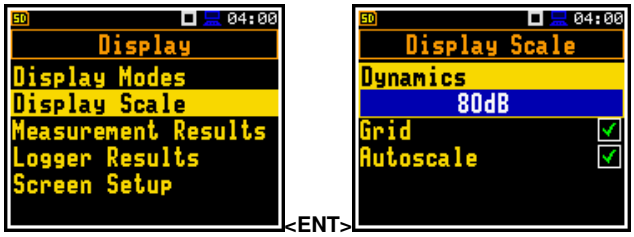
6.1.7 Run SPL presentation mode

Presentation mode **Running SPL** is used when measurement is not actually running, that is when the instrument is in standby mode before or after a measurement. In this mode **SPL** result is calculated and displayed, but not stored in the instrument's memory. The purpose of this displayed information is to give the user a first indication of the signal about to be measured. This can be useful for the correct selection of the measurement range.



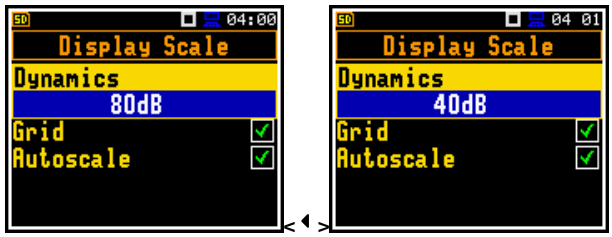
6.2 Setting the scale of the presentation and the display's grid – Disp. Scale

The **Display Scale** sub-list enables the user to change the scale in the available modes of graphical presentation of the measurement results and switch the grid on/off.



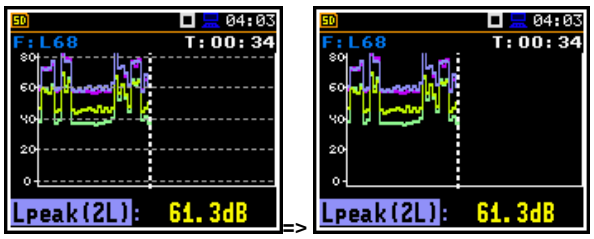
Scaling the vertical axis

The **Dynamics** position enables the user to select the required dynamic range scaling of the graphical mode display presentation. In the case of the vertical axis, one can obtain double, four times and eight times expansion (as the default the vertical axis corresponds to 80 dB, after expansion it corresponds to 40 dB, 20 dB, 10 dB and 120 dB – respectively).



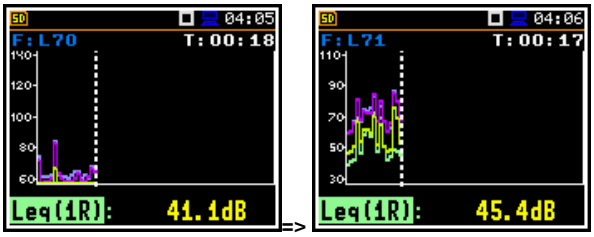
Switching the grid on/off

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



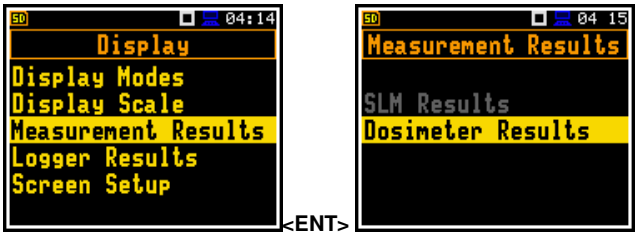
Switching the automatic Y-scale adjustment on/off

The **Autoscale** position switches on the automatic scale adjustment of the Y axis. The adjustment is performed once automatically after the start of the measurement to suit the initial level of the input signal from the microphone.



6.3 Selection of results for presentation – Measurement Results

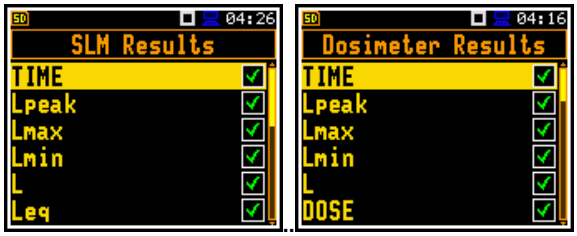
The **Measurement Results** position enables the user to choose the Sound Level Meter (**SLM Results**) or Dose Meter (**Dosimeter Results**) results, which should be presented on the display.



The result can be selected from the list:

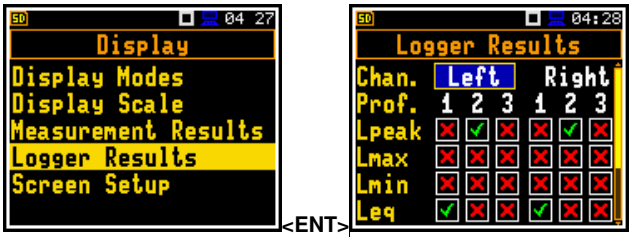
SLM Results: **TIME**, **Lpeak**, **Lmax**, **Lmin**, **Leq**, **LE**, **Lden**, **LEPd**, **PSEL**, **Ltm3**, **Ltm5**, **Ln**, **LFF**, **LDF**, **Lc-a** and **OVL**;

Dosimeter Results: **TIME**, **Lpeak**, **Lmax**, **Lmin**, **SPL**, **LEQ**, **L**, **DOSE**, **D_8h**, **PrDOSE**, **LAV**, **Leq**, **LE**, **SEL8**, **E**, **E_8h**, **LEPd**, **PSEL**, **Ltm3**, **Ltm5**, **Ln**, **PTC**, **PTP**, **ULT**, **TWA**, **PrTWA**, **LFF**, **LDF**, **Lc-a** and **OVL**.



6.4 Selection of logger results for presentation - Logger Results

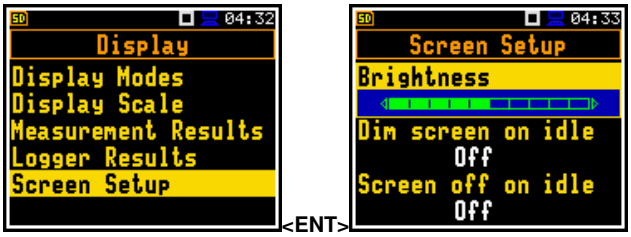
The **Logger Results** enables the user to choose the results, saved in the logger file, which should be presented for display on the logger screen. The result is selected by using the <▲> / <▼> or <▶> push-buttons. To mark the position the user should use the <◀> push-button.



6.5 Setting the power saver- Screen Setup

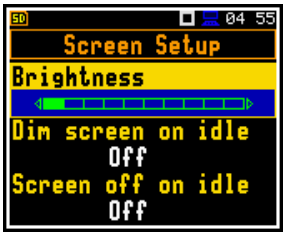
The **Screen Setup** window enables the user to set the brightness of the display and to switch on the screen saver.

and to set on the screen saver function (**Dim screen on idle** or **Screen off on idle**). Both functions can be switched off. If **Off** is chosen the screen will stay bright all the time.



Setting the brightness of the display

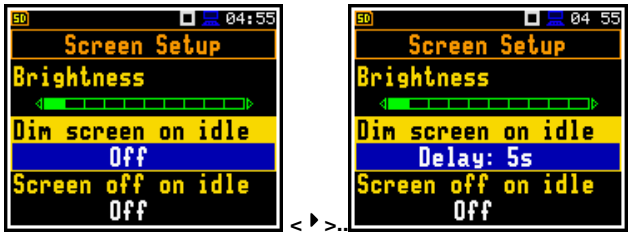
The **Brightness** position enables the user to set the proper brightness of the display by means of the <◀>, <▶> push-buttons. The user can select 10 different values of this parameter. The new value of the brightness level is confirmed after each press of the <◀> or <▶> push-buttons.



Setting the power saver function

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

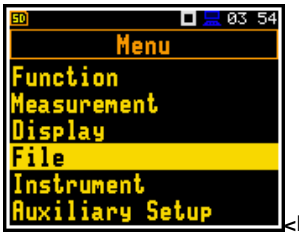
There are two options for the power saver function. The screen may be switched off (**Screen off on idle**) and/or dimmed



(**Dim screen on idle**). When either of these options is set, after a delay, set by the parameters **Dim screen delay** or **Screen off delay**, from pressing any push-button the screen is dimmed or switched off. If it happened, the first press of any push-button will cause the screen to switch back on again.

7 SAVING THE MEASUREMENT RESULTS – File

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



<ENT>

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

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

Setup Manager enables the user to manage the Setup files.

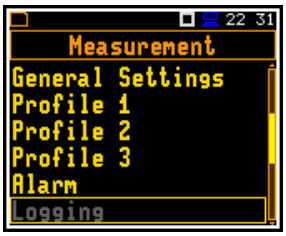
Notice: *Positions in the **File** list are active only when the **SD Card** is inserted into the card slot behind the bottom cover of the instrument.*

Instrument's files containing data:

- measurement results from **Dose Meter**, **SLM** and **Running LEQ**;
- measurement results from **1/1 Octave** analysis;
- measurement results from **1/3 Octave** analysis;
- logger results (measurement time history)
- wave and event recording;
- setups.

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

Notice: *Because of limited internal memory capacity of the instrument data files can be saved on the external memory only. So, if there is no **SD Card** in the instrument there is no any possibility to create any file. In such cases the **Logging** position in the **Measurement** list is not active and not available.*



Files are saved automatically, the user should only define the file name in the position **Logger Name** (*path: <Menu> / Measurement / Logging / Logger Setup*).

The elements of the file structure depend on the selected function (**Dose Meter**, **SLM**, **1/1 Octave**, **1/3 Octave**, **Running LEQ**), logging settings. These elements are as follows:

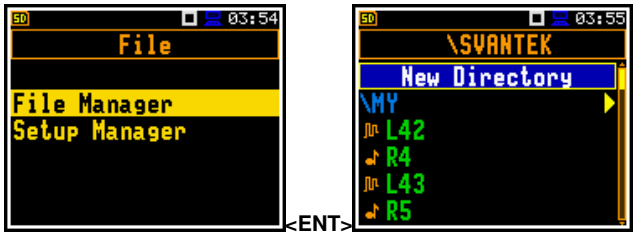
- the main results,
- the results of statistical analysis,
- the data stored during the measurements in the logger's file,
- audio waveform recording,
- the results coming from **1/1 Octave** analysis,
- the results coming from **1/3 Octave** analysis.

7.1 Managing the files saved in the external memory – File Manager

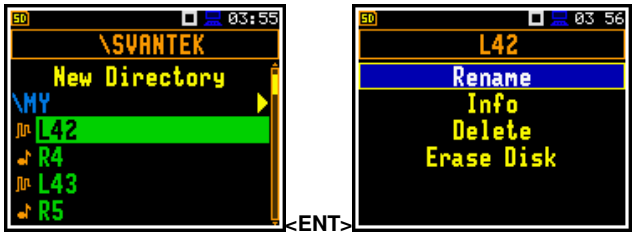
File manager

The **File Manager** is used for checking the contents of the memory and operation on files and catalogues such as: rename, delete, display information and also create new catalogues.

All names of files created by the instrument are of upper case letters and have no extensions. Catalogue names are of blue colour and file names are of green colour with additional icon.



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



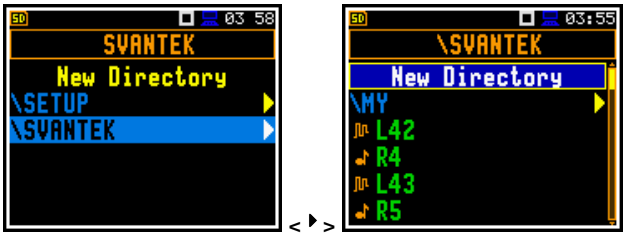
Creating new catalogue

The first position of the **File Manager** list is **New Directory**, which creates the new catalogue.

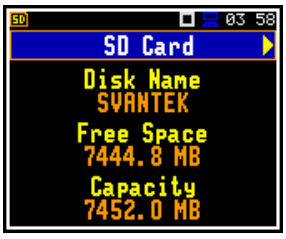
In order to create the new catalogue the user should enter the catalogue in which the new one will be created and press the **<Enter>** push-button at the **New Directory** position.

The marked catalogue can be opened by means of the **<▼>** push-button.

To return to the upper catalogue the user has to press the **<▲>** push-button.



The last screen after pressing the **<▲>** push-button, contains information about the **SD Card**: memory name (**Disk Name**), memory free space (**Free Space**) and total memory space (**Capacity**).



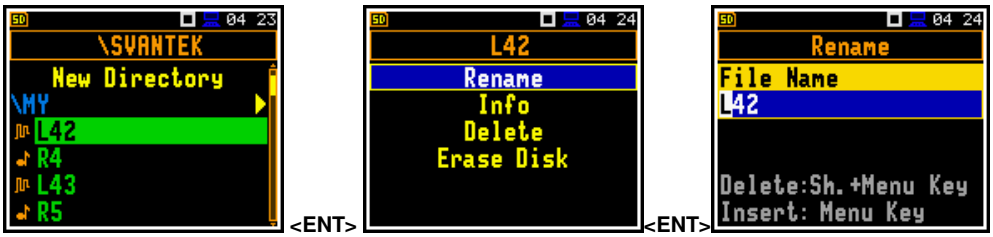
7.1.1 Setting the directory for saving files – Set as Working Dir.

It is possible to assign the catalogue for automatically saving logger files. In order to do this the user should choose the required catalogue and press the **<Enter>** push-button. After opening the list of operations the user should select **Set as Working Dir.** and press the **<Enter>** push-button.

Notice: *The working catalogue name is not displayed on the screen, but the working catalogue is the first catalogue when the user opens the* ***File Manager****.*

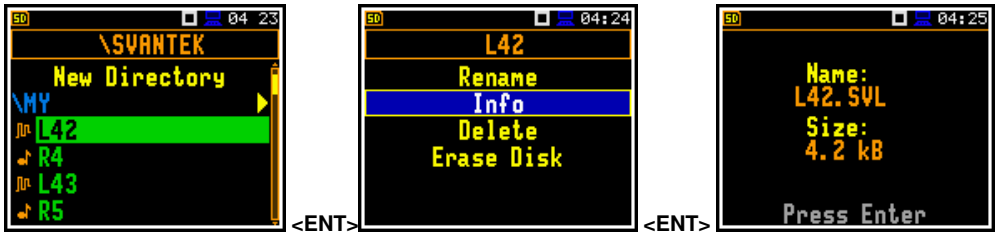
7.1.2 Renaming file/catalogue – Rename

To rename file or catalogue the user should select the file/catalogue and press the **<ENTER>** push-button. After opening the list of operations select the **Rename** position and press the **<ENTER>** push-button again. The window with the text editor function will appear.



7.1.3 Information about file/catalogue – Info

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

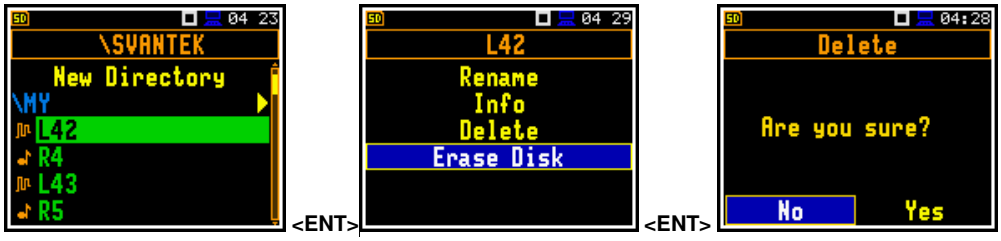


7.1.4 Deleting file/catalogue – Delete

It is possible to delete a file or catalogue from the file/catalogue list. In order to do this the user should select the file/catalogue and press the **<ENTER>** push-button. After opening the list of operations select the **Delete** position and press the **<ENTER>** push-button again. The display will ask for confirmation of this action since it cannot be undone once a file/catalogue has been deleted.

7.1.5 Erasing of the external memory – Erase Disk

It is possible to delete all files or catalogues from the external memory – SD-card. In order to do this the user should select any catalogue and press the **<ENTER>** push-button. After opening the list of operations select the **Erase Disk** position and press the **<ENTER>** push-button again. The display will ask for confirmation of this action since it cannot be undone once a file/catalogue has been erased.



7.2 Managing the setup files – Setup Manager

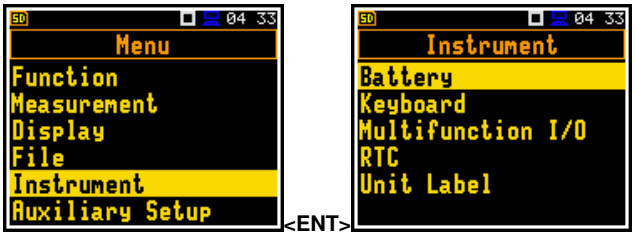
The **Setup Manager** enables the user to: save a new setup file and to select those ones that will appear in the setup screen during start-up of the instrument, delete, and display file information.

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

The window with the list of available operations on the setup file is opening when pressing the **<Enter>** push-button on the marked (highlighted) setup file.

8 SETTINGS OF THE INSTRUMENT PARAMETERS – Instrument

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



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

Battery enables the user to get information about current power source;

Keyboard enables the user to set the operating mode of the **<Shift>**

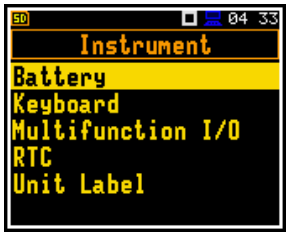
Multifunction I/O enables the user to select the available functionality of the I/O port.

RTC enables the user to set the Real Time Clock;

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

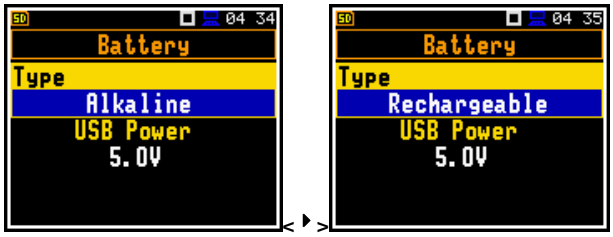
8.1. Checking the state of the internal battery – Battery

The **Battery setting** enables the user to check the internal battery condition. The instrument can be powered from four AA rechargeable or standard alkaline batteries or from the USB interface when its USB Device socket is connected by means of the standard SC 156 mini USB cable to a PC.



Notice: *Note that this cable is not the same as a mini USB cable such as the SC 56 used on some other Svantek instruments and care should be used not to force the wrong plug into the socket on the bottom of the instrument.*

The view presented on the display for each of three kinds of possible power sources is different (USB power, single use alkaline type batteries, rechargeable batteries). The current battery voltage is displayed together with its approximate state (in graphical format).

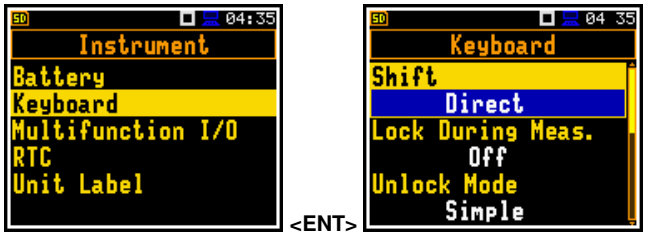


When the instrument is powered from a set of internal batteries the user should select the correct type. It is essential for the right detection of the capacity of the battery pack. Two types are available: **Alkaline** and **Rechargeable**.

Notice: *Note that rechargeable batteries must be recharged outside the instrument in an external charger. They cannot be charged when fitted inside the instrument.*

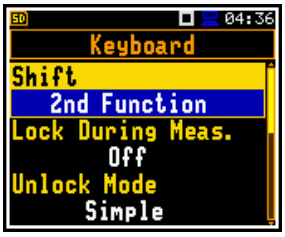
8.2. Selection of keyboard modes – Keyboard

The **Keyboard** enables the user to programme the operation mode of the **<Shift>** push-button (**Shift**), to switch on the key lock (**Lock During Meas.**) and the unlock (**Unlock Mode**) of the keyboard by means of three keys (**<Enter>**, **<** ◀ **>** and **<** ▶ **>**).



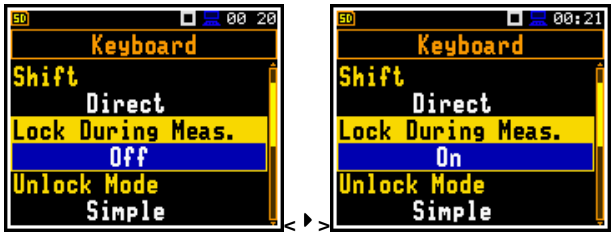
<Shift> push-button mode

In the **Shift** position the user can choose between **2nd Function** and **Direct**. When the **Direct** option is selected, the **<Shift>** push-button operates as in the keyboard of a computer – in order to achieve the desired result, the second push-button has to be pressed at the same time as the **<Shift>** one. When the **2nd Function** option is selected the **<Shift>** push-button operates after the second one.



Key locking

In the **Lock During Meas.** position the user can switch on/off key locking. If this function is swithed on the keyboard is automatically blocked during the measurement.



Key unlocking

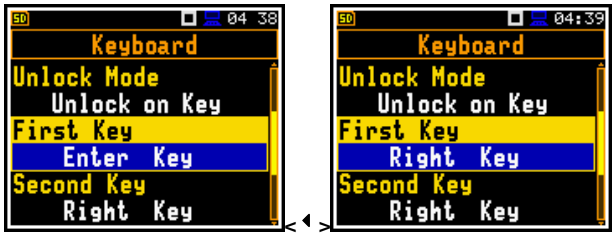
The **Unlock Mode** position enables the user to unlock the keyboard, blocked automatically or manually.

If the **Simple** value is selected the instrument is blocking and unblocking by pressing **<Shift>** with **<Enter>** and holding them during 3 sekonds.

After blocking the instrument the **Keybord Locked** screen appears with the running time of the measurement.

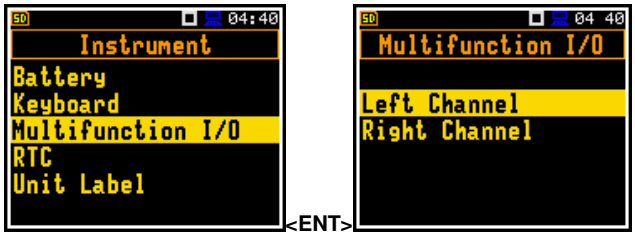
If the **Unlock on Key** value is selected the instrument is blocking by pressing **<Shift>** with **<Enter>** and holding them during 3 sekonds, but unblocking by pressing the sequence of four keys.

The unlocking code can be programmed with next four positions: **First Key**, **Second Key**, **Third Key** and **Fourth Key**. In every position the user may chose one of four arrow key: **Enter Key**, **Right Key** or **Left Key**, the sequence of which creates unlocking code.



8.3. Setting 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 for each channel: **Left Channel** and **Right Channel**.

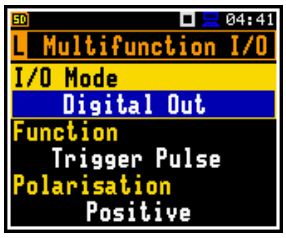


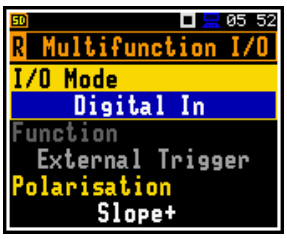
Selection of the mode of I/O port

In the **I/O Mode** it is possible to select the function of the instrument's 3.5 mm jack socket named as **I/O**.

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 digital output (**Digital Out**) in the left channel, 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 input of the digital signal (**Digital In**) in the right channel, used as an external trigger to start the measurements in the instrument, acting in this case as a so called "slave instrument".

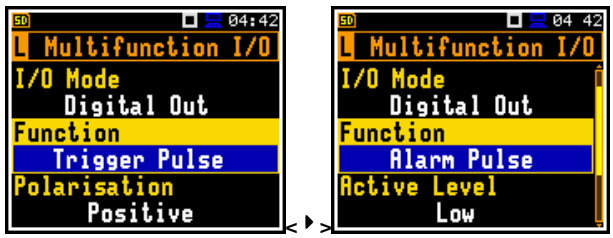




The more detailed description of the **I/O** socket is given in App. C.

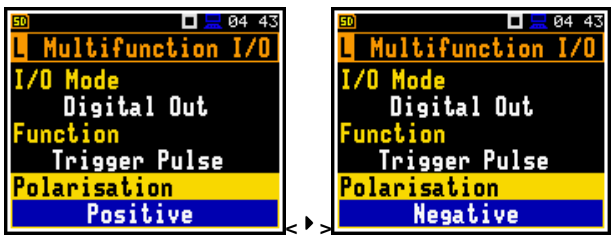
Digital output function selection of the I/O socket

The **Function** position enables the user to set the function of the digital output of the **I/O** instrument's socket. The socket can be used as the source of the trigger pulse (**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**).



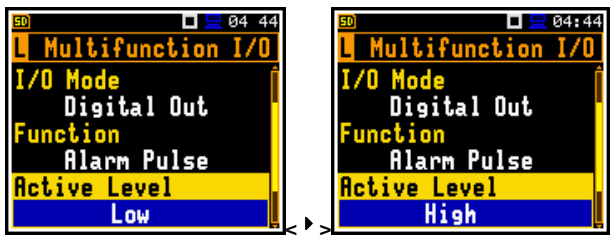
Polarisation selection of the digital output signal

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

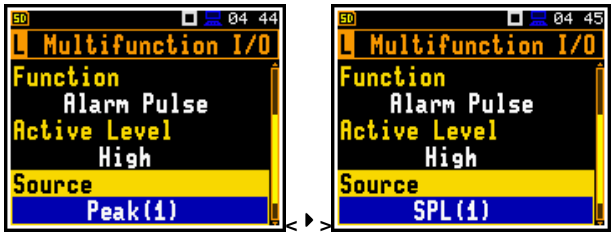


Active level selection of the digital output signal

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

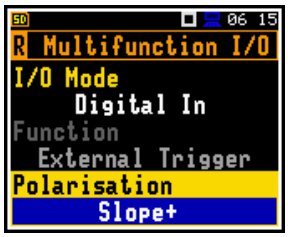


Source signal selection for the alarm pulse generation



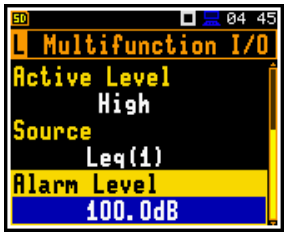
The **Source** position enables the user to select the measurement result which level should be checked. If the measured result level is greater than selected alarm level, the instrument will generate alarm signal on the **I/O** socket. The measurement results from the first profile: **Peak(1)**, **SPL(1)**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

Selection of signal polarisation for the Digital In mode (External Trigger)



In the case of **Digital In** selection the signal appearing on the **I/O** socket of the right channel will be treated as the external trigger if **External** is chosen as a trigger (*path: <Menu> / Measurement / Measure Trigger / Trigger = External*). For the **Digital In** mode only the **External Trigger** value for the **Function** parameter is available. It is possible to set up **Polarisation** as positive (**Slope+**) or negative (**Slope-**).

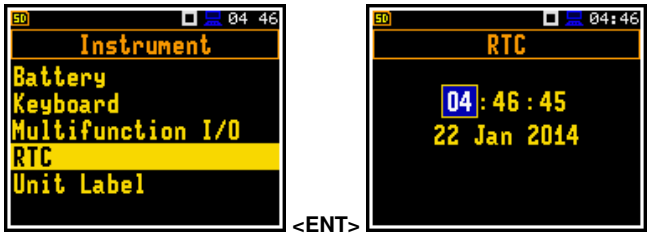
Alarm level selection on the digital output of I/O



The **Alarm Level** enables the user to set the level of the result to be monitored during the measurements. If the result is greater than the one set in this line, the instrument will generate the alarm signal in the selected logic. The available levels are within the range [30.0 dB, 140 dB].

The **Alarm Level** current value can be decreased / increased by 0.1 dB by means of the **<◄>** / **<►>** push-buttons.

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

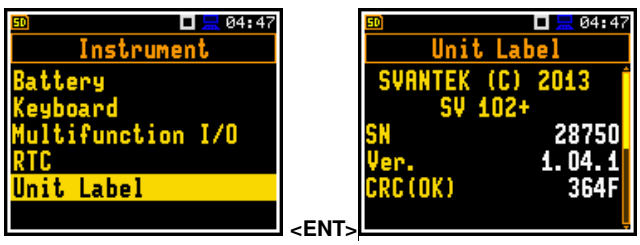


The **RTC** enables the user to programme the internal **Real Time Clock**. This clock is displayed in the top right hand position of the line of icons.

In order to set hours, minutes or seconds the user has to enter its position pressing the **<◄>**, **<►>** push button and then select the correct value using the **<▲>, <▼>** push-buttons and then pressing the **<Enter>** push-button to set the chosen value.

If exiting the window with **<Esc>** the time setup is automatically saved.

8.5. Checking specification of the instrument - Unit Label

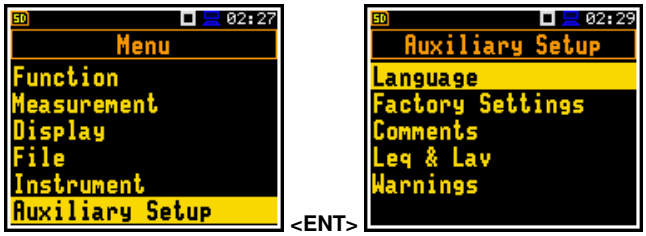


The **Unit Label** enables the user to check the model number of the instrument, its serial number, the current software version installed in it and the appropriate standards, which the instrument fulfils.

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

9 AUXILIARY SETTINGS – Auxiliary Setup

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



The **Auxiliary Setup** list is used for setting the various auxiliary parameters and contains the following items:

Language enables the user to select the language of the user interface.

Factory Set enables the user to return to the default, factory settings.

Comments enables the user to define the file name for recording voice comments;

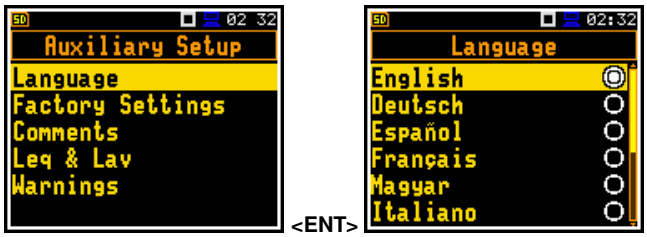
Leq & Lav enables the user to select the mode of display the **Leq** and **Lav** results. This position is available only in **Dose Meter** function.

Warnings enables the user to switch the warnings on or off that can be displayed during the normal operation of the instrument.

9.1. Setting the language of the user interface – Language

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

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

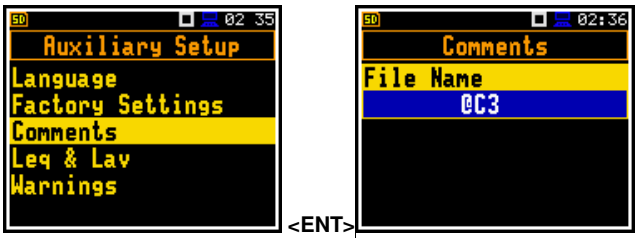


9.2. Return to the factory settings – Factory Set

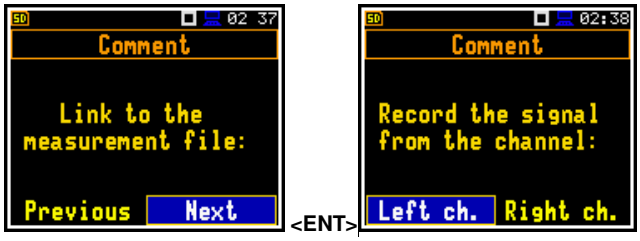
The **Factory Settings** position enables the user to return to the default setup of the instrument.

9.3. Voice comments – Comments

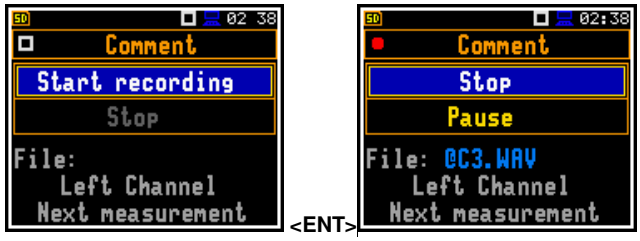
The **Comments** position enables the user to define the file name for recording voice comments. The voice comment can be recorded before or after the measurement takes place and linked to the **Previous** measurement or the **Next** measurement that takes place.



In order to record a comment, the user should press and hold the **<Shift>** push buttons. This will bring up a window with a question to which logger file to link a file containing the comment - to the previous or next one. After selecting an answer and pressing the **<Enter>** push-button the record command window will open.



After starting the recording (**Start rec.**) by means of the **<Enter>** push-button red circle that indicates recording in progress will start to flash at the top line of the screen. In this case, one can comment the measurement and press **<Enter>** push-button to finish recording. The recording end will be confirmed with the comment "**Saved O.K.**".



9.4. Mode of displaying of Leq & Lav results – Leq & Lav

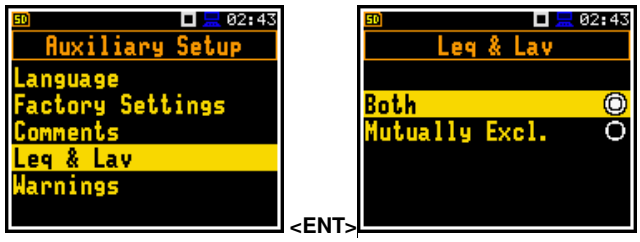
The **Leq & Lav** enables the user to select the mode of display the **Leq** and **Lav**.

This position is available only in **Dose Meter** function.

If **Both** is selected **Leq** and **Lav** are always displayed together.

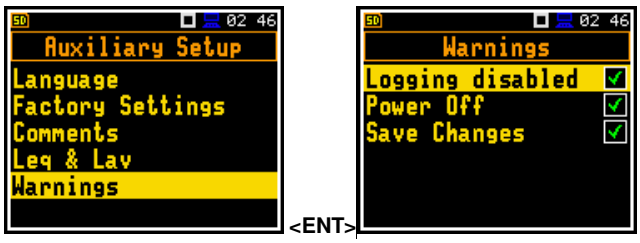
If **Mutually Excl.** is selected the rule is:

- for **Exchange Rate** equat to 3 **Leq** is displayed and **Lav** not;
- for **Exchange Rate** other than 3 **Lav** is displayed and not **Leq**.



9.5. Warnings selection – Warnings

The **Warnings** enables the user to select the messages, which may be displayed during the normal operation of the instrument.



If **Logging disabled** is active, then there will be warning if the user tries to start a measurement run without logging being selected. The user is given the choice to continue without the logging function being active or to stop and select logging from the menu list.

If **Power Off** is active, then in case the measurement is in progress, an attempt to swith off the unit will result in displaying the message "Measurement in progress". The user can not then turn off the unit. When the measurement is completed and the warning "Power Off" becomes active, then if the user would turn off the unit, he will be asked to confirm this.

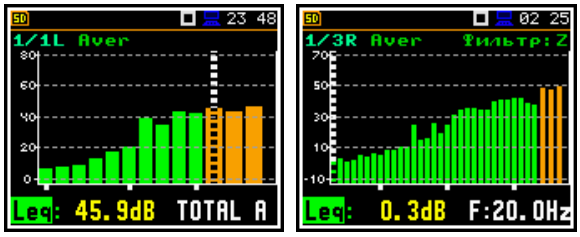
If **Changes** is active, then there will be warning if the user would make changes of some parameters, but exit the parameter list with the **<Esc>** push-button. since changes are only saved by pressing the **<Enter>** push-button when exiting a menu list.

10 1/1 AND 1/3 OCTAVE ANALYSER

The instrument operates as real time **1/1 Octave** or **1/3 Octave** analyser in parallel with the **Dose Meter** and **SLM** modes. All 1/1-octave (with 10 centre frequencies from 16 kHz down to 31.5 Hz; in base two system) and 1/3-octave (with 31 centre frequencies from 20 kHz down to 20 Hz; in base two system) digital pass-band filters are working in the real-time with the weighting filters (**Z**, **A**, or **C**) selected in the **Spectrum** (*path: Menu / Measurement / Spectrum / Filter*) and the linear LEQ (LEQ) detector. This enables the user to pre-weight a spectrum with one of the selected broadband frequncy curves if required for a particular application such as the provision of hearing protectors in the control of high workplace noise levels.

Notice: *The TOTAL LEQ results are measured with the weighting filters (**A**, **C**, **Z**) without taking into account the settings of the level meters for profiles**.** The spectra are always linearly averaged. Thus, the **TOTAL** values from **1/1 Octave** or **1/3 Octave** analysis can be different from those obtained for the profiles (if the **LEQ Integr.** was set as **Exponential**).*

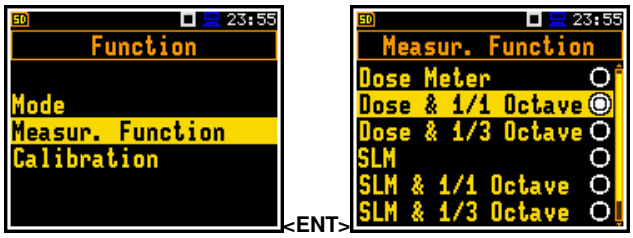
The results of **1/1 Octave** and **1/3 Octave** analysis (so-called spectrum) can be examined by the user on a display in **Spectrum** presentation mode. The availability of this mode can be switched on or off by the user (*path: <Menu> / Display / Display Modes)*.



1/1 Octave and **1/3 Octave** spectra for all centre frequencies of pass-band filters together with the **TOTAL** overall values measured with the user selected frequency weighting filters are presented in the **Spectrum** mode.

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

In order to select the **1/1 Octave** or **1/3 Octave** analysis mode the user has to enter the **Function** list by pressing the **<Menu>** push-button, then select the **Function** text and press **<Enter>**. Then, the user has to open the **Measurement Function** window and highlight the required position (**Dose & 1/1 Octave**, **Dose & 1/3 Octave**, **SLM & 1/1 Octave** or **SLM & 1/3 Octave**) and press **<Enter>**.



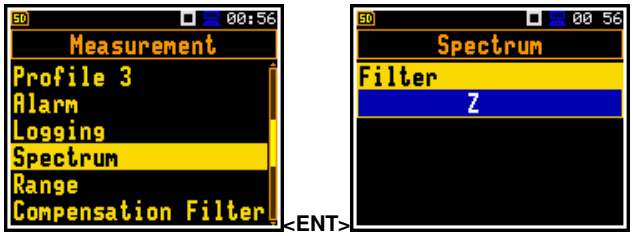
Notice: *It is not possible to change the current function during a live measurement. The instrument displays in this case for about 2 seconds the text: "**Measurement in Progress**". In order to change the current measurement function the measurement must be stopped!*

10.2. Selection of parameters of 1/1 Octave and 1/3 Octave analysis

The execution of **1/1 Octave** or **1/3 Octave** analysis depends on the certain number of the parameters, which can be set in the different windows of the **Measurement** list. Namely, the user can set there the **Filter** (*path: <Menu> / Measurement / Spectrum*) and switch on or off the recording of the spectra in the logger file (*path: <Menu> / Measurement / Logging / Logger Results*).

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

In **1/1 Octave** or **1/3 Octave** mode on the **Measurement** list the **Spectrum** position appears (*path: <Menu> / Measurement / Spectrum)*. Using the **Spectrum** window one can select the pre-weighting broadband filter for spectrum analysis.

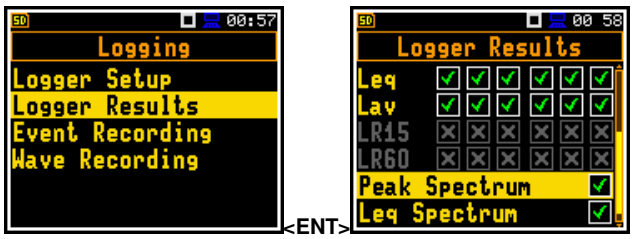


The following weighting filters are available in **1/1 Octave** and **1/3 Octave** analysis:

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

10.2.2. Saving of 1/1 and 1/3 Octave analysis results in the logger's file – Logger Results

The **Leq** results from **1/1 Octave** or **1/1 Octave** analysis can be saved in the logger's file. The enabling of spectrum saving in the logger file is made by activation / deactivation of the **Peak Spectrum** or **Leq Spectrum** position by means of the < ◀ >, < ▶ > push-buttons.



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

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

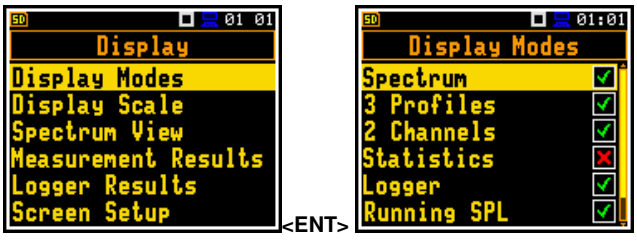
Disp. Modes enables the user to select the mode of the measurement results presentation;

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

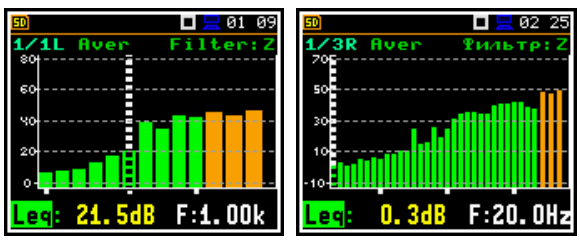
Spect. View enables the user to change the type of the spectrum and to activate the **Max** and/or **Min** spectrum.

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

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

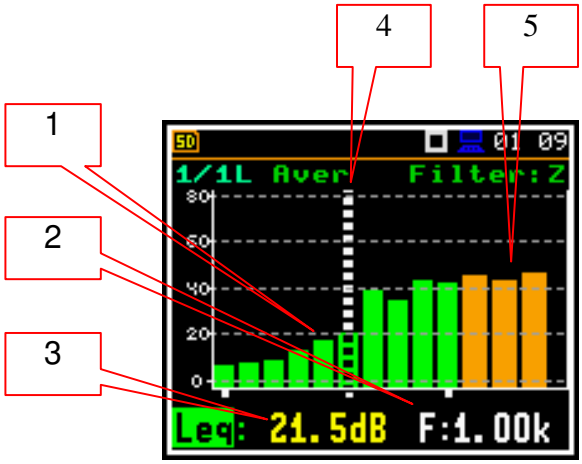


When **Spectrum** mode is switched on the measurement screen in the **Spectrum** display mode is shown like below.

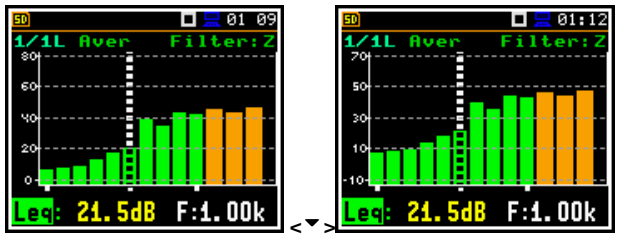


Field descriptions of the Spectrum view

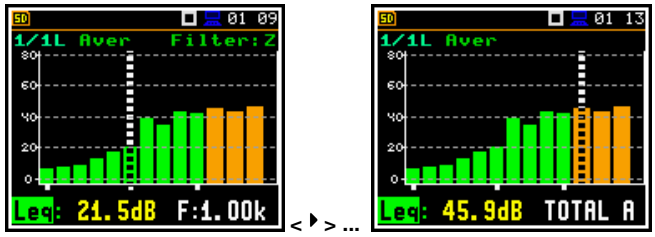
1. Spectrum plot
2. Central frequency for the cursor position
3. Value for the cursor position
4. Cursor position
5. Total values



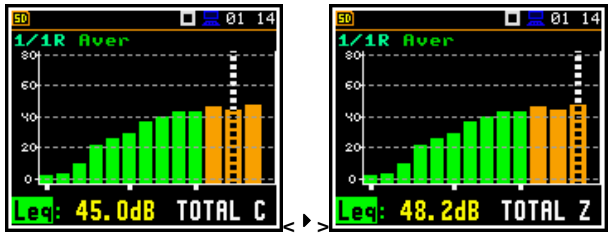
The user may shift the Y-axis up or down during the spectrum presentation by pressing the <▲> or <▼> push-buttons.



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

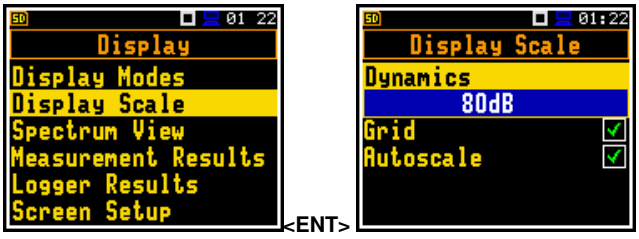


The **TOTAL** overall dB values are calculated with the filters **A**, **C** and **Z**, and are displayed at the bottom line of the screen when the cursor has been placed on the appropriate orange bar.



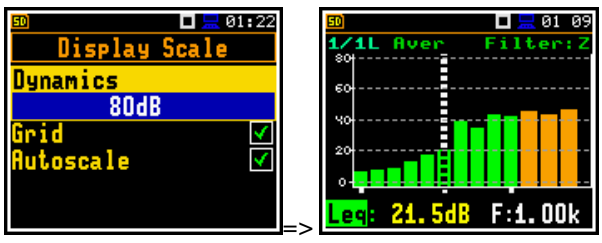
10.5. Setting the scale of the measurement results presentation - Scale

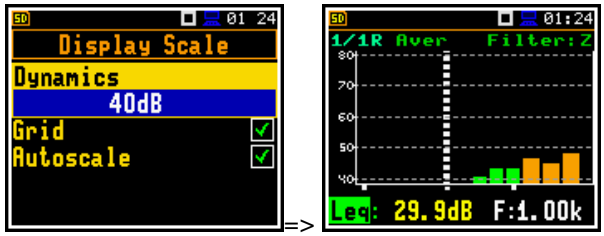
The **Disp. Scale** sub-list enables the user to change the scale in the available modes of graphical presentation of the measurement results and switch the grid on/off.



Scaling the vertical axis

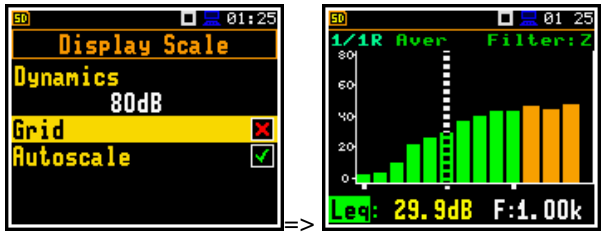
The **Dynamics** position enables the user to select the required dynamic range scaling of the graphical mode display presentation. In the case of the vertical axis one can obtain the double, four times and eight times expansion (as the default the vertical axis corresponds to 80 dB, after expansion it corresponds to 40 dB, 20 dB, 10 dB and 120 dB – respectively).





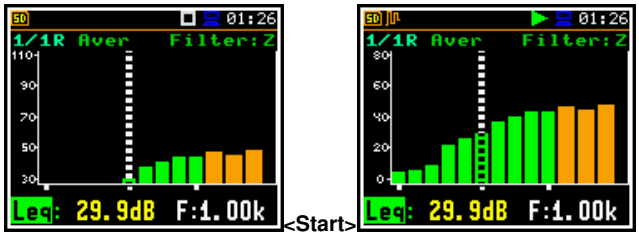
Switching the grid on/off

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



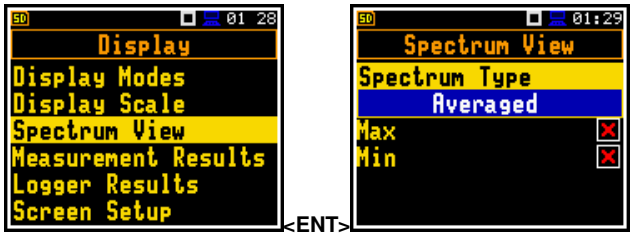
Switching the automatic Y-scale adjustment on/off

The **Autoscale** position switches on the automatic adjustment of the Y axis scale.

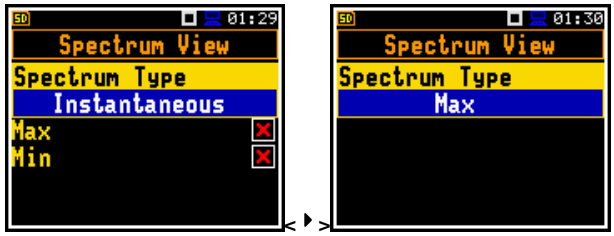


10.6. Setting the parameters of the spectrum presentation – Spectum View

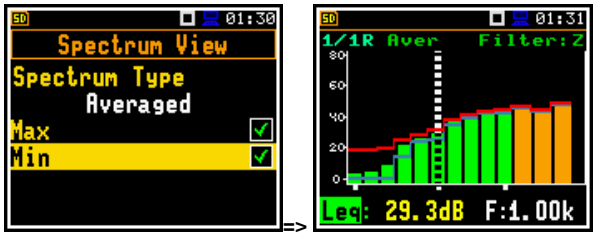
The **Spectrum View** position appears when **1/1 Octave** and **1/3 Octave** functions are selected in the **Measurement Function** window and enables the user to change the type of the spectrum (**Spectrum Type**) and to activate the presentation on the display of the **Max** and **Min** spectrum values for every displayed band.



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

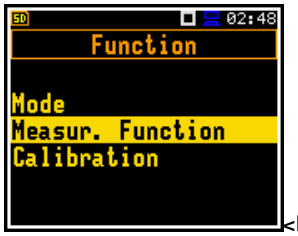


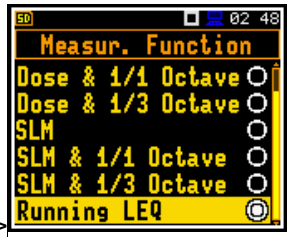
The minimum and maximum spectra can be presented at the same plot as main spectrum when the **Max** or **Min** parameter is switched on.



11 RUNNING LEQ

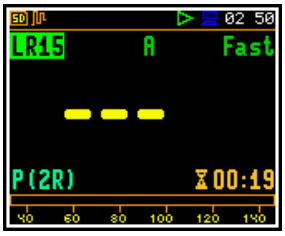
In order to select the **Running LEQ** mode the user has to enter the **Function** list by pressing the **<Menu>** push-button, then select the **Function** text and press **<Enter>**. Then, the user has to open the **Measur. Function** window and highlight the **Running LEQ** position and press **<Enter>**.



<ENT>


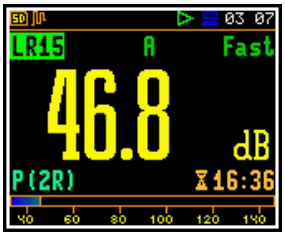
Notice: *It is not possible to change the current function during a live measurements. The instrument displays in this case for about 2 seconds the text: "**Measurement in Progress**". In order to change the current measurement function the measurement must be stopped!*

Running LEQ (**Running LEQ**) is a special function of the SVAN102+ instrument. This function is very similiar to **SLM** functions. The difference is that in **Running LEQ** there are two additional measurement results: **LR15** and **LR60**. **LR15** and **LR60** are calculated as **LEQ** during last 15 or 60 minuts of measurement. Therefore these results are not displayed before predefined period (accordingly 15 or 60 minuts) of measurement.



For example, if **LR15** and **LR60** are displayed with RTC:15:04:11 it means, that:

- **LR15** was calculated as **Leq** for period from 14:49:12 to 15:04:11, and
- **LR60** was calculated as **Leq** for period from 14:04:12 to 15:04:11.

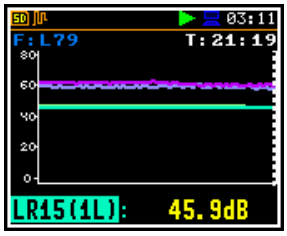
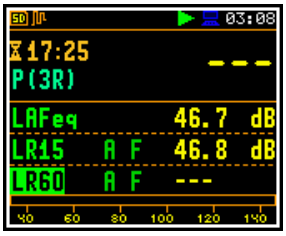


One second later (RTC:15:04:12) it means, that:

- **LR15** was calculated as **Leq** for period from 14:49:13 to 15:04:12, and
- **LR60** was calculated as **Leq** for period from 14:04:13 to 15:04:12.

Results **LR15** and **LR60** are calculated only for the 1st profile of each channel.

These results can be saved in a file as Summary Results with step, defined in **Integration Period** (*path: <Menu> / Measurement / General Settings*), or can be logged with the **Logger Step** (*path: <Menu> / Measurement / Logging / Logger Setup*).

The minimal **Logger Step** for the **Running LEQ** mode is **1s**.

Examples of **LR15** and **LR60** results in different display modes: **Logger** and **3 Profiles**.