SVAN 977

Sound & Vibration

ANALYSER

USER'S MANUAL

SVANTEK Sp. z o.o.
WARSAW, April 2013

Notice: *This user's manual presents the software revision named 1.01.5 (cf. the description of the* ***Unit Label*** *position of the* ***Instrument*** *list). The succeeding software revisions (marked with higher numbers) can slightly change the view of some displays presented in the text of the manual.*

CONTENTS

1. INTRODUCTION

The **SVAN 977** is an all digital, Type 1 Sound & Vibration level meter (SLM and VLM) as well as a real time 1/1 or 1/3 octave analyser. The instrument is designed for general acoustic and vibration measurements, environmental monitoring, occupational health and safety monitoring.

Three acoustic or vibration user configurable profiles allow parallel measurements with independently defined frequency filters and RMS detector time constants. Each profile provides significant number of results (like **Spl**, **Leq, Sel**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **LN%**, **LR15**, **LR60**, **Ovl**, **Peak**, **Max** and **Min** in the case of sound measurements or **RMS**, **Ovl**, **Peak**, **P-P**and **MTVV** in the case of vibration measurements). Advanced time history logging for each profile provides complete information about the measured signal using the external SD-card fitted in the bottom of the meter and can be easy downloaded to any PC using the USB interface and SvanPC+ software.

Spl, **Leq, Sel**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **LN%**, **LR15**, **LR60**, **Ovl**, **Peak**, **Max** и **Min Ovl**, **P-P**All required weighting filters (e.g.: **A**, **B**, **C**, **Z** in case of sound measurements and **Wh** in case of vibration measurements) including the latest ISO 2631-1&2 standard are available with this instrument. The general Vibration measurements (like acceleration, velocity and displacement) and HVM meeting ISO 8041:2005 standard are also available.

Using the computational power of its digital signal processor the **SVAN 977** instrument can, simultaneously to the meter mode, perform the real time **1/1 Octave** or **1/3 Octave** analysis including calculations of 10 x **LN%** statistical levels.

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

A fast USB 1.1 interface (12 MHz) creates a real time link for the PC "front-end" application of the **SVAN 977** instrument. With the use of optional interfaces (RS 232) the instrument can be remotely controlled from the PC. The measurement results can be downloaded to PC using all the interfaces mentioned above.

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

1.1. SVAN 977 as Sound Level Meter & Analyser

- noise measurements (**Spl**, **Lmax**, **Lmin**, **Lpeak**, **Leq**, **Sel**, **Lden**, **LEPd**, **Ltm3**, **Ltm5** and 10 x **LN%** statistics) with Type 1 IEC 61672:2002 accuracy in the frequency range 20 Hz to 20 kHz with the SV 7052 microphone (3.15 Hz ÷ 20 kHz with GRAS 40AE microphone)
- parallel **Impulse**, **Fast** and **Slow** detectors for the measurements with **A**, **B**, **C** and **Z** frequency filters
- two measurement ranges 22 dB RMS(A) ÷ 123 dB Peak (**Low**) and 30 dB RMS(A) ÷ 140 dB Peak (**High**)
- **1/1 Octave** and **1/3 Octave** real time analysis - 10 filters with centre frequencies 31,5 Hz ÷ 16 kHz, Type 1 – IEC 1260 and 31 filters with centre frequencies 20 Hz ÷ 20 kHz, Type 1 – IEC 1260

1.2. SVAN 977 as Vibration Level Meter & Analyser

- General Vibration measurements (acceleration, velocity and displacement) and optionally HVM meeting ISO 8041:2005 and ISO 10816-1 standards in the frequency range depending on the parameters of the attached accelerometer, i.e. with SV 80 general purpose transducer is equal to 0.5 Hz ÷ 14 kHz
- parallel **RMS**, **MTVV** or **Max**, **Peak**, **Peak–Peak** measurements
- **HP**, **HP1**, **HP3**, **HP10**, **Vel1**, **Vel3**, **Vel10**, **VelMF**, **Dil1**, **Dil3**, **Dil10** and **Wh** weighting filters

- **1/1 Octave** and **1/3 Octave** real time analysis - 15 filters with centre frequencies 1 Hz ÷16 kHz, Type 1 – IEC 1260 and 45 filters with centre frequencies 0.8 Hz ÷ 20 kHz, Type 1 – IEC 1260
- Advanced **Data Logger** including spectrum logging on the micro **SD-card** providing almost unlimited logging capacity
- Time domain waveform signal recording (option)
- Advanced trigger and alarm functions
- **USB 1.1 Client interface** (real time PC "front end" application supported)
- **RS 232** interface
- Integration time programmable up to **24 h**
- Power supply by **four AA** rechargeable or standard batteries
- Hand held, light weight and robust case
- Easy to use with menu driven user interface

1.4. Accessories included

- **SV 7052 -** prepolarised ½" microphone with nominal sensitivity 35 mV/Pa
- **SV 12L** - microphone preamplifier with IEPE power supply
- **SA 22** – foam windscreen
- **SC 16 -** USB 1.1 cable
- **four AA -** alkaline batteries
- **SvanPC++** - download and viewing software for Windows 2000/XP/Vista/Win 8 operating systems
- **SV 7052 Accessories available**
- **SA 17A** - external battery pack using 6 x AA batteries
- **SA 43** - carrying case for SVAN 95x and accessories (lightweight)
- **SA 79** - carrying case for SVAN 9xx and accessories (waterproof)
- **SA 47** - carrying bag for SVAN 95x and accessories (fabric material)
- **SV 55** - RS 232 option for the SVAN 955
- **SV 80** – general purpose vibration accelerometer 100 mV/g (10 mV/ms^{-2})
- **SC 27** – coiled cable for accelerometer 2 m
- **SA 27/10-32** – mounting magnetic base for accelerometer

1.6. Software options available

- **SVAN977 -** SVAN 977 including 1/1 octave analysis
- **SV 977_2 –** 1/3 octave analysis for the SVAN 977
- **SV 977_4 -** FFT analysis option for the SVAN 977
- **SV 977_5 -** RT60 option for the SVAN 977
- **SV 977_6 -** Tonality analysis option for the SVAN 977
- **SV 977_7 -** Loudness analysis option for the SVAN 977
- **SV 977_8 –** RPM Rotation measurement option (excluding Laser Tachometer) for the SVAN 977
- **SV 977_15** - Time domain waveform signal recording (to the micro SD card: *.srt or *.wav format) for the SVAN 977
- **SV 977_16 -** User programmable second order band pass filters* option for the SVAN 977

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

2. MANUAL CONTROL OF THE INSTRUMENT

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

2.1 Control push-buttons on the front panel

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

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

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

<Shift>

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

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

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

<Alt>

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

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

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

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

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

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

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

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

[<S/P>] This push-button enables the user to pause or break the measurement process temporarily.

<◀>, <▶> These push-buttons enable the user specifically to:

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

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

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

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

- select the parameters value in an active position in the matrix parameter list;
- select the parameters value in an active position (e.g. filter **Z**, **A**, **B** or **C**, Start Delay period: **1s**, **2s**, **3s** … etc.);
- insert or delete a character in the text edition screen.

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

- select lines in the list;
- select the correct character from the list in the text edition screen;

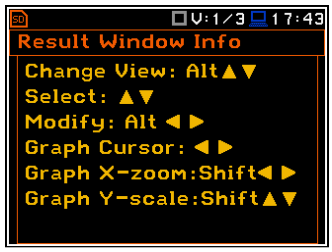
(<▲>, <▼>) The **<▲>**, **<▼>** push-buttons pressed in conjunction (or in sequence) with **<Shift>** enable the user specifically to:

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

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

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

[Info] The **<Info>** push-button (simultaneous pressing the **<◀>**, **<▶>** push-buttons) opens the window with the help information in the measurement display modes. Press **<ESC>** or <**ENTER**> to exit the Info screen.



2.2 Input and output sockets of the instrument

Top cover of the instrument

The measurement input is placed in the centre of the instrument's top cover. It is the TNC compatible socket. The **SV 12L** microphone preamplifier has a specially designed matching TNC plug and a locking screw to secure the preamplifier to the meter body. The accelerometers have to be connected to the instrument also using the TNC connector. After connecting the preamplifier or the accelerometer cable to the measurement input, the screw should be tightened to light resistance only. Do not over tighten this connector. It is not necessary to remove this preamplifier from the top of the instrument unless the meter is in a calibration laboratory as it is always used close coupled to the meter body. The full description of the signals connected to the socket is given in Appendix C.

Bottom cover of the instrument

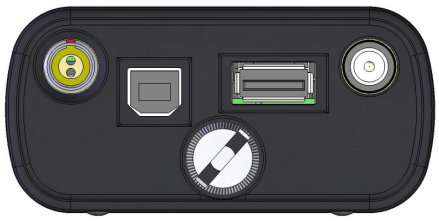
In the bottom cover there are four sockets, placed from the right to the left as follows: **6-24V**, **USB Host**, **USB Device** and **I/O**.

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

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

The additional multi-purpose input / output socket, called **I/O**, is a 3.5 mm jack socket. On this socket, in the case when the Analogue Output functionality is selected, the signal from the input of the analogue / digital converter (before any frequency correction) is available. This signal can be recorded using a magnetic recorder or observed on an oscilloscope. The Digital Input as another functionality that serves as the external trigger to the instrument, while the Digital Output is used to generate the trigger pulse or alarm pulse from the instrument.

The user can connect an external DC power 6-24V adapter to the **6-24V** socket located on the bottom cover of the instrument. The current consumption depends on the voltage of the power supplier.



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

3. SETTING THE INSTRUMENT

In order to perform measurements using the instrument the user only has to plug-in the preamplifier with the microphone already screwed on or the proper vibration transducer and to switch the power on by pressing the **<Alt>** and **<Start/Stop>** push-buttons at the same time. Hold both buttons down for 1 or 2 seconds and release to switch on.

3.1. Basis of the instrument's control

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

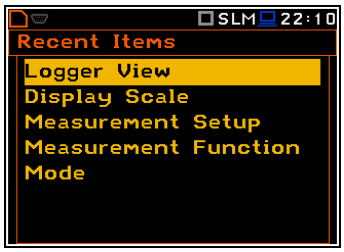
The instrument's menu consists of different type of windows, which include: main menu list, sub-menu list, option list, parameter list, text editor window, information window and file manager window with file command list.

Main menu

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

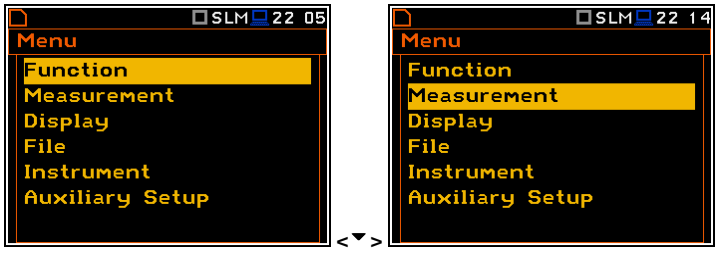
Recent Items list

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



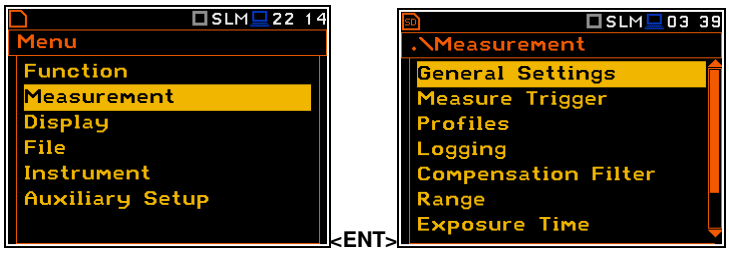
Position selection

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

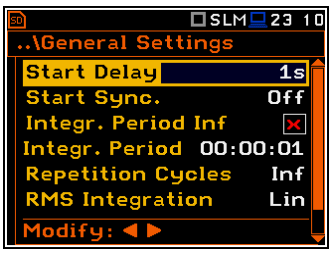


Entering position

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



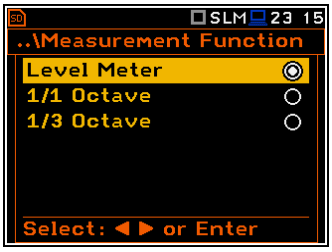
List of parameters



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

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

Option list

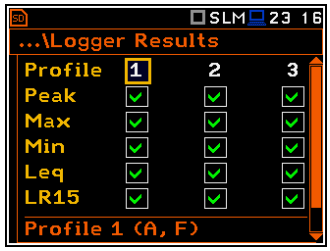


The option list consists of different choices, from which only one may be selected. The selection of the option is performed as follows. The user has to highlight the desired option by means of the <▲> or <▼> push-buttons and then press **<ENTER>**. This option becomes active and the list is closed.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

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

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

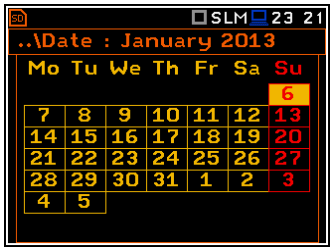
Matrix of parameters



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

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

Complex parameters

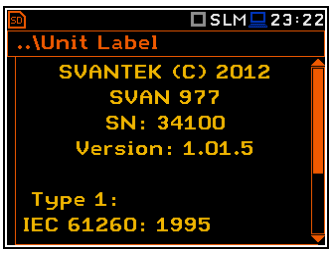


Some parameters like **Start Hour**, **Start Day** etc. are complex (consisting of more than one value field). The selection of values for such parameters is performed in a special window, which is opened with the <◄> or <►> push-buttons. In the special window the value is selected with the <◄>, <►>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

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

Information window

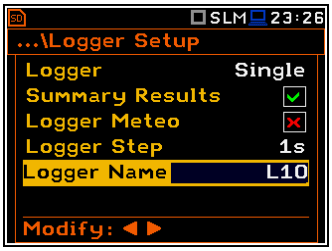
Some windows inform the user about the state of the instrument, available memory, none existing files or loggers, standards fulfilled by the unit, etc. In order to scroll through the list, the user has to use the <▲> or <▼> push-buttons. In order to close such a window, the user has to press **<ESC>**.



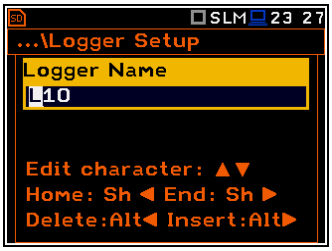
Text editing window

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

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



<►>

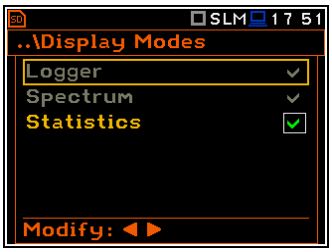


Help information

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

Inactive parameters

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



3.2. Powering of the instrument

The **SVAN 977** can be powered by one of the following sources:

- External DC power source – 6 V DC÷24 V DC (1.5 W)
- SA 17A external battery pack – operation time > 24 h (option)
- Four AA standard size internal batteries. In the case of alkaline type, a new fully charged set can operate more than 12 h (6.0 V / 1.6 Ah). Instead of the ordinary alkaline cells, four AA rechargeable batteries can be used (a separate external charger is required for charging them). In this case, using the best NiMH type, the operation time can be increased up to 16 h (4.8 V / 2.6 Ah)
- **USB** interface – 500 mA HUB

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

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

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

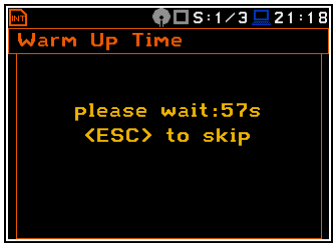
Notice: *In the case when **"Battery"** icon is red it is strongly recommended to use an external power adapter or USB interface as soon as possible to ensure reliable operation. If no suitable external power source is provided the instrument will be switched off automatically after a short time!*

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

3.3. Initial Setup of the instrument

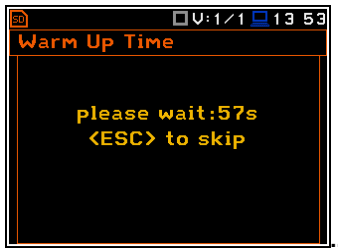
Switching the instrument on

To switch the power on the user should press the **<Alt>** and **<Start/Stop>** push-buttons at the same time. The instrument goes through the self-test routine after switching on (displaying the manufacturer and the name of the instrument) and then it enters the sound mode. The default display mode for result presentation is one profile.



Starting measurement

To start the measurements the user has to press the **<Start/Stop>** push-button. The result of the measurement is displayed with the unit of the measurement in so-called one profile mode.

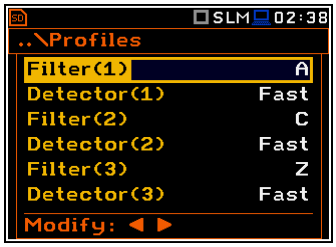


Default profile settings for Sound measurements:

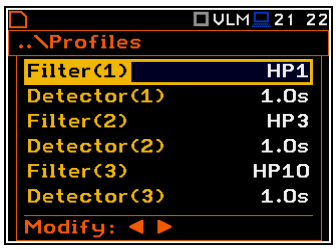
Profile 1 - **A** weighting filter (**Filter(1)=A**), **Fast** for the RMS detector (**Detector(1)=Fast**);

Profile 2 - **C** weighting filter (**Filter(2)=C**), **Fast** for the RMS detector (**Detector(2)=Fast**);

Profile 3 - **Z** weighting filter (**Filter(3)=Z**), **Fast** for the detector (**Detector(3)=Fast**).



Default profiles settings for Vibration measurements:



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

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

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

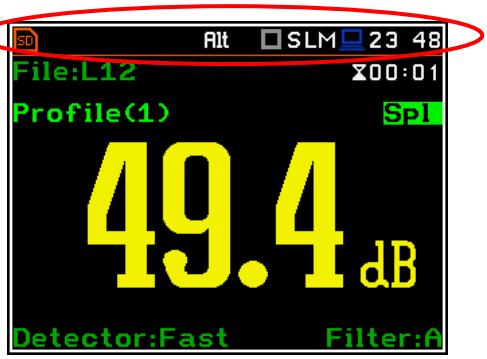
The user can change all the above mentioned settings using **Profiles** sub-list of the **Measurement** list. The instrument remembers all changes for the next time it is used. Return to the default settings (set up by the manufacturer) is possible after the selection of the **Factory Settings** position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

3.4. Description of icons

Description of the instrument state

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

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



The meanings of the icons are as follows:

	**"play"** icon is displayed when the measurement is started. .		**"Internal memory"** icon is displayed when there is no external SD memory card inserted.
	**"stop"** icon is displayed when the measurement is stopped.		"**SD Card**" icon is displayed when the external micro SD card memory is inserted.
	**"pause"** icon is displayed when the measurement is paused.		**"RS232"** icon is displayed when the RS232 port is activated.
	**"computer"** icon is displayed when there is a successful USB connection with the PC.		**"curve"** icon is presented when the current measurement results are logged into the instrument's logger file.
	**"arrow up"** icon is displayed when overload appears.		**"Trigger Level +"** icon is displayed when the trigger condition is set up to "**Level+**". The icon appears alternately with the "play" icon.
	**"arrow down"** icon is displayed when under range appears.		**"Trigger Level –"** icon is displayed when the trigger condition is set up to "**Level-**".

	**"Alt" icon** is displayed when the **<Alt>** push-button is pressed.		**"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.		**"Trigger Slope –"** icon is displayed when the trigger condition is set up to "**Slope-**"
	**"clock"** icon is displayed when the timer is **On**. It is active when the instrument is waiting for the measurement start up to occur. When the measurement start up is close, the icon changes its colour to green and starts to blink.		**"battery"** icon is displayed when the instrument is powered from the internal batteries. Icon corresponds to the status of the batteries (three, two, one or none vertical bars inside the icon). When voltage of batteries is too low, the icon becomes red.
	**"plug"** icon is displayed when the instrument is powered from the external source. .		

3.5. Memory organisation

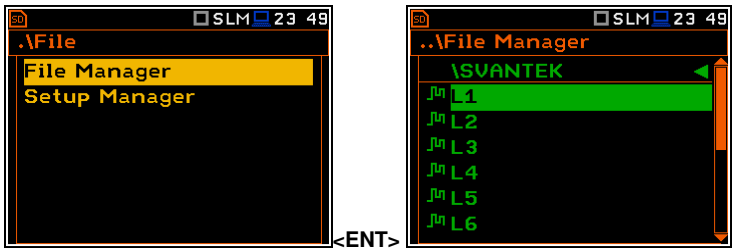
All available measurement results and settings can be stored in the external Memory (micro **SD Card**) in the predefined catalogue with the name SVANTEK.

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

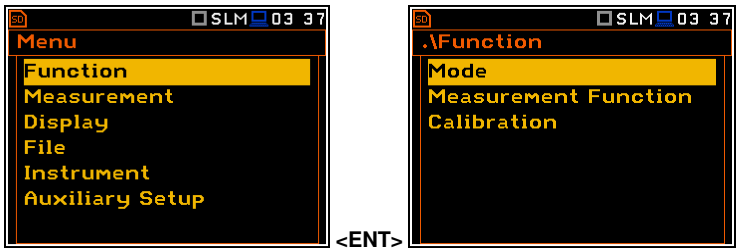
 - no SD card

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



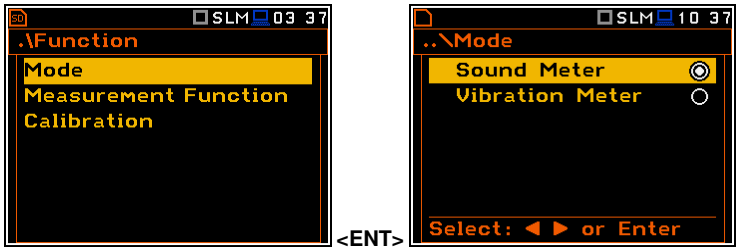
4. FUNCTIONS OF THE INSTRUMENT – Function

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: **Sound Meter** and **Vibration Meter**.



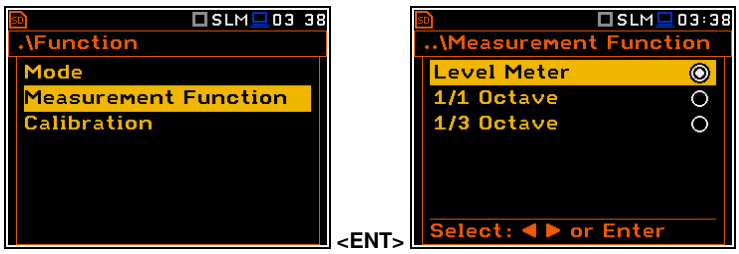
Notice: *In the user manual text the Sound mode (or Sound measurements) refers to the* ***Sound Meter*** *modes and the appropriate functions dedicated for the measurement and analysis of the acoustic signal:* ***Level Meter****,* ***1/1 Octave****,* ***1/3 Octave****,* ***FFT****; the Vibration mode (or Vibration measurements) refers to the* ***Vibration Meter*** *modes and the appropriate functions dedicated for the measurement and analysis of the vibration signal:* ***Level Meter****,* ***1/1 Octave****,* ***1/3 Octave****,* ***FFT****.*

4.2. Measurement functions of the instrument - Measurement Function

The main function of the instrument is the measurement of Sound pressure or Vibration broad band level (**Level Meter**). The Sound Level Meter (SLM) function provides the user with functions meeting the standard IEC 61672:2002 for Type 1 accuracy and the Vibration Level Meter (VLM) meeting the standard ISO 8041:2005. The instrument can also be used for medium to the long-term acoustic monitoring using the huge capacity data logger in which all the measurement results are stored.

The user may also use 1/1 and 1/3 real time octave band frequency analysis functions. These functions extend the main Level Meter functions of the instrument, because the selected 1/1 and 1/3 octave analysis is performed together with all calculations of Level Meter 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: **Level Meter**, **1/1 Octave**, **1/3 Octave** and **FFT** (in case of Sound modes). The currently active function is marked.



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

- ***SLM***	***Sound Level Meter***,	- ***VLM***	***Vibration Level Meter***,
- ***S: 1/1***	***Sound 1/1 Octave***,	- ***V: 1/1***	***Vibration 1/1 Octave***,
- ***S: 1/3***	***Sound 1/3 Octave***,	- ***V: 1/3***	***Vibration 1/3 Octave***,
- ***S: FFT***	***Sound FFT***,	- ***V: FFT***	***Vibration FFT***,

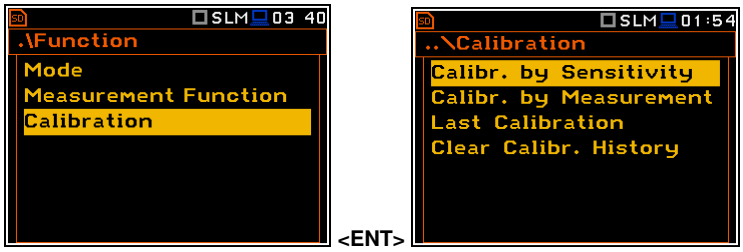
Optional measurement functions that broaden the application of the instrument can be easily installed. These options can be initially supplied by the manufacturer or purchased later and added by the user.

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 microphone 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** sub-list consists of four positions: **Calibr. by Sensitivity**, **Calibr. by Measurement**, which are used to perform the actual calibration, **Last Calibration**, which contains the list of calibration measurements performed earlier and the results obtained and finally **Clear Calibr. History**.



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

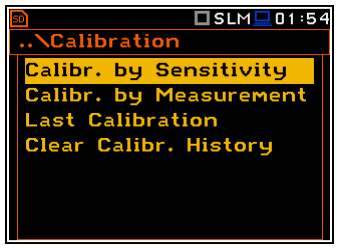
Notice: *The calibration level and the calibration result are expressed in different units depending on the settings of the instrument. The metric or non-metric Vibration units are set in the* ***Vibration Units*** *window (path: <Menu> / Auxiliary Setup / Vibration Units). Additionally, the linear or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

Notice: *It is not possible to calibrate the instrument during the execution of 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!*

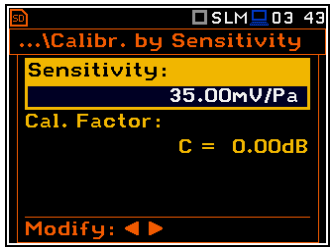
4.3.1. Calibration by Sensitivity in the case of Acoustic signal

Calibration by using the microphone's published sensitivity information can be performed in the following way:

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

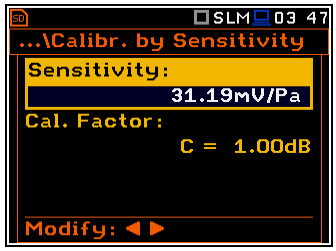


2. Set the sensitivity of the microphone taken from its calibration certificate using the **<Shift>** with **<◀>, <▶>** push-buttons and then press **<ENTER>.**



The calibration factor is calculated, after pressing the **<ENTER>** push-button, in relation to the nominal value of 35.0 mV / Pa. In order to avoid the calculation the user has to leave the **Calibration** sub-list by pressing **<ESC>**. For a microphone sensitivity higher than 35.0 mV / Pa the calibration factor will always be negative.

For a microphone sensitivity lower than 35.0 mV / Pa the calibration factor will always be positive.



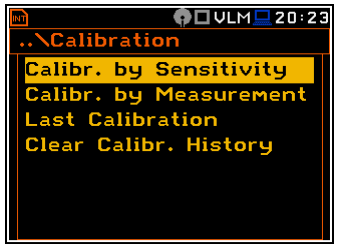
The lowest available value of the sensitivity that can be introduced is equal to 35.0 µV / Pa (it conforms to the calibration factor equal to 60.0 dB) and the highest value is equal to 35.0 V / Pa (calibration factor is equal to -60.0 dB).

In order to return to the **Calibration** sub-list the user has to press the **<ESC>** push-button.

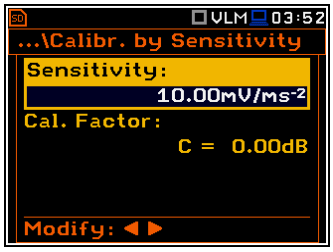
4.3.2. Calibration by Sensitivity in the case of Vibration signal

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

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



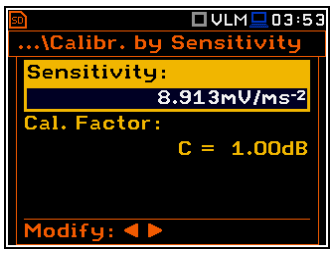
2. Set the sensitivity of the accelerometer taken from its calibration certificate using the **<Shift>** with **<◀>, <▶>** push-buttons and then press **<ENTER>**.



The calibration factor is calculated, after pressing the **<ENTER>** push-button, in relation to the nominal value of 10.0 mV / ms^{-2}. In order to avoid the calculation the user has to leave the **Calibration** sub-list by pressing **<ESC>**. For an accelerometer sensitivity higher than 10.0 mV / ms^{-2} the calibration factor will always be negative.

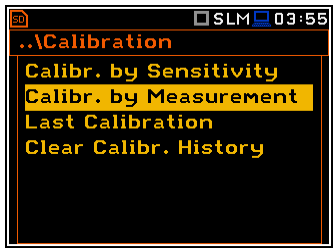
For an accelerometer sensitivity lower than 10.0 mV / ms^{-2} the calibration factor will always be positive.

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



4.3.3. Calibration By Measurement in the case of Acoustic signal

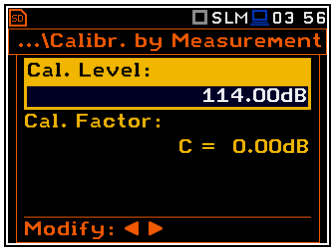
Calibration by measurement for the sound measurements can be done in the following way:



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

2. 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 977 is equal to 114 dB). It is also necessary to switch the instrument **Range** to the **High** level setting.*

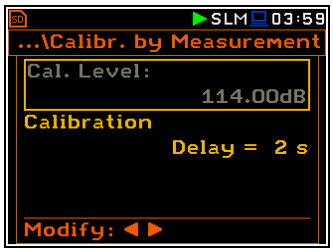


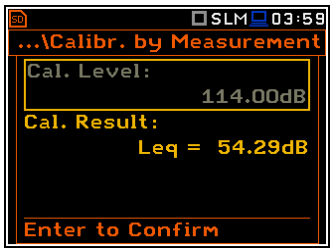
3. Switch on the calibrator and wait approximately 30 seconds for the tone to stabilise before starting the calibration measurement.

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

5. Stopt the calibration measurement by pressing the **<Start/Stop>** push-button after stabilisation of the calibration measurement result.

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.





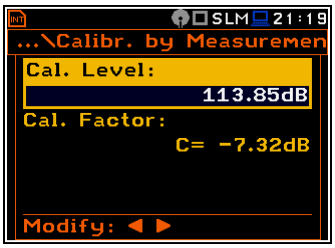
It is recommended to repeat the calibration measurement a few times to ensure the integrity of the calibration. The obtained results should be almost identical (with ±0.1 dB difference). Some possible reasons for unstable results are as follows:

- 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).*

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

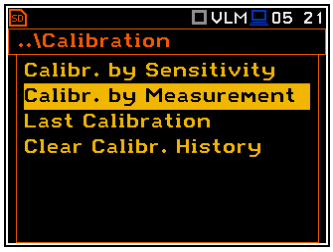


The calibration factor is calculated, stored and displayed (cf. next Figure) after pressing the **<ENTER>** push-button.

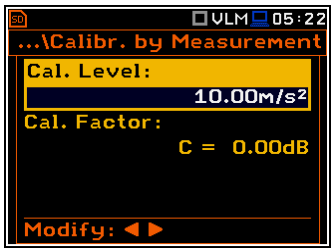
Notice: *The user has to press the* ***<ESC>*** *push-button to quit the calibration procedure without saving the calibration factor.*

4.3.4. Calibration By Measurement in the case of Vibration signal

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

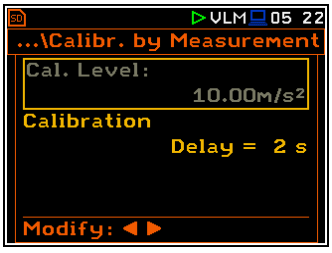


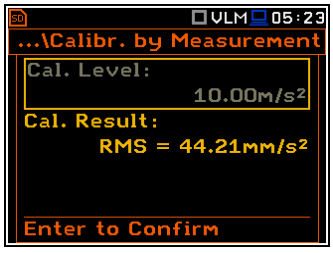
1. Select the calibration by measurement (highlight the **Calibr. by Measurement** text) from the **Calibration** sub-list and press the **<ENTER>** push-button.
2. Attach the instrument's accelerometer to the vibration calibrator using an appropriate or recommended fixing method.



3. Switch on the calibrator and wait approximately 30 seconds before starting the calibration measurement. The default level for calibration in the vibration mode is 10 m/s^2 at 159.2 Hz. Remember to change this level if using an alternative vibration calibration signal source.
4. Start the calibration measurement by pressing the **<Start/Stop>** push-button.
5. Stopt the calibration measurement by pressing the **<Start/Stop>** push-button after stabilisation of the calibration measurement result.

The calibration measurement starts after 3 seconds delay. Waiting for the calibration measurement the **Delay** is counted down on the display. After the end of the measurement, its 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:

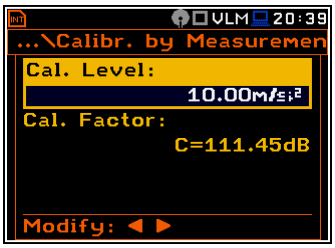
- the accelerometer is not properly attached to the calibrator,

- there are external disturbances,
- the calibrator or the measurement channel (the accelerometer or the instrument itself) are damaged.

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

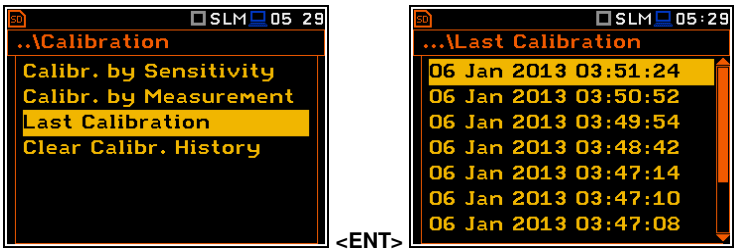
5. Press **<ENTER>** in order to accept the measurement result.

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

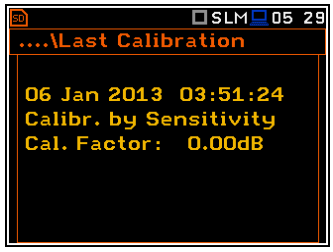


4.3.5. History of the calibrations - Last Calibration

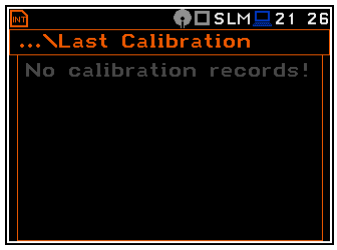
The **Last Calibration** window displays records from up to the ten last calibrations.



In order to review the calibration records, the user has to select the required line in the **Last Calibration** window and press **<ENTER>**. The opened window will contain the date and time of the performed calibration measurement, the way the calibration was done (**Calibr. by Measurement** or **Calibr. by Sensitivity**), the desired calibration level (**Cal. Level**) in the case of the measurements and the obtained calibration factor (**Cal. Factor**).



If calibration measurements were not performed, the **Last Calibration** window does not contain any previous calibration records. The content of this window is cleared after the **Factory Settings** operation.

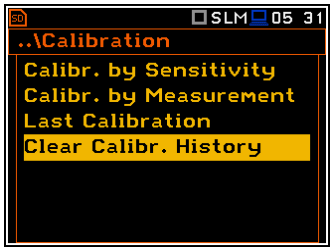


4.3.6. Clear calibration records - Clear Calibr. History

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

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

After **Clear Calibr. History** operation has been performed the

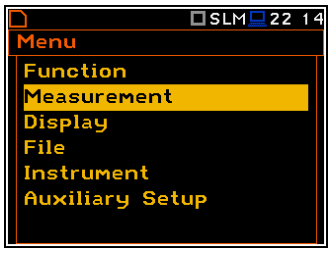


Calibration History window does not contain any more records.

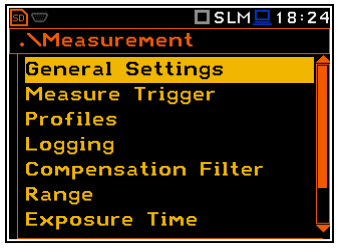
Notice: *Both acoustic and vibration calibration histories are stored in the same memory so clearing the calibration history when in the vibration mode will also clear all acoustic calibration history information as well.*

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 **Measurement** text and press **<ENTER>**.



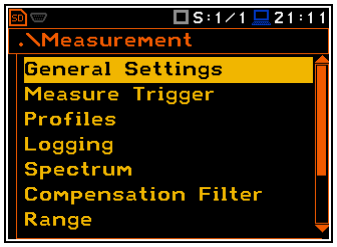
<ENT>

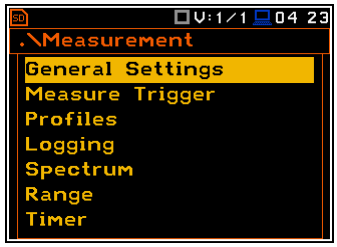


The **Measurement** list contains the following items:

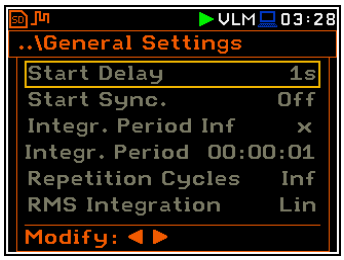
General Settings	enables the user to set various general measurement parameters;
Measure Trigger	enables the user to set up the measurement trigger;
Profiles	enables the user to program the profile parameters;
Logging	enables the user to program the logging function;
Spectrum	enables the user to set spectrum parameters;
Compensation Filter	enables the user to switch on required microphone compensation filter;
Range	enables the user to set the correct measurement range;
Exposure Time	enables the user to set the daily exposure time for dose results;
Statistical Levels	enables the user to define 10 statistical levels;
Timer	enables the user to program the internal timer.

The content of the **Measurement** list is different for different **Mode** and **Measurement Function** and other settings. Some examples for different modes and measurement functions are presented.



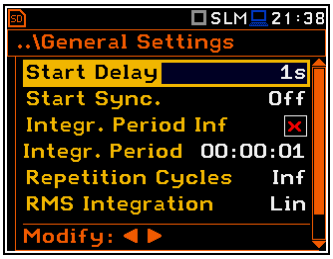


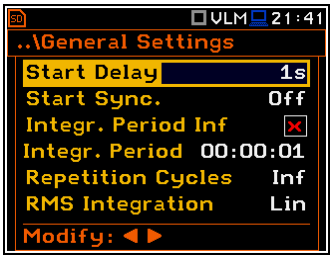
Any parameter in the **Measurement** list can be changed only when the instrument is not currently executing a measurement. The parameters are displayed with grey colour. The blinking "▶" icon on the top row indicates that the instrument is performing a measurement.



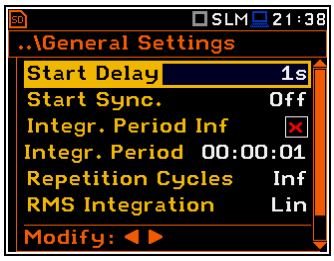
5.1 Selection of measurement parameters - General Settings

The **General Settings** list consists of the following parameters: the delay of the start of measurements (**Start Delay**), the maximum delay period for the synchronization with RTC (**Start Sync.**), the integration period / measurement run time (**Integration Period**), the repetition of the measurement cycles (**Repetition Cycles**), the RMS detector type (**RMS Integration**) and the intervals for day time period (**Day Time Limits**) in case of Sound modes.





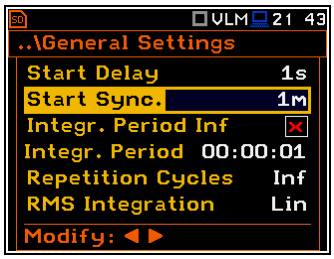
Setting time delay before the start of measurements



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

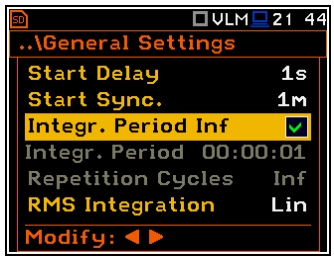
Notice: *The minimum delay period is equal to 0 second. In the* ***Calibration*** *mode, the delay period is always equal to 3 seconds.*

Setting synchronisation of the measurement start



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

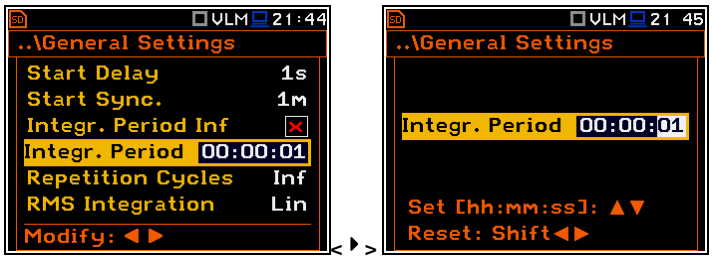
Switching on/off the integration period settings



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

Setting the integration period

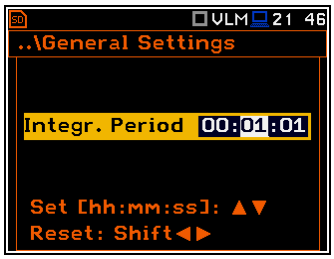
The **Integr. Period** position (integration period) defines the period during which the signal is being measured (integrated) and stored as the set of Summary Results (**SR**). The integration period can be set in the special window, which is opened by pressing the <◄> or <►> push- buttons.



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

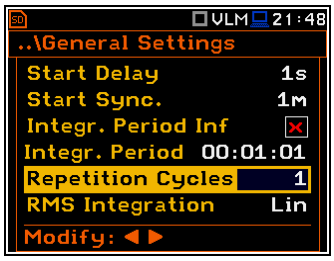
To set the integration period the user should define the required hours, minutes and seconds fields.

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



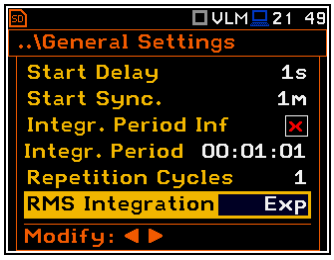
Setting the number of repetition of measurement cycles

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



Detector's type selection

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

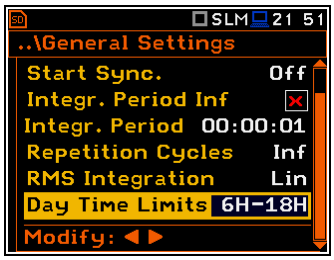


LN%

Selecting **Lin** is required to obtain the true RMS value of the measured signal. When this option is selected the value of the **Leq**, **LEPd**, **LN%** and **Sel** functions do not depend on the detector time constant: **Fast**, **Slow** or **Impulse** (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.

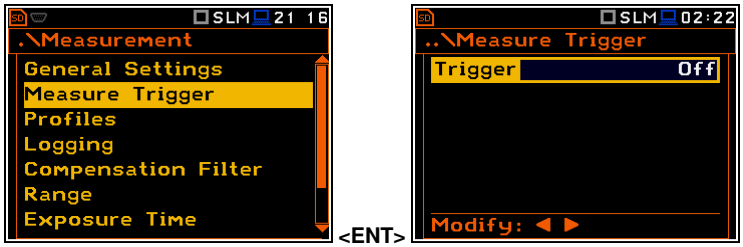
Selecting **Exp** enables the user to fulfil the requirements of other standards for the time averaged **Leq** measurements. When this option is selected the value of the **Leq, LEPd, LN%** and **Sel** function depends on the detector time constant (**Slow**, **Fast**, **Impulse**). The results are displayed with the indicator of the detectors selected in the profiles (*path: <Menu> / Measurement / Profiles*).

Day time limits selection



The **Day Time Limits** position appears only in Sound modes and enables the user to select the definition of the day and night periods 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**.

5.2 Measure trigger parameters selection – Measure Trigger

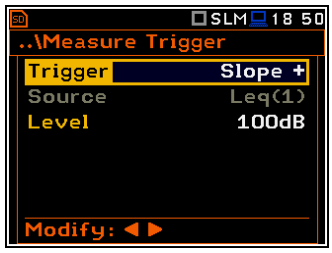


The **Measure Trigger** sub-list enables the user to set the parameters for the measure trigger. The **Measure Trigger** is a context sub-list in which the triggering can be switched off or on (**Trigger**), when on the source of the triggering signal (**Source**) can be determined, its level (**Level**)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

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

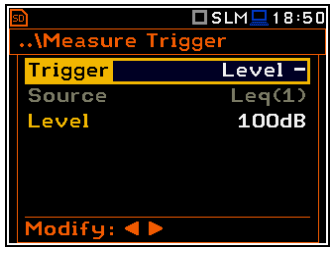
The triggering condition is checked every 0.5 miliseconds. This parameter (**Trigger period**) is constant and is displayed inversely.

Slope type trigger 



In the case when **Slope +** is selected, the measurement starts when the rising result value (**Source**) passes above the level determined by the selected decibel **Level**. When **Slope –** is selected, the measurement starts when the falling result value (**Source**) passes below the level determined by the selected decibel **Level**. The measurement is stopped when the conditions set in the **General Settings** sub-list are fulfilled or after pressing the **<Start/Stop>** push-button or after receiving the proper control code remotely.

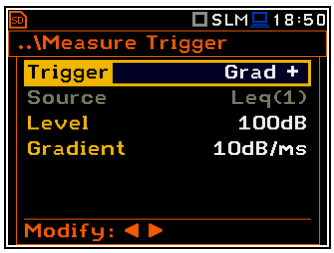
Level type trigger 



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

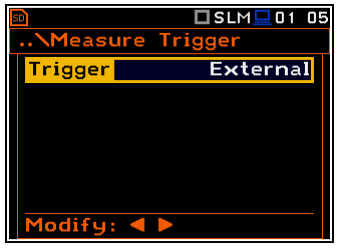
Gradient type trigger

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



External type trigger

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

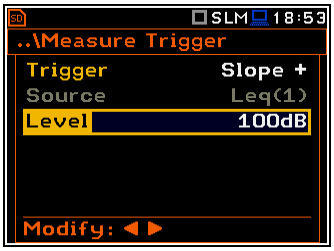


Selection of the triggering signal

It is assumed that only one measured result can be used as a source of the triggering signal in the **Level Meter** mode, namely the output signal from the RMS detector coming from the first profile which is denoted here as **Leq(1)**. This position does not become active (it is not displayed inversely) and the text stated here remains unchanged. After pressing there the **<▼>** push-button, the **Source** line is skipped.

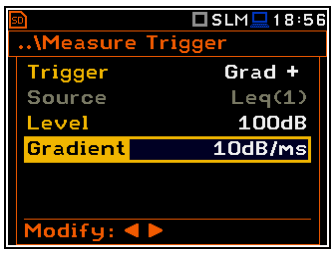
Setting the level of the triggering signal

The level of the triggering signal (**Level**) can be set with 1 dB step steps in the range from 24 dB to 136 dB in sound modes and from 64dB (1.585mm/s2) to 176dB (631 m/s2) in vibration modes. The **Level** value of the triggering signal refers to the instantaneous value of the RMS result from the first profile calculated during the period depending on selected **Detector** (path: <Menu> / Measurement / Profiles).



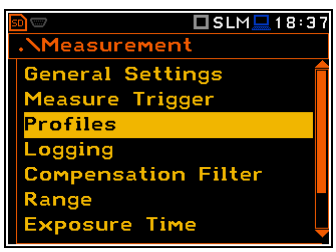
Setting the speed of the triggering signal changes

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

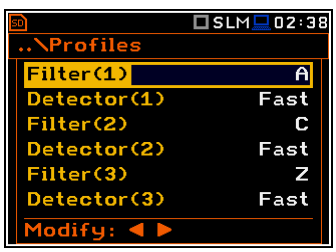


5.3 Setting parameters in a profile – Profiles

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



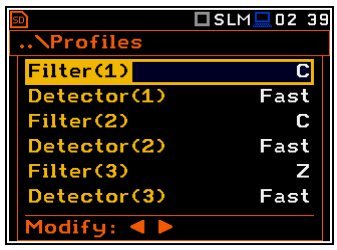
<ENT>



Weighting filter selection

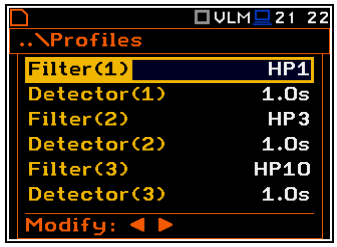
Sound measurements

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



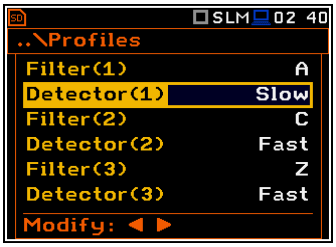
Vibration measurements

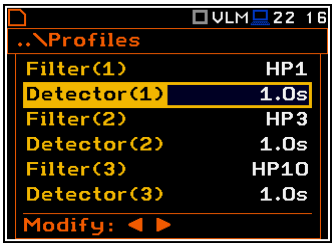
- acceleration measurements: **HP**, **HP1**, **HP3**, **HP10**,
- velocity measurements: **Vel1**, **Vel3**, **Vel10** and **VelMF**,
- displacement measurements: **Dil1**, **Dil3** and **Dil10**.



RMS detector selection

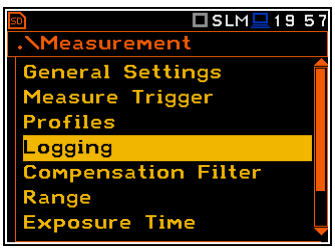
The following RMS detectors are available in the instrument: **Impulse**, **Fast** and **Slow** (in the case of Sound measurements) and **100ms**, **125ms**, **200ms**, **500ms**, **1.0s**, **2.0s**, **5.0s**, **10.0s** (in the case of Vibration measurements).





5.4 Setting the data logging functionality – Logging

The **Logging** list enables the user to program the logger functions: the recording of the measurement time history results . The **Logging** list consists of three positions: **Logger Setup**, **Logger Results** and **Logger Trigger**.

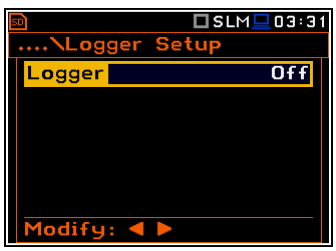


<ENT>

5.4.1 Data logger programming – Logger Setup

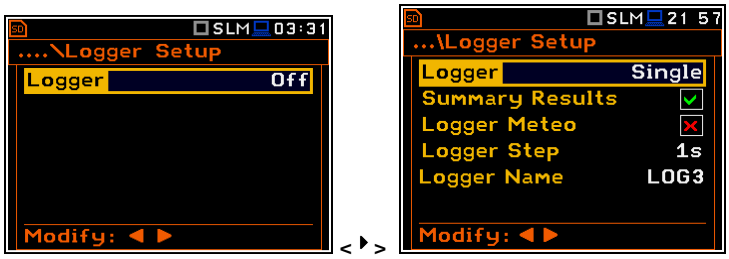
The **Logger Setup** list enables the user to activate logger functionality and meteo results logging. It also allows to edit the name of the logger file and to set the logger step.

<ENT>

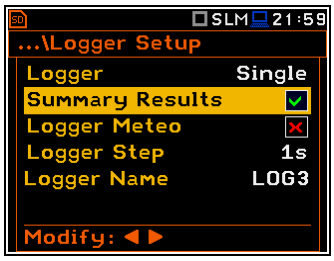


Notice: *If* ***Logger*** *is* ***Off****, files are not created and measurement results of the time history changes are not saved!*

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

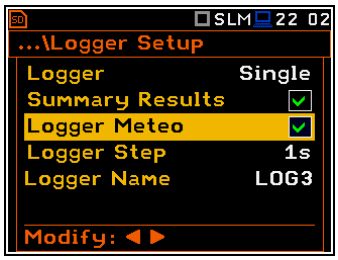


The **Summary Results** position allows the user to select or deselect the saving of the full set of profile results that the instrument generates during total measurement time and which are not belonged to the time history data.These results are: **Spl**, **Leq, Sel**, **Lden**, **LEPd**, **Ltm3**, **Ltm5, LN%, LR15, LR60, Ovl, Peak, Max, Min,** in the case of sound measurements or **RMS**, **Ovl, Peak**, **P-P** in the case of vibration measurements.



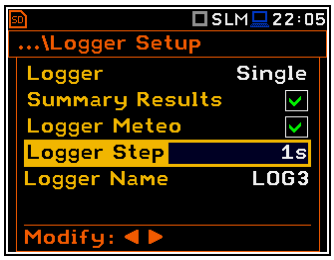
The **Logger Meteo** switches on (☑) and off (☒) the recording of the meteorological results from the Weather Monitoring Station.

The **Logger Step** defines the period of the data logging in a file. It can be set from 2 milliseconds to 1 second in 1, 2, 5 sequences, the values from 1 second to 59 seconds, the values from 1 minute to 59 minute and 1 hour.

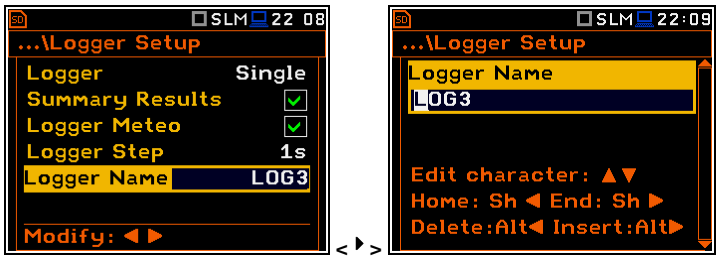


The **Logger Step** defines the period of the data logging in a file. It can be set from **1s** to **1h**. Its value by default is set to **1s**.

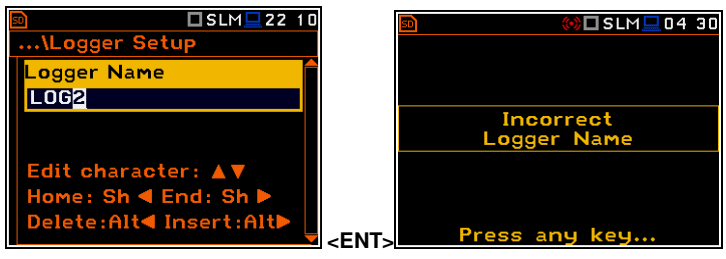
In the **Simple** instrument interface mode this parameter doesn't appear in the **Logger Set.** list and cannot be changed.



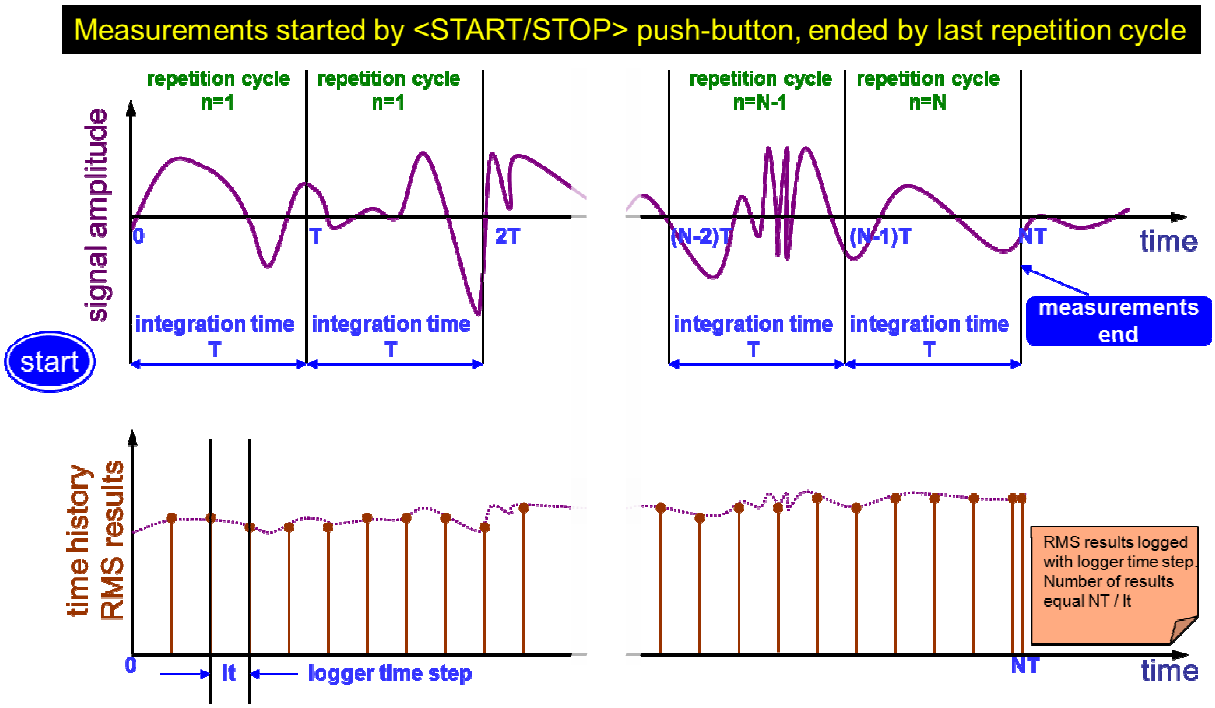
The **Logger Name** position enables the user to define the logger file name. The default name is **LOG**. The name can be up to eight characters long. After pressing the <◄►>, <►> push-buttons, the special window with text editing function is opened.



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



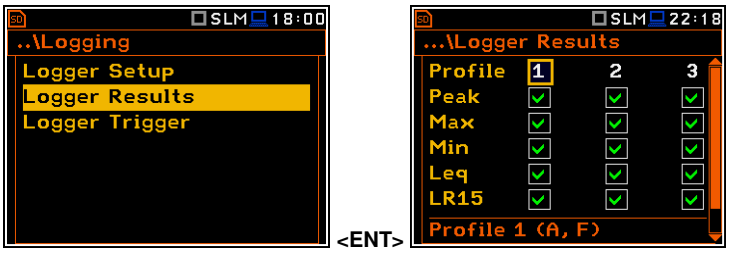
When the **Logger** is switched on and the logging results have been defined, then in parallel with measurements during **Intergation Period** results, the partial measurement results are saved in the file with the interval step, defined by **Logger Step** parameter. Up to 12 results can be logged simultaneously from three independent user defined profiles of the instrument (**Peak** / **Max** / **Min** / **Leq**) with time step down to **1s**. 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 **Intergation 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 Integration Period and Logger Step

5.4.2 Results selection – Logger Results

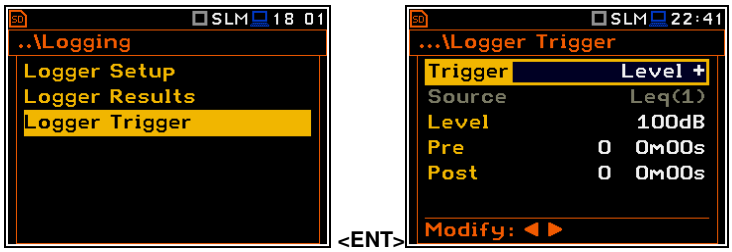
The **Logger Results** list enables the user to activate the results for three independent user defined profiles, which will be recorded to the logger file during measurement. Activation / deactivation can be done by means of the <◀>, <▶> push-buttons pressed together with **<Alt>**. The position is changed by means of the <◀>, <▶> and <▲>, <▼> push-buttons.



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

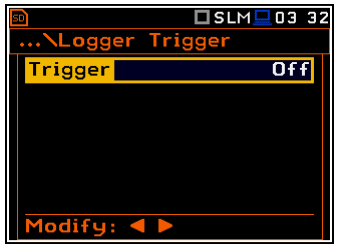
5.4.3 Logger trigger parameters setup – Logger Trigger

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



Trigger disabling

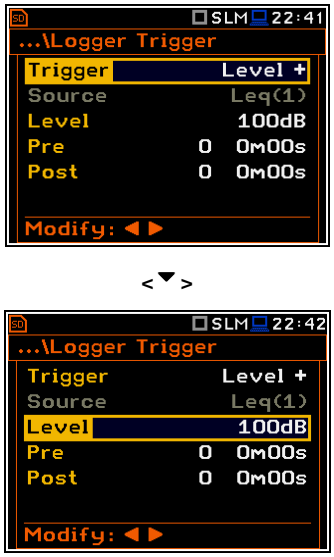
The logger triggering of the measurements (**Trigger**) can be switched off using the **<◀>** push-button. The triggering is switched on if the **Level +** or **Level –** mode is selected using the **<▶>** push-button.



Level type trigger

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

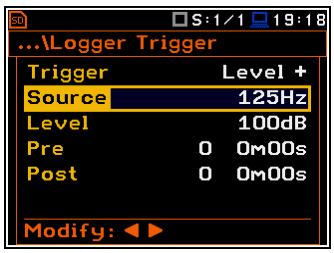
- the measurement results recorded directly before the fulfilment of the triggering condition; time of the recording can be calculated by multiplying the value set in the **Pre** by the time period taken from the **Logger Step** (*path: <Menu> / Measurement / Logging / Logger Setup*);
- all measurement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



Trigger Source selection

When the **Level Meter** mode is chosen only one measured result can be used as a source of the triggering signal in the logger, namely the output signal from the RMS detector coming from the first profile which is denoted here as **Leq(1)** for the SLM Mode or **RMS(1)** for the VLM Mode.. This position does not become active (it is shown greyed out) and the text stated here remains unchanged. After pressing the **<▼>** push-button, the **Source** line is skipped.

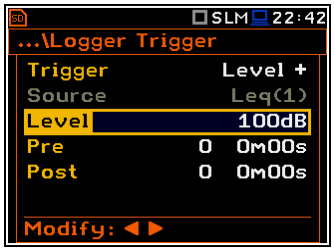
When the **1/1 Octave** or **1/3 Octave** mode is chosen it is possible to use the RMS band-pass value of the 1/1 octave or 1/3 octave spectrum filters with appropriate central frequency as a source of the triggering signal for the logger.



Available values for the **Source** parameter for the **1/1 Octave** mode: **Leq (1)/RMS(1)**, **125Hz**, **250Hz**, **500Hz**, **1.00kHz**, **2.00kHz**, **4.00kHz**, **8.00kHz**, **16.0kHz**.

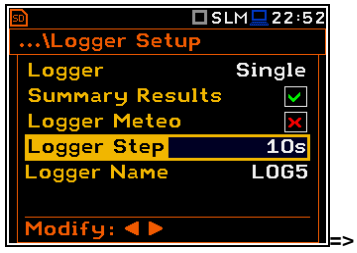
Available values of the **Source** parameter for the **1/3 Octave** mode: **Leq (1)/RMS(1)**, **125Hz**, **160Hz**, **200Hz**, **250Hz**, **315Hz**, **400Hz**, **500Hz**, **630Hz**, **800Hz**, **1.00kHz**, **1.25kHz**, **1.60kHz**, **2.00kHz**, **2.50kHz**, **3.15kHz**, **4.00kHz**, **5.00kHz**, **6.30kHz**, **8.00kHz**, **10.0kHz**, **12.5kHz**, **16.0kHz**, **20.0kHz**.

Level of the triggering signal

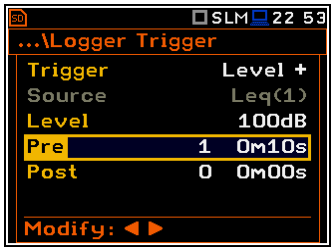


The level of the triggering signal for the logger (**Level**) can be set with 1 dB steps in the range from 24 dB to 136 dB in sound modes and from 64dB (1.585mm/s2) to 176dB (631 m/s2) in vibration modes . The **Level** value of the triggering signal for the logger refers to the instantaneous value of the RMS result from the first profile calculated during the period depending on selected **Detector (1)** (path: <Menu> / Measurement / Profiles).

Pre and post trigger recording



=>



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

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

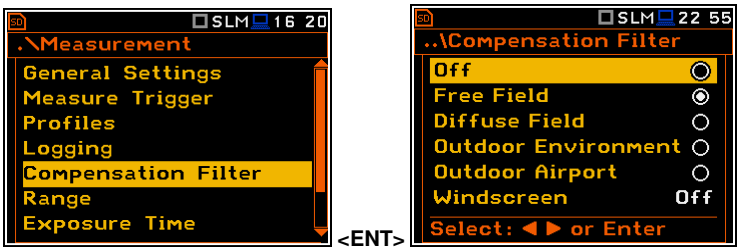
The period of the measurements that are saved in the logger before or after the fulfilment of the triggering condition can be calculated by multiplying the value set in the **Pre** or **Post** positions by the value set in the **Logger Step** position (*path: <Menu> / Measurement / Logging / Logger Setup*).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

5.5 Selection of the 1/1 Octave and 1/3 Octave spectrum parameters – Spectrum

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

5.6 Selection of the microphone compensation filters – Compensation Filter

The **Compensation Filter** position is available only in the case of the **Sound Meter** modes. It enables the user to select the appropriate frequency response compensation filter and the additional windscreen filter.



The **Compensation Filter** window consists of a list with 6 positions: **Off**, **Free Field**, **Diffuse Field**, **Outdoor Environment**, **Outdoor Airport** and **Windscreen**. The position in the sub-list is changed after pressing the **<▲>**, **<▼>** push-buttons. In order to switch the filter on the user should mark it, by means of the **<◄>**, **<►>** push-buttons and to confirm the selection with the **<ENTER>** push-button. Pressing **<ENTER>** push-button closes the sub-list. After pressing the **<ESC>** push-button the sub-list is also closed but any changes will be ignored.

The **Free Field** and **Diffuse Field** filters enable the user to set compensation for sound measurements in the free field conditions or in the diffuse field conditions. The microphone supplied with the **SVAN 977** instrument (SV 7052) is designed for sound measurements in free field conditions. The **Free Field** option means that the correction filter for the diffuse field conditions is switched off. In the case of sound measurements performed with the use of specific diffuse field microphone types the option **Diffuse Field** should never be used and the compensation filter should be turned off.

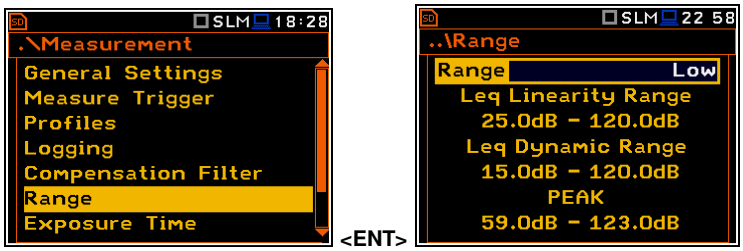
Outdoor Environment and **Outdoor Airport** filters are dedicated for the permanent outdoor monitoring application. The characteristics of the outdoor filters depend on the application: environmental (the acoustic signal is parallel to the microphone's grid) or airport (the acoustic signal is perpendicular to the microphone's grid). The frequency characteristic of the designed filters is given in App. D.

Windscreen filter can be switch **Off**, **On** or set to automatic detection – **Auto**.

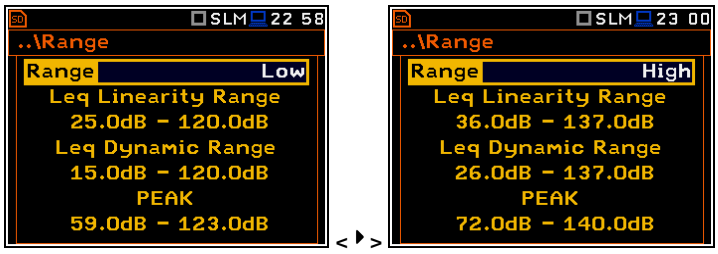
5.7 Measurement range setting – Range

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

The absolute range value changes due to the calibration factor and are shown on the screen.

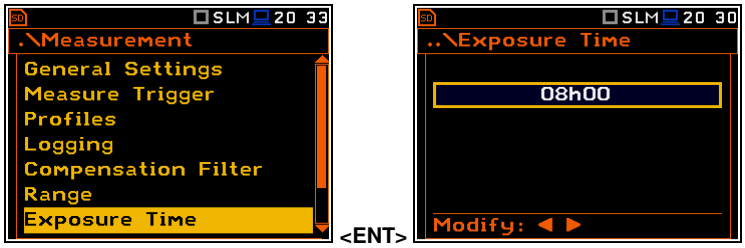


There are two ranges available: **High** and **Low**. The detailed description of the measurement ranges parameters is given in App. C. After pressing the **<ENTER>** push-button the change is confirmed and the window closes. Press the **<ESC>** push-button to return to the **Measurement** list ignoring any changes made in the sub-list.

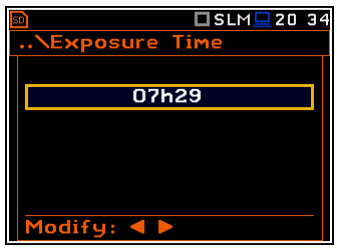


5.8 Exposure time setting - Exposure Time

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 sound mode.



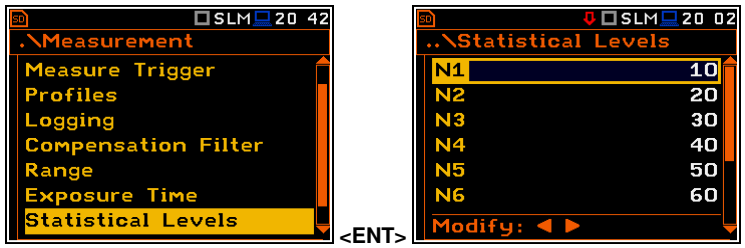
The **Exposure Time** values are within the range [00h01, 08h00]. The required value can be set using the **<◀ >** / **<▶>** push-buttons – after each button press the exposure time is decremented / incremented by one minute. The step can be decremented / incremented in 30 minute steps by pressing the **<◀ >** / **<▶>** push-buttons together with **<Shift>**.



5.9 Setting ten statistical levels - Statistical Levels

The **Statistical Levels** position is available only in the case of the **Sound Meter** modes.

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 main results.



The default statistical levels have the following settings: **10**, **20**, **30**, **40**, **50**, **60**, **70**, **80**, **90** and **95**. All values have to be within the integer range [1, 99]. Each individual value can be set independently from the others. The selection of the **Nx** in the list is made by means of the **<▲>**, **<▼>** push-buttons.

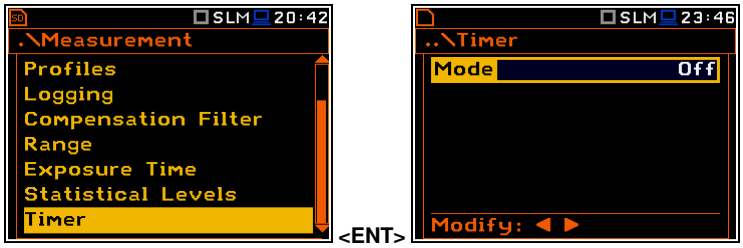
The upper **Nx** is visible on the display and becomes active for editing after pressing the **<▲>** push-button together with **<Shift>**. The lower **Nx** is visible on the display and becomes active for editing after pressing the **<▼>** push-button together with **<Shift>**.

The **Nx** current value is decreased / increased in 1 % steps by means of the **<◀ >** / **<▶>** push-buttons. The step can be decreased / increased up to ten % by simultaneously pressing the **<◀ >** / **<▶>** push-buttons with **<Shift>**.

The sub-list is closed and the instrument returns to the **Measurement** list after pressing the **<ENTER>** (with the confirmation of all changes made in this list) or **<ESC>** push-button (ignoring all changes).

5.10 Programming the instrument's internal timer – Timer

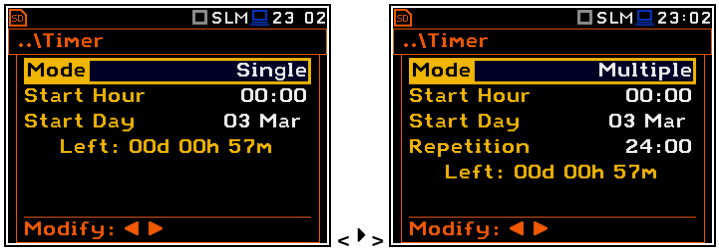
The **Timer** position enables the user to programme the internal real time clock to act as a delayed start and stop timer. The instrument can be switched on automatically at the pre-selected programmed time and perform the measurement with the same settings used before the instrument was switched off.



Selecting the mode of the timer function

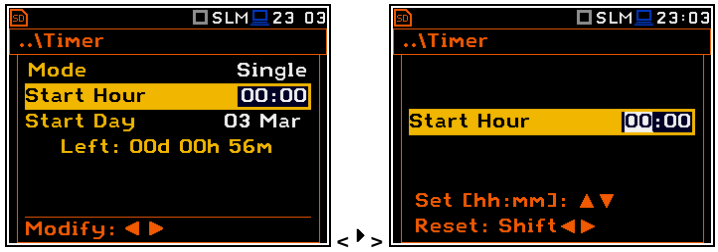
The timer can be switched off (**Off**), switched on only once (**Single**), or switched on many times regularly (**Multiple**) with the period between two consecutive measurements set in the **Repetition** line.

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



Setting the time for the measurement to start

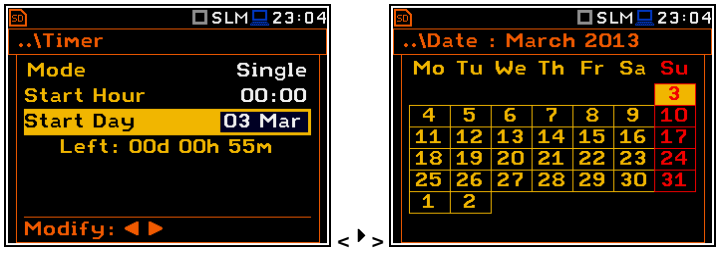
The **Start Hour** position determines the time for the measurement to start. The required hour and minute can be selected in a special window, which is opened by means of the <◄>, <►> push-buttons.



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

Setting the day for the measurement to start

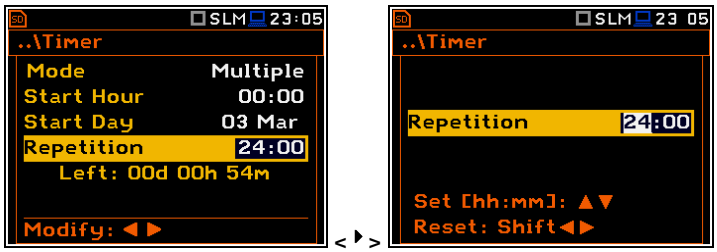
The **Start Day** position determines the date for the measurement to start. The timer can be programmed up to one month ahead and during the date setting the current state of the **R**eal Time **C**lock (**RTC**) is taken into account. The required date can be selected in a special window, which is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



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

Selecting the period between two consecutive measurements starts

The **Repetition** position is displayed when the **Multiple** mode is selected. This parameter can be programmed in the range from **00:00** up to **96:00**. The required date can be selected in a special window, which is opened by means of the <◀>, <▶> push-buttons when the **Repetition** text is displayed inversely in the **Timer** sub-list.



In order to set the proper value the user has to select hours or minutes pressing the <◀>, <▶> push-buttons and then, pressing the <▲>, <▼> push-buttons, to select the proper value.

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. Make sure that the RTC is set correctly before trying to set a value for a delayed Start/Stop Timer.*

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

5.11 Description of an example timer function execution

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

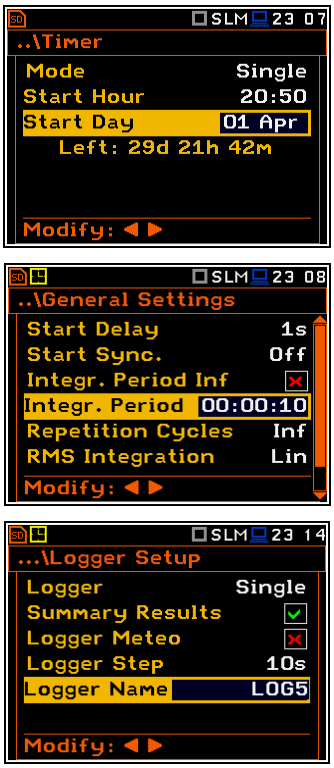
Let us assume that the user wants to switch on the instrument on the 1st of April, at 20:50, measure the sound for 10 seconds without using logger and save the results in a file named **LOG5**.

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 (*path: <Menu> / Measurement / Logger / Logger Setup*) and finally – switch off the instrument.

The instrument will be switched on the 1st of April at 20:50 and will be warmed up for the period of 60 seconds decrementing the counter visible on the display by one after each second.

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

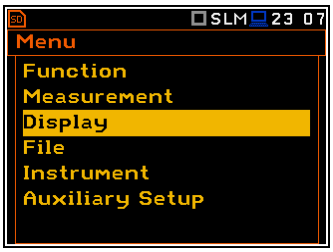
In this example the delayed start time on the meter can be configured any time during the previous month. It is recommended that for simplicity the **Start Delay** time is set to 0 seconds for use with the **Timer** function.



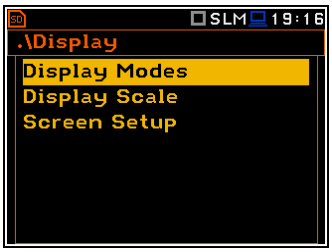
6. DATA AVAILABLE ON THE DISPLAY – Display

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

The content of the **Display** list differs for the spectrum analyser modes.



<ENT>



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

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

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

Spectrum View enables the user to change the type of the spectrum and to activate the **Max** and **Min** spectrum. This position appears only in **1|1 Octave** and **1/3 Octave** modes;

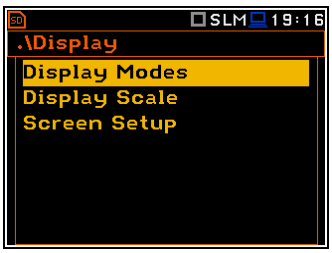
Spectrum Type enables the user to change the spectrum type presented on the display: **Acceleration**, **Velocity** and **Displacement**. This position appears only in **1|1 Octave** and **1/3 Octave** modes when the **Vibration Meter** mode is selected;

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

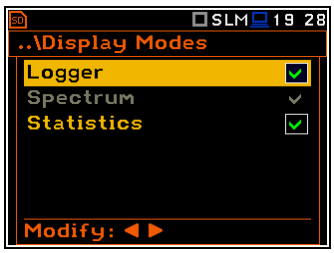
6.1 Selection of the modes of measurement results presentation - Display Modes

The One Profile 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 (**SLM** or **VLM**, **1/1 Octave**, **1/3 Octave**, etc.).

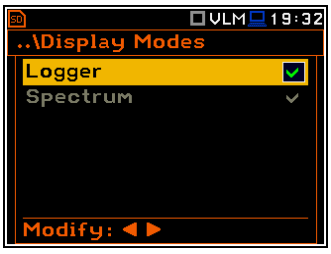


<ENT>



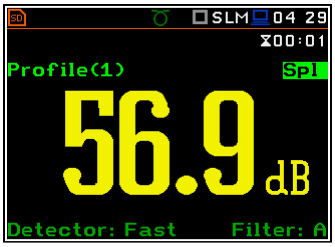
For the **Sound Level Meter** the following display modes are available: **Logger** and **Statistics**.

For the **Vibration Level Meter** only the **Logger** display mode is available.

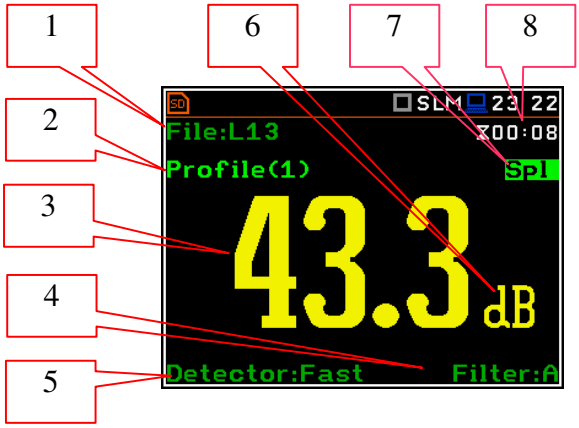


One Profile presentation mode

The One Profile mode is always available in all measurement modes. The display with the measurement result in one result mode is presented here.



Field description of the One Profile view



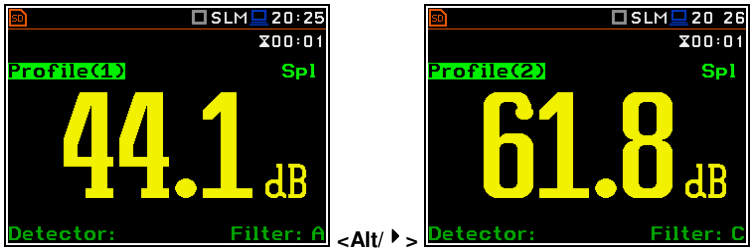
1. Logger file name.
2. Profile number.
3. The value of the measured function.
4. The name of the implemented filter: **Z**, **A**, **C**, **B** in the case of Sound measurements or **HP**, **HP1**, **HP3**, **HP10**, **Vel1**, **Vel3**, **Vel10**, **VelMF**, **Dil1**, **Dil3**, **Dil10** in the case of Vibration measurements.
5. Detector time constant: in the case of Sound measurements when the detector is exponential: **Imp.**, **Fast**, **Slow** or **Lin** when the detector is linear and in the case of Vibration measurements: **100 ms**, **125 ms**, **.. 10.0 s**,
6. Units of the measured value.
7. Function name: **Spl**, **Leq**, **Sel**, **LEPd**, **Ltm3**, **Ltm5**, **LN%**, **Ovl**, **Peak**, **Max**, **Min** in the case of Sound measurements or **RMS**, **Ovl**, **Peak**, **P–P**, **MTVV** in the case of Vibration measurements.
8. Elapsed time shows the current second of the measurement. The value presented there belongs to the range [**1**, **Integration Period**].

Notice: *In the case the* ***RMS Integration*** *is linear (path: <Menu> / Measurement / General Settings / RMS Integration: Lin) for the* ***Leq***, ***Sel***, ***Le***, ***LEPd*** *and* ***LN%*** *results* ***Lin.*** *Text appears on the display instead of* ***Imp.***, ***Fast*** *or* ***Slow*** *detector time constant.*

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

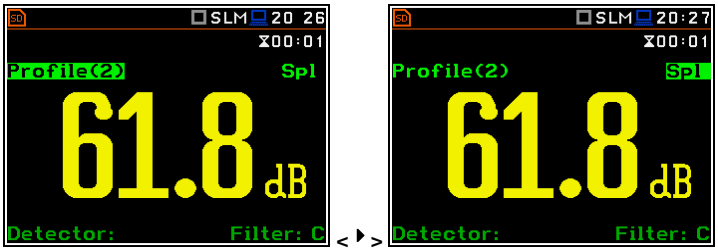
Changing the field content

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



Changing the active fields

The change of the active field is made by pressing the <◄> / <►> (horizontal) push-buttons.



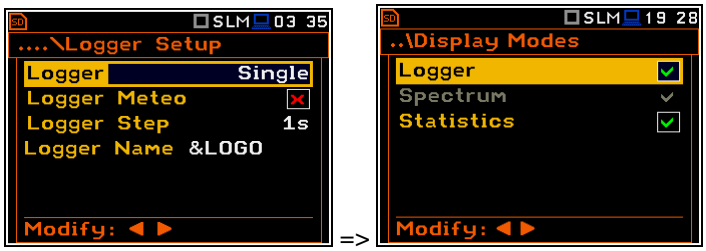
Changing the presentation mode

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

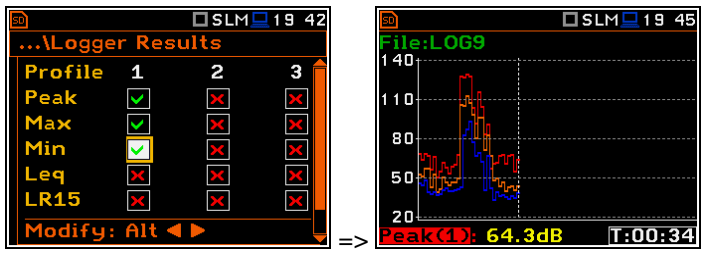
Logger presentation mode

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

So, to have this presentation mode active, the user has to switch the **Logger** on!

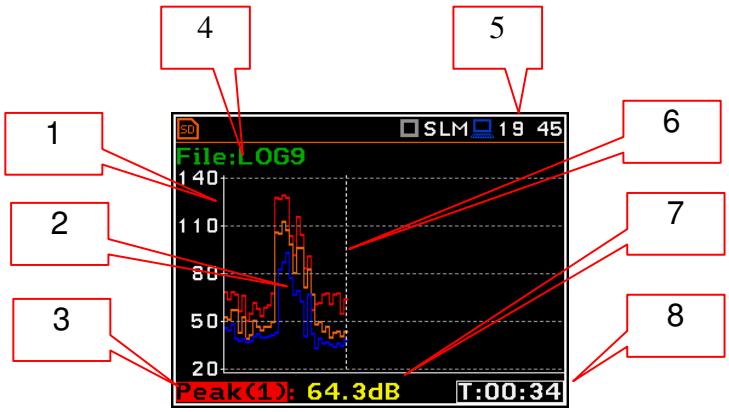


When **Logger** is switched on and there are results selected for logging the screen in one profile visualisation mode is as shown here.

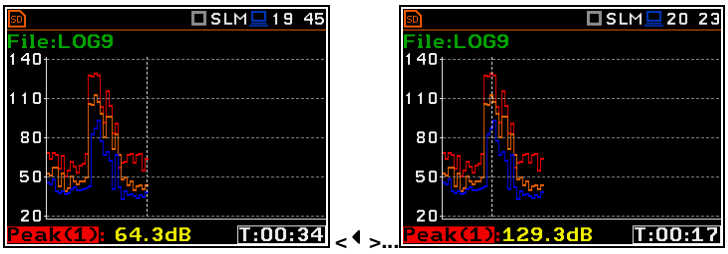


Field description of the Logger view

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

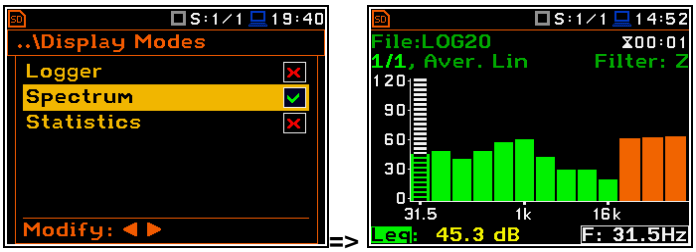


The user may change the cursor position by means of the < ◀ >, < ▶ > push-buttons.



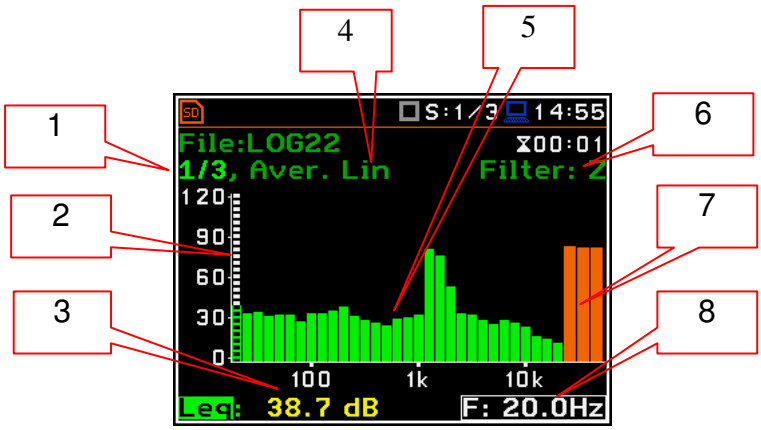
Spectrum presentation mode

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

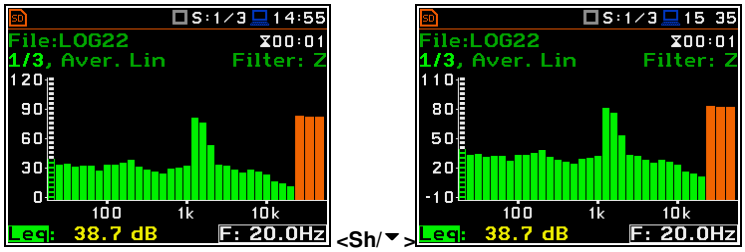


Field description of the Spectrum view

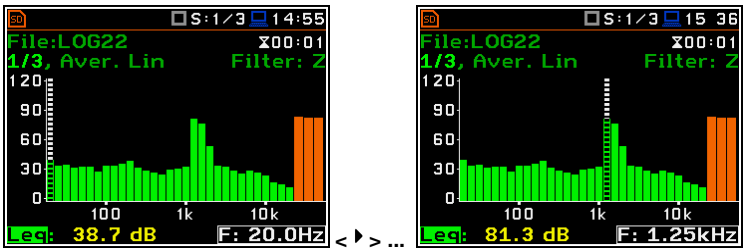
1. Type of spectrum
2. Cursor position
3. Value for the cursor position
4. Averaging used (Lin or Exp)
5. Spectrum plot
6. Frequency weighting filter used
7. Total values
8. Central frequency for the cursor position



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



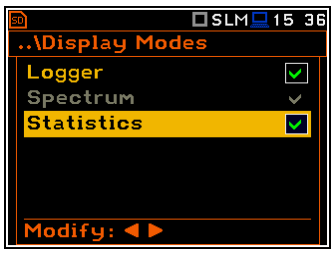
The user may change the cursor position by means of the <◀>, <▶> push-buttons. The frequency and the appropriate value are presented in the line below the plot. Press the <◀>, <▶> push-buttons with <**Shift**> to move straight to the first or last displayed band on screen.



Statistics presentation mode

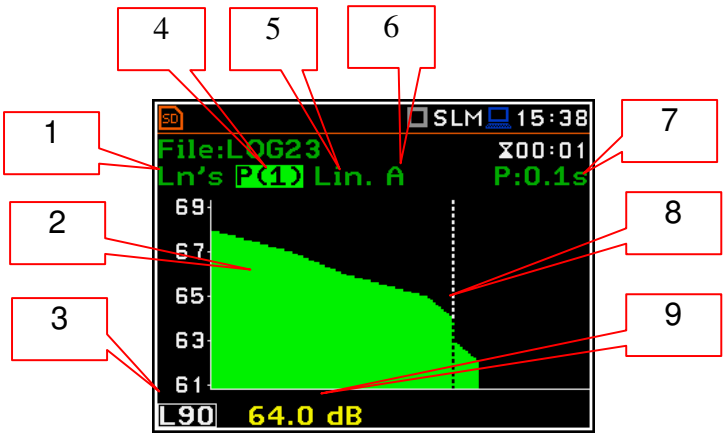
The **Statistics** position is accessible only for **Sound** measurements.

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

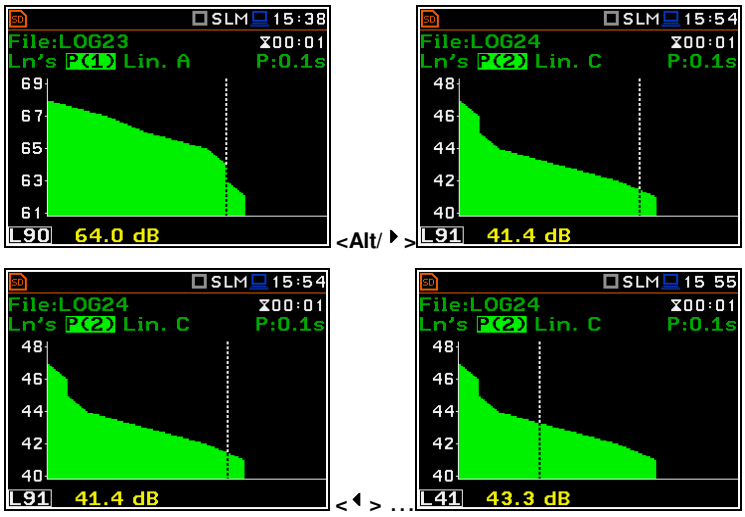
1. Function name
2. Statistics plot
3. Statistical level (LN% percentile value) for the active cursor position
4. Active profile (P1, P2 or P3)
5. RMS detector (**Lin.**, or **Exp.**: **Fast**, **Slow** or **Imp**.)
6. Averaging filter used (**A**, **B**, **C** or **Z**)
7. The sampling interval for the LN% values calculated by the meter (0.1 s)
8. Cursor position
9. Value of the selected statistical level **LN%** and units (dB)



The profile is changed after pressing the <◄> and <►> push-buttons simultaneously with **<Alt>**.

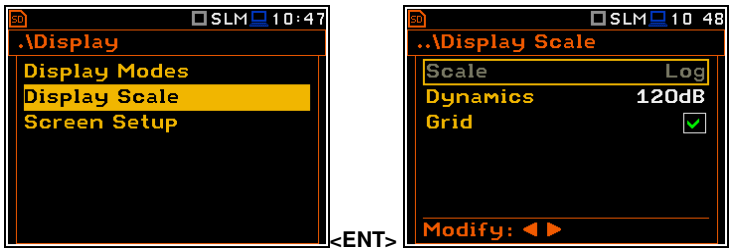
The cursor position is changed by means of the <◄>, <►> push-buttons. The statistical level and appropriate value are presented in the line below the plot.

Press the <◄>, <►> push-buttons with the <**Shift**> button to go straight to the first or last LN% position on the screen.



6.2 Setting the scale of the presentation and the display grid - Display Scale

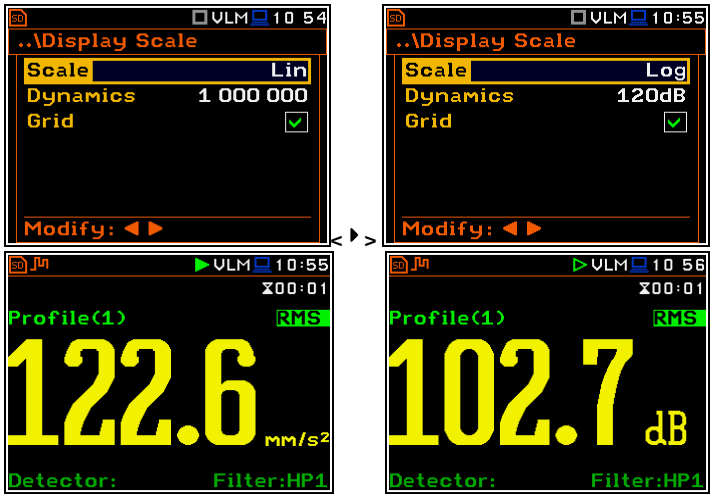
The **Display Scale** sub-list enables the user to change the displayed dynamic scale in the available modes of graphical presentation of the measurement results and switch the grid on/off.



Setting the scale of the measurement results presentation

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

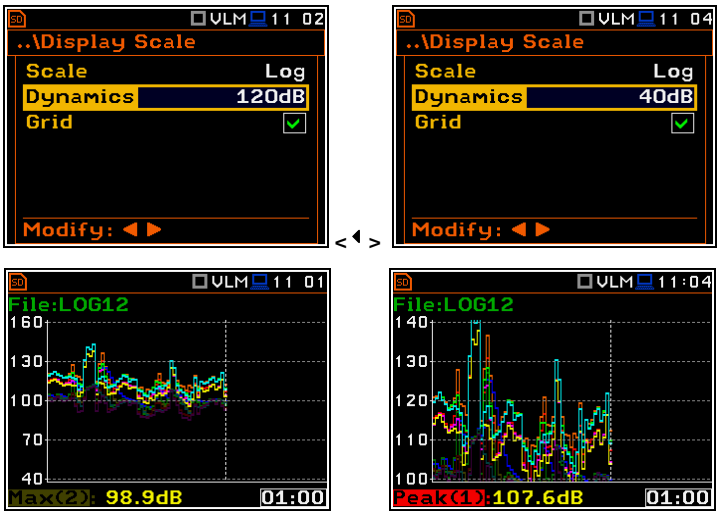
In case of the sound measurements the **Scale** position is not active. All results are presented in dB.



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

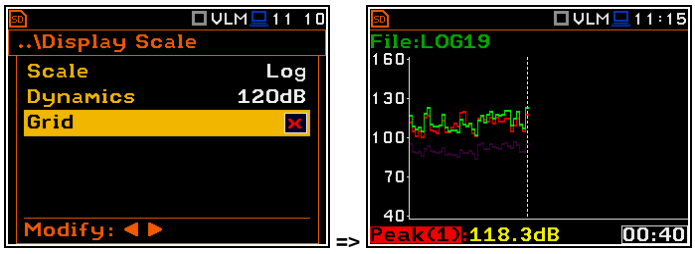
Scaling the vertical axis

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



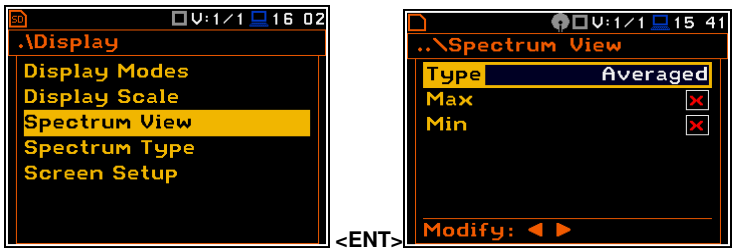
Switching the grid on/off

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

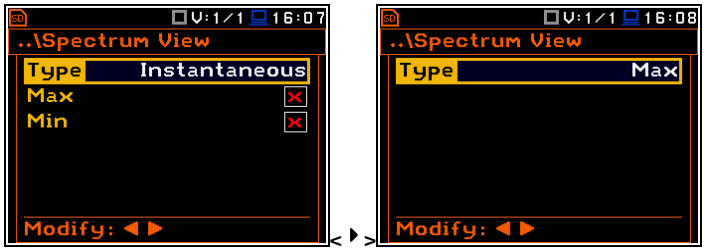


6.3 Setting the parameters of the spectrum presentation - Spectrum View

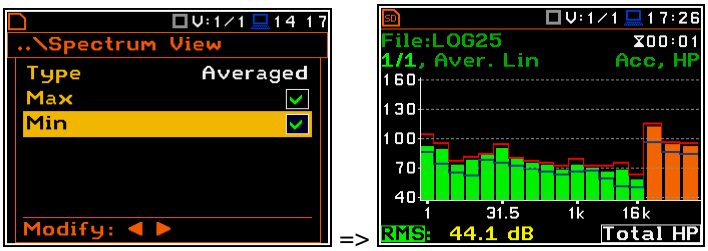
The **Spectrum View** position appears when **1/1 Octave** or **1/3 Octave** functions is selected in the **Measurement Function** window and enables the user to change the type of the spectrum (**Type**) and to activate the presentation on the display of the **Max** and **Min** values for every displayed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



In the **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** and **Min**.

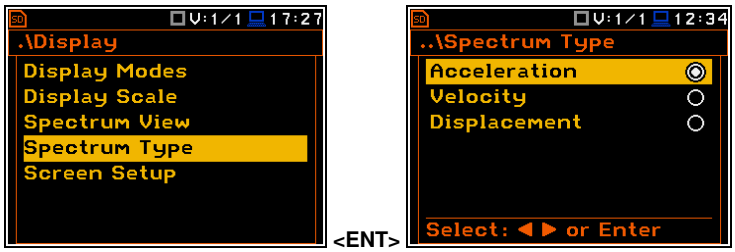


The minimum and maximum spectra can be presented at the same plot as main spectrum when the **Max** or **Min** parameter is switched on. A red line shows the maximum levels in every band while a blue line shows the minimum levels if selected by the user.



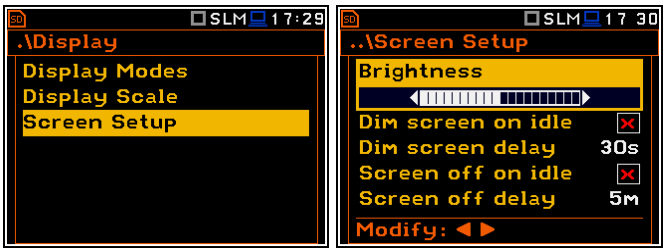
6.4 Selection of the Spectrum Type in Vibration mode - Spectrum Type

The **Spectrum Type** position appears only in the Vibration measurement modes when **1/1 Octave** and **1/3 Octave** functions are selected in the **Measurement Function** window and enables the user to change the vibration spectrum type. This sub-list contains three positions: **Acceleration**, **Velocity** or **Displacement**.



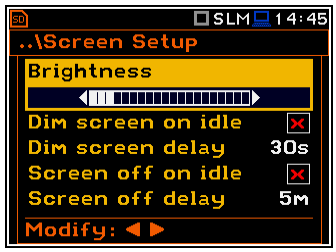
6.5 Setting the display brightness and power saver- Screen Setup

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



Setting the brightness of the display

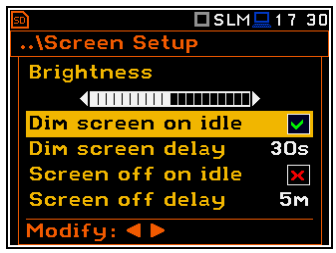
The **Brightness** position enables the user to set the proper brightness of the display by means of the <◀>, <▶> push-buttons. The user can select 20 different values of this parameter. The new value of the brightness level is confirmed after each press of the <◀> or <▶> push-buttons.



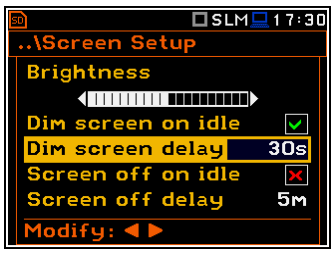
Setting the power saver function

The saving of the internal source of the instrument's power 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.



Setting the power saver delay

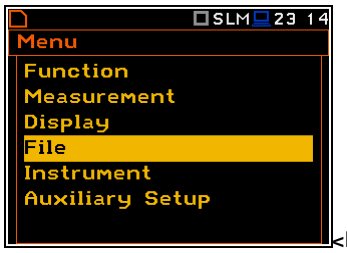


The power saver delay defines the delay period from last use of any push-button to the power saver mode. This delay period can be set for **Dim screen on idle** from **5 s** to **60 s** and for **Screen off on idle** from **1 m** to **60 m**. The **<ENTER>** push-button must be pressed for confirmation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

7. 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 (**micro SD Card**) fitted behind the bottom cover of the instrument.

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



<ENT>

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

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

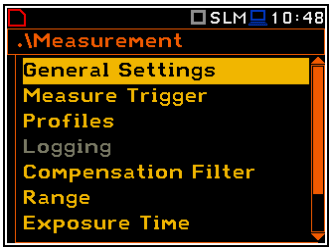
Notice: *Positions in the* ***File*** *list are active only when an* ***SD Card*** *is inserted into the card slot behind the bottom cover of the instrument. After the user's attempt to enter any position in the* ***File*** *list the warning appears if there is no SD card fitted.*

Instrument's files may contain data:

- measurement and time history results,spectra, event and marker recording;
- time waveform recordings; (available as an option)
- measurement configuration 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 not any possibility to create any data files. In such cases the* ***Logging*** *position in the* ***Measurement*** *list is not active and will not be 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 (**Level Meter**, **1/1 Octave**, **1/3 Octave**, etc.), logging settings. These elements are as follows:

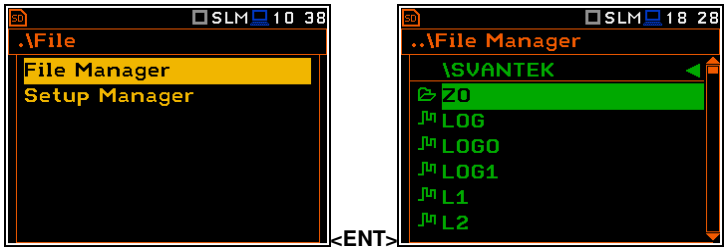
- the main results,
- the results of statistical analysis,
- the data stored during the measurements in the logger's file,
- audio time waveform recording,
- the results coming from **1/1 Octave** analysis,
- the results coming from **1/3 Octave** analysis,
- the results coming from **FFT** analysis.

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 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.

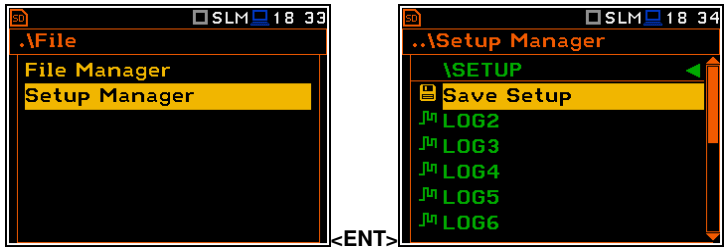


Notice: *In the current version of the firmware it is possible only to look through the file list of the SVANTEK catalogue. Other operations can be performed on the SD card by means of PC.*

7.2 Managing the setup files – Setup Manager

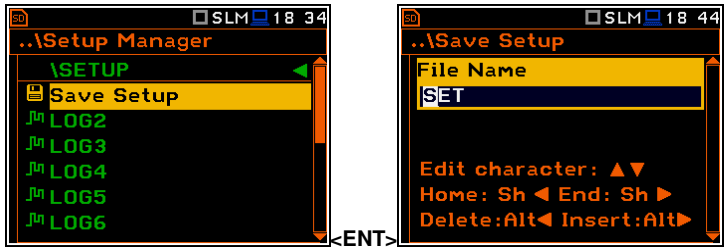
The **Setup Manager** enables the user to: save a new setup file and to select those ones that appear in the setup screen during start-up of the instrument, delete, and display file information.

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



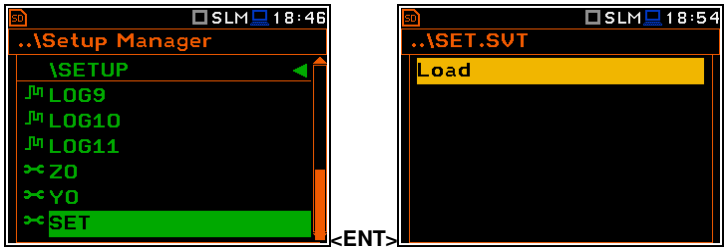
Saving setup files

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



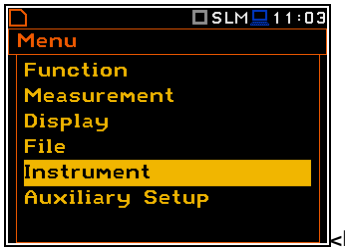
Loading setup files

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

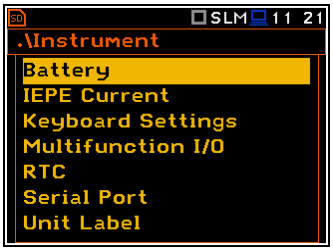


8. SETTING OF THE INSTRUMENT PARAMETERS – Instrument

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>**.



<ENT>



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.

IEPE Current enables the user to choose the correct IEPE current supply.

Keyboard Settings enables the user to set the operating mode of the **<Shift>** and the **<Start/Stop>** push-buttons.

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

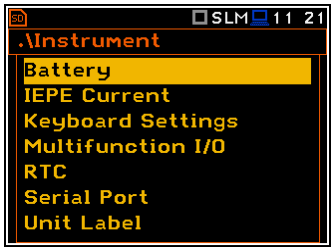
RTC enables the user to set the Real Time Clock.

Serial Port enables the user to set the transmission speed and the timeout in the RS232 interface.

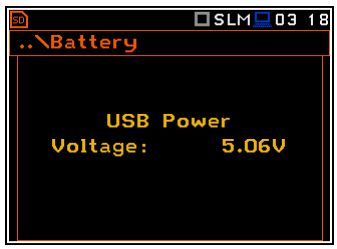
Unit Label enables the user to check information about the type of the instrument, its serial number, the current software versions installed in it and the standards, which the instrument fulfils.

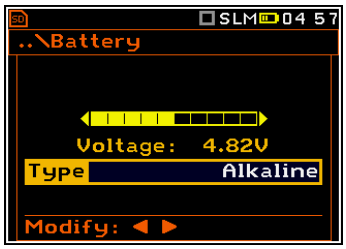
8.1. Checking the powering of the instrument – Battery

The **Battery** position enables the user to check the power source of the instrument: internal battery condition, source and voltage of the external power supply, and also set the battery type for checking their condition. The instrument can be powered from an external DC power supply, from the external battery pack, from four AA rechargeable or standard alkaline batteries or from the USB interface when its USB Device socket is connected by means of the SC 16 cable to a PC.



The view presented on the display for each of three kinds of possible power sources is different. The current battery voltage is displayed together with its approximate state (in graphical format).



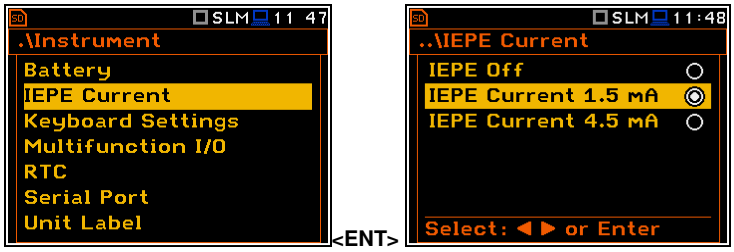


When the instrument is powered from a set of internal batteries the user should select the correct type. It is essential for the right detection of the capacity of the battery pack. Two types are available: **Alkaline** and **Rechargeable**.

8.2. Selection of the IEPE current supply - IEPE Current

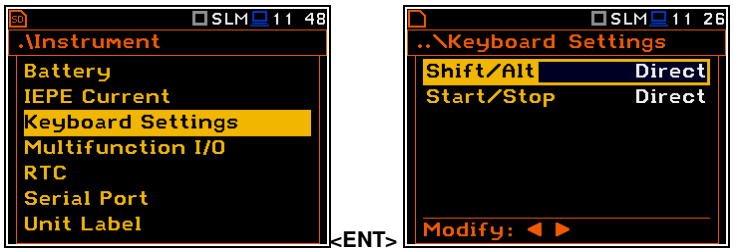
The **IEPE Current** position enables the user to choose the correct IEPE current supply.

In addition to selecting **IEPE Off** two further options are available: **1.5 mA** and **4.5 mA**. Select the appropriate IEPE current supply to most closely match the requirements of the connected input source.



8.3. Selection of keyboard modes – Keyboard Settings

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



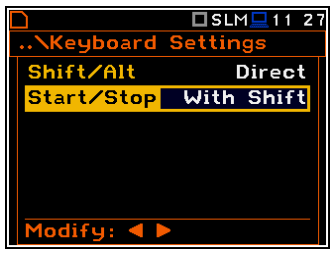
<Shift> / <Alt> push-button mode

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

<Start/Stop> push-button working mode selection

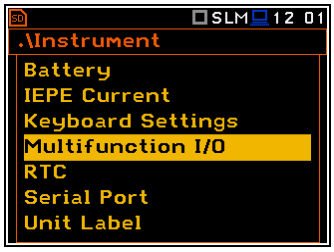
In the **Start/Stop** position the user can choose between **Direct** and **With Shift**. When the **Direct** option is selected the instrument reacts on each of the **<Start/Stop>** push-button press, starting or stopping the measurements.

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

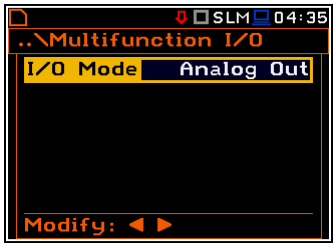


8.4. Setting parameters of the I/O port - Multifunction I/O

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



<ENT>



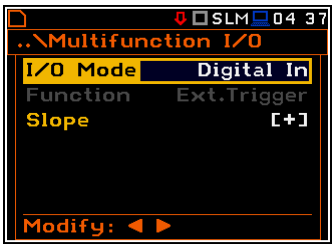
Selection of the mode of I/O port

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**.

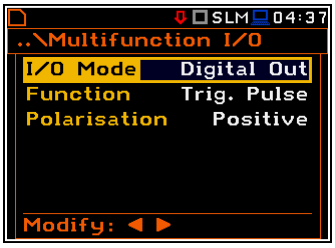
The **I/O** jack socket can be used as:

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

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

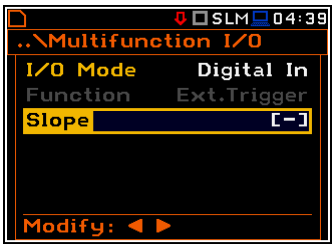


<>



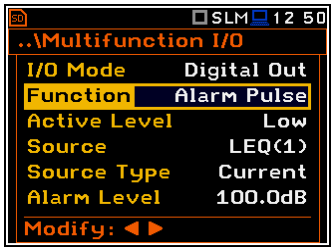
Slope parameter selection for the Digital In mode (Trigger function)

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



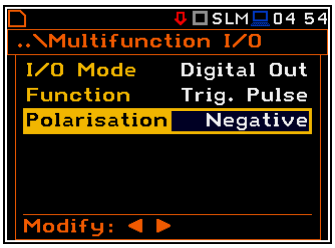
Digital output function selection of the I/O socket

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

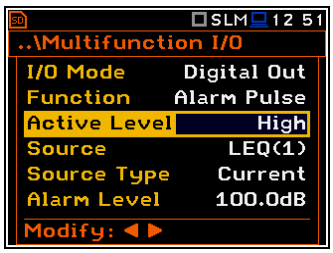


Polarisation selection of the digital output signal

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

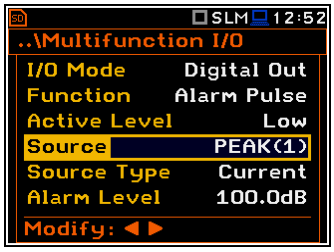


Active level selection of the digital output signal



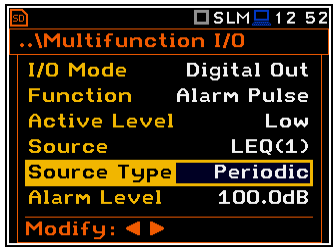
The **Active Level** position enables the user to select which level of the signal should be treated as a valid one ("negative" or "positive" logic): **Low** or **High**.

Source signal selection for the alarm pulse generation



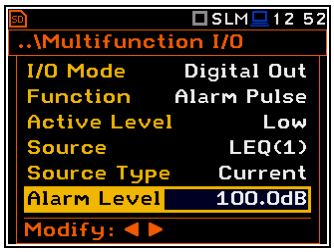
The **Source** position enables the user to select the measurement result which level should be checked. If the measured result level is greater than selected alarm level, the instrument will generate alarm signal on the **I/O** socket. The measurement results from the first profile: **PEAK(1)**, **SPL(1)**,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

Selection of the alarm source type



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

Alarm level selection on the digital output of I/O

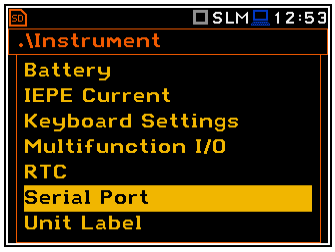


The **Alarm Level** enables the user to set the level of the result to be monitored during the measurements. If the result is greater than the one set in this line, the instrument will generate the alarm signal in the selected logic. The available levels are within the range [30.0 dB, 140 dB].

The **Alarm Level** current value can be decreased / increased by 0.1 dB by means of the <◀> / <▶> push-buttons. The step can be decreased / increased up to 1 dB after simultaneously pressing the <◀> / <▶> push-buttons together with **<Shift>**.

8.5. Setting the parameters of the serial interface - Serial Port

The **RS232** position enables the user to programme the RS 232 interface transmission speed (**Baud Rate**) and to set the time limit during which the communication operation should be performed (**Time Out**).



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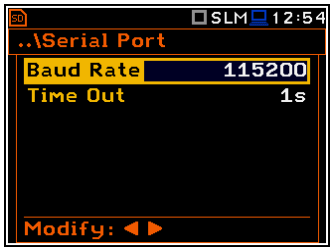


Setting the transmission speed of the serial interface

The RS 232 interface transmission (**Baud Rate**) speed can be selected from the following available values: **1200** (bits / second), **2400** (bits / s), **4800** (bits / s), **9600** (bits / s), **19200** (bits / s), **38000** (bits / s), **57600** (bits / s) or **115200** (bits / s). The selection is made by means of the <◀>, <▶> push-buttons. The

setting here should be the same as the connected instrument or computer to ensure successful data transfer.

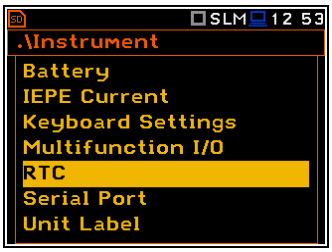
The other RS 232 transmission parameters are fixed to **8 bits for data**, **No parity** & **1 Stop bit**.

Setting time limit for the performance of serial interface operation

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

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

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



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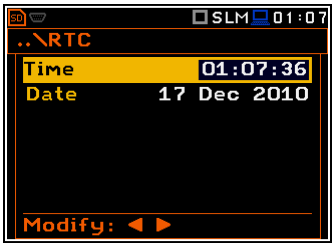
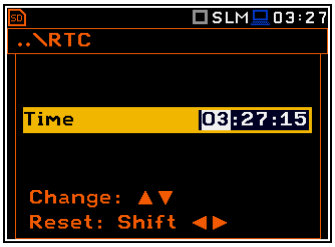


The required hour, minute and second can be selected in a special window, which is opened by means of the <◄>, <►> push-buttons.

In order to set hours, minutes or seconds the user has to enter the correct field position by pressing the <◄>, <►> push button and then select the correct value by means of the <▲>, <▼> push-buttons. To set the chosen value the user has to press the **<ENTER>** push-button.



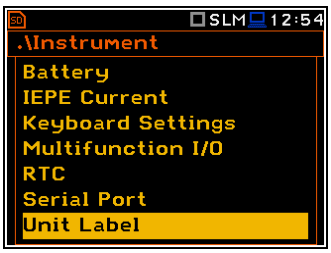
The required date can be selected in a special window, which is opened after pressing the <◄>, <►> push-buttons when the **Date** text is displayed inversely in the **Timer** sub-list.

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

8.7. Checking specification of the instrument - Unit Label

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

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



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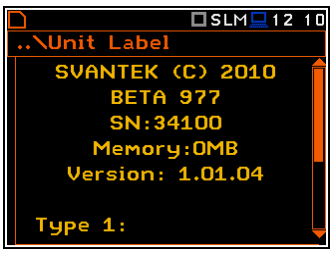
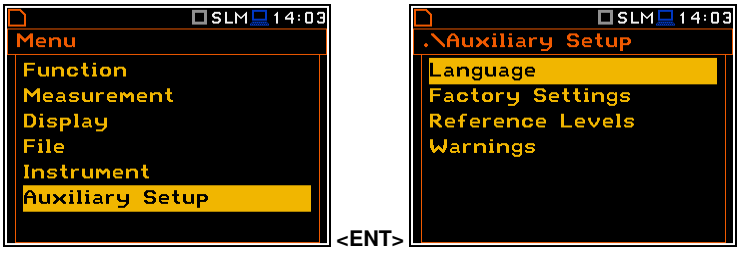


Notice: *The contents of the* ***Unit Label*** *window should be always sent to Svantek's service department or official representative in case of any problems faced by the user during the instrument's normal operation in the field.*

9. AUXILIARY SETTINGS – Auxiliary Setup

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



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

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

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

Reference Levels enables the user to select the reference level for the Vibration measurements and it informs the user about the reference level in the Sound measurements.

User Filters enables the user to select and set the correcting values for all real-time and the 1/1 and 1/3 octave filters. This position appears only with **1/1 Octave** and **1/3 Octave** functions.

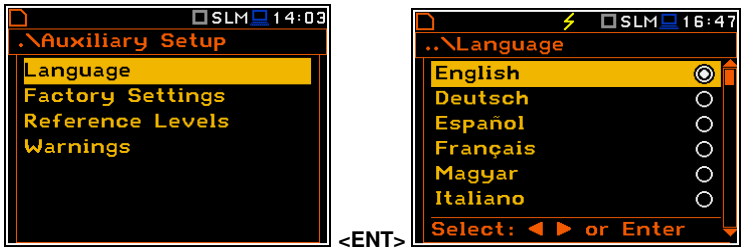
Vibration Units enables the user to select the Vibration units in which the results of the measurements are to be given. This position appears only in Vibration modes.

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** sub-list 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.

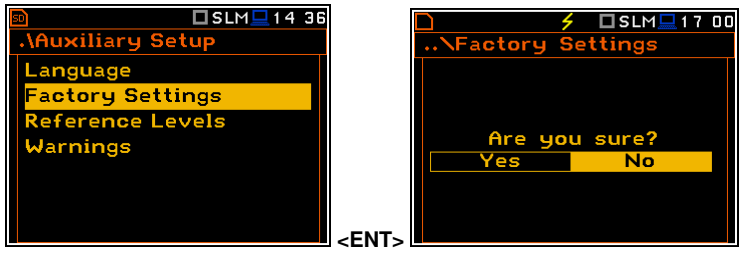
If after power on unknown language interface appears on the display the user can reset the instrument by means of the four **<Shift/Enter/Alt/Start>** push-buttons pressed together. After this the instrument will go back to the default setup with the English interface.



9.2. Return to the factory settings – Factory Settings

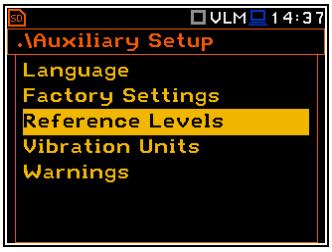
The **Factory Settings** sub-list enables the user to return to the default setup of the instrument.

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



9.3. Reference signal in vibration measurements - Reference Levels

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



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Reference level for vibration measurements

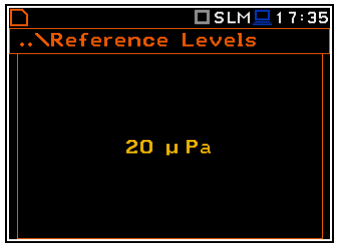
In the **Acc** position the user can set the reference level of the acceleration signal. It is possible to set this level from 1 μms^{-2} to 100 μms^{-2}.

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

In the **Dil** position the user can set the reference level of the displacement signal. It is possible to set this level from 1 pm to 100 pm.

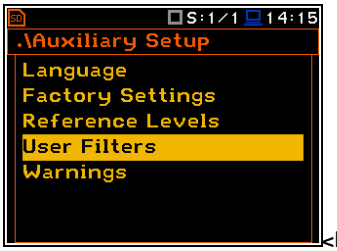
Reference level for sound measurements

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



9.4. Setting the coefficients of the user filters - User Filters

The **User Filters** position enables the user to introduce the values of the coefficients of the user defined filters. Currently this function is not available.



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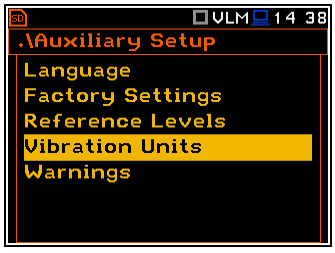
9.5. Selection of the Vibration units - Vibration Units

The **Vibration Units** sub-list enables the user to select the units for the Vibration measurements (this position is available only in Vibration modes).

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



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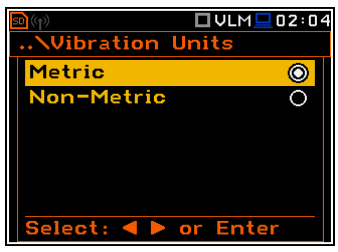
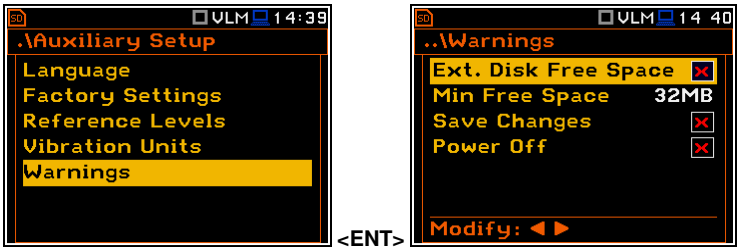
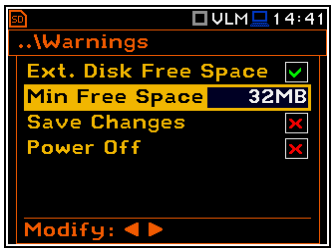


9.6. Warnings setup – Warnings

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



Checking free space on the external disk



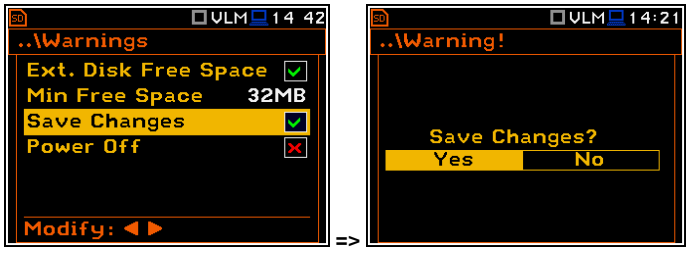
The position **Ext. Disk Free Space** switches on or off the checking of free space on the external memory and generates the warning when the space is lower than **Min Free Space**.

Minimum memory free space setting

In the line **Min Free Space**, the user can determine the amount of the **SD card** memory free space. The selected limit has to be within the range [1 MB, 1024 MB]. If the available memory is not greater than that limit, the warning will be displayed.

Confirmation of parameter changes

In the line **Save Changes** the user can switch on the option of confirmation of parameters changes, after exit the screen with the parameter list by means of the **<ESC>** push-button.



Confirmation of the instrument switch off

If the **Power Off** parameter is switch on then the instrument will display the warning message in case the user is switching the instrument off.

10. 1/1 AND 1/3 OCTAVE ANALYSER

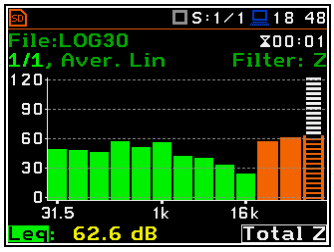
The instrument operates as real time **1/1 Octave** or **1/3 Octave** analyser (RTA) in a very similar way to the **Level Meter** mode and, in addition, **1/1 Octave** or **1/3 Octave** analysis is performed in parallel with the **SLM**/ **VLM** operations. All 1/1-octave (with 10/15 centre frequencies from 16kHz down to 31.5Hz/1.0Hz; in base two system for Sound/Vibration measurements) and 1/3-octave (with 31/45 centre frequencies from 20kHz down to 20Hz/0,8Hz; in base two system for Sound/Vibration measurements) digital pass-band filters are working in real-time with the weighting filters (**Z**, **A**, **B** or **C** - in the case of sound analysis; **HP** - in the case of vibration analysis) selected in the **Spectrum** (*path: Menu / Measurement / Spectrum / Filter*) and the linear RMS (Leq) detector. This enables the user to pre-weight a spectrum with one of the selected broadband frequency curves if required for a particular application such as the provision of hearing protectors in the control of high workplace noise levels.

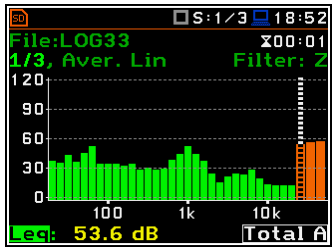
Notice: *The TOTAL RMS results are measured with the weighting filters (**A**, **C** and **Z** - in the case of sound measurements; **HP**, **HP3** and **HP10**– in the case of vibration measurements) without taking into account the settings of the level meters for profiles**.** The spectra are always 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 **RMS Integration** was set as **Exp**).*

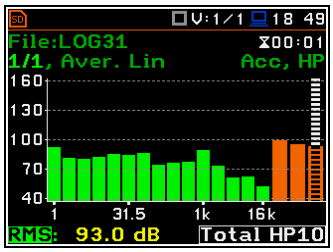
The **SVAN 977** instrument operates in two ranges, called **Low** and **High**, which can be selected in the **Range** window *(path: <Menu> / Measurement / Range)*.

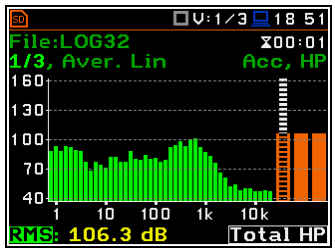
The results of **1/1 Octave** and **1/3 Octave** analysis (so-called spectrum) can be examined by the user on a display in the **Spectrum** presentation mode. The availability of this mode can be switched on or off by the user (*path: <Menu> / Display / Display Modes)*.

1/1 Octave and **1/3 Octave** spectra for all centre frequencies of pass-band filters together with the **Total** overall values measured with preselected frequency weighting filters are presented in the **Spectrum** mode if selected in the spectrum display menu. The read-out of the value of interest in the spectrum can be done in Sound modes and in Vibration modes of the presentation using a vertical cursor on the screen.



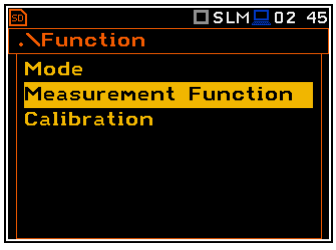




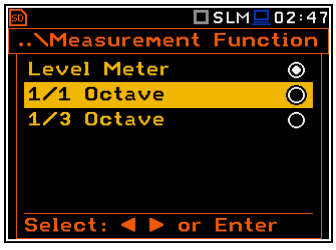


11.1. Selection of 1/1 Octave or 1/3 Octave analysis mode

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; highlight the required analysis bandwidth and press **<ENTER>**.



<ENT>



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

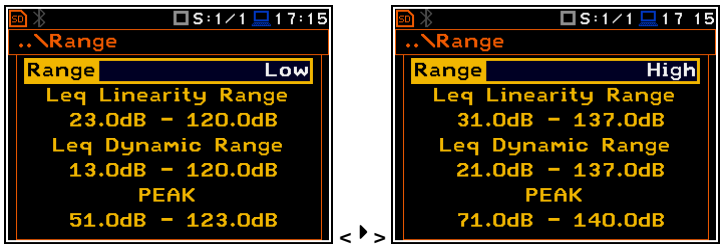
11.2. Selecting the parameters of 1/1 Octave and 1/3 Octave analysis

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

The output of the selected **1/1 Octave** or **1/3 Octave** filter can be also used as the triggering signal in the **Logger Trigger** window (*path: <Menu> / Measurement / Logging / Logger Trigger*).

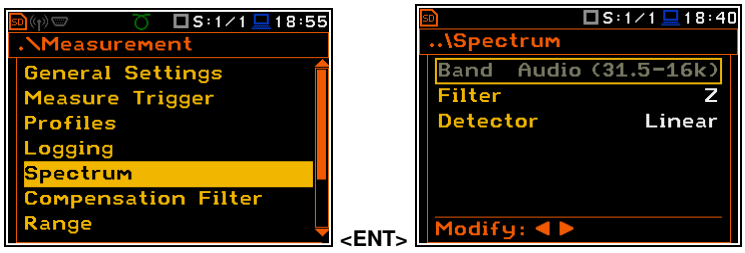
11.3. Measurement range selection in 1/1 Octave and 1/3 Octave analysis - Range

In the **1/1 Octave** or **1/3 Octave** analyser the user can select the input ranges specified in Appendix C, named as **Low** and **High**. The selection of the input range is possible after entering the **Range** window of the **Measurement** list.



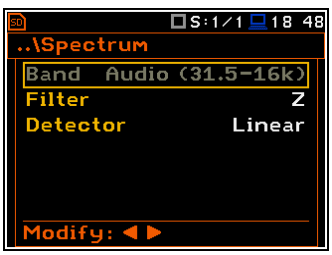
11.4. Setting the parameters of 1/1 Octave and 1/3 Octave analysis - Spectrum

In the **1/1 Octave** or **1/3 Octave** mode a context element (**Spectrum**) appears on the **Measurement** list (*path: <Menu> / Measurement / Spectrum)*. In the **Spectrum** window the user can select the pre-weighting broadband frequency filter and the band in the case of sound measurements.



Selection the band

The **Band** position informs the user about the applied band of **1/1 Octave** or **1/3 Octave** analysis. Available values of the bands of the analysis are as follows:

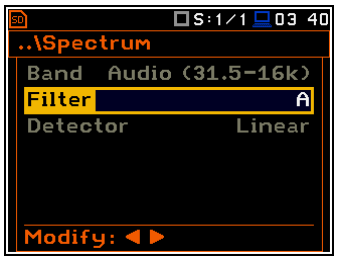


- for Sound 1/1 Octave analysis from 31.5Hz to 16kHz: **Audio (31.5-16k)**;
- for Sound 1/3 Octave analysis from 20Hz to 20kHz: **Audio (20-20k)**;
- for Vibration 1/1 Octave analysis from 1Hz to 16kHz: **Full (1-16k)**;
- for Vibration 1/3 Octave analysis from 0.8Hz to 20kHz: **Full (0.8-20k)**.

The following pre-weighting filters are available in **1/1 Octave** and **1/1 Octave** analysis of sound:

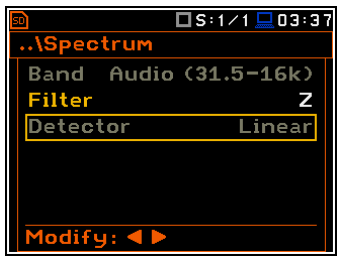
- **A** type 1 according to the IEC 651 and IEC 61672-1 standards,
- **C** type 1 according to the IEC 651 and IEC 61672-1 standards,
- **B** type 1 according to the IEC 651 standard,
- **Z** type 1 according to the IEC 61672-1 standard
- **HP** type 1 according to the IEC 61672-1 standard (vibration only)

The characteristics of the filters are given in Appendix D.



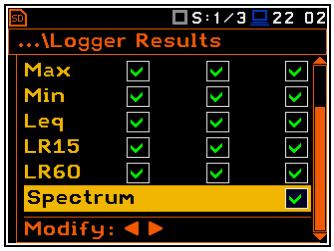
Detector for 1/1 Octave or 1/3 Octave analysis

The **Detector** position informs the user about the default **Linear** detector for the **1/1 Octave** or **1/3 Octave** analysis.



11.5. Saving of 1/1 Octave and 1/3 Octave analysis results - Logger Results

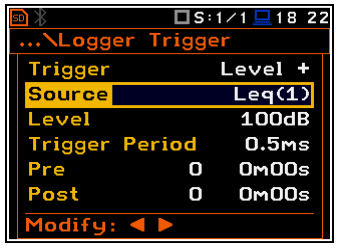
The **RMS** results from **1/1 Octave** or **1/1 Octave** analysis can be saved in the logger's file. The spectrum saving in the logger file is defined by activation / deactivation in the **Spectrum** position by means of the <◀>, <▶> push-buttons.



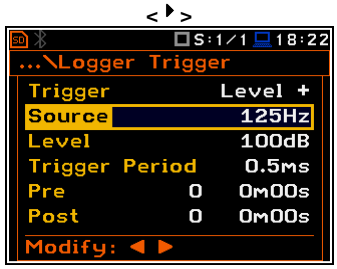
11.6. Selecting the result which triggers recording for the logger in 1/1 Octave and 1/3 Octave analysis - Logger Trigger

In the **SLM** mode the **Leq** result from the first profile (**Leq(1)**) only is used for triggering the measurement results recording for the logger of the instrument. The **Source** position in the **Logger Trigger** window is not accessible in that mode. However, in **1/1 Octave** or **1/1 Octave** analysis it is possible to access mentioned above position and to make a selection of a specific filter band for triggering purposes.

The results coming from the output of the **1/1 Octave** filters (**125 Hz**, **250 Hz**, **500 Hz**, **1.00 kHz**, **2.00 kHz**, **4.00 kHz**, **8.00 kHz** and **16.0 kHz**), or **1/3 Octave** filters (**125 Hz**, **160 Hz**, **200 Hz**, **250 Hz**, **315 Hz**, **400 Hz**, **500 Hz**, **630 Hz**, **800 Hz**, **1.00 kHz**, **1.25 kHz**, **1.60 kHz**, **2.00 kHz**, **2.50 kHz**, **3.15 kHz**, **4.00 kHz**, **5.00 kHz**, **6.30 kHz**, **8.00 kHz** **10.00 kHz**, **12.50 kHz**, **16.0 kHz** and **20.0 kHz**), are available as well as the **Leq** or **RMS** result from the first profile.



<◀▶>



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

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

Display Modes enables the user to select the mode of the presentation the **1/1 Octave** or **1/3 Octave** spectra;

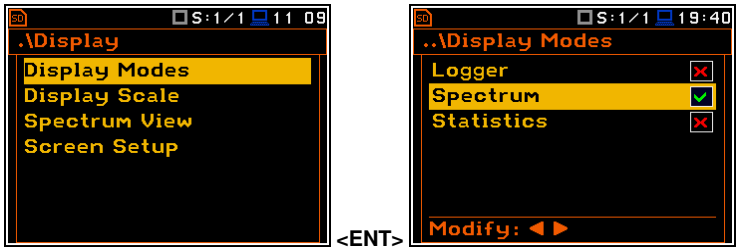
Display Scale enables the user to change the scale of the vertical and horizontal axis of the spectra presentation and switch on or off the grid;

Spectrum View enables the user to choose the type of the spectrum to be presented and to activate the **Max** and **Min** spectrum;

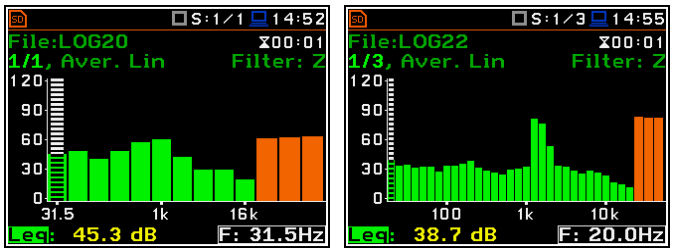
Spectrum Type enables the user to change the spectrum type presented on the display: **Acceleration**, **Velocity** and **Displacement**.

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

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

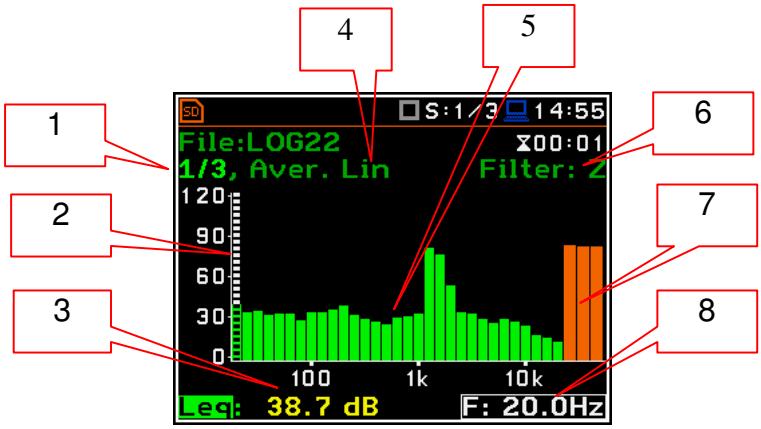


When the **Spectrum** mode is switched on the measurement screen in the **Spectrum** visualisation mode is shown here for octave and third octave bands in the sound mode.

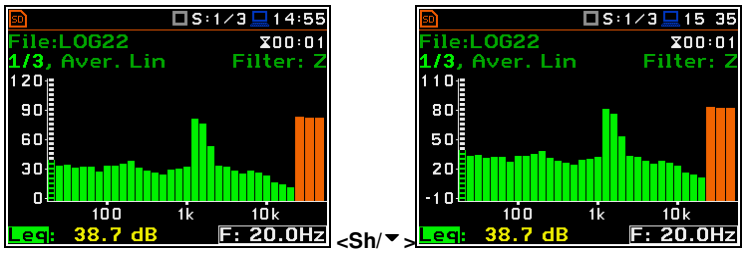


Field description of the Spectrum view

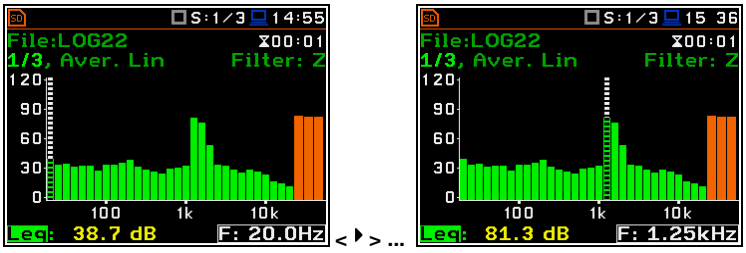
1. Type of spectrum
2. Cursor position
3. Value for the cursor position
4. Averaging used
5. Spectrum plot
6. Frequency weighting filter used
7. Total values
8. Central frequency for the cursor position



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

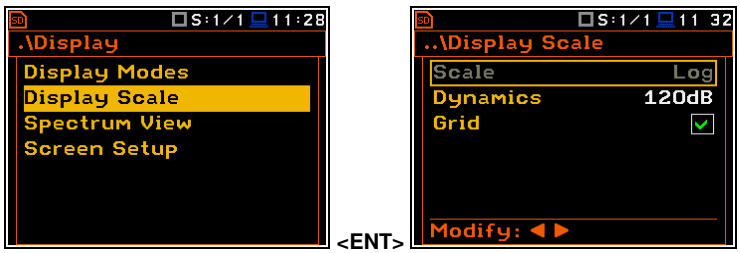


The user may change the cursor position by means of the <◀>, <▶> push-buttons. The frequency and the appropriate value are presented in the line below the plot. The user can change quickly to the first or last spectrum line by simultaneously pressing the <◀> or <▶> buttons with <**Shift**>.



11.9. Setting the scale of the spectrum presentation and the grid - Scale

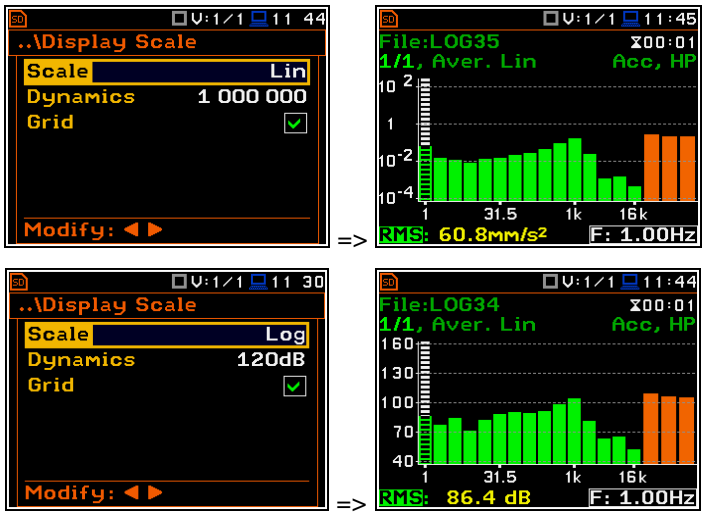
The **Display Scale** sub-list enables the user to change the scale in the available modes of graphical presentation of the measurement results and to switch the grid on or off.



Setting the scale of the measurement results presentation

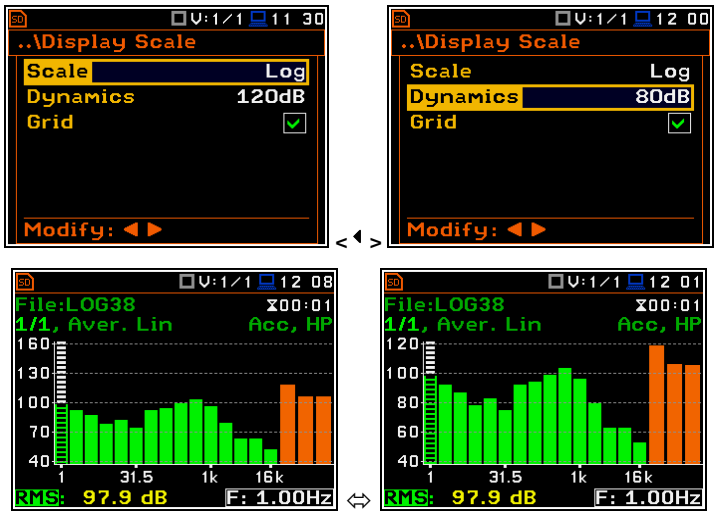
The **Scale** position is accessible only in case of Vibration measurement modes. Two options are available: **Lin** (linear) and **Log** (logarithmic). In case of **Lin** the graphical presentation and the units are linear. In case of **Log** the graphical presentation is given in the logarithmic scale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

In case of the sound measurements the **Scale** position is not active. All results are presented in dB.



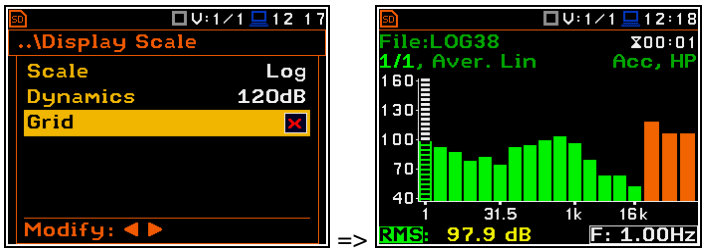
Scaling the vertical axis

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



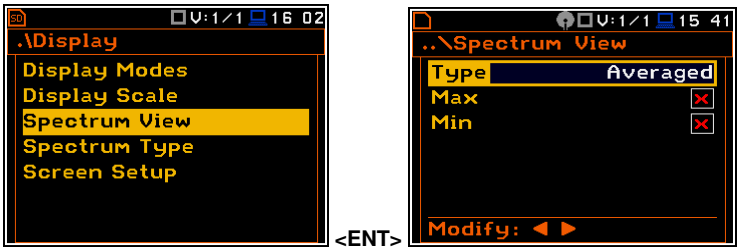
Switching the grid on/off

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

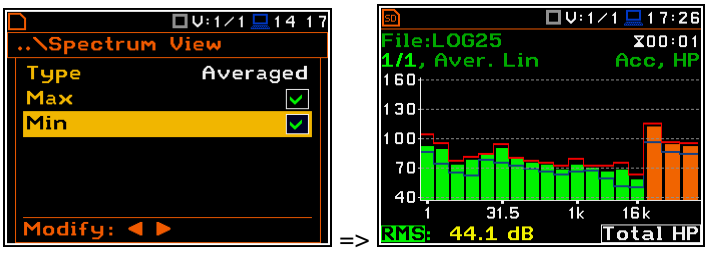


11.10. Setting the parameters of the spectrum presentation - Spectrum View

The user can select the different spectra to be visible on the display in the **Spectrum View** window (*path: <Menu> / Display / Spectrum View*). In the **Spectrum View** window the following spectrum types may be selected: **Averaged**, **Instantaneous**, **Max** or **Min**.

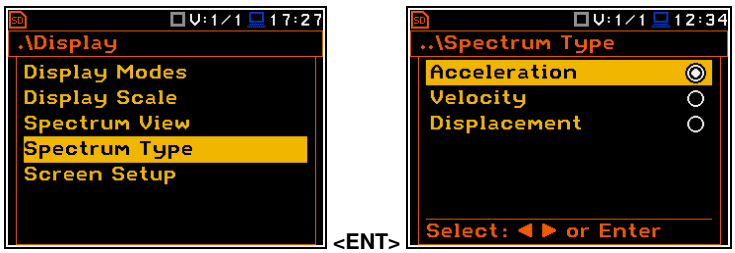


When the **Averaged** or **Instantaneous** spectrum is selected the user can additionally switch on or off the presentation of the **Max** and/or **Min** values for every displayed spectrum band by placing or replacing the special character in the displayed inversely line with the **Max** or **Min** text by means of the **<◀>**, **<▶>** push-buttons.



11.11. Selection of the Spectrum Type in Vibration mode - Spectrum Type

The user can select the different type of vibration spectrum to be presented on the display in the **Spectrum Type** window (*path: <Menu> / Display / Spectrum Type*). The **Spectrum Type** position is available only for Vibration modes and the following spectrum types can be selected in the **Spectrum Type** window: **Acceleration**, **Velocity** or **Displacement**.



11.12. Setting filter coefficients for 1/1 Octave and 1/3 Octave analysis - Spectrum Based Filter

The **User Filters** position enables the user to introduce the values of the coefficients of the user filters. Currently this function is not available.