SVAN 971

Pocket-size Sound Level Meter&Analyser

USER MANUAL

WARSAW, December 2012

© SVANTEK

> ⚠ **Notice:** *This user manual presents the software revision named 1.06.3 (cf. the description of the* **Unit Label** *position of the* **Instrument** *list). Newer software revisions (higher numbers) can slightly change the view of some displays presented in the text of the manual.*

CONTENTS

1   INTRODUCTION

The **SVAN 971** is an extremely small Type 1 IEC 61672 Sound Level Meter (SLM) and real time 1/1 & 1/3 octave analyzer (RTA). The instrument represents State of the Art technological design bringing unprecedented levels of SLM and RTA integration.

The new user interface of this instrument makes measurement configuration as easy as possible. This all makes **SVAN 971** an ideal choice for industrial hygiene noise measurements, short period environmental noise measurements, acoustics consultancy survays, technical engineers dealing with noise issues and general acoustics noise measurements.

The **SVAN 971** provides broad band results with all required frequency weighting filters plus real time 1/1 octave & 1/3 octave spectra in the auduo range.

The instrument enables huge time history logging capability providing broad band results and spectra with adjustable double (long and short) logging steps. Audio recording on user selectable trigger conditions complete the logging functionality. Data are stored on a micro SD memory card and can be easily downloaded to PC (with the provided SvanPC++ software) over USB or optional RS 232 interfaces.

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

Thanks to a robust (IP65) and pocket size housing, this instrument is an excellent tool for anyone who deals with acoustic measurements.

The **SVAN 971** comes with SvanPC++ software for data download, visualization, basic post-processing and exporting to commonly used office software applications. Additionally, a dedicated software package for environmental monitoring (SvanPC++_EM) is also available. This module supports measurement data management, advanced data processing and analysis, visualization and automated reporting.

1.1   SVAN 971 as Sound Level Meter & Analyser

- noise measurements: **SPL**, **LEQ**, **SEL**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **PEAK**, **MAX**, **MIN**, running LEQ (**LR15** and **LR60**) and statistics (**LN%**) with Type 1 IEC 61672:2002 accuracy in the frequency range 10 Hz ÷ 20 kHz with **ACO 7052E** microphone (38mV/Pa, prepolarised ½" condenser microphone);

- parallel **Impulse**, **Fast** and **Slow** detectors for the measurements with **A**, **B**, **C** and **Z** frequency filters;

- total linearity measurement range **25 dBA LEQ ÷ 140 dB PEAK**; is divided into two ranges:
  - low range: **25 dBA LEQ ÷ 123 dB PEAK**
  - high range: **30 dBA LEQ ÷ 140 dB PEAK**

- **1/1 Octave** real-time analysis meeting Type 1 requirements of IEC 61260, 10 centre frequencies from 31.5 Hz to 16 kHz (option) available simultaneously with three user definable profiles for broadband measurements (SLM), time history logging and audio recording;

- **1/3 Octave** real-time analysis meeting Type 1 requirements of IEC 61260, 31 centre frequencies from 20 Hz to 20 kHz (option) available simultaneously with three user definable profiles for broadband measurements (SLM), time history logging and audio recording.

1.2   General features of SVAN 971

- Sound Level Meter in extremely small pocket size body
- Noise measurements meeting Type 1 IEC 61672-1 accuracy
- Two overlapping wide measurement ranges
- 1/1 & 1/3 octave real-time frequency analysis
- Dosimeter function for personal noise monitoring in the workplace
- Audio event recording (voice recording)
- Statistical analysis with up to 10 percentile values
- Time-history with two logging step intervals
- Automated calibration start and save
- Free-field & diffuse-field measurements
- Integration measurement run time programmable up to 24 h
- Setup editor available with SvanPC++ software
- Ready to use with predefined setups and reports in H&S mode of SvanPC++ software
- Advanced modules for data processing and reporting SvanPC++_DM and SvanPC++_EM
- Super contrast color OLED display
- Wide range of temperature operating conditions
- Protection rating IP 65 for use in the field
- Very handy, light weight and robust pocket size case
- Easy and friendly user interface for quick start and stop

1.3   Accessories included

- **SV 7052** - microphone capsule (38mV/Pa, prepolarised ½" condenser microphone)
- **SV 18** - built-in non removable microphone preamplifier
- **SC 156 -** micro USB cable
- **SA 62** - micro SD memory card 4 GB capacity
- **SA 22** – foam windscreen
- **four AAA** batteries
- **CD** with instruction
- **SvanPC++** for Windows XP/VISTA7/ operating system.

1.4   Accessories available

- **SV 31_1**   Type 1 acoustic calibrator: 1000 Hz/114 dB
- **SC 91/5**   Extension cable for SV18 (SVAN 971), 5 meters (for laboratory purposes)
- **SA 72**   Carrying case for SVAN 971 and accessories (waterproof)
- **SvanPC++_EM** Environmental monitoring module for SvanPC++ (hardware key, single license)

1.5   Instrument Software options available (firmware)

- **SVAN 971**   Type 1 Sound Level Meter including time history logging
- **SVAN 971PACK** Type 1 Sound Level Meter including time history logging, 1/1 & 1/3 octave analysis
- **SV 971_1**   1/1 octave analysis option
- **SV 971_3**   1/1 & 1/3 octave analysis option
- **SV 971_15**   Audio events recording option (time waveform recording as wav format files)
- **SvanPC++**   PC Software for viewing and exporting data, USB drivers (MS Windows XP, Vista, Windows 7)

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

2 MANUAL CONTROL OF THE INSTRUMENT

Control of the instrument has been developed in a fully interactive manner. The user can operate the instrument by selecting the appropriate position from the screen **Menu** list. Thanks to that, the number of the control push-buttons of the instrument has been reduced to eight 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:

- **<ESC>, (<P/S>)**,
- **<ENTER>, (<Menu>)**,
- **<⏶>**,
- **<⏴>**,
- **<⏵>**,
- **<⏷>**.
- **<Shift>**,
- **<Start/Stop>**,

The action 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.

<Shift>   The second function of a push-button (**P/S** and **Menu**) can be used when the **<Shift>** push-button is pressed together with **<ESC>** or **<Enter>**. This push-button can be used in two different ways:

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

⚠️   *Notice: The simultaneously pressing the **<Shift>** and **<Start/Stop>** push-buttons switches the instrument on or off.*

<Start/Stop>   This push-button enables the user to start and stop the measurement process.

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

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

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

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

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

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

(< ◄ >, < ► >)	The **< ◄ >, < ► >** push-buttons pressed in conjunction (or in sequence) with **<Shift>** enable theuser, in particular, to:

- select the parameters value in an active position (e.g. filter **Z**, **A** or **C**, Integration period: **1s**, **2s**, **3s**, … etc.);

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

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

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

- change the current profile in the measurement display mode,
- change the relationship between the Y-axis and X-axis of all plots presented on the screen,
- program the Real Time Clock (**RTC**) and delayed run **Timer**.

< ♪ >	The simultaneously pressing the **< ◄ >, < ► >** push buttons initiates recording of a voice signal as a comment (see. Paragraph 9.3 "Voice comments").

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. The **SV 18** microphone preamplifier has a specially designed matching plug with a locking screw to secure the preamplifier to the meter body. After plugging in the preamplifier 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 sockets is given in Appendix C.

Bottom cover of the instrument

In the bottom cover there is only one socket - **USB**. This socket has a special protection cover held in place by a small captive screw.
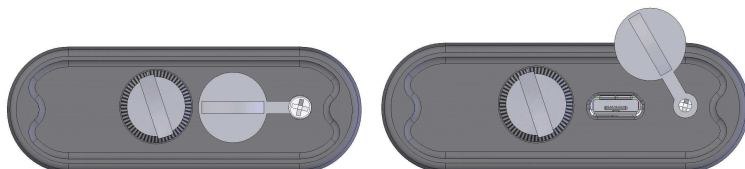
The **USB Device** 2.0 interface is the serial interface working with 12 MHz clock in the full speed mode and with 480MHz in the high speed mode, which is a default mode of the instrument. Thanks to its speed, it is widely used in all PCs. In the instrument, the standard 4-pin socket is used and described in detail in Appendix C.

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

3   <u>SETTING THE INSTRUMENT</u>

In order to perform measurements using the instrument the user only has to plug-in the preamplifier with the microphone already screwed on and to switch the power on by means of the **<Shift>** and **<Start/Stop>** push-buttons at the same time.

## 3.1.   Basis of the instrument's control

The instrument is controlled by means of eight push-buttons on the keypad. Using these push-buttons one can access all available functions and change the value of all available parameters. The functions are placed in a system of lists and sub-lists shown on the high contrast graphic colour display.

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

User interface Mode

The user interface may be presented in three modes: **Start/Stop**, **Simple** or **Advanced**. These modes can be selected in the **User Inter.** window of the **Instrument** menu. The **Simple** mode defines basic instrument functions, while the **Advanced** mode defines the full scope of available functions. Many windows can therefore have different view depending on the selected operational mode.

Start/Stop mode limits the menu to only one **User Inter.** window from **Menu** and measurement windows.
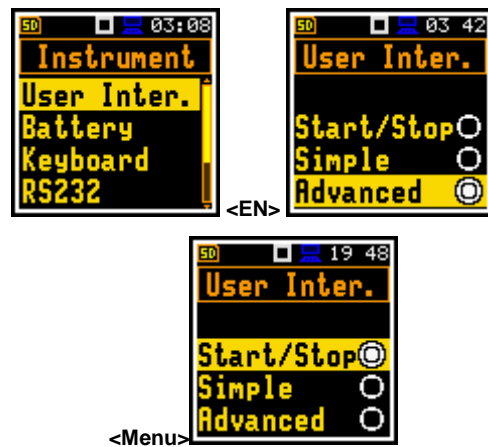
Main menu

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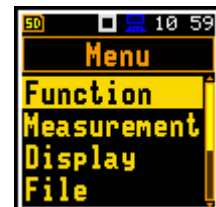
Recent Items list

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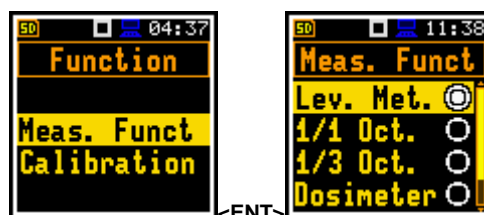
Position selection

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

Entering position

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

List of parameters

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

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

- The change of the value in a selected position is performed by the **<◄>** or **<►>** push-buttons (or pressed together with the **<Shift>** one).

Option list

The option list consists of different options, from which only one may be selected. The selection of the option is performed in the following way. The user has to highlight the desired option by means of the **<▲>** 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.
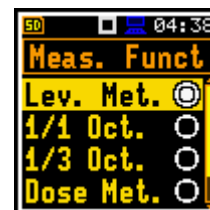
If the parameter has a numerical value the user may speed up selection by pressing the **<◄>** or **<►>** push-buttons (or pressed together with the **<Shift>** one) for longer than 2 seconds. In this case, the parameter starts to change automatically until the user releases the pressed buttons.

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 **<Shift>**.

**Matrix of parameters**

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

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

Complex parameters

Some parameters like **Start Hour**, **Start Day** etc. are complex (consisting of more than one value field). The selection of values for such parameters is performed in a special window, which is opened with the **<◄>** or **<►>** push-buttons. In the special, window the value is selected with the **<◄>**, **<►>** or **<▲>**, **<▼>** push-buttons and then is confirmed by pressing **<ENTER>**.
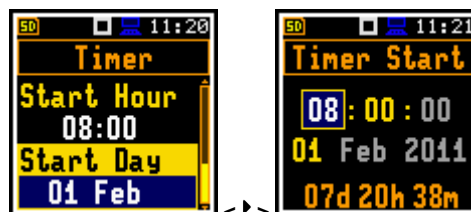
In all cases the **<ENTER>** push-button is used for confirmation of the selection in a position and for closing the opened sub-list. The sub-list is closed, ignoring any changes made in thr list by pressing the **<ESC>** push-button.

Information window

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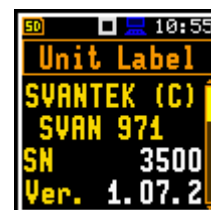
Text editing window

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

▪ One can select the position of the character in the edited text using the **< ◄ >**, **< ► >** push-buttons.

▪ The available ASCII characters can be changed using the **< ▲ >** or **< ▼ >** push-button. The subsequent digits, underline, upper case letters and space appear on the display in the inversely displayed position after each press of the push-buttons mentioned above.

▪ One can insert or delete the position in the edited text using the **< ◄ >**, **< ► >** push-buttons pressed together with **<Shift>**.

Help information

In most windows the last line or several lines contain help information. It informs the user how to select or modify the parameter's value, change the character in the text line etc. (**Delete: Sh<**, **Insert: Sh>**)

Inactive parameters

If some functions or parameters are not available, the positions in the menu or parameter lists linked with this function or parameter become inactive (the selected line field will be in frame with black background, not yellow). For example, if **Logger** (*path: <Menu> / Measurement / Logging / Logger Set.)* is switched off the other **Logging** positions are **not** active!

3.2. Powering of the instrument

The **SVAN 971** can be powered by one of the following sources:
- Four AAA standard size batteries fitted internally. 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 AAA 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 – 100 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 voltage of the batteries is too low for reliable measurements, the icon is red or during attempt to switch the instrument on the **Low Battery!** message occurs on the display for 2 seconds and the instrument switches off by itself. To change the batteries the user has to switch off the instrument, take off the black bottom cover of the instrument, unscrew battery cover, slide the battery tubes out, change the batteries taking care to observe the correct polarity and reassemble the parts of the instrument. The 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 SC 156 cable to a PC), the **"Computer"** icon is presented on the top of the display and in the **Battery** window, there is the **USB Power: Voltage: 5.00V** message.

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

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

3.3.   Initial Setup of the instrument

Switching the instrument on

To switch the power on the user should press the **<Shift>** and **<Start/Stop>** push-buttons at the same time. The instrument goes the self-test routine after switching on (in this time the manufacturer's logo and the name of the instrument is displayed) and then it enters the basic SPL view mode.

Starting measurement

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

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

Default Profile settings for Sound measurements:

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

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

Profile 3 - **Z** weighting filter (**Filter(3)=Z**), **Fast** for the detector (**Detector(3)=Fast**);
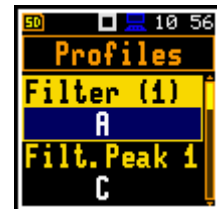
The user can change all the above mentioned settings using **Profiles** sub-list of the **Measurement** list. The instrument remembers all changes for the next time it is used. Return to the default settings (set up by the manufacturer) is possible after the selection of the **Factory Set.** position available in the **Aux. Setup** list.

3.4.   Icons description

Description of the instrument state

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

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

The meanings of the icons are as follows:

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

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

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

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

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

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

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

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

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

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

"RS232" icon is displayed when the RS232 port is activated.

"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.

3.5. Memory organisation

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

- SD card is inserted

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.

- no SD card

File manager

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

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

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

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

1. SD card should be inserted and there should be enough space on it.

2. The **Logger** (*path: <Menu> / Measurement / Logging / Logger Set.*) should be switched on.

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

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

The Setup files can be stored by means of **Setup Man.** list or by pressing **<Shift>** with **<ESC>** push-buttons from the measurement screen, when a measurement is not being made. All Setup files are stored in the default catalogue **SETUP** on the SD disk.
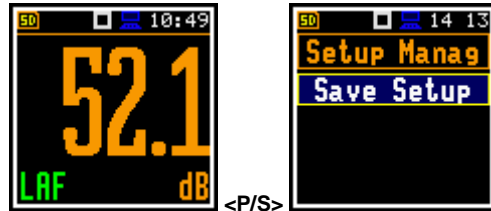
4 MEASUREMENT FUNCTIONS OF THE INSTRUMENT – Function

In order to select the **Function** list one has to press the **<Menu>** push-button, select the **Function** text and press **<ENTER>**. The **Function** list contains two elements: **Meas. Funct** and **Calibration**.

4.1. Measurement functions of the instrument – Meas. Funct

The main function of the instrument is the measurement of sound **pressure** level (**Lev. Met.**). The Sound Level Meter (SLM) function provides the user with functions meeting the standard IEC 61672:2002 for Type 1 accuracy. The instrument can also be used for medium to 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 analysis and dose meter (dosimeter) functions. These functions broaden the main Level Meter functions of the instrument, because 1/1 and 1/3 analysis as well as dose meter measurements are performed together with all calculations of the broadband Level Meter functions.

In order to select the required function the user has to enter the **Meas. Funct** list. After entering the **Meas. Funct** list, the set of the a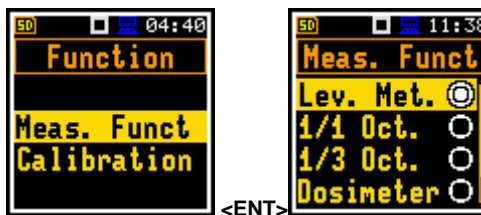vailable functions appears on the display: **Lev. Met.**, **1/1 Oct.**, **1/3 Oct.**, **Dosimeter** and **Run. LEQ**. The currently active function is highlighted.

⚠ *Notice: The type of measurement function and the measurement mode is not displayed on the screen, so the user should remember the currently selected function!*

Optional functions that broaden the applications of the instrument can be easily installed. These options can be provided initially by the manufacturer or can be purchased at a later time when required.

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

4.2. 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 instrument performs the acoustic calibration automatically, when the calibrator is placed over the microphone. The calibrator level is automatically detected and the calibration proceedure is started. The user simply has to press **<Enter>** to confirm the calibration results. A sound measurement cannot be in progress while the calibration is being performed.

The **Calibration** sub-list consists of the next positions: **By Measure.**, which may be used to perform the actual calibration, **Last Cal.**, which contains the list of calibration measurements performed earlier and the results obtained, **Post Cal.**, which enables the user to perform additional calibration after the measurement session is over and add the results to the saved file.
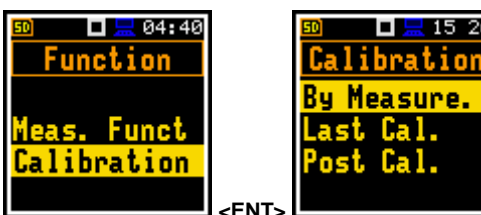
In the **Advanced** user interface there is additional position in the **Calibration** list - **Auto Cal.**, which enables the user to switch on the auto calibration function.
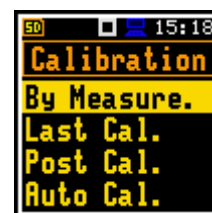
⚠️ *Notice: It is advised to perform an acoustic calibration of the instrument each time before the measurements begin. A sinle calibration at the start of each day is usually sufficient for most regulations.*

⚠️ *Notice: The calibration factor is always added to the results in the **Lev. Met.**, **1/1 Oct.**, **1/3 Oct.**, **Dosimeter***

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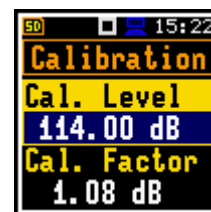
4.2.1. Calibration By Measurement

To calibrate the instrument:

1. Set the actual calibration level of the calibrator to be used in the position Cal. Level and press **<Enter>** or **<Start>** push-button.

2. Attach the acoustic calibrator, SV 30A (or equivalent **114 dB / 1000 Hz**) carefully over the microphone of the instrument. The presence of the calibrator will be detected automatically.

⚠️ *Notice: It is also possible to use an electro-mechanical pistonphone, which generates the signal (ca 124 dB) or different type of acoustic calibrator dedicated for ½" microphones. In any case, before starting the calibration measurement, the user has to set the level of the signal generated by the given calibrator (**Cal. Level** position of **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 971 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 ca 30 seconds for the tone to stabilise before starting the calibration measurement.

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

The calibration measurement time is set to 1 second with 5 seconds delay and stops until the same results are obtain 3 times in a rowDuring the calibration measurement the **<ESC>** and **<Pause>** push-buttons do not operate but it is possible to stop the measurement using the **<Start/Stop>** button.

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

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

- the calibrator is not properly attached to the instrument,
- there are external 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, the 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 in order to accept the measurement result.

The calibtarion factor is calculated and saved after pressing the **<ENTER>** push-button. If calculated calibration factor is out of the range of ±3 dB the special warning appears on the screen and calibration factor is out of the range of ±20 dB the calibration factor is not accepted.

⚠ **Notice:** *To quit the calibration procedure without saving the calibration factor press <ESC>.*

4.2.2. History of calibrations - Last Cal.

The **Last Calibr** window displays up to ten last calibration records and positions, which clears all calibration records (**Clear Hist.**).
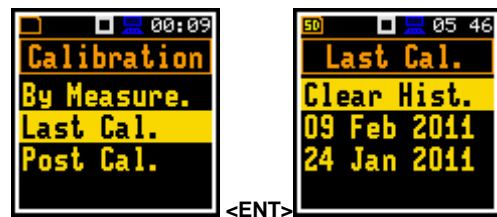
The user can clear all calibrations records in the history. In order to do this the user has to choose the position **Clear Hist.** and press **<ENTER>**.

The instrument requests confirmation of the selected operation. The next press of the **<ENTER>** push-button, when the **No** option is selected, closes the window and returns to the **Calibration** sub-list.
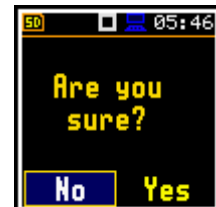
4.2.3. Post measurement calibration – Post Cal.

Sometimes it is required to perform so called post-calibration of the instrument. Position **Post Cal.** enables the user to perform additional calibration after a measurement session and add the results to the file saved in the memory. In the opened window, there are three options for saving results: not to save (**Off**), save in the last file (**Last File**) or save in the files which will be created after last calibration (**After Cal.**).

4.2.4. Automatic calibration – Auto Cal.

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

5 MEASUREMENT PARAMETERS SETTING – Measurement

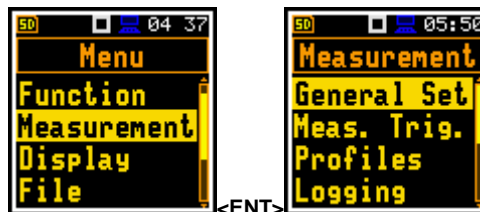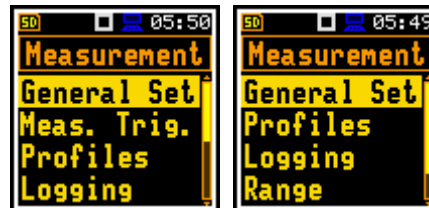The **Measurement** list contains the elements that enable the user to set the measurement parameters. To open the **Measurement** list the user has to press the **<Menu>** push-button, select the **Function** text and press **<ENTER>**.

The content of the **Measurement** list is different for different **Interface** modes **(Simple** and **Advanced)** and **Meas. Funct**. Example for **Advanced** and **Simple** modes is presented.

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

General Set	enables the user to set some general measurement parameters;
Meas. Trig.	enables the user to set up the measurement trigger. This position appears only in **Advanced** interface mode;
Profiles	enables the user to program the profile parameters in the **Lev. Met.** function. These positions appear only in the **Lev. Met.**function;
Profile 1 (2,3)	enables the user to program the profile parameters in the **Dosimeter** function. These positions appear only in the **Dosimeter** function;
Alarm	enables the user to program the alarm function. This position appears only in the **Dosimeter** function and **Advanced** interface mode;
Logging	enables the user to program the logging function;
Spectrum	enables the user to set spectrum parameters. This position becomes available only in **1/1 Oct.** and **1/3 Oct.** modes;
Range	enables the user to set the correct measurement range;
Comp. Filter	enables the user to switch on required microphone compensation filter. This position appears only in **Advanced** interface mode;
Stat. Lev.	enables the user to define 10 statistical levels;
Exp. Time	enables the user to set the exposure time duting dose measurements. This position appears only in the **Dosimeter** function and **Advanced** interface mode;
Timer	enables the user to program the internal timer. This position appears only in **Advanced** interface mode.

5.1 Selection of measurement parameters - General Settings

The **General Set** list consists of the following parameters: the delay of the start of measurements (**Start Delay**), the integration period / measurement run time (**Integr. Per**), the repetition of the measurement cycles (**Rep. Cycles**), the LEQ detector type (**LEQ Integr.**) and the intervals for day time period (**Day Time L.**).
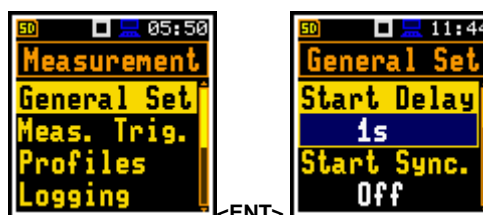
Setting time delay before the start of measurements

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

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

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

Setting synchronisation of the measurement start

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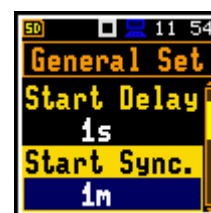
Setting the integration period

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

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

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

**Setting the number of repetition of measurement cycles**

The value of **Rep. Cycles** defines the number of cycles (with the measurement period defined in the **Integr. Per**) to be performed by the instrument. The **Rep. Cycles** number values are within the limits [1, 1000]. Its value by default is set to **1**.
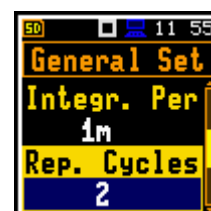
In the **Simple** instrument interface mode this parameter doesn't appear in the **General Set** list and cannot be changed.

Day time limits selection

The **Day Time L.** enables the user to select the definition of the day and night required by the local standards. These limits are used for the calculation of the **Le** function (cf. App. D for the definition). Two options are available: **6H–18H** and **7H–19H**. Its value by default is set to **6H–18H**.
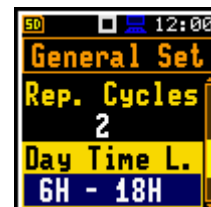
In the **Simple** instrument interface mode this parameter doesn't appear in the **General Set** list and cannot be changed.

The LEQ Integration

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

In the **Simple** instrument interface mode this

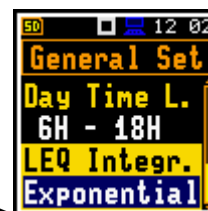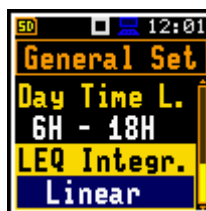parameter doesn't appear in the **General Set** list and
cannot be changed.

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

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

5.2   **Measure triggering parameters selection – Meas. Trig.**

The **Meas. Trig.** sub-list appears only in **Advanced** interface mode and enables the user to set the triggering parameters. The **Meas. Trig.** is a contexts sub-list in which the triggering can be switched off or on (**Trigger**), in the case when on - the source of the triggering signal can be determined (**Source**), its level (**Level**) and sometimes also the speed of changes (**Gradient**). The triggering of the measurements (**Trigger**) can be switched off using the **< ◄ >** push-buttons.


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

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

Level type trigger

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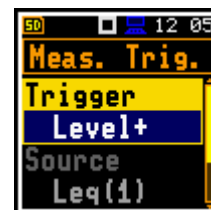
In the case, when **Level–** is selected, in each second the triggering condition is checked. The measurement starts when the **Source** has level lower than determined by **Level**. In other cases the measurement start is skipped.

Gradient type trigger

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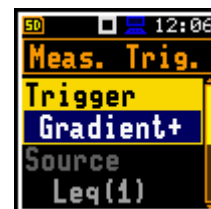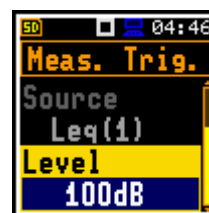

Selection of the triggering signal

It is assumed that only one measured result can be used as a source of the triggering signal in the **Lev. Met.** mode, namely the output signal from the LEQ detector coming from the first profile which is denoted here as **Leq(1)**. This position does not become active and the text stated here remains unchanged.

Setting the level of the triggering signal

The level of the triggering signal (**Level**) can be set in 1 dB step (or 10 dB steps if **< ◄ >/< ► >** push- buttons are used with **<Shift>**) in 24 dB to 136 dB range. The **Level** value of the triggering signal refers to the instantaneous value of the LEQ result from the first profile calculated during the period depending on selected **Detector** (*path: <Menu> / Measurement / Profiles*).

Setting the speed of the triggering signal changes

This position appears when the **Gradient+** trigger is chosen. The speed of the triggering signal changes (**Gradient**) can be set from 1 dB/ms to 100 dB/ms range.
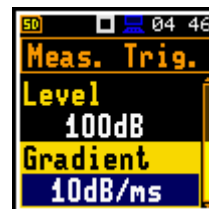
5.3 Setting parameters in a profile – Profiles

The parameters of three profiles can be set in the **Profiles** sub-list (in case of **Lev. Met.** function) or in the **Profile x** sub-lists (in case of **Dosimeter** function).

The following parameters can be programmed independently for each profile: weighting filter (**Filter**), peack filter (**Filter Peak**) and LEQ detector type (**Detector**).

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.

LEQ detector selection
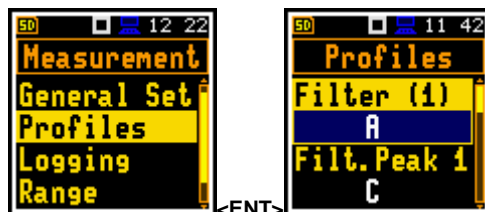
The following LEQ detectors are available in the instrument: **Imp.**, **Fast** and **Slow**
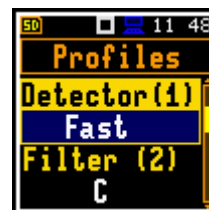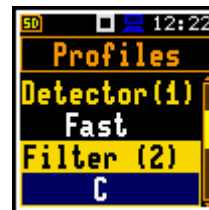
5.4 Setting the alarm thresholds for dose meter functions – Alarm

The **Alarm** position is active only in the **Dosimeter** function and described in details in **DOSIMETER** section of this manual.

5.5 Setting the data logging functionality – Logging

The **Logging** list enables the user to program the logger functions: the recording of the measurement history and program parameters of the event recording. The **Logging** list consists of four positions: **Logger Set.**, **Logger Res.**, **Logger Trig** and **Event Rec.**.

In the **Simple** instrument interface mode the **Logging** list consists only of one position **Logger Set.**

5.5.1 Setting the Logger – Logger Set.

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

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

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

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

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

If **Spec. Time** is selected in the **Log. Split** position, then six additional (**Split Time1**, **Split Time2**, **Split Time3**, **Split Time4**, **Split Time5** and **Split Time6**) positions appear on the list. The position may be swithed off if **Off** is selected.

After pressing the **< ▶ >** push-button while being on the one of **Split Time** position the **Off** is changing to time format value. Further use of the **< ▶ >** push-button enables the user to set the desired period of record in appropriate logger record.

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

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

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

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

The **Summary Res** position allows the user to select or deselect the saving of the full set of profile results that the instrument generates during total measurement time and which are not belonged to the time history data.These results are: **SPL**, **LEQ, SEL**, **Lden**, **LEPd**, **Ltm3**, **Ltm5, LN%**, **PEAK**, **MAX**, **MIN**.

When the **Logger** is switch on and the logging results have been defined, then in parallel with measurements during **Interg. Per** 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 **100ms**. These results are saved in the logger file in the external memory in all modes and functions of the instrument. The recording in the logger's memory is stopped after the period, which is equal to **Integr. Per** multiplied by **Rep. Cycles** or after pressing the **<Start/Stop>** push-button or after stopping the measurements remotely. The whole block of summary results will be added to the logger file at the end of the measurement cycle.
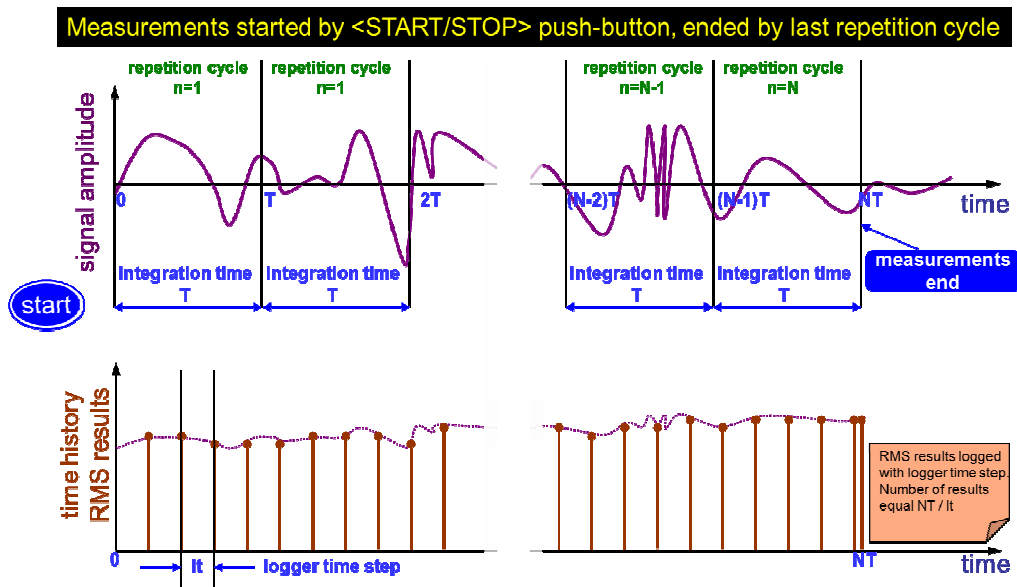
Relations between Integr. Per and Logger Step

5.5.2   Results selection – Logger Res.

The **Logger Res.** list enables the user to activate the results for three independant profiles, which will be recorded to the logger file during measurement.

For the **Lev. Met.** function it is possible to log the next results: **Lpk**, **Lmax**, **Lmin**, **Leq**.

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

In the **Simple** instrument interface mode the **Logger Res.** position doesn't appear in the **Logging** list.

⚠️ *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.*

5.5.3   Logger trigger parameters setup – Logger Trig

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

In the **Simple** instrument interface mode the **Logger Trig** position doesn't appear in the **Logging** list.

Trigger disabling

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

Level type trigger

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

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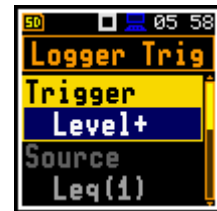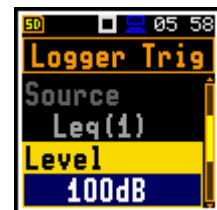
Trigger Source selection

When **Lev. Met.** 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 LEQ 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 the **< ▼ >** push-button, the **Source** line is skipped.

Level of the triggering signal

The level of the triggering signal in logger (**Level**) can be set in 1 dB step from 24 dB to 136 dB range. The **Level** value of the triggering signal in logger refers to the instantaneous value of the LEQ 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 Trigger** line the number of results recorded in the logger's file before the fulfilment of the triggering condition can be achieved. This number is within the limits 0..10.
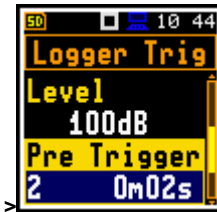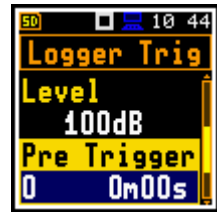
In the **Post Trig.** line the number of results recorded in the logger's file after the fulfilment of the triggering condition can be achieved. This number is within the limits 0..200.

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

5.5.4   Event recording setup – Event Rec.

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

In the **Simple** instrument interface mode the **Event Rec.** position doesn't appear in the **Logging** list.

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

Definition of record triggering

The **Recording** position, if it is not **Off**, defines how the recording should be triggered: **Continuous**, **Slope +**, **Slope -**, **Level +**, **Level -**, **Gradient +** or **Trig.manual**.

Definition of filter

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

Sampling frequency of event recording

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

Triggering signal source

The **Source** position only indicates the triggering signal source. Only one measured result can be used as a source of the triggering signal in all modes, namely the output signal from the LEQ detector coming from the first profile which is denoted here as **LEQ(1)**.

Level of the triggering signal

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

Checking the triggering condition

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

Recording before triggering condition

When **Pre Trigger** position is switched on then the event signal is recorded immediately before the triggering condition. The interval of such recording depends on the sample frequency. For 12 kHz the time interval is 1s.

Time of signal recording

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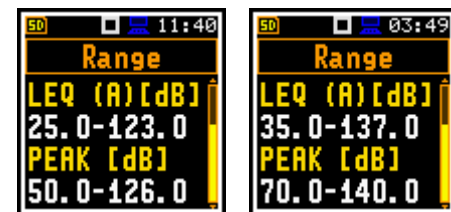
5.6   Measurement range setting – Range

The **Range** is used to view measurement range in the instrument.

The sbsolute range values changes due to the calibration factor.

There are two ranges available: **Low** and **High**. The detailed description of the measurement ranges parameters is given in App. C.

5.7   Deactivation of the microphone compensation filter – Comp. Filter

The **Comp. Filter** position is available only in the case of the **Advanced** interface mode.

The compensation of microphone internal noise (**Microphone**) is factory switched on, however it is possible to switch off the microphone compensation filter for electrical measurements (e.g. for laboratory calibration measurements).

The **Dif. Field** filter enables the user to set compensation for sound measurements in the diffuse field conditions. The microphone supplied with the

SVAN 971 instrument (ACO 4052 - 38mV/Pa, prepolarised ½" condenser microphone) is designed for sound measurements in free field conditions.

The **Windscreen** position swithes on the compensation when windscreen is aplyed.

The **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.

5.8 Exposure time setting – Exp. Time

The **Exp. 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 **Dosimeter** function.
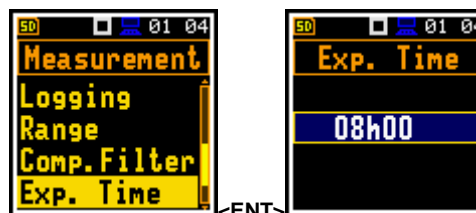
5.9 Setting ten statistical levels – Stat. Lev.

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

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

## 5.10 Programming the instrument's internal timer – Timer

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

In the **Simple** instrument interface mode the **Timer** position doesn't appear in the **Measurement** list.

Selecting the mode of the timer function

The timer can be switched off – **Off**, switched on only once – **Single**, or switched on many times regularly – **Multiple** times with the period between two consecutive measurements set in the **Repetition** line.
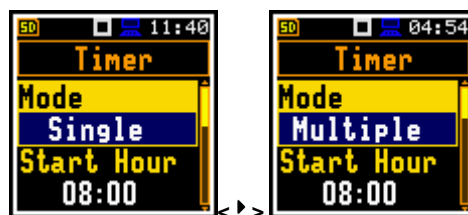
In the case the timer function is active (**Single** or **Multiple**) and the instrument is switched on the "**clock**" icon appears until the programmed measurements are finished.

Setting hour and day of the measurement's switch on

The **Start Hour** determines the time for the measurement to start. The required hour and minute can be selected in a special window, which is opening by means of the **< ◀ >**, **< ▶ >** push-buttons.
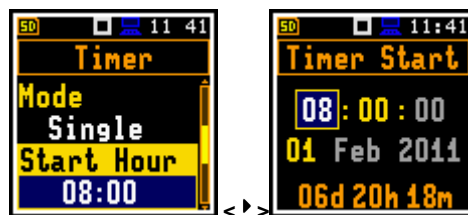
The **Start Day** determines the date of the measurement start. The timer can be programmed up to one month ahead and during the date setting the current state of the **R**eal **C**lock is taken into account. The required date can be selected in a special window, which is opening after pressing the **< ◀ >**, **< ▶ >** push-buttons. Make sure to check that the real time clock settings are correct before beginning a delayed timer measurement.
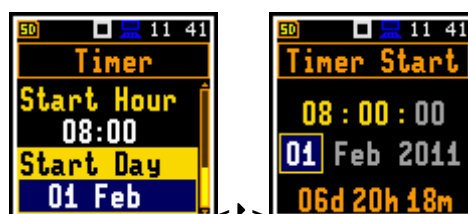
In order to set hour and day one has to select the position for changing with the **< ◀ >**, **< ▶ >** / **< ▲ >**, **< ▼ >** push-buttons and then select the proper value by means of the **< ▲ >**, **< ▼ >** push-buttons pressed together with **<Shift>** and then to press the **<ENTER>** push-button.

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

Selecting the period between two consecutive measurements

The **Repetition** position is displayed when **Multiple** mode is selected. This parameter can be programmed from **5m** up to **28d**. The required date can be selected by means of the **< ◀ >**, **< ▶ >** push-buttons.

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

5.11 Description of an exemple timer function execution

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

Let us assume that the user wants to switch on the instrument the 1st of February, at 08:00, measure the sound for 10 seconds and save the results in a file named R1.

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

The instrument will start the measurement on the 1st of February at 08:00.

If the instrument was switched off it will switch on 5 minute prior to **Start Delay** time to warm up, the measurements will be performed for a period of ten

seconds. Then, the results will be saved in the previously named file and finally – the instrument will switch off.

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

6 <u>DATA AVAILABLE ON THE DISPLAY – Display</u>

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

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

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

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

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

Spect. View   enables the user to change the type of the spectrum and to activate the **Max** and/or **Min** spectrum. This position only becomes available in the **1/1 Oct.** and **1/3 Oct.** modes;

Meas. Res.   enables the user to select results to be displayed;

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

Screen Set.   enables the user to switch the rotation of the screen on/off and set the energy saver function.

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

The One Profile mode is always available in all measurement modes. Other presentation modes can be switched on or off in the **Disp. Modes** sub-list.

The mode of the results presentation is related to the selection of the instrument's function (**Lev. Met.**, **1/1 Oct.**, **1/3 Oct.**, etc.).
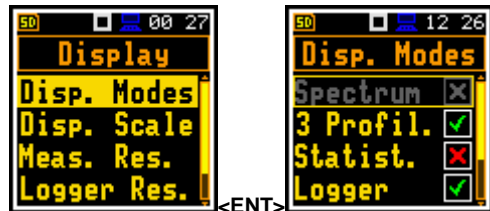
For the **Lev. Met.** the following possibilities of the measurement results presentation are available: **3 Profil.**, **Statist.**, **Logger**, **Run. SPL** and **File Info**.

For **1/1 Oct.** and **1/3 Oct.** additional position **Spectrum** becomes available.
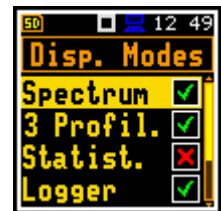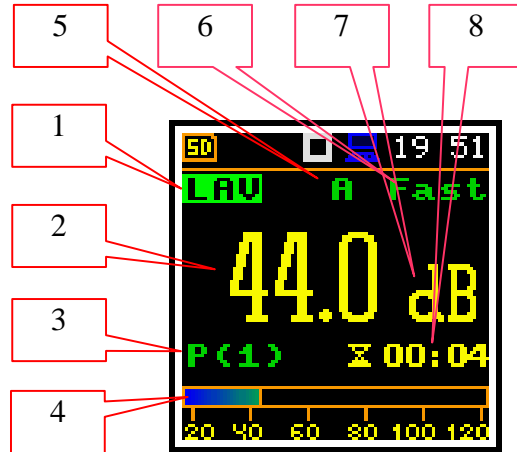
6.1.1 One profile presentation mode

The one result mode is always available in all measurement modes. In one result mode any measurement result, selected in **Disp. Res**, may be presented. User may change One profile view by pressing **<Enter>** push-button.
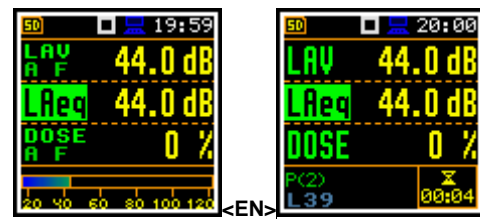
Field description of the 1 Profile view

1. Function name:
   - for **SLM**, **1/1 Oct.** and 1/3 Oct. functions: **L(A/C/Z)eq**, **L(A/C/Z)E**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **LN%**, **OVL**, **L(A,C,Z)peak**, **L(A,C,Z)(F/S/I)max**, **L(A/C/Z)(F/S/I)min**, **L(A,C,Z)(F/S/I)**;
   - for **Dosimeter** function: **LAV**, **L(A/C/Z)eq**, **L(A/C/Z)E**, **SEL8**, **E**, **E_8h**, **LEPd**, **PSEL**, **Ltm3**, **Ltm5**, **LN%**, **PTC**, **PTP**, **ULT**, **TWA**, **PrTWA**, **Lc-a**, **OVL**, **L(A,C,Z)peak**, **L(A,C,Z)(F/S/I)max**, **L(A/C/Z)(F/S/I)min**, **L(A,C,Z)(F/S/I)**, **DOSE**, **D_8h**, **PrDOSE**;
   - for **Run. LEQ** function: **L(A/C/Z)eq**, **L(A/C/Z)E**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **LN%**, **LR15**, **LR60**, **OVL**, **L(A,C,Z)peak**, **L(A/C/Z)(F/S/I)max**, **L(A/C/Z)(F/S/I)min**, **L(A,C,Z)(F/S/I)**.
2. The value of measured function.
3. Profile number.
4. Quasi analogue value indicator.
5. The name of the implemented filter: **Z**, **A**, **C**.
6. Detector time constant, when the detector is exponential: **Imp.**, **Fast**, **Slow** or **Lin** when the detector is linear.
7. Units of measured value.
8. Elapsed time shows the current second of the measurement. The value presented there belongs to the range [**1**, **Integration Period**].

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

6.1.2 3 profile presentation mode

In the **3 Profil.** mode any three measurement results, selected in **Disp. Res**, may be presented. User may change **3 Profil.** view by pressing the **<Enter>** push-button.

Field description of the 3 Profiles view

1. Result for the first profile
2. Function name:
   - for **SLM**, **1/1 Oct.** and **1/3 Oct.** functions: **L(A/C/Z)eq**, **L(A/C/Z)E**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **LN%**, **OVL**, **L(A,C,Z)peak**, **L(A,C,Z)(F/S/I)max**, **L(A/C/Z)(F/S/I)min**, **L(A,C,Z)(F/S/I)**;
   - for **Dosimeter** function: **LAV**, **L(A/C/Z)eq**, **L(A/C/Z)E**, **SEL8**, **E**, **E_8h**, **LEPd**, **PSEL**, **Ltm3**, **Ltm5**, **LN%**, **PTC**, **PTP**, **ULT**, **TWA**, **PrTWA**, **Lc-a**, **OVL**, **L(A,C,Z)peak**, **L(A,C,Z)(F/S/I)max**, **L(A/C/Z)(F/S/I)min**, **L(A,C,Z)(F/S/I)**, **DOSE**, **D_8h**, **PrDOSE**;
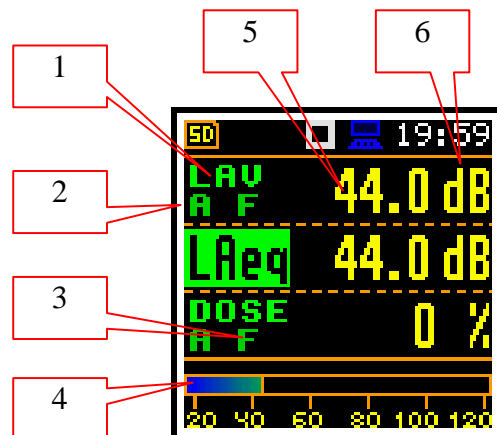
- for **Run. LEQ** function: **L(A/C/Z)eq**, **L(A/C/Z)E**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **LN%**, **LR15**, **LR60**, **OVL**, **L(A,C,Z)peak**, **L(A,C,Z)(F/S/I)max**, **L(A/C/Z)(F/S/I)min**, **L(A,C,Z)(F/S/I)**.

3. The name of the implemented filter: **A**, **C**, **Z**.
4. Detector time constant, when the detector is exponential: **Imp. (I)**, **Fast (F)**, **Slow (S)** or **Lin (L)** when the detector is linear
5. Quasi analogue value indicator.
6. The value of measured function.
7. Units of measured value.

6.1.3 Logger presentation mode

In the **Logger** mode logger results, as selected in the **Logger View** list are displayed. User may change results by pressing the **<Enter>** push-button.

The user may change the cursor position by means of the **< ◀ >**, **< ▶ >** push-buttons.
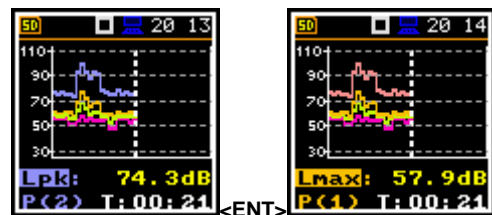
Field description of the Logger view

1. Logger Plot
2. Function value for cursor position
3. Function name (Profile number)
4. Cursor time position
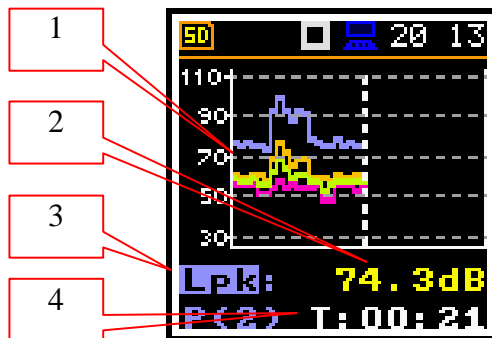
⚠ *Notice: If **Logger** (path: <Menu> / Measurement / Logging /Logger Set.) is switched off the **Logger** presentation mode is **not** active! So, to have this presentation mode active, the user has to switch the **Logger** on!*

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

Changing the field content

The content of some fields can be changed after pressing the **< ◀ >** and **< ▶ >** push-buttons.
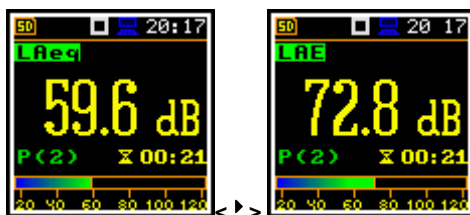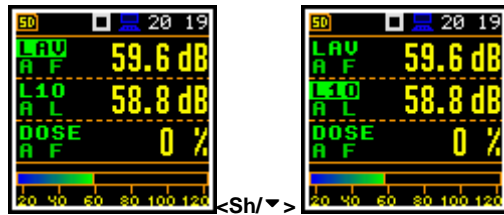
Changing the LN%

The statistical levels, which are defined in the **Stat. Lev.** list (*path: <Menu> / Measurement / Stat. Lev.*), can be changed after pressing the **< ◀ >** and **< ▶ >** push-buttons simultaneously with **<Shift>**.
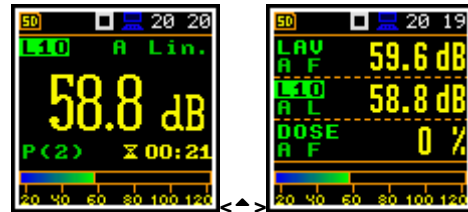
Changing the active fields

The change of fields is made by pressing the **<▲>** / **<▼>** push-buttons simultaneously with **<Shift>**.

Changing the presentation mode

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

6.1.4 Statistics presentation mode

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

Field description of the Statistics view

1. Cursor position
2. Statistics plot
3. Function name, active profile, LEQ detector (**L**inear, **F**ast, **S**low or **I**mpulse), used averaging filter name (**A**, **C** or **Z**)
4. Value of the selected statistical level **LN%** and units (dB)
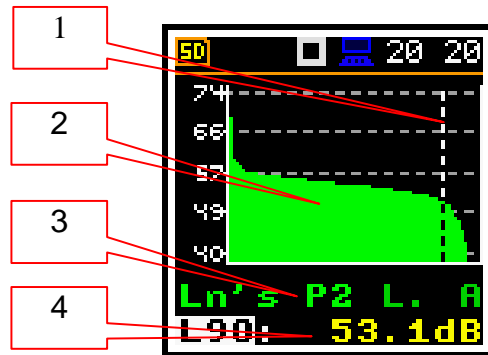
The change between positions is made by pressing the **<▲>** or **<▼>** push-buttons.

When position is chosen, then its value is changed after pressing the **<◄>** and **<►>** push-buttons simultaneously with **<Shift>**.

When the **LN%** field is active the user may change the cursor position by means of the **<◄>**, **<►>** push-buttons. The statistical level and appropriate value are presented in the line below the plot.
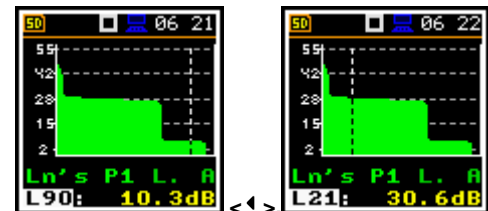
### 6.1.5 File information presentation mode

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

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

### 6.1.6 Run SPL presentation mode

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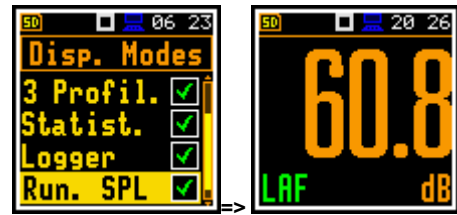
6.2 Setting the scale of the presentation and the display's grid – Disp. Scale

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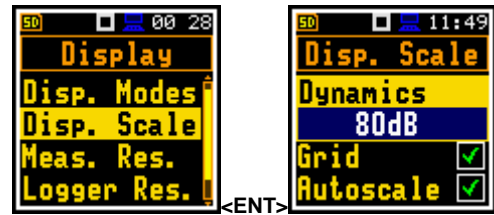
Scaling the vertical axis

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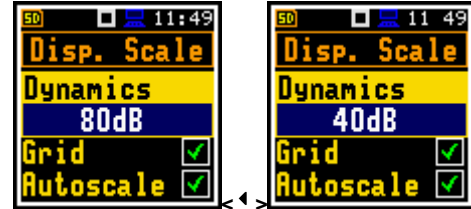
Switching the grid on/off

The **Grid** enables the user to switch on or off the horizontal grid lines in any graphical presentation.
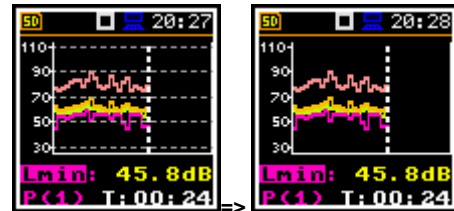
Switching the automatic Y-scale adjustment on/off

The **Autoscale** position switches on the automatic scale adjustment of the Y axis. The adjustment is performed once automatically after the start of the measurement to suit the initial level of the input signal from the microphone.
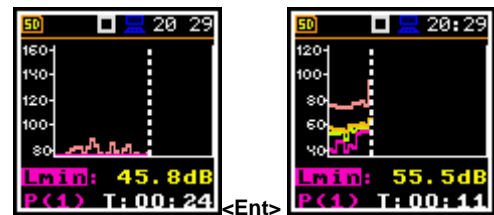
6.3 Selection of results for presentation – Meas. Res.

The **Disp. Res.** enables the user to choose the Sound Level Meter (**SLM Results**) or Dose Meter (**Dosim. Res**) results, which should be presented on the display.
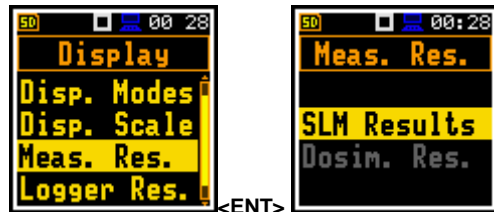
The result can be selected from the list: **TIME**, **PEAK**, **MAX**, **MIN**, **SPL**, **LEQ**, **SEL**, **Lden**, **LEPd**, **Ltm3**, **Ltm5**, **LN%**, and **OVL**; by using the **< ◄ >** or **< ► >** push-buttons pressed simultaneously with **<Shift>**.

6.4 Selection of logger results for presentation - Logger Res.

The **Logger Res.** enables the user to choose the results, saved in the logger file, which should be presented for display on the logger screen. The result is selected by using the **< ◄ >** or **< ► >** push-buttons pressed simultaneously with **<Shift>**.
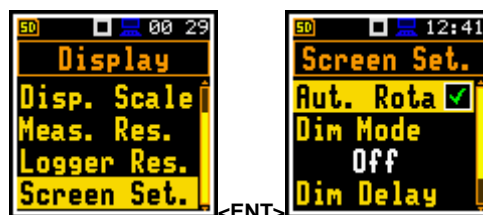
6.5 Setting the power saver- Screen Set.

The **Screen Set.** window enables the user to switch on the auto rotation of the display and to set on the screen saver function (**Dim Mode**). **Dim Mode** can be switched off if **Off** is chosen and the screen will stay bright all the time.

Activatiing the screen auto rotation

The **Aut. Rota** enables the user to switch on the adjustment of the screen image on the display according to the instrument's physical orientation in space. If the unit is rotated upside down then the display also changes it's image orientation accordingly, so the user can always see it in normal upright view. This also works if the meter is held sideways if **Aut. Rota** is selected by the user.

### Setting the power saver function

Minimising the consumption of the internal source of the instrument's power supply can be achieved by reducing the brightness of the screen whenever possible.

There are two options of power saver function. The screen may be switch off (**Screen off**) or dimmed with different levels (**Level 1**, **2** or **3**). In the case when any of these options is set, after a delay, set by parameters **Dim Delay**, from pressing any push-button the screen is dimmed or switched off. After it has happened, pressing any push-button will cause the display to switch on again.

Setting the power saver delay

The power saver delay defines the delay period from last use of any push-button to the start of the power saver mode. This delay period can be set for active **Dim Mode** from **5 s** to **60 m**. The **<ENTER>** push-button must be pressed to confirm the selection, which also closes the **Screen Set.** window.
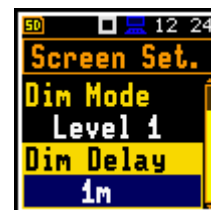
6.   <u>SAVING THE MEASUREMENT RESULTS – File</u>

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

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

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

Setup Manag.   enables the user to manage the Setup files.

⚠ *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.*

Instrument's files containing data:
- measurement results from **Lev.Met.**, **Dosimeter** and **Run. LEQ**;
- measurement results from **1/1 Oct.** analysis;
- measurement results from **1/3 Oct.** analysis;
- logger results (measurement time history)
- event recording;
- setups.

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

⚠ *Notice: Because of limited internal memory capacity of the instrument data files can be saved on the external memory only. So, if there is no **SD Card** in the instrument there is no any possibility to create any file. In such cases the **Logging** position in the **Measurement** list is not active and not available.*
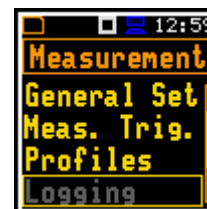
Files are saved automatically, the user should only define the file name in the position **Logger Name** (*path: <Menu> / Measurement / Logging / Logger Set.*).

The elements of the file structure depend on the selected function (**Lev. Met.**, **1/1 Oct.**, **1/3 Oct.**, **Dosimeter**), logging settings. These elements are as follows:
- the main results,
- the results of statistical analysis,
- the data stored during the measurements in the logger's file,
- audio waveform recording,
- the results coming from **1/1 Oct.** analysis,
- the results coming from **1/3 Oct.** analysis,
- the **Dosimeter** results.

7.1   Managing the files saved in the external memory – File Manag.

File manager

The **File Manag.** 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.

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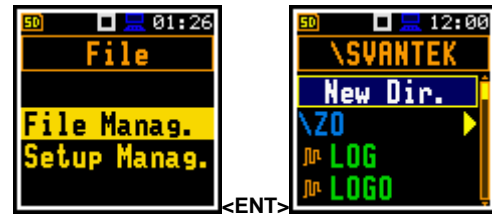
Creating new catalogue

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

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

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

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

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

7.1.1 Setting the directory for saving files – Work. Dir.

It is possible to assign the catalogue for automatically saving logger files. In order to do this the user should choose the required catalogue and press the **<ENTER>** push-button. After opening the list of operations the user should select **Work. Dir.** and press the **<ENTER>** push-button.
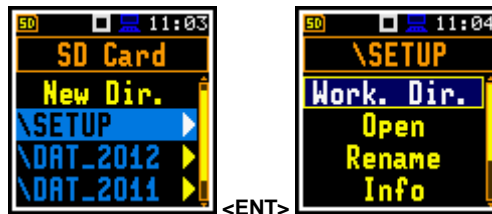
⚠️ *Notice: The working catalogue name is not displayed on the screen, so the user should remember or make a note of the selected working catalogue is!*

7.1.2 Renaming file/catalogue – Rename

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

7.1.3   Information about file/catalogue – Info

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

7.1.4   Deleting file/catalogue – Delete

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

7.1.5   Erasing of the external memory – Erase Disk

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

7.2   Managing the setup files – Setup Manag.

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

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

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

7. SETTINGS OF THE INSTRUMENT PARAMETERS – Instrument

The **Instrument** list contains different sub-lists and positions, which are directly related to the settings of the hardware components of the instrument. In order to open the **Instrument** list the user has to press the **Menu>** push-button, select the **Instrument** position and press **<ENTER>**.
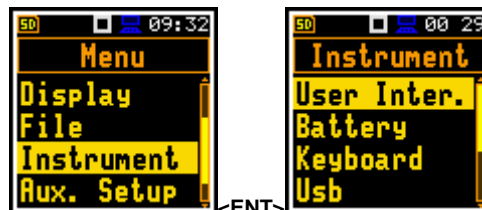
The **Instrument** list is used for setting the various parameters, which are primarily dedicated to control of the instrument hardware and contains the following items:

User Inter.	enables the user to choose the user interface version: **Simple** or **Advanced**;
Battery	enables the user to get information about current power source;
Keyboard	enables the user to set the operating mode of the **<Shift>**
Usb	enables the user to set the transmission speed of the USB interface. This position is available only in the **Advanced** user interface mode;
RS232	enables the user to set the transmission speed and the timeout in the RS232 interface;
Self Vibr.	enables the user to define the threshold for the self vibration of the instrument for marker registration. This position is available only in the **Advanced** user interface mode;
RTC	enables the user to set the Real Time Clock;
Unit Label	enables the user to check the model number of the instrument, its serial number, the current software version installed in it and the applicable standards, which the instrument fulfils.

8.1. Choosing Simple or Advanced user interface mode – Interface

The user interface may be presented in three modes: **Start/Stop**, **Simple** or **Advanced**. These modes can be selected in the **Interface** window of **Instrument** menu. The **Simple** defines basic instrument functions, while the **Advanced** mode defines full scope of functions. Many windows thus have different view.

Start/Stop mode limits the menu to the only one **Interface** window from **Menu** and measurement windows.

Notice: When the user swithes the interface mode from more complex to simpliest there always appear the request "Do you restore the default value of the advanced settings?" The user should always answer "Yes" or "No". If the answer is "No", then all settings that were made in positions not active in simpliest mode will stay unchanged. If answer is "Yes", then these parameters will be changed to default values.

8.2. Checking the state of the internal battery – Battery

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

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

The view presented on the display for each of three kinds of possible power sources is different (USB power, single use alkaline type batteries, rechargeable batteries). The current battery voltage is displayed together with its approximate state (in graphical format).
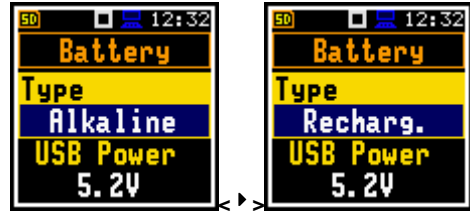
When the instrument is powered from a set of internal batteries the user should select the correct type. It is essential for the right detection of the capacity of the battery pack. Two types are available: **Alkaline** and **Rechargeable**.

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

8.3. Selection of keyboard modes – Keyboard

The **Keyboard** enables the user to programme the operation mode of the **<Shift>** push-button (**Shift**), to switch on the key lock (**Key Lock**) and the fast unlock (**Fast Unlock**) of the keyboard by means of four keys.

<Shift> push-button mode

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

Key locking

In the **Key Lock** position the user can switch on key locking. When **On** option is selected, the **Fast Unlock** function becomes active. This function enable the user to program the keyboard unlocking code.

Key unlocking

The unlocking code can be programmed with next four positions: **First Key**, **Second Key**, **Third Key** and **Fourth Key**. In every position the user may chose one of four arrow key: **Left Key**, **Right Key**, **Up Key** or **Down Key**, the sequence of which creates unlocking code.
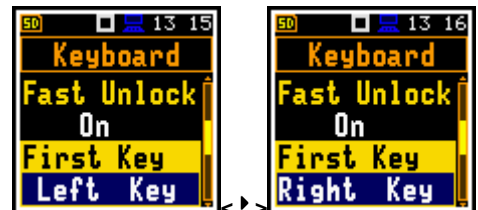
8.4. Transmission speed of the USB interface – Usb

The **Usb** position enables the user to select the transmission speed of the USB interface. There are two options: **Full 12Mbps** and **High 480Mbps**.

8.5. Setting the parameters of the serial interface - RS232

The **RS232** 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**).

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 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 too short period for the printers, which may not be fast enough. In such cases, the **Time Out** parameter may haveto be increased to a higher value.

8.6. Programming the self vibration marker – Self Vibr.

The **Self Vibr.** position enables the user to define the threshold for the self vibration of the instrument for marker registration. The special marker will be written to the file when the self vibration of the instrument is higher then defined in the **Marker Thr.** position.

This position is available only in the **Advanced** user interface mode.
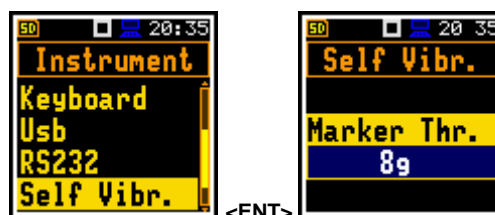
## 8.7. Programming the instrument's internal Real Time Clock – RTC

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

In order to set hours, minutes or seconds the user has to enter its position pressing the **< ◄ >**, **< ► >** push button and then select the correct value using the **< ▲ >**, **< ▼ >** push-buttons and then pressing the **<ENTER>** push-button to set the chosen value. If exiting the window with <ESC> the time set-uo is automatically saved.
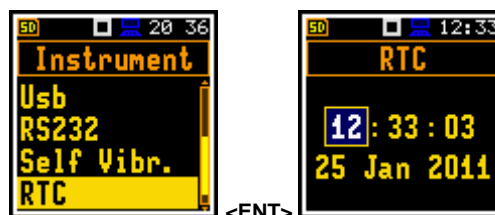
## 8.8. Checking specification of the instrument - Unit Label

The **Unit Label** enables the user to check the model number of the instrument, its serial number, the current software version installed in it and the appropriate standards, which the instrument fulfils.
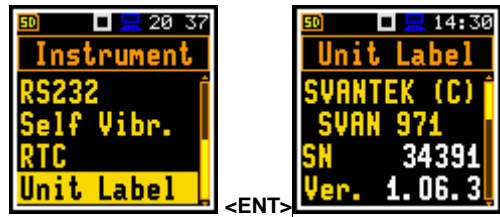
Notice: *The contents of the **Unit Label** should be always sent to Svantek's service department or official representative in case of any problems faced by the user during the instrument's normal operation in the field.*

8.   AUXILIARY SETTINGS – Auxiliary Setup

The **Auxiliary Setup** list contains positions directly related with sound measurements and not related with the hardware components of the instrument. In order to view the **Auxiliary Setup** list the user has to press the **<Menu>** push-button, select the **Function** text and press **<ENTER>**.
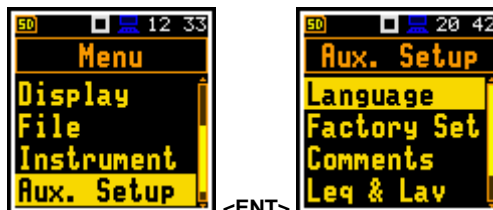
The **Auxiliary Setup** list is used for setting the various auxiliary parameters and contains the following items:

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

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

Comments   enables the user to define the file name for recording voice comments. This position is available only in the case of the **Advanced** interface mode;

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

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

9.1. Setting the language of the user interface – Language

The **Language** 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 an unknown language interface appears on the display the user can reset the instrument by means of the three **<Shift/Enter/Start>** push-buttons pressed together during the switching on of the device. After this the instrument will go back to the default setup with the English interface.
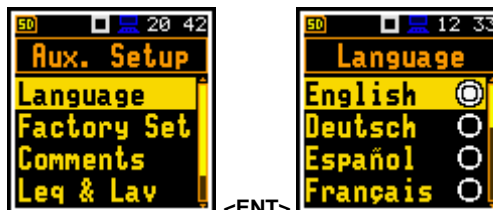
9.2. Return to the factory settings – Factory Set

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

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

9.3. Voice comments – Comments

The **Comments** position enables the user to define the file name for recording voice comments. This position is available only in the **Advanced** interface mode. The user can still record voice comments even in the **Simple**

interface mode.

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

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

9.4. Displaying of Leq & Lav results – Leq & Lav – Leq & Lav

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

This position is available only in **Dosimeter** function and is described in **DOSIMETER** section of this manual.

9.5. Warnings selection – Warnings

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

If **Logging** is active, then there will be warning if the user tries to start a measurement run without logging being selected. The user is given the choice to continue without the logging function being active or to stop and select logging from the menu list.
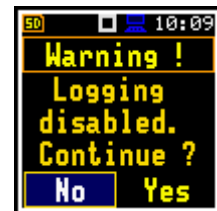
If **Power Off** is active, then in case the measurement is in progress, an attempt to swith off the unit will result in displaying the message "Measurement in progress". The user can not then turn off the unit. When the measurement is completed and the warning "Power Off" becomes active, then if the user would turn off the unit, he will be asked to confirm this.
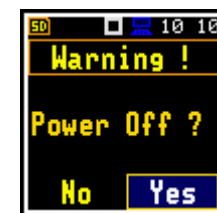
If **Preampl.** is active, then there will be warning if the instrument detects that there is no preamplifier attached to the instrument.

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

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

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

The **SVAN 971** 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 Oct.** and **1/3 Oct.** analysis (so-called spectrum) can be examined by the user on a display in **Spectrum** presentation mode. The availability of this mode can be switched on or off by the user *(path: <Menu> / Display / Disp. Modes)*.
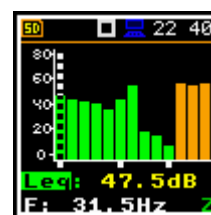
1/1 Oct. and **1/3 Oct.** spectra for all centre frequencies of pass-band filters together with the **TOTAL** overall values measured with the user selected frequency weighting filters are presented in the **Spectrum** mode if selected in the spectrum display menu.

10.1. Selection of 1/1 Oct. or 1/3 Oct. analysis function

In order to select the **1/1 Oct.** or **1/3 Oct.** 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 **Meas. Funct** window and highlight the required 1/1 Oct. or 1/3 Oct. analysis and press **<Enter>**.
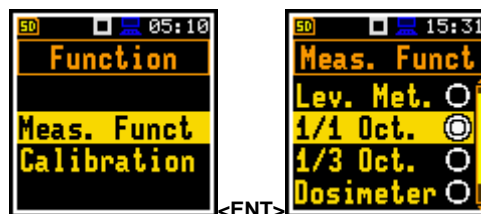
> ⚠ *Notice: It is not possible to change the current function during a live measurements. The instrument displays in this case for about 2 seconds the text: "Measurement in Progress". In order to change the current measurement function the measurement must be stopped!*

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

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

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

Range

In 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.

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

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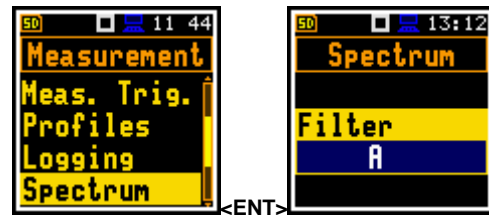
The following weighting filters are available in 1/1 Octave and 1/3 Octave analysis:

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

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

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

10.6. Display options in 1/1 Octave and 1/3 Octave analysis function

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

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

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

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

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

The **Spectrum** position of the **Disp. Modes** list is accessible only for **1/1 Oct.** and **1/3 Oct.** functions.
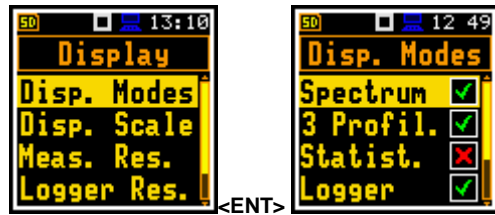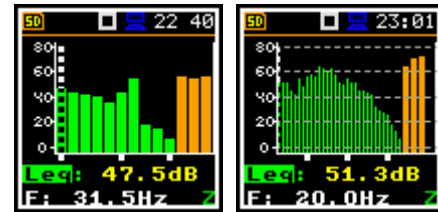
**Field descriptions of the Spectrum view**

1. Spectrum plot
2. Value for the cursor position
3. Central frequency for the cursor position
4. Cursor position
5. Total values
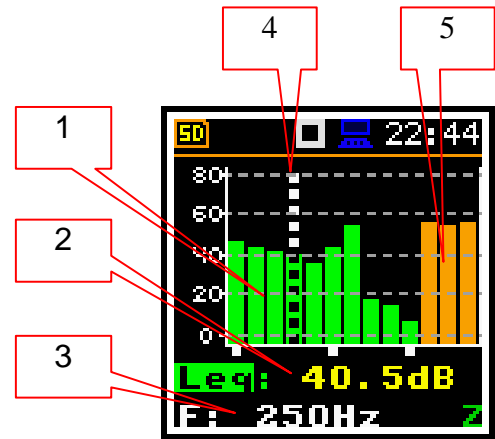
When **Spectrum** mode is switched on the measurement screen in the **Spectrum** display mode is shown like below.
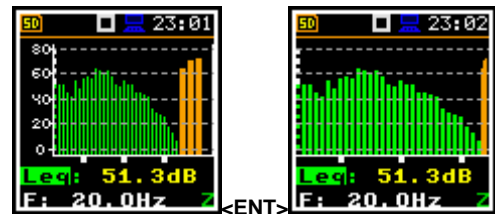
The user may shift the Y-axis up or down during the spectrum presentation by pressing the **<Shift>** and **<▲>** (or the **<Shift>** and **<▼>**) push-buttons.
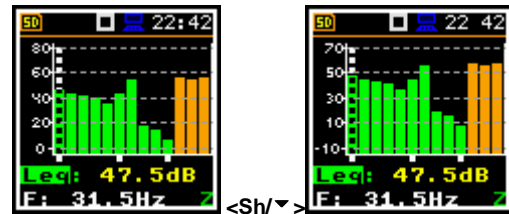
The user may change the cursor position by means of the **<◄>**, **<►>** push-buttons. The frequency and appropriate dB value are presented in the line below the plot.
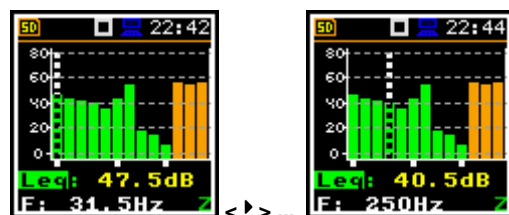
Spectrum view can be changed by means of the **<Enter>** push-button.

The **Total** overall dB values are calculated with the filters **A**, **C** and **Z**, and are displayed at the bottom line of the screen when the cursor has been placed on the appropriate orange bar.
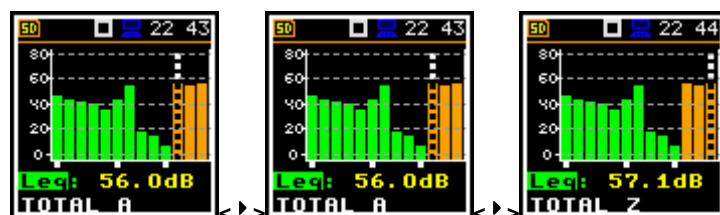
10.8.   Setting the scale of the measurement results presentation - Scale

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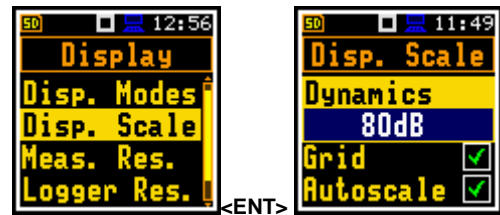
Scaling the vertical axis

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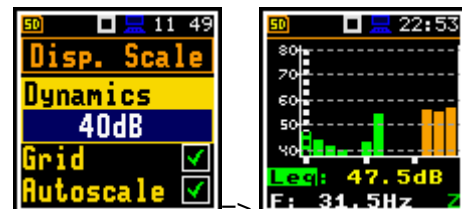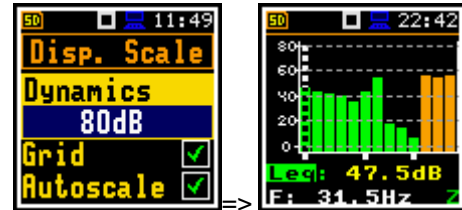
Switching the grid on/off

The **Grid** enables the user to switch on or off the grid in any graphical presentation.
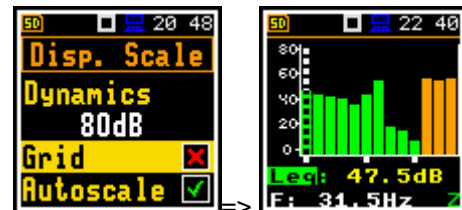
Switching the automatic Y-scale adjustment on/off

The **Autoscale** position switches on the automatic adjustment of the Y axis scale.
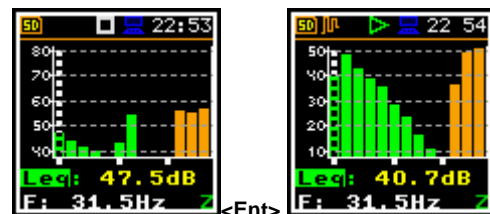
10.9.   Setting the parameters of the spectrum presentation – Spect. View

The **Spect. View** position appears when **1/1 Oct.** and **1/3 Oct.** functions are selected in the **Meas. Function** window and enables the user to change the type of the spectrum (**Spect. Type**) and to activate the presentation on the display of the **Max** and **Min** spectrum values for every displayed band.
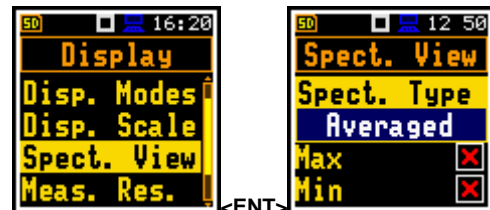
In the **Spect. Type** position the user may choose the following different spectrum type to be presented on the display in the graphical presentation modes: **Averaged**, **Instantan.**, **Max**, **Min** and **Peak**.
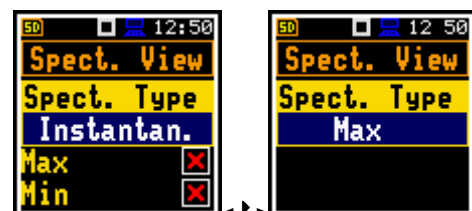
The minimum and maximum spectra can be presented at the same plot as main spectrum when the **Max** or **Min** parameter is switched on.
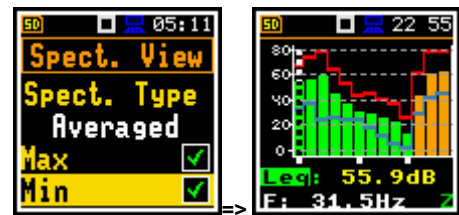
10. <u>DOSIMETER</u>

The instrument operates as **Dosimeter** function in a very similar way to the **Level Meter** functions and, in addition, measurement of basic dose parameters is performed in parallel with the **Level Meter** operations.

Below additional settings related with the **Dosimeter** function are described.

### 11.1. Selection of Dosimeter function

In order to select the **Dosimeter** function 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 **Meas. Funct** window and highlight the required 1/1 Oct. or 1/3 Oct. analysis and press **<Enter>**.
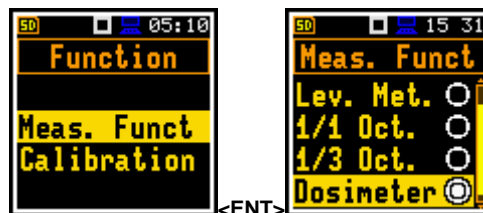
11.2. Setting parameters in a profile – Profiles

The parameters of three profiles can be set in the **Profile x** sub-lists.

The following parameters can be programmed independently for each profile: weighting filter (**Filter**), peack filter (**Filter Peak**) and LEQ detector type (**Detector**),: criterion level (**Crit. Level**), threshold level **(Thr. Level**), exchange rate (**Exch. Rate)**, **ULT Thresh.** and **PTC Thresh.**.
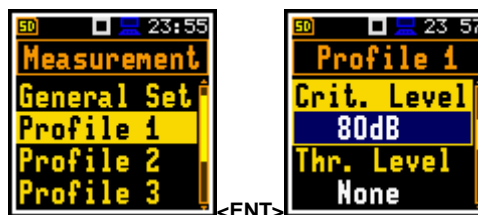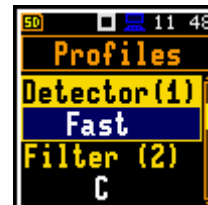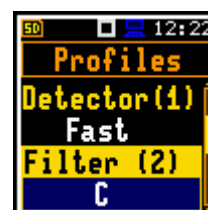
Weighting filter selection

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.

LEQ detector selection

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

The **Dose Meter** specific parameters can be set in accordance with the OSHA HC (Occupational Safety and Health Administration - Hearing Conversation), OSHA PEL (Occupational Safety and Health Administration – Permissible Exposure Level) and ACGIH standards.
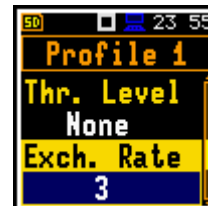
Criterion Level: **60dB**, **65dB**, **70dB**, **75dB**, **80dB**, **84dB**, **85dB**, **87dB**, **90dB**;

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

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

ULT Threshold Level: **70dB** – **140dB**;
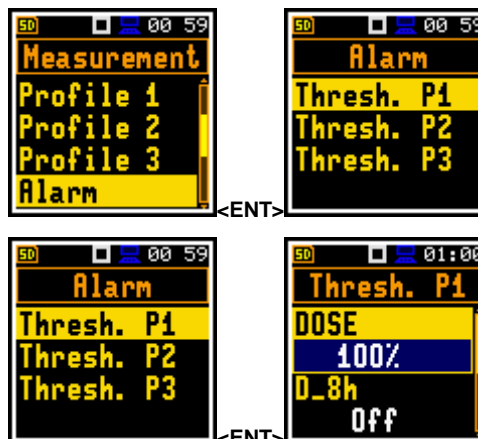
PTC Threshold Level: **70dB** – **140dB**.
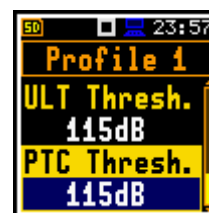
11.3. Setting the alarm thresholds for dose meter functions – Alarm

The **Alarm** position is active only in the **Dosimeter** function and enables the user to program the alarm thresholds for three profiles (**Thresh. P1 (2,3)**).

Alarm is recognised by the diode flashing. To stop the diode flashing the user has to press any key.

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

Dose: 1-200%;

D_8h: 1-200%;

PTC: 1-1000;

ULT: 1-60s.

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

## 11.4. Logging the results in the file - Logger Res.

The **Logger Res.** list enables the user to activate the results for three independant profiles, which will be recorded to the logger file during measurement.

For the **Dosimeter** function it is possible to log the next results: **Lpk**, **Lmax**, **Lmin**, **Leq** and **LAV**.
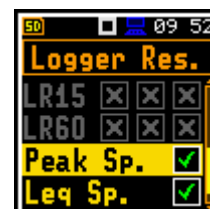
11.5. Displaying of Dosimeter results

For **Dose Meter** function next results are measured and displayed: **LAV**, **L(A/C/Z)eq**, **L(A/C/Z)E**, **SEL8**, **E**, **E_8h**, **LEPd**, **PSEL**, **Ltm3**, **Ltm5**, **LN%**, **PTC**, **PTP**, **ULT**, **TWA**, **PrTWA**, **Lc-a**, **OVL**, **L(A,C,Z)peak**, **L(A,C,Z)(F/S/I)max**, **L(A/C/Z)(F/S/I)min**, **L(A,C,Z)(F/S/I)**, **DOSE**, **D_8h**, **PrDOSE**;
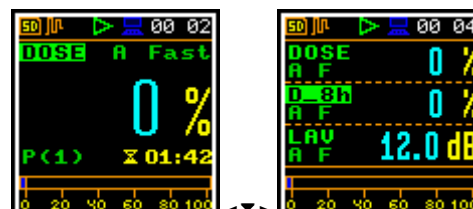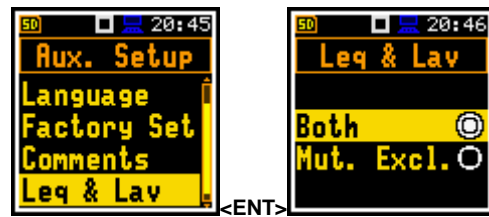

11.6. Displaying of Leq & Lav results – Leq & Lav – Leq & Lav

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

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

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

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

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

11. RUNNING LEQ

In order to select the **Run. LEQ** mode the user has to enter the **Function** list by pressing the **<Menu>** push-button, then select the **Function** text and press **<Enter>**. Then, the user has to open the **Meas. Funct** window and highlight the **Run. LEQ** position and press **<Enter>**.
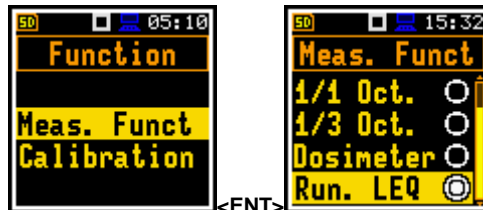
Notice: *It is not possible to change the current function during a live measurements. The instrument displays in this case for about 2 seconds the text: "Measurement in Progress". In order to change the current measurement function the measurement must be stopped!*

Running LEQ (**Run. LEQ**) is a special function of the SVAN971 instrument. This function is very similiar to Level Meter (**Lev. Met.**). The difference is that in **Run. LEQ** there are two additional measurement results: **LR15** and **LR60**. **LR15** and **LR60** are calculated as **LEQ** during last 15 or 60 minuts of measurement. Therefore these results are not displayed before predefined period (accordingly 15 or 60 minuts) of measurement.
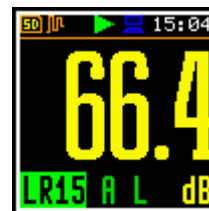
For example, if **LR15** and **LR60** are displayed with RTC:15:04:11 it means, that:

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

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

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

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

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

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

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

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

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