

4. MEASUREMENT FUNCTIONS OF THE INSTRUMENT

The **SVAN 945A** is a unique pocket instrument combining functions of a **sound level meter (SLM)**, with the Type 1 accuracy (according to IEC 651, IEC 804 and IEC 61672-1 standards), **1/1 OCTAVE** and **1/3 OCTAVE** real time analyser in which in parallel operate the digital pass-band filters. The values of the central frequencies of these filters are defined in the sequence conforming to the base two system. All 1/1 octave & 1/3 octave filters are Type 1 (according to IEC 1260 standard).

In the instrument some additional functions are also available as options, namely the narrow-band frequency analysis (**FFT**), the analysis of **TONALITY**, the measurement of **LOUDNESS** and reverberation time (**RT60**).

Thanks to the application of the state of the art in the digital signal processing, in the instrument work in parallel **three independent sound level meters, so-called here profiles**, which perform the measurement of the acoustic signal with the selectable combination of **A, C, LIN (Z)** (conforming to IEC 61672-1 standard) or **G** (conforming to ISO 7196 standard) weighting filters and **SLOW, FAST** or **IMPULSE** RMS detectors. **1/1 OCTAVE or 1/3 OCTAVE analyser works simultaneously with the mentioned above profiles.**

The measurement of **SPL, LEQ, SEL, Ltm3, Ltm5, PEAK, MAX, MIN, statistics (LN)** and **time history** are performed simultaneously in all profiles (cf. Appendix D for the definitions).

The measurement results can be presented on the screen of the instrument in the different ways depending on the selected function and the setting of the parameters. In the case of the sound level meter the following display modes (the ways of the measurement results presentation) are available:

- One Profile, **3 PROFILES, STATISTICS** and **PLOT**.
- In the case of **1/1 OCTAVE & 1/3 OCTAVE analysis** the possibility of the spectra presentation is also available (**SPECTRUM** mode).
- The **selection of the display mode** is made by pressing the **<SHIFT>** and **<▲>** or **<SHIFT>** and **<▼>** push-button.
- The **switching between the profiles** is possible by pressing the **<▲>**, **<▼>** push-buttons (in one profile, **3 PROFILES** or **STATISTICS** modes).
- The **switching between the results in the selected profile** is made by pressing the **<↵>**, **<▶>** push-buttons (in one profile or **3 PROFILES** modes).
- The **changing of the statistics class, 1/1 octave or 1/3 octave filter** and the **value in the buffer** is done by pressing the **<↵>**, **<▶>** push-buttons (the movement of the cursor in **STATISTICS, SPECTRUM** and **PLOT** modes).
- The pressing of the **<▲>**, **<▼>** push-buttons enables the user to **change the relation between the vertical and horizontal axis** for the **SPECTRUM** and **PLOT** modes of result's presentations.
- In the case of **1/1 OCTAVE** or **1/3 OCTAVE** analysis mode, pressing the **<ENTER>** push-button in the **SPECTRUM** mode of result's presentation enables the user to observe on the screen the statistical analysis performed for the selected **1/1 OCTAVE** or **1/3 OCTAVE** filter. The return to the **SPECTRUM** mode is performed after pressing the **<ESC>** push-button.
- In the case of the presentation of **1/1 OCTAVE** or **1/3 OCTAVE** statistical analysis results, pressing the **<SHIFT>** and **<▲>** or **<SHIFT>** and **<▼>** push-buttons enables the user to present the results of the analysis for different **1/1 OCTAVE** or **1/3 OCTAVE** filters. Pressing the **<↵>**, **<▶>** push-buttons results in the changing of the cursor position for which the value of **LN** is displayed.

The acoustic measurement channel, consisted of the instrument, the preamplifier SV 11 and the microphone, is factory calibrated and prepared for the work in the standard environmental conditions. The calibration of the measurement channel has to be done when the absolute sound pressure level value is important. It is because the microphone sensitivity is a function of the temperature, ambient pressure and humidity. The calibration procedure is described in Chapter 4.1.

The main function of the instrument is the **measurement of sound level**. **1/1 OCTAVE** or **1/3 OCTAVE** analysis, narrow-band frequency analysis (**FFT**), the analysis of **TONALITY**, the measurement of **LOUDNESS**, the measurement of the reverberation time (**RT60**) etc. are the optional functions, which broaden the applications of the instrument. They can be supported by the producer or purchased later. The producer activates the optional functions bought with the instrument. The user should activate by itself the functions purchased later.

The detailed description of

- the calibration procedure is given in Chapter 4.1,
- the measurements of sound in the **SLM** mode is described in Chapter 4.2,
- The way, in which this activation is performed, is presented in Chapter 4.3,
- **1/1 OCTAVE** analysis is given in Chapter 4.4,
- **1/1 OCTAVE** analysis is given in Chapter 4.5.

The optional functions are described in the Apps. The additional functions of the instrument, namely: the available ways of the measurement results presentation (**DISPLAY** list), the settings (**SETUP** list), the storing of the measurement results (**FILE** list) and the printing of the reports (**REPORT** list), are described in Chapter 5.

4.1. 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 calibration of the measurement channel has to be done. In order to select a calibration function the user has to enter the **FUNCTION** list by pressing the <MENU> push-button, selecting by means of the <^>, <v> (or <◀>, <▶>) push-buttons the **FUNCTION** text and pressing the <ENTER>. The **FUNCTION** list contains three elements: **MEASUR. FUNCTION** and **CALIBRATION** sub-lists and **METEO** window (in which the current temperature and pressure are displayed). Next, the user has to open the **CALIBRATION** sub-list (to select the **CALIBRATION** text using the <^>, <v> or <◀>, <▶> push-buttons and press the <ENTER> one, when this text is displayed inversely).



The view of the screens with the main list, the **FUNCTION** text selected (a), the **FUNCTION** list opened, the **CALIBRATION** text selected (b) and after entering the **CALIBRATION** sub-list

Calibration procedure of the instrument

The calibration for the sound measurements can be done in the following way:

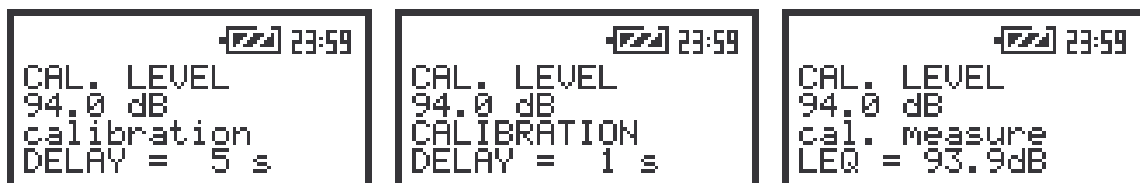
1. Attach the acoustic calibrator SV 30 (or equivalent 94 dB / 1000 Hz) to the microphone of the instrument.



Notice: It is also possible to use the pistonphone, which generates the signal ca 124 dB or different type of acoustic calibrator dedicated for 1/2" microphones. **In any case, before starting the calibration measurement, the user has to set (by means of the <◀>, <▶> push-buttons) the level of the signal generated by the given calibrator (CAL. LEVEL position of CALIBRATION sub-list), which is usually stated in the calibration certificate of the unit (the value of the CAL. LEVEL set by the producer of SVAN 945A is equal to 94.0 dB).**

2. Switch on the calibrator and wait ca 30 seconds before starting the calibration measurement.
3. Start the calibration measurement by pressing the <START / STOP> push-button.

The measurement time is set to 5 seconds with 5 seconds delay. During the calibration measurement the <ESC> and <PAUSE> push-buttons do not operate but it is possible to stop the measurement using the <START / STOP> one. It is not recommended to stop the calibration measurement before programmed 5 seconds period!



The view of the screens during the calibration measurement

Waiting for the start of the measurements the **DELAY** is counted down on the screen and the **CALIBRATION** text is changing (from big letters to small and vice versa). During the measurements the **cal. measure** text is changing. After the end of the measurement its result is displayed on the screen in the bottom line.

It is recommended to repeat the calibration measurement 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 disturbances,
- the calibrator or the measurement channel (the microphone, the preamplifier or the instrument itself) are damaged.



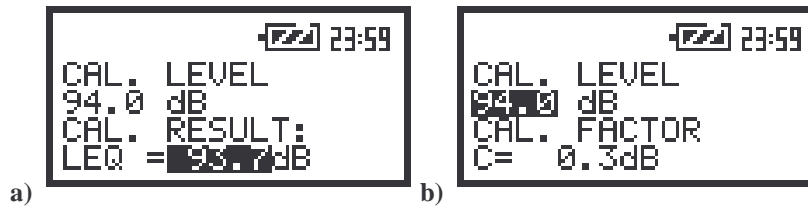
Notice: During the calibration measurement the external disturbances (acoustic noise or vibrations) should not exceed the value of 100 dB.

4. Press the <ENTER> push-button in order to accept the measurement result.

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



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



The view of the screens after the measurements (a) and after the acceptance of the value of the calibration factor (b)

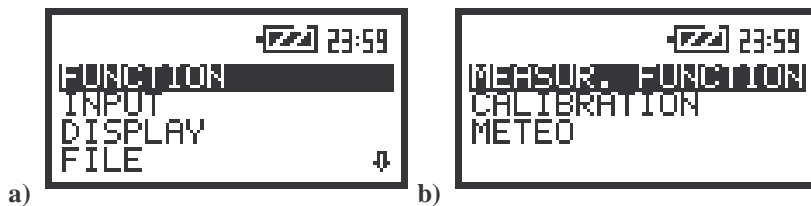


Notice: The calibration factor is always added to the results of sound level measurements and sound analysis.

4.2. SOUND LEVEL METER

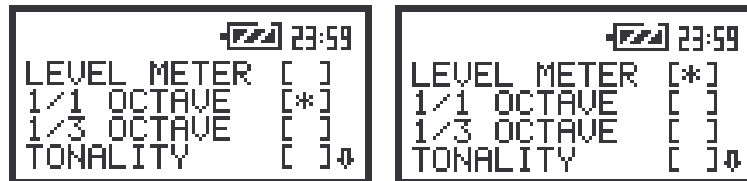
The **SOUND LEVEL METER mode** provides the user with the functions of the **SLM** meeting the IEC 651, IEC 804 and IEC 61672-1 standards for Type 1 accuracy. The instrument can also be used for the long-term acoustic monitoring using for this purpose the huge buffer, in which the measurement results are logged in.

In order to select the **SLM** mode the user has to enter the **FUNCTION** list by pressing the **<MENU>** push-button, selecting by means of the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons the **FUNCTION** text and pressing the **<ENTER>**. The **FUNCTION** list contains three elements: **MEASUR. FUNCTION** and **CALIBRATION** sub-lists and **METEO** window. Next, the user has to open the **MEASUR. FUNCTION** sub-list (to select the **MEASUR. FUNCTION** text using the **<▲>**, **<▼>** or **<◀>**, **<▶>** push-buttons and press the **<ENTER>** one, when this text is displayed inversely).



The view of the screens with the main list, the **FUNCTION** text selected (a) and the **FUNCTION** list opened; the **MEASUR. FUNCTION** selected (b)

After entering the **MEASUR. FUNCTION** sub-list, the set of the available functions appears on the screen. Currently active function is marked by the special character.



The view of the screens with the **FUNCTION** list opened (a) and after entering the **FUNCTION** sub-list (b)

The **SLM** mode is selected by placing the special character in the line with the **LEVEL METER** text. The position of the character can be changed using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons. After placing the character in the line with the **LEVEL METER** text the user has to press the **<ENTER>** push-button, which closes the **MEASUR. FUNCTION** sub-list.



Notice: It is not possible to change the mode during the measurements. The instrument displays in this case for about 3 seconds the text: **"measurement in progress / MEASUREMENT IN PROGRESS"**. In order to change the mode of the instrument the measurement must be finished!

The operation in **one measurement RANGE** from **24 dB_{RMS A}** to **137 dB_{RMS A}** (**140 dB_{PEAK}**) is the main distinguishing feature of the **SLM mode** of the instrument (for 1/2" condenser microphone with the sensitivity of 50 mV / Pa supplied with the unit).

The second distinguishing feature of the instrument is that **sound is always measured in three parallel "profiles" which are in fact three separate sound level meters working independently.**



Notice: **SOUND LEVEL METER** is the main mode of the instrument. In the **SLM** mode there is no access to **1/1 OCTAVE** or **1/3 OCTAVE** analysis.

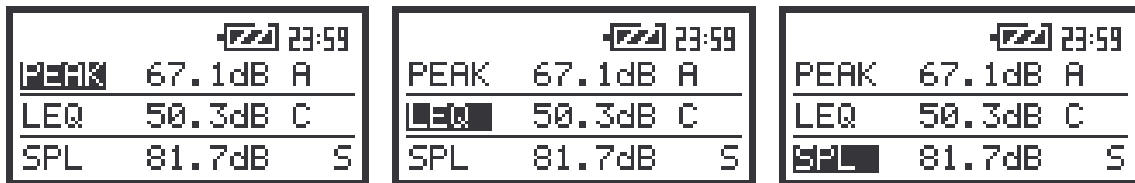
For each of the profiles the **RMS detector type and the weighting filter can be defined independently** (see the *INPUT* list).

The **main results** of the profiles are presented on the display in the form described below. For each profile the selected result is displayed on the left side followed by its value, units and the type of the detector. The **dB**, **dB A**, **dB C** or **dB G** units are related with the weighting filter selected for the given profile:

- the usage of **LIN** weighting filter is indicated by **dB** units.
- the usage of **A** weighting filter is indicated by **dB A** units,
- the usage of **C** weighting filter is indicated by **dB C** units,
- the usage of **G** weighting filter is indicated by **dB G** units.

On the right side of the display the RMS detector type (selected for the given profile) is presented:

- the **SLOW** type RMS detector is indicated by the symbol **S**,
- the **FAST** type RMS detector is indicated by the symbol **F**,
- the **IMPULSE** type RMS detector is indicated by the symbol **I>**.



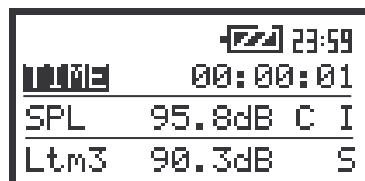
The view of the instrument's screens in 3 PROFILES display mode



Notice: The **PEAK** result never depends on the detector time constant. The results **LEQ** and **SEL** do not depend on the detector time constant if in the **LEQ INTEGRATION** position of the **SETUP** sub-list the **LINEAR** option was selected. The results **LEQ** and **SEL** depend on the detector time constant if in the **LEQ INTEGRATION** position of the **SETUP** sub-list the **EXPONENTIAL** option was selected.

For each of the profiles (three independent measurement modules) the following results are measured in parallel (see Appendix D for the definitions):

- **PEAK**,
- **MAX**,
- **MIN**,
- **SPL** (the displayed **SPL** value is the biggest measured result for the selected RMS detector **over the last second** of the measurement),
- **LEQ**,
- **SEL**,
- **Ltm3**,
- **Ltm5**,
- **LN** selected by the user statistics class (where N is from 1 to 99),
- **Current measurement time** (this time is available in the result's field only in **3 PROFILES** display mode).



The view of the instrument's screen in 3 PROFILES display mode with the current measurement time



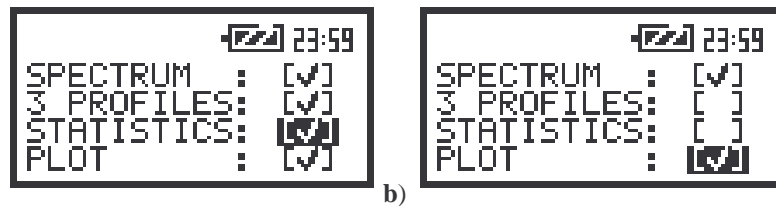
Notice: Switching between the profiles is possible by pressing the <^> <v> push-buttons. Switching between the results for the selected profile is made by pressing only the <◀>, <▶> push-buttons. In order to change the **nn** in statistical level the user has to press the <◀>, <▶> push-buttons together with the <SHIFT> one (in one profile or **3 PROFILES** mode).

By pressing the <SHIFT> and <^> or <SHIFT> and <v> push-button the user can switch the display mode (the way of the measurement results presentation) to:

- One profile,
- **3 PROFILES**,
- **STATISTICS**,
- **PLOT** (from the profiles in which the results of the measurement were stored in the files of the buffer; the number of the profile is displayed in this case along with the name of the result, i.e. **PEAK1**, **RMS2**, **MAX3**, etc).



Notice: The user can select the currently active mode of the result's presentation by means of the **DISPLAY MODES** sub-list of the **DISPLAY** list. The activation of a mode is indicated by the graphical symbol placed in the proper line of the **DISPLAY MODES** sub-list. Below the view of the screens is presented with all active modes ([✓]) and some of them switched off ([]). More details about the display modes are given in the description of the **DISPLAY** list in the Chapter 5.



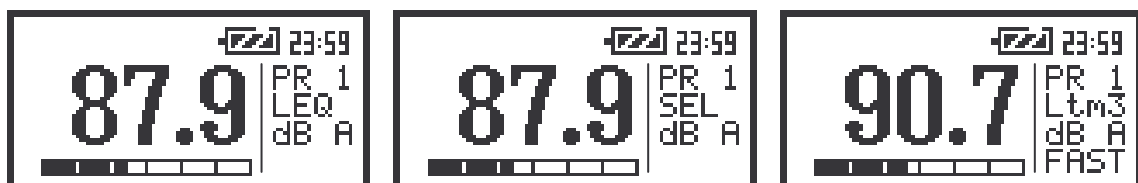
a)

b)

The view of the screens with the **DISPLAY MODES** sub-list opened and active all modes of the measurement results presentation (a) and some of the modes switched off (b)

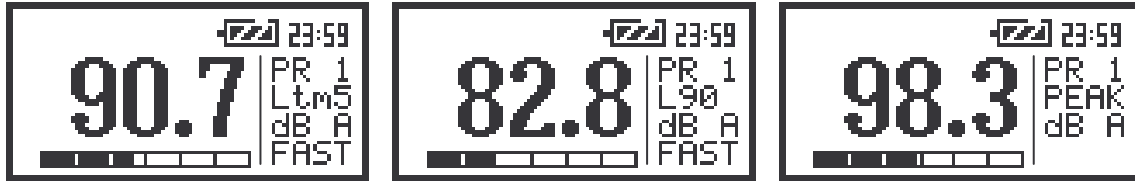
One profile mode of measurement results presentation

This mode of presentation is treated as main and it can not be switched off. In one profile mode the selected result is presented in the middle of the screen in the easy visible format. The length of the horizontal bar placed under the digital value corresponds to the measured result. In the case when the level of the measured signal is too small the **UNDERRANGE** text is displayed in the place of the analogue-like indicator. This text disappears after stopping the measurement by means of the <START / STOP> or <PAUSE> push-buttons. In this mode important parameters of the result, namely: the profile's number, the name of the displayed value, the weighting filter together with the units and the RMS detector's type are presented in four lines on the right side of the display just after the vertical line. This line is straight in the case of sound level meter mode and dotted in other modes. The **PEAK** result never depends on the detector time constant, so the fourth line for this result always remains empty. The **LEQ** and **SEL** results depend on the detector time constant if in the **LEQ INTEGRATION** position of the **SETUP** list the **EXPONENTIAL** option was selected.



The view of the screens in one profile presentation; the switching between the results in a profile

In this mode of presentation the switching between the simultaneously calculated results is performed by means of the of the <◀>, <▶> push-buttons.



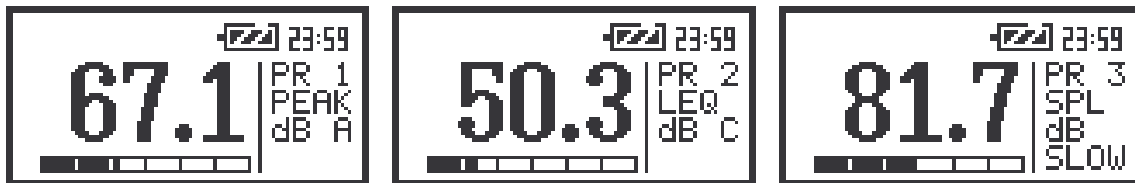
The view of the screens in one profile presentation; the switching between the results in a profile

After consecutive pressing of the mentioned above push-buttons the **LEQ**, **SEL**, **Ltm3**, **Ltm5**, **LN**, **PEAK**, **MAX**, **MIN** and **SPL** results are presented on screens as it is shown in the figures above and below.



The view of the screens in one profile presentation; the switching between the results in a profile

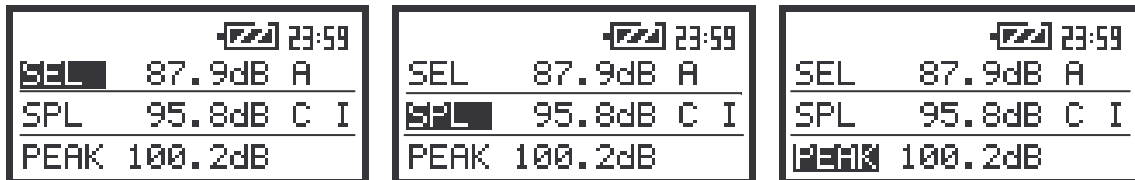
The change of the profile is achieved by pressing the <▲>, <▼> push-buttons. The selection of the statistical level number needs in this presentation mode pressing the <◀>, <▶> push-buttons together with the <SHIFT> one.



The view of the screens in one profile presentation – the changing of the profiles

3 PROFILES mode of the measurement results presentation

In **3 PROFILES** mode of result's presentation the selected results from each profile are displayed in three consecutive lines. In each line the name of the measurement result, its value, the weighting filter in the profile and the detector time constant are presented. The profiles are separated by two straight horizontal lines. These line are dotted in other modes than sound level meter.

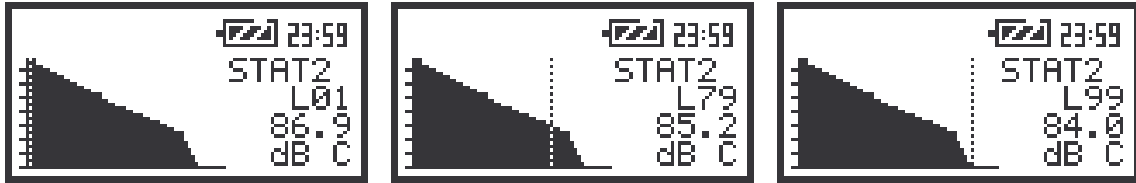


The view of the screens in 3 PROFILES presentation – the changing of the profiles

The change of the active profile (this in which the name is displayed inversely) is performed by means of the <▲>, <▼> push-buttons. The switching between the simultaneously calculated results is performed by means of the of the <◀>, <▶> push-buttons. The selection of the statistical level number needs in this presentation mode pressing the <◀>, <▶> push-buttons together with the <SHIFT> one.

Presentation of the statistical analysis results – STATISTICS

In the **STATISTICS** presentation all **LN** (from N = 1 up to N = 99) values for the selected profile are presented. The read-out of the interested **LN** value can be done using the cursor controlled by the <▲>, <▼> push-buttons. In this way of presentation the selected profile's number, the statistics class, its value and units are given on the right side of the display.



The view of the screens in STATISTICS way of presentation; the change of the cursor position in an active profile

The active profile can be changed in this mode by pressing the <▲>, <▼> push-buttons. The position of the cursor remains in the same position with the change of the profiles.



The view of the screens in STATISTICS way of presentation; the change of the active profile



Notice: The last selected statistics class (**LN** value) conforming to the cursor position in the **STATISTICS** mode of presentation, one for each profile, is also given in the other display modes (ways of the measurement results presentation).

Presentation of time history – PLOT

The **PLOT** mode of results presentation is available if data from at least one profile are logged in the buffer's file. If the **PLOT** position is switched on ([√]) but there was nothing stored in the buffer's file (in the selected profile there was **BUFFER:None** instead of **PEAK**, **MAX**, **MIN** or **RMS**) the **NO RESULTS** text is displayed after the first input to this mode (see Figure below). When the **PLOT** is selected as active and the **BUFFER:None** for all profiles is set, the **PLOT** mode of results presentation is skipped.



The view of the screen in the PLOT mode when there is nothing in the buffer to be displayed (after setting PLOT as active)

In the **PLOT** presentation the results logged in the file of the buffer of the instrument are also given on the display in the time history form. Each line corresponds to one measurement result (the results are registered with the step set in the **BUF. STEP** position of the **MEASURE SETUP** sub-list). There are 62 lines presented on the screen with the dynamics not greater than 80 dB.

The read-out of the interested value can be done using the cursor controlled by the <▲>, <▼> push-buttons. The selected profile's number, time of the measurement and the measured result with its unit are presented on the right side of the display. Each new measurement result saved in the file of the buffer during the **PLOT** mode shifts the cursor position to the right. When the cursor achieved the right

limit of the screen, new measurement results appears on the right end of the screen and the results from 63***BUF. STEP** disappears from the left end of the screen. It looks like the movement of the presentation to the left. The screen is updated every **BUF. STEP** time for the **BUF. STEP** greater than or equal to 1 second and every second for the **BUF. STEP** smaller than 1 second.



The screens in the PLOT presentation mode; the overview of the values later stored in the buffer

After finishing the registration it is possible to overview all saved results. For this reason the cursor has to be placed to the left or right limit of the presentation. Each pressing of the <◀>, <▶> push-buttons results in the appearing of the screen, respectively - the earlier or later value. The whole presented time history is shifted one position to the right (or to the left).



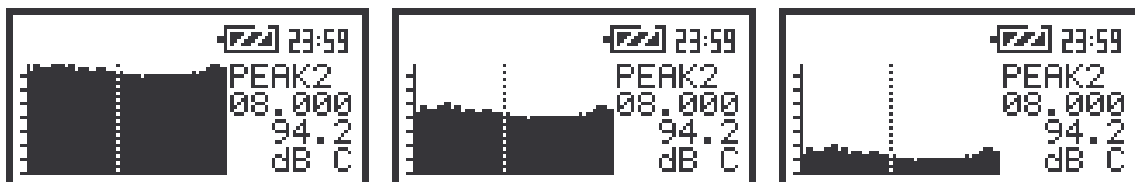
The screens in the PLOT presentation mode; the overview of the values earlier stored in the buffer

If in each profile a selected result is saved, in order to view time history in all profiles the user has to press the <SHIFT> and <▲> or <SHIFT> and <▼> push-buttons.



The screens in the PLOT presentation mode; the overview of the values earlier stored in the buffer

In the **PLOT** it is possible to shift the horizontal axis in relation to the vertical one using the <▲>, <▼> push-buttons. Each pressing of the <▲> push-button results in 10 dB shifting down of the presentation and each pressing of the <▼> push-button - 10 dB shifting up.



The view of the screens in the PLOT presentation mode with the shifted axes



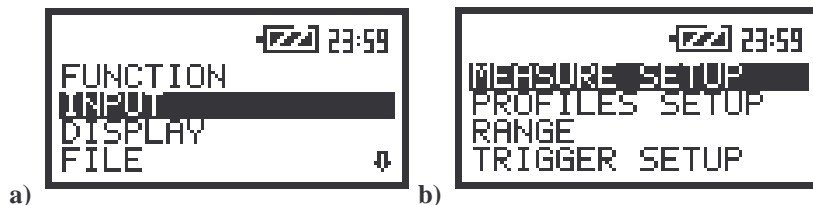
Notice: In the buffer many time histories can be stored, registered during the measurements. The user can select for the presentation the required time history in the **BUFFER VIEW** window available in the **DISPLAY** list (see Chapter 5 for details).

4.2.1. Measurement parameters setting

The important parameters for the measurement are programmed by means of the *INPUT* and *SETUP* lists.

Measurement parameters setting – INPUT list

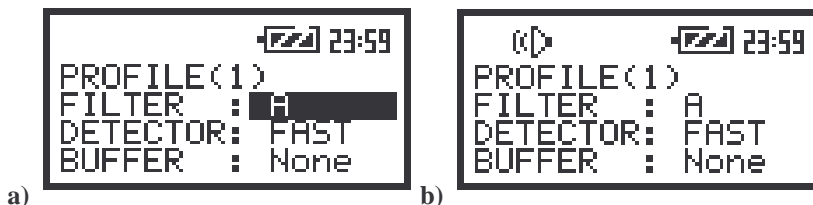
Setting of the profiles parameters can be done by means of the *INPUT* list after pressing the <MENU> push-button, selecting by means of the <▲>, <▼> (or <◀>, <▶>) push-buttons the *INPUT* text and pressing the <ENTER>. The *INPUT* list contains four elements which enable one the independent programming of the measurement parameters (**MEASURE SETUP** sub-list), the parameters of three profiles (**PROFILES SETUP** sub-list), common for all profiles setting of the input range (**RANGE** position) and the trigger function (**TRIGGER SETUP** sub-list).



The view of the screens in the main list with the *INPUT* text selected (a) and the *INPUT* list opened (b)



Notice: Any parameter in the *INPUT* list can be changed only when the instrument does not execute a measurement. The possibility of a change is signalled by displaying inversely a parameter's field. And in opposite, normally displayed field means that the parameter cannot be changed. The "Loudspeaker" icon indicates that the instrument is performing the measurements.



The view of the screens with the active (a) and not active (b) the PROFILE x sub-list

Selection of measurement parameters – MEASURE SETUP sub-list

The **MEASURE SETUP** sub-list is opened after the selection of the **MEASURE SETUP** text from the *INPUT* list by means of the <▲>, <▼> (or <◀>, <▶>) push-buttons and pressing the <ENTER> one. The **MEASURE SETUP** sub-list consists of the parameters, which can be set, switched on or off, namely: the delay of the start of measurements (**START DELAY** position), the integration time (**INT. TIME** position), the repetition of the measurement cycles (**REP. CYCLE** position) and the buffer's step (**BUF. STEP** position). In order to change the displayed inversely parameter the user has to press the <▲>, <▼> push-buttons. The confirmation of any change made in the sub-list requires pressing the <ENTER> push-button, which simultaneously closes the sub-list. The **MEASURE SETUP** sub-list is closed ignoring any changes made, after pressing in any time the <ESC> push-button.



The view of the screens with the **MEASURE SETUP** sub-list opened

Setting time delay before the start of measurements – START DELAY position

The **START DELAY** position defines the delay from the pressing the **<START / STOP>** push-button to the start of the measurements (the digital filters of the instrument analyse constantly the input signal even when the measurements are stopped). This delay can be set from **1 second** to **60 seconds** (with 1 second step by means of the **<◀>**, **<▶>** push-buttons and with 10 seconds step with the **<◀>**, **<▶>** push-buttons pressed together with the **<SHIFT>** one) The **<ENTER>** push-button must be pressed for the confirmation of the selection, which closes simultaneously the **MEASURE SETUP** sub-list.



The view of the screens with the MEASURE SETUP sub-list opened; the setting of the START DELAY position



Notice: The minimum delay time is equal to 1 second. It protects from the registration by the instrument the effects of the push-button pressing. In the **CALIBRATION** mode the delay time is equal to 5 seconds.

Setting the integration time – INT. TIME position

The **INT. TIME** position defines the time period in which the signal is being averaged during the sound level measurements. The required parameter can be set by means of the **<◀>**, **<▶>** and confirmed by the **<ENTER>** push-button.

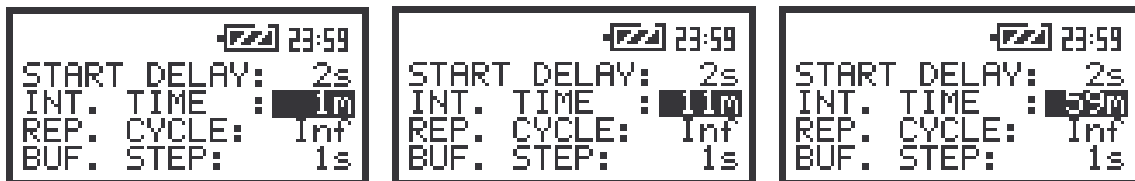
The integration time (**INT.TIME**) can be set (by pressing the **<▶>** or **<▶>** with **<SHIFT>** push-buttons):

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



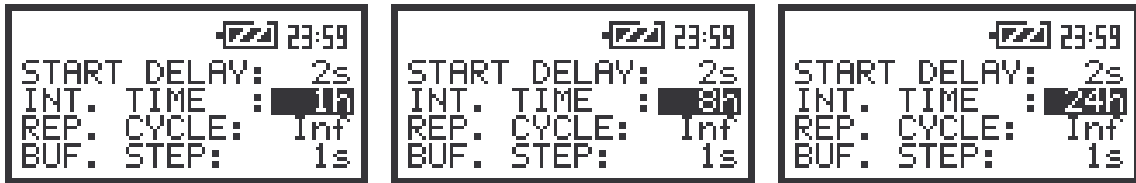
The view of the screens during setting the INT. TIME position; time expressed in seconds

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



The view of the screens during setting the INT. TIME position; time expressed in minutes

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



The view of the screens during setting the INT. TIME position; time expressed in hours

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



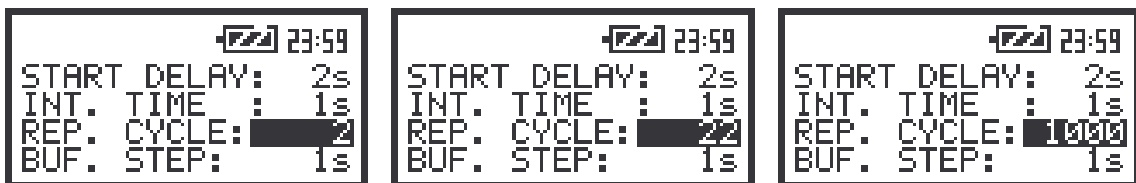
Notice: The measurement can also be **temporary stopped** by pressing the <PAUSE> push-button. It inserts an arbitrary long **PAUSE**. The measurements can be continued after pressing the <PROCEED> push-button (the <PAUSE> together with the <SHIFT>). The subsequent pressing of the <PAUSE> push-button causes the cancellation of the last second of the measurement. This procedure can be repeated up to fifteen times (last 15 seconds of the measurement can be cancelled and erased from the memory).



Notice: In the case of switching on the AUTO SAVE function the minimum value of the integration time is equal to 5 seconds.

Setting number of repetition of measurement cycles – REP. CYCLE position

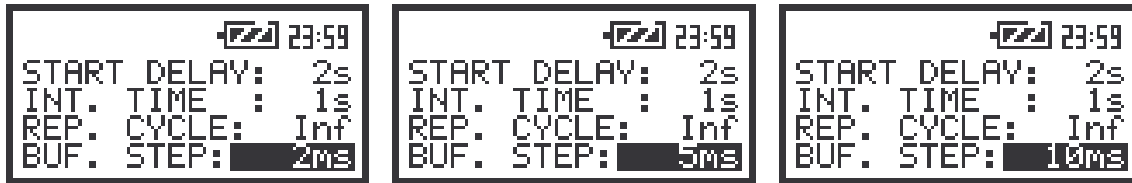
The **REP. CYCLE** position defines the number of cycles (with the measurement time defined in the **INT. TIME** position) which should be performed by the instrument. The required parameter can be set by means of the <◀>, <▶> push-buttons (with the step equal to 1) or by means of the <◀>, <▶> push-buttons pressed together with the <SHIFTR> one (with the step equal to 20). The selected value is accepted by pressing the <ENTER> push-button, which closes the **MEASURE SETUP** sub-list. The **Inf** value denotes the infinite repetition of the measurements (till the pressing of the <START / STOP> push-button or by remote control code). The **REP. CYCLE** values are within the limits [1, 1000].



The view of the screens during setting the REP. CYCLE position; available number of cycles: 1..1000, Inf

Setting time between two writings to the buffer's file – BUF. STEP position

The **BUF. STEP** position defines the time period of the data logging in the buffer's file. It can be set from **2 ms** to **1 s** in 1, 2, 5 sequence and the values from 1 second to 59 seconds, from 1 minute to 59 minute and 1 hour. The required parameter can be set by means of the <◀>, <▶> push-buttons and accepted by the <ENTER> one, which closes simultaneously the **MEASURE SETUP** sub-list. Any changes are ignored after pressing the <ESC> push-button.



The view of the screens during setting the BUF. STEP position; available values in a sequence 1, 2, 5

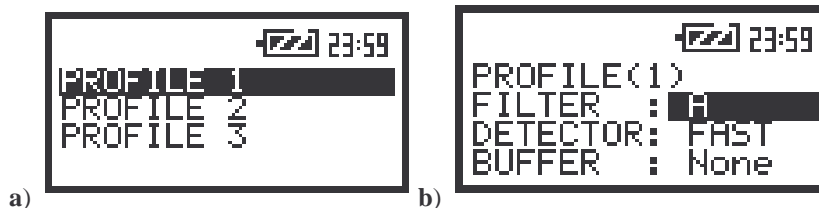
Setting parameters in profiles and for octave analysis – PROFILES SETUP sub-list

The user enters the **PROFILES SETUP** sub-list after pressing the <ENTER> push-button on the displayed inversely **PROFILES SETUP** text. This sub-list in the case of sound level meter mode consists of three **PROFILE x** sub-lists (each for one profile).



The view of the screens with the **PROFILES SETUP** sub-list opened; the selection of a profile

The next pressing of the <ENTER> push-button opens the sub-list for a profile which number is displayed inversely.



The view of the sub-lists: **PROFILES SETUP** (a) and **PROFILE 1** (b)

Setting parameters in a profile – PROFILE x sub-list

In the **PROFILE x** sub-list the following parameters can be programmed independently for each profile:

- **w** weighting filter,
- **R** RMS detector type,
- **r** profile's result logged in the buffer's file.

Passing throughout the sub-list is possible by pressing the <^>, <v> push-buttons.

Selection of the weighting filter in SLM – FILTER position

The following weighting filters are available in a profile of the instrument:

- **LIN** conforms to the requirements for the **Z** filter of type 1 according to the IEC 61672-1 standard.
- **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,
- **C** type 1 according to the ISO 7196 standard.



The view of the screens in the PROFILE 1 sub-list; the selection of the weighting filter

The characteristics of the filters are given in Appendix D. The selection of the required filter is made with the <◀>, <▶> push-buttons. The user can pass to the selection of the next parameter from the **PROFILE x** sub-list pressing the <▲>, <▼> push-buttons. After pressing the <ENTER> push-button any changes made in the sub-list are confirmed and the sub-list is closed. The return to the **PROFILES SETUP** sub-list ignoring any changes made in the sub-list is made after pressing the <ESC> push-button.

Selection of the RMS detector – DETECTOR position

In the instrument three RMS detectors are available: **IMPULSE**, **FAST** and **SLOW**. The selection of the required detector is made with the <◀>, <▶> push-buttons. The user can pass to the selection of the next parameter from the **PROFILE x** sub-list pressing the <▲>, <▼> push-buttons. After pressing the <ENTER> push-button any changes made in the sub-list are confirmed and the sub-list is closed. The return to the **PROFILES SETUP** sub-list ignoring any changes made in the sub-list is made after pressing the <ESC> push-button.



The view of the screens in the PROFILE 3 sub-list; the selection of the detector time constant

Selection of the SLM result to be saved in the buffer's file – BUFFER position


One measurement result from each profile can be saved in the buffer's file of the instrument. The following results can be saved: **PEAK**, **MAX**, **MIN** and **RMS**. The selection of the required result is made with the <◀>, <▶> push-buttons. The selection of the **None** text means that from this profile no result is to be saved in the buffer's file. After pressing the <ENTER> push-button any changes made in the sub-list are confirmed and the sub-list is closed. The return to the **PROFILES SETUP** sub-list ignoring any changes made in the sub-list is made after pressing the <ESC> push-button.




Notice: The change of the profiles parameters is not possible when the measurement is performed. The user has to finish the current measurement.



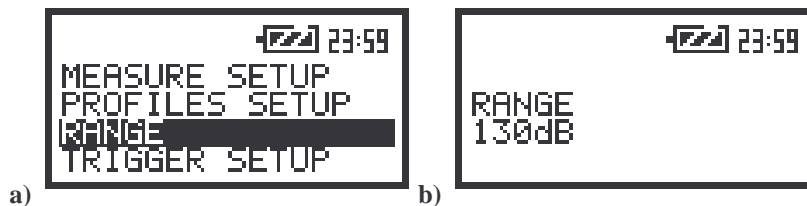
The view of the screens in the PROFILE 3 sub-list; the selection of the result to be saved in the buffer

 **Notice:** Setting **BUFFER:None** results in bypassing the storing of the given profile's results in the buffer's file. It creates more space in the buffer for other profiles (see Chapter 5 for details).

 **Notice:** The buffer is updated in the time periods (steps) defined in the **BUF. STEP** position. The way the measurement results are stored is described in Chapter 5.

Selection of the measurement range in SLM – RANGE position

After entering the **RANGE** position (the selection of the **RANGE** text from the **INPUT** list by means of the <◀>, <▶> push-buttons and pressing the <ENTER> push-button) the change of the input range is possible. In the **SLM** mode the instrument operates in **one, wide 125 dB** dynamic range and **no other ranges are available**. The return to the **INPUT** list is made after pressing the <ESC> or <ENTER> push-buttons.



The view of the screens in the INPUT list; the RANGE position selected (a) and opened (b)

Selection of mode and parameters of triggering – TRIGGER SETUP sub-list

The **TRIGGER SETUP** sub-list is opened after the selection of the **TRIGGER SETUP** text from the **INPUT** list by means of the <▲>, <▼> (or <◀>, <▶>) push-buttons and pressing the <ENTER> one. The **TRIGGER SETUP** sub-list consists of the positions, which can be set or selected. These positions are as follows:

- The triggering of the measurements (**TRIGGER** position).
- The source of the triggering signal (**SOURCE** position).
- The level of the triggering (**TRG. LEVEL** position).
- The parameters related with the triggering from the buffer (**PRE/POST TRIGGER**).

In order to change the displayed inversely parameter the user has to press the <▲>, <▼> push-buttons. The confirmation of any change made in the sub-list requires pressing the <ENTER> push-

button, which simultaneously closes the sub-list. The **TRIGGER SETUP** sub-list is closed ignoring any changes made, after pressing in any time the **<ESC>** push-button.

Switching the triggering on and off – TRIGGER position

The triggering of the measurements (**TRIGGER** position) can be switched off using the **<◀>**, **<▶>** push-buttons.



The view of the screens in the **TRIGGER SETUP** sub-list

The triggering is switched on if one off its five modes is selected: **SLOPE +**, **SLOPE -**, **LEVEL +**, **LEVEL -** or **BUFFER**. The selection of the triggering mode is performed using the **<◀>**, **<▶>** push-buttons. If the instrument works with the switching on triggering the “Tree” icon is flashing on the screen in the case when the triggering condition was not fulfilled.



The view of the screens in the **TRIGGER SETUP** sub-list with the **SLOPE** modes selected

In the case when the **SLOPE +** is selected, the measurement starts when the arising signal will pass the level determined in the **T. LEVEL** position. The measurement is stopped when the conditions set in the **MEASURE SETUP** sub-list are fulfilled, after pressing the **<START / STOP>**. push-button or after receiving remotely the proper control code.



Notice: In **SLM** mode only one available, so-called “triggering signal” is the signal coming from the RMS detector of the first profile.

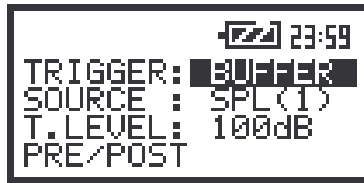
In the case when the **SLOPE -** is selected, the measurement starts when the falling down signal will pass the level determined in the **T. LEVEL** position.



The view of the screens in the **TRIGGER SETUP** sub-list with the **LEVEL** modes selected

In the case when the **LEVEL +** is selected, in each second of the measurement the triggering condition is checked; the measurement is registered only when the signal has the greater level then this determined in the **T. LEVEL** position and in the other case the measurement result is skipped.

In the case when the **LEVEL** - is selected, in each second of the measurement the triggering condition is checked; the measurement is registered only when the signal has the lower level then this determined in the **T. LEVEL** position and in the other case the measurement result is skipped.



The view of the screens in the TRIGGER SETUP sub-list with the **BUFFER** mode selected

After the selection of the **BUFFER** mode the **PRE/POST** text appears on the screen. This mode of triggering influences the way the measurement results are registered in the buffer, namely: if the triggering signal is greater then the selected **T. LEVEL**, the following results are saved in the buffer:

- registered directly before the fulfilment of the triggering condition; time of the registration can be calculated by multiplying the value set in the **PRE TRIGGER** by the step taken from the **BUFFER STEP** position (the **MEASURE SETUP** sub-list);
- all measurement results up to the moment the triggering signal falls down the **T. LEVEL**;
- the results registered directly after the fulfilment of the triggering condition; time of the registration can be calculated by multiplying the value set in the **POST TRIGGER** by the step taken from the **BUFFER STEP** position.

Selection of the triggering signal – SOURCE position

It is assumed that in the **SLM** mode there is only one triggering signal available. It is the output signal from the RMS detector coming from the first profile which is denoted here as **SPL(1)**. This position never becomes active (it is never displayed inversely) and the text stated here remains unchanged in the **SLM** mode.

Setting the level of triggering – T. LEVEL position

The level of the triggering (**T. LEVEL** position) can be set in 1 dB step (or 10 dB steps) from 24 dB to 136 dB range using the <◀>, <▶> push-buttons (or <◀>, <▶> with <SHIFT>).



The view of the screens in the TRIGGER SETUP sub-list; the **T.LEVEL** setting

Setting the parameter related with the buffer triggering – PRE/POST TRIGGER positions

In the case when the **BUFFER** mode is selected the text **PRE/POST** appears on the screen. After the activation of this text (the displaying inversely) and pressing the <ENTER> push-button the settings made in the **TRIGGER SETUP** sub-list are confirmed and the new sub-list is opened.

```

                [Battery] 23:59
TRIGGER:  BUFFER
SOURCE :  SPL(1)
T.LEVEL: 136dB
PRE/POST

```

The view of the screens in the TRIGGER SETUP sub-list; the PRE/POST position selected

In the **PRE** line the number of the results registered in the buffer before the fulfilment of the triggering condition can be set. This number is within the limits 0..50. Time period of the measurements which are saved in the buffer can be calculated multiplying the value set in the **PRE** position by the value set in the **BUFFER STEP** position. The result of the calculation is presented in the same line, at the right side of the screen.

<pre> [Battery] 23:59 PRE/POST TRIGGER PRE : 0 0.0s POST: 0 0.0s </pre>	<pre> [Battery] 23:59 PRE/POST TRIGGER PRE : 14 2.8s POST: 0 0.0s </pre>	<pre> [Battery] 23:59 PRE/POST TRIGGER PRE : 50 10.0s POST: 0 0.0s </pre>
---	---	--

The view of the screens in the TRIGGER SETUP sub-list; the setting of the PRE TRIGGER position

In the **POST** line the number of the results registered in the buffer after the fulfilment of the triggering condition can be set. This number is within the limits 0..200. Time period of the measurements which are saved in the buffer can be calculated multiplying the value set in the **POST** position by the value set in the **BUFFER STEP** position. The result of the calculation is presented in the same line, at the right side of the screen.

<pre> [Battery] 23:59 PRE/POST TRIGGER PRE : 50 10.0s POST: 0 0.0s </pre>	<pre> [Battery] 23:59 PRE/POST TRIGGER PRE : 50 10.0s POST: 15 3.0s </pre>	<pre> [Battery] 23:59 PRE/POST TRIGGER PRE : 50 10.0s POST: 40 40.0s </pre>
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The view of the screens in the TRIGGER SETUP sub-list; the setting of the POST TRIGGER position

The value set in the **PRE / POST** positions are confirmed and the sub-list is closed after pressing the **<ENTER>** push-button. After pressing the **<ESC>** push-button the sub-list is closed ignoring the settings made in the **PRE / POST** positions.

The other parameters important for the sound measurements can be set by means of the **SETUP** list after pressing the **<MENU>** push-button, selecting by means of the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons the **SETUP** text and pressing the **<ENTER>** one.

<pre> [Battery] 23:59 TUNER RTC RS232 MICROPHONE </pre>	<pre> [Battery] 23:59 RS232 MICROPHONE FIELD CORRECTION USER FILTERS </pre>	<pre> [Battery] 23:59 SHIFT MODE CLEAR SETUP LEQ INTEGRATION WARNINGS </pre>
---	---	--

The view of the SETUP list

In the **SETUP** list the following items are available:

- position which enables the user to set the Timer function (**TIMER**);
- position which enables the user to set the Real Time Clock. (**RTC**);
- sub-list which enables the user to set the parameters of the RS232 interface (**RS232**);
- sub-list which enables the user to set the voltage polarisation for the attached microphone and switch on or off the additional, so-called compensating filter dedicated for the microphones which are usually supplied with the instrument (**MICROPHONE**);
- position which enables the user to switch on the weighting filter for the measurements performed in the conditions of the diffuse field (**FIELD CORRECTION**);
- sub-lists which enables the user to select, switch on or off and set the correcting values for all 1/3 octave filters (**USER FILTERS**);
- sub-list which enables the user to set the operating mode of the push-buttons (**SHIFT MODE**);
- position which enables the user to return to the producer's set up (**CLEAR SETUP**);
- position which enables the user to select the way of integration for the **LEQ** and **SEL** measurements (**LEQ INTEGRATION**);
- sub-list which enables the user to switch on or off the warnings which can be displayed during the operation of the instrument (**WARNINGS**).

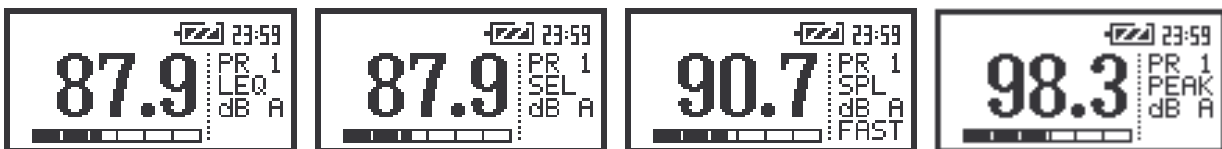
The detailed description of the elements of the **SETUP** list is presented in Chapter 5. For the sound measurements three positions are important: the setting of the **LEQ INTEGRATION** parameter, the selections made in the **MICROPHONE** position, and the setting of the correction filter for the diffuse field performed in the **FIELD CORRECTION** position.

The **LEQ INTEGRATION** position enables the user to select the detector type for the calculations of the **LEQ** function. The formulae used for the **LEQ** calculation are given in Appendix D.



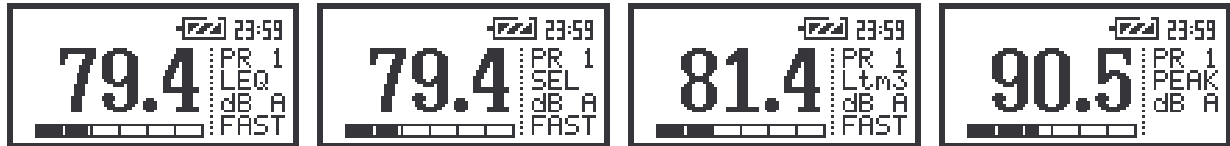
The view of the screens in the **SETUP** list (a) and with the possible options of **LEQ INTEGRATION** position (b), (c)

The selection of the **LINEAR** option causes that the **LEQ** and **SEL** results does not depend on the detector time constant set in any profile. Other results, i.e. the **SPL** value, depend on, which is presented on the screen by displaying the name of the detector which was used during the calculations. The **PEAK** value never depends on the detector time constant.



The view of the screens in the case when the **LINEAR** option is selected in the **LEQ INTEGRATION** position

The selection of the **EXPONENTIAL** option causes that the **LEQ** and **SEL** results depend on the detector time constant set in any profile as well as the other results (i.e. the **SPL** value), which is presented on the screen by displaying the name of the detector which was used during the calculations. The **PEAK** value never depends on the detector time constant.

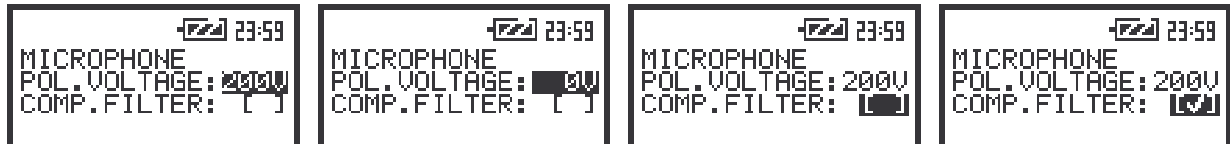


The view of the screens in the case when the **EXPONENTIAL** option is selected in the **LEQ INTEGRATION** position

The **MICROPHONE** sub-list consists of two positions. **POL. VOLTAGE** and **COMP. FILTER**.

In the **POL. VOLTAGE** position two values are available: **200 V** (for the condenser microphone i.e. G.R.A.S. 40AN or SV 02 usually supplied with the instrument) and **0 V** (for the prepolarised condenser microphones i.e. SV 22). The required value is selected by means of the <◀>, <▶> push-buttons and confirmed with closing the sub-list after pressing the <ENTER>. The sub-list is closed ignoring the changes made in the sub-list by pressing the <ESC> push-button.

In **COMP. FILTER** position it is possible to switch on or off the compensating filter which was designed taking into account the average frequency characteristic of the microphones supplied with the SVAN 945A instrument. The frequency characteristic of the designed filter is given in App. D. This filter compensates the non-linearity of the microphone's frequency characteristic.



The screens in the **MICROPHONE** sub-list, the selection of the polarisation voltage and compensating filter

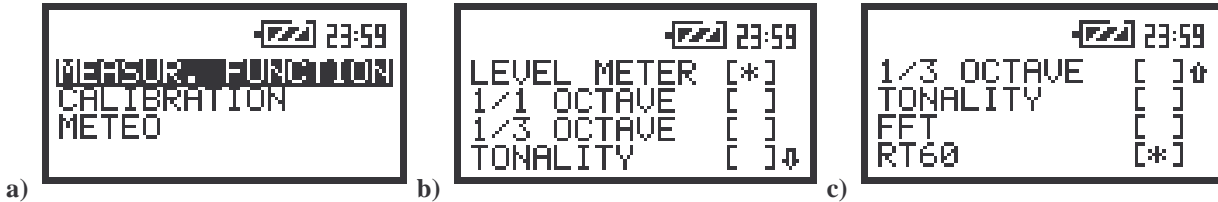
The **FIELD CORRECTION** position enables the user to set the proper conditions for making the measurements in the diffuse field. In this position two options are available: **FREE** (for the measurement performed in the free field conditions) and **DIFFUSE** (for the measurement performed in the diffuse field conditions). The microphones supplied with the SVAN 945A instrument (G.R.A.S. 40AN or SV 02) are designed for the measurement performed in the free field conditions. In order to make the measurements in the diffuse field conditions the user has to switch on an additional correcting filter. The frequency characteristic of this filter is given in App. D. The **FREE** option selection means that the correcting filter for the diffuse field conditions is switched off. For the measurements performed with the use of the microphones for the diffuse field conditions the option **DIFFUSE** should never be used.



The view of the screens in the **SETUP** list, the **FIELD CORRECTION** text highlighted (displayed inversely) (a) and the available options of the **FIELD CORRECTION** filter (b), (c)

4.3. ACTIVATION OF OPTIONAL FUNCTIONS

The measurement of loudness, the narrow-band frequency analysis (FFT), the **TONALITY** etc are the optional functions broadening the applications of the instrument. The function names are specified in the **MEASUR. FUNCTION** sub-list of the **FUNCTION** list.



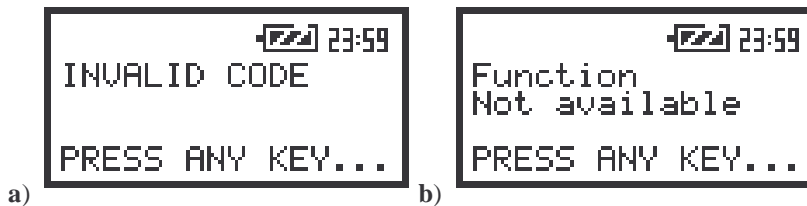
The view of the screens with the **FUNCTION** list opened, the **MEASUR. FUNCTION** selected (a) and the **MEASUR. FUNCTION** sub-list opened with the **LEVEL METER** (b) and **FFT** (c) selected

A function is selected by placing the special character in the line with the function's name. The position of the character can be changed using the <^>, <v> push-buttons. After placing the character in the line with the function's name the user has to press the <ENTER> push-button. The window for entering the access code to a function is opened in the first essay of its execution (after pressing the <ENTER> push-button) in the case when a function was not purchased together with the instrument.



The view of the screens during the entering of the access code to a function

The introduction of the access code is performed in the same way as the edition of the other text variables using the <^>, <v> push-buttons (the selection of the character's position), the <SHIFT> and <v> push-buttons (the **Insert** function), the <SHIFT> and <^> push-buttons (the **Delete** function) and the <^>, <v> push-buttons (the codes of characters). The verification is made after pressing the <ENTER> push-button. If the entered code was wrong the message is displayed and the instrument waits for the reaction of the user. After pressing the <ENTER> or the <ESC> push-button the information that the function is not available is displayed and the instrument once more waits for the reaction of the user.



The view of the screens after the unsuccessful verification of the access code (a) and with the text displayed after the negative verification (b)

After pressing the <ENTER> or the <ESC> push-button the instrument returns to the **FUNCTION** sub-list displaying the list of the functions implemented in the unit (cf. the first Fig. in this chapter). After successful verification of the access code the windows described above are no more displayed. Once activated function is always available.



Notice: The number of the attempts for the access code entering is limited. After three unsuccessful essays the possibility is blocked.

4.4. 1/1 OCTAVE ANALYSER

In order to select the **1/1 OCTAVE** analysis mode the user has to enter the **FUNCTION** list by pressing the **<MENU>** push-button, selecting by means of the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons the **FUNCTION** text and pressing the **<ENTER>**. Then, the user has to open the **MEASUR. FUNCTION** sub-list (to select the **MEASUR. FUNCTION** text using the **<◀>**, **<▶>** (or **<◀>**, **<▶>**) push-buttons and press the **<ENTER>** push-button when this text is displayed inversely).



The view of the screens in the main list with the **FUNCTION** text selected (a), the **FUNCTION** list opened with the **MEASUR. FUNCTION** text selected (b), **1/1 OCTAVE** analysis mode selected in **MEASUR. FUNCTION** sub-list (c)

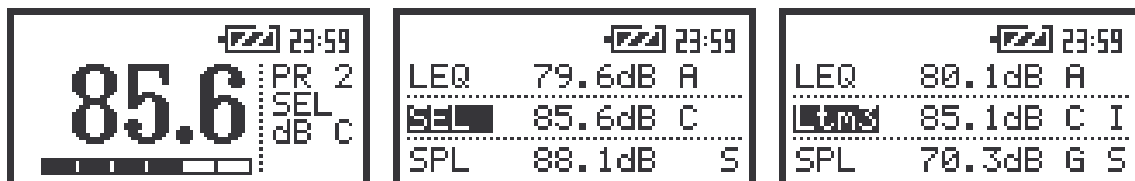
1/1 OCTAVE mode is selected by placing the special character in the line with **1/1 OCTAVE** text. The position of the character can be changed using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons. After placing the character in the line with **1/1 OCTAVE** text the user has to press the **<ENTER>** push-button, which closes the **MEASUR. FUNCTION** sub-list and confirms the selection. After pressing the **<ESC>** push-button the sub-list is also closed but **any changes are ignored**.



Notice: It is not possible to change the mode during the measurements. The instrument displays in this case for about 2 seconds the text: **"measurement in progress / MEASUREMENT IN PROGRESS"**. In order to change the mode the measurement must be finished!

The instrument's operation as **1/1 OCTAVE** analyser is similar to the **SLM** measurement mode with two important exceptions.

- In **1/1 OCTAVE** analysis the spectrum is available in parallel to the **SLM** operation. All 15 digital pass-band filters (with the centre frequencies from 16 kHz down to 1 Hz; in base two system) are working in the real time with the **weighting filters: HP, LIN, A or C** selected in the **SPECTRUM** sub-list of the **PROFILES SETUP** sub-list and the **linear RMS detector**. Additionally, the **TOTAL RMS** values for the full frequency range with the **A, C** and **LIN (Z)** weightings are displayed. In order to inform the user about the working mode of the instrument, in one profile and **3 PROFILES** modes of result's presentation the **dotted line** are used for the indication that the instrument **do not work in the SLM** mode. In the **SLM** mode the continuous lines are used.



The view of the screens in one profile and **3 PROFILES** result's presentation mode with the dotted lines indicating that the instrument do not work in the **SLM** mode



Notice: The **TOTAL RMS** results are measured with the weighting filters: **A, C** and **LIN** without taking into account the setting of the **SLM** profiles. The **spectra are always linearly averaged**. Thus, the **TOTAL** values from **1/1 OCTAVE** analysis can be different from those obtained for the **SLM** profiles (if the **LEQ INTEGRATION** was set as **EXPONENTIAL**).

2. As **1/1 OCTAVE** analyser the instrument operates in two input ranges **105 dB** and **130 dB**, which can be selected by means of the **RANGE** position (see below).

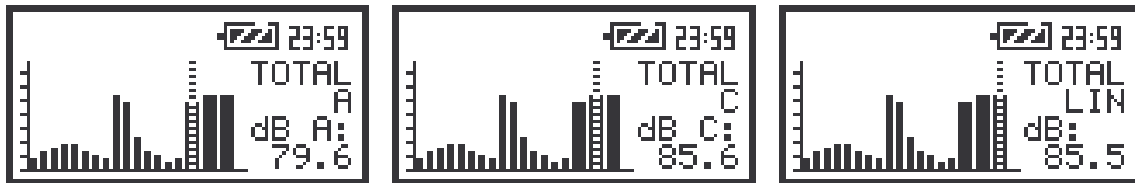
In order to change the mode of the measurement results presentation the user has to press the **<SHIFT>** and **<^>** or the **<SHIFT>** and **<v>** push-buttons. The following modes are available:

One profile, 3 PROFILES, SPECTRUM, STATISTICS and **PLOT**.



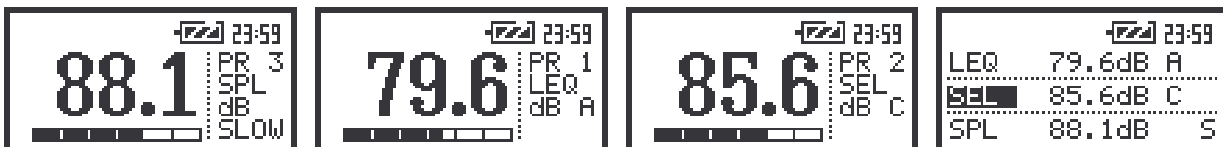
Notice: The user can select the number of the currently active modes of the measurement results presentation switching on ([√]) or off ([]) the given mode in the **DISPLAY MODES** sub-list of the **DISPLAY** list. Only one profile mode **cannot be switched off**. See Chapter 5 for the details about the display modes control.

One Profile, 3 PROFILES, STATISTICS and **PLOT** display modes are identical as for the **SLM**. The **SPECTRUM** mode displays **1/1 OCTAVE** analysis results (so-called spectrum) together with the **TOTAL RMS** values measured with **A, C** and **LIN** weighting filters. The read-out of the interested spectrum value can be done by means of the cursor controlled by the **<^>**, **<v>** push-buttons. On the right side of the screen the selected 1/1 octave filter centre frequency (or the selected **TOTAL**) is given, the units with the weighting filter (**dB A**, **dB C** or **dB** in the case of the **LIN**) and the numerical value are displayed.



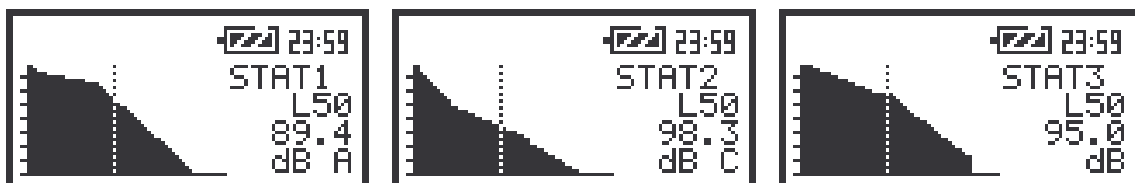
The view of the screens in 1/1 OCTAVE analysis in the **SPECTRUM** display mode

In one profile and **3 PROFILES** modes the results are presented in the same way as in the case of the **SLM** mode with only one difference that instead of the continuous line the dotted one is used. The active profile is changed after each pressing of the **<^>**, **<v>** push-buttons. The change of the result from the same profile is done by pressing the **<^>**, **<v>** push-buttons. The **LN** value is changed after pressing the **<SHIFT>** and **<^>** or **<SHIFT>** and **<v>** push-buttons.



The view of the screens in 1/1 OCTAVE analysis in one profile and **3 PROFILES** modes of result's presentation

In the **STATISTICS** mode it is possible to select the **LN** value using the **<^>**, **<v>** push-buttons. The active profile is displayed in the first line at the right side of the screen. **LN** corresponding to the current position of the cursor is displayed in the second line, value of **LN** - in the third line and the units together with the indicator of the weighting filter - in the fourth. When the **STATISTICS** mode of result's presentation is entered (**<SHIFT>** and **<^>** or **<SHIFT>** and **<v>** push-buttons are used for this purpose) in order to change the active profile the **<^>**, **<v>** push-buttons should be pressed.



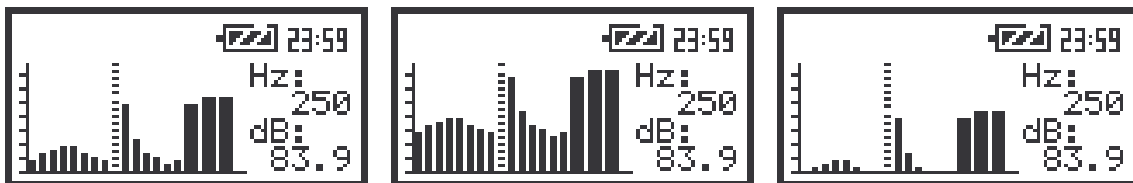
The view of the screens in 1/1 OCTAVE analysis with presentation of the statistical analysis in all profiles

In the **PLOT** mode the results are presented which are saved in the buffer from the profiles (in the case when in the **BUFFER** positions of the **PROFILE x** sub-lists the other texts than **None** were selected) with the step set for all profiles in the **BUF. STEP** position. The active profile is changed after pressing the **<SHIFT>** and **<◀>** or **<SHIFT>** and **<▶>** push-buttons. The position of the cursor can be done after pressing the **<◀>**, **<▶>** push-buttons. It is also possible to shift the horizontal axis in relation to the vertical one of the presented results using the **<▲>**, **<▼>** push-buttons (similarly as in the **SPECTRUM** mode).



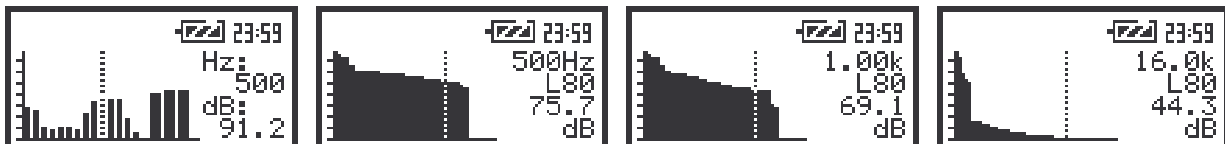
The view of the screens in 1/1 OCTAVE analysis in the PLOT mode; the registered results from all profiles

In the **SPECTRUM** mode it is possible to shift the horizontal axis in relation to the vertical one of the presented results using the **<▲>**, **<▼>** push-buttons. After each pressing of these buttons the presented picture moves 10 dB down or up - respectively.



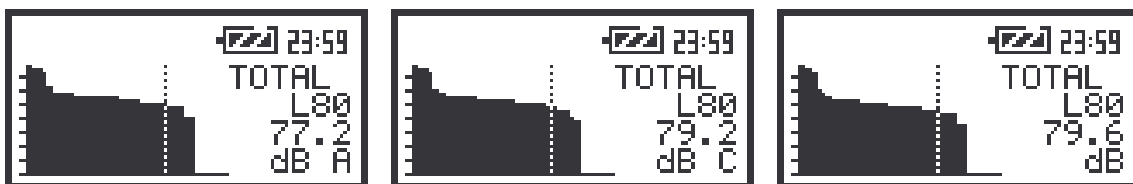
The view of the screens in 1/1 OCTAVE analysis with the shifted horizontal axis in relation to vertical one

The statistical analysis is also performed in **1/1 OCTAVE** analysis. The results of this analysis are presented on the screen after pressing the **<ENTER>** push-button in the case when the instrument is in the **SPECTRUM** mode of result's presentation. After this pressing the statistical analysis performed for the selected **1/1 OCTAVE** filter is shown on the screen. The centre frequency of the filter for which the analysis was made, the **LN** number corresponding to the cursor position, the **LN** value and the units are presented on the right side of the screen. The **LN** value can be changed by pressing the **<◀>**, **<▶>** push-buttons.



The view of the screens in SPECTRUM mode and after entering the presentation of the statistical analysis results performed for each 1/1 OCTAVE filter

The selection of **1/1 OCTAVE** filter is performed after pressing the **<SHIFT>** and **<◀>** or **<SHIFT>** and **<▶>** push-buttons. The statistical analysis is also made for all **TOTAL** values of **1/1 OCTAVE** analysis. The **<ESC>** push-button has to be pressed in order to leave the presentation of the statistical analysis performed in **1/1 OCTAVE** analysis and return to the **SPECTRUM** mode of result's presentation.



The view of the screens in the presentation of the statistical analysis results performed for TOTAL results of 1/1 OCTAVE analysis

The spectra registered in the buffer's file can be presented on the screen in the **BUFFER VIEW** sub-list of the **DISPLAY** list. These spectra are saved with the same step as selected in the **SLM** profiles (see the description of the **BUF. STEP** position of the **MEASURE SETUP** sub-list).

In order to display the registered in the buffer's file spectra the user has to:

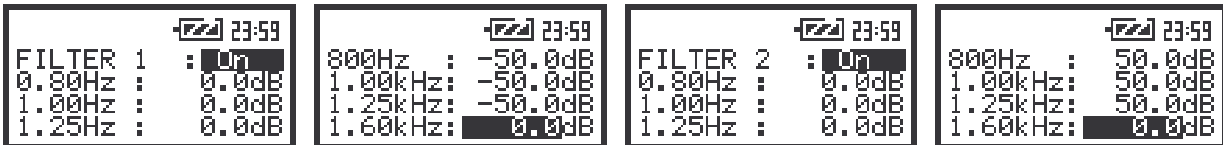
- press the **<SHIFT>** and **<▶>** push-buttons for the spectra stored later;
- press the **<SHIFT>** and **<◀>** push-buttons for the spectra saved earlier.

In the **BUFFER VIEW** sub-list it is also possible to examine the time history for **1/1 OCTAVE** filter selected by the cursor (cf. the description of the **BUFFER VIEW** sub-list in Chapter 5).



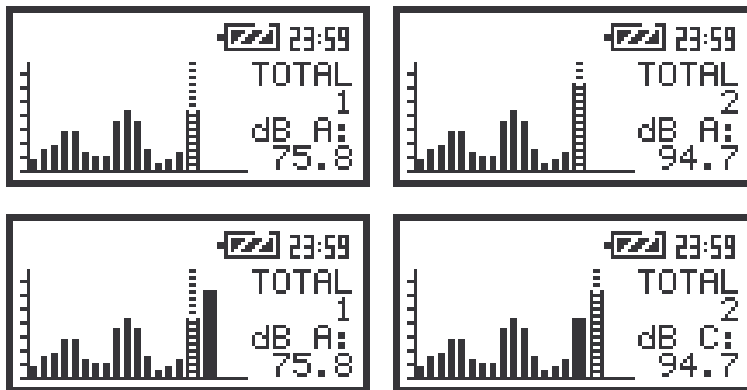
Notice: Many time histories can be saved in the buffer's file of the instrument during the measurements performed in different sessions. The presentation of these results is possible using the **BUFFER VIEW** window of the **DISPLAY** list (cf. Chapter 5).

1/1 OCTAVE analysis can be performed taking into account the **USER FILTERS** coefficients set in the **SETUP** list (see Chapter 5 for detailed description of the **USER FILTERS** setting).



The view of the screens in the coefficient values setting of **1/3** or **1/1 OCTAVE** filters in the **USER FILTERS** sub-list of the **SETUP** list

When these filters are switched on **1/1 OCTAVE** analysis is performed in the normal way but simultaneously the **USER FILTERS** coefficients are taken into account for the calculation of the **TOTAL** result. The **TOTAL** results for the first, the second or for both **USER FILTERS** are presented instead of the **TOTAL** for **A**, **C** and **LIN** weighting filters.



The view of the screens in **1/1 OCTAVE** analysis with the switched on **USER FILTERS**

Selection of the measurement range in **1/1 OCTAVE** analysis – **RANGE** position

The selection of the input range is possible after entering the **RANGE** position (from the **INPUT** list by means of the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons and pressing the **<ENTER>** one. In **1/1 OCTAVE** analyser the user can select (by means of the **<◀>**, **<▶>** and **<ENTER>** push-buttons) the input ranges specified in Appendix C. The return to the **INPUT** list is made after pressing the **<ESC>** push-button (ignoring the changes) or **<ENTER>** push-button (confirming the selection).



The view of the screens with the RANGE position in 1/1 OCTAVE analyser



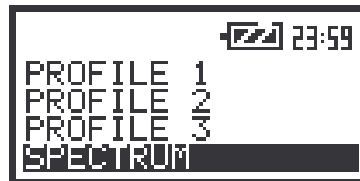
Notice: It is not possible to change the range during the measurement process. The instrument displays in this case for about 2 seconds the text: **"measurement in progress / MEASUREMENT IN PROGRESS"**. In order to change the range the measurement must be finished!



Notice: If an **OVERLOAD** occurs it is signalled by the **"Bell"** icon (cf. Chapter 3 for details).

Selection of 1/1 OCTAVE analysis parameters – SPECTRUM sub-list

The **SPECTRUM** sub-list is a context element, which appears on the **PROFILES SETUP** sub-list in **1/1 OCTAVE** or **1/3 OCTAVE** mode. Using the **SPECTRUM** sub-list one can select in **1/1 OCTAVE** analysis the weighting filter and the result which has to be saved in the buffer's file of the instrument.

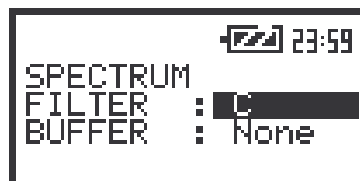
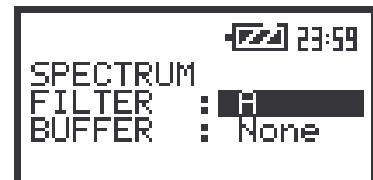
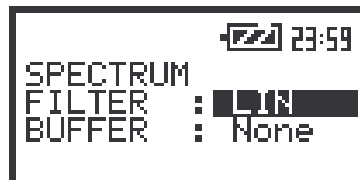
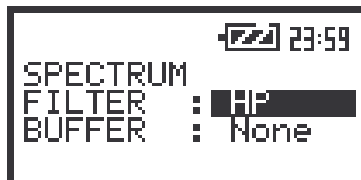


The view of the screens in the PROFILES SETUP sub-list with the SPECTRUM sub-list in 1/1 OCTAVE analyser

Selection of the weighting filter in 1/1 OCTAVE analysis – FILTER position

The following weighting filters are available in **1/1 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,
- **LIN** conforms to the requirements for the **Z** filter of type 1 according to the IEC 61672-1 standard,
- **HP** high-pass filter for **1/1 OCTAVE** analysis.



The view of the screens with the SPECTRUM sub-list opened, the selection of the weighting filter


The characteristics of the filters are given in Appendix D. The selection of the required filter is made with the <◀>, <▶> push-buttons. After pressing the <ENTER> push-button the user can confirm the selection and close the sub-list. The return to the **PROFILES SETUP** sub-list is made also after pressing the <ESC> push-button but in this case the selection is ignored.

Selection of 1/1 OCTAVE analysis result to be saved in the buffer's file – BUFFER position

The **RMS** result from **1/1 OCTAVE** analysis can be saved in the buffer's file of the instrument. The selection of the required result is made with the <◀>, <▶> push-buttons. The selection of the **None** text means that the **RMS** results are not saved in the buffer's file. The user causes the return to the **PROFILES SETUP** sub-list pressing the <ENTER> push-button with the confirmation of the selections made in the sub-list. The return to the **PROFILES SETUP** sub-list is also possible after pressing the <ESC> push-button but all changes are in this case ignored.




The view of the screens in the SPECTRUM sub-list, the selection of the BUFFER position



Notice: *It is not possible to change the values of the parameters during the execution of the measurements. It is possible to open different lists and sub-lists but the positions in these lists are not displayed inversely and so - not accessible. The “Loudspeaker” icon indicates that the instrument is in the measurement process.*



The view of the screens with not accessible parameters of the PROFILES SETUP lists



Notice: *All other settings of the instrument are common for 1/1 OCTAVE analyser and the SLM.*

4.5. 1/3 OCTAVE ANALYSER

In order to select the **1/3 OCTAVE** analysis mode the user has to enter the **FUNCTION** list by pressing the **<MENU>** push-button, selecting by means of the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons the **FUNCTION** text and pressing the **<ENTER>**. Then, the user has to open the **MEASUR. FUNCTION** sub-list (to select the **MEASUR. FUNCTION** text using the **<◀>**, **<▶>** (or **<◀>**, **<▶>**) push-buttons and press the **<ENTER>** push-button when this text is displayed inversely).



The view of the screens in the main list with the **FUNCTION** text selected (a), the **FUNCTION** list opened with the **MEASUR. FUNCTION** text selected (b), **1/3 OCTAVE** analysis mode selected in **MEASUR. FUNCTION** sub-list (c)

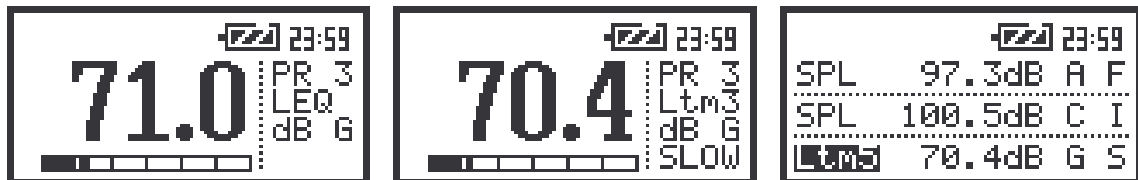
1/3 OCTAVE mode is selected by placing the special character in the line with **1/3 OCTAVE** text. The position of the character can be changed using the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons. After placing the character in the line with **1/3 OCTAVE** text the user has to press the **<ENTER>** push-button, which closes the **MEASUR. FUNCTION** sub-list and confirms the selection. After pressing the **<ESC>** push-button the sub-list is also closed but **any changes are ignored**.



Notice: It is not possible to change the mode during the measurements. The instrument displays in this case for about 3 seconds the text: **“measurement in progress / MEASUREMENT IN PROGRESS”**. In order to change the mode the measurement must be finished!

The instrument's operation as **1/3 OCTAVE** analyser is similar to the **SLM** with two important exceptions.

- In **1/3 OCTAVE** analysis the spectrum is available in parallel to the **SLM** operation. All 45 digital pass-band filters (with the centre frequencies from 20 kHz down to 0.8 Hz; in base two system) are working in the real time with **the weighting filters: HP, LIN, A or C** selected in the **SPECTRUM** sub-list of the **PROFILES SETUP** sub-list and **the linear RMS detector**. Additionally, the **TOTAL RMS** values for the full frequency range with the **A, C** and **LIN (Z)** weightings are displayed. In order to inform the user about the working mode of the instrument, in one profile and **3 PROFILES** modes of result's presentation the **dotted line** are used for the indication that the instrument **do not work in the SLM** mode. In the **SLM** mode the continuous lines are used.



The view of the screens in one profile and **3 PROFILES** result's presentation mode with the dotted lines indicating that the instrument do not work in the **SLM** mode



Notice: The **TOTAL RMS** results are measured with the weighting filters: **A, C** and **LIN** without taking into account the setting of the **SLM** profiles. The **spectra are always linearly averaged**. Thus, the **TOTAL** values from **1/3 OCTAVE** analysis can be different from those obtained for the **SLM** profiles (if the **LEQ INTEGRATION** was set as **EXPONENTIAL**).

4. As **1/3 OCTAVE** analyser the instrument operates in two input ranges **105 dB** and **130 dB**, which can be selected by means of the **RANGE** position (see below).

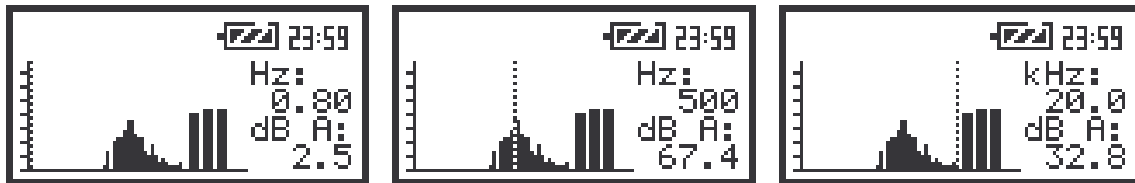
In order to change the mode of the measurement results presentation the user has to press the **<SHIFT>** and **<^>** or the **<SHIFT>** and **<v>** push-buttons. The following modes are available:

One profile, 3 PROFILES, SPECTRUM, STATISTICS and **PLOT**.



Notice: The user can select the number of the currently active modes of the measurement results **presentation** switching on ([✓]) or off ([]) the given mode in the **DISPLAY** sub-list of the **DISPLAY** list. Only one profile mode **cannot be switched off**. See Chapter 5 for the details about the display modes control.

One Profile, 3 PROFILES, STATISTICS and **PLOT** display modes are identical as for the **SLM**. The **SPECTRUM** mode displays **1/3 OCTAVE** analysis results (so-called spectrum) together with the **TOTAL RMS** values measured with **A, C** and **LIN** weighting filters. The read-out of the interested spectrum value can be done by means of the cursor controlled by the **<^>**, **<v>** push-buttons. On the right side of the screen the selected 1/3 octave filter centre frequency (or the selected **TOTAL**) is given, the units with the weighting filter (**dB A, dB C** or **dB** in the case of the **LIN**) and the numerical value are displayed.



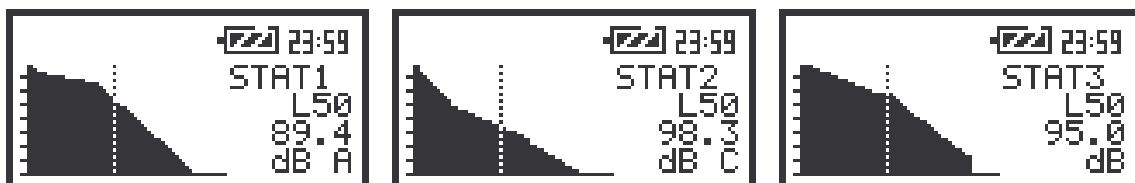
The view of the screens in 1/3 OCTAVE analysis in the **SPECTRUM** display mode

In one profile and **3 PROFILES** modes the results are presented in the same way as in the case of the **SLM** mode with only one difference that instead of the continuous line the dotted one is used. The active profile is changed after each pressing of the **<^>**, **<v>** push-buttons. The change of the result from the same profile is done by pressing the **<^>**, **<v>** push-buttons. The **LN** value is changed after pressing the **<SHIFT>** and **<^>** or **<SHIFT>** and **<v>** push-buttons.



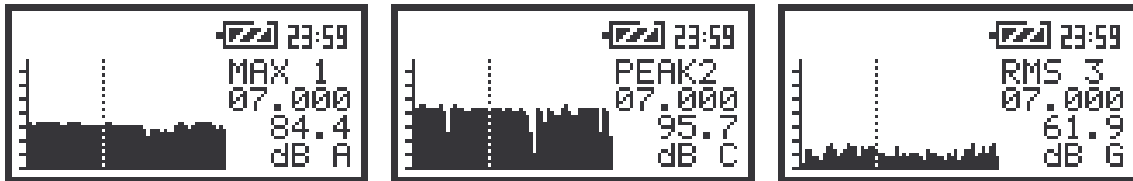
The view of the screens in 1/3 OCTAVE analysis in one profile and **3 PROFILES** modes of result's presentation

In the **STATISTICS** mode it is possible to select the **LN** value using the **<^>**, **<v>** push-buttons. The active profile is displayed in the first line at the right side of the screen. **LN** corresponding to the current position of the cursor is displayed in the second line, value of **LN** - in the third line and the units together with the indicator of the weighting filter - in the fourth. When the **STATISTICS** mode of result's presentation is entered (**<SHIFT>** and **<^>** or **<SHIFT>** and **<v>** push-buttons are used for this purpose) in order to change the active profile the **<^>**, **<v>** push-buttons should be pressed.



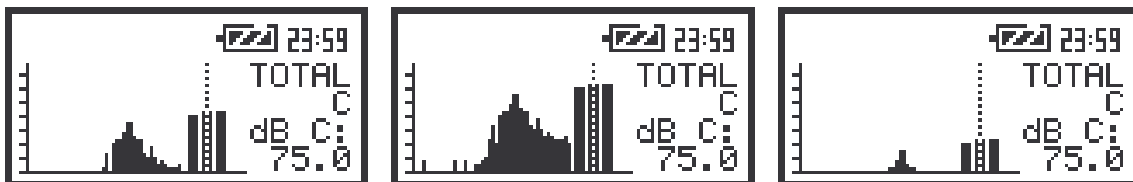
The view of the screens in 1/1 OCTAVE analysis with presentation of the statistical analysis in all profiles

In the **PLOT** mode the results are presented which are saved in the buffer from the profiles (in the case when in the **BUFFER** positions of the **PROFILE x** sub-lists the other texts than **None** were selected) with the step set for all profiles in the **BUF. STEP** position. The active profile is changed after pressing the **<SHIFT>** and **<◀>** or **<SHIFT>** and **<▶>** push-buttons. The position of the cursor can be done after pressing the **<◀>**, **<▶>** push-buttons. it is also possible to shift the horizontal axis in relation to the vertical one of the presented results using the **<▲>**, **<▼>** push-buttons (similarly as in the **SPECTRUM** mode).



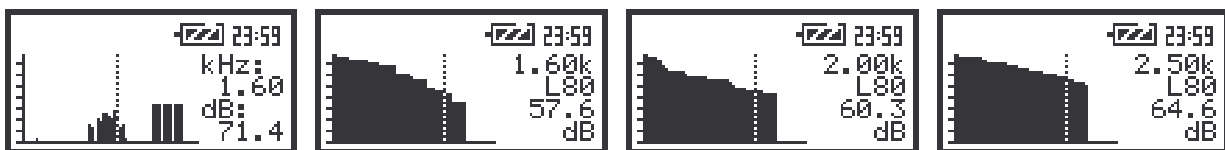
The view of the screens in 1/1 OCTAVE analysis in the PLOT mode; the registered results from all profiles

In the **SPECTRUM** mode it is possible to shift the horizontal axis in relation to the vertical one of the presented results using the **<▲>**, **<▼>** push-buttons. After each pressing of these buttons the presented picture moves 10 dB down or up - respectively.



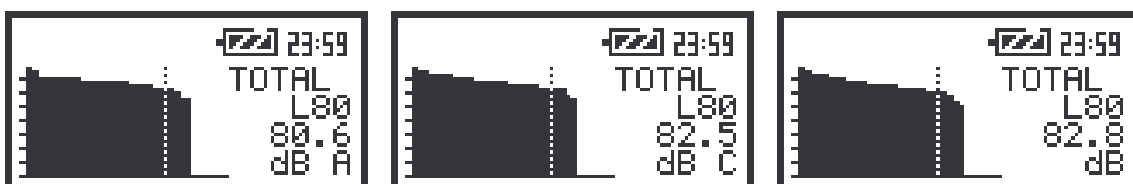
The view of the screens in 1/3 OCTAVE analysis with the shifted horizontal axis in relation to vertical one

The statistical analysis is also performed in **1/3 OCTAVE** analysis. The results of this analysis are presented on the screen after pressing the **<ENTER>** push-button in the case when the instrument is in the **SPECTRUM** mode of result's presentation. After this pressing the statistical analysis performed for the selected **1/3 OCTAVE** filter is shown on the screen. The centre frequency of the filter for which the analysis was made, the **LN** number corresponding to the cursor position, the **LN** value and the units are presented on the right side of the screen. The **LN** value can be changed by pressing the **<◀>**, **<▶>** push-buttons.



The view of the screens in SPECTRUM mode and after entering the presentation of the statistical analysis results performed for each 1/3 OCTAVE filter

The selection of **1/3 OCTAVE** filter is performed after pressing the **<SHIFT>** and **<◀>** or **<SHIFT>** and **<▶>** push-buttons. The statistical analysis is also made for all **TOTAL** values of **1/3 OCTAVE** analysis. The **<ESC>** push-button has to be pressed in order to leave the presentation of the statistical analysis performed in **1/3 OCTAVE** analysis and return to the **SPECTRUM** mode of result's presentation.



The view of the screens in the presentation of the statistical analysis results performed for TOTAL results of 1/3 OCTAVE analysis

The spectra registered in the buffer's file can be presented on the screen in the **BUFFER VIEW** sub-list of the **DISPLAY** list. These spectra are saved with the same step as selected in the **SLM** profiles (see the description of the **BUF. STEP** position of the **MEASURE SETUP** sub-list).

In order to display the registered in the buffer's file spectra the user has to:

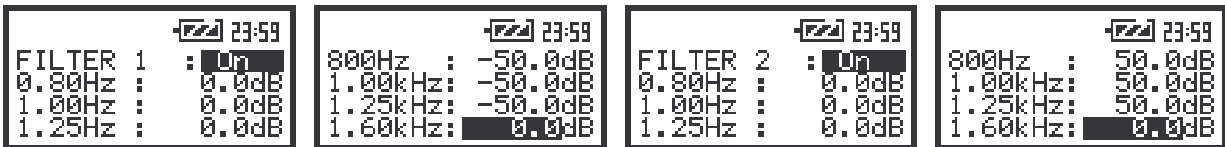
- press the **<SHIFT>** and **<▶>** push-buttons for the spectra stored later;
- press the **<SHIFT>** and **<◀>** push-buttons for the spectra saved earlier.

In the **BUFFER VIEW** sub-list it is also possible to examine the time history for **1/3 OCTAVE** filter selected by the cursor (cf. the description of the **BUFFER VIEW** sub-list in Chapter 5).



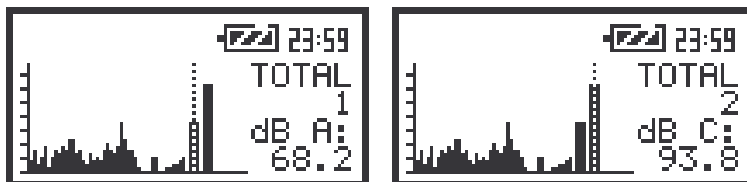
Notice: Many time histories can be saved in the buffer's file of the instrument during the measurements performed in different sessions. The presentation of these results is possible using the **BUFFER VIEW** window of the **DISPLAY** list (cf. Chapt.5).

1/1 OCTAVE analysis can be performed taking into account the **USER FILTERS** coefficients set in the **SETUP** list (see Chapter 5 for detailed description of the **USER FILTERS** setting).



The view of the screens in the coefficient values setting of 1/3 or 1/1 OCTAVE filters in the **USER FILTERS** sub-list of the **SETUP** list

When these filters are switched on **1/3 OCTAVE** analysis is performed in the normal way but simultaneously the **USER FILTERS** coefficients are taken into account for the calculation of the **TOTAL** result. The **TOTAL** results for the first, the second or for both **USER FILTERS** are presented instead of the **TOTAL** for **A**, **C** and **LIN** weighting filters.



The view of the screens in 1/3 OCTAVE analysis with the switched on **USER FILTERS**

Selection of the measurement range in 1/3 OCTAVE analysis – RANGE position

The selection of the input range is possible after entering the **RANGE** position (from the **INPUT** list by means of the **<▲>**, **<▼>** (or **<◀>**, **<▶>**) push-buttons and pressing the **<ENTER>** one. In **1/3 OCTAVE** analyser the user can select (by means of the **<◀>**, **<▶>** and **<ENTER>** push-buttons) the input ranges specified in Appendix C. The return to the **INPUT** list is made after pressing the **<ESC>** push-button (ignoring the changes) or **<ENTER>** push-button (confirming the selection).



The view of the screens with the **RANGE** position in 1/3 OCTAVE analysis mode



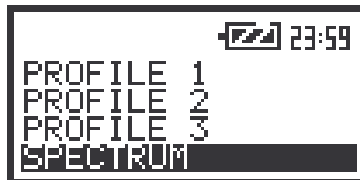
Notice: It is not possible to change the range of the measurements. The instrument displays in this case for about 3 seconds the text: **“measurement in progress / MEASUREMENT IN PROGRESS”**. In order to change the range the measurement must be finished!



Notice: If an **OVERLOAD** occurs it is signalled by the **“Bell”** icon (cf. Chapter 3 for details).

Selection of 1/3 OCTAVE analysis parameters – SPECTRUM sub-list

The **SPECTRUM** sub-list is a context element, which appears on the **PROFILES SETUP** sub-list in **1/1 OCTAVE** or **1/3 OCTAVE** mode. Using the **SPECTRUM** sub-list one can select in **1/3 OCTAVE** analysis the weighting filter and the result which has to be saved in the buffer's file of the instrument.

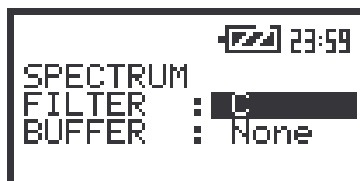
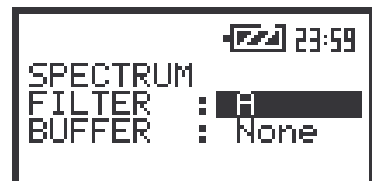
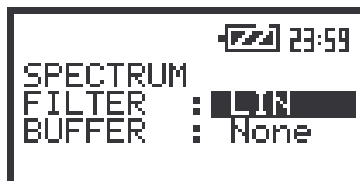
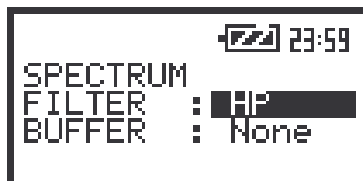


The view of the screens in the **PROFILES SETUP** sub-list with the **SPECTRUM** sub-list in **1/3 OCTAVE** analyser

Selection of the weighting filter in 1/3 OCTAVE analysis – FILTER position

The following weighting filters are available in **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,
- **LIN** conforms to the requirements for the **Z** filter of type 1 according to the IEC 61672-1 standard,
- **HP** high-pass filter for **1/3 OCTAVE** analysis.



The view of the screens with the **SPECTRUM** sub-list opened, the selection of the weighting filter

The characteristics of the filters are given in Appendix D. The selection of the required filter is made with the **<◀>**, **<▶>** push-buttons. After pressing the **<ENTER>** push-button the user can confirm the selection and close the sub-list. The return to the **PROFILES SETUP** sub-list is made also after pressing the **<ESC>** push-button but in this case the selection is ignored.

Selection of 1/3 OCTAVE analysis result to be saved in the buffer's file – BUFFER position

The **RMS** result from **1/3 OCTAVE** analysis can be saved in the buffer's file of the instrument. The selection of the required result is made with the <◀>, <▶> push-buttons. The selection of the **None** text means that the **RMS** results are not saved in the buffer's file. The user causes the return to the **PROFILES SETUP** sub-list pressing the <ENTER> push-button with the confirmation of the selections made in the sub-list. The return to the **PROFILES SETUP** sub-list is also possible after pressing the <ESC> push-button but all changes are in this case ignored.



The view of the screens in the SPECTRUM sub-list



Notice: It is not possible to change the values of the parameters during the execution of the measurements. It is possible to open different lists and sub-lists but the positions in these lists are not displayed inversely and so - not accessible. The "Loudspeaker" icon indicates that the instrument is in the measurement process.



The view of the screens with not accessible parameters of the PROFILES SETUP lists



Notice: All other settings of the instrument are common for 1/3 OCTAVE analyser and the SLM.