

### 3. SETTING OF THE INSTRUMENT

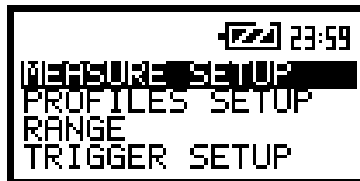
In order to perform the measurements using the instrument the user has only to plug in the preamplifier with the microphone and switch the power on.



**Notice:** The user has to press the <◀>, <▶> push buttons in parallel in order to switch the power On/Off.

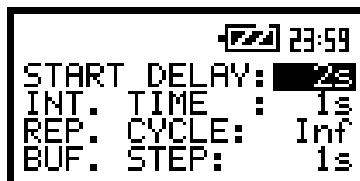
#### 3.1. BASIS OF THE INSTRUMENT'S CONTROL

The instrument is controlled by means of eight push-buttons of the keyboard. Using it one can access all available functions. These functions are placed in the system of windows. Six main windows are opened after pressing the following push-buttons: <FUNC>, <INPUT>, <DISPLAY>, <FILE>, <REPORT> and <SETUP>. Each pressing opens the corresponding window: *FUNCTION*, *INPUT*, *DISPLAY*, *FILE*, *REPORT* and *SETUP*. The elements of each window are described in details in Chapter 4 and 5. Only one window can be accessed in a time, this one which push-button was pressed. For example after pressing the <INPUT> push-button the *INPUT* window opens on the display. This window contains the elements which are also the windows or the final elements (options).



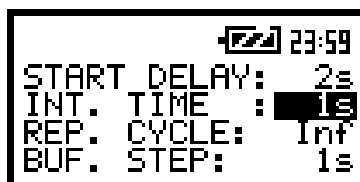
The view of the display with the *INPUT* window opened

After the selection of the desired sub-window (the <◀> or <▶> push-buttons), the user has to press the <ENTER> push-button in order to open it. After this new windows, options or various data specification appear on the display. For example, next pressing of the <ENTER> push-button, in the case of the above figure, enables one to access the **MEASURE SETUP** window containing the elements presented in the figure below.



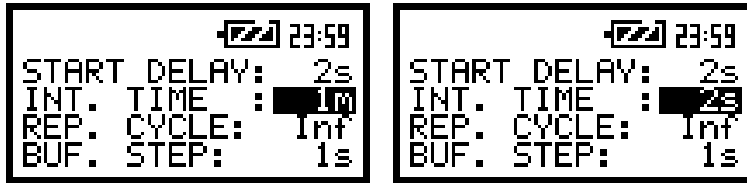
The view of the display with the **MEASURE SETUP** window opened

The desired element (option) of a window is accessed after pressing the <ENTER> push-button.



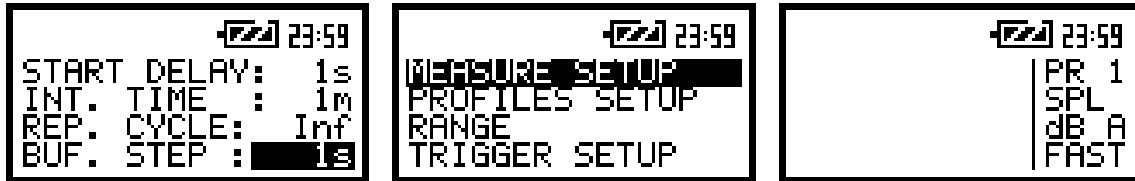
The display with the **MEASURE SETUP** window opened; the **INT.TIME** option accessible

The change of the value in a selected option is performed by pressing the <◀> or <▶> push-buttons.



The displays with the INT.TIME option accessed after pressing the <◀> or <▶> push-buttons, respectively

The <ENTER> push-button is also used for the confirmation of the selection in an option and for closing the opened window. The window is closed ignoring any changes made in it by pressing the <ESC> push-button.



The displays after three consecutive pressing of the <ESC> push-button from the MEASURE SETUP window

As it was mentioned, some of the windows end with the window informing the user about the state of the instrument, available memory, not existing files or buffers, standards fulfilled by the unit, etc.



The view of the displays during and after the accessing the FREE SPACE window of the FILE window

In order to close such window the user has to press the <ESC> push-button. In the instrument there are also windows which are used for entering text (i.e. the name of the file, the header for the printed reports from the measurements).

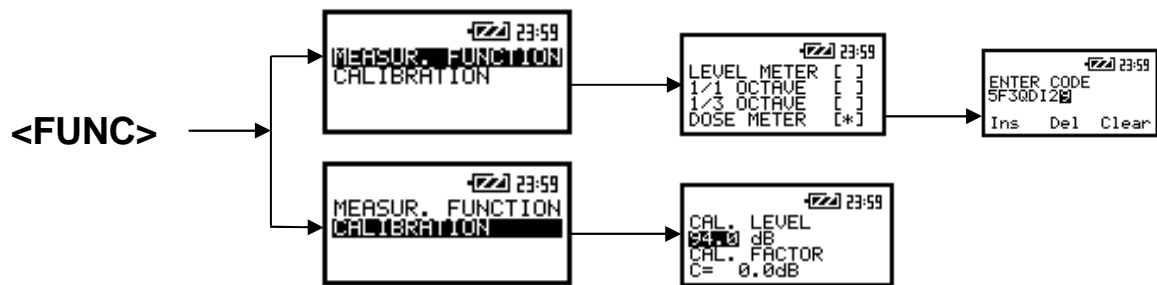


The displays during the edition of the text which has to be printed as a header in the measurement reports

Below the structure and the elements of six main windows are presented The more detailed description of the *FUNCTION* and *INPUT* windows is given in Chapter 4 and the *DISPLAY*, *FILE*, *REPORT* and *SETUP* windows – in Chapter 5.

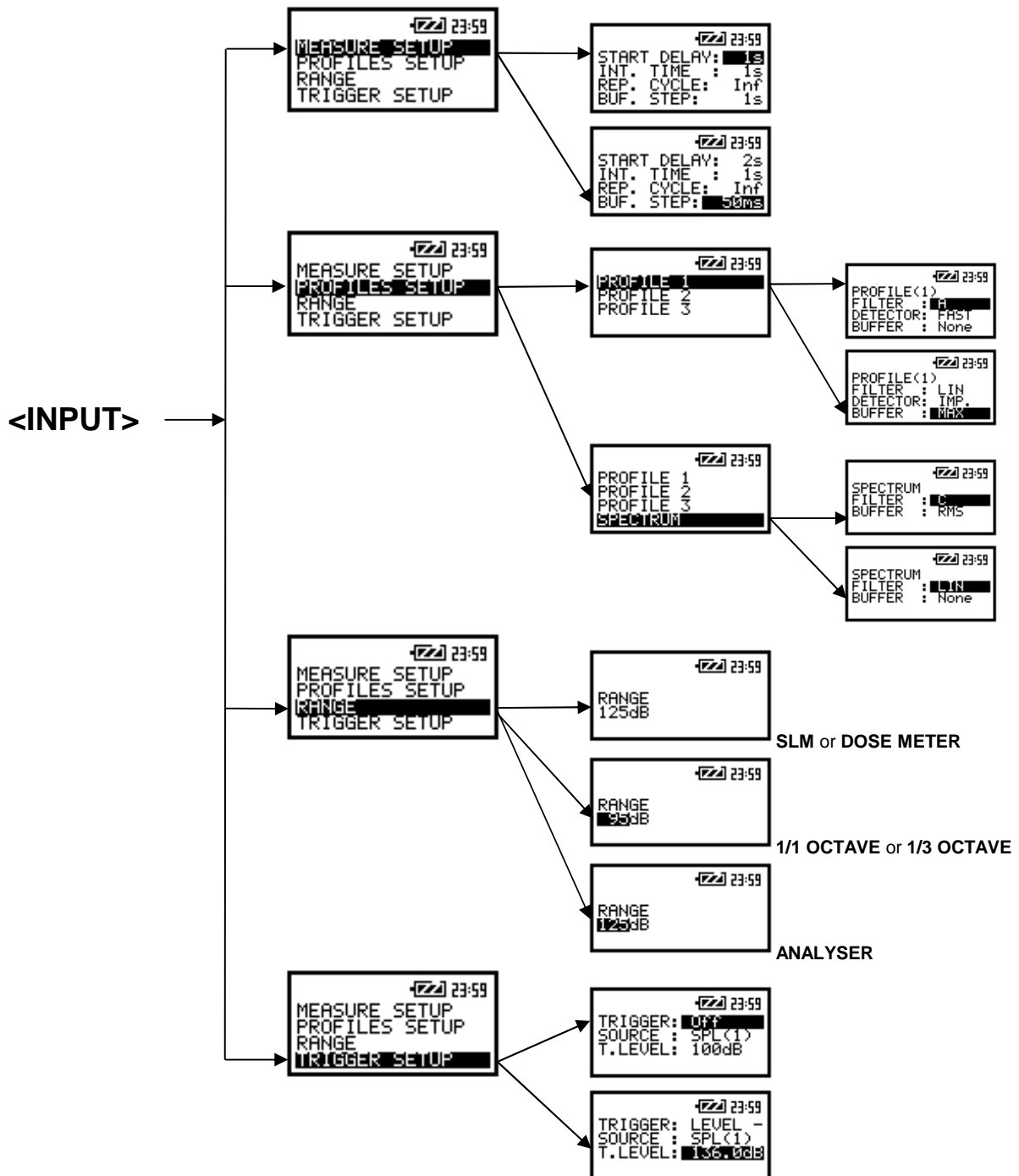
- ❖ *FUNCTION* (one of the main windows available after pressing the <FUNC> push-button)
  - MEASUREMENT FUNCTION (window)
    - LEVEL METER; available values: [ ] / [\*]
    - 1/1 OCTAVE; available values: [ ] / [\*]
    - 1/3 OCTAVE; available values: [ ] / [\*]
    - DOSE METER; available values: [ ] / [\*]

- **CALIBRATION** (window)
  - **CAL. LEVEL**; available values of the calibration level: **54dB .. 134dB**
  - **CAL. FACTOR**; it displays the calculated calibration factor

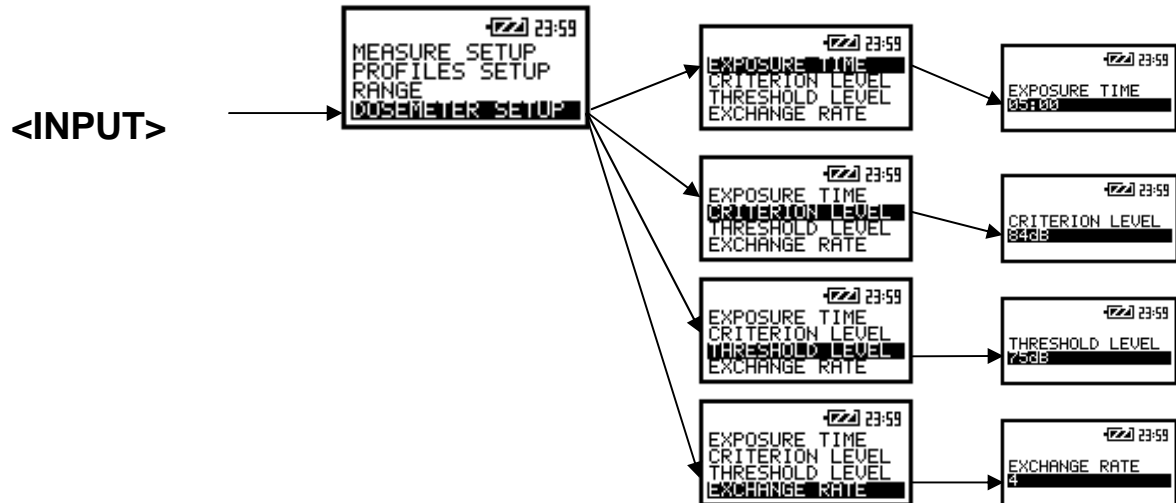
Control diagram of the *FUNCTION* window

- ❖ **INPUT** (one of the main windows available after pressing the **<INPUT>** push-button)
  - **MEASURE SETUP** (window)
    - **START DELAY**; available values of the delay before starting the execution of the measurements: **1s .. 60s**
    - **INT. TIME**; available values of the integration time: **1s .. 24h**
    - **REP. CYCLE**; available values for the measurement cycles which has to be repeated: **Inf, 1 ..1000**
    - **BUF. STEP**; available values of the step with which the measurement results are saved in a instrument's buffer: **10ms .. 1h**
  - **PROFILES SETUP** (window)
    - **PROFILE 1** (window)
      - **FILTER**; available types of the digital weighting filter used in the first profile during the measurements: **LIN, A, C**
      - **DETECTOR**; available values of the detector time constant used in the first profile: **IMP., FAST, SLOW**
      - **BUFFER**; available types of measurement results which has to be saved in the instrument's buffer from the first profile: **None, PEAK, MAX, MIN, RMS**
    - **PROFILE 2** (window)
      - **FILTER**; available types of the digital weighting filter used in the second profile during the measurements: **LIN, A, C**
      - **DETECTOR**; available values of the detector time constant used in the second profile: **IMP., FAST, SLOW**
      - **BUFFER**; available types of measurement results which has to be saved in the instrument's buffer from the second profile: **None, PEAK, MAX, MIN, RMS**
    - **PROFILE 3** (window)
      - **FILTER**; available types of the digital weighting filter used in the third profile during the measurements: **LIN, A, C**
      - **DETECTOR**; available values of the detector time constant used in the third profile: **IMP., FAST, SLOW**
      - **BUFFER**; available types of measurement results which has to be saved in the instrument's buffer from the third profile: **None, PEAK, MAX, MIN, RMS**
    - **SPECTRUM** (window); this sub-window is not available in the case of the **SLM** or the **DOSE METER**; it appears on the display in the case of the analyser
      - **FILTER**; available types of the digital weighting filter used during **1/1 OCTAVE** or **1/3 OCTAVE** analysis: **LIN, A, C**
      - **BUFFER**; available types of measurement results which has to be saved in the instrument's buffer during **1/1 OCTAVE** or **1/3 OCTAVE** analysis: **None, RMS**
  - **RANGE**, in the case of **SLM** or **DOSE METER** it informs the user about the available range of the measurements; in other modes the user can select the range

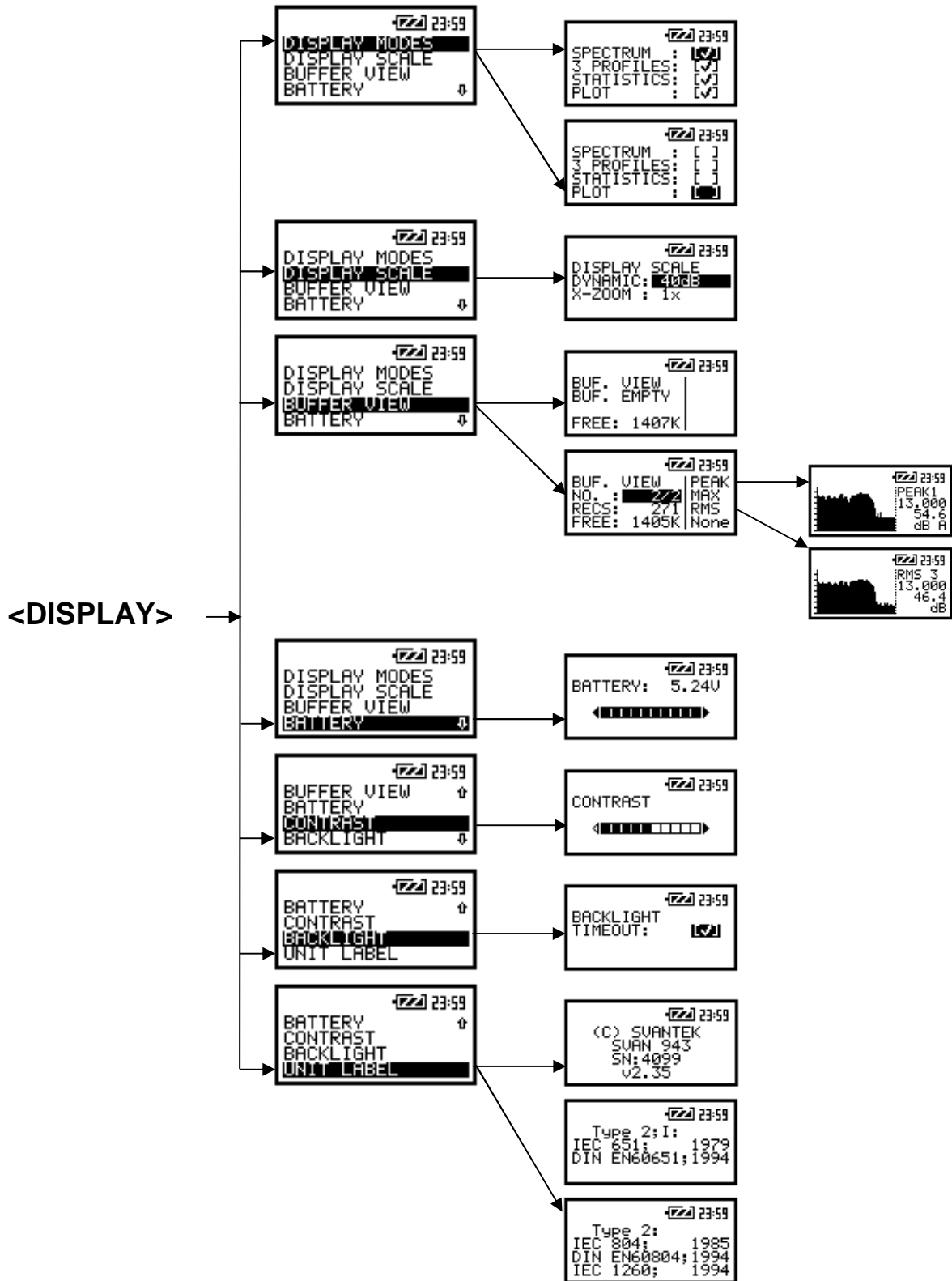
- **RANGE**; in the case of **SLM** or **DOSE METER** the measurement range is equal to **125dB**
- **RANGE** (in other modes); available values: **95dB, 110dB** or **125dB**
- **TRIGGER SETUP** (window, in the case of **SLM, 1/1 OCTAVE** or **1/3 OCTAVE**)
  - **TRIGGER**; available values: **Off, SLOPE +, SLOPE -, LEVEL +, LEVEL -**
  - **SOURCE**; it informs the user about the source of the triggering signal: **SPL(1)**
  - **T.LEVEL**; available values of the triggering level: **24dB ...136dB**
- **DOSIMETER SETUP** (window, in the case of **DOSE METER**)
  - **EXPOSURE TIME**; available values: from 1 minute to 480 minutes with 1 minute step
  - **CRITERION LEVEL**; available values of the criterion level: **80dB, 84dB, 85dB** or **90dB**
  - **TRESHOLD LEVEL**; available values of the threshold level: **None, 75dB, 80dB, 85dB** or **90dB**
  - **EXCHANGE RATE**; available values of the exchange rate given in decibels: **2, 3, 4** or **5**



Control diagram of the **INPUT** window in the **SLM, 1/1 OCTAVE** or **1/3 OCTAVE** analyser

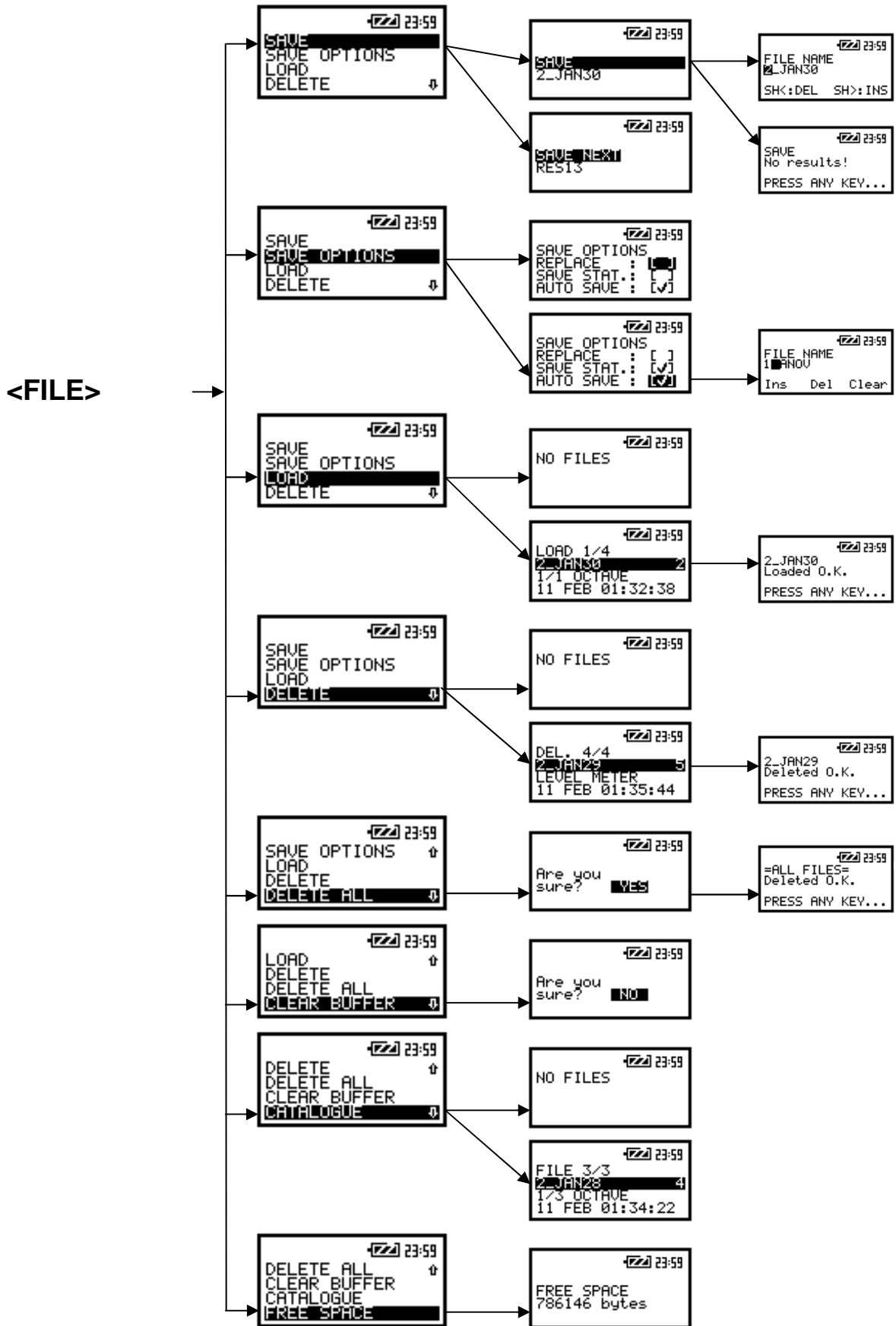
Control diagram of the *INPUT* window in the DOSE METER

- ❖ **DISPLAY** (one of the main windows available after pressing the <DISPLAY> push-button)
  - **DISPLAY MODES** (window); it enables the user to activate ([√]) or switch off ([ ]) the available modes of result's presentation
    - **SPECTRUM**; available values: [√] or [ ]; this option is not active in the **SLM** or **DOSE METER** mode
    - **3 PROFILES**; available values: [√] or [ ]
    - **STATISTICS**; available values: [√] or [ ]
    - **PLOT**; available values: [√] or [ ]
  - **DISPLAY SCALE** (window)
    - **SCALE**; available values of the scale of graphical modes of the result's presentation: **LINEAR, LOGARITHM**
    - **DYNAMIC**; available values of the dynamics of graphical modes of the result's presentation: **80dB, 40dB, 20dB, 10dB**
    - **X-ZOOM**; it informs the user about the multiplier for the horizontal axis of the graphical modes of the result's presentation: **1x**
  - **BUFFER VIEW** (window)
    - **NO.**; available number of the files in the instrument's buffer containing the results of measurements
    - **RECS**; it informs the user how many records with the measurement results contains the selected file from the instrument's buffer
    - **FREE**; it informs the user about the size of the available memory in the instrument's buffer
  - **BATTERY** (window); it informs the user about the state of the internal battery of the instrument
  - **CONTRAST** (window)
    - **CONTRAST**; it enables the user to select one from eleven possibilities of the contrast of the instrument's display
  - **BACKLIGHT** (window)
    - **TIMEOUT**, available values [√] or [ ]
  - **UNIT LABEL** (window); it informs the user about the serial number of the unit, the internal software version and the standards which the instrument fulfils



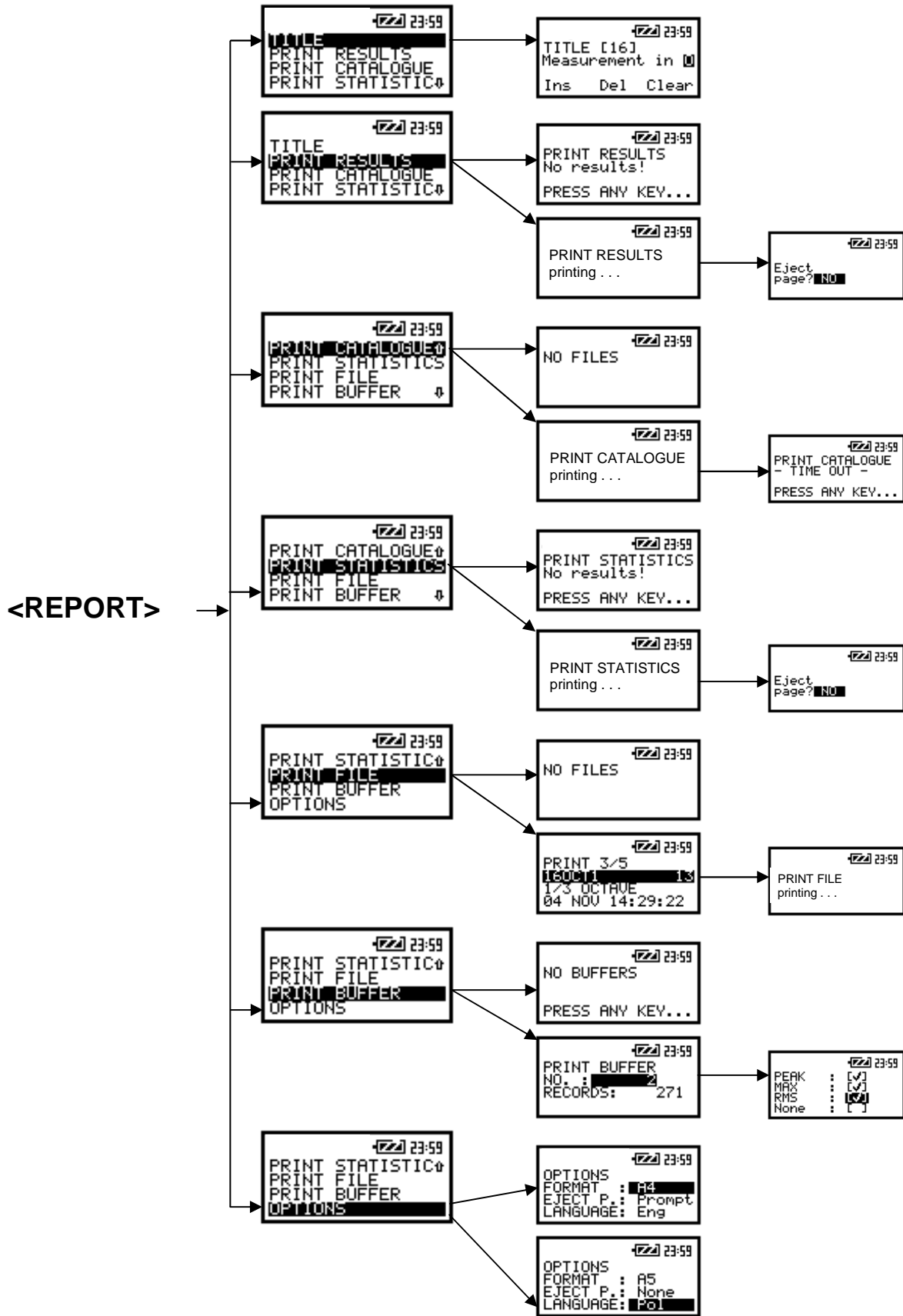
Control diagram of the *DISPLAY* window

- ❖ **FILE** (one of the main windows available after pressing the **<FILE>** push-button)
  - **SAVE: [name of the file]** or **SAVE NEXT: [name of the file]**; name of the file can be fully edited in the **FILE NAME** window after pressing the **<ENTER>** pushbutton in the case of **SAVE** or can be edited in the simplified way by pressing the **<◀>**, **<▶>** push-buttons together with **<SHIFT>** - in the case of **SAVE NEXT**; the **No results!** text is displayed in the case when the instrument did not perform any measurement
  - **SAVE OPTIONS** (window)
    - **REPLACE::**; it enables the user to replace the existing files in the instrument's memory by the files having the same name; available values: **[√]** or **[ ]**
    - **SAVE STAT.::**; it enables the user to save or not to save along with the measurement results the calculated statistics; available values: **[√]** or **[ ]**
    - **AUTO SAVE::**; it enables the user to save the measurement results in the instrument's memory without entering **SAVE** or **SAVE NEXT** option; available values: **[√]** or **[ ]**
  - **LOAD** (window); it enables the user to verify the window of files in the memory and to load to the working buffer of the instrument the selected one; the **NO FILES** text is displayed in the case when the instrument's memory is empty
  - **DELETE** (window); it enables the user to verify the window of files in the memory and to delete the selected one; the **NO FILES** text is displayed in the case when the instrument's memory is empty; the confirmation is required before the erasing of the selected file
    - **Are you sure?**
  - **DELETE ALL** (window); it enables the user to delete all files saved in the instrument's memory; the confirmation is required before the erasing of all files
    - **Are you sure?**
  - **CLEAR BUFFER** (window); it enables the user to delete all files saved in the buffer of the instrument; the confirmation is required before the erasing of all files from the buffer memory
    - **Are you sure?**
  - **CATALOGUE** (window); it enables the user to verify the list of files in the memory; the **NO FILES** text is displayed in the case when the instrument's memory is empty
  - **FREE SPACE** (window); it informs the user about the size of the available memory for saving the measurement results in the files



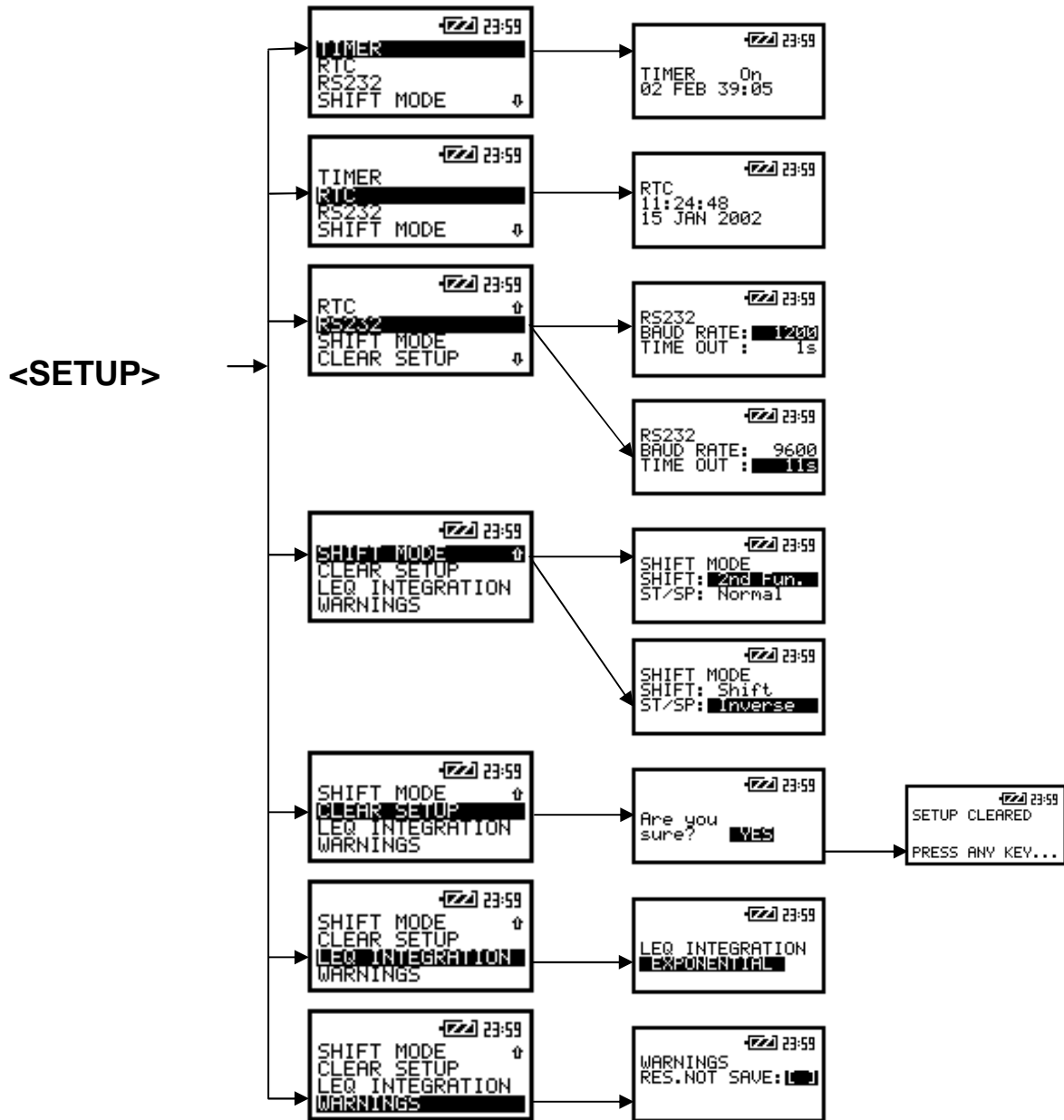
Control diagram of the FILE window

- ❖ **REPORT** (one of the main windows available after pressing the <REPORT> push-button)
  - **TITLE** (window); it enables the user to edit the text which will be placed in the header of the printed report from the measurements
  - **PRINT RESULTS** (window); it enables the user to print out on a printer connected directly to the instrument the measurement results; the **No results!** text is displayed in the case when the instrument did not perform any measurement
  - **PRINT CATALOGUE** (window); it enables the user to print out on a printer connected directly to the instrument the catalogue of the files stored in the memory
  - **PRINT STATISTICS** (window); it enables the user to print out on a printer connected directly to the instrument the results of the statistical analysis performed during the measurements; the **No results!** text is displayed in the case when the instrument did not perform any measurement
  - **PRINT FILE** (window); it enables the user to print out on a printer connected directly to the instrument the selected file with the measurement results; the **NO FILES** text is displayed in the case when the instrument did not save any file
  - **PRINT BUFFER** (window); it enables the user to print out on a printer connected directly to the instrument the measurement results saved in a selected file from the buffer; the **NO BUFFERS** text is displayed in the case when the instrument did not perform any measurement and the buffer is empty
    - **NO.;** available numbers of all files saved in the buffer of the instrument's memory
    - **RECS;** it informs the user about the number of records which contains the selected file from the buffer
      - **None, PEAK, MAX, MIN** or **RMS** (option for the first profile); available values: [ $\sqrt{\quad}$ ] or [ ]
      - **None, PEAK, MAX, MIN** or **RMS** (option for the second profile); available values: [ $\sqrt{\quad}$ ] or [ ]
      - **None, PEAK, MAX, MIN** or **RMS** (option for the third profile); available values: [ $\sqrt{\quad}$ ] or [ ]
      - **None** or **RMS** (option for **1/1 OCTAVE** or **1/3 OCTAVE** so-called spectra); available values: [ $\sqrt{\quad}$ ] or [ ]
        - **FROM RESULT;** the selection of the starting time from which the measurement results saved in the file of the buffer has to be printed
        - **TO RESULT;** the selection of the ending time to which the measurement results saved in the file of the buffer has to be printed
  - **OPTIONS** (window)
    - **FORMAT.;** available values of the format of the print out: **A4** or **A5**
    - **EJECT P.;** available values for the paper ejection in a printer connected directly to the instrument: **None, Prompt** or **Auto**
    - **LANGUAGE.;** available values for the language in which the report has to be printed: **Eng** (English) or **PoI** (Polish)



Control diagram of the *REPORT* window

- ❖ **SETUP** (one of the main windows available after pressing the <SETUP> push-button)
  - **TIMER** (window)
    - **TIME**; it enables the user to set time of the self switching on of the instrument
  - **RTC** (window)
    - **RTC**; it enables the user to set the internal real time clock of the instrument
  - **RS232** (window)
    - **BAUD RATE**::; available values of the transmission speed in the RS 232 serial interface: **1200, 2400, 4800, 9600, 19200, 38000, 57600** or **115200**
    - **TIME OUT**::; available values of the reaction time: **1s ..60s**
  - **SHIFT MODE** (window)
    - **SHIFT**::; available modes of the <SHIFT> push-button: **Shift** or **2nd Fun.**
    - **PAUSE**::; available modes of the <PAUSE> push-button: **Normal** or **Inverse**
  - **CLEAR SETUP** (window); it enables the user to return to the factory made settings of the instrument; the confirmation has to be done before the execution of this function
    - **Are you sure?**
  - **LEQ INTEGRATION** (window)
    - **LEQ INTEGRATION**::; available values of detector's type: **LINEAR** or **EXPONENTIAL**
  - **WARNINGS** (window)
    - **RES.NOT SAVE**::; it enables the user to switch on or off the warning that the results of the measurement were not saved in the memory; available values: [] or []



Control diagram of the *SETUP* window

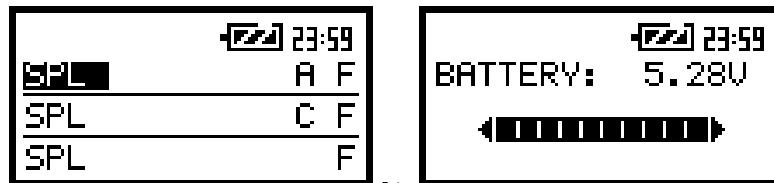
### 3.2. POWERING OF THE INSTRUMENT

The instrument is powered from the internal rechargeable NiMH battery 4.8 V / 1.6 Ah. The unit is equipped with the external power (110 V / 220 V mains) adapter. For the external power operation and recharging the battery, this adapter should be connected to the **Power** socket located on the bottom cover of the instrument. The battery has to be charged until the switch off of the red diode named **CHARGING** placed on the instrument's keyboard. In order not to decrease the battery lifetime at least **once for ten charging the battery has to be fully discharged** (up to self switch off of the instrument)!



**Notice:** The battery is also recharged during the instrument's operation with the external power. The internal power supply circuit protects the battery from the overcharging. Nevertheless, it is not recommended to keep the external power continuously plugged into the **Power** socket.

The fully charged battery ensures more than 8 hours of the continuous work of the instrument (with the backlight off). The operation time is decreased about 20 % with the backlight switched on. The battery condition can be checked by means of the **BATTERY** function. It is also presented continuously on the display by means of the „battery” icon.



a)

b)

The display in 3 PROFILES mode with the battery icon (a) and in the BATTERY window opened (b)

The instrument indicates too low state of the battery displaying the text:

**ALERT !!!  
BATTERY LOW !**



**Notice:** It is strongly recommended to use in this case as soon as possible the external power adapter. In the other case the instrument after a moment will be switched off by itself!

The display's "backlight" can be activated by means of the **<DISPLAY>** push-button. In order to switch the backlight on / off **the pushbutton has to be pressed for about 2 seconds**. For saving the power of the battery, in the normal "day-light" operation it is recommended to **keep the backlight off**.

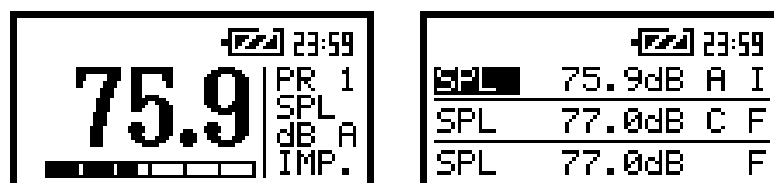
### 3.3. INITIAL SETUP OF THE INSTRUMENT

The instrument passes the self-test after switching on (in this time the producer and the name of the instrument is displayed on the display) and then it enters the default display mode for result's presentation which is One Profile (see Chapter 4 for details).



The view of the displays after switching on the instrument

To start measurements the user has to press **<ST/SP>** (START/STOP) push-button (the **<PAUSE>** push-button in conjunction with the **<SHIFT>**).



a)

b)

The view of the default One Profile (a) and 3 PROFILES display mode (b) with the SLM mode results

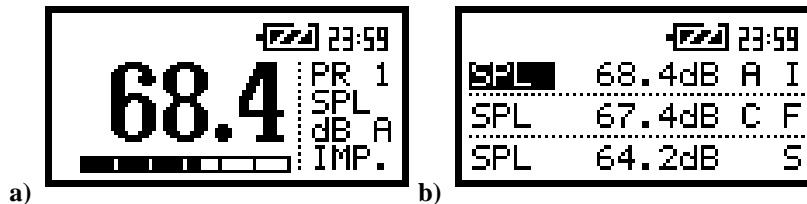
For **3 PROFILES** display mode the default settings (set up by the producer) are as follows:

- PROFILE 1 - **A** weighting filter (**FILTER: A**), **FAST** type of the RMS detector (**DETECTOR: FAST**), the results of the measurements are not stored in the buffer's file (**BUFFER: None**);
- PROFILE 2 - **C** weighting filter (**FILTER: C**), **FAST** type of the RMS detector (**DETECTOR: FAST**), the results of the measurements are not stored in the buffer's file (**BUFFER: None**);
- PROFILE 3 - **LIN** (or **Z**) weighting filter (**FILTER: LIN**), **FAST** type of the detector (**DETECTOR: FAST**), the results of the measurements are not stored in the buffer's file (**BUFFER: None**).

The results of the measurements can be presented as default in one profile, in **3 PROFILES** and in **STATISTICS** (these are the available display modes set by the producer in the case of the **SLM** or **DOSE METER**, cf. the description of the *DISPLAY* window).

The user can change all settings. The instrument remembers all changes. The return to the default settings (set up by the producer) is possible after the execution of the **CLEAR SETUP** function available in the *SETUP* window.

The instrument can be used not only as the **SLM** but also as **1/1 OCTAVE** analyser, **1/3 OCTAVE** analyser, **DOSE METER** etc. In order to distinguish the **SLM** mode of the unit from the others which are available, in one profile display mode the continuous vertical line separates the measurement result from its description and in **3 PROFILES** display mode two continuous horizontal lines are used to separate the measurement results from different profiles. In other modes than **SLM** the mentioned above lines are dotted.



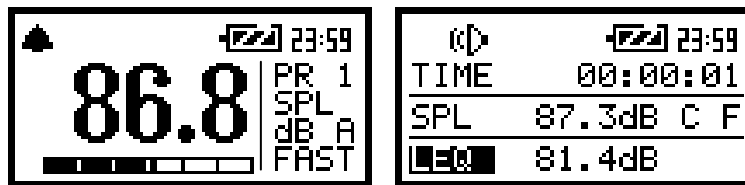
The view of the display in one profile (a) and **3 PROFILES** display mode (b) with the measurement results which are not taken from the **SLM** mode



**Notice:** See Chapters 4 and 5 for more details concerning different settings.

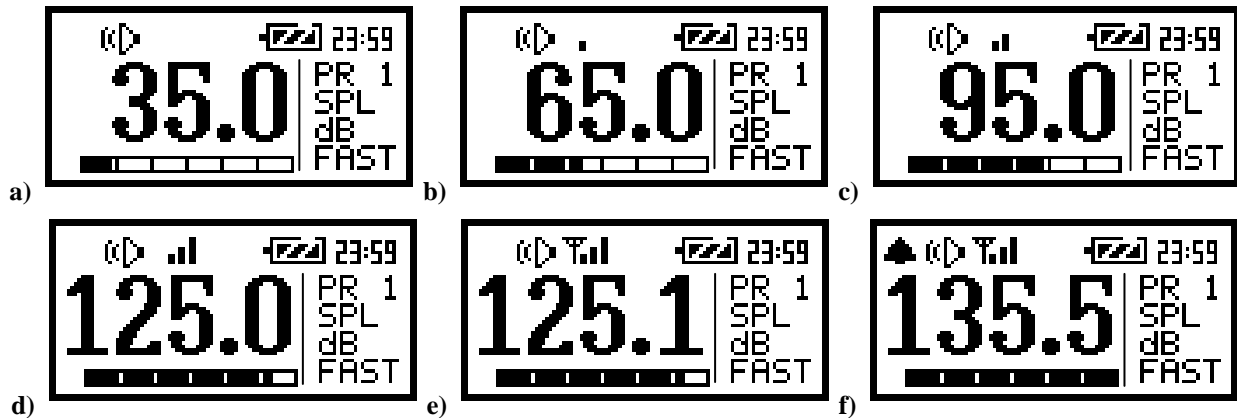
More information about the instrument's state are given by means of the icon's row visible in the top of the display. The meanings of the icons are as follows:

- "Bell" is displayed as a **WARNING** in several situations. When the "Bell" icon is visible the user has to pay attention to the state of the instrument. Typically, some user's action is required (e.g. on the low battery state or on too low input signal etc.).



The view of the display with the "Bell" icon and the "Loudspeaker" icon

- "Loudspeaker" icon is displayed when the measurement is started and executed.
- "Vertical bars" icon corresponds to the current **input signal level** (it is related to the maximum measured value over the last second). The sign  $\Upsilon$  means that the level of the signal was from 0.1 dB to 10 dB higher then the current measurement range. For the **SLM** mode, in which only one range is available (125 dB), the result of the measurement is in this case from 125.1 dB to 133 dB. The indicator of the overload (the "Bell" icon) appears when the signal overpasses more than 10 dB the measurement range (cf. Fig. below).



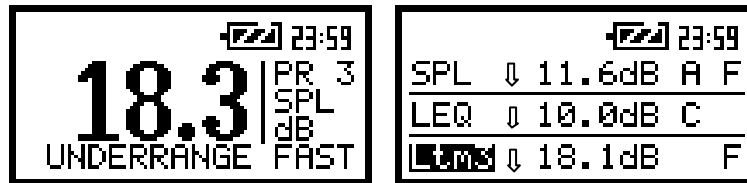
The view of the display in the SLM mode without the “Vertical bars” icon (a); with one “Vertical bar” (b); with two “Vertical bars” (c); with three “Vertical bars” (d); with three “Vertical bars” and the Y sign (e); with the indicator of the overload (f)

The number of the ”Vertical bars” on the display depends on the level of the measured signal, the selected mode (SLM, 1/1 OCTAVE or 1/3 OCTAVE analysis, DOSE METER) and the calibration factor. The limits of the signal causing the different icon’s indication for the calibration factor equal to 0 dB are presented in the Table 3.1. Non-zero value of this factor causes the shift of the limits given in the table.



**Notice:** The “Bell” icon is used as an indicator of an overload.

In the case when the level of the measured signal is too low in the relation to the measuring range (when the level of the input signal is under the linearity of the range declared in App. C, so-called **UNDERRANGE**) in one profile mode the message is displayed in the field of the analogue indicator of the measurement result. The arrow directed down is used for this reason in **3 PROFILES** mode.

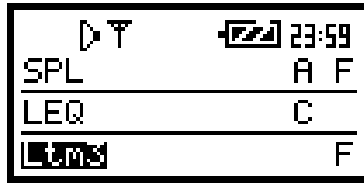


The view of the display when the level of the measured signal is too low

**Table 3.1. The limits of the signal causing the different icon’s indication**

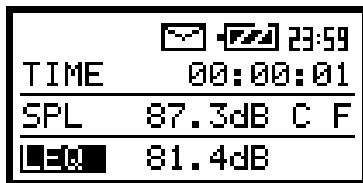
INDICATOR	SLM, DOSE METER	1/1 OCTAVE or 1/3 OCTAVE ANALYSIS		
	125 dB range	125 dB range	110 dB range	95 dB range
“Bell”	133.5 dB	133.5 dB	120.5 dB	105.5 dB
Y + 3 “Bars”	125.1 dB – 133.4 dB	125.1dB – 135.4 dB	110.1 dB – 120.4 dB	95.1 dB – 105.4 dB
3 “Bars”	95.1 dB – 125.0 dB	100.1 dB – 125.0 dB	85.1 dB – 110.0 dB	70.1 dB – 95.0 dB
2 “Bars”	65.1 dB – 95.0 dB	75.1 dB – 100.0 dB	60.1 dB – 85.0 dB	45.1 dB – 70.0 dB
1 “Bar”	35.1 dB – 65.0 dB	50.1 dB – 75.0 dB	35.1 dB – 60.0 dB	20.1 dB – 45.0 dB
	< 35.0 dB	< 50.0 dB	< 35.0 dB	< 20.0 dB
UNDERRANGE	< 26.0 dB A	< 40.0 dB A	< 30.0 dB A	< 26.0 dB A
UNDERRANGE	< 28.0 dB C	< 40.0 dB C	< 30.0 dB C	< 28.0 dB C
UNDERRANGE	< 35.0 dB	< 46.0 dB	< 36.0 dB	< 35.0 dB

- “Tree” icon is displayed in a flashing mode together with the “Loudspeaker” when the measurement is started, the trigger is switched on and the level of the signal is too low to start the registration.

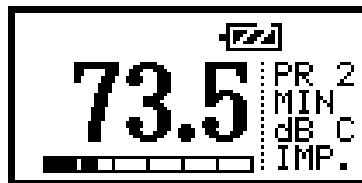


The view of the screen with the “Loudspeaker” icon

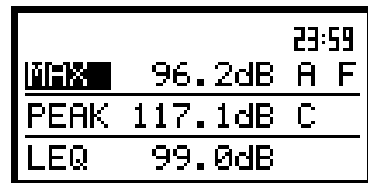
- “Envelope” icon is presented when the current **measurement results are logged** in the instrument’s buffer. Together with this icon the “Loudspeaker” icon is always displayed. In the case when the “Envelope” icon starts flashing, it means that the whole buffer of the instrument is filled. The new measurement result are not saved in it. If the user wants to save these results, he has to execute first the **CLEAR BUFFER** function from the *FILE* window which removes from the buffer memory all saved there results.



a)



b)



c)

The view of the display with the icons: “Envelope” (a); “Battery” (b) and with internal real time clock (c)

- “Battery” icon corresponds to the internal **battery state**. This icon is also used for the indication of the current state (the current filling) of the internal battery during the charging process.
- “Clock” icon displays the internal clock state (**the current time**) when the colon is flashing or the current time of the measurement (set in the **INT. TIME**). In the latter case the colon is displayed without flashing. The current time of the measurement is displayed after the start of the measurement and is shown also during it’s pausing (after pressing the <PAUSE> push button). In the case of the cutting off the last results (cf. the <PAUSE> push button description) the indicator is also updated. When the **2nd Func.** mode is selected (cf. the description of the *SETUP* window) instead of the clock the text **2n dF** is flashing. This flashing lasts from the pressing of the <SHIFT> push button till the pressing of any other one.



**Notice:** The time of the measurement is displayed **in minutes and seconds** in the range from **1 sec. to 39 minutes and 59 seconds**. After this limit the hours and minutes are shown (i.e. 00:40).



**Notice:** In all modes of the instrument the “Battery” and the “Clock” icons are always displayed on the display.



**Notice:** THE USER DYNAMICALLY MODIFIES THE DEFAULT SETUP. The last instrument’s setup (during the power off) is stored as a new default (see chapter 5 for details).