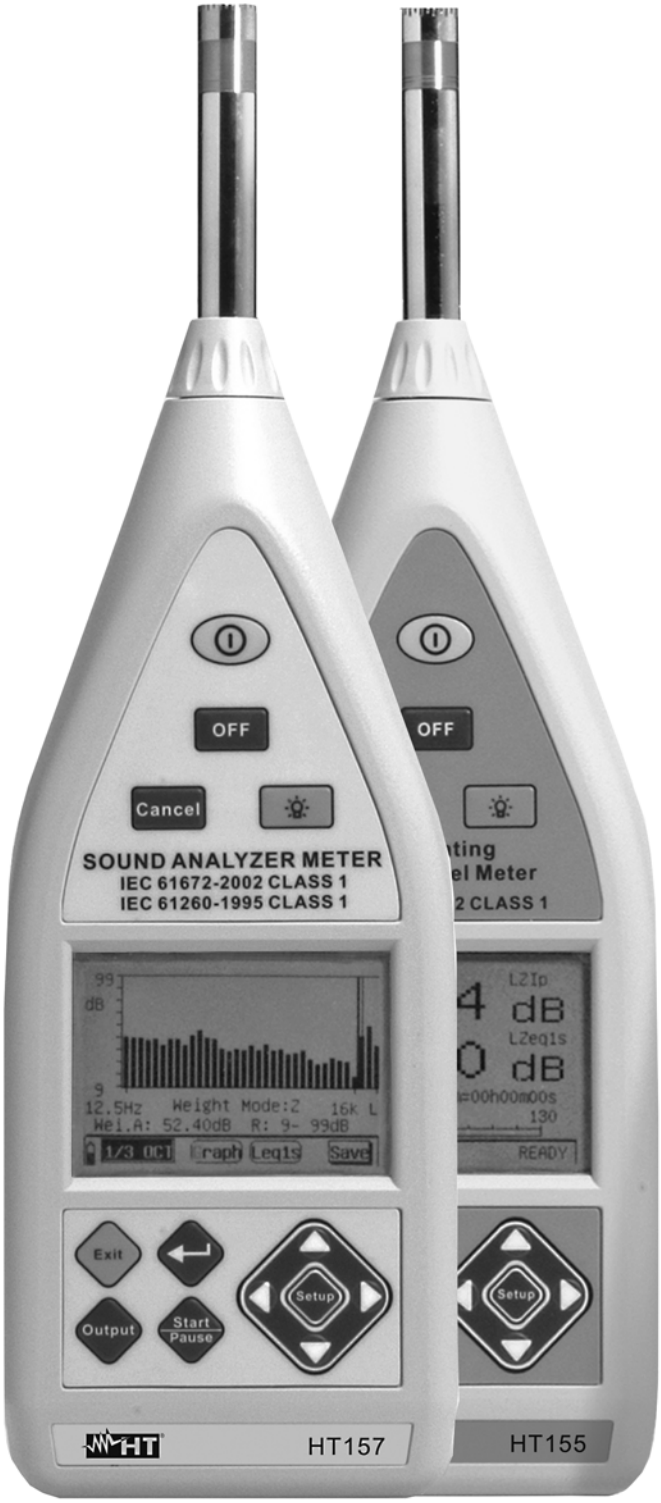
HT155 – HT157

User manual



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1. PRECAUTIONS AND SAFETY MEASURES

The instrument has been designed in compliance with the directives regarding electronic measuring instruments. For your safety and to prevent damaging the instrument, we recommend following the procedures described in this manual and carefully reading all notes preceded by the symbol ⚠.
Before and during measurements, carefully observe the following instructions:

- Do not perform any measurement in humid environments.
- Do not perform any measurement in the presence of gas, explosive or flammable material, or in dusty areas.
- Do not perform any measurement when anomalies are found in the instrument, such as deformations, breaks, substance leaks, no display view, etc.

In this manual and on the instrument, the following symbols are used:

Warning: observe the instructions reported in the manual. An improper use could damage the instrument or its components.

Instrument complying with the standards relevant to the EC mark

1.1. PRELIMINARY INSTRUCTIONS

CAUTION

- The instrument has been designed for measuring sound pressure levels (SPL) from 25dB to 140dB with frequency ranging from 10Hz to 20kHz
- We recommend following the usual safety rules to protect the instrument against improper use
- After a long storage period or if the instrument has been used under critical conditions, recalibrating the instrument is recommended (see § 6)
- Check if the batteries are correctly inserted

1.2. DURING USE

We recommend carefully reading the following recommendations and instructions:

CAUTION

- Failure to observe the warnings and/or instructions may damage the instrument and/or its components or generate a danger for the operator.
- Do not perform measurements in environmental conditions not within the limit values indicated in § 10.5
- Always use the windproof protection when carrying out measurements in environments where air currents are present
- Do not subject the instrument to strong mechanical stress and keep the microphone dry

1.3. AFTER USE

- When measurements are completed, turn off the instrument.
- If the instrument is not to be used for a long time, remove the battery.

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2. GENERAL DESCRIPTION

This manual refers to models HT155 and HT157. In the manual, the generic term “instrument” refers to both devices and, if not otherwise indicated, characteristics are to be considered as common to both models

The instrument has the following functions:

- Measurement of sound pressure level (SPL) Type 1
- Real-time and statistic analysis
- Octave band and in 1/3 octave band analysis (*HT157 only*)
- Measures weighted in frequency by means of A, C and Z curves and F, S impulses
- Fast, Slow, Impulse, PeakC+, Peak C- integrations
- Measurement of noise equivalent levels (Leq)
- Inner memory for saving measures and recordings
- AC analogue output for connection to external dataloggers
- USB interface for connection to PC and/or USB pen drive
- Wide backlit LCD display

The front panel of the instrument bears the function keys for the selection of the above-listed functions (see chapter 4.2). The measured value appears on the wide LCD display with the indication of the measuring unit and of the enabled functions.

In the lower part of the instrument there are the terminals for the AC analogue output with 3,5 mm coaxial connector and the (USB) ports for the connection of a possible DC 5V external adapter for power supply without using the internal battery and RS-232 (non-active output)

In the rear part of the instrument there is a hole for installing the instrument onto a possible tripod while measuring.

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3. PREPARATION FOR USE

3.1. INITIAL INSPECTIONS

Before shipment, the instrument's electronics and mechanics have been inspected.
All possible precautions have been taken in order for the instrument to be delivered without damage.

However, we recommend generally inspecting the instrument in order to detect any damage suffered during transport. Should you detect any anomalies, immediately contact the forwarding agent.

Moreover, we recommend checking that the package contains all parts listed in § 10.6. Should you find any discrepancy, please contact the dealer.

Should it become necessary to return the instrument, please follow the instructions reported in § 11.

3.2. INSTRUMENT POWER SUPPLY

The instrument is supplied by 4x1.5V alkaline batteries type AA IEC LR06 included in the package. The battery duration is of approximately 8 hours. When batteries are almost flat, the symbol "▯" appears on the display, further to the indication "BATTERY LOW". To replace the batteries, follow the instructions given in § 9.2.

The instrument may be supplied also by means of the provided external DC 5V supply **connected to the USB interface**. It is not necessary to remove the internal battery when the external power supply is connected. The instrument is provided with an automatic control which detects the presence of batteries or power supply and monitors the battery voltage. In case the external power supply is used and supply drops while measuring, the instrument passes directly to using the batteries, with no measurement interruption.

3.3. CALIBRATION

The instrument complies with the technical specifications reported in this manual. The instrument performance is guaranteed for 12 months.

3.4. STORAGE

In order to guarantee precise measurements, after a long storage period, in extreme environmental conditions, wait for the instrument to return to normal conditions (see the environmental specifications listed in § 10.5)

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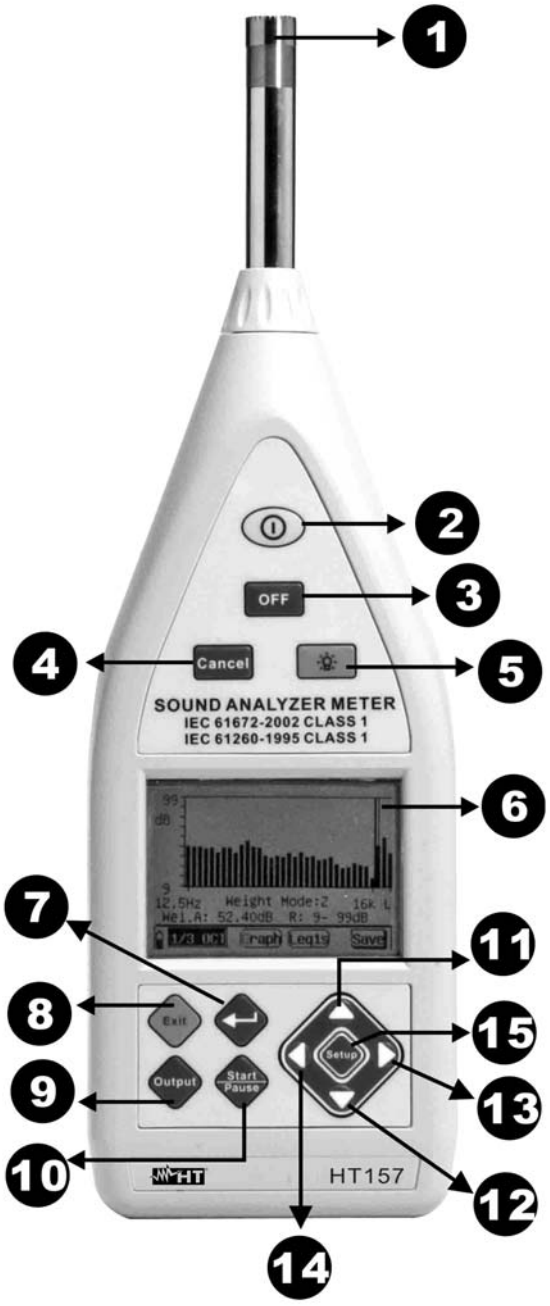
4. OPERATING INSTRUCTIONS

4.1. INSTRUMENT DESCRIPTION

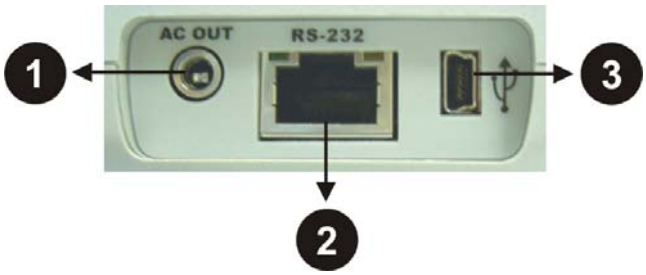
4.1.1. FRONT PANEL



LEGEND:
1. Microphone
2. **ON** key
3. **OFF** key
4. **CANCEL** key
5. Key to turn on the backlight
6. LCD display
7. **ENTER** key
8. **EXIT** key
9. **OUTPUT** key
10. **START/PAUSE** key
11. Arrow key for programming
12. Arrow key for programming
13. Arrow key for programming
14. Arrow key for programming
15. **SETUP** key for programming

Fig. 1: Description of the instrument's front panel

4.1.2. OUTPUT INTERFACE



LEGEND:
1. AC analogue output
2. RS-232 interface (not active)
3. Mini USB interface

Fig. 2: Description of the output interface

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4.2. DESCRIPTION OF FUNCTION KEYS

Key	Description
	Pressing the **ON** key allows turning on and internally resetting the instrument at any time
	The **OFF** key allows turning off the instrument
	The **CANCEL** key allows deleting the saved data from the instrument's memory
	Activates/deactivates the display's backlight. Backlight turns off automatically after 15s
	The **ENTER** key allows entering the internal programming screens and confirming the selections made
	The **OUTPUT** key allows stopping the measurements and automatically saving the result in the memory
	The **START/PAUSE** key allows activating or pausing a measurement
	The arrow keys allow navigating the programming menu, increasing/decreasing the parameter values by one unit (press and hold the keys for fast advance) and adjusting the display contrast
	The **SETUP** key allows rapidly accessing the programming menu without passing from the main menu when a measurement is in progress

4.3. ANALOGUE OUTPUT DESCRIPTION

The instrument is provided with an AC voltage analogue output proportional to the input signal measured in dB, which can be used to connect a 3.5mm output jack with the characteristics shown in Fig. 3

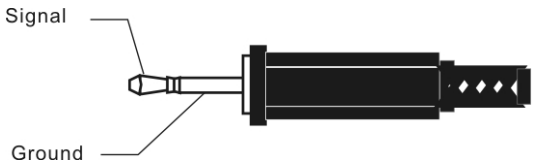

Fig. 3: Description of jack for AC analogue output

The proportion between the output and the input signal depends on the measuring range of the instrument and is shown in the following table:

Gain range	Output/input ratio	Measuring range [dB]
-10dB	0.316	50~140
0dB	1	40~130
10dB	3.16	30~120
20dB	10	20~110
30dB	31.6	10~100
40dB	100	0~90

The impedance of the AC output signal is 1kΩ. We recommend that the charge resistance connected to the AC output is at least 100kΩ and that the charge capacity is lower than 200pF. The ratio between the input and the output signal is 1mV / 0.1dB. The max output voltage is 3.2V.

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4.4. DISPLAY CONTRAST ADJUSTMENT

The instrument allows adjusting the display contract, proceeding as follows:

1. Turn on the instrument by pressing the key. The display shows the following screen:

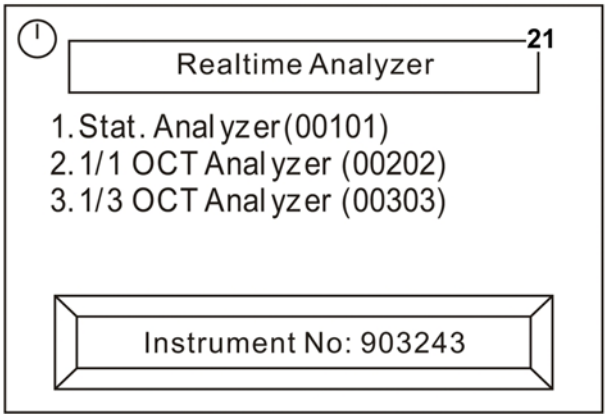

Fig. 4: Display contrast adjustment

2. Within 5s, press the arrow keys "" and "" respectively to decrease or increase the contrast level of the display. This parameter is shown in the upper right-hand part of the box "Realtime Analyzer". Up to 30 contrast levels are possible

4.5. TURNING ON/OFF THE INSTRUMENT

Respect the following instructions when turning on and off the instrument

- Press the key to turn on the instrument. The main screen in which the possible measuring modes are listed is shown on the display. Use the keys "" and "" for selecting and confirm with "". If no key is pressed within 5s, the instrument automatically sets itself to the last mode used
- Pressing the key when measuring automatically resets the system and brings the instrument back to the initial selection menu
- Press the OFF key to turn off the instrument. With the instrument turned off, the instrument's clock does not stop working thanks to the internal back-up battery. This battery is continuously recharged when the instrument is measuring and at least 24 hours are necessary for a complete charge. With fully charged back-up battery, the internal clock is maintained for over 3 months
- The measurement results are saved in an internal flash memory and are always maintained even with no external power supply or with the instrument turned off

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4.6. CONFIGURATION OF MEASURING PARAMETERS

4.6.1. FOREWORD

Before activating a recording operation, it is necessary to set the necessary parameters such as the measure name, the measuring time, etc., on the instrument, starting from section “Setup” of the main menu (see Fig. 5) or pressing the “” key inside a measuring section. The instrument will automatically save the values of the parameters each time it is turned off, subsequently recalling them each time it is turned on.

CAUTION

It is not possible to access the “Setup” section while the instrument is recording

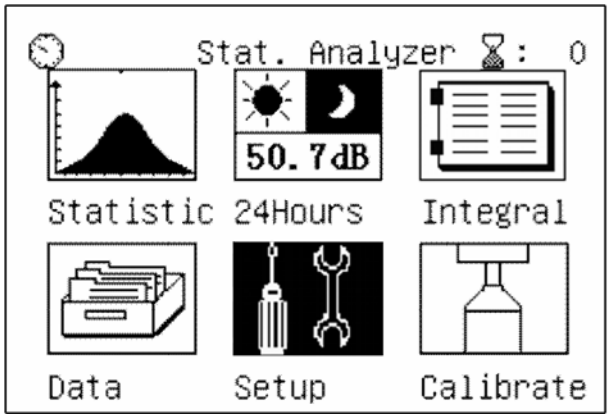

Fig. 5: Selection of the instrument’s SETUP section

4.6.2. PROGRAMMING MENU INTERFACE

Select the “Setup” section in the main menu and confirm with “”. The instrument displays the screen shown in Fig. 6:

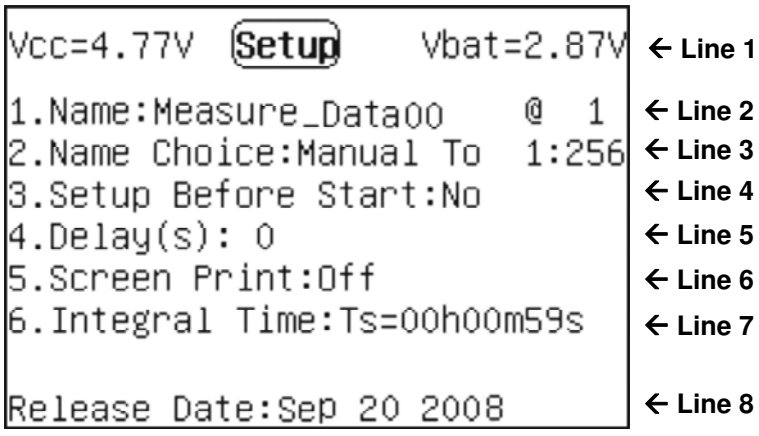

Fig. 6: Internal screen of programming menu

The single items can be selected by using the “” and “” keys and pressing the “” key to modify the parameter values.

The following table contains the descriptions of the single lines contained in the programming menu

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Line 1	On the left side of the line there is the voltage battery and on the right side the back-up battery voltage. In case the voltage value is > 10V, the message "Over" will appear on the display
Line 2	In this line, it is possible to select the name of measurement as a reference for the data saved during the operation, choosing among a list of names, which can be created by the user (see § 4.6.3), using the "▲" and "▼" keys. The indication "@ 1" for example is the indication of the first name available in the list
Line 3	In this line it is possible to define, by using the "▲" and "▼" keys, a criterion for the choice of the measure name. In particular, two modes are available: ➢ **Auto** mode → the measure name is automatically changed by the instrument each time a new measurement is started ➢ **Manual** mode → the measure name is not changed automatically by the instrument and only the user can make the change
Line 4	By using the "▲" and "▼" keys, it is possible to select the options: ➢ Option **No** → the instrument directly starts measuring when the "Start Pause" key is pressed ➢ Option **Yes** → before starting measuring, the instrument accesses the Setup section when the "Start Pause" key is pressed, so that the parameters can be checked and/or changed. When the "Exit" key is pressed, the instrument starts measuring. **This option is not available for the "24Hours" operating mode**
Line 5	In this line it is possible to select, by means of the "▲" and "▼" keys, a delay time (max 10s) for the activation of measurement after the "Start Pause" key is pressed. Value "0" indicates no delay. **This option is not available for the "24Hours" operating mode**
Line 6	In this line, by means of the "▲" and "▼" keys, it is possible to activate (On) or deactivate (Off) the print of the values shown on the display by means of a mini-printer connected to the RS-232 output, by pressing the "Output" key. **This function is not available**
Line 7	In this line it is possible to set the total measuring time, from 1s to 24 hours. The instrument allows rapidly setting, by means of the "▲" and "▼" keys, the following 12 preset levels: 10s, 1min, 5min, 10min, 15min, 20min, 30min, 1h, 2h, 4h, 8h, 24h, or it is possible to set the desired value by using the "◄" and "►" keys to move to the "h", "m" or "s" fields and the "▲" and "▼" keys to set the values
Line 8	This line contains the date of the instrument's Fw version

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4.6.3. DEFINING THE MEASURE NAME

By selecting Line 3 inside the programming menu (see Fig. 6) and pressing the "↵" key, the instrument displays the following screen, which shows a list of the measure names created by the user:

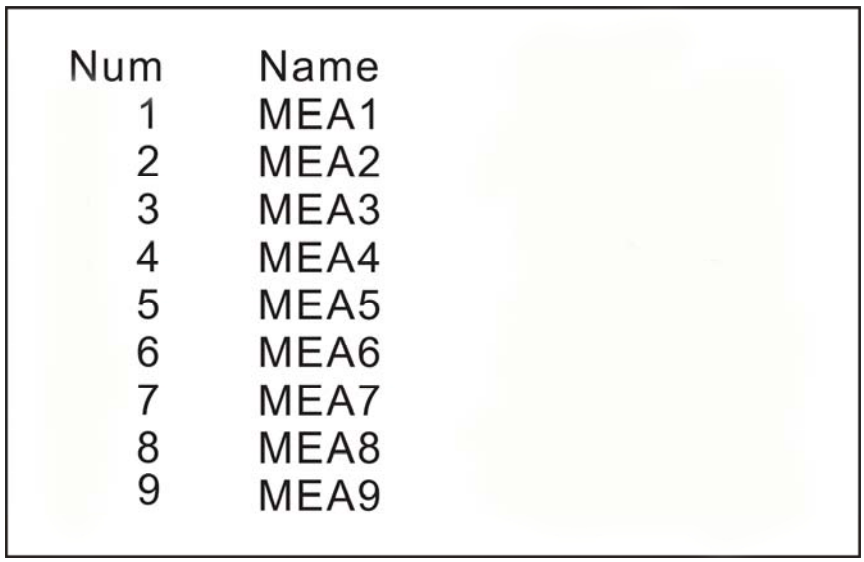

Fig. 7: Screen containing the list of measure names

The first column, "Num", refers to the number of the memory location used for saving the measure name. The second column, "Name", indicates the saved name, associated to the relevant location

CAUTION

The instrument is capable of saving up to **256 measure names**. If this reference is exceeded, it automatically deletes all 256 names already created, only saving the last input name

To create a new measure name, proceed as follows:

1. Select Line 2 inside the programming menu (see Fig. 6) and press the "↵" key. The instrument displays the following screen:

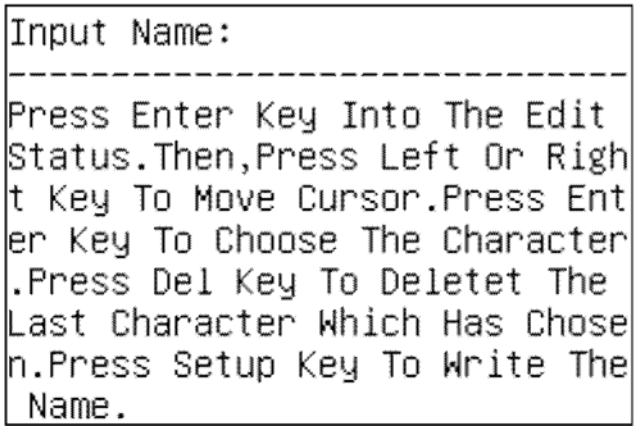

Fig. 8: Initial screen for setting the measure name

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2. Press "↵" again to enter the next screen, where it is possible to digit the measure name by using the "◄", "►", "▲" and "▼" keys, for the selection of the available characters, and the "Cancel" key to cancel the last input character.

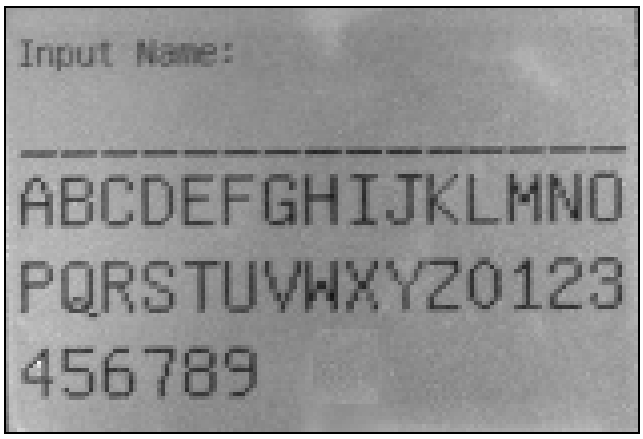

Fig. 9: Screen for typing the measure name

3. Press the "↵" key to confirm each character of the measure name (max 14 characters available)
4. Press the "." key to save the created measure name, which will be automatically present in Line 2 of the programming menu, further to the number of the location assigned to it.
5. Press the "Exit" key to exit the programming menu

CAUTION
For a more rapid creation of the measure names, we recommend using the provided software and to subsequently send these elements to the instrument connected to the PC via USB interface. Deletion of the measure names on the instrument is only possible via the software (see § 8.4.4)

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5. CARRYING OUT MEASUREMENTS

The instrument is capable of carrying out different types of analyses of the sound pressure level of a noise source:

1. Statistic analysis of noise
2. Spectrum analysis of noise with octave-band filter (1/1) *(HT157 only)*
3. Spectrum analysis of noise with third-octave band filter (1/3) *(HT157 only)*

For simplicity, the following descriptions are referred to the instrument model HT157

5.1. STATISTIC ANALYSIS OF NOISE

5.1.1. INITIAL OPERATIONS

1. Turn on the instrument by pressing the "⏻" key. The screen for the selection of the analysis type is shown on the display for approximately 5s (see Fig. 10)

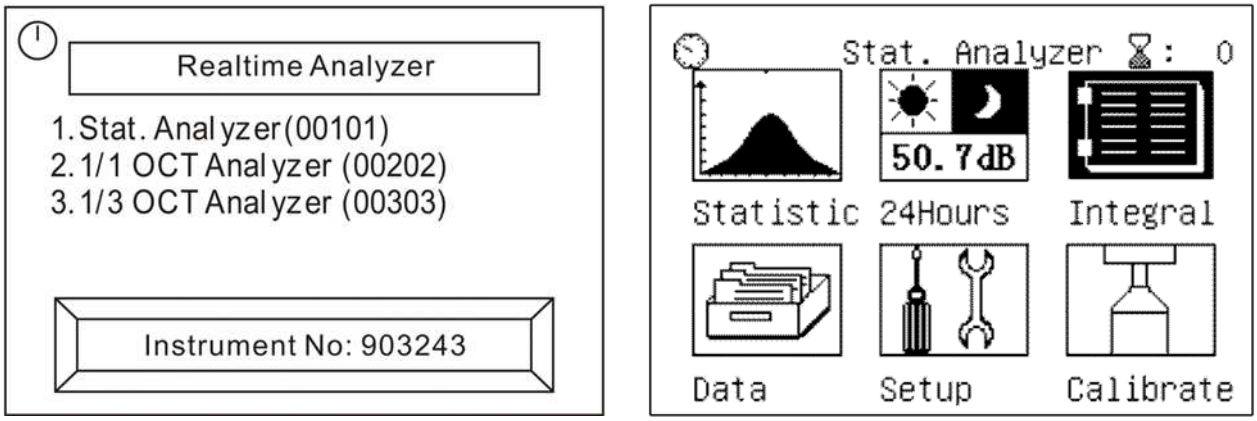

Fig. 10: Initial screens of statistic analysis

2. Use the keys "◀" and "▶" the option "**Stat.Analyzer (00101)**" and confirm with "↵". The instrument shows the main menu of the statistic analysis, consisting of 6 icons on the display
3. Select the relevant icon and press "↵" to enter the specific menu. In detail:
   - **Statistic** → the instrument measures the sound pressure level with weighting "A", with time constant Fast and equivalent noise level
   - **24 Hours** → measurement of the sound pressure level in a fixed time period of 24 hours
   - **Integral** → the instrument integrates the sound pressure level in the three frequency weightings (A, C, Z) and in the three time constants (Slow, Fast, Impulse)
   - **Data** → Section which contains the data of the recordings saved with the instrument (see chapter 7)
   - **Setup** → allows accessing the instrument's programming menu (see § 4.6)
   - **Calibrate** → section in which it is possible to calibrate the sensitivity level of the microphone by using the provided portable calibrator HT151 (see § 6.1.3)
4. The indication next to the icon "⌛:XXX" in the right-hand top part of the display indicates the number of the group of the datum which can be saved in the instrument's memory

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5.1.2. STATISTIC ANALYSIS OPERATIONS

1. Select the "**Statistic**" icon and confirm with "↵". The instrument shows the following screen relevant to the numerical display of the measured quantities

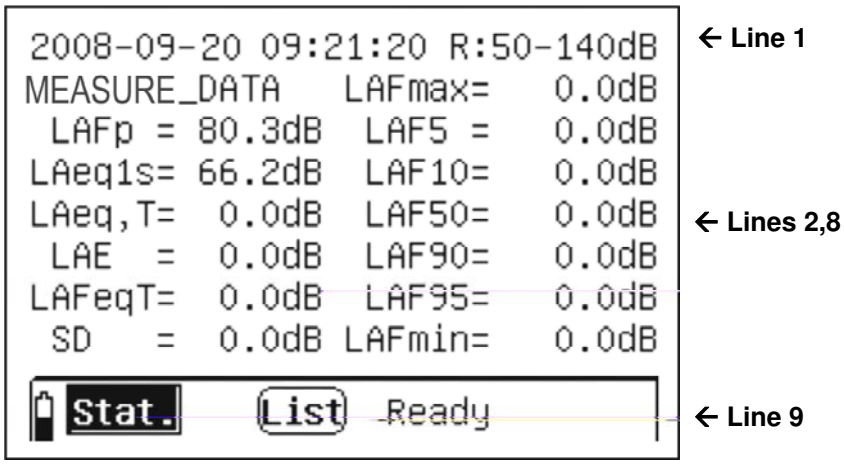

Fig. 11: Numerical screen of statistic analysis

Line 1	The left part shows the current date/time set on the instrument, while the right part shows the measuring range currently used by the instrument. Both the parameters can be programmed by the user as follows: ➢ **Date/time setting** 1. Use the "◁" and "▷" keys to move the flashing cursor to fields YYYY (year), MM (month), DD (day), HH (hours), MM (minutes) SS (seconds) 2. Use the "△" and "▽" keys to select the desired program: ➢ **Configuration of the measuring range** 1. Use the "◁" and "▷" keys to move the flashing cursor to symbol "R" 2. Use the "△" and "▽" keys to select the measuring range among the following options: 0 ÷90dB, 10 ÷100dB, 20 ÷110dB, 30 ÷120dB, 40 ÷130dB, 50 ÷140dB according to the reading carried out by the instrument. After each range modification, the reading takes approximately 3s to become stable
Lines 2 ÷ 8	The central part of the display shows: ➢ **The measure name** in the first 14 characters of the second line, defined in the programming section (see § 4.6.3). Press the "." key to change the measure name ➢ **The values of the measured quantities are updated in real time every second.** The following parameters, relevant to the sound pressure level, are considered: LAFp, LAeq1s, LAeq,T, LAE, LAFeqT, SD, LAFmax, LAF5, LAF10, LAF50, LAF90, LAF95, LAFmin

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Line 9	This line contains: ➢ The "🔋" icon, which indicates the battery charge level ➢ The "Stat." icon, which indicates the measuring mode. In the same position, the following messages can be displayed: "**OVER**" and "**UNDER**", to indicate that the measured values are respectively higher and lower than the maximum and minimum range set. Operate on Line 1 to change the measuring range value ➢ The "List" icon allows selecting the current numerical display or the **graphic** display of data ➢ The messages "Ready" (instrument ready for recording) "Run" (instrument recording), "Pause" (instrument paused), "Save" (instrument saving) or "End" (end of measuring campaign

2. Press the "Start Pause" key to start recording the values of the statistic analysis with a duration equal to the total measuring time (Tm) defined in the programming menu (see § 4.6). The instrument displays the following screen:

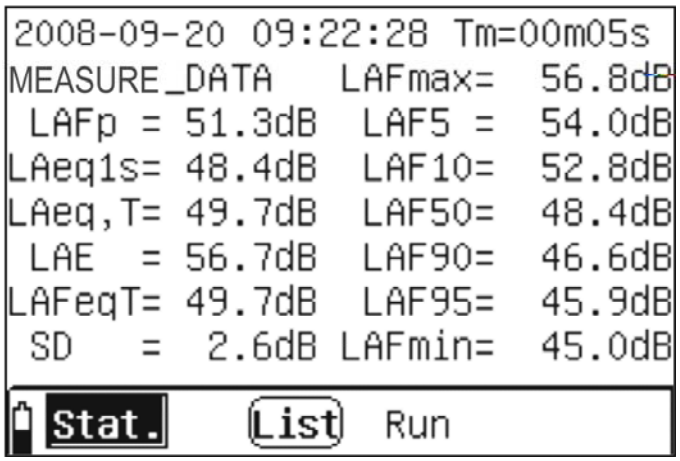

Fig. 12: Statistic analysis activation

3. The "Run" message appears in the lower part of the instrument, to indicate that a recording is currently in progress. In this condition, the indication of the measuring range disappears and the measuring time appears, and cannot be changed while recording
4. By pressing the "Start Pause" key while recording, the instrument is paused. The indication "Pause" appears in the lower part of the instrument. Press the key a second time to start recording again
5. When pressing the "Output" key with paused instrument, measurement is stopped and the result is saved in the internal memory
6. When pressing the "Cancel" key with paused instrument, the measurement being carried out is cancelled and the instrument waits for a new recording
7. With the flashing cursor on the "List" icon, press the "▲" or "▼" keys to access the graphic display of the measure. The instrument displays the following screen:

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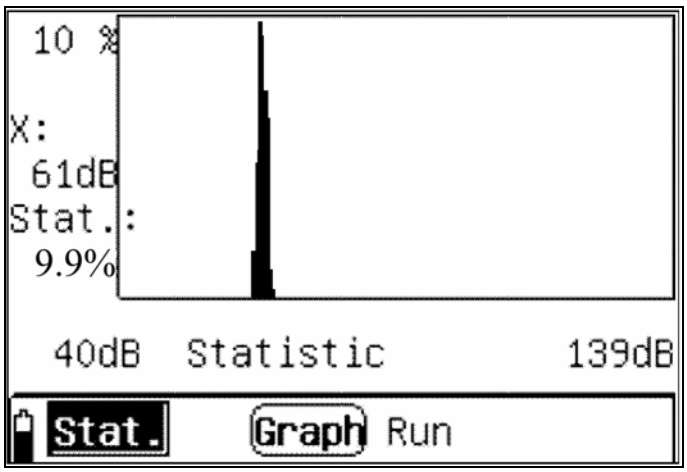

Fig. 13: Graphic screen of statistic analysis

8. The screen shows the diagram of the statistic distribution corresponding to the recording in progress, with update every second. The left part of the graphic displays the statistic percentage of the sound pressure level corresponding to the dB value measured by the instrument, which can be changed by means of the "◀" and "▶" arrow keys, within the measuring range reported on the x-axis. In the example in Fig. 13, the value of the sound pressure level is 61dB in 9.9% of the values measured within the 40 – 139dB range.
9. Press the "↵" key to pass from the statistic distribution diagram to the cumulative distribution diagram (Accumulation), which shows each statistic level of the noise
10. In the graphical screens, it is always possible to pause and/or stop recording in the same way as with numerical display, which it is always possible to go back to by pressing the "▲" or "▼" keys, with the cursor on the "**Graph**" icon

CAUTION

The main menu cannot be selected while recording. Cancel or stop recording to carry out this operation

11. Once the measuring time has elapsed, the recording stops and the result is **automatically** saved in the instrument's memory. The "End" message appears in the lower part of the instrument

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5.1.3. 24-HOUR ANALYSIS OPERATIONS

The "**24Hours**" analysis is a statistic analysis, but has a fixed duration of 24 hours starting from the programmable date/time, and divides the measuring results of the various quantities in 24 intervals of one hour each. After the analysis has automatically stopped, the calculated values of **Ld, Ln** and **Ldn** noise are also provided. This mode is appropriate when it is necessary to repeat an analysis of a certain duration (measuring time) from the same second of each hour during a whole day.

CAUTION

The measuring time within each interval can be set (see § 4.6.2) in a range of **1min ÷ 59min**. For a measuring time different from this range, the instrument automatically considers a time of **20min**

1. Use the keys "◄" or "►" to select the "**24Hours**" icon (see Fig. 14) and confirm with "↵".

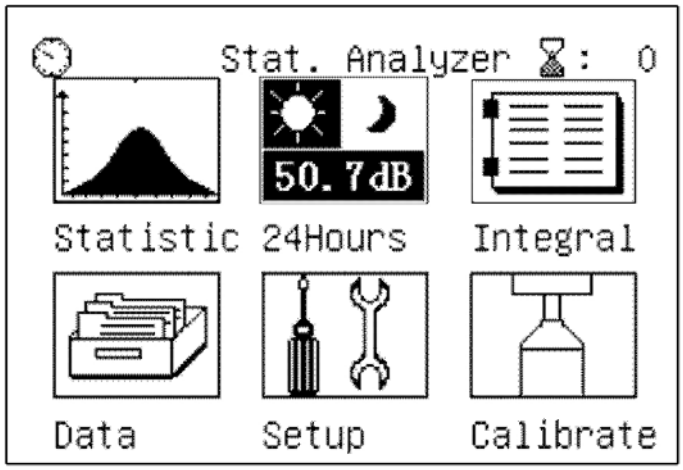

Fig. 14: Selection of 24Hours analysis

2. The instrument shows the following screen relevant to the measured quantities in numerical form:

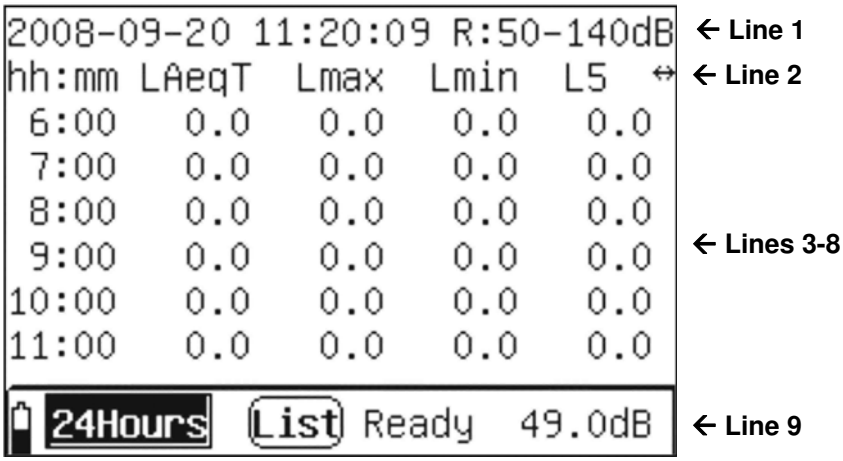

Fig. 15: 24Hours analysis screen in numerical form

3. Consider the following table for the meaning of the items found in screen of Fig. 15:

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Line 1	The left part shows the current date/time set on the instrument, while the right part shows the measuring range currently used by the instrument. Both the parameters can be programmed by the user as follows: ➢ **Date/time setting** 1. Use the "◄" and "►" keys to move the flashing cursor to fields YYYY (year), MM (month), DD (day), HH (hours), MM (minutes) SS (seconds) 2. Use the "▲" and "▼" keys to select the desired program: ➢ **Configuration of the measuring range** 1. Use the "◄" and "►" keys to move the flashing cursor to symbol "R" 2. Use the "▲" and "▼" keys to select the measuring range among the following options: 0 ÷90dB, 10 ÷100dB, 20 ÷110dB, 30 ÷120dB, 40 ÷130dB, 50 ÷140dB according to the reading carried out by the instrument. After each range modification, the reading takes approximately 3s to become stable
Line 2	➢ By using the "◄" or "►" keys to move the flashing cursor to the "**hh:mm**" field and repeatedly using the "▲" or "▼" keys, the instrument shows the 24 intervals from "0:00 to 23:00" and the values of the Ld, Ln, Ldn parameters. By moving the cursor to the symbol "↵" and pressing the "▲" or "▼" keys, the instrument shows the following quantities in a horizontal line: **LAeqT, Lmax, Lmin, L5, L10, L50, L90, L95, SD, LAFeq**, corresponding to the statistic analysis of the sound pressure level with frequency weighting "A" and time constant F
Lines 3- 8	These lines show in real time the values of the quantities integrated by the instrument during the whole measuring time and the resulting values at the end of each interval
Line 9	The left part of the line shows: ➢ The "▮" icon, which indicates the battery charge level ➢ The "24Hours" icon, which indicates the current operating mode. ➢ The "List" icon, to indicate the type of numerical display of the results (with flashing cursor on the icon, press the "▲" or "▼" keys to pass to graphic display "**Graph**") ➢ The messages "Ready", "Run", "Wait" or "End", to respectively indicate: waiting to start measuring, measurement in progress, waiting to start measuring in new range and end of measurement ➢ The indication in real time (e.g.: 49.0 dB) of the sound pressure level measured by the instrument

4. With the message "Ready" on the display, press the "." key to enter the instrument's programming menu and set the relevant parameters (measure name, measuring time, etc…) as described in § 4.6). Press the "Exit" key to go back to the measuring screen

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5. Press the "Start Pause" key to start measuring. After this operation, the instrument:
   - Starts measuring from the minute indicated in the system date/time and shows this reference in column "hh:mm" with the relevant values of the quantities read in real time
   - Shows the message "Run" on the display
   - In line 1, it shows the measuring time "Tm" instead of the indication of the set range
   - Disables the possibility of accessing the programming menu by pressing the "." key. Stops measuring to enter the programming menu again
6. Once the measuring time has elapsed, the instrument:
   - Shows the indication "Wait" on the display, to indicate that it is waiting to start (**instant "00**") in the new measuring interval at the hour following the initial one (see) (e.g.: if measurement is started at 8:49, the second measurement will be started at 9:49:00)
   - Shows the measuring range again instead of the measuring time "Tm"
   - This operation is repeated for each of the remaining 24 intervals

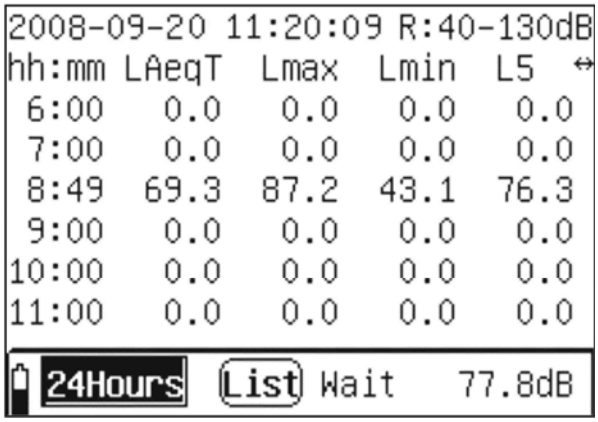

Fig. 16: Screen of instrument waiting to start a new recording (Wait)

CAUTION

When a measurement is in progress (Run) or waiting (Wait), the "Start Pause", "Exit", ".", "↵", "Output" keys are not active and it is necessary to stop or cancel measurement to activate them again

7. With the flashing cursor on the "List" icon, press the "△" or "▽" keys to access the graphic display of the measure. The instrument displays the following screen:

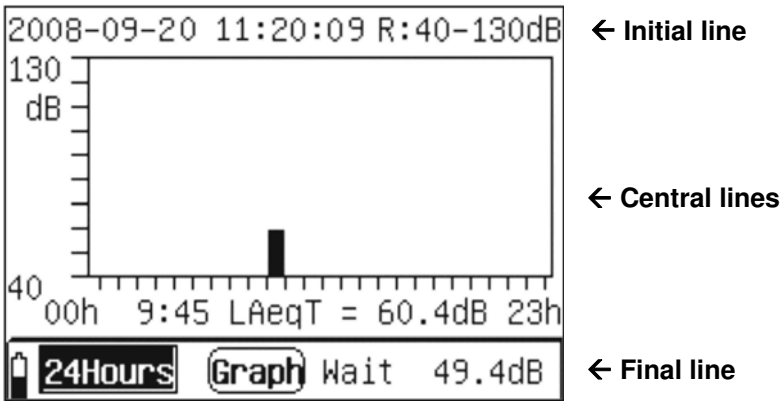

Fig. 17: Screen of graphic display in 24Hours mode

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Initial line	The left part shows the current date/time set on the instrument, while the right part shows the measuring range currently used by the instrument. Both parameters can be programmed, as with numerical display
Central lines	➢ By using the "◄" or "►" keys to move the flashing cursor to the "**hh:mm**" field and repeatedly using the "▲" or "▼" keys, the instrument shows the graphic values of the 24 intervals from "0:00 to 23:00". By moving the cursor to one of the parameters (e.g.: LAeqT) and by using the "▲" or "▼" keys, the instrument shows the graphic values of the quantities exactly as for the numerical view
Final line	The left part of the line shows: ➢ The "▮" icon, which indicates the battery charge level ➢ The "24Hours" icon, which indicates the current operating mode. ➢ The "**Graph**" icon, to indicate the type of graphic display of the results (with flashing cursor on the icon, press the "▲" or "▼" keys to pass to numerical display "List") ➢ The messages "Ready", "Run", "Wait" or "End", to respectively indicate: waiting to start measuring, measurement in progress, waiting to start measuring in new range and end of measurement ➢ The indication in real time (e.g.: 49.0 dB) of the sound pressure level measured by the instrument

8. Once the 24 intervals have elapsed, the recording stops and the result is **automatically** saved in the instrument's memory. The "End" message appears in the lower part of the instrument (see Fig. 18). Each interval maintains the same name as the measure

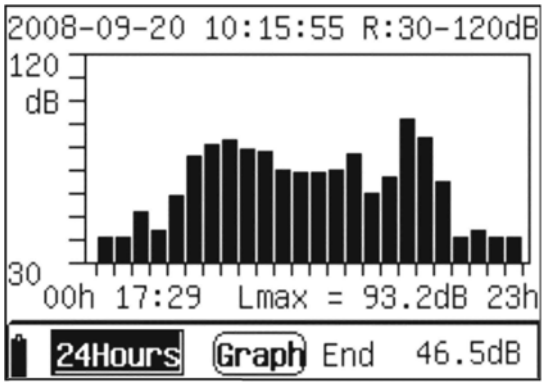

Fig. 18: Final display of 24Hours measure

9. To exit from the "24Hours" mode, press the "Cancel" key. The instrument shows the message "Press Enter key to exit!". Press "↵" to go back to the main menu. Press the "Cancel" key again to go back to the measuring mode
10. Once measurement is completed, press "Exit" to go back to the main menu

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5.1.4. INTEGRATION ANALYSIS OPERATIONS

In this type of analysis, the instrument carries out an instant measurement, measures integrated values and peak "C" values of the sound pressure level in the three frequency weightings (A, C, Z) and in the three time constants (Slow, Fast, Impulse)

1. Use the "◄" or "►" keys to select the "**Integral**" icon (see Fig. 19) and confirm with "↵".

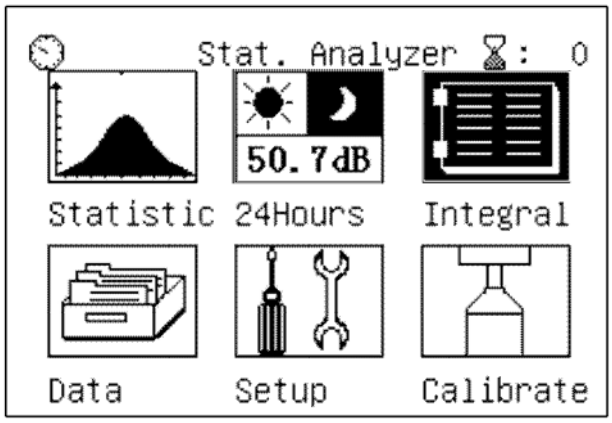
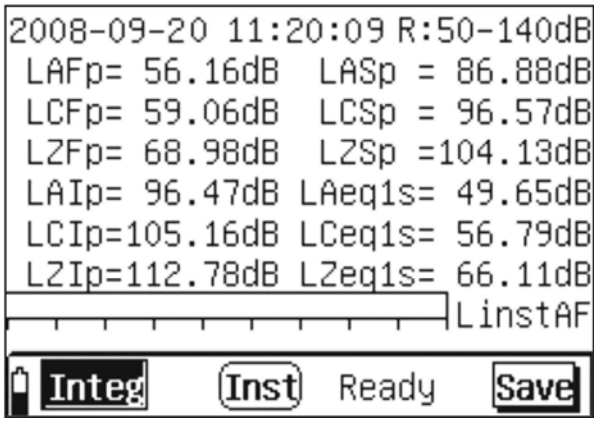


Fig. 19: Integral analysis selection

2. The instrument shows the following screen relevant to the measured **instant** quantities:



← **Line 1**

← **Lines 2-7**

← **Line 8**

← **Line 9**

Fig. 20: Screen of instant values of Integral analysis

Line 1	The left part shows the current date/time set on the instrument, while the right part shows the measuring range currently used by the instrument. ➢ **Date/time setting** Use the "◄" and "►" keys to move the flashing cursor to fields YYYY (year), MM (month), DD (day), HH (hours), MM (minutes) SS (seconds) and use the "▲" and "▼" keys to carry out the desired programming ➢ **Configuration of the measuring range** Use the "◄" and "►" keys to move the flashing cursor to symbol "R" and use the "▲" and "▼" keys to select the measuring range among the following options: 0 ÷90dB, 10 ÷100dB, 20 ÷110dB, 30 ÷120dB, 40 ÷130dB, 50 ÷140dB according to the reading carried out by the instrument. After each range modification, the reading takes approximately 3s to become stable

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Lines 2- 7	These lines show in real time the instant values of the following quantities, measured by the instrument: **LAFp, LCFp, LZFp, LASp, LCSp, LZSp, LAIp, LCIp, LZIp, LAeq1s, LCeq1s, LZeq1s** corresponding to the impulse levels of sound pressure with weightings A, C, Z and time constants Slow (S), Fast (F) and Impulse (I)
Line 8	The left part of the line shows a graphic bar, which dynamically updates the values of the instant quantities: **LAFinst, LASinst, LAIinst, LCFinst, LCSinst, LCIinst, LZFinst, LZSinst, LZIinst** found on the right part, by moving the cursor on one of them by means of the "◄" or "►" keys and selecting them by means of the "▲" or "▼" keys. Please note that each segment of the graphic bar corresponds to 10dB within the selected range
Line 9	This line shows: ➢ The "▮" icon, which indicates the battery charge level ➢ The "Integ" icon, which indicates the Integral mode selected ➢ The "Inst" icon, to indicate the type of instant display and the "**Integ**" icon, to indicate the integration measurement ➢ The messages "Ready", "Run", "Finish" and "End" to indicate respectively that the instrument is ready to carry out a recording (Integr mode), that a recording is in progress, that a recording has finished and that the whole operation has been completed ➢ The "Save" icon which allows saving the values on the display in the instrument's memory

3. In the **instant** display, the following operations associated to the "Save" icon are possible:
   - ➢ With cursor flashing on the "Save" icon, press the "↵" key to save the instant data shown on the display in the memory area (see §). During this operation, the "Save" icon is completely highlighted for a few seconds, before it goes back to normal display, to indicate correct saving
   - ➢ With the cursor flashing on the "Save" icon, press the "▲" or "▼" keys to instantly select the "Lock" option. Subsequently, press the "↵" key to lock the quantity data values shown on the display. Press "↵" again to exit the "Lock" function
   - ➢ With the cursor flashing on the "Save" icon, press the "▲" or "▼" keys to instantly select the "Max" option. By subsequently pressing the "↵" key, the instrument shows the maximum value of the quantities shown on the display, and the value automatically updates when a higher value is detected. Press "↵" again to exit the "Max" function

4. By using the "▲" or "▼" keys, the instrument goes to the following screen relevant to the **integrated** quantities:

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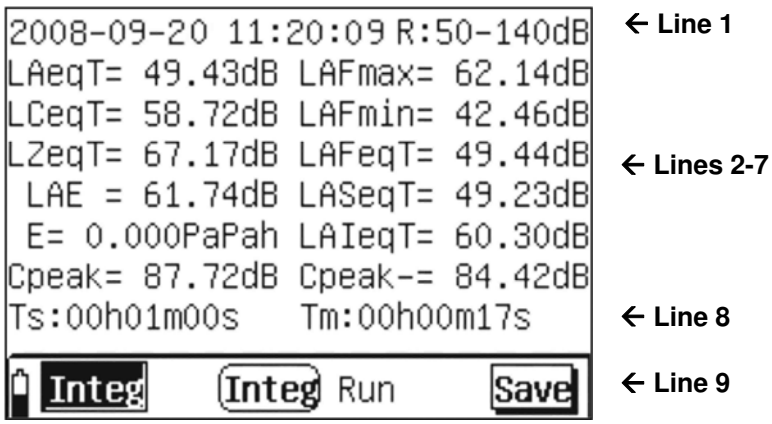

Fig. 21: Screen of integrated values of Integral analysis

Line 1	It allows setting the current date/time and the measuring range in the same way as for the instant value display
Lines 2- 7	These lines show in real time the values of the following quantities integrated by the instrument: **LAeqT, LCeqT, LZeqT, LAFmax, LAFmin, LAFeqT, LASeqT, LAIeqT, LAE, E, Cpeak+, Cpeak-**
Line 8	In this line, the left part shows the duration of the "Ts" measure set in the programming menu (see § 4.6.2) and the measuring time "Tm"

5. Press the "Start Pause" key to start the integration measurement. The instrument automatically shows the screen with the integrated values (see Fig. 21) and the "Run" message appears on the display
6. When the instrument reaches the measuring time (Tm = Ts), the instrument stops the integration measurement and the "End" message appears on the display. **Data are automatically saved in the instrument's memory**
7. By pressing the "Start Pause" key while a process is in progress, the instrument pauses measurement and the "Pause" message appears on the display. In this situation:
   - By pressing the "Output" key, the instrument stops measuring, shows the "Finish" message on the display and automatically saves the data up to that instant
   - By pressing the "Cancel" key, the measurement in progress is automatically cancelled and the instrument goes back to the waiting condition, showing the "Ready" message on the display
   - By pressing the "Start Pause" key again, the measurement starts again from the instant in which it was stopped and the "Run" message appears on the display again

CAUTION

- While a measurement is in progress (Run), it is not possible to access the programming menu and it is necessary to first complete or stop it
- The "Save" icon cannot be used for data integration measurement

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5.2. NOISE ANALYSIS IN 1/1 AND 1/3 OCTAVE BAND (HT157 ONLY)

Further to the statistic analysis, the instrument HT157 allows carrying out accurate measurements of the noise spectrum by using internal octave-band (1/1) and third-octave-band (1/3) filters

5.2.1. INITIAL OPERATIONS

1. Turn on the instrument by pressing the "⏻" key. The screen for the selection of the analysis type is shown on the display for approximately 5s (see Fig. 22)

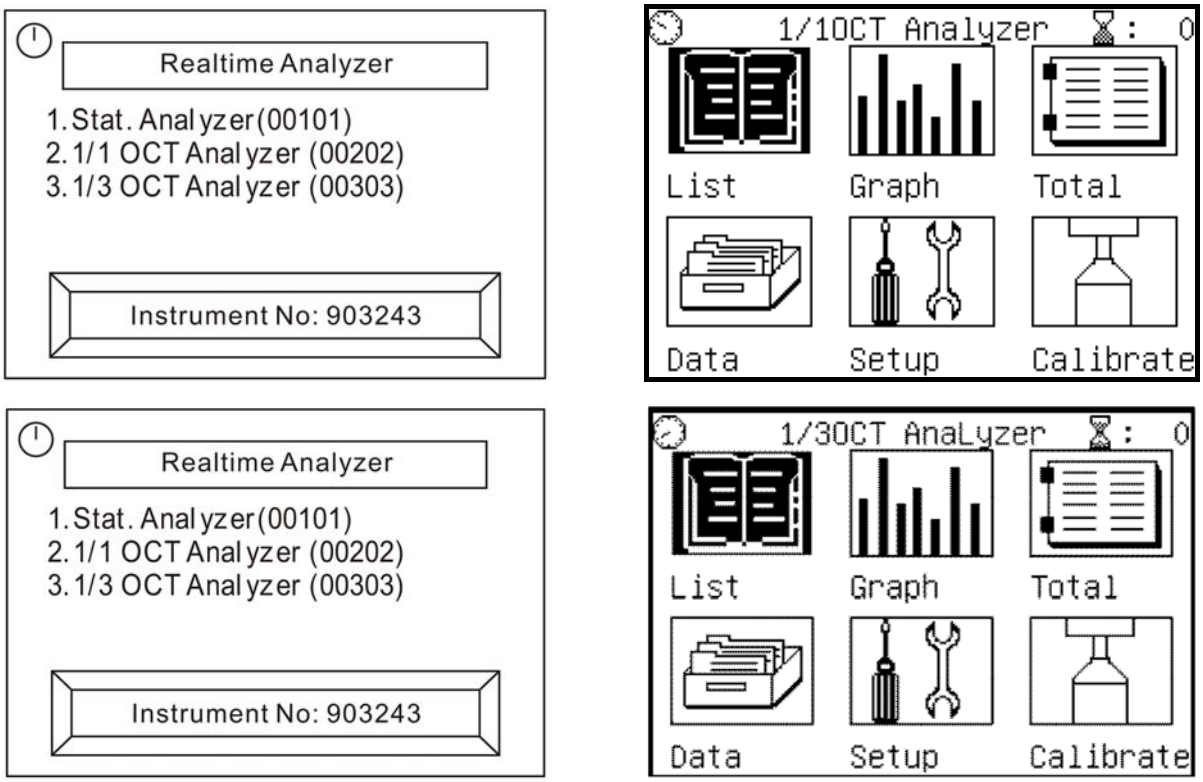

Fig. 22: Initial screens for analysis in 1/1 and 1/3 octave band

2. Use the "◀" or "▶" keys to select the item "**1/1 OCT Analyzer (00202)**" and press "↵" to activate the octave band analysis (1/1) or the item "**1/3 OCT Analyzer (00303)**" and press "↵" to activate the third-octave band analysis (1/3). The instrument shows the main menu consisting of 6 icons on the display
3. Select the relevant icon and press "↵" to enter the specific menu:
   - **List** → the instrument shows, in numerical form, the sound pressure level for each central band frequency in the range 16Hz ÷16kHz (1/1 analysis) and in the range 12.5Hz ÷ 16kHz (1/3 analysis) and the equivalent levels weighted A, C and Z
   - **Graph** → the instrument shows the histograms of the 1/1 and 1/3 analyses
   - **Total** → the instrument shows the whole of the data of the spectrum analysis
   - **Data** → Section which contains the data of the recordings saved with the instrument (see §)
   - **Setup** → allows accessing the instrument's programming menu (see § 4.6)
   - **Calibrate** → section in which it is possible to make the initial calibration by using the provided portable calibrator HT151 (see § 6.1.3)
4. The indication next to the icon "⌛:XXX" in the right-hand top part of the display indicates the number of the group of the datum which can be saved in the instrument's memory

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5.2.2. OCTAVE BAND ANALYSIS (1/1)

5.2.2.1. Operations for sections LIST, GRAPH and TOTAL

2. Select the "**List**" icon and confirm with "↵". The instrument displays the following numerical screen:

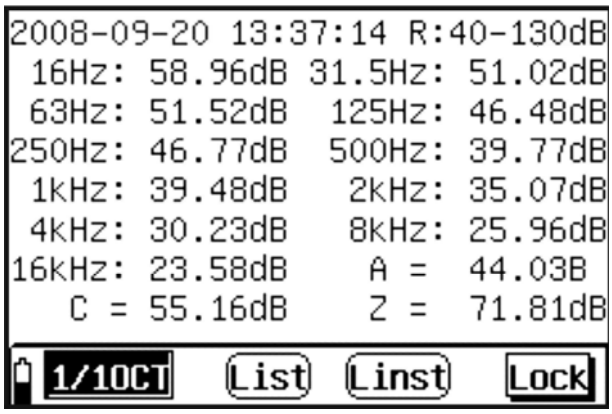

Fig. 23: Numerical screen of octave band analysis (1/1)

Line 1	The left part shows the current date/time set on the instrument, while the right part shows the measuring range selected. ➢ **Date/time setting** 1. Use the "◄" and "►" keys to move the flashing cursor to fields YYYY (year), MM (month), DD (day), HH (hours), MM (minutes) SS (seconds) 2. Use the "▲" and "▼" keys to select the desired program: ➢ **Configuration of the measuring range** 1. Use the "◄" and "►" keys to move the flashing cursor to symbol "R" 2. Use the "▲" and "▼" keys to select the measuring range among the following options: 0 ÷90dB, 10 ÷100dB, 20 ÷110dB, 30 ÷120dB, 40 ÷130dB, 50 ÷140dB according to the reading carried out by the instrument. After each modification, the reading takes approximately 3s to become stable
Lines 2 ÷ 8	The central part of the display shows the instant values of the sound pressure level for each central band frequency from **16Hz to 16kHz**, further to the values of the equivalent noise levels **Leq1s** and **Leq,T** updated in real time at each second. Also the values of parameters **LA, LC, LZ** weighted in modes A, C and Z are shown
Line 8	This line contains: ➢ The "▯" icon, which indicates the battery charge level ➢ The "1/10CT" icon which indicated the 1/1 measuring mode. In the same position, the following messages can be displayed: "**OVER**" and "**UNDER**", to indicate that the measured values are respectively higher and lower than the maximum and minimum range set. Operate on Line 1 to change the measuring range value ➢ The "List" icon allows selecting the current numerical display, the **graphic** display of data and the **total** display ➢ The "**Linst**" shows the instant values, the "**Leq1s**" icon shows the values of the level equivalent to 1s and the icon "**Leq,T**" shows the values of the equivalent level of the whole measuring time ➢ The "Save" icon which allows saving the values on the display

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3. Press the "Start Pause" key to start recording the values of the spectrum analysis 1/1 with a duration equal to the total measuring time (Tm) defined in the programming menu (see § 4.6). In this condition, the indication of the measuring range disappears and the measuring time appears, and cannot be changed while recording, and the "**Leq,T**" icon appears automatically on the display. The instrument displays the following screen:

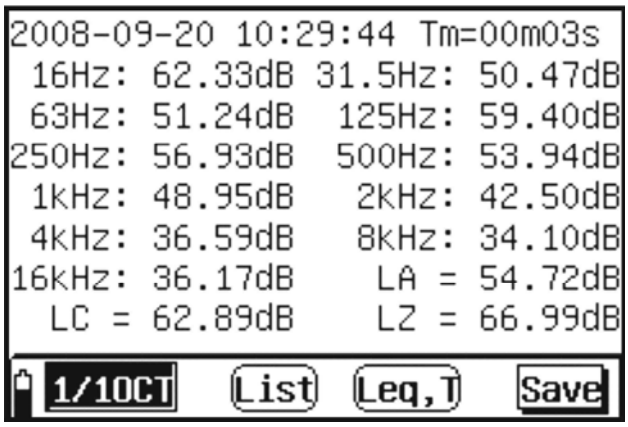

Fig. 24: Activation of recording of 1/1 spectrum analysis

3. By pressing the "Start Pause" key while recording, the instrument is paused. Press the key a second time to start recording again
4. When the instrument reaches the measuring time (Tm = Ts), the instrument stops the integration measurement and **the data are automatically saved in the memory**
5. When pressing the "Output" key with paused instrument, measurement is stopped and the result is saved in the internal memory
6. When pressing the "Cancel" key with paused instrument, the measurement being carried out is cancelled and the instrument waits for a new recording
7. In the **List** and **Leq1s** display, the following operations associated to the "Save" icon are possible:
   - With cursor flashing on the "Save" icon, press the "↵" key to save the instant data shown on the display in the memory area (see §). During this operation, the "Save" icon is completely highlighted for a few seconds, before it goes back to normal display, to indicate correct saving
   - With cursor flashing on the "Save" icon, press the "△" or "▽" keys to select the "Lock" option. Subsequently, press the "↵" key to lock the quantity data values shown on the display. Press "↵" again to exit the "Lock" function
   - With cursor flashing on the "Save" icon, press the "△" or "▽" keys to select the "Max" option. By subsequently pressing the "↵" key, the instrument shows the maximum value of the quantities shown on the display, and the value automatically updates when a higher value is detected. Press "↵" again to exit the "Max" function
8. With cursor flashing on the "List" icon, press the "△" or "▽" keys to access the "**Graph**" graphic display of the measure (or select the "Graph" icon in the main menu). The instrument displays the following screen:

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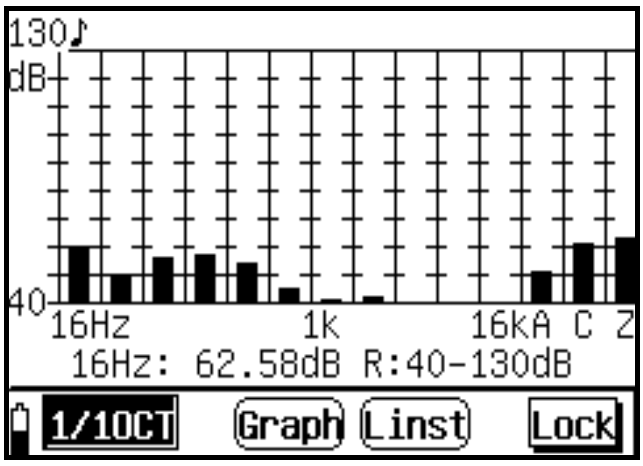

Fig. 25: Graphic screen of 1/1 spectrum analysis

9. The screen shows the histogram of the sound pressure level associated to the frequency spectrum whose center is reported on the x-axis, further to the indications of the frequency weightings A, C, and Z. The minimum and maximum values on the y-axis are determined by the measuring range selection
10. Move the cursor to the line at the bottom of the x-axis and use the "▲" or "▼" keys to select the spectrum frequencies. Observe the movement of a "music note" at the top of the graph. Use the same keys to dynamically modify the measuring range.
11. For the remaining functions, please refer to the numerical display
12. With cursor flashing on the "List" icon, press the "▲" or "▼" keys to access the "**Total**" display of the measure (or select the "Total" icon in the main menu). The instrument displays the following screen, relevant to the "**Linst**" item:

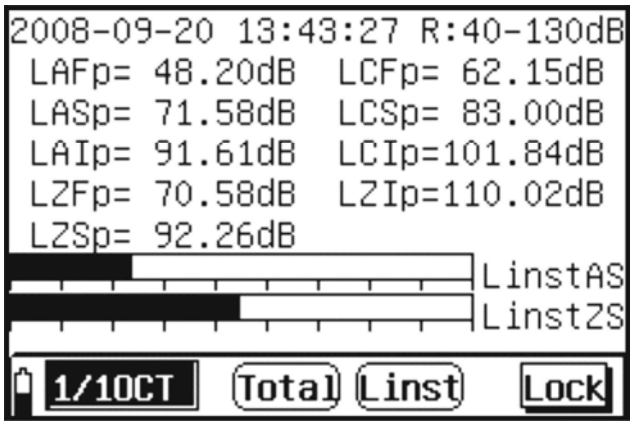

Fig. 26: Total section screen 1/1 spectrum analysis – Instant values

2. The initial part shows the system date/time and the measuring range which can be modified by using the "▲" or "▼" keys. In the five central lines, the instrument provides the **instant** values of the following sound pressure levels in frequency weightings A, C, Z and with time constants Fast, Slow, Impulse: **LAFp, LCFp, LZFp, LASp, LCSp, LZSp, LAIp, LCIp, LZIp**. Lines 7 and 8 show, in graphic bars, the instant values of the quantities: **LAFinst, LASinst, LAIinst, LCFinst, LCSinst, LCIinst, LZFinst, LZSinst, LZIinst**

3. Select the "Save" icon and confirm with "↵" to save the data in the instrument's memory

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CAUTION

The “Max” and “Lock” functions are not active for instant values shown in the graphic bar

4. With flashing cursor on the “**Linst**” item, select the “**Leq1s**” options with the “▲” or “▼” keys. The instrument shows the following screen relevant to the values of the noise level equivalent to 1s:

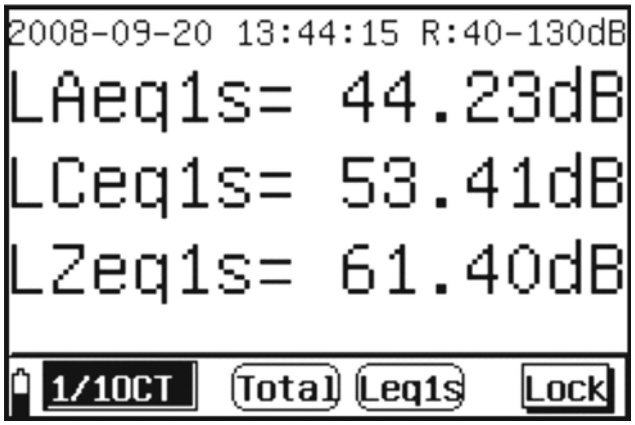

Fig. 27: Total section screen 1/1 spectrum analysis – Leq1s values

5. Use the “Save” functions to save the screen on the display and the options “Lock” and “Max” respectively to block the values on the display and show the maximum value of the quantities
6. With flashing cursor on the “**Linst**” item, select the “**Leq,T**” options with the “▲” or “▼” keys. The instrument shows the following screen relevant to the values of the equivalent noise level:

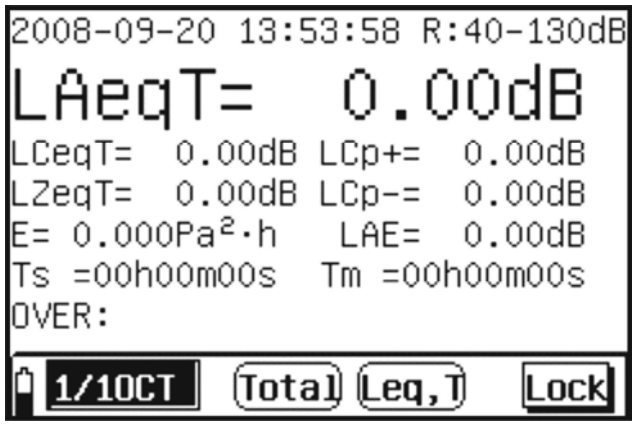

Fig. 28: Total section screen 1/1 spectrum analysis – LeqT values

18. Press the “Start Pause” key to start recording the values of the spectrum analysis 1/1 with a duration equal to the total measuring time (Tm) defined in the programming menu (see § 4.6). In this condition, the indication of the measuring range disappears and the measuring time appears, and cannot be changed while recording, and the “**Leq,T**” icon appears automatically on the display
19. By pressing the “Start Pause” key while recording, the instrument is paused. Press the key a second time to start recording again
20. When the instrument reaches the measuring time (Tm = Ts), the instrument stops the integration measurement and **the data are automatically saved in the memory**

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21. When pressing the "Output" key with paused instrument, measurement is stopped and the result is saved in the internal memory
22. When pressing the "Cancel" key with paused instrument, the measurement being carried out is cancelled and the instrument waits for a new recording

CAUTION

- The main menu cannot be selected while recording. Cancel or stop recording to carry out this operation
- The "Max" and "Lock" functions are not active while recording values

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5.2.3. ANALYSIS IN THIRD-OCTAVE BAND (1/3)
5.2.3.1. Operations for sections LIST, GRAPH

1. Select the "**List**" icon and confirm with "↵". The instrument displays the following numerical screen:

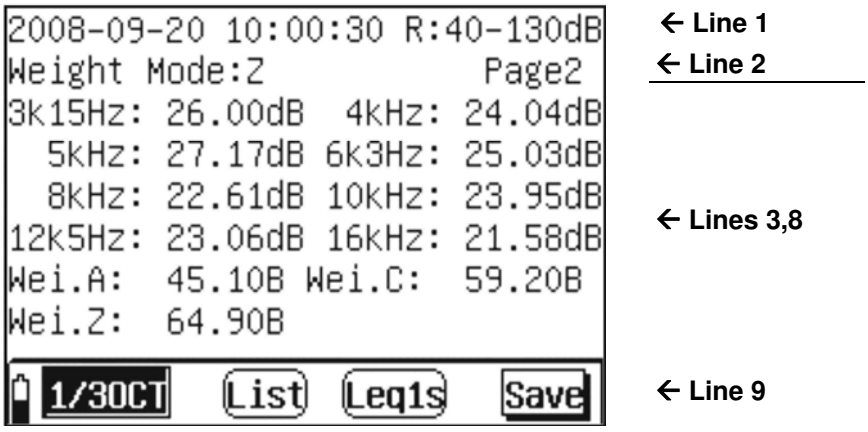

Fig. 29: Numerical screen of analysis in third-octave band (1/3)

Line 1	The left part shows the current date/time set on the instrument, while the right part shows the measuring range selected. ➢ **Date/time setting** 8. Use the "◄" and "►" keys to move the flashing cursor to fields YYYY (year), MM (month), DD (day), HH (hours), MM (minutes) SS (seconds) 9. Use the "▲" and "▼" keys to select the desired program: ➢ **Configuration of the measuring range** 1. Use the "◄" and "►" keys to move the flashing cursor to symbol "R" 2. Use the "▲" and "▼" keys to select the measuring range among the following options: 0 ÷90dB, 10 ÷100dB, 20 ÷110dB, 30 ÷120dB, 40 ÷130dB, 50 ÷140dB according to the reading carried out by the instrument. After each modification, the reading takes approximately 3s to become stable
Line 2	In this line, by using the "▲" and "▼" keys, it is possible to select the type of frequency weighting **(A, C or Z)** and the three pages (0, 1 and 2) of the instant values of the sound pressure levels for each central band frequency from **12.5Hz to 16kHz**
Lines 3-8	These lines show the instant values of the sound pressure level for each central band frequency from **12.5Hz to 160 Hz** (page 0), from **200Hz to 2.5kHz** (page 1) and from **3.15kHz to 16kHz** (page 2), further to the values of the parameters **LA, LC, LZ** with A, C and Z weighting (page 2)

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Line 9	This line contains: ➢ The "🔋" icon, which indicates the battery charge level ➢ The "1/3OCT" icon which indicated the 1/3 measuring mode. In the same position, the following messages can be displayed: "**OVER**" and "**UNDER**", to indicate that the measured values are respectively higher and lower than the maximum and minimum range set. Operate on Line 1 to change the measuring range value ➢ The "List" icon allows selecting the current numerical display, the **graphic** display of data and the **total** display ➢ The "**Linst**" shows the instant values, the "**Leq1s**" icon shows the values of the level equivalent to 1s and the icon "**Leq,T**" shows the values of the equivalent level of the whole measuring time ➢ The "Save" icon which allows saving the values on the display

2. Press the "Start Pause" key to start recording the values of the spectrum analysis 1/3 with a duration equal to the total measuring time (Tm) defined in the programming menu (see § 4.6). In this condition, the indication of the measuring range disappears and the measuring time appears, and cannot be changed while recording, and the "**Leq,T**" icon appears automatically on the display. The instrument displays the following screen:

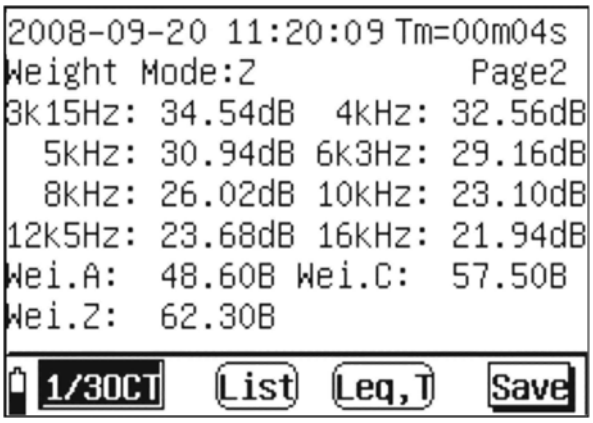

Fig. 30: Activation of recording of 1/3 spectrum analysis

3. By pressing the "Start Pause" key while recording, the instrument is paused. Press the key a second time to start recording again
4. When the instrument reaches the measuring time (Tm = Ts), the instrument stops the integration measurement and **the data are automatically saved in the memory**
5. When pressing the "Output" key with paused instrument, measurement is stopped and the result is saved in the internal memory
6. When pressing the "Cancel" key with paused instrument, the measurement being carried out is cancelled and the instrument waits for a new recording
7. In **List** and **Leq1s** display, the following operations are possible:
   - With cursor flashing on the "Save" icon, press the "↵" key to save the instant data shown on the display in the memory area (see §). During this operation, the "Save" icon is completely highlighted for a few seconds, before it goes back to normal display, to indicate correct saving

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- With cursor flashing on the "Save" icon, press the "▲" or "▼" keys to select the "Lock" option. Subsequently, press the "↵" key to lock the quantity data values shown on the display. Press "↵" again to exit the "Lock" function
- With cursor flashing on the "Save" icon, press the "▲" or "▼" keys to select the "Max" option. By subsequently pressing the "↵" key, the instrument shows the maximum value of the quantities shown on the display, and the value automatically updates when a higher value is detected. Press "↵" again to exit the "Max" function

13. With cursor flashing on the "List" icon, press the "▲" or "▼" keys to access the "**Graph**" graphic display of the measure (or select the "Graph" icon in the main menu). The instrument displays the following screen:

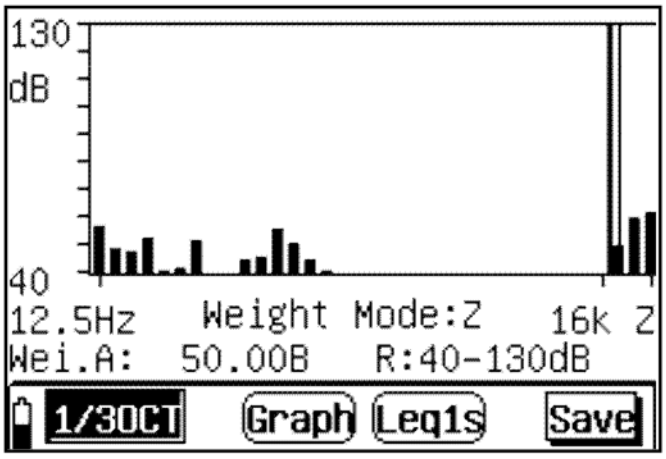

Fig. 31: Graphic screen of 1/3 spectrum analysis

14. The screen shows the histogram of the sound pressure level associated to the frequency spectrum whose center is reported on the x-axis, further to the indications of the frequency weightings A, C, and Z. The minimum and maximum values on the y-axis are determined by the measuring range selection
15. Move the cursor to the lines at the bottom of the x-axis and use the "▲" or "▼" keys to select the spectrum frequencies and the type of frequency weighting A, C or Z. Use the same keys to dynamically modify the measuring range. In graphic display, it is only possible to select options **Leq1s** and **Leq,T**
16. For the remaining functions, please refer to the numerical display

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5.2.3.2. Operations in TOTAL section

1. Select the "**Total**" item in the main menu (see Fig. 22) and confirm with "↵". The instrument displays the following screen, relevant to the "**Linst**" item:

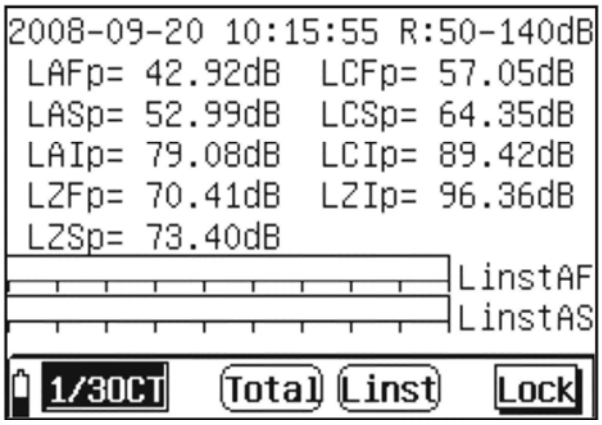

Fig. 32: Total section screen 1/3 spectrum analysis – Instant values

2. The initial part shows the system date/time and the measuring range which can be modified by using the "▲" or "▼" keys. In the five central lines, the instrument provides the **instant** values of the following sound pressure levels in frequency weightings A, C, Z and with time constants Fast, Slow, Impulse: **LAFp, LCFp, LZFp, LASp, LCSp, LZSp, LAIp, LCIp, LZIp**. Lines 7 and 8 show, in graphic bars, the instant values of the quantities: **LAFinst, LASinst, LAIinst, LCFinst, LCSinst, LCIinst, LZFinst, LZSinst, LZIinst**
3. Select the "Save" icon and confirm with "↵" to save the data in the instrument's memory

CAUTION

The "Max" and "Lock" functions are not active for instant values shown in the graphic bar

4. With flashing cursor on the "**Linst**" item, select the "**Leq1s**" options with the "▲" or "▼" keys. The instrument shows the following screen relevant to the values of the noise level equivalent to 1s

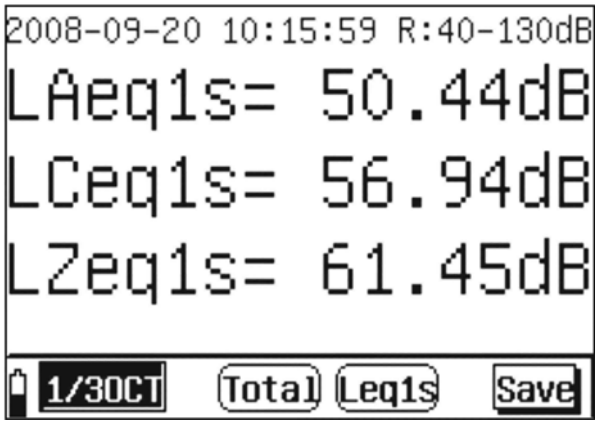

Fig. 33: Total section screen 1/3 spectrum analysis – Leq1s values

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5. Use the “Save” functions to save the screen on the display and the options “Lock” and “Max” respectively to block the values on the display and show the maximum value of the quantities
6. With flashing cursor on the “**Linst**” item, select the “**Leq,T**” options with the “▲” or “▼” keys. The instrument shows the following screen relevant to the values of the equivalent noise level:

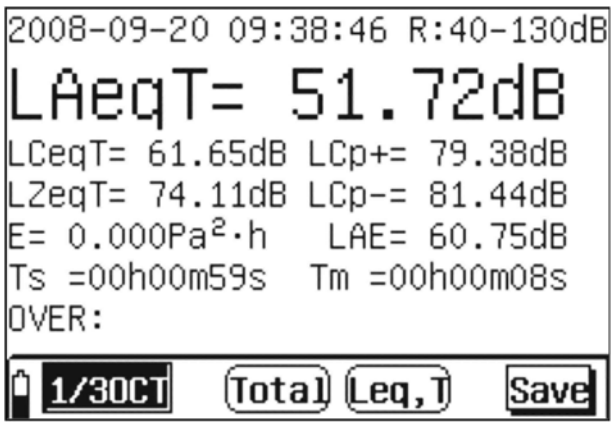

Fig. 34: Total section screen 1/3 spectrum analysis – LeqT values

7. Press the “Start Pause” key to start recording the values of the spectrum analysis 1/1 with a duration equal to the total measuring time (Tm) defined in the programming menu (see § 4.6). In this condition, the indication of the measuring range disappears and the measuring time appears, and cannot be changed while recording, and the “**Leq,T**” icon appears automatically on the display
8. By pressing the “Start Pause” key while recording, the instrument is paused. Press the key a second time to start recording again
9. When the instrument reaches the measuring time (Tm = Ts), the instrument stops the integration measurement and **the data are automatically saved in the memory**
10. When pressing the “Output” key with paused instrument, measurement is stopped and the result is saved in the internal memory
11. When pressing the “Cancel” key with paused instrument, the measurement being carried out is cancelled and the instrument waits for a new recording

CAUTION

- The main menu cannot be selected while recording. Cancel or stop recording to carry out this operation
- The “Max” and “Lock” functions are not active while recording values

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6. INSTRUMENT ACOUSTIC CALIBRATION

6.1.1. FOREWORD

The instrument is regularly calibrated upon purchase and upon first use. The acoustic calibration of the sensitivity level of the microphone is recommended in order to always carry out correct tests at the beginning of each measuring campaign and must be carried out by using the provided portable calibrator in Class 1 HT151, with an operating frequency of 1kHz ± 1% and harmonic distortion <1%.

6.1.2. PRELIMINARY OPERATIONS

Select the "**Calibrate**" icon in any measuring mode and confirm with "↵". The instrument displays the following screen:

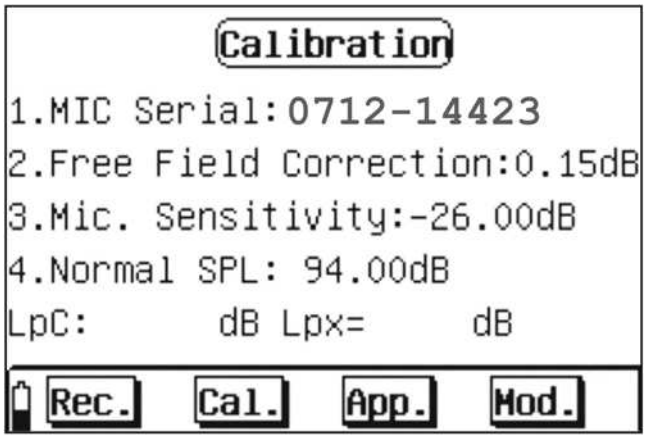

Fig. 35: Initial screen of calibration section

Line 1	This line contains the serial number of the microphone, which is a read-only datum, not modifiable by the user
Line 2	This line contains the field relevant to the free-field correction of the microphone on the sound-level meter. To use the instrument with ½" microphones, this parameter is **0.15dB** at a frequency of 1kHz. To change this value, proceed as follows: ➢ Use the keys "◄" or "►" to select "**Mod.**" and confirm with "↵". The "Mod" field appears highlighted ➢ Use the "◄" or "►" keys to move the cursor to Line 2 and the "▲" or "▼" keys to define the value in steps of 0.1dB. Accordingly, also the "App" field is highlighted ➢ Move the cursor to the "App" field and press "↵" to confirm
Line 3	This line contains the indication of the output sensitivity level of the preamplifier of the microphone used by the instrument. The microphone may need to be calibrated again in case the preamplifier is replaced, because of the different gain and input capacitance values. Proceed as follows: ➢ Use the keys "◄" or "►" to select "**Mod.**" and confirm with "↵". The "Mod" field appears highlighted ➢ Use the "◄" or "►" keys to move the cursor to Line 3 and the "▲" or "▼" keys to define the value in steps of 0.1dB. Accordingly, also the "App" field is highlighted ➢ Move the cursor to the "App" field and press "↵" to confirm

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Line 4	This line indicated the sound pressure level set on the portable calibrator HT151 during the calibration operation (see § 6.1.3)
Line 5	This line shows the results of the calibration operation. When the instrument is calibrated by means of frequency weighting type C, “Lpx=” indicates the current sensitivity level of the microphone
Line 6	This line contains the menu items which can be selected by the user ➢ The “**Rec.**” option allows displaying the results of each calibration operation ➢ The “**Cal.**” Option allows activating the calibration procedure (see § 6.1.3) ➢ The “**App.**” option is used for saving each setting defined by the user during the manual adjustment procedures of the sensitivity levels ➢ The “**Mod.**” option is used for the selection of the items relevant to the manual adjustments of the sensitivity levels

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6.1.3. ACOUSTIC CALIBRATION WITH CALIBRATOR HT151

CAUTION

- For the first acoustic calibration of the instrument's microphone, set the sound pressure level (SPL) according to the values allowed by the portable calibrator HT151 (94.0dB and 114.0dB). For values different from these reference values, program the instrument as described in § 6.1.2
- The portable calibrator HT151, which can be used to calibrate the sensitivity of the microphones, guarantees a very steady performance level, compliant with standard IEC 60492:2003 in Class 1

1. Turn on the instrument and select any operating mode, and wait for a few seconds until it reaches the operating temperature
2. Use the "◄" or "►" to select the "**Calibrate**" icon and confirm with " ↵" to enter the calibration mode (see Fig. 35)
3. Set the value of the sound pressure level to 94.0dB or 114.0dB according to the values available on the calibrator HT151 (see § 6.1.2 – Line 4) as follows:
   - Use the keys "◄" or "►" to select "**Mod.**" and confirm with "↵". The "Mod" field appears highlighted
   - Use the "◄" or "►" keys to move the cursor to Line 4 and the "▲" or "▼" keys to define the value in steps of 0.1dB. Press and hold the keys for an increase/decrease in steps of 1dB. Accordingly, also the "App" field is highlighted
   - Move the cursor to the "App" field and press "↵" to confirm the value
4. Insert the lower part of the portable calibrator HT151 into the ½" microphone of the instrument until a click is heard (see Fig. 36)

Fig. 36: Insertion of the calibrator HT151 into the instrument

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5. Press and hold the “ON” key on the calibrator HT151 to activate the level equal to 94.0dB, looking at the activation of the red LED on the calibrator. Press and hold both “ON” and “+20dB” keys to activate the level equal to 114.0dB. Preliminarily check the emission of the output sound of the calibrator. Otherwise, replace the internal battery (see §
6. Select the “**Cal.**” option on the instrument (see Fig. 35) and press the “” key to activate calibration, which takes 10s
7. Press and hold the key(s) on the calibrator and look at the count of the seconds from 0 to 9 in the left-hand top part of the instrument’s display. In the lower part of the display, the indication “LpC” indicates the applied sound pressure level, approximately equal to the difference between the value provided by the calibrator and the free-field correction of the microphone, while “Lpx” indicates the current sensitivity level of the microphone
8. Move the cursor to the “**App.**” option and press the “” key to save the new sensitivity level of the microphone in the memory
9. If the difference between the previous sensitivity level and the new level measured with calibration is **> 3dB**, for a few seconds the instrument shows the message “*The difference between these two sensitivity is too large! Please affirm the calibration is correct!*” If so, repeat the calibration procedure and, if necessary, contact the customer service, as the microphone could be damaged
10. Remove the calibrator HT151 from the instrument. The calibrator turns off automatically when releasing the “ON” key

6.1.3.1. Replacing the calibrator battery

LEGEND:

1. Metal cover of battery compartment
2. “ON” key to turn on the calibrator and red LED
3. “+20dB” key to activate the sound pressure level of 114.0dB
4. Adapter for the insertion of a ½” microphone
5. Internal cavity of the calibrator

Fig. 37: Replacing the calibrator HT151 battery

1. Fully unscrew the metal cover of the battery compartment
2. Extract the battery from inside the calibrator
3. Replace the battery with an equivalent one (see § 10.4)
4. Restore the metal cover of the battery compartment into place and screw it in

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6.1.3.2. Calibration result display

The instrument allows saving up to 256 calibration operations. For subsequent operations, the memory space is automatically reset and only the last operation carried out is saved. To recall the operation on the display, proceed as follows:

1. Use the keys "◄" or "►" to select "**Rec.**" and confirm with "↵". The instrument shows the following screen, which contains the date/time in which the operation was carried out and the measured sensitivity level

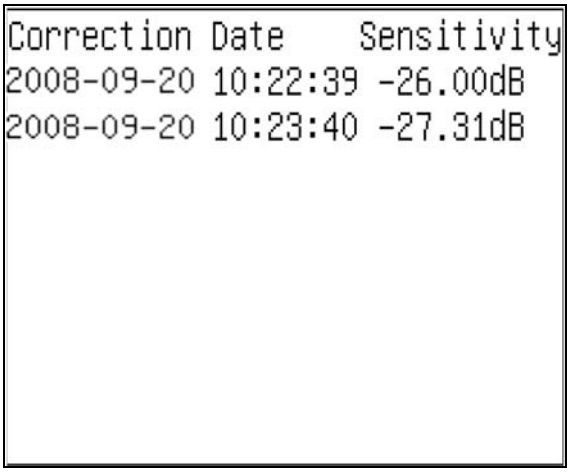

Fig. 38: Calibration result display

2. Use the "▲" or "▼" keys to go to the screens on the following pages
3. Press the "Exit" key to exit the mode and to go back to the previous page

6.1.4. DIRECT ACOUSTIC CALIBRATION

In case the calibrator is not available and with an a priori known indication of the sensitivity level of the microphone, this parameter can be set directly on the instrument as follows:

1. Use the keys "◄" or "►" to select "**Mod.**" and confirm with "↵". The "Mod" field appears highlighted
2. Use the "◄" or "►" keys to move the cursor to Line 3 and the "▲" or "▼" keys to define the value in steps of 0.1dB. Press and hold the keys for an increase/decrease in steps of 1dB. Accordingly, also the "App" field is highlighted
3. Move the cursor to the "App" field and press "↵" to confirm the sensitivity level

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7. OPERATIONS WITH THE MEMORY

The instrument is provided with an internal Flash memory with a capacity of 64Kbytes for saving data. Each saved measure can have a maximum size of up to 512 bytes, and therefore it is possible to save up to 128 measure groups. The saved data can be transferred onto the provided USB pen or transferred to the PC via USB connection and analyzed with the provided software. Each measure can be recalled on the instrument's display.

7.1. RECALLING RESULTS ON THE DISPLAY

1. Select the "**Data**" icon in any measuring mode (see Fig. 39) and confirm with "↵"

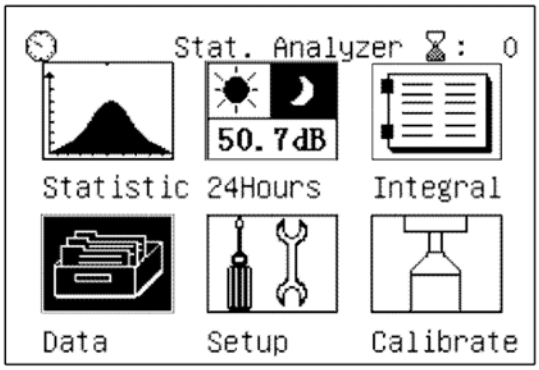

Fig. 39: Selection of memory data viewing mode

2. The instrument shows the following screens, which can be selected by using the "◄" and "►" keys

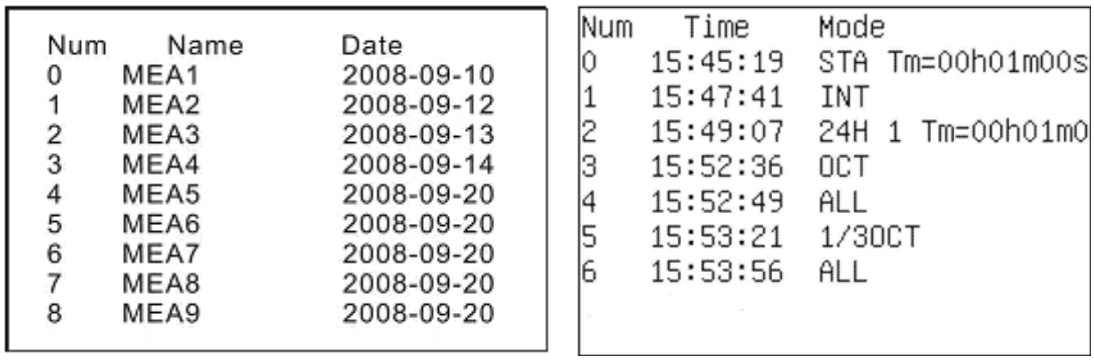

Fig. 40: Screens of saved data

Num → Indicates the number of the used memory location
Name → Indicates the measure name defined by the user
Date → Indicates the date in which the measure was saved
Time → Indicates the time in which the measure was saved
Mode → Indicates the type of measure saved

- STA → statistic data analysis
- INT → data of an integration measurement inside the statistic analysis
- 24Hxx → data of the "24Hours" measurement inside the statistic analysis. The two characters "xx" indicate the number of the saved interval
- OCT → indicates the octave band analysis (1/1)
- 1/3OCT → indicates the 1/3 octave band analysis (1/3)
- ALL → indicates the total analysis of results

3. Use the keys "▲" or "▼" for selecting the desired measure and confirm with "↵". Press "•" to go back to the main menu

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7.1.1. RECALLING THE STATISTIC ANALYSIS DATA ON THE DISPLAY

1. Select a datum corresponding to the “STA” indication available in the list of saved measures and press “ ”. The instrument displays the following screen:

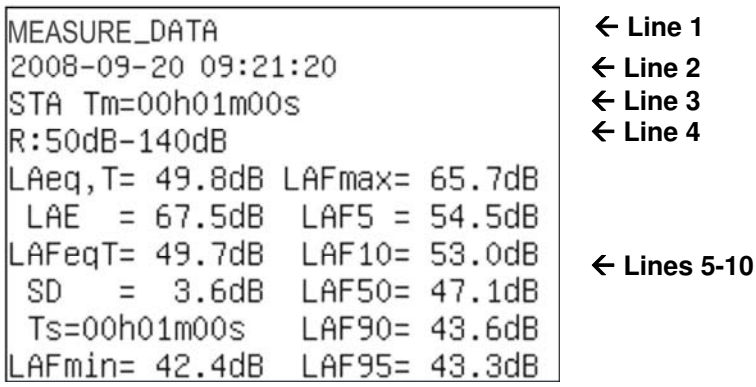

Fig. 41: Numerical display of "STA" analysis data

Line 1	This line shows the measure name defined in the programming menu (see § 4.6)
Line 2	This line shows the date/time when measurement was started
Line 3	This line shows the type of “STA” measurement and the measuring time defined in the programming menu (see § 4.6)
Line 4	This line shows the measuring range selected before starting measuring
Lines 5-10	These lines show the numerical values measured by the instrument

2. Press the “ ” key to view the graphic trend of the statistic analysis and “ ” again to view the cumulative values of distribution

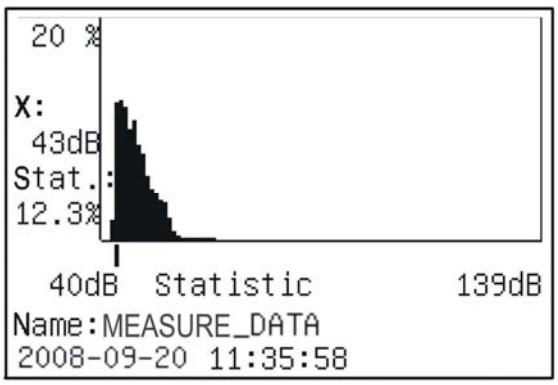

Fig. 42: Graphic display of "STA" analysis values

3. By using the “ ” or “ ” keys, it is possible to move the cursor on the x-axis, scrolling the values within the selected measuring range
4. Press the “ ” key again to go back to numerical display or the “ ” key to go back to the initial screen

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7.1.2. RECALLING THE 24H ANALYSIS DATA ON THE DISPLAY

1. Select a datum corresponding to the “24H” indication available in the list of saved measures and press “”. The instrument displays the following screen:

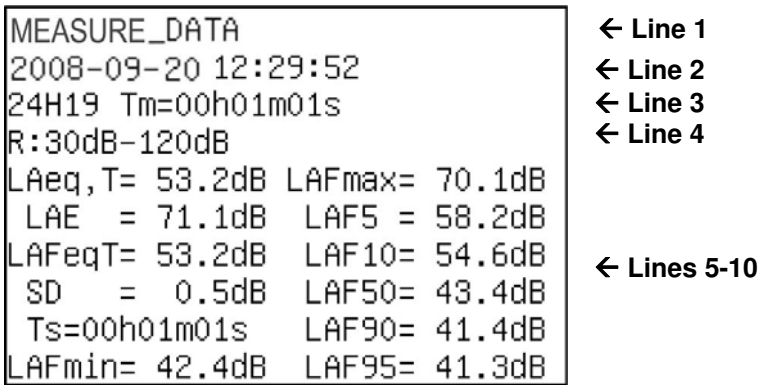

Fig. 43: Initial numerical display of "24H" analysis data

Line 1	This line shows the measure name defined in the programming menu (see § 4.6)
Line 2	This line shows the date/time when measurement was started
Line 3	This line shows the type of “24Hxx” measurement, where “xx” stands for the number of intervals considered (max 24), and the measuring time defined in the programming menu (see § 4.6)
Line 4	This line shows the measuring range selected before starting measuring
Lines 5-10	These lines show the numerical values measured by the instrument

2. Press the “” key to display in detail the value of each interval considered (e.g.: 8 intervals in Fig. 45). Press the “” or “” keys to go to the next pages and the “.” or “.” keys to display the values of parameters **Ld**, **Ln** and **Ldn**

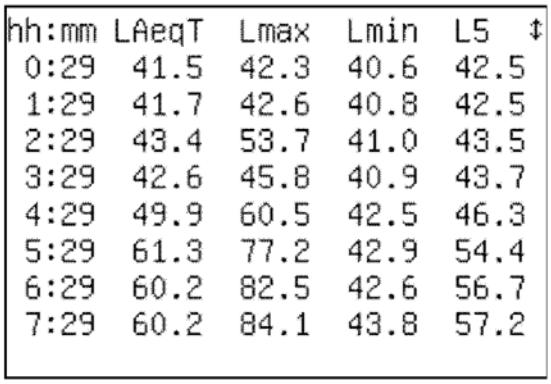

Fig. 44: Detailed display of "24H" analysis intervals

3. Press the “” key again for a graphic histogram display of the distribution of the measured values for each interval

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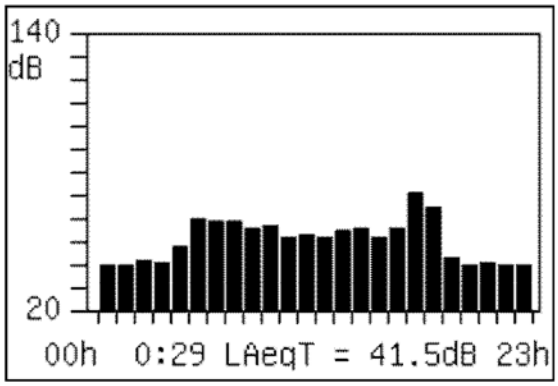

Fig. 45: Display of distribution graphic of the "24H" analysis values

4. Press the “” or “” keys to go to the next pages and the “” or “” keys to display the values of data in the single intervals
5. Press the “” key again to go back to numerical display or the “” key to go back to the initial screen

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7.1.3. RECALLING THE INTEGRATION MEASUREMENT DATA ON THE DISPLAY

1. Select a datum corresponding to the “INT” indication available in the list of saved measures and press “↵”. The instrument displays the following screen:

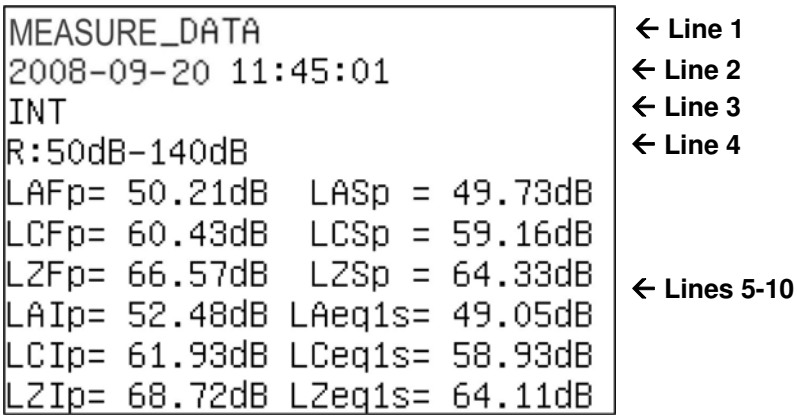

Fig. 46: Initial page display of "INT" analysis data

Line 1	This line shows the measure name defined in the programming menu (see § 4.6)
Line 2	This line shows the date/time when measurement was started
Line 3	The type of “INT” measurement is shown
Line 4	This line shows the measuring range selected before starting measuring
Lines 5-10	These lines show the numerical values measured by the instrument

2. Press the “▼” key to access the final page. The instrument shows the following screen, which also indicates the measuring time defined in the programming menu (see § 4.6)

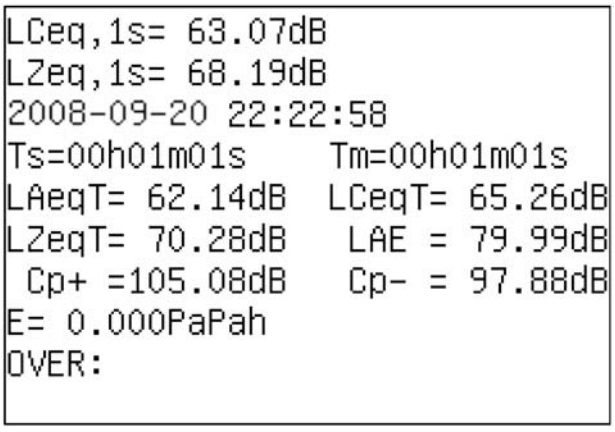

Fig. 47: Final page display of "INT" analysis data

3. Press the “▼” key to go back to the previous screen or the “▲” key to go back to the initial screen

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7.1.4. RECALLING THE DATA OF THE OCTAVE BAND ANALYSIS (1/1) ON THE DISPLAY

1. Select a datum corresponding to the “OCT” indication available in the list of saved measures and press “↵”. The instrument shows the following screens, which can be selected by using the “▲” or “▼” keys

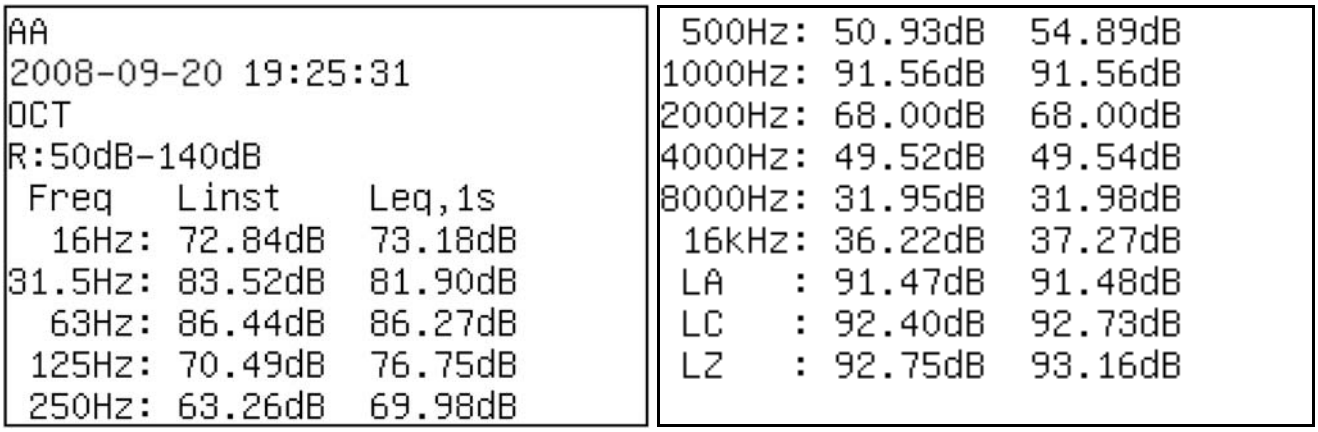

Fig. 48: Numerical screens of 1/1 analysis data

Line 1 (Page1)	This line shows the measure name defined in the programming menu (see § 4.6)
Line 2 (Page1)	This line shows the date/time when measurement was started
Line 3 (Page1)	The type of “OCT” measurement is shown
Line 4 (Page1)	This line shows the measuring range selected before starting measuring
Lines 5-10	These lines show the numerical values measured by the instrument, divided into each central band frequency considered

2. Press the “↵” key to access the graphic display of the spectrum octave band analysis. The instrument displays the following screen:

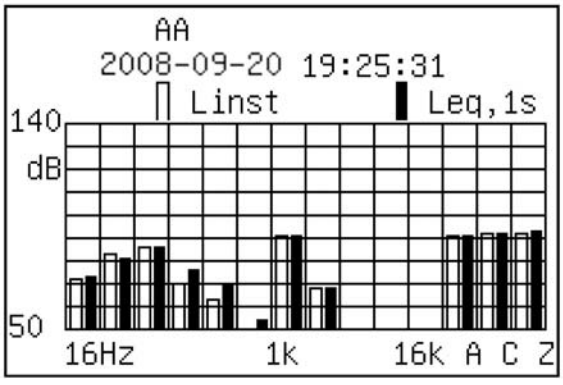

Fig. 49: Graphic display of 1/1 spectrum analysis

3. Press the “◆” key to go back to the previous screen and to the initial screen

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7.1.4.1. Recalling the data of the analysis in Total octave band (1/1)

Within the “OCT” analysis, it is possible to display the following screens relevant to the “TOTAL” function, which considers the whole of the data:

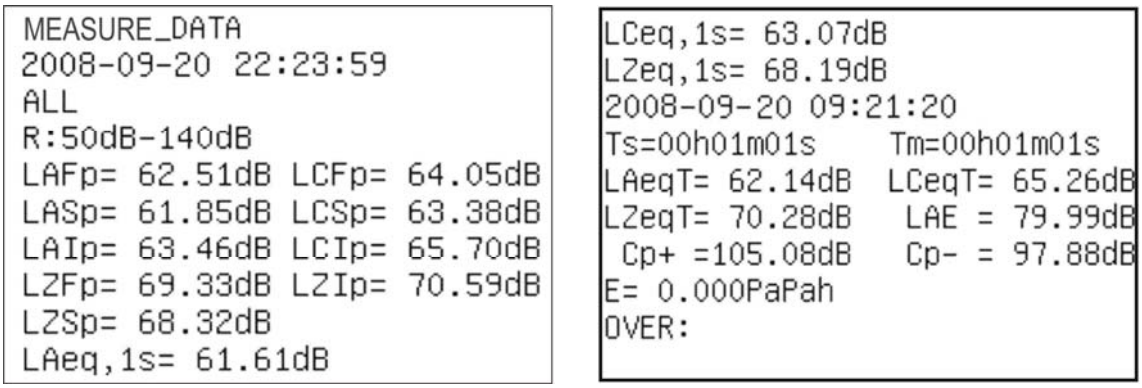

Fig. 50: Display of "TOTAL" analysis data

Line 1 (Page1)	This line shows the measure name defined in the programming menu (see § 4.6)
Line 2 (Page1)	This line shows the date/time when measurement was started
Line 3 (Page1)	The type of “ALL” measurement is shown
Line 4 (Page1)	This line shows the measuring range selected before starting measuring
Lines 5-10	These lines show the values of the sound pressure levels, both instant and relevant to integrations carried out with programmable time

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7.1.5. RECALLING THE DATA OF THE ANALYSIS IN THIRD-OCTAVE BAND (1/3) ON THE DISPLAY

1. Select a datum corresponding to the “1/3OCT” indication available in the list of saved measures and press “↵”. The instrument shows the following screens, which can be selected by using the “.” or “.” keys

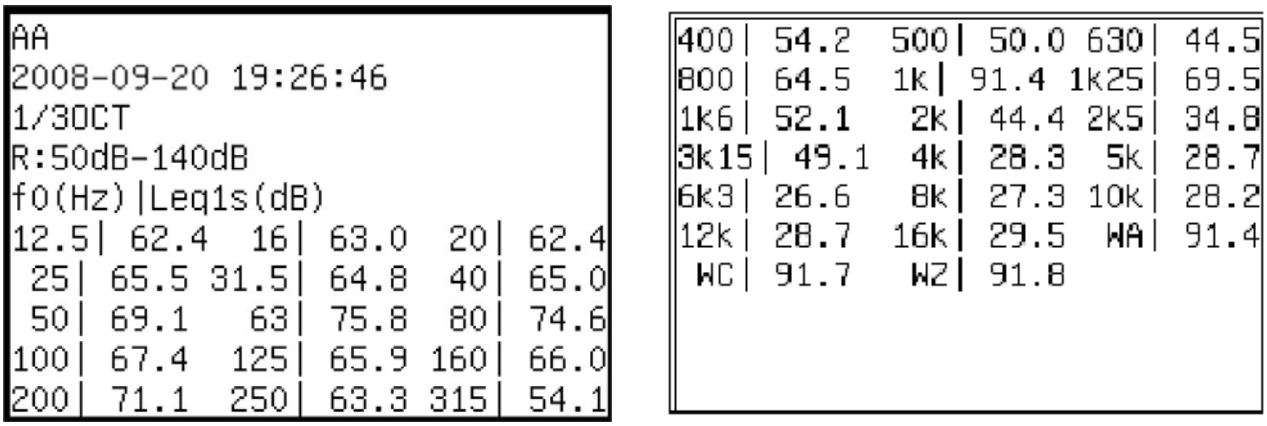

Fig. 51: Numerical screens of 1/3 analysis data

Line 1 (Page1)	This line shows the measure name defined in the programming menu (see § 4.6)
Line 2 (Page1)	This line shows the date/time when measurement was started
Line 3 (Page1)	The type of “1/3OCT” measurement is shown
Line 4 (Page1)	This line shows the measuring range selected before starting measuring
Lines 5-10	These lines show the numerical values measured by the instrument (Leq1s o Leq,T), divided into each central band frequency, f0 (Hz), considered

CAUTION

Independently from the type of frequency weighting selected for measurement, the saved data include anyway also the results obtained with Z (Zero) weighting

2. Press the “↵” key to access the graphic display of the spectrum analysis in 1/3 octave band. The instrument displays the following screen:

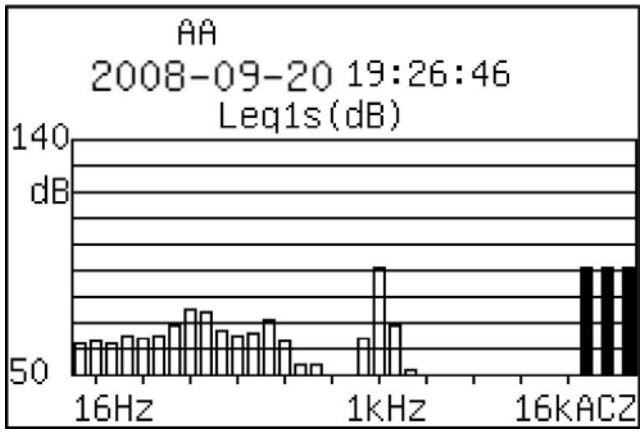

Fig. 52: Graphic display of 1/3 spectrum analysis

3. Press the “.” key to go back to the previous screen and to the initial screen

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7.2. DATA TRANSFER ONTO USB PEN DRIVE

CAUTION

Transferring the data contained in the instrument's memory onto an external USB pen drive unit is guaranteed **only when using the USB pen drive provided with the instrument**. This does not exclude, however, that appropriately formatted USB pen drives can be used.

1. Select section "**Data**" in the main menu and confirm with " ", when entering the instrument's memory area (see Fig. 40)
2. Press the "." key. The instrument shows the message "Please insert Usb-Disk….." on the display
3. Insert the provided USB pen drive into the relevant USB port on the instrument, by using the appropriate connection cable provided
4. After a few moments, the instrument checks the initialization of the connected pen drive and verifies if the necessary space for a correct data transfer is available. In case of insufficient memory space in the USB pen drive, the instrument shows a message on the display.
5. After transfer is completed, the instrument shows the same screen as in section "Data" (see Fig. 40)
6. In the USB pen drive, the instrument creates a subfolder in the main root with a name equal to the date of transfer and, inside it, there are files with extension *.TXT with a name consisting of the first 6 letters of the names of the files defined upon recording plus two letters corresponding to the memory location where they were saved in the instrument. These files contain the data of the performed recordings
7. Extract the USB pen drive and connect it to the PC for data display
8. Press "

" to go back to the main menu of the instrument

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8. OPERATIONS WITH SOUNDVIEW SOFTWARE

8.1. FOREWORD

The SoundView Windows software provided with the instrument allows carrying out the following operations:

- Downloading the data of the recordings carried out with the instrument connected to the PC via USB interface
- Read and analyze the saved data and customize them into PC folders with names defined by the user, which is not possible by operating directly on the instrument itself
- Define, in a simple way, the names of the measurements and send them directly to the instrument
- Display the data of the analyses in numerical and graphic format
- Download the results of the calibration operations carried out on the instrument
- Export the data of the recordings in Excel file format
- Copy and print directly the data downloaded by the instrument to PC

8.2. MINIMUM SYSTEM REQUIREMENTS

The following characteristics are necessary for a correct installation and use of the software

- Processor Pentium III 500MHz or higher
- RAM memory: 128Mbytes
- 100Mbytes of free space available on HD
- Operating system Windows 2k or higher

8.3. INSTALLING THE DRIVER USB

When connecting the instrument to the PC for the first time via an USB port of the PC, it is necessary to install the USB driver, so that the instrument can be recognized. To this purpose, proceed as follows (e.g.: Windows XP operating system):

1. Turn on the instrument in any screen
2. Connect the instrument to an USB port of the PC by means of the supplied cable
3. The PC shows the following screen:

4. Select the option “Install from list or specific location” in order to select the driver from a specific folder and click on the “Next” key. The PC shows the following screen:

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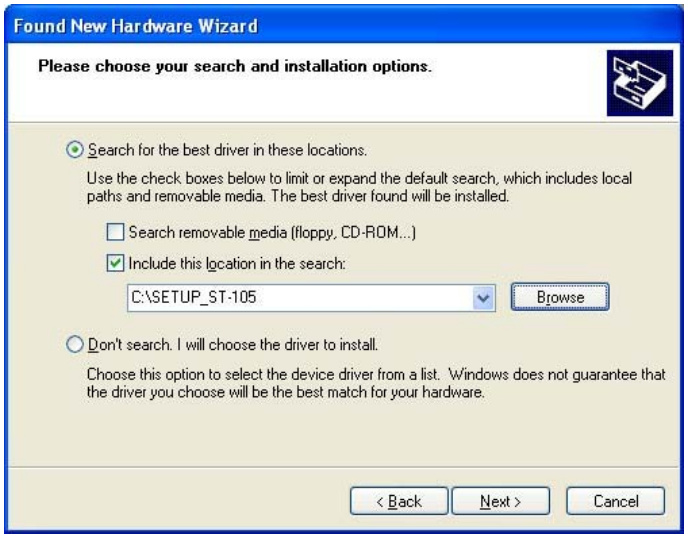
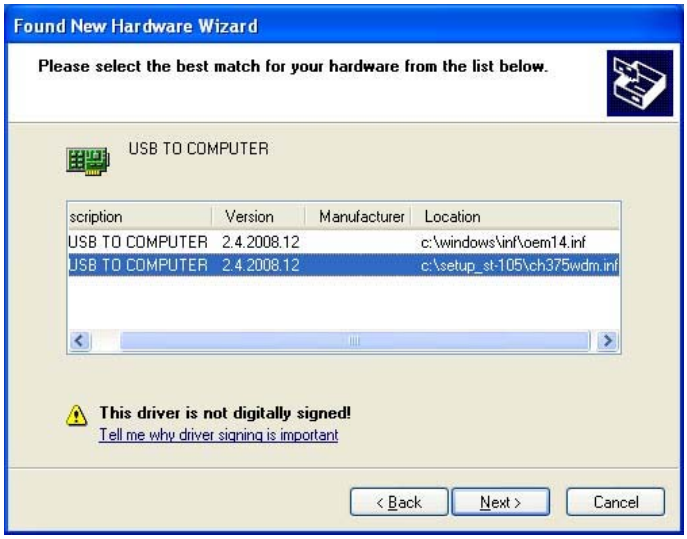


5. Press the “Browse” key and select the folder …\Sound Meter usb driver\ inside the USB pen drive provided (after saving the content of the pen drive on the HD of the PC). Press “Next”
6. Select the file with extension “ch375wdm.inf” and proceed with “Next”



7. The installation procedure of the driver is started by the PC

8. Press “Finish” to stop the installation procedure of the USB driver

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8.4. USE OF SOUNDVIEW SOFTWARE

After installing the software from the file “Setup.exe” contained in the USB pen drive provided with the instrument, launch the program. The PC shows the following screen:

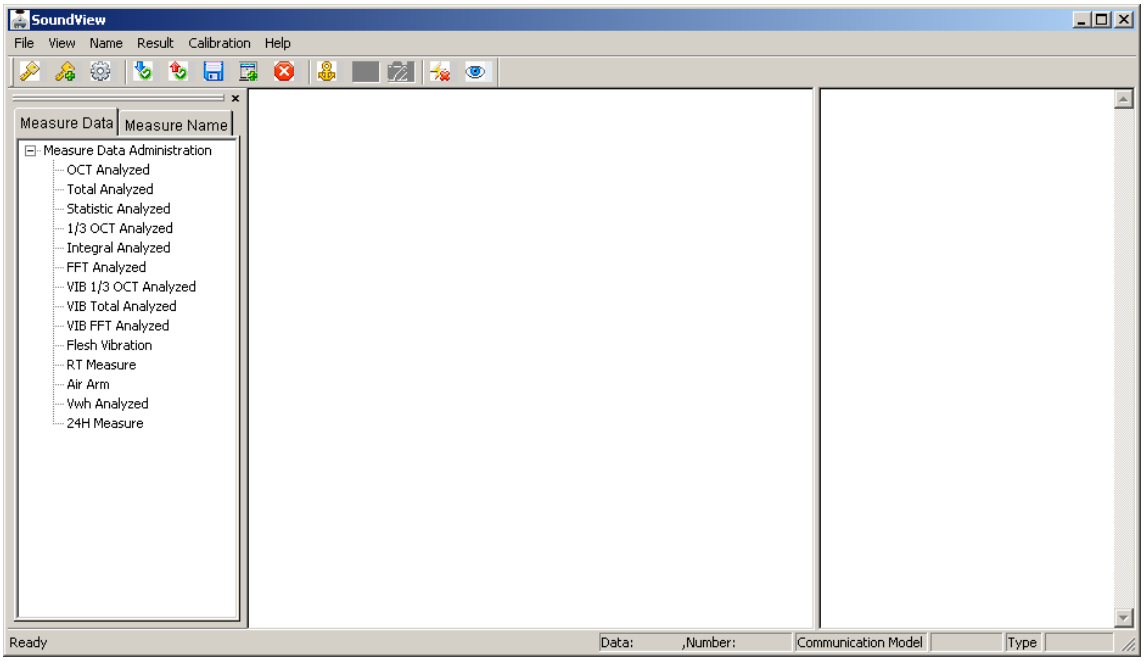

Fig. 53: Initial software screen

8.4.1. COPY AND PRINT COMMANDS

With a open measure shown to PC (command “Input Data” of **File** menu), perform a right click on measure name the “**Copy**” and “**Print**” are available on program

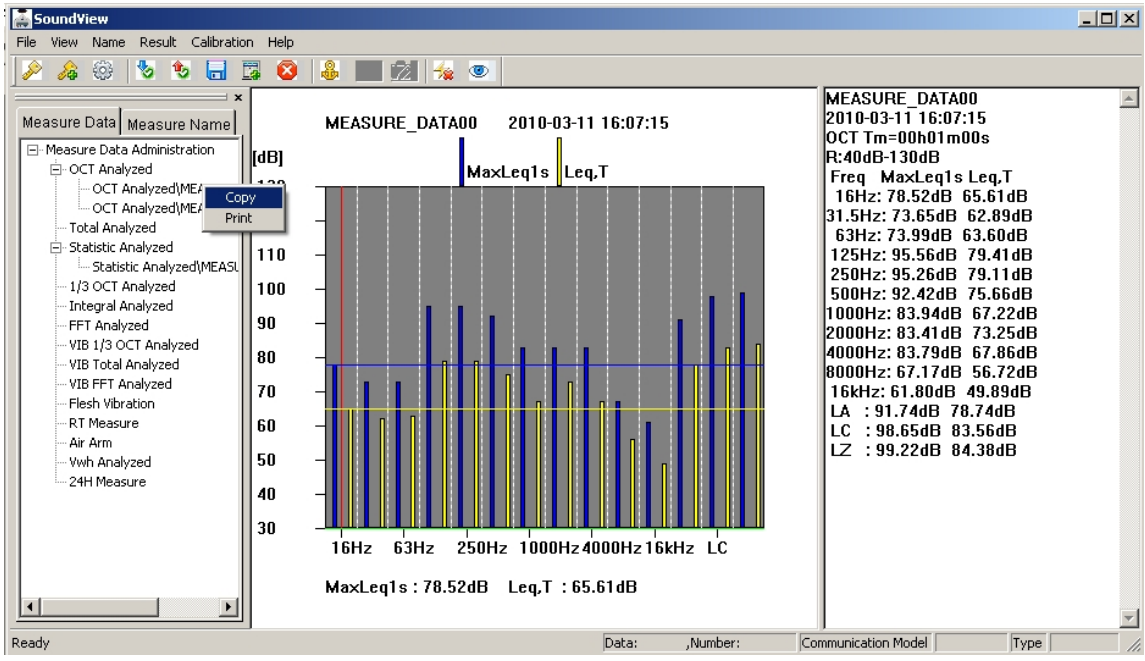

Fig. 54: Use of Copy and Print commands

Copy → A copy of graph and numerical data of current measure in a XLS file is performed
Print → The direct print of graph and numerical data of current measure is performed

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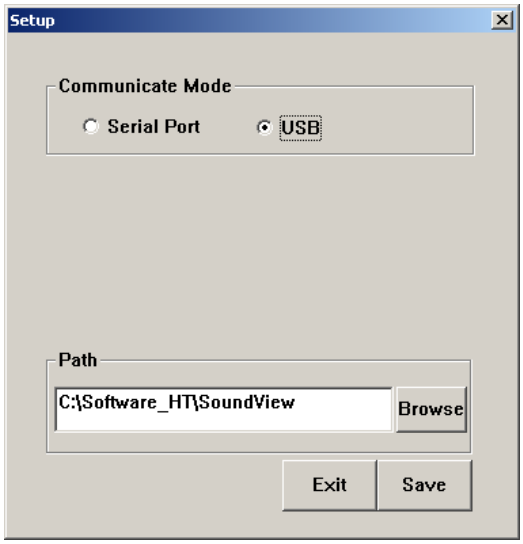
8.4.2. FILE MENU

This menu contains the following controls:

Control	Description
Input Name (CTRL+N) Key	It allows opening a file with extension (*.XLS) relevant to a defined measure name, available inside the PC (see § 8.4.4)
Input Data (CTRL+D) Key	It allows selecting a folder in the PC, in which there are analyses downloaded from the instrument (corresponding to files with *.TXT extension)
Setup (CTRL+Z) Key	It allows selecting the communicating mode (USB) between instrument and PC (**the option "Serial Port" is not active**) and the path in which to save the data of the recordings downloaded from the instrument (Path). Press **SAVE** to confirm 
Export to XLS	It allows exporting all the measures currently open in an Excel file format (*.XLS). The software allows defining the name of a folder and the saving path of the file "Conversion.xls" automatically created
Exit (CTRL+E)	It allows exiting the program

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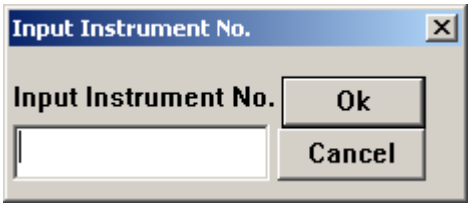
8.4.3. VIEW MENU

In this menu there are the following controls, which can be activated by the user in order to carry out the operations more rapidly:

- Toolbar → it allows displaying/hiding the toolbar
- Status bar → it allows displaying/hiding the status bar
- Work Space → it allows displaying/hiding the work space

8.4.4. NAME MENU

This menu contains the following controls:

Control	Description
Read Out (CTRL+C) Key	It allows viewing the list of the measure names defined by the user on the instrument in section “Measure Name” of the program
Add (CTRL+A) Key	It allows adding a custom measure name which can be viewed in section “Measure Name” of the program and which can be sent to the instrument. The provided program opens the following window, in which it is possible to digit the desired name, confirming with “Add”
Write In (CTRL+R) Key	It allows sending to the instrument the whole list of the measure names defined by the user, which can be viewed in section “Measure Name” of the program Before carrying out this operation, the program shows the following window:  where it is necessary to put in the instrument’s serial number (on the rear side of the instrument itself) **in the same format as it is written on the label** (e.g.: “8C0001” is correct, while “8c0001” is not) Upon correct activation of the control, the instrument turns off and on again automatically, and a confirmation message is provided by the program
Save (CTRL+B) Key	It allows saving the measure name defined by the user with extension *.XLS in a folder on the PC
Clear (CTRL+U) Key	It allows deleting **each measure name inside the instrument**. In this condition, the program first of all requires that the serial number is correctly put in, then sends the control to the instrument, which turns off and on again automatically, to confirm that the operation has been correctly carried out

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8.4.5. RESULT MENU

This menu contains the controls which allow transferring the recorder data from the instrument, analyzing the data and clearing all data from the instrument's memory

Control	Description
Read Results (CTRL+J) Key	It allows downloading the instrument's memory content onto the PC. According to the type of analysis, the downloaded data will appear in section "Measure Data" as TXT file and will be shown both in graphical and in numerical format in the working space. Defining the path where the file must be saved is possible by using the "Setup" control (see § 8.4.1)
Realtime Analyze	Command not active
Clear Results (CTRL+F)	It allows clearing the whole instrument's memory content. Before carrying out this operation, the program requires that the instrument's serial number is correctly put in

8.4.6. CALIBRATION MENU

This menu contains the controls to manage the information relevant to the calibrations performed on the instrument by using the portable calibrator HT151 (see § 6.1.3)

Control	Description
Read Cal (CTRL+X) Key	It allows saving on the PC the list of the calibrations contained in the instrument's memory in a file with extension *.CAL
View Cal (CTRL+W) Key	It allows opening a fine with extension *.CAL available in the PC
Clear Cal (CTRL+V)	It allows deleting the whole list of calibrations available in the instrument's memory. Before carrying out this operation, the program requires that the instrument's serial number is correctly put in

8.4.7. HELP MENU

It provides information on the program's version

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9. MAINTENANCE

9.1. GENERAL INFORMATION

The instrument You purchased is a precision instrument. During use and storage, carefully observe the recommendations listed in this manual in order to prevent possible damage or dangers during use.
Do not use the instrument in environments with high humidity levels or at high temperatures. Do not directly expose to sunlight.
Always turn off the instrument after use. If the instrument is not to be used for a long time, remove the battery to prevent any leaks of liquids which could damage the instrument's internal circuits.

9.2. REPLACING THE BATTERIES

When the LCD display shows the symbol "🔋" and the message "BATTERY LOW", it is necessary to replace the internal batteries

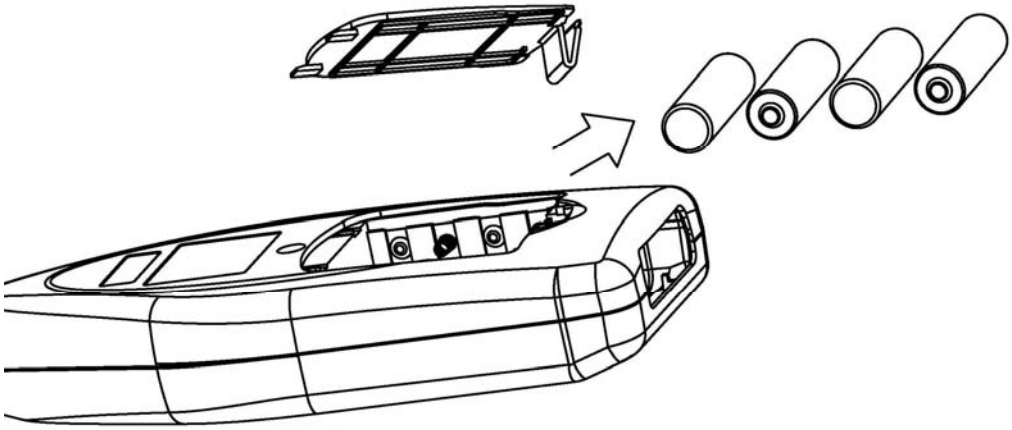

Fig. 55: Replacement of internal batteries

1. Turn off the instrument.
2. Open the battery compartment.
3. Removed the old batteries (see Fig. 55)
4. Insert new batteries of the same type (see § 10.5), respecting the indicated polarities.
5. Close the battery compartment.
6. Do not scatter old batteries in the environment. Use the appropriate containers for disposal.

9.3. CLEANING THE INSTRUMENT

To clean the instrument, use a soft dry cloth. Never use humid cloths, solvents, water, etc.

9.4. END OF LIFE

WARNING: the symbol reported on the instrument indicates that the appliance, its accessories and the battery must be disposed of separately and treated correctly.

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10. TECHNICAL SPECIFICATIONS

10.1. TECHNICAL SPECIFICATIONS

Uncertainties are referred to a temperature of 23°C±5°C with relative humidity <80%UR

- **Measuring range**

Weighting type A: 25 ÷ 140dB
Weighting type C: 30 ÷ 140dB
Weighting type Z: 35 ÷ 140dB
SLM level Peak C: 50 ÷ 143dB

Ranges [dB]	0 ÷ 90	10 ÷ 100	20 ÷ 110	30 ÷ 120	40 ÷ 130	50 ÷ 140
Weighting A	25 ÷ 90	25 ÷ 100	25 ÷ 110	30 ÷ 120	40 ÷ 130	50 ÷ 140
Weighting C	30 ÷ 90	30 ÷ 100	30 ÷ 110	30 ÷ 120	40 ÷ 130	50 ÷ 140
Weighting Z	35 ÷ 90	35 ÷ 100	35 ÷ 110	35 ÷ 120	40 ÷ 130	50 ÷ 140
Peak C	50 ÷ 93	50 ÷ 103	50 ÷ 113	50 ÷ 123	60 ÷ 133	70 ÷ 143

CAUTION

- For sensitivity values <50mV/Pa, the measuring range is higher. For example, with a microphone with a sensitivity of 40mV/Pa (-28dB), the measuring range increases by 2dB and the reference value on the display passes to range 42 ÷ 132dB
- We recommend using a ½" pre-polarized microphone with a sensitivity of 50mV/Pa, frequency range: 10Hz ÷ 20kHz, basic noise <16dB(A)

- Linear dynamic range: >90dB
- Resolution: 0.1dB (statistic), 0.01dB (1/1 and 1/3 octave)
- Frequency range: 10Hz ÷ 20kHz (±0.2dB); 1Hz ÷ 23kHz (±1.0dB)
- Gain range: -10dB, 0dB, 10dB, 20dB, 30dB, 40dB
- Internal error: ≤ 0.1dB
- Internal noise voltage: <4μV (1Hz ÷ 23kHz linear)
- Background noise: <13dB(A), 15dB(C), 25dB(Z)
- Total noise: <18dB(A), 23dB(C), 28dB(Z)
- Voltage measuring range: 15μV ÷10V (TRMS)
- Frequency weighting: A/C/Z
- Time constants: Fast, Slow, Impulse, Peak C+, Peak C-
- Internal A/D converter: 24 bits
- Anti-aliasing filter: cut-off frequency 23.5kHz, attenuation 100dB
- Sampling frequency: 20.8μs (48kHz)
- Integration time: 1s ÷ 24h at preset or custom intervals
- Internal memory: 64kByte flash memory
- Memory capacity: max 128 groups/ max 256 calibrations
- Analogue output: AC, ratio 1mV/0.1dB, max voltage 3.2V
- Output interface: mini-USB 1.1 and 2.0 compatible
- Connection to USB pen drive: recommended TRASCEND JF V30 2GB
- Microphone: ½" with prepolarized condenser with pre-amplifier, sensitivity: 50mV/Pa, frequency range: 10Hz÷20kHz, noise <16dB(A)

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10.2. STATISTIC ANALISYS CHARARCTERISTICS

- Functions: SLM statistic analysis in weighting A
  Frequency integration with programmable period
  Statistic analysis in 24 hours (24H)

Analysis type	Measured parameters (*)
Statistic	L_{AFp}, L_{AFmax}, L_{AF5}, L_{AF10}, L_{AF50}, L_{AF90}, L_{AF95}, L_{AFmin}, SD, L_{Aeq1s}, $L_{Aeq,T}$, L_{AE}, L_{AfeqT}.
24H	L_d, L_n, L_{dn} further to statistic analysis parameters
Integration	L_{xyp}, L_{xyi}, $L_{xeq,1s}$, $L_{xeq,T}$, L_{AE}, E, C_{peak+}, C_{peak-},L_{AFmax},L_{AFmin},L_{AFeqT}, L_{ASeqT}, L_{AIeqT}

(*) X = frequency weighting A/C/Z ; Y = time constants F/S/I

10.3. CHARACTERISTICS OF ANALYSIS IN 1/1 AND 1/3 OCTAVE BAND (HT157 ONLY)

- Functions: Spectrum analysis of noise in octave band (1/1) and 1/3 octave band with integration measure
- Frequency weighting:
  - A/C/Z
  - Spectrum analysis interface: spectrum frequency ensemble
  - Total analysis interface: realized with digital filter (see § 12.2)
  - Weighting Z added with high-pass digital filter (cut-off frequency: 4Hz) (see § 12.4)
- Type of filter: digital, G=2 for analysis 1/1 and 1/3 octave band
- Central frequencies of 1/1 octave band:
  - 16Hz, 31.5Hz, 63Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz, 4kHz, 8kHz, 16kHz (see § 12.2 and § 12.3)
- Central frequencies of 1/3 octave band:
  - 12.5Hz, 16Hz, 20Hz, 25Hz, 31,5Hz, 490Hz, 50Hz, 63Hz, 80Hz, 100Hz, 125Hz, 160Hz, 200Hz, 250Hz, 315Hz, 400Hz, 500Hz, 630Hz, 800Hz, 1kHz, 1.25kHz, 1.6kHz, 2kHz, 2.5kHz, 3.15kHz, 4kHz, 5kHz, 6.3kHz, 8kHz, 10kHz,12.5kHz, 16kHz (see § 12.2)
- Measured parameters (*): $L_{fmeq,1s}$, $L_{fmeq,T}$, L_{xyp}, L_{xyi}, $L_{xeq,1s}$, $L_{xeq,T}$, L_{AE}, E, C_{peak} Tm

(*) fm = central frequency; X = frequency weighting A/C/Z ; Y = time constants F/S/I

- Noise (E)'s exposure range : $0 \div 65.535 Pa^2h$

10.4. CHARACTERITICS OF PORTABLE CALIBRATOR HT151

- Selectable SLM levels: 94dB and 114dB (reference $2x10^{-5}$Pa)
- Uncertainty: ±0.3dB (94dB); ±0.5dB (114dB)
- Reference frequency: 1kHz ± 1%
- Distortion: ≤ 1%
- Reference standard: IEC 60942:2003 Class 1 and ANSI S1.40:1984
- Stability time: 3s
- Operating temperature: -10°C ÷ 50°C (-14°F ÷ 122°F)
- Storing temperature: -25°C ÷ 0°C (-13°F ÷ 158°F)
- Reference humidity: <90%HR
- Atmospheric pressure: 65kPa ÷ 100kPa
- Power supply: 1x9V battery type IEC 6F22 or NEDA 1604
- Dimensions: 117(L) x 53(∅) mm ; 5(L) x 2(∅)"
- Weight (with battery and ½" adapter):250g (9 ounces)

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10.5. GENERAL CHARACTERISTICS

Display

Characteristics:	LCD, (240x160pxl), backlit
Display update:	1Hz (numerical data), 10Hz (graphic data)

Power supply

Internal power supply:	4x1.5V alkaline batteries type IEC LR6, AA
Low battery indication:	symbol "🔋" and message "BATTERY LOW"
Duration:	approx. 8 hours
External power supply:	AC100-240V, 50/60Hz / 5VDC 2A external adapter

Mechanical characteristics

Dimensions:	285(L) x 90(W) x 39(H)mm 11 (L) x 4 (W) x 2 (H)"
Weight (batteries included):	approx. 500g (18 ounces)

Environmental conditions for use

Maximum altitude:	2000m
Reference temperature:	23°C ± 5°C ; (73°F ± 41°F)
Operating temperature:	5 ÷ 40 °C ; (41°F ÷ 104°F)
Operating humidity:	<80%RH (up to 31°C) and <50%RH (at 40°C)
Storing temperature:	-10 ÷ 60 °C ; (14°F ÷ 140°F)
Storing humidity:	< 70%RH

Reference standard

Statistic analysis and integration:	IEC 61672:2002 Class 1, CNS 7129 IEC 60651:1979 Type 1, IEC60804:2000 Type 1
1/1 and 1/3 analysis (HT157 only):	IEC 61260:1995 Class 1

This instrument complies with the requirements of European Directive EMC 2004/108/EC

10.6. ACCESSORIES

- Instrument HT155 or HT157
- Portable calibrator HT151
- Windproof protection
- Mini-USB/USB cable for PC connection
- USB Pen Drive type TRASCEND JF V30/2GB
- Cable for USB Pen Drive connection to the instrument
- AC/DC power supply with USB adapter cable
- Rigid transport suitcase
- Batteries
- ISO9000 calibration certificate of instrument and calibrator
- User manual

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11. SERVICE

11.1. WARRANTY CONDITIONS

This instrument is warranted against any material or manufacturing defect, in compliance with the general sales conditions. During the warranty period, defective parts may be replaced. However, the manufacturer reserves the right to repair or replace the product.

Should the instrument be returned to the After-sales Service or to a Dealer, transport will be at the Customer's charge. However, shipment will be agreed in advance. A report will always be enclosed to a shipment, stating the reasons for the product's return. Only use original packaging for shipment; any damage due to the use of non-original packaging material will be charged to the Customer.
The manufacturer declines any responsibility for injury to people or damage to property.

The warranty shall not apply in the following cases:

- Repair and/or replacement of accessories and battery (not covered by warranty).
- Repairs that may become necessary as a consequence of an incorrect use of the instrument or due to its use together with non-compatible appliances.
- Repairs that may become necessary as a consequence of improper packaging.
- Repairs which may become necessary as a consequence of interventions performed by unauthorized personnel.
- Modifications to the instrument performed without the manufacturer's explicit authorization.
- Use not provided for in the instrument's specifications or in the instruction manual.

The content of this manual cannot be reproduced in any form without the manufacturer's authorization.

Our products are patented and our trademarks are registered. The manufacturer reserves the right to make changes in the specifications and prices if this is due to improvements in technology.

11.2. SERVICE

If the instrument does not operate properly, before contacting the After-sales Service, please check the conditions of battery and cables and replace them, if necessary. Should the instrument still operate improperly, check that the product is operated according to the instructions given in this manual.

Should the instrument be returned to the After-sales Service or to a Dealer, transport will be at the Customer's charge. However, shipment will be agreed in advance. A report will always be enclosed to a shipment, stating the reasons for the product's return. Only use original packaging for shipment; any damage due to the use of non-original packaging material will be charged to the Customer.

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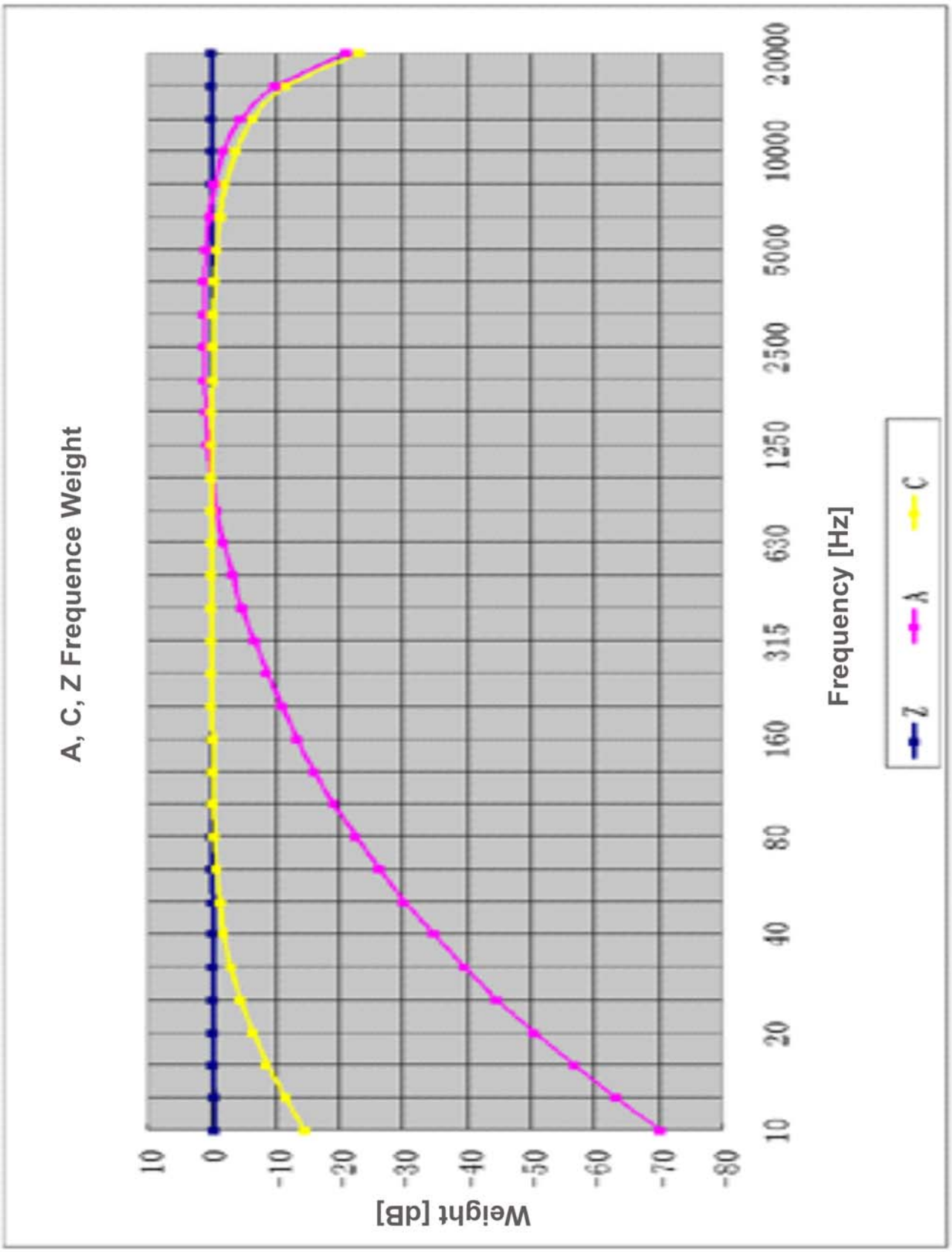
12. APPENDIXES

12.1. APPENDIX 1 – FREQUENCY WEIGHTING CHARACTERISTICS



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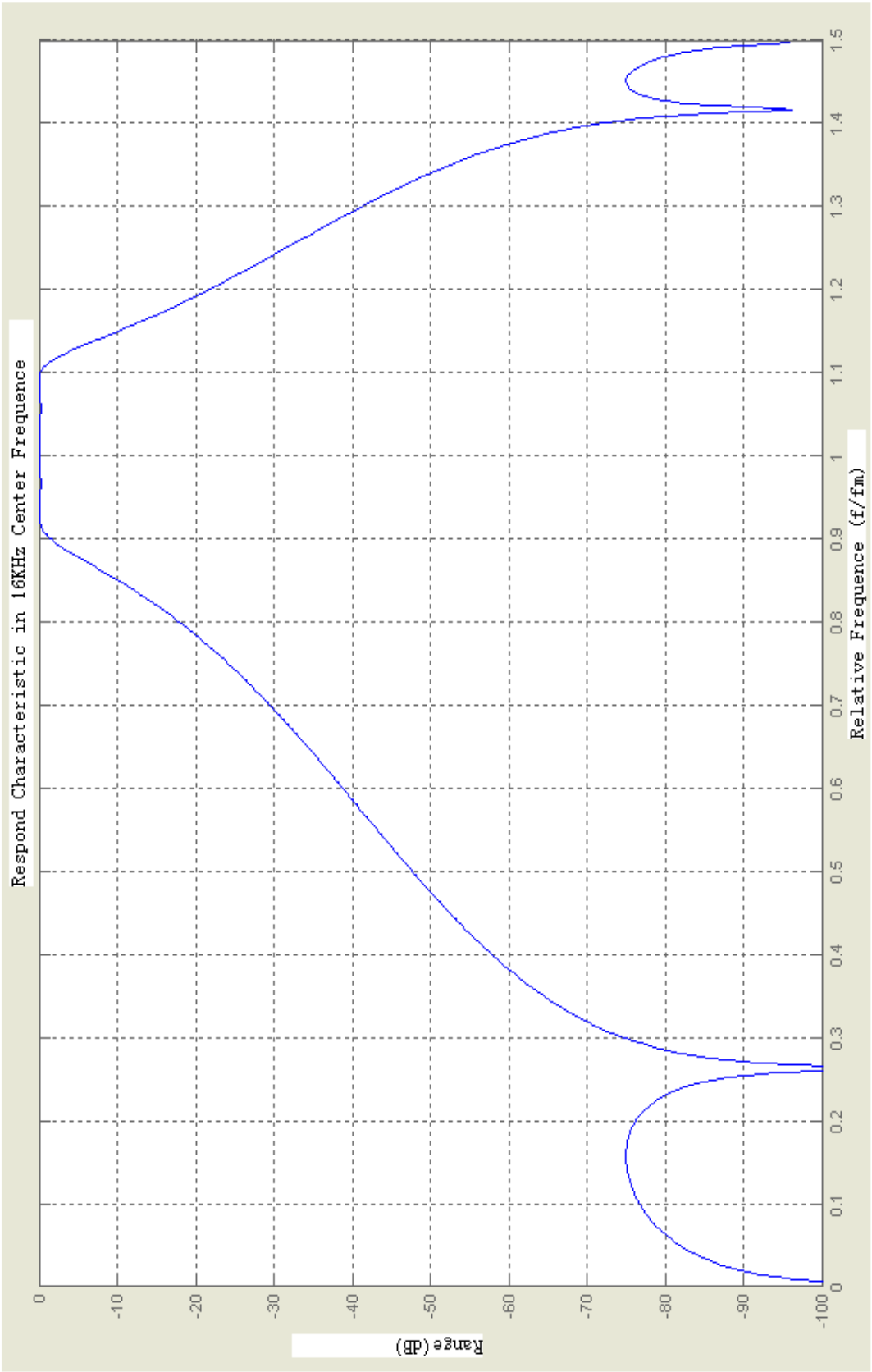
12.2. APPENDIX 2 – CHARACTERISTICS OF 1/3 OCTAVE BAND FILTER



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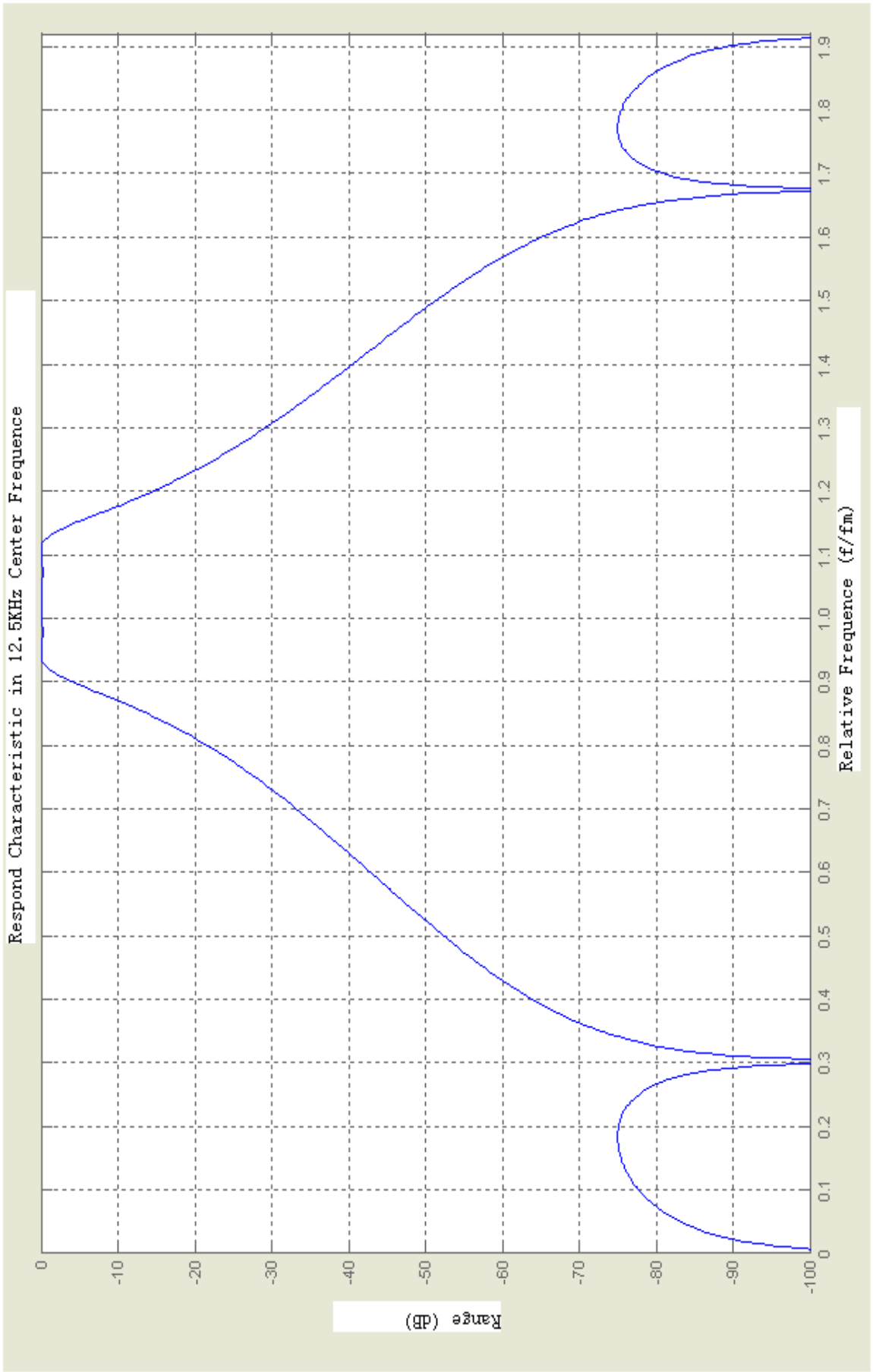

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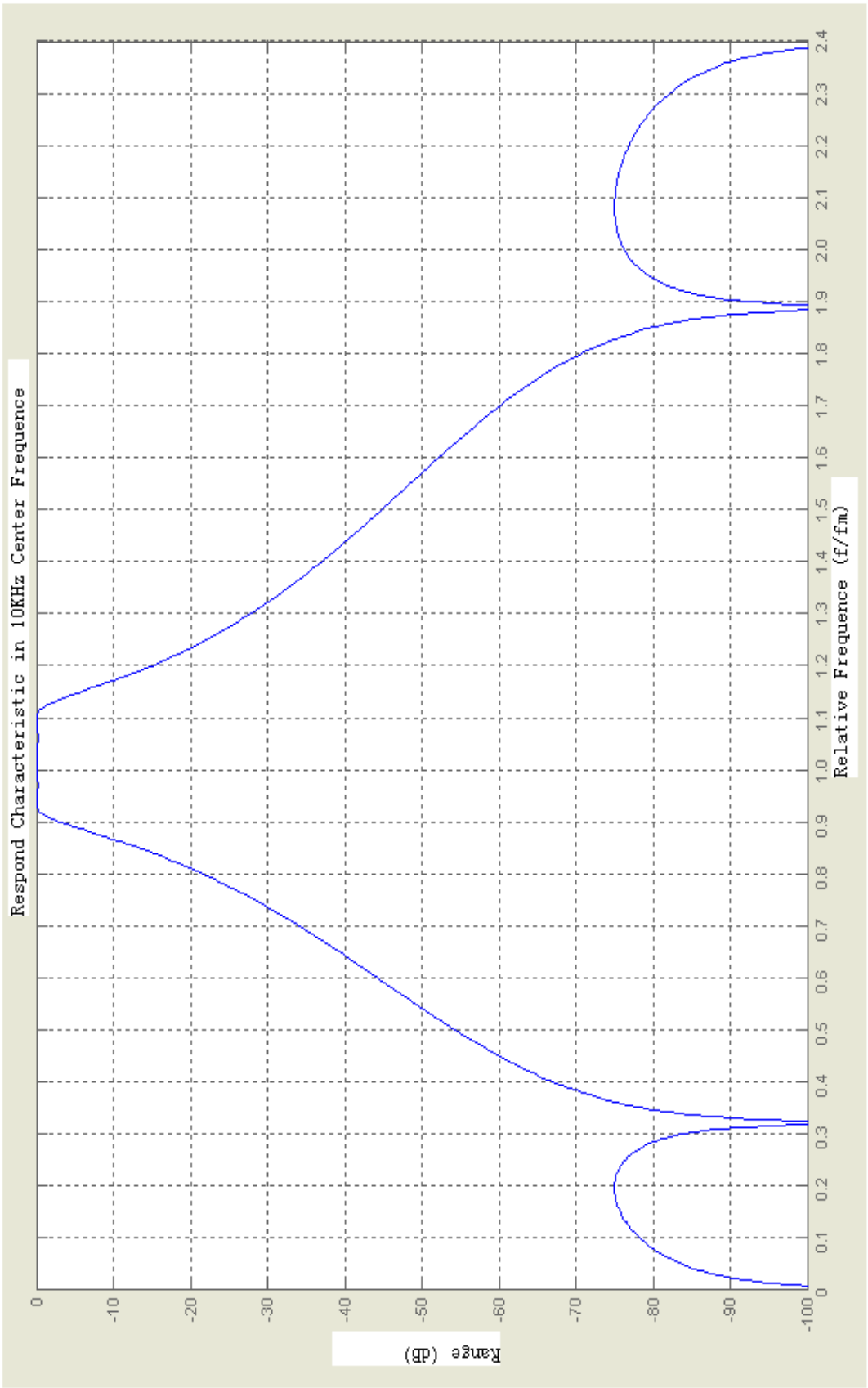

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12.3. APPENDIX 3 – FREQUENCY WEIGHTING A, C

Frequency [Hz]	A [dB]	C [dB]		Frequency [Hz]	A [dB]	C [dB]
10	-70.4	-14.3		500	-3.2	0
12.5	-63.4	-11.2		630	-1.9	0
16	-56.7	-8.5		800	-0.8	0
20	-50.5	-6.2		1000	0	0
25	-44.7	-4.4		1250	0.6	0
31.5	-39.4	-3.0		1600	1.0	-0.1
40	-34.6	-2.0		2000	1.2	-0.2
50	-30.2	-1.3		2500	1.3	-0.3
63	-26.2	-0.8		3150	1.2	-0.5
80	-22.5	-0.5		4000	1.0	-0.8
100	-19.1	-0.3		5000	0.5	-1.3
125	-16.1	-0.2		6300	-0.1	-2.0
160	-13.4	-0.1		8000	-1.1	-3.0
200	-10.9	0		10000	-2.5	-4.4
250	-8.6	0		12500	-4.3	-6.2
315	-6.6	0		16000	-6.6	-8.5
400	-4.8	0		20000	-9.3	-11.2

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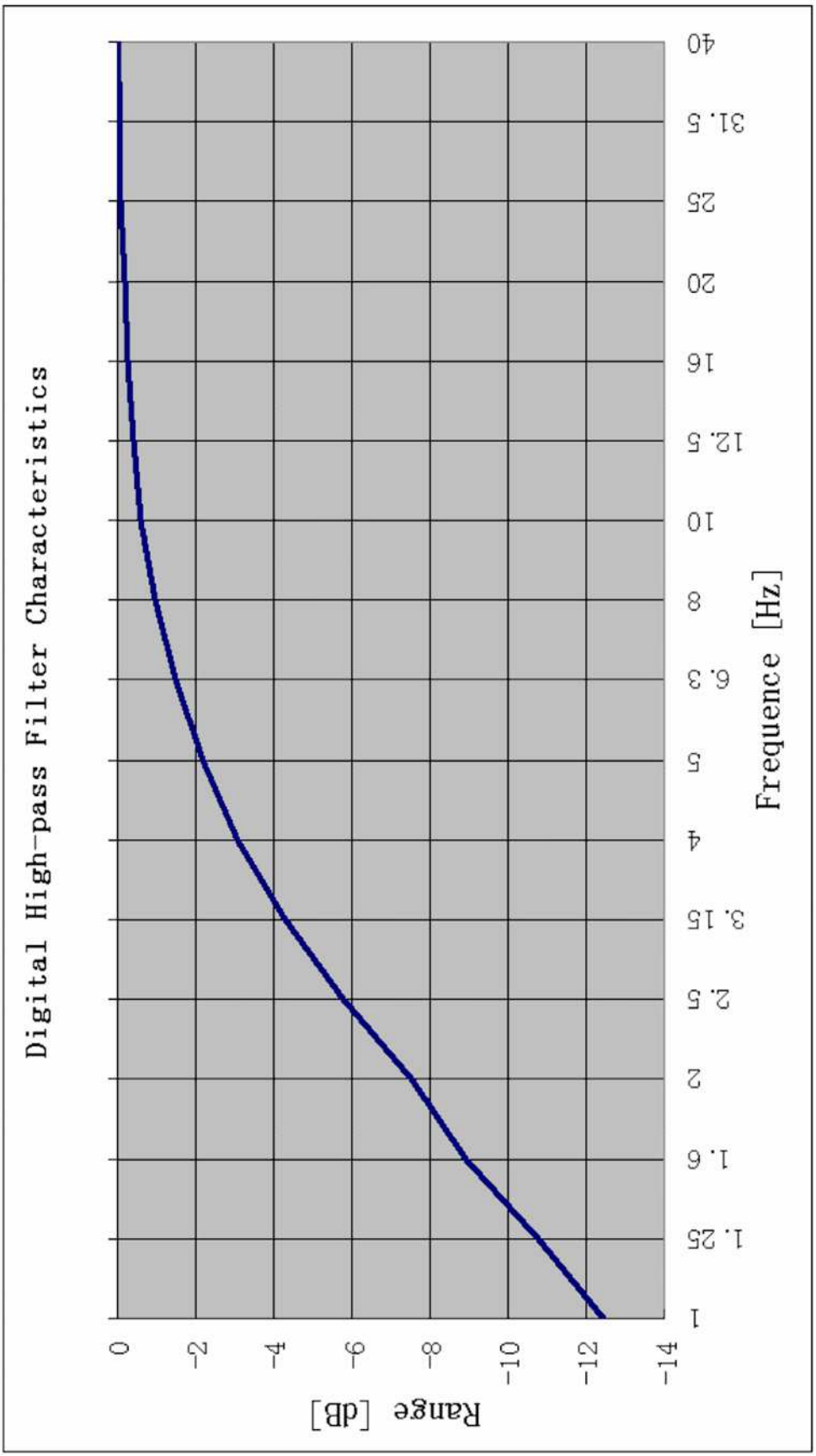
12.4. APPENDIX 4 – CHARACTERISTICS OF 4HZ HIGH-PASS DIGITAL FILTER



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