HD 2010UC

it consists of HD2010UC class 1 sound level meter (class 2 for HD2010UC kit2), HD WME weatherproof microphone unit for outdoor use, HD2010PNE2W heated preamplifier, HD2010PNE2 preamplifier, UC52/1 microphone for free fields (UC52 for HD2010UC kit2), HD SAV windscreen, 5m extension cable and serial RS232 or USB connection cable. Noise Studio PC programme.

Accessories
Option 0 "Memory Expansion": 4MB memory expansion. **It needs Option 2 "Data Logger".**
Option 2 "Data logger": storage of sound level profiles, continuous and with intervals. It includes the memory expansion from 2MB to 4MB.
Option 5 "Advanced Analyser": Profiles+reports+events data logging, event capture and full statistical analysis. **Only for HD2010UC class 1 with Option 2 "Data Logger".**
Option 7 "SIT Calibration": SIT calibration which replaces ISO9001 Reports. **For new instruments only**.
Option LCD: Backlit display. **For new instruments only**.
HD9101: class 1 calibrator according to IEC60942:1988. Features:
 • Cavity for 1" and ½" standard microphones according to IEC 61094,
 • Frequency: 1000Hz,
 • Sound level: 94dB/114dB.
 The calibrator is supplied with ISO 9001 report of calibration.
HD9102: class 2 calibrator according to IEC60942:1988. Features:
 • Cavity for 1" and ½" standard microphones according to IEC 61094,
 • Frequency: 1000Hz,
 • Sound level: 94dB/114dB.
 The calibrator is supplied with ISO 9001 report of calibration.
HD2020: class 1 calibrator according to IEC60942:2003 with I.N.RI.M. n.90-003-01 Certificate of Conformity. Features:
 • LCD Display,
 • Static pressure compensation from 65 kPa to 108 kPa,
 • Cavity for ½" standard microphones according to IEC 61094,
 • Frequency: 1000Hz,
 • Sound level: 94dB/114dB.
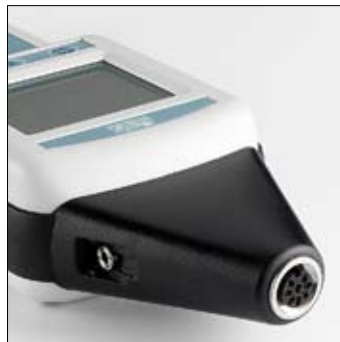 The calibrator is supplied with ISO 9001 report of calibration.
HD2110/RS: serial RS232 cable for connection to a PC or to HD40.1 printer.
HD2110/USB: serial USB cable for connection to a PC
SWD10: stabilized mains power supply with Vin=100÷230Vac Vout=12Vdc/1000mA voltage.
CPA/10: 10m extension cable.
VTRAP: tripod, 1550mm maximum height.

HD 2010UC
INTEGRATING SOUND LEVEL METER

HD2010UC is an integrating portable sound level meter performing statistical analysis. The instrument has been designed combining maximum low cost and simplicity of use. Attention has been paid to the possibility of adjusting the instrument and adding options at any time to the HD2010UC so to extend its applications. The user can upgrade the firmware directly by means of the Noise Studio programme supplied with the instrument.

Technical regulations:
• **Class 1 or 2 sound level meter according to IEC 61672-1 dated 2002 (Certificate of Compliance I.N.RI.M. n. 07-0124-02)**, IEC 60651 and IEC 60804.

Applications:
• Assessment of the environmental noise level,
• Optional "data logging" function,
• Optional capture and analysis of sound events,
• Statistical analysis with the calculation of 3 percentile level and optional full statistical analysis,
• Identification of impulsive noises,
• Measurements in workplaces,
• Selection of personal protective equipments (SNR and HML methods),
• Production quality control,
• Measurement of machine noise.

Sound level meter class 1 or 2 Kit
• **HD2010UC kit1 and kit2**: consists of HD2010UC sound level meter class 1 (class 2 for HD2010UC kit2), HD2010PNE2 preamplifier, UC52/1 microphone for free field (UC52 for HD2010UC kit2), windscreen, 5m extension cable and serial RS232 or USB connection cable. Noise Studio PC programme.
• **HD2010UC kit1/E and kit2/E**: version for outdoor measurements, it consists of HD2010UC sound level meter class 1 (class 2 for HD2010UC kit2), HD WME weatherproof microphone unit for outdoor use, HD2010PNE2W heated preamplifier, UC52/1 microphone for free field (UC52 for HD2010UC kit2) and serial RS232 or USB connection cable. Noise Studio PC programme
• **HD2010UC kit1/IE e kit2/IE**: version for indoor and outdoor measurements,

HD WME

HD2110/SA: support to fix preamplifier to tripod.

HD40.1: portable serial thermal printer with 57mm paper tape equipped with SWD10 stabilizer mains.

HD2010MC: SD memory card interface equipped with SD 1GB card. **It needs Option 2 "Data Logger"**.

Software for Windows® 98/XP/Vista operating systems

Noise Studio: Programme for Windows® 98,XP and Vista supplied with the sound level meter kit. Instrument configuration, download and graphic display of the stored data. This programme supports some sound analysis application modules which can be enabled by licence with the hardware key. The programme includes demo versions of the modules.

CH20: Hardware key for PC working with Windows® operating system. It enables the software modules of Noise Studio when introduced into the USB port.

NS1: "Workers' Protection" module in Noise Studio programme. Noise analysis in working environment according to L.D. 81 dated 2008 and to standard UNI 9432 dated 2008.

NS2: "Acoustic pollution" module in Noise Studio programme. Acoustic climate analysis and road, railway and airport noise evaluation. **It needs Option 2 "Data Logger".**

NS4: "Monitor" module in Noise Studio programme. Real time PC data acquisition. Synchronized audio recording. Monitor and remote control programming. Connection by modem.

With HD2010UC sound level meter it is possible to measure the sound level by programming 3 parameters with the possibility of freely selecting the frequency weightings and the time constants. It is possible to measure parameters such as Leq, SEL and maximum and minimum sound levels with integration times from 1 second to 99 hours. If an undesired sound event produces an over-load indication, or simply alters the result of integration, it is always possible to exclude it by using the versatile Back-Erase function.

The measured sound levels can be recorded in the large non-volatile memory in order to be transferred to a PC using the supplied Noise Studio programme.

As a statistical analyzer the HD2010UC samples the sound signal 8 times per second with A-frequency weighting and FAST constant, and it analyzes it statistically in 0.5 dB classes. It is possible to display up to 3 percentile levels between L_1 and L_{99}. By using "Advanced Analyser" it is possible to choose whether sampling L_{Fp}, L_{eq} or L_{pk} with A, C or Z weightings (only C and Z for L_{pk}).

For further analysis, the LINE un-weighted output allows recording the sound sample either on tape or directly on a PC equipped with a data acquisition card.

The high speed of the USB interface combined with the flexibility of the RS232 interface allows quick data transfers from the sound level meter to the PC mass storage, but can also control a modem or printer. For example, in case of lengthy recordings, you can activate the "Monitor" function. This function allows to send the displayed data to a PC via the RS232 serial interface, to be directly stored on the PC mass storage.

The sound level meter can be completely controlled by a PC through the multi-standard serial interface (RS232 and USB) by using a special communication protocol. Through the RS232 interface, the sound level meter can also be connected to a PC via modem.

The calibration can be performed either by using the provided acoustic calibrator (type 1 according to IEC 60942) or the built-in reference generator. The electric calibration uses a special preamplifier and checks the sensitivity of the measuring channel, microphone included. A protected area in the non-volatile memory, reserved to factory calibrations, is used as a reference for the user's calibrations, so to allow keeping instrument drifts under control and to prevent the instrument from losing of calibrations.

The control of the complete sound level meter functionality can be made directly by the user, on site, thanks to a diagnostic programme.

The HD2010UC sound level meter can perform all the measurements according to the law with respect to workers' protection from of exposure to noise (Legislative Decree n.81/2008). The selection of the personal protective equipment can be carried out through comparison of the A and C weighted equivalent levels that can be measured simultaneously (SNR method).

The class 1 HD2010UC sound level meter with the "Data Logger" option is suitable for performing sound level monitoring and acoustic mapping and, by using the "Advanced Analyzer" option, also assessments of the acoustic climate with capture and analysis of sound events function. When measuring traffic noise near airports, railways and roads, the sound level meter can be used as a multi-parameter sound recorder, combining statistical and spectrum analyzer features. Remote electrical calibrations and diagnostic tests can be executed by using its remote control capabilities.

Italian Legislation

- Noise in working environment: D.L. 81/2008, UNI 9432/2008 standard and 2003/10/ CE European regulation.
- Noise assessment in airports environment: Decree dated 31/10/97.
- Noise in entertainment dancing spaces: D.P.C.M. 215 dated 16/4/99.
- Noise emitted by machineries Lgs.D. 262 dated 4/9/2002 and 2005/88/CE European regulation.

Inputs and outputs

DC outputs corresponds to the A-weighed sound level with FAST time constant, updated 8 times per second (Ø 2.5mm jack).

Un-weighted LINE output (Ø 3.5mm jack).

RS232C standard serial port according to EIA/TIA574. Baud Rate from 300 to 115200 bauds.

USB 1.1 serial port.

9÷12Vdc External power supply (Ø 5.5mm jack).

Options and accessories:

HD2110/MC reader (it needs "Data Logger" Option 2)

It allows interfacing SD memory cards to the sound level meter.

This device is connected to the sound level meter by means of a serial interface which supplies the necessary power supply as well. Further to the remarkable recording capacity, the interface allows to quickly download data stored in the internal memory of the sound level meter. It is possible to connect cards having up to 2GB capacity. 1GB card is supplied.

Option 2 "Data Logger"

It includes the internal memory expansion from 2 MB to 4 MB.

It displays and records the A-weighted sound level profile with FAST time constant, sampled 8 times per second. It storages the profiles of 3 programmable parameters, sampled twice per second. It is possible to storage 3 programmable parameters at intervals from 1 second up to 1 hour for sound level monitoring. By this recording mode it is possible to storage 3 parameters by intervals of 1 minute for over 80 days by using the supplied memory (4MB expandable to 8MB). "Data Logger" option transforms the HD 2010UC sound level meter into a sound level recorder suitable for recording the profile of 4 parameters for over 23 hours. Impulsive events can be easily identified thanks to the possibility of analysing simultaneously sound level profiles with FAST, SLOW and IMPULSE constant.

During noise assessment in airport, railways or roads environments, the sound level meter can be used as multi parameters sound events recorder, making the most of the static analyser characteristics or the possibility for recording simultaneously the profile with FAST constant level and sound exposure level.

Option 5 "Advanced Analyser"
(it can be installed on the HD2010UC Class 1 with "Data logger" option")

This Option integrates the complete functions of sound level analyser with the following functions:

- Statistical analysis is available in graphic form both as probability distribution and as cumulative distribution.
- Trigger for the capture of sound events with threshold level and filter length.
- Record of the measuring reports with intervals from 1 s to 1 hour with a dedicated set of parameters which includes the complete statistic analysis.
- Record of the event parameters with the possibility of setting the maximum temporal resolution for the record of events and a lower resolution for the ground recording.
- Possibility of storing markers.
- Timer for programming delayed start of capture.

Software:
Noise Studio

The Noise Studio programme allows interfacing HD2010UC to the PC in a simple and intuitive way. Main functions are:

Transfer of stored data from the sound level meter to the PC memory.
Visualization of the captured data under graphic and tabular form.
Export to Excel and PDF format.
Printing of graphs and data tables.
Control of acquisition from a PC.
Sound level meter setup management.
Sound level meter firmware update.

It results easier drafting documents regarding the sound level meter's relief due to the handy function which allows to copy graphs or visualized tables from other applications and to create PDF files.

Moreover Noise Studio is a post processing programme able to perform different kind of analyses, studied for specific applications assembled in software modules to be enabled with licence. Demo versions of the software modules are provided.
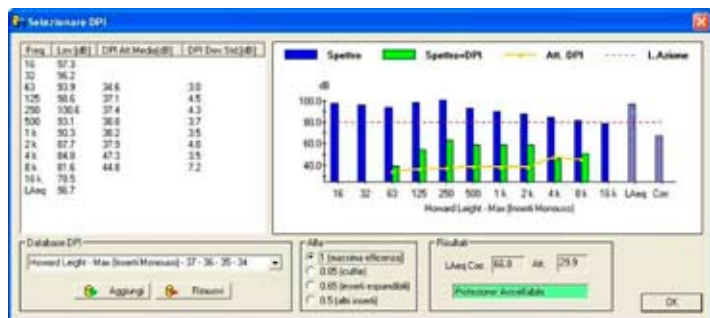
Noise Studio: 'Worker protection' module (to be activated by license)

This application module analyzes noise in the workplace according to the DL 81/2008, the European directive 2003/10/EC and the UNI 9432:2008. Data sound level measurement in work environment is organized in a project where they can be handled according to regulatory requirements. In addition to calculating the noise exposure of workers the program allows to evaluate the effectiveness of protective equipment by the methods SNR and OBM. According to UNI 9432 of 2008, the program also calculates the index of impulsiveness of a machine.

Noise Studio: 'Acoustic Pollution' module (to be activated by license)

This application module analyzes sound level profiles detected both in indoor and outdoor environments for assessment of the noise climate, of noise in airports and transport infrastructures.

The analysis of the noise climate is made on a daily, weekly and annual basis with resolutions up to 1 minute.

Acoustics - Vibrations

Noise studio: "workers' protection" module: analysis of the effectiveness of IPD

The profiles of noises detected in the external environment are analyzed in order to search for disturbing sources characterized by a sequence of events such as railways and airports. The analysis is performed on a daily basis with a resolution equal to 1/8 of a second and with automated search and analysis of sound events. **This module needs Option 2 "Data Logger"**.

Noise Studio: 'Monitor' module (to be activated by license)
This software module allows to control the sound level meter with PC in remote location. The main functions are:
 - Real time display of acquired data, in graphical and tabular form.
 - Possibility of connection via modem with the sound level meter.
 - Acquisition of data sound level data directly into the mass memory of the PC (monitor
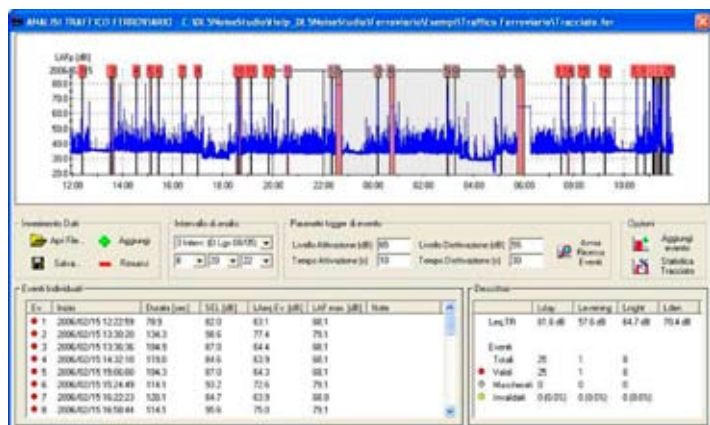
Noise studio: "railway traffic" module: analysis of 24 hours with automatic search of transit

function).
 - Management of diagnostic and calibration functions.
 - Automatic acquisition and monitoring programme.
 - Possibility of logging synchronized audio along with the sound level meter measures, by using the easy trigger function.

Codes for ordering the new kits and accessories
HD2010UC kit 1 and kit 2: it includes class 1 sound level meter HD2010UC (class 2 for HD2010UC kit2), HD2010PNE2 preamplifier, UC52/1 microphone for free field (UC52 microphone for HD2010UC kit2), windscreen, 5m extension cable and RS232 serial (HD2110/RS) or USB (HD2110/USB) connection cable. Noise Studio PC program).
HD2010UC kit 1/E and kit 2/E: version for outdoor measurements, it includes HD2010UC class 1 sound level meter (class 2 for HD2010UC kit2), weatherproof microphone unit for outdoor use HD WME equipped with bird spike, wind screen and rain screen, HD2010PNE2W heated preamplifier with 5m connection cable (other lengths upon request), UC52/1 microphone for free field (UC52 for HD2010UC kit2) and serial RS232 or USB connection cable. The kit also includes: Noise Studio software and RS232 (HD2110/RS) or USB (HD2110/USB) cable for connection to PC.
HD2010UC kit 1/IE and kit 2/IE: version for indoor and outdoor measurements, it includes HD2010UC class 1 sound level meter (class 2 for HD2010UC kit2), weatherproof microphone unit for outdoor use HD WME equipped with bird spike, wind screen and rain screen, HD2010PNE2W heated preamplifier with 5m connection cable (other lengths upon request), HD2010PNE2 preamplifier, HD SAV wind screen, CPA/5 5m extension cable and UC52/1 microphone for free field (UC52 for HD2010UC kit2). The kit also includes: Noise Studio software and RS232 (HD2110/RS) or USB (HD2110/USB) cable for connection to PC.
Option 0 "Memory Expansion": 4 MB memory expansion. **It can be installed on the HD2010UC with option 2 "Data Logger".**
Option 2 "Data logger": recording of 4 profiles continuously and at programmable intervals from 1s to 1 hour. It includes memory expansion from 2 MB to 4 MB.

Option 5 "Advanced Analyzer": Profile+report+event data logging, capture and analysis of events, full statistical analysis. **It can be installed on the class 1 HD2010UC with option 2 "Data Logger".**
Option 7 "SIT Calibration": SIT calibration replaces ISO9001 reports. **For new instruments only**.
Option "LCD": Backlit LCD. **For new instruments only**.
HD9101: Class 1 calibrator according to IEC90942:1988. Features:
 • Cavity for 1" and ½" microphones according to IEC61094,
 • 1000Hz frequency,
 • 94dB/114dB sound level.
 The calibrator is supplied complete with calibration report according to ISO 9001 (replaced by a SIT certificate if combined with option 7 "SIT Calibration").
HD2020: Class 1 calibrator according to IEC60942:2003 equipped with I.N.RI.M. n.90-003-01 Certificate of Conformity. Features:
 • Backlit LCD,
 • Static pressure compensation from 65kPa to 108kPa,
 • Cavity for 1" and ½" microphones according to IEC61094,
 • 1000Hz frequency,
 • 94dB/114dB sound level.
 The calibrator is supplied complete with calibration report according to ISO 9001 (replaced by a SIT certificate if combined with option 7 "SIT Calibration").
HD9102: Class 2 calibrator according to IEC90942:1988. Features:
 • Cavity for 1" and ½" microphones according to IEC 61094,
 • 1000Hz frequency,
 • 94dB/114dB sound level.
 The calibrator is supplied complete with calibration report according to ISO 9001 (replaced by a SIT certificate if combined with option 7 "SIT Calibration").
HD2110/RS: RS232 serial cable for PC connection or connection to HD40.1 printer.
HD2110/USB: serial USB cable for PC connection.
SWD10: Stabilized mains power supply Vin=100÷230Vac / Vout=12Vdc/1000mA.
CPA/10: 10m extension cable for HD2010PNE2 preamplifier.
VTRAP: Tripod, 1550 mm maximum height.
HD2110/SA: Support to fix the preamplifier to the tripod.
HD40.1: Portable thermal serial printer with 57mm paper rolls equipped with SWD10 power supply.
BAT40: Replacement battery pack for HD40.1.
RCT: 4 rolls of thermal paper, 57width and 32mm diameter.
HD2010MC: SD memory card interface. This device includes a 1GB SD card and **it needs Option 2 "Data Logger"**.

Codes for ordering spare parts and other accessories
Upgrade 1: Conversion of HD2010UC (**equipped with Option "Data Logger"**) into HD2010UC/A. It includes:
 • Octave band spectrum analysis
 • Sound level meter and filters ISO 9001 calibration report.
HD WME/UC1: outdoor microphone unit **for class 1 sound level meters** equipped with:
 • HD WME Weather protection with HD WME3 preamplifier housing, HD WME1 bird spike and HD SAV3 wind screen as well as HD WME2 rain screen,
 • HD2010PNE2W Heated preamplifier with 5m connection cable (other lengths upon request),
 • UC52/1 Pre-polarized microphone.
HD WME/UC2: outdoor microphone unit **for class 2 sound level meters** equipped with:
 • HD WME Weather protection with HD WME3 preamplifier housing, HD WME1 bird spike and HD SAV3 wind screen as well as HD WME2 rain screen,
 • HD2010PNE2W Heated preamplifier with 5m connection cable (other lengths upon request),
 • UC52 Pre-polarized microphone.
HD WME/PNE: Weather protection **for class 1 and class 2 sound level meters** equipped with:
 • HD WME Weather protection with HD WME3 preamplifier housing, HD WME1 bird spike and HD SAV3 wind screen as well as HD WME2 rain screen,
 • Heated preamplifier HD2110PNE2W with 5m connection cable (other length upon request).
HD WME: Weather protection, complete with:
 • Stainless steel housing for preamplifier HD WME3 with holder for rain shield HD WME2,
 • Bird spike HD WME1,
 • Wind screen HD SAV3,
 • Rain shield HD WME2.
HD SAV: Windscreen for ½" microphones.

HD SAV2: Windscreen with bird spike for weather protection HD WME950.
HD SAVP: Rain shield for HD WME950 weather protection.
HD SAV3: Windscreen for HD WME and HD WME950 weather protection.
HD WME1: Bird spike for HD WME weather protection.
HD WME2: Rain shield for HD WME microphone unit.
HD WME3: Stainless steel housing for the preamplifier of HD WME weather protection, with holder for rain shield HD WME2.
HD2010PNE2: Microphone preamplifier for pre-polarized UC52 microphones. Equipped with CTC device for electrical calibration.
HD2010PNE2W: Microphone preamplifier to be housed in outdoor protection WME950 HD and HD WME. The preamplifier is heated, provided with standard connection for pre-polarized UC52 microphones and provided with CTC device for electrical calibration. Ending with a connection 5m cable (other lengths upon request).
UC52/1: Class 1 pre-polarized microphone for free field.
UC52: Class 2 pre-polarized microphone for free field.
CPA/5: Microphone 5m extension cable.

TECHNICAL SPECIFICATIONS

Standards	Class 1 or 2 X group according to IEC 61672:2002 and class 1 or 2 according to IEC 60651:2001 and IEC 60804:2000 type 1 or 2 according to ANSI S1.4-1983 and S1.43-1997
½" Microphone	UC52 condenser type, pre-polarized, for free field.
Dynamic range	30 dBA ÷ 143 dB Peak
Linear Field	80 dB
Acoustic Parameters	Spl, L_{eq}, SEL, $L_{EP,d}$, L_{max}, L_{min}, L_{pk}, Dose, L_n
Frequency Weights	simultaneous A, C, Z (only C and Z for L_{pk})
Temporal Weights	simultaneous FAST, SLOW, IMPULSE
Integration	from 1s to 99 hours with erasing function (Back-Erase)
Statistical Analysis	It displays up to 3 percentile levels, from L_1 to L_{99} Probability distribution and percentile level calculation from L_1 to L_{99} (Option 2 "Data Logger" and option 5 "Advanced Analyzer") ✓Parameter: L_{Fp}, L_{eq}, L_{pk} weighted A, C o Z (solo C o Z per L_{pk}) ✓Sampling frequency: 8 samples/second ✓Classification: Classes of 0.5 dB
Analysis of Events (Option 2 Data Logger" and option 5 "Advanced Analyzer")	✓Calculation of 5 freely-programmable event parameters ✓Calculation of statistical levels from L_1 to L_{99} ✓Event identification trigger with programmable threshold and duration filter ✓Manual trigger
Profile Data Logging (Option: "Data Logger")	1 profile with programmable sampling from 1/8 s to 1 hour and 3 profiles with 2 samples/second
Display	Graphic display 128x64 ✓3 parameters in numeric format ✓Backlit LCD ("LCD" option): ✓Profile L_{AFp} with 8 samples/second (Option 2 "Data Logger") ✓Graph of sound level probability distribution (Option 2 "data Logger" and option 5 "Advanced Analyzer") ✓Graph of percentile levels from L_1 to L_{99} (Option 2 "data Logger" and option 5 "Advanced Analyzer")
Memory	✓Internal, equal to 2 MB, enough to store over 500 recordings. With option 2 "Data Logger", internal memory equal to 4 MB (1 profile for 23 hours or over 80 recording days of 3 parameters per minute). Expandable to 8 MB with option 0 "Memory expansion". ✓External, via the HD2110MC memory card interface, using MMC or SD cards up to 2 GB. The interface requires option 2 "Data Logger".
Input/Output	✓RS232 serial and USB interfaces ✓AC output (LINE) ✓DC output
PC Programs	**Noise Studio (supplied with the instrument):** PC interface for data download, set up and instrument management. Licensed software modules to be enabled by hardware key. ✓**"Worker protection" module.** Analysis of noise in the workplace in accordance with Decree 81 of 2008 and the UNI 9432-2008. ✓**"Acoustic pollution" module**. Analysis of environmental noise according to the Law 447/1995 and Decree of 16/03/1998. Analysis of the noise climate and assessment of noise from road, rail and airport according to the law. **Requires option 2 "Data Logger".** ✓**"Monitor" module**. Acquisition in real time on PC. Synchronized audio recording. Remote monitoring and data capture. Connection via Modem. The program allows programming of measurements and calibrations with timer and audio recording with programmable event triggers.
Operating conditions	✓Working temperature -10÷50°C, 25÷90%RH (without condensation), 65÷108kPa. Protection degree: IP64
Power Supply	✓4 alkaline or rechargeable NiMH type AA batteries or external 9÷12Vdc 300mA
Dimension and weight	✓445x100x50 mm equipped with preamplifier, 740 g (with batteries).