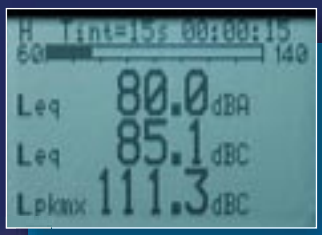
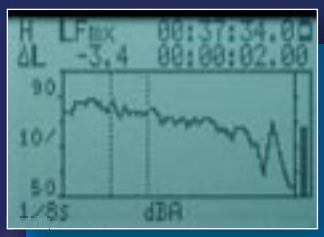
HD2010 UC/A

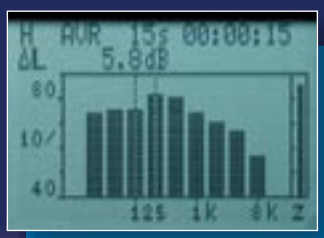
Integrating Sound Level Meter
Portable Analyzer



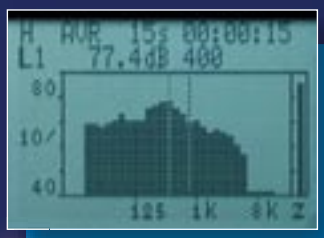
Basic screen



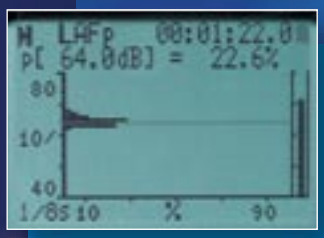
Time profile



Octave band spectrum



Third octave band spectrum ("third octave" option)



Statistical analysis: probability distribution of sound levels ("advanced analyzer" option)

Statistical analysis: percentile levels ("advanced analyzer" option)

HD 2010UC/A

Integrating Sound Level Meter - Portable Analyzer

The HD2010UC/A is an integrating portable sound level meter, with data logging functions, performing both spectrum and statistical analysis. The instrument has been designed combining maximum flexibility and simplicity. Attention has been paid to the possibility of adjusting the instrument to regulatory modifications regarding noise and to the necessity of meeting its users' needs of today and tomorrow. The HD2010UC/A can be integrated with other options to extend its application scope at any time; the firmware can be directly updated by the user by means of the DeltaLog5 program supplied with the instrument.

Technical regulations:

- **Class 1 or 2 sound level meter according to IEC 61672-1, 2002 (Certificate of Compliance I.N.RI.M. No. 07-0124-02)**, IEC 60651 and IEC 60804.
- Class 1 octave and third octave filters according to IEC 61260.
- Class 1 acoustic calibrator according to IEC 60942:1988.

Applications:

- Assessment of the environmental noise level,
- Noise monitoring and optional capture and analysis of sound events,
- Octave and optional third octave band spectrum analysis from 25 Hz to 12.5 kHz,
- Statistical analysis with the calculation of 3 percentile levels and optional full statistical analysis,
- Identification of impulsive noise,
- Measurements in the workplace,
- Selection of personal protective equipment (SNR, HML, and OBM methods),
- Sound insulation and reclamation,
- Production quality control,
- Measurement of machine noise,
- Optional architectural acoustics and building measurements.

Application Kits

Measurements in the workplace

- **HD2010UC/A kit 2**: Includes **class 2** HD2010UC/A Sound Level Meter, HD2010PNE2 preamplifier, UC52 microphone for free field, windscreen, 5m extension cable and RS232 serial or USB connection cable. DeltaLog5 PC program.
  - **Acoustic calibrator** HD9102
- **HD2010UC/A kit 1**: Includes **class 1** HD2010UC/A Sound Level Meter, HD9101 calibrator, HD2010PNE2 preamplifier, UC52/1 microphone for free field, windscreen, 5m extension cable and RS232 serial or USB connection cable. DeltaLog5 PC program.

Environmental noise monitoring

- **HD2010UC/A kit 1**: Includes **class 1** HD2010UC/A Sound Level Meter, HD9101 calibrator, HD2010PNE2 preamplifier, UC52/1 microphone for free field, windscreen, 5m extension cable and RS232 serial or USB connection cable. DeltaLog5 PC program.
  - **Option 5**: "Advanced Analyzer"
- **HD2010UC/A kit 1/IE**: Version for indoor and outdoor measurements. It includes **class 1** HD2010UC/A Sound Level Meter, HD9101 calibrator, HDWME950N weatherproof microphone unit with UC52/1 microphone cartridge for free field, windscreen, HD2010PNE2 preamplifier, 5m extension cable and RS232 serial or USB connection cable. DeltaLog5 PC program.
  - **Option 5**: "Advanced Analyzer"

Sound insulation and reclamation

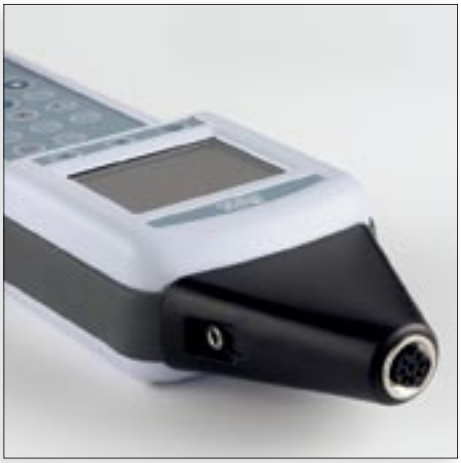
- **HD2010UC/A kit 1**: Includes **class 1** HD2010UC/A Sound Level Meter, HD9101 calibrator, UC52/1 microphone for free field, windscreen, 5m extension cable and RS232 serial or USB connection cable. DeltaLog5 PC program.
  - **Option 1**: "Third Octave"

Building acoustic measurements

- **HD2010UC/A kit 1:** Includes **class 1** HD2010UC/A Sound Level Meter, HD9101 calibrator, HD2010PNE2 preamplifier, UC52/1 microphone for free field, windscreen, 5m extension cable and RS232 serial or USB connection cable. DeltaLog5 PC program.
  - **Option 1**: "Third Octave"
  - **Option 4**: "Reverberation Time"

Accessories

Option 0 "Memory Expansion": 4 MB memory expansion.
Option 1 "Third Octave": Third octave band spectrum analysis in real time from 25 Hz to 12.5 kHz.
Option 4 "Reverberation Time": Measurement using sound source interruption or impulse response integration. Only for **class 1** HD2010UC/A with option 1.
Option 5 "Advanced Analyzer": Profile+report+event data logging, capture and analysis of events, full statistical analysis. Only for **class 1** HD2010UC/A.
Option 7 "SIT Calibration": SIT calibration replaces ISO9001 reports. For new instruments only.
Option "LCD": Backlit display. For new instruments only.
HD2110/CSM: MiniDin to DB25 serial cable for interconnection modem.
HD2110/CSP: MiniDin to DB9 cable to connect a serial printer.
SWD10: Stabilized mains power supply with Vin=100÷230Vac / Vout=12Vdc/1000mA.
CPA/10: 10m extension cable.
VTRAP: Tripod, max. height 1550 mm.
HD2110/SA: Support to fix the preamplifier to the tripod.
S'print-BT: Portable serial printer.
HD2110/MC: SD and MMC memory card interface.



HD SAV2

Software for Windows® 95/98/ME/2000/XP operating systems

DeltaLog5Monitor: Acoustic monitoring and PC remote control. Scheduler and synchronized audio recording.

DeltaLog5Building: Room acoustics evaluation according to D.P.C.M. of 5/12/1997 **(Option 4: "Reverberation Time" is required).**

DeltaLog5 Noise Studio: The analysis functions are supplied as modules for specific applications:

- **Worker Protection** analysis according to Legislative Decree No. 195/2006, European Directive 2003/10/CE of 06/02/2003 and UNI 9432:2002 standard.
- **Railway Traffic:** Analysis of sound events due to passing trains. The module processes the sound levels according to D.M. of 16/03/1998 and D.L. No.194 of 19/8/2005.

Using the HD2010UC/A you can log the time profile of 4 simultaneous parameters freely selecting temporal or frequency weightings. The possibility of displaying, storing and even printing the multi-parameter analysis of the sound level allows the sound level meter to work as a sound level logger capable of storing for more than 23 hours. For sound level monitoring, you can store 3 programmable parameters and the average spectrum at intervals of 1 second to 1 hour. In this recording mode, you can store the sound level (3 parameters + spectra) at intervals of 1 minute for over 23 days using the supplied memory (4 MB expandable to 8 MB).
An advanced acquisition mode ("Advanced Analyzer" option) allows storing report sequences with dedicated parameters, average spectra and full statistical analysis, as well as sound level profiles. Moreover, a versatile trigger function can identify the sound events and record their analysis with 5 dedicated parameters, average spectrum and statistical analysis.

The spectrum analysis is carried out simultaneous with the profile logging in real time by octave bands and optionally by third octave bands. The sound level meter calculates the sound signal spectrum twice a second and it integrates it linearly for up to 99 hours. The average spectrum is displayed together with an A, C or Z -weighted wideband level.

As a statistical analyzer, the HD2010UC/A samples the sound signal 8 times per second with A-weighting and FAST constant, and it analyzes it statistically in 0.5 dB classes. Up to 4 percentile levels, selectable between L_1 and L_{99}, can be programmed. The "Advanced Analyzer" option can be used to choose the sampling of the following: L_{Fp}, Leq and L_{pk} with A, C and Z -weightings (only C and Z for L_{pk}).

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

Recordings can be located in memory and viewed on the graphic display using the "Replay" function, which reproduces the time trend of the sound track. The high-speed USB interface combined with the flexible RS232 interface, allows quick data transfers from the sound level meter to the PC mass storage, as well as controlling a modem or printer. For example, should the supplied memory not be enough, this is the case of lengthy recordings, you can activate the "Monitor" function. This function allows sending the displayed data to a PC via the serial interface, to be directly stored on the PC mass storage.
The sound level meter can be completely controlled by a PC through the multistandard 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 made either using the supplied acoustic calibrator (complying with IEC 60942) or the built-in reference generator. The electrical calibration employs a special preamplifier and it checks the sensitivity of the measuring channel, microphone included. A protected area in the non-volatile memory, reserved for factory calibration, is used as a reference in the user's calibrations, and it allows keeping instrument drifts under control and preventing the instrument from "going out of calibration".
The check of the complete sound level meter functionality can be made directly by the user, in the field, thanks to a diagnostic program.

The HD2010UC/A sound level meter can perform all the measurements required to evaluate workers' noise exposure (Legislative Decree 10.04.06 No. 195). The selection of the personal protective equipment can be carried out through octave band spectrum analysis (OBM method) or comparison of the A and C weighted equivalent levels that can be measured simultaneously (SNR method). If an undesired sound event produces an overload indication, or simply alters the result of an integration, its contribution can be excluded using the versatile Back-Erase function.

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

The HD2010 sound level meter with the "Third Octave" and "Reverberation Time" options can perform all measurements prescribed by the regulations on room acoustics evaluation (D.P.C.M. of 5/12/1997). The sound level meter powerful DSP calculates 32 spectra/second, and it can measure reverberation times both using the sound source interruption and impulsive response integration. The analysis is carried out simultaneously by both octave and third octave bands.

Inputs and outputs

DC output corresponding to the A-weighted sound level with FAST constant time, updated 8 times/s (∅ 2.5 mm jack). This output is not available for all models.
LINE unweighted output (∅ 3.5 mm jack).
Standard RS232C serial port complying with EIA/TIA574. Baud Rate 300 to 115200 baud.
USB 1.1 serial port.
External power supply 9÷12Vdc (∅ 5.5 mm jack).

Italian Laws

- Workplace noise: D. Lgs 195/2006 and European Directive 2003/10/CE.
- Airport noise: Decree of 31.10.97.
- Entertainment noise: D.P.C.M. 215 of 16.04.99.
- Machine noise emissions: D. Lgs. 262 of 4/9/2002.
- Room acoustics evaluation: D.P.C.M. of 05.12.97.

Options and accessories:

HD2110/MC reader

It allows interfacing SD and MMC memory cards with the sound level meter.
This device is connected to the sound level meter through the serial interface that also gives the required power supply.
In addition to the remarkable recording capacity, the interface allows quickly downloading the data stored in the sound level meter internal memory. Cards up to a maximum capacity of 2 GB can be connected.

Option 1 "Third Octave"

Octave and third octave band spectrum analyzer class 1 according to IEC 61260.
Using the "Third Octave" option you can analyze the spectrum of a sound source in real time from 25 Hz to 12.5 kHz. The audibility of the different spectrum components can be evaluated thanks to the equal loudness curves calculation of DeltaLog5, the program supplied with the instrument.

Option 4 "Reverberation Time"

(it can be installed on the class 1 HD2010UC/A with "Third Octave" option)

Reverberation time measurement using the sound source interruption technique and the impulsive source method.
The reverberation time measurement is made simultaneously by wideband, octave band from 125 Hz to 8 kHz and, optionally, third octave band from 100 Hz to 10 kHz. Sampling interval 1/32 s.
Automatic calculation of reverberation times EDT, T10, T20 and T30 for all bands.

Option 5 "Advanced Analyzer"
(it can be installed on the class 1 HD2010UC/A)

This option completes the sound level analyzer functions with the following:

- Statistical analysis available graphically, both as probability distribution and cumulative distribution.
- Trigger function to capture sound events with programmable threshold and duration filter.
- Recording of reports at intervals of 1 s to 1 hour, with a dedicated set of parameters that includes average spectra and full statistical analysis.
- Recording of event parameters with the possibility of setting the maximum time resolution for event recording and a lower resolution for background noise recording.
- Possibility of storing markers.
- Timer for a delayed start of the acquisition.

Software:
DeltaLog5

The DeltaLog5 programm allows easily interfacing the sound level meter to the PC. Its main functions are:

- Transfer of the sound level meter data to the PC's memory.
- Display of the logged data as a table or a graph.
- Export to Excel
- Comparison of the third octave band spectra with the equal loudness curves.
- PC's acquisition control.
- Sound level meter setup.
- Sound level meter firmware upgrade

Writing reports is easier, thanks to a convenient function that allows copying the DeltaLog5 graphs or tables to other applications.

DeltaLog5 Monitor (optional)

In addition to the functions provided by DeltaLog5, the DeltaLog5Monitor program allows the complete control of the sound level meter using the PC. Its additional functions are:

- Possibility of connection to the sound level meter via modem.
- Management of the monitor function.
- Management of the calibration and diagnostic functions.
- Programming automatic acquisitions and monitoring.
- **Possibility of recording the audio synchronized with the sound measurements, using a versatile trigger function.**
- Real-time display of the captured data as a table or a graph.

DeltaLog5 Building (optional)

DeltaLog5Building uses the data acquired by the sound level meter and calculations for room acoustics evaluation according to ISO standards, in compliance with the requirements of the D.P.C.M. of 5/12/1997.

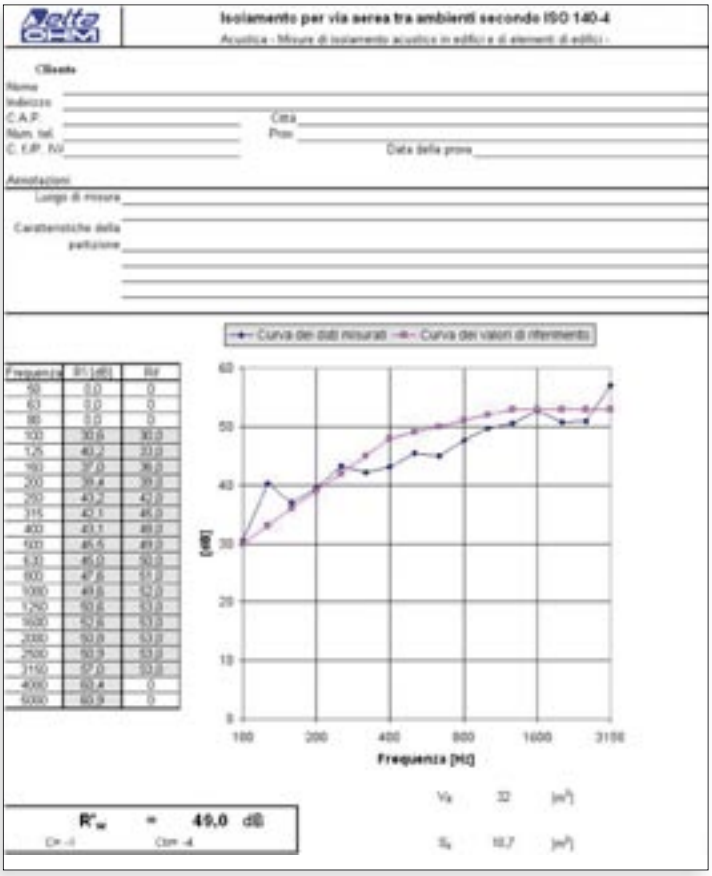
The necessary measurements for the analysis of a building can be grouped into a project so as to simplify their filing and retrieval. Moreover, it may be useful to add technical reports, comments, graphs, illustrations, etc. to the actual measurements (being an integral part of the job) in order to easily recover them when required.

An updatable database, divided into walls and ceilings, contains all soundproofing properties of the main structures. The data contained in the database can be graphically compared with the measurements in the field.

The program allows calculating:

- Average reverberation time
- Equivalent absorption area and sound absorption coefficient (ISO 354)
- Airborne noise insulation: R, R' and D_{nT} indices (ISO 140/III and IV)
- Façades and relevant elements' insulation: $D_{2m,nT}$ and R_{θ} indices (ISO 140/V)
- Impact noise insulation: L_n, DL, L'_n and L'_{nT} indices (ISO 140/VI, VII and VIII)

In order to calculate some indices option 4: "Reverberation Time" is required.



DL5 Building: ISO report writing.

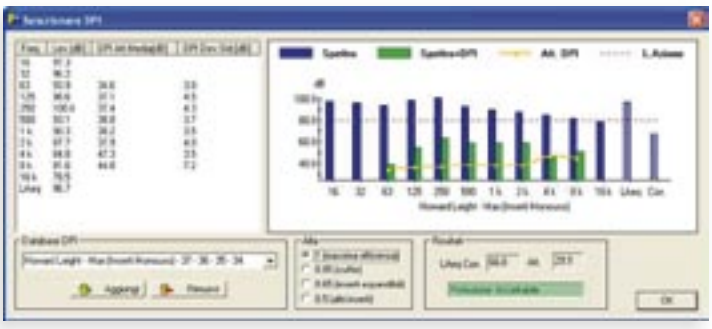
DeltaLog5 Noise Studio (optional)

DeltaLog5 Noise Studio is a post-processing program that can perform different types of analyses. The various analysis functions, specifically devised for a given application, are grouped in software modules that can be enabled using a licence.

The analysis environment gives several display functions (as a table or a graph) of the different sound measurements and processed results. All graphs and tables can be exported to other applications in the Windows® environment.

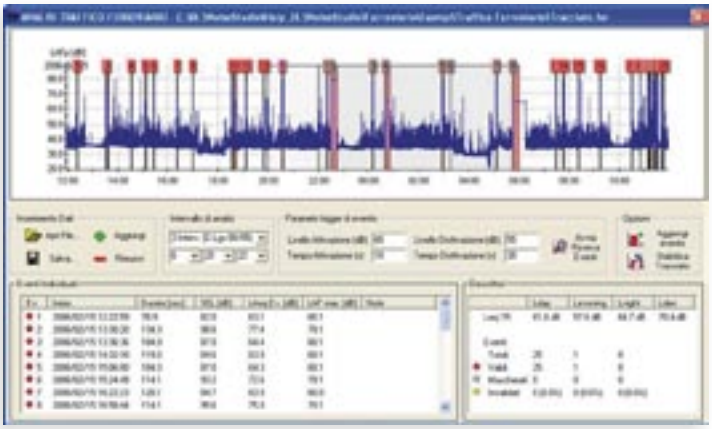
The currently available modules are:

- **Worker protection:** Noise analysis in the workplace according to D. Lgs. 195/2006, European Directive 2003/10/CE and UNI 9432:2002 standard. The module can be updated in case of variation of law requirements.



DL5 Noise Studio: Worker protection: analysis of PPE efficacy

- **Railway Traffic:** Analysis of the sound profiles captured over a 24-hour span, with automatic search and analysis of the sound events due to passing trains. The module processes the sound levels according to D.M. of 16/03/1998 and D.L. No. 194 of 19/8/2005.



DL5 Noise Studio: Railway traffic module: 24-hour analysis with automatic transit search.

Order codes of kits and accessories

HD2010UC/A kit 1: Includes **class 1** HD2010UC/A Sound Level Meter, carrying case, HD2010PNE2 preamplifier, HD9101 calibrator, UC52/1 microphone, CPA/5 5m extension cable, HD SAV windscreen, DeltaLog5 software, and serial cable for connection to a PC with COM (HD2110/CSNM) or USB (HD2101/USB) interface.

HD2010UC/A kit 1/E: Same as the HD2010UC/A kit 1 with weatherproof protection. Suitable for outdoor measurements.
It includes **class 1** HD2010UC/A Sound Level Meter, carrying case, HD2010PNE2W heated preamplifier with 5m connection cable, HD9101 calibrator, UC52/1 microphone, HDWME950/3 weatherproof protection, DeltaLog5 software and serial cable for connection to a PC with COM (HD2110/CSNM) or USB (HD2101/USB) interface.

HD2010UC/A kit 1/IE: Same as the HD2010UC/A kit 1 with weatherproof protection. Suitable for outdoor and indoor measurements.
It includes **class 1** HD2010UC/A Sound Level Meter, carrying case, HD2010PNE2W heated preamplifier with 5m connection cable, HD2010PNE2 preamplifier, CPA/5 5m extension cable, HD9101 calibrator, UC52/1 microphone, HDWME950/3 weatherproof protection, DeltaLog5 software and serial cable for connection to a PC with COM (HD2110/CSNM) or USB (HD2101/USB) interface.

HD2010UC/A kit 2: Includes **class 2** HD2010UC/A Sound Level Meter, carrying case, HD2010PNE2 preamplifier, UC52 microphone, CPA/5 5m extension cable, HD SAV windscreen, DeltaLog5 software and serial cable for connection to a PC with COM (HD2110/CSNM) or USB (HD2101/USB) interface.

HD2010UC/A kit 2/E: Same as the HD2010UC/A kit 2 with weatherproof protection. Suitable for outdoor measurements.
It includes **class 2** HD2010UC/A Sound Level Meter, carrying case, HD2010PNE2W heated preamplifier with 5m connection cable, UC52 microphone, HDWME950/3 weatherproof protection, Delta Log5 software and serial cable for connection to a PC with COM (HD2110/CSNM) or USB (HD2101/USB) interface.

HD2010UC/A kit 2/IE: Same as the HD2010UC/A kit 2 with weatherproof protection. Suitable for outdoor and indoor measurements.
It includes **class 2** HD2010UC/A Sound Level Meter, carrying case, HD2010PNE2W heated preamplifier with 5m connection cable, HD2010PNE2 preamplifier, CPA/5 5m extension cable, UC52 microphone, HDWME950/3 weatherproof protection, Delta Log5 software and serial cable for connection to a PC with COM (HD2110/CSNM) or USB (HD2101/USB) interface.

Option 0 "Memory Expansion": 4 MB memory expansion.

Option 1 "Third Octave": Spectrum analysis in real time by third octave bands from 25 Hz to 12.5 kHz.

Option 4 "Reverberation Time": Reverberation time measurement using the sound source interruption technique and the impulsive source method. It can be installed on the **class 1** HD2010UC/A with "Third Octave" option.

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/A.

Option 7 "SIT Calibration": SIT calibration replaces ISO9001 reports. For new instruments only.

Option "LCD": Backlit LCD. For new instruments only.

HD2101/USB: MiniDin to USB-A serial cable.

HD2110/CSNM: MiniDin to DB9 null-modem serial cable for interconnection.

HD2110/CSM: MiniDin to DB25 serial cable for interconnection modem.

HD2110/CSP: MiniDin to DB9 cable to connect a serial printer.

SWD10: Stabilized mains power supply with Vin=100÷230Vac / Vout=12Vdc/1000mA.

CPA/10: 10m extension cable for HD2010PNE2 preamplifier.

VTRAP: Tripod, max. height 1550 mm.

HD2110/SA: Support to fix the preamplifier to the tripod.

S'print-BT: Portable serial printer.

HD2110/MC: SD and MMC memory card interface.

Codes of spare parts and other accessories

HD9101: Class 1 calibrator according to IEC60942:1988. Frequency: 1000Hz; sound level: 94dB/114dB.

HD9102: Class 2 calibrator according to IEC60942:1988. Frequency: 1000Hz; sound level: 94dB/114dB.

CPA/5: 5m extension cable for HD2010PNE2 preamplifier.

HD SAV: Windscreen for 1/2" microphone.

HD SAV2: Windscreen with bird spikes for HDWME950 microphone unit.

HD SAVP: Rain shield for HDWME950 microphone unit.

HD2010PNE2: Microphone preamplifier with standard connection for ½" microphones. Provided with CTC device for electrical calibration.

HD2010PNE2W: Heated microphone preamplifier for HDWME950NE unit with standard connection for ½" microphones. It is heated and provided with CTC device for electrical calibration. Ending with 5m connection cable (other lengths on request).

UC52/1: Class 1 Microphone for free field.

UC52: Class 2 Microphone for free field.

Technical characteristics	
Standards	Class 1 or 2 group X according to IEC 61672:2002, and class 1 or 2 according to IEC 60651:2001 and IEC 60804:2000; Class 1 according to IEC 61260:1995 Type 1 or 2 according to ANSI S1.4-1983 and S1.43-1997 Class 1-D, order 3, Extended range according to ANSI S1.11-1986
½ inch 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 Weighting	Simultaneous A, C, Z (only C and Z for L_{pk})
Temporal Weighting	Simultaneous FAST, SLOW, IMPULSE
Integration	From 1s to 99 hours with Back-Erase function
Spectrum Analysis	Parallel filters in real time complying with class 1 specifications according to IEC61260 • Octave bands from 32 Hz to 8 kHz "Third Octave" option • Third octave bands from 25 Hz to 12.5 kHz Average spectrum (AVR) mode
Statistical Analysis	It displays up to 3 percentile levels, between L_1 and L_{99} "Advanced Analyzer" option Distribution of probabilities and percentile level calculation from L_1 to L_{99} • Parameter: L_{Fp}, L_{eq}, L_{pk} A, C or Z -weighted (only C or Z for L_{pk}) • Sampling frequency: 8 samples/second • Classification: Classes of 0.5 dB
Analysis of Events	"Advanced Analyzer" option Calculation of 5 freely-programmable event parameters Average spectrum calculation by octave and third octave bands Calculation of statistical levels from L_1 to L_{99} Event identification trigger with programmable threshold and duration filter External and manual trigger
Reverberation Time (optional)	The reverberation time measurement option requires the "Third Octave" option Reverberation time measurement using sound source interruption or impulse response integration
Profile Data Logging	1 profile with programmable sampling from ⅛ s to 1 hour and 3 profiles with 2 samples/second
Spectrum Data Logging	Programmable sampling from 1 second to 1 hour (AVR mode)
Display	Graphic display 128x64 • 3 parameters in numeric format • Profile L_{AFp} with 8 samples/second • Octave band spectrum from 32 Hz to 8 kHz "LCD" option • Backlit LCD "Third Octave" option • Third octave band spectrum from 25 Hz to 12.5 kHz "Advanced Analyzer" option • Graph of sound level probability distribution • Graph of percentile levels from L_1 to L_{99}
Memory	Internal, equal to 4 MB (4 profiles for 23 hours or over 23 recording days of 3 parameters + spectra per minute) expandable to 8 MB External, via the HD2110MC memory card interface, using MMC or SD cards up to 2 GB
Input/Output	• RS232 serial and USB interfaces • AC output (LINE) • DC output
PC Programs	• DeltaLog5: PC interface for data download, setup and sound level meter management (supplied with the instrument) • DL5 Monitor: For real-time acquisition in the PC mass storage, scheduler, audio recording • DL5 Building: For room acoustics evaluation in agreement with D.P.C.M. of 05.12.97 (it requires the "Third Octave" and "Reverberation Time" options) • DL5 Noise Studio: Analysis modular program "Worker Protection": Analysis module according to decree 195/2006 "Railway Noise": Analysis module of train noise profiles according to the decree of 16/03/1998
Operating conditions	Working temperature -10÷50°C, 25÷90%RH (not condensing), 65÷108kPa. Protection degree: IP64
Power	• 4 alkcaline or rechargeable NiMH type AA batteries or external 9÷12Vdc 300mA
Dimension and weight	• 445x100x50 mm equipped with preamplifier, 740 g (with batteries)

Manufacture of portable and bench top instruments.
Current and voltage loop transmitters.
Temperature - Humidity - Pressure - Air speed - Light - Acoustics
pH - Conductivity - Dissolved Oxygen - Turbidity - Elements for weather stations - Thermal Microclimate

SIT CENTRE N°124
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RoHS 2002/95/EC

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