



HD 2010UC/A INTEGRATING SOUND LEVEL METER - FREQUENCY ANALYZER

HD2010UC/A is a portable integrating sound level meter, with data logging function, suitable for performing statistical and spectral analyses. The instrument has been designed by combining maximum flexibility and simplicity. Attention has been paid to the possibility of adjusting the instrument so to comply with the changes in the rules about noise and to the necessity of comply with the current and future requests of the users. It is possible to add options to the HD2010UC/A so to extend its applications; the user can update 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, 2002 (Certificate of Compliance I.N.R.I.M. No. 07-0124-02), IEC 60651 and IEC 60804.
- Class 1 octave and third octave filters according to IEC 61260.

Applications:

- Assessment of the environmental noise level,
- Noise monitoring, 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, full statistical analysis,
- Identification of impulsive noise,
- Measurements in workplaces,
- Selection of personal protective equipment (SNR, HML, and OBM methods),
- Sound insulation and reclamation,
- Production quality control,
- Measurement of machine noise,
- Optional architectural and building acoustics measurements.

Sound level meter class 1 or 2 Kit

HD2010UC/A kit1 and kit2: consists of HD2010UC/A class 1 sound level meter (class 2 for HD2010UC/A kit2), HD2010PNE2 preamplifier, UC52/1 microphone for free field (UC52 for HD2010UC kit2), windscreens, 5m extension cable and serial RS232 or USB connection cable. Noise Studio PC programme. Supplied

with ACCREDIA calibration Certification, according to IEC 60651 and IEC 60804. ACCREDIA Certification of filters according to IEC 61260.

HD2010UC/A kit1/E and kit2/E: version for outdoor measurements, it consists of HD2010UC/A class 1 sound level meter (class 2 for l'HD2010UC/A 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. Supplied with ACCREDIA calibration Certification, according to IEC 60651 and IEC 60804. ACCREDIA Certification of filters according to IEC 61260.

HD2010UC/A kit1/IE e kit2/IE: version for indoor and outdoor measurements, it consists of HD2010UC/A class 1 sound level meter (class 2 for l'HD2010UC/A kit2), HD WME weatherproof microphone unit for outdoor use, HD2010PNE2W heated preamplifier, HD2010PNE2 preamplifier, UC52/1 microphone for free field (UC52 for HD2010UC kit2) and serial RS232 or USB connection cable. Noise Studio PC programme. Supplied with ACCREDIA calibration Certification, according to IEC 60651 and IEC 60804. ACCREDIA Certification of filters according to IEC 61260.

Accessories

Option HD2010.00 "Memory module": 4MB expansion memory.

Option HD2010.01: "Third Octave": spectral analysis in third octave bands from 25Hz to 12.5KHz, class 1 according to IEC 61260. **ACCREDIA calibration Certification according to IEC 61260 included.**

Option HD2010.04: "Reverberation Time": reverberation time measurement by source interruption and integration of impulse response method.

HD9101: class 1 calibrator according to IEC60942:1988. Features:

- Cavity for 1/2" 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 1/2" 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.R.I.M. n.90-003-01 Certificate of Conformity. Features:

- LCD Display,
- Static pressure compensation from 65 kPa to 108 kPa,
- Cavity for 1/2" 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.



HD WME

HD2110/USB: serial USB cable for connection to a PC
SWD10: stabilized mains power supply with $V_{in}=100\div 230V_{ac}$ $V_{out}=12V_{dc}/1000mA$ voltage.
CPA/10: 10m extension cable.
VTRAP: tripod, 1550mm maximum height.
VTRAP.H4: Tripod with 4 m maximum height.
HD2110/SA: support to fix preamplifier to tripod.
HD40.1: portable serial thermal printer with 57mm paper tape equipped with SWD10 stabilizer mains.
HD2010MC: module for data logging and data download to MMC or SD type memory cards, 1GB SD card included.
S.C ACCREDIA calibration Certification according to IEC 60942 for single frequency Calibrator.

Software for Windows® 98/XP/Vista/Win7 (32-64bit) operating systems

Noise Studio: Programme for Windows® 98, XP, Vista and Win7 (32-64bit) 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 of Noise Studio programme. Noise analysis in working environment according to UNI 9432/2011 and ISO 9612/2011.

NS2A: Noise Studio **"Acoustic Pollution"** module activation. Acoustic climate analysis based on daily, weekly, annual analysis (According to 2002/49/CE Directive) ; evaluation of road, railway and airport traffic noise. **Some of the functions need option "Third octave"**.

NS3: Noise Studio **"Acoustic Insulation"** module activation. Architectural and building acoustic according to ISO354, ISO140 and ISO717 series standards. **For some calculations sound level meter options HD2010.01 "Third Octaves" and HD2010.04 "Reverberation Time" are required.**

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

NS5: Noise Studio **"Environmental Noise"** module. Analysis of acoustic pollution and environmental noise sources. The software performs statistical and spectral analyses; automatically identifies noisy events and the pulse and tonal components of the noise sources. The analyses are performed in compliance with the national (D.L. 194/2005 and D.M. 16/03/1998) and EU legislation regarding the acoustic pollution

Noise Studio packages:

NSA: "Environmental" modules package including:

- NS2A: "Acoustic Pollution"
- NS4: "Monitor"
- NS5: "Environmental Noise"

NSLA: "Work & Environment" modules package including:

- NS1: "Workers Protection"
- NS5: "Environmental Noise"

NSAE: "Environmental & Building" modules package including:

- NS2A: "Acoustic Pollution"
- NS3: "Acoustic Insulation"
- NS5: "Environmental Noise"

NSS: Noise Studio software complete package including:

- NS1: "Workers Protection"
- NS2A: "Acoustic Pollution"
- NS3: "Acoustic Insulation"
- NS4: "Monitor"
- NS5: "Environmental Noise"

By 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 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 simultaneously 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.

Additional functions as advanced sound analyser are available in the basic version:

- **Statistical analysis** in graphic form both as probability distribution and as cumulative distribution

- Trigger functions for **sound events capture** with threshold level and event duration filter
- **Record of measuring reports** with programmable intervals from 1 s to 1 hour with a customizable set of 5 parameters, complete statistical analysis and frequency spectra
- Acquisition of noise events with the possibility to set the maximum temporal resolution for event recording and a lower resolution for background recording.
- Possibility to record up to **9 different markers**
- **Timer for programming delayed start** of acquisition

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" can be used to choose the sampling of the following: L_{Fp} , L_{eq} and L_{pk} with A, C and Z -weightings (only C and Z for L_{pk}).

For further analyses, 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 visualized 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 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 acoustic calibrator 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.

HD2010UC/A sound level meter can perform all the measurements required to evaluate **workers' noise exposure**. 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 integration, its contribution can be excluded using the versatile Back-Erase function.

HD2010UC/A sound level meter is suitable for **noise monitoring** and acoustic mapping. Using the "Advanced Analyzer", 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.

HD2010UC/A sound level meter with the "Third Octave" and "Reverberation Time" options can perform all measurements prescribed by the regulations on **room acoustics evaluation**. 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 time constant, updated 8 times/s (\emptyset 2.5 mm jack). This output is not available for all models.

LINE unweighted output (\emptyset 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 (\emptyset 5.5 mm jack).

Options and accessories:

HD2110/MC reader

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 "Third Octave" cod. HD2010.02

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 Noise Studio, the program supplied with the instrument.

Option "Reverberation Time" cod. HD2010.04

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

Software:

Noise Studio

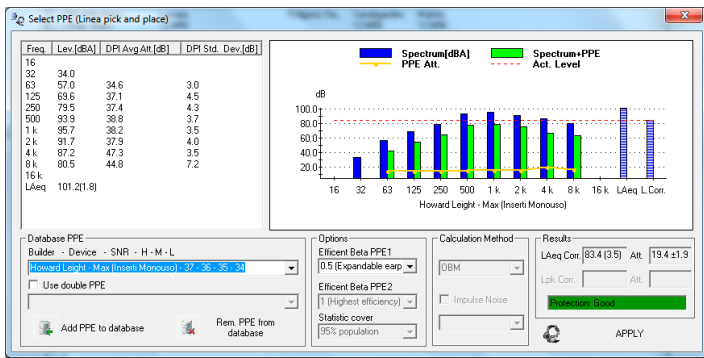
The Noise Studio software allows interfacing HD2010UC to the PC in a simple and intuitive way. Main functions are:

- 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 to other applications and to create PDF files. Moreover Noise Studio is a post processing software able to perform different kind of analyses, developed for specific applications assembled in software modules to be enabled with licence. Demo versions of the software modules are provided.

Noise Studio: NS1 'Worker protection' module (to be activated by license)

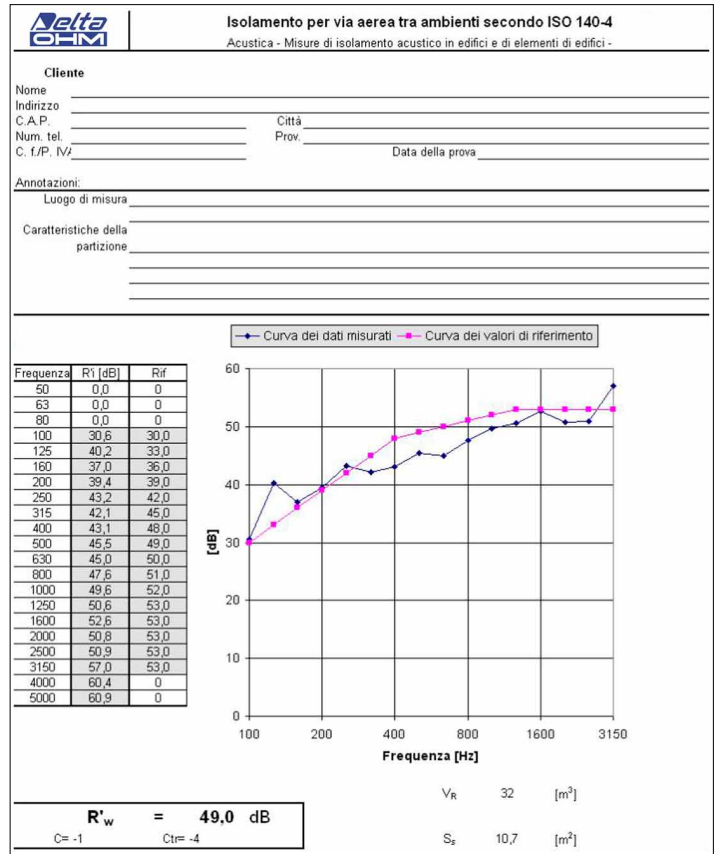
This application module analyzes noise in the workplace according to the European directive 2003/10/EC and UNI 9432/2011. Data sound level measurement in work environment is organized in a project where they can be handled according to regulatory requirements. In addition to calculating the noise exposure of workers the software allows to evaluate the effectiveness of protective equipment by the methods SNR HML and OBM. According to UNI 9432/2011 and ISO 9612/2011, the software also calculates the index of impulsiveness of a machine.



Noise studio: "workers' protection" module NS1: analysis of the effectiveness of PPE

Noise Studio: NS2A '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 according to 2002/49/CE Directive. 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. **Some of the functions need Option 1 "Third octaves"**.



Noise studio "acoustic insulation" module NS3: filling iso report.

Noise Studio: NS3 'Acoustic Insulation' module (to be activated by license)

This module performs calculations of building acoustics for the assessment of passive acoustic requirements of buildings, according to ISO standard. The measures necessary for the analysis of a building are grouped in a project to simplify their storage and research. Also, technical reports, comments, graphics, photos, etc. which remain part of the work can be added to the same measures and, if necessary, may be found easily.

An updateable database, divided by walls and floors, contains the main characteristics of sound-insulating structures. The data contained in the database can be compared graphically with in situ measures.

With the program you can calculate:

- Average reverberation time (ISO 3382)
 - Reverberation time decay editing
 - Acoustic classification according to UNI 11367/2010
 - Machinery noise: continuous and discontinuous systems
 - Area of equivalent absorption coefficient of sound absorption (ISO 354)
 - Airborne sound insulation: indices R, R' and D_{nT} (ISO 140/III and IV)
 - Insulation of facades and facade elements: indices D_{2m,nT} and R₀ (ISO 140 / V)
 - Impact noise insulation: indices L_n, DL, The N and L' _{nT} (ISO 140/VI, VII and VIII)
- Most of the calculation require "third octave" and "reverberation time" options installed on the sound level meter.**

Noise Studio: NS4 '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 sound level data directly into the mass memory of the PC (monitor 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.

Ordering codes for the new kits and accessories

HD2010UC/A kit1 and kit2: Includes HD2010UC/A class 1 Sound Level Meter (class 2 for kit HD2010UC/A kit 2), carrying case, HD2010PNE2 preamplifier, UC52/1 microphone for free field (UC52 for kit HD2010UC/A kit2), windscreens HD SAV, 5m extension cable CPA/5, Noise Studio software and serial cable for connection to a PC (HD2110/RS) or USB (HD2101/USB interface). Supplied with ACCREDIA calibration Certification, according to IEC 60651 and IEC 60804. ACCREDIA Certification of filters according to IEC 61260.

HD2010UC/A kit1/E and kit2/E: Version for outdoor measurements, includes class 1 Sound Level Meter HD2010UC/A (class 2 for HD2010UC/A kit2), carrying case, HD WME weather protection complete with bird spike, windscreen and rain shield, heated preamplifier HD2010PNE2W with 5m connection cable (other lengths on request), UC52/1 microphone for free field (UC52 microphone for HD2010UC/A kit2), RS232 serial (HD2110/RS) or USB (HD2110/USB) connection cable. Noise Studio PC software. Supplied with ACCREDIA calibration Certification, according to IEC 60651 and IEC 60804. ACCREDIA Certification of filters according to IEC 61260.

HD2010UC/A kit1/IE and kit2/IE: Version for indoor and outdoor measurements, includes class 1 Sound Level Meter HD2010UC/A (class 2 for HD2010UC/A kit2), carrying case, HD WME weather protection with bird spike, wind screen and rain shield, heated preamplifier HD2010PNE2W with 5m extension cable (other lengths on request), wind screen HD SAV, preamplifier HD2010PNE2, UC52/1 microphone for free field (UC52 microphone for HD2010UC kit2), 5m extension cable CPA/5, and RS232 serial (HD2110/RS) or USB (HD2110/USB) connection cable. Noise Studio PC programme. Supplied with ACCREDIA calibration Certification, according to IEC 60651 and IEC 60804.

Option HD2010.00 "Memory module": 4MB expansion memory

Option HD2010.01: "Third Octave": spectral analysis in third octave bands from 25Hz to 12.5KHz, class 1 according to IEC 61260. ACCREDIA calibration Certification according to IEC 61260 included.

Option HD2010.04: "Reverberation Time": reverberation time measurement by source interruption and integration of pulse response method.

HD9101: Class 1 calibrator according to IEC90942:1988. Features:

- Cavity for 1/2" microphones according to IEC61094,
- 1000Hz frequency,
- 94dB/114dB sound level.

The calibrator is supplied complete with calibration report according to ISO 9001 (replaced by ACCREDIA Certification if option S.C purchased).

HD2020: Class 2 calibrator according to IEC60942:2003 equipped with I.N.R.I.M. n.90-003-01 Certificate of Conformity. Features:

- Backlit LCD,
- Static pressure compensation from 65kPa to 108kPa,
- Cavity for 1/2" microphones according to IEC61094,
- 1000Hz frequency,
- 94dB/114dB sound level.

The calibrator is supplied complete with calibration report according to ISO 9001 (replaced by ACCREDIA Certification if option S.C purchased).

HD9102: Class 2 calibrator according to IEC90942:1988. Features:

- Cavity for 1/2" 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 ACCREDIA Certification if option S.C purchased).

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.

VTRAP.H4: Tripod with 4 m 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, 57 width and 32mm diameter.

HD2010MC: SD memory card interface. This device includes a 1GB SD card.

S.C ACCREDIA calibration Certification according to IEC 60942 for single frequency Calibrator.

Ordering codes for spare parts and other accessories

HD WME/PNEUC1 outdoor microphone unit for type 1 HD2010UC and HD2010UC/A.

Includes:

- Outdoor protection HD WME
- Heated preamplifier HD2010PNE2W with 5 m cable
- Electret condenser microphone UC52/1, 1/2" diameter

HD WME/PNEUC2 outdoor microphone unit for type 2 HD2010UC and HD2010UC/A.

Includes:

- Outdoor protection HD WME
- Heated preamplifier HD2010PNE2W with 5 m cable
- Electret condenser microphone UC52, 1/2" diameter

HD WME/PNE2 microphone preamplifier with outdoor protection. Includes:

- Outdoor protection HD WME with:
 - Windshield HD SAV3
 - Anti-bird spikes HD WME1
 - Rain protection HD WME2
 - Stainless steel support HD WME3
- Heated preamplifier HD2010PNE2W with 5 m cable

HD WME outdoor protection with windscreen, rain shield and anti-bird spikes.

Includes:

- Windshield HD SAV3
- Anti-bird spikes HD WME1
- Rain protection HD WME2
- Stainless steel support HD WME3

HD SAV: Windscreen for 1/2" microphones.

HD SAV3: Windscreen for HD WME and HD WME950 weather protections.

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.

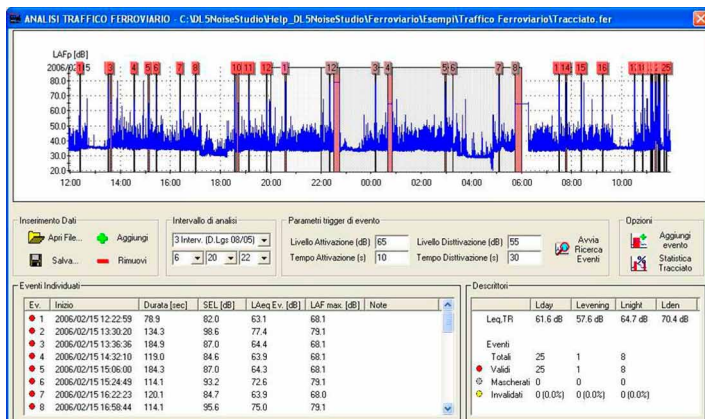
HD2010PNE2: Microphone preamplifier for pre-polarized UC52 microphones. Equipped with CTC device for electrical calibration.

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 (10mt length upon request).

UC52/1: Class 1 pre-polarized 1/2" microphone for free field.

UC52: Class 2 pre-polarized 1/2" microphone for free field.

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



Noise studio: "railway traffic" module include in NS2A: analysis of 24 hours with automatic search of transit



Acoustics - Vibrations

TECHNICAL SPECIFICATIONS

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} , 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 bands from 25 Hz to 12.5 kHz ("Third Octave" option) Average spectrum (AVR) mode
Statistical Analysis	It displays up to 3 percentile levels, between L_1 and L_{99} Probability distribution 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
Combined data logging	profiles, reports, events ✓ Record of measuring reports with programmable intervals from 1 s to 1 hour with a customizable set of 5 parameters, complete statistical analysis and frequency spectra
Analysis of Events	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 (option "Reverberation Time")	Reverberation time measurement using sound source interruption or impulse response integration
Profile Data Logging	1 profile with programmable sampling from 1/6 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 backlit LCD display 128x64 ✓ 3 parameters in numeric format ✓ Profile L_{AFp} with 8 samples/second ✓ Octave band spectrum from 32 Hz to 8 kHz ✓ Third octave band spectrum from 25 Hz to 12.5 kHz (option "Third Octave") ✓ 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	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. ✓ NS1 "Worker protection" module. Analysis of noise in the workplace in accordance with UNI 9432/2011 and ISO 9612/2011. ✓ NS2A "Acoustic pollution" module. Analysis of environmental noise. Analysis of the noise climate and assessment of noise from road, rail and airport according to the law. Some of the functions need option "Third octaves". ✓ NS3 "Acoustic Insulation" module. Evaluation of airborne sound insulation, impact noise and sound absorption; buildings insulation classification (UNI 11367). It needs option "Third octaves" and option "Reverberation time". Calculation according to ISO140, ISO717 and ISO354. ✓ "Monitor" module. Acquisition in real time on PC. Synchronized audio recording. Remote monitoring and data capture. Connection via Modem.
Operating conditions	✓ Working temperature -10÷50°C, 25÷90%RH (not condensing), 65÷108kPa. Protection degree: IP64
Power	✓ 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)