HD 2010UC/A

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.

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.

Accessories

Option 0 "Memory Expansion": 4MB memory expansion. **It needs Option 2 "Data Logger".**

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.**

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 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.

HD 2010UC/A
INTEGRATING SOUND LEVEL METER - PORTABLE 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.RI.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 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 workplaces,
- 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.

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), windscreen, 5m extension cable and serial RS232 or USB connection cable. Noise Studio PC programme.

HD WME

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.

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 of 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 of Noise Studio programme. Acoustic climate analysis and road, railway and airport noise evaluation. **Some of the functions need Option 1 "Third octaves".**

NS3: "Acoustic Insulation" module of Noise Studio programme. Calculations of acoustic and architectural evaluation of passive acoustic requirements of buildings according to D.P.C.M. dated 5/12/1997. **It needs Option 1 "Third octaves" and Option 4 "Reverberation Time".**

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

Noise Studio Suite: Noise Studio programme equipped with the following application modules:
- "Workers' Protection"
- "Acoustic pollution"
- "Acoustic Insulation"
- "Monitor"

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 ("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 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.

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 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 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.

HD2010UC/A sound level meter can perform all the measurements required to evaluate workers' noise exposure (Legislative Decree no.81 of 2008). 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 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.

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 (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 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.
- Room acoustics evaluation: D.P.C.M. of 05.12.97

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 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 Noise Studio, 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 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.
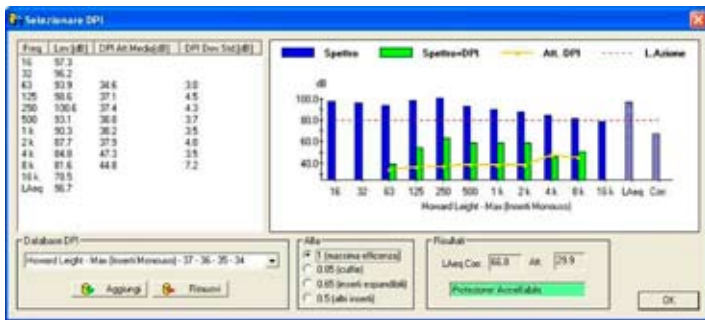
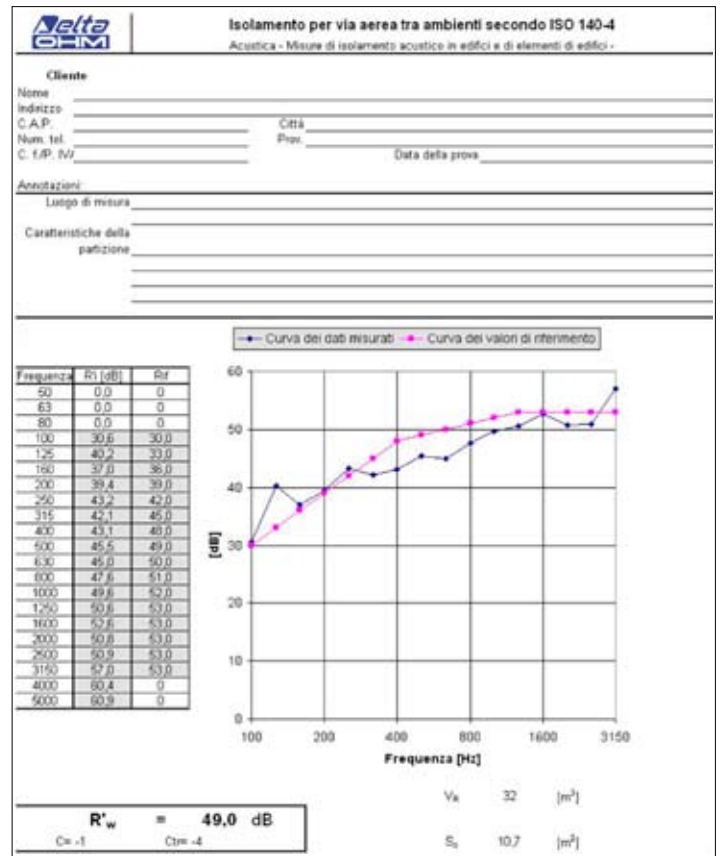**Noise studio: "workers' protection"** module: analysis of the effectiveness of IPD

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.

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".

Frequenza	R1 [dB]	Rif
50	0,0	0
63	0,0	0
80	0,0	0
100	30,6	30,0
125	40,2	33,0
160	37,0	36,0
200	39,4	39,0
250	43,2	42,0
315	42,1	45,0
400	43,1	48,0
500	45,5	49,0
630	45,0	50,0
800	47,6	51,0
1000	49,6	52,0
1250	50,6	53,0
1600	52,6	53,0
2000	50,8	53,0
2500	50,9	53,0
3150	50,0	53,0
4000	60,4	0
5000	60,9	0

R'_w = 49,0 dB
C= -1   Ctr= -4
V_a 32 [m²]
S_a 10,7 [m²]

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

Noise Studio: 'Acoustic Insulation' module

This module performs calculations of building acoustics for the assessment of passive acoustic requirements of buildings, according to ISO standard, and according to the DPCM of 5/12/1997.

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 principal characteristics of sound-insulating structures. The data contained in the database can be compared graphically with measures in place.
With the program you can calculate:
• Average reverberation time (ISO 3382)
• Area of equivalent absorption coefficient of sound absorption (ISO 354)
• Isolation by air: indices R, R 'and D_{nT} (ISO 140/III and IV)
• Insulation of facades and facade elements: indices $D_{2m,nT}$ and R_e (ISO 140 / V)
• Isolation of noise impact: indices L_n, DL, The N and L'_{nT} (ISO 140/VI, VII and VIII)
The form requires the Option 1 "Third Octave" also for the calculation of indices; you must have the Option 4: "Reverberation Time".

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 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/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), windscreen 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).

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 programme.

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.

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

Option 1 "Third Octave": Spectrum analysis in real time by third octave bands from 25 Hz to 12.5 kHz. Includes calibration report according to ISO9001.

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.**

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 2 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, 57 width and 32mm diameter.

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

Codes for ordering spare parts and other accessories

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 HD WME950 weather protection.

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

HD SAVP: Rain shield for 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 ½" microphone for free field.

UC52: Class 2 pre-polarized ½" microphone for free field.

CPA/5: 5m extension cable for preamplifier HD2010PNE2.
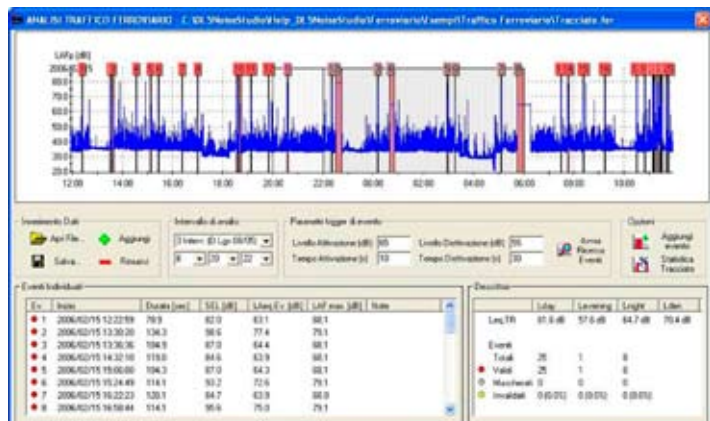
Noise studio: "railway traffic" module: analysis of 24 hours with automatic search of transit

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}, 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} ("Advanced Analyzer" option) ✓ 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 Option 5 "Advanced Analyzer"	This option is only available for class 1 instruments. 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 4 "Reverberation Time")	The reverberation time measurement option requires the option 1 "Third Octave" and is available for class 1 instruments only. 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 ✓ Backlit LCD ("LCD" option) ✓ Third octave band spectrum from 25 Hz to 12.5 kHz (option 1 "Third Octave") ✓ Graph of sound level probability distribution (option 5 "Advanced Analyzer") ✓ Graph of percentile levels from L_1 to L_{99} (option 5 "Advanced Analyzer")
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.** ✓ **"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. Some of the functions need option 1 "Third octaves".** ✓ **"Acoustic Insulation" module. Calculations of acoustic and architectural evaluation of passive acoustic requirements of buildings according to DPCM of 5/12/1997. It needs option 1 "Third octaves" and option 4 "Reverberation time".** ✓ **"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)