

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 software package.

As a **statistical analyzer** (option HD2010.02 “advanced data-logger” compulsory) the HD2010UC samples the sound signal 8 times per second with A-frequency weighting and FAST time constant, and 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 Data Logger” 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 fast 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 long term measurements, it's possible to 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 acoustic calibrator (class 1 or class 2 according to the sound level meter version) 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 measurements according to the law with respect to workers' protection from exposure to noise (D.Lgs.n.81/2008, UNI 9432/2011, ISO 9612/2011). The selection of the personal protective equipment (PPE) can be carried out through comparison of the A and C weighted equivalent sound pressure levels that can be measured simultaneously (SNR method).



## 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. HD2010UC is equipped with a backlit graphic display.*

### Technical regulations:

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

### Applications:

- Assessment of the environmental noise level,
- Optional “advanced data logging”,
- Optional capture and analysis of sound events,
- Statistical analysis with the calculation of 3 percentile level and optional full statistical analysis,
- Noise monitoring (“Advanced data logger” option required)
- Identification of impulsive noises,
- Measurements in workplaces,
- Selection of personal protective equipment (SNR and HML methods),
- Production quality control,
- Measurement of machine noise, sound power measurements.

With HD2010UC sound level meter it is possible to measure the sound pressure 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  $L_{eq}$ , SEL, maximum and minimum sound levels with integration times from 1 second to 99 hours. If an undesired sound event produces an overload indication, or simply alters the result of integration, it is always possible to exclude it by using the versatile Back-Erase function.



HD WME

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

#### Inputs and outputs

DC output: A-weighted 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:

##### HD2010MC card reader ( “Advanced Data Logger” option required)

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 with up to 2GB capacity. 2GB memory card is supplied.

##### Option HD2010.02 “Advanced Data Logger”

It displays and records the A-weighted **sound pressure level profile** with FAST time constant, sampled 8 times per second. It stores the profiles of 3 programmable parameters, sampled twice per second. It is possible to store 3 programmable parameters at intervals from 1 second up to 1 hour for sound level monitoring. By this recording mode it is possible to store 3 parameters by intervals of 1 minute for over 80 days by using the supplied memory (4MB expandable to 8MB with option HD2010.00). “Advanced 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 time constants.

During noise assessment in airport, railways or roads environments, the sound level meter can be used as multi parameters **sound events recorder**, or the possibility for recording simultaneously the profile with FAST time constant level and sound exposure level SEL.

This option integrates the sound level analyser functions, with the following additional features

- **Statistical analysis** available in graphic form both as probability distribution and as cumulative distribution.
- **Capture of sound events** with trigger activated using a threshold level and filter length.
- **REPORTS** function which allows to log 5 additional overall parameters with logging interval from 1 s to 1 hour and complete statistical analysis.
- Record of the event parameters with the possibility of setting the maximum time resolution for the record of events and a lower resolution for the ground recording.
- Possibility to store **markers** .
- **Timer** for **delayed start** of acquisition.

##### Option HD 2010.0R “Heated preamplifier”:

replacement of the standard preamplifier HD2010PNE2 with the heated version HD2010PNE2W. The heated preamplifier can be combined with the outdoor microphone protection HDWME and is equipped with CTC device for electrical calibration and 5m integrated extension cable (10m on request).

#### Post-processing 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 acquired data in a 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 configuration via PC. User configurations management and storage.

Sound level meter firmware update.

It results easier to create reports starting from the sound level meter’s measurements due to the handy function which allows to copy and paste graphs or tables to other applications and to create PDF files.

Moreover Noise Studio is a post processing software able to perform different types of processings, studied for specific applications assembled in software modules to be enabled with licence. Demo versions of the software modules are provided.

##### Noise Studio NS1: ‘Workers protection’ module (to be activated by license)

This application module analyses noise and vibrations in the workplace according to the European directives 2003/10/EC, 2002/44/EC, UNI 9432/2011 and ISO 9612/2011. Sound level measurements and vibration measurements in workplaces are organized in a project where they can be handled and analysed according to standards requirements. The company information, the list of workers and the noise or vibration sources are organized in a database. In addition to calculating the noise exposure of workers the program allows to evaluate the effectiveness of personal protective equipment (PPE) using the SNR, HML and OBM methods (the method applied depends on the presence or not of octave band spectrum on the sound level meter performances). According to UNI 9432/2011, the program also calculates the impulsiveness index of a noise source. The software creates complete reports both for individual worker and synthetic including the company exposition summary. Reports can be exported or printed directly.



Noise Studio: NS1 “Workers Protection” module; PPE effectiveness analysis.

##### Noise Studio NS2A: ‘Acoustic Pollution’ module (to be activated by license)

This application module analyzes sound level profiles for the assessment of the noise climate, airports noise, road traffic noise and railway noise according to 2002/49/CE Directive.

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

Noise profiles detected outdoor, are analyzed in order to search for annoying 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 detection and analysis of sound events. **This module works on time histories acquired with option “Advanced Data Logger” installed on the sound level meter.**

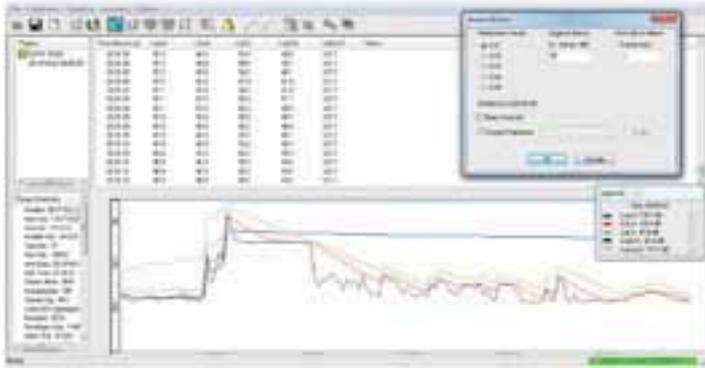


Noise Studio: NS2A “Acoustic Pollution” module; railway traffic noise, 24h analysis with automatic identification of train transits.

### 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 features are:

- Real time display of acquired data, in graphical and tabular form.
- Possibility to remotely connect to the sound level meter via modem.
- 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 to log synchronized audio along with the sound level meter measurements, by using the easy trigger function.



**Noise Studio:** NS4 "Monitor" module; PC based noise acquisition with synchronized audio recording (for later playback).

### ORDERING CODES

**HD2010UC kit 1 and kit 2:** it includes class 1 sound level meter HD2010UC (class 2 for HD2010UC kit2), HD2010PNE2 preamplifier, UC52/1 free field prepolarized microphone (UC52 microphone for HD2010UC kit2), windscreen, USB (HD2110USB) connection cable (alternatively on request RS232C connection cable). Noise Studio PC software, carrying case and paper instruction manual. Supplied with ACCREDIA individual calibration Certification, according to IEC 61672.

### Accessories and options

**Option HD2010.00 "Memory module":** 4MB expansion memory. **HD2010.02 "Advanced Data Logger" option required.**

**Option HD2010.02 "Advanced Data Logger":** automatic logging of time history noise profiles, complete statistical analysis, capture of noise events using trigger level function, simultaneous data logging of profiles, reports and events. "Navigator" program to recall from memory, view and analyze stored data.

**Option HD 2010.OR "Heated preamplifier":** replacement of the standard preamplifier HD2010PNE2 with the heated version HD2010PNE2W. The heated preamplifier can be combined with the outdoor microphone protection HDWME and is equipped with CTC device for electrical calibration and 5m integrated extension cable (10m on request).

**HD2020:** Class 1 sound calibrator according to IEC60942:2003 (I.N.RI.M. n.90-003-01 Type approval Certificate). Features:

- Static pressure compensation from 65kPa to 108kPa,
- Cavity for ½" microphones according to IEC61094,
- 1000Hz frequency,
- 94dB/114dB noise levels.

The calibrator is provided with ACCREDIA individual calibration Certification.

**HD9101:** Class 1 sound calibrator according to IEC60942:1988. Features:

- Cavity for ½" microphones according to IEC61094,
- 1000Hz frequency,
- 94dB/114dB sound levels.

The calibrator is provided with ACCREDIA individual calibration Certification.

**HD9102:** Class 2 sound calibrator according to IEC 942:1988. Features:

- Cavity for ½" microphones according to IEC 61094,
- 1000Hz frequency,
- 94dB/114dB sound levels.

The calibrator is provided with ACCREDIA individual calibration Certification.

**HD2010PNE2:** Preamplifier for UC52/1 and UC52 microphones, equipped with CTC device for electrical calibration and driver for cable up to 10 m

**HD2010PNE2W:** Heated preamplifier for UC52/1 and UC52 microphones, with 5m integrated extension cable (10m on request). The preamplifier can be combined with the microphone outdoor protection HD WME and is equipped with CTC device for electrical calibration

**HD2110RS:** RS232 serial cable for PC connection or connection to HD40.1 printer.

**HD2110USB:** serial USB cable for PC connection.

**SWD10:** Stabilized mains power supply  $V_{in}=100\div 230Vac / V_{out}=12Vdc/1000mA$ .

**CPA/5:** 5m microphone extension cable.

**CPA/10:** 10m microphone extension cable.

**VTRAP:** Tripod, 1550 mm maximum height.

**VTRAPH4:** Tripod with 4 m maximum height. Max. load 10 kg

**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:** module for data logging and data download to MMC or SD type memory cards, 2GB SD card included.

**HDWME:** Outdoor microphone protection with windscreen, rain shield and birds spike. Can be combined with the HD2010PNE2W preamplifier. Includes: windscreen HDSAV3, birds spike HDWME1, rain shield HDWME2, stainless steel support HDWME3

### Software for Windows® operating systems

**Noise Studio:** Programme for Windows® (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. When plugged into the USB port, according to licence purchased, it enables the following Noise Studio software modules:

**NS1:** Noise Studio "Workers' Protection" module activation. Noise and vibration analysis in the workplaces according to UNI 9432/2011, ISO 9612/2011 and 2003/10/CE and 2002/44/CE European directives.

**NS2A:** Noise Studio "Acoustic Pollution" module activation. Acoustic climate analysis and evaluation of road, railway and airport traffic noise (According to 2002/49/CE Directive). **Requires HD2010.02 "Advanced data logger" option**

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

### Ordering codes for spare parts and other accessories

**HD2010UC.U1: Upgrade** from HD2010UC with "Data Logger" or "Advanced Data Logger" option to HD2010UC/A. Includes:

- octave bands spectral analysis
- ACCREDIA calibration Certification of the sound level meter and the octave filter bank.

**HDSAV:** Windscreen for ½" microphones.

**HDSAV3:** Windscreen for HD WME microphone weather protection.

**HDWME1:** Bird spike for HD WME microphone weather protection.

**HDWME2:** Rain shield for HD WME microphone weather protection.

**HDWME3:** Stainless steel housing for the preamplifier of HDWME microphone weather protection, including holder for rain shield HDWME2.

**UC52/1: Class 1** free field pre-polarized microphone .

**UC52: Class 2** free field pre-polarized microphone.



## 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 free field, pre-polarized, condenser type .
Dynamic range	30 dBA ÷ 143 dB Peak
Linearity range	80 dB
Acoustic Parameters	Spl, L <sub>eq</sub> , L <sub>eqf</sub> , SEL, L <sub>EP,d</sub> , L <sub>max</sub> , L <sub>min</sub> , L <sub>pk</sub> , Dose, L <sub>n</sub>
Frequency Weightings	simultaneous A, C, Z (only C and Z for L <sub>pk</sub> )
Time Weightings	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 <sub>1</sub> to L <sub>99</sub> Probability distribution and percentile level calculation from L <sub>1</sub> to L <sub>99</sub> (HD2010.02 "Advanced Data Logger" option required) ✓Parameter: L <sub>Fp</sub> , L <sub>eq</sub> , L <sub>pk</sub> weighted A, C or Z (only C or Z for L <sub>pk</sub> ) ✓Sampling frequency: 8 samples/second ✓Classification: Classes of 0.5 dB
Analysis of Events (Option HD2010.02: "Advanced Data Logger")	✓Calculation of 5 freely-programmable event parameters ✓Calculation of statistical levels from L <sub>1</sub> to L <sub>99</sub> ✓Event identification trigger with programmable threshold and duration filter ✓Manual trigger
Profile Data Logging (Option HD2010.02: "Advanced Data Logger")	Parallel profiles, reports, events acquisition 1 profile with sampling 1/8 s + 3 customizable parameters profiles with 2 samples/second + 5 customizable parameters profiles with 1 s to 1 hour sampling period (Reports mode) ,
Display	Graphic LCD backlit display 128x64 ✓3 parameters in numeric format ✓Profile L <sub>A,Fp</sub> with 8 samples/second (Option HD2010.02: "Advanced Data Logger") ✓Graph of sound level probability distribution (Option HD2010.02: "Advanced Data Logger") ✓Graph of percentile levels from L <sub>1</sub> to L <sub>99</sub> (Option HD2010.02: "Advanced Data Logger")
Memory	✓4 MB internal, memory for more than 500 records . If HD2010.02 option installed: 1 profile for 23 hours or over 80 recording days of 3 parameters per minute) Expandable to 8 MB with option HD2010.00 "Memory module". ✓External, via the HD2010MC memory card interface, using SD memory cards up to 2 GB.
Input/Output	✓RS232 serial and USB interfaces ✓AC output (LINE) ✓DC output
PC Programs	Noise Studio (provided with the instrument): PC interface for data download, set up and instrument management. Licensed software modules to be enabled by hardware key. ✓NS1 "Workers protection" module. Analysis of noise and vibrations in the workplace according to 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 roads, railways and airports according to European Directive on environmental noise. Requires option HD2010.02: "Advanced Data Logger". ✓NS4 "Monitor" module. PC based real time acquisition. Synchronized audio recording. Remote monitoring and data capture. Remote connection also via Modem. The program allows programming of measurements and calibrations with timer and performs events audio recording with programmable triggers levels.
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).