

HD2010UC



HD2010UC 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

- Sound Level Meter Class 1 or 2 according to IEC 61672-1:2002 (I.N.R.I.M. Approval Certificate No. 07-0124-02), IEC 61672-1:2013, 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 over-load indication, or simply alters the result of integration, it is always possible to exclude it by using the versatile Back-Erase function. The measured sound levels can be recorded in the large non-volatile memory in order to be transferred to a PC using the supplied Noise Studio software package.

As a **statistical analyzer** (option HD2010.O2 "Advanced Data Logger" required) 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_F , 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. 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 9612/2011-2025). 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).

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.

Inputs and outputs

DC output: A-weighted sound level with FAST time constant, updated 8 times per second (Ø2.5 mm jack).

Un-weighted LINE output (Ø3.5 mm jack).

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

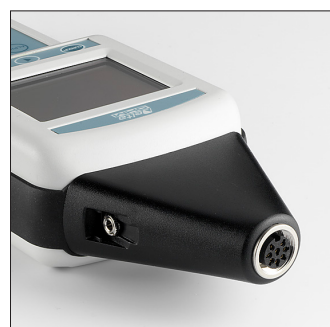
USB 1.1 serial port.

5÷24 Vdc/500 mA external power supply (Ø5.5 mm 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 2 GB capacity. 2 GB memory card is supplied.

Option HD2010.O2 “Advanced Data Logger”

Display and storage of A-weighted sound level profile with FAST time constant, sampled 8 times per second. Storage of the profiles of 3 programmable parameters, sampled 2 times per second. It is also possible to store, in the REPORTS mode, a further 5 global parameters programmable at intervals from 1 second to 1 hour.

The “Advanced Data Logger” option turns the HD2010UC Sound Level Meter into a sound level recorder capable for example of storing for over 40 hours, 1 PROFILE parameter @ 1/8 s + 3 SLM parameters @ 1/2 s.

The identification of impulsive events is possible, thanks to the simultaneous storage of sound level profiles with FAST, SLOW and IMPULSE 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.

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.
- 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 on CH20 hardware key. Demo versions of the software modules are provided.

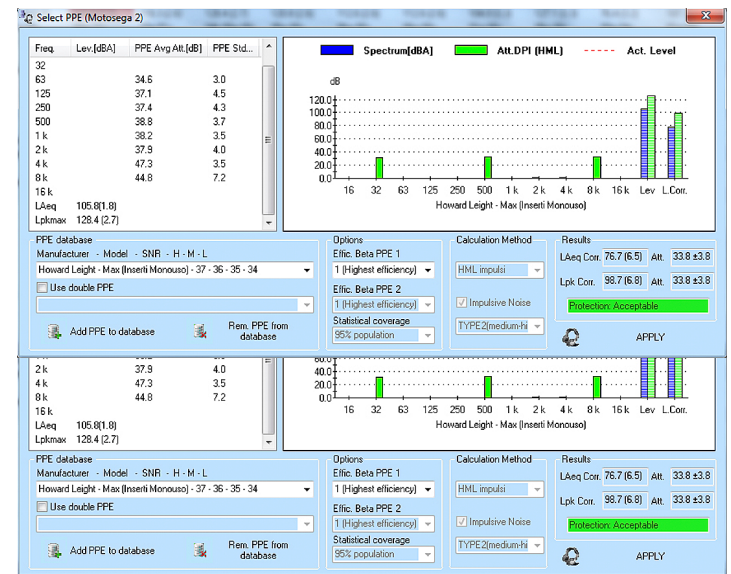
Noise Studio NS1: ‘Workers protection’ module (to be activated by license)

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 9612/2011-2025. 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, which are not available for HD2010UC, 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.

ORDERING CODES

HD2010UC.kit1: it includes class 1 sound level meter HD2010UC, UC52/1 free field prepolarized microphone, HDSAV windscreen, HD2010PNE2 preamplifier (or HD2010PNE2W with opt. HD2010.OE), HD2110USB cable (alternatively, on request, HD2110RS serial cable for RS232 connection),



Noise Studio: Modulo NS1 Worker Protection: Analysis of PPE Effectiveness.

Noise Studio: NS-ENS “Environmental Noise Studio” module (license-activated)

This application module is designed for advanced environmental noise analysis and enables the management, post-processing, and professional reporting of data acquired with compatible sound level meters. Analyses are performed in accordance with national regulations (Ministerial Decree 03/16/1998, Decree Law 194/2005) and EU regulations (Directive 2002/49/EC, ISO 1996-2:2017, UNI 11143-3).

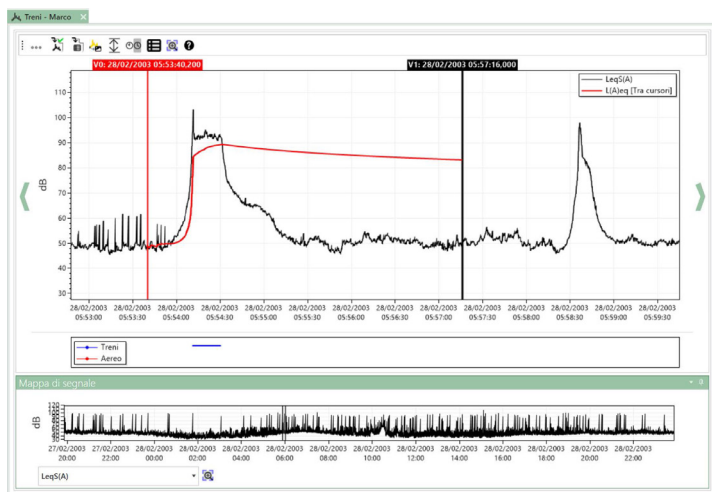
Measurement data are organized into a project that includes measurements and post-processing in a single container. The software allows for the visualization of time profiles, frequency spectra, spectrograms (spectral functions not available for HD2010UC), and statistical distributions, with advanced zoom, scroll, and multiple cursor functions for detailed analysis of sound events.

The module allows for the identification and quantification of disturbing sound sources, the detection of impulse and tonal components (tonal components not available for HD2010UC), the calculation of environmental noise indicators for daily periods (Ld, Le, Ln, Lden), and the automatic verification of compliance with absolute, emission, immission, and differential limits set forth by current regulations.

Measurement data can be stored and synchronized via NS Storage, a free* cloud platform compatible with all Senseca sound level meter models. The software generates comprehensive technical reports based on customizable Microsoft Word® templates, which can be exported in Word, PDF, and HTML formats.

The NS-ENS module is compatible with Windows OS (min. Windows 10). Activation is performed via an online license.

*Limited free storage space.



Noise Studio: Modulo NS-ENS Environmental Noise Studio



HD2020 Class 1 sound level calibrator



VTRAP tripod and HDWME outdoor microphone windscreen

rechargeable batteries, SWD10 stabilized mains power supply, Noise Studio basic software downloadable from Senseca website, IEC 61672 manufacturer conformity declaration, carrying case and instruction manual.

HD2010UC.kit2: it includes class 2 sound level meter HD2010UC, UC52 free field prepolarized microphone, HDSAV windscreen, HD2010PNE2 preamplifier (or HD2010PNE2W with opt. HD2010.OE), HD2110USB cable (alternatively, on request, HD2110RS serial cable for RS232 connection), rechargeable batteries, SWD10 stabilized mains power supply, Noise Studio basic software downloadable from Senseca website, IEC 61672 manufacturer conformity declaration, carrying case and instruction manual.

Options

HD2010.O2: "Advanced Data Logger": sound level profiles automatic recording, full statistical analysis with calculation of percentile levels from L_1 to L_{99} , capture and analysis of sound events with trigger function, simultaneous data logging of profiles, reports and events. "Navigator" program for reviewing stored data.

ACCREDIA-RK11: Option IEC 61672 ISO 17025 accredited calibration.

HD2010.OE: Microphone protection for outdoor measurements. It includes: HDWME outdoor microphone protection with windscreen, rain protection and bird spikes; compatible with $\frac{1}{2}$ " preamplifiers with min length 85 mm including microphone; HD2010PNE2W heated preamplifier (substitutes HD2010PNE2 standard preamplifier); includes CTC device for electric calibration and 5 m (10 m on request) integrated extension cable.

Calibrators

HD2020: Sound level calibrator, class 1 (type approved) according to IEC 60942:2003, with LCD display, suitable for $\frac{1}{2}$ " and $\frac{1}{4}$ " standard microphones. Does not require any correction for static pressure, humidity and temperature. Calibration frequency 1000 Hz, levels 94 dB and 114 dB. ACCREDIA (ISO 17025) calibration certificate according to IEC 60942 included.

HD2022: Sound level calibrator, class 2 according to IEC 60942:2003, suitable for $\frac{1}{2}$ " and $\frac{1}{4}$ " (1) standard microphones. Does not require any correction for static pressure, humidity and temperature. Calibration frequency 1000 Hz, level 114dB. ACCREDIA (ISO 17025) calibration certificate according to IEC 60942 included.

HD2020AD4: Adapter for $\frac{1}{4}$ " microphones. Can be used with HD2020 and HD2022 sound calibrators

Accessories

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

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

HD2110USB: serial USB cable for connection to a PC

SWD10: Stabilized mains power supply 100-240 Vac/12 Vdc 1 A.

CPA/5: 5 m microphone extension cable.

CPA/10: 10 m microphone extension cable.

VTRAP: tripod, 1310 mm maximum height.

BAT4V8NIMH: spare battery pack for the sound level meter.

HD2110/SA: support to fix preamplifier to tripod.

HD40.1: portable serial thermal printer equipped with SWD10 stabilizer mains.

HD2010MC: Module for data logging and data download to MMC or SD type memory cards, 2 GB SD card included (HD2010.O2 "advanced data logger" required)

BAGSL: Carrying case

Software for Windows® operating systems

Noise Studio basic: software for Windows® (32-64bit) that can be downloaded for free from the Senseca website. It allows sound level meter configuration, download, export and graphic display of stored data. This software supports acoustic and vibration post processing application modules, which can be enabled by licence with protection hardware key. Noise Studio includes demo versions of the application modules.

CH20: Hardware key for PC working with Windows® operating system. When plugged into the USB port, according to licence purchased, it enables the Noise Studio software modules.

NS1: Noise Studio "Workers' Protection" module activation . Noise and

vibration analysis in the workplaces according to UNI 9432/2011, ISO 9612/2011-2025 and 2003/10/CE and 2002/44/CE European directives.

NS-ENS "Environmental Noise Studio": Desktop software module for advanced environmental noise analysis (spectral analysis features not available for HD2010UC). Compatible with Windows OS (min. Windows 10). Licensing via alphanumeric code.

Ordering codes for spare parts and other accessories

HDSAV: Windscreen for ½" microphones.

UC52/1: Class 1 free field pre-polarized ½" microphone .

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

TECHNICAL SPECIFICATIONS	
Standards	Class 1 or 2 Group X according to IEC 61672-1:2013 Approval according to IEC 61672-1:2002 (I.N.R.I.M. Approval Certificate No. 07-0124-02) Class 1 or 2 according to IEC 60651:2001 and IEC 60804:2000
½" microphone	UC52 (or UC52/1) condenser type, pre-polarized, for free field
Dynamic range	30 dBA ÷ 143 dB Peak
Linearity range	80 dB
Acoustic parameters	Spl, L_{eq} , L_{eq} , SEL, $L_{EP,d}$, L_{max} , L_{min} , L_{pk} , Dose, L_n
Frequency weightings	Simultaneous A, C, Z (only C and Z for L_{pk})
Time weighting	Simultaneous FAST, SLOW, IMPULSE
Integration	From 1s to 99 hours with Back-Erase function
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} (HD2010.O2 "Advanced data logger" option) - Parameter: $L_{F,p}$, 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 HD2010.O2)	- Calculation of 5 freely-programmable event parameters - Calculation of statistical levels from L_1 to L_{99} - Event identification trigger with programmable threshold and duration filter - Manual trigger
Profile data logging (Option HD2010.O2)	Parallel acquisition of profiles, reports and events 1 profile with sampling ½ s and 3 profiles with 2 samples/second, 5 parameters profiles in Report mode with minimum sampling interval 1s.
Display	Graphic backlit LCD display 128 x 64 3 parameters in numeric format - Profile $L_{A,Fp}$ with 8 samples/second (option HD2010.O2 "Advanced Data Logger") - Graph of sound level probability distribution (option HD2010.O2 "Advanced Data Logger") - Graph of percentile levels from L_1 to L_{99} (option HD2010.O2 "Advanced Data Logger")
Memory	- Internal, equal to 8 MB for more than 500 records. If the HD2010.O2 option "Advanced Data Logger" is installed, with 8 MB it is possible to record 1 parameter PROFILE @ 1/8 s + 3 parameter SLM @ 1/2 s for more than 40 hours. - External, via the HD2010MC memory card interface, using SD 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 and ISO 9612 and 2003/10/CE and 2002/44/CE directives. NS-ENS "Environmental Noise Studio": desktop software module for advanced analysis of environmental noise in accordance with Directive 2002/49/EC, Ministerial Decree of March 16, 1998, ISO 1996-2:2017, and UNI 11143-3. Activation via online license. License provided via alphanumeric code.
Operating conditions	Working temperature -10...50 °C, 25...90% RH (not condensing), 65...108 kPa. Protection degree: IP64
Power supply	4.8 V / 2.1 A NiMH rechargeable battery or external 5÷24 Vdc / 500 mA
Dimensions and weight	445 x 100 x 50 mm equipped with preamplifier, 740 g (with batteries)