



HD 2010 INTEGRATING SOUND LEVEL METER - PORTABLE ANALYZER

The HD2010 is a precision integrating portable sound level meter, with data logging functions, performing both spectrum and statistical analysis. The instrument has been designed combining maximum flexibility and simplicity. Attention has been paid to the possibility of adjusting the instrument to regulatory modifications and to the necessity of meeting its users' needs of today and tomorrow. The HD2010 can be integrated with other options to extend its application scope at any time; the firmware can be directly updated by the user by means of the Noise Studio program (supplied with the instrument).

Technical regulations:

- Class 1 sound level meter according to IEC 61672-1, 2002 (Certificate of Compliance I.E.N. No. 37035-01C), IEC 60651 and IEC 60804.
- Class 1 octave and third octave filters according to IEC 61260
- Microphone complying with IEC 61094-4.

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 16 Hz to 20 kHz,
- Statistical analysis with 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 Kits

HD2010 kit 1: consists of HD2010 Sound Level Meter, HD2010PN preamplifier, MK221 microphone for free field, windscreen, 5m extension cable and RS232 serial or USB connection cable. Noise Studio PC Program.

HD2010 kit 1/E: Version for outdoor measurements. It consists of HD2010 Sound Level Meter, HD WME weather protection, free field microphone unit MK223, windscreen, heated preamplifier HD2010PNW, RS232 serial or USB connection cable. Noise Studio PC Program.

HD2010 kit 1/IE: Version for indoor and outdoor measurements. It includes HD2010 Sound Level Meter, HD WME weather protection, free field microphone unit MK223, windscreen HDSAV, heated preamplifier HD2010PNW, preamplifier HD2010PN, 5m extension cable CPA/5 and RS232 serial or USB connection cable. Noise Studio PC Program.

Accessories

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

Option 1 "Third Octave": Third octave band spectrum analysis in real time from 16 Hz to 20 kHz. Includes calibration report according to ISO 9001.

Option 4 "Reverberation Time": Measurement using sound source interruption or impulse response integration. **It requires option 1 "Third octaves".**

Option 5 "Advanced Analyzer": Profile+report+event data logging, capture and analysis of events, full statistical analysis.

Option 7 "SIT Calibration": SIT calibration replaces ISO 9001 reports. **For new instruments only.**

MK231: Class 1 microphone for diffuse field type WS2D according to IEC 61094-4:1995.

MK223: Class 1 Microphone for free field, type WS2F, according to IEC 61094-4:1995. Coated membrane for outdoor use.

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

- Cavity for 1" and ½" microphones according to IEC61094
- Sound level 94dB/114dB.

The calibrator is supplied complete with calibration report according to ISO 9001.

HD2020: class 1 calibrator according to IEC60942:2003 with I.N.R.I.M. certificate of conformity n.90-003-01. Specifications:

- LCD display,
- Static pressure compensation from 65kPa to 108kPa,
- Cavity for 1" and ½" microphones according to IEC61094,
- 1000Hz frequency,
- Sound level 94dB/114dB.

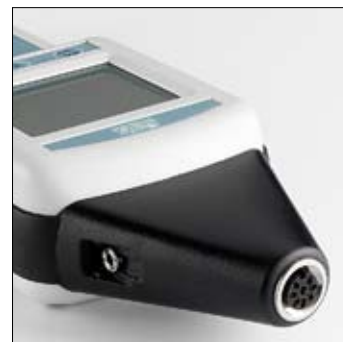
The calibrator is supplied complete with calibration report according to ISO 9001.

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.



HD WME

VTRAP: Tripod, 1550 mm maximum height.
HD2110/SA: Support to fix the preamplifier to the tripod.
HD40.1: Portable serial printer with 57mm paper rolls and SWD10 power supply.
HD2010/MC: SD memory card interface complete with 1GB SD card

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

Noise Studio: Software for Windows® ME/2000/XP and Vista operating systems supplied in the sound level meter kit. Configuration of the instrument, downloading and graphical display of stored data. This programme supports some sound analysis application modules which can be enabled by licence with the hardware key. The program contains demo versions of the modules.

CH20: Hardware key for PC with Windows® operating systems. Inserted into a USB port enables PCs to use software modules of the program Noise Studio.

NS1: Activation of module "Worker protection" of the Noise Studio program. Analysis of noise in the workplace in accordance with Decree 81 of 2008 and the UNI 9432-2008.

NS2: Activation of module "Noise pollution" of the Noise Studio Program. 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 program functions require option 1 "Third octaves".**

NS3: Activation of the module "Acoustic Insulation" of the Noise Studio program. Calculations of acoustic and architectural evaluation of passive acoustic requirements of buildings according to DPCM of 5/12/1997. **Requires option 4 "Reverberation time".**

NS4: Activation of the module "Monitor" of the Noise Studio program. Acquisition in real time on PC. Synchronized audio recording. Remote monitoring and data capture. Connection via Modem.

Noise Studio Suite: Noise Studio Program complete with following application modules:

- "Worker Protection"
- "Noise Pollution"
- "Acoustic Insulation"
- "Monitor"

Using the HD2010 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 logging 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 in real time, simultaneous with profile acquisition, 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 HD2010 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 if you want to sample L_{Fp} , L_{eq} and L_{pk} with A, C and Z weightings (only C and Z for L_{pk}).

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

Recordings can be located in memory and viewed on the graphic display using the "Replay" function, which reproduces the time trend of the sound track. The high-speed USB interface combined with the flexible RS232 interface allows quick data transfers from the sound level meter to the PC mass storage, as well as controlling a modem or printer. For example, should the supplied memory not be enough, this is the case of lengthy recordings, you can activate the "Monitor" function. This function allows sending the displayed data to a PC via the serial interface, to be directly stored on the PC memory.

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 made either using an acoustic calibrator (class 1 according to IEC 60942) or the built-in reference generator. The electrical calibration employs a special preamplifier and it checks the sensitivity of the measuring channel, microphone included. A protected area in the non-volatile memory, reserved for

factory calibration, is used as a reference in the user's calibrations, and it allows keeping instrument drifts under control and preventing the instrument from "going out of calibration".

The control of the complete sound level meter functionality can be made directly by the user, on site, thanks to a diagnostic programme.

The HD2010 sound level meter can perform the measurements required to evaluate workers' noise exposure (Legislative Decree 10.04.06 No. 195). The selection of the personal protective equipment can be carried out through octave band spectrum analysis (OBM method) or comparison of the A and C weighted levels that can be measured simultaneously (SNR method). If an undesired sound event produces an overload indication or simply alters the result of the integration, its contribution can be excluded using the versatile Back-Erase function.

The HD2010 sound level meter is suitable for sound level monitoring and acoustic mapping. Using the "Advanced Analyzer" option, it can also perform analysis of the acoustic climate with capture and analysis of sound events. When measuring traffic noise near airports, railways and roads, the sound level meter can be used as a multi-parameter sound recorder, combining the statistical and spectrum analyzer features. Remote electrical calibrations and diagnostic tests can be executed using its remote control capabilities.

The HD2010 sound level meter with the "Third Octave" option meets the technical requirements of art. 2 of the Decree of 16 March 1998.

Impulsive events can be easily identified thanks to the possibility of analyzing the profile of the A-weighted level with FAST, SLOW, and IMPULSE constants. All measuring parameters can be stored for subsequent analysis. The identification of tonal components using the HD2010 has its limitations: the source can be identified only if dominant in the acoustic climate being examined. Moreover, the sound level meter cannot identify the tonal components at the standard third octave band crossing point. The audibility of the tonal component, to be compared with that of the remaining spectrum areas, can also be evaluated using the Noise Studio program supplied with the instrument, thanks to the calculation of the equal loudness curves.

The HD2010 sound level meter, with the "Third Octave" and "Reverberation Time" options, can perform all measurements prescribed by the regulations on room acoustics evaluation (D.P.C.M. of 5/12/1997). The sound level meter powerful DSP calculates 32 spectra/second, and it can measure reverberation times both using the sound source interruption and the impulsive source integration technique. The analysis is carried out simultaneously both by 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 (\varnothing 2.5 mm jack).

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

Italian Laws

- Workplace noise: D.L.81/2008, European Standard UNI 9432/2008 and European Directive 2003/10/CE.
- Noise pollution: Law 447 of 26/10/95, D.P.C.M. of 1/3/91, Decree of 16/03/98, D.L. 194 dated 19/08/2005 and European Directive 2002/49/CE.
- Airport noise: Decree of 31.10.97.
- Entertainment noise: D.P.C.M. 215 of 16.04.99.
- Machine noise emissions: D. Lgs. 262 of 4/9/2002 and European Directive 2005/88/CE.
- Room acoustics evaluation: D.P.C.M. of 05.12.97.

Options and accessories:

HD2110/MC reader

It allows interfacing SD memory cards with the sound level meter.

This device is connected to the sound level meter through the serial interface that also gives the required power supply.

In addition to the remarkable recording capacity, the interface allows quickly downloading the data stored in the sound level meter internal memory. Cards up to 2 GB can be connected. Includes a 1GB SD card.

Option 1 "Third Octave"

Class 1 octave and third octave band spectrum analyzer according to IEC 61260. Using the "Third Octave" option you can analyze the spectrum of a sound source from 16 Hz to 20 kHz in real time. The audibility of the different spectrum components can be evaluated thanks to the calculation of equal loudness curves using the Noise Studio program supplied with the instrument.

Option 4 "Reverberation Time" (it requires the "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, by third octave band from 100 Hz to 10 kHz. Sampling interval 1/32 s.

Automatic calculation of reverberation times EDT, T10, T20 and analysis of the decay profile with the possibility to calculate the reverberation time in an interval of your choice.

Option 5 "Advanced Analyzer"

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

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

Software:

Noise Studio

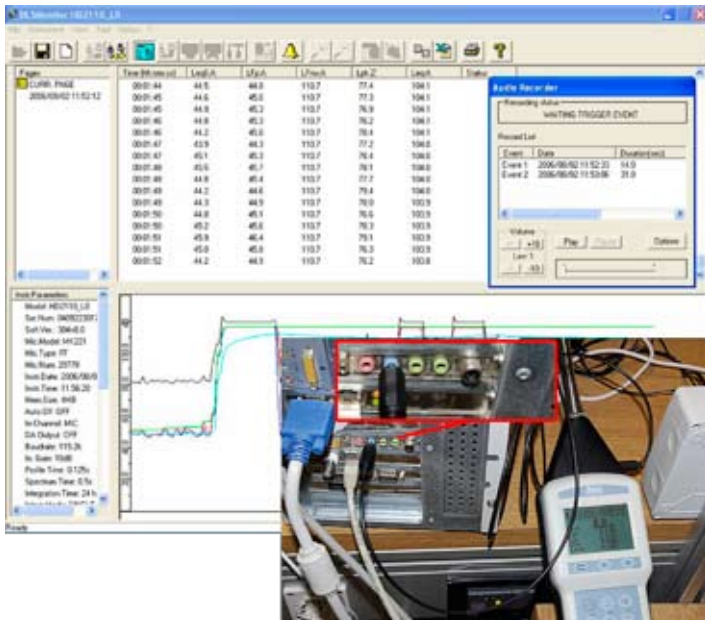
The Noise Studio program allows easily interfacing the sound level meter with the PC. Its main functions are:

- Data transfer from the sound level meter to the PC's memory.
- Display of the logged data as a table or a graph.
- Export to Excel
- Comparison of third octave band spectra with equal loudness curves.
- Logging control through PC (with the "Data Logger" option).
- Sound level meter setup.
- Sound level meter firmware upgrade

Writing reports is easier, thanks to a convenient function that allows copying the graphs or tables to other applications and the ability to create PDF files. Noise Studio is a program of post-processing that can perform different types of analysis designed for specific applications and grouped into modules with licensed software. Demo versions of the software modules are included.

Noise Studio: 'Worker protection' module

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 measurements in work environment are 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: "monitor" module: acquisition on pc with synchronized audio recording

Noise Studio: 'Acoustic Pollution' module

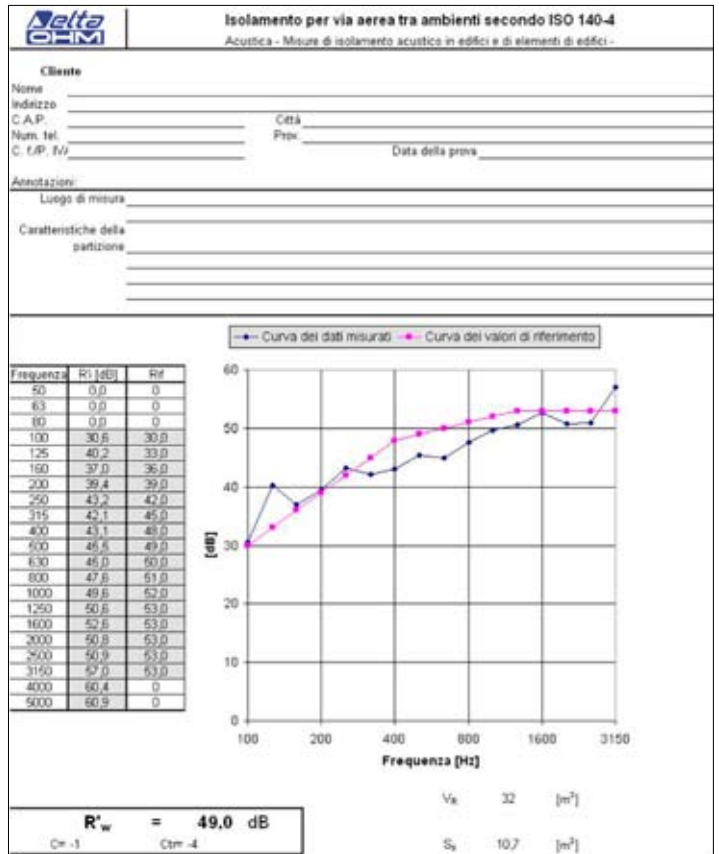
This application module analyzes sound level profiles detected in indoor and outdoor environment for the assessment of the noise climate, the noise of industrial sites, ports, airports and transport infrastructure, and noise generally understood as a disturbance of human activity. The analysis of the noise climate is made on a daily, weekly and annual basis with resolutions up to 1 minute, according to DL 194, 19/08/2005.

The profiles of noise detected in the external environment are analyzed 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 automatic search and analysis of sound events, according to the Ministerial Decree D.L. 194, 19/08/2005 of 16/03/1998. For the evaluation of the disturbance caused to the population from any source of noise even domestic, according to DM of 16/03/1998, the measured noise profiles are analyzed in search of impulsive or tonal components.

For some functions you need option 1: "Third octaves".

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. You can also add to the measures themselves, a technical report, comments, graphics, photos, etc. that remain part of the work 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



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

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 DNT (ISO 140/III and IV)
- Insulation of facades and facade elements: indices $D_{2M,NT}$ and R_0 (ISO 140 / V)
- Isolation of noise impact: indices L_n , D_n , L_n and L'_{nr} (ISO 140/VI, VII and VIII)
- Global Indices (ISO 717-1 and 717-2)
- The program requires option 1 "Third octave" and for the calculation of some indices also the option 'Reverberation time'

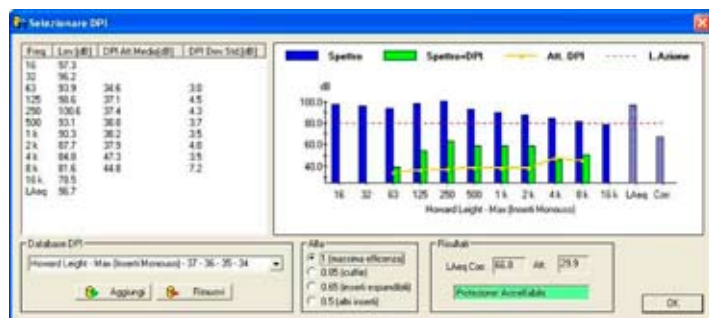
Noise Studio: 'Monitor' module

- 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 calibration and diagnostic functions.
- Automatic acquisition and monitoring program.
- Possibility of synchronized audio recording with the sound level measures, using a versatile trigger function

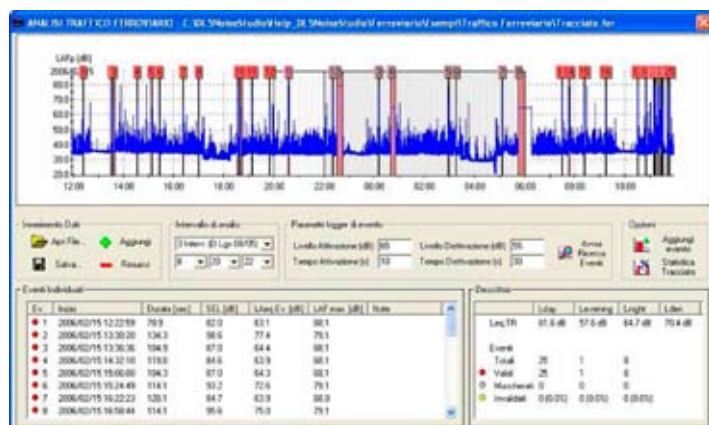
Purchasing codes for kit and accessories

HD2010 kit 1: consists of HD2010 Sound Level Meter, carrying case, HD2010PN preamplifier, MK221 microphone, CPA/5 5m extension cable, HD SAV windscreen, Noise Studio software and serial cable for connection to a PC (HD2110/RS) or USB (HD2101/USB interface).

HD2010 kit1/E: Version for outdoor measurements. It consists of: HD2010 Sound



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



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

Level Meter, carrying case, HD WME weather protection with bird spike, wind screen and rain shield. HD SAV windscreen, heated preamplifier HD2010PNW with 5m extension cable (other lengths available on request), MK223 microphone, Noise Studio software and serial cable for connection to a PC (HD2110/RS) or USB (HD2101/USB interface).

HD2010 kit1/E: Version for indoor and outdoor measurements. It consists of HD2010 Sound Level Meter, carrying case, HD WME weather protection with bird spike, wind screen and rain shield, heated preamplifier HD2010PNW with 5m extension cable CPA/5, preamplifier HD2010PN, HD SAV windscreen, free field microphone unit MK223, Noise Studio software and serial cable for connection to a PC (HD2110/RS) or USB (HD2101/USB interface).

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

Option 1 "Third Octave": Real-time third octave band spectrum analysis from 16 Hz and 20 kHz.

Option 4 "Reverberation Time": Reverberation time measurement using the sound source interruption technique and the impulsive source method. **It requires the "Third Octave" option and, for instruments manufactured before 2007, also the "Data logger" option.**

Option 5 "Advanced Analyzer": Profile+report+event data logging, capture and analysis of events, full statistical analysis. **It requires the "Data Logger" option for instruments manufactured before 2007.**

Option 7 "SIT Calibration": SIT calibration replaces ISO 9001 reports. **Only for new instruments.**

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

- Cavity for 1" and 1/2" microphones according to IEC61094
- 1000Hz Frequency
- Sound level 94dB/114dB

The calibrator is supplied complete with calibration report according to ISO 9001 (replaced by a SIT certificate if combined to Option 7 "SIT Calibration").

HD2020: class 1 calibrator according to IEC60942:2003 with I.N.R.I.M. certificate of conformity n.90-003-01. Characteristics:

- LCD display
- Static pressure compensation from 65kPa to 108kPa
- Cavity for 1" and 1/2" microphones according to IEC61094
- Frequency 1000Hz
- Sound level 94dB/114dB

The calibrator is supplied complete with calibration report according to ISO 9001 (replaced by a SIT certificate if combined to Option 7 "SIT Calibration").

MK231: Class 1 Microphone for diffuse field, type WS2D, according to IEC 61094-4:1995.

MK223: Class 1 Microphone for free field, type WS2F, according to IEC 61094-4:1995. Coated membrane for outdoor use.

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 with $V_{in}=100\div230Vac$ / $V_{out}=12Vdc/1000mA$.

CPA/10: 10m extension cable for HD2010PN preamplifier.

VTRAP: Tripod, 1550 mm maximum height.

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

HD40.1: Portable serial printer with 57mm paper rolls and SWD10 power supply.

BAT40: Spare battery pack for HD40.1

RCT: 4 rolls of thermal paper, 57 width and 32mm diameter.

HD2010/MC: SD memory card interface complete with 1GB SD card

Codes for spare parts and other accessories

Option 2 "Data logger": Storage of 4 sound level profiles, continuously and at intervals. It includes memory expansion from of 2 MB. **This option is included in the new instruments.**

HD WME/PNWK: HD WME weather protection equipped with:

- HD WME consisting of preamplifier housing WME3 HD, bird spikes WME1, HD SAV wind screen SAV3 and rain shield HD WME2.
- Heated preamplifier HD2010PNW with 5m connection cable (other lengths upon request),
- MK223 microphone for free field type WS2F according to IEC 61094-4:1995 with coated membrane for outdoors use.

HD WME/PN

: HD WME weather protection equipped with:

- HD WME consisting of preamplifier housing WME3 HD, bird spikes WME1, HD SAV wind screen SAV3 and rain shield HD WME2.
- Heated preamplifier HD2010PNW with 5m connection cable (other lengths upon request),

HD WME: Weather protection equipped with:

- Stainless steel housing for HD WME3 preamplifier with rain shield HD WME2 support,
- HD WME1 bird spike,
- HD SAV3 wind-screen,
- HD WME2 rain shield.

HD SAV: Windscreen for 1/2" microphone.

HD SAV2: Windscreen with bird spike for HD WME950 microphone unit.

HD SAVP: Rain shield for HD WME950 microphone unit.

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

HD WME1: Bird spike for HD WME microphone unit.

HD WME2: Rain shield for HD WME microphone unit.

HD WME3: Stainless steel housing for the preamplifier of the outdoor microphone unit HD WME with holder for rain protection HD WME2.

HD2010PN: Microphone preamplifier for 1/2" microphones. Provided with CTC device for electrical calibration.

HD2010PNW: Microphone preamplifier for HDWME950N and HDWME weather protections. Heated and provided with CTC device for electrical calibration. Ending with 5m connection cable (other lengths upon request).

MK221: Class 1 microphone for free field, type WS2F, according to IEC 61094-4:1995

CPA/5: 5m extension cable for HD2010PN preamplifier.

HD2101/USB: USB serial cable for PC connection. **For sound level meters with serial Mini-Din connector.**

HD2110CSNM: RS232 serial cable for PC connection. **For sound level meters with serial Mini-Din connector.**

TECHNICAL SPECIFICATIONS

Standards	Class 1 group X according to IEC 61672:2002 and class 1 according to IEC 60651:2001 and IEC 60804:2000 Class 0 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 Microphones	MK221 condenser microphone pre-polarized (200V), for free field, high stability, type WS2F according to IEC 61094-4. MK223 condenser microphone with coated membrane, polarized (200V), for free field, high stability, type WS2F according to IEC 61094-4 (combined with the HDWME950 weatherproof unit). MK231 condenser microphone, polarized (200V), for diffuse field, high stability, type WS2D according to IEC 61094-4.
Dynamic range	21 dBA ÷ 143 dB Peak
Linear Field	80 dB (110 dB for the HD2010RE version)
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 1 s 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 16 Hz to 16 kHz ✓ Third octave bands from 16 Hz to 20 kHz (option 1 “Third Octave”) Average spectrum (AVR) mode
Statistical Analysis	It displays up to 3 percentile levels for, L_1 to L_{99} Probability distribution and percentile level calculation from L_1 to L_{99} (option 5 “Advanced Analyzer”) ✓ Parameter: A, C or Z weighted, L_{Fp} , L_{eq} , L_{pk} (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” ✓ Calculation of 5 freely programmable event parameters ✓ Average spectrum calculation by octave and third octave bands ✓ Calculation of statistical levels from L_1 to L_{99} ✓ Event identification trigger with programmable threshold and duration filter ✓ External and manual trigger.
Reverberation Time (optional)	The reverberation time measurement option requires the “Third Octave” option Reverberation time measurement using sound source interruption or impulse response integration
Profile Data Logging	1 profile with programmable sampling from 1/8 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	Backlit graphic display 128x64 ✓ 3 parameters in numeric format ✓ Profile L_{AFp} with 8 samples/second Octave band spectrum from 16 Hz to 16 kHz ✓ “Third Octave” option ✓ Third octave band spectrum from 16 Hz to 20 kHz “Advanced Analyzer” option ✓ Graph probability distribution of sound level ✓ Graph of percentile levels from L_1 to L_{99}
Memory	Internal, equal to 4 MB (4 profiles for 23 hours or over 23 days recording 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 program functions require 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. Requires option 4 “Reverberation time”. ✓ “Monitor” module. Acquisition in real time on PC. Synchronized audio recording. Remote monitoring and data capture. Connection via Modem. The program allows programming of measurements and calibrations with timer and audio recording with programmable event triggers.
Operating conditions	Working temperature -10÷50°C, 25÷90%RH (without condensation), 65÷108kPa. Protection degree: IP6
Power	4 alkaline or rechargeable NiMH type AA batteries or external 9÷12Vdc 300mA
Dimensions and weight	445x100x50 mm equipped with preamplifier, 740 g (with batteries)