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DO-100.19E

PORTABLES SOUND LEVEL METERS

HD2010 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 fl exibility and simplicity. Attention has been paid to the possibility of adjusting the instrument to regulatory modifi cations 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 fi rmware can be directly updated by the user by means of the DeltaLog5 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 fi lters according to IEC 61260.
- Microphone complying with IEC 61094-4.
- Class 1 acoustic calibrator according to IEC 60942:1988.

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 the workplace,
- Selection of personal protective equipment (SNR, HML, and OBM methods),
- Sound insulation and reclamation,
- Production quality control,
- Measurement of machine noise,

APPLICATION KITS

Measurement of noise pollution

- **HD2010 kit 1:** Includes HD2010 Sound Level Meter, HD9101 calibrator, HD2010PN preamplifier, MK221 microphone for free field, windscreen, 5m extension cable and RS232 serial or USB connection cable. DeltaLog5 PC program
- **Option 1:** "Third Octave"
- **HD2010 kit 1/IE:** Version for indoor and outdoor measurements. It includes HD2010 Sound Level Meter, HD9101 calibrator, HDWME950N weatherproof microphone unit with MK223 microphone cartridge for free fi eld, windscreen, HD2010PN preamplifier, 5m extension cable and RS232 serial or USB connection cable. DeltaLog5 PC program
- **Option 1:** "Third Octave"

Building measurements

- **HD2010 kit 1**: Includes HD2010 Sound Level Meter, HD9101 calibrator, HD2010PN preamplifier, MK221 microphone for free field, windscreen, 5m extension cable and RS232 serial or USB connection cable. DeltaLog5 PC program.
- **Option 1**: "Third Octave"
- **Option 4**: "Reverberation Time"

Environmental noise level monitoring

- **HD2010RE kit 1**: Includes HD2010RE Sound Level Meter, HD9101 calibrator, HD2110P preamplifi er, MK221 microphone for free field, windscreen, 5m extension cable and RS232 serial or USB connection cable. DeltaLog5 PC program.
- **Option 5**: "Advanced Analyzer"
- **HD2010RE kit 1/IE**: Version for indoor and outdoor measurements. It includes HD2010RE Sound Level Meter, HD9101 calibrator, HDWME950 weatherproof microphone unit with MK223 microphone cartridge for free fi eld, windscreen, HD2110P preamplifier, 5m extension cable and RS232 serial or USB connection cable. DeltaLog5 PC program.
- **Option 5:** "Advanced Analyzer"

Accessories
Option 0 "Memory Expansion": 4 MB memory expansion.
Option 1 "Third Octave": Third octave band spectrum analysis in real time from 16 Hz to 20 kHz.
Option 4 "Reverberation Time": Measurement using sound source interruption or impulse response integration. It requires option 1.
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 fi eld type WS2D according to IEC 61094-4:1995.
HD2110/CSM: MiniDin to DB25 serial cable for interconnection modem.
HD2110/CSP: MiniDin to DB9 cable to connect a serial printer.
SWD10: Stabilized mains power supply Vin=100÷230Vac / Vout=12Vdc/1000mA.
CPA/10: 10m extension cable.
CPA/20: 20m extension cable (for HD2010RE).
CPA/50: 50m extension cable (for HD2010RE).
VTRAP: Tripod, max. height 1550 mm.
HD2110/SA: Support to fi x the preamplifi er to the tripod.
S'print-BT: Portable serial printer.
HD2010/MC: SD and MMC memory card interface.

Software for Windows® 95/98/ME/2000/XP operating systems
DeltaLog5Monitor: Acoustic monitoring and PC remote control. Scheduler and synchronized audio recording.
DeltaLog5Environment: Data analysis according to the decree of 16/3/98.
DeltaLog5Building: Room acoustics evaluation according to D.P.C.M. of 5/12/1997 *(Option 4: "Reverberation Time" is required).*
DeltaLog5 Noise Studio: The analysis functions are supplied as modules for specific applications:

- **Worker protection** analysis according to the Legislative Decree No. 195/2006, European Directive 2003/10/CE of 06/02/2003, and UNI 9432:2002 standard.
- **Railway Traffic** analysis of sound events produced by passing trains. The module processes sound levels according to D.M. of 16/03/1998 and D.L. No.194 of 19/8/2005

Using the HD2010 you can log the time profi le 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 L1 and L99, 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 multistandard 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 the supplied 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 check of the complete sound level meter functionality can be made directly by the user, in the field, thanks to a diagnostic program.
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 an 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 DeltaLog5 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.

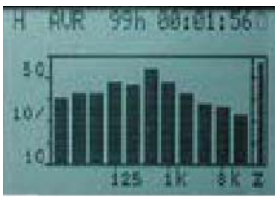
HD2010RE VERSION
The HD2010RE sound level meter extends the range HD2010 linear field. The dynamic range for wideband channels and constant percentage bandwidth channels of 20÷140dBA is divided into 2 ranges of 110dB (20÷130dBA, 30÷140dBA).
The HD 2010RE sound level meter allows making measurements over a dynamic range limited downwards only by the instrument intrinsic noise. For example, if you set the measuring range upper limit at 140 dB, you can carry out measurements at the typical sound levels of a quiet office, being able to measure accurately, without overload indications, peak levels up to 143 dB.

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).

OPTIONS AND ACCESSORIES:
HD2110/MC reader
It allows interfacing SD and MMC 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.
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 Deltalog5, a program supplied with the instrument.
Option 2 “Data Logger” (included in the new instruments)
It includes the internal memory expansion from 2 MB to 4 MB. Display and recording of the A-weighted sound level profile with FAST time constant, sampled 8 times per second. Storage of the profiles of 3 programmable parameters, sampled twice per second. Storage of 3 programmable parameters with octave and third octave band average spectra at intervals of 1 s to 1 hour (with the “Third Octave” option). In this recording mode, you can store 3 parameters at intervals of 1 minute for over 23 days using the supplied memory (4 MB expandable to 8 MB).
Option 4 “Reverberation Time”
(it can be installed on the HD2010 and HD2010RE with “Data logger” and “Third Octave” options)
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 T30 for all bands.
Option 5 “Advanced Analyzer”
(it can be installed on the HD2010 and HD2010RE with “Data logger” option)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.

Basic screen

Time profile



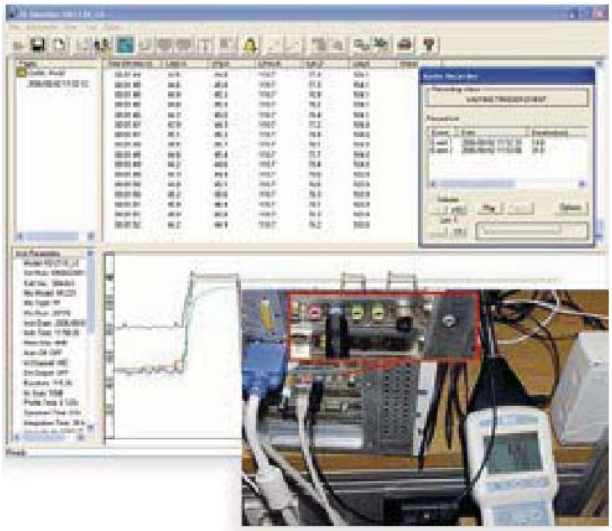
Octave band spectrum

Third octave band spectrum ("third octave" option)

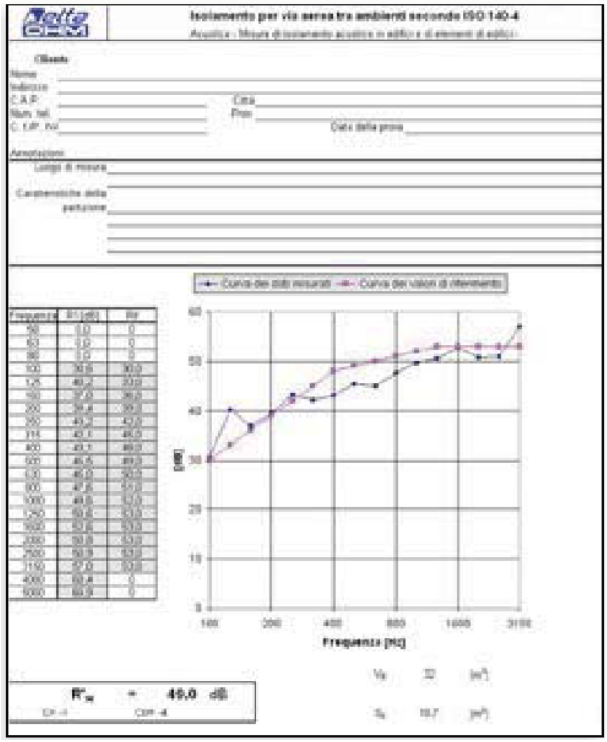
Statistical analysis: probability distribution of sound levels ("advanced analyzer" option)

Statistical analysis: percentile levels ("advanced analyzer" option)

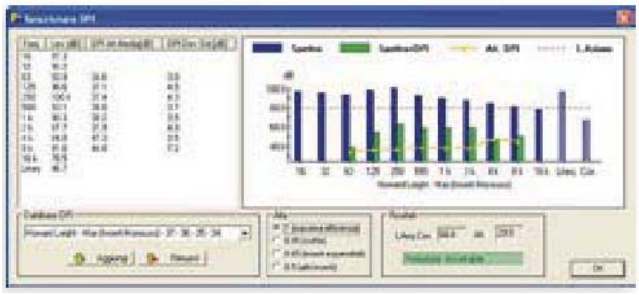
SOFTWARE:
DeltaLog5
The DeltaLog5 programm allows easily interfacing the sound level meter with the PC.Its main functions are:
Data transfer from the sound level meter to the PC’s memory.
Display of the logged data as a table or a graph.
Export to Excel
Comparison of third octave band spectra with equal loudness curves.
Logging control through PC (with the “Data Logger” option).
Sound level meter setup.
Sound level meter fi rmware upgrade
Writing reports is easier, thanks to a convenient function that allows copying the DeltaLog5 graphs or tables to other applications.
DeltaLog5 Monitor (optional)
In addition to the functions provided by DeltaLog5, the DeltaLog5Monitor program al-
lows the complete control of the sound level meter using the PC.
Its additional functions are:
Possible connection to the sound level meter via modem.
Monitor function management.
Calibration and diagnostic function management.
Programming of automatic logging and monitoring.
Possibility of recording the audio synchronized with the sound measurements, using a versatile trigger function.
Real-time display of the logged data as a table or a graph.



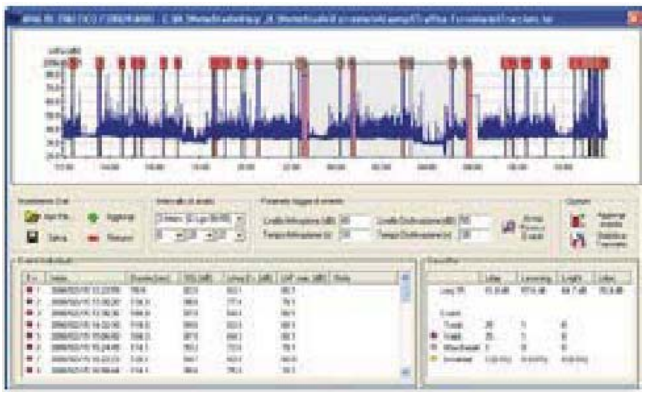
DeltaLog5 Environment (optional)
The DeltaLog5Environment program allows analyzing the data logged by the sound level meter, helping write measurement reports. Its main functions are:
Automatic search of impulsive components according to the Decree of 16/03/98.
Automatic search of tonal components according to the Decree of 16/03/98 (see the note on the HD2010 limits).
Statistical analysis.
Measurement archive.
Recalculation of equivalent level with masking function.
Display of the logged data as a table or a graph.
Limits of the HD2010 soud level meter:
During environmental noise analysis, the HD2010 has some limits when tonal components are present. The limits are due to two factors:
1) The spectrum analysis can be performed only as a linearly integrated spectrum.
2) Only a single third octave fi lter is available with standard central frequencies.
The fi rst factor allows the identifi cation of tonal components when the disturbing source which produces them is stationary and dominant in the acoustic climate being examined. The second factor does not allow the identifi cation of tonal components in the standard third octave band crossing point.
DeltaLog5 Building (optional)
DeltaLog5Building uses the data logged by the sound level meter and it calculates the coefficient for room acoustics evaluation according to ISO standards, in compliance with the requirements of the D.P.C.M. of 5/12/1997.
The necessary measurements for the analysis of a building can be grouped into a project so as to help fi le and locate them. Moreover, it may be useful to add technical reports, comments, graphs, illustrations, etc. to the actual measurements (being an integral part of the job) in order to easily recover them when required.
An updatable database, divided into walls and ceilings, contains all soundproof properties of the main structures. The data contained in the database can be graphically compared with the measurements in the fi eld.The program allows calculating:
Average reverberation time
Equivalent absorption area and sound absorption coeffi cient (ISO 354)
Airborne noise insulation: R, R' and DnT indices (ISO 140/III and IV)
Façades and relevant elements' insulation: D2m,nT and Rθ indices (ISO 140/V)
Impact noise insulation: Ln, DL, L'n and L'nT indices (ISO 140/VI, VII and VIII)
In order to calculate some indices you need option 4: "Reverberation Time".



DeltaLog5 Noise Studio (optional)
DeltaLog5 Noise Studio is a post-processing program that can perform different types of analyses. The various analysis functions, specifi cally designed for a given application, are grouped in software modules that can be enabled using a licence.
The analysis environment gives several display functions (as a table or as a graph) of the different sound measurements and processed results. All graphs and tables can be exported to other applications in the Windows® environment.
The modules currently available are:
Worker protection: Noise analysis at the workplace according to D. Lgs. 195/2006, European Directive 2003/10/CE and UNI 9432:2002 standard. The module can be updated in case of variation of law requirements.



Railway Traffic: Analysis of the sound profi les captured over a 24-hour span, with automatic search and analysis of the sound events due to passing trains. The module processes the sound levels according to D.M. of 16/03/1998 and D.L. No. 194 of 19/8/2005.



ORDER CODES OF KITS AND ACCESSORIES

HD2010 kit 1:
Includes
HD2010 Sound Level Meter,
carrying case,
HD2010PN preamplifier,
HD9101 calibrator,
MK221 mcrophone, PA/5 5m extension cable, HD SAV indscreen,
DeltaLog5 software
serial cable for connection to a PC with COM HD2110/CSNM) or USB (HD2101/USB interface).
HD2010 kit1/E: Version for outdoor measurements.
It includes :
DWME950/3: Weatherproof protection unit.
HD2010PNW: Heated preamplifier in place of HD2010PN,
HD SAV
CPA/5
MK223: Microphone with coated membrane in place of MK221
HD2010 kit1/IE: Version for outdoor and indoor measurements. It includes also:
HDWME950N/2: Weatherproof protection unit with HD2010PNW heated preamplifier
MK223: Microphone with coated membrane in place of MK221

ORDER CODES OF KITS AND ACCESSORIES

HD2010RE kit 1:
Includes
carrying case,
HD2010RE Sound Level Meter,
HD2110P preamplifier,
HD9101 calibrator,
MK221 microphone,
CPA/5 5m extension cable,
HD SAV windscreen,
DeltaLog5 software and serial cable for connection to a PC with COM (HD2110/CSNM) or USB (HD2101/USB interface).
HD2010RE kit1/E: Version for outdoor measurements.
It includes also:
HDWME950/3: Weatherproof protection unit.
HD2110PW: Heated preamplifi er in place of HD2110P,
HD SAV
CPA/5
MK223: Microphone with coated membrane in place of MK221
HD2010RE kit1/IE: Version for outdoor and indoor measurements.
It includes also:
HDWME950/2: Weatherproof protection unit with HD2110PW heated preamplifier
MK223: Microphone with coated membrane in place of MK221
Option 0 "Memory Expansion": 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": Profi le+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 nstruments.
MK231: Class 1 Microphone for diffuse fi eld, type WS2D, according to IEC 61094-4:1995.
HD2110/CSM: MiniDin to DB25 serial cable for interconnection modem.
HD2110/CSP: MiniDin to DB9 cable for serial printer connection.
SWD10: Stabilized mains power supply with Vin=100÷230Vac / Vout=12Vdc/1000mA.
CPA/10: 10m extension cable for HD2010PN and HD2110P preamplifi ers.
CPA/20: 20m extension cable for HD2110P preamplifi er.
CPA/50: 50m extension cable for HD2110P preamplifi er.
VTRAP: Tripod, max. height 1550 mm.
HD2110/SA: Support to fi x the preamplifi er to the tripod.
S'print-BT: Portable serial printer.
HD2110/MC: SD and MMC memory card interface.

CODES OF SPARE PARTS AND OTHER ACCESSORIES

Option 2 "Data logger": Storage of 4 sound level profi les, continuously and at intervals.
It includes memory expansion from 2 MB to 4 MB. This option is included in the new instruments.
Upgrade 2: Conversion of HD2010 into HD2010RE. It includes:
Analogue card with linear fi eld of 110 dB
HD2110P preamplifier.
The sound level meter and fi lter ISO 9001 calibration is included in the upgrade.
HD9101: Class 1 calibrator according to IEC60942:1988.
Frequency: 1000Hz; sound level: 94dB/114dB.
HD2101/USB: MiniDin to USB-A serial cable.
HD2110/CSNM: MiniDin to DB9 null-modem serial cable for interconnection.
CPA/5: 5m extension cable for HD2010PN and HD2110P preamplifi ers.
HD SAV: Windscreen for 1/2" microphone.
HD SAV2: Windscreen with bird spike for HDWME950 microphone unit.
HD SAVP: Rain shield for HDWME950 microphone unit.
HD2010PN: Microphone preamplifi er for ½" microphones for HD2010. Provided with CTC device for electrical calibration.
HD2010PNW: Heated microphone preamplifi er for HDWME950N unit for ½" microphones for HD2010. It is heated and provided with CTC device for electrical calibration. Ending with 5m connection cable (other lengths on request).
HD2110P: Microphone preamplifi er for ½" microphones for HD2010. Provided with CTC device for electrical calibration and with a driver for extension cable up to 100m.
HD2110PW: Heated microphone preamplifi er for HDWME950N unit for ½" microphones for HD2010. It is heated and provided with CTC device for electrical calibration.
Ending with 5m connection cable (other lengths on request).
MK223: Class 1 microphone with coated membrane for free fi eld, type WS2F, according to IEC 61094-4:1995.
MK221: Class 1 microphone for free fi eld, type WS2F, according to IEC 61094-4:1995

TECHNICAL CHARACTERISTICS HD2010 AND HD2010RE

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 prepolarized (200V), for free fi eld, high stability, type WS2F according to IEC 61094-4. - MK223 condenser microphone with coated membrane, polarized (200V), for free fi eld, high stability, type WS2F according to IEC 61094-4 (combined with the HDWME950 weatherproof unit). - MK231 condenser microphone, polarized (200V), for diffuse fi eld, 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	S_{pl}, L_{eq}, SEL, L_{EPd}, 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 fi lters in real time complying with class 1 specifi cations according to IEC61260 - Octave bands from 16 Hz to 16 kHz “Third Octave” option - Third octave bands from 16 Hz to 20 kHz Average spectrum (AVR) mode
Statistical Analysis	It displays up to 3 percentile levels for, L1 to L99 “Advanced Analyzer” option Probability distribution and percentile level calculation from L1 to L99 Parameter: A, C or Z weighted, L_{Fp}, L_{eq}, L_{pk} (only C or Z for L_{pk}) Sampling frequency:8 samples/second Classifi cation Classes of 0.5 dB
Analysis of Events	“Advanced Analyzer” option Calculation of 5 freely programmable event parameters Average spectrum calculation by octave and third octave bands Calculation of statistical levels from L1 to L99 Event identifi cation trigger with programmable threshold and duration fi lter 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
Profi le Data Logging	1 profi le with programmable sampling from 1/8 s to 1 hour and 3 profi les 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 L1 to L99
Memory	Internal, equal to 4 MB (4 profi les 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	- DeltaLog5: PC interface for download, setup and sound level meter management (supplied with the instrument) - DL5 Environment: For analyses according to the Decree of 16.03.98 - DL5 Monitor: For real time acquisition in the PC mass storage, scheduler, audio recording - DL5 Building: Room acoustics evaluation in agreement with D.P.C.M. of 05.12.97 (it requires the “Third Octave” and “Reverberation Time” option) - DL5 Noise Studio: Analysis modular program - “Worker protection”: Analysis module according to Decree 195/2006 - “Railway Traffic”: Analysis module of train noise profi les according to the Decree of 16/03/1998
Operating conditions	Working temperature -10÷50°C, 25÷90%RH (without condensation), 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 preamplifi er, 740 g (with batteries)

HD9020 Integrating Sound Level Meter

he HD 9020 precision sound level meter is a portable, microprocessor, is a Class 1 according to IEC 651 and IEC 804. Analysis satisfies the requirements of ISO 1996 and is complete with third of octave filters according to IEC 1260.

APPLICATIONS

- Measurement of noise in the industrial sector or civil statistical analysis
- Monitoring of compliance with regulations concerning noise in industrial or urban
- Soundproofing.

FEATURES

- Frequency Weighting: A, B, C, Linear and third-octave
- (16 Hz - 20 kHz)
- Weighted SPL · Measure SLOW, FAST and IMPULSE-peak level measurement (<50µs)
- Measure of Leq (0.125 s - 12 h) - Calculation of SEL-Storage of the maximum and minimum values
- Memory bank of 512 kB at low consumption
- Analysis and capturing statistical noise events
- Sweep automatic thirds of octave bands
- Calibration automatically using HD 9101 precision calibrator
- Output RS232C serial with remote control capability
- Output AC fi lters pre-and post-Output DC Power mV/dB- 20 4 1.5 V alkaline batteries, or with external power.

TECHNICAL DATA

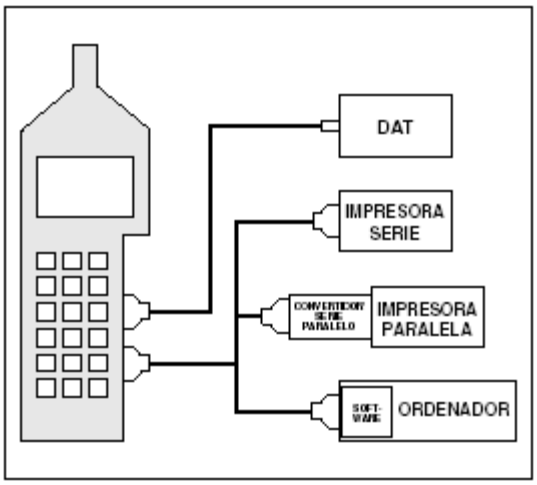
- Dynamics of the converter: 84 dB-input amplifiers: 0-60 dB in 4 ranges
- Interchangeable probes
- Line Filters frequency weighting A, B, C, Lin (16 Hz - 16 kHz) and fi lters in third octave from 16 Hz to 20 kHz (IEC 651 class 1 and class 2 per IEC 1260) .- Measurement Leq in programmable interval of 0.125 s to 12 h (class 1 according to IEC 804)
- Weighted SPL · Measurement SLOW, FAST or IMPULSE (class 1 IEC 651) - Measuring the SEL-peak value measurement (Class 1 IEC 651)
- Memory bank for storing measurements 512kb
- Program monitoring and storage of Leq with a threshold for noise events and statistical analysis (ISO 1996)
- Program for automatic scanning of the third octave bands
- Automatic calibration · Procedure
- Clock and calendar-Storage of the maximum and minimum values
- Power supply network with a 9 VDC external power
- Power supply with four 1.5V alkaline batteries Duration aprox.15 hours
- Turn off automatic
- Output DC 20 mV / dB
- Output AC pre-and post fi lter
- Output serial and possibility of remote control through RS232C interface
- Accessories for the probe microphone extension cable, wind shield, signal generator adapter, or pistonphone precision calibrator.

ORDER CODES

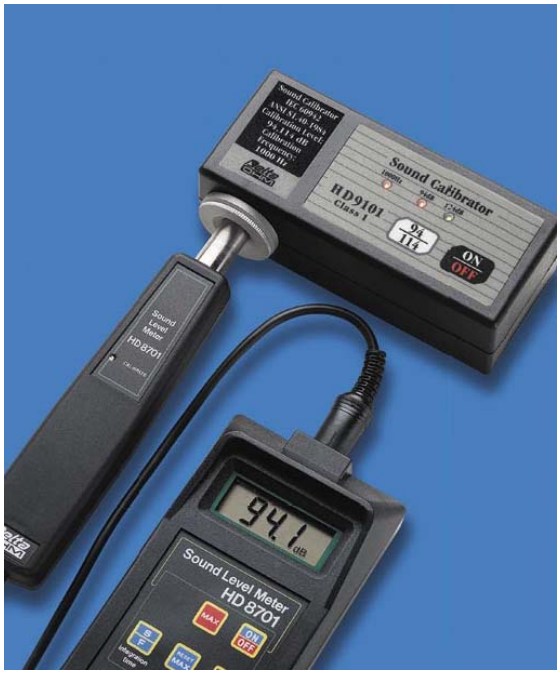
9020 HD Kit 1: The kit consists of case, sound level meter HD 9020, HD 9019 S1 probe, calibrator HD 9101, extension cord CPA / 3, windscreen and cable HD 9CPRS232 SAV.

HD 9019 S1: spare tube preamp complete accuracy class 1 according to IEC651.

SAV HD: microphone windscreen for 1 / 2 "
MK221: Class 1 microphone for free field according to IEC type 610944:199 WS2F
HD 9101: Class 1 IEC 942 calibrator, frequency 1000 Hz, the signal intensity of 94 dB / 114 dB
Briefcase: type 24 hours to hold the instrument and accessories.
Software: Deltalog4.



HD 8701 SOUND LEVEL METER



The sound level meter HD 8701 is a portable instrument, easy and quick to use,suitable for measuring industrial and civil noise levels.
The noise levels can be read easily in dB(A) on the large liquid crystal display which also shows all the information concerning the mode of operation of the instrument.
One second after switching on and with a resolution of 0.1 dB, the digital reading gives the continuously updated value of the RMS sound pressure level, with a type A frequency weighting. The single range from 30 to 130 dB further simplifi es the use of the instrument, as the user does not have to change scale.
With the keyboard the following operations are possible:
- selecting the response time constant S/F
- displaying the maximum value recorded “MAX” and zeroing it “RESET MAX”
- freezing the indication on the display “HOLD”.

METHOD OF USE
To switch the instrument on, press the ON/OFF key; to switch it off, press the ON/OFF key again. The time constant may be selected by means of the S/F key: Slow (1 second) - Fast (125 milliseconds), which are shown on the display with the letter “S” or “F”.
The indication on the display may be frozen by means of the HOLD Key. When the HOLD Key is pressed for the second time, normal operation is resumed (continuous updating of reading). Freezing of readings is indicated on the display with the letter “HOLD”.
When the MAX key is held down, the display indicates the maximum value automatically recorded by the instrument (for periods not exceeding one minute) since it was switched on or since last time the RESET MAX key was pressed.
The display also indicates if the battery is low.
If the instrument is in measuring mode it switches off automatically about 3 minutes after being switched on. In MAX mode and HOLD mode automatic switching off of the instrument is disabled.
In measurement mode, automatic switching off may be disabled by shifting the bridge in the battery compartment.
In order to ensure lasting precision of the instrument, it is advised to calibrate it from time to time by means of the “CAL” multirev trimmer in the probe, after connecting the microphone to the calibrator HD 9102.

TECHNICAL FEATURES
- Measuring range: 30 dB(A)...130 dB(A)
- Frequency response: weighted A
- Time constants: S = slow (1 s) and F = Fast (125 ms)
- Resolution: 0.1 dB
- Precision: class 2
- Display: 12 mm LCD with indication of operating mode and low battery
- Power supply: 9 V battery
- Autonomy: (continuous duty) 15 hours with zinc-carbon battery, 30 hours with alkaline battery
- Working temperature: -5...+50°C
- Storage temperature: -20...+70°C
- Dimensions instrument: 80 x 160 x 40 mm
- Weight: 350 gr.