HD 2030

HD 2030
FOUR CHANNEL VIBRATION ANALYZER

HD2030 is a portable vibration analyzer performing spectral and statistical analysis on four channels simultaneously. The instrument measures all parameters required by current regulations concerning workers protection from vibration related risks and is able to measure vibrations transmitted to both hand-arm and whole body.

Main features

HD2030 has been designed combining maximum flexibility and easy of use with the possibility to update the instrument according to the evolution of regulations concerning vibrations. The user can directly update the instrument firmware by means of the program Noise & Vibration Studio supplied with the instrument.
The HD2030 satisfies the specifications of standards **ISO 8041:2005, ISO 5349-1:2001** (hand-arm vibrations) and **ISO 2631-1, 2 and 4 1997** (whole-body vibrations). Octave and third octave filters satisfy class 1 specifications of IEC 61260 standard.

The HD2030 vibration analyzer detects accelerations on four axes through two accelerometers with integrated amplifying electronics (IEPE or equivalent type). Three axes are grouped in the right input, where it is possible to connect three accelerometers or a tri-axial one; the fourth axis is associated to left input. Accelerometers with integrated electronics allow using standard cables to achieve low impedance and low noise connections between the accelerometer and the instrument, simplifying its use and decreasing the probability to get wrong or altered measurements, because of interferences or electromagnetic disturbances.
The HD2030 analyzes accelerometer signals and makes calculations simultaneously on four axes. The instrument calculates, in parallel for all the measurement channels, weighted acceleration values and octave or third octave spectra; acceleration, velocity or displacement values can be shown for each frequency band. Frequency weightings can be freely chosen according to the specific application. Together with values of instantaneous and mean acceleration, the analyzer calculates in addition peak levels, vibration dose (VDV), crest factors and performs statistical analysis.
As statistical analyzer HD2030 calculates the probability distribution of a measurement parameter in 1dB classes. Both the probability distribution graph and the percentile levels from L1 up to L99 are available. The measurement of acceleration on four axes allows, as an example, to measure vibration transmitted to the driver body through the vehicle seat isolating driver movements or to evaluate, during design and production verification, the damping effectiveness of seat suspension and absorbing material in general. In building analysis it is possible to correlate the signal of the hammer used to excite the structure with the signal received by a high sensitivity tri-axial accelerometer.

A flexible data logger function stores multiple profiles and spectra either into the internal 8MB memory or into a memory card (SD up to 2GB). When needed, it's possible to add to profiles the logging of accelerometer signals, directly recording the digital samples. Analysing stored data, it's useful to examine accelerometer signals in order to verify the absence of artefacts like, for example, those generated by DC-shift. Each recording can be documented including a vocal comment. Besides HD2030 can be used like an audio recorder, another possibility to document the measurements.
The "Navigator" program available in the analyzer, allows to examine logged measurements and to hear vocal comments.

For a quick instrument setting the HD2030 can store up to nine setups, customized by the user according to specific applications. The desired setup can be easily identified through the associated title.

Calibration can be performed using either accelerometer calibration data or using a vibration generator. The last 120 performed calibrations are written in a register file and logged in a reserved and protected area of the instrument permanent memory. The interface program Noise & Vibration Studio, included with the instrument, adds automatically the calibration file to the measurements when downloading data into the PC memory.
HD2030 can be completely controlled by a PC, through the RS232 and USB serial interfaces, using a special communication protocol.

Software

The interface program Noise & Vibration Studio is provided with the instrument and allows to download and visualize data logged in the instrument and to manage setups, sensor configurations and calibration register file.
Instrument settings can be customized by the user and stored with a title in a setup file for later use. In order to easily perform different kind of measurements it is possible to upload up to nine instrument settings, selected from the setup file.
Sensor configurations can be set either manually, filling in the accelerometer data table, or automatically, using the CD provided with the accelerometers supplied by Delta Ohm.
The HD2030 stores calibration information in a reserved area of internal memory. The calibration register file is downloaded to PC memory together with logged data and stored in the same folder.
Several optional analysis modules can be activated by means of license. The program can be automatically updated through the web and includes demonstrative versions of all modules.
- NS1 Application module "Workers' Protection":
- Analysis of workers' exposure to noise and vibration, both hand-arm and whole-body, in accordance with Decree Law n.81/2008 9432/2008 and UNI.
- Evaluation of hearing protectors with the methods and OBM SNR according to UNI EN 458.
- Evaluation of measurement uncertainties in accordance with UNI 9432/2008.
- Calculation of the impulsiveness of noise sources according to the requirements of UNI 9432/2008.

Applications

The HD2030 analyzer executes all measurements required by the European regulations concerning workers protection from mechanical vibration exposition at the workplace (2002/44/EC). The choice to perform hand-arm (HA) or whole body (WB or BV) measurements modifies

Input details

Output details

the frequency range of spectral analysis. For hand-arm measurements the range goes from 3.15Hz up to 3.15kHz (from 4Hz to 2kHz for octave band spectrum), while for whole body measurements the range of central frequencies is shifted downward from 0.32Hz up to 315Hz (from 0.5Hz to 250Hz for octave band spectrum).

The HD2030 is suitable for the evaluation of workers exposure to vibrations and to assess the risk of injury in the following cases:
• vibrations transmitted to hand-arm system through vibrating tools or items subject to vibrations or impacts, vibrations transmitted to whole body system through the seat of transport vehicles, vibrations transmitted to whole body system by vibrating floors or seats at the workplace,
• vibrations transmitted to whole body system by buildings with vibrations or impacts.

The HD2030 is a vibration analyzer suitable for the following applications:
• Vibration spectral analysis by octave o third octave bands,
• Statistic analysis with percentile calculation from L1 to L99,
• Evaluation of vibration attenuation of anti-vibration gloves, seats and materials, Structural verification of buildings.

Technical standards
HD2030 vibration analyzer conforms to the following standards:
ISO 8041:2005 "Human response to vibration – Measuring instrumentation"
ISO 5349-1:2001 "Mechanical vibration – Measurement and evaluation of human exposure to hand-transmitted vibration – General requirements"
ISO 5349-2:2001 "Mechanical vibration – Measurement and evaluation of human exposure to hand-transmitted vibration – Practical guidance for measurement at the workplace"
ISO 2631-1:1997 "Mechanical vibration and shock – Evaluation of human exposure to whole body vibration – General requirements"
ISO 2631-2:1989 "Evaluation of human exposure to whole body vibration – Continuous and shock-induced vibrations in buildings (1 to 80 Hz)"
IEC 61260:1995 "Electroacustics – Octave band and fractional-octave band filters"

Accelerometer models
HD356A02: **tri-axial** accelerometer for the measurement of vibrations transmitted to the hand-arm system; sensitivity of 10mV/g and maximum acceleration equal to 500g. This sensor is mainly used for hand-arm measurements.
HD356B21: miniature **tri-axial** accelerometer for the measurement of vibrations transmitted to the hand-arm system; sensitivity of 10mV/g and maximum acceleration equal to 500g. This sensor is mainly used for hand-arm measurements.
HD356B41: tri-axial accelerometer inserted in a rubber pad for the measurement of the vibrations trasnmitted to the whole body. 1,5m connection cable to the HD2030 analyser included. Sensitivity 100mV/g and maximum acceleration 10g.
HD356A22: tri-axial accelerometer for general application with sensitivity of 100mV/g and maximum acceleration equal to 50g.
HD352C34: mono-axial accelerometer for general application with nominal sensitivity of 100mV/g and maximum acceleration equal to 50g.
HD356B20: miniature **tri-axial** accelerometer for the measurement of vibrations transmitted to the hand-arm system at high shock level. Sensitivity of 1mV/g and maximum acceleration equal to 5000g.

Accessories
In order to measure vibrations transmitted to the hand-arm system, it's necessary to use adapters coupling the accelerometer to the tool handle. The available accessories are:
HD2030AC1: cubic shaped mounting block to be fastened to the handle with a cable tie or a metal clamp as near as possible to the hand position. This adapter is suitable for measurements on light tools, where the weight of the measurement chain has to be minimized. Material: light alloy.
HD2030AC2: adapter to be held between the hand and the handle. The accelerometer is placed in lateral position, at the left or the right of the hand. This adapter is suitable for large cylindrical handles. The measurement must be repeated positioning the accelerometer on both hand sides. Material: light alloy.
HD2030AC3: adapter to be held between the hand and the handle. The accelerometer is placed in lateral position, at the left or the right of the hand. This adapter is suitable for large cylindrical handles and for accelerometers with integrated screw. The measurement must be repeated positioning the accelerometer on both hand sides. Material: stainless steel
HD2030AC4: adapter to be held between the hand and the handle. The accelerometer is placed in central position, between the middle and the ring fingers or between the index and the middle fingers. This adapter is suitable for anatomical handles, not necessarily cylindrical and of small dimensions. Material: light alloy.
HD2030AC5: Support for measurement on floors and vibrating surfaces in general. An air bubble level is included and the height of two out of the three feet can be adjusted as needed. The support has a cavity on the lower face, where a high sensitivity tri-axial accelerometer, suitable for measurements in buildings, can be fastened. On the upper face there is a tapped hole (10-32 UNF) for accelerometer mounting. In order to use three mono-axial accelerometers instead of a tri-axial one, a cubic adapter is included to be mounted on the upper face. Material: stainless steel, weight 1.9kg.

The following accessories, needed to keep the accelerometers in contact with various surfaces, are available on request:
- Adhesive metal plate for accelerometer mounting with magnet • Permanent magnet for accelerometer mounting on metal surfaces
- Adhesive mounting base (glue or wax)
- Insulated mounting base
- Screws with various threading

The following accessories are included with the HD2030 analyzer:
- Wax
- Silicon grease
- USB cable for PC connection
- 1GB SD memory card
- CD with the interface program for PC with Windows operating system "Nose & Vibration Studio" and the HD2030 user manual

Each accelerometer comes with the following accessories:
- Mounting screw
- 2m connecting cable to the HD2030 analyzer (other lengths on request)
- CD with calibration and configuration data and accelerometer manual

Technical specifications of HD2030
- ***Technical standards:***
  ISO 8041:2005
  ISO 5349-1:2001 (hand transmitted vibration)
  ISO 2631-1,2,4 1997 (whole body vibration)
  IEC 61260:1995 class 1 (octave and third octave filters)
- ***Measurement modes:***
  Hand-transmitted vibrations
  Whole-body vibrations
  Building vibrations
- ***Measurement parameters:***
  RMS, VDV, MTVV, Peak, Max, Min
- ***Frequency weightings:***
  Fz, Fc, Wh for hand-transmitted vibrations
  Fz, Fa, Wb, Wc, Wd, We, Wj, Wk for whole body vibrations
  Fz, Fm, Wm for building vibrations
- ***Octave or third octave band spectral analysis:***
  The range of central frequencies depends on the chosen application according to the following table

Application	Central frequency range	
	Octave Band	Third Octave Band
	[Hz]	[Hz]
Hand-Arm	4 ÷ 2000	3.15 ÷ 3150
Whole-Body	0.5 ÷ 250	0.315 ÷ 315
Building-Vibration	0.5 ÷ 250	0.315 ÷ 315

- ***Statistic Analysis*** The selected measurement parameter is analyzed in 1dB classes. Both the probability and the percentile graphs can be shown.
- ***Measurement range*** 0.1m/s2 ÷ 7000 m/s2 with accelerometer HD356A02 for hand-arm measurements
- ***Linearity range*** three ranges of 80dB overlapped by 70dB
- ***Digital converter*** Four analog to digital converters with a resolution of 25 bits at 8k samples per second
- ***Inherent noise level*** Less than 30mm/s2 with accelerometer HD356A02 for hand-arm measurements and Wh filter
- ***Display*** Graphic backlit display 128x64 pixels Screens:
  VLM1: Three parameters for each measurement axis
  VLM2: Three parameters of acceleration vector calculated from the three right channel input axes
  VLM3: Three global parameters for each measurement axis
  VLM4: Three global parameters of acceleration vector calculated from the three right channel input axes
  PROFILE: Graphic profile of one parameter for each measurement axis with integration time programmable from 1s to 1 hour
  SPECTRUM: Octave or third octave spectrum for each measurement axis with calculation of one wideband filter. The graph can show the spectrum of acceleration, velocity or displacement.
  STATISTICS: the statistical distribution of the parameter chosen in PROFILE
  PERCENTILES: Percentile level graph of the parameter chosen in PROFILE.
- ***Memory*** 8MB Internal FLASH type memory and connector for memory card SD type up to 2GB.
- ***Interface*** Serial RS232 and USB type
- ***nput/Output*** LINE output for the four measurement channels: 2Vpp F.S.
  TRGIN electrically isolated input: instrument trigger used by external devices
  TRGOUT 3V logic output: trigger output used by external devices
- ***Power supply*** Four alkaline batteries AA 1.5V type with 10 hour lifetime-
  The instrument can use rechargeable batteries Ni-MH type. The HD2030 does not perform the function of charger.

- ***Ambient parameters*** Storage: -25°C ÷ 70°C relative humidity less than 90% without condensation
  Operating: -10°C ÷ 50°C relative humidity less than 90% without condensation
- ***Weight and Dimensions*** 95mm X 240mm X 50mm, weight 680gr.

Technical specifications of accelerometers:

Model HD356A02

- ***Type:*** Tri-axial accelerometer with integrated electronics (LIVM™). This sensor is used for hand-arm measures.
- ***Sensitivity:*** 10mV/g
- ***Measuring range:*** 500g pk
- ***Frequency Range*** (±5%)**:** 1Hz ÷ 5000Hz
- ***Resonant frequency:*** >25kHz
- ***Linearity:*** 1% F.S.
- ***Transverse sensitivity:*** 5% max
- ***Overload Limit (Shock):*** 7000g pk
- ***Working temperature:*** -50°C ÷ 120°C
- ***Temperature drift:*** 0.1%/°C
- ***Bias voltage:*** 8V÷12V
- ***Mechanical specifications:*** Weight: 10,5gr
  Dimensions: (Height x Length x Width) 14.0mm x 20.3mm 14.0mm
  Mounting Thread: 10-32 female (10-32 UNF to 10-32 UNF, 10-32 UNF to M6 screws included)
  Connector: ¼-28 4-Pin side type
  Housing Material: Titanium alloy
  Isolation: case grounded

Model HD356B21

- ***Type:*** Miniature tri-axial accelerometer with integrated electronics (LIVM™). This sensor is used for hand-arm measurements.
- ***Sensitivity:*** 10mV/g
- ***Measuring range:*** 500g pk
- ***Frequency Range*** (±5%)**:** 2Hz ÷ 10000Hz (y or z axis)
- ***Frequency Range*** (±5%)**:** 2Hz ÷ 7000Hz (x axis)
- ***Resonant frequency:*** >55kHz
- ***Linearity:*** 1% F.S.
- ***Transverse sensitivity:*** 5% max
- ***Overload Limit (Shock):*** 10000g pk
- ***Working temperature:*** -50°C ÷ 120°C
- ***Temperature drift:*** <0.17%/°C
- ***Bias voltage:*** 7V ÷ 11V
- ***Mechanical specifications:*** Weight: 4gr
  Dimensions: (Height x Length x Width) 10.2mm x 15.5mm 10.2mm
  Mounting Thread: 5-40 female (5-40 UNF to 5-40 UNF, 10-32 UNF to 5-40 UNF and 5-40 UNF to M3 screws included)
  Connector: 8-36 4-Pin side type
  Housing Material: Titanium alloy
  Insulation: case grounded

Model HD356B41

- ***Type:*** Low profile tri-axial accelerometer with integrated electronics (LIVM™) put in a rubber pad. This sensor is used for measures of whole body vibration through the seat.
- ***Sensitivity:*** 100mV/g
- ***Measuring range:*** 10g pk
- ***Frequency response*** (±5%)**:** 0.5Hz ÷ 1000Hz
- ***Resonant frequency:*** >27kHz
- ***Linearity:*** 1% F.S.
- ***Transverse sensitivity:*** 5% max
- ***Overload Limit (Shock):*** 2000g pk
- ***Working temperature:*** -10°C ÷ 50°C
- ***Temperature drift:*** <0.17%/°C
- ***Bias voltage:*** 2.8V ÷ 4.5V
- ***Mechanical specifications:*** Weight: 272gr
  Dimensions: (diameter x thickness) 200mm x 12mm
  Cable: 3m integrated cable with 4 pin LEMO connector (supplied)
  Material: hard rubber with accelerometer and integrated cable replaceable
  Connector: ¼-28 4-Pin side type
  Mounting Thread: threaded screw hole 10-32 UNF
  Insulation: accelerometer case grounded

Model HD356A22

- ***Type:*** mono-axial accelerometer with integrated electronics (LIVM™). This sensor is used for general applications.
- ***Sensitivity:*** 100mV/g
- ***Measuring range:*** 50g pk
- ***Frequency Range*** (±5%)**:** 0.5Hz ÷ 4000Hz
- ***Resonant frequency:*** >25kHz
- ***Linearity:*** 1% F.S.
- ***Transverse sensitivity:*** 5% max
- ***Overload Limit (Shock):*** 5000g pk
- ***Working temperature:*** -54°C ÷ 77°C
- ***Temperature drift:*** 0.1%/°C
- ***Bias voltage:*** 8V ÷ 12V
- ***Mechanical specifications*** Weight: 5.4gr
  Dimensions: (Height x Length x Width) 11.4mm x 16.7mm X 11.4mm
  Mounting Thread: 5-40 female (5-40 UNF to 5-40 UNF, 10-32 UNF to 5-40 UNF and 5-40 UNF to M3 screws included)
  Connector: 8-36 4-Pin side type
  Material: Titanum
  Isolation: case grounded

Model HD352C34

- ***Type:*** mono-axial accelerometer with integrated electronics (LIVM™). This sensor is used for general applications.
- ***Sensitivity:*** 100mV/g
- ***Measuring range:*** 50g pk
- ***Frequency Range*** (±5%)**:** 0.5Hz ÷ 100000Hz
- ***Resonant frequency:*** >50kHz
- ***Linearity:*** 1% F.S.
- ***Transverse sensitivity:*** 5% max
- ***Overload Limit (Shock):*** 5000g pk
- ***Working temperature:*** -54°C ÷ 93°C
- ***Temperature drift:*** 0.1%/°C
- ***Bias voltage:*** 7V ÷ 12V
- ***Mechanical specifications*** Weight: 6gr
  Dimensions: (Hex x Height) 11.2mm x 22.4mm
  Mounting Thread: 10-32 female (10-32 UNF to 10-32 UNF, 10-32 UNF to M6 screws included)
  Connector: top mounted 10-32 coaxial jack
  Material: Titanum
  Isolation: case grounded

Model HD356B20

- ***Type:*** miniature tri-axial accelerometer with integrated electronics (LIVM™). It is mainly used for hand-arm and shock measurements.
- ***Sensitivity:*** 1.0mV/g
- ***Measuring range:*** 5000g pk
- ***Frequency Range*** (±5%)**:** 2Hz ÷ 10000Hz (y or z axis)
- ***Frequency Range*** (±5%)**:** 2Hz ÷ 7000Hz (x axis)
- ***Resonant frequency:*** >55kHz
- ***Linearity:*** 1% F.S.
- ***Transverse sensitivity:*** 5% max
- ***Overload Limit (Shock):*** 7000g
- ***Working temperature:*** -50°C ÷ 120°C
- ***Temperature drift:*** <0.1%/°C
- ***Bias voltage:*** 7V ÷ 11V
- ***Mechanical specifications*** Weight: 4gr
  Dimensions: (Height x Length x Width) 10.2mm x 15.5mm X 10.2mm
  Mounting Thread: 5-40 female (5-40 UNF to 5-40 UNF, 10-32 UNF to 5-40 UNF and 5-40 UNF to M3 screws included)
  Connector: 8-36 4-Pin side type
  Material: titanium alloy
  Isolation: case grounded

Purchasing codes for kits and accessories

HD2030 kit 1: it consists of: four channel analyzer HD2030, carrying case, program "Noise & Vibration Studio", USB serial cable (CP22) and 1GB SD memory card (HD2030MC). **Accelerometers, connection cables and accessories have to be specified at the time of placing the order**.

HD2030 kit "HA & WB": it includes,

- HD2030 kit 1 consisting of:
- HD2030: 4 channels vibration analyser with ISO 9001 reports of calibration,
- HD2030MC: 1GB SD memory card,
- CP22: USB serial cable,
- silicone grease (HD6188) and wax bonding (HD6273)
- user manual and case;
- HD356B41: tri-axial accelerometer in a rubber pad with connection cable to HD2030 analyser;
- HD356A02: Miniature tri-axial accelerometer with 081B02 and M081B05 screws and connection cable to HD2030 analyser (HD2030CAB3-3M);
- Reports of calibrations for accelerometers HD356B41 and HD356A02;
- "Noise Studio" interfacing programme for PC.

HD2030 kit "Acoustic & Vibrations": Including

- HD2010UC/A kit 1 consisting of:
- HD2010UC/A: type 1 analyzer sound level meter IEC 61672 with spectral analysis octave bands from 32Hz to 8kHz, data logging with 4MB memory, backlit display;
- UC52/1C: pre-polarized and removable ½" condenser microphone,
- HD2010PNE2: removable microphone preamplifier and 5m extension cable (CPA/5),
- HD SAV: Windscreen for ½" microphones,
- HD2110USB: serial USB cable for PC connection (as an alternative COM-type serial

RS232 cable is supplied),
- HD2020: type 1 acoustic calibrator IEC 60942,
- user manual and case;
- HD2030 kit "HA & WB" consisting of:
- HD2030: 4 channels vibration analyser with ISO 9001 reports of calibration,
- HD356B41: tri-axial accelerometer in a rubber pad with connection cable to HD2030 analyser;
- HD356A02: Miniature tri-axial accelerometer with 081B02 and M081B05 screws and connection cable to HD2030 analyser (HD2030CAB3-3M);
- HD2030MC: 1GB SD memory card,
- CP22: USB serial cable,
- "Noise Studio" interfacing programme for PC with user licence (CH20) for application modul NS1 "Workers protection",
- silicone grease (HD6188), wax bonding (HD6273) and glue (080A90)
- user manual and case;
- ISO 9001 Reports of calibration for:
- HD2010UC/A sound level meter,
- HD2020 acoustic calibrator,
- accelerometers HD356B41 and HD356A02,
- HD2030 4 channels vibration analyser.

HD2030AC1: cubic shaped mounting block to be fastened to the handle, by means of a cable tie or a metal clamp, as near as possible to the hand position. This adapter is suitable for measurements on light tools, where the weight of the measurement chain has to be minimized. Material: light alloy. It includes:
- Hexagon socket head cap screw 10-32 UNF
- 4mm hex key
- 10 cable ties (length x width) 200mm x 4.5mm
- 1 metal clamp with 9mm width

HD2030AC2: adapter to be held between the hand and the handle. The accelerometer is placed in lateral position, at the left or the right of the hand. This adapter is suitable for large cylindrical handles. The measurement must be repeated positioning the accelerometer on both hand sides. Material: light alloy. Includes:
- Hexagon socket head cap screw 10-32 UNF
- 4mm hex key
- 10 cable ties (length x width) 200mm x 4.5mm
- 2 flat velcro straps, 24.5mm size

HD2030AC3: adapter to be held between the hand and the handle. The accelerometer is placed in lateral position, at the left or the right of the hand. This adapter is suitable for large cylindrical handles and for accelerometers with integrated screw with 10-32 UNF-2A threading. The measurement must be repeated positioning the accelerometer on both hand sides. Material: stainless steel. Includes:
- 10 cable ties (length x width) 200mm x 4.5mm
- 2 flat velcro straps, 24.5mm size

HD2030AC4: adapter to be held between the hand and the handle. The accelerometer is placed in central position, between the middle and the ring fingers or between the index and the middle fingers. This adapter is suitable for anatomical handles, not necessarily cylindrical and of small dimensions. Material: light alloy. Includes:
- Hexagon socket head cap screw 10-32 UNF
- 4mm hex key
- 10 cable ties (length x width) 200mm x 4.5mm
- 2 flat velcro straps, 24.5mm size

HD2030AC5: Support for measurement on floors and vibrating surfaces in general. An air bubble level is included and the height of two out of the three feets can be adjusted as needed. The support has a cavity on the lower face, where a high sensitivity tri-axial accelerometer, suitable for measurements in buildings, can be fastened. On the upper face there is a tapped hole (10-32 UNF) for accelerometer mounting. In order to use three mono-axial accelerometers instead of a tri-axial one, a cubic adapter is included to be mounted on the upper face. Material: stainless steel, weight 1.9kg. Includes:
- Stainless steel base with air bubble level and three feets. There are a tapped hole on the upper face (10-32 UNF) and a cavity with tapped hole (M4) on the lower face.
- Cubic adapter to be mounted on the upper face using two M4 screws (included). The cube has threaded holes (10-32 UNF) on three orthogonal faces.
- 3mm hex key

HD356B21: miniature tri-axial accelerometer for the measurement of hand transmitted vibrations. Sensitivity 10mV/g, range ±500g. Mounting screws included.

HD356B41: tri-axial accelerometer contained within a rubber pad for the measurement of whole body transmitted vibrations. Analyzer 1.5m connecting cable included. Sensitivity 100mV/g, range ±50g.

HD356B20: tri-axial accelerometer for the measurement of hand transmitted vibrations at high shock levels. Sensitivity 1mV/g, range ±5000g. Mounting screws included.

HD352C34: mono-axial accelerometer for general purpose. Sensitivity 100mV/g, range ±50g. Mounting screws included.

HD356A22: high sensitività tri-axial accelerometer. Sensitivity 100V/g, range ±50g. Mounting screws included.

HD2110/CSNM: serial cable connection to PC COM interface.

CP22: serial cable for connection to a PC with USB interface.

HD2030CAB1-3M: low noise coaxial cable for connection of mono-axial accelerometers (mini-coax SMA 10-32 connector) to the HD2030 analyzer (4 pin push-pull circular connector). 3m Long (other lengths upon request). Equipped with connectors.

HD2030CAB3-3M: coaxial cable for connection of tri-axial accelerometers (4 pin SMA connector) to the HD2030 analyzer (4 pin push-pull circular connector). 3m Long (other lengths upon request). Equipped with connectors.

HD2030CAB13: coaxial cable for connection of three mono-axial accelerometers to the HD2030 analyzer. 400mm Long, BNC connectors.

HD2030CAB1B-5M: coaxial cable for connection of mono-axial accelerometers to the HD-2030CAB13 cable. 5m Long (other lengths upon request). Equipped with connectors.

HD2030CAB1B-10M: coaxial cable for connection of mono-axial accelerometers to the HD-2030CAB13 cable. 10m Long (other lengths upon request). Equipped with connectors.

HD2030CAB1B-3M: coaxial cable for connection of mono-axial accelerometers HD2030CAB13 analyzer. 3m Long. Equipped with connectors.

HD2030CAB.BNC-xxM: coaxial cable, extension for HD2030CAB1B-3M cable. 30m maximum length.

HD2030MC: 1GB SD memory card.

HD2030AM: headset with microphone.

SWD10: Stabilized mains power supply Vin=100÷230Vac / Vout=12Vdc/1000mA.

CH20: hardware key for PC with Windows® operating systems. When inserted into a PC USB port enables execution of software modules.

NS1: "Workers Protection" Module. Analysis of noise and vibration in the workplace in accordance with Decree 81/2008

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

BAT-40: Replacement battery pack for HD40.1

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

VTRAP: tripod.

Available accessories for the accelerometers are:

HD6188: Silicone grease repellent to water and electrically insulating.

HD6273: Pan with wax bonding

080A90: Glue for quick fixing.

081B05: screw with double thread 10-32 UNF, included in accelerometers HD356A02 and HD356C34.

081A90: screw with double thread 5-40 UNC and 10-32 UNF, included in accelerometers HD356B21, HD356A22 and HD356B20.

M081B05: screw with double thread 10-32 UNF and M6x0,75, included in accelerometers HD336A02 and HD352C34.

M081A27: screw with double thread 5-40 UNC and M3x0,5", included in accelerometers HD356B21, HD356A22 and HD356B20.

081A27: screw with double thread 5-40 UNC, included in accelerometers HD356B21, HD356A22 and HD356B20.

HD6239: tip for accelerometer.

HD6286: metal disk to be applied by adhesive; for magnetic bases HD6284 and HD6196.

HD6284: magnetic base with 10-32 UNF threaded hole; for any accelerometer.

HD6194: magnetic base with 10-32 UNF screw integrated; for accelerometers HD356A02, HD356C34 and HD356B41 (by removing the rubber pad).

HD6226: base with 10-32 UNF threaded hole for mounting by adhesive; for any accelerometer.

HD6245: isoltaed base with integrated 10-32 UNF screw for mounting by adhesive, for accelerometers HD356A02, HD356C34 and HD356B41 (by removing the rubber pad).

HD6220: isolated base with integrated 10-32 UNF screw and threaded 10-32 UNF hole for mounting the accelerometer; for any accelerometer.