

HD2070



HD2070 THREE CHANNELS VIBRATION METER-ANALYZER

HD2070 is a portable vibration analyser that provides all the measurement parameters required by current legislation on protecting workers from vibration-related risks and is capable of measuring both hand-arm and whole-body vibrations. In option, it performs spectral and statistical analyses simultaneously on three channels.

Main features:

- HD2070 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 programme Noise Studio supplied with the instrument.
- The HD2070 vibration analyzer detects accelerations on three axes through accelerometers with integrated amplifying electronics (IEPE or equivalent). On the input it is possible to connect three accelerometers or a tri-axial one. IEPE accelerometers 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.
- It performs simultaneous processing on all three axes, calculating weighted accelerations and, with the HD2070.01 option, spectra per octave or third-octave band. Shows the acceleration, speed or displacement for each frequency band. Frequency weightings are 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 (option HD2070.02 "statistical analysis").
- As statistical analyzer HD2070 calculates the probability distribution of a measurement parameter in 1 dB classes. Both the probability distribution graph and the percentile levels from L_1 up to L_{99} available.
- The data logging function stores multiple profiles and spectra using

either the 8MB internal memory or a memory card (mmC or SD up to 4GB). Each recording can be documented with a voice commentary. In addition, the HD2070 can be used as an audio recorder as a further possibility of documenting measurements.

- With the HD2070.03 option, signals provided by accelerometers can also be added to the profiles, recording digital samples directly (signals can be exported in wave format using the NS1 software module). When analysing the stored data, it is useful to examine the accelerometer signals for the absence of artefacts such as those associated with the DC-shift phenomenon.
- The "Navigator" programme, with which the analyser is equipped, allows recorded measurements to be examined and voice comments to be heard directly from the HD2070.
- For a quick instrument setting the HD2070 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 calibrator as HD2060. 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 programme Noise Studio, provided with the instruments, adds automatically the calibration file to the measurements when downloading data into the PC memory.
- HD2070 can be completely controlled by a PC, through the RS232 and USB serial interfaces, using a special communication protocol.

Applications

The HD2070 analyzer executes all measurements required by the European regulations concerning workers protection from mechanical vibration exposition at the workplace (2002/44/EC).

- 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;
- Vibratio spectral analysis by octave or third octave bands (option HD2070.01 "Spectral Analysis") on all channels;
- Statistical analysis with percentile calculation from L_1 to L_{99} (option HD2070.02 "Statistical Analysis") on all channels;
- Global signal analysis of exported raw digital samples (option HD2070.03) on all channels (to export data in wav format NS1 module is required);

Technical reference standards:

The HD2070 vibration analyser meets 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)"
- ISO 2631-4:2001 "Evaluation of human exposure to whole body vibration - Guidelines for the evaluation of the effects of vibration and rotational motion on passenger and crew comfort in fixed-guideway transport systems"
- ISO 2631-5:2004 "Evaluation of human exposure to whole body vibration - Method for evaluation of vibration containing multiple shocks"
- IEC 61260:1995 "Electroacoustics – Octave band and fractional-octave band filters" (option HD2070.01)

Measurement modes:

- HA: Hand-transmitted vibrations
- WB: Whole-body vibrations
- BV: Building vibrations

Measurement parameters:

RMS, VDV, MTWV, Picco, Max, Min

Frequency weightings

- Fz, Fc and Wh for hand-transmitted vibrations
- Fz, Fa, Wb, Wc, Wd, We, Wj, Wk for whole body vibrations
- Fz, Fm and Wm for buildin vibrations

Spectrum analysis by octave or third octave band (option HD2070.O1)

Real time, parallel on all input channels. The choice to perform hand-arm (HA) or whole body (WB or BV) measurements modifies the frequency range of spectral analysis. For hand-arm easurements the range goes from 3.15Hz up to 3.15kHz (from 4Hz up to 2kHz for octave band spectrum), while for whole body measurements the range of central frequencies is shifted downward from 0.315Hz up to 315Hz (from 0.5Hz up to 250Hz for octave band spectrum).

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

Statistical Analysis (option HD2070.O2)

The selected measurement parameter is analyzed in 1dB classes. Both the probability and the percentile graphs can be shown.

Measurement range

0.1 m/s² ÷ 7000 m/s² with HDP356A02 accelerometer (HA measurement),
0.0007 m/s² ÷ 7m/s² with HDP356B18 (BV measurement).

Linearity range

Three ranges of 80 dB overlapped by 70 dB

Digital converter

Three A/D converters with a resolution of 25 bits at 8k samples per second

Inherent noise level

Less than 30 mm/s² with accelerometer HDP356A02 for hand-arm measurements and Wh filter

Display

Gratic backlit display 128x64 pixels

Screens:

- **VLM1**: three parameters for each measurement axis
- **VLM2**: three parameters vector acceleration calculated from the channels of tri-axial input.
- **VLM3**: three global parameters for each measurement axis
- **VLM4**: three global parameters of vector acceleration calculated from the channels of tri-axial input.
- **PROFILE**: Graphic profile of one parameter for each measurement axis with integration time programmable from 1s to 1 hour.
- **SPECTRUM**: octave or tihrd-octave band spectrum with recalculation of a wideband filter of your choice, calculated simultaneously for all channels. Acceleration, velocity and displacement can be displayed (with option HD2070.O1).
- **STATISTICS**: the statistical distribution of the parameter chosen in PROFILE (with option HD2070.O2).
- **PERCENTILES**: percentile level graph of the parameter chosen in PROFILE (with option HD2070.O2).

Datalogging

Time history: Multi Profile recording with single integration allows to log with sampling periods from 1s to 1h:

- 3 instantaneous or integrated parameters of the VLM_1 screen calculated on Ch1, Ch2 and Ch3 channels (a total of 9 parameters)
- 3 vector parameters of the VLM_2 screen (vector values from Ch1, Ch2, Ch3)
- Multi-spectra (from 1s) on Ch1, Ch2 and Ch3 (3 multi-spectra), in octave and third-octave bands (option HD2070.O1).
- Raw acceleration signals on Ch1, Ch2 and Ch3 (3 signals at 8kHz each) with option HD2070.O3.
- Statistical analysis (option HD2070.O2) in 1dB classes with 1 second sampling frequency (only in multiple integration mode). Graph of levels probability distribution; graph of percentile levels from L₁ to L₉₉
- Voice comments recording
- **Global values**: in parallel to time histories data logging, are logged.
 - 3 overall integrated VLM_1 parameters for Ch1, Ch2 and Ch3
 - 3 overall vector parameters of the VLM_2 screen (vector values from Ch1, Ch2, Ch3)
 - Integrated spectra (option HD2070.O1) on Ch1, Ch2 and Ch3 (3 spectra)

for octave and third octave bands

- Graph of levels probability distribution (option HD2070.O2); graph of the percentile levels from L₁ to L₉₉

Memory

8MB internal FLASH memory and connector for memory card SD type up to 2GB (SD card supplied).

Interface

Serial RS232 and USB type

Input/Output

LINE output for the three measurements channels: 2Vpp F.S.

TRGIN electrically isolated input: intrument 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 HD2070 does not perform the function of the battery charger.**

Environmental parameters

Storage: -25°C ÷ 70°C, relative humidity less than 90% without consideration.

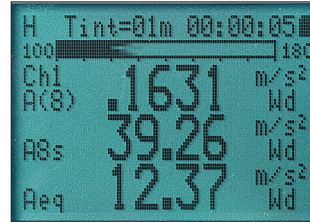
Operating : -10°C ÷ 50°C, relative humidity less than 90% without condensation

Dimensions and weight

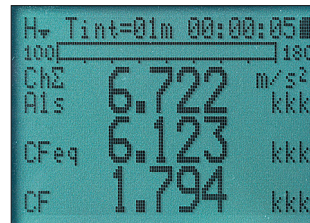
95 mm x 240 mm x 50 mm, weight 680g

Accessories for accelerometers

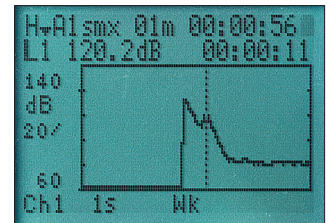
In order to measure vibrations transmitted to the hand-arm system, it is necessary to use accessories that allow the accelerometer to be coupled to the tool handle. The available accessories are:



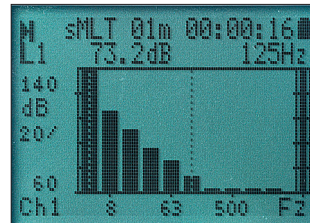
Base screen:
single axis measurements



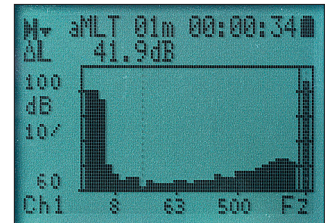
Base screen:
vector measurements



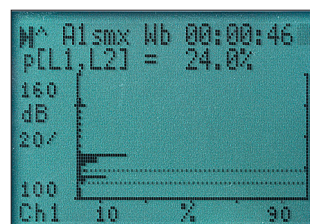
Time profile



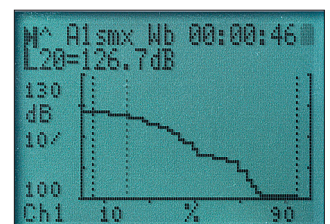
Octave band spectrum
(optional HD2070.O1)



Third octave spectrum
(optional HD2070.O1)



Statistic analysis:
probability distribution
(optional HD2070.O2)



Statistic analysis:
graph of percentile levels
(optional HD2070.O2)

Accelerometers

Tri-axial and single-axial accelerometers with integrated electronics (such as IEPE or equivalent) can be connected to the HD2070. The accelerometers are supplied with polarisation voltage of 25V and maximum current of 2mA.

The accelerometer models shown in the table are available on request.

Technical specifications of accelerometers:						
	HDP352C34	HDP356B20	HDD3023A2	HDP356A02	HDP356B21	HDP356A22
Axes	1	3	3	3	3	3
Applications	General	HA – Shock	HA	HA	HA	WB - General
Sensitivity [mV/g]	100	1	10	10	10	100
Range [±gpk]	50	5000	500	500	500	50
Frequency response [±5%]	0.5Hz ÷ 10kHz	(Z-Y) 2Hz ÷ 10kHz (X) 2Hz ÷ 7kHz	(X-Y)1.5Hz ÷ 4kHz (Z)1.5Hz ÷ 10kHz	1Hz ÷ 5kHz	(Z-Y) 2Hz ÷ 10kHz (X) 2Hz ÷ 7kHz	0.5Hz ÷ 4kHz
Resonance frequency [kHz]	50	55	40	25	55	25
Linearity [%F.S.]	±1	±2.5	±1	±2	±1	±1
Transverse sensitivity [%max]	5	5	6	5	5	5
Max shock [gpk]	5000	7000	5000	7000	10000	5000
Operating temperature [°C]	-54 ÷ +93	-54 ÷ +121	-54 ÷ +121	-54 ÷ +121	-54 ÷ +121	-54 ÷ +77
Weight [g]	5.8	4	10.5	10.5	4	5.4
Dimensions	7/16" x 22.4 mm	10.2 x 10.2 x 10.2 mm	9.1 x 9.1 x 12.3 mm	14 x 14 x 20.3 mm	10.2 x 10.2 x 10.2 mm	11.4 x 11.4 x 11.4 mm
Mounting	Threaded screw hole 10-32	Threaded screw hole 5-40	Threaded screw hole 10-32	Threaded screw hole 10-32	Threaded screw hole 5-40	Threaded screw hole 5-40
Insulation	-	-	-	-	-	-
Connector	Top mounted 10-32	Side 8-36 4 pin	Side ¼-28 4 pin	Side ¼-28 4 pin	Side 8-36 4 pin	Side 8-36 4 pin
Material	Titanium	Titanium	Titanium	Titanium	Titanium	Titanium
	HDP356B41	HDD3143D1	HDP356B18	HD2030MSP	HDWBV-100	HDBV-1000
Axes	3	3	3	3	3	3
Applications	WB + Seat pad	General	Buildings	WB	WB - General	Buildings
Sensitivity [mV/g]	100	100	1000	1000	1000	10000
Range [±gpk]	10	50	5	50	50	0,5
Frequency response [±5%]	0.5Hz ÷ 1kHz	0.5Hz ÷ 3kHz	0.5Hz ÷ 3kHz	0,6 Hz ÷ 230 Hz	0,6 Hz ÷ 230 Hz	0,6 Hz ÷ 230 Hz
Resonance frequency [kHz]	27	25	20	> 5 kHz	> 5 kHz	> 5 kHz
Linearity [%F.S.]	±1	±1	±1	± 0,5 %	± 0,5 %	± 0,5 %
Transverse sensitivity [%max]	5	5	5	< 5%	< 5%	< 5%
Max shock [gpk]	2000	1500	5000	1000	1000	1000
Operating temperature [°C]	-10 ÷ +50	-50 ÷ +85	-29 ÷ +77	-20°C ÷ +60°C	-20°C ÷ +60°C	-20°C ÷ +60°C
Weight [g]	272	14	25	410	50	50
Dimensions	Ø 200 mm x 12 mm	20.8 x 20.8 x 8.6 mm	20.3 x 20.3 x 26.1 mm	Ø 250 mm X 12 mm	Ø 71 mm X 12 mm	Ø 71 mm X 12 mm
Mounting	Accelerometer with 10-32 threaded hole inserted into a rubber seat pad.	Through-hole for 6-32 UNC or M3 screw	Threaded hole 10-32	Accelerometer with 10-32 threaded hole inserted into a rubber seat pad	Threaded hole 10-32	Threaded hole 10-32
Insulation	-	-	-	-	-	-
Connector	Side ¼-28 4 pin	Side ¼-28 4 pin	Side ¼-28 4 pin	4-pin M5	4-pin M5	4-pin M5
Material	Titanium	Titanium	Anodised aluminium	Aluminium anodised, rubber	Anodised aluminium	Anodised aluminium

- **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.

- Hexagon socket head screw 10-32 UNF
- Hexagon socket head screw 5-40 UNC
- 10 plastic ties width 4.5 mm length 200 mm
- 1 metallic clampwidth 9 mm

- **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.

- Hexagon socket head screw 10-32 UNF
- Hexagon socket head screw 5-40 UNC
- 10 plastic ties width 4.5 mm length 200 mm
- 2 velcro straps with strip width 24.5 mm

- **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.

- 10 plastic ties width 4.5 mm length 20 cm
- 2 fabric ties with strip width 24.5 mm

- **HD2030AC4:** Adapter to be held between the hand and the handle. The accelerometer is placed in lateral position, at the left or the right hand of the hand. This adapter is suitable for anatomical handles, not necessarily cylindrical and of small dimensions. Material: light alloy.

- Hexagon socket head screw 10-32 UNF
- Hexagon socket head screw 5-40 UNC.
- 10 plastic ties width 4.5 mm length 200 mm
- 2 fabric ties with strip width 24.5 mm

- **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.

- Steel bracket with three feet and spirit level. It has a 10-32 UNF threaded hole on the top side and a cavity on the bottom side with a M4 threaded hole.
- Cubic adapter to be mounted on the support top side with two M4 screws (included). The cube is provided with 10-32 UNF threaded holes on three orthogonal faces.
- 3 mm hex key.

HD2030.124 : adapters kit for the measurement of the vibrations transmitted to the hand-arm system. Includes:

- HD2030AC1: cube-shaped adapter for anatomical handles and small size tools. Has to be fastened to the handle with plastic cable-tie or metallic clamp (included).
- HD2030AC2: adapter for cylindrical handles. It is placed laterally with respect to the hand.
- HD2030AC4: general purpose adapter. The accelerometer is placed between the forefinger and the middle-finger or between the middle-finger and the ring-finger.

HD2030.1234: adapters kit for the measurement of the vibrations transmitted to the hand-arm system. Includes:

- HD2030AC1: cube-shaped adapter for anatomical handles and small size tools. Has to be fastened to the handle with plastic cable-tie or metallic clam (included).
- HD2030AC2: adapter for cylindrical handles. It is placed laterally with respect to the hand.
- HD2030AC3: adapter for cylindrical handles provided with threaded hole for accelerometers with 10-32 UNF screw. It is placed laterally with respect to the hand.
- HD2030AC4: general purpose adapter. The accelerometer is placed between the forefinger and the middle-finger or between the middle-finger and the ring-finger.

Screws, bonding bases, insulated bases, magnets and adhesive discs are available on request for mounting accelerometers on various surfaces.

With HD2070 are provided the following accessories:

- Wax, glue for quick fastening
- Silicone grease
- Glue for quick fastening
- USB cable for PC connection
- 2GB SD memory card
- CD containing "Noise Studio" PC software (Windows compatible), user manual and carrying case.

The following accessories are also supplied for each accelerometer combined with an HD2070 kit:

- Mounting screws (if the accelerometer requires them)
- Manufacturer calibration chart of the sensor and ISO9001 calibration report

Software per sistemi operativi Windows®

The interface program Noise Studio is provided with the instrument and allows to download and display data logged in the instrument and to manage setups, sensor configurations and calibration register files.

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.

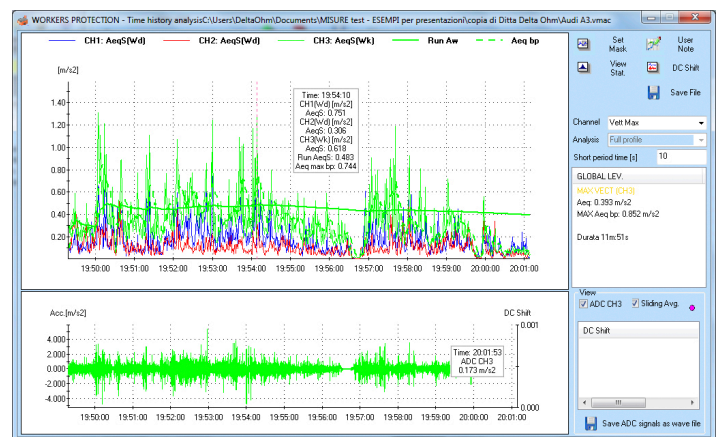
The HD2070 stores calibration information in a reserved area of internal memory. The calibration register file is downloaded to PC memory together with logged data and stored in the same folder.

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.

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

NS1 - 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 and UNI9432/2011, European Directive 2003/10/CE and 2002/44/CE.
- evaluation of hearing protectors with the methods OBM and SNR according to UNI EN 458
- evaluation of measurement uncertainties in accordance with UNI9612
- Calculation of the impulsiveness of noise sources according to the requirements of UNI 9432/2008.



NS1 "Workers Protection" Vibration module: evaluation of vibration exposure, analysis of X-Y-Z time traces.

ORDERING CODES FOR KITS AND ACCESSORIES

Vibration analyser kit

HD2070.K1 - Vibration analyser kit. Includes:

- **HD2070** vibration analyser, silicone grease for accelerometers **HD6188**, **HD6273** wax tray for gluing, **080A90** glue for quick mounting, **HD2030MC** 2 Gb Sd memory card, **CP22** serial cable for USB ports, manual and case
- **Noise Studio programme** for PCs with Windows® operating system, downloadable from Delta OHM website
- **Calibration report** according to ISO8041 of the HD2070 analyser. **Accelerometers, connection cables and accessories must be specified when ordering.**

HD2070 Analyser Options

HD2070.O1 - "Spectral analysis" option: measurement of the acceleration spectrum in 1/1 octave bands from 0.5Hz to 2kHz and 1/3 octave bands from 0.5Hz to 3.15kHz class 1 according to IEC 61260. Includes the Calibration report according to IEC 61260.

HD2070.O2 - "Statistical analysis" option: probability distribution graph and percentile levels graph from L_1 ad L_{99} in 1dB classes.

HD2070.O3 - "Digital recorder" option: digital storage of accelerometer raw signals (on all channels) in the memory card..

Optional software modules for data processing

CH20: Hardware key for PC with Windows® operating system. When connected to a USB port, it enables the use of software modules.

NS1: Application module "Workers' Protection": Analysis of noise and vibrations exposure in the workplace according to UNI9432, ISO9612, 2003-10-CE, 2002-44-CE.

Accelerometers

HDP352C34: General purpose ICP mono-axial accelerometer. Sensitivity 100 mV/g. Range ± 50 g pk.

Includes: 10-32 UNF copper-beryllium alloy mounting screw (081B05), M6 copper-beryllium alloy mounting screw (M081B05), Calibration certificate (ACS-1).

HDP356B20: Miniature ICP tri-axial accelerometer for hand-arm vibrations at high shock levels. Sensitivity 1 mV/g. Range ± 5000 g pk.

Includes: 5-40 UNC copper-beryllium alloy mounting screw (081A90), 10-32 UNF copper-beryllium alloy mounting screw (081A90), M3 copper-beryllium alloy mounting screw (M081A27), Calibration certificate (ACS-1T).

HDP356A02: ICP tri-axial accelerometer for the measurement of the vibrations transmitted to the hand-arm system. Sensitivity 10 mV/g. Range ± 500 g pk.

Includes: 10-32 UNF copper-beryllium alloy mounting screw (081B05), M6 copper-beryllium alloy mounting screw (M081B05), Calibration certificate (ACS-1T).

HDD3023A2: Miniaturised IEPE triaxial accelerometer for measuring vibrations transmitted to the hand-arm system. Sensitivity 10 mV/g. Range ± 500 g pk.

Includes: 10-32 UNF copper-beryllium alloy mounting screw, Calibration certificate (ACS-1T).

HDP356B21: Miniature ICP tri-axial accelerometer for hand-arm vibrations. Sensitivity 10 mV/g. Range ± 500 g pk.

Includes: 5-40 UNC copper-beryllium alloy mounting screw (081A27), 10-32 UNF copper-beryllium alloy mounting screw (081A90), M3 copper-beryllium alloy mounting screw (M081A27), Calibration certificate (ACS-1T).

HDP356A22: General purpose miniature ICP tri-axial accelerometer. Sensitivity 100 mV/g. Range ± 50 g pk.

Includes: 5-40 UNC copper-beryllium alloy mounting screw (081A27), 10-32 UNF copper-beryllium alloy mounting screw (081A90), M3 copper-beryllium alloy mounting screw (M081A27), Calibration certificate (ACS-1T).

HDD3143D1: General purpose tri-axial accelerometer. Sensitivity 100 mV/g. Range ± 50 g pk.

Includes: 6-32 UNC mounting screw, mounting adapter with M3 screw for fixing to the floor support HD2030AC5.

HDP356B41: General purpose ICP tri-axial accelerometer inserted in a rubber pad for whole body vibrations transmitted through seats and backs. Sensitivity 100 mV/g. Range ± 10 g pk.

Includes: 1,6 m connection cable HD2030.CAB3-1,6 M, Calibration certificate (ACS-1T), double-thread screw S - 40.

HDP356B18: High sensitivity ICP tri-axial accelerometer for buildings vibrations. Sensitivity 1 V/g. Range ± 5 g pk.

Includes: 10-32 UNF copper-beryllium alloy mounting screw (081B05), M6 copper-beryllium alloy mounting screw (M081B05), Calibration certificate (ACS-1T).

HD2030MSP: Tri-axial seat accelerometer for measuring whole-body vibrations in passenger and work vehicles.

Sensitivity 1 V/g. Range ± 5 g pk.

Includes: 10-32 UNF copper-beryllium alloy mounting screw (HD6200), mounting screw kit, rubber seat adapter (HD2030PAD). Can be used for measurements of vibrations transmitted from seats to occupants of passenger or work vehicles. The mechanical design complies with the requirements of ISO 10326-1.

HDWBV-100: Triaxial accelerometer for measuring whole-body vibrations, according to ISO 2631, ISO 10326-1, ISO 7096 and ISO 8041.

Sensitivity 1 V/g. Range ± 5 g pk.

Includes: 10-32 UNF copper-beryllium alloy mounting screw (HD6200), mounting screw kit. In combination with the HD2030PAD seat adapter, the HDWBV the accelerometer is suited for measuring vibrations in vehicles and construction machinery.

HDBV-1000: High-sensitivity IEPE tri-axial accelerometer.

Sensitivity 10 V/g. Range ± 5 m/s² pk.

Using the included mounting kit, the accelerometer can be combined with the HD2030AC5 floor measurement stand.



HDP352C34 - single-axis accelerometer for general applications, sensitivity 100 mV/g



HDP356B20 - triaxial accelerometer for HA applications - Shock, sensitivity, 1mV/g



HDP356A02 - triaxial accelerometer for HA applications, sensitivity 10 mV/g



HDD3023A2 - triaxial accelerometer for HA applications, sensitivity 10 mV/g



HDP356B21 - triaxial accelerometer for HA applications, sensitivity 10 mV/g



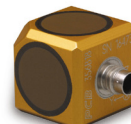
HDP356A22 - triaxial accelerometer for WB-general applications, sensitivity, 100 mV/g.



HDD3143D1 - triaxial accelerometer for general applications, sensitivity 100 mV/g



HDP356B41 - triaxial accelerometer for WB + Seat applications, sensitivity 100 mV/g



HDP356B18 - triaxial accelerometer for building applications, sensitivity 1000 mV/g



HD2030MSP - triaxial accelerometer for WB applications, sensitivity 1 V/g



HDWBV-100 - triaxial accelerometer for WB applications - general, sensitivity 1 V/g



HDBV-1000 - triaxial accelerometer for building applications, sensitivity 10 V/g

VIBRATION CALIBRATOR

HD2060: Portable vibration calibrator with frequency 15,915 Hz and levels 1 m/s² and 0,1 g, and frequency 159,155 Hz and levels 10 m/s² and 1 g. With LCD display. Includes: holder with UNF 10-32 screw for mounting triaxial accelerometers (HD2060.20), isolated base with integrated UNF 10-32 screw for mounting accelerometers by adhesive (HD6245.1), rechargeable battery pack (BAT-40), stabilised mains voltage power supply (SWD10), carrying case, Calibration report.



HD 2060

Mounting adapters for accelerometers (for detailed description see dedicated section)

- **HD2030AC1:** cubic support for accelerometer.
- **HD2030AC2:** accelerometer holder for cylindrical handle, light alloy material.
- **HD2030AC3:** accelerometer holder for cylindrical handle, material stainless steel
- **HD2030AC4:** flip-flop holder for tri-axial accelerometer.
- **HD2030AC5:** floor support for seismic accelerometers.
- **HD2030.124:** Adapters kit HD2030AC1, HD2030AC2, HD2030AC4.
- **HD2030.1234:** Adapters kit HD2030AC1, HD2030AC2, HD2030AC3, HD2030AC4.



HD2030AC5

HD2030AC3

HD2030AC2

HD2030AC1

CABLES FOR MONO-AXIAL ACCELEROMETERS

HD2030.CAB-X: Connector assembly on customer-supplied cable: instrument-side header of the connection cable between the accelerometer (IEPE/ICP) and the HD2030 or HD2070 analyser.

HD2030.CAB1-3M: low noise coaxial cable for connection of mono-axial accelerometers. **Length 3 m.** Can be used with HDP352C34 accelerometers.

HD2030.CAB1-5M: low noise coaxial cable for connection of mono-axial accelerometers. **Length 5 m.** Can be used with HDP352C34 accelerometers.

HD2030.CAB1-10M: low noise coaxial cable for connection of mono-axial accelerometers. **Length 10 m.** Can be used with HDP352C34 accelerometer.

HD2030.CAB13: Coaxial cable for connection of three mono-axial accelerometers to the HD2070 analyser. Length 40 cm and BNC connectors. The accelerometers are connected to the HD2030.CAB13 cable through HD2030.CAB1B-3M cables.

HD2030.CAB1B-3M: coaxial cable for connection of mono-axial accelerometers to the HD2030.CAB13 cable. **Length 3 m.** Can be used with HDP352C34 accelerometers.

HD2030.CAB.BNC-10M: coaxial extension cable for the connection of mono-axial HD2030.CAB13 cable. Maximum length 200 m, both ends terminated with BNC female connectors.

Cables for tri-axial accelerometers

HD2030.CAB3-1.6M cable for the connection of tri-axial accelerometers. **Length 1.6 m.** Can be used with HDP356B41 accelerometers.

HD2030.CAB3-3M: cable for the connection of tri-axial accelerometers. **Length 3 m.** Can be used with: HDP356A02, HDD3143D1 and HDP356B18 accelerometers.

HD2030.CAB3-5M: cable for the connection of tri-axial accelerometers. **Length 5 m.** Can be used with: HDP356A02, HDD3143D1 and HDP356B18 accelerometers.

HD2030.CAB3-10M: cable for the connection of tri-axial accelerometers. **Length 10 m.** Can be used with: HDP356A02, HDD3143D1 and HDP356B18 accelerometers.

Cables for miniature tri-axial accelerometers

HD2030.CAB3S-3M: cable for miniature tri-axial accelerometers connection to the right input of the analyser. **Length 3 m.** Can be used with HDP356B20, HDP356B21 and HDP356A22 accelerometers.

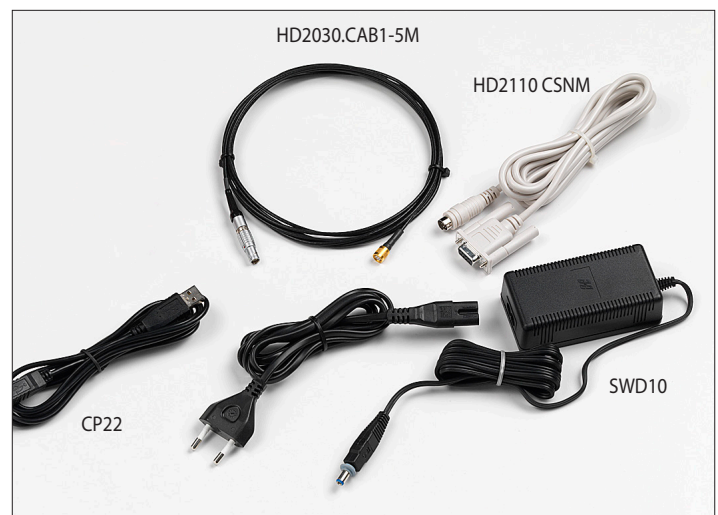
HD2030.CAB3S-5M: cable for miniature tri-axial accelerometers connection to. **Length 5 m.** Can be used with HDP356B20, HDP356B21 and HDP356A22.

HD2030.CAB3S-10M: cable for miniature tri-axial accelerometers connection. **Length 10 m.** Can be used with HDP356B20, HDP356B21 and HDP356A22 accelerometers.

Cables for tri-axial accelerometers with M5 connector

HD2030.CABM-2M: cable for connecting tri-axial accelerometers with 4-spin M5 connector. **Length 2 m** can be used with HD2030MSP, HDWBV - 100 and HDWBV - 1000 accelerometers.

HD2030.CAB3M-5M: cable for connecting tri-axial accelerometers with 4-spin M5 connector. **Length 5 m** can be used with HD2030MSP,



HD2030.CAB1-5M

HD2110 CSNM

SWD10

CP22

HDWBV - 100 and HDWBV - 1000 accelerometers.

Accessories for accelerometers mounting

- 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.
- 081A90: screw with double thread 5-40 UNC and 10-32 UNF.
- M081B05: screw with double thread 10-32 UNF and M6x0,75.
- M081A27: screw with double thread 5-40 UNC and M3x0,5".
- 081A27: screw with double thread 5-40 UNC.
- HD6239: Tip for accelerometer
- HD6286: metal disk to be applied by adhesive; for magnetic bases HD6284 and HD6196.
- HD6284: magnetic base with 10-32UNF threaded hole, for any accelerometer.
- HD6196: magnetic base with integrated 10-32 UNF screw, it can be used with the HDP356A02, HDP356C34 and HDP356B41 (removing the rubber pad) accelerometer.
- HD6226: base with 10-32 UNF threaded hole for mounting by adhesive. For any accelerometer.
- HD6245: Insulated base with integrated 10-32 UNF screw and threaded hole 10-32 UNF. It can be used with the HDP356A02, HDP356C34 and HDP356B41 (removing the rubber pad) accelerometers.
- HD6220: isolated base with integrated 10-32 UNF screw and threaded 10-32 UNF hole for accelerometer mounting. For any accelerometer.
- HD2060.20: support for the lateral mounting of tri-axial accelerometers



Input details



Output details



with 10-32 UNF mounting screw.

Accessories

- HD2110CSNM: serial cable connection to PC COM interface.
- CP22: serial cable for connection to a PC with USB interface.
- HD2070MC: 4GB SD memory card .
- HD2030AM: headset with microphone.
- SWD10: 100-240Vac/12Vdc-1A stabilised mains voltage power supply.
- VTRAP: tripod.
- HD40.1: 24-column portable thermal printer with RS232 interface. Paper width 57 mm. Powered by 4 x 1.2V NiMH rechargeable batteries. Connects to the HD2070 analyser using the HD2110CSNM cable (not included). Includes: SWD10 mains voltage stabilised power supply 100-240 vac/12VDC-1A, 5 rolls of thermal paper, user manual.
- BAT-40: Replacement battery pack for HD40.1.
- RCT: Set of 4 rolls of thermal paper 57 mm wide, 32 mm diameter.



Optional tripod



Headset with microphone (optional)