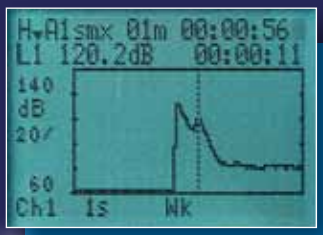
HD 2070

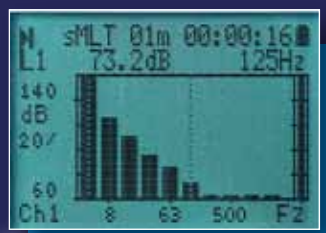
- Three channel vibration analyzer

Base screen:
single axis measurements

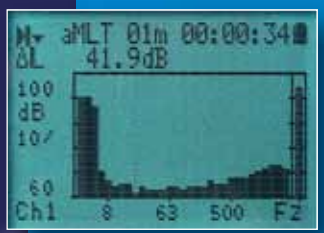
Base screen:
vector measurements



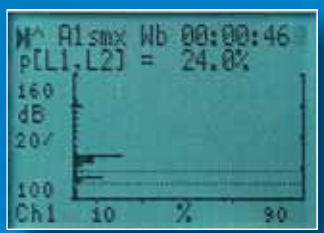
Time profile



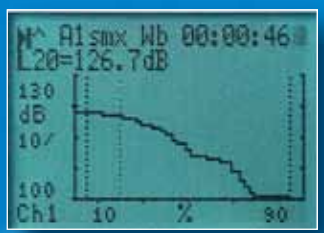
Octave band spectrum
(option)



Third octave spectrum
(option)



Statistic analisys:
probability distribution
(option)



Statistic analisys:
graph of percentile levels
(option)

Three channel vibration analyzer

HD2070 is a portable vibration analyzer performing spectral and statistical analysis on three 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. It has been designed combining simplicity of use with maximum flexibility and the possibility of updating the instrument according to the evolution of the regulations relating to vibration measurement. The firmware can be updated directly by the user by means of the Noise Studio program supplied with the instrument.

Technical standards

HD2070 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** "Electro- acoustics – Octave band and fractional-octave band filters" (option HD2070.O1)

Main features

- Octave and third octave filters, available as option **(HD2070.O1**), satisfy class 1 specifications of IEC 61260 standard.
- The HD2070 detects accelerations on three axes with integrated amplifying electronics (IEPE or equivalent type); it is possible to connect three single-axes or one tri-axial accelerometer to the instrument. Accelerometers with integrate electronics allow to achieve low impedance and low noise connections between the accelerometer and the instrument, decreasing the probability to get wrong or altered measurements because of interferences or electromagnetic disturbances.
- The HD2070 analyzes the signals coming from the accelerometer and makes calculations simultaneously on three axes; it calculates the weighted acceleration values as well as the octave or third octave spectra **(with option HD2070.O1).** 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 **(option HD2070.O2).**
- As statistical analyzer, the HD2070 calculates, with option **HD2070.O2**, the probability distribution of a measurement parameter in 1dB classes. Both the probability distribution and the percentile levels from L_1 to L_{99} are available as graphs.
- A versatile data logging function stores multiple profiles and spectra using either the internal memory of 8MB or memory card (MMC or SD cards up to 2GB). Each record can be documented with a voice comment. In addition, the HD2070 can be used as an audio recorder, as a further opportunity to document the measures.
- With the **option HD2070.O3** you can add to the profiles also the signals provided by accelerometers, recording the digital samples directly. When the stored data are analyzed, it is useful to examine the accelerometer signals to verify the absence of artefacts such as, for example, those associated with the phenomenon of DC-shift.
- The "Navigator" program available in the analyzer allows to examine logged measurements and to hear vocal comments.
- For a quick setup of the instrument it is possible to store up to nine setup, user-customized according to specific applications. The desired setup is easily identified by the associated title.
- The calibration can be performed using either the calibration data of the accelerometers with a vibration generator. The last 120 calibrations performed are recorded in a file and stored in a protected and reserved area of the permanent memory of the instrument. The program interface Noise Studio automatically adds the file supplied with the calibration measurements during the downloading of data into the PC memory.
- HD2070 can be completely controlled by a PC, via RS232 and USB serial interfaces, using a special communication protocol.

Applications

The HD2070 analyzer is able to perform all the measures required by the **European regulations 2002/44/EC** concerning workers protection from mechanical vibration at the work place. The choice of **hand-arm measurements (HA) or whole body (WB and BV)** changes the frequency range of the spectral analysis available with the option HD2070.O1. For hand-arm measures the range extends from 3.15Hz up to 3.15kHz (from 4Hz to 2kHz for octave band spectrum), while for whole body measures the range of central frequencies is shifted towards low frequencies, from 0.5Hz up to 315Hz (from 0.5Hz to 250Hz for octave band spectrum).
The HD2070 is suitable for the evaluation of worker exposure to vibration and the risk of injury in the following cases:

- vibrations transmitted to the hand-arm system by vibrating tools or objects subject to vibration or impact,
- whole-body vibration transmitted through the driver's seat of vehicles,
- whole-body vibration in workstations,
- Whole-body vibration of buildings subject to vibration or impact.

Technical specifications

Technical standards

- ISO 8041:2005
- ISO 5349-1:2001 (hand-arm transmitted vibrations)
- ISO 2631-1,2,4 and 5 1997 (whole body vibration)
- IEC 61260 :1995 class 1 **(option HD2070.O1)**

Measurement mode:

- **HA:** Vibrations transmitted to the hand-arm system
- **WB:** Vibrations transmitted to the whole body
- **BV:** Vibrations in buildings.

Measurement parameters
RMS, VDV, MTVV, Peak, Max, Min

Frequency weightings
- Fz, Fc and Wh for measurements on the hand-arm system
- Fz, Fa, Wb, Wc, Wd, We, Wj, Wk for whole-body measurements
- Fz, Fm and Wm for the measurement of vibrations transmitted by buildings

Spectrum analysis by octave or third octave bands (option HD2070.O1)
The range depends on the choice of the central frequencies as reported in the table below:

Application	Range of central frequencies	
	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)
It is performed on a parameter measuring range in 1dB classes. It is possible to see the probability distribution and graph of percentile levels.

Measurement range
0.1 m/s^2 ÷ 7000 m/s^2 with accelerometer HDD – 3023A2 for hand-arm measures

Linear range
Three measuring ranges from 80 dB to 70 dB superimposed

Digital converter
Four analog to digital converters with a resolution of 25 bits to 8k samples per second.

Levels of intrinsic noise
Less than 30mm/s^2 with accelerometer HDD – 356A02 for hand-arm measures and Wh filter.

Display
128x64 pixel large graphic backlit display
Screens:
- **VLM1:** Three measurement parameters to be chosen for all channels.
- **VLM2:** Three parameters of the acceleration vector calculated on the tri-axial input channels.
- **VLM3**: Three global parameters to be chosen, for all channels.
- **VLM4**: Three global parameters to of the acceleration vector calculated on the tri-axial input channels.
- **PROFILE**: graphic profile of a parameter of integration interval programmable from 1s up to 1 hour, calculated simultaneously for all channels.
- **SPECTRUM:** Band spectrum octave or third octave filter with restatement of a high-bandwidth choice, calculated for all channels simultaneously. It is possible to view the acceleration, velocity and displacement **(with option HD2070.O1).**
- **STATISTICS:** Probability distribution of the parameter chosen for the PROFILE screen (**with option HD2070.O2**).
- **PERCENTILES**: Graph of percentile levels relative to the parameter chosen for the PROFILE screen (**with option HD2070.O2**).

Storage
Internal 8MB FLASH type memory card and connector for type MMC or SD cards up to 2GB

Interface
Serial type RS232 and USB

Input/Output
LINE type output for each channel: 2Vpp f.s.
TRGIN input electrically isolated: used as trigger by external devices
TRGOUT output: 3V logic used as a trigger output for external devices

Power supply
Four AA 1.5V alkaline batteries with autonomy of 10 hours.
The instrument can use four rechargeable NiMH batteries. **The instrument does not act as a charger.**

Environmental Parameters
Storage range: -25°C to 70°C, relative humidity less than 90% non-condensing.
Operating range: -10°C to 50°C, relative humidity below 90% without condensation.

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

Accelerometers
HD2070 can be connected to tri-axial accelerometer-type and mono-axial with integrated electronics (IEPE type or equivalent) and sensitivity 1mV g up to 1 V/g. The accelerometers are powered with a DC bias voltage of 25V and a current of up to 2mA. The accelerometer models shown in table are available on request:

Model	Axes	Application	Sensitivity [mV/g]	Range [±gpk]	Weight [gr]
HDD – 3200B5T	1	HA - Shock	1	5000	6
HDP – 352C34	1	General	100	50	5.8
HDD – 3056B2	1	General	100	50	10
HDP – 356B20 (*)	3	HA – Shock	1	5000	4
HDP – 356A02 (*)	3	HA	10	500	10.5
HDP – 356B21	3	HA	10	500	4
HDP – 356A22	3	WB - General	100	50	5.4
HDP – 356B41 (*)	3	WB + seat	100	10	272
HDP – 356B18	3	Buildings	1000	5	25
HDD – 3233A	3	Buildings	1000	5	28

(*) Usually in stock

Input details

Output details

Technical characteristics of mono-axial accelerometers:

	HDD 3200B5T	HDD 3019A1	HDP 352C34	HDD 3056B2
Axes	1	1	1	1
Sensitivity [mV/g]	1	10	100	100
Range [±gpk]	5000	500	50	50
Frequency response [±5%]	0.5Hz ÷ 20kHz	1Hz ÷ 10kHz	0.5Hz ÷ 10kHz	1Hz ÷ 10kHz
Resonance frequency [kHz]	130	50	50	32
Linearity [%F.S.]	±1	±2	±1	±2
Transverse sensitivity [%max]	3	5	5	5
Maximum Shock [gpk]	50000	3000	5000	2000
Operating temperature [°C]	-51 ÷ +121	-51 ÷ +149	-54 ÷ +93	-51 ÷ +121
Weight [g]	6	8	5.8	10
Dimensions	3/8" x 16.3mm	3/8" x 18.5mm	7/16" x 22.4mm	½" x 23.1mm
Mounting	Integrated screw 10-32	Integrated screw 10-32	Threaded hole 10-32	Threaded hole 10-32
Isolation	> 10MΩ	> 10MΩ	-	> 10MΩ
Connector	Top 10-32	Top 10-32	Top 10-32	Top 10-32
Material	Stainless steel	Stainless steel	Titanium	Titanium

Technical characteristics of the tri-axial accelerometers:

	HDP 356B20	HDP 356A02	HDP 356B21
Sensitivity [mV/g]	1	10	10
Range [±gpk]	5000	500	500
Frequency response [±5%]	(Z-Y) 2Hz ÷ 10kHz (X) 2Hz ÷ 7kHz	1Hz ÷ 5kHz	(Z-Y) 2Hz ÷ 10kHz (X) 2Hz ÷ 7kHz
Resonance frequency [kHz]	55	25	55
Linearity [%F.S.]	±2.5	±2	±1
Transverse sensitivity [%max]	5	5	5
Maximum shock [gpk]	7000	7000	10000
Operating temperature [°C]	-54 ÷ +121	-54 ÷ +121	-54 ÷ +121
Weight [g]	4	10.5	4
Dimensions	10.2 x 10.2 x 10.2 mm	14 x 14 x 20.3 mm	10.2 x 10.2 x 10.2 mm
Mounting	Threaded hole 5-40	Threaded hole 10-32	Threaded hole 5-40
Isolation	-	-	-
Connector	Lateral 8-36 4 pin	Lateral ¼-28 4 pin	Laterale8-36 4 pin
Material	Titanium	Titanium	Titanium

	HDP 356A22	HDP 356B41	HDP 356B18	HDD 3233A
Sensitivity [mV/g]	100	100	1000	1000
Range [±gpk]	50	10	5	5
Frequency response [±5%]	0.5Hz ÷ 4kHz	0.5Hz ÷ 1kHz	0.5Hz ÷ 3kHz	0.4Hz ÷ 3kHz
Resonance response [kHz]	25	27	20	20
Linearity [%F.S.]	±1	±1	±1	±1
Transverse sensitivity [%max]	5	5	5	5
Maxumum Shock [gpk]	5000	2000	5000	5000
Operating temperature [°C]	-54 ÷ +77	-10 ÷ +50	-29 ÷ +77	-51 ÷ +121
Weight [g]	5.4	272 (with seat pad)	25	28
Dimensions	11.4 x 11.4 x 11.4 mm	Ø 200mm x 12 mm	20.3 x 20.3 x 26.1 mm	33 x 25 x 13 mm
Monting	Threaded hole 5-40	Accelerometer with 10-32 threaded hole inserted into a rubber pad for the seat.	Threaded hole 10-32	Hole for 8-32 screw or M4.
Isolation	-	-	-	Provided with insulating spacer
Connector	Lateral 8-36 4 pin	Lateral ¼-28 4 pin	Lateral ¼-28 4 pin	Lateral ¼-28 4 pin
Material	Titanium	Titanium	Anodized aluminium	Titanium steel

Accessories for accelerometers

In order to make measurements of vibration transmitted to the hand-arm system, you must use the accessories that allow you to pair the accelerometer to the handle of the tool. The accessories available are:

- **HD2030AC1:** Cube-shaped support to be fixed to the handle with a plastic or metal strap, positioned close to that occupied by the hand. Suitable for measurements on lightweight tools where you need to keep the weight measurement system. Material: Light alloy.
- **HD2030AC2**: Adapter to be held between the hand and the handle. The accelerometer is placed in a lateral position, the left or right hand. Suitable for large cylindrical handles. The measurement should be repeated by placing the accelerometer on both sides of the hand. Material: Light alloy.
- **HD2030AC3:** Adapter to be held between the hand and the handle. The accelerometer is placed in a lateral position, the left or right hand. Adapted to handle large cylindrical and accelerometers with integrated screw. The measurement should be repeated by placing the accelerometer on both sides of the hand. Material: stainless steel.
- **HD2030AC4:** Adapter to be held between the hand and the handle. The accelerometer is placed in a central position between the middle finger and ring finger or between the index and middle fingers. Suitable for handles with anatomical shape and small size. Material: Light alloy.
- **HD2030AC5:** Support for measurements on surfaces and floors vibrating in general. Fitted with bubble level and three supporting legs, two of which are adjustable in height. The media has, on the lower face, a quarry site for the assembly of a tri-axial accelerometer with high sensitivity for measuring vibrations in buildings. The upper surface has 10-32 UNF threaded hole for mounting an accelerometer. If you want to use mono-axial accelerometers, three, comes a cube adapter fixed on the top surface of the substrate. Material: steel, weight 1.9kg.

For mounting the accelerometers on different surfaces are available on request screws, bases for bonding, isolated bases, magnets and stickers discs. The HD2070 comes along with the following accessories:

- Wax
- Grease
- Adhesive for quick mounting
- Connection cable to the USB port of a PC
- 2GB SD Memory card
- CD-ROM containing the PC interface program "Noise Studio" and the user manual

For each accelerometer combined with a kit with HD 2070 are also provided the following accessories:

- Fixing screws (if required by the accelerometer))
- 2m connection cable for HD2070 (other lengths on request, on payment)
- CD ROM containing the manual and the configuration data of the accelerometer

Software for Windows ® 98/XP/Vista/7

The program interface Noise Studio is supplied to the instrument and allows downloading and displaying the data stored in the instrument, to manage the setup, configurations of sensors and calibration files.
Instrument settings can be customized by the user and stored with a title in a setup file for future use. In order to easily perform various types of measures, in up to nine different settings, selectable from the setup file, can be loaded into the instrument.
Sensor configurations can be set either manually, by filling out the table of the characteristics of each accelerometer, or automatically, using the CD-ROM provided by the accelerometers Delta OHM.
The HD2070 stores the calibration information in a reserved area of memory. The calibration of the log file is transferred to PC memory with the data and stored in the same folder.

Several optional analysis functions can be activated by means of license. The program can be updated automatically via the web and includes demo versions of all modules.

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

NS1 – Software module "Worker protection":

- Analysis of workers exposure to noise and vibration on the hand-arm system and whole body, in accordance with Decree Law n.81/2008 and standards UNI 9432 and ISO 9
- Evaluation of protective equipment including impulsive noise with SNR and OBM methods according to UNI EN 458,
- Evaluation of measurement uncertainties in compliance with ISO 9612
- Calculation of the index of impulsiveness of the noise sources.

Ordering codes and accessories

Vibration analyzer kit

HD2070.K1 Vibration analyzer Kit, includes:

- **HD2070** Vibration analyzer, silicon grease for **HD6188** accelerometers, wax bonding **HD6273**, adhesive for quick mounting **080A90**, 2GB SD memory card, serial cable **CP22** for USB ports, user manual and carrying case.
- **Noise Studio** PC program for Windows® operating systems,
- **Calibration report** according to ISO8041 of the HD2070 analyzer.

HD2070.HA-WB Kit Vibration analyzer Kit, It includes:

- **HD2070** Vibration analyzer, **HD6188** silicon grease for accelerometers, **HD6273** wax bonding, **080A90** adhesive for quick mounting, 2GB SD memory card, **CP22** serial cable for USB ports, user manual and carrying case.
- **10mV/g triaxial accelerometer** to measure the vibration transmitted to the hand-arm system, **HD2030CAB3-3M** 3m connection cable to the analyzer, mounting screws, manufacturer calibration documents and ISO8041 calibration report of the vibration meter-accelerometer measuring chain with Wh filter accelerometer for all axes,
- **100mV/g triaxial accelerometer** integrated into a rubber pad for the measurement of whole body vibration through the seat and back, **HD2030CAB3-3M** with 3m connection cable to the analyzer, the manufacturer's calibration chart and ISO8041 calibration report for the vibration meter-accelerometer measuring chain with filters Wd, Wd, Wk, respectively, for axes X, Y and Z,
- **HD2030.124 set** with 3 adapters for mounting the accelerometer on the handle of tools.
- **Noise Studio program** for PC with Windows® operating systems,
- **Calibration report** according to ISO8041 of analyzer HD2070.

HD2070.SL Kit "Safety in the workplace "for the measurement of noise and vibration in the workplace, including:

- **HD2010UC/A** integrating sound level meter and spectrum analyzer **for any work environment, includes**: windshield HD SAV, CPA/5 5m extension cable for the preamplifier , HD2110USB serial cable for USB ports, manual and carrying case
- **HD2070** Vibration analyzer, silicon grease for **HD6188** accelerometers, wax for bonding **HD6273**, adhesive for quick mounting **080A90**, 2GB SD memory card, serial cable **CP22** for USB ports, user manual and carrying case.
- **10mV/g triaxial accelerometer** to measure the vibration transmitted to the hand-arm system, 3m connection cable to the analyzer **HD2030CAB3-3M**, mounting screws, manufacturer calibration documents and ISO8041 calibration report of the vibration meter-accelerometer measuring chain with Wh filter accelerometer for all axes,
- **100mV/g triaxial accelerometer** integrated into a rubber pad for the measurement of whole body vibration through the seat and back, with 3m connection cable to the analyzer **HD2030CAB3-3M**, the manufacturer's calibration chart and ISO8041 calibration report for the vibration meter-accelerometer measuring chain with filters Wd, Wd, Wk, respectively, for axes X, Y and Z,
- **HD2030.124 set** with 3 adapters for mounting the accelerometer on the handle of tools,
- **Noise Studio program** for PCs with Windows® operating systems and software module "Worker protection" (**NS1**), **CH20 dongle** and licensing,
- **Calibration report** according to ISO8041 of the vibration analyzer HD2070,
- **Calibration report** according to IEC651 and IEC804 of the sound level meter HD2010UC/A.

HD2070.RV Kit "Noise and Vibrations" for the measurement of noise and vibrations, includes:

- **HD2110L** integrating sound level meter and spectrum analyzer (**option HD2110.O1** "Third octaves"), HD SAV wind shield, CPA/5 5m extension cable for the preamplifier, HD2110USB serial cable for USB ports, user manual and carrying case.
- **HD2070** Vibration analyzer, **HD6188** silicon grease for accelerometers, **HD6273** wax bonding, **080A90** adhesive for quick mounting, 1GB SD memory card, **CP22** serial cable for USB ports, user manual and carrying case.
- **10mV/g triaxial accelerometer** to measure the vibration transmitted to the hand-arm system, **HD2030CAB3-3M** 3m connection cable to the analyzer, mounting screws, manufacturer calibration documents and ISO8041 calibration report of the vibration meter-accelerometer measuring chain with Wh filter accelerometer for all axes,
- **100mV/g triaxial accelerometer** integrated into a rubber pad for the measurement of whole body vibration through the seat and back, **HD2030CAB3-3M** with 3m connection cable to the analyzer, the manufacturer's calibration chart and ISO8041 calibration report for the vibration meter-accelerometer measuring chain with filters Wd, Wd, Wk, respectively, for axes X, Y and Z,
- **HD2030.124 set** with 3 adapters for mounting the accelerometer on the handle of tools,
- **Noise Studio program** for PCs with Windows® operating systems and software module "Worker protection" (**NS1**), **CH20 key** and licensing,
- **Calibration report** according to ISO8041 of the vibration analyzer HD2070,
- **Calibration report** according to IEC651 and IEC804 of the sound level meter HD2110L.

Options for HD2070 analyzer

HD2070.O1 - option " Spectrum Analysis ": spectrum measurement of the acceleration in octave bands from 0.5Hz to 2kHz and third octaves from 0.5Hz to 3.15kHz, class 1 according to IEC 61260. Includes calibration report according to IEC 61260 standard.

HD2070.O2 – option "Statistical Analysis": graph of the probability distribution of acceleration and calculation of percentile levels from L_1 to L_{99} in 1dB classes.

HD2070.O3 – option "Digital recorder": digital storage of accelerometer signals to memory card

Options for the sound level meter HD2010UC/A

HD2010.O0 – option "Memory module": 4MB additional memory bank.

HD2010.O1 – option "Third octaves": spectral analysis in third octave bands from 25Hz to 12.5kHz according to IEC 61260 class 1. Includes certificate of calibration according to IEC 61260.

HD2010.O4 – option "Reverberation time": measurement of reverberation time by source interruption and integration of the impulse response.

Optional headset

Options for the sound level meter HD2110L

HD2010.O4 – option "Reverberation time": measurement of reverberation time by source interruption and integration of the impulse response.

HD2010.O6 – option "FFT": 1/32s Short Leq profile and FFT spectral analysis on the entire audio field with resolution ranging from 1.5 Hz to 100 Hz.

Sound level meter CALIBRATORS

HD2020: Class 1 sound level calibrator according to IEC60942: 2003 with LCD display, suitable for ½" standard microphones. Calibration frequency 1000Hz, 94dB and 114dB levels. I.N.RI.M approved.

Accelerometers

(*) Available from stock, the other codes are upon request.

HDD - 3200B5T: mono-axial accelerometer to measure vibrations transmitted to the hand-arm system in the presence of high shock levels. Sensitivity 1mV/g, range ±5000g. Integrated 10-32 mounting screw. Uses HD2030CAB1-xM cables for the connection to the analyzer.

HDD - 3019A1: mono-axial accelerometer to measure vibrations transmitted to the hand-arm system. Sensitivity 10mV/g, range ±500g. Integrated 10-32 Mounting screw. Uses HD2030CAB1-xM cables for the connection to the analyzer.

HDP - 352C34: mono-axial accelerometer to measure overall vibration. Sensitivity 100mV/g, range ±50g. 10-23 and M6 mounting screws included. Uses HD2030CAB1-xM cables for the connection to the analyzer.

HDD - 3056B2: mono-axial accelerometer to measure overall vibration. Sensitivity 100mV g, range ±50g. 10-32 mounting screw included. Uses HD2030CAB1-xM cables for the connection to the analyzer.

HDP - 356B20: miniature tri-axial accelerometer for the measurement of **(*)** vibrations transmitted to the hand-arm system in the presence of high shock levels. Sensitivity 1mV/g, range ±5000g. Mounting screws 5-40, 10-23 and M3 included. Uses HD2030CAB3S-xM cables for the connection to the analyzer.

HDP - 356A02: tri-axial accelerometer for measuring vibrations transmitted to the hand-arm system. Sensitivity 10mV/g, range ±500g. 10-23 and M6 mounting screws included. Uses HD2030CAB3-xM cables for the connection to the analyzer.

HDP - 356B21: miniature tri-axial accelerometer for measuring vibrations transmitted to the hand-arm system. Sensitivity 10mV/g, range ±500g. Mounting screws 5-40, 10-23 and M3 included. Uses HD2030CAB3S-xM cables for the connection to the analyzer .

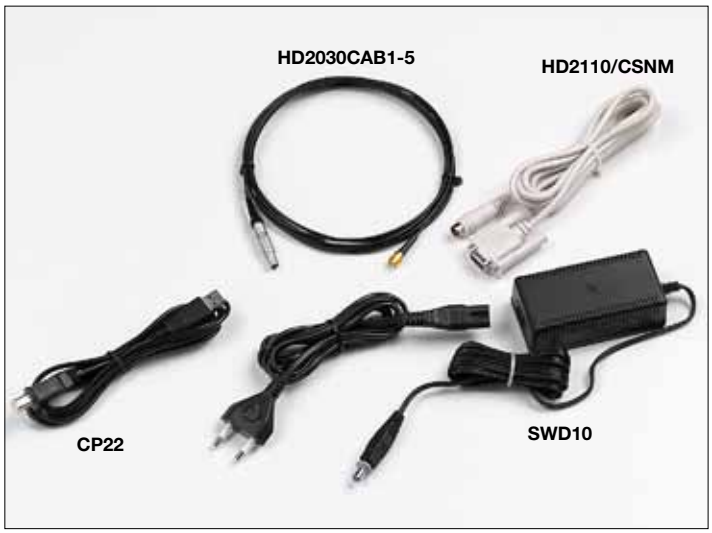
HDP - 356A22: miniature tri-axial accelerometer fro overall vibration measures. Sensitivity 100mV/g, range ± 50g. Mounting Screws 5-40, 10-23 and M3 included. Uses cables HD2030CAB3S-xM for the connection to the analyzer.

HDP - 356B41: tri-axial accelerometer, sensitivity 100mV/g, range ±50g, **(*)** integrated in a rubber pad for the measurement of whole body vibration through the seat and back. HD2030CAB3 1.5m connection cable to the analyzer included. The accelerometer, removable from the rubber pad and with a 10-32 threaded passing hole, is used for overall vibration measures.

HDP - 356B18: high sensitivity tri-axial accelerometer for vibration measurements in buildings. Sensitivity 1V/g, range ±5g. 10-23 and M6 mounting screws included. Uses HD2030CAB3-xM cables for the connection to the analyzer.

HDD - 3233A: high sensitivity tri-axial accelerometer for vibration measurements in buildings. Sensitivity 1V/g, range ±5g. M4x20 mounting screw and washer included. Uses HD2030CAB3-xM cables for the connection to the analyzer.

Optional tripod



Accessories

Accessories

Mounting adapters for accelerometers

HD2030AC1: Cube for mounting accelerometers on handles with plastic or metal cable ties in place as close as possible to the hand. Suitable for measurement of small tools where the weight of the measuring system must be minimized. Material: Light alloy. It includes:
- 10-32 UNF hexagon socket head cap screw
- 4mm hex wrench
- 10 plastic cable ties width 4.5mm length 200mm
- 1 metal band width 9mm

HD2030AC2: Adapter to be held between the hand and the handle. The accelerometer is placed in a lateral position to the left or the right side of the hand. Suitable for large cylindrical handles. The measurement should be repeated by placing the accelerometer on both sides of the hand. Material: light alloy. It includes:
- 10-32 UNF hexagon socket head cap screw
- 4mm hex wrench
- 10 plastic cable ties width 4.5mm length 200mm
- 2 straps fabric strips width 24.5mm

HD2030AC3: Adapter to be held between the hand and the handle. The accelerometer is placed in a lateral position to the left or the right side of the hand. Suitable for large cylindrical handles and **accelerometers with integrated screw**. The measurement should be repeated by placing the accelerometer on both sides of the hand. Material: stainless steel. It includes:
- 10 plastic cable ties width 4.5mm length 200mm
- 2 straps fabric strips width 24.5mm

HD2030AC4: Adapter to be held between the hand and the handle. The accelerometer is placed in a central position between the middle finger and ring finger or between the index and middle fingers. Suitable for handles with anatomical shape and small size. Material: light alloy. It includes:
- 10-32 UNF hexagon socket head cap screw
- 4mm hex wrench
- 10 plastic cable ties width 4.5mm length 200mm
- 2 straps fabric strips width 24.5mm

HD2030AC5: Support for measurements on vibrating surfaces and floors in general. Fitted with bubble level and three supporting studs, two of which are adjustable in height. The support has on its lower face a cavity for mounting a tri-axial accelerometer with high sensitivity for measurements in buildings. The upper surface has a 10-32 UNF threaded hole for mounting an accelerometer. If you want to use three mono-axial accelerometers, a cube adapter to be fixed on the top surface is provided. Material: stainless steel, weight 1.9kg. It includes:
- Stainless steel support with three supporting studs and bubble level. 10-32 UNF threaded hole on the upper surface and a M4 threaded cavity on the lower surface.
- Cube adapter to be mounted on the upper face by two screws. The cube has 10-32 UNF threaded holes on three orthogonal faces.
- 3mm hex wrench

Cables for the connection of the accelerometers to the analyzer HD2070

HD2030CAB1-3M: low noise coaxial cable for connection of mono-axial accelerometers, coaxial connector 10-32. 3m long (other lengths on request).

HD2030CAB3-3M: cable for connecting the tri-axial accelerometers, ¼-28 to 4-pin connector. 3m long (other lengths on request).

HD2030CAB3S-3M: cable for the connection of tri-axial accelerometers, 8-36 to 4-pin connector. 3m long (other lengths on request).

HD2030CAB13: cable for the connection of three mono-axial accelerometers to the tri-axial input of the analyzer. Length 40cm with 3 BNC connectors for connecting the accelerometer cables.

HD2030CAB1B-5M: coaxial cable for connection of mono-axial accelerometers to the cable HD2030CAB13, length 5 meters (other lengths on request).

HD2030CAB.BNC-xxM: coaxial extension cable for connecting mono-axial accelerometers to the HD2030CAB13 cable. BNC connectors and maximum length 50m.

Fixing accessories for accelerometers

HD6188: silicone grease, repellent to water and electrically insulating.
HD6273: wax bonding
HDV.540: screw with double 5-40 UNC thread.
HDV.5401032: screw with double 5-40 UNC and 10-32 UNF thread.
HDV.540M3: screw with double 5-40 UNC and M3 thread.
HDV.1032: screw with double 10-32 UNF thread.
HDV.1032M3: screw with double 10-32 UNF and M3 thread.
HDV.1032M5: screw with double 10-32 UNF and M5 thread.
HDV.1032M6: screw with double 10-32 UNF and M6 thread.
HD6239: tip for accelerometer.
HD6286: metal disc, to be applied by adhesive. Used for coupling the accelerometer by magnet on non-metallic surfaces.
HD6284: isolated magnetic base.
HD6226: base with 10-32 UNF threaded hole for mounting by adhesive.
HD6245: isolated base with integrated 10-32 UNF screw for mounting by adhesive.
HD6220: isolated base with integrated 10-32 UNF-2Amounting screw and 10-32 UNF-2A threaded hole.

Accessories

HD2110/CSNM: serial cable for connection to PC COM interface.
CP22: serial cable for connection to PC USB interface.
HD2030MC: 1GB SD memory card
HD2030AM: headset
SWD10: stabilized mains power supply 100–240Vac/12Vdc-1A.
VTRAP: tripod

HD40.1: Portable thermal printer, 24 columns with RS232 interface. Paper width 57mm. Powered by four 1.2 V NiMH rechargeable batteries. Connection to the analyzer HD2070 using the HD2110/CSNM cable (not included). Includes: SWD10 stabilized power supply voltage Vac/12Vdc-1A 100-240, 5 rolls of thermal paper, user's manual.

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Accessories

Manufacture of portable and bench top scientific instruments
Current loop and voltage output transmitters and regulators
Temperature - Humidity, Dew point - Pressure - CO_2
Air speed - Light - Optical Radiation - Acoustics - Vibration
pH - Conductivity - Dissolved Oxygen - Turbidity
Elements for weather stations - Thermal Microclimate

LAT N° 124 Signatory of EA, IAF and ILAC Mutual Recognition Agreements
Temperature - Humidity - Pressure - Air speed
Photometry/Radiometry - Acoustics

CE CONFORMITY
- **Safety:** EN61000-4-2, EN61010-1 Level 3
- **Electrostatic discharge:** EN61000-4-2 Level 3
- **Electric fast transients:** EN61000-4-4 Level 3, EN61000-4-5 Level 3
- **Voltage variations:** EN61000-4-11
- **Electromagnetic interference susceptibility:** IEC1000-4-3
- **Electromagnetic interference emission:** EN55022 class B

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