Delta OHM

HD 2040

- Tapping Machine

HD 2050

- Dodecahedron Loudspeaker

HD 2050.20

- Digital power amplifier

HD 2050.30

- Directional Sound Source for façade insulations

HD 2050.40

- Subwoofer

HD 2040

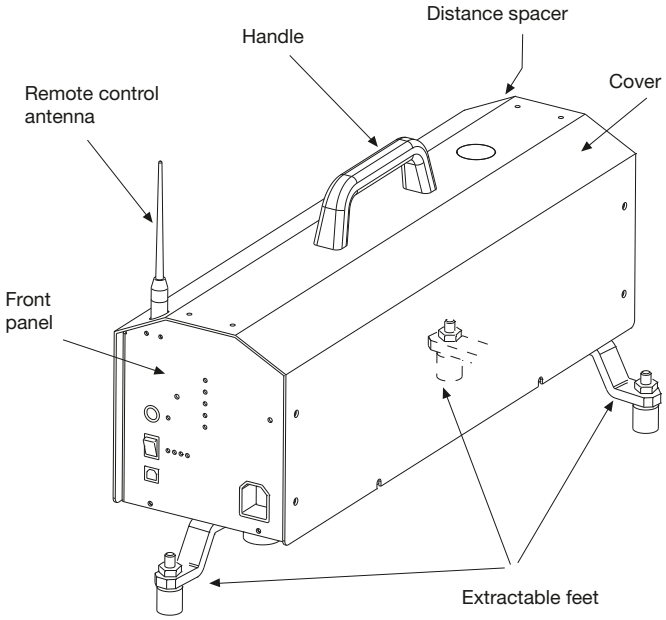
Tapping Machine

The tapping machine **HD 2040** is a noise generator to measure normalized impact sound insulation of floors according to ISO 140-6, ISO 140-7, ISO 140-8, ASTM E492 and E1007.
It has 5 in line hammers operated by means of a camshaft engine controlled by an electronic system. The falling speed of the hammers and the frequency of impacts are constantly monitored to ensure compliance with the legislation. LED indicators on the front panel indicate the correct operation of each hammer.
The hammers are made of hardened stainless steel and are non-deformable over time.
It is equipped with hight-adjustable feet with rubber base. On the back cover it is fitted with a **distance spacer** to verify the height of fall. The distance spacer enters into place with a slight pressure, pull to drive it out. The feet can be rotated under the base to reduce the size of the package and facilitate the transportation of the machine.
The starting and stopping of the machine is via a button on the front panel or remotely via the supplied remote control. The antenna is screwed to the connector on the top of the machine, unscrew it to store the machine in its case.
100 ... 240Vac mains supply or rechargeable lithium ion battery housed inside the machine. The charger is built-in and the battery recharges automatically when the machine is connected to the mains.
The aluminium construction reduces the weight of the machine and makes it easily transportable.
A bubble level on the cover of the machine allows you to position it perfectly in the horizontal plane.

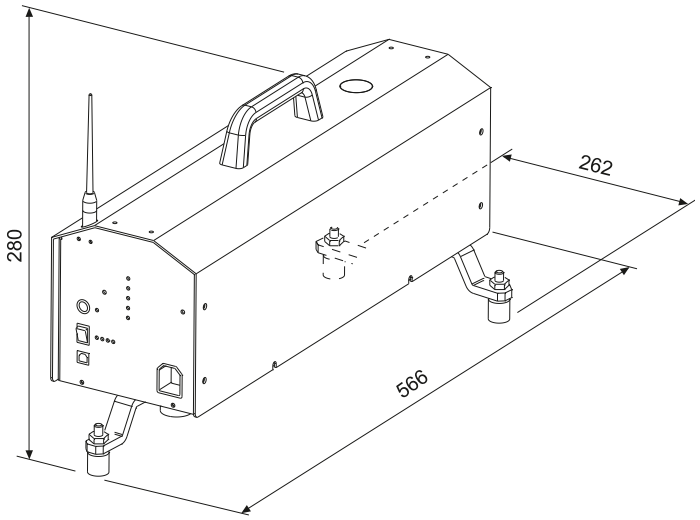
Technical specifications:

Number of hammers	5 in-line
Hammer weight	500 ± 12g each
Fall height	40 mm
Tapping frequency	100 ± 20ms
Average tapping frequency	100 mm ± 5ms
Interval between the impact and the lifting of the hammer	< 80ms
Distance between the hammers	100 ± 3mm
Hammer tip	Diameter 30 ± 0,2mm, spherical impact surface with 500 ± 100mm curvature radius
Falling direction	Perpendicular to the impact surface within ± 0.5 °
Feet	3 adjustable in height, rubber base
Service serial output	USB with type B connector
Remote control	By remote control (frequency 869,525 MHz, power 6 mW) or PC serial interface
Power supply	100…240Vac, 50÷60Hz Rechargeable Battery Pack Li-Ion, 7.2 V nominal voltage, nominal capacity 2900 mAh
Power absorption	< 30 W
Battery autonomy	80 min approx. of continuous working
Operating temperature and humidity	-10…+50 °C, 0 … 90% RH, no condensation
Dimensions (L x W x H)	520 x 162 x 280 mm cover with handle and feet in transport position 566 x 262 x 280 mm cover with handle and feet in working position (Remote control antenna excluded)
Weight	11 kg complete machine with battery pack and radio control 5,4 kg the carrying case for transportation
Machine structure	Anodized and painted aluminium

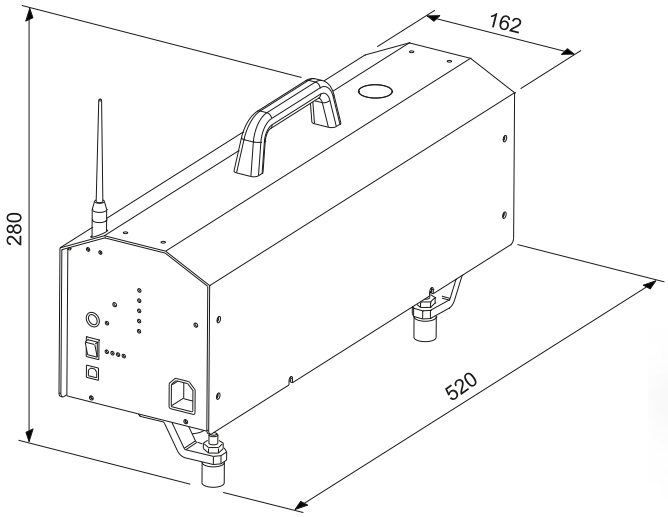
Description



Dimensions (mm)
With feet in transport position



With feet in working position



Ordering codes

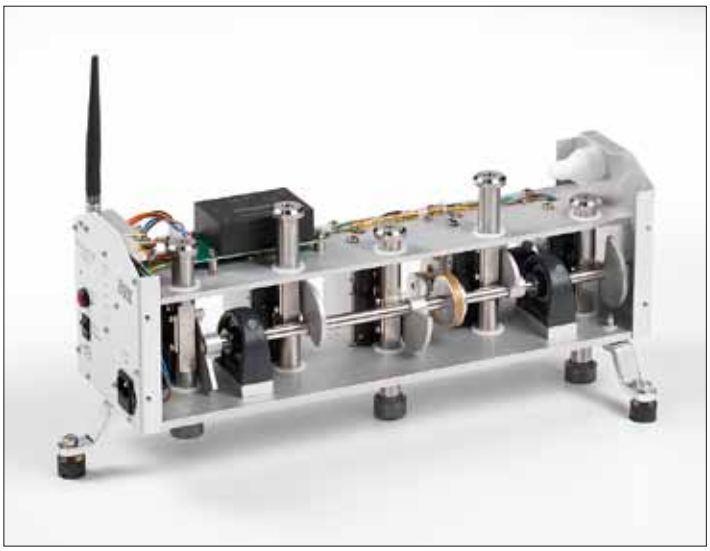
HD2040: Machine for the production of footfall noise in accordance with ISO 140-6 and 140-7, 140-8, ASTM E492 and E1007. Complete with rechargeable lithium ion battery, built-in battery charger, remote control, instruction manual. **Optional carrying case.**

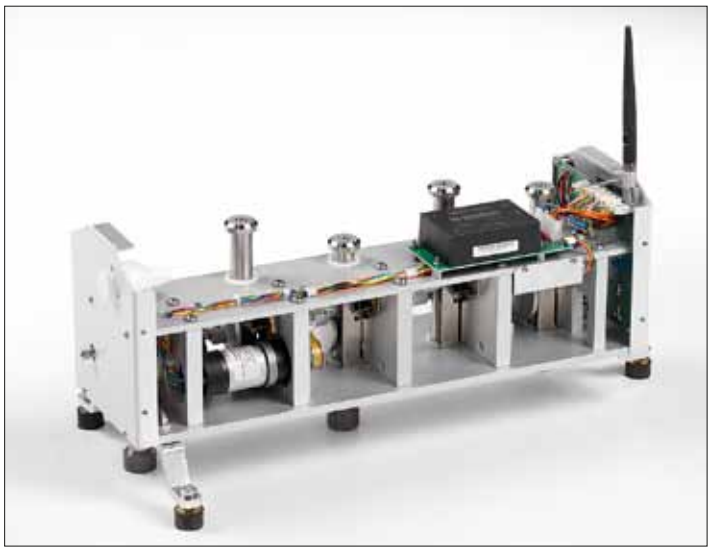
Accessories

hD2040-R: Additional remote control. Frequency 869.525 MHz Power 6 mW.
HD2040-A: Additional remote control antenna.
HD2040-V: Transportation carrying case for the machine.
HD2040-B: Additional rechargeable lithium ion battery pack. 7.2 V nominal voltage, nominal capacity 2900 mAh.

HD2040-A

HD2040-R





HD 2050

Dodecahedron Loudspeaker for building acoustics

To test buildings acoustic insulation, it's necessary to use sound sources that meet the demands of specific technical ISO standards.
Delta Ohm has developed a system for the measurement of passive acoustic performances of buildings that integrates the most advanced features required for this type of equipment.
The need for high noise excitation levels, necessary to deal with increasing insulation values of modern buildings, has been made co-exist with portability and versatility among the best on the market today.
HD 2050 is a sound source composed of 12 speakers arranged in a dodecahedral chassis, capable of radiating high power sound energy in all directions with a directionality in accordance with ISO3382.
The sound source can be integrated with the digital amplification system **HD 2050.20**, which offers high power as well as providing an equalizer that adapts the system's response to any more specific measurement needs.

Features:

- According to ISO 140-3, ISO 3382, UNI 11367 (D.p.c.m. 5/12/97).
- Customizable user setup with user defined equalization when used with **HD 2050.20** power amplifier.
- **High Power Level**
  With **122.8 dB** (LIN) re 1pW sound power level, the HD 2050 can also be used for sound insulation measures where the signal/noise ratio in the receiving room becomes critical. The linear frequency range from **80 Hz** to **10 kHz** (1/3 oct) can easily cover the requirements of technical standards for the measurement of acoustic insulation of buildings. In addition the spectrum extension over canonical range 100 Hz ÷ 3150 Hz makes the system HD 2050 a perfect tool also for room acoustics measurements. The optional subwoofer HD 2050.40 further improves power and response extension at lower frequency to cover specific applications in large volume rooms.
- **Versatility of use with digital amplification**
  Power amplifier HD 2050.20 incorporates a parametric equalizer that allows to change the emission spectrum of HD 2050. With this device, specific measurement needs can be easily satisfied, such as the need to concentrate more sound power in specific areas of the acoustic frequency spectrum. The software supplied with the power amplifier, allows to customize the frequency response and then store it, in order to be loaded and activated in the dodecahedron-amplifier system when needed.
- **Lightness and portability**
  With a weight of only 9 kg and an outer diameter of 38.5 cm, the HD 2050 is one of the lightest dodecahedron speakers on the market. HD 2050.20 digital amplifier provides an output of more than 1000 W @ 12 ohm, and comes with an extremely rugged and lightweight flight case. The HD 2050 system is designed for in situ portability: the dodecahedron has a robust and ergonomic T shaped carrying handle.

Accessories

The system can be supplied with all the accessories useful for transport and correct positioning: extendable tripod with foldable wheels **HD2050.1** (minimum height **1300mm** maximum height **2500mm**), flight-case **D2050-V** moreover, to dotain the best performance, the dodecahedron is to be coupled to the amplifier **HD2050.20** with remote control **HD2050.20R**, and with subwoofer **HD2050.40** To extend the response up to 20Hz.

- Automatic shut-off of ventilation fan (HD 2050.20 digital amplifier).
- Wireless remote control for digital amplifier HD 2050.20.

Applications:

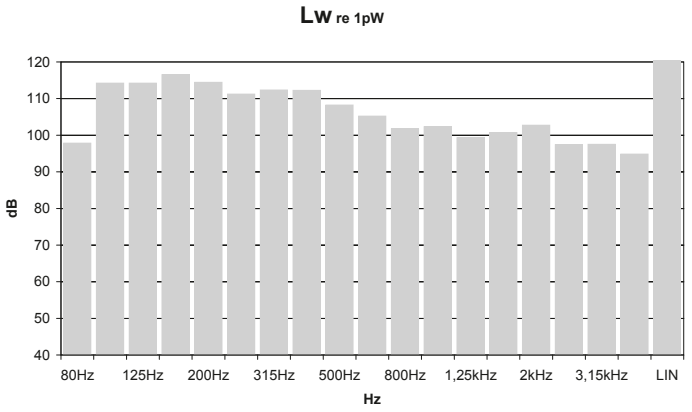
- Sound insulation
- Sound absorption
- Reverberation time measurements
- Architectural acoustics
- Impulse response

Technical specifications:

Reference Standards	ISO 140-3: 2006 ISO 3382: 2001
Nominal impedance	12 + 12 ohm
Power	Peak 540 + 540 W Nom. 180 + 180 W
Loudspeakers	12 x 5"
Operating frequency range	80 Hz ÷ 16 kHz (1/3 oct. bands)
Connectors	Neutrik® NL4FC speakON
Sound Power Level	122 dB re 1pW (10^{-12} W)
Dimensions	Diameter 38.5 cm
Weight	9 kg
Handling	T shaped handle Flight-case padded with wheels and carrying handles

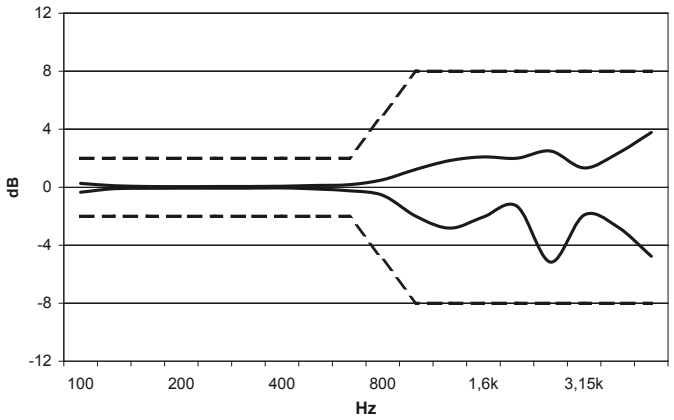
Note: Neutrik® is a registered trademark of Neutrik AG.

Typical Sound Power Level spectrum

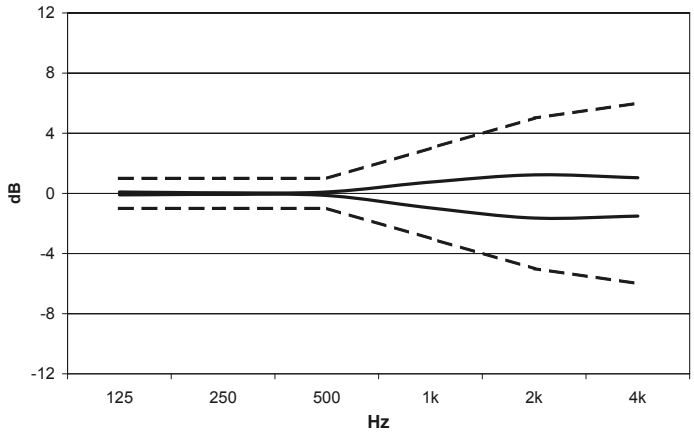


Directivity:
HD 2050 meets the requirements of ISO 140-3 and ISO 3382. The diagrams of directional response measured in the horizontal plane in octave bands, show the ideally isotropic behaviour of HD 2050. Below 1000 Hz the speaker has no significant directionality.

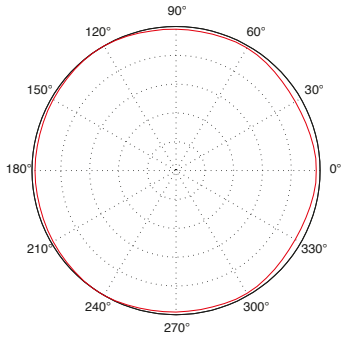
Directivity ISO 140



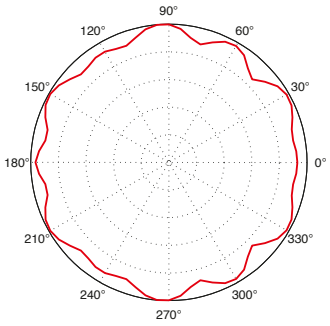
Directivity ISO 3382



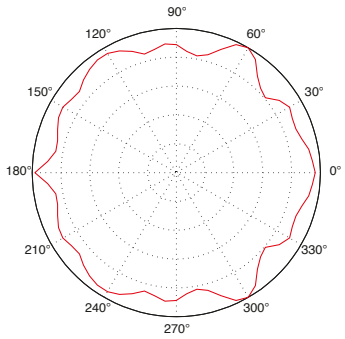
Polar diagrams: 10 dB / div. – sectors 30°



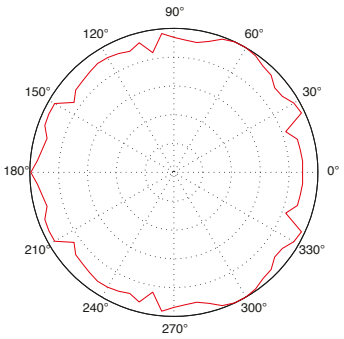
freq. **1000** Hz



freq. **2000** Hz

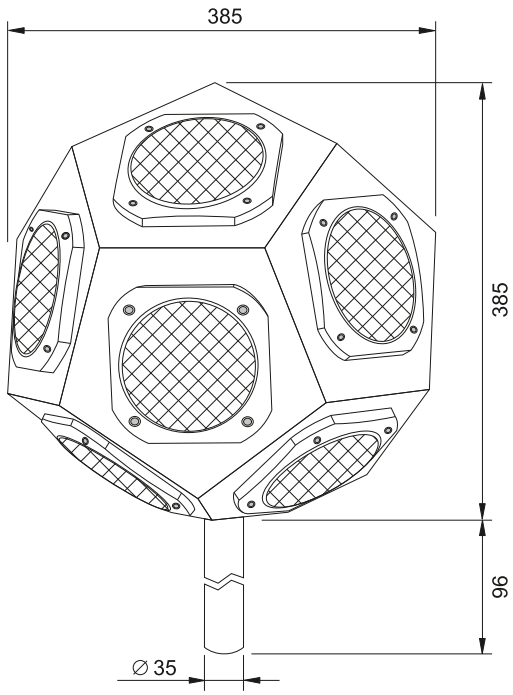


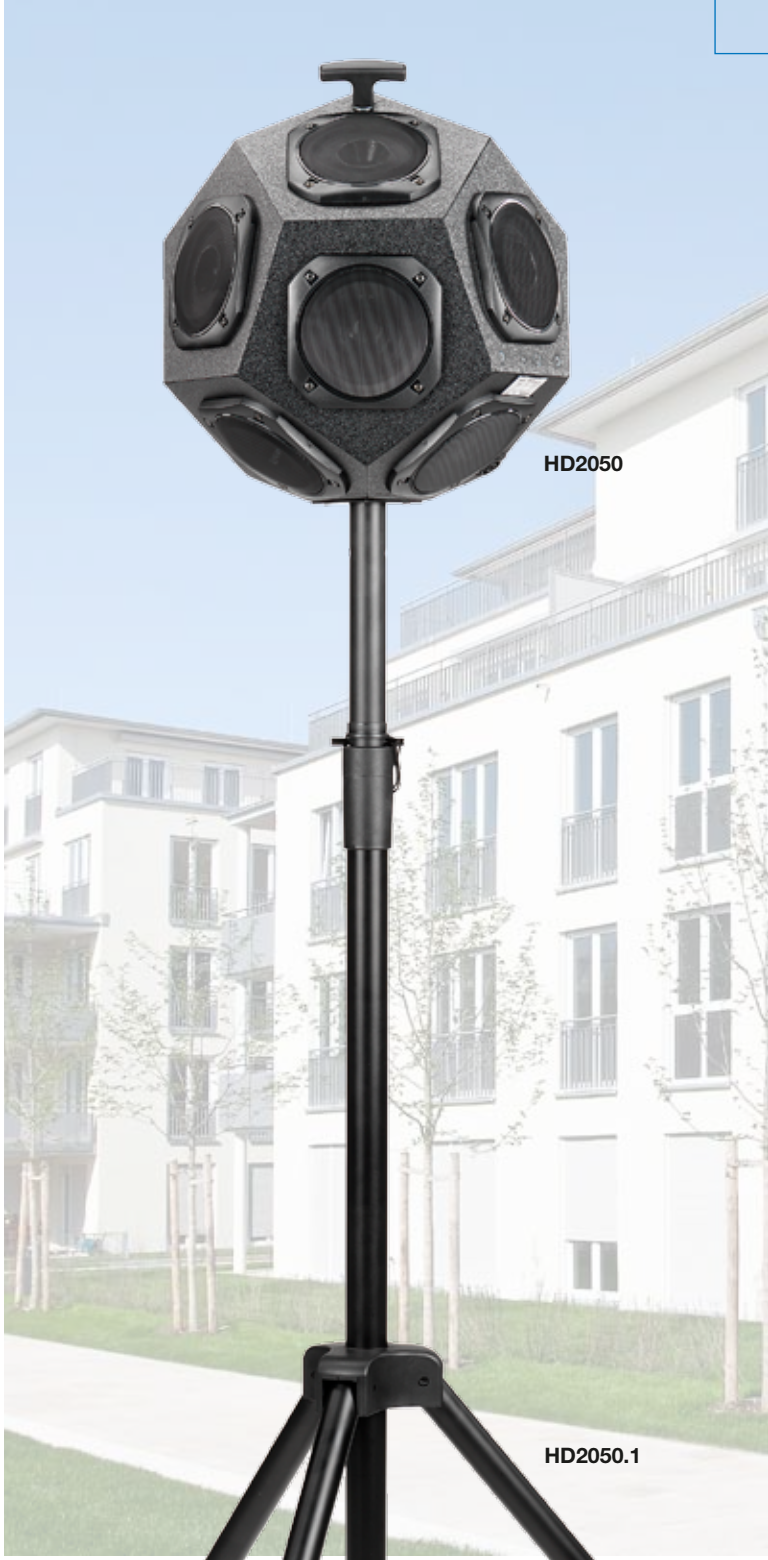
freq. **4000** Hz



freq. **8000** Hz

Dimensions (mm)





HD2050

HD2050.1

Input

Ordering codes

HD2050: Dodecahedral loudspeaker according to ISO 140-3 and ISO 3382 standards.

Accessories

HD2050.1: Stand for dodecahedron HD 2050, with steering wheels, extensible and foldable. Minimum height **1300mm,** maximum height **2050mm,** Damping of the extensible rod.

HD2050.1.5: Signal cable, length 5 m.

HD2050.1.L: L-shaped signal cable.

HD2050V: Semi-rigid carrying case for **HD 2050** dodecahedron.

HD2050.20: Digital power amplifier with integrated parametric equaliser. Complete with flightcase, power cord **HD2050.2,** connection cable **HD2050.20.1** and remote control with **HD2050.20R.**

HD2050.20R: Wireless remote control Kit to control the internal noise generator of **HD 2050.20**. Composed of receiver, transmitter with activation switch. Range of use up to 100 m.

HD2050B: Kit for battery power supply. 4 batteries 100 VA – 700 W. 15 minutes autonomy at maximum power.

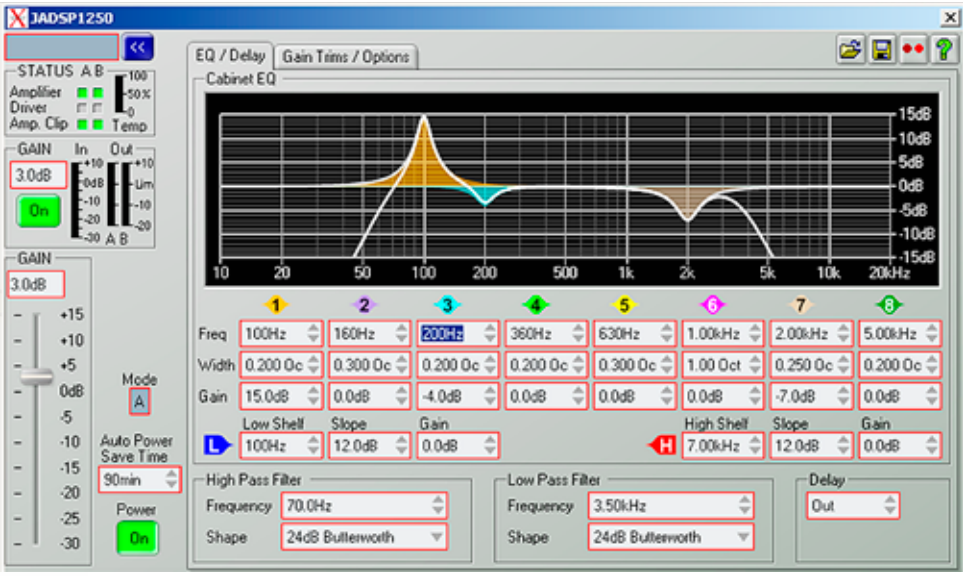
HD 2050.20

Digital power amplifier

HD 2050.20 is a high-power digital amplifier; it includes a white and pink noise generator with wireless remote control. Thanks to the auxiliary input it's possible to drive it with an external generator to apply, for example, sine sweep signals.

In order not to influence the measured levels, a controller can automatically turn off the cooling fan when taking measurements in a quiet environment or when measuring reverberation times with interrupted source technique; in such a case the fan is turned automatically off when you stop the generator's emission.

With Podware, the parametric equalizer's control software, it is possible, even in real time, to activate and manage the following functions: mute, gain, 8-band parametric equalizer and two shelving filters, two HP and LP filters, delay. The user setups can be stored in the amplifier's HD2050.20 memory.

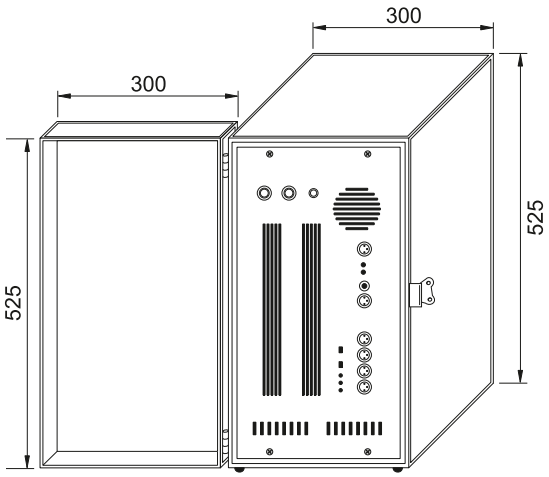


Technical specifications:

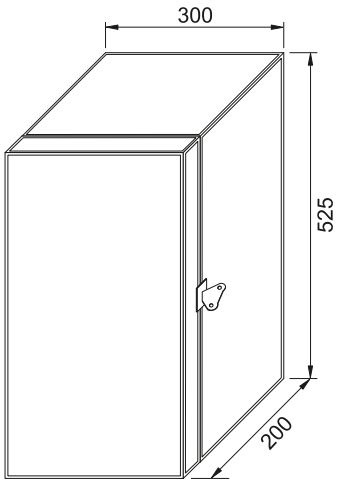
Reference Standards	EN 55103-1 (Emissions), EN 55103-2 (Immunity) EN 6065, class 1 (Safety)
Type	Digital, class D
Maximim power	1200 W @ 12 ohm
Continuous power	2 x 530 W RMS
External generator input	With level control
Power requirements	230 Vac (±10%), 50-60 Hz
Frequency response	20 Hz ÷ 20 kHz
THD	< 0.1% @ 1 kHz
Noise generator	white/pink with level control Output connector: Neutrik® XLR
Connectors	Input: Neutrik® Combo Output: Neutrik® NL4FC speakON AC Power: Neutrik® powerCON
Level limiter	Control on the maximum power accepted by HD 2050 loudspeaker
State indicators	Mute, Active, Power ON
Protections	Short circuit, thermal, ultrasonic and RF, clip limiter, DC Fault PS shutdown
Dimensions with flight-case	30 x 52.5 x 20 cm
Weight	4.8 kg without flight-case 11.8 kg with flight-case

Note: Neutrik® is a registered trademark of Neutrik AG.

Dimensions (mm)



Amplifier with opened flight case



Amplifier with closed flight case

HD2050.1.5

HD2050.1.2

HD2050.20.1

HD2050.20.2

HD2050.1.L

HD2050.20

Ordering codes

HD2050.20: Digital power amplifier with integrated parametric equaliser. Includes: Flight-case, power cord **HD2050.2**, and remote control kit **HD2050.20R**

Accessories

HD2050.1.5: Signal cable, length 5 m.

HD2050.20R: Wireless remote control Kit to control the internal noise generator of **HD2050.20**. Composed of receiver, transmitter with on/off switch. Range of use up to 100 m.

HD2050B: Kit for battery power supply. 4 batteries 100 VA – 700 W. 15 minutes autonomy at maximum power.

HD 2050.30

Directional Sound Source for façade insulations

The façade passive loudspeaker **HD 2050.30** is the ideal tool to create a uniform sound field in front of a building.

HD 2050.30 provides not only the high output emission in a frequency range extended from 65 Hz to 20 kHz, which is necessary to minimize background noise contribution, but also a uniform sound distribution, especially at higher frequencies, which is guaranteed by the particular construction of the high frequencies driver. With this solution, phenomena of sound concentration due to the directionality of the normal transducers when used near the wall, are greatly reduced especially on the high range; measurement accuracy is therefore improved.

Features:

- **High Power Level**

With a 129 dB spl, **HD 2050.30** loudspeaker allows to perform measurements on high insulated façade even in the presence of high background noise.

- **Versatility**

HD 2050.30 directional loudspeaker can be easily positioned in the typical situations found during façade testing. A specific support is available for 45 positioning both on land and on stand; with the latter system the user gains valuable meters in front of the façade, where space is often little. The weight of 18 kg is the right compromise between power emission and portability.

- Excellent diffusion of acoustic field at high frequency.
- Wireless remote control with HD 2050.20 digital power amplifier.

Applications:

- Façade sound insulation
- Sound absorption

Accessories

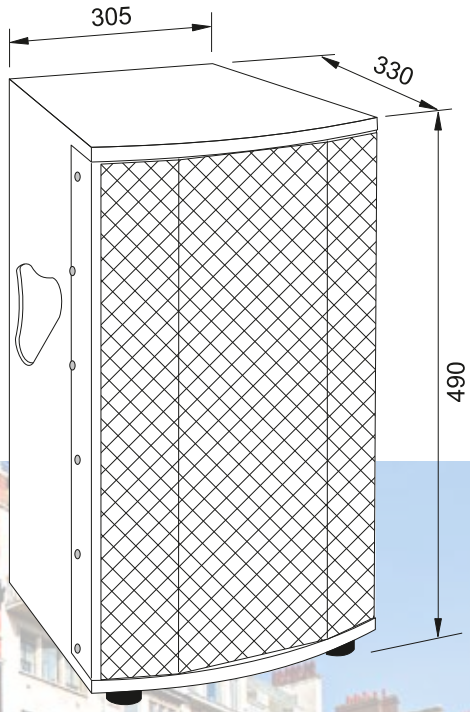
The system can be supplied with all the accessories useful for transport and correct positioning: extendable tripod with foldable wheels **HD2050.1** (minimum height **1300mm** maximum height **2500mm**), case **HD2050.30.1.**

Technical specifications:

RMS Power	300 W
Nominal impedance	8 ohm
Loudspeakers	Low frequency 1 x 10” (neodimium magnet) High frequency 1 x 1” (Mylar®)
Emission	129 dB spl peak @ 1 m
Frequency range	70 Hz ÷ 20 kHz
Connectors	2x Neutrik® NL4 speakON
Dimensions	305 x 409 x 330 cm
Weight	13,5 kg
Carriage	Protective bag with shoulder straps and handle
Finishing	Geal-coat anti-scratch
Amplifier	To be combined with HD 2050.20 digital power amplifier
Holder	Adjustable to 45° with hole for mounting on standard tripod HD 2050.1

Note: Mylar® is a registered trademark of Dupont Teijin Films. Neutrik® is a registered trademark of Neutrik AG.

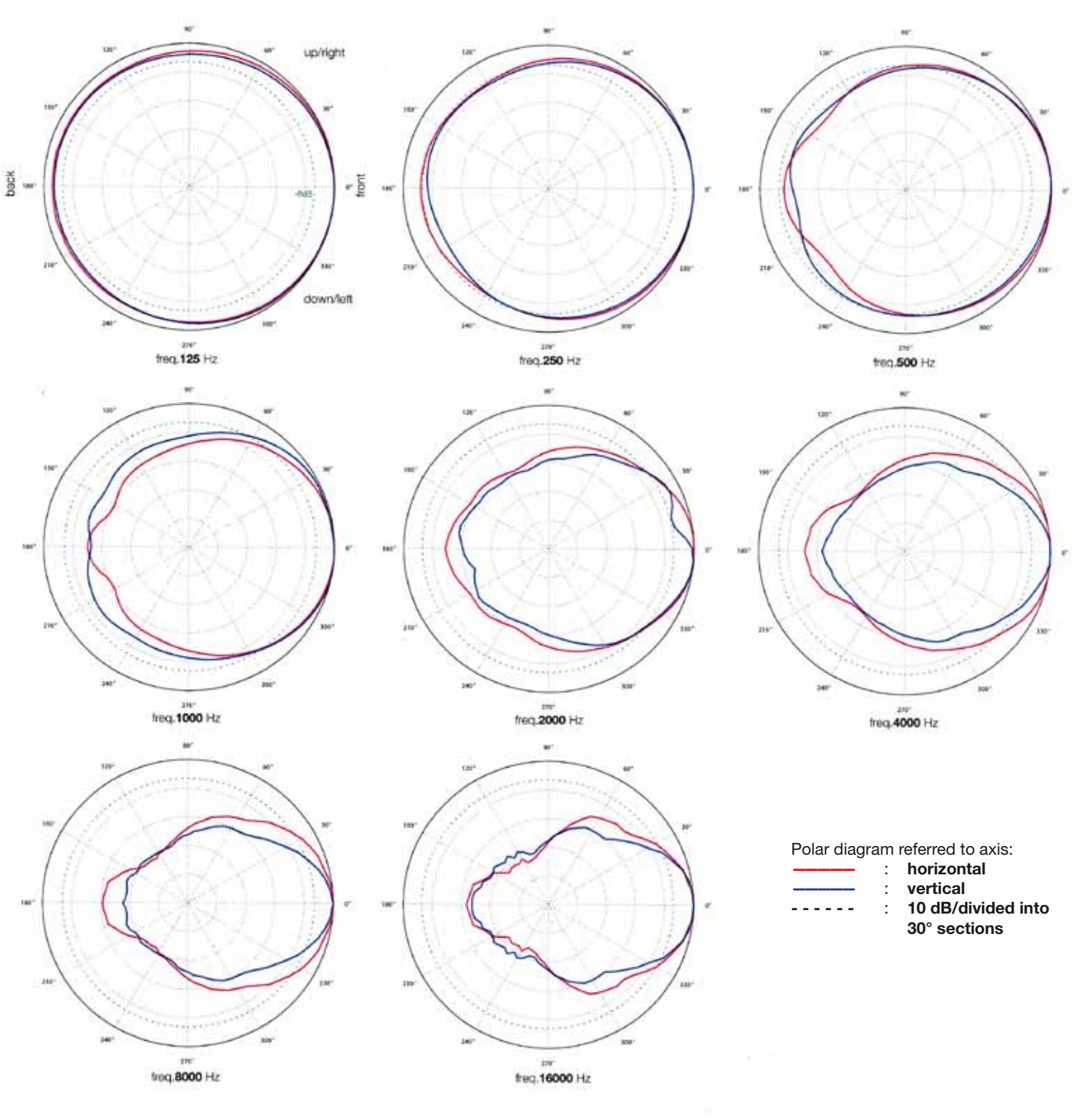
Dimensions (mm)



HD2050.30

Inputs

Directivity:
Polar diagrams by frequency referred to emission axis.



Ordering Codes

HD2050.30: Directional façade loudspeaker, **(signal cable HD2050.1.5 excluded).**

Accessories

hD2050.30.1: Protective bag with shoulder straps and handle.

HD2050.30.2: 45° holder for the case of façade loudspeaker HD 2050.30. Used to direct the case to 45° or to hoist HD 2050.1 on the tripod.

HD2050.1: Stand for HD 2050 dodecahedron, with steering wheels, extensible and retractile. Minimum height 1300mm, maximum height 2050mm, Damping of the extensible rod.

HD2050.1.5: Signal cable, length 5 m.

HD2050.20: Digital power amplifier with integrated parametric equaliser. Includes: Flight-case, power cord HD2050.2, and remote control kit HD2050.20R.

HD 2050.40

Subwoofer

HD 2050.40 passive subwoofer, is designed to work in conjunction with HD 2050 dodecahedron. The system composed of HD 2050.40 subwoofer, HD2050 dodecahedron and HD 2050.20 digital power amplifier allows to meet measurement requirements in the highest acoustic insulation situations.

Acoustic testing laboratories, high performance acoustic materials manufacturers, acoustic engineers with specific measurement needs or in general where it is needed a lot of sound energy at low and high frequency, they will find in this system a complete and effective tool.

Features:

- **High performance materials Sound Insulation**
  A 130 dB SPL in the frequency range **45 Hz to 120 Hz** allows the subwoofer HD 2050.40, combined with HD 2050 dodecahedron and HD 2050.20 digital power amplifier, to excite rooms in order to measure extremely high insulations at lower frequencies. HD 2050.40 is the correct solution for laboratories with measurement requirements up to date with the development of high-performance insulating materials in construction and shipbuilding fields.
- **Large rooms architectural acoustics**
  HD 2050.40 subwoofer integrates HD 2050 dodecahedron in applications where reverberation time measurement of high-volume environments is needed. In such environments, often the sound power and frequency extension characteristics of dodecahedron loudspeaker, are not sufficient to recreate a good diffuse sound field or even high sound pressure levels on the walls of large rooms. The measures in these sound field conditions can be unreliable, or heavily dependent on the need for a very low background noise. In these cases, HD 2050.40 is the correct solution.

Applications:

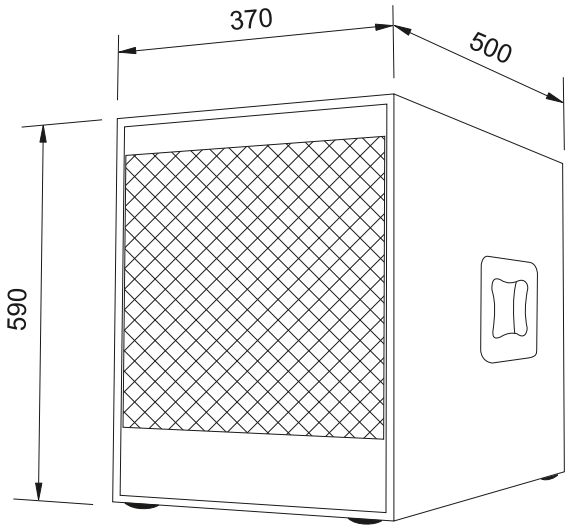
- High level sound insulation
- Sound absorption
- Large rooms reverberation time measurements

Technical specifications:

RMS Power	500 W
Nominal impedance	4 ohm
Loudspeaker	LF 1 x 12” (neodimium magnet)
Emission	130 dB spl peak @ 1 m
Frequency range	45 Hz ÷ 120 Hz
Connectors	2x Neutrik® NL4 speakON
Dimensions	500 x 500 x 370mm
Weight	22 kg
Finishing	Geal-coat anti-scratch
Amplifier	To be combined with HD 2050.20 digital power amplifier

Note: Neutrik® is a registered trademark of Neutrik AG.

Dimensions (mm)



HD2050.40

Input

Ordering codes

HD2050.40: Subwoofer.

Accessories

HD2050.40.1: Extensible stand for HD 2050 dodecahedron mounting on subwoofer. HD2050.40 Height min. 1370mm, max. 1970mm (subwoofer + stand + wheels).
HD2050.1.5: Signal cable, length 5m.
HD2050.1.2: Signal cable, length 2m.

Order codes for a complete system for building acoustics

HD2040: Machine for the production of footfall noise in accordance with ISO 140-6, ISO 140-7, ISO 140-8, ASTM E492 and E1007. Complete with rechargeable lithium-ion battery HD 2040-B, built-in battery charger, remote control HD 2040-R, Antenna HD 2040-A, Instruction Manual. **Optional carrying case**.
HD2040-V: Carrying case for the machine HD 2040.
HD2050: Dodecahedron in accordance with ISO 140-3 and ISO 3382. Complete with signal cable HD 2050.1 and cable HD2050.1.L.
HD2050V: Case for dodecahedron HD 2050.
HD2050.1: Stand for dodecahedron HD 2050, with wheels, extendable and foldable. Minimum height 1300 mm, maximum height 2050 mm. With rod damping system.
HD2050.1.S: Carrying bag for stand HD 2050.1 and telescopic rod HD 2050.40.1.
HD2050.20: Digital Amplifier with integrated parametric equalizer. Complete with flight case, power cord HD 2050.2, and remote control kit HD 2050.20R.
HD2050B: Kit for battery power 4 x 100 VA - 700 W. Autonomy 15 minutes at max. power.
HD2050.20R: remote control kit for the control of the internal generator of HD 2050.20. Composed of receiver and transmitter with activation switch. Range of use up to 100 m.
HD2050.30: Façade loudspeaker (signal cable HD 2050.1.5 not included).
HD2050.30.1: Protective case for the Façade loudspeaker HD 2050.30.
HD2050.30.2: 45° holder for the case of façade loudspeaker HD 2050.30. Used to direct the case to 45° or to hoist HD 2050.1 on the tripod.
HD2050.40: Subwoofer complete with transport wheels. (The needed signal cable HD 2050.1 for connection to the dodecahedron HD 2050 is not included)
HD2050.40.1: Telescopic pole to mount the dodecahedron on subwoofer HD 2050.40. Minimum height 1370 mm, maximum height 1970 mm (subwoofer + pole + wheels).
HD2050.1.5: Signal cable, length 5 m.
HD2050.1.2: Signal cable, length 2 m.
HD2050.20.2: Mains power cable for amplifier HD 2050.20.
HD2050.20.1: Connection cable for generator- amplifier HD 2050.20.
HD2050.1.L: L-shaped signal switch for dodecahedron.

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

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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

RoHS 2002/95/EC

CE

Delta OHM

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