



HD 2040
 HD 2050
 HD 2050.20
 HD 2050.30
 HD 2050.40



Technical Specifications

Number of hammers	5 in line
Weight of the hammers	500 ± 12g each
Fall height	40 mm
Tapping interval	100 ± 20 ms
Average tapping interval	100 ± 5 ms
Interval between the impact and the lifting of the hammer	< 80 ms
Distance among the hammers	100 ± 3 mm
Head of the hammers	Diameter 30 ± 0.2 mm, spherical impact surface with radius of curvature 500 ± 100 mm
Fall direction	Perpendicular to impact surface within ± 0.5°
Support feet	3 height-adjustable feet with rubber pads.
Service serial output	USB with type B connector
Remote control	By remote control (frequency 869.525 MHz, power 6 mW)
Power supply	100...240Vac, 50÷60Hz Lithium Ion rechargeable battery, rated voltage 7.2V, rated capacity 2900 mAh
Power consumption	< 30 W
Battery autonomy	About 80 min of continuous operation
Working Temperature and Humidity	-10...+50 °C, 0 ... 90 %RH no condensation
Weight	11 kg machine with battery pack and remote control 5,4 Kg carrying case.
Dimensions (L x W x H)	520 x 162 x 280 mm with cover with handle and retracted feet 566 x 262 x 280 mm with cover with handle and extended feet (excluding the antenna for the remote control)
Structure of the machine	Anodized and painted aluminum

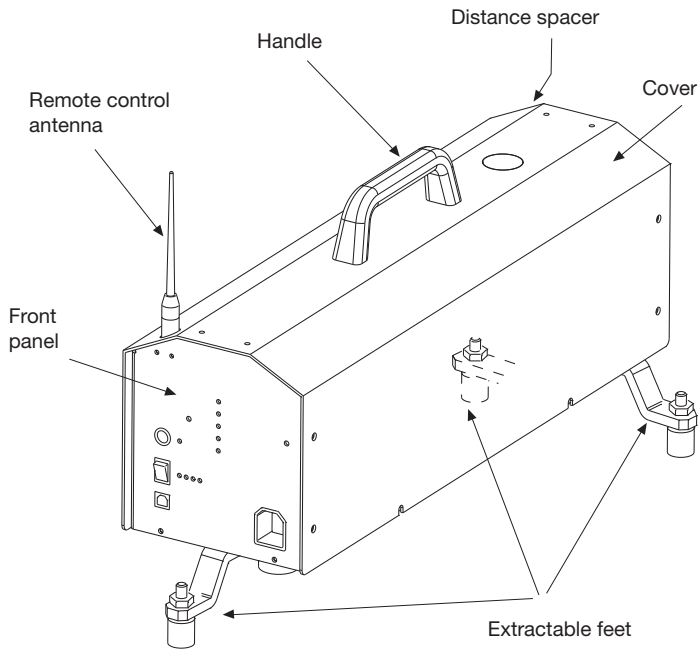
HD2040 TAPPING MACHINE, HD2050 OMNIDIRECTIONAL SOUND SOURCE, HD2050.20 POWER AMPLIFIER, HD2050.30 DIRECTIONAL LOUDSPEAKER FOR FAÇADE SOUND INSULATION, HD2050.40 PASSIVE SUBWOOFER

HD2040: Tapping Machine

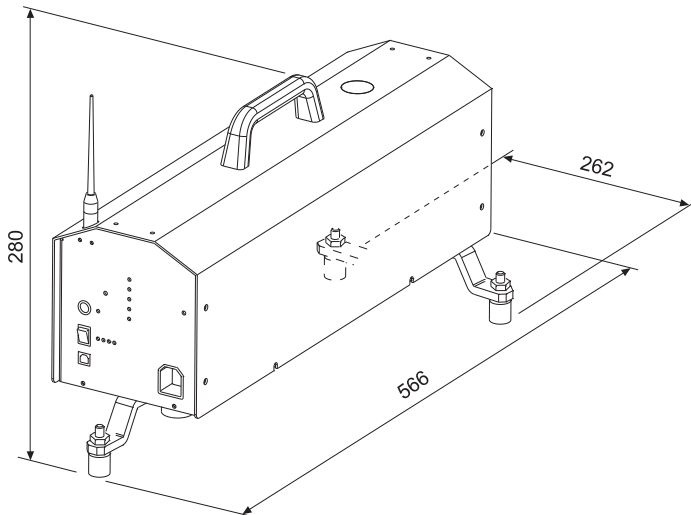
The tapping machine **HD2040** is a normalized impact noise generator for the measurement of sound insulation of floors according to ISO 140-6, ISO 140-7, ISO 140-8, ASTM E492 and E1007. It has 5 hammers in line driven by a motor controlled by an electronic system, by means of camshaft. The rate of fall of the hammer and the frequency of the impacts are constantly monitored to ensure compliance with the legislation. **LED indicators on the front panel indicate the proper functioning and impact speed of each hammer, detected by an optical sensor.** The hammers are made of stainless steel, hardened and dimensionally stable over time. The unit is equipped with support feet with height-adjustable rubber base. On the back cover is available a housing for a detachable spacer which can be used to assist the user to set exact 40mm vertical falling height from the floor. The spacer can be positioned in the housing with a light pressure; pull to remove it. A spirit level on the top cover allows to set the machine in a perfectly horizontal position. The feet will be turned below the base to reduce the size of the packing and easy transport of the machine. The starting and stopping of the machine is via a front panel button or remotely using the supplied remote control. The antenna is screwed to the connector on the top of the unit and it has to be unscrewed it to store the unit in its case. Mains power supply 100 ... 240 VAC or rechargeable lithium-ion battery housed inside the unit. The charger is built in; the battery recharges automatically when the machine is connected to the mains supply. The aluminium frame reduces the weight of the machine and makes it easily transportable. The inside of the lid of the machine is treated with sound absorbing material.



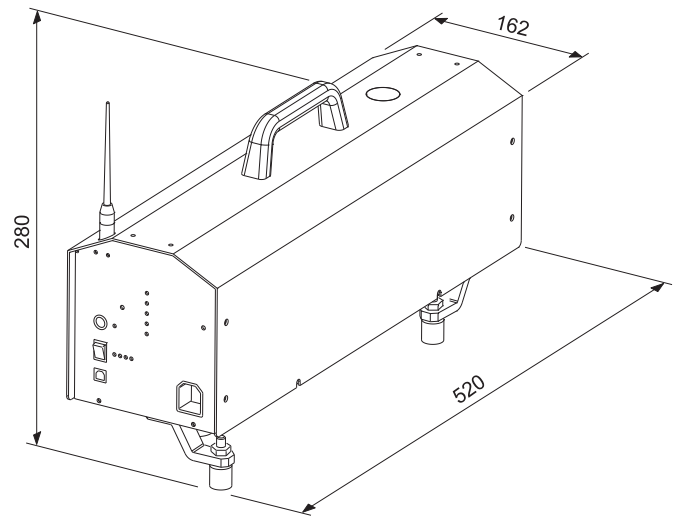
Description



**Dimensions (mm)
With extended feet**



With retracted feet



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HD2040: Machine for the generation of impact noise in accordance with ISO 140-6, ISO 140-7, ISO 140-8, ASTM E492 and E1007. Complete with rechargeable lithium ion battery, built-in battery charger, remote control, 13 mm wrench, instruction manual. **Optional carrying case.**

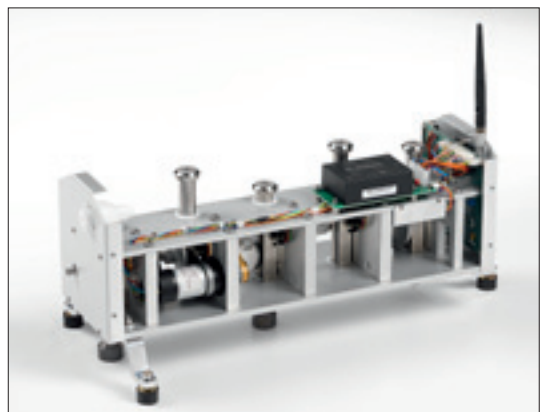
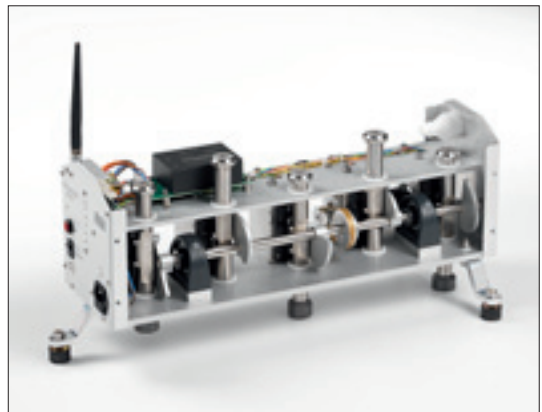
Accessories

HD2040-R: Additional remote control. Frequency 869.525 MHz Power 6 mW.

HD2040-A: Additional antenna for the remote control.

HD2040-V: Carrying case.

HD2040-B: Spare rechargeable lithium-ion battery pack. Nominal voltage 7.2 V. Rated capacity 2900 mAh.



HD2050 - Dodecahedron Loudspeaker

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.

HD2050 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 **HD2050.20**, 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 **HD2050.20** power amplifier.

• High Power Level

With more than **120 dB (LIN) re 1pW** sound power level, the HD2050 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 HD2050 a perfect tool also for room acoustics measurements. The optional subwoofer HD2050.40 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 HD2050.20 incorporates a parametric equalizer that allows to change the emission spectrum of HD2050. With this tool, 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 HD2050 is one of the lightest dodecahedron speakers on the market. HD2050.20 digital amplifier provides an output of more than 1000 W @ 12 ohm, and comes with an extremely rugged and lightweight flight case. The HD2050 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 in situ positioning: extendable tripod with steering wheels **HD2050.1** (minimum height 1300 mm, maximum height 2050 mm), wireless remote control, flight case for loudspeaker **HD2050-V**. For best performances, HD2050 should be driven with **HD2050.20** power amplifier (including wireless remote control **HD2050.20R**) and **HD2050.40** subwoofer to extend the frequency response down to 20Hz.

Applications:

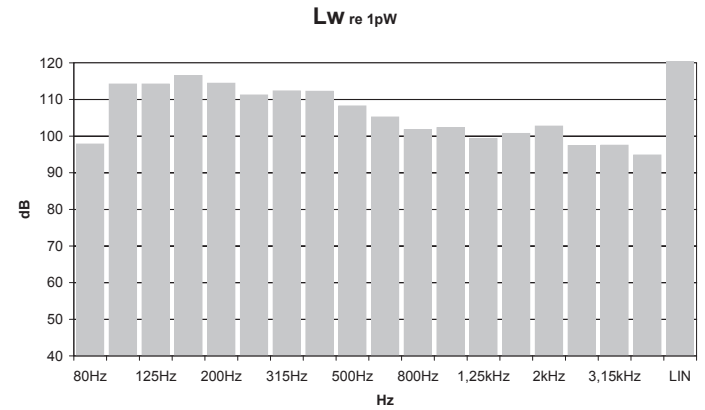
- Sound insulation
- Sound absorption
- Reverberation time measurements
- Architectural acoustics
- Impulse response of rooms

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	120 dB re 1pW (10 ⁻¹² W) or better
Dimensions	Diameter 38.5 cm
Weight	9 kg
Handling	T shaped handle Flight-case

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

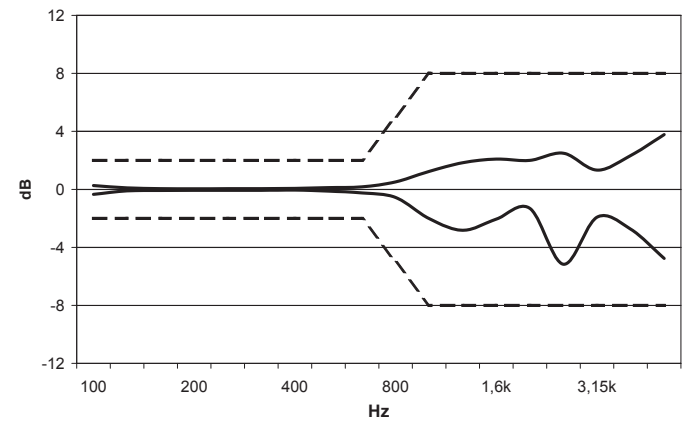
Typical Sound Power Level spectrum



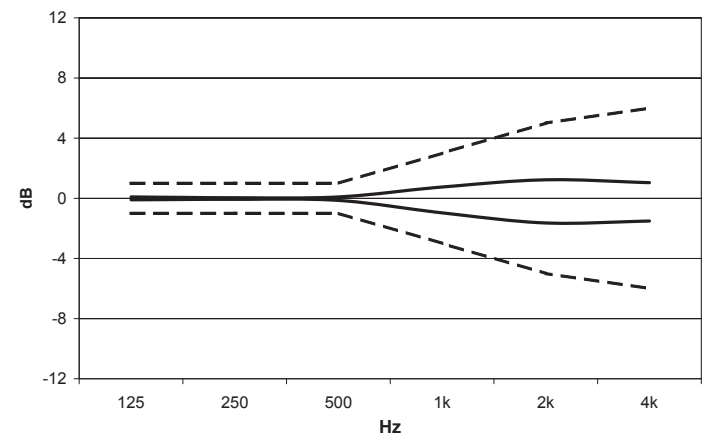
Directivity:

HD2050 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 HD2050. Below 1000 Hz the speaker has no significant directionality.

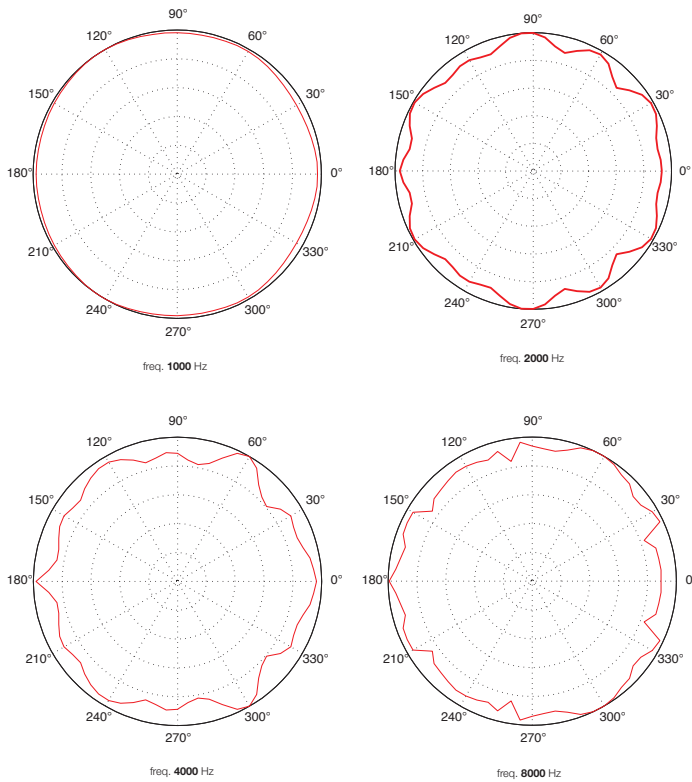
Directivity ISO 140



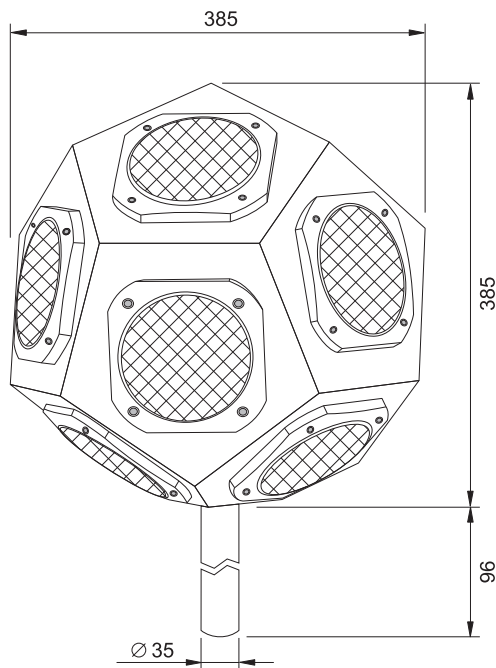
Directivity ISO 3382



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



DIMENSIONS (mm)



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HD2050: Dodecahedral loudspeaker according to ISO 140-3 and ISO 3382 standards. Including signal cable HD2050.1.5, cable HD2050.1.L. User manual. Carrying case.

Accessories

HD2050.1: Stand for dodecahedron HD2050, 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.

HD2050.1.L: Signal cable adapter.

HD2050V: Carrying case for HD2050 dodecahedron.

HD2050.20: Digital power amplifier with integrated parametric equaliser. Includes flight case, Podware software, power supply cable HD2050.2, integrated wireless remote control HD2050.20R, user manual.

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



HD2050.20 - Digital power amplifier

HD2050.20 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.

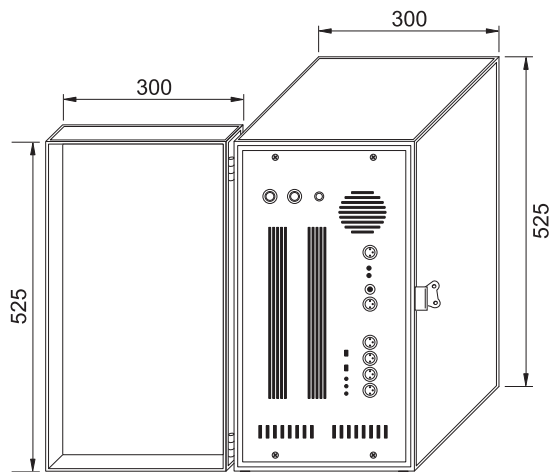
With Podware, the parametric equalizer's control software, it is possible, even in real time, to activate and manage the following functions: mute, gain, 8-band parametric equalizer and two shelving filters, two HP and LP filters, delay. The user setups can be stored in the amplifier's HD2050.20 memory.

Technical specifications:

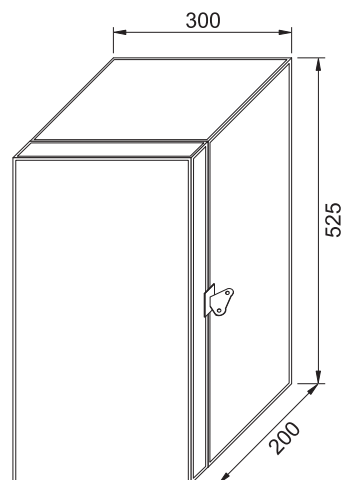
Reference Standards	EN 55103-1 (Emissions), EN 55103-2 (Immunity) EN 6065, class 1 (Safety)
Type	Digital, class D
Maximum power	1200 W @ 12 ohm
Continuous power	2 x 530 W RMS
External generator input	With level control
Power requirements	230 Vac ($\pm 10\%$), 50-60 Hz
Frequency response	20 Hz ÷ 20 kHz
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
RMS Level limiter	Control on the maximum power accepted by HD 2050 loudspeaker
Status 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

HD2050.20



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HD2050.20: Digital power amplifier with integrated parametric equaliser. Includes flight case, Podware software, power supply cable HD2050.2, integrated wireless remote control HD2050.20R, user manual.

Accessories

HD2050.1.5: Signal cable, length 5 m.

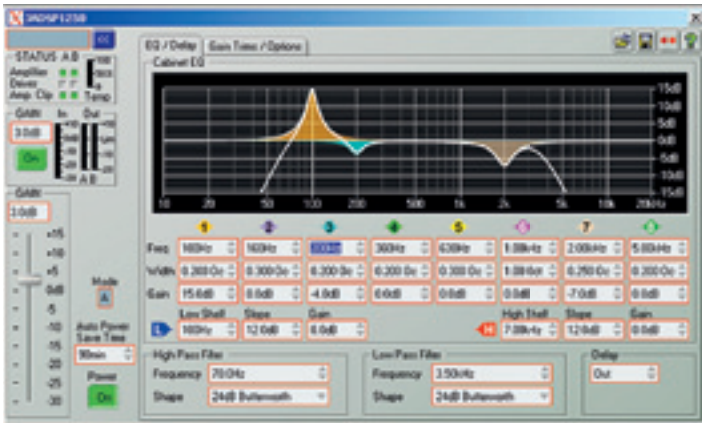
HD2050.20R: Wireless remote control Kit to control the internal noise generator of HD2050.20. Composed of receiver, transmitter with on/off switch. Range of use up to 100 m.

HD2050.1.5

HD2050.1.2

HD2050.20.2

HD2050.1.L



Software Podware: user defined frequency response equalization

HD2050.30 - Directional Sound Source for façade insulations

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

HD2050.30 provides not only the high output emission in a frequency range extended from 70 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 the land and on the stand; with the latter system user can gain valuable meters in front of the façade, where often space is little. The weight of 13.5 kg is the right compromise between power emission and portability.
- Excellent diffusion of acoustic field at high frequency.
- Wireless remote control with HD2050.20 digital power amplifier.

Applications:

- Façade sound insulation
- Sound absorption

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	30.5 x 49 x 33.3 cm
Weight	13.5 kg
Carriage	Protective bag
Finishing	Geal-coat anti-scratch
Amplifier	To be combined with HD2050.20 digital power amplifier
Holder	Adjustable to 45° with hole for mounting on standard tripod HD2050.1

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

Input



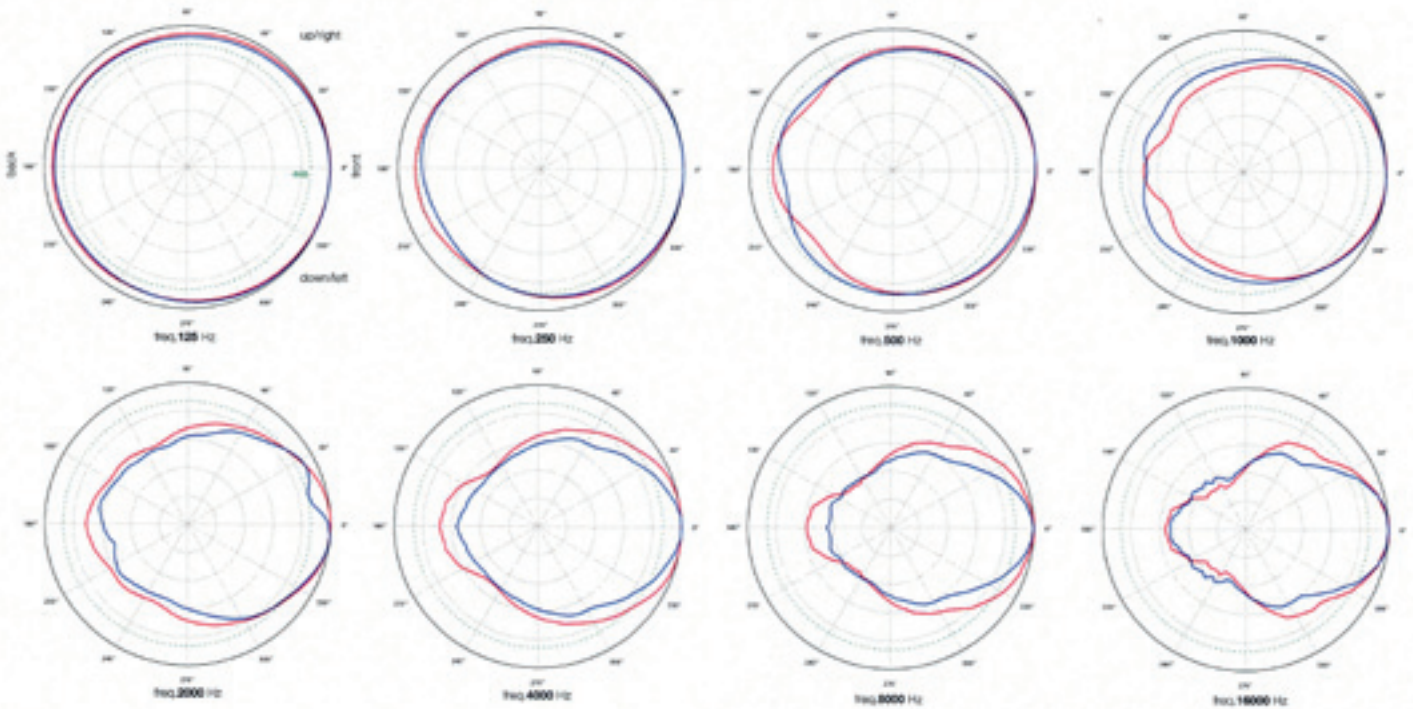
Acoustics - Vibrations



HD2050.30

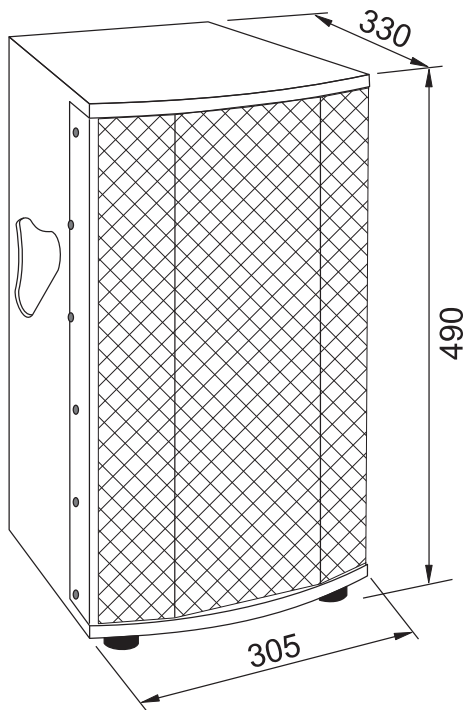
Directivity:

Polar diagrams by frequency referred to emission axis.



Polar diagram referred to axis:
 — : horizontal
 — : vertical
 - - - : 10 dB/divided into 30° sections

Dimensions (mm)



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HD2050.30: Directional façade loudspeaker, user manual (Signal cable HD2050.1.5 not included).

Accessories

HD2050.30.1: Protective bag for HD2050.30 loudspeaker.

HD2050.30.2: 45° adjustable holder. It allows to direct the loudspeaker to 45° and to hoist it on the HD2050.1 stand.

HD2050.1: Stand for HD2050 dodecahedron, with steering wheels, extensible and retractile. Minimum height 1300 mm, maximum height 2050 mm 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, Podware software, power supply cable HD2050.2, integrated wireless remote control HD2050.20R, user manual.

HD2050.40 - Subwoofer

HD2050.40 passive subwoofer, is designed to work in conjunction with HD2050 dodecahedron. The system composed of HD2050.40 subwoofer, HD2050 dodecahedron and HD2050.20 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 HD2050.40, combined with HD2050 dodecahedron and HD2050.20 digital power amplifier, to excite rooms in order to measure extremely high insulations at lower frequencies. HD2050.40 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**

HD2050.40 subwoofer integrates HD2050 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, HD2050.40 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	590 x 500 x 370 mm
Weight	22 kg
Finishing	Geal-coat anti-scratch
Amplifier	To be combined with HD2050.20 digital power amplifier

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

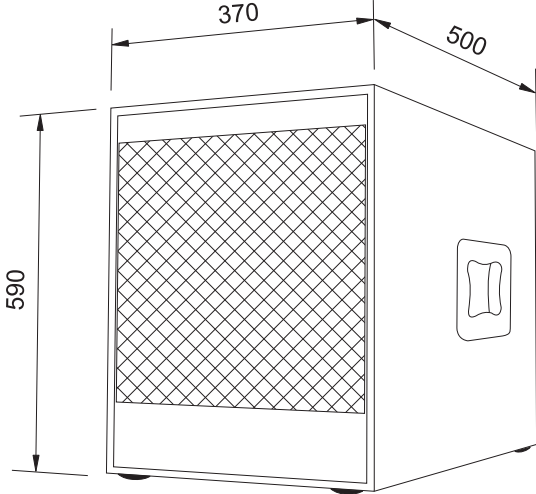
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HD2050.40: Subwoofer supplied with steering wheels, instruction manual. (for the connection to the HD2050 dodecahedron it is necessary the signal cable HD2050.1.2 not included).

Accessories

HD2050.40.1: Extensible stand for HD2050.40 subwoofer. Minimum height 1370 mm, maximum height 1970 mm (subwoofer + stand + wheels).
HD2050.1.5: Signal cable, length 5 m.
HD2050.1.2: Signal cable, length 2 m.

Dimensions (mm)



HD2050.20: Digital power amplifier with integrated parametric equaliser. Includes flight case, Podware software, power supply cable HD2050.2, integrated wireless remote control HD2050.20R, user manual.

HD2050.30: Directional façade loudspeaker, user manual (signal cable HD2050.1.5 not included).

HD2050.30.1: Protective bag for HD2050.30 loudspeaker.

HD2050.30.2: 45° adjustable holder. It allows to direct the loudspeaker to 45° and to hoist it on the HD2050.1 stand.

HD2050.40: Subwoofer supplied with steering wheels, instruction manual. (for the connection to the HD2050 dodecahedron it is necessary the signal cable HD2050.1.2 not included)

HD2050.40.1: Extensible stand for HD2050.40 subwoofer. Minimum height 1370 mm, maximum height 1970 mm (subwoofer + stand + wheels).

HD2050.1.2: Signal cable, length 2 m.

Ordering codes for complete building acoustics system

HD2040: Machine for the generation of impact noise in accordance with ISO 140-6 and 140-7, ASTM E492 and E1007. Complete with rechargeable lithium ion battery, built-in battery charger, remote control, 13 mm wrench, instruction manual. **Optional carrying case.**

HD2040-V: Carrying case for tapping machine.

HD2050: Dodecahedral loudspeaker according to ISO 140-3 and ISO 3382 standards. Including signal cable HD2050.1.5, cable HD2050.1.L. User manual. Carrying case.

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



HD2050.40.1



HD2050.40



HD2050.40

Input

