Member of GHM GROUP

English

Operating manual

Omnidirectional sound source
HD2050
Power amplifier/noise generator
HD2050.20
Facade directional loudspeaker
HD2050.30

www.deltaohm.com

Keep for future reference.

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INDEX

1 INTRODUCTION

The system is composed of dodecahedron loudspeaker **HD2050**, digital power amplifier HD2050.20 and related accessories; it allows to perform building and architectural acoustics measurements:

- Acoustic insulation
- Buildings acoustics
- Acoustic absorption
- Reverberation time
- Room acoustics (RASTI, STI, Clarity, Definition descriptors etc.)
- Risposta all'impulso

HD2050 is a sound source able to emit sound energy in the room in a isotropic way with very high very high sound power levels. The **HD2050** sound source is designed to offer maximum performances with special attention to international standards in the field of architectural and building acoustics.

The standards it complies with, are EN ISO 140-3:2006 and EN ISO 3382:2001 as concerns directivity; .

HD2050 features a wide extension frequency response and provides an emission sound power level of more than 122dB re 1pW. Twelve coaxial loudspeakers arranged on the dodecahedron faces, provide a high acoustic performance. The twelve faces cabinet is multilayer wood made and has a light weight allowing an optimal *on site* portability. The double components plastic coating VFI-2513 gives the case a high hardness, so to conform ASTM (American Society for Testing Materials) standards. A further opaque geal-coat finish makes the cabinet surface scratch and waterproof resistant.

2 DESCRIPTION

The HD2050.20 is a digital signal amplifier, designed to work with HD2050 and HD2050.30 sources to obtain from these maximum acoustic performances.

The HD2050.20 amplifier incorporates a white / pink noise generator and an auxiliary input to receive signals from other external devices.

Using Podware software (downloadable from Delta OHM website) you can modify the EQ curve stored in the amplifier's DSP in order to tailor the frequency response of the system to specific measurement needs.

It's also possible to connect the HD2050.30 façade loudspeaker or the HD2050.40 sub-woofer (matched to the source HD2050) to HD2050.20 amplifier.

The system can be both AC and DC current supplied.

For the connection of the HD2050.20 amplifier refer to connectors description shown in the picture below.

HD2050.20 amplifier front panel

Generator section (above) and amplifier section (below) panel

2.1 ELECTRICAL CONNECTIONS AND POWER ON

Below typical connection configurations.

2.1.1 HD2050 DODECAHEDRON + HD2050.20 AMPLIFIER

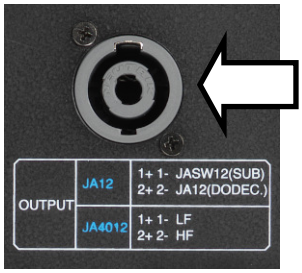
Before making any connections make sure that the "LEVEL" potentiometer is set to minimum by turning the knob all the way counterclockwise (position 0).

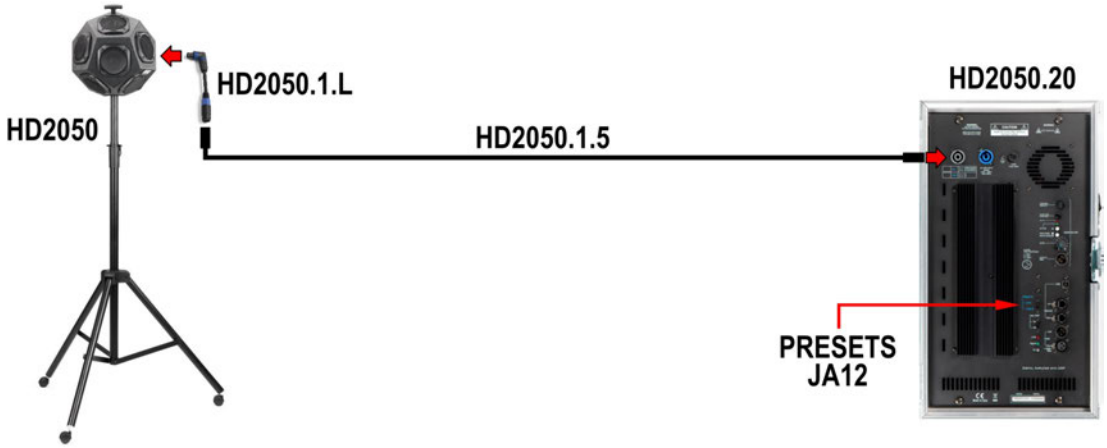
Set the PRESET switch on JA12 position for use with HD2050 dodecahedron (switch position on JA4012 for use with HD2050.30 loudspeaker).

If user needs a custom equalization, set the switch "User DSP" to ON. To create, edit and load in the DSP a custom equalization refer to the section on page 18.

Connect the L-shaped cable-adapter (HD2050.1.L) to HD2050 dodecahedron.

Connect the Neutrik SPEAKON signal cable to L-shaped cable-adapter (dodecahedron side) and to the "OUTPUT" amplifier connector.





Connect the power cord to the mains socket and to the AC LINE INPUT of the amplifier.

The amplifier-side power cord connector (Neutrik POWERCON) also acts as power switch of the equipment. Once the POWERCON connector is plugged in, rotate the connector about 45° clockwise in order to turn on the amplifier.

ROTATE CLOCKWISE TO TURN ON AMPLIFIER

2.1.2 HD2050.30 FACADE LOUDSPEAKER + HD2050.20 POWER AMPLIFIER

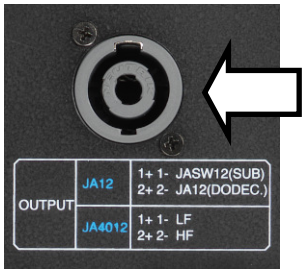
Before making any connections make sure that the "LEVEL" potentiometer is set to minimum by turning the knob all the way counterclockwise (position 0).

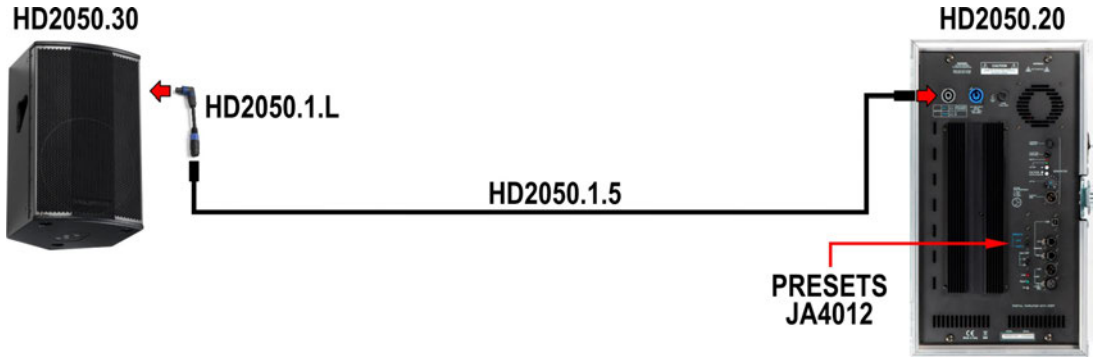
Set the PRESET switch on JA4012 position for use with HD2050.30 loudspeaker.

If user needs a custom equalization, set the switch "User DSP" to ON. To create, edit and load in the DSP a custom equalization refer to the section on page 18.

Connect the L-shaped cable-adapter (HD2050.1.L) to HD2050.30 loudspeaker.

Connect the Neutrik SPEAKON signal cable to L-shaped cable-adapter (loudspeaker side) and to the "OUTPUT" amplifier connector.





Connect the power cord to the mains socket and to the AC LINE INPUT of the amplifier.

The amplifier-side power cord connector (Neutrik POWERCON) also acts as power switch of the equipment. Once the POWERCON connector is plugged in, rotate the connector about 45° clockwise in order to turn on the amplifier.

ROTATE CLOCKWISE TO TURN ON AMPLIFIER

2.1.3 HD2050 DODECAHEDRON + HD2050.40 SUBWOOFER + HD2050.20 AMPLIFIER

Before making any connections make sure that the "LEVEL" potentiometer is set to minimum by turning the knob all the way counterclockwise (position 0).

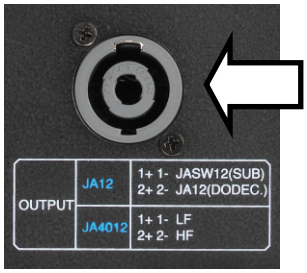
Set the PRESET switch on JA12 position for use with HD2050 dodecahedron.

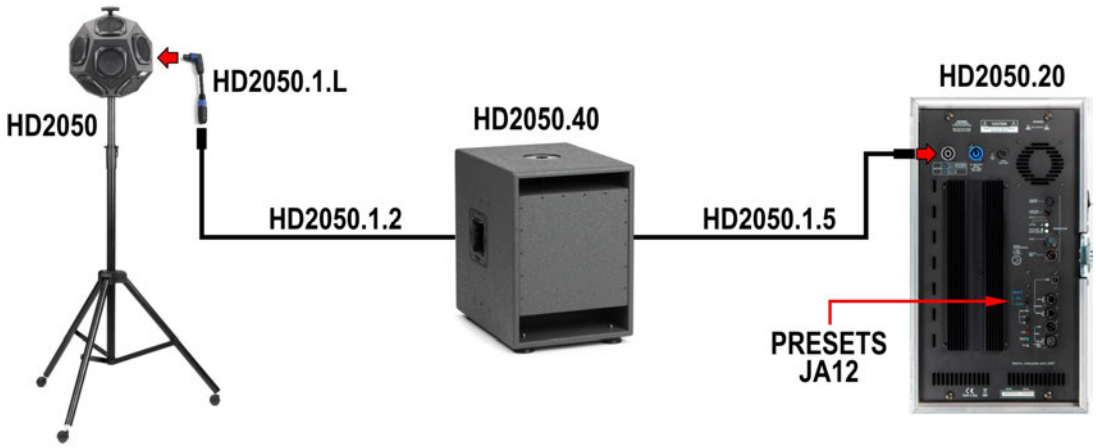
If user needs a custom equalization, set the switch "User DSP" to ON. To create, edit and load in the DSP a custom equalization refer to the section on page 18.

Connect the L-shaped cable-adapter (HD2050.1.L) to HD2050 dodecahedron.

Connect the short Neutrik SPEAKON signal cable (2 m cable HD2050.1.2) to L-shaped cable-adapter (dodecahedron side) and to HD2050.40 subwoofer using one of the two inputs (no matter which one).

Connect the Neutrik SPEAKON signal cable (5 m cable HD2050.1.5): one side to the second subwoofer input, the other side to the "OUTPUT" amplifier connector.





Connect the power cord to the mains socket and to the AC LINE INPUT of the amplifier.

The amplifier-side power cord connector (Neutrik POWERCON) also acts as power switch of the equipment. Once the POWERCON connector is plugged in, rotate the connector about 45° clockwise in order to turn on the amplifier.

ROTATE CLOCKWISE TO TURN ON AMPLIFIER

2.1.4 HD2050.30 FACADE LOUDSPEAKER + HD2050.40 SUBWOOFER + HD2050.20 AMPLIFIER

Before making any connections make sure that the "LEVEL" potentiometer is set to minimum by turning the knob all the way counterclockwise (position 0).

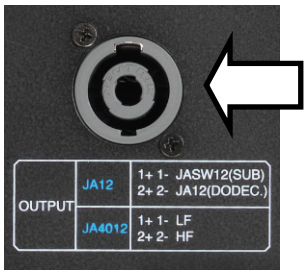
Set the PRESET switch on JA4012 position for use with HD2050.30 loudspeaker.

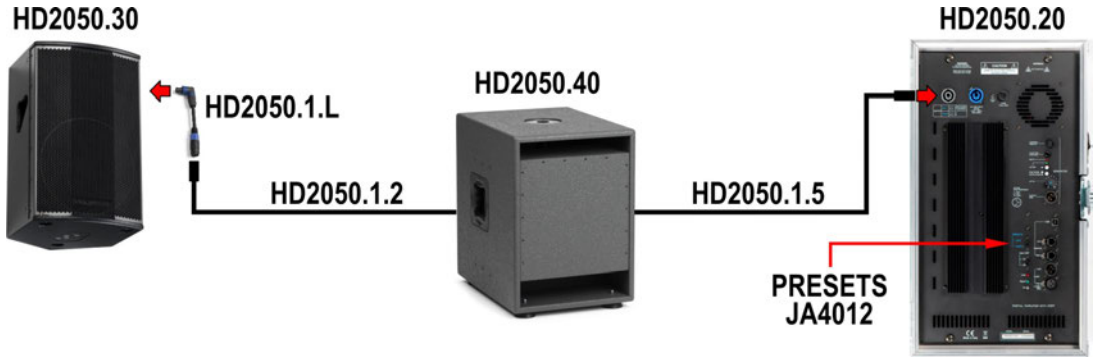
If user needs a custom equalization, set the switch "User DSP" to ON. To create, edit and load in the DSP a custom equalization refer to the section on page 18.

Connect the L-shaped cable-adapter (HD2050.1.L) to HD2050.30 loudspeaker.

Connect the short Neutrik SPEAKON signal cable (2 m cable HD2050.1.2) to L-shaped cable-adapter (facade loudspeaker side) and to HD2050.40 subwoofer using one of the two inputs (no matter which one).

Connect the Neutrik SPEAKON signal cable (5 m cable HD2050.1.5): one side to the second subwoofer input, the other side to the "OUTPUT" amplifier connector.





Connect the power cord to the mains socket and to the AC LINE INPUT of the amplifier.

The amplifier-side power cord connector (Neutrik POWERCON) also acts as power switch of the equipment. Once the POWERCON connector is plugged in, rotate the connector about 45° clockwise in order to turn on the amplifier.

ROTATE CLOCKWISE TO TURN ON AMPLIFIER

2.2 NOISE GENERATOR

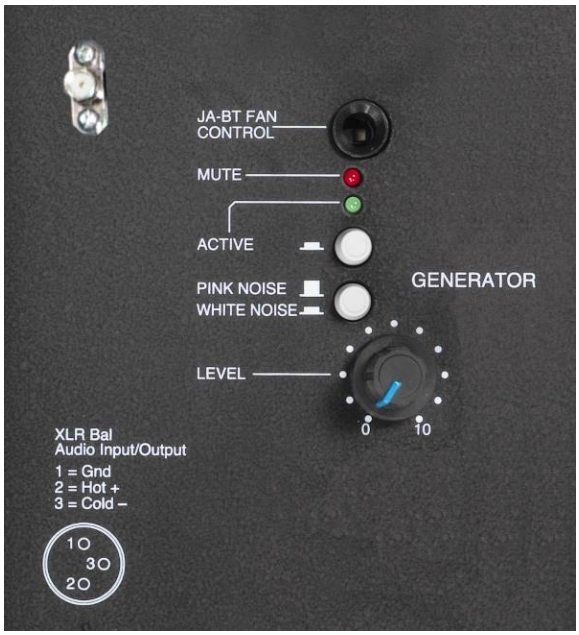


Fig. 2.2.1 – Noise Generator section of HD2050.20 amplifier

The noise generator has two buttons: one is used to activate the noise generator (ACTIVE); the other one is used to select the type of noise, between *white noise* and *pink noise*, sent to amplifier

The green led "active" indicates that the generator's status is ON.

By the external transmitter of the embedded remote control kit, the "mute" is activated, interrupting immediately the generated noise. When the "mute" is activated, the cooling fan of the amplifier's power section, will be turned OFF for some seconds; in this way it's avoided that the noise generated by the fan could influence the acoustic measurement, if the background noise level is considerably low

If the optional battery power kit (kit with inverter for battery power supply of apparatus when mains power supply is not available) is used, it is possible to use the JA-BT FAN CONTROL connector to drive the power OFF of cooling fan installed in the battery power kit.

The noise generator emission level is manually adjusted using the "LEVEL" potentiometer. In this way it's possible to send the requested signal level to amplifier's input. When the potentiometer is rotated to the maximum clockwise (indication 10), the generator's output level is equal to the maximum allowed level of HD2050.20 amplifier's input.

2.3 POWER AMPLIFIER AND DSP (DIGITAL SIGNAL PROCESSOR)

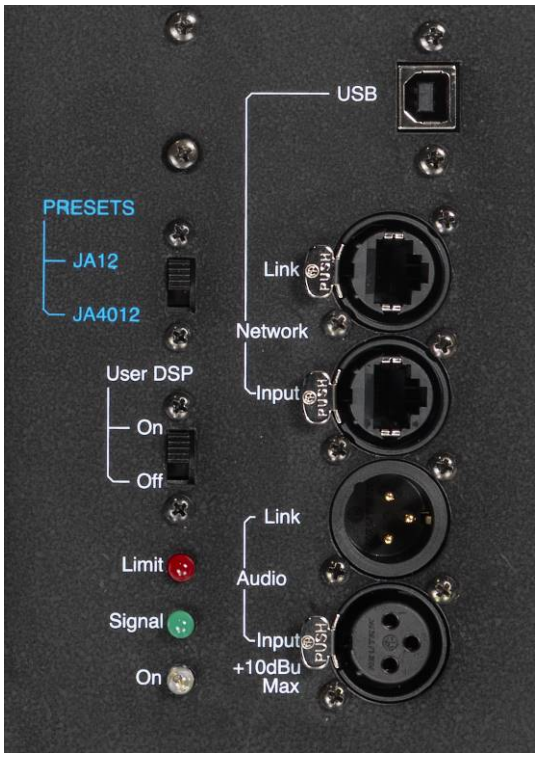


Fig. 2.3.1 –PRESETS, User DSP sections and amplifier connectors

HD2050.20 power amplifier uses a Digital Signal Processor with two different selectable "presets"; the needed preset can be activated using the "PRESETS" switch on the amplifier's front panel.

The preset settings allow optimum operation of the amplification system with the use of the dodecahedral source HD2050 or when the HD2050.30 facade loudspeaker is used

1. PRESET JA12: dodecahedral sound source HD2050 (with or without HD2050.40 sub)
2. PRESET JA4012: facade insulation loudspeaker HD2050.30

The two presets cannot be modified by the user and are loaded as factory default when the system is delivered to customers. They include correct frequency cuts and optimal setup (limiter) of input signal amplitude in order to obtain the maximum system performance without the risk to damage electronic components.

The two "presets" are very different each other and are studied to be used with specific loudspeakers models. For a correct loudspeaker response and mostly in order to avoid any damage, it's compulsory to use the correct preset for each loudspeaker connected to the system.

A second switch named "User DSP" allows to activate and load on the system a correction curve to equalize the acoustic response of the loudspeaker. The correction curve works "over" the selected *preset*. The equalization curve "User DSP" can be created and modified by the user, through the PodWare PC software program supplied with the amplifier HD2050.20. After equalization creation and modification the curve can be loaded on the amplifier's DSP through the serial interface (USB connector on the front panel). The user defined equalizations can be stored on the PC memory (file with *.dse extension) and when used are loaded on amplifier's DSP.

When the switch "User DSP" is set to ON, it will be activated the last equalization curve present while PC connected. If the switch is set to OFF , the "User DSP" is disabled and the response curve will be the "presets" currently active.

The three led on the front panel have the following functions:

1. yellow (ON): amplifier's power ON status
2. green (signal): signal present on the amplifier's input (whether it comes from the internal noise generator and from an external device)
3. red (limit): signal limiter active.

The limiter is set to drive the different loudspeakers (HD2050 and HD2050.30) at their maximum performances avoiding possible damage. When external signals are used, it's possible to increase the level until the limiter acts occasionally; it is not recommended to go above this threshold in order to avoid distortion on the signal.

HD2050.20 is based on switching technology and it is capable to deliver 1250 W per channel on 2 ohm. When used with HD2050.30 (two ways) façade loudspeaker ,the two available channels amplify the two speakers in bi-amp mode. If connected to HD2050 dodecahedron, the channel 2 is used for amplification. The channel 1 is dedicated to HD2050.40 subwoofer amplification. It's possible to use the dodecahedron alone without subwoofer connected. For audio output, on the front panel there is a female 4poles SpeakON connector with the following pin-out:

Switch PRESET	OUTPUT 1+1-	OUTPUT 2+2-
JA12	HD2050.40	HD2050
JA4012	HD2050.30 low freq.	HD2050.30 high freq.

The kit is delivered with a small 4-pole L-shaped cable-adapter with SpeakON male and female connectors. The male connector must be always connected to HD2050 dodecahedron or HD2050.30 facade loudspeaker in order to adapt their internal connections. It is compulsory to always connect this adapter in cascade with the usual 4 poles signal cable, in order to avoid that the signal intended for subwoofer could conflict with some of the transducers mounted on HD2050 and damage them.

It is strongly recommended to leave the L-shaped adapter connected to the dodecahedron. To consider it integral part of dodecahedron, it is a safe way to avoid connections potentially dangerous for the system.

Fig. 2.3.2 – L-Shaped adapter

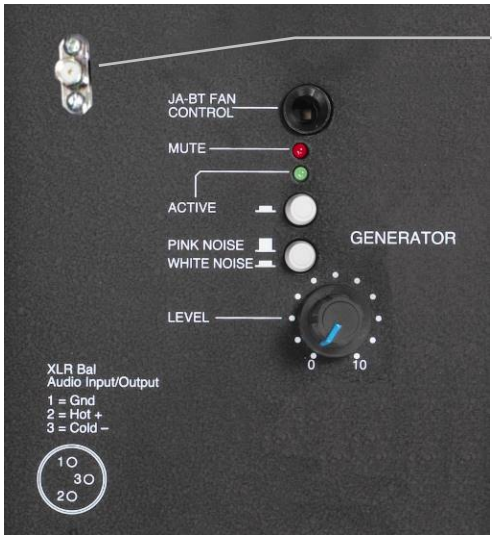
When the L-shaped adapter is connected to dodecahedron, **pay attention during the transport,** ensuring that it doesn't touch the ground or hard surfaces so that the connector can be damaged: eventually remove it temporarily. Remove the adapter when the dodecahedron is placed in its carrying case.

2.4 HD2050.20R REMOTE CONTROL KIT

The integrated HD2050.20R remote control kit allows to remotely control the internal noise generator of HD2050.20.

This kit consists of a portable transmitter and an integrated receiver that can be activated at a distance up to 100 m. Transmitter is supplied by batteries and is activated manually with a button.

The receiver has an external antenna to be screwed directly on the specific input connector on the front panel of HD2050.20 amplifier (generator section).



SMA Antenna Input connector

Generator section with integrated remote control receiver

Antenna to be screwed on HD2050.20 front panel

Transmitter

Fig. 2.4.1 – Remote control parts

2.5 HD2050.1 STAND

Tripod with adjustable height and foldable. Extremely stable and light weight, it is supplied with integrated wheels allowing to translate the dodecahedron on the floor with no need to dismount it.

HD2050.1 stand has a security system to slowdown the pole when extended in order to avoid possible damage to dodecahedron. It also has a lock system.

2.6 HD2050.40 SUBWOOFER

The HD2050.30 passive subwoofer is designed to work in conjunction with the HD2050 dodecahedron. The system consists of the sub HD2050.30, the dodecahedron HD2050 and the HD2050.20 digital power amplifier, allowing to fulfill advanced requirements in applications as sound insulation and architectural acoustics measurements.

Acoustic testing laboratories, manufacturers of materials with high insulation properties, acoustic consultants with specific measurement needs, or in general where it is needed a big amount of acoustic energy at low and high frequency, they will find the Delta OHM system a complete and effective solution.

The HD2050.40 is a band-pass type; the sound radiation is not direct but through a couple of resonant cavities, one front and one rear. In this way the reproduction of the low frequencies has the maximum efficiency, without interfering with the other components of the system. Thanks to the particular configuration, the speaker membrane undergoes far less movement than in *reflex* systems, significantly reducing distortion even at maximum drive power.

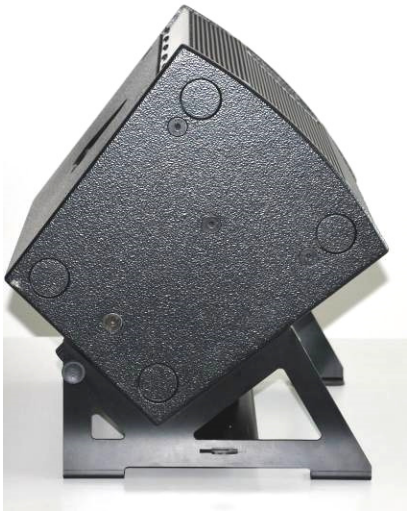
2.7 HD2050.30 FACADE LOUDSPEAKER

The **HD 2050.30** façade loudspeaker is the ideal tool to generate a uniform sound field on the front of a building

It provides not only a high sound power emission (into the range 70Hz-20KHz), needed in case of high background noise, but also a uniform sound distribution especially at high frequencies, guaranteed by the particular construction of the driver. Thanks to this solution are substantially reduced the phenomena of sound concentration, especially on the high range, due to the directionality of standard transducers when used close to the wall and it is therefore improved the measurements accuracy. The HD2050.30 loudspeaker can be easily positioned in all typical situations of facades sound insulation tests. HD2050.30.2 support is designed to position the loudspeaker at 45° both on the ground and on the tripod, with the latter system gaining valuable meters in front of the façade. The weight of 13.5Kg represents the best compromise between performance in sound emission and portability.

HD2050.30.2 support for 45° orientation

This accessory is designed to position the loudspeaker at 45° orientation with respect to the building facade as requested by the standards. A special housing makes it possible to install the support on the HD2050.1 tripod. This allows to lift the facade loudspeaker from the ground up to about 200 cm (maximum extension of the tripod). The support allows to rotate the loudspeaker freely in the horizontal plane.



The HD2050.30 loudspeaker must be fixed to the HD2050.30.2 support using the screws by hand as shown in the figure below.

Loudspeaker positioned at 45° by means of support HD2050.30.2

Loudspeaker installed on the tripod using HD2050.30.2 support

Mounting the loud-speaker on the support

The support has two screws with knob for each side (see figure above). The screw with the larger size is coupled to a female thread in the rear panel of the case. The coupling hole is positioned under the compartment for electrical connectors. The same type of connection is also present in the upper part of the case.

The two screws with smaller knob, instead are used to disassemble the aluminum support in case of transport.

Once the loudspeaker is assembled with the support, it can be positioned on the floor or installed on the stand (figure on the left).

NB: When the loudspeaker is installed on the stand, make sure that it is properly positioned with the legs extended; an incorrect positioning of the stand and the loudspeaker may damage the instrument itself as well as cause personal injury to user.

When the tripod is used with the pole to its maximum extension make sure that the floor is sufficiently flat to ensure the stability of the system.

The HD2050.30.2 aluminum support disassembled is divided in three parts as shown in the figure below.

HD2050.30.1 support disassembled

The 2050.30 loudspeaker has 2 Speakon NL4 connectors on the back. Only pins 1+/1- of each connector are connected.

3 CONNECTORS FOR REMOTE MANAGEMENT

The USB connector on the front panel of HD2050.20 amplifier, enables to connect the system to a PC.

The connection allows to remotely control the amplifier's DSP (Digital Signal Processor), to modify some parameters or customize the frequency response of the system using the parametric equalizer.

To modify the DSP settings it is necessary to install and use PodWare PC software supplied on CD with the amplifier. To use PodWare software it's necessary to install the USB driver supplied on CD (for installation instructions please refer to software installation manual).

The two EtherCon connectors are dedicated for functions available when the system is used with other amplified loudspeakers having DSP on board. Through these connectors, multiple speakers with DSP on board, can be chained together and controlled individually with a single software.

To remotely manage HD2050.20 amplifier from a PC the supplied software must be installed on a PC running Windows operating system. The system also works on Apple computers running Windows in emulation or Leopard with Boot Camp. The software requires DotNETV2SP1 Framework available on the supplied CD.

Once the software is installed (see installation manual), connect the USB cable from HD2050.20 USB socket to PC USB port and run PodWare software.

To connect to the amplifier go to menu *Networks* >> *Add networks* , and select the USB port detected by the system. Then click the red triangle icon that, upon connection, will turn to green. The software provides a online help with detailed explanations of all the operations possible with the system.

4 USING PODWARE SOFTWARE

HD2050.20 digital amplifier has an internal DSP which can be programmed using provided PodWare software. Connecting the amplifier to a PC via the USB cable it's possible, in real time, to perform the following operations: activate the mute, gain, 8-band parametric equalizer + two shelving filters, HP and LP filters, delay. The created setups can be uploaded in the HD 2050.20 amplifier simply retrieving them from PC.

The system's response equalization function is particularly important in measures of both building and architectural acoustics. The ISO 10140-5:2010 standard (measurement of sound insulation of building elements - Requirements for test facilities and equipment) requires that the noise spectrum generated by the sound source in the emitting room is good enough to obtain an adequate signal to noise ratio in the receiving room. Moreover, the noise generated in the room from 100Hz bandwidth, must be such that there is a difference < 6dB between adjacent bands of 1/3 octave so providing a sufficiently flat spectrum in the emitting room.

Since real rooms have different absorption characteristics, even if are used sound sources having a free field emission spectrum sufficiently smooth, it may be necessary to equalize the response of the system directly on the field to meet the requirements of the mentioned above international standard.

To this end, the PodWare software enables a quick adjustment of the system response.

System requirements:

To use the software, at least a 450 MHz Pentium processor and 128 MB RAM are required. It is required the presence in the system of Microsoft® .NET Framework 1.1 or .NET Framework 2.0. If .NET Framework is not installed in the system, it is possible to download it from Microsoft website.

4.1 CREATE A USER CONFIGURATION AND LOAD INTO THE DSP

In order to store into the DSP a user configuration of the response curve, is not necessary that the switch "user DSP" on the amplifier is set to ON. It's necessary that the switch is turned ON to activate the stored curve.

To install on a PC PodWare software and communication driver required for operation, please refer to the software manual.

To connect the PodWare software, connect the USB cable from PC to HD2050.20 amplifier USB input.

Turn ON the amplifier and start PodWare software.

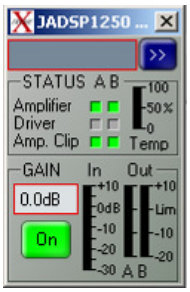
Verify that the communication port is the right one on the menu >> Network >> ComPort.

When the driver is installed, the system assign a COM port. In order to check which port is assigned by the system, go in Device manager in the PC control panel; under "Ports (COM and LPT)" should appear for example ***USB BvNet Port (COM6)****. The indicated COM6 port is the*

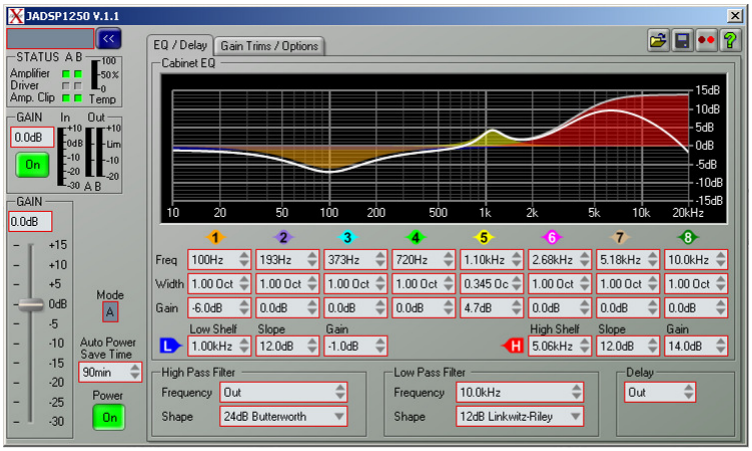
one to be used. The number of the COM port may vary according to PC configuration and the number of COM ports available on the system.

Click on >> Network >> Go online

Under "Devices" appears a line with the name of DSP (JADSP1250). Double click on the line to enable the connection with the DSP



It will appear a control windows with partial vision. Click the icon  to activate the full view.



The full control window allows to access the equalization, mute, filtering an delay functions.

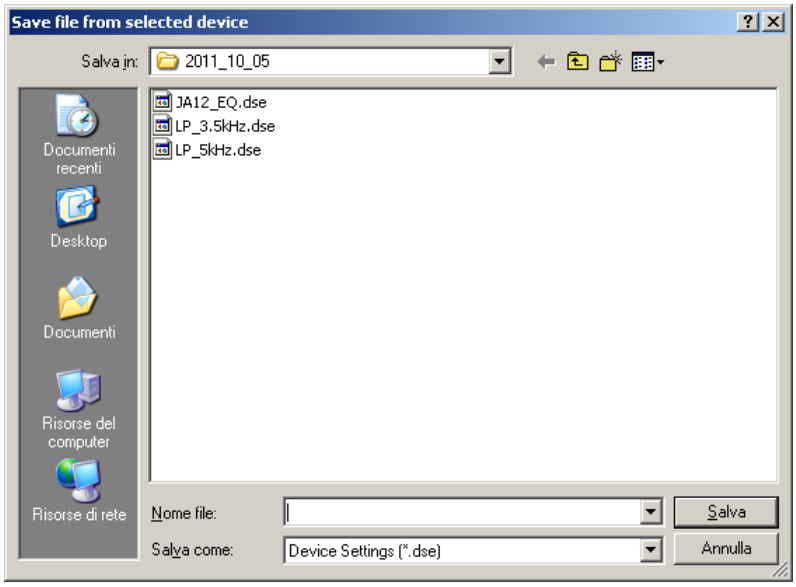
Equalization functions include **8 band-pass** filters, represented with different colors; central frequency, bandwidth and gain can be modified.

Under the band-pass filter section are available two additional "**shelf**" filters; low shelf, high shelf, slope and gain can be modified by the user.

Under the "shelf" filters section are available also two **high-pass** and **low-pass** filters; cut frequency and shape can be modified.

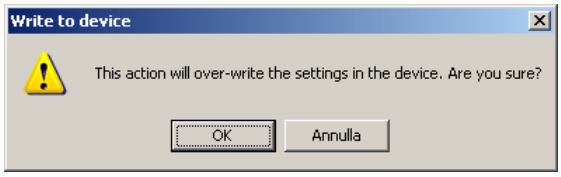
As soon as necessary adjustments have been applied to the system it's possible to save such configuration and recall it when needed.

To save the equalization created go on menu >> File >> Save as



Select a folder and save settings with a name (extension *.dse).

To recall the equalization curve go on menu >> File >> Open



A warning message reminds you that, once recalled the EQ curve, this will replace the one currently installed into the amplifier's DSP.

To activate the user equalization curve just created, in the HD2050.20 amplifier's front panel, set the User DSP switch to ON.

Amplifier is ready to work with the new EQ curve.

5 TECHNICAL SPECIFICATIONS

HD2050 - DODECAHEDRON	
Standards:	UNI EN ISO 140-3: 2006 UNI EN ISO 3382: 2001
Nominal Impedance	12+12 ohm
Power	Peak 540 + 540 W Nom. 180+180 W
Loudspeakers	12 x 5"
Frequency Range	80Hz-16KHz (1/3 octave bands)
Connectors	Neutrik® NL4FC speakON
Sound Power Level	122 dB re 1 pW (10^{-12} W)
Dimensions	∅ 385 mm
Weight	9 kg
Finishing	VFI-2513 and anti-scratch gelcoat

HD2050.20 - POWER AMPLIFIER	
Standards	EN 55103-1 (Emission), EN 55103-2 (immunity), EN 6065, Class I (safety)
Type	Digital, D class
Max Power	1200 W @12 ohm
Continuous Power	2x530 W RMS
Input for external generator	With level control
Supply	230 Vac (±10%), 50-60 Hz
Frequency response	20 Hz-20 kHz
THD	<0.1% @ 1 kHz
Noise Generator	Internal 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 of maximum power handled by HD2050
Status indicators	Mute, Active, Power ON
Protections	Short circuit, thermal, ultrasonic e RF, clip limiter, DC Fault PS shutdown
Dimensions with Flight case	300 x 525 x 200 mm
Weight	9.5 Kg with flight case
Remote control	Controls the HD2050.20 internal generator. Composed of internal receiver and external transmitter with activation button. Range up to 100 m.

HD2050.40 SUBWOOFER	
RMS power	500 W
Nominal impedance	4 ohm
Loudspeaker	LF 1 x 12” (neodymium magnet)
Emission	130 dB spl Peak @ 1m
Frequency Range	45 Hz-120 Hz
Connectors	2 x Neutrik® NL4 speakON
Dimensions	500 x 500 x 370 mm
Weight	22 kg
Finishing	Anti-scratch gelcoat

HD2050.30 - FAÇADE LOUDSPEAKER	
RMS power	300 W
Nominal impedance	8 ohm
Loudspeaker	Low frequency 1 x 10” (neodymium magnet) High frequency 1 x 1” (mylar)
Emission	129 dB spl Peak @ 1m
Frequency range	70 Hz-20 kHz
Connectors	2 x Neutrik® NL4 speakON
Dimensions	305 x 490 x 330 mm
Weight	13.5 kg
Finishing	Anti-scratch geal-coat

6 HD2050 – DIRECTIVITY (ISO 140 – ISO 3382)

The UNI EN ISO 140-3:2006, paragraph C1.3, requires that: "to check directional radiation of loudspeaker according to UNI EN ISO 140-3:2006 should be measured the sound pressure levels around the source in a free field. The source must be supplied with a signal and noise measurements must be performed in 1/3 octave bands."

This standard requires then to "measure the level difference between the energetic average value for a 360 ° arc (L360) and the mean values obtained by gently scanning all the 30 ° arcs (L30)."

The directivity indices are therefore:

$$DI_i = L_{360} - L_{30,i}$$

It can be considered that the radiation is omnidirectional if DI values are within ± 2 dB in the 100Hz-630Hz frequency range. In the 630Hz-1kHz frequency range, limits increase linearly from ±2 dB to ±8 dB. For frequencies from 1kHz to 5kHz limits are ±8 dB. During test were performed measurements with a rotation step equal to 5 °. For the source progressive rotation it has been used a rotating plate automatically controlled via a PC.

The test consists in measuring the impulse response (IR) with MLS technique for each angular position of the source, then this impulse response is processed so as to obtain the spectrum in 1/3 octave bands of the anechoic portion (excluding the sound reflection due to surfaces of the test room by an appropriate rectangular time window); directivity index is calculated with the procedure of moving average energy over 6 consecutive angular positions, as required by this ISO standard.

The signal processing was performed by narrow band frequency analysis with 2048 discrete frequencies, logarithmically spaced, starting from the appropriately windowed impulse response via rectangular window. Both the source and the microphone where placed at a height of 2.6 m from the floor and a distance source - microphone of 3m.

Below directivity charts of the source detected with the method indicated above.

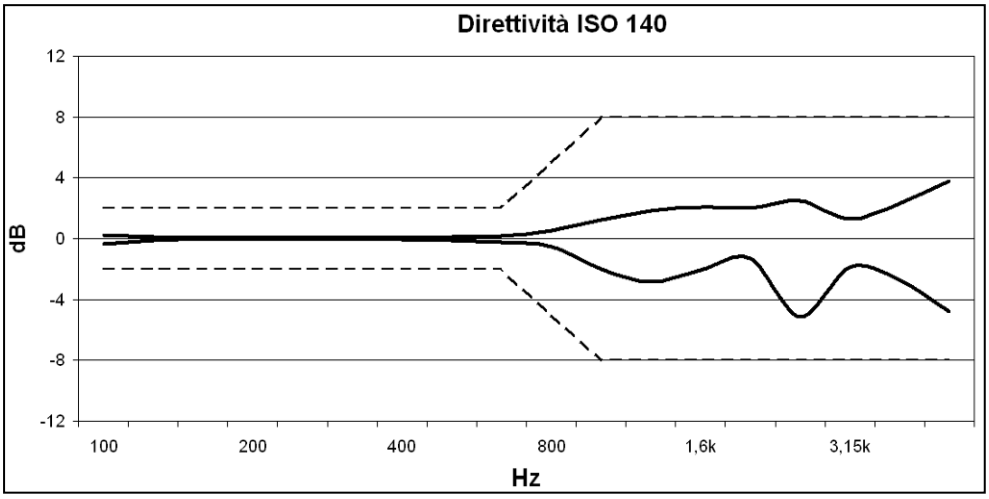


Fig. 6.1 – Directivity chart calculated according to ISO 140

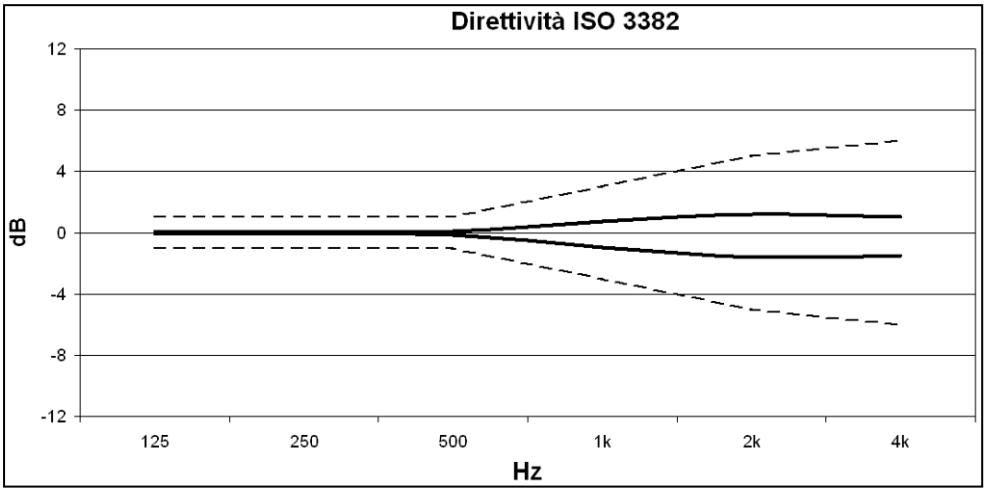


Fig. 6.2 – Directivity chart calculated according to ISO 3382

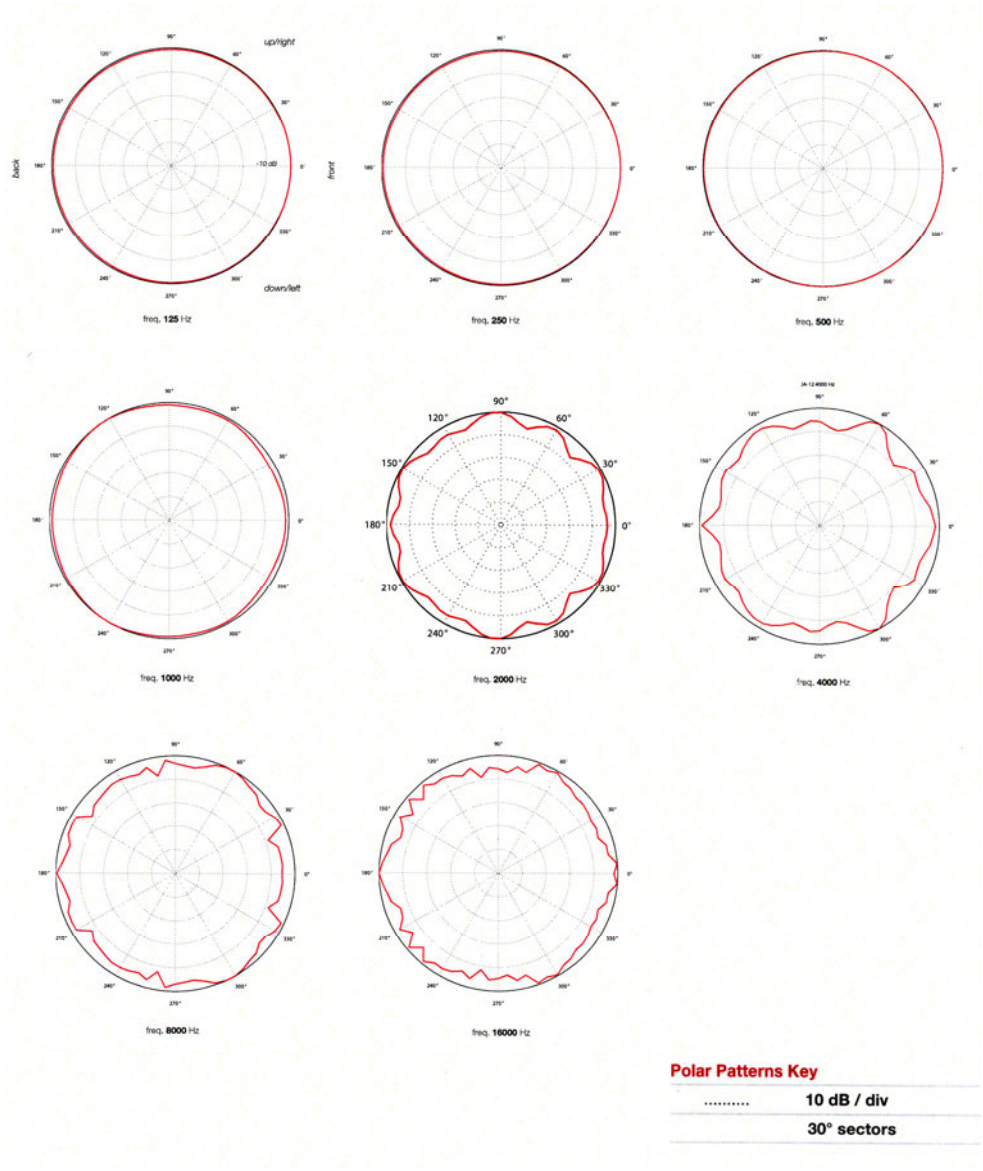


Fig. 6.3 – Directivity polar plots for 1/1 octave bands. 30° sectors. Display 10dB/div.

6.1 HD2050.30: SOUND POWER LEVEL

HD2050 sound power level has been calculated following instructions contained in ISO 3744 standard. Starting from sound pressure level measurements in 1/3 octave bands, made over a reflecting surface and in a free field, the Lw (re 1pW) sound power level is obtained.

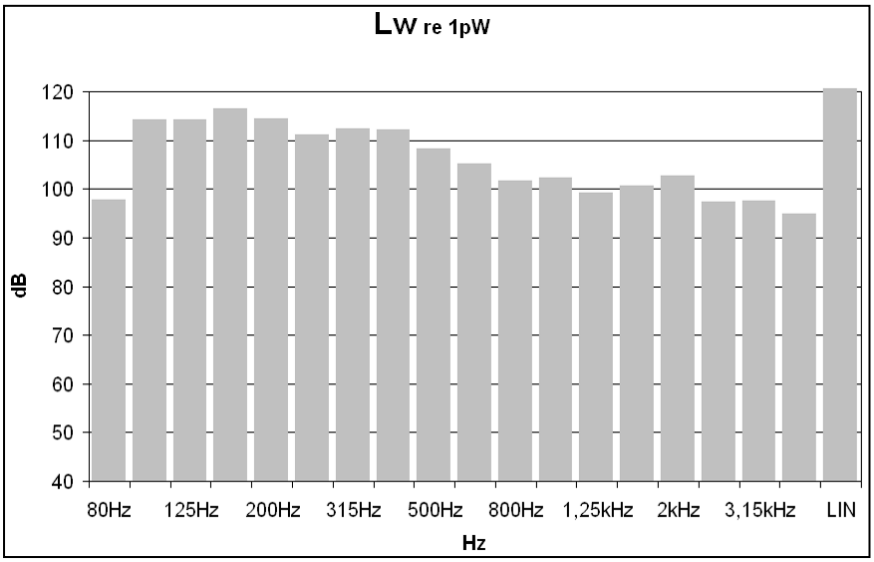


Fig. 6.1.1– Lw Sound power level chart in 1/3 octave bands and overall LINEAR level.

6.2 HD2050.30: DIRECTIVITY

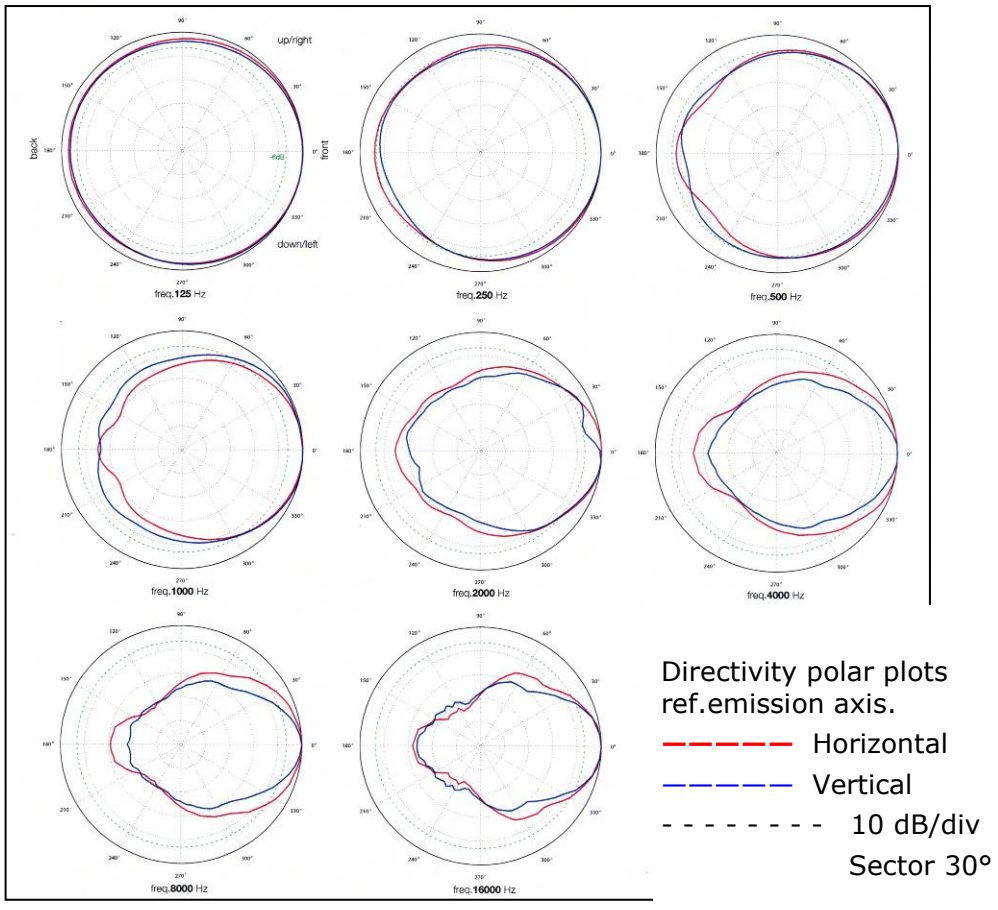


Fig. 6.2.1 – Directivity polar plots for 1/1 octave bands. 30° sectors. Display 10dB/div.

7 ORDERING CODES

HD2050 Dodecahedron complying with ISO 140-3 and ISO 3382 standards. Supplied with HD2050.1.5 and HD2050.1.L signal cables and rigid aluminum carrying case for transport.

HD2050.1 Stand with wheels. Retractable and extendible: min height 1300 mm, max height 2050 mm. Damped rod.

HD2050.20 Digital power amplifier with equalizer. Supplied with flight case, HD2050.2 power supply cable, HD2050.20R radio remote control kit and PodWare software downloadable from Delta OHM website.

HD2050.20R Remote control kit (spare part) consisting of receiver and transmitter with activation button. Transmission range 100 m.

HD2050.40 Subwoofer equipped with wheels. For the connection to HD2050 dodecahedron it is necessary the HD2050.1.2 or HD2050.1.5 signal cable not included.

HD2050.40.1 Extendable stand to mount the HD2050 dodecahedron on the HD2050.40 subwoofer min height 1370 mm, max height 1970 mm (subwoofer + stand + wheels).

HD2050.1.5 Signal cable, length 5 m.

HD2050.1.2 Signal cable, length 2 m.

HD2050.1.L Signal cable/adapter L-shaped

HD2050.30 Directional sound source for facade sound insulation measurements. HD2050.1.5 signal cable not included.

HD2050.30.1 Protective bag for the directional sound source.

HD2050.30.2 45° support for HD2050.30 facade directional source. It allows to orientate the loudspeaker at 45° both on the horizontal and on the vertical plane and to mount it on the top of HD2050.1 stand.

DELTA OHM metrology laboratories LAT N° 124 are accredited ISO/IEC 17025 by ACCREDIA for Temperature, Humidity, Pressure, Photometry / Radiometry, Acoustics and Air Velocity. They can supply calibration certificates for the accredited quantities.

NOTES

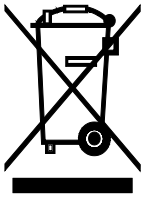
WARRANTY

The manufacturer is required to respond to the "factory warranty" only in those cases provided by Legislative Decree 6 September 2005 - n. 206. Each instrument is sold after rigorous inspections; if any manufacturing defect is found, it is necessary to contact the distributor where the instrument was purchased from. During the warranty period (24 months from the date of invoice) any manufacturing defects found will be repaired free of charge. Misuse, wear, neglect, lack or inefficient maintenance as well as theft and damage during transport are excluded. Warranty does not apply if changes, tampering or unauthorized repairs are made on the product. Solutions, probes, electrodes and microphones are not guaranteed as the improper use, even for a few minutes, may cause irreparable damages.
The manufacturer repairs the products that show defects of construction in accordance with the terms and conditions of warranty included in the manual of the product. For any dispute, the competent court is the Court of Padua. The Italian law and the "Convention on Contracts for the International Sales of Goods" apply.

TECHNICAL INFORMATION

The quality level of our instruments is the result of the continuous product development. This may lead to differences between the information reported in the manual and the instrument you have purchased.
We reserves the right to change technical specifications and dimensions to fit the product requirements without prior notice.

DISPOSAL INFORMATION



Electrical and electronic equipment marked with specific symbol in compliance with 2012/19/EU Directive must be disposed of separately from household waste. European users can hand them over to the dealer or to the manufacturer when purchasing a new electrical and electronic equipment, or to a WEEE collection point designated by local authorities. Illegal disposal is punished by law.

Disposing of electrical and electronic equipment separately from normal waste helps to preserve natural resources and allows materials to be recycled in an environmentally friendly way without risks to human health.

CE RoHS

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