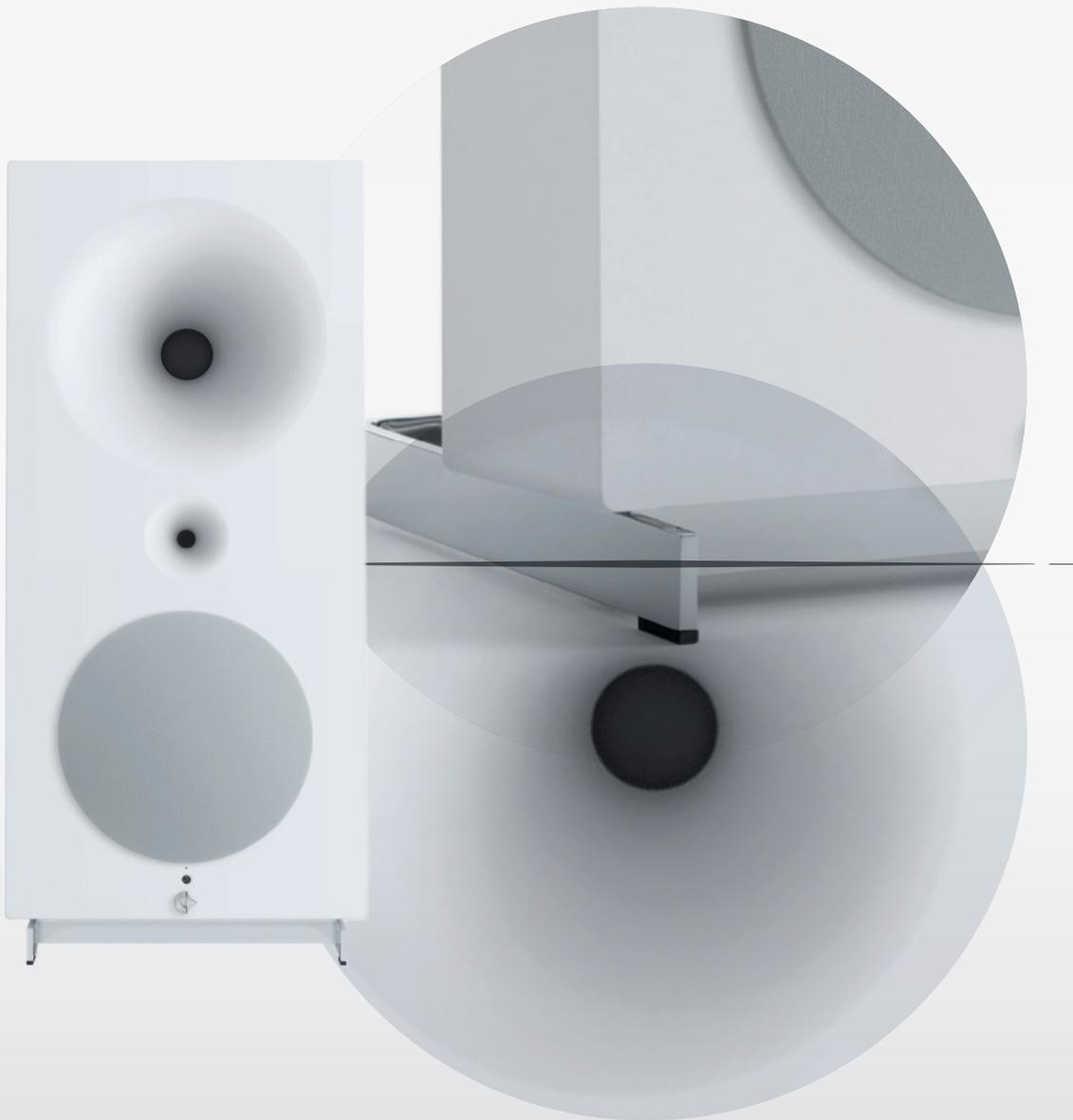


ZERO - TEIL AKTIV | FACT SHEET





Holger Fromme, CEO

DESIGNED BY NATURE.
DEVELOPED IN GERMANY BY PERFECTIONISTS.
MADE FOR ETERNITY.

How do speakers look like, if nature supplies the technology and the design?

All hornspeaker systems from Avantgarde Acoustic™ are an homage to the real and pristine. As no other brand, we in our team from the picturesque Odenwald in Germany have dedicated ourselves solely to the most primordial sound transducer technology available: the horn speaker.

Our claim is simple: building some of the best speakers available today. Entrhralling sounds which are unforgettable and which will never let you go. Timeless horn technology - timeless design. Sound in its most pure and natural shape. And at the same time incredibly powerful. A unique listening sensation in your home - this is Avantgarde Acoustic™.

To let music become a multisensual experience as described above, our real task is to drive this ingenious natural horn principle to its limits. To question every detail and continously trying to improve each and every component of our audio systems. UNO, DUO and TRIO are now being built since 1991. Although the essential concept and structure of these systems has never been changed, we used the past 25 years all of our commitment, dedication and enthusiasm to bring these products to a special level of uncompromising perfection.

All of this experience in the developement of semi active horn systems has now been implemented in the new ZERO - TEIL AKTIV. A powered subwoofer with a versatile sound processing combined with the spherical horn assembly of the awarded ZERO body. A speaker designed for customers who like the minimalistic design concept of the ZERO but who rather want to combine it with their own analog sources. A perfect entry into the spherical world of the Avantgarde sound as well for tube and analog lovers. This brochure will give you some valuable background of our design philosophy and the technical aspects of this speaker system.

Enjoy reading.



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ZERO 1 XD series - TEIL AKTIV in black soft-touch finish

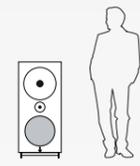


THE SYSTEM

XD
THE XD SERIES



ZERO 1 - TEIL AKTIV

- 
- 104 dB sensitivity*
 - 5 inch midrange driver with 8 ohm and ferrite magnet*
 - 15.7 inch spherical midrange horn*
 - CDC midrange system with no passive crossover components*
 - 1 x 12 inch bass drivers*
 - 500 watt subwoofer amplifier*
 - Digital sound processor with 10 band parametric EQ*

The ZERO - TEIL AKTIV is the logical consequence of the ZERO product line.

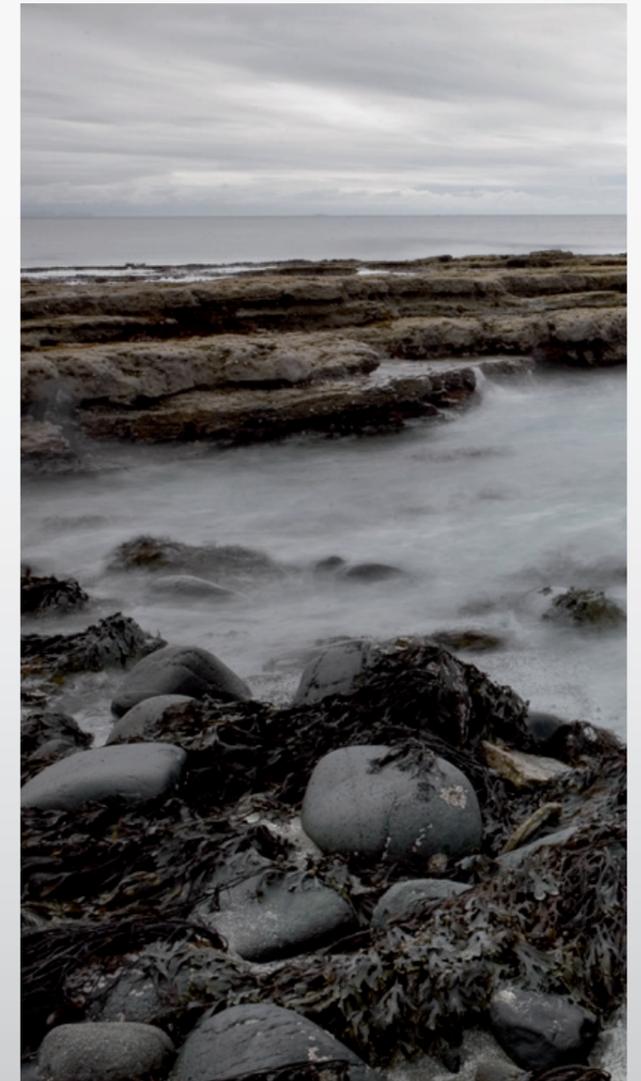
It combines the body structure of the ZERO with the 25 years Avantgarde knowhow in semi active speaker design. Basically it is scaled down version of the UNO in the significantly smaller enclosure of the ZERO. The objective was to accomplish the clarity and power of its "bigger" brother in a significantly reduced enclosure.

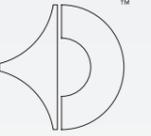
The 400mm spherical midrange horn covers a wide bandwidth down to 300 hz. The active subwoofer supplements the balance between spherical horn performance and low frequency reproduction. It is actuated by one 12 inch long-excursion driver powered by a 500 Watt amplifier.

All horn drivers are equipped with 8 ohm voice coils with 104 dB system sensitivity. This is 32 x times the dynamic range of a conventional 87 dB box speaker.

Using Avantgarde Acoustic's™ CDC-technology, we precisely align the frequency response, sensitivity of the driver, the geometry of the membrane and the air chamber at the horn throat to the response curve of the spherical midrange horn. This way the midrange driver has no passive filter components in the signal path - routing the music signal directly to the voice coil of the driver engine. Less components, less interactions, less friction ensuring more detail.

Frequency control in the low frequencies is managed by an advanced digital sound processor. The digitally controlled frequency crossover ensure a seamless integration of the bass response to the spherical horns. The DSP is equipped with 10 parametric equalizers to fine control the sound to the customers taste and to the acoustics of the room.





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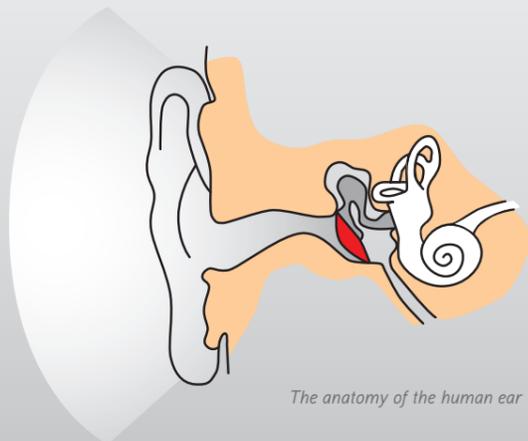
WHAT IS A HORN?

The horn principle is as old as the universe, maybe even older. Everybody knows the horn!

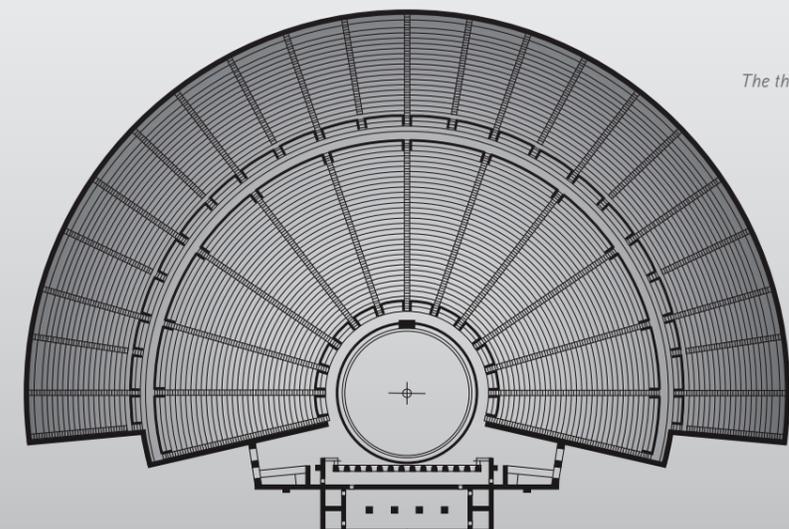
In nature the principle of the horn technology is ubiquitous. Our mouth is a funnel, as are our ears. And we form our hands in the shape of a copped funnel to amplify our voices and to improve the audibility when listening. Even the architectural design of the ancient amphitheatre in Epidaurus is based on the acoustical principles of the horn.

A horn funnel effectively guides the motion of sound waves and thus substantially increases the sensitivity and effectiveness of sound radiations.

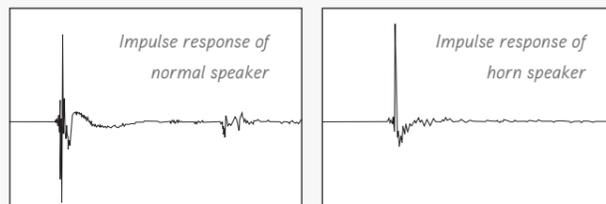
A horn is the most natural and powerful way to amplify sounds.



The anatomy of the human ear



The theatre of Epidaurus, Greece



WHAT ARE THE ADVANTAGES OF A HORN?

A horn funnel connected to the front of a speaker driver is the most efficient way to amplify the sound and to increase the efficiency of a speaker. The actual moving parts of a transducer - voice coils and membranes - can be designed much smaller. Smaller moving parts means less weight. This reduction of the inertia of the moving masses will increase the responsiveness of the system. A horn speaker will accelerate much faster and at the same time will come to an immediate stop of motion if induced by the audio signal.

The reduction in the dimensions of the membrane area adds to the mechanical stability of the assembly. This higher sturdiness of the membranes and the reduced amplitude of the driver movement in a horn system will significantly reduce the distortions.

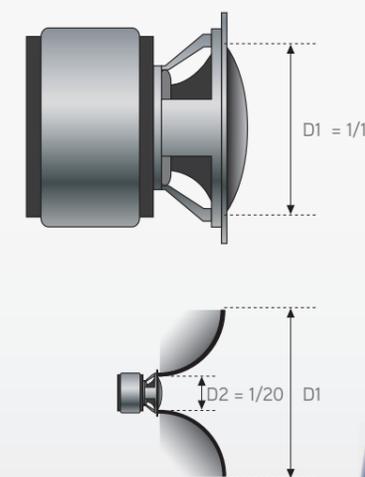
Distortions are alterations to the original shape of sound waves adding unwanted overtones to the original audio signal. This is negative in two ways. At first, these artificial dissonances will become audible by themselves, best described as an unnatural and harsh sound characteristic. Secondly, every detail of the original music signal which is smaller than these overtones will be masked and thus inevitably be lost.

Laboratory measurements of the ZERO XD series drivers with and without the horns executed by Prof. Dr. Anselm Goertz at the University of Aachen impressively endorse the advantages of the Avantgarde Acoustic spherical horn technology:

- 8 x** 8 x times higher dynamic bandwidth
- 90%** 90% less distortions
- 10 x** 10 x times more details

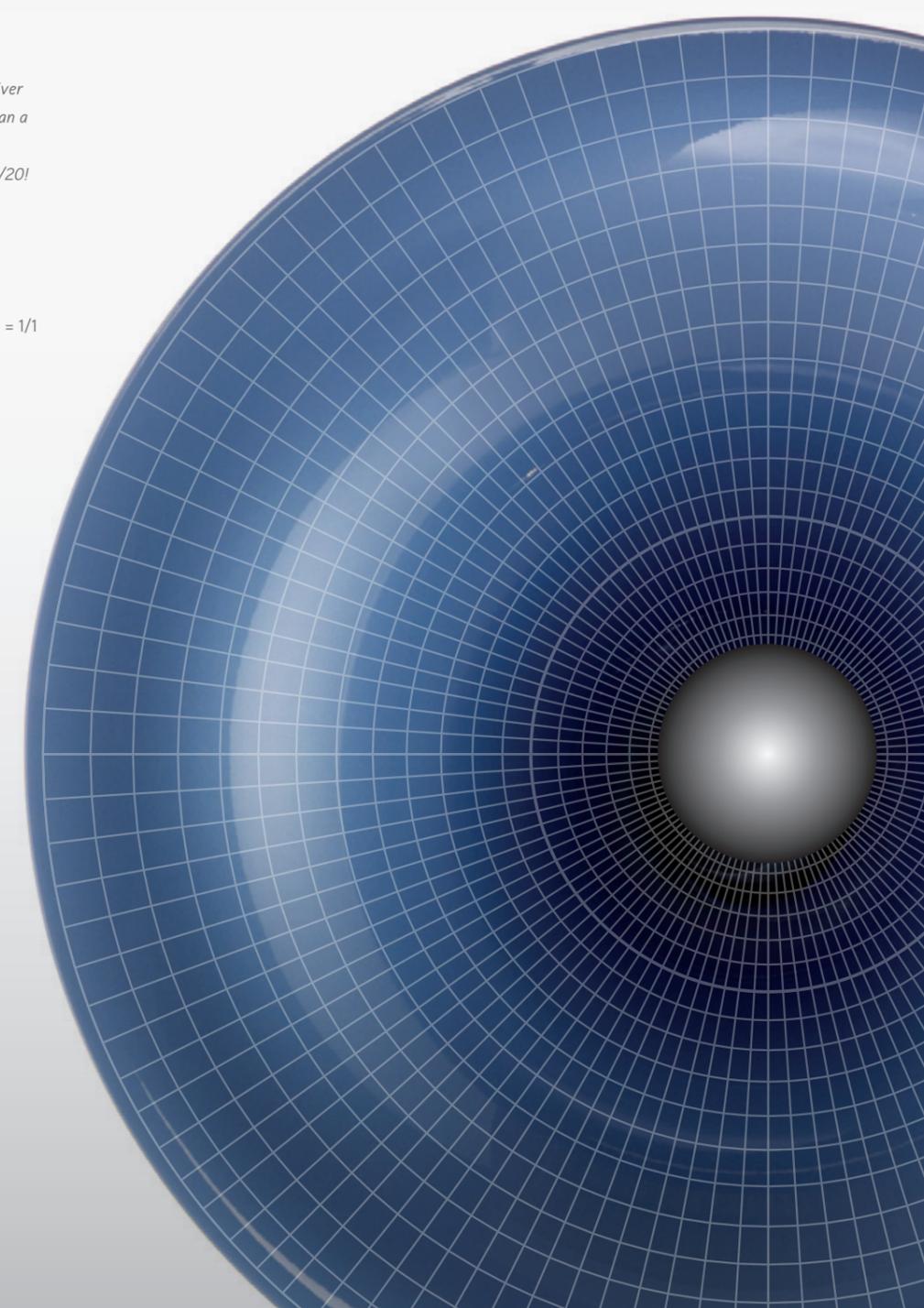
This means that with the Avantgarde Acoustic™ horn systems the usable range from the most quiet to the loudest tones is increased by 8 x times. At the same time the systems have much less distortions and are thus capable of reproducing details which are 10 x times smaller than with conventional box speakers in the boxdesign.

At a given SPL output a horn loaded driver can be designed significantly smaller than a driver without a horn. This results in a reduction of the moving mass of up to 1/20!



"Compared to normal box speakers, these measurements are worlds apart."

Prof. Dr. Anselm Goertz
University of Acoustics, Aachen, Germany





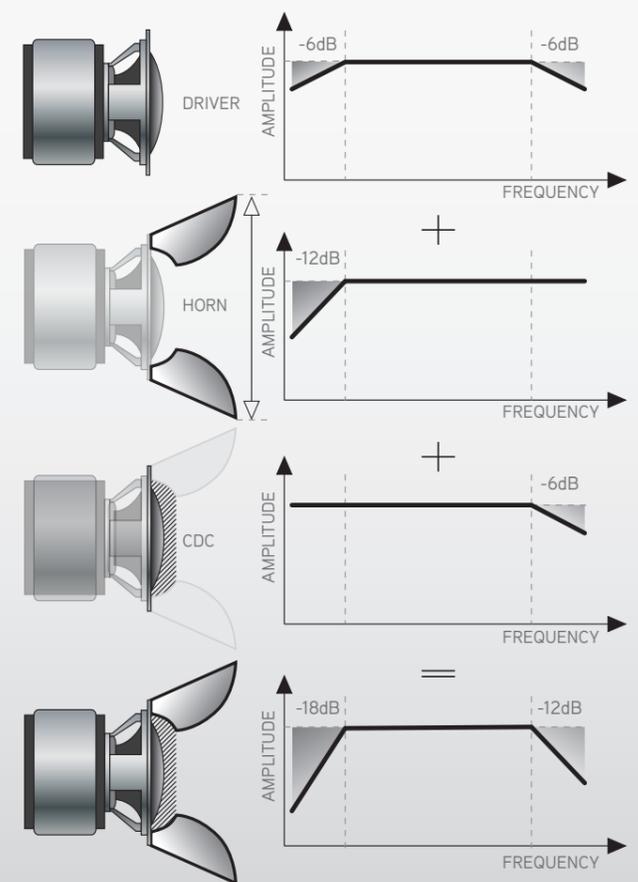
THE CDC SYSTEM

CDC stands for "Controlled Dispersion Characteristic". It is a technology developed by Avantgarde Acoustic™ to precisely align the frequency response, the sensitivity of the driver, the geometry of the membrane and the air chamber at the horn throat to the response curve of the spherical midrange horn. This way we manage to avoid any passive filter components in the signal path – routing the music signal directly to the voice coil of the driver engine. Less components, less interactions, less friction ensuring more detail.

This is how CDC works: the lower cut-off frequency of a horn loudspeaker is determined by the size of the horn. The larger the horn, the lower the response. Below the cut-off frequency of the horn, the response falls off steeply at 12 dB/octave. The midrange drivers 6 dB roll-off is set to exactly the same frequency thus achieving a total of 18 dB/octave bottom end attenuation. Avantgarde Acoustic™ speakers thus operate only down to their cut-off frequency limit and require no high pass filters.

The upper frequency response is determined by the driver itself. However, it can as well be influenced acoustically by the horn. For this purpose, Avantgarde Acoustic™ places a small chamber between the driver's membrane and the horn throat. The driver does not emit directly but via a small air chamber into the horn throat opening. This air volume operates as a low-pass filter and automatically filters frequencies above the resonance volume of the chamber (at 6 dB/oct.).

Avantgarde Acoustic™ now matches the -6dB roll-off point of the midrange driver to exactly the same frequency of the CDC air chamber. Thus we obtain an acoustic attenuation of the frequency response of 12 dB without any passive frequency crossover. No further low pass filters are necessary! The CDC system thus causes the midrange to only operate within its operational band and steeply fall off at the transition points.



THE SPEAKER DRIVERS



THE MIDRANGE HORN DRIVER

Although most speaker designs focus on treble and bass response, we at Avantgarde Acoustic™ consider the midrange as the “heart” of our speaker system.

The ZERO XD series midrange features the M0 driver with an 8 ohm voice coil loading a 400 mm spherical midrange covering a wide frequency bandwidth down to 300 Hz.

The M0 is a 125 mm (5 in) midrange driver with a 3 inch dome optimized for a large, linear excursion. Our engineers managed to increase the effective magnetic flux in the air-gap of the driver by eliminating the usual copper inlay of the pole-piece. A ferrite magnet assembly is used to generate a powerful magnetic field which homogeneously controls the movement of the voice coil.

The geometry of the membrane dome has been precisely aligned to the response curve of the spherical midrange horn to ensure a phase-neutral radiation of the sound waves.

The new “Soft-Mesh-Compound” membrane uses a stable grid carcass as its structural foundation. The microscopic apertures of the grid are sealed with a proprietary elastic durex coating. The combination of a stable grid structure with a flexible lining effectively reduces partial resonances of the dome itself and absorbs high frequency distortions.

The Avantgarde Acoustic™ CDC system features a controlled roll-off at 4,000 Hz, which eliminates all passive crossover components in the signal path. This way the M0 gets the pure and undistorted full-range signal directly from the amplifier.

The nominal impedance of the M0 is 8 ohms and the sensitivity with the spherical horn is 104 dB (Watt/m).



ZERO 1 XD series M0 midrange driver with ferrite magnet and soft-mesh membrane



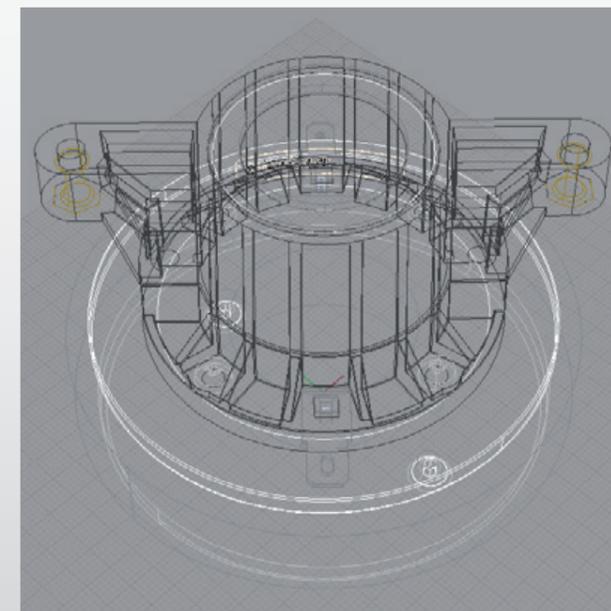
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THE TWEETER HORN DRIVER

The ZERO XD series H0 tweeter incorporates an Avantgarde Acoustic's™ 8 ohm copper clad aluminium voice coil.

This driver combines the smoothness often associated with electrostatic driver and the authority of a strong 1 inch horn driver. The H0 tweeter features a voice coil former made of Kapton with a minimised air gap, a strong ferrite magnet and an ultra light diaphragm.

With the 100mm spherical horn the H0 offers an extended bandwidth down to 2.000 Hz. Due to the passive crossover point being at 4,000 Hz the H0 tweeter achieves a seamless smooth sound with incredible dynamic headroom.



ZERO 1 XD series H0 tweeter

THE SPEAKER DRIVERS



THE BASS DRIVER

The ZERO - TEIL AKTIV is driven by one 320 mm (12 inch) 400 watts bass driver.

The long excursion bass driver is characterized by high efficiency and power handling capabilities. The extended excursion is +/- 7 mm. The driver incorporates a 3 inch voice coil made with copper round wire including high temperature bonding strength and apical former.

Ferrite magnets with a special under-pole magnet topology are used to improve the flux density in the air gap and to eliminate energy leakage of the magnetic field.



UNO XD series 250 mm bass driver

THE SUBWOOFER AMPLIFIER

The active subwoofer of the ZERO - TEIL AKTIV is driven by the XD-500 power module. This integrated amplifier consists of a 500 watt amplifier.

The XD-500 power module can be remotely switched on/off using a 12V trigger signal.

Direct connection to integrated amps, power amplifiers or receivers is done via speaker-level input terminals. Line level inputs via XLR terminals are available alternatively.

The signal take-off is not only at high impedance, but is also balanced and transformer coupled. This floats the circuit ground, avoiding hum loops and easing connection to balanced and bridged amplifier designs.

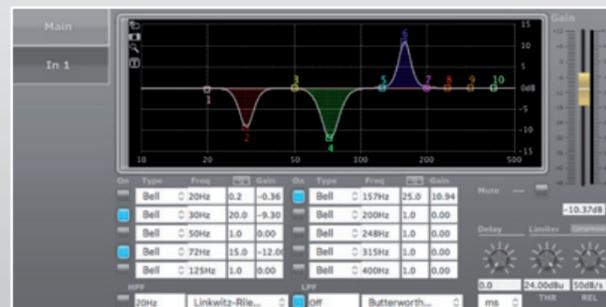
THE DIGITAL SOUND PROCESSOR

The XD-500 amplifier is equipped with an advanced digital sound processor.

With a precision and bit accuracy unattainable using analogue technology, the digital crossover network eliminates all the passive filter elements in the signal path of the subwoofer, thus circumventing a series of tonal problems caused by analogue filter technology (e.g. capacitors, resistors and coils in the signal path, phase shifts and associated negative effects on the impulse response).

Volume settings, delay time, high pass & low pass filters and up to 10 parametric equalizers are programmable. Thus a variety of parameters can be changed and fine tuned by directly using the control display at the rear of the XD-500 module or by connecting a PC or Mac computer.

This way it is possible to adjust the sound to individual preferences and to allow for a seamless integration of the system in different rooms.



Screenshot of XD-500 DSP control software



THE DESIGN

XD
THE XD SERIES



THE MECHANICAL CONSTRUCTION

We have tried our very best to design the ZERO XD series as lean as possible. No needless edges, no gadgets, no playing around with materials and surfaces. No forced design gimmicks. But a simple functional corpus. The midrange and tweeter horns are integral part of the speaker body.

The entire loudspeaker system is placed on a solid chrome plated base frame.

THE AWARDS

Member of  **Rat für Formgebung**
German Design Council

Our desire has always been to design speakers which will move people visually in a similar way to how they are moved when they listen to music through them. Speakers that will unleash emotions and memories even when standing silently in the room. In short, speakers that are loved.

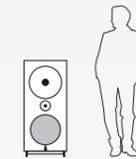
Giving very much attention to the finest detail and the composition of the complete system, we are very proud of being one of the highest awarded brands in our industry.

Besides winning some of the most reputed design awards like the Red Dot Award, iF Design Award Gold, German Design Award Special, Plus X Award and the Eisa Award, we have been elected in 2015 for an exclusive membership at the German Design Council.





SPECIFICATIONS



ZERO - TEIL AKTIV

SYSTEM DATA

Frequency response	satellite subwoofer
Power capacity	
Sensitivity (1 Watt / 1 m)	
Crossover frequencies	
Nominale Impedance	
Recommended amplification	
Recommended room size	
CDC (Controlled Dispersion Characteristic)	
CPC crossover (patent pend.)	

250- 20.000 Hz
18 - 350 Hz
50 Watts
> 104 dB
300 / 4.000 Hz
8 Ohm
> 10 Watts
> 16 m² / 170 ft²
Yes
No

HORN

Horn type	
Dispersion type	
Horn mouth diameter	mid range high range
Horn length	mid range high range

Spherical horn
180 degree

400 mm / 15.7 in
130 mm / 5.1 in

190 mm / 7.5 in
77 mm / 3.0 in

HORN DRIVERS

Diameter	subwoofer mid range high range
----------	--------------------------------------

300 mm / 11.8 in with Ferrite magnet
125 mm / 5 in with Ferrite magnet
25 mm / 1 in with Ferrite magnet

SUBWOOFER AMPLIFIER

Amplifier Output power (RMS)	
Total harmonic distortions	
Signal to Noise ratio	

500 Watts
0,05%
120 dB (A)

DIGITAL SOUND PROCESSOR

Delay	
High pass and low pass filters	
Parametric equalizer	
Compressor	
Limiter	

adjustable in 0,01 mSec steps
Bessel, Butterworth, Linkwitz-Riley filters
10 x parametric equalizers programmable
programmable
programmable

DIMENSIONS/WEIGHT

Dimensions	width depth height (+/- 15 mm)
Weight	

490 mm / 19.3 in
318 mm / 12.5 in
1,040 mm / 40.9 in

39 kg / 86 lbs



Front view

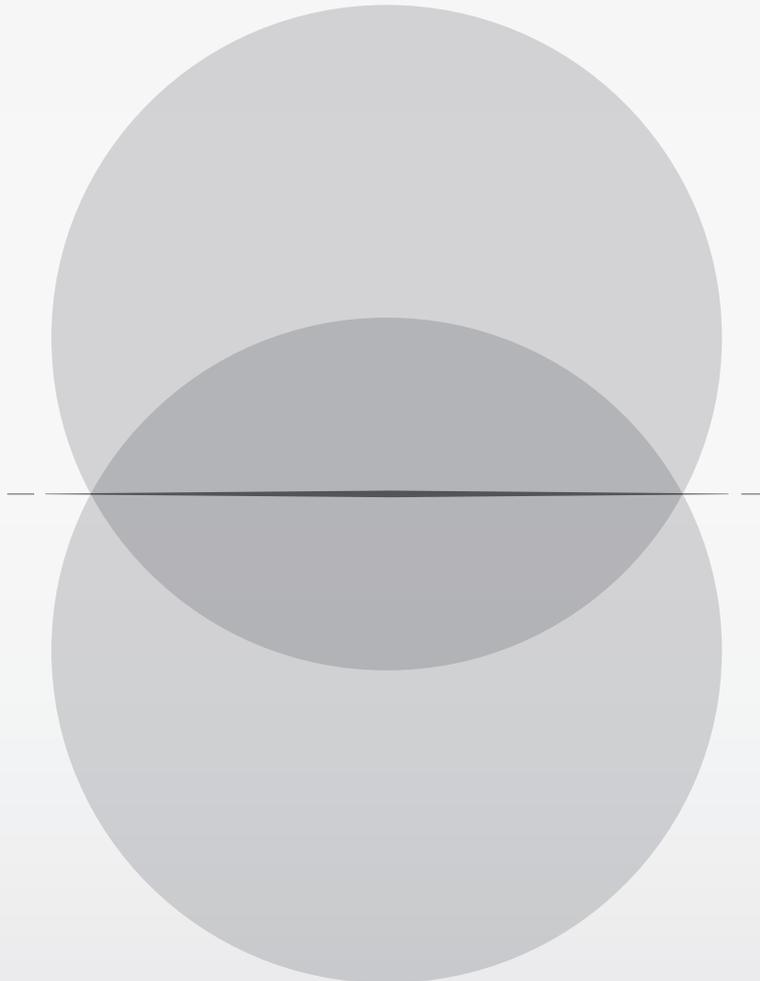


Side view



Rear view

purity



performance



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