

DUO GROSSO FACT SHEET

The big among the big



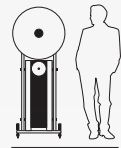
avantgarde
ACOUSTIC

DUO GROSSO FACT SHEET

The big among the big

DUO GROSSO

107 dB sensitivity
18 ohm omega drivers with neodymium magnet
27 inch spherical midrange horn
CDC system with no crossover
100V CPC crossover (patent pend.)
Bass with active feedback control
2 x 12 inch neodymium bass drivers
500 watt subwoofer amplifier with 120.000 μ F



THE SYSTEM

The Duo Grosso is the larger version of the Duo Omega, featuring the same phenomenal spherical horn assembly combined with the significantly more powerful Sub 231 subwoofer module.

By utilizing two big 12 inch drivers, the dynamic headroom of the bass has been practically doubled, compared to the Duo Omega. Exclusive neodymium magnets are used for increased magnetic force and reduced driver displacement.

Its ultra high sensitivity (107 dB/W/m) at 18 ohms system impedance and its hybrid concept with self-powered subwoofer makes it easy to drive with any amplifier. Even with low powered tube amps the Duo Grosso is able to deliver a powerful, dynamic and three-dimensional sound, because the power-demanding work at low frequencies is managed by the self-amplified Sub 231.



DUO GROSSO TECHNOLOGY

The big among the big



OMEGA TECHNOLOGY

To significantly improve the sound quality Avantgarde Acoustic™'s *Omega* approach is based on two major concepts: simplification of the passive crossover design and high impedance voice coils.

Different to 2nd order conventional passive crossover with six components for a 2-way speaker, the Duo Grosso omega crossover has only two components for the tweeter and no component for the midrange. Using no crossover in the midrange is usually not easy

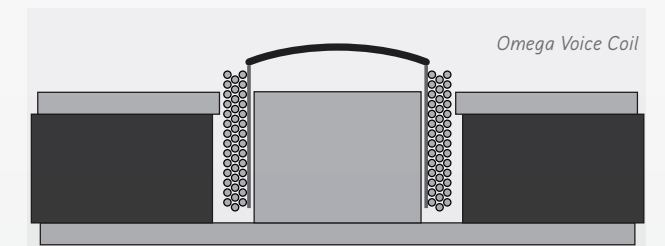
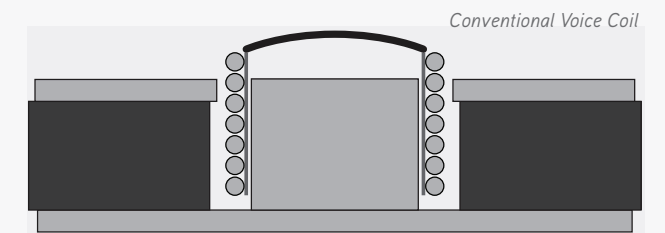
due to the large overlapping of the frequency response. Using their "Controlled Dispersion Characteristic" of the driver/horn configuration, Avantgarde Acoustic™ effectively controls the output.

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 18 dB/octave. 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. 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 kind of band-pass filter and automatically filters frequencies above the resonance volume of the chamber (at 6 dB/oct.). By choosing an adequate driver with a natural roll-off at 6 dB in this frequency range, Avantgarde Acoustic™ obtains 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 their operational band and steeply fall off at the transition points.

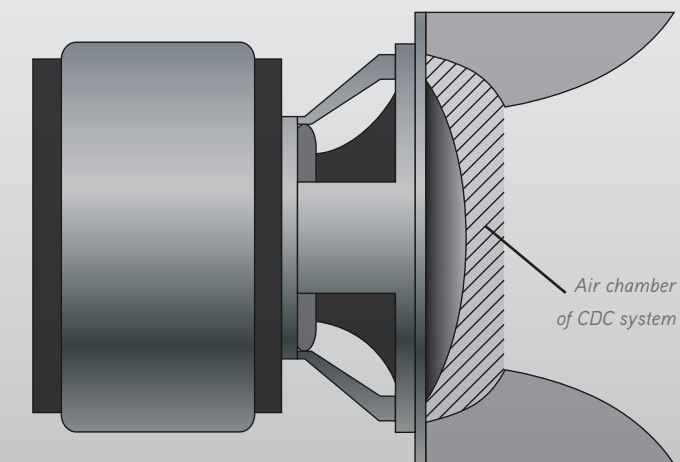
The attached graphics show the difference of conventional and the new Omega voice coils. To achieve very high resistance the voice coils of the Omega drivers are made with very long but very thin wires. Up to four windings are placed on the voice coil former. Elaborate production technology is required as the wire is so thin and easily breaks and the voice coil gap is so narrow. Now, why is the horn manufacturer taking so much energy and effort to simplify the passive crossovers and enhancing the impedance of their voice coils?.

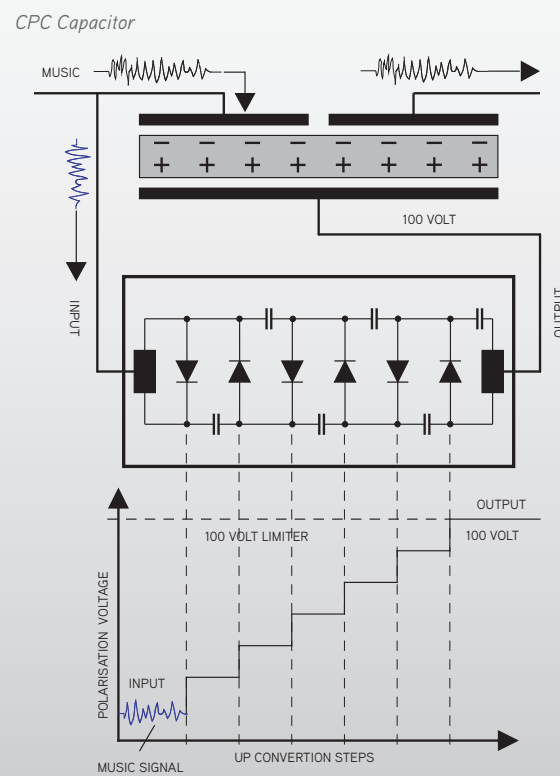
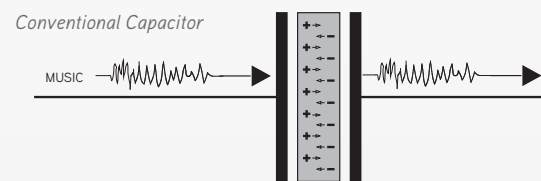
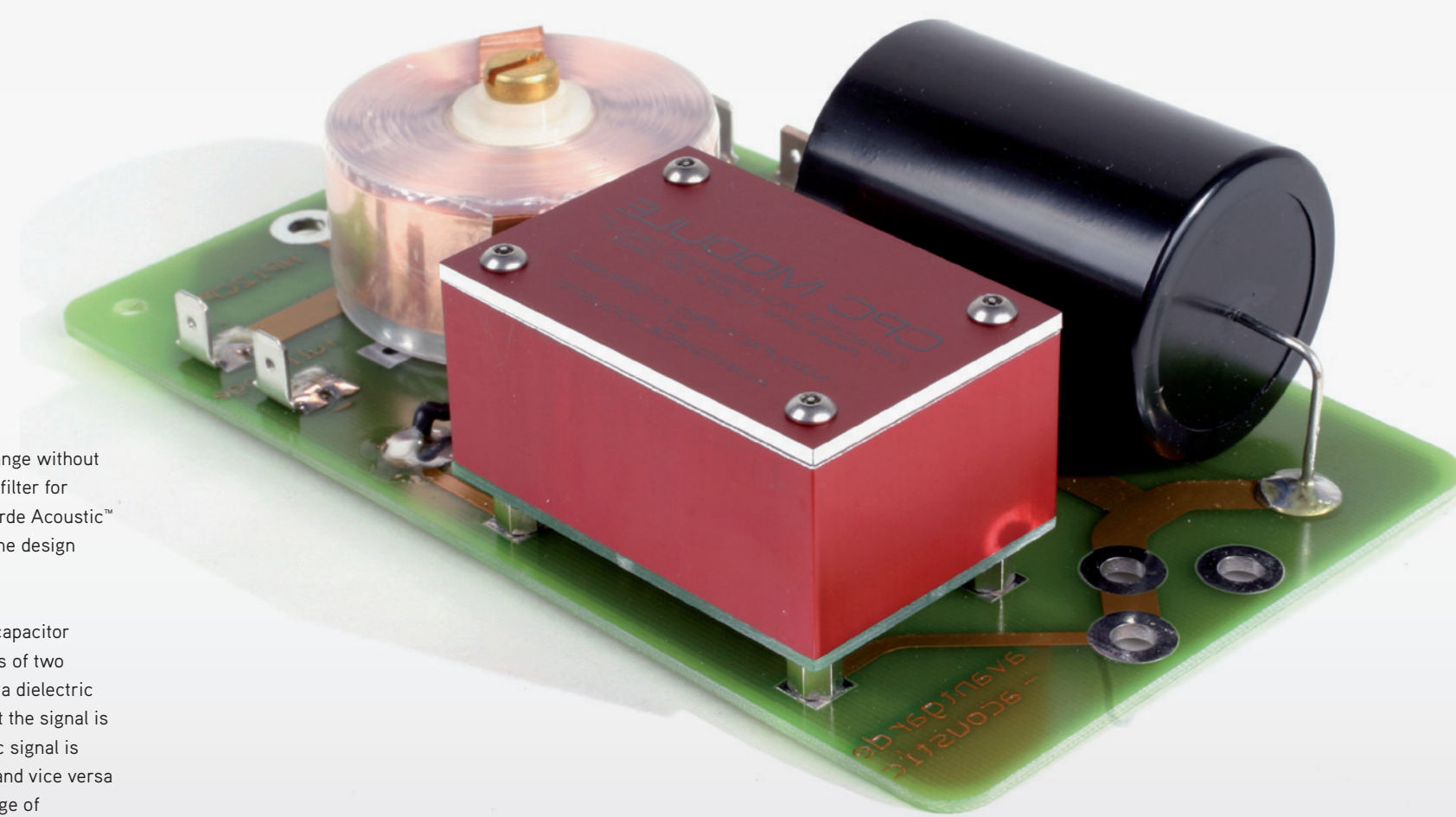
The key point is the damping factor. Damping factor is the technical term for the ability of an amplifier to control the movement of the



membrane. E.g. simply speaking the force the amplifier applies to the voice coil to follow exactly the musical signal. According to common knowledge the damping factor is determined by the quotient of load impedance (driver) and output impedance of the amplifier. An amplifier with an output impedance of 0,04 ohm will thus theoretically have a damping factor of 100 when connected to an 4 ohm speaker. But this is a purely theoretical figure! In real life the signal has to pass a speaker cable and the passive crossover components till it reaches the voice coil. Using a typical 5m long speaker cable with an W-resistance of 0,36 ohm and a resistance of the crossover coil of 0,6 ohm, the effective real damping factor will decrease to a value of only 4! Connecting the same amplifier/cable configuration to the Duo omega will result in a real damping factor of 18, which gives 4,5 times more control and precision! E.g. the control of the amp will increase by 450% and at the same time will reduce the negative effects of long speaker cables by 80%.

As a result the Omega drivers have more authority, less distortions and an excellent detailed response characteristics.

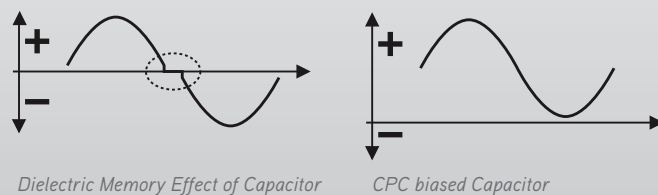




THE CPC CROSSOVER

Although the Omega midrange driver is running full range without any crossover, the Omega tweeter requires a passive filter for thermal protection. As with all their products Avantgarde Acoustic™ was taking a very puristic approach. Less is more is the design philosophy.

A potential limitation of any passive crossover is the capacitor required to filter low frequencies. A capacitor consists of two plates or conductors. As both plates are separated by a dielectric or insulator, the conductors have no direct contact but the signal is passed through a dielectric field. Every time the music signal is changing from the positive to the negative half-wave and vice versa the dielectric field gets inverted. The permanent change of direction of the field in a capacitor - a phenomenon called "dielectric memory effect" - causes distortions which get worse the closer the signal passes through the zero point and are at a max just when the electric field changes its direction.



To avoid these distortions Avantgarde Acoustic™ uses with the "Capacitor Polarisation Circuit" an elaborate approach. Different to conventional capacitors the CPC-capacitor has multiple conductor-foils connected with a special electric layout shown in the attached graphics. The CPC module up-converts the income music signal to the required voltage to bias the conductors. Only the inner conductor is biased with DC. In the CPC module a voltage cascade through a network of diodes increases the voltage of the music signal to a multiple. This high direct current is then fed into the inner conductor. Furthermore is the diode circuit electrically

decoupled through a very high impedance transformer to avoid any backlash to the music signal. Already a view moments after turning on the music the CPC module has generated the required direct current to bias the capacitor. As the CPC diode cascade can build-up voltages by far beyond allowable levels, Avantgarde Acoustic™ has included a protective circuit to avoid overloading the capacitor.

The CPC biased capacitor has less distortions and can more precisely handle incremental signal variations.

DUO GROSSO DRIVERS

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THE MIDRANGE HORN DRIVER

The utmost care at choosing the drivers is the key to successfully transforming the theoretical advantages of the horn technology into an outstanding High End speaker. As mostly people focus on treble and bass response, Avantgarde Acoustic™ considers the midrange as the “heart” of each speaker system.

The Duo Grosso offers the same technology as Avantgarde’s flagship model Trio. It features a sophisticated M2 omega driver with high impedance technology loading a 670 mm spherical midrange.

The M2 omega is a 170 mm (7 inch) midrange driver with a 100 mm (4 inch) dome especially developed for the Duo and optimized for a large, linear excursion.

Avantgarde Acoustic™ managed to increase the effective magnetic flow in the air-gap of the driver by eliminating the usual copper inlay of the pole-piece. The roll-off at higher frequencies caused by the higher inductivity of the voice coil and a specially designed dome was set to the exact crossover point of the tweeter.

Furthermore Avantgarde Acoustic™ added a powerful Alnico magnet to this new M2 omega development. This precious magnet material generates a powerful magnetic field which homogeneously controls the movement of the voice coil.



The M2 omega has a very low cut-off frequency with seamless and crossover-less integration to the subwoofer. The design of the dome ensures a phase-neutral radiation of the sound waves into the midrange horn SH6704 and wide bandwidth of the extended midrange down to 170 Hz.

The kevlar midrange cone of the M2 omega is coated with trillions of tiny microfibrils generating a “Velours Damping Effect”. This incrementally small fur of the VDE technology cone effectively reduces partial resonances of the cone itself. Furthermore the microscopic fibres of the VDE technology help to effectively absorb high frequency distortions.

The Avantgarde Acoustic™ proprietary CDC system features a controlled roll-off at 2,000 Hz, and allows us to completely eliminate all passive crossover components in the signal path. This way the M2 omega gets the pure and non-distorted full-range signal directly from the amplifier! The nominal impedance of the M2 omega is a staggering 18 ohm and the sensitivity is 107 dB (1Watt/1m).

DUO GROSSO DRIVERS

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THE TWEETER HORN DRIVER

As the performance of the M2 omega midrange driver achieved Trio levels, Avantgarde Acoustic™ was able to use their flagship tweeter H3 omega for the new Duo Grosso system.

This exceptional driver combines the smoothness of an electrostatic driver and the power of a strong 1 inch horn driver. The H3 omega features a voice coil former made of Kapton with a minimised air gap, a special geometrical shape of the 17 ohm voice coil and an ultra light diaphragm.

The mere force of the 3 kg (6.5 lb) magnet on the voice coil guarantees 100% detail and precision even at low volume levels, and provides the Duo Omega with compression-free sound reproduction at extreme sound pressure levels.

With the spherical horn SH1801 the H3 omega offers an ultra wide bandwidth down to 900 Hz. Due to the passive crossover point being at 2,000 Hz Avantgarde Acoustic™ achieves a seamless smooth sound with incredible dynamic headroom.



DUO GROSSO DRIVERS

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THE SUBWOOFER DRIVER

The Duo Grosso is supplied with the active subwoofer SUB231, which is driven by two powerful 30 cm (12 inch) 600 watts (RMS) long-excursion drivers.

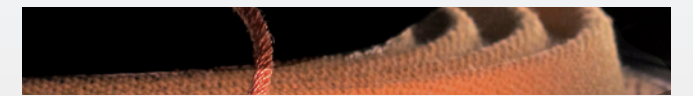
The 12-ND600 is the result of an extensive and intense research of every single constituent part of an electro-dynamic loudspeaker, rethinking the basics and taking care of every detail, to withstand the extreme power conditions it has been designed to work in. All this investigation is reflected in the new and innovative technologies developed by Avantgarde Acoustic™ and applied in this new transducer.

The 12-ND600 features a 4 inch voice coil with laminated former combining two different advanced technology materials to enhance the voice coil life and to ensure an optimum force transmission. A forced convection mechanism results in low power compression. This design has been optimized with the extensive use of miniature

high temperature probes and real-time temperature acquisition systems, together with a thermographic camera to obtain real images of the heat distribution in the voice coil and forced convection effects.

The Double Conex Spider with its diaphragm surround and the double spider have been carefully designed with the assistance of Finite Element calculations in order to match coherently, enabling long and controlled cone displacements.

The 12-ND600 long excursion drive unit is characterized by its extremely high efficiency and utmost power handling capabilities. The extended controlled excursion is +/- 8 mm. Exclusive neodym magnets with a special under-pole magnet topology are used to maximize the flux density in the air gap and to eliminate energy leakage of the magnetic field. The powerful neodym magnet with a very strong BL power factor and the very stiff but light membrane will ensure highest resolution and authority even with complex signals at extreme sound pressure levels.



DUO GROSSO AMPLIFIER

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THE SUBWOOFER AMPLIFIER

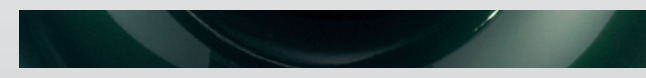
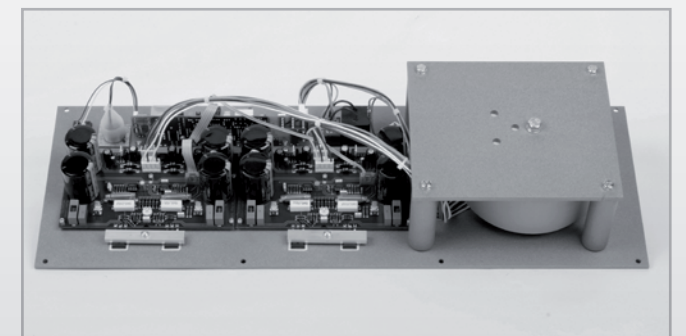
The integrated active HPA 106 electronics consists of two powerful 250 watt amplifiers and an active frequency crossover. A forceful 540VA toroidal transformer and an energy reservoir of 120.000 μ F providing ample energy reserves and dynamic headroom.

In order to achieve full control to overcome the inertia of the driver mass, the HPA 106 is equipped with Avantgarde's genuine adaptive motional feedback circuitry. These ultrafast analogue electronics compensate for signal deviations induced by the circuit and drivers in real-time. As a result the Sub 231 achieves an astonishingly flat frequency response down to 18 Hz! Furthermore, even at very low listening levels – when the music signal is too weak to overcome the inertia of the bass driver mass – the adaptive motional feedback circuitry will seamlessly increase its power output for a full and rich bass response.

The active crossover allows the adjustment of a number of parameters thus ensuring a very easy and fast installation of the system even in acoustically critical situations. A 3-position subsonic switch, variable settings for the input sensitivity and crossover frequencies make the Sub 231 extremely versatile. The Sub 231 can be remotely switched on/off using the 12V trigger signal.

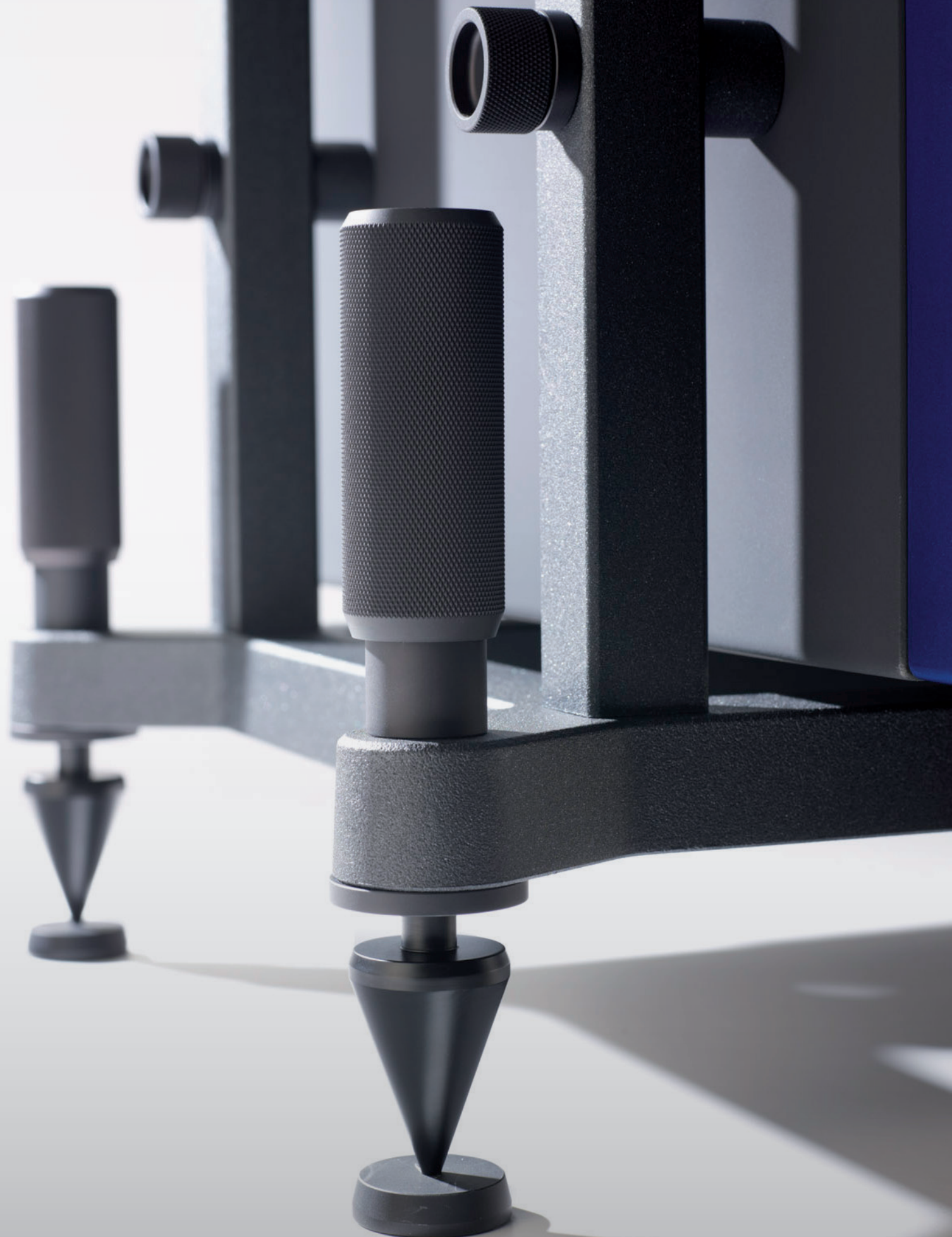
The Sub 231 is driven via high power speaker terminals for direct connection to integrated amps, power amplifiers or receivers or alternatively via XLR terminals. The signal take-off is not only at high impedance, but is also balanced and transformer coupled. This floats the subwoofer ground, avoiding hum loops and eases connection to balanced and bridged amplifier designs.

The enclosure of the Sub 231 is constructed from 1.2 inch MDF (28 mm). Designed with a centrally located reinforcing stabilizer, the box construction is very rigid, avoiding resonances.



DUO GROSSO CONSTRUCTION

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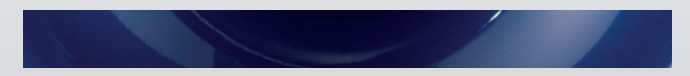
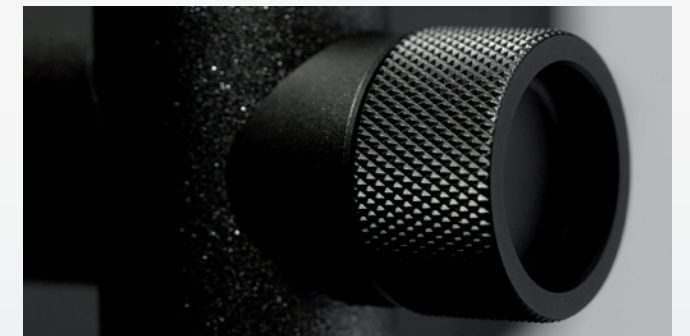
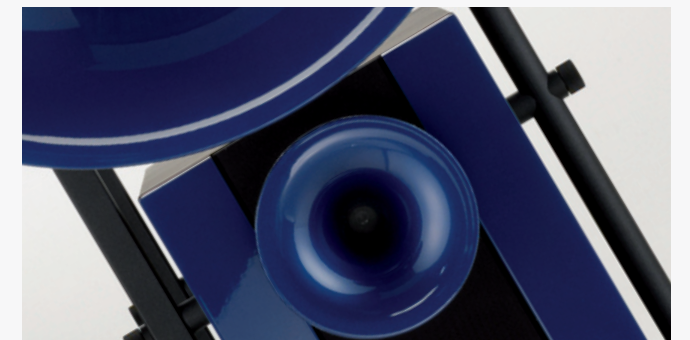
MECHANICAL CONSTRUCTION

The midrange horn is mounted into a circular housing cylinder with a solid cast aluminium back cover on its back end. The tweeter is located in a sealed compartment in the upper part of the subwoofer enclosure.

The entire loudspeaker system is placed on a solid cast aluminium base frame. The spike assembly of the base frame – featuring solid 55 mm spikes and massive adjusting handles – are easily accessible from the top. Newly designed aluminium spacers with knurled head screws, connecting the frame rails with midrange housing cylinder and subwoofer.



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DUO GROSSO COLORS

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EXAMPLES



COLORS FOR THE HORNS AND PANELS

Stealth Nocturne Black <small>(panel only)</small>	Turmaline Vivid Black
Stealth Nocturne Grey	Shiny Citrine Orange ¹⁾
Diamond Crystal Silver	Ruby Brilliant Red
Akoya Pearl White	Sapphire Burma Blue
Light Amber Bronze	Light Topas Blue
Saona Beach Cream	Smaragd Pearl Green

A selection of ten standard colors is available for the horns. This includes eight metallic lacquer finishes, the uni-color „Saona Beach Cream“ finish and the moderne „Stealth Nocturne Grey“ finish. The special „Shiny Citrine Orange“ multi-layer coating is available as an option.

The front panels can be ordered in any of the above horn colors, plus the elegant „Stealth Nocturne Black“ finish. Four different wooden veneers are available. As standard with matte surface and optional in shiny piano lacquer finish.

On this page you will only find a small selection of thumbnails of the color combinations possible. For a better overview you should visit our website www.avantgarde-acoustic.com.

Here you can download a special *Color & Finishes.pdf* for each product. In this document you can find a nice overview of all front-panel combinations available for each of the horn colors. This will quickly guide you to your favorite horn-panel combinations.

COLOR CONFIGURATOR

On our website www.avantgarde-acoustic.com you will find as well a comprehensive color selection tool. Just go to the respective product within the *HORN*-section. Under *DESIGN* you can select the color of the horn and the color and veneer of the front panel. If you have found your favorite color combination, simply click on the download-button for a high resolution picture (6 mb).

WOODEN VENEERS FOR THE PANELS

Flower Birdseye Maple ²⁾	Tianshan Mystic Walnut ²⁾
Hanami Lucent Cherrywood ²⁾	Jacaranda Aura Rosewood ²⁾

¹⁾ optional customized color
²⁾ optional available in high gloss piano lacquer finish

DUO GROSSO | REVIEWS

The big among the big



TEST REVIEWS*

"The DUO GROSSO showed its awesome musical authority. This said, I feel that the Avantgarde system has a sonic signature, not intrinsically organic, but delightfully musical, the sonic signature signed by an artist who understands tonal harmony. The Avantgarde system can be considered art — audio art, which transcends technological wonders and offers some of the best entertainment I've run across in years." (INNER EAR, E. Fisher, CANADA)



"Avantgarde DUO GROSSO: your voice is beautiful. This kind of succinct conclusion arises spontaneously when enjoying the sound of this spherical horn system. You do not need to listen for long. This favourable impression will get to you straight away and you simply cannot hide." (AUDIO ART, Jack Liu, TAIWAN)



"For the amplifier on duty, the 18-ohm impedance of the DUO OMEGA appears to remove the load altogether. Combine that with its extreme high sensitivity and the amplifier might think it's just idling while creating the most beautiful music for us. We now have more real music in the house which is effortless transmitted and completely free of constraints from the loudspeakers. The difference between the DUO and the DUO OMEGA is more than a small improvement. It is a major step towards TRIO Omega level." (6MOONS, Dr. Henk & Dr. Maja, HOLLAND)



"To round all this up, the Avantgarde hornspeaker is amazing. Even after hearing the DUOs it is like going from the Ferrari F40 to the Ferrari Enzo. For those looking for the speed of electrostatic panel loudspeakers yet with the easy of drive and dynamics of horns, the DUOs should make your very short list of must audition. Of course in the end what really matters is that you ... Enjoy the Music." (ENJOY THE MUSIC, Steve Rochlin, USA)



"The inexhaustible dynamic reserves of the DUO show the incredible strength of this set of horn satellite and active subwoofer. Drums sound totally unplugged. No peaks or fortissimo really challenge this speaker. Piano concerts are reproduced with original dynamics. No compression effect deteriorate the thrilling experience of a life orchestra." (STEREO, U. Rattai, GERMANY)



"The DUO captivated me with its musicality and unique qualities. In addition to the effortless and seemingly unlimited dynamics, the DUO system had an intimate quality that made it seem as though the musicians were communicating directly with me. It did what high-performance audio systems are supposed to do: involve the listener in the music. It went beyond next level of musical communication." (THE ABSOLUTE SOUND, R. Harley, USA)



TEST REVIEWS*

"Sonic dynamite. These are not normal speaker systems. Not even High End speakers. These are speakers in the Formula 1 class. They are incredible fast, dynamic, analytic, resolving, dimensional. I could easily continue listening more extraordinary accomplishments. But they all would anyway culminate in the one and only point which really matters - the fun listening to music. For me the DUO GROSSO is an absolutely dream system. Period." (AUDIO VIDEO, F. Kulpa, POLEN)



"Looking at the beautiful metallic paint finish of the horn, I was deluded myself as if it is not simply a loudspeaker, but a big painting, a piece of sculpture, or a huge flower. If you bring DUO GROSSO in your living room, you may not need to have any other pieces of art." (AUDIO, K. Nam, KOREA)



"Only few highly analytical speakers are capable of revealing the quality of a recording in such a merciless manner. High hats and cymbals of the drums of the Treya quartett on the track "Fauré Pavane" were impressive in size. Enthralling as well Keith Jarretts piano of his "Cologne Concert" live recording: the DUO GROSSO managed to reproduce the strain of the artist and the stroke of the keys - sometimes silky smooth, sometimes forced - so authentic and realistic like no others." (AUDIO VISION, U. Rattai, GERMANY)



"With the DUO OMEGA the pins and needles come at once. Especially timbals and trumpets have the weight and authenticity of the real thing. What is truly decisive? We believe its the incredible speed of the ultra-sensitive horns. This way even fine details of the recording have no chance to escape. One thing is for sure: where other speakers at the most reproduce hot air, the DUO OMEGA excels with drive, impact and structure. It's worth every penny." (HIFI TUNES, U. Heckers, GERMANY)



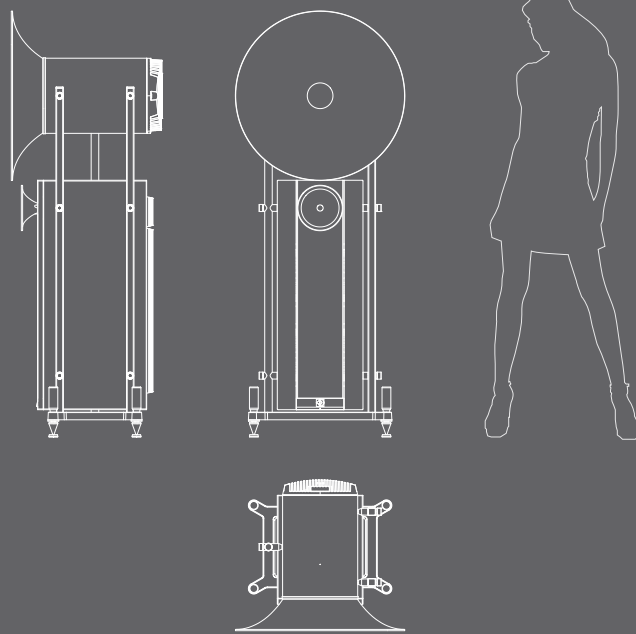
"The DUO OMEGA gives a whole new life to spherical horn architecture. Ning Kam's violin is precise and at the same time beautifully condensed. Just on the spot. Yet the energy of the treble penetrates with power like in reality. The proper tuning of these special tonal characteristics is what makes the DUO OMEGA so very special. The listening is more relaxed and at the same time envolving, like having the centre front row seat in a concert hall." (AUDIO CITE, Zhong-Hao Tao, TAIWAN)



"My feet tap all the time. Tonal quality is unbelievably better. The tone of string and brass instruments is just so rich, pure and believable. Drums have real decay and timbre. Electronic instruments, though clearly electronic, now sound extended without being terribly harsh. In a nutshell: the overall presentation is smoother, richer and fuller with more palpability, detail and dynamism thrown in to boot. I cannot find a downside. The DUO OMEGA is thoroughly recommended." AUDIO ASYLUM, P. Earnshaw, USA)



*) This is just a small selection of reviews. More quotes from international reviews for each product, can be downloaded on our website.



SYSTEM DATA

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

HORN

Horn type	
Horn material	
Horn finish	
Dispersion type	
Horn mouth area	low mid range mid range high range
Horn mouth diameter	low mid range mid range high range
Horn length	low mid range mid range high range

HORN DRIVERS

Diameter	low mid range mid range high range
Magnet material	low mid range mid range high range

SUBWOOFER

Power Output (RMS)	
Power capacitance	
Toroidal transformer	
REAL TIME feedback control	
ADRIC circuit (patent pend.)	
Active frequency crossover	
Subsonic filter, 3-positions	
Automatic 12V remote On/Off	
Smart Limiter	
SoftStart circuit	

Driver diameter	
Number of drivers per module	
Magnet material	

DIMENSIONS/WEIGHT

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

170 - 20.000 Hz
18 - 350 Hz
100 Watts
> 107 dB
170 / 2.000 Hz
18 Ohm
> 10 Watts
> 20 m ² / 200 ft ²
Yes
Yes

Spherical horn
ABS injection mold
polished
180 degree

n/a
0,353 m ² / 547 in ²
0,025 m ² / 39 in ²

n/a
670 mm / 26 in
180 mm / 7 in

n/a
370 mm / 15 in
85 mm / 3.3 in

n/a
170 mm / 7 in
25 mm / 1 in

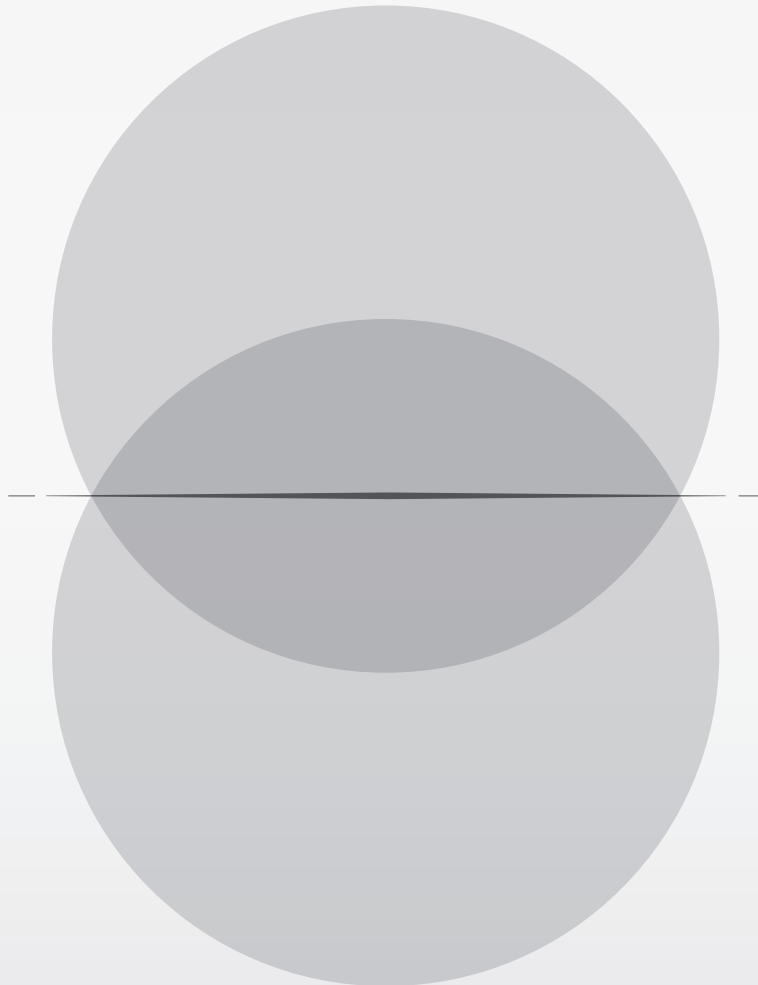
n/a
Alnico
Ferrite

2 x 250 Watts
120.000 µF
540 VA
Yes
n/a
variable 60 - 350 Hz
20 / 30 / 40 Hz
Yes
Yes
Yes

300 mm / 12 in
2
Neodym

670 mm / 26 in
600 mm / 24 in
1.695 mm / 67 in
88 kg / 194 lbs

purity



performance



avantgarde
ACOUSTIC

Avantgarde Acoustic GmbH
Nibelungenstraße 349
D-64686 Lautertal
Germany

Tel: +49.6254.306100
info@avantgarde-acoustic.de
www.avantgarde-acoustic.de