Welcome to the audiophile nirvana

TRIO FACT SHEET

avantgarde ACOUSTIC
THE SYSTEM

The Trio is a 3-way spherical horn satellite which – below 100 Hz – is complemented with active subwoofers. The transmission of the lower frequencies is handled by the 38 inch low-midrange horn. It is driven by the new 8 inch L3 omega driver with 16 ohm omega voice coil. The heart of the Trio – the midrange with coverage down to 600 Hz – is covered by the redesigned 27 ohm 2 inch M3 omega driver with the 23 inch midrange horn. The 16 ohm 1 inch tweeter H3 omega with its 7 inch horn blends in at 4 kHz.

The CDC technology allows for a minimalist concept with only 4 passive crossover components for the complete 3-way system. All capacitors have been completely redesigned and are configured with the patented CPC-technology. The sensitivity of the system is 109 dB.

In the low frequencies the Trio-series can be combined alternatively with the SUB231 subwoofer of the Duo Grosso, the ADRIC horn bass modules of the Duo Mezzo or, in its ultimate configuration, with from 2 up to 6 Basshorn modules.
Using a simple 1st order crossover for the low and mid frequency drivers 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 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. Thus the CDC system causes the lowrange and midrange drivers to only operate within their operational band and steeply fall off at the transition points. This way only one crossover component for the low and mid frequency drivers is required for seamless integration.

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?

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 nine and more components for a 3-way speaker, the Trio omega allows for a minimalist concept with only 4 passive crossover components for the complete 3-way system.

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 a 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.

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TRIO TECHNOLOGY

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THE CPC CROSSOVER

Unlike the Omega midrange driver of the Duo which is running full range without any crossover, the Trio omega tweeter and midrange drivers require passive filters 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 than 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 capacitors for the midrange and tweeter drivers of the Trio have less distortions and can more precisely handle incremental signal variations.
THE LOWRANGE HORN DRIVER

The specially optimized lowrange driver - L3 omega - is characterized by its extremely high efficiency of 109 dB (1W/1m) and utmost power handling capabilities.

A huge ferrite magnet, a 16 ohm voice coil and a very stiff, mass reduced membrane will ensure highest resolution and authority even with complex signals at extreme sound pressure levels.

Due to the Avantgarde Acoustic™ CDC system, the L3 omega works exclusively within its optimal frequency range and automatically rolls-off at the crossover frequencies. Thus only one crossover component is required for seamless integration with the midrange.

Connected to the impressive low-midrange horn SH9504 with 950 mm diameter (37 inch), the L3 omega offers a very neutral, dry and contoured sound reproduction across the entire mid-bass range.

The design of the dome ensures a phase-neutral radiation of the sound waves into the midrange horn SH9504 and wide bandwidth of the extended lowrange down to 100 Hz. This is approximately one octave lower than the response of the Duo midrange horn!

The kevlar midrange cone of the L3 omega is coated with trillions of tiny microfibres 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.

Vocals, instruments and complex signals are reproduced with speed and ease that will let you forget that you are listening to a recording.
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.

M3 omega, Avantgarde Acoustic™s midrange driver system, is the core of the Trio and especially designed for our 570 mm (22 inch) spherical horn SH5702. With its outstanding 27 ohm voice coil it amazes with its high sensitivity, very low distortion and an excellent linear response.

The exactly calculated CDC system allows us to reduce the passive crossover to only one component in the signal path, which is purely required for thermal protection.

Further characteristics of the Avantgarde Acoustic™ M3 omega system are the generously dimensioned strontium ferrite magnet structure which offers very high power handling and long linear excursion of the diaphragm.

The M3 omega has a very low cut–off frequency with seamingless and crossover–less integration to the lowrange and tweeter drivers. The design of the dome ensures a phase–neutral radiation of the sound waves into the midrange horn SH5702. The frequency bandwidth covers the range from 600 Hz to 4 KHz.

In contrast to the typical compression driver, the M3 omega uses a special dispersion characteristic with a very low compression ratio. The energy which is needed for the lower frequency range is provided by a strong and linear movement of the voice coil and not by a high compression ratio. It is this special design that makes a major contribution to the crystal clear transparency of the midrange frequencies even at extremely high power levels.
THE TWEETER HORN DRIVER

H3 omega is Avantgarde Acoustic’s statement for the Trio high frequency range. 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 ultralight diaphragm makes this special driver really outstanding.

Its massive 3 kg magnet with high magnetic flux density help produce enormous power and authority on the movement of the voice coil. Each signal is reproduced one-by-one, exactly to the original. The H3 omega convinces by its ability to produce absolute precision and detail of reproduced music of any kind.

Instead of a 2-way system with an additional super-tweeter, the Trio actually is a real 3-way satellite-system. The L3 omega midrange-bass driver works exclusively up to 600 Hz; thereby eliminating the critical „break-up“ of the cone as well as distortions that are typical of the upper frequency range of a cone driver.

The tweeter H3 omega starts working at 4 kHz and thus avoiding the problems of an excessive membrane movement. Thus, the H3 omega could be optimized for the high frequencies, instead of being misused for the midrange. The result is a harmonic system with 3 drivers working exclusively in their own well defined frequency range.
MECHANICAL CONSTRUCTION

Low-midrange, midrange and the tweeter horn are mounted into circular housing tubes with solid cast aluminium back covers on its back end. A straight three pillar steel-tube frame is used to support the horns. Newly designed aluminium spacers with knurled head screws, connecting the frame rails with the housing tubes of the three spherical horns.

The entire loudspeaker system is placed on a solid cast aluminium base frame. The spike assembly of the base frame – featuring solid 50 mm spikes and massive adjusting handles – are easily accessible from the top.

The horn alignment is a functional straight line and demonstrates visual integrity without any frills. Due to this compact design the Trio satellite only has a width of 950 mm (37 in). Alternatively to this mechanical design, the Trio Classico is available with a circular frame structure.
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.

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 combinations available.

On our website www.avantgarde-acoustic.com you will find as well a comprehensive color selection tool. Just go to the Trio product within the HORN–section. Under DESIGN you can select the color of the horn. If you have found your favorite color combination, simply click on the download–button for a high resolution picture (6 mb).
"Pure acoustics, only the absolute necessary electronics - and a realism in sound is achieved in the audiophile royal class only by the size of the TRIO horns. Back to the roots of the physics - again the membranes are incredibly small, move at lightning speed, dynamic and clean. The reward: the elaborate designed horn-transducers reproduce a sound like at a life concert. Ironically as well at very low volumes as the TRIO translates even the slightest soupcon of difference in sound pressure into full sound." (HANDELSBLATT, A. Postinett, GERMANY)

"If you have any affinity for horn speakers, you must admire and perhaps even lust for the TRIO. This is another speaker that makes a statement big as life. The TRIO made beautifully dynamic music, displaying the qualities I would look for in a big horn speaker without showing any traditional weaknesses. And remember not to close your eyes all the time while listening - the TRIO is very nice to look at. (SOUNDSTAGE, M. Frank, USA)

"Triumph of the TRIO! The most fascinating and sensible loudspeaker on the planet with better dynamic range and scaling than the TRIO. Considering that they rival their competition, they are something like a bargain. You cannot buy a loudspeaker that gives you more 'in the room' presence." (THE ABSOLUTE SOUND - Golden Ear Awards, J. Valin, USA)

"The TRIO with BASSHORN is - so to speak - resetting the clock. It reminds us that a speaker with high sensitivity and correctly executed horn technology is the only serious solution for people who like to have a real concert feeling at home. The speaker is beautiful, its curves irresistible and the sound is simply seductive. If you like the real thing, there is not much to think about ..." (PRESTIGE AUDIO, Pierre-Andre Viollet, FRANCE)

"These gorgeous flowers make music and music-makers sound astonishingly realistic. There is no loudspeaker on the planet with better dynamic range and scaling than the TRIO. Considering that they rival their competition, they are something like a bargain. You cannot buy a loudspeaker that gives you more 'in the room' presence." (THE ABSOLUTE SOUND - Golden Ear Awards, J. Valin, USA)

"The only criteria that really counts - capability to reproduce music - the TRIO is an offer without any competition in the top end. The TRIO controls the atmosphere and dominates the air in the room like no other speaker. The level of radiated energy is over-whelming. Thanks to the perfect clarity - cleanliness of the world's best low/mid combination - the TRIO mainlymediates the emotional impact of music. A "true" speaker for real music lovers." (HAUTE FIDELITE, O. Corton, FRANCE)

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"Horn culture par excellence: three spherical horns guarantee unlimited dynamics and a new level of fun. The natural tonal balance - which I absolutely did not expect - did the rest. Incredible: For the first time I did not hear any hornotypical colorations! On the contrary, the TRIO impressed with a lifelike and sheeny reproduction. The TRIO is without any doubt the most fascinating and sensible speaker system of our times." (STEREO, H. Barske, GERMANY)

"They are unquestionably the finest loudspeakers I have heard in my home and, without any doubt, one of the best loudspeaker systems in the whole blooming world ... and from an engineering standpoint the most remarkable. There is no sense of stepping up to the next dynamic level - no hard-ceilidged upper limit, no lost-in-the-murk lower limit, no mechanical rattching in between. Well-recorded music breathes forth with the naturalness of the real thing." (FI, J. Valin, USA)
communication design award

2010
## TECHNICAL SPECIFICATIONS

### SYSTEM DATA
- **Frequency response:** 100 – 20,000 Hz
- **Power capacity:** 150 Watts
- **Sensitivity (1 Watt / 1 m):** > 109 dB
- **Crossover frequencies:** 100 / 600 / 4,000 Hz
- **Nominal Impedance:** 19 Ohm
- **Recommended amplification:** 18dB
- **Recommended room size:** > 2 Watts / > 25 m² / > 250 ft²
- **Yes / Yes**

### HORN
- **Horn type:** Spherical horn
- **Horn material:** ABS injection mold
- **Horn finish:** polished
- **Dispersion type:** 180 degree
- **Horn mouth area:**
  - low mid range: 0.709 m² / 1099 in²
  - mid range: 0.255 m² / 395 in²
  - high range: 0.025 m² / 39 in²
- **Horn mouth diameter:**
  - low mid range: 950 mm / 37 in
  - mid range: 570 mm / 22 in
  - high range: 180 mm / 7 in
- **Horn length:**
  - low mid range: 950 mm / 37 in
  - mid range: 650 mm / 26 in
  - high range: 430 mm / 17 in

### HORN DRIVERS
- **Diameter:**
  - low mid range: 200 mm / 8 in
  - mid range: 50 mm / 2 in
  - high range: 25 mm / 1 in
- **Magnet material:**
  - low mid range: Ferrite
  - mid range: Strontium Ferrite
  - high range: Ferrite

### SUBWOOFER
- **Power Output (RMS):** n/a
- **Power capacitance:** n/a
- **Toroidal transformer:** n/a
- **REAL THD feedback control:** n/a
- **ADRC circuit (patent pend.):** n/a
- **Active frequency crossover:** n/a
- **Subsonic Filter, 3 positions:** n/a
- **Automatic, 62V ofven On/Off:** n/a
- **Smart Limiter:** n/a
- **SoftStart circuit:** n/a
- **Driver diameter:** n/a
- **Number of drivers per module:** n/a
- **Magnet material:** n/a

### DIMENSIONS/WEIGHT
- **Dimensions:**
  - width: 950 mm / 37 in
  - depth: 830 mm / 32 3/4 in
  - height (+/- 15 mm): 1,670 mm / 66 in
- **Weight:** 56 kg / 123 lbs