

CAR & HiFi

INTERNATIONAL

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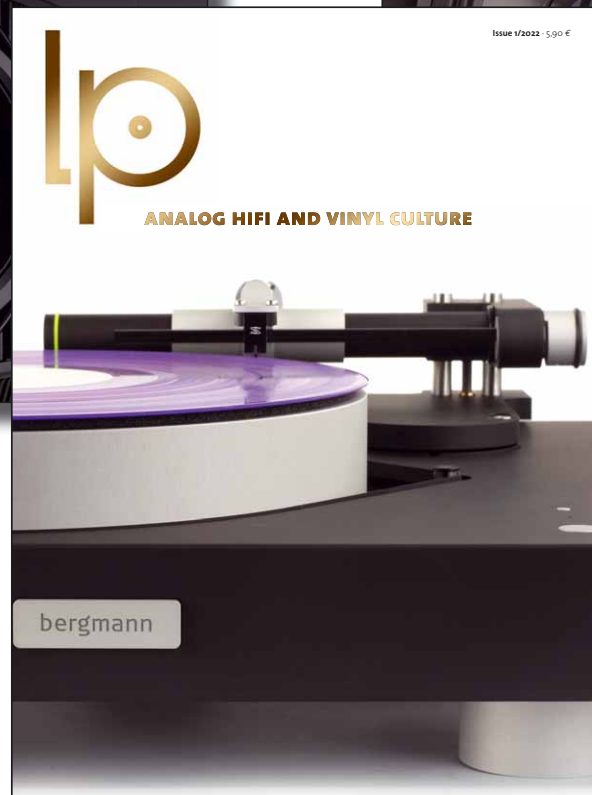
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- New universal speaker platform
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SPL
PRO SERIES

Sounds of summer

I am pleased to present the new issue of CAR&HIFI INTERNATIONAL to you. In the magazine you will again find a variety of tests from the head unit to the subwoofer and from bargain to high-end. For fans of exquisite sound, we have a fine

analog amplifier and high-quality loudspeakers with us. But the noise-makers also get their money's worth with our SPL subwoofers!



Elmar Michels
Editor-in-chief



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Visit www.carhifi-international.com for our free archive containing this issue and all older ones. All issues are also available on readly.com.

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Ground Zero GZ Ultra K-165/GZ Ultra T-30

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CAR & HiFi 5/22

Price/performance: appropriate

„Noble Loudspeakers of World Class Standard“



IN-CAR SPEAKER SYSTEM

Ground Zero GZ ULTRA T-30 + GZ ULTRA K-165



HELIX
COMPOSE
INNOVATIVE SPEAKER PLATFORM

Car speakers completely rethought *p. 14*



Highend six-channel amplifier *p. 36*



Everything but big *p. 26*



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▶ DSP amplifier

New from Audio System is the CO-40.5 DSP-BT, a small amplifier with a signal processor. The CO is only 123 x 80 x 45 millimeters in size and thus easily fits into the dashboard. Five amplifier channels deliver 40 watts into 4 ohms and 60 watts into 2 ohms. The DSP is controlled via the app, which provides all the functions for better sound. In addition, two processed outputs are available.

• www.en.audio-system.de



▶ P60 limited edition

In honor of the Porsche 911, Focal is launching a 911 limited edition Focal Inside System for the latest 911, Taycan, Cayenne and Panamera. Genuine Utopia technology in the form of beryllium tweeters and W cones are exclusive to the P 60 Limited Edition. The set comes in a case lined with leather to match the 911, a hand-stamped aluminum plate with serial number is included.

• www.focal-inside.com

▶ New Zeus subwoofers

Under the Zeus ZXE, Hifonics is bringing two new woofer chassis to specialist dealers. The woofers are in the low price range and are available in 10 and 12 inch sizes. Large 64 millimeter voice coils and double-stitched surrounds ensure power and resilience. The woofers play both in closed cabinets and in bass-strong reflex boxes.

• www.audiodesign.de/english



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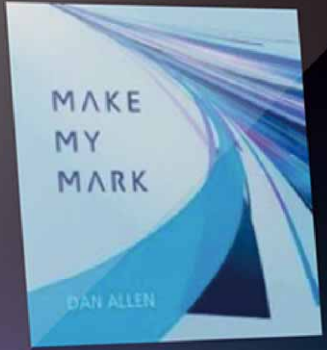
**Universal for all vehicles with DIN radio and
vehicle-specific for Fiat Ducato 7, 8, and Ford Transit**

Moniceiver Pioneer SPH-EVO950DAB in the Test

New navigaton concept

- ▶ With the new SPH-EVO950DAB, Pioneer offers a new navigation solution specifically designed for camper vans. Pioneer calls it Camper Navigation 2.0.





Marvellous
Dan Allen - Make My Mark

10/10 Mon **10:58**

 **23°C**
Your Location

 1  
John's phone
0*0216*... 
 10/10/...



Apple CarPlay

Android Auto

Digital Radio

Radio

Bluetooth Audio

Phone

Pioneer



Camper Navigation in the Ducato 7

First of all, the Pioneer SPH-EVO-950DAB is a state-of-the-art moniceiver that can provide comprehensive infotainment in many cars. The device body has standard DIN dimensions, so it can be installed in most vehicles without any problems. In addition, ready-to-install versions for the most common camper base vehicles are available with the SPH-EVO950DAB-C models. These camper packages are characterized not least by their particular navigation concept. More about this later. The large capacitive touchscreen

with a nine inches diagonal (23 cm) sits in front of the unit's DIN body. It can be positioned in all three dimensions during installation and tilted at angles of -15° to $+60^{\circ}$. Thus, finding an easily readable position in most vehicles without covering the car's operating elements is possible.

Apple CarPlay and Android Auto

Essential functions of the new Pioneer are Apple CarPlay and Android Auto for communication with the respective smartphone. They allow

the smartphone apps to be used on the SPH-EVO950DAB's large touchscreen. The connection can be made via the Pioneer's rear USB port, including the charging function, or wirelessly via WiFi. Both interfaces are specially programmed by Apple and Alphabet for use in the car while driving and support the respective voice control.

Navigation 2.0

The apps supported by CarPlay and Android Auto also include many navigation apps for cell phones, in-



Camper Navigation in the Ducato 8



Camper Navigation in the Transit

cluding the preinstalled and free Apple or Google Maps. In the SPH-EVO950DAB-C version for camper vans, Pioneer offers a very special solution. The package includes a QR or unlock code for the Pioneer Navigation App, which is based on Sygic in the camper version. This means that vehicle parameters of the motor home, such as height, width, weight, and others, can be entered and taken into account when planning the route and guiding to the destination. The Europe-wide map data can be used online or downloaded before the trip via home WiFi. If the route or destination needs to be changed on the way, the corresponding map data may have to be reloaded. If you have a suitable data plan, this can be done via the mobile network - roaming charges do not apply within the EU. In addition, many campsites now also offer WiFi access. Speaking of campsites - the navigation package includes access to the Promobil database, which is

well-known among campers, with detailed information on more than 20,000 campsites. To ensure reliable GPS reception even in alcove motorhomes or with metal-coated windows, the Pioneer SPH-EVO950DAB comes with an external GPS antenna.

Head-up display

In addition to integration into the CAN bus, the SPH-EVO950DAB offers two camera inputs with one-touch switching and functionality such as auxiliary lines for parking. The highlight is the optional SDA-

HUD100 head-up display, which the Camper Navi can work with to make driving and navigating safer and more convenient. In addition, the SPH-EVO950DAB-C is currently available in three versions: Basic Kit, HUD Ready, and Complete, including the head-up display. Presently available are ready-to-install versions for Fiat Ducato 7 and 8, including HUD, and for the Ford Transit. A head-up display for the Ford Transit and a plug-and-play version of the SPH-EVO950DAB for the Mercedes Sprinter are in preparation.



The SPH-EVO950DAB-C comes with a 1-DIN-Body and a 9" touchscreen



The head-up display is available as an optional accessory

Full media equipment

In addition to using CarPlay and Android Auto, the Pioneer also offers the option of mirroring smartphone content via WeLink. Bluetooth for phone calls and audio streaming is also available. And, of course, radio listeners also get their money's worth. FM and digital radio tuners with automatic switching are on board.

To guarantee optimal sound in all vehicles, the SPH-EVO950DAB has an integrated digital signal processor that offers, among other things, time alignment, high and low pass filters, and a 13-band equalizer.

User interface

The newly designed user interface is both pretty and neat. The individual widgets can be configured as needed. The large 9-inch display allows for a generous split-screen display, with plenty of room for navigation

and audio source at the same time, for example. The four softkeys on the left edge are practical and provide quick access to volume, home screen, and voice control. Finally, Pioneer's CarAVAssist app should be mentioned, which allows convenient remote device settings from the smartphone. It can also be used for wireless software updates.

Specifications

Amplifier power (W)	15
Output voltage (V)	4
Output impedance (ohm)	612
USB	
THD+N (%)	0,009
SNR (A)	92
Tuner	
THD+N (%)	0,028
SNR (A)	64
Crosstalk (dB)	51
Monitor size (in)	9.0
Touchscreen	•
Dual Zone	-
Dolby Digital / Pro Logic decoder	-
param./graph. EQ bands	- / 13
Crossovers	HP / LP
Time alignment	•
Pre-outs	6
AV-in / AV-out	• / •
Digital out	-
Camera-in/nav-in	2 / -
USB front/rear	- / •
iPod control	•
Bluetooth HFP/A2DP	• / •
Misc.	CarPlay, Android Auto

Here fits the Pioneer SPH-EVO950DAB

In cars with double DIN slot.

For many other models, installation and connection adapters are available in the accessories.

Vehicle kits are available for Fiat Ducato 7 + 8 including HUD as well as for Ford Transit.

Conclusion

The Pioneer SPH-EVO950DAB is a first-class media center that delivers a great new navigation concept for camping vehicles in the SPH-EVO-950DAB-C version.

Dipl.-Phys. Guido Randerath

Pioneer SPH-EVO950DAB

Price	950 Euro
Contact	Pioneer
Internet	pioneer-car.eu

Rating

▶ Sound	20 %	★★★★★
Bass foundation	4 %	★★★★★
Neutrality	4 %	★★★★★
Transparency	4 %	★★★★★
Spatiality	4 %	★★★★★
Dynamics	4 %	★★★★★
▶ Image	20 %	★★★★★
Sharpness	3,3 %	★★★★★
Brightness	3,3 %	★★★★★
Contrast	3,3 %	★★★★★
Color reproduction	3,3 %	★★★★★
Viewing angle	3,3 %	★★★★★
Reflection	3,3 %	★★★★★
▶ Lab	15 %	★★★★★
• USB	7,5 %	★★★★★
Distortion	3,75 %	★★★★★
Signal to noise ratio	3,75 %	★★★★★
• Tuner	7,5 %	★★★★★
Frequency response	1,88 %	★★★★★
Crosstalk	1,88 %	★★★★★
Distortion	1,88 %	★★★★★
Signal to noise ratio	1,88 %	★★★★★
▶ Practice	40 %	★★★★★
Operation	10 %	★★★★★
Features	20 %	★★★★★
Reception test	10 %	★★★★★
Build quality	5 %	★★★★★

Top Class



CAR & HiFi

INTERNATIONAL

Germany 2/23

Price/performance: very good

„Excellent navigation concept for campers.“



COMPOSE

INNOVATIVE SPEAKER PLATFORM

i7 | i3 | **BASIC**

WWW.AUDIOTEC-FISCHER.COM/COMPOSE





COMPOSE

INNOVATIVE SPEAKER PLATFORM

Helix Compose; innovative loudspeaker platform with a new concept

Car speakers completely rethought

- ▶ Mit Compose präsentiert Helix nicht nur eine neue Lautsprecherserie oder gleich drei. Compose ist ein revolutionäres Konzept mit universellen Einzellautsprechern, die standardmäßig in den bekannten DIN Einbauplätzen installiert werden können, die aber in Verbindung mit Fahrzeugadaptern zu fahrzeugspezifischen Lautsprechern werden. So lässt sich eine Vielzahl von Fahrzeugen mit genau passenden, fahrzeugspezifischen Nachrüstlautsprechern ausstatten. Und das auf ganz individuelle Weise, je nach Anspruch und Geldbeutel. Mit dabei sind jetzt schon Audi, BMW, Ferrari, Fiat, Ford, Jaguar, Land Rover, Mercedes, Porsche, PSA, Skoda, Tesla, Volkswagen und Volvo.

SE FORM



An i3 series Kit with Flex-Mount midwoofer, titanium tweeter and crossover



the component composition of the entire system while standardizing the performance and sound experience. All this is unprecedented in the aftermarket.

Loudspeaker development in the vehicle

Normally, car speakers are developed in the lab, just like home speakers. There are goals such as parametrics, efficiency and bandwidth that the developer tries to meet as best as possible. But unlike home speakers, where the housing and transducer can be precisely defined, the conditions in a car are different. Both the environment behind the loudspeaker and the environment in front of the diaphragm differ greatly from home or laboratory conditions. In addition, the placement of the installation locations and the orientation of the loudspeakers vary from vehicle to vehicle, with effects on performance, frequency response, etc. Consequently, Audio-

With Compose, Helix is introducing not just one new loudspeaker series or three at once. Compose is a revolutionary concept with universal individual loudspeakers that can be installed in the familiar DIN installation locations as standard, but which become vehicle-specific loudspeakers when combined with vehicle adapters. In this way, a large number of vehicles can be equipped with flush, vehicle-specific retrofit loudspeakers. And this can be done in a completely individual way, depending on requirements and budget. Already included are Audi, BMW, Ferrari, Fiat, Ford, Jaguar, Land Rover, Mercedes, Porsche, PSA, Skoda, Tesla, Volkswagen and Volvo.

connection and installation, integration, interaction of the system components of loudspeakers and amplifiers has been redesigned. This makes it possible to individualize

Helix Compose differs in several ways from previously used retrofit loudspeakers; Compose is a novel concept, a completely new approach. The entire process of development, materials, production,

A Basic series Kit with standard (DIN) midwoofer, fabric dome tweeter and crossover





A Basic series coaxial, which are available with oval baskets



A i3 series coaxial to be installed with FlexMount

tec Fischer, the parent company of the Helix brand, decided to develop all Compose loudspeakers from the ground up in the car. It is therefore logical that the new Helix loudspeakers have their own parameters and have frequency responses tailored to the typical installation locations in the vehicle. After all, a smooth amplitude response under laboratory conditions does not need to be goal-oriented in a car.

Three classes for all vehicles

Vehicle-specific loudspeakers are the trend. Most car hi-fi installations use only the original installation locations, and these can sometimes be quite fancy. This makes it necessary for manufacturers to offer a

loudspeaker system for every type of vehicle, which leads to an enormous number of different systems on dealers' shelves. For this reason, most manufacturers offer only one retrofit system per vehicle, which is usually in the EUR 250 category.



Like the Basic and i3 tweeters, the i7 tweeter fits into the surface mount housing

The kits come with a surface mount housing (Basic series pictured)



Basic series 165 mm midwoofer



Basic series 20 mm tweeter

Those with higher sound requirements are left with nothing or have to put up with more complex individual installations with universal components. This is where Compose comes in, because Compose offers the entire system in three price and performance classes: Basic, i3 and i7, from affordable to high-end.

The loudspeakers

In order to implement the concept, Audiotec Fischer faced a mammoth task. Three and a half years of development time went into Compose.



Basic series 130 mm midwoofer



Basic series 100 mm midwoofer

FlexMount100: the 100 mm midrange can be installed with the standard (DIN) ring or with vehicle specific rings according to car brand and model



The result is currently 25 newly-developed individual loudspeakers and 29 products, without counting the accessories. To implement the concept, new basket dimensions or individual dimensions of all parts were necessary in some cases. Standard sizes are only available for the 130 mm drivers, which actually fit in all vehicles without adaptation. For all other loudspeakers, there was a completely new tooling; a tremendous effort considering the number of loudspeakers to be developed. But the effort was unavoidable, only with at least three classes, Basic, i3 and i7, did the concept to make all customers happy work: from the beginner in the first BMW series to the extremely demanding Porsche driver.

The approach to loudspeaker development was the reverse of the

usual. First, they looked at vehicles like BMW, Mercedes, Porsche, Tesla, Jeep, etc. and studied the installation conditions. This also revealed the maximum possible dimensions of the individual speakers. At the same time, the designs of the individual brackets and adapter rings could be developed. It goes without saying that they wanted the loudspeakers to be as large as possible with a maximum diaphragm area, so rings and speaker baskets were designed to be extremely thin-walled. This, in turn, required careful research into the materials, as they had to provide the necessary strength as well as a precise fit over a wide temperature range, all demanding tasks that give an idea of where the more than three years of development time went.



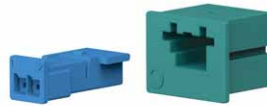
FlexConnect: The i3 and i7 midrange drivers can be fitted with vehicle specific inlays in order to connect to the original car harness



FlexMount20: the tweeters of any series can be fitted with vehicle specific rings e.g. for the mirror triangle

Finally, it was time to develop the loudspeakers themselves, of course with the maximum possible dimensions and installation depths adapted to the mounting system to fit all vehicles. And, of course, the development was carried out with the aim of maximum performance in the environment of the loudspeakers; in other words, in the vehicle. The first example is the i7 tweeter, whose diaphragm was not developed for an extended frequency response on axis, but for a constant frequency response for all listening angles. For this reason, but also for use in tight installation locations, the Compose tweeters use 20-millimeter diaphragms. In the case of the i7 tweeter, the difference to full size 25 domes is compensated with a coupling volume that makes it far superior to larger domes. Second come the i3 and i7 mid-range drivers, which are basically 10-centimeter drivers but have a larger diaphragm area than a normal 10. Stretching the basket dimensions and a thin surround make it possible. The amplitude frequency responses partly show a constant

FlexConnect:
Helix socket on the speaker, vehicle specific inlay and plug to the original car harness



increase in the mid-range, so that even in unfavorable installation locations enough mid-range reaches the ear. Drive and vibration unit are optimized for efficiency, so +4 dB should be achieved compared to the standard. The third example are the i3 and i7 200s. Here the basket size is a little

smaller than standard 20s; the reason is that standard baskets cannot be installed non-destructively in some vehicles. Thus, the Compose 200s are minimally smaller, but with the help of the appropriate installation rings, they fit quickly and cleanly in all vehicles. However, grilles and rings are included to turn the 200s into standard (DIN) baskets.



i7 series 200 mm midwoofer

Interaction with Helix and Match power amplifiers

To give the Compose loudspeakers not only good sound but also the best possible level capabilities, the developers have taken two measures. First, the speakers are designed for good efficiency. Because efficiency is always good, here you get sound pressure “for free”, i.e. higher levels than with speakers with lower efficiency at the same power. The characteristic sound pressure is the sound pressure at 1 watt (corresponds to 2 V for a 4-ohm loudspeaker) or at a certain reference voltage at a di-

stance of 1 m. Double the power corresponds to a level increase of 3 dB, double the voltage brings +6 dB. Conversely, a loudspeaker with a characteristic sound pressure advantage of 3 dB achieves the same sound pressure as a 3 dB quieter loudspeaker with twice the power. The second point is a way of impedance matching the speakers to the amplifiers. This is because the Compose speakers are certainly driven by the in-house Match and Helix DSP amplifiers. From the data sheets, we can see that Match amplifiers are normally 4-ohm stable at about 65 W of channel power. For the Helix, it is 75 W into 4 ohms and 120 W into 2 ohms. Now the point is that impedance classes are more or less arbitrary definitions. According to DIN, a 4-ohm loudspeaker is defined by the fact that its DC resistance must be at least 4 ohms - 20% = 3.2 ohms. This makes sense, so that the amplifier can “tolerate” the speaker,

i7 series 165 mm midwoofer



or drive it without damage. What has now been done with the Compose speakers is to push the minimum possible speaker impedances that Match and Helix amplifiers can drive. So, as an example, a Match UP 8DSP will be happy with a 3-ohm Compose speaker because its impedance to the tenth of an ohm meets the capabilities of the Texas Instruments power amp chips built into the amplifier. With a Helix V Twelve DSP (or on the 2-ohm stable subwoofer channels on Match), the play can also be played at 2 ohms. This works because at Audiotec Fischer they know

their own amplifiers inside out, so they can get everything out of the speakers. The point of the exercise is that the amplifiers deliver a tad more power to the low impedances than to a DIN 4-ohm speaker. In practice, this means that the Compose speakers perform better and deliver more sound pressure compared to other speakers on the market.

Integration

Helix has paid the utmost attention to integration and installation. The basis of the concept is the woofers, mid-range drivers and tweeters that can be used in all vehicles and can



i7 series 20 mm tweeter



i7 series 100 mm midrange



i7 series 130 mm midwoofer



i3 series 200 mm midwoofer

be converted into vehicle speakers using vehicle-specific installation adapters. But thought has also been given to the plug connections and wiring. The aim was to create a 100% vehicle-compatible system that does not require any modifications to the vehicle, either when installing the speakers or when connecting them. The rough tools remain in the mobile workshop and not a single cable is cut. This means that even users of leased vehicles or, for example, Porsche drivers with a manufacturer's warranty can sleep without worries. FlexMount at Compose refers to the installation adapters for the

speakers. Accordingly, under FlexMount20 you will find the installation rings for the 20 mm tweeters, which are available for all Basic, i3 and i7 series. The tweeter housings are extremely compact and are clipped into the vehicle mount, e.g., for the mirror triangle. The mounts in turn fit perfectly in place of the original tweeters.

FlexMount100 is the most comprehensive adapter system for the 100 mm i3 and i7 mid-range speakers used in the front doors or as a center on the dashboard, e.g., in Tesla, Ferrari, Porsche, Land Rover, Volvo and of course BMW and Mercedes.



i3 series 130 mm midwoofer

The adapter rings snap onto the mid-range speaker using a patented bayonet catch and then fit into the vehicle. But it is not just the mechanical connection that is ensured; the acoustic environment in the vehicle is also taken into account, in some cases with different foam seals at the front and rear to prevent acoustic short circuits and enable the best possible frequency response.

FlexMount165 and 200 refer to the large woofers of the i3 and i7 series. Here, the baskets of the woofers are shaped so that they, together with the universal adapter ring, make a standard basket and protective grilles are integrated at the same time. For the various vehicles, for example Volkswagen, there are the appropriate rings including seals. This ensures that the 200 fits perfectly, even where conventional eight-inchers do not normally fit. In addition, there are clever adapters for vehicles in which 16s are installed as standard, but thanks to Compose, the 200 also fits. For unusual and special requests, adapter rings can be created relatively easily and, above all, quickly with 3D printing. In the Helix development department, for example, original parts can be captured with a 3D scan and then created in 3D printing after CAD processing. Larger quantities are then produced by injection molding. In this way, the product range and the number of vehicles that can be retrofitted are constantly being expanded.

To allow the mid-range drivers to be connected to the vehicle-specific wiring harness, there is FlexConnect. For example, the 100 mm i3 and i7 mid-range drivers do not have specific terminals, but rather receptacles cast into the basket for specially developed inlays. Only these inlays contain the respective vehicle so-

ckets of the manufacturers. A Compose mid-range with a Mercedes inlay therefore accepts the original Mercedes connector, of course with reverse polarity protection. If the loudspeaker is not to be operated on the vehicle's own wiring harness, the cable supplied with the mid-range drivers can simply be used.

ProConnect is used for woofers. Here, the woofer baskets are equipped with a sturdy terminal with reverse polarity protection, which then docks onto the original wiring harness using a vehicle-specific adapter cable. In addition to the plug terminal, there are the old familiar contacts for flat plugs as on any other speaker.

And these are the theme of ComposeConnect, making the flat plug presentable in professional installations. Instead of fiddling around with the connecting wires with flat plugs and silicone socks as before, ComposeConnect offers a new connector for these flat plug pairs, which are in the drawer in every workshop for crimping and soldering. ComposeConnect are custom-tooled plastic housings into which standard flat plugs (both male and female) can be inserted, and the whole thing makes a neat, reverse polarity-protected connector.



i3 series 100 mm midrange

i3 series 165 mm midwoofer



As a result, we have a quick, clean, non-destructive installation, but also lots of error prevention thanks to reverse polarity speakers. The fact that the installation is always the same, regardless of the vehicle, allows for efficient installation times. And because the system can be combined with each other, it allows individual concepts such as a Basic system with i3 tweeters or an i7 system with i3 mid-range drivers. In the end, the sound also benefits. The installer can deliver 100% reproducible sound experiences, if only because of the defined installation position of the tweeters in the installation locations without emergency solutions with hot glue. And, last but not least, the time of full shelves with umpteen vehicle kits is over. Compose speakers are the same for all vehicles, only for the much cheaper adapter solutions is a variety needed.

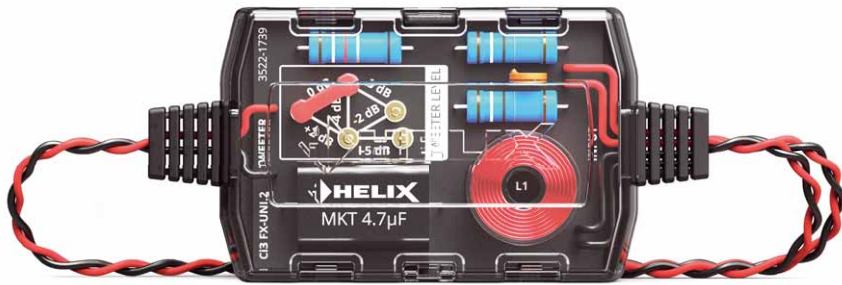
The Compose Lineup

As mentioned earlier, the Compose platform is divided into the Basic, i3 and i7 lines. This allows everyone to choose the right system depending on their budget or sound requirements.

The Basic forms the entry-level line of Compose. As the name suggests, it is quite simple, but the Basic speakers also have the features of the Compose platform. For example, they are developed in the vehicle and are characterized by high efficiency; the Basic series is also exactly impedance-matched with 3 ohms for the shot of extra level. The woofers come with standard sheet metal baskets and polypropylene cone, ferrite drives are a given. The basic tweeter is a 20 mm fabric dome, installed via FlexMount system. Kits are available exclusively in the form of composite systems with cable crossover and coaxial in all common round and oval sizes.

Compose i3 already serves upscale performance and sound requirements. i3 is installed via FlexMount if required and is available as kits or speaker pairs. The woofers and mid-range drivers use magnetically transparent plastic baskets filled with fiberglass spheres for reinforcement. The diaphragms are made of paper with a hollow sphere coating. For operation with Match and Helix DSP power amplifiers, the 165 and 200 mm woofers are available in 3- or 2-ohm versions. The i3 twee-

i3 series crossover



ter comes as a 20 mm dome tweeter with a titanium cone. The i3 crossover is part of the composition or also available as a pair separately, there are many setting options.

The top series i7 is manufactured in Germany and therefore bears the “Made in Germany” label. Clear technology borrowings from the high-end brand Brax are recognizable in the speakers, for example, in the neodymium push-pull drive of the 100 mm midrange driver. The i7 cone drivers feature glass-ball reinforced plastic baskets and coated diaphragms that are intricately manufactured with a pressed front and air-dried back. For operation with Match and Helix DSP power amplifiers, the 165 and 200 mm woofers will be available in 3- or 2-ohm versions, with the 3-ohm versions already available. The i7 tweeter

is a 20 mm high-end dome with a hand-laid silk dome. A large coupling volume helps it to achieve a low resonant frequency a performance that corresponds to larger tweeters. i7 is intended to be driven by a DSP power amplifier, so there are no kits available at the moment, but pairs of speakers and a matching i7 two-way passive crossover.

Conclusion

Helix Compose has the potential to revolutionize an aftermarket that is increasingly focused on vehicle-specific solutions. The concept is systematic and well thought out down to the smallest detail. The fact that there is no comparable system on the market shows that there is a lot of innovation in Compose. The combinability allows a variety of system concepts and combinations such as a Match M 5.4 DSP with Basic, a Match UP with i3 or a Helix V or even a Helix P Six DSP Ultimate with i7 promise extremely performant sound packages - and that for an unprecedented variety of vehicle types.

Elmar Michels



i3 series 20 mm tweeter

Helix Compose

Distribution	Audiotec Fischer, Germany
Hotline	+49-(0)-2972 9788 0
Internet	www.audiotec-fischer.com

Specifications

Universal loudspeaker platform

- 3 series Basic, i3 and i7
- Modular system, can be combined with each other
- Loudspeakers for standard (DIN) mounting and with vehicle specific adapters
- Currently available for Audi, BMW, Ferrari, Fiat, Ford, Jaguar, Land Rover, Mercedes, Porsche, PSA, Skoda, Tesla, Volkswagen, Volvo, universal DIN
- Retrofittable installation with vehicle specific installation adapters, plug-in wiring and vehicle plugs
- Loudspeaker developed inside the vehicle
- High efficiency and impedance matching to Match and Helix DSP amplifiers
- All speakers with 3 ohms, some 2 ohms

Compose Basic

- Exclusively as kits
- 2-way kits as 100, 130, 165 mm
- Coaxes as 87, 100, 130, 165 mm, 4x6, 5x7, 6x9 inches
- FlexMount for tweeters and woofers with standard (DIN) baskets
- All speakers 3 ohms

Compose i3

- As kits or pairs
- 2-way kits as 100, 130, 165 mm
- Coaxes as 100, 130, 165, 200 mm
- Pairs as tweeters, 100, 130, 165, 200 mm
- Woofers 165 and 200 mm as 3 ohms and 2 ohms
- Crossover i3
- FlexMount for all drivers (except 130s)

Compose i7

- Made in Germany
- Exclusively as pairs
- Pairs as tweeters, 100, 130, 165, 200 mm
- Woofers 165 and 200 mm as 3 ohms and 2 ohms
- Crossover i7
- FlexMount for all drivers (except 130s)

CAR & HiFi
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ZXM500.1 + ZXM500.4 – Mini amps from Phoenix Gold

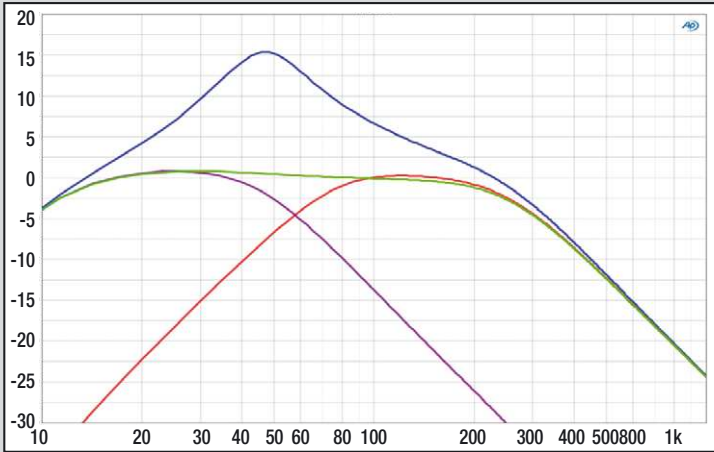
Everything but big

- ▶ With the new ZXM series, Phoenix Gold enters the market of small power amplifiers. And small means small in this case.

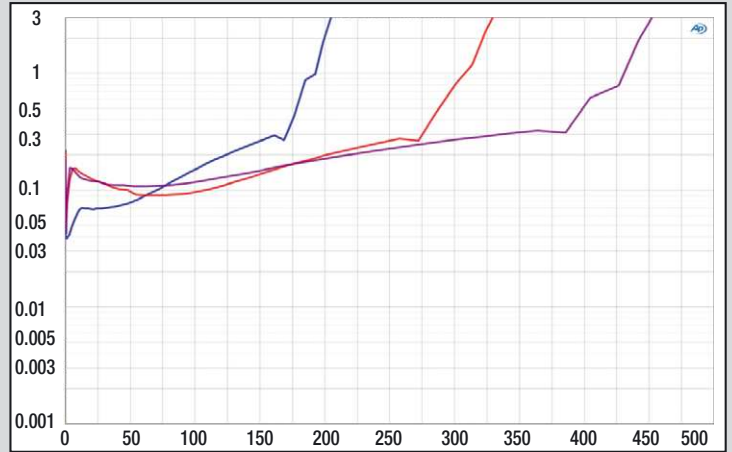
PHOENIX



CAR & HIFI Laboratory



The ZXM500.1 has everything you need on board. The bass boost achieves an (unnecessary) 15 dB boost. Low-pass and subsonic run smoothly



The ZXM500.1 delivers a whopping 430 W into 1 ohm. Even at low loads, distortion barely increases

Two new amplifiers comprise Phoenix Gold's ZXM series: the four-channel ZXM500.4 and the mono ZXM500.1. Both are the same size; the heatsinks measure just 142 x 84 x 35 millimeters and are smaller than a smartphone, except for

Many features on the mono amp: subsonic, boost and low pass



Two large coils can be seen on the PCB: the transformer for the power supply (center) and the standing coil for the class-D filter

the thickness. In the car, this naturally means that the amplifiers can be installed anywhere, e.g., in the radio slot. Both have a maximum power of 500 watts, distributed over four channels in the case of the ZXM500.4, making the amplifiers small but by no means weak; there is just as much power in them as in larger amplifiers. Both combined have enough power to supply a full-grown car hi-fi system: the front system, rear system, and a subwoofer box are no problem.

This is made possible by applying modern technologies, which help generate the required power highly efficiently and miniaturize the design simultaneously. Power amplification is based on the Class D principle, in which the power amplifier transistors are always switched through, and the music signal is modulated by pulse width modulation. Because the transistors are always fully closed or open, people often mistakenly speak of digital amplifiers, whereas the actual music is modulated as an analog signal. The final transistors sit on the ZXM500.4 as surface-mounted components on the circuit board, and two aluminum heat sinks provide a healthy temperature balance. The ZXM500.1 has to bring in heavier artillery because it handles higher currents. We find large heatsink-mounted MOSFETs here because the ZXM500.1 is one of the few mini amps that are 1-ohm-stable. When it comes to features, the mono power amplifier is not stingy. Besides a level remote control, it offers all features to control a subwoofer. A subsonic filter and a bass boost



Specifications

Channels	1
Power 4 ohms	193
Power 2 ohms	312
Power 1 ohms	428
Sensitivity max. mV	190
Sensitivity min. V	7,0
THD+N (<22 kHz) 5 W	0,034
THD+N (<22 kHz) Half Power	0,159
Signal-to-noise ratio dB(A)	91
Damping factor 20 Hz	80
Damping factor 40 Hz	109
Damping factor 60 Hz	128
Damping factor 80 Hz	132
Damping factor 100 Hz	136
Damping factor 120 Hz	140

Features

Low pass	50 – 250 Hz
High pass	–
Band pass	10 – 250 Hz
Bass boost	0 – 15 dB/45 Hz
Subsonic filter	10 – 50 Hz
Phase shift	–
High-level inputs	•
Automatic switch-on (Autosense)	•, DC
RCA output	–
Start/stop capable	• (7,7 V)
Dimensions (L x W x H in mm)	165 x 84 x 35
Others	remote control

Phoenix Gold ZXM500.1

Price	200 Euro
Contact	AAMP European Division, UK/Sweden
Internet	www.phoenixgold-eu.com

Rating

▶ Sound	40 %	★★★★★
Bass foundation	5 %	★★★★★
Bass pressure	5 %	★★★★★
Accuracy	5 %	★★★★★
Dynamics	5 %	★★★★★
▶ Lab	55 %	★★★★★
Power	40 %	★★★★★
Damping factor	5 %	★★★★★
Signal-to-noise ratio	5 %	★★★★★
Noise	5 %	★★★★★
▶ Practice	25 %	★★★★★
Features	15 %	★★★★★
Build quality electronics	5 %	★★★★★
Build quality mechanics	5 %	★★★★★

Upper class



CAR & HiFi

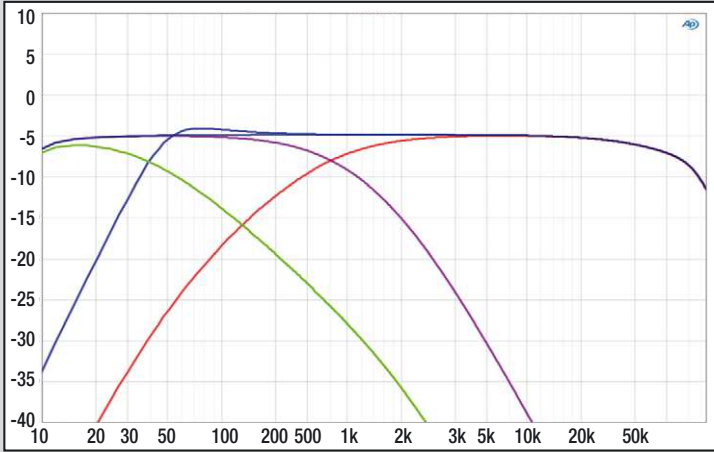
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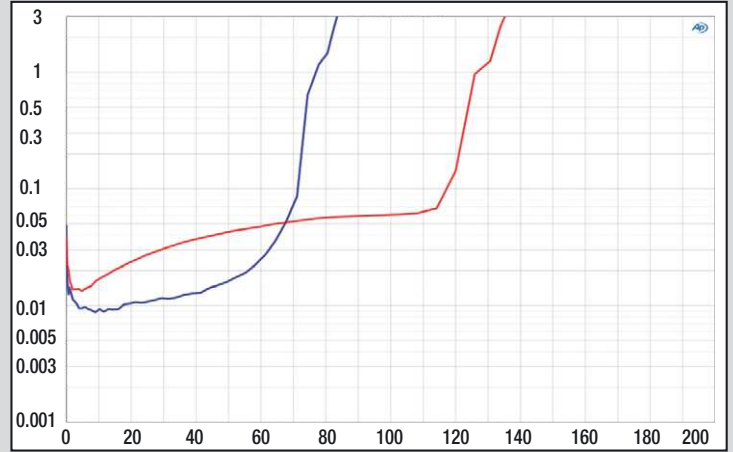
Price/performance: excellent

„The ZXM500.1 offers everything but size for little money“

CAR & HIFI Laboratory



The ZXM500.4 only offers essential equipment. The filters also change their slope – a flaw that should hardly be noticed in practice.



The ZXM 500.4 produces impressive power with little distortion, and larger amplifiers can learn something from this performance.

supplement the obligatory low-pass filter. The ZXM500.4 is less lavishly equipped. The user has the choice between high-pass or low-pass up to 400 Hz. This is enough for the sub/sat crossing of speaker systems and subwoofers.

The two channel pairs use the same sets of filters, each can be switched to low pass or high pass



The power amplification is located in the upper part of the PCB, the large components are the two heatsinks and the four class-D coils

Measurements and sound

Both amplifiers leave a consistently positive impression during the test run on our power bench. The ZXM500.4 is 2-ohm stable and produces a remarkable 75 watts per channel at 4 ohms. At 2 ohms, it is 129 watts, which, with its tiny dimensions, results in a power density of over one kilowatt per liter. Distortion is completely harmless at all times, and there is also very little noise. The ZXM500.1 achieves just under 200 watts at 4 ohms, enough to drive a small, lightweight subwoofer. A 2 Ohm subwoofer, which already receives over 300 watts of power, is in good hands. And the little one is even allowed to drive 1 Ohm; here, there are 428 watts to report. The mono amplifier also generates its power largely without distortion; the proven driver chip is obviously used correctly. Sound-wise, the ZXM500.1 surprises with much more power than one would expect. Even a 12-inch subwoofer can be pushed hard. Bass pressure and SPL are perfectly sufficient for everyday use. The ZXM500.4 is equally pleasing with its ability to control the speaker cones. Even with deep bass, it drives the component system to peak performance. Voices and instruments are pleasant, and the detail resolution is satisfactory. The four-channel amplifier performs really well for the size and price.

Conclusion

ZXM500.1 and ZXM500.4 can do everything you expect from good amplifiers, except they are much smaller than ordinary amps. This makes them practical problem solvers that don't cost a fortune either.

Elmar Michels



Phoenix Gold ZXM500.4

Price	250 Euro
Contact	AAMP European Division, UK/Sweden
Internet	www.phoenixgold-eu.com

Rating

▶ Sound	40 %	★★★★★
Bass	8 %	★★★★★
Neutrality	8 %	★★★★★
Transparency	8 %	★★★★★
Spatial imaging	8 %	★★★★★
Dynamics	8 %	★★★★★
▶ Lab	35 %	★★★★★
Power	20 %	★★★★★
Damping factor	5 %	★★★★★
Signal-to-noise ratio	5 %	★★★★★
Noise	5 %	★★★★★
▶ Practice	25 %	★★★★★
Features	15 %	★★★★★
Build quality electronics	5 %	★★★★★
Build quality mechanics	5 %	★★★★★

Specifications

Channels	4
Power 4 Ohm	75
Power 2 Ohm	129
Power 1 Ohm	0
Bridged Power 4 Ohm	258
Bridged Power 2 Ohm	0
Sensitivity max. mV	325
Sensitivity min. V	5,6
THD+N (<22 kHz) 5 W	0,010
THD+N (<22 kHz) Half Power	0,013
Signal-to-noise ratio dB(A)	89
Damping factor 20 Hz	71
Damping factor 80 Hz	70
Damping factor 400 Hz	71
Damping factor 1 kHz	69
Damping factor 8 kHz	17
Damping factor 16 kHz	5

Features

Low pass	40 – 400 Hz
High pass	40 – 400 Hz
Band pass	–
Bass boost	–
Subsonic filter	–
Phase shift	–
High-level inputs	•
Automatic switch-on (Autosense)	•, DC
RCA outputs	–
Start/stop capable	• (6,7 V)
Dimensions (L x W x H in mm)	165 x 84 x 35
Others	2 od 4 CH In

Upper Class



CAR & HiFi

INTERNATIONAL

Germany 2/23

Price/performance: very good

„The ZXM500.4 is tiny, inexpensive and powerful enough to drive any door speaker“

Audio System H-5000.1 D - 5 kilowatt
of power for subwoofers

Mono amplifier from Audio System

- ▶ Audio System breathes new life into the Helon series with the H-5000.1 D. We put the 5-kilowatt monster to the test.

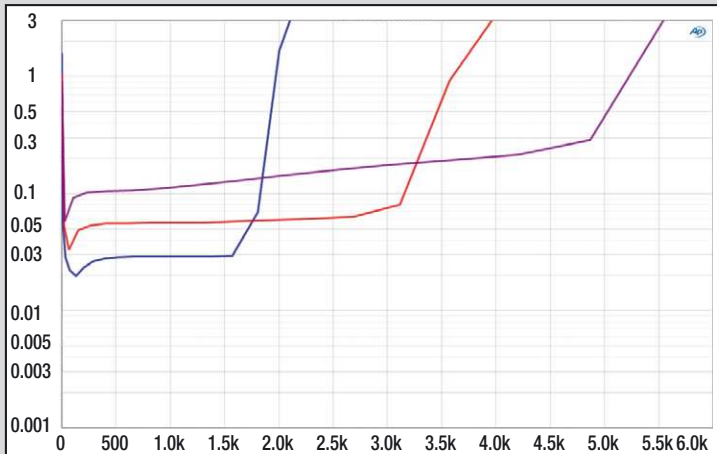




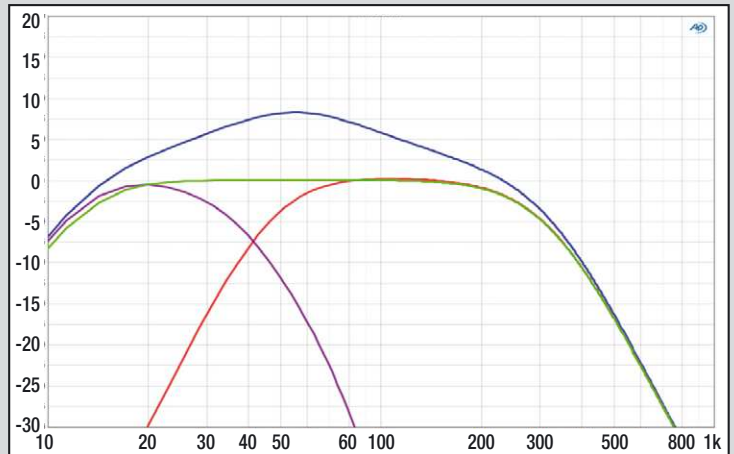
H SERIES
BY AUDIO SYSTEM

H-50001D

CAR & HIFI Laboratory



Immaculate power, and lots of it: at 1 ohm, the H-5000.1 D cracks the 5 kW mark. Distortions increase with decreasing load, but even at 1 ohm, the H-5000.1 D is better than many others



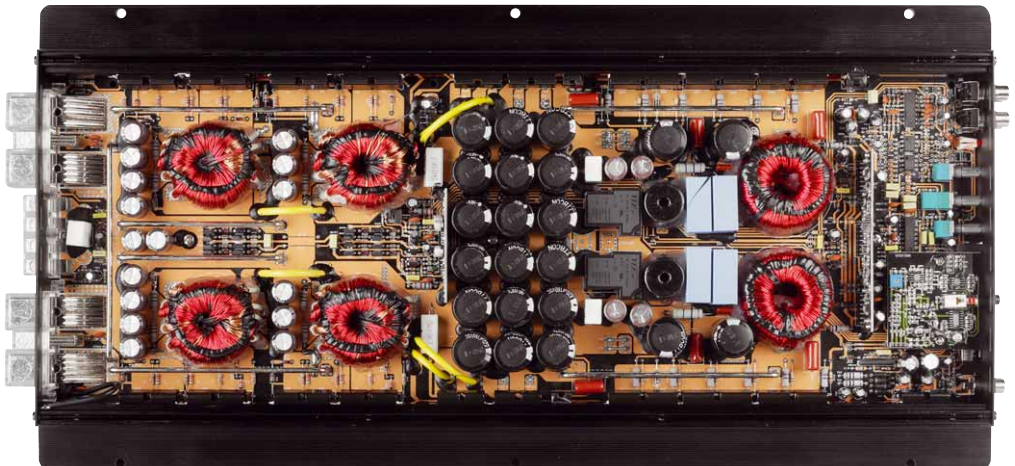
The H-5000.1 D also pleases with steep 24 dB filters in the subsonic. The boost works at high 55 Hz, and with low Q, it turns out discreet and broadband

Audio System's H Series or Helon is the equipment for the rough stuff. The subwoofers are power-hungry and made for SPL applications, and the loudspeakers are also governed by power handling and output. There is even a subseries with PA borrowings. With the H-5000.1 D, there is now the matching subwoofer amplifier – at the moment, still the only amplifier of the series. And you can immediately tell what the H-5000.1 D is: an old-school SPL mono. Easily recognizable by the fact that the amplifier weighs 9 kilograms, so the H is not a mini digital amplifier to help out the factory radio. In addition, the speaker level inputs are missing, which we can get over quickly with such a amplifier. Instead, the H-5000.1 D has a single RCA jack for master/slave operation. Two H-5000.1 D can be connected using this jack, whereby the master provides the slave with the processed signal and all settings.

Thus, two amplifiers can be operated with a remote control and in bridge mode so that insane 10 kilowatts of power are available. As a bonus, there is also a switchable limiter that is supposed to prevent dangerous clipping. The connections take up the entire back of the H-5000.1 D. The power terminals are designed for the thickest cable cross-sections, and there are two of them - they are also necessary because a current flow in the order of 500 amps is to be expected. The features are comprehensive: A remote control is included, and there are low-pass, subsonic, boost, and adjustable phase filters.

Now let's look at where the 9 kilos come from. The answer is inside in the form of lots of copper. Of course, the heatsink is massive as well. After all, it must dissipate much heat despite the relatively efficient Class D circuitry. Even if it were only 10% waste heat, it still adds up to 500 watts at 5 kilowatts, corresponding to a small stove top at half load. In the power supply alone, we find four big transformers, plus the two massive filter coils for the PWM amplified signal. The high symmetry on the circuit board indicates that the signal is processed separately by half-waves, which is not unusual for SPL

A lot inside:
There are four power transformers, 2 Class-D coils, and 18 buffer capacitors to help the H-5000.1 D to its performance



The power terminals are duplicated to ensure sufficient cable cross-section



amplifiers. Wire and cable jumpers are found everywhere to lighten the load on the circuit board, as long signal paths inevitably occur with this hunk of a power amp. The number of MOSFETs is also impressive; we count 16 in the power supply and 12 in the amplification – these are only the big ones.

Measurements and sound

All this indicates that it's also getting serious in terms of performance data. To make a long story short: There is plenty of power, namely just under 2 kW into 4 ohms, just under 3.6 kW into 2 ohms, and into 1 ohm, a tad more than the promised 5 kW. It's almost impressive that the H-5000.1 D does all this with minimal distortion. At 4 ohms, around 0.03% would do credit to any Sound Quality amp. The damping is ok, and the SNR is terrible on paper - it doesn't matter: Try listening to the residual noise of a subwoofer driven at 5 kW...

When the H-5000.1 D goes into action, listening quickly turns into feeling. The bass pounds the chest and hits the pit of the stomach hard in the lower registers. In the car, you quickly realize that damping is useless anyway and that it's high time

someone invented rear-view mirrors with image stabilizers. At halfway reasonable SPL levels, you can hear that the H-5000.1 D can also play properly and in a controlled manner. Even with deep synth basses, the contour remains intact and dynamic shifts are a joy for the listener.

Conclusion

The H-5000.1 D has earned the name power amplifier. An old-school amplifier, according to the motto „What's too much is not too little.“

Elmar Michels

Specifications

Channels	1
Power 4 ohms	1975
Power 2 ohms	3590
Power 1 ohms	5230
Sensitivity max. mV	200
Sensitivity min. V	6,0
THD+N (<22 kHz) 5 W	0,043
THD+N (<22 kHz) Half Power	0,028
Signal-to-noise ratio dB(A)	67
Damping factor 20 Hz	149
Damping factor 40 Hz	149
Damping factor 60 Hz	149
Damping factor 80 Hz	149
Damping factor 100 Hz	149
Damping factor 120 Hz	149

Features

Low pass	35 – 250 Hz
High pass	–
Band pass	10 – 250 Hz
Bass boost	0 – 9 dB/55 Hz
Subsonic filter	10 – 50 Hz/24 dB
Phase shift	0 – 180°
High-level inputs	–
Automatic switch-on (Autosense)	–
RCA output	•
Start/stop capable	– (8,4 V)
Dimensions (L x W x H in mm)	550 x 256 x 63
Others	remote control Master/Slave, clip-limiter

Audio System H-5000.1 D

Price	1.250 Euro
Contact	Audio System, Germany
Internet	www.audio-system.de

Rating

▶ Sound	20 %	★★★★★
Bass foundation	5 %	★★★★★
Bass pressure	5 %	★★★★★
Accuracy	5 %	★★★★★
Dynamics	5 %	★★★★★
▶ Lab	55 %	★★★★★
Power	40 %	★★★★★
Damping factor	5 %	★★★★★
Signal-to-noise ratio	5 %	★★★★★
Noise	5 %	★★★★★
▶ Practice	25 %	★★★★★
Features	15 %	★★★★★
Build quality electronics	5 %	★★★★★
Build quality mechanics	5 %	★★★★★

Absolute Top Class



CAR & HiFi

INTERNATIONAL Germany 3/22

Price/performance: very good

„Old school mono amp with endless power.“

Ground Zero GZUA 6SQ –
analog six-channel power
amplifier for sound gourmets

Highend six-channel amplifier

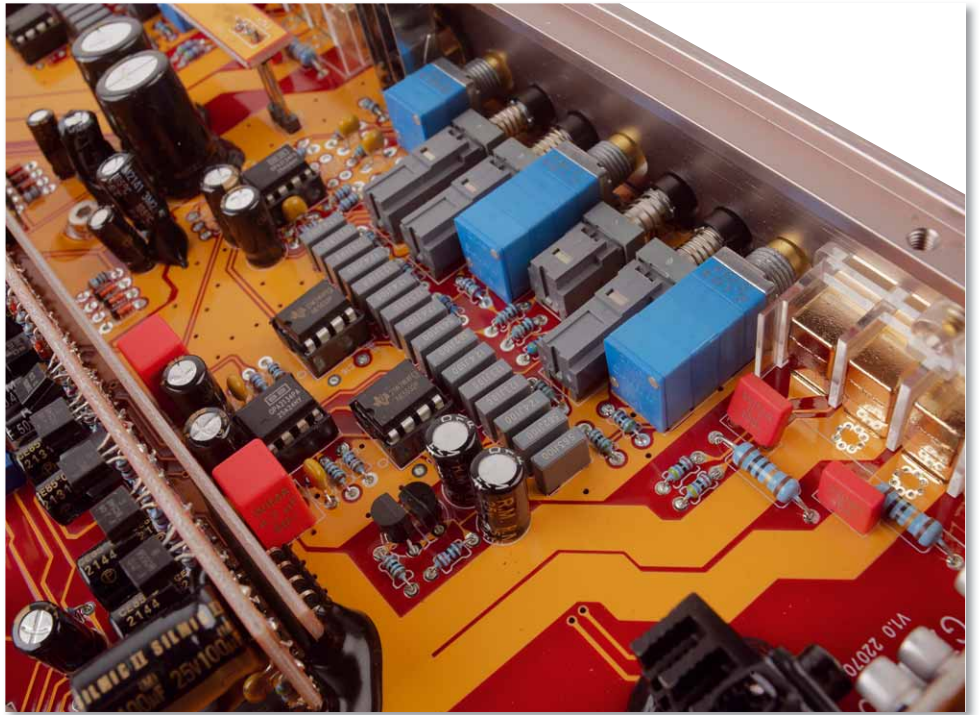
- ▶ Truly high-end six-channel amps are pretty rare. One came from Ground Zero and now gets a revised successor, the GZUA 6SQ.





The wonderfully analog, beautifully large amplifiers still exist, where sound is everything, and compactness and efficiency are relegated to the bottom of the list. There is a wide choice of four-channel and two-channel amplifiers on the market. With its six channels, the GZUA is not unique but quite alone with its high-end ambitions. Yet the concept makes perfect sense. The GZUA has four smaller channels and two particularly powerful ones – ideal for a large, sophisticated three-way system. Add a subwoofer solution, and you have a top system to make even the most demanding listeners happy.

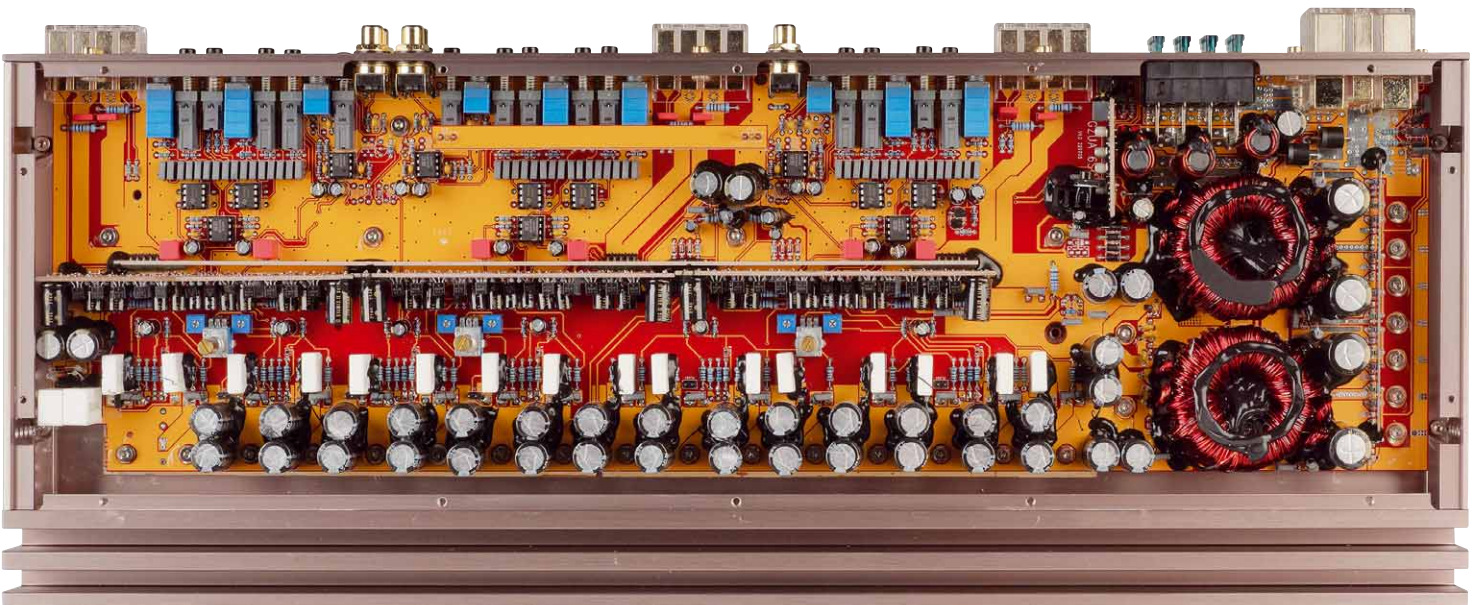
The GZUA 6SQ is visually indistinguishable from its predecessor, the GZUA 6.200SQ-Plus. An elongated, titanium-colored strand cast housing with a height of only 48 millimeters, the cooling fins at the back and the connectors and potentiometers lined up next to each other at the front. On the far right are the



The socketed operational amplifiers are the finest types of the premium manufacturer Burr Brown

solid power connections, then you'll find the four-pack of 30-amp fuses. After that, there are speaker connections, controls, and RCA input jacks for the three-channel pairs.

Everything is solidly made with excellent, smooth-running controls and sturdy jacks fastened with nuts. There are only high and low pass filters to operate. One looks for frills



High-quality board with clear layout and discrete signal conditioning and amplification. Instead of an SMD assembly, there are through-hole components and socketed operational amplifiers



Excellent RCA jacks and controls, plus switchable crossovers, suit the audiophile concept

in vain; instead, the crossovers are designed to perfection. That means you can switch them off so that the signal does not have to go through the potentiometer when the filters are not needed. The 10x multiplier switches are also helpful, as the frequencies can be adjusted over a wide range without using bad potentiometers with too broad a resistance range.

A look inside reveals a clean layout taken from the predecessor only at first glance. In fact, it is an entirely new PCB layout with enlarged paths to the speakers, improved cooling of the power transistors, and other detail optimizations. What remains is the very high-quality and beautiful red and orange PCB. As before, the finest components are used, such as the Burr Brown operational amplifiers in signal processing and the WIMA capacitors. New, however, are the Sanken transistors in the power amplification. Also revised is the bias control, which has been enlarged in its operating range - a specialty of Ground Zero. With three potentiometers located in the bottom, the operating point of the circuit can be shifted, which, with other manufacturers, is fixed by the developer. For the voltage supply of the amplification, we find two power supplies, one for each of the four small channels and one for the two large ones. The driver stages are similar in design. The increase in power of the large channels is due to the double final transistor assembly.

There is one pair of MOSFETs per channel for channels 1-4 and two pairs for channels 5 and 6. The board is super cleanly assembled and completely discrete. Instead of drivers or even amplifier ICs, there are individual components. And that's damn old-school with through-hole components without today's ubiquitous SMD surface mounting.

Measurements and Sound

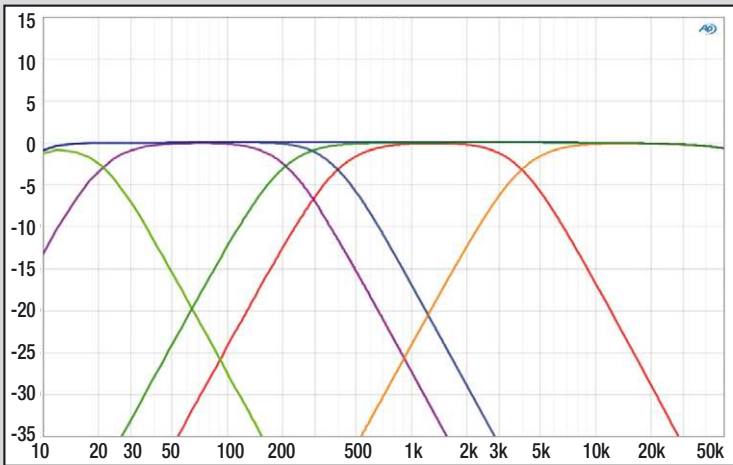
To say it in advance: The GZUA 6SQ is an absolute stunner in the lab. After Ground Zero broke all records last year with the ULTRA A-2, the developers have obviously been spurred on to other flights of fancy. The GZUA 6SQ delivers the best

lab result of all multi-channel amps in the Absolute Top Class, which is open towards the top. First, there's plenty of power for a six-channel power amplifier: 100 and 160 W are already achieved by the small channels, while channels 5 and 6 deliver a whopping 173 and 284 W into 4 and 2 ohms, respectively. The damping factors are enormously high, around 500 for the small channels and above 600 for channels 5 and 6. The best thing, however, is the distortion behavior, which shines through the bank by the almost complete absence of distortions. A Class AB amplifier likes half-load; here, it is sensationally low, 0.002% THD+N across the board. But even at only 5

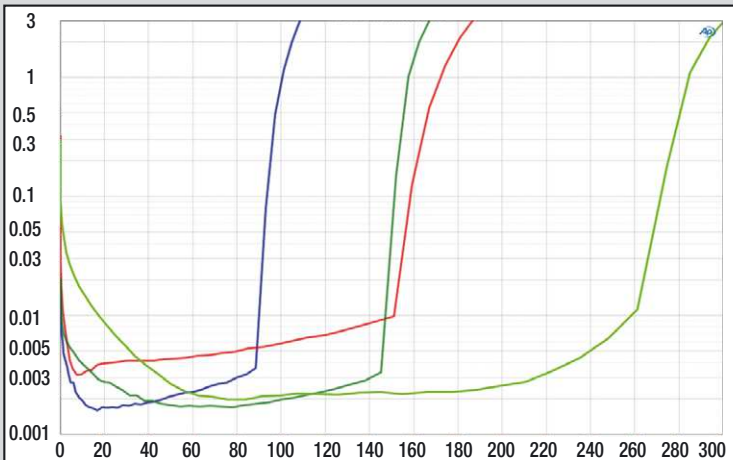


The GZUA 6SQ houses two power supplies, one for the small and one for the large channels

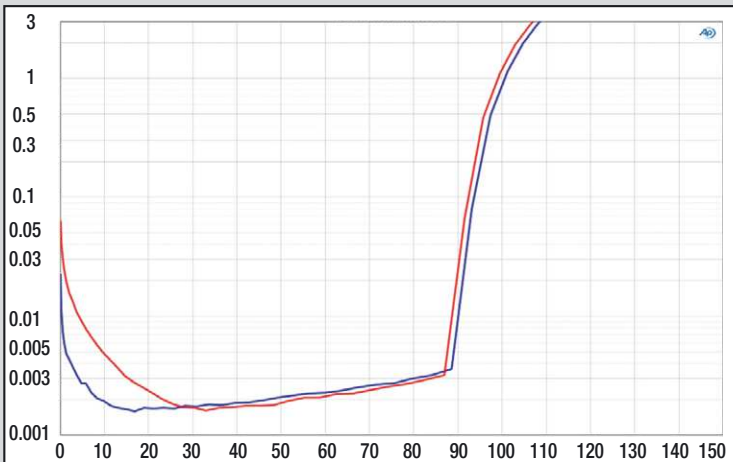
CAR & HI-FI Laboratory



All three channel pairs have high-pass and low-pass filters with the same adjustment ranges. The filters range from 20 Hz to 4 kHz, also thanks to x10 switches



Already the „small“ channels 1-4 achieve decent power (blue: 40hm, red: 2 Ohm). The „large“ channels deliver a whopping 284 W into 2 ohms (light green) and extremely low distortions of around 0.002 %.



Comparison of bias full (blue) and bias off (red). At medium and high powers, nothing happens. At low powers, the „Max“ setting produces less distortion



The power MOSFETs are hidden under the PCB. There one pair each for channels 1-4 and two pairs each for channels 5 and 6

watts, the small channels come in at 0.003, and even the powerful channels are at only 0.005%. We achieved these record-breaking results with the bias in the max position. In the min position, not much happens in the mid and upper power ranges. However, at low power - the most crucial range for sound-conscious music listening – the „Class A“ operation with turned-up bias current is advantageous over the „Class AB“ operation.



For circuitry reasons, the bias potentiometers are located at the bottom of the cabinet; there is one per channel pair

All connections and (almost all) controls are located on the front



Sound-wise, however, there is also something to like about the closed bias. The sound seems a bit more powerful, while the GZUA with the bias turned up seems to „breathe“ more and sounds more spatial. This leaves the user spoilt for choice – possibly the reason why other manufacturers set the bias at the factory. Basically, the GZUA 6SQ is a sound-wise highlight, no matter in which position the control is set. It handles the musical material wonderfully musically and simply sounds beautiful. However, by no means beautiful in the sense of glossiness or dishonest, but always of one piece, without asking big questions of the music. At the top, it allows the finest harmonics to be heard without any problems; it packs the musical actors cleanly onto the stage. Natural instruments like trumpet or double bass sound with masterly authenticity, as one rarely hears. And last but not least, the GZUA 6SQ has more than enough power to be heard at noise levels or to get a deep, clean bass out of the woofers. A well-rounded affair and sound at the very highest level.

Conclusion

The GZUA 6SQ represents an almost exclusive opportunity to ascend to the highest spheres of sound with a six-channel amplifier. It shows that the good old Class AB circuit is far from dead – at least when it comes to uncompromising sound.

Elmar Michels

Specifications

Channels	6
Power 4 ohms	4 x 101 + 2 x 158
Power 2 ohms	4 x 173 + 2 x 284
Power 1 ohms	0
Bridged Power 4 ohms	2 x 346 + 568
Bridged Power 2 ohms	0
Sensitivity max. mV	720
Sensitivity min. V	6,0
THD+N (<22 kHz) 5 W	0,003/0,005
THD+N (<22 kHz) Half Power	0,002/0,002
Signal-to-noise ratio dB(A)	94/93
Damping factor 20 Hz	497/745
Damping factor 80 Hz	497/639
Damping factor 400 Hz	497/639
Damping factor 1 kHz	497/639
Damping factor 8 kHz	497/639
Damping factor 16 kHz	407/497

Features

Low pass	20 – 4k Hz
High pass	20 – 4k Hz
Band pass	20 – 4k Hz
Bass boost	–
Subsonic filter	via HP
Phase shift	–
High-level inputs	–
Automatic switchon (Autosense)	–
RCA output	–
Start/stop capable	• (4,8 V)
Dimensions (L x W x H in mm)	550 x 209 x 48
Others	2, 4, 6 CH In, BIAS-Poti

Ground Zero GZUA 6SQ

Price	1000 Euro
Contact	Ground Zero, Germany
Internet	www.ground-zero-audio.com

Rating

▶ Sound	40 %	★★★★★
Bass	8 %	★★★★★
Neutrality	8 %	★★★★★
Transparency	8 %	★★★★★
Spatial imaging	8 %	★★★★★
Dynamics	8 %	★★★★★
▶ Lab	35 %	★★★★★
Power	20 %	★★★★★
Damping factor	5 %	★★★★★
Signal-to-noise ratio	5 %	★★★★★
Noise	5 %	★★★★★
▶ Practice	25 %	★★★★★
Features	15 %	★★★★★
Build quality electronics	5 %	★★★★★
Build quality mechanics	5 %	★★★★★

Absolute Top Class



CAR & HiFi
INTERNATIONAL Germany 2/23

Price/performance: excellent

„Spotless build quality and performance – highlight!“

Focal 6.5 KM/3 KM/FRAK – French loudspeaker engineering at its best

Active loudspeakers par excellence

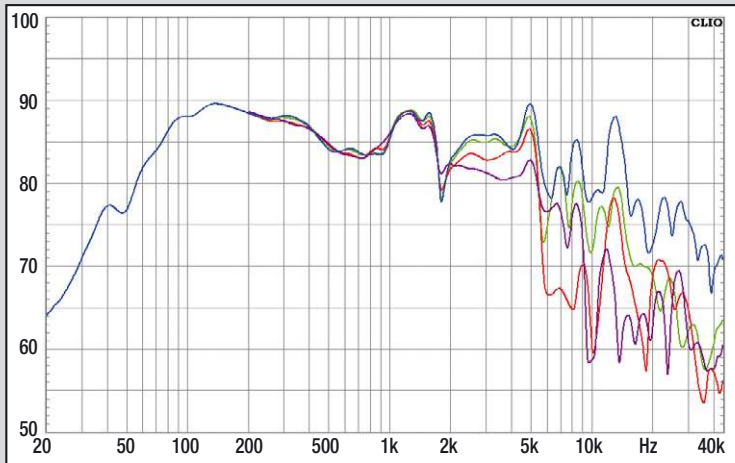
- ▶ The speakers of the French brand Focal have always distinguished themselves by their high level of innovation. Focal has never done what others did. The new K2 Power M series is another excellent example because it is brimming with individual solutions.

The relationship between K2 Power M and K2 Power is indeed apparent by the names; also, the optics with the characteristic yellow cones immediately indicate K2 Power. But the M in K2 Power M is taken from the top series Utopia M so that the K2 Power M series is located between K2 Power and Utopia M. The materials here are more reminiscent of K2 Power, but the technologies used come more or less directly from the distinguished reference series. Five individual drivers belong to the K2 Power M series. There are no kits; the series is intended exclusively for building active systems, which makes sense in this class. The four drivers are the FRAK tweeter, the 3 KM midrange, the 6.5 KM woofer, and the SUB 5 KM subwoofer. And yes, that's right, the subwoofer has a smaller diameter than the midwoofer, namely 5 as opposed to 6.5 inches. That surprises us only a little because we are talking about Focal, and the French have already had 13-cm / 5-inch subwoofers like 5 WS or 13 WS in the Utopia series.

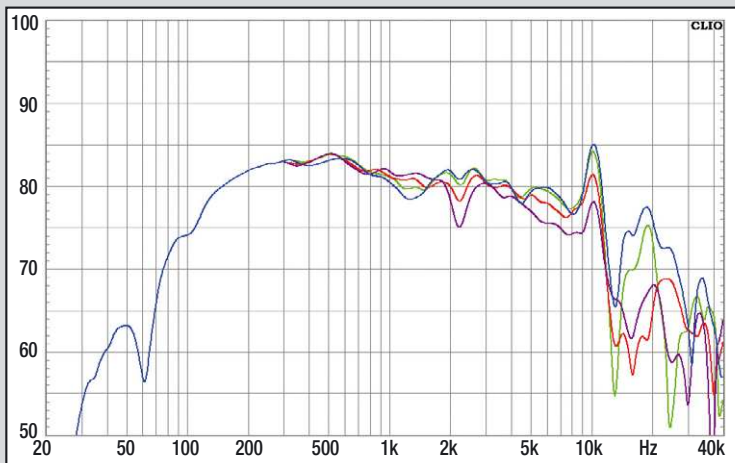




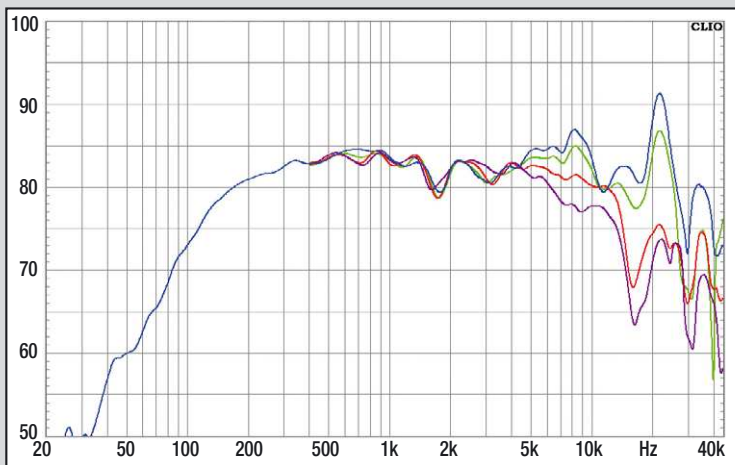
CAR & HIFI Laboratory



The 6.5 KM produces a lot of SPL up to the high range, but above 5 kHz, there is nothing usable, so careful filtering is recommended



The midrange driver can be used between 300 Hz and approx. 7 kHz. It runs flawlessly even under an angle



The tweeter produces full sound pressure already from 500 Hz, and it runs perfectly up to 14 kHz, even under a 30° angle

Let's stay with our SUB 5 KM, which immediately shows us where the K2M series is headed. We have an M cone in front of us, which takes its name from its roughly M-shaped profile. This proprietary Focal technology is used in the upscale Utopia M Series and is now inherited by the K2M. The highest point of the cone is formed by a ring, to the bottom of which the voice coil former is attached. Towards the inside, where regular cones have a dust cap, the M cone is shaped as an inverse dome; towards the outside, the result is a truncated cone sloping towards the edge. The material is similar to K2 Power, namely a sandwich with the characteristic yellow Kevlar layer on the front and a rigid foam core of Rohacell. Like Utopia, and unlike some K2 Power cones, there is a transparent fabric layer on the back of the cone. The whole thing is stiff as a board and has excellent damping due to the porous construction. The voice coils are pretty large on all four drivers; on the SUB 5 KM and 6.5 KM, they measure 2.5 inches in diameter and are wound on fiberglass formers – Focal prefers large surfaces for heat dissipation and no eddy currents with the electrically non-conductive material. Otherwise, the motors are conventionally designed but use ferrite rings instead of the several times more expensive neodymium used in Utopia.

However, the colossal pole piece ventilation on SUB 5 KM and 6.5 KM looks quite Utopia-like. They reveal another unique feature: While you look directly at the rear of the cone on the woofer, you can see a rubber disc on the subwoofer, which presumably simply serves as an additional weight to push the resonant frequency and thus the working range of the tiny driver towards the subwoofer frequencies. The midrange driver is a scaled-down version of its larger colleagues, but neodymium is used as the magnet material for spatial reasons. As with 6.5 KM and the tweeter, its surround is made according to the in-house TMD (Tuned Mass Damper) to counteract disturbing partial oscillation of the cone. The most exciting driver, however, is the FRAK tweeter, which bears no resemblance at all to a standard dome tweeter. Strictly speaking, it neither has a dome diaphragm nor is it a pure tweeter. Instead, we are seemingly looking at a cone of a small full-range driver, only

with the M-diaphragm instead of a conventional cone. It is also open at the back, so it needs a soundproof installation like the midrange driver to avoid the acoustic short circuit that occurs when sound from the back of the diaphragm reaches the front. The tweeter also immediately



The midwoofer is relatively shallow thanks to the M shaped cone that helps to keep the frame flat

reveals another reason Focal developed the M cone: its dispersion characteristics. At first glance, the cone looks like the famous inverse dome tweeter, developed initially by Focal and known for its consistent sound dispersion over a wide angle. Focal also follows a very similar concept with the Utopia M tweeter TBM, which, however, is only open via the pole piece ventilation at the back, and the TBM also shines with the typical beryllium cone, while our FRAK has to make do with aluminum/magnesium.

Measurements and sound

With a cone diameter of 40 millimeters and a voice coil diameter of 32 millimeters, the FRAK has quite impressive dimensions for a tweeter; it somewhat resembles a small full-range driver. The sound pressure

Specifications

Basket diameter	165 mm
Mounting diameter	142 mm
Mounting depth	54 mm
Magnet diameter	126 mm
Basket midrange	80 mm
Depth midrange	28 mm
Dome diameter tweeter	40 mm
Housing diameter tweeter	51 mm
Max. XO freq wf/mr	1,5/7k Hz
Min. XO freq mr/tw	300/600 Hz
XO for test	300/1,2k Hz
EQ for test	-
Grilles	- / - / •
Misc.	-
Nominal impedance	3 Ohm
DC resistance Rdc	2,89 Ohm
Voice coil inductance Le	0,11 mH
Voice coil diameter	64 mm
Cone area Sd	133 cm ²
Resonance frequency fs	72 Hz
Mechanical Q Qms	8,71
Electrical Q Qes	0,72
Total Q Qts	0,67
Equivalent volume Vas	9,10 l
Moving mass Mms	13,3 g
Rms	0,69 kg/s
Cms	0,37 mm/N
B*1	4,90 Tm
SPL 2v, 1m	89 dB
Amplifier power recommendation	75 – 250 W

Focal 6.5 KM/3 KM/FRAK

Price	1.400 Euro
Contact	Focal Naim Deutschland, Germany
Internet	www.focal.com

Rating

▶ Sound	55 %	★★★★★
Bass foundation	11 %	★★★★★
Neutrality	11 %	★★★★★
Sound stage	11 %	★★★★★
Spatiality	11 %	★★★★★
Dynamics	11 %	★★★★★
▶ Lab	30 %	★★★★★
Frequency response	10 %	★★★★★
Max. SPL	10 %	★★★★★
Distortion	10 %	★★★★★
▶ Practice	15 %	★★★★★

Absolute Top Class

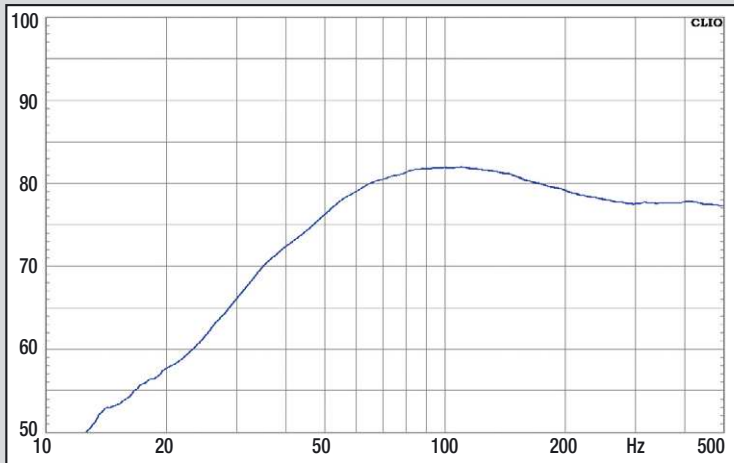


CAR & HiFi
INTERNATIONAL Germany 2/23

Price/performance: very good

„Great speaker series with exceptional technology and spectacular sound.“

CAR & HI-FI Laboratory



The SUB 5 KM in a small sealed box loses sound pressure below 60 Hz, but in the car, it sounds like a big one



The 3" midrange is equipped with an aluminum frame and a neodymium motor, K2M build quality is generally excellent

curve reaches 22 kHz at the top, where the cone breaks into a not-too-pronounced resonance – not bad for such a design. However, the performance at low frequencies is even more impressive, where the FRAK, with its resonant frequency of only 180 Hz, picks up speed from 300 Hz. It can be used only from about 600 Hz, which is still remarkable for such a small driver – and breathtakingly low for a tweeter. The 3 KM midrange driver could almost pass for a full-range driver, but its frequency response, unfortunately, shows a disturbance at just under 12 kHz, which limits its use to below 10 kHz or, better yet, below 7 kHz. In terms of distortion, we only notice a slight irregularity around



The tweeter is built like the larger drivers with a vented aluminum frame and the M-shaped cone

1 kHz, but that's harmless. The 6.5 KM doesn't want to stop producing sound at high frequencies. Even above 20 kHz, there is still considerable SPL at the microphone. But please don't rejoice too early; at the very latest, from 5 kHz, there is nothing usable anymore. There is interference between 1 and 2 kHz, so the 6.5 KM is best used as a three-way woofer in an audio system. That leaves the SUB 5 KM, which, with a resonant frequency of 68 Hz and a very high Q of just under 1.2, initially puzzles us as to what to do with this subwoofer. But the rigid suspension and the virtually non-existent equivalent volume make it largely independent of the box volume. So, we followed Focal's recommendation (4 - 6 liters) to install it in a small sealed box. And you need several woofers to keep up with the SPL of the front system.

In our case, two SUB 5 KM did the job, but even more would be an advantage because, in the bass, it's still true: a lot helps a lot! But then the SUB 5 KM really gets the bass range going. With the perfectly sufficient low end, it serves up tremendously precise bass attacks, making the music a lot of fun. You can still adjust the low bass via DSP, which the SUB 5 KM does without any problems due to its large voice coil and robust construction. The front system of 6.5 KM, 3 KM, and FRAK shows very quickly in which direction the sound journey goes: The system sets off with tremendous precision across the entire frequency range. An immense variety of subtleties can be heard from the recording, and voices sound mercilessly honest with the setup. It sounds very dynamic overall and with very high precision in the bass. The FRAK tweeter offers sparkling highs and a wonderfully airy soundscape paired with excellent stage imaging that we haven't heard in a while. Because of the low possible crossover frequency, a „broad-band“ spatiality can be achieved, with musical actors that can be localized to the point – truly grand cinema!

Conclusion

This combination of K2 Power and Utopia M is excellent. K2 Power M convinces us with outstanding drivers (Made in France), superb and distinctive engineering, and genuinely spectacular sound. Great job!

Elmar Michels



The SUB 5 KM features a long throw suspension and a vented TIL bobbin



This is the midwoofer's vent that lets you see the cone, the sub features a rubber disc in this place

Specifications

Basket diameter	15,4 cm
Mounting diameter	13,1 cm
Mounting depth	6,9 cm
Magnet diameter	12,0 cm
Weight	2,2 cm
Nominal impedance	4 Ohm
DC resistance Rdc	3,12 Ohm
Voice coil inductance Le	0,72 mH
Voice coil diameter	60 mm
Diaphragm area	99 cm ²
Resonant frequency fs	68 Hz
Mechanical quality Qms	6,03
Electrical quality Qes	1,47
Total quality Qts	1,18
Equivalent volume Vas	1,5 l
Moving mass Mms	52 g
Rms	3,62 kg/s
Cms	0,11 mm/N
B x l	6,82 Tm
Sound pressure 1 W, 1 m	82 dB
Recommended power	150 – 400 W
Test enclosure	g 7,5 l
Port dimensions (d x l)	–

Focal SUB 5 KM

Price	400 Euro
Contact	Focal Naim Deutschland, Germany
Internet	www.focal.com

Rating

▶ Sound	50 %	★★★★★
Bass	12,5 %	★★★★★
Pressure	12,5 %	★★★★★
Purity	12,5 %	★★★★★
Dynamics	12,5 %	★★★★★
▶ Lab	30 %	★★★★★
Frequency response	10 %	★★★★★
Efficiency	10 %	★★★★★
Maximum level	10 %	★★★★★
▶ Processing	20 %	★★★★★

Absolute Top Class



CAR & HiFi
INTERNATIONAL Germany 2/23

Price/performance: very good

„Great speaker series with exceptional technology and spectacular sound.“

ESX QXF201A - Active subwoofer for Fiat Ducato

Subwoofer in the mobile home

- ▶ With the QXF201A, ESX brings a small active subwoofer explicitly designed for the Fiat Ducato with some special features. We put the QXF to the test.



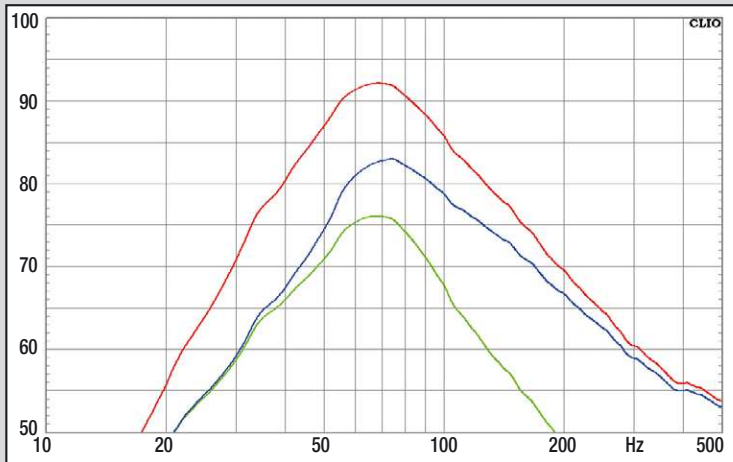


There are now several speaker systems to choose from for camper vans. But bass solutions for campers are relatively rare. For the Fiat Ducato and similar, there are speakers from ESX, even as a set with a power amplifier and a subwoofer for installation under the passenger seat. The QXF201A is also made for the Ducato platform but follows a different idea. The best and most space-saving spot for a subwoofer would be right up front, under the dash. Here, it's upfront with the music and easy to wire. Looking for the proper mounting spot, ESX chose to mount it in the center console, just below the cupholder. A sturdy mounting plate



The inner workings of the QXF do not provide any mysteries. The flat woofer and the power amplifier share the housing

CAR & HIFI Laboratory



The QXF gets bass up to 55 Hz from its 4 liters

made of sheet steel together with a mounting kit make installation child's play. The subwoofer naturally has to be as compact as possible. That's why the QXF201A was chosen for its ultra-compact aluminum housing, which just about fits a 20-cm woofer. Since the housing is only about seven centimeters high, a particularly flat woofer design must be used, which is achieved in the QXF by an almost flat aluminum cone that saves the crucial centimeters mounting depth compared to the usual cone shape. A remote control is included, with which the bass level can be conveniently regulated. Otherwise, the features are typical for an active subwoofer. On the housing, we find the low-pass control, which is adjusted according



The QXF offers high- and low-level inputs, a bass boost, and a remote control

to the existing door speakers, and a bass boost, which changes the dose of bass in relation to the mid-high. Of course, there is also a small amplifier, which slims down on one side of the case. A small class AB power amp is installed here - no rocket science, but perfectly adequate.

Measurements and sound

The small power amplifier then performs quite bravely at the test site. It produces 82 watts with tolerable distortion, sufficient for the small 8". As an analog class AB design, it also makes very little noise. A subsonic filter set to 30 Hz protects the woofer from frequencies that it can't reproduce anyway. The measurement microphone shows that the subwoofer works down to about 55 Hz. Therefore, the bass boost is not a boost for the very bottom but rather another volume control that could have been omitted. In the car, the QXF201A benefits from its installation position very close to the front seats; you have it next to your foot or diagonally under your knee. Accordingly, the small woofer feels like it makes a lot of SPL. Especially in a motorhome that is not exactly spoiled by hi-fi, the additional dose of bass is well received. There is also nothing to complain about regarding precision; the sub never plays mushy but is always pretty clean.

Conclusion

The QXF201A is a clever bass extension for Ducato & Co. Thanks to the discreet mounting, it brings good additional bass and integrates without losing space.

Elmar Michels



Without the Ducato bracket for mounting under the center console, the QXF passes as an under-seat woofer

Specifications	
Dimension w	29,0 cm
Dimension h	7,3 cm
Dimension d	21,0 cm
Box type/volume	cb 5,5 l
Reflex port (d x l)	-
Weight	5,6 kg
Nominal diameter	10"
Nominal impedance	4 Ohm
Voice coil diameter	38 mm
Power @ nom.imp.	82 W
Sensitivity RCA max	100 mV
Sensitivity RCA min	4,5 V
THD +N (<22 kHz) 5 W	0,09 %
THD +N (<22 kHz) half power	0,59 %
SNR (A-wgt)	105 dB
Features	
Low pass	50 – 150 Hz
Bass boost	0 – 12 dB/45 Hz
Subsonicfilter	fix 30 Hz
Phaseshift	Polarity switch
Low-level input	•
High-level input	•
Auto turn on	•, DC
Start-Stop capability	• (6,1 V)
Remote control	•, Gain
Misc.	Mounting kit Fiat Ducato

ESX QXF201A

Price	350 Euro
Contact	Audio Design, Kronau
Internet	www.audiodesign.de

Rating

▶ Sound	30 %	★★★★★
Bass	7,5 %	★★★★★
Pressure	7,5 %	★★★★★
Purity	7,5 %	★★★★★
Dynamics	7,5 %	★★★★★
▶ Lab	40 %	★★★★★
Frequency response	10 %	★★★★★
Max SPL	10 %	★★★★★
Amplifier power	20 %	★★★★★
▶ Practice	30 %	★★★★★
Features	10 %	★★★★★
Build Quality electronics	10 %	★★★★★
Build Quality mechanics	10 %	★★★★★

Compact Class



CAR & HiFi

INTERNATIONAL

Germany 2/23

Price/performance: very good

„Cleverly made space-saving bass for Ducato & Co.“

ZXT10D2 + ZXT12D2 + ZXT15D2 – SPL Subwoofers from Hifonics

Extreme subwoofers

- ▶ As if the Zeus Power subwoofers from Hifonics weren't heavy and loud enough, super-heavy SPL subwoofers are now coming to retailers with the Zeus Extreme woofers. We take a look at the series.





EXTREME

Under the Zeus label alone, Hifonics now offers five series of subwoofer drivers. Starting with the entry-level models ZXE, the ZST flat-woofers, the middle-class ZXS up to the top Power ZRX speakers, there is already something for every bass fan. But now Hifonics adds one more to it. With the ZXT „Extreme“ series, fat SPL beasts are now added. And as a whole series with 10", 12", 15" and even 18" models, of which we have the three small ones in the editorial office. Even the smallest woofer, the ZXT10D2, already weighs almost 20 kilos - so we are not dealing with inconspicuous space-saving woofers. Instead, the ZXT woofers are something for bass



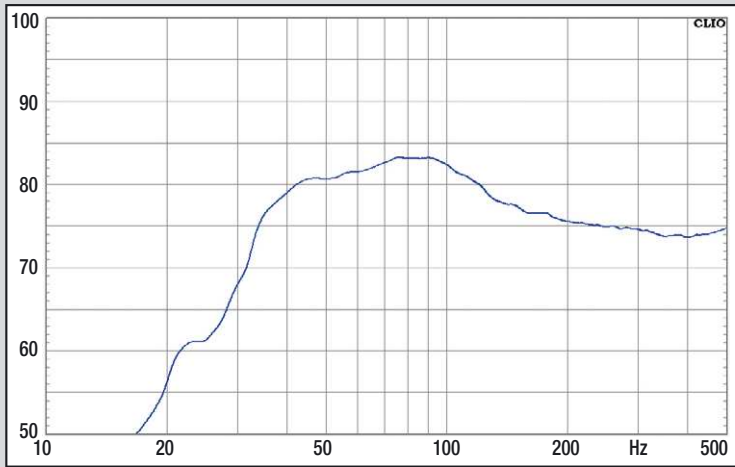
The ZXT woofers are veritable monsters. They didn't skimp on the magnet size or mounting depth in this case



fanatics who just cannot get enough or want to participate in SPL competitions. By the way, the ZXT power amplifiers with power values from 1,000 to 13,000(!) Watts are available to match the woofers.

Common to all ZXT woofers is their exceedingly sturdy construction. Robust cast frames with massive vents allow unimpeded airflow above and below the spider. Or rather, the spiders, because a triple spider made of resilient Nomex is used. This holds the cone so tightly that you have to exert quite a bit of force to push the cone a bit into the frame. There are

The leads are fixed to the upper of the three spiders



The ZXT10D2 reaches down to 40 Hz after all

matching high-profile surrounds for extreme excursions, made of foam, of course, because rubber surrounds of the required thickness would be much too heavy and stiff. As for the cones, it goes without saying that they have to be extremely stable; the recipe for this is steep cone angles with a lot of mounting depth and the use of carbon for cones and dust caps. The main reason for the high weight is the motors, first and foremost the triple magnets with three fat 20-millimeter ferrite rings. But the pole plates are also massive; the woofer's top plate alone is 11.5 millimeters thick. A dizzying 57.5 millimeters of winding height results in 23 millimeters of linear travel in each direction. All voice coils are 2 x 2-ohm variants that yearn to be paralleled to 1 ohm. The voice coil wire used is CCAR, which translates as Copper Clad Aluminum Ribbon, a flat aluminum wire with a copper coating. The aluminum saves weight, the copper coating lowers resistance, and the flat wire helps squeeze as many turns of wire as possible into the air gap. The only

difference in the ZXT woofers is the voice coil diameter. The smallest woofer, the ZXT10D2, has to make do with a three-inch voice coil, and already these 76 millimeters are the envy of the vast majority of woofers. Starting with the ZXT12D2, the woofers are equipped with huge

Specifications

Basket diameter	26,2 cm
Mounting diameter	23,5 cm
Mounting depth	9,8 cm
Magnet diameter	23,0 cm
Weight	19,5 cm
Nominal impedance	2 x 2 Ohm
DC resistance Rdc	3,82 Ohm
Voice coil inductance Le	1,93 mH
Voice coil diameter	76 mm
Diaphragm area	324 cm ²
Resonant frequency fs	60 Hz
Mechanical quality Qms	6,43
Electrical quality Qes	1,02
Total quality Qts	0,88
Equivalent volume Vas	4,5 l
Moving mass Mms	226 g
Rms	13,38 kg/s
Cms	0,03 mm/N
B x l	17,92 Tm
Sound pressure 1 W, 1 m	83 dB
Recommended power	> 1000 W
Test enclosure	BR 42 l
Port dimensions (d x l)	10 x 33 cm



The motors work with triple ferrite rings. The one of the ZXT10D2 just fits through the installation opening

four-inch coils (102 millimeters), whose stately surface area with almost 58 millimeters winding height

Hifonics ZXT10D2

Price	650 Euro
Contact	Audio Design, Switzerland
Internet	www.audiodesign.de

Rating

▶ Sound	50 %	★★★★★
Bass	12,5 %	★★★★★
Pressure	12,5 %	★★★★★
Purity	12,5 %	★★★★★
Dynamics	12,5 %	★★★★★
▶ Lab	30 %	★★★★★
Frequency response	10 %	★★★★★
Efficiency	10 %	★★★★★
Maximum level	10 %	★★★★★
▶ Processing	20 %	★★★★★

Absolute Top Class

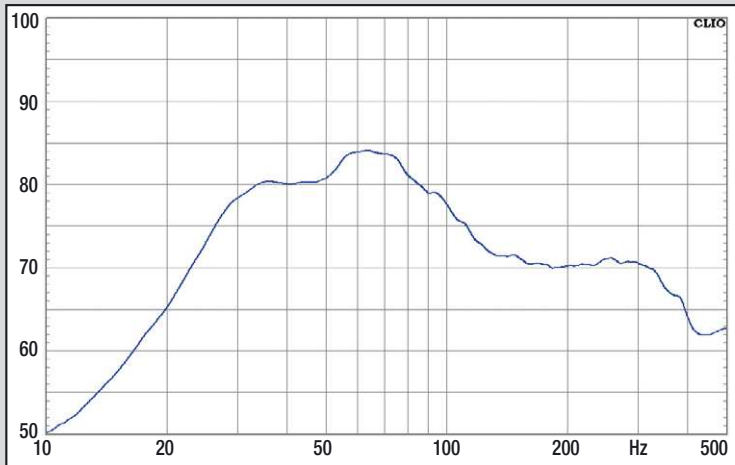


CAR & HiFi
INTERNATIONAL Germany 2/23

Price/performance: very good

"The right woofers for hardcore bass freaks."

CAR&HIFI Laboratory



The ZXT12D2 achieves 84dB at a -3dB frequency of just over 30Hz



Each woofer is equipped with a double voice coil and spring loaded terminals

brings an equally stately electrical load capacity. This is also helped by the voice coil former, which is made

of blackened aluminum and, therefore, also dissipates and radiates heat.

one percent, usually less than 0.5 %. And such an SPL woofer with a moving mass of several hundred grams and a diaphragm suspension that barely moves under a kilowatt of power input is even worse off. Thus, we determine 0.09 % for the 4" and 0.13 % for the 15" from the parameters. That would mean characteristic SPLs in the lower 80 dB range if it weren't for the enclosures. Because the ZXT woofers don't necessarily want to be tuned ultra-low, they feel comfortable with bass reflex tuning in the high 30Hz range, and the ZXT10D2 even has a leading 4. Thus, the cabinets still gain a few dB of sound pressure if the tunings are not too low. In any case, one should have enough amplifier power in the car. You don't need to start below one kilowatt, and there are almost no upper limits.

However, this does not mean the soundcheck has no low bass. The ZXT10D2 already hits the car crew in the pit of the stomach with force. Its 40 Hz cutoff frequency is enough

Hifonics ZXT12D2

Price	750 Euro
Contact	Audio Design, Switzerland
Internet	www.audiodesign.de

Rating

▶ Sound	50 %	★★★★★
Bass	12,5 %	★★★★★
Pressure	12,5 %	★★★★★
Purity	12,5 %	★★★★★
Dynamics	12,5 %	★★★★★
▶ Lab	30 %	★★★★★
Frequency response	10 %	★★★★★
Efficiency	10 %	★★★★★
Maximum level	10 %	★★★★★
▶ Processing	20 %	★★★★★

Absolute Top Class



CAR & HiFi

INTERNATIONAL

Germany 2/23

Price/performance: very good

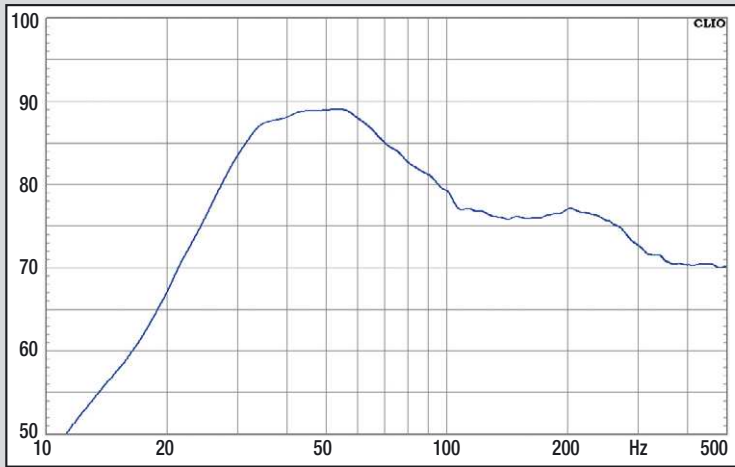
„The right woofers for hardcore bass freaks.“

Measurements and Sound

For waste heat, there is quite a lot to eliminate because a loudspeaker typically has an efficiency of less than

Specifications

Basket diameter	31,4 cm
Mounting diameter	28,4 cm
Mounting depth	22,2 cm
Magnet diameter	23,0 cm
Weight	20,9 cm
Nominal impedance	2 x 2 Ohm
DC resistance R _{dc}	3,94 Ohm
Voice coil inductance L _e	2,58 mH
Voice coil diameter	102 mm
Diaphragm area	460 cm ²
Resonant frequency f _s	51 Hz
Mechanical quality Q _{ms}	7,78
Electrical quality Q _{es}	1,23
Total quality Q _{ts}	1,06
Equivalent volume V _{as}	7,9 l
Moving mass M _{ms}	368 g
R _{ms}	15,10 kg/s
C _{ms}	0,03 mm/N
B x l	19,43 Tm
Sound pressure 1 W, 1 m	84 dB
Recommended power	> 1000 W
Test enclosure	BR 56 l
Port dimensions (d x l)	106 cm ² x 40 cm



The ZXT15D2 can be tuned „to peak“ very well. Thanks to its size, it still achieves a lot of low bass and an impressive 89 dB despite the bad driver efficiency



The ZXT woofers feature extra large ventilation openings in the frames as well as in the back plates

to push solid bass even with hip hop. The pressure that even the little one builds up is very impressive - wow! And you can also consume demanding music material with it. It even plays quite lively and balanced. We continue with the ZXT12D2, which has much less to do with fine music. Instead, it shoves tremendously until the body vibrates, and there's another, thicker shot of dark bass in the lower register. The maximum SPL is already beyond good and evil, so we anxiously await what the 15 can do. The ZXT15D2 then provides the typical grin on the face of bass freaks who are finally completely satisfied. The woofer shoves outrageous pressure in the car, especially at the most effective bass frequencies of 30 to 50 Hz. This deep bass blasts mercilessly, as loud as you want it to be.

Conclusion

Hifonics is serious about the ZXT series. Of course, the rule is: A lot

helps a lot. But the ZXT subwoofers also offer fine build quality, the best materials, and insane performance.

Elmar Michels

Specifications

Basket diameter	39,2 cm
Mounting diameter	35,8 cm
Mounting depth	25,1 cm
Magnet diameter	23,0 cm
Weight	22 cm
Nominal impedance	2 x 2 Ohm
DC resistance Rdc	3,89 Ohm
Voice coil inductance Le	2,51 mH
Voice coil diameter	102 mm
Diaphragm area	755 cm ²
Resonant frequency fs	38 Hz
Mechanical quality Qms	6,89
Electrical quality Qes	1,21
Total quality Qts	1,03
Equivalent volume Vas	28,1 l
Moving mass Mms	493 g
Rms	17,13 kg/s
Cms	0,04 mm/N
B x l	19,46 Tm
Sound pressure 1 W, 1 m	89 dB
Recommended power	> 1000 W
Test enclosure	BR 94 l
Port dimensions (d x l)	250 cm ² x 46 cm

Hifonics ZT15D2

Price	900 Euro
Contact	Audio Design, Switzerland
Internet	www.audiodesign.de

Rating

Sound	50 %	★★★★★
Bass	12,5 %	★★★★★
Pressure	12,5 %	★★★★★
Purity	12,5 %	★★★★★
Dynamics	12,5 %	★★★★★
Lab	30 %	★★★★★
Frequency response	10 %	★★★★★
Efficiency	10 %	★★★★★
Maximum level	10 %	★★★★★
Processing	20 %	★★★★★

Absolute Top Class



CAR & HiFi

INTERNATIONAL

Germany 2/23

Price/performance: very good

„The right woofers for hardcore bass freaks.“

The equipment classes

In **CAR&HIFI INTERNATIONAL**, all products are classified into one of five performance classes:

Ratings only comparable within their class: ★ (worst) ... ★★★★★ (best)

- **Absolute Top Class** – Uncompromising products with outstanding build and sound quality
- **Top Class** – Products for higher demands with excellent performance, sound, and processing quality
- **Upper Class** – Products for quality-conscious connoisseurs who value good value for money
- **Middle Class** – Solid products that meet average requirements in all respects
- **Entry Level** – Qualitatively convincing products with an excellent price-performance ratio

The rating

Devices are tested and rated according to strict criteria and can reach up to five “stars”. Ratings are only comparable within a class and device type. To score four stars in the top class, the device must meet more demanding requirements than for a 4-star rating in the upper class. The model names, prices (RRP), and equipment specifications for the devices always refer to the German market at testing. For some devices, prices and features may differ in the individual countries.

The star rating provides comprehensive and concise orientation when searching for devices for your in-car entertainment. However, depending on your situation and application, the device with the best star rating is not automatically the best fit for you. For example, an amplifier may score very well overall but may be difficult to connect to your car radio. So additional effort has to be considered for integration or a different model might be the better choice. Therefore, you should additionally consult the detailed information provided in the text of the test reports.

The test equipment of the **CAR&HIFI INTERNATIONAL** editorial team

For our tests, **CAR&HIFI INTERNATIONAL** uses – among others – the following special measuring instruments and reference devices for the comparison of image and sound quality:

- Audio Precision
- CLIO 12
- Kenwood CS-6030
- Microtech Gefell

MULTIPLE AWARDS

HX-PHASE

SPEAKER



CAR & HiFi:

„In the new EVO3 version, the HX Phase is more than ever a loudspeaker series at the highest level. If you have the necessary change, you will get exceptionally good stuff for the chassis and crossover.“

HX 100 PHASE **EVO 3**

■ 2x 110 WRMS ■ 3 Ohm Impedance

HX 100 PHASE ACTIVE **EVO 3**

■ 2x 100 WRMS ■ 3 Ohm Impedance

HX 130 PHASE **EVO 3**

■ 2x 125 WRMS ■ 3 Ohm Impedance

HX 130 PHASE ACTIVE **EVO 3**

■ 2x 115 WRMS ■ 3 Ohm Impedance

HX 165 PHASE **EVO 3**

■ 2x 175 WRMS ■ 3 Ohm Impedance

HX 165 PHASE ACTIVE **EVO 3**

■ 2x 165 WRMS ■ 3 Ohm Impedance



WWW.AUDIO-SYSTEM.DE



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Coming soon



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SMALL IN SIZE. BIG IN POWER.

INTRODUCING THE REVOLUTIONARY ZX SERIES MINI AMPLIFIERS

ZR
series



Upper class
★★★★★
CAR & HiFi
INTERNATIONAL Germany 2/23
Price/performance: excellent
„The ZX500.1 offers everything
but size for little money“

Upper Class
★★★★★
CAR & HiFi
INTERNATIONAL Germany 2/23
Price/performance: very good
„The ZX500.4 is tiny, inexpensive
and powerful enough to drive any
door speaker“

Our team has gone the extra mile to develop and release an amplifier series with unprecedented sound, quality, power, functions, and size.

ZXM500.1 | CLASS-D MONO MINI AMPLIFIER

- Power (MAX) 1000W
- Power Ratings (RMS)
500W x 1 @ 10hm, 360W x 1 @ 20hm, 230W x 1 @ 40hm
- Dimensions (L x W x H) 165 x 83.1 x 34.8mm

ZXM500.4 | CLASS-D 4-CHANNEL MINI AMPLIFIER

- Power (MAX) 1000W
- Power Ratings (RMS)
125W x 4 @ 20hm, 80W x 4 @ 40hm, 250W x 2 @ 40hm bridged
- Dimensions (L x W x H) 165 x 83.1 x 34.8mm



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