

# CAR HiFi

INTERNATIONAL

3/23 · 4,80 €



## European Edition

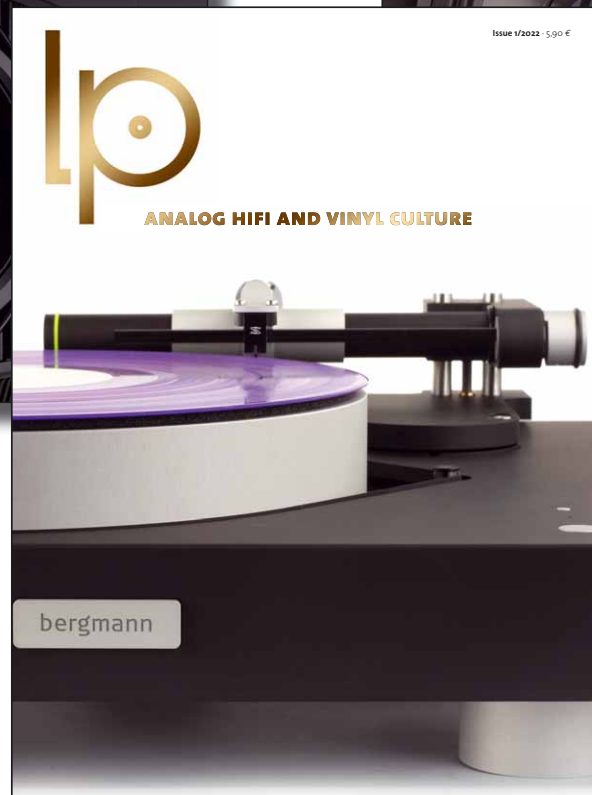
### Best topics

- New analog and digital amplifier series
- High-end flat subwoofer
- Helix Compose speakers first review
- Entry level subwoofer series
- Alarm and tracking for vans and campers

### Featured brands

- Audio System Germany
- ebi-tec
- Ground Zero
- Helix
- Hifonics
- Phoenix Gold

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# HIFONICS

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HEAVY  
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**CAR & HiFi** 6/2023

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Spitzenklasse **1+**  
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Preis/Leistung hervorragend

**EMV-TIPP**  
Ungestörter Radioempfang  
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HiFonics ZXE2000/1  
Oberklasse **1,1**  
**CAR & HiFi** 8/23  
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**LEISTUNGSTIPP**  
Oberklasse  
**CAR & HiFi** 5/2023

HiFonics ZXE600/4  
Oberklasse **1,2**  
**CAR & HiFi** 8/23  
Preis/Leistung sehr gut

## ZEUS ZXE EVO SERIES

### 5 X ANALOG CLASS A/B

2/4/6-Channel Amplifiers up to 1000 Watts RMS

### 2 X HYBRID CLASS A/B & D

5-Channel Amplifiers up to 1500 Watts RMS

### 3 X DIGITAL CLASS D

Mono Amplifiers up to 2000 Watts RMS

# THE NEW **ZEUS** EVOLUTION



HiFonics is a brand of Audio Design GmbH  
Am Breilingsweg 3 · D-76709 Kronau  
Tel. +497253 - 9465-0 · Fax 946510  
[www.hifonics.de](http://www.hifonics.de) - [www.audiodesign.de](http://www.audiodesign.de)

# Interesting novelties

Welcome to the third edition of CAR&HIFI INTERNATIONAL this year. I am pleased to present you a selection of fine devices for more fun (and safety) on the road. There is an alarm system that can be calibrated to all types of vehicles, from cars to campers to trucks. We are also introducing a new series of amplifiers that offer excellent performance at a competitive price. You are probably also looking forward to the first test of Helix's innovative competition loudspeaker, and for fans of the unobtrusively integrated bass experience, we are presenting two particu-

larly flat subwoofer solutions, with and without an enclosure. I would be happy to welcome you back next year for the next issue. Until then, enjoy reading!



Elmar Michels  
Editor-in-chief



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**GROUND ZERO**  
GERMAN ENGINEERING

**GROUND ZERO**  
URANIUM SQ AMPLIFIER



**URANIUM**

**GZUA 6SQ**

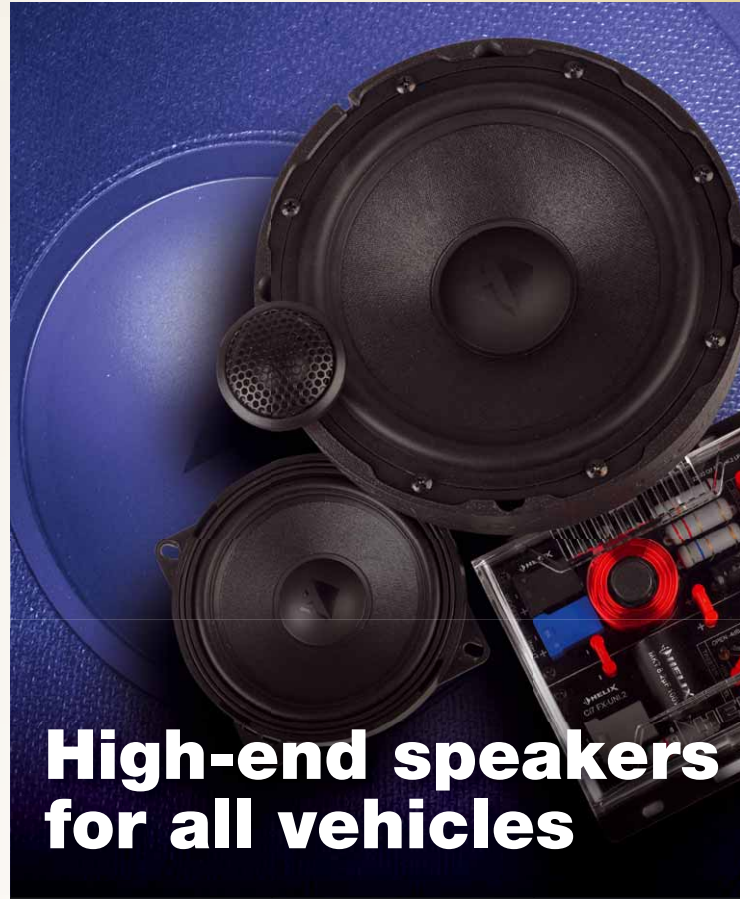
- High-performance SQ amplifier
- 1500 W max
- 2-ohms stable (stereo mode)
- Adjustable BIAS control
- High-performance OPA 2134 operational amplifiers
- High-end WIMA® capacitors
- Status LED indication
- Wide-band adjustable high pass & low pass filters
- Band-pass feature with activated LPF & HPF
- Adjustable input sensitivity
- Soft delayed remote turn-on
- Thermal / short circuit / overload protection





# New amplifier series

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# High-end speakers for all vehicles

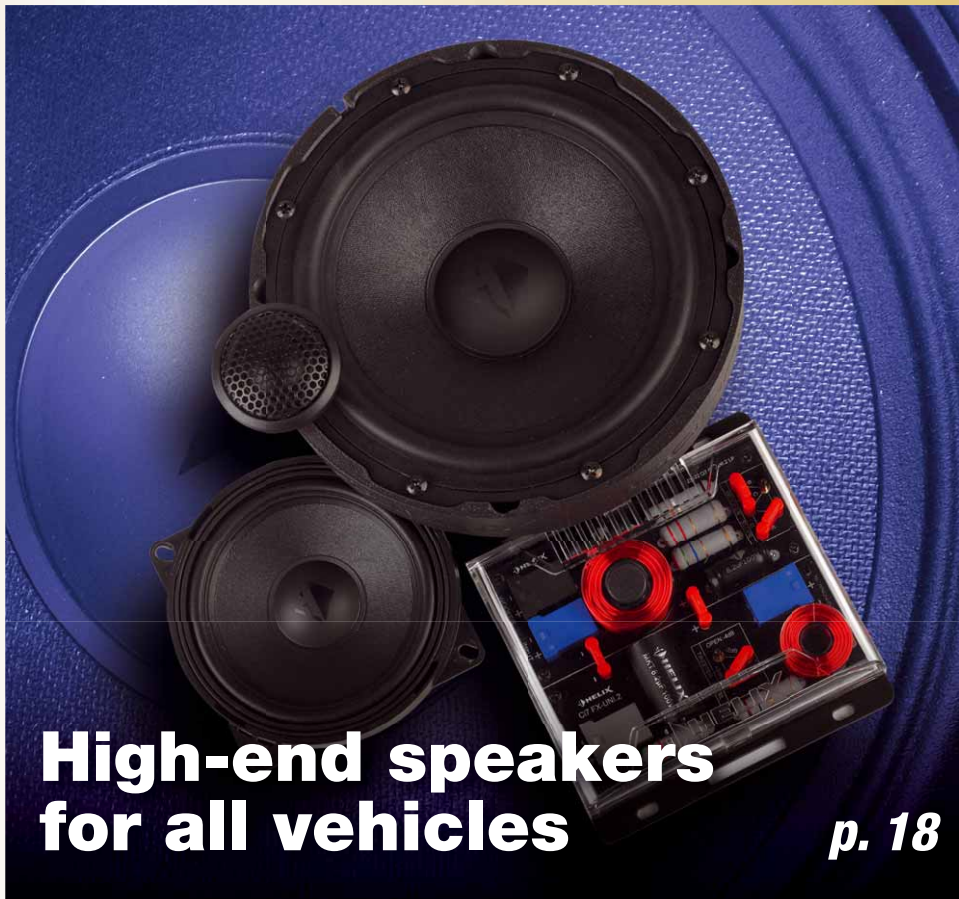


# Affordable subwoofers

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# Shallow subwoofer box



## High-end speakers for all vehicles

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## Shallow subwoofer box

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## ► Hifonics Zeus ZXR800/8DSP

An 8-channel amp with 10-channel DSP that is surprisingly user-friendly given its range of functions now complements the Zeus Power series. It comes in the same outfit as its ZXR model siblings. In terms of price, the DSP amp is also in the moderate price segment like its series colleagues. This should particularly delight DSP rookies who want to supply a multi-channel system with HiFonics power. The ZXR800/8DSP can be controlled via PC software and smartphone app; its integrated Bluetooth receiver also allows audio streaming in addition to DSP control.

● [www.hifonics.de/english/](http://www.hifonics.de/english/)



## ► Terminal amplifier

As a supplement to the M-400.1 MD, Audio System is now offering a terminal amplifier at a lower price. The CO-220.1 can be installed in place of a standard speaker terminal in any 4 ohm or 2 ohm enclosure subwoofer to power it up. With 150 and 220 watts, it has enough power as a practical solution for entry-level subwoofers.

● [www.audio-system.de](http://www.audio-system.de)



## ► Black Elegance subwoofers

Double magnets weighing up to 120 ounces, solid cast baskets and solid black protective grilles with a hexagon/honeycomb structure communicate generosity in the choice of materials, the power handling of up to 700 watts RMS signals willingness to perform. With the 8, 10 and 12 inch versions of the MG subwoofer series available, Musway is sending a new bass trio on the road that rounds off exquisite audio concepts with pleasant bass. The MG Subs feel particularly comfortable in closed boxes. When it comes to prices, Musway is still keeping a low profile, but wants to once again underline its brand image of offering affordable, top-quality audio technology with a high-quality look.

● [www.esxaudio.de/english](http://www.esxaudio.de/english)





# QUANTUM

## SOUND PROCESSORS



„The QE812SP with its built-in music player is the most complete offering on the market.“  
(Elmar Michels, Car & Hifi)



Incl. RC-BT Bluetooth® Steering Wheel Remote Controller



### QE812SP € 1499,00\*

#### Digital Full HD Audio Player

HD Audio: DFF / DSF / DSD (up to 24 bit/256 kHz), Uncompressed: WAV / FLAC / APE / AIFF  
Compressed: MP3 / AAC / OGG / WMA / MV, can be saved on an optional USB medium (FAT32, NTFS)  
Controllable via included RC-BT steering wheel controller via Bluetooth®, ESX Music App for iOS/Android via Bluetooth® or optional RC-QE Remote Controller with large LCD Color Display and large Knob

#### Digital 12-Channel Sound Processor

Analog Devices™ ADAU1452 Dual 2 x 32 Bit Processor, 294 MHz, Full HD Audio 96 kHz  
AKM Velvet Sound™ Series 5 Signal Converter, A/D 32 Bit, D/A 32 Bit, 8 x RCA Input  
8 x High Level Input with EPS PRO up to 40 V/RMS, Optical & Coaxial Input, S/PDIF 192 kHz, 24 bit  
12 x RCA Output @ 6 V RMS (THD+N <0.0004%) each with a 31 Band EQ, PEQ / Highshelf / Lowshelf  
Integrated Bluetooth® Receiver for DSP control via ESX TOOLKIT App and Fully HD Audio Streaming  
A2DP/AVRCP, Codecs: aptX, aptX LL, aptX HD, AAC, SBC · Dimensions: 226 x 43 x 120 mm

### RC-QE € 199,00\*

Remote Controller with large LCD Color Display and large Knob for controlling the DSP and Audio Player, incl. Connection Cable (5 m)



ESXAUDIO.DE

ESX is a brand of Audio Design GmbH · www.audiodesign.de  
Am Breilingsweg 3 · D-76709 Kronau · Tel. +497253 - 9465-0

\* Manufacturer's suggested retail price. All brand names, trademarks and trade names are owned by their respective owners.





ebi-tec GPS Alarm 5.0 Edition Van Protect

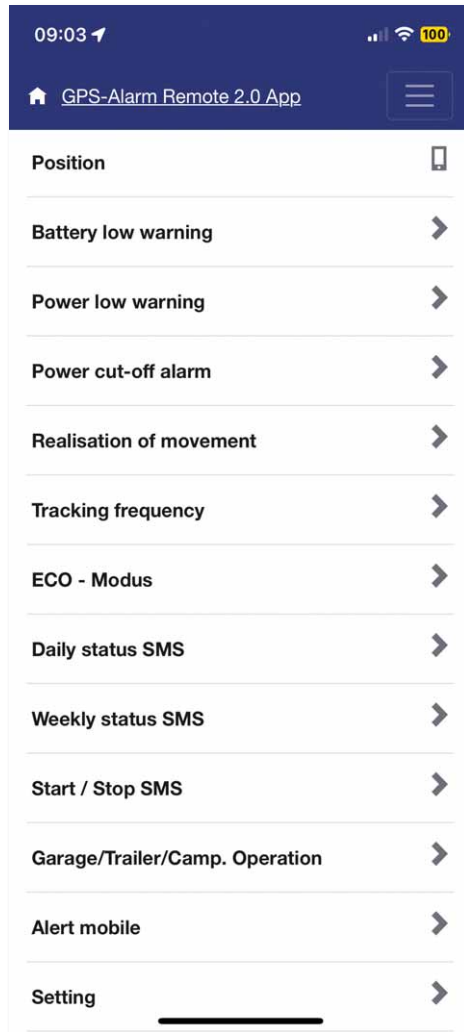
# Alarm and tracking system

- ▶ The alarm and tracking specialist ebi-tec is launching its GPS Alarm 5.0, tailored to vans and motorhomes in the 1.8 to 3.5 t weight class.

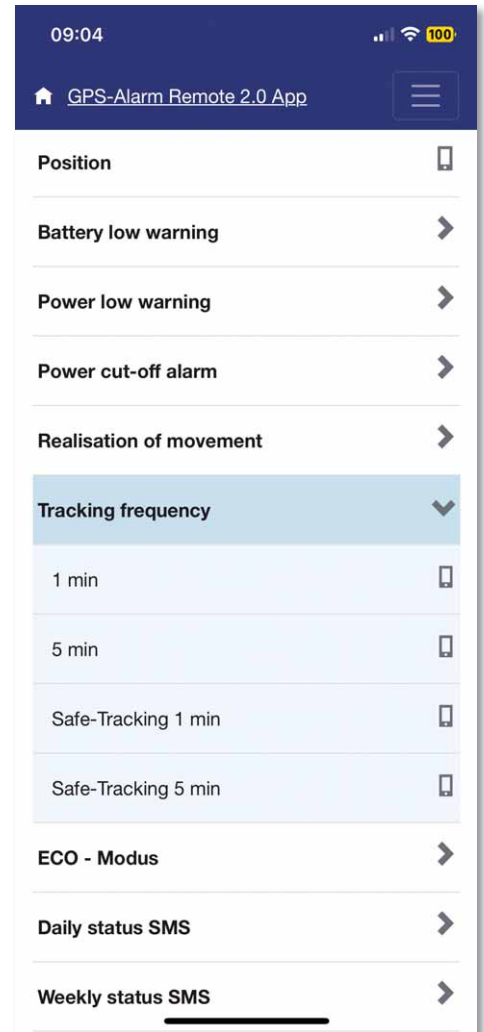


The latest version of the GPS Alarm supports the 4G mobile standard in addition to 2G and 3G networks. The user does not incur any monthly charges when using prepaid SIM cards. In addition to the versions for passenger cars and heavier RVs, there is now a model for vans and smaller RVs based on vans (VW Bus, Mercedes Vito, and others). The difference lies in the precise tuning of the motion sensor adapted to the vehicle weight, optimizing the response behavior and preventing false alarms. In addition, the user can fine-tune the sensitivity in four stages via the app.

In addition to the Van Protect alarm system, other versions of the GPS Alarm 5.0 are available. The editions WoMo Protect (motorhomes 2.8 to 7.5 t), Car Protect (cars up to 2.5 t) and Bike Protect (motorbikes) are available in English, French and German languages.



You can make numerous settings in the app

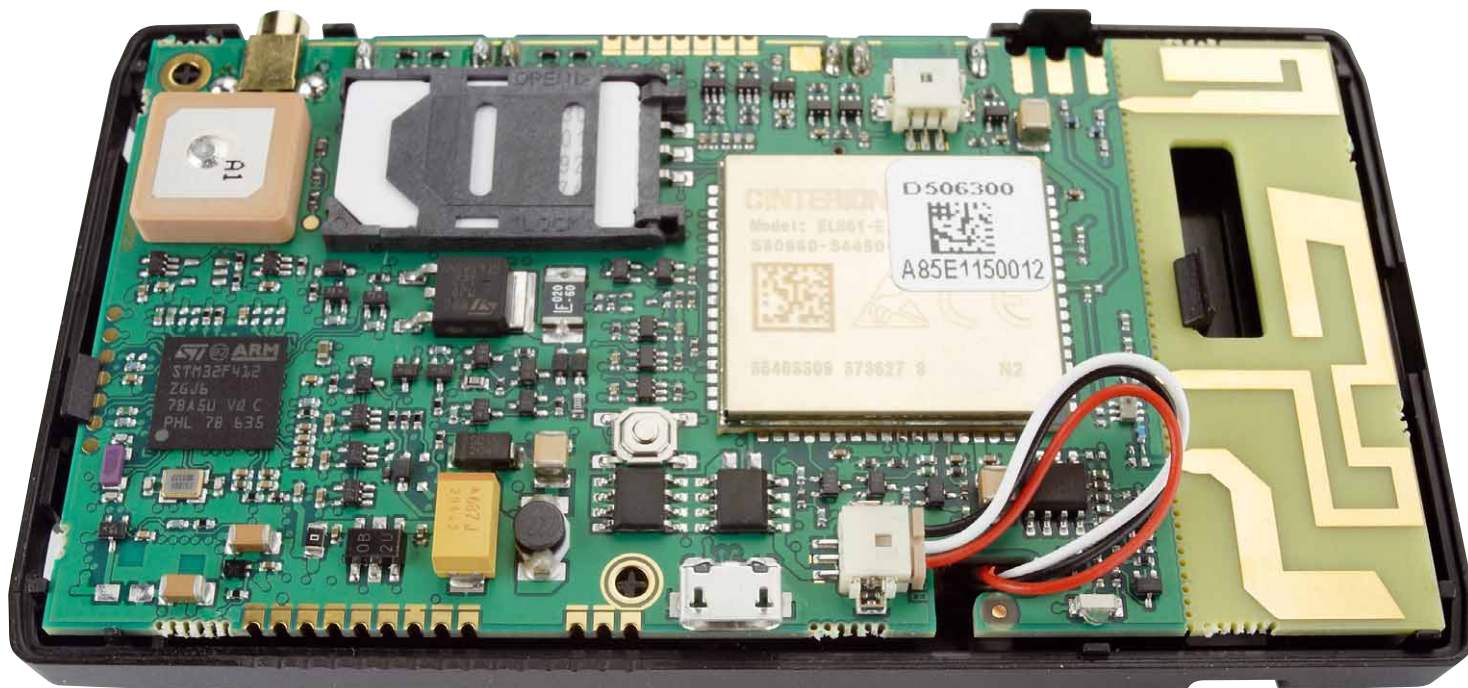


The app is available in English, French and German



## Installation

All vehicles can easily accommodate the very compact box (approximately 11 x 6 x 1.5 cm). Only three cables are required for connection: ground, ignition plus, and continuous plus (terminals 31, 15, and 30). In addition, the box has an integrated battery to maintain operation even if thieves disconnect the power supply.



Insert the SIM card inside the box

## Functionality

If the alarm system registers a movement or vibration, it sends a silent alarm via SMS. It does the same when the vehicle is disconnected from the power supply or the onboard voltage drops below 11.7 volts. The internal GPS antenna or, optionally, an external one determines the vehicle's position. If GPS tracking is impossible, radio cell positioning determines the vehicle's position. The vehicle position determined in this way is communicated by SMS. In addition, the system can send a weekly or daily status SMS, as desired, in which the onboard voltage is also reported. This makes the system ideal for long-term monitoring, e.g., motor homes parked over the winter. The system is configured and controlled via the free app.

## Jamming-Detection

Like its predecessor, the 5.0 has an anti-jamming functionality. If thieves try to interfere with the radio transmission via jamming, the system notices this, cancels the attack by changing the frequency and sends an alarm text message.

## Conclusion

The ebi-tec GPS Alarm 5.0 in the van edition is an excellent alarm and tracking system that makes it extremely difficult for even technically highly equipped thieves to steal the vehicle unnoticed. The tuning to the vehicle weight effectively prevents false alarms.

*Dipl.-Phys. Guido Randerath*

### ebi-tec GPS Alarm 5.0 Edition Van Protect

Price	540 Euro
Contact	ebi-tec, Weissach im Tal
Hotline	+49 7191 9333790
Internet	www.ebi-tec.de

### Specifications

**Alarm and tracking system for vans and small campers, also available tuned for other cars**

- SMS notification in case of movement, power disconnection, or voltage drop.
- Status report and position message via SMS
- Position determination via GPS and radio cell localization
- Eco mode
- Protection against GPS and GSM jamming
- Control via app

**CAR & HiFi**

INTERNATIONAL

Germany 3/23

"First-class alarm and location system"

Hifonics ZXE2000/1 + ZXE600/4 –  
the first amplifiers of the new Zeus  
entry-level series

# New amplifier series

- ▶ Hifonics is going all out under the ZXE label. Subwoofers and several amplifiers are just coming into stock to form Hifonics' new budget class.





The first two ZXE amplifier series models are already available for testing: the four-channel ZXE600/4 and the mono ZXE2000/1. But this is just the beginning since at least ten models are planned with 1, 2, 4, 5, and 6 channels, whereby our 2000/1 is the smallest of the three monos. The first sensation after unpacking is astonishment. Is this supposed to be an entry-level series? Okay, looking at the prices of 250 and 280 EUR, it is clear that there are a lot of cheaper amplifiers, so it is only the entry to Hifonics standards. The ZXEs are built very well; we have solid cast housings and front panels made of cast aluminum instead of plastic or sheet metal. The terminals are great: large, well-

Modern layout with generous power supply inside the mono amp

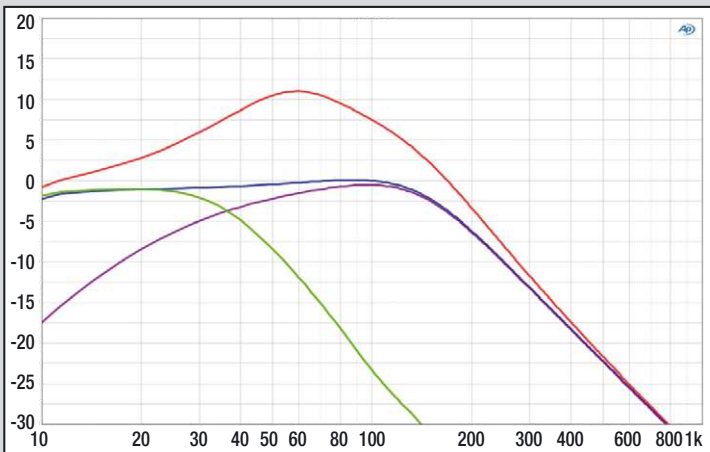


insulated, and solidly attached. And there are encapsulated pots and even nut-screwed RCA jacks – the more expensive series can't do that one bit better. The usual Hifonics gimmicks are not missing, either. There is white/blue switchable lighting (also for the terminals and fuse holders), and both test amplifiers come with a cable remote control. The mono ZXE2000/1 comes fully equipped. There is a boost, a subsonic, and an adjustable phase. Things that some

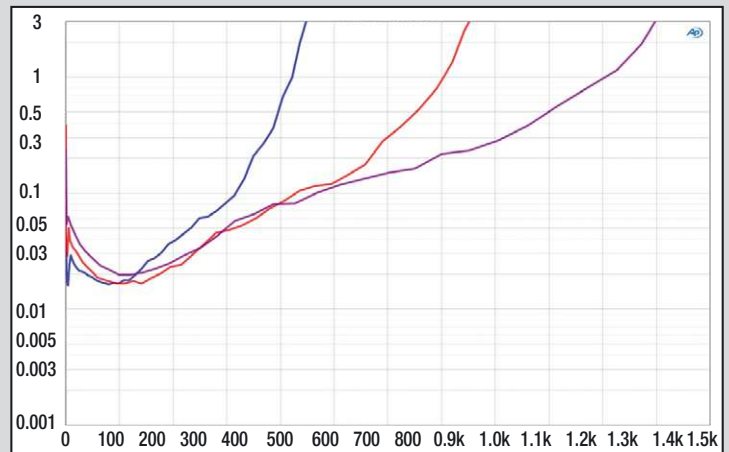


The ZXE subwoofer amp sports full fledged filters and a master/slave function to link two amps

## CAR&HIFI Laboratory



The ZXE2000/1 has everything on board. Bass boost, low pass, subsonic, and phase provide universal applicability



The ZXE2000/1 produces low distortion regardless of load while it is powerful with 420, 700, and 1,000 W at the same time

more expensive amps do not have to offer. And the most important: All ZXE amps have the in-house EPS system, including an automatic switch-on at the speaker level inputs to operate on all factory radios safely. Small compromises are the maximum input voltage of only 10 V, so adapters are required for factory amplifiers, and the slightly reduced filter equipment of the ZXE600/4 can only create a bandpass on the rear channels. Another feature of the ZXE series: The subwoofer channels are digital, the others analog. So, the ZXE2000/1 is a Class D amplifier, and the ZXE600/4 works in Class AB. There's some logic in whether you find this good or bad. Of course, the ZXEs are not the smallest amplifiers in the world, but for this clientele, there is the much more modern ZXS700/4, for example, which costs only 30 EUR extra. Thus, the ZXEs are a tad cheaper and more old-school - some fans have dedicated themselves to analog sound and for whom size and installability are less critical.

The very positive impression remains after opening the housing. Of course, they are less massive than the Hifonics' power monsters, and it's also clear that the ZXEs' power output doesn't require an enormous amount of copper in the form of transformers and coils. What is present is very neatly made for it, and both ZXE600/4 and ZXE2000/1 flaunt dual power supplies, which are anything but economy models for amateurs. Otherwise, we are looking at precisely what is expected—a Class D circuit with a solid assembly of four MOSFETs in the amplification and discrete SMD construction. The ZXE600/4 has discrete Class AB amplifier paths and one pair of



### Specifications

Channels	1
Power 4 ohms	422
Power 2 ohms	710
Power 1 ohms	1022
Sensitivity max. mV	420
Sensitivity min. V	>8
THD+N (<22 kHz) 5 W	0,020
THD+N (<22 kHz) Half Power	0,043
Signal-to-noise ratio dB(A)	80
Damping factor 20 Hz	639
Damping factor 40 Hz	639
Damping factor 60 Hz	639
Damping factor 80 Hz	639
Damping factor 100 Hz	639
Damping factor 120 Hz	639

### Features

Low pass	40 – 150 Hz
High pass	–
Band pass	10 – 150 Hz
Bass boost	0 – 12 dB/60 Hz
Subsonic filter	10 – 40 Hz
Phase shift	0 – 180°
High-level inputs	•
Automatic switch-on (Autosense)	•, DC
RCA output	• Master/Slave
Start/stop capable	• (7,4 V)
Dimensions (L x W x H in mm)	282 x 248 x 64
Others	remote control, EPS

### Hifonics ZXE2000/1

Price **280 Euro**  
 Contact Audio Design, Germany  
 Internet [www.audiodesign.de/english](http://www.audiodesign.de/english)

### 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**



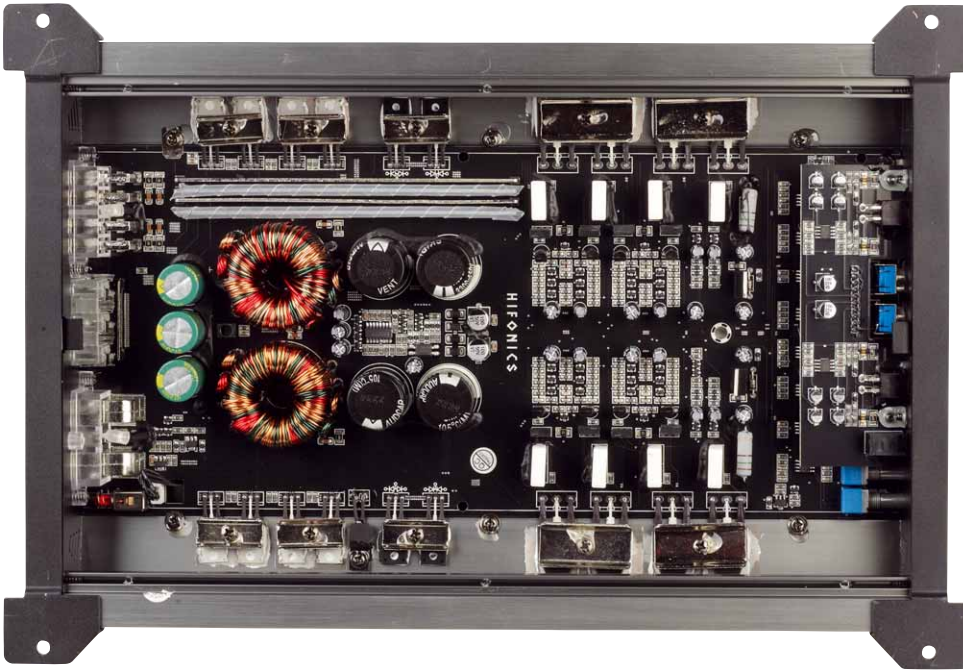
**CAR & HiFi**

INTERNATIONAL Germany 3/23

Price/performance: excellent

"Well done, affordable series."





The four-channel amp features an , analog' class AB board

MOSFETs per channel. Everything looks clean and tidy, also because of the generous circuit boards and suitable components in the respective signal processing, such as the legendary operational amplifier 5532 from Texas Instruments.

**Measurements and sound**

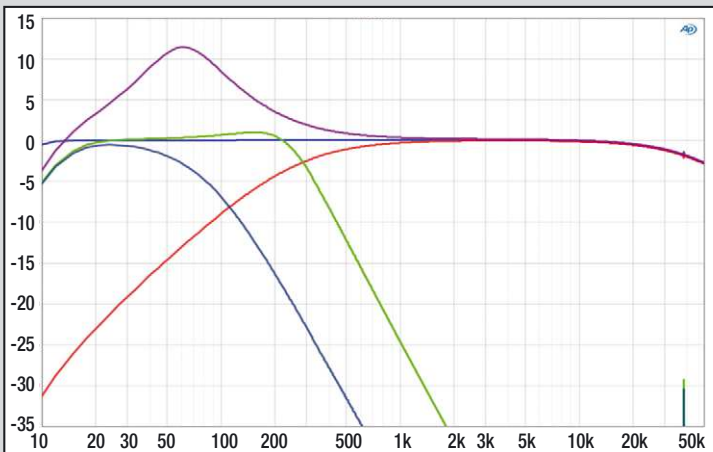
In the lab, the analog ZXE600/4 performs splendidly. With only little

distortion, it provides a lot of power. With 100 watts into 4 ohms, it is also two classes higher than cheaper amplifiers and belongs to the strongest amps in the Upper Class. Into 2 ohms, it's even more than promised, with 160 watts per channel. Unfortunately, Hifonics breaks with the known naming tradition for the ZXE2000/1. The first number indicates the total power of all channels in all other series, i.e., the sum of all channel powers at the lowest possible load. However, it is doubled here because the ZXE2000/1 manages

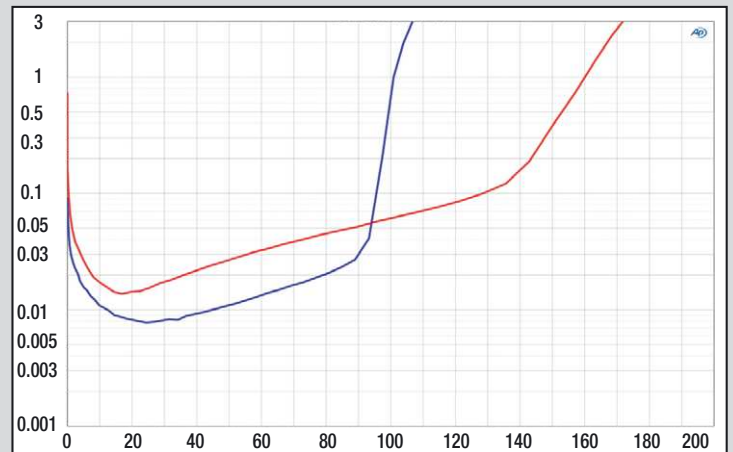


The ZXE score with noble aluminum fronts and very solidly mounted sockets

**CAR&HIFI Laboratory**



For the front channels, there's only the high pass. The rear channels are equipped with a bass boost and bandpass



The 4 Ohm curve shows the typical slight increase to high power levels before an apparent kink announces the power limit

1,000 watts into 1 Ohm. Of course, that's fine, just not what it says. Into 2 ohms, the ZXE2000/1 makes over 700 watts, and into 4 ohms, it's a solid 422 watts – enough for most subwoofers. The rest of the measurements also look great; the mono hardly produces any distortion and has plenty of damping.

Sound-wise, the mono belongs to the amplifiers with great measurement values and sound accordingly powerful. It has no problems exhibiting its power even in the deep bass and generates a lot of pressure when the volume is cranked up. And it does so without any weaknesses in other areas—a rock-solid performance without fault. The ZXE600/4 runs as expected but also immediately attracts attention. We are looking at nothing less than a hot insider tip for sound-quality fans. The ZXE600/4 offers a sound „to bathe in.“ It plays nice and warm so you can listen to it for hours. However, it does not undercut the edginess of some recordings and can deliver harsh sounds as well – true to the recording. It also convinces us in the bass range by accurately reproducing crisp bass drums and fat bass alike. Considering tonality and the overall impression, we have no criticism. The performance is balanced and coherent.

### Conclusion

The ZXE amplifiers are a perfect completion of the Hifonics program. In addition to small modern amplifiers on the one hand and fat performance models on the other, there are now affordable ones for friends of analog multi-channel amplifiers.

*Elmar Michels*



### Specifications

Channels	4
Power 4 Ohm	101
Power 2 Ohm	160
Power 1 Ohm	0
Bridged Power 4 Ohm	320
Bridged Power 2 Ohm	0
Sensitivity max. mV	210
Sensitivity min. V	7,3
THD+N (<22 kHz) 5 W	0,015
THD+N (<22 kHz) Half Power	0,012
Signal-to-noise ratio dB(A)	86
Damping factor 20 Hz	109
Damping factor 80 Hz	109
Damping factor 400 Hz	109
Damping factor 1 kHz	109
Damping factor 8 kHz	99
Damping factor 16 kHz	4

### Features

Low pass	50 – 250 Hz (CH34)/
High pass	10 – 250 Hz
Band pass	10 – 250 Hz (CH34)
Bass boost	0 – 12 dB/60 Hz (CH34)
Subsonic filter	–
Phase shift	–
High-level inputs	•
Automatic switch-on (Autosense)	•, DC
RCA outputs	–
Start/stop capable	• (7,5 V)
Dimensions (L x W x H in mm)	362 x 248 x 64
Others	2, 4 or 5 CH In, Remote Control

### Hifonics ZXE600/4

Price	250 Euro
Contact	Audio Design, Germany
Internet	www.audiodesign.de/english

### 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 %	★★★★★

Upper class



**CAR & HiFi**

INTERNATIONAL

Germany 3/23

Price/performance: very good

"Well done, affordable series."

Compose i7: first test of the top series  
from Helix's new Compose platform

# High-end speakers for all vehicles

- ▶ In its Compose platform, Helix has not only introduced three new speaker series, but created a whole new system of how to equip your vehicle with a set of speakers as desired.





The 165 mm woofer features a glass bead-reinforced plastic basket with integrated terminals for plugs and cable lugs

In Compose, Helix introduces the Basic, i3 and i7 series (in ascending price order), which represent a new approach to speaker retrofitting. It is no longer a matter of standard kits and then BMW, VW, and other speakers, instead Compose is both universal and vehicle-specific at the same time. Neglecting the cheaper Basic series for the time being, all speakers fit either from house in common standard openings or they are supplied with installation rings for standard places. It is also possible to use them right off the bat like any other speaker set. But beyond that, Helix offers vehicle-specific moun-



ting solutions for Audi, BMW, Ferrari, Fiat, Ford, Jaguar, Land Rover, Mercedes, Porsche, Citroen, Peugeot, Opel, Skoda, Tesla, Volkswagen and Volvo – with more to come. The system is called FlexMount and includes a tweeter, a mid-range driver, a 165 woofer and a 200 woofer. Only the 130 woofer is not featured, since it fits without the need for adaptation in all vehicles. The FlexMount20 deals with the tweeters (Basic, i3 and i7); they are mounting rings that make a click connection to the tweeter and to the installation location

The 100 mid-range driver can be equipped with different inlays that can accommodate original connectors from all brands

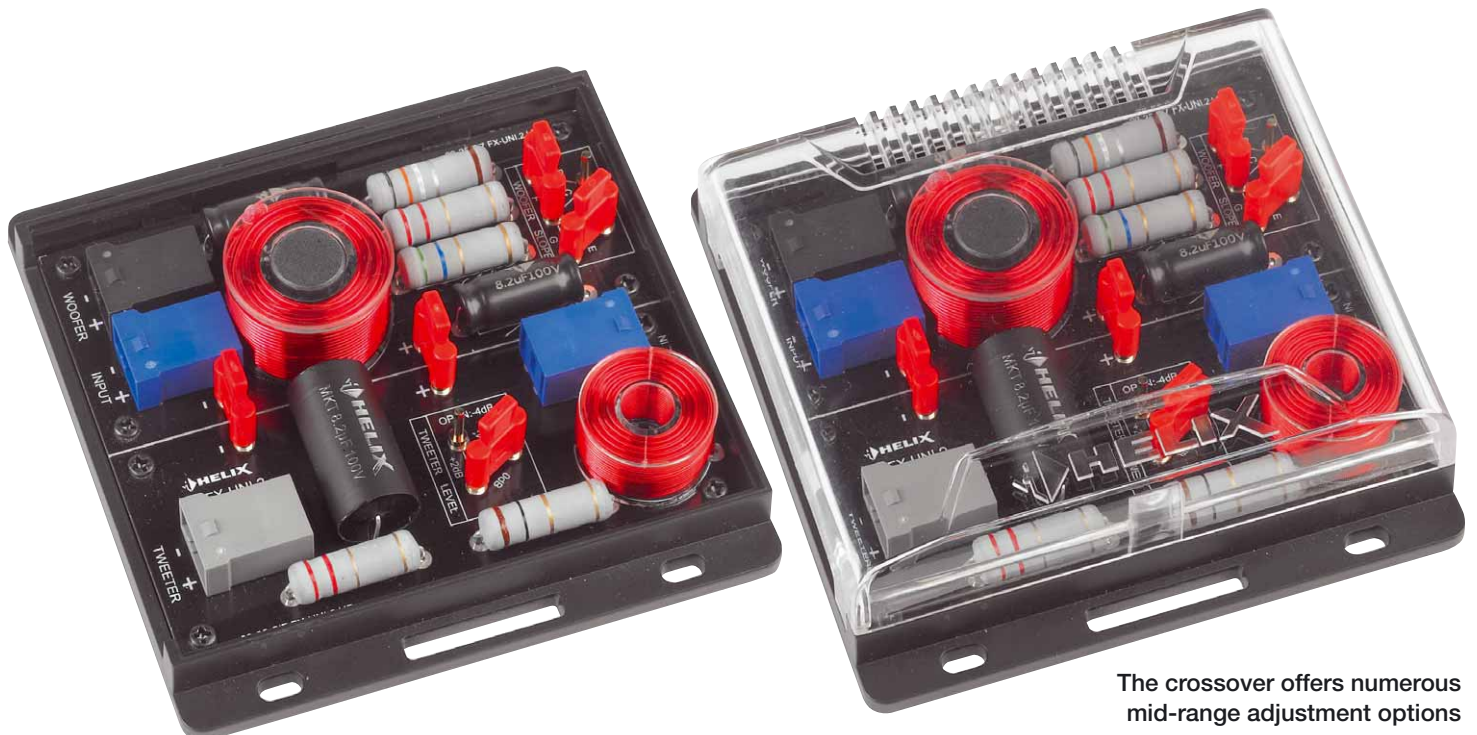
At the Salzburg fair, Helix introduced the Compose i7 series in a Porsche Taycan

of the vehicle, so that optimal acoustical and mechanical installation becomes child's play. The 100 mid-range driver is installed in its installation locations using vehicle-specific FlexMount100 mounting rings (i3 and i7), which snap into place on the round mid-range driver basket using a bayonet. For the 165 and 200 woofers, there are rings that adapt to vehicle-specific mounting diameters and bolt circle diameters and ensure the correct distance from the unit carrier of the door; even seals made of materials matched to the vehicle are included. Helix has used a trick on the 200 for the sake of Porsche drivers. With the same diaphragm area, the 200 woofer has a slightly smaller basket diameter, so that it fits without any problems, unlike the standard 200.



Speaking of Porsche: the Compose concept does not end after the individual speakers are installed; it also includes the wiring. Without exception, all vehicles are wired with a

plug-in system for the respective vehicle plugs, so that a retrofit is easily feasible and there is no risk of any trouble in warranty cases.



The crossover offers numerous mid-range adjustment options

Our test system consists of the Ci7 W165FM-S3 woofer, the Ci7 M100FM-S3 mid-range driver, the Ci7 T20FM-SC tweeter and the Ci7 FX-UNI.2 two-way crossover. Prices are 400 euros per pair for the speakers and 140 euros for the pair of crossovers. This means that we have a three-way semi-active system, which comes from the top series i7 and on which the Compose philosophy can be perfectly studied. The 165 comes with a DIN-compatible basket, which has a corrugated rim instead of a round one so that it fits positively into the adapter rings. Its connection terminal has a double design, one with the universal contacts for cable lugs and with the ProConnect christened terminal, a large and sturdy connector. A cable for the universal ComposeConnect connection is included, which fits on the Compose crossovers but can also be extended with appropriate connectors. For this purpose, there are specially developed plastic

housings for the installers, which turn standard flat plugs and couplings into a practical connection that can be used anywhere, i.e., in the ComposeConnect. The mid-range driver comes with a bayonet ring for standard places, its terminal is called FlexConnect. Helix understands this to be a socket on the speaker basket for vehicle-specific inlays, which in turn accommodates the original vehicle plugs. Enclosed is again a cable on the ComposeConnect and an inlay of type A (for Mercedes). For the tweeter, we decided to use a Mercedes connection; for universal further construction, an additional cable on the ComposeConnect is featured. The tweeter looks standard at first glance, because it sits in the universal holder with an integrated grille ex works. Freeing it from the mounting ring reveals an ultra-compact tweeter in a metal housing that uses a small three-quarter-inch silk diaphragm and has a coupling volume. The small diaphragm diameter is

necessary so that the tweeter, including the mounting ring, fits in all vehicles; in addition, the small dome has better omnidirectional response than a larger diaphragm. This is highly appreciated, especially in many factory settings that are hardly designed for good sonic placement and alignment of the tweeter. The rear chamber is important for the small diaphragm to keep up at low frequencies, so the i7 tweeter has advantages rather than disadvantages over a larger tweeter. The i7 mid-range driver, like all i3 and i7 cone drivers, is equipped with a plastic basket. This leads to basic advantages such as low weight, insensitivity to resonance and magnetic “transparency”, i.e., no influence on the magnetic field in the speaker motor. But Helix would not be Helix if they had simply taken a bit of plastic off the shelf. In contrast to the fiberglass-reinforced basket, the Helix basket is filled with glass beads, which not only increases stabi-



The compact tweeter is supplied with a grille mount; suitable mounting rings for the various vehicle models are available



The 165 can be installed using different mounting rings, available versions include even Bugatti or Scania

lity but also results in an advantage over the fiber filling in terms of resonance behavior. The whole thing also looks anything but cheap – all three i7 chassis are excellently manufactured and proudly display the “Made in Germany” lettering. The i7 series also relies on high-end technologies developed in-house by the parent company Audiotec Fischer for the upscale Brax brand. One example is the drive of the mid-range driver with a specially shielded neodymium drive that minimizes the sound-damaging interaction of the speaker’s magnetic field with sheet metal in the car door. The materials are generally of the finest. The diaphragms are made of paper in the i7 series. However, the same applies here as with plastic: Not all papers are the same. Thus, the Helix i7 paper diaphragm is a high-end product with a specially developed recipe and a manufacturing process that is also proprietary, in which the diaphragms are scooped by hand and then only partially pressed. By the way, the Ci7 M100FM-S3 is a pure mid-range driver and cannot be used in 4” two-way systems; the narrow surround and the motor are optimized for mid-range reproduc-

tion so that the 100 has much more efficiency constructed in than a 4” midbass driver. The 165 can run as a woofer or as a midbass, so that 16 two-way systems are also possible. Its motor works conventionally

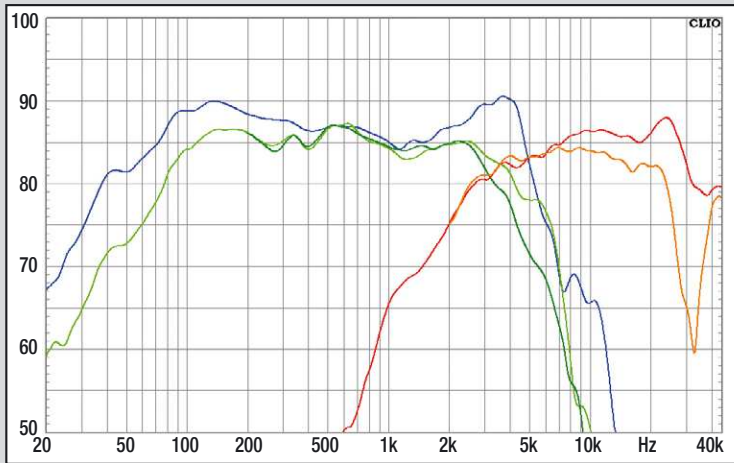
with a ferrite magnet feeding a large one-and-a-half-inch coil, so power handling and level are taken care of. The Ci7 FX-UNI.2 crossover can cross two-way systems as well as the mid-range driver and the i7 tweeter, as is our case with a partially active three-way system. As already known from Helix, the crossover can be divided into a woofer and a high-tweeter frequency if necessary, which can then be installed separately near the speakers. Neat components and very nice contact-safe jumpers leave a good impression, so the woofer coil is sufficiently dimensioned to not go into saturation even at high levels. Instead of the usual screw terminals,



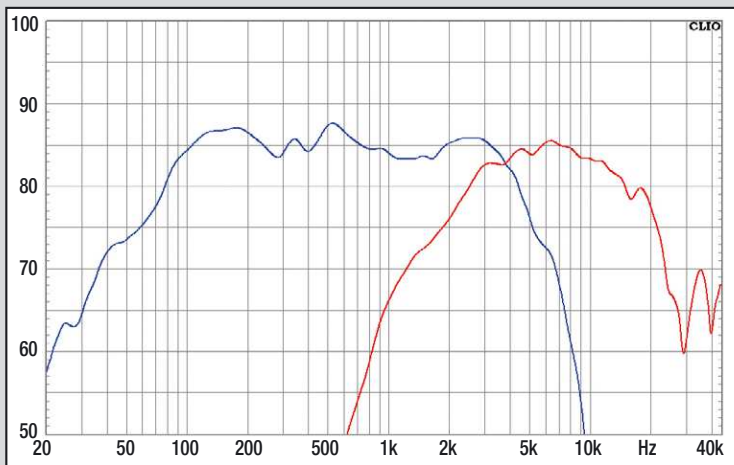
For the mid-range driver, there are various mounting rings available for the most varied vehicle models



## CAR&HIFI Laboratory



The tweeter (red) and mid-range driver (green) show a very good omnidirectional response. The woofer (blue) has no filtering during the measurement and it is actively driven on an extra pair of channels.



Here, the mid-range driver and tweeter are measured under a 45° angle. The result is almost identical to the measurements on axis



The i7 mid-range features motor technologies borrowed from the upscale Brax brand

there are of course ComposeConnect jacks in which the plugs sit bombproof. The tweeter sees a classic 12 dB high-pass with four-stage level control, and for the mid-range drivers, we are basically looking at a 12 dB circuit with a variable RC element. Two capacitors and three resistors can be connected together in a variety of ways, allowing a wide range of influence on the mid-range level. This is important for different installation situations in different vehicles, and Helix has solved this excellently.

### Measurements and sound

Before we get to the evaluation of the measurement results, there are two things to address. First, the Compose speakers were developed in a car and not under laboratory conditions as is usually the case beforehand. Second, the development process took into account the cooperation with the in-house DSP amplifiers of the Match and Helix brands. Among other things, the former affects the frequency response of the speakers, which is “by nature” tuned for use under adverse installation conditions in various vehicles. This is especially noticeable with the 20 tweeter and the 100 mid-range driver, because the sound bundling increases towards high frequencies. Conversely, the bundling effect is not so bad with a clean woofer that is operated in the footwell up to 300 Hz. The tweeter is designed to deliver a uniform result up to the highest possible frequency, especially under an angle or independent of an angle. The result is a sound pressure curve that shows a slight boost on the axis, but still delivers a lot of sound pressure under an angle. With the i7 mid-range driver, we find a steady increase to high frequencies on the axis and without a crossover. That would be too much of a good thing for a home speaker but installed in a car and possibly radiating a bit downwards towards the footwell, one is grateful for every dB in the mid-range. Thus, even the measurement at a rather large angle of 45° is almost linear. Even with a crossover the natural boost can be used, because the crossover can filter it away as needed. And this is better than a crossover that generates a high sound pressure in the mid-

range by overshooting the filters, because the electrical boost results in a worsened decay. If we look at our passive mid- and high-range of the test system, the crossover offers excellent possibilities to adjust the mid-range. On the axis it looks perfect, but then for fun we combined measurements of the mid-range driver and tweeter (with a different crossover setting) at 45° angles, and lo and behold – except for the inevitable drop in the tweeter, just as perfect as on the axis! The tweeter is characterized by a very good omnidirectional response, so it loses very little sound pressure towards high frequencies under our standard 30° angle. The second point of matching the Compose loudspeakers to Match and Helix amplifiers becomes manifest in the fact that the impedances of each Compose loudspeaker are set to get the maximum out of the amplifiers. Audiotec Fischer knows its amplifier chips very well, after all they are a development partner of Texas Instruments. The point of the exercise is to drive the Compose loudspeakers with as much power as possible to get them as loud as possible. This leads to the fact that, for example, our Ci7 W165FM-S3 woofer can be driven with an impedance of 3 ohms at a Match power amplifier, which on paper is only 4 ohms stable. Ultimately, only the headroom is exploited here, which must be left for any speakers on the market (4 ohms with Match) for safety reasons. However, our measurements also attest to the speakers in general at our measurement, which corresponds to 2 V/1 m (1 watt at 4 ohms), above-average efficiency with corresponding sound pressure. The 165 makes a very decent 89 dB, the 100 mid-range driver also 87 dB.

For the listening test, we were allowed to take a seat in a Porsche Taycan, which was not equipped with exactly our semi-active system, but with an i7 system and an additional subwoofer. What was presented here in terms of sound was breathtaking. The detail resolution in the tweeter is insane, every tiny detail comes to the ear and creamy melting overtones are just as possible as brightly radiating wind instruments or crisp percussion sounds. Vocals and instruments are reproduced in perfectly balanced tonality, deep male voices come with a full chest in the fundamental. In bass reproduction, the nicely dynamic kick range stands out, which also blends in nicely. The best thing, however, is that eve-

rything sounds like it was cast in one piece and the music “breathes” and completely detaches itself from the speakers. The listener sits in the middle of the sound and can simply enjoy it.

## Conclusion

After all the sophisticated technology and the great ideas for integration into the vehicle, the Helix Compose i7 remain first and foremost superbly functioning and built speakers that enable a level of sound in a number of vehicle models that could not even be dreamed of half a year ago.

*Elmar Michels*

Specifications	
Basket diameter	165 mm
Mounting diameter	143 mm
Mounting depth	66 mm
Magnet diameter	90 mm
Basket midrange	98 mm
Depth midrange	27 mm
Membrane tw	19 mm
Casing tw	27 mm
XO slope wf/twt	-/12 dB
XO slope mid HP/LP	-/12 dB
Tweeter protection	-
Tweeter level adjustable	+4, +2, 0, -2 dB
Grid	-
Others	widely adjustable midrange slope
Nominal impedance	3 Ohm
DC resistance R <sub>dc</sub>	2,55 Ohm
Voice coil inductance L <sub>e</sub>	0,22 mH
Voice coil diameter	25 mm
Cone area S <sub>d</sub>	72 cm <sup>2</sup>
Resonance frequency f <sub>s</sub>	65 Hz
Mechanical Q Q <sub>ms</sub>	5,74
Electrical Q Q <sub>es</sub>	0,32
Total Q Q <sub>ts</sub>	0,30
Equivalent volume V <sub>as</sub>	5,6 l
Moving mass M <sub>ms</sub>	7,9 g
R <sub>ms</sub>	0,56 kg/s
C <sub>ms</sub>	0,76 mm/N
B <sup>1</sup>	5,11 Tm
SPL 2v, 1m	86 dB
Amplifier power recommendation	50 – 150 W

## Helix Ci7 W165FM-S3/Ci7 M100FM-S3/Ci7 T20FM-SC/Ci7 FX-UNI.2

Price	1345 Euro
Contact	Audiotec Fischer, Germany
Internet	audiotec-fischer.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 %	★★★★★
Crossover	10 %	★★★★★
Build quality	5 %	★★★★★

**Absolute Top Class**



**CAR & HiFi**  
INTERNATIONAL Germany 3/23

Price/performance: very good

*“A brilliant concept with immense sound potential.”*

**SOUND AWARD****Absolute Top Class****CAR & HiFi**  
INTERNATIONAL 3/23

Ground Zero  
GZPK 165SQ-C/GZPM 80SQ-C/GZPT 28SQ  
– Sound Quality meets Power

# Noble three-way loudspeakers

- ▶ With the Plutonium-SQ components, Ground Zero wants to enter an area that can be described as „affordable high-end.“ With pair prices of 300 to 600 EUR for the speakers, you end up with 1,500 EUR in the case of our three-way combo – perhaps unattainably expensive for average consumers but well within reach for ambitious high-end buyers.



After Ground Zero went over the top with the ULTRA components (the two-way system costs about EUR 4,000) last year, they launched the „pursuer system“ under the Plutonium label. The Reference series doesn't count since it currently only features tweeters. The previous Plutonium-SQ system is now also almost ten years old, so action was needed. The result is an ensemble of speakers with a high-quality appearance. In our test, we have a three-way system with a 6.5“ woofer, an 8“ midrange speaker, and a tweeter. There are currently no passive crossovers, and we don't miss them because, in the digital age, a DSP takes over this job.

The three drivers are new developments and have nothing in common with their predecessors. Baskets, cones, motors, everything is new. The GZPT 28SQ tweeter is the most recognizable as a typical relative of other Ground Zero tweeters. This is simply because the people from Egmmating have their distinctive style of tweeter construction. The GZPT 28SQ also relies on a large 28mm silk dome tweeter with a hand-applied coating. The tweeter is also the only one of the trio to be manufactured in Germany. The grille is held in place magnetically, making it easy

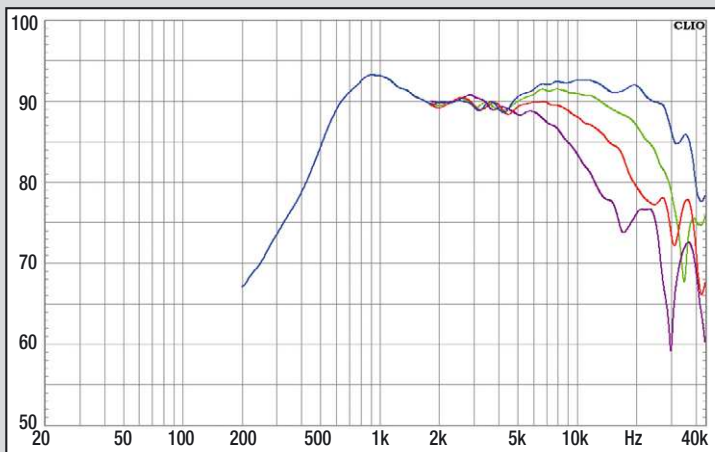
to remove. The body is made of polished stainless steel and is very heavy and solid. The mounting depth is 35 millimeters, nine due to the terminal alone. The terminal is exceedingly stable and offers plenty of space for a short-circuit-proof connection. Of course, the case houses a rear chamber connected to the volume under the dome via holes and filled with damping material.

A large 29 mm fabric dome comes to light under the magnetically mounted grille

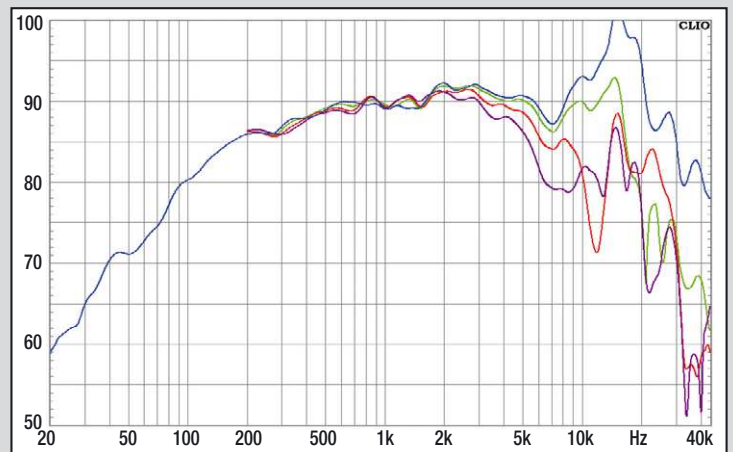


The tweeter, with its large rear chamber, is easily recognizable as a typical Ground Zero

## CAR & HIFI Laboratory



The GZPT 28SQ offers the best performance from 1 kHz, so you can't blame it for "only" running up to 20 kHz.



The midrange driver has plenty of characteristic SPL. Its cone resonance only occurs at 15 kHz and is thus very nicely shifted to high frequencies

Like the GZPK 165SQ-C woofer, the GZPM 80SQ midrange driver relies on a ceramic cone. This is nothing unusual at Ground Zero, but the cones themselves are a novelty. The base material is aluminum, electrochemically coated with a ceramic layer. This results in a sandwich diaphragm in which the ceramic coatings grant an enormous hardness but still have a certain amount of damping due to the sandwich construction. This is to achieve a perfectly „piston-like“ behavior typical of stiff diaphragms but with relatively little „hard“ resonance above the working range. The woofer has a new, picture-perfect aluminum die-cast frame with generous vents that point downward.

Meanwhile, the spider is pleased with a wide support circle that provides it with optimal working conditions. The relatively large voice coil has a diameter of 1.5 in, which is good for power handling. The motor does not work with neodymium as in the ULTRA and Uranium 165s, but not ferrite as in the Nuclear, either. Here we are dealing with a hybrid motor. In this case, that means that both a ferrite and a neodymium ring are used. From a purely external perspective, this does not save any significant volume or mounting depth. Still, using two magnets allows the magnetic field in the air gap to be amplified and, above all, linearized, which is good for distortion behavior, among other

things. The midrange driver has a similar cone to the woofer, except that the 80 uses a soft rubber dust cap instead of a hard-polypropylene cap like the 165. The small one also has a well-ventilated cast frame and just as high-quality terminals, which are even bent in the 80 and, therefore, for once, do not interfere with the installation. The motor of the GZPM 80SQ uses neodymium, of course, because a compact design has priority here. And we are talking about a full-fledged motor with a thick neodymium ring instead of a small neodymium pill inside the coil. The coil is only 19 millimeters in diameter, enough for such a small driver and good for a low moving mass. The motor is protected with

Three vents instead of one pole piece ventilation ventilate the midrange driver's motor



The frame and terminals are beautifully made. Under the chrome cap hides a hybrid motor with ferrite and neodymium

a metal cap, whose appearance is probably not yet final since our test object is the golden sample for production release.

### Measurements and Sound

We immediately notice that the hybrid drive of the GZPK 165SQ-C is very effective from the high Bxl product, which reflects the magnetic flux density and the wire length in the air gap. Likewise, we attest to

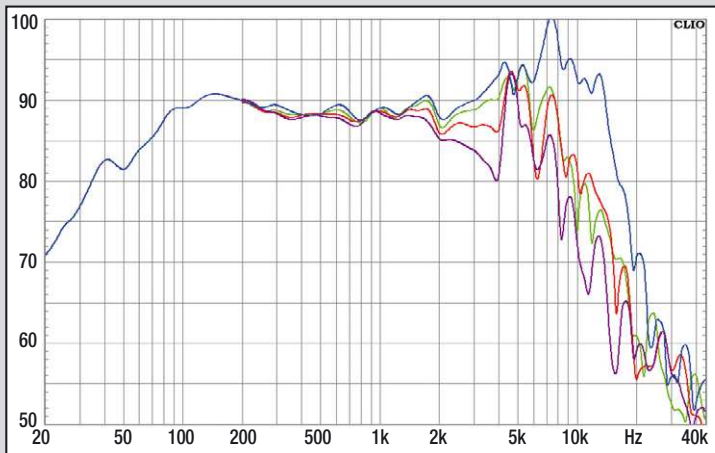
the 6.5 „s above-average 89 dB at 1 W. The frequency response is flawless up to 3 kHz, except for a slight dip at 1.8 kHz. Below 4 kHz, there is almost no distortion, even at significantly increased levels. The 165 plays not only extremely clean but also very level-stable. Above 4 kHz, the cone becomes noticeable with resonance phenomena and somewhat delayed decay - a price you must pay. The GZPM 80SQ midran-

ge driver, one of the rare drivers that work almost perfectly, shows that it can be done even better. It runs up to 6 kHz, and the cone resonances only appear at 15 kHz, well above the working range. Distortions are almost non-existent. Even at extreme SPLs, the distortion stays below 0.5% - wow! At low frequencies, the midrange also behaves exemplary. With a 100 Hz resonance frequency and negligible distortion, you can

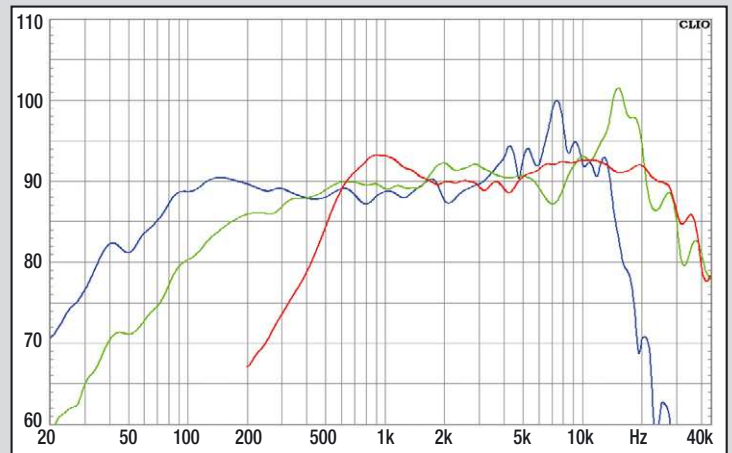


The woofer features a wide spider and a large 38 mm voice coil

## CAR & HIFI Laboratory



The GZPK 165SQ-C runs perfectly up to a solid 3 kHz. Above that, resonances become apparent, especially at 4.7 kHz, which are inconspicuous on the axis, but at 30° and 45° are even louder than on the axis.



The three drivers match nicely with their characteristic SPL. They overlap each other quite well so that crossover design will not be an issue

use it from 200 Hz. As always, a little higher is better for the maximum level. There are no surprises with the tweeter. The GZPT 28SQ does its job exceptionally well, as expected. With its resonant frequency of 790 Hz, it delivers full SPL already at 1 kHz. It can be used from 1.5 kHz and belongs to the broader-band tweeters. At the top end, it is still enough for just about 20 kHz; here, the large dome exchanges a HiRes-like upper cutoff frequency for better performance in the lower frequency range. You don't have to worry about distortions with fabric domes anyway, also not with the GZPT 28SQ.

Regarding the sound, the three-way set belongs to the honest, high-resolution representatives. The Ground Zeros play straightforwardly and firmly, giving breathtaking insights into the recording. Here, a lot comes to light that is lost with other speakers. It pays to play top-notch program material; then the sun rises when the Ground Zeros conjure up lifelike music on the stage. The bass can hammer ultra-precisely and pounds out loose, dust-dry bass drums. Both male and female voices sound authentic and aren't glossed over. The listener always has the impression that everything sounds as it should. When necessary, it becomes exceptionally dynamic, for example, with percussion, but guitars also come across as almost brutal at full SPL. In contrast, the fabric tweeter always adds beautiful details to the soundscape, ultimately removing any harshness. This works splendidly and is fun on the highest audiophile level.



The midrange driver uses a full neodymium motor with a strong magnetic ring

## Conclusion

It may sound strange to budget-minded readers, but these Ground Zero components offer fantastic value for money. The GZPK 165SQ-C, GZPM 80 SQ, and GZPT 28SQ are

the perfect choice for those who like their sound high-end and dynamic.

*Elmar Michels*

Specifications	
Basket diameter	165 mm
Mounting diameter	144 mm
Mounting depth	70 mm
Magnet diameter	98 mm
Basket diameter mid	94 mm
Mounting depth mid	41 mm
Membrane tw	28 mm
Casing tw	48 mm
Highest xo freq. wf/mid	3/7k Hz
Lowest xo freq. mit/tw	200/1,6k Hz
xo freq. used	-
Grilles	• / • / •
Others	-
Nominal impedance	4 Ohm
DC resistance R <sub>dc</sub>	3,29 Ohm
Coil inductivity L <sub>e</sub>	0,20 mH
Coil diameter	38 mm
Membrane surface	127 cm <sup>2</sup>
Resonance frequency f <sub>s</sub>	47 Hz
Mechanical Q-Factor Q <sub>ms</sub>	5,81
Electrical Q-factor Q <sub>es</sub>	0,47
Overall Q-factor Q <sub>ts</sub>	0,44
Equivalent volume V <sub>as</sub>	18,4 l
Moved mass M <sub>ms</sub>	14,1 g
R <sub>ms</sub>	0,71 kg/s
C <sub>ms</sub>	0,82 mm/N
B x l	5,37 Tm
SPL 2 V, 1 m	89 dB
Recommended power	50 – 200 W

### Ground Zero GZPK 165SQ-C/ GZPM 80SQ-C/GZPT 28SQ

Price	1.500 Euro
Contact Internet	Ground Zero, Germany ground-zero-audio.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 % ★★★★★

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INTERNATIONAL Germany 3/23

Price/performance: very good

„Outstanding measurement results and audiophile-dynamic sound.“



ZX210PBS – flat bass box from Phoenix Gold

# Shallow subwoofer box

- ▶ For people who want the full bass pleasure but not a big bass box, Phoenix Gold introduces the right subwoofer with the ZX210PBS.





 PHOENIX GOLD

Phoenix Gold offers subwoofers for every need and taste. From the SPL behemoth ZMAX to ultra-flat under-seat subwoofers, there's something for everyone. The ZX210PBS falls somewhere in the middle, but we have a particular design instead of the usual trunk box. The ZX210PBS is also about saving space, but with a standard passive subwoofer box. The trick is to build this box with a height of only 14 centimeters, flat enough that it either disappears in the double trunk

floor or takes up as little space as possible in the trunk. The flat woofer is loadable so that heavy load can be put on top without damaging the woofer. Cleverly, the ZX210PBS is a down-fire subwoofer, so the woofers are built into the bottom of the enclosure and radiate downward

For this, the bass driver must have only a few centimeters of air so that the cone can move freely and the sound radiation works unhindered. With a subwoofer, it is not decisive in which direction the cones ,look.'

Because of the large wavelengths, the sound radiation is spherical, and you also hear bass when you stand behind the speaker. In the ZX-210PBS, the engineers have come up with something so that the subwoofer can turn out so flat – even the woofer drivers are designed extremely flat. For this purpose, a sheet metal frame was designed that looks like it was pressed together in a hydraulic press, saving the woofer's overall height. Of course, the cone must also be shaped accordingly because a

The Phoenix Gold driver has a dual voice coil wired in parallel





The box is equipped with a driver and a passive radiator, both downfiring from the bottom of the box

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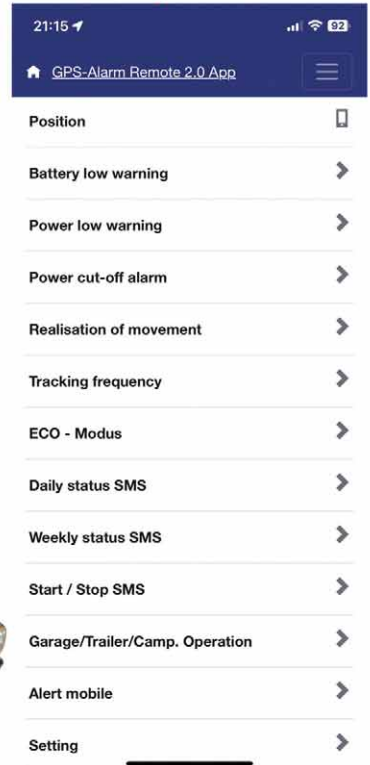
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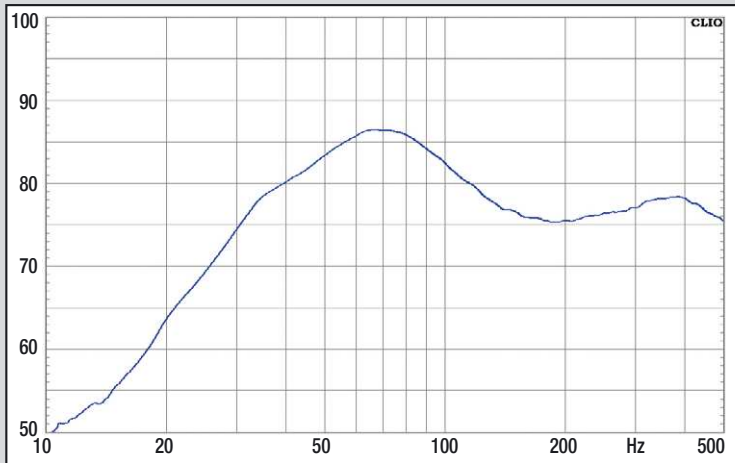
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## CAR & HIFI Laboratory



The ZX210PBS manages 86 dB with one watt.  
It delivers usable sound pressure above 40 Hz

normal one would not fit. Therefore, the Phoenix Gold driver has a folded cone made of fiberglass, which is flat and stable at the same time. The second bass driver in the cabinet is not a driver at all but a passive radiator. It has no motor and is excited by the powered driver. Not randomly, but in a precisely calculated resonance system that works like a vent. If an air column is excited in the tube to vibrate at low frequencies, it is the passive diaphragm in the ZX210PBS. With the same effect- extending the frequency response to low frequencies - more bass! A passive radiator is more expensive than a vent but takes up less space, so it is used here.

### Measurements and sound

The ZX210PBS's 15-liter enclosure can be tuned very low thanks to the passive radiator. 42 Hz is already decently low for a 10-inch bass in 15 liters. The measurements show that the woofer has a low impedance. Specified by Phoenix Gold as a 2 Ohm woofer, we measured an impedance minimum in the box of 1.64 Ohm, still just within the norm to be driven by a 2-Ohm-stable amplifier. The amplitude response shows 86 dB characteristic SPL and a frequency band from about 40



The motor is nicely built with  
precisely machined pole plates



# PHOENIX GOLD

The ZX210PBS comes with a study enclosure, heavy load on top welcome

Hz to 100 Hz, very nicely fitting for this type of subwoofer. In operation, the Phoenix Gold does not shy away from low tones. From double bass down to synth basses of the non-extreme variety, it reproduces its music program diligently. Even the good old bass drum in loud rock music is a pleasure to listen to. The ZX210PBS plays the bass beats to the point; there is no washed-out or rumbling of the bass. We are also satisfied with the maximum SPL. The 10-inch driver doesn't pull out any trees but reliably asserts itself in the overall sound and is fun to listen to.

## Conclusion

The Phoenix Gold ZX210PBS pleases with its concept of integrating a subwoofer enclosure into the trunk without sacrificing much space. And it does so with a rich bass sound and without the compromise of stopgap solutions. A subwoofer that can do more than one would give it credit for at first glance.

*Elmar Michels*

### Specifications

Basket diameter	26,0 cm
Mounting diameter	23,2 cm
Mounting depth	8,8 cm
Magnet diameter	14,0 cm
Box width	65,0 cm
Box height	14,0 cm
Box depth	32,0 cm
Weight	10,3 kg
Nominal impedance	2 Ohm
DC resistance R <sub>dc</sub>	1,00 Ohm
Coil inductivity L <sub>e</sub>	0,72 mH
Coil diameter	50 mm
Membrane surface	340 cm <sup>2</sup>
Resonance frequency f <sub>s</sub>	36 Hz
Mechanical Q-Factor Q <sub>ms</sub>	5,92
Electrical Q-factor Q <sub>e</sub>	0,88
Overall Q-factor Q <sub>ts</sub>	0,76
Equivalent volume V <sub>as</sub>	21,8 l
Moved mass M <sub>ms</sub>	146 g
R <sub>ms</sub>	5,55 kg/s
C <sub>ms</sub>	0,14 mm/N
B x l	6,12 Tm
SPL 1 W, 1 m	86 dB
Recommended power	250 – 400 W
Test cabinet	PM 15 l
Reflex tunnel (d x l)	–

### Phoenix Gold ZX210PBS

Price	300 Euro
Distributor	AAMP European Division, UK/Sweden, UK/Sweden
Internet	phoenixgold-eu.com

### Rating

▶ Sound	50 %	★★★★★
Low frequency extension	12,5 %	★★★★★
Sound pressure	12,5 %	★★★★★
Sound purity	12,5 %	★★★★★
Dynamics	12,5 %	★★★★★
▶ Lab	30 %	★★★★★
Frequency response	10 %	★★★★★
Efficiency	10 %	★★★★★
Max. SPL	10 %	★★★★★
▶ Build quality	20 %	★★★★★

**Top class**



**CAR & HiFi**  
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Price/performance: very good

"Lots of bass in a small, convenient package."

Audio System HX12 Flat Evo –  
noble woofer driver with a low mounting depth

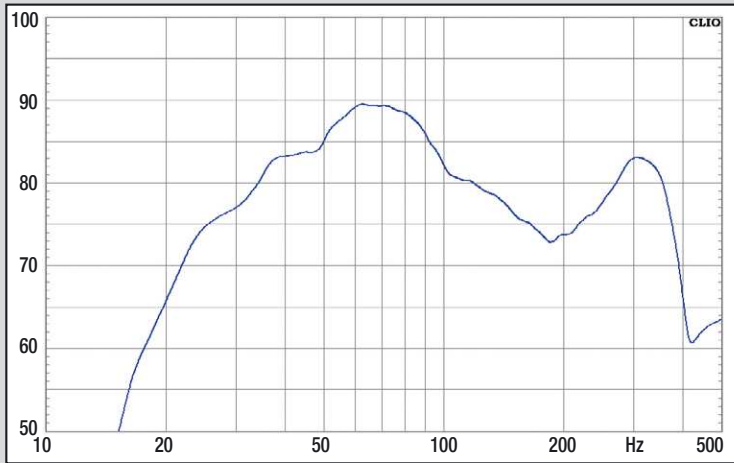
# Premium flat subwoofer

- ▶ The HX series subwoofers have proven themselves as high-quality bass makers for demanding playback. Now come flat versions, of which the HX12 Flat Evo has just arrived in the editorial office.





## CAR&HIFI Laboratory



The HX12 Flat Evo runs down to well below 40 Hz in 40L. It peaks in its favorite range from 50 to 90 Hz with almost 90 dB 1 W 1m.

While the H series from Audio System offers bass for the rough stuff, the HX series is aimed at demanding sound lovers. The subwoofers HX10 SQ and HX12 SQ are pretty elaborately made, but of course, „normal“ subwoofer chassis with a lot of mounting depth for a lot of excursion. This is, as always, precisely the challenge in constructing flat subwoofers, namely, little mounting depth with the most extended possible excursion design. So it's about the longest possible stroke for the cone assembly without hitting the top plate, as well as a motor for the most extended possible linear excursion, i.e., the winding height of the voice coil. Audio System relies on a ferrite motor to offer the HX12 Flat Evo for 300 EUR, which would probably not have been feasible with the required amount of neodymium. Top plates that have been finely machined in the lathe help to get as much field strength out of the magnet ring and cause as little loss as possible. The voice coil diameter is 2 inches, or 50 millimeters, which is already standard for a 30-woofer but not maxed out. As is often the case with Audio System, the spider is made of Con-

There are ventilation holes in the pole piece for the space under the voice coil, and the pole piece is extended for a few more millimeters of excursion clearance

The motor is fully integrated into the frame except for a few millimeters, resulting in a shallow mounting depth of 92 millimeters



The cone is pressed from paper and folded for a flat design



nex, a blend of cotton and Nomex. The surround is made of butyl rubber; a lighter foam surround would probably not be stable enough. Audio System uses pressed paper for the cone, which is still a good choice for subwoofers. Here, we take advantage of the fact that paper cones can be pressed to any shape, resulting in the very flat cone geometry achieved here. For maximum stability, the cone consists of a single piece from the voice coil former to the surround, and the paper dust cap is glued on afterward.

### Measurements and sound

The Thiele Small parameters suggest use in sealed boxes, but a vented box is also possible. The latter just won't be very compact. If you want it small, build a sealed box from 25 liters, which can be accommodated quite well in the double trunk floor, especially in a flat design. Our vented box of 40 liters is bulkier, but it can be tuned nice and low. In this case, the HX Flat is involved with a healthy 36 Hz, which is also enough for low bass. The listening check has more than enough of that; the HX is absolutely suitable for hip-hop. It is nice that it also plays quite cleanly at the lower transmission end. At medium and upper bass frequencies, it

even goes a step further in terms of precision and dynamics, making it an excellent subwoofer for rock music as well. At the maximum level, we didn't expect the world from a flat woofer, but Audio System has done a great job here. The HX12 Flat Evo is hardly inferior to a deep subwoofer and makes a number of them look old. It thrusts wonderfully – the HX Flat is undoubtedly one of the most potent flat woofers.

### Conclusion

The HX12 Flat Evo shows that a 30 cm/12 in driver with a mounting depth of only 9 centimeters can easily compete with larger drivers. It offers excellent performance and is not too expensive.

*Elmar Michels*

Specifications	
Basket diameter	32,1 cm
Mounting diameter	28,1 cm
Mounting depth	9,2 cm
Magnet diameter	–
Weight	4,4 cm
Nominal impedance	2 x 2 Ohm
DC resistance R <sub>dc</sub>	4,02 Ohm
Voice coil inductance L <sub>e</sub>	1,89 mH
Voice coil diameter	50 mm
Diaphragm area	531 cm <sup>2</sup>
Resonant frequency f <sub>s</sub>	37 Hz
Mechanical quality Q <sub>ms</sub>	9,93
Electrical quality Q <sub>es</sub>	0,97
Total quality Q <sub>ts</sub>	0,88
Equivalent volume V <sub>as</sub>	34,8 l
Moving mass M <sub>ms</sub>	205 g
R <sub>ms</sub>	4,85 kg/s
C <sub>ms</sub>	0,09 mm/N
B x l	14,15 Tm
Sound pressure 1 W, 1 m	89 dB
Recommended power	200 – 400 W
Test enclosure	BR 40 l
Port dimensions (d x l)	90 cm <sup>2</sup> x 35 cm

Audio System HX12 Flat Evo		
Price	300 Euro	
Contact	Audio System, Germany	
Internet	www.audio-system.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 %	★★★★★

**Top Class**

★★★★★

**CAR & HiFi**

INTERNATIONAL Germany 3/23

**Price/performance: very good**

„Very performant flat woofer.“

Hifonics ZXE10S4 + ZXE12S4 –  
full-grown woofers at a budget price

# Affordable subwoofers

- ▶ As a new beginner-friendly series, Hifonics launches the ZXE amplifiers and subwoofers, aka Zeus Evolution. We take a closer look at the ZXE10S4 and ZXE12S4 woofers.





**BEST PRODUCT**

**Middle Class**

**CAR & HiFi**

INTERNATIONAL

3/23



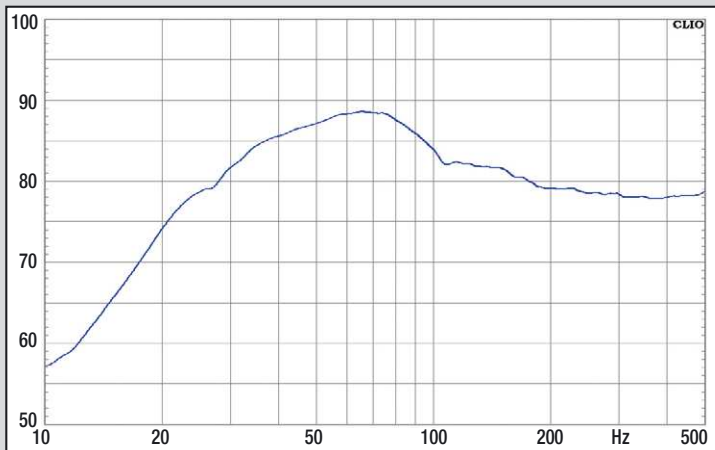
Both woofers have the same motor, which looks dainty here on the ZXE12S4

At Hifonics, a contrasting program is the order of the day. After the fat SPL speakers of the ZXT series, of which the twelve-inch weighs over 20 kilograms, the ZXE subwoofers reside at the lower end

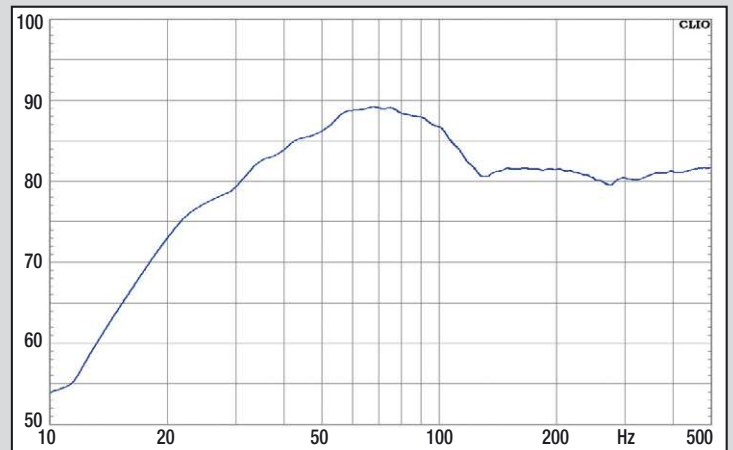
of their portfolio. So far, only offered as single drivers, two models are currently waiting for customers: the 25-centimeter ZXE10S4 and the 30-centimeter ZXE12S4. The S4 displays a 4-ohm single voice coil,

and that's about it. The best part is the pricing policy, which puts a tag of EUR 89 on the ZXE10S4, and its big brother is only ten Euros more expensive. No one will expect high-end at this point, but it shouldn't be

## CAR & HIFI Laboratory



The ZXE12S4 prefers the upper bass, but thanks to lower tuning, it delivers sound pressure down to about 40 Hz



The ZXE10S4 delivers almost the same frequency response as the 12". The main difference is one dB more characteristic SPL



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- Expert Imaging and Sound Association



junk, either. Hifonics' immense experience in subwoofer construction benefits the ZXE woofers because the development department certainly knows exactly how to build inexpensive but not cheap woofers. For the most part, the ZXEs come with the standard ingredients in woofer construction. There are stamped steel frames that are neatly deburred and coated, and the vents have been thought of as well. The cones are made of air-dried paper and are pretty stiff. Of course, they use foam surrounds, which are light and cost-effective but also have advantages. It's been a long time since foam surrounds came into disrepute because they weren't UV stable and dissolved into thin air within a few years. There are ferrite motors with single rings, and nothing is wrong with that. Both models are featured with the same motor, so there is no individual development, which is also impossible in this price range. And last but not least, the ZXEs come up with a real highlight, namely their voice coils. They measure 2.5 inches/64 millimeters in diameter, which puts a big exclamation point on the price. The standard would be 50 millimeters, and twelve-inches with 38-millimeter voice coils have already been spotted. These large coils give the ZXE woofers, above all, a plus in power handling simply because of the larger surface area for heat dissipation. This is very helpful for entry-level woofers, often roasted by inexperienced users.

**Measurements and sound**

Of course, we don't expect miracles from the ZXE woofers (and we can't measure power handling), but the ZXEs perform solidly in the lab but



Both woofers feature 4 ohm single voice coils and extended pole pieces

Specifications	
Basket diameter	27,6 cm
Mounting diameter	23,8 cm
Mounting depth	12,0 cm
Magnet diameter	14,5 cm
Weight	4,2 cm
Nominal impedance	4 Ohm
DC resistance Rdc	6,34 Ohm
Voice coil inductance Le	1,64 mH
Voice coil diameter	64 mm
Diaphragm area	330 cm <sup>2</sup>
Resonant frequency fs	42 Hz
Mechanical quality Qms	7,43
Electrical quality Qes	0,95
Total quality Qts	0,84
Equivalent volume Vas	19,9 l
Moving mass Mms	109 g
Rms	3,89 kg/s
Cms	0,13 mm/N
B x l	10,54 Tm
Sound pressure 1 W, 1 m	88 dB
Recommended power	250 – 500 W
Test enclosure	BR 32 l
Port dimensions (d x l)	7 x 22 cm

Hifonics ZXE10S4	
Price	90 Euro
Contact	Audio Design, Germany
Internet	www.audiodesign.de/english

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 % ★★★★★

**Middle Class**

★★★★★

**CAR & HiFi**

INTERNATIONAL Germany 3/23

**Price/performance: very good**

*"Lots of bass for little money."*

not perfectly. Parametry is similar on both, which is no surprise with identical motors. The thing is that Hifonics wanted to please everyone and recommended the woofers for closed boxes, vented boxes, and free-air. The result is naturally a compromise that somehow always fits but nowhere perfectly right. A side effect is, in any case, that the woofers prefer large enclosures, so they do not want to become really compact (except for Free-air use). Bass always comes out, of course, especially from our vented boxes, which we set at 32 liters for the ZXE10S4 and 56 liters for the ZXE12S4. There are no straight frequency responses, so we recommend the closed versions, which can't be big enough either. But we also have output for that in our listening check! The ZXE10S4 already doesn't let itself down. It sounds a size bigger and makes plenty of bass. Sufficiently deep and very nicely punchy, that's fun. The ZXE12S4 goes a whole lot deeper. It copes with hip-hop and achieves top SPL thanks to good power handling. The result is a quasi-scale enlargement of the 10" in terms of bass and fun. The SQ ambitions keep within limits with our reflex enclosures. It does not sound too spongy, but it is also by no means dry and overly precise. Those who want more in this direction should try the sealed boxes.

### Conclusion

A lot of bass for little money? No problem with the ZXE woofers. If you want a lot of output at an affordable price, you can go for the ZXE10S4 and ZXE12S4.

*Elmar Michels*



Solid goods: stamped metal frames with rear vents and air-dried paper cones look good on affordable subwoofers

### Specifications

Basket diameter	32,0 cm
Mounting diameter	27,6 cm
Mounting depth	13,5 cm
Magnet diameter	14,5 cm
Weight	4,3 cm
Nominal impedance	4 Ohm
DC resistance Rdc	6,68 Ohm
Voice coil inductance Le	1,64 mH
Voice coil diameter	64 mm
Diaphragm area	499 cm <sup>2</sup>
Resonant frequency fs	36 Hz
Mechanical quality Qms	6,82
Electrical quality Qes	0,95
Total quality Qts	0,98
Equivalent volume Vas	49,0 l
Moving mass Mms	140 g
Rms	4,62 kg/s
Cms	0,14 mm/N
B x l	10,89 Tm
Sound pressure 1 W, 1 m	89 dB
Recommended power	300 – 600 W
Test enclosure	BR 56 l
Port dimensions (d x l)	10 x 28 cm

### Hifonics ZXE12S4

Price	90 Euro
Contact	Audio Design, Germany
Internet	<a href="http://www.audiodesign.de/english">www.audiodesign.de/english</a>

### 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 %	★★★★★

**Middle Class**



**CAR & HiFi**  
INTERNATIONAL Germany 3/23

Price/performance: very good

"Lots of bass for little money."



# 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
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■ 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



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# Coming soon



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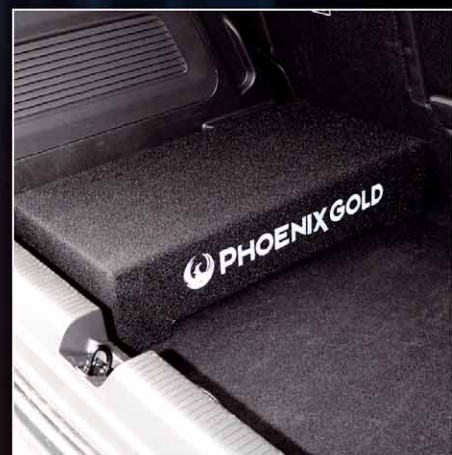
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