

# CAR & HiFi

INTERNATIONAL

1/23 · 4,80 €



## European Edition

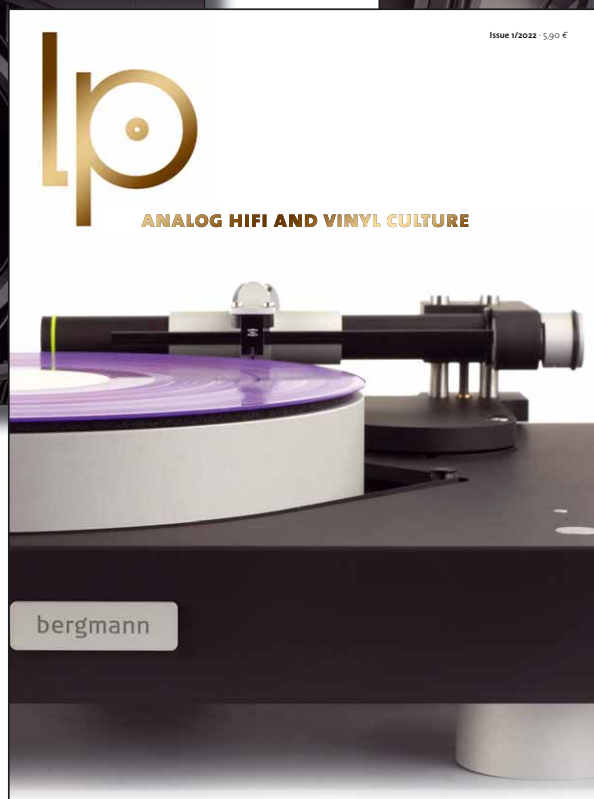
### Best topics

- Camper van head unit with built-in navigation
- Deluxe dsp with built-in music player
- Compact five channel amplifiers
- Slim active subwoofers
- Four speaker kits for older vehicles

### Featured brands

- Audio System • ESX • Ground Zero
- Helix • Hifonics • Kenwood

# READ IT !



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# QUANTUM

## SOUND PROCESSORS

„The QE812SP with its built-in music player is the most complete offering on the market.“

(Elmar Michels, Car & HiFi)

**HIGHLIGHT**  
Soundprozessor  
**CAR & HiFi** 2/2023

**12-CH DSP**  
INCL. Hi-RES  
MEDIAPLAYER



Incl. RC-BT  
Bluetooth® Steering Wheel  
Remote Controller



**DIGITAL FULL HD**  
AUDIO PLAYER 24bit/256 kHz



**ESX DSP TOOLKIT**  
PC & APP CONTROL

**EPS PRO**  
ADVANCED ERROR PROTECTION SYSTEM

**SEQ**  
STAGING EQUALIZER



**ESX TOOLKIT APP**



### 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

#### Digitale 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  
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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](http://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.

# More to come

Although the maximum of the wave of novelties still has not arrived at the editorial office, am I confident that great things are still ahead of us due this season. Very promising are the announcements that are already available. So we are expecting many new items for mobile homes, but also high-end amplifiers and loudspeakers. The topic of vehicle

integration is becoming increasingly important this season, including not only electronics such as DSPs, but also loudspeakers and subwoofers. I hope you enjoy reading it and I look forward to the season.



*Elmar Michels*  
Editor-in-chief



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**GROUND ZERO**<sup>®</sup>  
GERMAN ENGINEERING



## RADIOACTIVE

### GZRW 250-D2 FLAT GZRW 300-D2 FLAT

- Subwoofer with shallow installation depth
- Klippel® optimized
- Efficient ferrite motor
- Durable rubber surround
- Shallow GZ-design steel basket
- Paper sandwich cone
- Chrome-plated push terminal

#### GZRW 250-D2 FLAT

- 25 cm / 10"
- 400 Watts RMS – 2 x 2 Ohms
- Mounting depth 85 mm / 3.35"

#### GZRW 300-D2 FLAT

- 30 cm / 12"
- 450 Watts RMS – 2 x 2 Ohms
- Mounting depth 93 mm / 3.66"





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## ► Plug and play DSP amp

The GZCS DSPA-4.60ISO is a compact digital amplifier with DSP, which is ideal for the small, fine hi-fi system on the factory radio. The amp is looped in with an ISO wiring harness and produces 4 channels with 60 watts each. Another 4 DSP channels are available as processed outputs.

• [www.ground-zero-audio.com](http://www.ground-zero-audio.com)



## ► Active set for the Fiat Ducato platform

With the motorhome boom that started in 2020, the Fiat Ducato and its siblings started a triumphal procession that not only rolls down our streets during the holiday season. Accordingly, interest in the perfect sound in the popular base camper vehicle also increased. With the QXFA6.2C active complete set for the Fiat Ducato platform, consisting of a 2-way component system and QS-TWO-ISO nano amplifier, ESX offers a brand new sound package, where not only the fair price makes the purchase decision easy: The system is Plug+Play ISO-ready and only needs to be installed and plugged in.

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

## ► SW series subwoofers

Audio System's SW11 Active UNI + SW11 Passive UNI fit in a spare wheel well and thank to the mounting kit as well in vans like VW T5/T6/T6a, Fiat Ducato, Peugeot Boxer or Citroen Jumper. The subwoofers are equipped with a 11" woofer and optionally with a 150 W amplifier. The powered versions come with a harness and a wired remote control for phase shift, bass boost and level. Aftermarket head units can be connected as well as factory ones, the latter being able to turn the subwoofer on and off. Passive versions feature a 2 x 2 ohm voice coil that is versatile to cooperate with most amplifiers in the market.

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





# HIFONICS

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Suitable for many BMW E/F/G

**NEW**



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20 CM (8") SUBWOOFER-SET  
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**NEW**



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**NEW**



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Universal for all vehicles with 2-DIN radio

RV Navitainer Kenwood DNR992RVS

# Highend Camper Navigation

- ▶ Kenwood's brand new multimedia head unit brings not only a 10.1-inch screen but also navigation explicitly tailored for RVs.







You can configure various widgets

If, like me, you frequently travel with sizeable RVs or other larger cars, you learn to pay attention to signs that most passenger car drivers don't even notice. Clearance heights, maximum weight, axle loads, permissible width, and length are essential, especially for large camping vehicles. If you are not used to paying attention to these things, you can quickly maneuver yourself and your vehicle into a problematic situation. Most common navigation systems are no help in this respect either, as they are designed for passenger cars and do not consider or are unaware

of corresponding limitations when selecting and routing paths. The same applies to Google and Apple Maps, by the way.

The solution is a special truck navigation system in which the vehicle parameters, such as weight, height, width, etc., are entered and considered

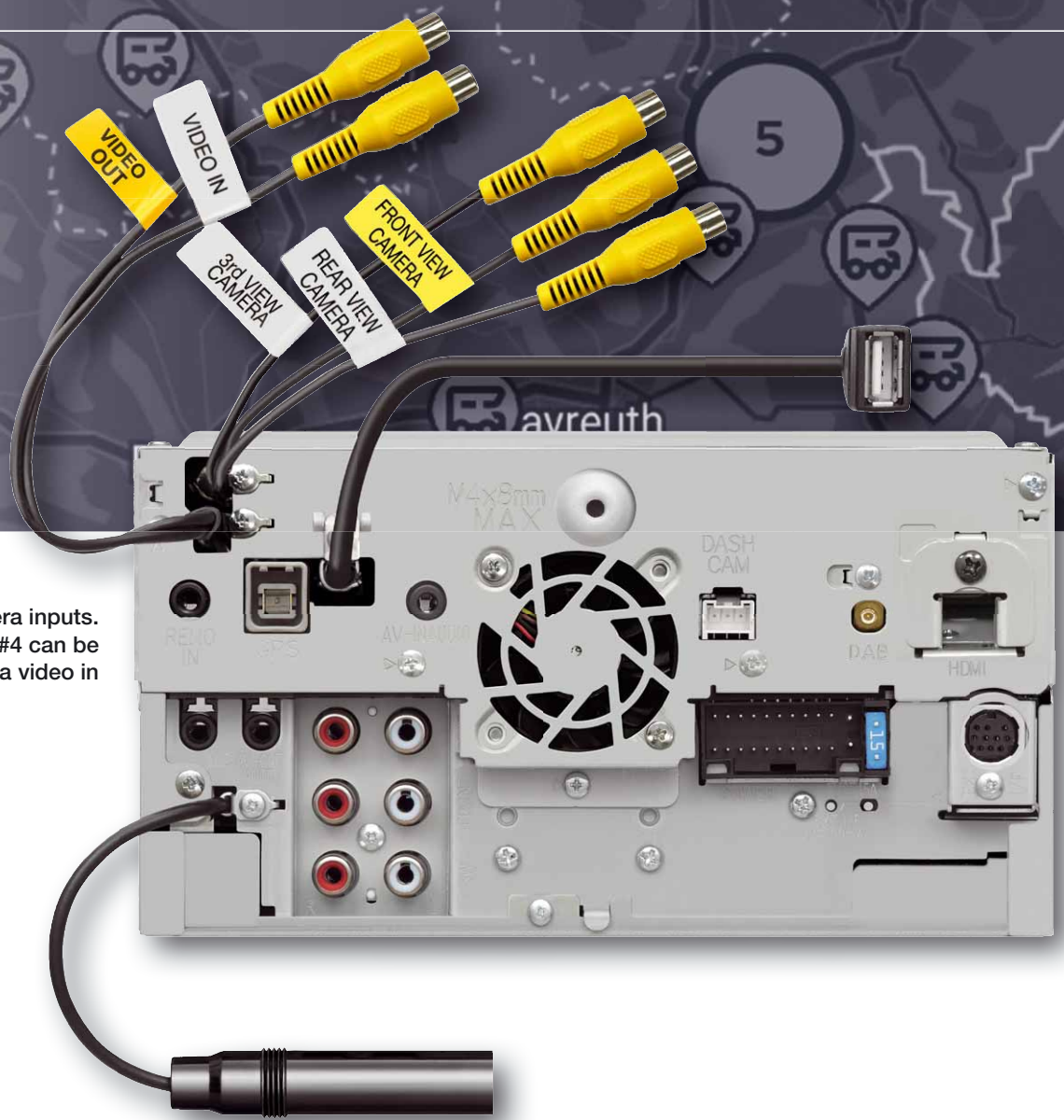
when planning the route, avoiding annoying detours and, in extreme cases, expensive „roof damage.“

### Navigation

Such a navigation system is on board the DNR992RVS. Kenwood relies on the truck version from Garmin,

Camper navigation with numerous POIs





Three dedicated camera inputs. In addition, camers #4 can be connected via video in

where all relevant vehicle parameters can be entered. However, this does not exempt the driver from paying attention to the signs because no database is perfect. Particularly on secondary routes, it is possible that individual passage restrictions are not recorded. Nevertheless, considering the vehicle parameters when choosing a way is an enormous help and can save many a detour and turning maneuver.

Kenwood covers the needs of campers even further. Several particular destinations relevant to motorhomes are integrated into the navigation. The databases for this come

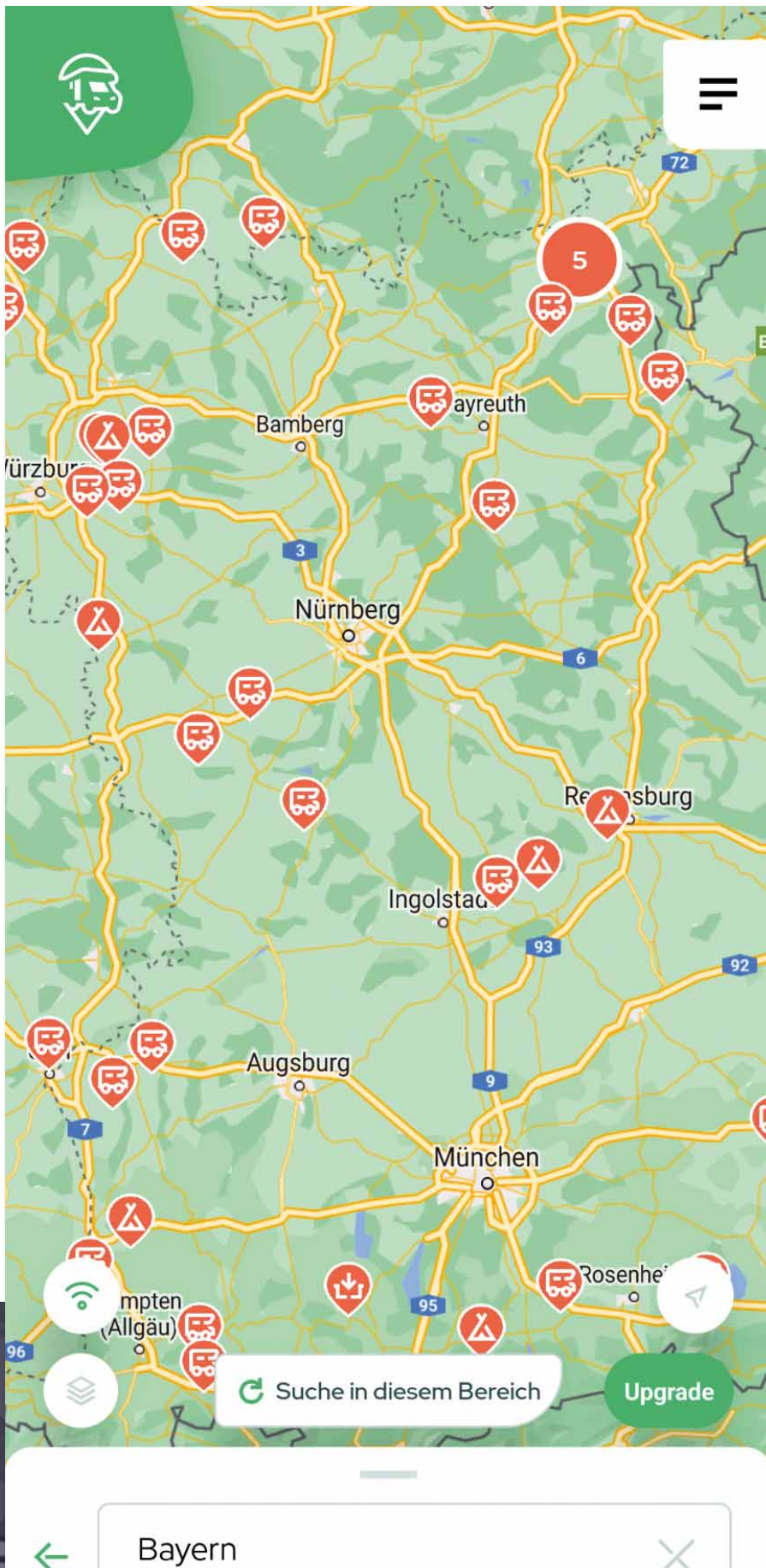
from Campercontact and ACSI – two site guides that campers will be familiar with.

In addition, the navigation offers all the comfort and guidance aids familiar from the Garmin car version: lane assistant, turn-by-turn directions, photo-realistic intersection views, traffic information, speed limits, and much more.

### Android Auto and CarPlay

The DNR992RVS offers full smartphone compatibility with Android Auto and Apple CarPlay. All you need to do is connect a corresponding iPhone or Android phone. The connection can even be established

wirelessly via WIFI. If Apple CarPlay or Android Auto is installed on the phone, the respective app starts automatically, is shown on the massive display, and can be operated via it. Both CarPlay and Android Auto can be downloaded for free from the respective app store, and they are pre-installed in newer versions anyway. They have a straightforward, simplified user interface and are thus optimized for operation even while driving. They provide access to important phone functionality such as telephony, navigation, media player, messenger services, and other apps. Operation is simple and fluid via the touchscreen of the DNR992RVS or



even more convenient via voice input, thanks to Apple Siri or Google Assistant. The screen content of USB phones can also be flipped via mirroring – without the need for wires.

### Digital radio

For contemporary, noise-free radio enjoyment, the Kenwood also offers DAB+ digital radio in addition to the conventional FM tuner. Thanks to „seamless blending,“ automatic switching between the two types of reception happens without interruption, time offset or volume jumps. The DNR992RVS is thus ideally equipped for undisturbed radio enjoyment throughout Europe. Smartphones and USB sticks can be connected via the rear USB socket. Kenwood's exemplary Bluetooth functionality allows hands-free calling and audio streaming.

### Dashcam Link

The back of the Kenwood offers multiple ports, including HDMI and up to four camera inputs. A compatible front camera can even be connected via a dashcam link. The dashcam's image can be displayed on the DNR, and all control of the individual functions can be handled using the touchscreen. The navigator's moni-

Campercontact knows over 38,000 RV pitches in 58 countries, with ratings and photos

tor also displays warnings indicating dangerous situations detected by the integrated driver assistance systems.

## Audio

It goes without saying that the sound quality should not be neglected in a device of this price range. Thus, high-quality components are on board, and the preamplifier outputs provide up to 5 volts of output voltage. Kenwood's powerful digital signal processor is also integrated into the unit. It offers extensive adjustment options from an equalizer to the active crossovers and several sound effects to five-channel time alignment for optimal staging and precise dynamics.

In addition to compressed formats, the Kenwood DNR992RVS also plays up to 192kHz/24bit high-resolution WAV and FLAC files from USB & 2.8 MHz/11.2 MHz DSD data.

## Hardware

The body of the DNR992RVS has a standard double DIN format and thus fits into the radio slots of common motorhome base vehicles. The large front panel with its 10.1-inch display (25.7 cm) can be mounted at two distances in front of it. In addition, the height of the display mounting can be varied during installation to prevent essential controls like the hazard warning switch from being covered. Even after fixed installation, the screen can be tilted from -10 to +45° at any time to create optimal viewing conditions.

## Operation

To put it directly: Size is important here. The 10.1-inch touchscreen allows for large functional areas, and excellent readability, primarily since a high-quality display with good anti-reflective properties is used

here. The user can freely configure the interface of the Kenwood DNR992RVS with widgets, and individual background pictures can be uploaded. The illumination color of the keys at the bottom edge can also be adjusted.

## Conclusion

The Kenwood DNR992RVS is a Navitainer of the highest order. It offers state-of-the-art technology in every respect. Due to the integrated navigation with consideration of the vehicle parameters and extensive camping POIs, it is our very special recommendation for campers.

*Dipl.-Phys. Guido Randerath*

### Specifications

Amplifier power (W)	15
Output voltage (V)	4.9
<b>USB</b>	
THD+N (%)	0,007
SNR (A)	92
<b>Tuner</b>	
THD+N (%)	0,143
SNR (A)	61
Crosstalk (dB)	50
Monitor size (inch)	10,1 Zoll
Touchscreen	•
EQ/DSP	•
Crossovers	HP / TP
Pre-outs	6
AV-in	•
Video-out	•
Camera-in	4
MP3/WMA/AAC	• / • / •
USB / iPod	• / •
Bluetooth HFP/A2DP	• / •
Maps	Europe
TMC/TMC Pro	• / -
Remote Control	-
Other	Campsite finder

### Here fits the Kenwood DNR992RVS

In cars with double DIN slot. For many other models, installation and connection adapters are available in the accessories. You can find dealers and installation partners on the Internet: [http://www.hifitest.de/marken/kenwood\\_37/haendler](http://www.hifitest.de/marken/kenwood_37/haendler)

### Kenwood DNR992RVS

Price	1600 Euro
Contact	JVCKENWOOD Germany
Internet	<a href="http://www.kenwood.de">www.kenwood.de</a>

### Rating

▶ Sound	15 %	★★★★★
Bass	3 %	★★★★★
Neutrality	3 %	★★★★★
Transparency	3 %	★★★★★
Spatial imaging	3 %	★★★★★
Dynamics	3 %	★★★★★
▶ Image	20 %	★★★★★
Sharpness	3,3 %	★★★★★
Brightness	3,3 %	★★★★★
Contrast	3,3 %	★★★★★
Color reproduction	3,3 %	★★★★★
Viewing angle	3,3 %	★★★★★
Reflection	3,3 %	★★★★★
▶ Navigation	15 %	★★★★★
Itinerary	5 %	★★★★★
Route calculation	5 %	★★★★★
Features	5 %	★★★★★
▶ 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 %	★★★★★
Handling	10 %	★★★★★
Reception test	5 %	★★★★★
Build quality	5 %	★★★★★
Features	20 %	★★★★★

**Absolute Top Class**



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Price/performance: very good

„The ideal travel companion in the motorhome.“

Hifonics ZXS1100/5 + ZXR1200/5 –  
compact five-channel from the Zeus series

# Five- channel amplifiers from Hifonics

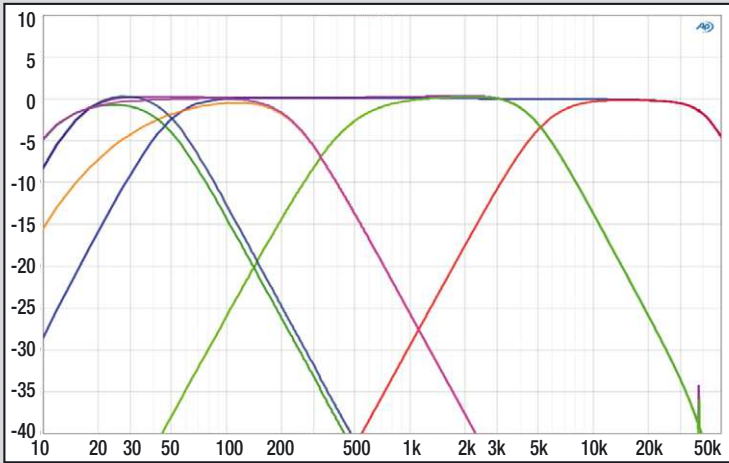


- ▶ Hifonics launches two new five-channel amplifiers to supply the entire hi-fi system. We look at the similarities and differences.

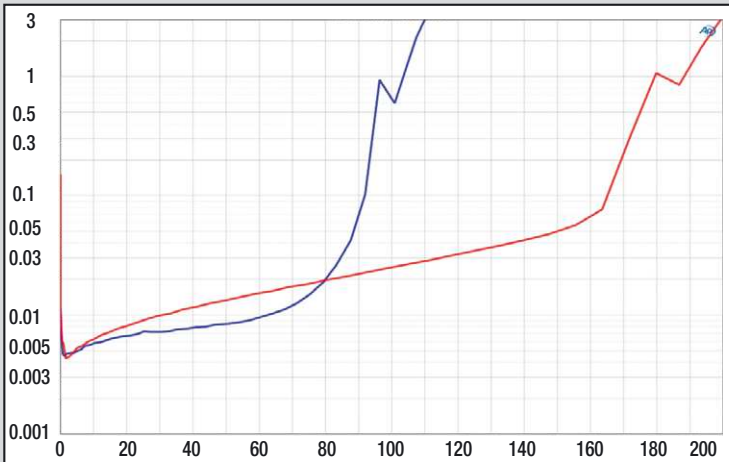




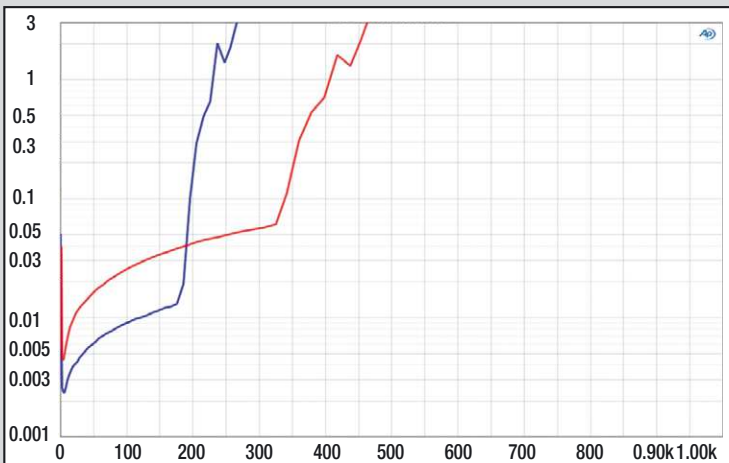
## CAR & HIFI Laboratory



The ZXS offers the complete package with adjustment ranges up to 5 kHz, a bandpass on channel 3+4, and a subsonic filter also for the small channels



The ZXS offers immense power reserves on channels 1-4. In addition, it scores with extremely low distortion



The ZXS is very powerful down to 2 ohms, although it doesn't look that way in the diagram because of the scaling up to 1 kW (for the ZXR)

The Zeus series is positioned fairly high up in the Hifonics amplifier range. In the past, Zeus amplifiers were a heavy „board“: the proper amplifiers for power-hungry applications. Of course, there are compact, digital Zeus models: the somewhat more upscale ZXR series and the slightly smaller ZXS. Both series are now getting five-channel additions, namely the ZXS1100/5 and the ZXR1200/5. The names already indicate that the ZXR has more power in the housing since the designations express the maximum RMS power of all channels. That means 4 x 175 watts (into 2 ohms) + 400 watts (into 2 ohms) for the subwoofer in the case of the ZXS1100/5. For the ZXR1200/5, the corresponding figures are 4 x 125 watts (into 2 ohms) and 700 watts (into 1 ohm). Here you can see that the larger ZXR focuses on the subwoofer, while the smaller ZXS gives more power to the four smaller channels. In terms of size, both are compact, and there is no difference in length. The height is also only a few millimeters more on the ZXR, the main difference being the width, with the ZXS being much slimmer.

The build quality is similar, with sturdy extruded housings and cast aluminum front panels. Music signals enter the chassis via Molex harnesses on both, with the option of using harnesses with RCA connectors or wires for high-level connections. The latter also includes EPS resistors for



High-level or RCA harnesses dock to the Molex jacks



The ZXS1100/5 is much slimmer than the ZXR. On the left, you can see the encapsulated coils of the small channels, and in the middle, the giant coil for the bass channel

factory radios with speaker detection. The features are almost identical – they are both Zeus power amps, after all. There is a bass remote control and active crossovers for each, which can drive everything up to the tweeter and are bandpass capable on channel pair 3+4. The ZXR is minimally ahead because it offers a bypass on the small channels to override the crossovers, plus it has a bass boost since it is a bass specialist. Both allow the signal from 2 or 4 input channels to be distributed to the bass and/or rear channels – a handy thing that can save a lot of cabling. A look into the housings reveals that the circuits are similar, too. We have modern Class-D power amplifiers with driver chips but discrete power transistors in front of us. We can also see that the ZXR is more substantial with increased buffering, a bigger power transformer, and larger transistors in the power supply. This is necessary to ensure the immense power of the bass channel – a hefty 1-ohm output simply requires a lot of amperage.

### Specifications

Channels	5
Power 4 Ohm	4 x 104 + 233
Power 2 Ohm	4 x 188 + 408
Power 1 Ohm	0
Bridged Power 4 Ohm	2 x 376
Bridged Power 2 Ohm	0
Sensitivity max. mV	500
Sensitivity min. V	>13,3
THD+N (<22 kHz) 5 W	0,005/0,003
THD+N (<22 kHz) Half Power	0,009/0,01
Signal-to-noise ratio dB(A)	100/98
Damping factor 20 Hz	118/213
Damping factor 80 Hz	118/213
Damping factor 400 Hz	112/213
Damping factor 1 kHz	102/213
Damping factor 8 kHz	13/213
Damping factor 16 kHz	3/313

### Features

Low pass	50 – 5k (CH34)/ 40 – 200 (CH5) Hz
High pass	50 – 5k Hz (CH12)/ 10 – 500 (CH34)
Band pass	10 – 5k Hz (CH34)
Bass boost	–
Subsonic filter	15 – 50 Hz/12 dB (CH5) /via HP (CH34)
Phase shift	0 – 180° (CH5)
High-level inputs	•
Automatic switch-on (Autosense)	•, DC or signal
RCA outputs	–
Start/stop capable	• (7,3 V)
Dimensions (L x W x H in mm)	305 x 112 x 42
Others	2, 4 or 5 CH In, EPS, Remote Control

### Hifonics ZXS1100/5

Price	350 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 %	★★★★★

Top class



**CAR & HiFi**

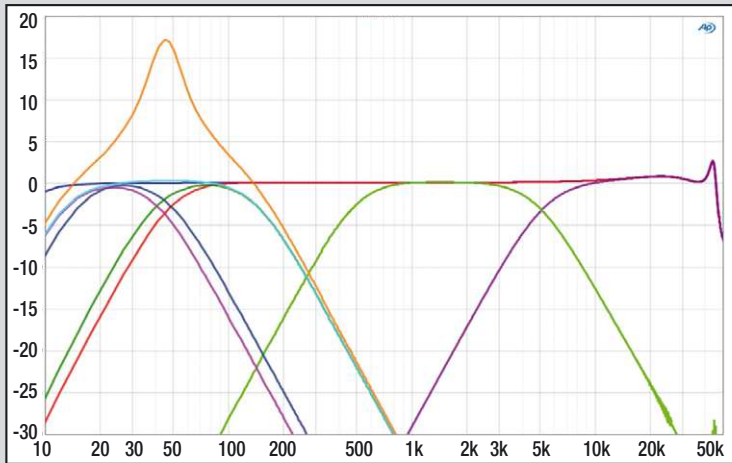
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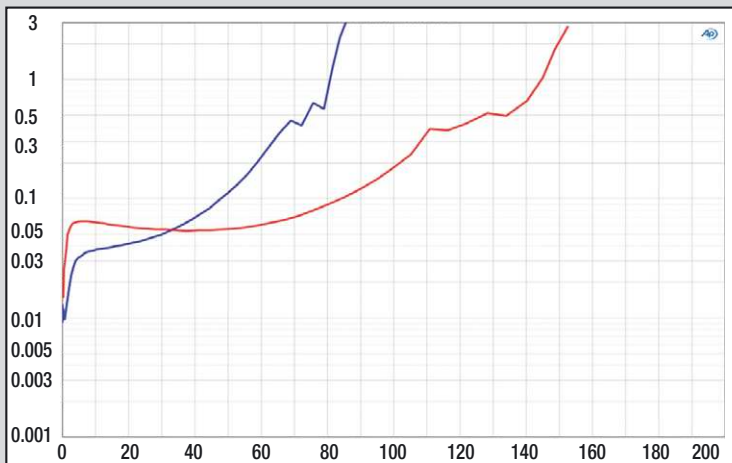
Price/performance: excellent

„Compact five-channel package with plenty of power.“

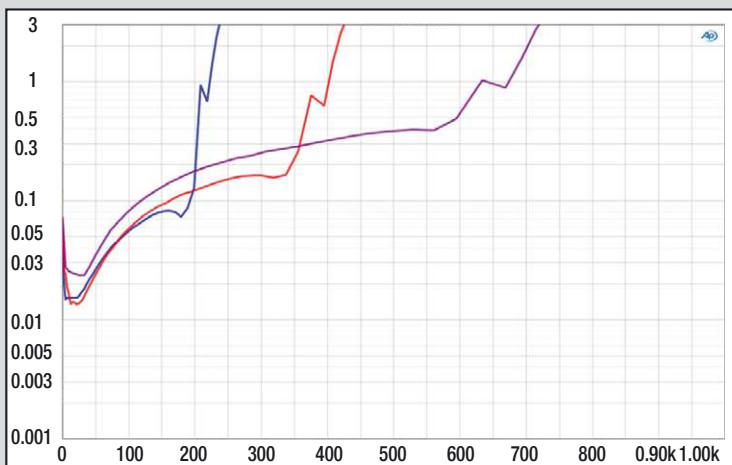
## CAR & HIFI Laboratory



The ZXR emphasizes subwoofer operation, so there is a bass boost at 45 Hz in addition to the ZXS' extensive filter palette



The ZXR's just over 80 watts are enough to drive compos or car woofers. At 2 Ohm, it puts out even just under 150W



The ZXR's bass channel scores with 1-ohm stability, where there's immense power for the compact size at just under 700W

## Measurements and sound

It's always nice when amps exceed the manufacturer's specifications instead of flaunting great numbers on the box. This is usually the case with Hifonics. In the four-channel rating, the ZXS comes out on top with 104/188 watts into 4/2 ohms versus the ZXR's 81/145 watts. Conversely, the ZXR wins the bass rating with 222/402/676 watts because, unlike the ZXS, it is 1-ohm stable. At 2 ohms, however, the ZXS is on par; both deliver a good 400 watts here. In the distortion measurements, both are top, the ZXR is very good, and the ZXS is even excellent. On the other hand, the ZXR is again ahead regarding the damping factor. All in all, both don't do anything wrong.

Sound-wise, the differences between the small channels are also negligible. Both play clearly and cleanly with superbly reproduced voices and instruments. Both have enough thrust in the lower range to power the system thoroughly. And it sounds dynamic – no one has to fear a dull reproduction. At the subwoofer, both amplifiers can impress because low bass and cleanliness leave nothing to be desired with a 2-ohm specimen. There is enough pressure, and both the ZXS and the ZXR are fun to listen to. Perhaps the ZXR has a tad more control, but the differences won't dissuade anyone from choosing the ZXS. Only at a



The ZXR has comprehensive filter equipment with a bandpass up to 5 kHz so that it can drive all kinds of loudspeakers



The ZXR1200/5 is generously equipped with a power supply and buffering

chunky 1-ohm subwoofer the ZXR shows it can do more. In this case, it produces an extra dose of SPL, which bass freaks will be very happy about. The ZXS can no longer keep up – its circuitry is designed for a minimum impedance of 2 ohms.

### Conclusion

ZXS1100/5 and ZXR1200/5 are accomplished amplifiers with top features and performance. Ultimately, the ZXS wins our rating by a narrow margin because it delivers better on the small channels and still has enough power on the bass. If you want to drive a 1-ohm subwoofer and place the highest value on bass level, you should go for the ZXR - the additional price for the almost 700 watts is justified due to the higher material costs, and this bass performance in a compact five-channel package is hardly available anywhere else. The ZXS, on the other hand, is the more sensible choice: It is more compact, better balanced, and cheaper.

*Elmar Michels*

### Specifications

Channels	5
Power 4 Ohm	4 x 81 + 222
Power 2 Ohm	4 x 145 + 402
Power 1 Ohm	676
Bridged Power 4 Ohm	2 x 290
Bridged Power 2 Ohm	0
Sensitivity max. mV	500
Sensitivity min. V	>13,3
THD+N (<22 kHz) 5 W	0,032/0,015
THD+N (<22 kHz) Half Power	0,07/0,062
Signal-to-noise ratio dB(A)	100/98
Damping factor 20 Hz	132/263
Damping factor 80 Hz	136/344
Damping factor 400 Hz	140/373
Damping factor 1 kHz	140/344
Damping factor 8 kHz	186/373
Damping factor 16 kHz	-/373

### Features

Low pass	50 – 5k (CH34)/ 40 – 150 (CH5) Hz
High pass	50 – 5k Hz (CH12)/ 10 – 500 (CH34)
Band pass	10 – 5k Hz (CH34)
Bass boost	0 – 18 dB/45Hz
Subsonic filter	15 – 40 Hz/12 dB (CH5) /via HP (CH34)
Phase shift	0 – 180° (CH5)
High-level inputs	•
Automatic switch-on (Autosense)	•, DC or signal
RCA outputs	–
Start/stop capable	• (7,3 V)
Dimensions (L x W x H in mm)	320 x 150 x 50
Others	2, 4 or 5 CH In, EPS, DUPE, Remote Control

### Hifonics ZXR1200/5

Price	400 Euro
Contact	Audio Design, Germany
Internet	<a href="http://www.audiodesign.de/english">www.audiodesign.de/english</a>

### 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 %	★★★★★

**Top class**



**CAR & HiFi**  
INTERNATIONAL Germany 1/23

Price/performance: excellent

„Compact five-channel package with plenty of power.“

ESX QE812SP - High-End Sound Processor  
with Music Player

# DSP with comprehensive features



- ▶ After ESX unveiled the excellent QL812SP, a high-end DSP, it's hard to believe it can be topped. But watch out, here comes the QE812SP.

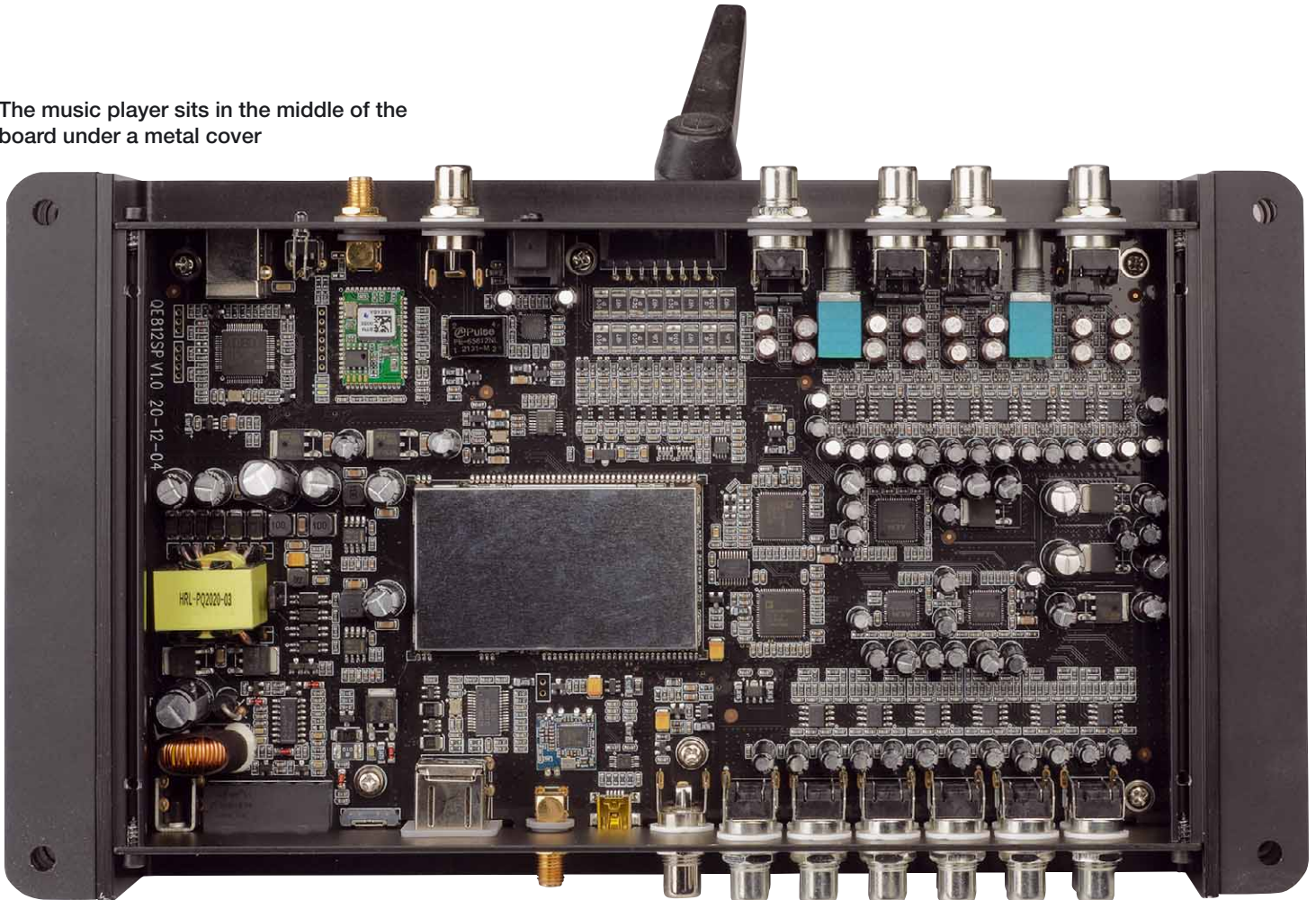


A year ago, ESX released the QL812SP, a sound processor that was a hoot for sound enthusiasts with the finest hardware and software aimed at sound tinkerers. However, the QL812SP doesn't neglect practice and everyday life, especially since music streaming is already built in. Wireless streaming from a mobile device in the best Bluetooth 5 quality – what more could you want? The QE812SP has the answer in the form of another way to feed music into the DSP: HiRes audio streaming! This was already possible before, namely with one of the two digital inputs (and, of course, analog). But if you don't have a head unit with a corresponding playback option, e.g., if the DSP is connected to the factory radio, that's it. Not so

with the QE812SP; it has a built-in music player so that it can play music on its own, so there's a small head unit inside. The music is stored on a USB storage directly connected to the DSP. Two advantages: firstly, it works without a smartphone, and secondly, it offers unrestricted HiRes audio playback. Theoretically, Bluetooth audio streaming also provides that, e.g., a Qualcomm aptX HD certified connection can transmit HiRes quality at least with 24 bit/48 kHz. But with Bluetooth, it is always a problem because it automatically varies the data rate dynamically depending on the quality of the connection. Only with wired streaming can you be sure that true HiRes quality is transmitted. Therefore, connecting a USB stick or an

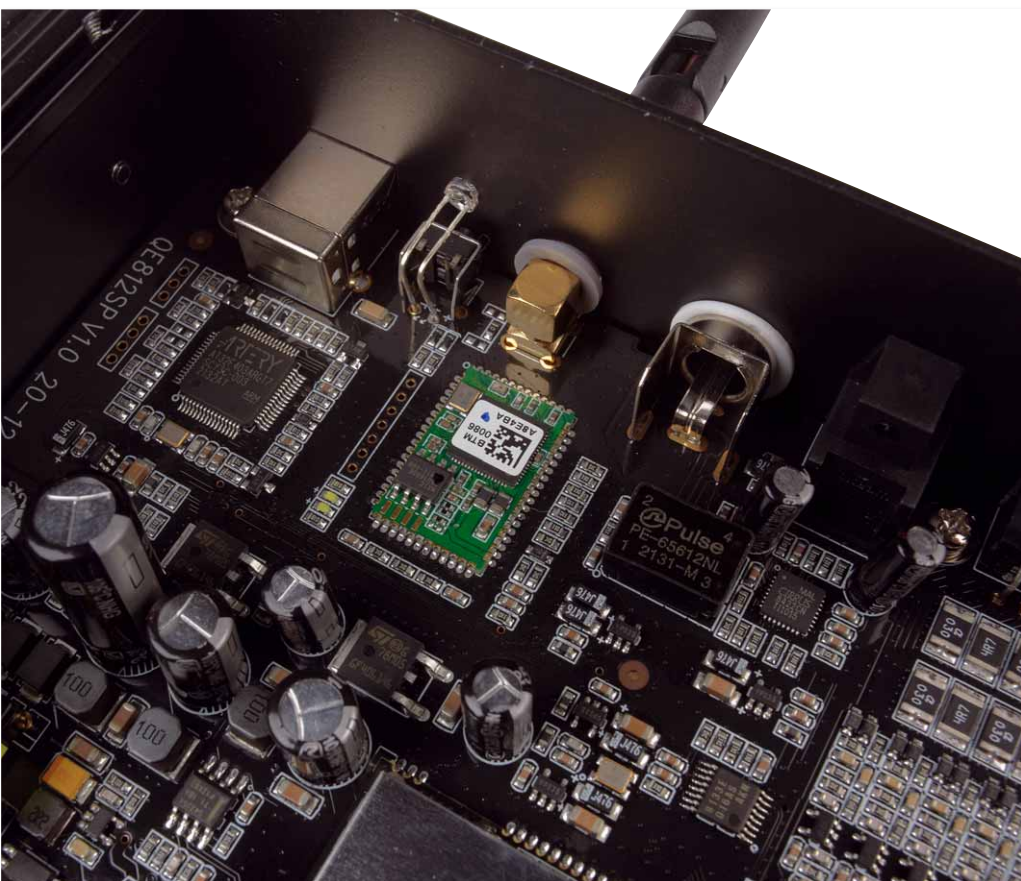
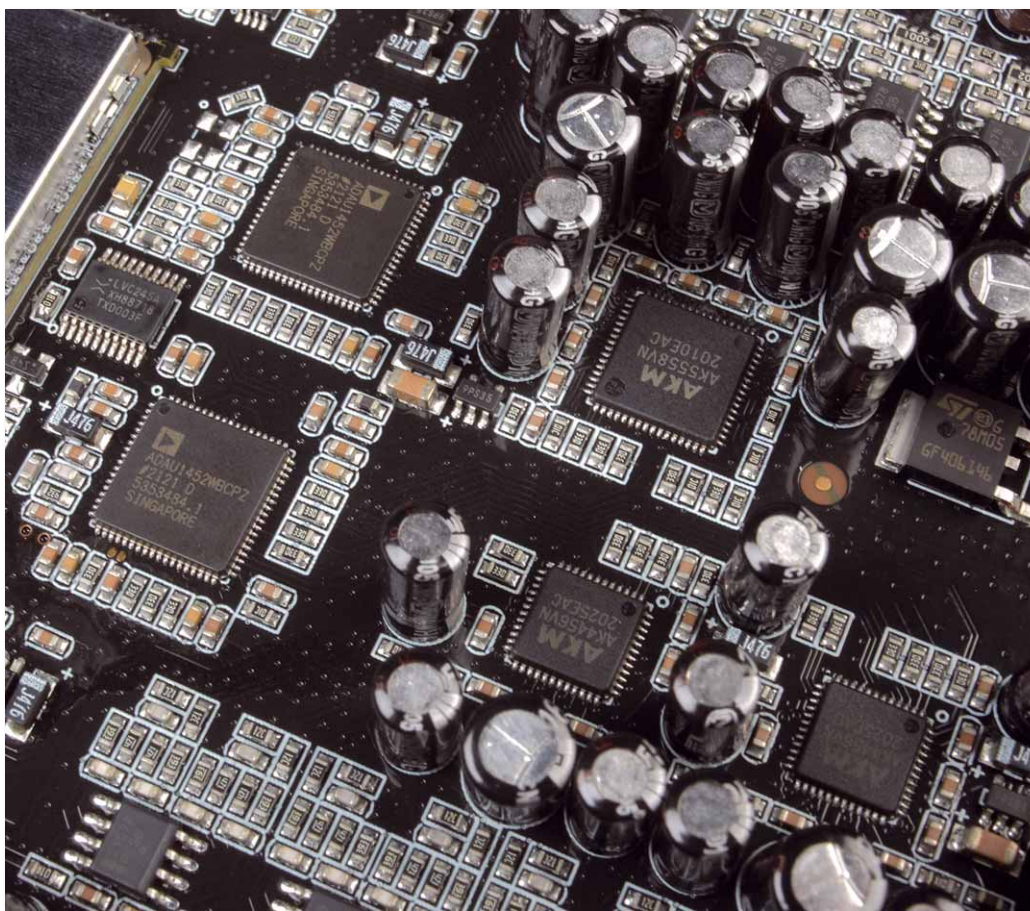
SSD is the preferred means. And the QE812SP still offers Bluetooth streaming, so you can play music from your smartphone in no time. The QE812SP provides three options for playing music via USB/music player. Firstly, controlled via a mobile app (currently only iOS) or one of the two remote controls. There's the display remote control RC-QE for 200 EUR, which is also connected via USB cable, and the steering wheel remote control included in the box, which even works wirelessly (USB dongle). A second wireless connection is available for smartphone control, which does not work via Bluetooth but via WIFI. Then, you can control the music with the ESX Player app. Folder and source selection, setup change, and the usu-

The music player sits in the middle of the board under a metal cover



DSP at its best: 2 DSP cores ADAU1452 and 32-bit converter from AKM

al like track skipping and pausing (strangely, no forward/rewind) can be controlled via the app, and there is also a nice cover display. The display remote offers the same range of functions except for the latter. It is similar to the steering wheel remote control, except that fishing in the mud is the order of the day here without a display. However, as a remedy, the QE812SP has a video output that displays the music player on the car radio's screen when the corresponding input is available on the head unit. The whole thing works excellently. The player finds all folders and tags and plays the corresponding files in the best HiRes qua-



lity. The compatibility is convincing and includes DSD up to DSD256 and FLAC of any sampling rate and bit depth. This is an excellent thing with only one drop of bitterness: The extra price of 500 EUR must be worth the HiRes music player on the hardware side.

### Hardware

The signal processor is technically the same as the smaller sister model QL812SP. This means, first of all, that the QE812SP also contains some of the best components that can be given to a car audio DSP. The twelve DSP channels are processed at a sample rate of 96 kHz, so two processor cores of the type

32-bit controller, Bluetooth board, and the digital inputs





Lots of connections, including two digital inputs, two USBs, and two antennas for Bluetooth and WIFI, and the video output for the music player

ADAU1452 from Analog Devices are installed. The analog-to-digital conversion of the inputs, like the digital-to-analog conversion of the outputs, is handled by the finest 32-bit converters from AKM's Q5 series

– it doesn't get any better than that if you use automotive-specification components correctly. A 32-bit ARM processor controls the whole thing, and the excellent Bluetooth 5 has already been mentioned. Finally,

we find a sample rate converter from Cirrus, whose job is to bring the variety of formats processed by the music player to a uniform standard compatible with the DSP. The music player is comparatively gigantic, hiding under a shielding tin lid in the middle of the board.



Equalizers and crossovers are set on the main screen. Master and channel levels are available. Absolute or relative linking of channels is possible here

### Software

ESX has already introduced a new software version with its little sister model QL812SP. It is available as an app (Android and iOS) and desktop software (Windows) with an equivalent range of functions. As a sound processor, our QE812SP offers an identical feature set with eight input channels and 12 outputs. On the user interface, one feels

Here the output time alignment is set. The speakers are displayed nicely in the vehicle. Here, we see a Mercedes with footwell woofers as an example





In expert mode, a new staging channel with a dedicated EQ emerges between inputs and outputs

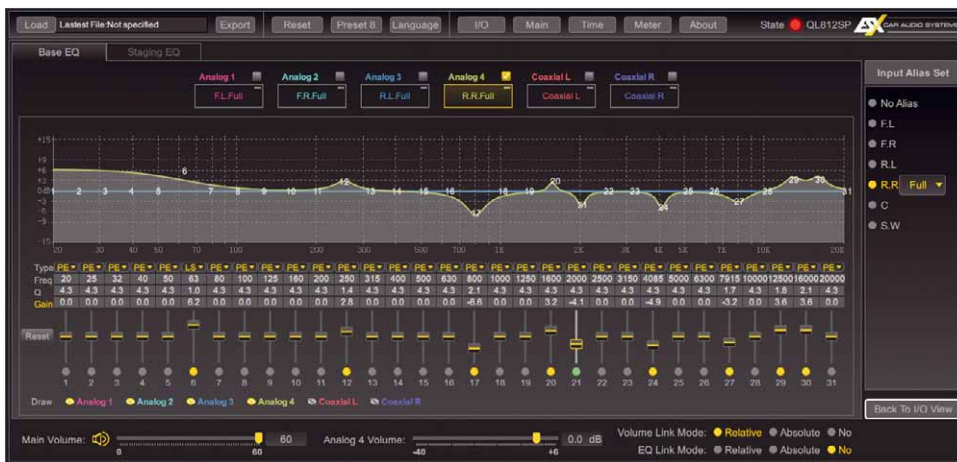
The SPL of all eight analog inputs and 12 outputs is displayed and directly adjusted

at home right away; everything is logically arranged and largely self-explanatory. The settings are placed in four windows, so it doesn't get too crowded in each. Names can be assigned to the inputs and outputs, e.g., tweeter front left. These names are then found in other places, and the speakers are even placed correctly in the auto diagram at runtime. This applies to the predefined BMW and Mercedes setups with the corresponding under-seat and footwell woofers as well. In general, there are several niceties in addition to the standard functions. For example, the channels designated as subwoofers (no matter which) are automatically assigned to the subwoofer level of the remote control.



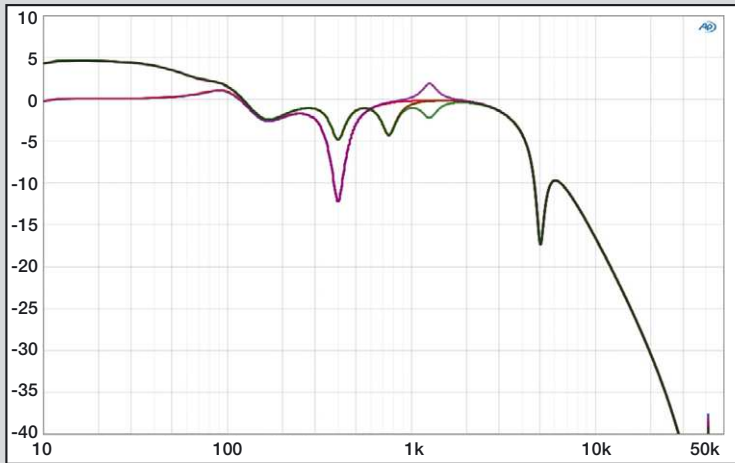
In the setups, you can see which ones are active, full, or empty, and you can also set a startup setup that is always active after switching on. The marker „active/used/unused“ also runs through the main window, e.g., with the EQ bands, of which there are 31 per output and can be either a shelf or a parametric EQ. Fine 3.5-mil-

limeter steps or 0.01-millisecond steps are possible for the delay time. The crossovers can do Butterworth, Bessel, and Linkwitz up to 48 dB/octave, which is all anyone needs. The digital inputs or the Bluetooth can be prioritized in the software, which means it is automatically switched to S/PDIF or Bluetooth when music is played. If you don't want to do without car sounds, they can be added to the mixer, so digital and analog sources can be mixed. A new addition is the meter window, where we find level meters for all eight analog inputs and twelve outputs. This is

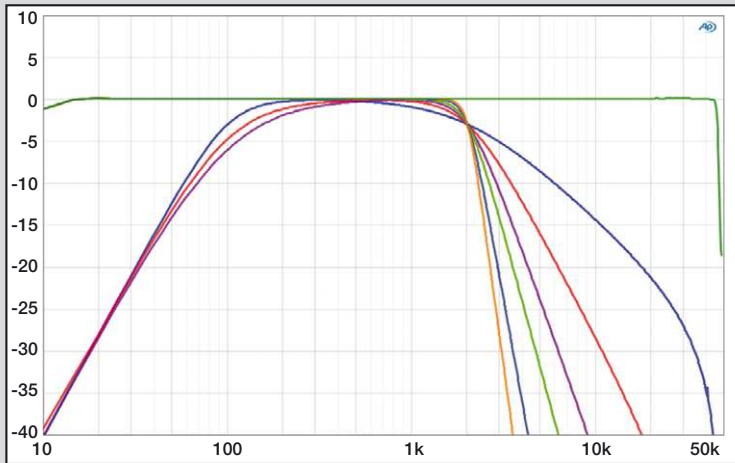


In addition to the input EQ, there is a staging EQ with 31 bands per channel as well

## CAR&HIFI Laboratory



The EQs allow you to build shelf and parametric EQs and adjust them individually or together. The balance link EQ at 1.25 kHz simultaneously adjusts purple louder and green softer

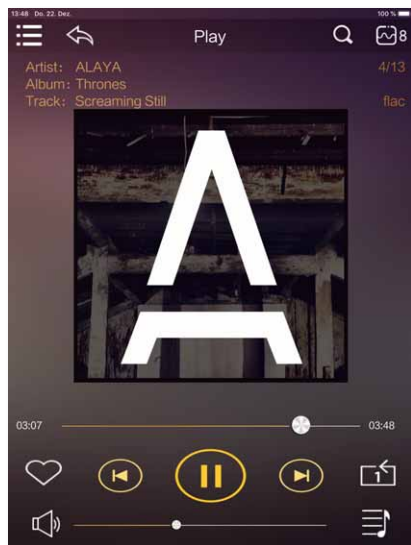


Hi-res frequency range up to 44kHz. 100-Hz high-pass with Butterworth, Bessel, Linkwitz. Low-pass at 2kHz with Butterworth, 6-48 dB/octave

helpful to be aware of what signal is present where. The correct level can be read and adjusted for all channels with level controls. In the I/O section, there is routing and a 31-band input EQ per channel with full functionality.

### Additional staging level

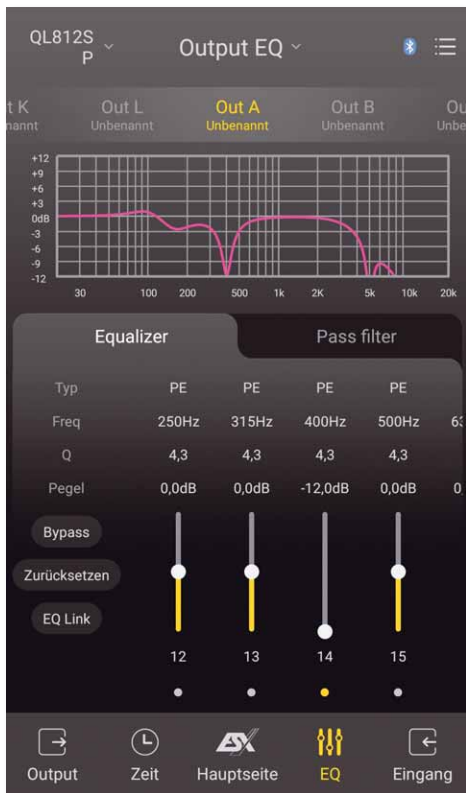
When the expert mode switch is pressed, the programming changes fundamentally. The number of analog inputs is reduced from eight to four, but an entirely new channel layer emerges. There are then four staging channels, which are located between the input channels and the outputs. This way, a multi-way front system can be assigned to a staging channel, which receives its dedicated 31-band EQ in the staging area. So the individual loudspeakers are separated and delay-corrected in the output section, and the output EQ is adjusted to the needs of the loudspeaker. That remains untouched from then on; the sound design happens via input EQ and staging EQ for, e.g., total front left. For simplified adjustment, channels can also be linked so that SPL and EQs can be changed either absolutely or relatively for the group. The staging EQ also has the balance link as a unique feature. It works like a balance control and takes away from one side what it adds to the other side when linked right-left. Of course, for each EQ band, which then also allows the stage imaging of the system to be fine-tuned.



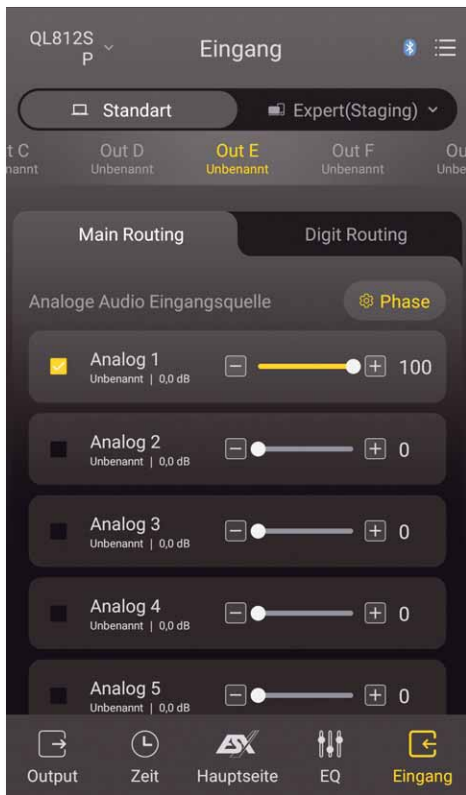
Music player app on iPhone with cover display



The display remote control allows source and setup selection as well as the control of the music player



Like the output EQ displayed here, input EQ and staging EQ can also be adjusted in the mobile app



Depending on Standard or Expert mode, inputs can be conveniently routed to outputs or staging channels

## Conclusion

With its built-in music player, the QE812SP is the most comprehensive offering on the market. In addition to first-class hardware and various digital and analog inputs, including Bluetooth streaming, the music player, with its dedicated control, allows the playback of any digital music in HiRes quality directly out of the DSP. This makes it a self-sufficient HiFi control center that no

longer needs auxiliary players or control devices.

*Elmar Michels*



## ESX QL812SP

Price	1500 Euro
Contact	Audio Design, Germany
Internet	<a href="http://www.audiodesign.de">www.audiodesign.de</a>

## Specifications

Dimensions	279 x 155 x 46 mm
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### Inputs

- 8-channel high-level with autosense
- 8-channel RCA, 2 x gain control
- Sensitivity 6 V (RCA), 45 V (high level)
- 1 x digital S/PDIF optical
- 1 x digital S/PDIF coax
- 1 x digital bluetooth
- 1 x mode („convertible pin“)
- 2 x USB (media, remote control)

### Outputs

- 12-channel RCA
- Remote-out
- Video out (music player)

### DSP-channels

- 8 Inputs, 12 Outputs (+ 4 Staging)

### DSP software

(PC V2/Android V1.0.0 in test)

### Equalizer

#### Inputs

- param./Shelf, 31 bands per channel, 8-channel (Standard)
- param./Shelf, 31 bands per channel, 4-channel + digital (Expert)

#### Staging (only Expert):

- param., 31 bands per Channel, 4-Channel

#### Outputs

- parametric, 31 band per channel, +12 – -12 dB
- 20 – 20k Hz, 1 Hz steps, Q 0.3 – 15
- optional shelf 25-10k Hz, Q 0.3-2

### Crossovers

- 20 – 20k Hz, 1 Hz steps

- Bessel, Butterworth, Linkwitz, 6 – 48 dB/oct.

### Time and level

- Sample rate 96 kHz, 3.5 mm steps (0.01 ms)

### Outputs

- 0 – 680 cm (20.00 ms), 2048 samples
- Level steps 0.5 dB, Main: 1 dB

### Features

- 8 presets
- Inputs and outputs arbitrarily routable
- Start-stop capability up to 7.2 V
- EPS (Error Protection System) for diagnostic function
- Signal dependent switching to Bluetooth or S/PDIF
- Coupling of channels (gain and EQ) absolute and relative possible
- Ground switch against hum interference
- Setup change via mode pin
- Input sensitivity adjustable via jumper
- Bluetooth (audio streaming and app control of all functions)
- WIFI (hi-res audio streaming, music player app)
- Music player display on head unit
- Internal memory for test tones

### Optional accessories

- Remote controller RC-DQ (volume, bass level, sources, setups)

# CAR & HiFi

INTERNATIONAL Germany 1/23

„All-in-one solution comprising a high-end DSP and a HiRes music player.“

Audio System HX 120 SQ (EM) Evo3 + HX 406 SQ (EM) Evo3 – Two-way systems as composite systems and easy mounting kits

# Component Systems for 5 and 4x6 inches

- ▶ Audio System offers a comprehensive range of loudspeaker systems that serve formats beyond the standard sizes of 4, 5.25, and 6.5 inches. We test two-way systems in the formats 5 and 4x6 inches.





The HX tweeter has a small coupled chamber, but it is not bulky



The 5" woofer is held in place with two spring clips

Especially for the „exotic“ formats, the market mainly offers cheap replacement speakers that often cost less than EUR 100. There's nothing wrong with that because, especially for older vehicles (the 120s fit Mercedes W123 and VW T4, among others), it's often simply a matter of replacing the defective originals. However, if you want to do yourself some good in terms of sound, the market runs thin. Therefore, it is a welcome development that Audio System also offers its high-quality HX-SQ series in these formats. And as usual with Audio System, it's not just one version. Because Audio System generally offers the systems as regular composites and EM sets, which stands for Easy Mounting. The EM kits are slimmed-down versions of the regular compos offered at a lower price. Savings are made on

the peripheral equipment, but the speakers are usually the same except for some woofers replaced by flatter versions that are easier to install. This is not the case with our 5 and 4x6 systems; the drivers are already tiny. The tweeters of the EM sets come without housing as „naked“ high-range „pills“ for gluing into the original mounting holes. The crossovers consist of only a few components and are integrated into the supply cables - in other words, easy mounting.

On the other hand, the regular combo systems are richly equipped with several mounting cups for the tweeters and, in the case of the HX-SQ series, with the FWX crossover. And this has it all because it offers a variety of tuning options. Thus, the woofers can be switched optionally with 6 dB or 12 dB/octave, and

THE ULTIMATE SOUND EXPERIENCE



 **HELIX**

**ULTIMATE**

**P SIX DSP**

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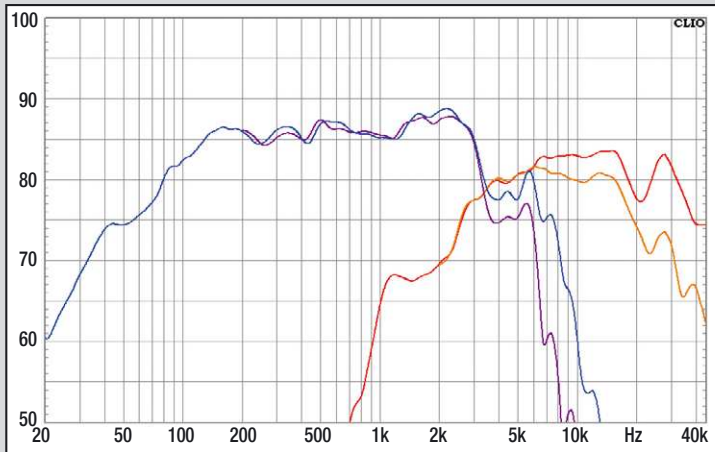
12-channel DSP with 6-channel High-Res amplifier

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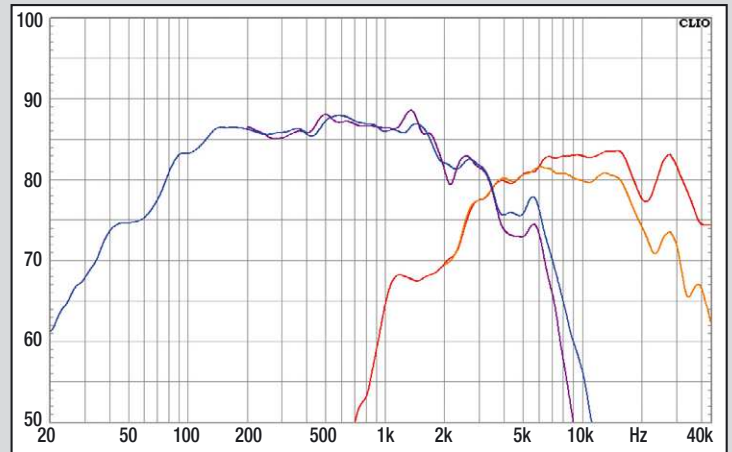
[www.audiotec-fischer.de/p-six-dsp-ultimate](http://www.audiotec-fischer.de/p-six-dsp-ultimate)



## CAR&HIFI Laboratory



The HX 120 SQ Evo3 shows very nicely performing drivers with a quieter and smoother operating tweeter



The HX 406 SQ Evo3 is configured like the 120 SQ with 12 dB plus RC element. The tweeter has the lowest crossover frequency with all capacitors

several midrange tunings are also available. The tweeters can be adjusted in crossover frequency and SPL, making the appropriate tuning for many installation situations possible.



The EM systems' tweeter is technically the same, only without housing

### Specifications

Basket diameter	120 mm
Mounting diameter	110 mm
Mounting depth	47 mm
Magnet diameter	55 mm
Membrane tw	25 mm
Casing tw	40 mm
slope wf/tw	6/6 dB
Tweeter protection	PTC
Tweeter level adjustable	0, -3, -6 dB
Grid	-
Others	-
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*l	5,11 Tm
SPL 2v, 1m	86 dB
Amplifier power recommendation	20 – 60 W

### Audio System HX 120 SQ EM Evo3

Price	325 Euro
Contact	Audio System, Germany
Internet	www.audio-system.de

### 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 %	★★★★★

## Top Class



# CAR & HiFi

INTERNATIONAL

Germany 1/23

Price/performance: very good

„Quality two-way systems for vehicles with 5" and 4x6" mounting holes.“



The Easy Mounting systems' woofer branch consists of a small core coil. Two MKP capacitors can be connected for the high range

le. Our HX 120 SQ Evo3 and HX 406 SQ Evo3 are featured with the HS 25 tweeter, a nice 25-millimeter fabric dome tweeter used in any number of systems in the X series and HX-SQ series at Audio System. The woofers are finely made with compact neodymium motors and 25-millimeter voice coils with stamped metal frames. The cones consist of paper with a water-repellent-coated front.

### Measurements and sound

With identical woofers and technically identical tweeters, our four systems naturally behave similarly. Even the two bass-midrange drivers differ only in the shape of the cone; the motors are identical, and the cone areas are approximately the same. The main difference is the crossovers, which in the EM sets consist only of 6 dB filters, each with a core coil or a (switchable) capacitor. The result is that the cone resonances of the low-midrange drivers can still be read in the frequency responses, and the fundamental resonance of the tweeters is only slightly damped. The regular compos with the full-size crossover do better. They also show superior performance in

terms of distortion. While the EM tweeter branches are featured with good MKP capacitors, the low-pass coil causes distortions due to saturation of the ferrite core – but only at high SPLs.

### Specifications

Basket diameter	153 x 99 mm
Mounting diameter	144 x 90 mm
Mounting depth	47 mm
Magnet diameter	55 mm
Membrane tw	25 mm
Casing tw	40 mm
slope wf/tw	6/6 dB
Tweeter protection	PTC
Tweeter level adjustable	0, -3, -6 dB
Grid	-
Others	-
Nominal impedance	3 Ohm
DC resistance R <sub>dc</sub>	2,63 Ohm
Voice coil inductance L <sub>e</sub>	0,21 mH
Voice coil diameter	25 mm
Cone area S <sub>d</sub>	77 cm <sup>2</sup>
Resonance frequency f <sub>s</sub>	72 Hz
Mechanical Q Q <sub>ms</sub>	5,02
Electrical Q Q <sub>es</sub>	0,46
Total Q Q <sub>ts</sub>	0,42
Equivalent volume V <sub>as</sub>	5,7 l
Moving mass M <sub>ms</sub>	7,1 g
R <sub>ms</sub>	0,64 kg/s
C <sub>ms</sub>	0,69 mm/N
B*l	4,27 Tm
SPL 2v, 1m	86 dB
Amplifier power recommendation	20 – 60 W

### Audio System HX 406 SQ EM Evo3

Price	325 Euro
Contact	Audio System, Germany
Internet	www.audio-system.de

### 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 %	★★★★★

Top Class

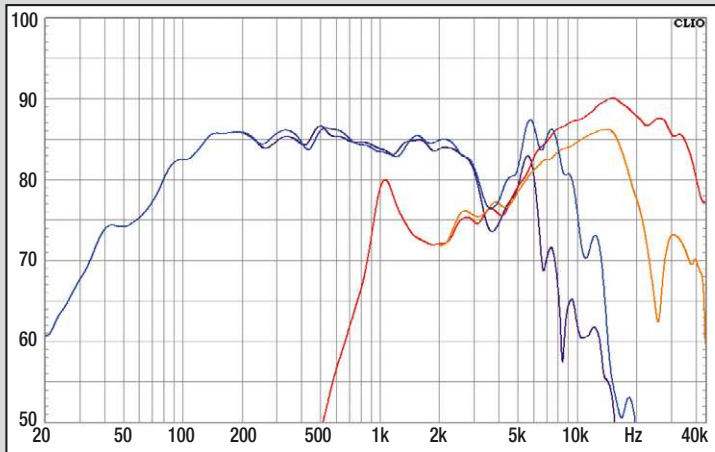


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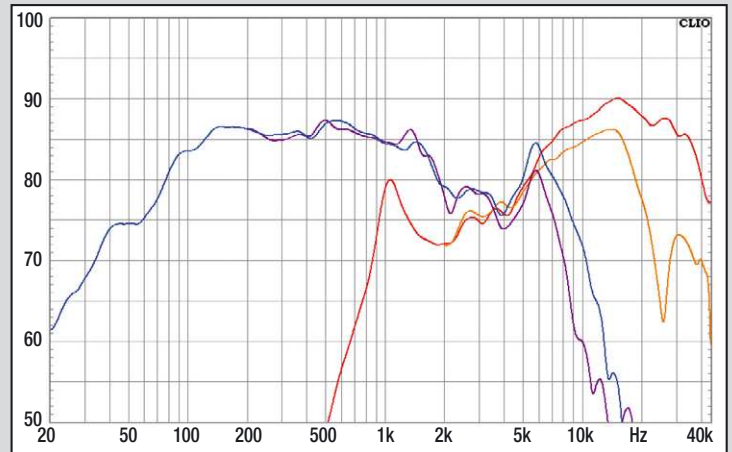
Price/performance: very good

„Quality two-way systems for vehicles with 5" and 4x6" mounting holes.“

## CAR&HIFI Laboratory



The Easy Mounting 120 still has some cone resonances at 5 kHz. However, the frequency response is generally satisfactory



As with the 120 EM, the 6-dB filtering on the 406 Easy Mounting leaves peaks for bass and tweeter



The regular compos are equipped with the FWX Evo2 full-size crossover, which can be adjusted in many ways and is of high quality

### Specifications

Basket diameter	120 mm
Mounting diameter	110 mm
Mounting depth	47 mm
Magnet diameter	55 mm
Membrane tw	25 mm
Casing tw	48 mm
slope wf/tw	6, 12/12 dB
Tweeter protection	PTC
Tweeter level adjustable	+4, +2, 0, -1 dB
Grid	-
Others	Trennfrequenz, Flankensteilheit, Mittelton, Hochtonpegel vielfältig anpassbar

Nominal impedance	3 Ohm
DC resistance Rdc	2,55 Ohm
Voice coil inductance Le	0,22 mH
Voice coil diameter	25 mm
Cone area Sd	72 cm <sup>2</sup>
Resonance frequency fs	65 Hz
Mechanical Q Qms	5,74
Electrical Q Qes	0,32
Total Q Qts	0,30
Equivalent volume Vas	5,6 l
Moving mass Mms	7,9 g
Rms	0,56 kg/s
Cms	0,76 mm/N
B*I	5,11 Tm
SPL 2v, 1m	86 dB
Amplifier power recommendation	20 – 60 W

### Audio System HX 120 SQ Evo3

Price	375 Euro
Contact	Audio System, Germany
Internet	www.audio-system.de

### 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 %	★★★★★

## Top Class



# CAR & HiFi

INTERNATIONAL

Germany 1/23

Price/performance: very good

„Quality two-way systems for vehicles with 5" and 4x6" mounting holes.“



The bass-midrange drivers have the same motor and almost the same cone area

The 406 woofer uses a paper cone and a neodymium motor

On the other hand, the large air coil made of thick wire in the large crossover is perfect. Sound-wise, this is also noticeable, but there are no worlds between the regular compos and the EM versions. The same speakers make it sound very similar. The small woofers naturally don't produce abysmal bass, but they do a swell job with precise bass hits and dynamic playing. Also, the HX-SQ systems have a very nicely resolved and pleasant high range along with generous spaciousness. The regular compos come out ahead for voices and instruments, but as mentioned, not by miles. Overall, all four systems deliver an appealing sound on a high level.

### Conclusion

With the HX 120 SQ EM Evo3, HX 406 SQ EM Evo3, HX 120 SQ Evo3, and HX 406 SQ Evo3, Audio System offers recommendable systems that are significantly better than standard products and provide real sound improvement.

*Elmar Michels*

### Specifications

Basket diameter	153 x 99 mm
Mounting diameter	144 x 90 mm
Mounting depth	47 mm
Magnet diameter	55 mm
Membrane tw	25 mm
Casing tw	48 mm
slope wf/tw	6, 12/12 dB
Tweeter protection	PTC
Tweeter level adjustable	+4, +2, 0, -1 dB
Grid	-
Others	Trennfrequenz, Flankensteilheit, Mittelton, Hochtonpegel vielfältig anpassbar
Nominal impedance	3 Ohm
DC resistance Rdc	2,63 Ohm
Voice coil inductance Le	0,21 mH
Voice coil diameter	25 mm
Cone area Sd	77 cm <sup>2</sup>
Resonance frequency fs	72 Hz
Mechanical Q Qms	5,02
Electrical Q Qes	0,46
Total Q Qts	0,42
Equivalent volume Vas	5,7 l
Moving mass Mms	7,1 g
Rms	0,65 kg/s
Cms	0,69 mm/N
B*1	4,27 Tm
SPL 2v, 1m	86 dB
Amplifier power recommendation	20 – 60 W

### Audio System HX 120 SQ Evo3

Price	375 Euro
Contact	Audio System, Germany
Internet	www.audio-system.de

### 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 %	★★★★★

**Top Class**



**CAR & HiFi**  
INTERNATIONAL Germany 1/23

Price/performance: very good

„Quality two-way systems for vehicles with 5" and 4x6" mounting holes.“

Ground Zero GZCS SW-800A + GZCS SW-1000A  
– two compact under-seat subwoofers

# Subwoofer under the seat

- ▶ Ground Zero has taken on under-seat subwoofers and presents the models GZCS SW-800A and GZCS SW-1000A, two new powered woofers that are pretty elaborately made and practically form the top end of this subwoofer category in its product range.





**GROUND ZERO**  
GERMAN ENGINEERING

**GROUND ZERO**  
GERMAN ENGINEERING



The mono power amplifier operates in traditional Class AB mode



The woofers have a shallow mounting depth thanks to the flat cones

The most crucial criterion for under-seats is the size because the woofer must fit under the seat, although you can install it elsewhere. Our SW-800A and SW-1000A differ mainly in the size of the bass driver, which also determines the size of the housing. The 800 is equipped with an 8-inch woofer, while the 1000 is a 10-inch model. Both drivers are designed to be as flat as possible, made possible by the aluminum cones. These are perfectly flat and stabilized with embossing. The flat dust caps also contribute to stability. The motors are the same for both drivers and work with 1.5" diameter voice coils. The built-in amplifiers are also similar. They are designed on the same circuit board and are analog Class AB mono amplifiers. The SW-1000A has a little extra power compared to its little brother. In addition, the components on the board are somewhat more extensive, with larger power transistors.

There is nothing to complain about the features of the woofers. Both come with a level remote control and are also suitable for use with a car radio, thanks to high- and low-



Speaker-level inputs are available as well as a polarity switch, a low-pass filter, and a bass boost

# 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](http://WWW.AUDIO-SYSTEM.DE)



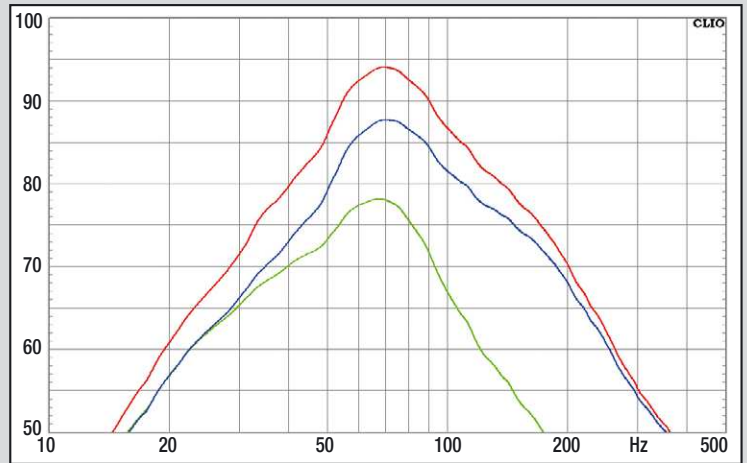


level inputs. There is also a practical automatic turn-on. There are gain and low-pass controls, and the phase can also be reversed to integrate the sub into the existing system's soundscape. For an additional charge, there is also the practical GZCS Y-Box, which is used to operate two GZCS woofers in parallel and control them with a single remote control.

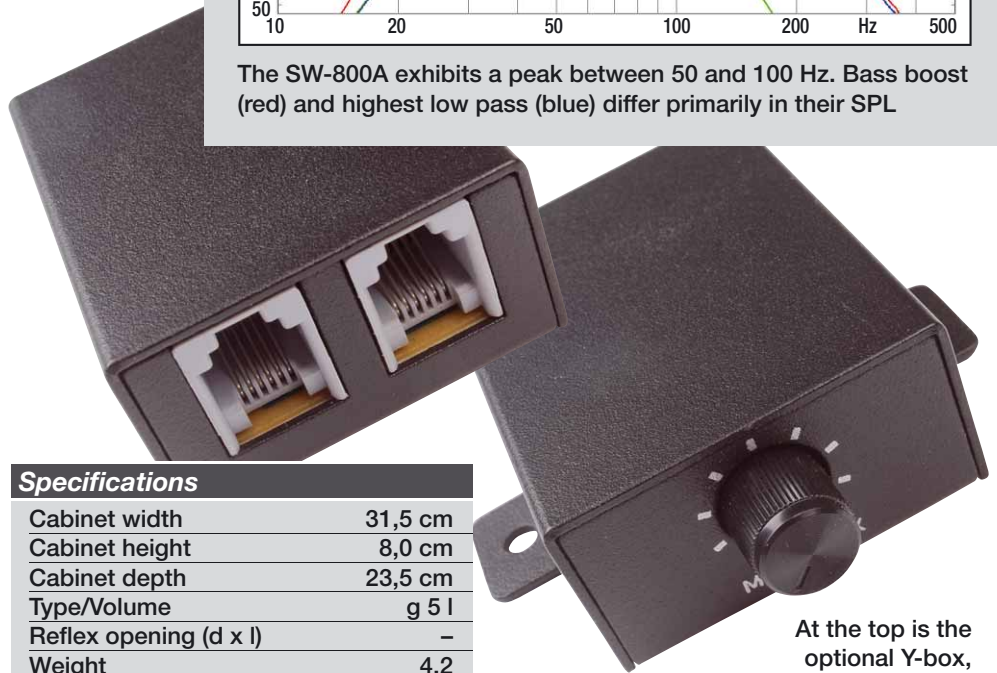
**Measurements and sound**

The woofers are equipped with 2-ohm voice coils, helping the amplifiers deliver more power. In the measurements on the amplifiers, we find very little residual noise, low distortion, and sufficient power. With 138 watts and 163 watts, the SW-800A and SW-1000A are

**CAR&HIFI Laboratory**



The SW-800A exhibits a peak between 50 and 100 Hz. Bass boost (red) and highest low pass (blue) differ primarily in their SPL



At the top is the optional Y-box, and at the bottom, the enclosed level remote control

**Ground Zero GZCS SW-800A**

Price 250 Euro  
 Contact Ground Zero, Germany  
 Internet www.ground-zero-audio.com

**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 %	★★★★★

**Specifications**

Cabinet width	31,5 cm
Cabinet height	8,0 cm
Cabinet depth	23,5 cm
Type/Volume	g 5 l
Reflex opening (d x l)	-
Weight	4,2
Driver diameter	20 cm
Nominal impedance	2 Ohm
Voice coil diameter	38 mm
Output at nom. imped.	138 W
Sensitivity RCA max.	50 mV
Sensitivity RCA min.	1,2 V
THD +N (<22 kHz) 5 W	0,06 %
THD +N (<22 kHz) Halblast	0,13 %
Signal-to-noise ratio (A weighted)	104 dB

**Equipment**

Low-pass	50 – 150 Hz
Bass boost	0 – 6 dB/60 Hz
Subsonic filter	fix 25 Hz
Phase shift	polarity switch
Low-Level inputs	•
High-Level inputs	•
Automatic switchon	•, DC
Start-stop capability	• (6,9 V)
Remote control	•, Gain
Miscellaneous	-



**Compact Class**



**CAR&HIFI**

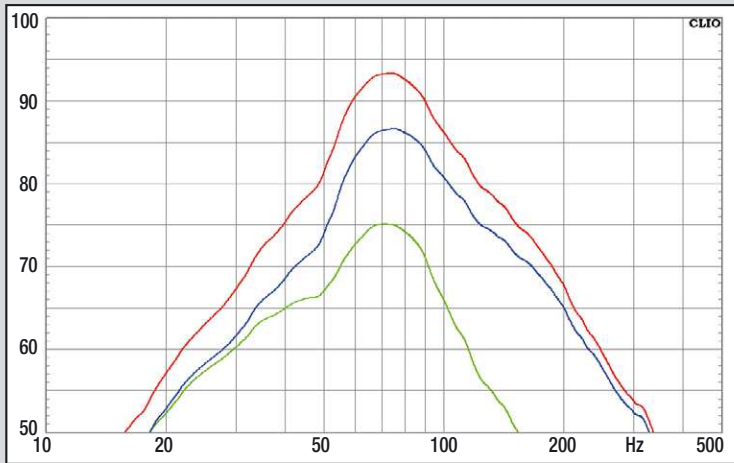
INTERNATIONAL

Germany 1/23

Price/performance: very good

„Well-made powered subwoofers“

## CAR&HIFI Laboratory



The SW-1000A shows almost the same frequency response as the 800; both are equipped with a subsonic filter

among the most potent under-seat subwoofers on the market. The bass boost does little justice to its name because it boosts too unspecifically, so the result is more or less a volume control. This is also evident in the acoustic measurements of the boxes, which otherwise impress with quite decent SPLs. In the listening check, the Ground Zeros do what is expected of them. They lay down a solid bass foundation for small (factory-

installed) systems. The bass doesn't reach abysmally low, but it sounds much more authoritative with the Ground Zeros. Bass notes also reach the ear more accurately, and the



### Specifications

Cabinet width	36,5 cm
Cabinet height	8,0 cm
Cabinet depth	27,0 cm
Type/Volume	g 7,5 l
Reflex opening (d x l)	-
Weight	5,0 kg
Driver diameter	25 cm
Nominal impedance	2 Ohm
Voice coil diameter	38 mm
Output at nom. imped.	163 W
Sensitivity RCA max.	50 mV
Sensitivity RCA min.	1,2 V
THD +N (<22 kHz) 5 W	0,03 %
THD +N (<22 kHz) Halblast	0,09 %
Signal-to-noise ratio (A weighted)	104 dB

### Equipment

Low-pass	50 – 150 Hz
Bass boost	0 – 6 dB/60 Hz
Subsonic filter	fix 25 Hz
Phase shift	polarity switch
Low-Level inputs	•
High-Level inputs	•
Automatic switchon	•, DC
Start-stop capability	• (6,9 V)
Remote control	•, Gain
Miscellaneous	-

overall sound quality increases. The differences between the two models turn out to be small. The SW-1000A sounds more confident at higher levels due to the larger cone area, but the 800 also does a good job. Both woofers are fun when listening to somewhat louder music. Then everything can get snappy, and the woofers impress with their precise sound.

### Conclusion

GZCS SW-800A and GZCS SW-1000A belong to the better under-seat subwoofers on the market. They are solidly made and perform quite well, thanks to excellent amplifiers.

*Elmar Michels*

### Ground Zero GZCS SW-1000A

Price	300 Euro
Contact	Ground Zero, Germany
Internet	www.ground-zero-audio.com

### 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 1/23

Price/performance: very good

„Well-made powered subwoofers“

Helix DSP PRO MK3  
– 10-channel DSP with dual core

# High-end sound processor

- ▶ When it was released in 2015, the Helix DSP PRO eclipsed all stand-alone DSPs on the market. Now, even the MK2 version released in 2017 is becoming a little outdated, so it is time for the new DSP PRO MK3.

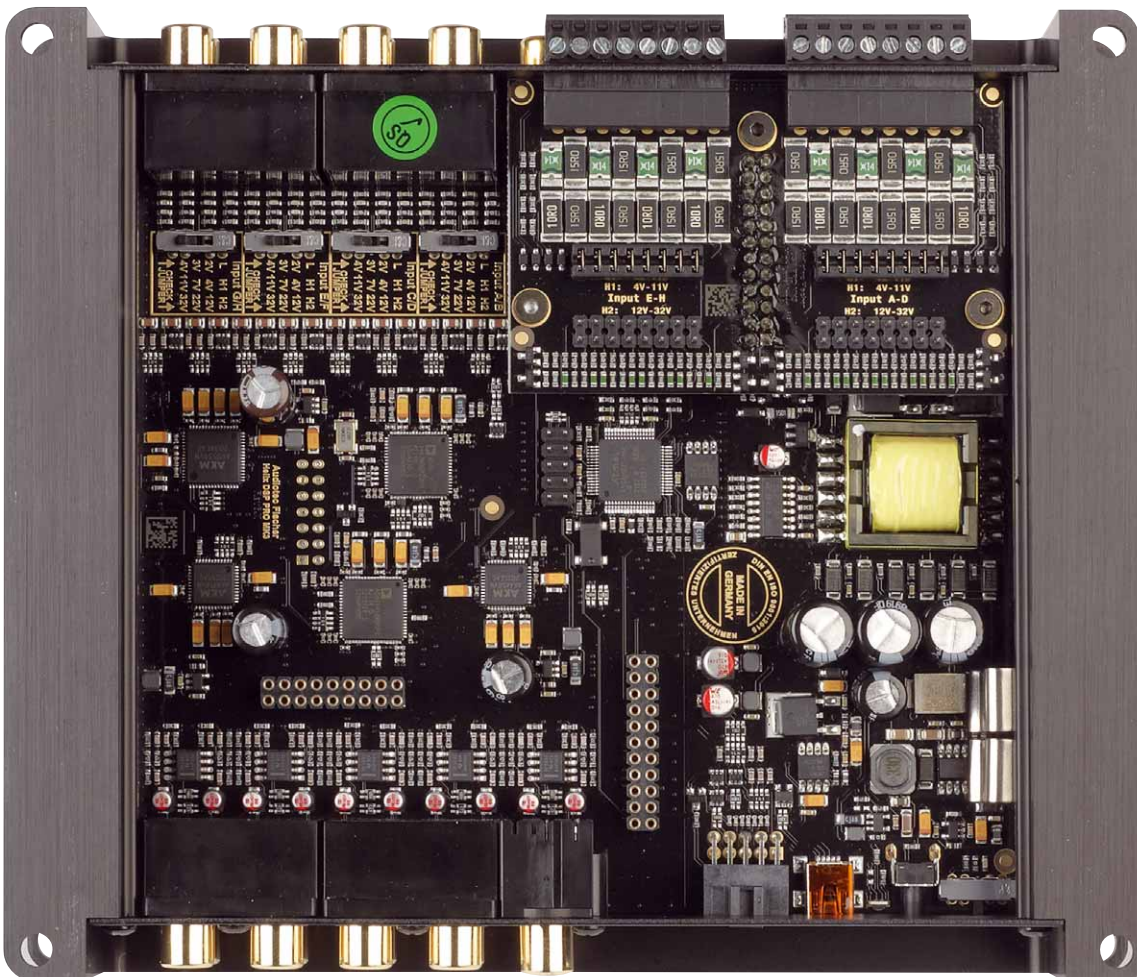




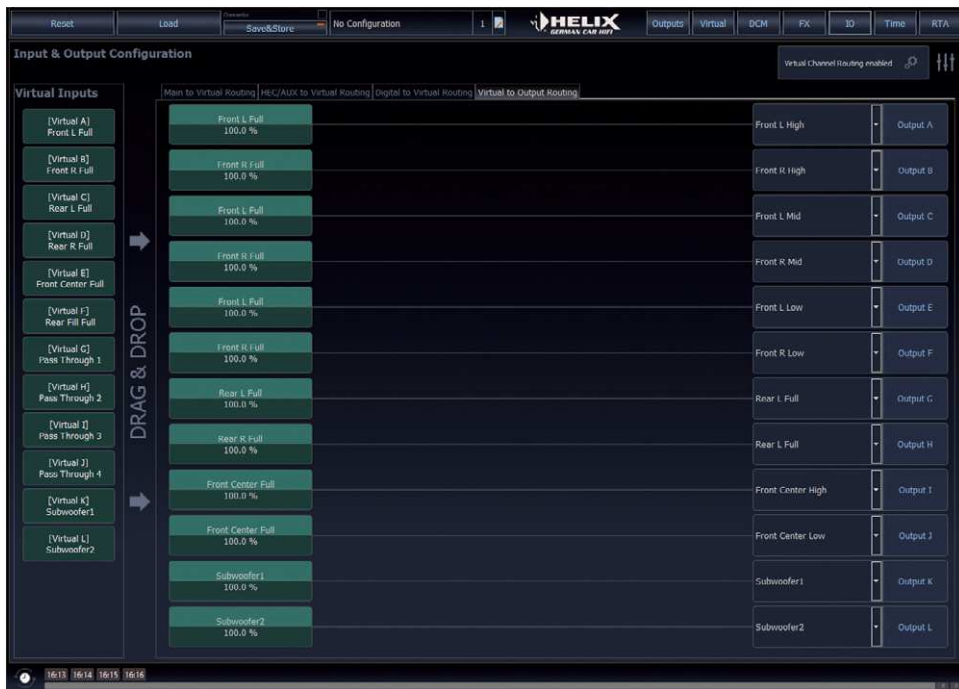
For many years, the DSP PRO was Helix's flagship, with its 10 channels and 96 kHz sample rate for a hi-res frequency range right from the start, it was the top dog on the market. But a lot has happened technically since then, and so it became an urgent need to release the DSP PRO MK3. At Helix, the MK3 indicates that nothing has changed in the concept, otherwise the name would have been changed. As it is with the DSP ULTRA, which has replaced the PRO as Helix's top-of-the-line model since 2020. And it is also the DSP ULTRA that now needs to prove



As an alternative to the normal routing, virtual channel processing can be used to combine groups together and equalize them across the crossover frequencies



The upper third contains the analog signal processing with 4 switches and 2 large jumpers for sensitivity adjustment. In the middle left, you can see the AKM converters and the two DSP chips



If VCP is activated, first the inputs are routed to the virtual channels, then the virtual channels are routed to the outputs

itself after the DSP PRO MK3 renovation. Because at Helix, of course, they did not intentionally make the new MK3 inferior, but rather gave it only the finest features. In terms of crucial hardware, it shares a lot of similarities with the DSP ULTRA. It goes without saying that the DSP PRO MK3 features the latest ACO platform with the powerful 32-bit

coprocessor. This upgrade makes the newer features like the extensive measurement functions possible in the first place. Also the VCP with its virtual channels, which can be combined as a group of several output channels and then processed, is not possible without ACO. This is where the DSP PRO MK3 is now up to date. No compromises were made in DSP

performance either, the DSP PRO MK3 operates at a hi-res-capable sample rate of 96 kHz and it offers all features including the above VCP, so two instead of one DSP chips are required, which the DSP PRO MK3 carries on the board in the form of the duo ADAU1462 and ADAU1452 from the Analog Devices manufacturer. This makes it state of the art worldwide; only the Brax DSP, also from Audiotec Fischer, has one more DSP chip. There is no mistake with the converters either: It has to be the outstanding 32-bit types from AKM (“Velvet Sound”), namely an eight-channel AK5558 as ADC and two six-channel AK4456 as DACs – all from AKM’s noble 5 series. So far, the DSP PRO MK3 is on a par with the identically equipped DSP ULTRA. The DSP PRO MK3 has to make concessions in the number of channels, it “only” has 10 channels, although the DACs would provide 12. Another technical difference is the signal processing at the analog inputs. Here, the DSP PRO MK3 works passively, while the DSP ULTRA has a more complex active signal processing. But the passive circuit



RTA measurement of a mid-range woofer: Original curve (red) and result with 24-dB crossing (white). You can see the correction via TuneEQ in green and, at the bottom, the EQ bands 4 – 24 are accordingly adjusted. We measured with an accuracy of 1/6 octave and standard smoothing; finer is possible if desired



In addition to the hardware settings, the DCM menu contains a gain control including a clipping display

of the PRO MK3 is anything but a cost-cutting program. On the contrary, the engineers got the maximum out of it by making the circuit adaptable to the input signal in many ways. Gain controls are missing on the DSP PRO MK3, but there are plenty of switching options, the fine tuning is done afterwards in the software. For the 8 inputs there are channel-pair switches, with which the sensitivity can be adjusted in three stages. In addition, the high-level inputs have two jumpers that roughly determine the sensitivities of the A-D and E-H channels. The sensitivity of the channels can be set in the software. Here it can be jumped whether the inputs accept up to 11 volts or up to 33 volts signal. The 33 volts also cover the powerful top factory packages of the premium manufacturers. Thus the low and high level

## Software

All DSP products of the Brax, Helix and Match brands are controlled by the DSP PC tool, which is now available in version 5 free of charge. Besides 30 EQs per channel, time alignment of both inputs and outputs and of course freely programmable crossovers, there is the VCP (virtual channel processing) with the possibility to process channel groups as virtual channels between inputs and output channels. For example, a three-way front system with six output channels for right and left sides can be managed by the virtual channels front left and right. The time alignment of the individual loudspeakers, the crossings of tweeter, midrange and woofer are carried out at the output channels, here also peculiarities of the installation situations are corrected. The sound-decisive equalizing, however, can be conveniently performed in the virtual front channels, for the entire front system and across all crossover frequencies. The virtual channel can also be used to "shift" the entire three-way side via time alignment or to level it via the gain control. The FX sound effects now also affect the virtual center and rear channels, which means that two-way centers can also be perfectly controlled.

Under the FX section (effects), algorithms for optimizing the center and bass can be activated. The real center is a blessing by itself; a center channel signal is calculated by specially programmed audio processing. Thus, the real center is not a stopgap solution like a mono sum or a reversed sum of left and right. For center there is the clarity expander, which

affects the midrange reproduction, e.g., for voices. Bass processing includes the SubXpander, which adds low tones to music by creating subharmonics to existing frequencies. In addition, there is a dynamic bass boost, which boosts the bass depending on the playback volume. This helps quite nicely with factory systems that have limited loadable woofers and subwoofers, for example. There are adjustment controls for all FX functions, with which you can specifically influence the extent and function.

Furthermore, the latest measurement functions of the PC-Tool are supported. The well-known RTA (real-time frequency response measurement with optional microphone) has been improved with some new features; there are now even more setting possibilities concerning the measurement, e.g., a microphone calibration. If desired, the RTA can automatically adjust the EQs, tolerance thresholds and the number of EQs to be used can be set here. Version 5 also allows the adjustment of individual speakers with their crossovers, creating perfect acoustic filter slopes that then also add to a clean SPL summation when the speakers play together.

The ISA can also be used to measure sums of several inputs, thus tracking down hidden all-pass filters that remain inconspicuous in individual measurements. This electrical measurement of the inputs saves the installer a lot of time in troubleshooting and tuning of the DSP, because at the same time as the measurement, the input EQs (and the input time) can be set with immediate success control.

Furthermore, there is the ATM (automatic time measurement), which allows a fully automatic runtime measurement and adjustment of the entire system. The advantage here is that the measurement signal is played back as a sound file like a piece of music via the head unit; this is possible in all type of vehicles. The measurement is then carried out using the company's own in-house programmed measurement signals and a great deal of audio processing. The time of all the loudspeakers in the system is compared with a reference loudspeaker and then calculated.

The current version also includes the advanced import function of setups, which is now also available for the inputs. This makes life easier, especially for professionals, because it allows previously created setups to be transferred in whole or in part to the fresh unit. For example, the existing subwoofer settings of an existing setup can be placed on any two channels with a click. The transfer of high pass, low pass, EQ, gain and name from any channel to any channel is possible for inputs and outputs – practical for power users.

Very praiseworthy are the numerous integration features like power save mode for CAN vehicles or bypass circuits for diagnostic programs of some factory radios and a freely configurable source management with automatic switching of sources and vehicle sounds. The in-house ADEP.3 system is capable of bypassing the speaker diagnostics of some vehicles, thus bypassing error codes or even disabling channels.

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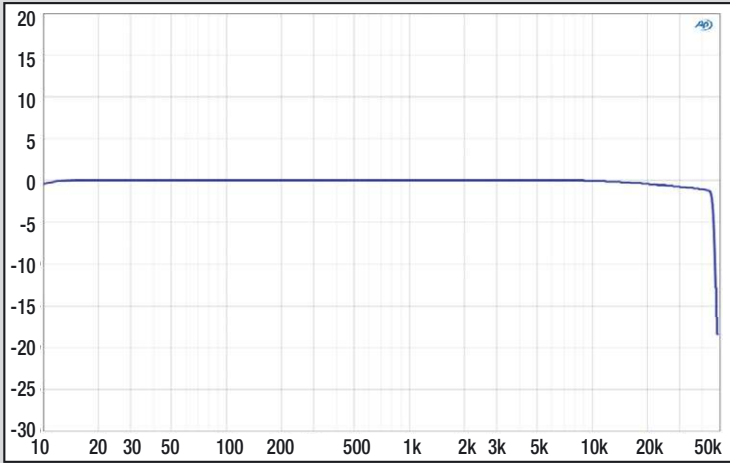
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The Test-Specialists  
Duisburg · Germany



# CAR & HIFI Laboratory



Der DSP PRO MK3 zeigt dank der hohen Samplingrate der DSPs einen Audiofrequenzumfang bis knapp 50 kHz

inputs cover voltage levels from 2 volts to 32 volts, whereby the circuit always works in the optimal range. This is good against noise and allows for a clean signal. And then the DSP PRO MK3 also has a digital input, which can even be fed optically or electrically. This makes the DSP PRO MK3 a device with a very clear high-end aspirations, quite close to the DSP ULTRA. Finally, all the expansion possibilities are still available with the HEC port and the SCP system connector. The URC remote controls, Conductor and Director shine with configurability and intelligent functions and various HEC expansion cards allow additional inputs and outputs, wireless programming and music streaming via Bluetooth 5.0 and aptX HD or via USB cable as hi-res access with up to 192 kHz/32 bit. And supporting the already very good



The ISA (Input Stage Analyzer) features single or combined measurement of the input channels. Time alignment and equalizing can be applied immediately

The output side contains the 10 sockets of the DSP channels; the left contains the switch for grounding against interference



The analog inputs are available as eight channels each as low and high level, the digital input is also available in duplicate

vehicle integration with the ADEP.3 system, cable sets and MOST bus adapters are available to achieve optimal sound in any vehicle.

## Conclusion

After upgrading to the DSP PRO MK3, we have a high-end DSP in front of us that, with its two DSP cores and top converters, ranks among the best DSPs in the world. Also thanks to the powerful software DSP PC-Tool, the DSP PRO MK3 does not need to shy away from any comparison in the 1,000 Euro class.

*Elmar Michels*



### Helix DSP PRO MK3

Price	1000 Euro
Contact	Audiotec Fischer, Germany
Internet	www.audiotec-fischer.com

### Specifications

Dimensions (L x W x H in mm)	177 x 150 x 40
---------------------------------	----------------

#### Inputs

- 8-channel RCA
- 8-channel High-level
- 2 x digital S/PDIF (optical + coax)
- Sensitivity Low: 4V, High: 11/32 V (via jumper)

#### Outputs

- 10-channel RCA (8 V)
- Remote-out

#### DSP-Channels

- 10 Outputs + 8 virtual channels

#### DSP-Software (V 5.00)

#### Equalizer

##### Inputs:

- param., 5 bands per channel

##### Virtual channels:

- param., 30 bands per channel

#### Outputs:

- param., 30 bands per channel, +6 – -15 dB
- 20 – 20k Hz, 1-Hz increments, Q 0,5 – 15
- Shelf 25 – 10k Hz, Q 0,1 – 2
- Allpass filters 1st or 2nd order, f and Q adjustable

#### Crossovers

##### Outputs:

- 20 – 20k Hz, 1-Hz increments
- Bessel, Butterworth, Chebychev, Linkwitz, User, 6 – 42 dB/Okt.

#### Time and level

- Samplerate 96 kHz, 3,5 mm increments (0,01 ms)

#### Inputs:

- 0 – 5,20 ms, 512 samples

#### Virtual channels:

- 0 – 708 cm (20,82 ms), 2048 samples

#### Outputs:

- 0 – 708 cm (20,82ms), 2048 samples
- Phase 0, 180° (fullrange), 0 – 360° (22,5° increments)
- Adjustable level increments 0,1– 1 dB

#### Features

- 10 Setups with fast switchover
- User-defined routing of in- and output ports
- Control connector for programmable remote controls and accessories
- Start-stop capability up to 6V
- Signal-dependent switching to digital or Aux inputs

- Automatic putting through of all vehicle tones
- Power-Save-Mode
- ADEP.3 error protection circuit for factory radios with speaker recognition
- RTA real-time frequency curve measurement (with optional microphone), automatic adjustment including filter slopes
- FX menu with dynamic bass, center and front processing
- ISA for measuring, summing and correcting inputs
- Time Machine for taking back and restoring adjustments
- Device Monitor (temperature and voltage control)
- ATM automatic time alignment with custom signal
- Import of setups and data from other devices
- VCP (optionally activated), virtual channels, routable, with EQ, time alignment and FX processing

#### Optional accessories

- Wired remote control (programmable)
- Display remote control Director with memory, USB, etc.
- Smart remote control Conductor
- WIFI Control for wireless programming
- Measurement microphone MTK1
- HEC Extension Cards

**CAR & HiFi**  
INTERNATIONAL Germany 1/23  
"World-class DSP by Helix  
now in the 1000 Euro price range."

Next issue June 9, 2023

# Coming soon

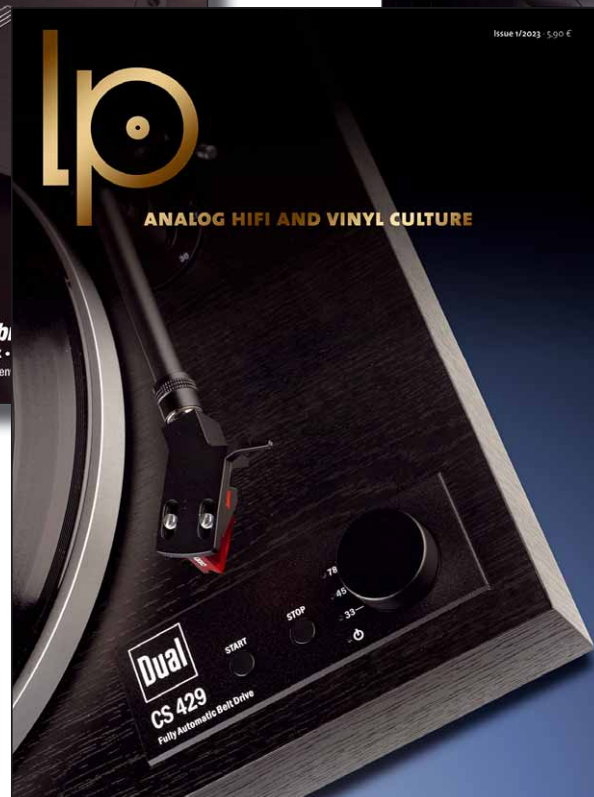


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