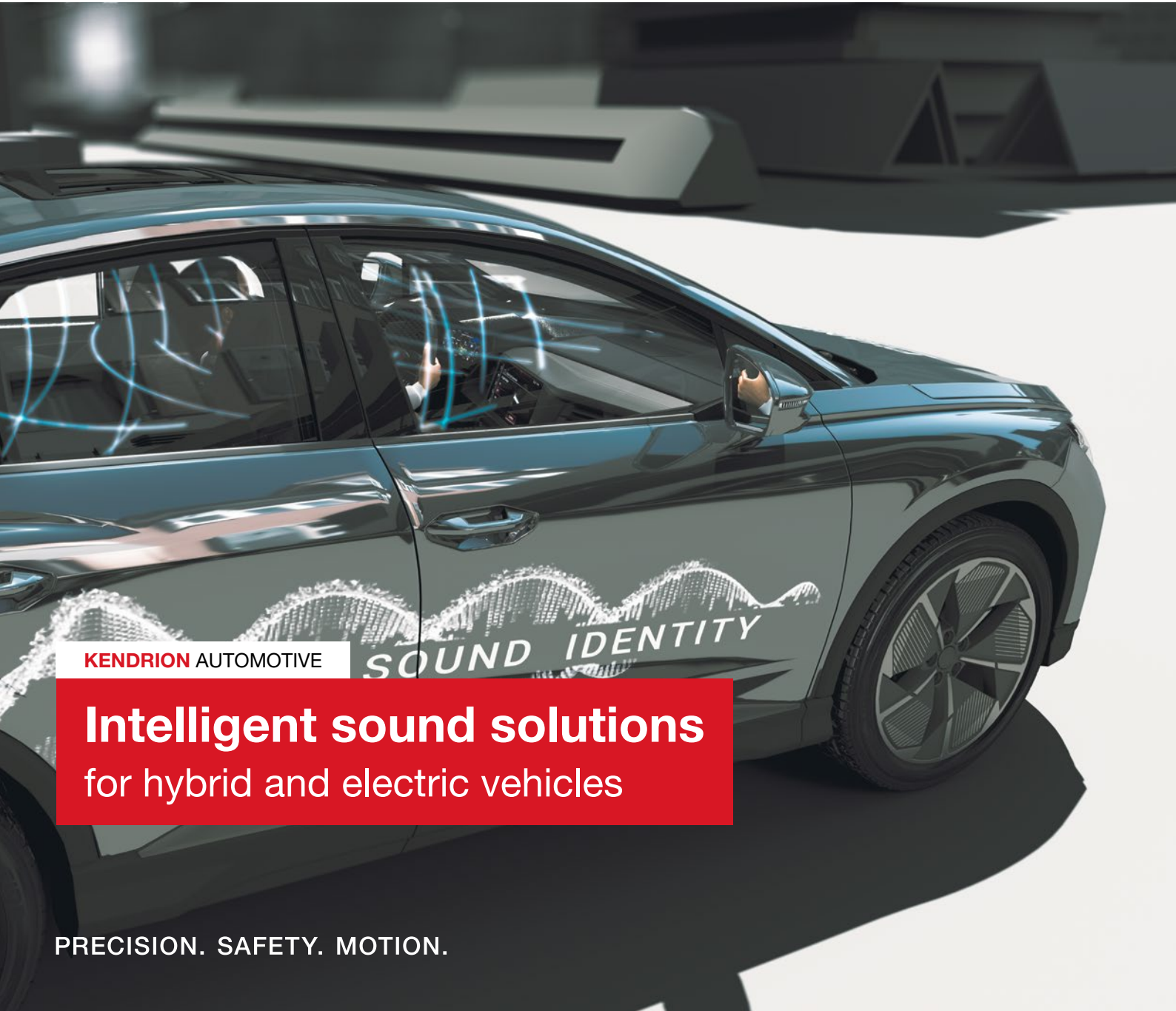


KENDRION



KENDRION AUTOMOTIVE

SOUND IDENTITY

Intelligent sound solutions
for hybrid and electric vehicles

PRECISION. SAFETY. MOTION.

Develops, produces and markets high precision systems and components enabling the actuation and control of forces and fluids throughout the entire powertrain and chassis. As a reliable partner of the automotive industry we provide high quality, innovative solutions with the highest performance.

We are the trusted partner of some of the world's market leaders in the automotive and industrial segments when it comes to designing and producing complex components and customized systems. As a technology pioneer and innovator, we keep in motion and we are committed to create solutions for the mobility changes of tomorrow.

Taking broad responsibility for how we source, manufacture and conduct business is integrated in our processes and embedded into our culture.

Rooted in Germany, headquartered in the Netherlands and listed on the Amsterdam stock exchange, our expertise extends across Europe to the Americas and Asia.

**KENDRION –
Precision. Safety. Motion.**

Sound systems from Kendrion

Ground-breaking for
modern drive systems





Electric and hybrid vehicles generate very little driving noise, particularly at low speeds, which makes them a potential hazard on the road.

Kendrion's sound systems enable an optimized and original engine sound with a specific identifying factor for your vehicle. Our products enhance the sound of the engine in the cabin specifically to each individual brand for a pleasant driving experience and additionally increase the sound quality of the engine noise outside the vehicle for greater safety on the road.

Kendrion offers a complete package for interior and exterior sound solutions consisting of control unit, software, speakers and sound actuator for a vehicle-specific sound.



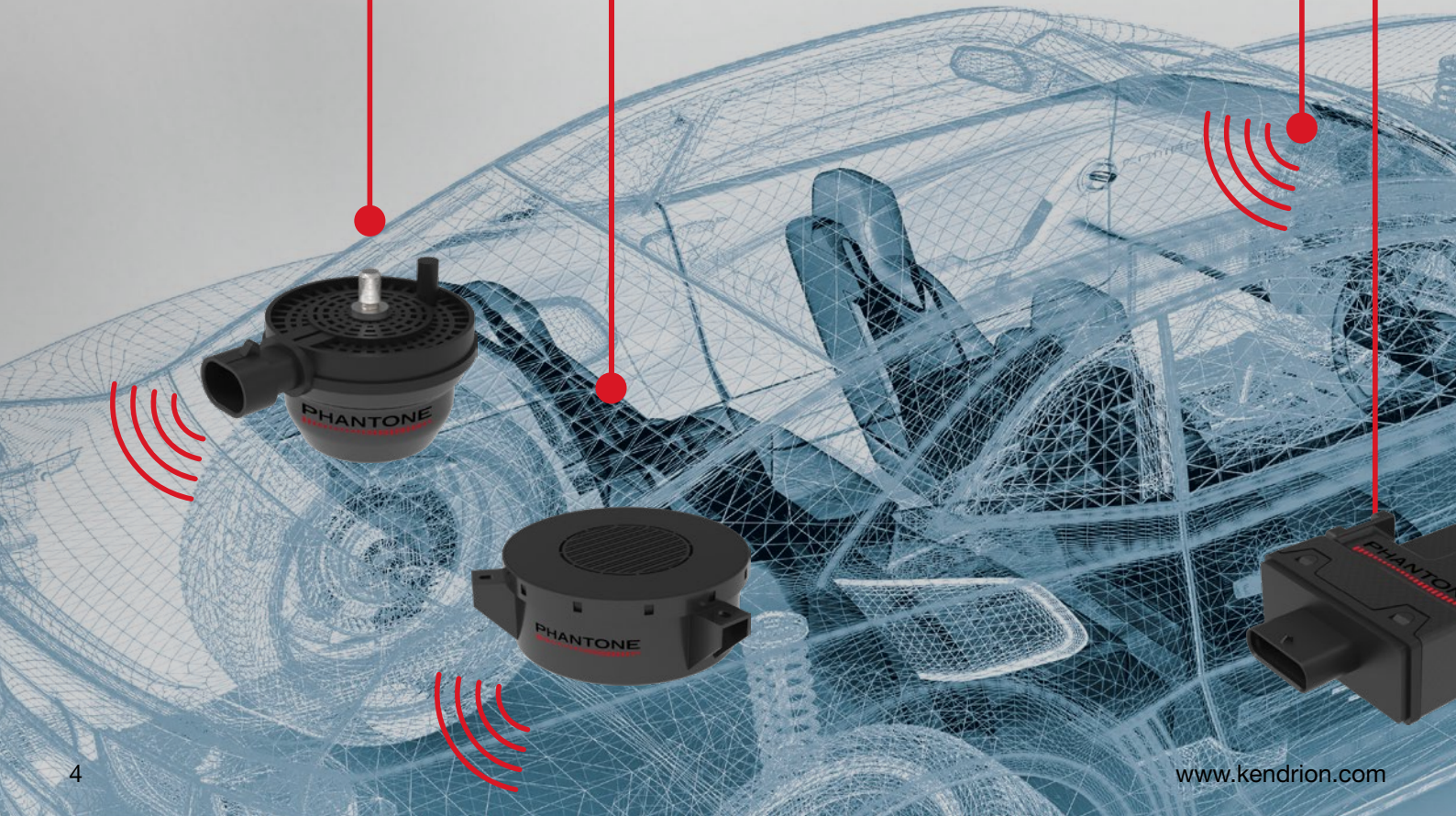
SoundDesigner

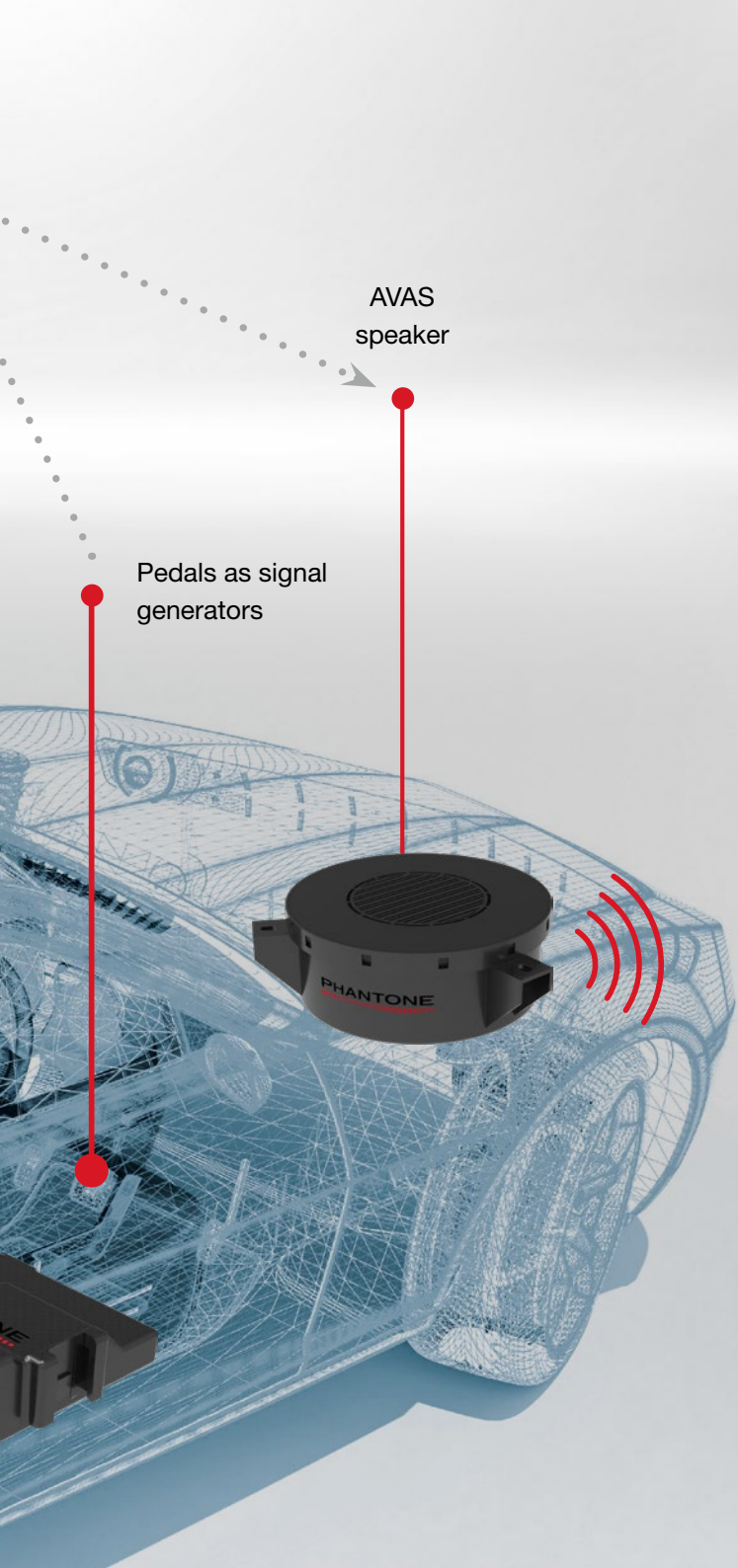
Electronic Control Unit

Actuator

Actuator

AVAS speaker





AVAS
speaker

Pedals as signal
generators

PHANTONE

As an expert for interior sound, KENDRION offers customized solutions for vehicle interiors. We accomplish this by supplying structure-borne sound actuators with or without control unit.

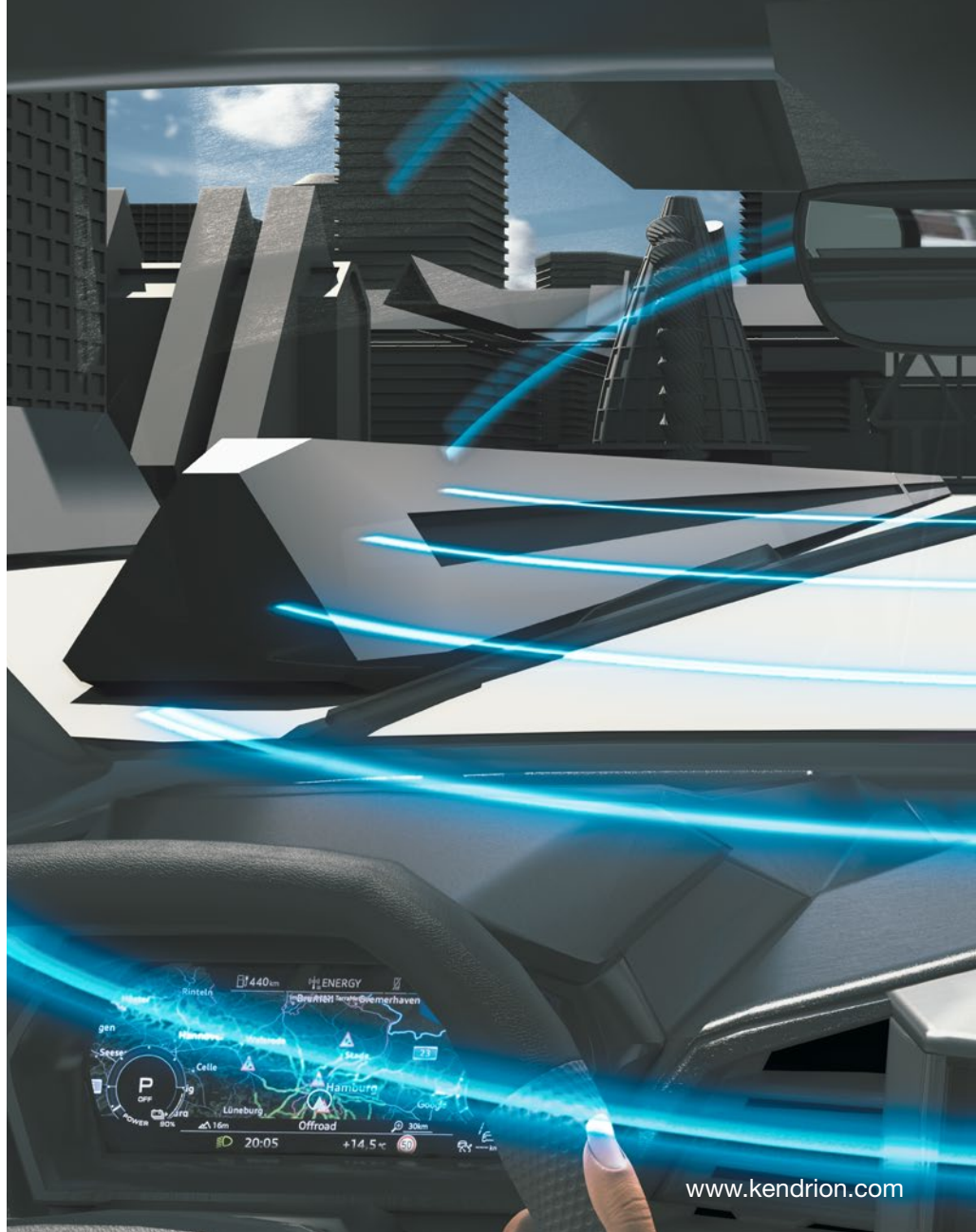
The electrodynamic drive of the actuator transforms the body structure or the windshield into a sound converter to enhance the sound of smaller engines inside the vehicle and thus increase driving enjoyment.

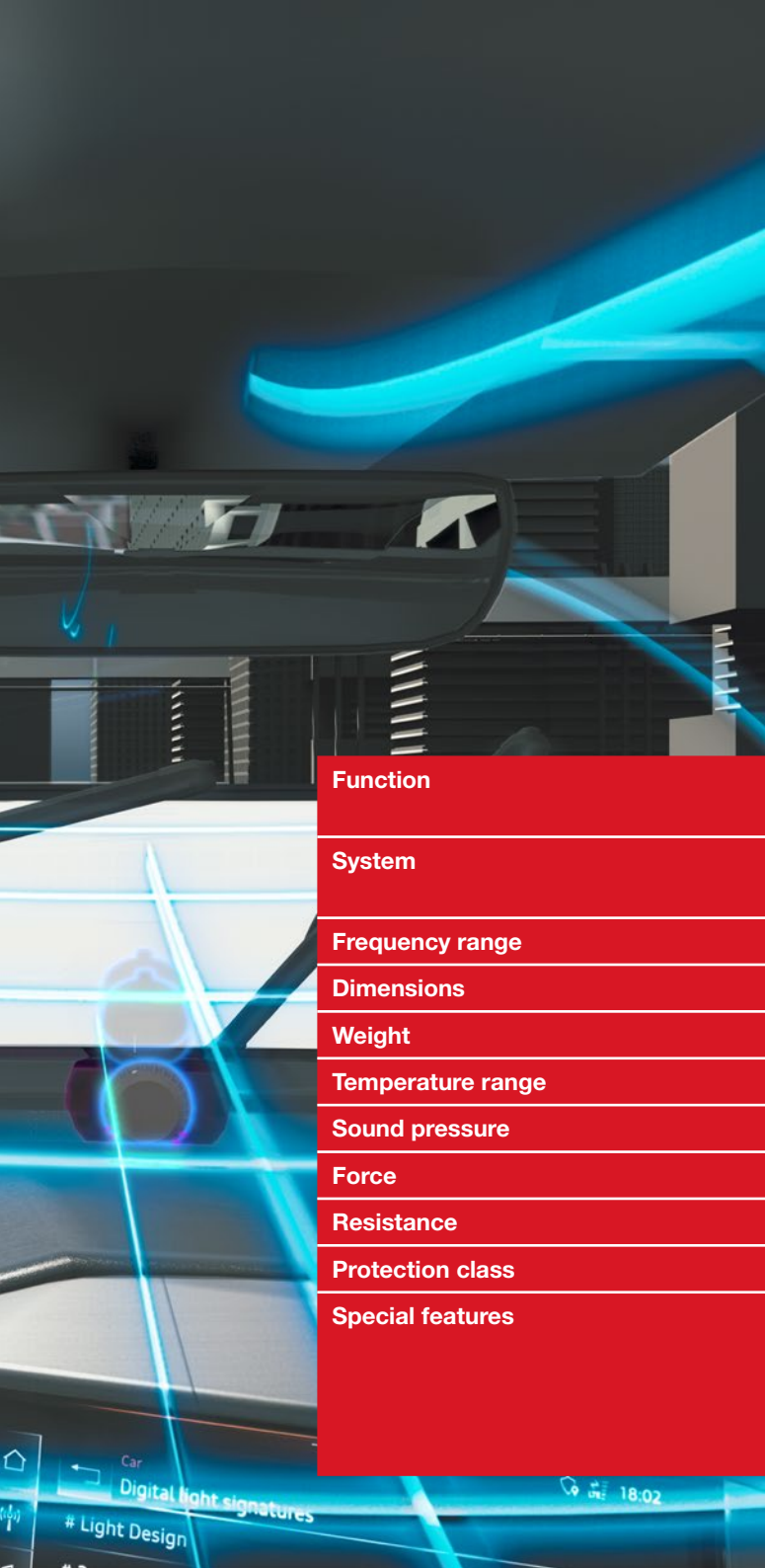
The sound actuator offers a compact solution for both interior and exterior sound reinforcement with a minimum of installation space. Its protection class makes it suitable for robust use in the exterior of the vehicle.

The KENDRION sound actuator can not only enhance the conventional engine sound, but also render a completely new, unmistakable sound for hybrid and electric vehicles.

Sound systems

for vehicle interiors





Sound actuators & Control unit

- Low weight: 75% lighter than comparable speakers
- Small size: 80% less installation space
- Excellent acoustics and natural sound image
- High protection class
- Patented design



Technical specifications

Function

Structure-borne sound actuator for the acoustic stimulation of various surfaces, such as the windshield

System

Structure-borne sound actuator / Control unit: Complex sound algorithm, audio amplifier & software

Frequency range

50 to 8,000 Hz

Dimensions

D60 mm x H40 mm

Weight

150 g

Temperature range

-40°C to 80°C

Sound pressure

max. 95 dB(A) at a distance of 1 m

Force

7 N

Resistance

8 Ω

Protection class

IP6K7K

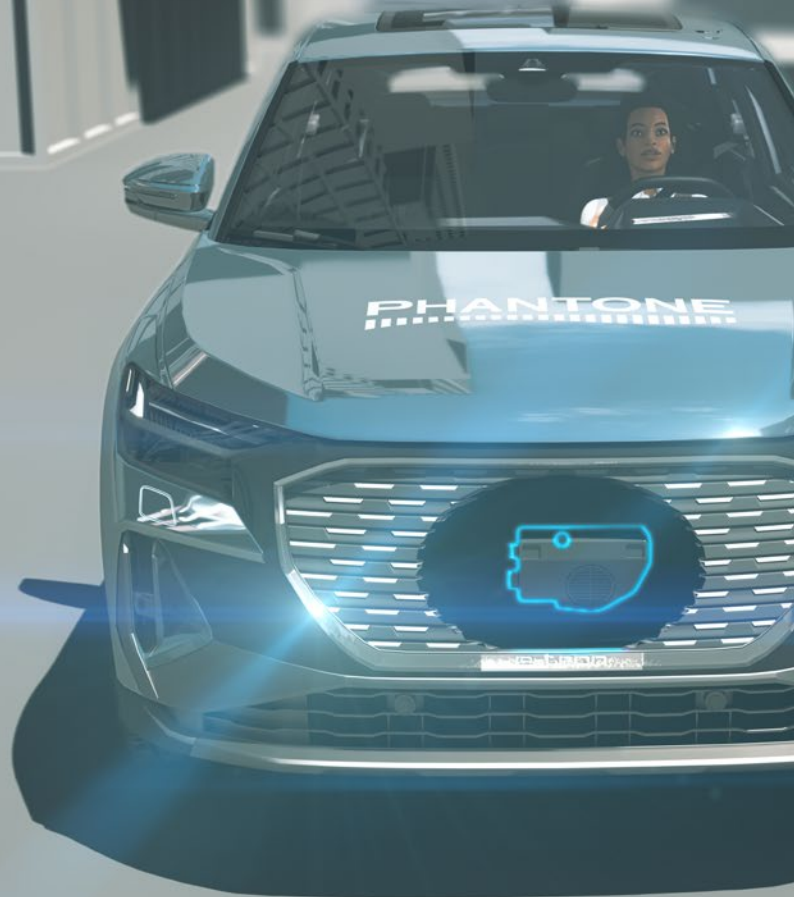
Special features

- Acoustic feedback of driving status
- Extended frequency range and long service life
- More natural sound image due to the bending wave principle, making the sound less locatable
- Also suitable for exterior sound: Meets AVAS requirements

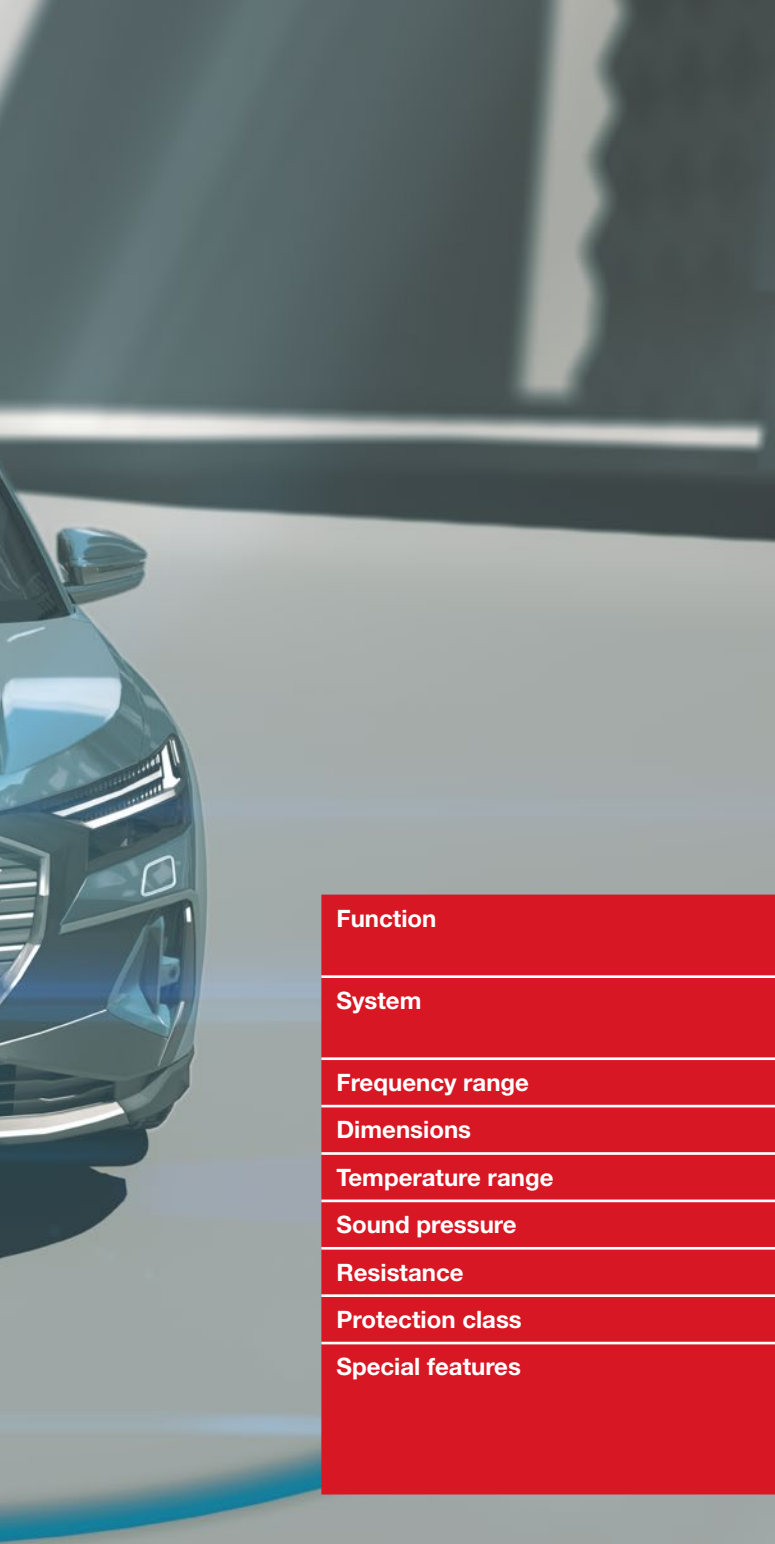
KENDRION, as an expert for exterior sound, offers loudspeakers in customer-specific enclosures with its PHANTONE product platform and develops individual active and passive loudspeaker variants. This application represents a new software concept for the external sound of vehicles. Our loudspeaker system reproduces a warm and brilliant sound independent of the vehicle structure and can be applied flexibly due to its low installation depth.

Due to a possible master-slave functionality, our loudspeaker system can be combined with a tuned additional loudspeaker and thus offers an additional safety potential when reversing. For a high-end system, the structure-borne noise exciter can easily be combined with our loudspeaker system for a pleasant interior sound and an AVAS-compliant exterior sound. If required, our loudspeaker variants can be combined with KENDRION control units as well as with customers' control units.

Sound solutions for exterior sound



The Kendrion sound system meets all the requirements of AVAS legislation.



Loudspeaker system

- System solution: from interface to sound output
- Premium sound
- High protection class
- Flat design
- AVAS-compliant



Technical specifications

Function

Closed loudspeaker system for sound generation in hybrid and electric vehicles

System

Loudspeaker with integrated Class D amplifier control unit, software, direct / CAN bus connection

Frequency range

150 to 7,000 Hz

Dimensions

D160 mm x H60 mm

Temperature range

-40°C to 80°C

Sound pressure

95 dB(A) at a distance of 1m

Resistance

5 Ω

Protection class

IP6K7K

Special features

- Compact housing
- Space- and weight-saving thanks to modular design
- Robust and vibration-resistant housing
- Meets AVAS requirements

KENDRION offers a sound control unit for the customised vehicle sound solution. The housing of this control unit can be adapted to the customer's wishes and configured individually. The KENDRION sound control unit is connected to the CAN bus and generates the appropriate output signal or the brand-specific vehicle sound using the Sound Designer software.

The KENDRION product range enables exclusive sound solutions for any desired application. Driven by a control unit, the KENDRION structure-borne sound actuator is capable of meeting the requirements of indoor and outdoor sound reinforcement.

The KENDRION sound control unit is able to control a loudspeaker as well as an actuator due to its performance.

Electronic control unit for sound systems





Electronic control unit

- Highest protection class
- >90% efficiency
- Up to 8 sound profiles
- AUTOSAR-compliant
- Integrated diagnostics features



Technical specifications

Function
Interfaces
Operating voltage
Ambient temperature
Power
Protection class
Special feature

Control of a speaker or actuator with a generated sound depending on the driving status (CAN bus)
<ul style="list-style-type: none">- CAN bus- Speaker / actuator
9 to 17 V
-40°C to 80°C
15 W @ 12 V, 1% THD, 4 Ohm
IP6K9K
<ul style="list-style-type: none">- High protection class due to encapsulation- Robust and vibration-proof housing- Any installation position- High energy efficiency due to low power consumption- EMC-tested

Sound Design Software

for individual vehicle sound

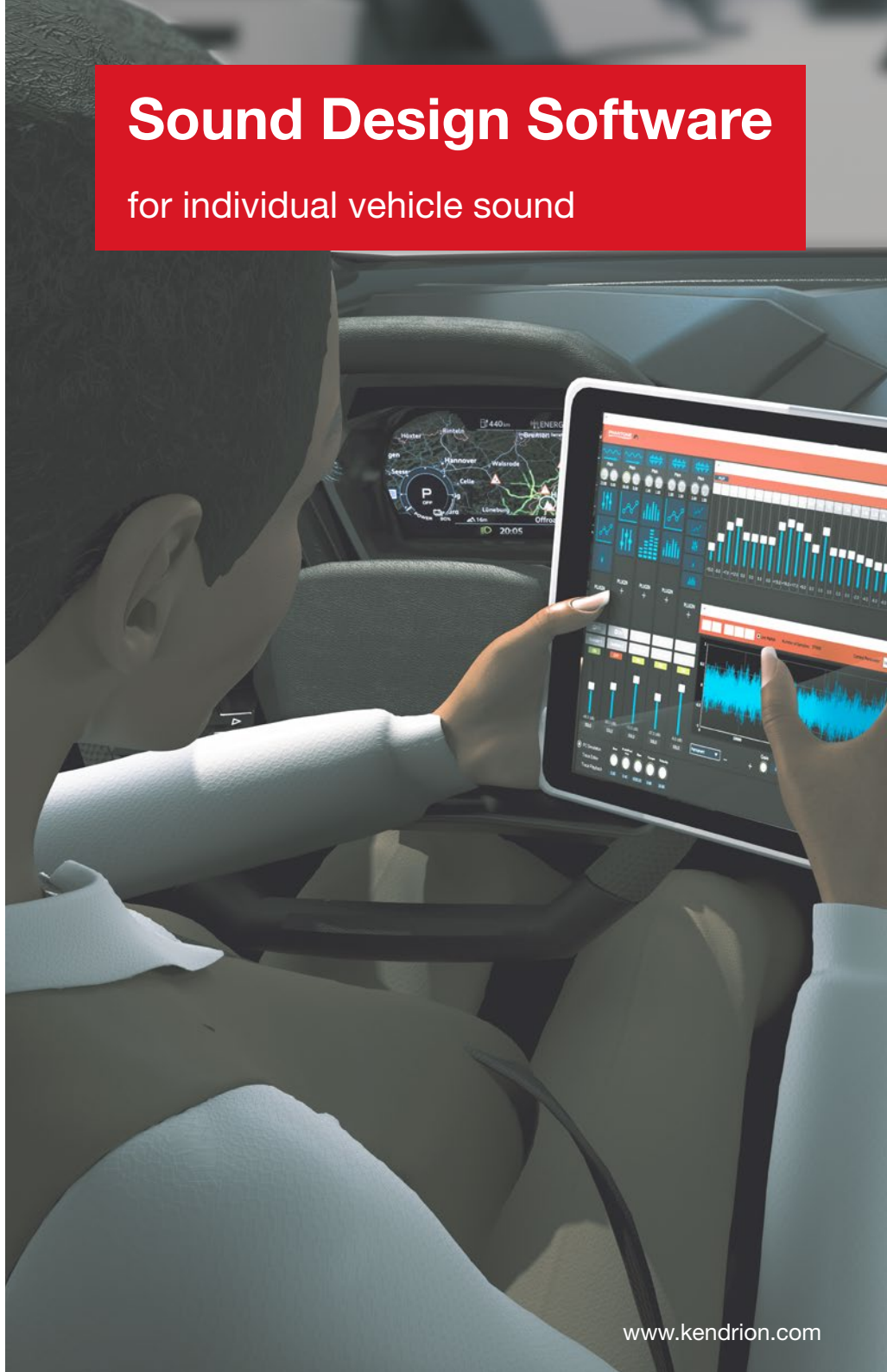
The user-friendly SoundDesigner-Software enables the user to design both classic engine noises and sounds for electric and hybrid vehicles. The basis for the sound generation is the vehicle data, which is read out via the CAN bus interface depending on the driving behaviour. These parameters are e.g. engine speed, torque or speed of the vehicle. Due to the online mode, tuning by means of CAN simulation is possible at the workstation or even while driving.

KENDRION can develop a customer-specific sound file for you or provide you with the KENDRION SoundDesigner, a software package with which you can design your own sound.

The Kendrion Automotive software enables the creation of a **brand-specific vehicle sound** for hybrid and electric vehicles.

We offer two options:

- You can fall back on a sound profile tailored to your personal needs.
- We offer you a software with a graphical interface on which you can create your own sound.





Highlights

- Online calibration
- Sample editor
- Intuitive operating philosophy based on a digital audio mixing console

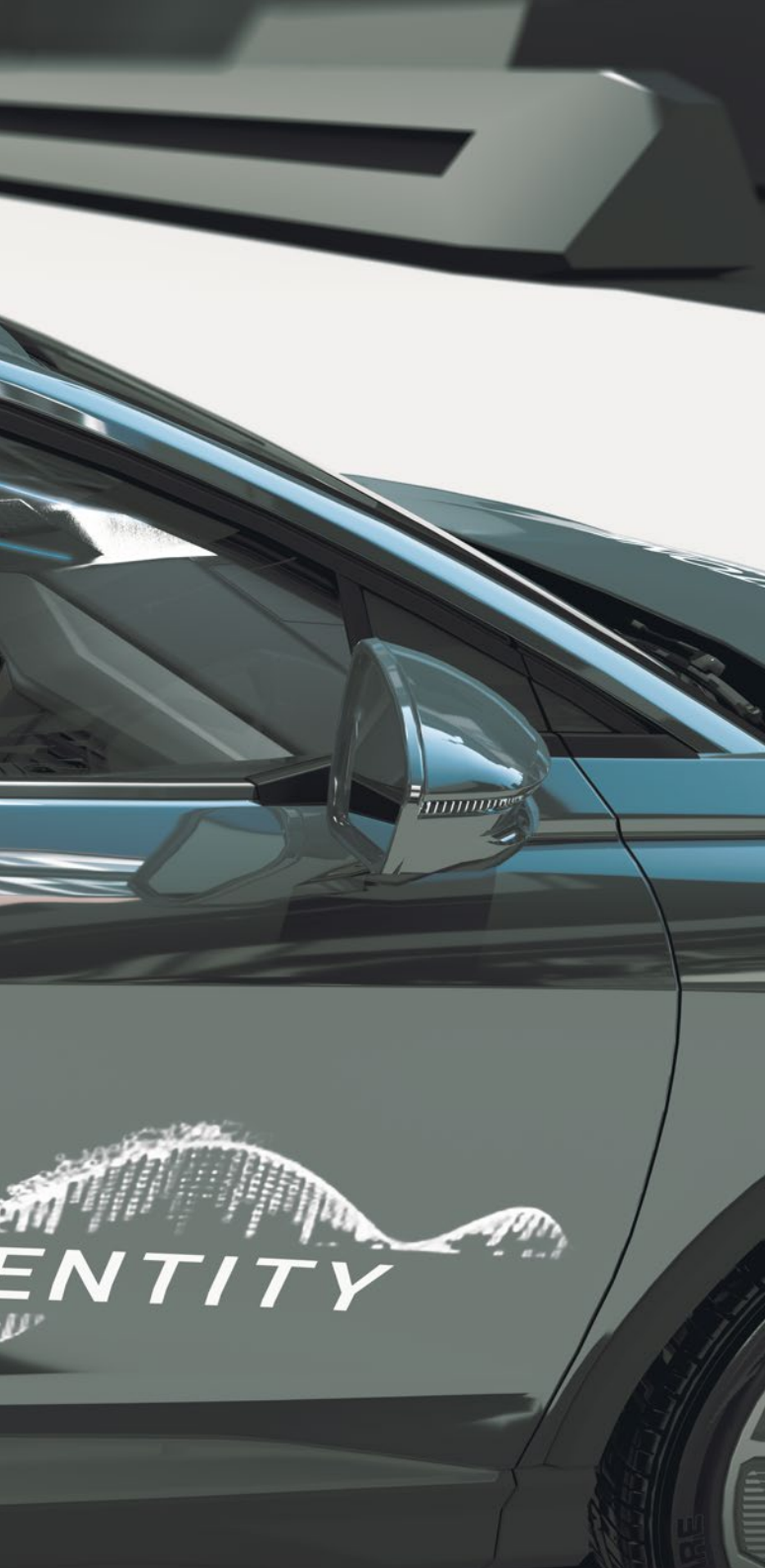


The benefit to you

Everything from one source and always individual.



VEHICLE SOUND ID



We combine our experience in electronics, acoustics and sound design to an effective complete package.

Individual

Our own development departments for hardware and software enable us to produce samples and prototypes for specific customer requirements at short notice.

Certified

Our quality management and environmental management is certified according to ISO TS 16949, ISO 14001 and ITAF 16949.

Reliable

We develop the best possible product in close cooperation with you and find the most efficient way to implement it in line with the market.

From a single source

We develop complete sound systems including software, speakers, actuator and electronic control unit.



**We find the
best solution
for you!**

Kendrion Automotive Group

marketing-automotive@kendrion.com



www.kendrion.com

