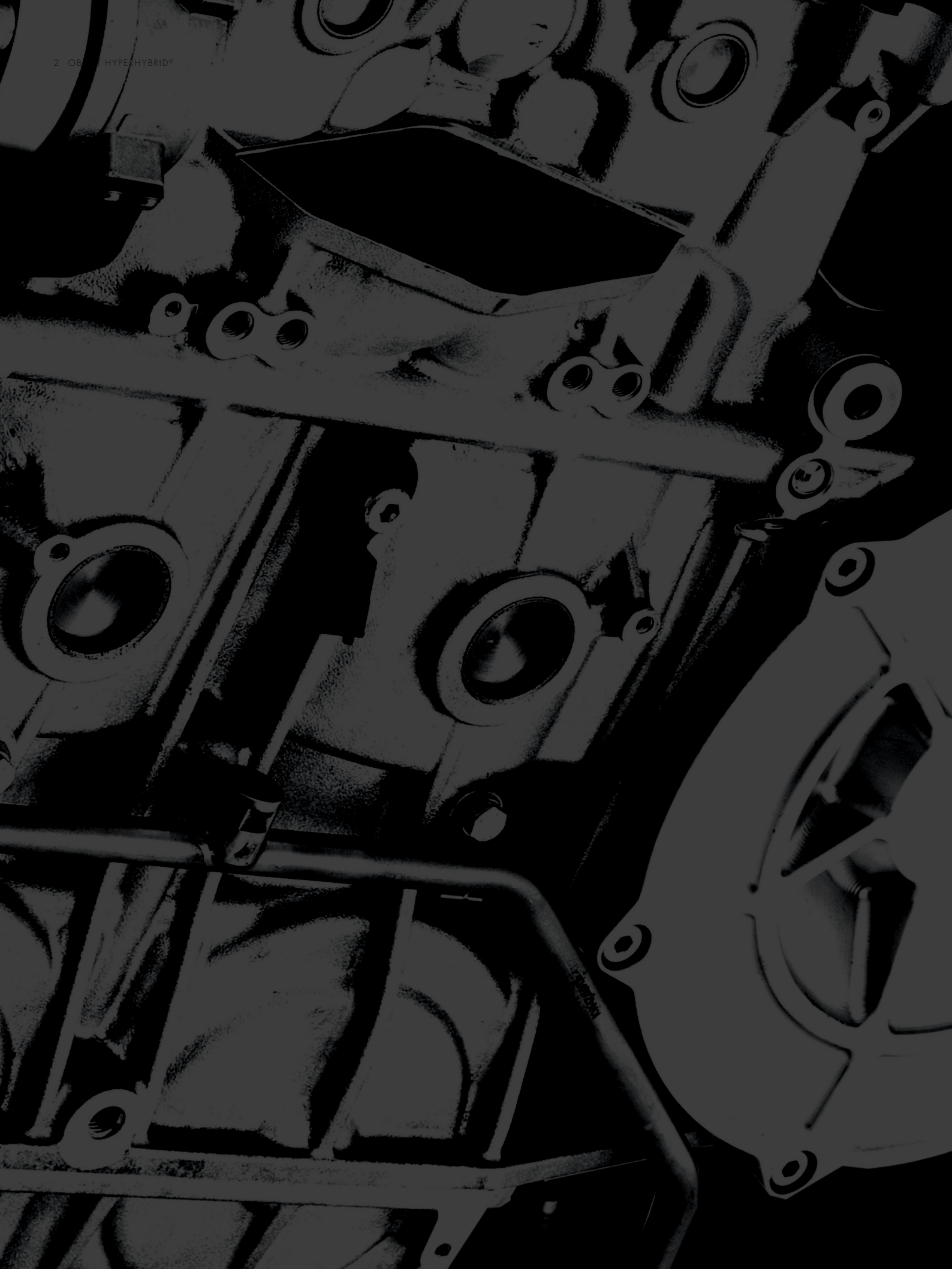


HyperHybrid®

The Smarter Electric Vehicle



Welcome to OBRIST Powertrain

OBRIST Powertrain is an Austrian engineering company specializing in the development of key components for hybrid and battery-powered vehicles.

Our components and systems are ultra-compact, simple and very cost-effective. We offer scalable solutions that are perfectly adapted to a wide range of requirements – from affordable mobility solutions for the mass market to the premium segment.

OBRIST Powertrain was founded in 2011 as a spin-off of OBRIST Engineering, a company that has been working on environmentally friendly thermal management solutions since 1996.

Our team consists of highly committed and qualified employees from all major technical disciplines, but especially from the fields of thermal management, electronics, mechanical engineering and system control.

HyperHybrid® powertrain

Thanks to an intelligent, multifunctional and yet simple design, our serial plug-in hybrid drive system offers maximum energy efficiency at unbeatably low costs.

Our HyperHybrid® powertrain offers a glimpse of the mobility of the future: if the powertrain is operated with eFuels, emission-neutral operation can be achieved. The use of Sub Zero® Methanol, the world's first climate-positive energy carrier based on green methanol developed by OBRIST Technologies, also enables an emission-negative driving balance.

Find out more about Sub Zero® Methanol at the end of this brochure.

Creating tomorrow's sustainable mobility.

HyperHybrid® Powertrain

Serial hybrid drive

Electromobility fascinates people. However, the limited range of the vehicles is still causing problems in many cases. Journeys need to be planned carefully based on the available charging infrastructure. The HyperHybrid®, our serial hybrid drive solution, combines electric driving with an unrivaled range – and this with maximum efficiency at affordable prices.

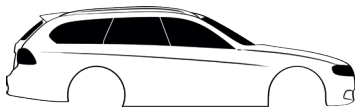
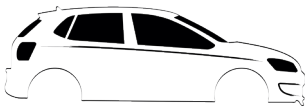
The HyperHybrid® powertrain has an ultra-compact, vibration-free and highly efficient combustion engine (ZVG), a powerful, cost-effective battery based on 18650 cells and innovative thermal management.

Customers now decide for themselves whether or not to connect their vehicle for charging. The two-cylinder combustion engine with its integrated generator is capable of providing the required driving energy at all times.

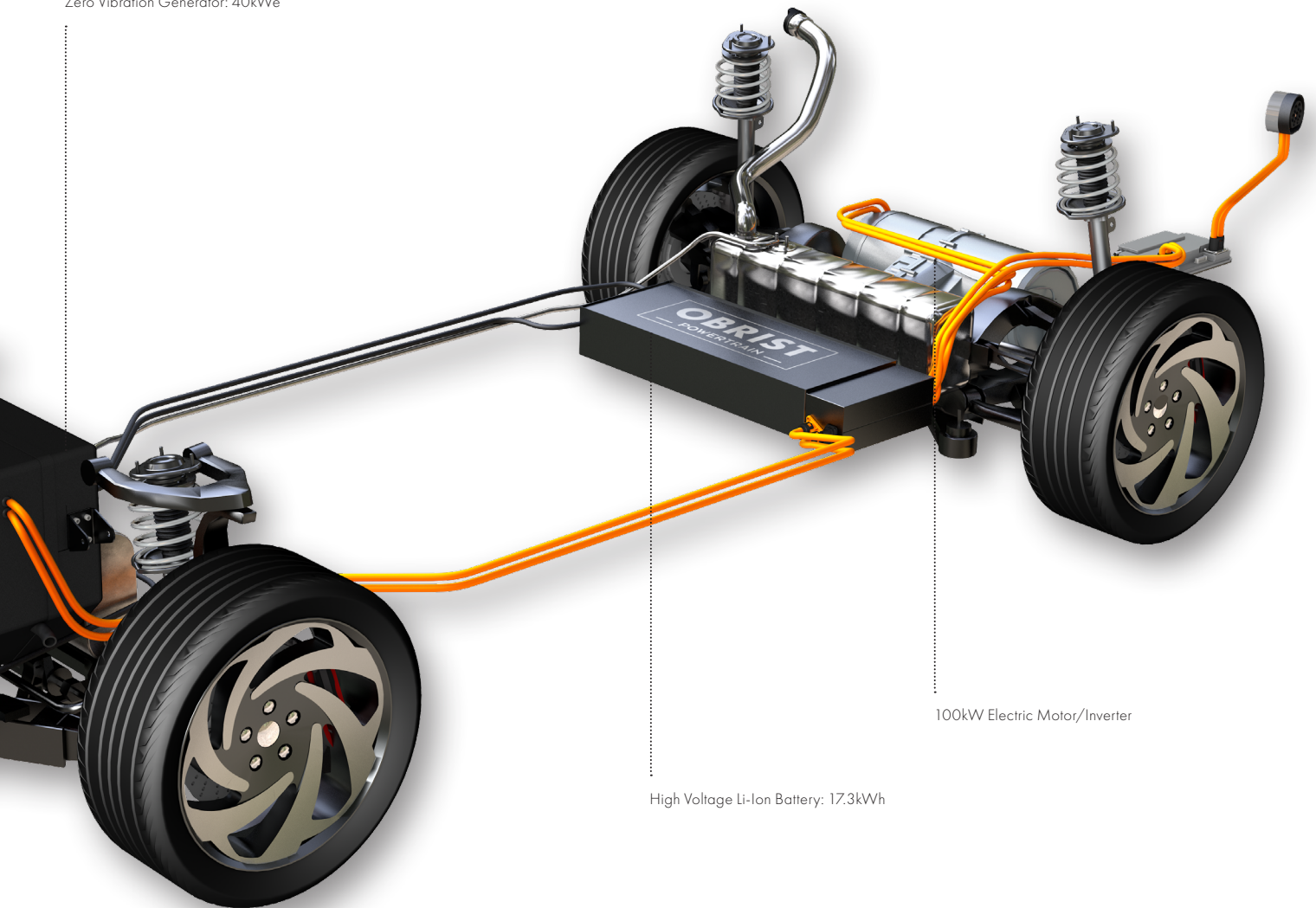
Pure Driving Pleasure and Comfort

- Electric drive with high torque for maximum driving pleasure
- Highest NVH comfort level comparable to a battery electric vehicle (BEV)
- The packaging enables a low center of gravity and perfect weight distribution between the front and rear axles

The optimal solution for global automotive mass markets.



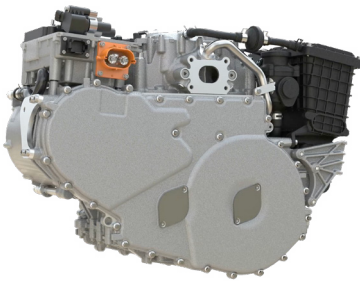
Zero Vibration Generator: 40kWe



100kW Electric Motor/Inverter

High Voltage Li-Ion Battery: 17.3kWh

HyperHybrid® Demonstrator



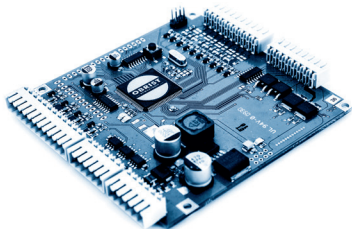
Zero Vibration Generator

Twin-cylinder-four-stroke engine with 999cm



High Voltage Li-Ion Battery

Vacuum Fixation Technology



HyperHybrid® Control Unit

Unmatched driving experience

Real-Life Experience

The HyperHybrid® powertrain has been installed in a fully functional demonstrator that has undergone intensive bench and road testing. This demonstrator represents a global mid-range vehicle and is designed for a top speed of 170 km/h (140 km/h continuous).

In urban traffic, the HyperHybrid® operates as a purely battery-electric vehicle, while outside urban areas it automatically switches to hybrid mode („ZVG-on“). The innovative zero vibration generator concept achieves NVH values that are comparable with BEVs, while the HyperHybrid® control unit manages the energy flows in the hybrid system and takes care of the operating strategy of the zero vibration generator, brake energy recovery and thermal management. Both the hardware and the algorithms are developed in-house by OBRIST Powertrain.

Our HyperHybrid® demonstrator can be powered by either with gasoline, eFuels and their blends. When operating with Sub Zero® Methanol, the world's first climate-positive energy carrier negative emissions can be achieved – an unprecedented milestone!

Advantages

- Price comparable to conventional petrol/diesel drives
- NVH comfort comparable to BEV
- Significant weight reduction compared to BEV
- Charging via socket possible, but not mandatory
- Range is no longer a problem
- Battery range meets requirements for government subsidies

We invite you to test drive the future.



Efficiency Level

• Segment:	Midsized
• Model:	Crossover
• Powertrain:	HyperHybrid®
• Fuel:	Sub Zero® Methanol

Fuel Economy WLTP

• Combined Fuel Consumption:	3.3l/100km
• Combined CO2 Emission:	-24g/km

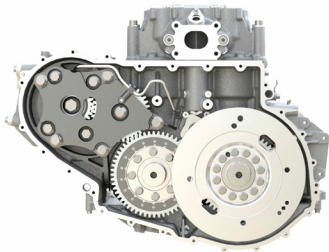


Zero Vibration Generator

The Next Generation



1st order compensation by contra-rotating crankshafts
2nd order compensation by linear mass spring system



Power transmission with steel case housing for constant tooth clearance, flywheel for mass inertia compensation and rubber damped gear set



Acoustic and thermal insulation

Leading Energy Efficiency up to 50 % – thanks to aFuel®

The vibration-free Zero Vibration Generator (ZVG) is a generator-integrated combustion engine with first-class efficiency, ultra-compact design and Euro 7 capability – completely CO₂ emission-free thanks to „green“ Sub Zero® Methanol!

The engine integrates a generator, an inverter and an engine control unit. Its design is reduced to the essentials, resulting in a simple, ultra-compact and cost-effective solution.

Superior NVH Performance

When designing the Zero Vibration Generator, special emphasis was placed on eliminating vibrations and minimizing noise. To meet the NVH requirements of an electric vehicle, the next generation of the Zero Vibration Generator impresses with a range of innovative solutions:

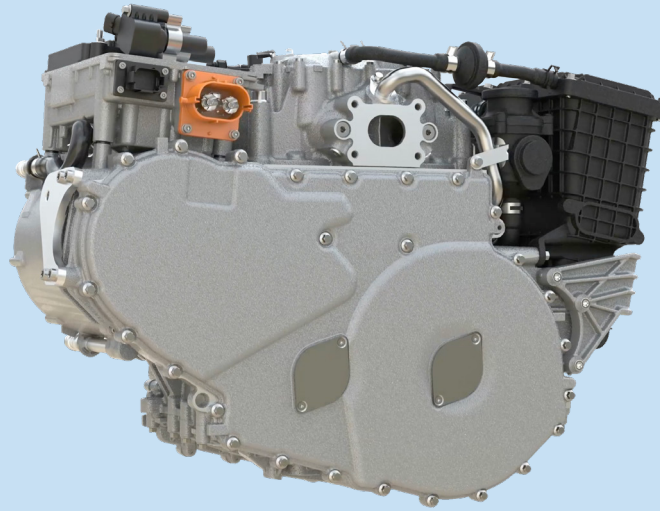
- Counter-rotating crankshafts to compensate for the first order
- Mass balancing on the crankshaft to compensate for the second order
- Flywheel to compensate for rolling moments caused by inertia
- Damped gearwheel to eliminate gear rattle
- Insulation box of the ZVG significantly reduces NVH levels

The insulation also allows the thermal management system to use the engine as a heat source at low temperatures and reduce cold starts.

Application

With its motor characteristics, the Zero Vibration Generator is the ideal energy source for electrifying vehicles, boats and aircraft, making it the perfect centerpiece for a serial drivetrain.

The ingenious design of the ZVG makes it possible to install the motor in any orientation. This offers engineers unprecedented freedom in the design of hybrid powertrains.



Zero Vibration Generator: Sub Zero® Methanol Technical Data

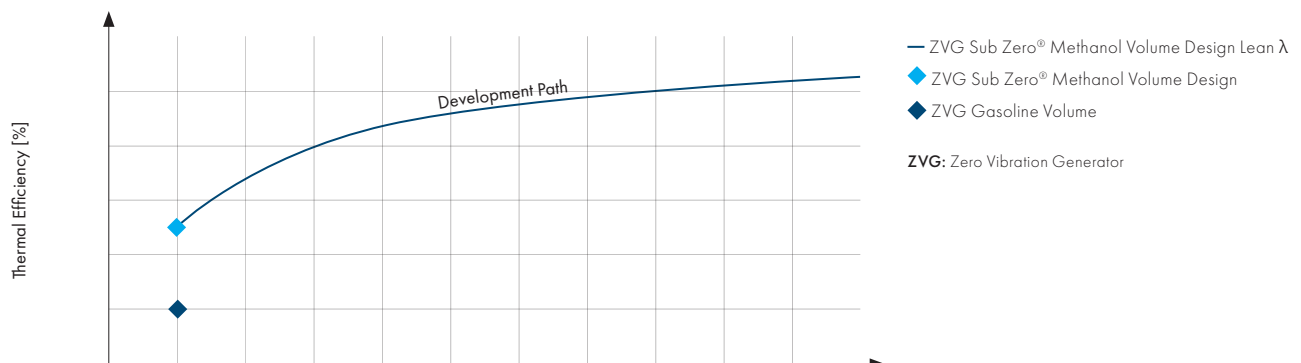
- Engine displacement of 999ccm – Sub Zero®Methanol calibration
- DC Power @ 5.000 rpm: 45kW (potential for 50kWe)
- Thermal Efficiency (Best Point): see graphic
- Engine Weight (without fluids): 129kg
- Mass Balancing: F1, F2, M1, M2 inertia moment
- DC Efficiency: 40 %

- Compression Ratio: 16:1
- Compact design: 688 × 503 × 269 mm
- Naturally aspirated with MP-Injection
- Four stroke two-cylinder with 360° firing sequence
- Main Gear Drive System with constant clearance
- Electrically heated catalytic converter

Vibration Comparison for



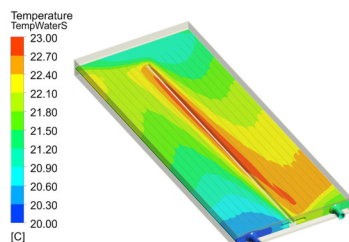
	ZVG 2 cylinders, 2 crankshafts	V90 2 cylinders	Inline 3 cylinders, 1 balancing shaft	Inline 4 cylinders, 2 balancing shafts
force 1st order (F_{1max}) (N)	0	0	0	0
force 2nd order (F_{2max}) (N)	0	existing	0	0
torque 1st order (T_{1max}) (Nm)	0	0	0	0
torque 2nd order (T_{2max}) (Nm)	0	0	existing	0



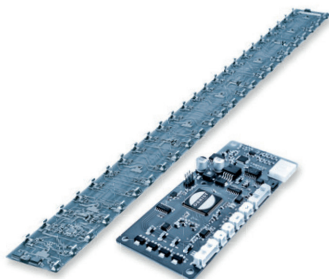
High Voltage Li-Ion Battery



Vacuum Fixation Technology



Liquid cooled design –
 $\Delta T < 3K$ @ 4C continuous discharge rate



Battery Management System (BMS)

More Energy - Less Weight

OBRIST Powertrain's batteries for PHEV and BEV applications are designed to meet all customer expectations in terms of increased specific energy and reduced costs. For example, our 17.3 kWh battery with vacuum fixation technology achieves an unsurpassed energy density.

Key facts

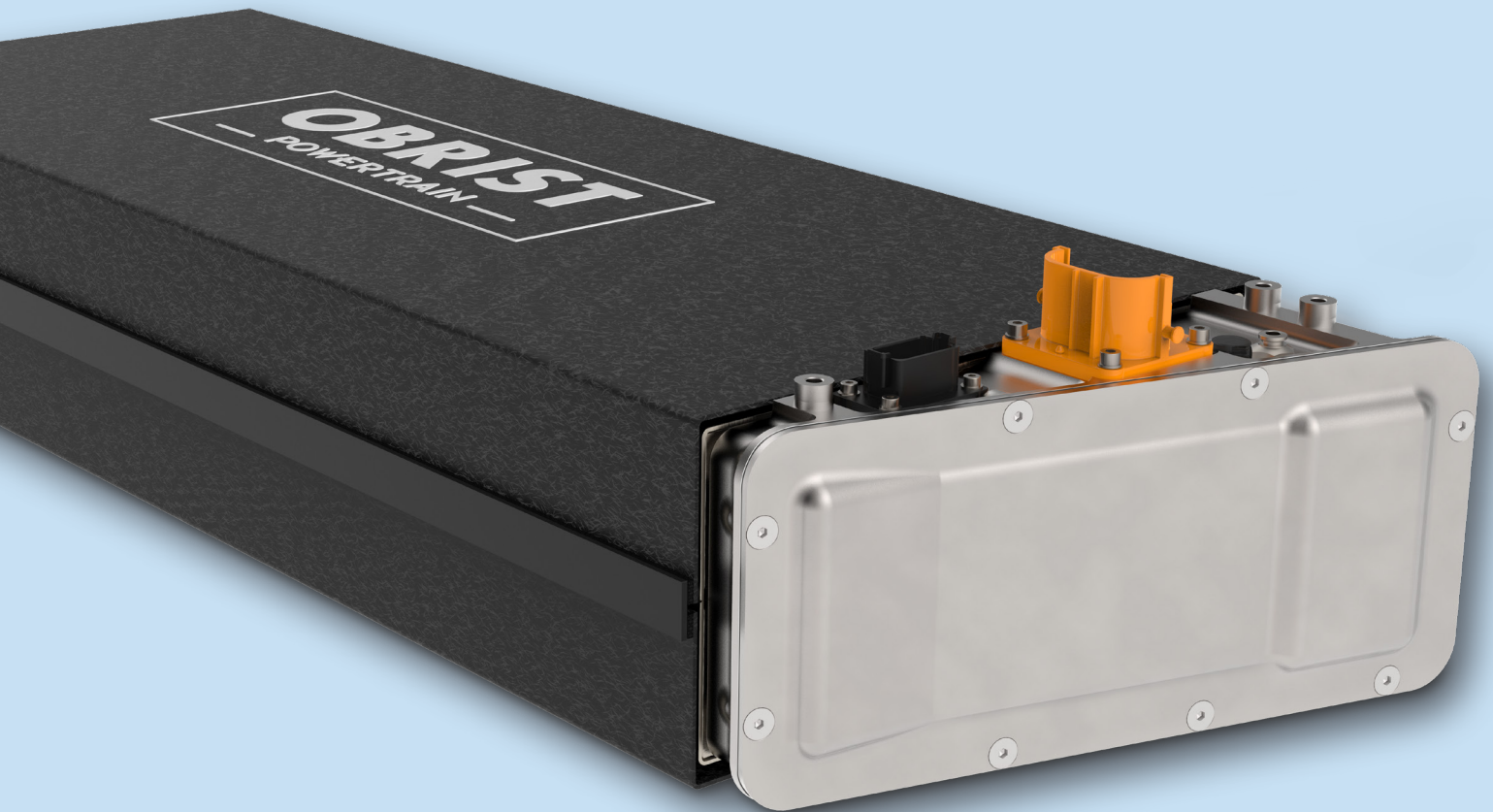
The heart of our batteries is the innovative vacuum fixation technology, which minimizes the amount of material required and thus offers a significant cost advantage compared to currently used battery systems. Furthermore, the battery system impresses with a highly integrated, efficient and cost-effective thermal management system. Cylindrical 18650 cells are currently used to achieve maximum modularity, although this technology can also be applied to all other available cell geometries.

Design features

- Liquid cooling (optionally also air-cooled design)
- Innovative vacuum fixation technology
- Thermal insulation for longer service life and better performance
- Low costs and high flexibility with 18650 cells (pouch optional)
- Low weight with highest specific energy density values
- Lightweight aluminum housing (2 mm thickness)
- Battery management system for precise cell control and active thermal management
- Full mounting flexibility

Key Facts:

- Vacuum Fixation Technology
- Lightweight Aluminium Housing (2 mm thickness)
- Battery weight: 97,6 kg



Technical Data:

- High Power: 17,3 kWh mit 3000 mAh
- Nominal Voltage: 360 VDC (420 V–240 V)
- Continuous discharge power: 110 kW (200 kW pulse)
- Continuous charge: 26 kW

High Performance Version



HyperHybrid® for Premium Segments

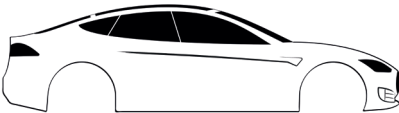
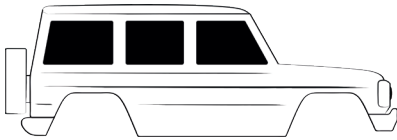
Our high-performance drive solution is geared towards the premium vehicle segment. This drive concept is based on the standard components of OBRIST Powertrain and can be used as a two- or four-wheel drive in various performance levels.

System Configuration

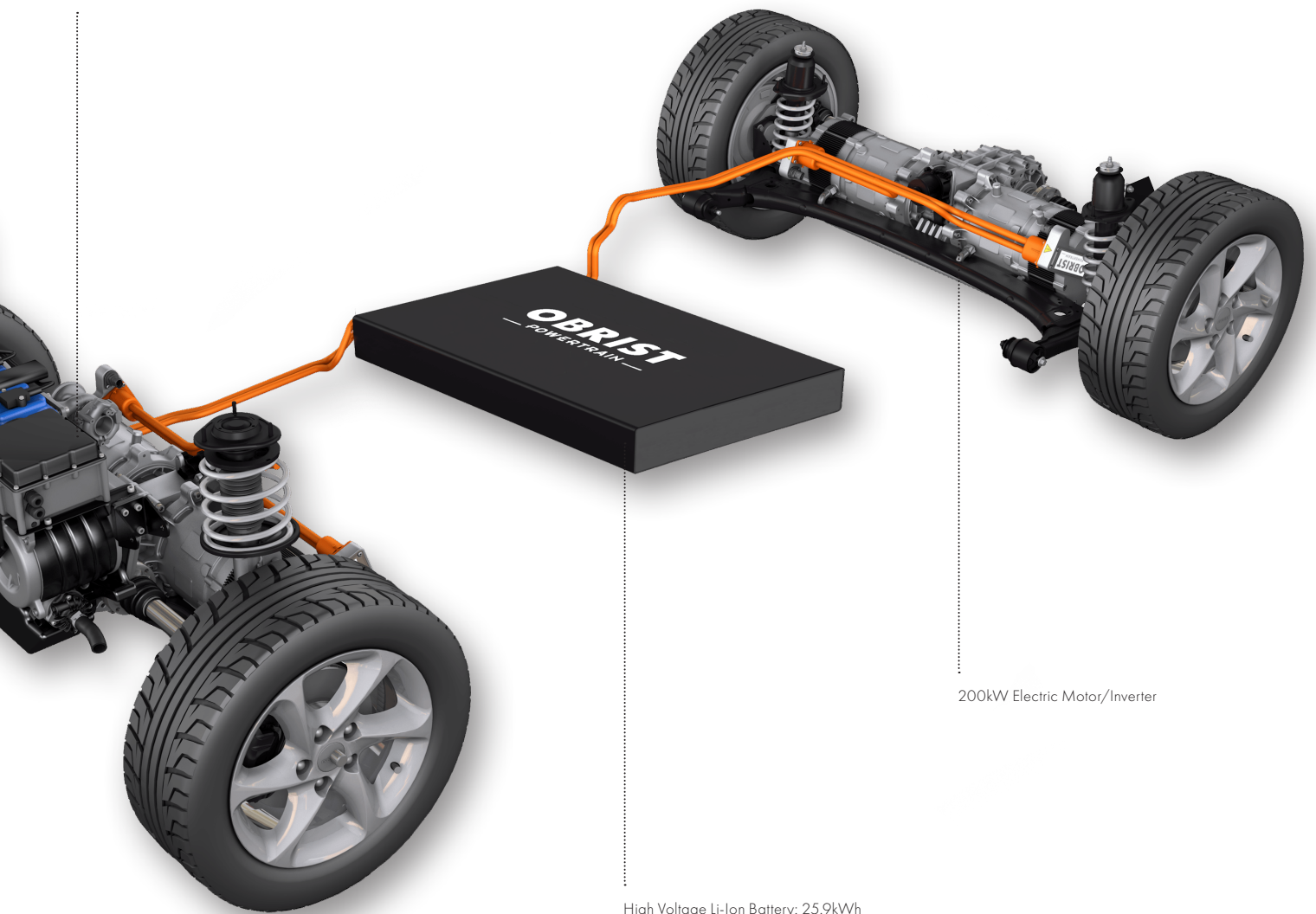
- Turbocharged combustion engine with 100 to 110 kW_e delivers consistently high performance (depending on fuel)
- Electric all-wheel drive
- Better NVH comfort than a V12 engine

Battery System

For higher electric battery performance and longer electric ranges, the installed battery capacity in this drive concept must be increased.



Zero Vibration Generator powered by Sub Zero® Methanol
High Power 90kWe



200kW Electric Motor/Inverter

High Voltage Li-Ion Battery: 25.9kWh



The World's First Climate Positive Vehicle

powered by Sub Zero® Methanol

The HyperHybrid® powertrain has the potential to actively reduce the carbon footprint of global mobility. In city traffic, the HyperHybrid® powertrain uses energy from the battery system and automatically switches to hybrid mode outside the city. A unique feature of this system is the Zero Vibration Generator (ZVG), the latest version of which is powered by green methanol – the energy carrier Sub Zero® Methanol developed by OBRIST Technologies. Sub Zero® Methanol is an environmentally friendly and sustainable alternative to fossil fuels. The HyperHybrid® technology has already been successfully integrated into eleven demonstration vehicles. These road-legal prototypes have undergone rigorous testing in recent years, confirming the performance and efficiency of the system.

Sub Zero® Methanol : Green Methanol From The Earth's Sunbelt

Sub Zero® Methanol is produced using solar energy and combines the production of the liquid global energy carrier eMethanol with a carbon sink (cSink®). One key element of the Sub Zero® Methanol production process is Direct-Air-Cap-

ture: OBRIST DAC® removes more CO₂ from the atmosphere than is required for the production of Sub Zero® Methanol. The excess CO₂ is converted into oxygen and solid carbon. cSink® allows carbon to be permanently removed from the atmosphere.

The Modern Forest

The energy carrier Sub Zero® Methanol is produced in large-scale industrial plants – The Modern Forest. These so-called gigaplants are built in the Earth's sun belt, where solar energy is

available in unlimited quantities and at unrivaled prices. The system works in the same way as a forest, but with up to 30 times greater efficiency.

An Energy Carrier With Great Potential

The Sub Zero® Methanol technology has the potential to cover the entire global energy demand and can also be easily used in the world's existing infrastructure.

Areas of Application for Innovative Sub Zero® Methanol

- Transport und Mobility
- Chemical Use
- Industry
- Power Plants

For more information about
Sub Zero® Methanol



Affordable

Serial Hybrid

Performance

Energy Density

Smart and simple

Beneficial

CO₂ neutral

Reliability

Driving Passion

Silent

Thermal Management

Electric Drive

Climate positive

Technology

Superior NVH

Future Mobility

Global

Plug-in chargeable

Improved Lifetime

Safety

Compact

Engineering

Innovative

Modularity

CO₂ negative

Flexibility

Comfort

High Torque

Efficiency

Low Complexity

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