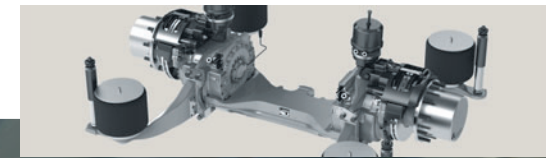
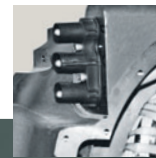


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ZF Electric Driven
Drop Center Axle AVE 130



The right is reserved to modify products and technical data.

The ZF drive solution
for serial hybrid designs.
And more.



TA/AVE 130 / EN / 2011



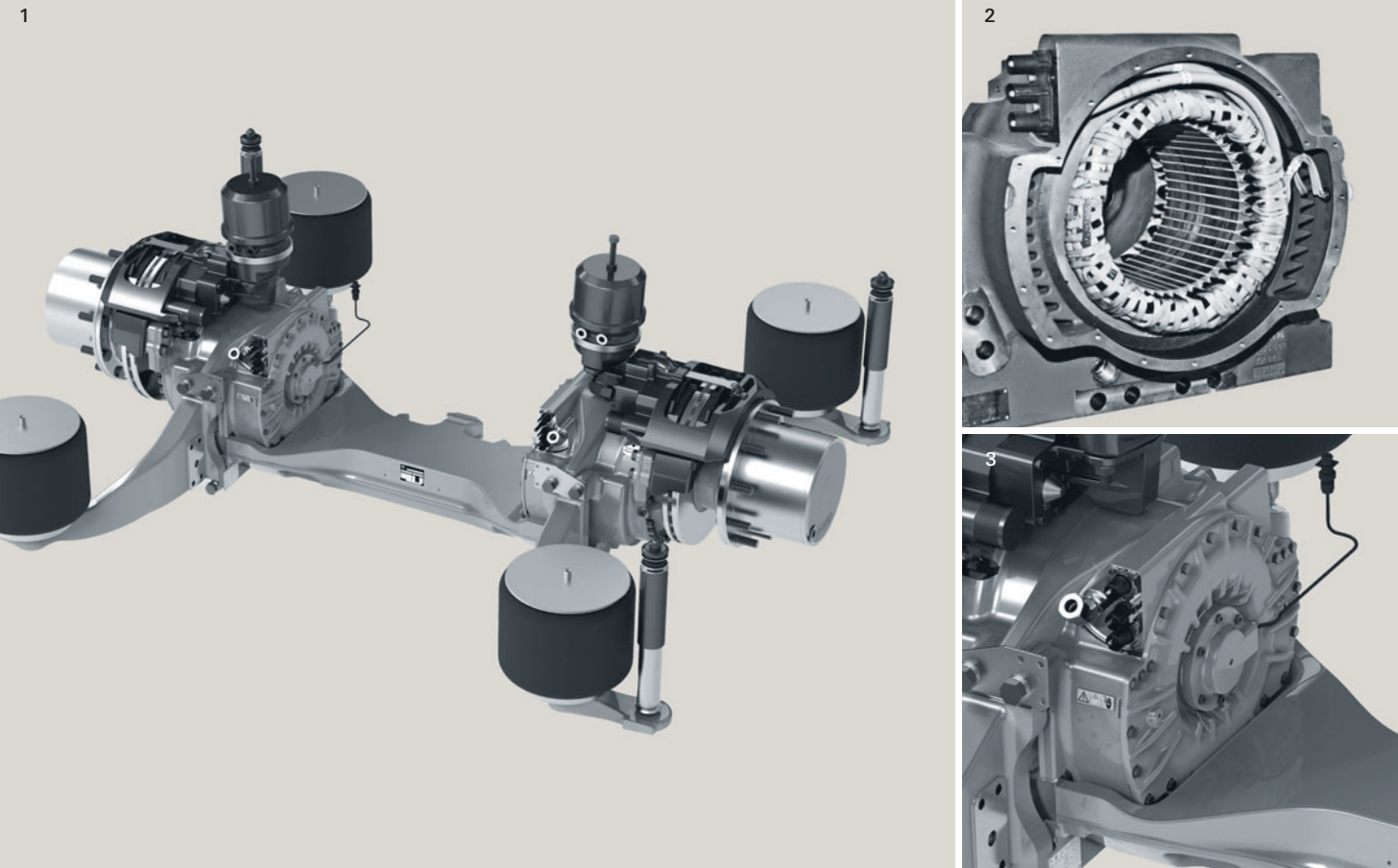
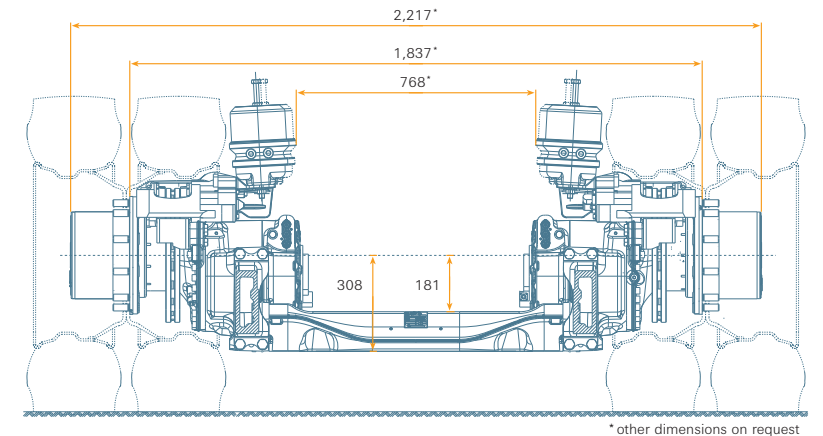


More functional features in the same space: ZF hybrid drive straight from the axle.

The latest product innovation from ZF in Passau, the electric driven low-floor axle AVE 130, has been specially developed for serial hybrid drives in city buses. Two water-cooled asynchronous motors are integrated into the wheel drives. The AVE 130 is still though compatible to the well-proven ZF drop center axles for installation.

Compact axle system

Also with the high performance integrated electric motors, the AVE 130 can be accommodated in the installation space of the ZF standard drop-center axles AV 132 and AVN 132. The interfaces to the chassis remain unchanged.



1 Electric driven drop center axle AVE 130

The electrically driven low-floor axle is designed for city buses with a maximum axle load of 13 tonnes. With the ZF design the drive on each wheel is provided by a high-revving, liquid-cooled asynchronous motor (2/3) followed by a two-stage drive. A short-term, maximum drive power of

240 kW and a continuous power of 120 kW is available per axle.

Despite the integration of high performance electric motors the installation space required for the hybrid-drive axle corresponds almost exactly to the standard drop-center axles AV 132 and AVN 132 for low-floor buses. This facilitates application in a vehicle range with standard diesel buses

without the necessity of having to adapt the chassis unit. Due to the low contour of the axle housing, installation is possible as a center axle and rear axle in articulated buses. Through the application of standard large-scale production components for brakes, brake disks, wheel bearings and their seals, the AVE 130 is particularly service-friendly.

The concept of the serial hybrid drive particularly enables city buses to operate economically and environment-friendly on harsh inner-city duty with its continual moving off and braking maneuvers. With the serial configuration the internal combustion engine is operated with a generator to provide electrical power. It has no direct mechanical link to the wheels. Using intervening power electronics, it can supply power to the electric motors for driving the wheels or it can charge traction batteries. The drive can also be inverted. During regenerative braking the traction motor acts as a generator and feeds the energy obtained back into the batteries (regeneration). The diesel engine is therefore no longer the sole energy source and so it can be downsized significantly.

Even with the internal combustion engine switched off, the powerful electric drive still provides full tractive power so that, for example, emission-free and quieter approaching and departure are possible at the bus stops.

Overall on the bottom line, optimum driveline management and downsizing enables up to 30% fuel savings depending on the application.

The serial principle demonstrates its flexibility also with the bus design. Since the drive power is supplied through power cables, the vehicle manufacturer has more freedom in the placement of his components. The small diesel engine also facilitates a larger passenger compartment.

Features:

- Low-floor axle system with integrated electric motors for serial hybrid drive designs in city buses
- Installation space and mating dimensions are compatible to ZF AV 132 and AVN 132 standard drop-center axles
- Liquid-cooled asynchronous motors (maximum speed 11,000 rpm)
- Wheel-hub drive in a 2-stage design
- Sensors for temperature, ABS, motor speed, speedometer
- More freedom in the planning and design of the vehicle
- Individual torque distribution using two driven axles and single-wheel drive gives traction advantages and reduced tire wear
- Also suitable for energy sources such as fuel cell, overhead contact line and pure battery operation

Electric driven drop center axle	AVE 130
Axle load kg	13,000
Output torque max. Nm	2 x 10,500
Motor performance max. kW	2 x 120
Wheel speed max. 1/min	485
Ratio	22.63
Tire size (standard)	275/70R22.5
Wheel size (standard)	22.5" x 8.25"
Brakes	ventilated disc brakes
Axle weight kg	1,110*
Degree of protection	IP6K9K
Cooling liquid	water/glycol 50/50
Motor	2 x asynchronous motor 3 phases
Nominal voltage	350-420 V _{rms}
Nominal current	135 A _{rms}
Max. current	350 A _{rms}

* including suspension arms