

AxTrax 2 LF

Low-Floor Electric Axle

Next-generation advanced e-Drive specifically
designed for city bus applications

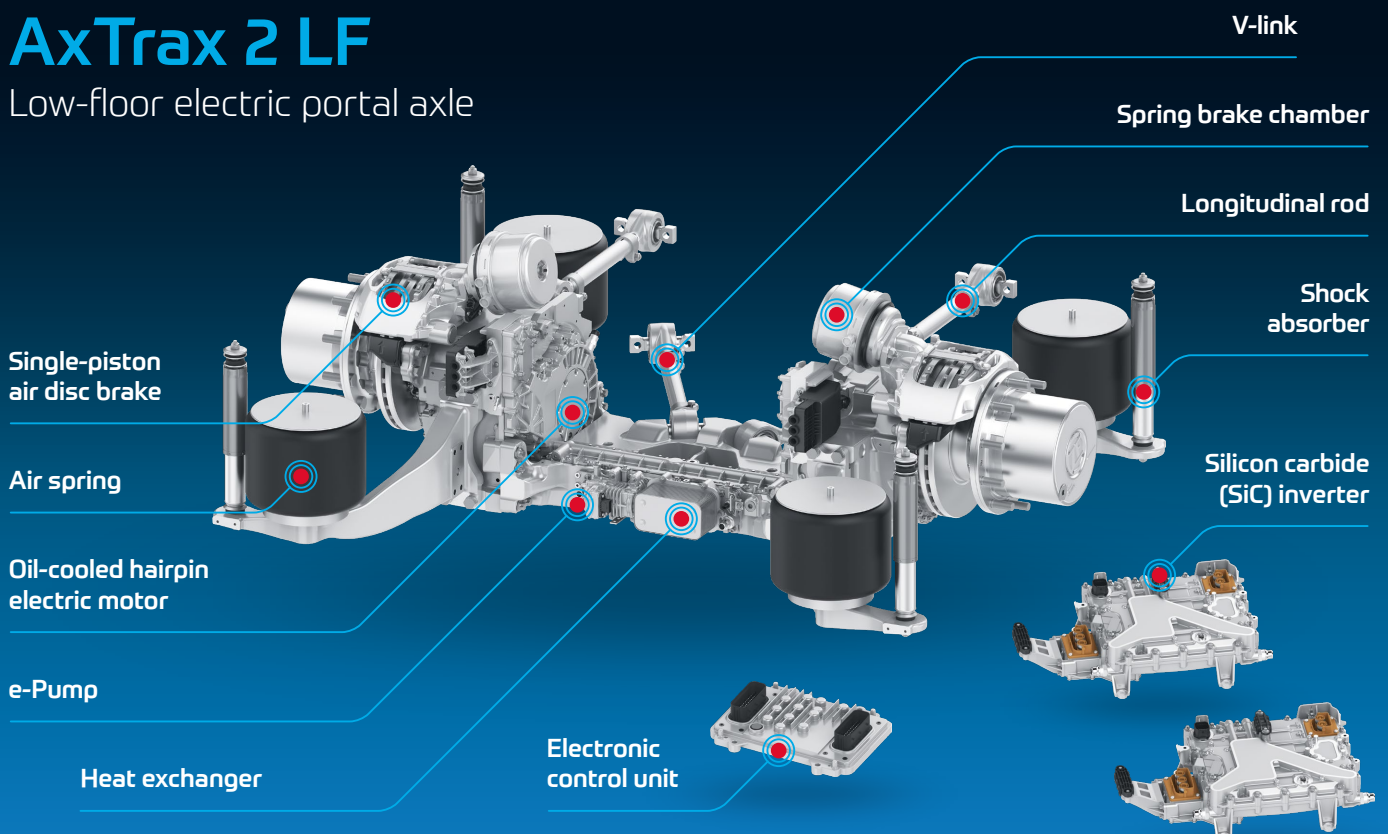


ZF's Next-Generation Low-Floor Electric Axle for City Buses

AxTrax 2 LF is ZF's latest addition to its in-house developed suite of e-drives specifically designed for city and intercity buses up to 29 tons. With a space-efficient design using similar installation space than the previous low-floor e-axle, it allows for simple interchangeability with existing electric vehicle setups. The innovative solution comprises two stand-alone silicon carbide (SiC) inverters and an ECU, creating a comprehensive e-axle system for electric, hybrid, and trolley buses.

AxTrax 2 LF

Low-floor electric portal axle



Value to Customers

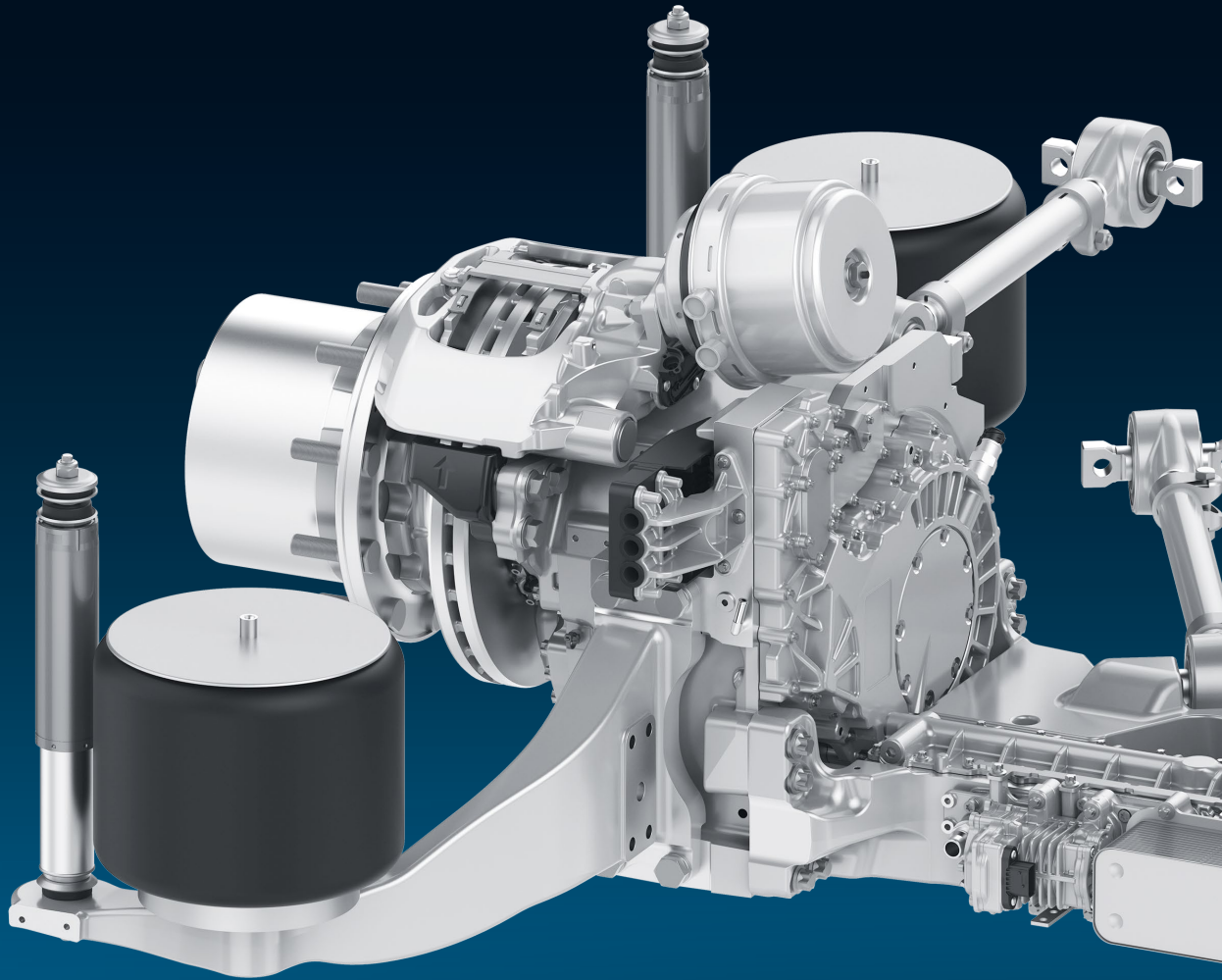
- Advanced next-generation e-axle system provides premium, reliable performance, and optimized energy efficiency tailored to demanding bus applications
- Flexible, streamlined approach enables powerful operation of a solo or articulated bus with only one driven axle as pusher or puller, with an overall lighter system
- Offers more space for powerful batteries, passengers, or innovative bus interior designs
- Helps to extend battery duration and vehicle operational range
- Offers high-speed processing for advanced software functionality, while fulfilling regulatory cyber security requirements and functional safety
- Optimizes uptime through enhanced axle condition monitoring and over-the-air software updates
- Enables local zero emissions for battery electric, fuel cell and trolley buses
- Supports to optimize ride experience for drivers and passengers with quiet and smooth electric powertrain operation
- Able to be delivered as full e-axle system with harmonized in-house air suspension and wheel-end solutions for ease of integration of AxTrax 2 LF into vehicle applications

The ZF Difference

- Provides optimized system performance and efficiency achieved through the exclusive utilization of in-house developed key components and software as part of a seamless platform approach
 - Simplifies vehicle system integration, interoperability and therefore enables faster time-to-market, helping to accelerate the public transit conversion towards electrification and zero emission
 - Provides a one-stop-shop for aftermarket partners and vehicle maintainers with a worldwide trained network of 3,800 ZF Service Partners
 - Benefits from ZF's expertise in developing e-mobility, axle, and transmission solutions for a broad range of vehicles spanning from passenger cars up to heavy-duty trucks and buses
- 

AxTrax 2 LF Low-Floor Electric Axle

Next-generation advanced e-Drive specifically designed for city bus applications



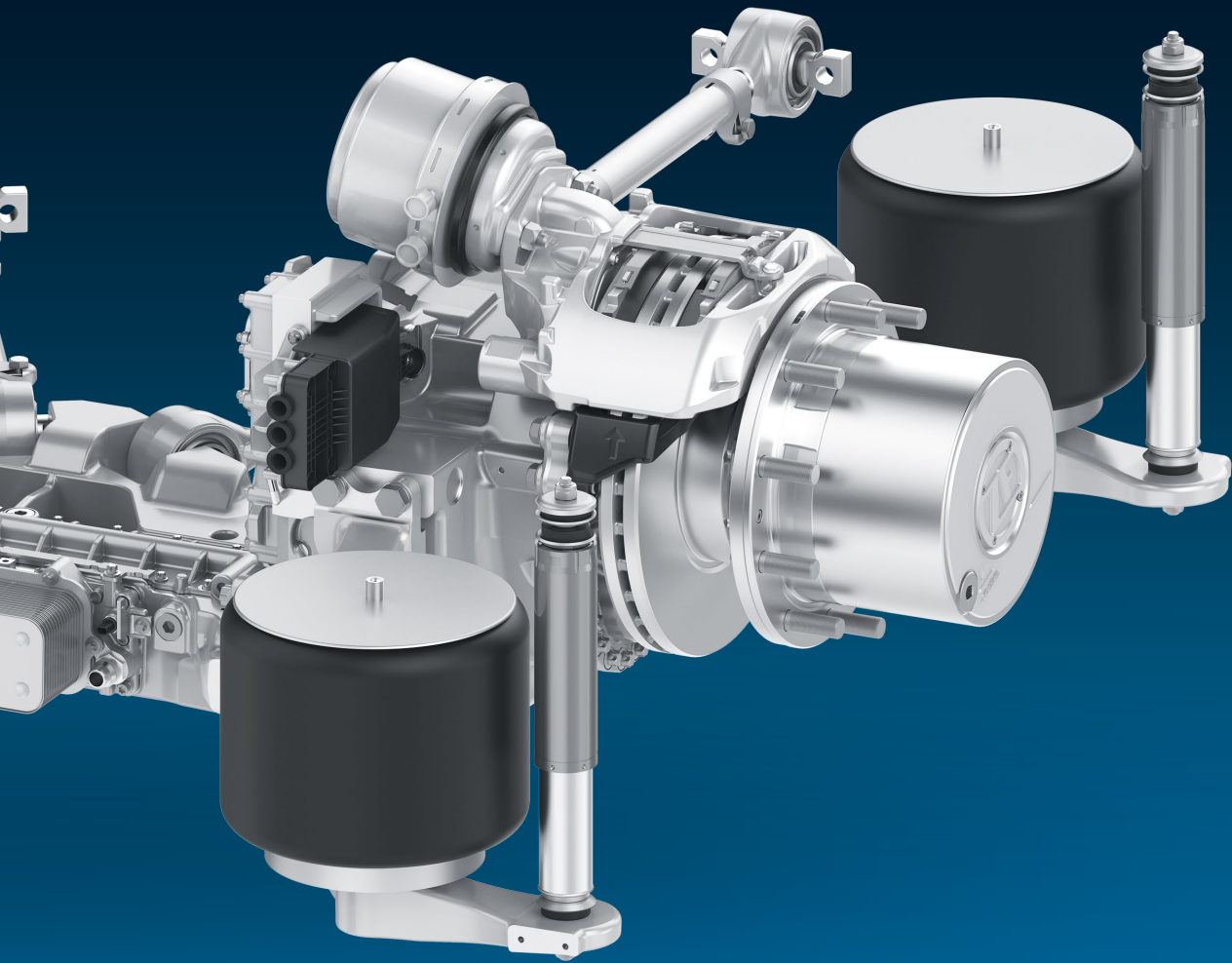
Modular Platform Approach

Leverages only ZF in-house developed key components and software



Powerful Operation

Integrates two PSM hairpin electric motors delivering up to 360 kW continuous power



Enhanced e-Drive Efficiency

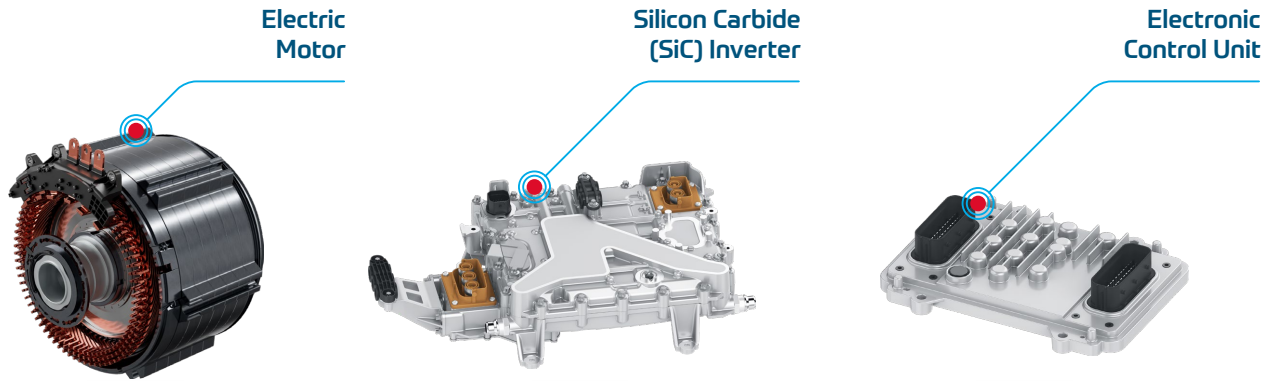
Controlled by two 800 Volt silicon carbide (SiC) inverters and a high-performance ECU



Optimized Uptime

Enables enhanced axle condition monitoring and over-the-air software updates

E-Drive Platform Components



Electric Motor

- Designed with hairpin windings to deliver high power and torque density in a compact lightweight package
- Provides high efficiency due to improved oil cooling
- Engineered in-house design delivers performance dedicated to commercial vehicle requirements
- Delivers quiet and smooth operation

Silicon Carbide (SiC) Inverter

- Delivers highly efficient power usage extending vehicle range
- Delivers high voltage (HV) range of 450V–770V or 500V–850V
- Offers a maximum high voltage (HV) DC current of up to 520A
- Utilizes ZF control board and in-house developed software
- In-house developed key component as part of ZF's scalable and modular e-Drive platform

Electronic Control Unit

- Provides efficient powertrain control on electrified buses
- Enables advanced processing capability to match advanced customer requirements
- Complies with regulatory cyber security requirements
- Fulfills highest functional safety requirements for automotive regulations (ISO 26262)
- Provides optimized packaging design for limited installation space
- Builds on ZF experience in commercial vehicle electronics and intelligent transmission automation

Technical Features

- Leverages modular and scalable innovative platform approach with only in-house developed key components
- Integrates two permanent magnet synchronous hairpin electric motors delivering up to 360 kW continuous power and up to 37,300 Nm of peak system output torque
- Provides more than 20% climbing ability in 29t articulated buses with only one driven axle compared to the previous low-floor e-axle*
- Comes with an advanced motor oil-cooling system integrating e-pump and heat exchanger into the axle
- Enables up to 10% lower energy consumption compared to the previous low-floor e-axle through higher recuperation and improved efficiency**
- Controlled by two 800 Volt silicon carbide (SiC) inverters and a high-performance ECU for optimized e-drive efficiency
- Provides enhanced data basis and readiness for over-the-air software updates
- Offers optional integration of ZF air springs, shock absorbers, air disc brake and brake actuation solutions

* Based on performance assessment calculation; depending on specific combination of various factors, such as tire size, axle ratio, acceleration, starting speed

** based on various simulations

Technical Data

AxTrax 2 LF – AX426

Continuous Power	260 kW	
Axle ratio (integrated)	1 st gear; i= 21.57	1 st gear; i= 18.88
Peak output torque	22,700 Nm	19,800 Nm
Total vehicle weight (max.)	20 t ¹⁾	
System weight	ca. 1,257 kg ²⁾	
Performance weight	0.26 kW/kg	

AxTrax 2 LF – AX436

Continuous Power	360 kW	
Axle ratio (integrated)	1 st gear; i= 21.57	1 st gear; i= 18.88
Peak output torque	37,300 Nm	32,600 Nm
Total vehicle weight (max.)	29 t ¹⁾	
System weight	ca. 1,257 kg ²⁾	
Performance weight	0.36 kW/kg	

¹⁾ higher vehicle weights with multiple axles possible, max. axle load 13t ²⁾ incl. spring carrier, ECU, inverter (2x), oil, air disc brakes

For further product details contact your sales representative.
For information about our product portfolio, visit: zf.com/cv
Follow us on LinkedIn to stay up to date:



About Us

ZF is a global technology company supplying systems for passenger cars, commercial vehicles and industrial technology, enabling the next generation of mobility. ZF allows vehicles to see, think and act. In the four technology domains of Vehicle Motion Control, Integrated Safety, Automated Driving, and Electric Mobility, ZF offers comprehensive product and software solutions for established vehicle manufacturers and newly emerging transport and mobility service providers. ZF electrifies a wide range of vehicle types. With its products, the company contributes to reducing emissions, protecting the climate and enhancing safe mobility. With some 165,000 employees worldwide, ZF reported sales of €43.8 billion in fiscal 2022. The company operates 168 production locations in 32 countries.

ZF's Commercial Vehicle Solutions (CVS) division is helping shape the future of commercial transportation ecosystems. Our mission is to be the preferred global technology partner to the commercial vehicle industry. Powerfully combining ZF's commercial vehicle systems expertise, extensive technology portfolio and global operations, the division serves the full commercial vehicle industry value chain. As the automotive industry progresses towards an increasingly autonomous, connected, and electrified (ACE) future, ZF's CVS division innovates, integrates and supplies components and advanced control systems that help make commercial vehicles and fleets operate more safely and sustainably. CVS unites ZF's former Commercial Vehicle Technology and Commercial Vehicle Control Systems divisions, the latter being formed following ZF's acquisition of WABCO in Spring 2020