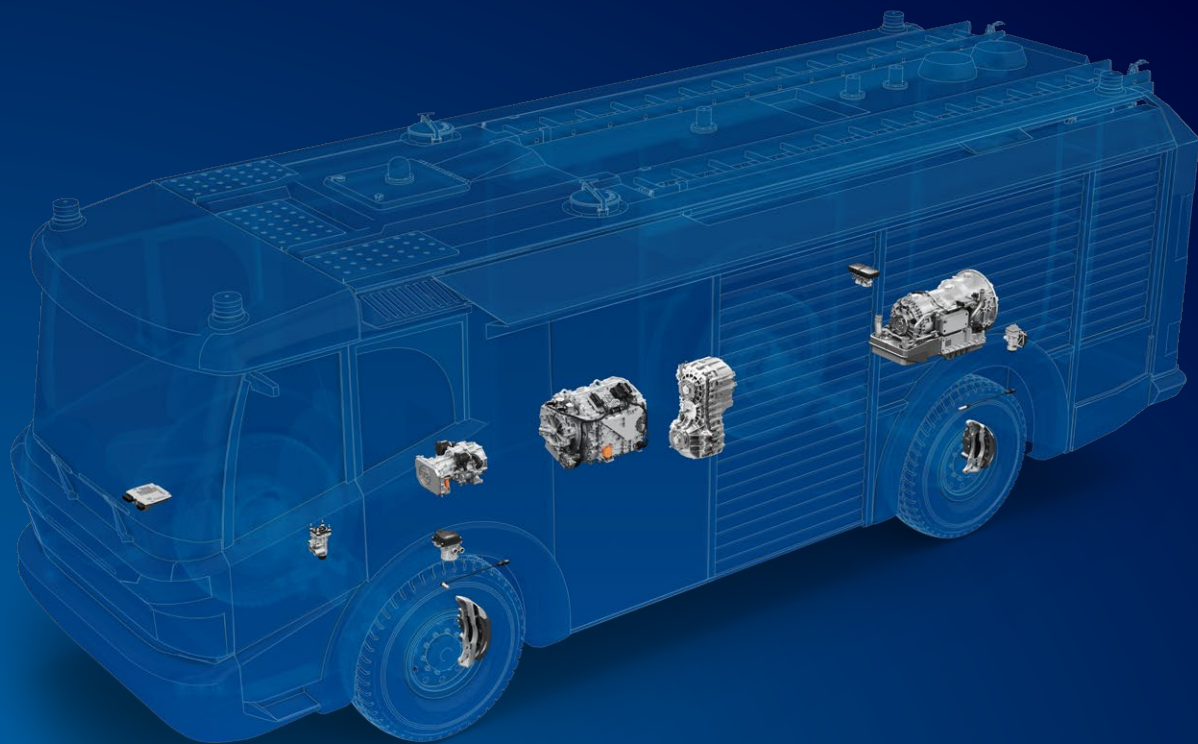


Together on Mission

Drive systems and braking solutions for special vehicles





Empowering You When Every Second Counts

Emergency and special vehicles must perform reliably at all times – under extreme loads, on challenging terrain and in time-critical situations. In these demanding environments, the driveline plays a key role in ensuring safe and efficient vehicle operation.

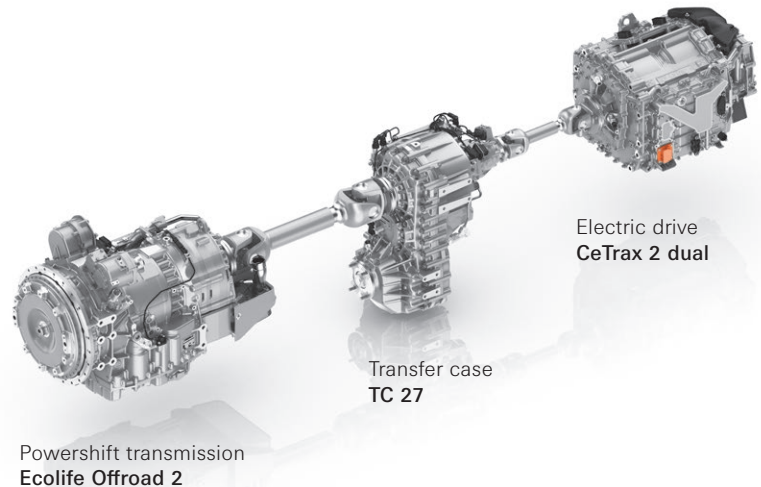
ZF develops integrated driveline solutions tailored to the specific requirements of special vehicles. By combining proven mechanical systems with advanced electric driveline technologies, ZF delivers reliable performance, high efficiency and robust system design.

With extensive application expertise and a strong focus on system integration, ZF supports vehicle manufacturers and emergency services worldwide – enabling them to meet today's operational demands while preparing for future mobility concepts.

Modular Drive Solution for Off-Road Vehicles

Modular drive system

- Flexible modular system from proven ZF volume production components
- Maximum flexibility: Conventional, electric, or combined drive
- System solution from a single source: drive, integrated power electronics, and function electronics
- Electric motor enables hybrid drive as well as purely electric driving, boost function, and zero-emission operation of equipment
- Electric motor acts as retarder or recuperator, which reduces brake wear and thus maintenance costs

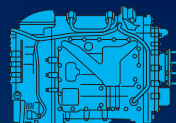


MAXIMUM FLEXIBILITY: Electric, conventional, or combined drive

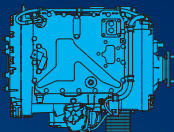
COMBINED DRIVE FORCE: Optimal system solution from a single source

RELIABILITY: Modular system from proven ZF volume production products

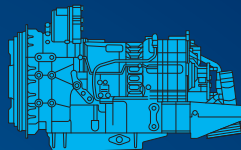
Flexible modular system for hybrid or all-electric driving



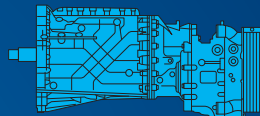
CeTrax 2 dual
Electric Drive



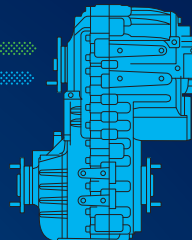
CeTrax 2
Electric Drive



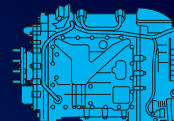
EcoLife Offroad 2
Powershift Transmission



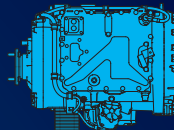
TraXon 2
Automatic Transmission



TC 27
Transfer Case



CeTrax 2 dual
Electric Drive



CeTrax 2
Electric Drive

Learn more:



System Expertise for Light- and Medium-Duty Vehicles

Integrated, modular electric central drive CeTrax 2

- Delivers premium, reliable performance, and optimized energy efficiency
- High electrical efficiency helps extend vehicle operational range
- Fulfills regulatory cyber security requirements and functional safety
- Includes an integrated 800 Volt silicon carbide (SiC) inverter
- Equipped with a hairpin electric motor
- Features a 3-speed transmission with 2 e-actuators for optimized efficiency
- Optionally allows for integration of a compact mechanical power take-off
- Incorporated high-performance ECU

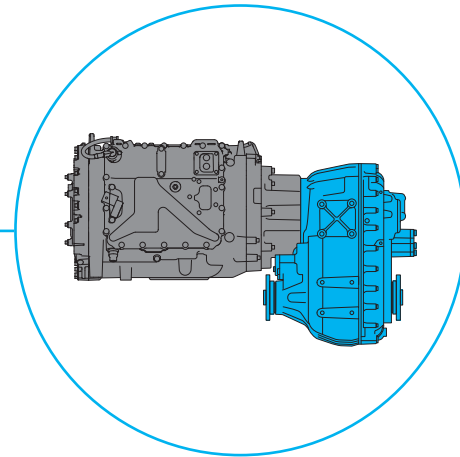
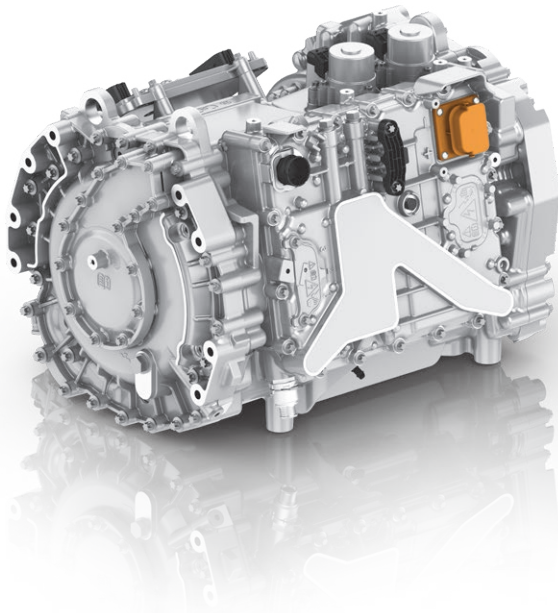
Technical data

Performance peak / 30 min [kW]	250 / 210
Output torque peak / 30 min [Nm]	8,720 / 4,720
E-motor speed / Output speed [rpm]	12,000
Technology	PSM
Voltage [V]	DC 650 / 750 (optional)
Current DC (peak / continuous)	520 / 350 A _{rms}
Weight with Inverter [kg]	< 250
Gearbox (ratio)	3-speed (10.1 / 4.2 / 2.4)

Learn more:



One-box-solution



CeTrax 2 with directly connected VG 750|270

System Expertise for Heavy-Duty Vehicles

Integrated, modular electric central drive CeTraX 2 dual

- Delivers powerful acceleration and seamless torque delivery
- High electrical efficiency helps to extend vehicle operational range
- Fulfills regulatory cyber security requirements and functional safety
- Includes 2 integrated 800 Volt silicon carbide (SiC) inverters
- Equipped with 2 hairpin electric motors
- Features a 3-speed transmission with 2 e-actuators for optimized efficiency
- Integrates state-of-the-art powershifting strategy
- Incorporated high-performance ECU

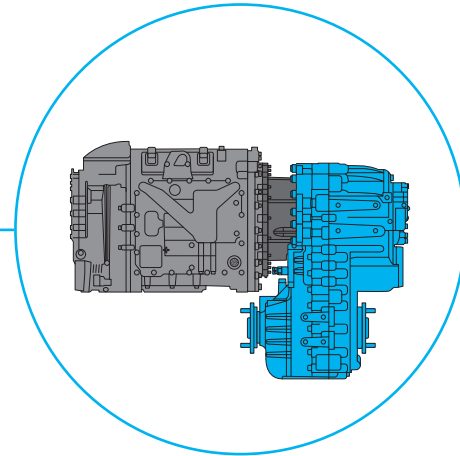
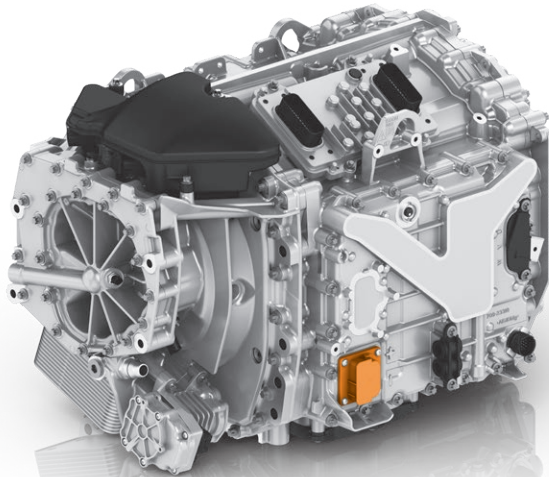
Technical data

Performance peak / 30 min [kW]	450 / 380
Output torque peak / 30 min [Nm]	24,700 / 13,680
E-motor speed / Output speed [rpm]	6,500
Technology	PSM
Voltage [V]	DC 650 / 750 (optional)
Current DC (peak / continuous)	520 / 350 A _{rms}
Weight with Inverter [kg]	~ 385
Gearbox (ratio)	3-speed (10.0 / 7.92 / 3.25)

Learn more:



Efficient and powerful



Direct mounting option to TC 27 transfer case

Powershift Transmission for Off-Road Vehicles

EcoLife Offroad 2

- Fully automatic 7-speed off-road transmission with integrated retarder
- Powerful: application dependent input torque with up to 3,000 Nm
- Two engine-dependent PTOs with max. 1,000 Nm available for different applications
- On-board electronics
- Best performance thanks to Smart Driveline Torque Control: Intelligent transmission function that guides the engine along the permissible converter turbine torque
- Dual cooling system consisting of integrated oil cooler and separate retarder oil cooler for optimized offroad performance
- High efficiency, high power-to-weight ratio
- Optional interface for directly attached TC 27 transfer case

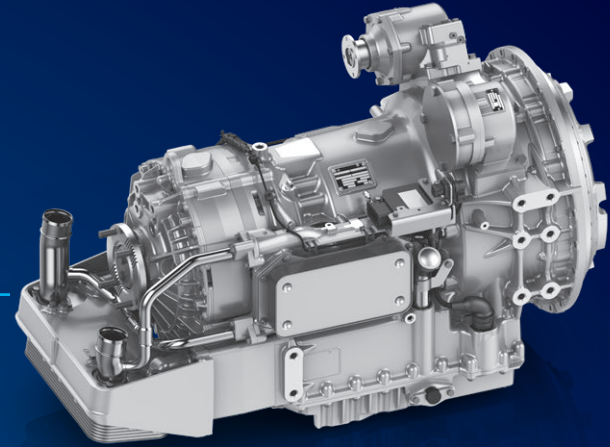
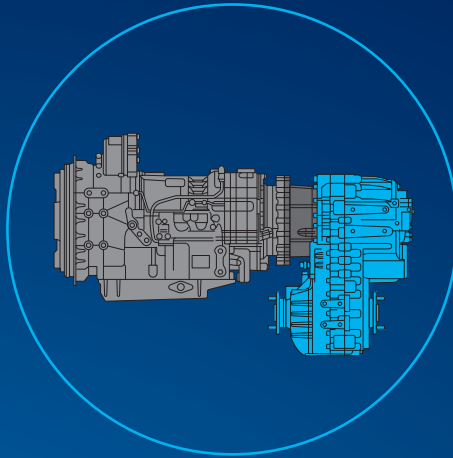
Technical data	6/7 AP 3000 S
Number of gears	6 / 7
Max. input torque [Nm]	3,000
Length [mm]	732 / 871
Weight approx. [kg]	410 / 456
Transmission ratio	5.6-0.559
Max. power [kW] ¹⁾	545

¹⁾ Indicative value only (engine auxiliaries are not covered)

Learn more:



Viable for the future



EcoLife Offroad 2 with directly connected TC 27

POWERFUL: Input torque up to 3,000 Nm, two PTO's up to 1,000 Nm

RELIABLE: Best performance under the toughest conditions

CUSTOMER-SPECIFIC: Individual adaption of the transmissioin to the vehicle

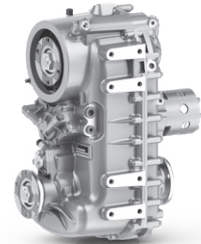
Maximum Traction and Mobility

Transfer case series

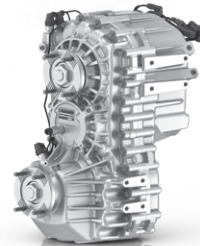
- No reversal of rotational direction thanks to 3-shaft design
- Suspension via three and four screw-on surfaces, respectively
- Permanent all-wheel drive with lockable planetary gear differential, alternative: front axle activation and deactivation, both pneumatically operated
- Pneumatic two-speed shift system
- Robust, weight-optimized design
- Ground, noise-optimized gearing
- Robust sealing system, fordable thanks to hose breather, if required
- Integrated oil pump (partly optional), designed for external cooling system
- ADM-capable (Automatic Drive-Train Management)



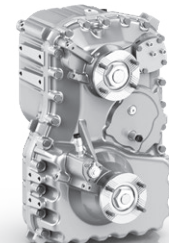
VG 750



VG 750I400



TC 27



VG 2700

Designed for tough use

Technical data	VG 750 2-speed	VG 750 400 2-speed	TC 27 2-speed	VG 2700 2-speed
Max. input torque [Nm]	10,000	12,500	27,000	35,000
Max. input speed [rpm]	3,500	4,500	3,200	2,800
Gear ratio high gear / low gear option	1.00 / 2.00 (1 / 2.39)	1.09 / 2.10 (1 / 2.52)	0.87 / 1.54	0.91 / 1.41
Spreading	2.00	1,93	1,76	1,55
Differential torque distribution option	1:2	1:2 (1:1)	1:2.636 (1:1)	1:2.60
Shaft distance [mm]	270	400	300 or 396	400
Weight from, dry [kg]	from 115	from 155	from 246	from 450

All-Rounder for All-Wheel Drives

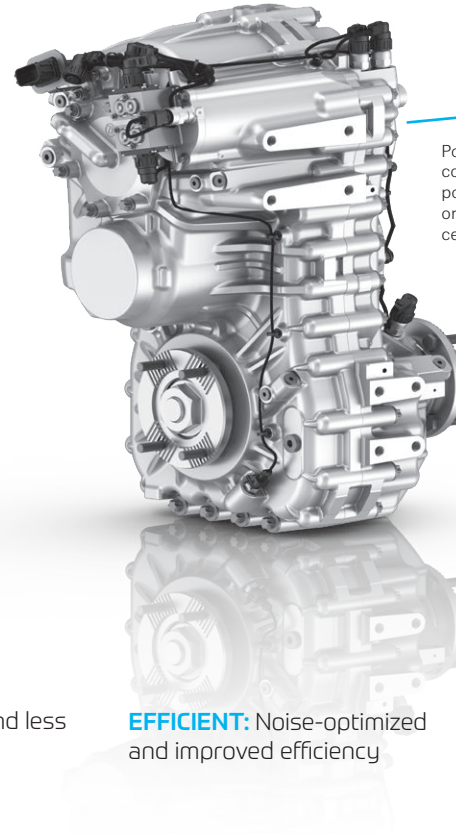
TC 27

- Weight-optimized thanks to aluminum housing
- Higher payload or reduced fuel consumption due to lower weight
- New suspension method reduces installation cost
- Compact design
- Improved efficiency
- Noise-optimized
- Optional:
 - Central electrical / pneumatic connection
 - With control unit directly on transmission, all types of software applications can be implemented
 - Oil level and oil temperature sensors

LIGHTWEIGHT: Weight-optimized thanks to aluminum housing

POWERFUL: Higher payload and less fuel consumption

EFFICIENT: Noise-optimized and improved efficiency



Possibility to directly connect **EcoLife Offroad 2** powershift transmission or **CeTrax 2 dual** electric central drive

Learn more:





Applications in Emergency Services

Emergency service vehicles are used in a wide range of critical scenarios – from firefighting and technical rescue to off-road disaster response.

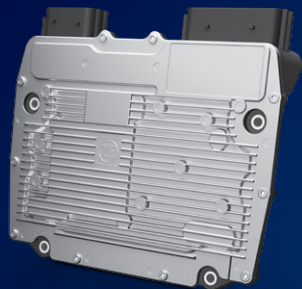
Each application comes with specific operational requirements, including high vehicle weight, challenging terrain and the need for immediate readiness. Reliable mobility and full vehicle control are essential in every situation.

ZF solutions support these diverse applications by enabling stable vehicle behavior, dependable performance and consistent drivability – regardless of terrain or operating conditions.

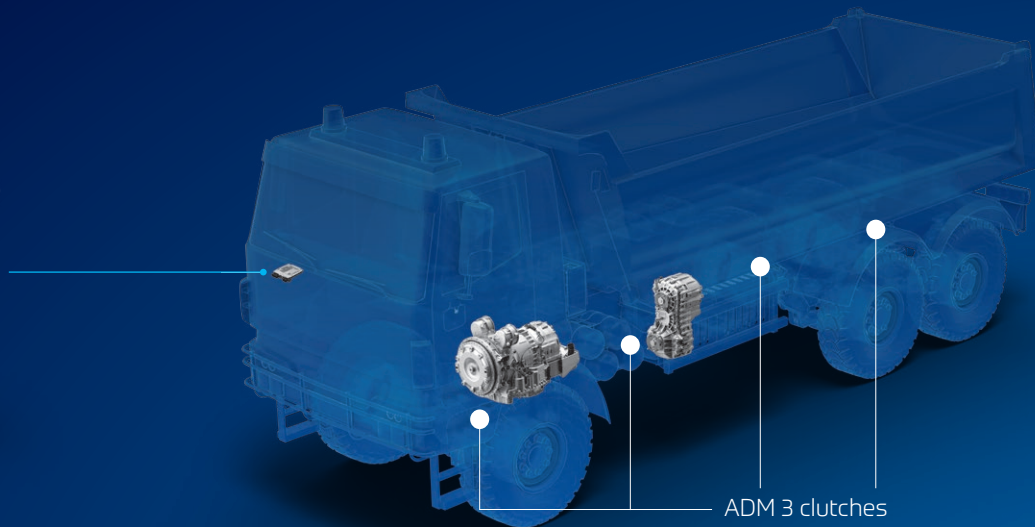
Learn more:



Always the Perfect Traction



ADM 3 – EC5 ECU



ADM 3 clutches

Learn more:



More safety by ADM 3

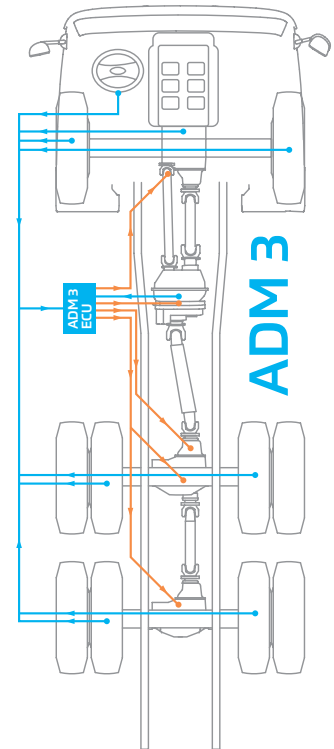
Automatic Drivetrain Management ADM 3

- Automatic engagement of all differential locks at the right time and on the fly
- Always 100% of possible traction available
- Increase of driving stability and safety
- Noticeable relieve of the driver
- Minimum of driver training needed
- Less driveline damages due to incorrect operation
- The new electronic control unit EC5 is geared up for expansions and long term supply
- EC5 fulfills most of military and commercial vehicle standards concerning: electromagnetic compatibility, temperatures, vibrations and shocks
- World wide support for standardized diagnostics ZF Testman available
- Customized application and parameterization for all kind of wheeled vehicles
- Special dog clutch design for high loads, shocks and shifting on the fly

AUTOMATIC SYSTEM: Driveline management at the right time and on the fly

MAXIMUM TRACTION: Always 100% of possible AWD traction

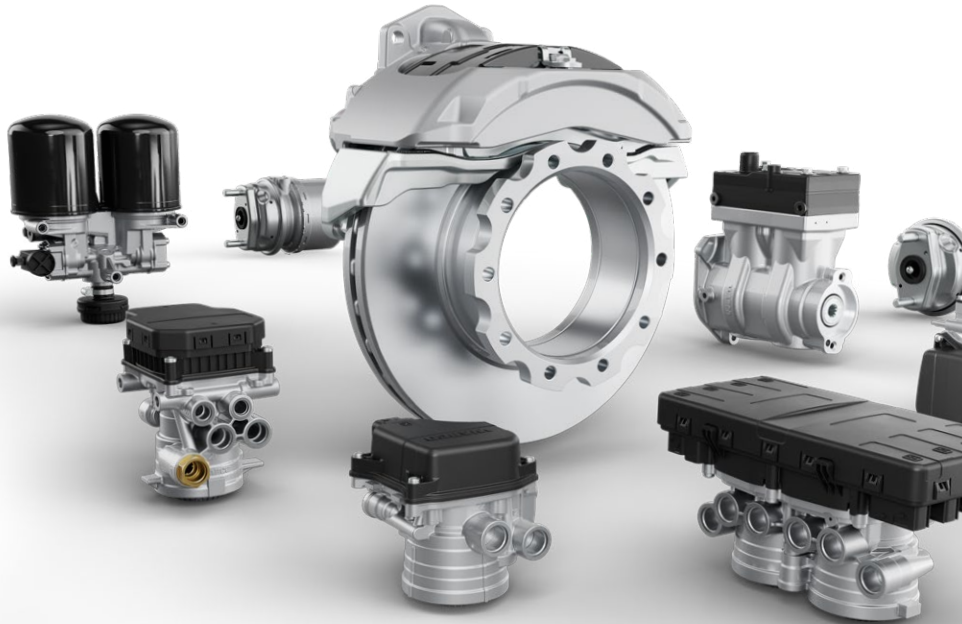
MORE SAFETY: Increase of driving stability and safety



Precision Braking for Every Mission

ZF provides braking solutions tailored to emergency and special vehicles, ensuring reliable performance under demanding conditions.

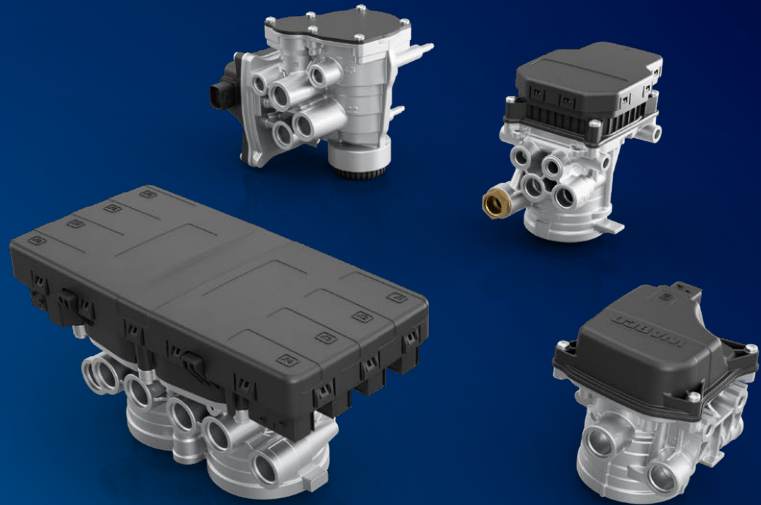
Based on proven hydraulic and pneumatic technologies, ZF systems deliver controlled deceleration, high durability and safe operation across a wide range of applications.



Electropneumatic brake system

Electronic braking system for a wide range of vehicles

- High integration level: Equipped with centralized intelligence and 30% less parts
- Scalability: Provides various stages of electronic braking systems for all kind of applications
- Ready for the future: Enables automation up to Level 5 with one braking system platform



Hydraulic ABS (Antilock Braking System)

Electronic braking system and stability control

- Independent pressure generation via intelligent control to actuation and brake
- Future ready for autonomous vehicles including functional safety, cyber security and update management
- Modular adaptable system for various applications including multiple all-wheel drive



Electrically driven air compressor

e-comp Scroll

- **Functions**

Provides compressed air up to 12.5 bar for suspension, braking, gear shifting.
Integrates air end with electric motor and inverter.

- **Oil free**

Supporting global sustainability & zero emission vehicle targets

- **Lowest TCO**

Maintenance free (only air filter exchange)

- **Liquid cooling**

For higher power density and improved durability

- **High efficiency**

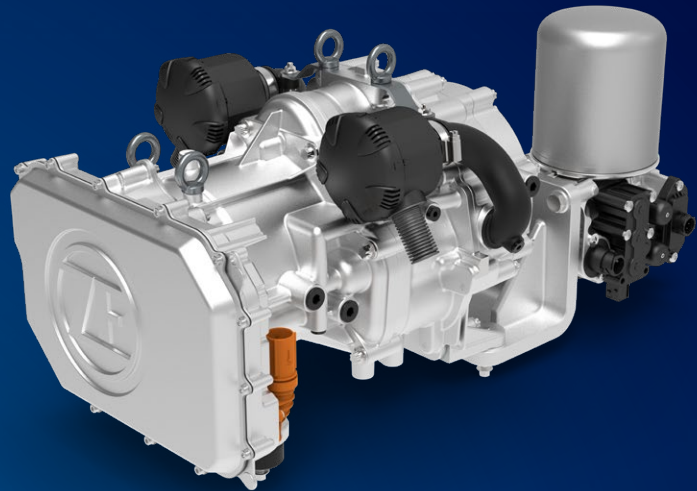
<4.5 kW targeted power consumption
@12,5 bar, 250 l/min

- **Ultra silent**

67 dB(A) targeted

- **Negligible vibration**

scroll circular motion



Worldwide Mobile Power

As technology leader, ZF considers itself not only a manufacturer, but also a reliable partner who supports you throughout the lifecycle of your vehicles. And that worldwide. Wherever you may need us, ZF Aftermarket supports you with its own comprehensive service network and the entire range of after-sales services. From prompt genuine parts supplies via technical service, up to consultancy and training. Quickly, directly, reliably. In a nutshell: ZF Aftermarket links powerful top-quality products with excellent services to provide a unique, premium offer.

Comprehensive service from one hand

Our products are used around the world and our technical staff is available and ready to support our products through the entire lifecycle.

Internationally, ZF Aftermarket is represented with its own locations and partner operations and is well equipped for the relevant markets. The German organization of ZF Aftermarket for example, is present locally throughout Germany with sixteen service points – nine of its own locations together with nine authorized service partners – just where the customers need them. ZF after-sales specialists ensure the operational readiness for ZF chassis and driveline technology in the sectors of cars, commercial vehicles, buses, construction machinery, agricultural machinery, materials handling, railways and marine. The manufacturer's engineering expertise, the high quality of spare parts and processes, short throughput times and good accessibility are features of these service locations.

Learn more about the services from ZF Aftermarket.
aftermarket.zf.com

Globally present, locally anchored



ZF Service Network
www.zf.com/service-network



ZF Group

Industrial Technology

Marine & Special Driveline Technology

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