

For this family of vehicles, INGETEAM supplies the water-cooled on-board traction converters for 3,000 Vdc catenary that make up the auxiliary converters, thus optimizing the system in terms of costs, space and weight. The auxiliary converter for each of the converters has a power of 250 kVA.

Each of the traction converters incorporates two 660 kW traction inverters, one for each traction engine, providing redundancy for the vehicle in order to improve availability rates.

The modular design of the converters has optimized their maintenance since it allows power modules to be exchanged in a simple manner, in a reduced period of time, without the need for heavy, special tools and without the need to empty the cooling circuit. Likewise, diagnostic tools have been developed for the purpose of minimizing maintenance costs.

The converters include a regenerative braking system, returning energy from braking to the catenary, in an effort to optimize energy consumption, thus reducing operating costs.

Traction systems have been designed both distributed (13*2 units) and concentrated (47*2 units) versions.

Vehicle Characteristics

Client:	PESA
Type of Vehicle:	ELF 22 WE
Supply Voltage:	3,000 Vdc
Number of cars:	4
Traction distribution:	Push-Pull
Track Gauge:	1,435 mm
Maximum Speed:	160 km/h
Axle Arrangement:	Bo'2'2'2'Bo
Acceleration:	≥ 1 m/s ²
Traction Converters:	2
Traction Motors:	4 asynchronous motors
Maximum Power at Wheel:	2,500 kW
Traction Effort:	200 kN



TF 09 DTR 01_B 08/2012

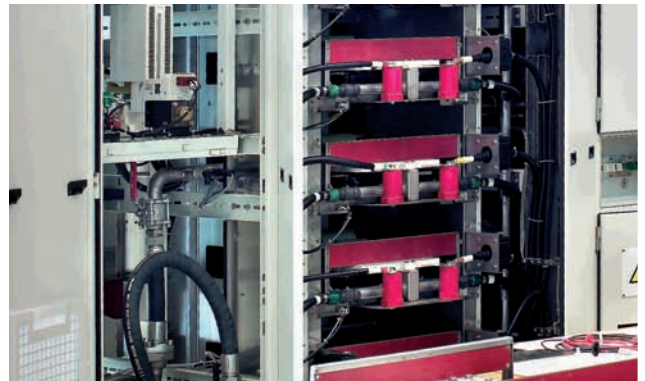
Traction Converter

Dimensions:	2,400 x 1,114 x 2,107 mm
Weight:	1,600 kg
Input Voltage:	3,000 Vdc(EN50163)
Number of inverters:	2
Number of motor per inverter:	1
Inverter Topology:	2 level inverter
Semiconductor Technology:	6.5 kV IGBT-s
Output Voltage of inverter:	0 to 2,346 Vrms (traction) 0 to 2,806 Vrms (braking)
Output Frequency of inverter:	0 to 172 Hz
Output Current per inverter:	0 to 280 Arms per phase
Cooling system:	Water with anti-freezing
Deionised water required:	No
Temperature range:	-40°C to 45 °C
Brake method:	Regenerative to catenary
Secondary brake method:	Rheostatic

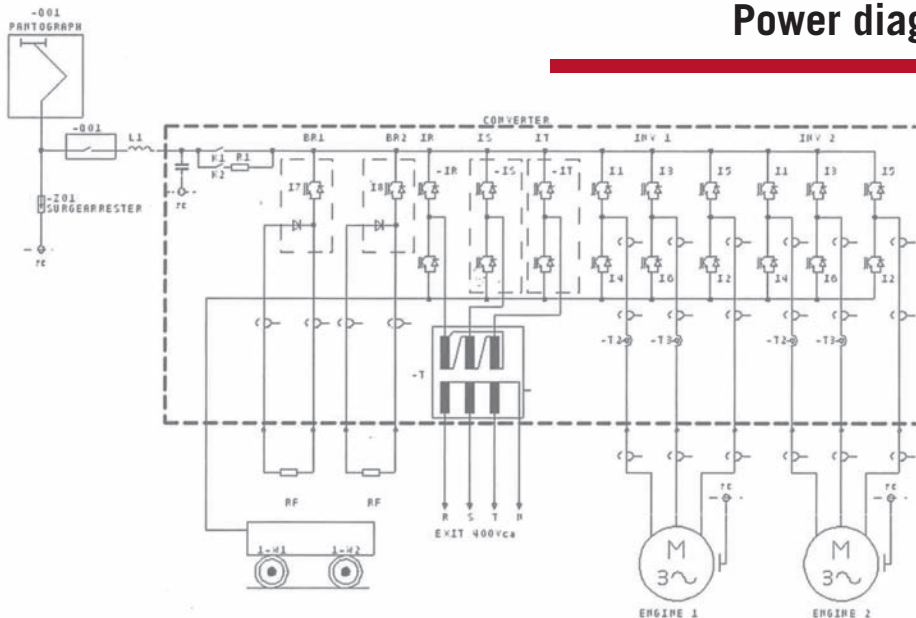
Modular concept, in order to maximize the availability and maintainability of the system.

Auxiliary Converter

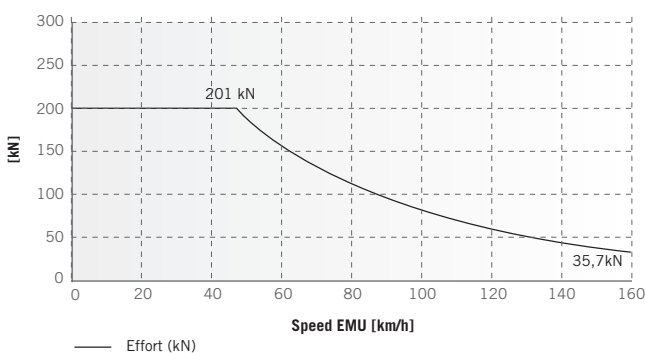
Dimensions:	Integrated in the traction converter
Input Voltage:	3,000 Vdc ($\pm 1,000$ V)
Output Voltage:	400 Vac $\pm 5\%$
Nominal Power:	250 kVA
Output current per phase:	180 A
Output Voltage Ramp:	Programmable 0 to 5 s
Total Harmonic Distortion (THD):	< 8%



Power diagram



Maximum traction effort characteristic in train speed function



Maximum Braking effort characteristic in train speed function

