

The tramways of Bilbao are in operation since 2002: Ingeteam developed and supplied the electrical traction system for 70% and 100% low floor vehicles. During 2016, INGETEAM has refurbished some external elements of the traction system.

The 70% low floor solution is equipped with two traction converters, each of them feeding two induction three-phase motors situated in each of the two traction bogies, one per axle. For the 100% low floor, a double traction converter has been designed, feeding two motors, one per wheel. The system is controlled by a 32-bit microprocessor control, designed, manufactured and programmed by Ingeteam.

Other elements were specified by the engineering, to provide with a turn-key traction solution.

Likewise, the tramway is equipped with a 3 x 380 Vac 50Hz 50 kVA auxiliary converter which includes a high-frequency battery charger (6 kW).

The traction system is equipped with a regenerative braking. Maintainability and reliability of the converter have been key factors for the design, in order to minimize LCC.

Vehicle Characteristics

Client:	CAF
Vehicle:	Tram. Low – Floor: 70% & 100%
Catenary voltage:	750 Vdc
Length:	24.4 m
Max Speed:	70 km/h
Max. Effort:	180 kW
Nr of inverters:	2
Nr of motors:	4 induction machines
Cooling:	Air



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Technical data

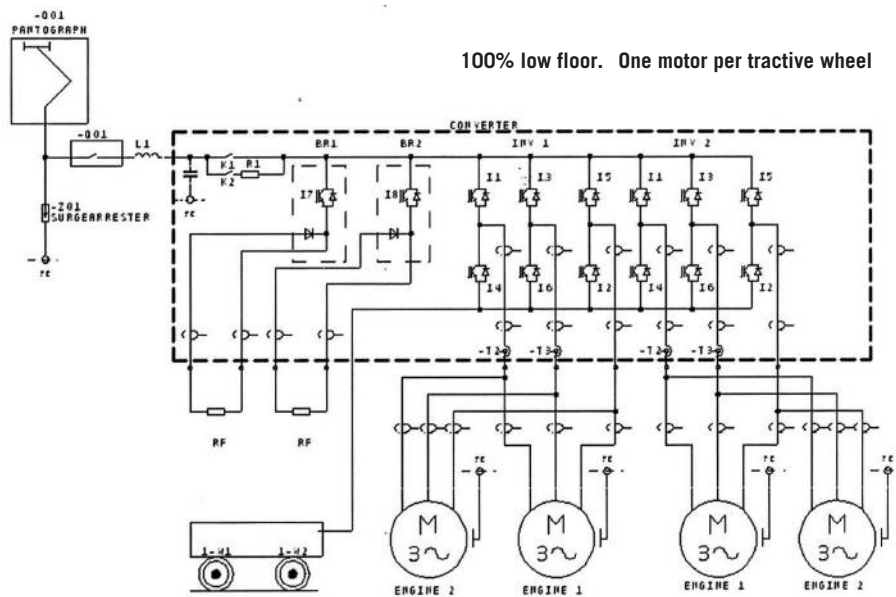
100% low floor traction converter

Controlled by a DCU, have been designed using DSPs and are based on IGBTs as the switching element. Each traction converter consists of two separate inverters.

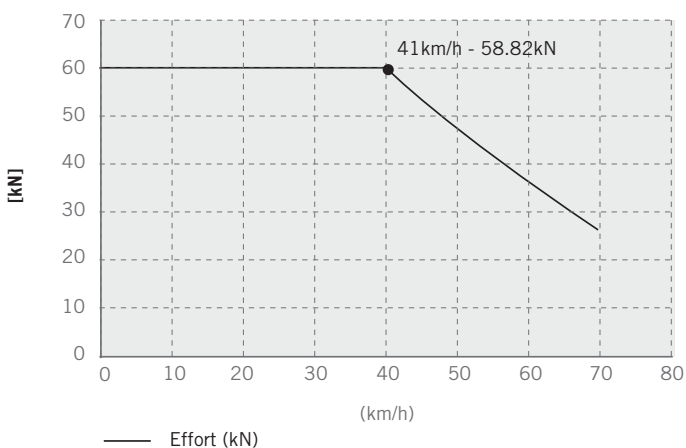
Supply voltage	750 Vdc+25%-30% (500-900 V)
Rated power	200 kW
Maximum power	500 kW
Output frequency range	0-270 Hz (0-80 km/h)
Switching frequency	2.2 kHz
Output current	325 A / 780 A máx
Output voltage	0-550 Vac



Power diagram



Traction effort in relation to speed.
MTM unit with 2 traction modules and 4 motors
70% low floor



Braking effort in relation to speed.
MTM unit with 2 traction modules and 4 motors
70% low floor

