

Ingeteam

Modernization of electrical multiple units UT-3500



The modernization has obtained a substantial improvement in the reliability and availability rates, as well as a reduction in operating costs

Ingeteam Traction has won a contract awarded for the modernization of 12 electrical multiple units UT-3500 for FEVE (Ferrocarriles Españoles de Vía Estrecha).

The modernization process involves renovating the traction system, as well as the auxiliary power systems and the control system, in order to improve the availability rates, to reduce costs and to extend the useful life of the fleet.

Ingeteam Traction has replaced the units' direct-current traction system with a new asynchronous traction system thus increasing the traction power by 40%.

The modernization has obtained a substantial improvement in the reliability and availability rates, as well as a reduction in operating costs due to the increased efficiency of the system and the inclusion of the regenerative braking system.

Maintenance costs have also been reduced thanks to the simplicity of the alternate-current motors when compared to the direct-current ones.

The air-cooled traction converters, based on the latest IGBT technology,

have been designed to integrate the auxiliary converter and the battery charger due to the minimum space available on the units. Two converters have been installed on each unit to incorporate redundancy into the system.

The electrical motor has been designed to be mechanically compatible with previous direct-current motor, whereby no significant mechanical modification has been necessary.

The new control system connects to the various elements of the train by means of the TCN network integrated in the train and it includes a diagnosis interface that allows any system incident to be quickly resolved.

The modernization carried out by Ingeteam Traction has allowed the useful life of the material to be extended, improving its reliability and dynamic performance and reducing maintenance costs without the need for significant mechanical changes, thus reducing the investment on the part of the operator.

Ingeteam

TF06DTR01_A • 09/2008



Technical data

1 Unit characteristics

Track gauge	1,000 mm
Coach arrg.	M - M
Catenary voltage	1,500 Vdc (± 500V)
Max. speed	80 km/h
Continous power	600 kW
Max. power	914 kW
Max. tracting effort	94 kN
Converter technology	3.3 kV IGBTs
Motors	Asynchronous
Auxiliary converters	2
Cooling system	Air

2 Traction converter

Dimensions	1,800 x 2,300 x 700 mm
Weight	1,900 kg
Nominal power	300 kW
Maximum power	457 kW
Stablished intermediate circuit voltage	1,500 Vdc
Output current	0 to 330 Arms
Output voltage of inverter	0 to 1,170 Vrms
Output frequency of inverter	0 to 114 Hz
Cooling system	Forced air

3 Traction motor

Asynchronous motor, mechanically compatible with the original direct-current engine.

Weight	850 Kg
Continous power	150 kW
Max. torque	1,900 Nm
Nominal voltage	1,170 Veff
Nominal frequency	39.1 Hz
Motor speed	3,500 rpm
Cooling system	Self-ventilation
Insulation class	200

4 Auxiliary converter

Integrated on the traction converter.

Continous power	70 kVA
Max. output	124 kVA
Input voltage	1,500Vdc
Output voltage	3 x 400 V / 50 Hz+N
Cooling system	Forced air

5 Battery charger

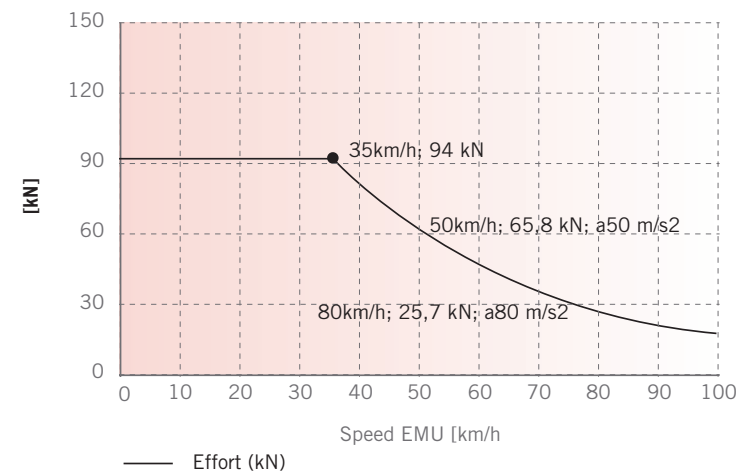
Integrated on the auxiliary converter

Continous power	10 kW
Charger technology	High frequency
Cooling system	Natural air

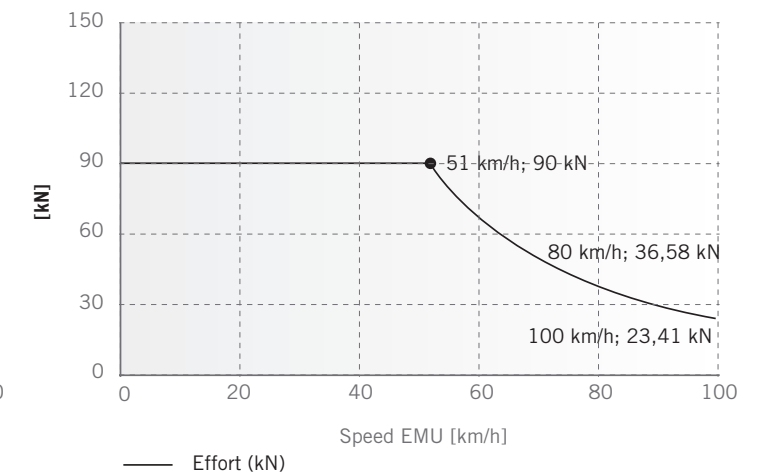
6 Control system

Based on Ingeteam's SISTEAM OCS control system and HMI-s, with decentralised, redundant configuration, with MVB and WTB communicating buses according to IEC 61.375-1 TCN standard.

Maximum traction effort in relation to speed.
Traction System. UT - 3500.



Braking effort in relation to speed.
Traction system. UT - 3500.



Power diagram by motor coach

