



## METRO CLASS 777 IPEMU

Merseytravel, Liverpool (UK)

Stadler has developed an innovative Independent Powered Electrical Multiple Unit (IPEMU), based on the Merseytravel Class 777 and equipped with a battery-based energy storage system. The new battery traction equipment is mounted in the underframe and the cooling system is located on the roof. The interior, the high levels of passenger comfort, and the number of passengers it can carry, are the same, with the IPEMU retaining all the basic functionalities of the Class 777. IPEMU trains can operate beyond the electrified third rail network on non-electrified systems, preventing costly infrastructure changes for clients, who can extend the network beyond the third rail. This provides greater flexibility and means more services for passengers. While an IPEMU is running on the electrified network, the batteries can be charged from the third rail, as well as through regenerative braking. IPEMUs have the potential to replace diesel powered units, which helps clients and local and national governments meet decarbonisation targets. The ride quality is smooth and passengers will not notice the transition from EMU to IPEMU mode. Furthermore, IPEMUs avoid passengers having to change trains, enhancing the journey experience and reducing travel time. IPEMUs can be recharged in less than 15 minutes. The IPEMU battery can undergo more than 10,000 charge/discharge cycles.

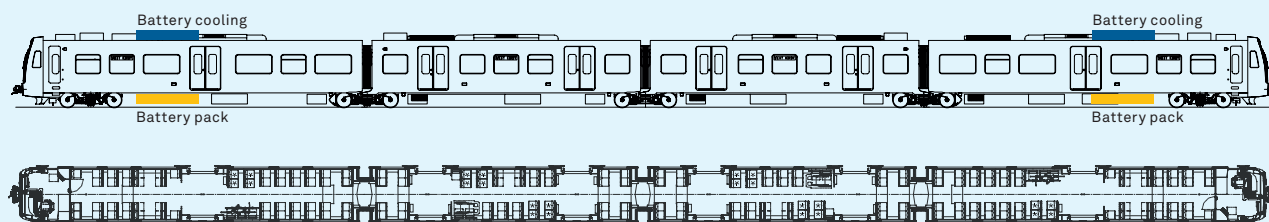
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## Technical features

### Technology

- Lightweight carriage body made of extruded aluminium profiles
- Electrical front door combined with a sliding step for front evacuation and detrainment between two units (patented solution)
- Newly developed Jacobs motor and trailer bogies with internal bogie frames and pneumatic suspension
- Plug sliding doors and automatic sliding steps
- Prepared for later retrofit of ERTMS equipment
- Meeting highest fire protection requirements EN45545 Level HL3
- Powerful traction battery equipment allowing to serve non-electrified networks and decarbonise the public transportation

### Comfort

- Bright, passenger-friendly interior with an iconic design
- Wide entrance doorways for rapid passenger flow
- Level access at all entrances
- Spacious multifunction areas and wheelchair spaces
- Advanced passenger information system, CCTV and TCIS (Train Connectivity and Information System)
- Powerful HVAC system
- Transition between electrified and non-electrified networks without interruption, reducing travel times
- No exhaust gases and noise pollution

### Personnel

- Spacious cab with enhanced driver sight lines
- Ergonomically designed driver's desk
- Automated cab side doors for comfortable access

### Reliability / Availability / Maintainability / Safety

- Redundant drive equipment with maintenance-friendly air-cooled
- IGBT power converters
- Remote vehicle diagnostics to support condition-based maintenance

## Vehicle data

<b>Owner</b>	Merseytravel
<b>Operator</b>	Merseyrail
<b>Area served</b>	Liverpool, UK
<b>Track gauge</b>	1,435 mm
<b>Axle load</b>	16.9 t (full load)
<b>Supply voltage</b>	750 V DC
<b>Axle arrangement</b>	2'(Bo)'(Bo)'(Bo)'2'
<b>Seat capacity</b>	184
<b>Standing capacity (4 pers./m2)</b>	302
<b>Starting tractive effort</b>	162 kN
<b>Starting acceleration</b>	1.1 m/s <sup>2</sup>
<b>Maximum speed (EMU mode)</b>	120 km/h
<b>Maximum speed (IPEMU mode)</b>	100 km/h
<b>Energy consumption (IPEMU mode)</b>	1 kWh/100 km/pass.
<b>Traction power</b>	6x350 kW (2.1 MW)
<b>Battery technology</b>	LTO-NMC
<b>Installed battery capacity</b>	320 kWh
<b>Battery operation voltage</b>	386 V DC
<b>Battery expected lifetime</b>	min. 8 years
<b>Range in normal operation</b>	55 km
<b>Recharging time</b>	< 15 min.
<b>Floor height</b>	960 mm
<b>Entrance width</b>	1,300 mm
<b>Coupler compression load</b>	1,500 kN
<b>Unit length</b>	64,980 mm
<b>Vehicle width</b>	2,820 mm
<b>Vehicle height</b>	3,828 mm
<b>Bogie wheelbase</b>	2,400 mm
<b>Wheel diameter</b>	760 mm