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## Belkommunmash joins the low-floor tram race



The 24.8 m bi-directional tram has three sections supported on two motor bogies and a central truck. Key components have been supplied by leading European manufacturers, including brakes from Knorr-Bremse and articulations and electric ramps from Hübner.

Now on test in Minsk is a prototype low-floor tram developed by Belkommunmash in 2008, which is intended for target markets in Russia, Turkey and Western Europe. Launched at a conference organised by the manufacturer in September 2009, the Model 84300M is the result of a year-long development process, which began when the Moscow city government expressed interest in buying 20 low-floor vehicles.

According to Director-General Vladimir Korol, the project is an ambitious development, which will enable the Belorussian company to compete in the low-floor tram market. The company is currently negotiating its first order to supply 20 cars for Moscow. Under the terms of an agreement signed between Moscow and Belarus, the first tram will be delivered this month for a three-month trial before the order is confirmed.



Founded in July 1973 as a tram and trolleybus repair plant, Belkommunmash is now Belarus' leading producer of urban transport vehicles. Since 2000 it has assembled more than 100 high-floor Model 601-02 uni-directional trams, which are 15 m long. Production of the Model 743 began in 2002; this 26 m three-section six-axle car with 60% mid-level floor is designed for use on 1 524 mm gauge tracks.

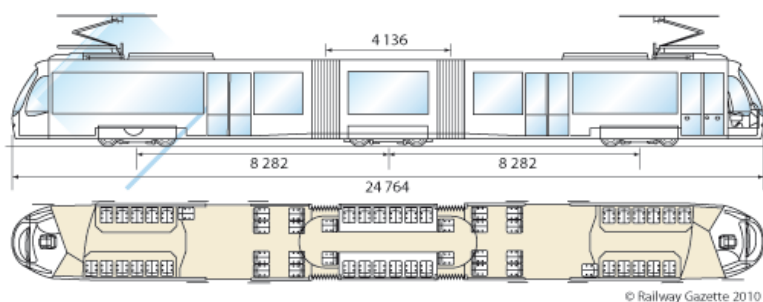
### Description

Model 84300M is another three-section tram, with an 80% low floor (Table I); it has a design life of 35 years. The vehicle includes a variety of components from western European manufacturers (Table II). For example Siemens has co-operated with Belkommunmash to design a bogie suitable for the Russian market. The vehicle is 24.8 m long and 2 650 mm wide, and can accommodate 242 passengers; it has a maximum speed of 100 km/h. The car body is built from a welded steel frame, covered with GRP panels. The interior finish, side frames and roof are GRP and aluminium. The car has a powered bogie at each end, and an unpowered fixed truck under the central section. The low-floor sections are 350 mm above rail, with steps leading up to the high-floor end sections at 600 mm over the motor bogies. Hübner articulations provide for movement in both the horizontal and vertical axes.

[www.hubner-germany.com](http://www.hubner-germany.com)    [info@hubner-germany.com](mailto:info@hubner-germany.com)

The interior provides 66 seats and space for 176 standing passengers at 8/m<sup>2</sup>. Seats in the central section are mounted on low boxes over the truck wheels either side of the low-floor gangway. The driver's cab is divided from the passenger

compartment by a screen.



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The bi-directional vehicle has three sets of two-leaf swing-plug doors on each side. The vehicle has been designed to provide easy access by the mobility impaired; the second doorway on each side is fitted with an electrically-powered ramp, supplied by Hübner, and there are two designated wheelchair spaces with the appropriate fixings.

The motor bogies each have two 105 kW asynchronous motors driving through a two-stage gearbox. The motor drives the input shaft of the reduction gearbox via a flexible diaphragm, and the output shaft drives the axle through a spherical rubber articulated coupling. Primary suspension is provided by Meggi rubber-metal elements supporting the axleboxes. Secondary suspension is achieved with coil springs and hydraulic shock absorbers. The frame of the central truck is designed to flex, helping to cushion the load on uneven track; this truck has pneumatic secondary suspension. Power is collected at 550 V DC from overhead lines via pantographs above each cab. Four independent converter-inverter sets each feed one traction motor, and provide for regenerative brake energy to be recovered and returned to the overhead line. The onboard static converter feeds equipment at 380 V 50 Hz and provides a 24 V DC supply to recharge the batteries.

The driver's cabin and the passenger compartment are fitted with heating and air-conditioning. Forced ventilation is achieved using six axial fans and four centrifugal fans mounted on the roof whilst four vents provide natural ventilation. For operation in severe winter weather, the sand boxes are heated electrically, as are the driver's wing mirrors.

Table I. Model 84300M specification

Length (m)	24.78
Width (mm)	2 650
Height (mm)	3 900
Max capacity 8/m <sup>2</sup>	242
Seats	66
Standees	176
Floor height above rail (mm)	350/600
Traction motors (kW)	4 x 105
Maximum speed (km/h)	100
Weight, empty (tonnes)	27.7
Max weight (kg)	44.4

Table II. Equipment suppliers

Hydraulic brakes	Knorr-Bremse
Bogie equipment	Siemens
Traction motors	VEM
Traction control package	Medcom
Articulations	Hübner
Wheelchair ramp	Hübner

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