KOLEJOVÉ POHONY

To optimize railway sidings.

Rail Towing Vehicles of 211 Series

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Determination

Rail towing vehicles of 211 series are driving rail vehicles designed for light and medium-heavy shunting and manipulation with railway wagons at sidings, terminals, ports when loading and unloading takes place. These tractors work with minimal demands on energy, operating materials and operating personnel. They are not a locomotive due to lower demands on the operator, which can only be a person trained with the qualification "shift manager", but legislatively meets all the conditions for operation on the tracks in conjunction with other rail vehicles.

Each towing vehicle of 211 series is driven by traction motor. The source of power for traction inverters a high-capacity traction accumulator – **A version**, or diesel-electric generator producing alternating current – **D version**.

In the standard is produced without the operator's cab equipped with the remote control only, but it is possible to supply a version with the operator's cab.

The Chassis

is designed as a complete reconstruction of the locomotive T 211, of which the main frame is used with the draw and buffer device, axle gearboxes, wheel sets, mechanical brake parts. Other parts are designed as a new installation.

The Frame

is adapted for the installation of new elements. The vehicle has two driving axle with wheel diameter 1000 m. On each axle, on double row self-aligning roller bearings, there is mounted drive axle housing. Drive axles are made directly by Cardan shafts from traction descending transmission.

Drive System

Version A 211 (Accu)

The source of electrical power is a traction accumulator supplying direct current, which is fed through the isolator, fuses, the circuit breakers on the traction inverter DC link. The traction inverter with full vector control controls the speed and torque of the traction electric motor.

In the event of a predominance of positive torque from the load, the traction motor switches to generator mode and charges the traction battery with the help of the inverter.

A lead-acid battery with a nominal voltage of 572 V and a capacity of 330 Ah serves as the source of electric current for the traction inverter. The battery is adapted for traction purposes and its four blocks are safe even in the event of an impact of another rail vehicle with a speed of v = 20 km / h. into a standing vehicle.

The semi-automatic AQUAMATIC device is used to replenish demineralized water to the individual cells of the traction accumulator. An aeration system is installed on the vehicle together with the charger to stir the electrolyte during charging. The lead traction battery is a very hard source of electricity that allows you to supply several times the rated current for a short time.

The traction battery is protected by an electronic device against the danger of deep discharge. When the lowest permissible capacity in the battery is reached, the vehicle stops and an acoustic signal is triggered. The operator is allowed to drive by vehicle to the nearest power supply point, where the process of charging the traction battery starts after connecting the cable to the mains plug.

Version D 211 (Diesel)

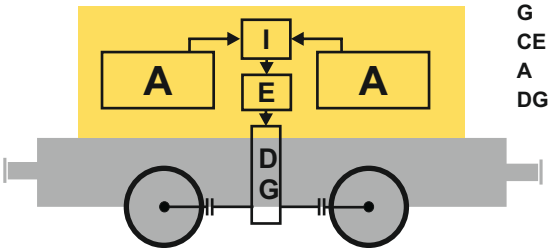
The power source is a diesel-electric unit producing alternating current. The alternating current is fed to the rectifier, which supplies the intermediate circuit and to the traction inverter which controls the speed and torque of the traction electric motor. The drive unit consists of a diesel engine connected by a flexible coupling to a synchronous generator. The actual drive consists of an asynchronous electric motor, which is equipped with external cooling.

The external cooling fan is controlled by a converter, it works on the basis of temperature data obtained from KTY semi-conductor sensors located in the stator winding of the traction electric motor.

The diesel-electric unit is adapted to the needs of the winter start and its maintenance requirements are minimized. If the vehicle does not receive a command from the operator for approx. 10 min., the diesel drive switches off automatically.

Basic Technical Data of Rail Towing Vehicles of 211 Series	
Wheel set layout / Track arrangement	B / 1435 mm
Max. width, height, length over the bumpers	2600 mm, 2600 mm, 7240 mm
Wheelbase / Dia. wheelset	2700 mm / 1000 mm
The smallest radius of travel arc	60 m
Total weight / Axle weight	24 t / 12 t
Maximum / Continuous power of the traction electric motor	77 kW / 37 kW
Power transmission	electromechanical, alternating

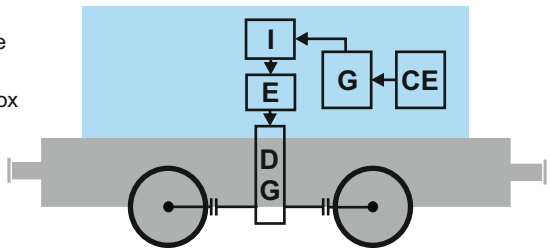
Accumulator version diagram

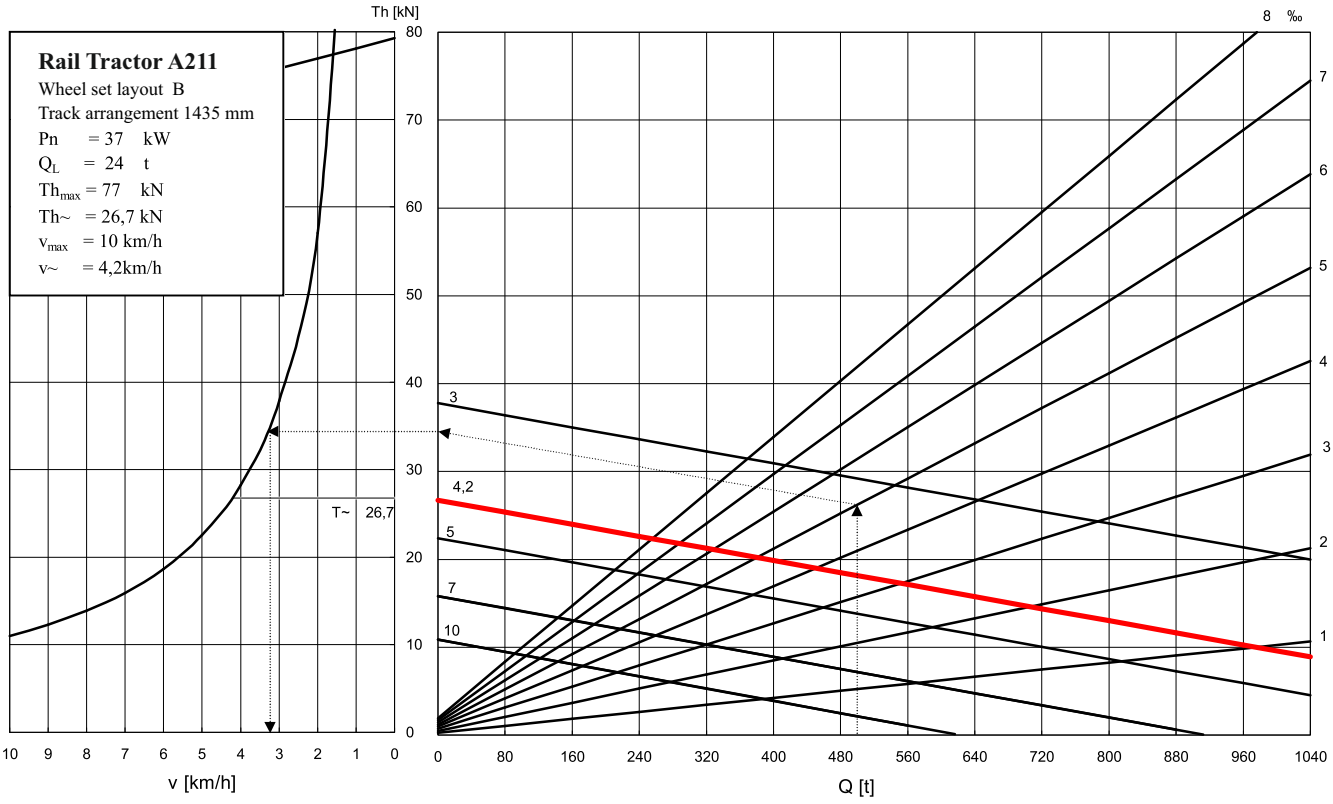


Legend:

I	Inverter
E	Electric motor
G	Generaor
CE	Combustion engine
A	Battery assembly
DG	Descending gearbox

Diesel engine version diagram





Driving

The 211 series rail tractor is remotely controlled using the HBC Radiomatic portable radio set. It can be started remotely and remotely control the tractor´s forward and reverse, accelerated travel without load and coupling the vagon with an automatic coupler.

Fairing

The fairing ensures reliable protection of the units from the weather. The hood of the vehicle is equipped on both sides with the prescribed position lighting and high beam, as well as light and acoustic signals, which is active when the tractor is moving.

The vehicle is covered with the durable PUR2 paint, which is also used to protect Czech Railways vehicles. At the customer's request, the vehicle can be covered in company colors in any design.

Electricity Consumption and Battery Charging

The electrical energy of lead-acid batteries with a nominal voltage of 600 V and a capacity of 330 Ah can be used from 80% of the capacity. When this limit is reached, the vehicle automatically shuts off to prevent the batteries from completely discharging. Before reaching this limit, it is necessary to reach the charging point with the vehicle. The maximum charging time for its batteries is 6 hours. If the discharge rate is lower, it means a shorter charging time. The life of the battery pack is around 1500 charge cycles.

Battery capacity	330 Ah
Usable battery capacity *	254 Ah
Nominal voltage	600 V
Guaranteed continuous working time at full load (800t) and speed of 5 km/h**	4,24 hour

The A211 rail tractor is able to deliver the maximum permissible load over a distance of 21 km.

* 80% capacity - 3% (own consumption of the mechanism)
** The usage time of charged batteries depends on the operating load of the mechanism

Certification and Documentation

All rail vehicles offered by our company have been certified by TÜV SÜD Czech s.r.o. since 2008.

Benefits and Advantages of 211 Series Vehicles

- favorable purchase price compared to a classic locomotive
- low operating costs, especially for the battery type, (the price of energy consumed is approx. 10 times lower than the price of diesel consumed by diesel shunting locomotives)
- low maintenance and service costs
- fast return on investment depending on operational use
- simple operation
- saving of skilled labor - the vehicle is not a locomotive and there is no need for a lovomotive driver's qualification
- significant reduction of noise and emissions, especially in the battery version

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