



# HE 4/4 ELECTRIC RACK-AND-PINION AND ADHESION LOCOMOTIVE

MRS Logística S.A., Brazil

In January 2010, MRS Logística S.A. ordered seven He 4/4 electric rack-and-pinion and adhesion locomotives from Stadler for the transport of goods. They are largely used to pull trains loaded with iron ore and agricultural products from the interior of the country to the Port of Santos on the railway line from São Paulo and Jundiaí. The line has a rack-and-pinion section of around 10 kilometres. The new locomotives will be able to pull 50 per cent more load at higher speeds than the existing locomotives. Two new locomotives in multiple unit train control can pull an 850-tonne trailing load on the 104‰ ramp (triple-lamella Abt rack). The new locomotives, designed especially for intensive use around the clock, have an output of 5 MW at 3 kV DC catenary supply voltage, and are able to recuperate braking energy. The position of the rack can be adjusted as the wheels wear down.

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# **Technical features**

## Technology

- Each bogie has two adhesion and rack-and-pinion engines
- High redundancy: each locomotive comprises two drive units powered independently of each other
- Multiple unit train control with two vehicles
- Robust and high-strength steel underframe, designed for 5000 kN longitudinal force
- Standard AAR couplers and adhesion brake system
- Rack rail: Abt, three lamellae of 60 mm width each
- Maximum gradient: 104‰
- Gauge: 1600 mm

#### Personnel

- Air-conditioned driver's cab
- The locomotive is always on the downhill side, as the carriages have no rack brake. The driver's seat is therefore positioned at right angles to the direction of travel, and is turned around by the driver depending on the direction of travel

### Reliability / Availability / Maintainability / Safety

 Power supply via an external diesel generator group is possible on the uphill side, enabling track maintenance to be mechanised and carried out independently of contact wires

## Vehicle data

Customer	MRS Logística S.A., Brazil
Serviced line	Paranapiacaba-Raiz da Serra
Gauge	1600 mm
Туре	He 4/4
Catenary supply voltage	3000 VDC
Axle arrangement	Bozz' Bozz'
Number of vehicles	7
Commissioning	2012-2013
Length over coupling	18720 mm
Vehicle width	3280 mm
Vehicle height	4600 mm
Bogie wheelbase	5000 mm
Wheel diameter (new)	1069 mm
Output at wheel	5000 kW
Starting tractive effort	760 kN
Speed	
Uphill	30 km/h
Downhill	25 km/h