The E40 has been designed by Siemens for heavy duty freight service. The mechanical design of carbody and bogies is new. Its electrical traction system is based on standard components and the proven design of Queensland Rail's 63 Class 3700 locomotives where three refurbished units replace now five older Class 3100 / 3200 units on a 13,500 tonne coal train and provide significant advantages to the customer. The first application for these new units will be as Class 3800 locomotive on Queensland Rail's electrified line in the Goonyella system in Northern Queensland, Australia.

The vehicles are manufactured and tested at Siemens Munich plant in Germany.

In March 2006 Queensland Rail awarded a contract for the supply of 20 new Class 3800 narrow gauge electric locomotives with three phase AC propulsion traction technology. In August 2007, Queensland Rail increased the number of units ordered to 45.

Technical data	
Wheel arrangement	Bo'Bo'Bo'
Track gauge	1,065 mm / 1,067 mm
Weight	132 t
Length over couplers	20,400 mm
Width (incl. handrails)	2,894 mm (3,103 incl. mirrors)
Height (without pantograph)	3,890 mm
Distance between bogie centers	6,600 mm
Wheel diameter (new / worn)	1,092 mm / 1,012 mm
Maximum speed	80 km/h
Catenary voltage & frequency	25kV / 50 Hz
Rated Power	4,000 kW
Starting tractive effort	525 kN (μ = 0.4)
Continuous tractive effort	450 kN
Electrical braking effort	450 kN
Minimum curve radius	80 m

Class 3800 Narrow Gauge Electric Locomotives for Queensland Rail

for Heavy Haul Applications (Coal Service)

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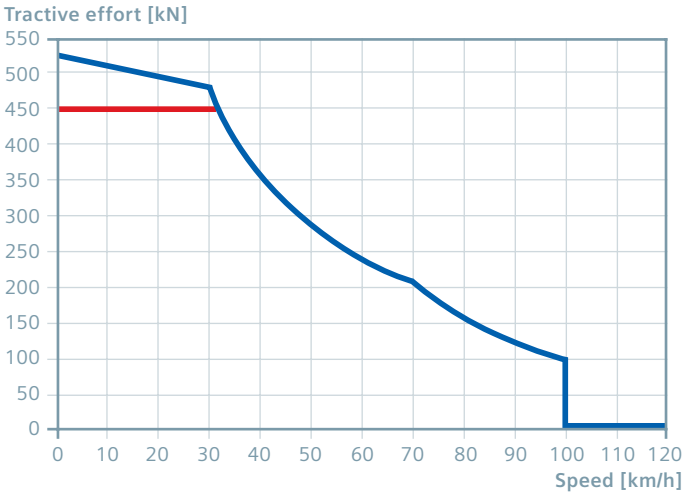
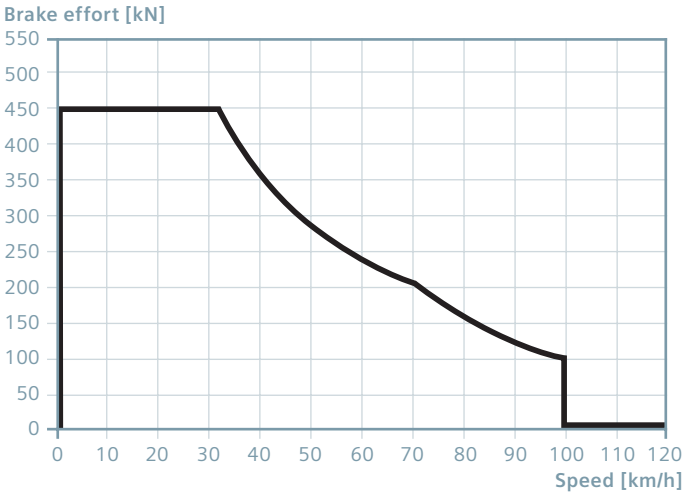


25 kV Heavy Haul Loco – Cape Gauge – Bo'Bo'Bo'



25 kV Heavy Haul Loco – Cape Gauge – Bo'Bo'Bo'

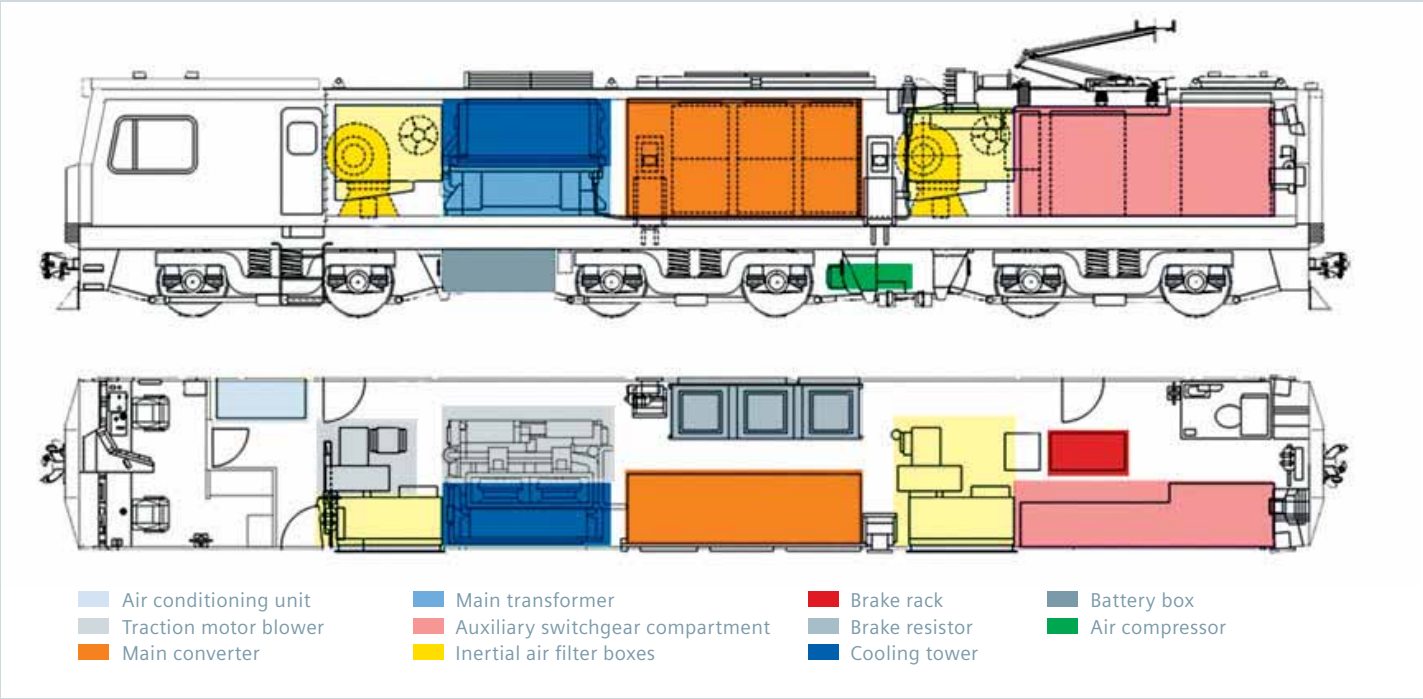
The locomotive is a wide body design, suited for the narrow gauge systems in Australia (Queensland) and southern Africa. The carbody is designed to allow tensile and compression forces up to 4 MN (buff load = 4,5 MN). It is equipped with an AAR F-type coupler, anti climber and provides enhanced cab protection for the safety of the crews. The locomotive is equipped with a Wabtec AAR type 26L Brake System, a Wireless Remote Control Distributed Power System and Electronically Controlled Pneumatic Brake System (ECP).

The engine room layout is similar to the Class 3700 locomotive and the majority of the electrical components are identical. This provides the customer with the benefits of a proven design such as interchange ability and ease of maintenance as well as reduced effort for spare parts management and stocking. To further enhance reliability, all wire, cable and piping is routed and protected within the locomotive carbody.

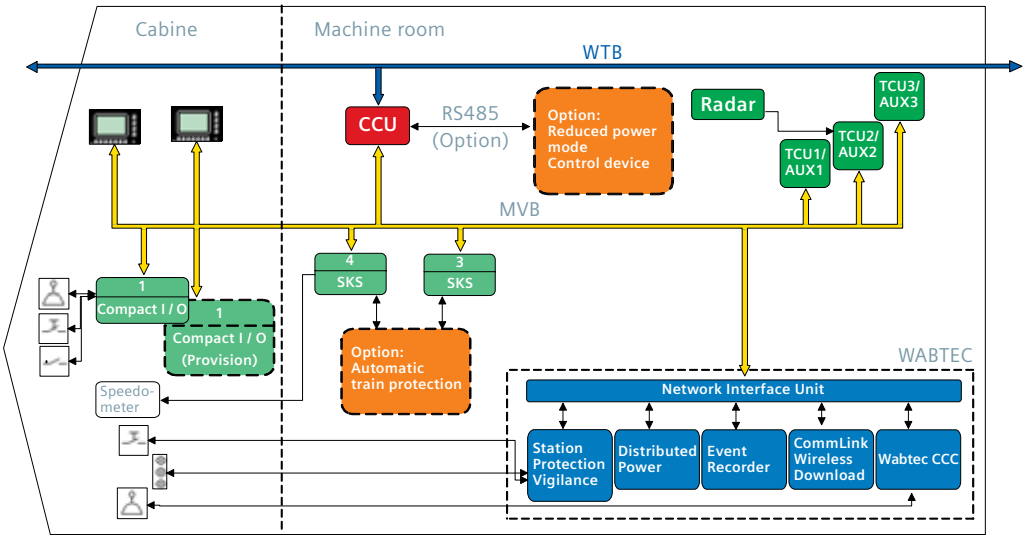
With a maximum continuous tractive effort of 450 kN, up to 32 km/h, the Class 3800 locomotive is the highest powered narrow gauge electric locomotive in the world.

The electric brake system of the Class 3800 can feedback train brake power into the catenary system or, on unavailability of the overhead line, dissipate the brake energy via the three brake resistor stacks of the locomotive.

Energy feedback into the catenary system can sum up to 10–15% energy savings per year and thus help significantly reduce CO_2 emissions.



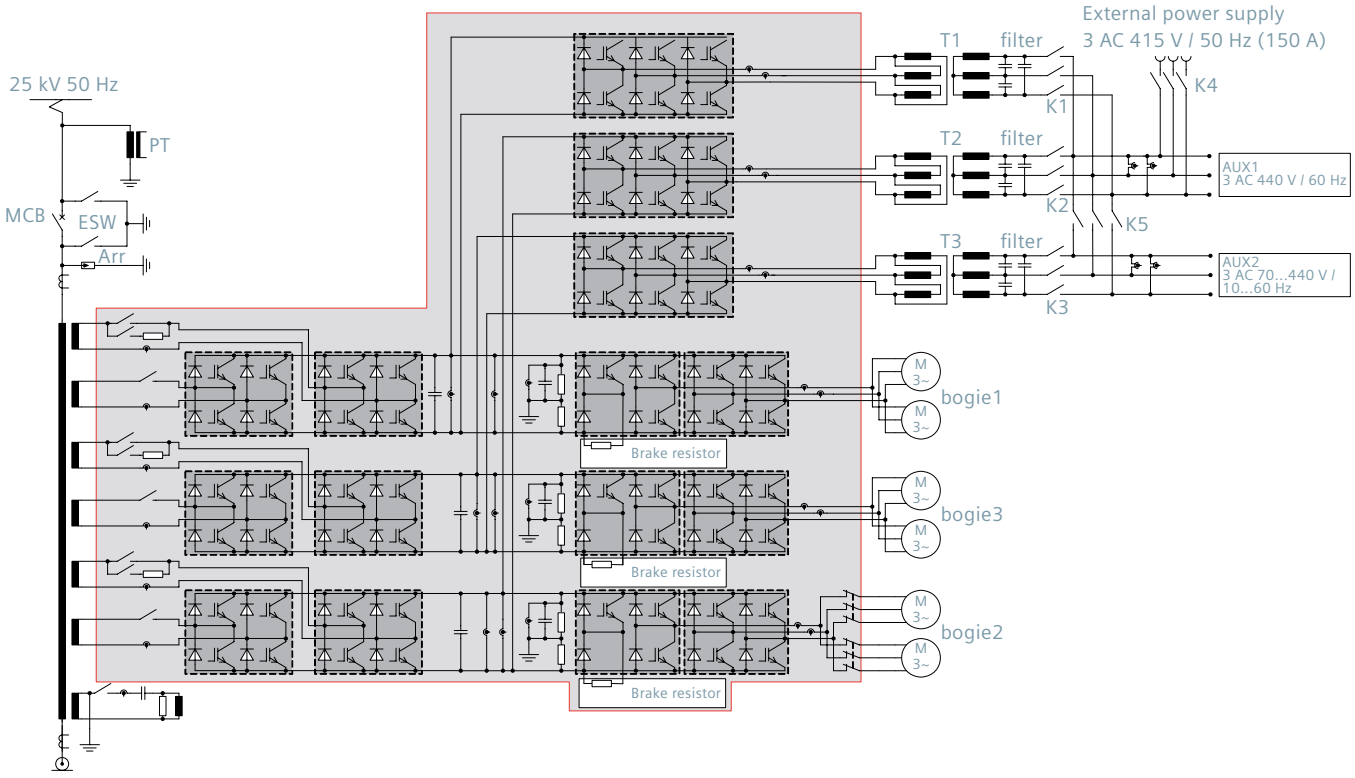
Locomotive layout



Locomotive Control System Diagram

The traction control system consists of six input- and three output-, water cooled IGBT inverters, where two input inverters feed one DC link. Each of the three output inverters is connected to the two AC traction motors of one bogie. Additionally, each DC link supplies one auxiliary inverter, meaning two out of three are required to ensure normal operation. To enable rheostatic braking, three of the Brake choppers are installed to divert the train brake energy onto the three brake resistors of the locomotive.

Traction and locomotive control is performed by the proven Sibas® 32 control system. The core of the control system is the Multi-Vehicle-Bus (MVB), interfacing with the subsystem control computers, all the I / O stations as well as the Man-Machine-Interfaces such as drivers desk controls and displays. Locomotive units connected in multiple unit interface via a Wired Train Bus (WTB), whilst further units in the train consist are connected via Wabtec's Radio Frequency controlled Distributed Power (DP) system.



Locomotive Main Circuit Diagram

The driver's desk layout was designed in close cooperation with the Queensland Rail Drivers Cab Committee. The right side arrangement shown is customer specific and variable to a certain extent. A small kitchinette at the back of the cab contains a fridge, hotplate, sink and a microwave for the drivers' convenience. Additional equipment, such as a CD player can be installed in the cab.

The bogie is completely new developed. The frame is a welded structure which integrates all connecting points for the traction arrangement, drive units and bogie brake equipment. Bogie frames of center- and end bogies are interchangeable. Bogie brake equipment consists of one tread brake unit per wheel. Park brakes are installed on the center bogie.

The drive unit consists of an axle hung, frameless asynchronous AC traction motor and gear unit. Based on the successful and proven design for the Class 4000 locomotive, this motor provides high torque and power within the restricted space of a narrow gauge bogie.

Driver's Desk

Locomotive Bogie

Locomotive Drive

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