

Diesel Electric Locomotive 2700 HP – Modernised



The Diesel electric 2700 HP modernized locomotive, brings back first of all, the innovative technology tested on Carpathia 2300 DE-M locomotive.

In order to achieve this project we used the platform of a 2100 HP old locomotive, brought into the workshop from operation for repair works.

In its modernization we used a more powerful diesel engine, from the range of products of the German producer MTU, so we succeeded to create a high performance and balanced product, built exactly according to the requirements of the client.

TECHNICAL DATA

Wheel arrangement	Co'Co'
Maximum power output	2700 HP
Top speed	100 km/h
Fully loaded weight	115 t
Maximum axle load	19 t
Starting tractive effort	350 kN
Wheel radius	1100 mm
Wheelbase (between bogie pivots)	9000 mm
Length	17000 mm
Width	3000 mm
Height (measured from the rail top)	4475 mm
Minimum curve radius	275 m - line service

Design concept

Drive concept

The voltage from the main generator is rectified by a three-phase rectifier and applied to a convertor which in turn feeds independently each traction motor using six PWM traction inverters. Two choppers deal with the rheostatic braking. This equipment is assembled into two identical and independent groups supply the driving trains. Each group consists of an chopper for braking and three traction motors which drive the wheels of each bogie. If a fault is signaled by one of the six sensors installed in each traction motor or by a protection device inside the power semiconductor inverters, the locomotive can continue it's service at a traction rating proportional with the faulty sections that can be independently isolated.

For feeding the auxiliary services, an IGBT static coverter is used. This converter consists of an chopper for the braking circuit and four inverters for the asynchronous motors of the compressor, forced ventilation motors for the traction motors and rheostatic braking blocks.

Control concept

A command, protection, diagnose and signaling computer collects various data types and continuously monitors the regimes in wich the locomotive is operating. This computer is built-up in a modular design and keeps track of 160 digital signals, 60 analog signals, and commands 64 power outputs.

Also, a traction-braking computer controls and monitors the six traction inverters of the six traction motors. Using the built-in braking choppers energy is recovered. Advanced software algorithms implemented in this computer prevents wheel slip and ensures the optimum system operation.

Mechanical concept

The Diesel electric 2700 HP modernized locomotive is a box-frame locomotive with crew cabs at the ends. The machinery room is split into three distinct compartments, electric, diesel engine, pneumatic and hydraulic. For easy installation of equipment or maintainance, the top of the machinery room is open. Roof sections can be removed for this purpose.

Diesel engine



MTU - 16V4000R43R

UIC nominal power rating	2000 bkW
Rated speed	1800 rpm
Idle speed	600 rpm
Engine torque	9019 Nm
No load, idle fuel consumption	5,7 kg/h
Engine arrangement	V16
Engine displacement	76,3 liters
Bore / stroke	170 /210 mm
Emissions regulation	Stage III A

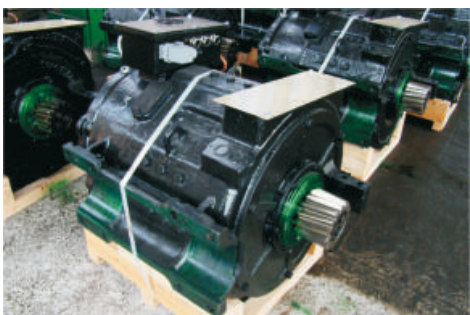
Generator



GFP 560 M8

Power rating	2000 kVA
Rated speed	1800 rpm
Voltage	1400 V
Frequency	120 Hz
Current	825 A
Efficiency	0,95
Protection class	IP 21
Operating class	S1
Isolation class	H (VPI)

Traction motors



GDTM 533 F

Power rating	475 kVA
Rated speed	2380 rpm
Voltage	1400 V
Frequency	48 Hz
Current	238 A
Efficiency	0,947
Protection class	IP 21
Operating class	S1
Isolation class	H (VPI)

Compressor



Almig TrackAir TA22E

Type of compressor	screw
Air flow	2770 l/min
Pressure rating	10 Bar
Driving motor power	22 kW
Driving motor type	async
Driving motor rated speed	3000 rpm
Other installed features	air dryer
	cooling fan
	oil heater

Command block



Command, protection, diagnose

- Measures fuel levels in main fuel tank
- Measures in kilograms fuel consumption rates
- Measures fuel temperature
- Measures engine RPM
- Manages data using the cab HMI's
- Stores and tracks the state of all system inputs
- Send data to the speed measuring devices
- Stores non-authorized system entry's
- Vocal and grafic signalig of system status

Inverter block



Traction-braking inverters

- Uses DSP micro-controller tehnology
- Independent invertes, one for each traction motor
- Long life-expectancy (no moving parts)
- Constant power or constant torque regimes
- Energy recovery using built in choppers
- Dynamic software controlled traction motor outputs
- Software wheel-slip prevention algorithms
- Modular design, with separate funcion blocks
- Built-in communication modules

Cab equipment



Improved crew conditions

- Air cooling unit
- Joystick-type train commands
- HMI display with touchscreen
- Ergonomic seats
- High power cabin heating units
- Adjustable heated rear-view mirrors
- Controls for shunting operation