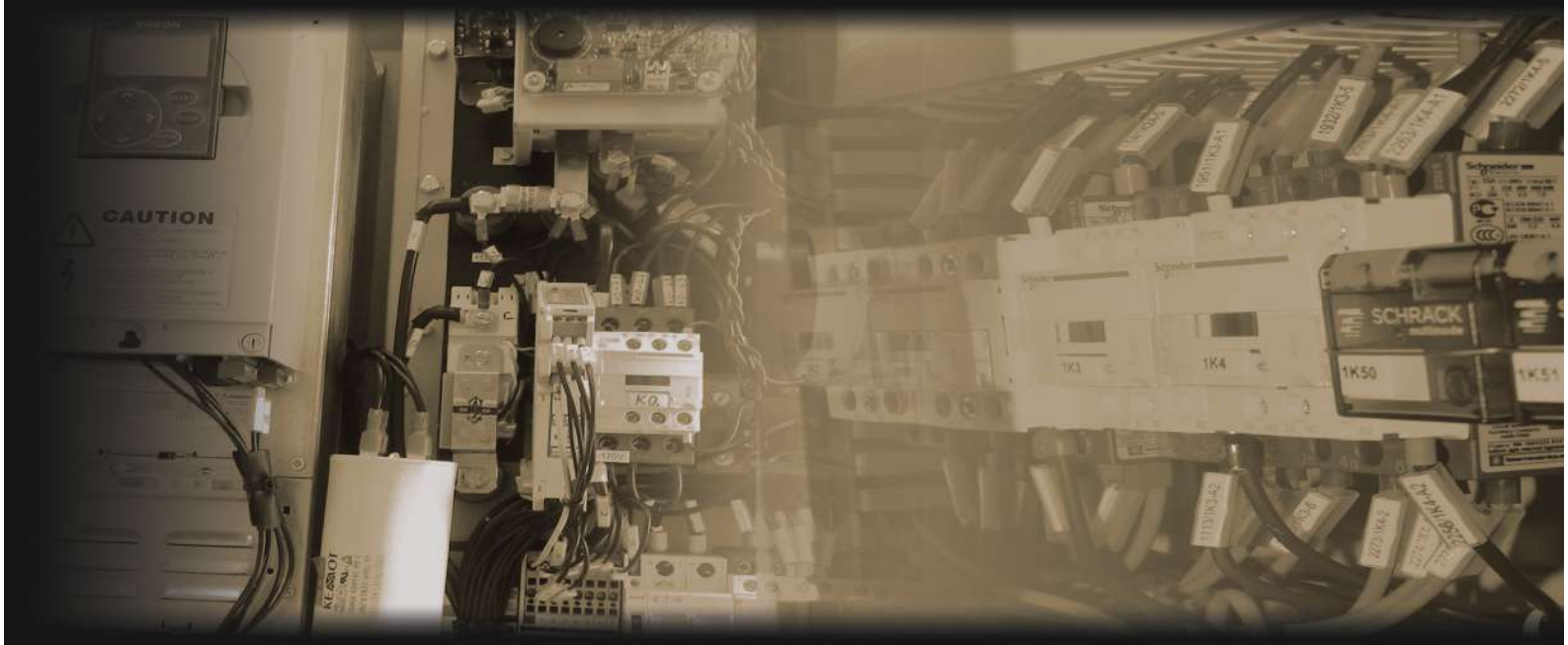
PRODUCTS AND SERVICES

INNOVATIVE SYSTEMS FOR ROLLING STOCK



AUTOMATIZATION
SOFTWARE DEVELOPMENT
ELECTRIC & ELECTRONIC SYSTEMS
INDUSTRIAL DESIGN & MANUFACTURE
TEST AND OPTIMIZATION

TEHMIN®
BRAŞOV

ABOUT US:

* "TEHMIN-BRASOV" company was founded in 2002. After than, wishing to apply a lot of innovative ideas in railway rolling stock field, the company knew a permanent development in the productivity and engineering endowment.

* Since 2002, we have been developing and delivering innovative technical solution for train manufacturers and operators. Our product development is supported by dedicated electronics and automation laboratories and a strong team of software engineers.

* Our company has close cooperation with international partners EKE-Electronics (Finland) and Selectron Systems AG (Finland) and with "Transilvania" University of Brasov (Romania).

* We are involved in designing and delivering specific solutions for coach electric systems, train management systems, train data networks, and passenger information systems for both new and refurbished railway rolling stock projects. We are also engineering custom built heating and battery loading/management systems.

* In manufacturing area, the company own now the latest generation equipments like the modern CNC punching and bending machine, electronic laboratory at last standards, painting in electrostatic field etc., in order to obtain products at highest level of quality with the capability to satisfy the actual requirements of the market.

* All our products are very new and have an own conception and design; some of them are being protected through the Romanian Law No.64/1991 following the obtained patents from OSIM-National Authority for invention.
  A special characteristic of our company products is that they reduced energy and fuel consumption during exploatation of motorized railways rolling stock.
  These products are replayed in a very short period of time, getting substantial amount of savings for transporters and also for beneficiary from another fields of activity.

* At this time the company has more than 60 types of products and equipments in manufacture.

* Beginning with 2004 we introduced the Quality Management System ISO 9001 as a real and intensive fight for quality.
  This system was completely introduced and was issued by TUV Certificate.
  The company is attested by AFER- Bucharest – Romanian Railway Authority as a railway deliverer and all the products are validated consequently.

* At this time, almost every Romanian train or locomotive has one of our product on board and keeping our reputation by delivering high quality solutions tailored to our customers needs, it is high importance for us.

TEHMIN®
BRAŞOV

INNOVATIVE SYSTEMS FOR ROLLING STOCK

WHAT WE DO:

AUTOMATIZATION, ELECTRIC AND ELECTRONIC SYSTEMS,
DESIGN AND MANUFACTURE:

- ROLLING STOCK MONITORING SYSTEMS
- NEW SOLUTIONS FOR INCREASING THE EFFICIENCY OF DIESEL LOCOMOTIVES
- PASSENGER INFORMATION SYSTEMS (PIS)
- TRAIN COMMUNICATION AND MANAGEMENT SYSTEMS (TCMS)
- COOLANT HEATING ELECTRICAL SYSTEMS FOR DIESEL ENGINE
- AIR HEATING ELECTRICAL SYSTEMS FOR COACHES, RAILCARS AND DRIVING CABS
- AIR HEATING THERMAL SYSTEMS FOR RAILCARS AND DRIVING CABS
- ACCUMULATORS BATTERY CHARGING SYSTEMS
- ELECTRICAL SYSTEMS AND EQUIPMENT FOR THE DRIVER'S DESKS
- SHEET METAL CASES FOR VARIOUS APPLICATIONS
- COMPLEX STANDS FOR PRODUCT TESTING

TECHNICAL ASSISTANCE AND TRAINING

SOFTWARE & HARDWARE DEVELOPMENT

UPDATING AND UPGRADING OF EQUIPMENT

REPAIR AND MAINTENANCE

OPTIMIZATION

TESTS AND MEASUREMENTS

ON CUSTOMERS REQUEST, WE CAN DESIGN AND DELIVER

SYSTEMS FOR OTHER TYPES OF VEHICLES

OUR PARTNERS:

Schneider Electric Selectron EKE ELECTRONICS smarter trains

CONTROL AND AUTOMATION SYSTEMS FOR LOCOMOTIVES

INTEGRATED SOLUTIONS FOR LOCOMOTIVES:

STATIC CONVERTERS	PREHEATING SYSTEMS FOR DIESEL ENGINES	AUTOMATION MODULES
COOLING SYSTEMS	DRIVER DESKS	ELECTRICAL ENCLOSURES	GPS/GSM MODULES

TEHMIN® BRAŞOV

DIESEL ELECTRIC
2100 HP

DIESEL HYDRAULICS
1250 HP, 700 HP, 450 HP

AUXILIARY DIESEL ENGINES | HEATING SYSTEMS FOR DRIVING CABS | PROTECTION MODULES

EFFICIENCY IMPROVEMENT SYSTEMS | TCMS (TRAIN CONTROL MANAGEMENT SYSTEMS) | SOFTWARE

TEHMIN® BRAŞOV

BY CUSTOMERS REQUEST, WE CAN DESIGN AND DELIVER SYSTEMS FOR OTHER TYPES OF VEHICLES

MULTIPLE CONTROL AND DIAGNOSE SYSTEM FOR RAILCARS

TCMS - A900 type railcars

The system was designed and manufactured for Class 900 railcars which was modernised by S.C. MARUB S.A. Braşov and S.C. PETROUTILAJ S.A. Câmpina.

The on-board equipment ensures:

- starting, stopping and speed control of Diesel engine;
- control of direction travel reverser, sanders, automatic gear box and lighting;
- data exchange between the Diesel engine and automatic gear box's electronic control unit using a CAN J1939 network;
- multiple controls from a single driver's cab for up to three railcars.

The train bus has a CANopen network, while the train bus is also using a CAN based network – CAN Powerline. In order to control the railcars direction's reversing, speed information is obtained from railcar(s) speedometer using a RS485 network. The driver can monitor the parameters of railcar(s) using a 5.7", VGA LCD displayfrom the driber's desk. The automated system has been integrated by redesigning the whole railcar electrical installation, the main electrical cabinet and the driver desks.

Our company has designed and built for Class 900 railcars main electrical cabinet and the driver's desk.

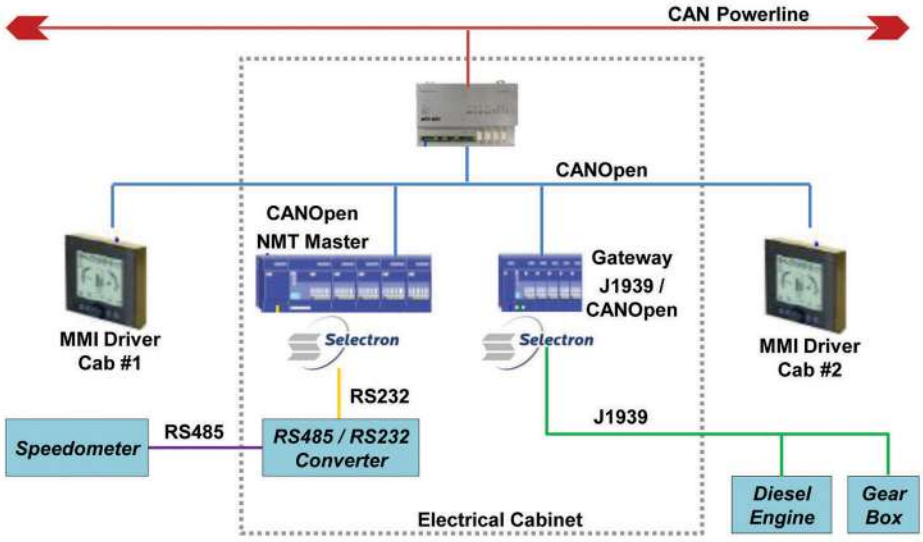
ADVANTAGES

- Easy exploitation for the personal;
- Low costs with maintenance;
- On-board diagnosis;
- High availability in operation.

TEHNICAL DATA

Supply voltage:	(16.8÷32) VDC
Dimensions (LxWxD):	(1270 x 710 x 262) mm
Temperature range(operational):	(-25..+55) °C
Data networks:	CANopen, J1939, CAN-Powerline, RS232

TCMS for Class 900 and 700 Diesel railcars



MULTIPLE CONTROL AND DIAGNOSE SYSTEM FOR RAILCARS

TCMS for Class 700 and Class 1000 Diesel railcars



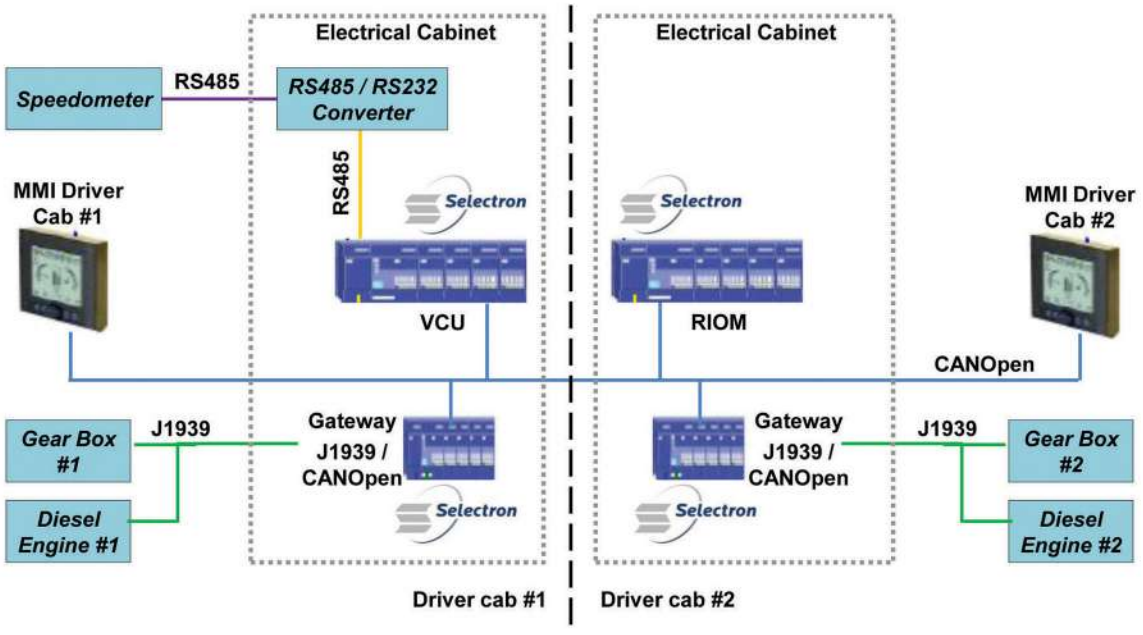
The system was designed and manufactured for Class 700 and Class 1000 Diesel railcars which was modernised by S.C. MARUB S.A. Braşov and S.C. RELOC S.A. Craiova.

TCMS for Class LVT Diesel railcars



The system was designed and manufactured for Class LVT Diesel railcars which was modernised by S.C. MARUB S.A. Braşov and S.C. REMARUL 16 FEBRUARIE S.A. Cluj-Napoca.

TCMS for Class 1000 Diesel railcars



TRAIN CONTROL MANAGEMENT SYSTEMS (TCMS) FOR PASSENGERS CARS

TCMS for passenger cars Class ADH

source: Astra Vagoane Arad

The system equip 1st class passenger salon cars built by S.C. ASTRA VAGOANE DE CĂLĂTORI S.A. ARAD.

- The train control and management system (TCMS) is based on a CANopen vehicle bus and a WTB train bus (UIC556). The system controls doors and lighting, provides protection against battery's deep discharging, collects different analogues signals (battery voltage, battery charging/discharging current, three-phase supplying system, etc.) and supervises the Passenger Information System (PIS).
- Controls the internal and external displays, audio messages and train's position (GPS). The system collects data from different subsystems (HVAC, toilets, doors, etc.).
- Diagnose data collected with our TCMS are stored in order to be sent to a ground station via WLAN.
- WLAN is used to configure PIS while the passenger cars are in a shed.
- GPRS/3G system is used to inform a ground station about critical failures (A and A1 level of priority, according to UIC557) that have occurred on-board.
- The PIS could be updated (delays, train connections, etc.) from a ground station. The system is integrated by redesigning of the electrical installation and the main electrical cabinet.

The main electrical cabinet is delivered by
S.C. TEHMIN-BRAŞOV S.R.L.

ADVANTAGES

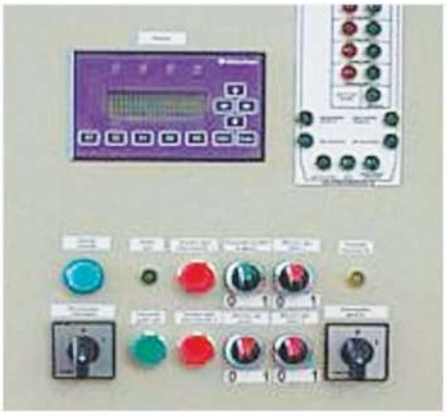
- Programmable logic controllers allows easy extension of the system;
- Easy maintenance for railway operators;
- Low costs for maintenance;
- Complies with UIC requirements;
- Just in time control of different process, optimising the consumptions and ensuring passenger's comfort.

TEHNICAL DATA

Voltage supply:	24 VDC (-30/+25) % 230/400 VAC, 50 Hz
Overall dimensions (LxWxD):	1(805 x 750 x 385) mm
Temperature range (operational):	(-25..+70) °C
Networks data:	WTB, CAN, RS485, RS232, ETHERNET
Standards:	UIC556,UIC557,EN 50155

TRAIN CONTROL MANAGEMENT SYSTEMS (TCMS) FOR PASSENGERS CARS

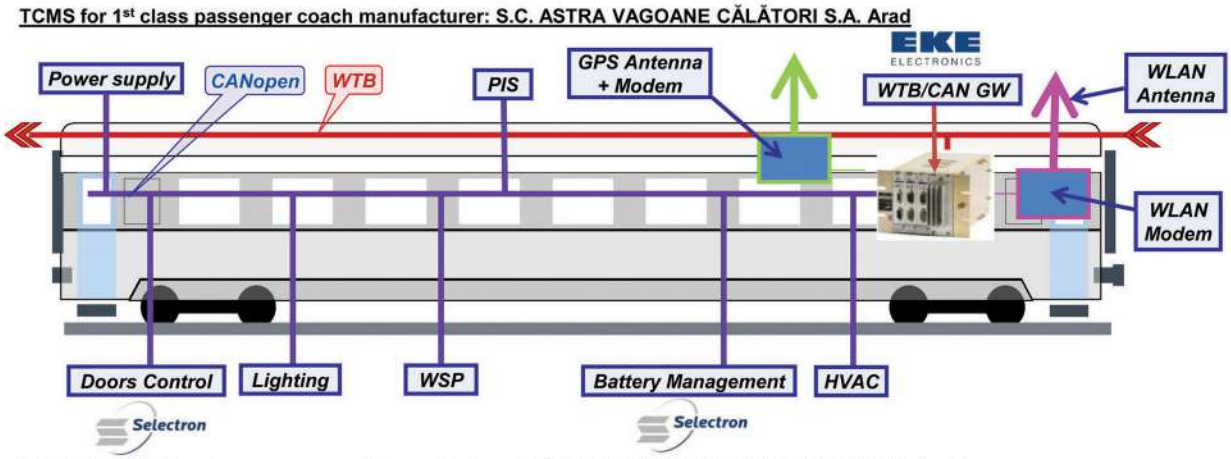
TCMS for passenger cars Class ADK



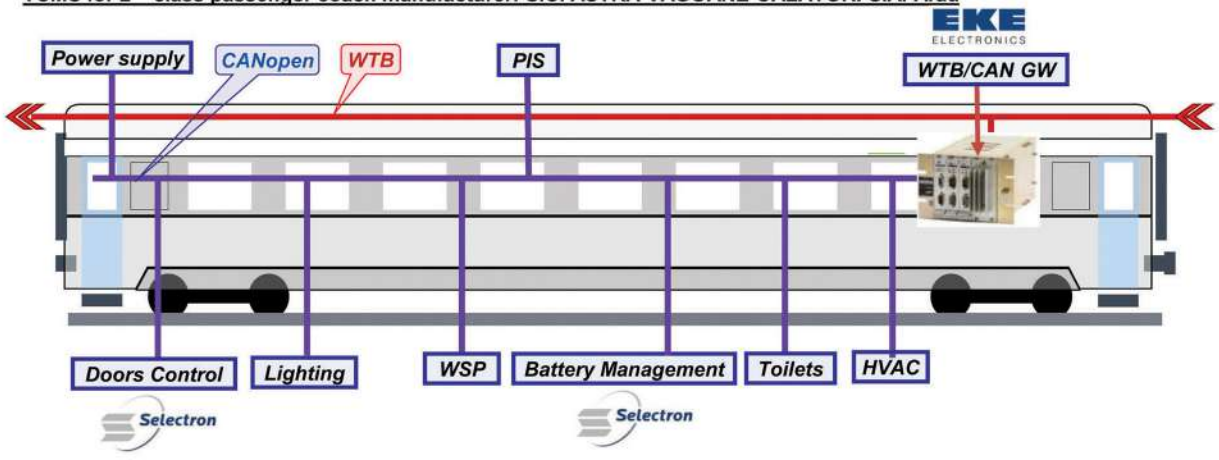
1st and 2nd class coaches, restaurant cars

We design and develop: software; TCMS; electrical & ventilation systems; other systems for several customers and applications including more than 600 equipped coaches in more than 40 types, 19 full equipped locomotives and more than 120 equipped railcars.

TCMS for 1st class passenger coach manufacturer: S.C. ASTRA VAGOANE CĂLĂTORI S.A. Arad



TCMS for 2nd class passenger coach manufacturer: S.C. ASTRA VAGOANE CĂLĂTORI S.A. Arad

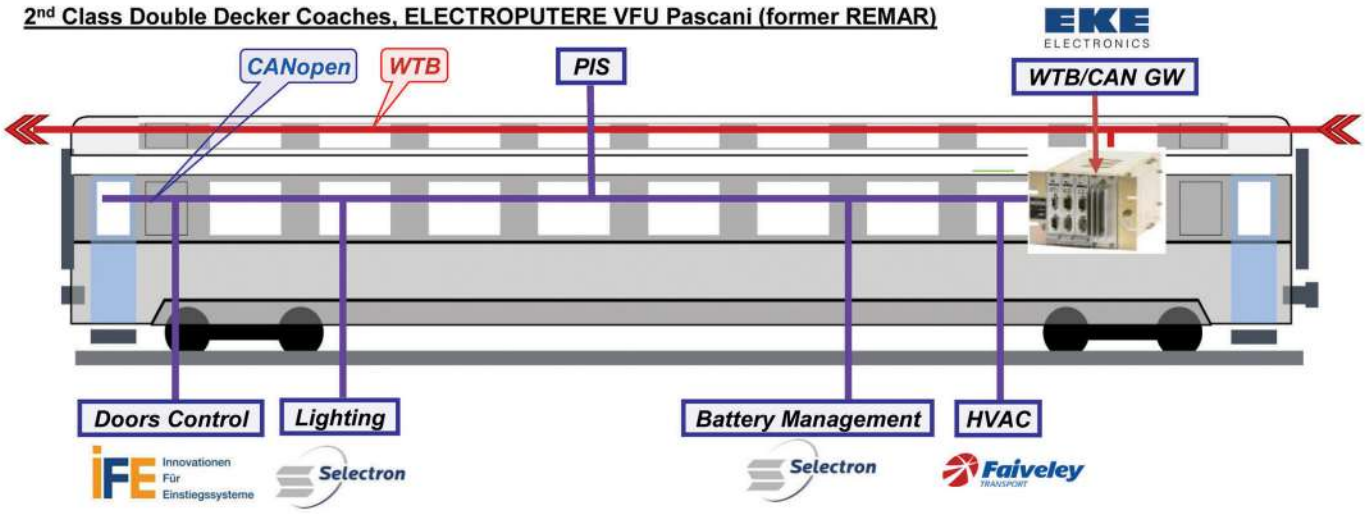


MULTIPLE CONTROL AND DIAGNOSE SYSTEM FOR PASSENGER COACHES

TCMS - 2616 type passenger coaches

TCMS for 1st class and 2nd class Double Decker passenger coaches.

We design and develop: software; TCMS; electrical & ventilation systems; other systems for several customers and applications including more than 600 equipped coaches in more than 40 types, 19 full equipped locomotives and more than 120 equipped railcars.

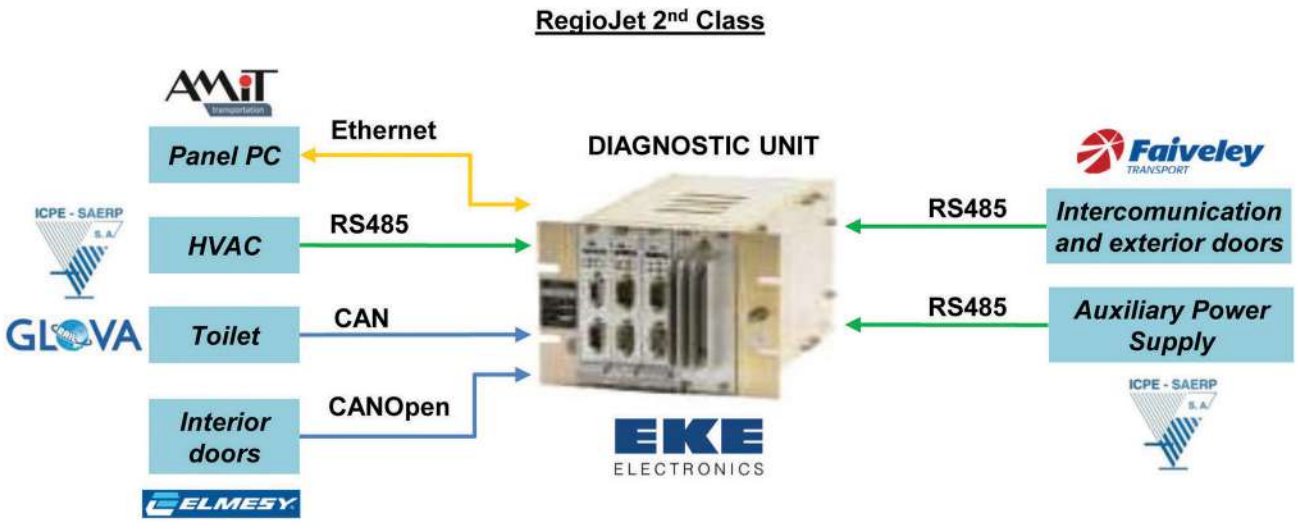


MULTIPLE CONTROL AND DIAGNOSE SYSTEM FOR PASSENGER COACHES

TCMS - REGIOJET coaches (CZECH REPUBLIC)

2nd class Passenger Coach for RegioJet

We design and develop: software; TCMS; electrical & ventilation systems; other systems for several customers and applications including more than 600 equipped coaches in more than 40 types, 19 full equipped locomotives and more than 120 equipped railcars.

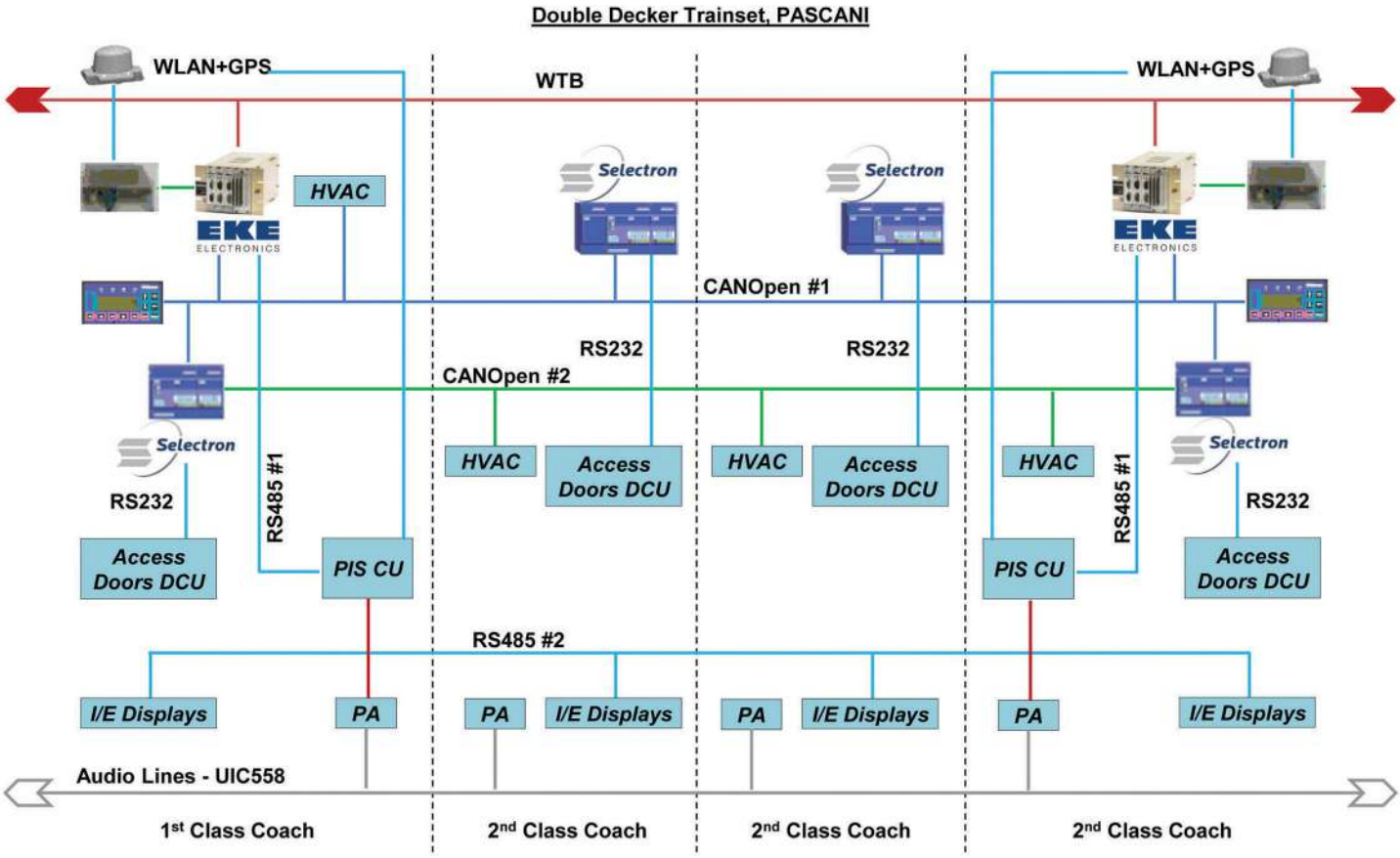


MULTIPLE CONTROL AND DIAGNOSE AUTOMATED SYSTEM FOR PASSENGER COACHES.

TCMS - 1617 double decker trainset

Double Decker Train Set, Pascani.

We design and develop: software; TCMS; electrical & ventilation systems; other systems for several customers and applications including more than 600 equipped coaches in more than 40 types, 19 full equipped locomotives and more than 120 equipped railcars.

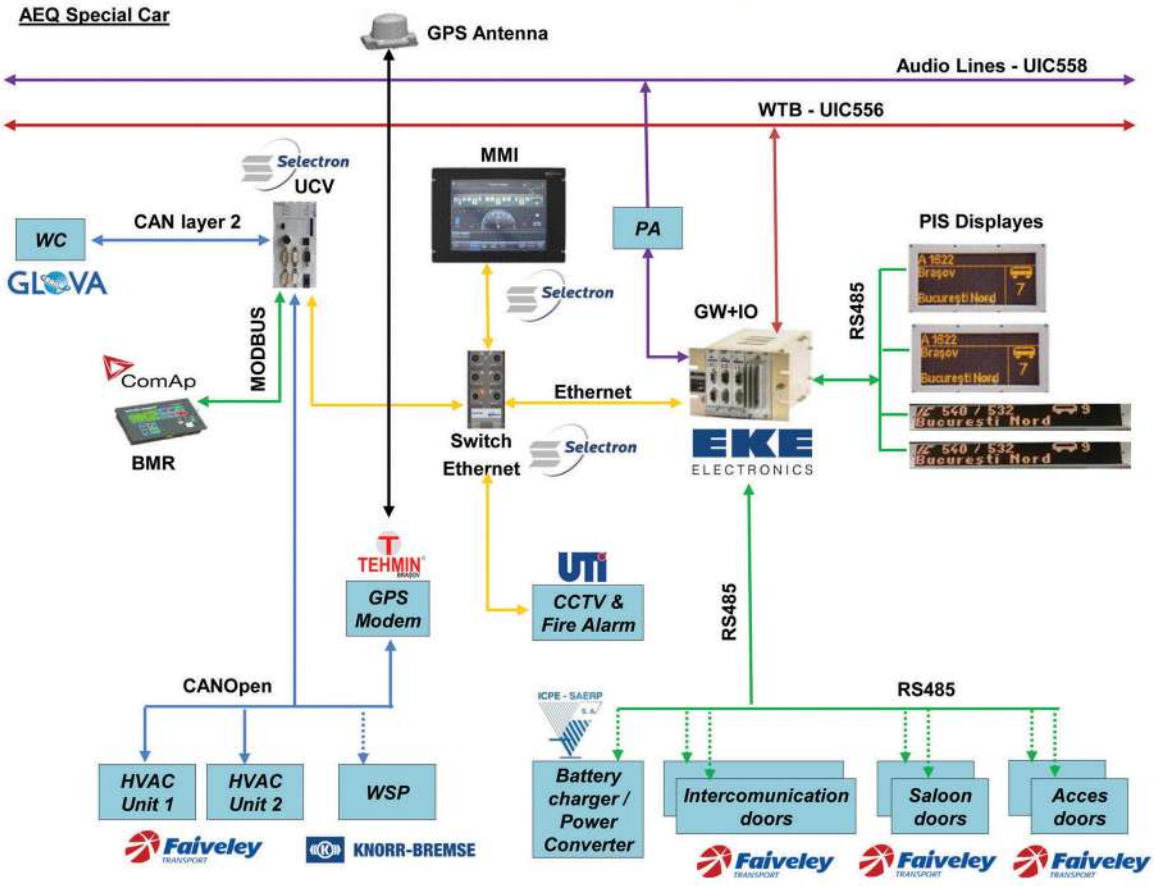


MULTIPLE CONTROL AND DIAGNOSE AUTOMATED SYSTEM FOR PASSENGER COACHES.

TCMS - AEN,AEM,AED,AER,AEZ,AES,AEQ coaches (BRAZIL)

1st class, 2nd class, restaurant, snack-bar, luggage, gen-set and special coaches for VALE company - Brazil

We design and develop: software; TCMS; electrical & ventilation systems; other systems for several customers and applications including more than 600 equipped coaches in more than 40 types, 19 full equipped locomotives and more than 120 equipped railcars.

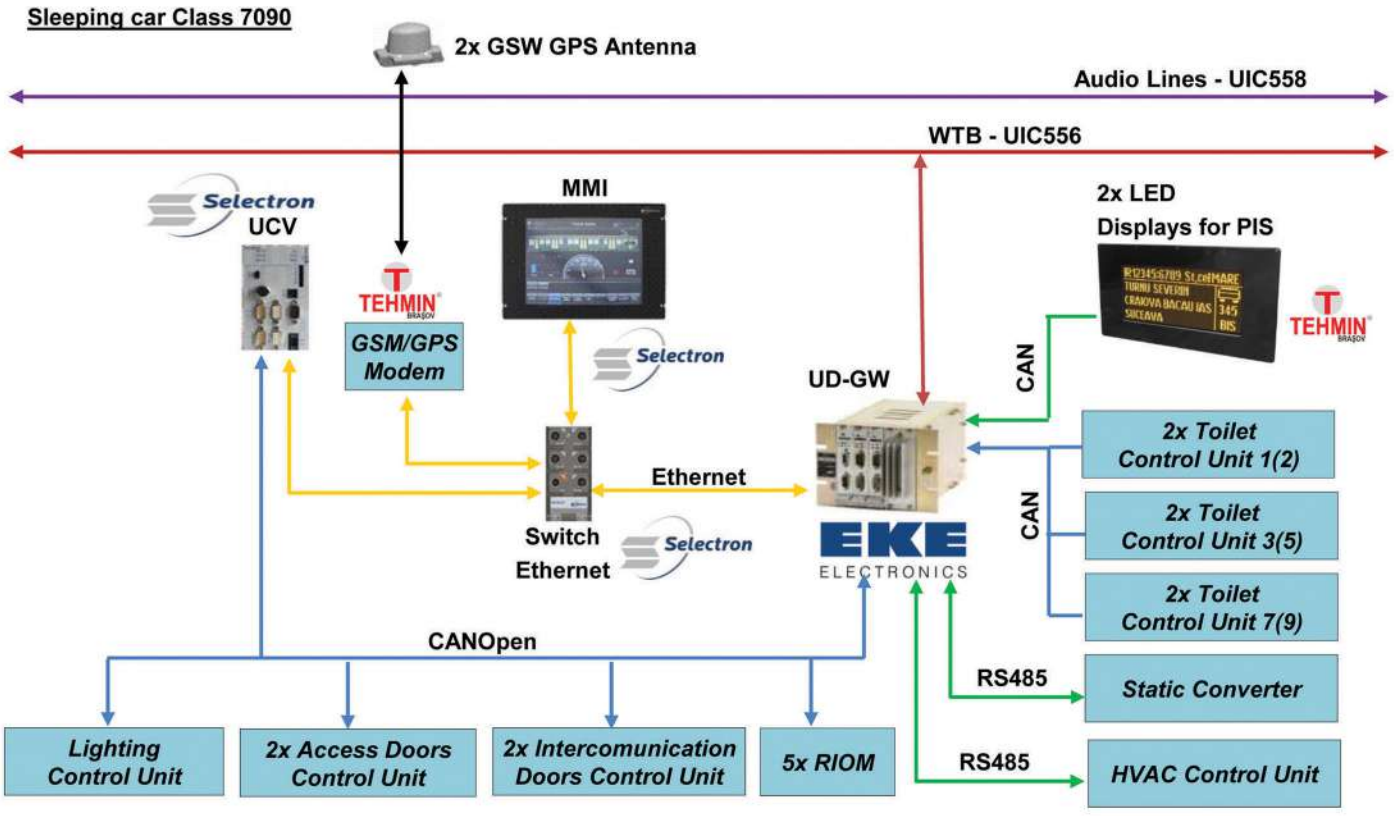


TRAIN CONTROL MANAGEMENT SYSTEMS (TCMS) FOR PASSENGER CARS

TCMS for ASTRA TRANS CARPATIC coaches

Sleeping car, couchette car, saloon coach - manufacturer: S.C. ASTRA VAGOANE CĂLĂTORI S.A. ARAD.

We design and develop: software; TCMS; electrical & ventilation systems; other systems for several customers and applications including more than 600 equipped coaches in more than 40 types, 19 full equipped locomotives and more than 120 equipped Diesel railcars.

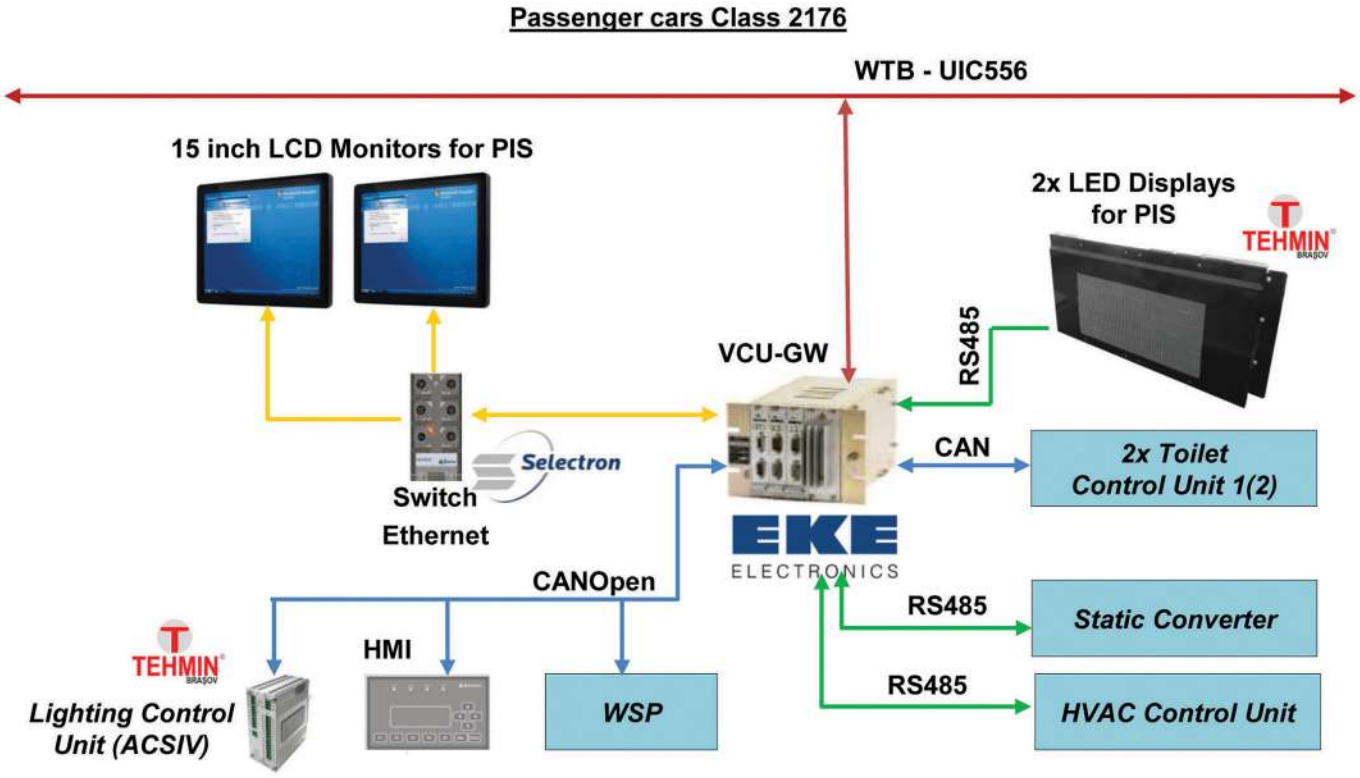


TRAIN CONTROL MANAGEMENT SYSTEMS (TCMS) FOR PASSENGER CARS

TCMS for passenger cars Class 2176

TCSM for passenger cars Class 2176 - modernised by S.C. Atelierele GFR Griviţa, Bucureşti.

We design and develop: software; TCMS; electrical & ventilation systems; other systems for several customers and applications including more than 600 equipped coaches in more than 40 types, 19 full equipped locomotives and more than 120 equipped railcars.

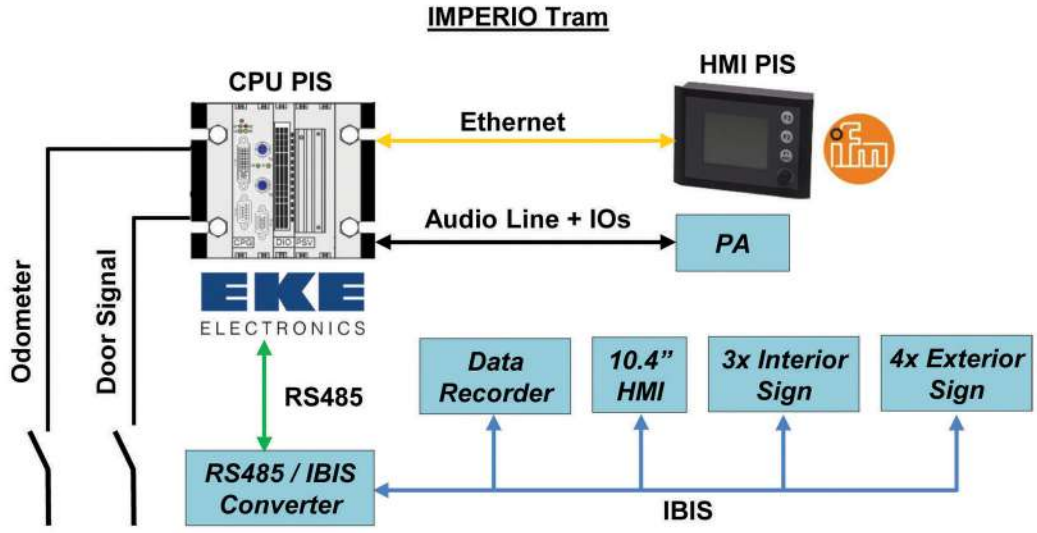


PASSENGER INFORMATION SYSTEMS (PIS) FOR TRAMS

IMPERIO TRAMS

IMPERIO TRAMS - manufacturer S.C. ASTRA VAGOANE CĂLĂTORI S.A. ARAD.

We design and develop: software; TCMS; electrical & ventilation systems; other systems for several customers and applications including more than 600 equipped coaches in more than 40 types, 19 full equipped locomotives and more than 120 equipped railcars.



TECHNICAL SYSTEM TO DECREASE THE IDLE TIME OF THE MAIN DIESEL ENGINE OF THE LOCOMOTIVE

REFERENCE - Diesel electric locomotive Class LDE 2100 HP

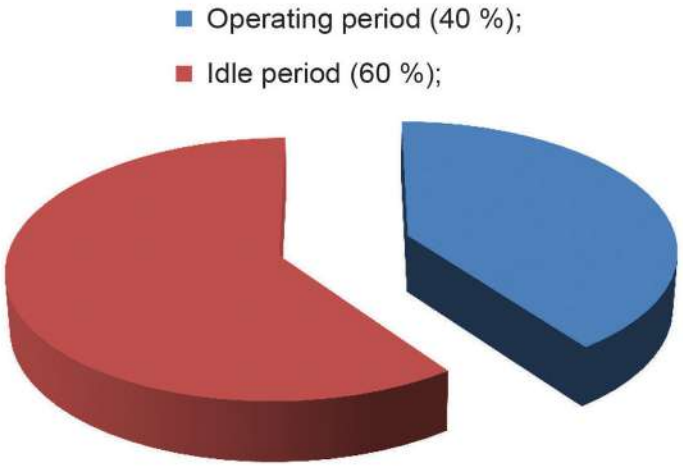
OVERVIEW

Diesel locomotive has daily two periods:

Operating period:
- Locomotive operate in the traction regime;
- Average operational period is about 40%.

Idle period:
- Train formation;
- Waiting in the station or in the shed;
- Roll down a long slope;
- Keeping warm the Diesel engine;
- Low capacity of batteries;
- Deviations from the timelable;

Average idle time is about 60% of the total operating time.



HARMFUL EFFECTS OF DIESEL ENGINE IDLING

- Wear of main Deisel-generator group (which have a mass of 28 tonnes and 2100 HP rated power);
- Main Diesel-generator group must supply electricity for auxiliary services between 28 kW and 1.7 kW;
- Engine oil consumption of about 12,5 kg / 1000 kg of fuel;
- Excessive pollution of the environment due to incomplete combustion of fuel;
- Specific fuel consumption over 180 gr/HPh;

NEW SOLUTIONS FOR INCREASING THE EFFICIENCY OF DIESEL LOCOMOTIVES

TEHMIN® BRAŞOV

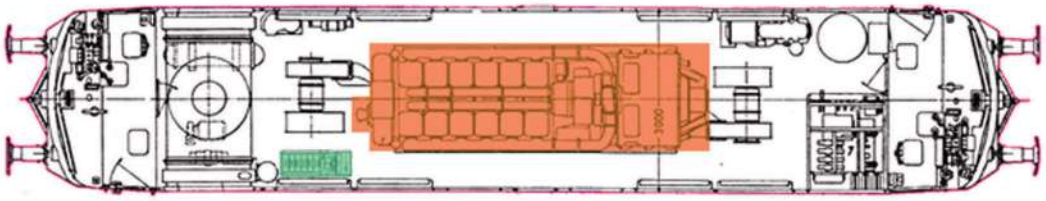
THE SOLUTION PROPOSED FOR SOLVING THE PROBLEM OF IDLE TIME

- According with the Diesel locomotive and auxiliary services, it is neccesary to install a Diesel genset. Instead running at idling main Diesel engine is stopped and this Diesel genset of 40 kW is activated to ensure the following:

- Keeping warm the main Diesel engine;
- Battery storage charging;
- Driving cab heating;
- Lighting and power supply for control circuits;
- Operating of air compressor.

MAIN CHARACTERISTICS OF THE MAIN AND DIESEL GENSET

	main	auxiliary generator
Type of Diesel engine		
Power	2100 HP	60 HP
Weight	28000 kg	700 kg
Average hourly fuel consumption	23 kg/h at idle	5 kg/h at full load
Supply voltage of auxiliary services	170 VDC	170 VDC

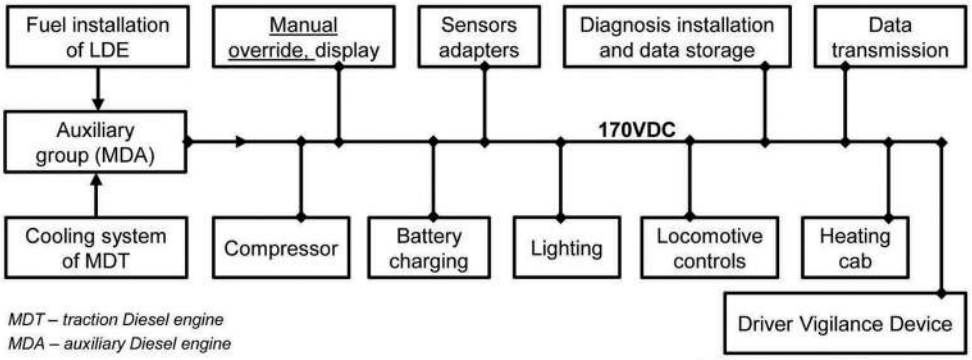


ADVANTAGES:

- Average diesel fuel consumption decreases at least 50%;
- Oil consumption decreases in acording with the decreasing of fuel consumption;
- Maintenance costs of main diesel engine decreases by 30%;
- Increasing locomotive availability with minimum 20%;
- The period between two planned revisions increase with 20%;
- Reducing environmental pollution proportional with the decrease of the fuel and oil consumption economy;
- Average recovery time and return of investment is about 12 months.

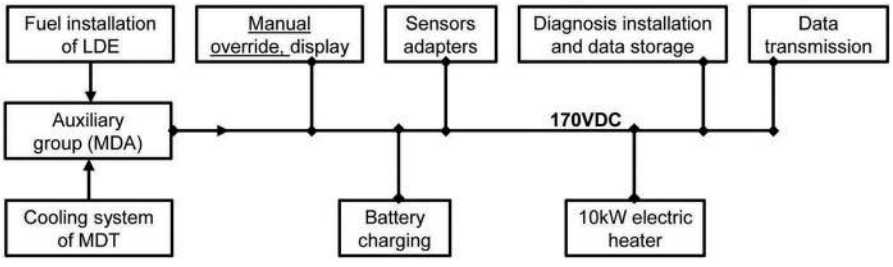
DIAGRAMS OF THE SYSTEM IN OPERATING/IDLING OR OUT OF SERVICE PERIOD

Diagram of the system in operating period



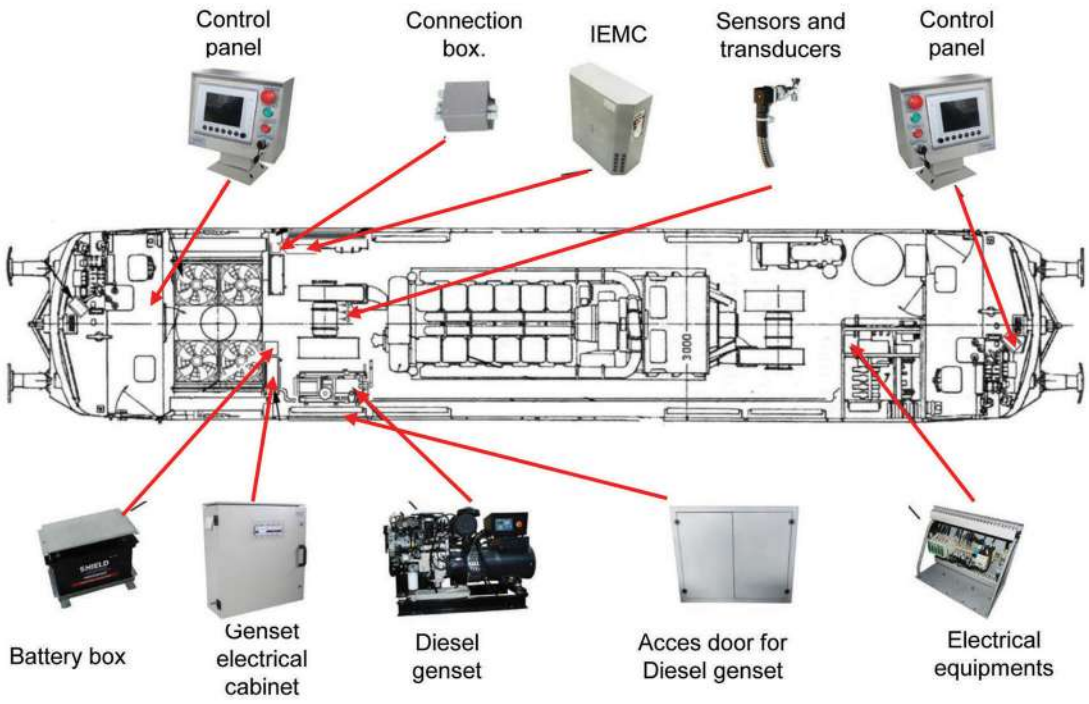
MDT – traction Diesel engine
MDA – auxiliary Diesel engine

Diagram of the system in idling or out of service period



MDT – motor Diesel de tractiune
MDA – motor Diesel auxiliar

INSTALLATION COMPONENTS



REMARCS

The Diesel genset (MDA) is the third energy source of the locomotive that replace the idling period of the diesel engine, without affecting the operation of the locomotive in operating or stand-by mode, taking into consideration all the provisions of the safety instructions for railway operation.

INSTALLATION TO INCREASE DIESEL TRACTION ENGINE EFFICIENCY OF THE DIESEL LOCOMOTIVE

REFERENCE - Diesel electric locomotive Class LDE 2100 HP

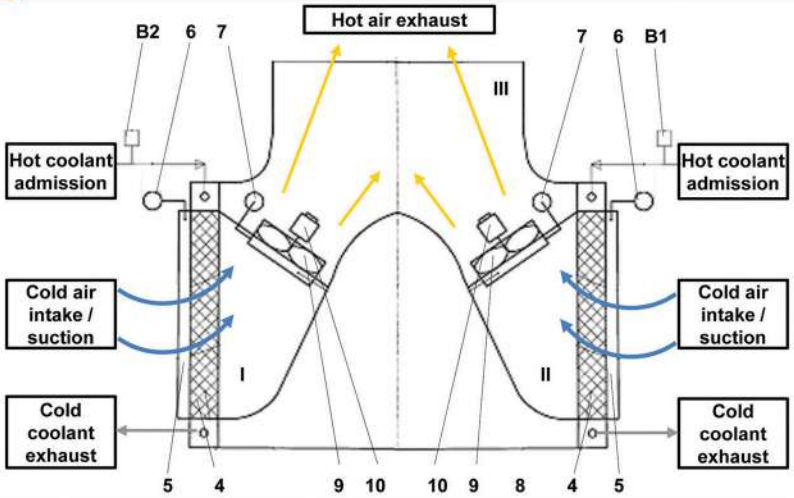
TARGETS OF THE INSTALLATION

1. The functioning of traction diesel engine at the optimum temperature to ensure minimum fuel conumption;
2. Reduces energy consumption to keep the traction diesel engine warm;
3. Suppress additional energy consumption of ventilation when thermal conditions of engine are under optimum value
4. Replace the hydrostatic installation for radiator ventilation.

ADVANTAGES OF THE INSTALLATION

- The diesel traction engine always operates at the optimal temperature range with minimum fuel consumption;
- Reduction of fuel consumption to keep the traction diesel engine warm;
- Eliminate the additional fan power consumption if the temperature of traction diesel engine is below optimum value;
- Does not requires maintenance and consumables.

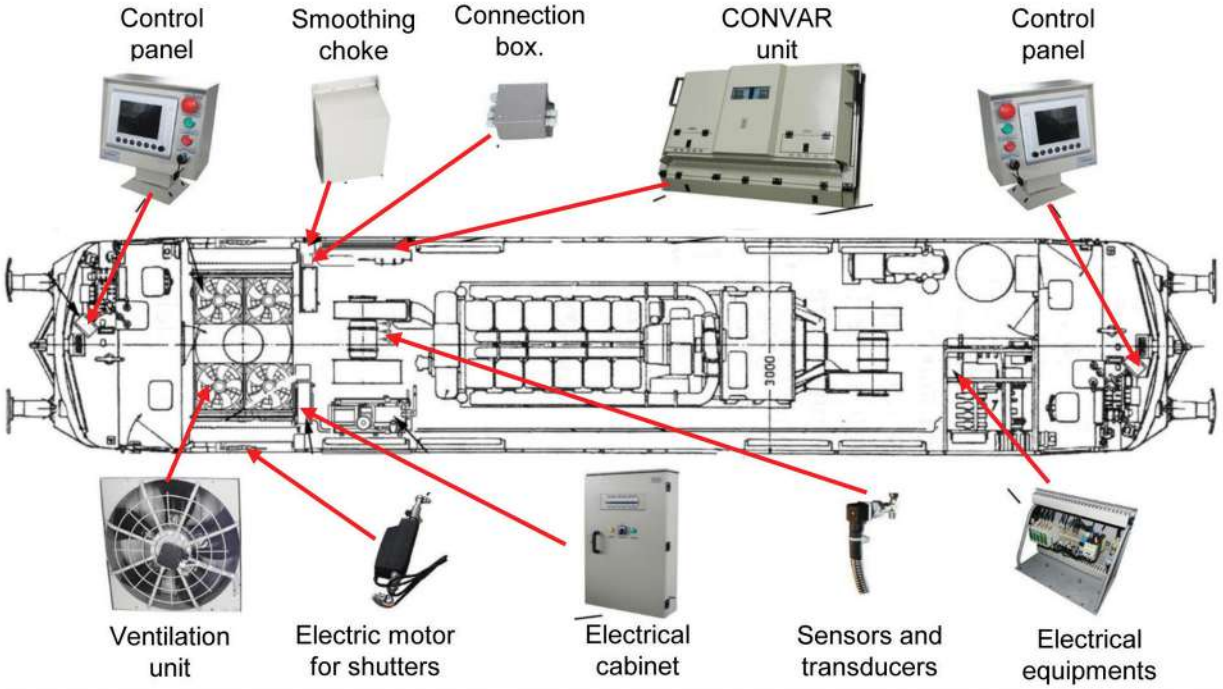
REFERENCE - Diesel electric locomotive Class LDE 2100 HP



4 – cooling heat-sinks;
5 – exterior shutters;
6 – electric motor/actuator for exterior shutters;
7 – electric motor/actuator for interior shutters;
8 – cooling tank;
9 – interior shutters;
10 – electric ventilator;
B1, B2 – thermostats;
I, II – suction chamber;
III – exhaust chamber;

ADVANTAGES OF OUR SOLUTION FOR THE VENTILATION OF COOLING UNIT

- Removes the heat losses within heat-sinks when the temperature is below the minimum recommended value;
- Ensures an optimum temperature for the traction diesel engine when it is in operation;
- Removes the additional power consumption of the diesel engine to start the fan when the temperature îs below the minimum recommended value;
- The power consumed for ventilation is according with the coolant temperature;
- Removes heat losses within heat-sinks by keeping warm the main Diesel engine;
- Removes human subjectivity concerning the settings on the control & command installation.



OTHER ADVANTAGES

The economy achieved by locomotives equipped with a full efficiency facility is particularly high and the recovery time of the investment is very low.

Ventilation operates about 50% of the operating time of the diesel engine. Average power consumption is about 1.6 kW/hour of traction diesel engine operation.

ECONOMIC VENTILATION OF THE TRACTION ELECTRIC MOTORS OF LOCOMOTIVE DIESEL

REFERENCE - Diesel electric locomotive Class LDE 2100 HP

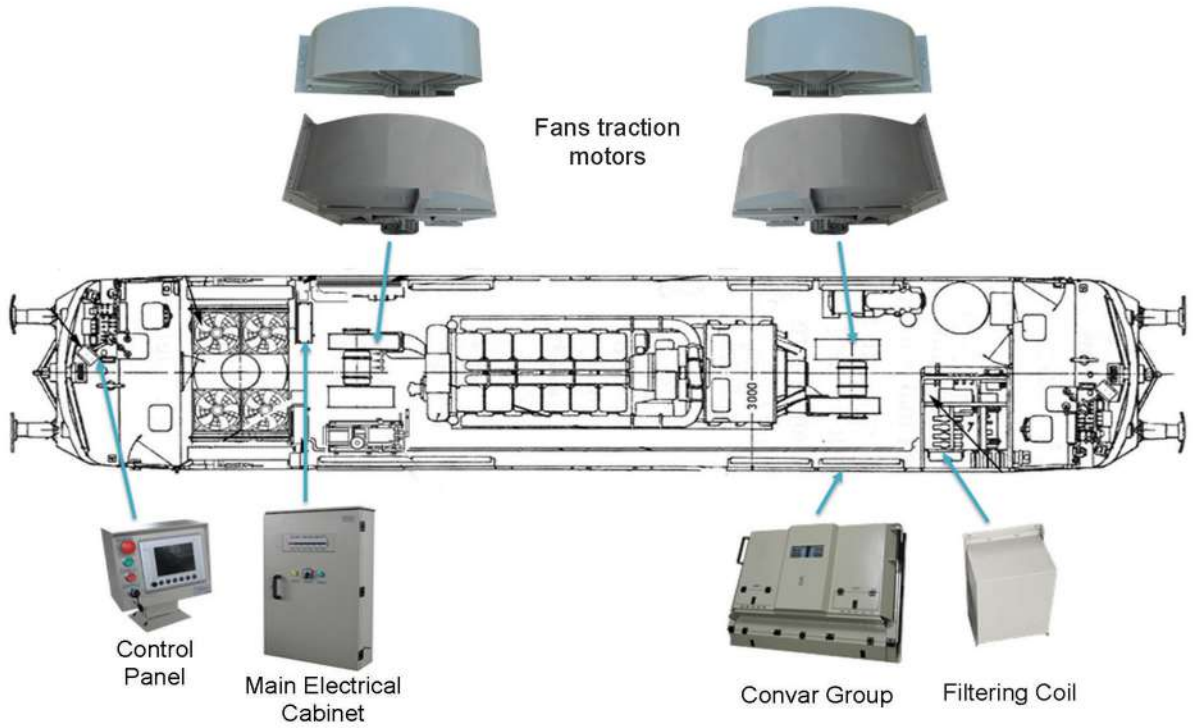
OUR SOLUTION

Modern, three-phase, alternating current electric motors, with automatic voltage and frequency adjustment as required, are used to actuate ventilators;

Each screw-fan is fitted with an electric motor with its own fan with a power of 5 kW for ventilation of two traction electric motors and 3 kW for a traction electric motor.

Old system versus new system comparison table:

PARAMETER	OLD SYSTEM	NEW SYSTEM	
POWER [kW]:	2x16	1x3	2x5
VOLTAGE [V]:	170 VDC	3x400 VAC	3x400 VAC
CURRENT [A]:	115	2.6	4.6
SPEED [RPM]:	2450	2600	2550



ADVANTAGES

- Electric motors do not require any kind of maintenance and consumables;
- The power system of the electric motors has no contactors;
- The same control, display and memory card as the cooling fan ventilation system are used;
- Low energy consumption (three times lower than the old system);
- Increases accessibility to the front and end parts of diesel engine-main generator set.

DAGNOSIS FOR LOCOMOTIVES

REFERENCE - Diesel electric locomotive Class LDE 2100 HP

OUR SOLUTION

- The system record and display diagnosis data of the locomotive, and also the damage and faults that occurred during locomotive operation. Collected data provided by the locomotive are recorded on a memory card.

- When the locomotive is in maintenance, the data recorded is downloaded to a PC, and the parameters can easily be tracked in graphical form, or generate as a specific report:
- traction diesel engine and electrical transmission of the locomotive
- the temperature of the bearing supports of the traction electric motors;
- air pressure in the main pipeline, in bogie brake cylinders.
- Optionally, the diagnosis system may be equipped with a GSM modem and antenna for real-time transmission of diagnosis data operating parameters to an operator.

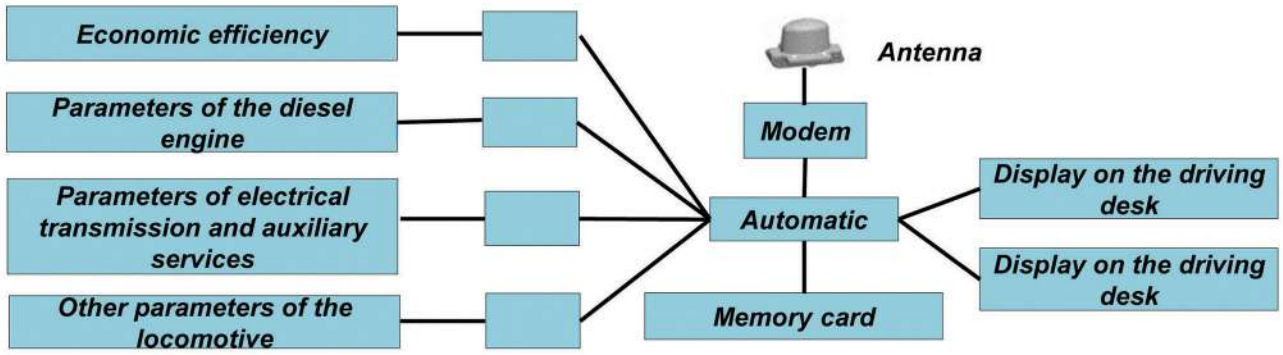
- The recorded data is used for three purposes:
1. Tracking the technical condition of the locomotive.
2. Economic efficiency:
- fuel consumption registered by ICL;
- energy consumed in traction operation;
- energy consumed by auxiliary services;
- diesel engine operation time: total, at load and at idle.

3. Safety operation by analysis the air pressure in the main pipeline and in the bogie brake cylinders.

Examples of monitored parameters:

- battery charging current;
- main diesel engine speed;
- main generator voltage;
- main generator power;
- current of a group of electric motors;
- oil temperature;
- oil pressure;
- brake air pressure;
- coolant pressure;
- coolant temperature.

Block diagram of the diagnosis system

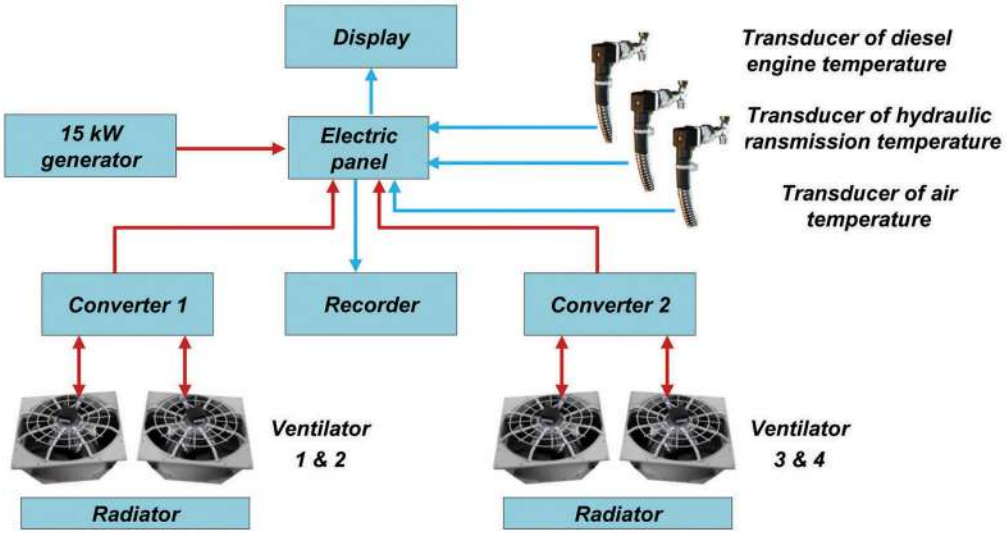


ComAp InteliLite Display

OMRON Display

VENTILATION INSTALLATION OF THE COOLING UNIT FOR REMEMORIZED LOCOMOTIVE LDH

Locomotiva LDH 1250CP



PRODUCTS FOR UPGRADE THE CLASS DA 2100 HP LOCOMOTIVES

IEIPC LDE

* Electric heating unit for the locomotive driving cab.

- Provides heating the driving cab during locomotive operation;
- It is mount one in each driving cab.

IPM 170

* Electric radiator for lateral heating of the driving cab.

- Produces a warm air curtain at the side cab window;
- It is mount one in each driving cab.

IEMC 25.2

* Electric installation to keep warm diesel engine

- Maintain warm the coolant from the diesel engine cooling circuit;
- Mounted in the engine room instead AV00 unit.

SIBA 170

* Accumulator battery charger unit.

- Ensure the charging of the vehicle battery during the stops;
- Mounted in the engine room;
- Power supplied from IEMC or independently.

VENTILATION SYSTEMS

* Electrical ventilation of electric traction motors.

* The fan group and the interior shutter system from the tank of the radiator cooler.

PRODUCTS FOR UPGRADE THE LOCOMOTIVES

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CONTROL PANELS

* Control panels for driving cabs
- Provides an easy access to all the data required for the driving and supervise the locomotive by the driver and by the maintenance team.
- The control panels are equipped with electrical control and signalling equipment, according to specific requirements imposed by the operation of the locomotive systems and with the conditions requested by the customer.
- Displays all operating parameters of the traction diesel engine, main generator, auxiliary services and locomotive diagnosis.

DIESEL GENSET

* Diesel generator set

- Ensures driving cabin heating, battery charging, air compressor operation, keeping warm diesel engine.
- The Diesel genset is the third energy source of the locomotive that replace the idling period of the diesel engine, without affecting the operation of the locomotive in operating or stand-by mode, taking into consideration all the provisions of the safety instructions for railway operation.

OTHER PRODUCTS

*CONVAR group

*Electrical cabinets

TEHMIN® BRAŞOV

PRODUCTS FOR UPGRADE THE CLASS 1250 HP DIESEL HYDRAULIC LOCOMOTIVES

IEIPC-LDH

* Electric heating unit for the locomotive driving cab.

- Provides heating the driving cab during locomotive operation.

IPM 110

* Electric radiator for lateral heating of the driving cab.

- Produces a warm air curtain at the side cab window;
- It is mount one in each lateral side of the driving position.

IEMC 21.1

* Electric installation to keep warm diesel engine.

- Maintain warm the coolant from the diesel engine cooling circuit;
- Mounted instead AV00 unit under the small hood.

SIBA 110

* Accumulator battery charger unit.

- Ensure the charging of the vehicle battery during the stops;
- Mounted under the small hood;
- Power supplied from IEMC or independently.

IEMC with SIBA

* Electric installation to keep warm diesel engine and charging the accumulator battery.

- Maintain warm the coolant from the diesel engine cooling circuit;
- Ensure protection of engine and related installations against frost and optimal conditions for diesel engine starting at any time.
- Ensures the battery in full charge.

VENTILATION SYSTEMS

* Electrical ventilation of the cooling radiators

PRODUCTS FOR UPGRADE THE CLASS 450 HP AND 700 HP DIESEL HYDRAULIC LOCOMOTIVES

ITIPC-LDH AB

* Thermal heating unit for the locomotive driving cab.

- Provides heating the driving cab during locomotive operation.

SIBA 24

* Accumulator battery charger unit.

- Ensure the charging of the vehicle battery during the stops;
- Mounted under the small hood;
- Power supplied from IEMC or independently.

IEMC 21.1

* Electric installation to keep warm diesel engine.

- Maintain warm the coolant from the diesel engine cooling circuit;
- Mounted instead AV00 unit under the small hood.

IEMC AS SOURCE

* Electric installation to keep warm diesel engine and charging the accumulator battery.

- Ensure protection of engine and related installations against frost and optimal conditions for diesel engine starting at any time.

IPM 24V

* Electric radiator for lateral heating of the driving cab.

- Produces a warm air curtain at the side cab window;
- It is mount one in each lateral side of the driving position.

PRODUCTS FOR UPGRADE THE CLASS 700 AND CLASS 1000 DIESEL RAILCARS

APC A700

* Electric heating unit for the railcar Class 700 and Class 1000 driving cab.

- Provides heating the driving cab during railcar operation.

IEMC 10.5

* Electric installation to keep warm diesel engine.
- Maintain warm the coolant from the diesel engine cooling circuit when diesel engine is stopped;
- Mounted under railcar frame.

APC A700-S

* Electric heating unit for the driving cab of railcars Class 700 and railcars Class Special.
- Provides heating the driving cab during railcar operation.
- Mounted instead Webasto unit.

GI-A700/A1000

* Heating and ventilation unit for the passenger saloon of railcar Class 700 and Class 1000.

- The unit uses the cooling fluid heated by the traction diesel engine as the heat source.

PPC-A700

* The control panel and its display enable access to all the data needed to the driver for driving and breaking the railcar.

- It also allows the driver access to the operating parameters of the railcar.

Electrical cabinet with SACDT

PRODUCTS FOR UPGRADE THE CLASS 900 DIESEL RAILCARS

GI-A900

* Heating and ventilation unit for the passenger saloon.
- The unit uses the cooling fluid heated by the traction diesel engine as the heat source.
- There are two units mounted in each passenger saloon with the appropriate tubing.

IEMC 8/3

* Electric installation to keep warm diesel engine.

- Maintain warm the coolant from the diesel engine cooling circuit when diesel engine is stopped;
- Mounted in the diesel engine room.

PPC-A900

* The control panel and its display enable access to all the data needed to the driver for driving and breaking the railcar.

- It also allows the driver access to the operating parameters of the railcar.

Power transformer

Electric panel with SACDT

Electric panel A900

THERMAL SYSTEMS TO HEAT THE PASSENGER SALON FROM THE DIESEL RAILCARS CLASS 700 / 1000 AND CLASS 900

GI A700/1000

OVERVIEW

- GI A700/1000 installation is design and manufactured for heating the passengers saloon of the diesel railcars Class 700 and 1000. The heating system uses as a source of heat the coolant heat energy from the diesel engine cooling unit.

GI A900

OVERVIEW

- GI A900 installation is design and manufactured for heating the passengers saloon of the diesel railcars Class 900. The heating system uses as a source of heat the coolant heat energy from the diesel engine cooling unit.

BENEFITS

- Heats up quickly;
- Eliminates the fuel consumption for heating the passengers saloon; increases the thermal efficiency of the diesel engine;
- Reduce environment pollution;
- High reliability;
- In summer, the unit participate in the efficient cooling of the diesel engine.

TECHNICAL SPECIFICATIONS

Product code	**GI A700 GI A1000**	**GI A900**
Fans supply voltage	16-28VDC	12-32VDC
Fan power	93W	18W
Fan speed	4550 rev/min	3400 rev/min
Hot air flow	500mc/h	250mc/h
Equivalent power / heater	16KW	8KW
Equivalent power / unit	32KW	16KW
No of ventilation level	2	
Heater unit weight	80 kg	21 kg
Overall dimensions / one heater (mm)	1110x935x670	640x560x350

THERMAL SYSTEMS TO HEAT THE PASSENGER SALON FROM THE CLASS LVT DIESEL RAILCARS LVT

GI LVT

OVERVIEW

- The GI LVT installation is design and manufactured for heating the passengers saloon of the Class LVT diesel railcar.

BENEFITS

- Using the heat of the diesel engine cooling agent, it eliminates the fuel consumption for heating the passengers saloon;
- Indirect increase the thermal efficiency of the diesel engine;
- High reliability.

TECHNICAL SPECIFICATIONS

Product code	**GI LVT**
Fans supply voltage	12-28VDC
Fan power	93W
Fan speed	4550 rev/min
Hot air flow	500mc/h
Equivalent power	16KW
No of ventilation level	3
Heater unit weight	50kg
Overall dimensions (mm)	1845x445x705

ELECTRICAL SYSTEMS FOR THE HEATING OF THE DRIVING CAB

X4500

TECHNICAL SPECIFICATIONS

Product code	**X4500**
Installation power	2kW
Installation supply voltage	72VDC
Fan power	12W
Setting thermostat	70°C
Heater unit weight	5,5kg
Overall dimensions (mm)	312x312x144

A AIR HEATER UNITS FOR THE DIESEL LOCOMOTIVES DRIVING CABS

TEHMIN® BRAŞOV

IEIPC LDH

OVERVIEW

- The installation is design and manufactured for electric heating of the Class LDH 1250 HP locomotives' driving cabs;
- The heating unit replace of the old heating system with hot water and provide the heating requirements of the locomotive's driving cabs

IEIPC LDE

OVERVIEW

- The installation is design and manufactured for electric heating of the Class LDE 2100 HP locomotives' driving cabs;
- The heating unit replace of the old heating system with hot water and provide the heating requirements of the locomotive's

BENEFITS

- Eliminates the possibility of flooding or freezing of driving cab (existing at the old driving cab heating system);

- Eliminates the idling with high speed of the diesel engine, if the coolant temperature is low, and the premature wear of engine equipments to provide the heating of driving cab with hot water;

- Easy maintenance and high reliability.

TECHNICAL SPECIFICATIONS

Product code	**IEIPC LDH**	**IEIPC LDE**
Supply voltage	110VDC	170VDC
Power of installation	4000W	5000 W
Fan power	48W	48W
Fan speed	2400 rev/min	2425 rev/min
Hot air flow	200mc/h	200mc/h
Weight	14,5 kg	14 kg
Overall dimensions (mm)	500x290x410	500x290x375

AIR HEATER UNITS FOR THE DIESEL LOCOMOTIVES DRIVING CABS

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IEIPC LE

OVERVIEW

- The installation is design and manufactured for electric heating of the Class LE 5100 kW locomotives' driving cabs;

TECHNICAL SPECIFICATIONS

Product code	**IEIPC LE**
Supply voltage	380VAC
Power of installation	5kW
Fan power	55 W (la 48VDC)
Fan speed	2950 rev/min
Hot air flow	1090mc/h
Weight	21kg
Overall dimensions (mm)	600x360x315

IEIPC X4500

OVERVIEW

- The installation is design and manufactured for electric heating driving posts. It is provided with an electric ventilator, powered by the 24VDC circuit of the heater blower.

TECHNICAL SPECIFICATIONS

Product code	**IEIPC X4500**
Supply voltage	72VDC
Power of installation	750W
Fan speed	1500 rev/min
Hot air flow	90mc/h
Weight	5,5kg
Overall dimensions (mm)	355x178x242

IPM

OVERVIEW

- This installation is a part of the modernization program to improve the working conditions of locomotive drivers.
- The installation is design and manufactured for the Class LDE 2100HP, Class LDH and Class LE locomotives' driving cabs;

BENEFITS

- All the advantages created by the presence of a hot object in a cold area;
- High reliability.

TECHNICAL SPECIFICATIONS

Product code	**IPM LDE**	**IPM LDH**	**IPM LE**
Supply voltage	170V	110V	380V
Power of installation	400W	400W	400 W
Weight	7 kg	7 kg	7 kg
Overall dimensions (mm)	78x500x500	78x500x500	78x500x500

BY CUSTOMERS REQUEST, WE CAN DESIGN AND DELIVER SYSTEMS FOR OTHER TYPES OF VEHICLES

AIR HEATER UNITS FOR THE LOCOMOTIVES DRIVING CABS

TEHMIN® BRAŞOV

ITIPC-UAM

OVERVIEW

- The installation is design and manufactured to heat the cabs on track machines and as a new solution, offers a higher heat instead of the old system.

ITIPC-LDH

OVERVIEW

- The installation is design and manufactured for the Class 450HP and Class 700HP locomotives as a new solution different from the old radiator system.

BENEFITS

- Heats up quickly;
- Ensuring the possibility of selecting the ventilation level;
- It uses the cooling heat of the diesel engine, thus eliminates additional fuel consumption for the heating of driving post;
- Indirect increase the thermal efficiency of the diesel engine;
- High reliability.

TECHNICAL SPECIFICATIONS

Product code	**ITIPC-UAM**	**ITIPC-LDH**
Supply voltage	12-32VDC	12-32VDC
Fan power	18W	18W
Fan speed	3400 rev/min	3400 rev/min
Hot air flow	250mc/h	250mc/h
Power of installation	7000W	7000W
Weight	14 kg	14 kg
Overall dimensions (mm)	260x360x650	450x220x700

APC A700/A1000

OVERVIEW

- The installation is design and manufactured for heating driving posts of the Class 700 and Class 1000 railcars.

BENEFITS

- It uses the cooling heat of the diesel engine, thus eliminates additional fuel consumption for the heating of driving post;

- Indirect increase the thermal efficiency of the diesel engine;
- High reliability.

TECHNICAL SPECIFICATIONS

Product code	**APC A700/A1000**
Supply voltage	72VDC
Power of installation	7000W
Fan power	18W
Fan speed	3400 rev/min
Hot air flow	250mc/h
Weight	14kg
Overall dimensions (mm)	501x357x220

APC-LVT

OVERVIEW

- The installation is design and manufactured for heating driving posts of the Class LVT railcars.

BENEFITS

- It uses the cooling heat of the diesel engine, thus eliminates additional fuel consumption for the heating of driving post;
- Indirect increase the thermal efficiency of the diesel engine;
- High reliability.

TECHNICAL SPECIFICATIONS

Product code	**APC-LVT**
Supply voltage	12-32VDC
Fan power	18W
Fan speed	3400 rev/min
Hot air flow	250mc/h
Power of installation	7000W
Weight	13 kg
Overall dimensions (mm)	369x405x541

INSTALLATION TO KEEP WARM DIESEL ENGINE AND BATTERIES CHARGING

IEMC

PRODUCT INFORMATION

- The installation is designed to maintain warm the coolant from the diesel engine cooling circuit and kept the accumulator battery charging when railway vehicles are in the depot.

- The installation ensures the protection of engine and engine's auxiliaries from freezing and optimal conditions for diesel engine starting at any time.

ADVANTAGES

- easy to start the diesel engine;
- eliminates diesel engine wear at idle for the keeping warm;
- eliminate the battery overloading for starting the diesel engine;
- eliminate fuel and oil consumption for keeping warm the diesel engine;
- reduces the wear of all diesel's auxiliaries;
- reduces environmental pollution;
- keep the accumulator battery charged;
- easy maintenance and a high reliability;
- installation not require supervisory staff.

TECHNICAL SPECIFICATIONS

Product code:	**IEMC 10.5-S 28V**	**IEMC 21.1-S 110V**	**IEMC 25.2-S 170V**
Supply voltage:	3x400 V	3x400 V	3x400 V
Supply frequency:	50 Hz	50 Hz	50 Hz
Power of installation:	10,5 kW	21 kW	25 kW
Efficiency:	0,98	0.98	0.98
Operating temperatures:	40-50 °C	40-50 °C	30-40 °C (level 1); 40-50 °C (level 2)
Protection temperature:	90 °C	90 °C	90 °C
Flow rate:	3 m³/h	3 m3/h	3 m3/h
Inlet diameter:	1"	1"	1"
Outlet diameter:	1"	1"	1"
Maximum charging source output voltage:	28.5 VDC ± 2%	110 VDC ± 2%	170 VDC ± 2%
Batteries charging current:	10 A ± 5%	9A ± 5%	8A ± 5%
Weight:	30 kg	30 kg	30 kg
Overall dimensions (LxHxW):	468x480x182	468x480x182	468x480x182

ELECTRICAL SYSTEMS TO KEEP WARM THE COOLANT OF THE DIESEL ENGINE

IEMC

OVERVIEW

- The installation is designed and manufactured to keep warm the coolant in the diesel engine cooling circuit.

- Ensure protection of engine and related installations against frost and optimal conditions for diesel engine starting at any time.

IEMC M

OVERVIEW

- The installation is designed and manufactured to allow movement from one locomotive to another. Each locomotive needs to be equipped with a coolant inlet.
- Ensure protection of engine and related installations against frost and optimal conditions for diesel engine starting at any time.

BENEFITS

- Easy to start the diesel engine;
- Eliminates diesel engine wear at idle for the keeping warm;
- Eliminate the battery overloading for starting the diesel engine;
- Eliminate fuel and oil consumption for keeping warm the diesel engine;
- Reduces the wear of all diesel's auxiliaries;
- Installation not requires supervisory staff and have a high reliability.

TECHNICAL SPECIFICATIONS

Product code	**IEMC 10.5**	**IEMC 21.1**	**IEMC 25.2**	**IEMC M**
Supply voltage	3x400 V	3x400 V	3x400 V	3x400 V
Supply frequency	50 Hz	50 Hz	50 Hz	50 Hz
Power of installation	10,5 kW	21 kW	25 kW	8-30kW
Efficiency	0,98	0,98	0,98	0,98
Operating temperatures	45-50 °C	45-50 °C	38-43 °C (tr.1); 45-50 °C (tr.2)	45-50°C
Protection temperature	70 °C	70 °C	70 °C	70 °C
Flow rate	2 m³/h	3 m3/h	3 m3/h	3 m3/h
Inlet diameter	3/4"	1"	1"	1"
Outlet diameter	3/4"	1"	1"	1"
Weight	20 kg	20 kg	20 kg	Depending on the type of installation
Overall dimensions (mm)	550x228x450	550x228x450	550x228x450	1100x500x840

BY CUSTOMERS REQUEST, WE CAN DESIGN AND DELIVER SYSTEMS FOR OTHER TYPES OF VEHICLES

ELECTRIC INSTALLATION TO KEEP WARM DIESEL ENGINE

TEHMIN® BRAŞOV

IEMC GENSET

OVERVIEW

- The installation is designed and manufactured to keep warm the coolant fluid of the diesel engines, existing on drilling groups or generating sets.

BENEFITS

- Easy to start the diesel engine;
- Eliminates diesel engine wear at idle for the keeping warm;
- Eliminate the battery overloading for starting the diesel engine;
- Eliminate fuel and oil consumption for keeping warm the diesel engine;
- Reduces the wear of all diesel's auxiliaries;
- Reduces the environmental pollution;
- Installation not requires supervisory staff and have a high reliability.

TECHNICAL SPECIFICATIONS

Product code	**IEMC 15P**	**IEMC 21.1P**
Supply voltage	3x400V/220V	3x400V/220V
Supply frequency	50 Hz	50 Hz
Power of installation	15 kW	21 kW
Efficiency	0,98	0,98
Operating temperatures	45-50 °C	45-50 °C
Protection temperature	70 °C	70 °C
Flow rate	3 m^3/h	3 m3/h
Inlet diameter	1"	1"
Outlet diameter	1"	1"
Weight	45 kg	45 kg
Overall dimensions (mm)	555x380x750	555x380x750

IEMC LVT

TECHNICAL SPECIFICATIONS

Product code	**IEMC LVT**
Power of installation	8÷30 kW according vehicle type
Number of regulation steps	1÷2
Supply voltage	3x400VAC
Command voltage	230V
Pump flow rate	1,5÷3 m^3/h H=2÷3m
Efficiency	0,98
Weight	According vehicle type
Overall dimensions (mm)	According vehicle type

ACCUMULATOR BATTERY CHARGER UNITS

SIBA 230

PRODUCT INFORMATION

- Unit mounted on railway vehicles, ensures the charging and recharging of accumulator batteries, which equip railway vehicles.
- It mounts near to the electric installation to keep warm diesel engine (IEMC) or in the cabinet of apparatus from the locomotive or railcar.
- The power supply is from the single-phase network 230 V, 50-60 Hz, which can be taken from the IEMC power supply terminal with the voltage 3x400 VAC + N.

ADVANTAGES

- The charging current is limited;
- The maximum output voltage is limited;
- Increases the battery life;
- Wide range for ambient temperature operation;
- It has natural ventilation;
- Resistance to shock and vibration;-
- Accidental short-circuit protection at the output;
- Reduces additional fuel consumption from the diesel engine for batteries charging;
- No maintenance, easy to adapt to any vehicle.

TECHNICAL DATA

Product code	**SIBA 230/12-10/20**	**SIBA 230/24-10**	**SIBA 230/72-10**	**SIBA 230/110-9**	**SIBA 230/ 170-8**
U rated battery	12 VDC	24 VDC	72 VDC	96 VDC	144 VDC
I max charging	10A ± 2 %	10A ± 2 %	10A ± 2 %	9A ± 2 %	8A ± 2 %
U max output	14,4 VDC ± 2 %	28,5 VDC ± 2 %	85 VDC ± 2 %	110 VDC ± 2 %	170 VDC ± 2 %
Overall dimensions (LxHxW)	250x117x134 mm	250x117x134 mm	250x170x180 mm	250x170x180 mm	250x170x180 mm

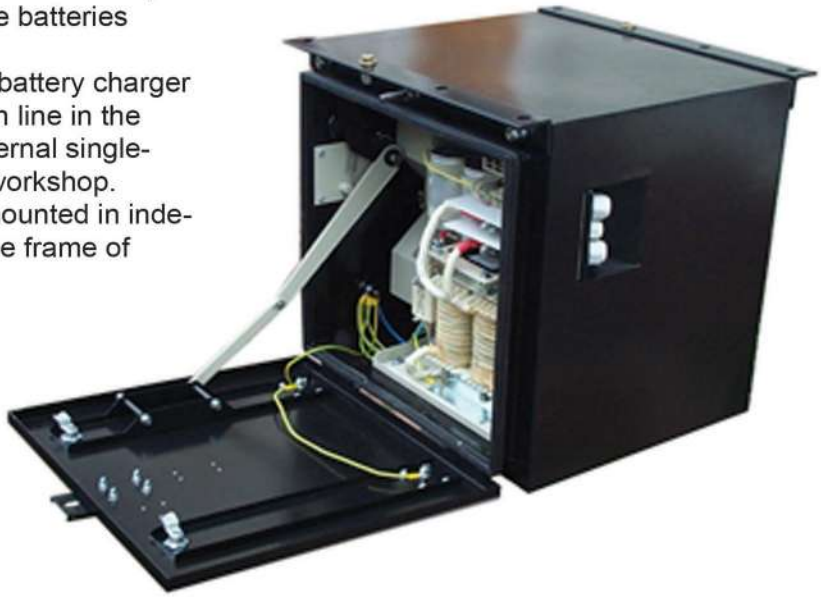
Power supply voltage	230 VAC ± 10 %, -15 % accidental
Frequency of supply voltage	50 Hz - 60 Hz ± 5 Hz
Operating temperature range	- 25 °C + 50 °C
Current–voltage characteristic	UI constant
Protected against short circuit (output)	Da
Degree of protection:	IP 21

SIBA 1500/230/24-200M

PRODUCT INFORMATION

- SIBA 1500/230/24 accumulator battery charger unit ensure the electrical supply of the all electrical components on passenger's cars and keep the batteries charged.
- The power supply of the accumulator battery charger is from the high-voltage 1500 V AC train line in the coach running operation or from an external single-phase 230 V AC when the coach is in workshop.
- The unit consists of two assemblies mounted in independent housing and fastened under the frame of coach.

High voltage



Low voltage

TECHNICAL DATA

- Supply voltage: 1500 (1050...1860)V AC according UIC 550, or 230 (187...250)V AC
- Supply frequency: 50 Hz±2 Hz
- The shape of the supply voltage: sinusoidal or rectangular
- Output current: 200 A or 60 A, depending supply voltage (1500 or 230) V AC
- Output voltage according to environmental temperature: 26.75 V DC at 20 °C +/- 60 mV/°C;
- Operating temperatures: (-25 ... +55) °C;
- Allowable ambient humidity: up to 95% at 20 °C;
- Degree of protection: IP54;
- Short-circuit protection: limits the output current;
- Overheating protection: 80 °C;
- Communication type: RS485, CAN, RS232 (for configuration and diagnosis);
- Setting options: communication type, interface, speed of communication;
- Interface galvanic separation: 1500 V, 50 Hz at 60 s;
- The high voltage assembly is provided for protection with a mechanical locking;
- The presence of voltage and communication is signalled by a lamp;
- High security level;
- The housings are mounted under the frame of coach;
- Weight of the high voltage module: maximum 160 kg;
- Weight of the low voltage module: maximum 138 kg.

SIBA M

OVERVIEW

- Accumulator battery charger SIBA M a mobile unit used to charge storage batteries. The power is supplied from the stationary single-phase or three-phase electrical network.

BENEFITS

- Accumulator battery charger may be moved to the location of the batte pack to be charged and not vice versa;
- Easy to handle with its own rolling system;
- Easy connection to the battery and the electrical network supply through their own connection system;
- The charging current is limited for two steps;
- Wide range for operation ambient temperature;
- Resistant to shock and vibrations;
- IP43 degree of protection;
- Polarity reversal protection at battery terminals;
- Accidental output short circuit protection;
- Protection to the absence of battery;
- The accumulator battery charger is equipped with connection cables and necessary elements of connection to the electrical network supply and battery pack.

TECHNICAL SPECIFICATIONS

Product code	**SIBA 24/60M**	**SIBA 110/32M**	**SIBA 170/32M**
Supply voltage	230VAC±10%	230VAC±10%	3x400VAC±10%
Frequency supply voltage	50Hz±2Hz	50Hz±2Hz	50Hz±2Hz
Battery nominal voltage	24VDC	96VDC	144VDC
Maximum charging current	30A/60A	16A/32A	16A/32A
Charging steps	2	2	2
Operating temperature	-40°C ... +55°C	-40°C ... +55°C	-40°C ... +55°C
Short-circuit protected	UI constant	UI constant	UI constant
Over-temperature protected	Yes	Yes	Yes
Reverse connection protected	Yes	Yes	Yes
Degree of protection	IP43	IP43	IP43
Overall dimensions (mm)	740x420x800	740x420x800	740x420x800

SIBA F

OVERVIEW

- Accumulator battery charger SIBA M a mobile unit used to charge storage batteries. The power is supplied from the stationary single-phase or three-phase electrical network.

BENEFITS

- The charging current is limited for two steps;
- Adjustable maximum output voltage;
- Increase battery life;
- Wide range for operation ambient temperature;
- Natural ventilation;
- Resistant to shock and vibrations;
- Reverse connection protected;
- Accidental output short circuit protection;
- Protection to the absence of battery;
- Reduce the consumption of gas oil in diesel engine.

TECHNICAL SPECIFICATIONS

Product code	**SIBA 24/60F**	**SIBA 110/32F**	**SIBA 170/32F**
Supply voltage	230VAC±10%	230VAC±10%	3x400VAC±10%
Frequency supply voltage	50Hz±2Hz	50Hz±2Hz	50Hz±2Hz
Battery nominal voltage	24VDC	96VcDC	144VDC
Maximum charging current	16A/32A	16A/32A	16A/32A
Charging steps	2	2	2
Operating temperature	-25°C ... +55°C	-25°C ... +55°C	-25°C ... +55°C
Charge characteristic	UI constant	UI constant	UI constant
Short-circuit protected	Yes	Yes	Yes
Overcharge protected	Yes	Yes	Yes
Degree of protection	IP21	IP21	IP21
Overall dimensions	365x175x347	262x334x577	262x435x627

Type of rolling stock they are mounted	All types of locomotives, railcars or track machinery equipped with traction system

EQUIPMENT FOR ELECTRIC VENTILATION

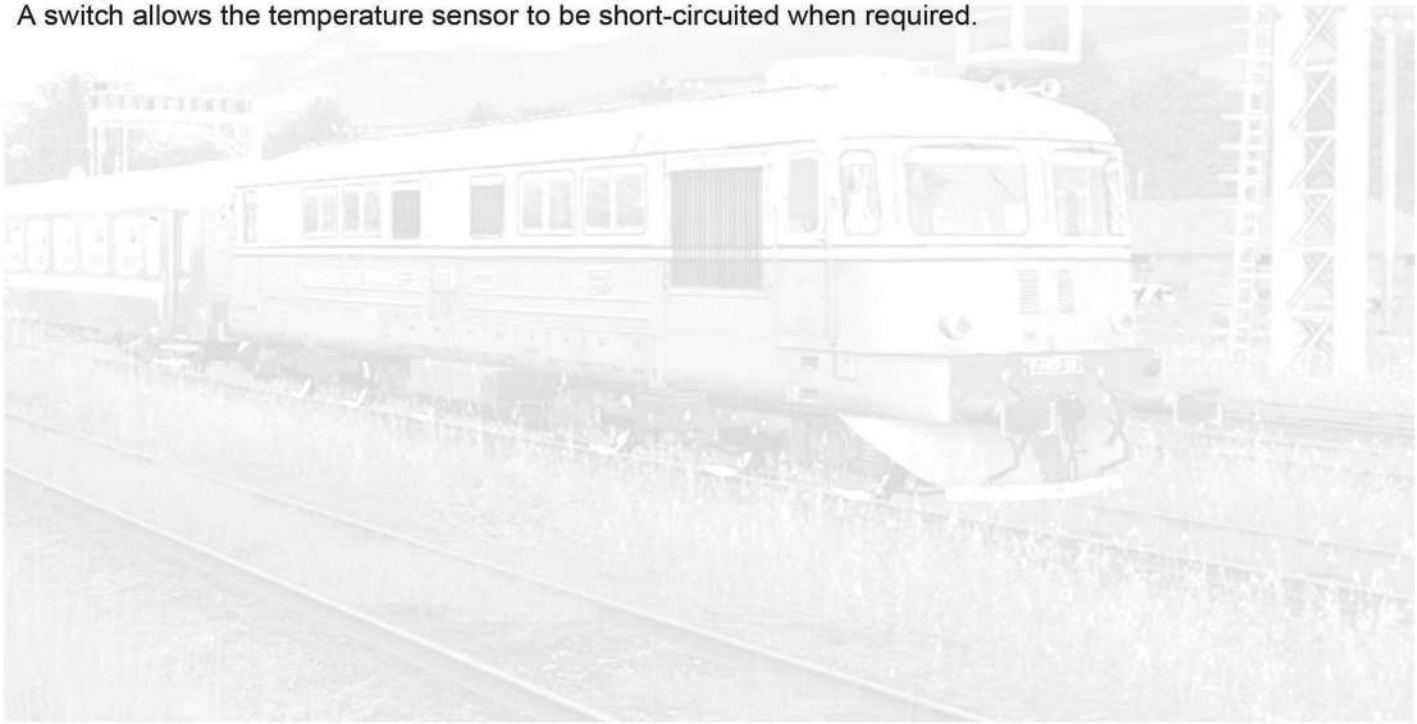
OVERVIEW

The product is designed and manufactured to cool the equipment in the machinery room and the S7 and S8 electrical compartment of the LE 5100KW electric locomotive.

TECHNICAL SPECIFICATIONS

Power of installation	55W
Supply voltage	380VAC
Hot air flow	1090mc/h
Ventilator power	55W (at 48VDC)
Ventilator speed	2950 rev/min
Weight	6 kg
Overall dimensions (mm)	324,5x253x183 324,5X253X153

The electrical ventilation installation is provided with a temperature sensor which controls the operation only if the ambient temperature is higher than 25 ° C.
A red-green LED indicates operation when temperature t > 25 °C.
A switch allows the temperature sensor to be short-circuited when required.



ADAPTERS WITH GALVANIC SEPARATION

FOR DIRECT CURRENT

ASGA24-10÷17 FEATURES

ASGA24 assures transmission to the automation equipment, in unified (4 ... 20) mA system with galvanic separation, of the current information taken from the external direct current shunt.

Code	ASGA 24-10	ASGA 24-11	ASGA 24-12	ASGA 24-13	ASGA 24-14	ASGA 24-15	ASGA 24-16	ASGA 24-17
Input signal (other values on request)	(-45…+45) VDC	(0…+45) VDC	(-60…+60) VDC	(0…+60) VDC	(-75…+75) VDC	(0…+75) VDC	(-100…+100) VDC	(0…200) VDC
Output signal	(4…20)mA							
Supply voltage	(12…36) VDC common circuit with the output circuit							
Operating temperature range	(-25….+70)°C							
Degree of protection	IP20							
Overall dimensions (L x W x D)	(111 x 19 x 76) mm							
Weight	0.1 kg							
Input reverse voltage protection	Yes							

FOR DIRECT CURRENT

ASGA24-20÷27 FEATURES

ASGA24 assures transmission to the automation equipment, in unified (4 ... 20) mA system with galvanic separation, of the current information taken from the external direct current shunt.

Code	ASGA 24-20	ASGA 24-21	ASGA 24-22	ASGA 24-23	ASGA 24-24	ASGA 24-25	ASGA 24-26	ASGA 24-27
Input signal (other values on request)	(0…+40) VDC	(0…+250) VDC	(0…+350) VDC	(0…+1000) VDC	(0…+250) VAC (TRMS)	(0…+440) VAC (TRMS)	(0…+32) VDC	(0…+100) VDC
Output signal	(4…20)mA							
Supply voltage	(12…36) VDC common circuit with the output circuit							
Operating temperature range	(-25….+70)°C							
Safety class	IP20							
Overall dimensions (L x l x h)	(111 x 19 x 76) mm							
Weight	0.1 kg							
Input reverse voltage protection	Yes							

BENEFITS

- Wide input voltage range
- Two-wire system
- Possibility of taking bipolar signals/TRMS
- High separation voltage

ADAPTERS WITHOUT GALVANIC SEPARATION

A3UI FOR TENSION-CURRENT

REFERENCES

- LDH 1250 –Diesel Hydraulic Locomotive (1250 HP)
- LDH 700 –Diesel Hydraulic Locomotive (700 HP)
- LDH 450 –Diesel Hydraulic Locomotive (450 HP)
- LDH CI –Narrow gauge Diesel Hydraulic Locomotive
- LDE 2100 –Diesel Electric Locomotive (2100 HP)
- LDE 1250 –Diesel Electric Locomotive (1250 HP)
- LE – Electric Locomotive

FEATURES

A3UI contains 3 channels of voltage signal conversion (0 ... 10) V in standard current signal (4 ... 20) mA without galvanic separation.

BENNEFISTS

- Wide input voltage range
- Possibility to convert three different signals;
- Status indicator for each output;
- Extended operating temperature range.

TECHNICAL DATA

Code	A3UI
Number of entries	3
Number of outputs	3
Supply voltage	(16…32) VDC
Operating temperature range	(-25….+70)°C
Degree of protection	IP20
Overall dimensions (L x W x D)	(111 x 19 x 76) mm
Weight	0.1 kg

LED EXTERIOR DISPLAYS

AFLE 144X64P4, 94X48P4

REFERENCES

- passenger car Class 2176 for Astra TRANS CARPATIC

PRODUCT INFORMATION

Displays for passengers' information regarding the train's traffic (number of train, destination, route, coach number). Mounted outside the cars, the system has a monochromatic LED display with 144x64 or 96x48 resolutions.

BENEFITS

- Large range of power supply voltages;
- Galvanic separation between power supply and chassis;
- Serial communication with galvanic separation;
- Wide operating temperature range;
- Low power consumption;
- Wide area display at good resolution;
- Automatic brightness adjustment

TECHNICAL DATA

Code	AFLE 144X64	AFLE 96X48
Resolution	144 x 64	96 x 48
Pitch	4 mm	
Pixel diameter	3 mm	
Display mode	LED	
LED colour	Yellow (590 nm)	
Brightness/pixel	91 mcd/10mA	
Operating temperature range	(-25….+75)°C; on request (-40….+70)°C	
Dimensions (L x W x D)	(852.5 x 464 x 59) mm	(674 x 326 x 41) mm
Weight	18 kg	7 kg
Supply voltage	(16.8 ÷ 32)VDC	
Degree of protection	IP21	IP20
Reverse polarity protection	Yes	

LED INTERIOR DISPLAYS

AFLI 224x16P4

REFERENCES

- passenger car

PRODUCT INFORMATION

Displays for passengers' information regarding the train's traffic (number of train, destination, route, coach number). Mounted inside the coaches, the system has a monochromatic LED display with 224x16 resolutions.

BENEFITS

- Large range of power supply voltages;
- Galvanic separation between power supply and chassis;
- Serial communication with galvanic separation;
- Wide operating temperature range;
- Low power consumption;
- Wide area display at good resolution;
- Automatic brightness adjustment

TECHNICAL DATA

Code	AFLI 224X16P4
Resolution	224 x 16
Pitch	4 mm
Pixel diameter	3 mm
Display mode	LED
LED colour	Yellow (590 nm)
Brightness/pixel	91 mcd/10mA
Operating temperature range	(-25…+55)°C; on request (-40…+70)°C
Overall dimensions (L x W x D)	(948 x 129 x 79) mm
Weight	7 kg
Supply voltage	(16.8…32)VDC
Degree of protection	IP20
Reverse polarity protection	Yes

CANOPEN / RS485 DIGITAL INPUT-OUTPUT MODULES

8ID8OD CANO;16ID CANO;8ID8OD CANO+RS485;16ID CANO+RS485

REFERENCES

- LDH 1250 –Diesel Hydraulic Locomotive (1250 HP)
- LDH 700 –Diesel Hydraulic Locomotive (700 HP)
- LDH 450 –Diesel Hydraulic Locomotive (450 HP)
- LDH CI –Narrow gauge Diesel Hydraulic Locomotive
- LDE 2100 –Diesel Electric Locomotive (2100 HP)
- LDE 1250 –Diesel Electric Locomotive (1250 HP)
- LE – Electric Locomotive
- SACDT – ASTRA Transcarpatic coach

PREZENTARE

Modulele SLAVE CANO asigură prelucrarea semnalelor de intrări-ieşiri digitale, în sistem 24Vcc, în regim SLAVE CANOpen.

BENEFITS

- Wide input voltage range;
- Galvanic separation between power input and chassis;
- Serial communication with galvanic separation;
- Possibility to convert three different signals;
- Extended operating temperature range;

TECHNICAL DATA

Code	8ID 8OD CANO	16ID CANO	8ID 8OD CANO+RS485	16ID CANO+RS485
Number of entries	8	16	8	16
Number of outputs	8	-	8	-
Supply voltage	(16.8…32)VDC			
Operating temperature range	(-25…+55)°C; on request (-40…+70)°C			
Degree of protection	IP21			
Overall dimensions (L x W x D)	109 x92 x 46 mm; 109 x 106 x 46 mm with connectors			
Weight	0.4 kg			
Serial communication	CANOpen		CANOpen+RS485	
Detection of short-circuit output	Yes			
Reverse power supply protection	Yes			

CANOPEN / RS485 DIGITAL INPUT-OUTPUT MODULES

8IA CANO;8IA CANO+RS485

REFERENCES

- LDH 1250 –Diesel Hydraulic Locomotive (1250 HP)
- LDH 700 –Diesel Hydraulic Locomotive (700 HP)
- LDH 450 –Diesel Hydraulic Locomotive (450 HP)
- LDH CI –Narrow gauge Diesel Hydraulic Locomotive
- LDE 2100 –Diesel Electric Locomotive (2100 HP)
- LDE 1250 –Diesel Electric Locomotive (1250 HP)
- LE – Electric Locomotive

FEATURES

The SLAVE CANO modules provide processing digital inputs / outputs, in a 24 V DC system, in the SLAVE CANOpen mode.

BENEFITS

- Wide input voltage range;
- Galvanic separation between power input and chassis;
- Serial communication with galvanic separation;
- Possibility to convert three different signals;
- Extended operating temperature range;

TECHNICAL DATA

Code	8IA CANO	8IA CANO + RS485
Number of entries	8	8
Number of outputs	-	-
Input type	12 bit	
Supply voltage	(16.8…32)VDC	
Operating temperature range	(-25…+55)°C; on request (-40…+70)°C	
Degree of protection	IP21	
Overall dimensions (L x W x D)	109x92x46 mm; 109x106x46 mm with connectors	
Weight	0.4 kg	
Serial communication	CANOpen	CANOpen+RS485
Detection of short-circuit output	Yes	
Reverse power supply protection	Yes	

GNSS RECEIVER MODULE WITH CANO OR RS485 COMMUNICATION PORT

Rolling stock

APPLICATIONS

- Passenger Information System
- Clocking networks;
- Fleet Management

BENEFITS

- System support: GPS, GLONASS, GALILEO, BeiDou
- Wide input voltage range;
- Galvanic separation between power input and chassis;

TECHNICAL DATA

Main characteristics	MRGPS-24CAN-485	
Acceleration	4g	
Altitude	50.000	
Speed	500 m/s	
Input for active antenna	3.3VDC	[3,30]mA
CANOpen communication	Type D connector Sub15	
Transfer Rate (bps)	10 k, 20 k, 50 k, 125 k, 250 k, 500 k	
Terminal resistance		
ID node	1-127	
PDO number	Max. 4 Rx 4 Tx	
PDO mode	Triggered	
Error test	Heartbeat Protocol	
Emergency message	Yes	
RS485 communication	DB15 connector	
Protocol	NMEA	GGA, RMC, GSV
Operating Voltage	(16.8…32)VDC	
Consumption	0.1A/24VDC	
Galvanic separation voltage	750VAC, 50Hz, 1min.	
Overvoltage protection on power supply	Yes	
Reverse power supply protection	Yes	
Operating temperature range	(-25….+75)°C	
Storage temperature range	(-40….+85)°C	
Overall dimensions (L x W x D)	(100 x 108,5 x 46) mm	
Weight	Max. 0.4 kg	
Degree of protection	IP21	

CONTROL, DIAGNOSIS AND AUTOMATION SYSTEM FOR GENSET

PRODUCT INFORMATION

- The installation is designed to ensure the start and stop of the genset.
- The installation ensures the diagnosis of the genset and keeps warm the coolant of the cooling circuit to protect against frost and ensure optimum start-up at any time.
- System control as well as diagnostic and operation data can be remotely controlled via WIFI/GSM.

IEMC 10.5

* Electric installation to keep warm diesel engine.

- Maintain warm the coolant from the diesel engine cooling circuit when diesel engine is stopped;
- Mounted on genset frame.

BATTERY CHARGER

- Ensures the charging of batteries that equip the genset and keep them in charged state.

- Mounted near IEMC or in the electric cabinet.

ELECTRIC PANEL

* Contains the electrical/electronic equipment for:

- Automatically starts the genset in case of supply failure;
- Automatically stops the genset when the supply is re-started;
- Control and supervise the diesel engine and the alternator;
- Safety and emergency systems.

WI-FI/GSM COMMUNICATION

- By request, the system may be equipped with:
- A WiFi modem if the command centre is located on the same premises with the gen sets or a GSM modem if the command center is located away from the gen sets, for the transmission of diagnosis data and parameters to a control center;

- Copper or fiber optic communication network for transmitting diagnostic data and parameters to a control center.

ELECTRICAL CABINETS AND PANELS

We design and manufacture electrical cabinets and panels for rolling stock.

The electrical cabinets are equipped with the automation, control, diagnosis and communication systems of the vehicle. They are delivered with functional checks and insulation resistance measurements, respectively dielectric rigidity.

Electrical panels for passenger cars

1st and 2nd class coach Class ADH

1st and 2nd class coach Class ADK

Bilevel rail car Class 3616

Bilevel rail car Class 2616

1st class coach Class REGIOJET

Bilevel unit car Class 1617

Coaches Class AEN, AEM, AED, AER, AEZ, AES, AEQ (Brazil)

For TRANSCARPATIC:
Sleeping car Class AFE,
Couchette car Class AFE,
Couchette car with steward compartment Class AFE,
Saloon coach Class AFE/G

Electrical cabinets and panels for railcars

Railcar
Class 900

Railcar Class 700
and Class 1000

Railcar
Class LVT

Electrical cabinets and panels for locomotives

Electrical panel
for generator

General
electric panel

Group CONVAR

HMI FOR DRIVER's DESK

Type:
RM1401

Type:
CR1050,
CR1051

Type:
MFD10/1e,
MFD10/4E

Type:
MFT1S1dys

Type:
400052355

Type:
ICT-30.02/AV1

I/O MODULES

Type:
8ID 8OD
Manufacturer
TEHMIN-
BRASOV

Type:
16ID
Manufacturer
TEHMIN-
BRASOV

Type:
8IA
Manufacturer
TEHMIN-
BRASOV

Type: DIO

Analogue Input module
Type: AIT 701-T

Digital I/O module
DOT 701-T

DYSPLAYS MODULES FOR PASSENGER INFORMATION SYSTEM

External display

Interior display

External display

External display

Exterior display

Exterior display

Exterior display
Type: BS 308C9GD

Exterior display
Type: AFLE 144x64
Manufacturer
TEHMIN-BRASOV

Exterior display
Type: AFLE 96x48
Manufacturer
TEHMIN-BRASOV

Interior display
Type: AFLE 224x16
Manufacturer
TEHMIN-BRASOV

DOOR CONTROL UNITS

Type:
3EST000202

Type:
MT24/E

Type:
MT24-2

Central unit
Type: TZG4

Type:
PMC20

Type:
MDC-24RS4

TOILET SYSTEM CONTROLLER

Type:
PDC100

Type:
PDC110

Type:
22177

Type: A/C

HVAC CONTROLLERS

Type:
FPC24-2

Type:
FPC24

Type:
KS101

LIGHTING CONTROLLERS

Converter for exterior lighting

Converter for exterior lighting

Power supply unit
Type: 22230

CONTROL OF REVERSE GEAR UNIT

Control of reverser device mounted inside gear box

Control of reverser device mounted outside gear box

AUXILIARY POWER SUPPLY UNITS

Auxiliary power supply

Battery charger unit

Battery charger unit

Mobile battery charger unit
Manufacturer:
TEHMIN-BRASOV

Battery charger unit
Type: 1500/230/24
Manufacturer:
TEHMIN-BRASOV

Battery charger unit
Type: 230/170-8
Manufacturer:
TEHMIN-BRASOV

DC – DC CONVERTERS

Type:
PB0793

Type:
PB0845

Type:
BQ2320-7R

Type: 170/530 6kW
Manufacturer:
TEHMIN-BRASOV

Type: 144/24V –
12A144/24V – 20A
Manufacturer:
TEHMIN-BRASOV

DC-AC INVERTERS

Inverter for auxiliary
motors
Type: WD254-24

Type:
24V DC/230VAC

CENTRAL UNITS FOR PASSENGER INFORMATION SYSTEM

Automatic acoustic
announcement unit
Type: V108995

Automatic acoustic
announcement unit
Type: METROVOX 2000

Automatic acoustic
announcement unit
Type: METROVOX MVX013

Control unit for route display
Type: ERIC+

Audio amplifier
Type: SS-CF-46

Control unit
Type: FT 95

FULLY ASSEMBLED CIRCUIT BOARDS

MD board
Type: FCB1-01/A

MD board
Type: MPU23-03
EURO1

MD board
Type: MPU23-03
EURO2

MD board
Type: MFB1-01/A

MD board
Type: AIB1-02

MD board
Type: IIB-01

MD board
Type: BOB2-02

Socket board Type:
5285301169

Fibber optic control
board
Type: HIET 404236

Pulse shaper board
Type: HIET 301068

Download board
Type: 3EHL 409055

Download board
Type: 3EHL 400963

Download board
Type: 3EHL 400462

GTO GATE DRIVE UNITS

Type:
HIEE 454149

GATE DRIVE
UNITS
Type: DYTP140A

PROGRAMABLE CONTROLLERS

Type:
PEP ASMC 1478 14339

Extension for digital I/O
Type: DDT732-TG/0,5A

Type:
CPU 727DT

Central unit
Type: CPU 727-T

Process Module
Type: DDC 712-T

TRACTION INVERTER

Type:
3EHN400150

SPEED TRANSDUCERS

Speed transducer

Axle Generator

VOLTAGE REGULATOR

Type: RD100

ELECTRIC MACHINES

Electric generator

Fuel pumps and oil pumps

MASTER CONTROLLERS

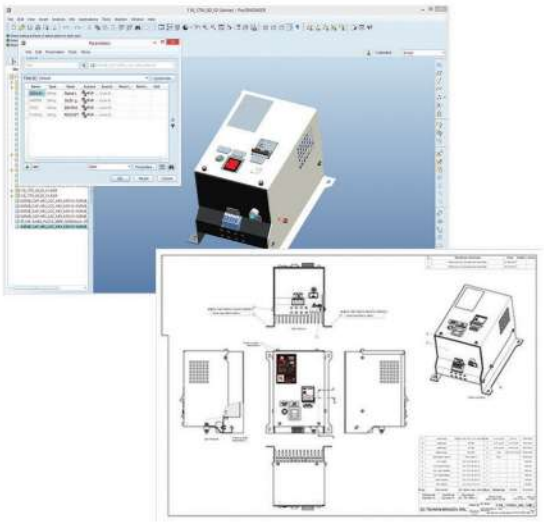
OTHER EQUIPMENT

3-way valve

Passenger speaker
Type: FGS5

Electrical wiring connections

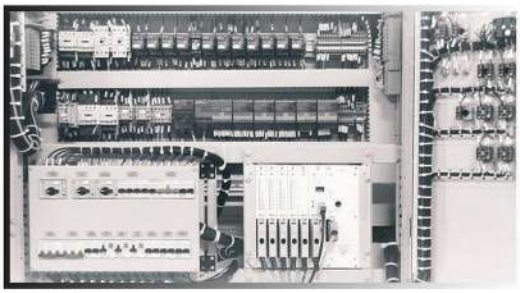
Handset equipment and radio units for driver cab



MECHANICAL DESIGN

We offer 3D design and modelling solutions for the shape and functionality of railway products; on the other hand we are able to apply our expertise in other industrial fields, too. Using licensed software such as Pro/E, Pro/E Wildfire and AutoCAD, our design team offers design and assembly drawings in according with the complexity of every product.

We design different mechanical items such as:
- New products or improvements to existing products in the railway field: control desks, electrical panels, ventilation systems;
- Metal structures: housings, workbenches, welded structures with pipes or pipelines;
- Other metal products: access stairs, handrails, walkways.



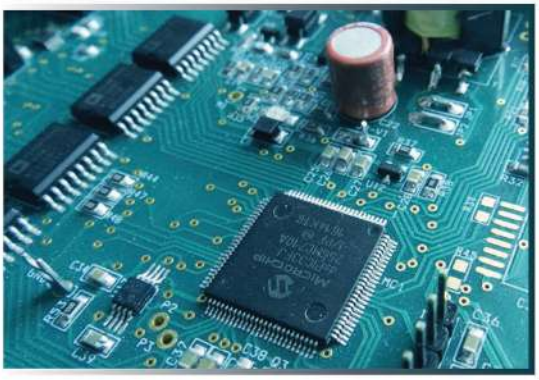
ELECTRICAL DESIGN AND AUTOMATION

The evolution of the company in the railway field offers technical solutions chosen by a team with experience in specific fields of the railways and rolling stock. During the years, our team has managed very complex situations of designing and commissioning different installations.

ELECTRONIC DESIGN

We offer electronic concepts and design for railway applications. Using licensed software, including OrCAD and Verilog, our designers delivers the package required to manufacture the PCB required by the customer.

We design different electronic PRODUCTS such as:
- Printed circuit boards with SMD inserting (services included in functional testing with our equipment);
- Communication devices (GSM, RS485, CAN etc.);
- Electronic schemes: layout and design, technical documentation, power electronics, digital electronics;
- Other products: static sources, electronic modules programmed for many applications.



SOFTWARE AND HARDWARE

TEHMIN-BRASOV develops products that include software and hardware applications using:

- A wide range of software development tools: MPLAB, AVR Studio, LABVIEW, C #, PYTHON, C / C ++, QT, CODESYS, ISA GRAF, CAP, ARENA;
- Databases: ACCESS, MYSQL, SQLITE;
- Communication protocols: TCP/ IP, CANO, MODBUS, J1495, UDP, HTTP, FTP, SOAP.

TEHMIN®
BRAŞOV

INNOVATIVE SYSTEMS
FOR ROLLING STOCK

OUR CERTIFICATIONS:

Certificate

Standard **ISO 9001:2015**

Certificate Registr. No. 01 100 1521122

TÜV Rheinland Cert GmbH certifies:

Certificate Holder: **S.C. TEHMIN BRAŞOV S.R.L.**
Str. Tudor Vladimirescu nr. 47
RO-507015 Bod, jud. Braşov

Scope: Design, manufacture and repair of electrical, electronic and thermal installations for railway vehicles.

An audit was performed, Report No. 1521122. Proof has been furnished that the requirements according to ISO 9001:2015 are fulfilled.

Validity: The due date for all future audits is **17 of September**.
The certificate is valid from **2018-09-15** until **2019-10-11**.

2018-09-18

TÜV Rheinland Cert GmbH
Am Grauen Stein · 51105 Köln

www.tuv.com

DAkkS Deutsche Akkreditierungsstelle D-ZM-16031-01-00

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Genau. Richtig.

AUTORITATEA FEROVIARĂ ROMÂNĂ
Bucuresti, Calea Grivitei nr. 393, sector 1

AUTORITATEA FEROVIARĂ ROMÂNĂ, organism de certificare funcționând în baza Hotărârii Guvernului României Nr. 626 / 1998 cu modificările și completările ulterioare

acreditat pentru CERTIFICARE
RENAR
SR EN ISO / CEI 17021-1: 2015
CERTIFICAT DE ACREDITARE
SM 009

AFER

ORGANISMUL DE CERTIFICARE
A SISTEMELOR DE MANAGEMENT OCSM - AFER

CERTIFICAT

SERIA SMC, NR. 230

Organismul de certificare a sistemelor de management atestă că:

S.C. TEHMIN-BRAŞOV S.R.L.
Bod, Str. Tudor Vladimirescu nr. 47, jud. Braşov

are implementat și menține **un sistem de management al calității** conform cerințelor standardului:

SR EN ISO 9001 : 2015

pentru domeniile de activitate:

- **Proiectare, execuție și reparații echipamente electronice, electrice și termice pentru vehicule feroviare – (din C 3020).**

Certificatul de conformitate este valabil în condițiile supravegherii exercitate de OCSM-AFER.

DIRECTOR GENERAL
Constantin ANDRONACHE

PREȘEDINTE
COMISIE DE CERTIFICARE
Mircea Cristian ARNĂUTU

Data certificării inițiale: 25 martie 2015
Data certificării curente: 27 iulie 2018
Prezentul certificat este valabil până la data: 26 iulie 2021

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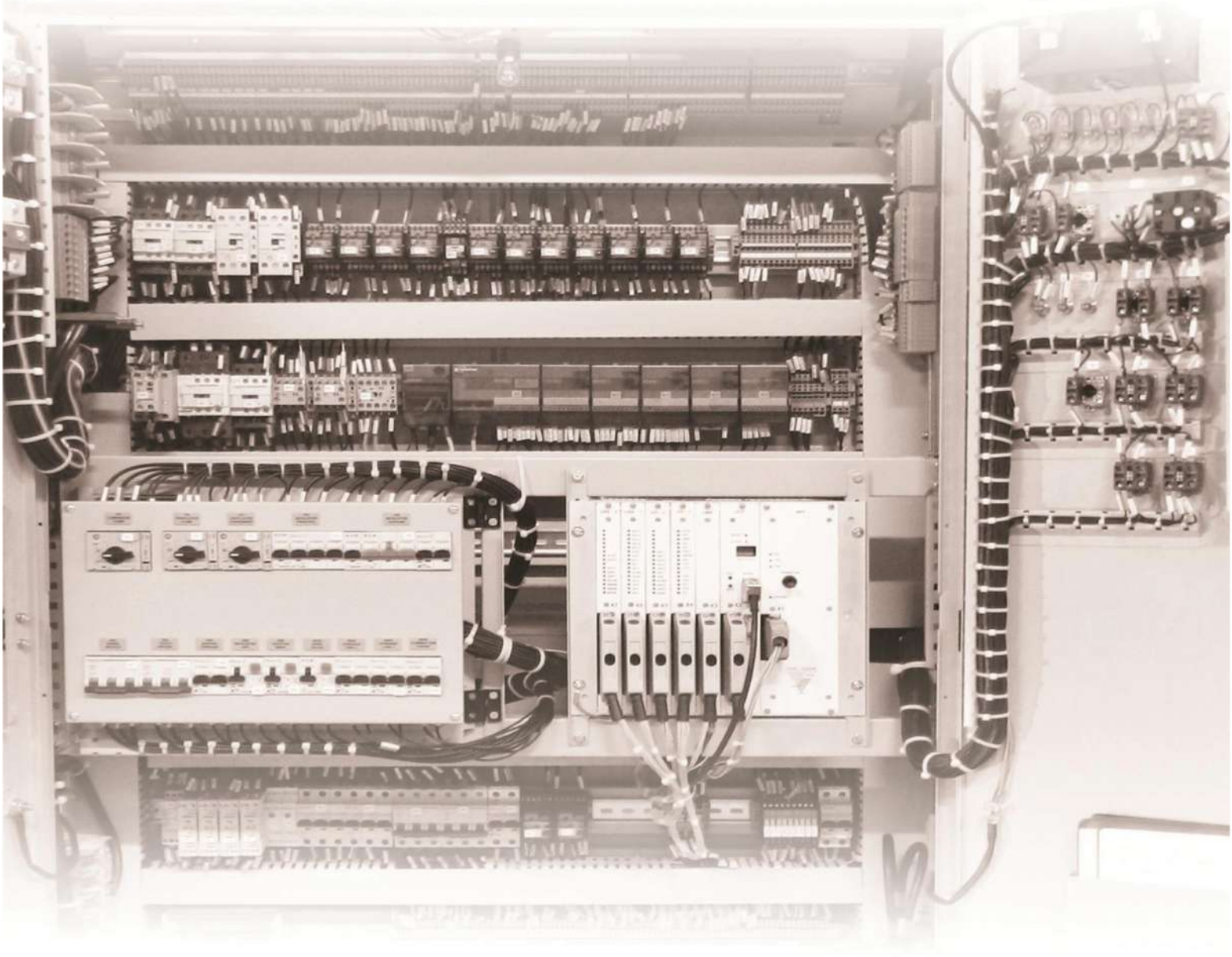
BRAŞOV

INNOVATIVE SYSTEMS FOR ROLLING STOCK



TCMS (TRAIN CONTROL MANAGEMENT SYSTEMS)
ETHERNET COMMUNICATION SYSTEMS
SOFTWARE
PASSENGER INFORMING SYSTEMS
BATTERY CHARGING STATIONS
ELECTRICAL ENCLOSURES
STATIC CONVERTERS
PREHEATING SYSTEMS FOR DIESEL ENGINES
AUTOMATION MODULES
COOLING SYSTEMS
DRIVER DESKS AND CONTROL
REPAIRING SERVICES
GPS MODULES

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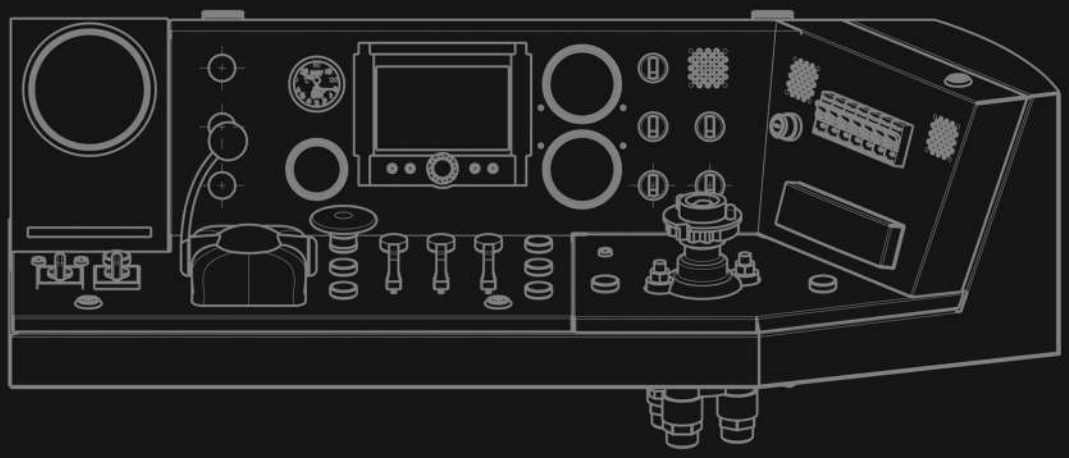

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