

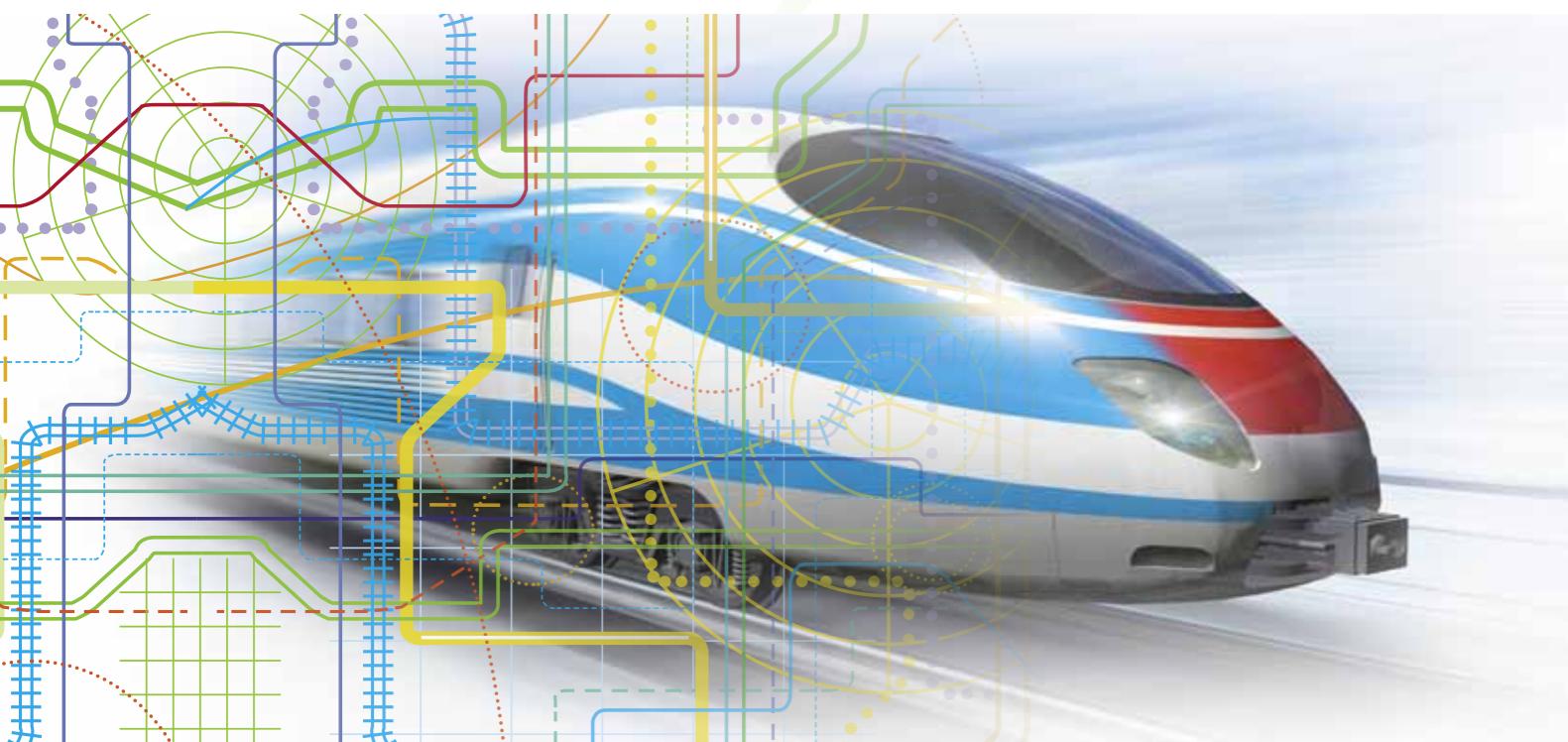
Systems and devices for rail vehicles



Product catalogue 2013

UniControls
Transport and Industrial Control Systems

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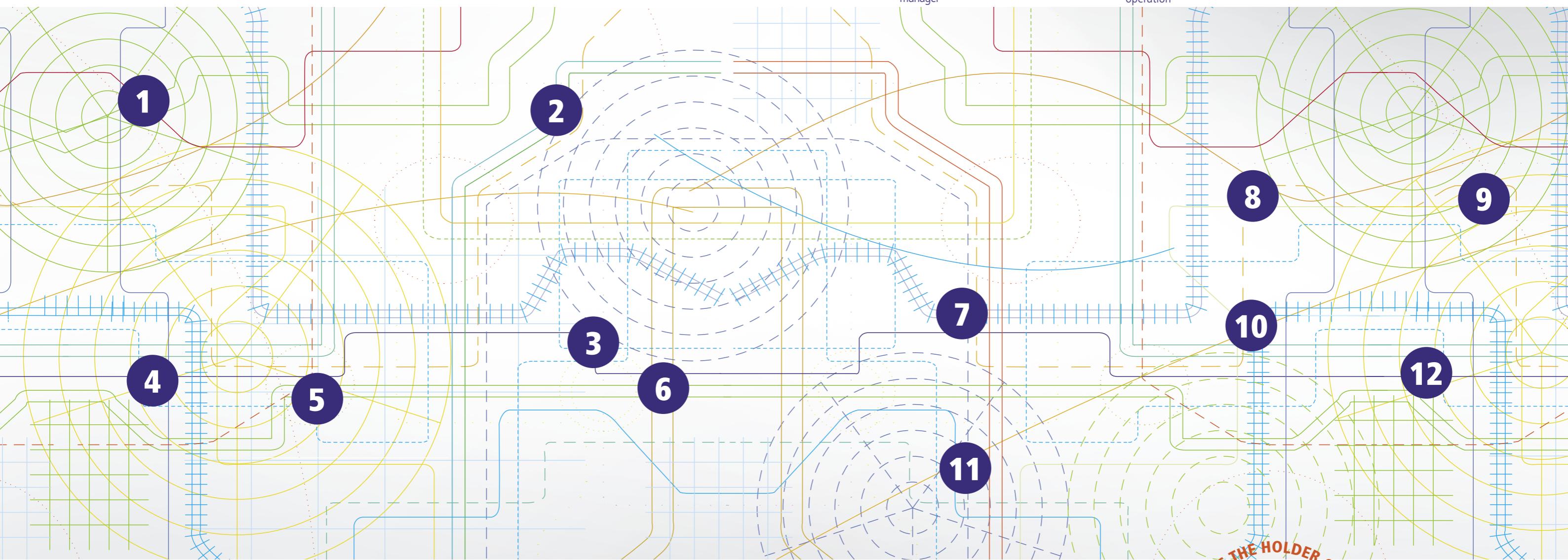
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Company profile

Since its establishment in 1991, UniControls has been systematically engaged in the development, production and installation of control systems and electronic equipment in the field of rail transport and industrial control. It specializes in applications requiring high reliability in harsh working environments. The course in the direction of high innovative products corresponds to the company's goal; to be a reliable and reputable supplier of complete solutions for its customers.

- 1 The development and manufacture of electronic equipment for modern rail vehicles
- 2 Complete delivery of control systems for rail vehicles and trains including their on-board communication infrastructure
- 3 Wide applicability in electric and diesel multiple units, electric and diesel-electric locomotives and coaches
- 4 The integration of on-board systems into the telematic applications of the railway operator or infrastructure manager
- 5 Solutions tailored for a particular customer and type of the vehicle
- 6 Economical solutions for refurbished rail vehicles
- 7 Bespoke development of hardware and software
- 8 Full customer support in all phases of the product's life cycle – development, commissioning and operation
- 9 Solutions for interoperable vehicles compliant with international standards
- 10 High quality warranty through thorough output testing including heat cycles applied to every piece of manufactured equipment
- 11 Member of associations and standardization working groups dealing with railway technology
- 12 Holder of IRIS, ISO 9001:2009, ISO 14001:2005 certificates



04 In the sign of innovation

UniControls have purposefully increased the portfolio of its products and services so as to offer a wide assortment of control systems and electronic equipment for both new rolling stock and modernizations.

Focus is placed on the high reliability and long-term availability of the products, and the innovative approach and compliance with standards is emphasised.

This is the reason why 25% of the company's 200 employees are involved in the

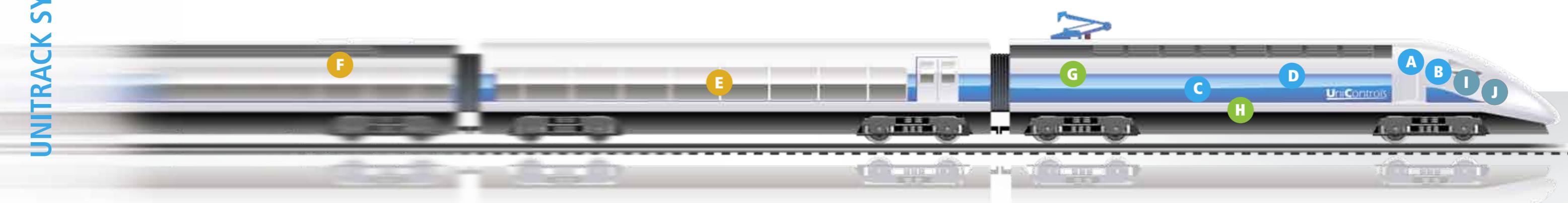
development of new products. The company is export-oriented, and the company's systems have been in successful, long-term operation in numerous countries both in and outside Europe.

UNICONTROLS IS THE HOLDER OF CERTIFICATES

IRIS
ISO 9001
ISO 14001

UNITRACK

Provides key functions and integrates equipment in trains



A UNITRACK TCMSe
is a platform to implement the control, monitoring and diagnostic functions at vehicle and train levels. It integrates the main processing unit, display units, I/O systems and the communication infrastructure consisting of Ethernet, MVB and CAN networks. With the use of wireless networks, it ensures data transmission between the train and ground systems.



B UNITRACK TCMS
implements control, monitoring and diagnostic functions at vehicle and train levels. It integrates the main processing unit, display units, I/O systems and the communication infrastructure; consisting of TCN, Ethernet and CAN networks. With the use of wireless networks, it ensures data transmission between the train and ground systems.



C UNITRACK DIESEL
is a complete control system for diesel-electric locomotives that is based on TCN communication infrastructure. It provides vehicle control functions including monitoring and diagnostics with wireless data transmission to ground systems. For an efficient and smooth regulation of traction motors it uses advanced control algorithms.

OVERVIEW OF UNITRACK SYSTEMS

Control & diagnostics

UNITRACK TCMS
UNITRACK TCMSe
UNITRACK DIESEL
UNITRACK TELEDIAG

Information & security

UNITRACK PIREDI
UNITRACK CAM

Energy consumption

UNITRACK EMS
UNITRACK FUEL

Driver support

UNITRACK ETD
UNITRACK ASIS



G UNITRACK EMS
is an energy measuring system for both DC and AC traction vehicles. The values measured can serve both for the evaluation of operational effectiveness from the viewpoint of electricity consumption and as input data for the billing system on the basis of actual electrical energy consumption.



H UNITRACK FUEL
is a system for the monitoring and registration of fuel consumption of diesel rail vehicles. The consumption data can be used for vehicle operation planning, the assessment of the status of a diesel engine and for the detection of leakage or theft of fuel.



D UNITRACK TELEDIAG
is an autonomous diagnostic system which collects train data, processes it to detect faults and stores the diagnostic results. It ensures the wireless transmission of the diagnostic data to the ground server to provide it for the applications of railway operators, the infrastructure manager or the vehicle manufacturer.



E UNITRACK PIREDI
is a comprehensive passenger information, reservation and diagnostic system suitable for all types of passenger transport from urban to long-distance trains. Based on a scalable and modular architecture, it can be easily adapted to diverse train operator requirements. It complies with UIC 176 Leaflet, and relevant technical specifications for interoperability.



F UNITRACK CAM
is an on board network video surveillance system for real-time monitoring of passenger compartments, doors and platform using both indoor and outdoor cameras. The system is based on video streaming over Ethernet which connects IP cameras and network video recorders.



I UNITRACK ETD
outputs timetables, track and station characteristics and driving instructions for the driver on an ETD display. These, in addition to other documents provided in electronic form, are replacing the printed documents which had to be at the driver's disposal during missions.



J UNITRACK ASIS
integrates functionality provided by an electronic timetable system with a driver advisory function. This function recommends the travel speed and driving actions for the driver to achieve minimum energy consumption while adhering to the timetable.

UNITRACK TCMSe

Train Control and Monitoring System



2.1 CONTROL & DIAGNOSTICS



FEATURE HIGHLIGHTS

- TCN based standard solution
- Ethernet train backbone and consist networks
- Large variability of connection with other train systems
- Wireless data transmission in GSM/GSM-R/UMTS and WiFi networks
- Processing and display units programmable in PLC and C/C++ languages
- Remote and local I/Os for analogue and logical signals
- Redundancy of critical components
- Rich diagnostic functionality

DESCRIPTION

The UNITRACK TCMSe is a robust, modular and scalable platform for building a Train Control and Monitoring System (TCMS) tailored to customer needs. It provides communication network, equipment and tools that allow easy integration of functions delivered by on-board systems. The system offers redundancy of all critical components to ensure high reliability and availability.

The UNITRACK TCMSe provides train-wide and in vehicle (consist) communication using Ethernet networks as specified in the TCN standard IEC 61375. The Ethernet and IP technologies allows for seamless communication and integration of end devices without using communication protocol convertors. On consist level both linear and ring topologies are supported; the latter one greatly reduces network failures.

The UNITRACK TCMSe offers wireless data transmission in GSM/GSM-R/UMTS and WiFi networks to allow the train equipment to exchange data with ground systems. The communication op-

tions are extended by MVB and CANopen buses, also specified in the TCN standard, and by a number of serial lines.

The control and diagnostics functions of TCMS are performed by its processing units, display units and I/O systems. Their programming is greatly simplified by using UniCAP IDE, a tool for developing applications and GUI in PLC languages according to the IEC 61131-3 standard. In device logging and remote access over Ethernet further speeds up development and resolving possible problems.

Components

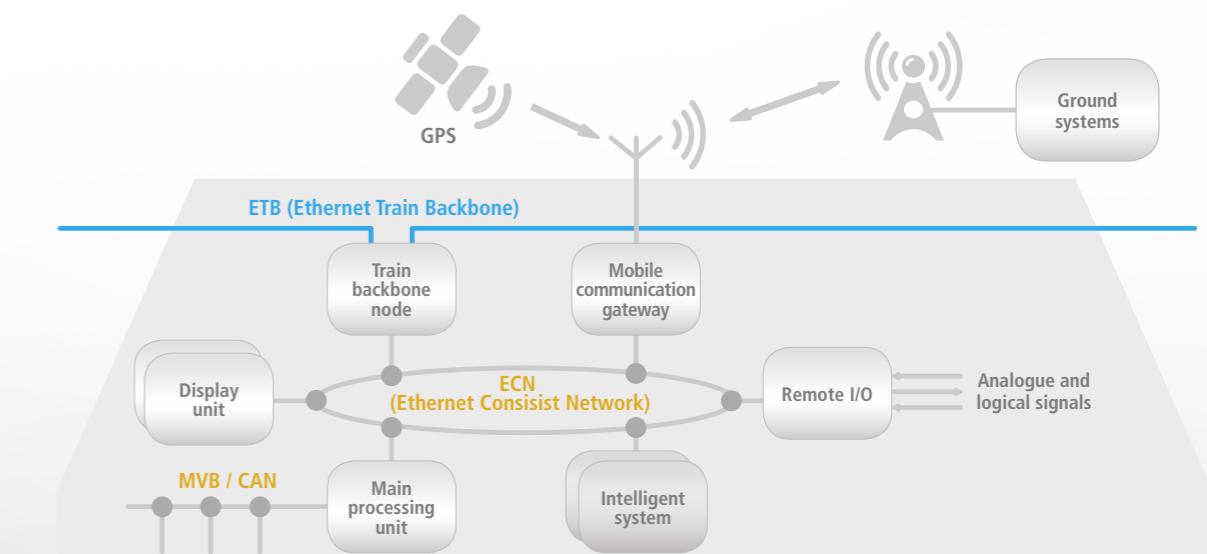
- Main processing units (VCU01, UniNOD Compact)
- Display units (DISPL-1)
- Train backbone node (EBN-600)
- Managed and unmanaged Ethernet switches
- Mobile communication gateway (TLR-2)
- Local and remote I/O systems (RIO, RIO-300)

Connectivity

- Ethernet 10Base-T/100Base-TX
- GSM/GSM-R/UMTS and WiFi wireless networks
- MVB bus with bus administration capability
- CAN bus supporting CANopen or J1939 protocols
- RS-232/422/485 serial lines

Environment

- Power supply voltage 24V, 48V, 72V or 110V DC $\pm 30\%$
- Operating temperature -40°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days



STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155,
EN 61373, IEEE 802.3, IEEE 802.11,
IEC 61375, EN 50325-4, UIC 612

2

UNITRACK SYSTEMS

2.1.2

UNITRACK TCMS

Train Control and Monitoring System



2.1 CONTROL & DIAGNOSTICS



FEATURE HIGHLIGHTS

- Based on WTB train bus and MVB vehicle bus
- Large variability of connection with other train systems
- Wireless data transmission in GSM/GSM-R/UMTS and WiFi networks
- Processing and display units programmable in PLC and C/C++ languages
- Remote and local I/Os for analogue and logical signals
- Redundancy of critical components
- Rich diagnostic functionality

DESCRIPTION

UNITRACK TCMS is a comprehensive train control and monitoring system (TCMS) based on the on-board network infrastructure according to the international standard IEC 61375 – Train Communication Network (TCN). By meeting the UIC 556 Leaflet requirements, it allows for the achievement of interoperability of railway vehicles produced by various manufacturers on the WTB bus.

With a robust, modular and scalable design, the UNITRACK TCMS system

can be easily adapted to various requirements. The system offers redundancy of all critical components to ensure high reliability and availability.

The UNITRACK TCMS provides complete communication infrastructure that connects electronic equipment between and within rail vehicles, and ensures data transmission between the train and ground systems with the use of wireless networks. The WTB is used as a train bus and the MVB as a vehicle bus. The latter can also have CAN seg-

ments with CANopen and J1939 protocols and possibly Ethernet segments.

The control and diagnostics functions of TCMS are performed by its processing units, display units and I/O systems. Their programming is greatly simplified by using UniCAP IDE, a tool for developing applications and GUI in PLC languages according to the IEC 61131-3 standard. In device logging and remote access over Ethernet further speeds up development and resolving possible problems.

Components

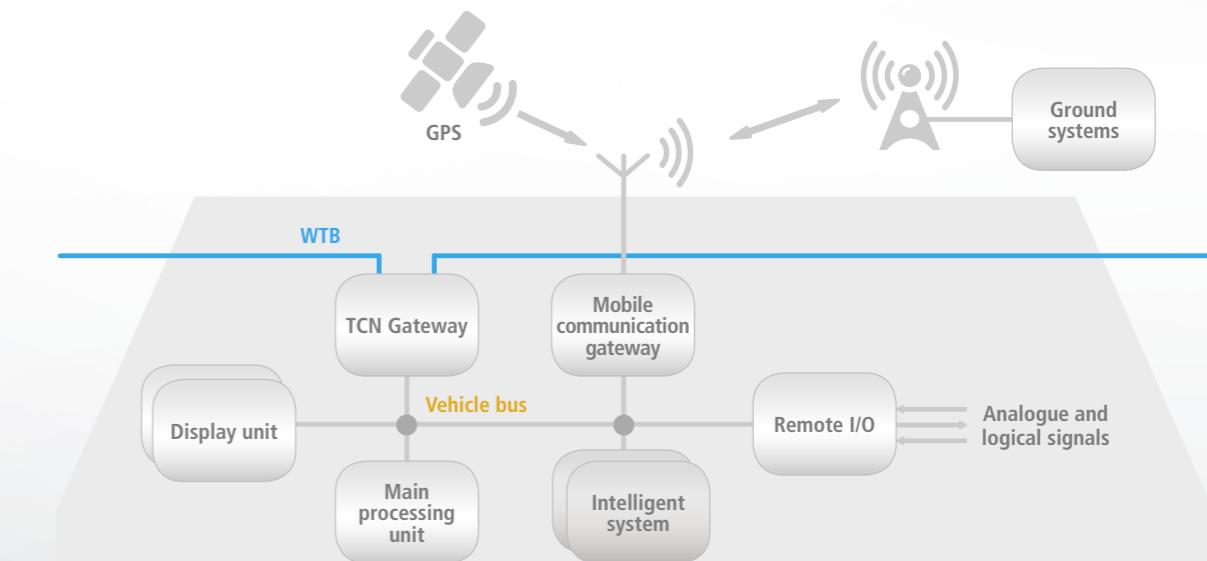
- TCN Gateway (TCN-GW01, TCN-GW03)
- Mobile communication gateway (TLR-2)
- Main processing units (VCU01, UniNOD Compact)
- Display units (DISPL-1)
- MVB/CANopen Gateway (MVB-CAN1)
- Local and remote I/O systems (RIO, RIO-300)

Connectivity

- WTB bus
- MVB bus with bus administration capability
- Ethernet 10Base-T/100Base-TX
- GSM/GSM-R/UMTS and WiFi wireless networks
- CAN bus supporting CANopen or J1939 protocols
- RS-232/422/485 serial lines

Environment

- Power supply voltage 24V, 48V, 72V or 110V DC ±30%
- Operating temperature - 40°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days



STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155, EN 61373, IEEE 802.3, IEEE 802.11, IEC 61375, EN 50325-4, UIC 556, UIC 612

UNITRACK DIESEL

Control System for Diesel-electric locomotives



2.1 CONTROL & DIAGNOSTICS



FEATURE HIGHLIGHTS

- Higher level control, monitoring and diagnostics
- Multiple-unit control and interoperability owing to TCN and UIC 556
- The control of DC and AC traction motors
- An anti-sliding and anti-skidding protection system
- Cruise control
- Redundancy of key components
- 10.4" colour LCD display
- Wireless transmission in the GSM/UMTS and WiFi networks

DESCRIPTION

UNITRACK DIESEL is a complete control system for diesel-electric locomotives. It provides higher level control functions including the monitoring and diagnostics of the diesel engine, electrical generator, traction motors, braking system, auxiliary drives and other vehicle systems. It includes multiple-unit control, cruise control and anti-sliding and anti-skidding protection functions.

For an efficient and smooth regulation of traction motors, a dedicated Traction Control Unit is provided. It

features advanced control algorithms, such as vector control, direct torque control or sensor-less control. In addition it controls the brake chopper, which implements the electro-dynamic brake, and ensures its cooperation with the pneumatic brake.

The integrated diagnostic system processes train data to detect faults and to store the results in the form of event, trace and snap diagnostic records. The diagnostic data is provided to the driver and for transmission to the ground.

The on-board communication infrastructure is based on TCN, Ethernet, CANopen, and J1939 networks. GSM, UMTS or WiFi wireless networks can be used for the transmission of data between the train and ground. The system makes it possible to connect the automatic train operation and train protection systems. It may also be additionally equipped with a remote control system.

In order to increase reliability and availability, the key components are available in a redundant design.

Components

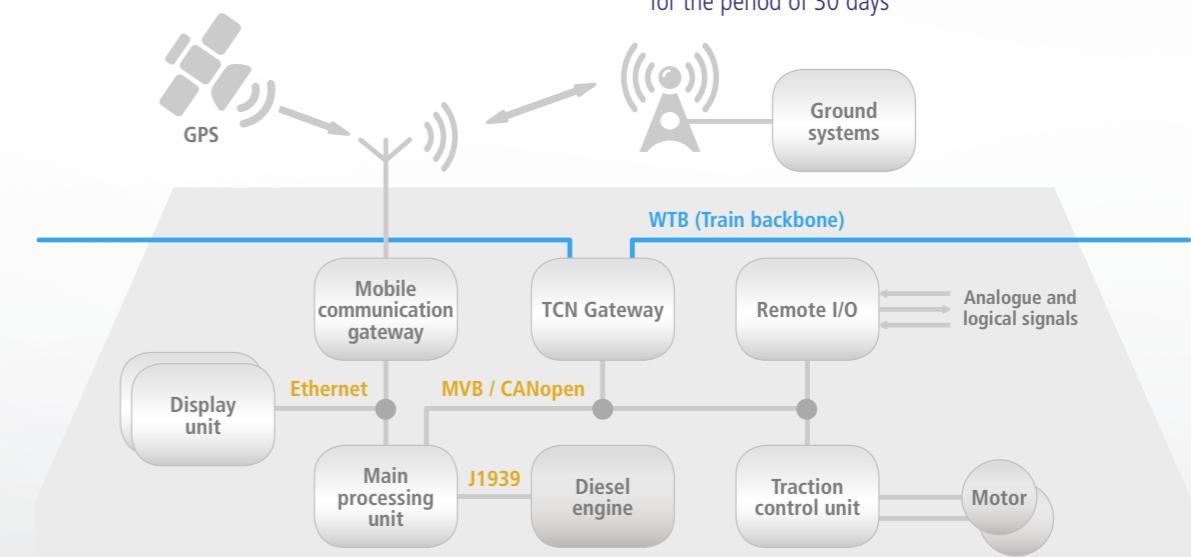
- Vehicle control unit (VCU01)
- Traction control unit (TCU-60)
- Display units (DISPL-1)
- TCN Gateway (TCN-GW01, TCN-GW03)
- Mobile communication gateway (TLR-2)
- Local and remote I/O systems (RIO, RIO-300)

Traction control

- Vector control, direct torque control or sensor-less control
- PWM rectifier control
- Brake chopper control
- An anti-sliding and anti-skidding protection system
- Torque and speed limiter
- Short-term overload protection, over-current protection, over-voltage and under-voltage protection, thermal overload protection, and others

Environment

- Power supply voltage 24V, 48V, 72V or 110V DC $\pm 30\%$
- Operating temperature -40°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for the period of 30 days



STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155, EN 61373, IEEE 802.3, IEEE 802.11, IEC 61375, EN 50325-4, UIC 612

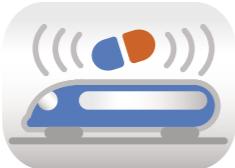
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UNITRACK SYSTEMS

2.1.4

UNITRACK TELEDIAG

Train Telediagnostic System



2.1 CONTROL & DIAGNOSTICS



FEATURE HIGHLIGHTS

- Programmable in PLC and C/C++ languages
- Local and remote I/Os for logical and analogue signals
- Ethernet, CAN and RS-232/422/485 communication interfaces
- On-board database for event, trace and snap diagnostic records
- Wireless data transmission in the GSM/GSM-R/UMTS and WiFi networks
- Diagnostic records from all trains maintained on the ground server

DESCRIPTION

UNITRACK TELEDIAG is an autonomous diagnostic system with wireless transmission of diagnostic data to the ground server to provide data for the applications of railway operators, the infrastructure manager or the vehicle manufacturer.

The system inputs analogue and logical signals, and collects process and diagnostic data from the existing vehicle systems. It processes data to

detect faults. The diagnostic results are stored in the form of event, trace and snap records in the on-board diagnostic database. From there, data are transmitted to the ground server, which maintains diagnostic records of all the vehicles monitored in its database. For the data transmission between the vehicle and the ground part of the system; GSM, UMTS or WiFi wireless networks can be used.

The integrated development environment UniCAP IDE is intended for the fast development and tuning of diagnostic applications in the PLC programming languages according to the IEC 61131-3 standard. The applications can also be programmed in C/C++ languages. A part of the system is a tool for the viewing of the diagnostic databases located both on vehicles and on the ground server.

Components

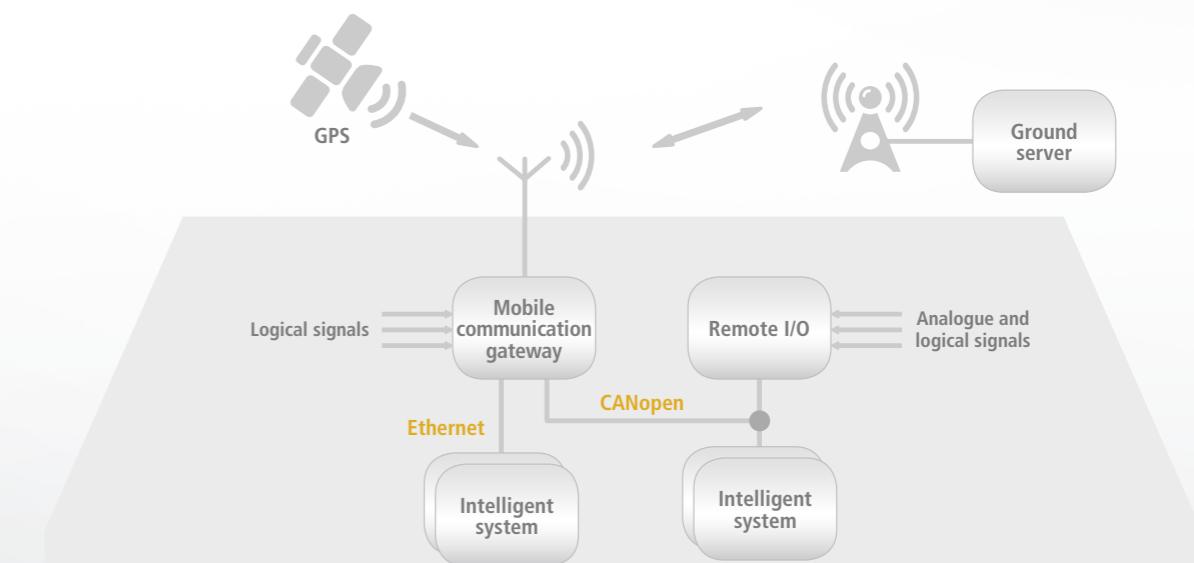
- Mobile communication gateway (TLR-2)
- Remote I/O systems (RIO, RIO-300)

Connectivity

- Ethernet 10Base-T/100Base-TX
- GSM/GSM-R/UMTS and WiFi wireless networks
- CAN bus supporting CANopen or J1939 protocols
- RS-232/422/485 serial lines

Environment

- Power supply voltage 16.8V to 154V
- Operating temperature -40°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days



STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155, EN 61373, IEEE 802.3, IEEE 802.11, IEC 61375, EN 50325-4

UNITRACK PIREDI

Passenger Information, Reservation and Diagnostic System



2.2 INFORMATION & SECURITY



FEATURE HIGHLIGHTS

- Complies with UIC 176, CR LOC&PAS TSI, PRM TSI
- Scalable and modular design fits diverse requirements
- Manual or automatic operation based on GPS position or odometer
- Portfolio includes LCD displays, LED boards, seat reservation displays
- WTB or Ethernet train backbone
- Train-to-Ground communications via GSM/GSM-R/UMTS and WiFi
- MOMA ground server with web-based administration and API

DESCRIPTION

is a comprehensive passenger information, reservation and diagnostic system suitable for all types of passenger transport from urban to long-distance trains. It fulfills the requirements defined in the UIC 176 Leaflet, CR LOC&PAS TSI (Locomotives and passenger rolling stock subsystems), and PRM TSI (Persons with reduced mobility).

Based on a scalable and modular architecture, the UNITRACK PIREDI can be easily adapted to diverse train operator requirements. The product portfolio includes control LCD displays for driver

and train crew, information LCD displays, LED boards, and seat reservation displays. Moreover, it can be connected to the train's public address system and ticketing system.

For the train-wide communication, the UNITRACK PIREDI is equipped with a train backbone node to connect to WTB or Ethernet train backbone. Alternatively, it can connect to consist network and rely on existing network infrastructure.

A mobile communication gateway ensures train-to-ground communications

and provides GPS data. If these services are already available by a train communication system, they can be outsourced.

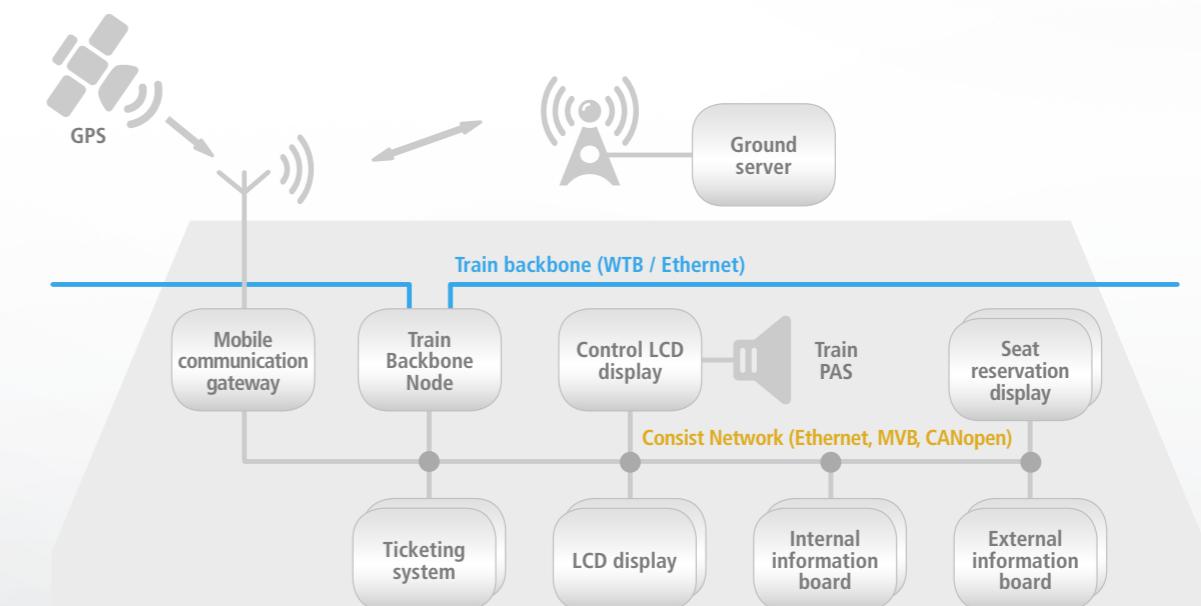
The MOMA ground server maintains all data required by the on board system and distributes the data to the trains. The server provides browser-based administration and access to all operational data, such as train position, speed and system status. A web API simplifies the integration of the MOMA server into operator's information system. The data can be created in PISPREP editor.

Components

- Touchscreen LCD display unit for control (DISPL-1)
- Information LCD displays (DISPL-1, DISPL-2, ITD-101)
- External and internal LED boards
- Seat reservation displays (RS02LCD, SRD-801)
- Train backbone node (EBN-600, TCN-GW01, TCN-GW03)
- Mobile communication gateway (TLR-2)

Environment

- Power supply voltage 24V DC - 30/+25%
- Operating temperature - 25°C to +55°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days



STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155, EN 61373, IEEE 802.3, IEEE 802.11, IEC 61375, EN 50325-4, UIC 176, UIC 612

2

UNITRACK SYSTEMS

2.2.2

UNITRACK CAM

Video Surveillance System



2.2 INFORMATION & SECURITY



FEATURE HIGHLIGHTS

- Digital image transmission across the Ethernet network
- Simultaneous display of up to 16 cameras
- Touch screen display
- Indoor and outdoor cameras with anti-vandal design
- Network video recorder with swappable mass storage
- Automatic reconfiguration after the coupling of the vehicles or units
- Service program for the downloading and checking of records

DESCRIPTION

UNITRACK CAM is an on-board network video surveillance system intended for the real-time monitoring of passenger compartments, doors and platform using both indoor and outdoor cameras. The system is based on IP cameras and video streaming across an Ethernet network.

The video streams from network cameras are recorded in a network

video recorder (NVR). As the number of available cameras depends on coupled vehicles, the NVR cooperates with the train control and monitoring system (TCMS) to receive necessary information about the train composition and cameras installed on the train.

A driver operates the surveillance system through a touch screen LCD monitor, which shows the live video

simultaneously from up to 16 cameras located anywhere in the train. Alternatively, the camera layout on the LCD display can be controlled by TCMS.

A service program provided with the system makes it possible to view and download stored records as static images or video sequences with the use of various selection filters.

Components

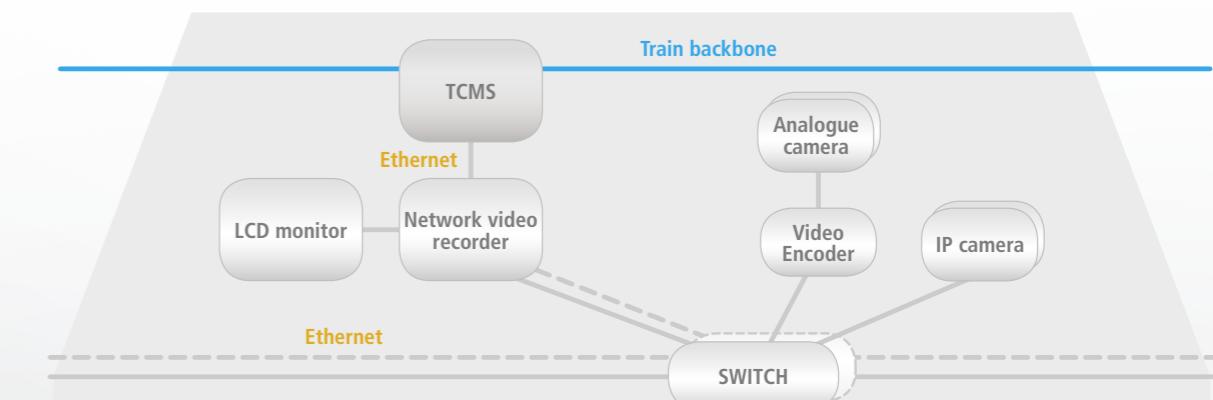
- Touch screen LCD monitor (DISPL-2)
- Network video recorder (NVR)
- Video encoder
- Ethernet switch

Environment

- Power supply voltage 24V DC ±30%
- Operating temperature - 40°C to +45°C (0°C to 45°)
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days

Cameras

- Indoor cameras with a resolution of 640x480 pixels, 2 to 30 fps
- Outdoor cameras with a resolution of 640x480 pixels, 25 fps, optical zoom, heated cover



STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155,
EN 61373, IEEE 802.3

UNITRACK EMS

Energy Measurement System



2.3 ENERGY CONSUMPTION



FEATURE HIGHLIGHTS

- Suitable for all AC and DC traction supply systems
- Applicable to multi-system locomotives
- Four-quadrant energy metering
- Accuracy class 0.5 (EN 50463), class B (EN 50470)
- Recording load profiles at 1 minute intervals
- Recorded data marked by time and GPS position
- Wireless data transmission in the GSM/GSM-R, UMTS and WiFi networks
- Data from all vehicles maintained on the ground server
- Fully compliant with EN 50463:2012

DESCRIPTION

UNITRACK EMS is an energy measurement system for DC (1.5kV, 3kV), AC (15kV/16.7Hz, 25kV/50Hz) and multi-system traction vehicles using more than one electrification system. It is fully compliant with the IEC 50463:2012 series of international standards for energy measurement on board trains. It provides measurement and data suitable for billing and may

also be used for energy management, e.g. energy saving.

The compiled energy billing data, including the time and GPS position, are recorded by the energy meter at 1 minute intervals and transmitted to the ground server over the GSM, GSM-R, UMTS or WiFi wireless networks. The support of two SIM cards makes it possible to operate in the networks of two

telecommunication operators; which can be required in the case of a cross-border operation of the vehicle.

The ground server stores the energy data of all monitored vehicles in its database for further processing. By using an Internet browser on the client stations, it is possible to view this data and to display the position and the route of the vehicles on the map.

Components

- Energy meter (ELM-201)
- Traction voltage sensors
- Traction current sensors

Measurement and Calculations

- Accuracy class 0.5 (EN 50463), class B (EN 50470)
- Harmonics up to 25th
- Active energy consumed and regenerated (MWh)
- Active energy consumed and regenerated in DC network only (MWh)
- Reactive energy consumed and regenerated both capacitive and inductive (Mvarh)
- Active power (MW), reactive power (Mvar)

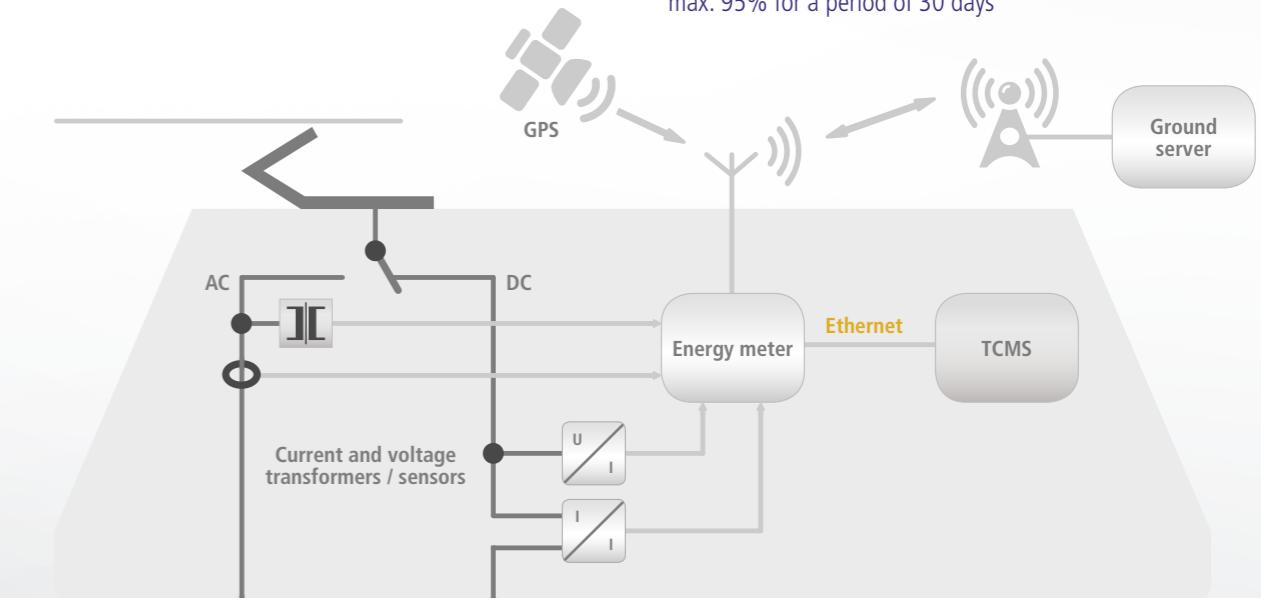
- Instantaneous/effective value of voltages and currents
- Load profiles recording at 1 minute intervals; recording capacity is 72 days

Connectivity

- Ethernet 10Base-T/100Base-TX
- GSM/GSM-R/UMTS and WiFi wireless networks
- RS-232/422/485 serial lines
- USB 1.1 Host

Environment

- Power supply voltage 24V, 48V, 72V or 110V DC $\pm 30\%$
- Operating temperature -40°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days



STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155, EN 61373, EN 50463:2012, EN 50470-1, EN 62056-21, EN 62056-61, IEEE 802.3, IEEE 802.11

2

UNITRACK SYSTEMS

2.3.2

UNITRACK FUEL

Fuel Consumption Measuring System



2.3 ENERGY CONSUMPTION



FEATURE HIGHLIGHTS

- Evaluation and registration of consumption in 1-min intervals
- Measurement of the fuel level in the tank
- Compensation for fuel temperature
- Recorded data marked by time and GPS position
- Wireless data transmission in GSM/GSM-R/UMTS and WiFi networks
- Consumption data from all vehicles maintained on the ground server

DESCRIPTION

UNITRACK FUEL is a system for the monitoring and registration of fuel consumption of diesel rail vehicles. The consumption data can be used for vehicle operation planning, assessment of the status of a diesel engine and for the detection of leakage or theft of fuel.

Fuel consumption is primarily evaluated on the basis of measurement of the fuel level in the tank with compensation for the temperature. It can be alternatively determined on the basis of

measurement of the flow-rate through the fuel circuit.

The consumption data, including the time and GPS position (and possibly with the consumption data from the control unit of the diesel engine), is stored in the on-board part of the system. The data is automatically transmitted to the ground server over the GSM, UMTS or WiFi wireless networks. The support of two SIM cards makes it possible to operate in the networks of two telecommunica-

tion operators; which may be required in cases of a cross-border operation of the vehicle.

The ground server stores in its database various data with regards to the consumption data of all monitored vehicles; for the purpose of further processing. By using an Internet browser on the client stations, it is possible to view not only this data but also to display the position and route of vehicles on the map.

Components

- Mobile communication gateway (TLR-2)
- Fuel level probe
- Fuel flow rate sensor

Measurement and processing

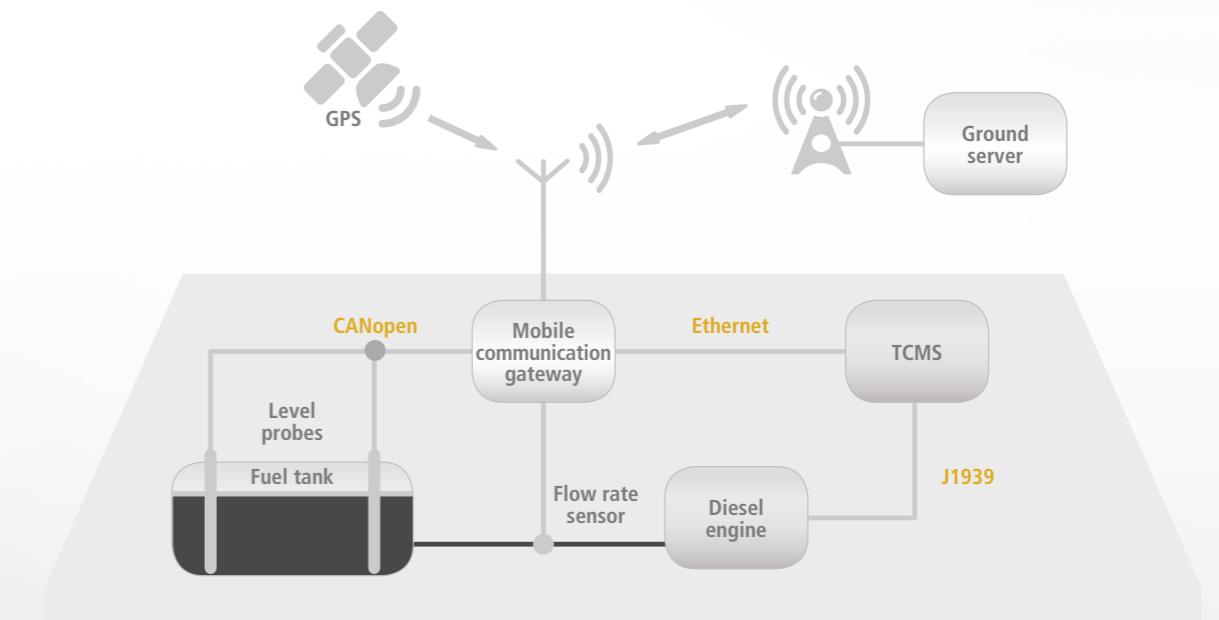
- Measurement error < 1%
- Consumption data recording at 1 minute intervals

Connectivity

- Ethernet 10Base-T/100Base-TX
- GSM/GSM-R/UMTS and WiFi wireless networks
- RS-232/422/485 serial lines
- USB 1.1 Host

Environment

- Power supply voltage 24V, 48V, 72V or 110V DC ±30%
- Operating temperature - 40°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days



STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155, EN 61373, IEEE 802.3, IEEE 802.11, EN 50325-4

2

UNITRACK SYSTEMS

2.4.1

UNITRACK ETD

Electronic Timetable System



2.4 DRIVER SUPPORT



FEATURE HIGHLIGHTS

- Displaying timetables and track and station characteristics
- Automatic operation according to the GPS position, odometry data or time
- For one or two drivers' cabs in the vehicle
- Integration into the display system in the driver's cab
- Timetable updates over the GSM/GSM-R/UMTS and WiFi networks
- Compliance with the Draft UIC 612-05 Leaflet
- Replacement of printed documents

DESCRIPTION

UNITRACK ETD is intended for outputting timetables, track and station characteristics and driving instructions for the driver on an ETD display. It operates in manual or automatic mode; in which the current position in the timetable is automatically moved according to GPS position, the distance travelled or time.

The driver can see the names of the stations and important points on the

railway line, departure and arrival times, permitted speeds, instructions for the train journey and other information. In addition, some information is represented by pictograms. The driver has the possibility to choose a track and the possibly to select an alternative route.

The ETD display can be integrated into the display system in the driver's cab in a way that its function can be

taken over by another display in cases of failure.

The UNITRACK ETD system uses the GSM, GSM-R, UMTS or WiFi wireless networks for the download and automatic update of the timetable data from a ground server. By typing a Train Number on the ETD device, the driver requests the correct set of electronic documents for the required mission.

Components

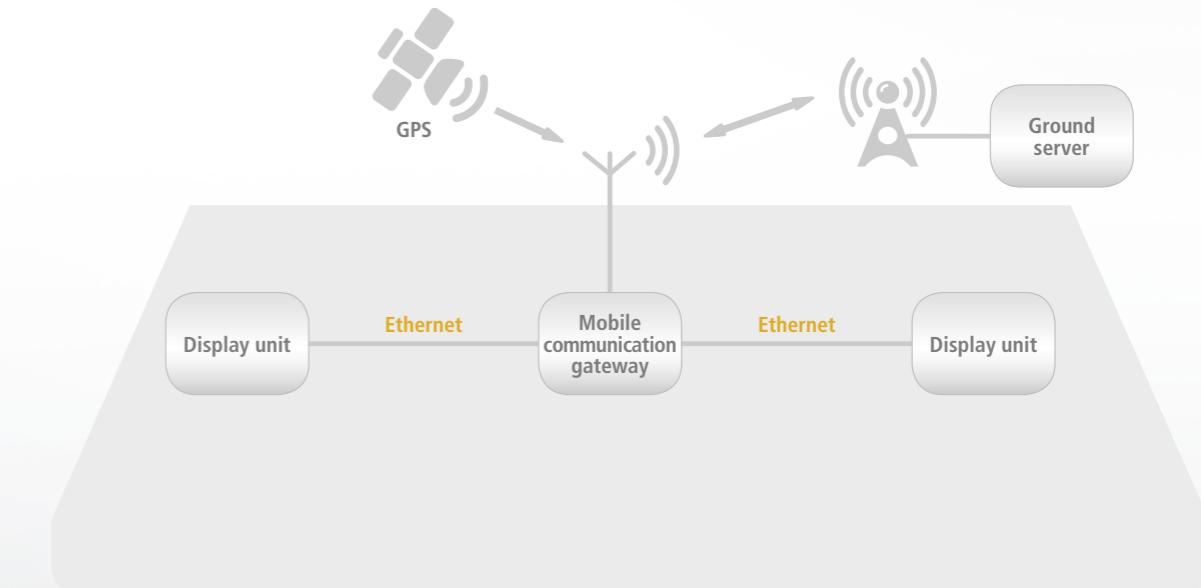
- Display unit (DISPL-1)
- Mobile communication gateway (TLR-2)

Connectivity

- Ethernet 10Base-T/100Base-TX
- GSM/GSM-R/UMTS and WiFi wireless networks
- USB 1.1 Host

Environment

- Power supply voltage 24V, 48V, 72V or 110V DC $\pm 30\%$
- Operating temperature -30°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days



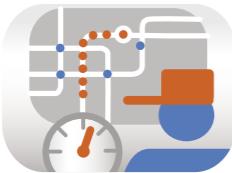
2

UNITRACK SYSTEMS

2.4.2

UNITRACK ASIS

Driver Advisory System



2.4 DRIVER SUPPORT



FEATURE HIGHLIGHTS

- Provides the functionality of electronic timetable system UNITRACK ETD
- Dynamically generates recommended travelling speed and driving mode
- Automatic operation according to the GPS position, odometry data or time
- For one or two drivers' cabs in the vehicle
- Integration into the display system in the driver's cab
- Timetable updates over the GSM/GSM-R/UMTS and WiFi networks
- Compliance with the Draft UIC 612-05 Leaflet
- Contributes to energy saving driving

DESCRIPTION

The system UNITRACK ASIS integrates the functionality of the electronic timetable system UNITRACK ETD with a driver advisory function. This function recommends the travelling speed and driving actions (acceleration, run, coasting, braking) for the driver to achieve minimum energy consumption while adhering to the timetable and track, technical and legislative limitations.

The optimal driving strategy is determined on the basis of the timetable

data extended by the infrastructure and vehicle data and the current position of the train on the track. The position is primarily determined from GPS data. If the GPS signal is not available, the position is computed on the basis of distance travelled or current time.

The recommendations are visualized in the designated area of a 10.4" colour ETD display, which also displays timetable, track and station characteristics, and driving instructions.

The ETD display can be integrated into the display system in the driver's cab in a way that its function can be taken over by another display in cases of failure.

The UNITRACK ASIS system uses the GSM, GSM-R, UMTS or WiFi wireless networks for the download and automatic update of the timetable and infrastructure data from a ground server. Train and locomotive data are inserted into the system manually, before run.

Components

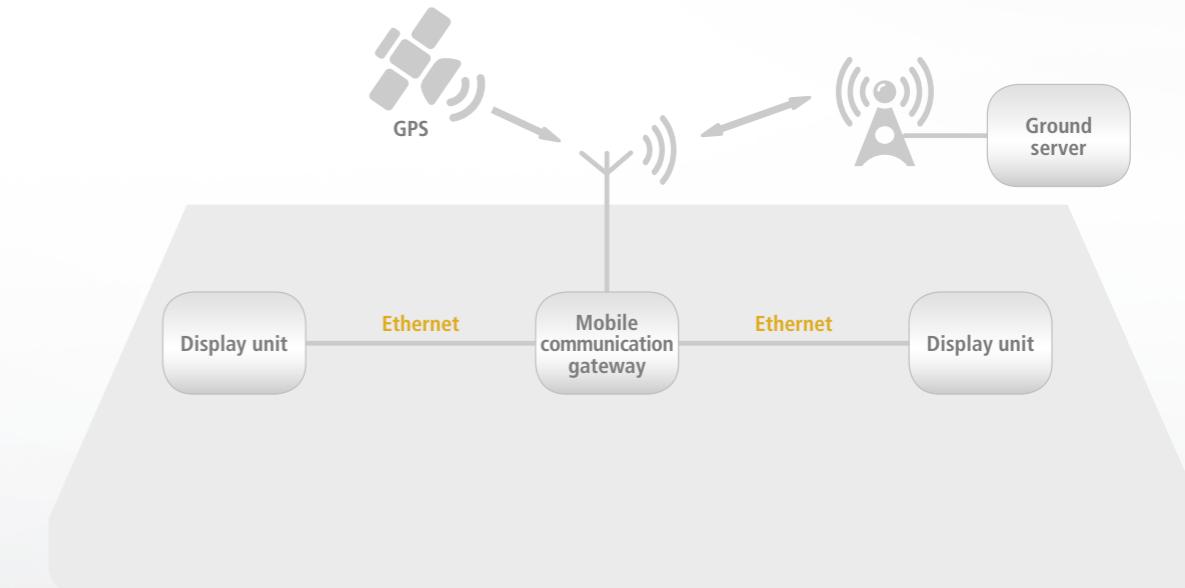
- Display unit (DISPL-1)
- Mobile communication gateway (TLR-2)

Connectivity

- Ethernet 10Base-T/100Base-TX
- GSM/GSM-R/UMTS and WiFi wireless networks
- USB 1.1 Host

Environment

- Power supply voltage 24V, 48V, 72V or 110V DC $\pm 30\%$
- Operating temperature -30°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days

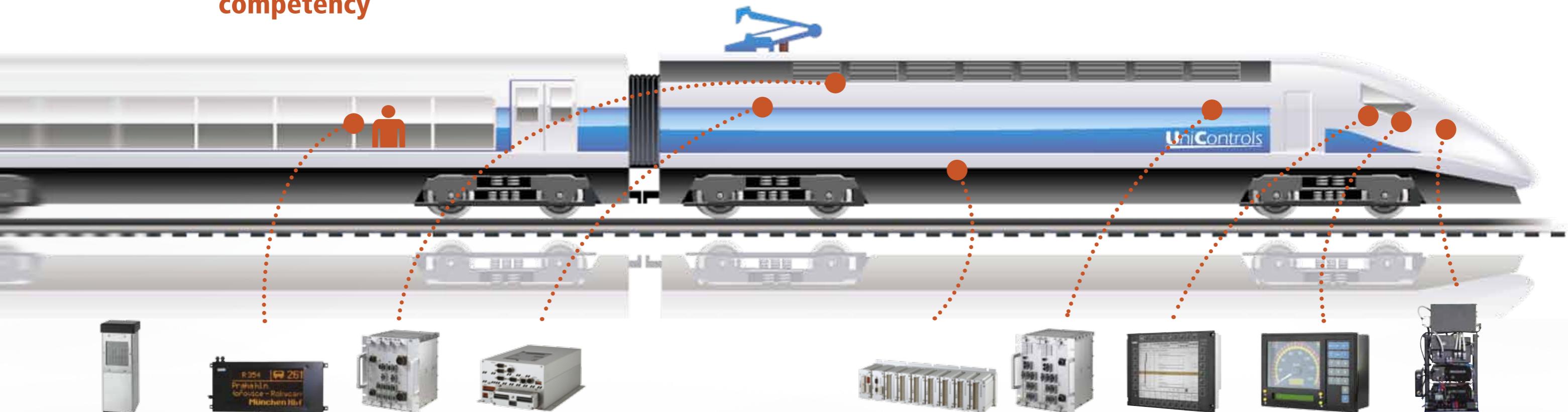


DEVICES

From individual components to the complete solutions with a background of engineering competency

FROM THE FIRST IDEA TO SERIAL PRODUCTION WE KEEP IN MIND THAT OUR PRODUCTS WILL BE USED IN HARSH ENVIRONMENTS FOR MANY YEARS.

Our effort is aimed at providing high quality products that meet the customers' expectations. To achieve this level we rely on our highly skilled team of engineers with a broad range of experience in the rolling stock domain. The Unicontrols trademark is also a synonym for professional customer service through all stages of the product life cycle.



FREIGHT VEHICLE TRACKING

includes onboard equipment intended for the use in systems for the automatic location of freight vehicles particularly with the goal to improve logistics and maintenance planning. Devices can also record data, which for example, may help to find the cause of the damage of transported goods.

INFORMATION BOARDS AND DISPLAYS

are designed for installation in trains to provide passengers with visual information about the train journey and reserved seats. The product range includes both internal and external LED boards and displays for reservation systems.

NETWORK DEVICES

offer advanced energy metering on board AC, DC and multi-system traction vehicles. The values measured can serve both for the evaluation of operational effectiveness from the viewpoint of electricity consumption and as input data for the billing purposes..

ENERGY METERS

are active components of the data communication network that connects electronic equipment between and within rail vehicles. With the use of wireless networks they also ensure data transmission between the train and ground systems.

I/O SYSTEMS

are designed to facilitate the connection of logical, analogue, frequency, PWM, temperature, and other signal types to MVB and CANopen buses. They are modular, housed in a robust enclosure and feature advanced auto-diagnostics.

MAIN PROCESSING UNITS

are designed particularly for use in a train control and monitoring system (TCMS). They feature a powerful processor and a number of communication interfaces. They are user-programmable in PLC and C/C++ programming languages.

DISPLAY UNITS AND MONITORS

feature a high brightness LED backlit TFT LCD panel with touch screen or pushbuttons housed in a robust panel mount enclosure. They are equipped either with a powerful processor and a number of communication interfaces or they utilize DVI-D signals only.

SPEEDOMETERS

are designed to provide reliable and accurate readings and records of speed, distance, time and selected vital signals. They are equipped with both a needle indicator with a circular scale and a numeric display. Data storage is provided by FLASH memory.

RADIO COMMUNICATIONS

includes onboard devices ensuring voice communication between the train driver, dispatcher, ground staff and other participants, and possibly data communication between onboard systems and ground applications.

3.1 NETWORK DEVICES**FEATURE HIGHLIGHTS**

- Fully compatible with IEC 61375 series of standards
- 100 Mbps Ethernet Train Backbone and Consist Network
- 4 ETB ports with bypass function
- 7 port consist switch (optional)
- Redundancy (optional)
- Web-based configuration and system diagnostics
- Power supply voltage 16.8V to 154V DC
- Operating temperature from - 40°C to +70°C

**EBN-600
ETHERNET TRAIN BACKBONE NODE****3.1.1****DESCRIPTION**

The EBN-600 Ethernet train backbone node (ETBN) is used to connect an Ethernet consist network (ECN) or directly one or more end devices to the Ethernet Train Backbone (ETB). It entirely fulfills the requirements defined in the IEC 61375 series of international standards.

The main function of the ETBN is to route data packets between the ETB and ECN networks. The IP routing tables and address translation rules are automatically configured using TTDP protocol, which detects all changes to train backbone topology, such as train shortening or lengthening.

In addition to the routing function, the ETBN builds and maintains the train topology database containing static information and dynamic information about the train, such as vehicle and consist properties, current train composition, current leading vehicle, and orientation of vehicles in respect to the direction of travel. It provides services for end devices to retrieve this information and to manage the train.

The EBN-600 features four ETB ports to support ETB link redundancy, load sharing and consist orientation reversing. If the node is powerless or not operating, its ports

are bypassed with the relay circuit to allow continuous ETB operation.

The EBN-600 supports redundancy by adding a backup ETBN to the network. A redundancy protocol ensures that the backup ETBN takes over all ETBN functions in case of primary node failure. The backup ETBN can be placed in a different location from the primary node anywhere in the consist.

The built-in web server provides easy browser-based configuration and system diagnostics.

Network protocols and services

- Train inauguration: Train Topology Discovery Protocol (TTDP)
- Railway-Network Address Translation (R-NAT)
- DHCP server
- DNS server
- VLAN services
- Dynamic link aggregation
- Static and dynamic routing
- Multicast routing
- NTP server/client
- ETBN redundancy protocol

Environment

- Power supply voltage from 16.8V to 154V DC
- Power input max. 8W
- Operating temperature - 40°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Ingress protection IP20
- Dimensions 238 x 266 x 290 mm (width x height x depth)
- Weight max. 10 kg

Connectivity

- 4x ETB ports with bypass relay function
- 7x ECN ports (Ethernet 10Base-T/100Base-TX), 1x without consist switch
- 1x backplane CAN/CANopen
- 1x RS-232 for device management
- 1x USB 1.1

Components

- VC-EBN ETBN module
- GW-PWR2 Power supply unit

**STANDARDS**

EN 50121-3-2, EN 50124-1, EN 50155, EN 61373, IEC 61375, IEEE 802.3, EN 50325-4

TCN-GW01/GW03

TCN GATEWAY

3.1 NETWORK DEVICES



FEATURE HIGHLIGHTS

- Fully compatible with IEC 61375 and UIC 556
- WTB/MVB and WTB/CANopen Gateways
- Support of dynamic coupling of vehicles
- Redundancy (optional)
- Direct inputs/outputs
- Rich configuration and diagnostics tools
- Power supply voltage 16.8V to 154V DC
- Operating temperature from - 40°C to +70°C

DESCRIPTION

The TCN Gateway is a key component of the on-board network infrastructure which is based on the international standard IEC 61375 – Train Communication Network (TCN). This standard, together with the UIC 556 Leaflet, facilitates the interoperability of vehicles from different manufacturers.

The TCN Gateway works as a communication node which ensures the transfer of process data and the routing

of messages between the WTB train bus and MVB or CANopen vehicle bus. It can be used for connection to the WTB bus of both individual vehicles and train sets. The dynamic coupling of vehicles or train units during operation is supported.

It features the possibility of redundant configuration with doubled components; which increases the reliability and availability of the train communication network.

The toolset provided for the TCN Gateway includes Configuration & Service Station (CSS) intended for the creation of configuration data and UIC Diagnostic Station (UDS) for on-line monitoring and servicing of the nodes and TCN network.

The device was certified in accordance with the UIC 556 Leaflet, in 2005.

Main functions

- The transfer of process data between the WTB train bus and MVB or CANopen vehicle buses
- Routing of messages between the train and vehicle buses
- UIC Mapping Server according to UIC 556
- TCN and UIC inauguration – acquiring the train composition and information about vehicles
- MVB bus administration
- CANopen slave device
- Automatic redundancy switchover controlled by hardwired logic
- Cleaning the WTB contacts of the connector with direct-current (fritting)
- Standby and sleep modes, remote switching off

Environment

- Power supply voltage 16.8V to 154V DC
- Power input max. 30W
- Operating temperature - 30°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Ingress protection IP20
- Dimensions 6U: 238 – 483 x 266 x 290 mm (width x height x depth)
- Dimensions 3U: 197 x 132 x 200 mm (width x height x depth)
- Weight max. 10 kg

Connectivity

- 1x WTB
- 1x MVB EMD (excluding TCN-GW03 CAN), CLASS 5
- 1x CANopen (only for TCN-GW03 CAN)
- 1x RS-232
- 4 Digital outputs
- 16 Digital inputs

Model variants

- TCN-GW01 WTB/MVB in a 6U design
- TCN-GW03 MVB WTB/MVB in a 3U design
- TCN-GW03 CAN WTB/CAN in a 3U design

Components (6U)

- GW-CPU2 Processor card with communication interfaces
- GW-DIO Digital inputs and outputs
- GW-PWR2 Power supply unit



STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155, EN 61373, IEC 61375, EN 50325-4, UIC 556

3.1 NETWORK DEVICES**FEATURE HIGHLIGHTS**

- Powerful PowerPC-based CPU
- Ethernet, CANopen and RS-232/422/485 communication interfaces
- Communication over GSM/GSM-R, UMTS and WiFi networks
- Support of 2 SIM cards, integrated GPS receiver
- Linux 2.6 operating system
- Power supply voltage from 16.8V to 154V DC
- Operating temperature from -40°C to +70°C
- Robust design, ingress protection IP30

**TLR-2
MOBILE COMMUNICATION GATEWAY****3.1.3****DESCRIPTION**

The TLR-2 mobile communication gateway belongs to the family of on-board network devices. It is intended for train-ground wireless data transmission over the WiFi and GSM/GSM-R and UMTS networks. The gateway contains a GPS receiver which provides position, speed and time information.

The gateway is supplied with a Linux operating system in the UcBox distribu-

tion, which is optimised for industrial applications. UcBox integrates alongside Internet technologies such as VPN, NAT, HTTP and FTP servers, also TCN and CANopen protocols stacks.

For the development of user applications in C/C++ programming languages, tools are provided for cross compilation and a set of libraries for work with hardware components, for

the support of TCN and CANopen communications and other libraries.

The TLR-2 gateway can be used by applications such as telediagnostics, electric energy and fuel consumption measurement, passenger information and reservation, video surveillance, and an electronic timetable or passengers' access to the internet.

System

- 400MHz CPU based on PowerPC core with integrated FPU
- 256MB RAM, 1MB MRAM or battery-backup SRAM
- 32MB FLASH
- Integrated RTC chip

Wireless technologies

- GSM/GSM-R and UMTS with the support of 2 SIM cards
- WiFi standard 802.11 a/b/g
- 20-channel GPS receiver

Environment

- Power supply voltage 16.8V to 154V DC
- Power input max. 35W
- Operating temperature -40°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Ingress protection IP30
- Dimensions 165 x 105 x 305 mm (width x height x depth)
- Weight 1.2 kg

Connectivity

- 5x Ethernet 10Base-T/100Base-TX
- 2x CAN/CANopen
- 2x RS-232
- 2x RS-422/485
- 2x USB 1.1 Host
- 4 Digital inputs
- 4 Digital inputs with a counting function
- 2 Digital outputs
- 1x CompactFlash slot equipped with 1 GB card

**STANDARDS**

EN 50121-3-2, EN 50124-1, EN 50155, EN 61373, IEEE 802.3, IEEE 802.11, EN 50325-4

EXT-501

WIRELESS ACCESS POINT/BRIDGE

3.1 NETWORK DEVICES



FEATURE HIGHLIGHTS

- IEEE 802.11 a/b/g/h & super AG standards
- Data rate up to 108 Mbps
- Frequency band 2.4 GHz and 5 GHz
- 64/128 bit WEP, WPA-PSK, WPA2-PSK, IEEE 802.1x (RADIUS)
- Web-based configuration and system diagnostics
- 2dBi omnidirectional antenna
- Power supply voltage from 16.8V to 36V DC
- Operating temperature from - 25°C to +70°C

DESCRIPTION

The ETX-501 is an industrial grade Wireless Access Point/Bridge. In Access Point mode it allows wireless devices to connect to a wired network using WiFi standards. Used in the bridge mode, the ETX-501 enables the connection of one or more devices which feature a 10/100 Ethernet interface to the WiFi wireless network; it supports both Infrastructure and Ad-Hoc modes. The unit can be also

used as a WiFi network repeater (WDS) in order to extend radio coverage.

This product complies with IEEE 802.11 a/b/g/h standards (2.4 GHz & 5 GHz) and features a 10/100 auto-sensing Ethernet interface. The nominal range (open space) of the ETX-501 with the antenna included is 300 m for a transmission power of +20 dBm. Receiver sensitivity is -92 dBm for IEEE

802.11a/g modes and -95 dBm for IEEE 802.11b mode.

The radio link is made safe by utilizing 64/128 bits WEP, WPA-PSK, WPA2-PSK, and IEEE 802.1x (RADIUS authenticator & supplicant) security protocols.

The built-in web server allows the setup of the device from an internet web browser.

WLAN

- Compatible with IEEE 802.11 a/b/g/h standards
- 2.4 GHz and 5 GHz frequency bands
- Data rate up to 54/108 Mbps (Super AG mode)
- Access Point, Ethernet Bridge or WDS repeater in Ad-Hoc and Infrastructure modes
- Security: 64/128 bit WEP, WPA-PSK, WPA2-PSK, IEEE 802.1x (RADIUS authenticator & supplicant), MAC address filtering, SSID broadcast control
- LEDs indicating LAN/WLAN network activity and 10/100 mode
- 2dBi omnidirectional 2.4/5 GHz antenna

LAN

- 1x Ethernet 10Base-T/100Base-TX

Environment

- Power supply voltage 16.8V to 36V DC
- Power input max. 6W
- Operating temperature - 25°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Ingress protection IP20
- Dimensions 80 x 44 x 104 mm without antenna (width x height x depth)
- Weight 300 g



STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155, EN 61373, IEEE 802.3, IEEE 802.11

MVB-CAN1

MVB/CANopen GATEWAY

3.1 NETWORK DEVICES



FEATURE HIGHLIGHTS

- Connection for up to 126 CANopen slaves to the MVB bus
- Fast transfer of periodic process data
- User configurable data mapping
- Node guarding or heartbeat protocols
- 4 integrated digital inputs
- Power supply voltage from 14.4V to 154V DC
- Operating temperature from -40°C to +70°C

DESCRIPTION

The MVB-CAN1 is a gateway designed to interconnect the multifunction vehicle bus MVB and the CAN bus. Up to 126 CANopen enabled devices with slave functionality can be connected to the gateway. The gateway allows the fast transfer of

periodic process data between the two networks with a typical period of 10ms.

The gateway supports CANopen NMT master capability and device monitoring using node guarding or heartbeat mechanisms for network

start-up and error management. It is able to generate SYNC messages.

The parameter data and data mapping between PDO objects and MVB ports is user configurable via a service serial line RS-232.

Main functions

- The transfer of process data between the CANopen and MVB buses
- User configurable mapping of PDOs into MVB ports
- Up to 126 CANopen slave devices
- Up to 1024 PDOs
- SYNC producer, PDO producer/consumer, node guarding, heartbeat producer/consumer
- LED status indicators

Environment

- Power supply voltage 14.4V to 154V DC
- Power input max. 6W
- Operating temperature -40°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Ingress protection IP20
- Dimensions 173 x 130 x 54 mm (width x height x depth)
- Weight 0.75 kg

Connectivity

- 1x MVB EMD
- 1x CAN/CANopen
- 1x RS-232
- 4 digital inputs (24V)



STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155, EN 61373, IEC 61375, EN 50325-4

VCU01

VEHICLE CONTROL UNIT

3.2 MAIN PROCESSING UNITS



FEATURE HIGHLIGHTS

- Processor with a frequency of 400 MHz
- Linux 2.6 operating system
- The development of applications in PLC languages
- Redundancy (optional)
- Ethernet, MVB, CANopen and RS-232/422/485 communication interfaces
- Power supply voltage 24V, 48V, 72V and 110V DC
- Operating temperature from - 40°C to +70°C

DESCRIPTION

VCU01 is a control unit intended for implementing vehicle and train control functions in railway vehicles. It is equipped with a powerful PowerPC-based CPU and a number of communication interfaces including Ethernet and MVB, which are specified in the international standard IEC 61375 – Train Communication Network (TCN). The VCU01 also features hardware controlled redundancy, which ensures high reliability and availability.

The modular design of the VCU01, consisting of processor cards, redundancy control unit and power supply unit, makes it possible to easily integrate these components together with the TCN Gateway (TCN-GW01), Ethernet Backbone Node (EBN-600) and I/O cards (RIO-300) into one 6U rack.

The unit is supplied with the Linux operating system in the UcBox distribution, which is optimised for industrial applications. The built-in web server provides easy browser-

based configuration and system diagnostics.

Application programming is greatly simplified by using UniCAP IDE, a tool for developing applications in PLC languages according to the IEC 61131-3 standard. For the development of user applications in C/C++ programming languages, there are tools provided for cross compilation and a set of libraries for work with hardware components, for the support of TCN and CANopen communications and other libraries.

System

- 400MHz CPU based on PowerPC core with integrated FPU
- 256MB RAM, 32MB FLASH, 1MB non-volatile RAM (MRAM)
- 1GB CompactFlash
- Integrated RTC chip

Connectivity

- 1x Ethernet 10Base-T/100Base-TX on backplane connector
- 1x Ethernet 10Base-T/100Base-TX on front panel (M12)
- 7/8 port Ethernet switch
- 4x CAN/CANopen/J1939
- 1x MVB EMD, ESD or OGF, CLASS 4
- 4x RS-232/422/485
- 2x RS-232

Environment

- Power supply voltage 16.8V to 154V DC
- Power input max. 30W
- Operating temperature - 40°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Ingress protection IP20
- Dimensions 238 – 483 x 266 x 290 mm (width x height x depth)
- Weight max. 10 kg

Components

- VC-CPU2 Processor card with communication interfaces
- VC-RCU Redundancy control + MVB OGF interface
- VC-ETXM Redundancy control + 7/8 port Ethernet switch
- GW-PWR2 Power supply unit



STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155, EN 61373, IEEE 802.3, IEC 61375, EN 50325-4

UniNOD Compact

COMPACT CONTROL UNIT

3.2 MAIN PROCESSING UNITS



FEATURE HIGHLIGHTS

- Powerful PowerPC-based CPU
- Ethernet, CANopen, and RS-232/422/485 communication interfaces
- Integrated digital and analogue I/Os
- Linux 2.6 operating system
- UniCAP development environment
- Attachment to a DIN bar
- Operating temperature from -40°C to +70°C
- Robust design, aluminium enclosure

DESCRIPTION

The UniNOD is a compact control unit intended for assembly onto a DIN bar. It is equipped with a powerful PowerPC-based CPU, a number of communication interfaces, and according to the model variant, with integrated digital and analogue I/Os also.

The unit is supplied with the Linux operating system in the UcBox distribu-

tion, which is optimised for industrial applications. The built-in web server provides easy browser-based configuration and system diagnostics.

Application programming is greatly simplified by using UniCAP IDE, a tool for developing applications in PLC languages according to the IEC 61131-3 standard. For the development of user

applications in C/C++ programming languages, there are tools provided for cross compilation and a set of libraries for work with hardware components, for the support of TCN and CANopen and Modbus communications and other libraries.

System

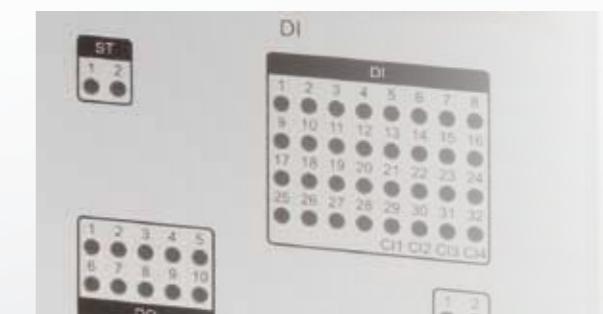
- 400MHz CPU based on PowerPC core with integrated FPU
- 256 MB RAM, 1 MB battery-backup SRAM
- 32MB FLASH
- 1GB CompactFlash
- Integrated RTC chip

Connectivity

- 2x Ethernet 10Base-T/100Base-TX
- 2x CAN/CANopen
- 5x RS-232
- 2x RS-422/485
- Up to 10 digital outputs
- Up to 28 digital inputs, 4 digital inputs with the counting function to 20 kHz
- Up to 20 analogue inputs 0-20mA/0-24mA/
±24mA/0-20V/±10V
- The possibility of customised I/O

Environment

- Power supply voltage 14.4V to 36V
- Power input max. 15W
- Operating temperature -40°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Ingress protection IP30
- Dimensions 271/489 x 123 x 56 mm (width x height x depth)
- Weight 1.85 kg



STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155, EN 61373, IEEE 802.3, EN 50325-4

DISPL-1

MULTI-APPLICATION DISPLAY UNIT

3.3 DISPLAY UNITS AND MONITORS



FEATURE HIGHLIGHTS

- 10.4" colour TFT LCD with LED backlighting
- Touch screen or 32 pushbuttons
- Powerful PowerPC-based CPU
- Ethernet, MVB, CANopen communication interfaces
- Linux 2.6 operating system
- Power supply voltage from 16.8V to 154V DC
- Operating temperature from -30°C to +70°C
- Robust design, ingress protection IP54
- Complies with the UIC 612 Leaflet

DESCRIPTION

The DISPL-1 is a compact display unit that features a high brightness LED backlit TFT LCD panel with touch screen or pushbuttons housed in a robust panel mounted enclosure. It is equipped with a 400MHz processor and a number of communication interfaces. The display is designed in accordance with the UIC 612 Leaflet and is intended to be used in the display system in the driver's cab.

of user applications in C/C++ programming languages, there are tools provided for cross compilation and a set of libraries for work with hardware components, for the support of TCN and CANopen communications, a Qt library for creation of a graphic user interface, and other libraries.

Application programming is greatly simplified by using UniCAP IDE, a tool for developing applications and GUI in PLC languages in accordance with the IEC 61131-3 standard. For the development

The DISPL-1 can be used, for example, as a display for control & command, diagnostics, electronic timetable, and train radio.

Panel

- 10.4" colour TFT LCD panel with LED backlighting and anti-reflection layer
- Touch screen or 32 pushbuttons according to UIC 612-05
- Safety glass (not possible with touch screen option)
- Resolution 800 x 600 or 640 x 480, 262k colours
- Brightness 450 cd/m², contrast 600:1
- Viewing angles: 140° horizontally, 50° upwards, 60° downwards
- Sensor of surrounding luminous intensity
- Automatic/manual brightness regulation

Environment

- Power supply voltage 16.8V to 154V DC
- Power input max. 40W
- Passive cooling (without a fan)
- Operating temperature -30°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Ingress protection IP54 (front side)
- Dimensions 310 x 214 x 97 mm (width x height x depth)
- Weight 3 kg

System

- 400MHz CPU based on PowerPC core with integrated FPU
- Graphic accelerator with 64MB video memory
- 256MB RAM, 1MB non-volatile RAM (MRAM)
- 32MB FLASH
- 1GB CompactFlash
- Integrated RTC chip

Connectivity

- 1x Ethernet 10Base-T/100Base-TX
- 3x CAN/CANopen, max. 1M b/s
- 1x MVB EMD or ESD, CLASS 3
- 2x RS-232
- 1x RS-422/485
- 1x USB 1.1 Host
- 1x Audio mono output, max. 1W
- 1x Input for an external pushbutton



STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155, EN 61373, IEEE 802.3, IEC 61375, EN 50325-4, UIC 612

DISPL-2

LCD MONITOR

3.3 DISPLAY UNITS AND MONITORS



FEATURE HIGHLIGHTS

- 10.4" colour TFT LCD with LED backlighting
- Resolution 800x600, 262k colours
- Touch screen (optional)
- DVI-D video input
- Ambient light sensor
- Power supply voltage 24V DC
- Operating temperature from -30°C to +70°C
- Robust design, ingress protection IP54

DESCRIPTION

The DISPL-2 is a 10.4" touch screen LCD monitor housed in a robust panel mounted aluminium enclosure. It features a high brightness TFT LCD panel with a resolution of 800x600 pixels and LED backlight technology. The monitor is equipped with a DVI-D connector.

In the pushbutton version, the LCD monitor can be equipped with safety glass.

Panel

- 10.4" colour TFT LCD panel with LED backlighting and an anti-reflection layer
- Touch screen
- Safety glass (not possible in the touch screen variant)
- Resolution 800 x 600, 262k colours
- Brightness 420 cd/m², contrast 500:1
- Viewing angles: 140° horizontally, 50° upwards, 60° downwards
- Ambient light sensor
- Status and user LED diodes
- Brightness control of LCD panel and LED diodes

Environment

- Power supply voltage 24V DC ±30%
- Power input max. 25W
- Operating temperature -30°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Ingress protection IP54 (front side)
- Dimensions 310 x 214 x 97 mm (width x height x depth)
- Weight 3 kg

Connectivity

- 1x DVI-D
- 1x RS-232 for touch screen output
- 1x RS-232 for control and ambient light reading



STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155, EN 61373

ITD-101

18.5" INFOTAINMENT DISPLAY

3.3 DISPLAY UNITS AND MONITORS



FEATURE HIGHLIGHTS

- 18.5" colour TFT LCD with LED backlighting
- Resolution 1366x768, 16.7M colours
- DVI-D and VGA video inputs
- Power supply voltage 16.8V to 154V DC
- Operating temperature from 0°C to +60°C
- Low temperature start up capability from -20°C
- Robust design, ingress protection IP50

DESCRIPTION

The ITD-101 is an 18.5" colour LCD flat panel monitor specifically designed for harsh industrial environments and rolling stock applications. It is housed

in a heavy duty aluminium enclosure suitable for panel mounting.

The monitor accepts DVI-D and VGA input signals. It supports WXGA

(1366 x 768) native resolution and 16.7M colours.

Panel

- 18.5" colour TFT LCD panel with LED backlighting and an anti-reflection layer
- Resolution 1366 x 768, 16.7M colours
- Brightness 300 cd/m², contrast 1000:1
- Viewing angles: 170° horizontally, 160° vertically
- Refresh rate 75Hz (max.)

Connectivity

- 1x DVI-D
- 1x VGA

Environment

- Power supply voltage 16.8V to 154V
- Power input max. 30W
- Operating temperature 0°C to +60°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Ingress protection IP50 (front side)
- Dimensions 480 x 280 x 58 mm (width x height x depth)
- Weight 6 kg

STANDARDS

EN 50121-3-2, EN 50124-1,
EN 50155, EN 61373



ITLU

LED INFORMATION BOARDS

3.4 INFORMATION BOARDS AND DISPLAYS



FEATURE HIGHLIGHTS

- Matrix of 20x64, 20x128 or 20x192 dots
- Various font sizes and support for international characters
- One or two lines of text
- User-configurable text placement
- A CANopen communication interface
- Power supply voltage 24V DC
- Robust design, ingress protection IP52

DESCRIPTION

External and internal LED information boards from the ITLU series are designed in particular for use in public transport vehicles. They feature a matrix of 20x64, 20x128 or 20x192 LED diodes. On one or two lines, several numerals, texts and pictograms can be displayed.

User-configurable is the placement of texts and pictograms, the font size

and thickness, text effects, display time and number of repetitions. The embedded sets of fonts contain both upper-case and lower-case letters, including international characters, numerals, punctuation marks and special characters.

The texts, pictograms and their attributes are transmitted in XML format

to the information boards over the CANopen communication interface.

The ITLU information boards are available in two variants. The internal boards are equipped with standard brightness LED diodes. The external boards feature high-brightness LEDs for improved legibility outside the vehicle.

System

- Matrix of 20x64, 20x128 or 20x192 dots
- Displays several text and pictograms in one or two lines
- 7 font sizes, bold typeface, international characters
- Input data in the XML format, UNICODE coding
- Yellow or red LED colour, dot diameter 2.4 mm

Connectivity

- 1x CANopen

Environment

- Power supply voltage 24V DC - 30%/+25%
- Power input max. 45W
- Operating temperature - 25°C to +55°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Ingress protection IP52
- Dimensions 1220 x 200 x 42 mm (width x height x depth)
- Weight 9 kg



STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155,
EN 61373, EN 50325-4

EIB01

EXTERNAL LED INFORMATION BOARDS

3.4 INFORMATION BOARDS AND DISPLAYS



FEATURE HIGHLIGHTS

- Matrix of 48x96 dots
- Various font sizes and support for international characters
- Multiple lines of text
- User-configurable text placement
- A CANopen communication interface
- Power supply voltage 24V DC
- Robust design, ingress protection IP52

DESCRIPTION

The EIB01 series of external LED information boards are designed in particular for use in public transport vehicles. They feature a matrix of 48x96 high-brightness LED diodes. On multiple lines they can display several numerals, texts and pictograms.

User-configurable is the placement of texts and pictograms, the font size and thickness, text effects, display time and number of repetitions. The embedded sets of fonts contain both upper-case and lower-case letters, texts and pictograms, including international characters,

numerals, punctuation marks and special characters.

The texts, pictograms and their attributes are transmitted in XML format to the information boards over the CANopen communication interface.

System

- Matrix of 48x96 dots
- It displays several texts and pictograms in multiple lines
- 7 font sizes, bold typeface, international characters
- Input data in the XML format, UNICODE coding
- Yellow or red LED colour, dot diameter 1.6 mm

Connectivity

- 1x CANopen

Environment

- Power supply voltage 24V DC - 30%/+25%
- Power input max. 45W
- Operating temperature - 25°C to +55°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Ingress protection IP52
- Dimensions 670 x 280 x 45 mm (width x height x depth)
- Weight 6 kg

STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155,
EN 61373, EN 50325-4



RS02LCD

SEAT RESERVATION DISPLAY

3.4 INFORMATION BOARDS AND DISPLAYS



FEATURE HIGHLIGHTS

- LCD or VFD display
- Dedicated for 2 seats
- Displays up to 24 characters per seat
- Wall mounting or installation into the overhead luggage rack
- A CANopen communication interface
- UTF-8 encoding
- Power supply voltage 24V DC

DESCRIPTION

The RS02LCD is a seat reservation display intended to inform passengers about occupied seats. It is designed for wall mounting or installation into the overhead luggage rack.

On the two lines display, texts of up to 24 characters per line can be

displayed. The text can contain both upper-case and lower-case letters including international characters, numerals, and punctuation marks.

The RS02LCD is available with either a VFD (vacuum fluorescent display) or an LCD display. The brightness of the

VFD display is user-configurable in four steps from 25% to 100%. The displays are equipped with 3 pushbuttons to set up communication parameters.

The display communicates through the CAN bus using CANopen protocol.

Display

- LCD or VFD display, active area 84.2 x 11.5 mm
- Matrix of 2x24 characters
- International characters, UTF-8 coding
- Blue or yellow-green backlighting (LCD only)
- Brightness control in four steps from a 25% to 100% range (VFD only)

Connectivity

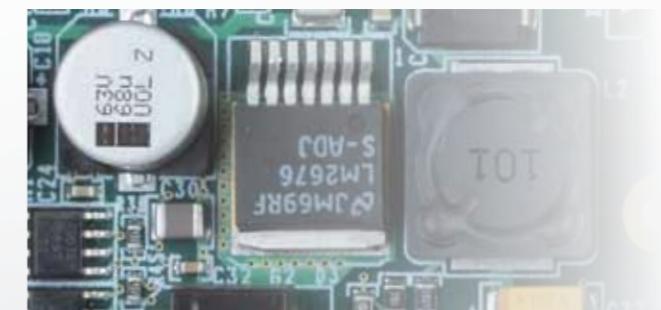
- 1x CANopen

Environment

- Power supply voltage 24V DC ±40%
- Power input max. 3W
- Operating temperature - 40°C to +70°C (VFD), - 20°C to +60°C (LCD)
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Dimensions 210 x 40 x 28 mm (width x height x depth)
- Weight 0.3 kg

STANDARDS

EN 50121-3-2, EN 50124-1,
EN 50155, EN 61373, EN 50325-4



SRD-801

SEAT RESERVATION DISPLAY

3.4 INFORMATION BOARDS AND DISPLAYS



FEATURE HIGHLIGHTS

- LCD or VFD display with dimming capability
- Dedicated for 8 seats
- Displays up to 20 characters per seat
- Wall or glass mounting
- A CANopen communication interface
- UTF-8 encoding
- Power supply voltage 24V DC

DESCRIPTION

The SRD-801 is a seat reservation display intended to inform passengers about occupied seats. The display is designed for wall or glass mounting in the compartments.

On the eight lines display, arranged into 2 columns and 4 rows, texts of up to 20 characters per line can be

displayed. The text can contain both upper-case and lower-case letters including international characters, numerals, and punctuation marks.

The SRD-801 is available either with VFD (vacuum fluorescent display) or LCD display. The LCD can be dimmed from 0% to 100% and for

the VFD display, in four steps from 25% to 100%. The displays are equipped with 3 pushbuttons to set up parameters.

The display communicates through the CAN bus using CANopen protocol.

Display

- LCD or VFD display
- Matrix of 2x4x20 characters
- International characters, UTF-8 coding
- Yellow-green backlighting (LCD only)
- Dimming control in range from 0% to 100% on LCD and in four steps in a 25% to 100% range on a VFD display

Connectivity

- 1x CANopen

Environment

- Power supply voltage 24V DC ±40%
- Power input max. 3.5W (LCD), 5.5W (VFD)
- Operating temperature - 40°C to +70°C (VFD), - 20°C to +60°C (LCD)
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Dimensions 260 x 77 x 31 mm (width x height x depth)
- Weight 750 g



STANDARDS

EN 50121-3-2, EN 50124-1,
EN 50155, EN 61373, EN 50325-4

RIO REMOTE I/O SYSTEM

3.5 I/O SYSTEMS



FEATURE HIGHLIGHTS

- Connection to the MVB or CANopen bus
- Galvanically isolated I/Os
- Independent power supply of each I/O module possible
- Individual channel status LEDs
- Auto-diagnostics
- Robust aluminium enclosure
- Power supply voltage from 14.4V to 154V DC
- Tolerance of voltage drop to 9V
- Operating temperature from -40°C to +70°C

DESCRIPTION

The RIO system is a universal modular system of remote inputs and outputs which can be connected to the MVB or CANopen bus. The range of I/O modules includes digital and analogue inputs and outputs, inputs for revolution sensors, and others. One RIO system may consist of up to 31 I/O modules, which makes it possible, for example, to connect 496

digital inputs or 248 digital outputs. All I/O modules are galvanically isolated.

The aluminium enclosure of modules ensures mechanical robustness and high EMI immunity. The modules are equipped with overheating protection, diagnostics of inputs and outputs and with protection from the unintentional change of module types and connectors.

The power supply voltage can be within a range of 14.4V to 154V, with a voltage drop tolerance to 9V for the duration of 10s. In addition, it is possible to power each module individually, which makes it possible to combine various technological voltages in one RIO system or to use the separately protected circuits.

System

- Galvanically isolated I/O modules
- I/O modules can be connected to different voltages or protected circuits
- Connection to the MVB or CANopen bus
- Up to 31 I/O modules in one RIO system
- Backplane for 5 or 9 positions
- Robust aluminium enclosure of both modules and backplane

Connectivity

- 1x CANopen (CF-CCAN only)
- 1x MVB EMD, CLASS 1 (CF-MVB1 only)
- 1x RS-232

Environment

- Power supply voltage 14.4V to 154V DC, or 14.4V to 40V DC with a tolerance of 9V for 10s
- Power input max. 4.7 W per module
- Operating temperature -40°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Ingress protection IP40
- Module dimensions 48 x 111 x 108 mm (width x height x depth)
- Dimensions CF-BP9 130 x 460 x 25 mm (width x height x depth)
- Weight 1.45 kg + 0.45 kg/module

RIO COMPONENTS

I/O modules

CF-DI16/A	16x switched digital input
CF-D08/A	8x digital output 1A
CF-D08/B	8x digital output 2A (11A overall)
CF-D04/A	4x digital output 2A
CF-AI8/A	8x analogue input 0-50mA/0-10V
CF-AI8/B	8x analogue input ±25mA/±10V
CF-AI8/C	8x analogue input ±25mA/±10V, fast
CF-AO3/A	3x analogue output 0-20mA, 4-20mA, 4-24mA, 0-10V
CF-RS6/A	12x input for 1, 2 and 4 wire revolution sensors, 2Hz-10kHz, measurement of frequency and PWM

Communication modules

CF-MVB1/A	MVB (EMD), CLASS 1
CF-CCAN/A	CANopen

Power supply modules with a repeater

CF-RPT4/A	14.4V to 154V
CF-RPT5/A	14.4V to 40V with tolerance of 9V per 10s

Backplane

CF-BP9/A	Backplane for 9 modules
CF-BP7/A	Backplane for 7 modules

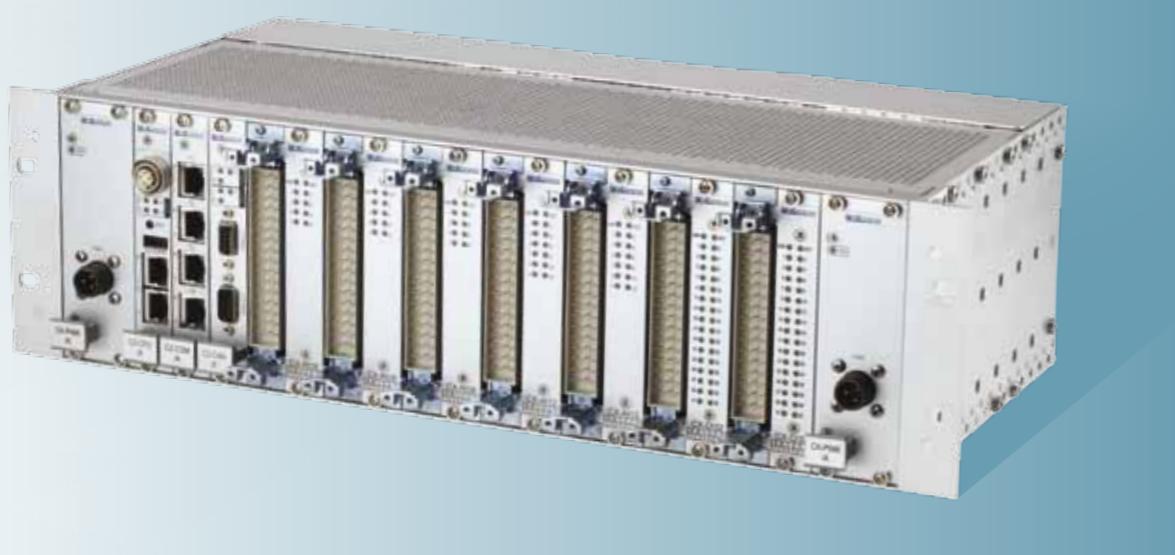
STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155, EN 61373, IEC 61375, EN 50325-4

RIO-300

3U MODULAR I/O SYSTEM

3.5 I/O SYSTEMS



FEATURE HIGHLIGHTS

- High density galvanically isolated I/O cards
- CANopen communication interface
- MVB and Ethernet gateway available
- Front panel or rear I/O connectivity
- Individual channel status LEDs
- Auto-diagnostics
- Power supply voltage from 16.8V to 154V DC
- Operating temperature from -40°C to +70°C

DESCRIPTION

RIO-300 is a modular system of pluggable 3U size cards providing high density remote I/O. The product range includes I/O cards of digital inputs and outputs, relay outputs, voltage and current inputs and outputs, and special purpose I/Os. The wide power supply range enables the system to be used with all on-board network voltages on rolling stock (24V, 48V, 72V and 110V DC).

The I/O cards feature an integrated CANopen communication interface which allows direct communication with the I/O cards using CANopen protocol. In addition, it is possible to connect the RIO-300 to Ethernet and MVB networks with the help of CX-CPU and GW-CM interfacing cards. Most of the I/O cards are equipped with auto-diagnostics and individual channel status LEDs allowing straightforward troubleshooting.

Depending on model variant, the I/O cards provide either front panel I/O connectivity via a single connector or rear I/O connectivity through a backplane connector. All I/O cards are galvanically isolated from the CANopen bus and power supply.

System

- 3U Eurocard form factor
- CANopen communication interface
- MVB and Ethernet gateway (optional)
- Front panel or rear I/O connectivity
- Galvanically isolated I/Os
- Individual channel status LEDs
- Auto-diagnostics

Connectivity

- 1x CANopen
- 1x MVB EMD, CLASS 1 (GW-CM only)
- 1x Ethernet 10Base-T/100Base-TX (CX-CPU only)

Environment

- Power supply voltage 16.8V to 154V DC
- Power input max. 1W per module
- Operating temperature -40°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Dimensions of cards 3U x 4TE, depth 160mm (EUROCARD)

RIO-300 COMPONENTS

I/O cards

CX-DI32	32x digital input
CX-D08	8x digital output 2A/24-48V, 0.5A/72-110V
CX-R08	8x relay output 1A/24-48V, 0.3A/72-110V
CX-AI12	12x analogue input 0-50mA, 0-30V
CX-AO4	4x analogue output 0-50mA, 0-10V
CX-SF4	4x digital output, 6x digital input, autonomous logic

Communication cards

CX-CAN	CAN interfacing card
GW-CM/C	MVB gateway
CX-CPU	Ethernet gateway

Power Supply

CX-PWR	16.8V-154V
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Racks

CX-R19F-M/A	3U 19", 9 slots for I/O cards
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RE1XX ELECTRONIC SPEEDOMETER

3.6 SPEEDOMETERS



FEATURE HIGHLIGHTS

- Display and recording of speed, distance, time and selected vital signals
- Both needle and numerical speed indicators
- I/Os for analogue and logical signals
- DCF77 time signal receiver
- USB for downloading records
- Software for the evaluation of records
- Certified by the Czech Rail Authority

DESCRIPTION

The RE1XX electronic speedometer is designed to provide reliable and accurate readings and records of speed, distance, time and selected vital signals. Its modular design facilitates the installation in various types of vehicles.

The speedometer is equipped with both a needle indicator with a circular scale and a numerical LED display

complete with indication of acceleration or deceleration. On the integrated alphanumeric LCD display, it shows time, date, distance travelled and other information according to the configuration.

The records of speed, distance, time, pressure, and selected logical and analogue signals connected to

the inputs provided, are stored into FLASH memory. They can be downloaded using a service PC through a USB cable, or with the help of an external USB module they can be copied to USB FLASH memory.

Configuration and analysing tools are provided with the speedometer.

System

- Needle speed indicator with a maximum deviation angle 240°
- Three-digit LED display, 16-digit alphanumeric LCD display
- Scales from 0 to 80, 100, 140, 200 or 250 km/h
- Yellow or green backlighting, brightness can be manually adjusted
- FLASH memory with a capacity of 4MB or 20MB

Sensors

- TMG 568 Z3E Pressure sensor 0-600 kPa
- GEL2710.x Speed sensor

Environment

- Power supply voltage 24V, 48V, 72V or 110V DC -30%/+25%
- Power input max. 26W
- Operating temperature - 25°C to +55°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Ingress protection IP40 (front side of RJI1xx)
- Dimensions RJI1xx: 223 x 158 x 89 mm, RJE1xx 158/270/483 x 133 x 245 mm (width x height x depth)

Connectivity

- 1x CAN
- 1x RS-422/485
- 1x USB 1.1
- 4 inputs for speed sensor
- 1 input for pressure sensor
- 3 analogue inputs 0-10V DC
- Up to 64 digital inputs
- Up to 4 digital outputs
- Up to 54 relay outputs

Components

- RJI1xx Indication and communication unit
- RJE1xx Control unit
- DCF01 Receiver of the DCF77 time information



STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155,
EN 61373, EN 50325-4

RME10

ELECTRONIC SPEEDOMETER

3.6 SPEEDOMETERS



FEATURE HIGHLIGHTS

- Display and recording of speed, distance, time and selected vital signals
- Both needle and numerical speed indicators
- I/Os for analogue and logical signals
- USB for downloading records
- Software for the evaluation of records
- Certified by the Czech Rail Authority

DESCRIPTION

The RME10 compact electronic speedometer is designed to provide reliable and accurate readings and records of speed, distance, time and selected vital signals. Its compact design facilitates the installation directly into the driver's desk on various types of vehicles.

The speedometer is equipped with both a needle indicator with a circu-

lar scale and a numerical LED display complete with indication of acceleration or deceleration. On the integrated alphanumeric LCD display, it shows time, date, distance travelled and other information according to the configuration.

The records of speed, distance, time, pressure, and selected logical and ana-

logue signals connected to the inputs provided are stored into FLASH memory. They can be downloaded using a service PC through a USB cable, or with the help of an external USB module they can be copied to USB FLASH memory.

Configuration and analysing tools are provided with the speedometer.

System

- Needle speed indicator with a maximum deviation angle 240°
- Three-digit LED display, 16-digit alphanumeric LCD display
- Scales from 0 to 80, 100, 140, 200 or 250 km/h
- Yellow or green backlighting, brightness can be manually adjusted
- FLASH memory with a capacity of 4MB or 20MB

Sensors

- TMG 568 Z3E Pressure sensor 0-600kPa
- GEL2710.x Speed sensor

Connectivity

- 1x USB 1.1
- 4 inputs for speed sensor
- 1 input for pressure gauge
- 8 digital inputs
- 6 relay outputs

Environment

- Power supply voltage 24V, 48V, 72V or 110V DC -30%/+25%
- Power input max. 15W
- Operating temperature - 25°C to +55°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Ingress protection IP40 (front side)
- Dimensions 223 x 158 x 135 mm (width x height x depth)



STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155, EN 61373, IEEE 802.3, IEC 61375

ELM-101 ENERGY METER

3.7 ENERGY METERS



FEATURE HIGHLIGHTS

- Four-quadrant energy metering
- Suitable for all AC and DC traction supply systems
- Applicable to multi-system locomotives
- Accuracy Class 0.5 (EN 50463), Class C (EN 50470)
- Recording load profiles at 1 minute intervals
- Approved for billing purposes
- Power supply voltage 14.4V to 36V DC
- Operating temperature from - 40°C to +70°C

DESCRIPTION

The ELM-101 energy meter is designed especially for energy metering on-board electric traction vehicles. It can measure both DC and AC signals of any existing traction supply system (1.5kV DC, 3kV DC, 15kV/16.7 Hz, 25kV/50Hz). Moreover, it is also suitable for multi-system locomotives using more than one electrification system.

The ELM-101 combines the task of measuring active and reactive energy consumed and regenerated, both capacitive and inductive, recording load profiles at 1 minute intervals, measuring of instantaneous values (voltages, currents), and the monitoring of the minimums and maximums of values measured.

The ELM-101 meets the requirements of standards EN 50463 for Class 0.5 and EN 50470 for Class C energy meters. The energy meter can be supplied with a calibration certificate enabling its use for billing purposes.

Measurement and Calculations

- Accuracy Class 0.5 (EN 50463), Class C (EN 50470)
- Harmonics up to 25th
- Active energy consumed and regenerated (MWh)
- Active energy consumed and regenerated in DC network only (MWh)
- Reactive energy consumed and regenerated both capacitive and inductive (Mvarh)
- Active power (MW), reactive power (Mvar) Instantaneous/ effective value of voltages and currents

Environment

- Power supply voltage 14.4V to 36V DC
- Power input max. 3W
- Operating temperature - 40°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Ingress protection IP30
- Dimensions 105 x 223 x 46 mm (width x height x depth)

Load Profiles

- Recording at 1 minute intervals
- Recording capacity 72 days
- Records include date, time, active and reactive energy consumed and regenerated, maximum values of power, voltages, and currents, electrification system

Connectivity

- 1x RS-232/422



STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155, EN 61373, EN 50463:2012, EN 50470-1, EN 62056-21, EN 62056-61

ELM-201

GSM/WIFI ENERGY METER

3.7 ENERGY METERS



FEATURE HIGHLIGHTS

- Four-quadrant energy metering
- Suitable for all AC and DC traction supply systems
- Applicable to multi-system locomotives
- Accuracy Class 0.5 (EN 50463), Class C (EN 50470)
- Recording load profiles at 1 minute intervals
- Approved for billing purposes
- Communication over GSM/GSM-R, UMTS and WiFi networks
- Support of 2 SIM cards, integrated GPS receiver
- Power supply voltage 16.8V to 154V DC
- Operating temperature from - 40°C to +70°C

DESCRIPTION

The energy meter ELM-201 is designed especially for energy metering on board electric traction vehicles. It can measure both DC and AC signals of any existing traction supply system (1.5kV DC, 3kV DC, 15kV/16.7 Hz, 25kV/50Hz). Moreover, it is also suitable for multi-system locomotives using more than one electrification system.

The ELM-201 combines the task of measuring active and reactive energy

consumed and regenerated, both capacitive and inductive, recording load profiles at 1 minute intervals, measuring of instantaneous values (voltages, currents), and the monitoring of the minimums and maximums of values measured.

The energy meter can wirelessly transmit the measured data over the GSM/GSM-R/UMTS and WiFi networks. An integrated GPS receiver

adds position information to the load profiles and is used for time synchronisation.

The ELM-201 meets the requirements of standards EN 50463 for Class 0.5 and EN 50470 for Class C energy meters. The energy meter can be supplied with a calibration certificate enabling its use for billing purposes.

Measurement and Calculations

- Accuracy Class 0.5 (EN 50463), Class C (EN 50470)
- Harmonics up to 25th
- Active energy consumed and regenerated (MWh)
- Active energy consumed and regenerated in DC network only (MWh)
- Reactive energy consumed and regenerated both capacitive and inductive (Mvarh)
- Active power (MW), reactive power (Mvar)
- Instantaneous/effective value of voltages and currents

Environment

- Power supply voltage 16.8V to 154V DC
- Power input max. 35W
- Operating temperature - 40°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Ingress protection IP30
- Dimensions 165 x 105 x 310 mm (width x height x depth)
- Weight 1.2 kg

Load Profiles

- Recording at 1 minute interval
- Recording capacity 72 days
- Records include date, time, position, active and reactive energy consumed and regenerated, maximum values of power, voltages, and currents, electrification system

Wireless technologies

- GSM/GSM-R and UMTS with the support of 2 SIM cards
- WiFi standard 802.11 a/b/g
- 20-channel GPS receiver

Connectivity

- 3x Ethernet 10Base-T/100Base-TX
- 2x RS-232
- 1x RS-422/485
- 1x USB 1.1 Host
- 1x CompactFlash slot equipped with 1 GB card



STANDARDS

- EN 50121-3-2, EN 50124-1, EN 50155,
EN 61373, EN 50463:2012, EN 50470-1
EN 62056-21, EN 62056-61, IEEE 802.3,
IEEE 802.11

VS67-LCD

QUAD-MODE CAB RADIO

3.8 RADIO COMMUNICATIONS



Airport Radar and Radiocommunication Systems



FEATURE HIGHLIGHTS

- Voice and data in GSM-R and GSM digital networks
- Analogue radio in 150 MHz and 450 MHz bands
- 10.4" colour LCD display
- GPS satellite localization
- In-built diagnostics and service functions
- Power supply voltage 16V to 30V DC and 33V to 138V
- Complies with EIRENE and UIC 612-04 Leaflet
- Certified to the TSI CCS Class A

DESCRIPTION

The VS67-LCD is a cab radio system that provides voice and data communication via a digital GSM-R network compliant with EIRENE standard features, public GSM and analogue systems in 450 MHz (UIC 751-3) and 150 MHz bands. Its modular design, open architecture and the option for software updates provides maximum flexibility to meet current and future

requirements to voice and data communication.

The cab radio is operated through a 10.4" colour LCD display that complies with the requirements of the Train Radio Display as specified in UIC 612-04 Leaflet. The LCD display can be integrated into the display system in the driver's cab in a way that its function can be taken over by another display in

cases of failure. For vehicles with two cabs, the cab radio is equipped with two displays and handsets.

An integrated GPS satellite localisation system makes it possible to transmit the position of the vehicle to the base station over a GSM network.

The cab radio comprises of a VS67 radio system designed and manufactured by T-CZ.

Components

- Display unit DISPL-1 for graphical user interface
- Quad-mode radio station VS67
- Handset
- Multiband Antenna +Multiband Combiner

LCD display

- 10.4" colour TFT LCD panel with LED backlighting and an anti-reflection layer
- 32 pushbuttons in accordance with UIC 612-05
- Brightness 450 cd/m², contrast 600:1
- Viewing angles: 140° horizontally, 50° upwards, 60° downwards
- Automatic brightness regulation

Connectivity

- 1x Ethernet 10Base-T/100Base-TX
- 1x RS-232/422/485
- 1x Audio output

Analogue radios

- Simplex, band 150.050 – 158.375 MHz (99 channels)
- UIC 751-3, band Rx 467.4 – 468.3 MHz, Tx 457.4 – 458.3 MHz
- Voice call
- Remote stop function over XX48

GSM-R

- Band EGSM-900
- Voice call features ASCI (VGCS, VBS, REC)
- Multi-Level Precedence and Pre-emption Service (eMLPP)
- EIRENE features: functional numbering, location dependent addressing
- Data transfers, SMS messages

GSM/GPS

- Band EGSM-900, GSM-1800
- Voice call
- Data transfers using GPRS/EDGE, SMS messages
- GPS position acquiring and transmission

Environment

- Power supply voltage 16V to 30V DC and 33V to 138V
- Power input max. 143W
- Operating temperature -25°C to +55°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Ingress protection IP54 (front side of DISPL-1)
- DISPL-1 dimensions 310 x 214 x 97 mm (width x height x depth)
- VS64 dimensions 290 x 440 x 220 mm (width x height x depth)
- Weight 31.5 kg

VLU-1

VEHICLE LOCATOR UNIT

3.9 FREIGHT VEHICLE TRACKING



FEATURE HIGHLIGHTS

- GPS position tracking
- Communication over GPRS/SMS
- Up to 48 months battery lifetime
- 6 digital inputs
- Operating temperature from - 40°C to +70°C
- Robust design, ingress protection IP55

DESCRIPTION

The vehicle locator unit VLU-1 is a device intended for the real-time position tracking of freight vehicles. It uses GPS to determine the precise location of a vehicle at regular intervals. The acquired position is recorded within the unit and transmitted to the ground system at regular intervals using GPRS or SMS.

The VLU-1 is powered from battery cells which ensure the operation for at least 48 months if the position is acquired and transmitted hourly. Optionally, the unit can be equipped with a solar panel.

Six digital inputs are available for the connection of external switches, which are used for the monitoring of events

such as door opening. The internal accelerometer allows the registration of shocks and vibrations.

The VLU-1 is housed in a robust enclosure made from galvanized Fe steel. Optionally, it can be delivered with a stainless steel enclosure. The mounting adapter can be customized for a particular vehicle type.

System

- Power supply from internal batteries and solar panel
- Configurable position acquiring and transmission intervals
- Battery lifetime min 48 month for 1 hour/1 hour position acquiring/transmission; min 24 month for 15min/1hour intervals
- Accelerometer

Environment

- Battery voltage 10.8V DC
- Operating temperature - 40°C to +70°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Ingress protection IP55
- Dimensions 100 x 300 x 100 mm (width x height x depth)
- Weight 4.6 kg

Wireless technologies

- GSM dual band 900/1800, GPRS/CSD/SMS data
- 20-channel GPS receiver
- Internal antenna

Connectivity

- 6 digital inputs



STANDARDS

EN 50121-3-2, EN 50124-1, EN 50155, EN 61373

NSV100

LED CLEARANCE AND TAIL LIGHTS

3.10 OTHERS



FEATURE HIGHLIGHTS

- Long lifespan due to the high-brightness LED diodes
- Brightness control
- Failure detection and indication
- Over-voltage protection
- Power supply voltage 16.8V to 60V DC
- Complies with requirements of the UIC 534 and UIC 532 Leaflets

DESCRIPTION

The NSV100 series of train clearance and tail lights feature high-brightness LED diodes which ensure a long lifespan in comparison to light bulbs. They are intended for new vehicles and can be used to replace classical lamp lights in existing vehicles.

Depending on the variant, the lights are equipped with white, red or both LEDs. The white colour LEDs can be switched between low and high intensity mode.

The LED diodes are clustered in zones, which ensure the lights re-

main operational even if some LEDs fail. The zone failures are detected and signalled on the digital output provided.

The NSV100 series complies with the UIC 534 Leaflet and the EN 15153-1 standard.

Light types

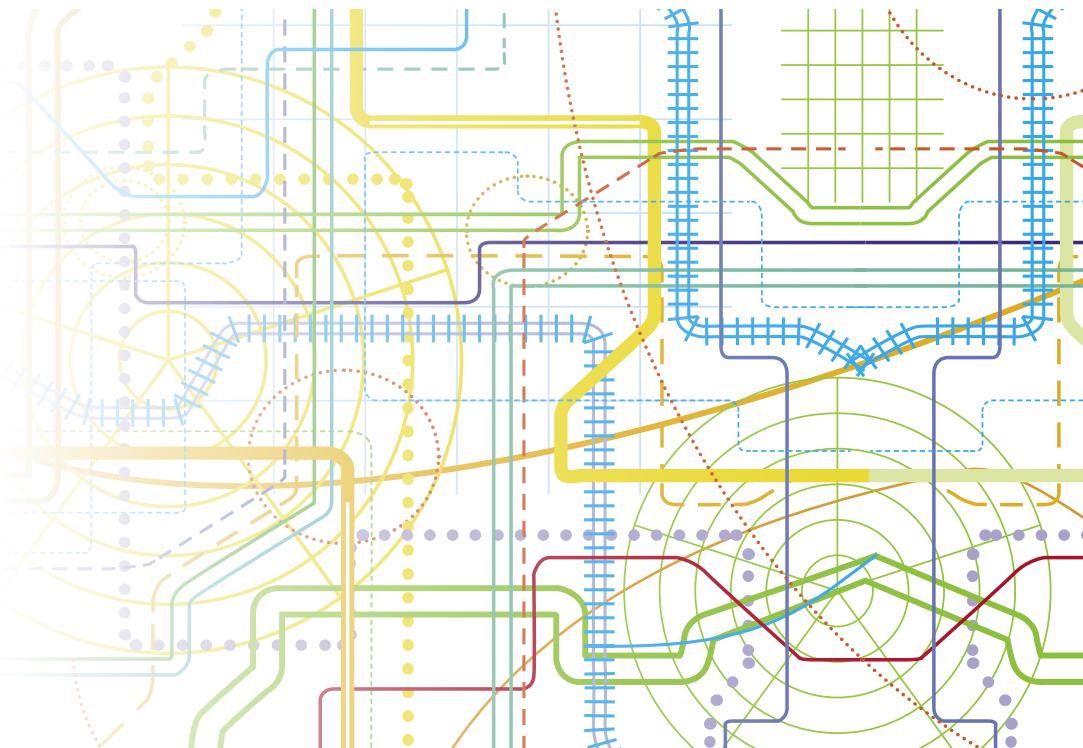
- NSV11x Clearance and tail lights – white and red colours
- NSV12x Clearance lights – white colour
- NSV13x Tail lights – red colour

Environment

- Power supply voltage 16.8 to 60V DC
- Power input max. 6W (white), 2.4W (red)
- Operating temperature - 30°C to +55°C
- Relative humidity max. 75% annual average, max. 95% for a period of 30 days
- Ingress protection IP55 (front side)
- Dimensions 248 x 248 x 57/85 mm (width x height x depth)
- Weight 2.5 kg

MODEL VARIANTS

	Location on vehicle	Color	Failure indication	Cover	Glass
NSV111SR	lower	white + red	passive	standard	plain
NSV111SV	lower	white + red	passive	standard	concave
NSV111NR	lower	white + red	active	tilting	plain
NSV111NV	lower	white + red	active	tilting	concave
NSV121SR	lower	white	passive	standard	plain
NSV121SV	lower	white	passive	standard	concave
NSV141SR	upper	white	passive	standard	plain
NSV141SV	upper	white	passive	standard	concave
NSV141HB	upper	white	passive	upper	none
NSV142HB	upper	white	active	upper	none
NSV131SR	lower	red	passive	standard	plain
NSV131SV	lower	red	passive	standard	concave



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