Trainguard ZSI 127

ETCS-based Train Control System

Transportation Systems

SIEMENS

Simis Train Control Computer – compact and modular

ETCS-based Train Control System

Train control systems are an integral part of modern railway operations. They make an important contribution to the high level of safety which is considered to be virtually matter-of-fact practice today. On the basis of the European Train Control System (ETCS), the different train control systems are being continuously standardised, resulting in savings in both time and costs.

The Trainguard ZSI 127 train control system features the basic functions of ETCS Level 1 and offers the possibility of preparing existing systems for the introduction of ETCS.

Fits into existing systems
Trainguard ZSI 127 is a compact, low-cost train control system which can be simply integrated into existing systems without entailing any adjustment.

Enhances safety
Trainguard ZSI 127 continuously and uninterruptedly monitors train movements in the background by dynamic braking curve calculation. As a result, the safety of railway operations is enhanced. The system has been developed in line with the CENELEC safety standards for railway applications.

Prepared for ETCS Level 1
Trainguard ZSI 127 features specific functions for operation on secondary lines.

In the event of later conversion to ETCS Level 1, the installed ZSI 127 components can continue to be used. This means that the procurement of this system is an investment into the future.

ETCS Level 1 basic functions
The system features the following ETCS Level 1 basic functions:

- Movement authority with monitoring of the maximum permitted speed
- acoustic alarm in the event of exceeded speed
- active intervention with the braking system if the train driver fails to respond
- information about speed restrictions along the route

Transmission point with Trainguard Eurobalises S21

Trainborne Equipment

The trainborne equipment components, comprising the Simis Train Control Computer, the control and display unit and the ETCS trainborne antenna are all rugged and very compact in their design. Hence, they can be easily integrated even where space is limited. Also longer vehicles are fitted with only one on-board computer and at each end with one Control- and Display Unit and one trainborne antenna.

Simis Train Control Computer

The on-board computer is based on the new Simis Train Control Computer-platform. A fail-safe dual-channel system has been implemented on only one tier. Thanks to its modular design, it can be easily expanded. The equipment frame is EMC-proof and the front-panel connectors simplify installation.

Dimensions	19" mounting frame, 84 units wide, 3 units high and 240 mm deep
Power supply	24 V, 36 to 48 V, 72 to 110 V; power consumption max. 90 W
Modules	balise / loop channel, digital I/O, fail-safe relays, serial interface

Control and Display Unit

The two compact units for input and display constitute the interfaces between the train driver and the on-board computer. Further elements such as switches, lamps or buzzers are not required.

Dimensions	96 x 48 mm
Power supply	via the connecting cable from the Train Control Computer

ETCS Trainborne Antenna

The compact balise / loop antenna can be mounted on the vehicle body or on the bogie. The connection to the on-board computer is by means of a coaxial cable only.

Dimensions	295 x 445 x 100 mm

Odometer Pulse Generator

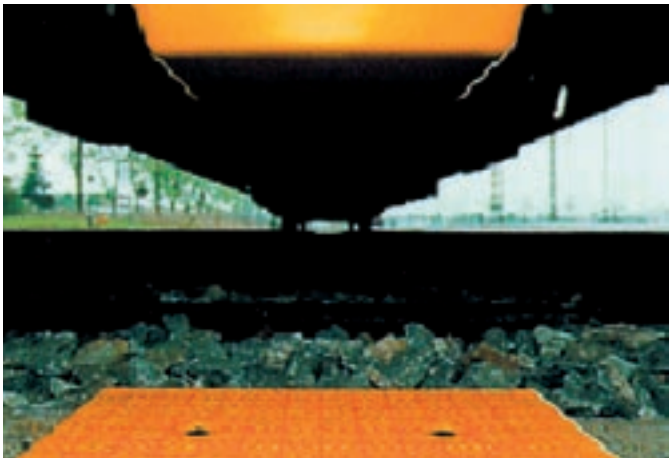
The following Odometer Puls Generator types can be connected and configured:

- Sécheron 5.8600.022/3x
- Krauss-Maffei KMG-2H, KMG-1,4
- Deuta DF 16/1, DF 22

Tools for Configuration, Commissioning and Maintenance

The on-board computer is configured and the diagnostic data is selected and displayed menu-driven using a notebook.

Control and Display Unit of Trainguard ZSI 127



Trainguard Eurobalise S21 and trainborne antenna

Trackside Equipment

The trackside equipment is identical with the ETCS Level 1 equipment and comprises the LEU S21, Eurobalise S21 and Euroloop S21.
The line data is transmitted by an ETCS telegram. This telegram can be supplemented so that the mixed operation of vehicles fitted with ETCS Level 1 and Trainguard ZSI 127 is possible.

Trainguard LEU S21 M

Depending on the signal aspect, this central trackside element sends the appropriately configured ETCS telegram to the vehicle via Eurobalise S21 or Euroloop S21:

- signal interface with 16 current inputs and 4 voltage inputs
- cascadable: with up to 8 balise / loop connections
- maximum safety (SIL 4) and tried-and-tested reliability (in operation since 1998)
- compact dimensions (286 x 185 x 190 mm)

Trainguard Eurobalise S21

For intermittent data transmission from the line to the vehicle, fixed balises and transparent balises have optimally proved themselves and offer the following benefits:

- compact (450 x 260 x 40 mm) and rugged (GRP housing)
- no plug-in connections; programming is via the air gap
- simple installation directly on the sleeper or by means of tie rod brackets

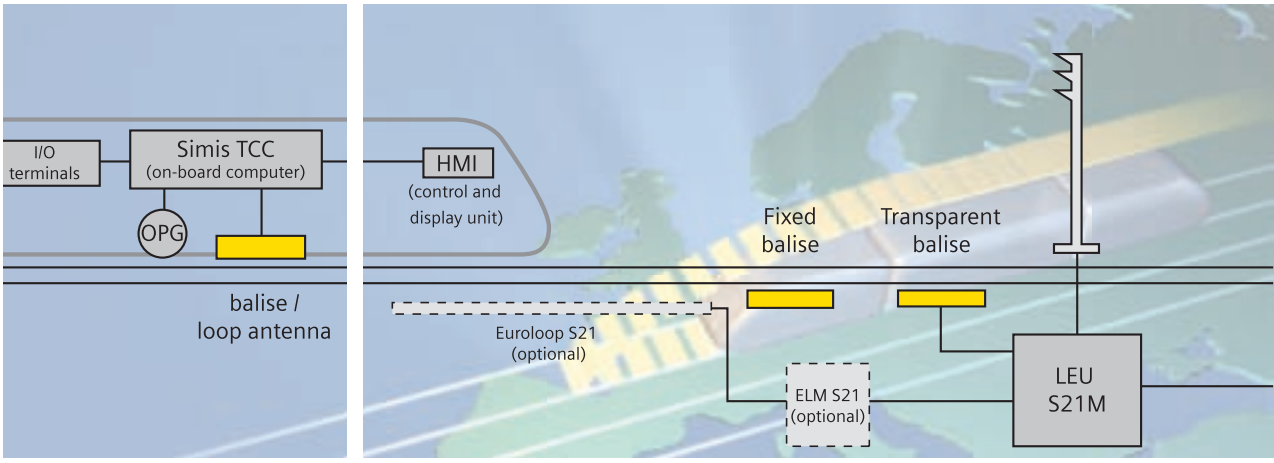
Trainguard Euroloop S21

The cable at the base of the rail ensures continuous data transmission over a distance of up to 800 m and thus boosts performance and operational safety (e.g. in the event of non-existent overlaps). The Euroloop S21 features the following properties:

- state-of-the-art spread-spectrum modulation for reliable data transmission at low transmission levels
- identical telegram format to that of the Eurobalise S21
- leaky feeders for installation in the base of the rail web (no loop in the centre of the track)

Tools for Configuration, Commissioning and Maintenance

An internal event memory records operator actions and telegram communications, for example. A wide range of tools supports configuration, commissioning and maintenance.



Block diagram of train control system

Function
Data is intermittently transmitted by means of Eurobalises S21 and semi-continuously by the Euroloop S21. Intervention takes place stepwise. First by means of an acoustic alarm, then service braking and finally, if necessary, emergency braking.
Data transmission complies with the ETCS standard. The line data for Trainguard ZSI 127 is programmed in the system-specific telegram package 44.

Differences in function	Trainguard ZSI 127	ETCS Level 1
Cab signalling	no	yes
Safety integrity level	max. SIL 2	SIL 4
Vehicle speed	max. 180 km/h	max. 500 km/h
Speed graduation	1 km/h	5 km/h
Departure hindrance	yes, even in push-pull operation (after activation)	only during full monitoring
Switchover of operating mode	yes	no
Odometry (standard case)	2 odometer pulse generators	1 odometer pulse generator and 1 radar
Configuration	ETCS Class 1 with package 44	ETCS Class 1

Installation and Operation
Instead of the large ETCS display for cab signalling, a simple, compact control and display unit in the driver's cab is sufficient. Depending on the system involved, standard-gauge, metre-gauge and mixed operation are all possible. The Eurobalise S21 can even be installed on rack railways.

Monitoring Functions
The movement authority is continuously and uninterruptedly monitored by the dynamic braking curve calculation and transmitted by the trackside equipment. The following criteria are of prime significance:
- safe stopping before a hazard point
- permitted speed in speed restriction sections (e.g. at level crossings, points and work sites)
- operator actions of the train driver
- maximum permitted rollback distance
- permitted speed during shunting

Departure Hindrance
After the train is activated (e.g. in push-pull operation), the Euroloop S21 prevents the train from departing if the signal shows stop.

Customer-specific Functions
For example:
- switchover of operating mode (adhesion-/cogwheel)
- switchover of current system
- passenger information

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