



LS06 AUTOMATIC TRAIN PROTECTION

- Indoor architecture 2oo2
- Safety Integrity Level SIL 4
- High reliability and stability
- Easy transition to ETCS
- Small dimensions and low power consumption



General Description

Automatic train protection system LS06 is a mobile part of train protection system of LS type. Its unified solution with STMLS module simplifies economic and technical demands for connection to ETCS.

Basic Technical Description

In the active mode operation, the automatic train protection system LS06 provides three basic functions:

- Transmission and display of signal information between the line

and tractive vehicle about the signal aspect to which the train is approaching

- Check whether the information transmitted was acknowledged by train driver and was respected
- Intervention to the traction vehicle control in case of negative outcome of checking function

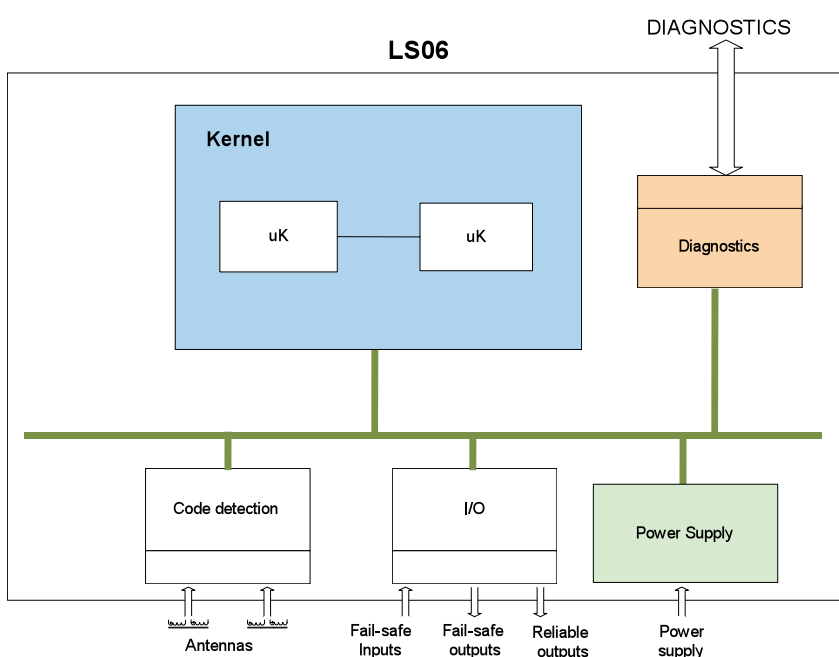
A coded signal from the track circuit for a specific section is received by sensors in front of the first axle. The received signal is digitally detected and safely processed. The evaluated

signal aspect is displayed for the train driver on the cab signal. Depending on the current speed and the evaluated signal aspect the response of the train driver is monitored. If the response is inadequate, even after acoustic warning, the unit generates the command to stop the train by emergency brakes.

During movement along the non-coded track or in the presence of a restrictive signal aspect the automatic train protection system LS06 also checks the driver's vigilance and in the absence of adequate reaction, re-generates the command to stop the train by emergency brakes.

Main functions meet criteria for the SIL4 Safety Integrity Level according to EN 50129.

Automatic train protection LS06 is designed as a set of plug-in units



Block diagram



installed in durable 19" subrack for mobile use 3U height. The core of the LS06 system consists of two processor units μK , operating in 2oo2 architecture to achieve the required safety. The core ensures all control and supervisory functions. Other units with specific functions for the LS06 application (timing, input-output, scanning and detection of code

from the track circuit) complement the core module.

All types of units use powerful 16-bit processors. The LS06 power supply is backed-up and includes a wide range of supply voltages used on tractive vehicles. The system is equipped with diagnostics for storing of recorded data.

The wayside elements of the system are the code scanner (antennas), cab signalling and acoustic warning.

System provides diagnostics interfaces for fast failure location. Restoring of function is solved by defective card exchange.

Basic Technical Parameters

Surroundings operating temperature	-40 °C to +40 °C for scanners -40 °C to +70 °C for other parts	
Relative humidity	The annual average max. 75 %, continually 30 days a year max. 95 %	
Above sea level	-120 m to + 2000 m	
Long term vibration	5 -150 Hz, 2.5 mm to 8.4 Hz, acceleration amplitude 7 mm/s ² over 8.4 Hz	
Standard compliance	EN 50155	
Short term vibration	Vertically 3g/30 ms; diagonally 3g/30 ms; longitudinally 5g/30 ms; duration ½ period	
Power supply	Basic nominal power supply	24, 48, 110 V DC
	Power supply operating tolerance	-30 %, +25 %
	Power supply interruption	max. 10 ms
	Power input	max. 60 W
Cover rating	IP20	
Insulation resistance:	In standard environment	min. 20 MΩ
	After constant humid heat test	min. 7 MΩ
Electric strength:	3750 V / 50 Hz / 1 min	
EMC	LS06 complies with EN 50121-1 and EN 50121-3	
Failure-free operation and renewability	MTBF	12 000 hours
	MTTR	1,5 hours

