Tire Pressure Monitoring System (RDKS)

1 Description of the system

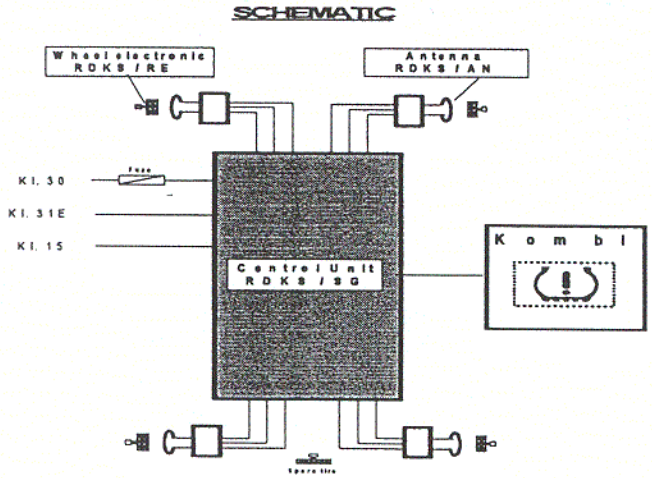
The RDKS Tire Pressure Monitoring System is a system for permanently monitoring tire pressure. To do so, the pressure and temperature in a tire are measured at regular intervals and transmitted telemetrically over an RF transmission route to a central control unit. The control unit evaluates the data received.

2 Layout of the system

This Tire Pressure Monitoring System is made up of the following components:

- 5 wheel electronic systems (includ. transmitter)
  Type: RDKS / RE
- 4 or 5 reception antennas
  4 or 5 antennas
- 1 control unit (receiver)
  Type: RDKS / SG

Fig. 1: Schematic representation of the system's layout in a vehicle



The wheel electronic systems are mounted inside the wheels and gauge the tire's pressure and temperature. The data measured is transmitted out of the wheel over a transmission stage. The power supply is provided by a battery in the wheel's electronic system.

Each wheel electronic system has an individual ID that is transmitted along with each transmission of data. The RF transmission is done in the 433-MHZ range, the ISM-Band as it is called, or in some countries in the 315-MHZ range.

The antennas mounted in the wheel vicinity receive the data transmitted by the wheel electronic systems, which is then passed on to the control unit via shielded twisted-pair cable that is installed in the vehicle's harness.

The control unit is made up of an RF receiving module and basic control unit circuit board.

2.1 The wheel electronic system

The wheel electronic system together with the filling valve form a compact unit and is installed in the wheel rim like a screw valve.

Located on a circuitry retainer in the housing of the wheel electronic system are:

- a pressure sensor accommodated together with a temperature sensor and an ASIC to process the signals in one housing (intelligent sensor).
- a transmission stage and
- a lithium battery as the power supply.

In the course of its energy management, the wheel electronic system automatically switches between various operating modes:

Mode 0: Energy-saving mode, as long as the part is in storage, uninstalled. In this mode only measurements are taken, but there is no transmission.

Mode 1: As long as no significant change in pressure is detected, a data telegram is sent at 55-second intervals to the monitoring system and transmitted to detect very slow changes in pressure. (normal operating mode)

Mode 2: The rate of measuring and transmitting is temporarily increased (0.8 sec.) when a certain change in pressure has been detected. (alarm mode)

2.2 Receiving antenna

The data is received over planar antennas that are installed near the wheels.

2.3 Control unit

The control unit is accommodated in one housing. The RF part and the regulating electronics are arranged on two separate circuit boards.

The RF receiving module is designed with four or five channels. The individual channels are conducted over a special multiplexer to one common RF receiver.

Two processors are integrated on the control unit circuit board. All the system functions are implemented in the system processor. The interface functions such as diagnosis and communication with the driver information system are realized in the communication processor.

3 Important technical specifications

Transmission interval (in Mode 1)	54.6 sec (normal operating mode)
Transmission interval (in Mode 2)	0.85 sec (alarm mode in case of pressure loss)

RF transmission

Transmission frequency	433.92 or 315,0 MHz
Transmitting power (test conditions according I-ETS 300 220)	3,5 µW
Field intensity (outside of the tire in a distance of 3m)	approximately 3,4 µV/m
Bit transmission rate	9.6 kBd
Modulation type	frequency shift keying (FSK)
Data telegram length	10 ms

Power supply of the wheel electronic system

Battery system	lithium-thionyl chloride
Cell voltage	3.6 V