

Functional Description

Functional Description / User Manual

of the

Siemens VDO

Keyless Vehicle Module

**type 5WK4 8079
5WK4 8089**

General functional description

The immobilizer system is equipment which enables comfortable operation of the vehicle. To be able to operate the vehicle the driver only has to take the key with him. The vehicle communicates with the key inductively via ferrite- antennas which are located in the front doors, in the interior of the car and in the bumper. These ferrite antennas are driven by inductance with a frequency of 125 kHz. By damping the body sheet-metal of the car, the system's range is kept in defined limits. The range of the interior antennas of the vehicle is the interior of the car only. This enables the locating of the key.

The door handles and the trunk lid have been equipped with contacts for the functions "locking" and "unlocking" the vehicle. Woken up by pulling a door handle the immobilizer sends a challenge 125 kHz via the corresponding inductive door antenna to the key. The data transmitted in the process activate the key. The key sends a code to the radio receiver on the control unit via radio frequency transmission. The control unit transmits the data to the vehicle's "electronic ignition starter switch (EZS)". If this code is assessed as valid in the EZS, the vehicle will be unlocked.

If a lock command is send to the control module while the vehicle is unlocked, the EZS and the key interchange a code via the control module and the antennas. If the key is in the exterior area and the code is valid, the vehicle will be locked.

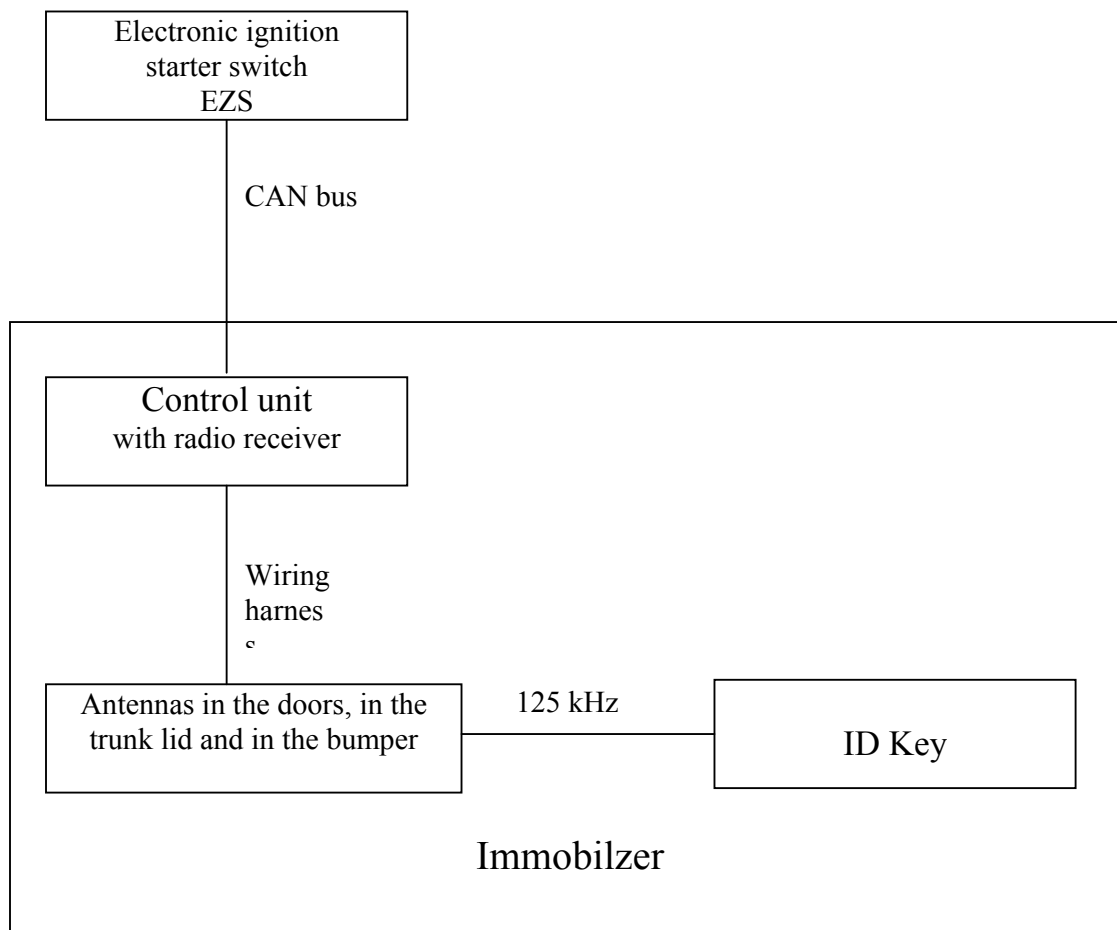
If it is intended to start the engine of a vehicle, this requires actuation of a start key. The interior inductive antennas are activated. This is to ensure that the key is inside the vehicle. If the valid code is emitted by the key, the engine will start. If the code is invalid, the engine will not start.

List of variants

5WK4 8079	Control unit W221for ECE use
5WK4 8089	Control unit W221 for USA use
5WK4 8193	Ferrite antenna

Block diagram

The immobilizer system consists of a control unit, the inductive antennas and the key. To activate the system, sensors or push-buttons are located in the doors, in the trunk lid and in the interior. Interaction with the vehicle is effected via the radio receiver in the control module, which receives the messages from the key and transmits them via the vehicle's CAN bus to the EZS.



Technical description

Carrier frequency:	125kHz ± 5kHz
Field strength:	<42 dμA/m in 10 m
Modulation:	ASK
Supply voltage:	13.5 V
Type of battery:	car battery
Range:	< 2.0 m

Duty Cycle

20 actuations of immobilizer system within 24 hours with a typical transmission time of 0,08 seconds. 0.07 seconds / hour.

Transmission time T (on) 0.07 seconds / hour

Off time T (off) 3,599.93 seconds / hour

Duty Cycle: $T(\text{on}) / T(\text{on+off}) \times 100\% = 0.07 / 3,600 \times 100\% = 0.002\%$

Label Design

Europe:

Siemens VDO
5WK4 8079



USA/CAN:

Siemens VDO
5WK48089
FCC ID:KR55WK48089
IC:267T-5WK48089

This device complies with part 15 of the FCC Rules and RSS-210. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept interference received, including interference that may cause undesired operation.

NOTE:

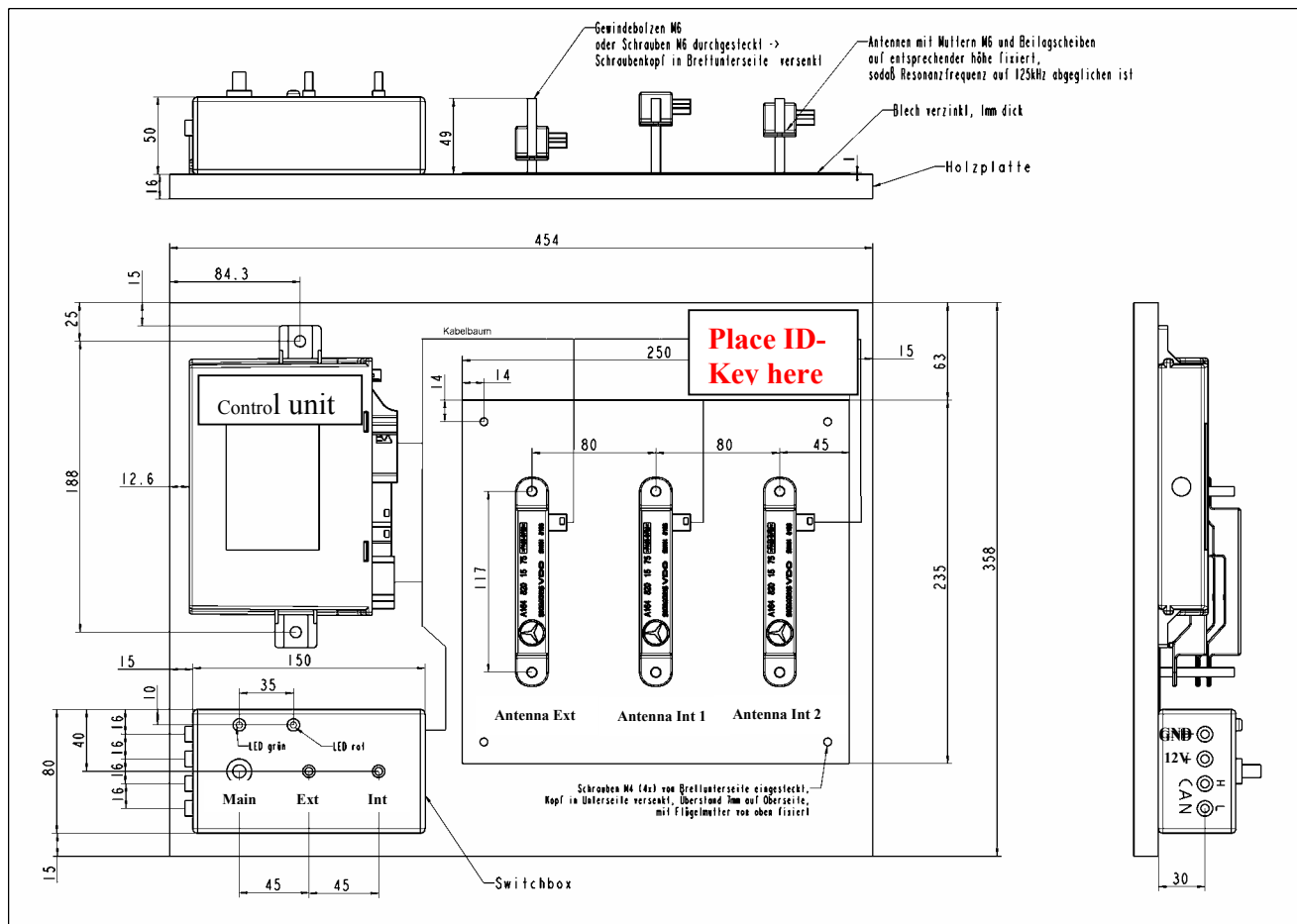
Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

Functional description of the measurement system

The test setup comprises the following components:

- Control unit
- Induktive Ferrite antennas
- Board for radio homologation measurements (including Wiring harness)
- Key (normal Mode) to verify the function (if attached/required)
- Test box

Board for radio homologation measurement



Functional description of the measurement system

The entire setup is supplied with power via the two banana jacks on the test box:

Banana jack, red : +12V DC

Banana jack, black : GND (ground)

The current input (in case of operation) is

min 0,3A/ max 0,8A av. (min 1,5App/max 8App)

"Main" switch:

"Main" switch on: control unit is powered and the green LED is lighting

"Main" switch off: control module is unpowered

Switches "Ext" and "Int"

"Ext" on, "Int" off: selects functional test and test of emission of external antenna

"Ext" off, "Int" on: selects test of emission of internal antenna

"Ext" off, "Int" off: no mode selected

"Ext" on, "Int" on: no operation is possible when both switches are turned on

Functional test

1. Select "main" switch on
2. green LED is lighting
3. Turn the switch "ext" on (make sure switch "int" is off)
4. Place the Id-key (normal Mode) within the red marked square on the board. It will receive the inductive telegram and answer via RF.
5. If an RF telegram from the ID- key is received by the control module, the red LED is flashing for 200ms.
6. As soon as the ID-Key is brought out of range (use 5m) the red LED will stop flashing.

Test of emission of the exterior antenna

1. Select "main" switch on
2. Green LED is lighting
3. Turn the switch "ext" on (make sure switch "int" is off)
4. The control module sends every 700ms an inductive telegram via the exterior antenna
5. Measure the emission
6. After the test switch the switch "ext" and the main switch off.

Test of emission of the interior antennas

1. Select "main" switch on
2. Green LED is lighting
3. Switch the switch "int" on (make sure switch "ext" is off)
4. The control module sends every 700ms an inductive telegram via the interior antenna
5. Measure the emission
6. After the test switch the switch "int" and the "main" switch off.