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E70 Comfort Access

Initial Print Date: 10/06 Revision Date:

Subject Page

Comfort Access

Model: E70

Production: From Start of Production

OBJECTIVES

After completion of this module you will be able to:

- Explain the Comfort Access system in the E70 X5
- Locate all the components used in the system

Introduction

Using Comfort Access the customer can unlock and open the vehicle without active use of the ID transmitter. It is unimportant how the customer wishes to access the vehicle. It is important that the ID transmitter be located in the vehicle's immediate vicinity (approximately. 2m). It is sufficient to have the ID transmitter somewhere on your person.

Comfort Access was first introduced on the E65 (03/2002). The system was then gradually introduced on different BMW models.

These models are:

- E87 from 09/2004
- E90 from 03/2005
- E60 from 09/2005
- E61 from 09/2005
- E63 from 09/2005
- E64 from 09/2005
- E91 from 09/2005
- E92 from 05/2006.

Comfort Access is available on the E70 from SOP (Start of Production).

The benefits of Comfort Access are:

- High level of convenience when unlocking and locking the vehicle
- Quick and easy access to the vehicle
- Easy engine start/shutdown
- Maximum comfort for the driver
- No more annoying hunting for keys.

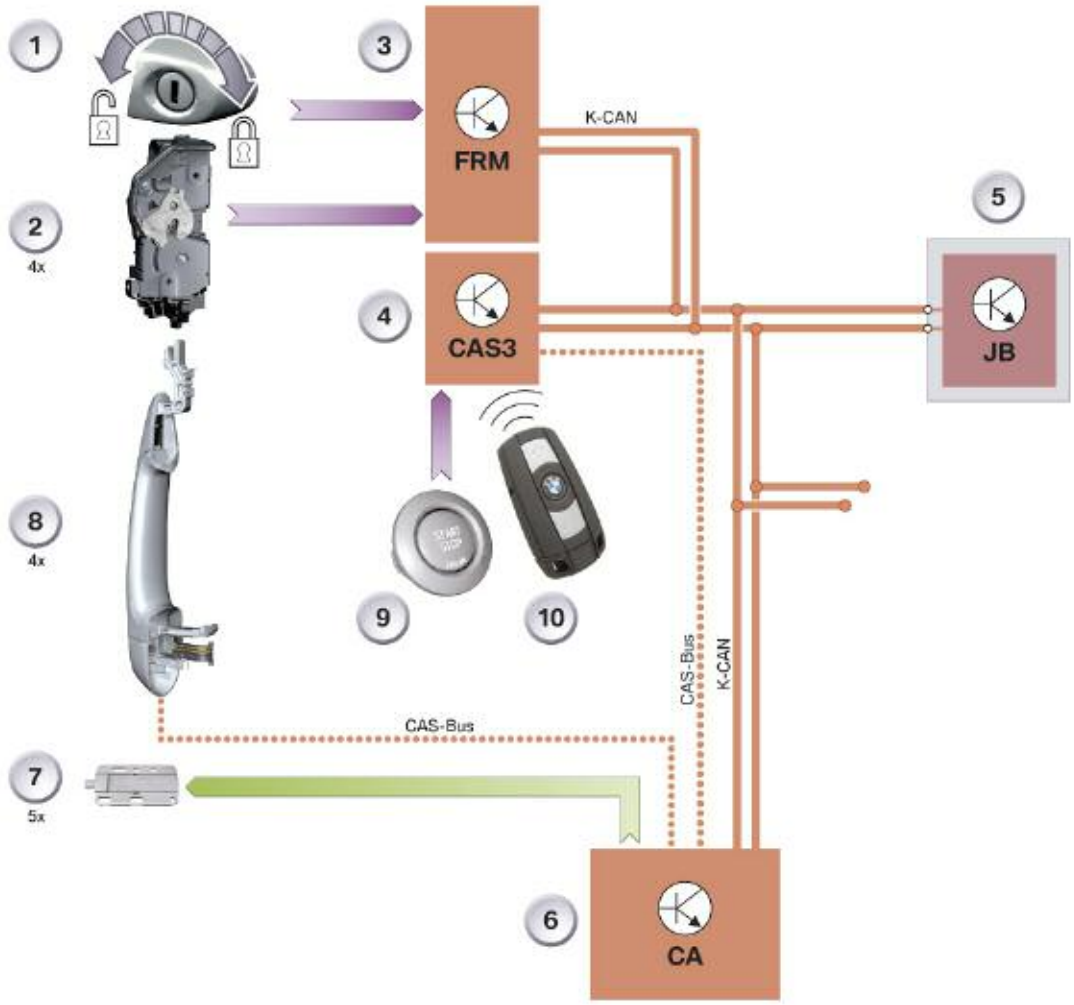
The system is based on the Comfort Access on the E90/E91. Inserting a hand into the handle recess of the outside door handle unlocks and then opens the vehicle. The vehicle is locked by touching the sensitive area of the outside door handle.

For vehicles fitted with Soft Close Automatic, the Soft Close Automatic drive fully closes the vehicle door. The sensitive area can then be used to lock the vehicle.

To allow the engine to start, an ID transmitter must be located in the vehicle interior. This being the case, when the START-STOP button is pressed, the engine starts and the vehicle is ready for use.

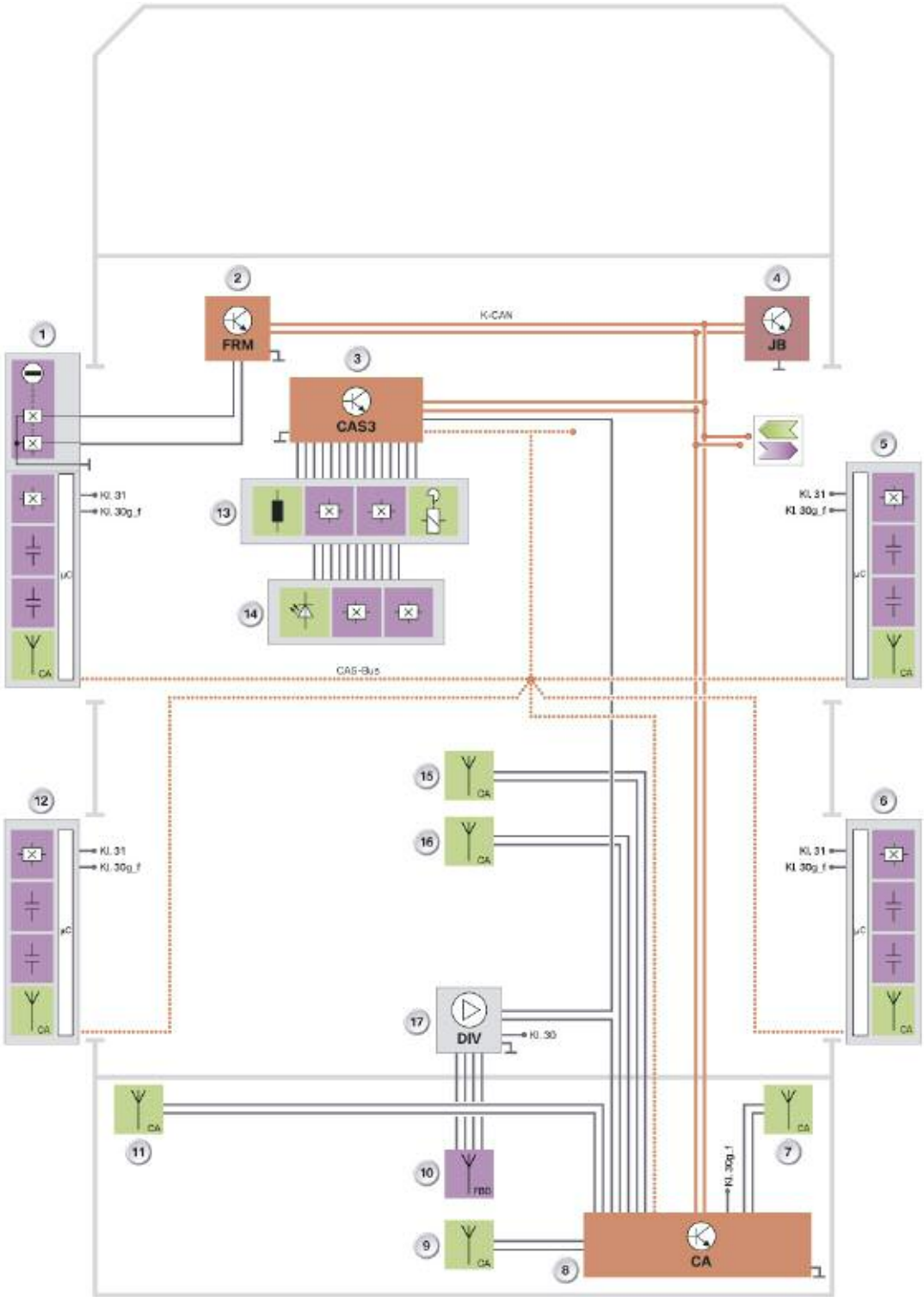
System Overview

Input/Output



Index	Explanation	Index	Explanation
1	Driver's door lock cylinder	7	Interior antenna x 5
2	Lock with door contact x 4	8	Outside door handle electronics module
3	Footwell module FRM	9	START-STOP button
4	Car Access System 3 CAS 3	10	ID transmitter
5	Junction box control unit JB	K-CAN	Body CAN
6	Comfort access CA	CAS-Bus	CAS-bus (K-bus protocol)

System Circuit Diagram



Legend for System Circuit Diagram

Index	Explanation	Index	Explanation
1	Driver's door lock cylinder, Outside door handle electronics	10	Rear window with antenna for remote control functionality
2	Footwell module FRM	11	Luggage compartment antenna
3	Car Access System 3 CAS 3	12	Rear driver's side outside door handle electronics
4	Junction box control unit JB	13	ID transmitter slot
5	Front-passenger outside door handle electronics	14	START-STOP button
6	Passenger-side outside door handle electronics inside	15	Front interior antenna
7	Luggage compartment antenna	16	Rear interior antenna
8	Comfort access CA	17	FBD antenna amplifier in diversity module
9	Luggage compartment antenna outside tailgate area		

System Components

Control Unit

The Comfort Access control unit is located at the rear right of the luggage compartment.

Comfort Access controls the transmit antennas for the exterior and interior.

The signals from the outside door handle electronics modules are read in and transferred via the CAS bus to the Car Access System 3.

Index	Explanation	Index	Explanation
1	Comfort Access	4	Vertical Dynamic Management
2	Trailer module	5	Electronic ride-height control
3	Park Distance Control		

Control Elements

ID Transmitter

The ID transmitter for Comfort Access must be actuated by means of a radio signal. The ID transmitter is therefore equipped with a receiver for the coded 125 kHz radio signal that is transmitted by the outside door handle electronics module. The radio signal enables the ID transmitter to register with the vehicle (authentication).

For this purpose, the ID transmitter emits a coded 868 MHz high-frequency signal to enable identification of the ID transmitter as being valid and belonging to the vehicle.

The ID transmitter is exclusively responsible for use of Comfort Access.

The ID transmitter for Comfort Access has a battery, representing the externally identifiable difference compared to the remote control which features an integrated rechargeable battery. The service life of the battery in the ID transmitter is about 2 years.

Voltage Monitoring

The ID transmitter monitors its own battery voltage. The battery voltage is monitored in 2 stages.

The first stage signals to the Car Access System 3 that the battery is flat. In response, the Car Access System 3 generates a check control message. The check control message informs the customer that the battery needs to be changed.

Index	Explanation
1	Unlock button for mechanical key
2	Battery compartment

If the battery is not changed, the voltage monitoring facility switches to the second stage. This means that the data in the ID transmitter are saved. The ID transmitter is then set "inoperable".

Data for Conditioned Based Service

When terminal status "terminal 15 ON" is selected, data for the Conditioned Based Service is transferred to the ID transmitter using the interior antennas. The ID transmitter then confirms that the transmission was received.

Antennas for Comfort Access

Nine antennas are built in for Comfort Access.

Four of these can be found in the outside door handle electronics modules and five in the vehicle interior/luggage compartment.

The antennas for the exterior and interior are inductive antennas and have a ferrite core The antenna transmission frequency is 125 kHz. All messages that are sent via the antennas are encrypted.

Antenna Installation Locations

Exterior Antennas

The exterior antennas are installed in the following locations on the E70:

- Front and rear driver's side outside door handle electronics
- Front and rear passenger-side outside door handle electronics

The antenna characteristic gives 2m of coverage around the vehicle.

Interior Antennas

The interior antennas are installed in the following locations on the E70:

- Passenger compartment, front
- Passenger compartment, center
- Luggage compartment, left and right
- Luggage compartment, near to the load edge, middle.

The antenna characteristic is spherical. The entire vehicle interior is covered by the front and middle antennas.

Luggage Compartment Antenna

The luggage compartment antennas are of the same design as the interior antennas. The antenna characteristic is configured so that the antennas in the luggage compartment cover that whole area.

Interior Antenna

Outside Door Handle Electronics Module

The outside door handle is connected to terminal 30g and works inside a voltage range of 9 V to 16 V.

The outside door handle electronics module is connected to the vehicle via the CAS bus thus making available the information from the capacitive sensors and the Hall sensor.

With the aid of the 3 sensors, the electronic outside door handle module detects the status of the outside door handle. Each change in the status of the outside door handle module triggers the corresponding function.

These functions are:

- Trigger pulse by inserting a hand into the handle recess of the outside door handle; Capacitive sensor 1
- Unlock request by pulling the outside door handle; Hall sensor
- Lock request by touching the sensitive area on the outside door handle; Capacitive sensor 2

Sensors

To protect the battery, the outside door handle electronics module switches off the capacitive sensors for the driver's side after 192 hours when the vehicle is at rest. The passenger-side capacitive sensors are switched off after 72 hours.

Capacitive Sensor 1

A pulse is generated when a hand is inserted into the handle recess of the outside door handle.The pulse wakes up the electronic circuitry in the outside door handle.

If the vehicle is in sleep mode, the electronics module will wake up the Comfort Access and Car Access System 3. This involves the outside door handle electronics module sending out a wake-up signal via the CAS-bus.

Comfort Access permanently switches on the remote control receiver in order to receive the data sent from the ID transmitter.

Capacitive Sensor 2

Touching the sensitive area generates a signal from the capacitive sensor 2 until contact ceases. The electronic module in the outside door handle sends the request via the CAS bus. The request is to lock the vehicle.

Outside Door Handle Hall Sensor

The Hall sensor is a backup system for capacitive sensor 1. After 192 hours, the outside door handle electronics in the driver's door enter sleep mode. This period begins when the vehicle is locked or unlocked. The Hall sensor remains operational for a longer period.

Sleep mode reduces the power consumption of the outside door handle electronics by switching off the capacitive sensors. By pulling twice on the outside door handle (two Hall sensor status changes) the vehicle is unlocked.

Note: Both outside door handle electronics modules on the passenger-side and the rear outside door handle electronics module on the driver's side switch off after only 72 hours.

Door Locks

The capacitive sensor 1 initiates the vehicle unlocking procedure.

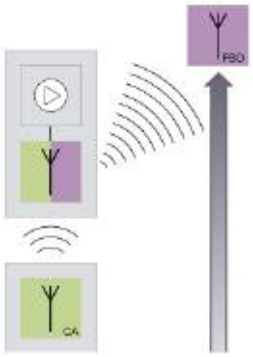
The door locks are equipped with an additional spring to ensure the vehicle can be opened fast enough. The spring exerts pretension on the central locking drive unit for the unlocking procedure. The door is already unlocked before an attempt is made to open it with the outside door handle.

Note: If pulled very fast, however, it may be necessary to pull the outside door handle a second time in order to open the door.

Principles of Operation

Comfort Access is divided into the following functions:

- Passive entry
- Passive go
- Passive exit



Comfort Access enables the central locking by allowing keyless access to the vehicle.

The ID transmitter is an essential component of Comfort Access. The ID transmitter comprises all remote control functionality, meaning that it can be used in exactly the same way as a remote control.

Function Sequence

The ID transmitter sends out a coded signal as soon as the unlock or lock button is pressed.

The signal from the ID transmitter is demodulated and conditioned in the remote control receiver. This signal is also used by the Car Access System 3.

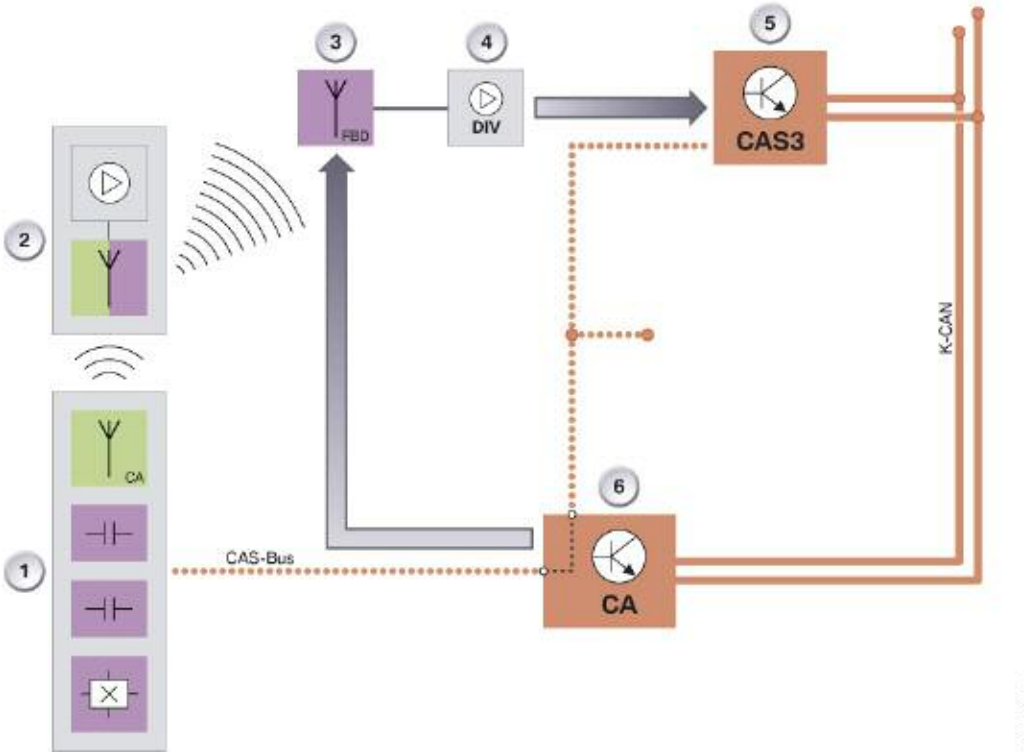
The ID transmitter can also be used to open the tailgate separately. For further information, see the following chapter "Passive Entry for upper tailgate".

Passive Entry

The graphic in the next page shows the functional principle of "Passive entry".

Passive entry enables access to the vehicle without operating the ID transmitter (remote control). The vehicle in sleep mode is woken with a valid ID transmitter (remote control). Comfort Access is activated by grasping the outside door handle.

Signal Path for Comfort Access



Index	Explanation	Index	Explanation
1	Outside door handle electronics module TAGE	5	Car Access System 3 CAS 3
2	ID transmitter	6	Comfort access CA
3	Rear window antenna	CAS bus	CAS bus
4	Remote control receiver in diversity module	K-CAN	Body CAN

Note: The ID transmitter comprises the remote control function and is used solely for Comfort Access.

For Comfort Access to work, the ID transmitter must be activated by the vehicle via radio signal so it can register (be authenticated) with the vehicle. This makes it possible to unlock the vehicle without actively using the ID transmitter.

Unlocking Sequence

The capacitive sensor 1 in the outside door handle electronics module recognizes that the handle has been grasped and activates the transmit antenna. The transmit antenna sends a 125 kHz signal to the ID transmitter. The signal contains the authentication request.

The ID transmitter sends a high-frequency signal of 868 MHz to the remote control receiver to obtain authentication.

The Car Access System 3 checks the authentication of the ID transmitter.

Following successful authentication, the Car Access System 3 issues an approval to unlock the vehicle and initiates the vehicle unlocking procedure. The junction box control unit executes the unlocking procedure.

Passive Entry for Upper Tailgate

An authentication check also takes place before opening the upper tailgate. The junction box control unit evaluates the status of the outside tailgate button. Pressing the outside tailgate button changes its status.

The change in status is transmitted via the K-CAN.

The Comfort Access control unit prompts the ID transmitter to register and obtain authentication from the vehicle. This prompt is sent by the antenna in the rear of the vehicle.

After successful authentication, the tailgate can be unlocked and opened with the outside tailgate button.

Passive Go

The Passive Go function makes it possible to start the vehicle without the ID transmitter inserted in its holder.

Issuing Start Enable

Authorization to start the engine is only given when there is an ID transmitter in the vehicle. Three seconds after the door has been opened the Car Access System 3 begins its search for a valid ID transmitter. The Car Access System 3 requests the Comfort Access control unit to prompt for identification of a valid ID transmitter.

The Comfort Access control unit sends the request via the interior antennas.

The ID transmitter responds using a high frequency range (868 MHz). If the ID transmitter is authenticated, the Car Access System 3 grants permission for the engine to be started.

Note: The electronic immobilizer gives its own approval for the engine to be started. This approval can only come when terminal 15 is selected.

Passive Exit

The Passive Exit function makes it possible to lock the vehicle without actively using the ID transmitter.

Locking Procedure

After the vehicle door has been closed, the locking procedure is started by touching the sensitive area on the outside door handle. The outside door handle electronics module sends the request to unlock the vehicle via the CAS bus to the Comfort Access system.

Comfort Access checks via the outside antennas whether there is a valid ID transmitter in the vicinity of the outside door handle (transmission range of the outside door handle antennas).

The ID transmitter is instructed to send an authentication signal.

In turn, the identification sensor sends encrypted data via the high-frequency link to the remote control receiver.

The Car Access System 3 checks whether the ID transmitter is valid.

On successful completion of the check, the Car Access System 3 issues the enable to engage the central locking drive and initiates locking.

The junction box control unit activates the central locking drive units.

Special Functions

The Comfort Access additionally features the special functions described in the following that are determined by the actions of the vehicle user.

Two ID transmitters Remain Inside the Vehicle

Using the interior antennas, the Car Access System 3 detects whether there is a valid ID transmitter in the vehicle.

If the Car Access System 3 detects a valid ID transmitter in the vehicle interior and the vehicle is locked by means of another valid ID transmitter (located outside), the ID transmitter located in the vehicle interior is set to "invalid".

For Comfort Access purposes, this ID transmitter is considered as no longer belonging to the vehicle until the vehicle is unlocked again.

Note: The "invalid" status only applies to the functions of Comfort Access. The remote control functions are still available.

The ID Transmitter Inside the Luggage Compartment

On closing the tailgate, if an ID transmitter is located either in the luggage compartment or the vehicle interior when the vehicle is locked, the tailgate is immediately reopened automatically. An audible and visual signal draws the customer's attention to the fact that the ID transmitter has been left in the luggage compartment or vehicle interior.

The Comfort Access control unit starts searching, prompted by the Car Access System 3, using the vehicle interior antennas and luggage compartment antennas.

If a valid ID transmitter is detected, the Car Access System 3 will not issue the enable for locking the tailgate.

The tailgate cannot be closed before the ID transmitter has been removed and is located outside the vehicle interior or luggage compartment.

Note: The tailgate can only be reopened when Comfort Access cannot find a valid ID transmitter in the vicinity of the vehicle.

Starting Engine without ID Transmitter

This function allows the vehicle to be restarted within 10 seconds after the "Engine OFF" switch has been activated, even if the ID transmitter is not detected. This function is intended for cases where, for example, the ID transmitter is not detected due to high frequency interference.

Check Control Message, Terminal 15

Comfort Access enables terminal selection without the ID transmitter being inserted in its holder. It is possible that terminal 15 is selected by pressing the START-STOP button. A corresponding check control message is shown in the instrument cluster after the door is opened. An audible signal also sounds.

Note: The battery may be discharged if the driver ignores the warnings and locks the vehicle.

Unintentional Wake-up Function

The vehicle cannot be woken simply by someone gripping the outside door handle. A valid ID transmitter must be detected in the vicinity of the vehicle.

Locking with Engine Running

The vehicle can also be unlocked with the engine running if the engine was started with Passive Go. When leaving the vehicle, the ID transmitter should also be taken and the vehicle locked from the outside.