Electronic vehicle immobilization system EWS3

The EWS3 serves as an antitheft system and enables start of BMW vehicles.

The function of the EWS3 is basically the same as that of the EWS2:

A transponder chip is integrated in each of the vehicle keys. A ring coil is fitted about the ignition lock. The transponder chip is powered by the EWS3 control unit via this coil, i.e. no battery is required in the key. The power supply and data transfer take place in the same way as a transformer between the ring antenna (coil) at the ignition lock and the transponder chip integrated in the key. In contrast to EWS2, this takes place directly and without any additional intermediate components.

The key then sends data to the EWS3 control unit. If these data are correct, the EWS3 enables the starter by way of a relay installed in the control unit and additionally sends a coded start enable signal via a data link to the DME/DDE.

In addition, the EWS3 replaces the contact in the ignition lock for the "ignition key in lock" signal on US versions.

Components

Key with integrated transponder chip

A chip which can both transmit as well as receive (transponder) is integrated in the key. This transponder chip obtains its power from the field built up by the ring coil and uses it to communicate with the EWS3 control unit. This means that no battery is necessary in the key for power supply. Every key or the transponder integrated in it is a unique part. The control unit can also differentiate between the individual keys. The key transmits and receives data from/to the EWS control unit.

If errors occur during communication between the EWS3 control unit and the individual keys, these errors are stored in the fault code memory - separate for each individual key -.

Ring coil

The ring coil is fitted on the ignition lock and serves as an antenna for communication between the transponder chip (in the key) and control unit.

EWS3 control unit

The EWS3 control unit communicates with the key fitted in the ignition lock. If the communication procedure is correct and the key has sent all data necessary for identification and start enable to the control unit, the control unit detects whether the key is valid and has been released for use. If this is the case, it releases the starter relay located in the control unit and sends a coded enable signal via the data link to the DME/DDE.

The control unit can manage a maximum of 10 keys allocated to the control unit, i.e. a maximum of 6 replacement keys are possible.

The control unit can identify the individual keys thus making it possible to disable/enable individual keys and to store fault codes for each individual key separately in the fault code memory.

Data link to DME/DDE

The EWS3 control unit sends a coded enable signal to the DME/DDE via the data link. The engine cannot be started before this signal has been transferred.

Engine control unit (DME/DDE) with coded start enable input

The engine control unit (DME/DDE) only enables ignition and fuel supply if a correct enable signal is received from the EWS control unit.

EWS-DME/DDE interface

The diagnostic program indicates under <Service functions> <Coding data> whether the interface is an EWS 3.**2** or EWS 3.**3** interface.

EWS 3.2

In the same way as in the EWS 2, the basis of the enable signal sent by the EWS 3.2 to the DME/DDE is a variable code made up of the individual control module numbers (ISN) of the engine control unit.

For this reason, after replacing the engine control unit (DME/DDE), the individual control unit number (ISN) of the new engine control unit must be transferred by means of coding into the EWS control unit (ISN calibration). The ISN cannot be changed from the outside.

EWS 3.3

In the EWS 3.3, the enable signal is based on a variable code resident in the EWS control unit. It is therefore necessary to adapt a new DME/DDE control unit to the EWS 3.3 control unit.

Important!

Test replacement of the DME/DDE control units is **no longer possible** in the case of engine control units with EWS 3.3 interface as adaptation to the EWS control unit is only possible with a new (virgin) DME/DDE control unit.

Influencing variables

P/N input for automatic transmission

Whether the vehicle is equipped with automatic transmission is defined in the coding.

On automatic vehicles, a start procedure is enabled by the EWS3 only if the selector lever is in position P or N.

The EWS3 control unit receives the information with regard to the selector lever position twice:

- Via a data link
- Via the K-bus

If the information "selector lever in position P or N" is sent only via the K-bus but, due to a fault, not via the data link, noticeable start delays within the range of 1 - 2 s can occur.

"ZV armed" signal/BC code active

The EWS3 control unit receives these two items of information only via the K-bus.

This information can be read out via "diagnosis scan" in the diagnosis program.

If the EWS3 receives the "ZV armed" signal from the general module, in ignition lock position 1 (terminal R), the EWS3 sends a signal via the K-bus which releases (enables) the vehicle.

Start is not enabled as long as the EWS3 receives the "BC code active" signal.

Afterrunning time

Important!

For safety reasons, the EWS3 control unit features a code-dependent afterrunning time. It begins when the ignition lock is switched to 0 position. Within this afterrunning time start with any mechanically fitting key is enabled.

Key identification and start procedure

- The transponder in the key is powered via the loop antenna and sends the key data to the EWS3 control unit.
- The EWS3 control unit then checks the key data to ensure it is correct and only then sends an enable signal to the engine management system and starter.
- After the engine has started, the EWS3 control unit generates new key data (change code) and transfers them to the transponder in the key.

Changing individual components

Key

In the same way as with EWS2, replacement keys can be obtained from a sales point only via a BMW dealer where one of the 6 replacement keys fitting the vehicle is programmed. This key is not a copy of the lost key, but rather a new key.

A total of not more than 6 replacement keys suitable for the installed EWS control unit can be made and handed over.

There is a noticeable start delay of 1 - 2 s when a new key is inserted in the ignition lock for the very first time. From then on, the start procedure should take place without delay.

Lost keys must be blocked by means of diagnosis. Refer to "Special features of the diagnosis program".

CAUTION!

Every request for a key is documented so that enquiries from insurance companies and authorities can be followed up.

Procedure for loss of all 10 keys

A new EWS3 control unit is required if all 10 keys are lost.

By providing all the necessary data, it is possible to obtain a new EWS3 control unit from a BMW dealer and the new transponder keys allocated to it with the previous mechanical key code.

EWS3 control unit

The basic procedure is the same as with EWS 2 systems:

The following procedure should be adhered to when replacing the EWS 3.3 control unit:

- Before replacing the EWS 3 control unit: Leave defective control unit installed in vehicle and in the coding program (Encoding ZCS) select point "1 New coding - 1 Replace control unit - 1 Read out data from defective control unit". Coding data and vehicle-specific data are read out of the EWS control unit with this part of the program and buffered in the MoDiC or DIS tester.
- Now install new EWS 3 control unit.
- After replacing the control unit: Encode new EWS 3 control unit with coding program selection point "1 New coding - 1 Replace control unit - 2 Transfer data to new control unit and encode control unit". The buffered data are now transferred and EWS - DME/DDE matching is carried out.

Note

The procedure described above must be adhered to as all the data necessary for vehicle identification are also stored in the EWS control unit. It will be necessary to do without the data readout from the old control unit only if the EWS 3 control unit no longer has diagnostic capabilities.

Proceed as follows in this case:

- Install new EWS control unit in the vehicle and encode with the encoding program and selection point "1 New coding - 2 Re-encode control unit".
- Then carry out matching with selection point "EWS - DME/DDE matching".
- In this procedure, the vehicle data necessary for automatic vehicle identification cannot be written to the EWS control unit.

Replacement of engine control unit (DME/DDE)

After replacing the engine control unit, "EWS - DME/DDE matching" must be conducted with the coding program or in the diagnosis program.

Important!

The ignition must then be switched off for at least 25 s.

Special features of the diagnosis program.

The following points are contained under point "3 service functions":

Data comparison EWS-DME/DDE (only on EWS 3.2)

Here, the individual control unit number (ISN) stored in the engine control unit (DME/DDE) is compared with

the number stored in the EWS control unit.

Start enable to the DME/DDE is only possible if both individual control unit numbers are identical.

If both ISN numbers are not identical, EWS-DME/DDE calibration must be carried out manually.

Key test

The following information concerning the key currently inserted in the ignition lock is displayed: Key No., disabled/enabled, valid/invalid, fault code memory entries concerning the current key

Disable/enable key

It is possible to disable or enable individual keys electronically via the diagnosis function.

Important!

Electronically disabled means that both the starter as well as the engine control unit are not released (enabled) for the start procedure. It should be borne in mind that an electronically disabled key still fits mechanically, i.e. all flaps, lids and doors can still be opened.

Display of keys used to date in this vehicle

Here, the display shows for each one of the 10 keys which can be managed by the EWS3 control unit whether it has been recognized at least once by the EWS3 control unit, i.e. it is possible to trace, also on older vehicles, how many keys have already been used in this particular vehicle.