

Electronic damper control III Plus

The electronic damper control III Plus (EDC III +) is an electronic damping force control system. The aim of the system is to adapt the necessary damping force of the vibration dampers to current driving and road conditions such that maximum driving safety is achieved in conjunction with the highest possible degree of comfort.

For this purpose, the system features following sensors to record the driving situation: Steering angle sensor, speed sensor, front body acceleration sensor, rear body acceleration sensor.

Dependent on these sensor data relating to the driving situation, the EDC control unit switches the damper valves integrated in the shock absorbers in the stages "soft", "medium" or "hard".

With the aid of the EDC program button, the driver has the option of selecting two different programs: The "Sports program" is selected in button position "S" and the "Comfort program" in button position "K". In the sports program, the dampers are switched more rigidly oriented, i.e. the damper setting "soft" is avoided. In setting "K", all three switching stages are operated, i.e. there is a sports and a comfort characteristic curve.

Since the EDC programs ("Sports" and "Comfort") are selected by means of a button (no rocker switch), only the LED integrated in the button indicates which program is currently selected. When the LED at the "S" symbol lights, the EDC operates in the "Sports program", if the LED is off the system is operating in the "Comfort program". This, of course, only applies if the EDC system is intact.

Important!

If the EDC system is not operable (e.g. one sensor defective) or faulty to such an extent that reliable road adhesion can no longer be guaranteed under all conditions, the safety concept (integrated in the software of the EDC control unit) switches off the entire EDC system. In this case, the LED in the selector switch goes out even if the "Sports program" is active. To ensure continued safe vehicle operation in the event of such a system failure, the power supply to the damper valves is cut, i.e. they are operated in the fixed stage "hard". Although vehicle damping is then rigid, it can be further operated without any loss in road adhesion and the next service workshop can be visited safely.

General information

The EDC III Plus system has diagnostic capabilities. Disturbances on the supply and signal lines of the damper valves, defects and illogical behaviour of the system sensors and their corresponding lines are stored in the defect code memory of the control unit.

Note

Faults in the EDC system found by the defect code memory can be examined and rectified by way of the program point "Test modules".

EDC program button

In line with the operating philosophy of the E38, the EDC programs are selected by means of a button (in contrast to the rocker switch in earlier EDC systems).

The program button is marked with "K" for "Comfort program" and "S" for "Sports program".

When the sports program is selected, the LED lights at the "S" symbol. The LED remains off when the comfort program is selected.

The button lighting is dimmed when the headlights are switched on.

Important!

If operation of the EDC III Plus system is persistently disturbed, the system is switched off, the LED in the program button remains off.

Steering angle sensor

The task of the steering angle sensor is to record the steering wheel angle while driving.

The EDC control unit processes both the real steering angle as well as the steering angle speeds, i.e. changes in angle. In this way, the variables of the steering angle as well as the steering angle speed have an influence on the switching logic of the EDC system.

The steering angle sensor is mounted on the steering column spindle. The sensor consists of 2 wipers offset by 90 degrees. The measuring range of the steering angle sensor extends from 180 degrees left to 180 degrees right and the straight-ahead position, i.e. the centre position of the steering wheel marks the 0 degree

setting.

Important!

If the steering angle sensor is changed or if it is necessary to carry out work on the front axle system, front wheels/steering system, the so-called steering angle offset must be carried out on completion of this work. The diagnosis program is used for this purpose.

The steering angle offset is selected under the point SERVICE FUNCTIONS. After setting the front wheels in the straight ahead-position, the control unit carried out the offset procedure automatically after pressing the confirmation button. The 0 degrees setting of the steering angle sensor now agrees with the physical straight-ahead position of the front wheels.

Slight deviations which may occur because the straight-ahead position of the steering wheels can only be set by eye, are compensated by the EDC control unit itself when driving.

The EDC control unit powers the steering angle sensor with a 5 Volt supply. Data transfer to the control unit takes place via 2 signal lines.

Front acceleration sensor

The front acceleration sensor records the acceleration of the car body at the front in vertical direction.

The body acceleration is caused by the reaction of the car to the road surface. In addition to the absolute acceleration, the acceleration frequency is also recorded, i.e. the changes in acceleration (spring deflection/rebound), in other terms the vibration frequency of the vehicle body.

The acceleration sensor receives a 12 Volt supply from the control unit.

A voltage value between 0 and 5 Volt is output to the control unit at the signal output of the sensor. A value of 2.5 Volt represents the rest position (acceleration = 0), the values 0 Volt and 5 Volt are the maximum acceleration values.

Important!

In order to check the function of the sensor, "front acceleration sensor" can be selected in the diagnosis program under the point "Function test".

Checking outside the vehicle:

Remove sensor, connect to 12 Volt supply and check the function by measuring the voltage at the signal output while at the same time moving the sensor. If the sensor is operating correctly, the measured voltage value is varied between approx. 0 and 5 Volt (depending on degree of movement, i.e. acceleration magnitude).

Installation location of sensor: Right-hand spring strut dome on side panel behind splash guard.

Rear acceleration sensor

The rear acceleration sensor records the acceleration of the vehicle body at the rear in vertical direction.

The body acceleration is caused by the reaction of the vehicle to the road surface. In addition to the absolute acceleration, the acceleration frequency is also recorded, i.e. the changes in acceleration (spring deflection/rebound), in other terms the vibration frequency of the vehicle body.

The acceleration sensor receives a 12 Volt supply from the control unit.

A voltage value between 0 and 5 Volt is output to the control unit at the signal output of the sensor. A value of 2.5 Volt represents the rest position (acceleration = 0), the value 0 Volt and 5 Volt are the maximum acceleration values.

Important!

In order to check the function of the sensor, "front acceleration sensor" can be selected in the diagnosis program under the point "Function test".

Checking outside the vehicle:

Remove sensor, connect to 12 Volt supply and negative and check function by measuring voltage at signal output while at the same time moving the sensor. If the sensor is operating correctly, the measured voltage value will vary between approx. 0 and 5 Volt (depending on movement, i.e. acceleration magnitude).

Installation location of sensor: Rear RH spring dome, accessible from luggage compartment after removing the trim.

EDC valves for chassis dampers

Newly developed vibration dampers with integrated valves operate in the EDC III Plus system. Contact of the connection is made by the piston rod.

The two valves are switched in combination such that three damping force stages are made possible: Damper stage "hard", damper stage "medium" and damper stage "soft".

In addition to the more compact design compared to the old EDC system, it has also been possible to reduce the weight of the new dampers.

Speed signal

The EDC control unit receives its speed signals from the front left wheel speed sensor of the ABS system.

From this speed sensor, the signal is transferred to the ABS control unit which in turn sends the signal to the EDC control unit. The speed signal received by the EDC control unit is a square-wave signal (0 to 12 VOLT).

The corresponding cornering speed/lateral acceleration is calculated on the basis of the measuring variables vehicle speed and steering wheel angle.

Calculating the change in vehicle speed renders a longitudinal acceleration sensor unnecessary.