

Multiple Restraint System (MRS) and MRS 2

Function

The multiple restraint system MRS includes the functions of the central triggering unit ZAE2 and has been extended to include the operation of the side airbags for the front upper torso (Thorax).

The MRS2 system additionally monitors the triggering circuits of both front head airbags and the two rear side airbags as well as the safety battery terminal.

Functions same as ZAE2

After "Ignition ON" the system carries out a self-test for approx. 4 s. The failure warning lamp (AWL) lights during this test time.

If the control unit detects a fault which is currently pending or has already been stored in the fault code memory, the AWL will continue to light after the 4 s test phase, otherwise it will go out. The system assumes standby mode as soon as the self-test is completed.

The central control unit accommodates sensors which pick up and evaluate the deceleration values of the vehicle which occur in the event of an accident.

The electronic control of the seat occupancy detection facility supplies the system with information as to whether the front passenger seat is occupied.

At the same time it monitors the belt buckles (on US vehicles) and in this way receives information as to whether the seat belts are buckled.

The control unit processes all this information and, on the basis of certain criteria, decides if and when the driver/passenger airbag as well as the belt tensioners are to be triggered, e.g. the front passenger airbag/belt tensioner is not triggered if the passenger seat is not occupied.

The MRS control unit can process a maximum of 3 accidents involving activation of at least one triggering circuit. An internal fault is then stored in the fault code memory which makes it necessary to replace the control unit.

Additional functions of MRS/MRS2

The sensors integrated in the central control unit MRS mainly detect deceleration in longitudinal direction of the vehicle. Two additional remote sensors, the so-called satellites, are provided in order to detect and assess deceleration values in transverse direction faster, as they typically occur in the event of side impact. These are located on the cross members beneath the driver's and front passenger seats and inform the MRS control unit when an accident situation is recognized which demands the triggering of one or both side airbags for the upper torso (MRS) or of the rear head or side airbags (MRS2). The MRS or MRS2 control unit compares these reports with the measurements made by the sensors within the control unit, and if necessary then triggers one or more of the side airbags.

System components

MRS/MRS2 control unit

The MRS/MRS2 control unit contains sensors which record and evaluate deceleration in an accident.

Depending on the information received from the periphery and the integral sensors, the MRS or MRS2 control unit decides which ignition circuits are to be triggered.

Failure warning lamp AWL

The failure warning lamp lights during the self-test which takes place after switching on the ignition and when a fault is present in the system or an appropriate fault code is stored in the fault code memory.

If the control unit is disconnected from the vehicle wiring harness, the AWL will light up due to a short circuit in the wiring harness connector.

Seat occupancy detection (SBE) (codeable)

A seat mat located under the seat cushion of the front passenger's seat changes its resistance depending on the load applied on the seat. The seat occupancy electronics evaluate this resistance and transmit the result "occupied"/"not occupied" via a data lead to the MRS or MRS2 control unit.

The "occupied" status is recognized when the passenger seat is subjected to a load exceeding about 12 kg.

Note

For safety reasons, the "occupied" status is still detected for approx. 2 minutes after the load has been removed.

Satellites (sensors for side airbags)

The satellites (sensors for side airbags) are mounted on the cross members beneath the driver's and passenger's seats.

They are connected by means of a 3-pin plug connector to the vehicle wiring harness: Voltage supply and a data lead to the MRS or MRS2 control unit.

The sensors for the side airbags detect transverse deceleration in an accident which typically occur in a side impact, and report to the control unit that they have recognized an accident situation which demands the triggering of a side airbag.

The satellites are essential components of the MRS/MRS2 and cannot be coded.

If a data lead between the control unit and one of its satellites is interrupted, diagnosis can only be carried out after about 30 seconds.

Warning!

The satellites may only be removed, installed or disconnected with the battery disconnected. This also applies to all jobs during which the satellites may be subject to vibration/shaking.

Belt contacts (codeable)

Switches are integrated in the buckles which signal to the control unit whether the belt is buckled.

Triggering circuits

- Driver airbag (codeable)
- Passenger airbag (codeable)
- Belt tensioner driver's side (codeable)
- Belt tensioner passenger's side (codeable)
- Side airbag for upper torso (Thorax), left (codeable)
- Side airbag for upper torso (Thorax), right (codeable)

In addition possible triggering circuits in MRS2

- Thorax side airbag, rear left and right (codeable)
- ITS head airbag, front right and left (codeable)
- Safety battery terminal

The MRS in the workshop

A test adapter is available for the 50-pin connector of the ZAE2 for the MRS and the MRS2.

Caution!

The MRS or MRS2 control units and satellites (sensors for side airbag) must only be removed, installed or disconnected with the battery disconnected at the terminals!

The MRS or MRS2 control unit must be coded after being renewed.

Seat occupancy detection

The seat occupancy detection status (seat occupied or not) can be read out via diagnosis.

For safety reasons, the "occupied" status is still indicated for approx. 2 minutes after the load has been removed.