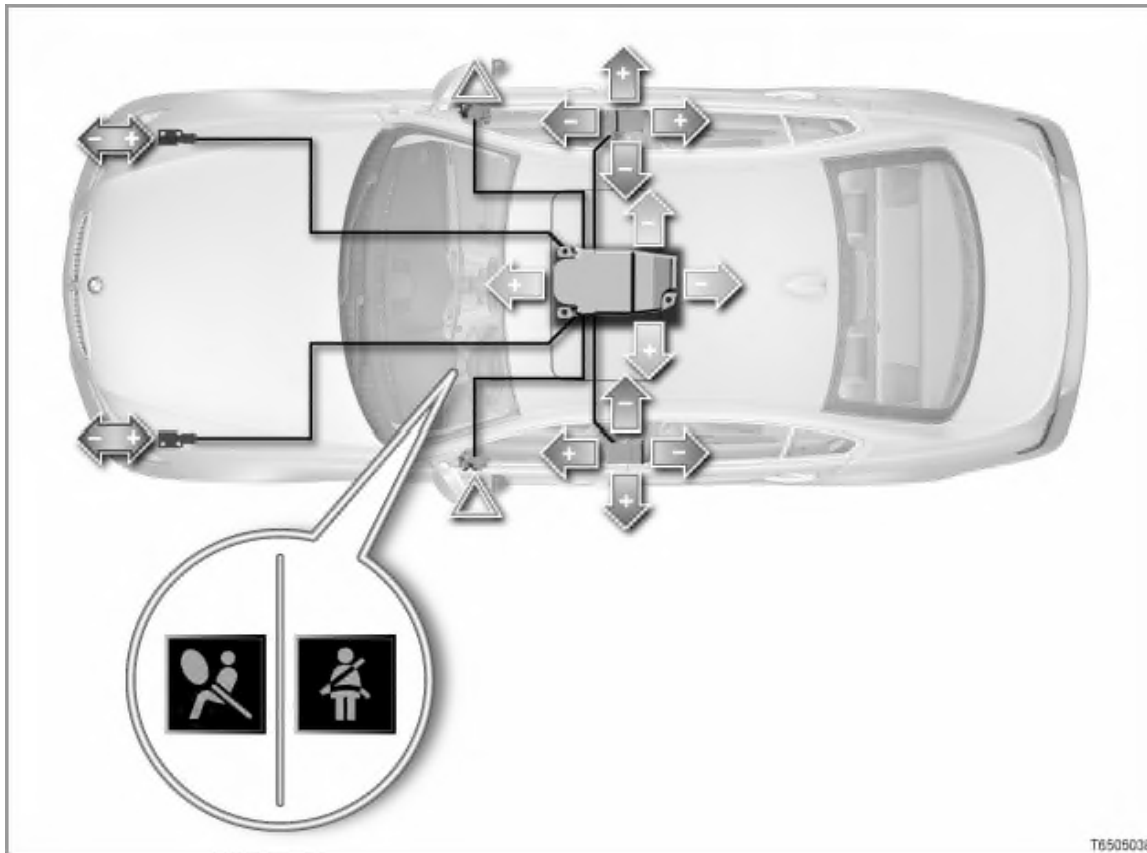


Crash safety (ACSM)

E60, E61, E63, E64, E70, E85, E93



Introduction

The ACSM crash safety system is installed in E60, E61, E63, E64 from 09/2005 (ACSM stands for "Advanced Crash Safety Module", referred to as the "crash safety module").

In contrast to the safety system used to date in the E60, E61, E63 and E64, E85, all crash safety functions are controlled by the crash safety module.

> E60, E61, E63, E64

[system overview ...]

> E70

from start of series production [system overview ...]

> E85

Launch date from 01/2006 [system overview ...]

> E93

from start of series production [system overview ...]

The crash safety module has the following tasks:

- Detects an accident situation which could be critical for the occupants
- Activates the necessary restraint systems (selectively, depending on the severity and type of accident)

Brief description of components

The following sensors detect the direction and severity of an impact:

- Sensors in the crash safety module

The following sensors are installed in the crash safety module:

•

2 acceleration sensors for longitudinal and transverse acceleration

- 1 yaw-rate sensor to detect vehicle rollover (E64, E70, E93)
- 2 acceleration sensors for transverse acceleration and acceleration about the vertical axis for detecting rollover (E64, E70, E93 only)

- **Airbag sensor in B-pillar, driver's and passenger's side**

The 2 airbag sensors in the left and right B-pillars each feature one transverse acceleration sensor and one longitudinal acceleration sensor. The sensors are arranged at 90 degrees to each other.

[more ...]

- **Front airbag sensor, driver's side and front-passenger side**

The 2 front airbag sensors are longitudinal acceleration sensors.

The installation of the front airbag sensors depends on the national version.

> E60, E61, E63, E64, E85, E93: US version only

> E70: Europe and US versions

[more ...]

- **Airbag sensor on front driver's side door and front passenger's side door**

The 2 airbag sensors are pressure sensors.

The installation of the airbag sensors depends on the national version.

> E60, E61, E63, E64: standard

> E70, E85: US version only

> E93: Europe and US versions

[more ...]

The following components send signals to the crash safety system:

- **Seat belt buckle switch for driver's seat belt and passenger's seat belt**

The seat belt buckle switches provide information as to whether or not the seat belts are buckled.

The crash safety module powers the seat belt buckle switches.

The power consumption of the switch forms the signal for the switch position (seat belt engaged or not engaged).

The signal from the seat belt buckle switch decides whether or not the seat belt tensioner is actuated when needed.

The seat belt-lock switches on the driver and front passenger seats are permanently monitored when terminal R is ON.

- **Seat-occupancy detector, driver's side**

> Only vehicles with option 5DF "Active cruise control with stop & go function".

The seat-occupancy detector for the driver's side is only used to control the system (active cruise control with stop & go function) (e.g. if the driver intends to get out of the vehicle).

If the driver's seat is occupied, the seat occupancy mat changes its resistance. The signal is sent to the crash safety module via a direct wire.

The crash safety module emits this signal as a message on the K-CAN.

- **Passenger-seat occupancy detector**

The passenger seat-occupancy detector recognises whether the seat is occupied or not. The resistance of the seat occupancy mat changes when it is loaded with a weight of more than approx. 12 kg. The signal is sent to the crash safety module via a direct wire.

If the front passenger seat is recognised as being occupied without the seat belt buckle switch sending a signal, a fasten belt warning will be emitted.

> E60, E61, E63, E64, E85, E93

The seat-occupancy detector is used for triggering the airbags and for the seat belt warning.

If the crash safety module triggers the airbags and the front passenger seat is unoccupied, the front passenger's airbag and the side airbag on the front passenger side will not be triggered.

The head airbag is triggered.

> E70

The seat-occupancy detector is only used for the seat belt warning.

If the crash safety module triggers the airbags and the front passenger seat is unoccupied, the front passenger's airbag, and the side airbag and head airbag on the front passenger side will not be triggered.

Whether or not the belt tensioner on the front passenger side is activated depends on the status signal of the seat belt buckle switch (seat belt fastened or not fastened). The seat belt tensioner is also triggered if the seat belt is inserted in the seat belt buckle switch (only in the case of head-on/rear-end impact).

[more ...]

- **Passenger seat occupancy detector (US version)**

In accordance with the stipulations of the National Highway Traffic Safety Administration (NHTSA) a small child in a child restraint system on the front-passenger seat must be automatically detected. Upon detection, the airbags on the passenger side are automatically deactivated (front-passenger airbag and side airbag). The indicator lamp for front-passenger airbag deactivation lights up.

The seat-occupancy detector is based on an evaluation of the surface pressure generated when the seat is loaded.

[more ...]

- **Switch for disabling front passenger's airbag (Europe version)**

If option 470 "ISOFIX mounting for child seat" (front) has been installed, the airbags can be disabled via the switch for passenger's airbag deactivation. The switch is operated using the key integrated into the remote control.

In switch position OFF, the following airbags on the front-passenger side will not be triggered: front-passenger airbag and side airbag.

The indicator lamp for front-passenger airbag deactivation (front-passenger airbag OFF lamp) lights up.

> E60, E61: The switch is located in the glove compartment.

> E63, E64, E70, E85, E93: The switch is installed on the instrument panel on the passenger's side.

Note: Retrofit of the passenger's airbag disabling facility

For vehicles without a switch to deactivate the front-passenger airbag, there is a retrofit kit (option 5DA "front-passenger airbag deactivation" or option 470 "ISOFIX child seat mounting").

- **Battery cable monitoring wire**

Petrol engine vehicles: The battery cable must be monitored on vehicles where the battery cable is installed on the underbody parallel to the fuel line.

The crash safety module triggers the safety battery terminal in the case of a short-circuit.

The following control units are involved in the crash safety system:

- **ACSM: Crash safety module**

All inflator assemblies and sensors are connected directly to the crash safety module.

The crash safety module evaluates the data from the sensors.

In the case of a crash, the crash safety module decides whether it is necessary to trigger the seat belt tensioner and airbags and what airbags need to be triggered.

The crash safety module also triggers the active head restraints (only E60, E61 and E70 from 09/2007).

> E60, E61, E63, E64, E85[more ...]

> E70, E93[more ...]

- **CAS: Car access system**

The CAS control unit provides input signals relating to terminal voltage (e.g. terminal R ON). The CAS control unit is the master control unit for the central locking system. (KGM, KBM and JBE are the executing control units for the central locking.)

- **DME or DDE: Digital engine electronics or digital diesel electronics**

When an airbag is triggered, the electric fuel pump is switched off by the DME or DDE (only on vehicles **with no** electronic control of the fuel pump).

- **EKP: Controlled fuel pump**

When an airbag is triggered, the electric fuel pump is switched off by the EKP control unit (only on vehicles **with**

electronic control of the fuel pump).

The EKP control unit receives a message from the crash safety module.

- **GM: General module**

> E85

The general module provides input signals relating to terminal voltage (e.g. terminal R ON). The general module is the executing control unit for the central locking system. The general module controls the interior lighting. In the event of an accident with corresponding severity, the interior light switches on automatically and the central locking unlocks.

- **KOMBI: Instrument cluster**

The instrument cluster provides a visual seat belt warning and triggers an audible seat belt warning.

The crash safety module controls the seat belt warning using a check control message.

The instrument cluster receives data about the status from the crash safety module when terminal R is ON. Depending on the status, the optical and audible warning is triggered when terminal 15 is ON.

- **KGM: Body gateway module**

> E60, E61, E63, E64

The KGM is the data interface (= the gateway) between the K-CAN and the PT-CAN. (K-CAN = body CAN; PT-CAN = powertrain CAN.)

The KGM is connected to the crash safety module via the K-CAN.

The KGM is the executing control unit for the front central locking system. (The CAS control unit is the master control unit for the central locking system.)

The KGM controls activation of all front central locking drive units.

In the event of an accident exceeding a certain severity (crash signal from crash safety module) the front central locking is automatically unlocked.

- **KBM: Basic body module**

> E60, E61, E63, E64

The KBM is connected to the crash safety module via the K-CAN.

The KBM is the executing control unit for the rear central locking system. (The CAS control unit is the master control unit for the central locking system.)

The KBM controls activation of all rear central locking drive units.

The KBM controls the interior lighting. In the event of an accident exceeding a certain severity (crash signal from crash safety module) the interior light is automatically switched on and the rear central locking is unlocked.

- **JBE: Junction box electronics**

> E70, E93

The JBE is connected to the crash safety module via the K-CAN.

The JBE is the executing control unit for the central locking system. (The CAS control unit is the master control unit for the central locking system.)

- **LM: Light module**

> E60, E61, E63, E64

The lights module is connected to the crash safety module via the K-CAN. In the event of an accident exceeding a certain severity (crash signal from crash safety module) the light module will switch the hazard warning lights on.

- **LSZ: Light switch cluster**

> E85

The light switch cluster is connected to the crash safety module via the K-bus. In the event of an accident exceeding a certain severity (crash signal from crash safety module) the light switch cluster will switch the hazard warning lights on.

- **FRM: Footwell module**

> E70, E93

The footwell module is connected to the crash safety module via the K-CAN. In the event of an accident

exceeding a certain severity (crash signal from crash safety module) the footwell module will switch the hazard warning lights on.

- **SMFA and SMBF: Driver's seat module and front passenger's seat module**

> E64, E93

Seats with three-point seat belt integrated in the backrest are installed in the cabriolet. If the seat backrests are not locked correctly, in the event of an accident there is the danger that the occupants move forward with the backrests with no restraint.

The seat modules monitor the seat backrest to ensure they are locked correctly. Hall sensors are installed in the seat backrests for this purpose.

> E64

The seat modules send messages on the K-bus to the centre console switch cluster (SZM) when the seat backrests are not locked correctly. The SZM is the data interface (= gateway) to the K-CAN. The SZM processes the message (check control message).

> E93

If the backrests are not correctly locked, the seat modules will emit messages on the K-CAN.

The check control messages are shown in the instrument cluster and in the central information display.

The check control message is triggered as follows:

- The seat belt indicator lamp in the instrument cluster comes on (visual seat belt warning).
- The check control symbol is shown in the LCD display.
- The check control messages relating to the check control symbol are shown in the Central Information Display (CID).

The crash safety module controls the following components:

- **Triggering circuit for the airbags**

With the maximum amount of equipment, the safety system consists of the following triggering circuits:

- Driver's airbag (stage 1)
- Front-passenger airbag (stage 1)
- Driver's airbag (stage 2)
- Front-passenger airbag (stage 2)
- Side airbag, front driver's side
- Side airbag, front-passenger side
- Side airbag, rear driver's side
- Side airbag, rear passenger side
- Head airbag, driver's side
- Head airbag, front-passenger side
- Seat belt tensioner, driver's seat belt
- Seat belt tensioner, front passenger's seat belt
- Seat belt tensioner, rear driver's side
- Seat belt tensioner, rear passenger side
- End fitting pretensioner, driver
- Knee airbag for driver or active head restraint for driver
- Knee airbag for front passenger or active head restraint for front passenger
- Adaptive belt force limiter, front left
- Adaptive belt force limiter, front right
- Safety battery terminal

Driver and front-passenger airbag

The driver and front-passenger airbag reduces the risk of injury to the occupants' head and chest area in the event of a head-on collision.

The driver airbag is located under the centre pad on the steering wheel. The front-passenger airbag is integrated into the instrument panel above the glove box.

Side airbag

Side airbags reduce the risk of injury to the occupants' pelvis and torso in the event of a side impact. The side airbags are installed behind the respective door trim panels.

Head airbag

> E60, E61, E63, E70

The head-level airbag prevents the head making direct contact with the side structure or an object which penetrates the vehicle. The head airbag extends continuously from the A-pillar to the C-pillar.

The shape and stability of the head airbag are retained for several seconds after triggering. The head airbag deflates slower than the front and side airbags, thus providing longer protection for the head in lateral rollover situations.

A head-level airbag is installed on the driver's side and on the front passenger's side.

Belt tensioners

As a rule, the seat belt will not be sitting completely tight around the body: This seat belt slack makes sure that the occupants have adequate comfort of movement.

During a head-on or rear-end collision, the pyrotechnical seat belt tensioner pulls down the seat belt buckle by several centimetres, thus pulling the seat belt tight into the occupant's shoulder and pelvis.

> E64, E70, E93

The seat belt tensioner also triggers in the event of imminent rollover.

End fitting pretensioner

> E60, E61, E70 Europe version

The end fitting pretensioner prevents the driver's pelvis moving too far forward in the event a head-on or rear-end collision. The end fitting pretensioner is installed in addition to the seat belt tensioner on the driver's seat. In principle, the end fitting pretensioner functions in the same way as a seat belt tensioner.

Active head restraint

> E60, E61

> E70 from 09/2007

On triggering, the active head restraint locks the distance between the head restraint and head in order to reduce the load on the cervical vertebrae during a rear-end collision.

(Reason: The distance between the head and head restraint can increase as the result of the individual setting options of the comfort seat.)

The plunger extends when the inflator assembly in the backrest is triggered. The plunger operates the bolt of the active head restraint. As a result, the head restraint is guided forward on a slide guide.

Safety battery terminal

Depending on the severity of the accident, the safety battery terminal disconnects the starter motor and the alternator from the battery. This minimises the risk of electrical short-circuits in a serious accident.

- Airbag indicator lamp

The airbag indicator lamp indicates the operability of the crash safety system. The airbag indicator light in the instrument cluster is actuated as follows by the crash safety module:

> E60, E61, E63, E64, E70, E93: via the K-CAN

> E85: via the K-bus

- Seat belt indicator lamp

The seat belt indicator lamp is the visual seat belt warning. The visual seat belt warning instructs the occupants of the vehicle to fasten their seat belts. Terminal 15 ON activates the visual seat belt warning.

The visual seat belt warning is issued as follows:

- Seat belt warning lamp in the instrument cluster

- Check control symbol in LCD display in instrument cluster
- **Indicator lamp for front passenger's airbag deactivation**
If the warning lamp for passenger-airbag deactivation (passenger airbag off lamp) is lit, the following airbags on the passenger side have been deactivated: front-passenger airbag and side airbag.
The passenger airbag OFF lamp is constantly monitored by the crash safety module. A fault in the power supply or a defective lamp is stored in the fault memory of the crash safety module. If this occurs, the airbag warning lamp is switched on.
- **Rollover protection controller and roll bar**
> Only E64, E93
The rollover protection system triggers in the event of the vehicle rolling over or in situations that could lead to the vehicle rolling over. The rollover system consists of the rollover protection controller and 2 extendable roll bars.
[more ...]
- **Fuel pump**
Depending on accident severity, the fuel supply may also be cut off.
- **TCU: Telematics control unit**
The emergency call is transmitted via the TCU. The TCU is connected to the crash safety module by the instrumentation bus (I-bus).

Mechanical components of the safety system:

- **Belt force limiters on seat belts**
The seat belts are the primary restraint system for all occupants.
To minimise the load on the chest area of the front passengers in the event of a severe head-on collision, the front seat belts are fitted with belt force limiters as standard. The belt force limiters ensure that the belt strap can give by a defined amount if the load exceeds a certain level. The risk of injury due to the belt force acting on the body is therefore reduced.

System functions

The following safety system functions are described:

- Self-test
- Impact detection
- Triggering of safety system
- Data storage in the case of safety system triggering
- Message to other control units
- Visual and audible seat belt warning
- Emergency call
- Monitoring of battery cable

Self-test

In addition to all the inputs and outputs, the crash safety module also monitors the internal components (self-test). Possible fault codes are stored in the crash safety module. In the event of a system fault or a component fault, the airbag warning lamp lights up.

The crash safety module performs a self test after the ignition is switched on. During this time, the airbag indicator lamp will light up (approximately 3 to 5 seconds). The airbag indicator lamp goes out when the safety system is operational.

- The airbag indicator lamp come on if the crash safety module receives no CAN message from the instrument cluster.
- The airbag warning lamp remains on if the crash safety module detects an existing fault or one that has been stored during the self-test or while the vehicle is in motion.
- If the safety system detects a fault, operability of the safety system is partially maintained, subject to the

following preconditions:

- If a fault is detected in a power circuit of the safety system, only the affected circuit is deactivated. The other airbags and belt tensioners remain operational.
- If there is a fault in the airbag warning lamp circuit, the lamp does not light up during the self-test. If there is no other fault, the safety system remains fully operational.
- The entire safety system is deactivated if there is an internal fault in the crash safety module or in the power supply. (The airbag and seat belt indicator lamps light up, check control symbol in the LCD)

Impact detection

The crash safety module can detect an impact from any angle (360°).

The direction and severity of an impact is detected by the acceleration sensors in the crash safety module and by external acceleration sensors.

External acceleration sensors:

- Front airbag sensor, driver's side and front airbag sensor, passenger's side
- Airbag sensor on driver's door and airbag sensor on front passenger's door
- Airbag sensor on driver's side B-pillar and passenger's side B-pillar

The crash safety module processes all acceleration data. This is used to determine the accident severity.

Triggering of safety system

Extensive testing has allowed the triggering thresholds to be determined for all possible types of accidents.

The following triggering thresholds were set for activating the different restraint systems:

- Seat belt tensioners
- End fitting pretensioner
- Front airbags
- Knee airbags
- Side airbags
- Head airbags
- Active head restraint
- Adaptive belt force limiter

The restraint systems are triggered only when 2 independent sensors detect the corresponding threshold.

For example, a frontal collision is detected by the longitudinal acceleration sensor in the airbag sensor in the driver's side B-pillar and by the longitudinal acceleration sensor in the crash safety module. The crash safety module calculates the direction of the impact and the collision severity from the data sent by the sensors.

Depending on accident severity, the safety battery terminal is activated and the electric fuel pump switched off.

Triggering of the various restraint systems is illustrated based on two examples (frontal impact and side impact):

- **Head-on collision**

The restraint systems (seat belt tensioner, end fitting pretensioner, front airbag, knee airbag, adaptive belt force limiter) are triggered when the force of the frontal impact is so strong that the triggering thresholds in the crash sensor module are exceeded.

The belt tensioners have a lower triggering threshold than the front airbags. This means that depending on accident severity, only the belt tensioner may be activated by the crash safety module.

If the seat belt buckle switch is faulty, the crash safety module will attempt to activate the belt tensioner in spite of the error message.

If the seat-occupancy detector is faulty, the control unit assumes that the passenger seat is occupied. The restraint systems are activated.

Depending on accident severity, the safety battery terminal is activated and the electric fuel pump switched off.

- **Side impact**

If the triggering threshold in the crash safety module is exceeded, the side airbag and the head-level airbag

on the side affected by the impact are activated.

Depending on accident severity, the safety battery terminal is activated and the electric fuel pump switched off.

Data storage in the case of safety system triggering

When the restraint systems trigger, certain data are written to a read only memory in the crash safety module. The data are used for accident research purposes (no access for service purposes).

Message to other control units

The crash safety module sends a message to other control units when the restraint systems are triggered. The following functions are performed by the relevant control units depending on the severity of the accident:

- Switching off the electric fuel pump:
 - via the EKP control unit
(on vehicles **with** electronic fuel pump control)
 - via the DME control unit
(on vehicles **with no** electronic fuel pump control)
- Switching off the alternator (via DME control unit)
- Opening central locking:
 - > E60, E61, E63, E64
 - at the front via the body-gateway module (KGM)
 - at the rear via the basic body module (KBM)
 - > E85
via the general module (GM)
 - > E70, E93
via the junction box electronics (JBE)
- Switching on interior lights
 - > E60, E61, E63, E64
via the body basic module
 - > E85
via the general module
 - > E70, E93
via the footwell module (FRM)
- Switching on the hazard warning lights
 - > E60, E61, E63, E64
via the light module
 - > E85
via the light switch cluster
 - > E70, E93
via the footwell module (FRM)
- Sending emergency call (via telematics control unit)

Visual and audible seat belt warning

For the seat belt warning, the signals of the 2 seat belt buckle switches (driver's belt/front-passenger belt) are monitored separately.

If the seat occupancy detector detects that the passenger seat is occupied, the front passenger's belt must be inserted into the seat belt buckle. This switches off the seat belt warning.

The following situations are taken into account in respect of the issuing of a seat belt warning:

- **Front seat belt not fastened and distance driven less than 200 m**

If less than 200 m has been driven, only a visual seat belt warning is issued (the seat belt indicator lamp lights up). The vehicle may for example be driven out of a garage without triggering an audible seat belt warning.

- **Front seat belt not fastened and distance driven more than 200 m**

The seat belt indicator lamp and the check control symbol in the LCD light up (visual seat belt warning). The audible seat belt warning is activated for approximately 90 seconds.

Once the seat belt has been fastened, the visual seat belt warning disappears. The audible seat belt warning is deactivated.

If the seat belt has **not** been fastened by the end of the audible seat belt warning, the seat belt indicator lamp lights up.

- **Unfastening the front seat belt when the vehicle is in motion**

If a seat belt is unfastened when the vehicle is in motion, the seat belt warning lamp will light up immediately.

The check control symbol also lights up in the LCD after approx. 15 seconds. An audible seat belt warning sounds for approximately 90 seconds.

Once the seat belt has been fastened, the visual seat belt warning disappears. The audible seat belt warning is deactivated.

If the seat belt has **not** been fastened by the end of the audible seat belt warning, the seat belt indicator lamp lights up.

Emergency call

- **Manual emergency call**

A manual emergency call is initiated by the emergency call button. The emergency call button is directly connected to the telephone. A voice connection is established with the service provider by pressing the emergency button (press button for at least 2 seconds).

The manual emergency call function is not standard.

> E60, E61, E63, E64, E70, E93

The emergency call button is integrated into the roof control panel (FZD).

> E85

The emergency call switch is installed in the centre console.

- **Automatic emergency call:**

A further function is connected to the safety system on vehicles equipped with BMW Assist: the automatic emergency call. In the event of an accident exceeding a certain level of severity, BMW Assist automatically initiates an emergency call. Some of the vehicle data and its exact location, which is determined by the navigation system, are transmitted to the emergency call centre.

Monitoring of battery cable

Petrol engine vehicles:

The battery cable must be monitored on vehicles where the battery cable is installed on the underbody parallel to the fuel line. The battery cable is monitored by the crash safety module.

Depending on the type of vehicle, the battery cable is made from copper or aluminium and insulated with plastic. The plastic insulation is covered by a low impedance metal braiding which serves as the monitoring wire. The battery cable is then covered with a second insulation layer made from plastic. This is the external insulation layer.

A connection wire is provided at both ends of the monitoring wire. Both connection lines are connected to the crash safety module.

The crash safety module triggers the safety battery terminal if the monitoring wire is damaged or there is a short to positive or negative. The battery cable is consequently separated from the battery.

Notes for service staff

- General note: [more ...]

- Diagnosis: [more ...]

National versions

The following national versions are described:

- US
- Japan/Gulf States

US national version

- **Knee airbag**

> E63, E64, E85, E93

When triggered, the knee airbag provides support for the knee if the front passenger is not wearing a seat belt. This initiates controlled forward displacement of the upper body. The upper body is cushioned by the respective airbag (driver's or passenger's side).

- **Adaptive belt force limiter, front left and front right**

> E70

The pyrotechnic belt force limiter minimises the load on the upper torso of the front-seat occupants in the event of a severe frontal collision. The risk of injury from the force of the seat belt acting on the body is reduced.

Two torsion shafts are fitted in the inertia reel. The torsion shafts are intermeshed. Up to a certain load, the belt force is specifically limited by the two torsion shafts. From a certain load, a gas generator is used to decouple the torsion shafts. Only one of the torsion shafts is connected to the belt. This allows the belt force to be smoothly limited for the entire duration of the impact.

- **Seat position detector on the driver's side**

> E70

According to the stipulations of the FMVSS (Federal Motor Vehicle Safety Standards), the driver's seat must be able to tell the difference between a 5% woman and a 50% man.

The seat position detector indicates the longitudinal position of the driver's seat. This allows the system to recognise the distance between the person sitting on the driver's seat and the steering wheel.

The seat position signal influences the response of the adaptive belt force limiter and the delayed triggering of the 2nd stage of the gas generator (driver's airbag).

The adjustment distance of the driver's seat is registered by Hall sensors in the drive and processed in the seat module. The seat module emits a message on the K-CAN. The crash safety module is a bus subscriber on the K-CAN.

Note: Recalibrate the driver's seat

Over time, repeatedly moving the driver's seat forward and back can cause the seat position to become implausible. When the driver's seat needs to be recalibrated, this will be shown by a Check-Control symbol and a Check-Control message.

Calibration is described in the vehicle Owner's Handbook.

- **Emergency call**

The manual emergency call and the automatic emergency call are standard features.

- **Manual emergency call**

(Same as Europe version)

- **Automatic emergency call:**

If the accident is of corresponding severity, the crash safety module sends a signal to the Telematics Control Unit (TCU). The TCU initiates an emergency call which also contains the location of the vehicle. The TCU receives the location determination for the navigation system. If a navigation system has not been installed, the location is determined by an internal GPS receiver in the TCU.

- **Visual and audible seat belt warning**

A visual and audible warning is triggered when terminal 15 is ON. The seat belt warning is active for a limited

period of time (6 seconds).

The further progression of the seat belt warning is identical to that of the seat belt warning in Europe vehicles.

National version - Japan/Gulf States

- **Visual and audible seat belt warning**

A visual and audible warning is triggered when terminal 15 is ON. The seat belt warning is active for a limited period of time (6 seconds).

Subject to change.