



Guidelines for Rescue Services Vans



Mercedes-Benz

Guidelines for Rescue Services Vans

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Revisions from edition of 2010

! Observe modification notes

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Dear reader,

One of Daimler's top priorities has traditionally been to guarantee the highest possible standards of safety.

For this reason our vehicles always represent the state of the art, particularly in terms of vehicle safety.

Our integrated safety philosophy also extends to providing rescue crews with specific information about our vehicles and their safety systems.

The top priority of the rescue crew is to save lives. The rescue team must be able to gain access to the casualties as quickly as possible without exposing them or themselves to additional danger.

In order to do this, the rescue services must be properly trained. In addition, knowledge of vehicle-specific accessibility options and of the function and operation of the safety systems is absolutely essential.

Mercedes-Benz has been providing this information in its "Guidelines for Rescue Services" for passenger cars for some time. A guide for trucks is available too. These Guidelines for Rescue Services describe the rescue of occupants from Mercedes-Benz vans. It presents a concept that allows occupants to be rescued from vans properly, safely and yet quickly.

These guidelines describe several methods for rescuing accident victims from the vehicle. We must emphasize, however, that these guidelines cannot claim to be exhaustive and on no account should they, nor are they intended to, act as a substitute for proper specialist training and the relevant specialized literature.

These guidelines were produced by the Van Development Department (VAN/EA). They would like to thank the Plant Fire Brigade of the Daimler Sindelfingen plant, our accident research staff and all others involved.

The photographs were taken during cutting trials on Vito/Viano, Vario and Sprinter vehicles.

Daimler AG

Technical Information and Workshop Equipment
(GSP/OI)



Proper casualty rescue

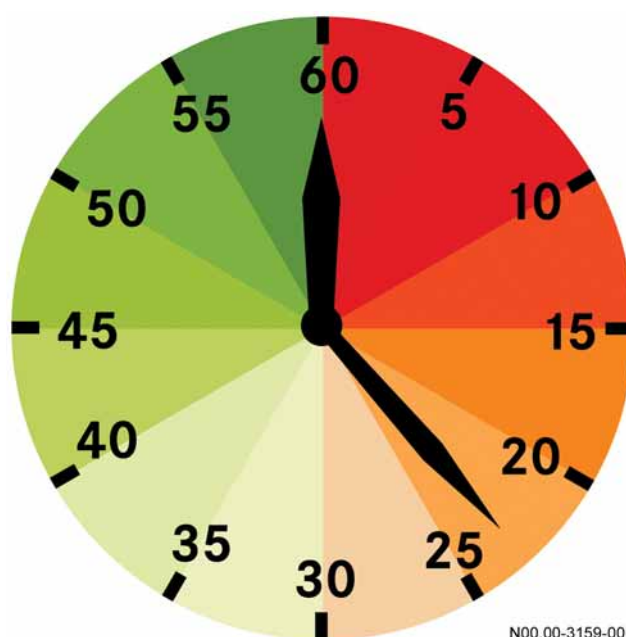
When vehicle occupants are trapped in their vehicles following a road accident, the utmost priority is to ensure that they receive the best possible and most useful continuous medical treatment. It is also crucial to keep the rescue time short so that the casualty can be delivered to the hospital as quickly as possible, because a causal and definitive treatment of certain injuries is only possible in suitable hospitals. Proper casualty rescue requires a close interaction between the fire crew and the rescue service.

Once access has been gained, initial medical aid is given to the casualty and technical measures then allow further treatment to be continued in order to free the trapped occupant.


The principle of the "golden hour of shock" applies, by which the accident victim should ideally be treated at a suitable hospital within one hour of the accident. According to this principle, between 20 and 30 minutes are available at the scene of the accident for the rescue and treatment of the vehicle occupants. Psychological support for the occupants should not be neglected.

Golden hour of shock

	<i>Accident</i>
5	<i>Report</i>
10	<i>Alarm</i>
15	<i>Arrival</i>
20	<i>Securing the scene</i>
25	<i>Initial opening</i>
30	<i>Initial medical aid</i>
35	<i>Treatment opening</i>
40	<i>Rescue opening</i>
45	<i>Treatment</i>
50	<i>Transport</i>
55	<i>Hospital</i>



Proper casualty rescue

 Risk of injury	Action
<p>When vehicle parts are cut open or cut off, sharp edges are produced, which can cause injury to the casualties or to the rescue personnel.</p>	<ul style="list-style-type: none"> • Wear protective clothing. • Cover the relevant parts with safety blankets or similar.
<p>Work on windows and glass roofs and the use of rescue equipment may produce splinters which can cause injuries to the occupants and rescuers.</p>	<ul style="list-style-type: none"> • Cover the occupants with a safety blanket or a transparent sheet before commencing work. • Wear face and eye protection and a protective mouth mask if necessary.
<p>Unintended movements of the bodywork during rescue operations may cause further injury to the casualties.</p>	<ul style="list-style-type: none"> • Immobilize the occupant's cervical vertebrae by fitting a cervical collar. • To prevent dangerous movements from occurring during the rescue, the vehicles involved should first be secured and supported.

During rescue work the safety of the rescue team itself is of the utmost priority. In addition, further injury to the vehicle occupants by the rescue work must be avoided at all costs. The above safety rules therefore apply for the entire duration of the operation.



Proper casualty rescue

From a medical standpoint the most urgent immediate measures are:

- Maintaining or restoring the vital functions (respiration/circulation).
- Keeping the respiratory passages clear and rectifying any breathing difficulties.
- Assessing shock and initiating measures to stabilize the casualty.
- Psychological support for the casualty.
- Treating life-threatening injuries.
- Stopping heavy bleeding.
- Immobilizing certain parts of the body.

i Proper casualty rescue always requires close consultation between the fire service commander and the emergency physician of the rescue service.

Special features of vans

Mercedes-Benz vans have extremely high safety standards. Electrical and electronic safety systems such as ABS, ASR and ESP help to avoid or reduce the effects of accidents.

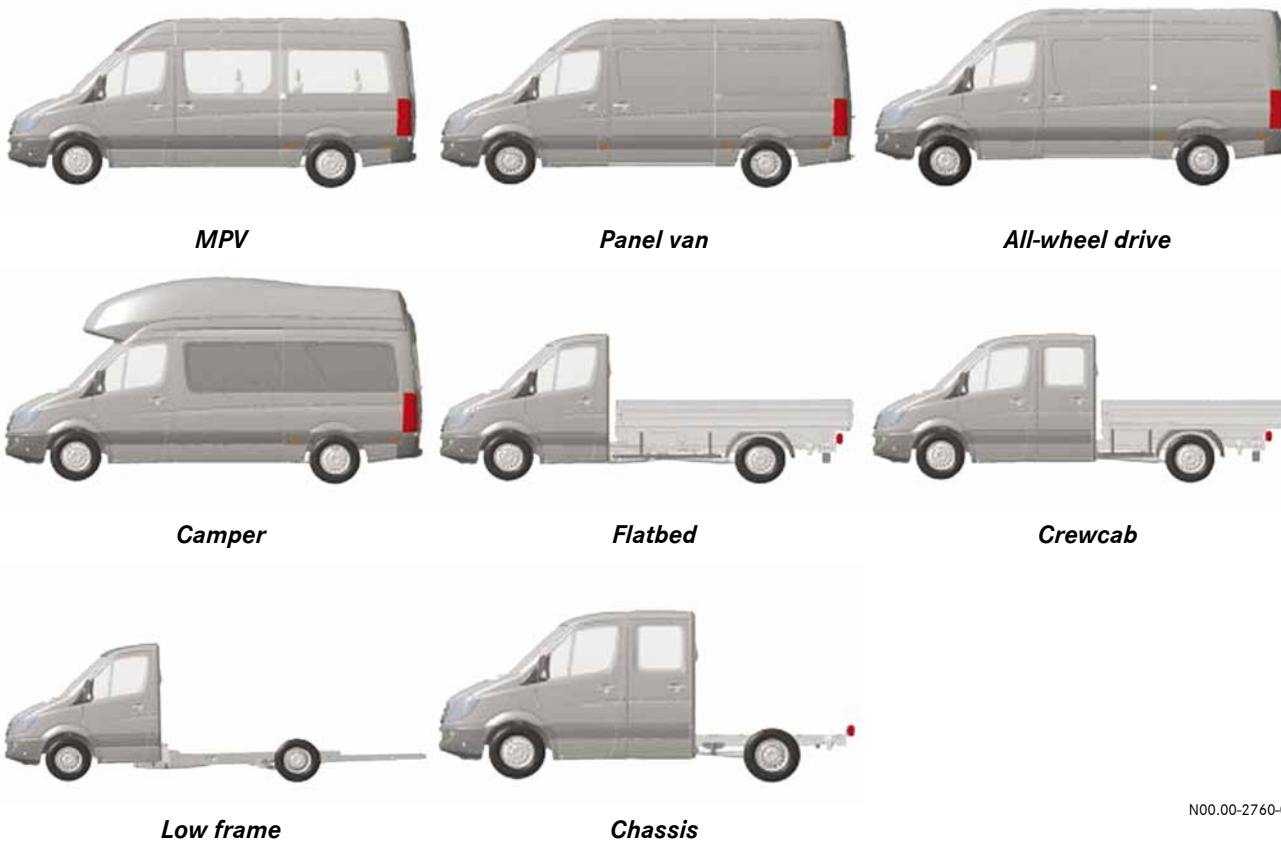
Some van model series and special equipment versions also feature extensive equipment for improving passive safety in the vehicle, such as seat belts, emergency tensioning retractors, front airbags, sidebags and windowbags. The seat belt is the "number 1 lifesaver". The other passive restraint systems can only work properly when the seat belt is being worn.

Vans are unusual in that many different models are available which differ, for example, in terms of the different methods of gaining access to the occupants during a rescue operation.

i **Seat belts should always be worn in emergency vehicles too!**

And when actually rescuing the occupants, certain van-specific features can necessitate a deviation from the rescue techniques familiar from passenger car rescue techniques.

The higher the permissible gross vehicle weight of the van, the more the vehicle resembles a heavy truck. For vehicles of model series 667 - 670 (Vario) we refer you at this point to the "Guidelines for Rescue Services, Trucks".



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Examples of various Sprinter models (model series 906)



Special features of vans

Mercedes-Benz vans are available in versions ranging from the classic frame vehicles (Vario model series 667 - 670) to the integral vehicles (Vito/Viano model series 638/639 and Sprinter model series 906) with their closed design. The forces arising during an accident are transmitted via the longitudinal frame members. The front end of the vehicle is designed as a crumple zone.

Other components that distinguish the van from a passenger car or truck are, for example:

- Sliding doors
- Partition wall or partition grille between the cab and the load compartment
- Variable interior equipment

These guidelines also cover these types of equipment.

Mercedes-Benz vans are also available with low-emission powerplants, e.g. natural gas and electric drive systems (Vito E-Cell).



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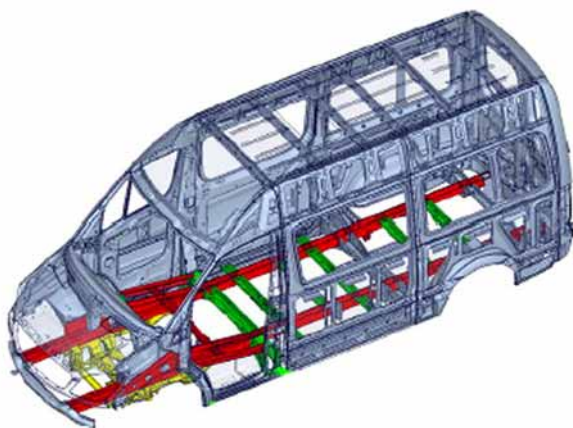


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Vehicle structure of the Sprinter (model series 906)



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Extinguishing vehicle fires

Extinguish fires in accordance with the guidelines of the professional fire services.

Particular attention should be paid during the initial assessment to:

- Ascertaining the nature of the cargo and any hazards arising from it
- Ascertaining the type of drive system
- **Firefighting should always be begun from a safe distance utilizing the full throw distance of the jet pipe.**
- **When it can be done safely, the vehicle must be secured to prevent it from rolling.**
- **When firefighting is complete, the battery should be disconnected.**



Note

If an undeployed airbag unit is heated to a temperature of approx. 160 - 180 °C, the airbag is likely to be triggered.

Natural gas vehicle

Operation notes on the procedure in the event of fire in a natural gas vehicle can be found in the section "Natural gas vehicles" (see page 53 ff).



Note

Natural gas is a Class C flammable material according to the EN 2 European Standard on "flammable materials of various kinds".

Electric drive system

Information on vehicles with electric drive can be found in the chapter on electric drive systems (page 62 ff.).



Note

When working on high-voltage components observe the instructions in the "**High-voltage systems**" chapter (pages 62-64).



Initial opening

Procedure

The goal of proper casualty rescue is to ensure the most continuous possible treatment of the casualty from the time of the accident through to ultimate treatment at the hospital.

Proper casualty rescue from vans can therefore be subdivided into different phases in the same way as rescue from passenger cars and trucks:

- 1st phase: Initial opening
- 2nd phase: Treatment opening
- 3rd phase: Rescue opening

The flow chart illustrates the possible procedure for proper casualty rescue. It is obvious that time can be saved by performing medical treatment and various technical measures at the same time. The necessity for close communication between the fire crew and the rescue service remains unaffected.

i The actions described refer to the procedure for the rescue of a trapped driver in a van following a frontal collision. A similar procedure can be employed for the front passenger.

The procedure is based on the initial opening, treatment opening and rescue opening phases of the rescue operation, although there are no definite transitions between these phases.

On no account should the measures described be regarded as binding; they must be adapted according to the situation in hand.

i The technical measures must be interrupted at any time whenever this necessary from a medical standpoint.

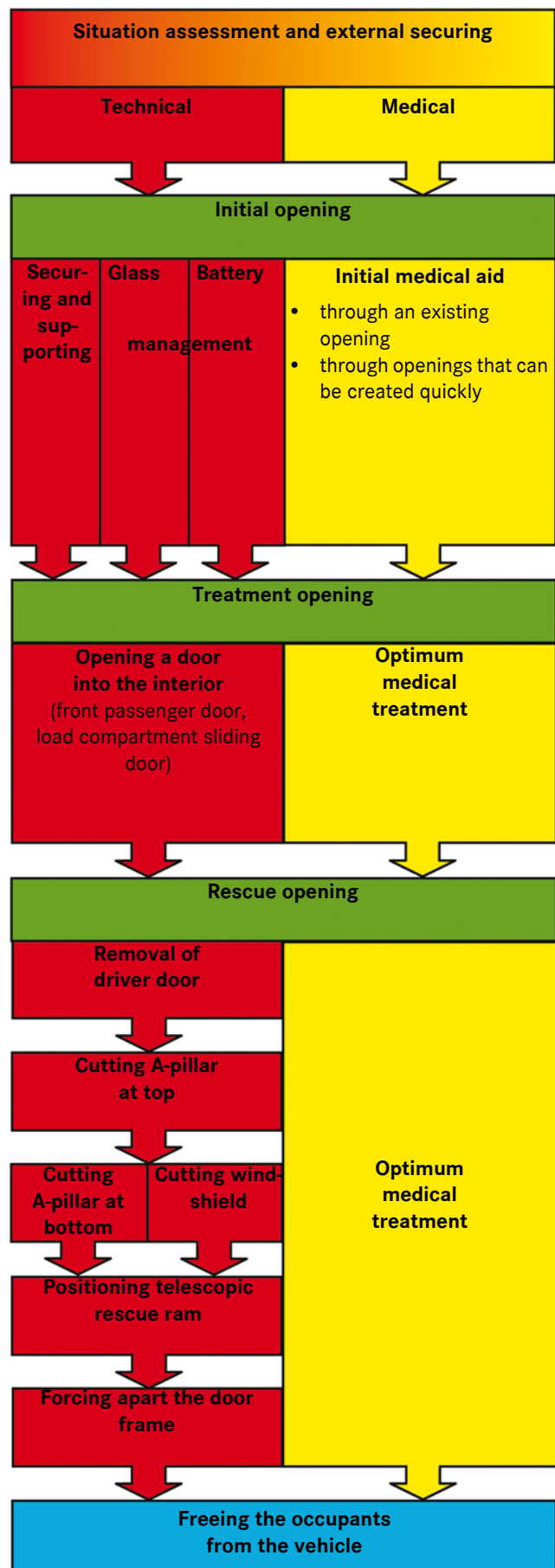
Every operation begins with an assessment of the situation and the securing of the vehicle from the outside:

Situation assessment:

- Number of injured casualties and trapped victims
- Number of vehicles involved
- Type of entrapment
- Nature of cargo
- Access and rescue options
- Special technical features of the vehicle
- Special hazards

External securing:

- Protection from moving traffic
- Protection against fire by provision of suitable extinguishing agents
- Protection against danger from the cargo (hazardous goods, cargo shifting etc.)
- Protection against darkness by illumination of the accident scene



Initial opening

The aim of the **initial opening** is to gain first access to the vehicle occupants and to establish safe working conditions for proper casualty rescue. The initial access allows the rescue service to carry out immediate lifesaving action and to perform an initial diagnosis.

i During initial opening, always check whether individual doors can be opened by hand.

Depending on the vehicle model designation, the access opening may be, for example, an openable door (front passenger door) or a window (including the roof window) and, if necessary, a rear door or the load compartment sliding door, providing there is no partition wall installed.

It may also be necessary to remove the windshield or the side windows.



Initial access to the occupants through the driver door window



Treatment of the occupants from inside the interior compartment

Furthermore, the following actions should be performed and the following aspects taken into account in the course of initial opening. These measures should run in parallel wherever possible:

- Securing and stabilizing the vehicle
- Glass management
- Battery management
- Occupant restraint systems

Consideration of the aspects listed above is important even after the "initial opening" phase of the operation is complete. The safety rules listed remain in force until the end of the rescue operation.

i The occupants should be treated by the rescue crew from inside the vehicle wherever possible. Necessary equipment can be passed through the door on the side furthest away from the impact or through the interior compartment. The impact side should be used as the working area for the technical aspects of the rescue. This allows the work to be performed quickly and in parallel.

Securing and stabilizing the vehicle

⚠ Risk of injury	Action
<p>Unintended movements of the bodywork during rescue operations may cause further injury to the casualties or others.</p>	<p>To prevent dangerous movements from occurring while rescuing the casualties, the vehicles involved must first be secured and supported.</p>

The primary task of technical rescue is to secure the vehicle so that no further movements are possible.

If the vehicle is situated on steep ground, it can be additionally secured by means of an endless sling passed either through the window opening (e.g. forward of the D-pillar) or around rigid parts of the vehicle. The sling should be passed around several components in order to spread the forces.

Chocking in front of and behind one of the wheels is intended to prevent the vehicle from rolling away.



Using chocks to prevent the vehicle from rolling

Securing and stabilizing the vehicle

Trapped casualties are in direct physical contact with the accident vehicle. Therefore the supports must guarantee that the vehicle cannot move and that the suspension cannot compress during the subsequent rescue work.

Depending on their length, vans should be supported at 4 points, or 6 points in the case of extremely long and heavy vehicles. The vehicle should be supported under the A-pillar, under the B-pillar and, if necessary, forward of the rear axle.

Due to the greater ground clearance of vans and their length, more supporting material may be required than for a passenger car.



Supporting a van at 3 points on each side

i The **supports** should be **checked and adjusted regularly** during the course of the operation because the disassembly or unloading of the vehicle can loosen the supports.

If necessary, this effect can be minimized by letting the air out of the tires once the vehicle is supported.


When a van is lying on its side, its large surface area generally prevents it from tipping back onto its wheels. However, the vehicle should be secured by pushing wedges and other supporting materials underneath so that no tilting and rolling movements can occur.

Vehicles in an unstable position can also be secured by using dedicated support systems, for example.




Securing a van lying on its side with wedges and blocks

Glass management

 Risk of injury	Action
Work on windows and glass roofs or adjacent components may produce glass splinters which can cause injuries to the occupants and rescuers.	<ul style="list-style-type: none"> • Cover the occupants before commencing work, preferably with a safety blanket or a transparent sheet. • In addition to personal protective equipment, wear face and eye protection and a protective mouth mask if necessary.

Single-pane safety glass

 Risk of injury	Action
Windows made of single-pane safety glass may shatter, resulting in tiny, sharp glass particles flying around which may cause injury to the occupants and rescuers.	Always remove windows made of single-pane safety glass before working on adjacent components.

The side windows in vans are generally made of single-pane safety glass. The use of rescue equipment can produce stress in the windows, causing them to shatter suddenly and violently. The ejected fragments can inflict injuries. For this reason the single-pane safety glass windows in adjacent components should be removed before rescue equipment is used.

Single-pane safety glass windows are generally cemented into the window frame or mounted in movable frames. Windows in the Vario (model series 667 – 670) and in the partition wall between the cab and the load compartment, if installed, may also be framed in a rubber seal.

The windows can be removed using a spring center punch for example:

- Protect the occupants with a safety blanket or a transparent sheet.
- Stick adhesive foil or tape over the window.
- Punch the corner of the window with a spring center punch.
- The window shatters into small shards which mostly stick to the film or adhesive tape.
- Remove the window outwards.



Procedure for removing a single-pane safety glass side window

Glass management

Side windows that are lowered into the doors should also be secured, either by punching the glass and removing it, or by taping over the window slot with adhesive tape. Otherwise it is possible that the window may shatter when rescue equipment is used, ejecting glass fragments from the window slot.



Taped window slot over a lowered window

A firefighter knife can be used to remove windows that are framed in a rubber lip:

- Cut through the rubber lip with the firefighter knife.
- Pull off the rubber lip.
- Remove the window in one piece.



Firefighter knife

Laminated safety glass



Risk of injury

The sawing of **laminated safety glass windows** in particular produces a fine glass dust, which under no circumstances should be allowed to enter wounds.

Action

Cover the occupants with a safety blanket or a transparent sheet before commencing work.

The number of cuts should be kept to the barest minimum necessary.

The windshield on vans is made of laminated safety glass which is cemented into the window frame. The windshield can only be removed with tools, and this is not easy on vans because of the sloping front end.

Laminated safety glass can be removed using a glass saw or a hooligan tool for example:

- Protect the occupants with a safety blanket or a transparent sheet.
- Use an existing opening or knock a hole in the windshield with the tip of a spring center punch.
- Cut through the window using tools. The number of cuts should be kept to the barest minimum necessary.

One exception is the Vario (model series 667 – 670), where the windshield is not cemented in, but is framed by a rubber seal.

Rubber-framed windshields can be removed very quickly by cutting through the window rubber with a rubber knife and pulling off the seal. The window can then be removed complete.

Therefore, if access via the windshield is not necessary for providing initial medical aid to the occupants, it should be postponed. Otherwise the windshield should be sawn out along the edges.



Sawing out a laminated safety glass windshield on a van that is lying on its side

Battery management, 12 V on-board electrical system

Battery management involves the systematic utilization of the power supply, if it still exists, and the subsequent deactivation of the electrical system. The following sequence must be followed:

- 1 Switching off the engine if it is running
- 2 Switching on the hazard warning flashers
- 3 Use of the power equipment
- 4 Switching off the ignition
- 5 Locating the battery/batteries
- 6 Disconnecting the battery/batteries
- 7 Checking that the voltage is off

Depending on the vehicle model series, the batteries in vans are sometimes located inside the passenger cell, meaning that it is not always possible to disconnect them. In such cases the systematic battery management procedure – as listed above – should be followed as closely as possible!



Disconnecting the battery under the driver seat in the Viano/Vito (model series 639)

i Note

When working on high-voltage components observe the instructions in the "**High-voltage systems**" chapter (pages 62-64).

Automatic unlocking of the central locking in the event of an accident

Some Mercedes-Benz vans feature the "**central locking emergency opening**" function.

When a collision of a certain severity occurs, an emergency opening signal is transmitted to the door control units. Each door is unlocked by the associated door control unit.

Depending on the model series, the engine and auxiliary heater are switched off and the windows are lowered a few centimeters.

Battery management, 12 V on-board electrical system

Switching off the engine if it is running

Under certain circumstances, diesel engines in particular may continue to run after an accident.

There are various ways to stop the engine:

- Switch off the ignition.
- Blow CO₂ into the air intake.
- Disconnect the fuel line.

i Further information on this can also be found in the "Guidelines for Rescue Services, Trucks".

Switching on the hazard warning flashers

In the case of an accident involving **vehicles with airbag equipment**, the hazard warning system may be switched on automatically, depending on the equipment variant.

It can be **switched on or off** at any time using the hazard warning flasher switch.

If the hazard warning lights are flashing when the rescue crews arrive, this should be interpreted as an indication that the power supply of the vehicle is switched on.



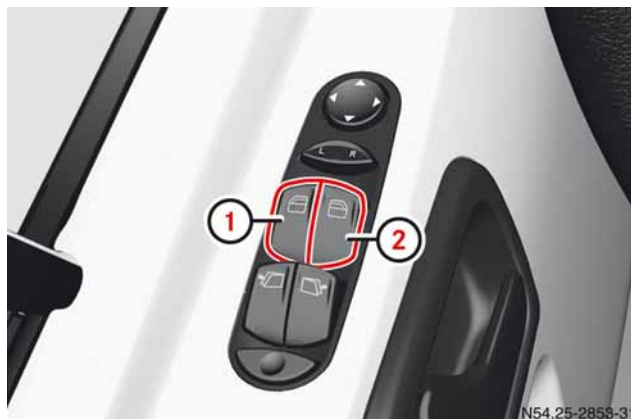
Hazard warning system switch

i All rescue crews should note that the hazard warning system indicates that the power supply in the vehicle is intact.

Battery management, 12 V on-board electrical system

Use of the power equipment

Some vans feature a series of electrically powered equipment such as power windows or electric seat adjustment (see "Driver seat adjustment"). If necessary, this equipment can be operated to assist the rescue before disconnecting the battery.



Power windows

- 1 Left power window
- 2 Right power window

i Utilizing the electrically powered equipment can speed up the rescue of the occupants and should therefore always be considered before the battery is disconnected.

When operating the power equipment, make sure that nobody can become trapped by the moving parts.

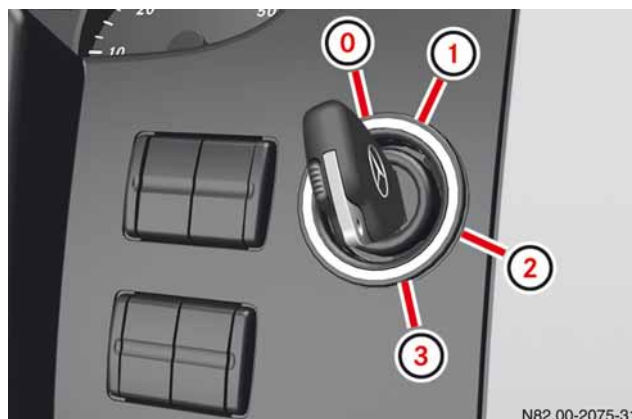
All measures affecting the occupants must be coordinated with the rescue crew (e.g. emergency physician)!

Battery management, 12 V on-board electrical system

Switching off the ignition

The vehicle's ignition should be switched off as quickly as possible.

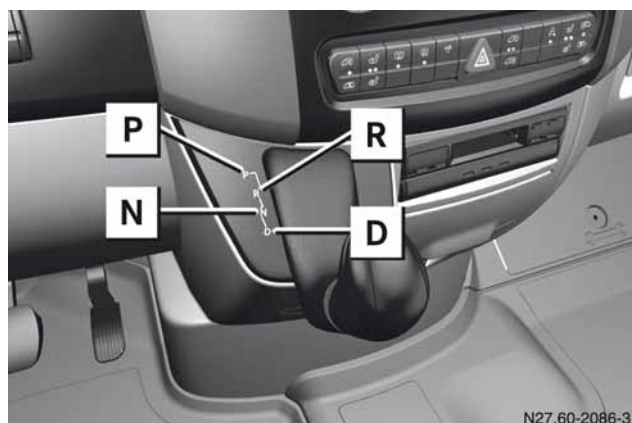
This done by turning the ignition key to position 0.



Ignition key

- 0 Remove key, lock steering wheel
- 1 Unlock steering wheel
- 2 Ignition ON
- 3 Start

If the vehicle is equipped with an automatic transmission and it is necessary to remove the ignition key, the transmission must first be set to the P (Park) position.



Automatic transmission gear selector lever

- P Park
- R Reverse
- N Neutral
- D Drive mode

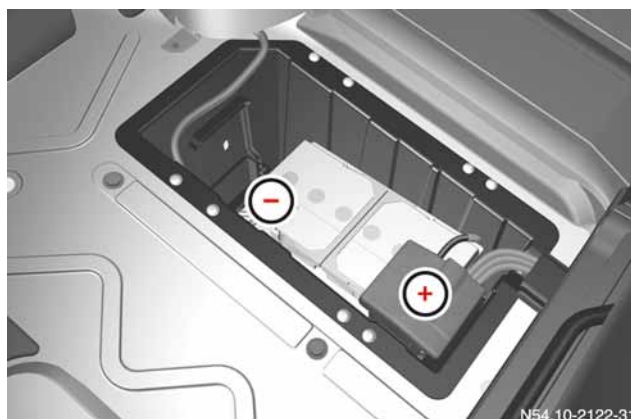
Battery management, 12 V on-board electrical system

Locating the battery/batteries

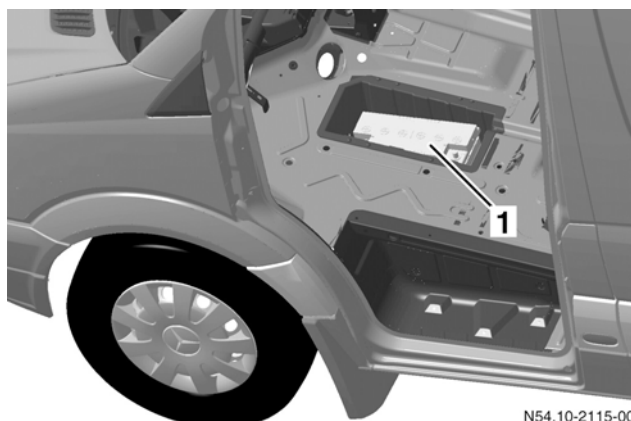
The installation locations of the main battery and additional batteries vary according to the model series:

- Viano/Vito (model series 638/639): The main battery is located in the base of the driver seat. The additional battery is in the base of the front passenger seat.
- Vario (model series 667/670): The batteries are located in the base of the driver seat.
- Sprinter (901 – 905): The main battery is located in the engine compartment on the left-hand side. The additional battery is in the base of the front passenger seat.
- Sprinter (model series 906): The main battery is located in the footwell under the floor in front of the driver seat. The additional battery is located in the engine compartment on the left-hand side.

Some vehicle equipment versions are fitted with an additional battery as special equipment in addition to the main battery.

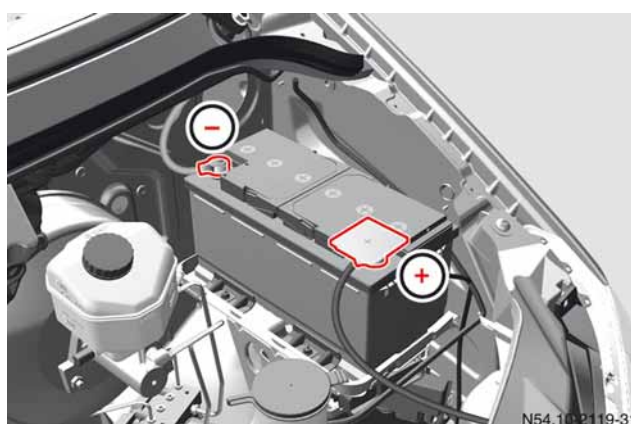


Location of the battery terminals of the main battery Sprinter (model series 906)



Installation location of the main battery Sprinter (model series 906)

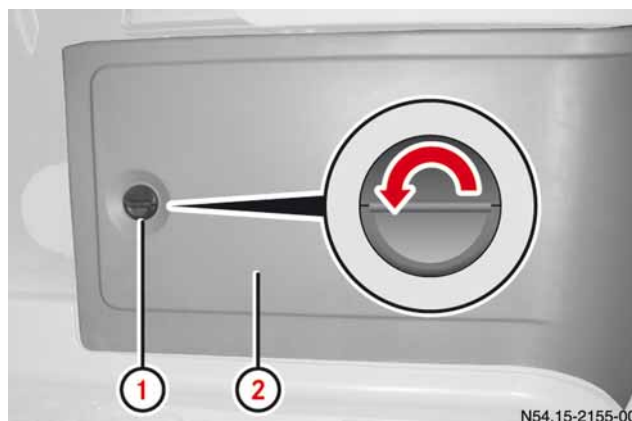
1 Main battery



Installation location of main battery Sprinter (model series 901 - 905)
Installation location of additional battery Sprinter (model series 906)

Battery management, 12 V on-board electrical system

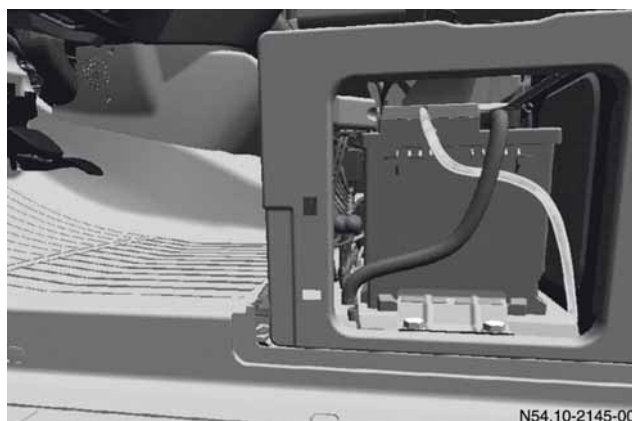
To gain access to the batteries in the seat bases, it is necessary to remove the side covering on the seat box.



Battery installation locations in the seat base with covering

Viano/Vito (model series 639)

- 1 Rotary catch
- 2 Cover flap



Seat base without covering for main battery, additional battery in front passenger seat base is mirror image
Viano/Vito (model series 639)

The Vito E-Cell (model series 639) is supplied with electrical energy via two on-board electrical systems:

- 12 V electrical system
- High-voltage electrical system

The 12 V battery is located in the base of the driver seat.

Information on the high-voltage battery and on HV battery management can be found in the "Electric drive system" chapter (page 65 ff.).

i Note

When working on high-voltage components observe the instructions in the **"High-voltage systems"** chapter (pages 62-64).

Battery management, 12 V on-board electrical system

The engine compartment can be opened by pulling the engine hood release cable.



Opening the engine hood
Sprinter (model series 906)

1 Release lever

Pressing the retaining hook upwards unlocks the engine hood.



Opening the engine hood
Sprinter (model series 906)

2 Retaining hook

Battery management, 12 V on-board electrical system

Disconnecting the battery/batteries



Risk of injury

Battery acid is **corrosive**. To avoid injury it must **not** be allowed to come into **contact** with the **skin**, **eyes** or **clothing**.

Action

- **Wear protective clothing (pull down your visor, wear safety glasses).**
- **Do not smoke or produce sparks or open flames near the batteries.**
- **Rinse off acid splashes immediately with clean water.**

To isolate the battery, the ground connection should be disconnected first once access has been gained. Then, if possible, the positive terminal should also be removed from the battery.

Always disconnect all the batteries (main battery and additional battery), because some electrical accessories may continue to operate if the main battery is disconnected and not the additional battery!



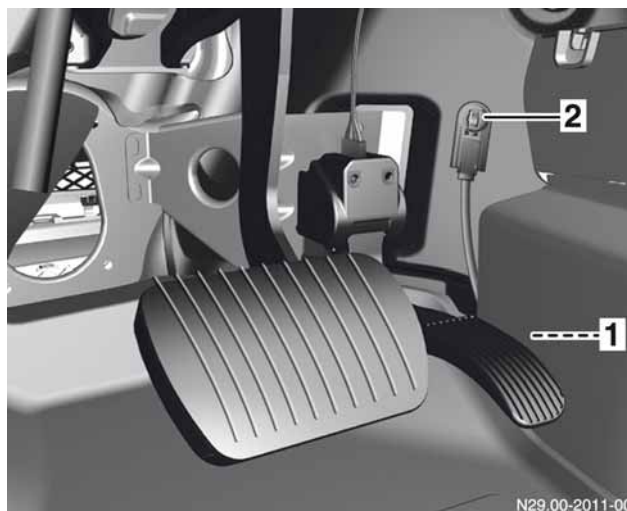
Risk of injury

When disconnecting the battery/batteries, always disconnect or cut the ground lines first otherwise there is a risk of short circuit.

If this is not possible, insulated tools must be used to disconnect or cut the cables.

In the Sprinter (model series 906), the starter battery in the driver footwell is only directly accessible when certain covers have been removed.

The standard ground connection (1) of the starter battery can be disconnected in the driver footwell after removing the lower engine dome paneling. In vehicles with 1-pin battery terminal (special version), there is a quick-release coupling (2) beside the accelerator pedal for disconnecting.



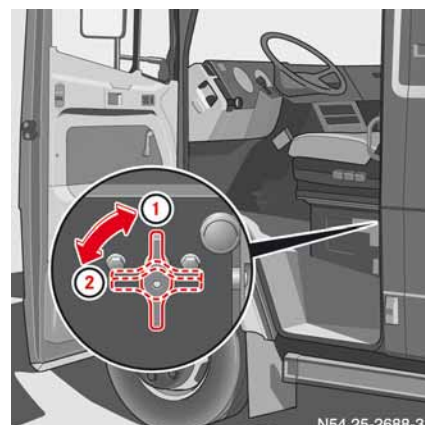
**Ground line of main battery in the driver footwell
Sprinter (model series 906)**

- 1 Ground connection behind lower engine dome paneling
2 1-pin ground connection (special version)

Battery management, 12 V on-board electrical system

The optional equipment with an EMERGENCY OFF switch is also possible. If such a facility is present, it can be used to deactivate the power supply.

The battery master switch is located on the driver seat base, for example.



Battery master switch
Vario (model series 667)

- 1 Power supply ON
- 2 Power supply OFF

When the power supply is switched off with the EMERGENCY OFF switch, all the electrical consumers, with the exception of the tachograph (indicator lamp and clock) and the auxiliary heater, are isolated from the batteries.




EMERGENCY OFF switch
Vario (model series 667)


- 1 Cover
- 2 Switch stalk


Checking that the voltage is off

If the hazard warning system does not go out when the battery is disconnected, then there is another battery present. This should also be located and disconnected.

- i** If it is **not possible** to **disconnect** certain batteries, proceed with the utmost caution:
- **Keep well away from undeployed airbags.**

 Risk of injury	Action
<p>There is a risk of injury in the deployment area of undeployed airbags.</p> <p>If, during rescue work where the battery has not been disconnected, parts of the vehicle undergo significant movement or electrical lines are cut, then an airbag may be triggered (front airbag, sidebag or windowbag). If this happens, both the airbag and any loose objects and glass splinters which could be projected towards the accident victim or the rescuers, may cause injuries.</p>	<ul style="list-style-type: none"> • Perform the battery management measures. If it is not possible to disconnect the battery, keep well away from undeployed airbags. • Do not perform cutting work near undeployed airbags or in the vicinity of the airbag control unit. • Avoid heating near undeployed airbags. • Do not place any objects near undeployed airbags.

 Risk of injury	Action
<p>The gas generators of windowbags are filled with compressed gas and they must not be cut!</p> <p>The gas generator will burst and sharp-edged parts may be ejected at high speeds. Depending on the circumstances in question, the loud noise may result in casualties suffering blast trauma.</p>	<p>Use the cutting zones provided or check the cutting points for gas generators beforehand, if necessary, by removing the interior paneling.</p>

 Merely cutting through the steering wheel rim or the spokes will not usually trigger the airbag.

Occupant restraint system

To improve occupant protection, Mercedes-Benz vans feature a number of safety systems (in addition to the seat belt), such as airbags, emergency tensioning retractors and belt force limiters.

Depending on the nature of the collision and the airbag equipment installed, one or more of the restraint systems are triggered. Crews should therefore perform a thorough examination of the interior compartment in order to ascertain the airbag equipment installed. All the rescue services involved should then be advised of any airbags that have not been triggered.

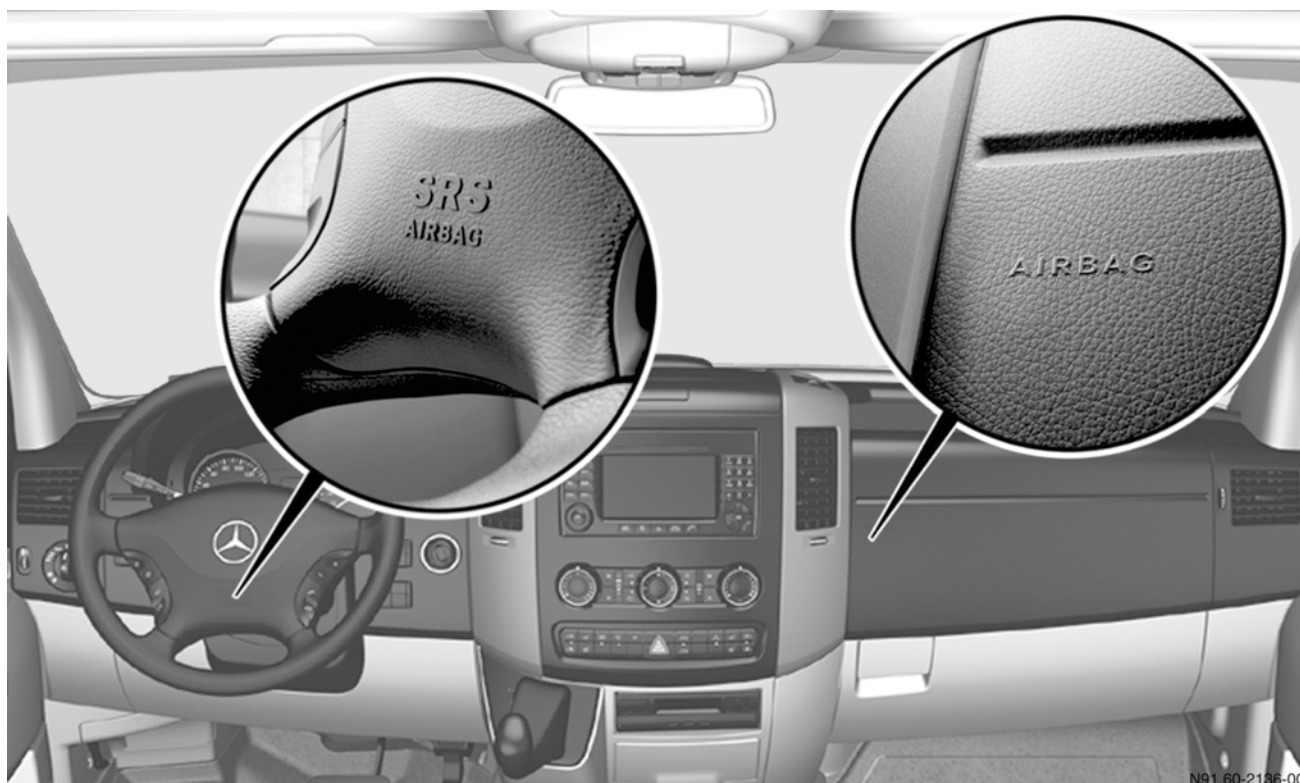
The extent of the airbag equipment and the approximate locations of the airbags in the vehicle can be identified by the "SRS AIRBAG" or "AIRBAG" signage in the vicinity of each installation position.

The following airbags may be installed in Mercedes-Benz vans:

- Driver airbag (in the steering wheel housing)
- Front passenger airbag (above the glove compartment)
- Thoraxbag (in the outside of the backrests)
- Windowbag (in the roof frame between the A-pillar and B-pillar and between the B-pillar and C-pillar)



Location of the airbags
Sprinter (model series 906)



Location of the driver and front passenger airbags, shown on the cockpit of the Sprinter (model series 906)

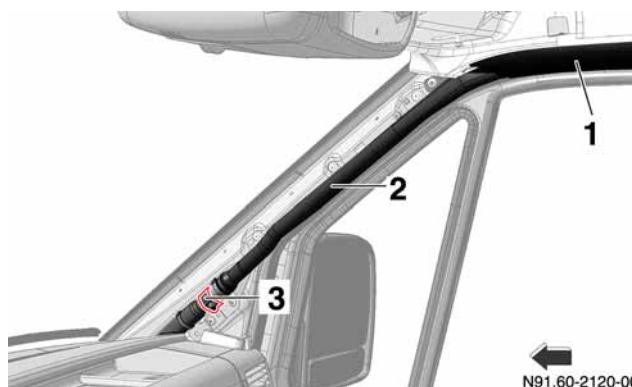
Occupant restraint system

Thoraxbag (in the outside of the front seat backrests)



Location of the thoraxbag unit

Windowbag (in the roof frame between the A-pillar and B-pillar)



Location of the windowbag unit

- 1 Cover
- 2 Windowbag
- 3 Gas generator



The **gas generators** of **windowbags** are filled with compressed gas and **they must not be cut!**

Occupant restraint system

The air sack of an airbag inflates within a few milliseconds during the collision. The driver airbag reaches its full volume within approximately 30 – 40 ms. The pressure in the air sack immediately begins to decrease, the gas escapes through a filter or an air hole and the airbag collapses. An exception to this are the window-bags, which maintain their volume for a short time in order to continue rendering a certain amount of protection in case of further collisions.

Deployed airbags are easily recognized by the sagging air sacks. They can be pushed out of the way or even cut if necessary in order to clear the necessary space for the rescue operation. A triggered airbag has no medical risks for the occupants or the rescue crew.

i The white, powdery residues left inside the vehicle after deployment of an airbag are non-toxic. They consist for the most part of talcum, which acts as a lubricant for the airbag fabric.

i In vehicles of the later generation (Sprinter model series 906), the windows are automatically lowered a few centimeters after deployment of the front airbags in order to ventilate the interior compartment.

If there are any undeployed airbags present, the following safety rules must be observed in the further course of the rescue:

- Perform the battery management measures. If it is not possible to disconnect the battery, keep well away from undeployed airbags.
- Do not perform cutting/spreading work near undeployed airbags or in the vicinity of the airbag control unit.
- Do not cut gas generators.
- Avoid heating near undeployed airbags.
- Do not place any objects near undeployed airbags.

⚠ Depending on the circumstances of the case, slight irritation of the respiratory passages cannot be ruled out.

⚠ Risk of injury

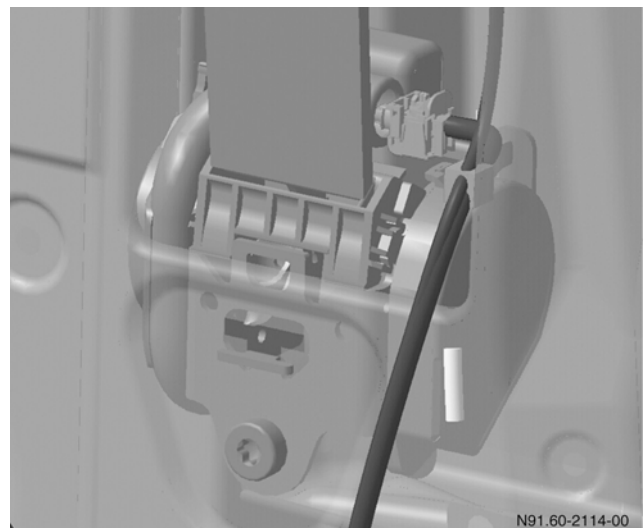
From contact with the airbag during deployment, occupants may suffer slight **burns** and abrasions, e.g. on the insides of the forearms or in the face.

Emergency tensioning retractors

As the status of the emergency tensioning retractors is very difficult to ascertain following an accident, the occupants' seat belts should be unbuckled or cut at the earliest opportunity.

i When the emergency tensioning retractors are activated, the belt is retracted by approx. 100 mm. The retractors cannot be triggered after the battery has been disconnected.

If the condition of the casualty permits, the seat belt should be unbuckled or cut at the earliest opportunity.



Emergency tensioning retractor in the B-pillar Sprinter (model series 906)

Treatment opening

In the "treatment opening" phase of the operation, technical assistance measures enable the occupant to be treated in order to stabilize his condition as far as possible at the scene of the accident. If not already done to create the initial opening, a door into the interior (hinged or sliding door) should now be opened in this phase at the latest, in order to perform further treatment on the occupants.

Opening/removal of hinged doors

First you should check whether the door lock can be opened in spite of the deformed door. To do this, try both the outside and the inside door handles. This may be enough to open the door.

The hinged doors can be opened/removed from the hinge side or from the lock side depending on the situation. If the door is jammed in the door frame, it may be possible to reduce the force required to open the door by holding the door locking system open.

The B-pillar should not be damaged by the use of rescue equipment because they are still needed for positioning rescue equipment later on and because parts of the fuel system are located in the B-pillar.

Opening/removal of hinged doors

To open the hinged door, proceed as follows:

- Remove single-pane safety glass windows in the door and in adjacent components (see "Glass management").
- Hold the door handle open with a wedge.
- Make a gap to allow the spreader to be applied at the door lock, e.g. using a crowbar.
- Enlarge the gap and force the door out of the lock.

There are two ways to remove the door entirely:

- Open the door on the lock side as described above.
- Force out the door hinges from inside.
- If necessary, cut electrical lines with cable shears.

Or:

- Remove single-pane safety glass windows in the door and in adjacent components (see "Glass management").
- Hold the door handle open with a wedge.
- Make a gap on the hinge side, e.g. using a crowbar or by crushing the fender.
- Enlarge the gap and force off the hinge side.
- Open the lock side using the spreader. However, the door can often be detached on the lock side without the use of equipment.



Inside/outside door handle held open with a wedge



Forcing out the door at the hinges



*Cutting electrical lines
with cable shears*

i The fender of the Viano/Vito (model series 639) is made of plastic.

Adjustment of individual seats

After removing the appropriate door it is sometimes possible to move the driver seat (or the front passenger seat, as necessary) manually or electrically in order to relieve or free the occupant.

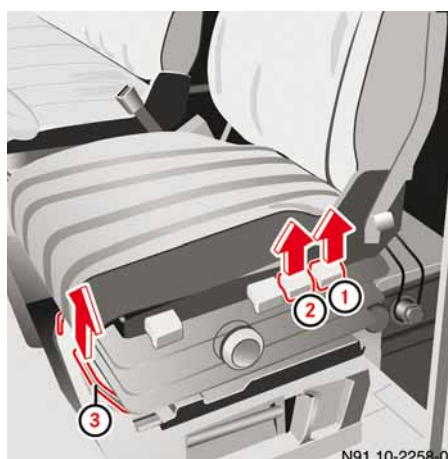
i All measures affecting the occupants must be coordinated with the rescue crew!

Manual seat adjustment



Standard/comfort/suspension seat Sprinter (model series 906)

- 1 Seat fore/aft adjustment
- 2 Backrest adjustment
- 3 Seat height adjustment



Suspension seat Vario (model series 967 - 670)

- 1 Backrest angle
- 2 Seat height
- 3 Seat fore/aft adjustment

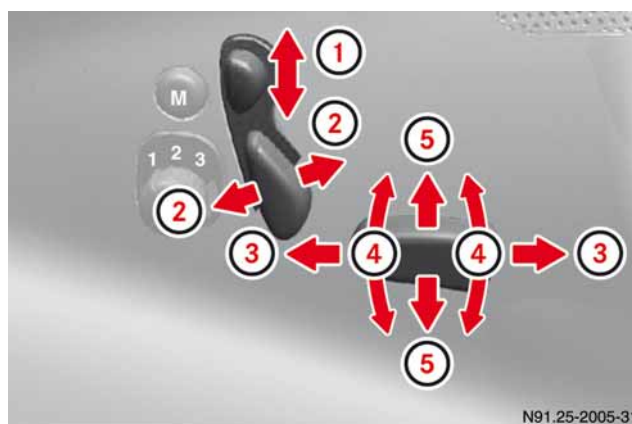
Adjustment of individual seats

Electric seat adjustment

The seat elements depicted by the differently shaped segments of the switch can be moved in the desired direction by pressing the appropriate switch.

i The electric seat adjustment is – at the latest – no longer functional after disconnecting the battery.

i When operating the electric seat adjustment, make sure that nobody can become trapped by the moving parts.



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Electric seat adjustment **Vito/Viano (model series 639)**

- 1 Head restraint adjustment
- 2 Backrest adjustment
- 3 Fore/aft adjustment
- 4 Seat tilt adjustment
- 5 Seat height adjustment



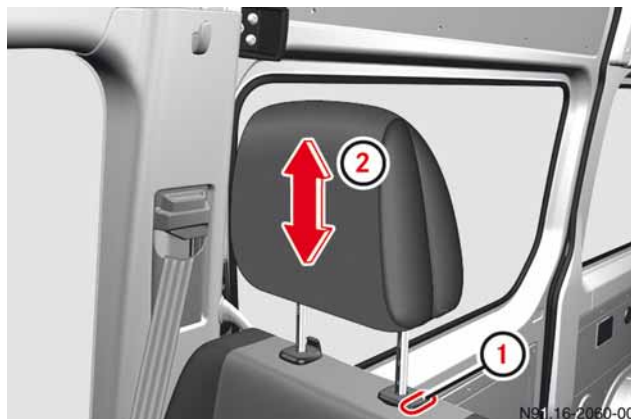
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Electric seat adjustment **Vito/Viano (model series 639)**

Head restraints and passenger seats

Head restraints

After an accident it is sometimes useful to remove the head restraints (in consultation with the rescue crew), e.g. to facilitate the fitting of a cervical collar.

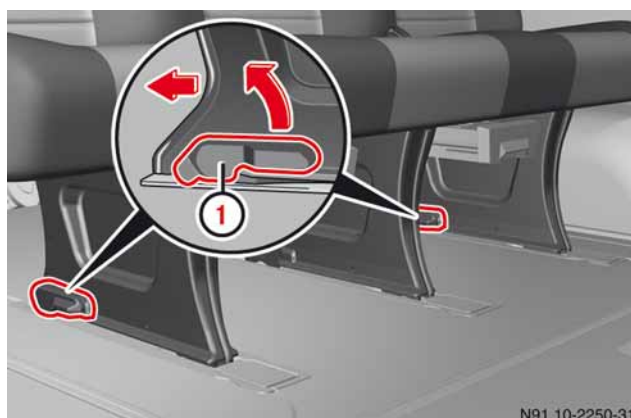


**Removing the head restraints
Sprinter (model series 906)**

- 1 Release button
- 2 Height adjustment

Removal/moving of passenger seats

The variability of the interior in the MPV versions allows seats or entire seat rows to be folded down or removed quickly. This can be used to improve access to the occupants or to prepare for a rescue through the interior compartment towards the rear.



Removing the rear seats

- 1 Lever

Tilting the backrest forwards

The backrest can be tilted forwards by pulling the release lever upwards.



Tilting the backrest forwards

- 1 Backrest release lever

Steering column adjustment

Adjusting the steering column

To create additional space and relieve any loads on the occupants, it may be possible to use the steering column adjustment (if installed).

If the steering column is adjustable, the lever is located at the bottom of the steering column.

The steering wheel rim can be cut with cutting gear if necessary.

i The steering wheel should only be adjusted in close consultation with the rescue crew!



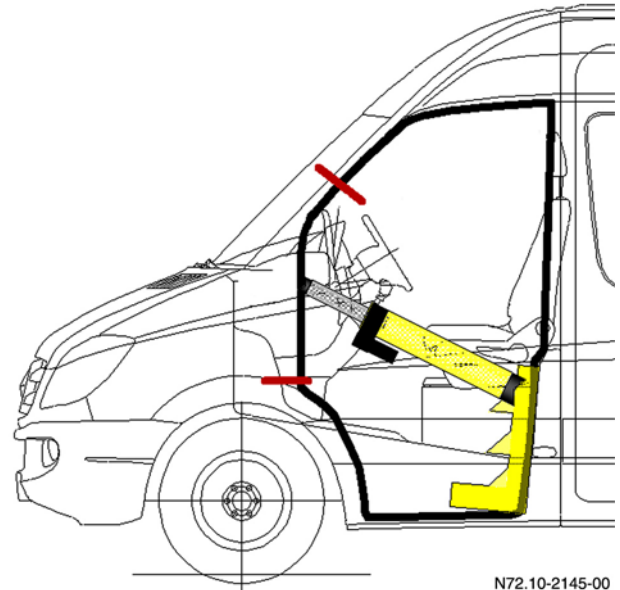
Steering column adjustment Vito/Viano (model series 639)

- 1 Steering column longitudinal direction
- 2 Steering column height
- 3 Lever

Rescue opening

In the "rescue opening" phase, space is created for removing the occupant from the vehicle e.g. by spreading apart the passenger cell. Depending on the degree of damage, it may be necessary to weaken the closed structure of the door frame by making specific relief cuts.

The door on the side of the trapped occupant must be removed before these actions are performed.



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*Use of the telescopic rescue ram at the A- and B-pillars
Sprinter (model series 906)*

Making relief cuts

Risk of injury

When vehicle parts are **cut open** or **cut off**, **sharp edges** are produced, which can cause **injury** to the **casualties** or to the **rescue personnel**.

Action

Cover the relevant parts with safety blankets or similar.

Risk of injury

The **gas generators** of **windowbags** are filled with compressed gas and **they must not be cut!**

The gas generator will burst and **sharp-edged parts** may be ejected at high speeds.

Depending on the circumstances in question, the loud noise may result in casualties suffering **blast trauma**.

Action

Use the cutting zones provided or check the cutting points for gas generators beforehand, if necessary, by removing the interior paneling.

Upper A-pillar

The first relief cut is made in the upper region of the A-pillar (approximately in the middle of the pillar). The following points should be observed when selecting the position of the cut:

- If there is a cutting mark, the A-pillar can be severed in the specified cutting area without the need for further action.

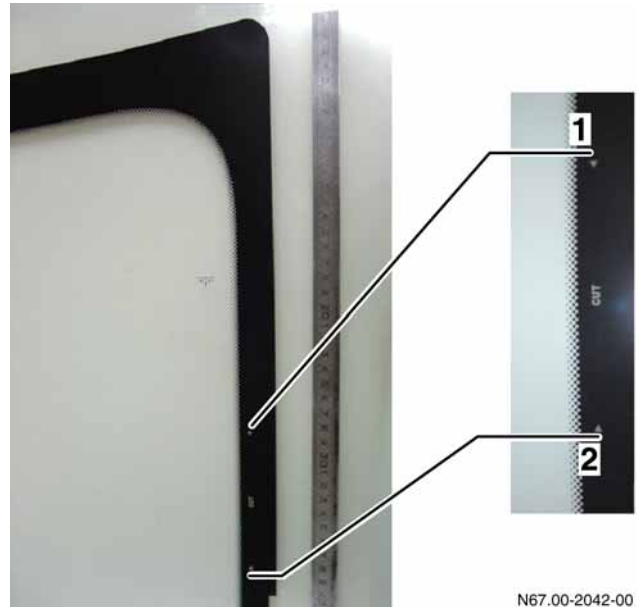
*Location of CUT marking on the NCV2
(as of 04/2008)*

1. approx. 190 mm from upper edge
2. approx. 290 mm from upper edge

*Location of CUT marking on the NCV3
(as of 04/2006)*

1. approx. 280 mm from upper edge
2. approx. 390 mm from upper edge

- If there is no marking present and an undeployed head airbag is in the vicinity, remove the interior paneling on the A-pillar and cut the pillar only at points at which no gas generator is installed.



**Cut markings at the windshield on the left and right A-pillars
Sprinter (model series 906)**



Cutting through the A-pillar at the height of the cutting mark



**Removing the interior paneling
Vito/Viano (model series 639)**

Rescue opening

Cutting the windshield

If it has not already been done, the windshield should be cut once horizontally all the way across to the other side of the vehicle. The cut in the A-pillar can serve as the starting point.



Lower A-pillar

The relief cut is made horizontally at the lower end of the A-pillar, above the transition from the A-pillar to the wheel well or rocker panel.



Making the relief cut

Use of telescopic rescue rams

In the next step the door frame is forced forwards with the aid of the telescopic rescue ram:

- Remove the rubber seals in the door frame.
- Position the sill panel attachment at the B-pillar to improve the distribution of the forces arising.
- Position the telescopic rescue ram diagonally in the door aperture. Make sure that the rear end of the ram runs below the level of the seat surface.
- Select a reliable positioning point on the A-pillar. (Strong areas can normally be found at the hinges.)
- Force the door frame apart.
- The telescopic rescue ram remains in the door gap during the rescue.



Using the telescopic rescue ram at the A-pillar

Rescuing the occupant from the vehicle

Depending on the vehicle model, the occupant can be rescued in consultation with the rescue crew either through the door frame or in the longitudinal direction of the vehicle.



Rescue in the longitudinal direction, e.g. in MPVs or after removing the partition wall



Rescue from the door frame

Other possible rescue techniques



Risk of injury

When vehicle parts are cut open or cut off, sharp edges are produced, which can cause injury to the casualties or to the rescue personnel.

Action

Cover the relevant parts with safety blankets or similar.

Removal of sliding doors

Vans feature load compartment sliding doors to provide access to the rear seat rows or the load compartment. **The lock(s) for these doors is/are located on the left-hand side of the door (at the rear in the direction of travel, by the C-pillar).** If the doors cannot be opened in the conventional way, the following alternative is available:

- Hold the inside/outside door handle open with a wedge.
- Make a gap at the side of the lock, by removing the trim cover over the rail for example.
- Apply the spreader, enlarge the gap and work forward towards the lock.
- Force out the lock(s).
- On the other side of the door, use the spreader to force the sliders out of the rail.
- If necessary, the sliders can also be cut away at their weakest point using cutting gear.



Removing a load compartment sliding door

Other possible rescue techniques

Side opening ("4th door")

On vehicles equipped with only one load compartment sliding door, a "4th door" (i.e. a hole in the side wall) can be created on the opposite side if necessary.

- Remove single-pane safety glass windows.
- Remove the interior paneling so that you can see the internal structure.
- Cut into the window sill on each side using cutting gear.



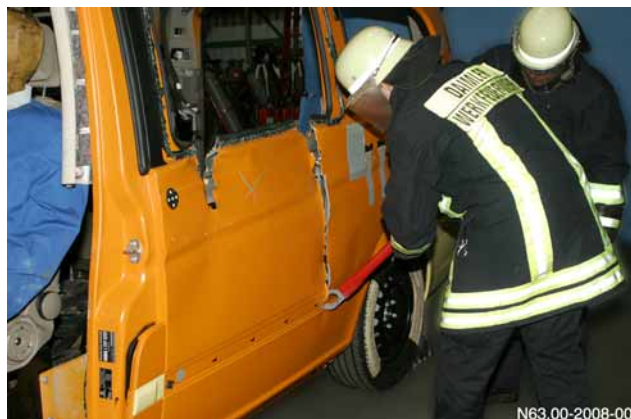
Cutting into the window sill on each side

- Continue the cuts down through the panel as far as the vehicle floor. A hooligan tool or a pendulum jigsaw can be used.



Making two cuts down to the level of the vehicle floor using a hooligan tool

Other possible rescue techniques



Making two cuts down to the level of the vehicle floor using a hooligan tool

- It may be necessary to cut through the cross struts.
- The panel produced should be bent down or cut off entirely.



Bending down or removing the panel

- Cover sharp edges.



Covering sharp edges

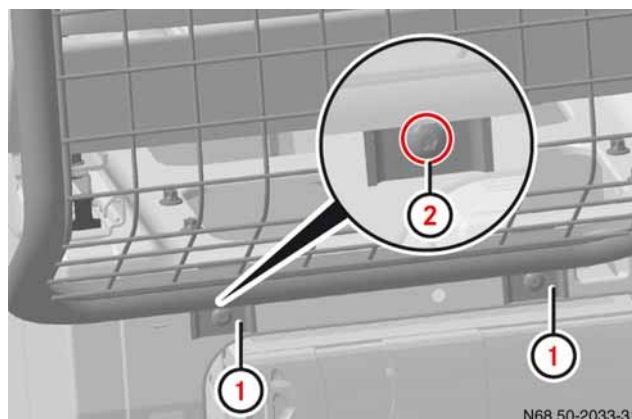
Other possible rescue techniques

Removal of load protection grille or partition wall

Vans may be fitted with a partition grill or partition wall between the cab and the load compartment as protection against shifting cargo items.

Load protection grille

If a load protection grille interferes, it can be unbolted in a very short time by unscrewing first the lower mounting bolts and then the upper bolts, or cutting gear can be used if necessary.



Unbolting load protection grilles
Vito (model series 638)

- 1 Lower mounting
- 2 Mounting bolt

Partition wall

An opening can be made in the partition wall using a hooligan tool. The time required for this depends in particular on the nature of the partition wall (material thickness etc.).

- Remove any windows in the partition wall (e.g. by cutting away the rubber seal).
- Find a suitable starting point for the hooligan tool.
- Make the required hole in the partition wall.
- Cut through any reinforcement brackets using cutting gear if necessary.



Glass management on partition wall window



Cutting open the partition wall using a hooligan tool

Vehicle on its side

If the van comes to rest on its side after an accident, the following additional points should be observed:

- Stabilize the vehicle to prevent it from tipping over further
(see "Securing and supporting").



Securing a van lying on its side with wedges and blocks

- Make the initial opening through the tailgate or windshield (see "Glass management").
- The treatment and rescue options in a vehicle that is lying on its side can be improved by bending down part or all of the vehicle roof.



Vehicle on its side

Roof opening (e.g. on an MPV)

- Cut through the window pillars on the top side (e.g. from a scaling ladder).
- Make relief cuts in the roof edge at the front and rear.
- Bend the roof down.



Roof bent down on a vehicle lying on its side

Vehicle on its side

Bending down part of the roof (e.g. forward of the B-pillar)

- Cut through the A-pillar at the top.
- In order to **bend down part of the roof**, the roof must be cut through to the other side of the vehicle forward of the B-pillar, for example, with the aid of a hooligan tool or a pendulum jigsaw. In addition, the top of the A-pillar must be severed and a relief cut made in the roof edge.

i Do not cut the gas generators of windowbags. Remove the interior paneling so that you can avoid this area.

- Cut through the roof surface, e.g. forward of the B-pillar, using a hooligan tool or saber saw.



- Bend the roof section down.



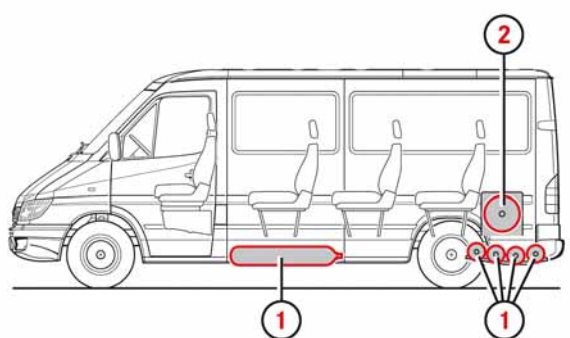
Vehicles with gas drive

Monovalent natural gas operation

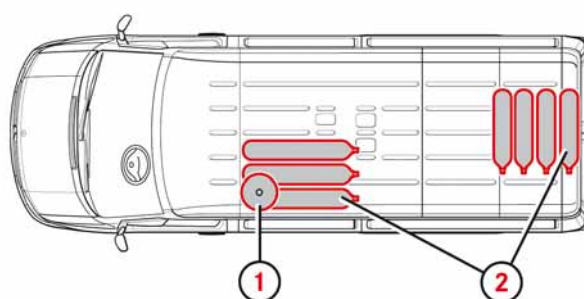
The Mercedes-Benz Sprinter (model series 901 - 905) is also available as a monovalent version where the vehicle is powered solely by natural gas (NGT – Natural Gas Technology).

Safety

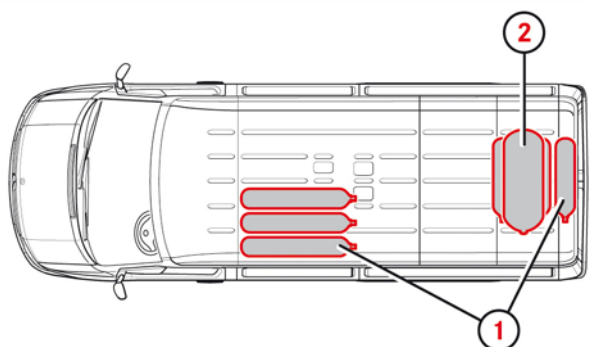
- Natural gas is lighter than air. Thus there are no restrictions on driving natural gas vehicles in multilevel car parks and tunnels.
- The components necessary for the natural gas drive system are installed in the vehicle in such a way that gas cannot enter the interior compartment of the vehicle.
- The risk of fire is no greater in natural gas vehicles than in gasoline or diesel-powered vehicles.



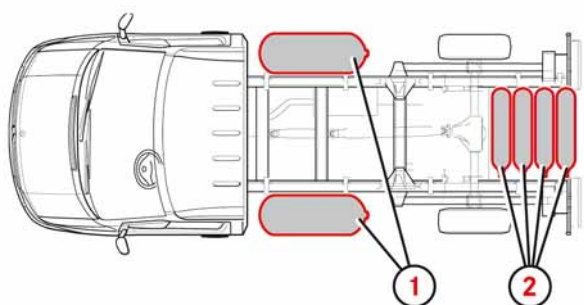
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Location of compressed-gas tanks

Sprinter model series 901 - 905) with natural gas drive

1 Standard equipment

2 Special equipment

Vehicles with gas drive

Bivalent natural gas operation

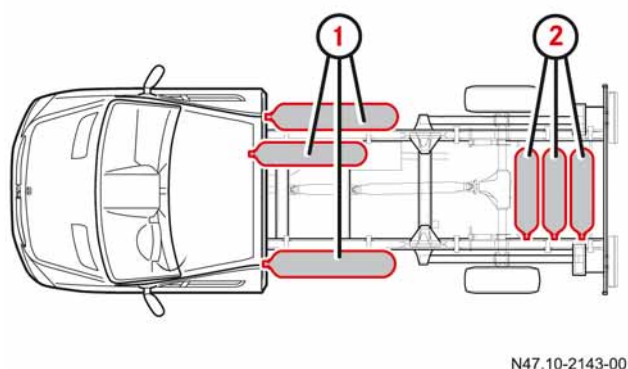
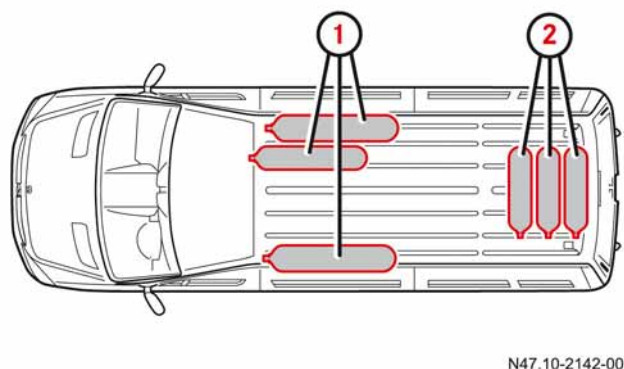
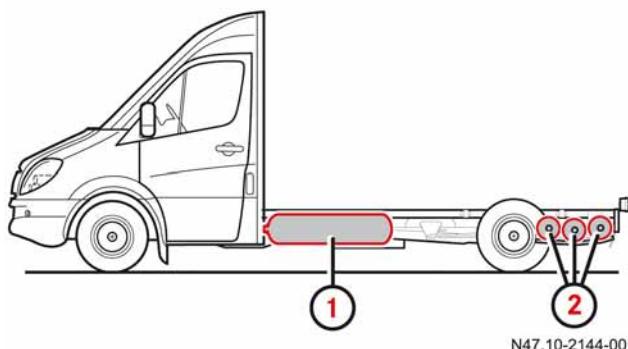
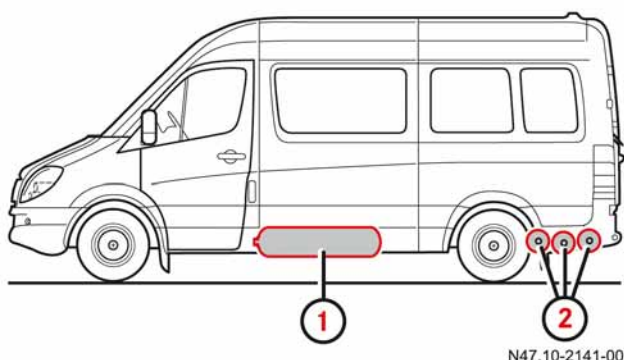
Sprinter NGT

The Sprinter NGT of model series 906 is fitted with compressed-gas tanks in sizes between 30 l and 110 l. Depending on the body variant, they are mounted under the vehicle at the side or at the rear. There may be up to six compressed-gas tanks with a total capacity of 125 l to 313 l.

Fuse links and flow limiters provide extra protection in the event of damage to the gas tanks (leakage). In addition, each gas tank can be mechanically locked manually.

Safety

- Natural gas is lighter than air. Thus there are no restrictions on driving natural gas vehicles in multilevel car parks and tunnels.
- The components necessary for the natural gas drive system are installed in the vehicle in such a way that gas cannot enter the interior compartment of the vehicle.
- The risk of fire is no greater in natural gas vehicles than in gasoline or diesel-powered vehicles.



Location of compressed-gas tanks

Sprinter NGT (model series 906) with natural gas drive

- 1 Standard equipment
- 2 Special equipment

Safety devices

- **Gas safety shutoff valve (1)**

At "ignition ON" in gas mode, the safety shutoff valve is open. When the engine is off or in gasoline mode (bivalent vehicle) or in an emergency situation (crash sensor signal from control unit), the circuit of the solenoid valve is interrupted, and the valve closes automatically.

- **Manual shutoff valve (2)**

For service work or if the natural gas system is leaking, the compressed-gas tanks can be closed with the manual shutoff valve using a suitable tool. It is closed by turning in the clockwise direction.

- **Fuse (3)**

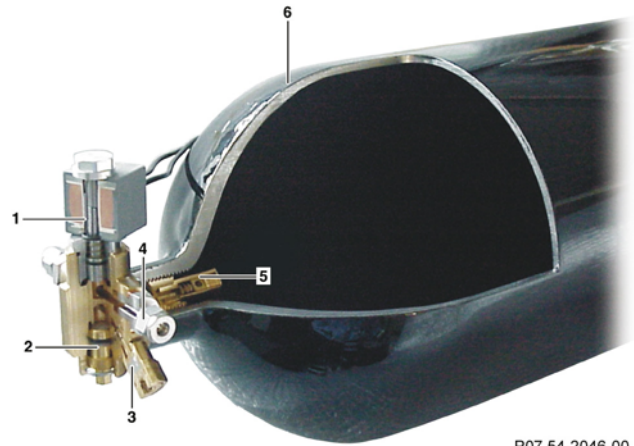
The fuse reacts at temperatures above 110 °C and opens the associated compressed-gas tank. The content can then escape into the atmosphere in a controlled manner via the flow limiter (5).

- **Flow limiter (5)**

If there is a significant pressure drop in the system, e.g. in a crash involving separation of the entire connection fitting or a broken line in the system between the compressed-gas tank and the gas pressure regulator, the flow limiter screwed into the neck of the compressed-gas tank reduces the escaping gas by means of a very small shutter.

- **Rubber caps**

On compressed-gas tanks installed in the interior compartment, the safety fittings are fitted with gas-tight rubber caps. If the fuse (3) blows or gas escapes at the shutoff valves (1, 2), it is collected in the rubber caps and directed into the atmosphere via the connected corrugated tube on the vehicle floor.



P07.54-2046-00

Safety device on compressed-gas tank

- 1 Safety shutoff valve
- 2 Manual shutoff valve
- 3 Fuse
- 4 Threaded connection
- 5 Flow limiter
- 6 High-strength steel cylinder

i Note

Natural gas is a Class C flammable material according to the EN 2 European Standard on "flammable materials of various kinds".

Vehicles with gas drive

Sprinter LGT (Liquefied Gas Technology)

From November 2010 the Sprinter of model series 906 will be available with an engine which can be operated with either liquefied petroleum gas or gasoline.

The following body variants are available in left-hand or right-hand drive versions:

- Cab (FHS/FHL)
- Panel van (FKA)
- Crewbus (FKB)

Note

The Sprinter LGT is equipped with a liquefied petroleum gas system as per ECE-R 67. For this reason the vehicle may only be operated with liquefied petroleum gas or with gasoline, otherwise the engine will be damaged.

Liquefied Gas Technology is a drive technology with an extremely low pollutant emission level on the basis of fossil fuels.

- Reduced CO₂ emissions
- Compliance with the limits for pollutant emissions as per EURO 5 in gasoline and gas operation
- Reduced noise emissions compared to diesel engines

General

- In most regions of Germany there are no restrictions on using LPG-fueled vehicles in multi-level car parks and tunnels. Instructions governed by civil law in multi-level car parks and underground garages, and rules for tunnels, rail transport and ships must be observed.
- The LPG cylinder, the lines, threaded connections and other fittings offer the greatest possible safety in the event of accidents. LPG-fueled vehicles therefore have no disadvantages in terms of accident behavior in comparison with conventionally powered vehicles.
- The installation in the vehicle guarantees that the liquefied petroleum gas cannot enter the interior compartment of the vehicle.
- The risk of fire in LPG-fueled vehicles is no higher than in gasoline or diesel vehicles.
- Liquefied petroleum gas is heavier than air and collects in depressions in the ground/floor.

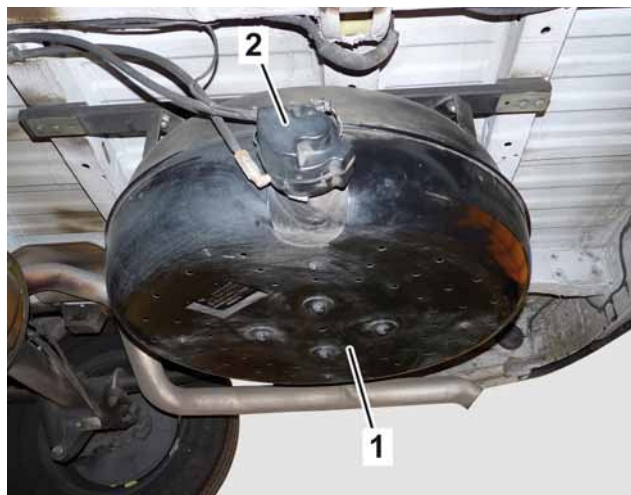
Vehicles with gas drive

Location of the LPG cylinder (Sprinter LGT)

The 95-liter LPG cylinder is mounted behind the rear axle in the vicinity of the spare wheel.

The cylinder is made of steel 3.5 mm thick and is fastened in sturdy, crash-proof brackets.

The LPG cylinder can be closed manually using the manual shutoff valve.



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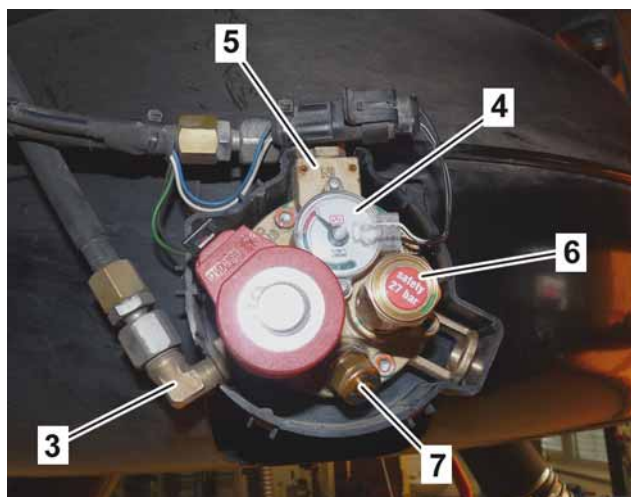
Location of LPG cylinder

- 1 Gas cylinder
- 2 Combination valve with protective cap

Combination valve

On the left side of the LPG cylinder is the combination valve which contains the following components:

- Filler valve
- Electromagnetic gas sampling valve
- Manual shutoff valve
- Fill level indicator
- Overpressure safety valve
- Flow limiter in pressure relief valve



N47.10-2167-00

Combination valve

- 3 Gas sampling valve
- 4 Fill level indicator
- 5 Filler valve
- 6 Overpressure safety valve
- 7 Manual shutoff valve

Vehicles with gas drive

Operational notes

Vans over 3.5 t with natural gas drive are marked at the factory with an adhesive label which is located in the vicinity of the tank cap.

CNG *Compressed Natural Gas*

LPG *Liquefied Petroleum Gas*

These abbreviations denote the fuel type used. The associated model designations LGT and NGT stand for the corresponding drive technology.

In the event of **uncontrolled escape of natural gas** (without fire) the following safety measures should be performed:

- Switch off the engine.
- Move people away from the hazard area.
- Move the vehicle out of buildings/halls if necessary by pushing (do not start the engine).
- Open the vehicle doors, engine hood and trunk luggage cover.
- Seal off and secure a wide area around the hazard area.
- Measure the gas concentration (pay attention to shifting wind direction).
- Allow the gas to escape.
- Provide ventilation (blow the gas away).
- Pay attention to gas pockets (interior, engine compartment, luggage compartment, wheel wells).
- Avoid ignition sources.
- Cool the vehicle if necessary.
- If it is possible to do so safely, close the shutoff device(s) for the tanks.
- The vehicle may only be restarted by specialized workshops with the appropriate expertise.

In the event of fire in a natural gas vehicle:

- Move people away from the hazard area.
- Switch off the engine/ignition if possible.
- Cool the areas of the vehicle affected.
- Cool the surrounding area.

If the gas cylinders have caught fire, action to extinguish the fire should only be taken if it is necessary to save lives or valuable goods. In this case, disperse the natural gas e.g. with fans.



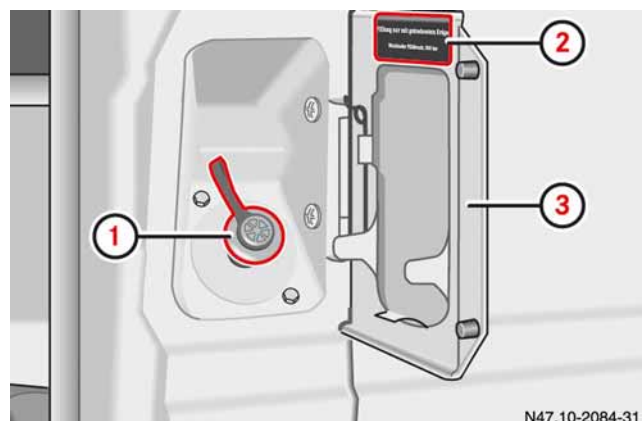
Identification

Sprinter NGT (model series 901 - 906) with natural gas drive



Identification

Sprinter LGT (model series 906) with natural gas drive



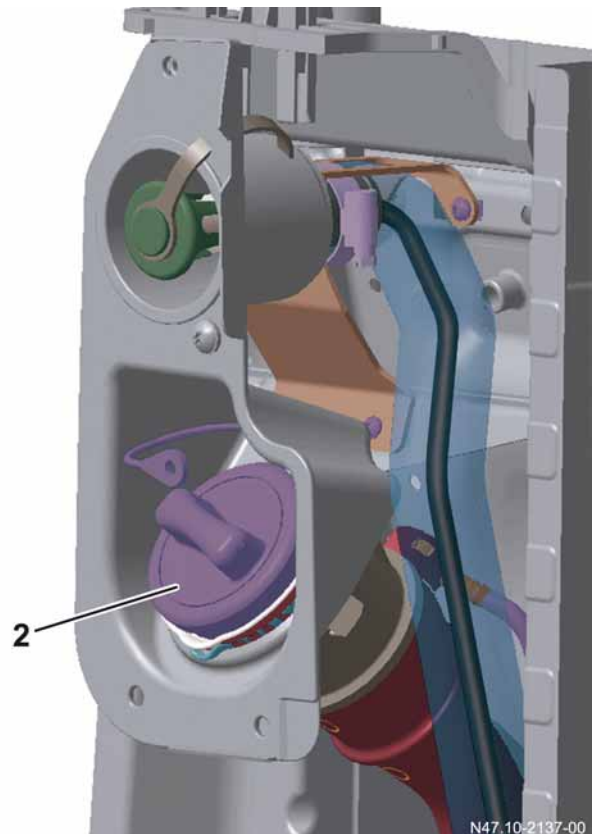
Tank cap

Sprinter (model series 901 - 905) with natural gas drive

- 1 Filler connection (NGV1)
- 2 Adhesive label
- 3 Tank cap

Combined tank recess (model series 906)

The standardized gas filler connection (NGV1) forms the link between the gas filling station and the vehicle system and is located behind the fuel filler flap. The vehicle can only be refueled at special gas filling stations. Refueling is done using a mechanical adapter coupling.



Combined tank recess with fuel filler flap

- 1 Gas filler connection (NGV1)
- 2 Gasoline filler neck

High-voltage systems



Risk of death

New drive technologies (e.g. hybrid or electric drive) mean that lines carrying voltages of up to 500 V are used in some vehicles. For this reason, any work on the vehicle may only be carried out by specially trained technicians.

Particular caution is required at those locations in the vehicle which are associated with voltages up to 500 V, e.g. parts in the engine compartment.

Orange lines and their connectors carry voltages of up to 500 V and must not be, or become, damaged.

You may be seriously or fatally injured if you

- remove covers from components marked with warning labels
- tamper with components of the drive system
- open housings
- separate connectors
- touch components or orange lines of the drive system in accident vehicles
- touch damaged orange lines or their damaged connectors
- touch damaged components of the drive system



Risk of injury

Risk of injury from cables and components carrying high voltage.

Danger of electric shock

All components of the high-voltage system are marked with yellow warning labels alerting you to the high voltage.

The high-voltage cables are orange.

Any work on the vehicle may only be carried out by specially trained technicians.

To avoid injury from electric shock, observe the following instructions:

- **Deactivate the high-voltage circuit.**
- **Do not cut any high-voltage lines!**
- **Avoid cutting or deforming the bodywork with rescue equipment in the vicinity of lines and components carrying high voltage!**
- **Avoid touching damaged orange lines and their damaged connectors!**
- **Avoid touching damaged components of the drive system!**



Protection against the hazards of electrical current:

- All components that operate with high voltage have a contact protection feature, which guarantees effective protection against the hazards of the electrical current.
- All components that operate with high voltage are marked with warning labels (see picture). Cables supplying the components are colored orange for identification.
- Shutdown of the high-voltage on-board electrical system in an accident by triggering of the pyrotechnical isolation element actuated by the restraint systems control unit (crash detection).
- All-pole separation of the energy sources and storage units.
- Deactivation of the generator function of the electrical powerplant and disabling of the DC/DC converter boost function.
- Active discharging of the intermediate circuit capacitors to below a critical value.
- Automatic shutdown in the event of short circuit (software and fuse) to avoid cable overloads.



P08.00-2008-00

Warning labels on components of the high-voltage system

General precautions

- Do not touch any open high-voltage lines (orange cables) at the damaged point
- Do not cut any high-voltage lines (orange cables)
- Do not touch any high-voltage components with damaged or broken housings

High-voltage systems

Procedure for rescue services

- Turn ignition key to OFF position and remove
- Do not operate remote control of locking system
- Secure ignition key so that it cannot be operated inadvertently

Alternatively, if inaccessible:

- Disconnect 12 V battery/batteries

Note

After disconnection of the 12 V battery/batteries, locked doors can no longer be unlocked and electrically adjustable systems, such as the steering wheel or seat adjustment, are deactivated.

Note

Even if no noises are audible from the vehicle, it may spontaneously become operational and active with hazardous high voltages.

For this reason, always remove the ignition key and secure it so that it cannot be operated inadvertently.

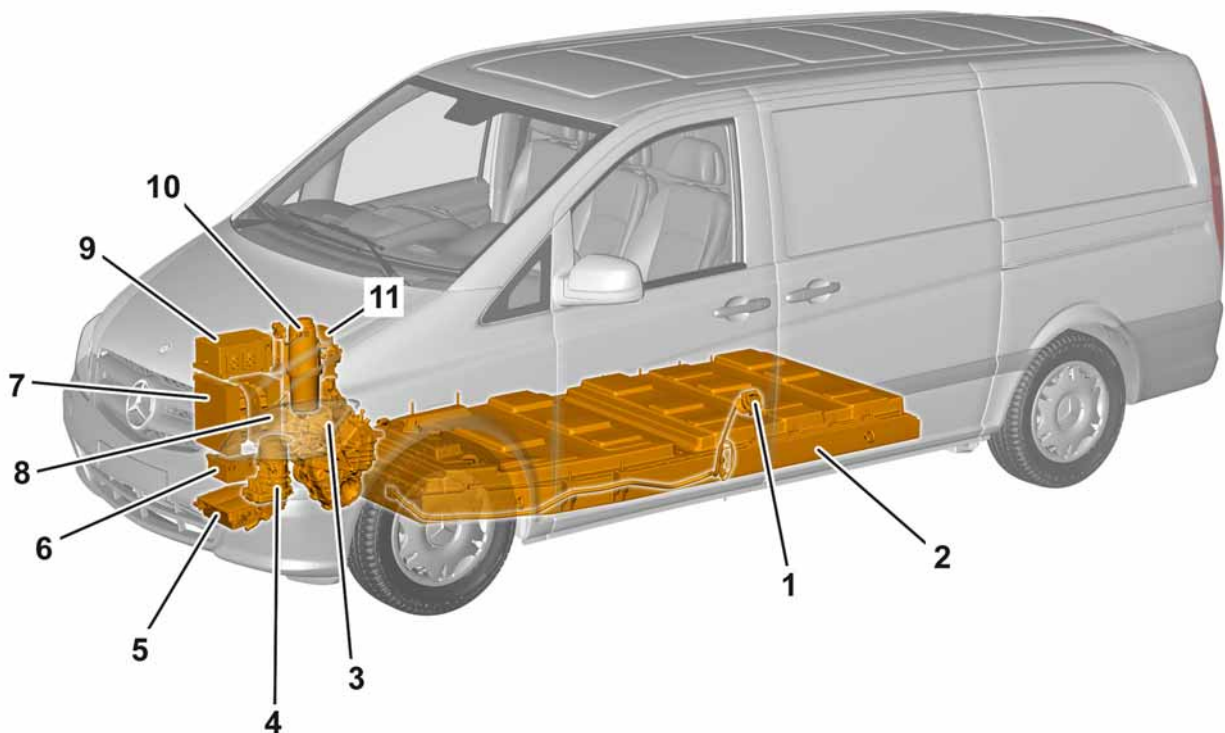
Vito E-Cell (model series 639)

From December 2010 the Vito E-Cell will be available as a panel van with electric drive system. Its main features include:

- 60 kW permanent magnet motor
- Fixed-ratio transmission (1 forward/reverse gear)
- Water-cooled lithium-ion battery

i Note

When working on high-voltage components observe the instructions in the "**High-voltage systems**" chapter (pages 62-64).



N08.00-2022-00

Overview of high-voltage components

- | | | | |
|---|---------------------------------|----|--|
| 1 | Charge socket | 6 | Smart Charge Communication Unit (SCCU) |
| 2 | High-voltage battery | 7 | High-voltage charger 1 |
| 3 | Electric drive | 8 | High-voltage charger 2 |
| 4 | Electrohydraulic power steering | 9 | High-voltage distributor module |
| 5 | DC/DC converter | 10 | High-voltage heater |

Electric drive system

On-board electrical system

The electric drive system and all the electrical consumers and components in the vehicle are supplied with electrical energy according to the situation and present requirements via two on-board electrical systems.

12 V on-board electrical system with 12 V battery

To supply all the 12 V consumers the DC/DC converter transforms high-voltage DC into 12 V DC.

High voltage on-board electrical system with high-voltage battery

The high-voltage battery supplies electrical energy to all the high-voltage consumers. The high-voltage battery is charged by connecting it to an external power source or to the regenerative braking system.

Interlock

The interlock circuit is a failure management system for monitoring the high-voltage system. The high-voltage components contain an integrated active quick discharge feature which discharges the high-voltage system to below 60 V DC within 5 s.

The interlock signal is generated in the battery management system control unit and is transmitted in series via the following components:

- High-voltage charger 1
- High-voltage charger 2
- Electric drive system
- High-voltage heater
- High-voltage distributor module

If the interlock signal is interrupted, the high-voltage system is shut down.

Safety function after an accident:

Shutoff of the high-voltage system

The high-voltage battery is shut off and the high-voltage components are discharged automatically following a:

- head-on collision
- rear end collision
- side collision
- rollover



Important:

After a rear end collision or rollover the high-voltage system is reactivated by turning the ignition key to the "ignition ON" position.

Removing the voltage from the vehicle

Withdrawing the ignition key removes the voltage from the 12 V on-board electrical system and the high-voltage electrical system.

Disconnecting the 12 V battery

The 12 V battery is located in the base of the driver seat. Disconnecting the 12 V battery automatically shuts off the high-voltage on-board electrical system.

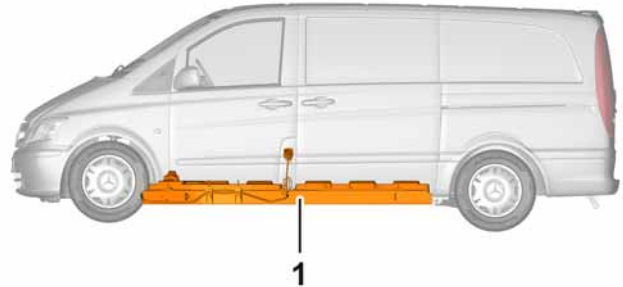


Important:

The high-voltage system is de-energized downstream of the high-voltage battery. The high-voltage battery remains as an energy source at the present voltage. The instructions in the "**High-voltage systems**" chapter (pages 62-64) must be observed even after a power disconnect!

High-voltage battery

The high-voltage battery is a lithium-ion battery, which acts as the energy storage for the electric drive system. The high-voltage battery is connected to the 12 V on-board electrical system via the DC/DC converter. The contactors internally isolate the high-voltage battery from the high-voltage system on the positive and negative sides.



1 High-voltage battery

N54.10-2297-00

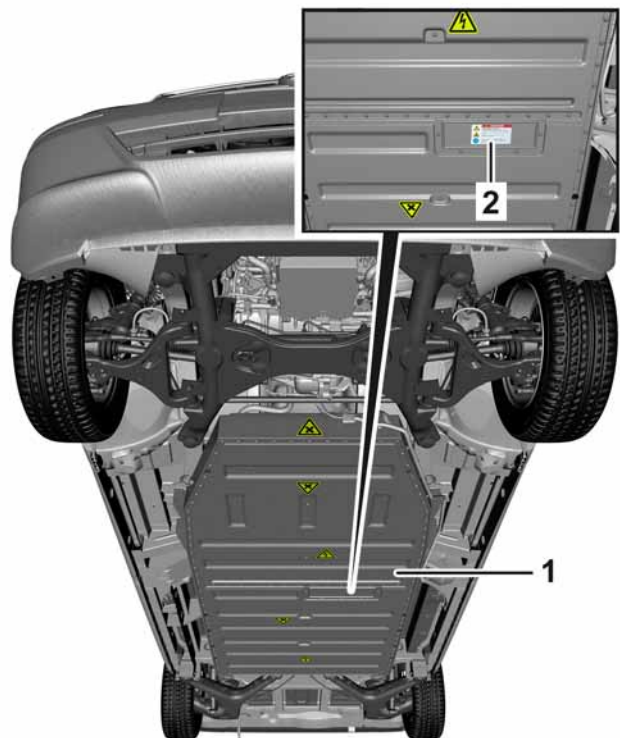
Service Disconnect plug

The Service Disconnect cover is located on the underside of the high-voltage battery.

- Disconnect the 12 V battery
- Unscrew the mounting bolts
- Remove the service cover
- Unplug the Service Disconnect plug

The primary function of the Service Disconnect plug is to allow servicing and modification work to be performed without the risk of electric shock.

The head of rescue operations must decide whether the situation permits the use of the Service Disconnect plug by appropriately trained rescue crews to remove the voltage from the HV system.



Service Disconnect plug

- 1 High-voltage battery
2 Service cover

N54.10-2299-00

General

Location of airbags

Depending on the equipment installed, the airbags in the Mercedes-Benz van model series are located:

- In the steering wheel (driver airbag)
- Above the glove compartment in the instrument panel (front passenger airbag)
- In the outsides of the backrests (front sidebags)
- In the area of the A-pillars and in the side of the roof frame (windowbags)

The location of each airbag can be identified by the SRS AIRBAG or AIRBAG symbol on the airbag or in immediate vicinity of installation location.

The illustrations show the maximum possible equipment.

Location of battery

Depending on the equipment installed, the battery in the Mercedes-Benz van model series is located:

- In the engine compartment
- In the left footwell
- Under the driver seat
- Under the front passenger seat

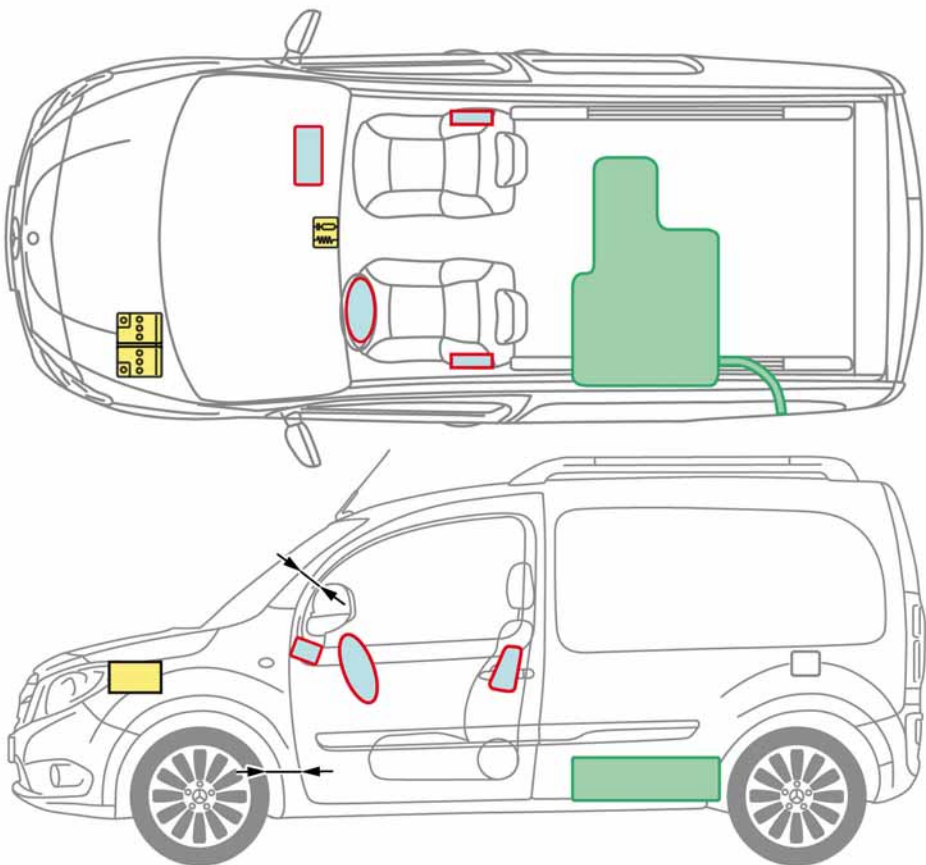
Some vehicle equipment variants are fitted with two batteries. In vehicles with special bodies, batteries may also be installed at other locations in the vehicle.

The illustrations show the maximum possible standard equipment.

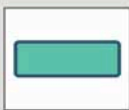
Location of fuel tank:

The fuel tank in the Mercedes-Benz van model series is located in the area under the loading floor or on the side of the vehicle frame.

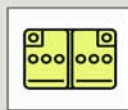
Citan
Panel van
Model 415



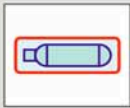
Airbag



Body
reinforcement



Battery



Gas generator



Rollover
protection



High-voltage
components



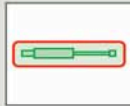
Emergency
tensioning
retractor



Fuel tank



Cutting points



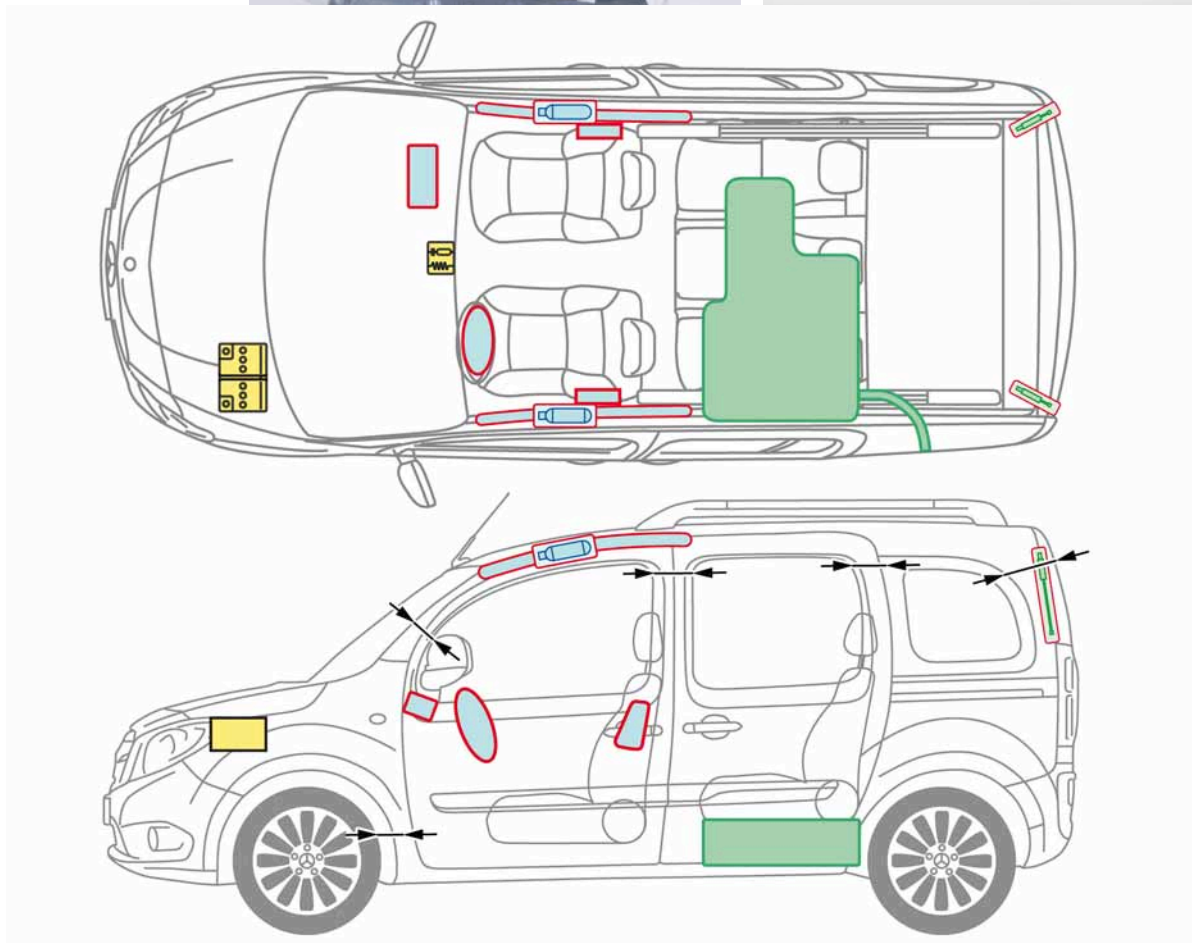
Gas filled
strut



Control unit

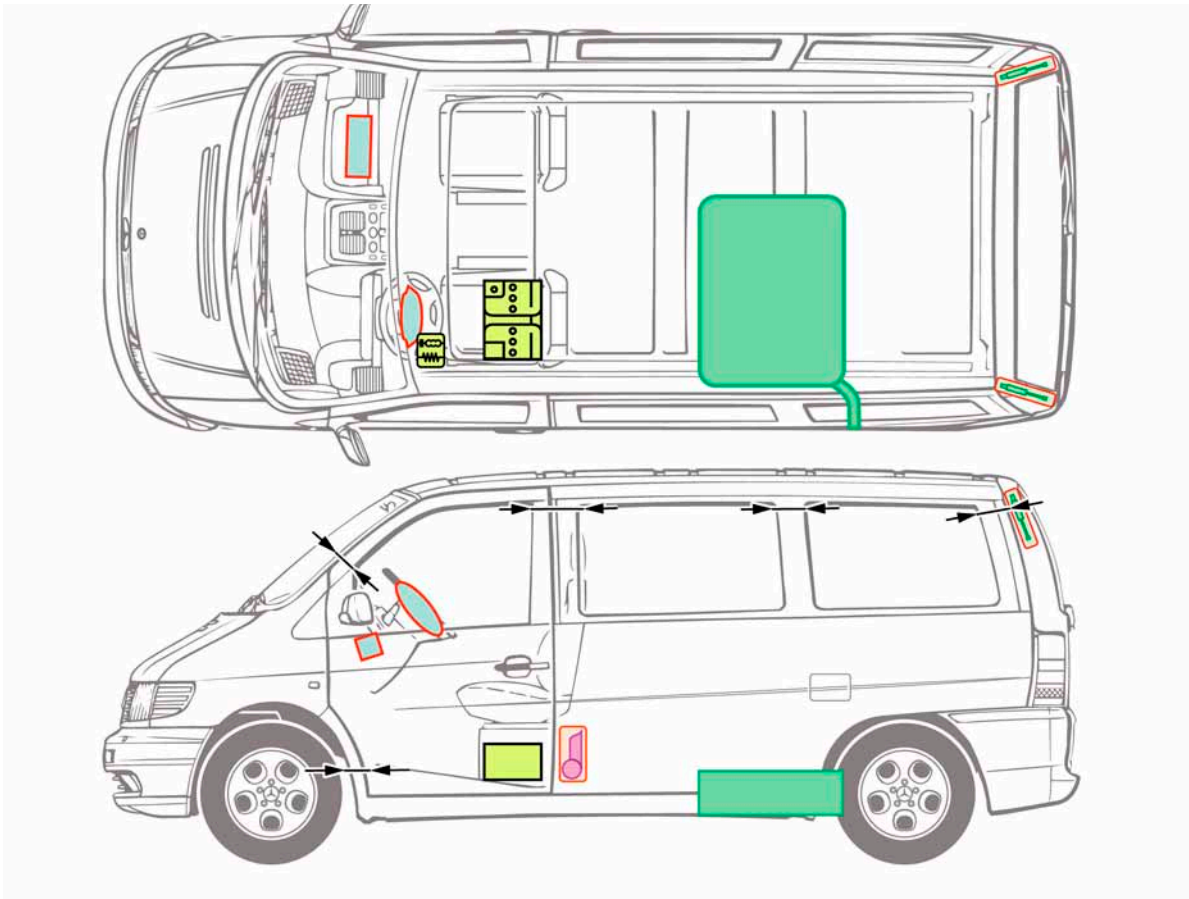
Citan Van (model 415)

Citan
Van
Model 415


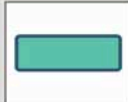
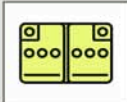







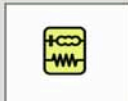


	Airbag		Body reinforcement		Battery
	Gas generator		Rollover protection		High-voltage components
	Emergency tensioning retractor		Fuel tank		Cutting points
	Gas filled strut		Control unit		

Vito (model 638)

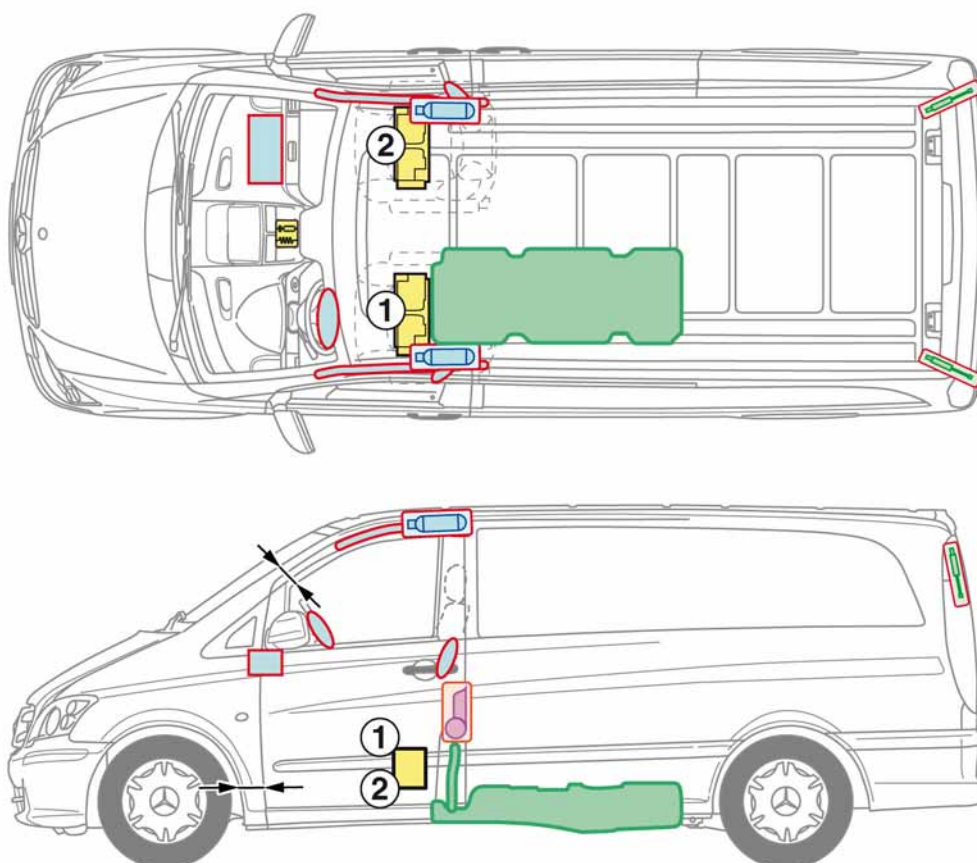


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	Airbag		Body reinforcement		Battery
	Gas generator		Rollover protection		High-voltage components
	Emergency tensioning retractor		Fuel tank		Cutting points
	Gas filled strut		Control unit		

Viano/Vito (model 639)

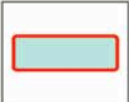
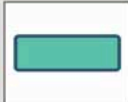
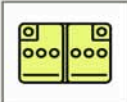
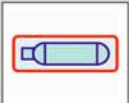






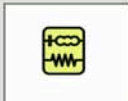
Viano/Vito
(model 639)



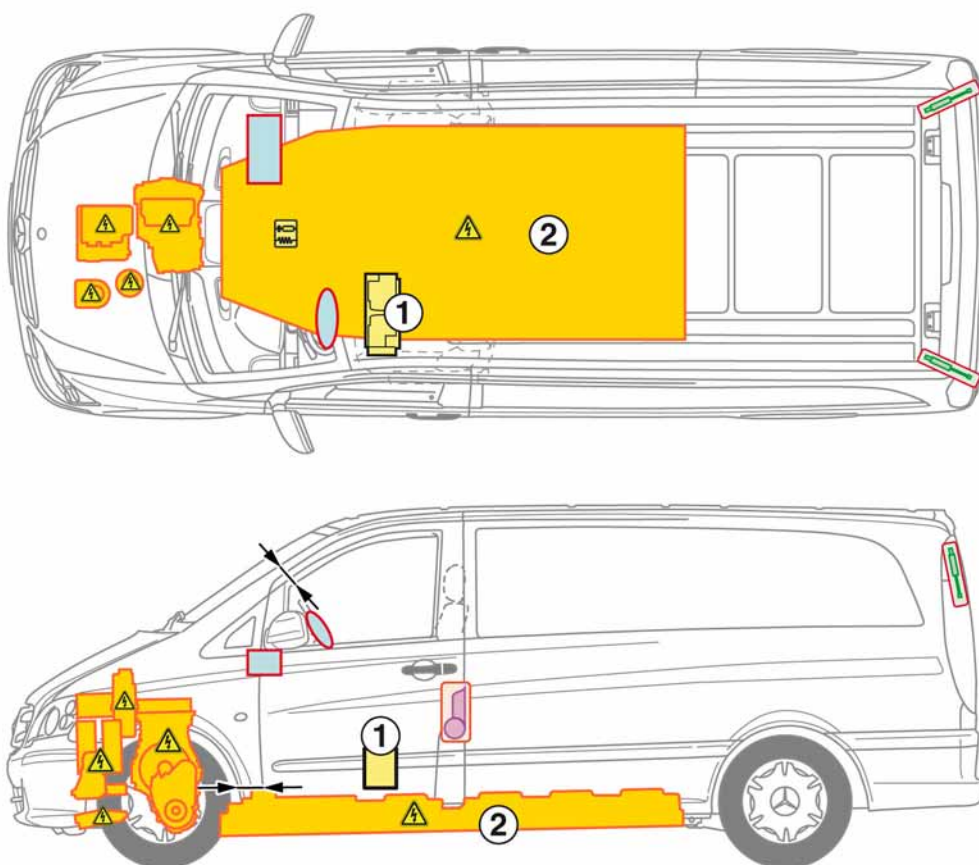
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1 Starter battery (LHD vehicle)
or additional battery (RHD vehicle)

2 Starter battery (RHD vehicle)
or additional battery (LHD vehicle)


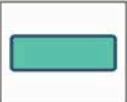
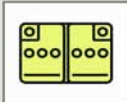
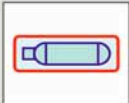







	Airbag		Body reinforcement		Battery
	Gas generator		Rollover protection		High-voltage components
	Emergency tensioning retractor		Fuel tank		Cutting points
	Gas filled strut		Control unit		

Vito E-Cell
(model 639)



N00.00-3367-00

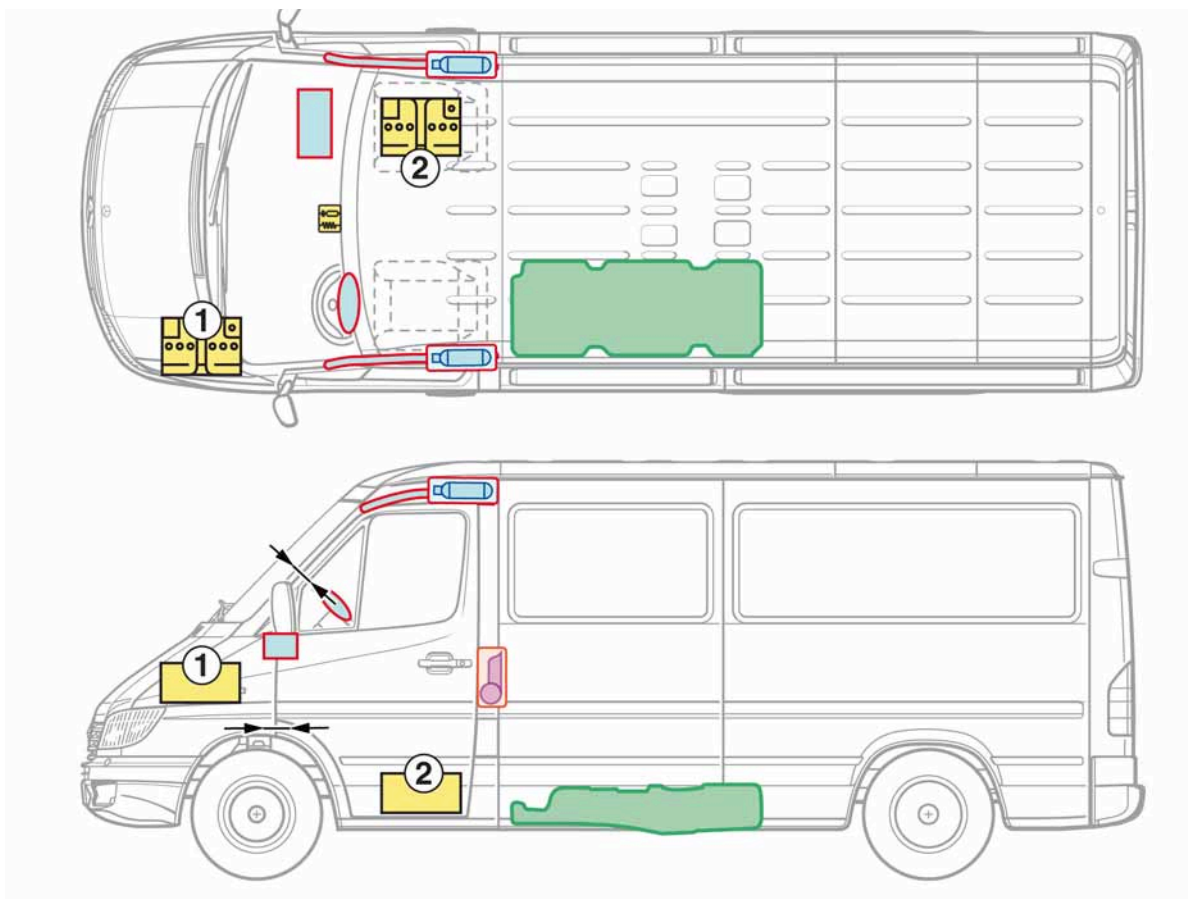
- 1 12 V battery
2 High-voltage battery

	Airbag		Body reinforcement		Battery
	Gas generator		Rollover protection		High-voltage components
	Emergency tensioning retractor		Fuel tank		Cutting points
	Gas filled strut		Control unit		

Sprinter (models 901-905)

Sprinter

(models 901-905)



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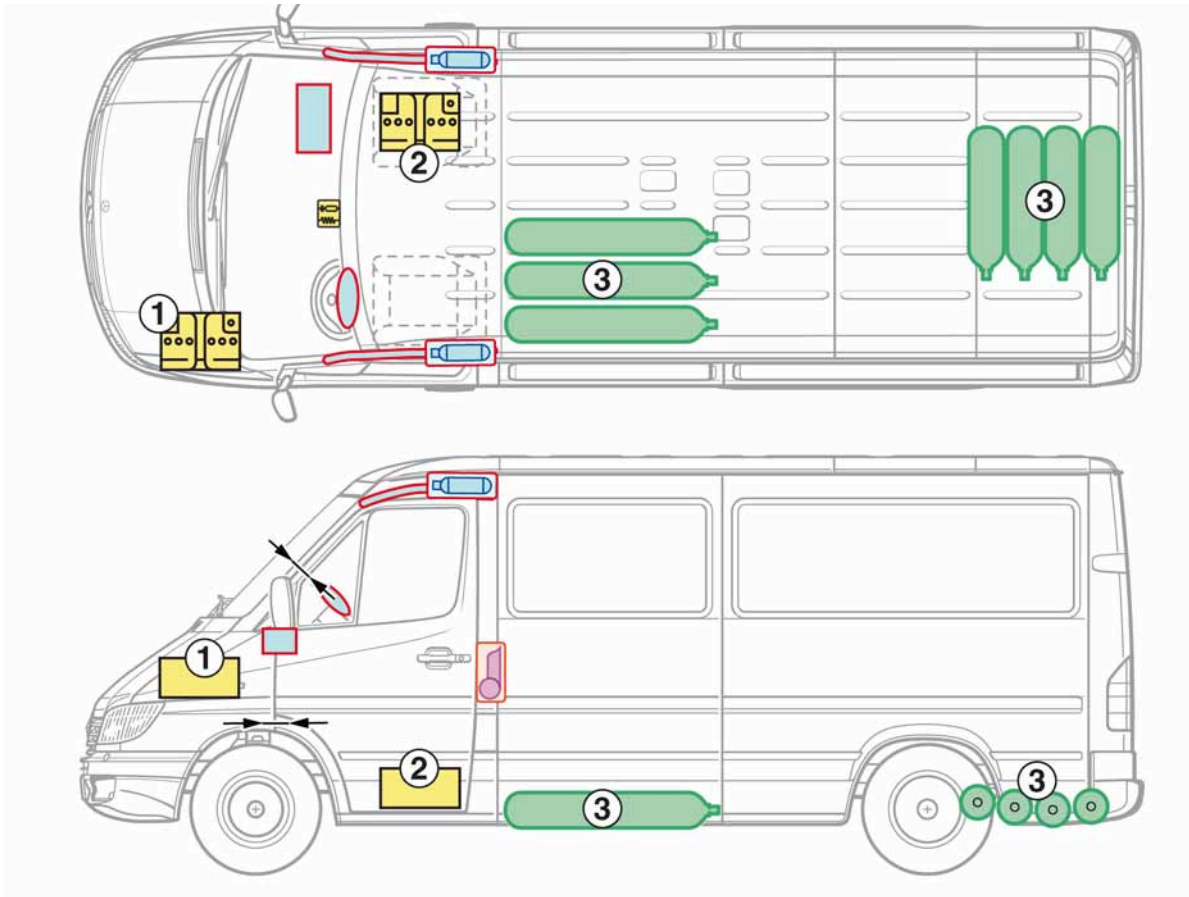
Shown on panel van (valid for all variants)

- 1 Starter battery
- 2 Additional battery

	Airbag		Body reinforcement		Battery
	Gas generator		Rollover protection		High-voltage components
	Emergency tensioning retractor		Fuel tank		Cutting points
	Gas filled strut		Control unit		

Sprinter NGT

(models 901-905)

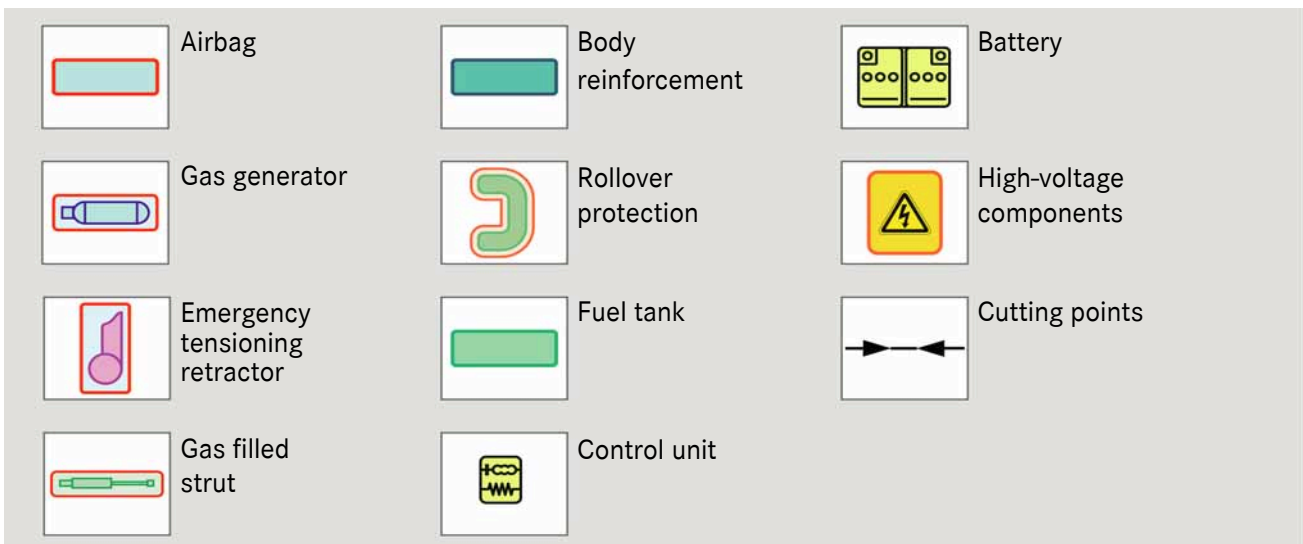


N00.00-3371-00

Shown on panel van (for all variants see page 55)

- 1 Starter battery
- 2 Additional battery

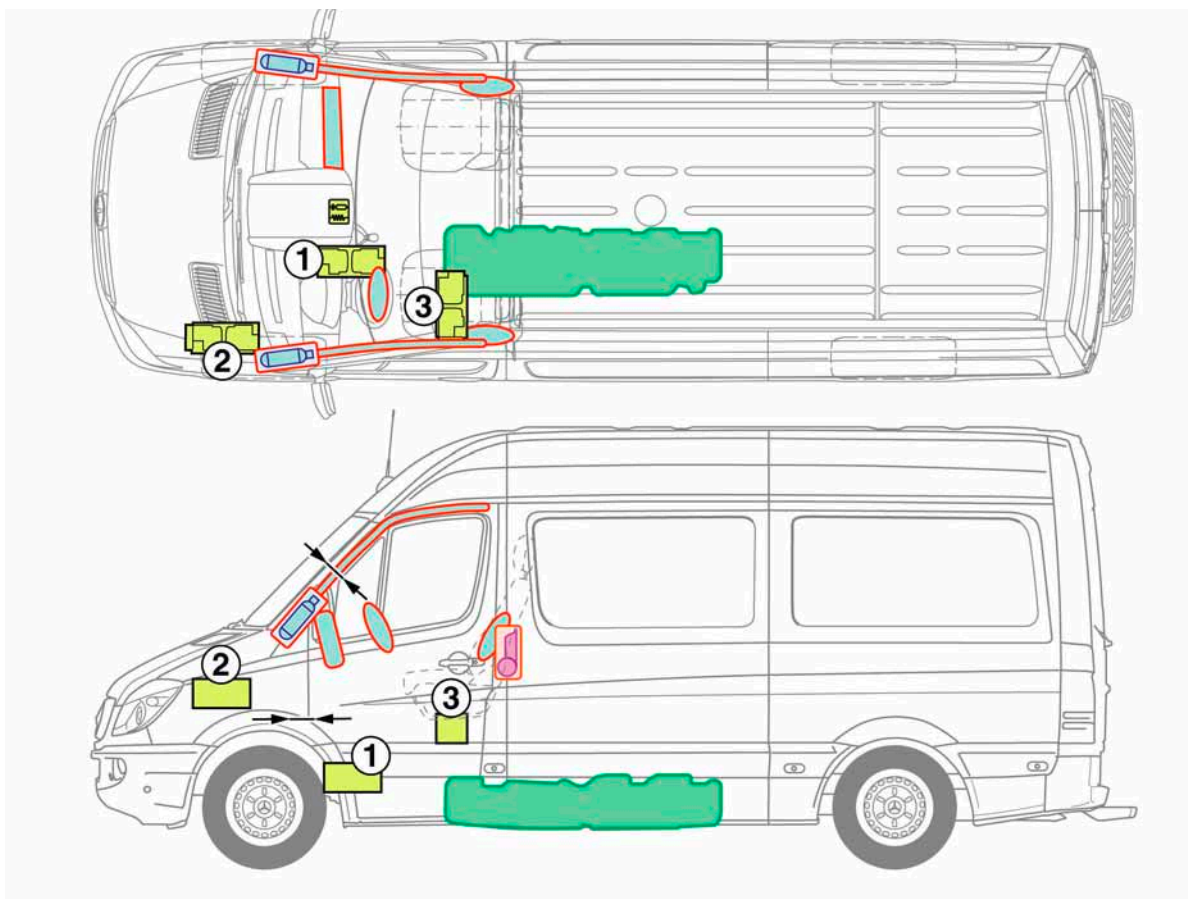
3 Gas cylinder



Sprinter (model 906)

Sprinter

(model 906)



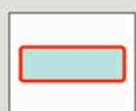
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Shown on panel van (valid for all variants)

1 Starter battery

2 Additional battery (LHD vehicle)

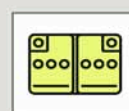
3 Additional battery (RHD vehicle)



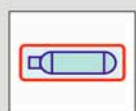
Airbag



Body reinforcement



Battery



Gas generator



Rollover protection



High-voltage components



Emergency tensioning retractor



Fuel tank



Cutting points

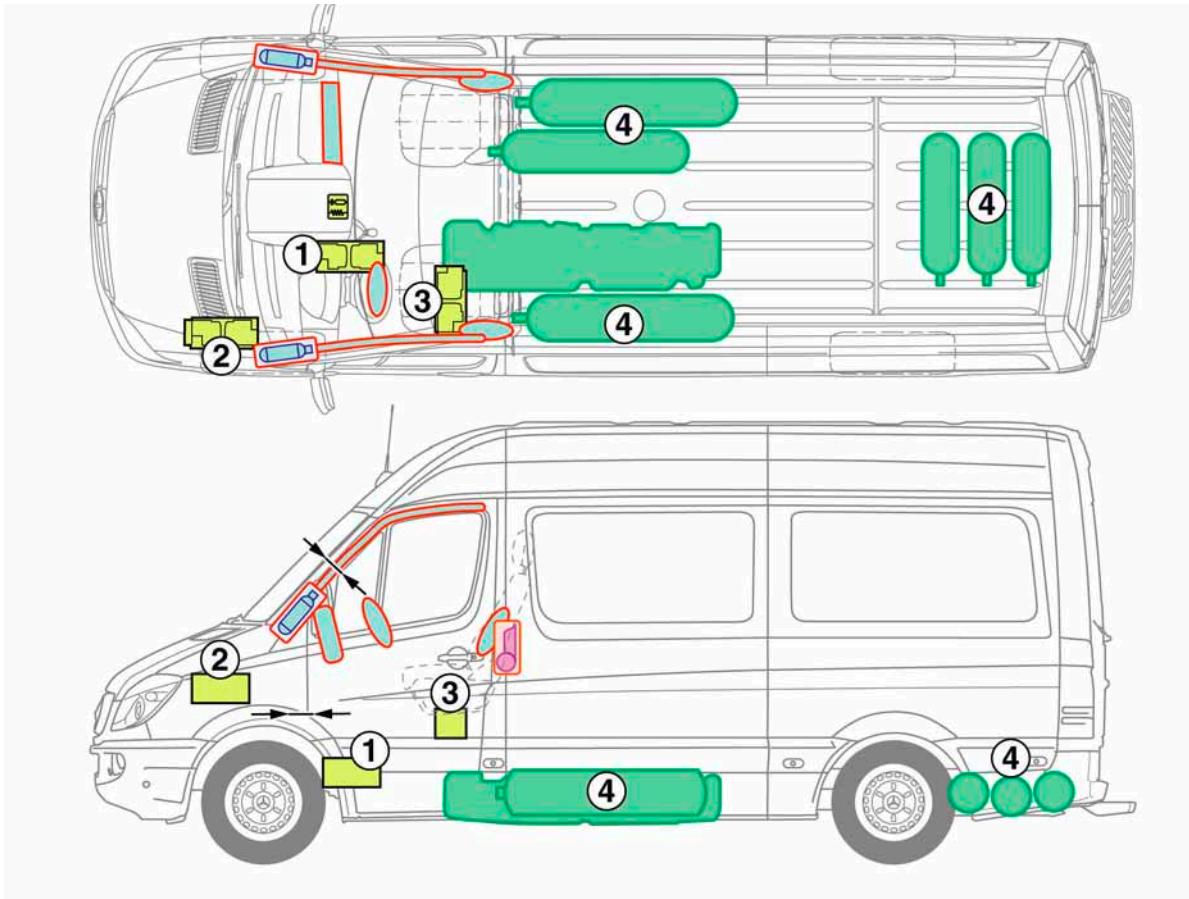


Gas filled strut



Control unit

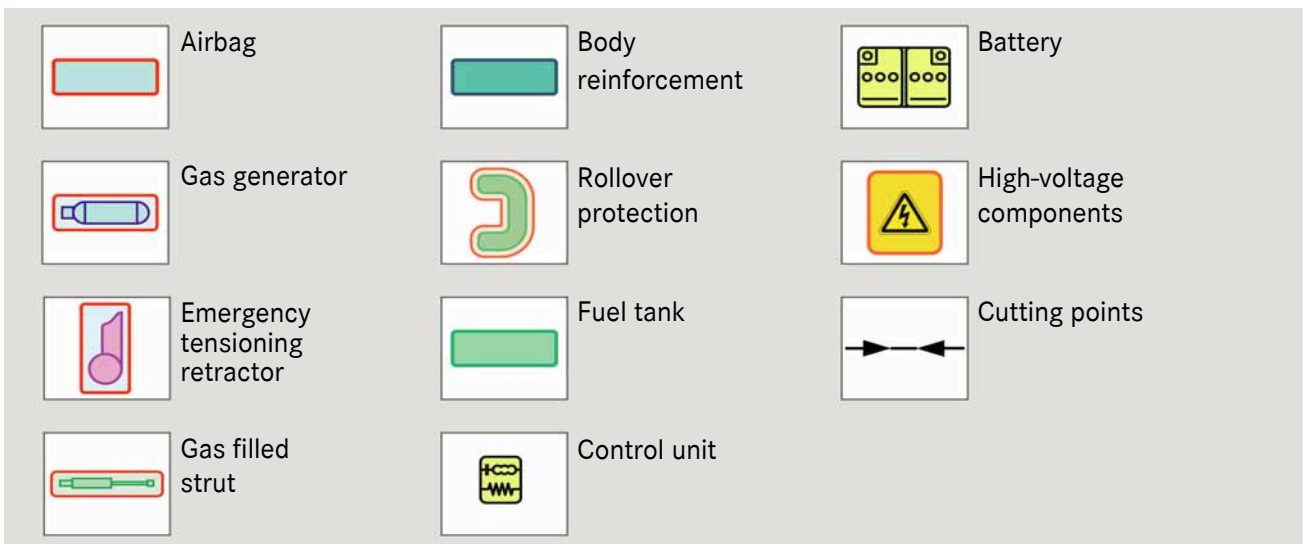
Sprinter NGT (model 906)



N00.00-3372-00

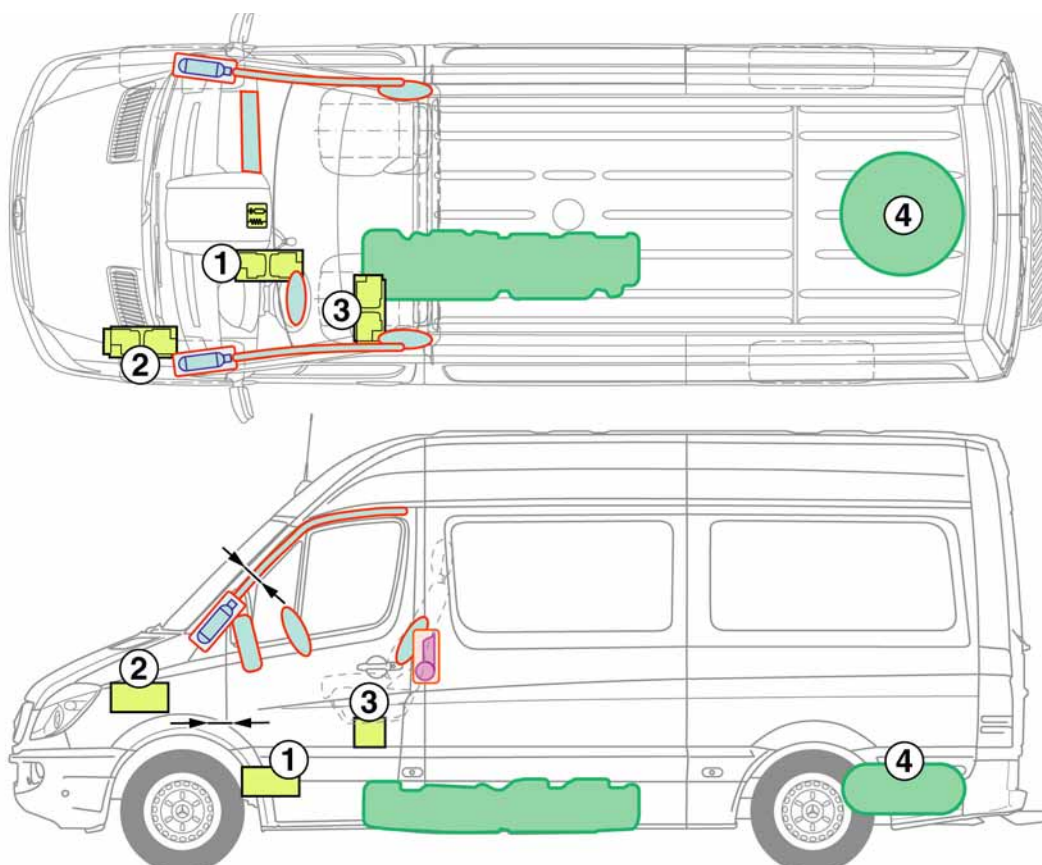
- 1 Starter battery
2 Additional battery (LHD vehicle)

- 3 Additional battery (RHD vehicle)
4 Gas reservoir



Sprinter LGT (model 906)

Sprinter LGT (model 906)



N00.00-3369-00

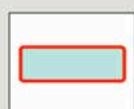
Shown on panel van (valid for all variants)

1 Starter battery

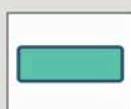
2 Additional battery (LHD vehicle)

3 Additional battery (RHD vehicle)

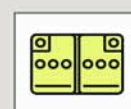
4 Gas cylinder



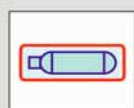
Airbag



Body
reinforcement



Battery



Gas generator



Rollover
protection



High-voltage
components



Emergency
tensioning
retractor



Fuel tank



Cutting points



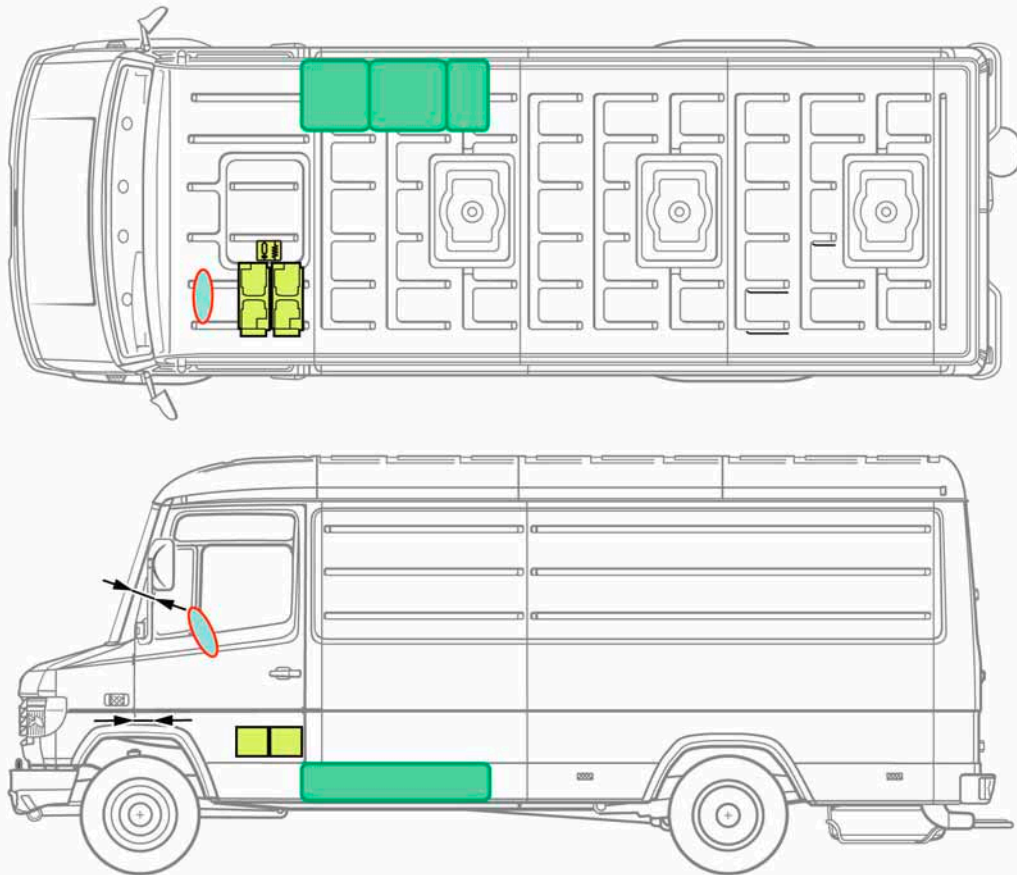
Gas filled
strut



Control unit

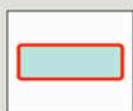
Vario

(models 667-670)

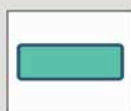


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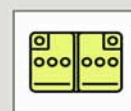
Shown on panel van (valid for all variants)



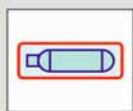
Airbag



Body reinforcement



Battery



Gas generator



Rollover protection



High-voltage components



Emergency tensioning retractor



Fuel tank



Cutting points



Gas filled strut



Control unit

List of abbreviations

ABS

Anti-lock braking system

ASR

Acceleration skid control

BAS

Brake Assist System

CNG

Compressed natural gas

ESG

Single-pane safety glass

ESP

Electronic Stability Program

LGT

Liquefied Gas Technology

LPG

Liquefied petroleum gas

NGT

Natural-Gas Technology

SRS

Supplemental Restraint System

VSG

Laminated safety glass

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