




The Hybrid

Volkswagen offers a Touareg with a hybrid engine (the Volkswagen Touareg Hybrid). Vehicles with a hybrid engine are different than conventional vehicles.

This is very important for emergency response personnel.





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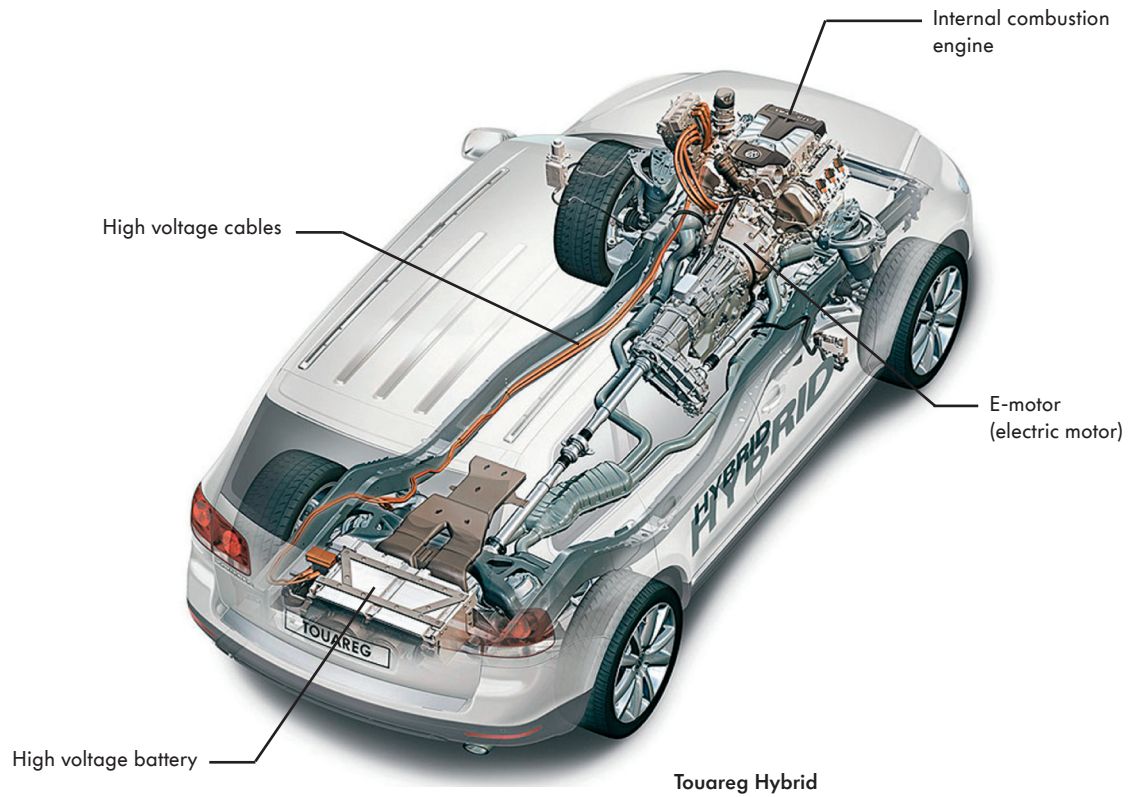
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A hybrid vehicle has an internal combustion engine and electric motor that is supplied with electricity by a high voltage battery. The electric motor functions as a 12V starter and generator and makes it possible for the vehicle to run on electricity (E-drive). It supports the internal combustion engine when accelerating, and works like a generator when braking in order to charge the high voltage battery (recuperation).

The high voltage battery is charged exclusively by the electric motor. Since the internal combustion engine does not run when driving with electricity, other engine components such as the coolant pump are operated by electricity, and are supplied with voltage from the 12V vehicle electrical system. The high voltage battery supplies voltage to the A/C compressor, one of several high voltage components.



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When does the hybrid work?

The Volkswagen Touareg Hybrid is based on a parallel hybrid engine whereby the internal combustion engine and the electric motor work together to drive the vehicle.

Since the electric motor functions as a 12V generator and a 12V starter, these components are not on the vehicle. At the same time, components in a conventional vehicle that are driven by the internal combustion engine must be powered with electricity, for example, oil and coolant pumps or the steering.

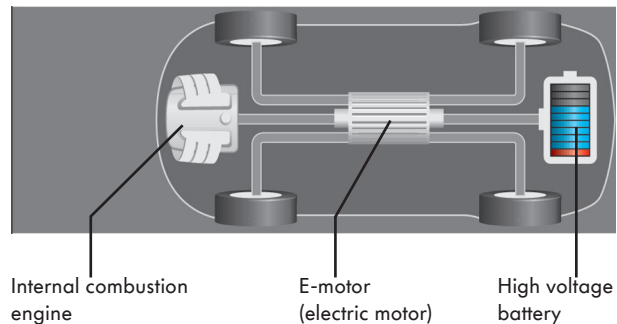
The Touareg Hybrid works:

- when the vehicle is stationary
- when driving in electric driving mode
- when driving using the internal combustion engine
- when using E-Boost
- when using brake recovery

The following illustrations explain each mode.

Vehicle is Stationary

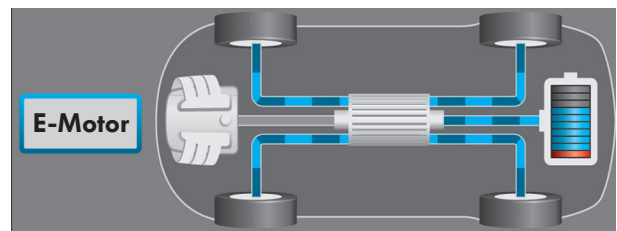
- The internal combustion engine is not running.
- The high voltage battery supplies the vehicle (for example, the A/C system) with electricity.



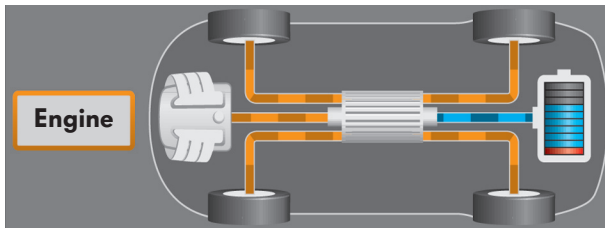
Hybrid vehicle in idle

Electric Driving Mode

- The internal combustion engine is not running.
- The electric motor drives the vehicle.



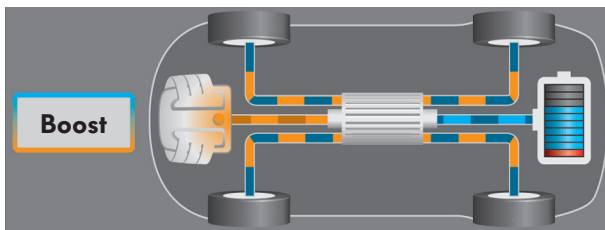
Hybrid vehicle when E-driving (driving electrically)



Hybrid vehicle driving using the internal combustion engine

Driving using the internal combustion engine

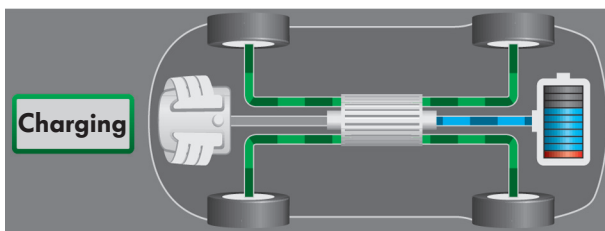
- The internal combustion engine drives the vehicle.
- The high voltage battery is being charged (depending on the state of charge). This results in the engine working most optimally.



Hybrid vehicle using E-boost

E-Boost

- When the load requirement is very high, the electric motor supports the internal combustion engine.
- The torque and power of the internal combustion engine and the electric motor are added together for a short period.



Hybrid vehicle in brake recuperation

Brake Recovery

- The internal combustion engine turns off.
- The electric motor, which is working as the generator, converts the braking energy into electric energy, which is then stored in the high voltage battery.

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- i** The electric components in the vehicle, such as the power electronics, the E-motor, the high voltage battery and the electric A/C compressor, work in voltage ranges above 25V alternating current and 60V direct current. Since the voltage exceeds the usual 12V electrical system voltage on a conventional vehicle, the term “High Voltage” (HV) is used for these vehicles.

! DANGER!

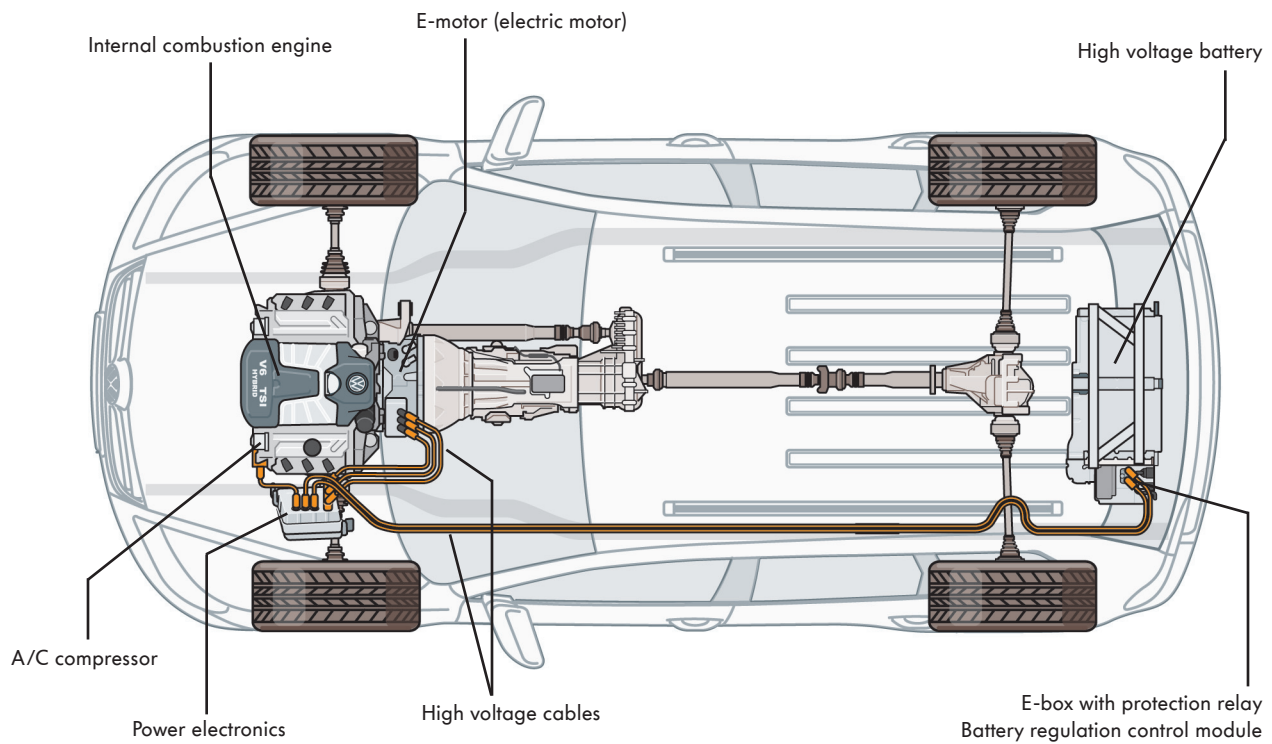
The vehicle’s high voltage electrical system and high voltage battery are dangerous and can cause burns, other serious personal injuries, electrocution, and death. Never touch or let jewelry or other metal objects contact high voltage cables or the high voltage battery and battery poles, especially if the cables, battery, and battery poles have been damaged in any way.

- Never do any work yourself on the high voltage electrical system, the orange-colored high voltage wiring, or on the high voltage battery. Never open, service, repair, or disconnect any part of the hybrid electrical system. Always have work on the hybrid electrical system and systems that could be indirectly affected by it done by qualified, trained technicians who have the know-how, experience, documentation, and tools to do the work safely.
- Never open or remove the orange-colored cover on the high voltage battery.
- Never damage the orange-colored high voltage cables. Never remove them and never disconnect them from the high voltage electrical system.
- All work on the high voltage electrical system and the high voltage battery must be done in compliance with Volkswagen standards and guidelines.

High Voltage Components

The high voltage system on the Touareg can cause serious physical injury and even death to a person who is not trained to work on this system. The Touareg Hybrid offers a comprehensive safety concept, which covers the following components of the high voltage system:

- the electric motor
- the power electronics
- the high voltage cables
- the A/C compressor and
- the high voltage battery with E-box



Hybrid high voltage components

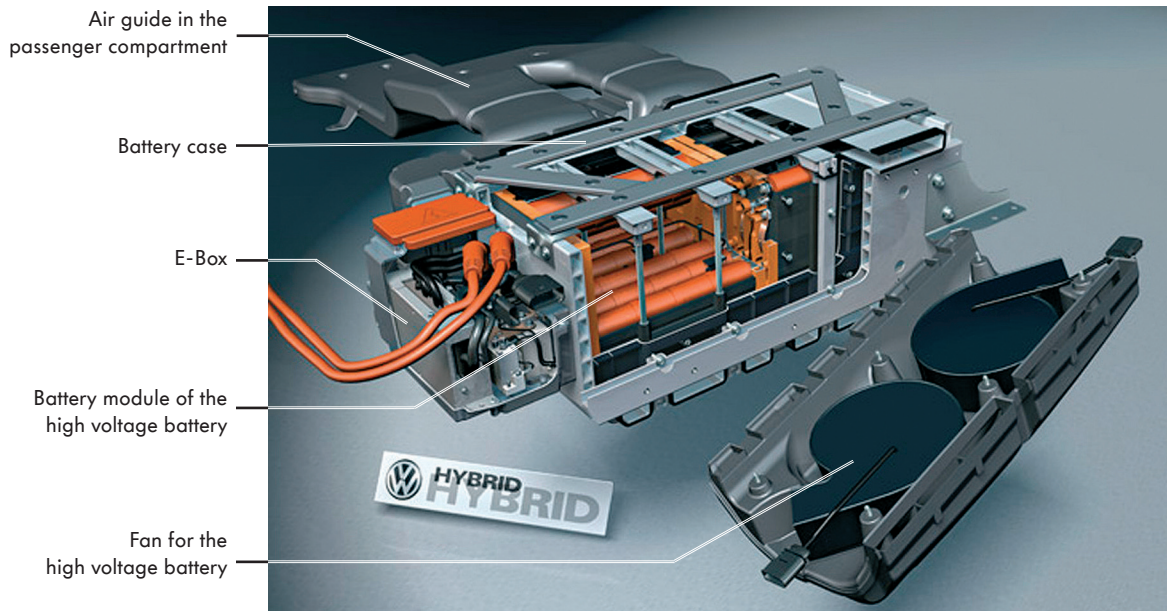
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The High Voltage Battery

The high voltage battery is a nickel-metal hydride battery (NiMH) and is installed inside the luggage compartment under the cargo floor. The high voltage battery is made up of 240 battery cells in a series, that are connected together in a module of 4 cells. The electrolyte is a potassium hydroxide solution (potash) inside the battery cells in small quantities. Small amounts of electrolyte can leak out of the battery cells if they are damaged. The high voltage battery provides a nominal voltage of 288 volts.

The high voltage battery has its own cooling system which takes air from the passenger compartment under the rear seat bench and guides it over the battery cells. The warmed-up air is guided to vent openings in the vehicle body.

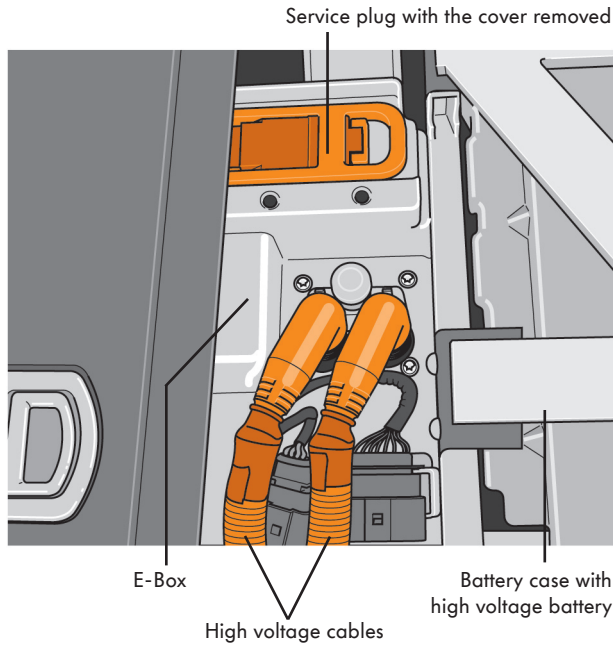
In the case of an accident, the high voltage battery is protected by a battery case. The battery case helps to deflect the energy of impact to the vehicle frame.



Touareg Hybrid high voltage battery

i In addition to the high voltage battery, the Volkswagen Touareg Hybrid also has a standard 12V automobile battery.

E-Box



E-box inside the luggage compartment next to the high voltage battery

The connection/conjunction box and the E-box are located to the left of the high voltage battery. These connect the high voltage battery to the high voltage system. The E-box contains the safety systems for the high voltage system, and the monitoring system for the high voltage battery. The service plug is located under an orange cover.

Both battery terminals have a protection relay, which is closed for using the high voltage system. In the case of an accident where the airbag and/or seat belt tensioner has deployed, the protection relay opens and the high voltage system discharges. The high voltage connections on the high voltage system are then disabled.

High Voltage Cables

The high voltage cables connect the high voltage battery in the back of the vehicle to the other high voltage components inside the engine compartment, and connect these components to each other (for example, power electronics, the electric generator, and the A/C compressor). The cables are routed under the floor panel, as well as around the high voltage components inside the engine compartment.

All high voltage cables have an orange jacket around them and have an additional cover to help protect them from getting damaged.

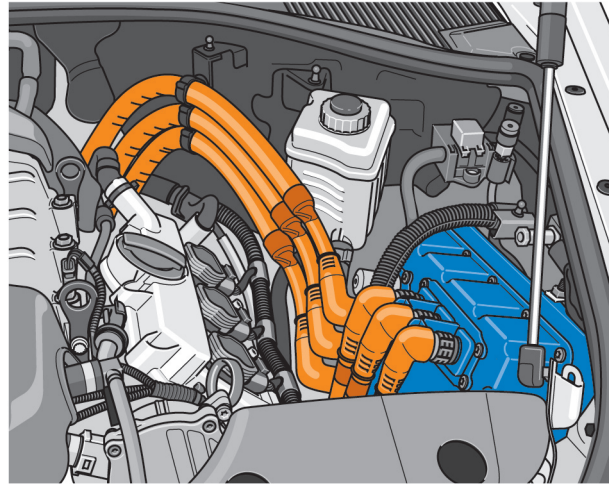
In contrast to the 12V vehicle electrical system, the high voltage system does not have a body ground cable.

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The Power Electronics

The power electronics are located inside the engine compartment under a cover.

In addition to having other functions, the power electronics convert the energy from the electric drive. They convert the alternating current from the E-generator into direct current for the high voltage battery, as well as high voltage current into a 12V direct current for the 12V vehicle electrical system.



Power electronics and high voltage cables with the cover removed

High Voltage Safety

The high voltage system can cause serious personal injury and even death to persons who are not trained to work on such systems. Therefore, the vehicle has a comprehensive safety system. Only specially trained technicians are permitted to repair, perform maintenance on and service high voltage components, including the orange high voltage cables. **Technicians who do not have the special training are not permitted to work on the system.**

Warning Symbols

All high voltage components are identified with specific warning label stickers. The high voltage cables are excluded from this.

There are two types of warning label stickers.

- a yellow warning sticker with the warning symbol for voltage
- a warning sticker with the word "DANGER" written in white letters against a red background.

The yellow stickers indicate high voltage components that are installed near the sticker or are hidden by a cover. The "DANGER" sticker is located directly on the high voltage component.



Warning label sticker on the high voltage components



Warning label sticker on the plastic carrier inside the engine compartment



Warning label sticker on the high voltage battery

Additional information regarding high voltage safety

- The high voltage battery is located under the cargo floor in the luggage compartment inside a battery case.
All high voltage cables have orange insulation as well as additional covers and tubing to help protect them.
- The high voltage battery has a positive and negative terminal, a protection relay, which is “on” when the vehicle is being driven, that is, when the ignition is “on.”
- The orange service plug is near the high voltage battery. **The plug is to be used only for repairing, servicing and performing maintenance work.**
- The high voltage system **discharges** its power in the event of an accident or any malfunction of the system. Such a discharge of power from the high voltage system takes approximately 20 seconds.
- The high voltage system is galvanically isolated from the vehicle.
- All connections (connectors, contacts) on the high voltage components are touch-safe.
- A fuse in the service plug serves as an **over-current protective device**. When the fuse is triggered, the voltage is interrupted.
- The **isolation resistance** of the high voltage system is monitored periodically. If there is a malfunction, a warning message will appear in the instrument cluster, a yellow indicator lamp will come on and a warning signal will sound.

The high voltage system turns off when:

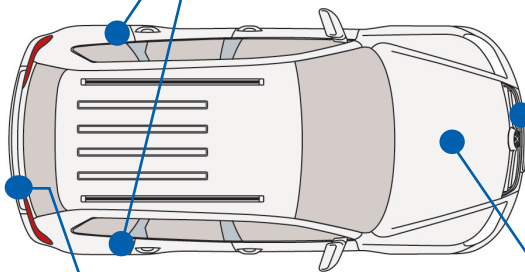
- the ignition is turned off, or
- an accident is detected, the airbags and/or the seat belt tensioners are deployed or
- the 12V connector on the high voltage battery E-box under the cargo floor is disconnected or
- disconnecting the 12V connector from the E-box deactivates the high voltage system only. The 12V vehicle electrical system provides the safety features, such as airbags or seat belt tensioners, with voltage.

Vehicle Identification

The Touareg Hybrid has a “Hybrid” name plate. It is located:

- on the rear lid
- in the radiator grille
- on the engine cover
- on the chrome strips on the rear doors near the rear wheels
- on the ashtray cover in front of the shifter

Examples for identifying the Touareg Hybrid



Important Information


In case there is a system malfunction (due to an accident, vehicle fire) on a Touareg V6 TSI Hybrid, the emergency response personnel must do the following:




- Identify the type of engine (refer to the chapter “Vehicle Identification”)
- Secure the vehicle from rolling away
- Turn off the engine
- Proceed with caution

WARNING

The high voltage hybrid electrical system is dangerous and can cause burns, other serious personal injuries, electrocution and death.

- **Never open, service, repair, or disconnect the high voltage hybrid battery.**
- **Never touch or let jewelry or other metal objects contact high voltage cables or the high voltage battery and battery poles, especially if the cables, battery or battery poles have been damaged in a crash or in some other way.**
- **Always have work on the hybrid electrical system and on systems that could be indirectly affected by it done by qualified, trained technicians, who have the know-how, experience, documentation, and tools to do the work safely.**

 **The location of the relevant components of the high voltage system can be found on the Emergency Data Sheet. The following is explained on the Emergency Data Sheet:**

	High voltage battery		High voltage components
	High voltage disconnection point High voltage cable		

Secure the vehicle from rolling away

If the vehicle is being powered by the electric motor, the system readiness cannot be recognized by sounds. The electric motor is silent when the vehicle is in idle.

! DANGER!

The vehicle can be driven even if there are no sounds coming from the engine.

! DANGER!

The internal combustion engine can start by itself when in "P" or "N" depending on charge of the high voltage battery.



Switch for setting the parking brake

The emergency response personnel should:

- Place wedges under the wheels
- Move the selector lever into "P"
- Set the parking brake (electronic parking brake)

Selector lever and parking brake inside the center console

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Turn off the engine and deactivate the high voltage system

(If the ignition and 12V battery are accessible)

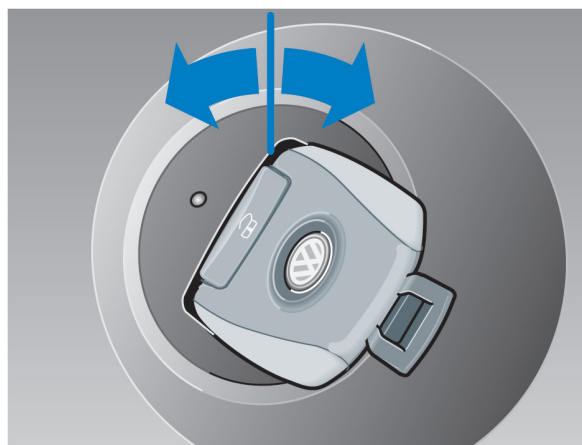
i If the airbag control module detects an accident, the high voltage system switches off.

To make sure the motor and the safety systems are deactivated, the emergency response personnel should do the following:

Turn off the vehicle using the vehicle key:

- With the engine running, turn the key to the left or to the right from the neutral position. The key will spring back by itself into the neutral position and can then be pulled out. The high voltage system is deactivated and the voltage supply to the airbag control module is cut off.

i The key for starting the engine or turning it off can be turned to the left or to the right.



Conventional key

If the engine is "OFF", turning the key to the right or to the left will turn the ignition on.

If the engine is running, turning the key to the right or to the left will turn the ignition off.

Deactivating vehicles with the lock-and-start system without using the key (KESY = keyless entry system):

- Press the Stop/Start button to the second detent. The high voltage system is deactivated, and the voltage supply to the airbag control module is cut off.

! DANGER!

It is possible to start the motor and the internal combustion engine again if the key remains within the KESY effective range.

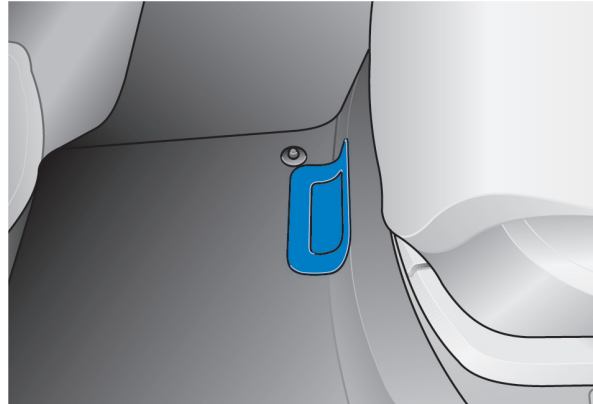


Start/Stop knob in the center console

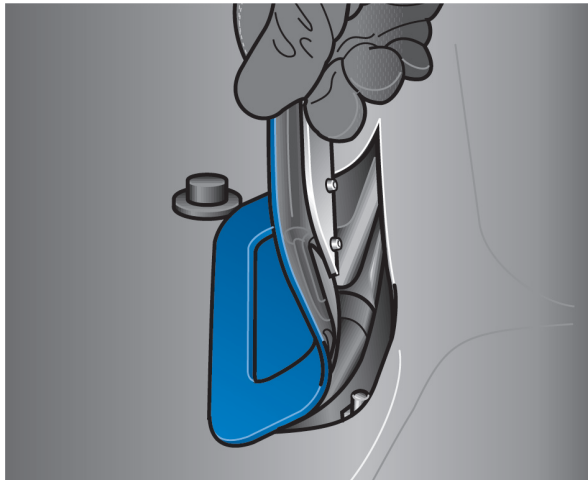


Disconnect the 12V battery

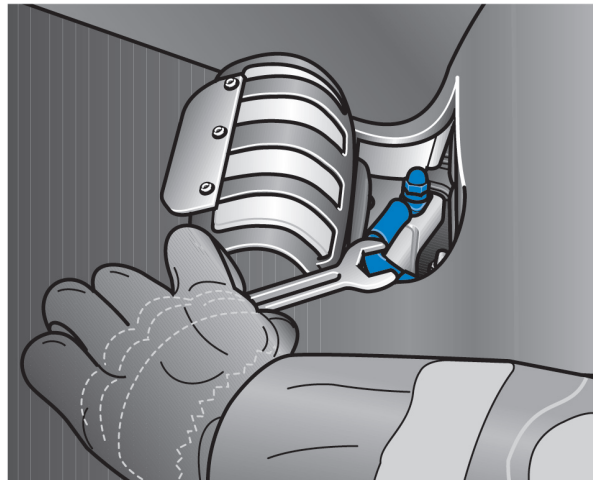
- Disconnect the 12V battery ground cable using the access flap in the floor panel in front of the driver seat.
This will prevent short circuits when using jaws of life (danger of deploying the airbag).



Cover flap for disconnecting the 12V battery in the floor panel in front of the driver seat.




Opening the cover flap



Disconnecting the ground cable at the threaded connection with a wrench.

WARNING

Failure to disconnect the battery could result in airbag deployment and possible injury.

 The high voltage system and the safety systems switch off only when the ignition is turned off AND the 12V battery is disconnected. Just disconnecting the 12V battery (without turning off the ignition) does not deactivate the high voltage system, nor the safety systems when the Hybrid system is on.



THE HYBRID

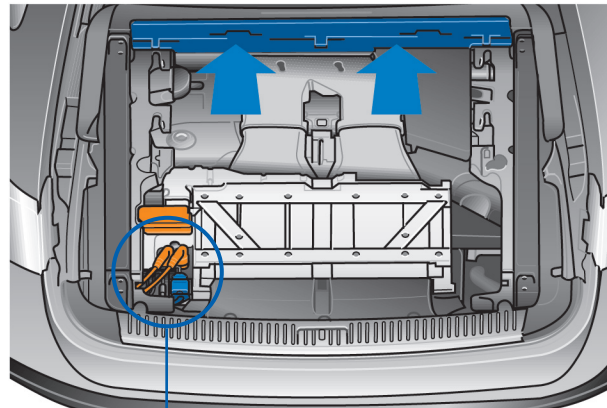
Deactivate the high voltage system

(Alternative method: If the Ignition and 12V battery are NOT accessible)

If access to the ignition lock and to the 12V battery is not possible, then the high voltage system can be deactivated by the 12V connector on the E-box inside the luggage compartment.

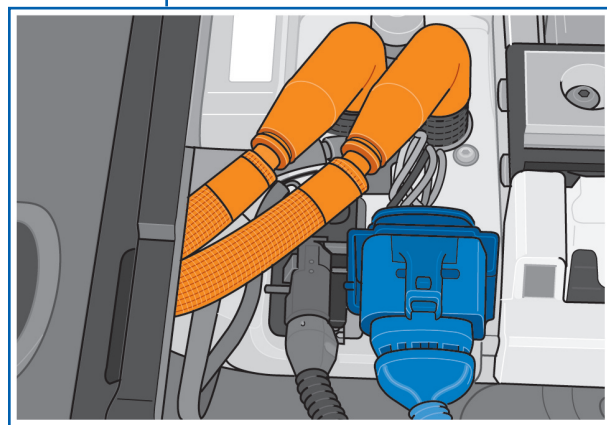
Locate the separating point

- Fold up the luggage compartment floor and find the 12V connector on the E-box on the left side of the high voltage battery.



Disconnect the connector

- This will deactivate the high voltage system only.



12V connector on the E-box shown in blue

i Disconnecting the 12V connector from the E-box deactivates the high voltage system only. The 12V vehicle electrical system provides the safety features, such as airbags or seat belt tensioners, with voltage.

! WARNING

The high voltage system is disabled approximately 20 seconds after deactivation. To prevent serious injury or death from severe burns or electric shock, avoid touching, cutting or breaching any orange high voltage power cable or high voltage component. Any other deactivating - as is described in the Repair Manual (for example, removing the service plug) - must be performed by qualified technicians only.

Proceed with caution

Special caution must be taken when working on the high voltage system:

WARNING

The high voltage hybrid electrical system is dangerous and can cause burns, other serious personal injuries, electrocution and death.

- Never open, service, repair, or disconnect the high voltage hybrid battery.
- Never touch or let jewelry or other metal objects contact high voltage cables or the high voltage battery and battery poles, especially if the cables, battery or battery poles have been damaged in a crash or in some other way.
- Always have work on the hybrid electrical system and on systems that could be indirectly affected by it done by qualified, trained technicians, who have the know-how, experience, documentation, and tools to do the work safely.

Special information:


Vehicle fire

DANGER!

Maintain a safe distance when putting out a vehicle fire.

Vehicle in water

 If the Volkswagen Touareg Hybrid is submerged in water, there is generally no risk of danger that the voltage is in contact with vehicle body.

 After the vehicle has been pulled out of the water, the emergency response personnel should let the water drain out of the vehicle. Work on vehicle may then begin following the instructions given in this manual.







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