

## Service

<b>Chassis ID</b>	<b>Path</b>
	000/Description, Design and function//Product information on electric truck for emergency services personnel
<b>Model</b>	<b>Identity</b>
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# Product information on electric truck for emergency services personnel

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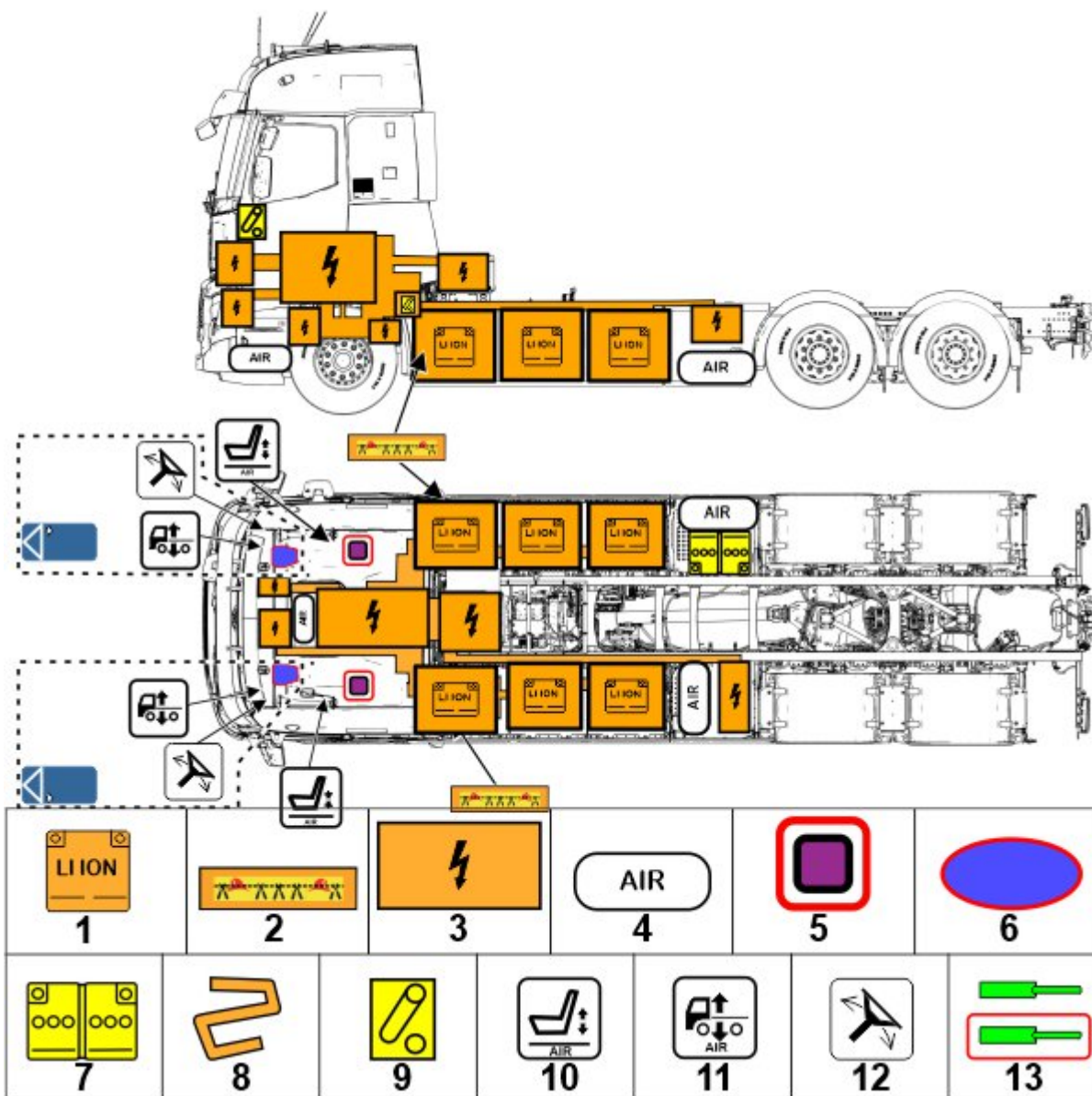
Explanation of pictograms

## Product information on electric truck for emergency services personnel

### *Introduction*

This document gives technical information, procedures and methods for rescue operations during accidents. It explains the potential dangers during the rescue operation to the emergency service personnel.

### **Overview**



1	High-voltage lithium-ion battery
2	Emergency cut-off loop
3	High-voltage component
4	Air tank
5	Seat belt pretensioner
6	Airbag
7	12 V battery (two numbers)
8	High-voltage cable
9	Starter switch
10	Seat adjustment
11	Chassis height control (Air suspension)
12	Steering wheel tilt control
13	Gas strut (pre-loaded spring)

**Note**

The above image shows information for one variant of this product. The number of axles, cab structure, and traction batteries can vary depending on the variant of the product.

These instructions do not cover the safety aspects of the components and equipment mounted by a third party (example: Body builders).

Discrepancy may exist in the translated documents as the original document is authored in English.

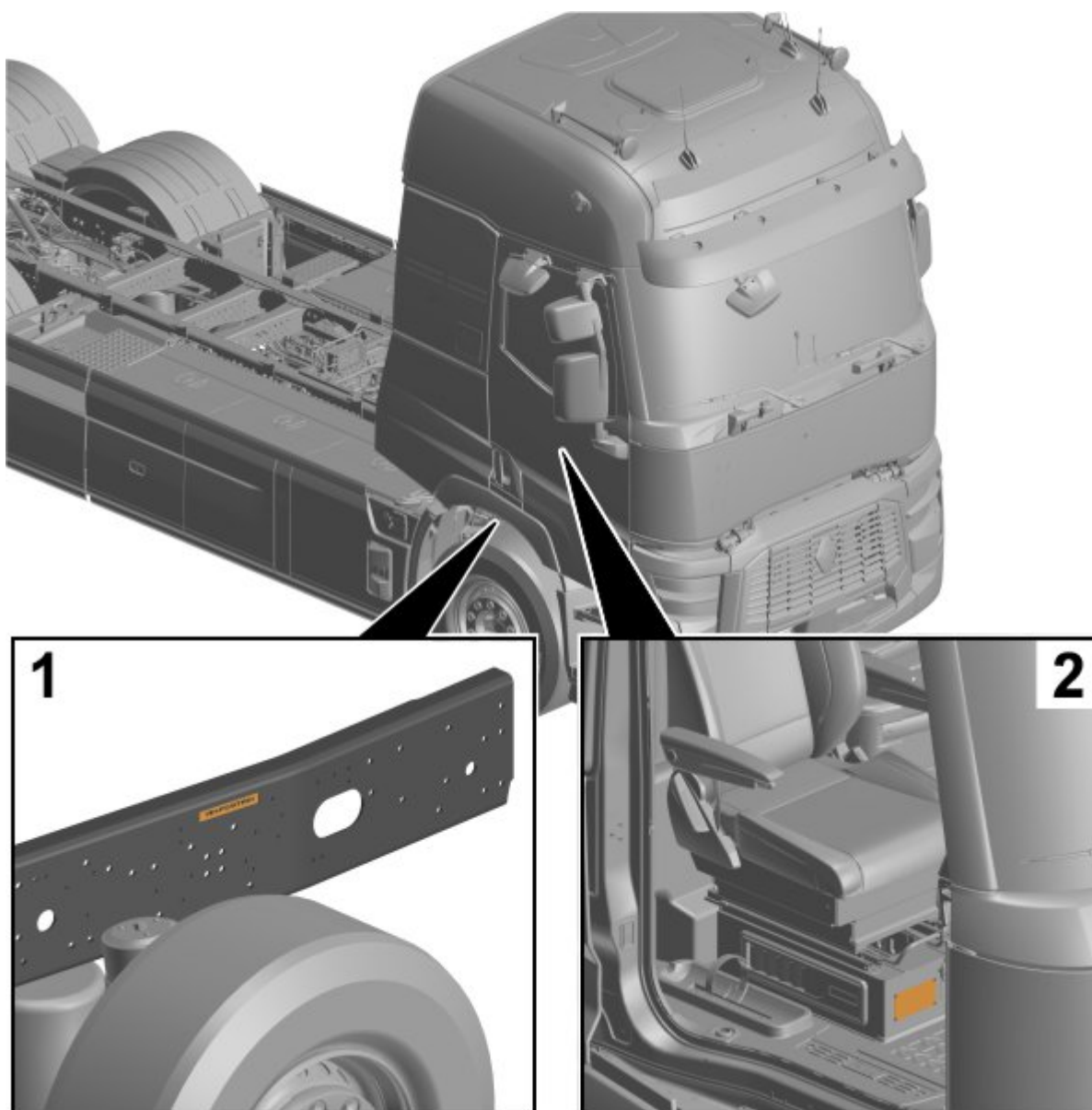
## Identification/recognition



A BEV (Battery-Electric Vehicle) is identified by the 'E-TECH' emblem located on the front of the cab and near to the cab doors on both sides.

Other ways to identify an electric truck are: The presence of orange high-voltage cables and absence of an exhaust system.

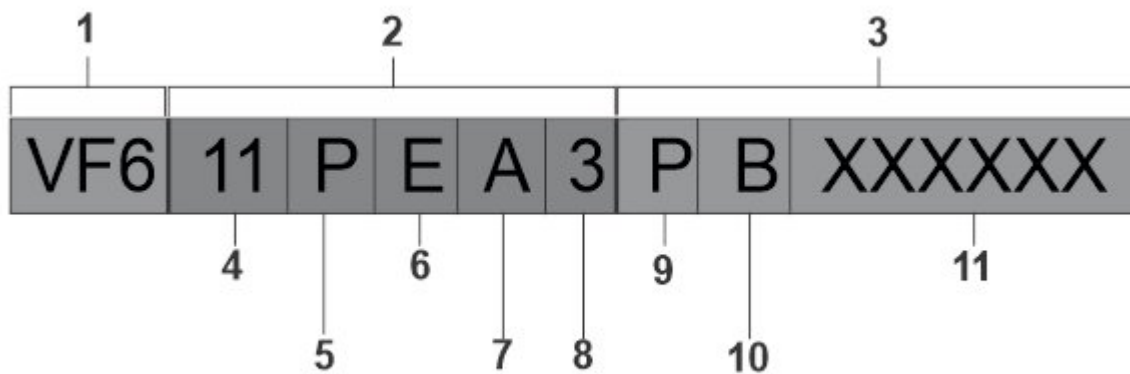
## VIN (Vehicle Identification Number) location



1	VIN is punched on the outer side of the right-hand side of the frame member
2	Identification plate (located on under the passenger seat)

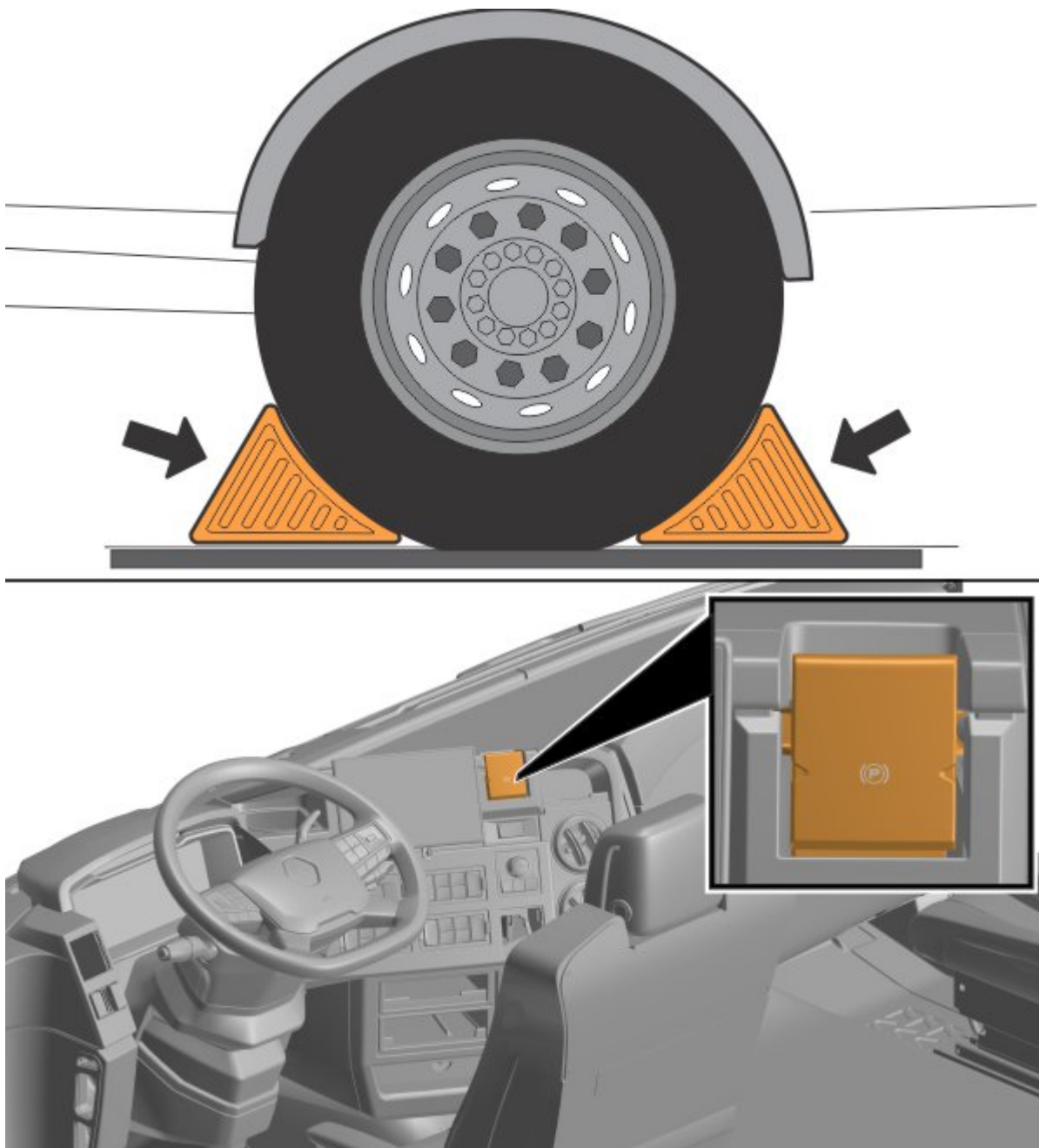
The VIN (Vehicle Identification Number) is a structured combination of unique alpha-numeric characters assigned to each vehicle by the manufacturer for identification purposes.

**Overview**



1	WMI (World Manufacturer Identifier)
2	VDS (Vehicle Descriptor Section)
3	VIS (Vehicle Indicator Section)
4	Cab type
5	Axle configuration type
6	Engine type (Electric motor (UENGINE))
7	Usage variant type
8	Check digit
9	Model year
10	Assembly plant
11	Serial number

*Immobilisation/stabilization/lifting*



Always approach the electric truck from the sides to stay out of the potential travel path. Due to the lack of noise, it may be difficult to determine whether the vehicle is active or not.

To Prevent the vehicle from moving:

- Chock the wheels.
- Apply the handbrake.

### *Disable direct hazards/safety regulations*

#### **Disconnect the traction voltage circuit**

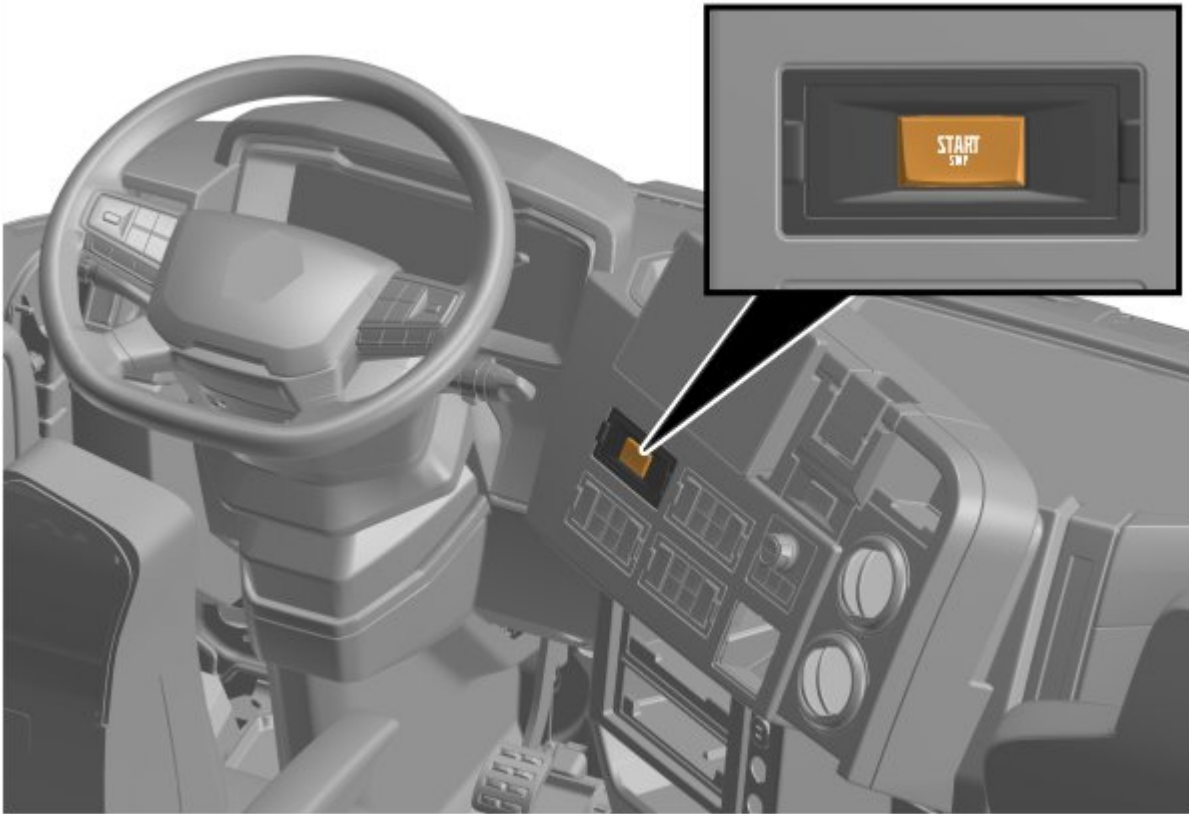
Before a rescue operation, it is recommended to disconnect the traction voltage circuit by cutting the emergency cut-off loop.

The emergency cut-off loop is in the right and left-hand sides of the truck, behind the side marker lamp (front).

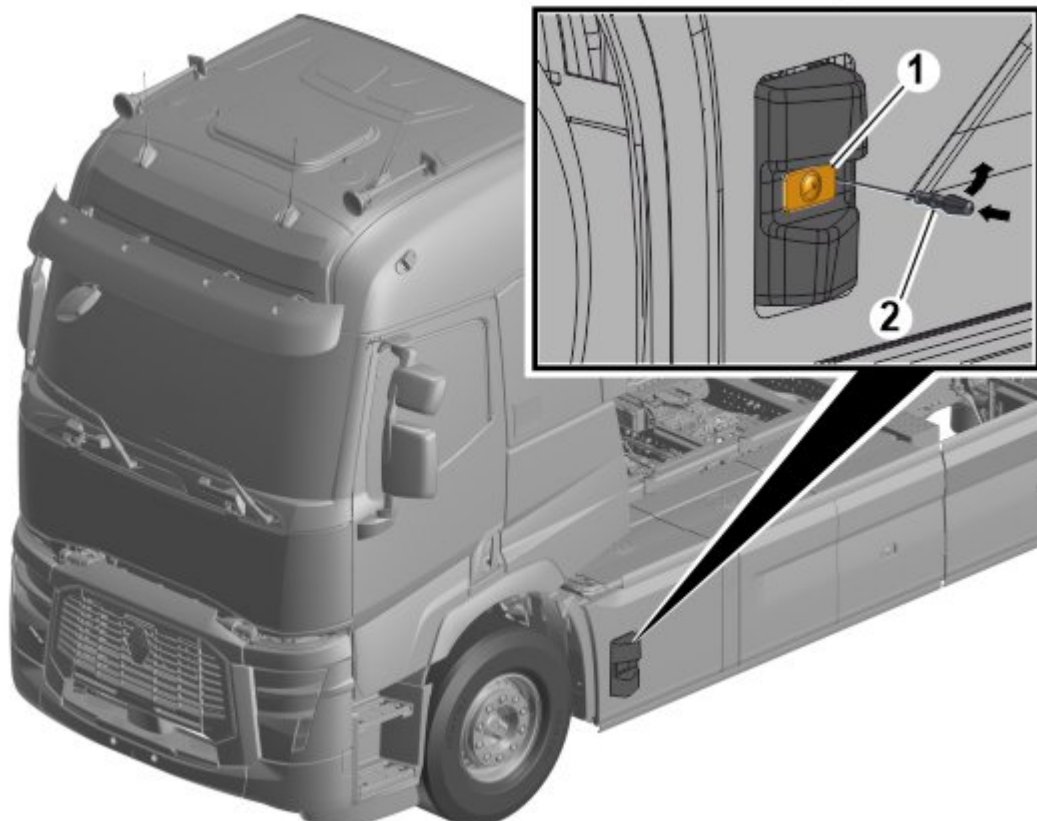
To disconnect the traction voltage circuit:

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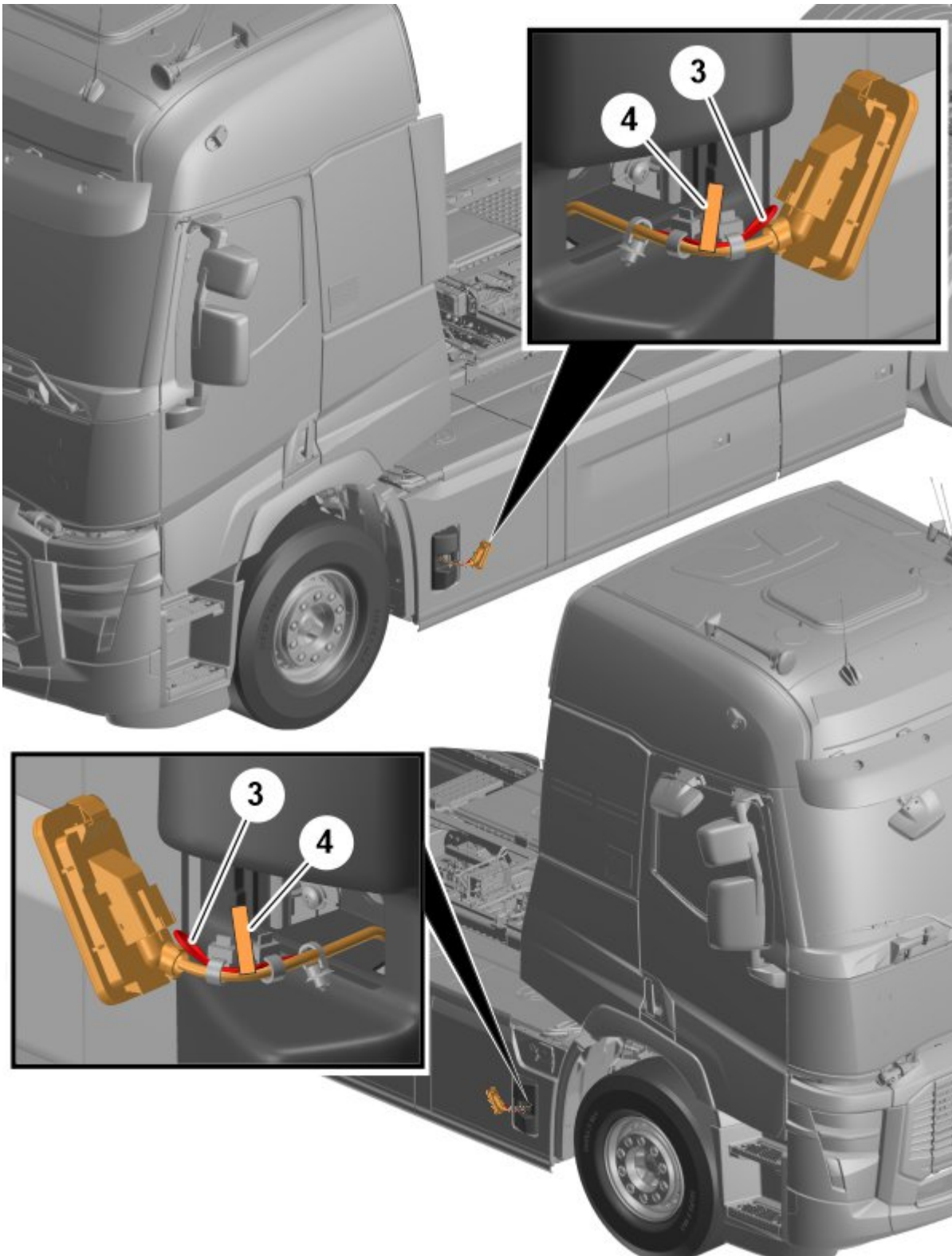


- If possible, turn off the vehicle using the START / STOP push button.

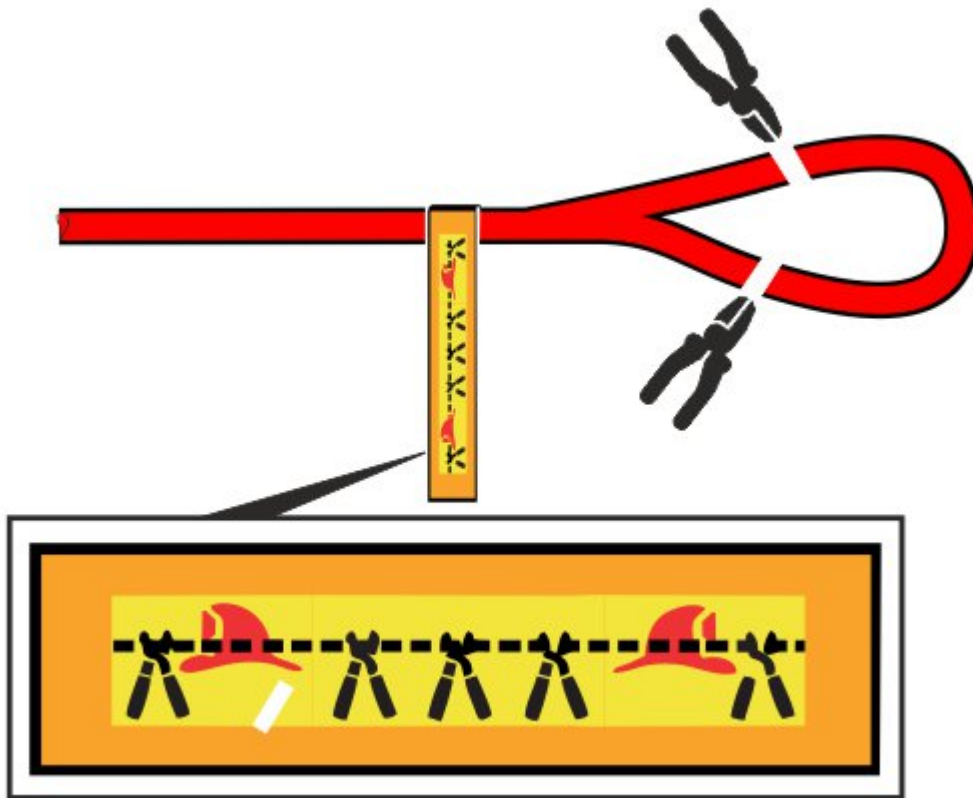


- Remove the side marker lamp (1) using a screwdriver (2) .





- Pull out the marker lamp cable and locate the emergency cut-off loop (low-voltage) (3) with the label (4) .

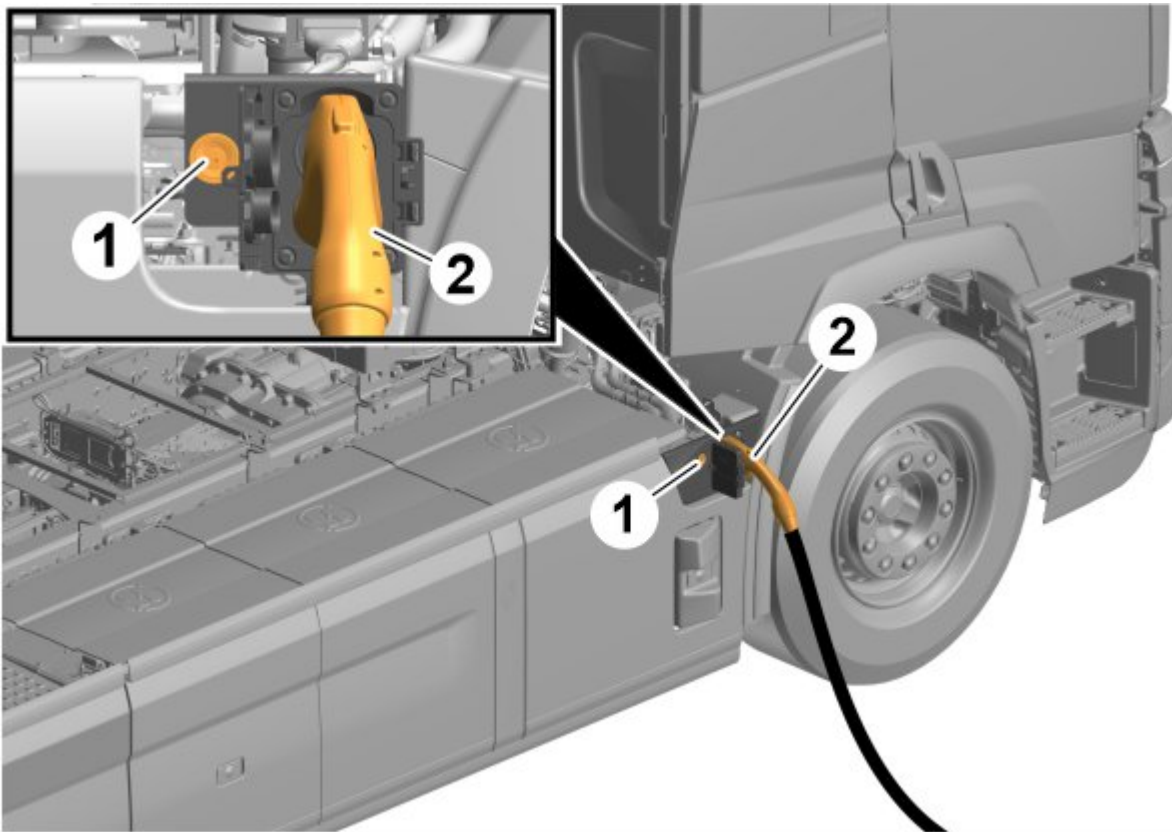


- Cut the emergency cut-off loop on each side of the loop to disconnect the traction voltage supply from the traction batteries.

Cutting at any of the emergency cut-off loops (left/right-hand side) will disable the traction voltage in the traction battery and all the high-voltage components. High-voltage components will discharge their own capacitance within five seconds of cutting the emergency cut-off loop.

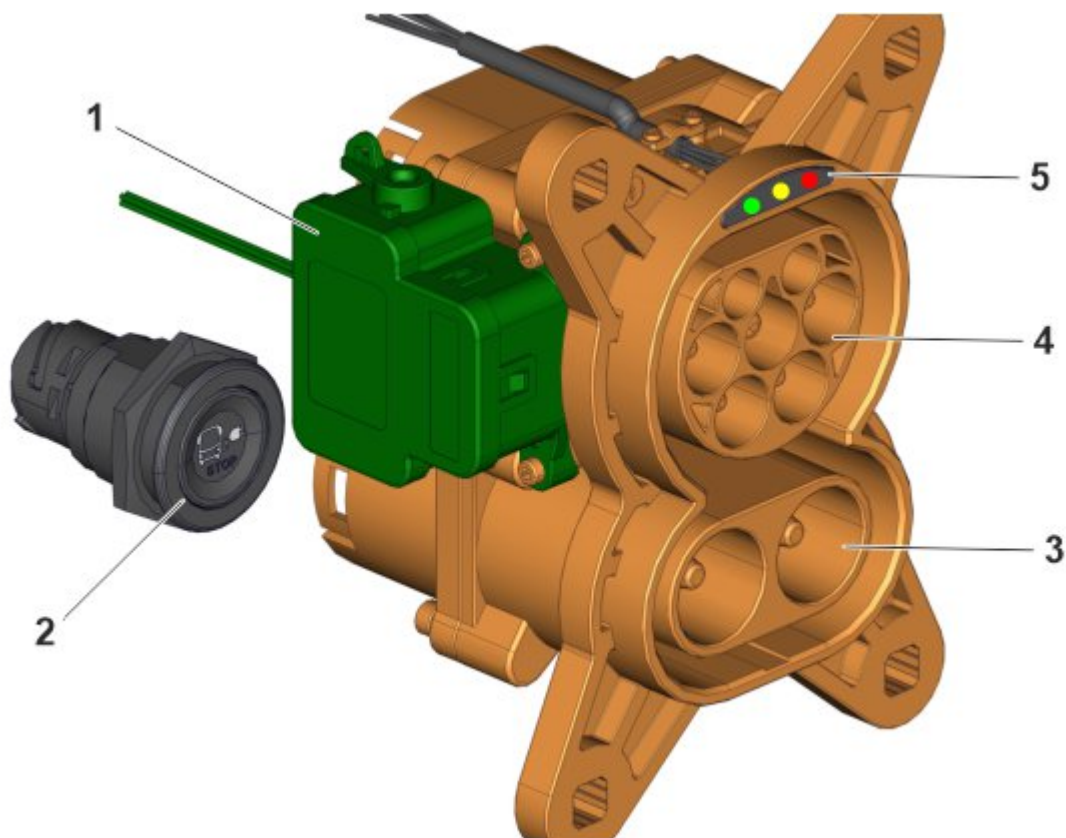
24 V systems like seat position adjustment and steering system will still function after cutting the emergency cut-off loop.

### Accident while charging



- Press the stop button on the charging station (charging power source).
- Press and hold the UNLOCK button on the key remote for five seconds.
- Press the stop button (1) on the CCS (Combined Charging System) inlet and wait for the steady yellow light. The steady yellow light indicates that charging has stopped.
- Wait until the yellow light turns off and then remove the charging plug (2) .

## CCS 2 inlet

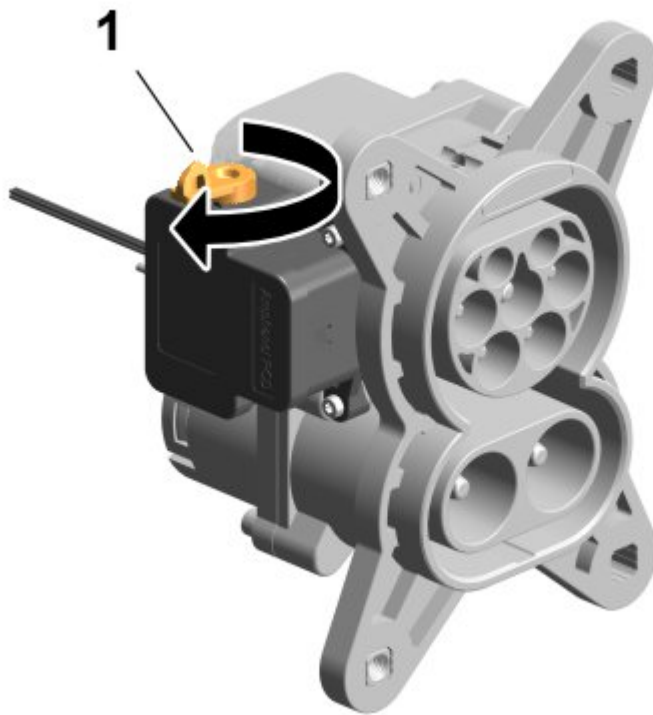


1	Actuator
2	Charging stop switch
3	Charging inlet (600 V DC (Direct Current))
4	Charging inlet (400 V AC (Alternating Current))
5	LED (Light-emitting diode) indicators

**LED indication**

LED colour	Steady/Blinking	Description	Comment
Green	Steady	Fully charged	Battery is fully charged, but maintenance charging can still continue
Green	Blinking	Charging	
Yellow	Steady	Charging paused or charging stop switch pressed	Truck or charger has paused charging Operator has pressed the charging stop switch in the truck
Yellow	Blinking	Charging is initiated	
Red	Steady	Charging fault	Error in the charger/grid or truck
			Preconditions to allow charging are: <ul style="list-style-type: none"> <li>Handbrake must be applied</li> </ul>

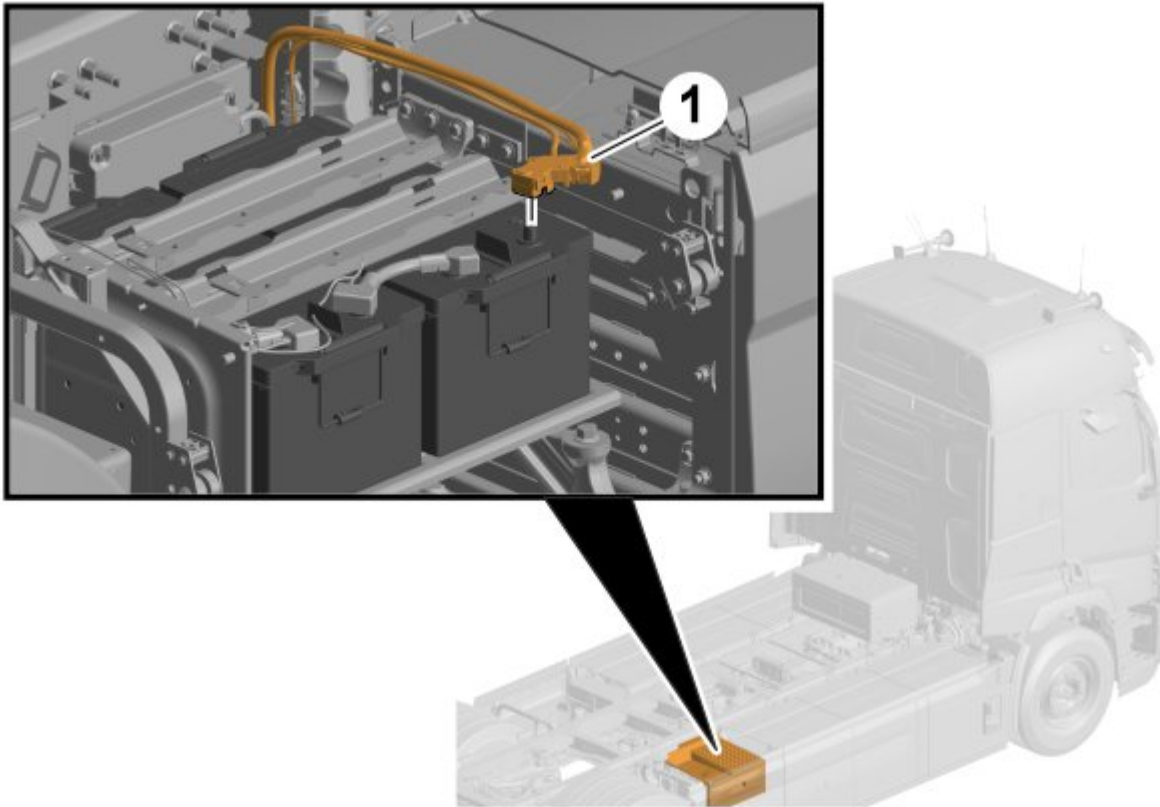
Red	Blinking	Precondition not met	<ul style="list-style-type: none"> <li>Chassis switch must be closed</li> </ul>
			<ul style="list-style-type: none"> <li>Truck must be stationary</li> </ul>



If the charging plug cannot be removed,

- Rotate the lever (1) and manually retract the locking pin to remove the charging plug.

### Disconnect the 12 V and 24 V circuits



The 12 V batteries are located at the rear end of the truck.

- Remove the battery cover and battery negative terminal (1) .

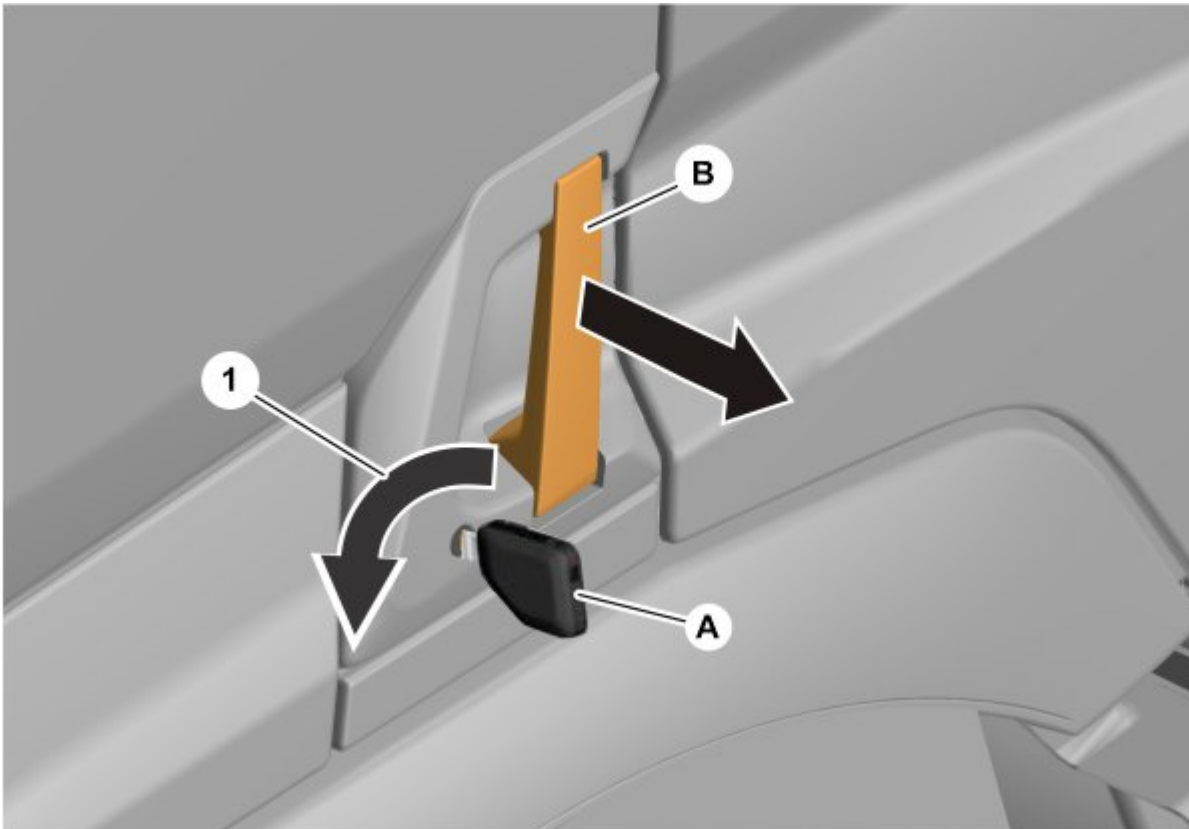


#### Note

Note It is not possible to disconnect the negative terminal of the 12 V batteries in all the rescue operations.

## *Access to the occupants*

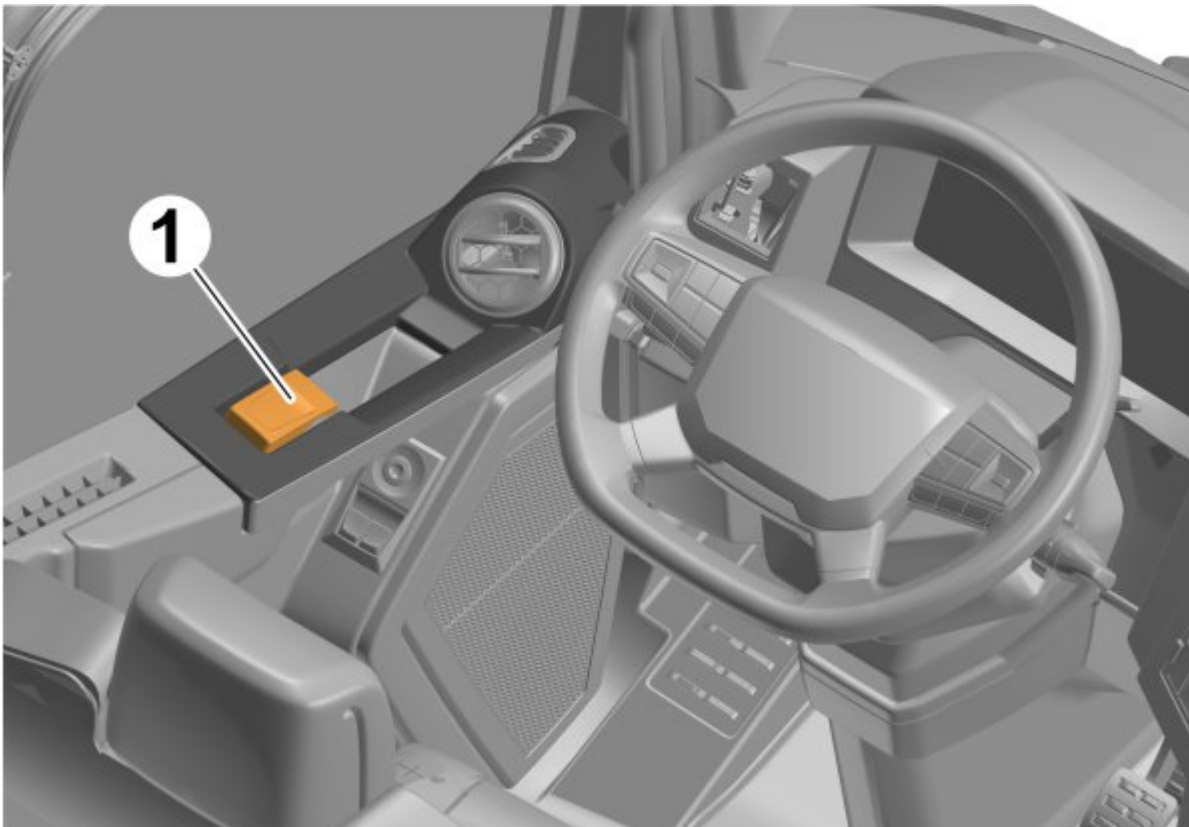
### **Opening the doors from outside**



- To unlock the driver door, turn the key (A) in the anticlockwise (1) .

- To open the door, pull the handle (B) and pull the door.

### Opening the doors from inside



To open the door from inside the cab, lift the handle (1) and push the door.

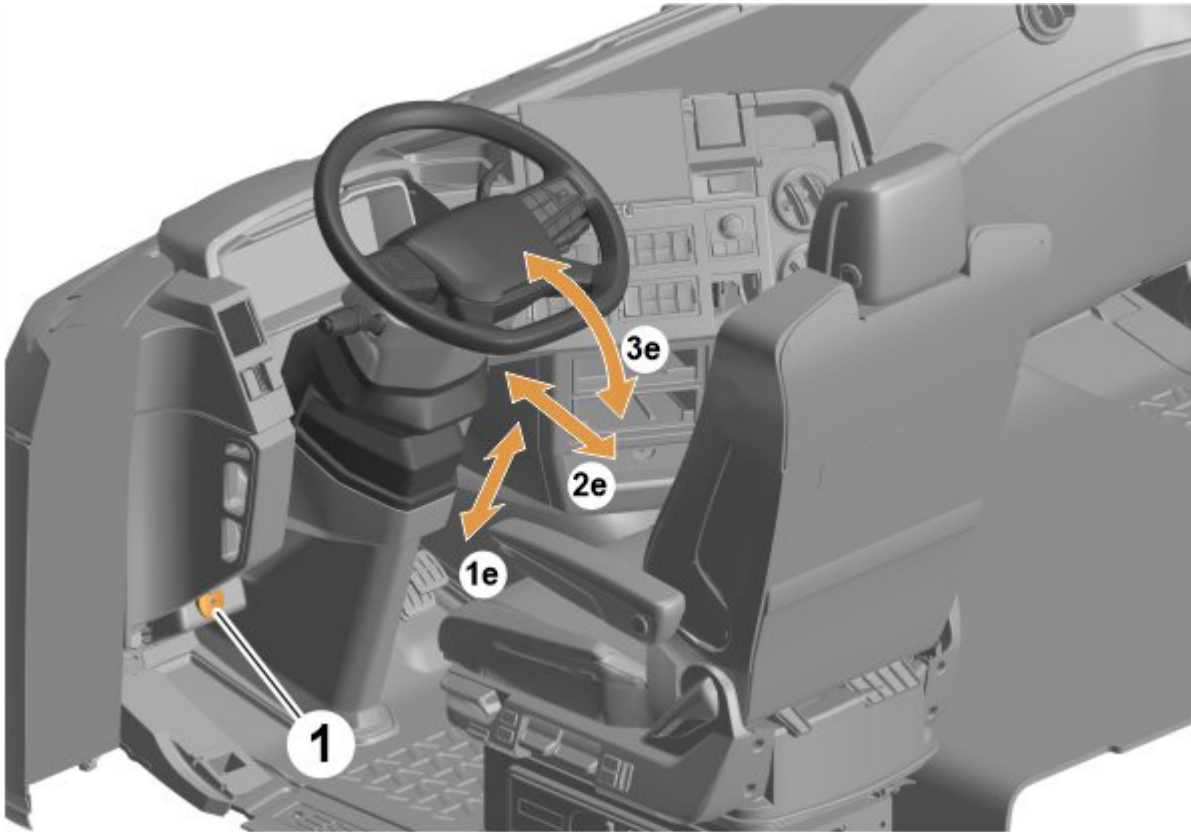
## Seat adjustment



- To adjust the seat height, press the switch (2) .
- Pull the lever (1) for sliding the seat to a desired position.
- Pull the lever (3) upwards for backrest tilt adjustment.

## Steering system adjustments



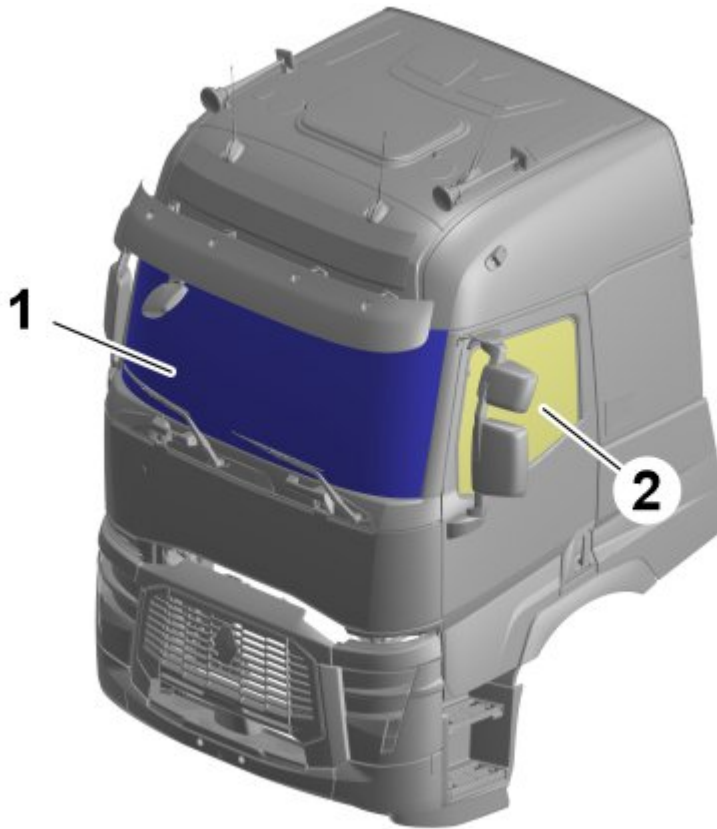


- Press the control **(1)** to the position to adjust the steering column in the vertical **(1e)** , lateral **(2e)** and angular directions **(3e)** .

**Note**

The steering wheel adjustment in the angular direction **(3e)** is applicable only for particular models.

## Windows and windscreen



- The windscreen is made of laminated glass (1) . The window glasses are made of tempered glass (2) .

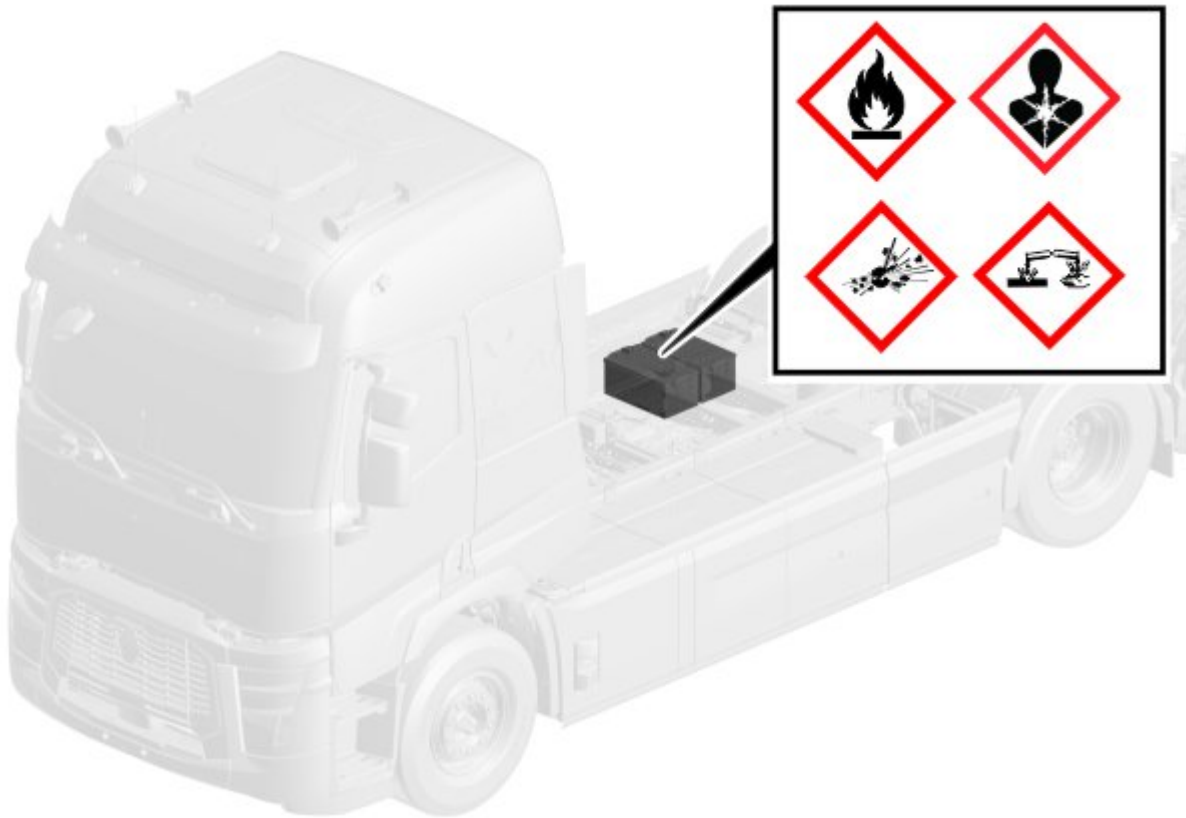
### High-strength zone



- The cab has no high-strength or ultra-high-strength steel. The cab structure is made of plain carbon sheet steel that will not exceed the yield strength of 420 MPa.

## Stored energy/liquid/gases/solid

### 12 V Battery



The electrolyte solution in 12 V batteries contains sulphuric acid, which is highly corrosive and can cause severe chemical burns to the skin and damage the eyes. The solution is also poisonous if ingested.

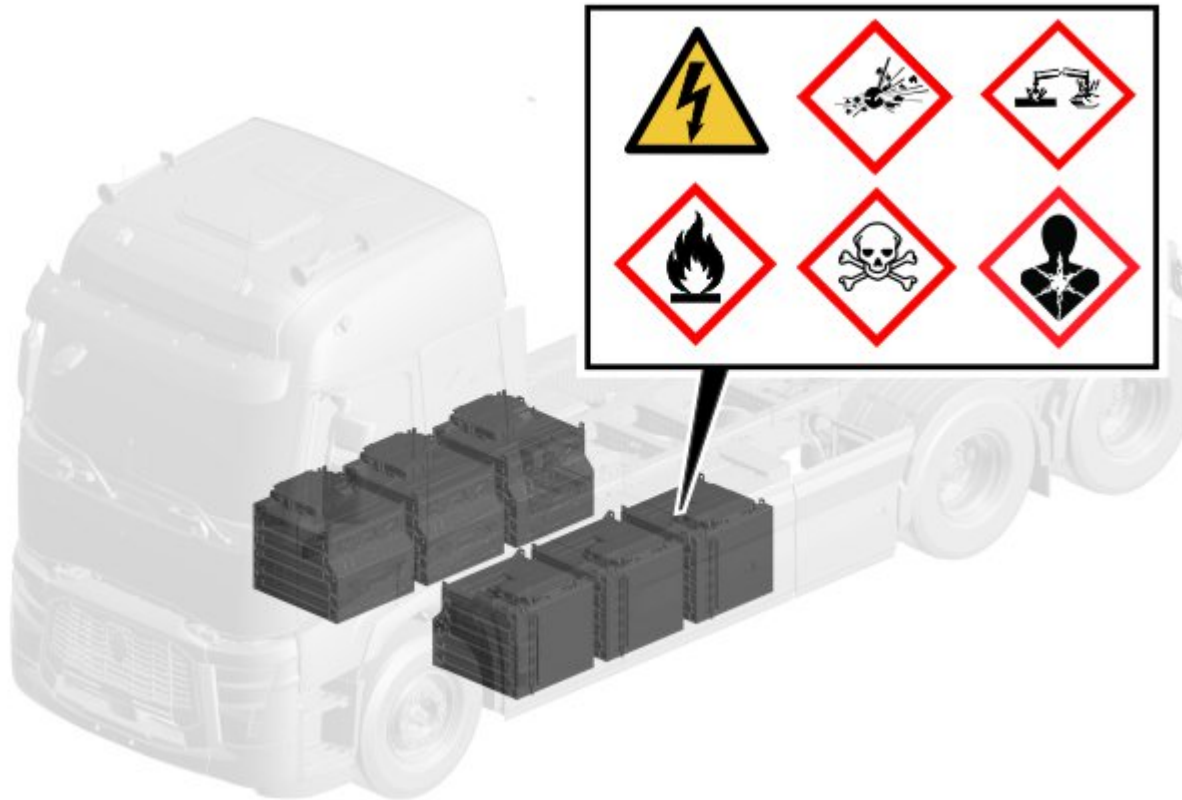
12 V batteries vent little or no gas while discharging, but explosive mixtures of hydrogen and oxygen can be produced during charging that may cause fire or explosion.



#### Note

Do not perform any operation on 12 V batteries without the appropriate PPE (Personal Protective Equipment).

### Traction Battery



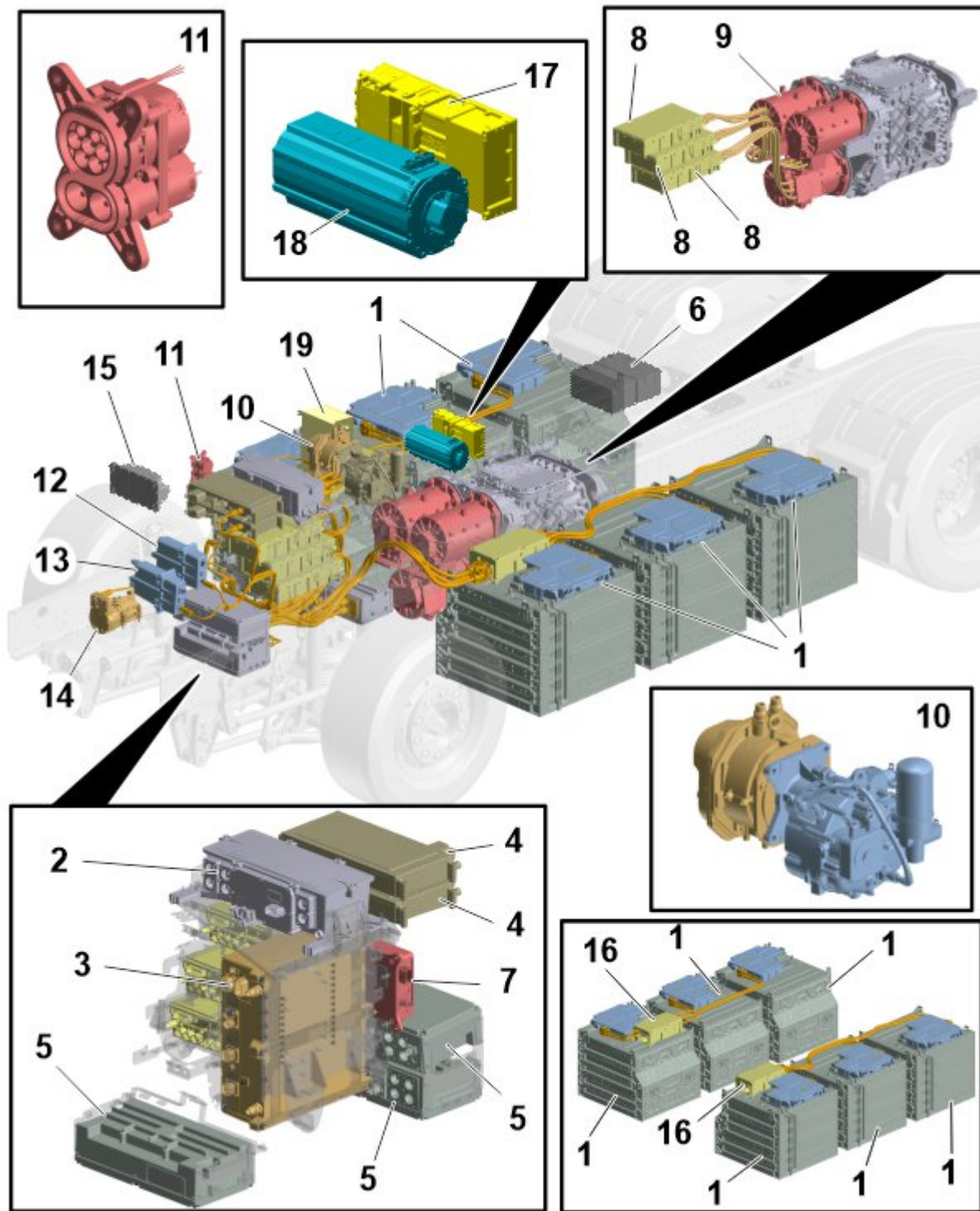
Lithium-ion batteries contain flammable electrolytes and lithium batteries contain lithium metal, which is highly flammable. These batteries can fail and overheat for a variety of reasons, including puncture, overcharge, short circuit or internal failure. Failure of these batteries can cause thermal runaway, which is a reaction within the battery cell that causes temperature and pressure to rise at a faster rate than can be dissipated. This causes thermal runaway to occur in adjacent cells and can produce a fire.

Handling a traction battery without an appropriate PPE may result in serious injury or death due to electric shock.

## Main components in electric truck

<b>i</b>	<b>Note</b> The number of traction batteries or electric motor and location of the EVAC (Electric Vehicle Air Compressor) may vary according to the vehicle specification.
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## Overview



1	Traction battery (Capacity, location and number of traction batteries vary depending on vehicle configurations)
2	CSU (Charging Switch Unit)
3	OCEPS (On-board Charger and Electric Power Supply)
4	DC/DC Converter (Direct Current/Direct Current converter)
5	TVJB (Traction Voltage Junction Box)
6	12 V battery (two numbers)
7	TVMU (Traction Voltage Monitoring Unit)
8	EMD (Electric Motor Drive)

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9	Electric motor
10	EVAC
11	CCS inlet
12	ESS (Energy Storage System) heater
13	Cab heater
14	AC (Air Conditioning) compressor
15	EMC filter
16	BJB (Battery Junction Box)
17	EMD, ePTO (electric Power Take-Off) (Optional)
18	Mechanical ePTO (Optional)
19	IRM (Insulation Resistance Monitoring) unit (optional)

The traction batteries supply power to the battery-electric vehicle for propulsion.

The traction voltage is defined as the voltage that does not exceed 1000 V AC or 1500 V DC. The nominal operating traction voltage range in the battery-electric vehicle is between 500 V and 750 V.

## TVS (Traction Voltage System) components

### Traction battery

Four lithium-ion battery packs supply a maximum of 750 V. The traction battery electrodes are made of carbon, lithium, nickel, manganese and cobalt.

### CSU

The primary function of the CSU is to act as a circuit breaker in between the charging station and the vehicle.

### DC/DC converter

The DC/DC converter converts the traction voltage of 600 V DC to 24 V DC. In the battery-electric vehicle, the DC/DC converter charges the 12 V batteries and handles the load connected to the 24 V system.

### TVJB

The TVJB has two variant combinations depending on the number of high-current and low-current connection interfaces. The TVJB distributes power in the electric propulsion system.

### EMD

The EMD converts 600 V DC to three-phase AC. The EMD operates the electric motor and controls the speed, the torque and the calibration.

### CCS

The CCS inlet is used for charging the traction batteries. The CCS inlet is used for both AC charging (400 V) and DC charging (600 V), but not at the same time. The CCS inlet is equipped with an actuator that prevents accidental disconnection of the charging plug on the vehicle side.

### TVMU

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The TVMU performs measurement in the traction voltage system, detects any potential hazardous situation and communicates to the HPCU (Hybrid Powertrain Control Unit).

## **Electric motor**

The electric motor is used to propel the BEV by converting electrical energy into mechanical energy. The electric motor gets power from the traction batteries through the TVJB. The EMD controls the electric motor. Three three-phase AC motors with 334 kW to 400 kW capacity power the vehicle.

## **OCEPS**

The OCEPS converts AC to DC for charging the traction batteries through AC charging interface.

The OCEPS provides AC and DC PTO (Power Take-Off) for other applications like a chiller and the EVAC.

## **EVAC**

The EVAC is a screw compressor. Its main function is to produce compressed dry air in the battery-electric vehicle.

## **BJB**

BJB acts as a junction box to connect the traction batteries together parallelly. There are two BJB's in the truck, one on each side of the truck. Each BJB connects a maximum of three batteries.

## **Electric motor, ePTO**

The electric motor, mechanical ePTO is a device, which converts the electric power to mechanical power. It transfers the mechanical power to various auxiliary equipment. The electric motor is able to operate at 70 kW AC power.

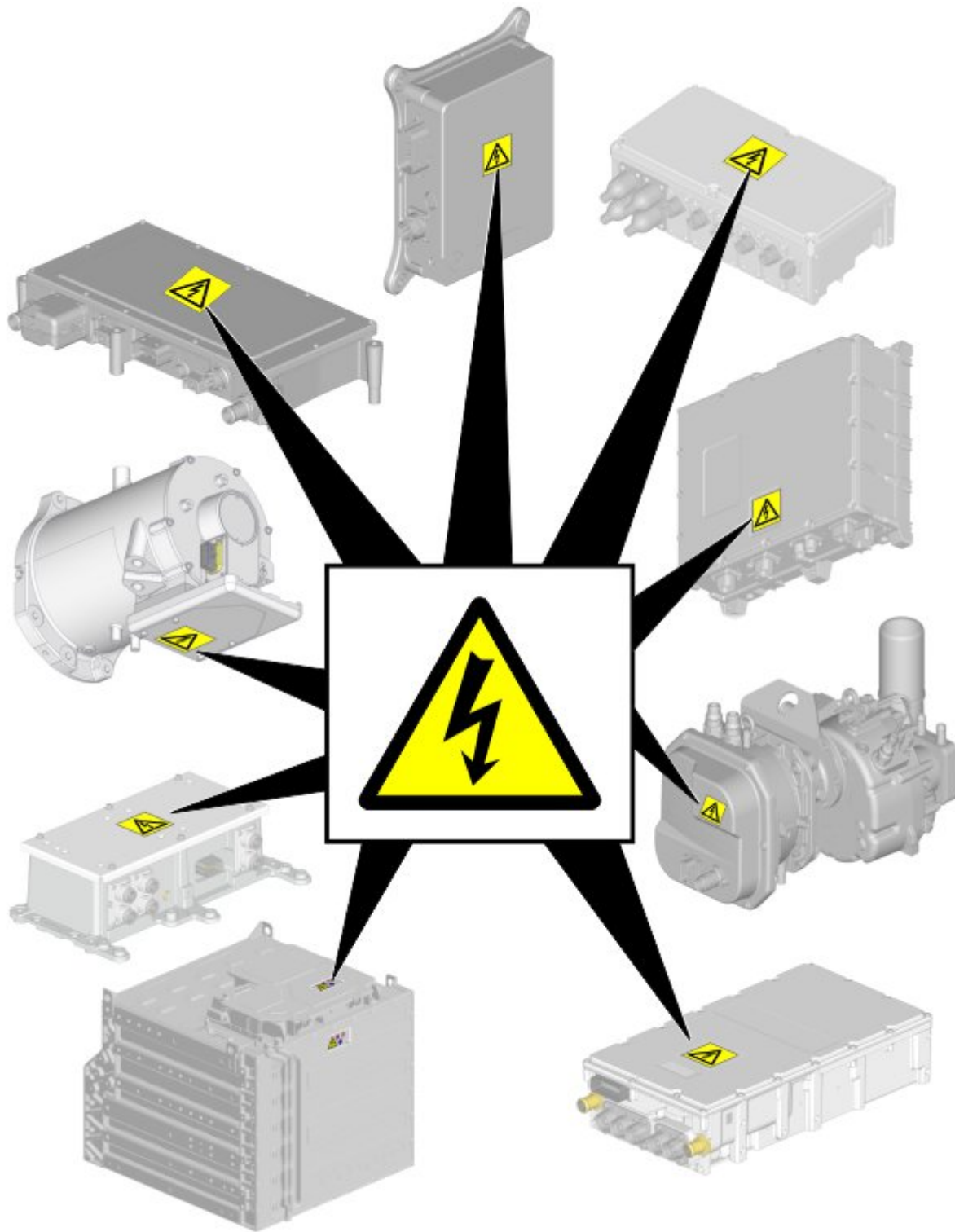
## **EMD, ePTO**

The EMD converts 600 V DC to three-phase AC. The EMD operates the electric motor of ePTO and controls the speed, torque and calibration.

## **IRM unit**

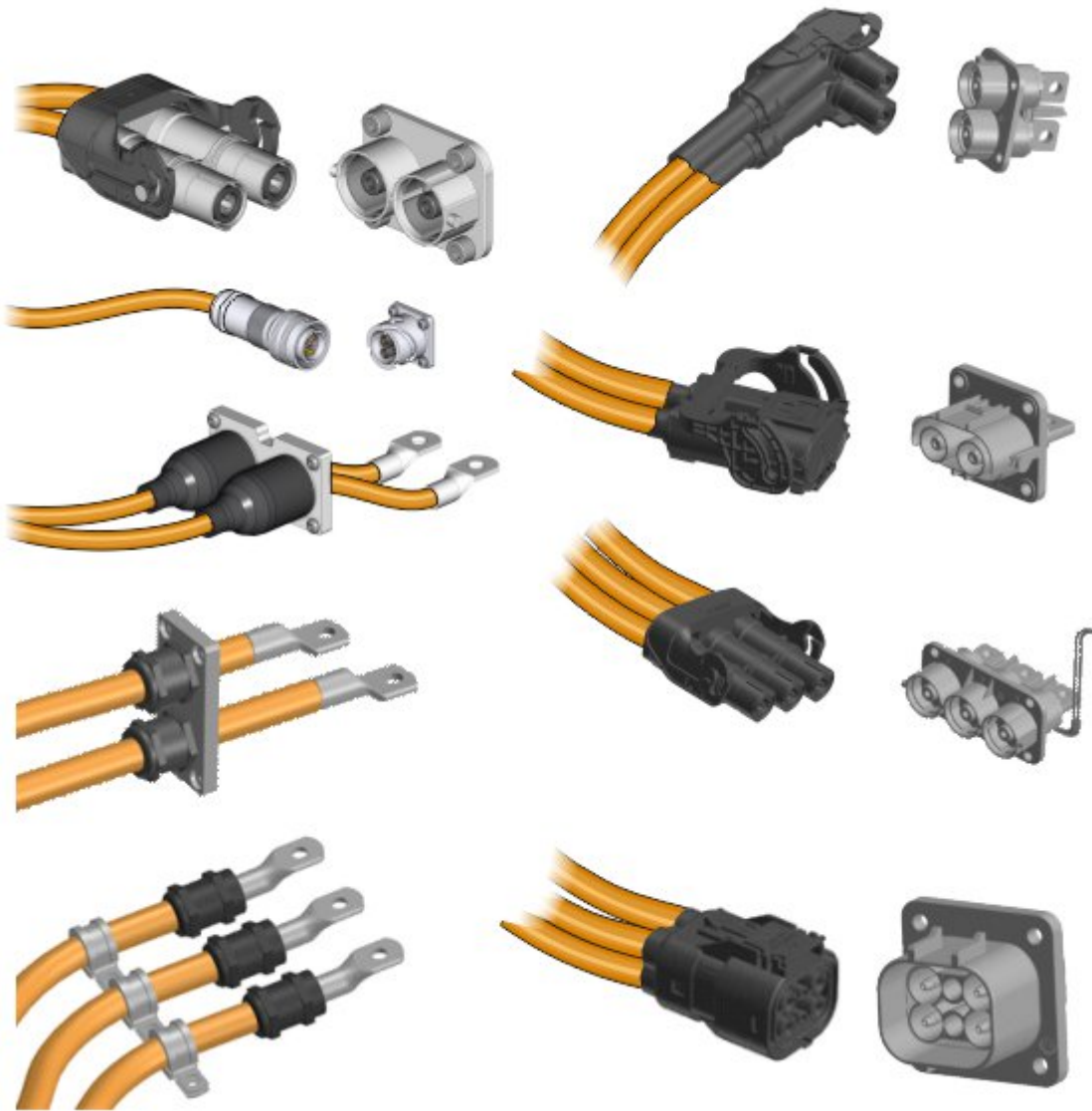
The IRM unit monitors the insulation resistance of unearthed AC and DC main circuits.

## **Warning label and identification of traction voltage cables**



Most of the traction voltage components are marked with the warning label for hazardous voltage.





Traction voltage cables are orange in colour for easy identification.

### *In case of collision*

- Always approach the electric truck from the sides to stay out of the potential travel path. Due to the lack of noise, it may be difficult to determine whether the vehicle is active or not.
- Check for thermal runaway, refer to “Thermal Runaway Detection” for more information.
- Evacuate and secure the area.
- If the traction battery cover is opened or deformed and the inside is exposed, there is a risk of a serious electric shock.
- Disconnect the power in the vehicle, refer to “Disconnect the traction voltage circuit” and “Disconnect the 12 V and 24 V circuits”.








#### **Note**

Isolate the electric vehicle involved in an accident to a safe location, preferably outdoors with weather protection and away from people, operations and buildings according to local laws, regulations and risk assessment.

*In case of fire*

**Symbols**

	<p>Emergency services personnel must wear PPE and Self-Contained Breathing Apparatus (SCBA).</p> <p>To avoid potential injury, always approach the vehicle from the side, as the vehicle can move without giving warning. If the vehicle moves, it is difficult to find the vehicle travel path due to lack of noise.</p> <p>If possible, chock the wheels and apply the handbrake.</p> <p>Evacuate and secure the area.</p> <p>Disconnect the power in the vehicle, refer to “Disconnect the traction voltage circuit” and “Disconnect the 12 V and 24 V circuits”.</p> <p>It is not recommended to approach the electric truck during or immediately after a thermal event. Be aware before approaching the electric truck that a delayed thermal event in the lithium-ion batteries can occur.</p>
	<p>In case of a fire in the traction batteries, use a large volume of sustained water to extinguish the fire.</p>
	<p>Extinguishing a lithium-ion battery-related fire with water can produce hydrofluoric acid.</p>
	<p>Use class ABC fire extinguishers on all parts of the vehicle excluding the traction batteries.</p>
	<p>In case of the thermal runaway, the lithium-ion batteries can release hydrogen fluoride.</p>



PPE of the first responders may be contaminated due to the exposure to hazardous chemicals.



**Note**

The water used to extinguish the lithium-ion battery-related fire will get contaminated. Efforts should be made to control and collect the run-off water to prevent mixing with water resources.

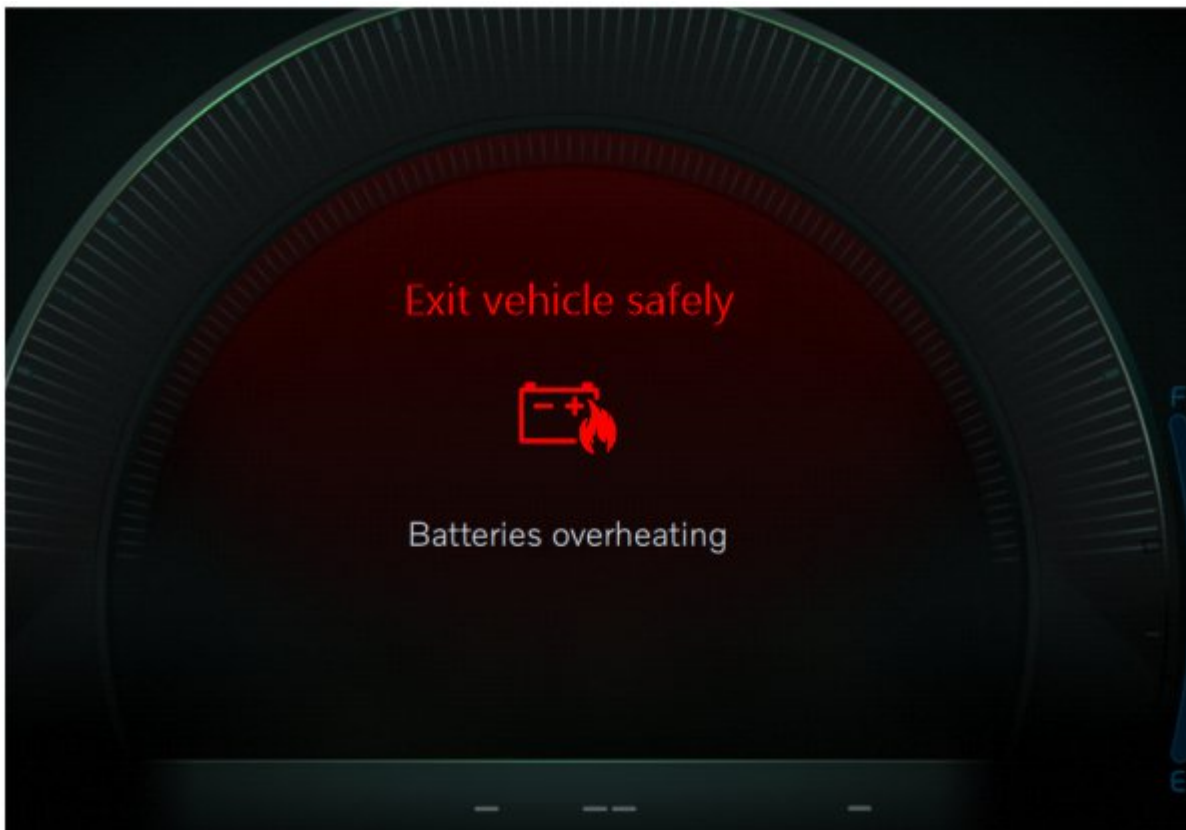
**Thermal runaway detection**

In case of a fire in the traction batteries, breather valves can emit large flames as a result of the thermal runaway.

The thermal runaway in the traction battery occurs when a battery cell or area within a battery cell reaches a higher temperature due to the following:

- Thermal failure
- Mechanical failure
- Internal or external short circuit
- Electrochemical mishandling.

In the battery cell, an unstoppable exothermic reaction occurs, which results in a rapid temperature rise within a second. There is a risk of propagation of fire to the whole battery depending on the degree of damage. Consequentially, the energy contained in the battery is released as heat.



- If “Batteries overheating” warning is displayed in the instrument cluster, exit the vehicle safely.
- If the thermal runaway is detected, carefully monitor the traction batteries for smoke. The breather valves and a tray seal of the traction batteries are the usual smoke exit areas. Use a continuous stream of water directly on the battery to cool the battery until the battery temperature is stabilised to a normal temperature.
- If there is no smoke, use a thermal infrared camera for heat detection.
- If smoke is detected during the observation, refer to “In case of fire” for more information.

### *In case of water submersion*

 <b>DANGER</b>
---

**Risk of electrical discharge:**  
 The degree of damage of a submerged vehicle may not be visible. Handling the submerged vehicle without appropriate PPE results in serious injury or death due to electric shock.

▶ Avoid any contact with the traction voltage cables and electric components.

- If possible, disconnect the power in the truck, refer to “Disconnect the traction voltage circuit” and “Disconnect 12 V and 24 V circuits”.
- Move the truck away from the water and drain to avoid electric shock.
- Evacuate and secure the area.
- Contact with water can cause a short circuit in the 12 V, 24 V and traction voltage components, which can lead to electric shock and potential fire once the truck is removed from the water.

### *Towing/transportation/storage*

 <b>DANGER</b>
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**Risk of electrical discharge:**  
 Handling an electric vehicle without appropriate PPE results in serious injury or death due to electric shock.


▶ Avoid any contact with the traction voltage cables and electric components.

 <b>CAUTION</b>
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**Risk of fire:**  
 If the traction batteries are damaged, there is a risk of thermal or chemical reaction.

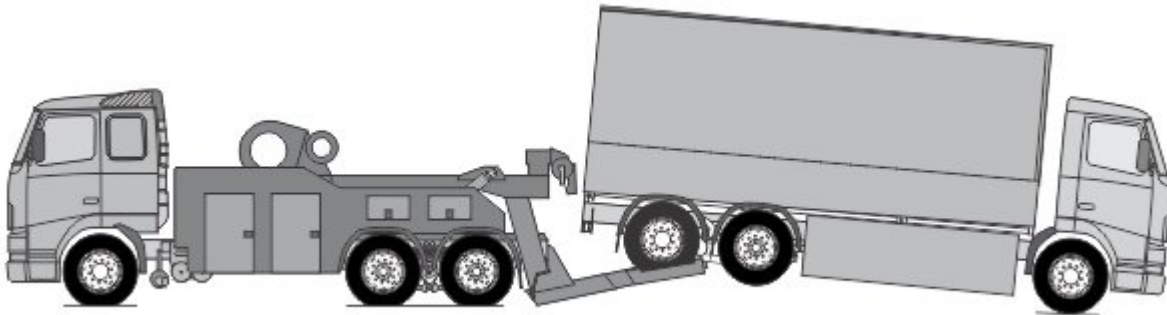
▶ Do not touch any traction voltage cables or electric components.

▶ Use appropriate PPE.

 **Note**  
 Delayed thermal event in the lithium-ion batteries can occur after they are damaged or after battery fire/heat suppression. A thermal infrared camera may be used to identify the thermal event.

To ensure the traction battery safety, it is recommended to perform risk analysis based on the local situation. Observe the electric truck for an amount of time decided during the risk analysis.

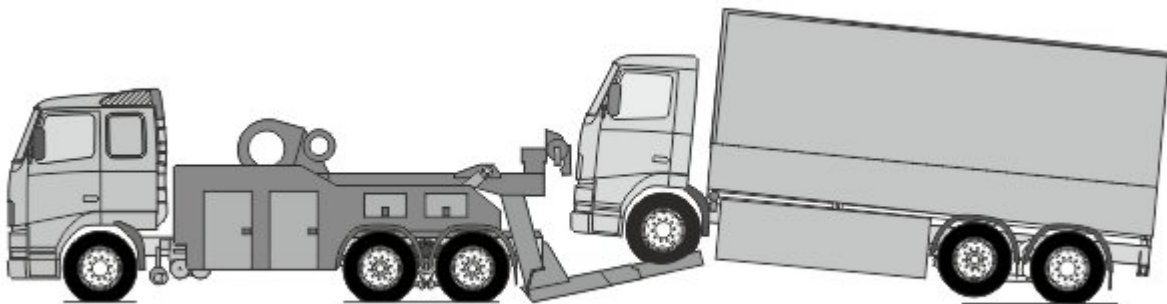
Park the truck involved in an accident in a safe place maintaining a safe distance from other vehicles, buildings and combustible objects.



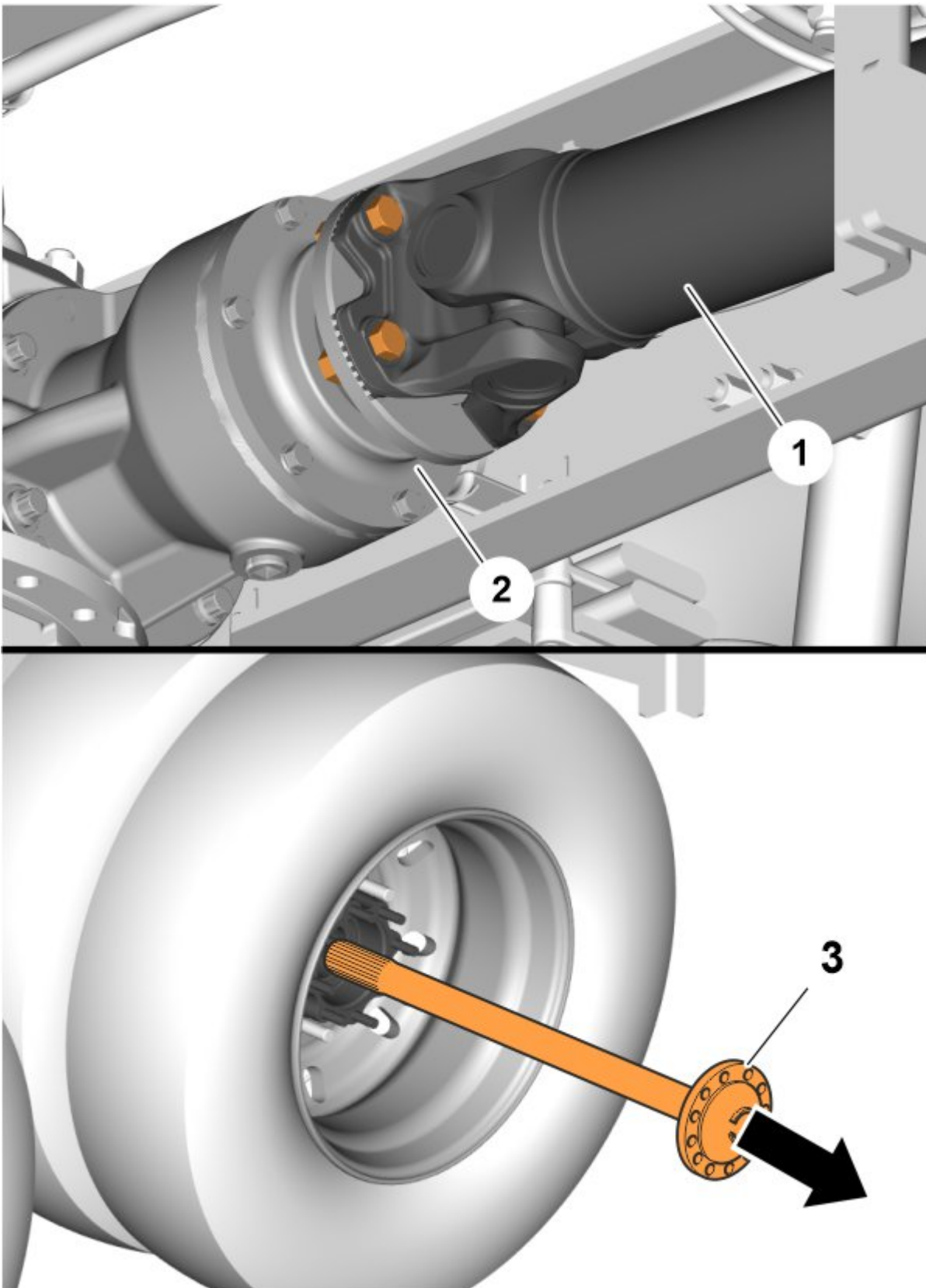
In case of a physical damage or a thermal event on the lithium-ion batteries, it is recommended to tow an electric truck with the rear wheels lifted.

**Note**

Make sure that the steering wheel is locked position before towing from the rear.



If the vehicle is towed with the rear wheels on the ground, it is mandatory to disconnect the drive to the wheels.




The drive to the rear wheels is disabled by either uncoupling the propeller shaft **(1)** from the driven axle **(2)** or by removing the axle shafts **(3)** .


**Note**

Towing an electric truck through tunnels is prohibited due to deflagration from the flammable vent gas and fire hazard due to thermal runaway propagation between cells.

### Important additional information

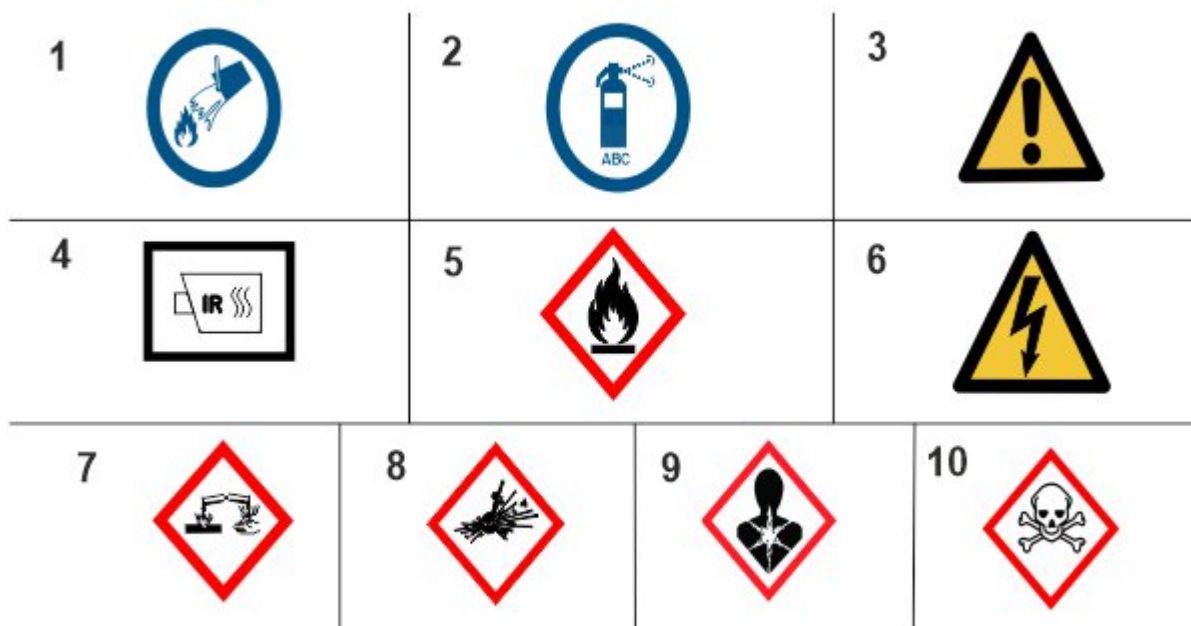
 <b>DANGER</b>	
<b>Risk of electrical discharge:</b>	
Incorrect handling of the TVS (>60 V DC) can cause electric shocks and arcs resulting in serious burns or death.	
▶	Any operation must only be carried out by personnel with adequate training to safely work on battery-electric vehicles.
▶	Always use PPE to protect against the risk of electric shock and arc flash.
▶	Always use non-sparking and insulated tools while working with high-voltage electricity.
•	Always assume that the traction batteries and the related traction voltage components are fully charged and energized.
•	Exposed electrical components, cables and traction batteries lead to a potential dangerous situation.
•	Physical damage to the vehicle or traction batteries can cause an immediate or delayed release of toxic and flammable gases.

### High-voltage

	• Do not cut any orange cables.
	• Do not touch any high-voltage cables and electric components.
	• Do not perform any operations on a damaged vehicle without proper PPE.

### Explanation of pictograms

#### ISO (International Organization for Standardization) symbols and description



1	Use water to extinguish the fire
2	Use ABC powder to extinguish the fire
3	General warning sign
4	Use thermal infrared camera
5	To indicate the risk of flammability
6	Warning (electricity)
7	To indicate the risk of corrosive material/substances
8	To indicate the risk of an explosion
9	Hazardous to the human health
10	To indicate the risk of acute toxicity