

# Product information for the emergency services

Truck

L, P, G, R and S series





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# Before reading

The document is intended for emergency services, recovery companies and similar. Workshops should refer to the *Workshop Manual*.

 **WARNING!**

Check that this is the latest issue of Scania's product information for the rescue services. Go to [www.scania.com/group/en/home/products-and-services/rescue-and-towing](http://www.scania.com/group/en/home/products-and-services/rescue-and-towing).

 **WARNING!**

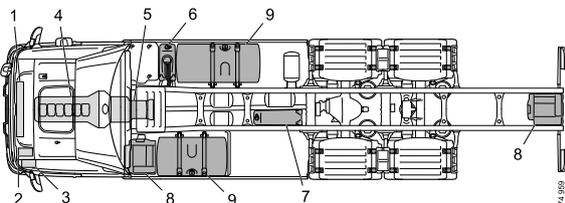
The information in Scania's product information for emergency services applies to vehicles in the L, P, G, R and S series that have been ordered in the ordinary order system.



# Fluids in the vehicle

**⚠ WARNING!**

Fuel in the fuel tank, fuel pipes and fuel hoses may be at a temperature of 70 Celsius.



The following fluids and volumes can be found in the vehicle:

1. Coolant: 80 litres
2. Washer fluid: 16 litres
3. Power steering gear
4. Engine oil: 47 litres
5. Transmission oil: 80 litres
6. Reductant\*: 38-96 litres
7. Reductant\*: 62-115 litres
8. Battery acid
9. Refrigerant: approx. 1,050 grams
10. Fuel: The capacity is shown on the vehicle's fuel tanks

\* Reductant is a solution of urea and water that is added to the exhaust gases upstream of the catalytic converter in engines with an SCR system. The aim is to reduce the emissions of nitrogen oxides.



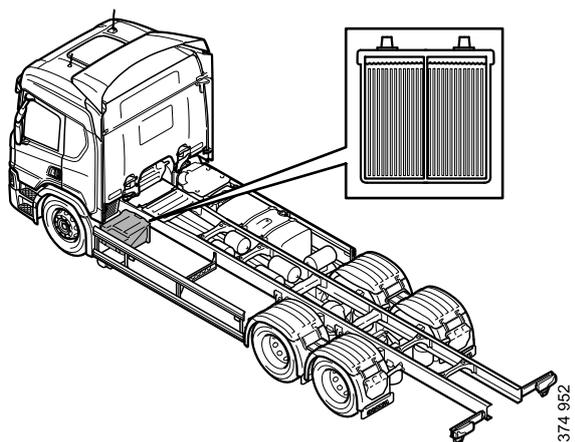
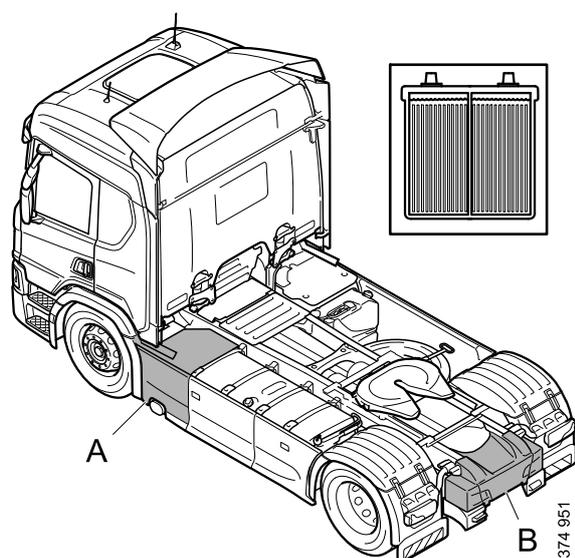
# Electrical system 24 V

## Battery

The location of the battery box varies depending on the vehicle equipment. The illustrations show standard positioning (A and B). If the vehicle does not have a battery master switch then the battery must be disconnected to switch off the voltage.

**! IMPORTANT!**

Battery box (A) can hold batteries for 2 separate circuits.





## Battery master switch

The vehicle may be fitted with one or two battery master switches. In most vehicles only the tachograph and the vehicle alarm are supplied with voltage when the battery master switch is activated.

Depending on how the vehicle bodywork is connected, the bodywork may be supplied with voltage even when the battery master switch is activated.

Vehicles with a battery at the rear are fitted with a jump socket that is live even when the battery master switch is not activated.

Depending on the vehicle equipment, the battery master switch can be activated in different ways. The battery master switch can be activated with the battery master switch handle, an external switch or a switch in the instrument panel.

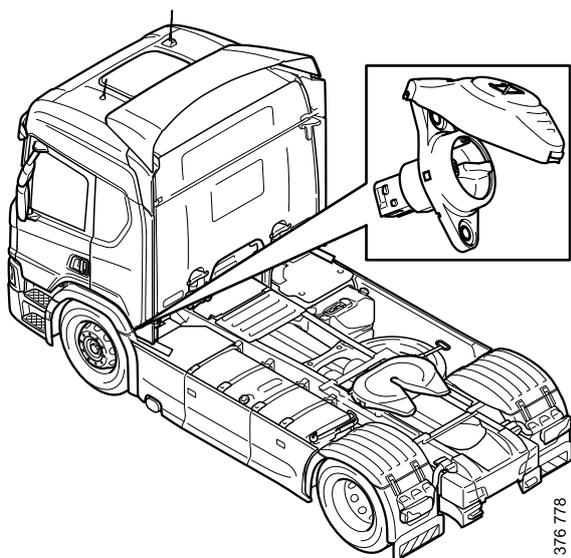
### **IMPORTANT!**

#### **Disconnect the yellow control switch to switch off the VCB system:**

- For hybrid vehicles, see section: *Hybrid vehicles and plug-in hybrid electric vehicles > Built in safety devices.*
- For electric vehicles, see section: *Electric vehicles > Built in safety devices.*

### **External switch for battery master switch for the 24 V system**

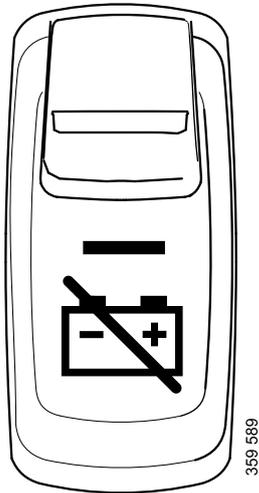
The vehicle may be fitted with an external switch for the battery master switch; this is normally red. The outer switch for the battery master switch is positioned behind the vehicle cab on the left-hand side.





## Switch for battery master switch in the instrument panel

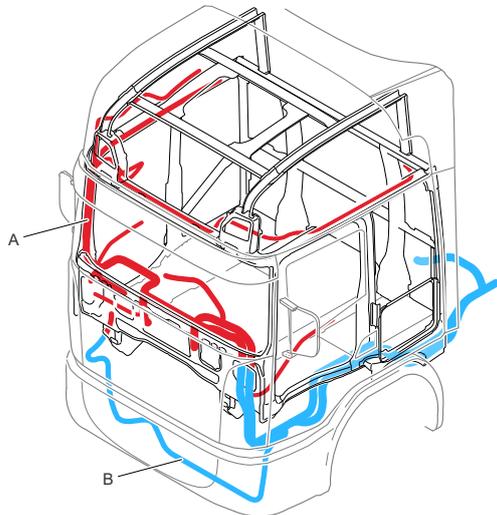
The switch for the battery master switch is located in the instrument panel.





## Cable harness

The illustration shows the routing of the largest cable harnesses in the cab.



*A - Cable harness inside the cab*

*B - Cable harness on the outside of the cab*



# Getting into the vehicle

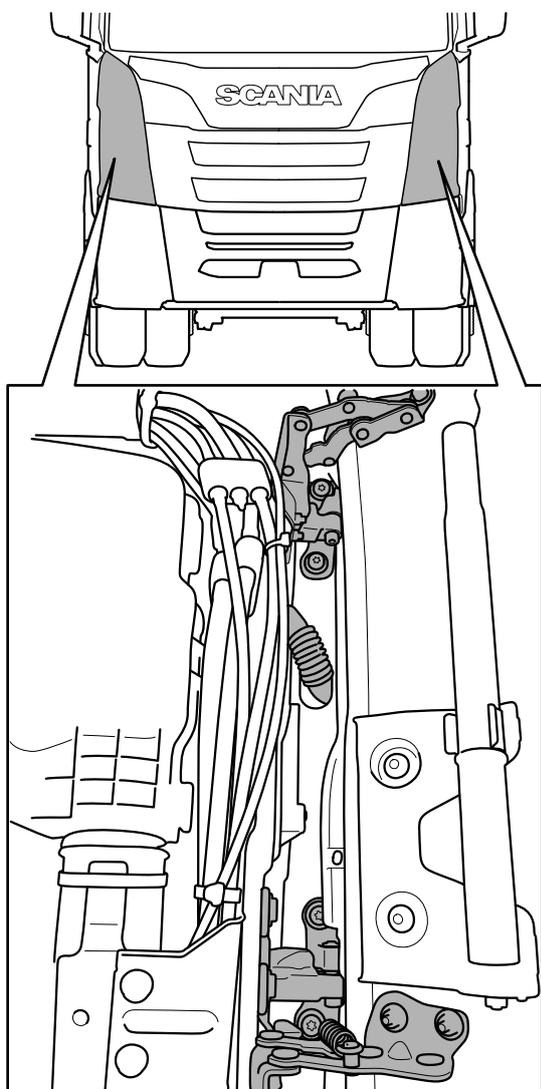
## Door

The door can be removed from the cab by cutting off the hinge.

**⚠ WARNING!**

The door can weigh up to 60 kg.

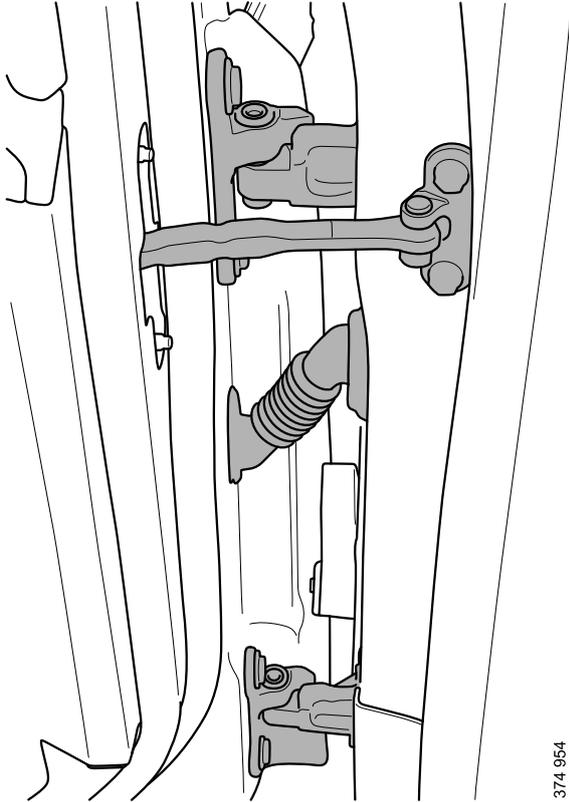
1. Open the cab corner to access the hinge. On electric vehicles, the right-hand corner can be opened through an eye with wire rope from the outside
2. Cut or saw off hinges, door stop and cable harness.





## Getting into the vehicle

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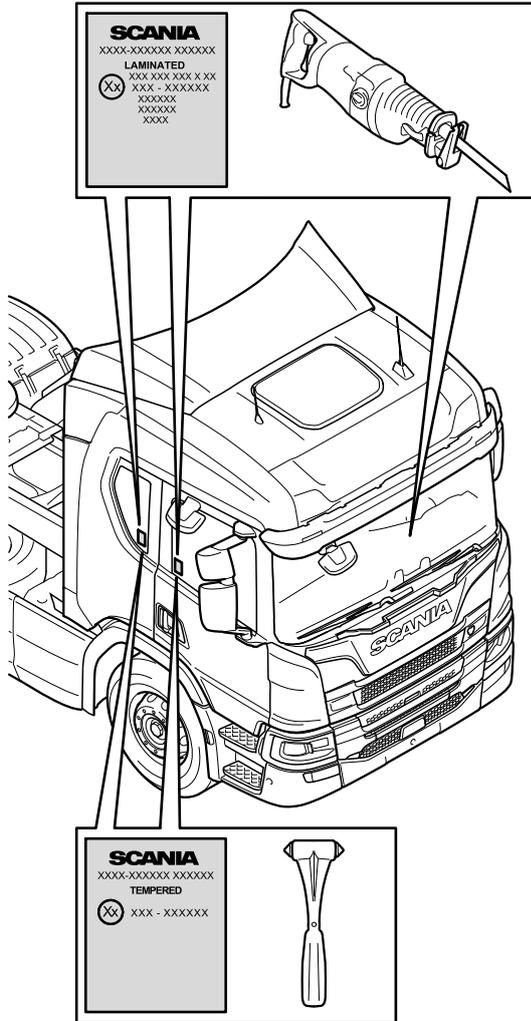
374 954



## Windscreen and door window

The windscreen is laminated and glued to the cab structure. Use a tiger saw, for example, to saw through the windscreen.

The door window may consist of single or laminated glass. Use an emergency hammer or tiger saw, for example, to smash the door window.



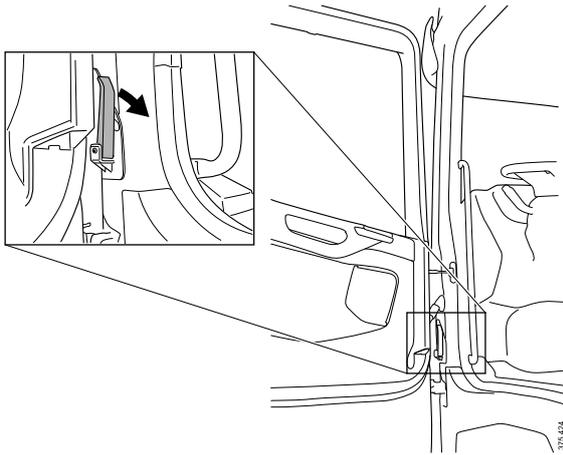
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# Opening the vehicle front grille panel

## Lockable front grille panel

The lockable front grille panel can be opened using a handle in the door pillar. Grasp the handle at the arrow and pull back forcibly. If the front grille panel is stuck, ask someone else to pull up forcibly on the lower edge of the front grille panel at the same time.

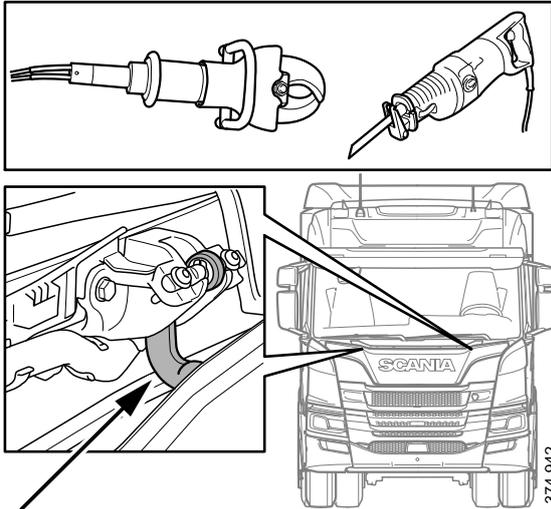




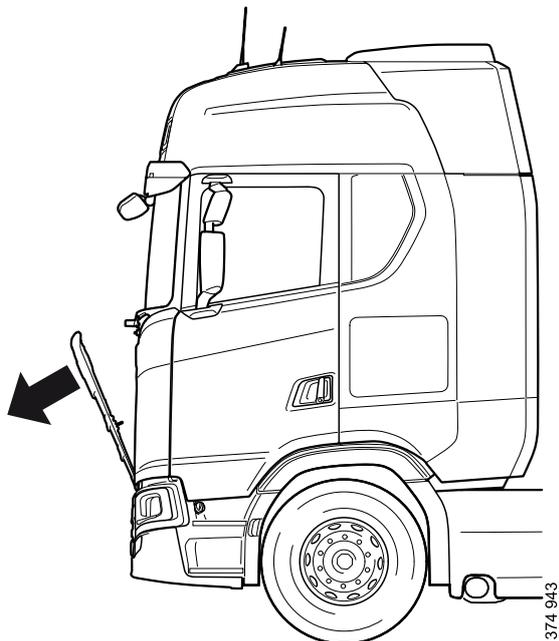
## If the front grille panel of the vehicle cannot be opened

The front grille panel of the vehicle is attached by a hinge in the upper part.

3. Cut or saw off the hinges on the grille panel's left or right-hand side.

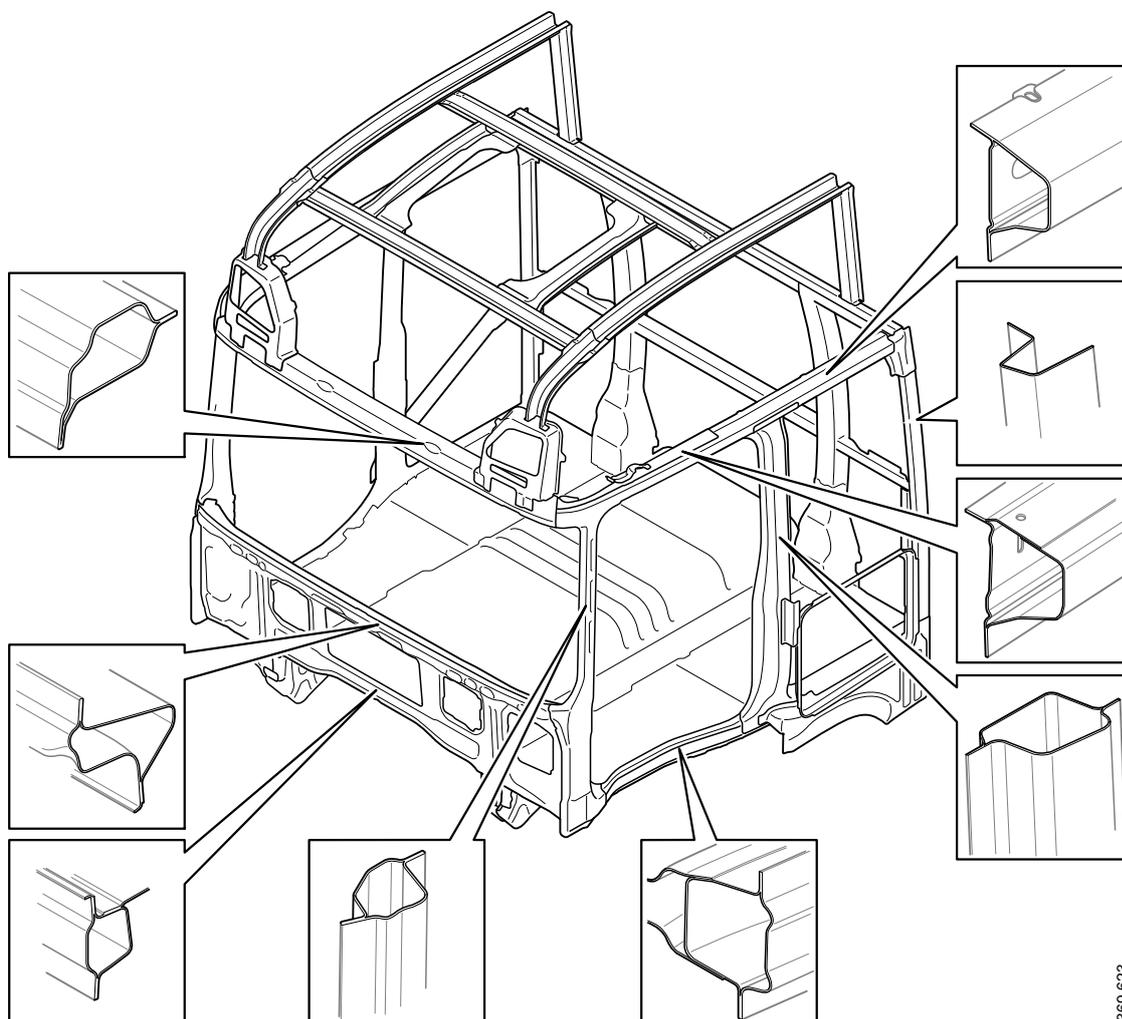


4. Fold down the front grille panel.





# Cab structure



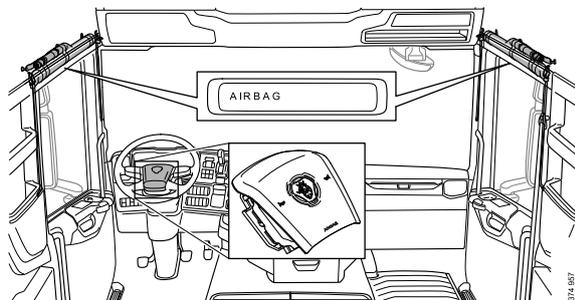
369 623

The illustration shows which profiles the cab structure is made up of. All beams in the cab structure can be cut with a cutting tool.



# Vehicle safety equipment

## Airbag

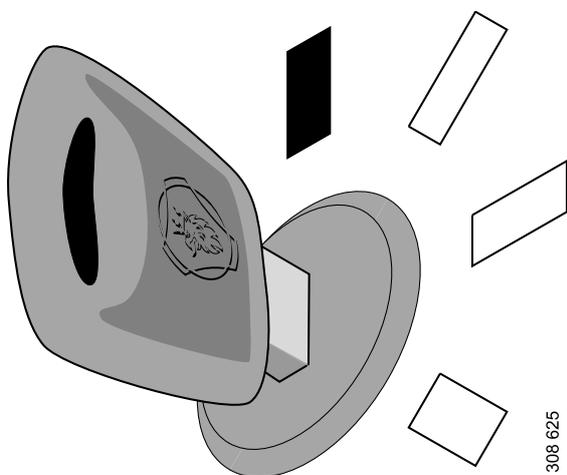


### **WARNING!**

The airbag contains explosive substances!

If the vehicle is fitted with an airbag on the driver's side, this is indicated by the text AIRBAG on the steering wheel. The passenger side is never fitted with an airbag.

When the vehicle starter key is in the lock position, or there is no vehicle power, then the airbag is deactivated.



*The starter key is in the lock position.*



## Belt pretensioner

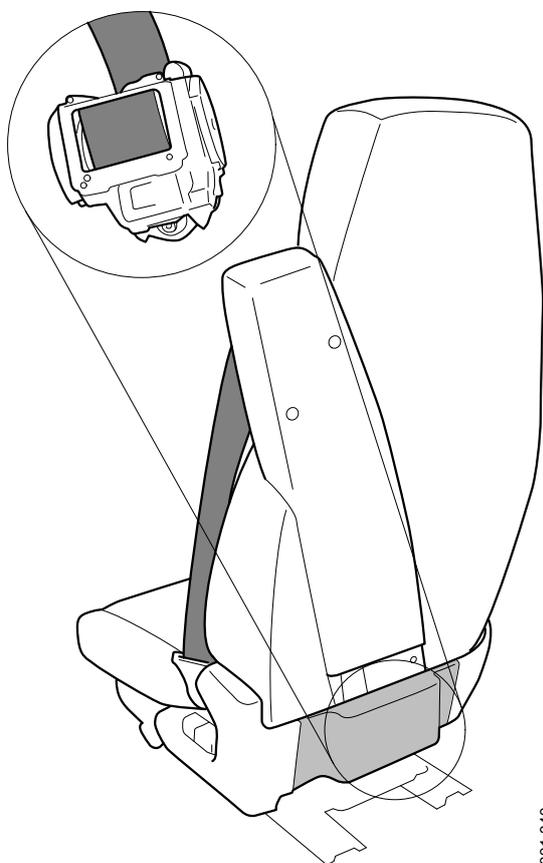
**⚠ WARNING!**

The belt pretensioner contains explosive substances!

The belt pretensioner is positioned on the driver's seat and on the passenger seat. If the vehicle is fitted with an airbag there is always a belt pretensioner on the driver's seat.

When the vehicle starter key is in the lock position, or there is no vehicle power, then the belt pretensioner is deactivated.

The belt pretensioner is positioned as illustrated on the 2-seat models that are fitted with a belt pretensioner.



301 340

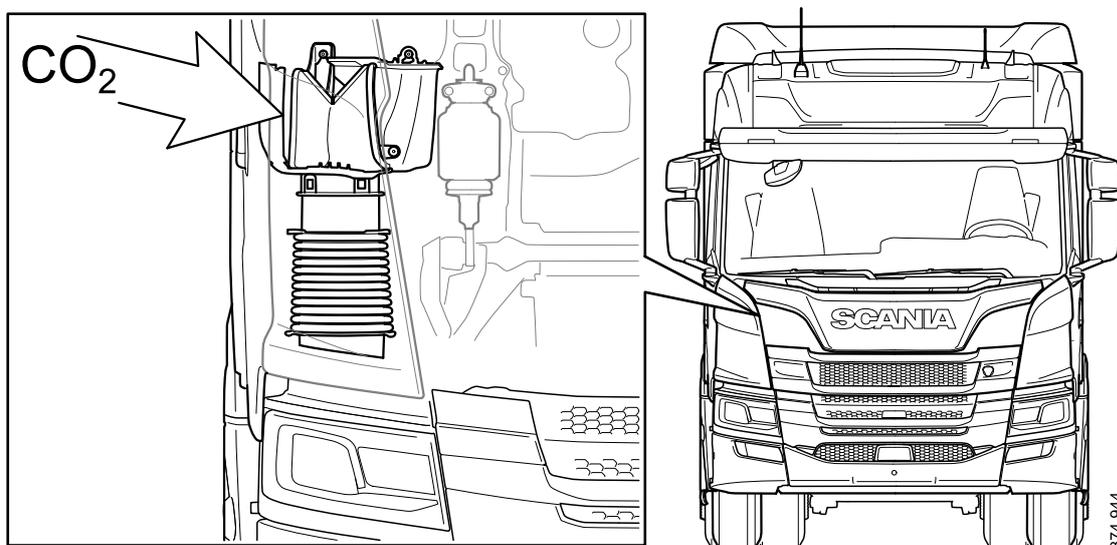


# Engine air intake

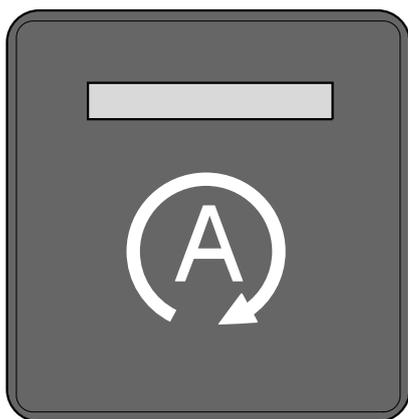
## Front air intake

The vehicle engine can be shut off by spraying carbon dioxide into the air intake. The air intake can be accessed with the front grille panel open.

Switch off the voltage to prevent the engine on vehicles with automatic idle stop and start starting by itself. Switch off the voltage by removing the battery terminals or battery master switch. Idle stop and start can also be deactivated using the break switch in the instrument panel.



The vehicle engine can be shut off by spraying carbon dioxide into the air intake.



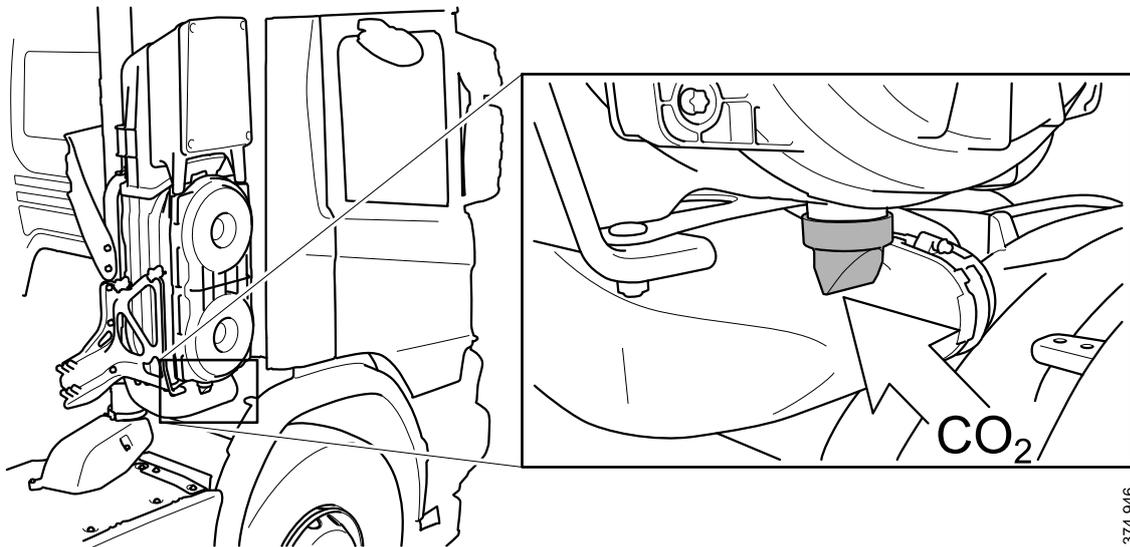
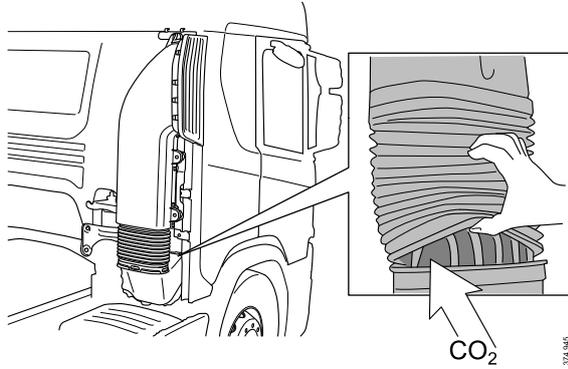
456 320

The break switch that deactivates idle stop and start in the instrument panel.



## High air intake

On vehicles with high air intake, the air intake can be accessed behind the cab.





# Air suspension

## Cab with air suspension

On vehicles with a cab with air suspension, the air can be released from the air suspension to stabilise the cab.

 **WARNING!**

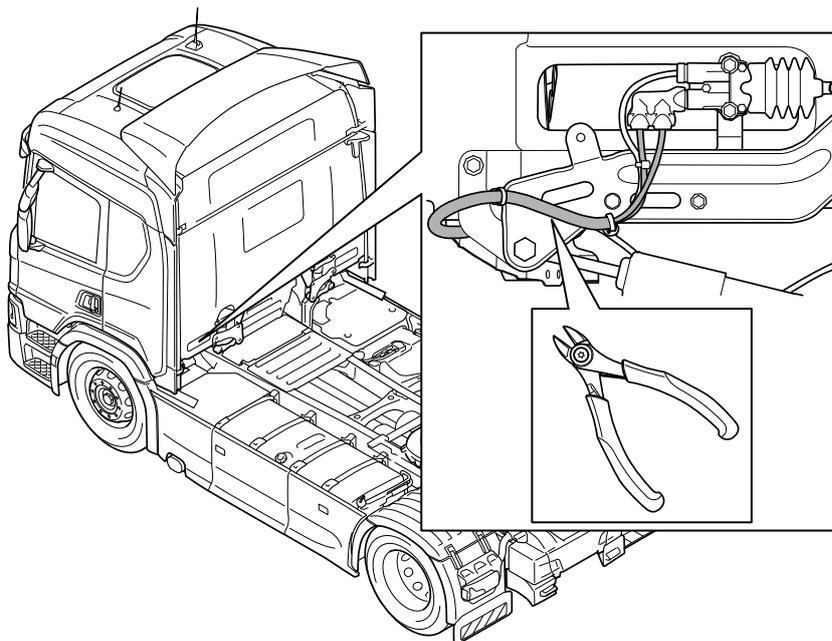
Risk of hearing impairment! A loud noise occurs when the air flows out of the cut or disconnected hose.

 **WARNING!**

Risk of injury when the cab suspension is emptied.

### Rear cab suspension

- Cut off air hose to the rear cab suspension.

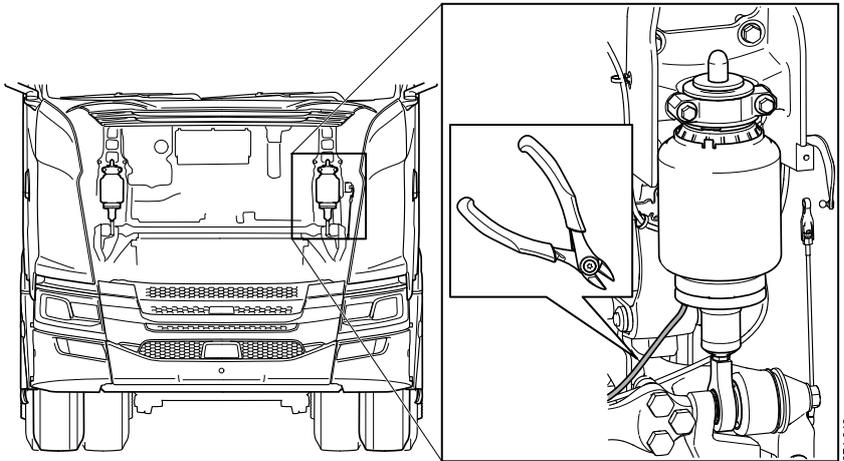


374 947



## Front cab suspension

- Cut off air hose to the front cab suspension.



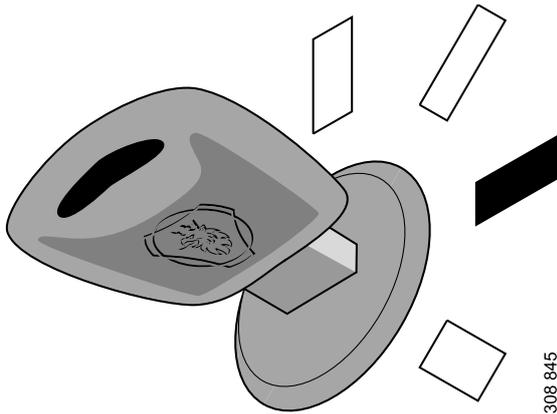


## Chassis air suspension

### The operation unit

Vehicles with air suspension chassis are raised and lowered using the operation unit. Raising the chassis can be carried out as long as there is pressure in the system's compressed air tanks.

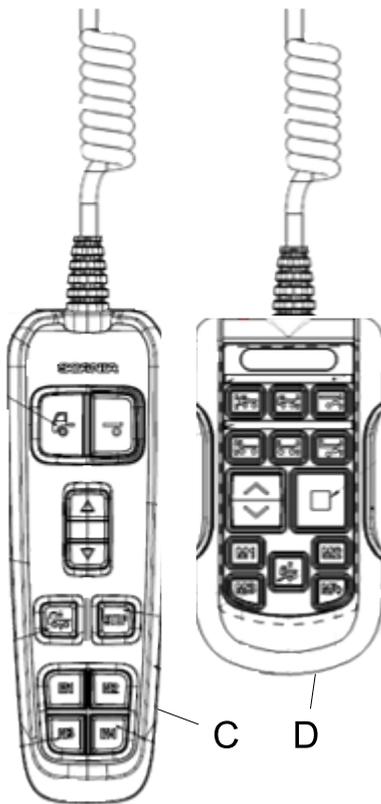
To operate the operation unit, the starter key must be in drive mode and the vehicle voltage must be connected.



*The starter key is in drive mode.*

The operation unit is positioned at the side of the driver's seat.

- Gear selection buttons
- Memory buttons
- Level change buttons
- Normal level restore button
- Deactivation
- Stop button
- Memory buttons



408 196



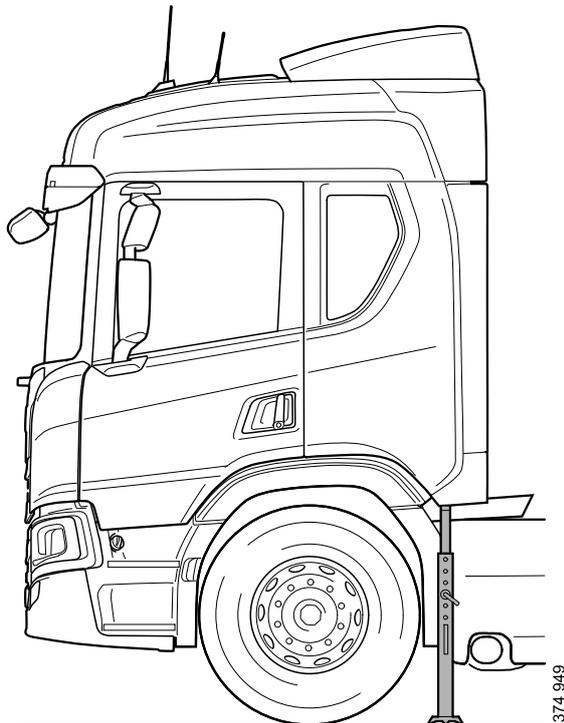
# Securing the cab

Supports on each side at the rear of the cab prevent the cab from moving downwards.

By anchoring the cab in the frame on each side the cab is prevented from moving upwards. The brackets under the cab can be used as illustrated.

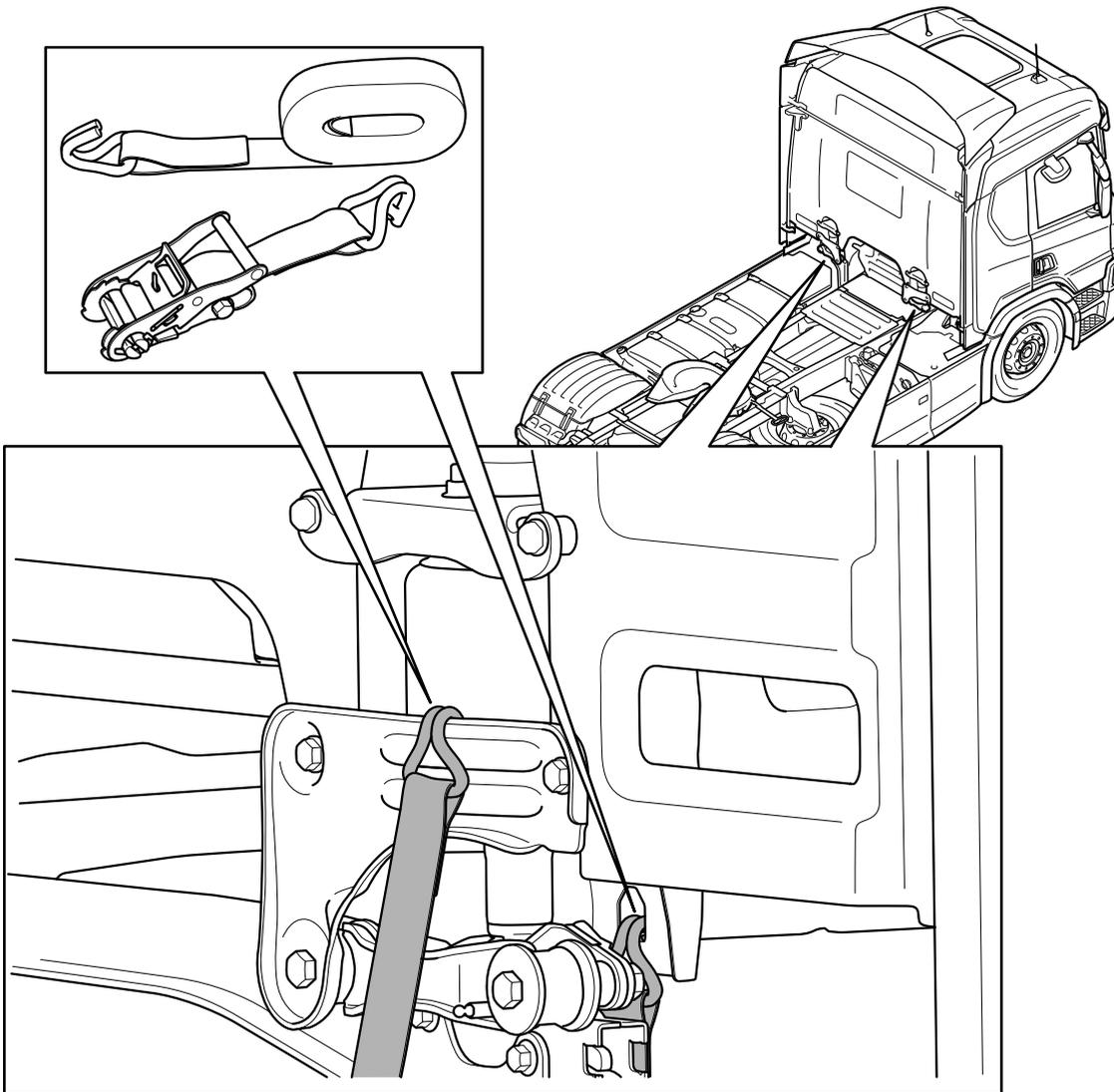
 **WARNING!**

Beware of hot exhaust system mounted on the right side of the vehicle.





# Securing the cab



374 950



# Adjusting steering wheel

## Adjusting with button

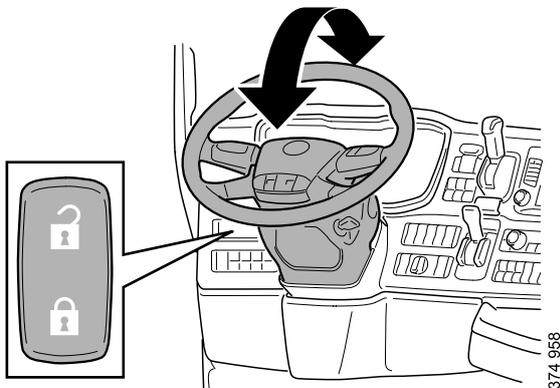
To adjust the height and angle: press the button by the open lock for a few seconds.

To lock the selected setting: press the button by the closed lock.

The settings are also locked automatically after a few seconds.

**i** **NOTE:**

The function requires that there be compressed air remaining in the vehicle.

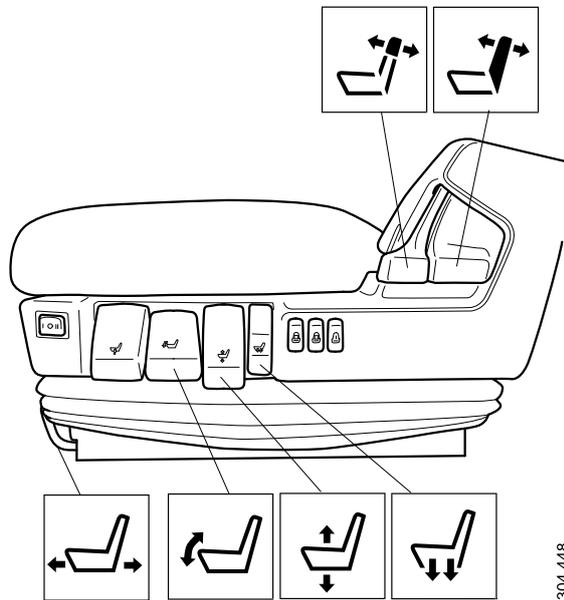




# Adjusting the seat

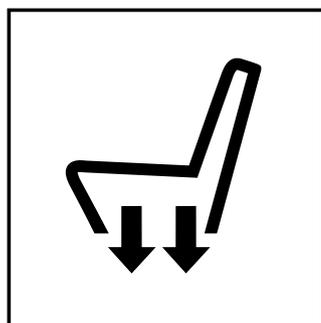
The option to adjust the seat depends on the seat type.

The illustration shows an example.



## **WARNING!**

The control for quick lowering of the seat lowers the seat quickly and empties the system of air. This may mean that the seat cannot be adjusted after the control has been used.



## **WARNING!**

Risk of hearing impairment! A loud noise occurs when the air flows out of the cut or disconnected hose.

Quick lowering of the seat and emptying of air from the system can also occur if the air hose at the rear of the seat is loosened or cut.



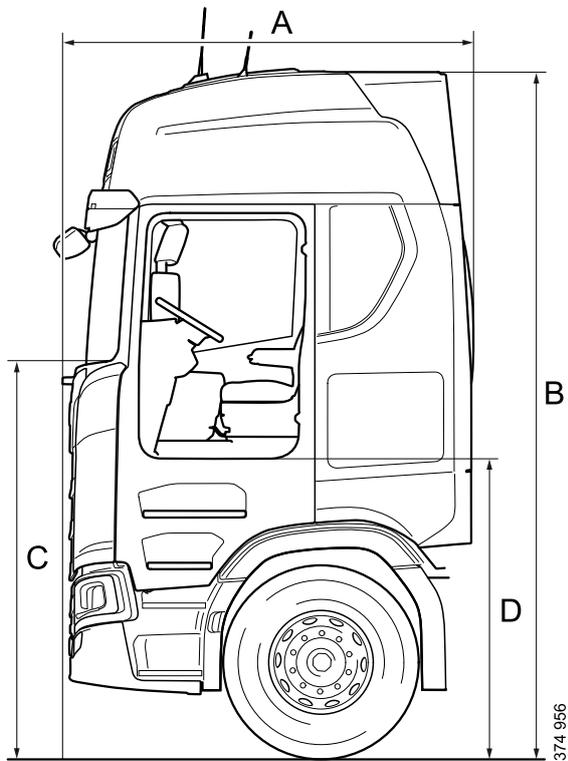
# Cab dimensions and weight

The cab can weigh up to 1,320 kg.

The outer dimensions from the ground vary depending on the cab type, roof height, choice of suspension, load and settings.

## Dimensions (mm)

	Min.	Max.
A	1,730	2,280
B	2,695	3,900
C	1,640	2,250
D	1,000	1,650





# Gas vehicles

## Vehicle gas

The vehicle gas used in Scania gas vehicles is biogas, natural gas, or a mixture of these.

Vehicle gas is primarily made up of methane and has a methane content of 75-97%. Methane is a highly flammable gas that has explosive limits at 5-16% mixture in air. The gas self-ignites at a temperature of 595°C.

Vehicle gas is essentially colourless and odourless. Pressurised vehicle gas, CNG, is often mixed with odorants to enable leakages to be detected. Liquid vehicle gas, LNG, has no added odour, but major leakages are visible as a mist as the water in the air condenses when it is cooled down by the throttle.

Methane is lighter than air and therefore rises in the event of leakage. This should be taken into account when leakages occur, for example indoors or in a tunnel. The gas can cause suffocation in confined spaces. Liquid and cold methane gas is heavier than air and can run into low points in the event of leakage. Therefore, ensure good ventilation.

### Plate

Gas vehicles are marked at several points with a diamond-shaped symbol with the text CNG or LNG.

### Pressurised vehicle gas, CNG

CNG stands for Compressed Natural Gas. The gas tank packages consist of a number of gas tanks which are positioned together. A truck with a full tank can hold up to 150 kg of fuel.

The pressure in the gas tank and the fuel system can exceed 230 bar when refuelling.



327 069

*Green symbol for compressed vehicle gas, CNG.*



## Liquid vehicle gas, LNG

LNG stands for Liquefied Natural Gas. The fuel is cooled to  $-130^{\circ}\text{C}$  and then consists of liquid and gaseous methane. Leaking LNG boils and expands to 600 times the liquid volume at normal pressure. A vehicle with a full tank can hold up to 180 kg of fuel.

The fuel is kept pressurised in the tanks to 10 bar (g). The pressure in the tanks and gas lines can vary, up to a maximum of 16 bar, provided that the safety valves are intact.



401 816

*Green symbol for liquid vehicle gas, LNG.*

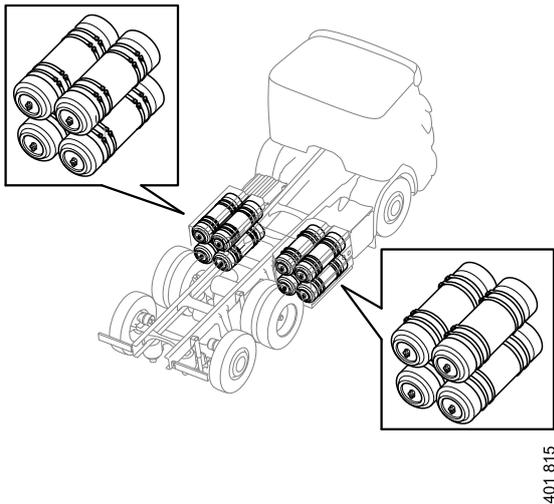


## Gas vehicle components in CNG

The design of the gas tanks and valves varies depending on the manufacturer.

### Gas tank package

- On trucks, the gas tank packages are positioned on the frame.



*Position of the gas tank packages on trucks.*

There are 2 versions of gas tanks: steel or composite. Each gas tank in the gas tank package is fitted with a solenoid valve, shut-off valve and pipe break valve.

### **WARNING!**

If the outer casing of composite tanks is damaged, the structure is weakened, which over time can cause the gas tank to crack.

### Gas lines

The gas lines on trucks are routed along the frame and between the tank package.



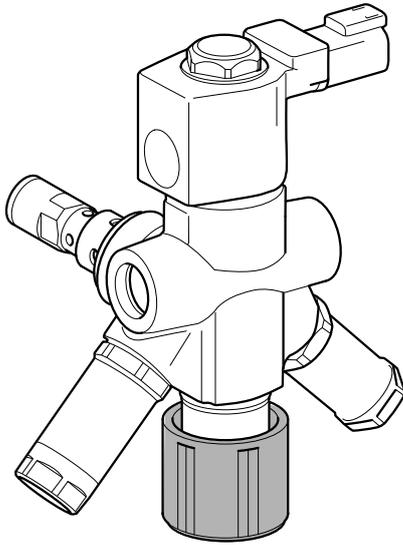
## Safety valves

**⚠ WARNING!**

The solenoid valves are only open when the engine is running.

The gas tanks are equipped with one or more temperature-sensitive fuses. Steel tanks also have pressure fuses. There is also a pipe break valve which restricts the flow from the tank if the pressure causes major leakage from a line. If the pressure exceeds 11 bar on the low pressure side, a safety valve in the pressure regulator is also opened.

On trucks, the safety valves are located at the rear of the gas tanks, directed at an inwards angle and a rearwards angle under the truck.



406 648

*Gas bottle shut-off valve*



## Gas vehicle components in LNG

The design of the gas tanks and valves varies depending on the manufacturer.

### Gas tanks

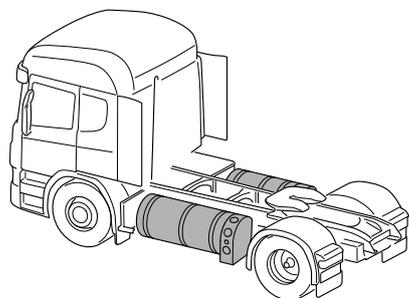
Common positioning of gas tanks:

- On trucks, the gas tank is positioned on the frame.

The gas tanks are made of steel.

The pressure in the tank can be read on a manometer located on the side of the tank.

The gas tanks are fitted with a solenoid valve, shut-off valve, pipe break valve, and pressure-activated safety valves.

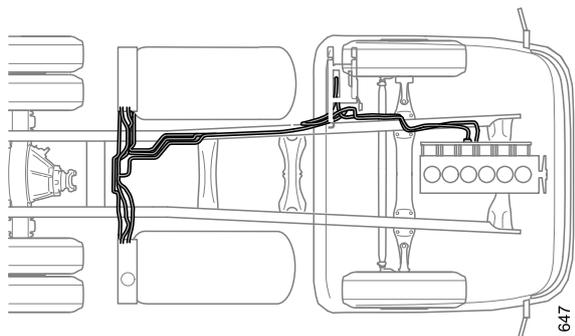


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*Position of the gas tanks on trucks.*

### Gas lines

The gas lines on trucks are routed along the frame and between the tanks.



406 647



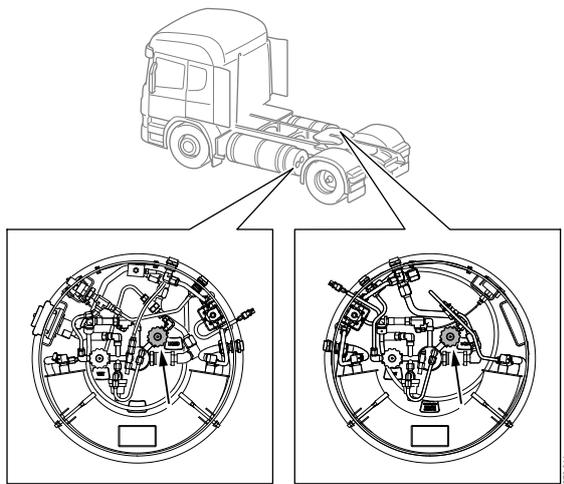
## Safety valves

**⚠ WARNING!**

The solenoid valves are only open when the engine is running.

Each tank is fitted with 2 overpressure valves in the rear section. These are triggered at 16 bar and 24 bar. The safety valves are directed at an inwards angle and a rearwards angle under the truck.

There is no manual shut-off valve on the gas panel, but there is a manual tap on each tank. There is a pipe break valve which restricts the flow from the tank in the event of major leakage from a line. If the pressure exceeds 12 bar on the low pressure side, a safety valve in the pressure regulator is also opened.



*Shut-off cock.*



## Risk management for gas vehicles

The area must always be evacuated in the event of fire, leakage, or a vehicle with a damaged gas tank.

Due to a risk of explosion and suffocation, gas vehicles must be declared to be free of gas before they are taken indoors. If a gas leakage occurs, the gas will be confined, contributing to an unsafe environment.

### Explosion

#### CNG

The risk of explosion is very small. Temperature fuses are automatically triggered at 110°C in order to prevent explosion. If the vehicle is equipped with a pressure fuse, this triggers at 340 bar. Explosive pressure is 450 bar for steel tanks and 470 bar for composite tanks.

#### LNG

The risk of explosion is very small. Pressure valves are triggered at 16 bar and 24 bar.

### Damaged gas tank

Always evacuate the area around a vehicle with a damaged gas tank.

Vehicle gas expands with the temperature and it is therefore important to lower the pressure in a damaged gas tank. A damaged gas tank can withstand pressure temporarily, but if the pressure is raised, e.g. by heat from the sun, the gas tank may break. Therefore, try to reduce the pressure in a damaged gas tank in a safe way by shooting holes in the tank from a safe distance.



#### **WARNING!**

The pressure displayed on a manometer is the pressure in the pipe system. The gas tanks have solenoid valves, which are closed when power is cut. Therefore, always treat the tank as if it is filled with gas, even if the pressure gauge shows 0 bar.



## Leakage

 **WARNING!**

Remove all ignition sources in the vicinity of a gas leakage during evacuation.

 **WARNING!**

The gas can cause suffocation in confined spaces.

 **WARNING!**

Liquid vehicle gas, LNG, is extremely cold. Leakages can lead to personal injury.

If a high-frequency high whining noise is heard, this indicates that the gas system has a leak.

Gas leakage from CNG pressurised vehicle gas can also be identified by an acrid odour if the gas has had an odour added.

Major LNG liquid vehicle gas leakages can be seen as a mist since the cold gas makes the water in the air condense.

If a gas leakage has been identified, evacuate the area until no sound can be heard, no mist can be seen and no odour detected.

Pressurised vehicle gas, CNG, is lighter than air and therefore rises in the event of leakage. Take this into account if leakages occur, for example indoors or in a tunnel.

Liquid vehicle gas, LNG, is initially heavier than air because it is cooled. It rises as the temperature increases.



## Fire

In the event of a fire: If possible, cut off the gas supply by switching off the engine.

The area around the vehicle must then be evacuated. Cordon off an area of a radius of at least 300 m around the vehicle. Only then can fire extinguishing activities be carried out, if they can be performed in a safe way. Otherwise, wait until the gas has burnt up.

Water or carbon dioxide must never be used to extinguish LNG vehicles. This can lead to a powerful fire sequence and at worst an explosion. Use a powder fire extinguisher instead.

Do not cool down the temperature-sensitive fuses on CNG tanks, as this can cause the safety valves to close or cease to open. This can lead to a terrible fire or, in the worst case, an explosion

### **WARNING!**

Avoid cooling the tanks or spraying water on the fire. This will result in a more powerful fire.

### **WARNING!**

The safety valve is triggered at abnormally high temperatures or pressure, in order to prevent an explosion. This produces a burst of flame tens of metres long. Evacuate the area in the direction of the safety valve.

### **WARNING!**

Use a powder fire extinguisher.



# Hybrid vehicles and plug-in hybrid electric vehicles, truck

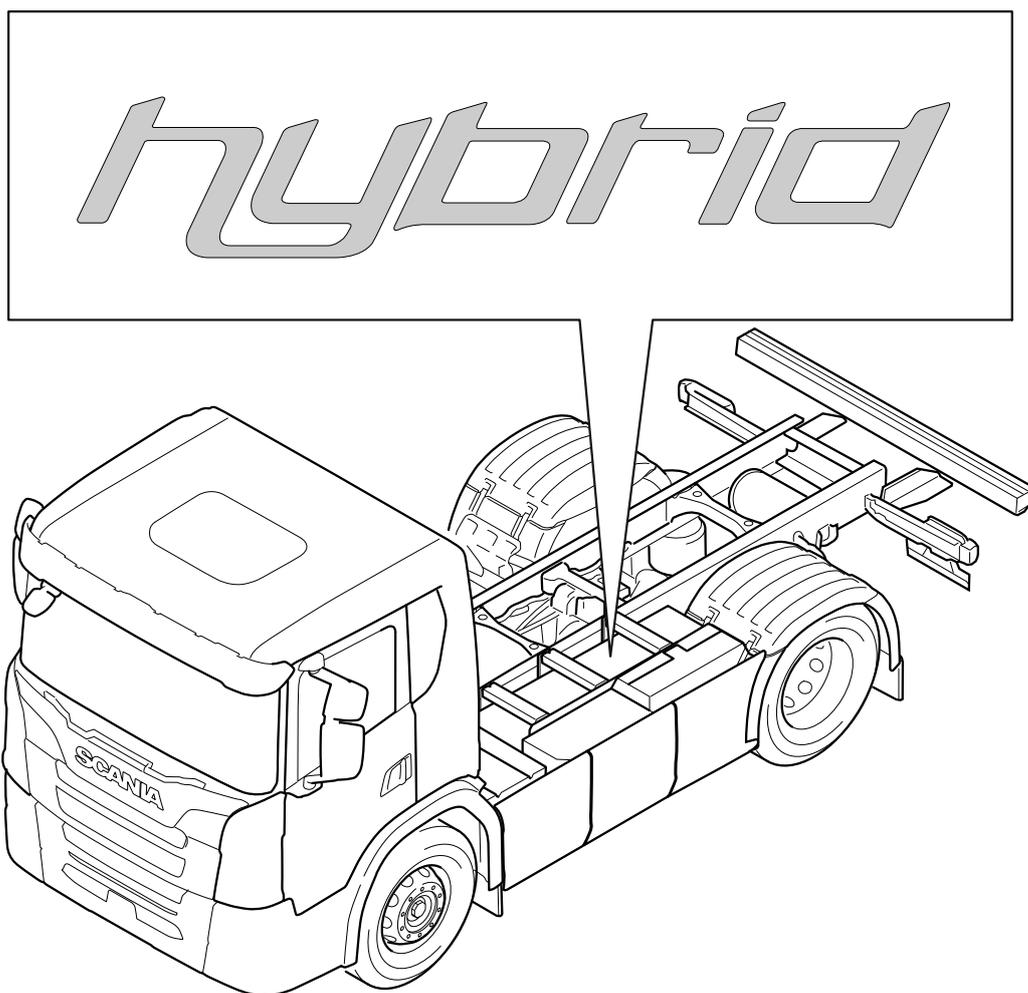
## The electric propulsion system in hybrid and plug-in hybrid vehicles

**⚠ WARNING!**

Wear eye protection and rubber gloves classified for 1,000 V when carrying out work with a risk of coming into contact with voltage class B.

The hybrid system is powered by voltage class B (650 V); see definition below.

Voltage class A	Voltage class B
0 V-60 V DC	60 V-1,500 V DC
0 V-30 V AC	30 V-1,000 V AC



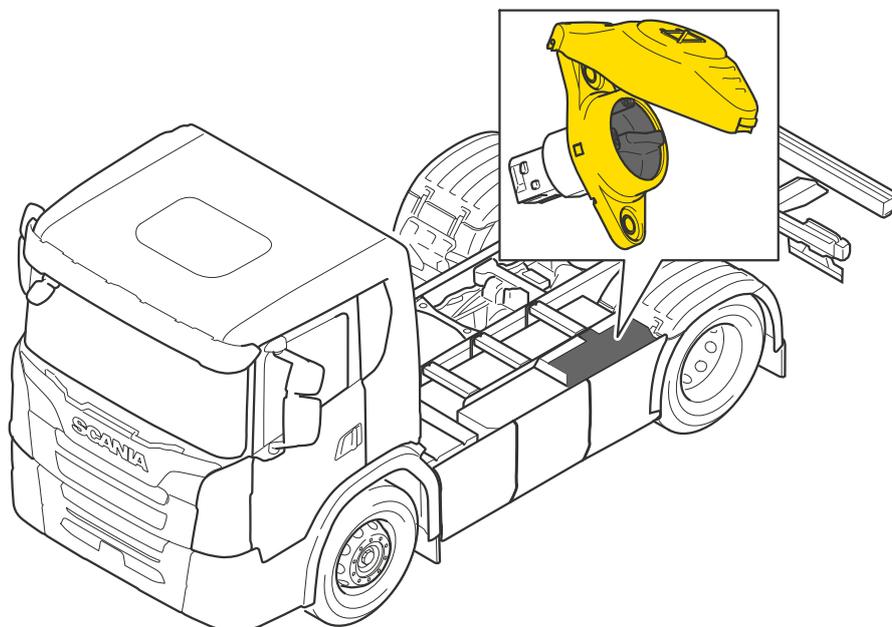
397 317



## Built-in safety devices

The hybrid system has the following built-in safety devices:

- The hybrid system cable harness for voltage class B (650 V) is orange. The cable harness for voltage class B (650 V) is insulated from chassis earth. This means that there has to be contact with both conductors before there is a risk of personal injury.
- The hybrid system components that pose a fire hazard are equipped with warning plates that warn of voltage class B (650 V).
- The hybrid system monitors the battery temperature, voltage, current intensity and electrical insulation level. The hybrid system disconnects the battery and cuts the power to the cable harness if any results deviate.
- The hybrid system voltage is normally switched off when the 24 V system is switched off.
- The hybrid system is shut off using the control switch, which is normally yellow, located in the hybrid power unit.



455 204



## Cut all power to the vehicle

### **WARNING!**

Wear eye protection and rubber gloves classified for 1,000 V when carrying out work with a risk of coming into contact with voltage class B (650 V).

### **WARNING!**

Always avoid cutting VCB cables (650 V). The system may be live even if:

- the break switches for 24 V or voltage class B are switched off
- the contactors in the propulsion batteries have been welded in the closed position.

There is a high risk of an electrical arc that may cause personal injury. Wear eye protection and rubber gloves classified for 1,000 V.

### **WARNING!**

The electric machine always produces power if the combustion engine is in operation, or if it for some other reason starts rotating, even if the hybrid system is otherwise disconnected.

1. Turn off the ignition.
2. Switch off the 24 V system by disconnecting the battery terminals on the 24 V batteries. The 24 V battery is located on the battery shelf behind the cab on the left-hand side.  

Normally, this means that the propulsion battery is disconnected and that starting the combustion engine is prevented. This in turn, prevents voltage from the electric machine.

To be sure that there is no residual voltage remaining in the system's charged capacitor, wait 15 minutes.
3. If the cable harness for voltage class B needs to be cut or becomes damaged, and if the 24 V system is not accessible, disconnect the connectors on the propulsion battery. This guarantees that the hybrid system is disconnected.



## **Procedure for extinguishing a fire**

### **Propulsion battery fire**

If there is a visible fire in the propulsion battery, use large amounts of water to cool the propulsion battery.

Contact the fire service, which has equipment to extinguish fires in propulsion batteries for vehicles.

### **For other vehicle fires, not battery fire**

In the event of a vehicle fire where the battery box is intact and not on fire, we recommend using normal procedures for extinguishing a fire.

The propulsion battery must be protected and cooled down with large amounts of water.

If the battery box is significantly damaged, large amounts of water must be used to cool the propulsion battery. It is important to reduce the temperature of the propulsion battery with water only to prevent the risk of fire and fight any fire.



## Recovery and shunting

Information and instructions must be followed during recovery and shunting to prevent personal injury and vehicle damage.

Recovery of heavy vehicles should always be entrusted to an authorised recovery company.

Collision-damaged or suspicious vehicles need to be clearly marked when they are left at the workshop. Position the vehicle at a suitable distance from buildings and other vehicles. The area around the vehicle may need to be cordoned off.

Remember that workshops may have their own local procedures.

### Preparatory work

- In the event of recovery from a ditch: unload the vehicle and clear the ditch of stones etc. that may damage or get caught in the vehicle during recovery.
- Check that the vehicle has not sustained any damage that may cause a short circuit in the 24 V electrical system. If it has, disconnect the 24 V batteries to prevent fire.
- When carrying out a recovery on a road, the vehicle should always be lifted without a load. Alternatively, the front axle weight can be reduced as much as possible.
- When the VCB system is switched off using S229, the electrical air compressor will be deactivated. Air must therefore be topped up in the brake system in a different way. Recovery vehicles usually have an air outlet from which the vehicle to be towed/recovered can be supplied with air.



## Recovery

### Please note:

The information about recovery and shunting that follows only applies when:

- the vehicle has not sustained any visible damage due to a collision or other incident
- The risk of fire is considered low
- The risk of exposure to high voltage is considered low
- No warnings about electrical hazards are displayed on the instrument cluster (ICL).

If the vehicle is blocking traffic or poses a potential risk, it can be towed with the propeller shaft fitted. In such circumstances, move the vehicle to a safer place.

### Please note:

Before towing is carried out:

- the vehicle's 15 voltage must be switched off with the starter key on the ICL
- the vehicle's voltage class A (VCA) must be switched off using the red control switch
- the electric drive system's voltage class B (VCB) must be switched off using the yellow control switch.

### **WARNING!**

When towing with a fitted propeller shaft:

- the vehicle must not be towed further than 500 metres
- the vehicle speed must not exceed 10 km/h.

### **WARNING!**

When towing with a fitted propeller shaft, there is a risk of damage to the vehicle's propulsion unit, propulsion batteries and other parts of the electrical system.

### **WARNING!**

It is common for several of the vehicle functions to be disengaged or out of order during recovery and towing.

### **IMPORTANT!**

Do not lift on the towing brackets.

### **IMPORTANT!**

When towing to a workshop, communicate and position the vehicle in accordance with workshop procedures.



**Please note:**

Vehicles fitted with alarms can react at speed and lock themselves even during recovery. Avoid leaving the starter key in drive mode during recovery or towing.

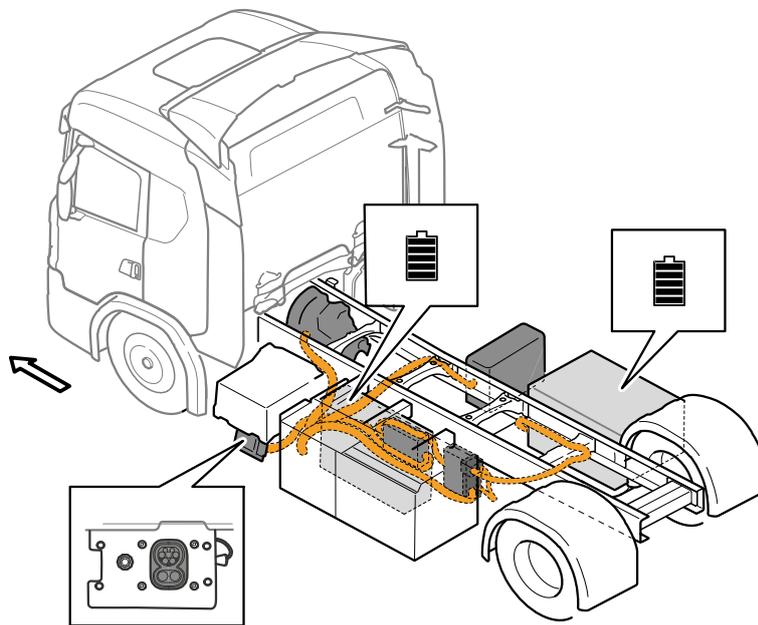


## The hybrid system

The hybrid system is a parallel hybrid and comprises a diesel engine assembled with an electric machine. The electric machine is in turn, assembled with the gearbox. The hybrid system is supplied with energy via one or more propulsion batteries that are connected to the electric machine via an inverter.

The inverter supplies the electric machine with 3-phase alternating current.

The inverter is cooled with a water cooling system that also cools the direct current converter. The direct current converter supplies the 24 V battery and the vehicle's electrical system with 24 V voltage, which is converted from the propulsion battery's voltage class B (650 V).



Overview of the hybrid system components with voltage class B and their location.

455 298

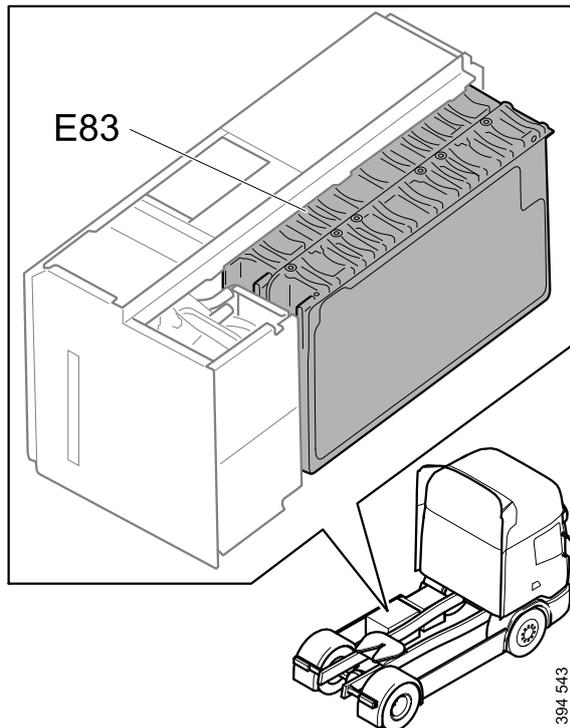


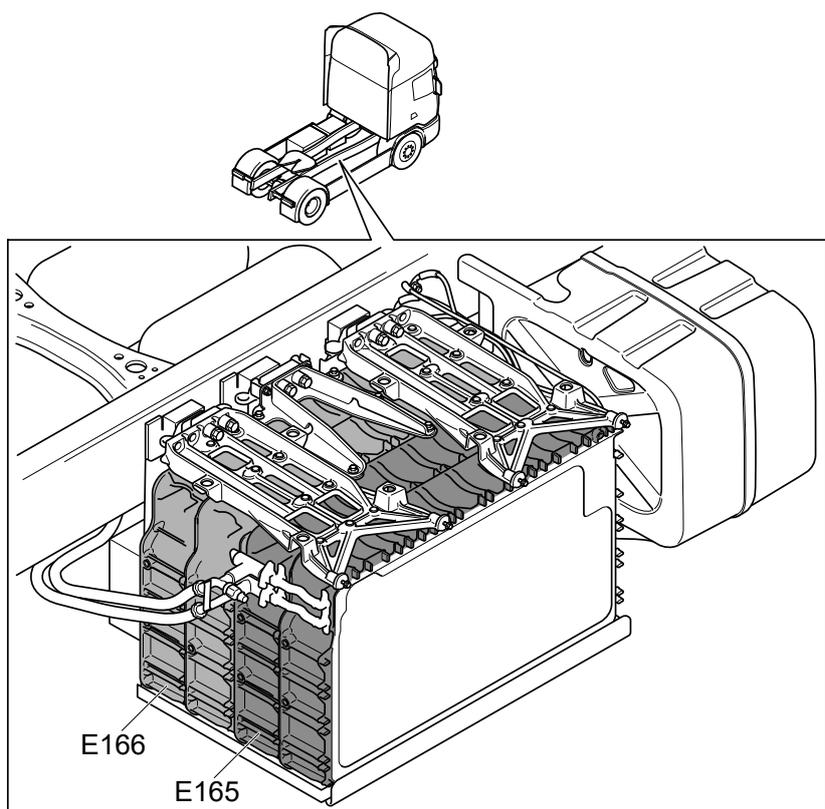
## Components with voltage class B (650 V)

### Propulsion battery

The propulsion battery is a lithium-ion battery with voltage class B (650 V). The propulsion battery is connected to the electric machine via the inverter and supplies the hybrid system with current.

The propulsion battery is located in the hybrid power unit, which is located behind the battery shelf on the left-hand side of the frame. The illustration below shows where on the vehicle components with voltage class B are positioned.

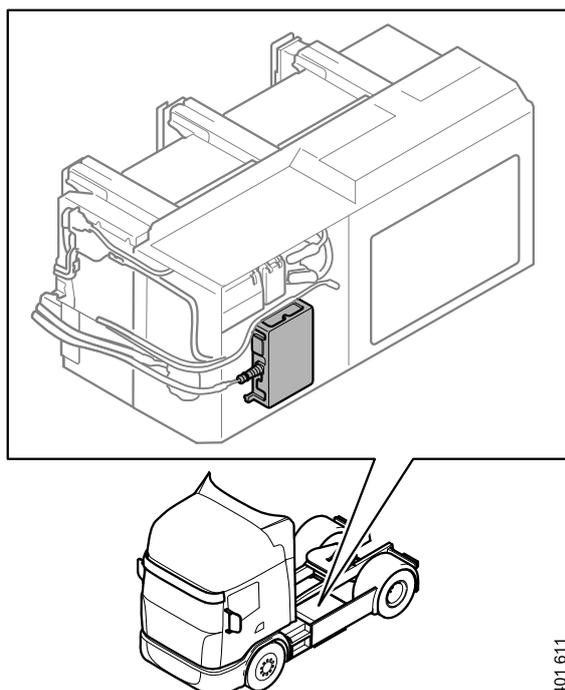


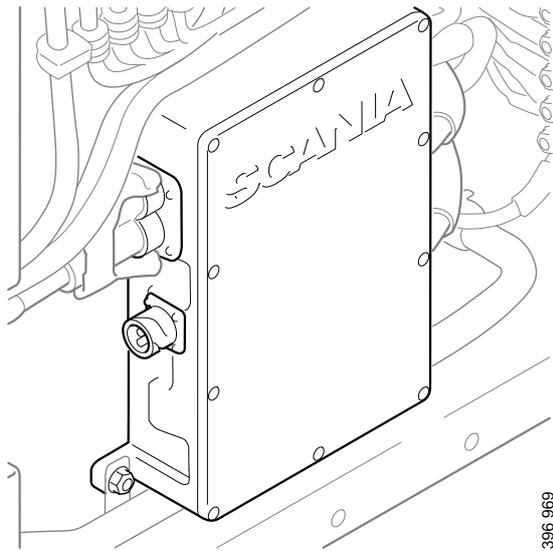


### Voltage class B central electric unit

The central electric unit for voltage class B (650 V) connects the propulsion battery, inverter, heater and the direct current converter.

The inverter is located in the hybrid power unit, which is positioned behind the battery shelf on the left-hand side of the frame.

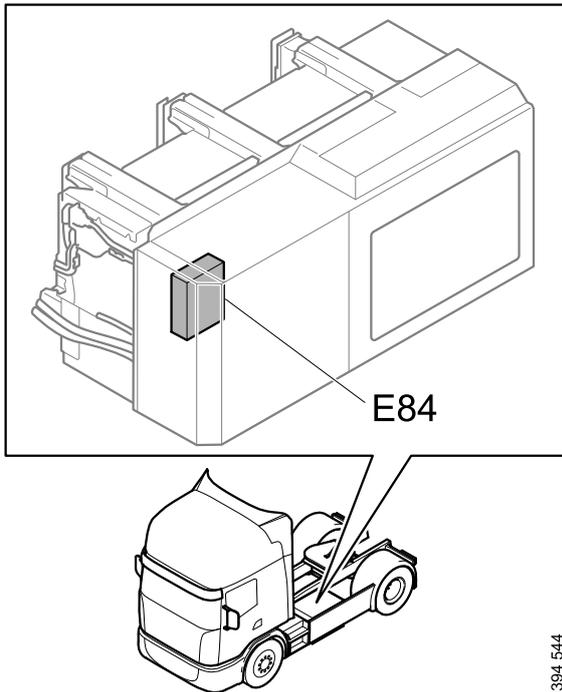


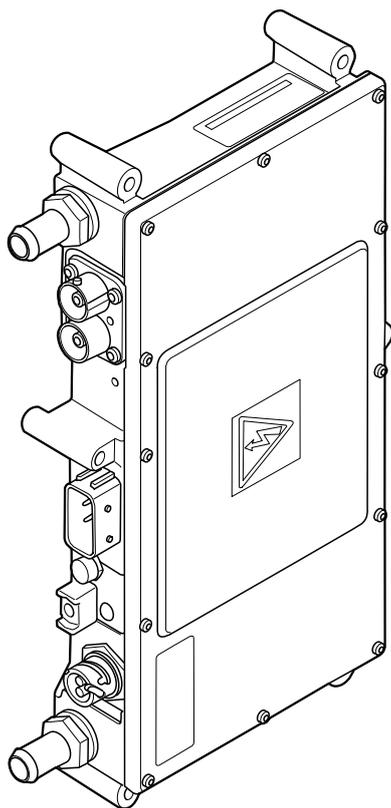


### Direct current converter

The direct current converter replaces the alternator and converts voltage class B (650 V) to 24 V.

The direct current converter is located in the hybrid power unit, which is positioned behind the battery shelf on the left-hand side of the frame.



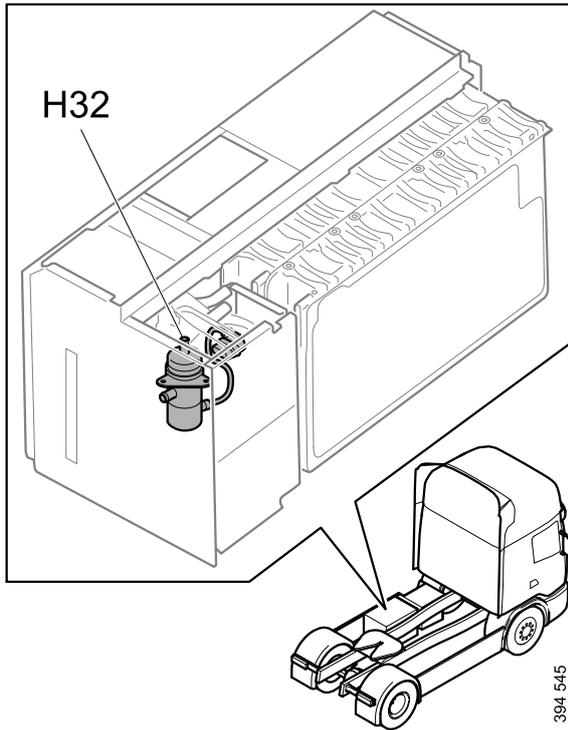


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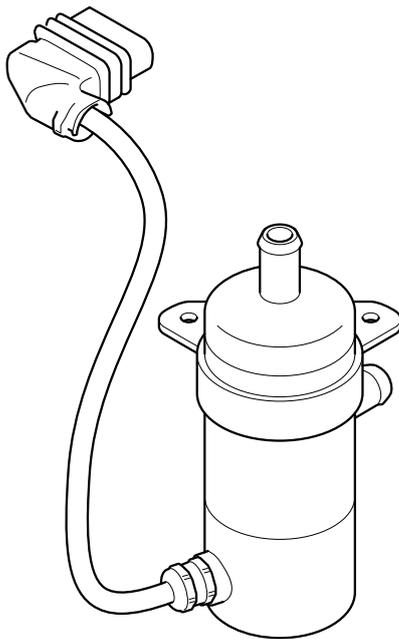
## Heater

The electric heater heats the propulsion battery if the temperature of the propulsion battery is below 5°C.

The heater is powered by 650 V and is located in the hybrid power unit, which is positioned behind the battery shelf on the left-hand side of the frame.



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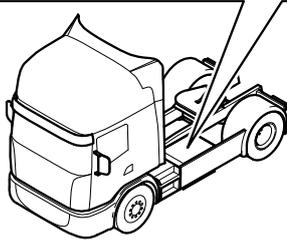
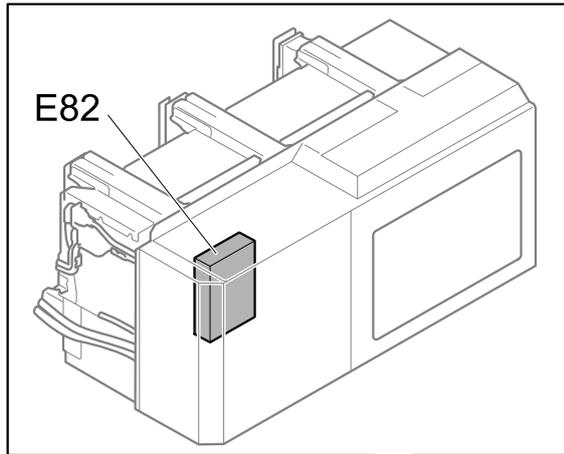
394 560

## Inverter

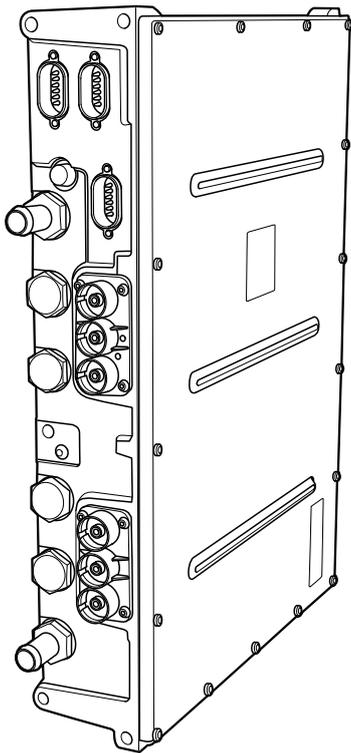
The inverter converts the propulsion battery's 650 V DC to 3-phase 400 V AC to drive the electric machine and vice versa in the event of alternator operation.

The inverter is located in the hybrid power unit, which is positioned behind the battery shelf on the left-hand side of the frame. It is liquid-cooled and part of one of the 2 cooling circuits in the hybrid power unit.

The inverter is connected to the electric machine using 3 cables for voltage class B.



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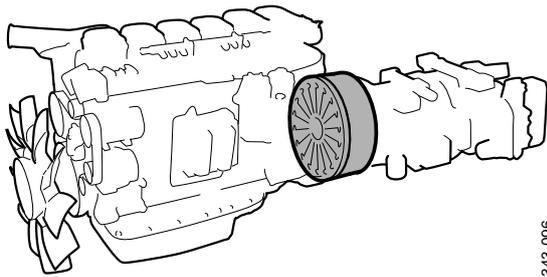


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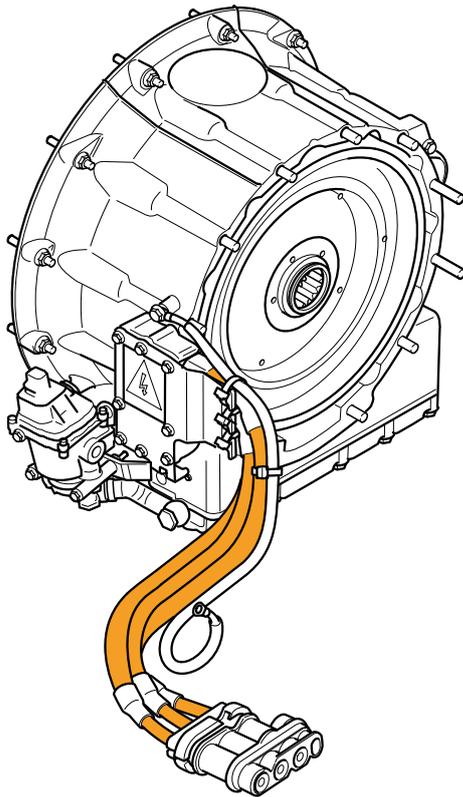
## Electric machine

The electric machine is electromagnetic and transforms electric energy into mechanical energy and vice versa.

It is located between the gearbox and diesel engine and used for propulsion and braking of the vehicle.



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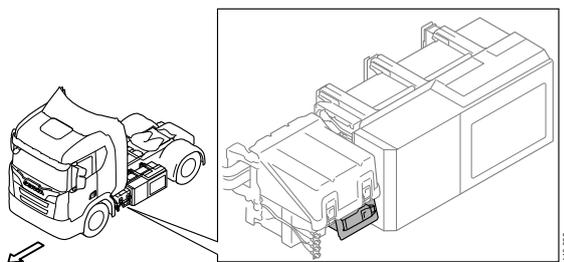


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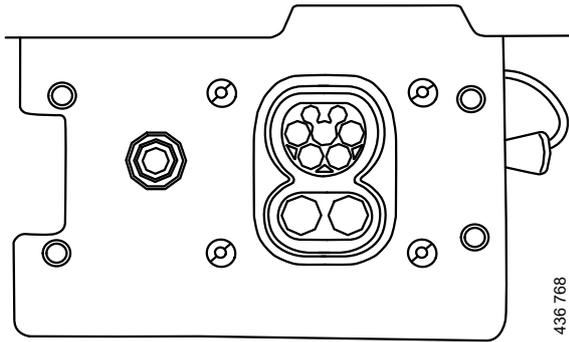
### Unit for external charging

Plug-in hybrid electric vehicles have a charging socket to which an external power source from a charging station is connected for charging the vehicle.

The external charging unit is located on the left-hand side of the frame next to the hybrid power unit.



418 862





## Chemical information on propulsion batteries

Under normal conditions, the chemicals are enclosed in so-called cells within the propulsion battery. The chemicals cannot leak out into the surrounding area. The cells usually contain a combination of a liquid and some solid materials. The liquid in the cells is firmly bonded to the materials.

There is a risk of contact when the contents are converted to gas and vent out of the cell. This can occur in the event of external damage to one or more cells, in the event of too high a temperature or overload. When a cell has been opened or damaged, the electrolyte may be exposed. Exposed electrolytes are converted to a gaseous state at room temperature. This gas is flammable.

The liquid within the cells is flammable and can be corrosive if it comes into contact with moisture. If damage occurs and the battery starts to emit steam or mist, this may irritate mucous membranes, airways, eyes and skin. Exposure can also cause dizziness, nausea and headache.

Undamaged cells in a battery can handle up to 80° Celsius before starting to ventilate. If the temperature in the cells is greater than 80° Celsius, the electrolyte in the cell starts to change into a gas. This may cause the pressure relief valve in the cells to break, and flammable and corrosive gas is released via the battery pack ventilation duct.



# Electric vehicles

## The electric propulsion system in electric vehicles

 **WARNING!**

Wear eye protection and rubber gloves classified for 1,000 V when carrying out work with a risk of coming into contact with voltage class B (650 V).

The hybrid system is powered by voltage class B (650 V); see definition below.

Voltage class A	Voltage class B
0 V-60 V DC	60 V-1,500 V DC
0 V-30 V AC	30 V-1,000 V AC



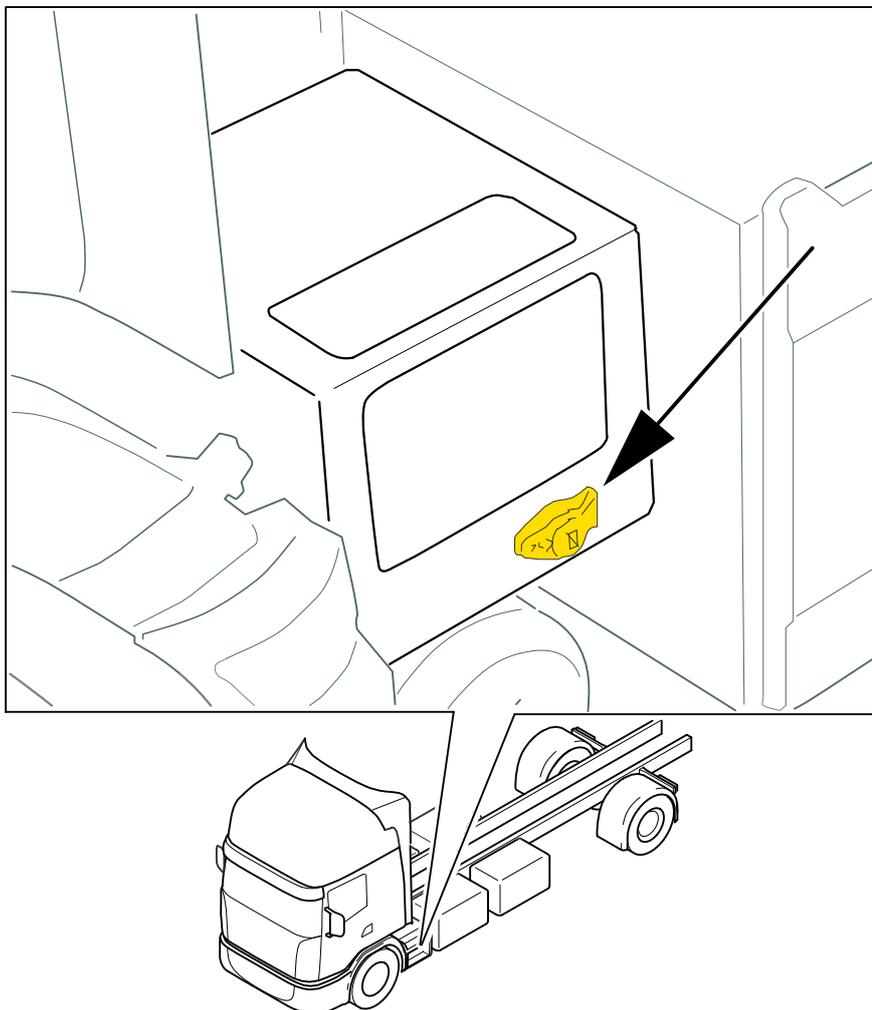
## Built-in safety devices

### The electric drive system has the following built in safety devices:

- The electric drive system cable harness for voltage class B (650 V) is orange. The cable harness for voltage class B (650 V) is insulated from chassis earth. This means that there has to be contact with both conductors before there is a risk of personal injury.
- The electric drive system components that pose a fire hazard are fitted with warning plates warning about voltage class B (650 V).
- The electric drive system monitors the battery temperature, voltage, current and electrical insulation level. The electric drive system disconnects the battery and cuts the power to the cable harness if any results deviate.
- Voltage to the electric drive system is normally switched off when the 24 V system is switched off; the control switch is normally red.
- The electric drive system's voltage class B is switched off using a control switch located on the left-hand side behind the cab; the control switch is normally yellow.



**BEV1 vehicles**



*The illustration applies to BEV1 vehicles. The control switch is located on the left-hand side.*

456 282



## Cut all power to the vehicle

### **WARNING!**

Wear eye protection and rubber gloves classified for 1,000 V when carrying out work with a risk of coming into contact with voltage class B (650 V).

### **WARNING!**

Always avoid cutting VCB cables (650 V). The system may be live even if:

- the break switches for 24 V or voltage class B are switched off
- the contactors in the propulsion batteries have been welded in the closed position.

There is a high risk of an electrical arc that may cause personal injury. Wear eye protection and rubber gloves classified for 1,000 V.

1. Switch off the 24 V system by disconnecting the battery terminals on the 24 V batteries. The 24 V batteries are located on the right-hand side behind the front wheel.

This normally results in the propulsion battery being disconnected. This action prevents voltage from the electric machine.

To be sure that there is no residual voltage remaining in the system's charged capacitor, wait 15 minutes.

2. If the cable harness for voltage class B needs to be cut or becomes damaged, and if the 24 V system is not accessible, disconnect the connectors on the propulsion battery. This guarantees that the electric drive system is disconnected.



## **Procedure for extinguishing a fire**

### **Propulsion battery fire**

If there is a visible fire in the propulsion battery, use large amounts of water to cool the propulsion battery.

Contact the fire service, which has equipment to extinguish fires in propulsion batteries for vehicles.

### **For other vehicle fires, not battery fire**

In the event of a vehicle fire where the battery box is intact and not on fire, we recommend using normal procedures for extinguishing a fire.

The propulsion battery must be protected and cooled down with large amounts of water.

If the battery box is significantly damaged, large amounts of water must be used to cool the propulsion battery. It is important for the temperature of the propulsion battery to be reduced by only using water, to prevent risk of fire and to fight any fire.



## Recovery and shunting

### Recovery and shunting of battery electric vehicles

Information and instructions must be followed during recovery and shunting to prevent personal injury and vehicle damage.

Recovery of heavy vehicles should always be entrusted to an authorised recovery company.

Collision-damaged or suspicious vehicles need to be clearly marked when they are left at the workshop. Position the vehicle at a suitable distance from buildings and other vehicles. The area around the vehicle may need to be cordoned off.

Remember that workshops may have their own local procedures.

### Preparatory operations

- In the event of recovery from a ditch: unload the vehicle and clear the ditch of stones etc. that may damage or get caught in the vehicle during recovery.
- Check that the vehicle has not sustained any damage that may cause a short circuit in the 24 V electrical system. If this is the case, disconnect the 24 V batteries to prevent fire.
- When carrying out a recovery on a road, the vehicle should always be lifted without a load. Alternatively, the front axle weight can be reduced as much as possible.
- When the VCB system is switched off using S229, the electrical air compressor will be deactivated. Air must therefore be topped up in the brake system in a different way. Recovery vehicles usually have an air outlet from which the vehicle to be towed/recovered can be supplied with air.



## Recovery of all battery electric vehicles

### Please note:

The information about recovery and shunting that follows only applies when:

- the vehicle has not sustained any visible damage due to a collision or other incident
- The risk of fire is considered low
- The risk of exposure to high voltage is considered low
- No warnings about electrical hazards are displayed on the instrument cluster (ICL).

### Please note:

Before towing is carried out:

- the vehicle's 15 voltage must be switched off with the starter key on the ICL
- the vehicle's voltage class A (VCA) must be switched off using the red control switch
- voltage class B (VCB) of the electric drive system must be switched off using the yellow control switch.



### IMPORTANT!

Do not lift on the towing brackets.



### IMPORTANT!

When towing to a workshop, communicate and position the vehicle in accordance with workshop procedures.

### Please note:

Vehicles fitted with alarms can react at speed and lock themselves even during recovery. Avoid leaving the starter key in drive mode during recovery or towing.

## Towing BEV1 vehicles

If the vehicle is blocking traffic or poses a potential risk, it can be towed with the propeller shaft fitted. Towing with the propeller shaft fitted must only be carried out at a maximum of 10 km/h and 500 metres. In such circumstances, move the vehicle to a safer place.

This applies to towing when the propeller shaft is fitted:

- the vehicle must not be towed further than 500 metres
- the vehicle speed must not exceed 10 km/h.



### WARNING!

Danger of personal injury. Follow approved instructions for towing with the propeller shaft fitted on the vehicle.



## Towing BEV3 vehicles

If the vehicle is blocking traffic or poses a potential risk, it can be towed with the propeller shaft fitted on the vehicle. In such circumstances, move the vehicle to a safer place.

This applies to towing when the propeller shaft is fitted:

- the vehicle must not be towed further than 300 metres
- the vehicle speed must not exceed 5 km/h.



### **WARNING!**

Danger of personal injury. Follow approved instructions for towing with the propeller shaft fitted on the vehicle.



### **IMPORTANT!**

When towing the vehicle, the speed must not exceed 5 km/h and must not exceed 300 m.

Remove the propeller shaft or half shafts if there is a need for faster, longer towing or if there is a gearbox malfunction.



### **IMPORTANT!**

Risk of current being generated in the VCB system if:

- the electric machines rotate during towing due to trailering
- the gearbox is not in neutral position.



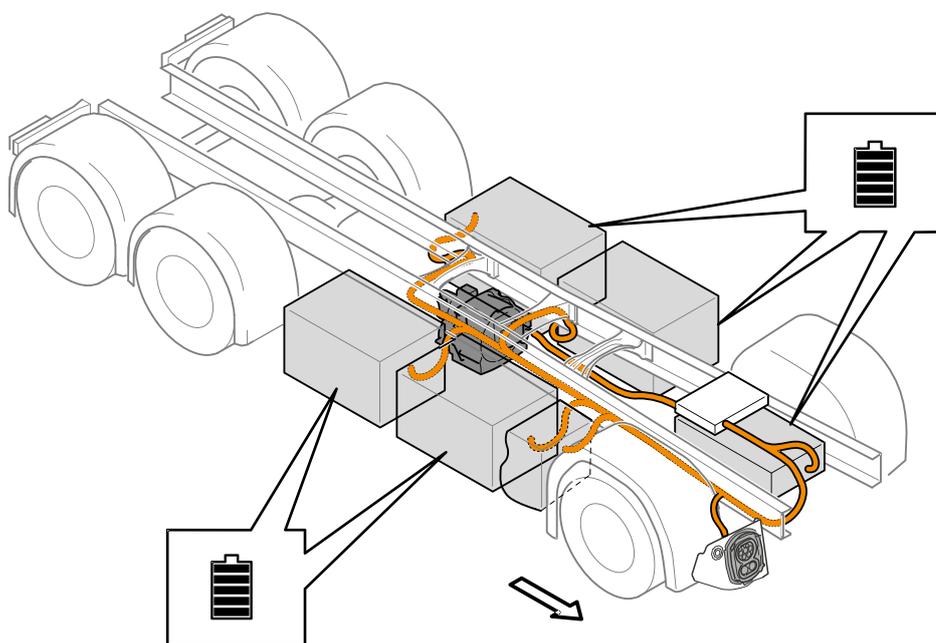
# Electric drive system

## Electric drive system on BEV1 vehicles

The electric vehicle powertrain is powered by propulsion batteries. A battery electric vehicle of this generation can have 5-9 propulsion batteries.

The propulsion batteries have voltage class B (650 V), which supplies the electric machine with 3-phase alternating current via an inverter.

The inverter is cooled with a water cooling system that also cools the direct current converter. The direct current converter supplies the 24 V battery and the vehicle's electrical system with 24 V voltage, which is converted from the propulsion battery's voltage class B (650 V).



List of components with voltage class B

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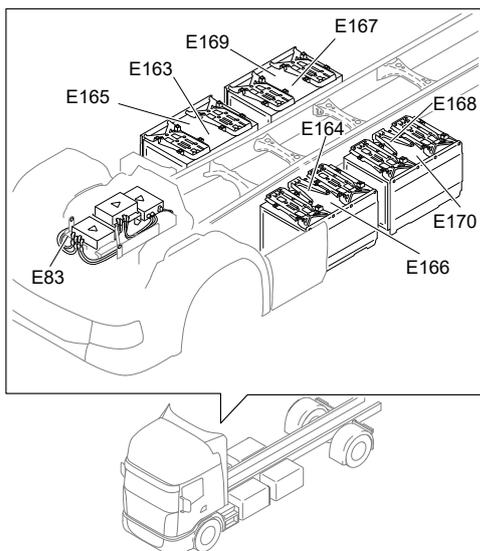


## Components with voltage class B (650 V)

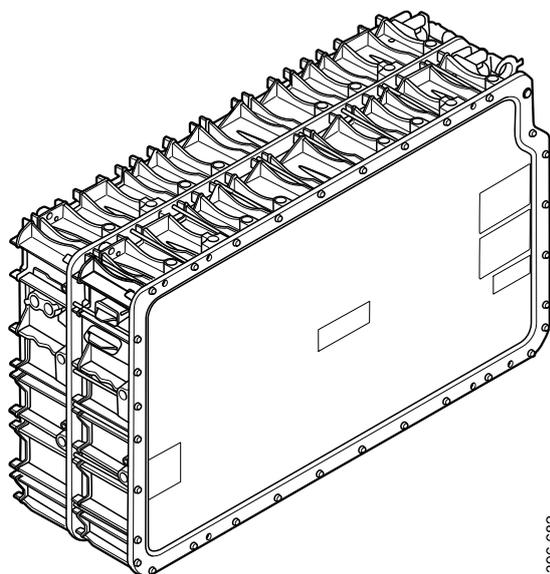
### Propulsion batteries

The propulsion batteries are lithium-ion batteries with voltage class B (650 V). The propulsion batteries are connected to the electric machine via the inverter and supply the electric drive system with power.

The propulsion batteries are located as shown in the illustration. One is located under the cab and the others are distributed on the left-hand and right-hand side of the frame.



Propulsion batteries

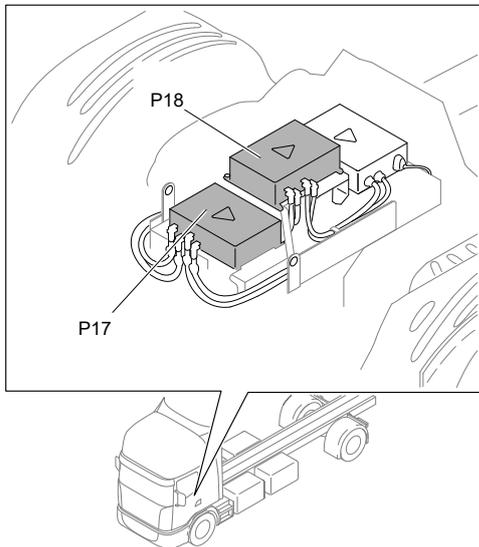


### Central electric units for voltage class B

The electric drive system contains multiple central electric units for voltage class B. The number of central electric units depends on the vehicle specification.



The central electric units function as a safe connection between the components that are connected to direct current. The central electric units have to supply the connections with positive and negative voltage. The central electric units distribute voltage class B to the consumers. To protect the cable harness and components, there are fuses on the connection to certain consumers in the central electric unit.

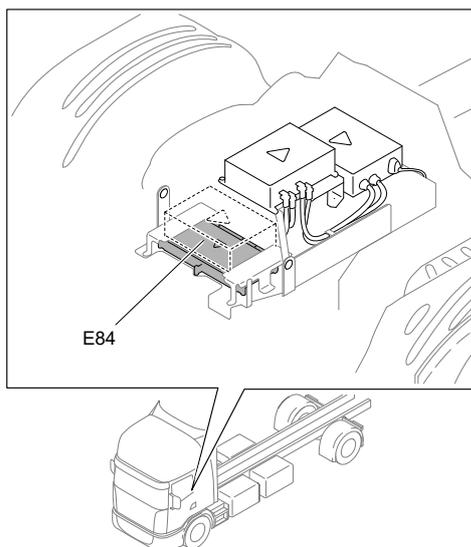


Central electric units P17 and P18.

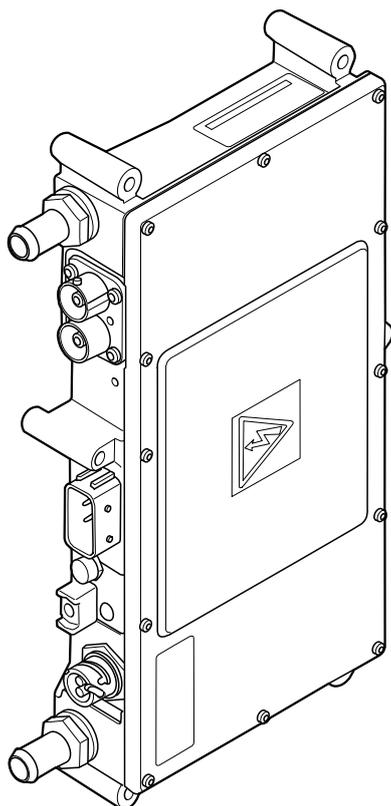
## Direct current converter

The direct current converter is positioned under the cab.

The direct current converter replaces the alternator and converts voltage class B (650 V) to 24 V.



Direct current converter (E84)



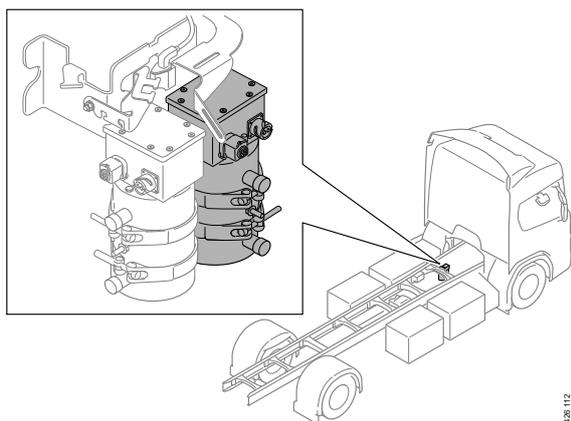
396 725

Direct current converter (E84)

### Heater

Heater H40 is part of the cooling coil for the propulsion batteries and is positioned on the left-hand side of the frame.

The heater is powered by 650 V and heats the propulsion batteries if the temperature of the propulsion batteries falls below 5°C.



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Heater (H40)

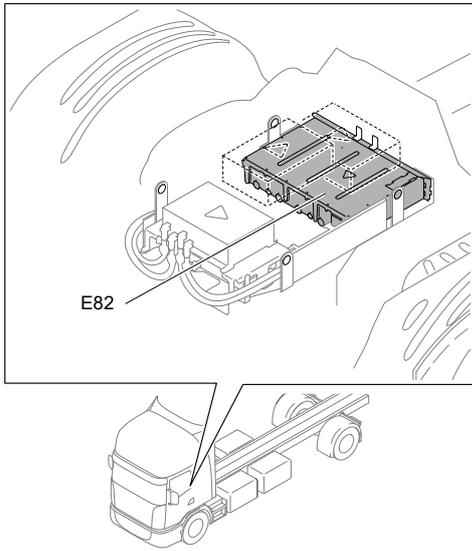
### Inverter

The inverter (E82) is located under the cab.

It converts direct current (650 V) from the propulsion batteries to 3-phase alternating current (300 A).

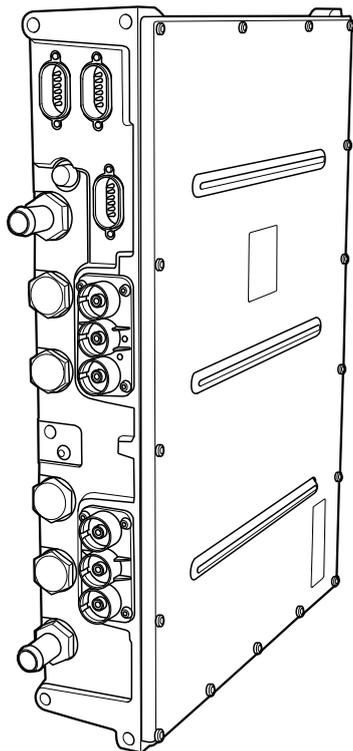


It is liquid-cooled and connected to the electric machine via 3 cables for voltage class B.



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*Inverter (E82)*



*Inverter (E82)*

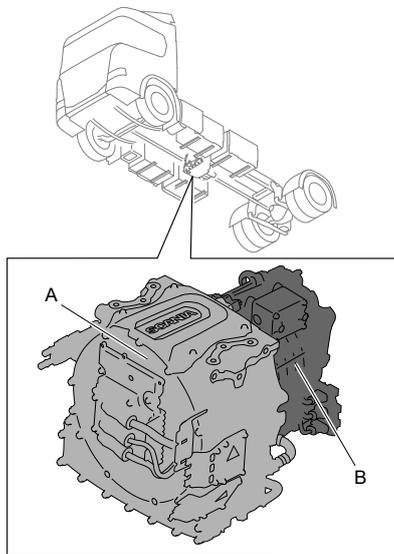
### **Electric machine and electric propulsion unit**

The electric machine is located in the centre of the vehicle.

The electric machine is electromagnetic and transforms electric energy into mechanical energy and vice versa.



Behind the electric machine (A) there is an electric propulsion unit (B), which is the vehicle's gearbox.

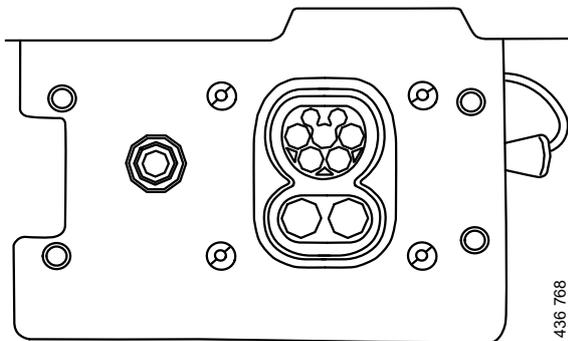


A. Electric machine for electric propulsion unit.  
B. Electric propulsion unit.

### External charging unit (CCS)

Scania's electric vehicles have a charging socket to which an external power source from a charging station is connected for charging the vehicle.

The external charging unit is located on the right-hand side above the front headlamp unit.



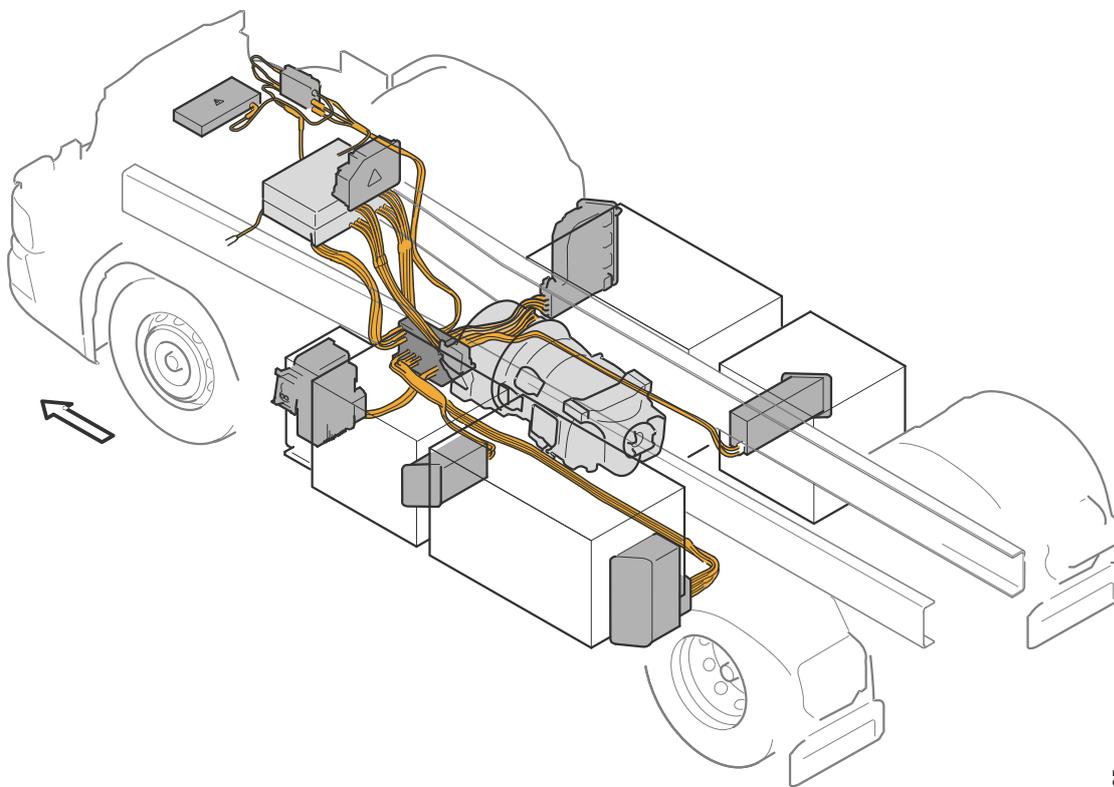
Unit for external charging

### Electric drive system on BEV3 vehicles

The electric vehicle powertrain is powered by propulsion batteries. A battery electric vehicle of this generation can have 2-4 propulsion batteries.

The propulsion batteries have voltage class B (650 V), which supplies the electric machine with 3-phase alternating current via an inverter.

The direct current converter supplies the 24 V battery and the vehicle's electrical system with 24 V voltage, which is converted from the propulsion battery's voltage class B (650 V).



Overview of components with voltage class B on BEV3 vehicles.

466 125

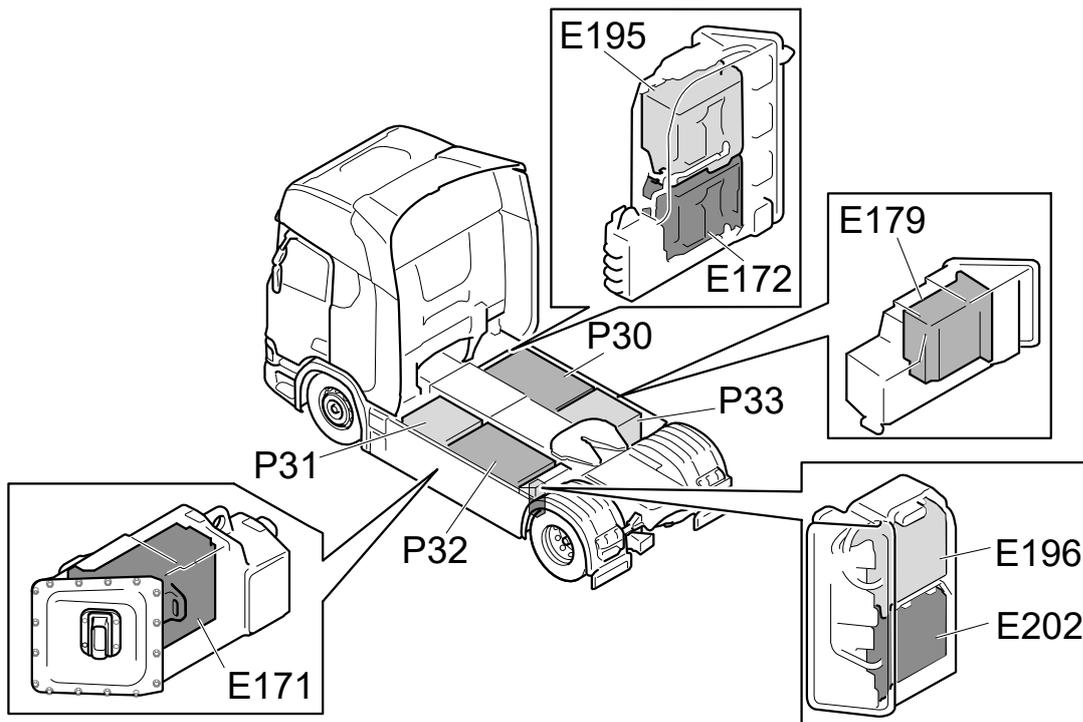


## Components with voltage class B (650 V)

### Propulsion batteries

The propulsion batteries are lithium-ion batteries with voltage class B (650 V). The propulsion batteries are connected to the electric machine via the inverter and supply the electric drive system with power.

The propulsion batteries are located as shown in the illustration. They are distributed on the left-hand and right-hand side of the frame.



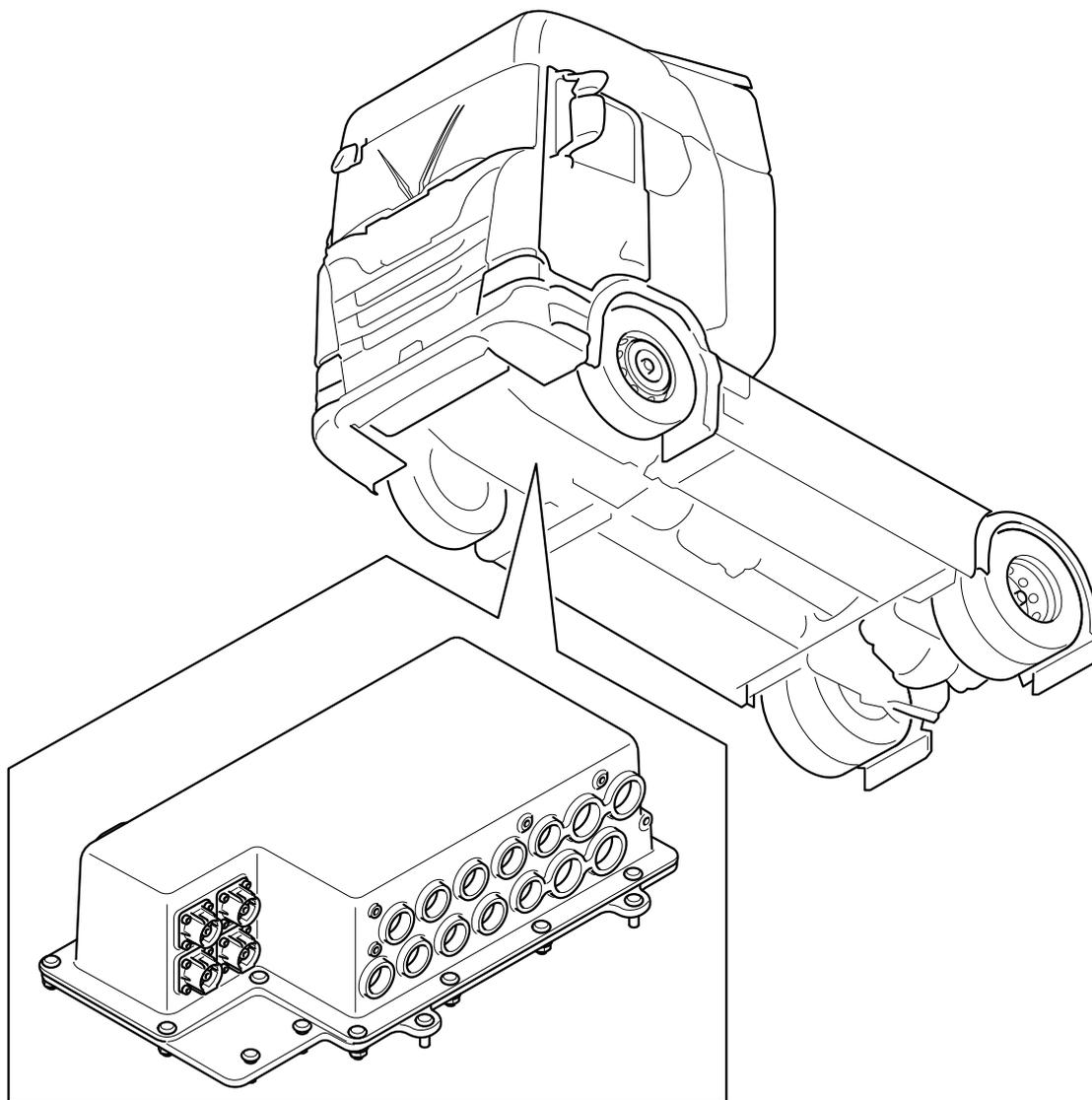
460 963

*Location of propulsion batteries and battery junction boxes.*

### Central electric units for voltage class B

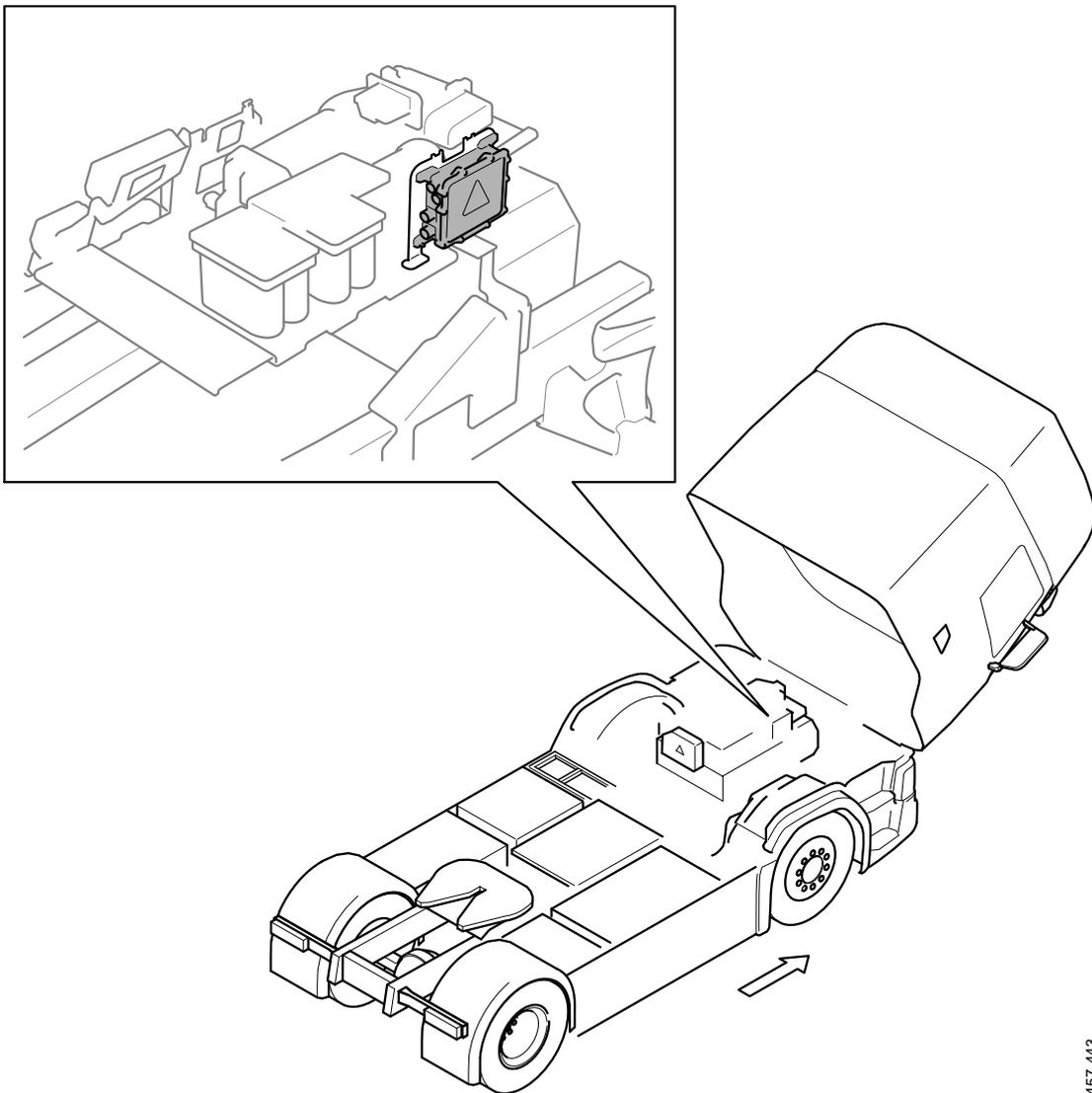
The electric drive system contains 2 central electric units for voltage class B. The number of central electric units depends on the vehicle specification.

The central electric units function as a safe connection between the components that are connected to direct current. The central electric units have to supply the connections with positive and negative voltage. The central electric units distribute voltage class B to the consumers. To protect the cable harness and components, there are fuses on the connection to certain consumers in the central electric units.



463 485

*P16, Central electric unit for voltage class B*



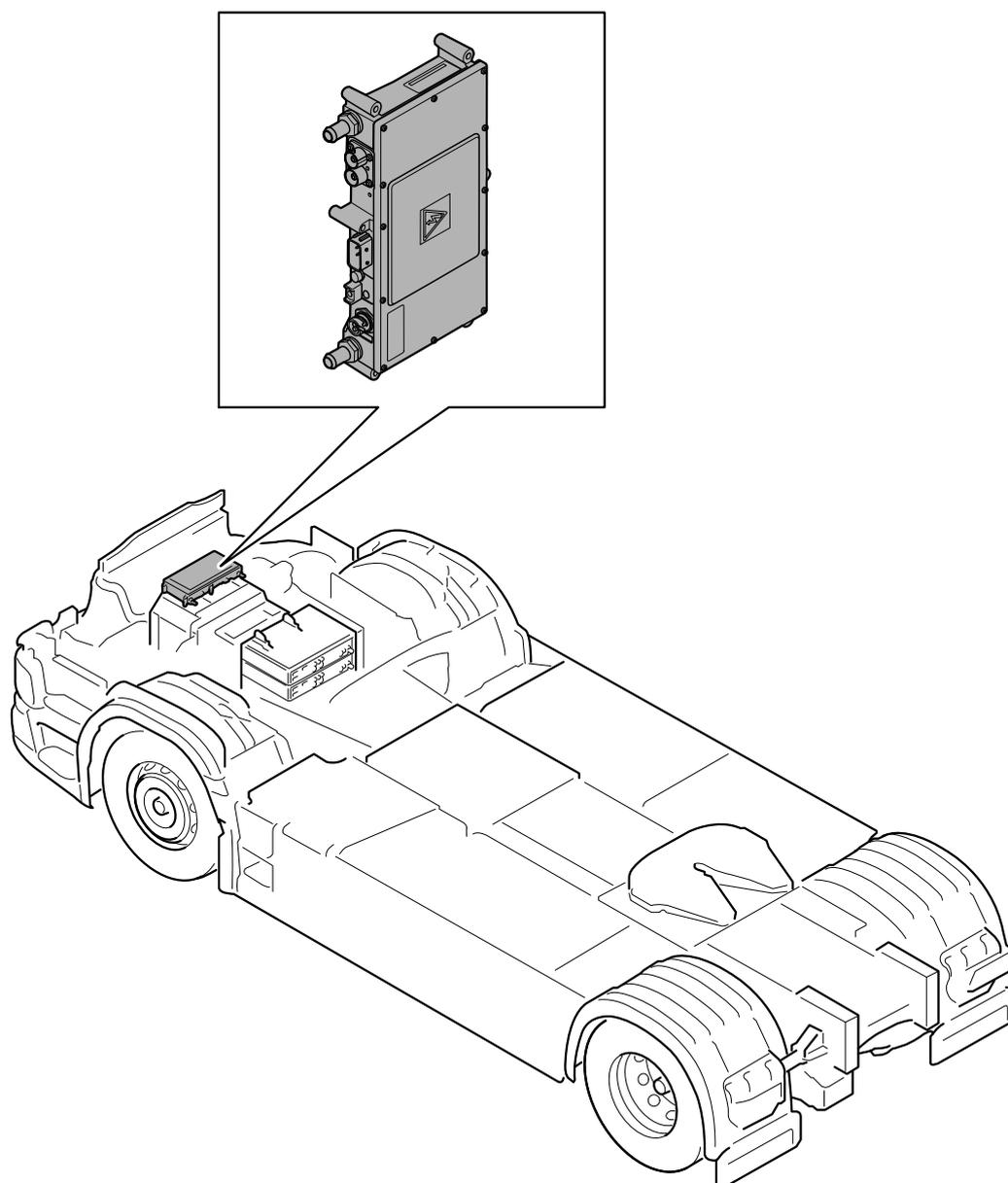
457 443

*P17, Auxiliary central electric unit for voltage class B (AUX CEUB)*

### **Direct current converter**

The direct current converter is positioned under the cab.

The direct current converter replaces the alternator and converts voltage class B (650 V) to 24 V.



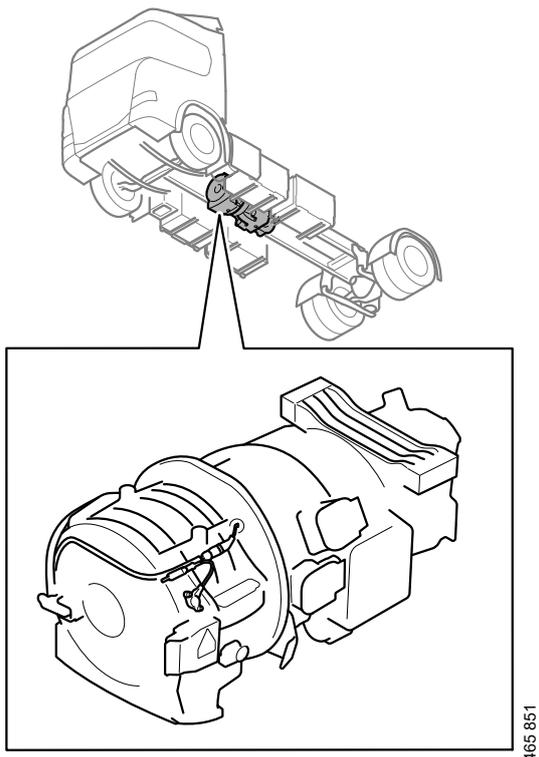
455 869

*Direct current converter*

### **Electric machines and electric propulsion unit**

The electric machine is located in the centre of the vehicle.

The electric machine is electromagnetic and transforms electric energy into mechanical energy and vice versa.

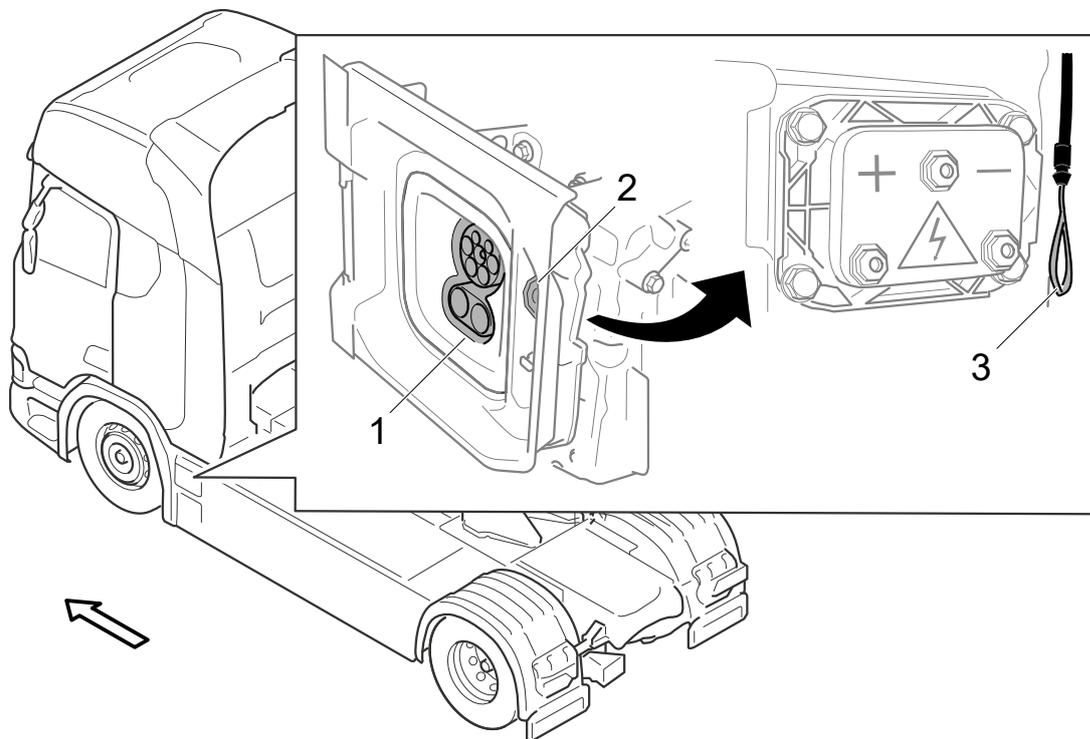


*Electric machines and electric propulsion unit*

### **External charging unit (CCS)**

Scania's electric vehicles have a charging socket to which an external power source from a charging station is connected for charging the vehicle.

Connector for external charging (1) is located on the left-hand side frame behind the front wheel. There is a button (2) on the right-hand side of the connector casing that interrupts the charging. If the charging plug is not disengaged automatically, there is a wire rope (3) on the rear of the connector which is used to release the charging plug manually.



466 179

Connector for external charging



## Chemical information on propulsion batteries

Under normal conditions, the chemicals are enclosed in so-called cells within the propulsion battery. The chemicals cannot leak out into the surrounding area. The cells usually contain a combination of a liquid and some solid materials. The liquid in the cells is firmly bonded to the materials.

There is a risk of contact when the contents are converted to gas and vent out of the cell. This can occur in the event of external damage to one or more cells, in the event of too high a temperature or overload. When a cell has been opened or damaged, the electrolyte may be exposed. Exposed electrolytes are converted to a gaseous state at room temperature. This gas is flammable.

The liquid within the cells is flammable and can be corrosive if it comes into contact with moisture. If damage occurs and the battery starts to emit steam or mist, this may irritate mucous membranes, airways, eyes and skin. Exposure can also cause dizziness, nausea and headache.

Undamaged cells in a battery can handle up to 80° Celsius before starting to ventilate. If the temperature in the cells is greater than 80° Celsius, the electrolyte in the cell starts to change into a gas. This may cause the pressure relief valve in the cells to break, and flammable and corrosive gas is released via the battery pack ventilation duct.



# Recovery and shunting

## Recovery

Information and instructions must be followed during recovery or towing to prevent vehicle damage and personal injury.

Recovery should be entrusted to a recovery company authorised for heavy vehicles.



### WARNING!

It is common for several of the vehicle functions to be disengaged or out of order during recovery and towing.



### IMPORTANT!

For gearboxes: GR/S/O 875/895/905/925/926/R, the propeller shaft or half shafts need to be detached if the vehicle is to be towed or recovered for a distance farther than 325 metres. Towing or recovering the vehicle 325 metres without detaching the propeller shaft or half shafts is permitted if done at a speed of 5 km/h.



### IMPORTANT!

HEV, PHEV and BEV vehicles are subject to special regulations for how far and what speed the vehicle may be towed without removing the propeller shaft. See the relevant towing section for that vehicle.

For other vehicles: Detach the propeller shaft or half shafts if the vehicle is to be towed or recovered further than 500 metres. If you do not detach the propeller shaft or half shafts, the gearbox could be damaged. See section Detaching the propeller shaft and Removal – Half shaft.



### IMPORTANT!

Do not lift on the towing brackets.

### Preparatory operations

- In the event of recovery from a ditch: unload the vehicle and clear the ditch of stones etc. that may damage or get caught in the vehicle during recovery.
- Check that no damage has occurred to the vehicle that may cause a short circuit in the electrical system. If this is the case, disconnect the batteries to prevent fire.
- When carrying out a recovery on a road, the vehicle should always be lifted without a load. Alternatively, the front axle weight can be reduced as much as possible.
- If it is not possible to start the engine, the brake system must be filled with air using an alternative method. Recovery vehicles usually have an air outlet from which the vehicle to be towed/recovered can be charged with air. Your vehicle has an air intake nipple positioned behind the cab on the driver's side.

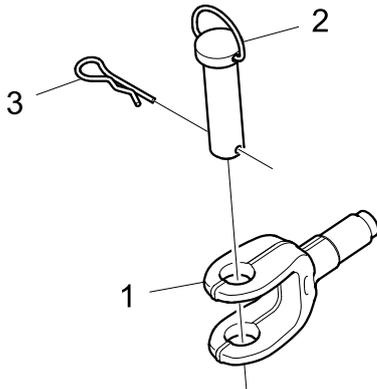


**i NOTE:**

Vehicles with alarms can react at speed and lock themselves even during recovery. Avoid leaving the starter key in the drive position during recovery or towing.

### Alternative procedure for recovery of vehicles from a ditch

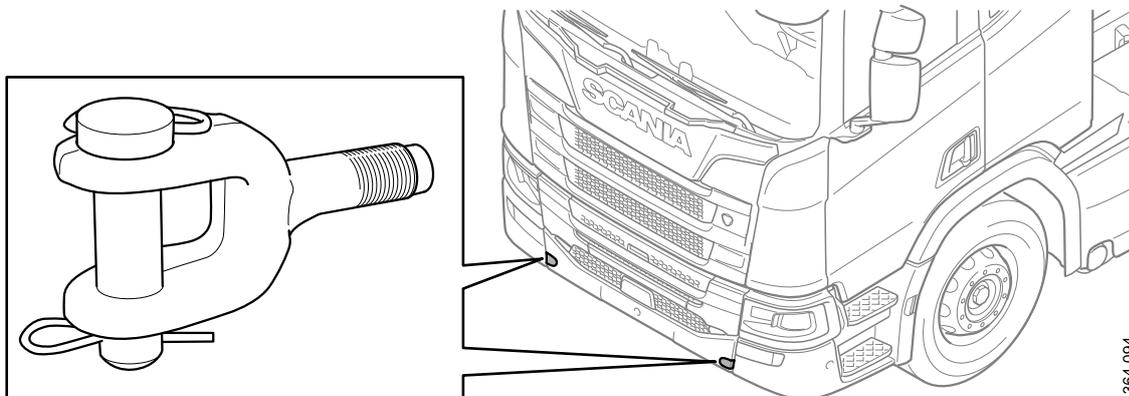
- Recovery from the front via the towing brackets



378 685

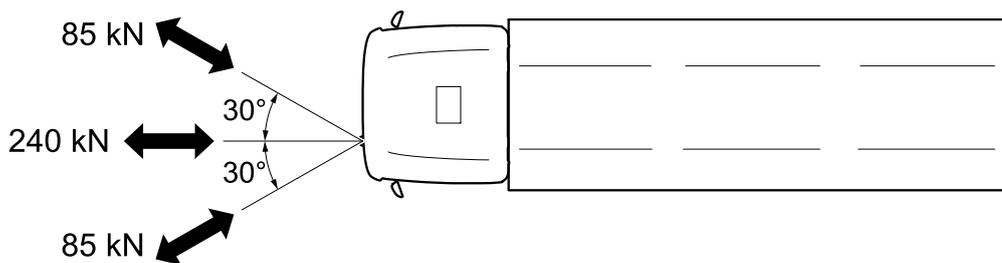
1. Tow hook, 2055887
2. Tow pin, 2043632
3. Lock pin, 1893903

The tow pin can be positioned on both sides of the vehicle. Remove the rubber protection and screw in the tow pin as far as possible into one of the attachment points.



364 094

During recovery, it is necessary to take into account the maximum tow pin load, which is 240 kN straight forwards, falling to 85 kN at a 30° angle.

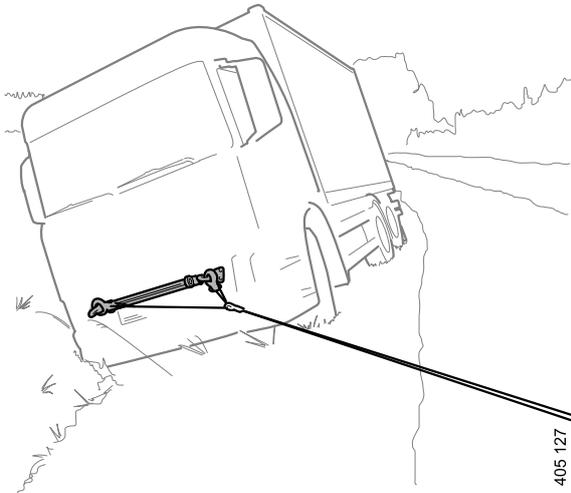


396 619

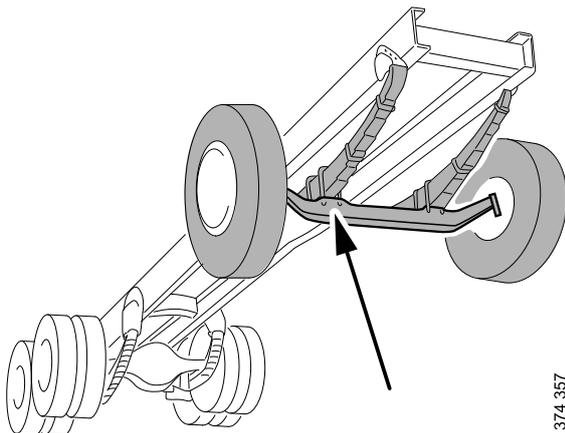


## Recovery and shunting

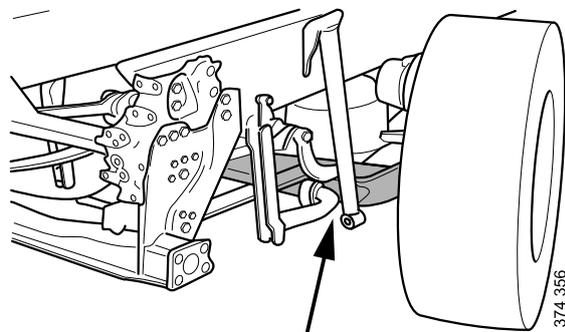
- Recovery using 2 722 133 Tool kit for recovery. For more information about usage, see *00-01 Instructions > Recovery and shunting > Recovery tool 2 722 133*



- Recovery from the front, vehicle with leaf spring suspension  
During recovery from a ditch, the spring attachment on the front axle beam is a suitable towing point.



- Recovery from the front, vehicle with air suspension  
During recovery from a ditch, the front axle by the air bellows attachment is a suitable towing point.



- Recovery from the rear and from the side  
Attach the recovery equipment to the body frame when the vehicle is pulled backwards or sideways.

### **Alternative procedure for recovery of vehicles on a level surface**



## Recovery and shunting

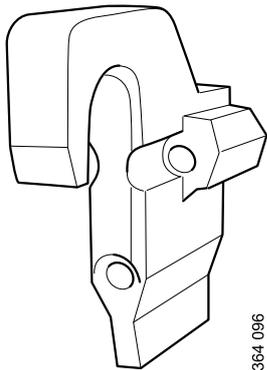
Scania recommends using the recovery tool. The recovery tool is designed for lifting the vehicle. The recovery tools should be fixed with 3 screws on both sides of the vehicle. Tighten the screws to 530 Nm.

### **!** IMPORTANT!

The recovery tool must not be used if the front axle weight of the vehicle to be recovered exceeds 10 tonnes.

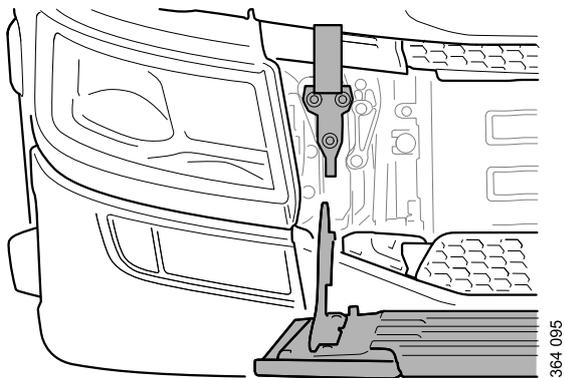
If the vehicle has several front axles, the total front axle weight must not exceed 10 tonnes.

- Recovery using 2 426 174 Towing tool



364 096

Recovery tool, part no. 2426174

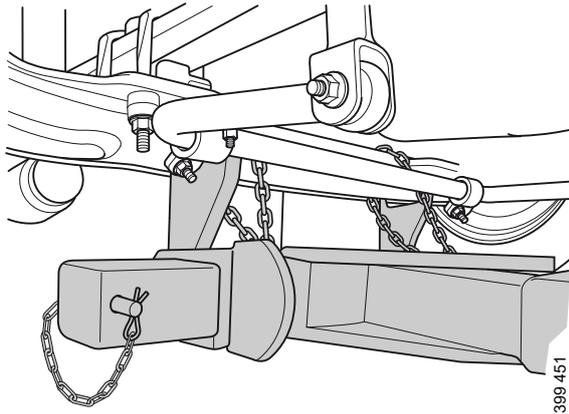


364 095

Recovery tool fitted. Recovery tools should be fitted on both sides of the vehicle.

- Recovery by lifting under the front axle

Lifting under the front axle is carried out using a recovery vehicle drawbeam. Lifting must be carried out on the suspension attachment.



### Vehicle with heavy-duty front

Information and instructions must be followed during recovery or towing to prevent vehicle damage and personal injury.

Recovery should be entrusted to a recovery company authorised for heavy vehicles.

#### **WARNING!**

It is common for several of the vehicle functions to be disengaged or out of order during recovery and towing.

#### **IMPORTANT!**

For gearboxes: GR/S/O 875/895/905/925/926/R, the propeller shaft or half shafts need to be detached if the vehicle is to be towed or recovered for a distance farther than 325 metres. Towing or recovering the vehicle 325 metres without detaching the propeller shaft or half shafts is permitted if done at a speed of 5 km/h.

#### **IMPORTANT!**

HEV, PHEV and BEV vehicles are subject to special regulations for how far and what speed the vehicle may be towed without removing the propeller shaft. See the relevant towing section for that vehicle.

For other vehicles: Detach the propeller shaft or half shafts if the vehicle is to be towed or recovered further than 500 metres. If you do not detach the propeller shaft or half shafts, the gearbox could be damaged. See section Detaching the propeller shaft and Removal – Half shaft.

#### **IMPORTANT!**

Do not lift on the towing brackets.

### Preparatory operations

- In the event of recovery from a ditch: unload the vehicle and clear the ditch of stones etc. that may damage or get caught in the vehicle during recovery.



## Recovery and shunting

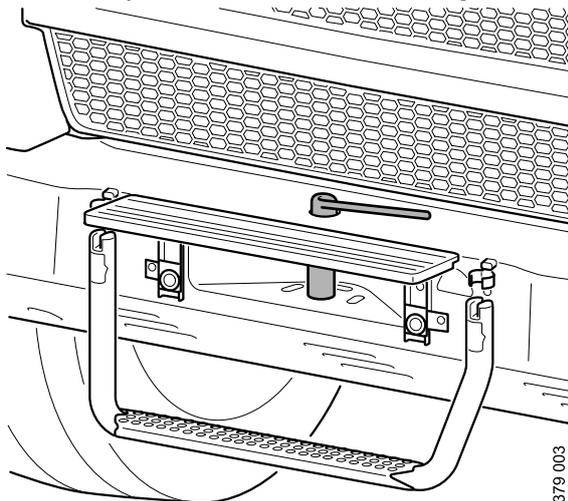
- Check that no damage has occurred to the vehicle that may cause a short circuit in the electrical system. If this is the case, disconnect the batteries to prevent fire.
- When carrying out a recovery on a road, the vehicle should always be lifted without a load. Alternatively, the front axle weight can be reduced as much as possible.
- If it is not possible to start the engine, the brake system must be filled with air using an alternative method. Recovery vehicles usually have an air outlet from which the vehicle to be towed/recovered can be charged with air. Your vehicle has an air intake nipple positioned behind the cab on the driver's side.

### **i** NOTE:

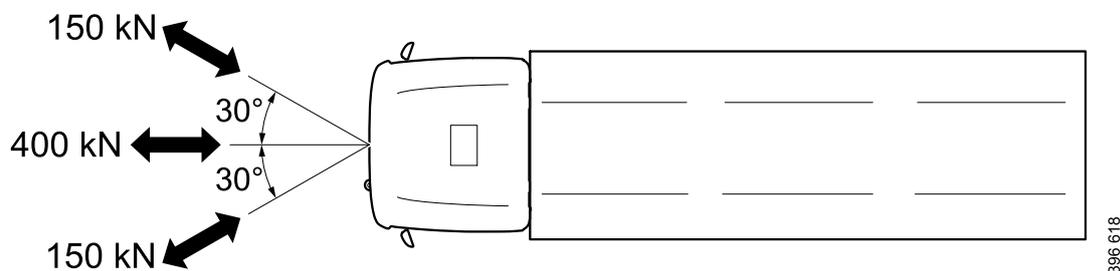
Vehicles with alarms can react at speed and lock themselves even during recovery. Avoid leaving the starter key in drive mode during recovery or towing.

### Alternative procedure for recovery of vehicles from a ditch

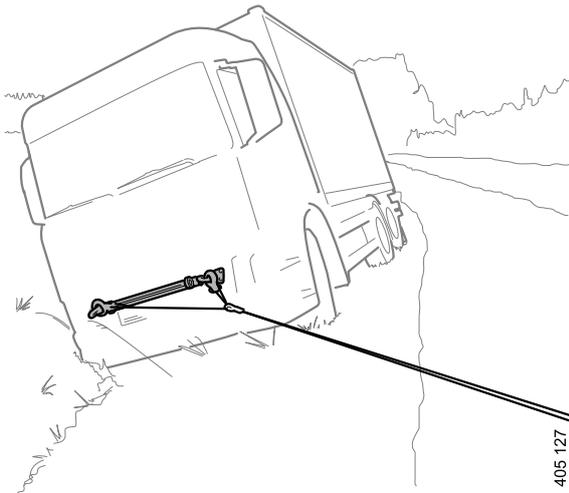
- Recovery from the front via the towing brackets



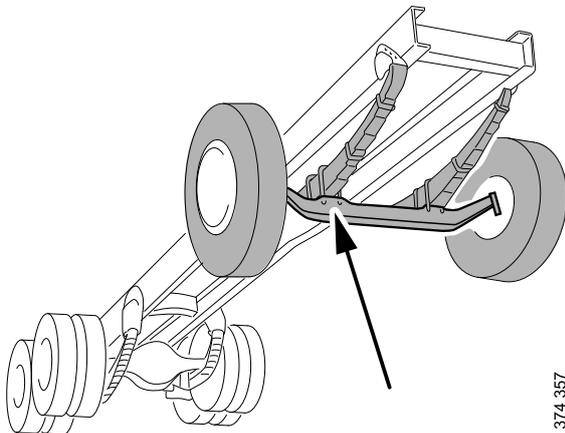
During recovery, it is necessary to take into account the maximum tow pin load, which is 400 kN straight forwards, falling to 150 kN at a 30° angle.



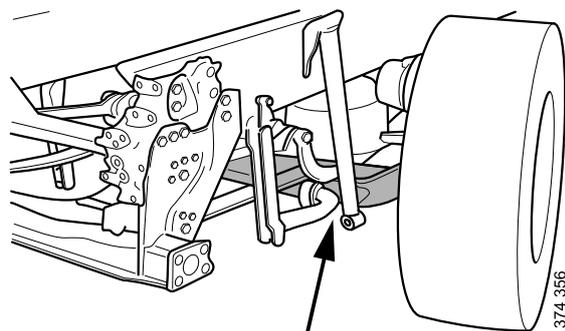
- Recovery using 2 722 133 Tool kit for recovery. For more information about usage, see *00-01 Instructions > Recovery and shunting > Recovery tool 2 722 133*



- Recovery from the front, vehicle with leaf spring suspension  
During recovery from a ditch, the spring attachment on the front axle beam is a suitable towing point.



- Recovery from the front, vehicle with air suspension  
During recovery from a ditch, the front axle by the air bellows attachment is a suitable towing point.



- Recovery from the rear and from the side

Attach the recovery equipment to the body frame when the vehicle is pulled backwards or sideways.

### **Alternative procedure for recovery of vehicles on a level surface**

Scania recommends using the recovery tool. The recovery tool is designed for lifting the vehicle. The recovery tools should be fixed with 3 screws on both sides of the vehicle.

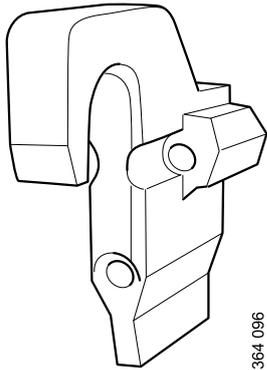


## **!** IMPORTANT!

The recovery tool must not be used if the front axle weight of the vehicle to be recovered exceeds 10 tonnes.

If the vehicle has several front axles, the total front axle weight must not exceed 10 tonnes.

- Recovery using 2 426 174 Recovery tool

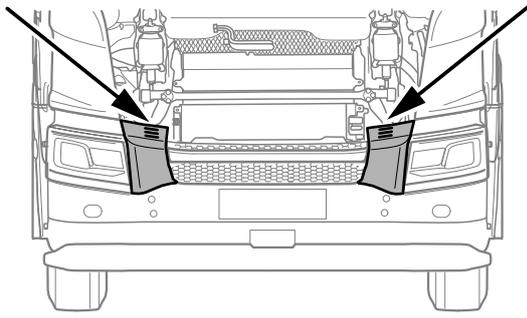


364 096

Recovery tool, part no. 2426174

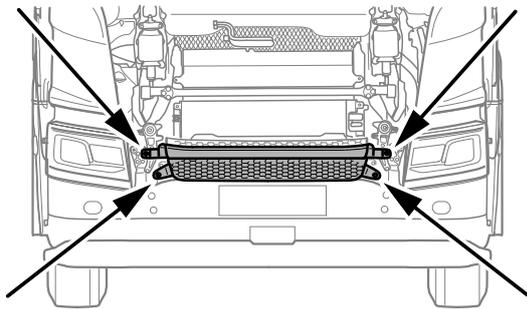
Fitting the recovery tool:

1. Open the front grille panel and remove the casings.



382 724

2. Remove the grille.

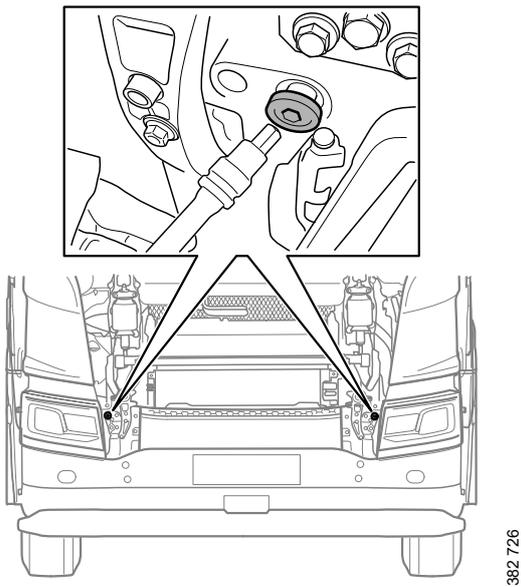


382 727

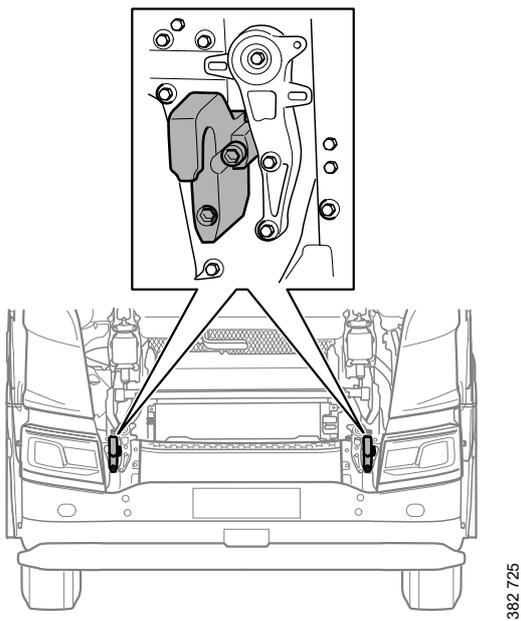
3. Remove the spacers.



## Recovery and shunting

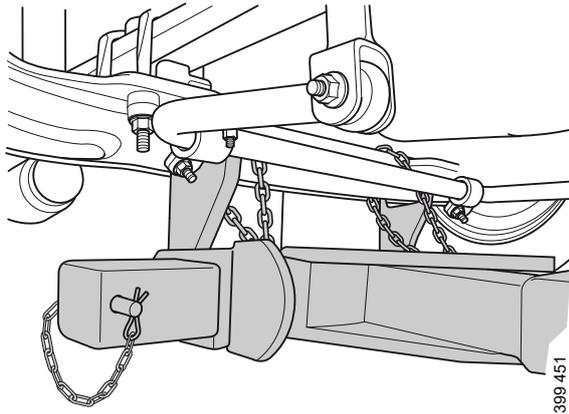


4. Fit the recovery tool on both sides and torque tighten the screws to 530 Nm. Recovery tool 530 Nm



- Recovery by lifting under the front axle

Lifting under the front axle is carried out using a recovery vehicle drawbeam. Lifting must be carried out on the suspension attachment.



### Vehicles with low-entry cab

Information and instructions must be followed during recovery or towing to prevent vehicle damage and personal injury.

Recovery should be entrusted to a recovery company authorised for heavy vehicles.

#### **WARNING!**

It is common for several of the vehicle functions to be disengaged or out of order during recovery and towing.

#### **IMPORTANT!**

For gearboxes: GR/S/O 875/895/905/925/926/R, the propeller shaft or half shafts need to be detached if the vehicle is to be towed or recovered for a distance farther than 325 metres. Towing or recovering the vehicle 325 metres without detaching the propeller shaft or half shafts is permitted if done at a speed of 5 km/h.

#### **IMPORTANT!**

HEV, PHEV and BEV vehicles are subject to special regulations for how far and what speed the vehicle may be towed without removing the propeller shaft. See the relevant towing section for that vehicle.

For other vehicles: Detach the propeller shaft or half shafts if the vehicle is to be towed or recovered further than 500 metres. If you do not detach the propeller shaft or half shafts, the gearbox could be damaged. See section Detaching the propeller shaft and Removal – Half shaft.

#### **IMPORTANT!**

Do not lift on the towing brackets.

### Preparatory operations

- In the event of recovery from a ditch: unload the vehicle and clear the ditch of stones etc. that may damage or get caught in the vehicle during recovery.



## Recovery and shunting

- Check that no damage has occurred to the vehicle that may cause a short circuit in the electrical system. If this is the case, disconnect the batteries to prevent fire.
- When carrying out a recovery on a road, the vehicle should always be lifted without a load. Alternatively, the front axle weight can be reduced as much as possible.
- If it is not possible to start the engine, the brake system must be filled with air using an alternative method. Recovery vehicles usually have an air outlet from which the vehicle to be towed/recovered can be charged with air. Your vehicle has an air intake nipple positioned behind the cab on the driver's side.

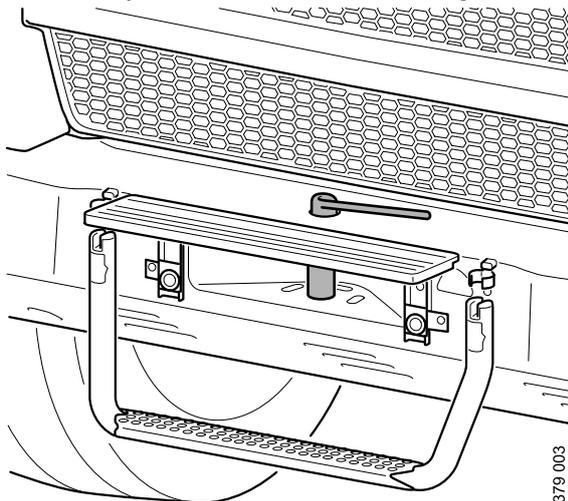


### NOTE:

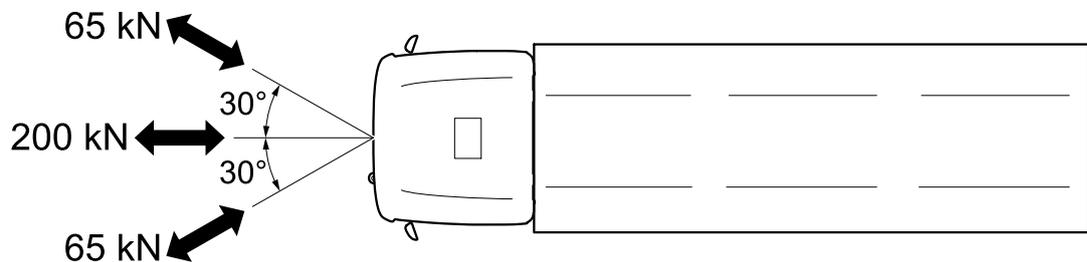
Vehicles with alarms can react at speed and lock themselves even during recovery. Avoid leaving the starter key in the drive position during recovery or towing.

### Alternative procedure for recovery of vehicles from a ditch

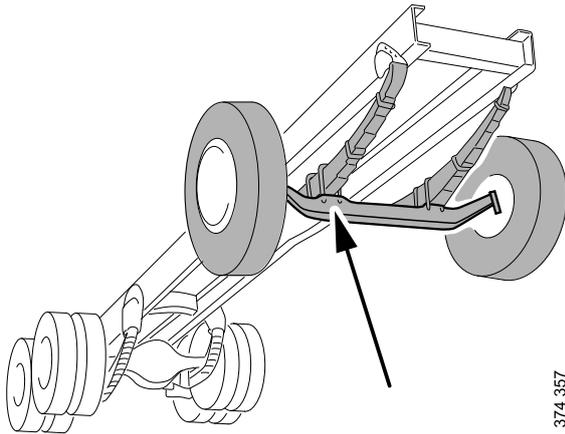
- Recovery from the front via the towing brackets.



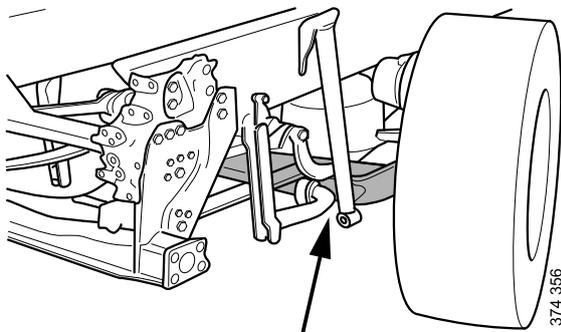
During recovery, it is necessary to take into account the maximum tow pin load, which is 200 kN straight forwards, falling to 65 kN at a 30° angle.



- Recovery from the front, vehicle with leaf spring suspension  
During recovery from a ditch, the spring attachment on the front axle beam is a suitable towing point.



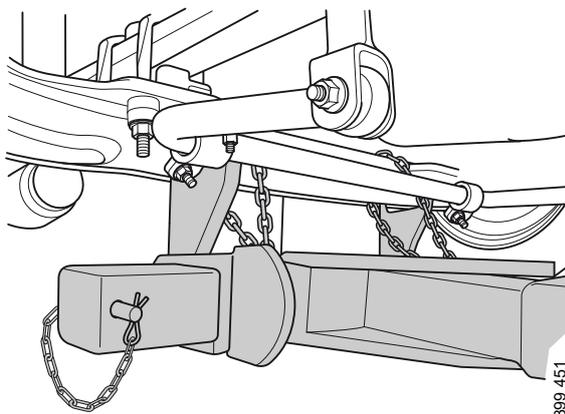
- Recovery from the front, vehicle with air suspension  
During recovery from a ditch, the front axle by the air bellows attachment is a suitable towing point.



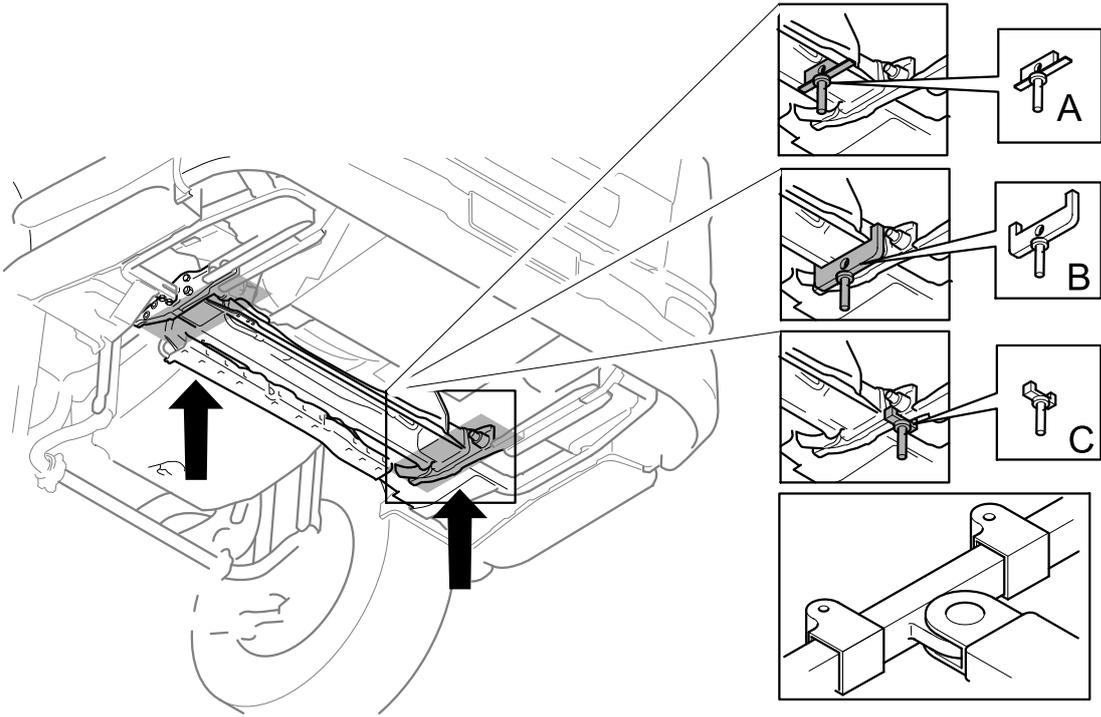
- Recovery from the rear and from the side  
Attach the recovery equipment to the body frame when the vehicle is pulled backwards or sideways.

### Alternative procedure for recovery of vehicles on a level surface

Scania recommends lifting under the front axle as close to the suspension attachment as possible and making lifting as safe as possible by using chains.



The front part of the vehicle can also be lifted under the beam as illustrated below. The maximum load on the front axle is 9 tonnes. The illustration shows within the marked area different potential clamping positions (A, B, C) for the recovery vehicle drawbeam. Clamps are not supplied by Scania. Extra care should be taken so as not to damage e.g. water pipes.





## Towing and shunting

Recovery is always preferable to towing. Towing should always be carried out with a drawbar.

### **WARNING!**

It is common for several of the vehicle functions to be disengaged or out of order during recovery and towing.

### **IMPORTANT!**

For gearboxes: GR/S/O 875/895/905/925/926/R, the propeller shaft or half shafts need to be detached if the vehicle is to be towed or recovered for a distance farther than 325 metres. Towing or recovering the vehicle 325 metres without detaching the propeller shaft or half shafts is permitted if done at a speed of 5 km/h.

### **IMPORTANT!**

HEV, PHEV and BEV vehicles are subject to special regulations for how far and what speed the vehicle may be towed without removing the propeller shaft. See the relevant towing section for that vehicle.

For other vehicles: Detach the propeller shaft or half shafts if the vehicle is to be towed or recovered further than 500 metres. If you do not detach the propeller shaft or half shafts, the gearbox could be damaged. See section Detaching the propeller shaft and Removal – Half shaft.

### **WARNING!**

Vehicles without functioning brakes must not be towed.

### **IMPORTANT!**

Never tow with the clutch pedal depressed. The gearbox can be damaged.

### **IMPORTANT!**

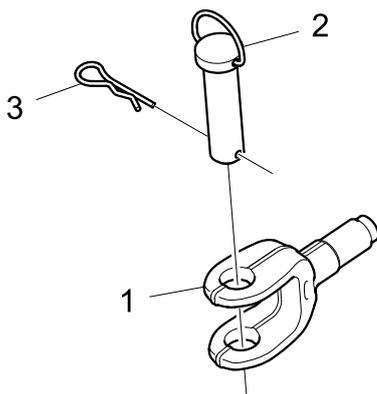
Tow-starting should not be carried out for more than 500 metres. Otherwise, the gearbox could be damaged through insufficient lubrication.

### **NOTE:**

The engine cannot be tow-started when the vehicle is equipped with an automatic gearbox.



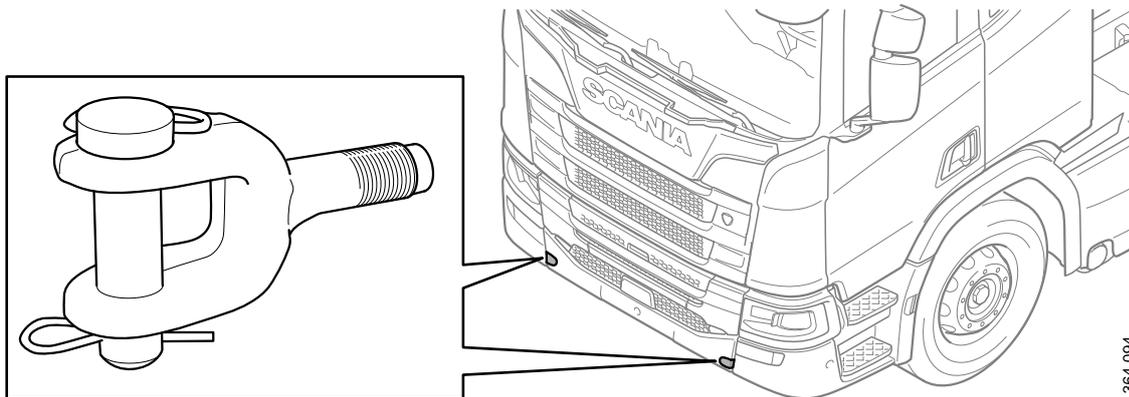
## Recovery and shunting



378 685

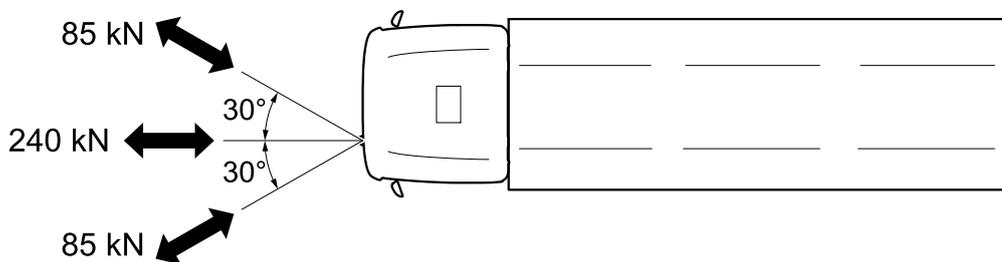
1. Tow hook, 2055887
2. Tow pin, 2043632
3. Lock pin, 1893903

When towing, the tow pin should be used together with a drawbar. The tow pin can be positioned on both sides of the vehicle. Remove the rubber protection and secure the tow pin in one of the attachment points. If possible, the vehicle should be unladen when towing. If possible, run the engine at idle speed to obtain power steering and air pressure in the brake system. The parking brake can be applied automatically in the event of the pressure in the brake system falls if it is released with air to the braking system. Therefore, if air is not continuously supplied from the towing vehicle, stop at regular intervals and charge the air system.



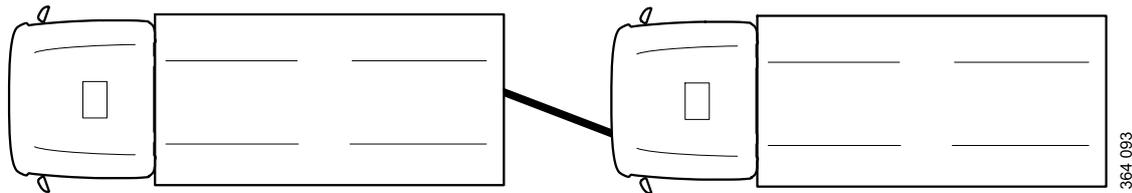
364 094

When towing, the tow pin must be used together with the towing bar. The tow pin can be positioned on both sides of the vehicle.



396 619

Stringent requirements are stipulated for the person steering the towed vehicle. The drawbar can turn in relation to the attachment. This can result in the vehicles colliding. The picture illustrates how the vehicles should be positioned in relation to each other during towing.



## Vehicle with heavy-duty front

Recovery is always preferable to towing. Towing should always be carried out with a drawbar.

### **WARNING!**

It is common for several of the vehicle functions to be disengaged or out of order during recovery and towing.

### **IMPORTANT!**

For gearboxes: GR/S/O 875/895/905/925/926/R, the propeller shaft or half shafts need to be detached if the vehicle is to be towed or recovered for a distance farther than 325 metres. Towing or recovering the vehicle 325 metres without detaching the propeller shaft or half shafts is permitted if done at a speed of 5 km/h.

### **IMPORTANT!**

HEV, PHEV and BEV vehicles are subject to special regulations for how far and what speed the vehicle may be towed without removing the propeller shaft. See the relevant towing section for that vehicle.

For other vehicles: Detach the propeller shaft or half shafts if the vehicle is to be towed or recovered further than 500 metres. If you do not detach the propeller shaft or half shafts, the gearbox could be damaged. See section Detaching the propeller shaft and Removal – Half shaft.

### **WARNING!**

Vehicles without functioning brakes must not be towed.

### **IMPORTANT!**

Never tow with the clutch pedal depressed. The gearbox can be damaged.

### **IMPORTANT!**

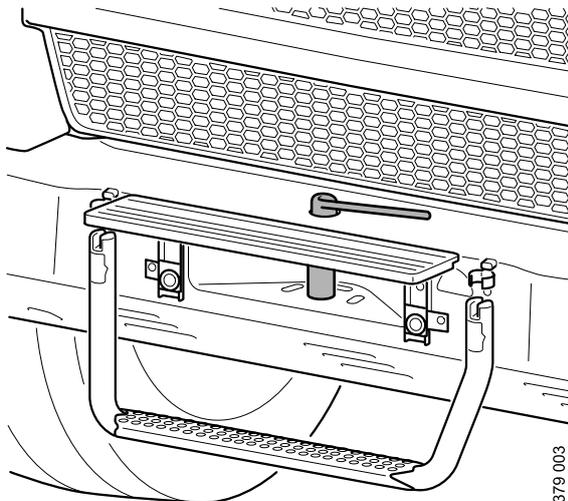
Tow-starting should not be carried out for more than 500 metres. Otherwise, the gearbox could be damaged through insufficient lubrication.



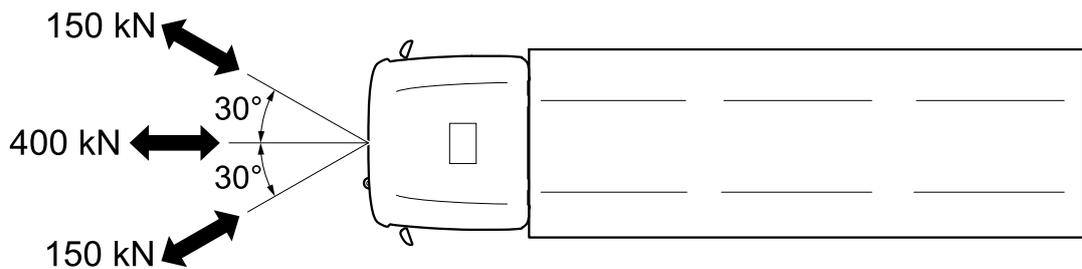
**i NOTE:**

The engine cannot be tow-started when the vehicle is equipped with an automatic gearbox.

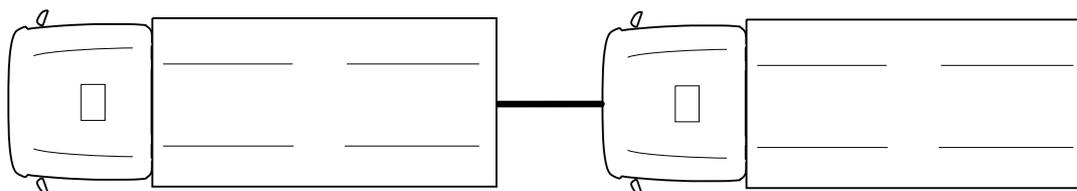
When towing, the tow pin should be used together with a drawbar. The tow pin is located behind the registration plate. If possible, the vehicle should be unladen when towing. If possible, run the engine at idle speed to obtain power steering and air pressure in the brake system. The parking brake can be applied automatically in the event of the pressure in the brake system falls if it is released with air to the braking system. Therefore, if air is not continuously supplied from the towing vehicle, stop at regular intervals and charge the air system.



During recovery, it is necessary to take into account the maximum tow pin load, which is 400 kN straight forwards, falling to 150 kN at a 30° angle.



Stringent requirements are stipulated for the person steering the towed vehicle. The drawbar can turn in relation to the attachment. This can result in the vehicles colliding. The picture illustrates how the vehicles should be positioned in relation to each other during towing.





## Vehicles with low-entry cab

Recovery is always preferable to towing. Towing should always be carried out with a drawbar.



### WARNING!

It is common for several of the vehicle functions to be disengaged or out of order during recovery and towing.



### IMPORTANT!

For gearboxes: GR/S/O 875/895/905/925/926/R, the propeller shaft or half shafts need to be detached if the vehicle is to be towed or recovered for a distance farther than 325 metres. Towing or recovering the vehicle 325 metres without detaching the propeller shaft or half shafts is permitted if done at a speed of 5 km/h.



### IMPORTANT!

HEV, PHEV and BEV vehicles are subject to special regulations for how far and what speed the vehicle may be towed without removing the propeller shaft. See the relevant towing section for that vehicle.

For other vehicles: Detach the propeller shaft or half shafts if the vehicle is to be towed or recovered further than 500 metres. If you do not detach the propeller shaft or half shafts, the gearbox could be damaged. See section Detaching the propeller shaft and Removal – Half shaft.



### WARNING!

Vehicles without functioning brakes must not be towed.



### IMPORTANT!

Never tow with the clutch pedal depressed. The gearbox can be damaged.



### IMPORTANT!

Tow-starting should not be carried out for more than 500 metres. Otherwise, the gearbox could be damaged through insufficient lubrication.



### NOTE:

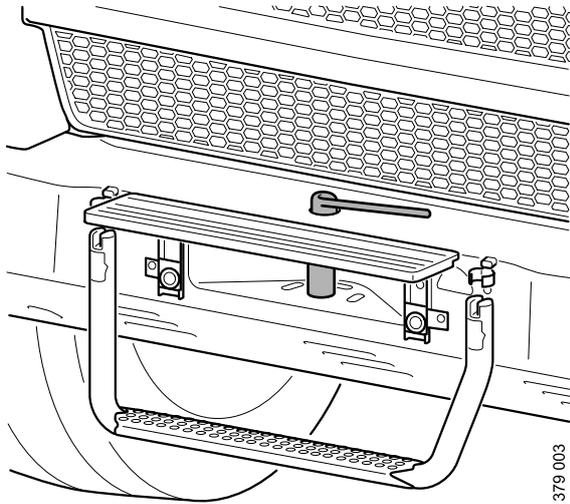
The engine cannot be tow-started when the vehicle is equipped with an automatic gearbox.

When towing, the tow pin should be used together with a drawbar. The tow pin is located behind the registration plate. If possible, the vehicle should be unladen when towing. If possible, run the engine at idle speed to obtain power steering and air pressure in the brake system. The parking brake can be applied automatically in the event of the pressure

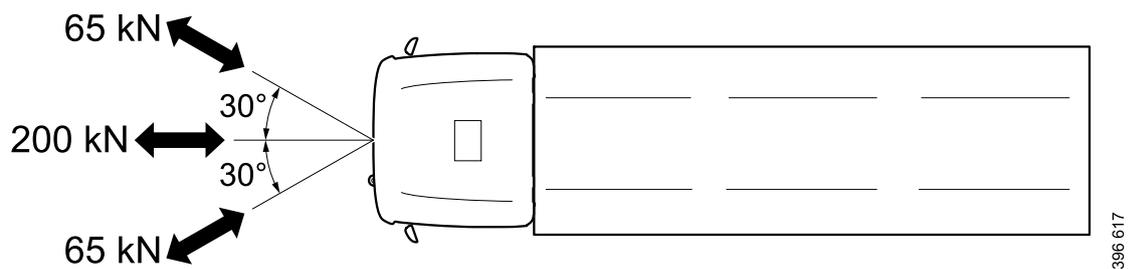


## Recovery and shunting

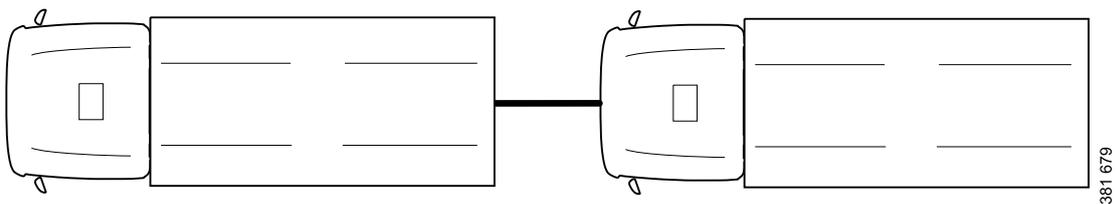
in the brake system falls if it is released with air to the braking system. Therefore, if air is not continuously supplied from the towing vehicle, stop at regular intervals and charge the air system.



During recovery, it is necessary to take into account the maximum tow pin load, which is 200 kN straight forwards, falling to 65 kN at a 30° angle.



Stringent requirements are stipulated for the person steering the towed vehicle. The drawbar can turn in relation to the attachment. This can result in the vehicles colliding. The picture illustrates how the vehicles should be positioned in relation to each other during towing.





## Vehicles with electrohydraulically steered tag axle



### NOTE:

If the battery voltage of the towed vehicle is low, there is a risk that EST will not be able to be adjusted without connecting jump leads.

Switch off the voltage to lock the tag axle in its current position.

If the **yellow** system warning lamp is on:

- The tag axle is centred automatically when the yellow warning lamp is on.
- Switch off the power to lock the tag axle in the centred position.

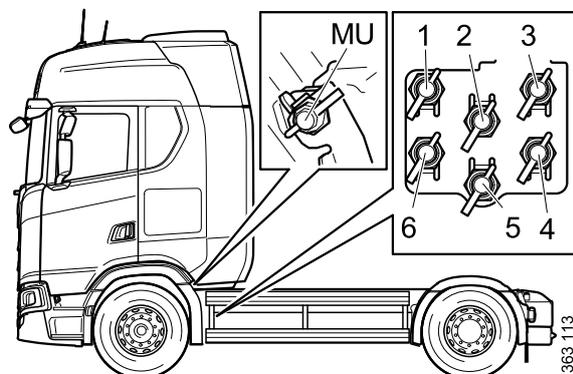
If the **red** system warning lamp is on:

- The tag axle is self-steering or locked in the central position.
- In the case of a serious system fault, the tag axle may need to be centred manually.
  - Centre the tag axle manually or tow the vehicle straight ahead until the tag axle is centred. The ignition must be switched on when the centring is being done.
  - Switch off the power to lock the tag axle in the centred position.



## Release the electronic parking brake

### Releasing the parking brake by refilling with external air



Connect the compressed air from an external source to the MU connection.

Activate workshop mode for the parking brake.

1. Switch on the voltage with the starter key.
2. Release the parking brake.
3. Press and hold the parking brake release for five seconds and turn off the power with the starter key.

Apply the parking brake via the hand control unit **or** drive the vehicle at a speed of more than 10 km/h to deactivate workshop mode.



## Releasing the parking brake by filling the parking brake circuit with external air

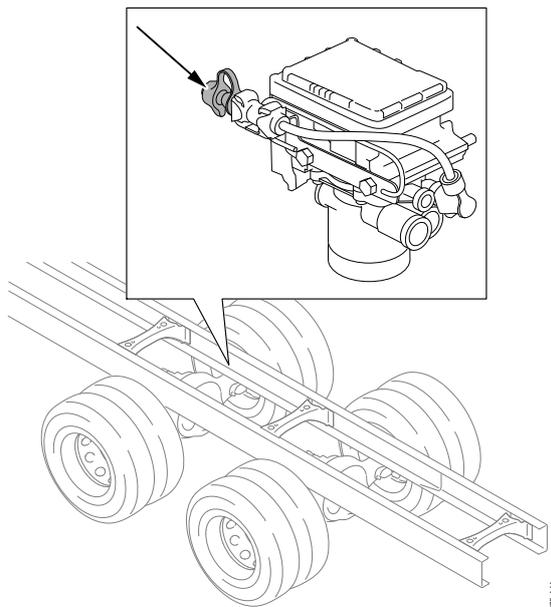
### **WARNING!**

Always support the vehicle on stands when working on vehicles with air suspension. Empty the air bellows.

When working on vehicles without stands under the frame, there is a considerable risk of serious personal injury. When the bellows lose air pressure, the frame will drop onto the axles. This will occur when:

- pressurised lines are removed.
- an air bellows is punctured.
- voltage is applied to the valve for the purpose of emptying the bellows.
- the level sensor lever is moved downwards.

Place chocks on the wheels so that the vehicle cannot roll away when the parking brake is released.



Fill with air at the connection.

### **WARNING!**

To actuate the parking brake again, the air must be drained via the same connection.



## Releasing the parking brake with inoperative pneumatic system

If the compressed air system is deactivated, the parking brake can be released by refilling with air from one of the tyres or from another pneumatic system.

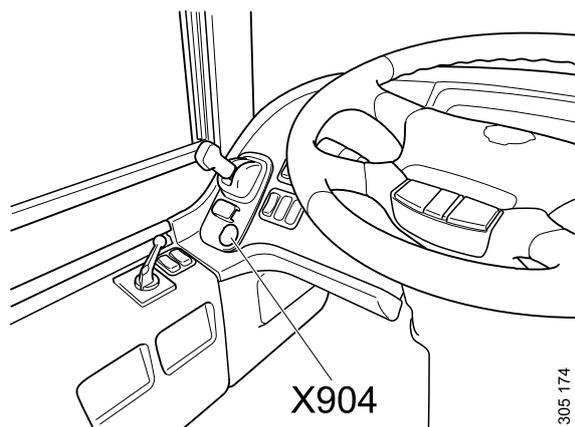
Air can be filled using the pressurising hose, which can be found in the tool equipment.

Connect the hose to one of the tyres and to the filler valve 28 or X904 on the instrument cluster. This enables the parking brake to be released for a short period of time.

### **WARNING!**

Do not tow the vehicle with the parking brake released with refilled air for long stretches because the brake will be applied if the air pressure drops.

The pressure indicator on the instrument cluster does not show the pressure in the parking brake circuit.



*Position on bus.*

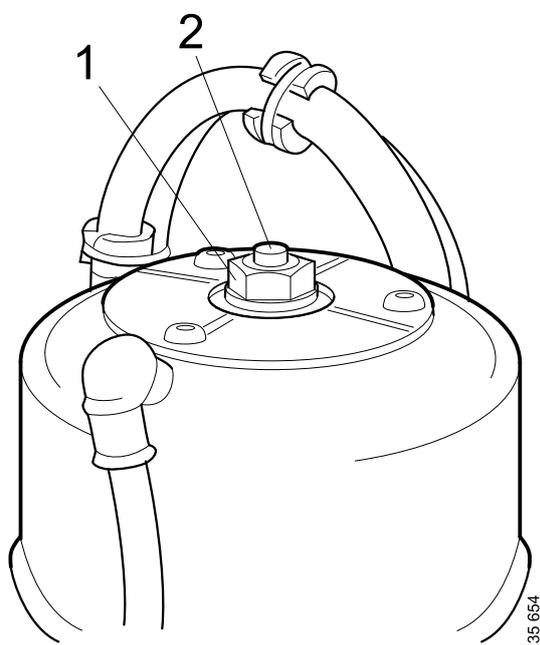
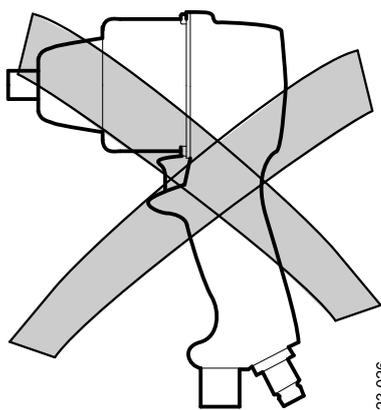


## Disabling the parking brake

If there is no other way of releasing the parking brake or if the vehicle needs to be towed some distance, the parking brake can be disabled using the release bolt in the spring brake chamber.

### **WARNING!**

When the parking brake is put out of action in this way, there is no parking brake function. The vehicle must therefore be prevented from rolling before the release bolts are unscrewed. Use a towing bar when towing.



Unscrew the release bolt until the parking brake is fully released on the relevant wheel.

### **WARNING!**

When the release bolts are screwed out, the vehicle has no parking brake on the wheels where the release bolt has been screwed out. Therefore, use wheel chocks to prevent the vehicle from rolling.



### **IMPORTANT!**

Danger of cross-threading. Clean and oil the bolt. Do not use a nut runner. If the bolt is damaged, the parking brake will not release even though the bolt is unscrewed.

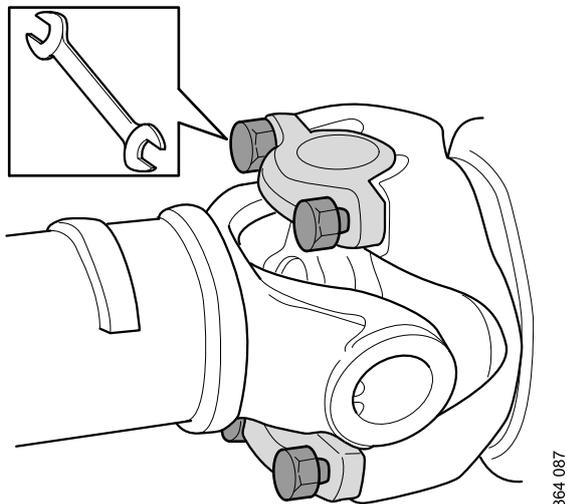
The release bolts 1 are available in different versions. The release bolt is screwed out different lengths depending on the version. Screw until it stops. On certain versions there is a red pin 2 in the release bolt centre that indicates that the bolt is screwed out from its normal position.



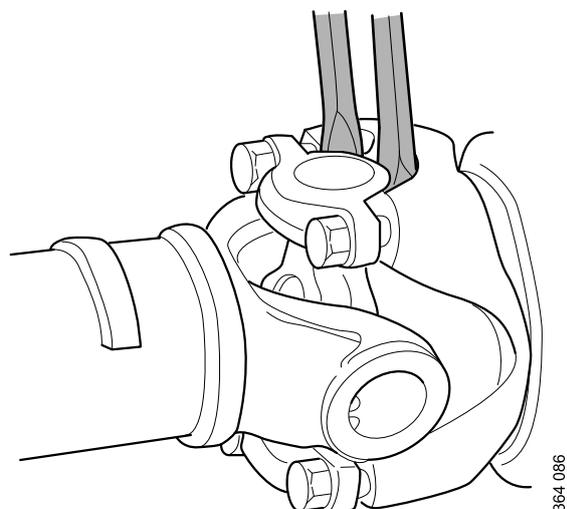
## Detach propeller shaft

### Propeller shaft, P400-500

Apply the parking brake.



Loosen the bolts in the central gear end yokes but do not take out the bolts.



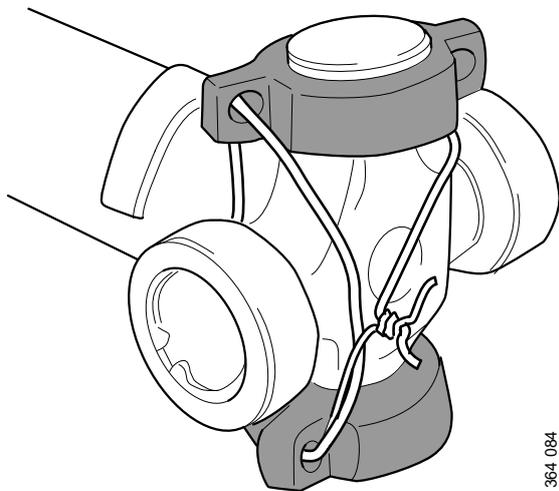
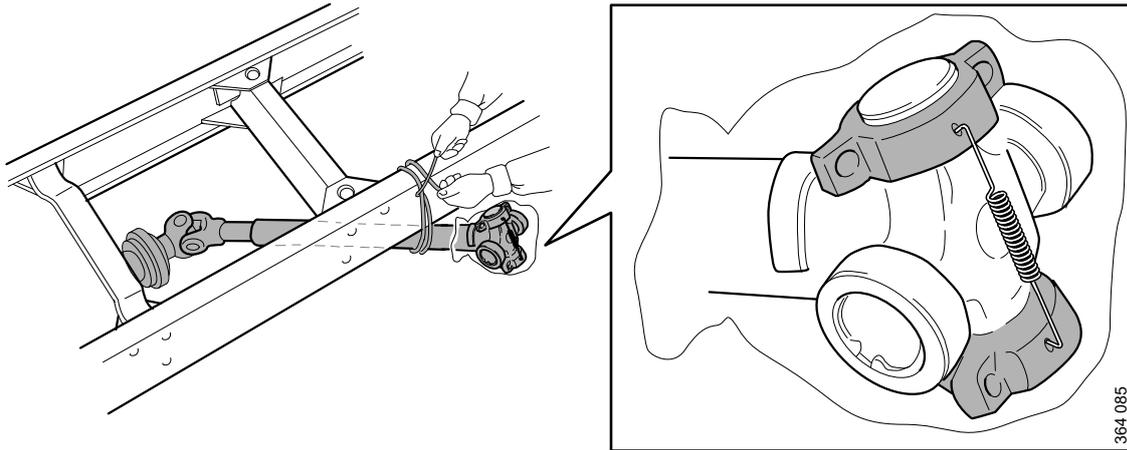
Prise off the bearing retainers alternately from both sides using two screwdrivers.



#### **IMPORTANT!**

If any of the bearing retainers fall off a new universal joint cross with bearing retainer must be fitted. This is because dirt may have penetrated.

Hold the shaft and remove the screws.

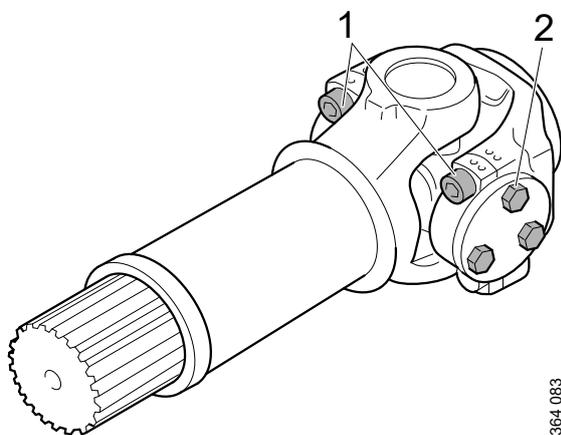


Attach the shaft to the chassis and cover the universal joint and bearing retainer with a plastic bag.

If the spring is broken or missing, tie the bearing retainers to the universal joint cross so the bearing retainers do not fall off. Then attach the shaft to the chassis.

## Propeller shaft, P600

Apply the parking brake.



1. Bearing cap screws
2. Bolt in yoke cover



## Recovery and shunting

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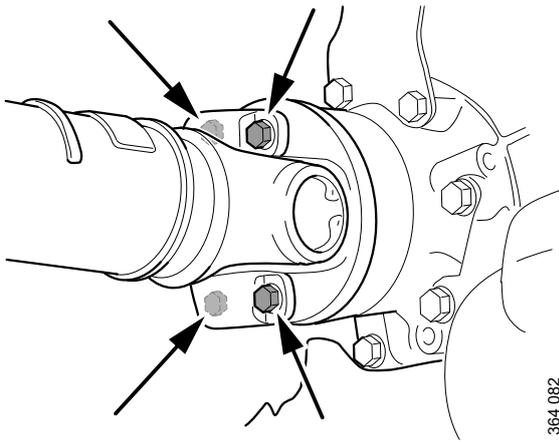
Unscrew the blanking pieces.

Undo the screws on the rear axle central gear but do not remove them.

Prise off the bearing caps alternately from both sides using two screwdrivers.

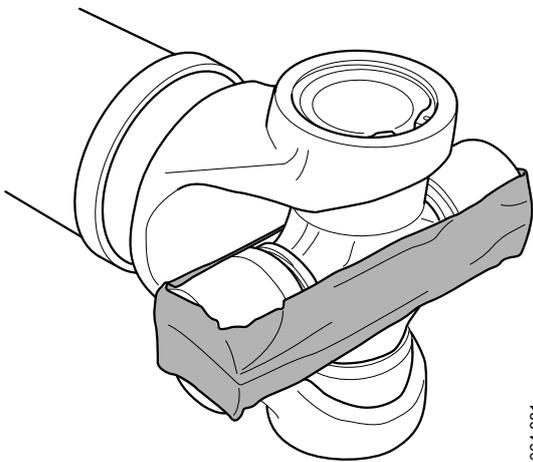
### **IMPORTANT!**

If any of the bearing retainers fall off a new universal joint cross with bearing retainer must be fitted. This is because dirt may have penetrated.

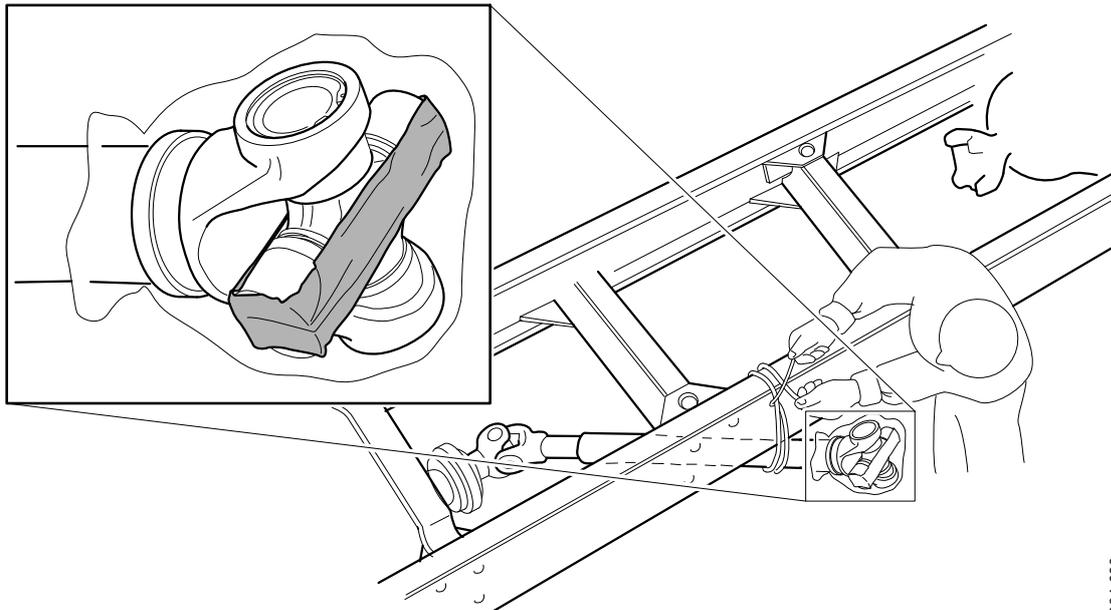


*Bearing cap screws*

Hold the shaft and remove the screws.



Secure the bearing shells with e.g. adhesive tape.

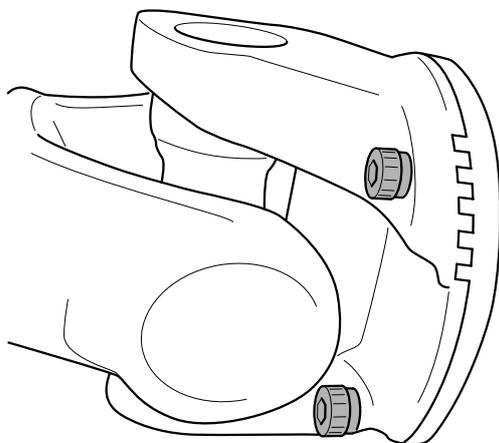


364 080

Attach the shaft to the chassis and cover the universal joint with a plastic bag.

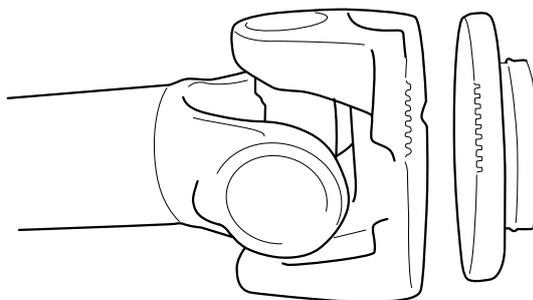
## Propeller shafts, P604 and P644

Apply the parking brake.



364 079

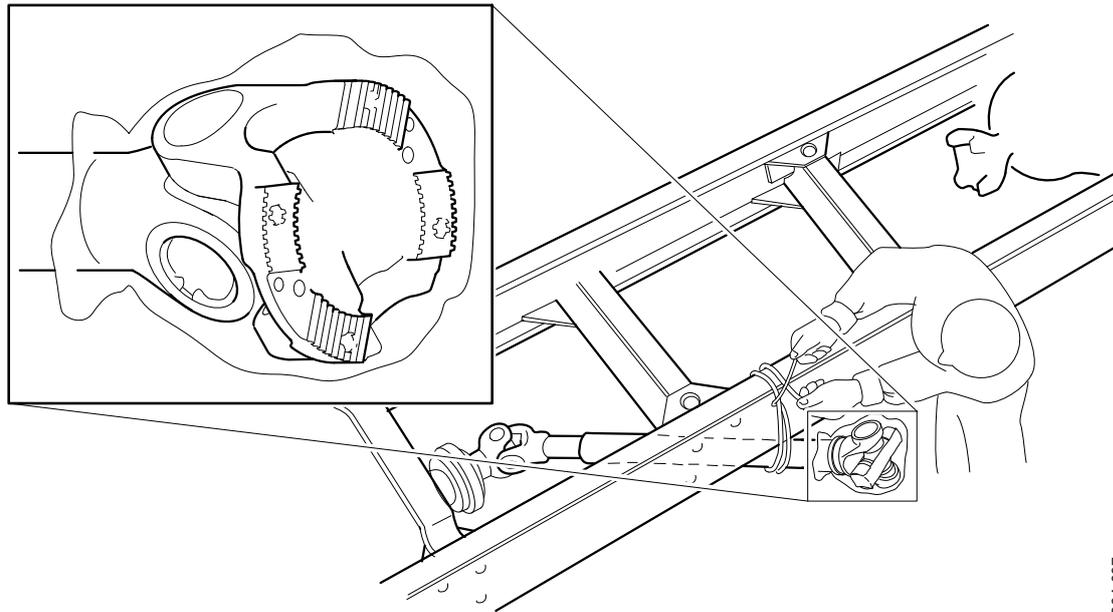
Undo the screws on the rear axle central gear but do not remove them.



364 078

Disconnect the propeller shaft.

Hold the shaft and remove the screws.



364 097

Secure the axle to the chassis. If you think there may be a risk that the propeller shaft will be exposed to dirt or water cover the cross slots on the propeller shaft flange.

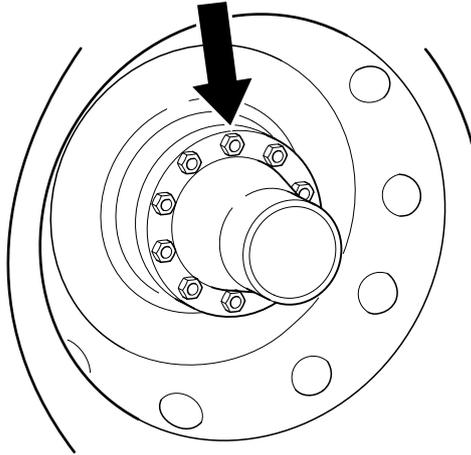


## Half shaft

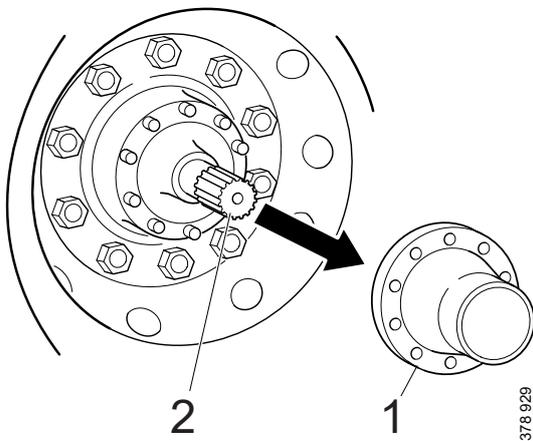
The half shafts must be removed on both the left-hand and right-hand sides.

Apply the parking brake.

Clean the area around the half shaft flange.



Remove nuts and cones. Knock the edge of the flange if the cones are stuck.



1. Half shaft flange
2. Half shaft

Remove the half shaft flange.

Remove the half shaft.

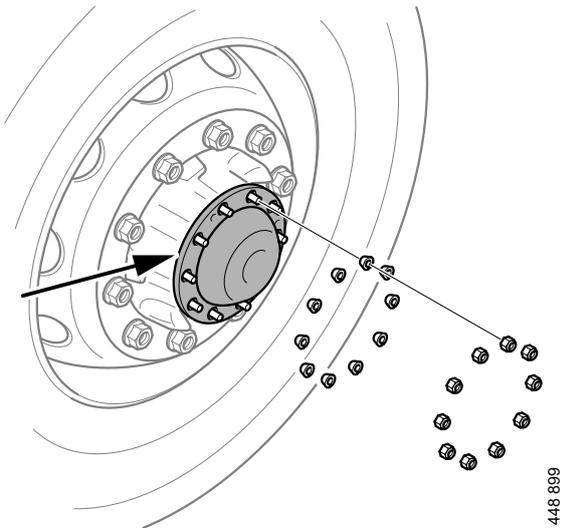
Refit the half shaft flange which keeps dirt out.

## Half shaft with built in flange

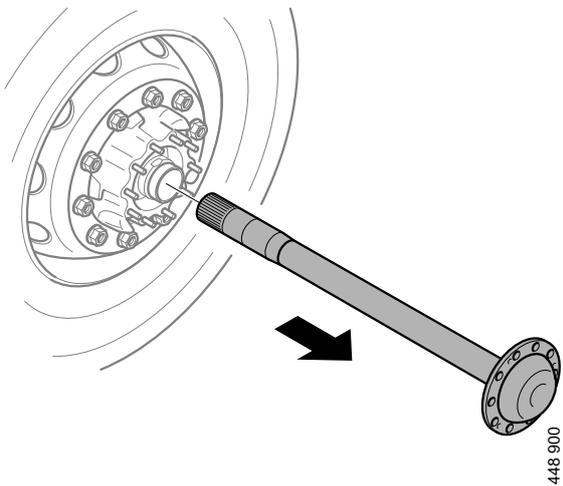
The half shafts must be removed on both the left-hand and right-hand sides.

Apply the parking brake.

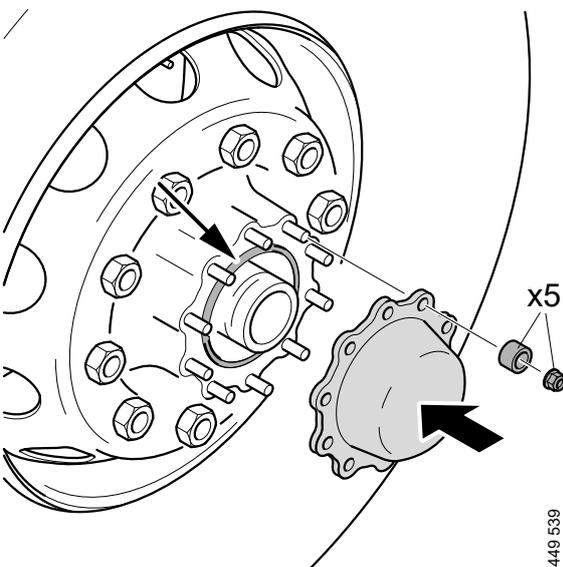
Clean the area around the half shaft flange.



Remove nuts and cones. Knock the edge of the flange if the cones are stuck.



Remove the half shaft.



**When towing:**

Fit a protection cover, e.g. 2 290 533 with O-ring and nuts.

Use spacers (e.g. cones) between the nuts and the protection cover. 5 nuts per hub is sufficient.



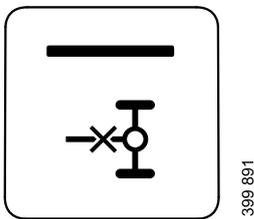
## All-wheel drive vehicles

There are 3 ways of disengaging the gearbox when recovering or towing all-wheel drive vehicles.

- Via the drive wheel disengagement function (if the vehicle is fitted with this).
- By removing the propeller shaft from the front and rear axles.
- Through manual resetting to neutral position (if the vehicle is fitted with this).

### Drive wheel disengagement for a short recovery or towing

Drive wheel disengagement means that you can set the transfer gearbox to neutral position during towing or when you are using the power take-off on the transfer gearbox.



*Drive wheel disengagement switch*

#### **!** IMPORTANT!

If the vehicle is without power or without compressed air, the propeller shafts on both the front and rear axle must be detached before towing. This must be done when towing both with and without a raised front axle.

Avoid damage to the main gearbox and the transfer gearbox when towing by first taking the following action. If the transfer gearbox is fitted with a power take-off, you must take the following action before activating the power take-off.

1. Turn the starter key to drive mode.
2. Put the gear lever in neutral position and the range switch in its upper position, high range. If the vehicle is fitted with an automatic gearbox, put the drive mode selector in neutral position.
3. Activate the drive wheel disengagement switch.

The instrument cluster will indicate that propulsion has been disengaged.

#### **!** IMPORTANT!

When drive wheel disengagement is activated, the main gearbox must also be in neutral position. Otherwise the transfer gearbox will be damaged due to a lack of lubrication. This does not apply to special versions which are equipped with a power take-off or a built in oil pump.



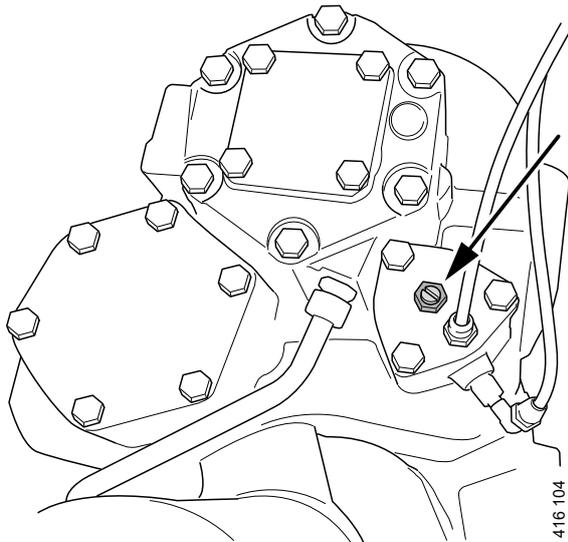
## Removing propeller shafts

If the vehicle is recovered with the axles having wheels in contact with the ground, the propeller shaft should be removed from the driving axle which has wheels in contact with the ground.

## Manual resetting to neutral position when towing

For vehicles fitted with ZF transfer gearboxes.

In the event of problems with the pneumatic system for the transfer gearbox, or if the vehicle lacks compressed air, you can place it in neutral position for towing using an adjusting screw on the transfer box.



1. Loosen the lock nut.
2. Screw in the adjusting screw until it stops.

**i** **NOTE:**

Adjusting screws must be reset by trained mechanics.

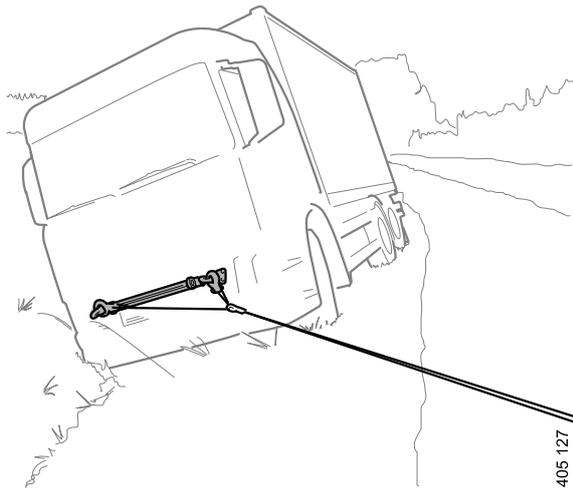
For more information about resetting, see *05-00-> GT/GTD 800/801/900/901 -> Repair -> Adjusting high and low gear.*



## Recovery tool

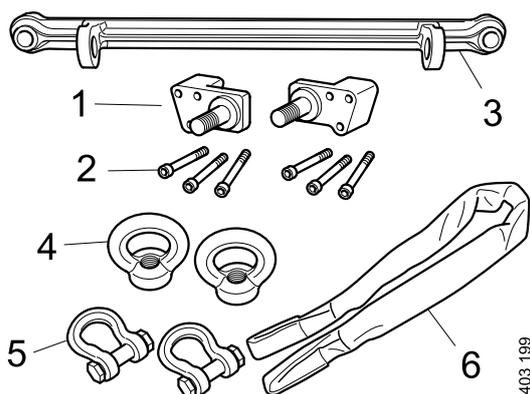
2 722 133 Tool kit for recovery supports and distributes pulling forces on both the frame members. This counteracts the compression of frame members during recovery. The tool kit is recommended by Scania for all types of heavy recovery when the vehicle is at the side of the road.

For vehicle recovery, as transport, after recovery vehicles can 2 426 174 Towing tool be used.



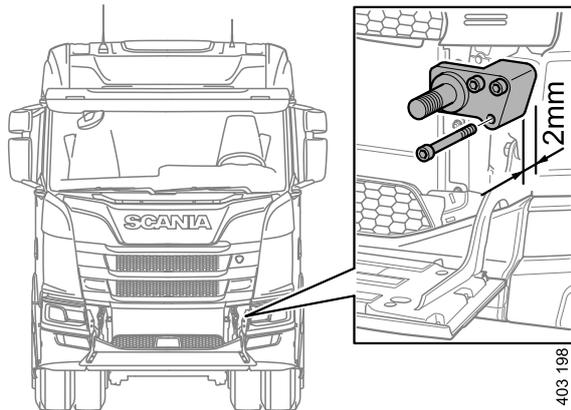
The tool kit consists of:

1. Chassis brackets (2 off)
2. Screw, M20, 10.9 mm, 130 mm (6 off)
3. Intermediate member (1)
4. Towing eyes (2 off)
5. Shackles (2 off)
6. Pulling strap 2.5 m (1)

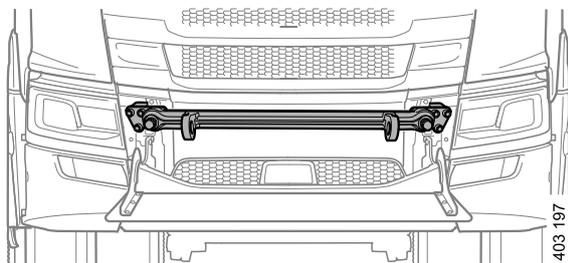




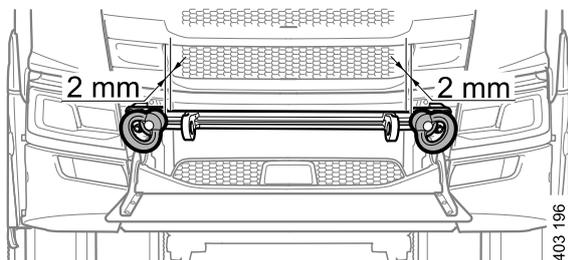
**Use**



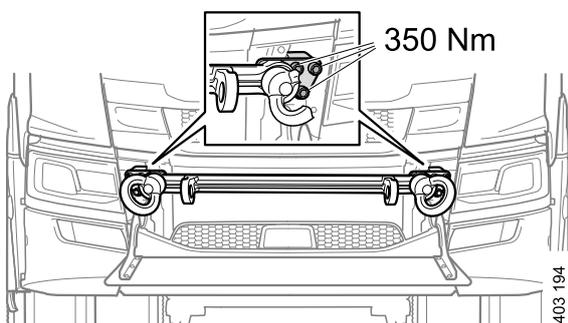
Fold down the front grille panel and fit the brackets on each side of the chassis without tightening the screws.



Fit the intermediate member.



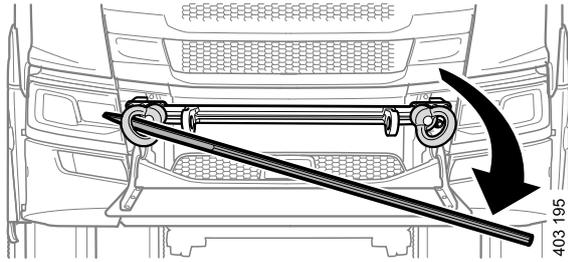
Fit the towing eyes without tightening them.



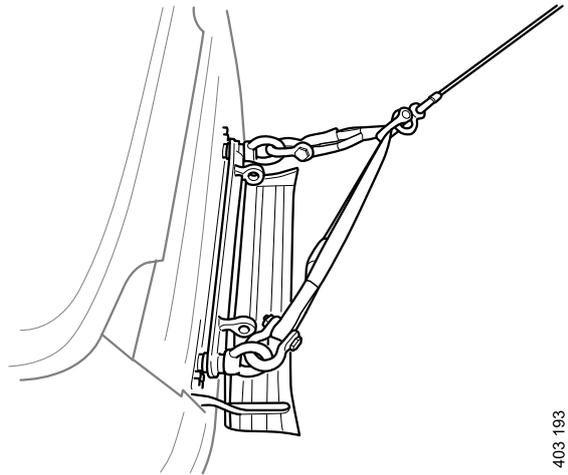
Tighten the screws in the chassis brackets to 350 Nm.



## Recovery and shunting



Tighten the towing eyes with a tommy bar or equivalent.



Fit the shackles to the towing eyes and fasten the pulling strap around the screw going through the shackles as illustrated. During recovery, the shackles must be able to turn in the towing brackets depending on the direction of the tow, and the towing eye from a recovery vehicle must be able to move freely on the pulling strap.

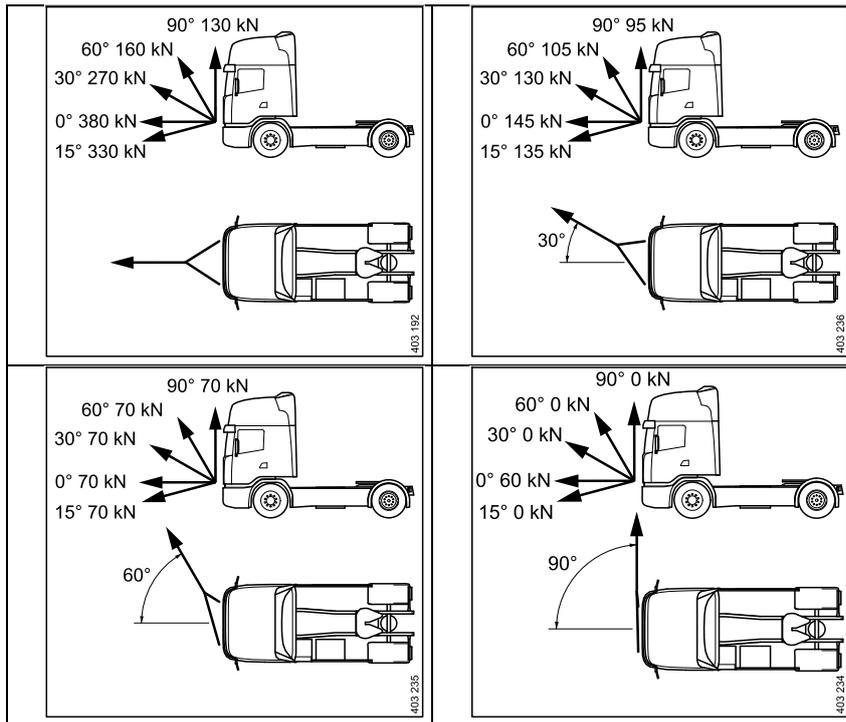


### **IMPORTANT!**

The inner brackets of the intermediate member must not be used.



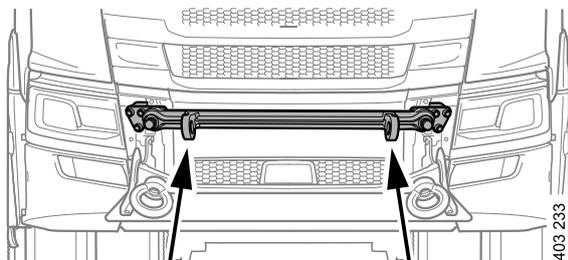
## Recovery and shunting



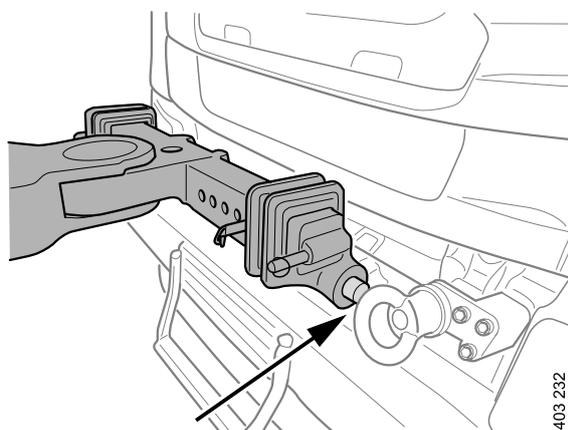
The potential towing power depends on the towing angle horizontally and vertically. Refer to the tables.

### Intermediate member inner brackets

These are designed to lift and pull the vehicle behind the recovery vehicle. With equivalent function to

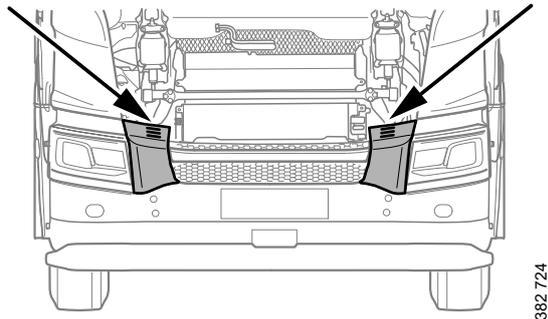


Adapters between the intermediate member and the recovery vehicle beam are not supplied by Scania.

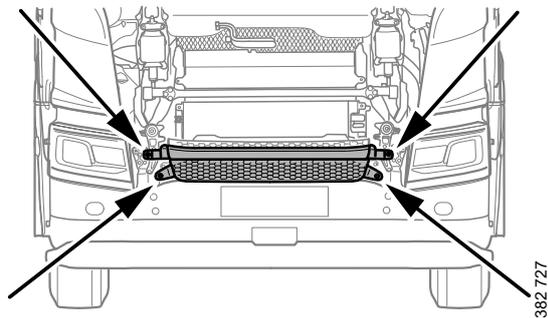




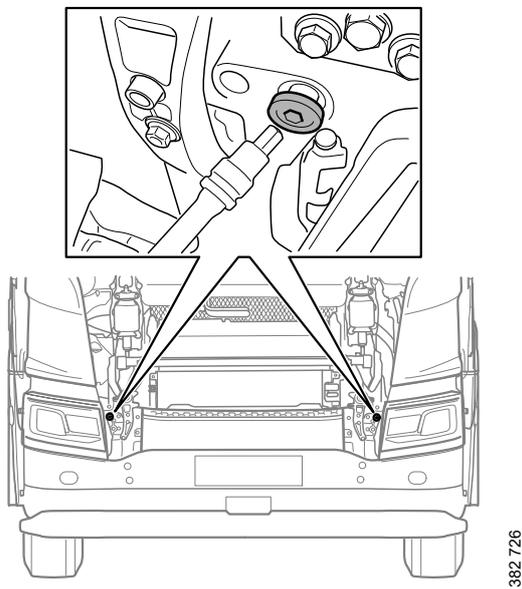
### Additional work for vehicles with a heavy-duty front



Open the front grille panel and remove the casings.



Remove the grille.



Remove the spacers.