

Important information Serious risk of injury

Work that is classified as electrical work may only be carried out by trained and qualified personnel who are authorised to perform electrical work.

Therefore, block the starting device and ensure that the electric drive system is powered off.



WARNING!

This warning symbol and text can be found next to maintenance items where it is particularly important to bear in mind the risk of injury.

Operator's manual Electric propulsion system en-GB

Issue 1.0



IMPORTANT!

The owner is responsible for making sure that maintenance is carried out on time and in accordance with the instructions.

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Start of warranty

The more Scania knows about you, your company and your equipment, the more effectively we can adapt our services to you. If you have started to use a new Scania engine, it is very important that you send in the warranty start report to Scania immediately. Quite simply, Scania needs to register all the details on engine ownership etc. in order to carry out monitoring for you.

You can report the start of the warranty on the Scania website <https://www.scania.com/>.

Note:

If you do not send in the warranty report, the engine is not covered by the accompanying Scania warranty.

Also fill in below the details you enter in the warranty report. These details can facilitate contact with a workshop, for example. The engine serial number is on the engine data plate and is also engraved on the cylinder block.

Engine serial number (e.g. 1 111 111)

Vessel identification number (e.g. MMSI 111 111 111 or IMO 1 111 111)

Start date (yyyy-mm-dd)

Company name

Contact person

Telephone number

E-mail address

Address

Postcode

Postal town

State/County

Country

Introduction

This Operator's manual describes the operation and maintenance of Scania's electric propulsion unit.

The electric propulsion unit is available in various power ratings. The power for the propulsion unit ordered is indicated on a plate located on the engine control unit.

Note:

Only standard components are described in the operator's manual. For more information on special equipment, refer to the instructions provided by the respective manufacturers.

To ensure the maximum performance and the longest service life for the engine, remember the following:

- Read through the Operator's manual before starting to use the engine. Even regular users of Scania engines will get new information from the Operator's manual.
- Always follow the maintenance instructions.
- Read the section on safety carefully.
- Get to know your engine so that you know what it can do and how it works.
- Always contact a workshop with qualified personnel for maintenance and repair.

The information in this Operator's manual was correct at the time of going to press. Scania reserves the right to make alterations without prior notice.

Certification



IMPORTANT!

For Scania to guarantee that the electric propulsion unit corresponds to its certified configuration, and take responsibility for any damage and injuries that occur, maintenance must be completed in accordance with the instructions in this Operator's manual.

Otherwise, the instructions in the Operator's manual for the running and maintenance of the engine shall apply. Follow the safety precautions on the following pages.

Environment and safety

Environmental liability

Scania develops and produces engines that are as environmentally-friendly as possible. Scania has made major investments in the reduction of harmful exhaust emissions in order to fulfil the environmental requirements in force in almost every market.

At the same time, we have been able to maintain a high level of performance and operating economy for Scania engines. To maintain these throughout the entire service life of the engine, it is important for the user to follow the instructions on driving, maintenance and fuel, lubricating oil and coolant as outlined in the Operator's manual.

Other green initiatives taken include ensuring that, following maintenance and repair, waste that is harmful to the environment (for example oil, fuel, coolant, filters and batteries) is disposed of accordance with the applicable environmental requirements.

Safety

The following pages contain a summary of the safety precautions to be complied with when operating and maintaining Scania engines. The equivalent text can also be found under the relevant maintenance item.

To prevent damage to the engine and to ensure that it runs optimally, follow the instructions in the warnings and advisories.

If the instructions are not followed, the warranty can cease to apply.

Different types of advisory

Warning!

All advisories preceded by Warning! are very important. They warn of serious faults and incorrect operation that could lead to personal injury. Example:



WARNING!

Work that is classified as electrical work may only be carried out by trained and qualified per-

sonnel who are authorised to perform electrical work.

Important!

Advisories preceded by Important! warn of faults and incorrect operation that could lead to equipment being damaged. Example:

Please note:

Advisories preceded by Note: refer to information important to ensure the best possible operation and functionality. Example:

Note:

The definition of electrical work is when you can come into contact with normally live parts, such as open poles. Electrical work does not include loosening harness-to-component connectors, as no contact is made with normally live parts.

Environment

This Operator's manual contains specially highlighted text with instructions to help protect the environment during maintenance. Example:



Environment

Depending on the battery type, the vehicle's batteries may contain corrosive diluted sulphuric acid and the toxic metal lead. Lead is harmful to humans and the environment. Wash your hands after contact with the battery. The batteries should be handled in accordance with national regulations on environmentally hazardous substances.

Warnings and advisories

Smoking

Depending on the battery type, explosive hydrogen gas may be generated during charging. Smoking is prohibited and there must not be any devices that can generate sparks in the vicinity.

Safety precautions for driving

Daily maintenance

Always perform a visual inspection of the electric propulsion unit and the rest of its equipment

before starting the machine or after shutting it down following operation.

This inspection should be done to detect oil or coolant leakage, or anything else that may require corrective action.

Batteries



WARNING!

Never use a high pressure gun against surfaces close to the batteries. Water can penetrate and damage batteries and other electrical equipment.

There must be no smoking, naked flames or sparks near the batteries or the battery compartment. Incorrect connection of a battery cable or jump lead can cause a spark, which can cause the battery to explode.

Hazardous gases



WARNING!

Danger of personal injury. Never try to extinguish a burning propulsion battery. Avoid the smoke.

Starter lock



IMPORTANT!

If the instrument panel is not fitted with a starter lock, the engine compartment should be locked to prevent unauthorised personnel from starting the engine. Alternatively, a lockable master switch or battery master switch can be used.

Starter gas



WARNING!

Never use starter gas or similar agents to help start the engine. This can cause an explosion in the intake manifold and possible injury.

Driving



WARNING!

The engine must not be run in environments where there is a risk of explosion, as all of the electrical or mechanical components can generate sparks.

Approaching a running engine always poses a safety risk. Parts of the body, clothes or dropped

tools can get caught in rotating parts such as the fan and cause injury. For personal safety all rotating parts and hot surfaces must be fitted with guards.

Safety precautions for handling materials

Fuel and lubricating oil



WARNING!

All fuels and lubricants as well as many chemicals are flammable. Always follow the instructions on the relevant packaging.

The work must be carried out on a cold engine. Fuel leaks and spillages on hot surfaces can cause fire.

Store used rags and other flammable materials safely so as to avoid spontaneous combustion.

Chemicals



WARNING!

Most chemicals such as glycols, anti-corrosive agents, preservative oils and degreasing agents, are harmful. Some chemicals, such as preservative oil, are also flammable. Always follow the safety precautions on the packaging.

Store chemicals and other harmful materials in approved and clearly marked containers, where they are inaccessible to unauthorised persons.



Environment

Excess and used chemicals must be disposed of as specified in national and international laws and regulations.

Safety precautions for maintenance

Switch off the engine



WARNING!

Working on a running engine always poses a safety risk. Parts of the body, clothes or dropped

tools can get caught in rotating parts and cause injury.

Always switch off the engine before maintenance, unless otherwise indicated.

Make it impossible to start the engine: Remove any starter key, or cut the power using the main power switch or battery master switch and lock them.

Fit a warning plate somewhere appropriate, showing that work is being carried out on the engine.

Lubrication system



WARNING!

Hot oil can cause burns and skin irritation. Wear protective gloves and eye protection when changing hot oil.

Make sure that there is no pressure in the lubrication system before starting work on it.

Make sure that the oil filler cover is fitted when starting and driving in order to avoid oil escaping.



Environment

Used oil must be disposed of as specified in national and international laws and regulations.

Cooling system



WARNING!

Never open the coolant filler cap when the engine is hot. Hot coolant and steam may spray out and cause burns. If the cover has to be opened do it slowly to release the pressure before removing the cover. Wear protective gloves as the coolant is still very hot.

Avoid skin contact with coolant as this may cause irritation to the skin. Wear eye protection and gloves when handling coolant.

Ethylene glycol can be fatal if ingested.



Environment

Used coolant must be disposed of as specified in national and international laws and regulations.

Electrical system



WARNING!

Switch off the engine and switch off the power by disconnecting the electrical cables to the battery. External power supplies to extra equipment in the engine must also be disconnected.

Always use Scania spare parts for the fuel and electrical systems. Scania spare parts are designed to minimise the risk of fire and explosion.

Electric welding



WARNING!

When carrying out welding work on and near the engine, disconnect the battery and alternator leads. Pull out the multi-pin connector for the engine control unit as well.

Connect the welding clamp close to the component to be welded. The welding clamp must not be connected to the engine, or so that the current can cross a bearing.

When welding is finished:

1. Connect the alternator and engine control unit cables.
2. Connect the batteries.

Batteries



WARNING!

If the propulsion battery is damaged or is suspected to be damaged, the vehicle may not be parked inside or in the immediate vicinity of the workshop. This applies both to physical damage and damage such as high acceleration. No repairs may be carried out on any part of the vehicle.

Contact Local Technical Helpdesk.



WARNING!

The propulsion battery must not be subjected to direct sunlight. Never park the vehicle outdoors without protective casings. Direct sunlight could cause the propulsion battery to reach a high temperature that would permanently damage the cells.

Note:

When renewing the propulsion battery, return the old battery using the propulsion battery packaging from the new battery. The propulsion battery must be carried out in accordance with the applicable regulations for the transport of dangerous goods (ADR).



Environment

Used batteries must be disposed of as specified in national and international laws and regulations.

Before starting



WARNING!

Ensure that all protection is in place before starting the electric propulsion unit. Ensure that no tools or other objects have been left on the engine.

Electrical safety

Only qualified personnel are permitted to carry out work on the electric propulsion unit and high-voltage components.

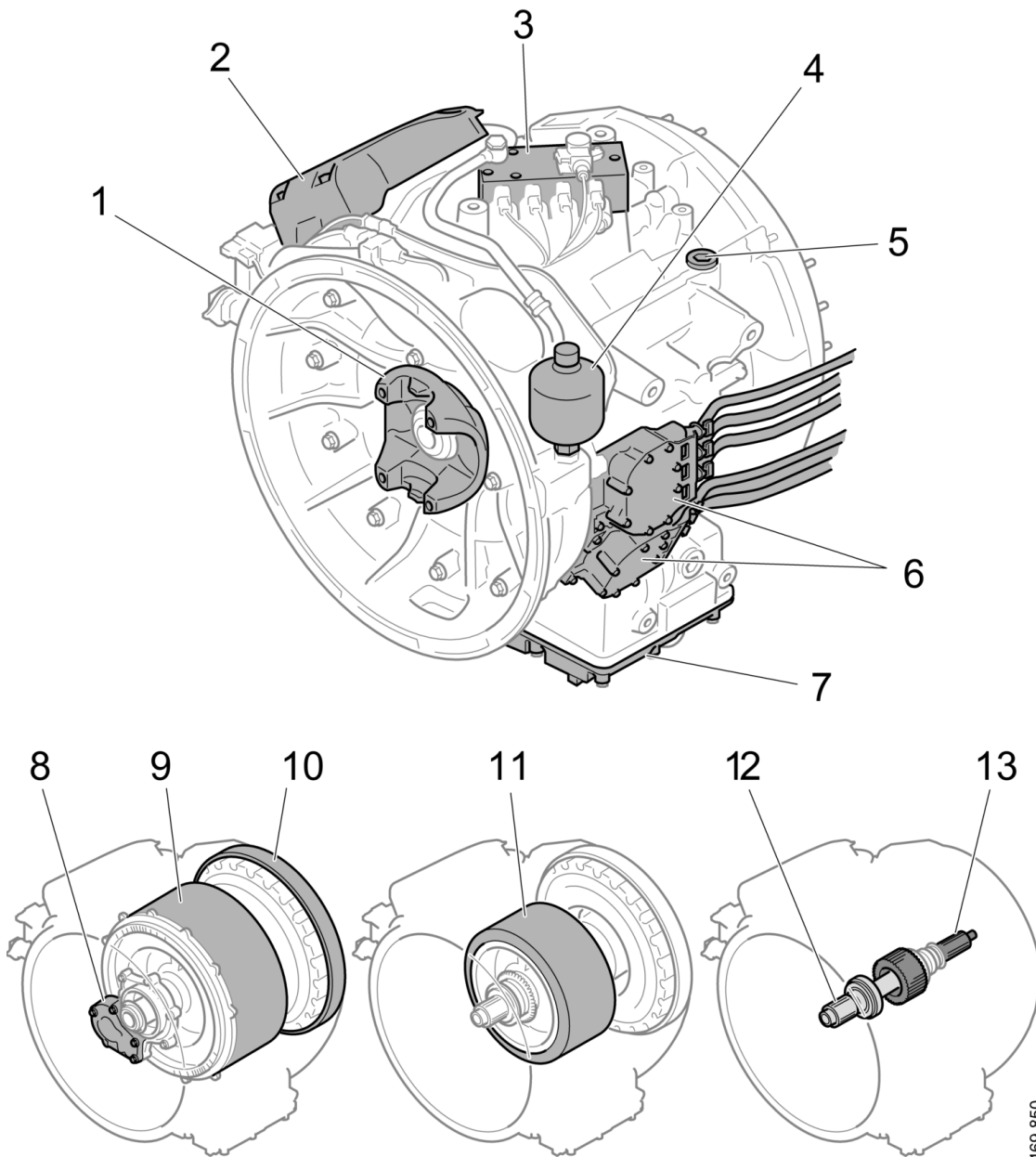
Propulsion batteries that are overheated or otherwise damaged may catch fire.

Exercise extreme caution if you suspect that a propulsion battery has been damaged, even after an extended period.

The smoke from a burning propulsion battery is toxic.

Component identification

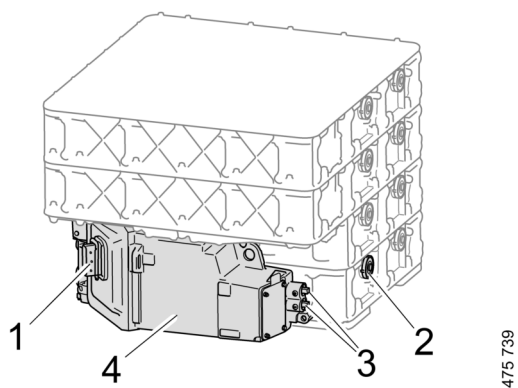
Electric propulsion unit



469 850

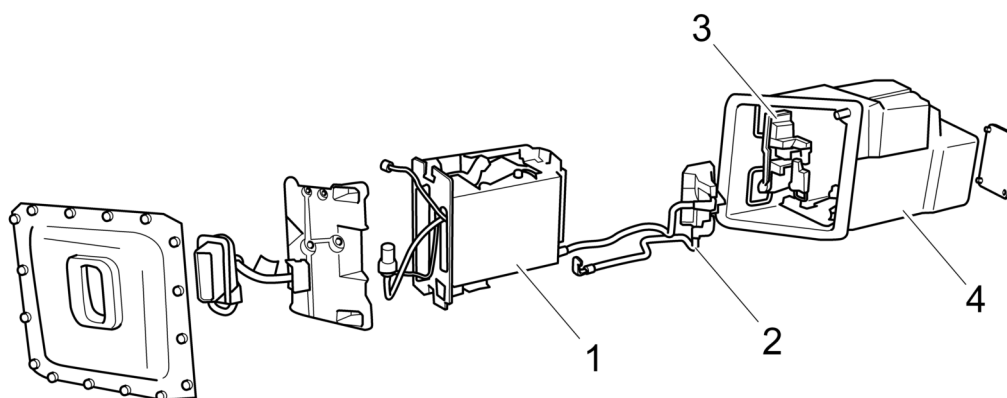
1. End yoke	8. Mechanical oil pump
2. ECU protective casing	9. Stator
3. Valve block	10. Flywheel housing
4. Pressure accumulator	11. Rotor
5. Oil filler and connection for manual disengagement	12. Output shaft
6. Junction box for voltage class B	13. Input shaft
7. Oil sump	

Battery



- | |
|---------------------------|
| 1. VCA connection |
| 2. Overpressure valves |
| 3. VCB connection |
| 4. Pressure accumulator |
| 5. Battery connection box |

Battery junction box



475 753

- | |
|--|
| 1. Battery junction box cluster |
| 2. Busbars |
| 3. Inline busbar connector |
| 4. Battery connection box housing |

Starting and driving

Checks before first start

Complete the maintenance tasks listed under "First Start" in the maintenance schedule before starting the engine for the first time. Check the following:

- Oil level.
- Fluid level in batteries.
- Battery state of charge.

For more information, see section [Maintenance intervals](#).

checks before driving

Perform daily inspections of the coolant level for both the electronics cooling circuit and the battery cooling circuit. This is done by checking that the liquid level in the expansion tanks is sufficient.

Also look for visible leakage.

For more information, see section [Maintenance intervals](#).

Driving

Check instruments and warning lamps at regular intervals.

Emergency control

If the internal jaw coupling between the combustion engine and the electric machine fails to engage, meaning the vehicle does not switch to hybrid mode, activate manual emergency control.

There is an oil filler hole on top of the electric motor. Use this hole to manually operate the emergency control system.

The electric motor comes equipped with a lifting eye bolt. Fit the bolt through the oil filler hole for manual steering.

IMPORTANT!

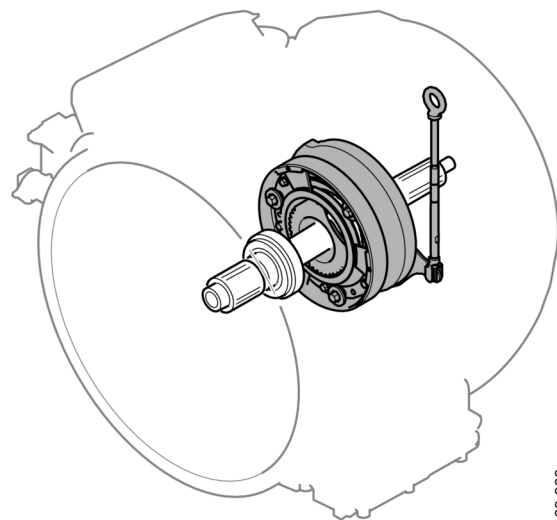
Before repair or maintenance can be performed, please ensure that the electric machine is disconnected.

Procedure

The operating unit is a clutch that connects and disconnects the electric machine from the driving axle.

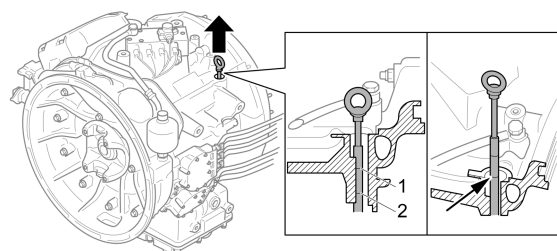
There are 2 indicator lines on the pull rod, indication lines 1 and 2. See illustration. To connect the combustion engine, the pull rod must be in position so that the other indicator line is level with the edge of the housing; see the right arrow in the illustration. Follow the steps below.

1. Remove the oil filler plug and attach a lifting eye to the pull rod.
2. Pull the emergency control to indicator line 1 on the pull rod.
3. Press the emergency control down to its original position.
4. Rotate the output shaft forwards and backwards while simultaneously pulling the emergency control unit. It should now be possible to slide the pull rod to indicator line 2.
5. If it stops at indicator line 1, repeat steps 3 and 4.
6. When the emergency control has been pulled to indicator line 2, the control system has been connected to the engine.
7. Remove the lifting eye, press the pull rod, refit the rubber holder securing the pull rod position and close the hatch.
8. Fit the oil filler plug.



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Operating unit



470 378

Indication lines on pull rod

Note:

An electric machine requires approximately 300 N of lifting force to connect the control system to the engine.

If the pull rod does not pass the first indicator line, more force is needed.

It is not possible to pull harder on the pull rod, and it is necessary to rotate either the input shaft or the output shaft.

Maintenance

The maintenance programme covers a number of points that are divided into the following sections:

- Lubrication system
- Cooling system
- Other



WARNING!

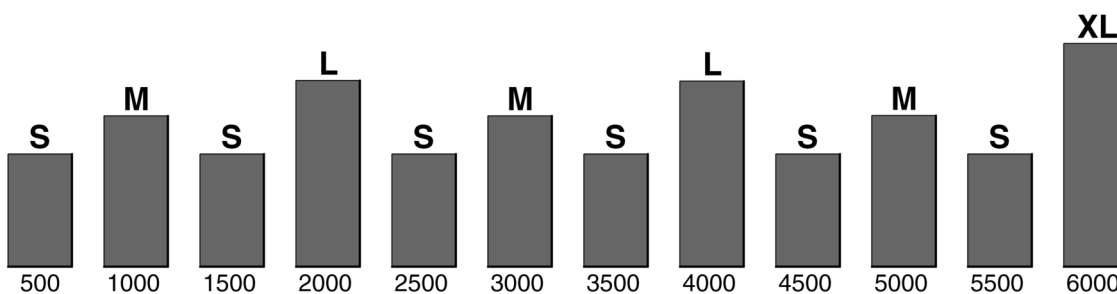
Block the starting device when working on the engine. If the engine starts unexpectedly, there is a serious risk of injury.

There is always a risk of sustaining burns when an engine is hot. Particularly hot parts include oil sumps, hot coolant and oil in pipes and hoses.

The maintenance programme includes the following:

- Maintenance R: One event when taken into service.
- Maintenance S: Minimum basic maintenance.
- Maintenance M: More extensive maintenance.
- Maintenance L: Includes nearly all maintenance items in the form.
- Maintenance XL: Includes all maintenance items in the form.

During a period, the sequence is S-M-S-L-S-M-S-L-S-M-S-XL.



IMPORTANT!

On delivery a Scania engine is optimised for its application. However, regular maintenance is necessary to:

- prevent unplanned stops
- extend the service life of the engine
- maximise the long-term emission performance of the engine
- give the best possible operating economy.

Electric propulsion unit washing



WARNING!

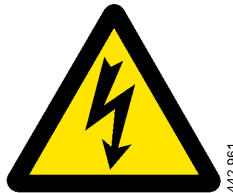
Beware of hot washing water. Wear eye protection, protective clothes and protective gloves.



WARNING!

VCB components marked with a high voltage warning plate must not be high pressure washed.

VCB orange cables must not be high pressure washed.



Warning plate for high voltage



Environment

Dispose of the washing water in compliance with relevant national or local regulations.

Electric propulsion units with low running hours



IMPORTANT!

On engines with few hours of operation, maintenance must be carried out annually or every 5 years.

Stand-by generator sets and similar items that are not used regularly should be test run and checked in accordance with the manufacturer's instructions.

The following maintenance items must be carried out once the engine has been warmed up to operating temperature.

1. Checking the oil level.
2. Checking the coolant level.
3. Checking for engine leakage.

Maintenance intervals

	Daily	First start	Interval (hours)		
			2000	6000	20000
Lubrication system					
Checking the oil level	X	X	X	X	X
Changing the oil					X
Renewing the oil filter					X
Cooling system					
Checking the coolant level	X	X	X	X	X
Checking the coolant's anti-freeze and corrosion protection		X			
Changing the coolant and cleaning the cooling system		X	X	X	
Other					
Checking for leakage	X	X	X	X	X

Lubrication system

Oil grade

This table applies to electric vehicles where the electric machine and gearbox have separate oil systems.

The recommended oil for the propulsion unit is STO EV.

Oil volume	Oil grade
9.2 litres	STO EV

Checking the oil level



REQUIREMENT!

The electric propulsion unit should have been left off for at least 7 minutes before the oil level is checked.

For information on the correct oil grade, see section [Oil grade](#).

The oil level in the electric propulsion unit is displayed on the customer's cluster instrument via an electric oil level sensor fitted at the bottom of the e-machine.

Check the oil level daily before starting the machine.

If the oil level is below the recommended level, fill the e-machine with oil according to the specifications.

Changing the oil



WARNING!

Hot oil can cause burns and skin irritation. Use protective gloves and eye protection when renewing hot oil. Make sure that there is no pressure in the lubrication system before changing the oil. The oil filler cover must always be in place when starting and running the engine to prevent oil being ejected.

Note:

Change the oil more often if the engine is operated in particularly demanding conditions, e.g. in a dusty environment.

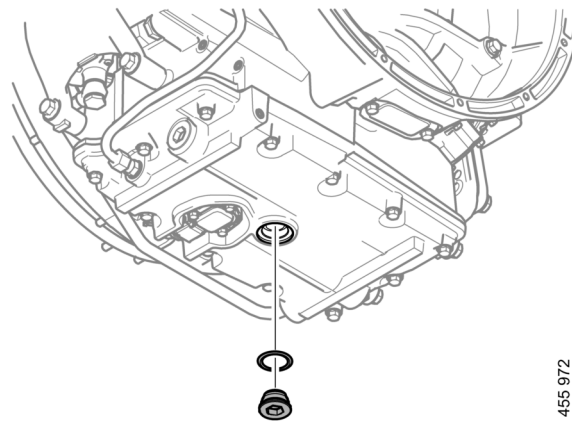


Environment

Use a suitable container. Used oil must be disposed of as specified in national and international laws and regulations.

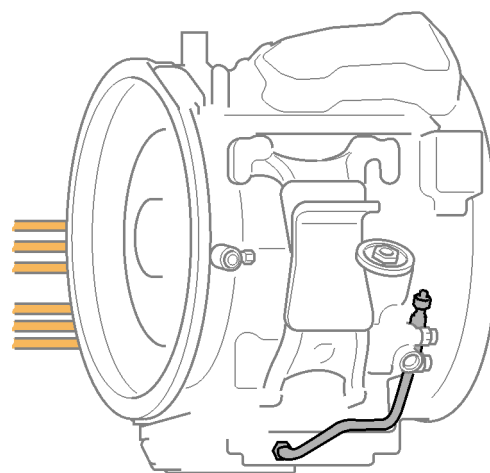
Draining the oil

1. Unscrew the oil plug and drain the oil.
2. It is also possible to connect an external drain pump and extract the oil from the oil sump.



Oil plug with gasket

455 972

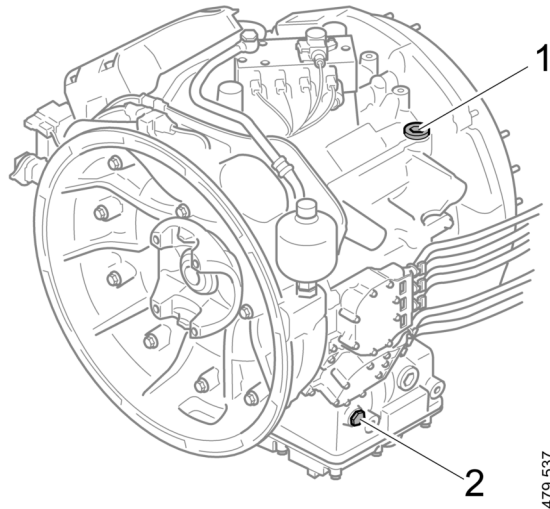


Connection for external oil drain pump

479 536


Fill with oil

1. Remove the oil filler plug (1) and the oil plug (2).
2. Fill with new oil in the level hole (2) until the oil reaches the edge.
3. Close the oil plug and the oil filler plug.
4. Run the electric pump for 5 minutes to fill the cooling system. The pump is started via Scania's work tool.
 - a) If an external oil cooler is filled through the drive unit, additional oil is displaced to the cooler.
 - b) If the external cooling system holds more than 4 litres of oil, step 4 must be adjusted.
5. Check the oil level. If the level is too low, top up with oil.
6. Reinstall the oil level plug and the oil filler plug.
7. Run the electric machine for 5 minutes at a minimum of 500 RPM on the output shaft to fill the ports connected to the gearbox lubrication circuit, including the oil filter.
8. Repeat steps 4-7 until the correct oil level has been reached in the electric machine and the external cooling system.



Renewing the oil filter

Tool

Designation	Figure
Hexagon socket, 1/2", 36 mm	

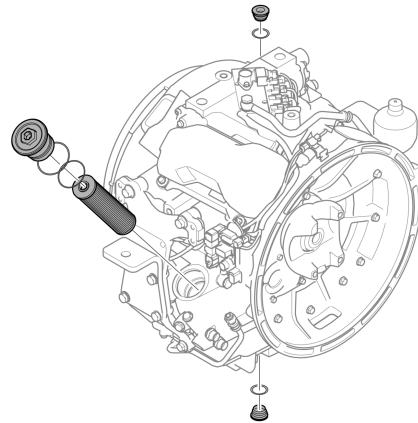
1. Unscrew the filter cover using the socket.



IMPORTANT!

Do not use an adjustable spanner or other open tool, as there is a risk of damaging the filter cover.

2. Lift out the filter housing cover with filter element. The filter housing will drain automatically once the filter has been removed.
3. Detach the old filter from the cover by holding the cover and carefully tapping the entire filter element against something hard. Remember that there will be oil splashes.
4. Fit the new filter and tighten the filter cover to 25 Nm (18 lb/ft).



Oil filter location

Cooling system

Coolant

The section only applies to batteries and inverters.

The electric machine is oil-cooled; for more information see the section [Lubrication system](#).

Note:

The coolant should be changed when the cooling system is cleaned: every 6,000 hours or at least every five years. See section [Maintenance](#).

The coolant recommended by Scania is a mixture of water with antifreeze (ethylene glycol) and corrosion protection. The coolant has several properties which are important for the function of the cooling system:

- Corrosion protection
- Antifreeze
- Increases the boiling point

The coolant should always contain 35-55 per cent by volume of antifreeze and corrosion protection so that the coolant properties ensure that the coolant works correctly.

Note:

Too high a dose of antifreeze and corrosion protection will increase the amount of sludge and blockages accumulating in the radiator. Too low a concentration can lead to corrosion of the cooling system and ice formation at low temperatures.

Hot climates

In order to retain the corrosion protection and the higher boiling point, it is essential to use coolant consisting of water mixed with antifreeze and corrosion protection (ethylene glycol). This also applies in countries where the temperature never drops below 0°C (32°F).

Antifreeze and corrosion protection

The antifreeze and corrosion protection used in Scania engines should be of the antifreeze (ethylene glycol) and corrosion protection type.

Only the product Scania coolant, or other products tested as antifreeze and corrosion protection for Scania, may be used in Scania engines. Products that do not satisfy the requirements for use

in a Scania engine may result in faults in and damage to the cooling system. This may lead to the invalidation of Scania's warranty for faults and damage caused by the use of unsuitable coolant.

Scania Ready Mix coolant is a pre-mixed coolant consisting of water, antifreeze (ethylene glycol) and corrosion protection.

Water

Use only pure fresh water that is free from particles, sludge and other impurities. If there is uncertainty about the quality of the water, Scania recommends use of Scania ready-mixed coolants. See section [Recommended Scania products](#).

Recommended Scania products

Scania Ready Mix 50/50

Scania Ready Mix 50/50 is a ready-mixed coolant containing 50% antifreeze (ethylene glycol) and corrosion protection and 50% water. It should be used in cold countries where there is a risk of freezing in the cooling system.

Part no.	Volume litres	Volume US gallons
1 921 955	5	1.3
1 921 956	20	5.3
1 921 957	210	55
1 896 695	1,000	264

Scania concentrate

Scania also produces coolant with antifreeze and corrosion protection in the form of a concentrate.

Part no.	Volume litres	Volume US gallons
1 894 323	5	1.3
1 894 324	20	5.3
1 894 325	210	55
1 894 326	1,000	264

Topping up

Coolant must only be topped up with pre-mixed coolant. The pre-mixed coolant can either be concentrate mixed with clean freshwater or pre-mixed coolant from the factory. Use only pure fresh water that is free from particles, sludge and other impurities.



IMPORTANT!

Containers used for mixing coolant must be intended for the purpose and free from any dirt or contaminants. When the containers not in use they must be kept closed to avoid collecting dirt and dust.

Note:

Within the coolant change interval, coolant may only be reused if it has been cleaned of dirt, sludge and particles. If the coolant is contaminated with oil or fuel, it must not be reused.

Addition of antifreeze and corrosion protection to water

The coolant should contain 35-55% by volume antifreeze (ethylene glycol) and corrosion protection. The percentage varies depending on the need for antifreeze.

A minimum of 35% by volume of Scania antifreeze and corrosion protection is needed to provide sufficient corrosion protection.

Measure the ethylene glycol content (antifreeze and corrosion protection) with a refractometer following the instructions in section [Checking the coolant's antifreeze and corrosion protection](#).

Risk of freezing

As the coolant starts to freeze, the water in the coolant starts to crystallise and the percentage of ethylene glycol in the coolant therefore rises. If freezing produces a great increase in the amount of ice, circulation problems could arise. There is no risk of damage by freezing if the content of Scania antifreeze and corrosion protection, or an equivalent mixture of a similar product, is at least 35% by volume.

Antifreeze and corrosion protection concentration table, litres

Freezing point (°C)	-21	-24	-30	-38	-50	Cooling system volume (litres)
Ethylene glycol (vol. %)	35	40	45	50	60	
Ethylene glycol (litres)	11	12	14	15	18	30
	14	16	18	20	24	40
	18	20	23	25	30	50
	21	24	27	30	36	60
	25	28	32	35	42	70
	28	32	36	40	48	80
	32	36	41	45	54	90
	35	40	45	50	60	100
	39	44	50	55	66	110
	42	48	54	60	72	120
	46	52	59	65	78	130
	49	56	63	70	84	140
	53	60	68	75	90	150
	56	64	72	80	96	160
	60	68	77	85	102	170
	63	72	81	90	108	180
67	76	86	95	114	190	
70	80	90	100	120	200	

Antifreeze and corrosion protection concentration table, US gallons

Freezing point (°F)	-6	-11	-22	-36	-58	Cooling system volume (US gallons)
Volume of ethylene glycol (%)	35	40	45	50	60	
Volume of ethylene glycol (US gallons)	2.9	3.2	3.7	4	4.8	7.9
	3.7	4.2	4.8	5.3	6.3	10.6
	4.8	5.3	6.1	6.6	7.9	13.2
	5.5	6.3	7.1	7.9	9.5	15.9
	6.6	7.4	8.5	9.2	11.1	18.5
	7.4	8.5	9.5	10.6	12.7	21.1
	8.5	9.5	10.8	11.9	14.3	23.8
	9.2	10.6	11.9	13.2	15.9	26.4
	10.3	11.6	13.2	14.5	17.4	29.1
	11.1	12.7	14.3	15.9	19	31.7
	12.2	13.7	15.6	17.2	20.6	34.3
	12.9	14.8	16.6	18.5	22.2	37
	14	15.9	18	19.8	23.8	39.6
	14.8	16.9	19	21.1	25.4	42.3
	15.9	18	20.3	22.5	26.9	44.9
	16.6	19	21.4	23.8	28.5	47.6
17.7	20.1	22.7	25.1	30.1	50.2	
18.5	21.1	23.8	26.4	31.7	52.8	

Checking the coolant level



WARNING!

Do not open the coolant filler cover in the expansion tank if the engine is hot. Hot coolant and steam may spray out and cause burns. If the cover has to be opened do it slowly to release the pressure before removing the cover.

Use protective gloves as coolant can cause irritation if it comes in contact with the skin.



IMPORTANT!

It is not permissible to top up large amounts of coolant via the expansion tank. Filling via the expansion tank leads to air locks in the cooling system which can lead to e.g. cavitation damage to the coolant pump shaft seal. If a large amount of coolant needs to be filled, follow the instructions in section [Coolant](#).

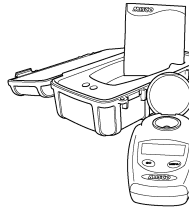
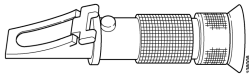
Only pour pre-mixed coolant into the cooling system.

The following instructions apply to Scania expansion tanks. For other types of expansion tanks, follow the manufacturer's instructions.

1. Open the expansion tank cover and check the coolant level.
 - The right coolant level on a cold engine is at the height of the lower edge of the filler neck.
 - The right coolant level on a hot engine is approximately 25 mm (1 in) over the lower edge of the filler neck.
2. Top up with coolant as necessary.

Checking the coolant's anti-freeze and corrosion protection

Tool

Designation	Figure
Refractometer	
	



WARNING!

Avoid skin contact with coolant as this may cause irritation to the skin. Wear eye protection and gloves when handling coolant.



IMPORTANT!

Use only pure fresh water that is free from particles, sludge and other impurities.

1. Pour a small amount of coolant into a container and check that the coolant is pure and clear.
2. Change the coolant if it is contaminated or cloudy.
3. Measure the antifreeze and corrosion protection content with the refractometer.

The following rules apply to ethylene glycol-based coolant:

- The antifreeze and corrosion protection content must be a minimum of 35 per cent by volume for corrosion protection to be sufficient.
- An antifreeze and corrosion protection content greater than 55 percent by volume impairs the ability to protect against frost.
- If ice forms in the coolant, there are disruptions initially, but there is no immediate risk of damage. The engine should not be subjected to heavy loads when ice starts to form.

Battery

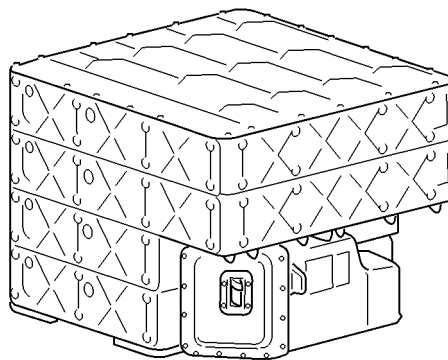
Battery pack

Note:

The battery control unit is integrated into the battery pack.

MP10

MP20



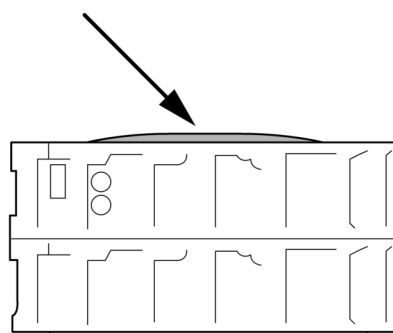
457 775

Installation requirements

Do not install the battery pack facing downwards. Install the battery pack with consideration for crash safety.

The battery pack must have sufficient space for the gas release valve.

For safety reasons, the battery gas valve must be positioned away from the operator.

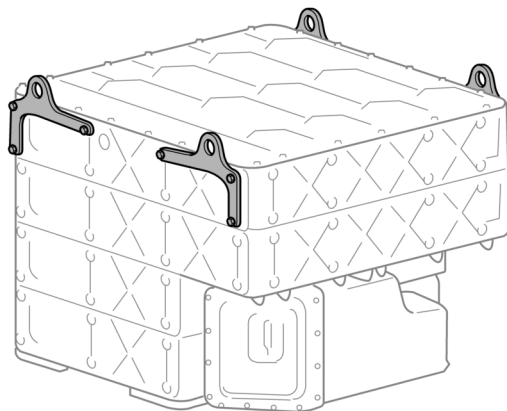


457 723

Lifting the battery pack

When lifting battery packs, use the correct lifting eyes as recommended by Scania.

Use 98 094 Lifting accessory when lifting the battery pack.



456 483

Safety

In case of an event where the battery is seriously damaged, the battery can cause a fire. The expected order for the major battery event is:

- Smoke through the exhaust outlet, for approximately 30 minutes (if battery integrity is maintained).
- Flames leaving the battery assembly in many directions.

Another battery fault mode is cell ventilation of flammable and toxic gases. During ventilation, the gases are expected to leave the battery through the exhaust interface. It must therefore not be covered or blocked. The installation should ensure that ventilated gas can leave the vehicle safely. To prevent the risk of toxic gas inhalation, as well as ignition of the gases, the battery installation must ensure that:

- Ventilated gases are prevented from entering the driver or passenger compartment.
- Ventilated gases are prevented from accumulating in enclosed spaces.
- Ventilated gases are directed away from the emergency exits.

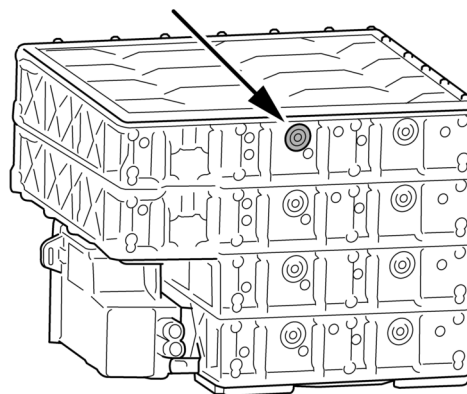


WARNING!

Never carry out any work on the battery or its installation if the vehicle ignition is on.

Only handle and use rechargeable energy storage systems if you are fully familiar with all information and safety procedures.

Always follow available instructions and checklists when applicable.



457 778

Handling, transport and storage

General

Lithium-ion batteries are classified as hazardous goods, requiring handling by trained and qualified personnel who fully understand the risks and comply with training requirements.

Minimum training requirements

Fundamental knowledge of the safe handling of propulsion batteries for vehicles, along with fundamental electrical training and an understanding of associated risks.

Scania recommends the following courses on **Scania Learning Portal**:

- Safety and handling of propulsion batteries for HEV, PHEV and BEV.
- Electrical training Level 1 – Electricity, risks and safety.

Safety advisor

Organisations involved in the loading, unloading, and transport of hazardous goods must have a certified safety advisor in compliance with ADR/RID 1.8.3.

Transport personnel

All personnel involved in transport, including loading and unloading, must complete training in the relevant transport regulations.

Training should be conducted by a certified organisation and must cover the transport of lithium-ion batteries as follows:

- ADR 1.3 (Transport by road)
- IMDG Code 1.3 (Maritime transport)
- IATA-DGR 1.5 (Air transport)

Battery status classification

CBP units are classified into different status categories that determine how they should be handled and transported.

Scania category	Information	Transport category	Handling and transport guidelines	Use in public vehicles
Prototype	Not approved under UN 38.3. A unit that is still under development, for example prototypes.	Non-UN-approved battery	See battery-specific handling guidelines	Assessed on a case-by-case basis
New	A newly produced unit that has not been used or installed in a vehicle.	New or used	See battery-specific handling guidelines	Yes
Used	Used batteries without any problems detected.	New or used	See battery-specific handling guidelines	Yes
NOK (Not Ok) Quality	Unit with some form of quality deviation without obvious damage.	New or used	See battery-specific handling guidelines	No
Unknown	A unit with unknown values.	Defective	See battery-specific handling guidelines	No
Suspect	Unit with deviating measurement values.	Defective	See battery-specific handling guidelines	No
Dangerous	Unit with deviating reaction and/or compromised electric safety barriers. Temperature increase and/or gas or electrolyte leakage. Major mechanical damages and/or damages to critical parts. Measured insulation fault.	Seriously damaged	See battery-specific handling guidelines	No
Undergoing reaction	Unit exhibiting a clear internal reaction, such as visible flames, cell venting or a rapid increase in internal or surface temperature.	Transport prohibited	See battery-specific handling guidelines	No
After damage	A unit that has been subjected to an internal reaction or extreme external conditions. Cells that have undergone venting, excessive overcharging, short-circuiting or combustion. Units that have been exposed to external fire.	Seriously damaged	See battery-specific handling guidelines	No

Handling guidelines

Handling battery packs and modules requires strict safety measures to prevent injury and ensure safe operation.

All operations must be carried out according to a risk assessment, and personnel must follow established safety procedures.

Personal protective equipment (PPE)

Handling closed battery packs (Categories: New & Used) does not require additional protective equipment beyond standard work attire. When working with open or unsafe batteries (categories: Unknown, Suspect, Dangerous, After Damage), appropriate personal protective equipment (PPE) must be used based on the risk assessment.



IMPORTANT!

Protective equipment can include:

- Insulated gloves and tools
- Face protection or protective goggles
- Flame-retarded work attire
- Respiratory protective equipment in the event of exposure to hazardous leakages

Chemical risks

If a battery cell is leaking or spraying out electrolyte fluid, personnel handling the affected battery module or pack must immediately take precautions to prevent exposure to toxic and corrosive substances.



WARNING!

Electrolyte leakage can result in chemical burns on the skin and irritation of the respiratory tract if inhaled.

- Spilled electrolyte must be neutralised and cleaned with the help of suitable chemical absorbents.
- The working area should be ventilated to disperse any hazardous gases.
- Personnel must wear chemical-resistant gloves and protective clothing before beginning decontamination.

General handling instructions for the battery pack

Many battery components and interfaces are exposed to external factors and must be handled with care.

Following these guidelines minimises the risk of accidents and damage. Always make sure to follow Scania's safety precautions.

Important handling precautions:



IMPORTANT!

Do not apply external force to the rigid cooling pipes or connections on the battery pack.

- Cover exposed electrical connections (VCA and VCB) with the intended plastic covers when the battery pack is not connected or installed in a vehicle.
- Never expose a standalone battery pack to water or other liquids. The battery's IP rating is valid only when all connections are securely sealed.
- The cooling system connections are very sensitive to dirt, dust and mechanical damage.
 - If cooling pipes are installed, the interface must be protected.

- If cooling pipes are not installed, ensure that the cooling plate interface remains clean and protected from dust and debris.
- Batteries must not be subjected to impact, punctures, breaks or pin damage. If this occurs, an immediate risk assessment must be carried out to determine its classification.
- Exercise caution when handling the Battery Junction Box (BJB), as it is particularly vulnerable and sensitive to improper handling.

General handling of battery modules

Battery modules contain individual cells and require precise handling to prevent mechanical or electric damage.



WARNING!

If a module is dropped, discard it immediately. Internal damage may be invisible but still pose serious electric risks.

- Never expose the top of a module to pressure. Modules must not be subjected to impact, punctures, breaks or pin damage.
- Never open the enclosure.
- Exercise caution when handling the module's underside. It is covered with an insulating layer, which must remain intact.
- The modules are classified as high-voltage components (above 60V) and require careful handling.
- Always lift modules with the approved Scania lifting device.
- Handling modules classified as Unknown, Suspect, Dangerous or After Damage requires appropriate protective equipment.
- Battery modules must not be exposed to water or other liquids. Their IP class is valid only when they are properly connected.
- Battery modules should never be positioned close to heat sources. The maximum operating temperature is 60°C.

Lifting

Always lift battery packs and modules with approved lifting tools to avoid damage.

- Only certified lifting tools may be used.
- Always lift batteries by the intended mechanical connection points.

- Use a four-point lifting device and approved equipment.
- Avoid off-center loads or sudden force when lifting.
- Fork lift trucks may only be used if the battery is packed or placed on a pallet.

Storage guidelines

Proper procedures are essential to maintain safety and performance during storage. Incorrect storage can affect the service life, capacity and safety of the battery.

Self-discharge and ageing

Batteries lose charge over time, which can cause deep discharge and render them unusable.



IMPORTANT!

Batteries with a cell voltage below 1.5V should be discarded.

- New CBP batteries are charged to 50% SOC during manufacture and can be stored for up to 6 years before requiring a maintenance charge.
- After 6 years: Check the state of charge (SOC) and maintenance charge if the level is below 20%.
- Avoid storing fully charged batteries – this accelerates the ageing process.
- If any cell voltage is below 3.2V (0% SOC), a specific charging procedure must be followed.

Storage conditions (general requirements)

As each storage environment is different, a risk assessment must be completed before storage. The basic requirements for safe and efficient storage are listed below.

- Do not store large amounts of batteries unnecessarily. Adjust the storage volume as needed.
- Batteries must be stored in upright position.
- Keep all electrical connections (VCA/VCB) covered with the designated protective covers.
- Protect the cooling system connections from dirt and moisture.

- Do not place batteries directly on the floor – use an EU pallet or similar.
- Avoid humid environments and keep batteries protected from rain and snow.
- Temperature limits:
 - Operating temperature, 30°C till 60°C.
 - Long-term storage: -5°C to 20°C (recommended). Temperatures above 20°C accelerate battery ageing.
- The storage space must be marked and comply with fire safety requirements pursuant to GR23.
- Well-ventilated areas are recommended to reduce gas formation.

Specific storage guidelines



WARNING!

Batteries in the category "Undergoing reaction" must not be stored and must be handled immediately.

New, Used and NOK quality:

- Store according to general requirements.
- Ensure that the storage area is clean and dry.

Prototype, Unknown, Suspect, Dangerous, Undergoing reaction, After damage:

- Must be stored in a separate, fireproof space.
- Ventilation is mandatory in order to minimise gas formation.

Transport and logistics

Transport requirements

Batteries are classified as hazardous goods and must be transported according to:

- ADR 1.3 (Transport by road)
- IMDG Code 1.3 (Maritime transport)
- IATA-DGR 1.5 (Air transport)

Basic requirements:

- Battery classification must be completed before transport.
- Maximum SOC 30%, unless otherwise specified in transport regulations.
- Visual inspection of the battery's condition prior to transport.

- Packaging in accordance with UN regulations, including marking and labelling.

Packaging and marking

The battery package must be transported in approved packaging with:

- Hazardous goods labels (UN3480, UN3481 for lithium-ion batteries).
- Warning signs indicating high voltage and flammability.
- Transport documentation containing information on battery classification and accident handling procedures.

Note:

Loads must be properly secured to prevent movement during transport and to protect them from physical damage.

Reception and unloading

Upon arrival at the destination, receiving personnel must:

- Check the battery's condition for possible damage.
- Ensure that all transport documents are correct and adhere to regulations.
- Carry out safe unloading with trained personnel.
- Store batteries in accordance with guidelines.

Following these guidelines ensures safe and efficient transport while minimising the risk of damage and security incidents.

Recycling and disposal

Repair and re-use

Batteries can often be reconditioned or utilised in other applications:

- Reconditioning and repair – Renewing defective modules to extend the service life of the battery.
- Second-life use – Batteries with sufficient capacity can be re-used in stationary energy storage systems.

Only approved workshops and certified operators may carry out repairs and re-use.

Recycling and disposal

Batteries that cannot be reused must be recycled by authorised installations.

- Lithium-ion batteries must never be discarded with household waste.
- Recovery must be carried out through authorised facilities.
- Transport to recycling facilities must adhere to applicable hazardous waste regulations.
- When exporting end-of-life batteries to non-EU countries, compliance with the Basel Convention is mandatory.

Proper recovery ensures sustainable battery management and minimises environmental impact.

Technical data

Electric machine

Output (continuous)	
501A, 501M	150 kW
502A	180 kW
503A, 503M	200 kW
505A, 505M	230 kW
The system's nominal voltage	650 V DC
System voltage signal	24 V
Rotational speed range	0-2,900 rpm
Power density	0.8 kW/kg
Cooling	Oil-cooled
Oil type	Scania STO EV
Oil volume	9.2 litres
Oil filter	Scania cartridge filter
Coolant temperature	Up to 60°C
Operating temperature	25°C to 80°C
Operation at high altitude	Max. 3,000 m
Oil pump flow	20 l/min at 1 bar
Regulator	Scania-developed control system
Interface to combustion engine and powertrain	SAE 1 flange
Clutch	Integrated jaw coupling to combustion engine
Weight	230 kg
Communication	CAN, checked by Scania
IP classification	IP44
Approval according to UN ECE R10	

Inverter

The system's nominal voltage	650 V DC
Cooling	Scania coolant, see the chapter on coolant
Weight	33 kg
Communication	CAN, checked by Scania
IP classification	IP6K9K
Up to 97% efficiency with silicon carbide technology (SiC)	

Battery

Cell chemistry	Lithium ion NMC/graphite
Configuration	
MP10, B8 408	10 modules x 18s (180 cells), 4 bearings
MP20, B8 413	20 modules x 18s (180 cells), 4 bearings
Cell styles	Prismatic PPE
Cooling	Liquid cooling
Maximum coolant volume	
MP10, B8 408	10 litres
MP20, B8 413	20 litres
Maximum coolant flow	
MP10, B8 408	30 l/min (nominal flow 20 l/min)
MP20, B8 413	60 l/min (nominal flow 40 l/min)
Heat dissipation	
MP10, B8 408	3 kW
MP20, B8 413	6 kW
Weight excluding coolant	
MP10, B8 408	approx. 620 kg
MP20, B8 413	approx. 1,150 kg
Calendar life	12 years (at 25°C), depending on cycled energy
Communication	CAN, controlled by Scania
IP classification	IP69K, IP67
Approvals	UN ECE R10 and R100
Compliance	Battery Regulation (EU) 2023/1542 & CE marking guidelines Harmonised standards IEC 62660-1:2018 Harmonised standards IEC 62660-2:2018 PV8450:2021-11
Installed energy	
MP10, B8 408	100 kWh
MP20, B8 413	200 kWh
Installed capacity	
MP10, B8 408	157 Ah
MP20, B8 413	314 Ah
Energy density	
MP10, B8 408	167 Wh/kg
MP20, B8 413	181 Wh/kg
The system's nominal voltage	650 V
Battery voltage	Max. 756 V, nominal 661 V, min 504 V
C rate (discharging/charging)	Up to 1.6/up to 1.3
Usable energy	Up to 75%
Total energy flow	

MP10, B8 408	500 MWh to 80% battery state of health
MP20, B8 413	1,000 MWh to 80% battery state of health
Discharge current, continuous/maximum	
MP10, B8 408	180 A/250 A*
MP20, B8 413	360 A/500 A*
Charge current, continuous/maximum	
MP10, B8 408	180 A/210 A*
MP20, B8 413	360 A/420 A*
Maximum discharging power, continuous/maximum	
MP10, B8 408	152 kW/164 kW*
MP20, B8 413	304 kW/328 kW*
Maximum charging power, continuous/maximum	
MP10, B8 408	128 kW/137 kW*
MP20, B8 413	256 kW/274 kW*

* The discharge and charging values apply at the beginning of the battery service life, 25°C and 50% state of charge. The maximum values are valid for 20 minutes.

Scania Assistance

Wherever you are, you can always get assistance from Scania's service organisation, Scania Assistance, 24 hours a day, every day of the year.

Always call the contact for your country.

Country	Tel.	Country	Tel.
Austria	+43 1 256 44 11	Latvia	+371 29 44 24 24
America	+1 (0) 800 272 2642	Lithuania	+46 8 52 24 24 24
America	1 800 272 2642	Luxembourg	+32 2 264 00 00
Argentina	800,999,722,642	Malaysia	1800 08 8500
Australia	+611300722642	Malaysia	+6035590907
Belgium	+32 2 264 00 00	Mexico	+543327451092
Botswana	+267 72 102 591	Morocco	+3222640000
Brazil	+8000194224	Namibia	+264634461352
Bulgaria	+359 88 666 0001	Netherlands	+31 76 52 54 111
Chile	188,800,722,642	Norway	+47 223 217 00
Colombia	+1800184548	Peru	0800-51-727
Czech Republic	+420,225,020,225	Peru	(01) 512-1877
Denmark	+45 333 270 44	Poland	+48 22 331 22 33
Estonia	Tallinn: +372 5153 388	Portugal	+34 91 678 9247
Estonia	Tartu: +372 5126 333	Romania	+40 723 27 27 26
Estonia	Pämu: +372 5071 477	Russia	+7 (495) 925 77 75
Estonia	Rakvere: +372 5074 655	Singapore	+6565917180
Finland	+358 10 555 24	Slovakia	+421,903,722,048
France	+33 2 414 132 32	South Africa	0 800 005 798
Germany	+49 261 887 8888	South Africa	+27 11 226 5005
Great Britain	0 800 800 660	Spain	+34 91 678 80 58
Great Britain	+441274301260	Sweden	+46 42 100 100
Hungary	+36,209,727,197	Switzerland	+41 800 55 24 00
Ireland	+353 71 963 4000	Thailand	+66819397525
Italy	+39046 1996222	Thailand	+1800 019 88
Latvia	+46 8 52 24 24 24	Uruguay	0 800 835 1

Other countries: +46 8 52 24 24 24

Note:

Calls will be recorded for training purposes.

Tightening torque for screw joint

Screws and nuts

Hexagon screws, hexagon socket screws, Torx screws, hexagon nuts

Metric thread. Strength class 8.8/8.

Thread	Tightening torque	
	Nm	Lb-ft
M4	2.9	21
M5	6	4
M6	9.5	7
M8	24	18
M10	47	35
M12	84	62
M14	135	100
M16	210	155
M18	290	214
M20	420	310
M22	580	428
M24	730	538

Flange screws with hexagonal head and hexagonal flange nuts

Metric thread. Strength class 8.8/8.

Thread	Tightening torque	
	Nm	Lb-ft
M5	6.7	5
M6	10.2	8
M8	26	19
M10	50	37
M12	92	38
M14	149	110
M16	184	136