Scania Engines

Operator's manual

Scania Generator set

en-GB 2 374 139

Issue 2.0

Introduction

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

Note:

Always use Scania spare parts for repair work.

Function

The generator set can act as the primary power source in an electrical consumer network or as a stand-by generator set that is activated when the main electric power network fails.

The generator set can operate independently or be connected together with other generator sets for parallel operation.

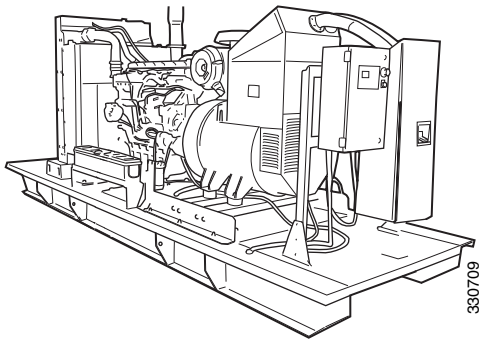
The generator sets can supply output power of 250-600 kVA (50-60 Hz).

Variants

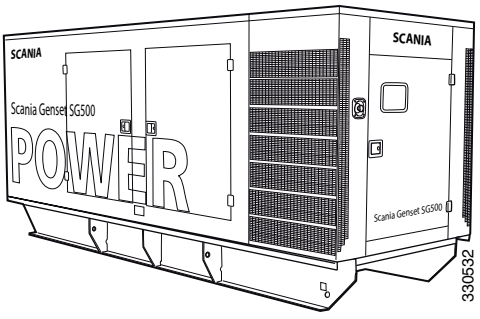
This Operator's manual does not describe each specific generator set. Scania generator sets are available in a large number of variants:

- With or without canopy.
- CE marked or not CE marked.
- Multiple options for engine and generator, the choice depends on the power needed.
- Several options of instrument panels, the choice depends on the generator set operation type.
- With or without a number of options.

This Operator's manual gives an overview of a generator set which is either open or equipped with a canopy.



Open generator set



Generator set with canopy

Personnel

REQUIREMENT!

Installation, commissioning, operation, maintenance and repairs must be carried out by trained and qualified staff who are authorised to perform the work.

Installation inspection

When the generator set has been commissioned, an installation inspection must be performed by Scania or an inspection company appointed by Scania. An inspection record must be completed and sent to Scania.

REQUIREMENT!

Scania must approve the installation before the generator set may be commissioned.

Operator's manuals

The engine and instrument panel are described in separate instruction manuals. A complete Operator's manual for the generator set comprises the following instruction manuals:

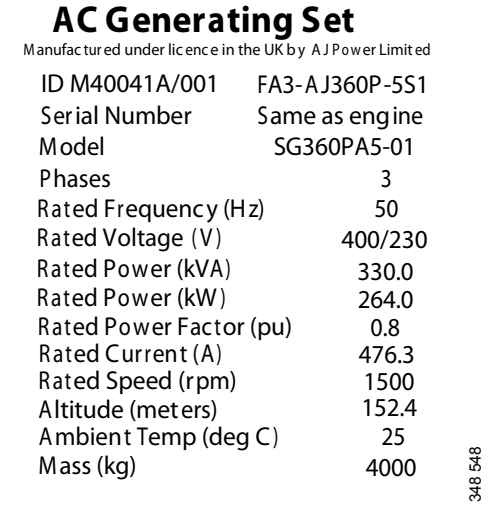
- Generator set (this Operator's manual)
- Industrial engine
- Instrument panel

Plates

Every generator set has a plate which indicates the generator set's rated voltage, rated power and rated current, among other things. The plate is located on the generator terminal box.

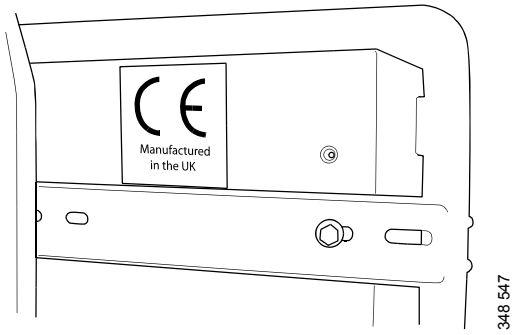
The generator set serial number is the same as the engine serial number. This is indicated on the engine data plate. See the Industrial engine Operator's manual.

The serial number is very important when contacting Scania for technical support or when ordering spare parts.



Example of plate

On CE marked generator sets, the CE marking is located at the rear of the central electric unit.



CE marking

Warning stickers

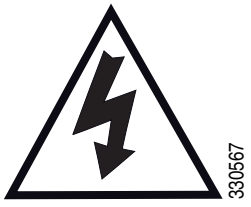
The generator set is supplied with general warning stickers. The warning stickers must be replaced if they come off or have become illegible.

WARNING!

The generator set can be remotely controlled and may start without warning.

WARNING!

A warning sticker with a lightning symbol indicates that there is a voltage within the casing that is dangerous for a person.



Safety

Different types of advisory

Warning!

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

WARNING!

The generator set must be installed and commissioned in full agreement with current national, local or regional regulations, standards or other requirements.

Important!

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

IMPORTANT!

An open generator set must be transported and stored under cover.

Note:

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

Note:

Select a generator set with a canopy if it is to be located outdoors.

Environment

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

Environment

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

Safety precautions

Read and understand all safety precautions and warnings before installation, commissioning, operation and maintenance actions of the generator set.

Only start the generator set if it can be done safely. Never run a generator set with known faults.

Electrical installation

WARNING!

The generator set must be installed and commissioned in full agreement with current national, local or regional regulations, standards or other requirements.

WARNING!

Only trained and qualified personnel authorised to carry out this work can install, commission and perform maintenance on the generator set.

WARNING!

When a generator set with a canopy is in operation, all hatches must be closed. The hatches may only be opened once the generator set has been switched off and when required by the work.

WARNING!

The generator set can be remote-controlled and start without prior warning. Therefore, set the battery master switch (option) to the OFF position or disconnect the battery negative cable before any work is carried out on the generator set.

WARNING!

Electrical cables and components in the generator set may be live with lethal voltage.

When any hatch is opened while working on the generator set, its electrical cables and components are unprotected.

Work may only be carried out by trained and qualified personnel.

Electric shock

WARNING!

Always cut off the power and take a reading between a conductor and ground before starting work on the generator set. This is to ensure no voltage remains in the system. High voltage may cause damage, injury or even death.

24 V and 230 V central electric unit

WARNING!

Cut the 230 V voltage before opening the central electric unit front hatch to reset tripped miniature circuit breakers. Otherwise there is a risk of serious personal injury.

Hot surfaces

WARNING!

The exhaust manifold, turbocharger, cooling package and generator can become extremely hot during operation. Do not touch these components when the generator set is in operation, and make sure that they have cooled down sufficiently before any maintenance is carried out.

Moving parts

WARNING!

A generator set contains many mechanical moving parts. Remove protection devices and belt guards with caution and only if it is absolutely necessary to do so. Do not run a generator set without all protection devices in place.

Noise

WARNING!

Always wear ear defenders in the vicinity of a generator set in operation. Long-term exposure to noise levels above 85 dBA is harmful to hearing.

A generator set without a canopy can cause noise levels of above 105 dBA.

Batteries

WARNING!

Batteries contain and emit oxyhydrogen gas, particularly during charging, and this gas is flammable and highly explosive. There must be no smoking, naked flames or sparks near the batteries or the battery compartment.

Transport and installation

Dimensions

Generator set with canopy

There are two alternative sets of dimensions for a generator set with canopy, these are as follows:

Alternative A	
Length x width x height	5,400 x 1,750 x 1,750 mm

Alternative B	
Length x width x height	5,000 x 1,600 x 1,750 mm

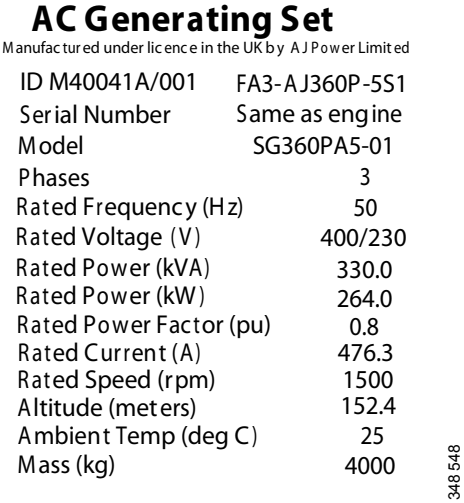
Open generator set

An open generator set has the following dimensions:

Length x width	3,600 x 1,100 mm
Height DC09	approx. 1,835 mm
Height DC13	approx. 2,140 mm
Height DC16	approx. 2,245 mm

Weights

The weight of the generator set is indicated on the plate located on the generator terminal box.



Example of plate

Actions prior to transport

1. Check that the central electric unit circuit breaker is in the 0 position and that any battery master switch (option) is in the off position.
2. Check that no cables are connected to the generator set.
3. Drain the fuel tank (applies to certain types of transport).
4. Remove the batteries (applies to certain types of transport).
5. Check that there is no loose equipment on the generator set.
6. Close and lock all hatches.
7. Take appropriate action to protect the generator set against external damage.

IMPORTANT!

An open generator set must be transported and stored under cover.

Lifting the generator set

The generator set can be lifted in various ways depending on its equipment:

- Lifting using slings connected to the four load securing eyes in the base frame.
- Lift using straps connected to lifting eyes on the roof that are part of a built-in lifting device. This is an option and only applies to generator sets with canopy.
- Lifting using a lift fork in the pre-drilled holes (option).

WARNING!

Lifting devices must be approved for the weight of the generator set. The weight is indicated on the plate located on the generator terminal box.

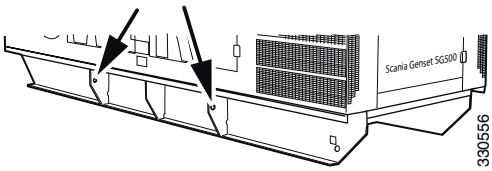
WARNING!

Do not work or stand under a suspended load.

Lifting in load securing eyes

The generator set has four load securing eyes located on the two longitudinal frame members of the base frame.

Lift the generator set by connecting thongs to the four eyes.

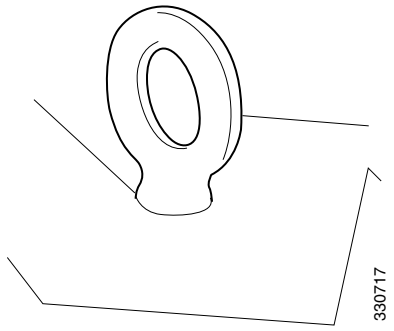


Load securing eyes on one frame member

Lifting using the built-in lifting device (option)

A generator set with a canopy equipped with a built-in lifting device has a lifting eye on the roof.

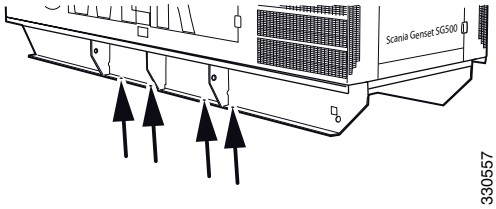
Lift the generator set by connecting a thong to the lifting eye.



Lifting eye

Lifting using a lift fork in the pre-drilled holes (option)

Lift fork brackets can be screwed into place in pre-drilled holes in the two longitudinal members of the base frame.



Lift fork brackets are screwed into these holes

IMPORTANT!

Lift fork brackets must be removed when transporting a generator set with a canopy in a standard ISO container.

Load securing the generator set

Safety precautions

WARNING!

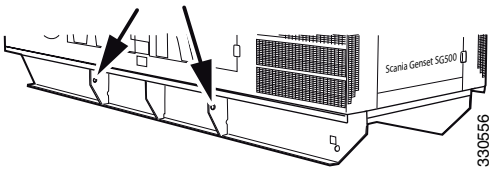
Use gloves when handling load securing equipment.

Loading onto a load carrier

Loading onto a load carrier is described in the documentation of the loader/load carrier.

Load securing

Secure the generator set in the four load securing eyes located on the two longitudinal frame members of the base frame.



Load securing eyes on one frame member

Installing the generator set

Selecting a site for installation

Selecting an installation site for the generator set is an important part of installation. The following section details the general factors that impact the installation site. The particular factors that impact installation outdoors and indoors are detailed overleaf.

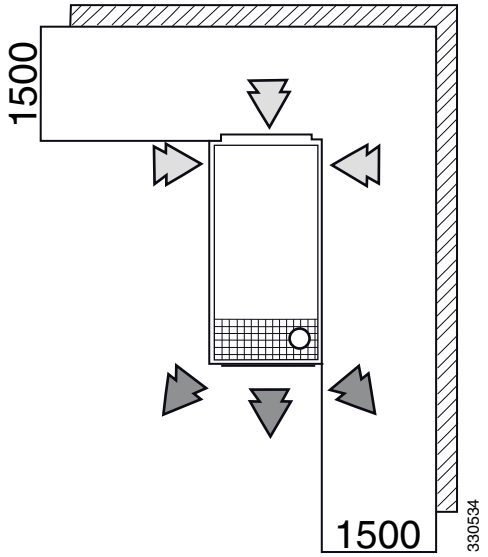
- It must be possible to install a ground electrode. During operation the generator set must be connected to an ground electrode that complies with applicable regulations. If there is no ground electrode there is a risk of personal injury due to electrical shock.
- The safe routing of cables underground must be possible. Cables that have been laid out must be protected.
- There must be access to a permanent 230 V electrical power system or other power supply for a built-in battery charger (option) or engine heater (option).
- Take preventive action to minimise the risk of fire. Be aware of the fire risks caused by hot exhaust pipes, exhaust hoses or exhaust gases coming into contact with flammable material.
- The location of the generator set adjacent to solid surfaces, such as concrete walls, can affect the noise level of the generator set through echoing. If avoiding noise is particularly important: Contact Scania for advice.
- There must be enough space around the generator set to allow maintenance and repair.
- The maximum inclination of the generator set during operation depends on the type of oil sump in the engine, see the Operator's manual Industrial engines.
- Access to the generator set must be restricted for unauthorised personnel.
- Where installation is permanent Scania recommends that the generator set be secured to the floor.

Installing outdoors

Note:

Select a generator set with a canopy if it is to be located outdoors.

- There must be an adequate air flow for air intakes and air vents. This is vital to the operation of the generator set. As a guideline value when installing a generator set with a canopy outdoors, leave a space of at least 1,500 mm all around.
- The installation site must be protected from exposure to airborne contaminants such as aggressive or conductive particles, oil mist, fumes, engine exhaust gases or other contaminants.
- Select an installation site where contaminants in the form of sand, dust and other contaminants are to the greatest possible extent prevented from entering the air intake and from blocking the air vent.
- If possible, avoid setting the generator up without protection from solar radiation.
- Locate the generator set so as to protect it from surface water in the event of rain.



Space around the generator set

Installing indoors

- There must be adequate ventilation for intake air and exhaust air.
- It must be possible to lead exhaust gases and cooling air to the outside of the building without any leaking back into it.
- If possible, place extra fuel tanks outdoors.

Removing transport protection

Take care when removing the transport protection using a knife or scissors so as not to damage the underlying paintwork or cable harness on the machine.

Remove any wooden blocks positioned under the generator set.

Design of the external exhaust system

WARNING!

Exhaust gases contain carbon monoxide and nitrogen oxides, which are toxic. Ensure that all exhaust gases are properly vented as inhalation can be fatal.

WARNING!

Equip the external exhaust system with exhaust guards or thermal insulation to minimise the risk of burn injuries.

A generator set with canopy is supplied with an operational exhaust system.

Make a note of the points in the following section on open generator sets and where a generator set with a canopy is to be provided with an external exhaust system.

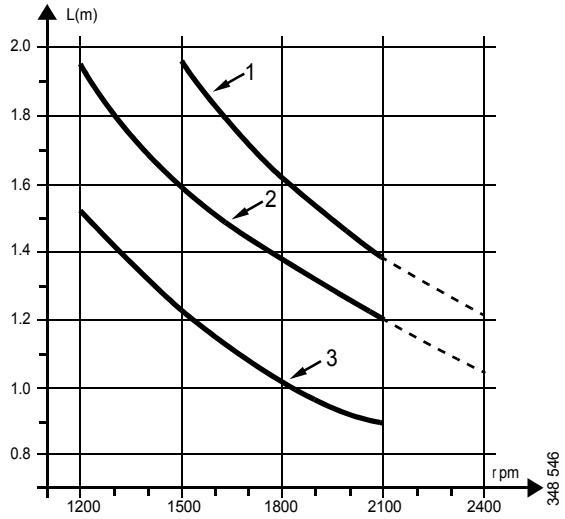
Positioning the silencer

Position the silencer as close to the end of the exhaust system as possible. In order to obtain the best noise reduction, there should only be a short tailpipe after the silencer (0.8-1.5 m) as shown in the chart. Read off the engine operating speed.

If the silencer cannot be positioned close to the exhaust system outlet because of a lack of space, it should be placed as close to the engine as possible. This location is, however, unfavourable in silencing terms if the pipes beyond it are long. It may be advisable to install another silencer near to the outlet.

Note:

Sharp exhaust pipe bends close to the outlet increase the risk of hissing sounds.



1. *DC09*
2. *DC13*
3. *DC16*

Exhaust outlet

Design the exhaust system so that the exhaust gases are not reflected against vertical walls, since this results in increased noise level.

Position the exhaust outlet so that no exhaust gases can be drawn into the engine intake. If exhaust gases are drawn into the intake, intake air temperature increases rapidly. The exhaust gases contain soot particles so there is also a risk of the air filter becoming blocked.

WARNING!

Position the exhaust outlet so that exhaust gases cannot penetrate areas occupied by people, e.g. residential buildings.

Example

If 2 silencers are used in the system, they should be positioned in series at a distance of 2/3 of the length of the tailpipe and with the silencer used to dampen high-frequency noise furthest away from the engine.

Since the pipes which form part of an exhaust system also operate as silencers, it is important that they are dimensioned correctly.

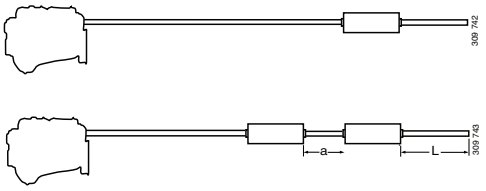
Note:

The exhaust back pressure increases with the number of pipe bends and with increased pipe length. This leads to higher fuel consumption and loss of power.

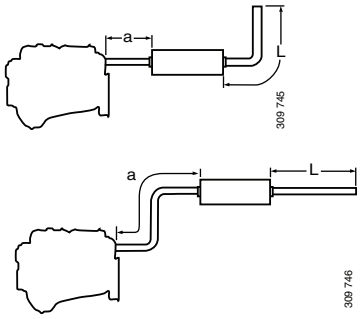
IMPORTANT!

The installer is responsible for ensuring that the exhaust system is well sealed during installation. The installer is also responsible for ensuring that the pipe and silencer suspension is designed in such a way that system leaks cannot arise during operation.

Examples of long exhaust systems (i.e. longer than 5 metres) with designs which aid sound reduction.

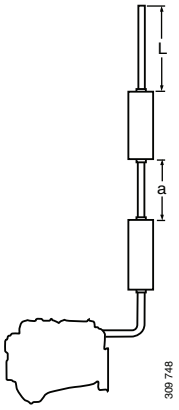


Examples of short exhaust systems with designs which aid sound reduction.



L = Length of tailpipe, determined from graph.

a = 2/3 of L. Length a is less significant in exhaust systems with only one silencer.



The table can be used as reference when planning an exhaust system with industrial silencer.

Gen. set (kVA)	Expansion unit (inches)	Pipe diameter (inches)	Maximum pipe length (m)	Maximum number pipe bends
144-275	4	4	15	3
330-500	5	5	15	3
550-600	6	6	15	3

Connection of exhaust system to engine

There should always be a flexible connection between the exhaust system and the engine which absorbs the movement of the engine and changes in length in the exhaust system due to temperature changes. A flexible connection can consist of the Scania exhaust bellows.

The weight of the exhaust system must not load the exhaust bellows or turbocharger. Therefore, place a suspension point immediately after the flexible connection.

If the exhaust pipes are very long or if the exhaust system has a relatively long horizontal part between two vertical parts, several flexible connections may be required in the system. There must then be a fixed anchorage point on one side of the vertical exhaust bellows and a suspension which allows axial movement on the other side.

Exhaust back pressure

The back pressure in the exhaust system must not exceed the maximum recommended exhaust back pressure, including silencers. A higher exhaust back pressure leads to increased fuel consumption and a loss of power.

The maximum recommended exhaust back pressure is 100 mbar for all engines.

Always check the exhaust back pressure when installation is complete. Perform the measurement on a straight section of the system approximately 1 metre downstream of the turbocharger.

Insulating the exhaust system

Assess on a case-by-case basis whether the exhaust system requires thermal insulation.

If the engine intake air is taken from the engine room, exhaust pipes should be insulated especially well to keep down the temperature in the engine room.

Other reasons for insulating the exhaust system are to prevent burn injuries to personnel, reduce ventilation costs or reduce the risk of fire from the discharge of fluids, such as hydraulic oil. The exhaust system may also require insulation if there are lead throughs made of or near flammable material.

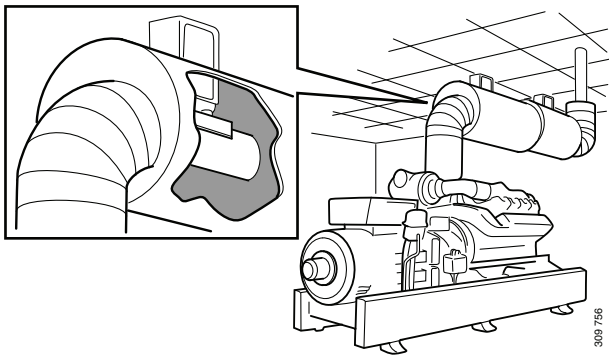
The insulation should withstand a temperature of at least 700°C.

The outer shell of the insulation must be so well sealed that fibres from the insulation cannot come loose during vibration and block the air filter.

The insulation of long pipes affects the exhaust back pressure. The diameter of the exhaust system should therefore be increased if it is insulated. An insulated system can increase the noise level at the outlet. This should also be considered when determining the measurements.

IMPORTANT!

The insulation must be designed so that the flexible part of the exhaust system is not restricted in its movement. It must also be possible to inspect the exhaust system without damaging the insulation during dismantling.



Insulating the exhaust system

Protection against water ingress

The exhaust system must be designed to prevent water ingress. If rain or condensation enters the exhaust system, this causes corrosion damage. If water reaches all the way into the engine, in the worst cases this can lead to bent connecting rods and the total destruction of the engine.

Long exhaust systems should be equipped with a condensation separator. It should be located as close to the engine as possible, but after the flexible connection.

The occurrence of condensation is greater with a vertical exhaust system since the exhaust gases in a horizontal system carry away much of the condensation.

Even with short exhaust pipes, it may be a good idea to fit a condensation separator if there is any risk of rain water entering.

Vertical exhaust outlets must be fitted with a device that prevents water ingress.

Grounding the generator set

WARNING!

The generator set must be grounded in accordance with national or local regulations. Grounding regulations may vary from country to country.

WARNING!

If necessary, shield power cables against mechanical damage using cable protectors.

WARNING!

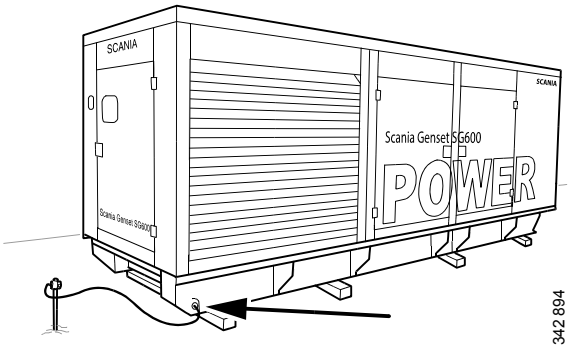
Warn people of the risk of tripping when power cables have been laid out.

REQUIREMENT!

At the very least, ground cables or ground strips must have full load capacity and must comply with the applicable regulations.

Ground screw

The generator set has a ground screw for safe connection to ground. The ground screw is located on one of the longitudinal frame members of the base frame. Next to the ground screw is a sticker with a ground symbol.



Ground screw (example)

Connecting electrical consumers

WARNING!

Electrical consumers may only be connected by trained and qualified personnel authorised to carry out this work.

WARNING!

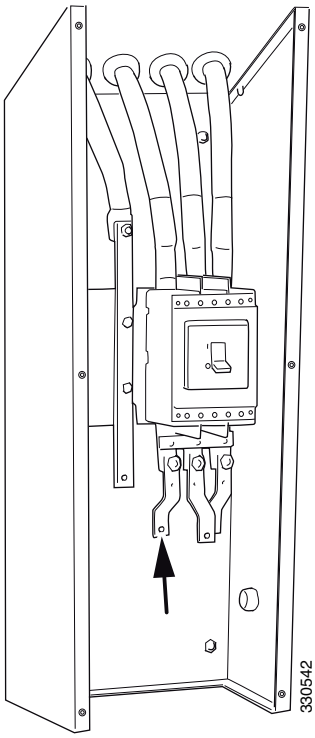
Electrical consumers may only be connected in full compliance with national or local regulations.

Busbars

The generator set has busbars for the connection of electrical consumer cable harnesses. The busbars are protected by a hatch which is screwed into place.

Note:

The illustration shows a 3-pin circuit breaker in the generator set, which is the standard specification. A 4-pin circuit breaker is available as an option.



Busbars with the hatch removed (example)

Power cables

WARNING!

If necessary, shield power cables against mechanical damage using cable protectors.

WARNING!

Warn people of the risk of tripping when power cables have been laid out.

Depending on how the generator set is moving on its vibration brackets, the electrical connection to the generator set should be made using flexible power cables. This prevents vibrations being transferred which may damage the generator or busbars.

The power cables must be appropriate for the generator set output voltage and rated current. Take the ambient temperature, installation method, cable length and bundling into account when determining the size of the power cables.

When single core power cables are used, the lead-in plates must be made of aluminium, brass or a non-metallic material such as tufnol. An alternative is to cut grooves between the electrical cable lead-ins to prevent any currents circulating in the lead-in plates.

Check the phase rotation in order to ensure that it is compatible with the installation site.

Load

When electrical distribution system is being planned, it is important to ensure that a balanced load is supplied to the generator set.

If the load on one phase is considerably greater than that on the other phases, this can cause overheating in the generator windings or imbalance in the output voltage from phase to phase.

Ensure that no single phase current exceeds the rated current of the generator set.

When connecting to an existing distribution system, it may be necessary to reorganise the distribution system to ensure that these load factors are fulfilled.

Power factor

Determine the power factor of the connected load. Power factors of 0.8 lag (reactive) can overload the generator. The generator set provides its kW class and runs satisfactorily from an 0.8 lag to a unit power factor (1.0).

Actions prior to starting after transport

Do the following prior to starting for the first time after delivery:

- Fit fully-charged batteries (included in the delivery).
- Check the engine oil level.
- Check the engine coolant level and the coolant antifreeze or corrosion inhibitor.
- Fill the internal fuel tank.
- Bleed the fuel system.

Oil level and coolant level/antifreeze

Instructions for checking the oil level and coolant level of the engine can be found in the Industrial engine Operator's manual.

Fuel system

Filling the internal fuel tank

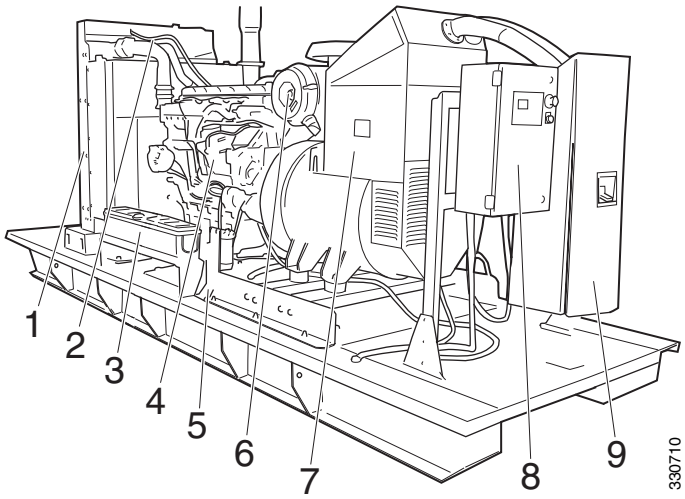
Instructions for filling the internal fuel tank can be found in the section *Filling the internal fuel tank*.

Bleeding the fuel system

If the fuel tank has been empty, the fuel system must be bled. See the Industrial engine Operator's manual.

Generator set design

The generator set comprises the main parts as shown in the figure below.



1. *Silencer (hidden)*
2. *Added on engine cooling system*
3. *Batteries, 24 V electrical system*
4. *Engine*
5. *Basic frame with integrated fuel tank*
6. *Air cleaner*
7. *Generator*
8. *24 V and 230 V central electric unit*
9. *Central electric unit for current consumers*

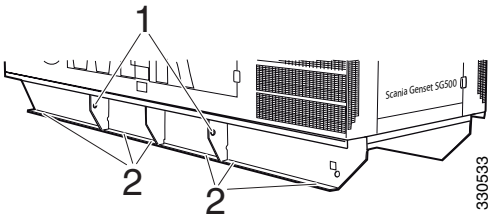
Base frame

The generator set basic frame comprises 2 longitudinal beams and an integrated fuel tank. A retainer collects any spilt oils or fluids.

The longitudinal beams have four load securing eyes used to secure the generator set during transit.

The longitudinal beams also contain holes for e.g. fitting fork tunnels, for lifting using a loader with lifting forks.

The holes can also be used for attaching the generator set to the floor in a fixed installation.

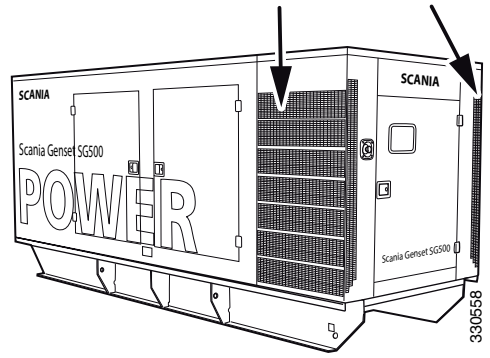


1. *Load securing eye*
2. *Hole*

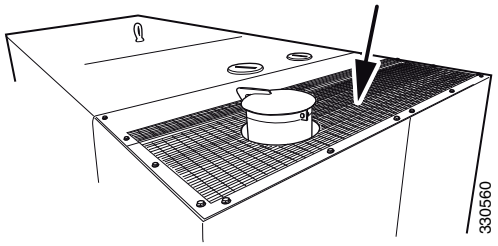
Canopy

The canopy comprises an end plate section and a combined centre and end plate section. The sections can be removed separately.

There are air intake grilles on both sides of one of the end plate sections to supply the generator set with air. There are air outlet grilles on the roof of the opposite end plate section.



Air intake grille



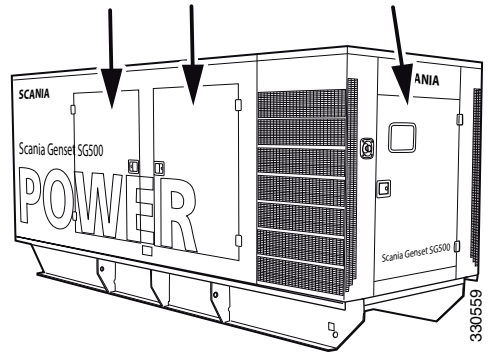
Air outlet grille

Two hatches on each long side provide access to the engine and generator for maintenance purposes. One hatch on one of the end plates provides access to the instrument panel and to the junction blocks to connect the current consumer power cables.

The hatches are equipped with a stop device on the bottom edge that limits the opening angle and holds the hatch open.

All five hatches are lockable with one common key.

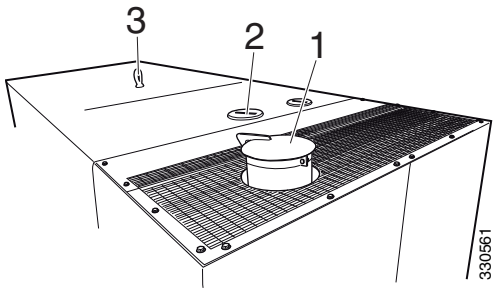
The whole canopy, including the hatches, is provided with sound-absorbing insulation.



Hatches

On the roof of the canopy there is an outlet for the exhaust pipe and two alternative hatches for filling the engine cooling system with coolant.

If the generator set is equipped with a lifting device (option), there is also a lifting eye on the roof.



1. *Exhaust pipe*
2. *Cover for topping up cooling system*
3. *Lifting eye*

Engine/generator set

An engine/generator unit is fixed to a number of attachments in the basic frame.

Generator

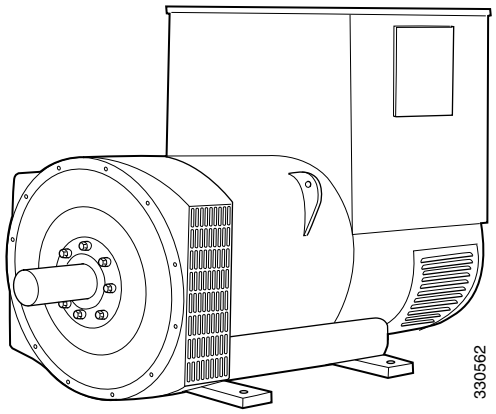
The generator has no brushes and is equipped with a 3-phase voltage regulator.

The generator can be equipped with a permanent magnet (option).

The generator, which is single-bearing, is bolted to the engine via a drive plate. When the generator starts to rotate a voltage is induced in the magnetising section. The induced voltage is rectified and conducted to the generator rotor. The generator stator then generates an output voltage to load, which is monitored by the voltage regulator.

There are two makes of generator: Mecc Alte and Stamford. Both makes have variants for different voltages. A plate on the generator states the make and voltage of the generator concerned.

In principle, the generator is maintenance-free for users.



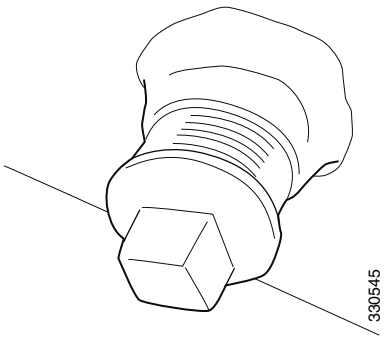
Generator

Engine

The engine is a direct-injection, liquid-cooled, four-stroke, turbocharged, single-speed diesel engine.

The engine is described in the Industrial Engine instruction manual.

To drain the engine oil some generator sets have a hose that feeds from the oil sump drain valve to an external drainage point in one of the longitudinal beams.

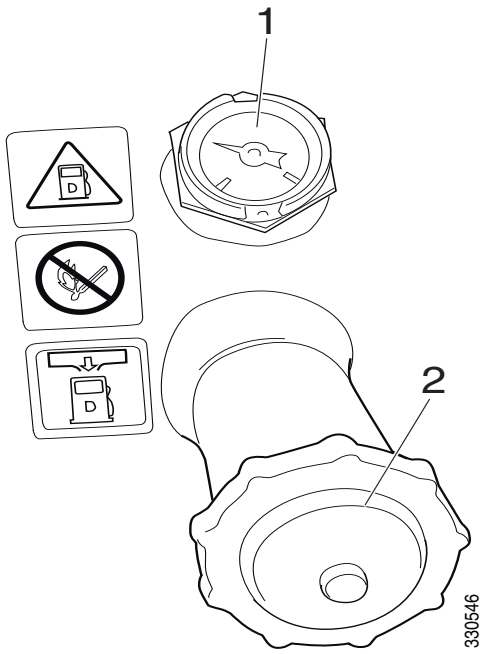


External drain valve for engine oil

Fuel system

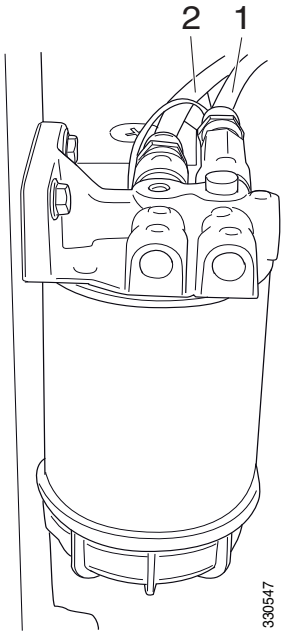
The generator set fuel tank is made of steel and integrated into the basic frame. It has a capacity between 800 l and 1,100 l.

The fuel filler point is located on one edge with a fuel gauge adjacent to it.



1. *Fuel gauge*
2. *Refuelling*

A fuel filter with water separator is located between the fuel tank and engine. Refer also to the Industrial Engine instruction manual.



Fuel filter

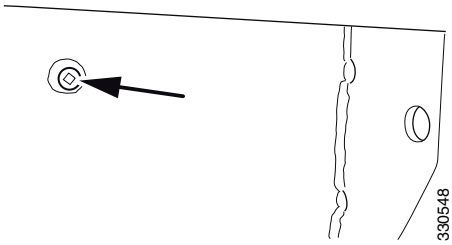
1. *From fuel tank*
2. *To engine*

Cooling system

An external radiator is connected to the engine cooling system.

Some generator sets are equipped with an expansion tank.

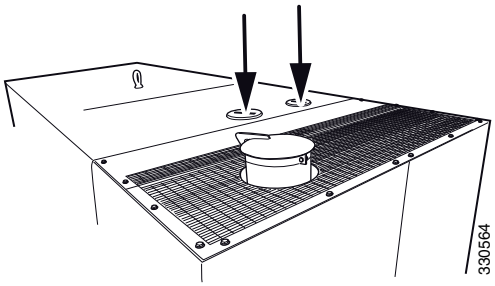
To drain the coolant some generator sets have a hose that feeds from the radiator drain valve to an external drainage point in one of the longitudinal beams.



External coolant drainage point

Generator set with canopy

There are two alternative hatches on the canopy roof for filling the cooling system with coolant.



Filling coolant

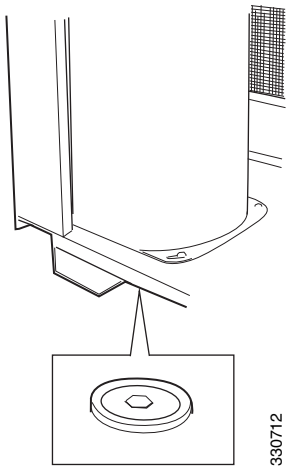
Intake and exhaust system

Air cleaner

For the engine air cleaner, see the Industrial Engine instruction manual.

Silencer

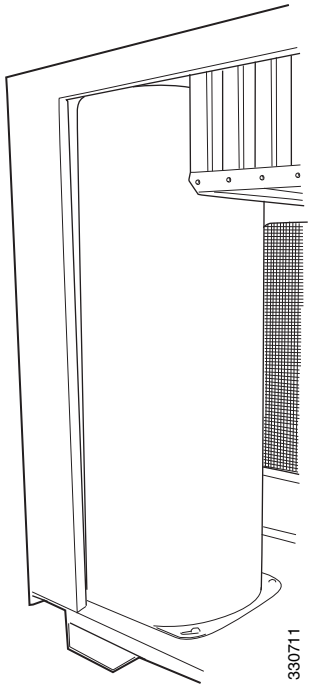
The silencer is equipped with a condensation separator with drain valve for draining water from the exhaust system. The condensation separator can be accessed from the underside of the generator set.



Condensation separator

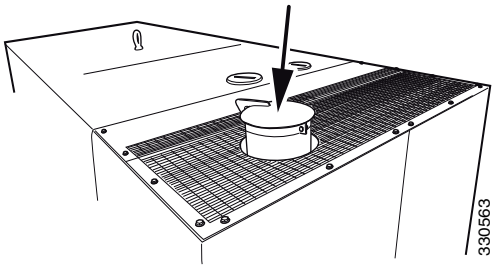
Generator set with canopy

On generator sets with a canopy the silencer is located in its own space. The silencer can be accessed through a bolted hatch on the end plate section.



Silencer with hatch removed

On generator sets with a canopy the exhaust pipe discharges out through the roof and is equipped with a rainguard.



Exhaust pipe

Battery system 24 V

The generator comes delivered with a 24 V electrical system for starting the engine and the generator set control system.

Batteries

WARNING!

Wear gloves and eye protection when handling batteries. Batteries contain a highly corrosive battery sulphuric acid.

WARNING!

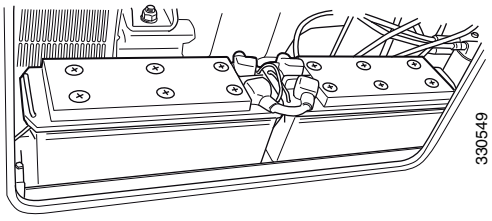
Batteries contain and emit oxyhydrogen gas, particularly during charging, and this gas is flammable and highly explosive. There must be no smoking, naked flames or sparks near the batteries or the battery compartment.

IMPORTANT!

Make sure you connect the batteries correctly when they are connected. If the batteries are not connected correctly, this can cause serious damage to the electrical system. Sparking may occur if the terminals are short-circuited.

The generator set is provided with two 12 V batteries connected in series. The batteries are included in the delivery.

- When the batteries are connected, connect the positive cable before the negative cable.
- When the batteries are disconnected, disconnect the negative cable before the positive cable.



Two 12 V batteries connected in series

Battery master switch (option)

If the generator set is equipped with a battery master switch, this is located next to the batteries. It is used to disconnect the batteries during maintenance and when the generator set is not being used.

Battery charger (option)

The instrument panel and other stand-by functions can drain power from the batteries. Scania therefore recommends that a battery charger is fitted to trickle charge the batteries. To power the battery charger there must be access to a fixed 230 V electrical power network or other 230 V energy source. Electrical power supply cables are connected in the central electric unit.

The battery charger controls the battery charging current and charges the batteries when necessary. When the batteries are fully charged the battery charger switches to trickle charging.

IMPORTANT!

If the generator set does not have a battery charger or if the generator set is not run for a long time, the batteries must be charged by connecting them to an external battery charger.

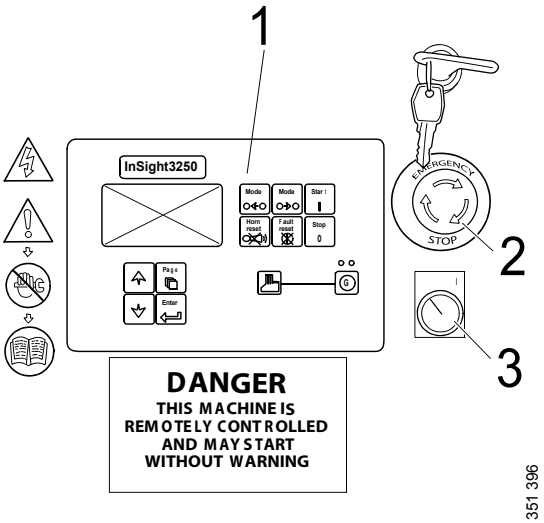
24 V and 230 V central electric unit

WARNING!

Before opening the central electric unit front hatch to reset tripped circuit breakers, the 230 V voltage must be interrupted. Otherwise there is a risk of serious personal injury.

A central electric unit is located on one end plate. The generator set instrument panel, a circuit breaker for the 24 V electrical system and an emergency stop are located on the central electric unit front hatch.

On generator sets with a canopy, the hatch has a window for viewing the instrument panel display without having to open the hatch.

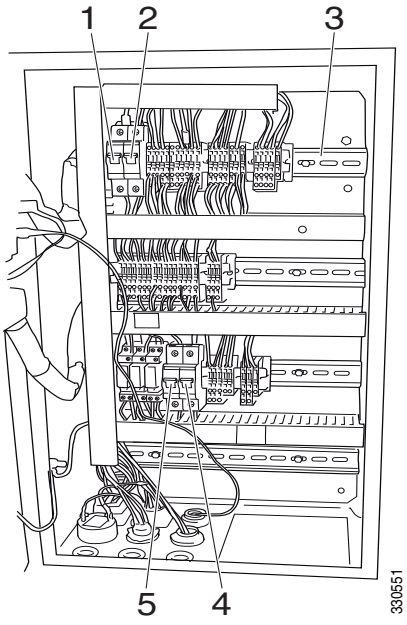


1. *Instrument panel 3250*
2. *Emergency stop*
3. *Circuit breaker*

A battery charger (option) and heating element for the central electric unit (option) are located inside the central electric unit. In order for the heater element to receive electric power, there must be access to a fixed 230 V electrical power network or another 230 V power source. Then the heater element keeps the inside of the central electric unit free of condensation. Electrical power supply cables are connected to the central electric unit.

Circuit breakers for the instrument panel and engine control unit as well the circuit breakers for any options are also located inside the central electric unit.

If the generator set has additional options there will be more circuit breakers inside the central electric unit. These are described in the Instrumentation Operator's manual.



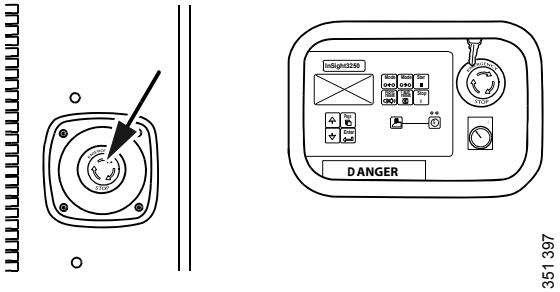
1. *Circuit breaker for instrument panel*
2. *Circuit breaker for engine control unit*
3. *Place for battery charger (option)*
4. *Circuit breaker for engine heater*
5. *Circuit breaker for battery charger*

Emergency stop

In addition to the emergency stop on the central electric unit, there is a further emergency stop located on the end plate on generator sets with a canopy.

When one of the emergency stops is depressed, the engine switches off.

The emergency stops must be reset before the generator set can be restarted.

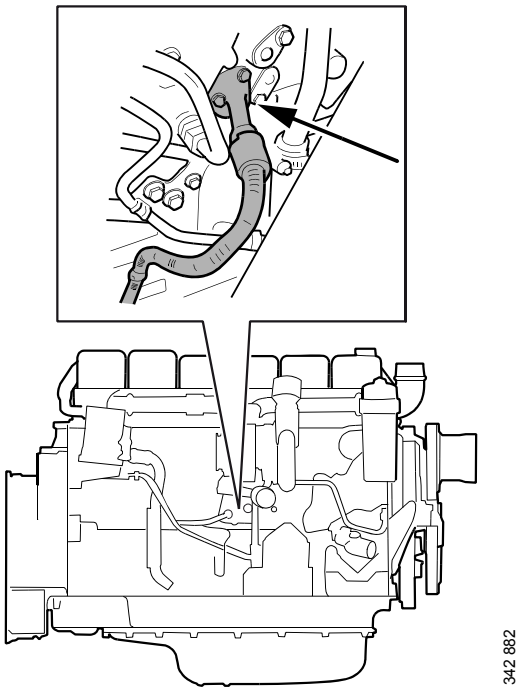


Emergency stop on canopy

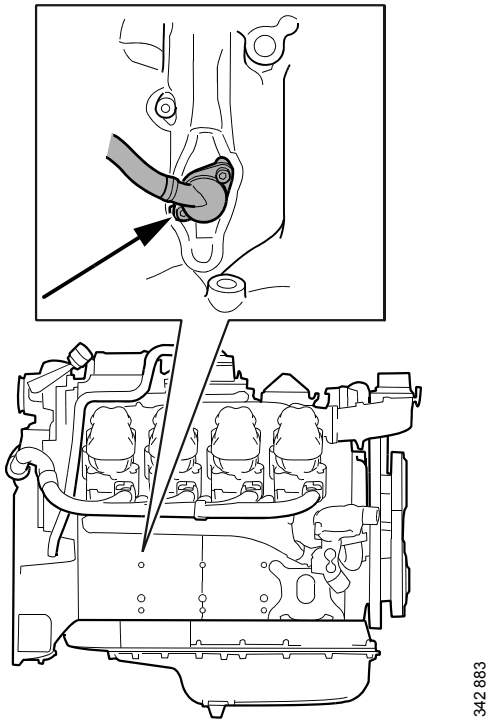
Engine heater (option)

The generator set engine can be preheated with a block heater with thermostat (option).

To power the engine heater there must be access to a fixed 230 V electrical power network or other 230 V energy source. Electrical power supply cables are connected in the central electric unit.

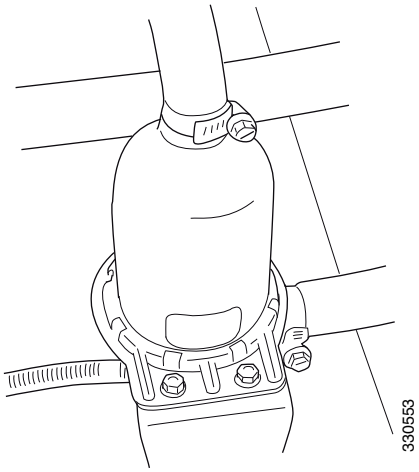


Block heater on 9 and 13 litre engines



Block heater on 16 litre engine

The generator set with a 16 litre engine may have a coolant heater (option) as shown in the illustration.



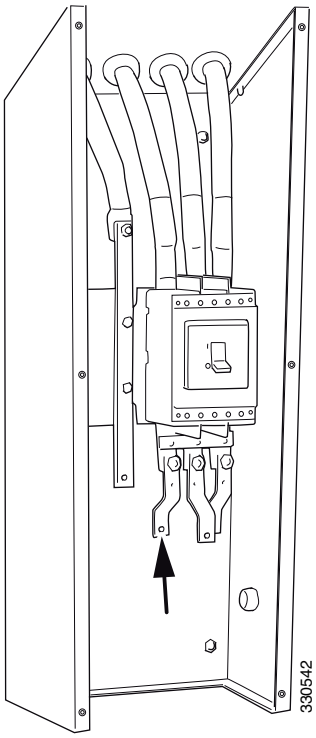
Coolant heater (option)

Central electric unit for current consumers

The current consumers are supplied with electrical power via a central electric unit, which is located on one of the end plates to the right of the 24 V central electric unit.

Busbars for connecting the current consumer power cables are located in a protected position behind a bolted hatch.

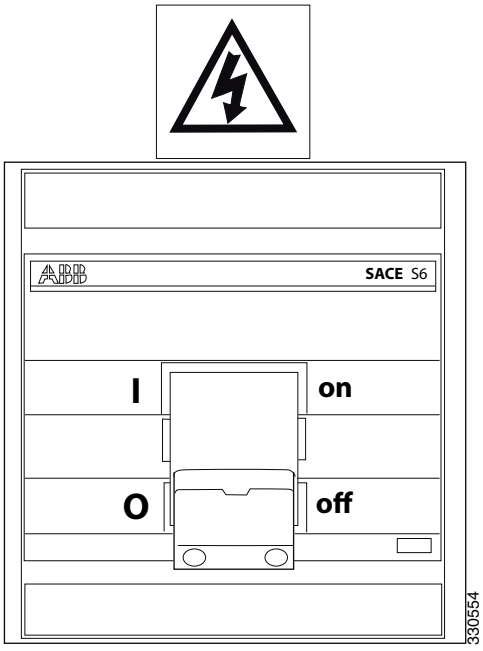
The illustration shows a 3-pin circuit breaker in the generator set, which is the standard specification. A 4-pin circuit breaker is available as an option.



Busbars with the hatch removed (example)

The generator set circuit breaker, which can be manually activated as shown in the illustration, or equipped with a motor for automatic control, is located on the hatch.

An ground fault circuit breaker is available as an option, which trips the circuit breaker at very small currents in the event of a fault in the electrical cables or current consumers.



Manual circuit breaker

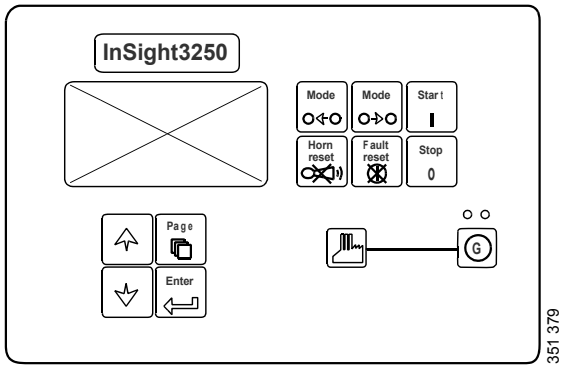
Operation

Instrument panel

There are three variants of instrument panel: InSight 3250, 4000 and 6000. Which type of instrument panel the generator set is equipped with depends on the type of operation.

The instrument panel runs and monitors different parameters. The operating status and alarm messages are displayed on the instrument panel.

The current instrument panel is described in the Instrument panel Operator's manual.



Example of instrument panel: InSight 3250

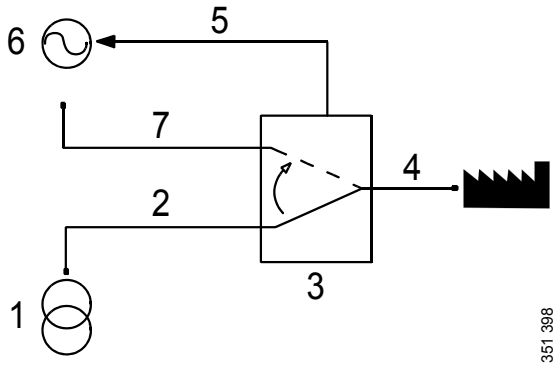
Automatic transfer switch

When the generator set is on stand-by in a current consumer network, an automatic transfer switch is located in the current consumer network switchgear.

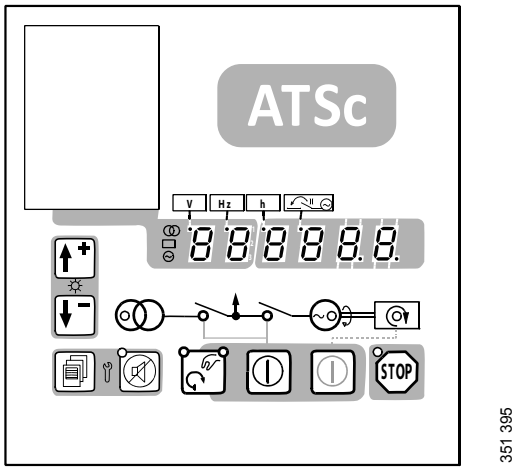
When the instrument panel detects a power failure in the electrical power network, a signal is sent to the generator set requesting it to start and take over the load from the electrical consumers. When the instrument panel detects that the mains voltage is back up, the generator set is switched off.

Note:

To be able to run the generator set with an automatic transfer switch, the generator set instrument panel must be set to automatic operating mode.



1. *Electrical power network*
2. *Power supply from electrical power network*
3. *Automatic transfer switch*
4. *To electrical consumer*
5. *Control signal*
6. *Generator set*
7. *Power supply from generator set*



Automatic transfer switch

Operating modes

It is possible to set three operating modes on the generator set instrument panel:

- Manual mode when the engine and circuit breaker are run via the instrument panel display.
- Automatic mode when all the functions for the engine as well as the circuit breakers in the generator set and automatic transfer switch are run automatically.
- Stop mode when neither the engine nor circuit breaker can be run. This only applies to instrument panels InSight 4000 and 6000.

Application modes

The instrument panels can be configured to four application modes:

- {0}starting and switching off of engine.
- {1o}starting and switching off of engine, interrupts the circuit breaker in the generator set.
- {1oc}starting and switching off of engine, interrupts and ends the circuit breaker in the generator set.
- {2oc}starting and switching off of engine, interrupts and ends the circuit breakers in the generator set and automatic transfer switch.

Note:

Not all instrument panels can be configured to all four application modes.

Operation

Before operation

Check that

- all power cables and ground cables are undamaged and correctly connected
- the fuel tank is full
- any battery switch is in the On position
- the circuit breaker on the 24 V central electric unit is in position I
- the generator set circuit breaker is in the On position. Applies to generator sets with manually activated circuit breaker.

Operation

See the Instrument Panel Operator's Manual.

Refuelling

WARNING!

During refuelling there is a risk of fire and explosion. The engine must be switched off and smoking is prohibited.

WARNING!

Only use recommended fuel according to the Industrial Engine Operator's Manual. The wrong fuel grade can cause breakdowns or stoppages by causing the injection system to malfunction. This can cause damage to the engine and, possibly, injury.

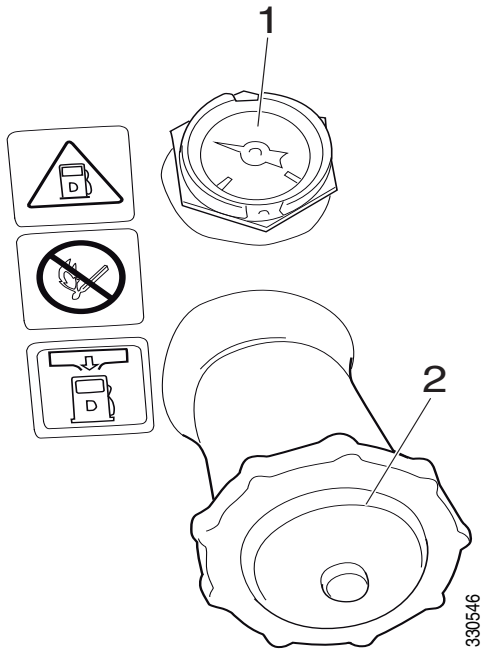
Filling the internal fuel tank

WARNING!

Never overfill the fuel tank as the fuel needs space to expand. Make sure that the refuelling cap is fully closed. Risk of fire and explosion.

The refuelling point is located on one of the long sides.

The fuel tank has a capacity between 800 l and 1,100 l.



1. *Fuel gauge*
2. *Refuelling*

Maintenance

This Operator's manual does not describe the maintenance items which apply to the engine itself. Instead, these are described in the Industrial engine Operator's manual.

WARNING!

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

IMPORTANT!

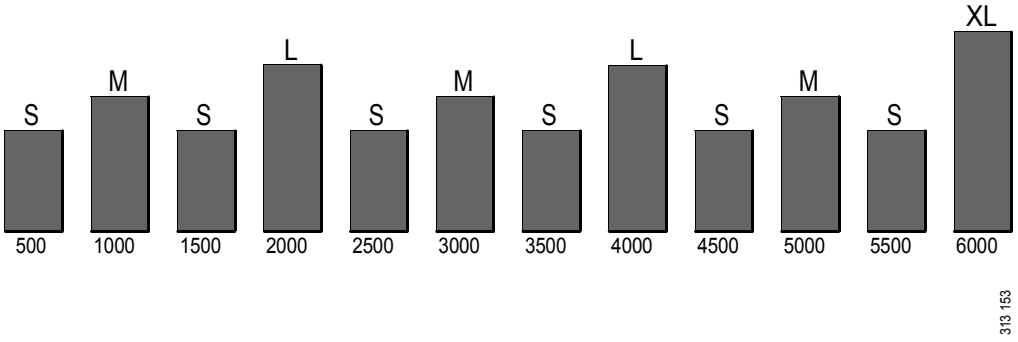
On delivery a Scania engine is optimised for its application. However, regular maintenance is necessary to

- 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.

The maintenance programme includes the following:

- S maintenance: Minimum basic maintenance.
- M maintenance: More extensive maintenance.
- L maintenance: Includes nearly all maintenance items.
- XL maintenance: Includes all maintenance items.

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



Generator sets with few hours of operation

IMPORTANT!

On generator sets with few hours of operation, maintenance must be carried out according to the maintenance interval annually or every 5 years.

Stand-by generator sets and the like 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 oil level.
2. Checking coolant level.
3. Checking vacuum indicator.
4. Checking fuel level.
5. Check for engine leaks.

Maintenance intervals for generator set

	Daily	Interval (hours)				At least once every		
		500 S	1,000 M	2,000 L	6,000 XL	month	year	5 years
Battery								
Checking electrolyte level	*X*							
Cleaning		*X*[1]	*X*	*X*	*X*		*X*	
Checking state of charge				*X*	*X*		*X*	
Exhaust system								
Draining condensation separators	*X*			*X*	*X*			
Engine								
Retightening of screws for engine brackets	*X*							
Running						*X*		
Generator								
Retightening screws for connectors				*X*	*X*			
Retightening connectors				*X*	*X*			
Removal of condensation							*X*	*X*
Cleaning				*X*[1]	*X*			
Generator set								
Cleaning				*X*[1]				

1. More often if required.

Batteries

General

WARNING!

Do not carry out battery care or store batteries near naked flames or anywhere there is a risk of sparks. When the batteries are charged, oxyhydrogen gas is formed which is flammable and explosive.

WARNING!

Wear gloves and protective goggles when charging and handling batteries. The batteries contain a highly corrosive acid.

WARNING!

Make sure you connect the batteries correctly when they are connected. If the batteries are not connected correctly, this can cause serious damage to the electrical system. Sparking may occur if the terminals are short-circuited.

Environment

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

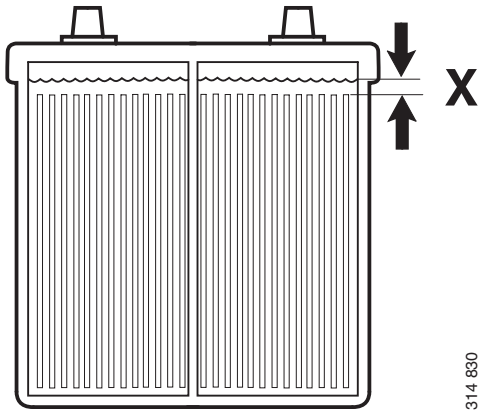
Checking electrolyte level

1. Check that the electrolyte level is at the correct level above the plates in all cells (see table).
2. Top up with distilled water when necessary.

Battery capacity	X = Electrolyte level above the plates
140 Ah	20-25 mm
175 Ah	20-25 mm
180 Ah	20-25 mm
220 Ah	30-35 mm
225 Ah	30-35 mm

Electrolyte level for low maintenance battery

Battery capacity	Electrolyte level above the plates
180 Ah	30-35 mm



Checking state of charge

Note:

Unless the generator set is equipped with a battery charger (optional), an external battery charger must be connected when necessary to charge batteries.

1. Check the density with an acid tester.

   In a fully-charged battery it should be:
   - 1.280 g/cm^3 at +20°C
   - 1.294 g/cm^3 at 0°C
   - 1.308 g/cm^3 at -20°C
2. Charge the battery if density is lower than 1.20 g/cm^3. A discharged battery freezes at -5°C.

IMPORTANT!

Disconnect the cable terminal prior to charging to prevent damage to the engine control unit. Avoid boost charging as this damages the battery over time.

Note:

It is not possible to measure the specify gravity if the battery has recently been topped up with dis-

tilled water. It takes several days for water and acid to mix properly.

Cleaning

1. Clean batteries, cables and cable terminals.
2. Check that all cable terminals are firmly tightened.
3. Grease the battery terminals and cable terminals with Vaseline.

Renewal

Removal:

1. Disconnect the negative cable (-) from the battery.
2. Disconnect the positive cable (+) from the battery.

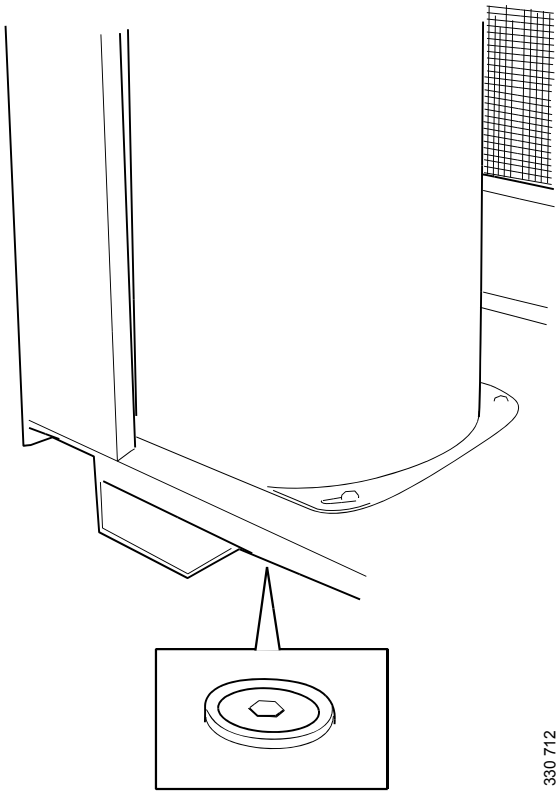
Fitting:

1. Connect the positive battery cable (+).
2. Connect the negative battery cable (-).

Exhaust system

Draining of water in the condensation separator

1. Remove the condensation separator drain valve and drain the water.
2. Refit the drain valve.



Condensation separator, silencer

Engine

Retightening of screws for engine brackets

Retighten the screws in the 2 engine brackets, one bracket on either side.

Tightening torque: 128 Nm.

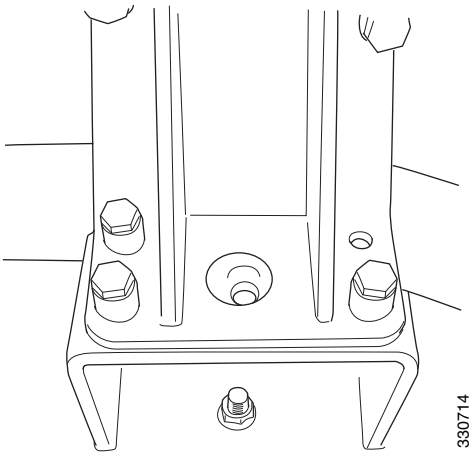
Running

Every month during storage

When starting at low temperatures, Scania recommends that the engine heater (optional) is turned on before starting.

Start and run the engine until operating temperature is reached and then perform the maintenance items below.

1. Checking oil level.
2. Checking coolant level.
3. Checking air cleaner vacuum indicator.
4. Check for engine leaks.



Engine bracket

Generator

Retightening screws for connectors

WARNING!

Make sure the generator has cooled down before the actions are carried out.

Generator Mecc Alte

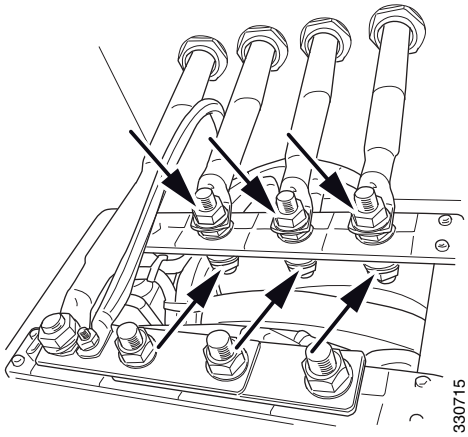
IMPORTANT!

Use counterhold during tightening to prevent the plastic rail from breaking.

1. Loosen the 8 screws on the upper hatch of the generator and remove the hatch.
2. Tighten the nuts of the three brass screws on both sides of the plastic rail.

- Tightening torque, M16: 80 Nm.
- Tightening torque, M20: 100 Nm.

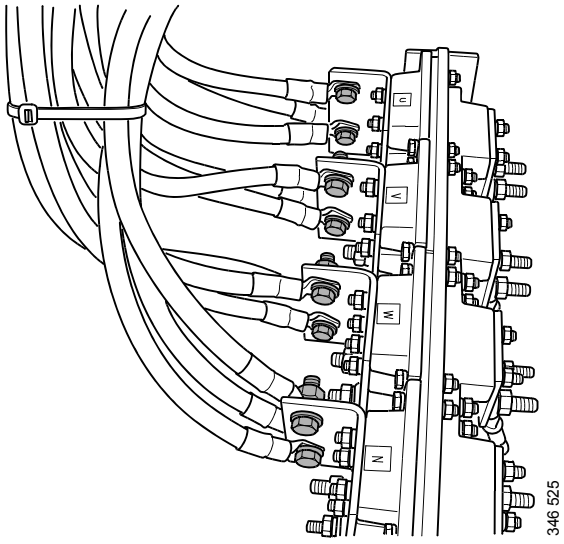
3. Fit the top hatch, then tighten the 8 screws.



Retightening the screws on the Mecc Alte generator

Generator Stamford

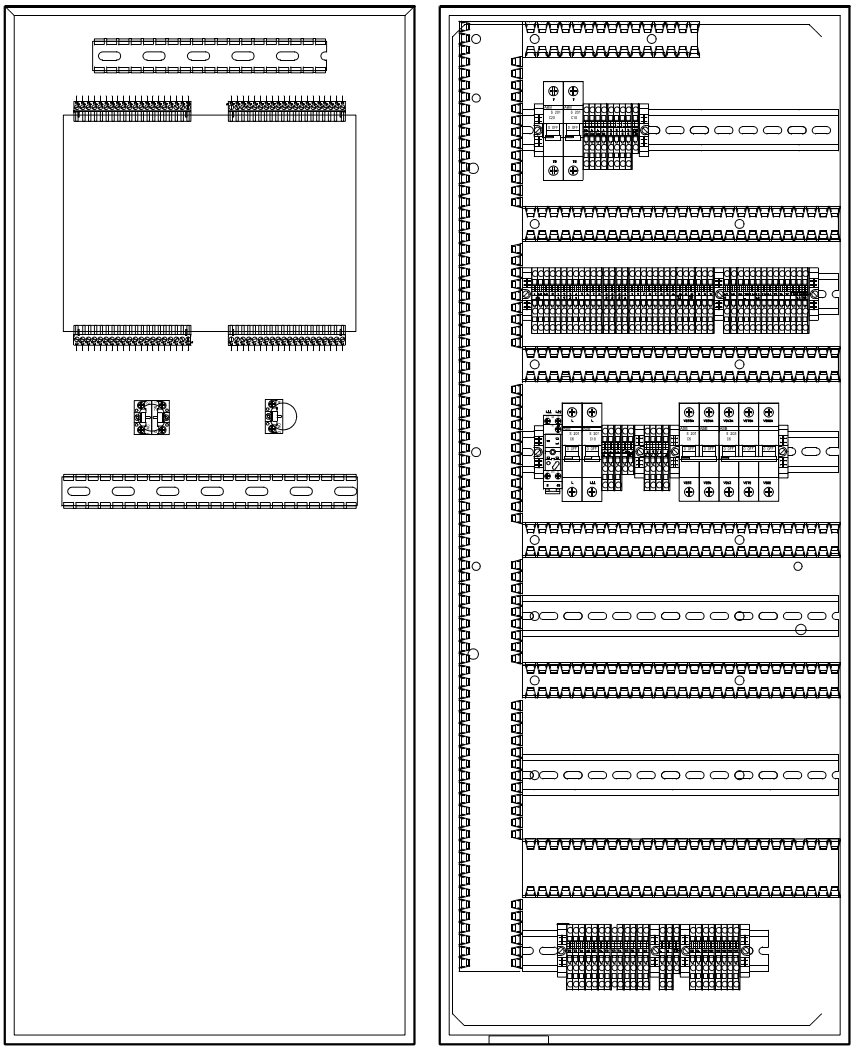
Tightening torque for screw joint			
Busbar width (mm)	**Number of screw joints**	**Thread**	**Torque (Nm)**
25	2	M8	17
30	2	M8	17
40	2	M10	28
50	2	M12	45
60	4	M10	28
80	4	M12	45
100	5	M12	45
120	5	M12	45



Retightening the screws on the Stamford generator

Retightening connectors

Retighten all the connectors and cable connections in the central electric unit.



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The illustration shows an example of a central electric unit

Removal of condensation

When commissioning after storage

Note:

If the generator is equipped with a generator heater (optional), it should be used to remove any condensation.

If the generator set has not been used for some time, any condensation in the generator must be removed.

Blow hot air, 50-60°C over the generator's air intakes and air vents.

IMPORTANT!

Hold the nozzle of the heat source at least 300 mm from the generator and do not blow with a high pressure.

Cleaning

Engine

Clean the engine with warm water. Use high-pressure jets with caution and avoid spraying electric parts such as the starter motor, the engine alternator or the batteries.

Generator

IMPORTANT!

The generator may not be cleaned with water or detergent.

Dry off the generator with a lint free cloth or blow carefully with compressed air.