

Atlas Copco Instruction Manual



Instruction Manual
for AC Generators
English

QAS+ 250

QAS+ 325

QAS+ 450

DC9 320A

DC9 320A

DC13520

Atlas Copco

QAS+ 250-450 Sd ESF

Instruction Manual for AC Generators

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Original instructions

Printed matter N°
2960 7400 00

02/2022



ATLAS COPCO - POWER AND FLOW DIVISION
www.atlascopco.com

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Neglecting maintenance or making changes to the setup of the machine can result in major hazards, including fire risk.

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Congratulations on the purchase of your AC generator. It is a solid, safe and reliable machine, built according to the latest technology. Follow the instructions in this booklet and we guarantee you years of trouble free operation. Please read the following instructions carefully before starting to use your machine.

While every effort has been made to ensure that the information in this manual is correct, Atlas Copco does not assume responsibility for possible errors. Atlas Copco reserves the right to make changes without prior notice.

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1 Safety precautions for on-site generators

To be read attentively and acted accordingly before towing, lifting, operating, performing maintenance or repairing the generator.

1.1 Introduction

The policy of Atlas Copco is to provide the users of their equipment with safe, reliable and efficient products. Factors taken into account are among others:

- the intended and predictable future use of the products, and the environments in which they are expected to operate,
- applicable rules, codes and regulations,
- the expected useful product life, assuming proper service and maintenance,
- providing the manual with up-to-date information.

Before handling any product, take time to read the relevant instruction manual. Besides giving detailed operating instructions, it also gives specific information about safety, preventive maintenance, etc.

Keep the manual always at the unit location, easy accessible to the operating personnel.

See also the safety precautions of the engine and possible other equipment, which are separately sent along or are mentioned on the equipment or parts of the unit.

These safety precautions are general and some statements will therefore not always apply to a particular unit.

Only people that have the right skills should be allowed to operate, adjust, perform maintenance or repair on Atlas Copco equipment. It is the responsibility of management to appoint operators with the appropriate training and skill for each category of job.

Skill level 1: Operator

An operator is trained in all aspects of operating the unit with the push-buttons, and is trained to know the safety aspects.

Skill level 2: Mechanical technician

A mechanical technician is trained to operate the unit the same as the operator. In addition, the mechanical technician is also trained to perform maintenance and repair, as described in the instruction manual, and is allowed to change settings of the control and safety system. A mechanical technician does not work on live electrical components.

Skill level 3: Electrical technician

An electrical technician is trained and has the same qualifications as both the operator and the mechanical technician. In addition, the electrical technician may carry out electrical repairs within the various enclosures of the unit. This includes work on live electrical components.

Skill level 4: Specialist from the manufacturer

This is a skilled specialist sent by the manufacturer or its agent to perform complex repairs or modifications to the equipment.

In general it is recommended that not more than two people operate the unit, more operators could lead to unsafe operating conditions. Take necessary steps to keep unauthorized persons away from the unit and eliminate all possible sources of danger at the unit.

When handling, operating, overhauling and/or performing maintenance or repair on Atlas Copco equipment, the mechanics are expected to use safe engineering practices and to observe all relevant local safety requirements and ordinances. The following list is a reminder of special safety directives and precautions mainly applicable to Atlas Copco equipment.

Neglecting the safety precautions may endanger people as well as environment and machinery:

- endanger people due to electrical, mechanical or chemical influences,
- endanger the environment due to leakage of oil, solvents or other substances,
- endanger the machinery due to function failures.

All responsibility for any damage or injury resulting from neglecting these precautions or by non-observance of ordinary caution and due care required in handling, operating, maintenance or repair, also if not expressly mentioned in this instruction manual, is disclaimed by Atlas Copco.

The manufacturer does not accept any liability for any damage arising from the use of non-original parts and for modifications, additions or conversions made without the manufacturer's approval in writing.

If any statement in this manual does not comply with local legislation, the stricter of the two shall be applied.

Statements in these safety precautions should not be interpreted as suggestions, recommendations or inducements that it should be used in violation of any applicable laws or regulations.

1.2 General safety precautions

- 1 The owner is responsible for maintaining the unit in a safe operating condition. Unit parts and accessories must be replaced if missing or unsuitable for safe operation.
- 2 The supervisor, or the responsible person, shall at all times make sure that all instructions regarding machinery and equipment operation and maintenance are strictly followed and that the machines with all accessories and safety devices, as well as the consuming devices, are in good repair, free of abnormal wear or abuse, and are not tampered with.
- 3 Whenever there is an indication or any suspicion that an internal part of a machine is overheated, the machine shall be stopped but no inspection covers shall be opened before sufficient cooling time has elapsed; this to avoid the risk of spontaneous ignition of oil vapour when air is admitted.
- 4 Normal ratings (pressures, temperatures, speeds, etc.) shall be durably marked.
- 5 Operate the unit only for the intended purpose and within its rated limits (pressure, temperature, speeds, etc.).
- 6 The machinery and equipment shall be kept clean, i.e. as free as possible from oil, dust or other deposits.
- 7 To prevent an increase in working temperature, inspect and clean heat transfer surfaces (cooler fins, intercoolers, water jackets, etc.) regularly. See the maintenance schedule.
- 8 All regulating and safety devices shall be maintained with due care to ensure that they function properly. They may not be put out of action.
- 9 Pressure and temperature gauges shall be checked regularly with regard to their accuracy. They shall be replaced whenever outside acceptable tolerances.
- 10 Safety devices shall be tested as described in the maintenance schedule of the instruction manual to determine that they are in good operating condition.
- 11 Mind the markings and information labels on the unit.
- 12 In the event the safety labels are damaged or destroyed, they must be replaced to ensure operator safety.
- 13 Keep the work area neat. Lack of order will increase the risk of accidents.
- 14 When working on the unit, wear safety clothing. Depending on the kind of activities these are: safety glasses, ear protection, safety helmet (including visor), safety gloves, protective clothing, safety shoes. Do not wear the hair long and loose (protect long hair with a hairnet), or wear loose clothing or jewellery.
- 15 Take precautions against fire. Handle fuel, oil and anti-freeze with care because they are inflammable substances. Do not smoke or approach with naked flame when handling such substances. Keep a fire-extinguisher in the vicinity.
- 16a **On-site generators (with earthing pin):**
Earth the generator as well as the load properly.
- 16b **On-site generators IT:**
Note: This generator is built to supply a sheer alternating current IT network.
Earth the load properly.

1.3 Safety during transport and installation

To lift a unit, all loose or pivoting parts, e.g. doors and towbar, shall first be securely fastened.

Do not attach cables, chains or ropes directly to the lifting eye; apply a crane hook or lifting shackle meeting local safety regulations. Never allow sharp bends in lifting cables, chains or ropes.

Helicopter lifting is not allowed.

It is strictly forbidden to dwell or stay in the risk zone under a lifted load. Never lift the unit over people or residential areas. Lifting acceleration and deceleration shall be kept within safe limits.

1 Before towing the unit:

- check the towbar, the brake system and the towing eye. Also check the coupling of the towing vehicle,
- check the towing and brake capability of the towing vehicle,
- check that the towbar, jockey wheel or stand leg is safely locked in the raised position,
- ascertain that the towing eye can swivel freely on the hook,
- check that the wheels are secure and that the tyres are in good condition and inflated correctly,
- connect the signalisation cable, check all lights and connect the pneumatic brake couplers,
- attach the safety break-away cable or safety chain to the towing vehicle,
- remove wheel chocks, if applied, and disengage the parking brake.

2 To tow a unit use a towing vehicle of ample capacity. Refer to the documentation of the towing vehicle.

- 3 If a unit is to be backed up by a towing vehicle, disengage the overrun brake mechanism (if it is not an automatic mechanism).
- 4 In case of transporting a non-trailer unit on a truck, fasten it to the truck by attaching straps via fork lift slots, via the holes in the frame at the front and back or via the lifting beam. To prevent damage, never put straps on the roof surface of the unit.
- 5 Never exceed the maximum towing speed of the unit (mind the local regulations).
- 6 Place the unit on level ground and apply the parking brake before disconnecting the unit from the towing vehicle. Unclip the safety break-away cable or safety chain. If the unit has no parking brake or jockey wheel, immobilize the unit by placing chocks in front of and/or behind the wheels. When the towbar can be positioned vertically, the locking device must be applied and kept in good order.
- 7 To lift heavy parts, a hoist of ample capacity, tested and approved according to local safety regulations, shall be used.
- 8 Lifting hooks, eyes, shackles, etc., shall never be bent and shall only have stress in line with their design load axis. The capacity of a lifting device diminishes when the lifting force is applied at an angle to its load axis.
- 9 For maximum safety and efficiency of the lifting apparatus all lifting members shall be applied as near to perpendicular as possible. If required, a lifting beam shall be applied between hoist and load.
- 10 Never leave a load hanging on a hoist.

- 11 A hoist has to be installed in such a way that the object will be lifted perpendicular. If that is not possible, the necessary precautions must be taken to prevent load-swinging, e.g. by using two hoists, each at approximately the same angle not exceeding 30° from the vertical.
- 12 Locate the unit away from walls. Take all precautions to ensure that hot air exhausted from the engine and driven machine cooling systems cannot be recirculated. If such hot air is taken in by the engine or driven machine cooling fan, this may cause overheating of the unit; if taken in for combustion, the engine power will be reduced.
- 13 Generators shall be stalled on an even, solid floor, in a clean location with sufficient ventilation. If the floor is not level or can vary in inclination, consult Atlas Copco.
- 14 The electrical connections shall correspond to local codes. The machines shall be earthed and protected against short circuits by fuses or circuit breakers.
- 15 Never connect the generator outlets to an installation which is also connected to a public mains.
- 16 Before connecting a load, switch off the corresponding circuit breaker, and check whether frequency, voltage, current and power factor comply with the ratings of the generator.
- 17 Before transportation of the unit, switch off all the circuit breakers.

1.4 Safety during use and operation

- 1 When the unit has to operate in a fire-hazardous environment, each engine exhaust has to be provided with a spark arrestor to trap incendiary sparks.
- 2 The exhaust contains carbon monoxide which is a lethal gas. When the unit is used in a confined space, conduct the engine exhaust to the outside atmosphere by a pipe of sufficient diameter; do this in such a way that no extra back pressure is created for the engine. If necessary, install an extractor. Observe any existing local regulations.

Make sure that the unit has sufficient air intake for operation. If necessary, install extra air intake ducts.
- 3 When operating in a dust-laden atmosphere, place the unit so that dust is not carried towards it by the wind. Operation in clean surroundings considerably extends the intervals for cleaning the air intake filters and the cores of the coolers.
- 4 Never remove a filler cap of the cooling water system of a hot engine. Wait until the engine has sufficiently cooled down.
- 5 Never refill fuel while the unit is running, unless otherwise stated in the Atlas Copco Instruction Book (AIB). Keep fuel away from hot parts such as air outlet pipes or the engine exhaust. Do not smoke when fuelling. When fuelling from an automatic pump, an earthing cable should be connected to the unit to discharge static electricity. Never spill nor leave oil, fuel, coolant or cleansing agent in or around the unit.
- 6 All doors shall be shut during operation so as not to disturb the cooling air flow inside the bodywork and/or render the silencing less effective. A door should be kept open for a short period only e.g. for inspection or adjustment.
- 7 Periodically carry out maintenance works according to the maintenance schedule.
- 8 Stationary housing guards are provided on all rotating or reciprocating parts not otherwise protected and which may be hazardous to personnel. Machinery shall never be put into operation, when such guards have been removed, before the guards are securely reinstalled.
- 9 Noise, even at reasonable levels, can cause irritation and disturbance which, over a long period of time, may cause severe injuries to the nervous system of human beings.

When the sound pressure level, at any point where personnel normally has to attend, is:

 - below 70 dB(A): no action needs to be taken,
 - above 70 dB(A): noise-protective devices should be provided for people continuously being present in the room,
 - below 85 dB(A): no action needs to be taken for occasional visitors staying a limited time only,
 - above 85 dB(A): room to be classified as a noise-hazardous area and an obvious warning shall be placed permanently at each entrance to alert people entering the room, for even relatively short times, about the need to wear ear protectors,
- above 95 dB(A): the warning(s) at the entrance(s) shall be completed with the recommendation that also occasional visitors shall wear ear protectors,
- above 105 dB(A): special ear protectors that are adequate for this noise level and the spectral composition of the noise shall be provided and a special warning to that effect shall be placed at each entrance.
- 10 The unit has parts of which the temperature can be in excess of 80°C (176°F), and which may be accidentally touched by personnel when opening the machine during or just after operation. Insulation or safety guards protecting these parts shall not be removed before the parts have cooled down sufficiently, and must be re-installed before operating the machine. As it is not possible to insulate or protect all hot parts by guards (e.g. exhaust manifold, exhaust turbine), the operator / service engineer must always be aware not to touch hot parts when opening a machine door.
- 11 Never operate the unit in surroundings where there is a possibility of taking in flammable or toxic fumes.
- 12 If the working process produces fumes, dust or vibration hazards, etc., take the necessary steps to eliminate the risk of personnel injury.
- 13 When using compressed air or inert gas to clean down equipment, do so with caution and use the appropriate protection, at least safety glasses, for the operator as well as for any bystander. Do not apply compressed air or inert gas to your skin or direct an air or gas stream at people. Never use it to clean dirt from your clothes.

- 14 When washing parts in or with a cleaning solvent, provide the required ventilation and use appropriate protection such as a breathing filter, safety glasses, rubber apron and gloves, etc.
- 15 Safety shoes should be compulsory in any workshop and if there is a risk, however small, of falling objects, wearing of a safety helmet should be included.
- 16 If there is a risk of inhaling hazardous gases, fumes or dust, the respiratory organs must be protected and depending on the nature of the hazard, so must the eyes and skin.
- 17 Remember that where there is visible dust, the finer, invisible particles will almost certainly be present too; but the fact that no dust can be seen is not a reliable indication that dangerous, invisible dust is not present in the air.
- 18 Never operate the generator in excess of its limits as indicated in the technical specifications and avoid long no-load sequences.
- 19 Never operate the generator in a humid atmosphere. Excessive moisture reduces the generator insulation.
- 20 Do not open electrical cabinets, cubicles or other equipment while voltage is supplied. If such cannot be avoided, e.g. for measurements, tests or adjustments, have the action carried out by a qualified electrician only, with appropriate tools, and ascertain that the required bodily protection against electrical hazards is applied.
- 21 Never touch the power terminals during operation of the machine.
- 22 Whenever an abnormal condition arises, e.g. excessive vibration, noise, odour, etc., switch the circuit breakers to OFF and stop the engine. Correct the faulty condition before restarting.
- 23 Check the electric cables regularly. Damaged cables and insufficient tightening of connections may cause electric shocks. Whenever damaged wires or dangerous conditions are observed, switch the circuit breakers to OFF and stop the engine. Replace the damaged wires or correct the dangerous condition before restarting. Make sure that all electric connections are securely tightened.
- 24 Avoid overloading the generator. The generator is provided with circuit breakers for overload protection. When a breaker has tripped, reduce the concerned load before restarting.
- 25 If the generator is used as stand-by for the mains supply, it must not be operated without control system which automatically disconnects the generator from the mains when the mains supply is restored.
- 26 Never remove the cover of the output terminals during operation. Before connecting or disconnecting wires, switch off the load and the circuit breakers, stop the machine and make sure that the machine cannot be started inadvertently or there is any residual voltage on the power circuit.
- 27 Running the generator at low load for long periods will reduce the lifetime of the engine.
- 28 When operating the generator in Remote or Auto mode, observe all relevant local legislation.

1.5 Safety during maintenance and repair

Maintenance, overhaul and repair work shall only be carried out by adequately trained personnel; if required, under supervision of someone qualified for the job.

- 1 Use only the correct tools for maintenance and repair work, and only tools which are in good condition.
- 2 Parts shall only be replaced by genuine Atlas Copco replacement parts.
- 3 All maintenance work, other than routine attention, shall only be undertaken when the unit is stopped. Steps shall be taken to prevent inadvertent starting. In addition, a warning sign bearing a legend such as "work in progress; do not start" shall be attached to the starting equipment.
On engine-driven units the battery shall be disconnected and removed or the terminals covered by insulating caps.
On electrically driven units the main switch shall be locked in open position and the fuses shall be taken out. A warning sign bearing a legend such as "work in progress; do not supply voltage" shall be attached to the fuse box or main switch.
- 4 Prior to stripping an engine or other machine or undertaking major overhaul on it, prevent all movable parts from rolling over or moving.

- 5 Make sure that no tools, loose parts or rags are left in or on the machine. Never leave rags or loose clothing near the engine air intake.
- 6 Never use flammable solvents for cleaning (fire-risk).
- 7 Take safety precautions against toxic vapours of cleaning liquids.
- 8 Never use machine parts as a climbing aid.
- 9 Observe scrupulous cleanliness during maintenance and repair. Keep away dirt, cover the parts and exposed openings with a clean cloth, paper or tape.
- 10 Never weld on or perform any operation involving heat near the fuel or oil systems. Fuel and oil tanks must be completely purged, e.g. by steam-cleaning, before carrying out such operations. Never weld on, or in any way modify, pressure vessels. Disconnect the alternator cables during arc welding on the unit.
- 11 Support the towbar and the axle(s) securely if working underneath the unit or when removing a wheel. Do not rely on jacks.
- 12 Do not remove any of, or tamper with, the sound-damping material. Keep the material free of dirt and liquids such as fuel, oil and cleansing agents. If any sound-damping material is damaged, replace it to prevent the sound pressure level from increasing.
- 13 Use only lubricating oils and greases recommended or approved by Atlas Copco or the machine manufacturer. Ascertain that the selected lubricants comply with all applicable safety regulations, especially with regard to explosion or fire-risk and the possibility of decomposition or generation of hazardous gases. Never mix synthetic with mineral oil.
- 14 Protect the engine, alternator, air intake filter, electrical and regulating components, etc., to prevent moisture ingress, e.g. when steam-cleaning.
- 15 When performing any operation involving heat, flames or sparks on a machine, the surrounding components shall first be screened with non-flammable material.
- 16 Never use a light source with open flame for inspecting the interior of a machine.
- 17 When repair has been completed, the machine shall be barred over at least one revolution for reciprocating machines, several revolutions for rotary ones to ensure that there is no mechanical interference within the machine or driver. Check the direction of rotation of electric motors when starting up the machine initially and after any alteration to the electrical connection(s) or switch gear, to check that the oil pump and the fan function properly.
- 18 Maintenance and repair work should be recorded in an operator's logbook for all machinery. Frequency and nature of repairs can reveal unsafe conditions.
- 19 When hot parts have to be handled, e.g. shrink fitting, special heat-resistant gloves shall be used and, if required, other body protection shall be applied.
- 20 When using cartridge type breathing filter equipment, ascertain that the correct type of cartridge is used and that its useful service life is not surpassed.
- 21 Make sure that oil, solvents and other substances likely to pollute the environment are properly disposed of.
- 22 Before clearing the generator for use after maintenance or overhaul, submit it to a test run, check that the AC power performance is correct and that the control and shutdown devices function correctly.

1.6 Tool applications safety

Apply the proper tool for each job. With the knowledge of correct tool use and knowing the limitations of tools, along with some common sense, many accidents can be prevented.

Special service tools are available for specific jobs and should be used when recommended. The use of these tools will save time and prevent damage to parts.

1.7 Battery safety precautions

When servicing batteries, always wear protecting clothing and glasses.

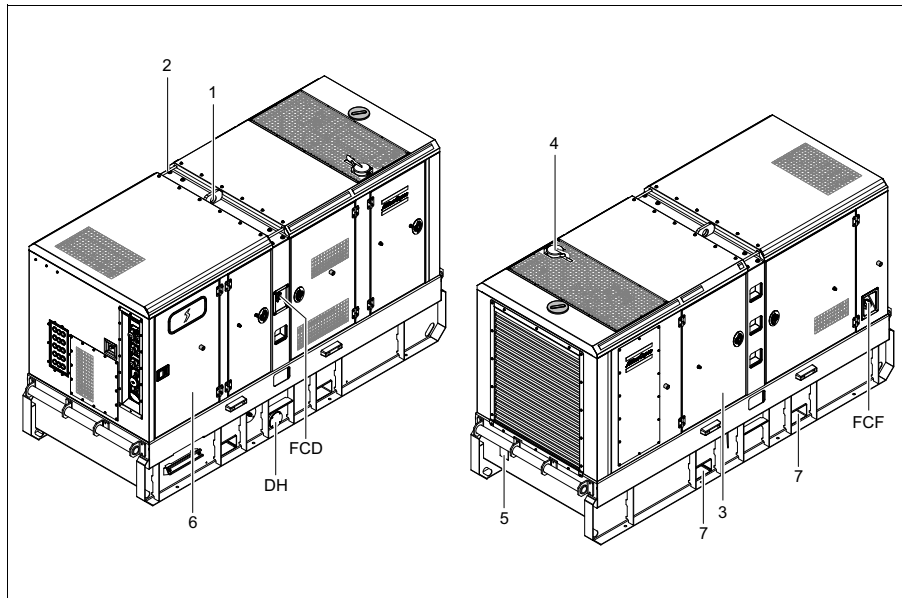
- 1 The electrolyte in batteries is a sulphuric acid solution which is fatal if it hits your eyes, and which can cause burns if it contacts your skin. Therefore, be careful when handling batteries, e.g. when checking the charge condition.
- 2 Install a sign prohibiting fire, open flame and smoking at the post where batteries are being charged.
- 3 When batteries are being charged, an explosive gas mixture forms in the cells and might escape through the vent holes in the plugs.
Thus an explosive atmosphere may form around the battery if ventilation is poor, and can remain in and around the battery for several hours after it has been charged. Therefore:
 - never smoke near batteries being, or having recently been, charged,
 - never break live circuits at battery terminals, because a spark usually occurs.
- 4 When connecting an auxiliary battery (AB) in parallel to the unit battery (CB) with booster cables: connect the + pole of AB to the + pole of CB, then connect the - pole of CB to the mass of the unit. Disconnect in the reverse order.

2 Main parts

2.1 General description

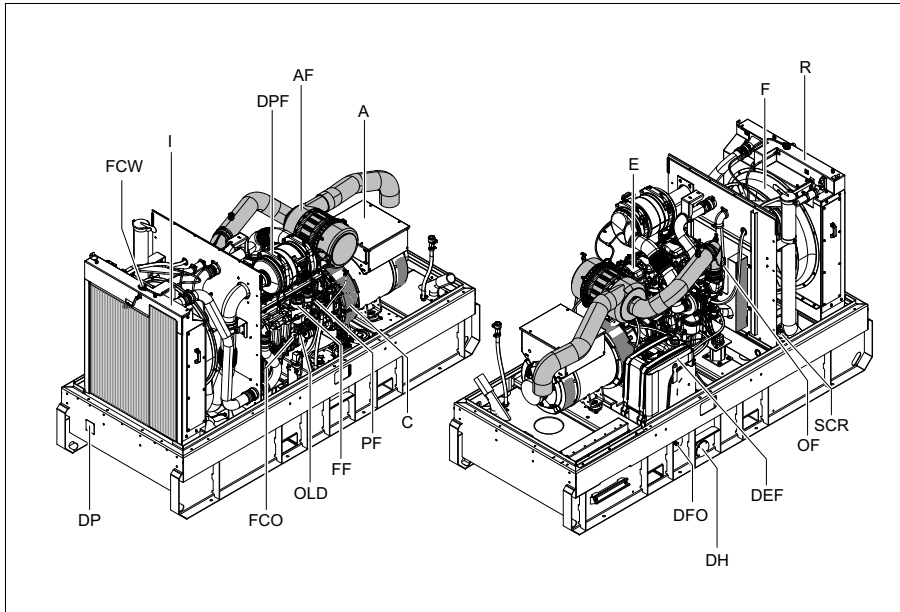
The QAS+ 250-450 Sd is an AC generator, built for continuous running at sites where no electricity is available or as stand-by in cases of interruption of the mains. The generator operates at 50/60 Hz, 400/480V 3 phase line-to-line with neutral. The QAS+ generator is driven by a fluid-cooled diesel engine, manufactured by Scania. An overview of the main parts is given in the diagram below.

QAS+ 250-325

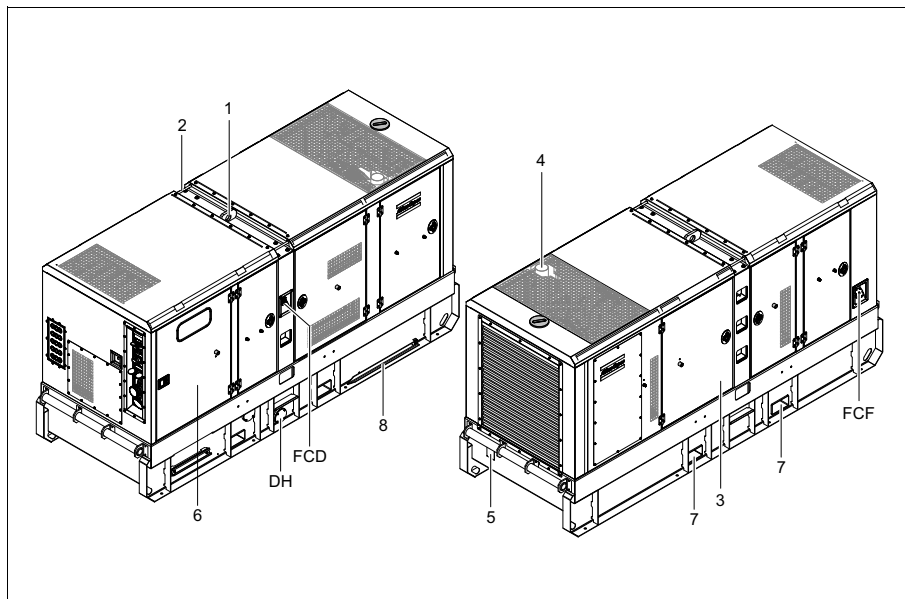


- 1 Lifting beam
- 2 Guiding rod
- 3 Side doors
- 4 Engine exhaust
- 5 Data plate
- 6 Door, access to control and indicator panel
- 7 Forklift slots

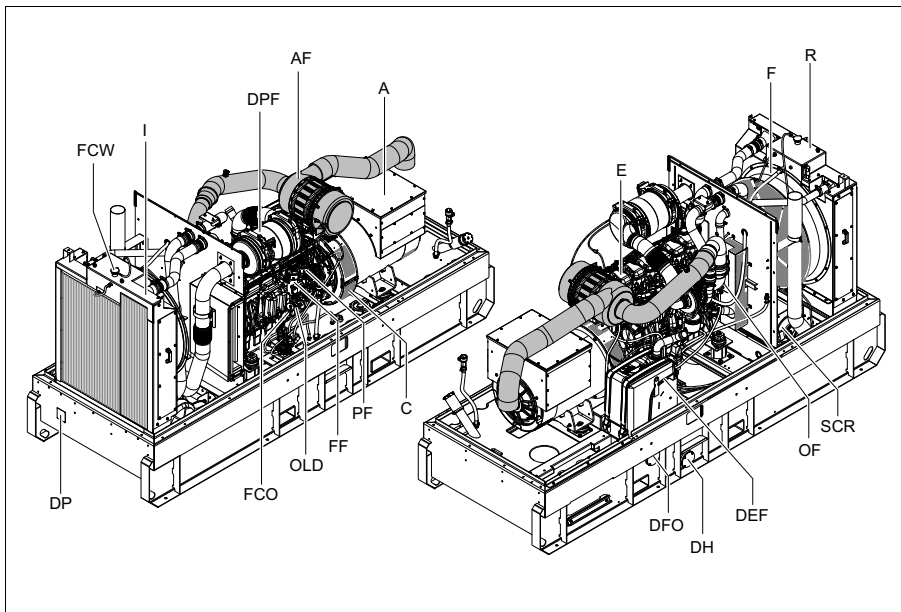
- DH Drain and access hole (in the frame)
- FCD Filler cap DEF (AdBlue)
- FCF Filler cap fuel



- A Alternator
- AF Air filter
- C Coupling
- DEF Diesel exhaust fluid tank
- DFO Drain flexible engine oil
- DH Drain and access hole (in the frame)
- DP Data plate
- DPF Diesel particulate filter
- E Engine
- F Fan
- FCO Filler cap engine oil
- FCW Filler cap coolant
- FF Fuel filter
- I Intercooler
- OF Oil filter
- OLD Engine oil level dipstick
- PF Pre-fuel filter
- R Radiator
- SCR Catalytic converter



- 1 Lifting beam
 - 2 Guiding rod
 - 3 Side doors
 - 4 Engine exhaust
 - 5 Data plate
 - 6 Door, access to control and indicator panel
 - 7 Forklift slots
 - 8 Earthing rod
-
- DH Drain and access hole (in the frame)
 - FCD Filler cap DEF (AdBlue)
 - FCF Filler cap fuel



- A Alternator
- AF Air filter
- C Coupling
- DEF Diesel exhaust fluid tank
- DFO Drain flexible engine oil
- DH Drain and access hole (in the frame)
- DP Data plate
- DPF Diesel particulate filter
- E Engine
- F Fan
- FCO Filler cap engine oil
- FCW Filler cap coolant
- FF Fuel filter
- I Intercooler
- OF Oil filter
- OLD Engine oil level dipstick
- PF Pre-fuel filter
- R Radiator
- SCR Catalytic converter

2.2 Markings

Markings provide instructions and information. They also warn of hazards. For convenience and safety, keep all markings in legible condition, replacing them when damaged or missing. Replacement markings are available from the factory.

A brief description of all markings provided on the generator is given hereafter. The precise location of all markings can be found in the parts manual of this generator.



Indicates the presence of electric shock hazards. Enclosures marked with these symbols should only be opened by trained or instructed people.



Indicates that the engine exhaust is a hot and harmful gas, which is toxic in case of inhalation. Always make sure that the unit is operated outside or in a well-ventilated room.



Indicates that these parts can become very hot during operation (e.g. engine, cooler, etc.). Always make sure that these parts are cooled down before touching them.



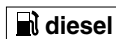
Indicates the sound power level in accordance with Directive 2000/14/EC (expressed in dB (A)).



Indicates that the guiding rods may not be used to lift the generator. Always use the lifting rod in the roof of the generator to lift it.



Indicates a lifting point of the generator.



Indicates that the generator may be refuelled with diesel fuel only.



Indicates the drain for the engine oil.



Indicates the drain for the coolant.



Indicates the drain plug for the engine fuel.



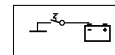
Use PAROIL E only.



Indicates the different earthing connections on the generator.



Indicates that the alternator should not be cleaned with high pressurised water.



Indicates the battery switch.



Indicates that the unit may start automatically and that the instruction book has to be consulted prior to use.



Read the instruction manual before using the lifting eye.



Indicates the 3-way valve.

Atlas Copco		XXXXXXXXXXXXXXXXXX	
SERVICE PACK			
	XXXXXXXXXXXXXXXXXX	XXXXX XXXXX XX	XXXXX XXXXX XX
Engine oil			
	PAROIL E	PAROIL Extra	
	XXXXX XXXXX XXXX	XXXXX XXXXX XX	XXXXX XXXXX XX
	XXXXX XXXXX XXXX	XXXXX XXXXX XX	XXXXX XXXXX XX
Engine coolant			
PARCOOL EG			
	XXXXX XXXXX XXXX	XXXXX XXXXX XX	XXXXX XXXXX XX
	XXXXX XXXXX XXXX	XXXXX XXXXX XX	XXXXX XXXXX XX

Indicates the part numbers of the different service packs and of the engine oil. These parts can be ordered to the factory.



Indicates that the generator must be refilled with DEF (AdBlue) only for the DEF system. The DEF filling point is identified with a blue cap. No diesel allowed in the DEF filling point. Severe engine damages can be caused.





Indicates to not switch off the battery when the switch light is ON. It can cause severe damages to the emissions system.



Carbon monoxide (CO) can cause brain damage or death. Engine and generator exhaust contains odourless and colourless carbon monoxide gas. Signs of carbon monoxide poisoning include nausea, headache, dizziness, drowsiness, and lack of consciousness. Get fresh air if anyone shows signs of carbon monoxide poisoning.



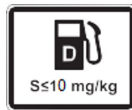
Data plate.



Use PARCOOL GREEN only.



Indicates a risk of fire. This label is required for On Road transport into the European Union according to the European agreement concerning international carriage of Dangerous goods by Road, Annex A.



European ULSD 0.0010 percent (10ppm (mg/kg)) sulfur fuel is required by regulation for the use in engines certified to

EC European nonroad Stage V and newer standards and are equipped with exhaust after-treatment systems.

2.3 Mechanical features

2.3.1 Compartments

The QAS+ is divided in two compartments: the engine and alternator compartment, the exhaust and cooler compartment.

2.3.1.1 Engine and alternator compartment

Engine, alternator, fuel tank and cubicle are located in the engine compartment. This compartment is ventilated by a fixed speed fan, driven by a DC motor.

2.3.1.2 Exhaust and cooler compartment

The exhaust and cooler are located in a separate compartment.

2.3.2 Engine and alternator

The alternator is driven by a coolant-cooled diesel engine. The engine's power is transmitted through a direct disc coupling.

The generator houses a single bearing alternator with a dedicated voltage regulator.

The synchronous brushless alternator has Class H rotor and stator windings in an IP23 housing.

2.3.3 Cooling system

The engine is provided with a water cooler. The cooling air is generated by one large and two small fans.

2.3.4 Safety devices

The engine electronics monitor the engines parameters and generate warning and shut-down signals when the parameters reach a preset threshold value.

2.3.5 Hot parts protection

The hot parts protection shields hot parts of the generator set (turbo and exhaust system) to reduce the risk of burns.

2.3.6 Bodywork

The alternator, the engine, the cooling system, etc. are enclosed in a sound-insulated bodywork that can be opened by means of side doors (and service plates).

The generator can be lifted by using the lifting eye integrated in the bodywork (roof).

The earthing rod, connected to the generator's earth terminal is located at the bottom of the frame on the outside.

2.3.7 Data plate and serial number

The generator is furnished with a data plate showing the product code, the unit number and the power output.

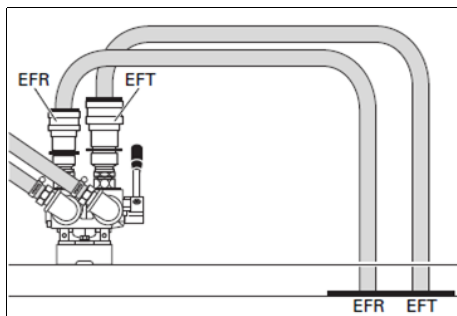
2.3.8 Drain plugs and filler caps

The drain holes for the engine oil, the coolant and the plug for the fuel, are located and labelled on the frame. The fuel drain plugs are located; one at the bottom of the frame and the other at the cubicle side of the frame.

The drain flexible for engine oil can be brought to the outside of the generator through the drain hole.



The drain hole can also be used to guide external fuel tank connections. When connecting an external fuel tank, use the 3-way valves. Refer to Cold weather.



EFT | External fuel tank feed connection
EFR | External fuel tank return connection

The filler cap for the engine coolant is accessible via an opening in the roof. The fuel filler cap is located in the side panel.

2.3.9 Spillage free skid

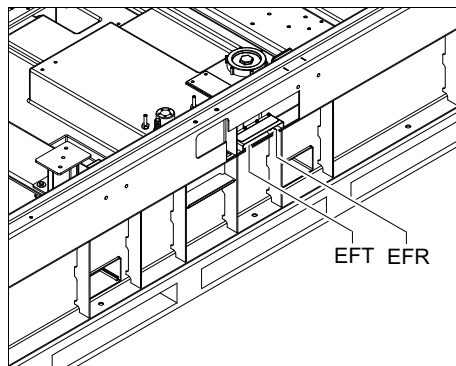
A Spillage free skid with forklift slots allows the customer to transport the generator easily with a forklift. It avoids accidental spilling of engine fluids and thus helps to protect the environment.

The leaking fluid can be removed via drain holes, secured by drain plugs. Tighten the plugs firmly and check for leakages. When removing the leaking fluid, observe all relevant local legislation.

2.3.10 External fuel tank connection (with/without quick couplings)

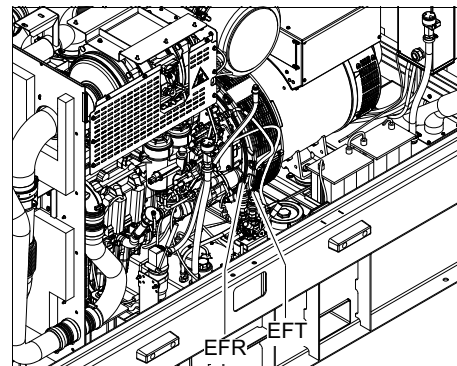
The option external fuel tank connection allows to bypass the internal fuel tank and to connect an external fuel tank to the unit.

View outside



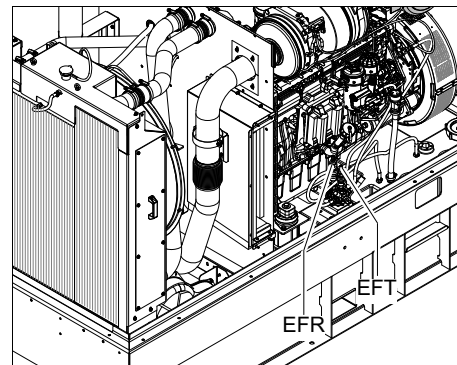
EFT | External fuel tank feed connection
EFR | External fuel tank return connection

View inside - QAS+ 250



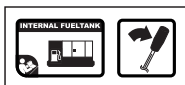
EFT | External fuel tank feed connection
EFR | External fuel tank return connection

View inside - QAS+ 450



EFT | External fuel tank feed connection
EFR | External fuel tank return connection

When using this option, make sure to connect the fuel supply line as well as the fuel return line. Connections to fuel lines ought to be air-tight to prevent air from entering the fuel system. Turn the handle of 3-way valve to desired condition.



Position 1: Indicates that the fuel supply line to the engine is connected to the internal fuel tank.



Position 2: Indicates that the fuel supply line to the engine is connected to the external fuel tank.

2.3.11 Manual oil drain pump

The manual oil drain pump facilitates oil changes.

2.3.12 Engine-after treatment

The exhaust gas after-treatment system is activated immediately after the engine is started and remains activated during engine operation. It ensures that the pollutant emissions in the exhaust gas are reduced to the limits stipulated in the emissions standard.

Exhaust gas treatment is carried out by:

- The diesel oxidation catalytic converter (DOC).
- The diesel particulate filter (DPF)
- Selective catalytic reduction (SCR) with ammonia slip catalytic converter.

In order to ensure correct operation of the exhaust gas after-treatment system, only operate the engine/generator with the AdBlue® reducing agent. AdBlue® is not refilled as part of the maintenance work. You should therefore top up the AdBlue® tank regularly yourself.

The engine system is equipped with an electronic engine management system which comprises the following control units:

- Exhaust gas after-treatment control unit (ACM).

The control units are connected in an electronic network. Data is exchanged via CAN (controller area network).

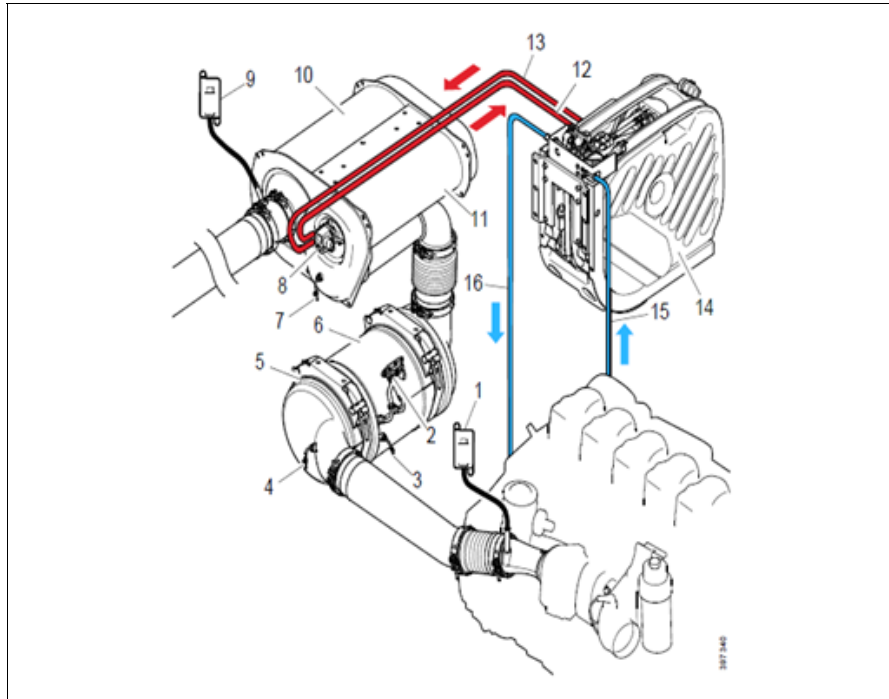
2.3.12.1 Diesel particulate filter

Diesel particulate filter (DPF) is a device designed to remove diesel particulate matter or soot from the exhaust gas of a diesel engine.

The DPF filters about 99% volume of the particulate matters, carbon monoxide (CO), and hydrocarbons (HC). During regenerating, particulate matters are converted in carbon dioxide (CO₂) and ash.

2.3.12.2 Engine after-treatment flow diagram

The illustration provides an overview of exhaust gas after-treatment management system components.



- 1 NOx sensor with control unit
- 2 Differential pressure sensor
- 3 Exhaust gas temperature sensor
- 4 Exhaust gas temperature sensor
- 5 Oxidation catalytic converter (DOC)
- 6 Particulate filter (DPF)
- 7 Exhaust gas temperature sensor
- 8 Reductant doser
- 9 NOx sensor with control unit
- 10 SCR catalytic converter
- 11 Evaporator
- 12 Reductant return line
- 13 Pressure line for reductant
- 14 Reductant tank
- 15 Coolant hose for tank and pump heating
- 16 Coolant hose, return from tank and pump heating

2.4 Electrical features

The electrical features described in this chapter are standard provided on this generator. For all other electrical features, see “Overview of the electrical options” on page 103.

2.4.1 Earth stick

The earth stick with cable connected is delivered to allow the generator to earth properly.

2.4.2 Battery switch

A battery switch allows to disconnect the positive pole of the battery.

2.4.3 Spillage liquid sensor

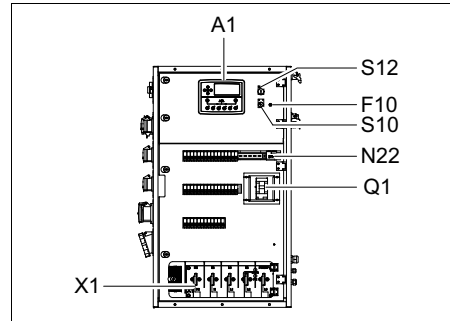
Whenever the sensor detects a spillage of fluid into the frame, the unit is shut-down.

2.4.4 Control and indicator panels

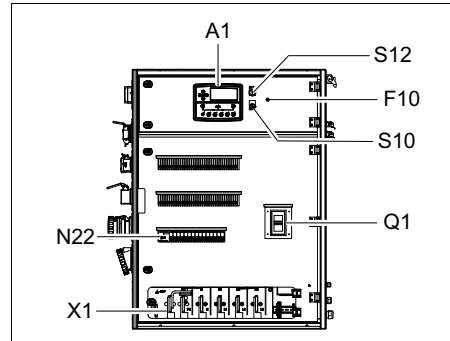
To operate the generator, the QAS+ control panel contains a Qc1212™ basic controller or a Qc4004™ controller. This controller is located inside the control cubicle, and communicates via a display located at the front. The controller will carry out all necessary tasks to control and protect the generator, which allows operation in many different applications.

2.4.4.1 Control panel with Qc1212™ controller

QAS+ 250



QAS+ 450



A1 Qc1212™ Controller

S10 On/Off switch

Put the starter switch in position I (ON). The control cubicle receives voltage. Put the switch in position O (OFF) to unpower the control cubicle.

N22 Earth leak detector

Detects and indicates an earth fault current and activates the main circuit breaker Q1. The detection level can be set at 0.03 A fixed with instantaneous trip but can also be adjusted between 0.1 A and 1 A with time delayed (0 - 0.5 sec) trip. N22 has to be reset manually after eliminating the problem (reset button marked R). It can be overridden by means of the earth leakage relay switch (S22, labelled IΔN) but has to be tested monthly (by pushing test button T).

Q1 Main circuit breaker

Interrupts the power supply to X1 when a short-circuit occurs at the load side, or when the earth leak detector (30 mA) or the overcurrent protection is activated or when the shunt trip is energized. It must be reset manually after eliminating the problem.

F10 Fuse

The fuse (10 A) trips when the current from the battery to the engine control circuit exceeds its setting. The fuse can be reset by pushing the button.

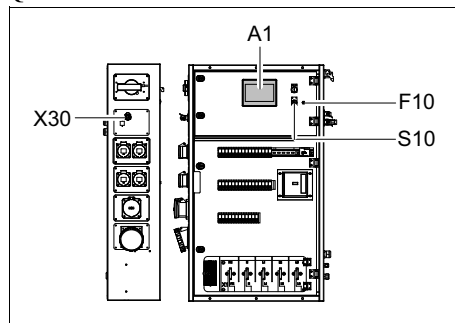
S12Frequency selector switch (50 Hz/
60 Hz)

X1 Terminal board

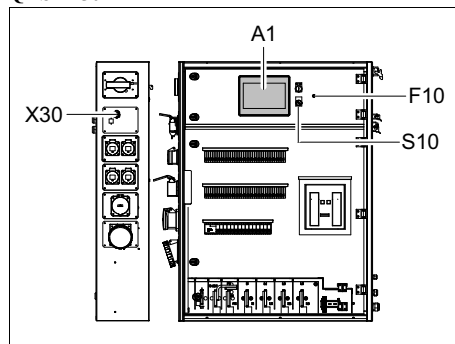
2.4.4.2 Control panel with Qc4004™ controller

General description Qc4004™ control panel

QAS+ 250



QAS+ 450



A1Display Qd0701

To operate the generator, the QAS+ control panel contains a Qc4004™ controller. This controller is located inside the control cubicle, and communicates via a display Qd0701 located at the front. The controller will carry out all necessary tasks to control and protect the generator, which allows operation in many different applications.

F10Fuse

The fuse (10 A) trips when the current from the battery to the engine control circuit exceeds its setting. The fuse can be reset by pushing the button.

S10ON/OFF switch

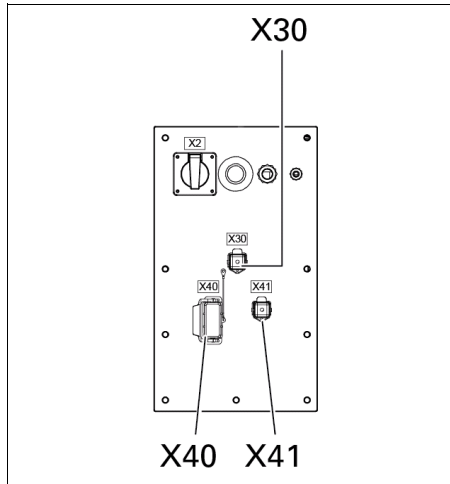
Position O: No voltage is supplied to the Qc4004™ module, the generator will not start.

Position I: Voltage is supplied to the Qc4004™ module, it is possible to start up the generator.

X30Connector - Power management system

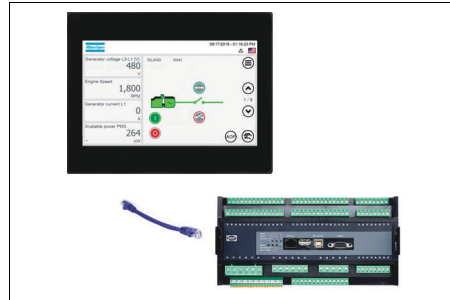
Connector for communication with other generators with Qc4004™ when paralleling, both in ALS and PMS mode. An adapter can be plugged in. The X30 connector is installed in slot 1, instead of sockets. It is a small square connector. It only occurs when the Qc4004™ controller.

With Transformer maintenance option, the panel looks like this:



- X40 | Connector - TM controls
- X41 | Connector - TM sensing

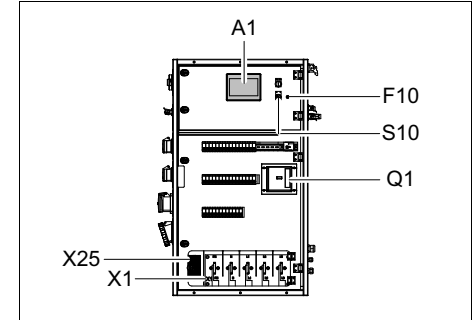
Qc4004™ module



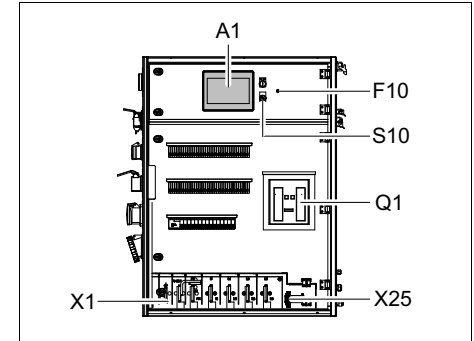
2.4.5 Output terminal board

The cubicle provides a terminal board for easier connection of cables. It is situated below the control and indicator panel.

QAS+ 250



QAS+ 450



A1 Display

F10 Fuse

S10 ON/OFF switch

X25 Terminal

X1 Terminal board (400 V AC)

Terminals L1, L2, L3, N (= neutral) and PE (= earthing), hidden behind the control panel door and behind a small transparent door.

Q1 Main circuit breaker

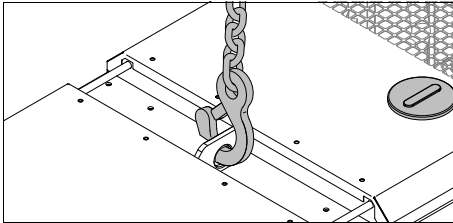
Interrupts the power supply to X1 when a short-circuit occurs at the load side, when the earth leak detector (30 mA) or the overcurrent protection is activated, or when the shunt trip is energized. It must be reset manually after eliminating the problem.

3 Installation and connection

3.1 Lifting

The lifting eye, to lift the generator by means of a hoist, is integrated in the bodywork and easily accessible from the outside. The recesses in the roof have guiding rods at both sides.

When lifting the generator, the hoist has to be placed in such a way that the generator, which must be placed level, will be lifted vertically.



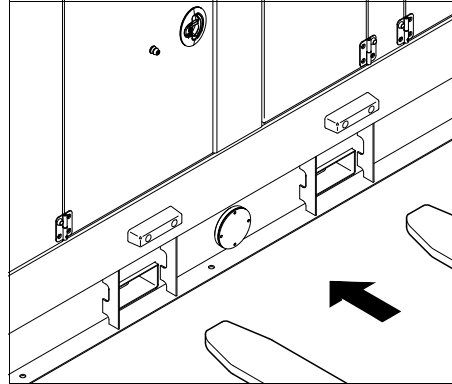
Never use the guiding rods to lift the generator.



Lifting acceleration and deceleration must be kept within safe limits (max. 2 g).

Helicopter lifting is not allowed.

To be able to lift the generator by means of a forklift, rectangular slots are provided at the bottom of the frame.



3.2 Installation

3.2.1 Indoor installation

If the generator is operated indoors, install an exhaust pipe of sufficient diameter to duct the engine exhaust towards the outside. Check for sufficient ventilation so that the cooling air is not recirculated.



For more information about indoor installation, consult your local Atlas Copco dealer.

3.2.2 Outdoor installation

- Place the generator on a horizontal, even and solid floor. The generator can operate in a slant position not exceeding 15% (in both senses: front/rear and left/right).
- The generator should be kept with the doors closed, in order to avoid the ingress of water and dust. Dust ingress reduces the lifetime of filters and may reduce your generator's performance.
- Check that the engine exhaust is not directed towards people.
- Locate the rear end of the generator upwind, away from contaminated wind streams and walls. Avoid recirculation of exhaust air from the engine. This causes overheating and engine power decrease.

- Leave enough space for operation, inspection and maintenance (at least 1,5 meter at each side, check dimension drawing at the end of this manual for a more detailed information).
- Check that the inner earthing system is in compliance with the local legislation.
- Use coolant for the engine cooling system. Refer to the Engine instruction book for the proper coolant mixture.
- Check the tightness of the bolts and nuts.
- Check that the cable end of the earthing rod is connected to the earth terminal.



The generator is wired for a TN-system to IEC 364-3, i.e. one point in the power source directly earthed - in this case the neutral. The exposed conductive parts of the electric installation must be directly connected to the functional earth.

If operating the generator in another power system, e.g. an IT-system, other protective devices required for these types must be installed. In any case only a qualified electrician is authorized to remove the connection between the neutral (N) and earth terminals in the terminal box of the alternator.

3.3 Connecting the generator

3.3.1 Precautions for non-linear and sensitive loads



Non-linear loads draw currents with high contents in harmonics, causing distortion in the wave form of the voltage generated by the alternator.

The most common non-linear, 3-phase loads are thyristor/rectifier-controlled loads, such as convertors supplying voltage to variable speed motors, uninterruptable power supplies and Telecom supplies. Gas-discharge lighting arranged in single-phase circuits generate high 3rd harmonics and risk for excessive neutral current.

Loads most sensitive to voltage distortion include incandescent lamps, discharge lamps, computers, X-ray equipment, audio amplifiers and elevators.

Consult Atlas Copco for measures against the adverse influence of non-linear loads.

3.3.2 Quality, minimum section and maximum length of cables

The cable connected to the terminal board of the generator must be selected in accordance with local legislation. The type of cable, its rated voltage and current carrying capacity are determined by installation conditions, stress and ambient temperature. For flexible wiring, rubber-sheathed, flexible core conductors of the type H07 RN-F (Cenelec HD.22) or better must be used.

The following table indicates the maximum allowable 3-phase currents (in A), at an ambient temperature of 40°C, for cable types (multiple and single core PVC insulated conductors and H07 RN-F multiple core conductors) and wire sections as listed, in accordance with VDE 0298 installation method C3. Local regulations remain applicable if they are stricter than those proposed below.

Wire section (mm ²)	Max. current (A)		
	Multiple core	Single core	H07 RN-F
2.5	22	25	21
4	30	33	28
6	38	42	36
10	53	57	50
16	71	76	67
25	94	101	88
35	114	123	110
50	138	155	138
70	176	191	170
95	212	228	205

The lowest acceptable wire section and the corresponding maximum cable or conductor length for multiple core cable or H07 RN-F, at rated current (20 A), for a voltage drop e lower than 5% and at a power factor of 0.80, are respectively 2.5 mm² and 144 m. In case electric motors must be started, oversizing the cable is advisable.

The voltage drop across a cable can be determined as follows:

$$e = \frac{\sqrt{3} \cdot I \cdot L \cdot (R \cdot \cos \varphi + X \cdot \sin \varphi)}{1000}$$

e = Voltage drop (V)

I = Rated current (A)

L = Length of conductors (m)

R = Resistance (Ω /km to VDE 0102)

X = Reactance (Ω /km to VDE 0102)

3.3.3 Connecting the load

3.3.3.1 Site distribution panel

If outlet sockets are provided, they must be mounted on a site distribution panel supplied from the terminal board of the generator and in compliance with local regulations for power installations on building sites.

3.3.3.2 Protection



For safety reasons, it is necessary to provide an isolating switch or circuit breaker in each load circuit. Local legislation may impose the use of isolating devices which can be locked.

- Check whether frequency, voltage and current comply with the ratings of the generator.
- Provide a load cable, without excessive length, and lay it out in a safe way without forming coils.
- Open the door of the control and indicator panel and the transparent door in front of the terminal board X1.
- Provide the wire ends with cable lugs suited for the cable terminals.
- Loosen the cable clamp and push the wire ends of the load cable through the orifice and clamp.
- Connect the wires to the proper terminals (L1, L2, L3, N and PE) of X1 and tighten the bolts securely.
- Tighten the cable clamp.
- Close the transparent door in front of X1.

4 Operating instructions



In your own interest, always strictly observe all relevant safety instructions.

Do not operate the generator in excess of the limitations mentioned in the Technical Specifications.

Local rules concerning the setting up of low voltage power installations (below 1000 V) must be respected when connecting site distribution panels, switch gear or loads to the generator.

At each start-up and at any time a new load is connected, the earthing and protections (GB trip and earth leakage relay) of the generator must be verified. Earthing must be done either by the earthing rod or, if available, by an existing, suitable earthing installation. The protective system against excessive contact voltage is not effective unless a suitable earthing is made.

4.1 Before starting

- With the generator standing level, check the engine oil level and top up if necessary. The oil level must be near to, but not exceed the high mark on the engine oil level dipstick.
- Check the coolant level in the expansion tank of the engine cooling system. The coolant level must be near to the FULL mark. Add coolant if necessary.
- Drain any water and sediment from the fuel pre-filter. Check the fuel level and top up if necessary. It is recommended to fill the tank after the day's operation to prevent water vapor in a nearly empty tank from condensing.
- Drain leaking fluid from the frame.
- Check the vacuum indicator of the air filter. If the red part shows completely, replace the filter element.
- Press the dust evacuator of the air filter to remove dust.
- Check the generator for leakage, tightness of wire terminals, etc. Correct if necessary.
- Check that circuit breaker Q1 is switched off.
- Check that fuse F10 has not tripped and that the emergency stop is in the OUT position.
- Check that the load is switched off.
- Check that the earth fault protection (N13) has not tripped (reset if necessary).

4.2 Operating and setting Qc1212™

4.2.1 Starting

To start up the unit locally, proceed as follows:

- Switch on the battery switch.
- Switch off circuit breaker Q1. This is not necessary when a plant contactor is installed between Q1 and the load.
- Put the starter switch S10 in position 1 (ON).
- Push the “manual” button of the Qc1212.
- Push the “start” button of the Qc1212.
- The unit starts a preheating cycle which takes 15 seconds.
- The unit will start.
In cold conditions the unit might not start from the first attempt. The controller will take 3 start attempts.
- Switch on circuit breaker Q1 in case no contactor is installed.

To start up the unit from a remote location, proceed as follows:

- Put the starter switch S10 in position 1.
- Switch on circuit breaker Q1.
- Close the remote contact “start/stop”. The unit starts a preheating cycle which takes 15 seconds.
- The unit will start.
In cold conditions the unit might not start from the first attempt. The controller will take 3 start attempts.
- An external contactor can be connected and controlled by the Qc1212™ in order to control the output power.

4.2.2 During operation

Regularly carry out following checks:

- Check the controller display for normal readings.



Avoid to let the engine run out of fuel. If it happened, priming will speed up the starting.

- Check for leakage of oil, fuel or coolant.
- Check, by means of the generator gauges, that the voltage between the phases is identical and that the rated current is not exceeded.
- When single-phase loads are connected to the generator output terminals, keep all loads well-balanced.
- If circuit breakers have tripped during operation, switch off the load and stop the generator. Check and, if necessary, decrease the load.



The generator’s doors may only remain opened for short periods during operation, to carry out checks for example.



Avoid long low-load periods (<30%). In this case, an output power drop and higher oil consumption of the engine could occur. Worst case, the DPF system can become blocked. Refer to ‘Preventing low loads’.



Avoid to let the unit run out of DEF (AdBlue®).

4.2.3 Stopping



Do not switch off the battery when the switch light is ON. It can cause severe damage to the emissions system.

To stop the unit locally, proceed as follows:

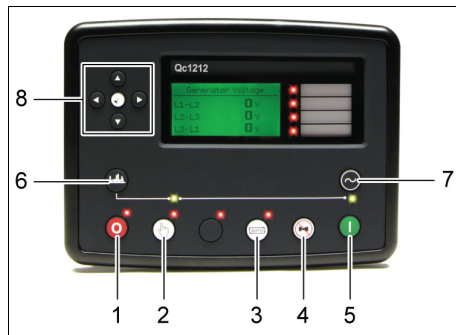
- Switch off the load.
- Switch off circuit breaker Q1.
- Stop the engine by pushing the stop button O from the Qc1212. The engine will still run during 4 minutes in order to cool down.
- Wait until the engine is totally stopped.
- Disconnect the tension from the cubicle by putting the switch S10 in position O.
- Disconnect the main battery switch if the genset will not be used the next day. Lock all doors to avoid unauthorized access.



4.2.4 Qc1212 control module description








The Qc1212 control module is integrated in the control panel. The Qc1212 will carry out all necessary tasks to control and protect the generator set, regardless of its use.

This means that the Qc1212 control module can be used for several applications.

4.2.4.1 Qc1212 buttons



- 1  **STOP/RESET:** Allows to put the control module in **Stop/Reset** mode.
- 2  **MANUAL:** Allows to put the control module in **Manual** mode.

- 3  **AUTO:** Allows to put the control module in **Automatic** mode.
- 4  **MUTE/LAMP TEST:** Allows to silence the audible alarm if it is sounding and illuminate all LED indicators as a lamp test feature.
- 5  **START:** Allows to start the generator set. This button is only active in **Stop/Reset** or **Manual** mode.
- 6  **OPEN GENERATOR:** Allows to open the generator load switch (when in **Manual** mode only).
- 7  **TRANSFER TO GENERATOR:** Allows to transfer the load to the generator set (when in **Manual** mode only).
- 8  **MENU NAVIGATION:** Allows to navigate the instrumentation, event log and configuration screens.
-  **UP:** Allows to scroll to the next item above. Increases the value of the selected set point in the editor menu.



DOWN: Allows to scroll to the next item below. Decreases the value of the selected set point in the editor menu.



PREVIOUS PAGE: Allows to navigate to the previous page/digit.



NEXT PAGE: Allows to navigate to the next page/digit.



ACCEPT: Allows to accept modifications made, enable set parameters.

4.2.4.2 Qc1212 LEDs



- | | | |
|---|-------------------------------------|--|
| 1 | Close Generator | LED indicates that the generator set is required to be on load. |
| 2 | Generator available | LED indicates that the generator set is within limits and able to take load. |
| 3 | User Configurable Indicators | <ul style="list-style-type: none"> – REMOTE START – OVERCURRENT – COMMON ALARMS – COMMON SHUTDOWNS |

4.2.4.3 Qc1212 menu overview

Status page

This is the 'home' page, the page that is displayed when no other page has been selected, and the page that is automatically displayed after a period of inactivity of the module control buttons.

Status page - engine running:

Safety On Delay	00:00
L-N	277 V 43 A
L-L	480 V 60.0Hz
	28.5kW 0.80 pf

Status page - engine stopped:

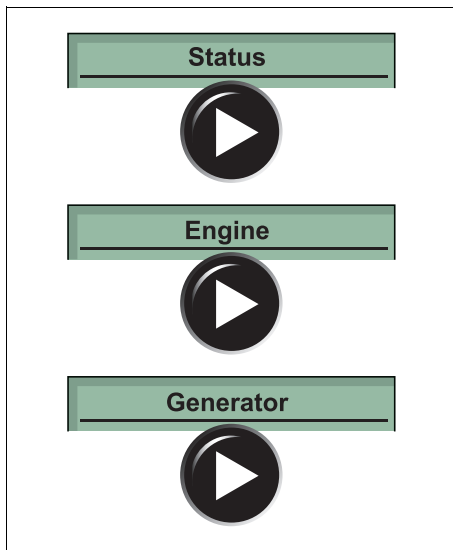
Status	22:31
Generator at Rest	
Stop Mode	

If an alarm becomes active while viewing the Status page, the display shows the Alarms page to draw the operator's attention to the alarm condition.

Instrument pages

It is possible to scroll to display the different pages of information by repeatedly operating the NEXT / PREVIOUS PAGE pushbuttons.

Example:



Further pressing of the NEXT PAGE pushbutton, returns the display to the Status page.

Once selected, the instrument page will remain on the LCD display until the user selects a different page, or after an extended period of inactivity (LCD Page Timer), the module will revert to the Status display.

If no buttons are pressed upon entering an instrumentation page, the instruments will be displayed automatically.

Alternatively, to scroll manually through all instruments on the currently selected page, press the UP/DOWN buttons. The 'autoscroll' is disabled. To re-enable 'autoscroll' press the UP/DOWN buttons to scroll to the 'title' of the instrumentation page. After a short period the instrumentation page will begin to autoscroll again.

Engine page

Contains instrumentation gathered about the engine itself, some of which may be obtained using the CAN or other electronic engine link.

- Engine Speed (RPM)
- Engine Oil Pressure (bar/psi/kpa)
- Engine Coolant Temp. (°C/°F)
- Engine Battery Voltage (V)
- Engine Run Time
- Engine Fuel Level (%)
- Engine Oil Temperature* (°C/°F)
- Engine Coolant Pressure* (bar/psi/kpa)
- Engine Inlet Temp. (°C/°F)
- Engine Exhaust Temperature* (°C/°F)
- Engine Fuel Temperature (°C/°F)
- Engine Turbo Pressure (bar/psi/kpa)
- Engine Fuel Pressure* (bar/psi/kpa)
- Engine Fuel Consumption*
- After-treatment Exhaust Inlet (°C/°F)
- After-treatment Exhaust Outlet (°C/°F)
- Engine Percent Torque (%)
- Engine Demand Torque (%)
- Engine Percent Load (%)
- Engine Coolant Level (%)
- Atmospheric Pressure (bar/psi/kpa)
- Air Inlet Pressure (bar/psi/kpa)
- Electrical Potential (V)
- ECM Operation (Mode)
- DPF Regeneration
- DPF Regeneration Lamps
- DEF Tank Level (%)
- DEF Tank Temperature (°C/°F)
- DEF Level Status
- Auxiliary Sensors (If fitted and configured)
- Engine Maintenance Due (If configured)
- Engine ECU Link*
- After-treatment Status
- SCR-DEF Lamps
- Engine Links
- ECU Lamps
- Can Bus Information*

* When connected to suitably configured and compatible engine ECU.

Depending on configuration and instrument function, some of the instrumentation items may include a tick icon beside them.

Generator page

Contains electrical values of the generator (alternator), measured or derived from the module's voltage and current inputs.

- Generator Voltage (ph-N)
- Generator Voltage (ph-ph)
- Generator Frequency
- Generator Current
- Generator Earth Current
- Generator Load (kW)
- Generator Load (kVA)
- Generator Power Factor
- Generator Load (kVA_r)
- Generator Load (kWh, kVAh, kVA_rh)
- Generator Phase Sequence

Serial port page

This section is included to give information about the currently selected serial port and external modem (if connected).

About page

Contains important information about the module and the firmware versions.

- Module Type
- Application Version
- USB ID
- Firmware Update Bootloader software version
- Engine type or ECU file which is configured within the module.
- Engine type file version.

CAN error messages

When connected to a suitable CAN engine the controller displays alarm status messages from the ECU.

- Type of alarm as reported by the ECU
- Type of alarm that is triggered in the Qc module (i.e. Warning or Shutdown)

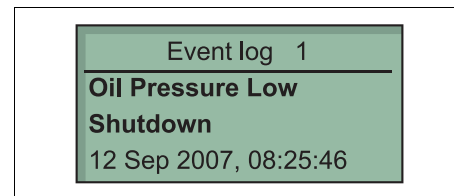
Event log

The Qc1212 module maintains a log of past alarms and/or selected status changes. The log is capable of storing the last 250 log entries.

Once the log is full, any subsequent shutdown alarms will overwrite the oldest entry in the log. Hence, the log will always contain the most recent shutdown alarms.

The module logs the alarm, along with the date and time of the event (or engine running hours if configured to do so).

To view the event log, repeatedly press the NEXT PAGE button until the LCD screen displays the Event log.



Press DOWN to view the next most recent shutdown alarm. Continuing to press DOWN cycles through the past alarms after which the display shows the most recent alarm and the cycle begins again.

To exit the event log and return to viewing the instruments, press the NEXT PAGE button to select the next instrumentation page.

4.2.4.4 Scheduler

The Qc1212 contains a scheduler, capable of automatically starting and stopping the set.

Up to 16 scheduled start/stop sequences can be configured to repeat on a 7 day or 28 day cycle.

Scheduled runs may be on load or off load depending upon module configuration.

STOP Mode

- Scheduled runs will not occur when the module is in STOP/RESET mode.

MANUAL Mode

- Scheduled runs will not occur when the module is in MANUAL mode.
- Activation of a Scheduled Run 'On Load' when the module is operating OFF LOAD in Manual mode will have no effect, the set continues to run OFF LOAD.

AUTO Mode

- Scheduled runs will operate ONLY if the module is in AUTO mode with no Shutdown or Electrical Trip alarm present.
- If the module is in STOP or MANUAL mode when a scheduled run begins, the engine will not be started. However, if the module is moved into AUTO mode during a scheduled run, the engine will be called to start.
- Depending upon configuration by the system designer, an external input can be used to inhibit a scheduled run.
- If the engine is running OFF LOAD in AUTO mode and a scheduled run configured to 'On Load' begins, the set is placed ON LOAD for the duration of the Schedule.

4.3 Operating and setting Qc4004™ - Qd0701



Before setting the controller make sure that the Qc4004™ is NOT in AUTO mode. This will prevent the unit to start up automatically without prior notice. Also, in AUTO mode some parameters are unavailable.

4.3.1 Starting

- Turn the battery switch to ON.
- Turn the S10 switch to the ON position to activate the Qc4004™ controller.
- Select the correct application type and the correct mode on the Qc4004™ module (see “Overview of applications” on page 56 for the possible selections).
- Make the correct wiring and program the applicable parameters (see “Standard applications” on page 45 for more details).
- When in SEMI-AUTO mode:
 - Use the START button to start-up the generator.
 - Allow the generator to start-up till voltage and frequency are OK (LED U/F OK lights up).
 - Press the GB open/close button to close the generator breaker.
- When in AUTO mode:
 - The generator will start-up automatically and close the contactors depending on the selected application.

4.3.2 During operation

Regularly carry out following checks:

- Check the display for normal readings.



Avoid letting the engine run out of fuel. If this happens, priming will speed up the starting.

- Check for leakage of oil, fuel or cooling water.



Avoid long low-load periods (<30%). In this case, an output power drop and higher oil consumption of the engine could occur. Worst case, the DPF system can become blocked. Refer to ‘Preventing low loads’.

- When single-phase loads are connected to the generator output terminals, keep all loads well-balanced.
- If circuit breakers have tripped during operation, switch off the load and stop the generator. Check and, if necessary, decrease the load.



Never turn the battery switch to OFF during operation.



The generator’s doors may only remain opened for short periods during operation, to carry out checks for example.



Avoid to let the unit run out of DEF (AdBlue®).

4.3.3 Stopping



Do not switch off the battery when the switch light is ON. It can cause severe damage to the emissions system.

- When in SEMI-AUTO mode:
 - Press the GB open/close button to open the generator breaker.
 - Press the STOP button **once** to stop the generator. The unit will go into cooldown and stop after the cooldown period.
 - Press the STOP button **twice** to stop the generator immediately, without going into cooldown.



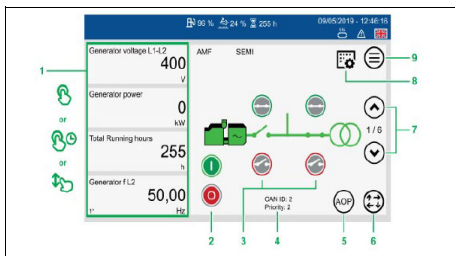
Not allowing the unit to cooldown properly can lead to severe damage to the engine!






- When in AUTO mode:
 - The generator shuts down automatically depending on the selected application.
 - If you want to stop the generator manually, go first to SEMI-AUTO mode and follow the procedure for stopping in SEMI-AUTO mode.


4.3.4 Setting Qc4004™ + Qd0701


4.3.4.1 Interface


Following buttons are used on the Qd0701





- 1  **Press:** Changes the instrument shown.
- 1  **Scroll:** Scrolls up or down the instrument pages.
- 1  **Hold:** Configures the instrument properties. (Hold for 3 seconds.)
- 2  **START:** Starts generator.
- 2  **STOP:** Stops generator.


3  **Close GB:** Closes breaker.


3  **Open GB:** Opens breaker.


4  **CAN ID / Priority** Shows the CAN ID and the priority number in power management applications. This is not shown in single genset operation.

5  **AOP*:** Opens Additional Operator Panel (Shortcut*).

6  **Manual mode:** Changes the operating mode to MANUAL.


6  **Semi auto mode:** Changes the operating mode to SEMI-AUTO.

6  **Auto mode:** Changes the operating mode to AUTO.

6  **Test mode:** Changes the operating mode to TEST.

7  **Scroll up.**

7  **Scroll down.**

8  **Controller settings:** Opens Controller settings (Shortcut*).

9  **Menu:** Opens the menu page.

4.3.4.2 Qc4004™ + Qd0701 menu overview

Main view

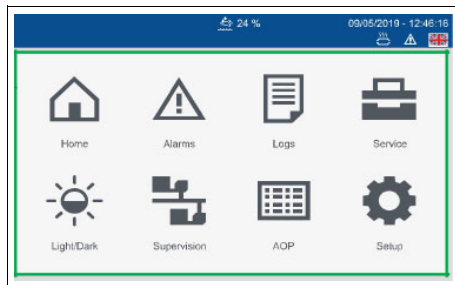
The display mainly shows information about the power unit.

Control buttons for the power unit are embedded in the screen.

At the top of the screen, some general information such as time and display language can be found.

Config menu

The config menu can be accessed by tapping the menu button (☰).



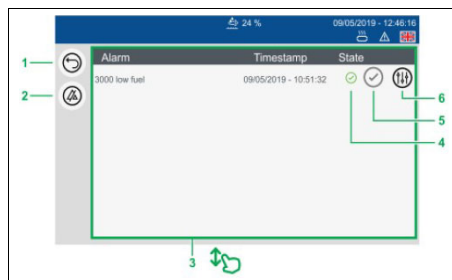
Home

Tap Home to return to Main view.

Alarms

Alarms of any units will pop up at the home page, and in every page of Config menu even in screensaver mode.

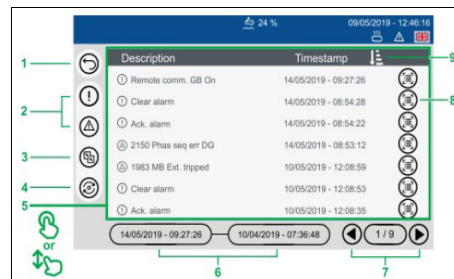
Tap Alarms to view or acknowledge the active alarms.



- 1 Back
- 2 Acknowledge all alarms
- 3 Alarms list
- 4 Alarm state
- 5 Acknowledge
- 6 Alarm settings

Logs

Tap Logs to view the historic events and alarms. You can also filter, merge, or view further details on the events.



- 1 Return
- 2 Filter
- 3 Merge list
- 4 Refresh
- 5 Log list
- 6 Page range
- 7 Scroll page
- 8 Event details
- 9 Sort page

Service

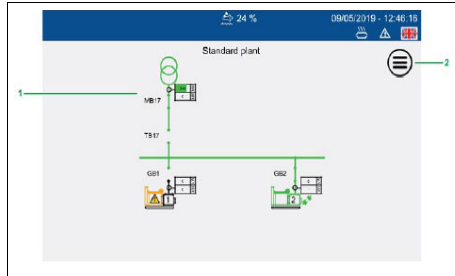
Tap Service to enter the service menu.

Light/Dark

Tap Light/Dark to switch between the two display modes.

Supervision

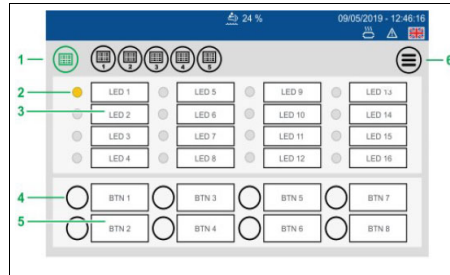
Views the state of the system in real-time. The system shown depends upon your plant configuration.



- 1 Live system overview
- 2 Menu

Additional operator panel (AOP)

Additional operator panels (AOPs) provide you with LED indication and button actions. You can configure LED or button labels directly on the display, but the functionality behind them must be configured in your M-logic project on the Parus software.*



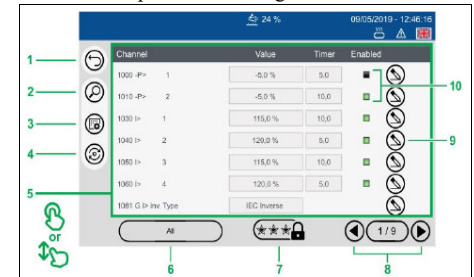
- 1 Panel selection
- 2 LED status
- 3 LED name**
- 4 Button
- 5 Button name**
- 6 Menu

* The logic condition(s) must be configured in your M-logic project for the LED status and buttons to work.

** LED names and buttons are saved locally.

Setup

In the Setup menu, the controller settings can be found. This page allows the user to view or configure the controller parameter settings.

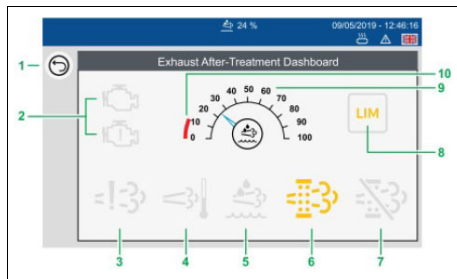


- 1 Return
- 2 Search
- 3 Filter groups
- 4 Refresh
- 5 Controller settings list
- 6 Clear filter group
- 7 Filter by password level*
- 8 Scroll page
- 9 Edit
- 10 Enabled status

* For more information, see the Qd0701 manual.

4.3.4.3 Exhaust after-treatment dashboard

This screen shows information about the Exhaust after-treatment system.



- 1 Return
- 2 Engine interface status
- 3 Engine emission system failure
- 4 High temperature - Regeneration
- 5 Diesel exhaust fluid (DEF)
- 6 Diesel particulate filter (DPF)
- 7 Diesel particulate filter (DPF) inhibit
- 8 Limit lamp (not used)
- 9 Diesel exhaust fluid (DEF) % level
- 10 Minimum diesel exhaust fluid (DEF) % level

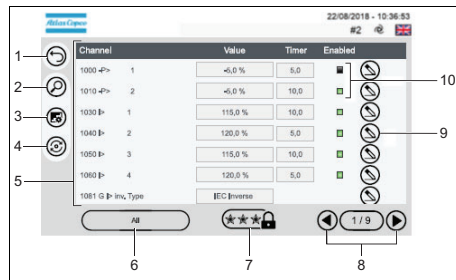
4.3.4.4 Changing settings



For more details we refer to the Qc4004™ User Manual.

View settings

Views or configures the controller parameter settings.



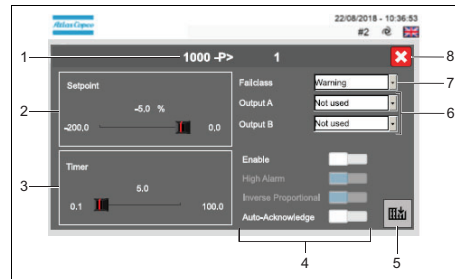
- 1 **Return** Returns to previous display.
- 2 **Search** Opens search keyboard.
- 3 **Filter groups** Opens groups of parameters.
- 4 **Refresh** Reloads the list.
- 5 **Controller settings list** Scrolls settings up or down on this page.
- 6 **Clear filter group** Clears the filter group (if used).
- 7 **Filter by password level** Filters the list by the minimum password level.
Displays prompt to enter a password level.

- 8 **Scroll page** Scrolls the page left or right.
- 9 **Edit** Edits the setting.
- 10 **Enabled status** Shows the status of the setting.
Not enabled/enabled (green).

Edit settings

Consult the Qc4004™ user manual for all customer level parameters. In order to receive the default parameters for your unit, please contact Atlas Copco Service staff.

The actual controller settings shown depend upon the type of setting that you are configuring.



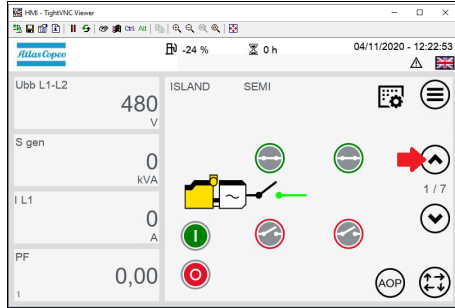
- 1 **Setting** Shows the name of the setting.
- 2 **Value** Shows the value of the setting.
Opens the Value keyboard to edit value.
- 3 **Value (scroll)** Scrolls left or right to increase or decrease the value.
- 4 **Settings** Toggles on or off additional settings (setting enabled/setting disabled/cannot be changed).

- | | | |
|---|------------------|--|
| 5 | Write | Writes the settings to the controller. |
| 6 | Output | Selects an output terminal. |
| 7 | Failclass | Selects a Failclass. |
| 8 | Cancel | Cancel the changes. |

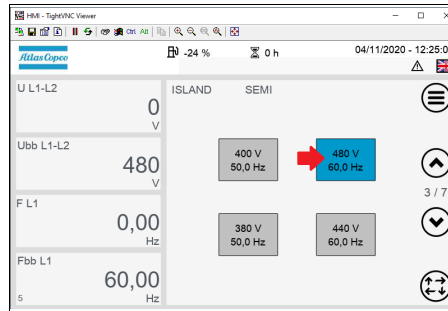
4.3.4.5 Dual frequency

In order to change the frequency please follow the below instruction.

- Please stop the genset if it is running.
- When the genset is fully stopped, please use the arrows in the right on the control panel display to go to page 3/7.



- Select the correct voltage and frequency, in this example 480/277 V at 60 Hz.



- Use the arrows in the right on the control panel display to come back to page 1/7, the genset is ready to work at 60 Hz.

4.3.4.6 Standard modes

The unit has four different running modes.

Auto mode

In this mode the Qc4004™ controls the gen-set and the circuit breakers (generator breaker GB and mains breaker MB) automatically according to the operational state.



When operating in AUTO mode the STOP and GB Open/Close button will not function.

Semi-Auto mode

In semi-auto mode the operator has to initiate all sequences. This can be done via the pushbutton functions, modbus commands or digital inputs. When started in semi-automatic mode, the generator will run at nominal values.

Test mode

Enables the user to test the generator on a regular basis. The generator will follow a predefined sequence of actions.

In this mode it is possible to perform the following tests:

- Simple test
- Load test
- Full test

Manual mode

When manual mode is selected, the generator frequency and voltage can be controlled with external inputs.



MAN mode cannot be selected, when AUTO mode is selected. To go from AUTO to MAN it is necessary to go to SEMI-AUTO to make MAN available.

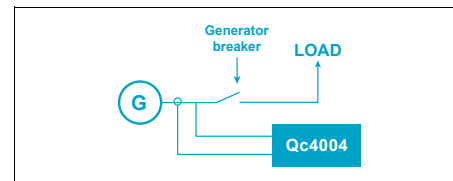
4.3.4.7 Standard applications

In the Qc4004™ module 10 application types can be selected. A combination of each application type with the running mode results in a specific application.

Gen-set mode	Running mode				
	Auto	Semi	Test	Man	Block
Automatic Mains Failure (no back sync.)	X	(X)	X	X	X
Automatic Mains Failure (with back sync.)	X	(X)	X	X	X
Island operation	X	X		X	X
Fixed power/base load	X	X	X	X	X
Peak shaving	X	X	X	X	X
Load take over	X	X	X	X	X
Mains power export	X	X	X	X	X
Transformer maintenance		X			
Multiple gen-sets, load sharing	X	X		X	X
Multiple gen-sets, power management	X	(X)	X	X	X

Depending on the application the user has to connect extra wirings to terminal blocks X25. These terminal blocks can be found inside the control box on a DIN-rail. We refer to the circuit diagram for the correct connections.

Island operation



This application is possible in combination with SEMI-AUTO mode or AUTO mode. The internal real time clock timer can only be used in AUTO

This operation type is selected for installations with one or more generators, but always without the Mains (= stand-alone). In practice up to 16 generators can be installed in parallel.

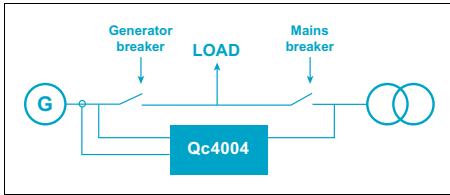
Installation wirings

- Terminals X25.10/X25.11 have to be linked. The module always needs a feedback signal from the Mains Breaker MB. In Island mode there is no MB in the system. In this case the MB opened signal is simulated with this link.
- The busbar sensing lines have to be wired to the corresponding control module inputs. Place bridge between:
 - X25.33 (L1) => X25.3
 - X25.34 (L2) => X25.4
 - X25.35 (L3) => X25.5
 - X25.36 (N) => X25.6

(The busbar = power cables between GB and load)

- For Remote Start operation:
 - wire the RS switch between X25.9 & X25.10.
- For Paralleling applications with other generators:
 - See “Paralleling” to set up generator for paralleling.

Automatic Mains Failure (AMF) operation



This application is only possible in combination with the AUTO mode. If the SEMI-AUTO mode is selected the AMF operation will NOT function!

The unit automatically starts the gen-set and switches to generator supply at a mains failure after an adjustable delay time.

- AMF no back synchronisation:

When the mains returns, the unit will switch back to mains supply and cool down and stop the gen-set. The switching back to mains supply is done without back synchronisation when the adjusted ‘Mains OK delay’ has expired.

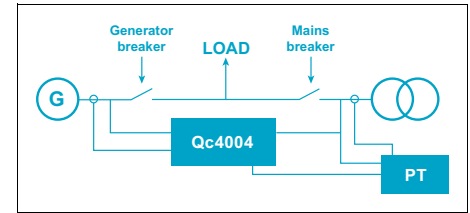
- AMF with back synchronisation:

When the mains returns, the unit will synchronise the mains breaker to the busbar when the ‘Mains OK delay’ has expired. Then the gen-set cools down and stops.

Installation wirings

- The link between X25.10/X25.11 has to be removed.
- Mains breaker feedback lines have to be wired to X25.10/X25.11/X25.12.
- Mains breaker control lines have to be wired to X25.13/X25.14/X25.15/X25.16. These terminals are voltage free contacts. The power for the MB has to be supplied by the customer (24 Vdc/ 230 Vac) (max. contact rating K11, K12 = 250 V/ 16 A).
- The Mains sensing lines L1/L2/L3/N have to be wired to terminals X25.3/X25.4/X25.5/X25.6.
- Make sure the connections between X25.33 & X25.3; X25.34 & X25.4; X25.35 & X25.5; X25.36 & X25.6 are removed.
- If back synchronisation is enabled, all settings for paralleling set up (see “Paralleling”) must be verified also.

Peak Shaving (PS) operation



This application is normally used in combination with the AUTO mode. Installation with the Mains.

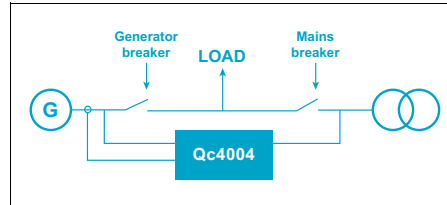
The generator will start up when the mains imported power (measured through an optional Power Transducer = PT) exceeds a defined level. The generator will synchronise with the bus, and will take load until the defined allowable mains imported power level is reached.

When the mains imported power decreases below the defined mains imported power level for a defined time, the generator will unload and disconnect from the bus. Then the generator will go into cool down.

Installation wirings

- The link between X25.10/X25.11 has to be removed.
- Mains breaker feedback lines have to be wired to X25.10/X25.11/X25.12.
- Mains breaker control lines have to be wired to X25.13/X25.14/X25.15/X25.16. These terminals are voltage free contacts. The power for the MB has to be supplied by the customer (24 Vdc/ 230 Vac) (max. contact rating K11, K12 = 250 V /16 A).
- The Mains sensing lines L1/L2/L3/N have to be wired to terminals X25.3/X25.4/X25.5/X25.6.
- Make sure the connections between X25.33 & X25.3; X25.34 & X25.4; X25.35 & X25.5; X25.36 & X25.6 are removed.
- Power Transducer lines have to be wired to X25.21 (input) and X25.22 (GND).
- Verify all settings for paralleling set up (see “Paralleling”).

Fixed Power (FP) operation



This application is possible in combination with SEMI-AUTO mode or AUTO mode. Normally it is used in combination with SEMI-AUTO mode in installations with the Mains. The internal real time clock timer can only be used in AUTO mode.

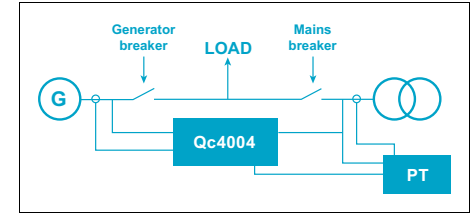
The generator will deliver a defined fixed power to the load or to the Mains.

Installation wirings

- The link between X25.10/X25.11 has to be removed.
- Mains breaker feedback lines have to be wired to X25.10/X25.11/X25.12.
- Mains breaker control lines have to be wired to X25.13/X25.14/X25.15/X25.16. These terminals are voltage free contacts. The power for the MB has to be supplied by the customer (24 Vdc/ 230 Vac) (max. contact rating K11, K12 = 250 V /16 A).
- The Mains sensing lines L1/L2/L3/N have to be wired to terminals X25.3/X25.4/X25.5/X25.6.

- Make sure the connections between X25.33 & X25.3; X25.34 & X25.4; X25.35 & X25.5; X25.36 & X25.6 are removed.
- Verify all settings for paralleling set up (see “Paralleling”).

Load Take Over (LTO) operation



This application is normally used in combination with SEMI-AUTO mode or AUTO mode in installations with the Mains.

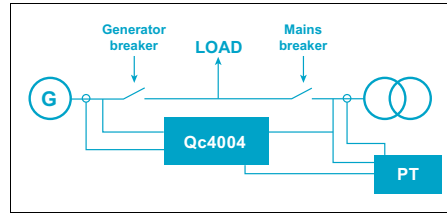
The purpose of the load take over mode is to transfer the load imported from the mains to the gen-set for operation on generator supply only.

The generator will start-up, synchronise and take over the load from the Mains gradually, before opening the Mains Breaker. To know if the load is completely taken over from the mains, an optional Power Transducer is necessary.

Installation wirings

- The link between X25.10 & X25.11 has to be removed.
- Mains breaker feedback lines have to be wired to X25.10/X25.11/X25.12.
- Mains breaker control lines have to be wired to X25.13/X25.14/X25.15/X25.16. These terminals are voltage free contacts. The power for the MB has to be supplied by the customer (24 Vdc/ 230 Vac) (max. contact rating K11, K12 = 250 V/ 16 A).
- The Mains sensing lines L1/L2/L3/N have to be wired to terminals X25.3/X25.4/X25.5/X25.6.
- Make sure the connections between X25.33 & X25.3; X25.34 & X25.4; X25.35 & X25.5; X25.36 & X25.6 are removed.
- Power Transducer lines have to be wired to X25.21 (input) and X25.22 (GND).
- Verify all settings for paralleling set up (see “Paralleling”).

Mains power export (MPE) operation



This application is possible in combination with SEMI-AUTO mode or AUTO mode. The internal real time clock timer can only be used in AUTO mode. Installation is with the Mains.

The mains power export mode can be used to maintain a constant level of power through the mains breaker. The power can be exported to the mains or imported from the mains, but always at a constant level.

Installation wirings

- The link between X25.10 & X25.11 has to be removed.
- Mains breaker feedback lines have to be wired to X25.10/X25.11/X25.12.
- Mains breaker control lines have to be wired to X25.13/X25.14/X25.15/X25.16. These terminals are voltage free contacts. The power for the MB has to be supplied by the customer (24 Vdc/ 230 Vac) (max. contact rating K11, K12 = 250 V/ 16 A).
- The Mains sensing lines L1/L2/L3/N have to be wired to terminals X25.3/X25.4/X25.5/X25.6.
- Make sure the connections between X25.33 & X25.3; X25.34 & X25.4; X25.35 & X25.5; X25.36 & X25.6 are removed.
- Power Transducer lines have to be wired to X25.21 (input) and X25.22 (GND).
- Verify all settings for paralleling set up (see “Paralleling”).

Multiple gen-sets with load sharing

In this application the units are enabled to share the active and reactive load equally in percentage of the nominal power. The load sharing is active when each gen-set is running in island mode and the generator breaker is closed.

Multiple gen-sets with power management (PMS)

PMS (= Power Management System) is a system that will automatically start and stop generators based on the actual load dependency. This is done through a PMS communication between the different units connected.

PMS applications are always in combination with AUTO mode. If the SEMI-AUTO mode is selected, the PMS operation will NOT function! The Qc4004™ controllers from the gensets need to be programmed as PMS in AUTO mode. When a Qc Mains controller is installed this needs to be programmed in the application that is required (AMF, LTO, FP, MPE) and AUTO mode.



By programming the parameters in AUTO mode, the generator can start up immediately. It is recommended to place the generator in SEMI-AUTO mode while programming all the PMS parameters!

Installations are possible with stand-alone generators or with the Mains (extra Qc4004™ Mains is then needed). A number of Qc4004™ units are being used in the power management application, i.e. one for each mains breaker (Qc4004™ mains controller), if installed, and one for each generator (Qc4004™ genset controller). All units communicate by means of an internal CANbus connection.

In an application with PMS it is important to program correctly the Start and Stop signals between the different generators because of the following reasons:

- The maximum load step needs to be programmed in the Qc4004™ controllers. This never may exceed the power reserve of the running generators. Otherwise the gensets will go in overload with a sudden max. load increase before the next generator is started up and connected to the busbar.
- To prevent the gensets to run in a start - stop loop.

The start signal is the value of the maximum required load step.

The stop signal is the value when the generator should be stopped automatically.

Example: Installation with 3 gensets

G1 = 300 kW; G2 = 200 kW; G3 = 200 kW.

- Start signal is set at 90 kW (maximum load step < 90 kW).

Start signal if:

Total Power needed > (total available power of running gensets -set point start signal).

- Only G1 is running; at 210 kW load (300 kW - 90 kW) => G2 will be started.
- G1 & G2 are running; at 410 kW load (200 kW + 300 kW - 90 kW) => G3 will be started.
- Stop signal is set at 100 kW and priority is set as (high) G1 > G2 > G3 (low).

Stop signal if:

Total Power needed < (Total available power of running gensets - Power of generator with lowest priority - set point stop signal).

- G1 & G2 & G3 are running; at 400 kW (700 kW - 200 kW - 100 kW) => G3 will be stopped.
- G1 & G2 are running; at 200 kW (500 kW - 200 kW - 100 kW) => G2 will be stopped.

The priority on starting and stopping the generators can be chosen on priority settings or on the amount of running hours. In manual mode the start and stop sequence is determined by the chosen priority between the generators. The generator with the lowest priority will start as the latest genset and will stop as first. If running hours are chosen as priority the start and stop sequence will be defined based on the actual running hours of the different generators. The lowest running hours will get the highest priority.

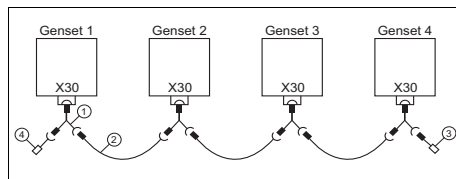


When paralleling generators with PMS, it is no longer necessary to use the analogue load sharing lines. This will be done through the PMS communication lines. Use a screened CAN communication cable with a maximum total distance of 200 meters. Do not connect the cable screen to the ground! Use a 120 Ohm resistor at both end controllers of the PMS.



For more information on this option, see User Manual Qc4004™ and dedicated PMS manual.

Installation wirings

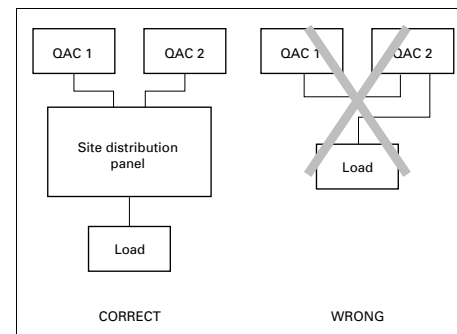


- 1 | Splitter (1626 6901 00)
- 2 | Cable (1626 6906 00)
- 3 | End resistor (male) (1626 6926 00)
- 4 | End resistor (female) (1626 6927 00)

4.3.4.8 Paralleling

Prior to starting parallel operation of two generators, connect the load with the generator.

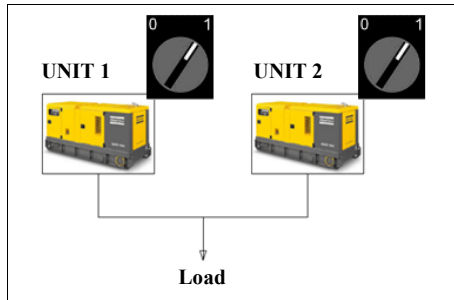
Go via the site distribution panel (to be installed by the customer) to connect the generator(s) with the load. Always connect generator with the load, and never directly with second generator.



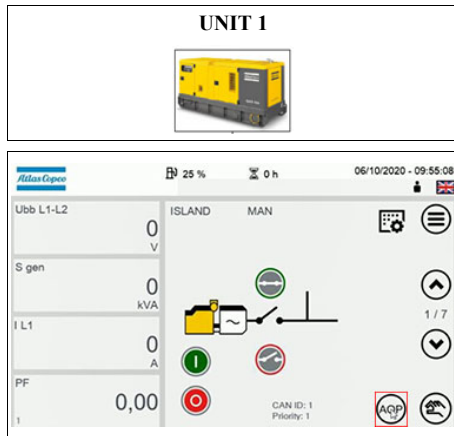
When paralleling, make sure to disable the Earth leakage relay by putting switch S22 into off position.

4.3.4.9 Paralleling machines with Easy connect on the Qd0701 display

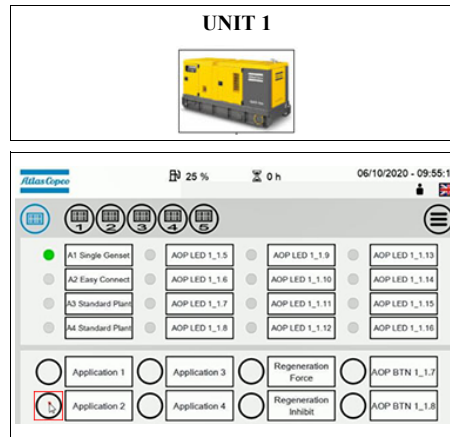
1. Connect load cables and **switch on** all Qd0701 without connecting communication cables X30.



2. Go to Qd0701 and press **AOP** button.



3. Select **Application 2** (Easy connect).



Application 3 and 4 are kept for customization (to be edited by Parus software for special application).

4. **Wait** for the application **setup** to be completed.



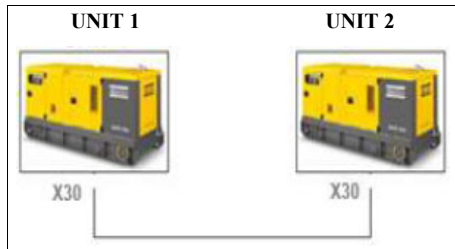
Repeat points 2, 3 and 4 for UNIT 2 (UNIT 3, UNIT 4, ...).



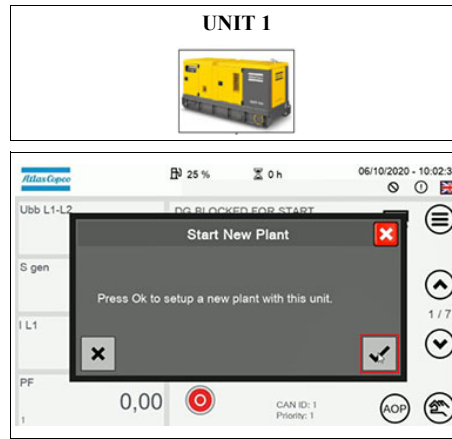
5. **Mount** splitters on **X30** connectors with end resistors joining across the PMS cables.



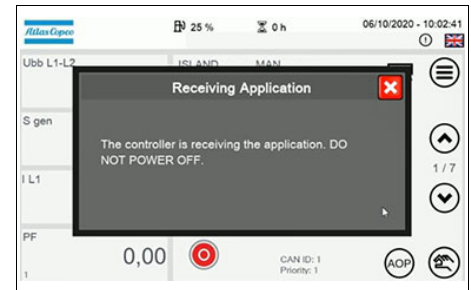
- 1 Splitters
- 2 PMS cable
- 3 End resistors



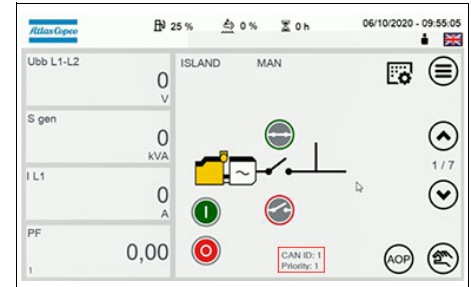
6. Confirm **Start New Plant**.



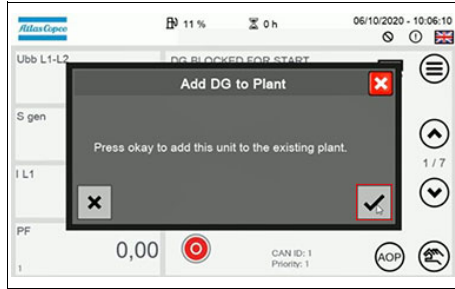
7. **Wait** for the application **setup** to be completed.



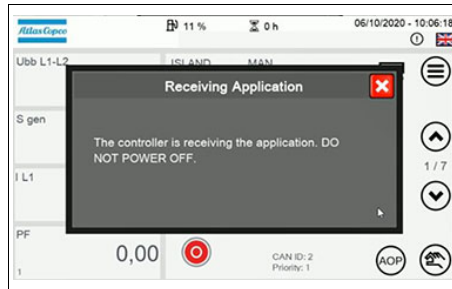
8. **UNIT 1** is ready: ID 1, Priority 1.



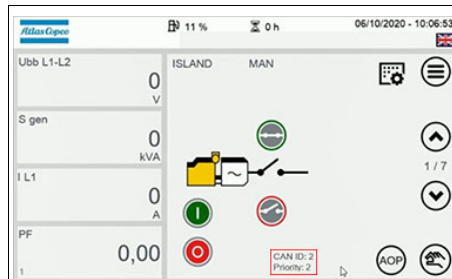
9. Confirm **Add Generator** to Plant.



10. Wait for the application **setup** to be completed.

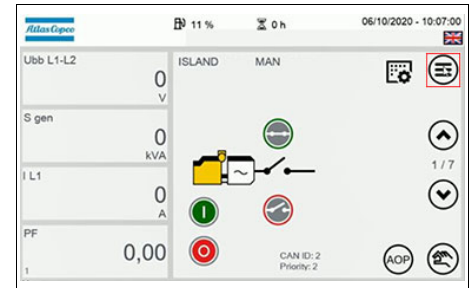


11. **UNIT 2** is ready: ID 2, Priority 2.

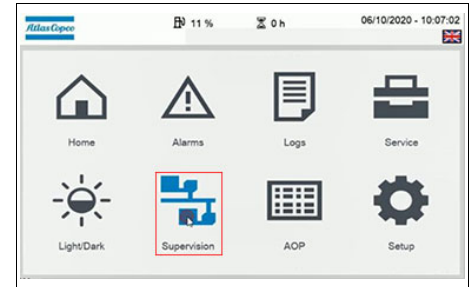


Repeat points 9, 10 and 11 in case of power plant is larger than 2 units (UNIT 3, UNIT 4, ...).

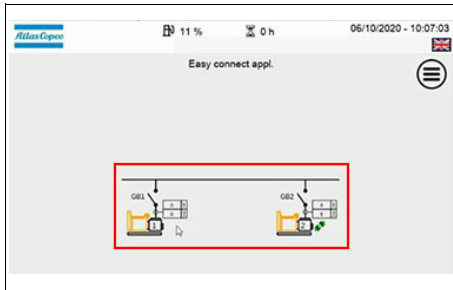
12. Verify the **plant** is created. Go to **settings**.



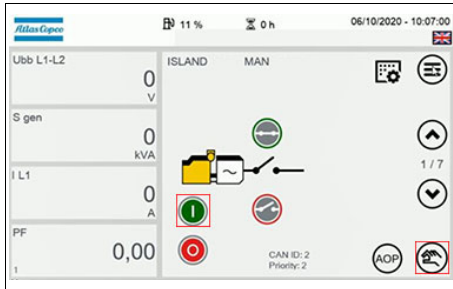
13. Verify the plant is created. Go to **Supervision**.



14. Verify the plant is created. See **Diagram** with right number of units.



15. Select **Auto** mode and **start** the plant.

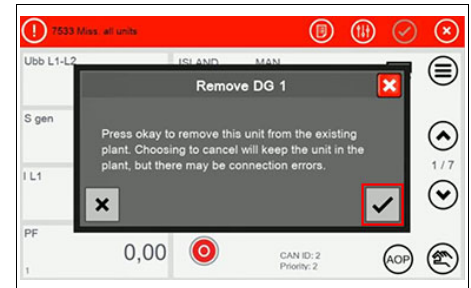


4.3.4.10 Removing one unit with Easy connect on the Qd0701 display

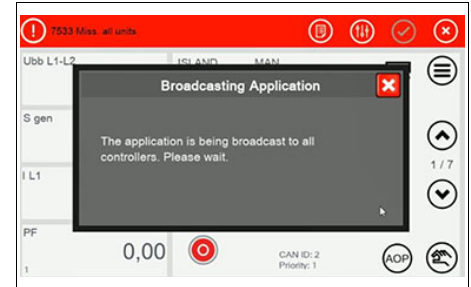
- To remove one unit from the plant (example UNIT 1) - **unplug** the X30 cable in UNIT 1 and get the **Setup Stand Alone** message on UNIT 1. Confirm it.



- The rest of the units on the plant will show **Remove DG 1**. Confirm it in just one unit.




- Wait** for removal to be completed - **Broadcasting** Application.



- Select AOP and disable Easy connect by changing to **Application 1** on **UNIT 1**.

UNIT 1



Atlas Copco
11 % 0 h
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12345

6

<input checked="" type="radio"/> A1 Single Genset	<input type="radio"/> AOP LED 1_1,5	<input type="radio"/> AOP LED 1_1,9	<input type="radio"/> AOP LED 1_1,13
<input type="radio"/> A2 Easy Connect	<input type="radio"/> AOP LED 1_1,6	<input type="radio"/> AOP LED 1_1,10	<input type="radio"/> AOP LED 1_1,14
<input type="radio"/> A3 Standard Plant	<input type="radio"/> AOP LED 1_1,7	<input type="radio"/> AOP LED 1_1,11	<input type="radio"/> AOP LED 1_1,15
<input type="radio"/> A4 Standard Plant	<input type="radio"/> AOP LED 1_1,8	<input type="radio"/> AOP LED 1_1,12	<input type="radio"/> AOP LED 1_1,16

Application 1

Application 3

Regeneration Force

AOP BTN 1_1,7

Application 2

Application 4

Regeneration Inhibit

AOP BTN 1_1,8

4.3.4.11 Overview of applications

Installations with only 1 generator

Application type	Mode	Comments
Island operation	SEMI-AUTO mode	= Local start
	AUTO mode	= Remote start
AMF operation	(SEMI-AUTO mode)	AMF operation will not function properly!
	AUTO mode	= Emergency start @ Mains Failure
Peak shaving	SEMI-AUTO mode	Only with Power Transducer (*)
	AUTO mode	Only with Power Transducer (*)
Fixed Power	SEMI-AUTO mode	
	AUTO mode	
Load Take Over	SEMI-AUTO mode	Only with Power Transducer (*)
	AUTO mode	Only with Power Transducer (*)
Mains Power Export	SEMI-AUTO mode	Only with Power Transducer (*)
	AUTO mode	Only with Power Transducer (*)
Transformer Maintenance	SEMI-AUTO mode	Only with Transformer Maintenance Box

(*) A Power Transducer is a device that measures the actual power of the mains and which translates this into a 4...20 mA signal towards the Qc4004™ module. For details, please contact Atlas Copco.

Installations with more generators

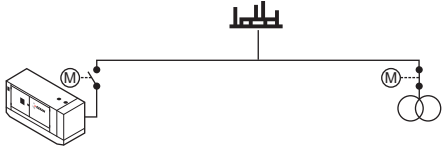
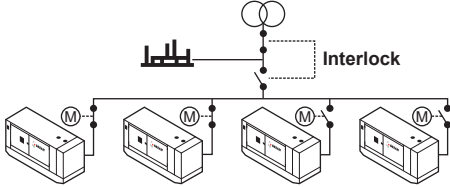
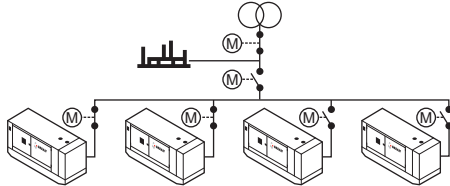
Application type	Mode	Comments
Island operation	SEMI-AUTO mode	= Manual paralleling between generators
	AUTO mode	= Remote paralleling between generators
AMF operation	(SEMI-AUTO mode)	AMF operation will not function properly!
	AUTO mode	PMS + Qc4004™ Mains module (**)
Peak shaving	SEMI-AUTO mode	PMS + Qc4004™ Mains module (**)
	AUTO mode	PMS + Qc4004™ Mains module (**)
Fixed Power	SEMI-AUTO mode	PMS + Qc4004™ Mains module (**)
	AUTO mode	PMS + Qc4004™ Mains module (**)
Load Take Over	SEMI-AUTO mode	PMS + Qc4004™ Mains module (**)
	AUTO mode	PMS + Qc4004™ Mains module (**)
Main Power Export	SEMI-AUTO mode	PMS + Qc4004™ Mains module (**)
	AUTO mode	PMS + Qc4004™ Mains module (**)
Power Management System	(SEMI-AUTO mode)	PMS + Qc4004™ Mains module (**)
	AUTO mode	PMS + Qc4004™ Mains module (**)

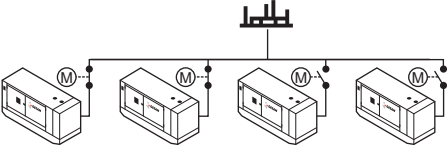
(**) The power management system (PMS) allows communication between the Qc4004™ modules over CAN-bus. It has a fully intelligent system, which will start/load/stop the generator according to the actual load and to the status of each generator. The installation can contain up to 16 Qc4004™ modules. If the Mains is included in the installation, then an extra Qc4004™ module is required. The installation can be monitored and controlled via the PMS Software Package. For details on this application, please contact Atlas Copco.



1. Each installation has to be prepared and reviewed very carefully before start-up. Wrong or incomplete wirings can damage the installation brutally!
2. Each application requires a specific combination of the following parameters:
 - Auto / Semi-auto / Test / Manual / Block mode.
 - Island / AMF / PS / FP / LTO / MPE / PMS / TM application type (in AUTO mode PS / FP / LTO can be combined with AMF).
 - Back synchronising enabled/disabled (parameter channel 7080).Wrong parameter settings can damage the installation brutally!
3. To be able to start up in cold conditions, parameter 6181 (Start prepare) can be changed to a higher value to have some preheating. Do not put this value above 60 seconds to avoid any possible damage.
4. For more information on the Qc4004™ module and its applications, we refer to the Qc4004™ User manual and the Qc4004™ Application data sheets. If you need more assistance, please contact Atlas Copco.

4.4 Overview of applications

Use	Mode	Configuration	Description	Required material for N generator sets
Single Stand-by Genset AMF mode	Single Parallel to Mains		<p>This configuration is used to connect one generator set as stand-by power with the mains. The generator set will synchronize with the mains at the mains return in order to avoid the second blackout. The generator set can be tested on-load in parallel with the mains.</p>	<p>1 x Qc controller for synchronizing with mains and AMF function 1 x Genset circuit breaker 1 x STB</p>
Multiple Stand-by Gensets AMF mode	Multiple Standby Gensets without Mains Synchronizing		<p>This configuration is used to connect several generator sets as stand-by power with the mains. The generator set will receive a remote signal from the ATB controller and they will synchronize together and supply power to the load. At the mains return the ATB will transfer the load with a blackout and the generator sets will stop after cooling time. The system can automatically equalize the generator sets running hours.</p>	<p>N x Qc controller for paralleling N x Genset Motorised Circuit breaker 1 x ATB</p>
Multiple Stand-by Gensets AMF mode	Multiple Standby Gensets with Mains Synchronizing		<p>This configuration is used to connect several generator sets in parallel as stand-by power with the mains. The generator set will receive a remote signal from the Mains Qc controller and they will synchronize together and supply power to the load. At the mains return the generator sets will synchronize with the mains and will transfer the load without blackout and the generator sets will stop after cooling time. The system can automatically equalize the generator sets running hours.</p>	<p>N x Qc controller for paralleling N x Genset Motorised Circuit breaker 1 x STB with specific Qc controller for Mains synchro and STB control</p>

Use	Mode	Configuration	Description	Required material for N generator sets
Prime Power Gensets Island mode	Multiple Gensets		<p>This configuration is used to connect several generator sets in parallel as prime power island supply. The generator set synchronize together and supply power to the load. The generator sets will share the load and the power management will start and stop the generator set according to the load demand adjustment. The system can automatically equalize the generator sets running hours or keep the generator set running hours difference constant.</p>	<p>N x Qc controllers for paralleling N x Genset Motorised Circuit breaker 1 x Optional BUS Circuit breaker</p>

5 **Maintenance**

5.1 **Maintenance schedule**



Before performing any maintenance job always switch the battery switch off.



Always observe the applicable safety precautions.



Please note that when the battery switch is off there can still be some parts live.



Unauthorized modifications can lead to risk for injury or machine damage.



Always keep the machine tidy in order to prevent fire hazard.

Note:

Poor maintenance can void any warranty claims.

Service Packs

A Service Pack is a collection of parts to be used for a specific maintenance task, e.g. after 50, after 500, after 1000 and after 2000 running hours.

It guarantees that all necessary parts are replaced at the same time keeping down time to a minimum.

The order number of the Service Packs are listed in the Atlas Copco Parts List (ASL).

Service kits

A service kit is a collection of parts to fit a specific repair or rebuilding task.

It guarantees that all necessary parts are replaced at the same time, which improves the uptime of the unit.

The order numbers of the Service Kits are listed in the Atlas Copco Parts List (ASL).

Liability

The manufacturer does not accept any liability for any damage arising from the use of non-original parts and for modifications, additions or conversions made without the manufacturer's approval in writing.

Maintenance schedule	Daily	500 hrs after start-up	Every 500 hours	Every 1000 hours	Every 2000 hours	Every 4500 hours	Yearly	Every 2 Years
<i>To determine the maintenance intervals, use service hours, or calendar time, whichever occurs first.</i>								
<i>For the most important subassemblies, Atlas Copco has developed service kits that combine all wear parts. These service kits offer you the benefits of genuine parts, save administration costs and are offered at a reduced price, compared to individual components. Refer to the parts list for more information on the contents of the service kits.</i>								
Check/Fill fuel level (3)	x							
Empty air filter vacuator valves	x							
Check air intake vacuum indicators	x							
Check engine oil level (if necessary top up)	x							
Check coolant level	x							
Check control panel for alarms and warnings	x							
Check on abnormal noise	x							
Check function of coolant heater (option)				x	x		x	
Replace air filter element (1)			x	x	x		x	
Check/Replace safety cartridge				x	x		x	
Change engine oil (2) (6)		x	x	x	x		x	
Replace engine oil filter (2)		x	x	x	x		x	
Clean centrifugal lub oil filter					x		x	
Replace centrifugal lub oil filter					x		x	
Replace fuel (primary)filter(s) (5)				x	x		x	
Replace fuel (secondary)filter(s) (5)				x	x		x	
Inspect/Adjust fan/alternator belt			x	x	x		x	
Replace fan/alternator belt					x			x
Measure alternator insulation resistance (11)				x	x		x	
Test Earth Leakage Relay (13)	x							
Check emergency stop (13)	x							

Maintenance schedule	Daily	500 hrs after start-up	Every 500 hours	Every 1000 hours	Every 2000 hours	Every 4500 hours	Yearly	Every 2 Years
Clean radiator (1)				X	X		X	
Clean intercooler (1)				X	X		X	
Drain condensate and water from spillage-free frame or catch basin (8)			X	X	X		X	
Check for leaks in engine-, air-, oil-, or fuel system		X	X	X	X		X	
Hoses and clamps - Inspect/Replace			X	X	X		X	
Check electrical system cables for wear				X	X		X	
Check torque on critical bolt connections (12)				X	X		X	
Check electrolyte level and terminals of battery (10)			X	X	X		X	
Analyse coolant (4) (7)		X			X		X	
Check external fuel connection (option)				X	X		X	
Grease locks and hinges			X	X	X		X	
Check rubber flexibles (9)				X	X		X	
Drain/Clean fuel tank water and sediments (1) (14)				X	X		X	
Inspect/clean fuel tank breather filter(s)			X	X	X		X	
Replace fuel tank breather filter(s)					X			
Adjust engine inlet and outlet valves (2)		X			X			
Check engine protective devices (15)				X	X		X	
Inspection by specialized service technician			X	X	X		X	
Replace the reductant filter				X	X		X	
Clean the reductant tank filler filter			X	X	X			
Clean the reductant tank ventilation filter			X	X	X			
Check/Replace the particulate filter (16)						X		

Notes:

- (1) More frequently when operating in a dusty environment.
- (2) Refer to engine operation manual.
- (3) After a days work.
- (4) Yearly is only valid when using PARCOOL/GENCOOL. Change coolant every 5 years.
- (5) Gummed or clogged filters means fuel starvation and reduced engine performance. Reduce service interval in heavy duty application.
- (6) See section “Engine oil specifications”.
- (7) The following part numbers can be ordered from Atlas Copco to check on inhibitors and freezing points:
 - 2913 0028 00: refractometer
 - 2913 0029 00: pH meter
- (8) See section “Before starting”.
- (9) Replace all rubber flexibles every 5 years.
- (10) See section “Battery care”.
- (11) See section “Measuring the alternator insulation resistance”.
- (12) See section “Critical bolt connections - torque values”.
- (13) The function of this protection should be tested minimum on every new installation.
- (14) Water in fuel tank can be detected by means of 2914 8700 00. Drain fuel tank when water is detected.

(15) See section “Testing engine protections”. Other specific engine and alternator requirements, referred to the books.

(16) Change interval is highly dependent on medium load and type of application.

5.1.1 Use of maintenance schedule

The maintenance schedule contains a summary of the maintenance instructions. Read the respective section before taking maintenance measures.

When servicing, replace all disengaged packings, e.g. gaskets, O-rings, washers.

For engine maintenance refer to Engine Operation Manual.

The maintenance schedule has to be seen as a guideline for units operating in a dusty environment typical for generators applications. Maintenance schedule can be adapted depending on application, environment and quality of maintenance.

5.1.2 Use of Service Packs

Service Packs include all genuine parts needed for normal maintenance of both compressor and engine. Service Packs minimize downtime and keep your maintenance budget low.

The order number of the Service Packs are listed in the Atlas Copco Parts list (ASL). Order Service Packs at your local Atlas Copco dealer.

5.2 Preventing low loads

5.2.1 General

All engine parts are designed with tolerances to allow work under full load conditions. When operating at low load, these tolerances allow more lube oil to pass between valve guides, stems, liners and pistons due to the lower engine temperatures.

Lower combustion pressure has an influence on the piston ring operation and the combustion temperature. Low boost pressure will cause oil leakage over the turbo shaft seal.

5.2.2 Risks of low load operation

- Cylinder glazing: the cylinder bore troughs become filled with lacquer, displacing oil and thus preventing correct ring lubrication.
- Bore polishing: the bore surface becomes polished, all peaks and most troughs become worn away, also preventing correct ring lubrication.
- Heavy carbon buildup: on pistons, piston ring grooves, valves and turbo charger. Carbon buildup on pistons can cause seizure when later operating at full load.
- High oil consumption: prolonged no-load/low load operation of the engine may cause it to blue/gray smoke at low rpm with an associated increase in oil consumption

- Low combustion temperature: this will result in insufficiently burnt fuel, which will cause diluting of the lube oil. Also, unburnt fuel and lube oil can enter the exhaust manifold and eventually leak out through joints in the exhaust manifold.
- Risk for fire

5.2.3 Best practices

Reduce the low load periods to a minimum. This should be achieved by adequately sizing the unit for the application.

It is recommended that a unit is always used with a load > 30% of nominal. Corrective actions should be taken if due to circumstances this minimum load capacity cannot be obtained.

Operate the unit at full load capacity after any low load operating period. Therefore, connect the unit periodically to a load bank. Increase the load in steps of 25% every 30 minutes and allow the unit to run for 1 hour in full load condition. Gradually return the unit to the operating load.

The interval between load bank connections may vary according to the conditions present on site and the amount of load. However, a rule of thumb is to connect a unit to a load bank after every maintenance operation.

Units equipped with Qc4004™ and operating in parallel with the Mains may be placed in Fixed Power or Test mode without the requirement of a load bank.

If the engine is installed as a stand-by generator, then it should be operated at full load for at least 4 hrs/year. If periodic tests are performed on a regular basis without load, these should not exceed 10 min. Full load tests help to clean out the carbon deposits in the engine and exhaust system and evaluate the engine's performance. To avoid potential problems during the test, load should be gradually increased.

In rental applications (where the load is often an unknown factor) units should be tested at full load after each rental job or every 6 months, whichever comes first.

For more info, please contact your Atlas Copco Service Center.



When a failure occurs and is deemed due to low load operation, the repairs fall outside warranty coverage.

5.3 Alternator maintenance procedures

5.3.1 Measuring the alternator insulation resistance

A 500 V megger is required to measure the alternator insulation resistance.

If the N-terminal is connected to the earthing system, it must be disconnected from the earth terminal. Disconnect the AVR.

Connect the megger between the earth terminal and terminal L1 and generate a voltage of 500 V. The scale must indicate a resistance of at least 5 MΩ.

Refer to the alternator operating and maintenance instructions for more details.

5.4 Engine maintenance procedures

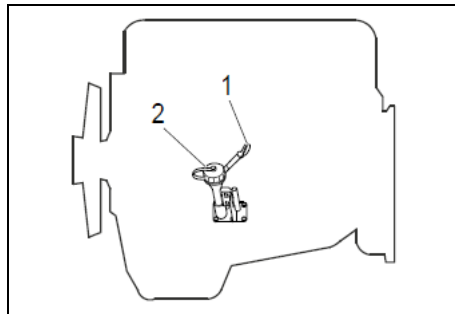
Refer to the engine's operator manual for full maintenance, including instructions for changing the oil and coolant and replacing the fuel, oil and air filters.

5.4.1 Engine oil level check

Consult the Engine Operation Manual for the oil specifications, viscosity recommendations and oil change intervals.

For the intervals, see also section "Maintenance schedule".

Check the engine oil level in accordance with the instructions in the Engine Operation Manual and if necessary, top up with oil.



Leave the engine off for at least 7 minutes before you check the oil level.

1. Remove the oil dipstick (1) and check the oil level. The correct level is between the minimum and maximum marks on the oil dipstick. Check that the correct level has been achieved.
2. Top up with more oil via the oil filler (2) if the oil level is at or below the minimum mark.

5.4.2 Engine oil and oil filter change



Observe all relevant environmental and safety precautions.



Be sure to stop the engine before draining engine oil or changing the oil filter cartridge.



Make sure that there is no pressure in the lubrication system before changing the oil.



The oil filler cap must always be in place when starting and running the engine to prevent oil being ejected.



Allow the engine to cool down sufficiently; oil can be hot and cause burns.

Notes:

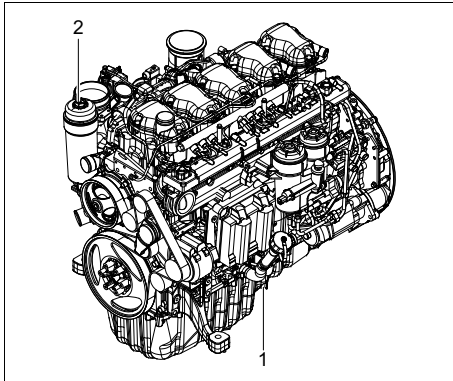
Renew the oil filter and clean the centrifugal oil cleaner* when changing oil.

Change oil more often if the engine is subjected to particularly demanding operation, such as a dusty environment, or if deposits in the centrifugal oil cleaner* are thicker than 28 mm (1.1 in).

* For more information, see the Scania DC09 XPI Operator's Manual.

To change engine oil:

1. Run the engine for approximately 5 minutes to warm up the oil. Stop the engine.
2. Remove the oil drain plug (1). Its position may vary depending on the engine application.



3. Drain crankcase oil from the engine while warm.

4. If the engine is drained via the valve, the oil should be hot. Alternatively, use a pump. This so that draining occurs more quickly.
5. Wipe off the magnet on the oil plug.
6. Renew the gasket on the oil plug.
7. Refit the oil plug.
8. Fill with the amount of oil specified for the oil sump (see "Specifications of the engine/alternator/unit" on page 111).
9. Wait at least 7 minutes.
10. Check the level on the oil dipstick.

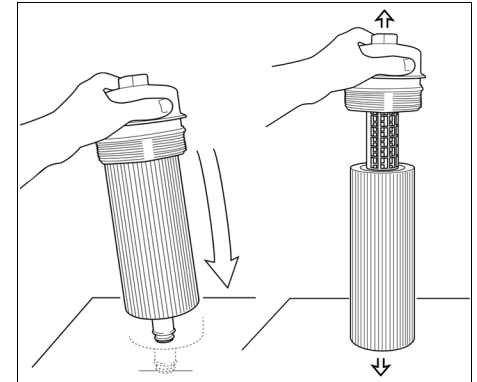
To change oil filter (2):



Filtration of engine oil is critical to proper lubrication. Therefore, change the oil filter regularly, respecting the intervals specified in the "Maintenance schedule". Use an oil filter, meeting the Atlas Copco performance specifications.

1. Unscrew the filter cover using a suitable filter wrench an socket.
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).



Immediately after completing the oil change, crank the engine for 30 seconds, without permitting the engine to start. This will help to insure adequate lubrication of the engine components, before the engine starts.



The oil capacity of the crankcase may slightly vary. ALWAYS fill the crankcase within the crosshatch marks on the dipstick. DO NOT overfill.

5. Start the engine and check for possible leaks, while the engine is running.
6. Stop the engine and check the oil level after 10 minutes. Oil level reading should be within the crosshatch marks on the dipstick.

5.4.3 Coolant check

5.4.3.1 Monitoring coolant condition



Never remove the cooling system filler cap while coolant is hot.

The system may be under pressure. Remove the cap slowly and only when coolant is at ambient temperature. A sudden release of pressure from a heated cooling system can result in personal injury from the splash of hot coolant.

In order to guarantee the lifetime and quality of the product, thus to optimise engine protection, regular coolant-condition-analysis is advisable.

The quality of the product can be determined by three parameters.

Visual check

- Verify the outlook of the coolant regarding colour and make sure that no loose particles are floating around.

pH measurement

- Check the pH value of the coolant using a pH-measuring device.
- The pH-meter can be ordered from Atlas Copco with part number 2913 0029 00.
- Typical value for PARCOOL Green = 8.0.
- If the pH-level is below 7 or above 9.5, the coolant should be replaced.

Glycol concentration measurement

- To optimise the unique engine protection features of the PARCOOL Green the concentration of the Glycol in the water should be always above 33 vol.%.
- Mixtures with more than 68 vol.% mix ratio in water are not recommended, as this will lead to high engine operating temperatures.
- A refractometer can be ordered from Atlas Copco with part number 2913 0028 00.



In case of a mix of different coolant products this type of measurement might provide incorrect values.

5.4.3.2 Topping up of coolant



Do not top up when the engine is hot.

- Verify if the engine cooling system is in a good condition (no leaks, clean,...).
- Check the condition of the coolant.
- If the condition of the coolant is outside the limits, the complete coolant should be replaced (see chapter “Replacing the coolant”).
- Always top-up with PARCOOL Green.
- Topping up the coolant with water only, changes the concentration of additives and is therefore not allowed.

5.4.3.3 Replacing the coolant

Drain

- Completely drain the entire cooling system.
- Used coolant must be disposed or recycled in accordance with laws and local regulations.

Flush

- Flush twice with clean water. Used coolant must be disposed or recycled in accordance with laws and local regulations.
- From the Atlas Copco Instruction book, determine the amount of PARCOOL Green required and pour into the radiator top tank.
- It should be clearly understood that the risk for contamination is reduced in case of proper cleaning.
- In case a certain content of ‘other’ coolant remains in the system, the coolant with the lowest properties influences the quality of the ‘mixed’ coolant.

Fill

- Fill the cooling system with PARCOOL Green, not faster than 19 l/min, to avoid air locks. In case a recovery tank is installed, do not fill the tank as it is intended for overflow.
- Do not install the cooling system filler cap.
- Vent air at the coolant drain tap, located at the rear of the frame.
- Start the engine and run without load.
- Run the engine for about 1 minute, in order to purge the air from the cavities of the engine block.
- Stop the engine.
- Check the coolant level. Maintain the coolant level flush with the bottom of the pipe for filling.
- Check the seal of the filler cap for damages and replace if needed. Fit the filler cap.
- Start the engine and inspect the cooling system for leaks and for proper operating temperatures.

Note:

Overfilling will result in less expansion volume and might result in coolant overflow. In case a recovery tank is installed, do not fill the recovery tank as it is intended for coolant overflow. A small amount of coolant in the recovery tank is allowed.

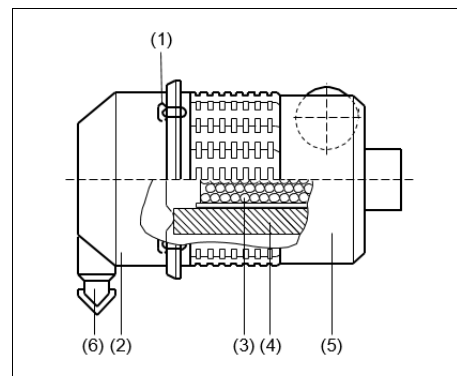
5.4.4 Air filter check



The Atlas Copco air filters are specially designed for the application.

The use of non-original air filters may lead to severe damage of the engine and/or compressor element. Never run the compressor without air filter element.

5.4.4.1 Main parts



- | | |
|---|---------------------------|
| 1 | Snap clips |
| 2 | Dust trap cover |
| 3 | Safety cartridge (option) |
| 4 | Filter element |
| 5 | Filter housing |
| 6 | Vacuator valve |

5.4.4.2 Recommendation

- Always select the service point according to the vacuum indicator or display message.
- Atlas Copco always recommends exchanging rather than cleaning the filter element in order to avoid damage and ensure maximum engine protection.
- New elements must be inspected for tears or punctures before installation.
- A dirty safety cartridge (3) is an indication of a malfunctioning filter element.

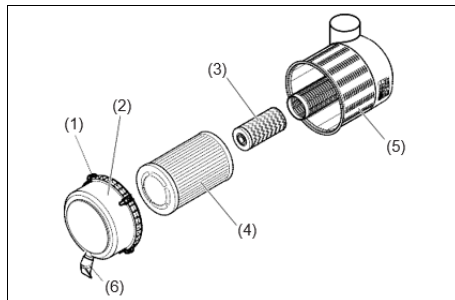


The safety cartridge cannot be cleaned.

5.4.4.3 Cleaning the dust trap

To remove dust from the dust trap squeeze the vacuator valve (6) several times.

5.4.4.4 Replacing the filter element and the safety cartridge



- Release the snap clips (1) and remove the dust trap cover (2). Clean the inside of the cover.
- Remove the element (4) and the safety cartridge (3).
- Reassemble in reverse order of dismantling. Make sure the vacuator valve (6) points down.
- Inspect and tighten all air intake connections.

5.4.5 Replacing fuel filter



Fluid escaping under pressure can penetrate the skin causing serious injury. Therefore:

- **Relieve pressure before disconnecting fuel or other lines.**
- **Tighten all connections before applying pressure.**
- **Keep hands and body away from pinholes and nozzles which eject fluids under high pressure.**
- **Use a piece of cardboard or paper to search for leaks, do not use your hand.**



If any fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this kind of injury or gangrene may result.

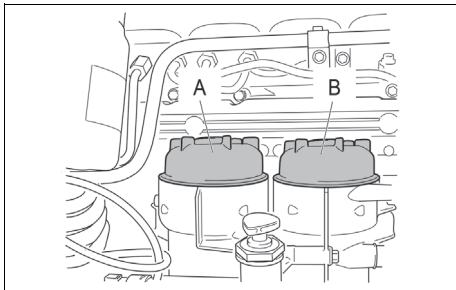
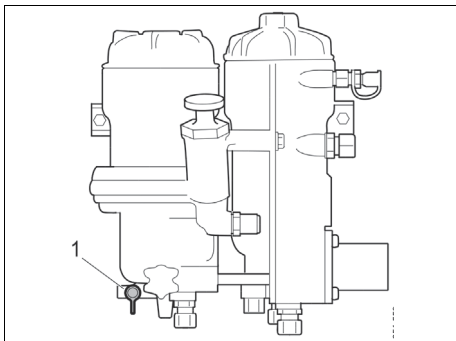
Note:

Use a suitable container. The fuel collected must be disposed of as specified in national and international laws and regulations.

If the fuel tank is positioned higher than the fuel filter housing, the shut-off valve between the fuel tank and the fuel filter housing must be closed.

This is to prevent fuel running into the fuel filter housing.

5.4.5.1 Removing the fuel filters using a draining nipple



On certain engines, there is a draining nipple (1) on the fuel filter housing. If there is no draining nipple, see the following section.

1. Open the draining nipple.

To ensure that the filter housings are drained properly, the filter covers must be removed as follows:

2. On the main filter (B): Make a mark on the cover. Unscrew the cover 3 to 4 turns with a socket.
 3. Repeat the procedure with the water separating prefilter (A).
 4. Wait at least 2 minutes to ensure the filter housings have drained properly.
 5. On the main filter: Unscrew the filter cover and lift it up slowly with the filter element.
 6. On the water separating prefilter: Unscrew the filter cover and lift it up slowly with the filter element.
- The remaining fuel will drain out of fuel filter housing automatically once the filter element has been removed.
7. Check that no fuel or particles remain in the bottom of the filter housings. Draw off remaining fuel and any particles.



It is important to remove remaining fuel and particles from the filter housings to prevent fuel system contamination.

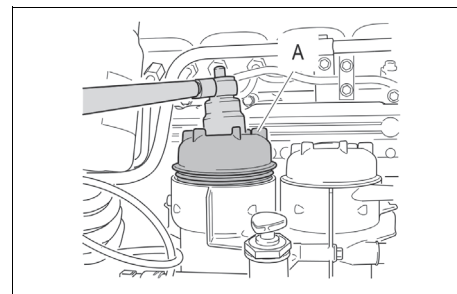
8. Undo the old filter elements from the covers by carefully bending them to one side.
9. Close the draining nipple.

5.4.5.2 Removing the fuel filters using a suction tool

To ensure that the filter housings are drained properly, the filter covers must be removed as follows:



Start with the water separating prefilter (A). Do not open the main filter cover (B) until the filter housing for the water separating prefilter is completely drained.

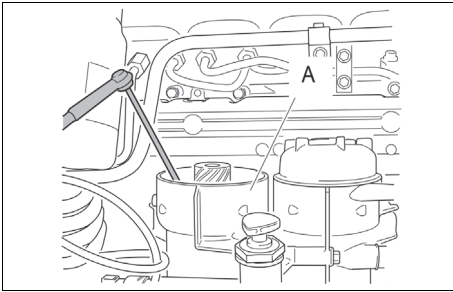


1. Make a mark on the water separating prefilter cover (A). Unscrew the cover 3 to 4 turns with the socket.

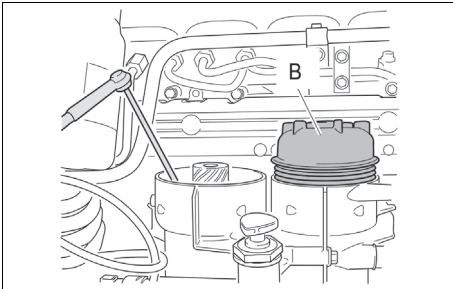


Do not use an adjustable spanner or other open tool to remove the filter covers, as the filter covers may then get damaged.

Wait for at least 2 minutes to allow as much of the fuel as possible to drain out of the filter housing.



2. Unscrew the filter cover (A) and lift it up slowly with the filter element.
3. Make sure the suction tool is completely drained before starting work. Draw out remaining fuel and any particles using the suction tool or a similar tool.
4. Keep the suction tool hose in the filter housing for the water separating prefilter (A).

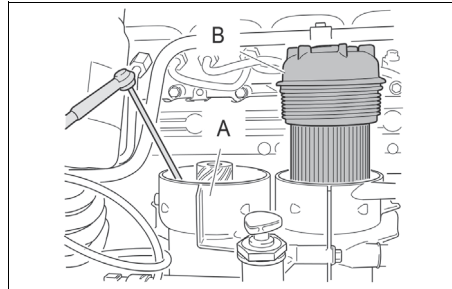


5. Make a mark on the main filter cover (B). Unscrew the cover 3 to 4 turns with the socket. Draw out fuel which may drain into the water separating prefilter housing when the main filter is detached.



Wait for at least 2 minutes to allow as much of the fuel as possible to drain out of the filter housing.

6. Unscrew the main filter cover (B) and lift it up slowly with the filter element.



7. Fuel from the main filter housing (B) will flow into the water separating prefilter housing (A). Leave the suction tool in the water separating suction filter housing until it is completely drained of fuel.
8. Move the suction tool to the main filter housing (B). Draw out remaining fuel and particles.



It is important to remove remaining fuel and particles from the filter housings to prevent fuel system contamination.

9. Undo the old filter elements from the covers by carefully bending them to one side.

5.4.5.3 Fitting the fuel filters

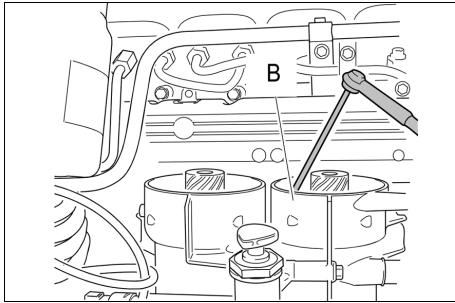


Check that there is no remaining packaging material stuck to the new filter elements. Secure the filter elements in the filter covers before positioning them in the fuel filter housings. Otherwise, the filter elements may break.

In order to prevent back pressure in the filter housings when the filter elements are screwed on, the bleed nipple should be open.

1. Fit a new O-ring on the cover. Lubricate the O-ring with O-ring grease.
2. Press the filter elements into the snap fasteners on the covers.
3. Check that the filter housing is clean before fitting. Use lint free cloths.
4. Press down the filter elements into the fuel filter housings with the filter covers.
5. Screw down the filter covers until the cover seals are in contact with the filter housings. Use the socket.

6. Tighten the filter housings to 25 Nm (18 lb/ft).
7. Bleed the fuel system as per the following section.
8. Start the engine and check that there is no fuel leakage between the filter covers and filter housings. If there is leakage, undo the filter covers and start again from step 4.



5.4.6 Bleeding the fuel system

Every time the fuel system has been opened up for service (lines disconnected or filters), it is necessary to bleed air from the system.



Observe all relevant environmental and safety precautions.

Notes:

Use a suitable container. The fuel collected must be disposed of as specified in national and international laws and regulations.

It is recommended bleeding the fuel system using suction tools rather than with a hand pump. This is a quicker and simpler method, which ensures a complete bleeding.



High-pressure fluid remaining in the fuel lines can cause serious injury. Do not disconnect or attempt to repair fuel lines, sensors or any other component between the high-pressure fuel pump and nozzles on engines with High Pressure Common Rail (HPCR) fuel system. Only technicians familiar with this type of system can perform repairs.

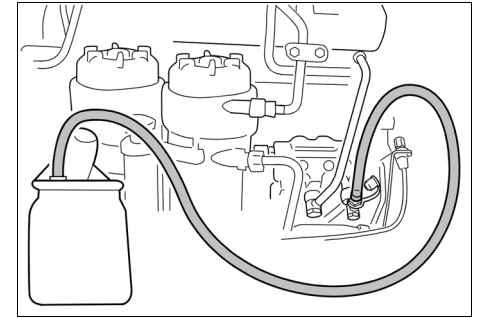


Protect hands and body from high pressure fluids. If an accident occurs, see a doctor immediately.



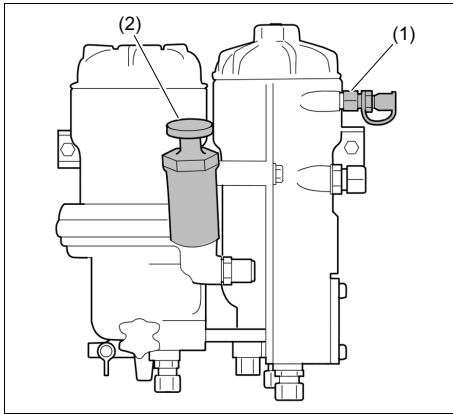
Prevent fuel contamination. Do not crack any fuel lines to bleed the fuel system.

5.4.6.1 Bleeding the fuel system using a suction tool



1. Open the bleed nipple on the high pressure pump and connect the suction tool.
2. Hold the suction tool straight and draw out at least a full container of fuel.
3. Once the fuel coming out of the hose is free of air bubbles, then bleeding is complete.
4. Close the bleed nipple on the high pressure pump. Remove the hose and suction tool.
5. Start the engine and check that no leakage occurs.

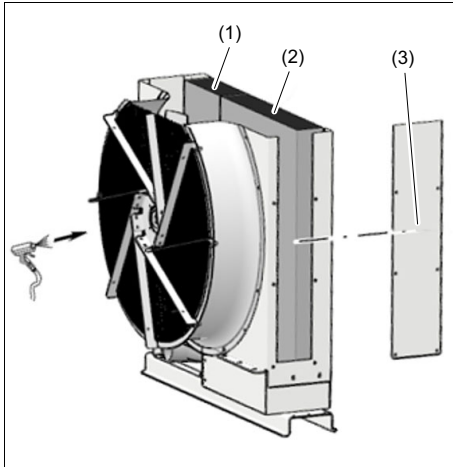
5.4.6.2 Bleeding the fuel system using a hand pump



1. Attach a clear plastic hose to the bleed nipple (1) on the fuel filter housing. Let the plastic hose drop into a container that holds at least 5 litres (1.3 US gallons).
2. Loosen the hand pump (2) handle.
3. Open the bleed nipple (1) on the fuel filter housing and pump until fuel runs out, which will take around 100 pump strokes. Close the bleed nipple.
4. Start the engine and open the bleed nipple carefully. Approximately 3 litres (0.8 US gallons) will run out into the container before the fuel coming out will be free of air.

5.5 Adjustments and service procedures

5.5.1 Cleaning coolers



- Keep the coolers (1) and (2) clean to maintain the cooling efficiency.
- Service doors (3) are provided on both sides of the fan cowl to allow easy access to the fan side surface of the coolers.



Remove any dirt from the coolers with a fibre brush. Never use a wire brush or metal objects.

- Clean by air jet in the direction of the arrow.

- Steam cleaning in combination with a cleansing agent may be applied (do not use jet at max. power).



To avoid damaging the coolers, angle between jet and coolers should be approx. 90°.

- Close the service door(s).



Protect the electrical and controlling equipment, air filters, etc. against penetration of moisture. Make sure to not steam clean the alternator.
Never leave spilled liquids such as fuel, oil, water and cleansing agents in or around the generator.

5.5.2 Cleaning fuel tank



Observe all relevant environmental and safety precautions.



Never leave spilled liquids such as fuel, oil, water and cleansing agents in or around the generator.

5.5.3 Battery care



Before handling batteries, read the relevant safety precautions and act accordingly.

OPTIMA's Absorbent Glass Mat (AGM) separators hold electrolyte like a sponge to eliminate acid spilling. Each maintenance-free battery is also completely sealed, preventing corrosion and acid spills.

Because of the high-purity lead grid in the OPTIMA battery, it has a self-discharge rate much lower than conventional flat-plate batteries. This means the OPTIMA battery can sit for longer periods retaining enough charge to start your engine when stored and maintained properly.

5.5.3.1 Storage



Read the safety instructions carefully.

The most important consideration when storing any battery is to make sure the voltage never drops below 12.4 volts. We recommend using a type of battery maintainer - a device that will monitor your battery and keep it at full state of charge during storage.

If it is not possible to use a maintenance charger, disconnect the battery with the battery switch during storage to prevent small electrical drains from discharging the battery. Always provide a full charge with a battery charger prior to storage, and then check

the battery voltage every three to six months. Charge the battery if it falls below 12.4 volts

5.5.3.2 Periodic battery service

The OPTIMA® battery is truly carefree. When it's maintained properly there is no risk of leaking, corrosion or gassing.

Inspect battery terminal connections periodically to ensure they are clean, snug and protected from the elements.

Open circuit voltage (OCV) and storage

OCV: about 12.6-12.8 volts for a new, fully charged battery

Carry out periodic condition tests. Test intervals of 1 to 3 months, depending on climate and operating conditions, are recommended.

5.5.3.3 Recharging a battery

All lead-acid batteries can experience sulfation-the formation of lead sulfate crystals upon discharge. Look for a charger with a desulfation mode to help condition the battery and keep it performing at its best.

Low and slow is best. A low amp charger is generally the best choice for charging any lead-acid battery. It's quicker to charge at higher amperage, but it also can generate a lot of heat, which reduces the life of a battery.

Alternators are NOT chargers. Don't rely on engine alternator to do the work of a charger. If a battery is discharged to the point where it cannot start the engine, use a charger as soon as possible to make sure the battery gets fully charged.

5.5.3.4 Resuscitate a deeply discharged AGM battery

Most battery chargers have built-in safety features that may prevent chargers from recharging deeply discharged batteries. A traditional battery that's at 10.5 volts or less is seen as defective, having either a short, a bad cell or some other defect while the AGM battery may be just fine.

To resuscitate a deeply discharged AGM battery a modern battery charger capable to charge deeply discharged AGM batteries is needed.

5.5.4 Checking belt tensioner spring tension and belt wear

Belt drive systems equipped with automatic (spring) belt tensioners cannot be adjusted or repaired. The automatic belt tensioner is designed to maintain proper belt tension over the life time of the belt. If the tensioner spring is not within specification, replace the tensioner assembly.

5.5.4.1 Checking belt wear

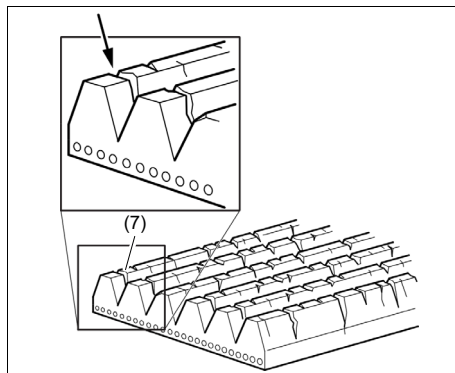
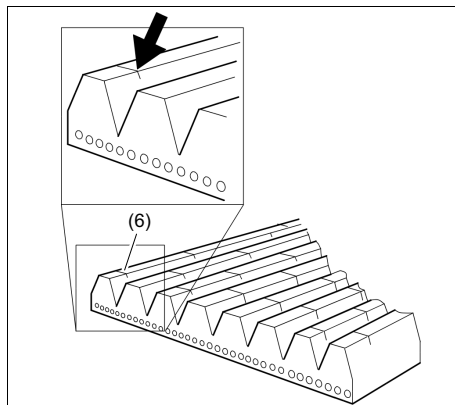


Before starting, make a note of how the drive belt is fitted. Refit the drive belt with the same direction of rotation as it had before removal.

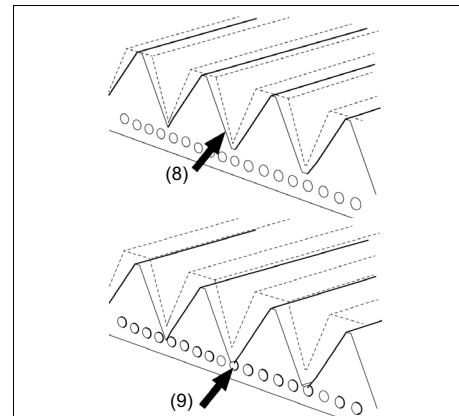
1. Check the drive belt thoroughly, particularly at the idler rollers.
2. Check the drive belt for cracks. Renew the drive belt if deep cracks (7) have formed.

Note:

Small and shallow cracks (6) are normal and form after only a few hours of operation. They do not mean that the drive belt needs to be renewed. If there are many deep cracks (7), or if parts of the drive belt have started to come off, the drive belt must then be renewed.



3. Check drive belt wear. Renew the drive belt if it is too worn. If the drive belt is only starting to become worn (8) it can be refitted. If the belt is worn down to the cord (9) then he must be renewed.

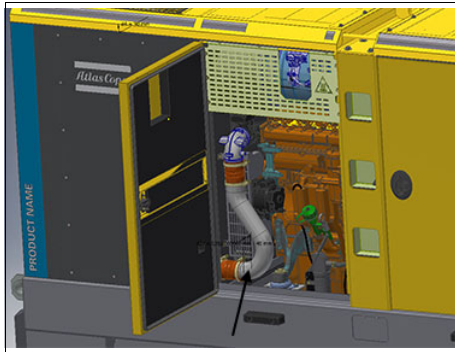


5.5.4.2 Checking tensioner spring tension

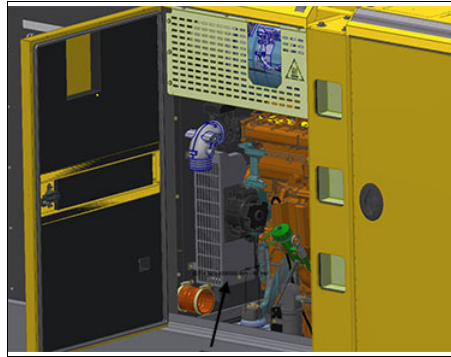
Automatic belt tensioner must not be readjusted, opened or modified. If belt tensioner does not provide the right tension to the belt it will have to be replaced. In case to be needed consult the engine manufacturer manual.

5.5.4.3 Engine belt replacement

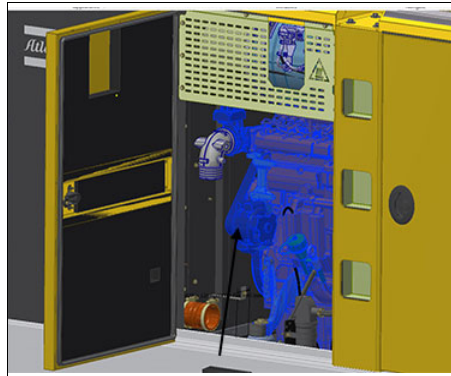
- Remove the CAC outlet pipe.



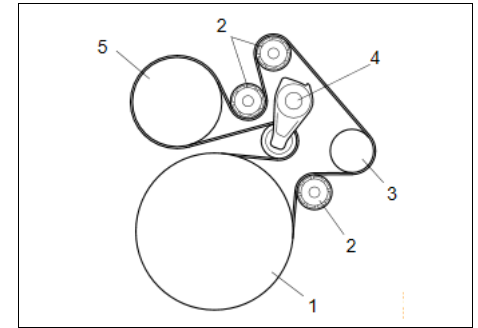
- Remove the belt guard.



- Get access to the engine belt.

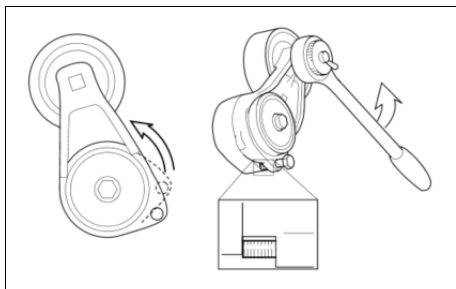


- Block the tensioner.



- | | |
|---|--------------|
| 1 | Crankshaft |
| 2 | Free pulleys |
| 3 | Alternator |
| 4 | Tensioner |
| 5 | Coolant pump |

- Remove the tension to the belt. Check tensioner is not blocked, move in direction to decrease the tension and remain free. It has to come back to the original position.
- Remove the tension to belt until tensioner reach the blockage position with the M8 blocking bolt.



- Remove the belt.
- Assemble the new belt and unlock the tensioner till its original position.

5.5.5 Measuring the valve clearance



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



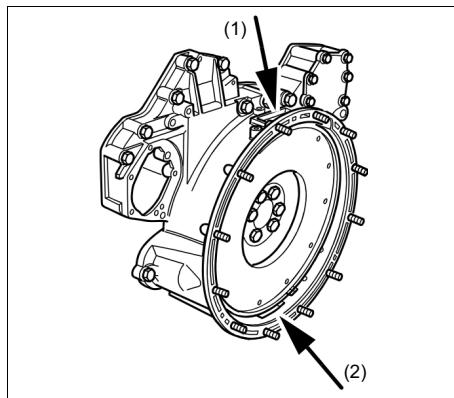
The engine must be cold when the work is carried out.

Remember to remove the turning tool from the flywheel after adjustment.

Notes:

Carry out the working without pausing, so that no step is overlooked.

Carry out a check and adjustment of the valve clearances one more time after the first 500 hours of operation. After this, adjustment according to the regular interval takes place, which is every 2,000 operational hours.



The reference information UP TDC, DOWN TDC and the angle indications listed in the table below are engraved on the flywheel. Depending on the engine installation, this information is visible in one of the windows, either furthest up (1) or furthest down (2) on the flywheel. See illustration.

Valve clearance:	
Intake valve	0.45 mm (0.018 inch)
Exhaust valve	0.70 mm (0.028 inch)
Tightening torque of the lock nut for the valves:	
35N•m (26 lb-ft)	

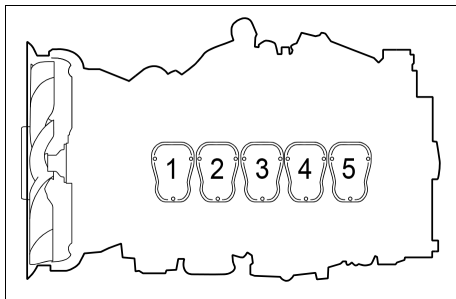
Adjusting the valves

Adjust valves according to the table below. Follow the respective column depending on whether you are reading the engraving on the flywheel in the lower or the upper window. Start adjustment at the top of the table.

Reading in the lower window	Rotation	Valve transition on cylinder	Adjust valves on cylinder
DOWN TDC	1		1
72/432	1	5	
144/504	1		2
216/576	1	3	
288/648	1		4
DOWN TDC	2	1	
72/432	2		5
144/504	2	2	
216/576	2		3
288/648	2	4	

Reading in the upper window	Rotation	Valve transition on cylinder	Adjust valves on cylinder
UP TDC	1		1
252/612	1	5	
324/684	1		2
36/396	1	3	
108/468	1		4
UP TDC	2	1	
252/612	2		5
324/684	2	2	
36/396	2		3
108/468	2	4	

The figure below shows the order of the cylinders.



1. Clean the rocker covers and the area around them.
2. Remove the rocker covers.
3. Use the turning tool appropriate to the installation of the engine. Tool 99 309 is used to rotate the

flywheel from the underside of the engine and tool 2 402 509 is used from the top side.

4. Start adjusting one cylinder according to the table. Rotate the flywheel until the correct engraving can be read on the flywheel. It may be necessary to rotate it more than 1 revolution.

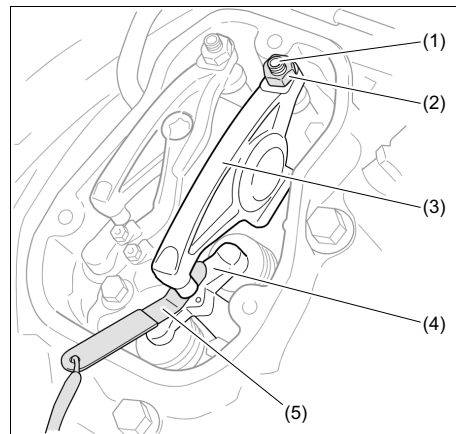
Rotate the flywheel in the rotational direction of the engine, which is clockwise viewed from the front of the engine and anticlockwise viewed from the back of the engine.

During a valve transition, the exhaust valve (the long arm) is closing at the same time as the intake valve is opening.

UP TDC engraving on the flywheel is now visible in the window furthest up on the flywheel. The DOWN TDC engraving is visible in the lower window.

5. Read the table on the previous page to see which valve to adjust.
6. Stick the feeler gauge under the pressure pad of the rocker arm and check the valve clearance.
7. If necessary, adjust the valve clearance by:
 - loosening the lock nut on the end of the rocker arm,
 - adjusting the valve clearance with the adjusting screw,
 - tightening the lock nut.

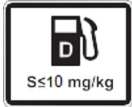
8. Mark the rocker arm with the felt-tip pen and then continue with the next cylinder according to the table.



- | | |
|---|-----------------|
| 1 | Adjusting screw |
| 2 | Lock nut |
| 3 | Rocker arm |
| 4 | Valve bridge |
| 5 | Feeler gauge |

5.6 Engine consumable specifications

5.6.1 Engine fuel specifications



EC

European ULSD 0.0010 percent (10ppm (mg/kg)) sulfur fuel is required by regulation for the use in engines certified to European nonroad Stage V and newer standards and are equipped with exhaust after-treatment systems.

Misfueling with fuels of higher sulfur level can have the following negative effects:

- Shorten the time interval between after-treatment device service intervals (cause the need for more frequent service intervals).
- Adversely impact the performance and life of after-treatment devices (cause loss of performance).
- Reduce regeneration intervals of after-treatment devices.
- Reduce engine efficiency and durability.
- Increase the wear.
- Increase the corrosion.
- Increase the deposits.
- Lower fuel economy.
- Shorten the time period between oil drain intervals (more frequent oil drain intervals).
- Increase overall operating costs.

- Failures that result from the use of improper fuels will not be covered by warranty.

5.6.2 Diesel exhaust fluid (AdBlue)

General information

For diesel engines that are equipped with SCR equipment, meeting the mandated exhaust emissions levels requires the use of diesel exhaust fluid (AdBlue).

For engines and machines with SCR equipment used in the U.S., the use of API certified diesel exhaust fluid (AdBlue) is required.



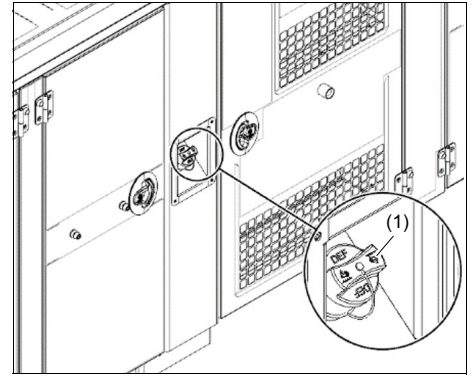
Use of fluids that are not recommended by Atlas Copco can result in numerous problems including damage to the equipment.



As diesel exhaust fluid (AdBlue) is very corrosive, you need to thoroughly clean up any spilled diesel exhaust fluid (AdBlue).

Filling up Diesel exhaust fluid (AdBlue)

1. Remove filling cap (1) and fill the tank with diesel exhaust fluid (AdBlue).
2. When you refill with diesel exhaust fluid (AdBlue), there is no need to wear protective clothing. However, we recommend that you wear gloves to prevent irritation to sensitive skin.



Do not use old diesel or oil containers to transfer diesel exhaust fluid (AdBlue) into the tank. Any non-dedicated equipment can contaminate the diesel exhaust fluid (AdBlue). Even very small quantities of fuel/oil/lubricant can damage your SCR system.



Do not replace diesel exhaust fluid (AdBlue) by a water/urea solution. Water or urea solution cause easily identifiable damage, including a build-up of calcium deposits from the minerals found in water and urea solution. Gradual degrading and clogging of the SCR system will result in costly replacement parts, reducing efficiency and lost time. These repairs will not be covered by warranty if it can be detected that the damage was caused by water, or urea solution.



If diesel exhaust fluid (AdBlue) is accidentally filled into the diesel tank or diesel into the diesel exhaust fluid (AdBlue) tank, do not start the engine.

It is essential that you drain the tank with the unit still in its original position. If the engine is started, even just briefly:

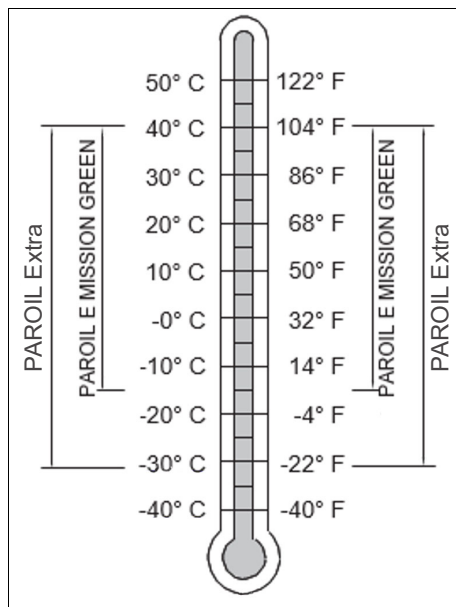
- The fluid will enter the wrong system, and this can have expensive consequences in the long and short term.
- Diesel exhaust fluid (AdBlue) will slowly degrade the fuel system's pipework and components.
- Diesel will poison the catalyst which is expensive to replace (unwarrantable damage), resulting in downtime and maintenance bills.

5.6.3 Engine oil specifications



It is strongly recommended to use Atlas Copco branded lubrication oil.

High-quality, mineral, hydraulic or synthesized hydrocarbon oil with rust and oxidation inhibitors, anti-foam and anti-wear properties is recommended. The viscosity grade should correspond to the ambient temperature and ISO 3448, as follows:



Specifications PAROIL

PAROIL from Atlas Copco is the ONLY oil tested and approved for use in all engines built into Atlas Copco compressors and generators.

Extensive laboratory and field endurance tests on Atlas Copco equipment have proven PAROIL to match all lubrication demands in varied conditions. It meets stringent quality control specifications to ensure your equipment will run smoothly and reliably.

The quality lubricant additives in PAROIL allow for extended oil change intervals without any loss in performance or longevity.

PAROIL provides wear protection under extreme conditions. Powerful oxidation resistance, high chemical stability and rust-inhibiting additives help reduce corrosion, even within engines left idle for extended periods.

PAROIL contains high quality anti-oxidants to control deposits, sludge and contaminants that tend to build up under very high temperatures. PAROIL's detergent additives keep sludge forming particles in a fine suspension, instead of allowing them to clog your filter and accumulate in the valve/rocker cover area.

PAROIL releases excess heat efficiently, whilst maintaining excellent bore-polish protection to limit oil consumption.

PAROIL has an excellent Total Base Number (TBN) retention and more alkalinity to control acid formation.

PAROIL prevents Soot build-up.

PAROIL is optimized for the latest low emission Stage V, IV, 3 & 2, Tier 4 Final, 3 & 2 engines running on low sulphur diesel for lower oil and fuel consumption.

PAROIL Extra is a Synthetic ultra high performance diesel engine oil with a high viscosity- index. Atlas Copco PAROIL Extra is designed to provide excellent lubrication from start-up at temperatures as low as -25°C (-13°F).

PAROIL E Mission Green is a mineral based high performance diesel engine oil with a high viscosity-index. Atlas Copco PAROIL E Mission Green is designed to provide a high level of performance and protection under 'standard' ambient conditions from -10°C (14°F) onward.

PAROIL Extra and PAROIL E Mission Green are low SAPS oil. These oils are to be used in Stage V / Tier 4 Final engines in order to provide the full performance and life of the engine and after-treatment systems.



Never mix synthetic with mineral oil.
When changing from mineral to synthetic oil (or the other way around), you will need to do an extra rinse:
After a complete change over to synthetic oil, run the unit for a few minutes to allow proper and complete circulation of the synthetic oil.
Then drain the synthetic oil again and fill again with new synthetic oil.
To set correct oil levels, follow the normal instructions.

Synthetic engine oil PAROIL Extra

	Liter	US gal	Order number
Can	5	1.3	1630 0135 01
Can	20	5.3	1630 0136 01
Barrel	209	55.2	1626 0102 00

Mineral engine oil PAROIL E Mission Green

	Liter	US gal	Order number
Can	5	1.3	1630 0471 00
Can	20	5.3	1630 0472 00
Barrel	209	55.2	1626 00473 00

5.6.4 Engine coolant specifications



Never remove the cooling system filler cap while coolant is hot.
The system may be under pressure. Remove the cap slowly and only when coolant is at ambient temperature. A sudden release of pressure from a heated cooling system can result in personal injury from the splash of hot coolant.



It is strongly recommended to use Atlas Copco branded coolant.

The use of the correct coolant is important for good heat transfer and protection of liquid-cooled engines. Coolants used in these engines must be mixtures of good quality water (distilled or de-ionised), special coolant additives and anti-freeze, if required. Coolant that is not to manufacturer's specification will result in mechanical damage of the engine.

The freezing point of the coolant must be lower than the freezing point that can occur in the area. The difference must be at least 5°C (9°F). If the coolant freezes, it may crack the cylinder block, radiator or coolant pump.

Consult the engine's operation manual and follow the manufacturer's directions.



Never mix different coolants and mix the coolant components outside the cooling system.

Specifications PARCOOL GREEN

PARCOOL Green is the only coolant that has been tested and approved by all manufacturers of engines currently used in Atlas Copco compressors and generators.

Atlas Copco's PARCOOL Green extended life coolant is the new range of organic coolants purpose-designed to meet the needs of modern engines. PARCOOL Green can help prevent leaks caused by corrosion. PARCOOL Green is also fully compatible with all sealants and gasket types developed to join different materials used within an engine.

PARCOOL Green is a ready to use Ethylene Glycol based coolant, premixed in an optimum 50/50 dilution ratio, for antifreeze protection guaranteed to -40°C (-40°F).

Because PARCOOL Green inhibits corrosion, deposit formation is minimized. This effectively eliminates flow restriction problems through the engine coolant ducts and the radiator, minimizing the risk of engine overheating and possible failure.

It reduces water pump seal wear and has excellent stability when subjected to sustained high operating temperatures.

PARCOOL Green is free of nitride and amines to protect your health and the environment. Longer service life reduces the amount of coolant produced and disposal requirements, which limits environmental impact.

To ensure protection against corrosion, cavitation and formation of deposits, the concentration of the additives in the coolant must be kept to certain limits,

as stated by the manufacturer's guidelines. Topping up the coolant with water only, changes the concentration and is therefore not allowed.

Liquid-cooled engines are factory-filled with this type of coolant mixture.

For order numbers see Service label in the control panel of your generator.

Handling PARCOOL GREEN

PARCOOL Green should be stored at ambient temperatures, while periods of exposure to temperatures above 35°C (95°F) should be minimized. PARCOOL Green can be stored for a minimum of 5 years in unopened containers without any effect on the product quality of performance.

PARCOOL Green is compatible with most other coolants based on ethylene glycol, but you only get the benefits of 5 years protection when its used on its own. Exclusive use of PARCOOL Green is recommended for optimum corrosion protection and sludge control.

For simple density-measuring of Ethylene Glycol and Propylene Glycol in general the standard available 'density' measuring devices are used to measure the concentration of EG. In case a device is used to measure EG, no PG can be measured afterwards as a result of the difference in the density. More specific measurements can be done by the use of a refractometer. This device can measure both EG and PG. A mix of both products will show unreliable results.

Mixed EG coolants with identical glycol type can be measured by use of a refractometer as well as the

'density' system. The mixed coolants will be considered as one product.

The use of distilled water is recommended. If you have exceptionally soft water it would be acceptable, as well. Basically, the engine metals are going to corrode to some extent no matter what water you use, and hard water will encourage the resulting metal salts to precipitate.

PARCOOL Green comes as a pre-mixed coolant to safeguard the quality of the complete product.

It is recommended that topping up of the cooling system is always done with PARCOOL Green.

6 Checks and trouble shooting



Never perform a test run with connected power cables. Never touch an electrical connector without a voltage check.

When a failure occurs, always report what you experienced before, during and after the failure. Information with regard to the load (type, size, power factor, etc.), vibrations, exhaust gas colour, insulation check, odours, output voltage, leaks and damaged parts, ambient temperature, daily and normal maintenance and altitude might be helpful to quickly locate the problem. Also report any information regarding the humidity and location of the generator set (e.g. close to sea).

6.1 Engine troubleshooting

The list below gives an overview of the possible engine problems and their possible causes.

For more details, please check the engine manufacturer user manual.

The starter motor turns the engine too slowly

- Battery capacity too low.
- Bad electrical connection.
- Fault in starter motor.
- Wrong grade of lubricating oil.

The engine does not start or is difficult to start

- Starter motor turns engine too slowly.
- Fuel tank empty.
- Fault in fuel control solenoid.
- Restriction in a fuel pipe.
- Fault in fuel lift pump.
- Dirty fuel filter element.
- Air in fuel system.
- Fault in atomisers.
- Cold start system used incorrectly.
- Fault in cold start system.
- Restriction in fuel tank vent.
- Wrong type or grade of fuel used.
- Restriction in exhaust pipe.

Not enough power

- Restriction in a fuel pipe.
- Fault in fuel lift pump.
- Dirty fuel filter element.
- Restriction in air filter/cleaner or induction system.
- Air in fuel system.
- Fault in atomisers or atomisers of an incorrect type.
- Restriction in fuel tank vent.
- Wrong type or grade of fuel used.
- Restricted movement of engine speed control.
- Restriction in exhaust pipe.
- Engine temperature is too high.
- Engine temperature is too low.

Misfire

- Restriction in a fuel pipe.
- Fault in fuel lift pump.
- Dirty fuel filter element.
- Air in fuel system.
- Fault in atomisers or atomisers of an incorrect type.
- Fault in cold start system.
- Engine temperature is too high.
- Incorrect valve tip clearances.

The pressure of the lubricating oil is too low

- Wrong grade of lubricating oil.
- Not enough lubricating oil in sump.
- Defective gauge.
- Dirty lubricating oil filter element.

High fuel consumption

- Restriction in air filter/cleaner or induction system.
- Fault in atomisers or atomisers of an incorrect type.
- Fault in cold start system.
- Wrong type or grade of fuel used.
- Restricted movement of engine speed control.
- Restriction in exhaust pipe.
- Engine temperature is too low.
- Incorrect valve tip clearances.

Black exhaust smoke

- Restriction in air filter/cleaner or induction system.
- Fault in atomisers or atomisers of an incorrect type.
- Fault in cold start system.
- Wrong type or grade of fuel used.
- Restriction in exhaust pipe.
- Engine temperature is too low.

- Incorrect valve tip clearances.
- Engine overload.

Blue or white exhaust smoke

- Wrong grade of lubricating oil.
- Fault in cold start system.
- Engine temperature is too low.

The engine knocks

- Fault in fuel lift pump.
- Fault in atomisers or atomisers of an incorrect type.
- Fault in cold start system.
- Wrong type or grade of fuel used.
- Engine temperature is too high.
- Incorrect valve tip clearances.

The engine runs erratically

- Fault in fuel control.
- Restriction in a fuel pipe.
- Fault in fuel lift pump.
- Dirty fuel filter element.
- Restriction in air filter/cleaner or induction system.
- Air in fuel system.
- Fault in atomisers or atomisers of an incorrect type.

- Fault in cold start system.
- Restriction in fuel tank vent.
- Restricted movement of engine speed control.
- Engine temperature is too high.
- Incorrect valve tip clearances.

Vibration

- Fault in atomisers or atomisers of an incorrect type.
- Restricted movement of engine speed control.
- Engine temperature is too high.
- Fan damaged.
- Fault in engine mounting or flywheel housing.

The pressure of the lubricating oil is too high

- Wrong grade of lubricating oil.
- Defective gauge.

The engine temperature is too high

- Restriction in air filter/cleaner or induction system.
- Fault in atomisers or atomisers of an incorrect type.
- Fault in cold start system.
- Restriction in exhaust pipe.
- Fan damaged.
- Too much lubricating oil in sump.
- Restriction in air or coolant passages of radiator.

Crankcase pressure

- Restriction in breather pipe.
- Vacuum pipe leaks or fault in exhaust.

Bad compression

- Restriction in air filter/cleaner or induction system.
- Incorrect valve tip clearances.

The engine starts and stops

- Dirty fuel filter element.
- Restriction in air filter/cleaner or induction system.
- Air in fuel system.

6.2 Alternator troubleshooting

<i>Symptom</i>	<i>Possible cause</i>	<i>Corrective action</i>
<i>Alternator gives 0 Volt</i>	Blown fuse. No residual voltage.	Replace fuse. Excite the alternator by applying a 12V battery voltage with a 30 Ω resistor in series on the + and - terminals of the electronic regulator, respecting the polarities.
<i>After being excited the alternator still gives 0 Volt</i>	Connections are interrupted.	Check connection cables, measure winding resistance and compare with values mentioned in the alternator manual.
<i>Low voltage at no load</i>	Voltage potentiometer out of setting. Intervention of protection. Winding failure.	Reset voltage. Check frequency/voltage regulator. Check windings.
<i>High voltage at no load</i>	Voltage potentiometer out of setting. Failed regulator.	Reset voltage. Substitute regulator.
<i>Lower than rated voltage at load</i>	Voltage potentiometer out of setting. Intervention by protection. Failed regulator. Rotating bridge failure.	Reset voltage potentiometer. Current too high, power factor lower than 0.8; speed lower than 10% of rated speed. Substitute regulator. Check diodes, disconnect cables.
<i>Higher than rated voltage at load</i>	Voltage potentiometer out of setting. Failed regulator.	Reset voltage potentiometer. Substitute regulator.
<i>Unstable voltage</i>	Speed variation in engine. Regulator out of setting.	Check regularity of rotation. Regulate stability of regulator by acting on STABILITY potentiometer.

6.3 Solving controller alarms

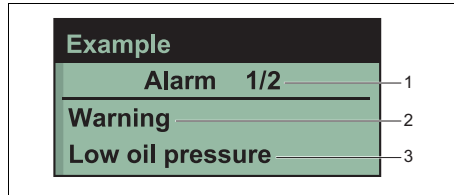
6.3.1 Qc1212™ alarms and remedies

6.3.1.1 Protections

When an alarm is present, the audible alarm will sound and the common alarm LED, if configured, will illuminate.

The audible alarm can be silenced by pressing the MUTE button.

The LCD display will jump from the Information page to display the Alarm page.



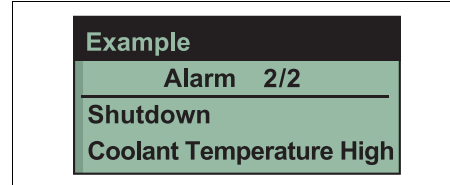
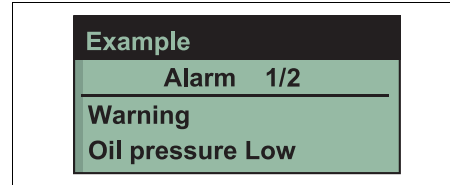
- 1 Number of present alarms. This is alarm 1 of a total of 2 present alarms
- 2 The type of alarm. E.g. Shutdown or warning
- 3 The nature of alarm, e.g. Low oil pressure

The LCD will display multiple alarms E.g. “High Engine Temperature shutdown”, “Emergency Stop” and “Low Coolant Warning”.

These alarms will automatically scroll in the order that they occurred.

In the event of a warning alarm, the LCD will display the appropriate text. If a shutdown then occurs, the module will again display the appropriate text.

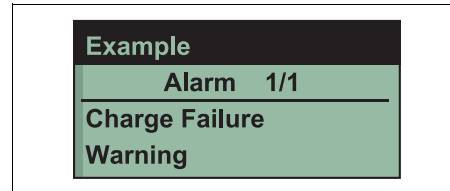
Example:



6.3.1.2 Warnings

Warnings are non-critical alarm conditions and do not affect the operation of the generator set system, they serve to draw the operators attention to an undesirable condition.

Example:



In the event of an alarm the LCD will jump to the Alarm page, and scroll through all active warnings and shutdowns.

By default, warning alarms are self-resetting when the fault condition is removed. However enabling ‘all warnings are latched’ will cause warning alarms to latch until reset manually. This can be enabled using the Qc1212™ configuration suite in conjunction with a compatible PC.

6.3.1.3 High current warning alarms

If the module detects a generator set output current in excess of the pre-set trip a warning alarm initiates. The module shows Alarm Warning High Current.

If this high current condition continues for an excess period, then the alarm escalates to a shutdown condition.

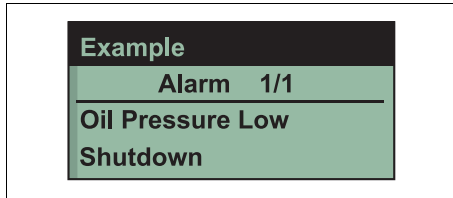
For further details of the high current alarm, please see “High current shutdown / Electrical trip alarm”.

By default, High Current Warning Alarm is self-resetting when the overcurrent condition is removed. However enabling ‘all warnings are latched’ will cause the alarm to latch until reset manually. This can be enabled using the Qc1212™ configuration suite in conjunction with a compatible PC.

6.3.1.4 Shutdowns

Shutdowns are latching alarms and stop the generator set. Clear the alarm and remove the fault then press STOP to reset the module.

Example:



The alarm condition must be rectified before a reset will take place. If the alarm condition remains, it will not be possible to reset the unit.

(The exception to this is the Low Oil Pressure alarm and similar 'delayed alarms', as the oil pressure will be low with the engine at rest.)

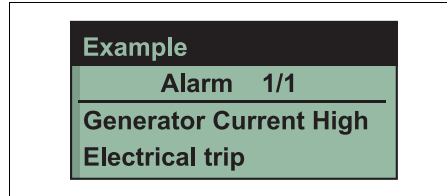
6.3.1.5 Electrical trips

Electrical trips are latching and stop the generator set but in a controlled manner.

On initiation of the electrical trip condition the module will de-energise the 'Close Generator' Output to remove the load from the generator set. Once this has occurred the module will start the Cooling timer and allow the engine to cool off-load before shutting down the engine.

The alarm must be accepted and cleared, and the fault removed to reset the module.

Example:



Electrical trips are latching alarms and stop the generator set. Remove the fault then press STOP to reset the module.

6.3.1.6 High current shutdown / Electrical trip alarm

The overcurrent alarm combines a simple warning trip level with a fully functioning IDMT curve for thermal protection.

Immediate warning

If the Immediate Warning is enabled, the Qc1212™ controller generates a warning alarm as soon as the Trip level is reached.

The alarm automatically resets once the generator set loading current falls below the Trip level (unless All Warnings are latched is enabled).

IDMT alarm

The aim of the IDMT alarm is to prevent the alternator windings being overload (heated) too much.

If the IDMT Alarm is enabled, the Qc1212™ controller begins following the IDMT 'curve' when the trip level is passed. If the Trip is surpassed for an excess amount of time the IDMT Alarm triggers (Shutdown or Electric trip as selected in Action).

- **High current shutdown** is a latching alarm and stops the generator set. Remove the fault then press STOP to reset the module.
- **High current electrical trip** is a latching alarm and removes the generator set from the load, before stopping the generator set after the off load Cooling timer. Remove the fault then press STOP to reset the module.

The higher the overload the faster the trip.

6.3.1.7 Earth fault shutdown / electrical trip alarm

When the module is suitably connected using the 'Earth Fault CT'. The module measures Earth Fault and can optionally be configured to generate an alarm condition (shutdown or electrical trip) when a specified level is surpassed.

If the Earth Fault alarm is enabled, the Qc1212™ controller begins following the IDMT 'curve'. If the Trip is surpassed for an excess amount of time the Alarm triggers (Shutdown or Electric trip as selected in Action).

The higher the earth fault the faster the trip.

6.3.1.8 Short circuit alarm

If the Short Circuit alarm is enabled, the controller begins following the IDMT ‘curve’. If the Trip is surpassed for an excess amount of time the Alarm triggers (Shutdown or Electrical trip as selected in Action).

The higher the Short Circuit, the faster the trip.

6.3.1.9 Maintenance alarm

Depending upon module configuration one or more levels of maintenance alarm may occur based upon a configurable schedule.

When activated, the maintenance alarm can be either a warning (set continues to run) or shutdown (running the set is not possible).

Resetting the maintenance alarm is normally done by the site service engineer after performing the required maintenance.

6.3.1.10 CAN alarms

CAN alarms are messages sent from the CAN ECU to the DSE controller. A description of each displayed alarm can be found in the section “Overview displayed alarm messages”.

DM1 Signals

Messages from the CAN ECU that are configurable within the DSE module for: Warning, Electrical Trip, Shutdown or None.

Display	Reason
Amber Warning	The CAN ECU has detected a Amber warning.
Red Shutdown	The CAN ECU has detected a Red Shutdown.
Malfunction	The CAN ECU has detected a Malfunction message.
Protect	The CAN ECU has detected a Protect message.

ECU alarms (CAN fault codes / DTC)

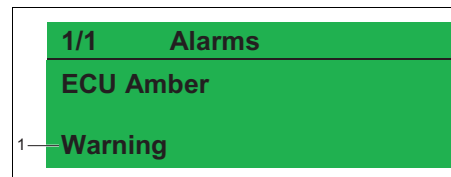


For details on these code/graphic meanings, refer to the ECU instructions provided by the engine manufacturer, or contact the engine manufacturer for further assistance.



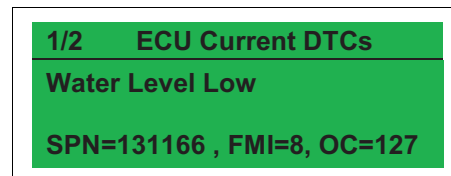
For further details on connection to electronic engines, refer to DSE Publication: 057-004 Electronic Engines And DSE Wiring.

When connected to a suitable CAN engine, the controller displays alarm status messages from the ECU in the Alarms section of the display.



- 1 | Type of alarm that is triggered on the DSE module, e.g. Warning.

Press the Next Page button to access the list of Current Engine DTCs (Diagnostic Trouble Codes) from the ECU which are DM1 messages.



The DM1 DTC is interpreted by the module and is shown on the module’s display as a text message. In addition to this, the manufacturer’s DTC is shown below.

Press the Next Page button to access the list of ECU Prev. DTCs (Diagnostic Trouble Codes) from the ECU which are DM2 messages.

1/10 ECU Prev. DTCs

Water Level Low

SPN=131166 , FMI=8, OC=127

The DM2 DTC is interpreted by the module and is shown on the module's display as a text message. In addition to this, the manufacturer's DTC is shown below.

DPF regeneration lamps



For further details of module configuration, refer to DSE Publication: 057-243 DSE7310 MKII & DSE7320 MKII Configuration Software Manual.

Depending upon the Engine Type selected in the module's configuration, the Engine section may include the DPF Regeneration Lamps page. This page contains icons to show the status of various ECU functions, some of which are applicable to Tier 4 engine requirements. The icons flash at different rates to show the status of the ECU function, refer to the engine manufacturer for more information about this.



ECU Amber Alarm

The module received an Amber fault condition from the engine ECU.



ECU Red Alarm

The module received a Red fault condition from the engine ECU.



DPF Active

The module received a fault indication from the engine ECU informing that the Diesel Particulate Filter is active.



DPF Warning

The module received a fault condition from the engine ECU informing that the Diesel Particulate Filter has a fault condition.



DPF Stop

The module received a fault indication from the engine ECU informing that the Diesel Particulate Filter has been stopped.



DPF Inhibited

The module received a fault indication from the engine ECU informing that the Diesel Particulate Filter has been inhibited.



HEST Active

The module received a fault indication from the engine ECU informing that the High Exhaust System Temperature is active.



DEF Low Level

The module received a fault condition from the engine ECU informing that the Diesel Exhaust Fluid Low Level is active.




SCR Inducement

The module received a fault indication from the engine ECU informing that the Selective Catalytic Reduction Inducement is active.

6.3.1.11 Overview displayed alarm messages



Warnings

Display	Reason
CHARGE FAILURE	The auxiliary charge alternator voltage is low as measured from the W/L terminal.
BATTERY UNDER VOLTAGE	The DC supply has fallen below the low volts setting level for the duration of the low battery volts timer.
BATTERY OVER VOLTAGE	The DC supply has risen above the high volts setting level for the duration of the high battery volts timer.
FAIL TO STOP	<p>The module has detected a condition that indicates that the engine is running when it has been instructed to stop.</p> <p> ‘Fail to Stop’ could indicate a faulty oil pressure sensor. If the engine is at rest, check the oil sensor wiring and configuration.</p>
FUEL USAGE	Indicates the amount of fuel used is in excess of the Fuel Usage alarm settings. This often indicates a fuel leak or potential fuel theft.
AUXILIARY INPUTS	Auxiliary inputs can be user configured and will display the message as written by the user.
LOW FUEL LEVEL	The level detected by the fuel level sensor is below the low fuel level setting.
CAN ECU ERROR	The engine ECU has detected a warning alarm and has informed the DSE module of this situation. The exact error is also indicated on the module’s display.
kW OVERLOAD	The measured Total kW is above the setting of the kW overload warning alarm.
LOADING VOLTAGE NOT REACHED	Indicates that the generator voltage is not above the configured loading voltage after the safety timer. The generator will shutdown.
PROTECTIONS DISABLED	Shutdown and electrical trip alarms can be disabled by user configuration. In this case, Protections Disabled will appear on the module display; The alarm text will be displayed but the engine will continue to run. This is ‘logged’ by the module to allow DSE Technical Staff to check if the protections have been disabled on the module at any time. This feature is available from V4 onwards.
LOADING FREQUENCY NOT REACHED	Indicates that the generator frequency is not above the configured loading frequency after the safety timer. The generator set will shutdown.

Display	Reason
LOW OIL PRESSURE	The module detects that the engine oil pressure has fallen below the low oil pressure pre-alarm setting level after the <i>Safety On</i> timer has expired.
ENGINE HIGH TEMPERATURE	The module detects that the engine coolant temperature has exceeded the high engine temperature pre-alarm setting level after the <i>Safety On</i> timer has expired.
OVERSPEED	The engine speed has risen above the overspeed pre-alarm setting.
UNDERSPEED	The engine speed has fallen below the underspeed pre-alarm setting.
GENERATOR OVER FREQUENCY	The generator output frequency has risen above the pre-set pre-alarm setting.
GENERATOR UNDER FREQUENCY	The generator output frequency has fallen below the pre-set pre-alarm setting after the <i>Safety On</i> timer has expired.
GENERATOR OVER VOLTAGE	The generator output voltage has risen above the pre-set pre-alarm setting.
GENERATOR UNDER VOLTAGE	The generator output voltage has fallen below the pre-set pre-alarm setting after the <i>Safety On</i> timer has expired.
ECU WARNING	The engine ECU has detected a warning alarm and has informed the DSE module of this situation. The exact error is also indicated on the module's display.

NOTE: If the module is configured for CAN and receives an "error" message from the engine control unit, 'Can ECU Warning' is shown on the module's display and a warning alarm is generated.

Shutdowns

Display	Reason
FAIL TO START	The engine has not fired after the preset number of start attempts.
EMERGENCY STOP	<p>The emergency stop button has been depressed. This a failsafe (normally closed to battery positive) input and will immediately stop the set should the signal be removed. Removal of the battery positive supply from the emergency stop input will also remove DC supply from the Fuel and Start outputs of the controller.</p> <p> The Emergency Stop Positive signal must be present otherwise the unit will shutdown.</p>
LOW OIL PRESSURE	The engine oil pressure has fallen below the low oil pressure trip setting level after the <i>Safety On</i> timer has expired.
ENGINE HIGH TEMPERATURE	The engine coolant temperature has exceeded the high engine temperature trip setting level after the <i>Safety On</i> timer has expired.
FUEL USAGE	Indicates the amount of fuel used is in excess of the Fuel Usage alarm settings. This often indicates a fuel leak or potential fuel theft.
PHASE ROTATION (Qc1212 V2.0 or above)	The phase rotation is measured as being different to the configured direction.
OVERSPEED	<p>The engine speed has exceeded the pre-set trip.</p> <p> During the start-up sequence, the overspeed trip logic can be configured to allow an extra trip level margin. This is used to prevent nuisance tripping on start-up.</p>
UNDERSPEED	The engine speed has fallen below the pre-set trip after the <i>Safety On</i> timer has expired.
GENERATOR OVER FREQUENCY	The generator output frequency has risen above the preset level.
GENERATOR UNDER FREQUENCY	The generator output frequency has fallen below the preset level.
GENERATOR OVER VOLTAGE	The generator output voltage has risen above the preset level.
GENERATOR UNDER VOLTAGE	The generator output voltage has fallen below the preset level.
OIL PRESSURE SENSOR OPEN CIRCUIT	The oil pressure sensor is detected as not being present (open circuit)

Display	Reason
AUXILIARY INPUTS	An active auxiliary input configured as a shutdown will cause the engine to shut down. The display shows the text as configured by the user.
LOSS OF SPEED SIGNAL	The speed signal from the magnetic pickup is not being received by the DSE controller.
ECU DATA FAIL	The module is configured for CAN operation and does not detect data on the engine CAN data link, the engine shuts down.
ECU SHUTDOWN	The engine ECU has detected a shutdown alarm and has informed the DSE module of this situation. The exact error is also indicated on the module's display.
kW OVERLOAD	The measured Total kW is above the setting of the kW overload shutdown alarm.
GENERATOR HIGH CURRENT	A High Current condition has continued for an excess period, then the alarm escalates to either a shutdown or electrical trip condition (depending upon module configuration). For further details of the high current alarm, see High current shutdown / Electrical trip alarm - page 90.
LOADING VOLTAGE NOT REACHED	Indicates that the generator voltage is not above the configured loading voltage after the safety timer. The generator set will shutdown.
LOADING FREQUENCY NOT REACHED	Indicates that the generator frequency is not above the configured loading frequency after the safety timer. The generator set will shutdown.
PROTECTIONS DISABLED	Shutdown and electrical trip alarms can be disabled by user configuration. In this case, Protections Disabled will appear on the module display; The alarm text will be displayed but the engine will continue to run. This is 'logged' by the module to allow DSE Technical Staff to check if the protections have been disabled on the module at any time. This feature is available from V4 onwards.
POSITIVE VAR	Positive VARs has exceeded the trip settings.
NEGATIVE VAR	Negative VARs has exceeded the trip settings.

Electrical trips

Display	Reason
GENERATOR HIGH CURRENT	If a generator set output in excess of the high current alarm point, a warning alarm occurs. If this high current condition continues for an excess period, then the alarm escalates to either a shutdown or electrical trip condition (depending upon module configuration). For further details of the high current alarm, see High current shutdown / Electrical trip alarm - page 90.
AUXILIARY INPUTS	If an auxiliary input configured as an electrical trip is active, the appropriate message will be displayed as configured by the user.
kW OVERLOAD	The measured Total kW is above the setting of the kW overload Electrical Trip alarm.
FUEL USAGE	Indicates the amount of fuel used is in excess of the Fuel Usage alarm settings. This often indicates a fuel leak or potential fuel theft.
LOADING VOLTAGE NOT REACHED	Indicates that the generator voltage is not above the configured loading voltage after the safety timer. The generator set will shutdown.
LOADING FREQUENCY NOT REACHED	Indicates that the generator frequency is not above the configured loading frequency after the safety timer. The generator set will shutdown.
PROTECTIONS DISABLED	Shutdown and electrical trip alarms can be disabled by user configuration. In this case, Protections Disabled will appear on the module display; The alarm text will be displayed but the engine will continue to run. This is 'logged' by the module to allow DSE Technical Staff to check if the protections have been disabled on the module at any time. This feature is available from V4 onwards.
GENERATOR UNDER FREQUENCY	The generator output frequency has fallen below the preset level.
GENERATOR UNDER VOLTAGE	The generator output voltage has fallen below the preset level.
UNDERSPEED	The engine speed has fallen below the underspeed level.
POSITIVE VAr	Positive VAr has exceeded the trip settings.
NEGATIVE VAr	Negative VAr has exceeded the trip settings.

6.3.2 Qc4004™ alarms and remedies

6.3.2.1 Fail Classes

All the activated alarms of the module are configured with a fail class. The fail class defines the category of the alarm and the subsequent action.

6 different fail classes can be used:

Engine running:

- **Alarm:** Alarm Horn Relay, Alarm Display.
- **Warning:** Alarm Horn Relay, Alarm Display.
- **Trip of GB:** Alarm Horn Relay, Alarm Display, GB Trip.
- **Trip & Stop:** Alarm Horn Relay, Alarm Display, (Deload), GB Trip, Genset cooling down, Genset stop.
- **Shutdown:** Alarm Horn Relay, Alarm Display, GB Trip, Genset stop.
- **Trip of MB:** Alarm Horn Relay, Alarm Display, MB Trip.

Engine stopped:

- **Alarm:** Block engine start.
- **Warning:** -
- **Trip of GB:** Block engine start, Block GB sequence.
- **Trip & Stop:** Block engine start, Block GB sequence.
- **Shutdown:** Block engine start, Block GB sequence.
- **Trip of MB:** Block MB sequence.

All alarms can be disabled or enabled as following:

- **OFF:** disabled alarm, inactive supervision.
- **ON:** enabled alarm.

6.3.2.2 Diagnostics menu

The diagnostics menu can be entered via channel 6700. It is used for engine diagnostics situations.

If diagnostics is selected in this menu, the fuel solenoid relay output will be de-energized for 30 seconds (to make sure that the unit is completely stopped), and then gets energized again. Then engine diagnostics can take place.

To leave this status, disable diagnostics in channel 6700, or press stop, or start the machine (not during the first 30 s).



It's only possible to start the generator when Normal is selected.

6.3.2.3 DPF regeneration alarms:



ECU Amber Alarm

Shows an engine warning.



ECU Red Alarm

Shows an engine shut-down.



DPF Active

Shows that a regeneration is needed.



DPF Inhibited

The module received a fault condition from the engine ECU informing that the Diesel Particulate Filter has been inhibited.



HEST Active

The module received a fault condition from the engine ECU informing that the High Exhaust System Temperature is active.



DEF Low Level

The module received a fault condition from the engine ECU informing that the Diesel Exhaust Fluid Low Level is active.



SCR Inducement

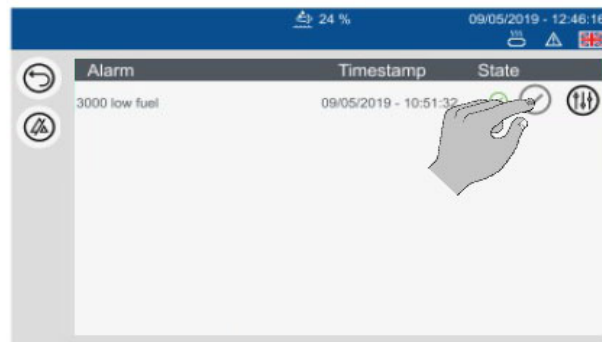
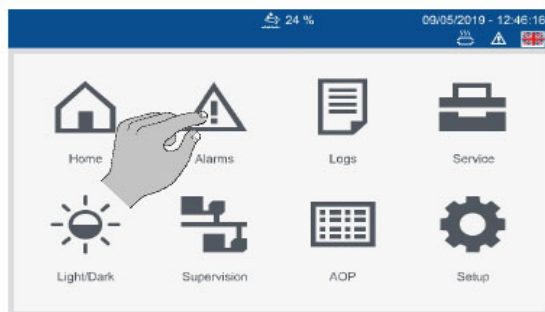
The module received a fault condition from the engine ECU informing that the Selective Catalytic Reduction Inducement is active.

6.3.2.4 Solving alarms

Menu flow



OR



7 Storage of the generator

7.1 Storage

- Store the generator in a dry, frost-free room which is well ventilated.
- Run the engine regularly, e.g. once a week, until it is warmed up. If this is impossible, extra precautions must be taken:
 - Consult the engine's operator manual.
 - Remove the battery. Store it in a dry, frost-free room. Keep the battery clean and its terminals lightly covered with petroleum jelly. Recharge the battery regularly.
 - Clean the generator and protect all electrical components against moisture.
 - Place silica gel bags, VCI paper (Volatile Corrosion Inhibitor) or another drying agent inside the generator and close the doors.
 - Stick sheets of VCI paper with adhesive tape on the bodywork to close off all openings.
 - Wrap the generator, except the bottom, with a plastic bag.

7.2 Preparing for operation after storage

Before operating the generator again, remove the wrapping, VCI paper and silica gel bags and check the generator thoroughly (go through the checklist "Before starting" on page 32).

- Consult the engine's operator manual.
- Check that the insulation resistance of the generator exceeds 5 M Ω .
- Replace the fuel filter and fill the fuel tank. Vent the fuel system.
- Reinstall and connect the battery, if necessary after being recharged.
- Submit the generator to a test run.

8 Disposal

8.1 General

When developing products and services, Atlas Copco tries to understand, address, and minimize the negative environmental effects that the products and services may have, when being manufactured, distributed, and used, as well as at their disposal.

Recycling and disposal policy are part of the development of all Atlas Copco products. Atlas Copco company standards determine strict requirements.

Selecting materials the substantial recyclability, the disassembly possibilities and the separability of materials and assemblies are considered as well as the environmental perils and dangers to health during the recycling and disposal of the unavoidable rates of not recyclable materials.

Your Atlas Copco generator consists for the most part of metallic materials, that can be remelted in steelworks and smelting works and that is therefore almost infinite recyclable. The plastic used is labelled; sorting and fractioning of the materials for recycling in the future is foreseen.



This concept can only succeed with your help. Support us by disposing professionally. By assuring a correct disposal of the product you help to prevent possible negative consequences for environment and health, that can occur with an inappropriate waste handling.

Recycling and re-usage of material helps to preserve natural resources.

8.2 Disposal of materials

Dispose contaminated substances and material separately, according to local applicable environmental legislation.

Before dismantling a machine at the end of its operating lifetime drain all fluids and dispose of according the applicable local disposal regulations.

Remove the batteries. Do not throw batteries into the fire (explosion risk) or into the residual waste. Separate the machine into metal, electronics, wiring, hoses, insulation and plastic parts.

Dispose all components according to the applicable disposal regulations.

Remove spilled fluid mechanically; pick up the rest with absorbing agent (for example sand, sawdust) and dispose it according the applicable local disposal regulations. Do not drain into the sewage system or surface water.

9 Options available

9.1 Overview of the electrical options

The following electrical options are available:

- Dual frequency (DF)
- Engine electrical coolant heater
- Automatic battery charger
- Transformer Maintenance (TM) connections
- Fleetlink CoreBox
- Fleetlink SmartBox
- “Electricité de France” (EDF)
- Outlet sockets
- Power locks
- Individual earth leakage protection for sockets, RCBO or VIGI depending on the socket
- Earth leakage relay B type, RCMA 420
- Terminal board plates extensions

9.2 Description of the electrical options

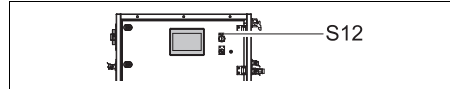


The positioning of the components mentioned in the description of the QAS+ options, may differ slightly depending on the generator model.

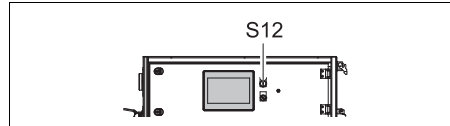
9.2.1 Dual frequency (DF)

The Dual frequency option allows the unit to work at 50 Hz or at 60 Hz at constant load. The frequency selection is done by means of switch S12.

QAS+ 250



QAS+ 450



S12Frequency selector switch (50 Hz/60 Hz)

Allows to choose the frequency of the output voltage: 50 Hz or 60 Hz.



Changing the output frequency is only allowed when the unit has stopped.

9.2.2 Engine electrical coolant heater

To make sure that the engine can start and accept load immediately, an external cooling water heater (2000 W, 240 V) is provided which keeps the engine temperature between 38°C and 49°C.

9.2.3 Automatic battery charger

The automatic battery charger has been designed to be permanently connected to a battery, keeping it charged to maximum capacity. The charger will continue to operate during cranking and running.

It can accept multiple AC voltage connections.

The LED indicator on the front shows when the charger is in a normal or overload condition:

- Off when AC supply is not present or output volts are too low.
- Steady during normal operation with AC supply above minimum operating voltage.
- Flashing when connected to an operating charging alternator.
- Pulsing during overload conditions.

The battery charger provides multi-stage charging:

- Constant current: maximum current available during charge recovery phase.
- Constant voltage.
- Chargers automatically return to float mode when charging is complete.

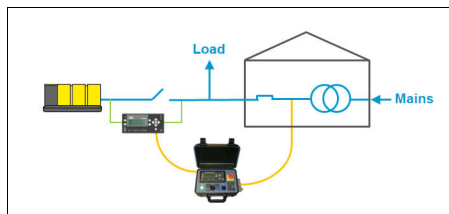
It also offers full protection:

- Reverse polarity protection, short circuit protection and current limiting.
- Automatic recovery after the removal of fault conditions.
- Battery charger thermal de-rate facility.

To use the battery charger:

- Provide the X25 connector, located at the side of the power cubicle, with external power to use the battery charger.

9.2.4 Transformer Maintenance (TM) connections



This application is normally used in combination with SEMI-AUTO mode in installations with the Mains. It is only applicable in combination with a Transformer Maintenance Box.

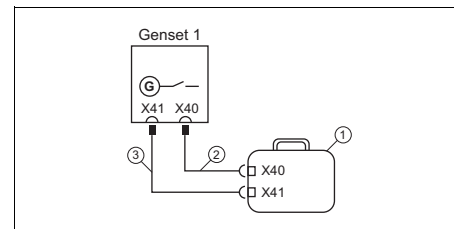
The purpose of the transformer maintenance mode is to enable repair of or service on a transformer by disconnecting the Mains from the system.

The generator will start up and synchronise with the busbar to connect to the electrical system. When the generator is synchronised, the generator breaker will close and the generator starts taking the load. When the Mains power is zero, the mains breaker can be switched off or the fuses can be removed.

After repair or service of the transformer the generator will be back synchronised to the mains and fuses can be restored. Power is moved from generator to mains again before disconnecting.

Installation wiring

- The link between X25.10 & X25.11 has to be removed.
- Plug the Transformer Maintenance Box cables into Transformer Maintenance Box connectors X40 and X41 on the cubicle.



- 1 Transformer Maintenance Box (1626 4629 00)
- 2 Control cable (25 m) (1626 4630 00)
- 3 Sensing cable (25 m) (1626 4631 00)



To protect the unit and the load, a suitable protection installed on the power cables between the Mains and the generator should be foreseen by the end-user.



For more information on Transformer Maintenance, refer to the Transformer Maintenance manual.

9.2.5 Fleetlink CoreBox

Fleetlink is an intelligent telematics system that helps optimize fleet usage, reduce maintenance cost, ultimately saving time and money. It allows to manage the unit conveniently wherever it is, always helping with the latest fleet information.

Fleetlink comes with the following functions:

- Location (GPS)
- Running status
- Running hours
- Service status
- Service notifications
- Geo fencing

Daily, weekly or monthly running log.

9.2.6 Fleetlink SmartBox

Fleetlink is an intelligent telematics system that helps optimize fleet usage, reduce maintenance cost, ultimately saving time and money. It allows to manage the unit conveniently wherever it is, always helping with the latest fleet information.

Fleetlink SmartBox comes with a full access to all the parameters available through CANbus in the control panel, location (GPS) and geo fencing.

Daily, weekly or monthly running log.

9.2.7 “Electricité de France” (EDF)

When the EDF-option is installed, the unit operates as a standard unit when the neutral and the PE terminals are connected to each other. In this case, an earth leakage at the side of the generator or at the side of the load will switch off the circuit breaker.

When EDF-option is installed, the unit operates as EDF-unit when the earthing, the PE and the PE EDF terminals are connected to each other. In this case, an earth leakage at the side of the generator will switch off the circuit breaker. An earth leakage at the side of the load will not switch off the circuit breaker.



Changing the operation mode from standard unit to EDF-unit or vice versa has to be carried out by a qualified person from “Electricité de France”.

9.2.8 Outlet sockets

A brief description of all outlet sockets and circuit breakers available on the generator is given hereafter.

2 sockets available per slot:

- 1-phase outlet socket 3P (230 V AC/ 16 A)
 - Domestic socket, RIM, PIN or CEE.
- 3-phase outlet socket 5P (400 V AC/ 16 A)
 - Provides phases L1, L2 and L3, neutral and earthing.
- 3-phase outlet socket 5P (400 V AC/ 32 A)
 - Provides phases L1, L2 and L3, neutral and earthing.

1 socket available per slot:

- 3-phase outlet socket 5P (400 V AC/ 63 A)
 - Provides phases L1, L2 and L3, neutral and earthing.
- 3-phase outlet socket 5P (400 V AC/ 125 A)
 - Provides phases L1, L2 and L3, neutral and earthing.

Outlet sockets:

- SKT 125A 400V
- SKT 63A 400V
- SKT 32A 400V
- SKT 16A 400V
- SKT 32A 230V
- DSKT 16A CEE
- DSKT 16A PIN
- DSKT 16A RIM

9.2.9 Power locks

Powerlock connectors are plastic bodied single pole electrical connectors withstanding 660 Amps nominal intensity.

They are moisture and impact resistant and feature insulated contact tips to prevent accidental touching of electrically live parts.

They are easy to terminate to copper cable using either industry standard crimp tools or set-screw contacts.

The high impact plastic connector bodies are keyed to prevent connection errors, and colour coded to ensure correct mating and suit 3 phase electrical systems that are used in Europe.

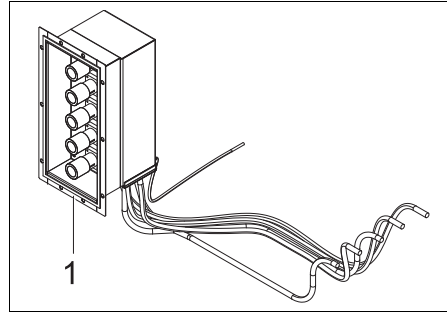
Secure coupling of a connector pair is through a bayonet lock together with a secondary locking pin.

The secondary lock engages when the bayonet lock is fully turned and disconnection requires a simple release key. The secondary lock discourages tampering and reduces the risk of accidental or unauthorized disconnection.

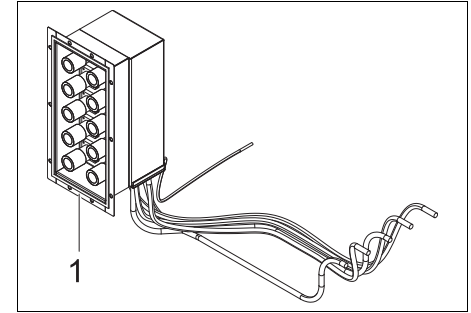
All connectors are IP2X finger protected and environmentally sealed to IP67.

Powerlocks are mounted on generator back side to access power as required.

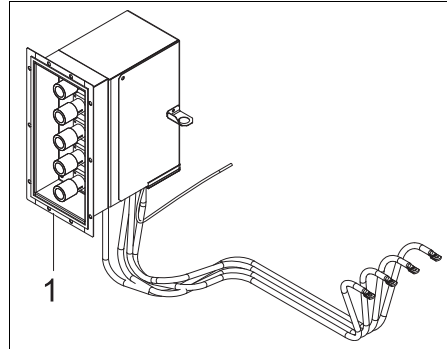
Powerlock - single - QAS+ 250



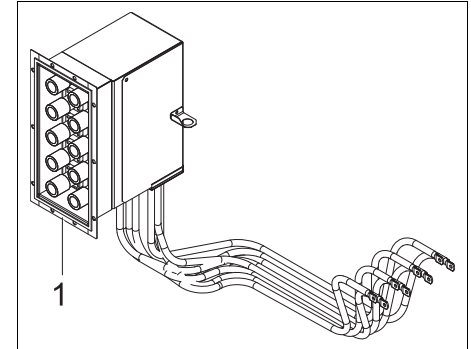
Powerlock - double - QAS+ 250



Powerlock - single - QAS+ 450



Powerlock - double - QAS+ 450



9.2.10 Individual earth leakage protection for sockets, RCBO or VIGI depending on the socket

The option provides a detector that will trip the socket breaker when an earth fault current is detected.

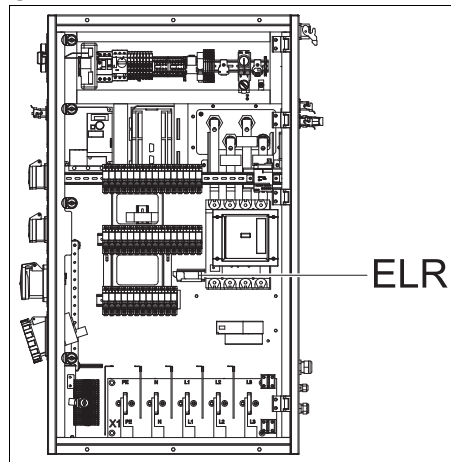
Type A and B protections available.

9.2.11 Earth leakage relay B type, RCMA 420

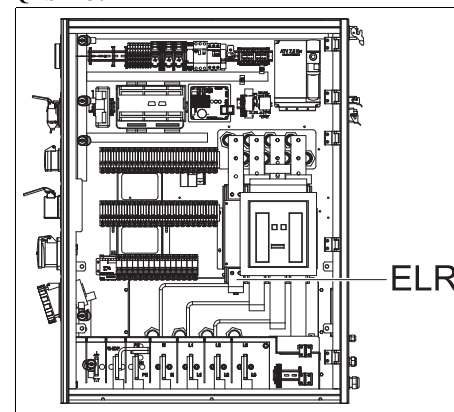
The Earth relay provides a detector that will trip the main circuit breaker Q1 when an earth fault current is detected.

This option replaces the standard earth leakage relay with a RCMA420 which is type B.

QAS+ 250



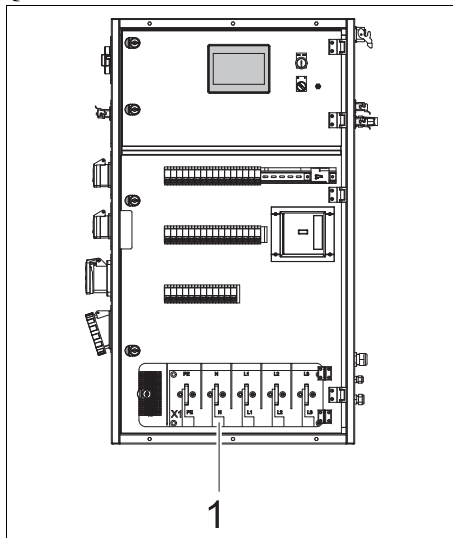
QAS+ 450



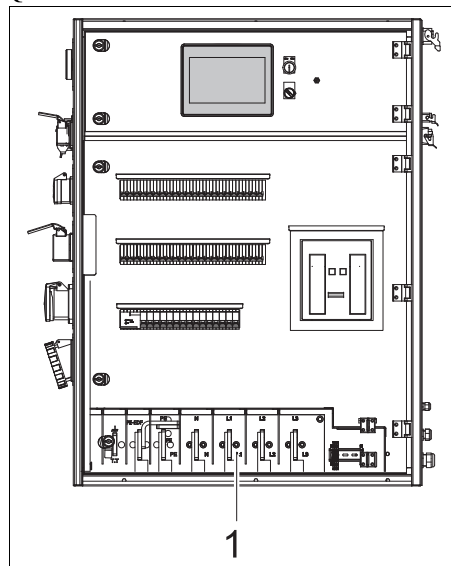
ELREarth leakage relay

9.2.12 Terminal board plates extensions

QAS+ 250



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Terminal board plates extensions can be added on the terminal connection plates. As a result, the connection cable doesn't need to have terminals. They can be connected with a locking screw.

9.3 Overview of the mechanical options

The following mechanical options are available:

- Cold weather
- Special Application Equipment: inlet shutdown valve (ISV)
- Galvanized traction bar add-on, one per side
- Transport bumpers
- Special colour
- External fuel tank quick couplings

9.4 Description of the mechanical options

9.4.1 Cold weather

Includes synthetic oil, engine coolant heater diesel antifreeze additive and fluid systems special isolations. It grants generator operation below -15°C.

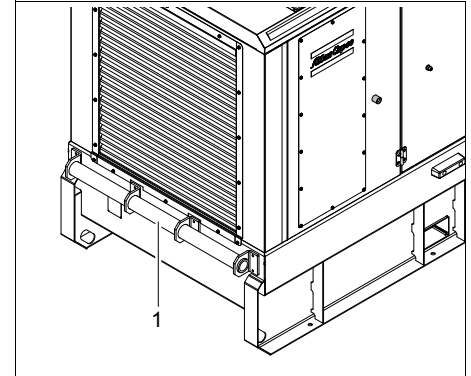
9.4.2 Special Application Equipment: inlet shutdown valve (ISV)

The inlet shutdown valve option is included in the refinery equipment pack. It will prevent over-speeding of the engine due to combustible gases being traced within the normal engine air intake.

9.4.3 Galvanized traction bar add-on, one per side

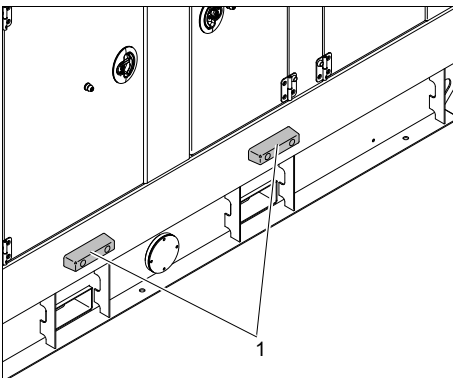
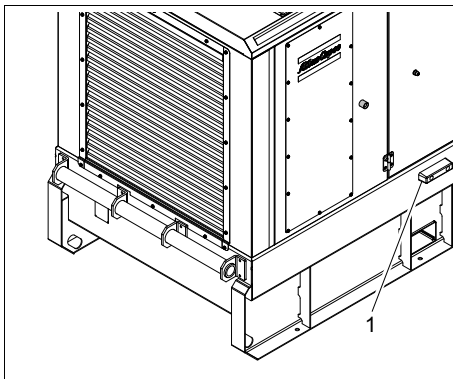
One galvanized traction bar per side. These are add-ons.

QAS+ 250



9.4.4 Transport bumpers

Two side rubbers (1) are present above the forklift slots.

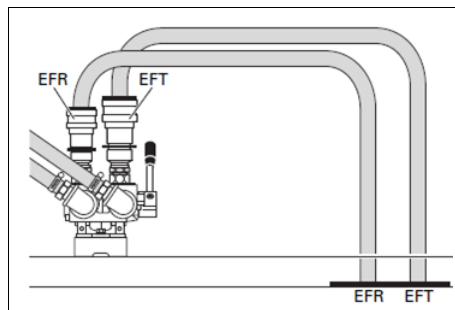


9.4.5 Special colour

Special colours are available for the canopy and the frame. Contact your generator set supplier for available configurations.

9.4.6 External fuel tank quick couplings

The option Quick couplings allows to bypass the internal fuel tank and to connect an external fuel tank to the unit.



EFT		External fuel tank connection
EFR		External fuel tank return connection

Make sure that:

- the big size coupling is used for the inlet.
- the small size coupling is used for the outlet.



An extra clamp needs to be used to guide the fuel lines.

10 Technical specifications

10.1 Technical specifications for QAS+ 250

10.1.1 Specifications of the engine/alternator/unit

		50 Hz	60 Hz
<i>Reference conditions</i> 1)	Rated frequency	50 Hz	60 Hz
	Rated speed	1500 rpm	1800 rpm
	Generator service duty	PRP	PRP
	Absolute air inlet pressure	1 bar(a)	1 bar(a)
	Relative air humidity	30%	30%
	Air inlet temperature	25°C	25°C
<i>Limitations</i> 2)	Maximum ambient temperature	35°C	35°C
	Altitude capability	3000 m	3000 m
	Maximum relative air humidity	85%	85%
	Minimum starting temperature	0°C	0°C
	Minimum starting temperature with cold start equipment (optional)	-10/ -25°C	-10/ -25°C
<i>Performance data</i> 2) 3) 4) 5)	Rated active power (PRP)	198 kW	206 kW
	Rated active power (ESP)	218 kW	226 kW
	Rated power factor (lagging) 3ph	0.8 cos φ	0.8 cos φ
	Rated apparent power (PRP)	247 kVA	258 kVA
	Rated apparent power (ESP)	272 kVA	283 kVA
	Rated voltage line to line	400 V	480 V
	Rated current	357 A	310 A
	Performance class (acc.ISO 8528-5:1993)	G2/ G3	G2/ G3
	Single step load acceptance	60/ 45%	75/ 60%
	Frequency droop	118.6/ 88.9 kW isochronous, ≤5%	154.8/ 123.8 kW isochronous, ≤5%
	Fuel consumption at no load (0%)	5.1 kg/h	8.0 kg/h
	Fuel consumption at 50% load	21.2 kg/h	25.2 kg/h
	Fuel consumption at 75% load	31.7 kg/h	34.4 kg/h

	Fuel consumption at full load (100%)	41.4 kg/h	45.6 kg/h
	Specific fuel consumption at full load (100%)	0.209 kg/kWh	0.210 kg/kWh
	Capacity of standard fuel tank	1240 l	1240 l
	Capacity of 24h fuel tank	N/A	N/A
	Fuel autonomy at full load with standard tank	25.5 h	23.1 h
	Fuel autonomy at 75% load with standard tank	33.2 h	30.6 h
	Max. oil consumption at full load	N/A	-
	Urea consumption at 50% load	2.5 kg/h	3.65 kg/h
	Urea consumption at 75% load	3.4 kg/h	4.16 kg/h
	Urea consumption at 100% load	4.0 kg/h	4.88 kg/h
	Relative urea consumption at 75% load	10.7% mass	12.1% mass
		8.3% Vol	9.4% Vol
	Relative urea consumption at 100% load	9.6% mass	10.7% mass
		7.5% Vol	8.3% Vol
	Specific urea consumption	0.020 kg/kWh	0.022 kg/kWh
	Urea autonomy at full load with standard tank	17.2 h	14.0 h
	Urea autonomy at 75% load with standard tank	20.3 h	16.5 h
	Capacity of standard urea tank	63 l	63 l
	Maximum sound power level (Lw) complies with 2000/14/EC	94 dB(A)	-
	Single step load capability	100%	100%
		197.6 kW	206.4 kW
<i>Application data</i>	Mode of operation	PRP	PRP
	Site	land use	land use
	Operation	single	single
	Start-up and control mode	manual/auto	manual/auto
	Start-up time	unspecified	unspecified
	Mobility/Config. acc. to ISO 8528-1:1993 (optional)	transportable/D mobile/E	transportable/D mobile/E
	Mounting	fully resilient	fully resilient
	Climatic exposure	open air	open air
<i>Engine</i>	Standard	ISO 3046	ISO 3046
		ISO 8528-2	ISO 8528-2
	Type Scania	DC9 320A	DC9 320A

	Rated net output rating type acc. ISO 3046-7	223 kW ICXN	223 kW ICXN
	Coolant	Parcool EG	Parcool EG
	Combustion system	direct injection	direct injection
	Aspiration	turbo charged	turbo charged
	Number of cylinders	5	5
	Swept volume	9.3 l	9.3 l
	Speed governing	electronic	electronic
	Capacity of oil sump (initial fill)	36 l	36 l
	Electrical system	24 Vdc	24 Vdc
	Maximum permissible load factor of PRP during 24h period	70%	70%
<i>Alternator 4)</i>	Standard	IEC 34-1 ISO 8528-3	IEC 34-1 ISO 8528-3
	Make	Leroy Sommers	Leroy Sommers
	Model	LSA 47.2 S5	LSA 47.2 S5
	Rated output, class H temperature rise rating type acc. ISO 8528-3	125 kVA 125/40°C	125 kVA 125/40°C
	Degree of protection (IP index acc. NF EN 60-529)	IP 23	IP 23
	Insulation stator class	H	H
	Insulation rotor class	H	H
	Number of wires	12	12
<i>Power circuit</i>	Circuit-breaker, 3ph.		
	Number of poles	4	4
	Thermal release I_t (thermal release is higher at 25°C)	360 A (0.9 x I_n)	360 A (0.9 x I_n)
	Magnetic release I_m	3.5 x I_n	3.5 x I_n
	Fault current protection		
	Residual current release I_{dn}	0.03-30 A	0.03-30 A
	Insulation resistance (optional)	1-200 kOhm	1-200 kOhm

Notes

- 1) Reference conditions for engine performance to ISO 3046-1.
- 2) See derating diagram below or consult the factory for other conditions.
- 3) At reference conditions unless otherwise stated.
- 4) Rating definition (ISO 8528-1):
 LTP: limited Time Power is the maximum electrical power which a generating set is capable of delivering (at variable load), in the event of a utility power failure (for up to 500 hours per year of which a maximum of 300 hours is continuous running). No overload is permitted on these ratings. The alternator is peak continuous rated (as defined in ISO8528-3) at 25°C.
 PRP: Prime Power is the maximum power available during a variable power sequence, which may be run for an unlimited number of hours per year, between stated maintenance intervals and under the stated ambient conditions. A 10% overload is permitted for 1 hour in 12 hours. The permissible average power output during a 24h period shall not exceed the stated load factor as indicated in the ‘Technical specifications’ above.
- 5) Specific mass fuel used: 0.86 kg/l.

*Derating factor (%)
PRP 1500 - 400V*

Height (m)	Temperature (°C)										
	0	5	10	15	20	25	30	35	40	45	50
0	100	100	100	100	100	100	95	95	95	90	90
500	95	95	95	95	95	95	95	95	90	90	90
1000	95	95	95	95	95	95	95	95	90	90	90
1500	95	95	95	95	95	95	95	90	90	90	90
2000	95	95	95	95	95	95	90	90	90	85	85
2500	90	90	90	90	90	90	85	85	85	NA	NA
3000	90	90	90	90	90	90	85	85	85	NA	NA

Derating factor (%)
PRP 1800 - 480V

Height (m)	Temperature (°C)										
	0	5	10	15	20	25	30	35	40	45	50
0	100	100	100	100	100	100	95	95	95	90	85
500	95	95	95	95	95	95	95	95	90	90	85
1000	95	95	95	95	95	95	95	95	90	90	85
1500	95	95	95	95	95	95	95	90	90	90	85
2000	95	95	95	95	95	95	95	90	90	90	85
2500	95	95	95	95	95	95	90	90	90	NA	NA
3000	90	90	90	90	90	90	90	90	90	NA	NA

Derating factor (%)
ESP 1500 - 400V

Height (m)	Temperature (°C)										
	0	5	10	15	20	25	30	35	40	45	50
0	100	100	100	100	100	100	95	95	95	90	90
500	95	95	95	95	95	95	95	95	90	90	90
1000	95	95	95	95	95	95	95	95	90	90	90
1500	95	95	95	95	95	95	90	90	90	90	85
2000	90	90	90	90	90	90	85	85	85	85	80
2500	85	85	85	85	85	85	80	80	80	NA	NA
3000	85	85	85	85	85	85	80	80	80	NA	NA

*Derating factor (%)
ESP 1800 - 480V*

Height (m)	Temperature (°C)										
	0	5	10	15	20	25	30	35	40	45	50
0	100	100	100	100	100	100	95	95	95	90	90
500	95	95	95	95	95	95	95	95	90	90	90
1000	95	95	95	95	95	95	95	95	90	90	90
1500	95	95	95	95	95	95	95	90	90	90	90
2000	95	95	95	95	95	95	95	90	90	90	85
2500	95	95	95	95	95	95	90	90	90	NA	NA
3000	95	95	95	95	95	95	90	90	90	NA	NA

For use of generator outside these conditions, please contact Atlas Copco.

10.2 Technical specifications for QAS+ 325

10.2.1 Specifications of the engine/alternator/unit

		50 Hz
<i>Reference conditions</i> 1)	Rated frequency	50 Hz
	Rated speed	1500 rpm
	Generator service duty	PRP
	Absolute air inlet pressure	1 bar(a)
	Relative air humidity	30%
	Air inlet temperature	25°C
<i>Limitations 2)</i>	Maximum ambient temperature	35°C
	Altitude capability	3000 m
	Maximum relative air humidity	85%
	Minimum starting temperature	0°C
	Minimum starting temperature with cold start equipment (optional)	-10/ -25°C
<i>Performance data 2) 3)</i> 4) 5)	Rated active power (PRP)	257 kW
	Rated active power (ESP)	283 kW
	Rated power factor (lagging) 3ph	0.8 cos φ
	Rated apparent power (PRP)	321 kVA
	Rated apparent power (ESP)	354 kVA
	Rated voltage line to line	400 V
	Rated current	463 A
	Performance class (acc.ISO 8528-5:1993)	G2/ G3
	Single step load acceptance	55/ 40%
	Frequency droop	141.2/ 102.7 kW isochronous, ≤5%
	Fuel consumption at no load (0%)	5.8 kg/h
	Fuel consumption at 50% load	27.6 kg/h
	Fuel consumption at 75% load	40.0 kg/h
	Fuel consumption at full load (100%)	53.3 kg/h
	Specific fuel consumption at full load (100%)	0.208 kg/kWh

	Fuel autonomy at full load with standard tank	19.8 h
	Fuel autonomy at 75% load with standard tank	26.4 h
	Max. oil consumption at full load	0.05 l/h
	Capacity of standard fuel tank	1240 l
	Capacity of 24h fuel tank	N/A
	Urea consumption at 50% load	2.8 kg/h
	Urea consumption at 75% load	3.6 kg/h
	Urea consumption at 100% load	5.4 kg/h
	Relative urea consumption at 75% load	9.0% mass 7.0% Vol
	Relative urea consumption at 100% load	10.1% mass 7.9% Vol
	Specific urea consumption	0.021 kg/kWh
	Urea autonomy at full load with standard tank	12.7 h
	Urea autonomy at 75% load with standard tank	19.0 h
	Capacity of standard urea tank	63 l
	Maximum sound power level (Lw) complies with 2000/14/EC	97 dB(A)
	Single step load capability	100% 256.8 kW
<i>Application data</i>	Mode of operation	PRP
	Site	land use
	Operation	single
	Start-up and control mode	manual/auto
	Start-up time	unspecified
	Mobility/Config. acc. to ISO 8528-1:1993 (optional)	transportable/D mobile/E
	Mounting	fully resilient
	Climatic exposure	open air
<i>Engine</i>	Standard	ISO 3046 ISO 8528-2
	Type Scania	DC9 320A
	Rated net output	289 kW
	rating type acc. ISO 3046-7	ICXN

	Coolant	Parcool EG
	Combustion system	direct injection
	Aspiration	turbo charged
	Number of cylinders	5
	Swept volume	9.3 l
	Speed governing	electronic
	Capacity of oil sump (initial fill)	36 l
	Electrical system	24 Vdc
	Maximum permissible load factor of PRP during 24h period	70%
<i>Alternator 4)</i>	Standard	IEC 34-1 ISO 8528-3
	Make	Leroy Sommers
	Model	LSA 46.3 L10
	Rated output, class H temperature rise	125 kVA
	rating type acc. ISO 8528-3	125/40°C
	Degree of protection (IP index acc. NF EN 60-529)	IP 23
	Insulation stator class	H
	Insulation rotor class	H
	Number of wires	12
<i>Power circuit</i>	Circuit-breaker, 3ph.	
	Number of poles	4
	Thermal release I_t (thermal release is higher at 25°C)	476 A (0.8 x I_n)
	Magnetic release I_m	4 x I_n
	Fault current protection	
	Residual current release I_{dn}	0.03-30 A
	Insulation resistance (optional)	1-200 kOhm

Notes

- 1) Reference conditions for engine performance to ISO 3046-1.
- 2) See derating diagram below or consult the factory for other conditions.
- 3) At reference conditions unless otherwise stated.
- 4) Rating definition (ISO 8528-1):
 LTP: limited Time Power is the maximum electrical power which a generating set is capable of delivering (at variable load), in the event of a utility power failure (for up to 500 hours per year of which a maximum of 300 hours is continuous running). No overload is permitted on these ratings. The alternator is peak continuous rated (as defined in ISO8528-3) at 25°C.
 PRP: Prime Power is the maximum power available during a variable power sequence, which may be run for an unlimited number of hours per year, between stated maintenance intervals and under the stated ambient conditions. A 10% overload is permitted for 1 hour in 12 hours. The permissible average power output during a 24h period shall not exceed the stated load factor as indicated in the ‘Technical specifications’ above.
- 5) Specific mass fuel used: 0.86 kg/l.

*Derating factor (%)
PRP 1500 - 400V*

Height (m)	Temperature (°C)										
	0	5	10	15	20	25	30	35	40	45	50
0	100	100	100	100	100	100	95	95	95	90	90
500	95	95	95	95	95	95	95	95	90	90	90
1000	95	95	95	95	95	95	95	95	90	90	90
1500	95	95	95	95	95	95	95	90	90	90	90
2000	95	95	95	95	95	95	90	90	90	85	85
2500	90	90	90	90	90	90	85	85	85	NA	NA
3000	90	90	90	90	90	90	85	85	85	NA	NA

Derating factor (%)
PRP 1800 - 480V

Height (m)	Temperature (°C)										
	0	5	10	15	20	25	30	35	40	45	50
0	100	100	100	100	100	100	95	95	95	90	85
500	95	95	95	95	95	95	95	95	90	90	85
1000	95	95	95	95	95	95	95	95	90	90	85
1500	95	95	95	95	95	95	95	90	90	90	85
2000	95	95	95	95	95	95	95	90	90	90	85
2500	95	95	95	95	95	95	90	90	90	NA	NA
3000	90	90	90	90	90	90	90	90	90	NA	NA

Derating factor (%)
ESP 1500 - 400V

Height (m)	Temperature (°C)										
	0	5	10	15	20	25	30	35	40	45	50
0	100	100	100	100	100	100	95	95	95	90	90
500	95	95	95	95	95	95	95	95	90	90	90
1000	95	95	95	95	95	95	95	95	90	90	90
1500	95	95	95	95	95	95	90	90	90	90	85
2000	90	90	90	90	90	90	85	85	85	85	80
2500	85	85	85	85	85	85	80	80	80	NA	NA
3000	85	85	85	85	85	85	80	80	80	NA	NA

Derating factor (%)
ESP 1800 - 480V

Height (m)	Temperature (°C)										
	0	5	10	15	20	25	30	35	40	45	50
0	100	100	100	100	100	100	95	95	95	90	90
500	95	95	95	95	95	95	95	95	90	90	90
1000	95	95	95	95	95	95	95	95	90	90	90
1500	95	95	95	95	95	95	95	90	90	90	90
2000	95	95	95	95	95	95	95	90	90	90	85
2500	95	95	95	95	95	95	90	90	90	NA	NA
3000	95	95	95	95	95	95	90	90	90	NA	NA

For use of generator outside these conditions, please contact Atlas Copco.

10.3 Technical specifications for QAS+ 450

10.3.1 Specifications of the engine/alternator/unit

		50 Hz
<i>Reference conditions</i> 1)	Rated frequency	50 Hz
	Rated speed	1500 rpm
	Generator service duty	PRP
	Absolute air inlet pressure	1 bar(a)
	Relative air humidity	30%
	Air inlet temperature	25°C
<i>Limitations</i> 2)	Maximum ambient temperature	35°C
	Altitude capability	3000 m
	Maximum relative air humidity	85%
	Minimum starting temperature	0°C
	Minimum starting temperature with cold start equipment (optional)	-10/ -25°C
<i>Performance data</i> 2) 3) 4) 5)	Rated active power (PRP)	359 kW
	Rated active power (ESP)	395 kW
	Rated power factor (lagging) 3ph	0.8 cos φ
	Rated apparent power (PRP)	449 kVA
	Rated apparent power (ESP)	494 kVA
	Rated voltage line to line	400 V
	Rated current	648 A
	Performance class (acc.ISO 8528-5:1993)	G2/ G3
	Single step load acceptance	55/ 40%
	Frequency droop	197.6/ 143.7 kW isochronous, ≤5%
	Fuel consumption at no load (0%)	8.1 kg/h
	Fuel consumption at 50% load	37.0 kg/h
	Fuel consumption at 75% load	53.7 kg/h
	Fuel consumption at full load (100%)	74.1 kg/h
	Specific fuel consumption at full load (100%)	0.206 kg/kWh

	Fuel autonomy at full load with standard tank	14.2 h
	Fuel autonomy at 75% load with standard tank	19.6 h
	Max. oil consumption at full load	0.08 l/h
	Capacity of standard fuel tank	1240 l
	Urea consumption at 50% load	4.1 kg/h
	Urea consumption at 75% load	3.9 kg/h
	Urea consumption at 100% load	8.1 kg/h
	Relative urea consumption at 75% load	7.3% mass 5.7% Vol
	Relative urea consumption at 100% load	11.0% mass 8.6% Vol
	Specific urea consumption	0.023 kg/kWh
	Urea autonomy at full load with standard tank	8.4 h
	Urea autonomy at 75% load with standard tank	17.6 h
	Capacity of standard urea tank	63 l
	Maximum sound power level (Lw) complies with 2000/14/EC	97 dB(A)
	Single step load capability	100% 359.2 kW
<i>Application data</i>	Mode of operation	PRP
	Site	land use
	Operation	single
	Start-up and control mode	manual/auto
	Start-up time	unspecified
	Mobility/Config. acc. to ISO 8528-1:1993 (optional)	transportable/D mobile/E
	Mounting	fully resilient
	Climatic exposure	open air
<i>Engine</i>	Standard	ISO 3046 ISO 8528-2
	Type Scania	DC13 320A
	Rated net output	397 kW
	rating type acc. ISO 3046-7	ICXN
	Coolant	Parcool EG

	Combustion system	direct injection
	Aspiration	turbo charged
	Number of cylinders	6
	Swept volume	12.7 l
	Speed governing	electronic
	Capacity of oil sump (initial fill)	45 l
	Electrical system	24 Vdc
	Maximum permissible load factor during 24h period	70%
<i>Alternator 4)</i>	Standard	IEC 34-1 ISO 8528-3
	Make	Leroy Sommers
	Model	LSA 47.2 S5
	Rated output, class H temperature rise rating type acc. ISO 8528-3	455 kVA 125/ 40°C
	Degree of protection (IP index acc. NF EN 60-529)	IP 23
	Insulation stator class	H
	Insulation rotor class	H
	Number of wires	12
<i>Power circuit</i>	Circuit-breaker, 3ph.	
	Number of poles	4
	Thermal release I_t (thermal release is higher at 25°C)	640 A (0.8 x I_n)
	Magnetic release I_m	4 x I_n
	Fault current protection	
	Residual current release I_{dn}	0.03-30 A
	Insulation resistance (optional)	1-200 kOhm

Notes

- 1) Reference conditions for engine performance to ISO 3046-1.
- 2) See derating diagram below or consult the factory for other conditions.
- 3) At reference conditions unless otherwise stated.
- 4) Rating definition (ISO 8528-1):
 LTP: limited Time Power is the maximum electrical power which a generating set is capable of delivering (at variable load), in the event of a utility power failure (for up to 500 hours per year of which a maximum of 300 hours is continuous running). No overload is permitted on these ratings. The alternator is peak continuous rated (as defined in ISO8528-3) at 25°C.
 PRP: Prime Power is the maximum power available during a variable power sequence, which may be run for an unlimited number of hours per year, between stated maintenance intervals and under the stated ambient conditions. A 10% overload is permitted for 1 hour in 12 hours. The permissible average power output during a 24h period shall not exceed the stated load factor as indicated in the ‘Technical specifications’ above.
- 5) Specific mass fuel used: 0.86 kg/l.

Derating factor (%)
 PRP 1500 - 400V

Height (m)	Temperature (°C)										
	0	5	10	15	20	25	30	35	40	45	50
0	100	100	100	100	100	100	95	95	95	90	90
500	95	95	95	95	95	95	95	95	90	90	90
1000	95	95	95	95	95	95	95	95	90	90	90
1500	95	95	95	95	95	95	95	90	90	90	90
2000	95	95	95	95	95	95	90	90	90	85	85
2500	90	90	90	90	90	90	85	85	85	NA	NA
3000	90	90	90	90	90	90	85	85	85	NA	NA

Derating factor (%)
PRP 1800 - 480V

Height (m)	Temperature (°C)										
	0	5	10	15	20	25	30	35	40	45	50
0	100	100	100	100	100	100	95	95	95	90	85
500	95	95	95	95	95	95	95	95	90	90	85
1000	95	95	95	95	95	95	95	95	90	90	85
1500	95	95	95	95	95	95	95	90	90	90	85
2000	95	95	95	95	95	95	95	90	90	90	85
2500	95	95	95	95	95	95	90	90	90	NA	NA
3000	90	90	90	90	90	90	90	90	90	NA	NA

Derating factor (%)
ESP 1500 - 400V

Height (m)	Temperature (°C)										
	0	5	10	15	20	25	30	35	40	45	50
0	100	100	100	100	100	100	95	95	95	90	90
500	95	95	95	95	95	95	95	95	90	90	90
1000	95	95	95	95	95	95	95	95	90	90	90
1500	95	95	95	95	95	95	90	90	90	90	85
2000	90	90	90	90	90	90	85	85	85	85	80
2500	85	85	85	85	85	85	80	80	80	NA	NA
3000	85	85	85	85	85	85	80	80	80	NA	NA

Derating factor (%)
ESP 1800 - 480V

Height (m)	Temperature (°C)										
	0	5	10	15	20	25	30	35	40	45	50
0	100	100	100	100	100	100	95	95	95	90	90
500	95	95	95	95	95	95	95	95	90	90	90
1000	95	95	95	95	95	95	95	95	90	90	90
1500	95	95	95	95	95	95	95	90	90	90	90
2000	95	95	95	95	95	95	95	90	90	90	85
2500	95	95	95	95	95	95	90	90	90	NA	NA
3000	95	95	95	95	95	95	90	90	90	NA	NA

For use of generator outside these conditions, please contact Atlas Copco.

10.4 Conversion list of SI units into British units

1 bar	=	14.504 psi
1 g	=	0.035 oz
1 kg	=	2.205 lbs
1 km/h	=	0.621 mile/h
1 kW	=	1.341 hp (UK and US)
1 l	=	0.264 US gal
1 l	=	0.220 imp gal (UK)
1 l	=	0.035 cu.ft
1 m	=	3.281 ft
1 mm	=	0.039 in
1 m ³ /min	=	35.315 cfm
1 mbar	=	0.401 in wc
1 N	=	0.225 lbf
1 Nm	=	0.738 lbf.ft
t_{F}	=	$32 + (1.8 \times t_{\text{C}})$
t_{C}	=	$(t_{\text{F}} - 32)/1.8$

A temperature difference of 1°C = a temperature difference of 1.8°F.

10.5 Data plate

1. Name of manufacturer
2. EEC or national type approved number
3. Vehicle identification number
4. Maximum permitted total weight of the vehicle
5. Maximum permitted load on towing eye (fixed towbar)
6. Maximum permitted axle load (fixed towbar)
7. Maximum permitted load on towing eye (articulated towbar)
8. Maximum permitted axle load (articulated towbar)
9. Model number
10. Frequency
11. Apparent power - PRP
12. Active power - PRP
13. Nominal rated voltage
14. Nominal rated current
15. Generator class
16. Manufacturing year
17. Machine type
18. Mode of operation
19. Winding connections
20. Power factor
21. Serial number
22. EEC mark in accordance with Machine Directive 89/392E

10.6 Critical bolt connections - torque values

Applications	Screw/Bolt/Nut		
	Type	Class	Torque (Nm)
Lifting beam - frame (horizontal)	M12	8.8	83 + Loctite 2400
Lifting beam - frame (vertical)	M12	8.8	83 + Loctite 2400
Fan box - roof	M8	8.8	24.3
Alternator - alternator vibration damper	M16	8.8	125 (+/- 10%)
Alternator vibration damper - beam	M12	8.8	83 (+/- 10%)
Coupling housing alternator - flywheel housing engine	M12	8.8	83 (+/- 10%)
Engine flywheel - alternator	M10	8.8	48.2 (+/- 10%)
Engine - engine support	M16	8.8	125 (+/- 10%)
Engine support - vibration damper	M12	8.8	83 (+/- 10%)
Cooler - frame	M8	8.8	24.3

NOTES:

Before adding Loctite 2400 make sure to clean bolt thread.

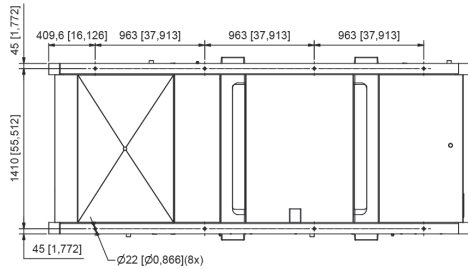
For non-critical bolts connections torque must be the standard one.

10.7 Dimension drawings

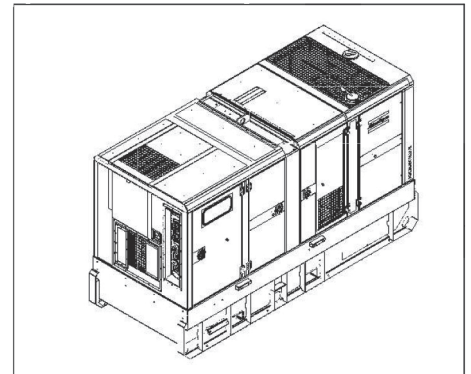
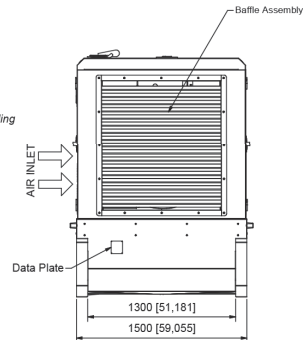
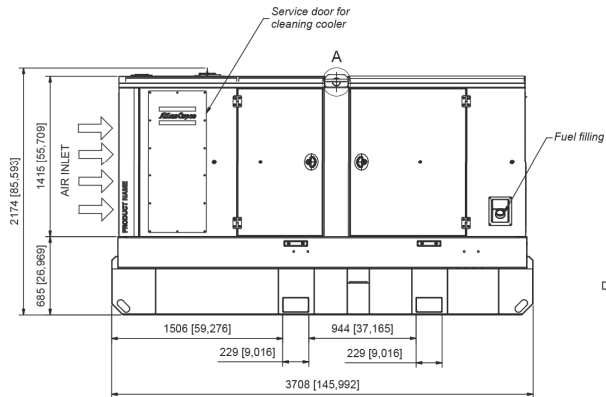
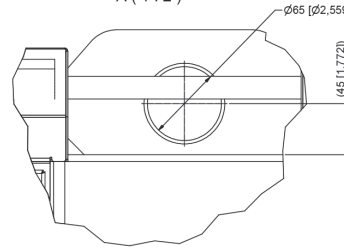
QAS+ 250-325

TYPE	BASIC UNIT							
	WET MASS Kg	X mm	Y mm	Z mm	NET MASS Kg	X mm	Y mm	Z mm
QAS+ BOX E								

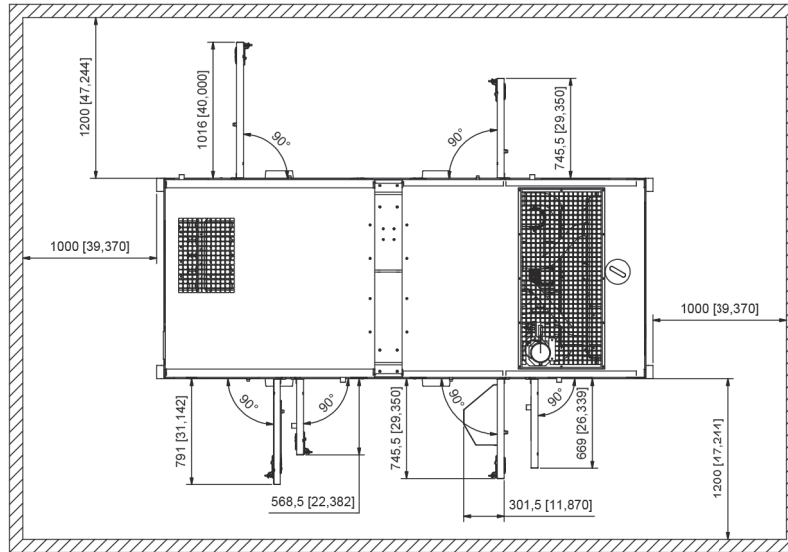
WET MASS = Wet engine and radiator (oil, coolant) and full tank.
NET MASS = Dry engine (without coolant and oil) and empty tank.

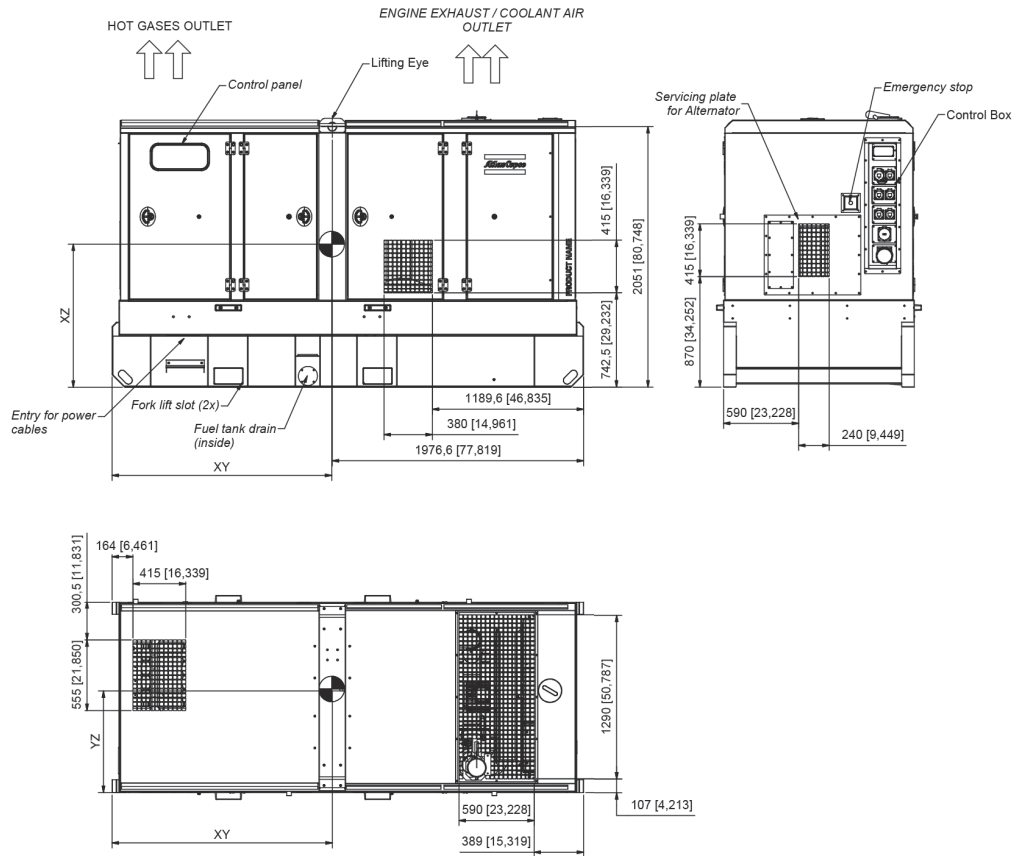


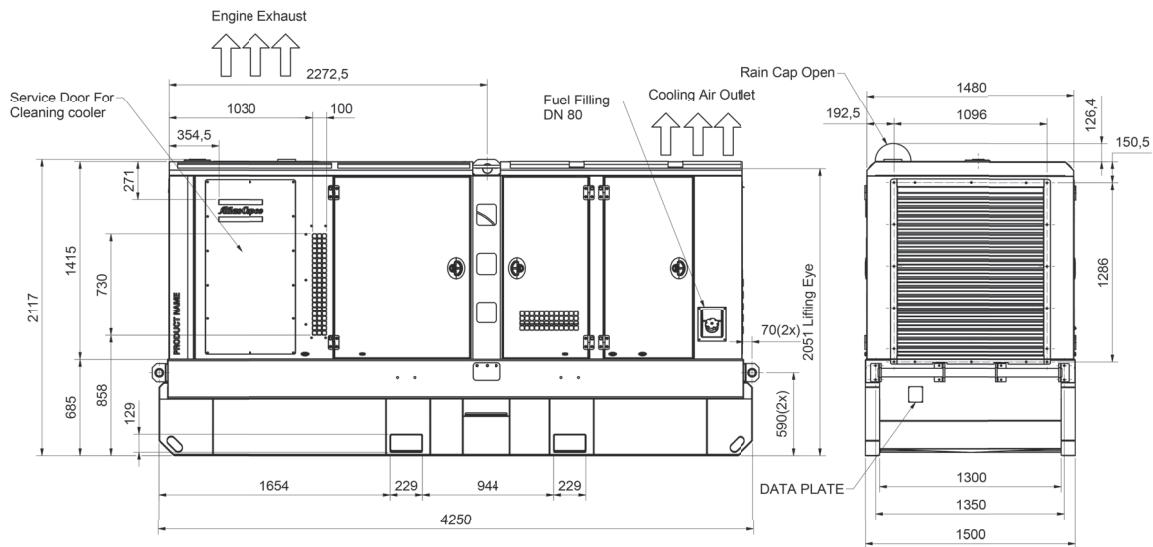
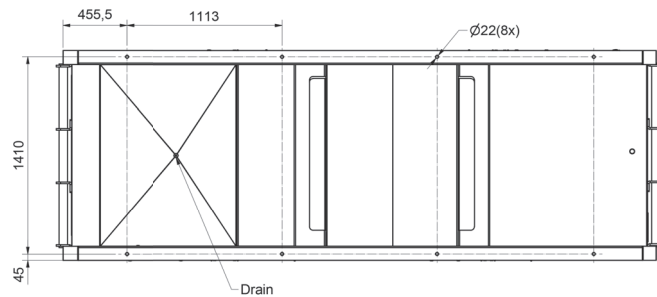
A (1 : 2)



MAINTENANCE SPACE (1 : 20)



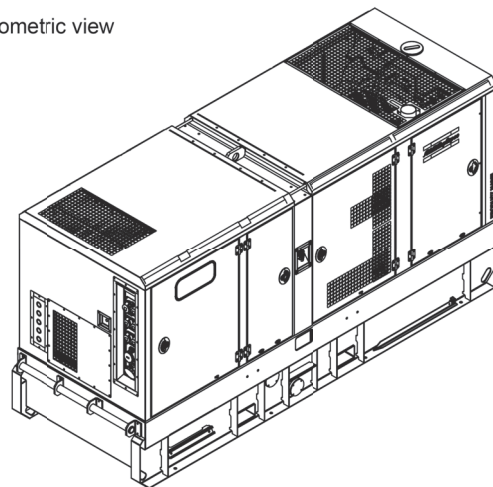




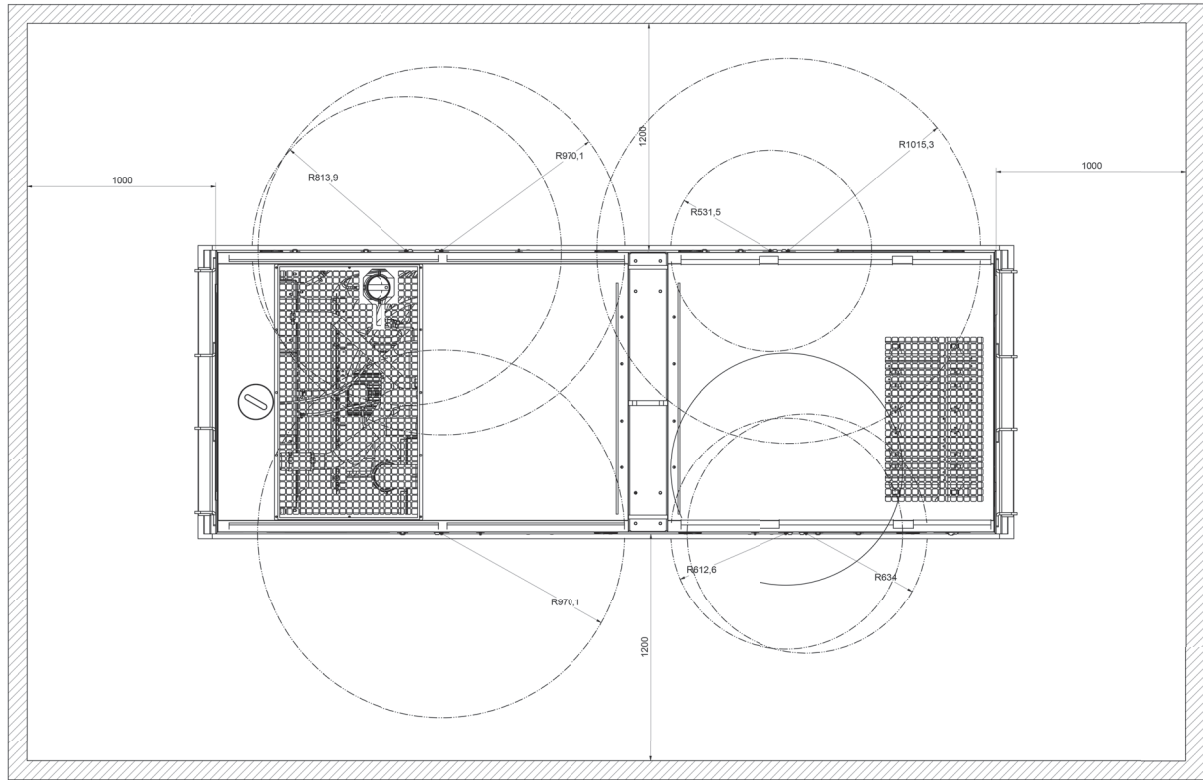
TYPE	NET MASS Kg	BASIC UNIT				WET MASS Kg	X mm	Y mm	Z mm
		X mm	Y mm	Z mm	Z mm				
QAS+ AF	4362.23	817.4	890.1	1938	5614.684	806.48	847.28	1850.45	

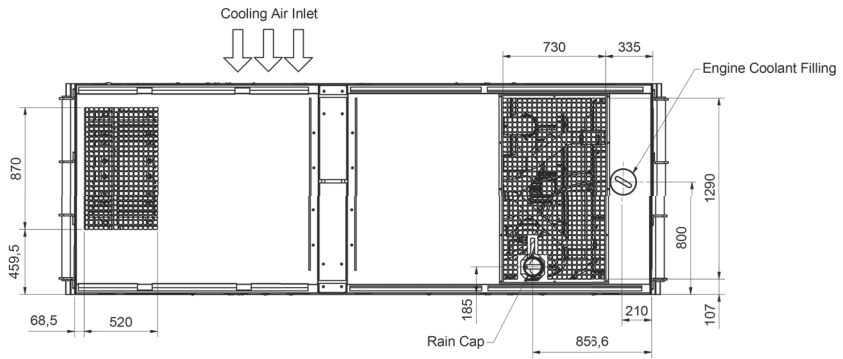
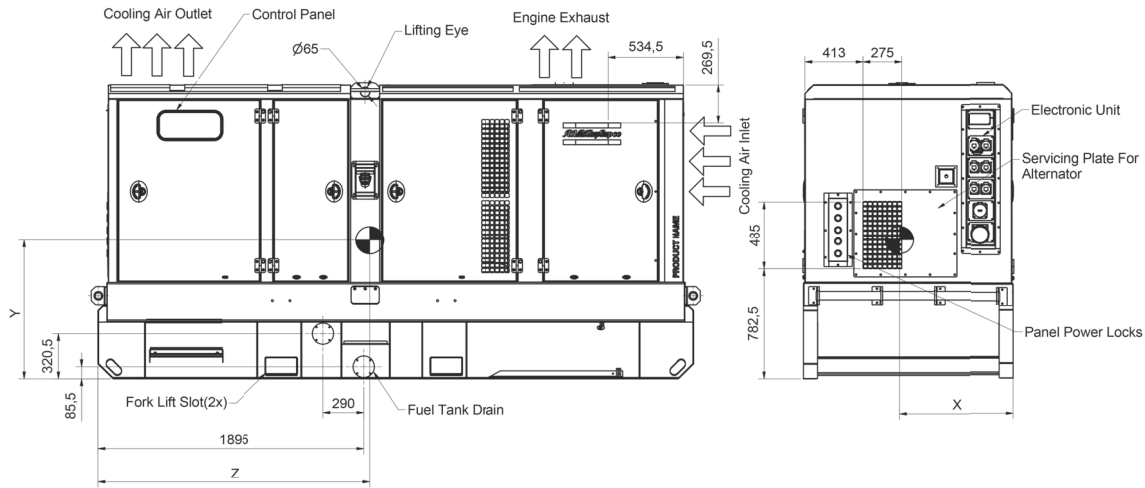
NET MASS = Dry engine (without coolant and oil) and empty tank
WET MASS = Wet engine (with coolant and oil) and full tank

Isometric view

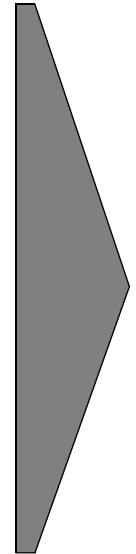


MAINTAINANCE SPACE





Circuit diagrams



1640 0127 02
Applicable to Qc1212

Sheet	Description
1	Index
2	Control circuit
3	Power circuit & Customer terminals
4	Sockets and powerlocks options

QAS	G1 (In)	lr	lm	T1-T2-T3	Wire size X	Wire size Z
250	400A	0,9xln+360A	3,5ln	400/5A	lx	lx
325	630A	0,8xln+475A	4xlr	600/5A	mx	lx

Size	Cross section	Wire Type
aa	0,5 mm ²	H05 V-K
a	1 mm ²	H05 V-K
b	1,5 mm ²	H07 V-K
c	2,5 mm ²	H07 V-K
d	4 mm ²	H07 V-K
e	6 mm ²	H07 V-K
f	10 mm ²	H07 V-K
g	16 mm ²	H07 V-K
h	25 mm ²	H07 V-K
i	35 mm ²	H07 V-K
j	50 mm ²	H07 V-K
k	70 mm ²	H07 V-K
l	95 mm ²	H07 V-K
ax	0,5 mm ²	BELDEN 9271
gx	16 mm ²	EPR-CSP (BS6195)
hx	25 mm ²	EPR-CSP (BS6195)
ix	35 mm ²	EPR-CSP (BS6195)
ix	50 mm ²	EPR-CSP (BS6195)
kx	70 mm ²	EPR-CSP (BS6195)
lx	95 mm ²	EPR-CSP (BS6195)
mx	120 mm ²	EPR-CSP (BS6195)
rx	150 mm ²	EPR-CSP (BS6195)
cx	185 mm ²	EPR-CSP (BS6195)

Size	Colour
0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Purple
8	Gray
9	White

Terminal	Description
48 (A)	Diagnostic mode
49 (B)	Spillage liquid alarm
50 (C)	Fan failure alarm
51 (D)	ELRTR alarm
52 (E)	Remote start
53 (F)	2nd parameter
3	Emergency stop
18 (D)	Fuel level sensor (analog)

Relay	Description
4 (A)	Run coil
5 (B)	Starter relay
6 (E)	Circuit breaker trip
9 (F)	Inlet shutdown valve (O9)
33 (D)	Open/close GB

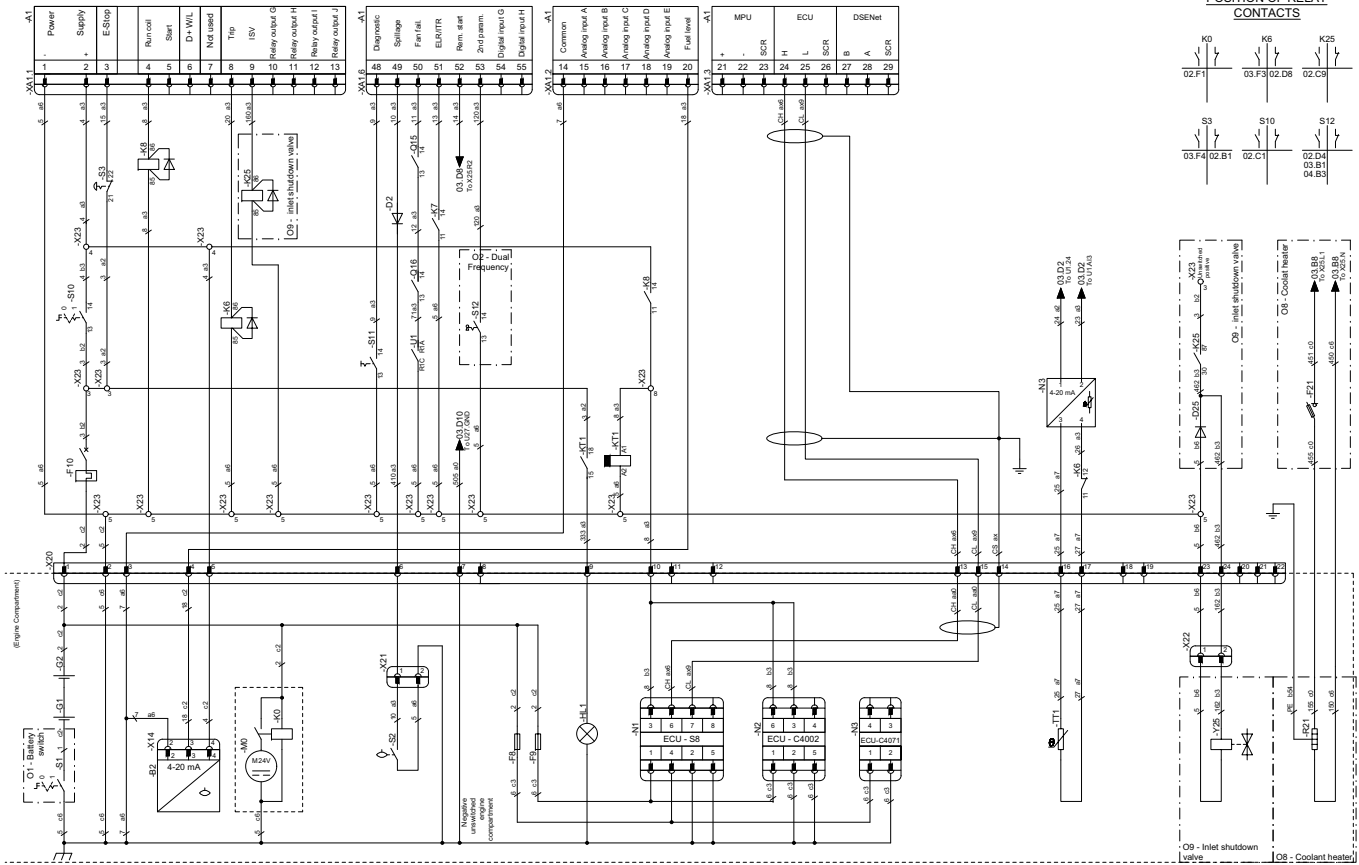
Option	Description
O1	Battery switch
O2	Dual frequency
O4	Earth leakage relay
O5	Earth leakage relay (RCMA 420)
O7	Battery charger
O8	Coolant heater
O9	Inlet shutdown valve
O11	Powerlocks
O12	Sockets
O13	Fleetlink CoreBox / SmartBox

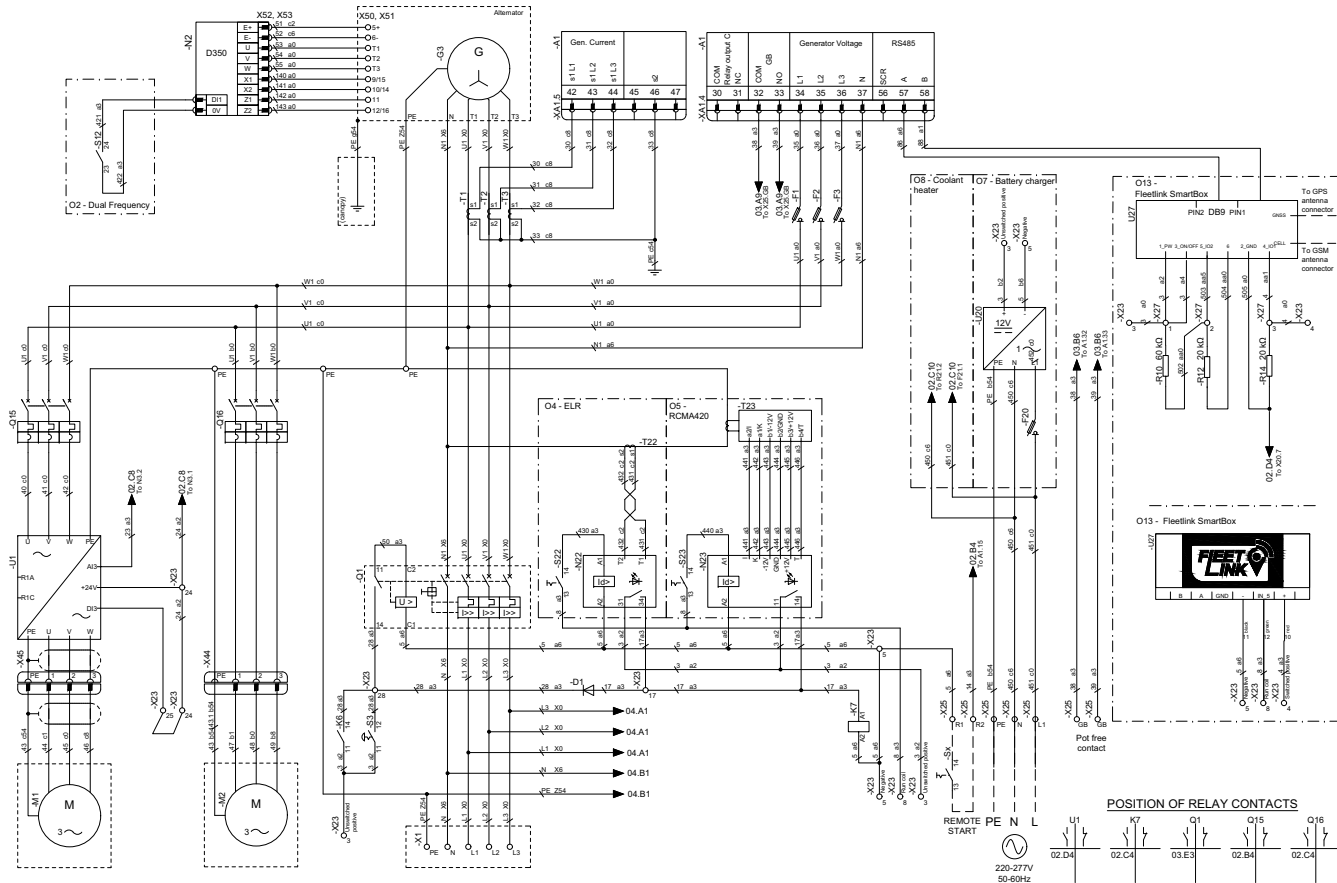
Tag	Description	Location *
-A1	Control unit	02.03.A
-B2	Fuel level sensor	02.F6
-D1	Diode	03.E6
-D6	Diode	02.C2
-D8	Diode	02.B2
-D25	Diode (O9)	02.D9
-F1	Fuse - 2A	03.B6
-F2	Fuse - 2A	03.B7
-F3	Fuse - 2A	03.B7
-F8	Fuse - 20A	02.F4
-F9	Fuse - 20A	02.F4
-F10	Circuit breaker - 10A	02.D1
-F20	Fuse - 2A	03.C9
-F21	Fuse - 5A (O8)	02.D10
-G1	Battery	02.F1
-G2	Battery	02.F1
-G3	Alternator	03.A4
-HL1	Battery disconnection lamp	02.F5
-K0	Starter solenoid	02.F2
-K6	Relay 12V 1CO - CB Trip	02.C2
-K7	Relay 12V 1CO - ELRTR trip	03.F7
-K8	Relay 12V 1CO - Run coil	02.B5
-K25	Relay 12V 1CO - Inlet shutdown valve control (O9)	02.B2
-KT1	Timer relay 150s (disconnection)	02.D5
-M0	Starter motor	02.F2
-M1	Cooling compartment fan motor	03.F1
-M2	Engine compartment fan motor	03.F2
-N1	ECU - C4001	02.F6
-N2	ECU - C4002	02.F5
-N3	ECU - C4071	02.F7
-N4	AVR	03.A2
-N3	PT100 4-20mA Converter	02.C8
-N22	Earth leakage relay (O4)	03.E5
-N23	Earth leakage relay RCMA 420 (O5)	03.E6
-Q2_Q11	Circuit breaker - Sockets	04.C
-S15	Switch - Block mode	03.D1
-S16	Circuit breaker - Engine fan motor	03.D2
-R21	Coolant heater - 500W (O8)	02.F10
-S1	Battery switch (O1)	02.F1
-S2	Spillage sensor	02.F3
-S3	Emergency stop - Cubicle	02.B1
-S10	Switch ON/OFF	02.C1
-S11	Switch - Block mode	02.D3
-S12	Key switch - Dual frequency (O2)	03.B1
-S22	Switch - ELR	03.E5
-S23	Switch - RCMA420	03.E6
-T1	Current transformer	03.B4
-T2	Current transformer	03.B4
-T3	Current transformer	03.B4
-T22	Earth leakage relay torus (O4)	03.D5
-T23	RCMA 420 torus (O5)	03.D6
-T11	PT100 - Coolant temperature	02.F8
-U1	VSD	05.E1
-U20	Battery charger (O7)	03.B9
-U27	Fleetlink locator	02.D8
-X1	Terminal board	03.G4

Tag	Description	Location *
-X2_X11	Socket 1PH/3PH - 16A to 125A	4
-X12	Powerlocks (O11)	04.B1
-X13	Power distribution device	04.A3
-X14	Connector - Fuel level sensor	02.F2
-X20	Connector - Cubicle-engine wire harness	02.E1
-X21	Connector - Spillage Sensor	02.F3
-X22	Connector - Inlet shutdown valve	02.E9
-X23	Terminal strip - Control cubicle connections	02.03
-X24	Terminal strip - Socket CB trip coil	4
-X25	Terminal strip - Customer terminals	03.E8-10
-X44	Connector - Supply M2	03.F2
-X45	Connector - Supply M1	03.F1
-X50.X51	AVR Connectors Alternator side	03.A3
-X52_X53	AVR Connectors AVR side	03.A3
-Y25	Inlet shutdown valve (O9)	02.F9

* 04.D8
 * 04.D9
 * 04.D10
 * 04.D11
 * 04.D12

Settings of cubicle electrical components according to instruction 1640054960





1640 0727 80
Applicable to Qc1212

Sheet	Description
1	Index
2	Control circuit
3	Power circuit & Customer terminals
4	Power meter Power Locks
5	Sockets and powerlocks options

QAS	Q1 (In)	Ir	Im	T1-T2-T3	Wire size X	Wire size Z
450	800A	0,8xIn-640A	4xIr	800/5A	2x lx	lx

Size	Cross section	Wire Type
aa	0,5 mm ²	H05 V-K
a	1 mm ²	H05 V-K
b	1,5 mm ²	H07 V-K
c	2,5 mm ²	H07 V-K
d	4 mm ²	H07 V-K
e	6 mm ²	H07 V-K
f	10 mm ²	H07 V-K
g	16 mm ²	H07 V-K
h	25 mm ²	H07 V-K
i	35 mm ²	H07 V-K
j	50 mm ²	H07 V-K
k	70 mm ²	H07 V-K
l	95 mm ²	H07 V-K
ax	0,5 mm ²	BELDEN 9271
gx	16 mm ²	EPR-CSP (BS8195)
hx	25 mm ²	EPR-CSP (BS8195)
ix	35 mm ²	EPR-CSP (BS8195)
ix	50 mm ²	EPR-CSP (BS8195)
ix	70 mm ²	EPR-CSP (BS8195)
ix	95 mm ²	EPR-CSP (BS8195)
mx	120 mm ²	EPR-CSP (BS8195)
mx	150 mm ²	EPR-CSP (BS8195)
ox	185 mm ²	EPR-CSP (BS8195)

Size	Colour
0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Purple
8	Grey
9	White

Terminal	Description
48 (A)	Diagnostic mode
49 (B)	Spillage liquid alarm
50 (C)	Fan failure alarm
51 (D)	ELR/ITR alarm
52 (E)	Remote start
53 (F)	2nd parameter
3	Emergency stop
18 (D)	Fuel level sensor (analog)

Relay	Description
4 (A)	Run coil
5 (B)	Starter relay
8 (E)	Circuit breaker trip
9 (F)	Inlet shutdown valve (O8)
33 (D)	Open/close GB

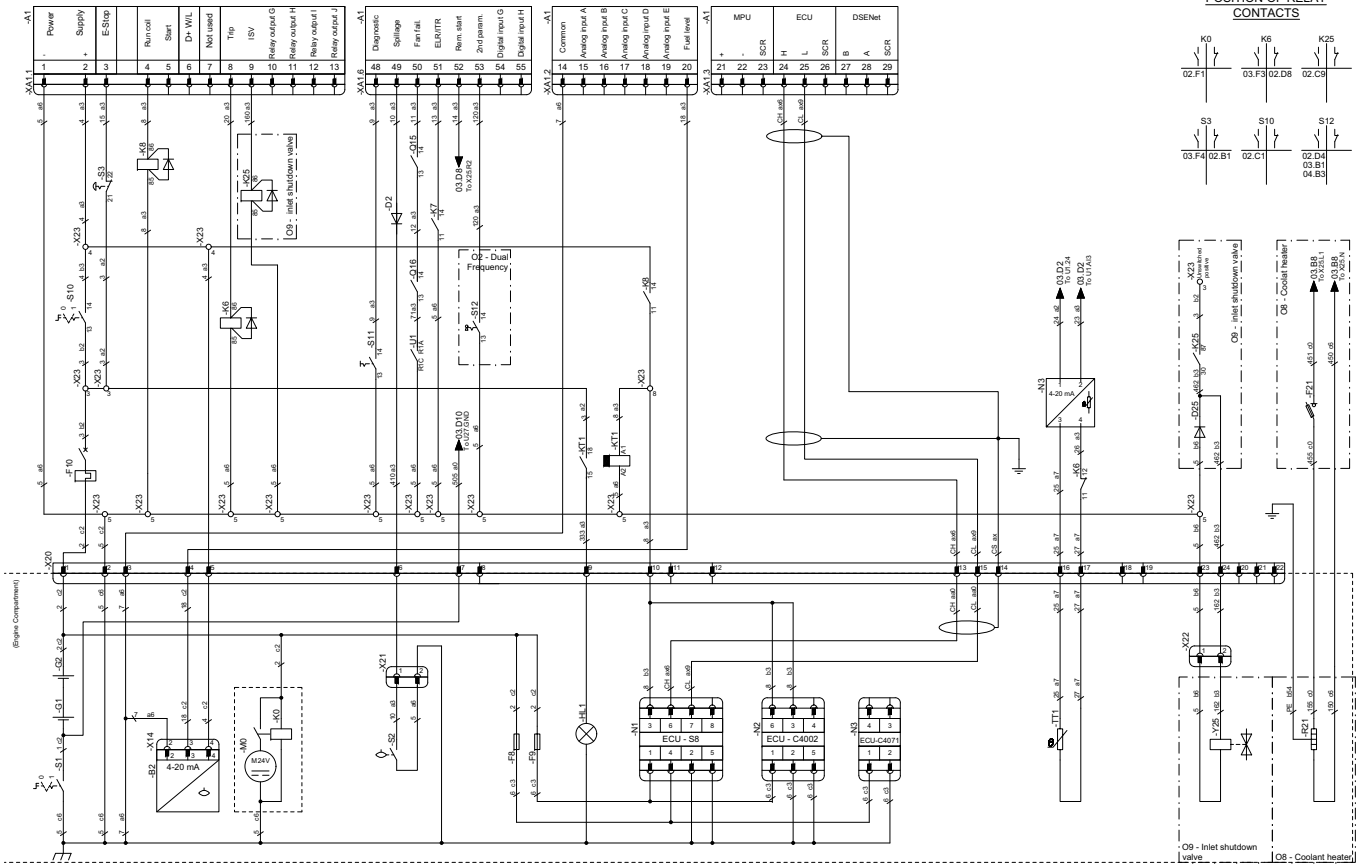
Option	Description
O1	Battery switch
O2	Dual frequency
O4	Earth leakage relay
O5	Earth leakage relay (RCMA 420)
O7	Battery charger
O8	Coolant heater
O9	Inlet shutdown valve
O11	Powerlocks
O12	Sockets
O13	Fleetlink CoreBox / SmartBox

Tag	Description	Location *
-A1	Control unit	02-03.A
-B2	Fuel level sensor	02.F8
-D1	Diode	03.E6
-D6	Diode	02.C2
-D8	Diode	02.B2
-D25	Diode (O6)	02.D9
-F1	Fuse - 2A	03.B6
-F2	Fuse - 2A	03.B7
-F3	Fuse - 2A	03.B7
-F8	Fuse - 20A	02.F4
-F9	Fuse - 20A	02.F4
-F10	Circuit breaker - 10A	02.D1
-F20	Fuse - 2A	03.C9
-F21	Fuse - 5A (O8)	02.D10
-G1	Battery	02.F1
-G2	Battery	02.F1
-G3	Alternator	03.A4
-HL1	Battery disconnection lamp	02.F5
-K0	Starter solenoid	02.F2
-K6	Relay 24V 1CD - CB Trip	02.C2
-K7	Relay 24V 1CD - ELR/ITR trip	03.F7
-K8	Relay 24V 1CD - Run coil	02.B5
-K25	Relay 24V 1CD - Inlet shutdown valve control (O9)	02.B2
-K11	Timer relay 150s (disconnection)	02.D5
-M0	Starter motor	02.F2
-M1	Cooling compartment fan motor	03.F1
-M2	Engine compartment fan motor	03.F2
-N1	ECU - C4001	02.F6
-N2	ECU - C4002	02.F6
-N3	ECU - C4071	02.F7
-N4	AVR	03.A2
-N3	PT100 4-20mA Converter	02.C8
-N22	Earth leakage relay (O4)	03.E5
-N23	Earth leakage relay RCMA 420 (O5)	03.E6
-O2	O11 Circuit breaker - Sockets	05.C
-O15	Circuit breaker - VSD	03.D1
-O16	Circuit breaker - Engine fan motor	03.D2
-R21	Coolant heater - 500W (O8)	02.F10
-S1	Battery switch (O1)	02.F1
-S2	Spillage sensor	02.F3
-S3	Emergency stop - Cubicle	03.B1
-S10	Switch ON/OFF	02.C1
-S11	Switch - Block mode	02.D3
-S12	Key switch - Dual frequency (O2)	03.B1
-S22	Switch - ELR	03.E5
-S23	Switch - RCMA420	03.E6
-T1	Current transformer	03.B4
-T2	Current transformer	03.B4
-T3	Current transformer	03.B4
-T4	Current transformer (O11)	05.E
-T5	Current transformer (O11)	05.E
-T6	Current transformer (O11)	05.E
-T7	Current transformer (O11)	05.E
-T8	Current transformer (O11)	05.E
-T9	Current transformer (O11)	05.E
-T22	Earth leakage relay torus (O4)	03.D5

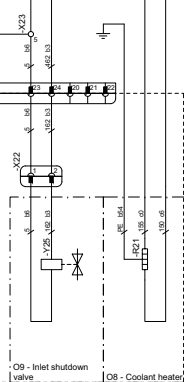
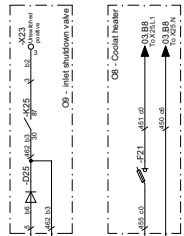
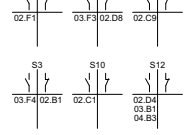
Tag	Description	Location *
-T23	RCMA 420 torus (O5)	03.D6
-T11	PT100 - Coolant temperature	02.F8
-J11	VSD	03.E1
-U20	Battery charger (O7)	03.B9
-U27	Fleetlink locator	02.D8
-V1	Power Meter	05.C
-V2	Power Meter	05.C
-X1	Terminal board	03.G4
-X2, X11	Socket IPH2PH - 16A to 125A	5
-X12	Powerlocks (O11)	04.F1
-X13	Powerlocks (O11)	04.F7
-X14	Connector - Fuel level sensor	02.F2
-X15	Power distribution device	04.A3
-X20	Connector - Cubicle-engine wire harness	02.E1
-X21	Connector - Spillage Sensor	02.F3
-X22	Connector - Inlet shutdown valve	02.E8
-X23	Terminal strip - Control cubicle connections	02-03
-X24	Terminal strip - Socket CB trip coil	4
-X25	Terminal strip - Customer terminals	03.E8-10
-X35	Terminal strip - Power meter powerlocks	5
-X44	Connector - Supply M2	03.F2
-X45	Connector - Supply M1	03.F1
-X50,X51	AVR Connectors Alternator side	03.A3
-X52, X53	AVR Connectors AVR side	03.A3
-Y25	Inlet shutdown valve (O9)	02.F9

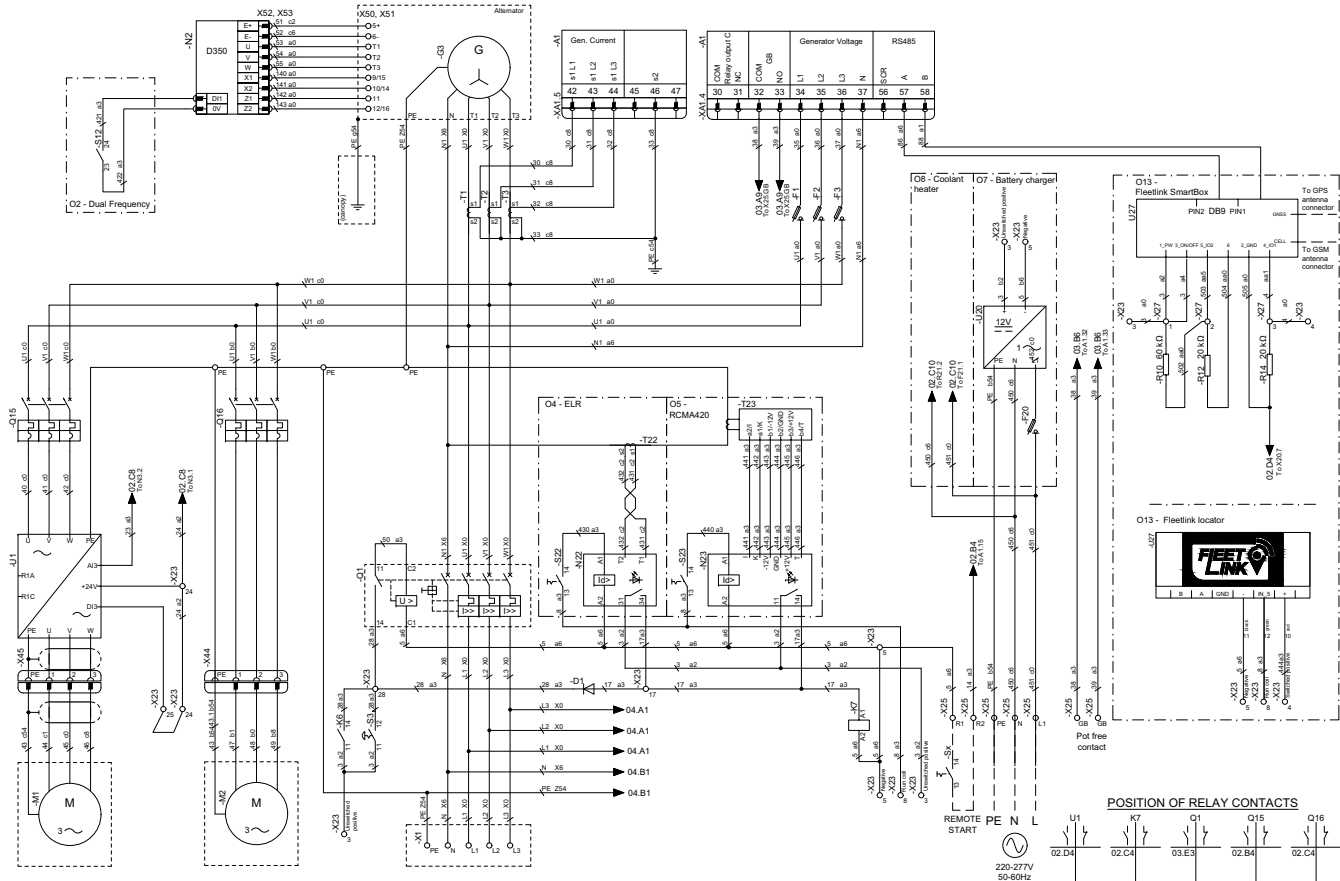
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Settings of cubicle electrical components according to instruction 1640054960



POSITION OF RELAY CONTACTS





1640 0531 11

Applicable to Qc4004

Sheet	Description
1	Index
2	Power supply, open/close GB/MB, engine
3	Inputs, outputs, display
4	Customer terminals
5	Power circuit
6	Sockets and powerlocks options

QAS	O1 (In)	I	I _m	TI-T2-T3	Wire size X	Wire size Z
250	400A	0.8kV=360A	3 kA	400/5A	k	x
325	630A	0.8kV=476A	4k	600/5A	nx	k

Tag	Description	Location *
-A1	Control unit	02,F3,A
-A3	Display	02,F3
-B2	Fuel level sensor	02,F2
-D11	Diode	02,B2
-D12	Diode	02,B3
-D200	Diode	03,D4
-D25	Diode	02,D9
-F1	Fuse - 2A	05,B8
-F2	Fuse - 2A	05,B8
-F3	Fuse - 2A	05,B8
-F4	Fuse - 2A	04,C2
-F5	Fuse - 2A	04,C2
-F6	Fuse - 2A	04,C2
-F8	Fuse - 20A	02,F3
-F9	Fuse - 20A	02,F4
-F10	Circuit breaker - 10A	02,D1
-F20	Fuse - 2A (O7)	04,C2
-F21	Fuse - 5A (O8)	02,D9
-F27	Fuse - 2A (O13)	03,D9
-G1	Battery	02,F1
-G2	Battery	02,F2
-G3	Alternator	05,A6
-H1	Battery disconnection lamp	02,F3
-K0	Starter solenoid	02,F3
-H1L	Battery disconnection lamp	02,F3
-K6	Relay 24V ICO - Fuel relay	02,F6
-K7	Relay 24V ICO - ELR/ETR trip	05,F9
-K11	Relay 24V ICO - Open MB	02,B2
-K12	Relay 24V ICO - Close MB	02,B3
-K25	Relay 24V ICO - Inlet shutdown valve control	03,D5
-K28	Relay 24V - 50-60Hz	02,B4
-K200	Relay 24V ICO - TM sensing changeover	03,D4
-K201	Relay 24V 4NO+1NC - TM sensing relay	04,C8
-K202	Relay 24V 4NO+1NC - TM sensing relay	04,C8
-K203	Relay 24V ICO - TM shutdown relay	04,D8
-K11	Timer relay 150s (disconnection)	02,D3
-M0	Starter motor	02,F5
-M1	Cooling compartment fan motor	05,F3
-M2	Engine compartment fan motor	05,F3
-N1	ECU - C4001	02,F4
-N2	ECU - C4002	02,F5
-N3	ECU - C4011	02,F5
-N4	AVR	05,A4
-N5	PT100 4-20mA Converter	02,D5
-N22	Earth leakage relay	05,E7
-N23	Earth leakage relay RCMA 420	05,E8
-O1	Circuit breaker - GB	05,D2
-O2..O11	Circuit breaker - Sockets	06,C
-O15	Circuit breaker - VSD	05,D2
-O16	Circuit breaker - Engine fan motor	05,D3
-R3	Resistor - 120 Ω Engine CAN end	02,B7
-R4	Resistor - 120 Ω Beckhoff CAN end	04,B7
-R7	Resistor - 470 Ω AVR	05,E2
-R10	Resistor - 60 kΩ	03,D9
-R12	Resistor - 20 kΩ	03,D9
-R14	Resistor - 20 kΩ	03,D9
-R21	Coolant heater - 500W	02,F10

Tag	Description	Location *
-S1	Battery switch	02,F1
-S2	Spillage sensor	02,F3
-S3	Emergency stop - Cubicle	02,C6
-S10	Switch ON/OFF	02,C1
-S22	Switch - ELR	05,E7
-S23	Switch - RCMA420	05,E8
-T1	Current transformer	05,B8
-T2	Current transformer	05,B8
-T3	Current transformer	05,B8
-T22	Earth leakage relay torus	05,D6
-T23	RCMA 420 torus	05,D6
-TT1	PT100 - Coolant temperature	02,F8
-U1	VSD	05,E1
-U20	Battery charger	04,B2
-U27	Fluorescent indicator	03,D6
-X1	Terminal board	05,C6
-X2..X11	Socket 1PH/3PH - 16A to 125A	05,D
-X12	Powerlocks	05,C2
-X13	Power distribution device	05,A3
-X14	Connector - Fuel level sensor	02,F2
-X20	Connector - Cubicle-engine wire harness	02,E
-X21	Connector - Spillage Sensor	02,F3
-X22	Connector - Inlet shutdown valve	02,F9
-X23	Terminal strip - Control cubicle connections	02,C5
-X24	Terminal strip - Socket GB trip coil	05,D
-X25	Terminal strip - Customer terminals	04,E2-6
-X26	Terminal strip - TM connection	04,D2
-X27	Terminal strip - TM power	04,D7
-X30	Connector - Power management system	04,E8
-X40	Connector - TM controls (O14)	04,E1-8
-X41	Connector - TM sensing (O14)	04,E9
-X44	Connector - Supply M2	05,E3
-X45	Connector - Supply M1	05,E1
-X50..X51	AVR Connectors Alternator side	03,A3
-X52..X53	AVR Connectors AVR side	03,A3
-Y25	Inlet shutdown valve	02,F9

* 04,D8


Size	Cross section	Wire Type
aa	0.5 mm ²	H05 V-K
a	1 mm ²	H05 V-K
b	1.5 mm ²	H07 V-K
c	2.5 mm ²	H07 V-K
d	4 mm ²	H07 V-K
e	6 mm ²	H07 V-K
f	10 mm ²	H07 V-K
g	16 mm ²	H07 V-K
h	25 mm ²	H07 V-K
i	35 mm ²	H07 V-K
j	50 mm ²	H07 V-K
k	70 mm ²	H07 V-K
l	95 mm ²	H07 V-K
ax	0.5 mm ²	SELDEN 9271
gx	16 mm ²	EPR-CSP (BS6195)
hx	25 mm ²	EPR-CSP (BS6195)
ix	35 mm ²	EPR-CSP (BS6195)
ix	50 mm ²	EPR-CSP (BS6195)
kx	70 mm ²	EPR-CSP (BS6195)
lx	95 mm ²	EPR-CSP (BS6195)
mx	120 mm ²	EPR-CSP (BS6195)
nx	150 mm ²	EPR-CSP (BS6195)
ox	185 mm ²	EPR-CSP (BS6195)

Size	Cross-section	Wire Colour
0	Black	Black
1	Brown	Brown
2	Red	Red
3	Orange	Orange
4	Yellow	Yellow
5	Green	Green
6	Blue	Blue
7	Purple	Purple
8	Grey	Grey
9	White	White

Terminal	Description
24	MB open feedback
25	MB close feedback
26	GB open feedback
27	GB close feedback
43	Diagnostic mode
44	2nd parameter
45	Fan failure alarm
46	VSD failure alarm
47	Remote start
48	Spillage liquid alarm
49	ELR/ETR alarm
50	TM changeover feedback
118	Emergency stop
IV108	Fuel level sensor (analog)

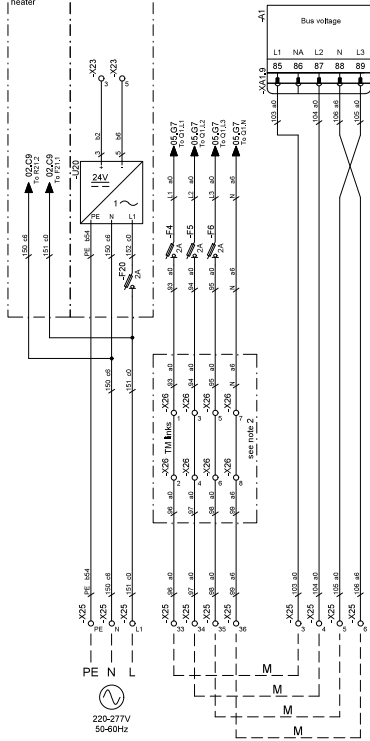
Relay	Cross-section
8	Open MB
11	Close MB
14	Open GB
17	Close GB
57	TM changeover
81	Inlet shutdown valve control
119	Fuel relay

Option	Description
O1	Battery switch
O2	Dual frequency
O4	Earth leakage relay
O5	Earth leakage relay (RCMA 420)
O7	Battery charger
O8	Coolant heater
O9	Inlet shutdown valve
O11	Powerlocks
O12	Sockets
O13	Fluorescent CoreBox / SmartBox
O14	Transformer maintenance

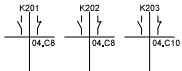
Settings of cubicle electrical components according to instruction 1640054960

O8 - Constant heater

O7 - Battery charger



POSITION OF RELAY CONTACTS



NOTES

- Note 2: In case of option 14 (transformer maintenance) remove TM-links between terminals X26 and make the wiring as shown in the option diagram.
- Note 3: Remove link "M" when paralleling with the mains. When paralleling multiple generator sets in ISLAND-mode, link "M" is necessary.
- Note 4: Remove link "P" when NOT running in ISLAND-mode. See table 9 for the setting of "P" link and the status of terminals X25,10, X25,11 and X25,12 with the different application modes.

O14 - Transformer maintenance

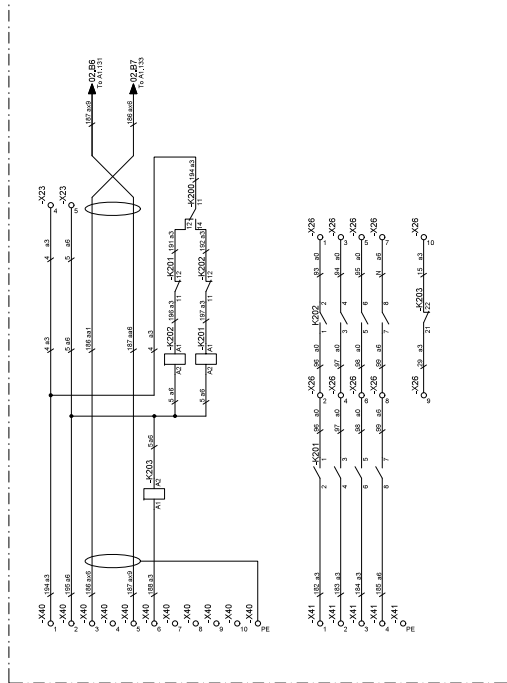
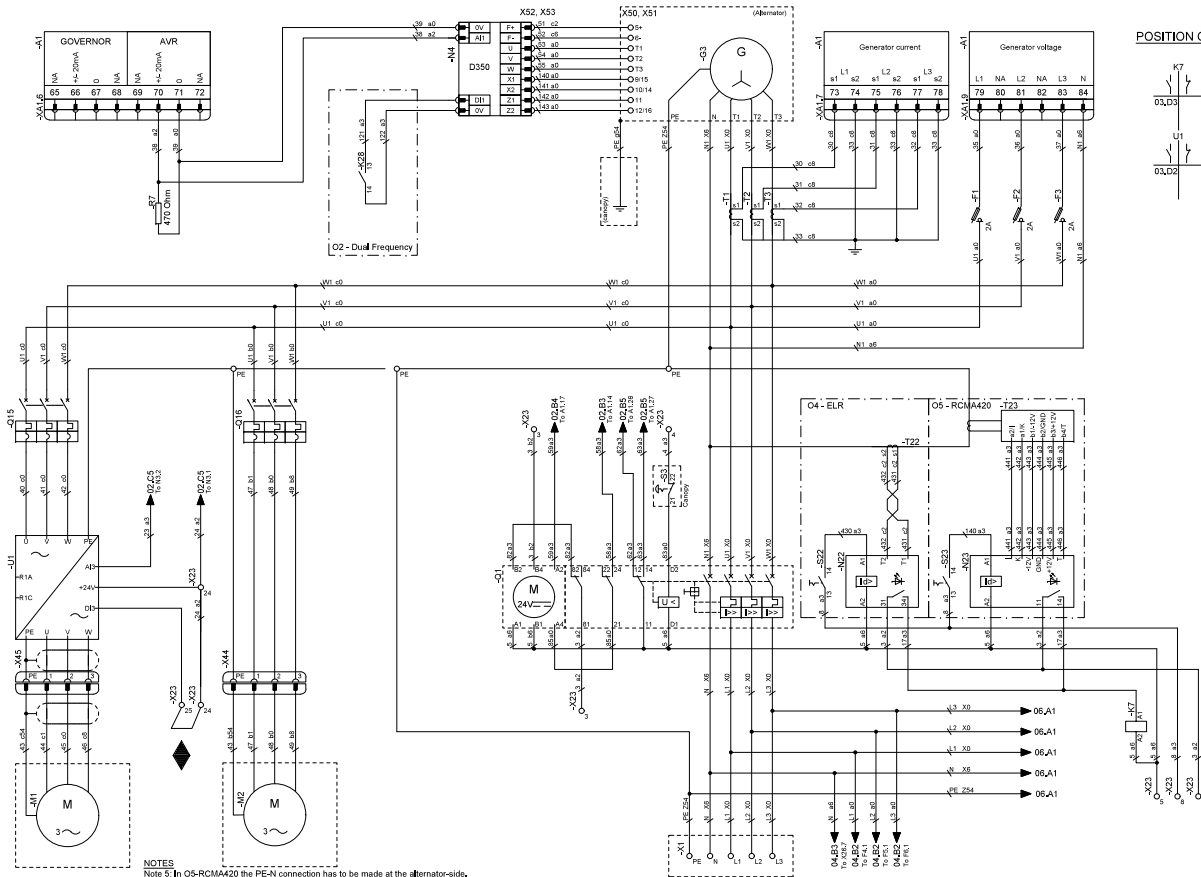


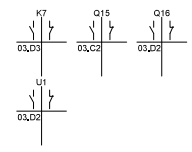
Table 9 - CONNECTOR X25 - 10/11/12 STATUS

APPLICATION	WITH MB		WITHOUT MB	
	10-11 (Open)	11-12 (Close)	10-11 (Open)	11-12 (Close)
Island			Link P	
AMF	NO Contact	NO Contact		
Peak Shaving	NO Contact	NO Contact		Link P
Fixed Power	NO Contact	NO Contact		Link P
Load Take Over	NO Contact	NO Contact		Link P
Mains Power Exp/Imp	NO Contact	NO Contact		Link P
Transform./Maintenance			Link P	



NOTES
 Note 5: In O5-RMA420 the PE-N connect has to be made at the alternator-side.

POSITION OF RELAY CONTACTS



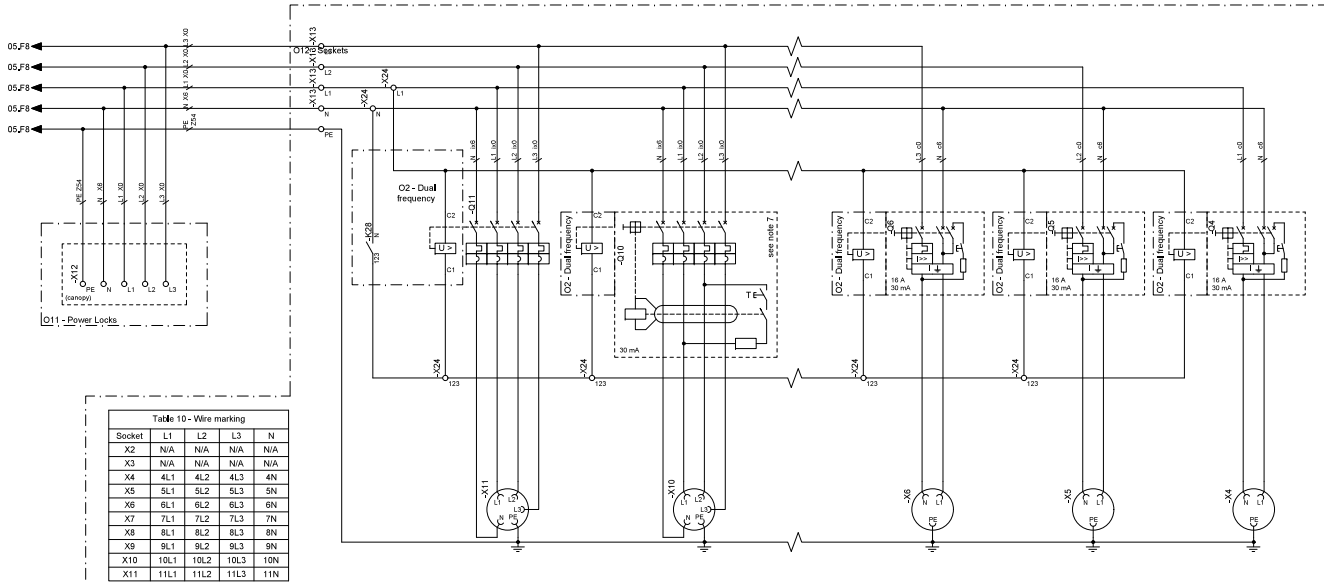


Table 10 - Wire marking

Socket	L1	L2	L3	N
X2	N/A	N/A	N/A	N/A
X3	N/A	N/A	N/A	N/A
X4	4L1	4L2	4L3	4N
X5	5L1	5L2	5L3	5N
X6	6L1	6L2	6L3	6N
X7	7L1	7L2	7L3	7N
X8	8L1	8L2	8L3	8N
X9	9L1	9L2	9L3	9N
X10	10L1	10L2	10L3	10N
X11	11L1	11L2	11L3	11N

Table 11 - 1PH socket connection

Socket slot	Socket 1	Phase	Socket 2	Phase
Socket slot 1	N/A	N/A	N/A	N/A
Socket slot 2	X4	L3	X5	L1
Socket slot 3	X6	L2	X7	L3
Socket slot 4	X8	L1	X9	L2
Socket slot 5	X10	L3	X11	L1

Table 12 - Cross-section/color

Socket	L1+L2+L3	N	PE
16A 1PH	c0	c6	c54
16A 3PH	c0	c6	c54
32A 3PH	e0	e6	e54
63A 3PH	gx0	gx6	gx54
125A 3PH	hx0	hx6	gx54

NOTES

Note 1: This representation of the sockets option is **only** one example of connection. Several configurations can be made.

Note 2: See Table 10 for wire marking.

Note 3: See Table 12 for wire cross-section and color.

Note 4: Connect 1PH sockets alternating the connection line as shown Table 11.

Note 5: Two types of circuit breakers might be selected: magnetothermal circuit breaker or earth leakage (ELCB) circuit breaker, with 1PH sockets **only** ELCB can be mounted. With 63A and 125A sockets, an earth leakage add-on blocks used when ELCB type is selected.

Note 6: In each socket slot might be fitted 2 sockets with exception of 63A and 125A sockets. In this case only one socket per slot is allowed, 63A and 125 sockets can only be mounted in slots 3, 4 or 5. There are 4 configuration sets depending on number of the 63A/125A sockets, 1 unit 63A/125A socket, 2 units 63A/125A sockets, 1 unit 63A socket and 2 units 63A/125A sockets, Table 13 shows the 4 configurations sets with the corresponding markings of sockets and circuit breakers.

Table 13 - Socket configuration set

Socket slot	Configuration set 1				Configuration set 2				Configuration set 3				Configuration set 4			
	Socket type	Socket Label	Circuit breaker label	Socket type	Socket Label	Circuit breaker label	Socket type	Socket Label	Circuit breaker label	Socket type	Socket Label	Circuit breaker label	Socket type	Socket Label	Circuit breaker label	
Socket slot 1	PMS / PMS + TM Connectors	N/A	N/A	PMS / PMS + TM Connectors	N/A	N/A	PMS / PMS + TM Connectors	N/A	N/A	PMS / PMS + TM Connectors	N/A	N/A	PMS / PMS + TM Connectors	N/A	N/A	
Socket slot 2	2x16 1PH or 2x16 3PH or 2x32 3PH	X4, X5	Q4, Q5	2x16 1PH or 2x16 3PH or 2x32 3PH	X4, X5	Q4, Q5	2x16 1PH or 2x16 3PH or 2x32 3PH	X4, X5	Q4, Q5	2x16 1PH or 2x16 3PH or 2x32 3PH	X4, X5	Q4, Q5	2x16 1PH or 2x16 3PH or 2x32 3PH	X4, X5	Q4, Q5	
Socket slot 3	2x16 1PH or 2x16 3PH or 2x32 3PH	X6, X7	Q6, Q7	2x16 1PH or 2x16 3PH or 2x32 3PH	X6, X7	Q6, Q7	2x16 1PH or 2x16 3PH or 2x32 3PH	X6, X7	Q6, Q7	2x16 1PH or 2x16 3PH or 2x32 3PH	X6, X7	Q6, Q7	2x16 1PH or 2x16 3PH or 2x32 3PH	X6, X7	Q6, Q7	
Socket slot 4	2x16 1PH or 2x16 3PH or 2x32 3PH	X8, X9	Q8, Q9	2x16 1PH or 2x16 3PH or 2x32 3PH	X8, X9	Q8, Q9	1x63 3PH or 1x125 3PH	X10	Q10	1x63 3PH or 1x125 3PH	X10	Q10	1x63 3PH or 1x125 3PH	X10	Q10	
Socket slot 5	2x16 1PH or 2x16 3PH or 2x32 3PH	X10, X11	Q10, Q11	1x63 3PH or 1x125 3PH	X11	Q11	1x63 3PH or 1x125 3PH	X11	Q11	1x63 3PH or 1x125 3PH	X11	Q11	1x63 3PH or 1x125 3PH	X11	Q11	

1640 0235 71

Applicable to Qc4004

Sheet	Description
1	Index
2	Power supply, open/close GBMB, engine
3	Inputs, outputs, display
4	Customer terminals
5	Power circuit
6	Sockets and powerlocks options

QAS	Q1 (In)	Ir	Im	T1-T2-T3	Wire size X	Wire size Z
450	800A	0.8In+640A	4xIr	800/5A	2x lx	lx

Size	Cross section	Wire Type
aa	0,5 mm ²	H05 V-K
a	1 mm ²	H05 V-K
b	1,5 mm ²	H07 V-K
c	2,5 mm ²	H07 V-K
d	4 mm ²	H07 V-K
e	6 mm ²	H07 V-K
f	10 mm ²	H07 V-K
g	16 mm ²	H07 V-K
h	25 mm ²	H07 V-K
i	35 mm ²	H07 V-K
j	50 mm ²	H07 V-K
k	70 mm ²	H07 V-K
l	95 mm ²	H07 V-K
ax	0,5 mm ²	BELDEN 9271
gx	16 mm ²	EPR-CSP (BS6195)
hx	25 mm ²	EPR-CSP (BS6195)
lx	35 mm ²	EPR-CSP (BS6195)
jk	50 mm ²	EPR-CSP (BS6195)
kk	70 mm ²	EPR-CSP (BS6195)
lx	95 mm ²	EPR-CSP (BS6195)
mx	120 mm ²	EPR-CSP (BS6195)
rx	150 mm ²	EPR-CSP (BS6195)
ox	185 mm ²	EPR-CSP (BS6195)

Size	Colour
0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Purple
8	Grey
9	White

Terminal	Description
24	MB open feedback
25	MB close feedback
26	GB open feedback
27	GB close feedback
43	Diagnostic mode
44	2nd parameter
45	Fan failure alarm
46	VSD failure alarm
47	Remote start
48	Spillage liquid alarm
49	ELR/ITR alarm
50	TM changeover feedback
118	Emergency stop
M108	Fuel level sensor (analog)

Relay	Cross-se
8	Open MB
11	Close MB
14	Open GB
17	Close GB
57	TM changeover
61	Inlet shutdown valve control
119	Fuel relay

Option	Description
O1	Battery switch
O2	Dual frequency
O4	Earth leakage relay
O5	Earth leakage relay (RCMA 420)
O7	Battery charger
O8	Coolant heater
O9	Inlet shutdown valve
O11	Powerlocks
O12	Sockets
O13	Feedlink locator
O14	Transformer maintenance

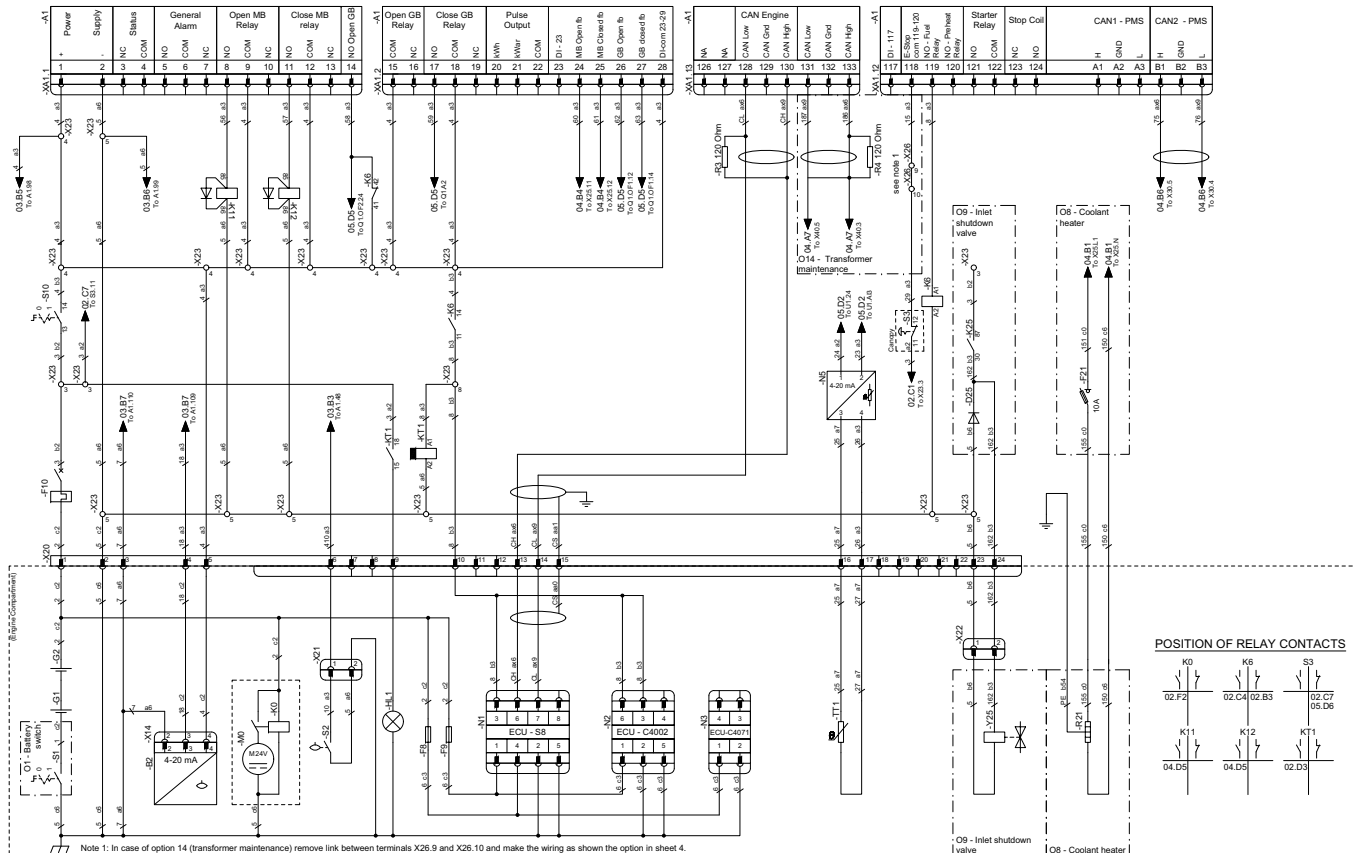
SEE THE CONFIGURATION SETTINGS DOCUMENT

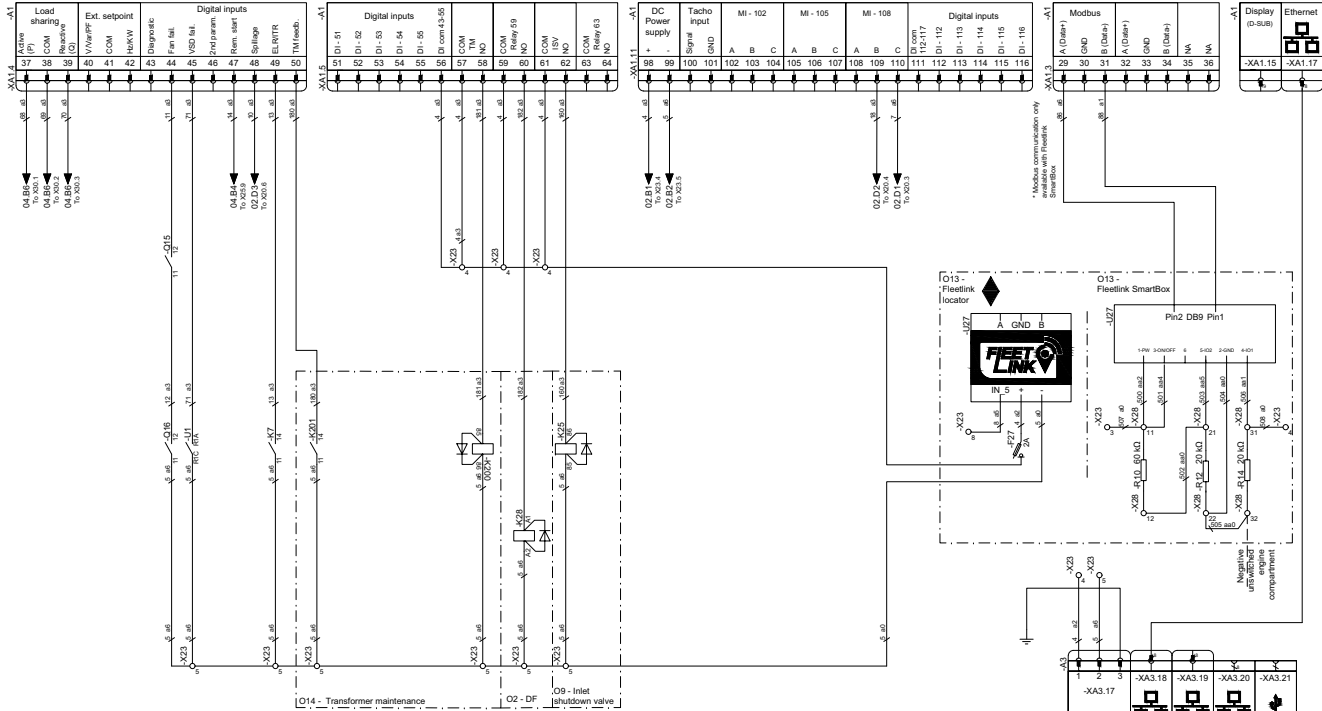


Tag	Description	Location *
-A1	Control unit	02.05.A
-A3	Display	03.E9
-B2	Fuel level sensor	02.F2
-D11	Diode	02.B2
-D12	Diode	04.C2
-D20	Diode	03.D4
-D25	Diode	02.D9
-F1	Fuse - 2A	05.B8
-F2	Fuse - 2A	05.B8
-F3	Fuse - 2A	05.B8
-F4	Fuse - 2A	04.C2
-F5	Fuse - 2A	04.C2
-F6	Fuse - 2A	04.C2
-F8	Fuse - 20A	02.F3
-F9	Fuse - 20A	02.F4
-F10	Circuit breaker - 10A	04.C1
-F20	Fuse - 2A (O7)	04.D2
-F21	Fuse - 10A (O8)	02.D9
-F27	Fuse - 2A (O13)	03.D9
-G1	Battery	02.F1
-G2	Battery	02.F2
-G3	Alternator	05.A6
-HL1	Battery disconnection lamp	02.F3
-K0	Starter solenoid	02.F3
-HL1	Battery disconnection lamp	02.F3
-K6	Relay 12V 1CO - Fuel relay	02.F6
-X7	Relay 12V 1CO - ELR/ITR trip	05.F9
-K11	Relay 12V 1CO - Open MB	02.B2
-K12	Relay 12V 1CO - Close MB	02.B3
-K25	Relay 12V 1CO - Inlet shutdown valve control	03.D5
-K28	Relay 24V - 50-60HZ	03.D5
-K20	Relay 12V 1CO - TM sensing changeover	03.D4
-K201	Relay 24V 4NO+1NC - TM sensing relay	04.C8
-K202	Relay 24V 4NO+1NC - TM sensing relay	04.C8
-K203	Relay 24V 1CO - TM shutdown relay	04.D4
-X11	Timer relay 150s (disconnection)	02.D3
-M0	Starter motor	02.F5
-M1	Cooling compartment fan motor	05.F2
-M2	Engine compartment fan motor	05.F3
-N1	ECU - C4001	02.F4
-N2	ECU - C4002	02.F5
-N3	ECU - C4071	02.F6
-N4	AVR	05.A4
-N5	PT100 4-20mA Converter	02.D8
-N22	Earth leakage relay	05.E7
-N23	Earth leakage relay RCMA 420	05.E8
-Q1	Circuit breaker - GB	05.D2
-Q2_Q11	Circuit breaker - Sockets	06.C
-O15	Circuit breaker - VSD	05.D2
-O16	Circuit breaker - Engine fan motor	05.D3
-R3	Resistor - 120 Ω Engine CAN end	02.B7
-R4	Resistor - 120 Ω Beckhoff CAN end	04.B7
-R7	Resistor - 470 Ω AVR	05.B2
-R10	Resistor - 60 kΩ	03.D9
-R12	Resistor - 20 kΩ	03.D9
-R14	Resistor - 20 kΩ	03.D9
-R21	Coolant heater - 500W	02.F10

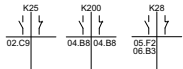
Tag	Description	Location *
-S1	Battery switch	02.F1
-S2	Spillage sensor	02.F3
-S3	Emergency stop - Cubicle	02.C6
-S10	Switch ON/OFF	02.C1
-S22	Switch - ELR	05.E7
-S23	Switch - RCMA420	05.E8
-T1	Current transformer	05.B6
-T2	Current transformer	05.B6
-T3	Current transformer	05.B6
-T4	Current transformer (O11)	06.E
-T5	Current transformer (O11)	06.E
-T6	Current transformer (O11)	06.E
-T7	Current transformer (O11)	06.E
-T8	Current transformer (O11)	06.E
-T9	Current transformer (O11)	06.E
-T22	Earth leakage relay torus	05.D6
-T23	RCMA 420 torus	05.D6
-TT1	PT100 - Coolant temperature	02.F8
-U1	VSD	05.E1
-U20	Battery charger	04.B2
-U27	Feedlink locator	03.D6
-V1	Power Meter	06.C
-V2	Power Meter	06.C
-X1	Terminal board	05.G6
-X2_X11	Socket 1PH/3PH - 16A to 125A	06.D
-X12	Powerlocks	06.C2
-X13	Powerlocks	06.A3
-X14	Connector - Fuel level sensor	02.F2
-X20	Connector - Cubicle-engine wire harness	02.E
-X21	Connector - Spillage Sensor	02.F3
-X22	Connector - Inlet subside valve	02.E9
-X23	Terminal strip - Control cubicle connections	02.O5
-X24	Terminal strip - Socket CB trip coil	07.D
-X25	Terminal strip - Customer terminals	04.E2-6
-X26	Terminal strip - TM connection	04.D2
-X27	Terminal strip - TM power	04.D7
-X28	Terminal strip - Feedlink SmartBox	03.D9
-X30	Connector - Power management system	04.E6
-X35	Terminal strip - Power meter powerlocks	06.D
-X40	Connector - TM controls (O14)	04.E7-8
-X41	Connector - TM sensing (O14)	04.E9
-X44	Connector - Supply M2 (O17)	05.E3
-X45	Connector - Supply M1 (O17)	05.E1
-Y25	Inlet shutdown valve	02.F9





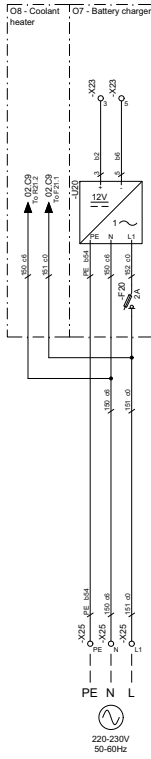


POSITION OF RELAY CONTACTS

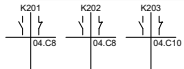


NOTES

The unit must always be grounded to earth. Earth connection will have to be done using either the screw or the faston terminal located near the power supply terminal block. Also connect to ground the terminal 3 on the power supply terminal block.



POSITION OF RELAY CONTACTS



NOTES

- Note 2: In case of option 14 (transformer maintenance) remove TM-links between terminals X26 and make the wiring as shown in the option diagram.
- Note 3: Remove link "M" when paralleling with the mains. When paralleling multiple gen-sets in ISLAND-mode, link "M" is necessary.
- Note 4: Remove link "P" when NOT running in ISLAND-mode. See table 9 for the setting of "P" link and the status of terminals X25.10, X25.11 and X25.12 with the different application modes.

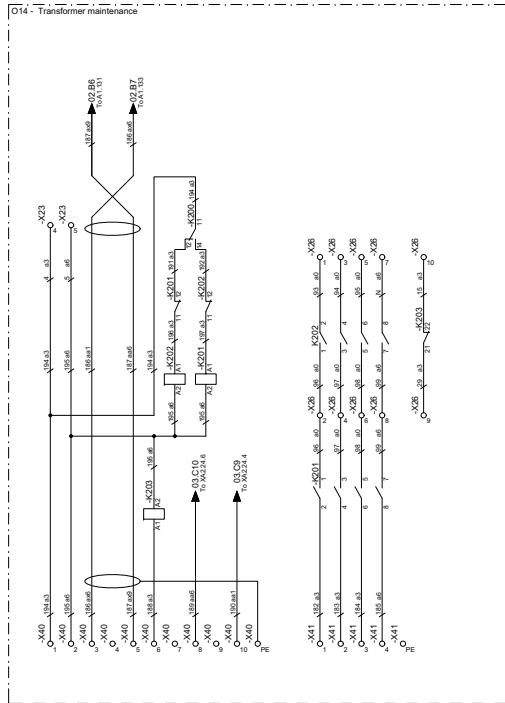
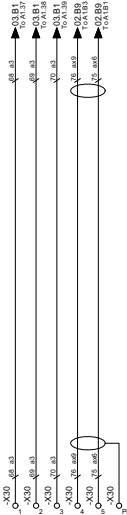
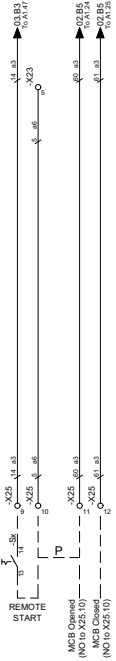
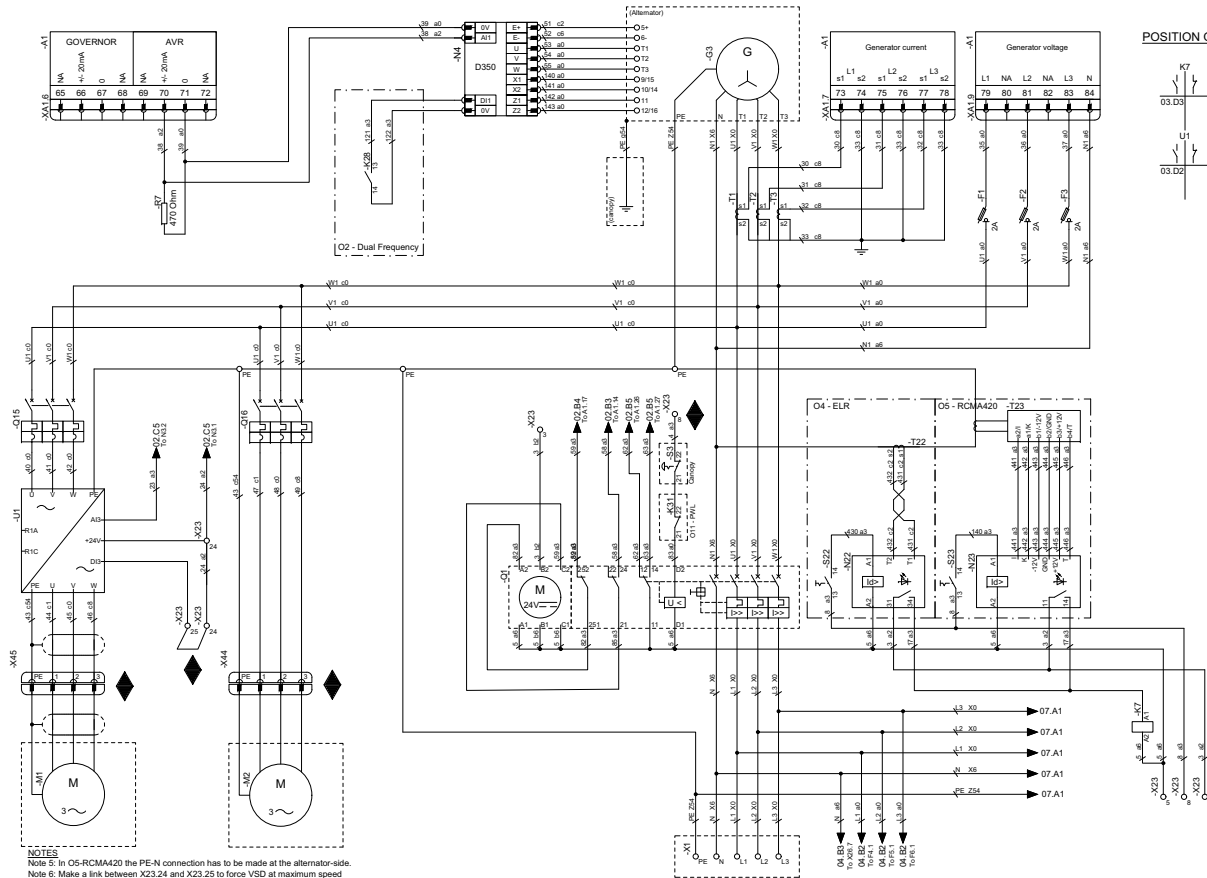


Table 9 - CONNECTOR X25 - 1011/12 STATUS

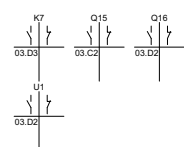
APPLICATION	WITH MB		WITHOUT MB	
	10-11 (Open)	10-12 (Close)	10-11 (Open)	10-12 (Close)
Island	NO Contact	NO Contact	Link P	Link P
AMF	NO Contact	NO Contact	Link P	Link P
Peak Shaving	NO Contact	NO Contact	Link P	Link P
Fixed Power	NO Contact	NO Contact	Link P	Link P
Load Take Over	NO Contact	NO Contact	Link P	Link P
Mains Power Exp/Imp	NO Contact	NO Contact	Link P	Link P
Transform.Maintenance	NO Contact	NO Contact	Link P	Link P

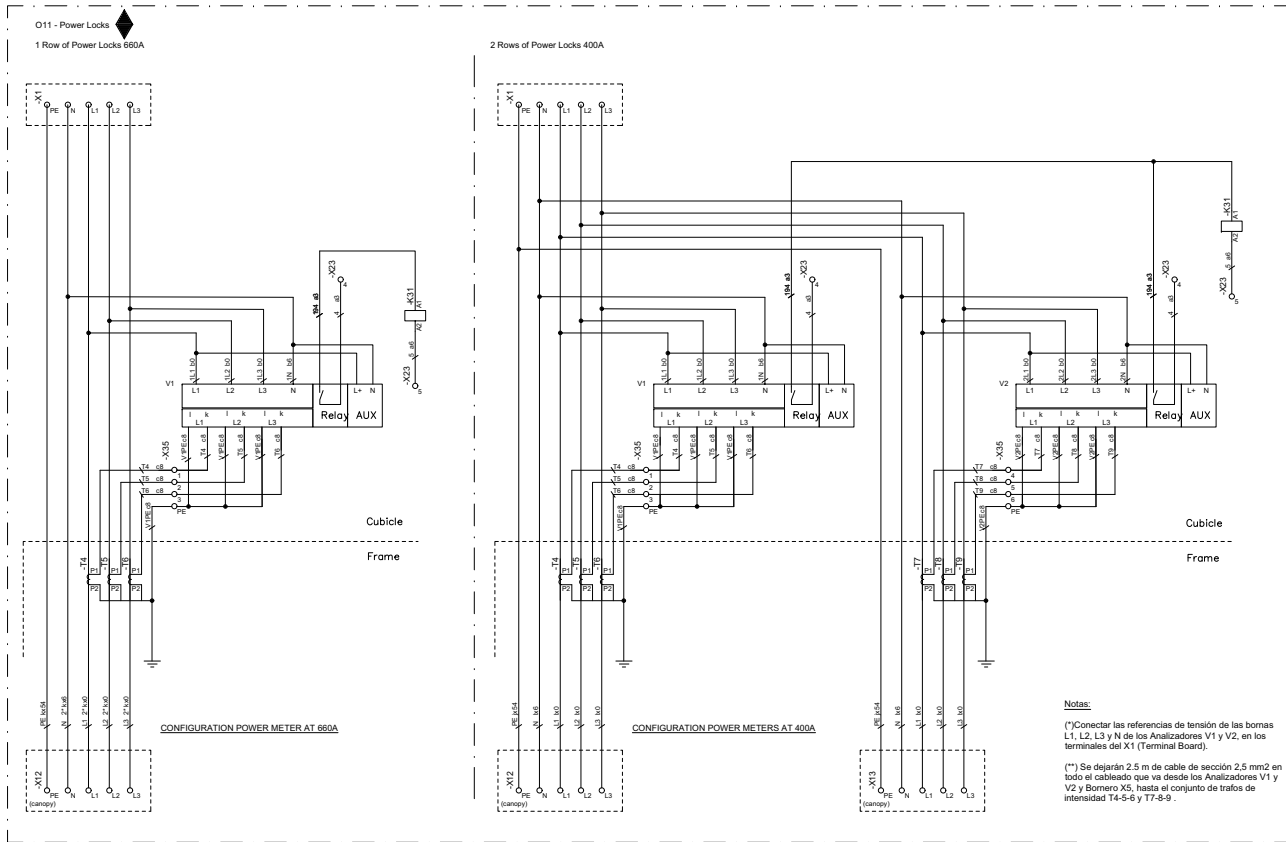


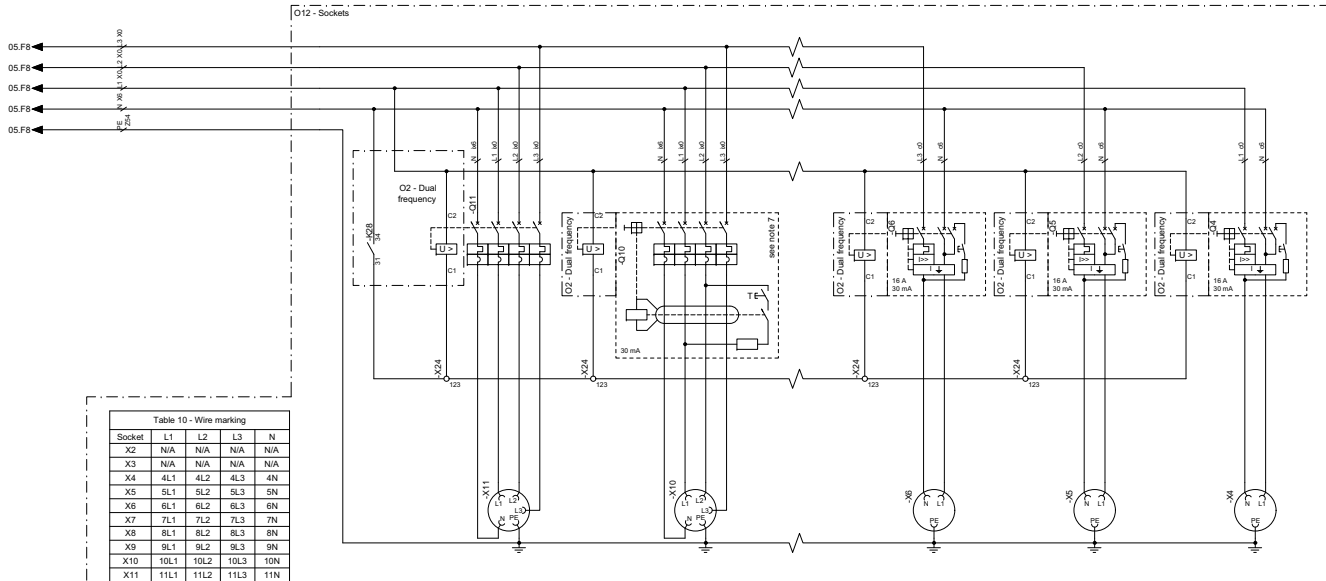
NOTES

Note 5. In O5-RCMA420 the PE-N connection has to be made at the alternator-side.
 Note 6. Make a link between X23.24 and X23.25 to force VSD at maximum speed

POSITION OF RELAY CONTACTS







Socket	L1	L2	L3	N
X2	N/A	N/A	N/A	N/A
X3	N/A	N/A	N/A	N/A
X4	4L1	4L2	4L3	4N
X5	5L1	5L2	5L3	5N
X8	8L1	8L2	8L3	8N
X7	7L1	7L2	7L3	7N
X8	8L1	8L2	8L3	8N
X9	9L1	9L2	9L3	9N
X10	10L1	10L2	10L3	10N
X11	11L1	11L2	11L3	11N

Socket slot	Socket 1	Phase	Socket 2	Phase
Socket slot 1	N/A	N/A	N/A	N/A
Socket slot 2	X4	L3	X5	L1
Socket slot 3	X6	L2	X7	L3
Socket slot 4	X8	L1	X9	L2
Socket slot 5	X10	L3	X11	L1

Socket	L1-L2-L3	N	PE
16A 1PH	c0	c6	c54
16A 3PH	c0	c6	c54
32A 3PH	e0	e6	e54
63A 3PH	gx0	gx6	gx54
125A 3PH	hx0	hx6	gx54

NOTES

Note 6: This representation of the sockets option is only one example of connection. Several configurations can be made.

Note 7: See Table 10 for wire marking.

Note 8: See Table 12 for wire cross-section and colour.

Note 9: Connect 1PH sockets alternating the connection line as shown Table 11.

Note 10: Two types of circuit breakers might be selected: magnet-thermal circuit breaker or earth leakage (ELCB) circuit breaker. With 1PH sockets only ELCB can be mounted. With 63A and 125A sockets, an earth leakage add-on blocks used when ELCB type is selected.

Note 11: In each socket slot might be fitted 2 sockets with exception of 63A and 125A sockets, in this case only one socket per slot is allowed. 63A and 125A sockets can only be mounted in slots 3, 4 or 5. There are 4 configurations sets depending on number of the 63A/125A sockets selected: No 63A/125A sockets, 1 unit 63A/125A socket, 2 units 63A/125A sockets, 1 unit 63A socket and 2 units 63A/125A sockets. Table 13 shows the 4 configurations sets with the corresponding markings of sockets and circuit breakers.

Socket slot	Configuration set 1			Configuration set 2			Configuration set 3			Configuration set 4		
	Socket type	Socket Label	Circuit breaker label	Socket type	Socket Label	Circuit breaker label	Socket type	Socket Label	Circuit breaker label	Socket type	Socket Label	Circuit breaker label
Socket slot 1	PMS / PMS + TM Connectors	N/A	N/A	PMS / PMS + TM Connectors	N/A	N/A	PMS / PMS + TM Connectors	N/A	N/A	PMS / PMS + TM Connectors	N/A	N/A
Socket slot 2	2x16 1PH or 2x16 3PH or 2x32 3PH	X4, X5	Q4, Q5	2x16 1PH or 2x16 3PH or 2x32 3PH	X4, X5	Q4, Q5	2x16 1PH or 2x16 3PH or 2x32 3PH	X4, X5	Q4, Q5	2x16 1PH or 2x16 3PH or 2x32 3PH	X4, X5	Q4, Q5
Socket slot 3	2x16 1PH or 2x16 3PH or 2x32 3PH	X6, X7	Q6, Q7	2x16 1PH or 2x16 3PH or 2x32 3PH	X6, X7	Q6, Q7	2x16 1PH or 2x16 3PH or 2x32 3PH	X6, X7	Q6, Q7	1x63 3PH	X9	Q9
Socket slot 4	2x16 1PH or 2x16 3PH or 2x32 3PH	X8, X9	Q8, Q9	2x16 1PH or 2x16 3PH or 2x32 3PH	X8, X9	Q8, Q9	1x63 3PH or 1x125 3PH	X10	Q10	1x63 3PH or 1x125 3PH	X10	Q10
Socket slot 5	2x16 1PH or 2x16 3PH or 2x32 3PH	X10, X11	Q10, Q11	1x63 3PH or 1x125 3PH	X11	Q11	1x63 3PH or 1x125 3PH	X11	Q11	1x63 3PH or 1x125 3PH	X11	Q11

Following documents are provided with this unit:

- Test Certificate
- EC Declaration of Conformity:

EC DECLARATION OF CONFORMITY

1 We, Grupos Electrógenos Europa S.A., declare under our sole responsibility, that the product

2 Machine name : **Power Generator**

3 Commercial name :

4 Serial number :

5 Which falls under the provisions of the article 12.2 of the EC Directive 2006/42/EC on the approximation of the laws of the Member States relating to machinery, is in conformity with the relevant Essential Health and Safety Requirements of this directive.

The machinery complies also with the requirements of the following directives and their amendments as indicated.

Directive on the approximation of laws of the Member States relating to	Harmonized and/or Technical Standards used	Att'mnt.
Machinery safety	2006/42/EC EN ISO 12100-1 EN ISO 12100-2 UNE EN 12501	
Electromagnetic compatibility	2004/108/EC EN 61000-6-2 EN 61000-6-4	
Low voltage equipment	2006/95/EC EN 60334 EN 60204-1 EN 60439	
Outdoor noise emission	2000/14/EC ISO 3744	

6 The harmonized and the technical standards used are identified in the attachments hereafter

7 Grupos Electrógenos Europa, S.A. is authorized to compile the technical file

Conformity of the specification to the Directives	Conformity of the product to the specification and by implication to the directives
8 Issued by	9 Product Engineering
10 Name	11 Manufacturing
12 Signature	

13 Place, Date *Muel (Zaragoza), Spain*

Grupos Electrógenos Europa, S.A. A company within the Atlas Copco Group

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– Outdoor Noise Emission
Directive 2000/14/EC:

Outdoor Noise Emission Directive 2000/14/EC

1. Conformity assessment procedure followed : Full Quality Assurance

2. Name and address of the notified body : Notified body number 0499
SNCH, Société Nationale de Certification
et d'Homologation
L-5201 Sandweiler

3. Measured sound power level : dB(A)

4. Guaranteed sound power level : dB(A)

5. Electric power : kW

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Rev. 15/04/01 02/09

