Instruction Manual for AC Generators

QAC1006 Gd

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Atlas Copco

ATLAS COPCO - PORTABLE AIR DIVISION
www.atlascopco.com

Congratulations on the purchase of your QAC1006 Gd 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 troublefree 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.

CONTENTS

1. SAFETY PRECAUTIONS FOR PORTABLE 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 **Portable generators (with earthing pin):**

Earth the generator as well as the load properly.

16b **Portable 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 retardation 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 tires 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 the unit is to be backed up by the towing vehicle, disengage the overrun brake mechanism (if it is not an automatic mechanism).

4 Never exceed the maximum towing speed of the unit (mind the local regulations).

5 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.

6 To lift heavy parts, a hoist of ample capacity, tested and approved according to local safety regulations, shall be used.

7 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.

8 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.

9 Never leave a load hanging on a hoist.

10 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.

11 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.

12 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.

13 The electrical connections shall correspond to local codes. The machines shall be earthed and protected against short-circuits by fuses or circuit breakers.

14 Never connect the generator outlets to an installation which is also connected to a public mains.

15 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.

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 Insulation or safety guards of parts the temperature of which can be in excess of 80 °C (175 °F) and which may be accidentally touched by personnel shall not be removed before the parts have cooled to room temperature.

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 causes worsening of 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.

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 testrun, 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

Batteries

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. LEADING PARTICULARS

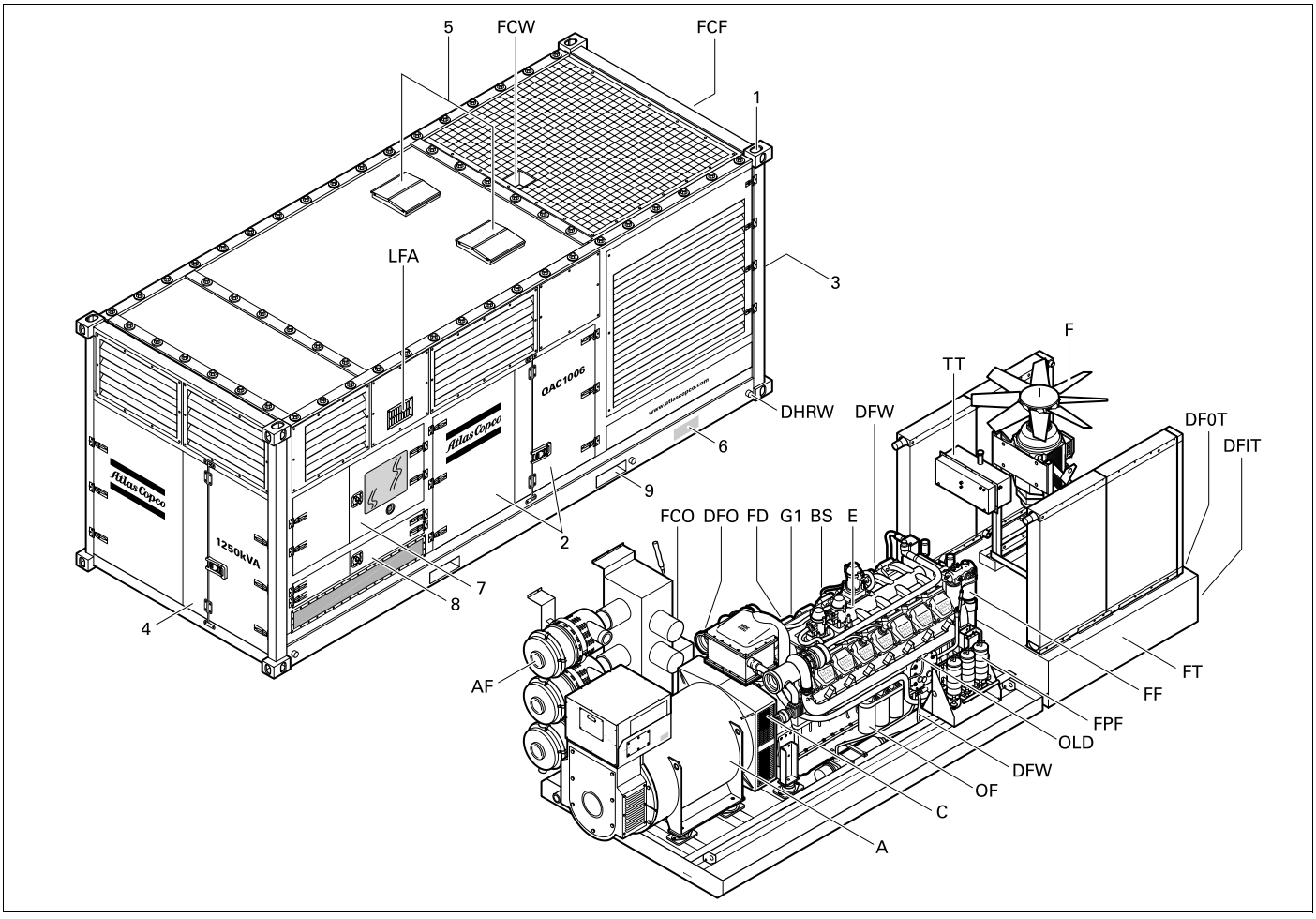
2.1 GENERAL DESCRIPTION

The QAC1006 Gd 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 60 Hz.
The rated output is 1250 kVA stand-by.

The QAC1006 Gd generator is driven by a fluid-cooled diesel engine, manufactured by DETROIT DIESEL.

An overview of the main parts is given in the diagram below.



1	Lifting holes
2	Side doors, access to engine and alternator
3	Front door, access to engine cooling system
4	Back door, access to alternator and airfilters
5	Engine exhaust
6	Data Plate
7	Side door, access to control and indicator panel
8	Side door, access to output terminal board
9	Hole for forklift
A	Alternator
AF	Air filter
BS	Battery switch
C	Coupling
DFIT	Drainhole fuel inner tank
DFO	Drain flexible engine oil
DFOT	Drainhole fuel outer tank
DFW	Drain flexible cooling water
DHRW	Drain hole rain water (in the frame)
E	Engine
F	Fan
FCF	Filler cap fuel
FCO	Filler cap engine oil
FCW	Filler cap cooling water
FD	Fuses DDEC
FF	Fuel filter
FPF	Fuel pre-filter
FT	Fueltank
G1	Battery
LFA	Low fuel alarm
OF	Oil filter
OLD	Engine oil level dipstick
TT	Top tank engine cooling system

2.2 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 the holes located in the corners of the container. To be able to lift the QAC1006 Gd by means of a forklift, rectangular holes are provided in the frame.

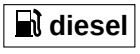
2.3 MARKINGS

A brief description of all markings provided on the QAC1006 Gd is given hereafter.

Indicates that an electric voltage, dangerous to life, is present. Never touch the electric terminals during operation.

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.



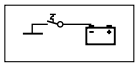
Indicates that the generator may be refuelled with diesel fuel only.

Indicates the drain for the engine oil.

Indicates the drain for the coolant.

Indicates the drain plug for the engine fuel.

Indicates the different earthing connections on the generator.

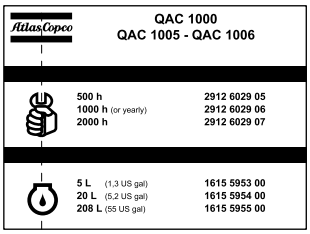


Indicates the battery switch.

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

Indicates a lifting point of the generator.

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



Indicates the partnumber of the different service paks and of the engine oil.
These parts can be ordered to the factory.

2.4 DRAIN PLUGS AND FILLER CAPS

The drain and the filler cap for the engine oil (DFO/FCO) are located on the oil tank. The manual oil drain pump can be used to drain the oil.

The drains for the coolant (DFW) are located at both sides of the engine and have to be drained both to remove all coolant. The filler cap for the coolant (FCW) is accessible via an opening in the roof.

The fuel filler cap (FCF) & the fuel drain plugs (DFIT & DFOT) are located in the front panel.

2.5 BATTERY SWITCH

The battery switch is situated inside the sound-insulated bodywork. It allows to open or to close the electrical connection between the battery and the engine circuits.

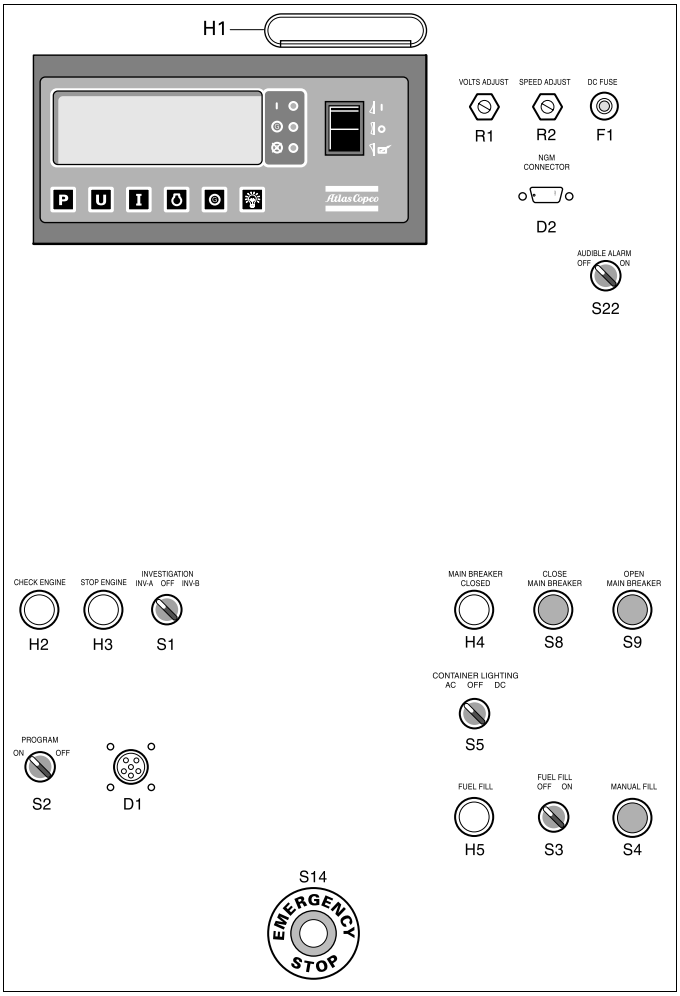
Never turn the battery switch to OFF during operation.

2.6 ALTERNATOR ANTI-CONDENSATION HEATER

– Provide the 32 A socket (X37) with external power to use the alternator heater.

2.7 CONTROL AND INDICATOR PANEL

The control and indicator panel is located behind a door in the side panel. The hinged door is partly transparent and allows easy access to the parts mounted behind it. Panel light H1 lights up as soon as the starter switch is turned into position I, indicating that the fuel solenoid is energized.



2.7.1 DC-Fuse

F1..... DC-Fuse

The fuse (10A) activates when the current from the battery to the engine control circuit exceeds its setting. The fuse can be switched on and off by pushing the button.

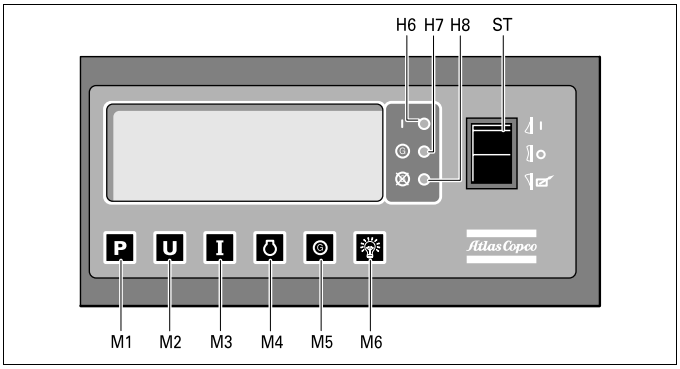
H1..... Panel light

2.7.2 Emergency stop

S14.... Emergency stop button

Push the button to stop the generator in case of an emergency. When the button is pressed, it must be unlocked, by turning it anti-clockwise, before the generator can be restarted.

2.7.3 Genset module



Starter switch

ST..... The starter switch is a three-position switch

I: Used to select normal generator start and to disable remote start. If the unit fails to start the first time, several starting attempts will take place with waiting time in between. The number of starting attempts and the waiting time in between is programmable.

O: Used to switch off the power supply from the battery or to reset after a shutdown due to a failure. The unit will not be able to start up.

: Used to select remote start.

LED indications genset module

H6..... Electrical system indicator

Lights up when the electrical system of the engine is energized.

H7..... Plant available indicator

Lights up when the generator is running.

H8..... Plant fail indicator

Lights up when a failure occurred on the generator.

Membrane keypad

M1.....Power screen selection

By pressing this button, the power screen will be displayed. Displayed parameters are:

- kVA
- kVAr
- kWh
- kW
- Power Factor (P.F.)
- Frequency in Hz

M2.....Voltage screen selection

By pressing this button, the voltage screen will be displayed. Displayed parameters are:

- Line 1 voltage to neutral
- Line 2 voltage to neutral
- Line 3 voltage to neutral
- Line 1 to line 2 Voltage
- Line 2 to line 3 Voltage
- Line 3 to line 1 Voltage
- Frequency in Hz

M3.....Current screen selection

By pressing this button, the current screen will be displayed. Displayed parameters are:

- Line 1 current
- Line 2 current
- Line 3 current
- Frequency in Hz

M4.....Engine screen selection

By pressing this button, the engine screen will be displayed. Displayed parameters are:

- Oil pressure
- Coolant temperature
- Battery voltage
- Speed in RPM

An extra parameter is displayed with the optional electrical fuel level gauge:

- Fuel level

M5.....Status screen selection

By pressing this button, the status screen will be displayed. Displayed parameters are:

- Current generator status
- Generator Fail information
- Run hours

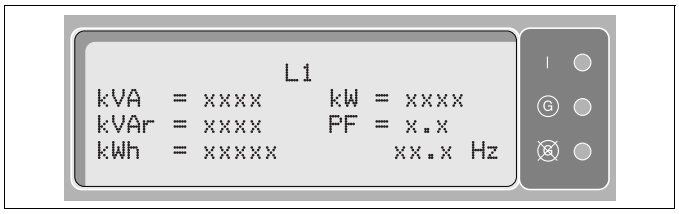
M6.....Back light

By pressing this button the screen lights up.

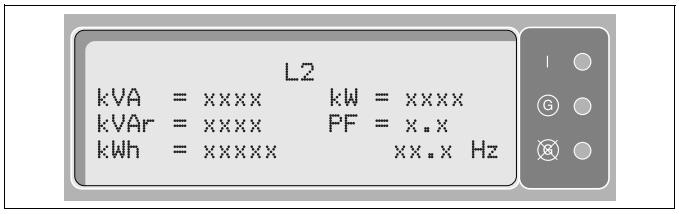
Normal running conditions

Power screen

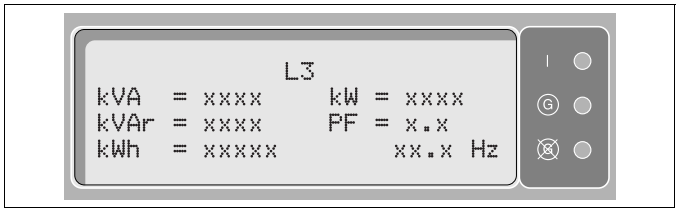
1. Press M1 once to see the Power screen L1:



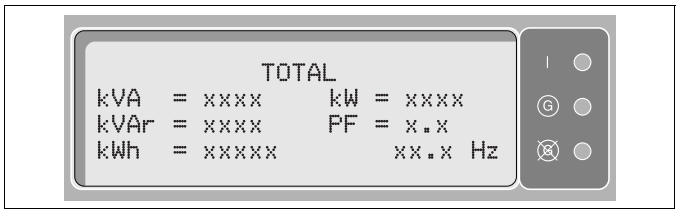
2. Press M1 twice to see the Power screen L2:



3. Press M1 three times to see the Power screen L3:



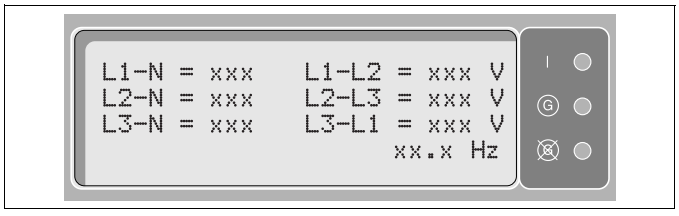
4. Press M1 four times to see the Power screen total:



5. Press M1 again to return to the power screen L1

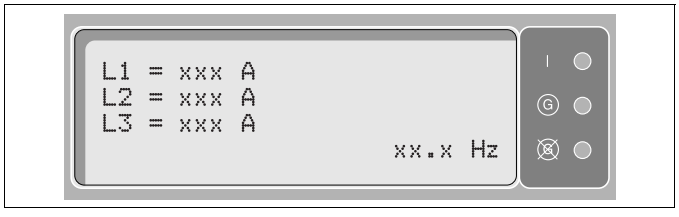
Voltage screen

1. Press M2 to see the Voltage screen:



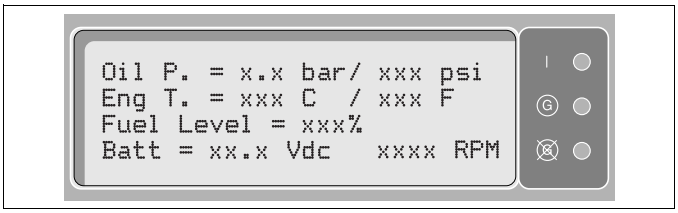
Current screen

1. Press M3 to see the Current screen:



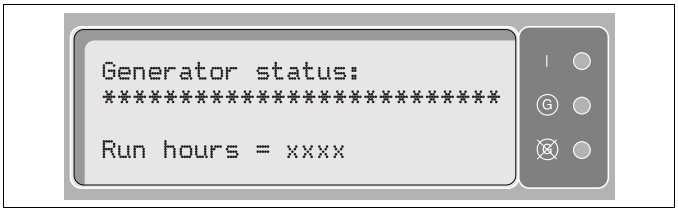
Engine screen

1. Press M4 to see the Engine screen:



Status screen

1. Press M5 to see the Status screen:

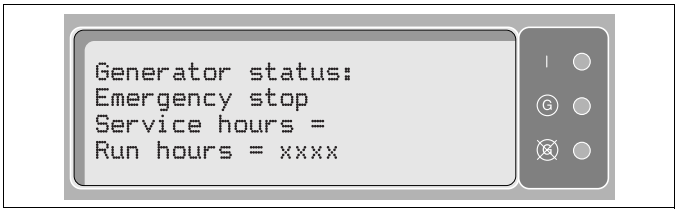


In normal running conditions, the actual generator status is shown on line 2. All possible generator status messages are listed below:

```
Display test
Emergency stop
Standby
Crank
Start time B
Timer A
Timer B
Timer C
Plant available
Plant on load
Cool down
General failure
Overspeed failure
```

Emergency stop activated

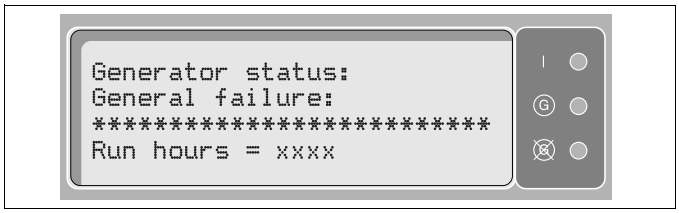
Put the starter switch of the Genset module in position I. Following screen appears.



Generator failure

Engine and alternator parameters are measured and controlled. When a failure or a shut down occurs, the active warning message and/or shutdown reason is displayed.

Several active warnings can occur during the same running period. Only the last active warning or shutdown reason is displayed.

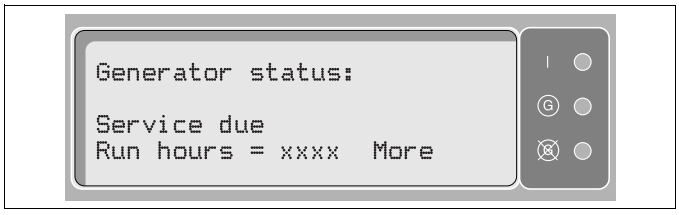


All possible failure messages are listed below:

```
Low Fuel Warning
Low Fuel Shutdown
Low Coolant Level
High Alternator Temp
Engine Overspeed
Engine Underspeed
Plant Overvoltage
Plant Undervoltage
Charging Alternator
Start Failure
Overload
Battery Low
DDEC Check Engine
DDEC Stop Engine
Fan Failure
```

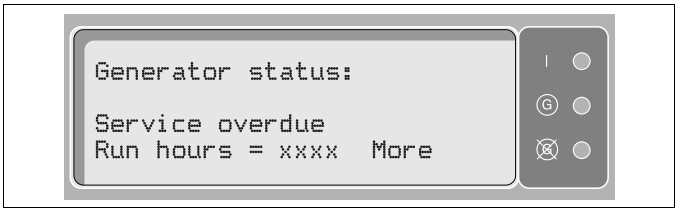
Normal maintenance reached

Each time a normal maintenance interval is reached, the following screen is displayed. The maintenance interval depends on the type of generator. Please refer to chapter “4. Maintenance” on page 22 for further information.



The module can be reset by your local Atlas Copco Service Department after maintenance is done.

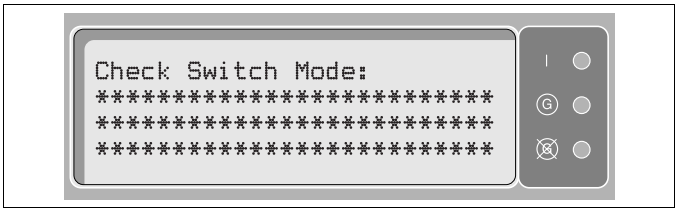
When no maintenance has been undertaken, according to the schedule in chapter “4. Maintenance” on page 22, the following screen is displayed that indicates service overdue and the actual running hours.



It is still possible to select other screens with the membrane keypad.

Module in stand-by mode, warnings active

When the module is in stand-by mode and warnings are active, the display will show as follows:



When the remote start signal is given, the generator will not start due to the active warning.

The possible failure messages are listed in “Generator failure”.

Bad communication links

When communication links between the module and connected devices are bad and need to be checked, the following screen appears.

2.7.4 Potentiometer

R1.....Supply voltage adjust potentiometer

Allows to adjust the output voltage.

R2.....Frequency adjust potentiometer

Allows to adjust the frequency of the output voltage. This adjustment has no influence on the output voltage.

2.7.5 Control panel lighting

S2.....Program ON/OFF

ON: Allows to read out and/or program the genset module, the paralleling module and the DDEC configuration when the engine is not running.

OFF: Used to turn off the displays of the control panel.

To be able to start the generator the program switch must be in position OFF. Always wait min. 30 sec. before changing position.

2.7.6 Container lighting

S5.....Container lighting AC/OFF/DC

The container lighting is turned on by S5 on the control and indicator panel.

AC: Used to turn the container lighting on with external power supply.
Provide the 16 A socket (X36) with external power to use the AC-container lighting.

OFF: Used to turn the container lighting off.

DC: Used to turn the container lighting on with battery power. To save the battery, the lighting goes out after an adjustable time.
Power provided by batteries.

2.7.7 Main breaker

H4.....Main breaker closed light

Lights up when the main breaker is closed

S8.....Close main breaker button

Push button to manually close main breaker

S9.....Open main breaker button

Push button to manually open main breaker.

2.7.8 Engine diagnosis

H2.....Check engine light

Turn the diagnostic request switch (S1) to have the inactive codes flashing on the check engine light.

H3.....Stop engine light

Turn the diagnostic request switch (S1) to have the active codes flashing on the stop engine light.

S1.....Diagnostic request switch

With the starter switch into the O position, switch S2 in position ON and the engine at idle or with the starter switch into the I/ position and the engine running, turn the switch to have the active codes flashing on the stop engine light (H3), followed by the inactive codes flashing on the check engine light (H2).
Turn the switch to the left for investigating engine module A.
Turn the switch to the right for investigating engine module B.
Module B will give only flash-codes if there is an error on module B.
Always wait minimum 30 seconds after shutdown or changing position of S1 before switching the diagnostic request switch to avoid inactive code 55 to appear on H2.

D1..... Engine diagnostic data socket

Allows to connect the diagnostic data reader.

Refer to chapter “Technical specifications – Engine diagnostic codes”

2.7.9 PC interface

D2..... PC interface

Allows direct connection of a PC to the generator control module.

2.7.10 Automatic Fuel fill

H5..... Fuel fill light

Lights up when S3, the fuel fill, is turned on.

S3..... Fuel fill ON/OFF switch

ON: The fuel pump starts automatically refilling the fueltank when the fuel level is below 20% of the maximum fueltank capacity.

OFF: The fuel pump will not start.

S4..... Manual fill button

Used to start the fuel pump to fill the fueltank. Regardless the fuellevel in the fueltank.

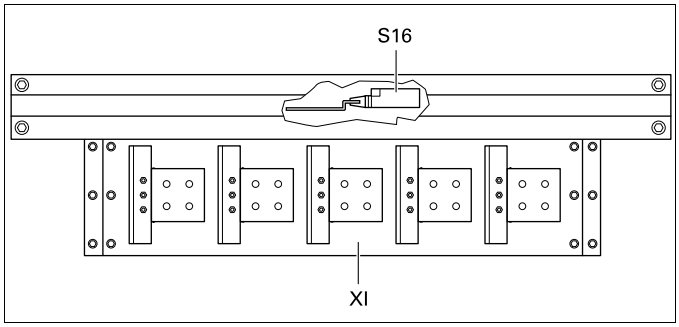
2.7.11 Fuel alarm

S22.... Fuel alarm switch

Used to switch the low fuel alarm on and off.

2.8 OUTPUT TERMINAL BOARD

The output terminal board is situated below the control and indicator panel.



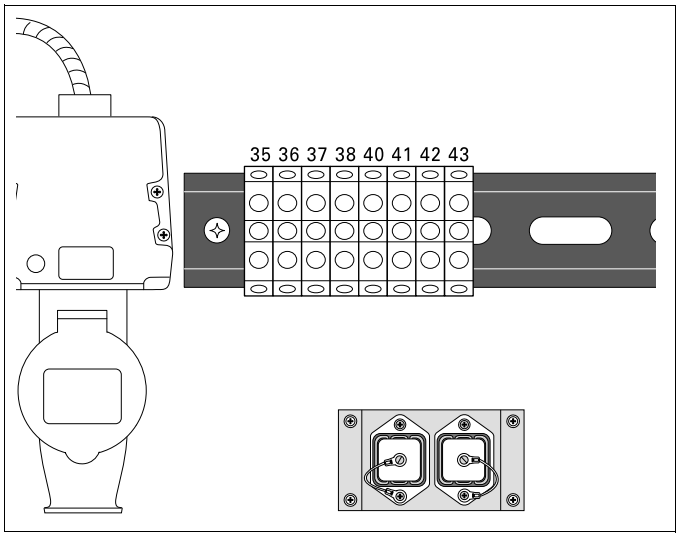
X1..... Main power supply

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

S16.... Safety button

When the door is opened during operation, the safety button is activated and the main breaker will trip.

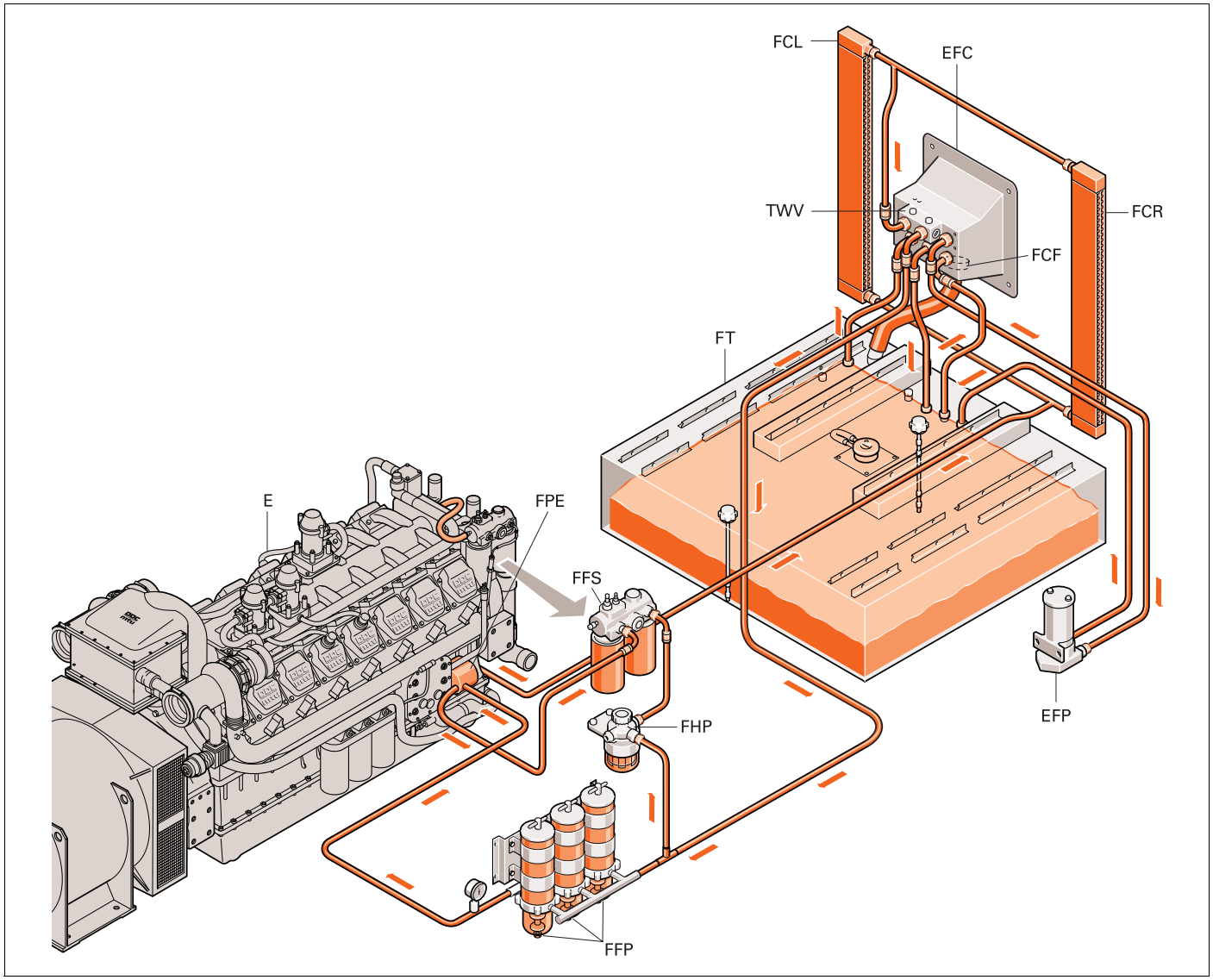
2.9 CONNECTIONS TERMINAL



X14.... Terminal strip

35	Plant contactor N
36	Plant contactor L
37	Remote start
38	Remote start
40	High alarm output
41	High alarm output
42	Fuel bund alarm output
43	Fuel bund alarm output

2.10 ENGINE FUEL SYSTEM



EFP	Electric fuel pump	FCR	Fuel cooler right
E	Engine	FHP	Fuel handpump
FPE	Engine fuelpump	FT	Fuel tank
EFC	External fuelsupply coupling	FFP	Primary fuel filters
FCF	Filler cap (fuel tank)	FFS	Secondary fuel filters
FCL	Fuel cooler left	TWV	Three way valve

2.11 EXTERNAL FUELTANK CONNECTION

The "External fueltank connection" allows to bypass the internal fueltank and to connect an external fueltank to the unit.

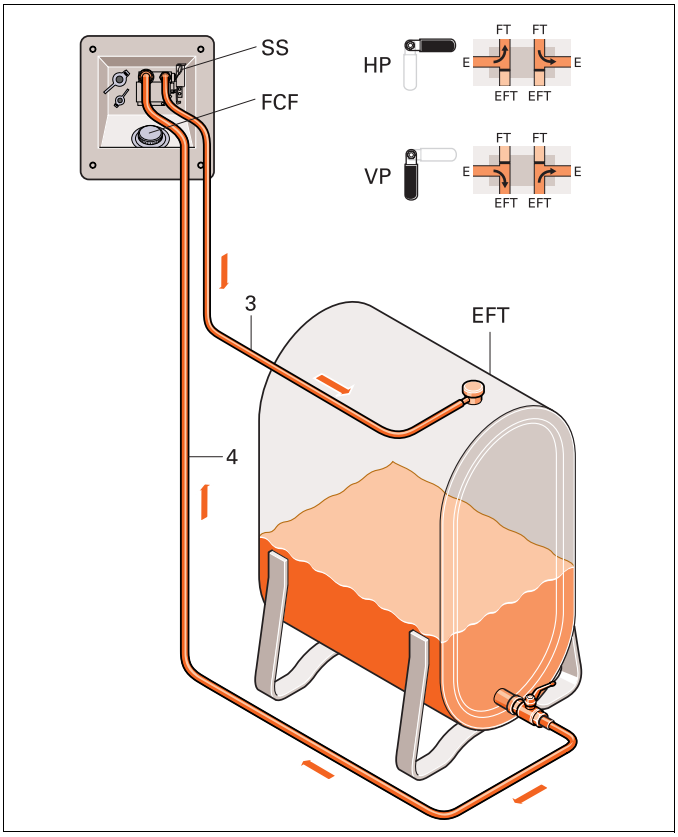
The unit must be stopped before switching from the internal to an external fueltank.

Connecting the external fueltank

1. Connect the fuel supply line (4) as well as the fuel return (3) line to the external fuel supply couplings.

Connections to fuel lines ought to be air-tight to prevent air from entering the fuel system.

External fuel circuit



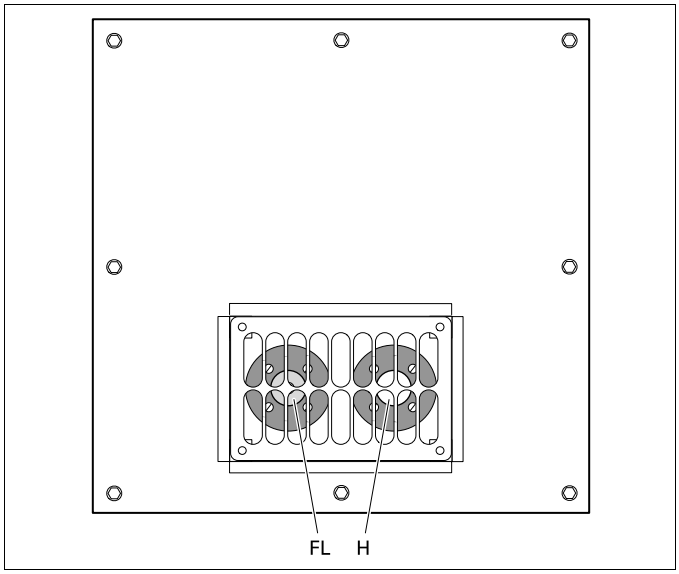
E	Engine
EFT	External fuel tank
FCF	Filler cap (fuel tank)
FT	Fuel tank
SS	Selector switch

SS ..... Selector switch

HP:Put the selector switch in horizontal position to select the internal fueltank

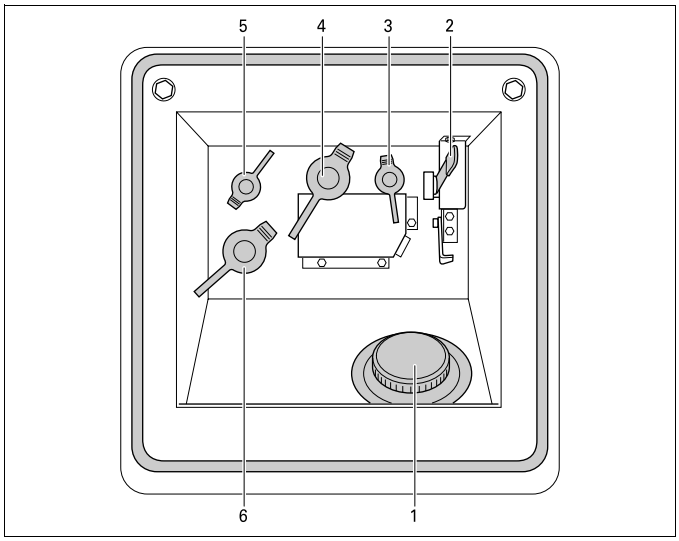
VP:Put the selector switch in vertical position to select the external fueltank

2.12 LOW FUEL ALARM



The fuel alarm will be activated at low fuel level. The alarm consists of a flash light (FL) and a horn (H). The horn can be switched off by turning switch S22 on the control panel to off.

2.13 FUEL FILL



2.13.1 Fuel fill

Refill the internal fueltank by using the fuel filler cap (1).

2.13.2 Manual fuel fill

Use the electrical fuel pump of the unit to pump fuel from an external fueltank to the internal fueltank of the unit.

1. Connect the fuel supply line (6) as well as the fuel return (5) line.

   Connections to fuel lines ought to be air-tight to prevent air from entering the fuel system.

2. Put the lever (2) in the upper position.

3. Turn the fuel fill switch (S3) on the control and indicator panel in position on.

4. Start the electrical fuel pump by pressing the manual fill button (S4) on the control and indicator panel. The pump will stop automatically when the internal fueltank is full.

2.13.3 Automatic fuel fill

The option “Automatic fuel fill” allows to refill the internal fueltank automatically.

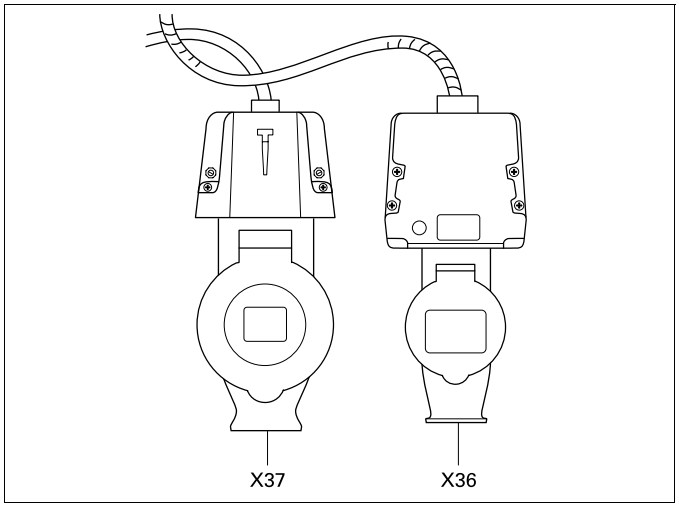
1. Connect the fuel supply line (6) as well as the fuel return (5) line.

   Connections to fuel lines ought to be air-tight to prevent air from entering the fuel system.

2. Put the lever (2) in the upper position.

3. Turn the fuel fill switch (S3) on the control and indicator panel in position on to switch on the automatic fuel fill. H5 lights up. The fuel pump will refill the fueltank automatically when the fuel level is below 20% of the maximum fueltank capacity.

2.14 SOCKETS



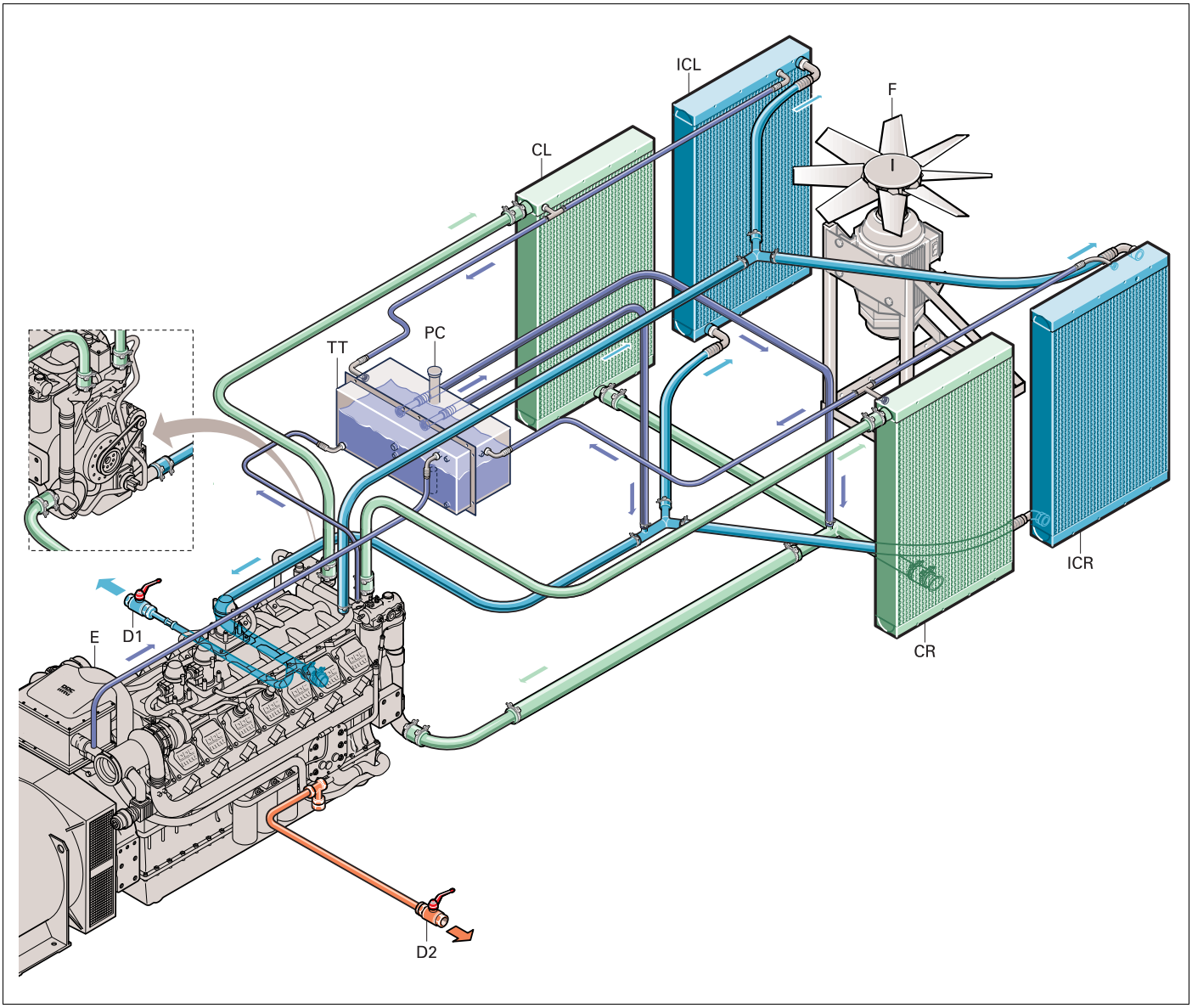
X36….16 A socket

Provide the 16 A socket with external power to use the battery charger and the container lighting.

X37….32 A socket

Provide the 32 A socket with external power to use the engine cooling water heater (option) and the alternator anti-condensation heater.

2.15 ENGINE COOLING SYSTEM



CL	Cooler left	F	Fan
CR	Cooler right	ICL	Intercooler left
D1	Drain intercooler	ICR	Intercooler right
D2	Drain cooler	PC	Pressure cap
E	Engine	TT	Top tank

3. 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 1,000 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 of the generator must be verified. Use the earthing terminal (PE) on the terminal board to earth the generator. The protective system against excessive contact voltage is not effective unless a suitable earthing is made.

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.

3.1 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).
- Protect the generator against dust and rain if it is operated outside.
- Check that the engine exhaust is not directed towards people. 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. If necessary, consult Atlas Copco.
- Leave enough space for operation, inspection and maintenance (at least 1 meter at each side).
- Check that the inner earthing system is in compliance with the local legislation.
- Use coolant for the engine cooling system. See “Engine coolant” on page 23 for details.
- Check the tightness of the bolts and nuts.
- Check that the earthing is connected.
- Plug in the engine and alternator heater (32 A socket X37) if required.
- Plug in the battery charger and container lighting (16 A socket X36) if required.
- Make sure the battery switch is on before starting the unit.

3.2 CONNECTING THE GENERATOR

3.2.1 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.

3.2.2 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), in 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 (mm²)	*120*	*150*	*185*	*240*	*300*
Max. current (A)					
Multiple core	*245*	*282*	*323*	*379*	*429*
Single core	*273*	*314*	*358*	*421*	*477*
H07 RN-F	*239*	*275*	*313*	*371*	*428*

The lowest acceptable wire section and the corresponding maximum cable or conductor length for multiple core cable or H07 RN-F, at rated current (433 A), for a voltage drop e lower than 5 % and at a power factor of 0.80, are respectively 300 mm^2 and 455 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)

3.2.3 Connecting the load

Site distribution panel

If outlet sockets are required, 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.

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 for the load cable, without excessive length, and lay it out in a safe way without forming coils.

– Open the 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.

– Close the door in front of X1.

3.3 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 water 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 waterdamp in a nearly empty tank from condensing.

– Check the vacuum indicator of the air filter. If the red part shows completely, replace the filter element.

– Press the vacuator valve of the air filter to remove dust.

– Check the generator for leakage, tightness of wire terminals, etc. Correct if necessary.

– Check that fuse F1 has not tripped and that the emergency stop is in the "OUT" position.

– Check that the load is switched off.

– Check that the program switch (S2) is turned OFF

3.4 STARTING

To start up the unit locally, without using the remote start/stop switch, proceed as follows

– Turn the battery switch to ON.

– Put the starter switch in position I.

If the engine fails to start, failure information will be shown via the LCD.

– Check the display.

– Run the engine for approximately 5 minutes to warm up. Check the engine oil pressure and the cooling water temperature (M4).

– Check the voltages and the frequency (M2).

– Switch main breaker Q1 on by pressing S8.

– Check the voltages, amps and freq (M1 & M2).

To start up the unit from a remote location using the remote start/stop switch, proceed as follows

– Put the starter switch in position .

– Put the remote start/stop switch in position start.

– Approximately 15 seconds after starting (stabilisation time for the generator), the timer relay closes the voltage free contact and the plant contactor is energized (if installed).

3.5 STOPPING

To stop the unit locally, without using the remote start/stop switch, proceed as follows

– Switch off the load.

– Switch main breaker Q1 off by pressing S9.

– Let the engine run for about 5 minutes.

– Stop the engine by putting the starter switch in position O.

– Turn the battery switch to OFF.

Lock the doors and the door of the control and indicator panel to avoid unauthorized access.

To stop the unit from a remote location using the remote start/stop switch, proceed as follows

– Switch off the load.

– Let the engine run for about 5 minutes.

– Stop the engine by putting the remote start/stop switch in position stop or by putting the starter switch in position O.

3.6 DURING OPERATION

Following points should be carried out regularly:

– Check the 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 cooling water.

– Avoid long low-load periods (< 30 %). In this case, an output drop and higher oil consumption of the engine could occur.

– Check, that the voltage between the phases is identical and that the rated current per phase is not exceeded.

– When single-phase loads are connected to the generator output terminals, keep all loads well-balanced.

Never turn the battery switch to OFF during operation.

If main breaker Q1 has tripped during operation, switch off the load and stop the generator. Check and, if necessary, decrease the load.

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

When the doors of the terminal board are opened during operation the circuit breaker will trip.

4. MAINTENANCE

Before carrying out any maintenance activity, check that the start switch is in position O and that no electrical power is present on the terminals.

4.1 MAINTENANCE SCHEDULE	Daily	Initial	Small	Normal	Yearly
		50 hours	*500 hours*	*1000 hours*	*2000 hours*
SERVICE PAK	-	**with unit**	**2912 6035 05**	**2912 6036 06**	**2912 6037 07**
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 on administration costs and are offered at reduced price, compared to the loose components.Refer to the parts list for more information on the contents of the service kits.					
Coolant level	Check	Check	Check	Check	Check
Coolant: Propylene glycol mixture (3)	Analyse every 500 hrs. for inhibitors and freezing point. Replace every 10.000 hrs or 4 yrs, whichever comes first.				
Tension and condition of drive belt(s)		Check	Check	Check	Check
Radiator and intercooler fins		Check/Clean	Check/Clean	Check/Clean	Check/Clean
Fuel pre-filter/Water separator	Check/Drain	Replace/Drain	Replace/Drain	Replace/Drain	Replace/Drain
Fuel filter element		Replace	Replace	Replace	Replace
Fuel injectors					Check
Oil level in sump	Check	Check	Check	Check	Check
Oil pressure display (min. 1.5 bar)	Check	Check	Check	Check	Check
Lubrication oil		Change	Change	Change	Change
Oil filter(s)		Replace	Replace	Replace	Replace
Crankcase pressure (3mm WG at no load)				Check	Check
Vacuum indicator	Check	Check	Check	Check	Check
Air cleaner and dust bowl		Clean	Clean	Clean	Clean
Air filter element (1)			Clean	Replace	Replace
Safety cartridge				Replace	Replace
Turbocharger impeller and housing					Clean/inspect
Fan hub bearings					Lubricate
Oil, fuel and water leaks		Check	Check	Check	Check
Mechanical links (e.g. fuel solenoid link)			Grease	Grease	Grease
Level battery electrolyte (2)		Check	Check	Check	Check
Condition of vibration dampers		Check	Check	Check	Check
Alternator insulation resistance (4)		Measure	Measure	Measure	Measure
Tightness of nuts and bolts		Check			Check
Door hinges and locks		Grease			Grease
Fixation of hoses, cables and pipes				Check	Check
Inspection by Atlas Copco Service technician					⚠

(1) More frequently when operating in a dusty environment. Evacuate dust from the airfilter valve daily.

(2) A Service Bulletin (ASB) dealing elaborately with batteries and due care is available on request.

(3) See “Engine coolant” on page 23 for more details.

(4) See “Measuring the alternator insulation resistance” on page 23

4.2 ENGINE MAINTENANCE

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

4.3 ENGINE COOLANT

Never remove the cooling system filler (pressure) 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.

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

The freezing point of the coolant must be at least 5 °C lower than the lowest temperature that can occur in the area. If the cooling water freezes, it may crack the cylinder block, radiator or cooling water pump.

To ensure protection against corrosion, caviation and formation of deposits, the concentration of the additives in the coolant must be kept between certain limits as stated by the manufacturer's guide lines. Topping up the coolant with water only, changes the concentration and is therefore not allowed.

Never mix different coolants

Prepare the coolant mixture outside the coolant system.

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

The coolant mixture consists of 50 % propylene glycol + additives and 50 % water.

PARCOOL PG can be ordered from Altas Copco. It contains 210 l of PG coolant 50/50 mix. The partnumber for this is 1604 3182 00. The QAC contains 260 l of coolant.

As the coolant is an important issue for engine warranty topics, the following partnumbers can be ordered from Atlas Copco to check on inhibitors and freezing point:

- 2913 0028 00 : refractometer.
- 2913 0029 00 : pH-meter.

4.4 ALTERNATOR MAINTENANCE

4.4.1 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.

4.4.2 Grease bearing

Every 4000 running hours the bearing of the alternator has to be greased with SKF28 or equivalent alternative.

5. STORAGE OF THE GENERATOR

5.1 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.

5.2 PREPARING FOR OPERATION AFTER STORAGE

Before operating the generator again, remove the wrapping, VCI paper and silicagel bags and check the generator thoroughly (go through the checklist "Before starting").

– Consult the engine's operator manual.

– Check that the insulation resistance of the generator exceeds 5 MΩ.

– Replace the fuel filter and fill the fueltank. Vent the fuel system.

– Reinstall and connect the battery, if necessary after being recharged.

– Submit the generator to a test run.

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 (e.g. close to sea).

6.1 GENSET MODULE TROUBLESHOOTING

Symptom *(=Message on LCD-Display)*	**Possible cause**	**Corrective action**
Fuel level warning	Low fuel level.	Check fuel level. Check for fuel leakages and repair. Refill fueltank with fuel.
	Bad fuel level switch.	Replace fuel level switch.
	Bad connection in wiring.	Check wiring and connections.
Fuel level shutdown	Fuel level too low.	Check fuel level. Check for fuel leakages and repair. Refill fueltank with fuel.
	Bad fuel level switch.	Replace fuel level switch.
	Bad connection in wiring.	Check wiring and connections.
Coolant level low	Low coolant level.	Check coolant level. Check for coolant leakages and repair. Refill with the suitable coolant.
	Bad coolant level switch.	Replace coolant level switch.
	Bad connection in wiring.	Check wiring and connections.
Alternator temperature high	High alternator temperature.	Contact your local Atlas Copco Dealer.
	Thermistor in the alternator is broken.	Contact your local Atlas Copco Dealer.
	Bad connection in wiring.	Check wiring and connections.
Engine overspeed	Engine speed above the maximum rpm.	Contact your local Atlas Copco Dealer.
Engine underspeed	Engine speed below the minimum rpm.	Check if the load doesn't exceed the nominal power of the unit.
		Contact your local Atlas Copco Dealer.
Plant Overvoltage	See "6.2 Alternator trouble shooting" on page 26.	
Plant Undervoltage	See "6.2 Alternator trouble shooting" on page 26.	
Charging alternator	Charging alternator doesn't charge the battery.	Check if the driving belt is broken and repair if necessary.
		Check wiring and connections.
Overload	Unit is being overloaded or short-circuited and the circuit breaker does not work properly.	Check if load doesn't exceed nominal load. Check power circuit for insulation failures.
		Check function of the circuit breaker.
		Contact your local Atlas Copco dealer.
Battery low	Battery charger is not charging.	Check battery charger.
	Battery cannot be charged anymore.	Replace battery.
DDEC Stop Engine	The DDEC engine controller decided to shut down the engine for a safety reason. A warning is showing 20 sec. before shutdown on display.	Check oil level. Check coolant level. Check engine temperature. Check for leakages and repair if necessary.
		Contact your local Atlas Copco dealer.
Fan failure	Bad connection.	Check connections.
	Problem with fandrive.	Contact your local Atlas Copco dealer.

6.2 ALTERNATOR TROUBLE SHOOTING

Symptom	Possible cause	Corrective action
Alternator does not excite	Blown fuse.	Replace fuse.
	Insufficient residual voltage.	Increase the speed by 15 %.
	No residual voltage.	For an instant apply on the + and – terminals of the electronic regulator a 12 V battery voltage with a 30 Ω resistor in series respecting the polarities.
After being excited alternator does not excite	Connections are interrupted.	Check connection cables as per attached drawings.
Low voltage at no load	Voltage potentiometer out of setting.	Reset voltage.
	Intervention of protection.	Check rpm.
	Winding failure.	Check windings.
High voltage at no load	Voltage potentiometer out of setting.	Reset voltage.
	Failed regulator.	Substitute regulator.
Lower than rated voltage at load	Voltage potentiometer out of setting.	Reset voltage potentiometer.
	Intervention by protection.	Current too high, power factor lower than 0.8; speed lower than 10 % of rated speed.
	Failed regulator.	Substitute regulator.
	Rotating bridge failure.	Check diodes, disconnect cables.
Higher than rated voltage at load	Voltage potentiometer out of setting.	Reset voltage potentiometer.
	Failed regulator.	Substitute regulator.
Unstable voltage	Speed variation in engine.	Check regularity of rotation.
	Regulator out of setting.	Regulate stability of regulator by acting on “STABILITY” potentiometer.

6.3 ENGINE TROUBLE SHOOTING

A first fault diagnose can be read on the check engine light (H2) and the engine stop light (H3), see chapter “Technical specifications – Engine diagnostic codes”page 41.

The DDEC reader is a useful tool for troubleshooting.

For more detailed information refer to the Engine operating manual. An extensive Engine troubleshooting manual is available at Detroit Diesel. For more information contact Detroit Diesel.

7. OPTIONS AVAILABLE FOR QAC1006 Gd UNITS

7.1 OVERVIEW OF THE OPTIONS

The following “electrical” options are available for the QAC1006 Gd unit:

– 7.2. Earth leakage relay (ER).

– 7.3. Automatic battery charger.

– 7.4. AMF operation.

– 7.5. Parallel operation (PAR).

The following “mechanical” options are available for the QAC1006 Gd unit:

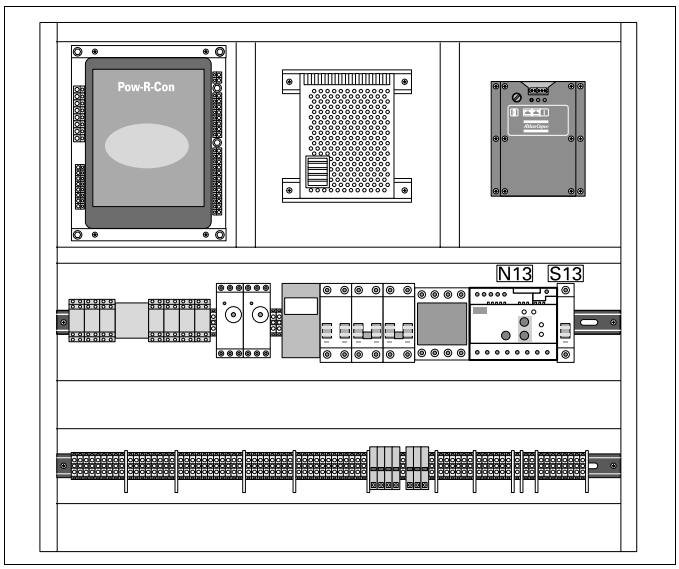
– 7.6. Engine cooling water heater.

– 7.7. Automatic oil make-up system.

– Air shut off valve

7.2 EARTH LEAKAGE RELAY (ER)

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



N13....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. N13 has to be reset manually after eliminating the problem (reset button marked R). It can be overridden by means of the earth leak switch (S13, labelled IΔN) but has to be tested monthly (by pushing test button T).

S13....Lock-out switch for earth fault protection (N13)

This switch is located inside the cubicle and is labelled IΔN.

Position O: No de-energising of the main circuit breaker Q1 when an earth fault occurs.

Position 1 : De-energising of the main circuit breaker Q1 when an earth fault occurs.

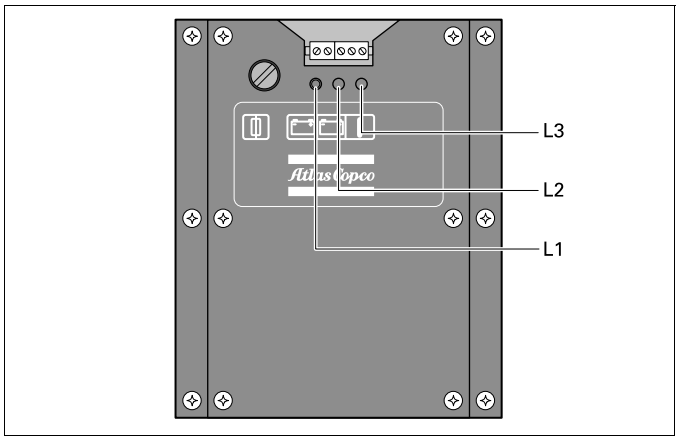
Position O will only be used in conjunction with an external earth fault protection unit (e.g. integrated in a distribution board).

If S13 is in position O, proper earthing is of the utmost importance for the safety of the user. Eliminating any earth fault protection can lead to serious injury or even death for anybody touching the unit or the load.

For parallel operation, it is necessary to disable the earth leakage detection. See “Parallel operation (PAR)” on page 32 for more detailed information.

7.3 AUTOMATIC BATTERY CHARGER

The “trickle charger” charges the battery completely and is disconnected once the unit starts up.



– Provide the X36 socket, located at the side of the output terminal board, with external power to use the battery charger.

L1.....Red Led

Lights up when the battery is charging.

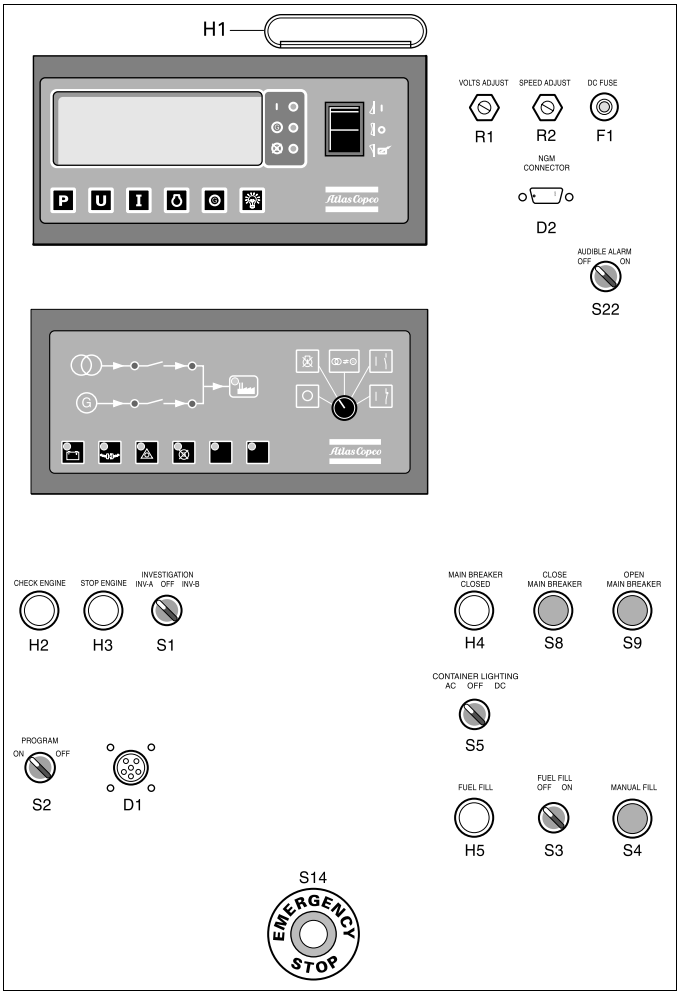
L2.....Yellow Led

Lights up when the battery is charged.

L3.....Green Led

Lights up when AC power supply is available.

7.4 AMF OPERATION



7.4.1 AMF module

The “Automatic mains failure” option continuously monitors four input lines of the main power supply: the three phases and neutral.

When the mains (one or all phases) is not available for a short period, the following timing sequence occurs:

– The mains contactor opens and disconnects the load from the mains.

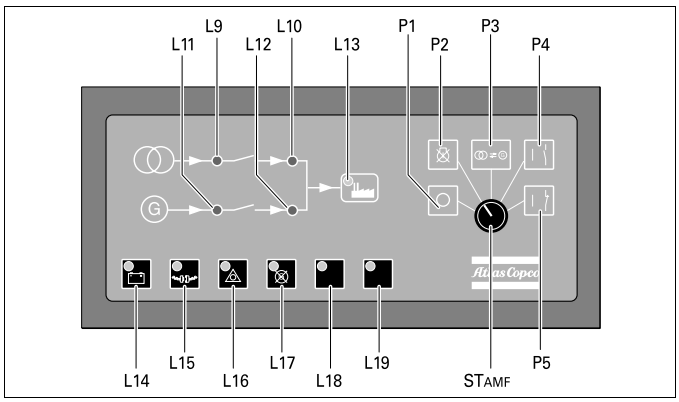
– The unit starts after 3 seconds (crank delay) after the mains failure. If the unit fails to start the first time, several starting attempts will take place with waiting time in between. The number of starting attempts and the waiting time in between is programmable.

– After a short generator stabilization time (plant settle time), the generator contactor is energized and the generator supplies power towards the load.

When the mains (all phases) is available again for a minimum period (mains restore time), the following timing sequence occurs:

– The generator contactor opens and the mains contactor closes (1 second change over time).

– The generator shuts down 1 minute later (delay run on time).



Starter switch AMF

ST_{AMF} The starter switch is a five-position switch

Make sure that the starter switch of the genset module (St) is in position .

P1: Used to switch off the power supply from the battery or to reset after a shutdown due to a failure. The unit will not be able to start up.

P2: The generator will not start. Nevertheless, the mains remains monitored and the mains contactor will trip in case of a mains failure.

P3: The generator will take over when a mains failure occurs.

P4: The generator starts immediately. The load will not be transferred if a mains failure occurs.

P5: The generator starts immediately. The load will be transferred even if no mains failure occurs.

LED indications

L9 ..... Mains available indicator

Lights up when the mains is available.

L10 .... Mains on load indicator

Lights up when the mains supplies power towards the load.

L11 .... Plant available indicator

Lights up when the generator is running.

L12 .... Plant on load indicator

Lights up when the generator supplies power towards the load.

L13 .... Indicator load provided with power

Lights up when the load is provided with power either from the mains or from the generator.

L14 .... Indicator alternator charging failure

Goes out after starting, indicating that the charging alternator is charging. A failing charging alternator however will not shut the engine down.

L15 .... Indicator connection between AMF module and Genset module broken

A failure occurred in the connection of the AMF module with the Genset module.

L16 .... Emergency stop indicator

L17 .... Plant fail indicator

Lights up when a failure occurred on the generator.

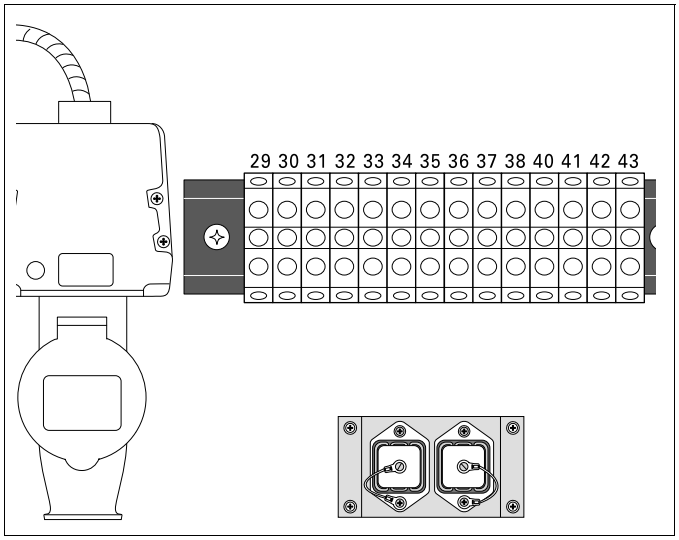
L18 .... Indicator spare shut down

Can be used to wire an extra shut down.

L19 .... Indicator spare shut down

Can be used to wire an extra shut down.

7.4.2 Connecting the AMF module



X14.... Terminal strip

29	Mains Neutral
30	Mains L1
31	Mains L2
32	Mains L3
33	Mains contactor L
34	Mains contactor N
35	Plant contactor N
36	Plant contactor L
37	Remote start
38	Remote start
40	High alarm output
41	High alarm output
42	Fuel bund alarm output
43	Fuel bund alarm output

7.4.3 Starting AMF operation

Turn the battery switch to ON before starting.

If the engine fails to start, failure information will be shown on the display.

If the engine either fails to start or you require advice for starting in extremely cold conditions, please consult your local Atlas Copco dealer.

To start up the unit locally, without using the remote start/stop switch, proceed as follows:

– Put the starter switch of the AMF module (ST_{AMF}) in position P1 or P2.

– Put the starter switch of the Genset module (ST) in position I.

– If the unit fails to start the first time, several starting attempts will take place with waiting time in between.

– Shortly after starting (stabilization time for the generator), the timer relay closes the voltage free contact and the plant contactor is energised (if installed).

– Check the display for normal readings (M1 to M5).

– Check the engine oil pressure and the cooling water temperature (M4).

To start up the unit from a remote location using the remote start/stop switch, proceed as follows:

– Put the starter switch of the AMF module (ST_{AMF}) in position P1 or P2.

– Put the starter switch of the Genset module (ST) in position ⊿ .

– Put the remote start/stop switch in position start.

– If the unit fails to start the first time, several starting attempts will take place with waiting time in between.

– Shortly after starting (stabilization time for the generator), the timer relay closes the voltage free contact and the plant contactor is energized (if installed).

To make the unit start and take over when a mains failure occurs, proceed as follows:

– Put the starter switch of the Genset module (ST) in position ⊿ .

– Put the starter switch of the AMF module (ST_{AMF}) in position P3.

The unit will start and take over when a mains failure occurs.

– If the unit fails to start the first time, several starting attempts will take place with waiting time in between.

– Shortly after starting (stabilization time for the generator), the timer relay closes the voltage free contact and the plant contactor is energized (if installed).

To start up the unit immediately, so the unit will not take over when a mains failure occurs, proceed as follows:

– Put the starter switch of the Genset module (ST) in position ⊿ .

– Put the starter switch of the AMF module (ST_{AMF}) in position P4.

– If the unit fails to start the first time, several starting attempts will take place with waiting time in between.

– Shortly after starting (stabilization time for the generator), the timer relay closes the voltage free contact and the plant contactor is energized (if installed).

To start up the unit immediately and make the unit take over when a mains failure occurs, proceed as follows:

– Put the starter switch of the Genset module (ST) in position ⊿ .

– Put the starter switch of the AMF module (ST_{AMF}) in position P5.

The unit will start immediately and will take over when an mains failure occurs.

– If the unit fails to start the first time, several starting attempts will take place with waiting time in between.

– Shortly after starting (stabilization time for the generator), the timer relay closes the voltage free contact and the plant contactor is energized (if installed).

7.4.4 During AMF operation

Following points should be carried out regularly:

– 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. It is recommended to operate the generator at full load capacity immediately after any low load operating period.

– When single-phase loads are connected to the generator output terminals, keep all loads well-balanced.

Never turn the battery switch to OFF during operation.

If the main circuit breaker trips during operation, switch off the load and stop the generator. Check and, if necessary, decrease the load.

When the doors of the terminal board are opened during operation the main circuit breaker will trip.

7.4.5 Stopping AMF operation

To stop the unit when the starter switch of the Genset module is in position I and the starter switch of the AMF module in position P1 or P2, proceed as follows:

– Switch off the load.

– Let the engine run for about 5 minutes.

– Stop the engine by putting the starter switch of the Genset module in position O.

– Turn the battery switch to OFF.

To stop the unit when the starter switch of the Genset module is in position ⌧ and the starter switch of the AMF module in position P1 or P2, proceed as follows:

– Switch off the load.

– Let the engine run for about 5 minutes.

– Stop the engine by putting the remote start/stop switch in position stop or by putting the starter switch of the Genset module in position stop.

To stop the unit when the starter switch of the Genset module is in position I and the starter switch of the AMF module in position P3, P4 or P5, proceed as follows:

– Switch off the load.

– Let the engine run for about 5 minutes.

– Stop the engine by putting the starter switch of the AMF module in position P1 or P2

– Put the starter switch of the Genset module in position O.

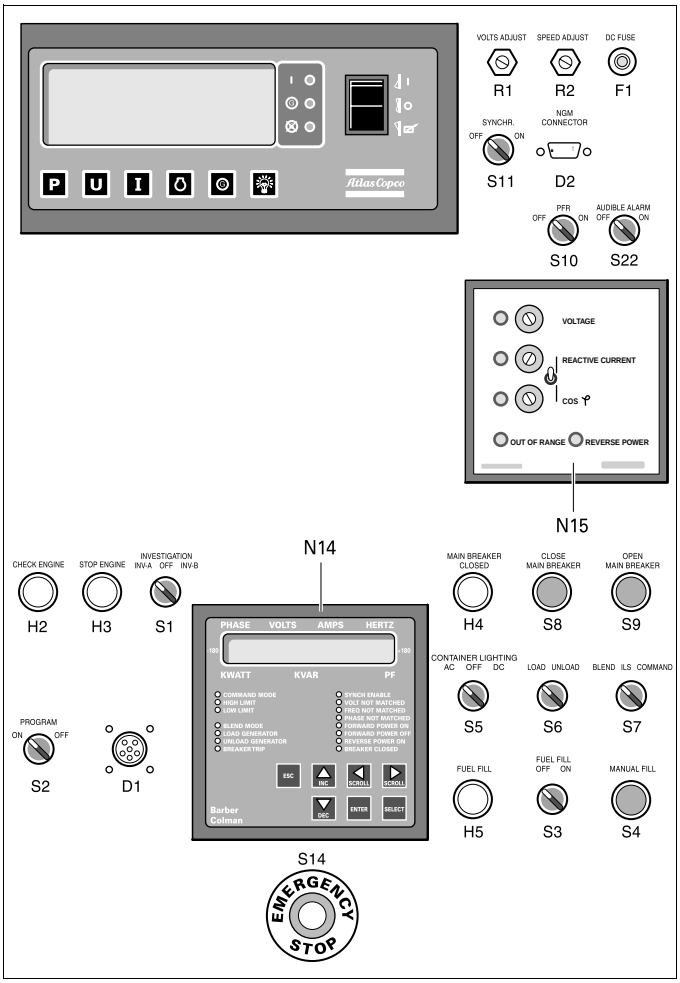
– Turn the battery switch to OFF.

Lock the doors to avoid unauthorized use of the unit.

7.5 PARALLEL OPERATION (PAR)

The “Parallel operation” option is used in those cases where the load exceeds the nominal load of the generator in operation. Using this option, generators can be connected in parallel in order to share the load proportionally.The generators do not have to be of the same type: any combination between QAC and/or QAS generators with parallel option is possible.

7.5.1 Paralleling components



N14 ... Paralleling control module

The following features are available with the paralleling control module:

– Measurement, Annunciation, and Control Setup

The paralleling control module is provided with an integral Keypad/Display Panel.
Parameters are monitored, and setup performed by means of this panel.

– Auto-Synchronizing

The paralleling control module incorporates automatic synchronizing to match the frequency and phase of an incoming generator to the frequency and phase of the bus or another generator. The synchronizer compares the incoming frequency and phase to be matched and to assure synchronization within a minimum of time with the other generator.

– Isochronous Load Sharing

The object of isochronous load sharing is to proportionally divide a common load between two or more generators in parallel while maintaining a fixed frequency. This means that the generators in the parallel connection will deliver equal percentages of their full load capacity. This also implies that due to the isochronous load sharing module and the proportional load sharing, the generators that are connected in parallel do not need to have the same rated output power.
The paralleling control module compares the load of its generator unit with the load applied to all other units in operation, through the paralleling lines, and either decreases or increases the engine fuel to maintain its proportional share of the total load.

– Load Commanding/Blending

Blending loads with the paralleling control module allows for soft loading, unloading and power setting of the controlled generator.

See the instruction manual of the Pow-R-Con for details.

N15 ... Network paralleling module

Power factor regulator (PFR)

See the instruction manual of the PFR for details.

S7..... Selector switch ILS/Blend/Command

This switch allows for three positions:

– **ILS (Isochronous Load Sharing):** both connected generators give their full proportional load immediately

– **Blending mode:** allows soft loading/unloading and power setting of the controlled generator. Selector switch S6 allows to load/unload the generator.

– **Command:** allows a fixed power output of the generator, irrespective of the load

S6..... Selector switch Unload/Load

This switch only applies to the ‘Blend’ or ‘Command’ mode (selector switch ILS/Blend/Command in position ‘Blend’ or ‘Command’).

The central position of the three position selector switch is used for ‘ILS’ mode. The other two positions are:

– **Unload:** one generator is enough to supply the full load, but to prevent the other generator from idling, it still supplies ± 10 % (adjustable value) while the other one supplies ± 90 % of the full load.

– **Load:** both connected generators deliver adjustable percentages of their full load capacity.

S10.... Power factor regulator ON/OFF

ON: To turn the Power Factor Regulator on.

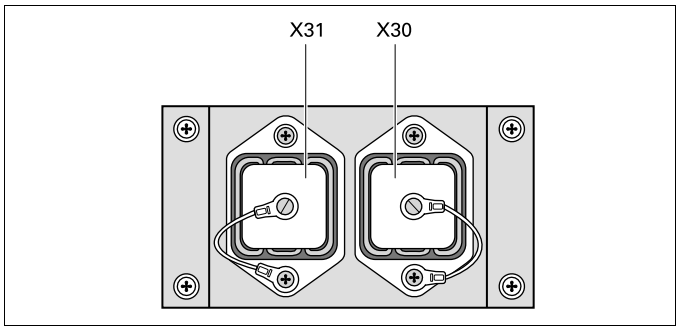
OFF: To turn the Power Factor Regulator off.

S11....Synchronize ON/OFF

ON: Allows the paralleling control module to synchronize and close the circuit breaker automatically.

OFF: The paralleling control module is not allowed to synchronize so it is not possible to parallel.

Always put synchronize in the ON position for parallel operations. For stand-alone use, put the switch into the OFF position.



X30....Connector X30

Connector for communication with another QAC with integrated paralleling (or with a SAPE unit).

Up to 7 generators can be connected to each other, as each generator has got two connectors (X30 and X31).

X31....Connector X31

Connector for communication with another QAC/QAS with integrated paralleling (or with a SAPE unit).

7.5.2 Connecting the generators for parallel operation

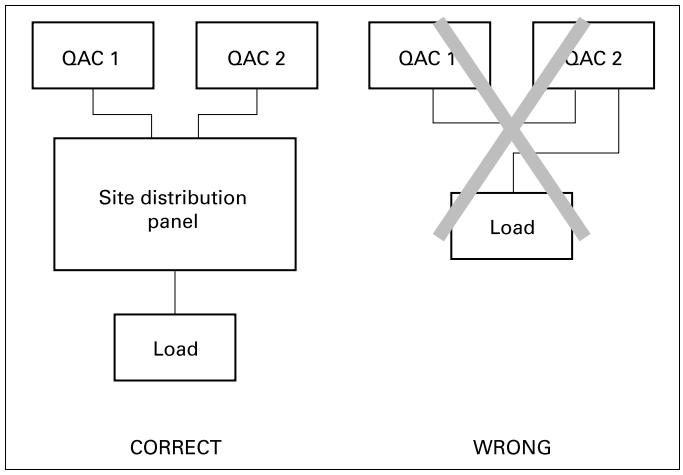
Prior to starting parallel operation of two generators, following connections need to be made:

1. Connect the communication cable between the generators (socket X30 or X31).

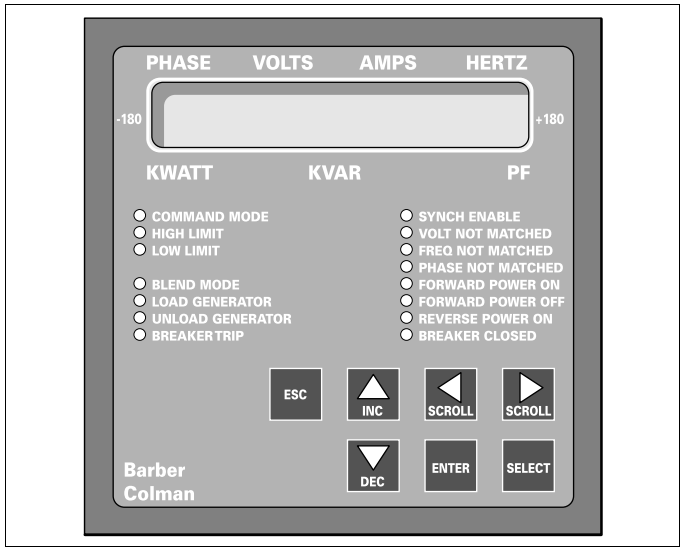
Each dedicated generator has two of these connections, to enable paralleling more than two generators.

2. Connect the load with the generator.

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



7.5.3 Keypad / Display Panel Operation



The following keys are provided for user monitoring and editing:

– **ESC - Escape key**

This key is used to select Monitor, Program, Review, or Setup modes. It may be pressed to return to the previous function at any time.

– **SCROLL - Scroll key**

From the automatic monitoring mode, pressing the left or right SCROLL key allows the desired phase-to-phase, phase-to-neutral, or average set of values to be displayed on the LCD. Press ESC to return to automatic monitoring.

In the Review, Program, or Setup modes, the Scroll key allows forward or reverse display of the various menu selections.

– **SELECT - Select key**

  Pressing the Select key places the unit in the mode or data entry point shown on the LCD display.

– **INCREASE / DECREASE - Increase and Decrease keys**

  When a data entry is selected, the value is changed by depressing the Increase or Decrease key.

– **ENTER - Enter key**

  When a desired data entry value is displayed, pressing the ENTER key will place the value in the program.

  Also, pressing ENTER during the monitor mode will stop the display from scrolling. Pressing ENTER again causes scrolling to resume.

During initial power up, the Liquid Crystal Display (LCD) on the Keypad/Display Panel displays the panel revision level, then reverts to automatically scrolling through the measured phase-to-phase, phase-to-neutral, and average values.

7.5.4 Factory settings Paralleling control module

The factory settings should not be changed.
If imperative, parameters can be adjusted however.

Changing Parameters

If parameters are to be changed in the paralleling control module, proceed as follows:

1. Select the SETUP mode: press SELECT, press SCROLL until SETUP is reached and press SELECT.
2. Enter password: successively press the ENT, DEC, SCROLL (left), and SELECT keys for the password.
3. Select the SYSTEM screen.
4. Select the desired parameter by using the SCROLL (left or right) key.
5. Press the SELECT key.
6. If applicable: choose the desired digit by using the SCROLL (left or right) key.
7. Change the digit by using the INCREASE (up) or DECREASE (down) key.
8. Press the ENTER key to place the value in the program.

Pressing ESC allows for returning to the previous function at any time.

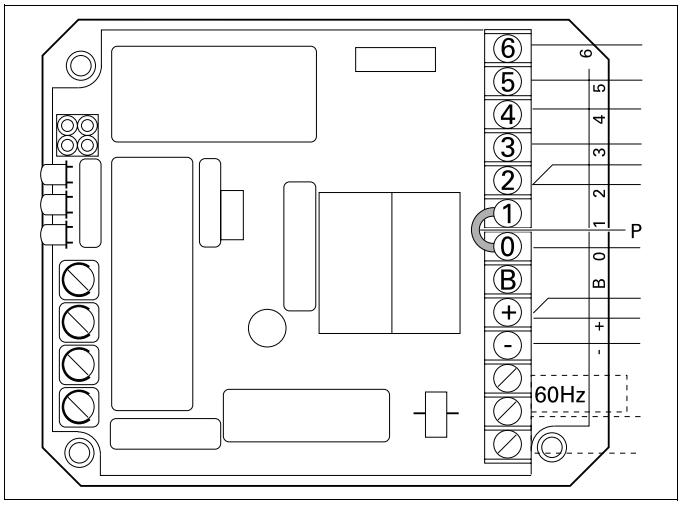
Generator Setup

– If an earth leakage relay (NB) is installed in the generator: disable the earth leakage relay before paralleling (put S13 in off position).

– Set engine VSG min. at 1710 rpm (for 60 Hz).
  Set engine VSG tax at 1810 rpm (for 60 Hz).

  Use a DDEC reader to adjust the speed limits of a generator.

– Remove the bridge (between connections 0 and 1) on the AVR (Automatic Voltage Regulator) to activate the paralleling device.



Setup Procedure

Prior to starting up the system, the paralleling control module needs to know what size of QAC is going to be connected.

Therefore proceed as follows:

1. Go to ‘SETUP’ ⇒ ‘PROGRAM’ ⇒
2. Voltage match: set at 4 %
3. Freq match: set at 0.12 Hz
4. Phase match: set at 20 deg
5. Go to ‘SETUP’ ⇒ ‘SETUP’ ⇒
6. CT ratio A, B, C: primary current divided by secondary current

Note that the ratio needs to be entered, not the primary current rating,
e.g.: For QAC1006 current transfo 1600/5
→ ratio to be entered = 320

7. PT ratio: 1
8. Gen Power: xxx kW: see technical specifications for nominal values
9. Sys Volt: Bus voltage: 208 – 240V ⇒ 240V
   400 – 480V ⇒ 480V
10. Bus Freq: 60 Hz.

Trouble Shooting

Symptom	Possible cause	Corrective action
Display does not function.	Connection between Pow-R-Con and display is faulty or absent.	Connect correctly.
Measured and actual power do not match.	CT ratio not entered correctly.	Enter the correct CT ratio.
Circulating current is too high.	Voltages of the generators are not matched.	Adjust the voltage on one or more generators until the circulating current is minimal.
	Parallel device is not or faulty connected.	Check the parallel device.
One generator supplies active power to the other.	Frequencies of the generators are not matched.	Adjust the frequency on a generator so that the power is zero.
	One of the connection cables is not connected.	Check all connections.

7.5.5 Starting parallel operation

Make sure that the generators are connected correctly before starting operation.

– Start both generators.

– Run the engines for approximately 5 minutes to warm up and stabilize speed and voltage.

– Try to match frequency and voltage of both generators as close as possible. (R1 & R2)

– Make sure (S11) synchronize ON/OFF switch is in the 'ON' position on both units.

– Push the button (S8) "main breaker close" on the control panel of the first generator.

When both generators are synchronized, the circuit breaker of the second generator is automatically closed and the second generator starts supplying power together with the first one.

The paralleling control modules will share the load evenly between the generators, according to the capacity of the units. It will also detect a circulating current and will deactivate one of the units if the circulating current exceeds the value set on the load sharing module. It is possible to lower the circulating current by better matching the voltages and/or frequency of the generators.

7.5.6 Parallel operation of more than two generators

After connecting two generators in parallel, more generators can be added.

Do not connect more than 7 generators in parallel.

Once two (or more) generators are connected in parallel, they can be treated as if they were one unit.

– Shut down or disconnect the load or make sure that the load is stable.

– Shut down the generators that are already in operation. Make sure not to change the settings on these generators.

– Connect the extra generator to the parallel connection of the first generators, treating these generators as one unit.

– Make sure that all main circuit breakers Q1 are switched OFF.

– Start up the generators and push the button "Breaker/Contactor close" on the first generator.

7.5.7 Stopping parallel operation

– Switch off and disconnect the load.

– Put (S11) synchronize ON/OFF switch is in the 'OFF' position on both generators.

– Push the buttons "Breaker/Contactor open" on both generators.

– Let the engines run for about 5 minutes to cool them down.

– Shut down the generators one by one.

7.5.8 Paralleling with the mains

– Together with the paralleling option comes a power factor regulator (N15). This device gives the possibility to keep a constant cos φ on reactive power when paralleling with the mains.

– To activate the Power Factor Regulator (PFR), switch S10 has to be put into the ON position.

– The Power Factor Regulator (PFR) should only be used when paralleling with the mains (otherwise put switch S10 into the OFF position).

– To use the Power Factor Regulator (PFR), the voltage adjustment potentiometer R1 should be disconnected by removing wire 85 or 95 on the back of the potentiometer R1. The voltage should now be adjusted by using the potentiometer for voltage setting on the Power Factor Regulator (PFR) itself.

Keypad/Display Panel Menu Structure

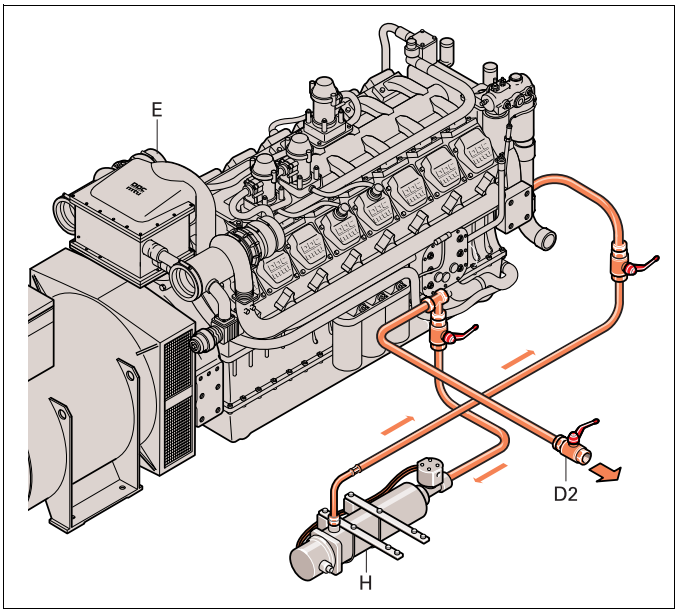
MODE	SCROLL	DISPLAY READOUT	DESCRIPTION	RANGE	DEFAULT
Review	Sync	Phase Over = _%	Phase Overall Gain	0-100	15
		Phas Prop = _%	Phase Proportional Gain	0-100	35
		Phas Intg = _%	Phase Integral Gain	0-100	80
		Freq Over = _%	Frequency Overall Gain	0-100	20
		Freq Prop = _%	Frequency Proportional Gain	0-100	40
		Freq Intg = _%	Frequency Integral Gain	0-100	75
		Volt Match = _%	Voltage Match Window	±1-±15	4
		Freq Match = _ HZ	Frequency Match Window	±0.1-±25	0.12
		Phase Match = DEG	Phase Match Windows	±2-±20	20
	Command	Pwr Input = POT	Power Set Select	Key,Pot	Pot
		Pwr LO Limit = _%	Power Limit Low	0-100	10
		Pwr HI Limit = _%	Power Limit High	0-120	100
		Pwr Set Lvl = _%	Power Set Level	0-120	50
		Trip Level= _%	Breaker Trip Level	0-120	15
		Ramp Up = _SEC	Ramp Up Time	0-300	40
		Ramp Down = _SEC	Ramp Down Time	0-300	40
	Blend	Pwr LO Limit= _%	Power Limit Low	0-100	10
		Trip Level= _%	Power Set Level	0-120	15
		Ramp Up = _SEC	Ramp Up Time	0-300	40
		Ramp Down = _SEC	Ramp Down Time	0-300	40
	L/s Setup	Parall Volt = _V	Parallel Voltage	1.5-4.5	3.000
		PT Ratio = _	Potential Transformer Ratio	1-600	1
		CT Ratio A = _	Current Transformer Ratio A	10-9999	(*)
		CT Ratio B = _	Current Transformer Ratio B	10-9999	(*)
		CT Ratio C = _	Current Transformer Ratio C	10-9999	(*)
		Gene Power = _KW	Nominal Generator Power	0-2500	(*)
	L/s Relay	Pwr ON Lvl = _%	Forward Preset Power Level On	20-120	90
		Pwr OFF Lvl= _%	Forward Preset Power Level Off	10-100	50
		Rev Pwr Lvl = _%	Reverse Preset Power Level	0-40	20
		Fpwr ON Del = _SEC	Forward Power On Time	0-300	10
		Fpwr OFF Del = SEC	Forward Power Off Time	0-300	10

(*) Depending on the size of generator (see Setup Procedure).

MODE	SCROLL	DISPLAY READOUT	DESCRIPTION	RANGE	DEFAULT
Program	Sync	Phas Over = _%	Phase Overall Gain	0-100	15
		Phas Prop = _%	Phase Proportional Gain	0-100	35
		Phas Intg = _%	Phase Integral Gain	0-100	30
		Freq Over = _%	Frequency Overall Gain	0-100	28
		Freq Prop = _%	Frequency Proportional Gain	0-100	50
		Freq Intg = _%	Frequency Integral Gain	0-100	75
		Volt Match = _%	Voltage Match Window	±1-±15	5.0
		Freq Match = _hz	Frequency Match Window	±0.1-±25	.2
		Phase Match = _DEG	Phase Match Windows	±2-±20	20
	Command	Pwr Input = _POT	Power Set Select	Key,Pot	Pot
		Pwr LO Limit = _%	Power Limit Low	0-100	10
		Pwr HI Limit = _%	Power Limit High	0-120	100
		Pwr Set Lvl = _%	Power Set Level	0-120	50
		Trip Level = _%	Breaker Trip Level	0-120	15
		Ramp Up = _SEC	Ramp Up Time	0-300	20
		Ramp Down = _SEC	Ramp Down Time	0-300	20
	Blend	Pwr LO Limit= _%	Power Limit Low	0-100	10
		Trip Level = _%	Power Set Level	0-120	15
		Ramp Up = _SEC	Ramp Up Time	0-300	20
		Ramp Down = _SEC	Ramp Down Time	0-300	20
	L/s Setup	Parall Volt = _V	Parallel Volt	0-4.5	3.000
		PT Ratio = _	Potential Transformer Ratio	1-600	1
		CT Ratio A = _	Current Transformer Ratio A	10-9999	(*)
		CT Ratio B = _	Current Transformer B	10-9999	(*)
		CT Ratio C = _	Current Transformer Ratio C	10-9999	(*)
		Gen Power = _KW	Nominal Gen Power	0-2500	(*)
	L/s Relay	Pwr ON Lvl = _%	Forward Preset Power Level On	20-120	90
		Power OFF Lvl = _%	Forward Preset Power Level Off	10-100	30
		Rev Pwr Lvl = _%	Reverse Preset Power Level	0-30	20
		Fpwr ON De= _SEC	Forward Power On Time	0-300	10
		Fpwr OFF De = _SEC	Forward Power Off Time	0-300	10
Setup	System	Gen Pwr = _KW	Generator Power	0-2500	(*)
		Sys Volt =_VAC	System Voltage	120,240,480	(*)
		Bus Freq =_Hz	Bus Frequency	50,60	(*)
		PT Ratio =_	Potential Transformer Ratio	1-600	1
		CT Ratio A =_	Current Transformer Ratio A	10-9999	(*)
		CT Ratio B =_	Current Transformer Ratio B	10-9999	(*)
		CT Ratio C =_	Current Transformer Ratio C	10-9999	(*)
		Bridge Int =	Bridge Integrator	On,Off	Off

(*) Depending on the size of generator (see Setup Procedure).

7.6 ENGINE COOLING WATER HEATER



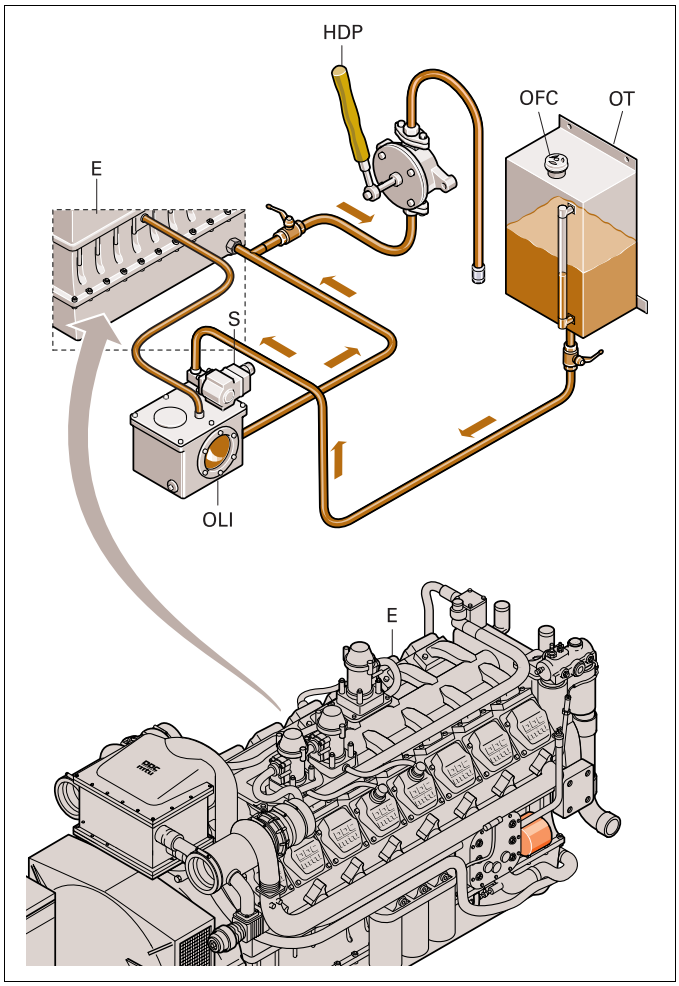
D2	Drain cooler
H	Heater

To make sure that the engine can start and accept load immediately, an external cooling water heater (6 kW) is provided which keeps the engine temperature between the required range.

– Provide the 32 A socket (X37) of external power to use the engine cooling water heater for anti-condensation purpose.

7.7 AUTOMATIC OIL MAKE-UP SYSTEM

An oiltank monitors the oil level in the engine sump. When the oil level becomes too low, the automatic oil filler will fill up the sump.



E	Engine
HDP	Hand drain pump
OLI	Oil level indicator
OT	Oil tank
S	Solenoid

8. TECHNICAL SPECIFICATIONS

8.1 SPECIFICATIONS OF THE ENGINE/ALTERNATOR/UNIT

Reference values	Rated frequency	60 Hz
	Rated speed	1800 rpm
	Generator service duty	Continuous
	Absolute air inlet pressure	100 kPa
	Relative air humidity	30 %
	Air inlet temperature	25 °C
Limitations	Maximum ambient temperature	50 °C
	Maximum altitude	3000 m
	Maximum relative air humidity	85 %
	Minimum starting temperature	-20 °C
	Derating above 40°C and 1000 m. See table on next page.	
Perform-ance data	Rated stand-by active power (LTP) 3 phase	1000 kW
	Rated prime active power (PRP) 3 phase	900 kW
	Rated power factor (lagging) 3 phase	0.8
	Rated stand-by apparent power 3 phase	1250 kVA
	Rated prime apparent power 3 phase	1125 kVA
	Rated voltage 3 phase line-to-line	480 V
	Rated stand-by current 3 phase	1505 A
	Rated prime current 3 phase	1355 A
	Performance class (acc.ISO 8528-5:1993)	G2
	Frequency droop	isochronous
	Fuel consumption at full load/no load	236/18.7 kg/h
	Specific fuel consumption	0.227 kg/kWh
	Fuel autonomy at full load	5.4 h
	Maximum oil consumption at full load	472 g/h
	Maximum sound power level (LWA)	±100 dB(A)
	Fueltank capacity	1500 l
	Single step load acceptance	60 %
Application data	Mode of operation	continuous
	Site	land use
	Operation	single/parallel
	Start-up and control mode	manual/auto
	Start-up time	unspecified
	Mobility/config. acc. to ISO 8528-1:1993	transportable/D
	Mounting	fully resilient
	Climatic exposure	open air
	Degree of protection (cubicle)	IP54
	Status of neutral	earthed
Alternator	Standard	IEC34-1
	Make	MECC ALTE
	Model	EC 43 LA/4
	Rated output, class H temp. rise	1320 kVA
	Degree of protection	23 IP
	Insulation class stator	H
	Insulation class rotor	H
	Number of wires	12

Engine	Type DETROIT DIESEL	16V2000 G81
	Rated net output	1115 kW
	Coolant	PARCOOL PG
	Combustion system	direct injection
	Aspiration	turbocharged, intercooled
	Number of cylinders	16
	Swept volume	32 l
	Speed governing	electronic
	Capacity of oil sump	96.5 l
	Capacity of cooling system	260 l
	Electrical system	24 V
Power circuit	Number of poles	4
	Thermal release (LTP)	1564 A
	Thermal release (PRP)	1420 A
	Magnetic release	3..10xIn
	Residual current release	0.025-25 A

Derating

Height(m)	Temperature (°C)					
	25	30	35	40	45	50
100	101.6	101.3	100.9	100.5	100.2	99.8
500	101.4	101.0	100.7	100.3	100.0	99.6
1000	101.1	100.7	100.4	100.0	99.6	99.3
1500	100.7	100.3	99.9	99.6	99.2	98.9
2000	100.0	99.7	99.3	98.9	98.6	98.2
2500	99.4	99.0	98.7	98.3	98.0	97.0
3000	98.6	98.3	97.9	97.6	97.2	96.9

Unit	Dimensions (L x W x H)	6058 x 2438x 2591 mm
	Weight net mass	16300 kg
	Weight wet mass	18100 kg

8.2 ENGINE DIAGNOSTIC CODES

8.2.1 To read the engine diagnostic codes with engine diagnostic data reader

Connect the diagnostic data reader to the diagnostic data socket (D1).

Turn the switch to the left for investigating engine module A. Turn the switch to the right for investigating engine module B.

8.2.2 To read the engine diagnostic codes without engine diagnostic data reader

With the starter switch into the O position, switch S2 in position ON and the engine at idle or with the starter switch into the I/ position and the engine running, turn the switch to have the active codes flashing on the stop engine light (H3), followed by the inactive codes flashing on the check engine light (H2).

Turn the switch to the left for investigating engine module A. Turn the switch to the right for investigating engine module B. Module B will give only flash-codes if there is an error on module B.

Always wait minimum 30 seconds after shutdown or changing position of S1 before switching the diagnostic request switch to avoid inactive code 55 to appear on H2.

The flash code contains 2 digits:

– the first digit is the number of times H2 or H3 flashes slowly.

– the second digit is the number of times H2 or H3 flashes fast.

Flash code	Code description
11	VSG input low
12	VSG input high
13	Coolant level circuit low
14	Intercooler, coolant or oil temperature circuit high
15	Intercooler, coolant or oil temperature circuit low
16	Coolant level circuit high
17	Bypass position circuit high
18	Bypass position circuit low
21	TPS circuit high
22	TPS circuit low
23	Fuel temperature circuit high
24	Fuel temperature circuit low
25	No codes
26	Auxiliary shutdown #1 or #2 active
27	Air temperature circuit high
28	Air temperature circuit low
31	Auxiliary output short or open circuit (high side)
32	SEL short or open circuit
33	Boost pressure circuit high
34	Boost pressure circuit low
35	Oil pressure circuit high
36	Oil pressure circuit low
37	Fuel pressure circuit high
38	Fuel pressure circuit low
41	Too many SRS (missing TRS)
42	Too few SRS (missing SRS)
43	Coolant level low
44	Intercooler, coolant or oil temperature high
45	Oil pressure low

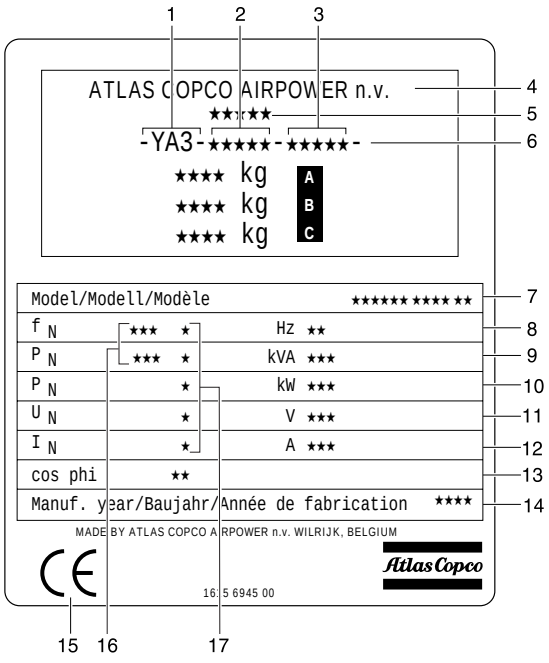
Flash code	Code description
46	Battery voltage low
47	Fuel pressure high
48	Fuel pressure low
52	A/D conversion fail
53	EEPROM write or nonvolatile checksum fail
54	Vehicle speed sensor fault
55	J1939 data link fault
56	J1587 data link fault
57	J1922 data link fault
58	Torque overload
61	Injector response time long
62	Auxiliary output open or short to battery
63	PWM open or short to battery
64	Turbo speed circuit failed
67	Coolant pressure circuit high or low
68	IVS switch fault, open or grounded circuit
71	Injector response time short
72	Vehicle overspeed
75	Battery voltage high
76	Engine overspeed with engine brake
81	Oil level or crankcase pressure circuit high
82	Oil level or crankcase pressure circuit low
83	Oil level or crankcase pressure high
84	Oil level or crankcase pressure low
85	Engine overspeed
86	Water pump or barometer pressure circuit high
87	Water pump or barometer pressure circuit low
88	Coolant pressure low

8.3 CONVERSION LIST OF SI UNITS INTO BRITISH UNITS

1 bar	=	14.504 psi	1 m	=	3.281 ft
1 g	=	0.035 oz	1 mm	=	0.039 in
1 kg	=	2.205 lb	1 m³/min	=	35.315 cfm
1 km/h	=	0.621 mile/h	1 mbar	=	0.401 in wc
1 kW	=	1.341 hp (UK and US)	1 N	=	0.225 lbf
1 l	=	0.264 US gal	1 Nm	=	0.738 lbf.ft
1 l	=	0.220 lmp gal (UK)	$t_{°F}$	=	32 + (1.8 x $t_{°C}$)
1 l	=	0.035 cu.ft	$t_{°C}$	=	($t_{°F}$ - 32)/1.8

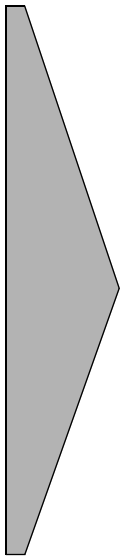
– A temperature difference of 1°C = a temperature difference of 1.8 °F.

8.4 DATAPLATE

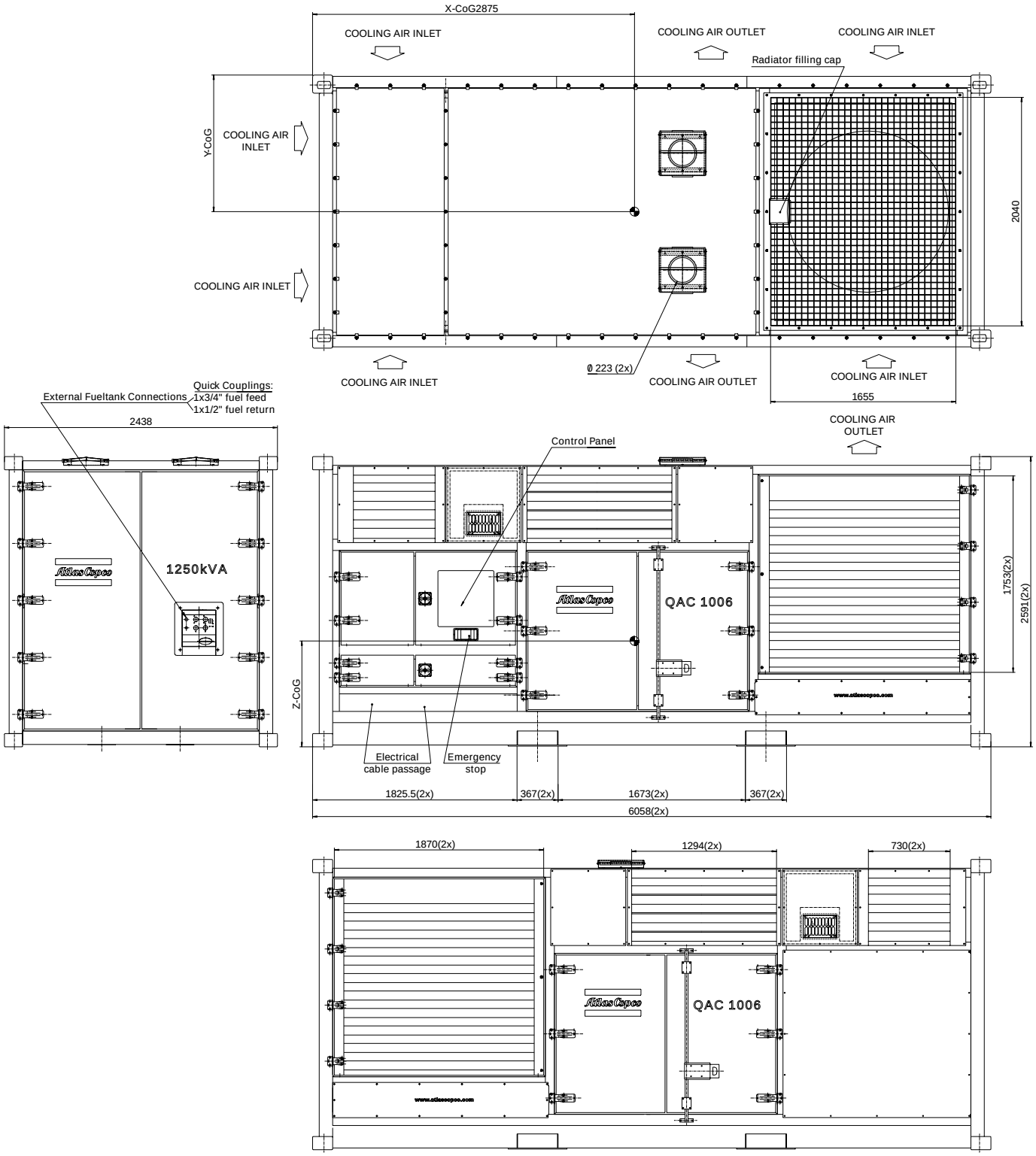


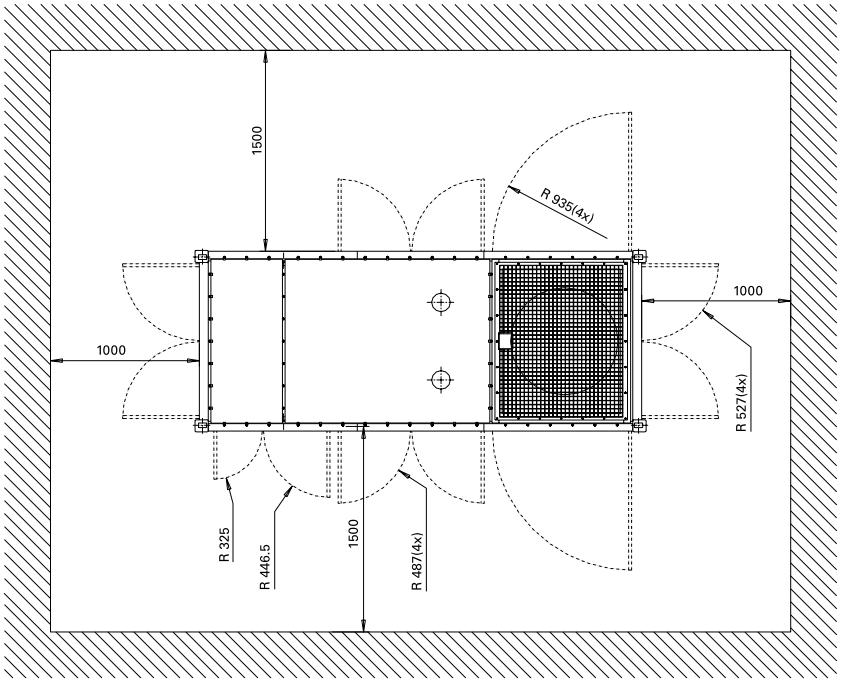
A	Maximum permitted loaded weight of the vehicle
B	Maximum permitted road weight of the front axle
C	Maximum permitted road weight of the rear axle
1	Company code
2	Product code
3	Unit serial number
4	Name of the manufacturer
5	EEC or national type approval number
6	Vehicle identification number
7	Model number
8	Frequency
9	Apparent power - COP
10	Active power - COP
11	Nominal rated voltage
12	Nominal rated current
13	Power factor
14	Manufacturing year
15	EEC mark in accordance with Machine Directive 89/392E
16	Mode of operation
17	Winding connections

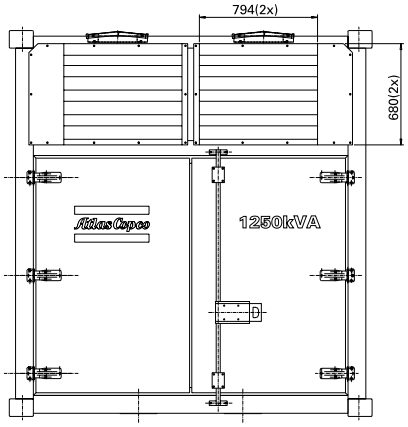
Dimension drawing
Plan geometral
Dimensiones (diagrama)
Desenho da dimensão



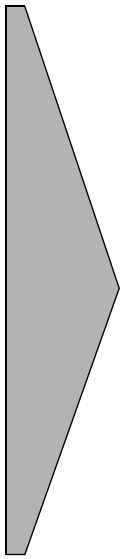
9822 0952 03/00
Applicable for QAC1006



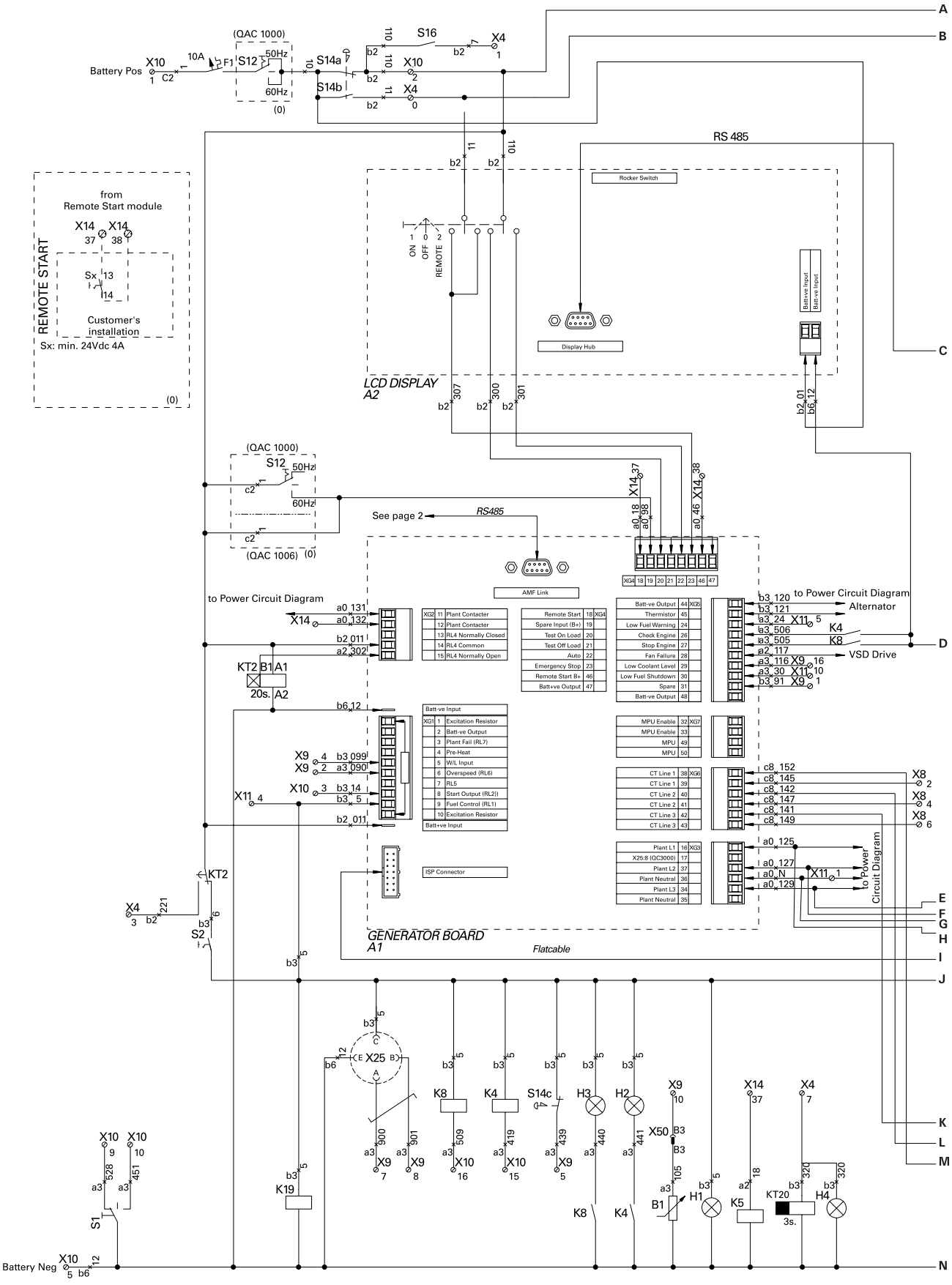

1500
R 935(4x)
1000
1000
R 527(4x)
R 325
R 446.5
1500
R 487(4x)

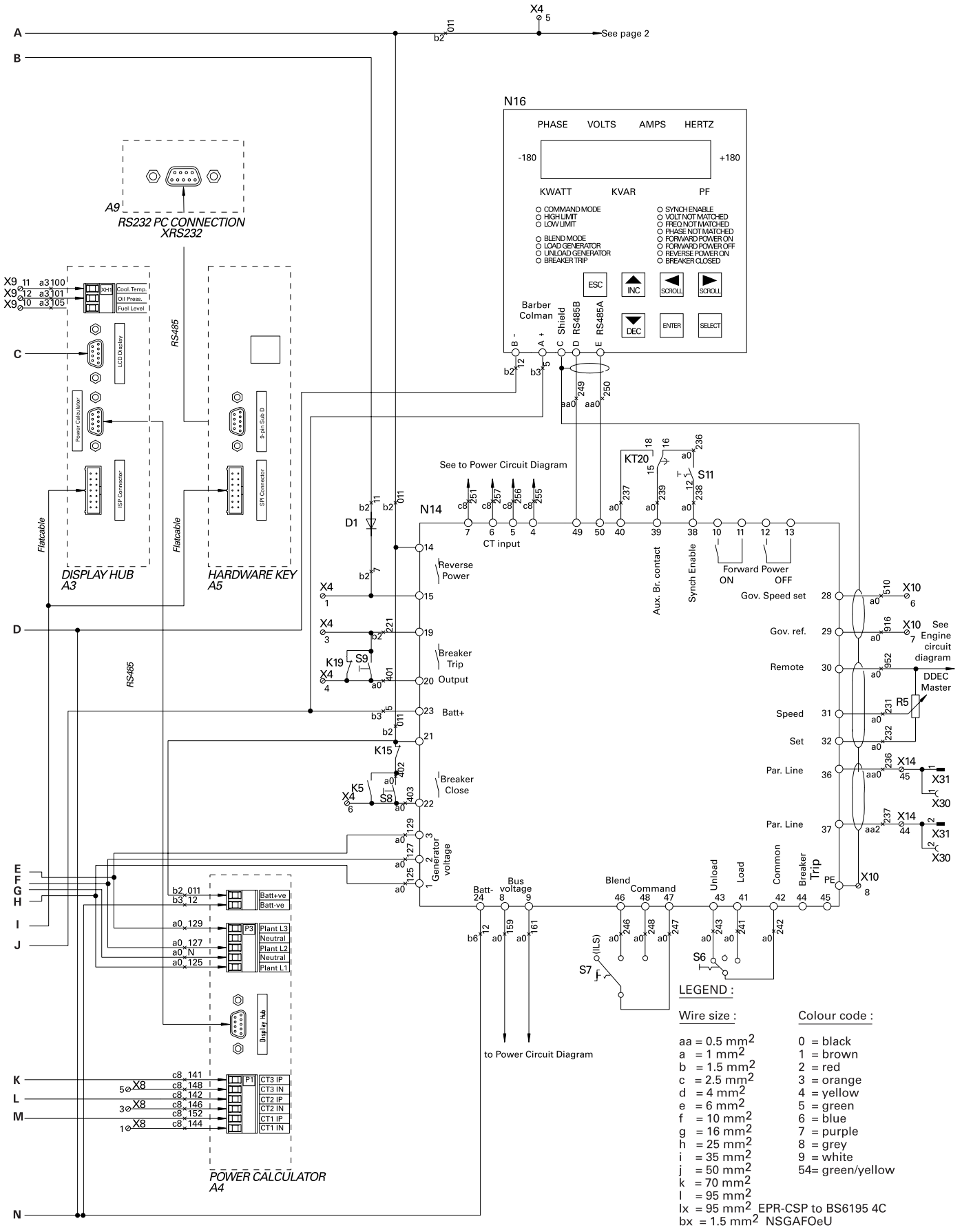

794(2x)
680(2x)
1250kVA

Circuit diagrams
Schéma de circuit
Esquema de conexiones
Esquemas eléctricos



9822 0952 04_01/01
Applicable for QAC1006




See page 2
N16
PHASE VOLTS AMPS HERTZ
-180 +180
KWATT KVAR PF
COMMAND MODE
HIGH LIMIT
LOW LIMIT
BLEND MODE
LOAD GENERATOR
UNLOAD GENERATOR
BREAKER TRIP
SYNCH ENABLE
VOLT NOT MATCHED
FREQ NOT MATCHED
PHASE NOT MATCHED
FORWARD POWER ON
FORWARD POWER OFF
REVERSE POWER ON
BREAKER CLOSED
ESC INC SCROLL SCROLL
DEC ENTER SELECT
Barber Colman
B - A + C Shield D RS485B E RS485A
A9
RS232 PC CONNECTION XRS232
RS485
Flatcable
DISPLAY HUB A3
HARDWARE KEY A5
Cool. Temp.
Oil Press.
Fuel Level
LCD Display
Power Calculator
ISP Connector
9-pin Sub D
SPI Connector
See to Power Circuit Diagram
N14
CT input
Aux. Br. contact
Synch Enable
Forward Power ON OFF
Gov. Speed set
Gov. ref.
Remote
Speed
Set
Par. Line
Par. Line
See Engine circuit diagram
DDEC Master
KT20
S11
D1
Reverse Power
Breaker Trip
Output
Batt+
Breaker Close
K15
K19
S9
K5
S8
Generator voltage
Batt-
Bus voltage
Blend
Command
Unload
Load
Common
Breaker Trip
PE
S6
S7
(ILS)
to Power Circuit Diagram
POWER CALCULATOR A4
Batt+ve
Plant L3
Neutral
Plant L2
Neutral
Plant L1
Display Hub
CT3 IP
CT3 IN
CT2 IP
CT2 IN
CT1 IP
CT1 IN
LEGEND :
Wire size :
aa = 0.5 mm2
a = 1 mm2
b = 1.5 mm2
c = 2.5 mm2
d = 4 mm2
e = 6 mm2
f = 10 mm2
g = 16 mm2
h = 25 mm2
i = 35 mm2
j = 50 mm2
k = 70 mm2
l = 95 mm2
lx = 95 mm2 EPR-CSP to BS6195 4C
bx = 1.5 mm2 NSGAFOeU
Colour code :
0 = black
1 = brown
2 = red
3 = orange
4 = yellow
5 = green
6 = blue
7 = purple
8 = grey
9 = white
54= green/yellow

9822 0952 04_01/01

	ENGLISH	NEDERLANDS	FRANCAIS
A1	Generator board	Klemmenbord generator	Carte de générateur
A2	LCD display	LCD-scherm	Affichage à cristaux liquides
A3	Display hub	Displayhub	Concentrateur d'affichage
A4	Power calculator	Vermogensberekenaar	Calculatrice électrique
A5	Hardware key	Hardwaresleutel	Clé (interdisant l'utilisation d'un matériel)
A9	RS232 PC connection	RS232 PC-aansluiting	Connexion PC RS232
D1	Diode	Diode	Diode
B1	Fuel level sensor	Sensor, brandstofpeil	Capteur, niveau de carburant
F1	DC fuse	DC zekering	DC fusible
H1	Panel light	Paneelverlichting	Eclairage panneau
H2	Check engine lamp	Controlelamp motor	Témoin de contrôle du moteur
H3	Stop engine lamp	Lampje motorstop	Témoin d'arrêt du moteur
H4	Main breaker closed lamp	Lampje hoofdschakelaar ingeschakeld	Témoin de disjoncteur principal fermé
K4	Check engine relay	Relais motorcontrole	Relais de contrôle du moteur
K5	Remote start relay	Relais start op afstand	Relais de démarrage à distance
K8	Stop engine relay	Relais motorstop	Relais d'arrêt du moteur
K15	AC sensing relay	AC-detectierelais	Relais de détection AC
K19	Breaker trip relay	Omschakelrelais stroomonderbreker	Relais de déclenchement du disjoncteur
KT2	Program delay timer	Programma-vertragingstimer	Minuterie de temporisation de programme
KT20	Breaker close hold-off timer	Vertragingstimer stroomonderbreker sluiten	Minuterie de maintien de fermeture de disjoncteur
N14	Barber Colman module	Barber Colman-module	Module Barber Colman
N16	Barber Colman display	Barber Colman-display	Affichage Barber Colman
R5	Speed adjustment potentiometer	Toerental-instelpotentiometer	Potentiomètre de réglage de la vitesse
S1	Investigation switch	Onderzoeksschakelaar	Interrupteur d'investigation
S2	Program DDEC switch	Programma DDEC-schakelaar	Interrupteur DDEC de programme
S6	Load/unload switch	Belastings/ontlastingsschakelaar	Interrupteur de chargement/déchargement
S7	Blend/ILS/command switch	Keuzeschakelaar 'mengen/ILS/opleggen'	Interrupteur fusion/ILS/instruction
S8	Breaker close button	Knop stroomonderbreker sluiten	Bouton de fermeture du disjoncteur
S9	Breaker trip button	Knop stroomonderbreker omschakelen	Bouton de déclenchement du disjoncteur
S11	Sync enable switch	Sync-vrijgaveschakelaar	Interrupteur de validation de la synchronisation
S12	Frequency selector switch 50 Hz/60 Hz	Frequentiekeuzeschakelaar 50 Hz/60 Hz	Sélecteur de fréquence 50 Hz/60 Hz
S14	Emergency stop	Noodstopknop	Arrêt d'urgence
S16	Door switch	Deurschakelaar	Interrupteur de porte
X4-14	Terminals	Klemmen	Bornes
X25	Diagnostic plug	Diagnosestekker	Fiche de diagnostic
X30-31	Parallelling connectors	Parallelschakelingsconnectoren	Connecteurs de mise en parallèle
X50	40-pole connector 1	Connector 1, 40 stiften	Connecteur 1, 40 broches
X51	40-pole connector 2	Connector 2, 40 stiften	Connecteur 2, 40 broches

	DEUTSCH	ESPAÑOL	SVENSKA
A1	Generatorkarte	Panel del generador	Generatorpanel
A2	LCD	Pantalla de cristal líquido (LCD)	LCD-display
A3	Display-Nabe	Terminal de visualización	Displayurtag
A4	Leistungsrechner	Cálculo de potencia	Effektkalkylator
A5	Hardwareschlüssel	Llave de hardware	Hårdvarutangent
A9	RS232-PC-Anschluss	Conexión RS232 de PC	RS232 PC anslutning
D1	Diode	Diodo	Diod
B1	Kraftstoffstandfühler	Sensor del nivel de combustible	Sensor - bränslenivå
F1	DC sicherung	DC fusible	DC säkring
H1	Instrumentenleuchte	Luz de panel	Panelljus
H2	Motorprüflampe	Lámpara de comprobación del motor	Motorkontroll - indikator
H3	Motor-Stopp-Lampe	Lámpara de parada del motor	Motorstopp - indikator
H4	Leuchte „Hauptleistungsschalter geschlossen"	Lámpara de cierre del disyuntor principal	Huvudströmbrytaren stängd - indikator
K4	Motorprüfrelais	Relé de comprobación del motor	Motorkontrollrelä
K5	Fernstartrelais	Relé de puesta en marcha remota	Fjärrstartsrelä
K8	Motor-Stopp-Relais	Relé de parada del motor	Motorstopprelä
K15	Wechselstromfühlerrelais	Relé de detección de CA	AC-avkänningsrelä
K19	Relais zur Auslösung des Leistungsschalters	Relé de disparo del disyuntor	Brytarutlösningsrelä
KT2	Programmverzögerungszeitgeber	Temporizador de retardo del programa	Program - fördröjningstimer
KT20	Sperrzeitgeber „Leistungsschalter schließen"	Temporizador de espera-desactivación para cierre del disyuntor	Fördröjd brytaravstängning - timer
N14	Barber-Colman-Modul	Módulo Barber Colman	Barber Colman modul
N16	Barber-Colman-Display	Visualización Barber Colman	Barber Colman display
R5	Drehzahlregelungspotentiometer	Potenciómetro de ajuste de velocidad	Potentiometer för varvtalsjustering
S1	Untersuchungsschalter	Interruptor de investigación	Kontrollväljare
S2	Programm-DDEC-Schalter	Interruptor DDEC de programa	DDEC-programväljare
S6	Schalter „Load/Unload"	Interruptor de carga y descarga	Pålastning/avlastning - väljare
S7	Schalter „Blend/ILS/Command"	Interruptor de Combinación/Carga compartida de forma isócrona/Control	Blend/ILS/command - väljare
S8	Taste „Schütz schließen"	Botón de cierre del disyuntor	Stäng brytare - knapp
S9	Taste „Leistungsschalter auslösen"	Botón de disparo del disyuntor	Öppna brytare - knapp
S11	Schalter „Sync aktivieren"	Interruptor de habilitación de sincronización	Synkroniseringskontakt
S12	Frequenz Wahlschalter 50 Hz/60 Hz	Conmutador selector 50 Hz/60 Hz	Väljare 50 Hz/60 Hz
S14	Notabschaltung	Parada de emergencia	Nödstopp
S16	Türschalter	Interruptor de compuerta	Dörrkontakt
X4-14	Klemmen	Terminales	Anslutningar
X25	Diagnosestecker	Enchufe para diagnóstico	Diagnostikpropp
X30-31	Parallelanschlüsse	Conectores para funcionamiento en paralelo	Parallellstyrningskontakter
X50	40-poliger Stecker 1	Conector 1, 40-polar	40-poligt kontaktdon 1
X51	40-poliger Stecker 2	Conector 2, 40-polar	40-poligt kontaktdon 2

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	ITALIANO	NORSK	DANSK
A1	Generatore	Generatorplate	Generatorkort
A2	Display a cristalli liquidi	LCD-display	LCD-display
A3	Supporto display	Displayenhet	Displayhub
A4	Calcolatore di potenza	Effektkalkulator	Effektberegner
A5	Chiave hardware	Maskinvarenøkkel	Hardwaretast
A9	Collegamento PC RS232	PC-tilkopling (RS232)	RS232 PC-forbindelse
D1	Diodo	Diode	Diode
B1	Sensore del livello di combustibile	Føler for drivstoffnivå	Brændstofniveauføler
F1	DC fusibile	DC sikring	DC sikring
H1	Luci del pannello	Panellys	Lampe
H2	Verificare la spia motore	Motorkontrollampe	Motorkontrollampe
H3	Arrestare la spia motore	Motorstopplampe	Motorstoplampe
H4	Spia interruttore automatico principale spenta	Lampe lukket hovedbryter	Lampe for hovedafbryder lukket
K4	Verificare il relè motore	Motorkontrollrelé	Motorkontrolrelæ
K5	Relè avviamento a distanza	Fjernstartrelé	Startfjernstyringsrelæ
K8	Arrestare il relè motore	Motorstopprelé	Motorstoprelæ
K15	Relè rilevamento CA	Avlesingsrelé vekselstrøm	AC-følerelæ
K19	Relè di scatto tagliacircuito	Bryterutløsingsrelé	Afbryderudløserrelæ
KT2	Timer ritardo programma	Tidsbryter programforsinkelse	Programforsinkelsestidstager
KT20	Timer pausa chiusura interruttore	Sperretidsbryter lukket bryter	Blokeringstidstager for lukning af afbryder
N14	Modulo Barber Colman	Barber Colman-modul	Barber Colman-modul
N16	Display Barber Colman	Barber Colman-display	Barber Colman-display
R5	Potenziometro regolazione velocità	Potensiometer hastighetsregulering	Hastighedsreguleringspotentiometer
S1	Interruttore di controllo	Diagnosebryter	Undersøgelseskontakt
S2	Interruttore DDEC programma	Bryter DDEC-program	DDEC-programkontakt
S6	Interruttore di carico/scarico	Bryter belastning/avlastning	Kontakt for belast/aflast
S7	Interruttore Blend/ILS/Command	Bryter blanding/ILS/kommando	Blande/ILS/kommandokontakt
S8	Pulsante di disattivazione dell'interruttore automatico	Knapp for lukking av bryter	Afbryderlukkeknap
S9	Pulsante di scatto tagliacircuito	Bryterutløsingsknapp	Afbryderudløserknap
S11	Interruttore abilitazione Sinc	Bryter aktivering synkronisering	Aktiver synk.-knap
S12	Interruttore di selezione 50 Hz/60 Hz	Velgerbryteren 50 Hz/60 Hz	Omskifterkontakt 50 Hz/60 Hz
S14	Arresto di emergenza	Nødstopp	Nødstop
S16	Interruttore sportello	Dørbryter	Dørkontakt
X4-14	Terminali	Terminaler	Klemmer
X25	Spina di diagnostica	Diagnoseplugg	Fejlfindingsstik
X30-31	Connettori di messa in parallelo	Kontakter for parallellkopling	Parallelisering af konnektorer
X50	Connettore 1 a 40 poli	40-polet kontakt 1	40 -faset kontaktklemme 1
X51	Connettore 2 a 40 poli	40-polet kontakt 2	40 -faset kontaktklemme 2

	ΕΛΛΗΝΙΚΑ	PORTUGUÊS	SUOMI
A1	Πλακέτα γεννήτριας	Quadro do gerador	Generaattorin taulu
A2	Οθόνη LCD	Ecrã LCD	LCD-näyttö
A3	Περίβλημα οθόνης	Centro do Ecrã	Näyttöhubi
A4	Υπολογιστής ισχύος	Calculador da Corrente	Teholaskin
A5	Κλειδί υλικού	Tecla de hardware	Laiteavain
A9	Σύνδεση υπολογιστή (RS 232)	Ligação RS232 PC	RS232-PC-liitäntä
D1	Δίοδος	Díodo	Diodi
B1	Αισθητήρας στάθμης καυσίμου	Sensor do nível de combustível	Polttoainemäärän anturi
F1	DC ασφάλεια	DC fusível	DC varoke
H1	Λυχνία πίνακα	Luz do painel	Kojetaulun valo
H2	Λυχνία ελέγχου κινητήρα	Lâmpada de controlo do motor	Moottorin tarkistus -valo
H3	Λυχνία διακοπής λειτουργίας κινητήρα	Lâmpada de paragem do motor	Moottorin pysäytys -valo
H4	Λυχνία κλειστού γενικού ασφαλειοδιακόπτη	Lâmpada fechada do disjuntor	Pääkatkaisin suljettu -valo
K4	Ρελέ ελέγχου κινητήρα	Relé do controlo do motor	Moottorin tarkistus -rele
K5	Ρελέ τηλεχειρισμού	Relé do arranque remoto	Kaukokäynnistysrele
K8	Ρελέ διακοπής λειτουργίας κινητήρα	Relé de paragem do motor	Moottorin pysäytys -rele
K15	Ρελέ ανίχνευσης εναλλασσόμενου ρεύματος	Relé sensitivo AC	Vaihtovirran tunnistusrele
K19	Ρελέ πτώσης ασφαλειοδιακόπτη	Relé de disparo do disjuntor	Katkaisimen laukeamisrele
KT2	Χρονοδιακόπτης καθυστέρησης προγράμματος	Cronometro de programação	Ohjelman viiveen ajastin
KT20	Χρονοδιακόπτης καθυστέρησης κλεισίματος ασφαλειοδιακόπτη	Cronometro do fecho do disjuntor	Virran katkaisun toipumisajastin
N14	Μονάδα Barber Colman	Módulo Barber Colman	Barber Colman -moduuli
N16	Οθόνη Barber Colman	Ecrã Barber Colman	Barber Colman -näyttö
R5	Ποτενσιόμετρο ρύθμισης στροφών	Potenciómetro de ajuste da velocidade	Nopeuden säädön potentiometri
S1	Διακόπτης διερεύνησης	Comutador de investigação	Tutkimuskytkin
S2	Διακόπτης προγράμματος DDEC	Comutador de Programação DDEC	Ohjelman DDEC-kytkin
S6	Διακόπτης φόρτωσης/εκφόρτωσης	Comutador de Carga/descarga	Lataa/pura-kytkin
S7	Διακόπτης ισόχρονης κατανομής/εξισορρόπησης/ελέγχου φορτίου (ILS/Blend/Command)	Comutador Blend/ILS/comand	Yhdistely-/ILS-/komentokytkin
S8	Κουμπί κλεισίματος ασφαλειοδιακόπτη	Botão de fechar o disjuntor	Virrankatkaisin kiinni -painike
S9	Κουμπί πτώσης ασφαλειοδιακόπτη	Botão de disparo do disjuntor	Katkaisimen laukaisupainike
S11	Διακόπτης ενεργοποίησης συγχρονισμού	Comutador de sincronização disponível	Synkronointikytkin
S12	Διακόπτης επιλογεα 50 Hz/60 Hz	Comutador-selector 50 Hz/60 Hz	Valintakytkin 50 Hz/60 Hz
S14	Στοπ έκτακτης ανάγκης	Paragem de emergência	Hätäpysäytys
S16	Διακόπτης πόρτας	Comutador da Porta	Ovikytkin
X4-14	Ακροδέκτες	Terminais	Liittimet
X25	Υποδοχή διαγνωστικού ελέγχου	Tomada de diagnóstico	Diagnoosipistoke
X30-31	Συνδετήρες παράλληλης σύνδεσης	Cabos paralelos (ligações paralelas)	Rinnakkaisliittimet
X50	40-πολικός σύνδεσμος 1	Ligação 1 em 40 polos	40-napainen liitin 1
X51	40-πολικός σύνδεσμος 2	Ligação 2 em 40 polos	40-napainen liitin 2

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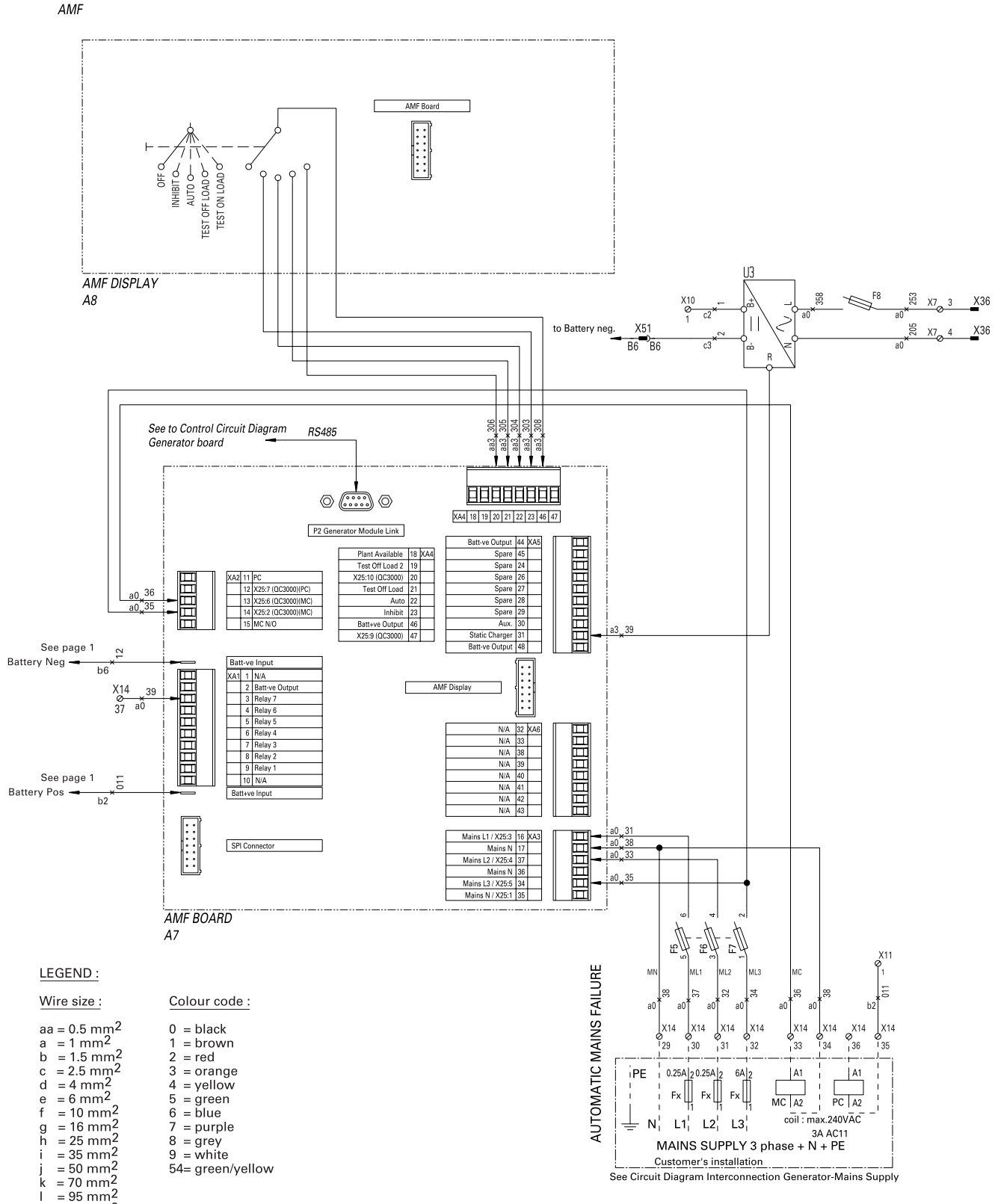
Applicable for QAC1006

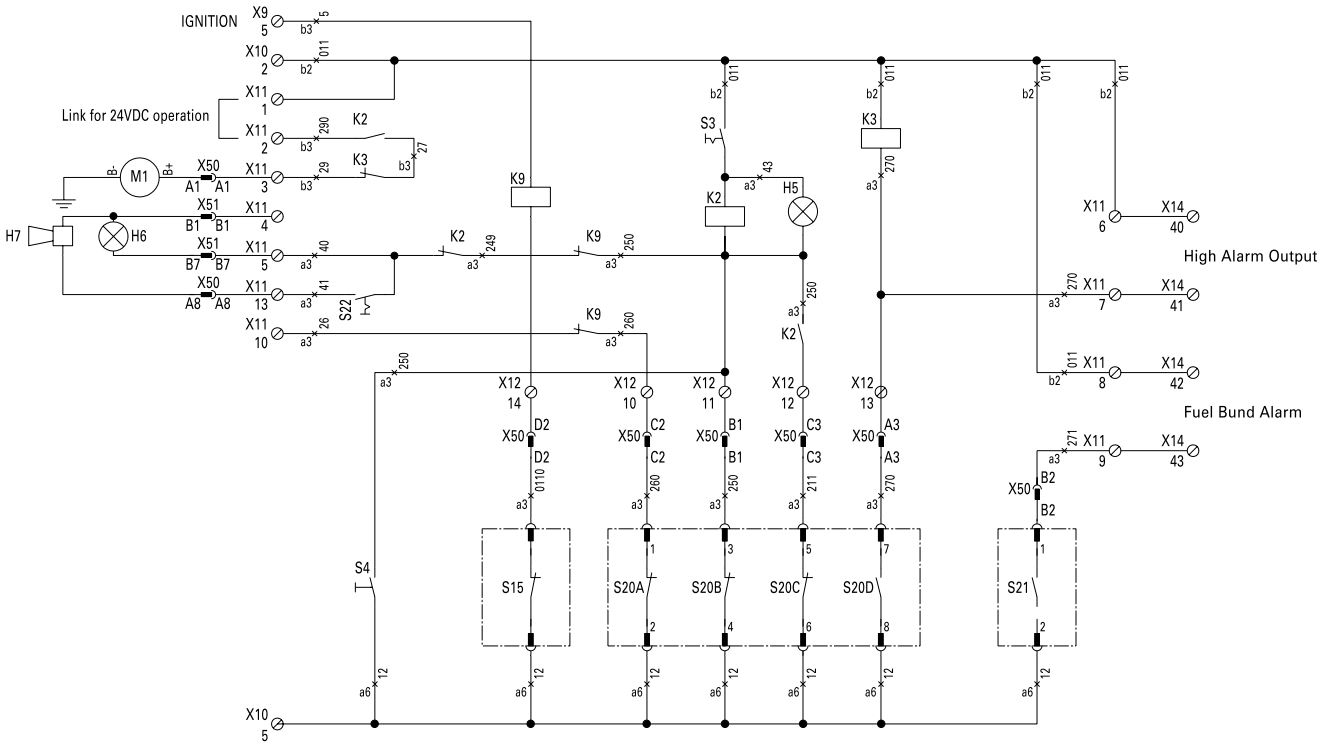


LEGEND :

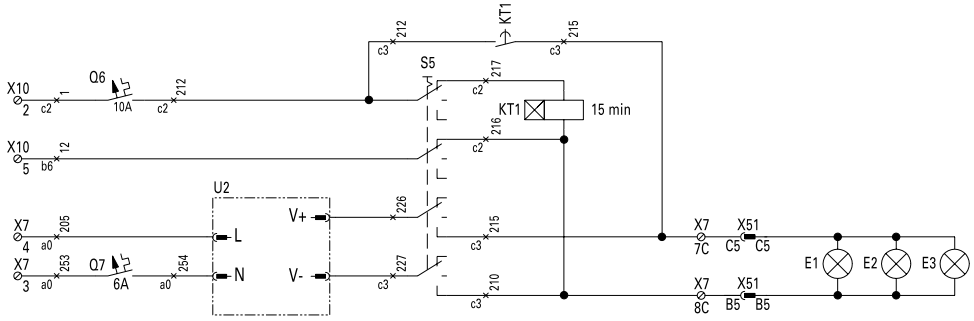
Wire size :	Colour code :
aa = 0.5 mm^2	0 = black
a = 1 mm^2	1 = brown
b = 1.5 mm^2	2 = red
c = 2.5 mm^2	3 = orange
d = 4 mm^2	4 = yellow
e = 6 mm^2	5 = green
f = 10 mm^2	6 = blue
g = 16 mm^2	7 = purple
h = 25 mm^2	8 = grey
i = 35 mm^2	9 = white
j = 50 mm^2	54= green/yellow
k = 70 mm^2	
l = 95 mm^2	

lx = 95 mm^2 EPR-CSP to BS6195 4C
bx = 1.5 mm^2 NSGAFOeU

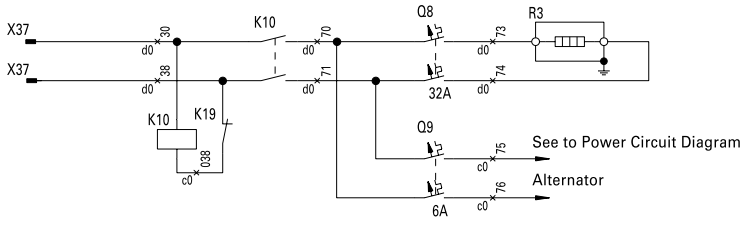
Fuel System



Internal Light System



Heater System



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	ENGLISH	NEDERLANDS	FRANCAIS
E1-3	Internal lights	Interne lampjes	Eclairages internes
F5-6	Fuse 250 mA	Zekering 250 mA	Fusible 250 mA
F7-8	Fuse 6 A	Zekering 6 A	Fusible 6 A
H5	Fuel fill lamp	Lampje bijtanken	Témoin de plein de carburant
H6	Visible alarm	Visueel alarm	Alarme visible
H7	Audible alarm	Geluidsalarm	Alarme audible
K10	External power supply contactor	Externe voedingscontactor	Contacteur d'alimentation extérieure
K2	Pump enable relay	Pomp-vrijgaverelais	Relais de validation de pompe
K3	Pump disable relay	Pomp-blokkeerrelais	Relais d'invalidation de pompe
K9	Alarm disable relay	Alarm-blokkeerrelais	Relais d'invalidation d'alarme
K19	Breaker trip relay	Omschakelrelais stroomonderbreker	Relais de déclenchement du disjoncteur
KT1	Internal lights timer	Timer interne lampjes	Minuterie pour éclairages internes
L1	Mains line 1	Netleiding 1	Ligne secteur 1
L2	Mains line 2	Netleiding 2	Ligne secteur 2
L3	Mains line 3	Contactor netvoeding	Ligne secteur 3
MC	Contactor mains supply	Contactor netvoeding	Alimentation secteur du contacteur
M1	Fuel pump	Brandstofpomp	Pompe à carburant
PC	Contactor generator	Contactor voor de generator	Générateur de contacteur
Q6	Circuit breaker 10 A	Vermogenschakelaar 10 A	Disjoncteur 10 A
Q7	Circuit breaker 6 A	Vermogenschakelaar 6 A	Disjoncteur 6 A
Q8	Circuit breaker 32 A	Vermogenschakelaar 32 A	Disjoncteur 32 A
Q9	Circuit breaker 6 A	Vermogenschakelaar 6 A	Disjoncteur 6 A
R3	Engine heater	Motorverwarmer	Réchauffeur du moteur
S15	External fuel switch	Externe brandstofschakelaar	Interrupteur de carburant extérieur
S20A	Low fuel shutdown switch	Uitschakelschakelaar brandstoftekort	Interrupteur d'arrêt de carburant bas
S20B	Low fuel level switch, warning	Schakelaar, laag brandstofpeil, waarschuwing	Interrupteur niveau de carburant bas, avertissement
S20C	Alarm high fuel level switch	Alarmschakelaar hoog brandstofpeil	Interrupteur alarme niveau de carburant haut
S20D	High fuel shutdown switch	Uitschakelschakelaar brandstofpeil te hoog	Interrupteur d'arrêt de carburant haut
S21	Bund leakage warning switch	Waarschuwingsschakelaar bufferlekkage	Interrupteur d'avertissement de fuites
S3	Auto/off fuel pump switch	Schakelaar brandstofpomp auto/uit	Interrupt. de pompe de carburant automatique/coupée
S4	Manual fuel fill button	Knop handmatig bijtanken	Bouton de remplissage manuel de carburant
S5	Container lights switch	Schakelaar containerverlichting	Interrupteur d'éclairages de coffret
S22	Audible alarm disable switch	Geluidsalarm-blokkeerschakelaar	Interrupteur d'invalidation d'alarme audible
U2	DC power supply	DC-voeding	Alimentation DC
U3	Battery charger	Batterijlader	Chargeur de batterie
X36	Socket inlet battery charger	Contactdoos ingang batterijlader	Fiche du chargeur de batterie
X37	Socket inlet heater	Contactdoos ingang verwarmer	Fiche du réchauffeur
X4-14	Terminals	Klemmen	Bornes
X50	Connector 1 40-pins	Connector 1, 40 stiften	Connecteur 1, 40 broches
X51	Connector 2 40-pins	Connector 2, 40 stiften	Connecteur 2, 40 broches

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	DEUTSCH	ESPAÑOL	SVENSKA
E1-3	Innenbeleuchtung	Luces internas	Intern belysning
F5-6	Sicherung 250 mA	Fusible 250 mA	Säkring 250 mA
F7-8	Sicherung 6 A	Fusible 6 A	Säkring 6 A
H5	Kraftstoffeinfüllleuchte	Lámpara de llenado de combustible	Bränslepåfyllning – indikator
H6	Warnanzeige	Alarma visible	Visuell signal
H7	Warnsignalton	Alarma acústica	Ljudsignal
K10	Schütz für externe Stromversorgung	Contactor para suministro externo de energía eléctrica	Kontaktdon för extern strömförsörjning
K2	Relais zur Aktivierung der Pumpe	Relé de habilitación de la bomba	Pump - påkopplingsrelä
K3	Relais zur Deaktivierung der Pumpe	Relé de inhabilitación de la bomba	Pump - bortkopplingsrelä
K9	Relais zur Deaktivierung des Warnsignals	Relé de inhabilitación de la alarma	Alarm – bortkopplingsrelä
K19	Relais zur Auslösung des Leistungsschalters	Relé de disparo del disyuntor	Brytare - utlösningsrelä
KT1	Zeitgeber für Innenbeleuchtung	Temporizador de luces internas	Timer för intern belysning
L1	Netzstromleitung 1	Línea 1 de red	Nätströmslinje 1
L2	Netzstromleitung 2	Línea 2 de red	Nätströmslinje 2
L3	Netzstromleitung 3	Línea 3 de red	Nätströmslinje 3
MC	Schütz für Netzstromversorgung	Contactor - Suministro de red eléctrica	Kontaktdon för nätström
M1	Kraftstoffpumpe	Bomba de combustible	Bränslepump
PC	Schütz Generator	Dínamo del contactor	Generatoranslutning
Q6	Leistungsschalter 10 A	Disyuntor 10 A	Strömbrytare 10 A
Q7	Leistungsschalter 6 A	Disyuntor 6 A	Strömbrytare 6 A
Q8	Leistungsschalter 32 A	Disyuntor 32 A	Strömbrytare 32 A
Q9	Leistungsschalter 6 A	Disyuntor 6 A	Strömbrytare 6 A
R3	Motorheizung	Calefactor del motor	Motorvärmare
S15	Externer Kraftstoffschalter	Interruptor de combustible externo	Extern bränslekontakt
S20A	Schalter zum Abschalten bei niedrigem Kraftstoff-stand	Interruptor de desconexión por nivel de combustible bajo	Låg bränslenivå - avstängningskontakt
S20B	Schalter für niedrigen Kraftstoffstand, Warnung	Interruptor bajo nivel de combustible, aviso	Brytare för låg bränslenivå, varning
S20C	Schalter Alarm hoher Kraftstoffstand	Conmutador de alarma por nivel de combustible alto	Strömbrytare vid alarm - hög bränslenivå
S20D	Schalter zum Abschalten bei hohem Kraftstoffstand	Interrup. de desconexión por nivel de combustible alto	Hög bränslenivå - avstängningskontakt
S21	Schalter für Warnung vor Undichtheit der Auf-fangvorrichtung	Interruptor de advertencia por pérdida de combustible	Spillvarning - väljare
S3	Kraftstoffpumpenschalter „Auto/Aus“	Interruptor de encendido/apagado de la bomba de combustible	Bränslepump Auto/off - väljare
S4	Kraftstoffhandfülltaste	Botón de llenado manual de combustible	Manuell bränslepåfyllning - knapp
S5	Behälterbeleuchtungsschalter	Interruptor de luces del contenedor	Huvens belysning - väljare
S22	Schalter zum Deaktivieren des Warnsignaltons	Interruptor de inhabilitación de alarma acústica	Bortkoppling av ljudsignal - väljare
U2	Gleichstromversorgung	Fuente de alimentación de CC	Likströmsförsörjning
U3	Batterieladegerät	Cargador de batería	Batteriladdare
X36	Steckdose Batterieladegerät	Zócalo para entrada de cargador de batería	Uttag för batteriladdare
X37	Steckdose Heizung	Zócalo para entrada de calefactor	Uttag för värmare
X4-14	Klemmen	Terminales	Anslutningar
X50	40-poliger Stecker 1	Conector 1, 40-polar	40-poligt kontaktdon 1
X51	40-poliger Stecker 2	Conector 2, 40-polar	40-poligt kontaktdon 2

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	ITALIANO	NORSK	DANSK
E1-3	Spie interne	Interne lamper	Interne lys
F5-6	Fusibile 250 mA	Sikring 250 mA	Sikring 250 mA
F7-8	Fusibile 6 A	Sikring 6 A	Sikring 6 A
H5	Spia rabbocco carburante	Drivstoffpåfyllingslampe	Brændstofpåfyldningslampe
H6	Allarme visibile	Lysalarm	Synlig alarm
H7	Allarme sonoro	Lydalarm	Hørbar alarm
K10	Contatore fonte di alimentazione esterna	Kontaktor ekstern strømtilførsel	Ekstern strømforsyningskontaktor
K2	Relè abilitazione pompa	Relé aktivering pumpe	Pumpeaktiveringsrelæ
K3	Relè disabilitazione pompa	Relé deaktivering pumpe	Pumpedeaktiveringsrelæ
K9	Relè disabilitazione allarme	Relé deaktivering alarm	Alarmdeaktiveringsrelæ
K19	Relè di scatto tagliacircuito	Bryterutløsingsrelé	Afbryderudløserrelæ
KT1	Timer spie interne	Tidsbryter interne lamper	Timer for interne lys
L1	Alimentazione linea 1	Hovednett linje 1	Hovedstrømforsyningslinie 1
L2	Alimentazione linea 2	Hovednett linje 2	Hovedstrømforsyningslinie 2
L3	Alimentazione linea 3	Hovednett linje 3	Hovedstrømforsyningslinie 3
MC	Fonte di alimentazione contatore	Kontaktor hovedstrømforsyning	Hovedstrømforsyningskontaktor
M1	Pompa di alimentazione	Drivstoffpumpe	Brændstofpumpe
PC	Generatore del contattore	Kontaktorgenerator	Kontaktor til generator
Q6	Interruttore 10 A	Kretsbryter 10 A	Afbryder 10 A
Q7	Interruttore 6 A	Kretsbryter 6 A	Afbryder 6 A
Q8	Interruttore 32 A	Kretsbryter 32 A	Afbryder 32 A
Q9	Interruttore 6 A	Kretsbryter 6 A	Afbryder 6 A
R3	Riscaldatore motore	Motorvarmer	Motorvarmer
S15	Interruttore carburante esterno	Bryter ekstern drivstofftilførsel	Ekstern brændstofkontakt
S20A	Interruttore arresto carburante basso	Avstengingsbryter lavt drivstoffnivå	Lavt brændstofafbryderkontakt
S20B	Interr. di basso livello del combustibile, avvertimento	Bryter for lavt drivstoffnivå, varsel	Brændstofniveaukontakt, advarsel
S20C	Interruttore allarme livello carburante alto	Bryter for alarm for høyt drivstoffnivå	Kontakt til alarm ved højt brændstofniveau
S20D	Interruttore arresto carburante alto	Avstengingsbryter høyt drivstoffnivå	Højt brændstofafbryderkontakt
S21	Interruttore segnalazione perdite Bund	Bryter advarsel spillkantlekkasje	Kontakt til advarsel om kappebrud
S3	Interruttore pompa di alimentazione auto/off	Bryter drivstoffpumpe auto/av	Auto/off for brændstofpumpekontakt
S4	Pulsante rabbocco di carburante manuale	Knapp manuell drivstoffpåfylling	Manuel brændstofpåfyldningsknap
S5	Interruttore luci contenitore	Bryter containerbelysning	Containerlyskontakt
S22	Interruttore di disabilitazione allarme sonoro	Bryter deaktivering lydalarm	Kontakt til deaktivering af hørbar alarm
U2	Alimentazione CC	Likestrømforsyning	DC-strømforsyning
U3	Carica batteria	Batterilader	Batterioplader
X36	Presa caricabatteria	Kontakt batterilader	Stikindgang til batterilader
X37	Presa riscaldatore	Kontakt varmer	Stikindgang til varmer
X4-14	Terminali	Terminaler	Klemmer
X50	Connettore 1 a 40 poli	40-polet kontakt 1	40 -faset kontaktklemme 1
X51	Connettore 2 a 40 poli	40-polet kontakt 2	40 -faset kontaktklemme 2

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	ΕΛΛΗΝΙΚΑ	PORTUGUÊS	SUOMI
E1-3	Εσωτερικά φώτα	Luzes internas	Sisäiset valot
F5-6	Ασφάλεια 250 mA	Fusível 250 mA	Varoke 250 mA
F7-8	Ασφάλεια 6 A	Fusível 6 A	Varoke 6 A
H5	Λυχνία πλήρωσης καυσίμου	Lâmpada do enchimento do combustível	Polttoaineen täyttö -valo
H6	Οπτικό σήμα συναγερμού	Alarme visível	Visuaalinen hälytys
H7	Ηχητικό σήμα συναγερμού	Alarme auditivo	Äänihälytys
K10	Συνδετήρας εξωτερικής παροχής ρεύματος	Interruptor de fornecimento de corrente externar	Ulkoinen virtalähdekontaktori
K2	Ρελέ ενεργοποίησης αντλίας	Relé de bomba disponível	Pumppu käyttöön -rele
K3	Ρελέ απενεργοποίησης αντλίας	Relé de bomba não disponível	Pumppu käytöstä -rele
K9	Ρελέ απενεργοποίησης συναγερμού	Relé de Alarme não disponível	Hälytys käytöstä -rele
K19	Ρελέ πτώσης ασφαλειοδιακόπτη	Relé de disparo do disjuntor	Katkaisimen laukeamisrele
KT1	Χρονοδιακόπτης εσωτερικών φώτων	Cronometro das luzes internas	Sisäisten valojen ajastin
L1	Γραμμή παροχής ρεύματος 1	Linha de Rede 1	Verkkolinja 1
L2	Γραμμή παροχής ρεύματος 2	Linha de rede 2	Verkkolinja 2
L3	Γραμμή παροχής ρεύματος 3	Linha de rede 3	Verkkolinja 3
MC	Επαφέας παροχής ρεύματος	Fornecimento da rede	Kontaktorin verkkovirtalähde
M1	Αντλία καυσίμου	Bomba do combustível	Polttoainepumppu
PC	Γεννήτρια επαφέα	Contactor do gerador	Generaattorin liitin
Q6	Διακόπτης κυκλώματος 10 A	Disjuntor 10 A	Virrankatkaisin 10 A
Q7	Διακόπτης κυκλώματος 6 A	Disjuntor 6 A	Virrankatkaisin 6 A
Q8	Διακόπτης κυκλώματος 32 A	Disjuntor 32 A	Virrankatkaisin 32 A
Q9	Διακόπτης κυκλώματος 6 A	Disjuntor 6 A	Virrankatkaisin 6 A
R3	Θερμαντήρας κινητήρα	Filamento aquecedor do motor	Moottorin lämmitin
S15	Διακόπτης εξωτερικής δεξαμενής καυσίμου	Comutador do combustível externo	Ulkoinen polttoainekytkin
S20A	Διακόπτης χαμηλής στάθμης καυσίμου	Interruptor de desligação do combustível baixo	Polttoaineen sammutuskytkin, alhainen
S20B	Διακόπτης χαμηλής σταθμής καυσίμου	Comutador do nível baixo de combustível, aviso	Alhaisen polttoainemäärän merkkivalon kytkin, varoitus
S20C	Διακόπτης συναγερμού υψηλής στάθμης καυσίμου	Interruptor de alarme de alto nível de combustível	Liiallisen polttoainemäärän hälytyskytkin
S20D	Διακόπτης υψηλής στάθμης καυσίμου	Interruptor de desligação do combustível alto	Polttoaineen sammutuskytkin, korkea
S21	Διακόπτης προειδοποίησης διαρροής καυσίμου	Comutador de aviso de fuga do dique	Polttoaineen vuodon varoituskytkin
S3	Διακόπτης αυτόματης διακοπής αντλίας καυσίμου	Comutador da bomba de combustível Automática/ desligada	Polttoaine autom/pois -kytkin
S4	Κουμπί μη αυτόματης πλήρωσης καυσίμου	Botão de enchimento manual de combustível	Polttoaineen täyttö käsin -painike
S5	Διακόπτης φώτων κουβουκλίου	Comutador das luzes do contentor	Säiliövalot-kytkin
S22	Διακόπτης απενεργοποίησης ηχητικού σήματος συναγερμού	Comutador do alarme não disponível auditivo	Äänimerkki pois käytöstä -kytkin
U2	Παροχή συνεχούς ρεύματος (DC)	Fornecimento de corrente DC	Tasavirtalähde
U3	Γομωτής στατικής μπαταρίας	Carregador de baterias	Akkulaturi
X36	Υποδοχή φορτιστή μπαταρίας	Introdução Ficha do carregador da bateria	Akkulaturin tuloliitin
X37	Υποδοχή θερμαντήρα	Introdução da ficha do filamento aquecedor	Lämmittimen tuloliitin
X4-14	Ακροδέκτες	Terminais	Liittimet
X50	40-πολικός σύνδεσμος 1	Ligação 1 em 40 polos	40-napainen liitin 1
X51	40-πολικός σύνδεσμος 2	Ligação 2 em 40 polos	40-napainen liitin 2

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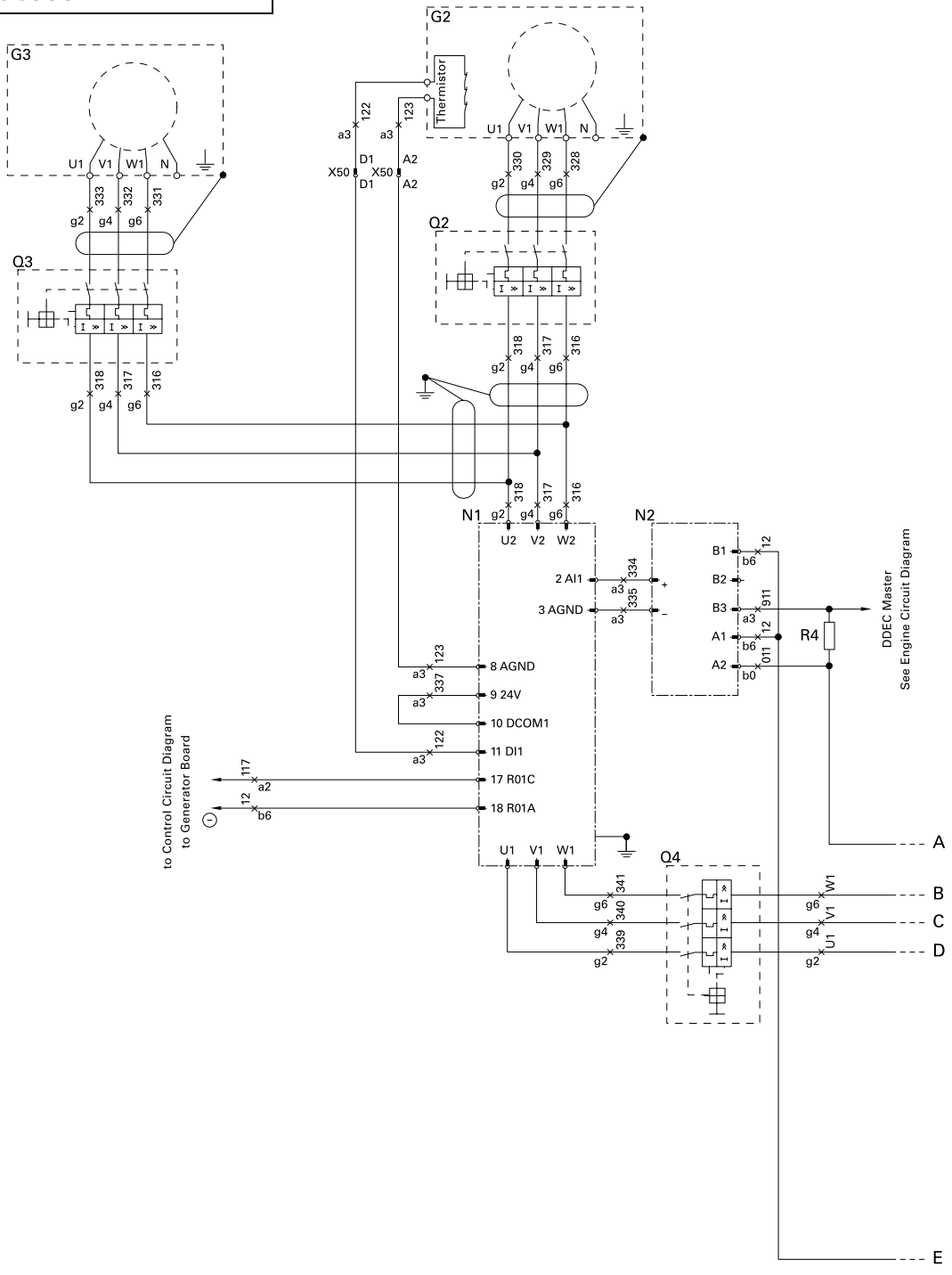

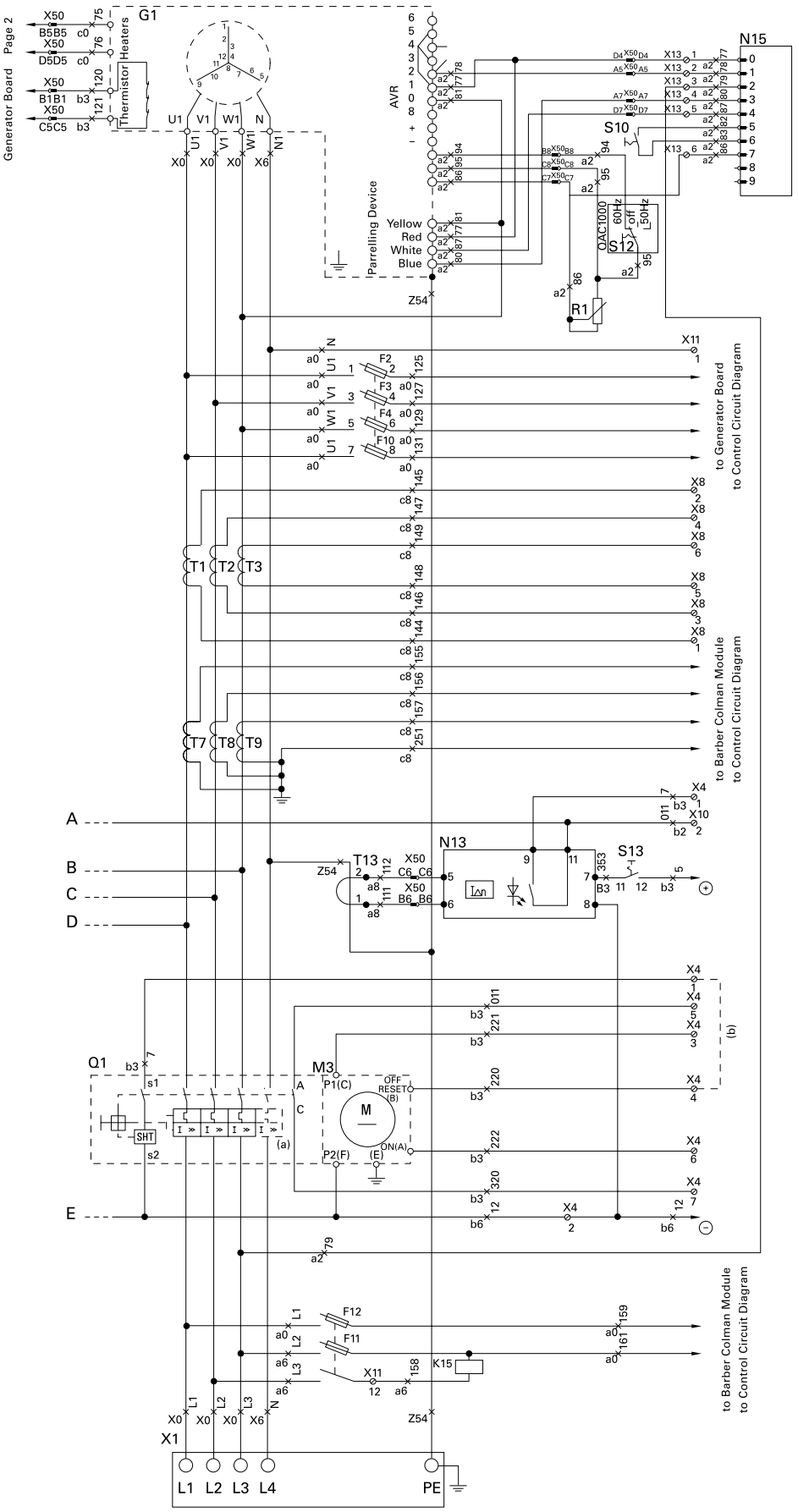

Legend

Wire size Colour code

aa = 0.5mm²	0 = black
a = 1mm²	1 = brown
b = 1.5mm²	2 = red
c = 2.5mm²	3 = orange
d = 4mm²	4 = yellow
e = 6mm²	5 = green
f = 10mm²	6 = blue
g = 16mm²	7 = purple
h = 25mm²	8 = grey
i = 35mm²	9 = white
j = 50mm²	54 = green/yellow
k = 70mm²	
l = 95mm²	

lx = 95mm² EPR-CSP to BS6195 4c
bx = 1.5mm² NSGAFOeU

Note: wire size X: 3x185sqmm parallel
wire size Z: 2x150sqmm parallel

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	ENGLISH	NEDERLANDS	FRANCAIS
F2-4	Fuse 250 mA	Zekering 250 mA	Fusible 250 mA
F10	Fuse 4 A	Zekering 4 A	Fusible 4 A
F11-12	Fuse 4 A	Zekering 4 A	Fusible 4 A
G1	Alternator	Alternateur	Groupe électrogène
G2	Fan motor 27 kW	Ventilatormotor 27 kW	Moteur de ventilateur 27 kW
G3	Fan motor 7.5 kW	Ventilatormotor 7,5 kW	Moteur de ventilateur 7,5 kW
K15	AC sensing relay	AC-detectierelais	Relais de détection AC
M3	Motor drive for Q1	Motoraandrijving voor Q1	Entraînement moteur pour Q1
N1	VSD drive	VSD-aandrijving	Commande VSD
N2	PVM module	PVM-module	Module PVM
N13	Earth fault-current relay	Aardlekrelais	Relais de fuite à la terre
N15	Power factor regulator	Vermogensfactorregelaar	Régulateur du facteur de puissance
Q1	Mains circuit breaker 1600 A	Netstroomonderbreker 1600 A	Disjoncteur secteur de 1600 A
Q2	Motor 27 kW circuit breaker 63 A	Stroomonderbreker 63 A motor 27 kW	Disjoncteur de 63 A du moteur de 27 kW
Q3	Motor 7.5 kW circuit breaker 16 A	Stroomonderbreker 16 A motor 7,5 kW	Disjoncteur de 16 A du moteur de 7,5 kW
Q4	Drive circuit breaker 80 A	Stroomonderbreker aandrijving 80 A	Disjoncteur de commande de 80 A
R1	Voltage adjustment potentiometer	Spanningsinstelpotentiometer	Potentiomètre de réglage de la tension
R4	7 W/270 ohm	7 W/270 ohm	7 W/270 ohm
S10	PFR on/off switch	PFR aan/uit-schakelaar	Interrupteur marche/arrêt PFR
S12	Frequency selector switch 50 Hz/60 Hz	Frequentiekeuzeschakelaar 50 Hz/60 Hz	Sélecteur de fréquence 50 Hz/60 Hz
S13	Earth fault relay lock-out switch	Blokkeerschakelaar verliesstroomrelais	Commutateur d'arrêt de relais des défauts à la terre
T1-3	Current transformer	Stroomtransformator	Transformateur de courant
T7-9	Current transformer	Stroomtransformator	Transformateur de courant
T13	Torus earth leakage	Torus-aardlek	Fuite à la terre de tore
X1	Terminals mains	Netklemmen	Bornes secteur
X4-14	Terminals	Klemmen	Bornes
X50	Connector 1 40-pins	Connector 1, 40 stiften	Connecteur 1, 40 broches
X51	Connector 2 40-pins	Connector 2, 40 stiften	Connecteur 2, 40 broches

	DEUTSCH	ESPAÑOL	SVENSKA
F2-4	Sicherung 250 mA	Fusible 250 mA	Säkring 250 mA
F10	Sicherung 4 A	Fusible 4 A	Säkring 4 A
F11-12	Sicherung 4 A	Fusible 4 A	Säkring 4 A
G1	Generator	Alternador	Generator
G2	Ventilatormotor 27 kW	Motor del ventilador a 27 kW	Fläktmotor 27 kW
G3	Ventilatormotor 7,5 kW	Motor del ventilador a 7,5 kW	Fläktmotor 7,5 kW
K15	Wechselstromfühlerrelais	Relé de detección de CA	AC-avkänningsrelä
M3	Motorantrieb für Q1	Motor para Q1	Motordrivning för Q1
N1	VSD-Antrieb	Control VSD	VSD-drivning
N2	PVM-Modul	Módulo PVM	PVM-modul
N13	Erdschlußrelais	Relé de pérdida a tierra	Relä för jordläckage
N15	Leistungsfaktorregler	Regulador de factor de potencia	Effektfaktorregulator
Q1	Hauptleistungsschalter 1600 A	Disyuntor del circuito principal 1600 A	Nätströmsbrytare 1600 A
Q2	Leistungsschalter 63 A für Motor 27 kW	Disyuntor del circuito del motor de 27 kW a 63 A	Motor 27 kW strömbrytare 63 A
Q3	Leistungsschalter 16 A für Motor 7,5 kW	Disyuntor del circuito del motor de 7,5 kW a 16 A	Motor 7.5 kW strömbrytare 16 A
Q4	Antriebsleistungsschalter 80 A	Disyuntor del circuito conductor de 80 A	Drivenhetens strömbrytare 80 A
R1	Regelungspotentiometer	Potenciómetro de ajuste de voltaje	Potentiometer för spänningsjustering
R4	7 W/270 ohm	7 W/270 ohm	7 W/270 ohm
S10	PFR Ein-/Ausschalter	Interruptor de encendido/apagado del regulador del factor de potencia (PFR)	PFR på/av - väljare
S12	Frequenz Wahlschalter 50 Hz/60 Hz	Conmutador selector 50 Hz/60 Hz	Väljare 50 Hz/60 Hz
S13	Riegelschalter Erdschlußrelais	Interruptor de bloqueo del relé de pérdida a tierra	Avstängningsbrytare för jordfelsrelä
T1-3	Stromwandler	Transformador de corriente	Strömtransformator
T7-9	Stromwandler	Transformador de corriente	Strömtransformator
T13	Torus-Erdschluss	Fuga a tierra de junta tórica	Jordströmsspole
X1	Klemmen Netzstrom	Conexiones terminales a la red eléctrica principal	Nätströmsuttag
X4-14	Klemmen	Terminales	Anslutningar
X50	40-poliger Stecker 1	Conector 1, 40-polar	40-poligt kontaktdon 1
X51	40-poliger Stecker 2	Conector 2, 40-polar	40-poligt kontaktdon 2

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	ITALIANO	NORSK	DANSK
F2-4	Fusibile 250 mA	Sikring 250 mA	Sikring 250 mA
F10	Fusibile 4 A	Sikring 4 A	Sikring 4 A
F11-12	Fusibile 4 A	Sikring 4 A	Sikring 4 A
G1	Generatore	Generator	Generator
G2	Motore ventola 27 kW	Viftemotor 27 kW	Ventilatormotor 27 kW
G3	Motore ventola 7,5 kW	Viftemotor 7,5 kW	Ventilatormotor 7,5 kW
K15	Relè rilevamento CA	Avlesingsrelé vekselstrøm	AC-følerelæ
M3	Motore per Q1	Motordrift for Q1	Motordrev for Q1
N1	Trasmissione VSD	VSD-drift	VSD-drev
N2	Modulo PVM	PVM-modul	PVM-modul
N13	Relè corrente di terra	Jordfeilrelé	Jordfejlstrømsrelæ
N15	Regolatore fattore di potenza	Effektfaktorregulator	Regulator for effektfaktor
Q1	Interruttore automatico principale 1600 A	Hovedkretsbryter 1600 A	Hovedstrømsafbryder 1600 A
Q2	Interruttore automatico 63 A con motore da 27 kW	Hovedkretsbryter motor 27 kW 63 A	Motor 27 kW kredsløbsafbryder 63 A
Q3	Interruttore automatico 16 A con motore da 7,5 kW	Hovedkretsbryter motor 7,5 kW 16 A	Motor 7,5 kW kredsløbsafbryder 16 A
Q4	Interruttore automatico trasmissione 80 A	Hovedkretsbryter 80 A drift	Drivkredsløbsafbryder 80 A
R1	Potenziometro regolazione tensione	Potensiometer for spenningsregulering	Spændingsreguleringspotentiometer
R4	7 W/270 ohm	7 W/270 ohm	7 W/270 ohm
S10	Interruttore PFR on/off	Bryter effektfaktorregulator (PFR) på/av	PFR on/off-kontakt
S12	Interruttore di selezione 50 Hz/60 Hz	Velgerbryteren 50 Hz/60 Hz	Omskifterkontakt 50 Hz/60 Hz
S13	Interruttore chiusura relé guasto di terra	Avstengingsbryter for jordfeilrelé	Afbryderkontakt til jordfejlstrømsrelæ
T1-3	Transformatore di corrente	Strøm	Strømtransformere
T7-9	Transformatore di corrente	Strøm	Strømtransformere
T13	Scarico a terra Torus	Toroidspole jordfeil	Torus jordafleder
X1	Alimentazione di rete terminali	Hovedstrømforsyning terminaler	Hovedstrøm for klemmer
X4-14	Terminali	Terminaler	Klemmer
X50	Connettore 1 a 40 poli	40-polet kontakt 1	40-faset kontaktklemme 1
X51	Connettore 2 a 40 poli	40-polet kontakt 2	40-faset kontaktklemme 2

	ΕΛΛΗΝΙΚΑ	PORTUGUÊS	SUOMI
F2-4	Ασφάλεια 250 mA	Fusível 250 mA	Varoke 250 mA
F10	Ασφάλεια 4 A	Fusível 4 A	Varoke 4 A
F11-12	Ασφάλεια 4 A	Fusível 4 A	Varoke 4 A
G1	Γεννήτρια	Alternador	Vaihtovirtageneraattori
G2	Ηλεκτροκινητήρας ανεμιστήρα 27 kW	Motor Fan 27 kW	Tuulettimen moottori 27 kW
G3	Ηλεκτροκινητήρας ανεμιστήρα 7,5 kW	Motor Fan 7,5 kW	Tuulettimen moottori 7,5 kW
K15	Ρελέ ανίχνευσης εναλλασσόμενου ρεύματος	Módulo PVM	Vaihtovirran tunnistusrele
M3	Κινητήρας του Q1	Motor de circulação para Q1	Moottorin voimansiirto Q1:lle
N1	Μονάδα κίνησης VSD	Condutor VSD	VSD-käyttömoottori
N2	Μονάδα PVM	Módulo PVM	PVM-moduuli
N13	Ρεύματος γείωσης	Relé de detecção de falha de terra	Maavuotorele
N15	Ρυθμιστής συντελεστή ισχύος	Regulador do factor de corrente	Tehokerroinsäädin
Q1	Γενικός ασφαλειοδιακόπτης 1600 A	Disjuntor do circuito de rede 1600 A	Päävirrankatkaisin 1600 A
Q2	Ασφαλειοδιακόπτης 63 A ηλεκτροκινητήρα 27 kW	Disjuntor do circuito 63A do Motor 27 kW	Moottorin 27 kW virrankatkaisin 63 A
Q3	Ασφαλειοδιακόπτης 16 A ηλεκτροκινητήρα 7,5 kW	Disjuntor do circuito 16 A do Motor 7,5 kW	Moottorin 7,5 kW virrankatkaisin 16 A
Q4	Ασφαλειοδιακόπτης 80 A μονάδας κίνησης	Disjuntor do circuito de condução 80 A	Käyttömoottorin virrankatkaisin 80 A
R1	Ποτενσιόμετρο ρύθμισης τάσης	Potenciómetro do ajuste da voltagem	Jännitteen säädön potentiometri
R4	7 W/270 ohm	7 W/270 ohm	7 W/270 ohm
S10	Διακόπτης λειτουργίας PFR	Comutador PFR ligado/desligado	PFR päälle/pois -kytkin
S12	Διακόπτης επιλογέα 50 Hz/60 Hz	Comutador-selector 50 Hz/60 Hz	Valintakytkin 50 Hz/60 Hz
S13	Διακόπτης αποκλεισμού μετάδοσης λάθους στη γείωση	Interruptor selector do relé de corrente de defeito à terra	Maavuodon tunnistimen sulkukytkin
T1-3	Μετασχηματιστής ρεύματος	Transformador de corrente	Virtamuuntaja
T7-9	Μετασχηματιστής ρεύματος	Transformador de corrente	Virtamuuntaja
T13	Στεφάνη διαρροής γείωσης	Fuga á terra Torus	Torus-maavuoto
X1	Ακροδέκτες παροχής ρεύματος	Rede dos terminais	Verkkovirtaliittimet
X4-14	Ακροδέκτες	Terminais	Liittimet
X50	40-πολικός σύνδεσμος 1	Ligação 1 em 40 polos	40-napainen liitin 1
X51	40-πολικός σύνδεσμος 2	Ligação 2 em 40 polos	40-napainen liitin 2

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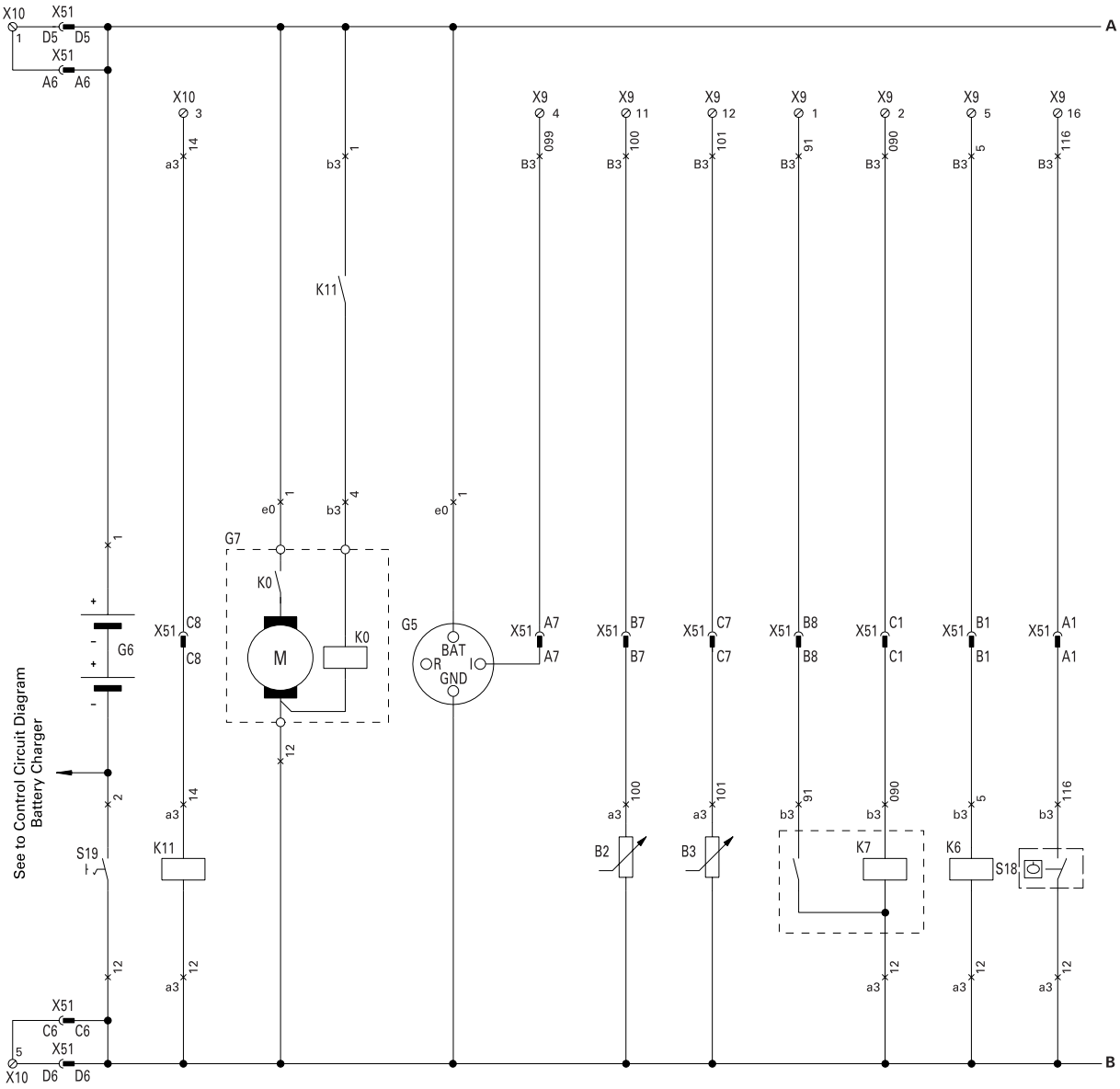
Applicable for QAC1006



LEGEND :

Wire size :	Colour code :
aa = 0.5 mm^2	0 = black
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b = 1.5 mm^2	2 = red
c = 2.5 mm^2	3 = orange
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e = 6 mm^2	5 = green
f = 10 mm^2	6 = blue
g = 16 mm^2	7 = purple
h = 25 mm^2	8 = grey
i = 35 mm^2	9 = white
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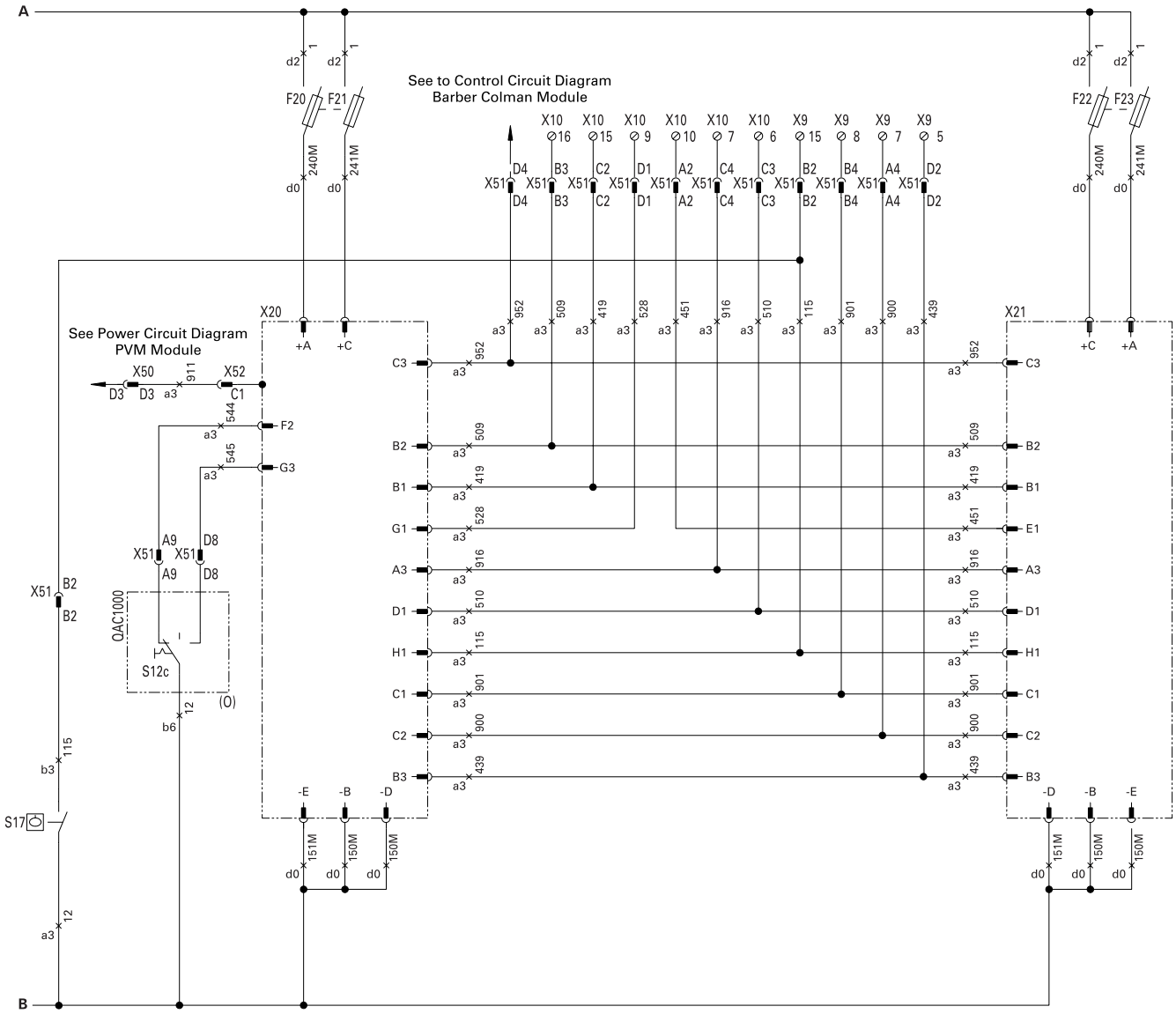
k = 70 mm^2	
l = 95 mm^2	
lx = 95 mm^2 EPR-CSP to BS6195 4C	
bx = 1.5 mm^2 NSGAFOeU	


A
B
See to Control Circuit Diagram
Barber Colman Module
See Power Circuit Diagram
PVM Module
X20
X21
F20
F21
F22
F23
F2
G3
S17
S12c
QAC1000
X50
X52
X51
X10
X9
+A
+C
-E
-B
-D
240M
241M
151M
150M
C3
B2
B1
G1
E1
A3
D1
H1
C1
C2
B3

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	ENGLISH	NEDERLANDS	FRANCAIS
B2	Coolant temperature sensor	Sensor, koelwatertemperatuur	Capteur, température eau de refroidissement
B3	Oil pressure sensor	Sensor, oliedruk	Capteur, pression d'huile
F20-23	Fuse 20 A	Zekering 20 A	Fusible 20 A
G5	Charging alternator	Laad alternator	Alternateur, charge
G6	Battery	Batterij	Batterie
G7	Starter motor	Startermotor	Démarreur
K6	Oil make-up solenoid (optional)	Olie-aanvulsolenoïde (optie)	Electrovanne d'appoint d'huile (en option)
K7	Air shutt off valve (optional)	Luchtafsluiter (optie)	Vanne de fermeture d'air (en option)
K11	Starter motor relay	Relais startmotor	Relais de démarreur
S12	Frequency selector switch 50 Hz/60 Hz	Frequentiekeuzeschakelaar 50 Hz/60 Hz	Sélecteur de fréquence 50 Hz/60 Hz
S17	Low coolant level switch (DDEC)	Schakelaar laag koelwaterpeil (DDEC)	Commutateur de niveau de réfrigérant bas (DDEC)
S18	Low coolant level switch (PCM)	Schakelaar laag koelwaterpeil (PCM)	Commutateur de niveau de réfrigérant bas (PCM)
S19	Battery isolator	Batterij-isolator	Isolateur de batterie
X4-14	Terminals	Klemmen	Bornes
X20	DDEC master	DDEC-master	DDEC maître
X21	DDEC receiver	DDEC-ontvanger	DDEC récepteur
X50	Connector 1 40-pins	Connector 1, 40 stiften	Connecteur 1, 40 broches
X51	Connector 2 40-pins	Connector 2, 40 stiften	Connecteur 2, 40 broches
X52	Connector EIH DDEC	Connector EIH DDEC	Connecteur EIH DDEC

	DEUTSCH	ESPAÑOL	SVENSKA
B2	Kühlwassertemperaturfühler	Sensor de temperatura del refrigerante	Sensor - kylvätskans temperatur
B3	Öldruckfühler	Sensor de presión de aceite	Oljetryckssensor
F20-23	Sicherung 20 A	Fusible 20 A	Säkring 20 A
G5	Lademaschine	Generador de carga	Laddningsgenerator
G6	Batterie	Batería	Batteri
G7	Startmotor	Motor de arranque	Startmotor
K6	Magnetventil für Ölausgleich (wahlweise)	Solenoide de calentamiento de aceite (opcional)	Oljepåfyllningssolenoid (option)
K7	Luftabsperrhahn (wahlweise)	Válvula de cierre de aire (opcional)	Luftavstängningsventil (option)
K11	Startermotorrelais	Relé del motor de arranque	Startmotorrelä
S12	Frequenz Wahlschalter 50 Hz/60 Hz	Conmutador selector 50 Hz/60 Hz	Väljare 50 Hz/60 Hz
S17	Schalter für niedrigen Kühlmittelstand (DDEC)	Interruptor de nivel de refrigerante bajo (DDEC)	Brytare för låg kylvätskenivå (DDEC)
S18	Schalter für niedrigen Kühlmittelstand (PCM)	Interruptor de nivel de refrigerante bajo (PCM)	Brytare för låg kylvätskenivå (PCM)
S19	Batterietrennschalter	Aislante de la batería	Batterifrånskiljare
X4-14	Klemmen	Terminales	Anslutningar
X20	DDEC-Muster	DDEC principal	DDEC-styrenhet
X21	DDEC-Empfänger	DDEC receptor	DDEC-mottagare
X50	40-poliger Stecker 1	Conector 1, 40-polar	40-poligt kontaktdon 1
X51	40-poliger Stecker 2	Conector 2, 40-polar	40-poligt kontaktdon 2
X52	Stecker EIH DDEC	Conector EIH DDEC	Kontaktdon EIH DDEC

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	ITALIANO	NORSK	DANSK
B2	Sensore della temperatura del refrigerante	Føler for kjølevæsketemperatur	Kølevandstemperaturføler
B3	Sensore della pressionde dell'olio	Oljetrykkføler	Olietryksføler
F20-23	Fusibile 20 A	Sikring 20 A	Sikring 20 A
G5	Generatore di carica	Ladegenerator	Ladegenerator
G6	Batteria	Batteri	Batteri
G7	Motore dell'avviatore	Starter	Startermotor
K6	Solenoide make-up olio (opzionale)	Magnetspole oljeetterfylling (ekstrautstyr)	Solenoide olie make-up (valgfri)
K7	Valvola di intercettazione aria (opzionale)	Luftavstengingsventil (ekstrautstyr)	Luftlukkeventil (valgfri)
K11	Relè avviatore motore	Startmotorrelé	Motorstarterrelæ
S12	Interruttore di selezione 50 Hz/60 Hz	Velgerbryteren 50 Hz/60 Hz	Omskifterkontakt 50 Hz/60 Hz
S17	Interruttore basso livello del liquido refriger. (DDEC)	Bryter for lavt kjølevæskenivå (DDEC)	Kontakt for lavt kølevæskeniveau (DDEC)
S18	Interruttore basso livello del liquido refrigerante (PCM)	Bryter for lavt kjølevæskenivå (PCM)	Kontakt for lavt kølevæskeniveau (PCM)
S19	Isolatore batteria	Batteriisolator	Batteriisolator
X4-14	Terminali	Terminaler	Klemmer
X20	DDEC principale	DDEC hovedenhet	DDEC-master
X21	DDEC serbatoio	DDEC mottaker	DDEC-modtager
X50	Connettore 1 a 40 poli	40-polet kontakt 1	40-faset kontaktklemme 1
X51	Connettore 2 a 40 poli	40-polet kontakt 2	40-faset kontaktklemme 2
X52	Connettore EIH DDEC	Kontakt EIH DDEC	Kontaktklemme EIH DDEC

	ΕΛΛΗΝΙΚΑ	PORTUGUÊS	SUOMI
B2	Αισθητήρας θερμοκρασίας ψυκτικού	Sensor da temperatura do refrigerante	Jäähdytysnesteen lämpötilan anturi
B3	Αισθητήρας πίεσης λαδιού	Sensor da pressão do óleo	Öljynpaineanturi
F20-23	Ασφάλεια 20 A	Fusível 20 A	Varoke 20 A
G5	Φορτιστής γεννήτριας	Gerador de carga	Latausgeneraattori
G6	Μπαταρία	Bateria	Akku
G7	Εκκίνησης	Motor de arranque	Käynnistysmoottori
K6	Ηλεκτρομαγνητική βαλβίδα αποκατάστασης λαδιού (προαιρετική)	Solenóide do óleo (opcional)	Öljyn lisäaineiden solenoidi (lisävaruste)
K7	Βαλβίδα αποκοπής αέρα (προαιρετική)	Válvula de fecho do ar (opcional)	Ilman sulkuventtiili (lisävaruste)
K11	Ρελέ μίζας	Relé do motor de arranque	Käynnistysmoottorin rele
S12	Διακόπτης επιλογεα 50 Hz/60 Hz	Comutador-selector 50 Hz/60 Hz	Valintakytkin 50 Hz/60 Hz
S17	Διακόπτης χαμηλής στάθμης ψυκτικού (DDEC)	Interruptor do nível baixo do líquido de arrefecimento (DDEC)	Alhaisen jäähdytysnestemäärän kytkin (DDEC)
S18	Διακόπτης χαμηλής στάθμης ψυκτικού (PCM)	Interruptor do nível baixo do líquido de arrefecimento (PCM)	Alhaisen jäähdytysnestemäärän kytkin (PCM)
S19	Απομονωτήρας μπαταρίας	Isolador da bateria	Akun eristin
X4-14	Ακροδέκτες	Terminais	Liittimet
X20	Κύρια μονάδα DDEC	DDEC master	DDEC-pääohjain
X21	Δευτερεύουσα μονάδα DDEC	Receptor DDEC	DDEC-vastaanotin
X50	40-πολικός σύνδεσμος 1	Ligação 1 em 40 polos	40-napainen liitin 1
X51	40-πολικός σύνδεσμος 2	Ligação 2 em 40 polos	40-napainen liitin 2
X52	Συνδεσμος EIH DDEC	Ligação EIH DDEC	Kaapeliliitin EIH DDEC

CIRCUIT DIAGRAM
ELEKTRISCH SCHEMA
SCHEMA DE CIRCUIT
VERDRAHTUNGSPLAN
DIAGRAMA DE CIRCUITOS
KOPPLINGSSCHEMA

DIAGRAMMA DEL CIRCUITO
KRETSSKJEMA
STRØMDIAGRAM
ΔΙΑΓΡΑΜΜΑ ΚΥΚλΩΜΑΤΟΣ
DIAGRAMMA DOS CIRCUÍTOS
SÄHKÖKAAVIO