Instruction Manual
for AC Generators

QAS 60-80-100 Pd

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Atlas Copco

ATLAS COPCO - PORTABLE AIR DIVISION
www.atlascopco.com

Warranty and Liability Limitation

Use only authorized parts.
Any damage or malfunction caused by the use of unauthorized parts is not covered by Warranty or Product Liability.
The manufacturer does not accept any liability for any damage arising for modifications, additions or conversions made without the manufacturer's approval in writing.

Congratulations on the purchase of your AC generator. It is a solid, safe and reliable machine, built according to the latest technology. Follow the instructions in this booklet and we guarantee you years of 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, coolant 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 tyres are in good condition and inflated correctly,
- connect the signalisation cable, check all lights and connect the pneumatic brake couplers,
- attach the safety break-away cable or safety chain to the towing vehicle,
- remove wheel chocks, if applied, and disengage the parking brake.

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

3 If 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 coolant 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

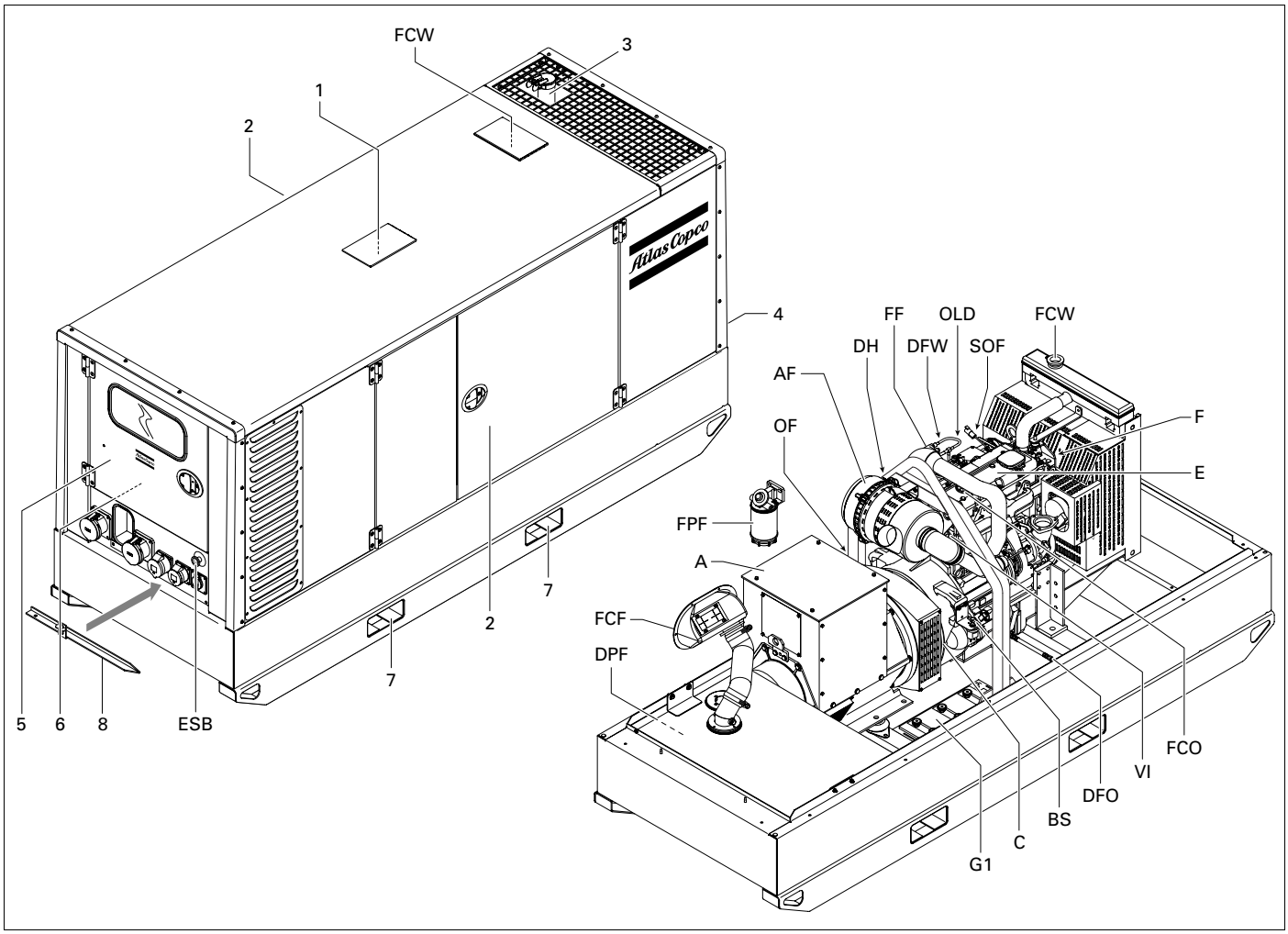
2.1 General description QAS 60 Pd

The QAS 60 Pd is an AC generator, built for continuous running at sites where no electricity is available or as stand-by in cases of interruption of the mains.

The generator operates at 50 Hz/60 Hz, 230/240 V in line-to-neutral mode and 400/480 V in line-to-line mode.

The QAS 60 Pd generator is driven by a water-cooled diesel engine, manufactured by PERKINS.

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



1	Acces to lifting eye
2	Side doors
3	Engine exhaust
4	Data Plate
5	Door, access to control and indicator panel
6	Output terminal board
7	Hole for forklift
8	Earthing rod (Not available in combination with an IT-relay)
A	Alternator
AF	Air filter
BS	Battery switch
C	Coupling
DFO	Drain flexible engine oil
DFW	Drain flexible coolant
DH	Drain and access hole (in the frame)
DPF	Drain plug fuel
E	Engine
ESB	Emergency stop button
F	Fan
FCF	Filler cap fuel
FCO	Filler cap engine oil
FCW	Filler cap coolant
FF	Fuel filter
FPF	Fuel pre-filter
G1	Battery
OF	Oil filter
OLD	Engine oil level dipstick
SOF	Side oilfiller
VI	Vacuum indicator

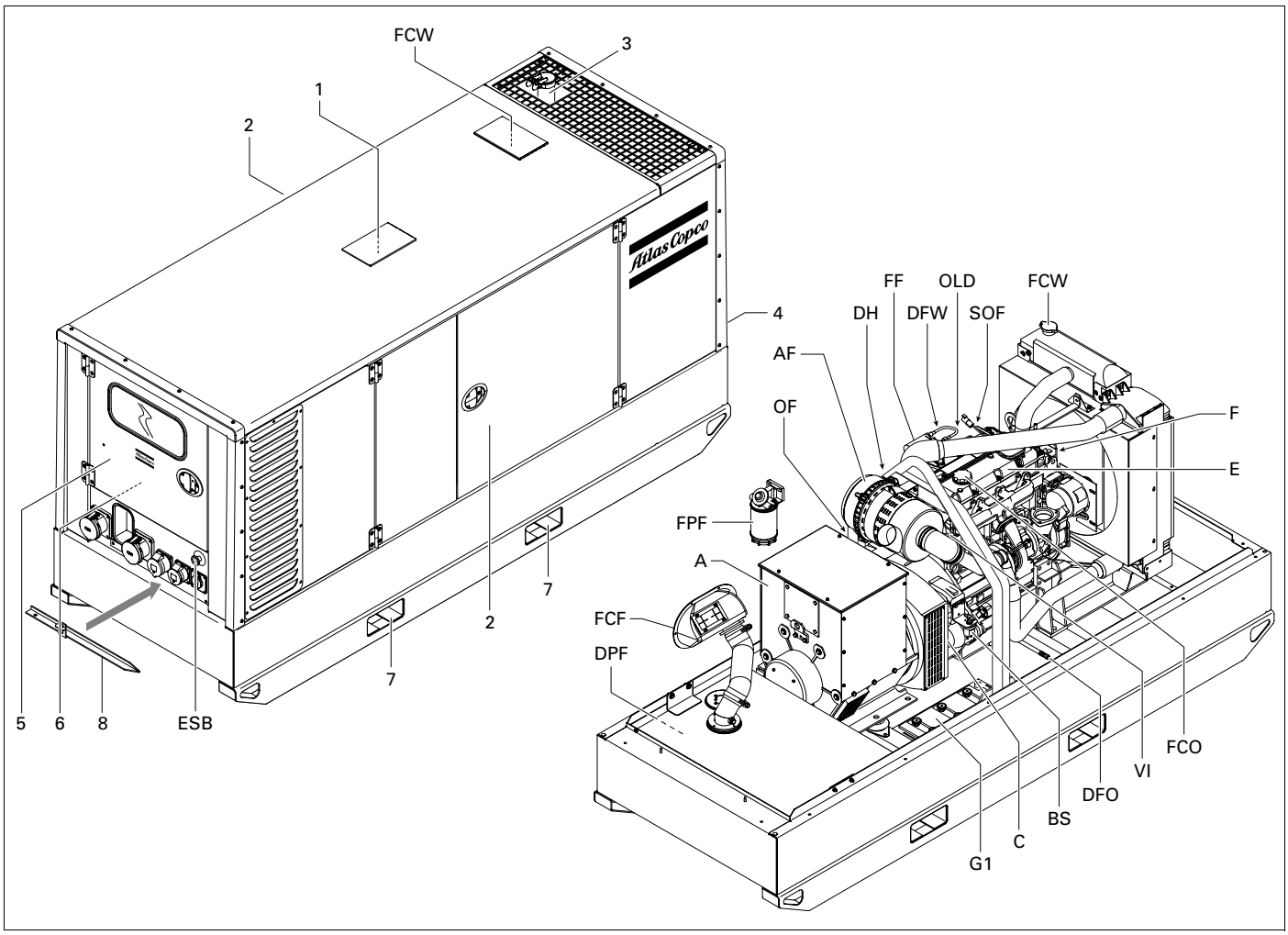
2.2 General description QAS 80 Pd and QAS 100 Pd

The QAS 80 Pd and QAS 100 Pd are AC generators, built for continuous running at sites where no electricity is available or as stand-by in cases of interruption of the mains.

The generator operates at 50/60 Hz, 230/240 V in line-to-neutral mode and 400/480 V in line-to-line mode.

The QAS 80 Pd and QAS 100 Pd generators are driven by a water-cooled diesel engine, manufactured by PERKINS.

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



1	Acces to lifting eye
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FF	Fuel filter
FPF	Fuel pre-filter
G1	Battery
OF	Oil filter
OLD	Engine oil level dipstick
SOF	Side oilfiller
VI	Vacuum indicator

2.3 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).

To be able to lift the generator by means of a crane, open the door in the middle of the roof to get access to the lifting beam.

To be able to lift the generator by means of a forklift, rectangular holes are provided in the frame.

The earthing rod, connected to the generator's earth terminal is located at the inside of the cubicle door.

2.4 Markings

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

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

Indicates the drain for the engine oil.

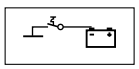
Indicates the drain for the coolant.

Indicates the drain plug for the engine fuel.

Use 15W40 oil only.

Indicates the different earthing connections on the generator.

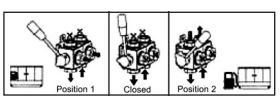
Indicates that the alternator should not be cleaned with high pressurised water.



Indicates the battery switch.

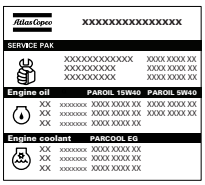
Indicates that the unit may start automatically and that the instruction book has to be consulted prior to use.

Read the instruction manual before using the lifting eye.



Indicates the 3-way valve.

Read the instruction manual before use.



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

2.5 Drain plugs and filler caps

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

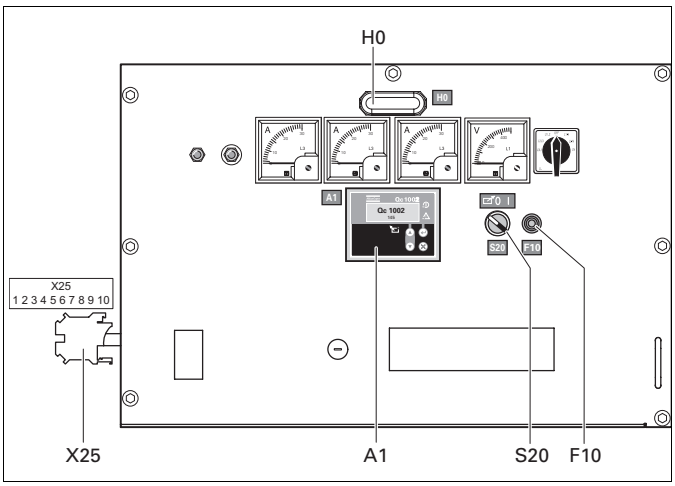
The drain flexible for engine oil can be brought to the outside of the generator through the drain hole.

The drain hole can also be used to guide external fuel tank connections. When connecting an external fueltank, use the 3-way valves. Refer to "External fueltank connection (with/without quick couplings)" on page 61.

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

2.6 Control and indicator panel Qc1002™

2.6.1 General description Qc1002™ control panel



A1.....Qc1002™ display

F10 ....Fuse

The fuse activates when the current from the battery to the engine control circuit exceeds its setting. The fuse can be reset by pushing the button.

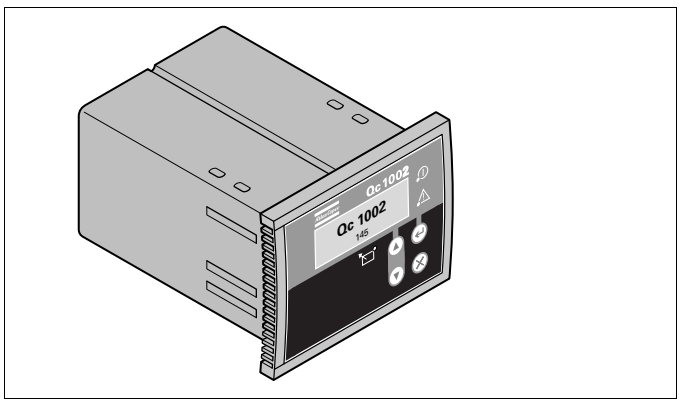
H0.....Panel light

S20....ON/OFF/REMOTE switch

To start up the unit (locally or remote).

X25....Terminal strip

2.6.2 Qc1002™ Module



The Qc1002™ module is located inside the control panel. This control module will carry out all necessary tasks to control and protect a generator, regardless of the use of the generator.

This means that the Qc1002™ module can be used for several applications.

2.6.3 Pushbutton and LED functions

Following pushbuttons are used on the Qc1002™

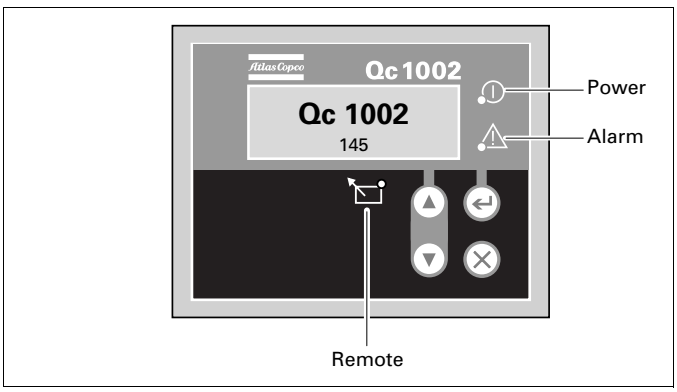
ENTER: Is used to select and confirm changed settings in the Parameter list.

UP: Is used to scroll through the display information and to adjust parameter value upwards.

DOWN: Is used to scroll through the display information and to adjust parameter value downwards.

BACK: Is used to leave/enter the Alarm pop-up window, to leave the Parameter list and to leave menu's without change.

Following LEDs are used on the Qc1002™



Power	Green LED indicates that the unit is powered up.
Remote	Green LED indicates that the Remote Mode is selected.
Alarm	Flashing red LED indicates that an alarm is present. A continuous red LED indicates that the alarm has been acknowledged by the user. The exact alarm is shown on the display.

2.6.4 Qc1002™ Menu Overview

At Qc1002™, the LCD will show following information:

– in **Normal** condition (scroll through the information using **UP** and **DOWN**):
  - Status (eg: preheat, crank, run, cooldown, extended stop time, …)
  - Controller type & version
  - Parameter list
  - Alarm list
  - LOG list
  - Service Timer 1 & Service Timer 2
  - Battery Voltage
  - Coolant temperature
  - Oil pressure
  - Fuel level
  - Voltage - frequency - running hours
– in **Alarm** condition (scroll through the information using **UP** and **DOWN**):
  - a list of all active Alarms

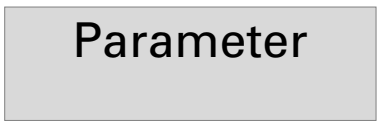
It's possible to scroll through the views, using the **UP** and **DOWN** buttons. The scrolling is continuous.

If a Special status comes up, the Status Display is shown.
If an Alarm comes up, the Alarm Display is shown.

Controller type and version display

This view shows the controller type and the ASW version number.

Parameter display



This view shows a number of Parameter settings and gives access to them.

An overview is given in “Parameter list” on page 16.

Alarm list display

This view shows the number of active alarms and gives access to them.

An overview is given in “Alarm Display (pop-up window)” on page 17.

LOG list display

This view shows the alarm memory and gives access to it.

An overview is given in “LOG list” on page 18.

Service timer 1 & Service timer 2 display

This view shows both Service timers. The service timer indication is shown when service time has run out. It can be removed by resetting the timers or acknowledging the Service timer indication.

The service timer indications count downwards and give an alarm when the set value 0 (zero) is reached.

Resetting the Service Timers can be done through the Parameter display.

Battery Voltage display

This view shows the Battery voltage and the running hours.

Coolant temperature display

This view shows the Coolant temperature and the running hours.

See also “Parameter list” on page 16 for selection between °C and °F.

Oil pressure display

This view shows the Oil pressure and the running hours.

See also “Parameter list” on page 16 for selection between bar and psi.

Fuel level display

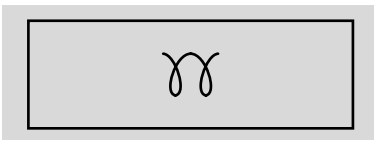
This view shows the Fuel level and the running hours.

Voltage - frequency - running hours display

This view shows the voltage, frequency and running hours.

2.6.5 Qc1002™ Menu Description

Status Display (pop-up window)

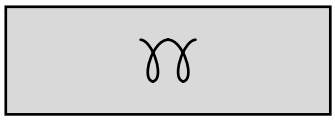


In case special statuses are entered, a pop-up window will automatically be entered for as long as the status is active.

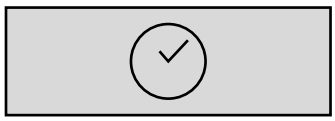
The background screen is not updated when the status pop-up window is active.

These special statuses are:

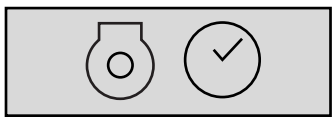
PREHEAT



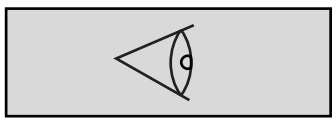
START OFF/
EXTENDED STOP
TIMER



COOLDOWN



DIAGNOSTIC



If a special status has elapsed, the default view will be entered again automatically.
If an Alarm comes up, the Alarm Display is shown.

Parameter list

The Parameter Menu's are pre-programmed!

A password will be asked for when an attempt to change a setting is about to be done (user password = 2003).

Menu's shown on the Parameter list LCD:

– Running hours adjust

  This menu is used to adjust the amount of running hours. The running hours can only be raised, not lowered.

– Unit Type

  Unit type 2 for QAS 60-80-100!

– Service Timer 2 reset

– Service Timer 1 reset

  These menus are used to reset the service timers. When a service timer alarm occurs and is acknowledged, the service timer will be reset automatically.

– Diagnostics Menu

  This menu is used to power up the engine electronics without starting the engine. When this setting is switched ‘on’, electric power will be supplied to the engine electronics after half a minute delay. The unit can not be started as long as this parameter is switched ‘on’.

– Unit Menu

  This menu is used to select whether tempreature and pressure should appear in °C/bar or °F/psi.

– Language selection

  Icons is the default factory set language, but 6 other languages can be selected: English, French, German, Italian, Spanish and Cyrillic (Russian). All information in the Parameter List display is always in English.

– Generator Underfrequency: failclass, enable, delay, setpoint

– Generator Overfrequency: failclass, enable, delay, setpoint

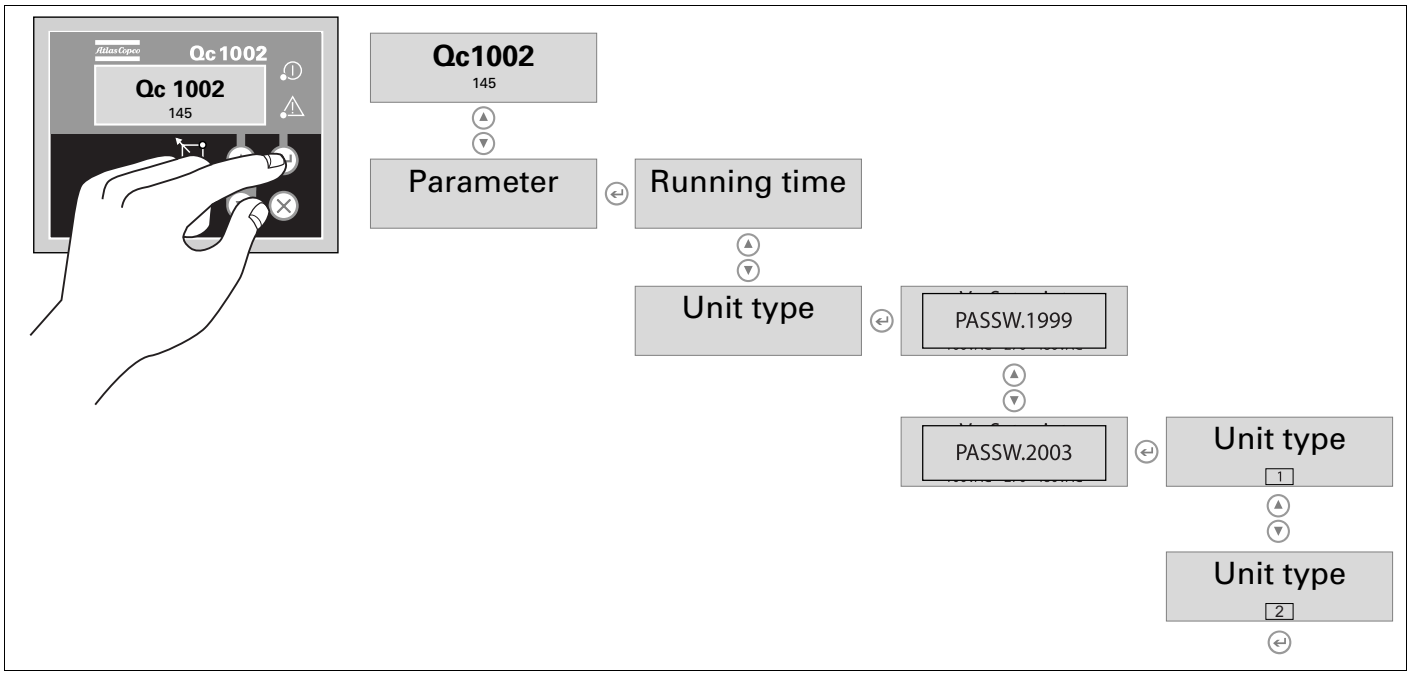
– Generator Undervoltage: failclass, enable, delay, setpoint

– Generator Overvoltage: failclass, enable, delay, setpoint

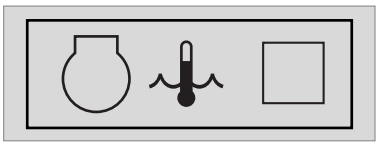
It's possible to scroll between configuration menu's by using the pushbuttons UP and DOWN.

Pushing the ENTER button activates the configuration menu which is shown at the display.

This is the described menu flow for changing the unit type:



Alarm Display (pop-up window)



In case an Alarm occurs, a pop-up window will automatically be displayed for as long as the alarm is active, no matter which view is active. The flashing red alarm LED will light up. The alarm icons will be shown together with an acknowledgement check-box. Push the ENTER button to acknowledge the alarm. When the alarm has been acknowledged, a V-marking will appear in the check-box and the red alarm LED will light up continuously.

An alarm should always be acknowledged before solving the problem that causes the alarm.

The Alarm Display can always be left or entered again by pushing the BACK button.

If more than one alarm comes up, it's possible to scroll through the alarm messages with the UP and DOWN pushbuttons. The newest alarm will be placed at the bottom of the list (meaning that the older alarm stays at the display when a newer alarm comes up).

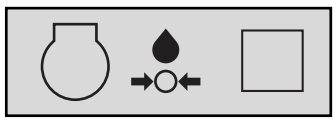
If one or more than one alarm is present, an arrow at the right of the display will be shown.

Following general groups of Alarms exist:

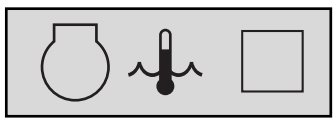
- Warning: Alarm LED lights up + Alarm pop-up appears on the display + Alarm relay is empowered (if configured)
- Trip of GB: 'Warning' actions + Generator Contactor opens
- Trip and Stop: 'Trip of GB' actions + unit stops after Cooldown
- Shutdown: 'Trip of GB' actions + unit stops immediately

List of possible alarms:

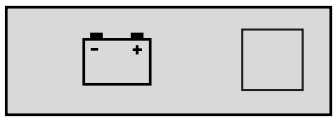
LOW OIL PRESSURE



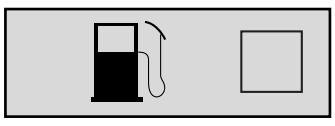
HIGH COOLANT TEMPERATURE



CHARGING ALTERNATOR

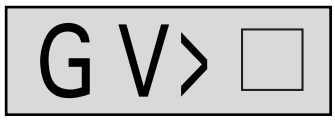


LOW FUEL LEVEL

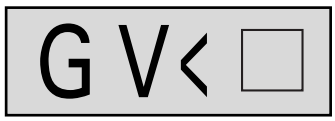


LOW COOLANT LEVEL

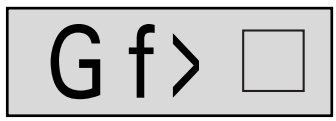
GENERATOR OVERVOLTAGE



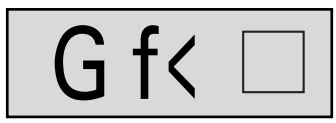
GENERATOR UNDERVOLTAGE



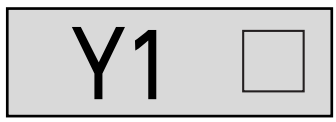
GENERATOR OVERFREQUENCY



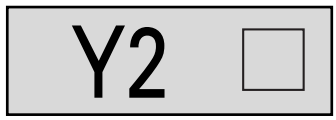
GENERATOR UNDERFREQUENCY



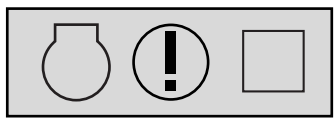
SERVICE TIMER 1



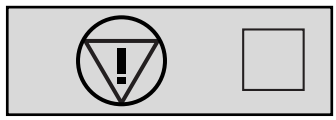
SERVICE TIMER 2



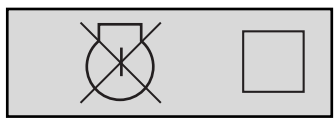
ENGINE ALARM



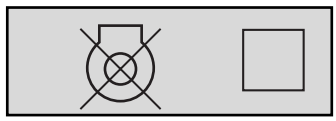
EMERGENCY STOP



START FAILURE



STOP FAILURE



LOG list

The unit will keep an event log of the latest 30 events.

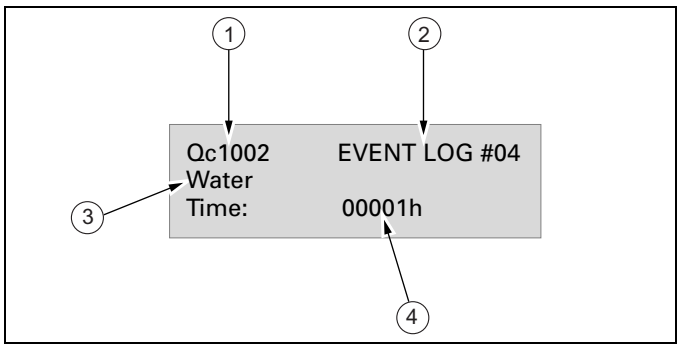
Events are:

– shutdowns

– service timer 1/2 reset

– unit type changes

Together with each event, the running hours at the time of the event will be stored.



1	Controller type	**3**	Event
2	Event number	**4**	Running hours

2.6.6 Remote start operation

Installation wirings:

– X25.1 & X25.2 to be wired for the remote start switch.

– X25.3 & X25.4 to be wired for the remote contactor (open/close).

2.6.7 Fail classes

All the activated alarms of the Qc1002™ have their own pre-defined fail class.

All alarms are enabled according to one of these three statuses:

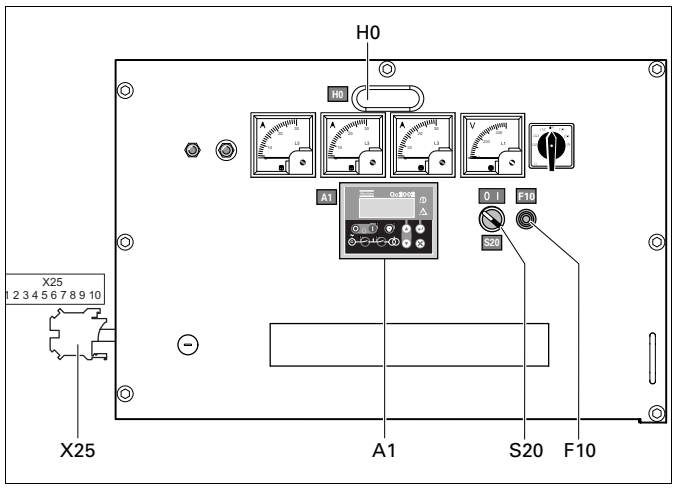
– disabled alarm, no supervision of alarm (OFF)

– enabled alarm, supervision of alarm all the time (ON)

– running alarm, only supervision when the machine is running (RUN)

2.7 Control and indicator panel Qc2002™

2.7.1 General description Qc2002™ control panel



A1..... Qc2002™ display

F10 .... Fuse

The fuse activates when the current from the battery to the engine control circuit exceeds its setting. The fuse can be reset by pushing the button.

H0..... Panel light

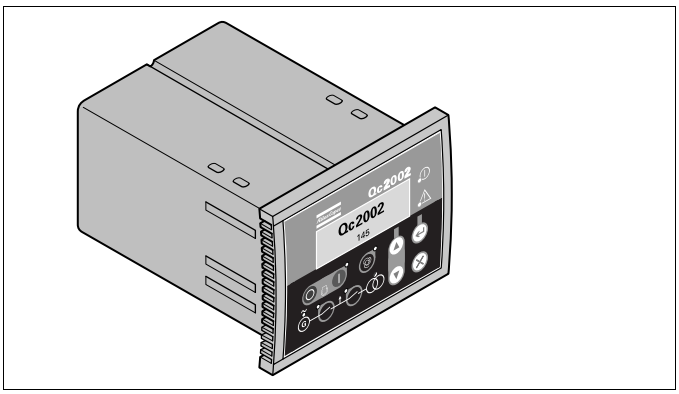
S20.... ON/OFF switch

Position O: No voltage is applied to the Qc2002™ module, the generator will not start.

Position I: Voltage is applied to the Qc2002™ module, it is possible to start up the generator.

X25.... Terminal strip

2.7.2 Qc2002™ Module



The Qc2002™ module is located inside the control panel. This control module will carry out all necessary tasks to control and protect a generator, regardless of the use of the generator.

This means that the Qc2002™ module can be used for several applications.

2.7.3 Pushbutton and LED functions

Following pushbuttons are used on the Qc2002™

ENTER: Is used to select and confirm changed settings in the Parameter list.

UP: Is used to scroll through the display information and to adjust parameter value upwards.

DOWN: Is used to scroll through the display information and to adjust parameter value downwards.

BACK: Is used to leave the Alarm pop-up window, to leave the Parameter list and to leave menu's without change.

AUTOMATIC: Is used to put the unit in Manual or Automatic Operation.

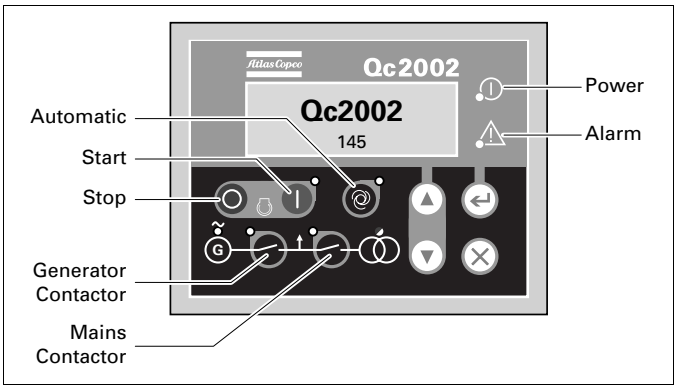
START: Is used to start the unit in Manual Operation.

STOP: Is used to stop the unit in Manual or Automatic Operation (without cooldown). When the unit is stopped with the STOP button in Automatic Operation, it will automatically go to Manual Operation.

MAINS CONTACTOR: Is used to open or close the Mains contactor, if the Qc2002™ is in Manual Operation.

GENERATOR CONTACTOR: Is used to open or close the Generator contactor, if the Qc2002™ is in Manual Operation

Following LEDs are used on the Qc2002™



Power	Green LED indicates that the unit is powered up.
Automatic	Green LED indicates that the Qc2002™ is in Automatic Operation.
Start/Stop	Green LED indicates that the Qc2002™ receives running feedback (via the W/L input, via the RPM value at the Canbus, or via the AC frequency).
Generator contactor	Green LED indicates that the voltage and the frequency of the alternator are within certain limits for a certain time. It will be possible to close the Generator Contactor (both in Island and in AMF mode), if the Mains contactor is open.
Mains contactor	Green LED indicates that it is possible to close the Mains Contactor (only in AMF mode), if the Generator contactor is open.
Alarm	Flashing red LED indicates that an alarm is present. A continuous red LED indicates that the alarm has been acknowledged by the user. The exact alarm is shown on the display.

2.7.4 Qc2002™ Menu Overview

At Qc2002™, the LCD will show following information:

– in **Normal** condition (scroll through the information using **UP** and **DOWN**):
  - Status (eg: preheat, crank, cooldown, extended stop time, …) (pop-up: this display is only shown when a Special status comes up)
  - Line voltages of the generator
  - Controller type & version
  - Parameter list
  - Alarm list
  - LOG list
  - Service Timer 1 & Service Timer 2
  - Battery Voltage
  - RPM (speed)
  - Coolant temperature
  - Oil pressure
  - Fuel level
  - kWh counter
  - Power factor, the frequency of the generator and the frequency of the mains
  - Line voltage, frequency and active power of the generator
  - Active, reactive and apparent power of the generator
  - Generator currents
  - Phase voltages of the mains
  - Line voltages of the mains
  - Phase voltages of the generator

– in **Alarm** condition (scroll through the information using **UP** and **DOWN**):
  - a list of all active Alarms

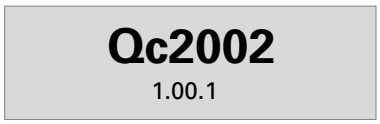
It's possible to scroll through the views, using the **UP** and **DOWN** buttons. The scrolling is continuous.

If a Special status comes up, the Status Display is shown.
If an Alarm comes up, the Alarm Display is shown.

Line voltages generator display

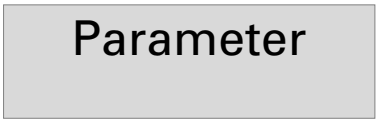
This view shows the line voltages of the generator.

Controller type and version display



This view shows the controller type and the ASW version number.

Parameter display



This view shows a number of Parameter settings and gives access to them.

An overview is given in “Parameter list” on page 23.

Alarm list display

This view shows the number of active alarms and gives access to them.

An overview is given in “Alarm Display (pop-up window)” on page 26.

LOG list display

This view shows the alarm memory and gives access to it.

An overview is given in “LOG list” on page 27.

Service timer 1 & Service timer 2 display

This view shows both Service timers. The service timer indication is shown when service time has run out. It can be removed by resetting the timers or acknowledging the Service timer indication.

The service timer indications count downwards and give an alarm when the set value 0 (zero) is reached.

Resetting the Service Timers can be done through the Parameter display.

Battery voltage display

This view shows the Battery voltage and the running hours.

RPM display

This view shows the Battery voltage and the running hours.

Coolant temperature display

This view shows the Coolant temperature and the running hours.

See also “Parameter list” on page 23 for selection between °C and °F.

Oil pressure display

This view shows the Oil pressure and the running hours.

See also “Parameter list” on page 23 for selection between bar and psi.

Fuel level display

This view shows the Fuel level and the running hours.

kWh counter display

This view shows the kWh counter.

Power factor - frequency generator - frequency mains display

This view shows the PF, the frequency of the generator and the frequency of the mains (M f L1: only in AMF mode).

One line voltage - frequency - active power display

This view shows one line voltage, frequency and active power of the generator.

Active - reactive - apparent power display

P	80kW
Q	0kVAr
S	80kVA

This view shows the active, reactive and apparent power of the generator.

Generator current display

G I1	100A
G I2	100A
G I3	100A

This view shows the generator current.

Phase voltages mains display

M L1-N	230V
M L2-N	230V
M L3-N	230V

This view shows the phase voltages of the mains (is only shown in AMF mode).

Line voltages mains display

M L1-L2	400V
M L2-L3	400V
M L3-L1	400V

This view shows the line voltages of the mains (is only shown in AMF mode).

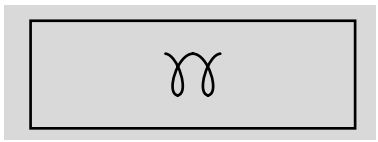
Phase voltages generator display

G L1-N	230V
G L2-N	230V
G L3-N	230V

This view shows the phase voltages of the generator.

2.7.5 Qc2002™ Menu Description

Status Display (pop-up window)

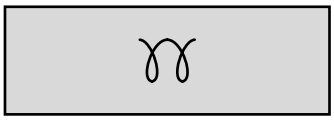


In case special statuses are entered, a pop-up window will automatically be entered for as long as the status is active.

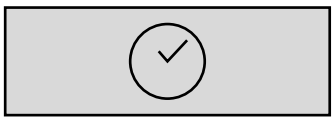
The background screen is not updated when the status pop-up window is active.

These special statuses are:

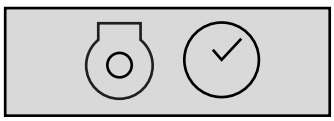
PREHEAT



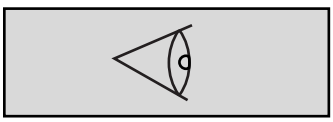
START OFF/
EXTENDED STOP
TIMER



COOLDOWN



DIAGNOSTIC



If a special status has elapsed, the active view will be entered again automatically.
If an Alarm comes up, the Alarm Display is shown.

Parameter list

The Parameter Menu's are pre-programmed!

A password will be asked for when an attempt to change a setting is about to be done (user password = 2003).

By entering the parameter list, pushbutton AUTOMATIC is disposed of its normal operations and will not perform any functionality.

It's possible to scroll between configuration menu's by using the pushbuttons UP and DOWN.

Pushing the ENTER button activates the configuration menu which is shown at the display.

Menu's shown on the Parameter list LCD:

Genset mode

This menu is used to change the mode of the machine. In the Qc2002™ module 2 application modes can be selected:

Island operation

– This operation type is selected for local/remote start applications, without the Mains (= stand-alone).
  - Combined with Manual Operation mode = Local Start operation.

    The sequences start / stop / close Generator Contactor / open Generator Contactor can be activated manually.
  - Combined with Automatic Operation mode = Remote Start operation.

– The remote start signal can be given with an external switch. After the generator has been started, the Generator Contactor will close automatically.

– Installation wirings for Remote Start operation: wire the RS switch between X25.9 & X25.10.

Automatic Mains Failure (AMF) operation

– This application is only possible in combination with the Auto mode. If the Manual Operation mode is selected the AMF operation will NOT function!

– When the Mains exceeds the defined voltage / frequency limits for a defined delay time, the generator will take over the load automatically.

– When the mains is restored within the defined limits for a defined time, the generator will unload before disconnecting and switching back to the Mains.

– The generator will then go into cooldown and stop.

– Installation wirings: we refer to circuit diagram 9822 0992 39/01 for the correct connections

Horn delay

This menu is used to set the delay, how long the general alarm relay stays energized (if present). If set to 0.0s, the general alarm relay will stay energized continuously.

Running hours adjust

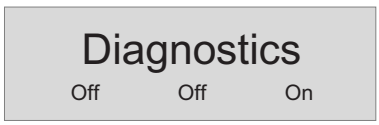
This menu is used to adjust the amount of running hours. The running hours can only be raised, not lowered.

Service timer 2 reset

Service timer 1 reset

These menus are used to reset the service timers. When a service timer alarm occurs and is acknowledged, the service timer will be reset automatically.

Diagnostics menu



This menu is used to power up the engine electronics without starting the engine. When this setting is switched ‘on’, electric power will be supplied to the engine electronics after half a minute delay. The unit can not be started as long as this parameter is switched ‘on’.

Unit menu

This menu is used to select the units into which pressures and temperatures will be shown.

Language selection

Icons is the default factory set language, but 6 other languages can be selected: English, French, German, Italian, Spanish and Cyrillic (Russian). All information in the Parameter List display is always in English.

MF high frequency

This menu is used to set the maximum limit for the mains frequency, in % of the nominal frequency (in AMF-Auto).

MF low frequency

This menu is used to set the minimum limit for the mains frequency, in % of the nominal frequency (in AMF-Auto).

M frequency delay

This menu is used to set the delay, which defines how long the mains frequency has to be back within the limits before there will be switched from generator to mains again (in AMF-Auto). During this delay, the Mains LED flashes in green.

MF frequency delay

This menu is used to set the delay, which defines how long the mains frequency may be above the max limit or below the min limit before there will be switched from mains to generator (in AMF-Auto). During this delay, the Mains LED flashes in red.

MF high voltage

This menu is used to set the maximum limit for the mains voltage, in % of the nominal voltage (in AMF-Auto).

MF low voltage

This menu is used to set the minimum limit for the mains voltage, in % of the nominal voltage (in AMF-Auto).

M voltage delay

This menu is used to set the delay,, which defines how long the mains voltage has to be back within the limits before there will be switched from generator to mains again (in AMF-Auto). During this delay, the Mains LED flashes in green.

MF voltage delay

This menu is used to set the delay, which defines how long the mains voltage may be above the max limit or below the min limit before there will be switched from mains to generator (in AMF-Auto). During this delay, the Mains LED flashes in red

Overvoltage enable

Overvoltage failclass

Overvoltage delay

Overvoltage setpoint

Undervoltage enable

Undervoltage failclass

Undervoltage delay

Undervoltage setpoint

Overfrequency enable

Overfrequency failclass

Overfrequency delay

Overfrequency setpoint

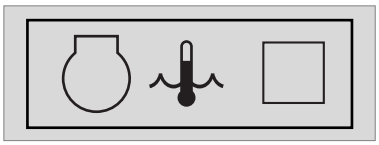
Underfrequency enable

Underfrequency failclass

Underfrequency delay

Underfrequency setpoint

Alarm Display (pop-up window)



In case an Alarm occurs, a pop-up window will automatically be displayed for as long as the alarm is active, no matter which view is active. The flashing red alarm LED will light up. The alarm icons will be shown together with an acknowledgement check-box. Push the ENTER button to acknowledge the alarm. When the alarm has been acknowledged, a V-marking will appear in the check-box and the red alarm LED will light up continuously.

An alarm should always be acknowledged before solving the problem that causes the alarm.

The Alarm Display can always be left by pushing the BACK button.

If more than one alarm comes up, it's possible to scroll through the alarm messages with the UP and DOWN pushbuttons. The newest alarm will be placed at the bottom of the list (meaning that the older alarm stays at the display when a newer alarm comes up).

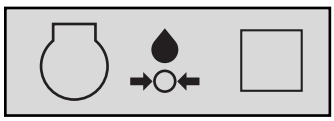
If one or more than one alarm is present, an arrow at the right of the display will be shown.

Following general groups of Alarms exist:

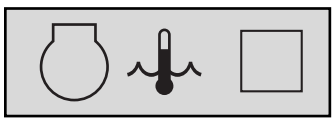
- Warning: Alarm LED lights up + Alarm pop-up appears on the display + Alarm relay is empowered (if configured)
- Trip of GB: 'Warning' actions + Generator Contactor opens
- Trip and Stop: 'Trip of GB' actions + unit stops after Cooldown
- Shutdown: 'Trip of GB' actions + unit stops immediately

List of possible alarms:

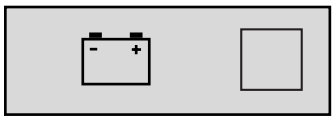
LOW OIL PRESSURE



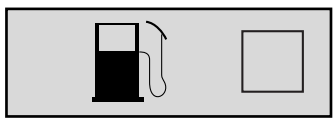
HIGH COOLANT TEMPERATURE



CHARGING ALTERNATOR

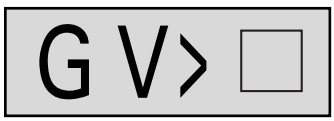


LOW FUEL LEVEL

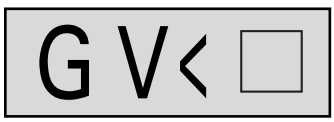


LOW COOLANT LEVEL

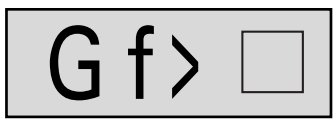
GENERATOR OVERVOLTAGE



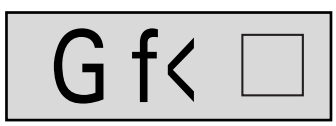
GENERATOR UNDERVOLTAGE



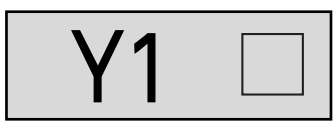
GENERATOR OVERFREQUENCY



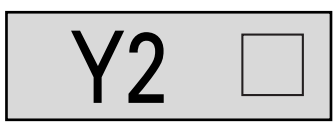
GENERATOR UNDERFREQUENCY



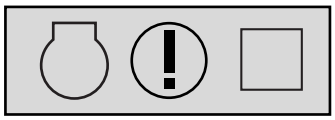
SERVICE TIMER 1



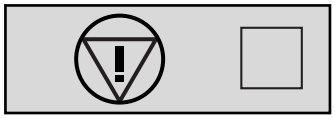
SERVICE TIMER 2



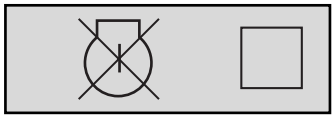
ENGINE ALARM



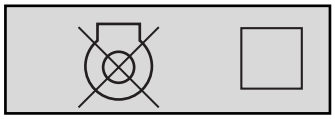
EMERGENCY STOP



START FAILURE



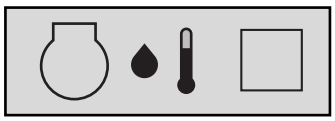
STOP FAILURE



HZ/V FAILURE

OIL LEVEL

OIL TEMPERATURE



LOG list

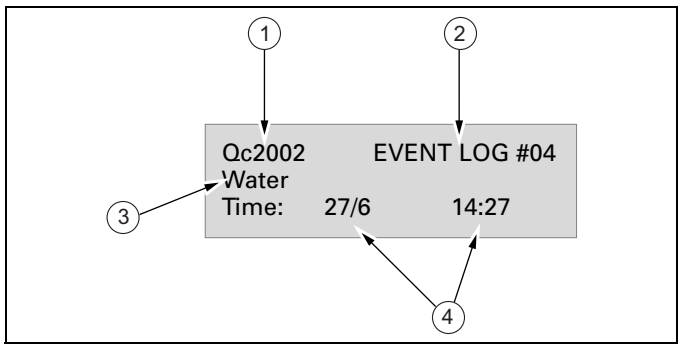
The unit will keep an event log of the latest 30 events.

Events are:

– shutdowns

– service timer 1/2 reset

Together with each event, the real time of the event will be stored.



1	Controller type	**3**	Event
2	Event number	**4**	Date and hour of the event

2.7.6 Fail classes

All the activated alarms of the Qc2002™ have their own pre-defined fail class.

All alarms are enabled according to one of these three statuses:

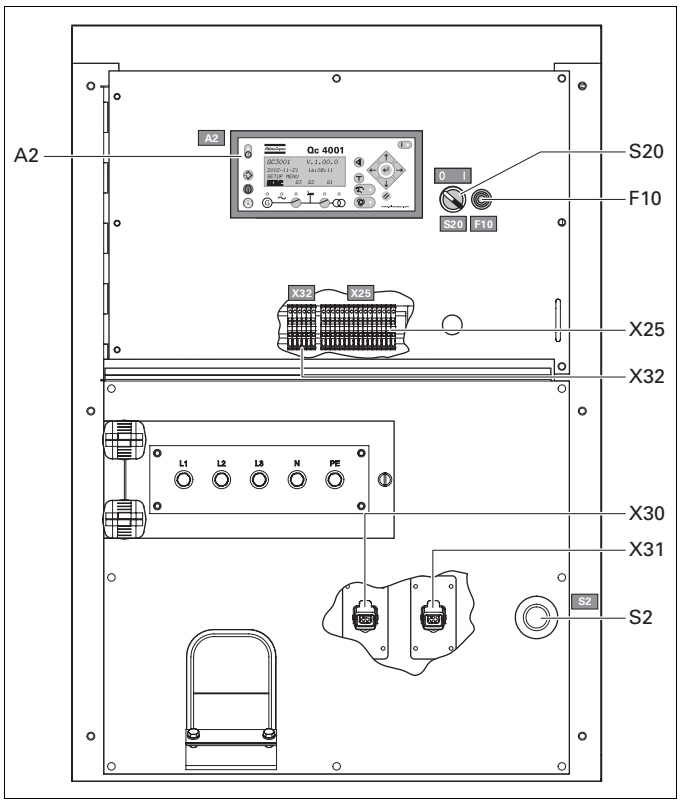
– disabled alarm, no supervision of alarm (OFF)

– enabled alarm, supervision of alarm all the time (ON)

– running alarm, only supervision when the machine is running (RUN)

2.8 Control and indicator panel Qc4001™

2.8.1 General description Qc4001™ control panel



A2..... Qc4001™ display

F10 .... Fuse

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

S2..... Emergency stop button

Push the button to stop the generator in case of an emergency. When the button is pressed, it must be unlocked, before the generator can be restarted. The emergency stop button can be secured in the locked position with the key, to avoid unauthorized use.

S20.... ON/OFF switch

Position O: No voltage is applied to the Qc4001™ module, the generator will not start.

Position I: Voltage is applied to the Qc4001™ module, it is possible to start up the generator.

X25.... Connection block

Inside the cubicle. Allows customer connections.

Refer to circuit diagram for the correct connection.

X30.... Connector X30

Connector for communication with other generators with Qc4001™ when paralleling.

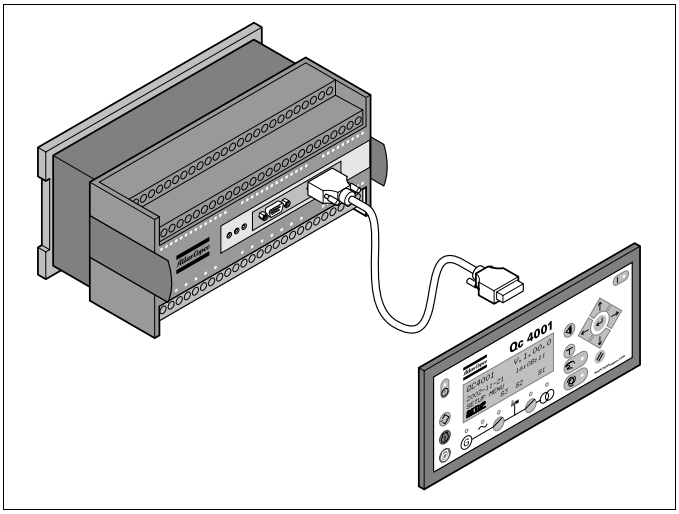
X31.... Connector X31

Connector for communication with other generators with Qc4001™ when paralleling.

X32.... PMS interface terminals

Connections for PMS communication cable.

2.8.2 Qc4001™ Module



The Qc4001™ module is located inside the control panel, and communicates with a display unit, located in front of the control panel. This control module will carry out all necessary tasks to control and protect a generator, regardless of the use of the generator.

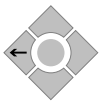
This means that the Qc4001™ module can be used for several applications.

2.8.3 Pushbutton and LED functions

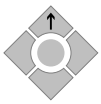
Following pushbuttons are used on the Qc4001™

ALARM: Shows the active alarm list (up to 30 alarms can be listed).

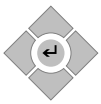
JUMP: Each programmable parameter has a channel number in the menu. Instead of navigating through the entire menu, the user can jump directly to the required parameter, if he knows the channel number of that specific parameter.E.g. if the user wants to change language, he can jump directly to channel 4240.



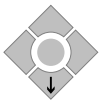
LEFT: Moves the cursor left for scrolling in the menus.



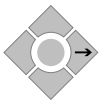
UP: Increases the value of the selected set-point (in the setting menus). Allows the user to scroll upwards (in the daily use display).



SELECT: Is used to select the chosen function. A function can be chosen by the cursor.



DOWN: Decreases the value of the selected set-point (in the setting menus). Allows the user to scroll downwards (in the daily use display).

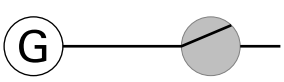


RIGHT: Moves the cursor right for scrolling in the menus.

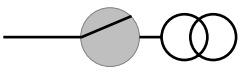
BACK: Jumps one step backwards in the menu (until the daily use display is reached).

START: Manual Start of the generator (only enabled if the SEMI-AUTO mode is selected).

STOP: Manual Stop of the generator (only enabled if the SEMI-AUTO mode is selected).



GB (Generator Breaker GB) ON: Manual activation of close breaker and open breaker sequence (only enabled if the SEMI-AUTO mode is selected).



MB (Mains Breaker MB) ON: Manual activation of close breaker and open breaker sequence (only enabled if the SEMI-AUTO mode is selected.

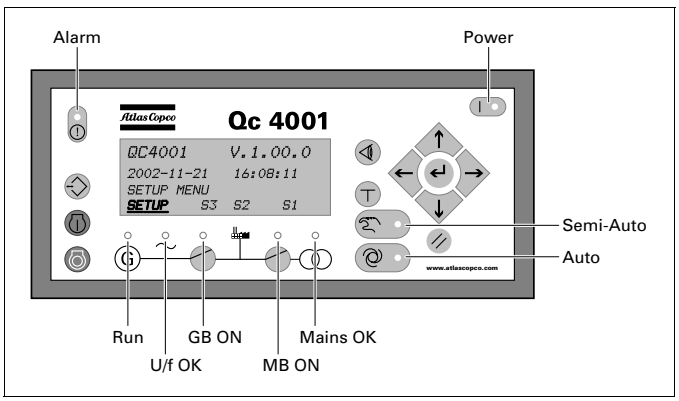
AUTO: Allows the user to set the generator in AUTO mode.

SEMI-AUTO: Allows the user to set the generator in SEMI-AUTO mode.

TEST: Allows the user to set the generator in TEST mode. To enter the TEST mode, a password needs to be entered.

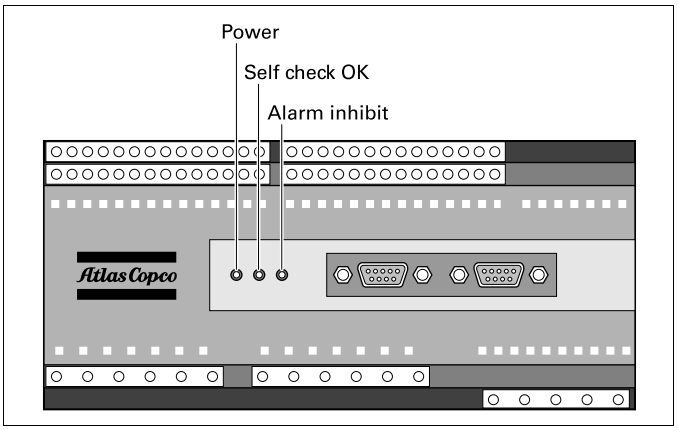
VIEW LOG: Shows the latest event. The user can scroll through the event & historical alarm list with the scroll buttons (up to 150 events & historical alarms can be listed).

Following LEDs are used on the Qc4001™



Alarm	Red LED flashing indicates that unacknowledged alarms are present.
	Red LED fixed indicates that ALL alarms are acknowledged.
Power	Green LED indicates that the voltage supply is switched on.
Run	Green LED indicates that the generator is running.
U/f OK	Green LED indicates that voltage/frequency is present and stable.
GB ON	Green LED indicates that the generator breaker is closed.
MB ON	Green LED indicates that the mains breaker is closed.
Mains OK	LED is green if the Mains is present and stable.
	LED is red when the Mains is not present.
	LED is flashing green when the Mains is present but not stable yet (during the "Mains OK" delay time).
Auto	Green LED indicates that AUTO mode is selected.
Semi-Auto	Green LED indicates that SEMI-AUTO mode is selected.

The main Qc4001™ control unit includes 3 LEDs



Power	Green LED indicates that the voltage supply is switched on.
Self check OK	Green LED indicates that the unit is OK.
Alarm inhibit	Green LED indicates that the inhibit input is ON.

2.8.4 Qc4001™ Menu Overview

Main View

The display has 4 different lines. The information on these lines can change, depending on which view is used. There are 4 different main views possible: SETUP / S3 / S2 / S1.

Setup view:

```
QC4001      V.1.00.0
2002-11-21   16:08:11
SETUP MENU
SETUP    S3  S2   S1
```

S3 view:

```
Island          SEMI
G   0,001  PF     0kW
G          0kVA   0 kvar
SETUP    S3  S2   S1
```

S2 view:

```
G          0     00A
G   0,001  PF     0kW
G          0kVA   0 kvar
SETUP    S3  S2   S1
```

S1 view:

```
     Run Time  0Hour
Fuel Level     100%
2002-11-21   16:08:11
SETUP    S3  S2   S1
```

The user can scroll through these views with the scroll buttons:

- The SETUP view shows the module name, the software version, the date and the time.
- The S3 view shows the application type and the mode, and some generator measurements. During synchronisation the S3 view will show a synchronoscope in the first line.
- The S2 view shows some generator measurements.
- In the S1 view the user can scroll up and down to 15 configurable screens showing different measurements of the generator, the bus and the Mains.

SETUP menu

The control and protection parameters can be programmed according the application. This can be done by scrolling through the setup menu to the appropriate parameter. Each parameter has a specific channel number and is listed in one of the 4 main SETUP menus:

- Protection Setup (PROT): Channels from 1010 to 1890 (steps of 10)
- Control Setup (CTRL): Channels from 2010 to 2210 (steps of 10)
- Power Setup (POWER): Channels from 3010 to 3250 (steps of 10)
- System Setup (SYST): Channels from 4010 to 4790 (steps of 10)

If you select SETUP then you get the following view:

```
G    0,001   PF   0kW
I-L1                0A
PROTECTION SETUP
PROT  CTRL  POWER  SYST
```

The fourth line is the entry selection for the Menu system. If the SELECT button is pressed, the menu indicated with an underscore will be entered.

If PROT is selected, the following view will appear (example of parameter):

```
G    0,001   PF   0kW
 1210 Gen high-volt 1
 Set point        105,00%
LIM  DEL 0A   0B  ACT FC
```

For a protective function the first entry shows the “Gen high-volt 1” setting.

Scrolling down will give all the protection parameters.

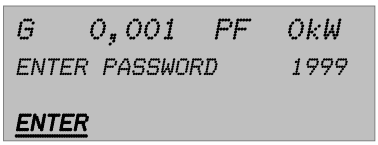
- The first line shows some generator data.
- The second line shows the channel number and the name of the parameter.
- The third line shows the value of a set point of this parameter.

– The fourth line shows the different possible set points. In this example:

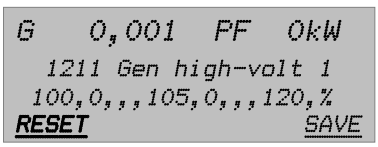
LIM	LIMIT, setting of switch point
DEL	DELAY, setting of time delay
OA	OUTPUT A, selection of which relay the function must activate
OB	OUTPUT B, selection of which relay the function must activate
ACT	ACTION, activate/de-activate the function
FC	FAIL CLASS, fail class setting.

The user can scroll to these choices and select one choice with the SELECT button.

After selection of LIM the following view will be visible:



If the correct password is entered, the following view appears:



Now the user can change the LIM of parameter “Gen high-volt 1”. This can be done with the scroll buttons. Then the user has to select SAVE to save the new settings.
To exit the user has to press the BACK button several times, until the main view appears.

The JUMP button

Instead of navigating through the entire menu, the user can jump directly to the required parameter, if he knows the channel number of that specific parameter.

If the JUMP button is pushed the password view will appear. Not all parameters can be changed by the end-user. The required password level for each parameter is given in the set point list.

The following menus can only be reached using the JUMP button:

– 4910 Service Timer 1

– 4920 Service Timer 2

– 4930 Diagnostics Menu

– 4940 Reset Eventlog

– 4950 Single/Split/Three phase

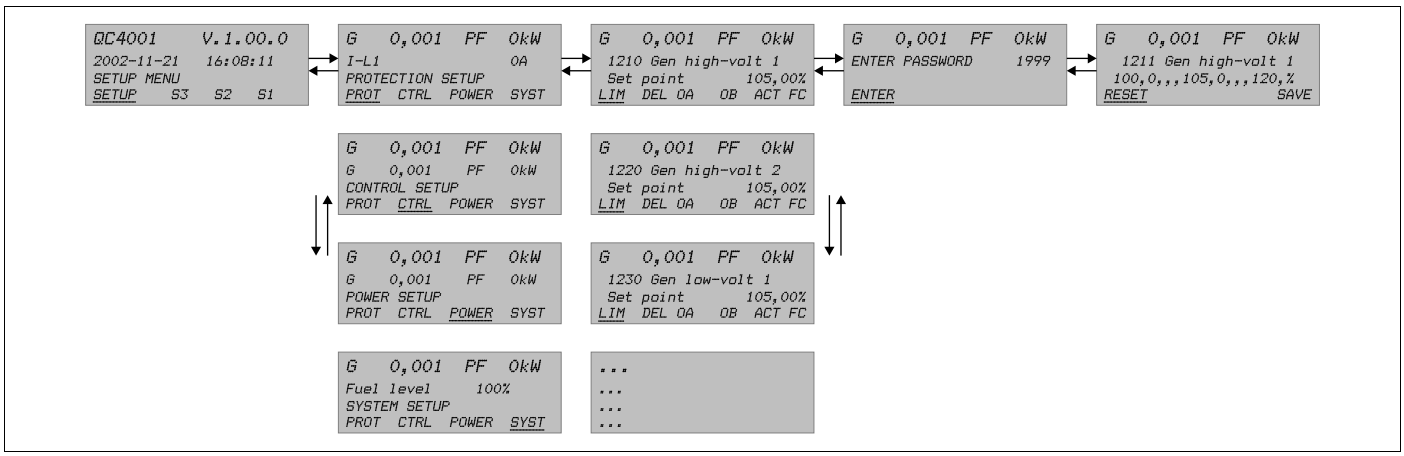
– 4971 User Password Change

  Level 2 and Level 3 passwords can only be set through the Atlas Copco Utility Software PC Software.

– 4980 Service Menu

Use the up and down buttons to change the settings and the SELECT button to store the new setting.

This is the described menu flow:



The menu flow is similar in the CONTROL SETUP, POWER SETUP and SYSTEM SETUP.

For more details on the Setup menu we refer to the Qc4001™ User manual.

Protection setup: overview of parameters *(for correct values refer to controller)*

1010	**Bus High Voltage 1**		***CUSTOMER LEVEL***	
1011	Setpoint	***103.0%***	*(100.0 ... 120.0)*
1012	Delay	***10.00s***	*(0.00 ... 99.99)*
1013	Output Relay A	***R0***	*(R0 ... R3)*
1014	Output Relay B	***R0***	*(R0 ... R3)*
1015	Enable	***OFF***	*(OFF / RUN / ON)*
1016	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1020	**Bus High Voltage 2**		***SERVICE LEVEL***	
1021	Setpoint	***108.0%***	*(100.0 ... 150.0)*
1022	Delay	***5.00s***	*(0.00 ... 99.99)*
1023	Output Relay A	***R0***	*(R0 ... R3)*
1024	Output Relay B	***R0***	*(R0 ... R3)*
1025	Enable	***OFF***	*(OFF / RUN / ON)*
1026	Fail Class	***Trip***	*(Warning / Trip / Trip+Stop / Shutdown)*

1030	**Bus Low Voltage 1**		***CUSTOMER LEVEL***	
1031	Setpoint	***97.0%***	*(80.0 ... 100.0)*
1032	Delay	***10.00s***	*(0.00 ... 99.99)*
1033	Output Relay A	***R0***	*(R0 ... R3)*
1034	Output Relay B	***R0***	*(R0 ... R3)*
1035	Enable	***OFF***	*(OFF / RUN / ON)*
1036	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1040	**Bus Low Voltage 2**		***SERVICE LEVEL***	
1041	Setpoint	***92.0%***	*(50.0 ... 100.0)*
1042	Delay	***5.00s***	*(0.00 ... 99.99)*
1043	Output Relay A	***R0***	*(R0 ... R3)*
1044	Output Relay B	***R0***	*(R0 ... R3)*
1045	Enable	***OFF***	*(OFF / RUN / ON)*
1046	Fail Class	***Trip***	*(Warning / Trip / Trip+Stop / Shutdown)*

1050	**Bus High Frequency 1**		***CUSTOMER LEVEL***	
1051	Setpoint	***103.0%***	*(100.0 ... 120.0)*
1052	Delay	***10.00s***	*(0.00 ... 99.99)*
1053	Output Relay A	***R0***	*(R0 ... R3)*
1054	Output Relay B	***R0***	*(R0 ... R3)*
1055	Enable	***OFF***	*(OFF / RUN / ON)*
1056	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1060	**Bus High Frequency 2**		***SERVICE LEVEL***	
1061	Setpoint	***105.0%***	*(100.0 ... 120.0)*
1062	Delay	***5.00s***	*(0.00 ... 99.99)*
1063	Output Relay A	***R0***	*(R0 ... R3)*
1064	Output Relay B	***R0***	*(R0 ... R3)*
1065	Enable	***OFF***	*(OFF / RUN / ON)*
1066	Fail Class	***Trip***	*(Warning / Trip / Trip+Stop / Shutdown)*

1070	**Bus Low Frequency 1**		***CUSTOMER LEVEL***	
1071	Setpoint	***97.0%***	*(80.0 ... 100.0)*
1072	Delay	***10.00s***	*(0.00 ... 99.99)*
1073	Output Relay A	***R0***	*(R0 ... R3)*
1074	Output Relay B	***R0***	*(R0 ... R3)*
1075	Enable	***OFF***	*(OFF / RUN / ON)*
1076	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1080	**Bus Low Frequency 2**		***SERVICE LEVEL***	
1081	Setpoint	***95.0%***	*(80.0 ... 100.0)*
1082	Delay	***5.00s***	*(0.00 ... 99.99)*
1083	Output Relay A	***R0***	*(R0 ... R3)*
1084	Output Relay B	***R0***	*(R0 ... R3)*
1085	Enable	***OFF***	*(OFF / RUN / ON)*
1086	Fail Class	***Trip***	*(Warning / Trip / Trip+Stop / Shutdown)*

1090	**Reverse Power**		***SERVICE LEVEL***	
1091	Setpoint	***-20.0%***	*(-50.0 ... 0.0)*
1092	Delay	***5.00s***	*(0.1 ... 100.0)*
1093	Output Relay A	***R0***	*(R0 ... R3)*
1094	Output Relay B	***R0***	*(R0 ... R3)*
1095	Enable	***ON***	*(OFF / RUN / ON)*
1096	Fail Class	***Trip + Stop***	*(Warning / Trip / Trip+Stop / Shutdown)*

1100	**Over Current 1**		***CUSTOMER LEVEL***	
1101	Setpoint	***110.0%***	*(50.0 ... 200.0)*
1102	Delay	***60.00s***	*(0.1 ... 100.0)*
1103	Output Relay A	***R0***	*(R0 ... R3)*
1104	Output Relay B	***R0***	*(R0 ... R3)*
1105	Enable	***ON***	*(OFF / RUN / ON)*
1106	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1110	**Over Current 2**		***SERVICE LEVEL***	
1111	Setpoint	***120.0%***	*(50.0 ... 200.0)*
1112	Delay	***30.00s***	*(0.1 ... 100.0)*
1113	Output Relay A	***R0***	*(R0 ... R3)*
1114	Output Relay B	***R0***	*(R0 ... R3)*
1115	Enable	***ON***	*(OFF / RUN / ON)*
1116	Fail Class	***Trip + Stop***	*(Warning / Trip / Trip+Stop / Shutdown)*

1120	**Over Load 1**		***CUSTOMER LEVEL***	
1121	Setpoint	***110.0%***	*(1.0 ... 200.0)*
1122	Delay	***60.00s***	*(0.1 ... 100.0)*
1123	Output Relay A	***R0***	*(R0 ... R3)*
1124	Output Relay B	***R0***	*(R0 ... R3)*
1125	Enable	***ON***	*(OFF / RUN / ON)*
1126	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1130	**Over Load 2**		***SERVICE LEVEL***	
1131	Setpoint	***120.0%***	*(1.0 ... 200.0)*
1132	Delay	***30.00s***	*(0.1 ... 100.0)*
1133	Output Relay A	***R0***	*(R0 ... R3)*
1134	Output Relay B	***R0***	*(R0 ... R3)*
1135	Enable	***ON***	*(OFF / RUN / ON)*
1136	Fail Class	***Trip + Stop***	*(Warning / Trip / Trip+Stop / Shutdown)*

1140	**Current Unbalance**		***SERVICE LEVEL***	
1141	Setpoint	***30.0%***	*(0.0 ... 100.0)*
1142	Delay	***10.00s***	*(0.1 ... 100.0)*
1143	Output Relay A	***R0***	*(R0 ... R3)*
1144	Output Relay B	***R0***	*(R0 ... R3)*
1145	Enable	***OFF***	*(OFF / RUN / ON)*
1146	Fail Class	***Trip + Stop***	*(Warning / Trip / Trip+Stop / Shutdown)*

1150	**Voltage Unbalance**		***SERVICE LEVEL***	
1151	Setpoint	***10.0%***	*(0.0 ... 50.0)*
1152	Delay	***10.00s***	*(0.1 ... 100.0)*
1153	Output Relay A	***R0***	*(R0 ... R3)*
1154	Output Relay B	***R0***	*(R0 ... R3)*
1155	Enable	***OFF***	*(OFF / RUN / ON)*
1156	Fail Class	***Trip + Stop***	*(Warning / Trip / Trip+Stop / Shutdown)*

1160	**var Import**		***SERVICE LEVEL***	
1161	Setpoint	***50.0%***	*(0.0 ... 150.0)*
1162	Delay	***10.00s***	*(0.1 ... 100.0)*
1163	Output Relay A	***R0***	*(R0 ... R3)*
1164	Output Relay B	***R0***	*(R0 ... R3)*
1165	Enable	***ON***	*(OFF / RUN / ON)*
1166	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1170	**var Export**		***SERVICE LEVEL***	
1171	Setpoint	***50.0%***	*(0.0 ... 100.0)*
1172	Delay	***10.00s***	*(0.1 ... 100.0)*
1173	Output Relay A	***R0***	*(R0 ... R3)*
1174	Output Relay B	***R0***	*(R0 ... R3)*
1175	Enable	***ON***	*(OFF / RUN / ON)*
1176	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1180	**Df/Dt (ROCOF)**		***SERVICE LEVEL***	
1181	Setpoint	***5.0Hz/s***	*(0.1 ... 10.0)*
1182	Delay	***6 periods***	*(1 ... 20)*
1183	Output Relay A	***R0***	*(R0 ... R3)*
1184	Output Relay B	***R0***	*(R0 ... R3)*
1185	Enable	***OFF***	*(OFF / ON)*

1190	**Vector Jump**		***SERVICE LEVEL***	
1191	Setpoint	***10.0 deg***	*(1.0 ... 90.0)*
1192	Output Relay A	***R0***	*(R0 ... R3)*
1193	Output Relay B	***R0***	*(R0 ... R3)*
1194	Enable	***OFF***	*(OFF / ON)*

1210	**Gen High Voltage 1**		***CUSTOMER LEVEL***	
1211	Setpoint	***110.0%***	*(100.0 ... 120.0)*
1212	Delay	***5.0s***	*(0.1 ... 100.0)*
1213	Output Relay A	***R0***	*(R0 ... R3)*
1214	Output Relay B	***R0***	*(R0 ... R3)*
1215	Enable	***ON***	*(OFF / RUN / ON)*
1216	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1220	**Gen High Voltage 2**		***MASTER LEVEL***	
1221	Setpoint	***120.0%***	*(100.0 ... 150.0)*
1222	Delay	***1.0s***	*(0.1 ... 100.0)*
1223	Output Relay A	***R0***	*(R0 ... R3)*
1224	Output Relay B	***R0***	*(R0 ... R3)*
1225	Enable	***ON***	*(OFF / RUN / ON)*
1226	Fail Class	***Shutdown***	*(Warning / Trip / Trip+Stop / Shutdown)*

1230	**Gen Low Voltage 1**		***CUSTOMER LEVEL***	
1231	Setpoint	***90.0%***	*(80.0 ... 100.0)*
1232	Delay	***10.0s***	*(0.1 ... 100.0)*
1233	Output Relay A	***R0***	*(R0 ... R3)*
1234	Output Relay B	***R0***	*(R0 ... R3)*
1235	Enable	***RUN***	*(OFF / RUN / ON)*
1236	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1240	**Gen Low Voltage 2**		***SERVICE LEVEL***	
1241	Setpoint	***80.0%***	*(50.0 ... 100.0)*
1242	Delay	***5.0s***	*(0.1 ... 100.0)*
1243	Output Relay A	***R0***	*(R0 ... R3)*
1244	Output Relay B	***R0***	*(R0 ... R3)*
1245	Enable	***RUN***	*(OFF / RUN / ON)*
1246	Fail Class	***Trip + Stop***	*(Warning / Trip / Trip+Stop / Shutdown)*

1250	**Gen High Frequency 1**		***CUSTOMER LEVEL***	
1251	Setpoint	***110.0%***	*(100.0 ... 120.0)*
1252	Delay	***5.0s***	*(0.2 ... 100.0)*
1253	Output Relay A	***R0***	*(R0 ... R3)*
1254	Output Relay B	***R0***	*(R0 ... R3)*
1255	Enable	***ON***	*(OFF / RUN / ON)*
1256	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1260	**Gen High Frequency 2**		***MASTER LEVEL***	
1261	Setpoint	***120.0%***	*(100.0 ... 120.0)*
1262	Delay	***1.0s***	*(0.2 ... 100.0)*
1263	Output Relay A	***R0***	*(R0 ... R3)*
1264	Output Relay B	***R0***	*(R0 ... R3)*
1265	Enable	***ON***	*(OFF / RUN / ON)*
1266	Fail Class	***Shutdown***	*(Warning / Trip / Trip+Stop / Shutdown)*

1270	**Gen Low Frequency 1**		***CUSTOMER LEVEL***	
1271	Setpoint	***90.0%***	*(80.0 ... 100.0)*
1272	Delay	***10.0s***	*(0.2 ... 100.0)*
1273	Output Relay A	***R0***	*(R0 ... R3)*
1274	Output Relay B	***R0***	*(R0 ... R3)*
1275	Enable	***RUN***	*(OFF / RUN / ON)*
1276	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1280 Gen Low Frequency 2 — *SERVICE LEVEL*

1281	Setpoint	***80.0%***	*(80.0 ... 100.0)*
1282	Delay	***5.0s***	*(0.2 ... 100.0)*
1283	Output Relay A	***R0***	*(R0 ... R3)*
1284	Output Relay B	***R0***	*(R0 ... R3)*
1285	Enable	***RUN***	*(OFF / RUN / ON)*
1286	Fail Class	***Trip + Stop***	*(Warning / Trip / Trip+Stop / Shutdown)*

1310 4...20mA Input 1.1 — *CUSTOMER LEVEL*

1311	Setpoint	***10.0mA***	*(0.0 ... 20.0)*
1312	Delay	***15.0s***	*(0.0 ... 600.0)*
1313	Output Relay A	***R0***	*(R0 ... R3)*
1314	Output Relay B	***R0***	*(R0 ... R3)*
1315	Enable	***OFF***	*(OFF / RUN / ON)*
1316	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Alarm Type	***High***	*(Low / High)*

High Alarm = Alarm when the actual value is higher than the setpoint.

1320 4...20mA Input 1.2 — *CUSTOMER LEVEL*

1321	Setpoint	***10.0mA***	*(0.0 ... 20.0)*
1322	Delay	***15.0s***	*(0.0 ... 600.0)*
1323	Output Relay A	***R0***	*(R0 ... R3)*
1324	Output Relay B	***R0***	*(R0 ... R3)*
1325	Enable	***OFF***	*(OFF / RUN / ON)*
1326	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Alarm Type	***High***	*(Low / High)*

High Alarm = Alarm when the actual value is higher than the setpoint.

1330 4...20mA Input 2.1 — *CUSTOMER LEVEL*

1331	Setpoint	***10.0mA***	*(0.0 ... 20.0)*
1332	Delay	***15.0s***	*(0.0 ... 600.0)*
1333	Output Relay A	***R0***	*(R0 ... R3)*
1334	Output Relay B	***R0***	*(R0 ... R3)*
1335	Enable	***OFF***	*(OFF / RUN / ON)*
1336	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Alarm Type	***High***	*(Low / High)*

High Alarm = Alarm when the actual value is higher than the setpoint.

1340 4...20mA Input 2.2 — *CUSTOMER LEVEL*

1341	Setpoint	***10.0mA***	*(0.0 ... 20.0)*
1342	Delay	***15.0s***	*(0.0 ... 600.0)*
1343	Output Relay A	***R0***	*(R0 ... R3)*
1344	Output Relay B	***R0***	*(R0 ... R3)*
1345	Enable	***OFF***	*(OFF / RUN / ON)*
1346	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Alarm Type	***High***	*(Low / High)*

High Alarm = Alarm when the actual value is higher than the setpoint.

1350 Oil Pressure — *SERVICE LEVEL*

1351	Setpoint	***4.0 bar***	*(0.0 ... 10.0)*
1352	Delay	***5.0s***	*(0.0 ... 100.0)*
1353	Output Relay A	***R0***	*(R0 ... R3)*
1354	Output Relay B	***R0***	*(R0 ... R3)*
1355	Enable	***OFF***	*(OFF / RUN / ON)*
1356	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Sensor Type	***0***	*(0 / 1 / 2 / 3)*

Sensor type: 0 = 0 - 5 bar (10 - 184 ohm) / 1 = 0 - 10 bar (10 - 184 ohm)
2 = Coolant Level Switch (threshold = 200 ohm) / 3 = Configurable 0 - 10 bar

1360 VDO 1.2 — *SERVICE LEVEL*

1361	Setpoint	***5.0 bar***	*(0.0 ... 10.0)*
1362	Delay	***5.0s***	*(0.0 ... 100.0)*
1363	Output Relay A	***R0***	*(R0 ... R3)*
1364	Output Relay B	***R0***	*(R0 ... R3)*
1365	Enable	***OFF***	*(OFF / RUN / ON)*
1366	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1370 High Coolant Temperature — *SERVICE LEVEL*

1371	Setpoint	***105 deg***	*(40 ... 150)*
1372	Delay	***3.0s***	*(0.0 ... 100.0)*
1373	Output Relay A	***R0***	*(R0 ... R3)*
1374	Output Relay B	***R0***	*(R0 ... R3)*
1375	Enable	***ON***	*(OFF / RUN / ON)*
1376	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Sensor Type	***0***	*(0 / 1 / 2 / 3 / 4)*

Sensor type: 0 = 40 - 120°C (291.5 - 22.4 ohm) / 1 = 40 - 150°C (480.7 - 18.2 ohm) / 2 = 40 - 120°C (69.3 - 7.4 ohm)
3 = Alternator Temperature PTC (threshold = 1700 ohm) / 4 = Configurable 40 - 110°C

1380 VDO 2.2 — *SERVICE LEVEL*

1381	Setpoint	***108 deg***	*(40 ... 150)*
1382	Delay	***5.0s***	*(0.0 ... 100.0)*
1383	Output Relay A	***R0***	*(R0 ... R3)*
1384	Output Relay B	***R0***	*(R0 ... R3)*
1385	Enable	***OFF***	*(OFF / RUN / ON)*
1386	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*

1390 Fuel Level 1 — *CUSTOMER LEVEL*

1391	Setpoint 1	***10.0%***	*(0 ... 100)*
1392	Delay	***10.0s***	*(0.0 ... 100.0)*
1393	Output Relay A	***R0***	*(R0 ... R3)*
1394	Output Relay B	***R0***	*(R0 ... R3)*
1395	Enable	***ON***	*(OFF / RUN / ON)*
1396	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Sensor Type	***1***	*(0 / 1 / 2)*

Sensor type: 0 = 0 - 100% (78,8 - 1,6 ohm) / 1 = 0 - 100% (10 - 180 ohm) / 2 = Configurable 0 - 100%

1400 Fuel Pump Logic — *CUSTOMER LEVEL*

1401	Setpoint 2	***20.0%***	*(0 ... 100)*
1402	Setpoint 3	***80.0%***	*(0 ... 100)*
1403	Pump Relay	***R4***	*(R4)*
1404	Enable	***OFF***	*(OFF / RUN / ON)*
1405	Fill Check Delay	***60.0s***	*(0.1 ... 300.0)*

1410 Fuel High Level — *CUSTOMER LEVEL*

1411	Setpoint 4	***98.0%***	*(0 ... 100)*
1412	Delay	***5.0s***	*(0.1 ... 300.0)*
1413	Output Relay A	***R0***	*(R0 ... R3)*
1414	Output Relay B	***R0***	*(R0 ... R3)*

1420 Overspeed — *MASTER LEVEL*

1421	Setpoint	***1980rpm***	*(1 ... 2250)*
1422	Delay	***3.0s***	*(0.2 ... 100.0)*
1423	Output Relay A	***R0***	*(R0 ... R3)*
1424	Output Relay B	***R0***	*(R0 ... R3)*
1425	Enable	***ON***	*(OFF / RUN / ON)*
1426	Fail Class	***Shutdown***	*(Warning / Trip / Trip+Stop / Shutdown)*

1430 Overspeed — *MASTER LEVEL*

1431	Overspeed S2	***1980rpm***	*(1 ... 2250)*
1432	Overspeed S3	***1980rpm***	*(1 ... 2250)*
1433	Overspeed S4	***1980rpm***	*(1 ... 2250)*

1440 Engine Failure — *SERVICE LEVEL*

1441	Delay	***1.0s***	*(0.0 ... 180.0)*
1442	Output Relay A	***R0***	*(R0 ... R3)*
1443	Output Relay B	***R0***	*(R0 ... R3)*
1444	Enable	***ON***	*(OFF / RUN / ON)*
1445	Fail Class	***Shutdown***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Type	***High***	*(Low / High)*

High Alarm = Alarm when the input closes.

1450 Emergency Stop — *MASTER LEVEL*

1451	Delay	***0.0s***	*(0.0 ... 60.0)*
1452	Output Relay A	***R0***	*(R0 ... R3)*
1453	Output Relay B	***R0***	*(R0 ... R3)*
1454	Enable	***ON***	*(OFF / RUN / ON)*
1455	Fail Class	***Shutdown***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Type	***High***	*(Low / High)*

High Alarm = Alarm when the input closes.

1460 Coolant Temperature 1 — *SERVICE LEVEL*

1461	Setpoint	***100 deg***	*(0 ... 150.0)*
1462	Delay	***3.0s***	*(0.0 ... 600.0)*
1463	Output Relay A	***R0***	*(R0 ... R3)*
1464	Output Relay B	***R0***	*(R0 ... R3)*
1465	Enable	***OFF***	*(OFF / RUN / ON)*
1466	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Alarm Type	***High***	*(Low / High)*

High Alarm = Alarm when the actual value is higher than the setpoint.

1470 Coolant Temperature 2 — *SERVICE LEVEL*

1471	Setpoint	***108 deg***	*(0 ... 150.0)*
1472	Delay	***3.0s***	*(0.0 ... 600.0)*
1473	Output Relay A	***R0***	*(R0 ... R3)*
1474	Output Relay B	***R0***	*(R0 ... R3)*
1475	Enable	***OFF***	*(OFF / RUN / ON)*
1476	Fail Class	***Shutdown***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Alarm Type	***High***	*(Low / High)*

High Alarm = Alarm when the actual value is higher than the setpoint.

1480 Oil Pressure — *SERVICE LEVEL*

1481	Setpoint	***3.0 bar***	*(0.0 ... 15.0)*
1482	Delay	***5.0s***	*(0.0 ... 600.0)*
1483	Output Relay A	***R0***	*(R0 ... R3)*
1484	Output Relay B	***R0***	*(R0 ... R3)*
1485	Enable	***OFF***	*(OFF / RUN / ON)*
1486	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
USW	Alarm Type	***Low***	*(Low / High)*

Low Alarm = Alarm when the actual value is lower than the setpoint.

1490 Fuel Level 2 — *CUSTOMER LEVEL*

1491	Setpoint	***5.0%***	*(0 ... 100)*
1492	Delay	***20.0s***	*(0.0 ... 100.0)*
1493	Output Relay A	***R0***	*(R0 ... R3)*
1494	Output Relay B	***R0***	*(R0 ... R3)*
1495	Enable	***ON***	*(OFF / RUN / ON)*
1496	Fail Class	***Trip + Stop***	*(Warning / Trip / Trip+Stop / Shutdown)*

1700 Low Oil Pressure — *SERVICE LEVEL*

1701	Delay	***3.0s***	*(0.0 ... 100.0)*
1702	Output Relay A	***R0***	*(R0 ... R4)*
1703	Output Relay B	***R0***	*(R0 ... R4)*
1704	Enable	***RUN***	*(OFF / RUN / ON)*
1705	Fail Class	***Shutdown***	*(Warning / Trip / Trip+Stop / Shutdown)*
1706	Type	***Low***	*(Low / High)*

Low Alarm = Alarm when the input opens.

1710 High Coolant Temperature — *SERVICE LEVEL*

1711	Delay	***3.0s***	*(0.0 ... 100.0)*
1712	Output Relay A	***R0***	*(R0 ... R4)*
1713	Output Relay B	***R0***	*(R0 ... R4)*
1714	Enable	***ON***	*(OFF / RUN / ON)*
1715	Fail Class	***Shutdown***	*(Warning / Trip / Trip+Stop / Shutdown)*
1716	Type	***Low***	*(Low / High)*

Low Alarm = Alarm when the input opens.

1720 Digital Input 23 — *CUSTOMER LEVEL*

1721	Delay	***10.0s***	*(0.0 ... 100.0)*
1722	Output Relay A	***R0***	*(R0 ... R4)*
1723	Output Relay B	***R0***	*(R0 ... R4)*
1724	Enable	***OFF***	*(OFF / RUN / ON)*
1725	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
1726	Type	***High***	*(Low / High)*

High Alarm = Alarm when the input closes.

1730 Digital Input 24 — *CUSTOMER LEVEL*

1731	Delay	***10.0s***	*(0.0 ... 100.0)*
1732	Output Relay A	***R0***	*(R0 ... R4)*
1733	Output Relay B	***R0***	*(R0 ... R4)*
1734	Enable	***OFF***	*(OFF / RUN / ON)*
1735	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
1736	Type	***High***	*(Low / High)*

High Alarm = Alarm when the input closes.

1740 Digital Input 25 — *CUSTOMER LEVEL*

1741	Delay	***10.0s***	*(0.0 ... 100.0)*
1742	Output Relay A	***R0***	*(R0 ... R4)*
1743	Output Relay B	***R0***	*(R0 ... R4)*
1744	Enable	***OFF***	*(OFF / RUN / ON)*
1745	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
1746	Type	***High***	*(Low / High)*

High Alarm = Alarm when the input closes.

1750 Digital Input 26 — *CUSTOMER LEVEL*

1751	Delay	***10.0s***	*(0.0 ... 100.0)*
1752	Output Relay A	***R0***	*(R0 ... R4)*
1753	Output Relay B	***R0***	*(R0 ... R4)*
1754	Enable	***OFF***	*(OFF / RUN / ON)*
1755	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
1756	Type	***High***	*(Low / High)*

High Alarm = Alarm when the input closes.

1760 Digital Input 27 — *CUSTOMER LEVEL*

1761	Delay	***10.0s***	*(0.0 ... 100.0)*
1762	Output Relay A	***R0***	*(R0 ... R4)*
1763	Output Relay B	***R0***	*(R0 ... R4)*
1764	Enable	***OFF***	*(OFF / RUN / ON)*
1765	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
1766	Type	***High***	*(Low / High)*

High Alarm = Alarm when the input closes.

1770 Digital Input 28 — *CUSTOMER LEVEL*

1771	Delay	***10.0s***	*(0.0 ... 100.0)*
1772	Output Relay A	***R0***	*(R0 ... R4)*
1773	Output Relay B	***R0***	*(R0 ... R4)*
1774	Enable	***OFF***	*(OFF / RUN / ON)*
1775	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
1776	Type	***High***	*(Low / High)*

High Alarm = Alarm when the input closes.

1780 Digital Input 29 — *CUSTOMER LEVEL*

1781	Delay	***10.0s***	*(0.0 ... 100.0)*
1782	Enable Output Relay	***R0***	*(R0 ... R4)*
1783	Disable Output Relay	***R0***	*(R0 ... R4)*
1784	Enable	***OFF***	*(OFF / RUN / ON)*
1785	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
1786	Type	***High***	*(Low / High)*

High Alarm = Alarm when the input closes.

1790 Digital Input 30 — *CUSTOMER LEVEL*

1791	Delay	***10.0s***	*(0.0 ... 100.0)*
1792	Enable Output Relay	***R0***	*(R0 ... R4)*
1793	Disable Output Relay	***R0***	*(R0 ... R4)*
1794	Enable	***OFF***	*(OFF / RUN / ON)*
1795	Fail Class	***Warning***	*(Warning / Trip / Trip+Stop / Shutdown)*
1796	Type	***High***	*(Low / High)*

High Alarm = Alarm when the input closes.

1860 Run Status — *SERVICE LEVEL*

1861	Delay	***5.0s***	*(0.0 ... 60.0)*
1862	Output Relay A	***R0***	*(R0 ... R3)*
1863	Output Relay B	***R0***	*(R0 ... R3)*
1864	Enable	***OFF***	*(OFF / ON)*

1870 W/L Input — *SERVICE LEVEL*

1871	Delay	***3.0s***	*(0.0 ... 100.0)*
1872	Output Relay A	***R0***	*(R0 ... R3)*
1873	Enable	***RUN***	*(OFF / RUN / ON)*
1874	Type	***Low***	*(Low / High)*

Low Alarm = Alarm when the input opens.

1880 Static Charger — *CUSTOMER LEVEL*

1881	Delay	***10.0s***	*(0.0 ... 100.0)*
1882	Output Relay A	***R0***	*(R0 ... R3)*
1883	Enable	***OFF***	*(OFF / ON)*
1884	Type	***High***	*(Low / High)*

High Alarm = Alarm when the input closes.

1890 MDEC Run Signal — *SERVICE LEVEL*

1891	Delay	***10.0s***	*(0.0 ... 100.0)*
1892	Output Relay A	***R0***	*(R0 ... R3)*
1893	Output Relay B	***R0***	*(R0 ... R3)*
1894	Enable	***OFF***	*(OFF / ON)*

Control setup: overview of parameters

2010 Synchronisation Type — *SERVICE LEVEL*

2011	Sync. Type	***Dynamic Sync.***	*(Dynamic Sync. / Static Sync.)*

2020 Dynamic Sync. — *SERVICE LEVEL*

2021	Df max.	***0.3Hz***	*(0.0 ... 0.5)*
2022	Df min.	***0.0Hz***	*(-0.5 ... 0.3)*
2023	DU max.	***5%***	*(2 ... 10)*
2024	Breaker Delay	***75ms***	*(40 ... 300)*

2030 Static Sync. — *SERVICE LEVEL*

2031	GB Close Time	***1.0s***	*(0.0 ... 100.0)*
2032	Close Window	***10.0 deg***	*(0.1 ... 20.0)*
2033	Phase Gain	***40***	*(0 ... 1000)*
2034	Frequency Gain	***40***	*(0 ... 1000)*

2050 f/U Limits — *SERVICE LEVEL*

2051	Df max.	***3.0Hz***	*(0.0 ... 5.0)*
2052	DU max.	***8%***	*(2 ... 10)*

2060 GB Synchr. Failure — *SERVICE LEVEL*

2061	Delay	***60.0s***	*(30.0 ... 300.0)*
2062	Output Relay A	***R0***	*(R0 ... R3)*
2063	Output Relay B	***R0***	*(R0 ... R3)*

2070 MB Synchr. Failure — *SERVICE LEVEL*

2071	Delay	***60.0s***	*(30.0 ... 300.0)*
2072	Output Relay A	***R0***	*(R0 ... R3)*
2073	Output Relay B	***R0***	*(R0 ... R3)*

2090 Frequency Control — *CUSTOMER LEVEL*

2091	Deadband	***0.2%***	*(0.2 ... 10.0)*
2092	Frequency KP	***15***	*(0 ... 1000)*
2093	Frequency KI	***120***	*(0 ... 1000)*

2100 Power Control — *CUSTOMER LEVEL*

2101	Deadband	***0.2%***	*(0.2 ... 10.0)*
2102	Power KP	***10***	*(0 ... 1000)*
2103	Power KI	***45***	*(0 ... 1000)*

2110 Power Ramp Up — *CUSTOMER LEVEL*

2111	Speed	***10%/s***	*(0.1 ... 20.0)*
2112	Delay Point	***10%***	*(1 ... 100)*
2113	Delay Time	***0.0s***	*(0.0 ... 180.0)*

2120 Power Ramp Down — *CUSTOMER LEVEL*

2121	Speed	***10%/s***	*(0.1 ... 20.0)*
2122	Breaker Open	***5%***	*(1 ... 20)*

2130 P/f Control Mix — *CUSTOMER LEVEL*

2131	Mix Factor	***50%***	*(0 ... 100)*
2132	PF Control KP	***250***	*(0 ... 1000)*
2133	PF Control KI	***160***	*(0 ... 1000)*

2140 Voltage Control — *CUSTOMER LEVEL*

2141	Deadband	***0.2%***	*(0.02 ... 10.0)*
2142	KP	***150***	*(0 ... 1000)*
2143	KI	***320***	*(0 ... 1000)*

2150 Var Control — *CUSTOMER LEVEL*

2151	Deadband	***0.2%***	*(0.0 ... 10.0)*
2152	KP	***25***	*(0 ... 1000)*
2153	KI	***80***	*(0 ... 1000)*

2160 Q/U Control Mix — *SERVICE LEVEL*

2161	Mix Factor	***50%***	*(0 ... 100)*

2170 PF Control — *CUSTOMER LEVEL*

2171	Deadband	***5***	*(0 ... 10)*

2180 Gov. Reg. Failure — *SERVICE LEVEL*

2181	Deadband	***30.0%***	*(1.0 ... 100.0)*
2182	Delay	***60.0s***	*(10 ... 300)*
2183	Output Relay A	***R0***	*(R0 ... R3)*
2184	Output Relay B	***R0***	*(R0 ... R3)*

2190 AVR Reg. Failure — *SERVICE LEVEL*

2191	Deadband	***30.0%***	*(1.0 ... 100.0)*
2192	Delay	***60.0s***	*(10 ... 300)*
2193	Output Relay A	***R0***	*(R0 ... R3)*
2194	Output Relay B	***R0***	*(R0 ... R3)*

2200 Breaker Type — *CUSTOMER LEVEL*

2201	GB Type	***Pulse***	*(Pulse / Continuous)*
2202	MB Type	***Pulse***	*(Pulse / Continuous)*

Pulse = 0 / Continuous = 1

2210 Static Sync. — *SERVICE LEVEL*

2211	Df max.	***0.1Hz***	*(0.0 ... 0.25)*
2212	DU max.	***5%***	*(2 ... 10)*
2213	Close Window	***10.0 deg***	*(0.1 ... 20.0)*
2214	KP	***80***	*(0 ... 1000)*
2215	KI	***80***	*(0 ... 1000)*
2216	Delay	***1.0s***	*(0.0 ... 5.0)*

Power setup: overview of parameters

3010	Mains Power	CUSTOMER LEVEL	
3011	Day	**5000kW**	(0 ... 20000)
3012	Night	**5000kW**	(0 ... 20000)
3013	Transducer Scale	**5000kW**	(0 ... 20000)

3020	Daytime Period	CUSTOMER LEVEL	
3021	Start Hour	**8**	(0 ... 23)
3022	Start Minute	**0**	(0 ... 59)
3023	Stop Hour	**16**	(0 ... 23)
3024	Stop Minute	**0**	(0 ... 59)

3030	Start Generator	CUSTOMER LEVEL	
3031	Setpoint	**80%**	(5 ... 100)
3032	Delay	**10.0s**	(0.0 ... 990.0)
3033	Minimum Load	**10%**	(0 ... 100)

3040	Stop Generator	CUSTOMER LEVEL	
3041	Setpoint	**60%**	(0 ... 80)
3042	Delay	**600.0s**	(0.0 ... 990.0)

3050	Load Dependent Start	CUSTOMER LEVEL	
3051	Setpoint	**50kW**	(0 ... 20000)
3052	Delay	**1.0s**	(0.0 ... 990.0)
3053	Minimum Load	**20kW**	(0 ... 20000)

3060	Load Dependent Stop	CUSTOMER LEVEL	
3061	Setpoint	**100kW**	(0 ... 20000)
3062	Delay	**30.0s**	(5.0 ... 9900.0)

3070	Test	CUSTOMER LEVEL	
3071	Setpoint	**50%**	(1 ... 100)
3072	Delay	**300.0s**	(30.0 ... 990.0)
3073	Test Synchron.	**OFF**	(ON / OFF)

3080	Fixed Power Setpoint	CUSTOMER LEVEL	
3081	Power Set	**80%**	(0 ... 100)
3082	PF Set	**0.95**	(0.60 ... 1.00)

3100	PMS Configuration	CUSTOMER LEVEL	
3101	# Gen-sets Available	**1**	(1 ... 16)
3102	Mains Available	**OFF**	(OFF / ON)
3103	PMS Active	**OFF**	(OFF / ON)
3104	Command Unit	**ON**	(OFF / ON)
3105	Enable Start/Stop	**Local**	(Remote / Local / Timer)

3110	Internal Communication ID	CUSTOMER LEVEL	
3111	Intern. Comm. ID	**1**	(1 ... 16)

3120	Priority Select	CUSTOMER LEVEL	
3121	Priority Select	**Manual**	(Manual / Running Hours)

Manual = 0 / Running Hours = 1

3130	Number of ID's	CUSTOMER LEVEL	
3131	Enable Mains	**OFF**	(OFF / ON)
3132	Enable ID1	**ON**	(OFF / ON)
3133	Enable ID2	**OFF**	(OFF / ON)
3134	Enable ID3	**OFF**	(OFF / ON)
3135	Enable ID4	**OFF**	(OFF / ON)
3136	Enable ID5	**OFF**	(OFF / ON)

3140	Number of ID's	CUSTOMER LEVEL	
3141	Enable ID6	**OFF**	(OFF / ON)
3142	Enable ID7	**OFF**	(OFF / ON)
3143	Enable ID8	**OFF**	(OFF / ON)
3144	Enable ID9	**OFF**	(OFF / ON)
3145	Enable ID10	**OFF**	(OFF / ON)
3146	Enable ID11	**OFF**	(OFF / ON)

3160	Priority of ID's	CUSTOMER LEVEL	
3161	Priority ID1	**1**	(1 ... # Gen-sets Available)
3162	Priority ID2	**2**	(1 ... # Gen-sets Available)
3163	Priority ID3	**3**	(1 ... # Gen-sets Available)
3164	Priority ID4	**4**	(1 ... # Gen-sets Available)
3165	Priority ID5	**5**	(1 ... # Gen-sets Available)
3166	Transmit	**OFF**	(OFF / ON)

3170	Priority of ID's	CUSTOMER LEVEL	
3171	Priority ID6	**6**	(1 ... # Gen-sets Available)
3172	Priority ID7	**7**	(1 ... # Gen-sets Available)
3173	Priority ID8	**8**	(1 ... # Gen-sets Available)
3174	Priority ID9	**9**	(1 ... # Gen-sets Available)
3175	Priority ID10	**10**	(1 ... # Gen-sets Available)
3176	Priority ID11	**11**	(1 ... # Gen-sets Available)

3230	Ground Relay	CUSTOMER LEVEL	
3231	Output Relay A	**R0**	(R0 ... R3)
3232	Output Relay B	**R0**	(R0 ... R3)
3233	Enable	**OFF**	(ON / OFF)

3240	Stop Noncon. Gen-sets	CUSTOMER LEVEL	
3241	Delay	**60.0s**	(10.0 ... 600.0)

3250	Power Capacity	CUSTOMER LEVEL	
3251	Power Capacity	**50kW**	(0 ... 20000)

System setup: overview of parameters

4010 Nominal Settings — *CUSTOMER LEVEL*

4011	Frequency	***50Hz***	*(48.0 ... 62.0)*
4012	Generator Power	***64kW/80kW****	*(10 ... 20000)*
4013	Generator Current	***116A/144A****	*(0 ... 9000)*
4014	Generator Voltage	***400V***	*(100 ... 25000)*

4020 Nominal Settings 2 — *CUSTOMER LEVEL*

4021	Frequency	***60Hz***	*(48.0 ... 62.0)*
4022	Generator Power	***76kW/92kW****	*(10 ... 20000)*
4023	Generator Current	***114A/138A****	*(0 ... 9000)*
4024	Generator Voltage	***480V***	*(100 ... 25000)*

4030 Nominal Settings 3 — *CUSTOMER LEVEL*

4031	Frequency	***50Hz***	*(48.0 ... 62.0)*
4032	Generator Power	***64kW/80kW****	*(10 ... 20000)*
4033	Generator Current	***116A/144A****	*(0 ... 9000)*
4034	Generator Voltage	***400V***	*(100 ... 25000)*

4040 Nominal Settings 4 — *CUSTOMER LEVEL*

4041	Frequency	***50Hz***	*(48.0 ... 62.0)*
4042	Generator Power	***64kW/80kW****	*(10 ... 20000)*
4043	Generator Current	***116A/144A****	*(0 ... 9000)*
4044	Generator Voltage	***400V***	*(100 ... 25000)*

4050 Transformer Gen-set — *SERVICE LEVEL*

4051	Volt. Prim.	***440V***	*(100 ... 25000)*
4052	Volt. Sec.	***440V***	*(100 ... 690)*
4053	Current Prim.	***150A***	*(5 ... 9000)*
4054	Current Sec.	***5A***	*(1 / 5)*

4060 Transformer Bus — *SERVICE LEVEL*

4061	Volt. Prim.	***440V***	*(100 ... 25000)*
4062	Volt. Sec.	***440V***	*(100 ... 690)*

4100 Engine Comms. — *SERVICE LEVEL*

4101	Type	***OFF***	*(OFF / MDEC / DDEC / EMR / JDEC)*

0 = OFF / 1 = MDEC / 2 = DDEC / 3 = EMR / 5 = JDEC

4110 Date & Time (internal clock) — *CUSTOMER LEVEL*

4110	Date	***dd/mm/yyyy***	*(...)*
4110	Time	***hh:mm***	*(...)*

4120 Counters — *MASTER LEVEL*

4121	Running Time	***0***	*(0 ... 20000)*
4122	GB Operations	***0***	*(0 ... 20000)*
4123	MB Operations	***0***	*(0 ... 20000)*
4124	Reset kWh	***OFF***	

4220 Battery Low — *SERVICE LEVEL*

4221	Setpoint	***9.0V***	*(6.0 ... 36.0)*
4222	Delay	***3.0s***	*(0.0 ... 999.0)*
4223	Output Relay A	***R0***	*(R0 ... R3)*
4224	Output Relay B	***R0***	*(R0 ... R3)*
4225	Enable	***ON***	*(ON / OFF)*

4230 Battery High — *SERVICE LEVEL*

4231	Setpoint	***15.0V***	*(12.0 ... 36.0)*
4232	Delay	***0.5s***	*(0.0 ... 999.0)*
4233	Output Relay A	***R0***	*(R0 ... R3)*
4234	Output Relay B	***R0***	*(R0 ... R3)*
4235	Enable	***ON***	*(ON / OFF)*

4240 Language — *CUSTOMER LEVEL*

4241	Language	***English***	*(GB / NL / F / D / E / I / DK / S / N / SF / P)*

0 = Master / 1 = English / 2 = Danish / 3 = Dutch / 4 = Finnish / 5 = French / 6 = German / 7 = Italian / 8 = Norwegian
9 = Portuguese / 10 = Spanish / 11 = Swedish

4250 Loadshare Out — *CUSTOMER LEVEL*

4251	Loadshare Out	***4.0V***	*(1.0 ... 5.0)*

4260 Loadshare Type — *CUSTOMER LEVEL*

4261	Loadshare Type	***Qc4001***	*(Deif / Qc4001 / Pow-R-Con)*

0 = DEIF / 1= Qc4001 / 2=Pow-R-Con

4270 Battery Low 2 — *CUSTOMER LEVEL*

4271	Setpoint	***9.0V***	*(6.0 ... 36.0)*
4272	Delay	***10.0s***	*(0.0 ... 999.0)*
4273	Output Relay A	***R0***	*(R0 ... R3)*
4274	Output Relay B	***R0***	*(R0 ... R3)*
4275	Enable	***OFF***	*(ON / OFF)*

4280 Battery High 2 — *CUSTOMER LEVEL*

4281	Setpoint	***15.0V***	*(12.0 ... 36.0)*
4282	Delay	***10.0s***	*(0.0 ... 999.0)*
4283	Output Relay A	***R0***	*(R0 ... R3)*
4284	Output Relay B	***R0***	*(R0 ... R3)*
4285	Enable	***OFF***	*(ON / OFF)*

4290 Mode Relay — *CUSTOMER LEVEL*

4291	Test	***R0***	*(R0 ... R3)*
4292	Auto	***R0***	*(R0 ... R3)*
4293	Semi	***R0***	*(R0 ... R3)*

4300 Engine Type — *MASTER LEVEL*

4301	Engine Type	***Diesel***	*(Diesel / Gas)*

0 = Diesel / 1 = Gas

4320 Gen-Set Mode — *CUSTOMER LEVEL*

4321	Gen-Set Mode	***Island***	*(Island / AMF / PS / FP / LTO / PMS)*

0 = Island / 1 = AMF / 2 = Peak Shaving / 3 = Fixed Power / 4 = Load Take Over / 5 = Power Management

4330 CAN Unit — *CUSTOMER LEVEL*

4331	CAN Unit	***bar-celsius***	*(bar-celsius / psi-farenheit)*

0 = bar-celsius / 1 = psi-farenheit

4350 Tacho Configuration — *SERVICE LEVEL*

4351	Setpoint	***500rpm***	*(1 ... 2000)*
4352	Teeth	***0***	*(0 ... 500)*

4360 Starter — *CUSTOMER LEVEL*

4361	Start Prepare	***12.0s***	*(0.0 ... 600.0)*
4362	Start ON Time	***12.0s***	*(1.0 ... 30.0)*
4363	Start OFF Time	***12.0s***	*(1.0 ... 99.0)*
4364	Prepare	***Normal***	*(Normal / Extended)*

4370 Start Attempts — *SERVICE LEVEL*

4371	Attempts	***3***	*(1 ... 10)*
4372	Output Relay A	***R0***	*(R0 ... R3)*
4373	Output Relay B	***R0***	*(R0 ... R3)*

4380 f/U OK — *SERVICE LEVEL*

4381	Delay	***3.0s***	*(1.0 ... 99.0)*

4390 f/U failure — *SERVICE LEVEL*

4391	Delay	***30.0s***	*(1.0 ... 99.0)*
4392	Output Relay A	***R0***	*(R0 ... R3)*
4393	Output Relay B	***R0***	*(R0 ... R3)*

4400 Stop — *SERVICE LEVEL*

4401	Cool Down Time	***60.0s***	*(0.0 ... 990.0)*
4402	Extended Stop	***15.0s***	*(1.0 ... 99.0)*
4403	Coil Type	***RUN***	*(RUN / STOP)*

0 = Run Coil / 1 = Stop Coil

4410 Stop Failure — *SERVICE LEVEL*

4411	Delay	***20.0s***	*(10.0 ... 120.0)*
4412	Output Relay A	***R0***	*(R0 ... R3)*
4413	Output Relay B	***R0***	*(R0 ... R3)*

4420 Mains V Failure — *CUSTOMER LEVEL*

4421	Fail Delay	***1.0s***	*(1.0 ... 990.0)*
4422	Mains OK Delay	***60.0s***	*(10.0 ... 990.0)*
4423	Low Voltage	***75%***	*(50 ... 100)*
4424	High Voltage	***120%***	*(100 ... 150)*
4425	Mains Fail Control	***Start+Open MB***	*(Start / Start+Open MB)*

0 = Start + Open MB / 1 = Start

4430 Mains Hz Failure — *CUSTOMER LEVEL*

4431	Fail Delay	***1.0s***	*(1.0 ... 990.0)*
4432	Mains OK Delay	***60.0s***	*(10.0 ... 990.0)*
4433	Low Frequency	***95%***	*(80 ... 100)*
4434	High Frequency	***105%***	*(100 ... 120)*

4440 MB Control — *CUSTOMER LEVEL*

4441	Function	***Mode Shift OFF***	*(Mode Shift OFF / Mode-AMF-Mode)*
4442	MB Close Delay	***0.5s***	*(0.0 ... 30.0)*
4443	Back Sync.	***OFF***	*(ON / OFF)*
4444	Synchr. Timer	***75ms***	*(40 ... 300)*

4450 Alarm Horn — *CUSTOMER LEVEL*

4451	Delay	***20.0s***	*(0.0 ... 990.0)*

4460 GB Control — *CUSTOMER LEVEL*

4461	GB Close Delay	***1.0s***	*(0.0 ... 30.0)*

4610 Relay 1 — *SERVICE LEVEL*

4611	Function	***Alarm***	*(Limit / Alarm)*
4612	Off Delay	***0.0s***	*(0.0 ... 999.9)*

4620 Relay 2 — *SERVICE LEVEL*

4621	Function	***Alarm***	*(Limit / Alarm)*
4622	Off Delay	***0.0s***	*(0.0 ... 999.9)*

4630 Relay 3 — *SERVICE LEVEL*

4631	Function	***Alarm***	*(Limit / Alarm)*
4632	Off Delay	***0.0s***	*(0.0 ... 999.9)*

4640 Relay 4 — *SERVICE LEVEL*

4641	Function	***Alarm***	*(Limit / Alarm)*
4642	Off Delay	***0.0s***	*(0.0 ... 999.9)*

4710 Start/Stop Cmd. 1 — *CUSTOMER LEVEL*

4711	Enable	***OFF***	*(ON / OFF)*
4712	START/STOP	***STOP***	*(START / STOP)*
4713	Day(s)	***10***	*(0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10)*
4714	Hour	***10***	*(0 ... 23)*
4715	Minute	***0***	*(0 ... 59)*

0 = Start / 1 = Stop
0 = Mo / 1 = Tu / 2 = We / 3 = Th / 4 = Fr / 5 = Sa / 6 = Su / 7 = Mo Tu We Th / 8 = Mo Th We Th Fr
9 = Sa Su / 10 = Mo Tu We Th Fr Sa Su

4720 Start/Stop Cmd. 2 — *CUSTOMER LEVEL*

4721	Enable	***OFF***	*(ON / OFF)*
4722	START/STOP	***STOP***	*(START / STOP)*
4723	Day(s)	***10***	*(0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10)*
4724	Hour	***10***	*(0 ... 23)*
4725	Minute	***0***	*(0 ... 59)*

0 = Start / 1 = Stop
0 = Mo / 1 = Tu / 2 = We / 3 = Th / 4 = Fr / 5 = Sa / 6 = Su / 7 = Mo Tu We Th / 8 = Mo Th We Th Fr
9 = Sa Su / 10 = Mo Tu We Th Fr Sa Su

4730 Start/Stop Cmd. 3 — *CUSTOMER LEVEL*

4731	Enable	***OFF***	*(ON / OFF)*
4732	START/STOP	***STOP***	*(START / STOP)*
4733	Day(s)	***10***	*(0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10)*
4734	Hour	***10***	*(0 ... 23)*
4735	Minute	***0***	*(0 ... 59)*

0 = Start / 1 = Stop
0 = Mo / 1 = Tu / 2 = We / 3 = Th / 4 = Fr / 5 = Sa / 6 = Su / 7 = Mo Tu We Th / 8 = Mo Th We Th Fr
9 = Sa Su / 10 = Mo Tu We Th Fr Sa Su

**** = First value applicable for QAS 80, second value applicable for QAS 100***

4740	Start/Stop Cmd. 4		CUSTOMER LEVEL	
	4741	Enable	**OFF**	(ON / OFF)
	4742	START/STOP	**STOP**	(START / STOP)
	4743	Day(s)	**10**	(0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10)
	4744	Hour	**10**	(0 ... 23)
	4745	Minute	**0**	(0 ... 59)

0 = Start / 1 = Stop
0 = Mo / 1 = Tu / 2 = We / 3 = Th / 4 = Fr / 5 = Sa / 6 = Su / 7 = Mo Tu We Th / 8 = Mo Th We Th Fr
9 = Sa Su / 10 = Mo Tu We Th Fr Sa Su

4750	Start/Stop Cmd. 5		CUSTOMER LEVEL	
	4751	Enable	**OFF**	(ON / OFF)
	4752	START/STOP	**STOP**	(START / STOP)
	4753	Day(s)	**10**	(0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10)
	4754	Hour	**10**	(0 ... 23)
	4755	Minute	**0**	(0 ... 59)

0 = Start / 1 = Stop
0 = Mo / 1 = Tu / 2 = We / 3 = Th / 4 = Fr / 5 = Sa / 6 = Su / 7 = Mo Tu We Th / 8 = Mo Th We Th Fr
9 = Sa Su / 10 = Mo Tu We Th Fr Sa Su

4760	Start/Stop Cmd. 6		CUSTOMER LEVEL	
	4761	Enable	**OFF**	(ON / OFF)
	4762	START/STOP	**STOP**	(START / STOP)
	4763	Day(s)	**10**	(0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10)
	4764	Hour	**10**	(0 ... 23)
	4765	Minute	**0**	(0 ... 59)

0 = Start / 1 = Stop
0 = Mo / 1 = Tu / 2 = We / 3 = Th / 4 = Fr / 5 = Sa / 6 = Su / 7 = Mo Tu We Th / 8 = Mo Th We Th Fr
9 = Sa Su / 10 = Mo Tu We Th Fr Sa Su

4770	Start/Stop Cmd. 7		CUSTOMER LEVEL	
	4771	Enable	**OFF**	(ON / OFF)
	4772	START/STOP	**STOP**	(START / STOP)
	4773	Day(s)	**10**	(0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10)
	4774	Hour	**10**	(0 ... 23)
	4775	Minute	**0**	(0 ... 59)

0 = Start / 1 = Stop
0 = Mo / 1 = Tu / 2 = We / 3 = Th / 4 = Fr / 5 = Sa / 6 = Su / 7 = Mo Tu We Th / 8 = Mo Th We Th Fr
9 = Sa Su / 10 = Mo Tu We Th Fr Sa Su

4780	Start/Stop Cmd. 8		CUSTOMER LEVEL	
	4781	Enable	**OFF**	(ON / OFF)
	4782	START/STOP	**STOP**	(START / STOP)
	4783	Day(s)	**10**	(0 / 1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9 / 10)
	4784	Hour	**10**	(0 ... 23)
	4785	Minute	**0**	(0 ... 59)

0 = Start / 1 = Stop
0 = Mo / 1 = Tu / 2 = We / 3 = Th / 4 = Fr / 5 = Sa / 6 = Su / 7 = Mo Tu We Th / 8 = Mo Th We Th Fr
9 = Sa Su / 10 = Mo Tu We Th Fr Sa Su

5010	VDO 1		SERVICE LEVEL	
	5011	VDO 1 @ 0,0bar	**10**	(0 ... 240)
	5012	VDO 1 @ 2,5bar	**44,9**	(0 ... 240)
	5013	VDO 1 @ 5,0bar	**81**	(0 ... 240)
	5014	VDO 1 @ 6,0bar	**134,7**	(0 ... 240)

5020	VDO 1		SERVICE LEVEL	
	5021	VDO 1 @ 7,0bar	**184**	(0 ... 240)
	5022	VDO 1 @ 8,0bar	**200**	(0 ... 240)
	5023	VDO 1 @ 9,0bar	**210**	(0 ... 240)
	5024	VDO 1 @ 10,0bar	**220**	(0 ... 240)

5030	VDO 2		SERVICE LEVEL	
	5031	VDO 2 @ 40°C	**292**	(0 ... 480)
	5032	VDO 2 @ 50°C	**197**	(0 ... 480)
	5033	VDO 2 @ 60°C	**134**	(0 ... 480)
	5034	VDO 2 @ 70°C	**97**	(0 ... 480)

5040	VDO 2		SERVICE LEVEL	
	5041	VDO 2 @ 80°C	**70**	(0 ... 480)
	5042	VDO 2 @ 90°C	**51**	(0 ... 480)
	5043	VDO 2 @ 100°C	**39**	(0 ... 480)
	5044	VDO 2 @ 110°C	**29**	(0 ... 480)

5050	VDO 3		CUSTOMER LEVEL	
	5051	VDO 3 @ 0%	**78,8**	(0 ... 180)
	5052	VDO 3 @ 40%	**47,9**	(0 ... 180)
	5053	VDO 3 @ 50%	**40,2**	(0 ... 180)
	5054	VDO 3 @ 60%	**32,5**	(0 ... 180)

5060	VDO 3		CUSTOMER LEVEL	
	5061	VDO 3 @ 70%	**24,8**	(0 ... 180)
	5062	VDO 3 @ 80%	**17**	(0 ... 180)
	5063	VDO 3 @ 90%	**9,3**	(0 ... 180)
	5064	VDO 3 @ 100%	**1,6**	(0 ... 180)

4790	GSM Pin Code		CUSTOMER LEVEL	
	4791	Pin code	**0000**	(0 ... 9999)

4910	Service Timer 1		SERVICE LEVEL	
	4911	Enable	**ON**	(ON / OFF)
	4912	Run Hours	**500h**	(10 ... 10000)
	4913	Elapsed Days	**365 days**	(1 ... 1000)
	4914	Fail Class	**Warning**	(Warning / Trip / Trip+Stop / Shutdown)
	4915	Output Relay A	**R0**	(R0 ... R3)
	4916	Reset		

4920	Service Timer 2		SERVICE LEVEL	
	4921	Enable	**ON**	(ON / OFF)
	4922	Run Hours	**1000h**	(10 ... 10000)
	4923	Elapsed Days	**365 days**	(1 ... 1000)
	4924	Fail Class	**Warning**	(Warning / Trip / Trip+Stop / Shutdown)
	4925	Output Relay A	**R0**	(R0 ... R3)
	4926	Reset		

4930	Diagnostics Mode		CUSTOMER LEVEL	
	4930	Diagnostics	**Normal**	(Normal / Diagnostics)

0 = Normal / 1 = Diagnostics

4940	Reset Eventlog		MASTER LEVEL	
	4940	Reset	**OFF**	(ON / OFF)

4971	Level 1 Password		CUSTOMER LEVEL	
	4971	Setting	**2003**	(0 ... 32000)

4972	Level 2 Password		SERVICE LEVEL	
	4972	Setting	****	(0 ... 32000)

4973	Level 3 Password		MASTER LEVEL	
	4973	Setting	****	(0 ... 32000)

0	Parameter ID		MASTER LEVEL	
	USW	ID	**9822 2003 26_00**	(QAS 80)
	USW	ID	**9822 2003 27_00**	(QAS 100)

2.8.5 Passwords

Changing different parameters requires different password levels. Some parameters cannot be changed by the end-customer because of safety reasons.

There are 4 different password levels:

– No password

– User password (default setting 2003)

– Service password

– Master password

Once the password has been entered, the user can change all the accessible set points.

The user can change the User password (go with JUMP button to channel 4971).

2.8.6 Fail classes

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

4 different fail classes can be used:

Fail class	*Action*				
	Alarm horn relay	*Alarm display*	*GB trip*	*Gen-set stop*	*Shutdown*
1. Warning		X			
2. Trip of GB	X	X	X		
3. Trip & Stop	X	X	X	X	
4. Shutdown	X	X	X		X

All alarms can be disabled or enabled as following:

– OFF: disabled alarm, inactive supervision.

– ON: enabled alarm, supervision of alarm all the time.

– RUN: generator running alarm, only supervision when the generator is running.

2.8.7 Languages

English is the default language ex-factory, but all the 12 European languages can be selected in channel 4240. It is possible to edit and/ or add text and to edit and/or add languages.

2.8.8 Standard modes

The following modes can be selected (push the dedicated button on the display unit).

Test mode

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

Semi-Auto mode

Enables the user to have manual control and activation of the sequences with the buttons on the Qc4001™ control panel (A2). The generator can be started/stopped manually. The breakers can be closed/opened manually, but the module will check automatically synchronizing sequences.

Auto mode

The module controls the generator and the circuit breakers (generator breaker GB and mains breaker MB) automatically according to the operational state.

Diagnostics menu

This diagnostics menu can only be entered using the JUMP pushbutton, and going to channel 4930. This menu is used for engine diagnostics situations.

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

To leave this status, normal operation has to be selected again in this menu.

It is only possible to start the generator when normal is selected.

2.8.9 Standard applications

In the Qc4001™ module 5 application types can be selected (in channel 4320). A combination of each application type with the running mode results in a specific application.

Depending on the application the user has to connect extra wirings to terminal blocks X25. These terminal blocks can be found inside the control box on a DIN-rail. We refer to the circuit diagram 9822 0992 27/03 for the correct connections.

Island operation

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

– Combined with Semi-auto mode = Local Start operation.

  The sequences start/stop/close GB/open GB can be activated manually.

– Combined with Auto mode = Remote Start operation.

  The remote start signal can be given with an external switch or with the internal real time clock (8 start/stop commands can be defined in channels 4710-4780). After the generator has been started, the generator breaker will close automatically.

The generator cannot be started with an external signal, if the internal real time clock commands are enabled!

Installation wirings

– Terminals X25.10/X25.11 have to be linked. The module always needs a feedback signal from the Mains Breaker MB. In Island mode there is no MB in the system. In this case the MB opened signal is simulated with this link.

– The busbar sensing lines have to be wired to the corresponding control module inputs.

  Place bridges between:

  – X25.33 (L1) => X25.3

  – X25.34 (L2) => X25.4

  – X25.35 (L1) => X25.5

  (The bus bar = power cables between GB and load).

– For Remote Start operation: wire the RS switch between X25.9 & X25.10.

– For Paralleling applications with other generators: see “Parallelling” section to set up generator for paralleling.

Automatic Mains Failure (AMF) operation

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

When the Mains exceeds the defined voltage/frequency/current/ speed limits for a defined delay time, the generator will take over the load automatically.

When the mains is restored within the defined limits for a defined time, the generator will synchronise to the mains and unload before disconnecting (only if back-synchronisation feature is enabled).

The generator will then go into cool down and stop.

It is possible to enable/disable the back synchronisation feature (in channel 4440).

Installation wirings

– The link between X25.10/X25.11 has to be removed.

– Mains breaker feedback lines have to be wired to X25.10/X25.11/ X25.12.

– Mains breaker control lines have to be wired to X25.13/X25.14/ X25.15/X25.16. These terminals are voltage free contacts. The power for the MB has to be supplied by the customer (24 Vdc/230 Vac) (max. contact rating K11, K12 = 250 V/16 A).

– Make sure the connections between X25.33 & X25.3, X25.34 & X25.4, X25.35 & X25.5 are removed.

– The Mains sensing lines L1/L2/L3 have to be wired to terminals X25.3/X25.4/X25.5 (mains neutral is not sensed).

– If back synchronisation is enabled, all settings for paralleling set up (see “Parallelling”) must be verified also.

Peak Shaving (PS) operation

This application is normally used in combination with the Auto mode.

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

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

Installation wirings

– The link between X25.10/X25.11 has to be removed.

– Mains breaker feedback lines have to be wired to X25.10/X25.11/ X25.12.

– Mains breaker control lines have to be wired to X25.13/X25.14/ X25.15/X25.16. These terminals are voltage free contacts. The power for the MB has to be supplied by the customer (24 Vdc/230 Vac) (max. contact rating K11, K12 = 250 V/16 A).

– The Mains sensing lines L1/L2/L3 have to be wired to terminals X25.3/X25.4/X25.5 (mains neutral is not sensed).

– Make sure the connections between X25.33 & X25.3, X25.34 & X25.4, X25.35 & X25.5 are removed.

– Power Transducer lines have to be wired to X25.21 (input) and X25.22 (GND).

Verify al settings for paralleling set up (see “Parallelling”).

Fixed Power (FP) operation

This application is normally used in combination with Semi-auto mode in installations with the Mains. The generator will deliver a defined fixed power to the load or to the Mains.

Installation wirings

– The link between X25.10/X25.11 has to be removed.

– Mains breaker feedback lines have to be wired to X25.10/X25.11/ X25.12.

– Mains breaker control lines have to be wired to X25.13/X25.14/ X25.15/X25.16. These terminals are voltage free contacts. The power for the MB has to be supplied by the customer (24 Vdc/230 Vac) (max. contact rating K11, K12 = 250 V/16 A)

– The Mains sensing lines L1/L2/L3 have to be wired to terminals X25.3/X25.4/X25.5 (Mains neutral is not sensed).

– Make sure the connections between X25.33 & X25.3, X25.34 & X25.4, X25.35 & X25.5 are removed.

– Verify al settings for paralleling set up (see “Parallelling”).

Load Take Over (LTO) operation

This application is normally used in combination with Semi-auto or Auto mode in installations with the Mains. The generator will start-up, synchronise and take over the load from the Mains gradually, before opening the Mains Breaker. To know if the load is completely taken over from the mains, an optional Power Transducer is necessary.

Installation wirings

– The link between X25.10/X25.11 has to be removed.

– Mains breaker feedback lines have to be wired to X25.10/X25.11/ X25.12.

– Mains breaker control lines have to be wired to X25.13/X25.14/ X25.15/X25.16. These terminals are voltage free contacts. The power for the MB has to be supplied by the customer (24 Vdc/230 Vac) (max. contact rating K11, K12 = 250 V/16 A).

– The Mains sensing lines L1/L2/L3 have to be wired to terminals X25.3/X25.4/X25.5 (mains neutral is not sensed).

– Make sure the connections between X25.33 & X25.3, X25.34 & X25.4, X25.35 & X25.5 are removed.

– Power Transducer lines have to be wired to X25.21 (input) and X25.22 (GND).

– Verify al settings for paralleling set up (see “Parallelling”).

2.8.10 Parallelling

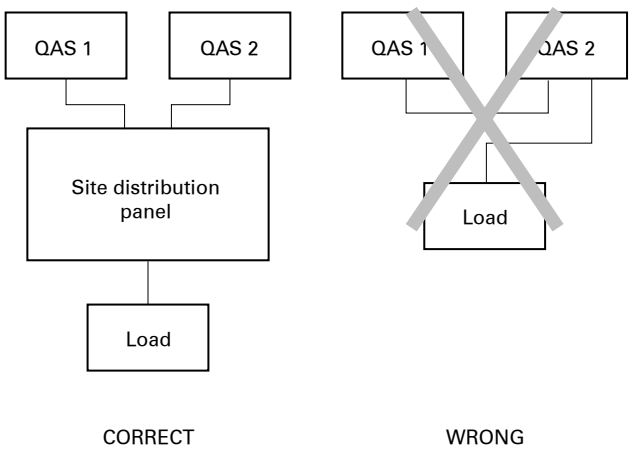
Prior to starting parallel operation of two generators, following connections need to be made:

– Connect the communication cable between the generators (sockets X30 & X31).

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

– Connect the load with the generator.

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



When paralleling, make sure to disable the Earth leakage relay by putting switch S13 into off position.

2.8.11 Option Power Management System

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

PMS applications are always in combination with AUTO mode. The Qc4001™ controllers from the gensets need to be programmed as PMS in AUTO mode. When a Qc Mains controller is installed this needs to be programmed in the application that is required (AMF, LTO, Fixed power) and AUTO mode.

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

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

- The maximum load step needs to be programmed in the Qc4001™ controllers. This never may exceeds the power reserve of the running generators. Otherwise the gensets will go in overload with a sudden max. load increase before the next generator is started up and connected to the busbar.
- To prevent the gensets to run in a start - stop loop.

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

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

Example: Installation with 3 gensets

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

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

  Start signal if:

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

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

  Stop signal if:

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

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

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

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

For more information on this option, see User Manual Qc4001™.

2.8.12 Overview of applications

Installations with only 1 generator		
Application type	**Mode**	**Comments**
Island operation	SEMI-AUTO mode	= Local start
	AUTO mode	= Remote start
AMF operation	(SEMI-AUTO mode)	AMF Function will not work!
	AUTO mode	= Emergency start @ Mains Failure
Peak shaving	SEMI-AUTO mode	Only with Power Transducer (*)
	AUTO mode	Only with Power Transducer (*)
Fixed Power	SEMI-AUTO mode	
	AUTO mode	
Load Take Over	SEMI-AUTO mode	Only with Power Transducer (*)
	AUTO mode	Only with Power Transducer (*)

(*) A Power Transducer is a device that measures the actual power of the mains and which translates this into a 4...20 mA signal towards the Qc4001™ module. For details, please contact Atlas Copco.

Installations with more generators		
Application type	**Mode**	**Comments**
Island operation	SEMI-AUTO mode	= Manual paralleling between generators
	AUTO mode	= Remote paralleling between generators
AMF operation	(SEMI-AUTO mode)	AMF Function will not work!
	AUTO mode	Only with PMS option + Qc4001™ Mains module (**)
Peak shaving	SEMI-AUTO mode	Only with PMS option + Qc4001™ Mains module (**)
	AUTO mode	Only with PMS option + Qc4001™ Mains module (**)
Fixed Power	SEMI-AUTO mode	Only with PMS option + Qc4001™ Mains module (**)
	AUTO mode	Only with PMS option + Qc4001™ Mains module (**)
Load Take Over	SEMI-AUTO mode	Only with PMS option + Qc4001™ Mains module (**)
	AUTO mode	Only with PMS option + Qc4001™ Mains module (**)

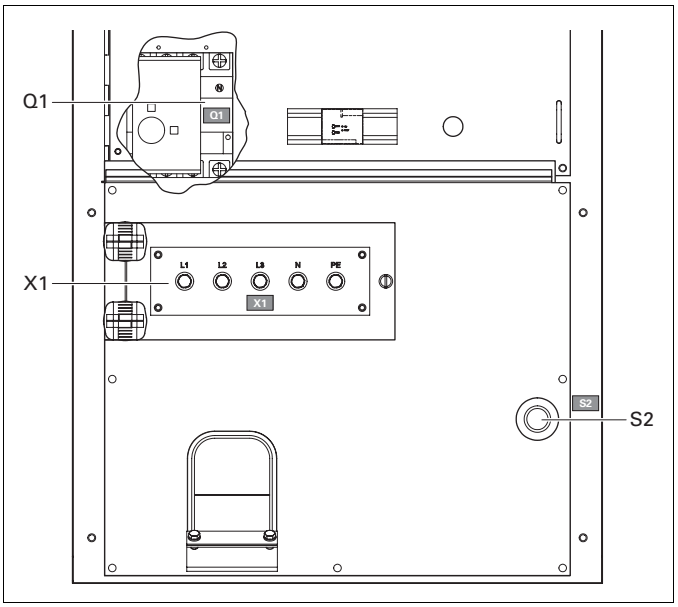
(**) It is possible to have an optional power management system (PMS) that allows communication between the Qc4001™ modules over CAN-bus. It has a fully intelligent system, which will start/load/stop the generator according to the actual load and to the status of each generator. The installation can contain up to 16 Qc4001™ modules (all equipped with this PMS option). If the Mains is included in the installation, then an extra Qc4001™ module is required. The installation can be monitored and controlled via the PMS Software Package. For details on this option, please contact Atlas Copco.

1. **Each installation has to be prepared and reviewed very carefully before start-up. Wrong or incomplete wirings can damage the installation brutally!**
2. **Each application requires a specific combination of the following parameters:**
   - **Test / Semi-auto / Auto mode**
   - **Island / AMF / PS / FP / LTO application type**
   - **Back synchronising enabled/disabled**

   Wrong parameter settings can damage the installation brutally!
3. **To be able to start up in cold conditions, parameter 4361 (Start prepare) can be changed to a higher value to have some preheating. Do not put this value above 60 seconds to avoid any possible damage.**
4. **For more information on the Qc4001™ module and its applications, we refer to the Qc4001™ User Manual. If you need more assistance, please contact Atlas Copco.**

2.9 Output terminal board

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



S2.....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. The emergency stop button can be secured in the locked position with the key, to avoid unauthorized use.

Q1.....Main circuit breaker

Interrupts the power supply to X1 when a short-circuit occurs at the load side, or when the earth leak detector (30 mA) or the overcurrent protection (QAS 60: 100 A, QAS 80: 125 A, QAS 100: 144 A) is activated or when the shunt trip is energized. It must be reset manually after eliminating the problem.

X1.....Main power supply (400 Vac)

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

2.10 Spillage free

A Spillage free skid with forklift slots allows the customer to transport the generator easily with a forklift.

It avoids accidental spilling of engine fluids.

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. Earthing must be done either by the earthing rod or, if available, by an existing, suitable earthing installation. The protective system against excessive contact voltage is not effective unless a suitable earthing is made.
The generator is wired for a TN-system to IEC 364-3, i.e. one point in the power source directly earthed - in this case the neutral. The exposed conductive parts of the electric installation must be directly connected to the functional earth.
If operating the generator in another power system, e.g. an IT-system, other protective devices required for these types must be installed. In any case only a qualified electrician is authorized to remove the connection between the neutral (N) and earth terminals in the terminal box of the alternator.

3.1 Installation

- Place the generator on a horizontal, even and solid floor.
- The generator should be kept with the doors closed, in order to avoid the ingress of water and dust. Dust ingress reduces the lifetime of filters and may reduce your generator's performance.
- Check that the engine exhaust is not directed towards people. 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. Refer to the Engine instruction book for the proper coolant mixture.
- Check the tightness of the bolts and nuts.
- Install the earthing rod as near as possible to the generator and measure its diffusion resistance (max. 1 kΩ) in order not to have a contact voltage higher than 25 V at 30 mA leakage current.
- Check that the cable end of the earthing rod is connected to the earth terminal.

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

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

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

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

e = Voltage drop (V)

I = Rated current (A)

L = Length of conductors (m)

R = Resistance (Ω/km to VDE 0102)

X = Reactance (Ω/km to VDE 0102)

3.2.3 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 of the control and indicator panel and the transparent door in front of the terminal board X1.
- Provide the wire ends with cable lugs suited for the cable terminals.
- Loosen the cable clamp and push the wire ends of the load cable through the orifice and clamp.
- Connect the wires to the proper terminals (L1, L2, L3, N and PE) of X1 and tighten the bolts securely.
- Tighten the cable clamp.
- Close the transparent door in front of X1.

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 coolant level must be near to the FULL mark. Add coolant if necessary.
- Drain any coolant 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 coolantdamp 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 F10 has not tripped and that the emergency stop is in the OUT position.
- Check that the load is switched off.
- Check that circuit breaker Q1 is switched off.
- Check that the earth fault protection (N13) has not tripped (reset if necessary).

3.4 Operating Qc1002™

3.4.1 Starting Qc1002™

To start up the unit locally, proceed as follows:

- Switch on the battery switch, if applicable.
- Switch off circuit breaker Q1. This is not necessary when a plant contactor is installed between Q1 and the load.
- Put the starter switch S20 in position I (ON). The unit starts a preheating cycle which takes 12 seconds.
- After the preheating period, the unit will start. The starting attempt will take maximum 12 seconds.
- Switch on circuit breaker Q1.

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

- Put the starter switch S20 in position ⌨ .
- Switch on circuit breaker Q1.
- Put the remote start/stop switch in position start. The unit starts a preheating cycle which takes 12 seconds.
- After the preheating period, the unit will start. The starting attempt will take maximum 12 seconds.
- An external contactor can be connected and controlled by the Qc1002™ .

3.4.2 During operation Qc1002™

Following points should be carried out regularly:

– Check the engine gauges and the lamps for normal readings.

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

– Check for leakage of oil, fuel or coolant.

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

– Check, by means of the generator gauges and/or a multimeter, that the voltage between the phases is identical and that the rated current in the third phase (L3) is not exceeded.

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

If circuit breakers are activated during operation, switch off the load and stop the generator. Check and, if necessary, decrease the load.

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

3.4.3 Stopping Qc1002™

To stop the unit locally, proceed as follows:

– Switch off the load.

– Switch off circuit breaker Q1.

– Let the engine run for about 5 minutes.

– Stop the engine by putting the starter switch S20 in position O.

– Lock the side doors and the door of the indicators and control panel to avoid unauthorized access.

To stop the unit when the starter switch is in position ⊘, proceed as follows:

– Switch off the load.

– Stop the engine by putting the remote start/stop switch in position stop or by putting the starter switch S20 in position O.

– Cooldown period default 15 sec.

– Lock the side doors and the door of the indicators and control panel to avoid unauthorized access.

3.5 Operating Qc2002™

3.5.1 Starting Qc2002™

To start up the unit locally, proceed as follows:

– Switch on the battery switch.

– Switch off circuit breaker Q1. This is not necessary when a plant contactor is installed between Q1 and the load.

– Put the starter switch S20 in position I (ON). Voltage is applied to the Qc2002™ module.

– The unit can be started manually by pressing the START button on the Qc2002™ module.

– The unit starts a preheating cycle which takes 12 seconds.

– After the preheating period, the unit will start. The starting attempt will take maximum 12 seconds.

– Switch on circuit breaker Q1 in case no contactor is installed.

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

– Put the starter switch S20 in position I (ON). Voltage is applied to the Qc2002™ module.

– Switch on circuit breaker Q1.

– For remote start:
  - Put the unit in Island mode. Push the AUTOMATIC button. Use an external switch to start the machine.

  or

  - Put the unit in AMF mode. Push the AUTOMATIC button. The machine will start automatically when Mains fails.

– The unit starts a preheating cycle which takes 12 seconds.

– After the preheating period, the unit will start. The starting attempt will take maximum 12 seconds.

3.5.2 During operation Qc2002™

Following points should be carried out regularly:

– Check the engine gauges and the lamps for normal readings.

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

– Check for leakage of oil, fuel or coolant.

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

– Check, by means of the generator gauges, that the voltage between the phases is identical and that the rated current in the third phase (L3) is not exceeded.

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

If circuit breakers are activated during operation, switch off the load and stop the generator. Check and, if necessary, decrease the load.

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

3.5.3 Stopping Qc2002™

To stop the unit , proceed as follows:

- Switch off the load.
- Switch off circuit breaker Q1.
- Let the engine run for about 5 minutes.
- Stop the engine by using the STOP button on the Qc2002™ module.
- Put the starter switch S20 in position O (OFF) to shut down the voltage apply towards the Qc2002™ module.
- Lock the side doors and the door of the indicators and control panel to avoid unauthorized access.

To stop the unit when the Qc2002™ module is in AUTOMATIC operation mode, proceed as follows:

- Switch off the load.
- For remote start:
  - When operating in Island mode, use the external switch to stop the machine.
  - When operating in AMF mode, the machine will automatically stop when the Mains returns.

When the unit is stopped with the STOP button in Automatic operation, it will automatically go to Manual Mode.

- Cooldown period default 15 sec.
- Put the starter switch S20 in position O (OFF) to shut down the voltage apply towards the Qc2002™ module.
- Lock the side doors and the door of the indicators and control panel to avoid unauthorized access.

3.6 Operating Qc4001™

3.6.1 Starting Qc4001™

- Turn the optional battery switch to ON.
- Turn the S20 button to the ON position, this will activate the Qc4001™ Controller.
- Select the correct application type and the correct mode on the Qc4001™ module (see "Overview of applications" on page 42 for the possible selections).
- Make the correct wirings and program the applicable parameters (see "Standard applications" on page 39 for more details).
- When in SEMI-AUTO mode, use the START button to start-up the generator. The GB button cannot be used to close the generator breaker.
- When in AUTO mode, the generator will start-up automatically and close the contactors depending on the selected application.

The START button, the GB-close button and the MB-close button cannot be used in AUTO mode.

3.6.2 During operation Qc4001™

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 immediatly 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 optional battery switch to OFF during operation.

If circuit breaker Q1 trips off during operation, switch off the load and stop the generator. Check and, if necessary, decrease the load.

3.6.3 Stopping Qc4001™

- When in SEMI-AUTO mode, use the STOP button to stop the generator. The GB button will work to open the GB.
- When in AUTO mode, the STOP and GB button will not function. The generator shuts down automatically depending on the selected application

If you want to stop the generator manually, use the S20 button or the emergency stop button.

4 Maintenance

4.1 Maintenance schedule for QAS 60-80-100 Pd

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

Maintenance schedule	Daily	500 hours or yearly	1000 hours
Service pak	-	**2912 4412 05**	-
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.			
Air/fuel/coolant & oil leakage	Check	Check	Check
Electrolyte level and terminals of battery		Check	Check
Fixation of hoses, cables and pipes		Check	Check
Oil and coolant level	Check	Check	Check
Coolers	Check and clean externally	Check and clean externally	Check and clean externally
Condition of cooling fan assembly	Check	Check	Check
Tension and condition of the drive belt	Check	Check	Check
Door hinges and locks		Grease	Grease
Engine oil		Replace	Replace
Engine oil filter		Replace	Replace
Fuel filter element		Replace	Replace
Fuel prefilter element		Replace	Replace
Water in fuel filter	Drain	Drain	Drain
Air cleaner and dust bowl	Clean	Clean	Clean
Air filter element		Change	Change
Safety cartridge		Replace	Replace
Engine inlet and outlet valves (2)			Check/Adjust if necessary
Alternator and starter motor			Check
Electrical system: security of cables and wear			Check
Mechanical links		Grease	Grease
Condition of vibration dampers		Check	Check
Alternator insulation resistance		Measure	Measure
Glycol level in coolant (1)		Check	Check
PH level of engine coolant		Check	Check
Filter closed breather system		Replace	Replace
Inspection by Atlas Copco Service technician			⚠

Notes:

In highly dusty environments, these service intervals do not apply. Check and/or replace filters and clean radiator on a regular basis.

(1) Change coolant every 5 years.

(2) Gaskets rocker cover can be re-used. New gasket can be ordered with partnumber 2914 9846 00.

4.2 Engine maintenance

Refer to the engine's operator manual for full maintenance schedule.

4.3 (*) 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 Engine oil specifications

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

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

Engine	Type of lubricant
between -15°C (5°F) and 40°C (104°F)	PAROIL 15W40
between -25°C (-13°F) and 30°C (86°F)	PAROIL 5W40

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

4.4.1 Specifications PAROIL

PAROIL from Atlas Copco is the ONLY oil tested and approved for use in all engines built into Atlas Copco compressors and generators.
Extensive laboratory and field endurance tests on Atlas Copco equipment have proven PAROIL to match all lubrication demands in varied conditions. It meets stringent quality control specifications to ensure your equipment will run smoothly and reliably.
The quality lubricant additives in PAROIL allow for extended oil change intervals without any loss in performance or longevity.

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

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

PAROIL releases excess heat efficiently, whilst maintaining excellent bore-polish protection to limit oil consumption.
PAROIL has an excellent Total Base Number (TBN) retention and more alkalinity to control acid formation.

PAROIL prevents Soot build-up.

PAROIL is optimized for the latest low emission EURO -3 & -2, EPA TIER II & III engines running on low sulphur diesel for lower oil and fuel consumption.

4.4.2 PAROIL 5W40 and PAROIL 15W40

Synthetic engine oil PAROIL 5W40

PAROIL 5W40 is a Synthetic ultra high performance diesel engine oil with a high viscosity- index. Atlas Copco PAROIL 5W40 is designed to provide excellent lubrication from start-up in temperatures as low as -25°C (-13°F).

	Liter	US gal	Imp gal	cu.ft	Order number
can	5	1.3	1.1	0.175	1604 6060 01
barrel	210	55.2	46	7.35	1604 6059 01

Mineral engine oil PAROIL 15W40

PAROIL 15W40 is a mineral based high performance diesel engine oil with a high viscosity- index. Atlas Copco PAROIL 15W40 is designed to provide a high level of performance and protection in 'standard' ambient conditions as from -15°C (5°F).

	Liter	US gal	Imp gal	cu.ft	Order number
can	5	1.3	1.1	0.175	1615 5953 00
can	20	5.3	4.4	0.7	1615 5954 00
barrel	210	55.2	46	7.35	1615 5955 00

4.5 Engine oil level check

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

For intervals, see “Maintenance schedule for QAS 60-80-100 Pd” page 48.

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

4.6 Engine oil and oil filter change

See section “Maintenance schedule for QAS 60-80-100 Pd” page 48.

4.7 Engine coolant specifications

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

The use of the correct coolant is important for good heat transfer and protection of liquid-cooled engines. Coolants used in these engines must be mixtures of good quality water (distilled or de-ionised), special coolant additives and 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 lower than the freezing point that can occur in the area. The difference must be at least 5°C (41°F). If the coolant freezes, it may crack the cylinder block, radiator or coolant pump.

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

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

4.7.1 Specifications PARCOOL EG

PARCOOL EG is the only coolant that has been tested and approved by all engine manufacturers currently in use in Atlas Copco compressors and generators.

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

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

Because PARCOOL EG inhibits corrosion, deposit formation is minimized. This effectively eliminates the problem of restricted flow through the engine coolant ducts and the radiator, minimizing the risk for engine overheating and possible failure.

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

PARCOOL EG is free of nitride and amines to protect your health and the environment. Longer service life reduces the amount of coolant produced and needing disposal to minimise environmental impact.

	Liter	US gal	Imp gal	cu.ft	Order number
can	5	1.3	1.1	0.175	1604 5308 00
can	20	5.3	4.4	0.7	1604 5307 01
barrel	210	55.2	46	7.35	1604 5306 00

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

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

4.8 Coolant check

4.8.1 Monitoring coolant condition

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

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

Visual check

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

pH measurement

– Check the pH value of the coolant using a pH-measuring device.

– The pH-meter can be ordered from Atlas Copco with part number 2913 0029 00.

– Typical value for EG = 8.6.

– If the pH-level is below 7 or above 9.5, the coolant should be replaced.

Glycol concentration measurement

– To optimise the unique engine protection features of the PARCOOL EG the concentration of the Glycol in the water should be always above 33 vol.%.

– Mixtures with more than 68 vol.% mix ratio in water are not recommended, as this will lead to high engine operating temperatures.

– A refractometer can be ordered from Atlas Copco with part number 2913 0028 00.

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

4.8.2 Topping up of coolant

– Verify if the engine cooling system is in a good condition (no leaks, clean,...).

– Check the condition of the coolant.

– If the condition of the coolant is outside the limits, the complete coolant should be replaced (see section “Replacing the coolant”).

– Always top-up with PARCOOL EG.

– Topping up the coolant with water only, changes the concentration of additives and is therefore not allowed.

4.8.3 Replacing the coolant

Drain

– Completely drain the entire cooling system.

– Used coolant must be disposed or recycled in accordance with laws and local regulations.

Flush

– Flush twice with clean water. Used coolant must be disposed or recycled in accordance with laws and local regulations.

– From the Atlas Copco Instruction book, determine the amount of PARCOOL EG required and pour into the radiator top tank.

– It should be clearly understood that the risk for contamination is reduced in case of proper cleaning.

– In case a certain content of ‘other’ coolant remains in the system, the coolant with the lowest properties influences the quality of the ‘mixed’ coolant.

Fill

– To assure proper operation and the release of trapped air, run the engine until normal engine operation temperature is reached. Turn off the engine and allow to cool.

– Recheck coolant level and add if necessary.

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 silica gel bags and check the generator thoroughly (go through the checklist "Before starting" page 45).

– Consult the engine's operator manual.

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

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

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

– Submit the generator to a test run.

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 Checking voltmeter P4

– Put a voltmeter in parallel with voltmeter P4 on the control panel.

– Check that the read-out of both voltmeters is the same.

– Stop the generator and disconnect one terminal.

– Check that the internal resistance of the voltmeter is high.

6.2 Checking ammeters P1, P2 and P3

– Measure the outgoing current during the load, by means of a clamp-on probe.

– Compare the measured current with the current indicated on ammeter. Both readings should be the same.

6.3 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 potentiometer.
	Intervention of protection.	Check rpm.
	Winding failure.	Check windings.
High voltage at no load	Voltage potentiometer out of setting.	Reset voltage potentiometer.
	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.

6.4 Engine trouble shooting

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

The starter motor turns the engine too slowly

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

The engine does not start or is difficult to start

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

Not enough power

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

– Restriction in fuel tank vent.
– Wrong type or grade of fuel used.
– Restricted movement of engine speed control.
– Restriction in exhaust pipe.
– Engine temperature is too high.
– Engine temperature is too low.

Misfire

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

The pressure of the lubricating oil is too low

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

High fuel consumption

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

Black exhaust smoke

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

Blue or white exhaust smoke

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

The engine knocks

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

The engine runs erratically

– Fault in fuel control.
– Restriction in a fuel pipe.
– Fault in fuel lift pump.
– Dirty fuel filter element.
– Restriction in air filter/cleaner or induction system.
– Air in fuel system.
– Fault in atomisers or atomisers of an incorrect type.
– Fault in cold start system.
– Restriction in fuel tank vent.
– Restricted movement of engine speed control.
– Engine temperature is too high.
– Incorrect valve tip clearances.

Vibration

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

The pressure of the lubricating oil is too high

– Wrong grade of lubricating oil.
– Defective gauge.

The engine temperature is too high

– Restriction in air filter/cleaner or induction system.

– Fault in atomisers or atomisers of an incorrect type.

– Fault in cold start system.

– Restriction in exhaust pipe.

– Fan damaged.

– Too much lubricating oil in sump.

– Restriction in air or coolant passages of radiator.

– Insufficient coolant in system.

Crankcase pressure

– Restriction in breather pipe.

– Vacuum pipe leaks or fault in exhauster.

Bad compression

– Restriction in air filter/cleaner or induction system.

– Incorrect valve tip clearances.

The engine starts and stops

– Dirty fuel filter element.

– Restriction in air filter/cleaner or induction system.

– Air in fuel system.

The engine shuts down after approx. 15 sec

– Bad connection towards oil pressure switch/coolant temperature switch.

7 Options available for QAS 60 Pd, QAS 80 Pd and QAS 100 Pd units

7.1 Circuit diagrams

The engine control circuit diagrams and the power circuit diagrams for the standard QAS 60 Pd, QAS 80 Pd and QAS 100 Pd units:

Unit	*Power circuit*	*Engine control circuit*
QAS 60-80-100 Pd Qc1002™	9822 0992 20	9822 0992 18
QAS 60-80-100 Pd Qc2002™	9822 0992 20	9822 0992 39
QAS 80-100 Pd Qc4001™	9822 0992 20	9822 0992 27
QAS 60-80-100 Pd Low voltage	9822 0992 21	
QAS 60-80-100 Pd Dual voltage - 1 ph	9822 0992 22	
QAS 60-80-100 Pd Dual voltage	9822 0992 23	

7.2 Overview of the electrical options

The following electrical options are available for the QAS 60 Pd, QAS 80 Pd and QAS 100 Pd units:

– Automatic battery charger

– Battery switch

– Engine coolant heater

– Outlet sockets (S)

– Single frequency with electronic speed control (SF)

– Dual frequency with electronic speed control (DF)

– Electronic speed regulator

– Low voltage (LV)

– Dual voltage (2V)

– Dedicated single phase (1 Ph)

– Earth leakage relay

– IT-relay

– “Electricité de France” (EDF)

– Integrated spark arrestor

– Air inlet shut-off valve

7.3 Description of the electrical options

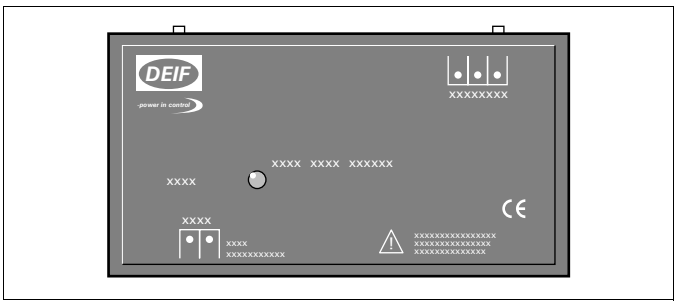
The positioning of the components mentioned in the description of the QAS 60-80-100 options, may differ slightly depending on the generator model.

7.3.1 Automatic battery charger

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

Besides the output terminals (secondary side) the automatic battery charger has a trim potentiometer for setting of the output voltage. By means of an insulated slotted screwdriver or adjusting pin the output voltage can be set in the range.

The LED on the front indicates that the unit is operational.



Setting:

– Lower output voltage = Counterclockwise rotation

– Higher output voltage = Clockwise rotation

To use the batery charger:

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

7.3.2 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.

7.3.3 Engine coolant heater

To make sure that the engine can start and accept load immediately, an external coolant heater (1000 W, 240 V) is provided which keeps the engine temperature between 38°C and 49°C.

7.3.4 Outlet sockets (S)

Outlet sockets QAS 60 Pd

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

X2..... 3-phase outlet socket (400 Vac)

Provides phases L1, L2 and L3, neutral and earthing.

X4..... 3-phase outlet socket (400 Vac)

Provides phases L1, L2 and L3, neutral and earthing.

X5..... 3-phase outlet socket (400 Vac)

Provides phases L1, L2 and L3, neutral and earthing.

X6..... 1-phase outlet socket (230 Vac)

Provides phase L3, neutral and earthing.

Q2 ..... Circuit breaker for X2

Interrupts the power supply to X2 when a short-circuit occurs at the load side, or when the overcurrent protection (63 A) is activated. When activated, Q2 interrupts the three phases towards X2. It can be activated again after eliminating the problem.

Q4 ..... Circuit breaker for X4

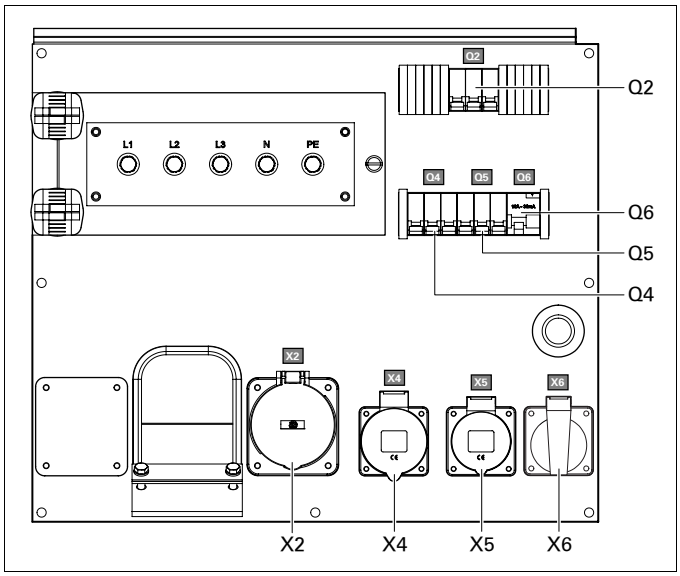
Interrupts the power supply to X4 when a short-circuit occurs at the load side, or when the overcurrent protection (32 A) is activated. When activated, Q4 interrupts the three phases towards X4. It can be activated again after eliminating the problem.

Q5 ..... Circuit breaker for X5

Interrupts the power supply to X5 when a short-circuit occurs at the load side, or when the overcurrent protection (16 A) is activated. When activated, Q5 interrupts the three phases towards X5. It can be activated again after eliminating the problem.

Q6 ..... Circuit breaker for X6

Interrupts the power supply to X6 when a short-circuit occurs at the load side, or when the overcurrent protection (16 A) is activated. When activated, Q6 interrupts phase L3 and the neutral towards X6. It can be activated again after eliminating the problem.



Circuit breaker Q1 does not only interrupt the power supply towards X1, but also towards X2, X4, X5 and X6.
Make sure to switch on circuit breakers Q1, Q2, Q4, Q5 and Q6 after starting the generator when power supply is done by means of X2, X4, X5 or X6.

Outlet sockets QAS 80-100 Pd

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

X2-X3 3-phase outlet socket (400 Vac)

Provides phases L1, L2 and L3, neutral and earthing.

X4.....3-phase outlet socket (400 Vac)

Provides phases L1, L2 and L3, neutral and earthing.

X5.....3-phase outlet socket (400 Vac)

Provides phases L1, L2 and L3, neutral and earthing.

X6..... 1-phase outlet socket (230 Vac)

Provides phase L3, neutral and earthing.

Q2-Q3 Circuit breaker for X2-X3

Interrupts the power supply to X2-X3 when a short-circuit occurs at the load side, or when the overcurrent protection (63 A) is activated. When activated, Q2-Q3 interrupts the three phases towards X2-X3. It can be activated again after eliminating the problem.

Q4.....Circuit breaker for X4

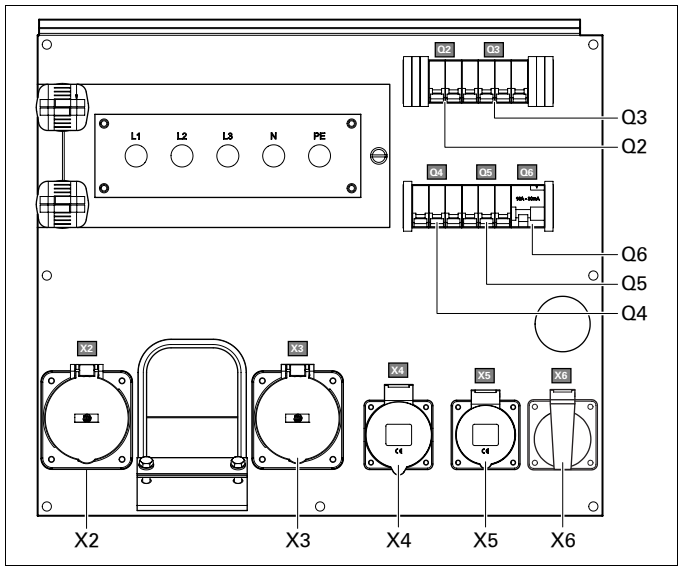
Interrupts the power supply to X4 when a short-circuit occurs at the load side, or when the overcurrent protection (32 A) is activated. When activated, Q4 interrupts the three phases towards X4. It can be activated again after eliminating the problem.

Q5.....Circuit breaker for X5

Interrupts the power supply to X5 when a short-circuit occurs at the load side, or when the overcurrent protection (16 A) is activated. When activated, Q5 interrupts the three phases towards X5. It can be activated again after eliminating the problem.

Q6.....Circuit breaker for X6

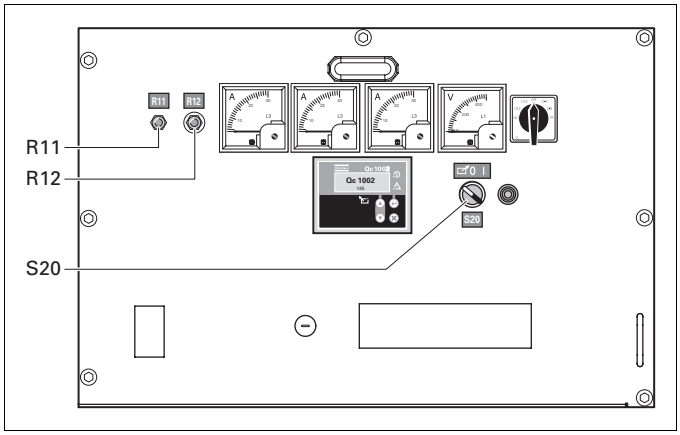
Interrupts the power supply to X6 when a short-circuit occurs at the load side, or when the overcurrent protection (16 A) is activated. When activated, Q6 interrupts phase L3 and the neutral towards X6. It can be activated again after eliminating the problem.



Circuit breaker Q1 does not only interrupt the power supply towards X1 but also towards X2, X3, X4, X5 and X6.
Make sure to switch on circuit breakers Q1, Q2, Q3, Q4, Q5 and Q6 after starting the generator when power supply is done by means of X2, X3, X4, X5 or X6.

7.3.5 Single frequency with electronic speed control (SF)

The Single frequency option provides an electronic speed controller which improves the output frequency of the generator at 50 Hz/60 Hz at a constant load.



R11.... Supply voltage adjust potentiometer

See “Electronic speed regulator”.

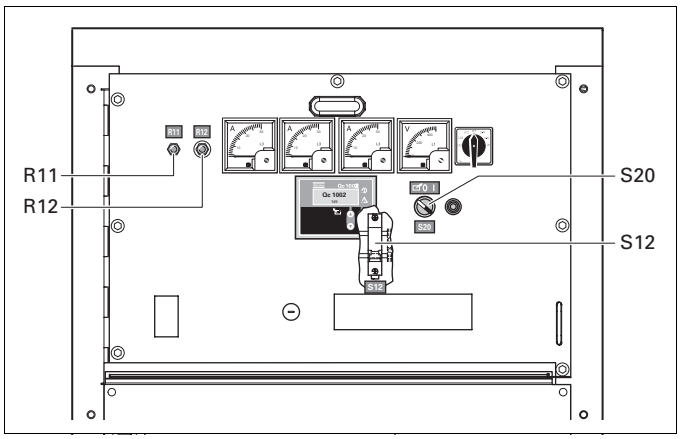
R12.... Voltage adjustment

Allows to adjust the output voltage.

Single frequency with electronic speed control is standard for the QAS 100 Pd.

7.3.6 Dual frequency with electronic speed control (DF)

The Dual frequency with electronic speed control option allows the unit to work at 50 Hz or at 60 Hz with an improved accuracy at constant load. The frequency selection is done by means of switch S12.



R11.... Speed adjustment

See “Electronic speed regulator”.

R12.... Voltage adjustment

Allows to adjust the output voltage.

S12.... Frequency selector switch (50 Hz/60 Hz)

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

Changing the output frequency is only allowed after shutdown.
After changing the output frequency, adjust the output voltage by means of potentiometer R12 to the required value.

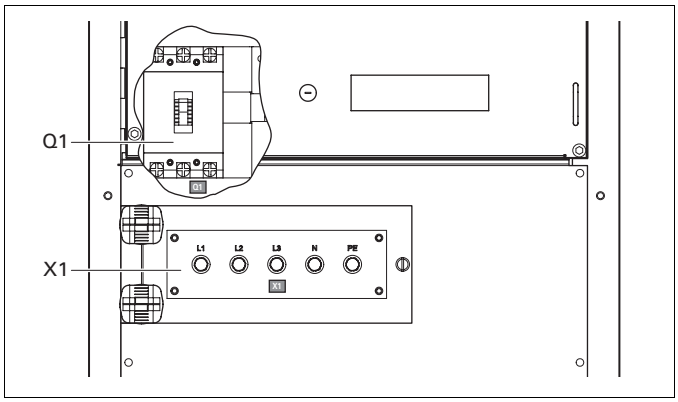
7.3.7 Electronic speed regulator

The electronic speed regulator makes sure that the output frequency of the generator is 50 Hz/60 Hz, independent of the amount of load.

7.3.8 Low voltage (LV)

The Low voltage option allows to run the unit at low voltage (= high current).

All the cables that are used must be suitable for high current.



Q1 ..... Circuit breaker for low voltage, high current

Interrupts the low voltage power supply towards X1 when a short-circuit occurs at the load side or when the overcurrent protection (QAS 60: 152 A, QAS 80: 200 A, QAS 100: 250 A) is activated. It must be reset manually after eliminating the problem.

7.3.9 Dual voltage (2V)

The generator can run in two different modes:

Dual voltage

3 phase, lower voltage

When using this selection, the generator provides a 230/240 V output voltage.

3 phase, higher voltage

When using this selection, the generator provides a 400/480 V output voltage.

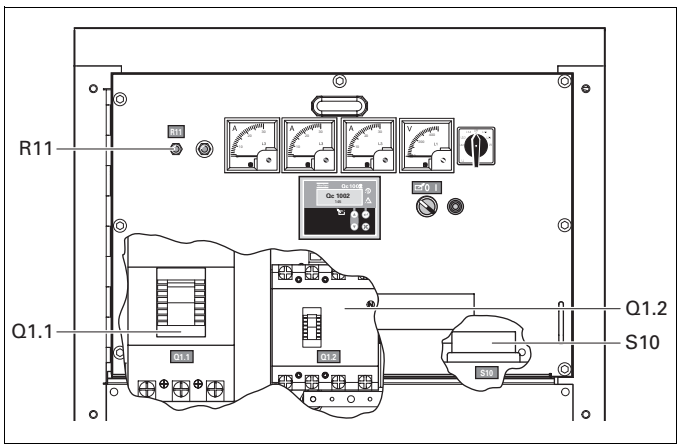
Dual voltage - Single phase

1 phase, lower voltage

When using this selection, the generator provides a 230/240 V output voltage.

3 phase, higher voltage

When using this selection, the generator provides a 400/480 V output voltage.



Q1.1...Circuit breaker for low voltage, high current

Interrupts the low voltage power supply towards X1 when a short-circuit occurs at the load side or when the overcurrent protection (QAS 60: 152 A, QAS 80: 200 A, QAS 100: 250 A for dual voltage and QAS 60: 175 A, QAS 80: 250 A, QAS 100: 280 A for dual voltage-single phase) is activated. It must be reset manually after eliminating the problem.

Q1.2...Circuit breaker for high voltage, low current

Interrupts the high voltage power supply towards X1 when a short-circuit occurs at the load side or when the overcurrent protection (QAS 60: 100 A, QAS 80: 125 A, QAS 100: 144 A for dual voltage and QAS 60: 100 A, QAS 80: 125 A, QAS 100: 144 A for dual voltage-single phase) is activated. It must be reset manually after eliminating the problem.

R11....Output voltage adjust potentiometer

Allows to adjust the output voltage.

Depending on which mode the generator is running in, circuit breaker Q1.1 or Q1.2 will be operational.

Circuit breakers Q1.1 and Q1.2 cannot be switched on at the same time. This is prevented by means of the auxiliary voltage selection relays S10b and S10c for dual voltage (refer to the circuit diagram 9822 0992 23/00) or K11 and K12 for dual voltage-single phase (refer to the circuit diagram 9822 0992 22/00).

The selection between the two modes is done by means of S10.

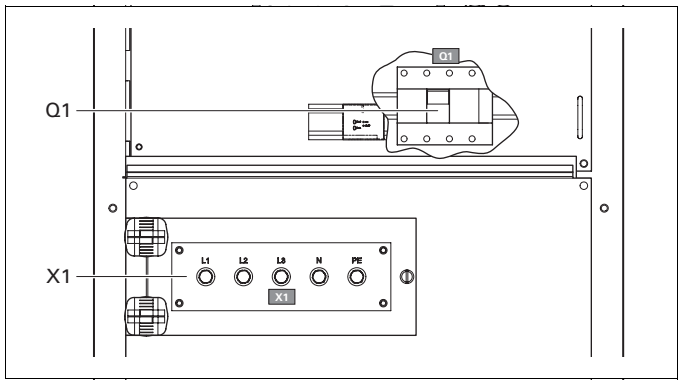
S10....Output voltage selection switch

Allows to select a 3 phase high output voltage or a 3 phase low output voltage. Selector switch S10 is located on the alternator.

Changing the output voltage is only allowed after shutdown.
After changing the output voltage by means of the selection switch S10, adjust the output voltage by means of potentiometer R11 to the required value.

7.3.10 Dedicated single phase (1 Ph)

The Single phase option provides single phase output voltage (e.g. 230 V).



X1.....Main power supply (230 Vac)

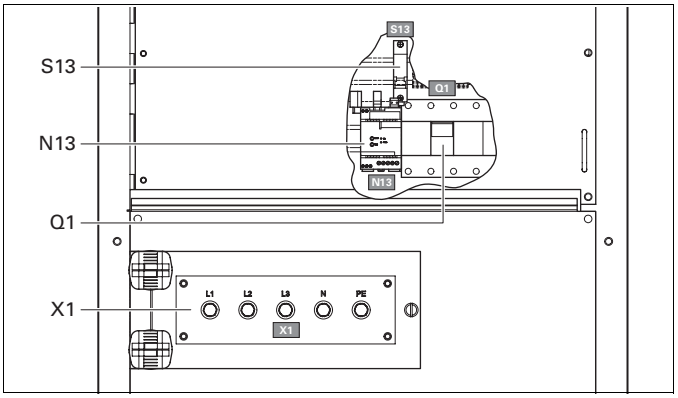
Terminals L1, L2, N (= neutral) and PE (= earthing), hidden behind the control panel door and behind a small transparent door.

Q1.....Circuit breaker for single phase operation

Interrupts phases L1, L2 and N towards X1 when a short-circuit occurs at the load side or when the overcurrent protection is activated. It must be reset manually after eliminating the problem.

7.3.11 Earth leakage relay

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



Q1 ..... Main circuit breaker

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 30 mA 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 T13.

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.

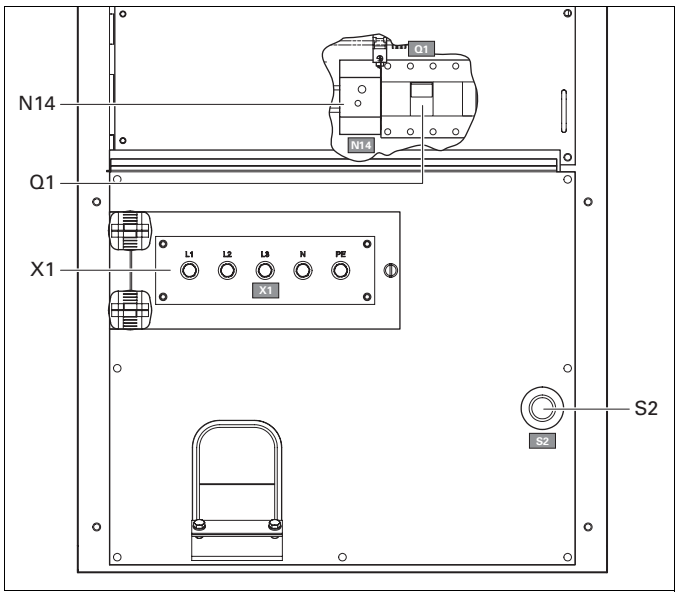
Position 1: De-energising of the main circuit breaker Q1 when an earth fault occurs.

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.

7.3.12 IT-relay

The generator is wired for an IT network i.e. no supply lines of the power supply are directly earthed. A failure in insulation resulting in a too low insulation resistance, is detected by the insulation monitoring relay.

The generator shall not be operated with other networks (such as TT or TN). Doing so will cause tripping of the insulation monitoring relay.
The generator is wired for an IT network i.e. no supply lines of the power supply are directly earthed. A failure in insulation resulting in too low an insulation resistance, is detected by the insulation monitoring relay.
At each start-up and any time a new load is connected, the insulation resistance must be verified. Check for the correct setting of the insulation monitoring relay (factory set at 13 kΩ).



Q1 ..... Circuit breaker for X1

Interrupts the power supply X1 when a short-circuit occurs at the load side, or when the overcurrent protection (QAS 60: 100 A, QAS 80: 125 A, QAS 100: 144 A) is activated. When activated, Q1 interrupts the three phases towards X1. It must be reset manually after eliminating the problem.

X1..... Main power supply (400 Vac)

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

N14 ... Insulation monitoring relay

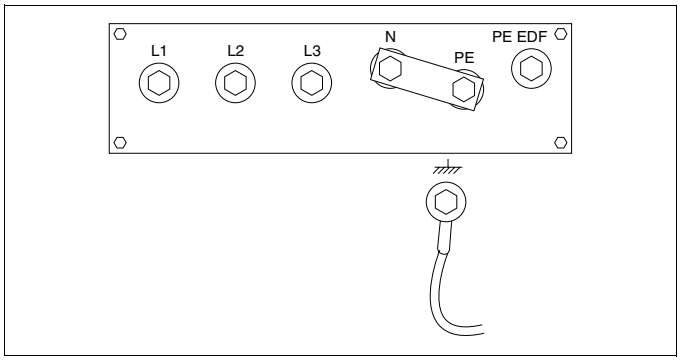
Checks the insulation resistance and activates Q1 when the insulation resistance is too low.

S2..... Emergency stop button

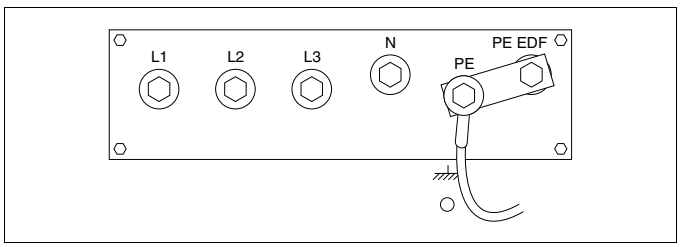
Push the button to stop the generator in case of an emergency. When the button is pressed, it must be unlocked, by turning it anti-clockwise, before the generator can be restarted. The emergency stop button can be secured in the locked position with the key, to avoid unauthorized use.

7.3.13 "Electricité de France" (EDF)

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



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



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

7.3.14 Integrated spark arrestor

The integrated spark arrestor option is included in the refinery equipment pack.

7.3.15 Air inlet shut-off valve

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

7.4 Overview of the mechanical options

The following mechanical options are available for the QAS 60 Pd, QAS 80 Pd and QAS 100 Pd units:

– External fueltank connection (with/without quick couplings)

– Undercarriage (axle, towbar, towing eyes)

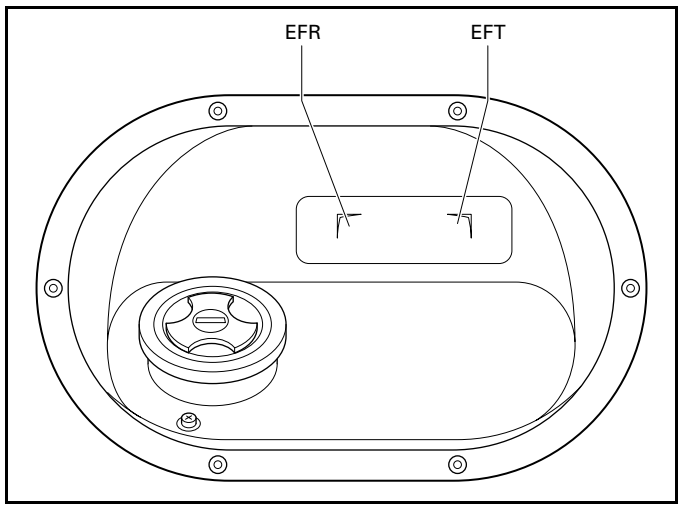
– Skid fueltank

7.5 Description of the mechanical options

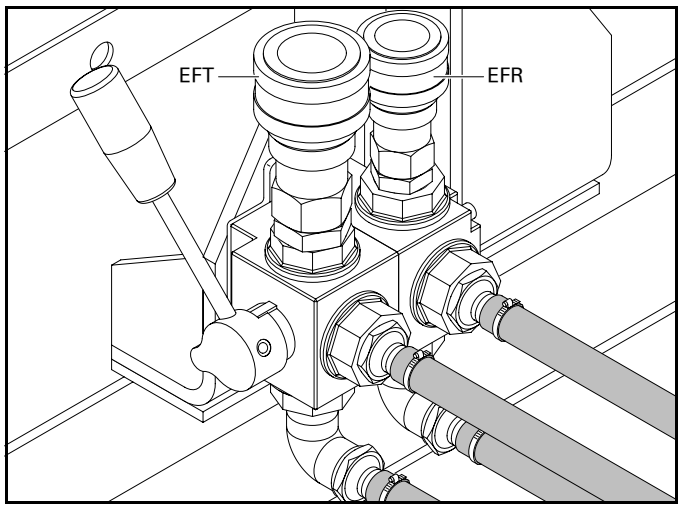
7.5.1 External fueltank connection (with/ without quick couplings)

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

View outside

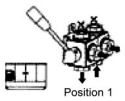


View inside



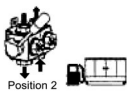
EFT	External fuel tank connection
EFR	External fuel tank return connection

When using this option, make sure to connect the fuel supply line as well as the fuel return line. Connections to fuellines ought to be air-tight to prevent air from entering the fuel system.



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

Position closed: Indicates that the fuel supply line to the engine is closed.



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

7.5.2 Undercarriage (axle, towbar, towing eyes)

The undercarriage is equipped with an adjustable towbar with brakes, with DIN- or NATO-eye and with road signalisation which is approved by EC legislation.

When using this option

- Make sure that the towing equipment of the vehicle matches the towing eye before towing the generator.
- Never move the generator while electrical cables are connected to the unit.
- Always apply the hand brake when parking the generator.
- Leave enough space for operation, inspection and maintenance (at least 1 meter at each side).

To maintain the undercarriage

- Check the tightness of the towbar bolts, the axle bolts and the wheel nuts at least twice a year and after the initial 50 hours of operation.
- Grease the wheel axle suspension bearings, the drawbar to the steering gear shaft and the spindle of the brake handle at least twice a year. Use ball bearing grease for the wheel bearings and graphite grease for the drawbar and spindle.
- Check the brake system twice a year.
- Check the condition of the vibration dampers twice a year.
- Repack the wheel hub bearings once a year using grease.
- Wheel chocks allows to park the generator on sloping ground. Place wheel chocks in front of or behind the wheels to immobilize the generator.

8 Technical specifications

8.1 Technical specifications for QAS 60 Pd units

8.1.1 Readings on gauges

Gauge	*Reading*	*Unit*
Ammeter L1-L3 (P1-P3)	Below max. rating	A
Voltmeter (P4)	Below max. rating	V

8.1.2 Settings of switches

Switch	*Function*	*Activates at*
Engine oil pressure	Shut down	0.5 bar
Engine coolant temperature	Shut down	105°C

8.1.3 Specifications of the engine/alternator/unit

		50 Hz	*60 Hz*
Reference conditions 1)	Rated frequency	50 Hz	60 Hz
	Rated speed (optional)	1500 rpm	1800 rpm
	Generator service duty	PRP	PRP
	Absolute air inlet pressure	100 kPa	100 kPa
	Relative air humidity	30%	30%
	Air inlet temperature	25°C	25°C
Limitations 2)	Maximum ambient temperature	50°C	50°C
	Altitude capability	4000 m	4000 m
	Maximum relative air humidity	85%	85%
	Minimum starting temperature unaided	-18°C	-18°C
	Minimum starting temperature aided (optional)	-25°C	-25°C
Performance data 2) 3) 5)	Rated active power (PRP) 3ph	47 kW	54.6 kW
	Rated active power (PRP) 1ph (optional)	40 kW	45 kW
	Rated power factor (lagging) 3ph	0.8 cos ϕ	0.8 cos ϕ
	Rated power factor (lagging) 1ph (optional)	1 cos ϕ	1 cos ϕ
	Rated PRP power 3ph	58.8 kVA	68.3 kVA
	Rated PRP power 1ph (optional)	40 kVA	45 kVA
	Rated voltage 3ph. line to line	400 V	480 V
	Rated voltage 3ph. line to line lower voltage	230 V	240 V
	Rated voltage 1ph (optional)	230 V	240 V
	Rated current 3ph.	84.9 A	82.2 A
	Rated current 3ph. lower voltage	147.6 A	164.3 A
	Rated current 1ph (optional)	173.9 A	187.5 A
	Performance class (acc.ISO 8528-5:1993)	G2	G2
	Single step load acceptance (0-PRP)	100%	TBA
	Frequency droop (optional)	< 5%	< 5%
		isochronous	isochronous
	Fuel consumption at no load (0%)	1.9 kg/h	TBA
	Fuel consumption at 50% load	5.9 kg/h	TBA
	Fuel consumption at 75% load	8.1 kg/h	TBA
	Fuel consumption at full load (100%)	10.6 kg/h	TBA
	Specific fuel consumption at full load (100%)	0.227 kg/kWh	TBA
	Fuel autonomy at full load with standard tank	13.6 h	TBA
	Fuel autonomy at full load with standard tank and optional skid fueltank	46.2 h	TBA
	Max. oil consumption at full load	15.9 g/h	TBA
	Maximum sound power level (LWA @ 75% PRP load) measured according to 2000/14/EC OND	91 dB(A)	TBA
	Capacity of fuel tank	168 l	168 l
	Capacity of optional skid fuel tank	403 l	403 l
	Single step load acceptance	100%	100%

Application data	Mode of operation	PRP	PRP
	Site	land use	land use
	Operation	single	single
	Start-up and control mode	manual/automatic	manual/automatic
	Start-up time	unspecified	unspecified
	Mobility/ Config. acc. to ISO 8528-1:1993	transportable/D	transportable/D
	(optional)	mobile/E	mobile/E
	Mounting	fully resilient	fully resilient
	Climatic exposure	open air	open air
	Degree of protection (cubicle)	IP54	IP54
	Status of neutral (TT or TN)	earthed	earthed
	Status of neutral (IT)	insulated	-
Alternator 4)	Standard	IEC34-1	IEC34-1
		ISO 8528-3	ISO 8528-3
	Make	NEWAGE	NEWAGE
	Model	UCI224-E1	UCI224-E1
	Rated output, class H temp. rise	60 kVA	75 kVA
	rating type acc. ISO 8528-3	BR	BR
	Degree of protection	IP 23	IP 23
	Insulation stator class	H	H
	Insulation rotor class	H	H
	Number of wires	12	12
Engine 4)	Standard	ISO 3046	ISO 3046
		ISO 8528-2	ISO 8528-2
	Type PERKINS	1104C-44TG3	
	(optional)	1104C-44TG2	1104C-44TG2
	Rated net output	53 kW	61 kW
	rating type acc. ISO 3046-7	ICXN	ICXN
	production tolerance	+/- 5%	+/- 5%
	Coolant	water	water
	Combustion system	direct injection	direct injection
	Aspiration	turbo	turbo
	Number of cylinders	4	4
	Swept volume	4.410 l	4.410 l
	Speed governing	mechanical	
	(optional)	electronic	electronic
	Capacity of oil sump	8.5 l	8.5 l
	Capacity of cooling system	12.6 l	12.6 l
	Electrical system	12 Vdc	12 Vdc
Power circuit	**Circuit-breaker, 3ph**		
	Number of poles	4	4
	Thermal release It (thermal release is higher at 25°C)	100 A	100 A
	Magnetic release Im	3..5xIn	3..5xIn
	Circuit-breaker, 3ph, lower voltage		
	Number of poles (optional)	3	4
	Thermal release It (thermal release is higher at 25°C)	152 A	175 A
	Magnetic release Im	3..5xIn	3..5xIn
	Circuit-breaker, 1ph		
	Number of poles (optional)	3	4
	Thermal release It (thermal release is higher at 25°C)	175 A	187.5 A
	Magnetic release Im	3..5xIn	3..5xIn
	Fault current protection		
	Residual current release IDn	0.030-30 A	0.030-30 A
	Insulation resistance (optional)	10-100 kOhm	

	Outlet sockets (optional)	domestic (1x) 2p + PE 16 A 230 V CEE form (1x) 3p + N + PE 16 A 400 V CEE form (1x) 3p + N + PE 32 A 400 V CEE form (1x) 3p + N + PE 63 A 400 V	
Unit	Dimensions (LxWxH)	2450 x 1100 x 1483 mm	2450 x 1100 x 1483 mm
	Weight net mass	1456 kg	1456 kg
	Weight wet mass	1566 kg	1566 kg

Notes

1) Reference conditions for engine performance to ISO 3046-1.

2) See derating diagram or consult the factory for other conditions.

3) At reference conditions unless otherwise stated.

4) Rating definition (ISO 8528-1):
LTP: Limited Time Power is the maximum electrical power which a generating set is capable of delivering (at variable load), in the event of a utility power failure (for up to 500 hours per year of which a maximum of 300 hours is continuous running). No overload is permitted on these ratings. The alternator is peak continuous rated (as defined in ISO 8528-3) at 25°C.
PRP: Prime Power is the maximum power available during a variable power sequence, which may be run for an unlimited number of hours per year, between stated maintenance intervals and under the stated ambient conditions. A 10% overload is permitted for 1 hour in 12 hours. The permissible average power output during a 24h period shall not exceed the stated load factor of 80%.

5) Specific mass fuel used: 0.86 kg/l.

Derating

Height	**Temperature (°C)**										
(m)	**0**	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**
0	100	100	100	100	100	100	100	98	97	86	76
500	100	100	100	100	100	100	99	98	97	86	76
1000	100	100	100	100	100	99	98	97	96	86	75
1500	97	97	97	97	97	97	97	96	95	85	73
2000	94	94	94	94	94	94	94	94	93	82	71
2500	88	88	88	88	88	88	88	88	88	77	67
3000	88	88	88	88	88	88	88	88	88	77	67
3500	82	82	82	82	82	82	82	82	82	72	62
4000	82	82	82	82	82	82	82	82	82	72	62

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

8.2 Technical specifications for QAS 80 Pd units

8.2.1 Readings on gauges

Gauge	*Reading*	*Unit*
Ammeter L1-L3 (P1-P3)	Below max. rating	A
Voltmeter (P4)	Below max. rating	V

8.2.2 Settings of switches

Switch	*Function*	*Activates at*
Engine oil pressure	shut down	0.5 bar
Engine coolant temperature	shut down	105°C

8.2.3 Specifications of the engine/alternator/unit

		50 Hz	*60 Hz*
Reference conditions 1)	Rated frequency	50 Hz	60 Hz
	Rated speed (optional)	1500 rpm	1800 rpm
	Generator service duty	PRP	PRP
	Absolute air inlet pressure	100 kPa	100 kPa
	Relative air humidity	30%	30%
	Air inlet temperature	25°C	25°C
Limitations 2)	Maximum ambient temperature	50°C	50°C
	Altitude capability	4000 m	4000 m
	Maximum relative air humidity	85%	85%
	Minimum starting temperature unaided	-18°C	-18°C
	Minimum starting temperature aided (optional)	-25°C	-25°C
Performance data 2) 3) 5)	Rated active power (PRP) 3ph	64 kW	72.8 kW
	Rated active power (PRP) 1ph (optional)	56.5 kW	62.5 kW
	Rated power factor (lagging) 3ph	0.8 cos ϕ	0.8 cos ϕ
	Rated power factor (lagging) 1ph (optional)	1 cos ϕ	1 cos ϕ
	Rated PRP power 3ph	80 kVA	91 kVA
	Rated PRP power 1ph (optional)	56.5 kVA	62.5 kVA
	Rated voltage 3ph line to line	400 V	480 V
	Rated voltage 3ph line to line lower voltage	230 V	240 V
	Rated voltage 1ph (optional)	230 V	240 V
	Rated current 3ph	115.5 A	109.5 A
	Rated current 3ph lower voltage	200.8 A	218.9 A
	Rated current 1ph (optional)	245.7 A	260.4 A
	Performance class (acc.ISO 8528-5:1993)	G2	G2
	Single step load acceptance (0-PRP)	90	100
	Frequency droop (optional)	< 5%	< 5%
		isochronous	isochronous
	Fuel consumption at no load (0%)	1.8 kg/h	2.6 kg/h
	Fuel consumption at 50% load	8.0 kg/h	10.1 kg/h
	Fuel consumption at 75% load	11.2 kg/h	13.6 kg/h
	Fuel consumption at full load (100%)	14.6 kg/h	17.1 kg/h
	Specific fuel consumption at full load (100%)	0.229 kg/kWh	0.240 kg/kWh
	Fuel autonomy at full load with standard tank	9.9 h	8.4 h
	Fuel autonomy at full load with standard tank and optional skid fueltank	33.6 h	28.7 h
	Max. oil consumption at full load	21.9 g/h	25.7 g/h
	Maximum sound power level (LWA) measured according to 2000/14/EC	93 dB(A)	96 dB(A)
	OND		
	Capacity of fuel tank	168 l	168 l
	Capacity of optional skid fuel tank	403 l	403 l
	Single step load acceptance	100%	100%

Application data	Mode of operation	PRP	PRP
	Site	land use	land use
	Operation	single	single
	Start-up and control mode	manual/automatic	manual/automatic
	Start-up time	unspecified	unspecified
	Mobility/ Config. acc. to ISO 8528-1:1993	transportable/D	transportable/D
	(optional)	mobile/E	mobile/E
	Mounting	fully resilient	fully resilient
	Climatic exposure	open air	open air
	Degree of protection (cubicle)	IP54	IP54
	Status of neutral (TT or TN)	earthed	earthed
	Status of neutral (IT) (optional)	insulated	-
Alternator 4)	Standard	IEC34-1	IEC34-1
		ISO 8528-3	ISO 8528-3
	Make	NEWAGE	NEWAGE
	Model	UCI224-G1	UCI224-G1
	Rated output, class H temp. rise	85 kVA	103.8 kVA
	rating type acc. ISO 8528-3	BR	BR
	Degree of protection	IP 23	IP 23
	Insulation stator class	H	H
	Insulation rotor class	H	H
	Number of wires	12	12
Engine 4)	Standard	ISO 3046	ISO 3046
		ISO 8528-2	ISO 8528-2
	Type PERKINS	1104C-44TAG1	1104C-44TAG1
	Rated net output	71 kW	80 kW
	rating type acc. ISO 3046-7	ICXN	ICXN
	production tolerance	+/- 5%	+/- 5%
	Coolant	water	water
	Combustion system	direct injection	direct injection
	Aspiration	turbo	turbo
		intercooled	intercooled
	Number of cylinders	4	4
	Swept volume	4.41 l	4.41 l
	Speed governing	mechanical	mechanical
	(optional)	electronic	electronic
	Capacity of oil sump	8.5 l	8.5 l
	Capacity of cooling system	12.6 l	12.6 l
	Electrical system	12 Vdc	12 Vdc
Power circuit	**Circuit-breaker, 3ph**		
	Number of poles	4	4
	Thermal release It (thermal release is higher at 25°C)	125 A	125 A
	Magnetic release Im	3..5xIn	3..5xIn
	Circuit-breaker, 3ph, lower voltage		
	Number of poles (optional)	3	4
	Thermal release It (thermal release is higher at 25°C)	200 A	225 A
	Magnetic release Im	3..5xIn	3..5xIn
	Circuit-breaker, 1ph		
	Number of poles (optional)	3	4
	Thermal release It (thermal release is higher at 25°C)	250 A	250 A
	Magnetic release Im	3..5xIn	3..5xIn
	Fault current protection		
	Residual current release IDn	0.030-30 A	0.030-30 A
	Insulation resistance (optional)	10-100 kOhm	

	Outlet sockets (optional)	domestic (1x) 2p + PE 16 A 230 V CEE form (1x) 3p + N + PE 16 A 400 V CEE form (1x) 3p + N + PE 32 A 400 V CEE form (2x) 3p + N + PE 63 A 400 V	
Unit	Dimensions (LxWxH)	2940 x 1100 x 1500 mm	2940 x 1100 x 1500 mm
	Weight net mass	1699 kg	1699 kg
	Weight wet mass	1854 kg	1854 kg

Notes

1) Reference conditions for engine performance to ISO 3046-1.

2) See derating diagram or consult the factory for other conditions.

3) At reference conditions unless otherwise stated.

4) Rating definition (ISO 8528-1):
LTP: Limited Time Power is the maximum electrical power which a generating set is capable of delivering (at variable load), in the event of a utility power failure (for up to 500 hours per year of which a maximum of 300 hours is continuous running). No overload is permitted on these ratings. The alternator is peak continuous rated (as defined in ISO 8528-3) at 25°C.
PRP: Prime Power is the maximum power available during a variable power sequence, which may be run for an unlimited number of hours per year, between stated maintenance intervals and under the stated ambient conditions. A 10% overload is permitted for 1 hour in 12 hours. The permissible average power output during a 24h period shall not exceed the stated load factor of 80%.

5) Specific mass fuel used: 0.86 kg/l.

Derating

Height (m)	**Temperature (°C)**										
	0	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**
0	100	100	100	100	100	100	99	98	97	86	76
500	100	100	100	100	100	100	99	98	97	86	76
1000	100	100	100	100	100	99	98	97	96	85	75
1500	100	100	100	100	99	98	96	96	95	85	74
2000	99	99	99	98	97	96	95	94	93	83	74
2500	92	92	92	92	92	92	92	92	92	81	69
3000	92	92	92	92	92	92	91	90	89	79	69
3500	86	86	86	86	86	86	86	86	86	75	65
4000	86	86	86	86	86	86	85	84	83	74	65

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

8.3 Technical specifications for QAS 100 Pd units

8.3.1 Readings on gauges

Gauge	*Reading*	*Unit*
Ammeter L1-L3 (P1-P3)	Below max. rating	A
Voltmeter (P4)	Below max. rating	V

8.3.2 Settings of switches

Switch	*Function*	*Activates at*
Engine oil pressure	shut down	0.5 bar
Engine coolant temperature	shut down	105°C

8.3.3 Specifications of the engine/alternator/unit

		50 Hz	*60 Hz*
Reference conditions 1)	Rated frequency	50 Hz	60 Hz
	Rated speed (optional)	1500 rpm	1800 rpm
	Generator service duty	PRP	PRP
	Absolute air inlet pressure	100 kPa	100 kPa
	Relative air humidity	30 %	30 %
	Air inlet temperature	25°C	25°C
Limitations 2)	Maximum ambient temperature	50°C	50°C
	Altitude capability	4000 m	4000 m
	Maximum relative air humidity	85%	85%
	Minimum starting temperature unaided	-18°C	-18°C
	Minimum starting temperature aided (optional)	-25°C	-25°C
Performance data 2) 3) 5)	Rated active power (PRP) 3ph	80 kW	92 kW
	Rated active power (PRP) 1ph (optional)	60 kW	67.5 kW
	Rated power factor (lagging) 3ph	0.8 cos ϕ	0.8 cos ϕ
	Rated power factor (lagging) 1ph (optional)	1 cos ϕ	1 cos ϕ
	Rated PRP power 3ph	100 kVA	115 kVA
	Rated PRP power 1ph (optional)	60 kVA	67.5 kVA
	Rated voltage 3ph. line to line	400 V	480 V
	Rated voltage 3ph. line to line lower voltage	230 V	240 V
	Rated voltage 1ph (optional)	230 V	240 V
	Rated current 3ph.	144.3 A	138.3 A
	Rated current 3ph. lower voltage	251.0 A	276.6 A
	Rated current 1ph. (optional)	260.9 A	281.3 A
	Performance class (acc.ISO 8528-5:1993)	G2	G2
	Frequency droop (optional)	< 5% isochronous	< 5% isochronous
	Fuel consumption at no load (0%)	2.2 kg/h	3.1 kg/h
	Fuel consumption at 50% load	10.2 kg/h	12.6 kg/h
	Fuel consumption at 75% load	14.2 kg/h	17.5 kg/h
	Fuel consumption at full load (100%)	18.8 kg/h	23.1 kg/h
	Specific fuel consumption at full load (100%)	0.236 kg/kWh	0.255 kg/kWh
	Fuel autonomy at full load with standard tank	8 h	6 h
	Fuel autonomy at full load with standard tank and optional skid fueltank	26 h	21 h
	Max. oil consumption at full load	28.2 g/h	34.7 g/h
	Maximum sound power level (LWA) measured according to 2000/14/EC OND	93 dB(A)	97 dB(A)
	Capacity of fuel tank	168 l	168 l
	Capacity of optional skid fuel tank	403 l	403 l
	Single step load acceptance	80%	90%

Application data	Mode of operation	PRP	PRP
	Site	land use	land use
	Operation	single	single
	Start-up and control mode	manual/automatic	manual/automatic
	Start-up time	unspecified	unspecified
	Mobility/ Config. acc. to ISO 8528-1:1993	transportable/D	transportable/D
	(optional)	mobile/E	mobile/E
	Mounting	fully resilient	fully resilient
	Climatic exposure	open air	open air
	Degree of protection (cubicle)	IP54	IP54
	Status of neutral (TT or TN)	earthed	earthed
	Status of neutral (IT) (optional)	insulated	-
Alternator 4)	Standard	IEC34-1	IEC34-1
		ISO 8528-3	ISO 8528-3
	Make	NEWAGE	NEWAGE
	Model	UCI274-C1	UCI274-C1
	Rated output, class H temp. rise	100 kVA	125 kVA
	rating type acc. ISO 8528-3	BR	BR
	Degree of protection	IP 23	IP 23
	Insulation stator class	H	H
	Insulation rotor class	H	H
	Number of wires	12	12
Engine 4)	Standard	ISO 3046	ISO 3046
		ISO 8528-2	ISO 8528-2
	Type PERKINS	1104C-44TAG2	1104C-44TAG2
	Rated net output	89 kW	100 kW
	rating type acc. ISO 3046-7	ICXN	ICXN
	production tolerance	+/- 5%	+/- 5%
	Coolant	water	water
	Combustion system	direct injection	direct injection
	Aspiration	turbo intercooled	turbo intercooled
	Number of cylinders	4	4
	Swept volume	4.41 l	4.41 l
	Speed governing	electronic	electronic
	Capacity of oil sump	8.5 l	8.5 l
	Capacity of cooling system	12.6 l	12.6 l
	Electrical system	12 Vdc	12 Vdc
Power circuit	**Circuit-breaker, 3ph**		
	Number of poles	4	4
	Thermal release It (thermal release is higher at 25°C)	144 A	144 A
	Magnetic release Im	3..5xIn	3..5xIn
	Circuit-breaker, 3ph, lower voltage		
	Number of poles (optional)	3	4
	Thermal release It (thermal release is higher at 25°C)	252 A	280 A
	Magnetic release Im	3..5xIn	3..5xIn
	Circuit-breaker, 1ph		
	Number of poles (optional)	3	4
	Thermal release It (thermal release is higher at 25°C)	280 A	280 A
	Magnetic release Im	3..5xIn	3..5xIn
	Fault current protection		
	Residual current release IDn	0.030-30 A	0.030-30 A
	Insulation resistance (optional)	10-100 kOhm	

	Outlet sockets (optional)	domestic (1x) 2p + PE 16 A 230 V CEE form (1x) 3p + N + PE 16 A 400 V CEE form (1x) 3p + N + PE 32 A 400 V CEE form (2x) 3p + N + PE 63 A 400 V	
Unit	Dimensions (LxWxH)	2940 x 1100 x 1500 mm	2940 x 1100 x 1500 mm
	Weight net mass	1810 kg	1810 kg
	Weight wet mass	1960 kg	1960 kg

Notes

1) Reference conditions for engine performance to ISO 3046-1.

2) See derating diagram or consult the factory for other conditions.

3) At reference conditions unless otherwise stated.

4) Rating definition (ISO 8528-1):
LTP: Limited Time Power is the maximum electrical power which a generating set is capable of delivering (at variable load), in the event of a utility power failure (for up to 500 hours per year of which a maximum of 300 hours is continuous running). No overload is permitted on these ratings. The alternator is peak continuous rated (as defined in ISO 8528-3) at 25°C.
PRP: Prime Power is the maximum power available during a variable power sequence, which may be run for an unlimited number of hours per year, between stated maintenance intervals and under the stated ambient conditions. A 10% overload is permitted for 1 hour in 12 hours. The permissible average power output during a 24h period shall not exceed the stated load factor of 80%.

5) Specific mass fuel used: 0.86 kg/l.

Derating

Height (m)	**Temperature (°C)**										
	0	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**
0	100	100	100	100	100	100	100	98	97	87	75
500	100	100	100	100	100	100	99	98	97	87	75
1000	100	100	100	100	100	99	98	97	96	86	75
1500	97	97	97	97	97	97	97	96	95	85	73
2000	94	94	94	94	94	94	94	94	93	82	71
2500	88	88	88	88	88	88	88	88	88	77	66
3000	88	88	88	88	88	88	88	88	88	77	66
3500	82	82	82	82	82	82	82	82	82	72	62
4000	82	82	82	82	82	82	82	82	82	72	62

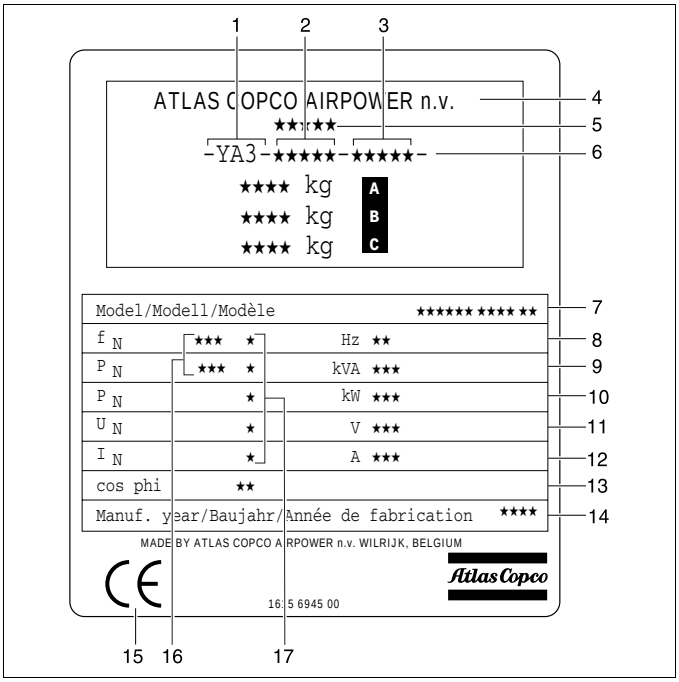
For use of generator outside these conditions, please contact Atlas Copco.

8.4 Conversion list of SI units into British units

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

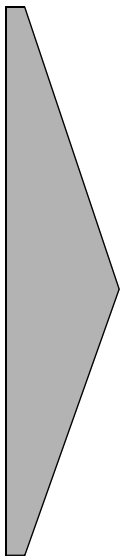
A temperature difference of 1°C = a temperature difference of 1.8°F.

8.5 Dataplate

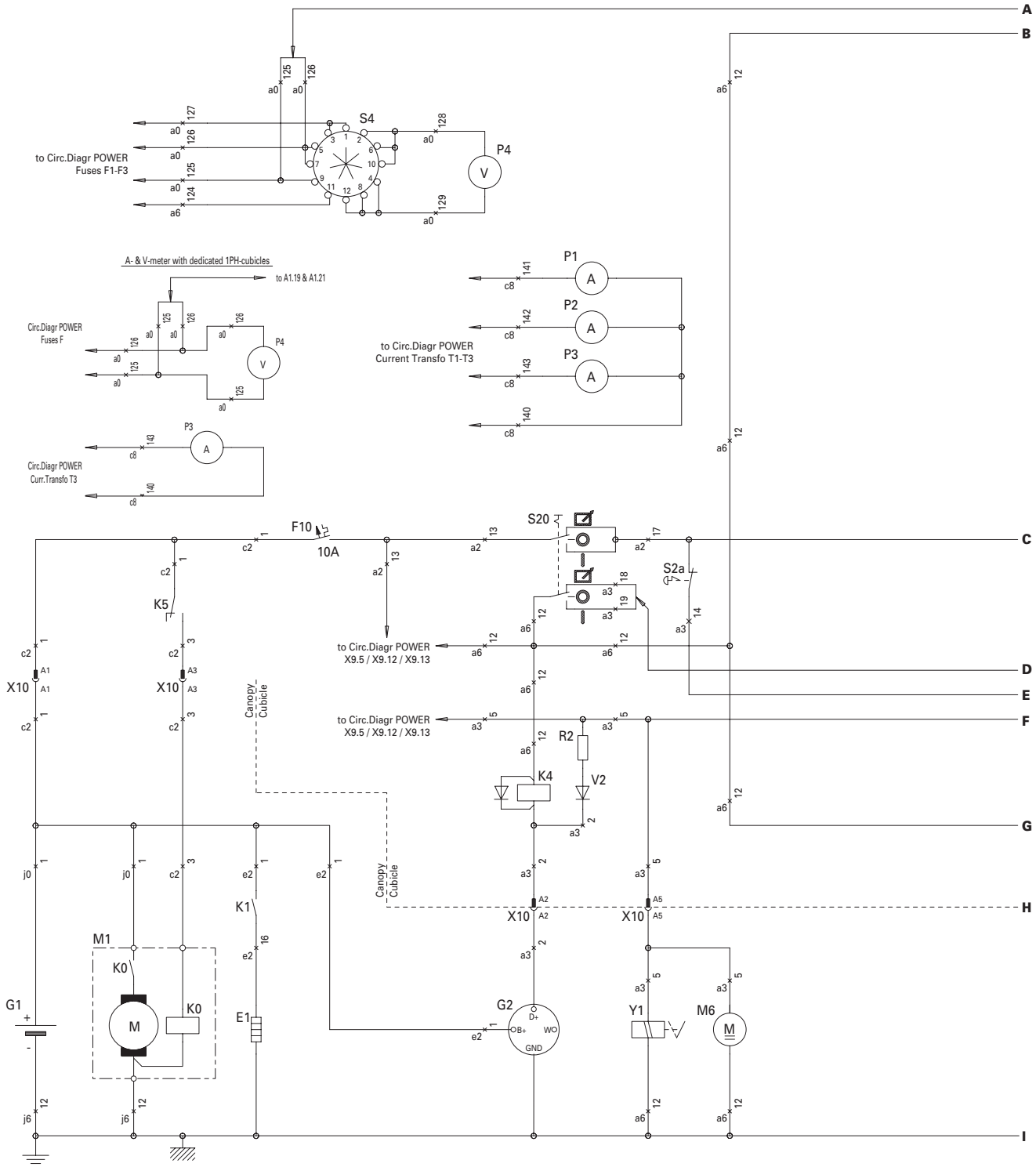


A	Maximum permitted loaded weight of the vehicle
B	Maximum permitted road weight of the front axle
C	Maximum permitted road weight of the rear axle
1	Company code
2	Product code
3	Unit serial number
4	Name of manufacturer
5	EEC or national type approved number
6	Vehicle identification number
7	Model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

Circuit diagrams

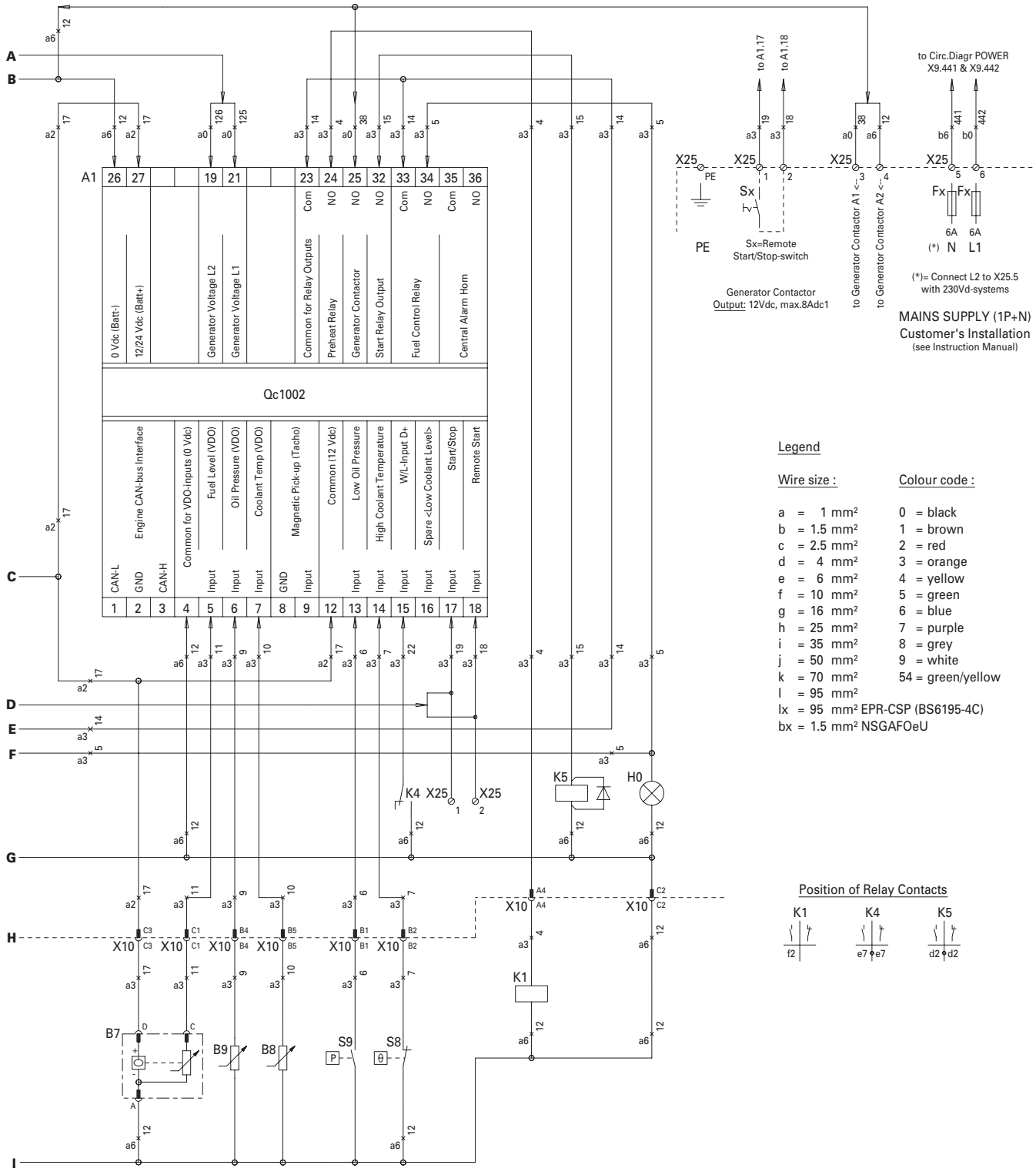


9822 0992 18/04
Applicable for QAS 60-80-100 Qc1002™



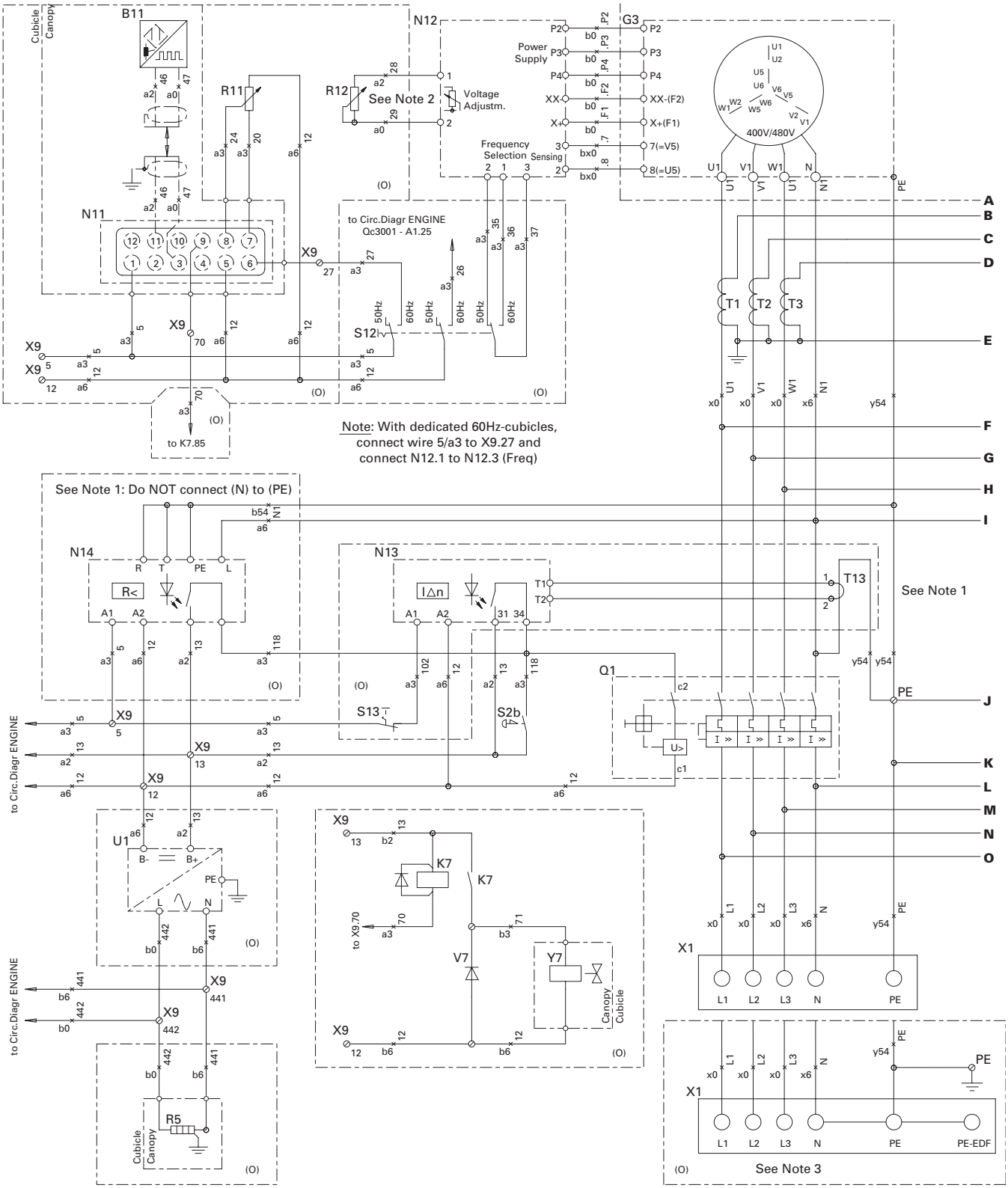
A1	Generator control unit (set A1 in UNIT-type 2)	F10	Fuse 10 A	K4	W/L-inverter relay
B7	Fuel level sensor	G1	Battery 12 Vdc	K5	Starter relay
B8	Coolant temperature sensor	G2	Charging alternator	M1	Starter motor
B9	Oil pressure sensor	H0	Panel light	M6	Fuel feed pump
E1	Preheat resistor	K0	Starter solenoid	P1-3	Amperemeter
		K1	Preheat Relay	P4	Voltmeter

CIRCUIT DIAGRAMS

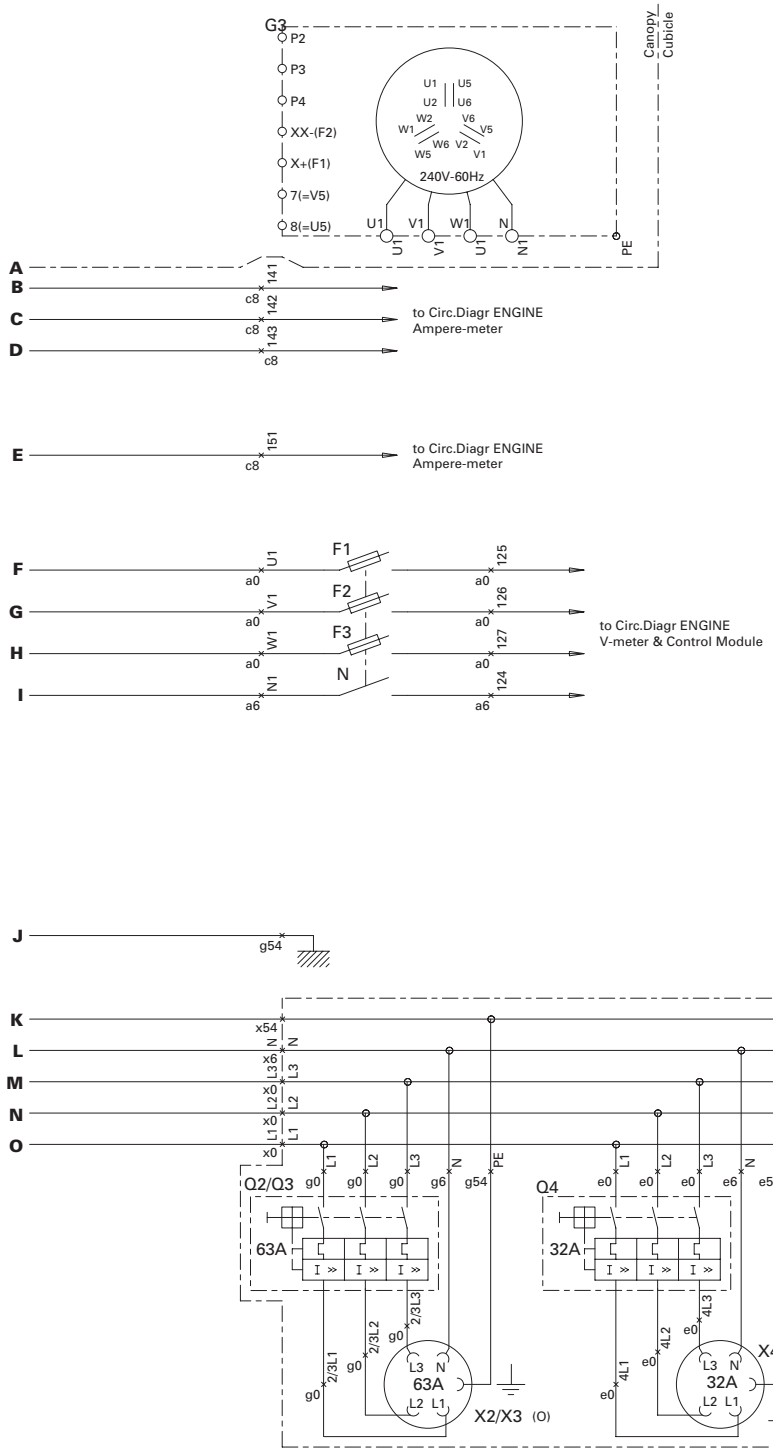


R2	Excitation resistor 47 Ohm	S8	High coolant temperature switch	X10	Connector wire harness
S2a	Emergency stop	S9	Low oil pressure switch	X25	Customer's terminal strip
	(S2b: see Power Circuit)	S20	ON/OFF/Remote switch	Y1	Fuel stop solenoid
S4	Voltmeter change-over switch	V2	Excitation diode		

9822 0992 20/03
Applicable for QAS 60-80-100 Power Circuit diagram



CIRCUIT DIAGRAMS



Legend

Wire size :	Colour code :
a = 1 mm²	0 = black
b = 1.5 mm²	1 = brown
c = 2.5 mm²	2 = red
d = 4 mm²	3 = orange
e = 6 mm²	4 = yellow
f = 10 mm²	5 = green
g = 16 mm²	6 = blue
h = 25 mm²	7 = purple
i = 35 mm²	8 = grey
j = 50 mm²	9 = white
k = 70 mm²	54 = green/yel.
l = 95 mm²	
lx = 95 mm²	EPR-CSP (BS6195-4C)
bx = 1.5 mm²	NSGAFOeU

Notes

Note 1: The PE-N connection has to be made at the alternator-side of main Circuit Breaker Q1.
Note 2: Link N12.1 to N12.2 on gen-sets without Electronic Speed Regulation (= no potentiometer R12).
Note 3: With "TB EDF", do NOT connect (N) to (PE) at Q1. T13 is to be mounted on the (PE)-conductor, instead of on the PE-N connection in the cubicle.

400V/480V

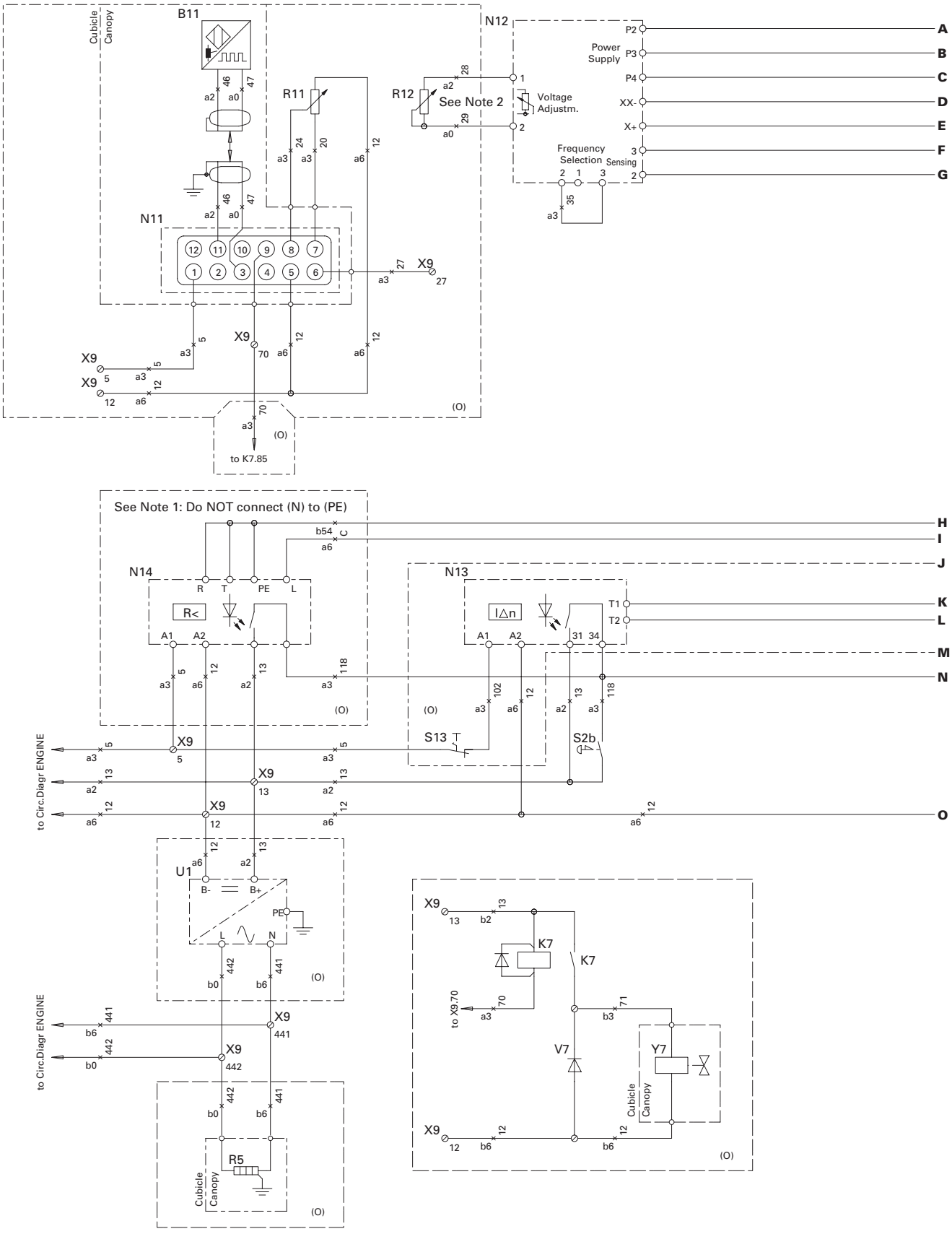
QAS	T1	Q1	Wire Size x	Wire Size y
45	60/5A	63A	16mm²	16mm²
60	100/5A	100A	35mm²	16mm²
80	150/5A	125A	50mm²	25mm²
100	150/5A	144A	50mm²	25mm²

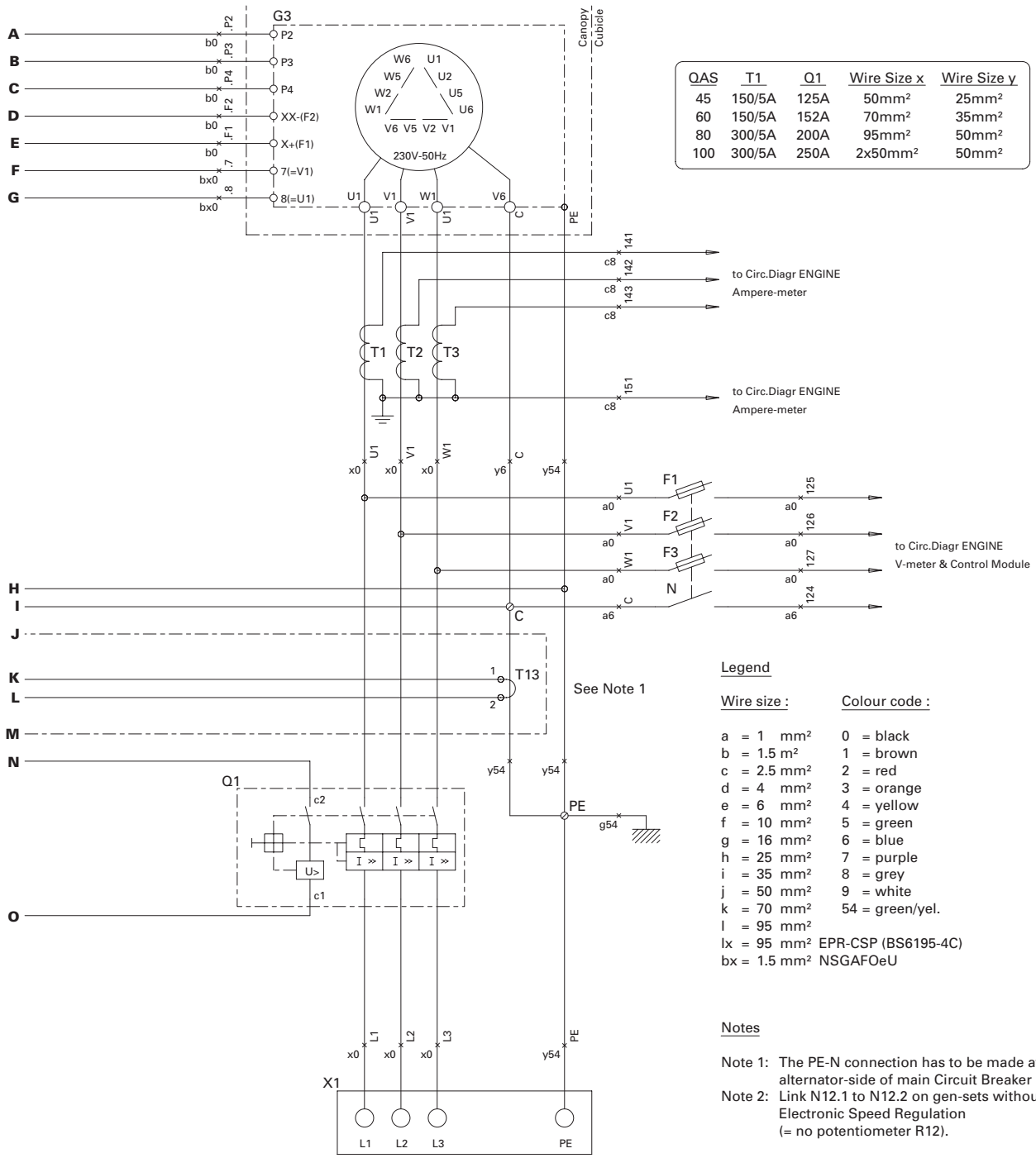
240V-60Hz

QAS	T1	Q1	Wire Size x	Wire Size y
55LV	150/5A	136A	50mm²	25mm²
70LV	300/5A	175A	70mm²	35mm²
95LV	300/5A	237A	2x50mm²	50mm²
115LV	300/5A	280A	2x50mm²	50mm²

B11	Speed sensor MPU (O)	Q5	Circuit breaker 16 A	V7	Free-wheeling diode Y7
F1-F3	Fuses 4 A	Q6	Circuit breaker 16 A/30 mA	X1	Terminal board
G3	Alternator	R5	Coolant heater (O)	X2	Outlet socket 63 A
K7	Auxiliary relay for Y7 (O)	R11	Speed adjustment 5 K (O)	X3	Outlet socket 63 A (Only for QAS 80-100)
N11	Speed controller (O)	R12	Voltage adjustment 1 K (O)	X4	Outlet socket 32 A
N12	Automatic voltage regulator	S2b	Emergency stop	X5	Outlet socket 16 A
N13	Earth leakage relay (O)		(S2a: see Engine Circuit)	X6	Outlet socket 16 A
N14	IT-relay (O)	S12	50/60 Hz switch (O)	X9	Terminal strip
Q1	Circuit breaker	S13	E.L.R. Disable Switch (O)	Y7	Air Inlet Shutdown Valve (O)
Q2	Circuit breaker 63 A	T1-T3	Current transformers	(O)	Optional equipment
Q3	Circuit breaker 63 A (Only for QAS 80-100)	T13	Torus earth leakage (O)		
Q4	Circuit breaker 32 A	U1	Battery charger (O)		

9822 0992 21/02
Applicable for QAS 60-80-100 Low voltage





QAS	T1	Q1	Wire Size x	Wire Size y
45	150/5A	125A	50mm²	25mm²
60	150/5A	152A	70mm²	35mm²
80	300/5A	200A	95mm²	50mm²
100	300/5A	250A	2x50mm²	50mm²

Legend

Wire size :	Colour code :
a = 1 mm²	0 = black
b = 1.5 m²	1 = brown
c = 2.5 mm²	2 = red
d = 4 mm²	3 = orange
e = 6 mm²	4 = yellow
f = 10 mm²	5 = green
g = 16 mm²	6 = blue
h = 25 mm²	7 = purple
i = 35 mm²	8 = grey
j = 50 mm²	9 = white
k = 70 mm²	54 = green/yel.
l = 95 mm²	
lx = 95 mm²	EPR-CSP (BS6195-4C)
bx = 1.5 mm²	NSGAFOeU

Notes

Note 1: The PE-N connection has to be made at the alternator-side of main Circuit Breaker Q1.
Note 2: Link N12.1 to N12.2 on gen-sets without Electronic Speed Regulation (= no potentiometer R12).

B11	Speed sensor MPU (O)	Q1	Circuit breaker	T13	Torus earth leakage (O)
F1-F3	Fuses 4 A	R5	Coolant heater (O)	U1	Battery charger (O)
G3	Alternator	R11	Speed adjustment 5 K (O)	V7	Free-wheeling diode Y7
K7	Auxiliary relay for Y7 (O)	R12	Voltage adjustment 1 K (O)	X1	Terminal board
N11	Speed controller (O)	S2b	Emergency stop	X9	Terminal strip
N12	Automatic voltage regulator		(S2a: see Engine Circuit)	Y7	Air Inlet Shutdown Valve (O)
N13	Earth leakage relay (O)	S13	E.L.R. Disable Switch (O)	(O)	Optional equipment
N14	IT-relay (O)	T1-T3	Current transformers		

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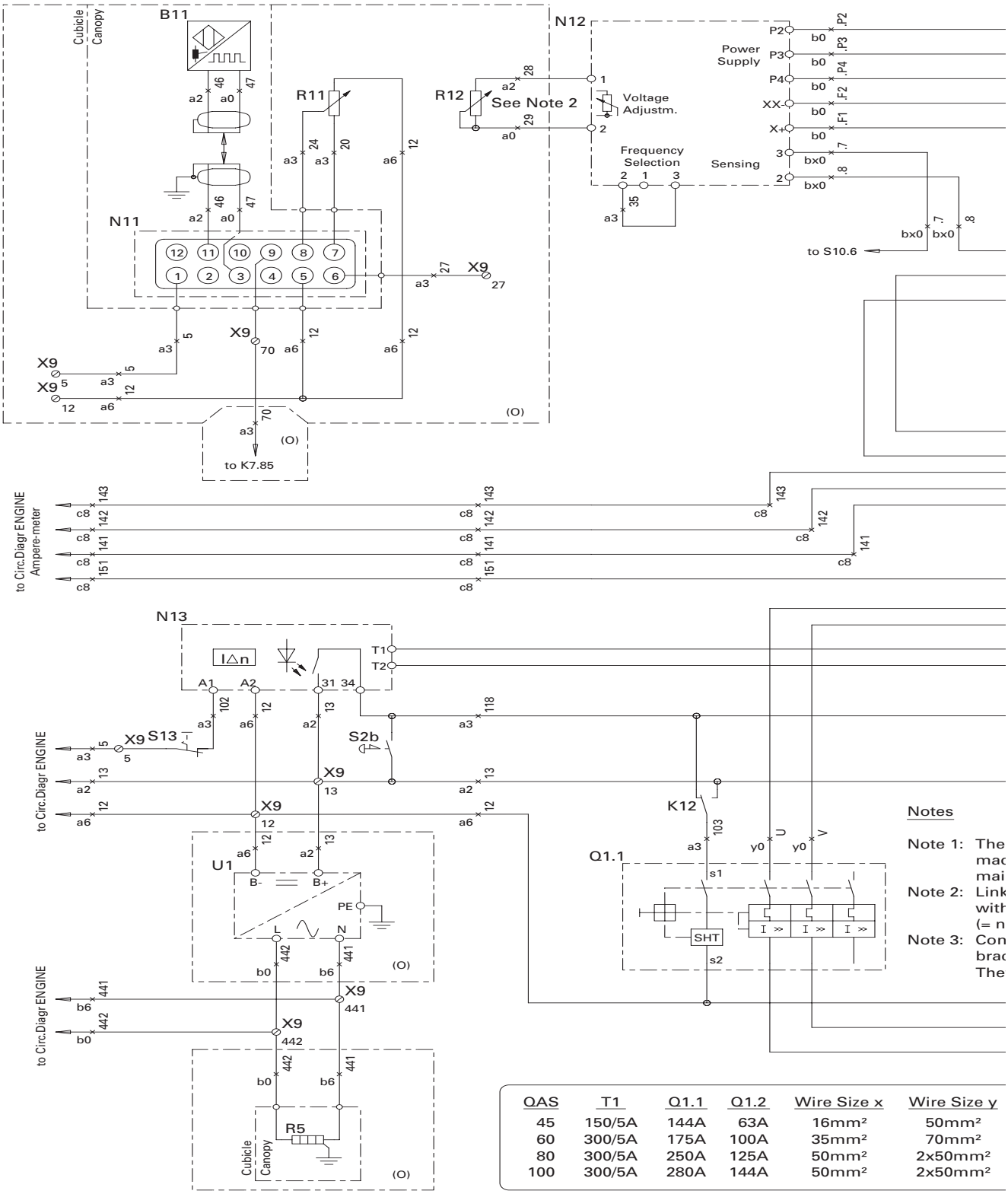
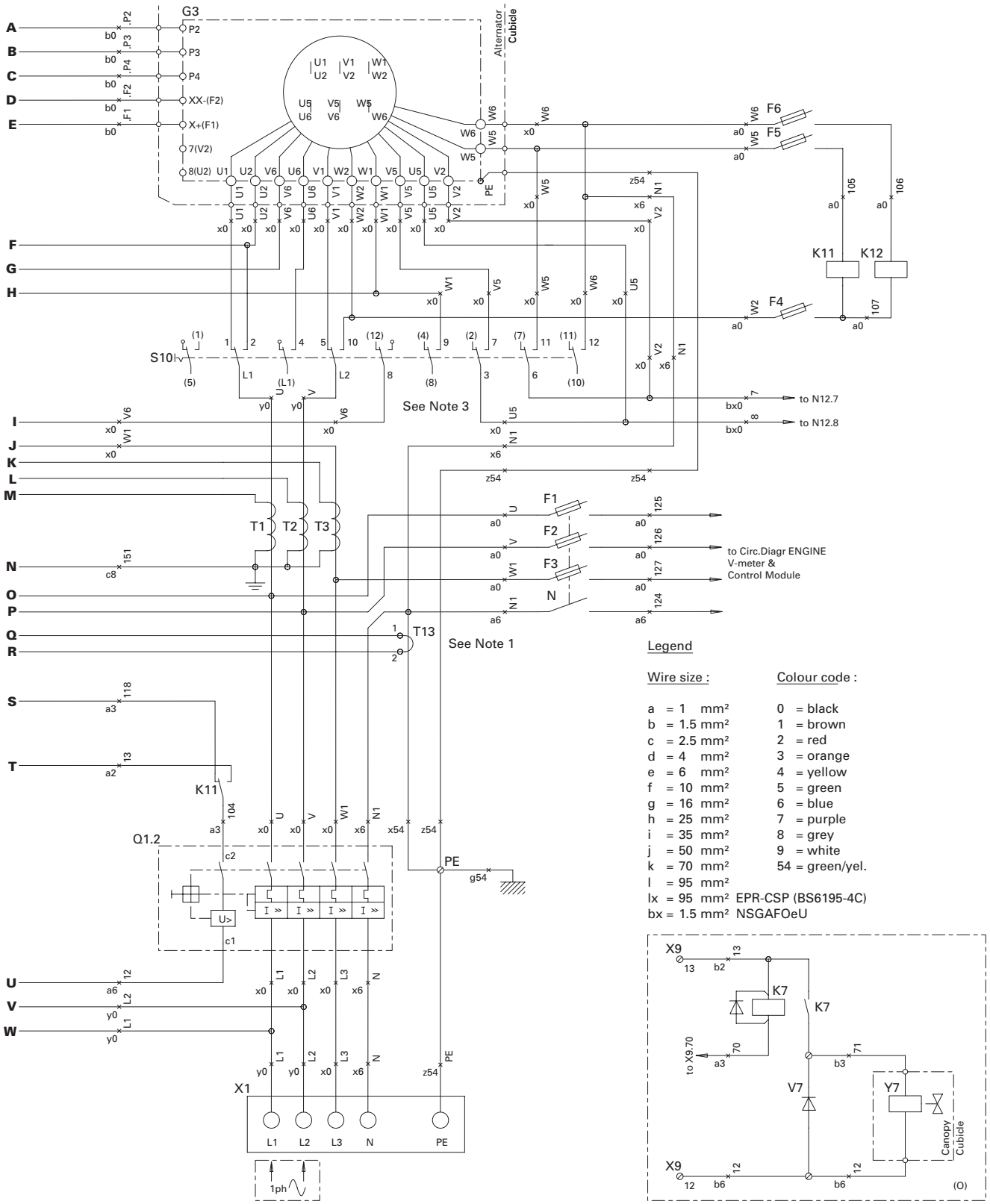


QAS	T1	Q1.1	Q1.2	Wire Size x	Wire Size y
45	150/5A	144A	63A	16mm²	50mm²
60	300/5A	175A	100A	35mm²	70mm²
80	300/5A	250A	125A	50mm²	2x50mm²
100	300/5A	280A	144A	50mm²	2x50mm²

B11	Speed Sensor MPU (O)	K12	Auxiliary Relay Select 400Vy (HV)	Q1.2	Circuit Breaker 400Vy (HV)
F1-F6	Fuses 4A	N11	Speed Controller (O)	R5	Coolant Heater (O)
G3	Alternator	N12	Automatic Voltage Regulator	R11	Speed Adjustment 5K (O)
K7	Auxiliary Relay for Y7 (O)	N13	Earth Leakage Relay	R12	Voltage Adjustment 1K (O)
K11	Auxiliary Relay Select 230Vzz (LV)	Q1.1	Circuit Breaker 230Vzz (LV)		



S2b	Emergency Stop (S2a: see Engine Circuit)	T1-T3	Current Transformer	X1	Terminal Board
		T13	Torus Earth Leakage	X9	Terminal Strip
S10	Voltage Selector Switch	U1	Battery Charger (O)	Y7	Air Inlet Shutdown Valve (O)
S13	E.L.R. Disable Switch	V7	Free-wheeling Diode Y7 (O)	(O)	Optional Equipment

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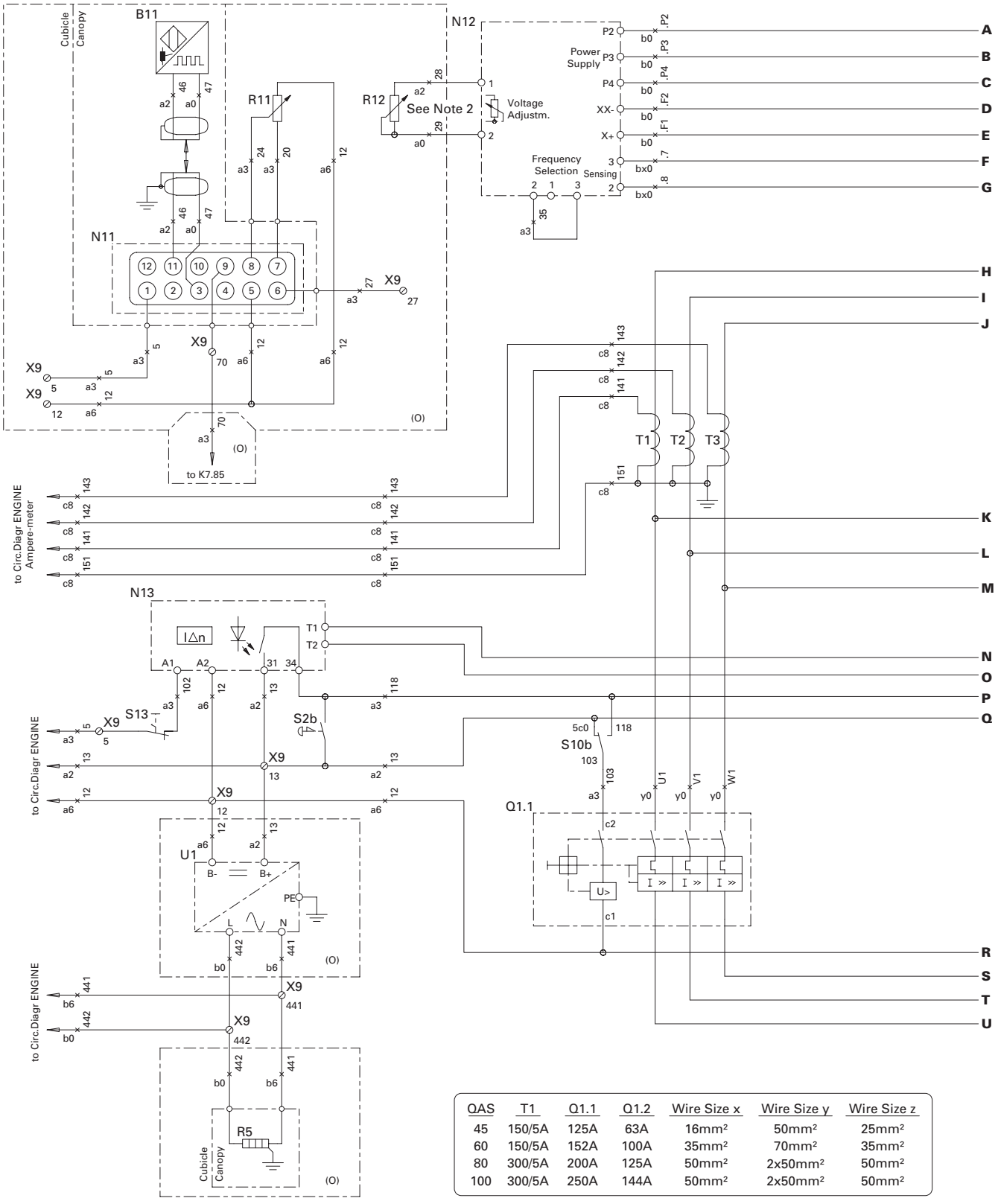
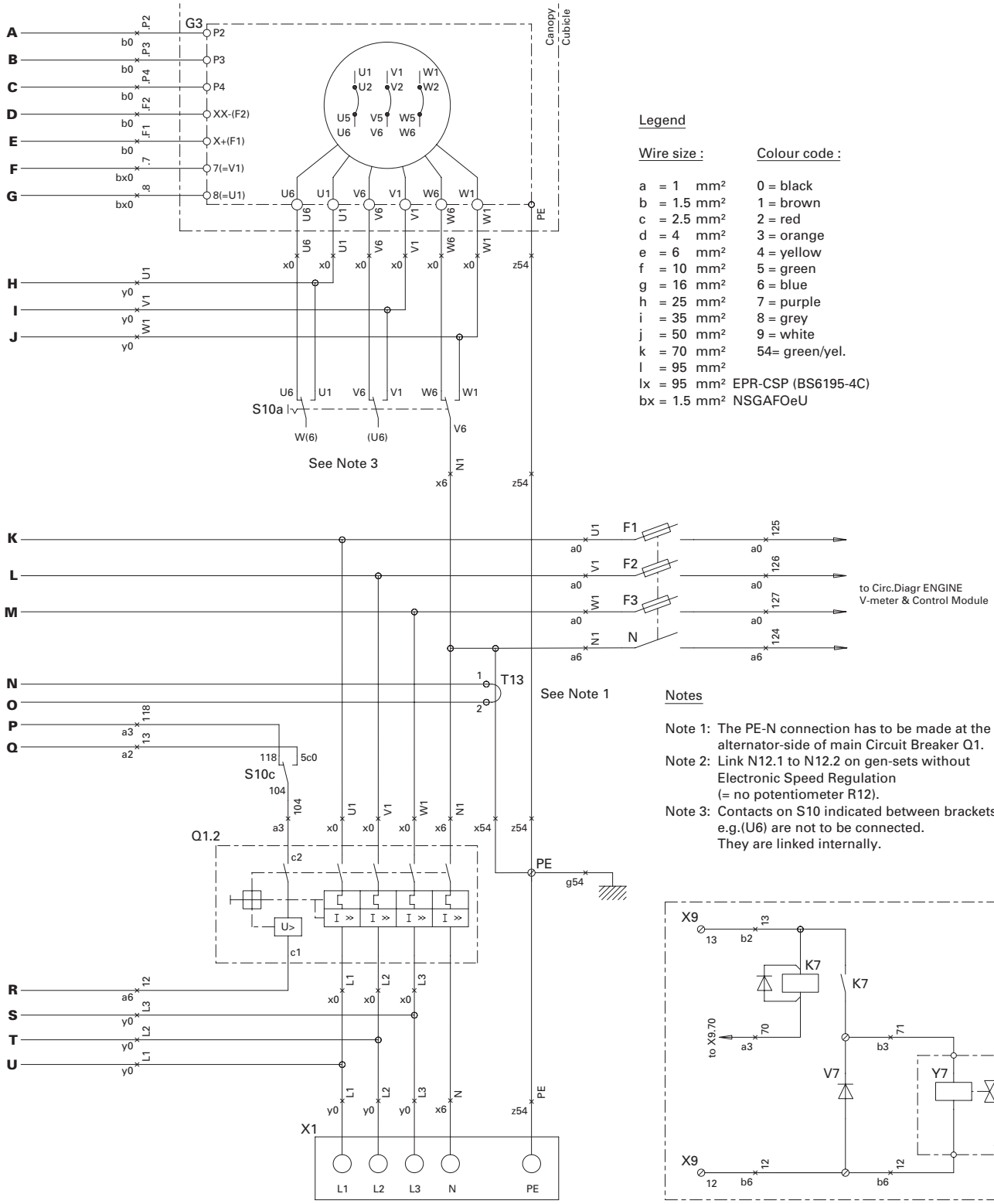
Applicable for QAS 60-80-100 Dual voltage



QAS	T1	Q1.1	Q1.2	Wire Size x	Wire Size y	Wire Size z
45	150/5A	125A	63A	16mm²	50mm²	25mm²
60	150/5A	152A	100A	35mm²	70mm²	35mm²
80	300/5A	200A	125A	50mm²	2x50mm²	50mm²
100	300/5A	250A	144A	50mm²	2x50mm²	50mm²

B11	Speed Sensor MPU (O)	N11	Speed Controller (O)	Q1.2	Circuit Breaker 400Vy (HV)
F1-F3	Fuses 4A	N12	Automatic Voltage Regulator	R5	Coolant Heater (O)
G3	Alternator	N13	Earth Leakage Relay	R11	Speed Adjustment 5K (O)
K7	Auxiliary Relay for Y7 (O)	Q1.1	Circuit Breaker 230Vd (LV)	R12	Voltage Adjustment 1K (O)

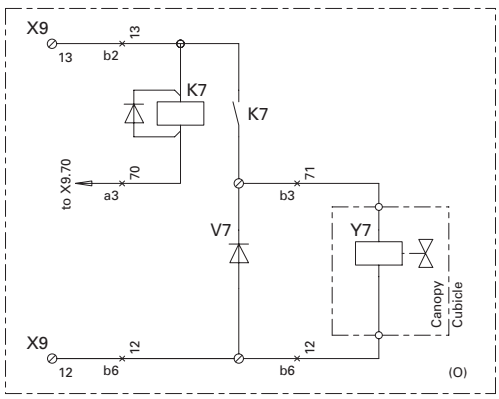


Legend

Wire size :		Colour code :
a	= 1 mm²	0 = black
b	= 1.5 mm²	1 = brown
c	= 2.5 mm²	2 = red
d	= 4 mm²	3 = orange
e	= 6 mm²	4 = yellow
f	= 10 mm²	5 = green
g	= 16 mm²	6 = blue
h	= 25 mm²	7 = purple
i	= 35 mm²	8 = grey
j	= 50 mm²	9 = white
k	= 70 mm²	54= green/yel.
l	= 95 mm²	
lx	= 95 mm²	EPR-CSP (BS6195-4C)
bx	= 1.5 mm²	NSGAFOeU

Notes

Note 1: The PE-N connection has to be made at the alternator-side of main Circuit Breaker Q1.
Note 2: Link N12.1 to N12.2 on gen-sets without Electronic Speed Regulation (= no potentiometer R12).
Note 3: Contacts on S10 indicated between brackets, e.g.(U6) are not to be connected. They are linked internally.



S2b	Emergency Stop (S2a: see Engine Circuit)	T1-T3	Current Transformers	X1	Terminal Board
S10a-c	Voltage Selector Switch	T13	Torus Earth Leakage	X9	Terminal Strip
S13	E.L.R. Disable Switch	U1	Battery Charger (O)	Y7	Air Inlet ShutdownValve (opt)
		V7	Free-wheeling Diode Y7 (O)	(O)	Optional Equipment

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Applicable for QAS 80-100 Qc4001™

Legend

Wire size :

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 (BS6195-4C)
bx	= 1.5	mm² NSGAFOeU

Colour code :

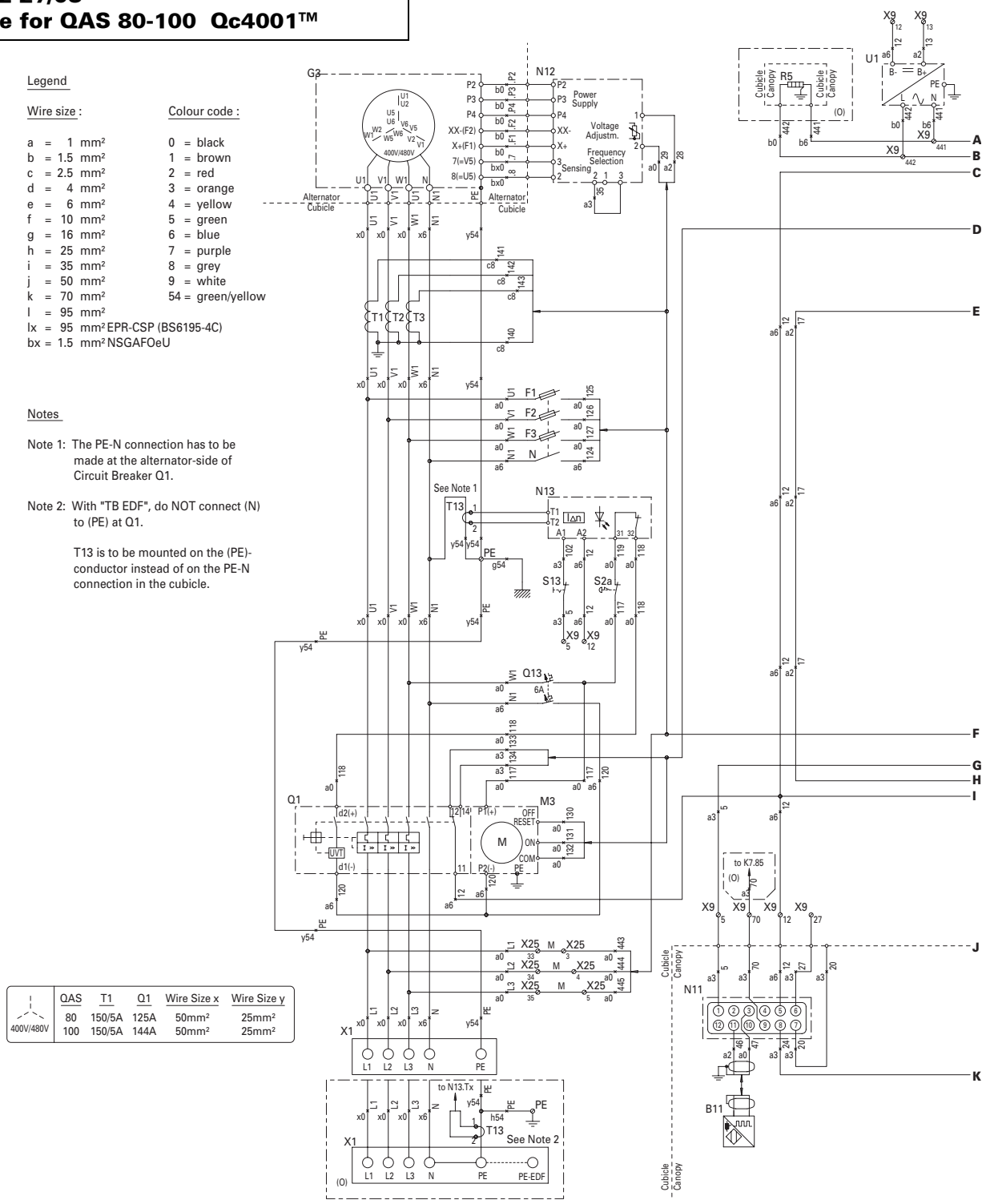
0	=	black
1	=	brown
2	=	red
3	=	orange
4	=	yellow
5	=	green
6	=	blue
7	=	purple
8	=	grey
9	=	white
54	=	green/yellow

Notes

Note 1: The PE-N connection has to be made at the alternator-side of Circuit Breaker Q1.

Note 2: With "TB EDF", do NOT connect (N) to (PE) at Q1.

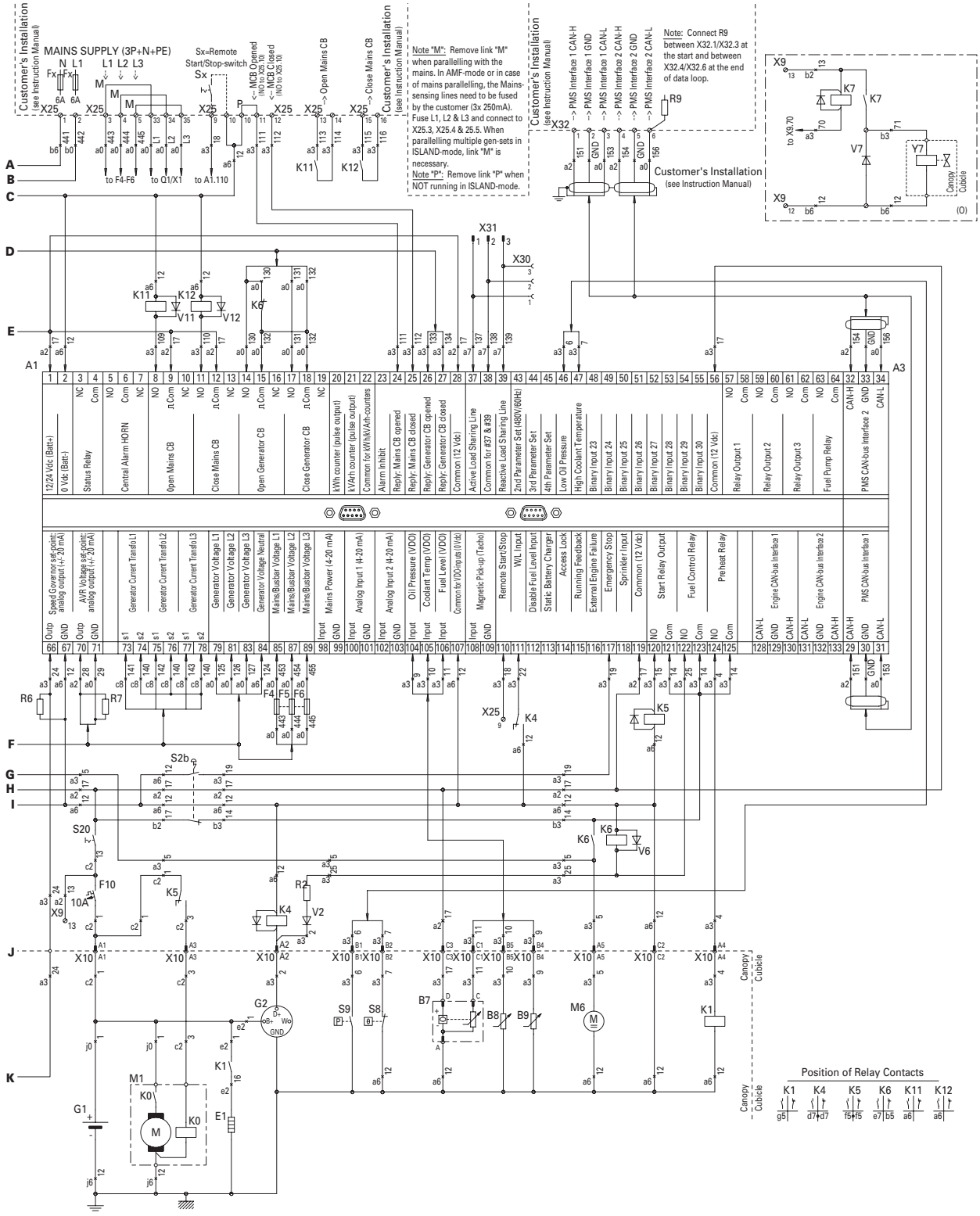
T13 is to be mounted on the (PE)-conductor instead of on the PE-N connection in the cubicle.



400V/480V	QAS	T1	Q1	Wire Size x	Wire Size y
	80	150/5A	125A	50mm²	25mm²
	100	150/5A	144A	50mm²	25mm²

A1	Generator Control Unit	E1	Preheat Resistor	K1	Preheat Relay
A2	LCD Display	F1-F6	Fuse 250mA	K4	W/L inverter Relay
A3	PMS CAN-communication	F10	Fuse 10A DC	K5	Starter Relay
B7	Fuel Level Sensor	G1	Battery 12Vdc	K6	Fuel Solenoid Relay
B8	Coolant Temperature Sensor	G2	Charging Alternator	K7	Auxiliary Relay for Y7 (O)
B9	Oil Pressure Sensor	G3	Alternator	K11	Auxiliary Relay Open MCB
B11	Speed Sensor MPU	K0	Starter Solenoid	K12	Auxiliary Relay Close MCB

CIRCUIT DIAGRAMS



M1	Starter Motor	R7	Resistor 220 ohm Voltage Adjustment	V6	Free-wheeling Diode K6
M3	Motor Drive for Q1	R9	Resistor 120 ohm PMS CAN-bus	V7	Free-wheeling Diode Y7 (O)
M6	Fuel Feed Pump	S2	Emergency Stop	V11-12	Free-wheeling Diode K11, K12
N11	Speed Controller	S8	High Coolant Temperature Switch	X1	Terminal Board
N12	Automatic Voltage Regulator	S9	Low Oil Pressure Switch	X9	Terminal Strip
N13	Earth Leakage Relay	S13	Earth Leakage Disable Switch	X10	Connector Wire Harness
Q1	Circuit Breaker	S20	ON/OFF-switch	X25	Customer's Terminal Strip
Q13	Circuit Breaker 6A	T1-3	Current Transformers	X30-31	Connector Load Sharing Lines
R2	Excitation Resistor 47ohm	T13	Torus Earth Leakage	X32	PMS Interface Terminals
R5	Coolant Heater (O)	U1	Battery Charger	Y7	Air Inlet Shutdown Valve (O)
R6	Resistor 120 ohm Speed Adjustment	V2	Excitation Diode	(O)	Optional Equipment

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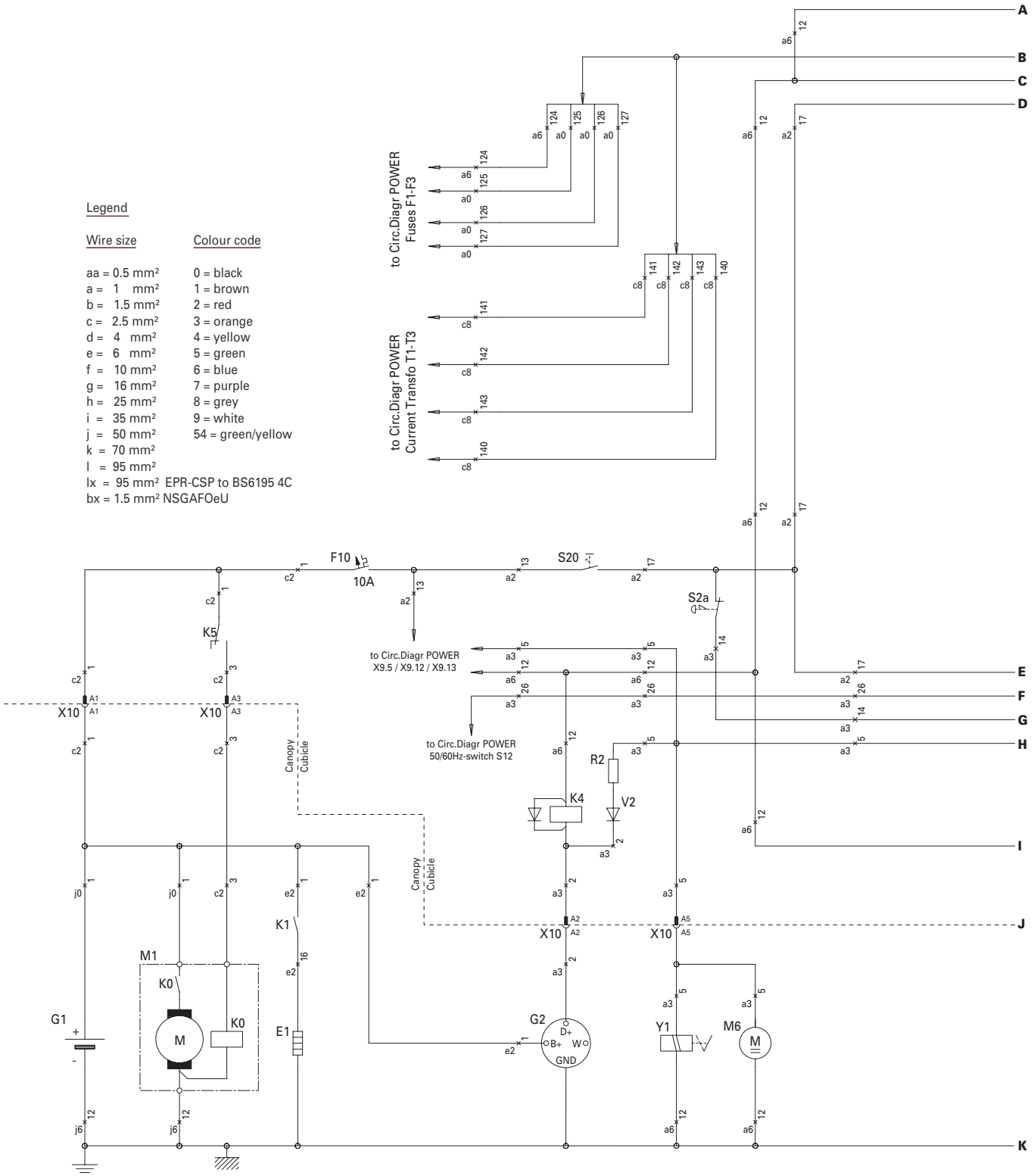
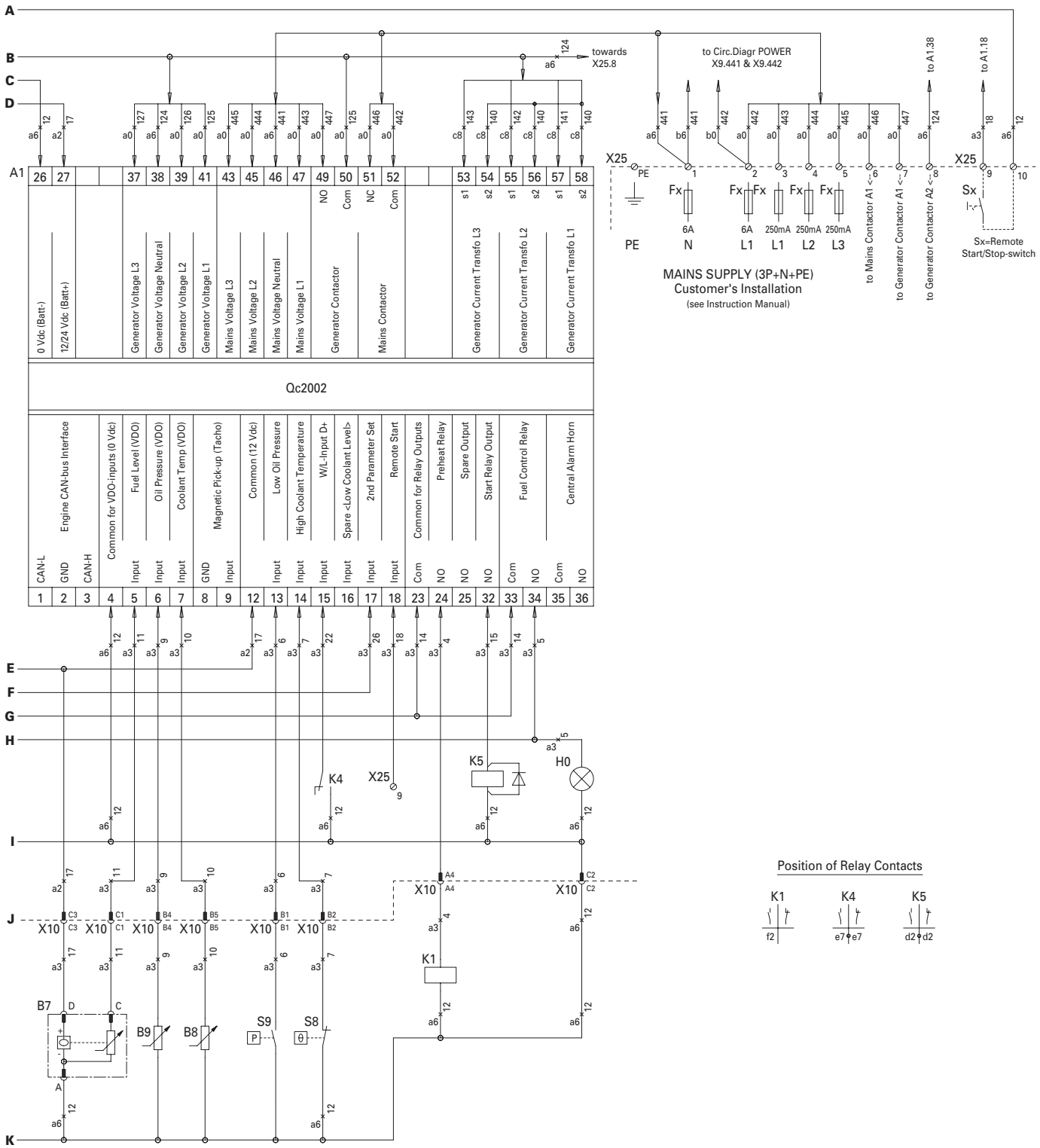


A1	Generator Control Unit	E1	Preheat Resistor	H0	Panel Light
B7	Fuel Level Sensor	F10	Fuse 10 A DC	K0	Starter Solenoid
B8	Coolant Temperature Sensor	G1	Battery 12 Vdc	K1	Preheat Relay
B9	Oil Pressure Sensor	G2	Charging Alternator	K4	W/L-Invertor Relay

CIRCUIT DIAGRAMS



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