

**Instruction Manual
for AC Generators**

QAS 14 - 20 Pd

Instruction manual 3

Circuit diagrams 49

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Use only authorized parts.

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Congratulations on the purchase of your AC generator. It is a solid, safe and reliable machine, built according to the latest technology. Follow the instructions in this booklet and we guarantee you years of 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.

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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

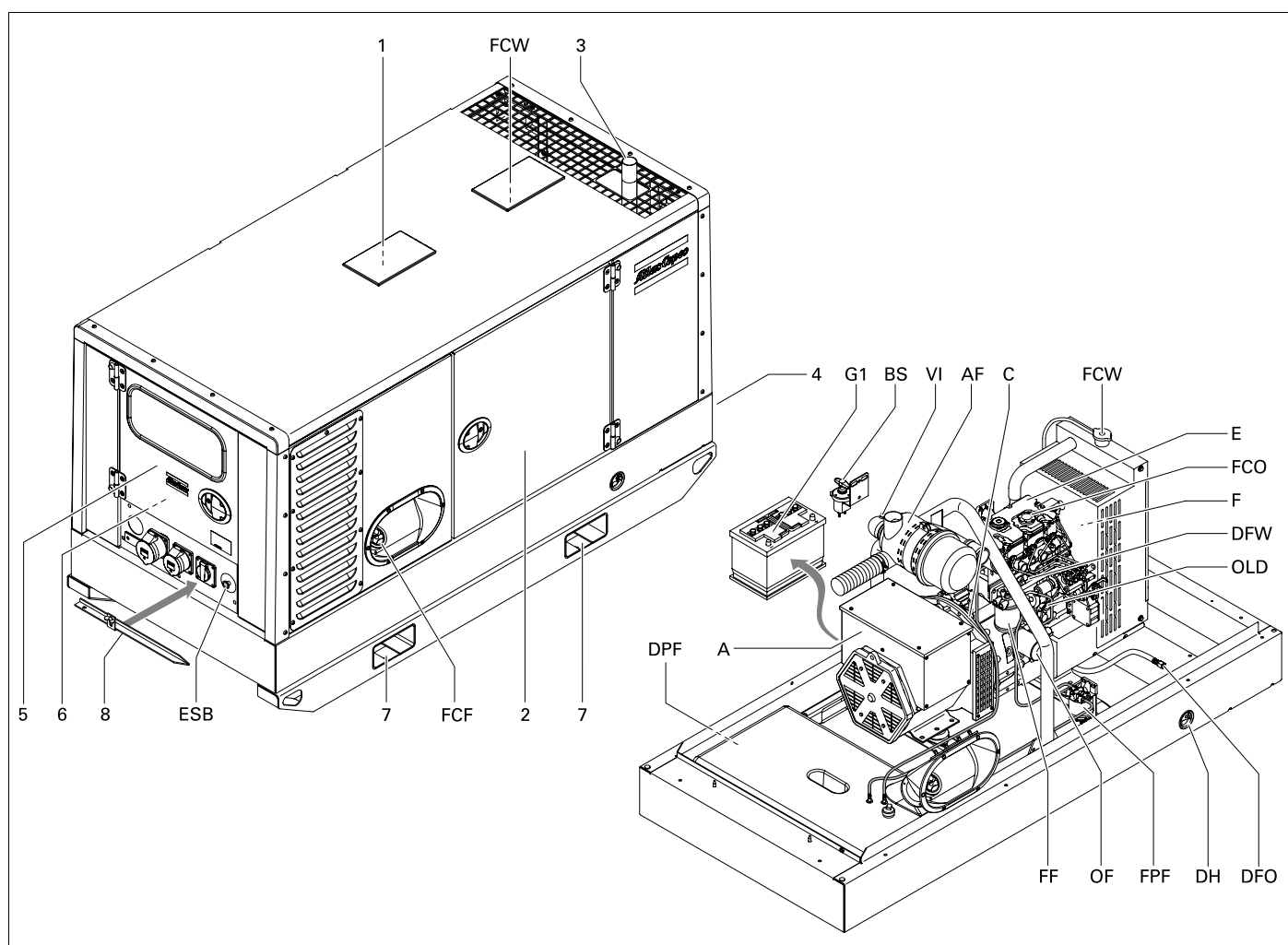
2.1 General description

The QAS 14 and QAS 20 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 14 and QAS 20 generators are driven by a fluid-cooled diesel engine, manufactured by PERKINS.

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



1	Access 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
VI	Vacuum indicator

2.2 Bodywork

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

The recess in the roof has a lifting rod in the middle.



Never use the guiding rods to lift the generator.

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 side of the frame.

2.3 Markings

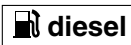
A brief description of all markings provided on the generator is given hereafter.



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



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



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



Indicates the drain for the engine oil.



Indicates the drain for the coolant.



Indicates the drain plug for the engine fuel.



Use 15W40 oil only.



Indicates the different earthing connections on the generator.



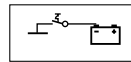
Indicates the lifting eye of the generator



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



Indicates 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.

MaxEgen		OAS 14 Pd, OAS20 Pd	
SERVICE PAN			
Yearly (max. 500h)		2912 8041 04	
Every 1000h		2912 8042 05	
Every 2000h		2912 8043 06	
Engine oil			
	PAROIL 15W40	PAROIL 5W30	
5 l (11.3 US gal)	1615 5953 00	1604 6060 00	
20 l (42.8 US gal)	1615 5954 00	1604 6059 00	
210 l (452 US gal)	1615 5955 00		
Engine coolant			
	PARCOOL EG		
5 l (11.3 US gal)	1604 5308 00		
20 l (42.8 US gal)	1604 5307 01		
210 l (452 US gal)	1604 5306 00		

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

2.4 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 front, 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.

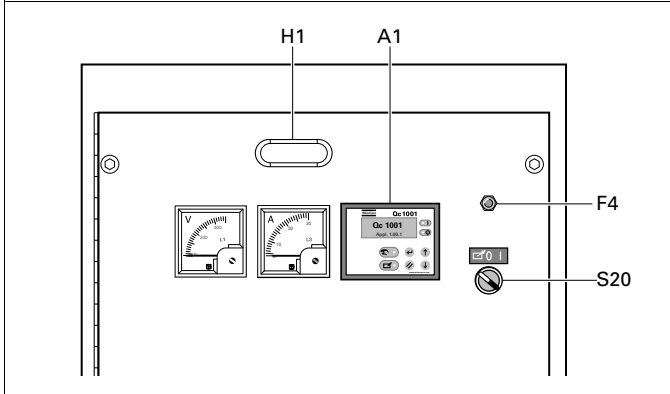


The drain hole can also be used to guide external fuel tank connections. When connecting an external fueltank, use the 3-way valves. Refer to "External fueltank connection (with/without quick couplings)".

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.

2.5 Control and indicator panel Qc1001™

2.5.1 General description Qc1001™ control panel



H1..... Panel light

S20.... ON/OFF/REMOTE switch

To start up the unit (locally or remote).

DC-Fuse

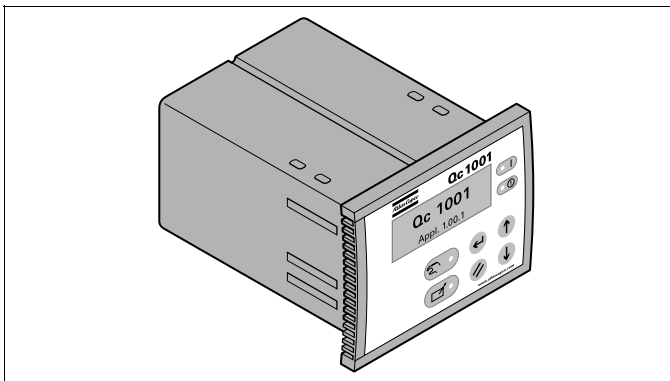
F4..... Fuse

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.

Qc1001™ display

A1..... Qc1001™ display

2.5.2 Qc1001™ Module



The Qc1001™ 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 Qc1001™ module can be used for several applications.

2.5.3 Pushbutton and LED functions

Following pushbuttons are used on the Qc1001™:



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



UP: Is used to scroll through the display information. This button is also active in Configuration Mode.



DOWN: Is used to scroll through the display information. This button is also active in Configuration Mode.



When **UP & DOWN** are pressed at the same time for 3s, Configuration Mode will be entered (see page 15).



BACK: Is used to leave/enter the Warnings pop-up window, to leave the Configuration Mode and to leave menu's without change.

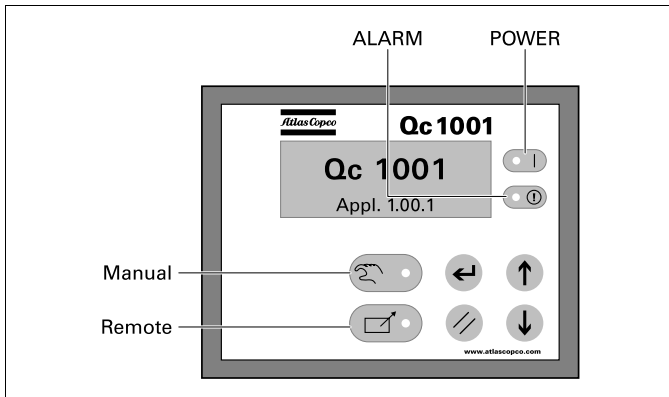


REMOTE MODE: The LED indicates if the gen-set is put in Remote Mode.



MANUAL MODE: The LED indicates if the gen-set is put in Manual Mode.

Following LEDs are used on the Qc1001™:



- Power:** Green LED indicates that the unit is powered up.
- Manual:** Green LED indicates that the Manual Mode is selected.
- Remote:** Green LED indicates that the Remote Mode is selected.
- Alarm:** Flashing red LED indicates that a shutdown is present. Continuous red LED indicates a warning. The exact warning/shutdown is shown at the display.

2.5.4 Qc1001™ Menu Overview

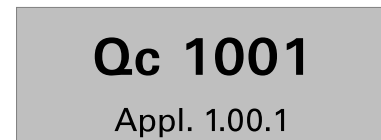
At Qc1001™, the LCD will show following information:

- in **Normal** condition (scroll through the information using **UP** and **DOWN**):
 - Status (eg: preheat, crank, run, cooldown, ext. stop, ...)
 - Running hours
 - Battery Voltage
 - Service Timer 1
 - Service Timer 2
 - Generator Frequency
- in **Warning** condition (scroll through the information using **UP** and **DOWN**):
 - a list of all active Warnings
- in **Shutdown** condition:
 - the cause of shutdown

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 a Warning comes up, the Warning Display is shown.
 If a Shutdown comes up, the Shutdown Display is shown.

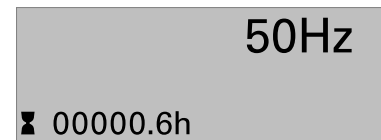
View 0



This view will show the ASW version number.

When there has been no button activity for three minutes, the display will return to the Default View.

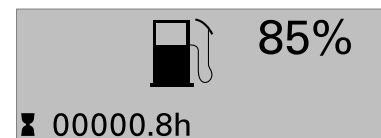
View 1 (Qc1001™-Default Display)



The frequency value is centered in the top-right corner area.

The running hours value is at the bottom-left corner. The service timer indication(s) are shown in the bottom-right corner when the service timer(s) have run out. They will disappear when the service timer(s) have been resetted.

View 2 (Fuel Level Display)




This view shows the fuel level icon.

When the English text view is selected, this view will mention: "FUEL LEVEL ***%".

When there has been no button activity for three minutes, the display will return to the Default View.

View 5 (Service Timers and Battery Voltage)

Y1	150 h
Y2	300 h
	24.0u

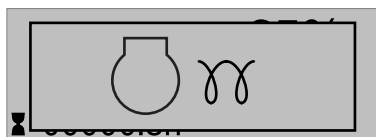
The service timer indications count upwards and give an alarm when the configured value is reached.

Resetting of the Service Timers is possible through a display Configuration Menu.

View 10 (reserved for normal English text)

In case that normal English text is selected i.s.o. icons, views 2 & 3 & 4 are changed into this three-row display format.

Status Display (pop-up window)

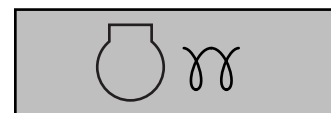


In case when special statuses are entered, a pop-up window will automatically be entered for as long as the status is active.

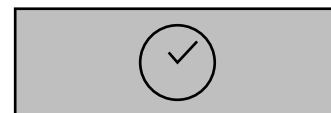
The background screen is not updated when the status pop-up window is active.

These special statuses are:

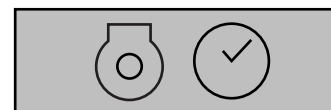
PREHEAT



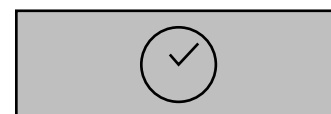
START OFF



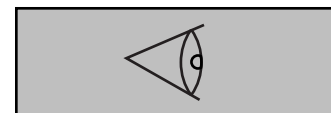
COOLDOWN



EXT. STOP TIME



DIAGNOSTIC

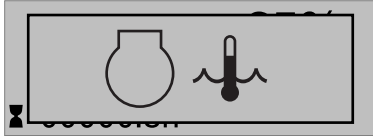


If a special status has elapsed, the default view will be entered again automatically.

If a Warning comes up, the Warning Display is shown.

If a Shutdown comes up, the Shutdown Display is shown.

Warning Display (pop-up window)



In case when a Warning occurs, a pop-up window will automatically be entered for as long as the warning is active, no matter which view is active. The warning icons will be shown (together with a continuous lit alarm LED at the fascia), which is centered at the display. The Warning Display can always be left or entered again by pushing the BACK button.

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

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

If a Shutdown comes up, the Shutdown Display is shown.

List of possible warnings:

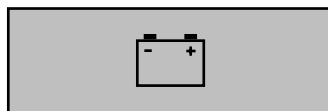
LOW OIL PRESSURE



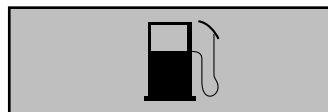
HIGH COOLANT TEMPERATURE



CHARGING ALTERNATOR



LOW FUEL LEVEL



LOW COOLANT LEVEL



GENERATOR OVERVOLTAGE



GENERATOR UNDERVOLTAGE



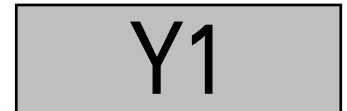
GENERATOR OVERFREQUENCY



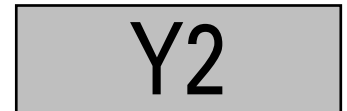
GENERATOR UNDERFREQUENCY



SERVICE TIMER 1



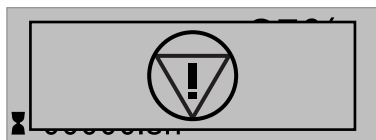
SERVICE TIMER 2



ALARM



Shutdown Display (pop-up window)



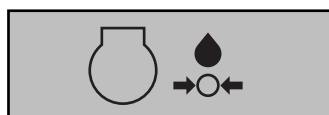
In case when a Shutdown occurs, a pop-up window will automatically be entered, no matter which view is active.

This pop-up window will stay present until the unit is put in OFF.

The shutdown icon will be shown (together with a flashing alarm LED at the fascia), which is centered at the display.

List of possible shutdowns:

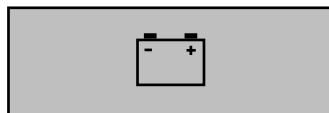
LOW OIL PRESSURE



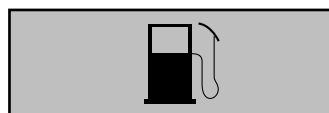
HIGH COOLANT TEMPERATURE



CHARGING ALTERNATOR



LOW FUEL LEVEL



LOW COOLANT LEVEL



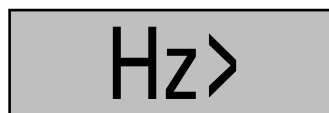
GENERATOR OVERVOLTAGE



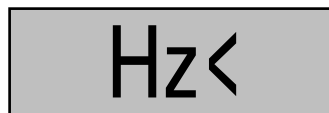
GENERATOR UNDERVOLTAGE



GENERATOR OVERFREQUENCY



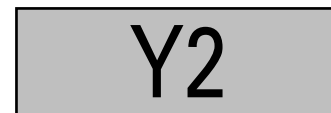
GENERATOR UNDERFREQUENCY



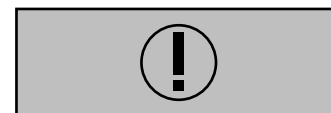
SERVICE TIMER 1



SERVICE TIMER 2



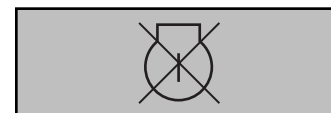
ALARM



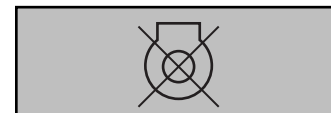
EMERGENCY STOP



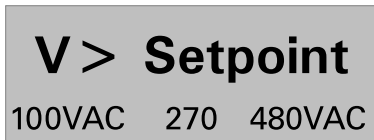
START FAILURE



STOP FAILURE



Configuration Mode View



The Configuration Menu's are pre-programmed!

The Configuration Mode is entered by detection of activation of pushbuttons UP and DOWN at the same time for 3s.

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

By entering the configuration mode, pushbuttons MANUAL, REMOTE are disposed of their normal operations and won't perform any functionality.

Menu's shown on the LCD in Configuration Mode:

- Language selection
- Diagnostics Menu
- Running hours adjust

- Service Timer 2 reset
- Service Timer 1 reset
- Start Prepare Time
- Unit Menu
- Unit Type



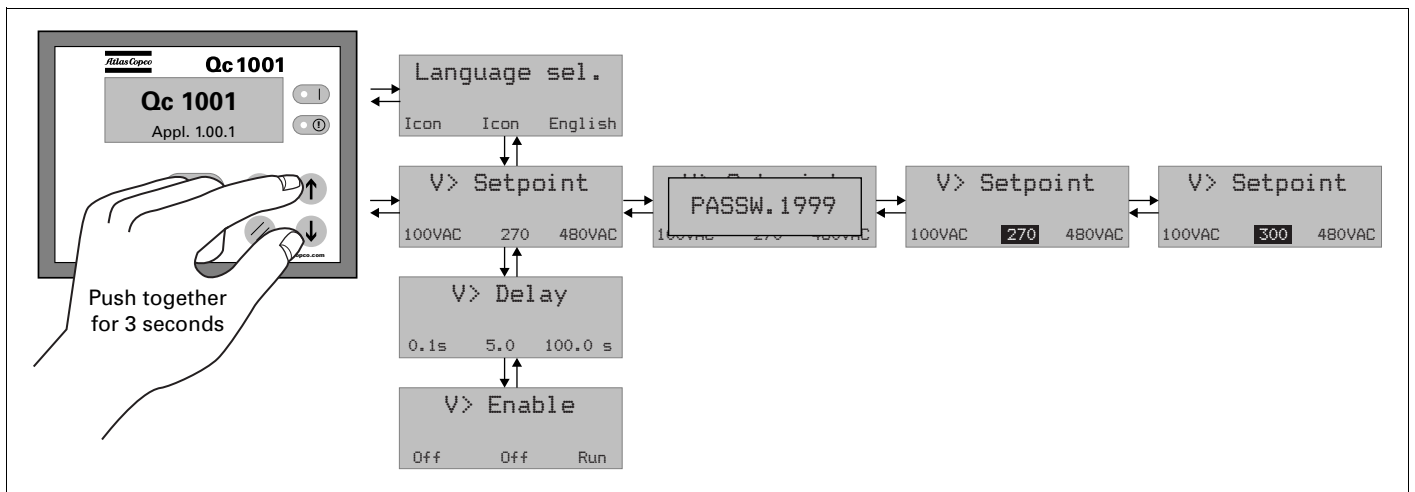
Unit type 1 for QAS 14 - 20!

- 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:



2.5.5 Fail classes

All the activated alarms of the Qc1001™ 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)

2.5.6 Event Log

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

Events are:

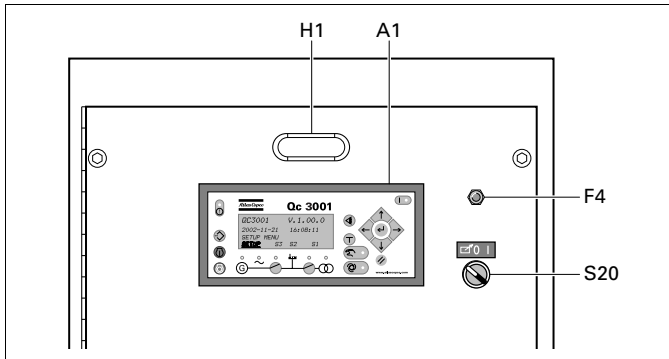
- shutdowns
- service timer 1 reset
- service timer 2 reset
- unit type changes

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

The events can only be read by means of the QcUSW.

2.6 Control panel Qc3001™

2.6.1 General description Qc3001™ control panel



H1.....Panel light

S20.... ON/OFF switch (2 positions)

To power up the Qc3001™ control panel.

DC-Fuse

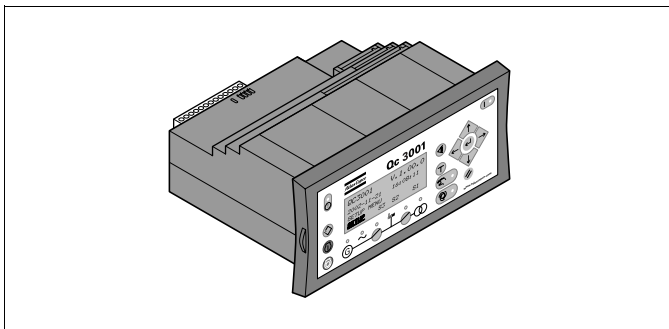
F4Fuse

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.

Qc3001™ display

A1..... Qc3001™ display

2.6.2 Qc3001™ Module



The Qc3001™ 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 Qc3001™ module can be used for several applications.

2.6.3 Pushbutton functions

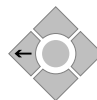
There are 16 pushbuttons on the display unit.



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 4241.



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.



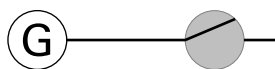
BACK: Jumps one step backwards in the menu (until the daily use display is reached).



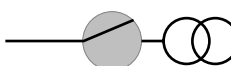
START: Manual Start of the generator (only enabled if the SEMI-AUTO mode is selected).



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. Only with motorized breaker).



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



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



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



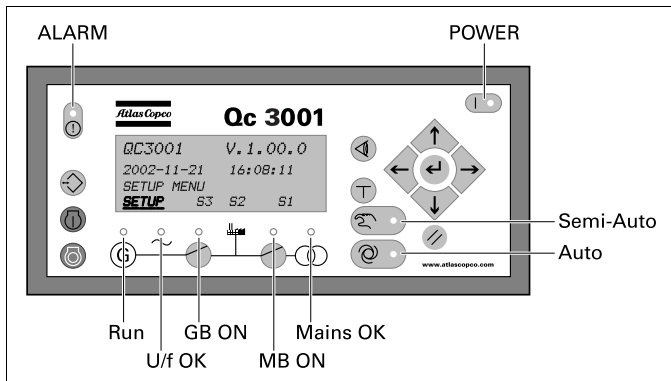
TEST: Allows the user to set the generator in TEST mode. To enter the TEST mode, a password needs to be entered.



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).

2.6.4 LED functions

9 LEDs are used on the display unit. The colour is green or red or a combination in different situations.



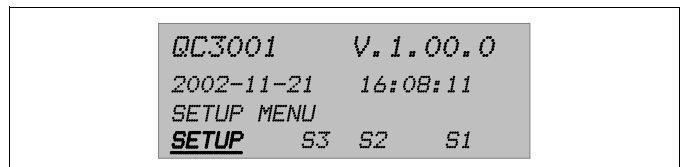
Alarm:	Red LED flashing indicates that unacknowledged alarms are present. Red LED fixed indicates that ALL alarms are acknowledged.
Power:	Green LED indicates that the voltage supply is switched on.
Run:	Green LED indicates that the generator is running.
U/f OK:	Green LED indicates that voltage/frequency is present and OK.
(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 OK. LED is red at a mains failure. LED is flashing green when the mains return 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.

2.6.5 Qc3001™ Menu Overview

Main View

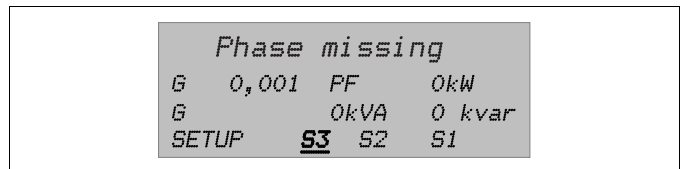
The display has 4 different lines. The information on these lines can change, depending on which view is used. There are 4 different main views possible: SETUP / S3 / S2 / S1.

Setup view



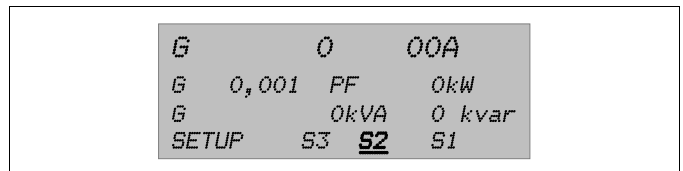
The SETUP view shows the module name, the software version, the date and the time.

S3 view



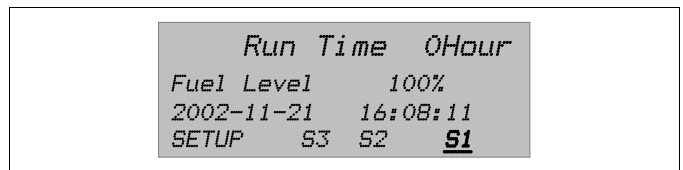
The S3 view shows operational status and selectable measurements.

S2 view



The S2 view shows some selectable measurements.

S1 view



In the S1 view the user can scroll up and down to 15 configurable screens showing different selectable measurements.

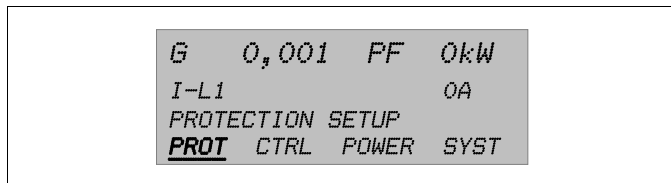
The configuration of the 15 different screens is done through the Qc3001™ Utility Software. It is not possible to configure the windows through the display. The screen shown when leaving "S1" will be the screen shown when returning to "S1".

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:

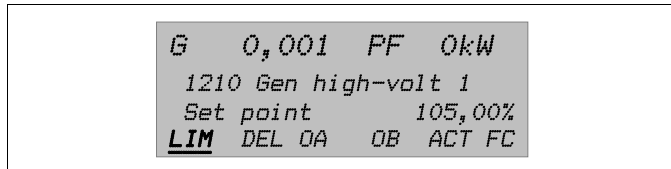
- Protection Setup (PROT): Channels from 1090 to 1890 (steps of 10)
- Control Setup (CTRL): Channel 2050
- Power Setup (POWER): Channel 3070
- System Setup (SYST): Channels from 4010 to 4920 (steps of 10)

If you select SETUP then you get the following view:



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):



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 user can scroll through with the VIEW button.

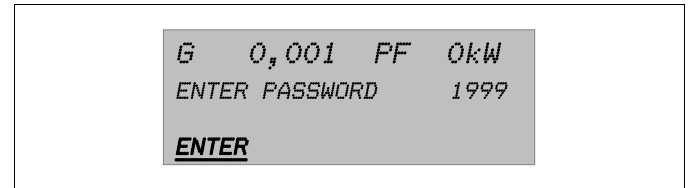
G	0,001 PF	0 kW
G	0 kVA	0 kvar
G-L1	0.0 Hz	0 V
B-L1	0.0 Hz	0 V
G	0	00 V
B	0	00 V
G	0	00 A

- 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:

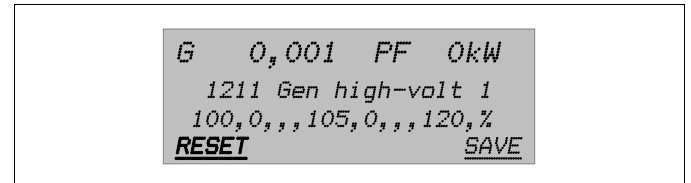
"LIM"	LIMIT, setting of switch point
"DEL"	DELAY, setting of time delay
"OA"	OUTPUT A, selection of which relay the function must activate
"OB"	OUTPUT B, selection of which relay the function must activate
"ACT"	ACTION, activate/de-activate the function
"FC"	FAIL CLASS, fail class setting.

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:



A password is needed in order to change the settings. There are three different password levels.

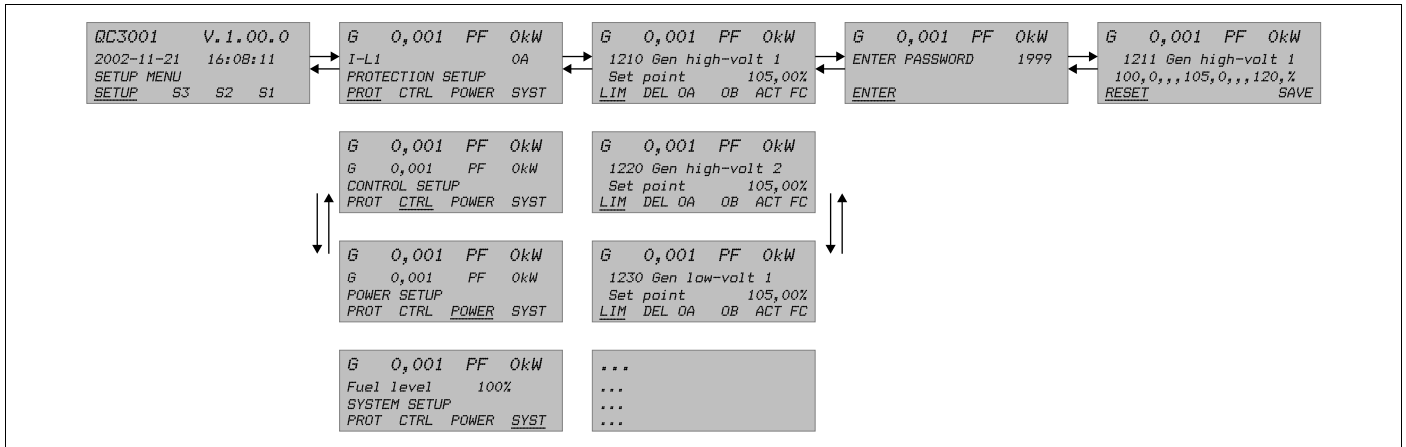
If the correct password is entered, the following view appears:



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.

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 Qc3001™ User Manual.

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.

Protection setup: overview of parameters

1090	Reverse Power	SERVICE LEVEL
	1091 Setpoint	-40.0%
	1092 Delay	0.5
	1093 Output Relay A	R0
	1094 Output Relay B	R0
	1095 Enable	ON
1096 Fail Class	Trip + Stop	

1100	Over Current 1	CUSTOMER LEVEL
	1101 Setpoint	110.0%
	1102 Delay	10.00s
	1103 Output Relay A	R0
	1104 Output Relay B	R0
	1105 Enable	OFF
1106 Fail Class	Trip + Stop	

1110	Over Current 2	SERVICE LEVEL
	1111 Setpoint	120.0%
	1112 Delay	5.00s
	1113 Output Relay A	R0
	1114 Output Relay B	R0
	1115 Enable	OFF
1116 Fail Class	Trip + Stop	

1120	Over Load 1	CUSTOMER LEVEL
	1121 Setpoint	110.0%
	1122 Delay	10.00s
	1123 Output Relay A	R0
	1124 Output Relay B	R0
	1125 Enable	OFF
1126 Fail Class	Trip + Stop	

1130	Over Load 2	SERVICE LEVEL
	1131 Setpoint	120.0%
	1132 Delay	5.00s
	1133 Output Relay A	R0
	1134 Output Relay B	R0
	1135 Enable	OFF
1136 Fail Class	Trip + Stop	

1140	Current Unbalance	SERVICE LEVEL
	1141 Setpoint	30.0%
	1142 Delay	10.00s
	1143 Output Relay A	R0
	1144 Output Relay B	R0
	1145 Enable	OFF
1146 Fail Class	Trip + Stop	

1150	Voltage Unbalance	SERVICE LEVEL
	1151 Setpoint	10.0%
	1152 Delay	10.00s
	1153 Output Relay A	R0
	1154 Output Relay B	R0
	1155 Enable	OFF
1156 Fail Class	Trip + Stop	

1210	Gen High Voltage 1	CUSTOMER LEVEL
	1211 Setpoint	110.0%
	1212 Delay	5.0s
	1213 Output Relay A	R0
	1214 Output Relay B	R0
	1215 Enable	ON
1216 Fail Class	Warning	

1220	Gen High Voltage 2	MASTER LEVEL
	1221 Setpoint	120.0%
	1222 Delay	1.0s
	1223 Output Relay A	R0
	1224 Output Relay B	R0
	1225 Enable	ON
1226 Fail Class	Shutdown	

1230	Gen Low Voltage 1	CUSTOMER LEVEL
	1231 Setpoint	90.0%
	1232 Delay	15.0s
	1233 Output Relay A	R0
	1234 Output Relay B	R0
	1235 Enable	RUN
1236 Fail Class	Warning	

1240	Gen Low Voltage 2	SERVICE LEVEL
	1241 Setpoint	70.0%
	1242 Delay	10.0s
	1243 Output Relay A	R0
	1244 Output Relay B	R0
	1245 Enable	RUN
1246 Fail Class	Shutdown	

1250	Gen High Frequency 1	CUSTOMER LEVEL
	1251 Setpoint	110.0%
	1252 Delay	5.0s
	1253 Output Relay A	R0
	1254 Output Relay B	R0
	1255 Enable	ON
1256 Fail Class	Warning	

1260	Gen High Frequency 2	MASTER LEVEL
	1261 Setpoint	120.0%
	1262 Delay	1.0s
	1263 Output Relay A	R0
	1264 Output Relay B	R0
	1265 Enable	ON
1266 Fail Class	Shutdown	

1270	Gen Low Frequency 1	CUSTOMER LEVEL
	1271 Setpoint	90.0%
	1272 Delay	10.0s
	1273 Output Relay A	R0
	1274 Output Relay B	R0
	1275 Enable	RUN
1276 Fail Class	Warning	

1280	Gen Low Frequency 2	SERVICE LEVEL
	1281 Setpoint	80.0%
	1282 Delay	5.0s
	1283 Output Relay A	R0
	1284 Output Relay B	R0
	1285 Enable	RUN
1286 Fail Class	Shutdown	

1290	Peak Current 1	CUSTOMER LEVEL
	1291 Setpoint	150.0%
	1392 Delay	5.0s
	1293 Output Relay A	R0
	1294 Output Relay B	R0
	1295 Enable	OFF
1296 Fail Class	Warning	

1300	Peak Current 2	SERVICE LEVEL
	1301 Setpoint	200.0%
	1302 Delay	3.0s
	1303 Output Relay A	R0
	1304 Output Relay B	R0
	1305 Enable	OFF
1306 Fail Class	Shutdown	

1350	VDO 1.1	SERVICE LEVEL
	1351 Setpoint	N/A
	1352 Delay	5.0s
	1353 Output Relay A	R0
	1354 Output Relay B	R0
	1355 Enable	OFF
1356 Fail Class	Warning	
USW	Sensor Type	N/A

1360	VDO 1.2	SERVICE LEVEL
	1361 Setpoint	N/A
	1362 Delay	5.0s
	1363 Output Relay A	R0
	1364 Output Relay B	R0
	1365 Enable	OFF
1366 Fail Class	Warning	

1370	VDO 2.1	SERVICE LEVEL
	1371 Setpoint	N/A
	1372 Delay	5.0s
	1373 Output Relay A	R0
	1374 Output Relay B	R0
	1375 Enable	OFF
1376 Fail Class	Warning	
USW	Sensor Type	N/A

1380	VDO 2.2	SERVICE LEVEL
	1381 Setpoint	N/A
	1382 Delay	5.0s
	1383 Output Relay A	R0
	1384 Output Relay B	R0
	1385 Enable	OFF
1386 Fail Class	Warning	

1380	VDO 2.2	SERVICE LEVEL
1381	Setpoint	N/A
1382	Delay	5.0s
1383	Output Relay A	R0
1384	Output Relay B	R0
1385	Enable	OFF
1386	Fail Class	Warning

1390	Fuel Level 1	CUSTOMER LEVEL
1391	Setpoint 1	5.0%
1392	Delay	20.0s
1393	Output Relay A	R0
1394	Output Relay B	R0
1395	Enable	OFF
1396	Fail Class	Warning
USW	Sensor Type	N/A

1400	Fuel Pump Logic	CUSTOMER LEVEL
1401	Setpoint 2	20.0%
1402	Setpoint 3	80.0%
1403	Pump Relay	R3
1404	Enable	OFF
1405	Fill Check Delay	60.0s

1410	Fuel High	CUSTOMER LEVEL
1411	Setpoint 4	98.0%
1412	Delay	5.0s
1413	Output Relay A	R0
1414	Output Relay B	R0

1420	Overspeed	MASTER LEVEL
1421	Setpoint	1650rpm
1422	Delay	3.0s
1423	Output Relay A	R0
1424	Output Relay B	R0
1425	Enable	ON
1426	Fail Class	Shutdown

1430	Overspeed	MASTER LEVEL
1431	Overspeed S2	1650rpm

1440	Engine Failure	SERVICE LEVEL
1441	Delay	1.0s
1442	Output Relay A	R0
1443	Output Relay B	R0
1444	Enable	ON
1445	Fail Class	Shutdown

1450	Emergency Stop	MASTER LEVEL
1451	Delay	0.0s
1452	Output Relay A	R0
1453	Output Relay B	R0
1454	Enable	ON
1455	Fail Class	Shutdown

1460	Coolant Temperature 1	SERVICE LEVEL
1461	Setpoint	N/A
1462	Delay	5.0s
1463	Output Relay A	R0
1464	Output Relay B	R0
1465	Enable	OFF
1466	Fail Class	Warning
USW	Alarm Type	High

1470	Coolant Temperature 2	SERVICE LEVEL
1471	Setpoint	N/A
1472	Delay	5.0s
1473	Output Relay A	R0
1474	Output Relay B	R0
1475	Enable	OFF
1476	Fail Class	Warning
USW	Alarm Type	High

1480	Oil Pressure	SERVICE LEVEL
1481	Setpoint	N/A
1482	Delay	5.0s
1483	Output Relay A	R0
1484	Output Relay B	R0
1485	Enable	OFF
1486	Fail Class	Warning
USW	Alarm Type	Low

1490	Fuel Level 2	CUSTOMER LEVEL
1491	Setpoint	N/A
1492	Delay	20.0s
1493	Output Relay A	R0
1494	Output Relay B	R0
1495	Enable	OFF
1496	Fail Class	Warning

1700	Low Oil Pressure	SERVICE LEVEL
1701	Delay	3.0s
1702	Output Relay A	R0
1703	Output Relay B	R0
1704	Enable	RUN
1705	Fail Class	Shutdown
1706	Type	Low

1710	Coolant Temp. & Cool. Level	SERVICE LEVEL
1711	Delay	3.0s
1712	Output Relay A	R0
1713	Output Relay B	R0
1714	Enable	ON
1715	Fail Class	Shutdown
1716	Type	Low

1720	Low Fuel Switch	CUSTOMER LEVEL
1721	Delay	3.0s
1722	Output Relay A	R0
1723	Output Relay B	R0
1724	Enable	ON
1725	Fail Class	Trip + Stop
1726	Type	High

1730	Dig.Input 4 / GCB closed	CUSTOMER LEVEL
1731	Delay	10.0s
1732	Output Relay A	R0
1733	Output Relay B	R0
1734	Enable	OFF
1735	Fail Class	Warning
1736	Type	High

1860	Run Status	SERVICE LEVEL
1861	Delay	5.0s
1862	Output Relay A	R0
1863	Output Relay B	R0
1864	Enable	OFF

1870	W/L Input	SERVICE LEVEL
1871	Delay	3.0s
1872	Output Relay A	R0
1873	Enable	RUN
1874	Type	Low

1880	Static Charger	SERVICE LEVEL
1881	Delay	10.0s
1882	Output Relay A	R0
1883	Enable	ON
1884	Type	High

Control setup: overview parameters

2050	f/U Limits	SERVICE LEVEL
2051	Df max.	4.0Hz
2052	DU max.	5%

Power setup: overview parameters

3070	Test	CUSTOMER LEVEL
3071	Setpoint	50%
3072	Delay	300.0s
3073	Test Breaker	OFF

System setup: overview of parameters

4010	Nominal Settings	CUSTOMER LEVEL	
	4011	Frequency	50Hz
	4012	Generator Power	13kW
	4013	Generator Current	42A
	4014	Generator Voltage	230V
4020	Nominal Settings 2	CUSTOMER LEVEL	
	4021	Frequency	50Hz
	4022	Generator Power	13kW
	4023	Generator Current	42A
	4024	Generator Voltage	230V
4050	Transformer Gen-set	SERVICE LEVEL	
	4051	Volt. Prim.	440V
	4052	Volt. Sec.	440V
	4053	Current Prim.	60A
	4054	Current Sec.	5A
4060	Transformer Bus	SERVICE LEVEL	
	4061	Volt. Prim.	440V
	4062	Volt. Sec.	440V
4100	Engine Comms.	SERVICE LEVEL	
	4101	Type	OFF
4110	Date & Time (internal clock)	CUSTOMER LEVEL	
	4110	Date	dd/mm/yyyy
	4110	Time	hh:mm
4120	Counters	MASTER LEVEL	
	4121	Running Time	0
	4122	GB Operations	0
	4123	MB Operations	0
	4124	Reset kWh	OFF
4220	Battery Low	SERVICE LEVEL	
	4221	Setpoint	9.0V
	4222	Delay	3.0s
	4223	Output Relay A	R0
	4224	Output Relay B	R0
	4225	Enable	ON
4230	Battery High	SERVICE LEVEL	
	4231	Setpoint	15.0V
	4232	Delay	0.5s
	4233	Output Relay A	R0
	4234	Output Relay B	R0
	4235	Enable	ON
4240	Language	CUSTOMER LEVEL	
	4241	Language	English
4250	Battery Low 2	SERVICE LEVEL	
	4251	Setpoint	N/A
	4252	Delay	10.0s
	4253	Output Relay A	R0
	4254	Output Relay B	R0
	4255	Enable	OFF
4260	Battery High 2	SERVICE LEVEL	
	4261	Setpoint	N/A
	4262	Delay	10.0s
	4263	Output Relay A	R0
	4264	Output Relay B	R0
	4265	Enable	OFF
4290	Mode Relay	CUSTOMER LEVEL	
	4291	Test	R0
	4292	Auto	R0
	4293	Semi	R0
4300	Engine Type	MASTER LEVEL	
	4301	Engine Type	Diesel
4320	Gen-Set Mode	CUSTOMER LEVEL	
	4321	Gen-Set Mode	Island
4330	CAN Unit	CUSTOMER LEVEL	
	4331	CAN Unit	bar-celsius
4350	Tacho Configuration	SERVICE LEVEL	
	4351	Setpoint	500rpm
	4352	Teeth	0
4360	Starter	CUSTOMER LEVEL	
	4361	Start Prepare	1.0s
	4362	Start ON Time	12.0s
	4363	Start OFF Time	12.0s
	4364	Prepare	Normal
4370	Start Attempts	SERVICE LEVEL	
	4371	Attempts	3
	4372	Output Relay A	R0
4373			R0
	4373	Output Relay B	R0
4380	f/U OK	SERVICE LEVEL	
	4381	Delay	3.0s
4390	f/U failure	SERVICE LEVEL	
	4391	Delay	30.0s
	4392	Output Relay A	R0
	4393	Output Relay B	R0
4400	Stop	SERVICE LEVEL	
	4401	Cool Down Time	60.0s
	4402	Extended Stop	15.0s
	4403	Coil Type	RUN
4410	Stop Failure	SERVICE LEVEL	
	4411	Delay	20.0s
	4412	Output Relay A	R0
	4413	Output Relay B	R0
4420	Mains V Failure	CUSTOMER LEVEL	
	4421	Fail Delay	1.0s
	4422	Mains OK Delay	60.0s
	4423	Low Voltage	75%
	4424	High Voltage	120%
	4425	Mains Fail Control	Start+Open MB
4430	Mains Hz Failure	CUSTOMER LEVEL	
	4431	Fail Delay	1.0s
	4432	Mains OK Delay	60.0s
	4433	Low Frequency	95%
4434			105%
	4434	High Frequency	105%
4440	MB Control	CUSTOMER LEVEL	
	4441	Function	Mode Shift OFF
	4442	MB Close Delay	0.5s
4450	Alarm Horn	CUSTOMER LEVEL	
	4451	Delay	20.0s
4460	GB Control	CUSTOMER LEVEL	
	4461	GB Close Delay	1.0s
4610	Relay 1	SERVICE LEVEL	
	4611	Function	Alarm
	4612	Off Delay	0.0s
4620	Relay 2	SERVICE LEVEL	
	4621	Function	Alarm
	4622	Off Delay	0.0s
4630	Relay 3	SERVICE LEVEL	
	4631	Function	Alarm
	4632	Off Delay	0.0s
4710	Start/Stop Cmd. 1	CUSTOMER LEVEL	
	4711	Enable	OFF
	4712	START/STOP	STOP
	4713	Day(s)	10
	4714	Hour	10
	4715	Minute	0
4720	Start/Stop Cmd. 2	CUSTOMER LEVEL	
	4721	Enable	OFF
	4722	START/STOP	STOP
	4723	Day(s)	10
	4724	Hour	10
	4725	Minute	0

4730	Start/Stop Cmd. 3	CUSTOMER LEVEL
4731	Enable	OFF
4732	START/STOP	STOP
4733	Day(s)	10
4734	Hour	10
4735	Minute	0
4740	Start/Stop Cmd. 4	CUSTOMER LEVEL
4741	Enable	OFF
4742	START/STOP	STOP
4743	Day(s)	10
4744	Hour	10
4745	Minute	0
4750	Start/Stop Cmd. 5	CUSTOMER LEVEL
4751	Enable	OFF
4752	START/STOP	STOP
4753	Day(s)	10
4754	Hour	10
4755	Minute	0
4760	Start/Stop Cmd. 6	CUSTOMER LEVEL
4761	Enable	OFF
4762	START/STOP	STOP
4763	Day(s)	10
4764	Hour	10
4765	Minute	0
4770	Start/Stop Cmd. 7	CUSTOMER LEVEL
4771	Enable	OFF
4772	START/STOP	STOP
4773	Day(s)	10
4774	Hour	10
4775	Minute	0
4780	Start/Stop Cmd. 8	CUSTOMER LEVEL
4781	Enable	OFF
4782	START/STOP	STOP
4783	Day(s)	10
4784	Hour	10
4785	Minute	0

4790	GSM Pin Code	CUSTOMER LEVEL
4791	Pin code	0000
4910	Service Timer 1	SERVICE LEVEL
4911	Enable	ON
4912	Run Hours	500h
4913	Elapsed Days	365 days
4914	Fail Class	Warning
4915	Output Relay A	R0
4916	Reset	
4920	Service Timer 2	SERVICE LEVEL
4921	Enable	ON
4922	Run Hours	1000h
4923	Elapsed Days	365 days
4924	Fail Class	Warning
4925	Output Relay A	R0
4926	Reset	
4930	Diagnostics Mode	CUSTOMER LEVEL
4930	Diagnostics	Normal
4940	Reset Eventlog	MASTER LEVEL
4940	Reset	OFF
4971	Level 1 Password	CUSTOMER LEVEL
4971	Setting	2003
4972	Level 2 Password	SERVICE LEVEL
4972	Setting	****
4973	Level 3 Password	MASTER LEVEL
4973	Setting	****

2.6.6 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).

2.6.7 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	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.

2.6.8 Languages

English is the default language ex-factory, but all the 12 European languages can be selected in channel 4241. It is possible to edit and/or add text and to edit and/or add languages.

2.6.9 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 Qc3001™ control panel. The generator can be started/stopped manually.

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 in EMR 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 EMR diagnostics can take place.

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



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

2.6.10 Standard applications

In the Qc3001™ module 3 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 09/03 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).

- Combined with Semi-auto mode = Local Start operation. The sequences start/stop 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).



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

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 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 go into cool down and stop.

Installation wirings:

- 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 the busbar sensing lines are wired, they have to be removed.

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 and take over the load from the Mains.

Installation wirings:

- 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 the busbar sensing lines are wired, they have to be removed.

2.6.11 Overview of applications

Single gen-set	Island operation	SEMI-AUTO mode
		AUTO mode
	AMF operation	(SEMI-AUTO mode)
		AUTO mode
	Load Take Over	SEMI-AUTO mode
		AUTO mode

From each of the above applications the module can jump into the Test mode, by pushing the dedicated Test button on the LCDisplay. The generator will follow the defined Test sequences and afterwards the generator will return in its previous application, always in combination with the AUTO mode.



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 / LTO application type
3. For more information on the Qc3001™ module and its applications, we refer to the Qc3001™ User Manual. If you need more assistance, please contact Atlas Copco.

2.7 Outlet sockets (S)

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

X1.2....3-phase outlet socket (400 V AC)

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

X3.....3-phase outlet socket (400 V AC)

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

X4..... 1-phase outlet socket (230 V AC)

Provides phase L3, neutral and earthing.

Q3..... Circuit breaker for X3

Interrupts the power supply to X3 when a short-circuit occurs at the load side, or when the overcurrent protection (16 A) is activated. When activated, Q3 interrupts the three phases towards X3. It can be activated again after eliminating the problem.

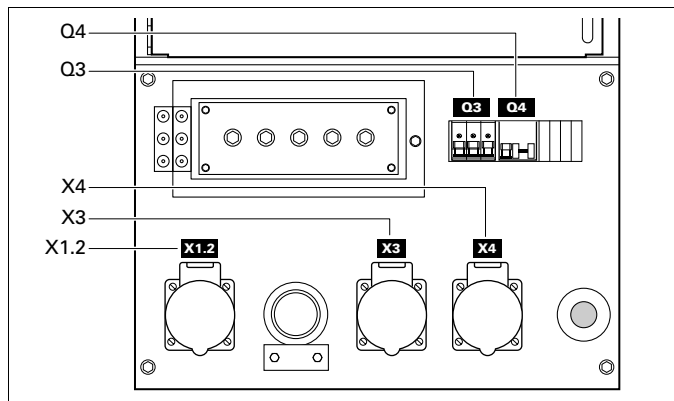
Q4..... Circuit breaker for X4

Interrupts the power supply to X4 when a short-circuit occurs at the load side, or when the overcurrent protection (16 A) is activated. When activated, Q4 interrupts phase L3 and the neutral towards X4. It can be activated again after eliminating the problem.

2.8 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.



Circuit breaker Q1 does not only interrupt the power supply towards X1.2, but also towards X3 and X4.

Make sure to switch on circuit breakers Q1, Q3 and Q4 after starting the generator when power supply is done by means of X3 or X4.

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.
- Protect the generator against dust and rain if it is operated outside.
- Check that the engine exhaust is not directed towards people. If the generator is operated indoors, install an exhaust pipe of sufficient diameter to duct the engine exhaust towards the outside. Check for sufficient ventilation so that the cooling air is not recirculated. If necessary, consult Atlas Copco.
- Leave enough space for operation, inspection and maintenance (at least 1 meter at each side).
- Check that the inner earthing system is in compliance with the local legislation.
- Use coolant for the engine cooling system. 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 converters 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 (mm ²)	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 X1.1.
- 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 X1.1.

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 coolant damp 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 F4 is not activated 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 Qc1001™

3.4.1 Starting Qc1001™

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 in position . 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 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.

3.4.2 During operation Qc1001™

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.**

3.4.3 Stopping Qc1001™

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 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 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 Qc3001™


3.5.1 Starting Qc3001™


- Turn the optional battery switch to ON.
- Turn the S20 button to the ON position, this will activate the Qc3001™ Controller.
- Select the correct application type and the correct mode on the Qc3001™ module (see Overview of applications for the possible selections).
- Make the correct wirings and program the applicable parameters (see Standard applications 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.**

3.5.2 During operation Qc3001™

Following points should be carried out regularly:


- Check the display for normal readings.
-  **Avoid letting the engine run out of fuel. If this happens, priming will speed up the starting.**
- Check for leakage of oil, fuel or cooling water.
- Avoid long low-load periods (< 30 %). In this case, an output power drop and higher oil consumption of the engine could occur. It is recommended to operate the generator at full load capacity immediately after any low load operating period.
- When single-phase loads are connected to the generator output terminals, keep all loads well-balanced.

-  **Never turn the 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.

3.5.3 Stopping Qc3001™

- When in SEMI-AUTO mode, use the STOP button to stop the generator. The GB button will not 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



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.

4.1 Maintenance schedule	Daily	Small	Normal	Yearly
		500 hours	1000 hours	2000 hours
Service pak	-	2912 6041 04	2912 6042 05	2912 6043 06
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	Check
Electrolyte level and terminals of battery (2)		Check	Check	Check
Fixation of hoses, cables and pipes		Check	Check	Check
Oil and coolant level	Check	Check	Check	Check
Coolers	Check and clean externally	Check and clean externally	Check and clean externally	Check and clean externally
Condition of cooling fan assembly	Check	Check	Check	Check
Tension and condition of the drive belt		Check	Check	Check
Alternator drive belt			Replace	Replace
Door hinges and locks		Grease	Grease	Grease
Engine oil		Replace	Replace	Replace
Engine oil filter		Replace	Replace	Replace
Fuel filter element		Replace	Replace	Replace
Fuel prefilter element		Replace	Replace	Replace
Water in fuel filter	Drain	Drain	Drain	Drain
Turbocharger impeller casing and turbocharger compressor casing			Clean	Clean
Air cleaner and dust bowl		Clean	Clean	Clean
Air filter element (1)		Change	Change	Change
Safety cartridge		Replace	Replace	Replace
Engine breather				Renew
Engine inlet and outlet valves			Check/Adjust	Check/Adjust
Alternator and starter motor			Check	Check
Electrical system: security of cables and wear			Check	Check
Mechanical links		Grease	Grease	Grease
Condition of vibration dampers		Check	Check	Check
Alternator insulation resistance		Measure	Measure	Measure
Glycol level in coolant		Check	Check	Check
PH level of engine coolant		Check	Check	Check
Inspection by Atlas Copco Service technician				▲

- (1) More frequently when operating in a dusty environment. Evacuate dust from the airfilter valve daily.
- (2) A Service Bulletin (ASB) dealing elaborately with batteries and due care is available on request.

4.2 Engine maintenance

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

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.

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").

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

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 frequency meter P5

- Run the unit at normal speed.
- Put a voltmeter in parallel with frequency meter P5.
- If the measured voltage is higher than 200 V, the frequency meter has to work properly.
- If not, remove the frequency meter, connect it with the mains (230 V) and check that it indicates 50 Hz.

6.3 Checking ammeter P1

- Measure during the load, by means of a clamp-on probe, the outgoing current in the third phase (L3).
- Compare the measured current with the current indicated on ammeter P1. Both readings should be the same.

6.4 Alternator trouble shooting

Symptom	Possible cause	Corrective action
<i>Alternator does not excite</i>	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.
<i>After being excited alternator does not excite</i>	Connections are interrupted.	Check connection cables as per attached drawings.
<i>Low voltage at no load</i>	Voltage potentiometer out of setting.	Reset voltage potentiometer.
	Intervention of protection.	Check rpm.
	Winding failure.	Check windings.
<i>High voltage at no load</i>	Voltage potentiometer out of setting.	Reset voltage potentiometer.
	Failed regulator.	Substitute regulator.
<i>Lower than rated voltage at load</i>	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.
<i>Higher than rated voltage at load</i>	Voltage potentiometer out of setting.	Reset voltage potentiometer.
	Failed regulator.	Substitute regulator.
<i>Unstable voltage</i>	Speed variation in engine.	Check regularity of rotation.
	Regulator out of setting.	Regulate stability of regulator by acting on “STABILITY” potentiometer.

6.5 Engine trouble shooting

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

6.5.1 The starter motor turns the engine too slowly

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

6.5.2 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.

6.5.3 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.

6.5.4 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.

6.5.5 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.

6.5.6 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.

6.5.7 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.

6.5.8 Blue or white exhaust smoke

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

6.5.9 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.

6.5.10 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.

6.5.11 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.

6.5.12 The pressure of the lubricating oil is too high

- Wrong grade of lubricating oil.
- Defective gauge.

6.5.13 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.

6.5.14 Crankcase pressure

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

6.5.15 Bad compression

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

6.5.16 The engine starts and stops

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

6.5.17 The engine shuts down after approx. 15 sec.

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

7. Options available for QAS 14 and QAS 20 units

7.1 Circuit diagrams

The engine control circuit diagrams and the power circuit diagrams for the standard QAS 14 and QAS 20 units:

Unit	Power circuit	Engine control circuit
QAS 14 - 20 Pd Qc1001™	9822 0992 00	9822 0992 08
QAS 14 - 20 Pd Qc3001™	9822 0992 00	9822 0992 09
QAS 14 - 20 Pd Low voltage	9822 0992 01	

7.2 Overview of the electrical options

The following “electrical” options are available for the QAS 14 and QAS 20 units:

- Automatic battery charger
- Battery switch
- Engine coolant heater
- Output terminal board
- Single frequency with electronic speed control (SF)
- Dual frequency with electronic speed control (DF)
- Electronic speed regulator
- Low voltage (LV)
- Single phase (1 PH)
- Earth leakage relay
- IT-relay
- “Electricité de France” (EDF)
- Refinery equipment pack

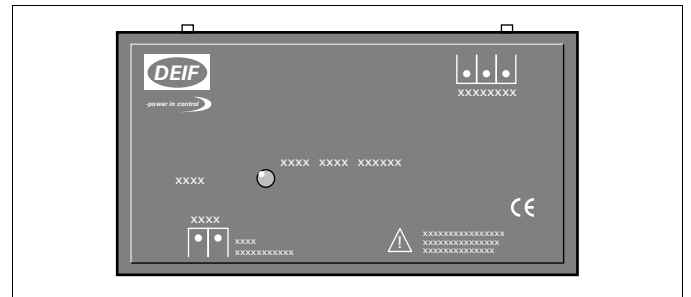
7.3 Description of the electrical options

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 23.5-27.5 V respectively 11.8-13.8 V.

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 battery 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.



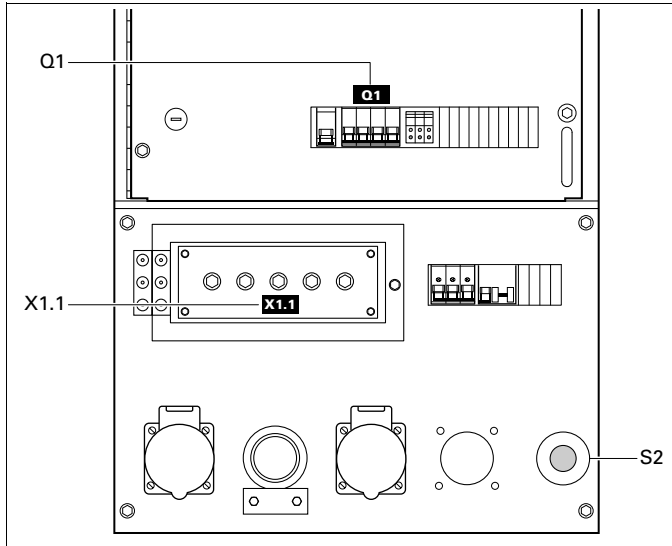
Never turn the battery switch to OFF during operation.

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 Output terminal board

The output terminal board option 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

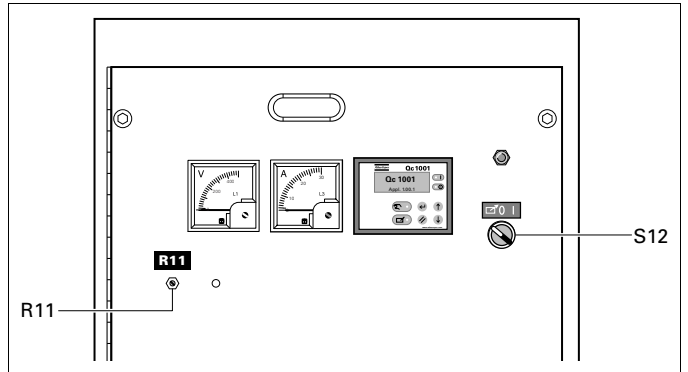
Interrupts the power supply to X1.1 when a short-circuit occurs at the load side, or when the earth leak detector (30 mA) or the overcurrent protection (QAS 14: 20 A, QAS 20: 32 A) is activated or when the shunt trip is energized. It must be reset manually after eliminating the problem.

X1.1... Main power supply (400 V AC)

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

7.3.5 Single frequency with electronic speed control (SF)

The “Single frequency” option provides an electronic speed controller which makes sure that the output frequency of the generator is 50/60 Hz with an accuracy of 0.25 % at constant load.

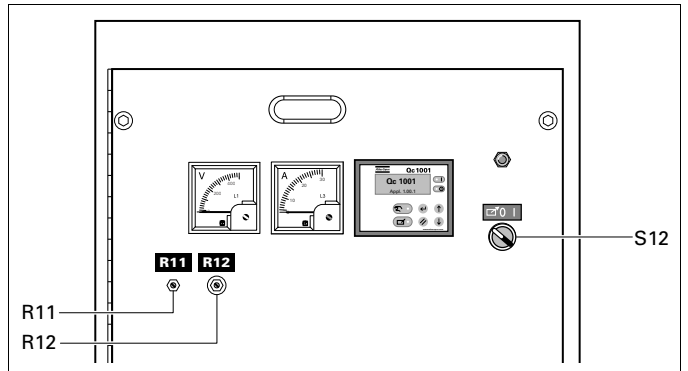


R11.... Supply voltage adjust potentiometer

Allows to adjust the output voltage.

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 accuracy of 0.25 % 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 R11 to the required value.

7.3.7 Electronic speed regulator

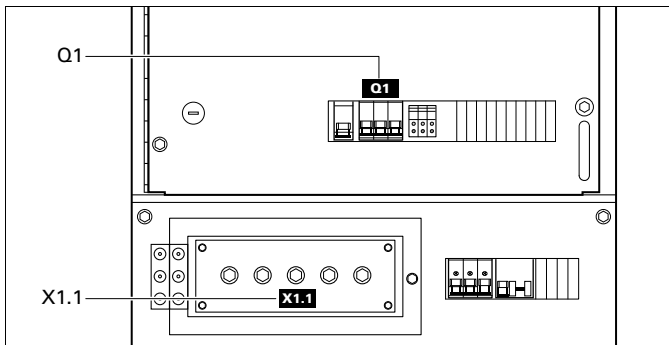
The electronic speed regulator makes sure that the output frequency of the generator is 60 Hz, independent of the amount of load. The accuracy at constant load is $\pm 0.25\%$.

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.

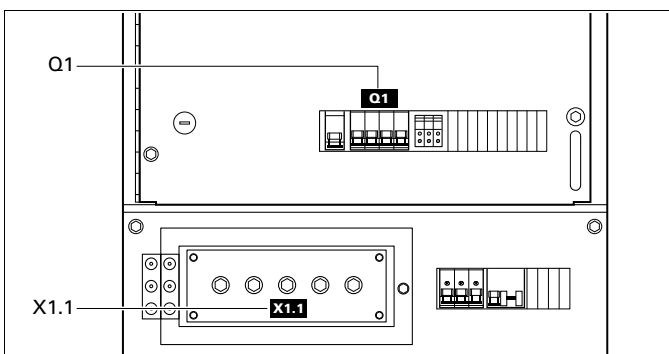


Q1..... Circuit breaker for low voltage, high current

Interrupts the low voltage power supply towards X1.1 when a short-circuit occurs at the load side or when the overcurrent protection (QAS 14: 50 Hz/60 Hz, 20 A, QAS 20: 50 Hz/60 Hz, 32 A) is activated. It must be reset manually after eliminating the problem.

7.3.9 Single phase (1 PH)

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



X1.1... Main power supply (230 V AC)

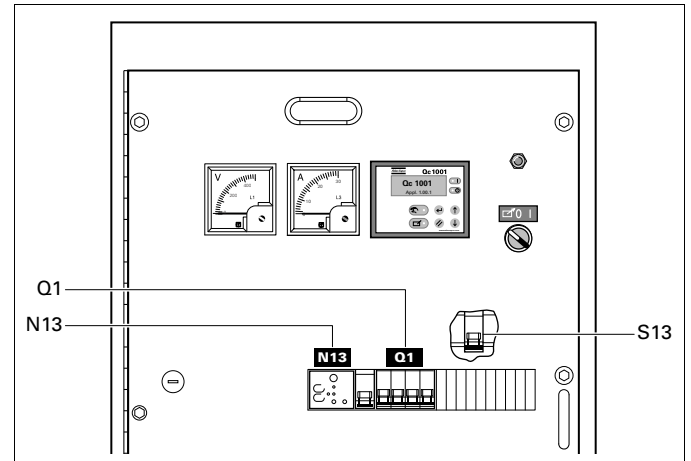
Terminals L1, L2, N (= neutral) and PE (= earthing), hidden behind the control panel door and behind a small transparent door.

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 (50 A) is activated. It must be reset manually after eliminating the problem.

7.3.10 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 0.03 A fixed with instantaneous trip but can also be adjusted between 0.1 A and 1 A with time delayed (0 - 0.5 sec) trip. N13 has to be reset manually after eliminating the problem (reset button marked R). It can be overridden by means of the earth leak switch (S13, labelled IAN) but has to be tested monthly (by pushing test button T).

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

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

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.

7.3.11 IT-relay

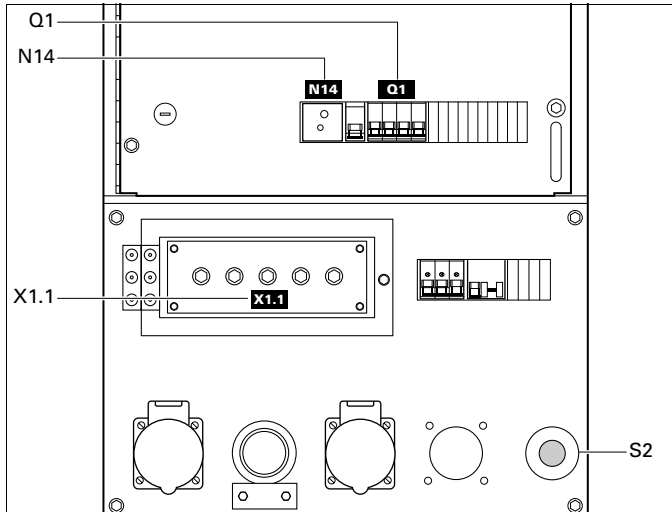
The generator is wired for an IT network i.e. no supply lines of the power supply are directly earthed. A failure in insulation resulting in a too low insulation resistance, is detected by the insulation monitoring relay.



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 X1.1

Interrupts the power supply X1.1 when a short-circuit occurs at the load side, or when the overcurrent protection (QAS 14: 20 A, QAS 20: 32 A) is activated. When activated, Q1 interrupts the three phases towards X1. It must be reset manually after eliminating the problem.

X1.1... Main power supply (400 V AC)

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

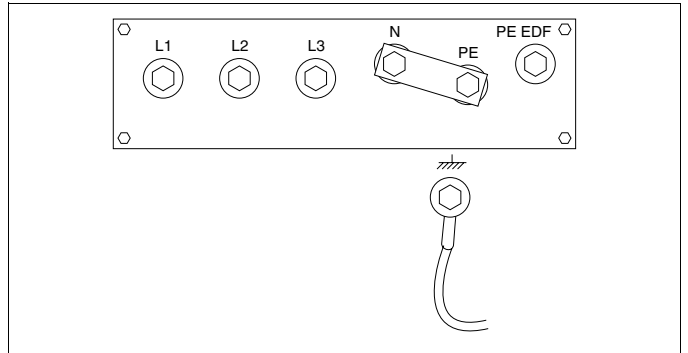
Checks the insulation resistance and activates Q1 when the insulation resistance is too low.

S2..... Emergency stop button

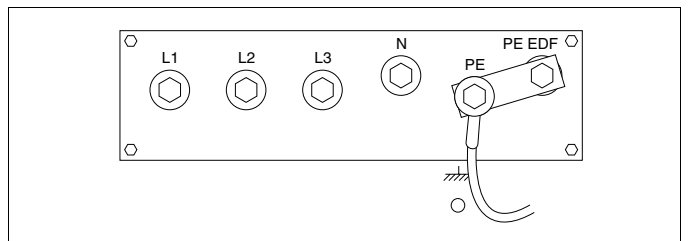
Push the button to stop the generator in case of an emergency. When the button is pressed, it must be unlocked, by turning it anti-clockwise, before the generator can be restarted. The emergency stop button can be secured in the locked position with the key, to avoid unauthorized use.

7.3.12 “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”.

7.3.13 Refinery equipment pack

This refinery equipment option consists of :

- Integrated spark arrestor
- Engine air inlet shut-off valve

Air inlet shut-off valve

The engine air inlet shut-off valve option 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 14 and QAS 20 units:

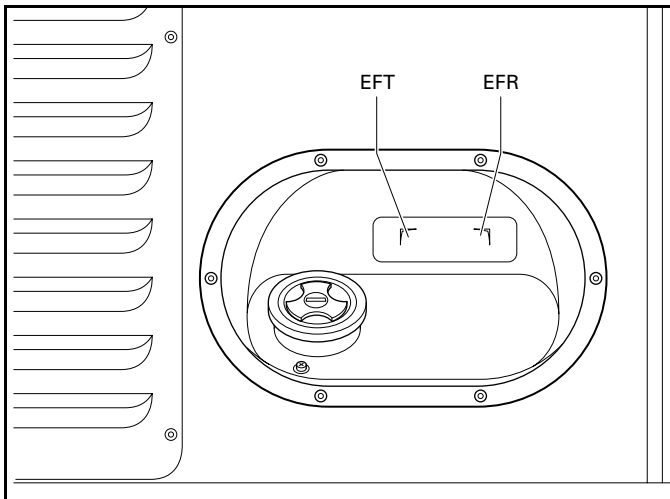
- External fuel tank connection (with/without quick couplings)
- Undercarriage (axle, towbar, towing eyes)
- Wheel chocks
- Lighting tower
- Skid fuel tank

7.5 Description of the mechanical options

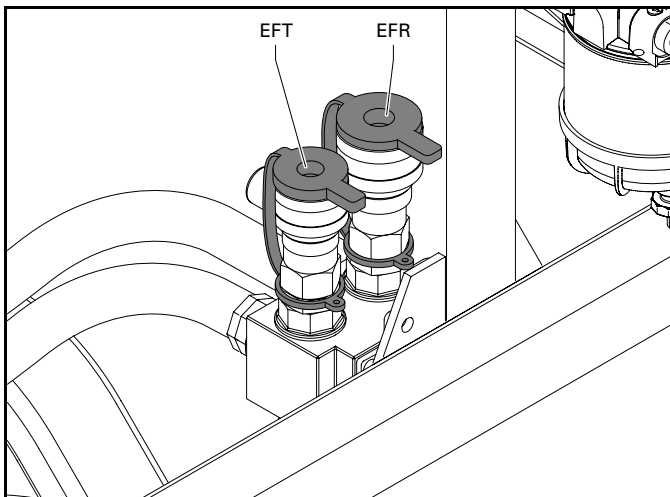
7.5.1 External fuel tank connection (with/without quick couplings)

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

View outside



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.



Indicates the fuel supply line from the tank to the engine.



Indicates the fuel return line from the engine to the tank.



Indicates the internal fuel tank.



Indicates the external fuel tank.

7.5.2 Undercarriage (axle, towbar, towing eyes)

The undercarriage is equipped with an adjustable towbar with brakes, with DIN-eye, AC-eye, NATO-eye, GB-eye, ITA-eye or ball coupling 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.

7.5.3 Wheel chocks

The option “wheel chocks” allows to park the generator on sloping ground. Place wheel chocks in front of or behind the wheels to immobilize the generator.

7.5.4 Lighting tower

The "Lighting tower" option provides an undercarriage (frame, axle and towbar) and 6 halogen projectors of 1500 W each. The lighting tower is very useful for construction sites where no electricity nor lighting is available.

Before raising the tower, install the four props for stability. To switch the lamps on, plug the connector of the power supply cables towards the lamps in outlet socket X3 of the generator.

To maintain the lighting tower

- Refer to the maintenance instructions mentioned in the chapter dealing with the "Undercarriage" option.
- Check the condition of the tower, the tightness of its bolts and the fixation of the elevation cable at least twice a year.



Do not use the handles on the lighting tower for towing or lifting the generator.

8. Technical specifications

8.1 Technical specifications for QAS 14 units

8.1.1 Readings on gauges

<i>Gauge</i>	<i>Reading</i>	<i>Unit</i>
Ammeter L3 (P1)	Below max. rating	A
Voltmeter (P4)	Below max. rating	V
Frequencymeter (P5)	50 Hz: Between 50 and 52.5	Hz
	60 Hz: Between 60 and 62.5	Hz
Hourmeter (P6)	Adding up	h
Fuel level (P7)	Above 0	Fuel tank full

8.1.2 Settings of switches

<i>Switch</i>	<i>Function</i>	<i>Activates at</i>
Engine oil pressure	shut down	0.5 bar
Engine coolant temperature	shut down	105 °C

8.1.3 Specifications of the engine/alternator/unit

		<i>50 Hz</i>	<i>60 Hz</i>
<i>Reference conditions 1)</i>	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
<i>Limitations 2)</i>	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
<i>Performance data 2) 3) 5)</i>	Rated active power (PRP) 3ph	10 kW	12 kW
	Rated power factor (lagging) 3ph	0.8	0.8
	Rated PRP power 3ph	12.5 kVA	15 kVA
	Rated voltage 3ph line to line	400 V	480 V
	Rated voltage 3ph line to line lower voltage	230 V	240 V
	Rated current 3ph	18 A	18 A
	Rated current 3ph lower voltage	31.4 A	36.1 A
	Performance class (acc.ISO 8528-5:1993) (optional)	G2	G2
	Frequency droop	<5 %	<5 %
		isochronous	isochronous
	Fuel consumption at full load/no load	2.9/0.8 kg/h	3.7/0.9 kg/h
	Specific fuel consumption	0.29 kg/kWh	0.28 kg/kWh
	Fuel autonomy at full load with standard tank	13 h	10.5 h
	Fuel autonomy at full load with standard tank and optional skid fuel tank	93 h	73 h
	Max. oil consumption at full load	4.4 g/h	5.6 g/h
	Maximum sound power level (LWA) measured according to 2000/14/EC OND	85 dB(A)	-
	Capacity of fuel tank	45 l	45 l
	Capacity of optional skid fuel tank	270 l	270 l
	Single step load acceptance	100 %	100 %
	<i>Application data</i>	Mode of operation	PRP
Site		land use	land use
Operation		single	single
Start-up and control mode		manual/auto.	manual/auto.
Start-up time		unspecified	unspecified
Mobility/ Config. acc. to ISO 8528-1:1993		transportable/D (optional) mobile/E	transportable/D (optional) mobile/E
Mounting		fully resilient	fully resilient

	Climatic exposure	open air	open air
	Degree of protection (cubicle)	IP54	IP54
	Status of neutral	earthed	earthed
<i>Alternator 4)</i>	Standard	IEC34-1	IEC34-1
	Make	ISO 8528-3	ISO 8528-3
	Model	NEWAGE	NEWAGE
	Rated output, class H temp. rise	BCI 164 D1	BCI 164 D1
	rating type acc. ISO 8528-3	13.5 kVA	16.9 kVA
	Degree of protection	BR	BR
	Insulation stator class	IP 23	IP 23
	Insulation rotor class	H	H
	Number of wires	H	H
		12	12
<i>Engine 4)</i>	Standard	ISO 3046	ISO 3046
	Type PERKINS	ISO 8528-2	ISO 8528-2
	Rated net output	403C-15	403C-15
	rating type acc. ISO 3046-7	12 kW	14.4 kW
	Coolant	ICXN	ICXN
	Combustion system	water	water
	Aspiration	direct injection	direct injection
	Number of cylinders	natural aspirated	natural aspirated
	Swept volume	3	3
	Speed governing	1.496 l	1.496 l
	(optional)	mechanical	mechanical
	Capacity of oil sump	electronic	electronic
	capacity of cooling system	6 l	6 l
	Electrical system	3.6 l	3.6 l
		12 Vdc	12 Vdc
<i>Power circuit</i>	Circuit-breaker, 3ph		
	Number of poles	4	4
	Thermal release It (Thermal release is higher at 25°C)	20 A	20 A
	Magnetic release Im	3..5xIn	3..5xIn
	Circuit-breaker, 3ph, lower voltage		
	Number of poles	3	4
	Thermal release It (Thermal release is higher at 25°C)	32 A	40 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	domestic (1x)	none
		2p + E	
		16A 230V	
		CEE form (1x)	
		3p + N + E	
		16A + 400V	
		CEE form (1x)	
		3p + N + E	
		32A + 400V	
<i>Unit</i>	Dimensions (LxWxH)	2070 x 870 x 1188 mm	2070 x 870 x 1188 mm
	Weight net mass	921 kg	921 kg
	Weight wet mass	969 kg	969 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	97	96	95	94
500	100	100	100	100	99	97	96	95	95	93	92
1000	98	97	97	96	96	94	93	91	90	89	89
1500	95	94	93	92	91	90	89	87	86	85	84
2000	90	89	88	87	86	84	83	82	81	80	79
2500	84	82	81	80	80	78	77	76	75	74	73
3000	78	77	76	75	74	72	71	70	69	67	66
3500	72	70	69	68	67	66	65	64	63	62	61
4000	64	63	63	61	60	59	59	57	56	54	53

8.2 Technical specifications for QAS 20 units

8.2.1 Readings on gauges

<i>Gauge</i>	<i>Reading</i>	<i>Unit</i>
Ammeter L3 (P1)	Below max. rating	A
Voltmeter (P4)	Below max. rating	V
Frequencymeter (P5)	50 Hz: Between 50 and 52.5	Hz
	60 Hz: Between 60 and 62.5	Hz
Hourmeter (P6)	Adding up	h
Fuel level (P7)	Above 0	Fuel tank full

8.2.2 Settings of switches

<i>Switch</i>	<i>Function</i>	<i>Activates at</i>
Engine oil pressure	shut down	0.5 bar
Engine coolant temperature	shut down	105 °C

8.2.3 Specifications of the engine/alternator/unit

		<i>50 Hz</i>	<i>60 Hz</i>
<i>Reference conditions 1)</i>	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
<i>Limitations 2)</i>	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
<i>Performance data 2) 3) 5)</i>	Rated active power (PRP) 3ph	15.6 kW	17.6 kW
	Rated power factor (lagging) 3ph	0.8	0.8
	Rated PRP power 3ph	20.0 kVA	22.0 kVA
	Rated voltage 3ph. line to line	400 V	480 V
	Rated voltage 3ph. line to line lower voltage	230 V	240 V
	Rated current 3ph.	28.1 A	26.5 A
	Rated current 3ph. lower voltage	48.9 A	52.9 A
	Performance class (acc.ISO 8528-5:1993) (optional)	G2	G2
	Frequency droop	<5 %	<5 %
		isochronous	isochronous
	Fuel consumption at full load/no load	4.1/1.0 kg/h	4.9/1.2 kg/h
	Specific fuel consumption	0.27 kg/kWh	0.27 kg/kWh
	Fuel autonomy at full load with standard tank	9 h	7 h
	Fuel autonomy at full load with standard tank and optional skid fuel tank	66 h	55 h
	Max. oil consumption at full load	6.2 g/h	7.4 g/h
	Maximum sound power level (LWA) measured according to 2000/14/EC OND	87 dB(A)	91 dB(A)
	Capacity of fuel tank	45 l	45 l
Capacity of optional skid fuel tank	270 l	270 l	
Single step load acceptance	100 %	100 %	
<i>Application data</i>	Mode of operation	PRP	PRP
	Site	land use	land use
	Operation	single	single
	Start-up and control mode	manual/auto.	manual/auto.
	Start-up time	unspecified	unspecified
	Mobility/ Config. acc. to ISO 8528-1:1993	transportable/D (optional)	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	earthed	earthed	

<i>Alternator 4)</i>	Standard	IEC34-1	IEC34-1
		ISO 8528-3	ISO 8528-3
	Make	NEWAGE	NEWAGE
	Model	BCI 184 E1	BCI 184 E1
	Rated output, class H temp. rise	20 kVA	25.3 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	
<i>Engine 4)</i>	Standard	ISO 3046	ISO 3046
		ISO 8528-2	ISO 8528-2
	Type PERKINS	404C-22	404C-22
	Rated net output	18.5 kW	20.7 kW
	rating type acc. ISO 3046-7	ICXN	ICXN
	Coolant	water	water
	Combustion system	direct injection	direct injection
	Aspiration	natural aspirated	natural aspirated
	Number of cylinders	4	4
	Swept volume	2.216 l	2.216 l
	Speed governing	mechanical	mechanical
	(optional)	electronic	electronic
	Capacity of oil sump	10.6 l	10.6 l
	capacity of cooling system	4.6 l	4.6 l
Electrical system	12 Vdc	12 Vdc	
<i>Power circuit</i>	Circuit-breaker, 3ph		
	Number of poles	4	4
	Thermal release It (Thermal release is higher at 25°C)	32 A	32 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)	50 A	63 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		
		domestic (1x)	none
		2p + E	
		16A 230V	
		CEE form (1x)	
		3p + N + E	
	16A + 400V		
	CEE form (1x)		
	3p + N + E		
	32A + 400V		
<i>Unit</i>	Dimensions (LxWxH)	2070 x 870 x 1188 mm	2070 x 870 x 1188 mm
	Weight net mass	946 kg	946 kg
	Weight wet mass	994 kg	994 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	97	96	95	94
500	100	100	100	100	99	97	96	95	95	93	92
1000	98	97	97	96	96	94	93	91	90	89	89
1500	95	94	93	92	91	90	89	87	86	85	84
2000	90	89	88	87	86	84	83	82	81	80	79
2500	84	82	81	80	80	78	77	76	75	74	73
3000	78	77	76	75	74	72	71	70	69	67	66
3500	72	70	69	68	67	66	65	64	63	62	61
4000	64	63	63	61	60	59	59	57	56	54	53

8.3 Conversion list of SI units into British units

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

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

8.4 Dataplate

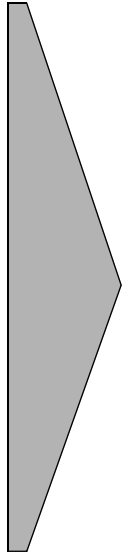
1	2	3	4
ATLAS COPCO AIRPOWER n.v.			

-YA3-*****-			
**** kg			
**** kg			
**** kg			
A			
B			
C			
Model/Modell/Modèle *****			
f _N	*** *	Hz	**
P _N	*** *	kVA	***
P _N	*	kW	***
U _N	*	V	***
I _N	*	A	***
cos phi	**		
Manuf. year/Baujahr/Année de fabrication ****			
MADE BY ATLAS COPCO AIRPOWER n.v. WILRIJK, BELGIUM			
16 5 6945 00			
Atlas Copco			
15	16	17	

A Maximum permitted loaded weight of the vehicle
 B Maximum permitted road weight of the front axle
 C Maximum permitted road weight of the rear axle

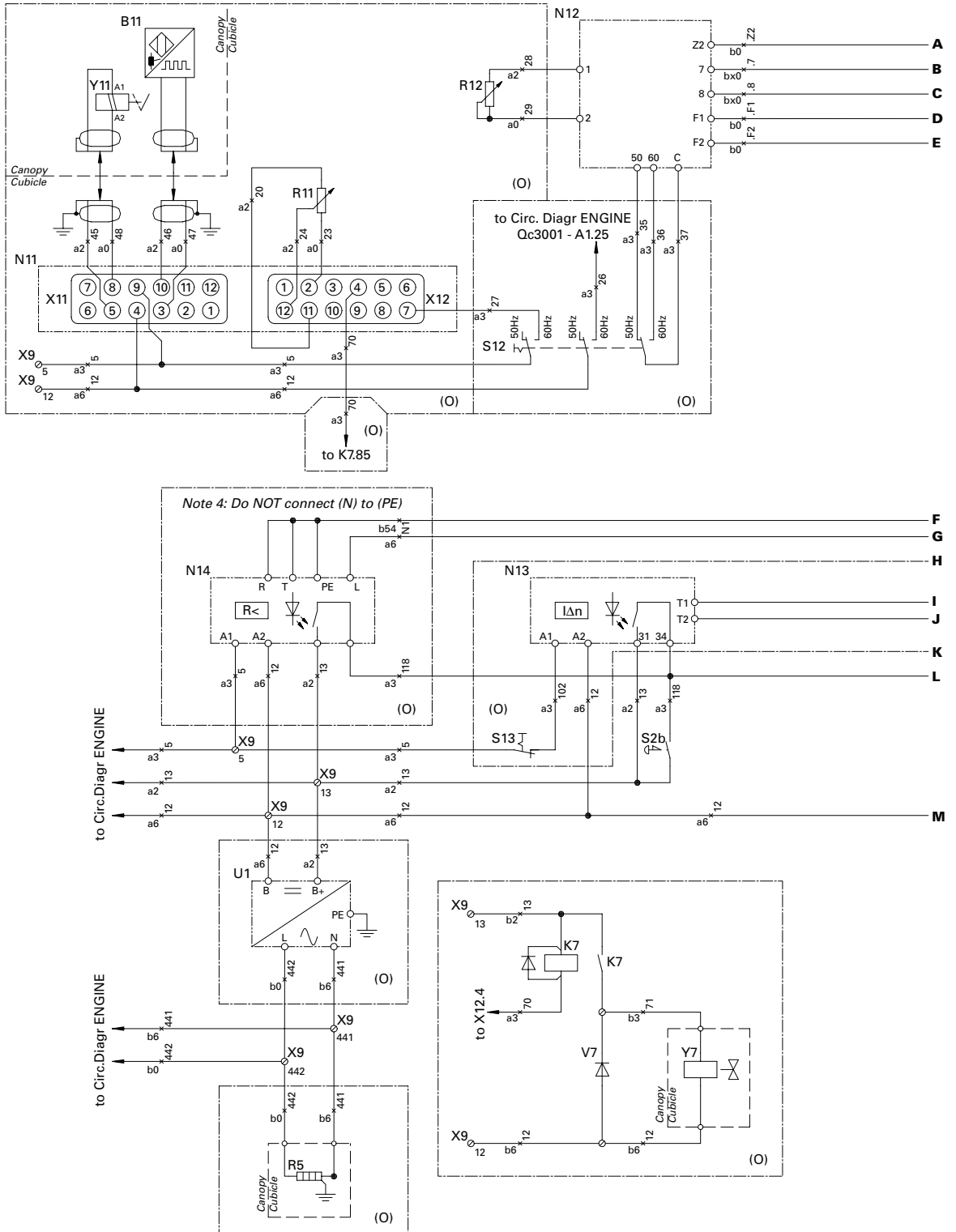
1 Company code
 2 Product code
 3 Unit serial number
 4 Name of the manufacturer
 5 EEC or national type approval number
 6 Vehicle identification number
 7 Model number
 8 Frequency
 9 Apparent power - PRP
 10 Active power - PRP
 11 Nominal rated voltage
 12 Nominal rated current
 13 Power factor
 14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

Circuit diagrams



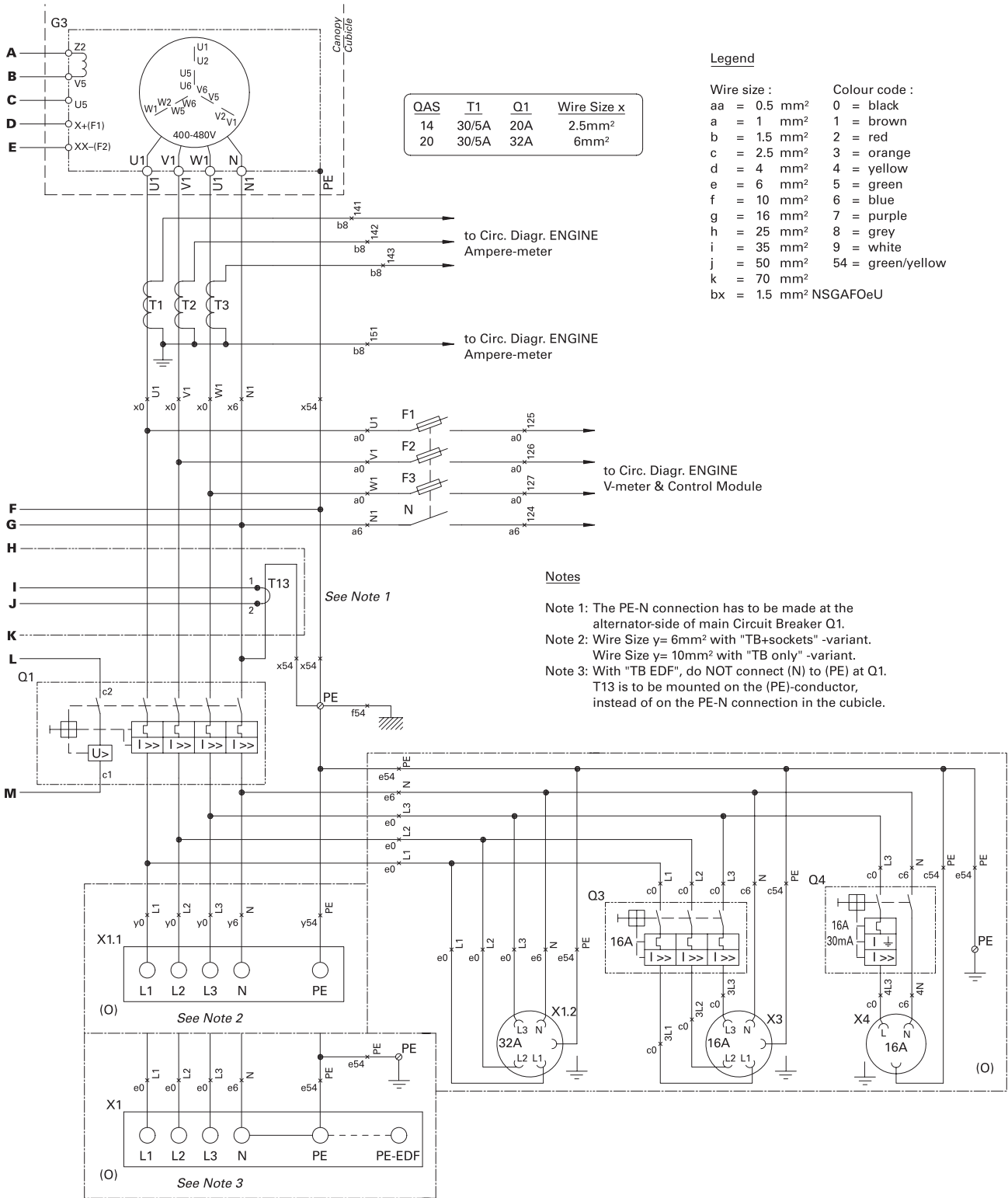
CIRCUIT DIAGRAM

9822 0992 00/04
Applicable for QAS 14 - 20 Power Circuit diagram



B11	Speed Sensor MPU (O)	N12	Automatic Voltage Regulator	Q4	Circuit Breaker 16A/30mA
F1-F3	Fuses 4A	N13	Earth Leakage Relay (O)	R5	Coolant Heater (O)
G3	Alternator	N14	IT Relay (O)	R11	Speed Adjustment (O)
K7	Aux. Relay for Y7 (O)	Q1	Circuit Breaker	R12	Voltage Adjustment (O)
N11	Speed Controller (O)	Q3	Circuit Breaker 16A	S2a	(see Engine Circuit)

CIRCUIT DIAGRAM

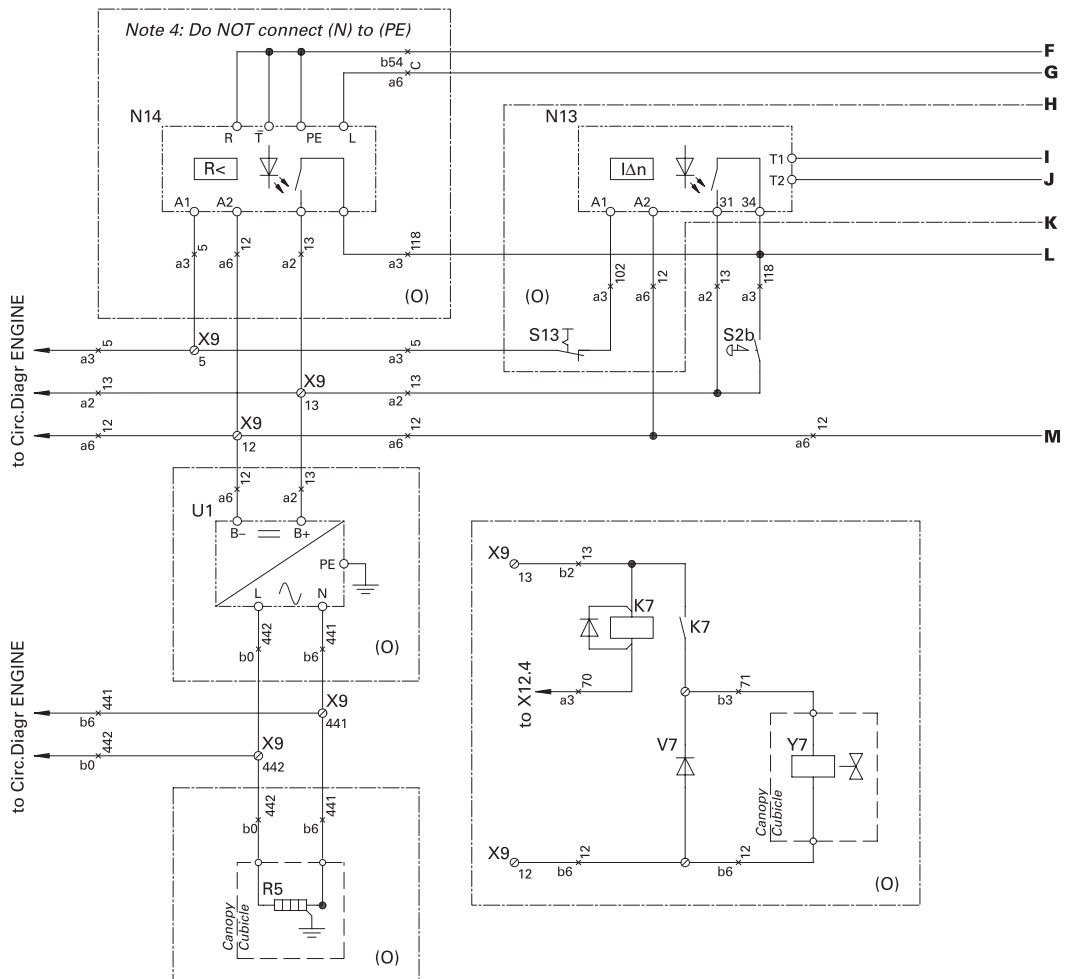
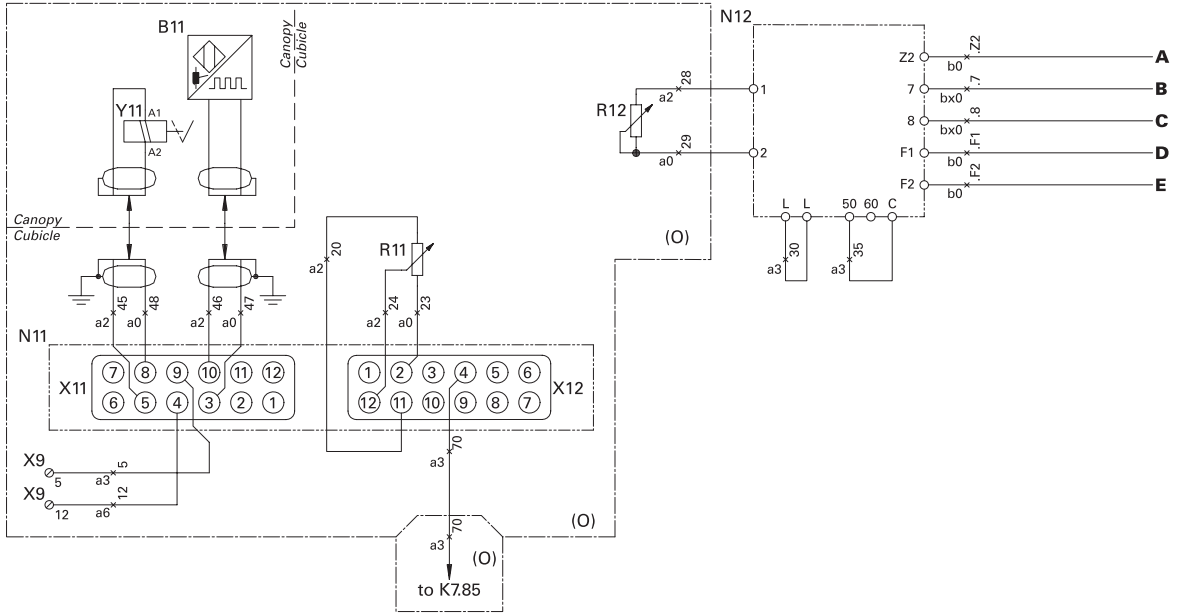


S2b	Emergency Stop	U1	Battery Charger (O)	X9	Terminal Strip
S12	50/60Hz-switch (O)	V7	Free-wheeling Diode Y7	X11	Connector Speed Control J1
S13	E.L.R. Disable-switch (O)	X1.1	Terminal Board (O)	X12	Connector Speed Control J2
T1-T2	Current Transformers (O)	X1.2	Outlet Socket 32A	Y7	Air Inlet Shutdown Valve (O)
T3	Current Transformer	X3	Outlet Socket 16A	Y11	Actuator ESR (O)
T13	Torus Earth Leakage (O)	X4	Outlet Socket 16A	(O)	Optional Equipment

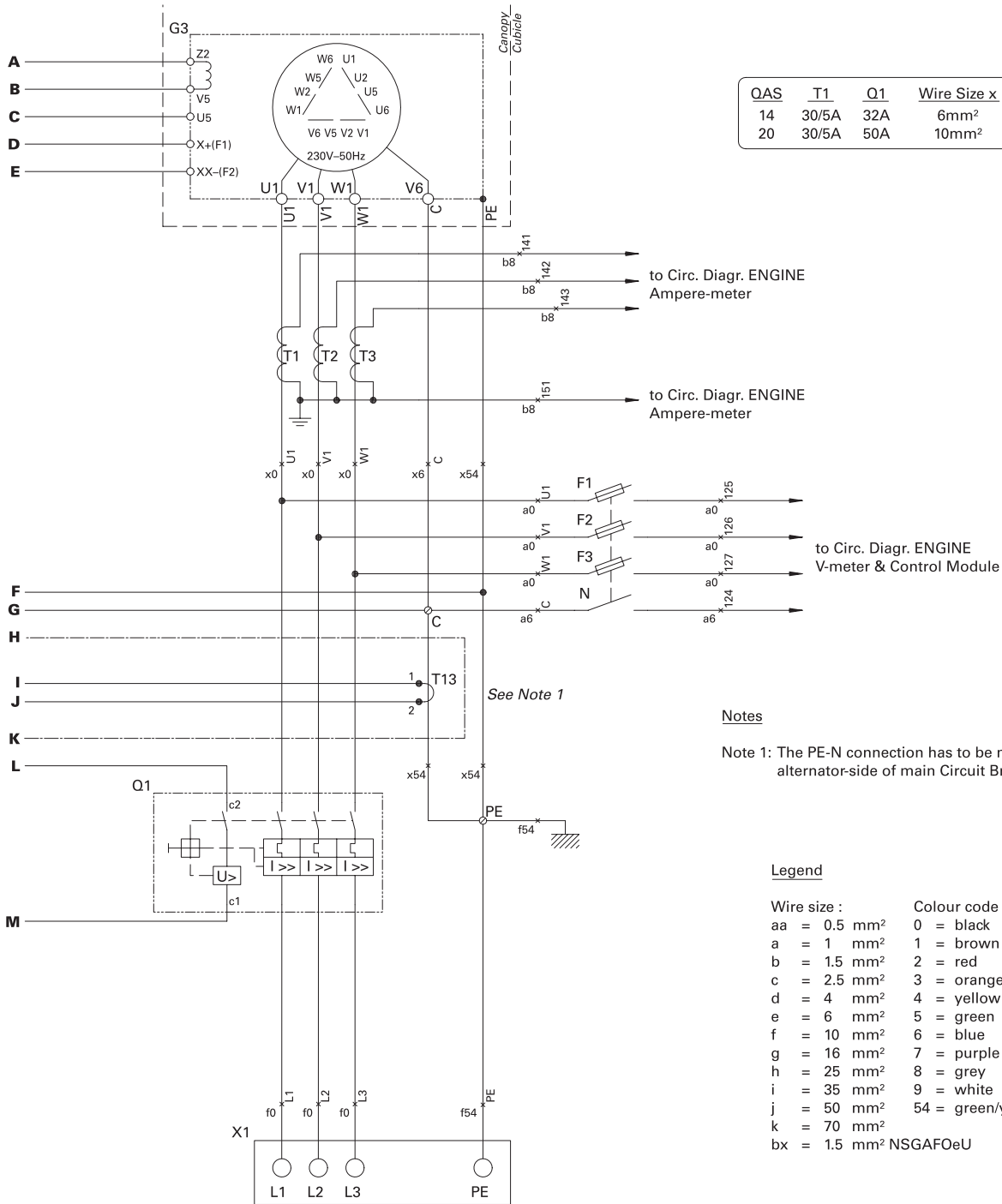
CIRCUIT DIAGRAM

9822 0992 01/02

Applicable for QAS 14 - 20 Power Circuit diagram - Low voltage



CIRCUIT DIAGRAM



Notes

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

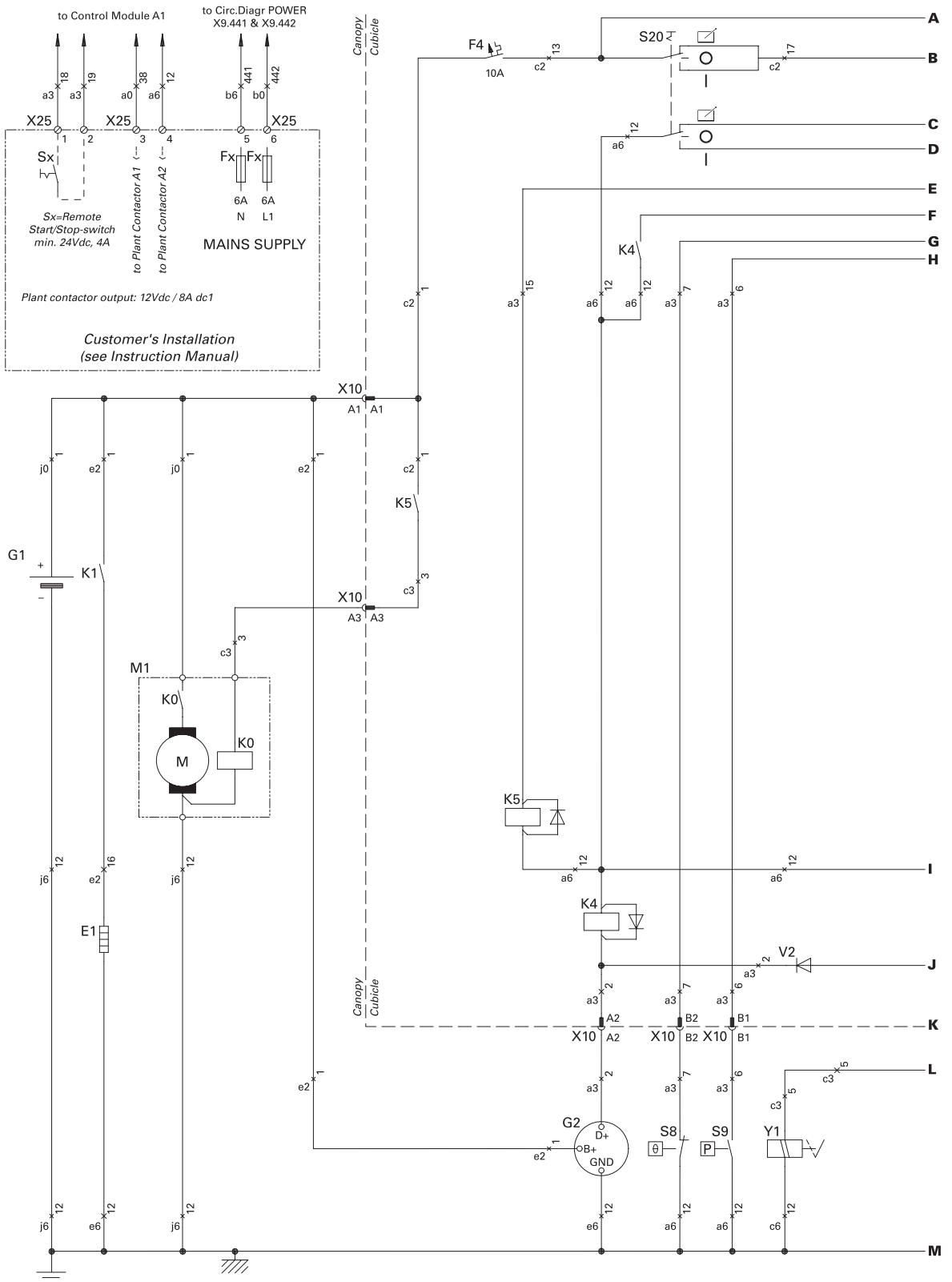
Legend

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

B11	Speed Sensor MPU (O)	R5	Coolant Heater (O)	U1	Battery Charger (O)
F1-F3	Fuses 4A	R11	Speed Adjustment (O)	V7	Free-wheeling Diode Y7
G3	Alternator	R12	Voltage Adjustment (O)	X1	Terminal Board
K7	Aux. Relay for Y7 (O)	S2a	(see Engine Circuit)	X9	Terminal Strip
N11	Speed Controller (O)	S2b	Emergency Stop	X11	Connector Speed Control J1
N12	Automatic Voltage Regulator	S13	E.L.R. Disable-switch (O)	X12	Connector Speed Control J2
N13	Earth Leakage Relay (O)	T1-T2	Current Transformers (O)	Y7	Air Inlet Shutdown Valve (O)
N14	IT Relay (O)	T3	Current Transformer	Y11	Actuator ESR (O)
Q1	Circuit Breaker	T13	Torus Earth Leakage (O)	(O)	Optional Equipment

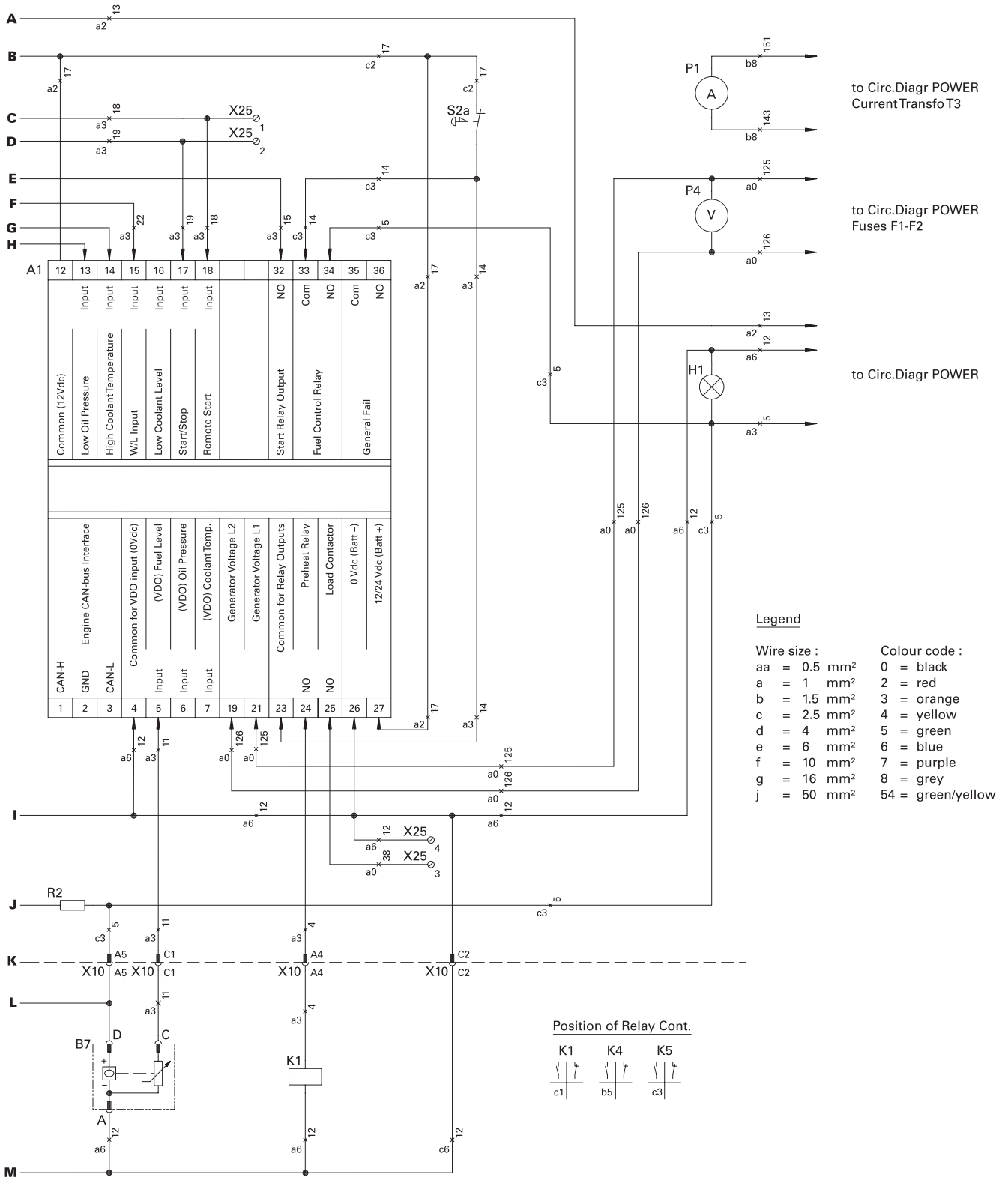
CIRCUIT DIAGRAM

9822 0992 08/02
Applicable for QAS 14 - 20 Qc1001™



A1	Control module	G1	Battery 12 Vdc	K1	Preheat relay
B7	Fuel level sensor	G2	Charging alternator	K4	W/L-inverter relay
E1	Preheat resistor	H1	Panel light	K5	Starter relay
F4	Fuse 10 A	K0	Starter solenoid	M1	Starter motor

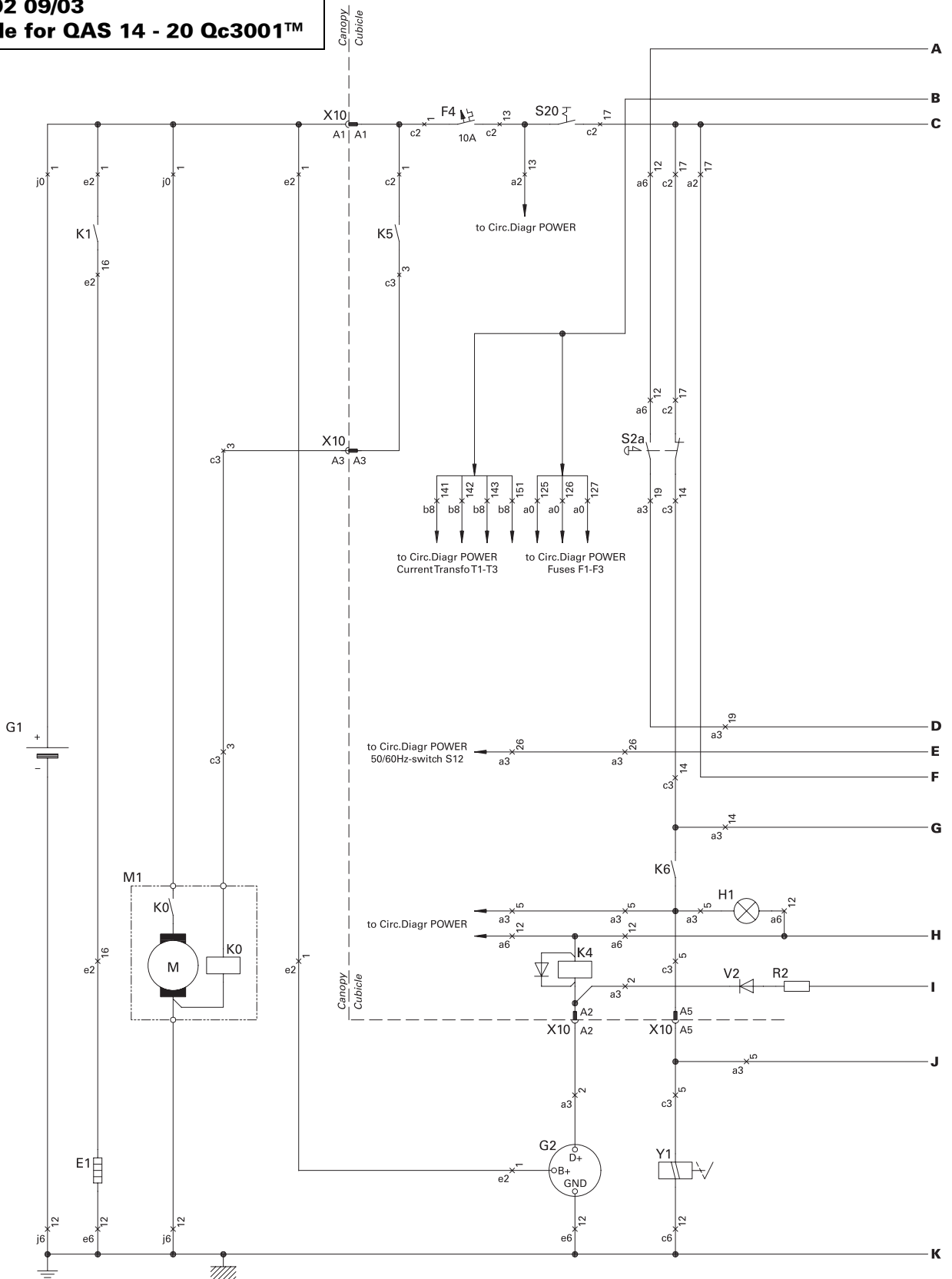
CIRCUIT DIAGRAM



P1 Amperemeter	S2b (see Power Circuit)	V2 Diode
P4 Voltmeter	S8 Coolant high temperature switch	X10 Connector wire harness
R2 Excitator resistor 47 Ohm	S9 Oil low pressure switch	X25 Customer's terminal strip
S2a Emergency stop	S20 ON/OFF/Remote switch	Y1 Fuel stop solenoid

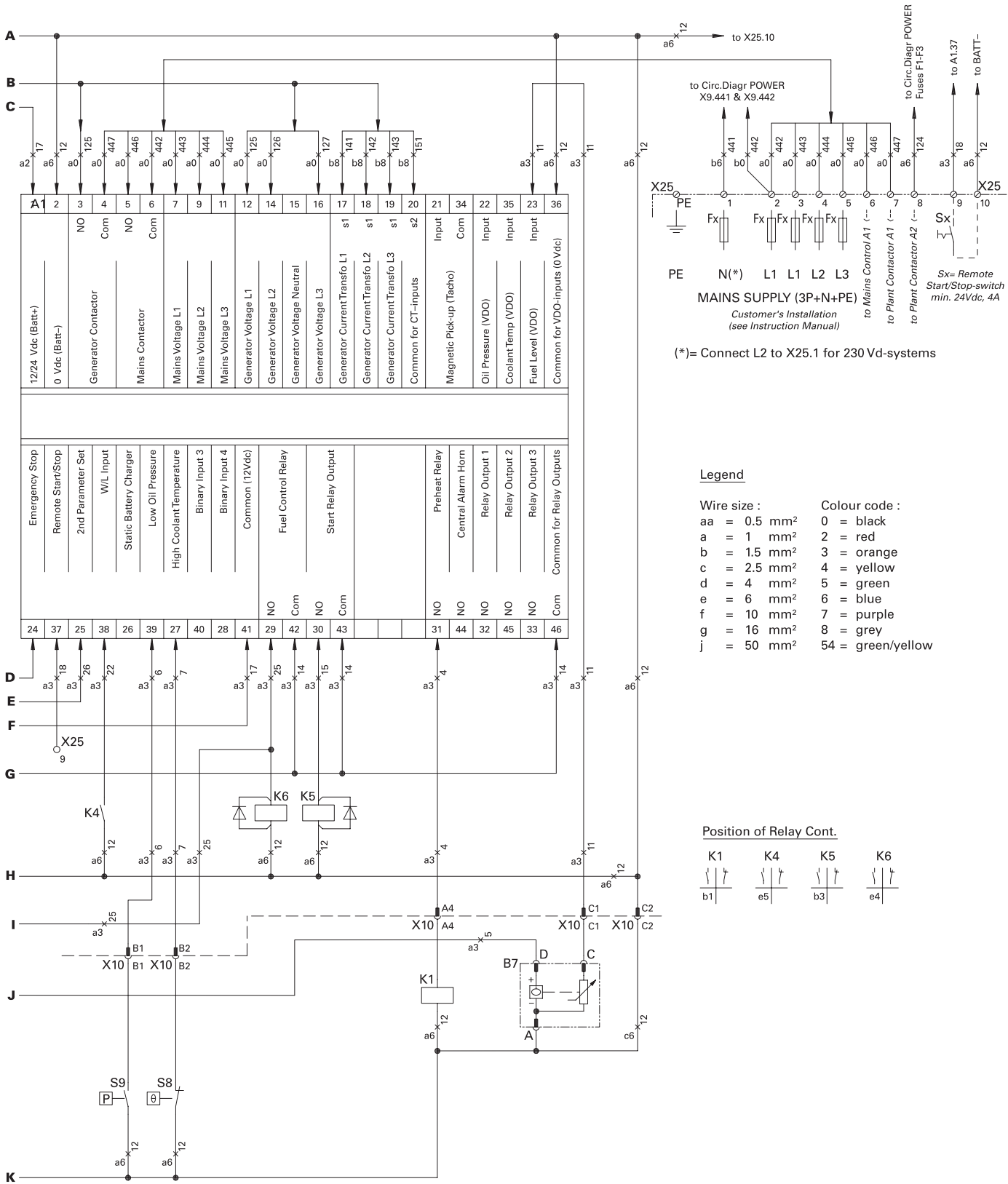
CIRCUIT DIAGRAM

9822 0992 09/03
Applicable for QAS 14 - 20 Qc3001™



A1	Generator Control Unit	F4	Fuse 10A	H1	Panel Light
B7	Fuel Level Sensor	G1	Battery 12Vdc	K0	Starter Solenoid
E1	Preheat Resistor	G2	Charging Alternator	K1	Preheat Relay

CIRCUIT DIAGRAM



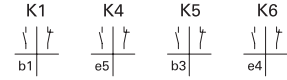
PE N(*) L1 L2 L3
MAINS SUPPLY (3P+N+PE)
Customer's Installation (see Instruction Manual)
 to Mains Contactor A1
 to Plant Contactor A1
 to Plant Contactor A2
 to Circ.Diagr POWER Fuses F1-F3
 to A1.37
 to BATT-

(*): Connect L2 to X25.1 for 230 Vd-systems

Legend

- | | |
|--------------------------|-------------------|
| Wire size : | Colour code : |
| aa = 0.5 mm ² | 0 = black |
| a = 1 mm ² | 2 = red |
| b = 1.5 mm ² | 3 = orange |
| c = 2.5 mm ² | 4 = yellow |
| d = 4 mm ² | 5 = green |
| e = 6 mm ² | 6 = blue |
| f = 10 mm ² | 7 = purple |
| g = 16 mm ² | 8 = grey |
| j = 50 mm ² | 54 = green/yellow |

Position of Relay Cont.



K4 W/L-Inverter Relay	S2a Emergency Stop	V2 Diode
K5 Starter Relay	S2b (see Power Circuit)	X10 Connector Wire Harness
K6 Fuel Solenoid Relay	S8 High Coolant Temp. Switch	X25 Customer's Terminal Strip
M1 Starter Motor	S9 Low Oil Pressure Switch	Y1 Fuel Stop Solenoid
R2 Excitat. Resistor 47 ohm	S20 ON/OFF-switch	



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**Instruction Manual
for AC Generators**

QAS 14 - 20 Pd

