

**Instruction Manual  
for AC Generators**

**QAS150 - 200 - 250 -  
300 Volvo**

Instruction manual ..... 3

Circuit diagrams ..... 63

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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, water jackets, etc.) regularly. See the maintenance schedule.
- 8 All regulating and safety devices shall be maintained with due care to ensure that they function properly. They may not be put out of action.
- 9 Pressure and temperature gauges shall be checked regularly with regard to their accuracy. They shall be replaced whenever outside acceptable tolerances.
- 10 Safety devices shall be tested as described in the maintenance schedule of the instruction manual to determine that they are in good operating condition.
- 11 Mind the markings and information labels on the unit.
- 12 In the event the safety labels are damaged or destroyed, they must be replaced to ensure operator safety.
- 13 Keep the work area neat. Lack of order will increase the risk of accidents.
- 14 When working on the unit, wear safety clothing. Depending on the kind of activities these are: safety glasses, ear protection, safety helmet (including visor), safety gloves, protective clothing, safety shoes. Do not wear the hair long and loose (protect long hair with a hairnet), or wear loose clothing or jewellery.
- 15 Take precautions against fire. Handle fuel, oil and anti-freeze with care because they are inflammable substances. Do not smoke or approach with naked flame when handling such substances. Keep a fire-extinguisher in the vicinity.

### 16a Portable generators (with earthing pin):

Earth the generator as well as the load properly.

### 16b Portable generators IT:

**Note:** This generator is built to supply a sheer alternating current IT network.

Earth the load properly.



### 1.3 Safety during transport and installation

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

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

Helicopter lifting is not allowed.

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

- 1 Before towing the unit:
  - check the towbar, the brake system and the towing eye. Also check the coupling of the towing vehicle,
  - check the towing and brake capability of the towing vehicle,
  - check that the towbar, jockey wheel or stand leg is safely locked in the raised position,
  - ascertain that the towing eye can swivel freely on the hook,
  - check that the wheels are secure and that the 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 cooling water system of a hot engine. Wait until the engine has sufficiently cooled down.
- 5 Never refill fuel while the unit is running, unless otherwise stated in the Atlas Copco Instruction Book (AIB). Keep fuel away from hot parts such as air outlet pipes or the engine exhaust. Do not smoke when fuelling. When fuelling from an automatic pump, an earthing cable should be connected to the unit to discharge static electricity. Never spill nor leave oil, fuel, coolant or cleansing agent in or around the unit.
- 6 All doors shall be shut during operation so as not to disturb the cooling air flow inside the bodywork and/or render the silencing less effective. A door should be kept open for a short period only e.g. for inspection or adjustment.
- 7 Periodically carry out maintenance works according to the maintenance schedule.
- 8 Stationary housing guards are provided on all rotating or reciprocating parts not otherwise protected and which may be hazardous to personnel. Machinery shall never be put into operation, when such guards have been removed, before the guards are securely reinstalled.
- 9 Noise, even at reasonable levels, can cause irritation and disturbance which, over a long period of time, may cause severe injuries to the nervous system of human beings.  
When the sound pressure level, at any point where personnel normally has to attend, is:
 

|                  |  |
|------------------|--|
| below 70 dB(A):  | no action needs to be taken,   |
| above 70 dB(A):  | noise-protective devices should be provided for people continuously being present in the room,   |
| below 85 dB(A):  | no action needs to be taken for occasional visitors staying a limited time only,   |
| above 85 dB(A):  | room to be classified as a noise-hazardous area and an obvious warning shall be placed permanently at each entrance to alert people entering the room, for even relatively short times, about the need to wear ear protectors, |
| above 95 dB(A):  | the warning(s) at the entrance(s) shall be completed with the recommendation that also occasional visitors shall wear ear protectors,  |
| above 105 dB(A): | special ear protectors that are adequate for this noise level and the spectral composition of the noise shall be provided and a special warning to that effect shall be placed at each entrance.                               |
- 10 Insulation or safety guards of parts the temperature of which can be in excess of 80 °C (175 °F) and which may be accidentally touched by personnel shall not be removed before the parts have cooled to room temperature.
- 11 Never operate the unit in surroundings where there is a possibility of taking in flammable or toxic fumes.
- 12 If the working process produces fumes, dust or vibration hazards, etc., take the necessary steps to eliminate the risk of personnel injury.
- 13 When using compressed air or inert gas to clean down equipment, do so with caution and use the appropriate protection, at least safety glasses, for the operator as well as for any bystander. Do not apply compressed air or inert gas to your skin or direct an air or gas stream at people. Never use it to clean dirt from your clothes.
- 14 When washing parts in or with a cleaning solvent, provide the required ventilation and use appropriate protection such as a breathing filter, safety glasses, rubber apron and gloves, etc.

- 15 Safety shoes should be compulsory in any workshop and if there is a risk, however small, of falling objects, wearing of a safety helmet should be included.
- 16 If there is a risk of inhaling hazardous gases, fumes or dust, the respiratory organs must be protected and depending on the nature of the hazard, so must the eyes and skin.
- 17 Remember that where there is visible dust, the finer, invisible particles will almost certainly be present too; but the fact that no dust can be seen is not a reliable indication that dangerous, invisible dust is not present in the air.
- 18 Never operate the generator in excess of its limits as indicated in the technical specifications and avoid long no-load sequences.
- 19 Never operate the generator in a humid atmosphere. Excessive moisture causes worsening of the generator insulation.
- 20 Do not open electrical cabinets, cubicles or other equipment while voltage is supplied. If such cannot be avoided, e.g. for measurements, tests or adjustments, have the action carried out by a qualified electrician only, with appropriate tools, and ascertain that the required bodily protection against electrical hazards is applied.
- 21 Never touch the power terminals during operation of the machine.
- 22 Whenever an abnormal condition arises, e.g. excessive vibration, noise, odour, etc., switch the circuit breakers to OFF and stop the engine. Correct the faulty condition before restarting.
- 23 Check the electric cables regularly. Damaged cables and insufficient lightening 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 QAS150 Volvo

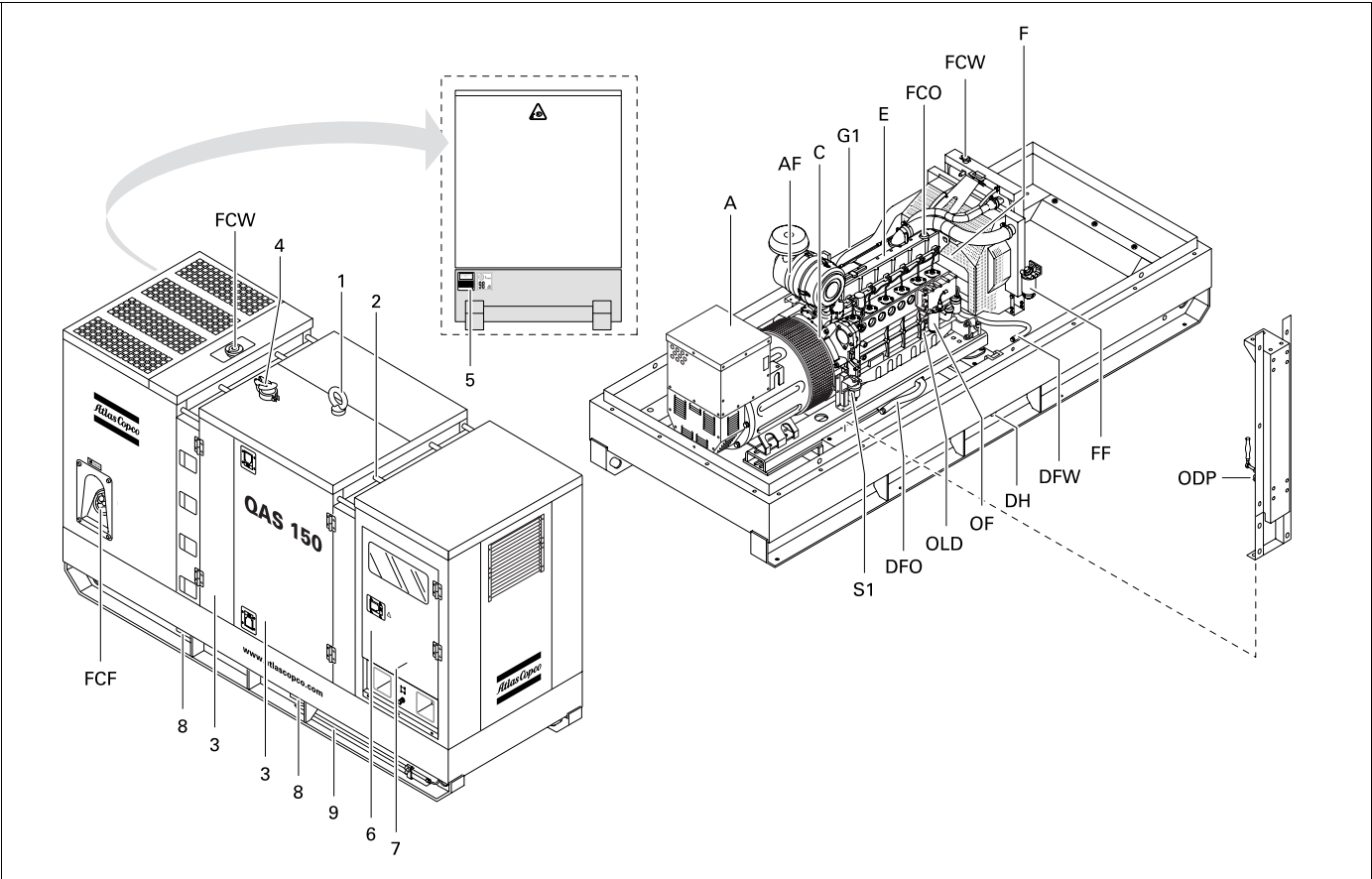
The QAS150 Volvo is an AC generator, built for continuous running at sites where no electricity is available or as stand-by in cases of interruption of the mains. The generators operates at:

- 50 Hz     230 V - 3ph
- 50 Hz     400 V - 3ph
- 50 Hz     230-400V - 3ph

Some parts of the unit are different, depending on which version.

The QAS150 Volvo generator is driven by a water-cooled diesel engine, manufactured by VOLVO PENTA.

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



|     |  |     |                                      |
|-----|--|-----|--------------------------------------|
| 1   | Lifting rod                                      | DFW | Drain flexible cooling water         |
| 2   | Guiding rod                                      | DH  | Drain and access hole (in the frame) |
| 3   | Side doors                                       | E   | Engine                               |
| 4   | Engine exhaust                                   | F   | Fan                                  |
| 5   | Data Plate                                       | FCF | Filler cap fuel                      |
| 6   | Side door, access to control and indicator panel | FCO | Filler cap engine oil                |
| 7   | Output terminal board                            | FCW | Filler cap cooling water             |
| 8   | Hole for forklift                                | FF  | Fuel filter                          |
| 9   | Earthing rod                                     | G1  | Battery                              |
| A   | Alternator                                       | ODP | Oil drain pump                       |
| AF  | Air filter                                       | OF  | Oil filter                           |
| C   | Coupling   | OLD | Engine oil level dipstick            |
| DFO | Drain flexible engine oil                        | S1  | Battery switch                       |

## 2.2 General description QAS200 Volvo

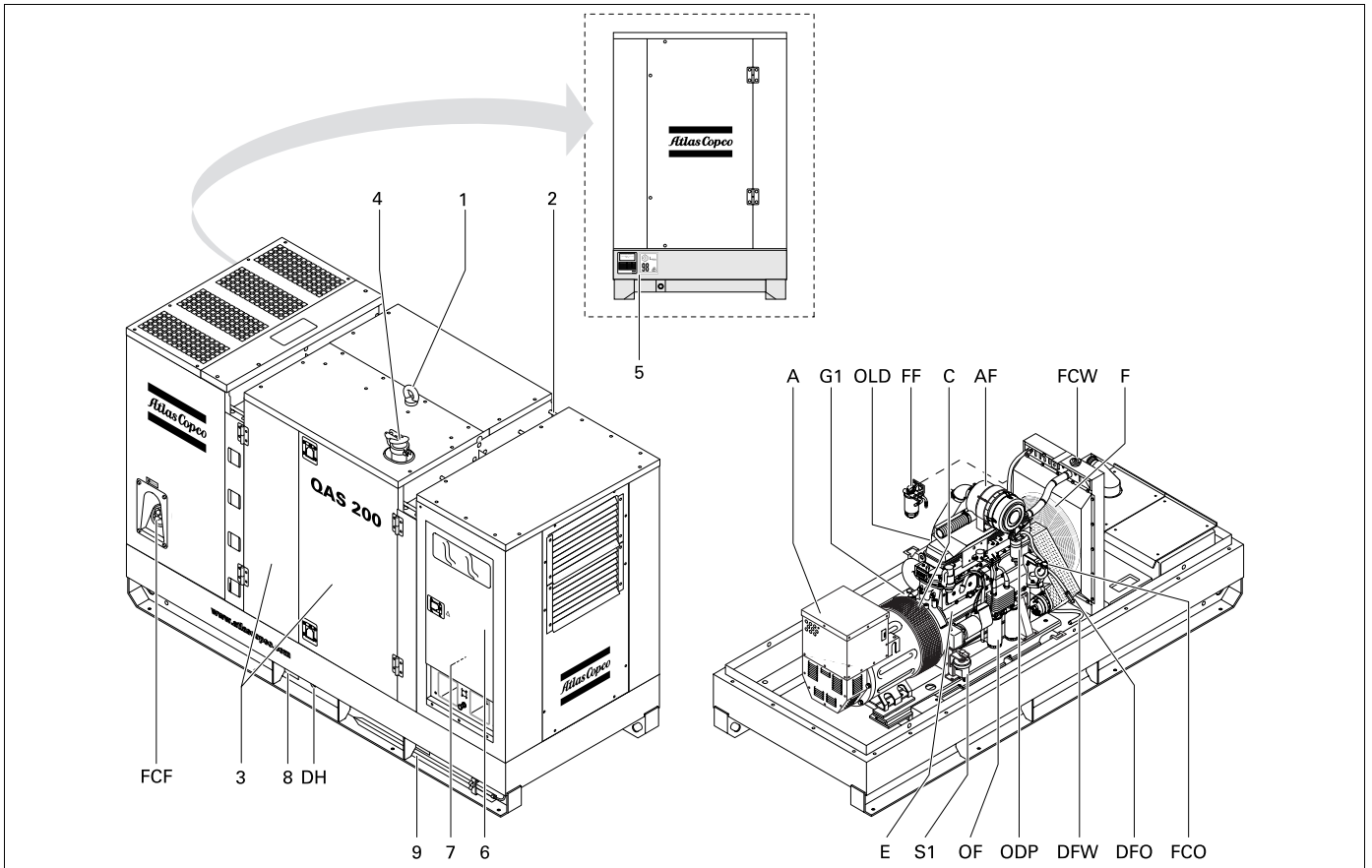
The QAS200 Volvo is an AC generator, built for continuous running at sites where no electricity is available or as stand-by in cases of interruption of the mains. The generator operates at:

|             |                |
|-------------|----------------|
| 50 Hz       | 230 V - 3ph    |
| 50 Hz/60 Hz | 400 V - 3ph    |
| 50 Hz       | 230-400V - 3ph |

Some parts of the unit are different, depending on which version.

The QAS200 Volvo generator is driven by a water-cooled diesel engine, manufactured by VOLVO PENTA.

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



|     |  |     |                                      |
|-----|--|-----|--------------------------------------|
| 1   | Lifting rod                                      | DFW | Drain flexible cooling water         |
| 2   | Guiding rod                                      | DH  | Drain and access hole (in the frame) |
| 3   | Side doors                                       | E   | Engine                               |
| 4   | Engine exhaust                                   | F   | Fan                                  |
| 5   | Data Plate                                       | FCF | Filler cap fuel                      |
| 6   | Side door, access to control and indicator panel | FCO | Filler cap engine oil                |
| 7   | Output terminal board                            | FCW | Filler cap cooling water             |
| 8   | Hole for forklift                                | FF  | Fuel filter                          |
| 9   | Earthing rod                                     | G1  | Battery                              |
| A   | Alternator                                       | ODP | Oil drain pump                       |
| AF  | Air filter                                       | OF  | Oil filter                           |
| C   | Coupling   | OLD | Engine oil level dipstick            |
| DFO | Drain flexible engine oil                        | S1  | Battery switch                       |

## 2.3 General description QAS250 Volvo

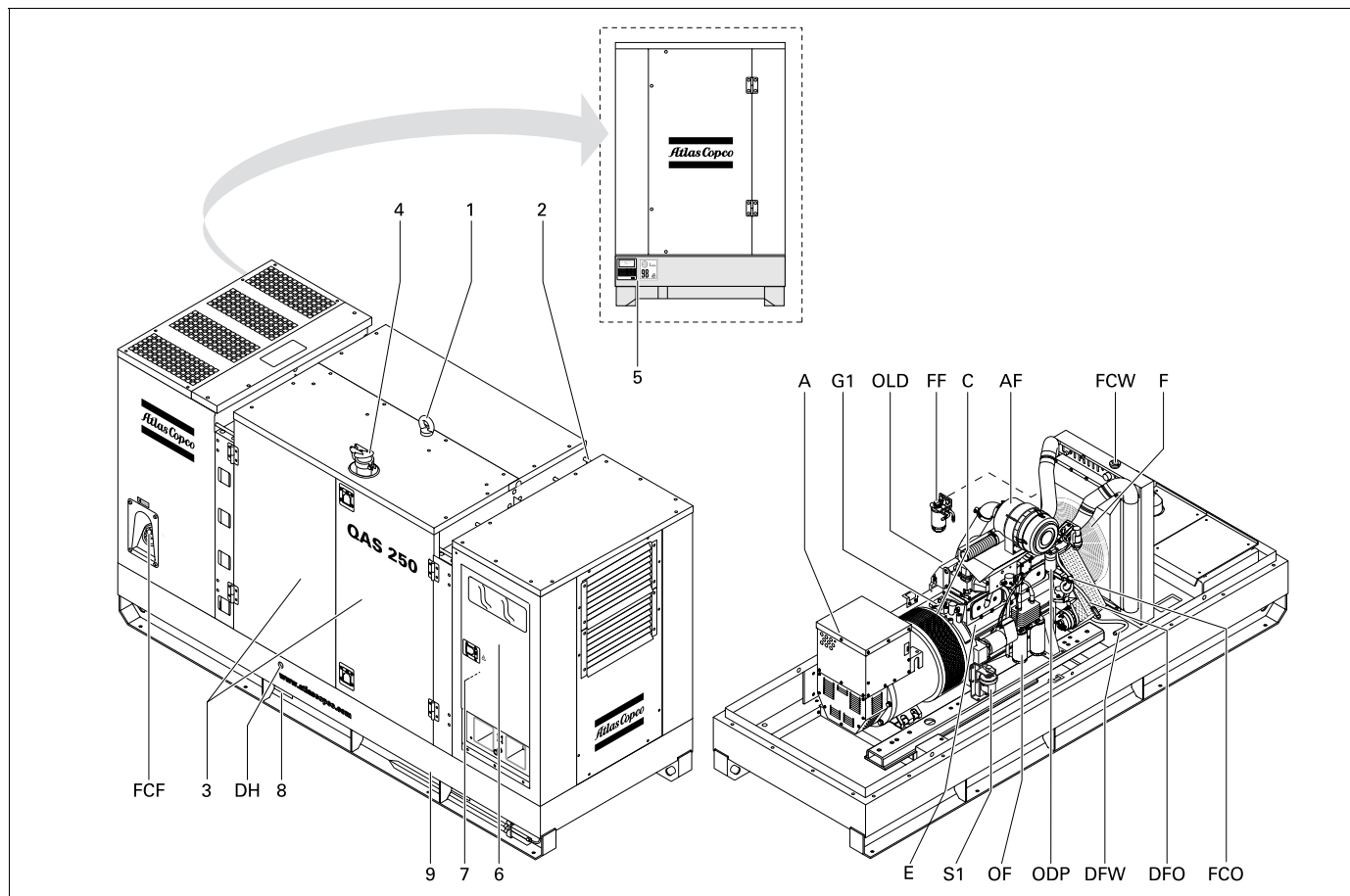
The QAS250 Volvo is an AC generator, built for continuous running at sites where no electricity is available or as stand-by in cases of interruption of the mains. The generators operates at:

|             |                |
|-------------|----------------|
| 50 Hz       | 230 V - 3ph    |
| 50 Hz/60 Hz | 400 V - 3ph    |
| 50 Hz       | 230-400V - 3ph |

Some parts of the unit are different, depending on which version.

The QAS250 Volvo generator is driven by a water-cooled diesel engine, manufactured by VOLVO PENTA.

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



|     |  |     |                                      |
|-----|--|-----|--------------------------------------|
| 1   | Lifting rod                                      | DFW | Drain flexible cooling water         |
| 2   | Guiding rod                                      | DH  | Drain and access hole (in the frame) |
| 3   | Side doors                                       | E   | Engine                               |
| 4   | Engine exhaust                                   | F   | Fan                                  |
| 5   | Data Plate                                       | FCF | Filler cap fuel                      |
| 6   | Side door, access to control and indicator panel | FCO | Filler cap engine oil                |
| 7   | Output terminal board                            | FCW | Filler cap cooling water             |
| 8   | Hole for forklift                                | FF  | Fuel filter                          |
| 9   | Earthing rod                                     | G1  | Battery                              |
| A   | Alternator                                       | ODP | Oil drain pump                       |
| AF  | Air filter                                       | OF  | Oil filter                           |
| C   | Coupling   | OLD | Engine oil level dipstick            |
| DFO | Drain flexible engine oil                        | S1  | Battery switch                       |

## 2.4 General description QAS300 Volvo

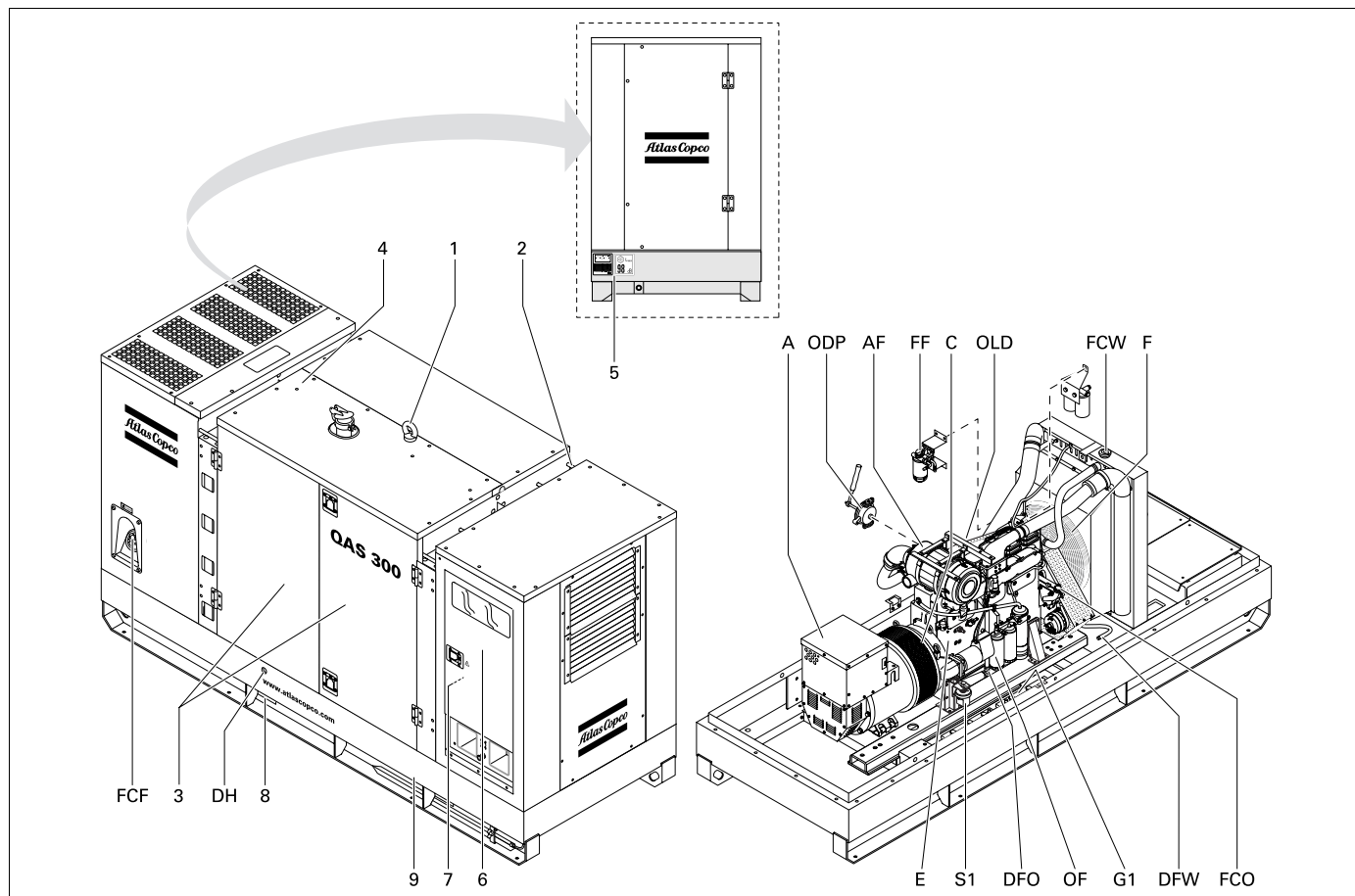
The QAS300 Volvo is an AC generator, built for continuous running at sites where no electricity is available or as stand-by in cases of interruption of the mains. The generator operates at:

|             |                 |
|-------------|-----------------|
| 50 Hz       | 230 V - 3ph     |
| 50 Hz/60 Hz | 400 V - 3ph     |
| 50 Hz       | 230-400 V - 3ph |

Some parts of the unit are different, depending on which version.

The QAS300 Volvo generator is driven by a water-cooled diesel engine, manufactured by VOLVO PENTA.

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



|     |  |     |                                      |
|-----|--|-----|--------------------------------------|
| 1   | Lifting rod                                      | DFW | Drain flexible cooling water         |
| 2   | Guiding rod                                      | DH  | Drain and access hole (in the frame) |
| 3   | Side doors                                       | E   | Engine                               |
| 4   | Engine exhaust                                   | F   | Fan                                  |
| 5   | Data Plate                                       | FCF | Filler cap fuel                      |
| 6   | Side door, access to control and indicator panel | FCO | Filler cap engine oil                |
| 7   | Output terminal board                            | FCW | Filler cap cooling water             |
| 8   | Hole for forklift                                | FF  | Fuel filter                          |
| 9   | Earthing rod                                     | G1  | Battery                              |
| A   | Alternator                                       | ODP | Oil drain pump                       |
| AF  | Air filter                                       | OF  | Oil filter                           |
| C   | Coupling   | OLD | Engine oil level dipstick            |
| DFO | Drain flexible engine oil                        | S1  | Battery switch                       |

## 2.5 Bodywork

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

The generator's lifting eye is located in the middle of the roof. The recesses in the roof have guiding rods at both sides.



**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.

## 2.6 Markings

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



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



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



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



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



Indicates a lifting point of the generator.



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



Use 15W40 oil only.



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



Indicates the drain for the engine oil.



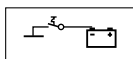
Indicates the drain for the coolant.



Indicates the drain plug for the engine fuel.



Indicates the different earthing connections on the generator.



Indicates the battery switch.



Indicates the 3-way valve.



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

| QAS 150 - QAS 200<br>QAS 250 - QAS 300 |              |
|--|--------------|
| <b>SERVICE PAK</b>                     |              |
| 100 l                                  | 2012 4365 05 |
| QAS 150                                | 2012 4367 05 |
| QAS 200                                | 2012 4372 05 |
| 1000 l                                 | 2012 4366 05 |
| QAS 150                                | 2012 4368 05 |
| QAS 200-250                            | 2012 4373 05 |
| 2000 l                                 | 2012 4365 07 |
| QAS 150                                | 2012 4367 07 |
| QAS 200                                | 2012 4374 07 |
| QAS 250                                | 2012 4375 07 |
| QAS 300                                | 2012 4376 07 |
| <b>PAROIL 15W40 (Engine oil)</b>       |              |
| 2 L (11.8 l/24.6 gal)                  | 1010 5850 00 |
| 5 L (26.4 l/57.0 gal)                  | 1010 5854 00 |
| 20 L (88.0 l/232.0 gal)                | 1010 5855 00 |

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

## 2.7 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.

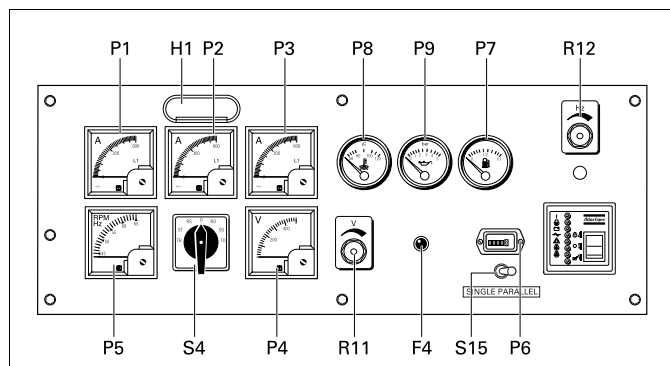
The drain flexibles for the engine oil and the engine coolant can be brought to the outside of the generator through the drain hole.



**The drain hole can also be used to guide external fuel tank connections. When connecting an external fuel tank, use the 3-way valves. See 'External fuel tank connection'**

## 2.8 Control and indicator panel - Remote start

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





## 2.8.1 Engine gauges

*P6..... Hourmeter*

*P7..... Fuel level gauge*

*P8..... Engine coolant temperature gauge*

*P9..... Engine oil pressure gauge*

## 2.8.2 Generator gauges

*P1..... Ammeter line L1*

Indicates the outgoing current in the first phase (L1).

*P2..... Ammeter line L2*

Indicates the outgoing current in the second phase (L2).

*P3..... Ammeter line L3*

Indicates the outgoing current in the third phase (L3).

*P4..... Voltmeter*

Indicates the voltage selected by means of voltage selector switch S4.

*P5..... Frequency / RPM meter*

Indicates the frequency of the supply voltage and the speed of the engine.

*S4..... Voltage selector switch*

Allows to measure the voltage between each of the phases and between each phase and the neutral. It also allows to switch off the voltmeter.

## 2.8.3 Potentiometer

*R11.... Voltage adjust potentiometer*

Allows to adjust the output voltage.

*R12.... Frequency adjust potentiometer*

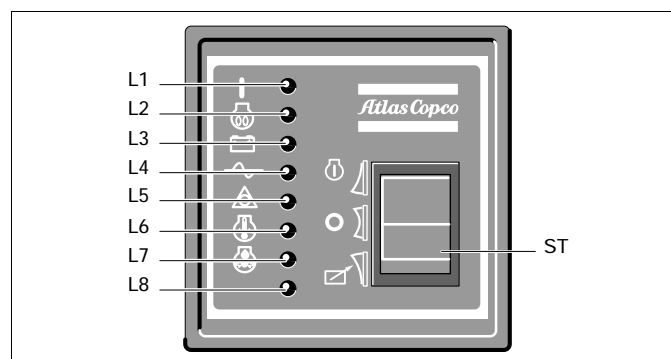
Allows to adjust the frequency of the output voltage.

## 2.8.4 Parallel operation

*S15.... Single/Parallel switch*




Enables the generator (combined with the SAPE unit) to operate in parallel mode. For details refer to the SAPE unit instruction manual. Always put this switch in single position for stand alone use.

## 2.8.5 Engine controls and lamps



*ST..... Starter switch*

The different positions of the starter switch ST are:

-  : used to select normal start and to disable remote start.
-  : used to switch off the power supply from the battery. The unit will not be able to start up.
-  : used to select remote start.

*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.

*L1 ..... Electrical system indicator*

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

*L2 ..... Engine preheating system indicator*

Lights up when the glow plugs in the engine, used to facilitate starting, are warming up. Extinguishes after approximately 10 seconds. Bypassing of the preheattime is allowed e.g. when starting a hot engine, but the preheat system remains active.

*L3 ..... Alternator charging indicator*

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

*L4 ..... AC shut down indicator*

Lights up when no AC input (< 70 V line-to-neutral) is present.

*L5 ..... Emergency stop Indicator*

*L6 ..... Engine coolant fault indicator*

Lights up when the high engine oil temperature was the cause of shut down, or when the coolant level is low.

*L7 ..... Engine oil pressure fault indicator*

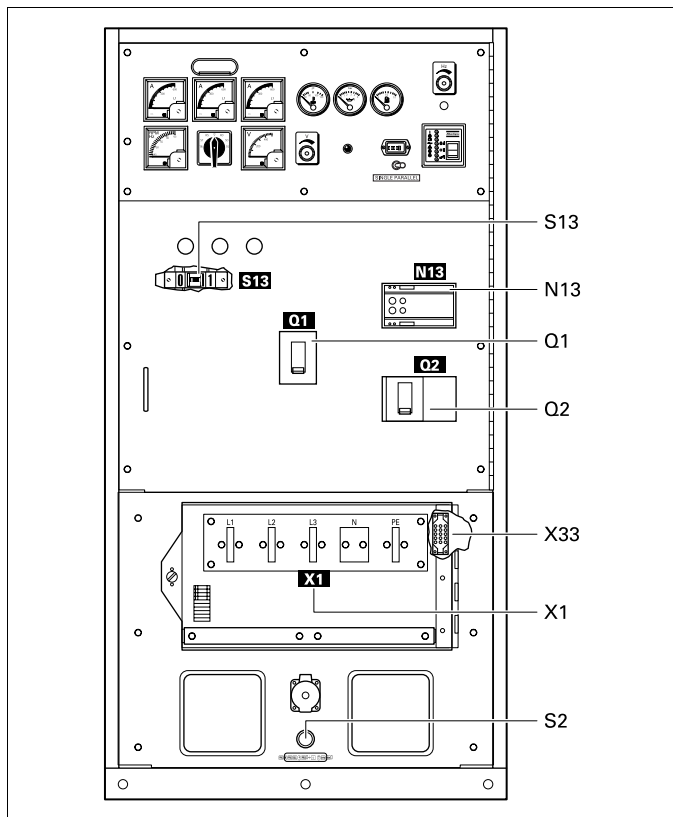
Lights up when the low engine oil pressure was the cause of shut down.

*L8 ..... Spare shut down indicator*

Can be used to wire an extra shut down, e.g. for low fuel level in case a switch is incorporated in the fuel tank.

## 2.9 Output terminal board (TB)

The “Terminal board” provides a terminal board for more easy connection of cables. It 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. When the emergency button is pressed the control module needs to be reset.

### Q1 ..... Circuit breaker for X1

Interrupts the power supply X1 when a short-circuit occurs at the load side, or when the overcurrent protection is activated. When activated, Q1 interrupts the three phases towards X1. It must be reset manually after eliminating the problem.

### Q2 ..... Circuit breaker for X2

Interrupts the power supply X2 when a short-circuit occurs at the load side, or when the overcurrent protection is activated. When activated, Q2 interrupts phase L3 and the neutral towards X2. It must be reset manually after eliminating the problem.

### N13... Earth leak detector

Detects and indicates an earth fault current and activates the main circuit breaker Q1. The detection level can be set at 30 mA fixed with instantaneous trip but can also be adjusted between 30 mA and 250 A with time delayed (0 – 1 sec) trip. N13 has to be reset manually after eliminating the problem (reset button marked R). It can be overridden by means of the earth leak switch (S13, labelled IΔN) but has to be tested monthly by pushing test button T13.

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

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

- Position O: No de-energising of the main circuit breaker Q1 when an earth fault occurs.
- Position 1: De-energising of the main circuit breaker Q1 when an earth fault occurs.

### X1..... Main power supply

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

### X33.... Connector X33

Connector for communication between the generator and a SAPE unit. For details refer to the SAPE unit instruction manual.



**Position O on switch S13 will only be used in conjunction with an external earth fault protection unit (e.g. integrated in a distribution board) or when the generator is used in parallel.**

**The earth fault protection on the single phase outlet socket is not affected by the switch S13.**

**If S13 is in position 0, 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.**

## 2.10 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.**

### 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 1000 V) must be respected when connecting site distribution panels, switch gear or loads to the generator.

#### 3.1 Installation



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

- Place the generator on a horizontal, even and solid floor. The generator can operate in a slant position not exceeding 15° (in both senses: front/rear and left/right).
- Protect the generator against dust and rain if it is operated outside.
- Check that the engine exhaust is not directed towards people. If the generator is operated indoors, install an exhaust pipe of sufficient diameter to duct the engine exhaust towards the outside. Check for sufficient ventilation so that the cooling air is not recirculated. If necessary consult Atlas Copco.
- Leave enough space for operation, inspection and maintenance (at least 1 meter at each side).
- Check that the inner earthing system is in compliance with the local legislation.
- Use coolant for the engine cooling system. Refer to the Engine instruction book for the proper coolant mixture.
- Check the tightness of the bolts and nuts.
- Install the earthing rod as near as possible to the generator and measure its diffusion resistance (max. 1 kΩ) in order not to have a contact voltage higher than 25 V at 30 mA leakage current.
- Check that the cable end of the earthing rod is connected to the earth terminal.

#### 3.2 Connecting the generator

##### 3.2.1 Precautions for non-linear and sensitive loads



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

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

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

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

##### 3.2.2 Quality, minimum section and maximum length of cables

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

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

| Wire section<br>(mm <sup>2</sup> ) | Max. current (A) |             |          |
|------------------------------------|------------------|-------------|----------|
|                                    | Multiple core    | Single core | H07 RN-F |
| 25                                 | 94               | 101         | 88       |
| 35                                 | 114              | 123         | 110      |
| 50                                 | 138              | 155         | 138      |
| 70                                 | 176              | 191         | 170      |
| 95                                 | 212              | 228         | 205      |
| 120                                | 245              | 273         | 239      |
| 150                                | 282              | 314         | 275      |
| 185                                | 323              | 358         | 313      |
| 240                                | 379              | 421         | 371      |
| 300                                | 429              | 477         | 428      |

The lowest acceptable wire section and the corresponding maximum cable or conductor length for multiple core cable or H07 RN-F, at rated current (216 A), for a voltage drop  $e$  lower than 5 % and at a power factor of 0.80, are respectively 120 mm<sup>2</sup> and 370 m. In case electric motors must be started, oversizing the cable is advisable.

The maximum cable or conductor length can be determined as follows:

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

$e$  = Voltage drop (V)

$I$  = Nominal rated current (A)

$L$  = Length of conductors (m)

$R$  = Resistance ( $\Omega$ /km to VDE 0102)

$X$  = Reactance ( $\Omega$ /km to VDE 0102)

### 3.2.3 Connecting the load

#### Site distribution panel

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

#### Protection



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

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


### 3.3 Before starting

- With the generator standing level, check the engine oil level and top up if necessary. The oil level must be near to, but not exceed the high mark on the engine oil level dipstick.
- Check the coolant level in the expansion tank of the engine coolant system. The water level must be near to the FULL mark. Add coolant if necessary.
- Drain any water and sediment from the fuel pre-filter. Check the fuel level and top up if necessary. It is recommended to fill the tank after the day's operation to prevent waterdamp in a nearly empty tank from condensing.
- Check the vacuum indicator of the air filter. If the red part shows completely, replace the filter element.
- Press the vacuator valve of the air filter to remove dust.
- Check the generator for leakage, tightness of wire terminals, etc. Correct if necessary.
- Check that circuit breaker Q1 is switched off.
- 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 the earth fault protection (N13) has not tripped (reset if necessary).
- Check that the selector switch "Single/Parallel" (S15) on the generator is in the "Single" position, when not paralleling.


### 3.4 Operating Remote start

#### 3.4.1 Starting

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

- 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.
- Approximately 15 seconds after starting (stabilization time for the generator), the timer relay closes the voltage free contact and the plant contactor is energized (if installed).
- Switch on circuit breaker Q1 in case no contactor is installed.

**To start up the unit from a remote location using the remote start/stop switch, 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.
- Approximately 15 seconds after starting (stabilization time for the generator), the timer relay closes the voltage free contact and the plant contactor is energized (if installed).

#### 3.4.2 During operation

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 cooling water.
- Avoid long low-load periods (<30 %). In this case, an output power 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 per phase is not exceeded.
- When single-phase loads are connected to the generator output terminals, keep all loads well-balanced.

Never turn the battery switch to OFF during operation.



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

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

#### 3.4.3 Stopping

**To stop the unit when the starter switch is in position , 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.
- Let the engine run for about 5 minutes.
- Stop the engine by putting the remote start/stop switch in position stop or by putting the starter switch in position O.

## 4 Maintenance

### 4.1 Maintenance schedule for QAS150 Volvo



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

| 4.1.1 Maintenance schedule   | Daily       | Initially  | Small               | Normal              | Yearly              |
|--|-------------|--|---------------------|---------------------|---------------------|
|  |             | 50 hours   | Every 500 hours     | Every 1000 hours    | Every 2000 hours    |
| <b>Service pak</b>   | -           |  | <b>2912 4363 05</b> | <b>2912 4364 06</b> | <b>2912 4365 07</b> |
| For the most important subassemblies, Atlas Copco has developed service kits that combine all wear parts. These service kits offer you the benefits of genuine parts, save on administration costs and are offered at reduced price, compared to the loose components. Refer to the parts list for more information on the contents of the service kits. |             |  |                     |                     |                     |
| Coolant level  | Check       | Check  | Check               | Check               | Check               |
| Tension and condition of drive belt(s)   |             | Check  | Check               | Check               | Replace             |
| Radiator and intercooler fins  |             | Check/Clean  | Check/Clean         | Check/Clean         | Check/Clean         |
| Fuel pre-filter/Water separator  | Check/Drain | Check/Drain  | Check/Drain         | Replace/Drain       | Replace/Drain       |
| Fuel filter element  |             |  |                     | Replace             | Replace             |
| Fuel injectors   |             |  |                     |                     | Check               |
| Oil level in sump  | Check       | Check  | Check               | Check               | Check               |
| Oil pressure on gauge  | Check       | Check  | Check               | Check               | Check               |
| Lubrication oil  |             |  | Change              | Change              | Change              |
| Oil filter(s)  |             |  | Replace             | Replace             | Replace             |
| Crankcase pressure   |             |  |                     | Check               | Check               |
| Vacuum indicator   | Check       | Check  | Check               | Check               | Check               |
| Air cleaner and dust bowl  |             | Clean  | Clean               | Clean               | Clean               |
| Air filter element (1)   |             |  | Replace             | Replace             | Replace             |
| Safety cartridge   |             |  |                     |                     | Replace             |
| Turbocharger impeller and housing  |             |  |                     |                     | Clean/Inspect       |
| Fan hub bearings   |             |  |                     |                     | Lubricate           |
| Oil, fuel and water leaks  |             | Check  | Check               | Check               | Check               |
| Mechanical links (e.g. fuel solenoid link)   |             |  | Grease              | Grease              | Grease              |
| Valve clearance  |             | (3)  |                     |                     | Check/Adjust        |
| Level battery electrolyte (2)  |             | Check  | Check               | Check               | Check               |
| Condition of vibration dampers   |             | Check  | Check               | Check               | Check               |
| Alternator insulation resistance (See "Measuring the alternator insulation resistance")  |             | Measure  | Measure             | Measure             | Measure             |
| Tightness of nuts and bolts  |             | Check  |                     |                     | Check               |
| Door hinges and locks  |             | Grease   |                     |                     | Grease              |
| Fixation of hoses, cables and pipes  |             |  |                     | Check               | Check               |
| Inspection by Atlas Copco Service technician   |             | Generators in standby application have to be tested on a regular basis. At least once a month the engine should run for one hour. If possible a high load (>30%) should be applied so that the engine reaches its operating temperature. |                     |                     |                     |

## 4.2 Maintenance schedule for QAS200 Volvo



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

| 4.2.1 Maintenance schedule   | Daily       | Initially  | Small               | Normal              | Yearly              |
|--|-------------|--|---------------------|---------------------|---------------------|
|  |             | 50 hours   | Every 500 hours     | Every 1000 hours    | Every 2000 hours    |
| <b>Service pak</b>   | -           |  | <b>2912 4367 05</b> | <b>2912 4368 06</b> | <b>2912 4369 07</b> |
| For the most important subassemblies, Atlas Copco has developed service kits that combine all wear parts. These service kits offer you the benefits of genuine parts, save on administration costs and are offered at reduced price, compared to the loose components. Refer to the parts list for more information on the contents of the service kits. |             |  |                     |                     |                     |
| Coolant level  | Check       | Check  | Check               | Check               | Check               |
| Tension and condition of drive belt(s)   |             | Check  | Check               | Check               | Replace             |
| Radiator and intercooler fins  |             | Check/Clean  | Check/Clean         | Check/Clean         | Check/Clean         |
| Fuel pre-filter/Water separator  | Check/Drain | Check/Drain  | Replace/Drain       | Replace/Drain       | Replace/Drain       |
| Fuel filter element  |             |  | Replace             | Replace             | Replace             |
| Fuel injectors   |             |  |                     |                     | Check               |
| Oil level in sump  | Check       | Check  | Check               | Check               | Check               |
| Oil pressure on gauge  | Check       | Check  | Check               | Check               | Check               |
| Lubrication oil  |             |  | Change              | Change              | Change              |
| Oil filter(s)  |             |  | Replace             | Replace             | Replace             |
| Crankcase pressure   |             |  |                     | Check               | Check               |
| Vacuum indicator   | Check       | Check  | Check               | Check               | Check               |
| Air cleaner and dust bowl  |             | Clean  | Clean               | Clean               | Clean               |
| Air filter element (1)   |             |  | Replace             | Replace             | Replace             |
| Safety cartridge   |             |  |                     |                     | Replace             |
| Turbocharger impeller and housing  |             |  |                     |                     | Clean/Inspect       |
| Fan hub bearings   |             |  |                     |                     | Lubricate           |
| Oil, fuel and water leaks  |             | Check  | Check               | Check               | Check               |
| Mechanical links (e.g. fuel solenoid link)   |             |  | Grease              | Grease              | Grease              |
| Valve clearance  |             | (3)  |                     |                     | Check/Adjust        |
| Level battery electrolyte (2)  |             | Check  | Check               | Check               | Check               |
| Condition of vibration dampers   |             | Check  | Check               | Check               | Check               |
| Alternator insulation resistance (See "Measuring the alternator insulation resistance")  |             | Measure  | Measure             | Measure             | Measure             |
| Tightness of nuts and bolts  |             | Check  |                     |                     | Check               |
| Door hinges and locks  |             | Grease   |                     |                     | Grease              |
| Fixation of hoses, cables and pipes  |             |  |                     | Check               | Check               |
| Inspection by Atlas Copco Service technician   |             | <b>Generators in standby application have to be tested on a regular basis. At least once a month the engine should run for one hour. If possible a high load (&gt;30%) should be applied so that the engine reaches its operating temperature.</b> |                     |                     |                     |

### 4.3 Maintenance schedule for QAS250 Volvo



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

| 4.3.1 Maintenance schedule   | Daily       | Initially  | Small               | Normal              | Yearly              |
|--|-------------|--|---------------------|---------------------|---------------------|
|  |             | 50 hours   | Every 500 hours     | Every 1000 hours    | Every 2000 hours    |
| <b>Service pak</b>   | -           |  | <b>2912 4367 05</b> | <b>2912 4368 06</b> | <b>2912 4370 07</b> |
| For the most important subassemblies, Atlas Copco has developed service kits that combine all wear parts. These service kits offer you the benefits of genuine parts, save on administration costs and are offered at reduced price, compared to the loose components. Refer to the parts list for more information on the contents of the service kits. |             |  |                     |                     |                     |
| Coolant level  | Check       | Check  | Check               | Check               | Check               |
| Tension and condition of drive belt(s)   |             | Check  | Check               | Check               | Replace             |
| Radiator and intercooler fins  |             | Check/Clean  | Check/Clean         | Check/Clean         | Check/Clean         |
| Fuel pre-filter/Water separator  | Check/Drain | Check/Drain  | Replace/Drain       | Replace/Drain       | Replace/Drain       |
| Fuel filter element  |             |  |                     | Replace             | Replace             |
| Fuel injectors   |             |  |                     |                     | Check               |
| Oil level in sump  | Check       | Check  | Check               | Check               | Check               |
| Oil pressure on gauge  | Check       | Check  | Check               | Check               | Check               |
| Lubrication oil  |             |  | Change              | Change              | Change              |
| Oil filter(s)  |             |  | Replace             | Replace             | Replace             |
| Crankcase pressure   |             |  |                     | Check               | Check               |
| Vacuum indicator   | Check       | Check  | Check               | Check               | Check               |
| Air cleaner and dust bowl  |             | Clean  | Clean               | Clean               | Clean               |
| Air filter element (1)   |             |  | Replace             | Replace             | Replace             |
| Safety cartridge   |             |  |                     |                     | Replace             |
| Turbocharger impeller and housing  |             |  |                     |                     | Clean/Inspect       |
| Fan hub bearings   |             |  |                     |                     | Lubricate           |
| Oil, fuel and water leaks  |             | Check  | Check               | Check               | Check               |
| Mechanical links (e.g. fuel solenoid link)   |             |  | Grease              | Grease              | Grease              |
| Valve clearance  |             | (3)  |                     |                     | Check/Adjust        |
| Level battery electrolyte (2)  |             | Check  | Check               | Check               | Check               |
| Condition of vibration dampers   |             | Check  | Check               | Check               | Check               |
| Alternator insulation resistance (See "Measuring the alternator insulation resistance")  |             | Measure  | Measure             | Measure             | Measure             |
| Tightness of nuts and bolts  |             | Check  |                     |                     | Check               |
| Door hinges and locks  |             | Grease   |                     |                     | Grease              |
| Fixation of hoses, cables and pipes  |             |  |                     | Check               | Check               |
| Inspection by Atlas Copco Service technician   |             | <b>Generators in standby application have to be tested on a regular basis. At least once a month the engine should run for one hour. If possible a high load (&gt;30%) should be applied so that the engine reaches its operating temperature.</b> |                     |                     |                     |



#### 4.4 Maintenance schedule for QAS300 Volvo



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

| 4.4.1 Maintenance schedule   | Daily       | Initially  | Small               | Normal              | Yearly              |
|--|-------------|--|---------------------|---------------------|---------------------|
|  |             | 50 hours   | Every 500 hours     | Every 1000 hours    | Every 2000 hours    |
| <b>Service pak</b>   | -           |  | <b>2912 4372 05</b> | <b>2912 4373 06</b> | <b>2912 4374 07</b> |
| For the most important subassemblies, Atlas Copco has developed service kits that combine all wear parts. These service kits offer you the benefits of genuine parts, save on administration costs and are offered at reduced price, compared to the loose components. Refer to the parts list for more information on the contents of the service kits. |             |  |                     |                     |                     |
| Coolant level  | Check       | Check  | Check               | Check               | Check               |
| Tension and condition of drive belt(s)   |             | Check  | Check               | Check               | Replace             |
| Radiator and intercooler fins  |             | Check/Clean  | Check/Clean         | Check/Clean         | Check/Clean         |
| Fuel pre-filter/Water separator  | Check/Drain | Check/Drain  | Replace/Drain       | Replace/Drain       | Replace/Drain       |
| Fuel filter element  |             |  | Replace             | Replace             | Replace             |
| Fuel injectors   |             |  |                     |                     | Check               |
| Oil level in sump  | Check       | Check  | Check               | Check               | Check               |
| Oil pressure on gauge  | Check       | Check  | Check               | Check               | Check               |
| Lubrication oil  |             |  | Change              | Change              | Change              |
| Oil filter(s)  |             |  | Replace             | Replace             | Replace             |
| Crankcase pressure   |             |  |                     | Check               | Check               |
| Vacuum indicator   | Check       | Check  | Check               | Check               | Check               |
| Air cleaner and dust bowl  |             | Clean  | Clean               | Clean               | Clean               |
| Air filter element (1)   |             |  | Replace             | Replace             | Replace             |
| Safety cartridge   |             |  |                     |                     | Replace             |
| Turbocharger impeller and housing  |             |  |                     |                     | Clean/Inspect       |
| Fan hub bearings   |             |  |                     |                     | Lubricate           |
| Oil, fuel and water leaks  |             | Check  | Check               | Check               | Check               |
| Mechanical links (e.g. fuel solenoid link)   |             |  | Grease              | Grease              | Grease              |
| Valve clearance  |             | (3)  |                     |                     | Check/Adjust        |
| Level battery electrolyte (2)  |             | Check  | Check               | Check               | Check               |
| Condition of vibration dampers   |             | Check  | Check               | Check               | Check               |
| Alternator insulation resistance (See "Measuring the alternator insulation resistance")  |             | Measure  | Measure             | Measure             | Measure             |
| Tightness of nuts and bolts  |             | Check  |                     |                     | Check               |
| Door hinges and locks  |             | Grease   |                     |                     | Grease              |
| Fixation of hoses, cables and pipes  |             |  |                     | Check               | Check               |
| Inspection by Atlas Copco Service technician   |             | <b>Generators in standby application have to be tested on a regular basis. At least once a month the engine should run for one hour. If possible a high load (&gt;30%) should be applied so that the engine reaches its operating temperature.</b> |                     |                     |                     |

#### 4.4.2 Notes

- (1) More frequently when operating in a dusty environment. Evacuate dust from the airfilter valve daily.
- (2) A Service Bulletin (ASB) dealing elaborately with batteries and due care is available on request.
- (3) After first initial 500 running hours it is required to check/adjust the valve clearance. When opening the rocker cover it is necessary to replace the gasket. This gasket can be ordered with AC partnumber:

| Generator    | Gasket partnumber |
|--------------|-------------------|
| QAS150 Volvo | 2914 9585 00      |
| QAS200 Volvo | 2914 9588 00      |
| QAS250 Volvo | 2914 9588 00      |
| QAS300 Volvo | 2914 9591 00      |

#### 4.5 Engine maintenance

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

#### 4.6 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 PE 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 silicagel 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, in a plastic bag.

#### 5.2 Preparing for operation after storage

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

- Consult the engine's operator manual.
- Check that the insulation resistance of the generator exceeds 5 MΩ.
- Replace the fuelfilter. Vent the fuelsystem.
- Reinstall and connect the battery, if necessary after being recharged.
- Submit the generator to a test run.

## 6 Checks and troubleshooting



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 frequencymeter P5

- Run the unit at normal speed.
- Put a voltmeter in parallel with frequencymeter P5.
- If the measured voltage is higher than 200 V, the frequencymeter has to work properly.

If not, remove the frequencymeter, connect it with the mains (230 V) and check that it indicates the mains frequency (50 Hz).

### 6.3 Checking ammeters P1, P2 and P3

- Measure by means of a clamp-on probe the current, during the load.
- Compare the measured current with the current indicated on the ammeter. Both readings should be the same.

## 6.4 Alternator troubleshooting

| <b>Symptom</b>   | <b>Possible cause</b>   | <b>Corrective action</b>  |
|--|---|---|
| <i>Alternator does not excite.</i>                     | Blown fuse.<br>Insufficient residual voltage.<br>No residual voltage.   | Replace fuse.<br>Increase the speed by 15 %.<br>For an instant apply on the + and – terminals of the electronic regulator a 12 V battery voltage with a 30 $\Omega$ 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.<br>Intervention of protection.<br>Winding failure.                              | Reset voltage.<br>Check frequency/voltage regulator.<br>Check windings.   |
| <i>High voltage at no load.</i>                        | Voltage potentiometer out of setting.<br>Failed regulator.  | Reset voltage.<br>Substitute regulator.   |
| <i>Lower than rated voltage at load.</i>               | Voltage potentiometer out of setting.<br>Intervention by protection.<br>Failed regulator.<br>Rotating bridge failure. | Reset voltage potentiometer.<br>Current too high, power factor lower than 0.8; speed lower than 10 % of rated speed.<br>Substitute regulator.<br>Check diodes, disconnect cables.                                 |
| <i>Higher than rated voltage at load.</i>              | Voltage potentiometer out of setting.<br>Failed regulator.  | Reset voltage potentiometer.<br>Substitute regulator.   |
| <i>Unstable voltage.</i>                               | Speed variation in engine.<br>Regulator out of setting.   | Check regularity of rotation.<br>Regulate stability of regulator by acting on "STABILITY" potentiometer.  |

## 6.5 Engine troubleshooting

Refer to the engine's operator manual for the engine troubleshooting. An extensive Engine troubleshooting manual is available at Volvo Penta. For more information contact Volvo Penta.

## 7 Options available for QAS150-200-250-300 Volvo units

### 7.1 Circuit diagrams

The engine control circuit diagrams and the power circuit diagrams for the standard QAS150-200-250-300 Volvo units, for the units with options and for the units with combined options are:

| <i>Voltage</i> | <i>Control system</i> | <i>Power circuit</i> | <i>Engine control circuit</i> |
|----------------|-----------------------|----------------------|-------------------------------|
| 230 V          | RS                    | 9822 0889 60         | 9822 0889 58                  |
|                |                       | 9822 0889 60         | 9822 0889 68                  |
| 230 V          | OUR                   | 9822 0888 89         | -                             |
| 400 V          | RS                    | 9822 0889 51         | 9822 0889 58                  |
|                |                       | 9822 0889 51         | 9822 0889 68                  |
| 400 V          | AMF                   | 9822 0889 51         | 9822 0889 59                  |
|                |                       | 9822 0889 51         | 9822 0889 69                  |
| 400 V          | Qc4001™               | 9822 0889 74-02      | 9822 0889 74-01               |
| 400 V          | EDF                   | 9822 0889 53         | -                             |
| 400 V          | OUR                   | 9822 0888 89         | -                             |
| DV             | RS                    | 9822 0889 76         | 9822 0889 58                  |
|                |                       | 9822 0889 76         | 9822 0889 68                  |
| DV             | OUR                   | 9822 0888 89         | -                             |

### 7.2 Overview of the electrical options

The following “electrical” options are available:

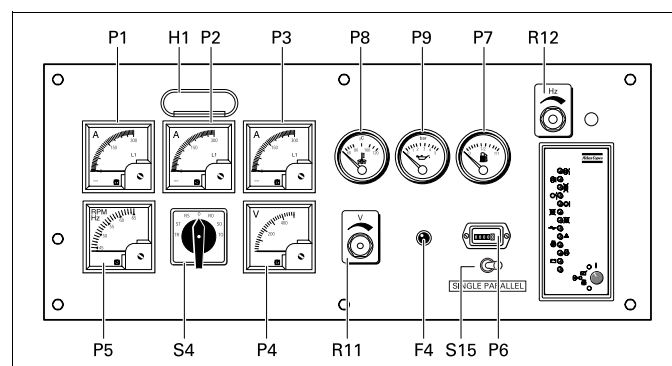
- Control and indicator panel - Automatic mains failure
- Control panel Qc4001™
- Automatic battery charger
- Engine coolant heater
- Outlet sockets (S)
- Dual voltage (DV)
- “Electricité de France” (EDF)
- Over and under voltage relay (O.U.R)
- Dual frequency (Not applicable for QAS150 Volvo units)

### 7.3 Description of the electrical options

#### 7.3.1 Control and indicator panel - Automatic mains failure

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

The controlpanel for automatic mains failure operations has an AMF module, plus additional timers, connection block and DIP switches installed.



#### 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.

#### Engine gauges

##### P6 .....Hourmeter

##### P7 .....Fuel level gauge

##### P8 .....Engine coolant temperature gauge

##### P9 .....Engine oil pressure gauge

#### Generator gauges

##### P1 .....Ammeter line L1

Indicates the outgoing current in the first phase (L1).

##### P2 .....Ammeter line L2

Indicates the outgoing current in the second phase (L2).

##### P3 .....Ammeter line L3

Indicates the outgoing current in the third phase (L3).

##### P4 .....Voltmeter

Indicates the voltage selected by means of voltage selector switch S4.

**P5..... Frequency / RPM meter**

Indicates the frequency of the supply voltage and the speed of the engine.

**S4..... Voltage selector switch**

Allows to measure the voltage between each of the phases and between each phase and the neutral. It also allows to switch off the voltmeter.

**Potentiometer**

**R11.... Voltage adjust potentiometer**

Allows to adjust the output voltage.

**R12.... Frequency adjust potentiometer**

Allows to adjust the frequency of the output voltage.

**Parallel operation**

**S15.... Single/Parallel switch**

Enables the generator (combined with the SAPE unit) to operate in parallel mode. For details refer to the SAPE unit instruction manual. Always put this switch in single position for stand alone use.

**“Automatic mains failure” offers the following features:**

- continuous monitoring of four input lines
- a connection block for monitoring
- an extended control module
- a remote start possibility
- an automatic battery charger, “trickle charge” (option)
- an engine cooling water heater (option)

**Continuous monitoring**

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

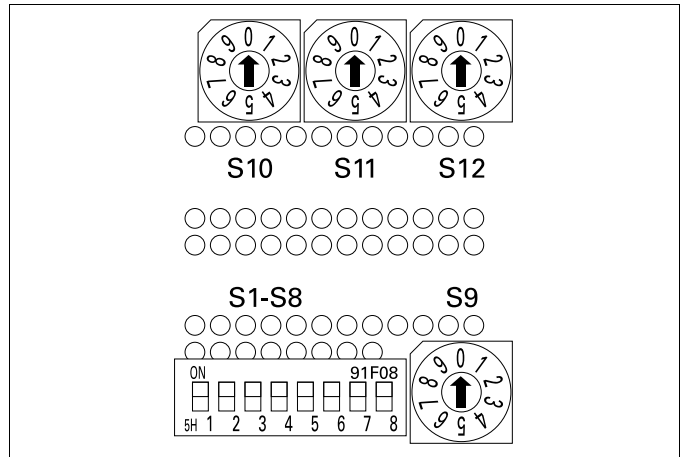
When the mains (one or all phases) is not available for approximately 0.5 seconds, the following timing sequence occurs:

- The mains contactor opens and disconnects the load from the mains.
- The unit starts 3 seconds (crank delay) after the mains failure. If the unit does not start immediately, it will carry out another 3 starting attempts, each consisting of 10 seconds cranking and 5 seconds interval (crank time).
- After 10 seconds generator stabilisation time (plant settle time), the generator contactor is energized and the generator supplies power towards the load.

When the mains (all phases) is available again for at least 10 seconds (mains restore time), the following timing applies:

- The generator contactor opens and the mains contactor closes (1 second change over time).
- The generator shuts down 1 minute later (delay run on time).

The timing can be adjusted by means of the potentiometers located at the back of the AMF control module:



**S1-8... DIP switches**

**S9..... Crank timer**

**S10.... Plant settle timer**

**S11.... Mains restore timer**

**S12.... Delay run on timer**

The table below summarises the relation between the position of the potentiometers and the value of the timers.

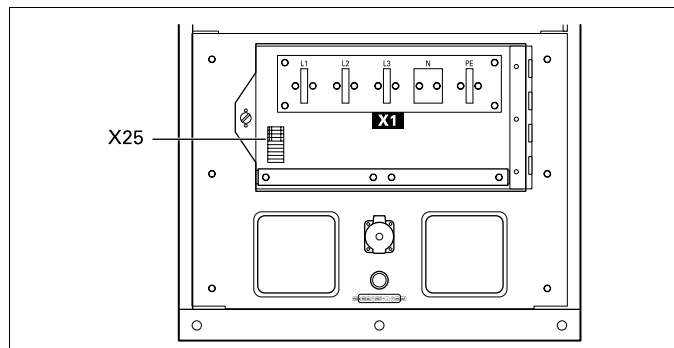
| Potentiometer<br>Position | S9          |            | S10<br>Plant settle time |
|---------------------------|-------------|------------|--------------------------|
|                           | Crank delay | Crank time |                          |
| 0                         | 3 sec       | 10 sec     | 10 sec                   |
| 1                         | 10 sec      | 10 sec     | 15 sec                   |
| 2                         | 10 sec      | 15 sec     | 20 sec                   |
| 3                         | 15 sec      | 10 sec     | 25 sec                   |
| 4                         | 15 sec      | 15 sec     | 30 sec                   |
| 5                         | 25 sec      | 10 sec     | 35 sec                   |
| 6                         | 25 sec      | 15 sec     | 40 sec                   |
| 7                         | 25 sec      | 25 sec     | 45 sec                   |
| 8                         | 50 sec      | 15 sec     | 50 sec                   |
| 9                         | 50 sec      | 25 sec     | 60 sec                   |

| Potentiometer<br>Position | S11                | S12          |
|---------------------------|--------------------|--------------|
|                           | Mains restore time | Delay run on |
| 0                         | 10 sec             | 1 min        |
| 1                         | 20 sec             | 2 min        |
| 2                         | 40 sec             | 3 min        |
| 3                         | 1 min              | 4 min        |
| 4                         | 2 min              | 5 min        |
| 5                         | 3 min              | 6 min        |
| 6                         | 4 min              | 7.5 min      |
| 7                         | 7.5 min            | 10 min       |
| 8                         | 10 min             | 12.5 min     |
| 9                         | 15 min             | 15 min       |



**The timers are factory set at position 0.**

### Connection block for monitoring



#### X25.... Connection block

Allows easy connection for a remote start switch, for sensing of mains voltage and control of the mains and the plant contactor.

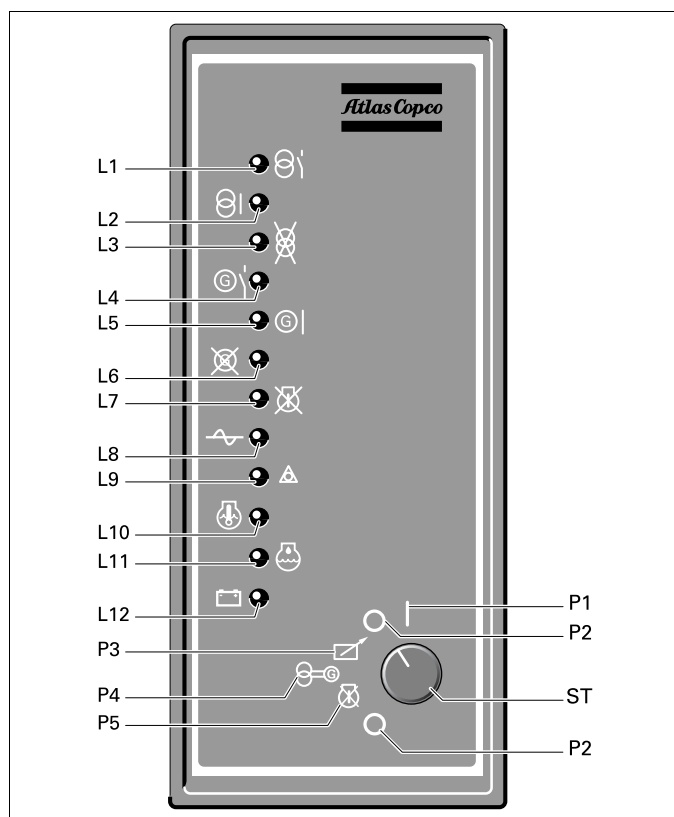


Refer to circuit diagram of “Automatic mains failure” for the correct connection.

### Extended control module

The standard control module is replaced by an extended module which allows more detailed control of the unit.

The controls and indicators on the AMF control module are:



#### L1.....Mains available

Lights up when the mains is available.

#### L2.....Mains on load

Lights up when the mains supplies power towards the load.

#### L3.....Mains failed

Lights up when a failure occurred on the mains.

#### L4.....Plant available

Lights up when the generator is running.

#### L5.....Plant on load

Lights up when the generator supplies power towards the load.

#### L6.....Plant fail

Lights up when a failure occurred on the generator.

#### L7.....Start fail

Indicates that four start attempts were not sufficient to start up the engine.

#### L8.....Undervoltage shut down

Lights up when AC input interruption or failure was the cause of shut down.

#### L9.....Emergency stop indicator

Lights up when an emergency stop was the cause of shut down.

#### L10.....Engine coolant temperature shut down

Lights up when the high engine oil temperature was the cause of shut down.

#### L11.....Engine oil pressure shut down

Lights up when the low oil pressure was the cause of shut down.

#### L12.....Charge fail indicator

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

#### ST.....Starter switch

##### P1 .....Position P1

The generator starts immediately. The load will be transferred if a mains failure occurs.

##### P2 .....Position P2

The generator will never start.

##### P3 .....Position P3

The generator will start when the remote start/stop contact is closed.

##### P4 .....Position P4

The generator will take over when a mains failure occurs.

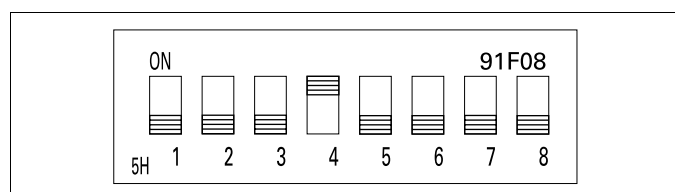
## P5..... Position P5

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



**The contactors between the mains, the unit and the load are not included in the option but should be sized according to the load. Nevertheless, they are also available as sales kit at Atlas Copco. Refer to circuit diagram 9822 0889 59 of “Automatic mains failure” for the correct connection.**

For correct functioning of the module, the DIP switches at the back of the module should be positioned as follows:



- |                    |                |
|--------------------|----------------|
| 1. Spare           | 5. Charge fail |
| 2. Oil pressure    | 6. W/L input   |
| 3. Oil temperature | 7. N/A         |
| 4. Static charge   | 8. Start delay |



**Besides dipswitch S8, located at the back of the control module and used for long/short preheating, dipswitch S1 can be used for enabling or disabling a spare shut down contact.**

## Remote start possibility

The “Remote start” feature of “Automatic mains failure” allows to switch the unit on or off without using the control panel located on the unit. For this purpose, the control module provides a voltage free contact for the connection of the remote start/stop switch (to be installed by the customer).

The unit will start in case the contact is closed (start/stop switch in position start) and the starter switch of the control module is in position ☒ (position P3).

## Operating Automatic mains failure

### Starting

- Turn the battery switch to ON.
- Put the starter switch in position I.
- Check that the warning lamps on the control and indicator panel are out.
- Run the engine for approximately 5 minutes to warm up. Check the engine oil pressure (P9) and the cooling water temperature (P8).
- Check the voltmeter P4 (with voltmeter selector switch S4 in different positions) and the frequency meter (P5).

- Switch circuit breaker Q1 on by pushing the lever fully down from TRIPPED (mid-position/white flag) to OFF (“0”/green flag) followed by pushing the lever fully up to ON (“1”/red flag).

- Switch on the load and check the ammeter P1, P2 and P3, voltmeter P4 (with voltmeter selector switch S4 in different positions) and frequency meter P5.

### During operation

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 cooling water.
- Avoid long low-load periods (<30 %). In this case, an output power 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 per phase is not exceeded.
- When single-phase loads are connected to the generator output terminals, keep all loads well-balanced.

Never turn the battery switch to OFF during operation.



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

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

### Stopping

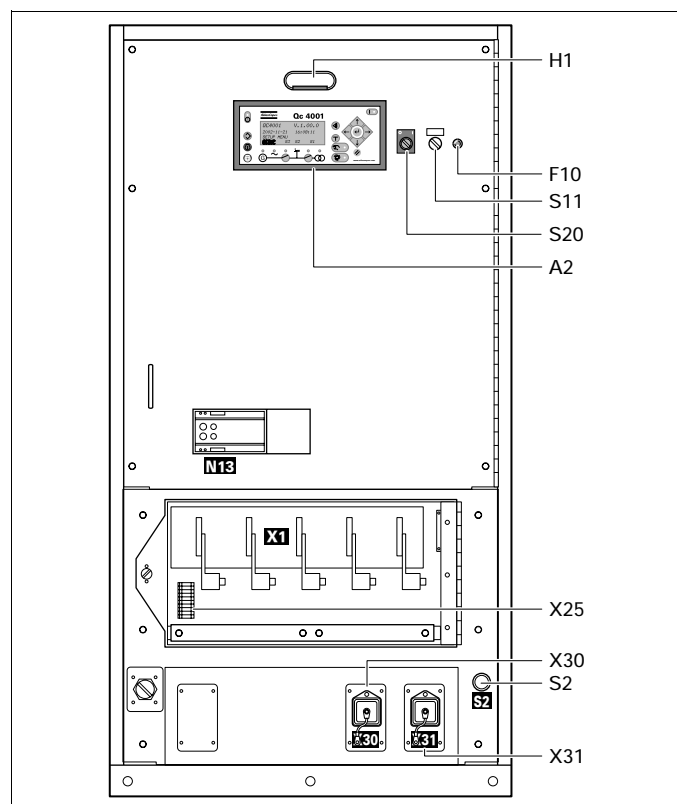
- Switch off the load.
- Switch off circuit breaker Q1.
- Let the engine run for about 5 minutes.
- Stop the engine by putting the starter switch in position O.
- Turn the battery switch to OFF.

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



## 7.3.2 Control panel Qc4001™

### General description Qc4001™ control panel



H1.....Panel light

#### Qc4001™ Module

A2.....Qc4001™ Module

#### DC-Fuse

F10 ....Fuse

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

#### Switches

S11....Frequency selector switch (50Hz/OFF/60Hz)

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



**Changing the output frequency is only allowed after shutdown.**



**Frequency selector switch S11 is not available on QAS150 Volvo units!**

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

Position 0: No voltage is applied to the Qc4001™ module, the generator will not start.

Position 1: Voltage is applied to the Qc4001™ module, it is possible to start up the generator.

#### Connection block

X25....Connection block

Allows to connect the Deutz EMR diagnostic data reader.

#### Connectors

X30....Connector X30

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

X31....Connector X31

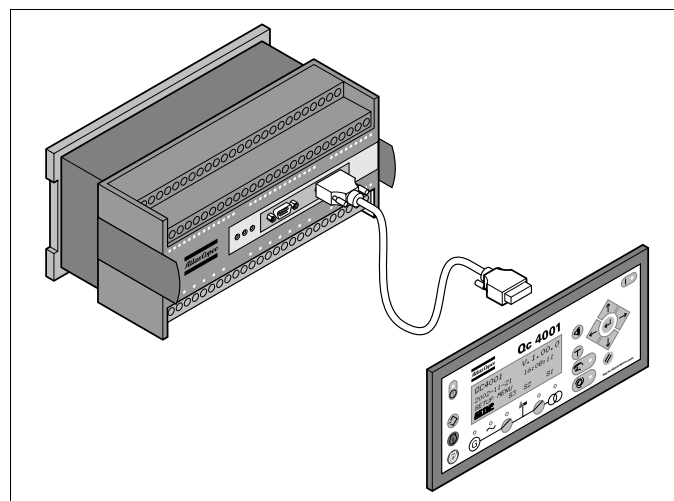
Connector for communication with other generators with Qc4001™ when paralleling.

#### Emergency stop

S2.....Emergency stop button

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

#### Qc4001™ Module




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


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

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 4240.




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




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




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




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




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



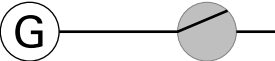
**BACK:** Jumps one step backwards in the menu (until the daily use display is reached).




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




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




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




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




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



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



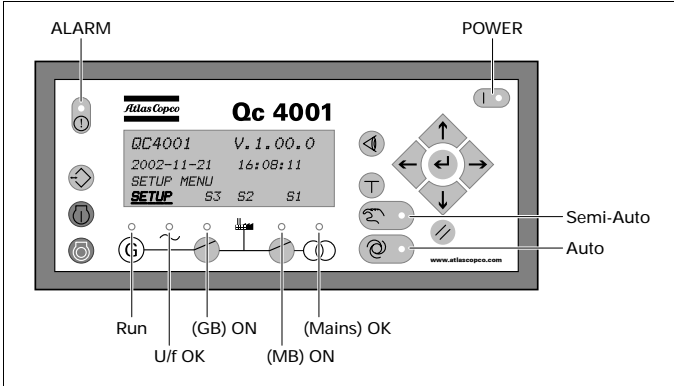
**TEST:** Allows the user to set the generator in TEST mode. To enter the TEST mode, a password needs to be entered.



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

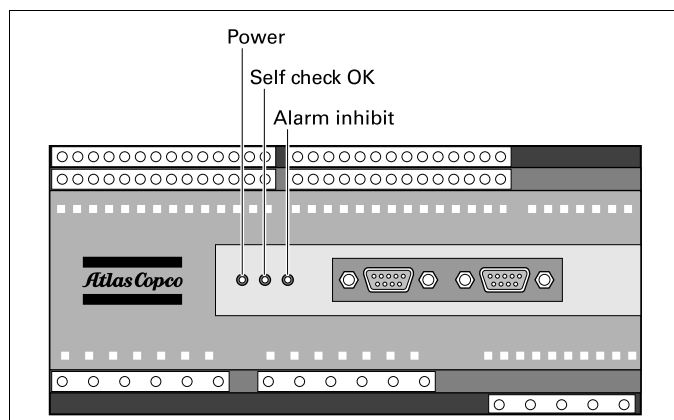
LED functions

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



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

The main Qc4001™ control unit includes 3 LEDs:



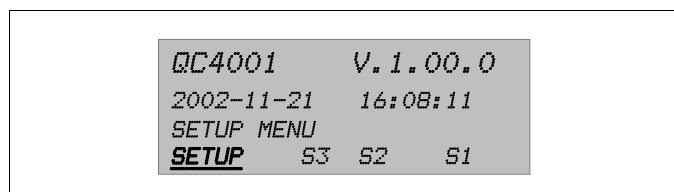
|                       |   |
|-----------------------|---|
| <b>Power:</b>         | Green LED indicates that the voltage supply is switched on. |
| <b>Self check OK:</b> | Green LED indicates that the unit is OK.                    |
| <b>Alarm inhibit:</b> | Green LED indicates that the inhibit input is ON.           |

## Qc4001™ Menu Overview

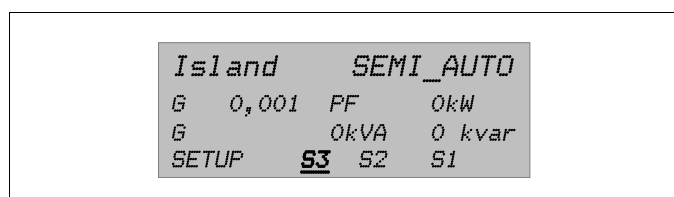
### Main View

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

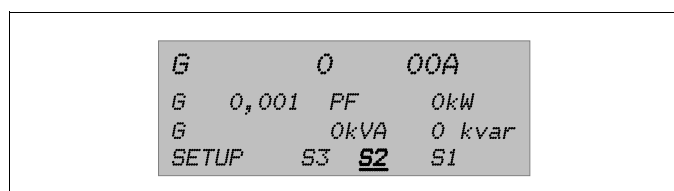
Setup view:



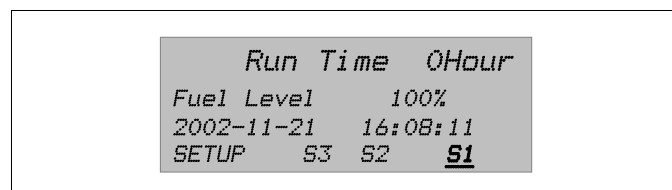
S3 view:



S2 view:



S1 view:



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

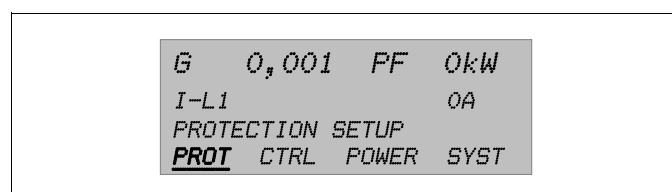
- The SETUP view shows the module name, the software version, the date and the time.
- The S3 view shows the application type and the mode, and some generator measurements. During synchronisation the S3 view will show a synchronoscope in the first line.
- The S2 view shows some generator measurements.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

### SETUP menu

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

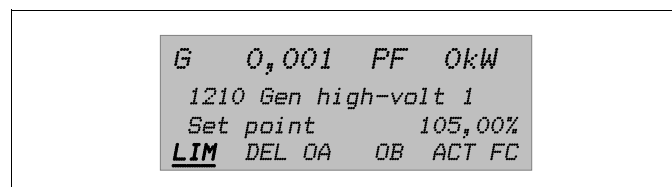
- Protection Setup (PROT): Channels from 1010 to 1890 (steps of 10)
- Control Setup (CTRL): Channels from 2010 to 2210 (steps of 10)
- Power Setup (POWER): Channels from 3010 to 3250 (steps of 10)
- System Setup (SYST): Channels from 4010 to 4790 (steps of 10)

If you select SETUP then you get the following view:



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.

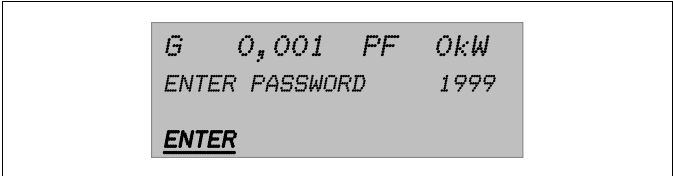
Scrolling down will give all the protection parameters.

- The first line shows some generator data.
- The second line shows the channel number and the name of the parameter.
- The third line shows the value of a set point of this parameter.
- The fourth line shows the different possible set points. In this example:

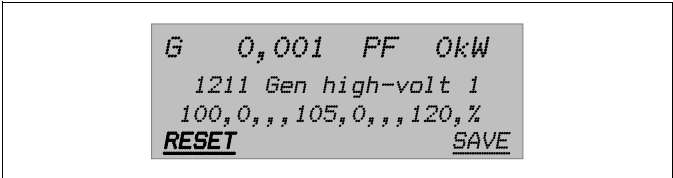
|       |   |
|-------|---|
| "LIM" | LIMIT, setting of switch point                                |
| "DEL" | DELAY, setting of time delay                                  |
| "OA"  | OUTPUT A, selection of which relay the function must activate |
| "OB"  | OUTPUT B, selection of which relay the function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

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

After selection of 'LIM' the following view will be visible:

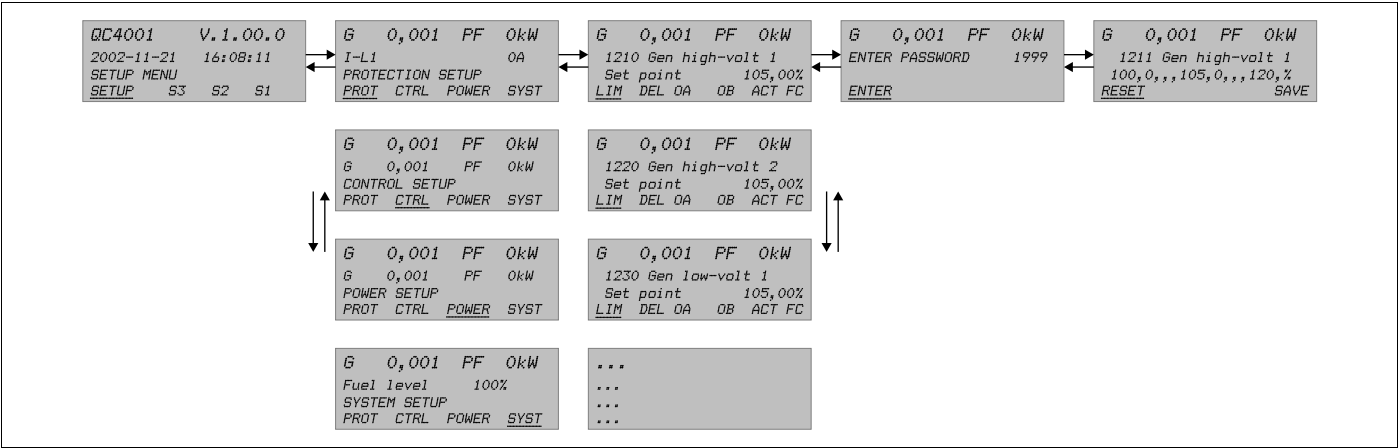


If the correct password is entered, the following view appears:



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

This is the described menu flow:



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



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

### **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.

## Overview of the parameters

### Protection setup: overview of parameters

|      |                             |                |                       |
|------|-----------------------------|----------------|-----------------------|
| 1010 | <b>Bus High Voltage 1</b>   |                | <b>CUSTOMER LEVEL</b> |
|      | 1011                        | Setpoint       | 103,0%                |
|      | 1012                        | Delay          | 10.00s                |
|      | 1013                        | Output Relay A | R0                    |
|      | 1014                        | Output Relay B | R0                    |
|      | 1015                        | Enable         | OFF                   |
|      | 1016                        | Fail Class     | Warning               |
| 1020 | <b>Bus High Voltage 2</b>   |                | <b>SERVICE LEVEL</b>  |
|      | 1021                        | Setpoint       | 108,0%                |
|      | 1022                        | Delay          | 5.00s                 |
|      | 1023                        | Output Relay A | R0                    |
|      | 1024                        | Output Relay B | R0                    |
|      | 1025                        | Enable         | OFF                   |
|      | 1026                        | Fail Class     | Trip                  |
| 1030 | <b>Bus Low Voltage 1</b>    |                | <b>CUSTOMER LEVEL</b> |
|      | 1031                        | Setpoint       | 97,0%                 |
|      | 1032                        | Delay          | 10.00s                |
|      | 1033                        | Output Relay A | R0                    |
|      | 1034                        | Output Relay B | R0                    |
|      | 1035                        | Enable         | OFF                   |
|      | 1036                        | Fail Class     | Warning               |
| 1040 | <b>Bus Low Voltage 2</b>    |                | <b>SERVICE LEVEL</b>  |
|      | 1041                        | Setpoint       | 92,0%                 |
|      | 1042                        | Delay          | 5.00s                 |
|      | 1043                        | Output Relay A | R0                    |
|      | 1044                        | Output Relay B | R0                    |
|      | 1045                        | Enable         | OFF                   |
|      | 1046                        | Fail Class     | Trip                  |
| 1050 | <b>Bus High Frequency 1</b> |                | <b>CUSTOMER LEVEL</b> |
|      | 1051                        | Setpoint       | 103,0%                |
|      | 1052                        | Delay          | 10.00s                |
|      | 1053                        | Output Relay A | R0                    |
|      | 1054                        | Output Relay B | R0                    |
|      | 1055                        | Enable         | OFF                   |
|      | 1056                        | Fail Class     | Warning               |
| 1060 | <b>Bus High Frequency 2</b> |                | <b>SERVICE LEVEL</b>  |
|      | 1061                        | Setpoint       | 105,0%                |
|      | 1062                        | Delay          | 5.00s                 |
|      | 1063                        | Output Relay A | R0                    |
|      | 1064                        | Output Relay B | R0                    |
|      | 1065                        | Enable         | OFF                   |
|      | 1066                        | Fail Class     | Trip                  |
| 1070 | <b>Bus Low Frequency 1</b>  |                | <b>CUSTOMER LEVEL</b> |
|      | 1071                        | Setpoint       | 97,0%                 |
|      | 1072                        | Delay          | 10.00s                |
|      | 1073                        | Output Relay A | R0                    |
|      | 1074                        | Output Relay B | R0                    |
|      | 1075                        | Enable         | OFF                   |
|      | 1076                        | Fail Class     | Warning               |
| 1080 | <b>Bus Low Frequency 2</b>  |                | <b>SERVICE LEVEL</b>  |
|      | 1081                        | Setpoint       | 95,0%                 |
|      | 1082                        | Delay          | 5.00s                 |
|      | 1083                        | Output Relay A | R0                    |
|      | 1084                        | Output Relay B | R0                    |
|      | 1085                        | Enable         | OFF                   |
|      | 1086                        | Fail Class     | Trip                  |
| 1090 | <b>Reverse Power</b>        |                | <b>SERVICE LEVEL</b>  |
|      | 1091                        | Setpoint       | -20,0%                |
|      | 1092                        | Delay          | 5.00s                 |
|      | 1093                        | Output Relay A | R0                    |
|      | 1094                        | Output Relay B | R0                    |
|      | 1095                        | Enable         | ON                    |
|      | 1096                        | Fail Class     | Trip + Stop           |
| 1100 | <b>Over Current 1</b>       |                | <b>CUSTOMER LEVEL</b> |
|      | 1101                        | Setpoint       | 110,0%                |
|      | 1102                        | Delay          | 60.00s                |
|      | 1103                        | Output Relay A | R0                    |
|      | 1104                        | Output Relay B | R0                    |
|      | 1105                        | Enable         | ON                    |
|      | 1106                        | Fail Class     | Warning               |
| 1110 | <b>Over Current 2</b>       |                | <b>SERVICE LEVEL</b>  |
|      | 1111                        | Setpoint       | 120,0%                |
|      | 1112                        | Delay          | 30.00s                |
|      | 1113                        | Output Relay A | R0                    |
|      | 1114                        | Output Relay B | R0                    |
|      | 1115                        | Enable         | ON                    |
|      | 1116                        | Fail Class     | Trip + Stop           |
| 1120 | <b>Over Load 1</b>          |                | <b>CUSTOMER LEVEL</b> |
|      | 1121                        | Setpoint       | 110,0%                |
|      | 1122                        | Delay          | 60.00s                |
|      | 1123                        | Output Relay A | R0                    |
|      | 1124                        | Output Relay B | R0                    |
|      | 1125                        | Enable         | ON                    |
|      | 1126                        | Fail Class     | Warning               |
| 1130 | <b>Over Load 2</b>          |                | <b>SERVICE LEVEL</b>  |
|      | 1131                        | Setpoint       | 120,0%                |
|      | 1132                        | Delay          | 30.00s                |
|      | 1133                        | Output Relay A | R0                    |
|      | 1134                        | Output Relay B | R0                    |
|      | 1135                        | Enable         | ON                    |
|      | 1136                        | Fail Class     | Trip + Stop           |
| 1140 | <b>Current Unbalance</b>    |                | <b>SERVICE LEVEL</b>  |
|      | 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 | <b>Voltage Unbalance</b>    |                | <b>SERVICE LEVEL</b>  |
|      | 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           |
| 1160 | <b>var Import</b>           |                | <b>SERVICE LEVEL</b>  |
|      | 1161                        | Setpoint       | 50,0%                 |
|      | 1162                        | Delay          | 10.00s                |
|      | 1163                        | Output Relay A | R0                    |
|      | 1164                        | Output Relay B | R0                    |
|      | 1165                        | Enable         | ON                    |
|      | 1166                        | Fail Class     | Warning               |
| 1170 | <b>var Export</b>           |                | <b>SERVICE LEVEL</b>  |
|      | 1171                        | Setpoint       | 50,0%                 |
|      | 1172                        | Delay          | 10.00s                |
|      | 1173                        | Output Relay A | R0                    |
|      | 1174                        | Output Relay B | R0                    |
|      | 1175                        | Enable         | ON                    |
|      | 1176                        | Fail Class     | Warning               |
| 1180 | <b>dI/dt (ROCOF)</b>        |                | <b>SERVICE LEVEL</b>  |
|      | 1181                        | Setpoint       | 5.0Hz/s               |
|      | 1182                        | Delay          | 6 periods             |
|      | 1183                        | Output Relay A | R0                    |
|      | 1184                        | Output Relay B | R0                    |
|      | 1185                        | Enable         | OFF                   |
| 1190 | <b>Vector Jump</b>          |                | <b>SERVICE LEVEL</b>  |
|      | 1191                        | Setpoint       | 10.0 deg              |
|      | 1192                        | Output Relay A | R0                    |
|      | 1193                        | Output Relay B | R0                    |
|      | 1194                        | Enable         | OFF                   |
| 1210 | <b>Gen High Voltage 1</b>   |                | <b>CUSTOMER LEVEL</b> |
|      | 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 | <b>Gen High Voltage 2</b>   |                | <b>MASTER LEVEL</b>   |
|      | 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 | <b>Gen Low Voltage 1</b>    |                | <b>CUSTOMER LEVEL</b> |
|      | 1231                        | Setpoint       | 90,0%                 |
|      | 1232                        | Delay          | 10.0s                 |
|      | 1233                        | Output Relay A | R0                    |
|      | 1234                        | Output Relay B | R0                    |
|      | 1235                        | Enable         | RUN                   |
|      | 1236                        | Fail Class     | Warning               |
| 1240 | <b>Gen Low Voltage 2</b>    |                | <b>SERVICE LEVEL</b>  |
|      | 1241                        | Setpoint       | 80,0%                 |
|      | 1242                        | Delay          | 5.0s                  |
|      | 1243                        | Output Relay A | R0                    |
|      | 1244                        | Output Relay B | R0                    |
|      | 1245                        | Enable         | RUN                   |
|      | 1246                        | Fail Class     | Trip + Stop           |
| 1250 | <b>Gen High Frequency 1</b> |                | <b>CUSTOMER LEVEL</b> |
|      | 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 | <b>Gen High Frequency 2</b> | <b>MASTER LEVEL</b> |
| 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 | <b>Gen Low Frequency 1</b> | <b>CUSTOMER LEVEL</b> |
| 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 | <b>Gen Low Frequency 2</b> | <b>SERVICE LEVEL</b> |
| 1281 | Setpoint                   | 80.0%                |
| 1282 | Delay                      | 5.0s                 |
| 1283 | Output Relay A             | R0                   |
| 1284 | Output Relay B             | R0                   |
| 1285 | Enable                     | RUN                  |
| 1286 | Fail Class                 | Trip + Stop          |

|      |                           |                       |
|------|---------------------------|-----------------------|
| 1310 | <b>4...20mA Input 1.1</b> | <b>CUSTOMER LEVEL</b> |
| 1311 | Setpoint                  | 10.0mA                |
| 1312 | Delay                     | 15.0s                 |
| 1313 | Output Relay A            | R0                    |
| 1314 | Output Relay B            | R0                    |
| 1315 | Enable                    | OFF                   |
| 1316 | Fail Class                | Warning               |
| USW  | Alarm Type                | High                  |

|      |                           |                       |
|------|---------------------------|-----------------------|
| 1320 | <b>4...20mA Input 1.2</b> | <b>CUSTOMER LEVEL</b> |
| 1321 | Setpoint                  | 10.0mA                |
| 1322 | Delay                     | 15.0s                 |
| 1323 | Output Relay A            | R0                    |
| 1324 | Output Relay B            | R0                    |
| 1325 | Enable                    | OFF                   |
| 1326 | Fail Class                | Warning               |
| USW  | Alarm Type                | High                  |

|      |                           |                       |
|------|---------------------------|-----------------------|
| 1330 | <b>4...20mA Input 2.1</b> | <b>CUSTOMER LEVEL</b> |
| 1331 | Setpoint                  | 10.0mA                |
| 1332 | Delay                     | 15.0s                 |
| 1333 | Output Relay A            | R0                    |
| 1334 | Output Relay B            | R0                    |
| 1335 | Enable                    | OFF                   |
| 1336 | Fail Class                | Warning               |
| USW  | Alarm Type                | High                  |

|      |                           |                       |
|------|---------------------------|-----------------------|
| 1340 | <b>4...20mA Input 2.2</b> | <b>CUSTOMER LEVEL</b> |
| 1341 | Setpoint                  | 10.0mA                |
| 1342 | Delay                     | 15.0s                 |
| 1343 | Output Relay A            | R0                    |
| 1344 | Output Relay B            | R0                    |
| 1345 | Enable                    | OFF                   |
| 1346 | Fail Class                | Warning               |
| USW  | Alarm Type                | High                  |

|      |                     |                      |
|------|---------------------|----------------------|
| 1350 | <b>Oil Pressure</b> | <b>SERVICE LEVEL</b> |
| 1351 | Setpoint            | 4.0 bar              |
| 1352 | Delay               | 5.0s                 |
| 1353 | Output Relay A      | R0                   |
| 1354 | Output Relay B      | R0                   |
| 1355 | Enable              | OFF                  |
| 1356 | Fail Class          | Warning              |
| USW  | Sensor Type         | 0                    |

|      |                |                      |
|------|----------------|----------------------|
| 1360 | <b>VDO 1.2</b> | <b>SERVICE LEVEL</b> |
| 1361 | Setpoint       | 5.0 bar              |
| 1362 | Delay          | 5.0s                 |
| 1363 | Output Relay A | R0                   |
| 1364 | Output Relay B | R0                   |
| 1365 | Enable         | OFF                  |
| 1366 | Fail Class     | Warning              |

|      |                                 |                             |
|------|---------------------------------|-----------------------------|
| 1370 | <b>High Coolant Temperature</b> | <b>SERVICE LEVEL</b>        |
| 1371 | Setpoint                        | 110 deg <sup>1)</sup>       |
|      | Setpoint                        | 100 deg <sup>2) 3) 4)</sup> |
| 1372 | Delay                           | 3.0s                        |
| 1373 | Output Relay A                  | R0                          |
| 1374 | Output Relay B                  | R0                          |
| 1375 | Enable                          | ON                          |
| 1376 | Fail Class                      | Warning                     |
| USW  | Sensor Type                     | 0                           |

|      |                |                      |
|------|----------------|----------------------|
| 1380 | <b>VDO 2.2</b> | <b>SERVICE LEVEL</b> |
| 1381 | Setpoint       | 108 deg              |
| 1382 | Delay          | 5.0s                 |
| 1383 | Output Relay A | R0                   |
| 1384 | Output Relay B | R0                   |
| 1385 | Enable         | OFF                  |
| 1386 | Fail Class     | Warning              |

|      |                     |                       |
|------|---------------------|-----------------------|
| 1390 | <b>Fuel Level 1</b> | <b>CUSTOMER LEVEL</b> |
| 1391 | Setpoint 1          | 10.0%                 |
| 1392 | Delay               | 10.0s                 |
| 1393 | Output Relay A      | R0                    |
| 1394 | Output Relay B      | R0                    |
| 1395 | Enable              | ON                    |
| 1396 | Fail Class          | Warning               |
| USW  | Sensor Type         | 1                     |

|      |                        |                       |
|------|------------------------|-----------------------|
| 1400 | <b>Fuel Pump Logic</b> | <b>CUSTOMER LEVEL</b> |
| 1401 | Setpoint 2             | 20.0%                 |
| 1402 | Setpoint 3             | 80.0%                 |
| 1403 | Pump Relay             | R4                    |
| 1404 | Enable                 | OFF                   |
| 1405 | Fill Check Delay       | 60.0s                 |

|      |                        |                       |
|------|------------------------|-----------------------|
| 1410 | <b>Fuel High Level</b> | <b>CUSTOMER LEVEL</b> |
| 1411 | Setpoint 4             | 98.0%                 |
| 1412 | Delay                  | 5.0s                  |
| 1413 | Output Relay A         | R0                    |
| 1414 | Output Relay B         | R0                    |

|      |                  |                     |
|------|------------------|---------------------|
| 1420 | <b>Overspeed</b> | <b>MASTER LEVEL</b> |
| 1421 | Setpoint         | 1980rpm             |
| 1422 | Delay            | 3.0s                |
| 1423 | Output Relay A   | R0                  |
| 1424 | Output Relay B   | R0                  |
| 1425 | Enable           | ON                  |
| 1426 | Fail Class       | Shutdown            |

|      |                  |                     |
|------|------------------|---------------------|
| 1430 | <b>Overspeed</b> | <b>MASTER LEVEL</b> |
| 1431 | Overspeed S2     | 1980rpm             |
| 1432 | Overspeed S3     | 1980rpm             |
| 1433 | Overspeed S4     | 1980rpm             |

|      |                       |                      |
|------|-----------------------|----------------------|
| 1440 | <b>Engine Failure</b> | <b>SERVICE LEVEL</b> |
| 1441 | Delay                 | 1.0s                 |
| 1442 | Output Relay A        | R0                   |
| 1443 | Output Relay B        | R0                   |
| 1444 | Enable                | ON                   |
| 1445 | Fail Class            | Shutdown             |
| USW  | Type                  | High                 |

|      |                       |                     |
|------|-----------------------|---------------------|
| 1450 | <b>Emergency Stop</b> | <b>MASTER LEVEL</b> |
| 1451 | Delay                 | 0.0s                |
| 1452 | Output Relay A        | R0                  |
| 1453 | Output Relay B        | R0                  |
| 1454 | Enable                | ON                  |
| 1455 | Fail Class            | Shutdown            |
| USW  | Type                  | High                |

|      |                              |                      |
|------|------------------------------|----------------------|
| 1460 | <b>Coolant Temperature 1</b> | <b>SERVICE LEVEL</b> |
| 1461 | Setpoint                     | 100 deg              |
| 1462 | Delay                        | 3.0s                 |
| 1463 | Output Relay A               | R0                   |
| 1464 | Output Relay B               | R0                   |
| 1465 | Enable                       | OFF                  |
| 1466 | Fail Class                   | Warning              |
| USW  | Alarm Type                   | High                 |

|      |                              |                      |
|------|------------------------------|----------------------|
| 1470 | <b>Coolant Temperature 2</b> | <b>SERVICE LEVEL</b> |
| 1471 | Setpoint                     | 108 deg              |
| 1472 | Delay                        | 3.0s                 |
| 1473 | Output Relay A               | R0                   |
| 1474 | Output Relay B               | R0                   |
| 1475 | Enable                       | OFF                  |
| 1476 | Fail Class                   | Shutdown             |
| USW  | Alarm Type                   | High                 |

|      |                     |                      |
|------|---------------------|----------------------|
| 1480 | <b>Oil Pressure</b> | <b>SERVICE LEVEL</b> |
| 1481 | Setpoint            | 3.0 bar              |
| 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 | <b>Fuel Level 2</b> | <b>CUSTOMER LEVEL</b> |
| 1491 | Setpoint            | 5.0%                  |
| 1492 | Delay               | 20.0s                 |
| 1493 | Output Relay A      | R0                    |
| 1494 | Output Relay B      | R0                    |
| 1495 | Enable              | ON                    |
| 1496 | Fail Class          | Trip + Stop           |

|      |                         |                       |
|------|-------------------------|-----------------------|
| 1700 | <b>Digital Input 21</b> | <b>CUSTOMER LEVEL</b> |
| 1701 | Delay                   | 10.0s                 |
| 1702 | Output Relay A          | R0                    |
| 1703 | Output Relay B          | R0                    |
| 1704 | Enable                  | OFF                   |
| 1705 | Fail Class              | Warning               |
| 1706 | Type                    | High                  |

|      |                         |                       |
|------|-------------------------|-----------------------|
| 1710 | <b>Digital Input 22</b> | <b>CUSTOMER LEVEL</b> |
| 1711 | Delay                   | 10.0s                 |
| 1712 | Output Relay A          | R0                    |
| 1713 | Output Relay B          | R0                    |
| 1714 | Enable                  | OFF                   |
| 1715 | Fail Class              | Warning               |
| 1716 | Type                    | High                  |

|      |                         |                       |
|------|-------------------------|-----------------------|
| 1720 | <b>Digital Input 23</b> | <b>CUSTOMER LEVEL</b> |
| 1721 | Delay                   | 10.0s                 |
| 1722 | Output Relay A          | R0                    |
| 1723 | Output Relay B          | R0                    |
| 1724 | Enable                  | OFF                   |
| 1725 | Fail Class              | Warning               |
| 1726 | Type                    | High                  |

|      |                         |                       |
|------|-------------------------|-----------------------|
| 1730 | <b>Digital Input 24</b> | <b>CUSTOMER LEVEL</b> |
| 1731 | Delay                   | 10.0s                 |
| 1732 | Output Relay A          | R0                    |
| 1733 | Output Relay B          | R0                    |
| 1734 | Enable                  | OFF                   |
| 1735 | Fail Class              | Warning               |
| 1736 | Type                    | High                  |

|      |                         |                       |
|------|-------------------------|-----------------------|
| 1740 | <b>Digital Input 25</b> | <b>CUSTOMER LEVEL</b> |
| 1741 | Delay                   | 10.0s                 |
| 1742 | Output Relay A          | R0                    |
| 1743 | Output Relay B          | R0                    |
| 1744 | Enable                  | OFF                   |
| 1745 | Fail Class              | Warning               |
| 1746 | Type                    | High                  |

|      |                         |                       |
|------|-------------------------|-----------------------|
| 1750 | <b>Digital Input 26</b> | <b>CUSTOMER LEVEL</b> |
| 1751 | Delay                   | 10.0s                 |
| 1752 | Output Relay A          | R0                    |
| 1753 | Output Relay B          | R0                    |
| 1754 | Enable                  | OFF                   |
| 1755 | Fail Class              | Warning               |
| 1756 | Type                    | High                  |

|      |                         |                      |
|------|-------------------------|----------------------|
| 1760 | <b>Low Fuel Warning</b> | <b>SERVICE LEVEL</b> |
| 1761 | Delay                   | 3.0s                 |
| 1762 | Output Relay A          | R0                   |
| 1763 | Output Relay B          | R0                   |
| 1764 | Enable                  | ON                   |
| 1765 | Fail Class              | Warning              |
| 1766 | Type                    | High                 |

|      |                         |                      |
|------|-------------------------|----------------------|
| 1770 | <b>Low Oil Pressure</b> | <b>SERVICE LEVEL</b> |
| 1771 | Delay                   | 3.0s                 |
| 1772 | Output Relay A          | R0                   |
| 1773 | Output Relay B          | R0                   |
| 1774 | Enable                  | RUN                  |
| 1775 | Fail Class              | Shutdown             |
| 1776 | Type                    | Low                  |

|      |  |                      |
|------|--|----------------------|
| 1780 | <b>Coolant Temp. &amp; Cool. Level</b> | <b>SERVICE LEVEL</b> |
| 1781 | Delay                                  | 7.5s                 |
| 1782 | Enable Output Relay                    | R0                   |
| 1783 | Disable Output Relay                   | R0                   |
| 1784 | Enable                                 | RUN                  |
| 1785 | Fail Class                             | Shutdown             |
| 1786 | Type                                   | Low                  |

|      |                         |                       |
|------|-------------------------|-----------------------|
| 1790 | <b>Digital Input 30</b> | <b>CUSTOMER LEVEL</b> |
| 1791 | Delay                   | 10.0s                 |
| 1792 | Enable Output Relay     | R0                    |
| 1793 | Disable Output Relay    | R0                    |
| 1794 | Enable                  | OFF                   |
| 1795 | Fail Class              | Warning               |
| 1796 | Type                    | High                  |

|      |                   |                      |
|------|-------------------|----------------------|
| 1860 | <b>Run Status</b> | <b>SERVICE LEVEL</b> |
| 1861 | Delay             | 5.0s                 |
| 1862 | Output Relay A    | R0                   |
| 1863 | Output Relay B    | R0                   |
| 1864 | Enable            | OFF                  |

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

|      |                       |                       |
|------|-----------------------|-----------------------|
| 1880 | <b>Static Charger</b> | <b>CUSTOMER LEVEL</b> |
| 1881 | Delay                 | 10.0s                 |
| 1882 | Output Relay A        | R0                    |
| 1883 | Enable                | OFF                   |
| 1884 | Type                  | High                  |

|      |                        |                      |
|------|------------------------|----------------------|
| 1890 | <b>MDEC Run Signal</b> | <b>SERVICE LEVEL</b> |
| 1891 | Delay                  | 10.0s                |
| 1892 | Output Relay A         | R0                   |
| 1893 | Output Relay B         | R0                   |
| 1894 | Enable                 | OFF                  |



## Control setup: overview parameters

|      |                             |                       |
|------|-----------------------------|-----------------------|
| 2010 | <b>Synchronisation Type</b> | <b>SERVICE LEVEL</b>  |
|      | 2011 Sync. Type             | Dynamic Sync.         |
| 2020 | <b>Dynamic Sync.</b>        | <b>SERVICE LEVEL</b>  |
|      | 2021 Df max.                | 0.3Hz                 |
|      | 2022 Df min.                | 0.0Hz                 |
|      | 2023 DU max.                | 5%                    |
|      | 2024 Breaker Delay          | 75ms                  |
| 2030 | <b>Static Sync.</b>         | <b>SERVICE LEVEL</b>  |
|      | 2031 GB Close Time          | 1.0s                  |
|      | 2032 Close Window           | 10.0 deg              |
|      | 2033 Phase Gain             | 40                    |
|      | 2034 Frequency Gain         | 40                    |
| 2050 | <b>f/U Limits</b>           | <b>SERVICE LEVEL</b>  |
|      | 2051 Df max.                | 3.0Hz                 |
|      | 2052 DU max.                | 8%                    |
| 2060 | <b>GB Synchr. Failure</b>   | <b>SERVICE LEVEL</b>  |
|      | 2061 Delay                  | 60.0s                 |
|      | 2062 Output Relay A         | R0                    |
|      | 2063 Output Relay B         | R0                    |
| 2070 | <b>MB Synchr. Failure</b>   | <b>SERVICE LEVEL</b>  |
|      | 2071 Delay                  | 60.0s                 |
|      | 2072 Output Relay A         | R0                    |
|      | 2073 Output Relay B         | R0                    |
| 2090 | <b>Frequency Control</b>    | <b>CUSTOMER LEVEL</b> |
|      | 2091 Deadband               | 0.2%                  |
|      | 2092 Frequency KP           | 15                    |
|      | 2093 Frequency KI           | 120                   |
| 2100 | <b>Power Control</b>        | <b>CUSTOMER LEVEL</b> |
|      | 2101 Deadband               | 0.2%                  |
|      | 2102 Power KP               | 10                    |
|      | 2103 Power KI               | 45                    |
| 2110 | <b>Power Ramp Up</b>        | <b>CUSTOMER LEVEL</b> |
|      | 2111 Speed                  | 10%/s                 |
|      | 2112 Delay Point            | 10%                   |
|      | 2113 Delay Time             | 0.0s                  |
| 2120 | <b>Power Ramp Down</b>      | <b>CUSTOMER LEVEL</b> |
|      | 2121 Speed                  | 10%/s                 |
|      | 2122 Breaker Open           | 5%                    |
| 2130 | <b>P/f Control Mix</b>      | <b>CUSTOMER LEVEL</b> |
|      | 2131 Mix Factor             | 50%                   |
|      | 2132 PF Control KP          | 250                   |
|      | 2133 PF Control KI          | 160                   |
| 2140 | <b>Voltage Control</b>      | <b>CUSTOMER LEVEL</b> |
|      | 2141 Deadband               | 0.2%                  |
|      | 2142 KP                     | 150                   |
|      | 2143 KI                     | 320                   |
| 2150 | <b>Var Control</b>          | <b>CUSTOMER LEVEL</b> |
|      | 2151 Deadband               | 0.2%                  |
|      | 2152 KP                     | 25                    |
|      | 2153 KI                     | 80                    |
| 2160 | <b>Q/U Control Mix</b>      | <b>SERVICE LEVEL</b>  |
|      | 2161 Mix Factor             | 50%                   |
| 2170 | <b>PF Control</b>           | <b>CUSTOMER LEVEL</b> |
|      | 2171 Deadband               | 5                     |
| 2180 | <b>Gov. Reg. Failure</b>    | <b>SERVICE LEVEL</b>  |
|      | 2181 Deadband               | 30.0%                 |
|      | 2182 Delay                  | 60.0s                 |
|      | 2183 Output Relay A         | R0                    |
|      | 2184 Output Relay B         | R0                    |
| 2190 | <b>AVR Reg. Failure</b>     | <b>SERVICE LEVEL</b>  |
|      | 2191 Deadband               | 30.0%                 |
|      | 2192 Delay                  | 60.0s                 |
|      | 2193 Output Relay A         | R0                    |
|      | 2194 Output Relay B         | R0                    |
| 2200 | <b>Breaker Type</b>         | <b>CUSTOMER LEVEL</b> |
|      | 2201 GB Type                | Pulse                 |
|      | 2202 MB Type                | Pulse                 |
| 2210 | <b>Static Sync.</b>         | <b>SERVICE LEVEL</b>  |
|      | 2211 Df max.                | 0.1Hz                 |
|      | 2212 DU max.                | 5%                    |
|      | 2213 Close Window           | 10.0 deg              |
|      | 2214 KP                     | 80                    |
|      | 2215 KI                     | 80                    |
|      | 2216 Delay                  | 1.0s                  |

## Power setup: overview parameters

|      |                                  |                       |
|------|----------------------------------|-----------------------|
| 3010 | <b>Mains Power</b>               | <b>CUSTOMER LEVEL</b> |
|      | 3011 Day                         | 5000kW                |
|      | 3012 Night                       | 5000kW                |
|      | 3013 Transducer Scale            | 5000kW                |
| 3020 | <b>Daytime Period</b>            | <b>CUSTOMER LEVEL</b> |
|      | 3021 Start Hour                  | 8                     |
|      | 3022 Start Minute                | 0                     |
|      | 3023 Stop Hour                   | 16                    |
|      | 3024 Stop Minute                 | 0                     |
| 3030 | <b>Start Generator</b>           | <b>CUSTOMER LEVEL</b> |
|      | 3031 Setpoint                    | 80%                   |
|      | 3032 Delay                       | 10.0s                 |
|      | 3033 Minimum Load                | 10%                   |
| 3040 | <b>Stop Generator</b>            | <b>CUSTOMER LEVEL</b> |
|      | 3041 Setpoint                    | 60%                   |
|      | 3042 Delay                       | 600.0s                |
| 3050 | <b>Load Dependent Start</b>      | <b>CUSTOMER LEVEL</b> |
|      | 3051 Setpoint                    | 50kW                  |
|      | 3052 Delay                       | 1.0s                  |
|      | 3053 Minimum Load                | 20kW                  |
| 3060 | <b>Load Dependent Stop</b>       | <b>CUSTOMER LEVEL</b> |
|      | 3061 Setpoint                    | 100kW                 |
|      | 3062 Delay                       | 30.0s                 |
| 3070 | <b>Test</b>                      | <b>CUSTOMER LEVEL</b> |
|      | 3071 Setpoint                    | 50%                   |
|      | 3072 Delay                       | 300.0s                |
|      | 3073 Test Synchron.              | OFF                   |
| 3080 | <b>Fixed Power Setpoint</b>      | <b>CUSTOMER LEVEL</b> |
|      | 3081 Power Set                   | 80%                   |
|      | 3082 PF Set                      | 0.95                  |
| 3100 | <b>PMS Configuration</b>         | <b>CUSTOMER LEVEL</b> |
|      | 3101 # Gen-sets Available        | 1                     |
|      | 3102 Mains Available             | OFF                   |
|      | 3103 PMS Active                  | OFF                   |
|      | 3104 Command Unit                | ON                    |
|      | 3105 Enable Start/Stop           | Local                 |
| 3110 | <b>Internal Communication ID</b> | <b>CUSTOMER LEVEL</b> |
|      | 3111 Intern. Comm. ID            | 1                     |
| 3120 | <b>Priority Select</b>           | <b>CUSTOMER LEVEL</b> |
|      | 3121 Priority Select             | Manual                |
| 3130 | <b>Number of ID's</b>            | <b>CUSTOMER LEVEL</b> |
|      | 3131 Enable Mains                | OFF                   |
|      | 3132 Enable ID1                  | ON                    |
|      | 3133 Enable ID2                  | OFF                   |
|      | 3134 Enable ID3                  | OFF                   |
|      | 3135 Enable ID4                  | OFF                   |
|      | 3136 Enable ID5                  | OFF                   |
| 3140 | <b>Number of ID's</b>            | <b>CUSTOMER LEVEL</b> |
|      | 3141 Enable ID6                  | OFF                   |
|      | 3142 Enable ID7                  | OFF                   |
|      | 3143 Enable ID8                  | OFF                   |
|      | 3144 Enable ID9                  | OFF                   |
|      | 3145 Enable ID10                 | OFF                   |
|      | 3146 Enable ID11                 | OFF                   |
| 3160 | <b>Priority of ID's</b>          | <b>CUSTOMER LEVEL</b> |
|      | 3161 Priority ID1                | 1                     |
|      | 3162 Priority ID2                | 2                     |
|      | 3163 Priority ID3                | 3                     |
|      | 3164 Priority ID4                | 4                     |
|      | 3165 Priority ID5                | 5                     |
|      | 3166 Transmit                    | OFF                   |
| 3170 | <b>Priority of ID's</b>          | <b>CUSTOMER LEVEL</b> |
|      | 3171 Priority ID6                | 6                     |
|      | 3172 Priority ID7                | 7                     |
|      | 3173 Priority ID8                | 8                     |
|      | 3174 Priority ID9                | 9                     |
|      | 3175 Priority ID10               | 10                    |
|      | 3176 Priority ID11               | 11                    |
| 3230 | <b>Ground Relay</b>              | <b>CUSTOMER LEVEL</b> |
|      | 3231 Output Relay A              | R0                    |
|      | 3232 Output Relay B              | R0                    |
|      | 3233 Enable                      | OFF                   |
| 3240 | <b>Stop Noncon. Gen-sets</b>     | <b>CUSTOMER LEVEL</b> |
|      | 3241 Delay                       | 60.0s                 |
| 3250 | <b>Power Capacity</b>            | <b>CUSTOMER LEVEL</b> |
|      | 3251 Power Capacity              | 50kW                  |

**System setup: overview of parameters**

|      |   |                       |
|------|---|-----------------------|
| 4010 | <b>Nominal Settings</b>                 | <b>CUSTOMER LEVEL</b> |
| 4011 | Frequency                               | 50Hz                  |
| 4012 | Generator Power                         | 120kW 1)              |
|      | Generator Power                         | 160kW 2)              |
|      | Generator Power                         | 200kW 3)              |
|      | Generator Power                         | 240kW 4)              |
| 4013 | Generator Current                       | 216A 1)               |
|      | Generator Current                       | 289A 2)               |
|      | Generator Current                       | 361A 3)               |
|      | Generator Current                       | 433A 4)               |
| 4014 | Generator Voltage                       | 400V                  |
| 4020 | <b>Nominal Settings 2</b>               | <b>CUSTOMER LEVEL</b> |
| 4021 | Frequency                               | 50Hz 1)               |
|      | Frequency                               | 60Hz 2) 3) 4)         |
| 4022 | Generator Power                         | 120kW 1)              |
|      | Generator Power                         | 190kW 2)              |
|      | Generator Power                         | 210kW 3)              |
|      | Generator Power                         | 239kW 4)              |
| 4023 | Generator Current                       | 216A 1)               |
|      | Generator Current                       | 286A 2)               |
|      | Generator Current                       | 315A 3)               |
|      | Generator Current                       | 360A 4)               |
| 4024 | Generator Voltage                       | 400V 1)               |
|      | Generator Voltage                       | 480V 2) 3) 4)         |
| 4030 | <b>Nominal Settings 3</b>               | <b>CUSTOMER LEVEL</b> |
| 4031 | Frequency                               | 50Hz                  |
| 4032 | Generator Power                         | 120kW 1)              |
|      | Generator Power                         | 160kW 2)              |
|      | Generator Power                         | 200kW 3)              |
|      | Generator Power                         | 240kW 4)              |
| 4033 | Generator Current                       | 216A 1)               |
|      | Generator Current                       | 289A 2)               |
|      | Generator Current                       | 361A 3)               |
|      | Generator Current                       | 433A 4)               |
| 4034 | Generator Voltage                       | 400V                  |
| 4040 | <b>Nominal Settings 4</b>               | <b>CUSTOMER LEVEL</b> |
| 4041 | Frequency                               | 50Hz                  |
| 4042 | Generator Power                         | 120kW 1)              |
|      | Generator Power                         | 160kW 2)              |
|      | Generator Power                         | 200kW 3)              |
|      | Generator Power                         | 240kW 4)              |
| 4043 | Generator Current                       | 216A 1)               |
|      | Generator Current                       | 289A 2)               |
|      | Generator Current                       | 361A 3)               |
|      | Generator Current                       | 433A 4)               |
| 4044 | Generator Voltage                       | 400V                  |
| 4050 | <b>Transformer Gen-set</b>              | <b>SERVICE LEVEL</b>  |
| 4051 | Volt. Prim.                             | 440V                  |
| 4052 | Volt. Sec.                              | 440V                  |
| 4053 | Current Prim.                           | 300A 1) 2)            |
|      | Current Prim.                           | 600A 3) 4)            |
| 4054 | Current Sec.                            | 5A                    |
| 4060 | <b>Transformer Bus</b>                  | <b>SERVICE LEVEL</b>  |
| 4061 | Volt. Prim.                             | 440V                  |
| 4062 | Volt. Sec.                              | 440V                  |
| 4100 | <b>Engine Comms.</b>                    | <b>SERVICE LEVEL</b>  |
| 4101 | Type                                    | OFF                   |
| 4110 | <b>Date &amp; Time (internal clock)</b> | <b>CUSTOMER LEVEL</b> |
| 4110 | Date                                    | dd/mm/yyyy            |
| 4110 | Time                                    | hh:mm                 |
| 4120 | <b>Counters</b>                         | <b>MASTER LEVEL</b>   |
| 4121 | Running Time                            | 0                     |
| 4122 | GB Operations                           | 0                     |
| 4123 | MB Operations                           | 0                     |
| 4124 | Reset kWh                               | OFF                   |
| 4220 | <b>Battery Low</b>                      | <b>SERVICE LEVEL</b>  |
| 4221 | Setpoint                                | 18.0V                 |
| 4222 | Delay                                   | 3.0s                  |
| 4223 | Output Relay A                          | R0                    |
| 4224 | Output Relay B                          | R0                    |
| 4225 | Enable                                  | ON                    |
| 4230 | <b>Battery High</b>                     | <b>SERVICE LEVEL</b>  |
| 4231 | Setpoint                                | 30.0V                 |
| 4232 | Delay                                   | 0.5s                  |
| 4233 | Output Relay A                          | R0                    |
| 4234 | Output Relay B                          | R0                    |
| 4235 | Enable                                  | ON                    |
| 4240 | <b>Language</b>                         | <b>CUSTOMER LEVEL</b> |
| 4241 | Language                                | English               |
| 4250 | <b>Loadshare Out</b>                    | <b>CUSTOMER LEVEL</b> |
| 4251 | Loadshare Out                           | 4.0V                  |
| 4260 | <b>Loadshare Type</b>                   | <b>CUSTOMER LEVEL</b> |
| 4261 | Loadshare Type                          | Qc4001                |
| 4270 | <b>Battery Low 2</b>                    | <b>CUSTOMER LEVEL</b> |
| 4271 | Setpoint                                | 18.0V                 |
| 4272 | Delay                                   | 10.0s                 |
| 4273 | Output Relay A                          | R0                    |
| 4274 | Output Relay B                          | R0                    |
| 4275 | Enable                                  | OFF                   |
| 4280 | <b>Battery High 2</b>                   | <b>CUSTOMER LEVEL</b> |
| 4281 | Setpoint                                | 30.0V                 |
| 4282 | Delay                                   | 10.0s                 |
| 4283 | Output Relay A                          | R0                    |
| 4284 | Output Relay B                          | R0                    |
| 4285 | Enable                                  | OFF                   |
| 4290 | <b>Mode Relay</b>                       | <b>CUSTOMER LEVEL</b> |
| 4291 | Test                                    | R0                    |
| 4292 | Auto                                    | R0                    |
| 4293 | Semi                                    | R0                    |
| 4300 | <b>Engine Type</b>                      | <b>MASTER LEVEL</b>   |
| 4301 | Engine Type                             | Diesel                |
| 4320 | <b>Gen-Set Mode</b>                     | <b>CUSTOMER LEVEL</b> |
| 4321 | Gen-Set Mode                            | Island                |
| 4330 | <b>CAN Unit</b>                         | <b>CUSTOMER LEVEL</b> |
| 4331 | CAN Unit                                | bar-celsius           |
| 4350 | <b>Tacho Configuration</b>              | <b>SERVICE LEVEL</b>  |
| 4351 | Setpoint                                | 400rpm                |
| 4352 | Teeth                                   | 129 1)                |
|      | Teeth                                   | 140 2) 3)             |
|      | Teeth                                   | 156 4)                |
| 4360 | <b>Starter</b>                          | <b>CUSTOMER LEVEL</b> |
| 4361 | Start Prepare                           | 1.0s                  |
| 4362 | Start ON Time                           | 12.0s                 |
| 4363 | Start OFF Time                          | 12.0s                 |
| 4364 | Prepare                                 | Normal                |
| 4370 | <b>Start Attempts</b>                   | <b>SERVICE LEVEL</b>  |
| 4371 | Attempts                                | 3                     |
| 4372 | Output Relay A                          | R0                    |
| 4373 | Output Relay B                          | R0                    |
| 4380 | <b>f/U OK</b>                           | <b>SERVICE LEVEL</b>  |
| 4381 | Delay                                   | 3.0s                  |
| 4390 | <b>f/U failure</b>                      | <b>SERVICE LEVEL</b>  |
| 4391 | Delay                                   | 30.0s                 |
| 4392 | Output Relay A                          | R0                    |
| 4393 | Output Relay B                          | R0                    |
| 4400 | <b>Stop</b>                             | <b>SERVICE LEVEL</b>  |
| 4401 | Cool Down Time                          | 60.0s                 |
| 4402 | Extended Stop                           | 15.0s                 |
| 4403 | Coil Type                               | RUN                   |
| 4410 | <b>Stop Failure</b>                     | <b>SERVICE LEVEL</b>  |
| 4411 | Delay                                   | 20.0s                 |
| 4412 | Output Relay A                          | R0                    |
| 4413 | Output Relay B                          | R0                    |
| 4420 | <b>Mains V Failure</b>                  | <b>CUSTOMER LEVEL</b> |
| 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 | <b>Mains Hz Failure</b>                 | <b>CUSTOMER LEVEL</b> |
| 4431 | Fail Delay                              | 1.0s                  |
| 4432 | Mains OK Delay                          | 60.0s                 |
| 4433 | Low Frequency                           | 95%                   |
| 4434 | High Frequency                          | 105%                  |
| 4440 | <b>MB Control</b>                       | <b>CUSTOMER LEVEL</b> |
| 4441 | Function                                | Mode Shift OFF        |
| 4442 | MB Close Delay                          | 0.5s                  |
| 4443 | Back Sync.                              | OFF                   |
| 4444 | Synchr. Timer                           | 75ms                  |
| 4450 | <b>Alarm Horn</b>                       | <b>CUSTOMER LEVEL</b> |
| 4451 | Delay                                   | 20.0s                 |
| 4460 | <b>GB Control</b>                       | <b>CUSTOMER LEVEL</b> |
| 4461 | GB Close Delay                          | 1.0s                  |
| 4610 | <b>Relay 1</b>                          | <b>SERVICE LEVEL</b>  |
| 4611 | Function                                | Alarm                 |
| 4612 | Off Delay                               | 0.0s                  |

|      |                |                      |
|------|----------------|----------------------|
| 4620 | <b>Relay 2</b> | <b>SERVICE LEVEL</b> |
| 4621 | Function       | <b>Alarm</b>         |
| 4622 | Off Delay      | <b>0.0s</b>          |

|      |                |                      |
|------|----------------|----------------------|
| 4630 | <b>Relay 3</b> | <b>SERVICE LEVEL</b> |
| 4631 | Function       | <b>Alarm</b>         |
| 4632 | Off Delay      | <b>0.0s</b>          |

|      |                |                      |
|------|----------------|----------------------|
| 4640 | <b>Relay 4</b> | <b>SERVICE LEVEL</b> |
| 4641 | Function       | <b>Alarm</b>         |
| 4642 | Off Delay      | <b>0.0s</b>          |

|      |                          |                       |
|------|--------------------------|-----------------------|
| 4710 | <b>Start/Stop Cmd. 1</b> | <b>CUSTOMER LEVEL</b> |
| 4711 | Enable                   | <b>OFF</b>            |
| 4712 | START/STOP               | <b>STOP</b>           |
| 4713 | Day(s)                   | <b>10</b>             |
| 4714 | Hour                     | <b>10</b>             |
| 4715 | Minute                   | <b>0</b>              |

|      |                          |                       |
|------|--------------------------|-----------------------|
| 4720 | <b>Start/Stop Cmd. 2</b> | <b>CUSTOMER LEVEL</b> |
| 4721 | Enable                   | <b>OFF</b>            |
| 4722 | START/STOP               | <b>STOP</b>           |
| 4723 | Day(s)                   | <b>10</b>             |
| 4724 | Hour                     | <b>10</b>             |
| 4725 | Minute                   | <b>0</b>              |

|      |                          |                       |
|------|--------------------------|-----------------------|
| 4730 | <b>Start/Stop Cmd. 3</b> | <b>CUSTOMER LEVEL</b> |
| 4731 | Enable                   | <b>OFF</b>            |
| 4732 | START/STOP               | <b>STOP</b>           |
| 4733 | Day(s)                   | <b>10</b>             |
| 4734 | Hour                     | <b>10</b>             |
| 4735 | Minute                   | <b>0</b>              |

|      |                          |                       |
|------|--------------------------|-----------------------|
| 4740 | <b>Start/Stop Cmd. 4</b> | <b>CUSTOMER LEVEL</b> |
| 4741 | Enable                   | <b>OFF</b>            |
| 4742 | START/STOP               | <b>STOP</b>           |
| 4743 | Day(s)                   | <b>10</b>             |
| 4744 | Hour                     | <b>10</b>             |
| 4745 | Minute                   | <b>0</b>              |

|      |                          |                       |
|------|--------------------------|-----------------------|
| 4750 | <b>Start/Stop Cmd. 5</b> | <b>CUSTOMER LEVEL</b> |
| 4751 | Enable                   | <b>OFF</b>            |
| 4752 | START/STOP               | <b>STOP</b>           |
| 4753 | Day(s)                   | <b>10</b>             |
| 4754 | Hour                     | <b>10</b>             |
| 4755 | Minute                   | <b>0</b>              |

|      |                          |                       |
|------|--------------------------|-----------------------|
| 4760 | <b>Start/Stop Cmd. 6</b> | <b>CUSTOMER LEVEL</b> |
| 4761 | Enable                   | <b>OFF</b>            |
| 4762 | START/STOP               | <b>STOP</b>           |
| 4763 | Day(s)                   | <b>10</b>             |
| 4764 | Hour                     | <b>10</b>             |
| 4765 | Minute                   | <b>0</b>              |

|      |                          |                       |
|------|--------------------------|-----------------------|
| 4770 | <b>Start/Stop Cmd. 7</b> | <b>CUSTOMER LEVEL</b> |
| 4771 | Enable                   | <b>OFF</b>            |
| 4772 | START/STOP               | <b>STOP</b>           |
| 4773 | Day(s)                   | <b>10</b>             |
| 4774 | Hour                     | <b>10</b>             |
| 4775 | Minute                   | <b>0</b>              |

|      |                          |                       |
|------|--------------------------|-----------------------|
| 4780 | <b>Start/Stop Cmd. 8</b> | <b>CUSTOMER LEVEL</b> |
| 4781 | Enable                   | <b>OFF</b>            |
| 4782 | START/STOP               | <b>STOP</b>           |
| 4783 | Day(s)                   | <b>10</b>             |
| 4784 | Hour                     | <b>10</b>             |
| 4785 | Minute                   | <b>0</b>              |

|      |                     |                       |
|------|---------------------|-----------------------|
| 4790 | <b>GSM Pin Code</b> | <b>CUSTOMER LEVEL</b> |
| 4791 | Pin code            | <b>0000</b>           |

|      |                        |                      |
|------|------------------------|----------------------|
| 4910 | <b>Service Timer 1</b> | <b>SERVICE LEVEL</b> |
| 4911 | Enable                 | <b>ON</b>            |
| 4912 | Run Hours              | <b>500h</b>          |
| 4913 | Elapsed Days           | <b>365 days</b>      |
| 4914 | Fail Class             | <b>Warning</b>       |
| 4915 | Output Relay A         | <b>R0</b>            |
| 4916 | Reset                  |                      |

|      |                        |                      |
|------|------------------------|----------------------|
| 4920 | <b>Service Timer 2</b> | <b>SERVICE LEVEL</b> |
| 4921 | Enable                 | <b>ON</b>            |
| 4922 | Run Hours              | <b>1000h</b>         |
| 4923 | Elapsed Days           | <b>365 days</b>      |
| 4924 | Fail Class             | <b>Warning</b>       |
| 4925 | Output Relay A         | <b>R0</b>            |
| 4926 | Reset                  |                      |

|      |                         |                       |
|------|-------------------------|-----------------------|
| 4930 | <b>Diagnostics Mode</b> | <b>CUSTOMER LEVEL</b> |
| 4930 | Diagnostics             | <b>Normal</b>         |

|      |                       |                     |
|------|-----------------------|---------------------|
| 4940 | <b>Reset Eventlog</b> | <b>MASTER LEVEL</b> |
| 4940 | Reset                 | <b>OFF</b>          |

|      |                         |                       |
|------|-------------------------|-----------------------|
| 4971 | <b>Level 1 Password</b> | <b>CUSTOMER LEVEL</b> |
| 4971 | Setting                 | <b>2003</b>           |

|      |                         |                      |
|------|-------------------------|----------------------|
| 4972 | <b>Level 2 Password</b> | <b>SERVICE LEVEL</b> |
| 4972 | Setting                 | <b>****</b>          |

|      |                         |                     |
|------|-------------------------|---------------------|
| 4973 | <b>Level 3 Password</b> | <b>MASTER LEVEL</b> |
| 4973 | Setting                 | <b>****</b>         |

|     |                     |                     |
|-----|---------------------|---------------------|
| 0   | <b>Parameter ID</b> | <b>MASTER LEVEL</b> |
| USW | ID                  | 1) 9822 2002 63 00  |
| USW | ID                  | 2) 9822 2002 64 00  |
| USW | ID                  | 3) 9822 2002 65 00  |
| USW | ID                  | 4) 9822 2002 66 00  |

|      |                |                      |
|------|----------------|----------------------|
| 5010 | <b>VDO 1</b>   | <b>SERVICE LEVEL</b> |
| 5011 | VDO 1 @ 0.0bar | <b>10</b>            |
| 5012 | VDO 1 @ 2.5bar | <b>44.9</b>          |
| 5013 | VDO 1 @ 5.0bar | <b>81</b>            |
| 5014 | VDO 1 @ 6.0bar | <b>134.7</b>         |

|      |                 |                      |
|------|-----------------|----------------------|
| 5020 | <b>VDO 1</b>    | <b>SERVICE LEVEL</b> |
| 5021 | VDO 1 @ 7.0bar  | <b>184</b>           |
| 5022 | VDO 1 @ 8.0bar  | <b>200</b>           |
| 5023 | VDO 1 @ 9.0bar  | <b>210</b>           |
| 5024 | VDO 1 @ 10.0bar | <b>220</b>           |

|      |              |                      |
|------|--------------|----------------------|
| 5030 | <b>VDO 2</b> | <b>SERVICE LEVEL</b> |
| 5031 | VDO 2 @ 40°C | <b>292</b>           |
| 5032 | VDO 2 @ 50°C | <b>197</b>           |
| 5033 | VDO 2 @ 60°C | <b>134</b>           |
| 5034 | VDO 2 @ 70°C | <b>97</b>            |

|      |               |                      |
|------|---------------|----------------------|
| 5040 | <b>VDO 2</b>  | <b>SERVICE LEVEL</b> |
| 5041 | VDO 2 @ 80°C  | <b>70</b>            |
| 5042 | VDO 2 @ 90°C  | <b>51</b>            |
| 5043 | VDO 2 @ 100°C | <b>39</b>            |
| 5044 | VDO 2 @ 110°C | <b>29</b>            |

|      |              |                       |
|------|--------------|-----------------------|
| 5050 | <b>VDO 3</b> | <b>CUSTOMER LEVEL</b> |
| 5051 | VDO 3 @ 0%   | <b>78.8</b>           |
| 5052 | VDO 3 @ 40%  | <b>47.9</b>           |
| 5053 | VDO 3 @ 50%  | <b>40.2</b>           |
| 5054 | VDO 3 @ 60%  | <b>32.5</b>           |

|      |              |                       |
|------|--------------|-----------------------|
| 5060 | <b>VDO 3</b> | <b>CUSTOMER LEVEL</b> |
| 5061 | VDO 3 @ 70%  | <b>24.8</b>           |
| 5062 | VDO 3 @ 80%  | <b>17</b>             |
| 5063 | VDO 3 @ 90%  | <b>9.3</b>            |
| 5064 | VDO 3 @ 100% | <b>1.6</b>            |

|     |                               |                      |
|-----|-------------------------------|----------------------|
| 0   | <b>Password Language Page</b> | <b>SERVICE LEVEL</b> |
| USW | Level                         | <b>Service</b>       |

|     |                          |                      |
|-----|--------------------------|----------------------|
| 0   | <b>Password Log Page</b> | <b>SERVICE LEVEL</b> |
| USW | Level                    | <b>Service</b>       |

|     |                              |                      |
|-----|------------------------------|----------------------|
| 0   | <b>Password Control Page</b> | <b>SERVICE LEVEL</b> |
| USW | Level                        | <b>Service</b>       |

## Notes

- 1) Only applicable for QAS150 Volvo units.
- 2) Only applicable for QAS200 Volvo units.
- 3) Only applicable for QAS250 Volvo units.
- 4) Only applicable for QAS300 Volvo units.

## 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).

## Fail Classes

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

4 different fail classes can be used:

| Fail Class     | Action           |               |         |              |          |
|----------------|------------------|---------------|---------|--------------|----------|
|                | Alarm Horn Relay | Alarm Display | GB Trip | Gen-Set Stop | Shutdown |
| 1. Warning     |                  | X             |         |              |          |
| 2. Trip of GB  | X                | X             | X       |              |          |
| 3. Trip & Stop | X                | X             | X       | X            |          |
| 4. Shutdown    | X                | X             | X       |              | X        |

All alarms can be disabled or enabled as following:

- OFF: disabled alarm, inactive supervision.
- ON: enabled alarm, supervision of alarm all the time.
- RUN: generator running alarm, only supervision when the generator is running.

## Languages

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

## Standard modes

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

### Test mode

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

### Semi-Auto mode

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

### Auto mode

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

## Diagnostics menu

This diagnostics menu can only be entered using the "JUMP" push-button, 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**

## Standard applications

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

Depending on the application the user has to connect extra wirings to terminal blocks X25. These terminal blocks can be found inside the control box on a DIN-rail. We refer to the circuit diagram 9822 0889 74-01/02 for the correct connections.

### Island operation

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

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

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

- Combined with Auto mode = Remote Start operation.

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



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

### Installation wirings:

- Terminals X25.10 / X25.11 have to be linked. The module always needs a feedback signal from the Mains Breaker MB. In Island mode there is no MB in the system. In this case the 'MB opened' signal is simulated with this link.
- The busbar sensing lines have to be wired to the corresponding control module inputs.

Place bridges between:

- X25.33 (L1) => X25.3
- X25.34 (L2) => X25.4
- X25.35 (L1) => X25.5

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

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

## Automatic Mains Failure (AMF) operation

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

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

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

The generator will then go into cool down and stop.

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

### Installation wirings:

- The link between X25.10 & X25.11 has to be removed.
- Mains breaker feedback lines have to be wired to X25.10 / X25.11 / X25.12.
- Mains breaker control lines have to be wired to X25.13 / X25.14 / X25.15 / X25.16. These terminals are voltage free contacts. The power for the MB has to be supplied by the customer (24Vdc / 230Vac). (max. contact rating K11, K12 = 250V / 16 A)
- Make sure the connections between X25.33 & X25.3; X25.34 & X25.4; X25.35 & X25.5 are removed.
- The Mains sensing lines L1 / L2 / L3 have to be wired to terminals X25.3 / X25.4 / X25.5 (Mains neutral is not sensed).
- If back synchronisation is enabled, all settings for paralleling set up (see "Paralleling") must be verified also.

## Peak Shaving (PS) operation

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

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

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

## Installation wirings:

- The link between X25.10 / X25.11 has to be removed.
- Mains breaker feedback lines have to be wired to X25.10 / X25.11 / X25.12.
- Mains breaker control lines have to be wired to X25.13 / X25.14 / X25.15 / X25.16. These terminals are voltage free contacts. The power for the MB has to be supplied by the customer (24 Vdc / 230 Vac). (max. contact rating K11, K12 = 250 V / 16 A)
- The Mains sensing lines L1 / L2 / L3 have to be wired to terminals X25.3 / X25.4 / X25.5 (Mains neutral is not sensed).
- Make sure the connections between X25.33 & X25.3; X25.34 & X25.4; X25.35 & X25.5 are removed.
- Power Transducer lines have to be wired to X25.21 (input) and X25.22 (GND).

Verify all settings for paralleling set up (see “Paralleling”).

## Fixed Power (FP) operation

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

## Installation wirings:

- The link between X25.10 / X25.11 has to be removed.
- Mains breaker feedback lines have to be wired to X25.10 / X25.11 / X25.12.
- Mains breaker control lines have to be wired to X25.13 / X25.14 / X25.15 / X25.16. These terminals are voltage free contacts. The power for the MB has to be supplied by the customer (24 Vdc / 230 Vac). (max. contact rating K11, K12 = 250 V / 16 A)
- The Mains sensing lines L1 / L2 / L3 have to be wired to terminals X25.3 / X25.4 / X25.5 (Mains neutral is not sensed).
- Make sure the connections between X25.33 & X25.3; X25.34 & X25.4; X25.35 & X25.5 are removed.
- Verify all settings for paralleling set up (see “Paralleling”).

## Load Take Over (LTO) operation

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

## Installation wirings:

- The link between X25.10 & X25.11 has to be removed.
- Mains breaker feedback lines have to be wired to X25.10 / X25.11 / X25.12.
- Mains breaker control lines have to be wired to X25.13 / X25.14 / X25.15 / X25.16. These terminals are voltage free contacts. The power for the MB has to be supplied by the customer (24 Vdc / 230 Vac). (max. contact rating K11, K12 = 250 V / 16 A)
- The Mains sensing lines L1 / L2 / L3 have to be wired to terminals X25.3 / X25.4 / X25.5 (Mains neutral is not sensed).
- Make sure the connections between X25.33 & X25.3; X25.34 & X25.4; X25.35 & X25.5 are removed.
- Power Transducer lines have to be wired to X25.21 (input) and X25.22 (GND).
- Verify all settings for paralleling set up (see “Paralleling”).

## Paralleling

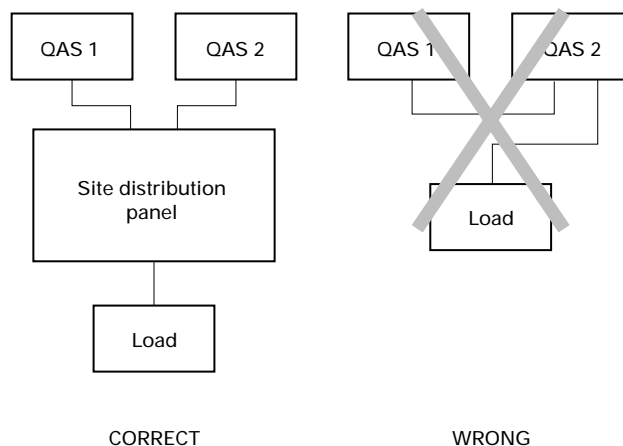
Prior to starting parallel operation of two generators, following connections need to be made:

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

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

- Connect the load with the generator.

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



**When paralleling, make sure to disable the Earth Leakage Relay by putting switch S13 into off position.**

## Option Power Managment System

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

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



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

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

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

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

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

### Example :

Installation with 3 gensets :

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

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

Start signal if :

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

- Only G1 is running; at 210kW load (300kW - 90kW)  
=> G2 will be started
- G1 & G2 are running; at 410kW load (200kW + 300kW - 90kW)  
=> G3 will be started

- Stop signal is set at 100 kW and priority is set as (high) G1 > G2 > G3 (low)

Stop signal if :

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

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

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



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



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

**Overview of applications**

| <b>Installations with only 1 generator</b> |                  |                                   |
|--|------------------|-----------------------------------|
| <b>APPLICATION TYPE</b>                    | <b>MODE</b>      | <b>COMMENTS</b>                   |
| Island operation                           | SEMI-AUTO mode   | = Local start                     |
|  | AUTO mode        | = Remote start                    |
| AMF operation                              | (SEMI-AUTO mode) | AMF Function will not work!       |
|  | AUTO mode        | = Emergency start @ Mains Failure |
| Peak shaving                               | SEMI-AUTO mode   | Only with Power Transducer (*)    |
|  | AUTO mode        | Only with Power Transducer (*)    |
| Fixed Power                                | SEMI-AUTO mode   |                                   |
|  | AUTO mode        |                                   |
| Load Take Over                             | SEMI-AUTO mode   | Only with Power Transducer (*)    |
|  | AUTO mode        | Only with Power Transducer (*)    |

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

| <b>Installations with only 1 generator</b> |                  |  |
|--|------------------|--|
| <b>APPLICATION TYPE</b>                    | <b>MODE</b>      | <b>COMMENTS</b>                                  |
| Island operation                           | SEMI-AUTO mode   | = Manual paralleling between generators          |
|  | AUTO mode        | = Remote paralleling between generators          |
| AMF operation                              | (SEMI-AUTO mode) | AMF Function will not work!                      |
|  | AUTO mode        | Only with PMS option + Qc4001™ Mains module (**) |
| Peak shaving                               | SEMI-AUTO mode   | Only with PMS option + Qc4001™ Mains module (**) |
|  | AUTO mode        | Only with PMS option + Qc4001™ Mains module (**) |
| Fixed Power                                | SEMI-AUTO mode   | Only with PMS option + Qc4001™ Mains module (**) |
|  | AUTO mode        | Only with PMS option + Qc4001™ Mains module (**) |
| Load Take Over                             | SEMI-AUTO mode   | Only with PMS option + Qc4001™ Mains module (**) |
|  | AUTO mode        | Only with PMS option + Qc4001™ Mains module (**) |

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



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

Wrong parameter settings can damage the installation brutally!

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



## **Operating Qc4001™**

### **Starting Qc4001™**

- Turn the optional battery switch to ON.
- Turn the S20 button to the ON position, this will activate the Qc4001™ Controller.
- Select the correct application type and the correct mode on the Qc4001™ module (see Overview of applications 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.**

### **During operation Qc4001™**

Following points should be carried out regularly:

- Check the display for normal readings.



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

- Check for leakage of oil, fuel or cooling water.
- Avoid long low-load periods (< 30 %). In this case, an output power drop and higher oil consumption of the engine could occur. It is recommended to operate the generator at full load capacity 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.

### **Stopping Qc4001™**

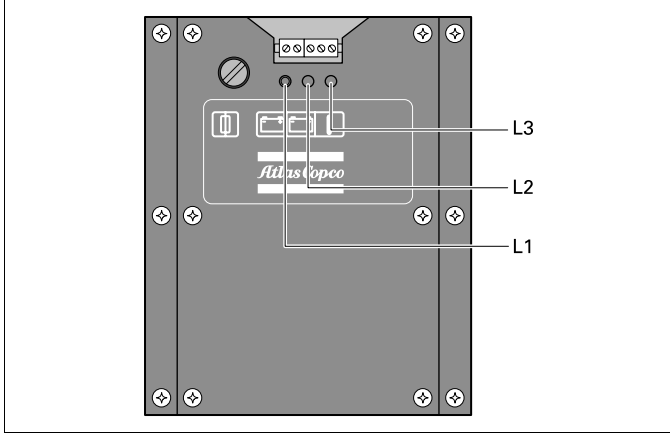
- When in SEMI-AUTO mode, use the STOP button to stop the generator. The GB button will work to open the GB.
- When in AUTO mode, the STOP and GB button will not function. The generator shuts down automatically depending on the selected application



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

### 7.3.3 Automatic battery charger

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



**L1..... Red Led**

Lights up when the battery is charging.

**L2..... Yellow Led**

Lights up when the battery is charged.

**L3..... Green Led**

Lights up when AC power supply is available.

To use the battery charger:

- Provide the X7 connector, located at the side of the power cubicle, with external power to use the battery charger.



**The automatic battery charger is always included with the AMF option.**

### 7.3.4 Engine coolant heater

To make sure that the engine can start and accept load immediately, an external cooling water heater (2 x 1000 W, 240 V) is provided which keeps the engine temperature between 38 °C and 49 °C.



**The engine coolant heater is always included with the AMF option.**

### 7.3.5 Outlet sockets (S)

The “Outlet sockets” option provides the following extra outlet sockets and circuit breakers:

**X1..... 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.

**X2..... Socket 16 A Rim earthing**

Provides lines L3, N (= neutral) and PE (= grounding).

**Socket 16 A Pin earthing**

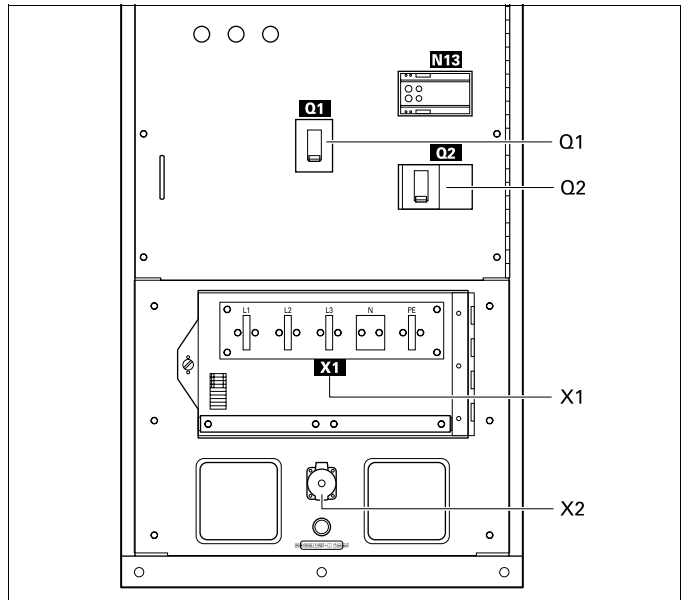
Provides lines L3, N (= neutral) and PE (= grounding).

**Q1 ..... Circuit breaker for X1**

Interrupts the power supply X1 when a short-circuit occurs at the load side, or when the overcurrent protection is activated. When activated, Q1 interrupts the three phases towards X1. It must be reset manually after eliminating the problem.

**Q2 ..... Circuit breaker for X2**

Interrupts the power supply to X2 when a short-circuit occurs at the load side, or when the overcurrent protection (16 A) is activated. When activated, Q2 interrupts the three phases towards X2. It can be activated again after eliminating the problem.



**When the sockets-option is installed, circuit breaker Q1 does not only interrupt the power supply towards X1 but also towards X2.**

**Make sure to switch on circuit breakers Q1 and Q2 after starting the generator when power supply is done by means of X2.**

### 7.3.6 Dual voltage (DV)

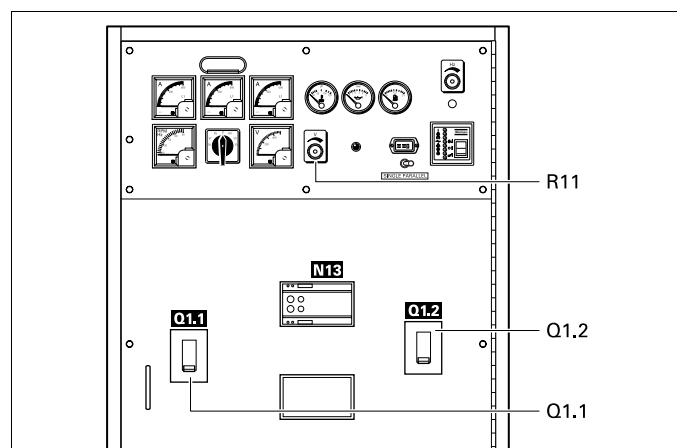
The generator can run in two different modes:

#### 3 phase, lower voltage

When using this selection, the generator provides a 230 V (QAS150) or 230/240 V (QAS200-300) output voltage.

#### 3 phase, higher voltage

When using this selection, the generator provides a 400 V (QAS150) or 400/480 V (QAS200-300) output voltage.



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

Interrupts the low voltage power supply towards X1 when a short-circuit occurs at the load side or when the overcurrent protection is activated. It must be reset manually after eliminating the problem.

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

Interrupts the high voltage power supply towards X1 when a short-circuit occurs at the load side or when the overcurrent protection is activated. It must be reset manually after eliminating the problem.

#### R11.... Output voltage adjust potentiometer

Allows to adjust the output voltage.



**AMF operation is not possible with a dual voltage generator.**

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

Circuit breakers Q1.1 and Q1.2 cannot be switched on at the same time. This is prevented by means of the auxiliary voltage selection relays K11 and K12 (refer to the circuit diagram).

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

#### S10.... Output voltage selection switch

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

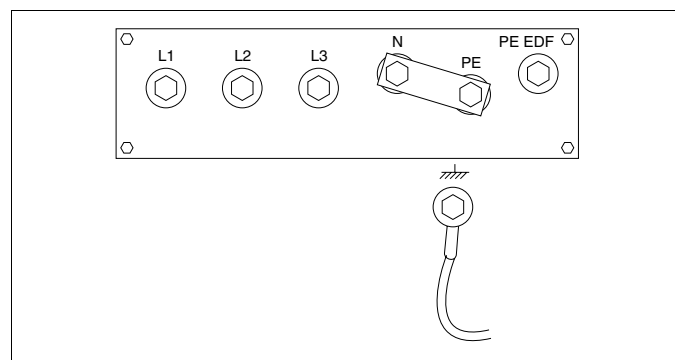


**Changing the output voltage is only allowed after shutdown.**

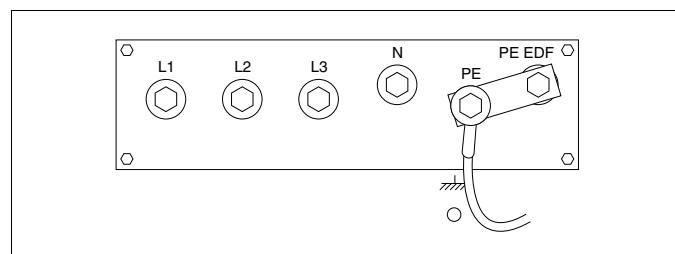
After changing the output voltage by means of the selection switch S10, adjust the output voltage by means of potentiometer R11 to the required value.

### 7.3.7 “Electricité de France” (EDF)

When the EDF-option is installed, the unit operates as a standard unit when the neutral and the PE terminals are connected to each other (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”.**

### 7.3.8 Over and under voltage relay (O.U.R)

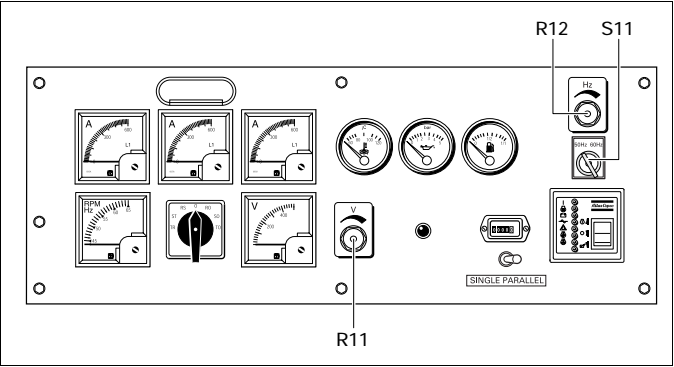
The settings of this relay can be adjusted by the customer via the dedicated potentiometers. Factory settings are +8% / -8% / 5 seconds. Outside these limits the generator will shut down (voltage LED of the module will light up).

7.3.9 Dual frequency



Not applicable for QAS150 Volvo units!

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 S11.



S11.... Frequency selector switch (50 Hz/60 Hz)

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

R11.... Voltage adjust potentiometer

Allows to adjust the output voltage

R12.... Frequency adjust potentiometer

Allows to adjust the frequency of the output voltage



Changing the output voltage is only allowed after shutdown.

After changing the output frequency, adjust the output voltage by means of potentiometer R11 to the required value.

7.4 Overview of the mechanical options

The following “mechanical” options are available:

- External fuel tank connection
- Spillage free skid

7.5 Description of the mechanical options

7.5.1 External fuel tank connection

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

When using this option, make sure to connect the fuel supply line as well as the fuel return line. Always put both valves in the same position (either internal or external tank) and make sure that they are in the extreme (horizontal) position. 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.



Only in combination with the built-in fuel tank.

7.5.2 Spillage free skid

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

It avoids accidental spilling of engine fluids.

## 8 Technical specifications

### 8.1 Technical specifications of the QAS150 Volvo unit

#### 8.1.1 Readings on gauges

| <i>Gauge</i>                          | <i>Reading</i>               | <i>Unit</i>    |
|---------------------------------------|------------------------------|----------------|
| Ammeter L1-3 (P1-3)                   | Below max. rating            | A              |
| Voltmeter (P4)                        | Depends upon selector switch | V              |
| Frequencymeter (P5)                   | Between 50 and 52.5          | Hz             |
| Hourmeter (P6)                        | Adding up                    | h              |
| Fuel level gauge (P7)                 | Above 0                      | fuel tank full |
| Engine coolant temperature gauge (P8) | Below max. rating            | °C             |
| Engine oil pressure gauge (P9)        | Below max. rating            | bar            |

#### 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       | 103 °C              |

#### 8.1.3 Specifications of the engine/alternator/unit

|                                     |  | <i>50 Hz</i>     |
|-------------------------------------|--|------------------|
| <i>Reference values 1) 4)</i>       | Rated frequency  | 50 Hz            |
|                                     | Rated speed  | 1500 rpm         |
|                                     | Generator service duty   | prime            |
|                                     | Absolute air inlet pressure  | 100 kPa          |
|                                     | Relative air humidity  | 30 %             |
|                                     | Air inlet temperature  | 25 °C            |
| <i>Limitations 2)</i>               | Maximum ambient temperature  | 50 °C            |
|                                     | Altitude capability  | 4000 m           |
|                                     | Relative air humidity maximum  | < 100 %          |
|                                     | Minimum starting temperature unaided   | -18 °C           |
|                                     | Minimum starting temperature with heater   | -25 °C           |
| <i>Performance data 2) 3) 4) 5)</i> | Rated active power (PRP) 3 phase   | 120 kW           |
|                                     | Rated power factor (lagging) 3 phase   | 0.8              |
|                                     | Rated apparent power (PRP) 3 phase   | 150 kVA          |
|                                     | Rated voltage 3 phase line to line   | 400 V            |
|                                     | Rated voltage 3 phase line to line lower voltage                                       | 230 V            |
|                                     | Rated current 3 phase  | 216.5 A          |
|                                     | Rated current 3 phase lower voltage  | 376.5 A          |
|                                     | Performance class (acc. to ISO 8528-5:1993)  | G2               |
|                                     | Single step load acceptance (0-PRP)  | 100 %            |
|                                     | Frequency droop  | isochronous      |
|                                     | Fuel consumption at full load (PRP)  | 28.2 kg/h        |
|                                     | Specific fuel consumption at full load (PRP)   | 0.235 kg/kWh     |
|                                     | Fuel autonomy at full load (PRP)   | 16.2 h           |
|                                     | Max. oil consumption at full load (PRP)  | 0.1 l/h          |
|                                     | Max. sound power level (LWA @ 75 % PRP load) measured according to REF 2000/14/EC OND: | 98 dB(A)         |
|                                     | Fuel tank capacity   | 530 l            |
|                                     | Single step load capability (0-PRP)  | 100 %            |
| <i>Application data</i>             | Mode of operation  | prime            |
|                                     | Site   | land use         |
|                                     | Operation  | single/parallel  |
|                                     | Start-up and control mode  | manual/automatic |
|                                     | Start-up time  | unspecified      |
|                                     | Mobility/Config. acc. to ISO 8528-1:1993   | transportable/D  |
|                                     | Mounting   | fully resilient  |
|                                     | Climatic exposure  | open air         |

|                       |   |                                       |
|-----------------------|---|---------------------------------------|
|                       | Degree of protection (cubicle)              | IP40                                  |
|                       | Status of neutral                           | earthed                               |
| <i>Alternator</i>     | Standard                                    | IEC 34-1<br>ISO 8528-3                |
|                       | Make  | MECC-ALTE                             |
|                       | Model                                       | ECO 38 1S/4                           |
|                       | Rated output, class H temp. rise            | 180 kVA                               |
|                       | Degree of protection                        | IP21                                  |
|                       | Insulation class stator                     | H                                     |
|                       | Insulation class rotor                      | H                                     |
|                       | Number of wires                             | 12                                    |
| <i>Engine</i>         | Standard                                    | ISO 3046<br>ISO 8528-2                |
|                       | Type VOLVO                                  | TAD720GE                              |
|                       | Rated net output                            | 131.8 kW                              |
|                       | Rating type acc. ISO 3046-7                 | ICXN                                  |
|                       | Production tolerance                        | 0 to +2%                              |
|                       | Coolant                                     | water                                 |
|                       | Combustion system                           | direct injection                      |
|                       | Aspiration                                  | turbocharged<br>intercooled           |
|                       | Number of cylinders                         | 6                                     |
|                       | Swept volume                                | 7.15 l                                |
|                       | Speed governing                             | electronic                            |
|                       | Capacity of oil sump                        | 17 l                                  |
|                       | Capacity of cooling system                  | 14 l                                  |
|                       | Electrical system                           | 24 Vdc                                |
| <i>Power circuit</i>  | <i>Circuit-breaker, 3ph.</i>                |                                       |
|                       | Number of poles                             | 4                                     |
|                       | Thermal release It                          | 215 A                                 |
|                       | Magnetic release Im                         | 3..10xIn                              |
|                       | <i>Circuit-breaker, 3ph., lower voltage</i> |                                       |
|                       | Number of poles                             | 3                                     |
|                       | Thermal release It (optional)               | 375 A                                 |
|                       | Magnetic release Im                         | 3..10xIn                              |
|                       | Residual current release IDn                | 0.025-25 A                            |
| <i>Outlet sockets</i> | <i>(optional)</i>                           | domestic (1x)<br>2p + E<br>16 A/230 V |

## 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

(in %, 100% is declared PRP  
at "Performance Data")

| Height(m) | Temperature<br>(°C) |     |     |     |    |    |
|-----------|---------------------|-----|-----|-----|----|----|
|           | 25                  | 30  | 35  | 40  | 45 | 50 |
| 1000      | 100                 | 100 | 100 | 100 | 96 | 93 |
| 1500      | 96                  | 96  | 96  | 96  | 92 | 89 |
| 2000      | 92                  | 92  | 91  | 91  | 87 | 83 |
| 2500      | 88                  | 88  | 85  | 85  | 81 | 78 |
| 3000      | 84                  | 84  | 84  | 84  | 81 | 78 |
| 3500      | 78                  | 78  | 78  | 78  | 74 | 71 |
| 4000      | 72                  | 72  | 72  | 72  | 70 | 68 |

|             |                        |                       |
|-------------|------------------------|-----------------------|
| <i>Unit</i> | Dimensions (L x W x H) | 3470 x 1430 x 2130 mm |
|             | Weight net mass        | 3005 kg               |
|             | Weight wet mass        | 3385 kg               |

## 8.1.4 Specifications of the options

### **Specifications of the Sockets option**

|                               |      |
|-------------------------------|------|
| Setting of circuit breaker Q2 | 16 A |
|-------------------------------|------|

### **Specifications of the Dual voltage option**

|   |       |
|---|-------|
| Rated voltage, 3 ph line to line higher voltage | 400 V |
| Rated voltage, 3 ph line to line lower voltage  | 230 V |
| Setting of circuit breaker Q1.1                 | 375 A |
| Setting of circuit breaker Q1.2                 | 215 A |

## 8.2 Technical specifications of the QAS200 Volvo unit

### 8.2.1 Readings on gauges

| <i>Gauge</i>                          | <i>Reading</i>               | <i>Unit</i>    |
|---------------------------------------|------------------------------|----------------|
| Ammeter L1-3 (P1-3)                   | Below max. rating            | A              |
| Voltmeter (P4)                        | Depends upon selector switch | 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 gauge (P7)                 | Above 0                      | fuel tank full |
| Engine coolant temperature gauge (P8) | Below max. rating            | °C             |
| Engine oil pressure gauge (P9)        | Below max. rating            | bar            |

### 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       | 103 °C              |

### 8.2.3 Specifications of the engine/alternator/unit

|                                     |  | <i>50 Hz</i>     | <i>60 Hz 6)</i>  |
|-------------------------------------|--|------------------|------------------|
| <i>Reference values 1) 4)</i>       | Rated frequency  | 50 Hz            | 60 Hz            |
|                                     | Rated speed  | 1500 rpm         | 1800 rpm         |
|                                     | Generator service duty   | prime            | prime            |
|                                     | 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           |
|                                     | Relative air humidity maximum  | < 100 %          | < 100 %          |
|                                     | Minimum starting temperature unaided   | -18 °C           | -18 °C           |
|                                     | Minimum starting temperature with heater   | -25 °C           | -25 °C           |
| <i>Performance data 2) 3) 4) 5)</i> | Rated active power (PRP) 3 phase   | 160 kW           | 190.4 kW         |
|                                     | Rated power factor (lagging) 3 phase   | 0.8              | 0.8              |
|                                     | Rated apparent power (PRP) 3 phase   | 200 kVA          | 238 kVA          |
|                                     | Rated voltage 3 phase line to line   | 400 V            | 480 V            |
|                                     | Rated voltage 3 phase line to line lower voltage                                       | 230 V            | 240 V            |
|                                     | Rated current 3 phase  | 288.7 A          | 286.3 A          |
|                                     | Rated current 3 phase lower voltage  | 502 A            | 572.5 A          |
|                                     | Performance class (acc. to ISO 8528-5:1993)  | G2               | G2               |
|                                     | Single step load acceptance (0-PRP)  | 70 %             | 90 %             |
|                                     | Frequency droop  | isochronous      | isochronous      |
|                                     | Fuel consumption at full load (PRP)  | 34.1 kg/h        | 42.5 kg/h        |
|                                     | Specific fuel consumption at full load (PRP)   | 0.213 kg/kWh     | 0.223 kg/kWh     |
|                                     | Fuel autonomy at full load (PRP)   | 13.4 h           | 13.4 h           |
|                                     | Max. oil consumption at full load (PRP)  | 0.03 l/h         | 0.03 l/h         |
|                                     | Max. sound power level (LWA @ 75 % PRP load) measured according to REF 2000/14/EC OND: | 98 dB(A)         | -                |
|                                     | Fuel tank capacity   | 530 l            | 530 l            |
|                                     | Single step load capability (0-PRP)  | 94 %             | 100 %            |
| <i>Application data</i>             | Mode of operation  | prime            | prime            |
|                                     | Site   | land use         | land use         |
|                                     | Operation  | single/parallel  | single/parallel  |
|                                     | Start-up and control mode  | manual/automatic | manual/automatic |
|                                     | Start-up time  | unspecified      | unspecified      |
|                                     | Mobility/Config. acc. to ISO 8528-1:1993   | transportable/D  | transportable/D  |
|                                     | Mounting   | fully resilient  | fully resilient  |
|                                     | Climatic exposure  | open air         | open air         |
|                                     | Degree of protection (cubicle)   | IP54             | IP54             |
|                                     | Status of neutral  | earthed          | earthed          |



|                       |   |                             |                             |
|-----------------------|---|-----------------------------|-----------------------------|
| <i>Alternator</i>     | Standard                                    | IEC 34-1<br>ISO 8528-3      | IEC 34-1<br>ISO 8528-3      |
|                       | Make  | MECC-ALTE                   | MECC-ALTE                   |
|                       | Model                                       | ECO 38 3S/4                 | ECO 38 3S/4                 |
|                       | Rated output, class H temp. rise            | 225 kVA                     | 270 kVA                     |
|                       | Degree of protection                        | IP21                        | IP21                        |
|                       | Insulation class stator                     | H                           | H                           |
|                       | Insulation class rotor                      | H                           | H                           |
|                       | Number of wires                             | 12                          | 12                          |
| <i>Engine</i>         | Standard                                    | ISO 3046<br>ISO 8528-2      | ISO 3046<br>ISO 8528-2      |
|                       | Type VOLVO                                  | TWD740GE                    | TWD740GE                    |
|                       | Rated net output                            | 181 kW                      | 207 kW                      |
|                       | Rating type acc. ISO 3046-7                 | ICXN                        | ICXN                        |
|                       | Production tolerance                        | 0 to +2%                    | 0 to +2%                    |
|                       | Coolant                                     | water                       | water                       |
|                       | Combustion system                           | direct injection            | direct injection            |
|                       | Aspiration                                  | turbocharged<br>intercooled | turbocharged<br>intercooled |
|                       | Number of cylinders                         | 6                           | 6                           |
|                       | Swept volume                                | 7.28 l                      | 7.28 l                      |
|                       | Speed governing                             | electronic                  | electronic                  |
|                       | Capacity of oil sump                        | 24 l                        | 24 l                        |
|                       | Capacity of cooling system                  | 26 l                        | 26 l                        |
|                       | Electrical system                           | 24 Vdc                      | 24 Vdc                      |
| <i>Power circuit</i>  | <i>Circuit-breaker, 3ph.</i>                |                             |                             |
|                       | Number of poles                             | 4                           | 4                           |
|                       | Thermal release It                          | 290 A                       | 290 A                       |
|                       | Magnetic release Im                         | 3..10xIn                    | 3..10xIn                    |
|                       | <i>Circuit-breaker, 3ph., lower voltage</i> |                             |                             |
|                       | Number of poles (optional)                  | 3                           | 4                           |
|                       | Thermal release It                          | 750 A                       | 750 A                       |
|                       | Magnetic release Im                         | 3..10xIn                    | 3..10xIn                    |
|                       | Residual current release IDn                | 0.025-25 A                  | 0.025-25 A                  |
|                       |   |                             |                             |
| <i>Outlet sockets</i> | <i>(optional)</i>                           | domestic (1x)               |                             |
|                       |   | 2p + E                      |                             |
|                       |   | 16 A/230 V                  |                             |

## 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.
- 6) 60 Hz is only for Dual frequency option.

Derating

(in %, 100% is declared PRP at "Performance Data")

| Height(m) | Temperature<br>(°C) |     |     |     |    |    |
|-----------|---------------------|-----|-----|-----|----|----|
|           | 25                  | 30  | 35  | 40  | 45 | 50 |
| 1000      | 100                 | 100 | 100 | 100 | 96 | 93 |
| 1500      | 96                  | 96  | 96  | 96  | 92 | 89 |
| 2000      | 92                  | 92  | 91  | 91  | 87 | 83 |
| 2500      | 88                  | 88  | 85  | 85  | 81 | 78 |
| 3000      | 84                  | 84  | 84  | 84  | 81 | 78 |
| 3500      | 78                  | 78  | 78  | 78  | 74 | 71 |
| 4000      | 72                  | 72  | 72  | 72  | 71 | 69 |

|      |                        |                       |
|------|------------------------|-----------------------|
| Unit | Dimensions (L x W x H) | 3470 x 1430 x 2130 mm |
|      | Weight net mass        | 3300 kg               |
|      | Weight wet mass        | 3740 kg               |

8.2.4 Specifications of the options

Specifications of the Sockets option

|                               |       |       |
|-------------------------------|-------|-------|
|                               | 50 Hz | 60 Hz |
| Setting of circuit breaker Q2 | 16 A  | 16 A  |

Specifications of the Dual voltage option

|   |       |       |
|---|-------|-------|
| Rated voltage, 3 ph line to line higher voltage | 400 V | 480 V |
| Rated voltage, 3 ph line to line lower voltage  | 230 V | 240 V |
| Setting of circuit breaker Q1.1                 | 500 A | 500 A |
| Setting of circuit breaker Q1.2                 | 290 A | 290 A |

Specifications of the Dual frequency option

|           |             |             |
|-----------|-------------|-------------|
| Frequency | 50 Hz/60 Hz | 50 Hz/60 Hz |
|-----------|-------------|-------------|

## 8.3 Technical specifications of the QAS250 Volvo unit

### 8.3.1 Readings on gauges

| <i>Gauge</i>                          | <i>Reading</i>               | <i>Unit</i>    |
|---------------------------------------|------------------------------|----------------|
| Ammeter L1-3 (P1-3)                   | Below max. rating            | A              |
| Voltmeter (P4)                        | Depends upon selector switch | 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 gauge (P7)                 | Above 0                      | fuel tank full |
| Engine coolant temperature gauge (P8) | Below max. rating            | °C             |
| Engine oil pressure gauge (P9)        | Below max. rating            | bar            |

### 8.3.2 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       | 103 °C              |

### 8.3.3 Specifications of the engine/alternator/unit

|                                     |  | <i>50 Hz</i>     | <i>60 Hz 6)</i>  |
|-------------------------------------|--|------------------|------------------|
| <i>Reference values 1) 4)</i>       | Rated frequency  | 50 Hz            | 60 Hz            |
|                                     | Rated speed  | 1500 rpm         | 1800 rpm         |
|                                     | Generator service duty   | prime            | prime            |
|                                     | 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           |
|                                     | Relative air humidity maximum  | < 100 %          | < 100 %          |
|                                     | Minimum starting temperature unaided   | -18 °C           | -18 °C           |
|                                     | Minimum starting temperature with heater   | -25 °C           | -25 °C           |
| <i>Performance data 2) 3) 4) 5)</i> | Rated active power (PRP) 3 phase   | 200 kW           | 209.8 kW         |
|                                     | Rated power factor (lagging) 3 phase   | 0.8              | 0.8              |
|                                     | Rated apparent power (PRP) 3 phase   | 250 kVA          | 262 kVA          |
|                                     | Rated voltage 3 phase line to line   | 400 V            | 480 V            |
|                                     | Rated voltage 3 phase line to line lower voltage                                       | 230 V            | 240 V            |
|                                     | Rated current 3 phase  | 360.8 A          | 315.1 A          |
|                                     | Rated current 3 phase lower voltage  | 627.6 A          | 630.3 A          |
|                                     | Performance class (acc. to ISO 8528-5:1993)  | G2               | G2               |
|                                     | Single step load acceptance (0-PRP)  | 60 %             | 80 %             |
|                                     | Frequency droop  | isochronous      | isochronous      |
|                                     | Fuel consumption at full load (PRP)  | 43.2 kg/h        | 46.8 kg/h        |
|                                     | Specific fuel consumption at full load (PRP)   | 0.216 kg/kWh     | 0.223 kg/kWh     |
|                                     | Fuel autonomy at full load (PRP)   | 10.6 h           | 9.7 h            |
|                                     | Max. oil consumption at full load (PRP)  | 0.04 l/h         | 0.05 l/h         |
|                                     | Max. sound power level (LWA @ 75 % PRP load) measured according to REF 2000/14/EC OND: | 98 dB(A)         | -                |
|                                     | Fuel tank capacity   | 530 l            | 530 l            |
|                                     | Single step load capability (0-PRP)  | 90 %             | 100 %            |
| <i>Application data</i>             | Mode of operation  | prime            | prime            |
|                                     | Site   | land use         | land use         |
|                                     | Operation  | single/parallel  | single/parallel  |
|                                     | Start-up and control mode  | manual/automatic | manual/automatic |
|                                     | Start-up time  | unspecified      | unspecified      |
|                                     | Mobility/Config. acc. to ISO 8528-1:1993   | transportable/D  | transportable/D  |
|                                     | Mounting   | fully resilient  | fully resilient  |
|                                     | Climatic exposure  | open air         | open air         |
|                                     | Degree of protection (cubicle)   | IP54             | IP54             |
|                                     | Status of neutral  | earthed          | earthed          |

|                       |   |                                       |                             |
|-----------------------|---|---------------------------------------|-----------------------------|
| <i>Alternator</i>     | Standard                                    | IEC 34-1<br>ISO 8528-3                | IEC 34-1<br>ISO 8528-3      |
|                       | Make  | MECC-ALTE                             | MECC-ALTE                   |
|                       | Model                                       | ECO 38 1L/4                           | ECO 38 1L/4                 |
|                       | Rated output, class H temp. rise            | 250 kVA                               | 300 kVA                     |
|                       | Degree of protection                        | IP21                                  | IP21                        |
|                       | Insulation class stator                     | H                                     | H                           |
|                       | Insulation class rotor                      | H                                     | H                           |
|                       | Number of wires                             | 12                                    | 12                          |
| <i>Engine</i>         | Standard                                    | ISO 3046<br>ISO 8528-2                | ISO 3046<br>ISO 8528-2      |
|                       | Type VOLVO                                  | TAD740GE                              | TAD740GE                    |
|                       | Rated net output                            | 220 kW                                | 228 kW                      |
|                       | Rating type acc. ISO 3046-7                 | ICXN                                  | ICXN                        |
|                       | Production tolerance                        | 0 to +2%                              | 0 to +2%                    |
|                       | Coolant                                     | water                                 | water                       |
|                       | Combustion system                           | direct injection                      | direct injection            |
|                       | Aspiration                                  | turbocharged<br>intercooled           | turbocharged<br>intercooled |
|                       | Number of cylinders                         | 6                                     | 6                           |
|                       | Swept volume                                | 7.28 l                                | 7.28 l                      |
|                       | Speed governing                             | electronic                            | electronic                  |
|                       | Capacity of oil sump                        | 24 l                                  | 24 l                        |
|                       | Capacity of cooling system                  | 21 l                                  | 21 l                        |
|                       | Electrical system                           | 24 Vdc                                | 24 Vdc                      |
| <i>Power circuit</i>  | <i>Circuit-breaker, 3ph.</i>                |                                       |                             |
|                       | Number of poles                             | 4                                     | 4                           |
|                       | Thermal release It                          | 360 A                                 | 360 A                       |
|                       | Magnetic release Im                         | 3..10xIn                              | 3..10xIn                    |
|                       | <i>Circuit-breaker, 3ph., lower voltage</i> |                                       |                             |
|                       | Number of poles (optional)                  | 3                                     | 4                           |
|                       | Thermal release It                          | 625 A                                 | 625 A                       |
|                       | Magnetic release Im                         | 3..10xIn                              | 3..10xIn                    |
|                       | Residual current release IDn                | 0.025-25 A                            | 0.025-25 A                  |
|                       |   |                                       |                             |
| <i>Outlet sockets</i> | <i>(optional)</i>                           | domestic (1x)<br>2p + E<br>16 A/230 V |                             |
|                       |   |                                       |                             |
|                       |   |                                       |                             |

## 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.
- 6) 60 Hz is only for Dual frequency option.

### Derating

(in %, 100% is declared PRP at "Performance Data")

| Height(m) | Temperature<br>(°C) |     |     |     |    |    |
|-----------|---------------------|-----|-----|-----|----|----|
|           | 25                  | 30  | 35  | 40  | 45 | 50 |
| 1000      | 100                 | 100 | 100 | 100 | 96 | 93 |
| 1500      | 96                  | 96  | 96  | 96  | 92 | 89 |
| 2000      | 92                  | 92  | 91  | 91  | 87 | 83 |
| 2500      | 88                  | 88  | 85  | 85  | 81 | 78 |
| 3000      | 84                  | 84  | 84  | 84  | 81 | 78 |
| 3500      | 78                  | 78  | 78  | 78  | 74 | 71 |
| 4000      | 72                  | 72  | 72  | 72  | 71 | 69 |

|             |                        |                       |
|-------------|------------------------|-----------------------|
| <i>Unit</i> | Dimensions (L x W x H) | 3955 x 1430 x 2130 mm |
|             | Weight net mass        | 3450 kg               |
|             | Weight wet mass        | 3860 kg               |

## 8.3.4 Specifications of the options

### Specifications of the Sockets option

|                               | 50 Hz | 60 Hz |
|-------------------------------|-------|-------|
| Setting of circuit breaker Q2 | 16 A  | 16 A  |

### Specifications of the Dual voltage option

|   |       |       |
|---|-------|-------|
| Rated voltage, 3 ph line to line higher voltage | 400 V | 480 V |
| Rated voltage, 3 ph line to line lower voltage  | 230 V | 240 V |
| Setting of circuit breaker Q1.1                 | 625 A | 625 A |
| Setting of circuit breaker Q1.2                 | 360 A | 360 A |

### Specifications of the Dual frequency option

|           |             |             |
|-----------|-------------|-------------|
| Frequency | 50 Hz/60 Hz | 50 Hz/60 Hz |
|-----------|-------------|-------------|

## 8.4 Technical specifications of the QAS300 Volvo unit

### 8.4.1 Readings on gauges

| <i>Gauge</i>                          | <i>Reading</i>               | <i>Unit</i>    |
|---------------------------------------|------------------------------|----------------|
| Ammeter L1-3 (P1-3)                   | Below max. rating            | A              |
| Voltmeter (P4)                        | Depends upon selector switch | 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 gauge (P7)                 | Above 0                      | fuel tank full |
| Engine coolant temperature gauge (P8) | Below max. rating            | °C             |
| Engine oil pressure gauge (P9)        | Below max. rating            | bar            |

### 8.4.2 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       | 103 °C              |

### 8.4.3 Specifications of the engine/alternator/unit

|                                     |  | <i>50 Hz</i>     | <i>60 Hz 6)</i>  |
|-------------------------------------|--|------------------|------------------|
| <i>Reference values 1) 4)</i>       | Rated frequency  | 50 Hz            | 60 Hz            |
|                                     | Rated speed  | 1500 rpm         | 1800 rpm         |
|                                     | Generator service duty   | prime            | prime            |
|                                     | 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           |
|                                     | Relative air humidity maximum  | < 100 %          | < 100 %          |
|                                     | Minimum starting temperature unaided   | -18 °C           | -18 °C           |
|                                     | Minimum starting temperature with heater   | -25 °C           | -25 °C           |
| <i>Performance data 2) 3) 4) 5)</i> | Rated active power (PRP) 3 phase   | 240 kW           | 239.2 kW         |
|                                     | Rated power factor (lagging) 3 phase   | 0.8              | 0.8              |
|                                     | Rated apparent power (PRP) 3 phase   | 300 kVA          | 299 kVA          |
|                                     | Rated voltage 3 phase line to line   | 400 V            | 480 V            |
|                                     | Rated voltage 3 phase line to line lower voltage                                       | 230 V            | 240 V            |
|                                     | Rated current 3 phase  | 433 A            | 359.6 A          |
|                                     | Rated current 3 phase lower voltage  | 753.1 A          | 719.3 A          |
|                                     | Performance class (acc. to ISO 8528-5:1993)  | G2               | G2               |
|                                     | Single step load acceptance (0-PRP)  | 65 %             | 85 %             |
|                                     | Frequency droop  | isochronous      | isochronous      |
|                                     | Fuel consumption at full load (PRP)  | 51.8 kg/h        | 53.8 kg/h        |
|                                     | Specific fuel consumption at full load (PRP)   | 0.212 kg/kWh     | 0.222 kg/kWh     |
|                                     | Fuel autonomy at full load (PRP)   | 8.8 h            | 8.5 h            |
|                                     | Max. oil consumption at full load (PRP)  | 0.04 l/h         | 0.04 l/h         |
|                                     | Max. sound power level (LWA @ 75 % PRP load) measured according to REF 2000/14/EC OND: | 98 dB(A)         | -                |
|                                     | Fuel tank capacity   | 530 l            | 530 l            |
|                                     | Single step load capability (0-PRP)  | 94 %             | 100 %            |
| <i>Application data</i>             | Mode of operation  | prime            | prime            |
|                                     | Site   | land use         | land use         |
|                                     | Operation  | single/parallel  | single/parallel  |
|                                     | Start-up and control mode  | manual/automatic | manual/automatic |
|                                     | Start-up time  | unspecified      | unspecified      |
|                                     | Mobility/Config. acc. to ISO 8528-1:1993   | transportable/D  | transportable/D  |
|                                     | Mounting   | fully resilient  | fully resilient  |
|                                     | Climatic exposure  | open air         | open air         |
|                                     | Degree of protection (cubicle)   | IP54             | IP54             |
|                                     | Status of neutral  | earthed          | earthed          |

|                       |   |                                       |                             |
|-----------------------|---|---------------------------------------|-----------------------------|
| <i>Alternator</i>     | Standard                                    | IEC 34-1<br>ISO 8528-3                | IEC 34-1<br>ISO 8528-3      |
|                       | Make  | MECC-ALTE                             | MECC-ALTE                   |
|                       | Model                                       | ECO 38 2L/4                           | ECO 38 2L/4                 |
|                       | Rated output, class H temp. rise            | 300 kVA                               | 360 kVA                     |
|                       | Degree of protection                        | IP21                                  | IP21                        |
|                       | Insulation class stator                     | H                                     | H                           |
|                       | Insulation class rotor                      | H                                     | H                           |
|                       | Number of wires                             | 12                                    | 12                          |
| <i>Engine</i>         | Standard                                    | ISO 3046<br>ISO 8528-2                | ISO 3046<br>ISO 8528-2      |
|                       | Type VOLVO                                  | TAD1032GE                             | TAD1032GE                   |
|                       | Rated net output                            | 266 kW                                | 262 kW                      |
|                       | Rating type acc. ISO 3046-7                 | ICXN                                  | ICXN                        |
|                       | Production tolerance                        | 0 to +2%                              | 0 to +2%                    |
|                       | Coolant                                     | water                                 | water                       |
|                       | Combustion system                           | direct injection                      | direct injection            |
|                       | Aspiration                                  | turbocharged<br>intercooled           | turbocharged<br>intercooled |
|                       | Number of cylinders                         | 6                                     | 6                           |
|                       | Swept volume                                | 9.6 l                                 | 9.6 l                       |
|                       | Speed governing                             | electronic                            | electronic                  |
|                       | Capacity of oil sump                        | 32 l                                  | 32 l                        |
|                       | Capacity of cooling system                  | 21 l                                  | 21 l                        |
|                       | Electrical system                           | 24 Vdc                                | 24 Vdc                      |
| <i>Power circuit</i>  | <i>Circuit-breaker, 3ph.</i>                |                                       |                             |
|                       | Number of poles                             | 4                                     | 4                           |
|                       | Thermal release It                          | 430 A                                 | 430 A                       |
|                       | Magnetic release Im                         | 3..10xIn                              | 3..10xIn                    |
|                       | <i>Circuit-breaker, 3ph., lower voltage</i> |                                       |                             |
|                       | Number of poles (optional)                  | 3                                     | 4                           |
|                       | Thermal release It                          | 750 A                                 | 750 A                       |
|                       | Magnetic release Im                         | 3..10xIn                              | 3..10xIn                    |
|                       | Residual current release IDn                | 0.025-25 A                            | 0.025-25 A                  |
|                       |   |                                       |                             |
| <i>Outlet sockets</i> | <i>(optional)</i>                           | domestic (1x)<br>2p + E<br>16 A/230 V |                             |

## 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.
- 6) 60 Hz is only for Dual frequency option.

Derating

(in %, 100% is declared PRP at "Performance Data")

| Height(m) | Temperature<br>(°C) |     |     |     |    |    |
|-----------|---------------------|-----|-----|-----|----|----|
|           | 25                  | 30  | 35  | 40  | 45 | 50 |
| 1000      | 100                 | 100 | 100 | 100 | 96 | 93 |
| 1500      | 96                  | 96  | 96  | 96  | 92 | 89 |
| 2000      | 92                  | 92  | 91  | 91  | 87 | 83 |
| 2500      | 88                  | 88  | 85  | 85  | 81 | 78 |
| 3000      | 84                  | 84  | 84  | 84  | 81 | 78 |
| 3500      | 78                  | 78  | 78  | 78  | 74 | 71 |
| 4000      | 72                  | 72  | 72  | 72  | 71 | 69 |

|      |                        |                       |
|------|------------------------|-----------------------|
| Unit | Dimensions (L x W x H) | 3955 x 1430 x 2130 mm |
|      | Weight net mass        | 3850 kg               |
|      | Weight wet mass        | 4240 kg               |

8.4.4 Specifications of the options

Specifications of the Sockets option

|                               |       |       |
|-------------------------------|-------|-------|
|                               | 50 Hz | 60 Hz |
| Setting of circuit breaker Q2 | 16 A  | 16 A  |

Specifications of the Dual voltage option

|   |       |       |
|---|-------|-------|
| Rated voltage, 3 ph line to line higher voltage | 400 V | 480 V |
| Rated voltage, 3 ph line to line lower voltage  | 230 V | 240 V |
| Setting of circuit breaker Q1.1                 | 745 A | 745 A |
| Setting of circuit breaker Q1.2                 | 430 A | 430 A |

Specifications of the Dual frequency option

|           |             |             |
|-----------|-------------|-------------|
| Frequency | 50 Hz/60 Hz | 50 Hz/60 Hz |
|-----------|-------------|-------------|



8.5 Conversion list of SI units into British units

|        |   |                      |          |   |                  |
|--------|---|----------------------|----------|---|------------------|
| 1 bar  | = | 14.504 psi           | 1 m      | = | 3.281 ft         |
| 1 g    | = | 0.035 oz             | 1 mm     | = | 0.039 in         |
| 1 kg   | = | 2.205 lb             | 1 m³/min | = | 35.315 cfm       |
| 1 km/h | = | 0.621 mile/h         | 1 mbar   | = | 0.401 in wc      |
| 1 kW   | = | 1.341 hp (UK and US) | 1 N      | = | 0.225 lbf        |
| 1 l    | = | 0.264 US gal         | 1 Nm     | = | 0.738 lbf.ft     |
| 1 l    | = | 0.220 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.

8.6 Dataplate

1

2

3

ATLAS COPCO AIRPOWER n.v.

\*\*\*

YA3-\*\*\*\*\*-\*\*\*\*\*

\*\*\*\* kg

\*\*\*\* kg

\*\*\*\* kg

A

B

C

Model/Modell/Modèle

\*\*\*\*\*

f<sub>N</sub> LTP \* Hz \*\*

P<sub>N</sub> LTP \* kVA \*\*\*

P<sub>N</sub> \* kW \*\*\*

U<sub>N</sub> \* V \*\*\*

I<sub>N</sub> \* A \*\*\*

cos phi \*\*

Manuf. year/Baujahr/Année de fabrication \*\*\*\*

MADE BY ATLAS COPCO AIRPOWER n.v. WILRIJK, BELGIUM

CE

15 16 17

15 6945 00

Atlas Copco

A

B

C

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

Maximum permitted loaded weight of the vehicle

Maximum permitted road weight of the front axle

Maximum permitted road weight of the rear axle

Company code

Product code

Unit serial number

Name of the manufacturer

EEC or national type approval number

Vehicle identification number

Model number

Frequency

Continuous apparant power

Continuous active power

Nominal rated voltage

Nominal rated current

Power factor

Manufacturing year

EEC mark in accordance witt Machine Directive 89/392E

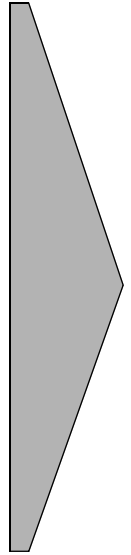
Mode of operation

Winding connections



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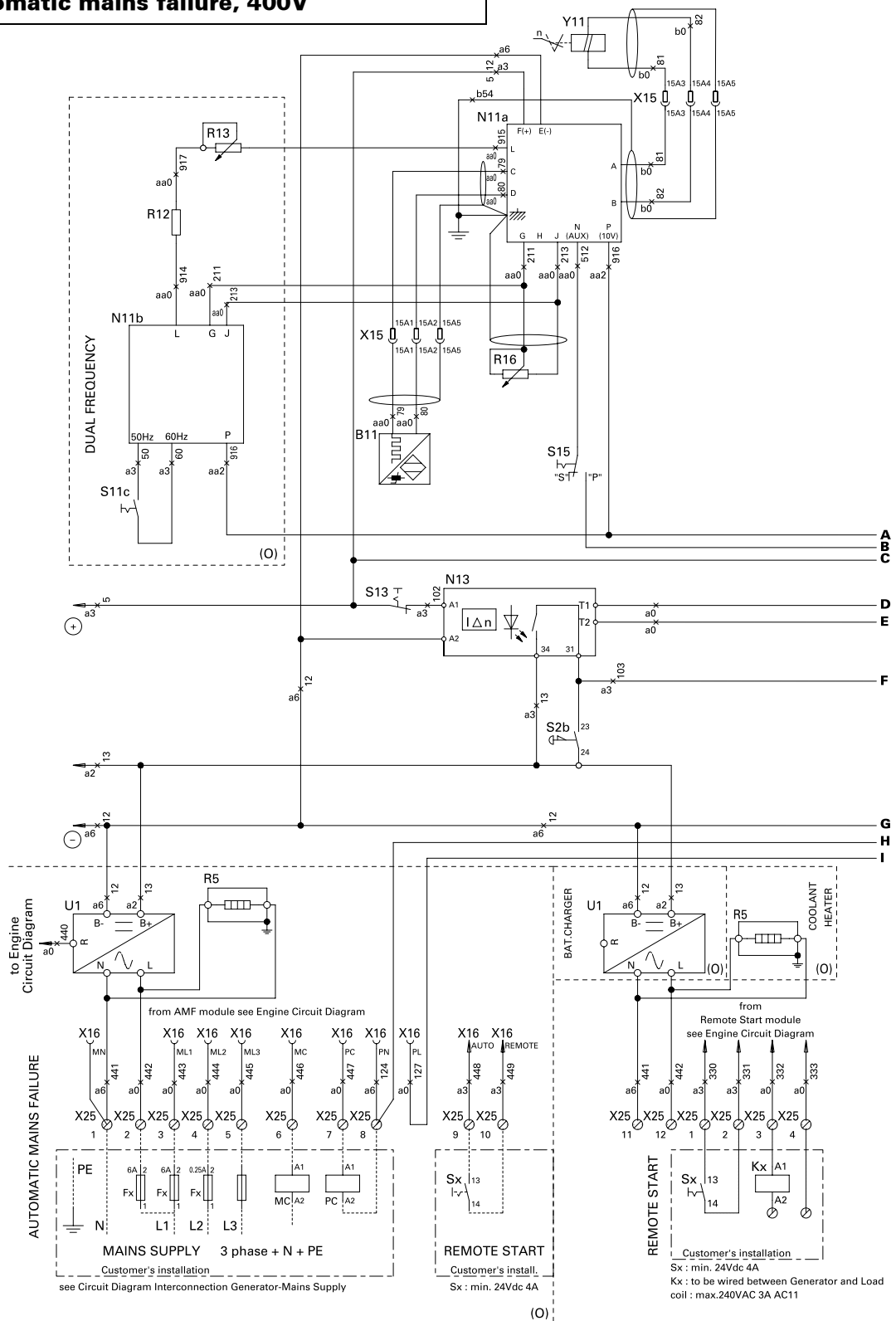
**Circuit diagrams**



## CIRCUIT DIAGRAM

**9822 0889 51/04**

**Applicable for QAS150-200-250-300 Volvo - Power Circuit,  
Remote start & Automatic mains failure, 400V**

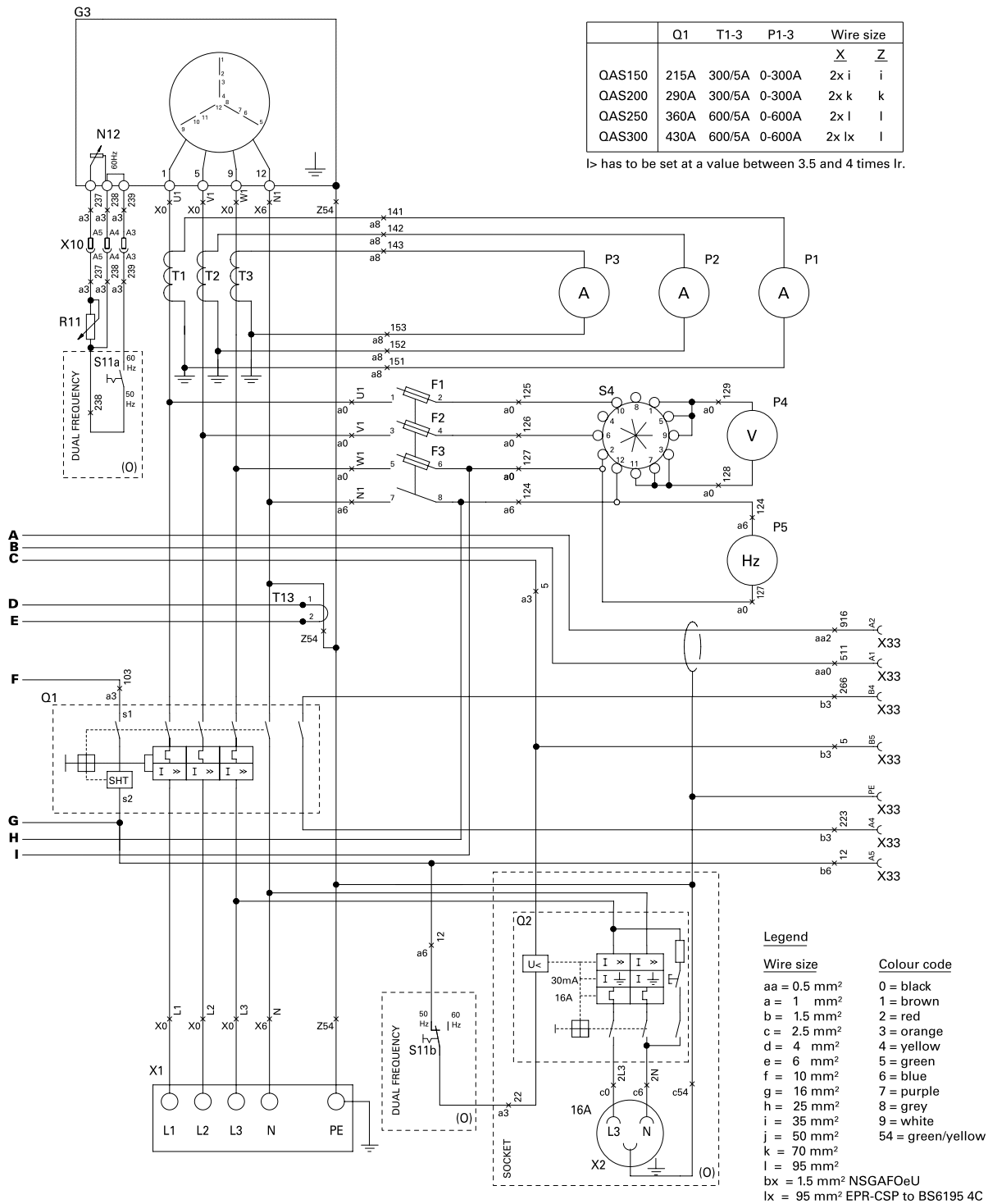


B11 Magnetic speed pick up  
F1-3 Fuse 4 A  
G3 Alternator  
N11a Engine speed controller  
N11b Dual frequency controller

N12 Automatic voltage regulator  
N13 Earth fault-current relay  
P1-3 Amperemeter  
P4 Voltmeter 0-500V  
P5 Frequency meter 45-65 Hz

Q1 Main circuit breaker  
Q2 Circuit breaker  
R5 Coolant heater  
R11 Voltage adjustment potentiometer  
R12 Resistor for dual frequency (fixed)

# CIRCUIT DIAGRAM

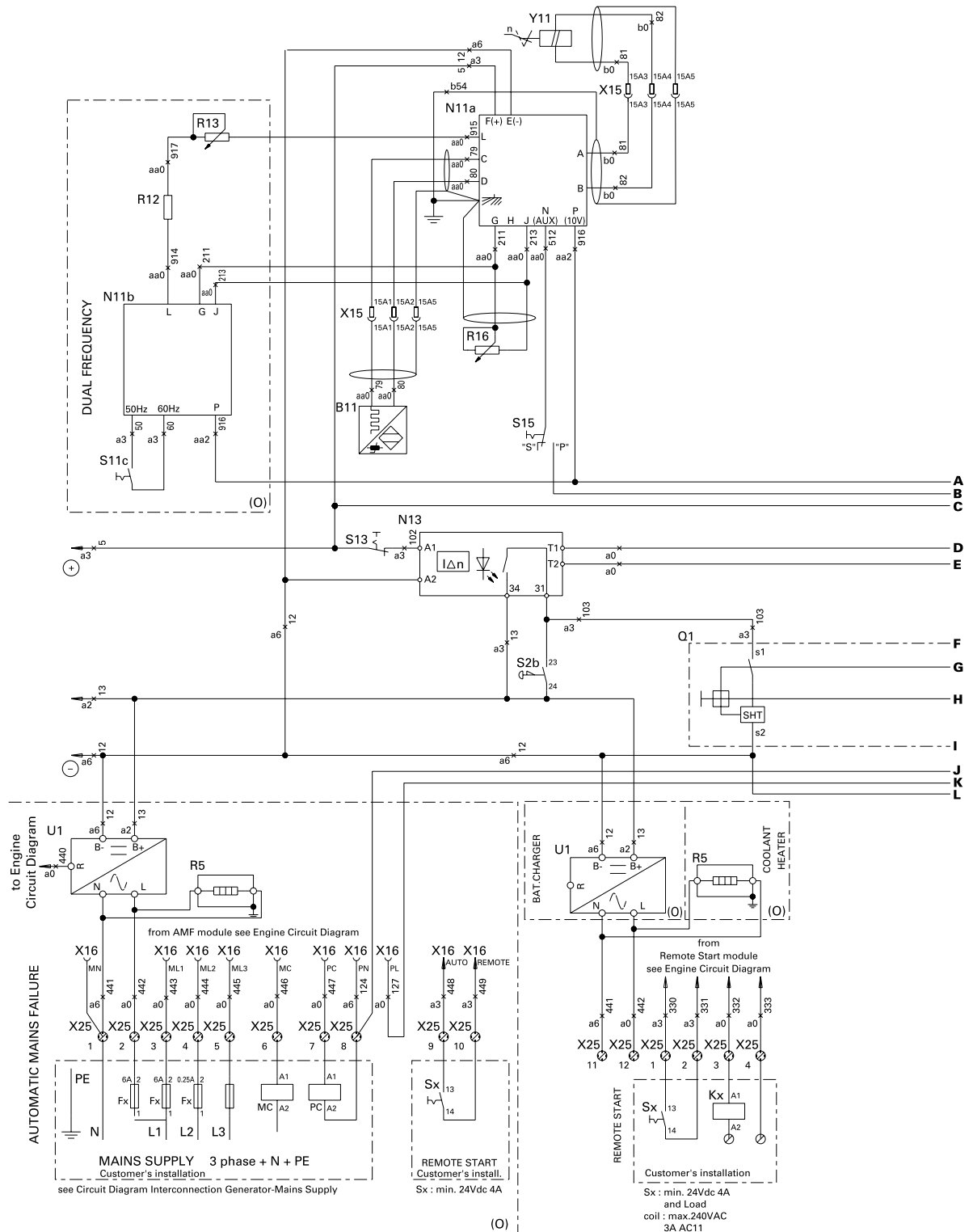


|             |   |          |                                    |     |  |
|-------------|---|----------|------------------------------------|-----|--|
| R13         | Resistor for dual frequency (variable)) | T1-3     | Current transformer                | X33 | Par. connector to control cub. (SAPE)                                |
| R16         | Engine speed adjustment potmeter        | T13      | Toroid transformer for earth relay | Y11 | Actuator   |
| S2b         | Emergency stop (S2a: see Engine Circ)   | U1       | Static battery conditioner         | Sx  | Remote Start/Stop  |
| S4          | Voltmeter change-over switch            | X1       | Terminal board                     | Kx  | Contactor generator ready (by voltage free contact, 15 sec. delayed) |
| S11 a, b, c | Selector switch 50 Hz / 60 Hz           | X2       | Outlet socket                      |     |  |
| S13         | Earth fault relay lock-out switch       | X10, X15 | 15-pole connector                  |     |  |
| S15         | Toggle switch single/parallel           | X25      | Terminal strip                     |     |  |

# CIRCUIT DIAGRAM

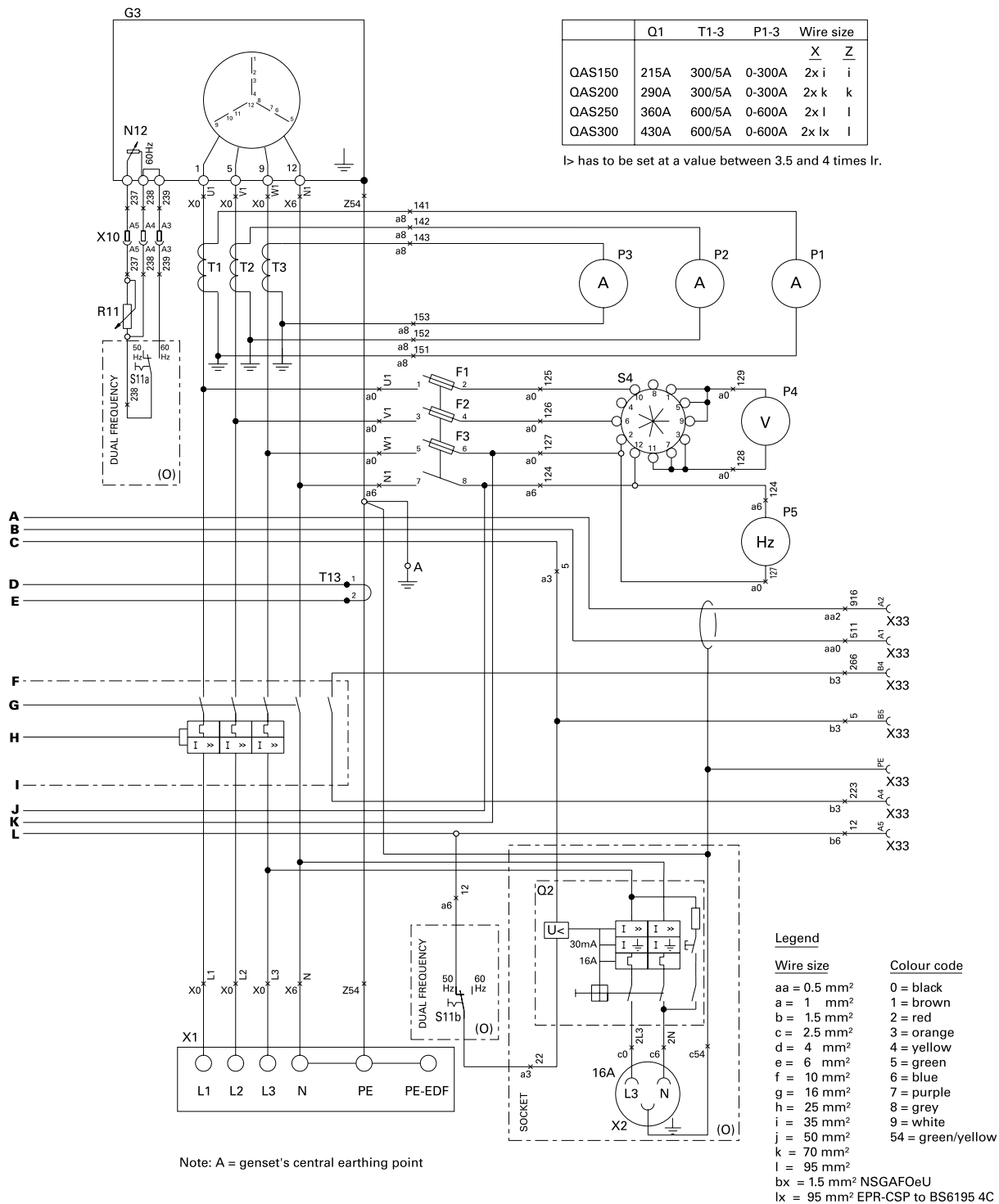
9822 0889 53/03

Applicable for QAS150-200-250-300 Volvo - Electricité de France



|      |                         |      |                             |    |                        |
|------|-------------------------|------|-----------------------------|----|------------------------|
| B11  | Magnetic speed pick up  | N12  | Automatic voltage regulator | P5 | Frequencymeter 45-65Hz |
| F1-3 | Fuse 4 A                | N13  | Earth fault-current relay   | Q1 | Main circuit breaker   |
| G3   | Alternator              | P1-3 | Amperemeter                 | Q2 | Circuit breaker        |
| N11  | Engine speed controller | P4   | Voltmeter 0-500V            | R5 | Coolant heater         |

# CIRCUIT DIAGRAM

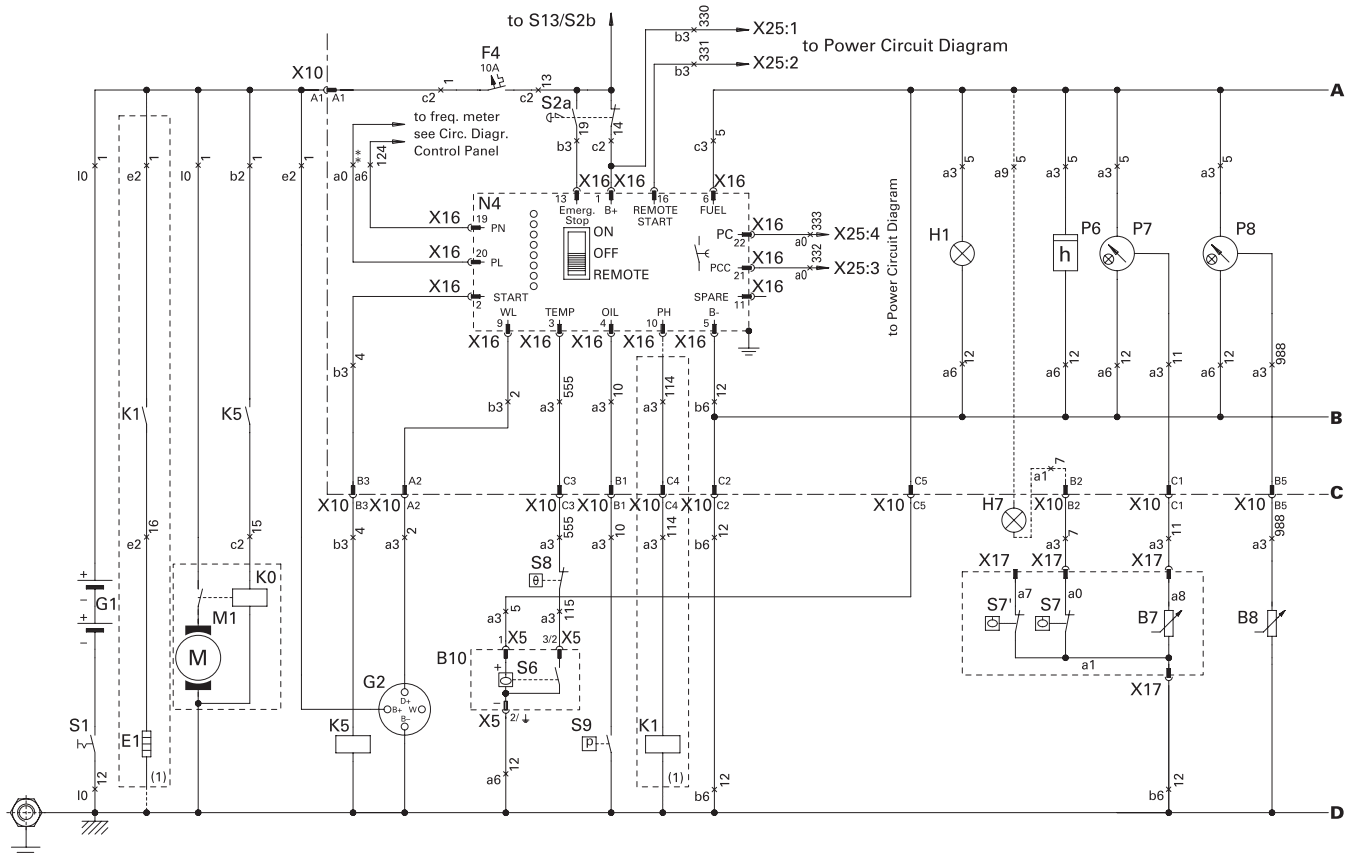


|             |  |          |                                    |     |  |
|-------------|--|----------|------------------------------------|-----|--|
| R11         | Voltage adjustment potentiometer       | S15      | Toggle switch single/parallel      | X33 | Par. connector to control cub. (SAPE)                                |
| R12         | Resistor for dual frequency (fixed)    | T1-3     | Current transformer                | Y11 | Actuator   |
| R13         | Resistor for dual frequency (variable) | T13      | Toroid transformer for earth relay | Sx  | Remote Start/Stop  |
| R16         | Engine speed adjustment potmeter       | U1       | Static battery conditioner         | Kx  | Contactor generator ready (by voltage free contact, 15 sec. delayed) |
| S2b         | Emergency stop (S2a: see Engine Circ)  | X1       | Terminal board                     |     |  |
| S4          | Voltmeter change-over switch           | X2       | Outlet socket                      |     |  |
| S11 a, b, c | Selector switch 50/60 Hz               | X10, X15 | 15-pole connector                  |     |  |
| S13         | Earth fault relay lock-out switch      | X25      | Terminal strip                     |     |  |

## CIRCUIT DIAGRAM

**9822 0889 58/04**

**Applicable for QAS150-200-250-300 Volvo - Remote Start**



**Note:**

\*\*: wire nr 110 for 115V

\*\*: wire nr 127 for 230V

(1): only for QAS 200,250 and 300

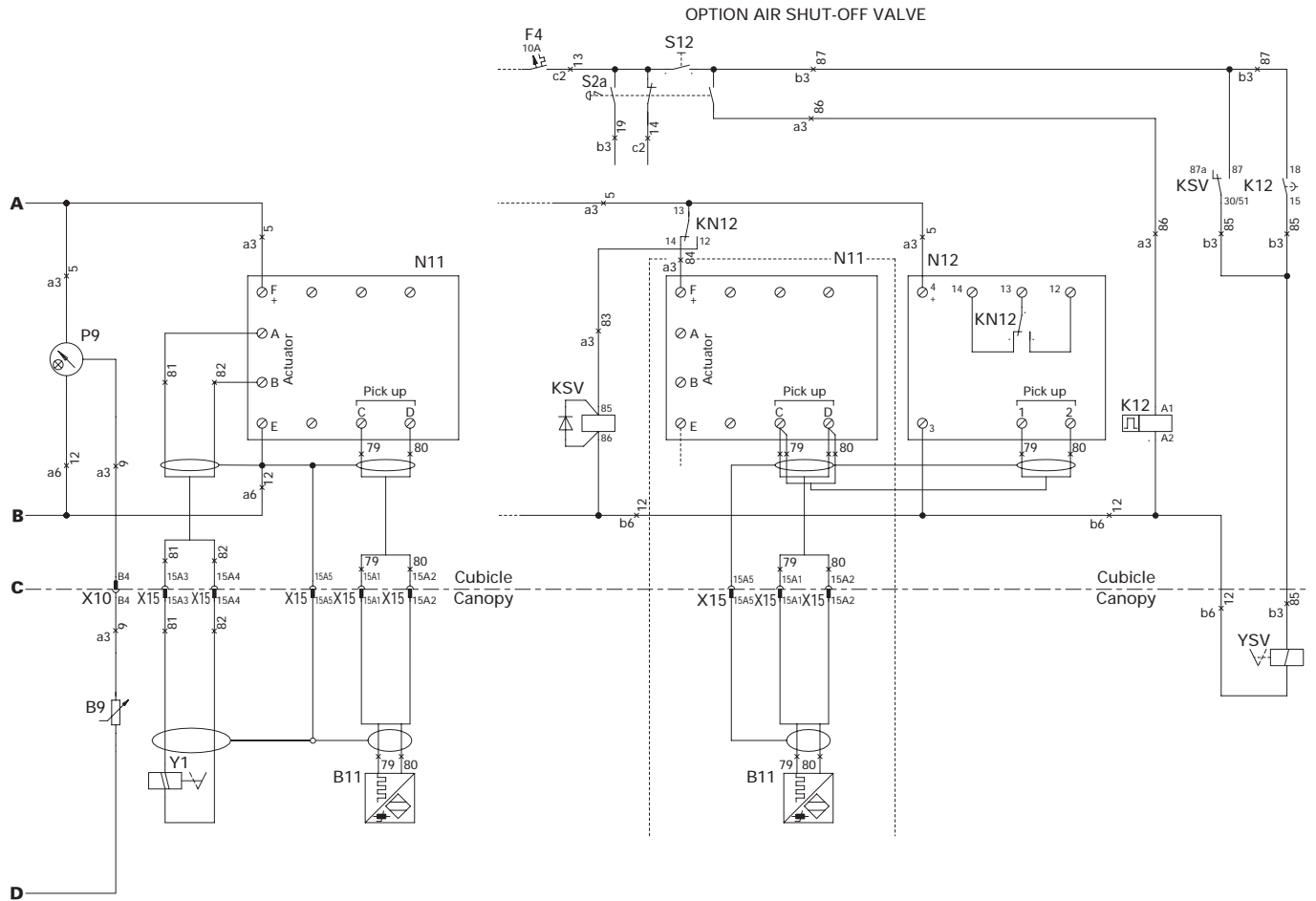
|     |                            |
|-----|----------------------------|
| B7  | Fuel level sensor          |
| B8  | Coolant temperature sensor |
| B9  | Oil pressure sensor        |
| B10 | Coolant level switch       |
| B11 | Speed pick up              |

|    |                     |
|----|---------------------|
| E1 | Preheat resistor    |
| F4 | Fuse                |
| G1 | Battery 24V         |
| G2 | Charging alternator |
| H1 | Panel light         |

|    |                                       |
|----|---------------------------------------|
| H7 | Indic. lamp low fuel level (optional) |
| K0 | Starter solenoid                      |
| K1 | Preheat relay                         |
| K5 | Starter relay                         |
| M1 | Starter motor                         |



# CIRCUIT DIAGRAM



## Legend

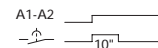
### Wire size

aa = 0.5 mm†  
a = 1 mm†  
b = 1.5 mm†  
c = 2.5 mm†  
d = 4 mm†  
e = 6 mm†  
f = 10 mm†  
g = 16 mm†  
h = 25 mm†  
i = 35 mm†  
j = 50 mm†  
k = 70 mm†  
l = 95 mm†  
bx = 1.5 mm† NSGAFOeU

### Colour code

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

## OPTION AIR SHUT-OFF VALVE

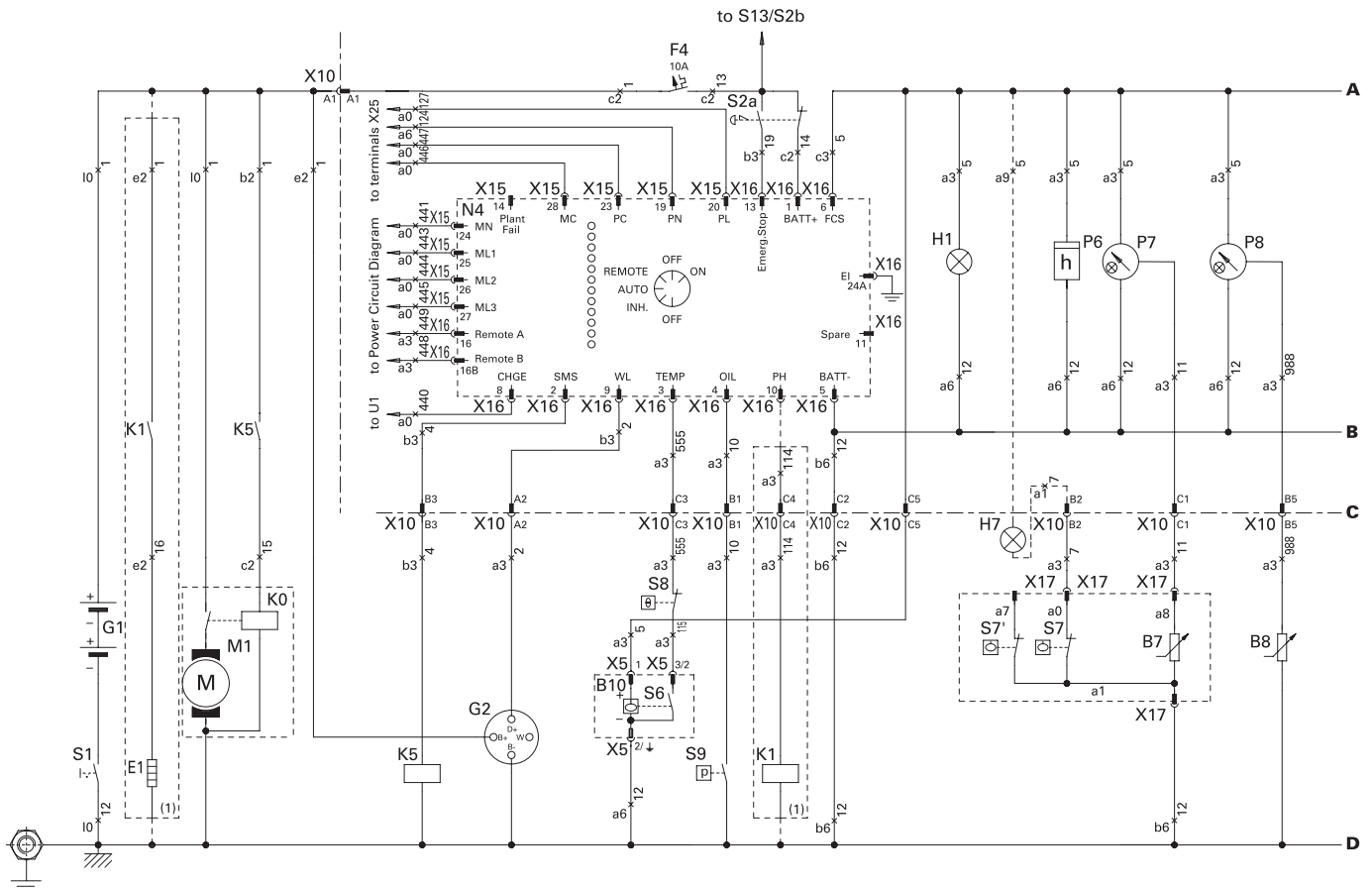


|     |                           |     |  |          |                                       |
|-----|---------------------------|-----|--|----------|---------------------------------------|
| N4  | Control module            | S1  | Battery switch                                 | S8       | Coolant high temperature switch       |
| N11 | Speed controller          | S2a | Emergency stop button (S2b: see Power Circuit) | S9       | Engine oil low pressure switch        |
| P6  | Hourmeter                 | S6  | Low coolant level switch                       | X10, X15 | 15-pole connector                     |
| P7  | Fuel level gauge          | S7  | Low fuel level switch                          | X16      | Module connector                      |
| P8  | Coolant temperature gauge | S7' | Low fuel level switch, warning                 | X17      | Fuel level unit connector             |
| P9  | Oil pressure gauge        |     |  | Y1       | (1) Fuel stop solenoid / (2) Actuator |

## CIRCUIT DIAGRAM

**9822 0889 59/03**

**Applicable for QAS150-200-250-300 Volvo - Automatic Mains Failure, 400V**

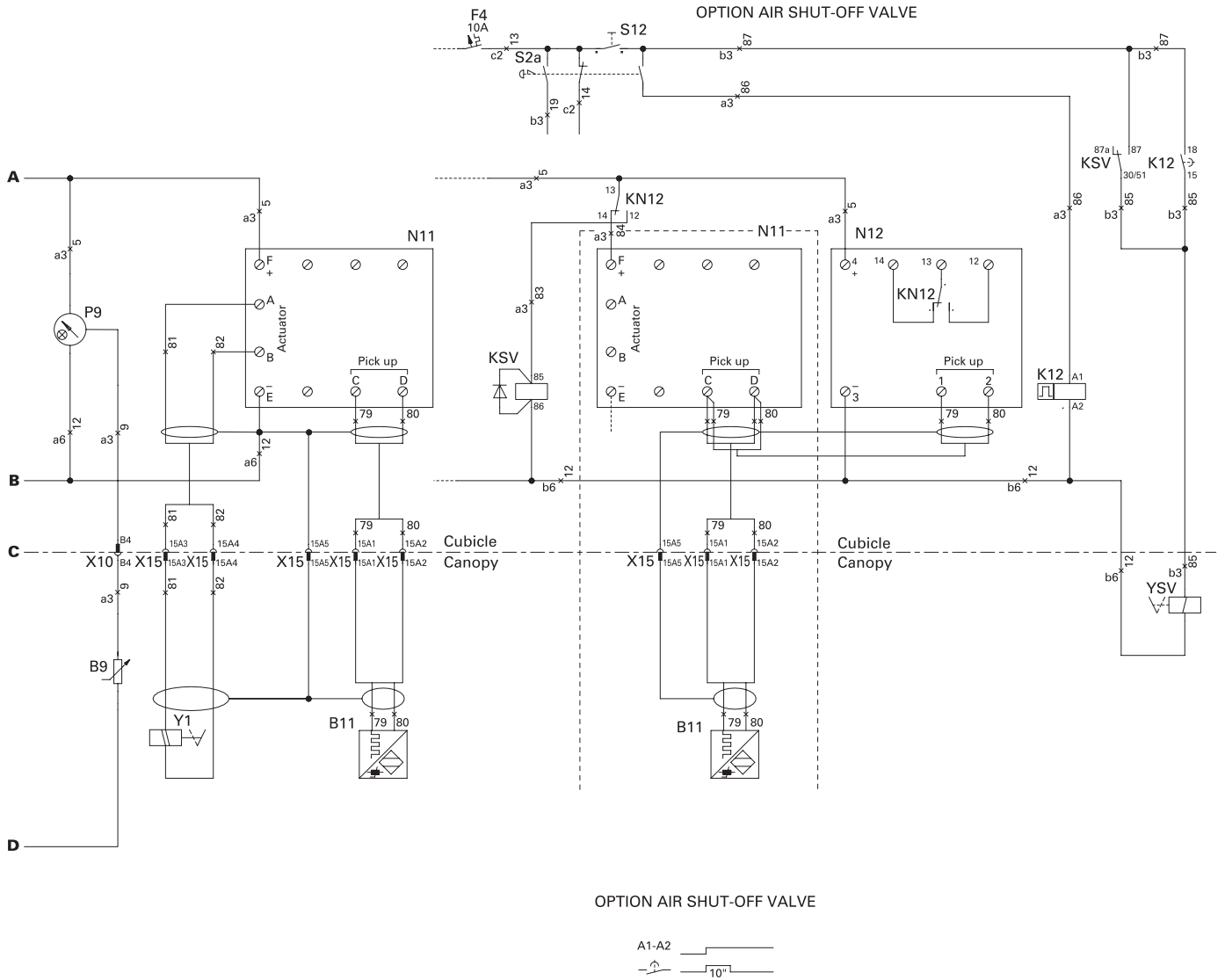


|     |                            |
|-----|----------------------------|
| B7  | Fuel level sensor          |
| B8  | Coolant temperature sensor |
| B9  | Oil pressure sensor        |
| B10 | Coolant level switch       |
| B11 | Speed pick up              |

|    |                     |
|----|---------------------|
| E1 | Preheat resistor    |
| F4 | Fuse                |
| G1 | Battery 24V         |
| G2 | Charging alternator |
| H1 | Panel light         |

|    |                                       |
|----|---------------------------------------|
| H7 | Indic. lamp low fuel level (optional) |
| K0 | Starter solenoid                      |
| K1 | Preheat relay                         |
| K5 | Starter relay                         |
| M1 | Starter motor                         |

# CIRCUIT DIAGRAM

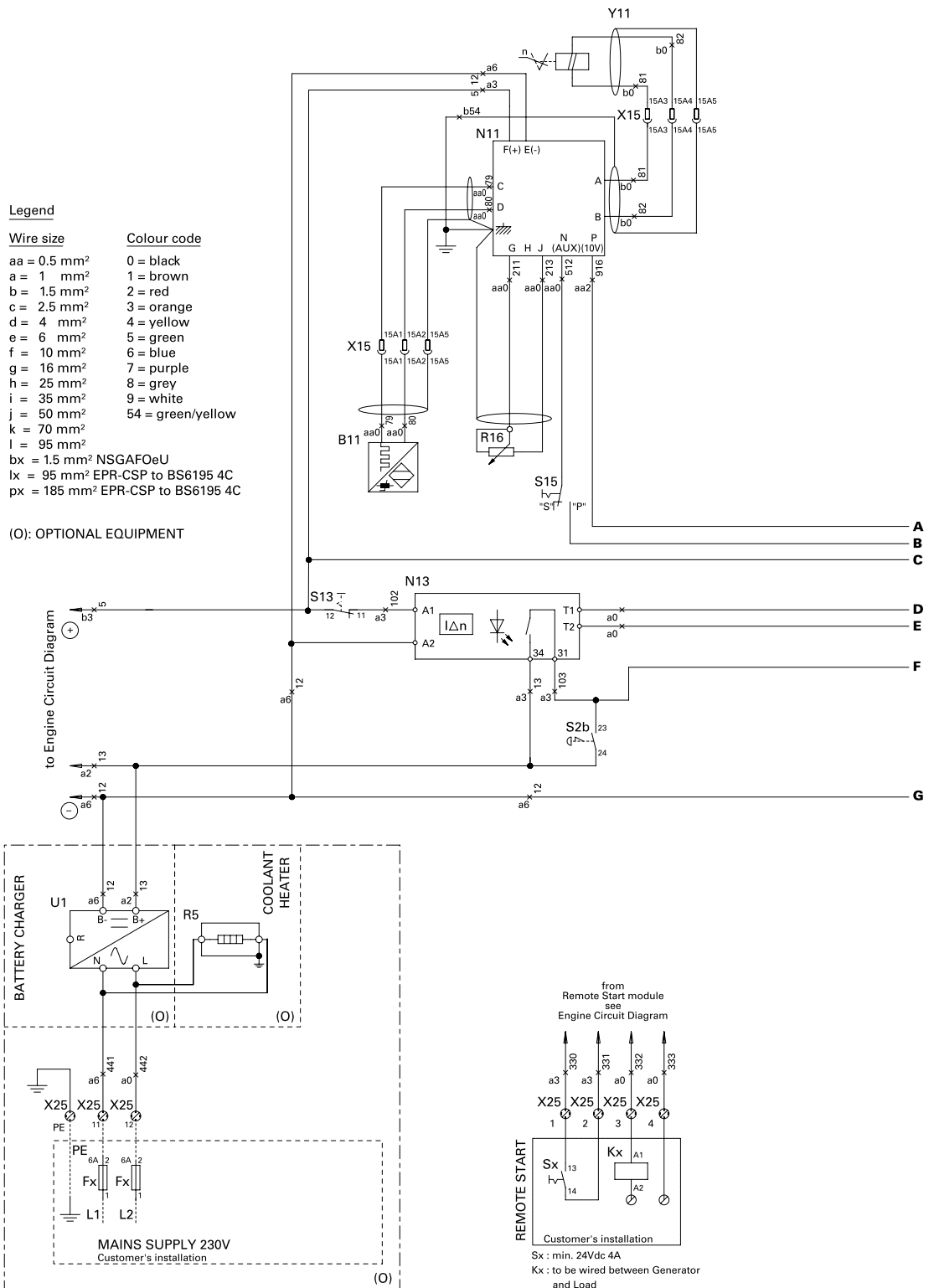


|     |                           |     |  |          |                                       |
|-----|---------------------------|-----|--|----------|---------------------------------------|
| N4  | Control module            | S1  | Battery switch                                 | S8       | Coolant high temperature switch       |
| N11 | Speed controller          | S2a | Emergency stop button (S2b: see Power Circuit) | S9       | Engine oil low pressure switch        |
| P6  | Hourmeter                 | S6  | Low coolant level switch                       | X10, X15 | 15-pole connector                     |
| P7  | Fuel level gauge          | S7  | Low fuel level switch                          | X16      | Module connector                      |
| P8  | Coolant temperature gauge | S7' | Low fuel level switch, warning                 | X17      | Fuel level unit connector             |
| P9  | Oil pressure gauge        |     |  | Y1       | (1) Fuel stop solenoid / (2) Actuator |

# CIRCUIT DIAGRAM

9822 0889 60/02

Applicable for QAS150-200-250-300 Volvo - Power Circuit, Remote Start, 230V

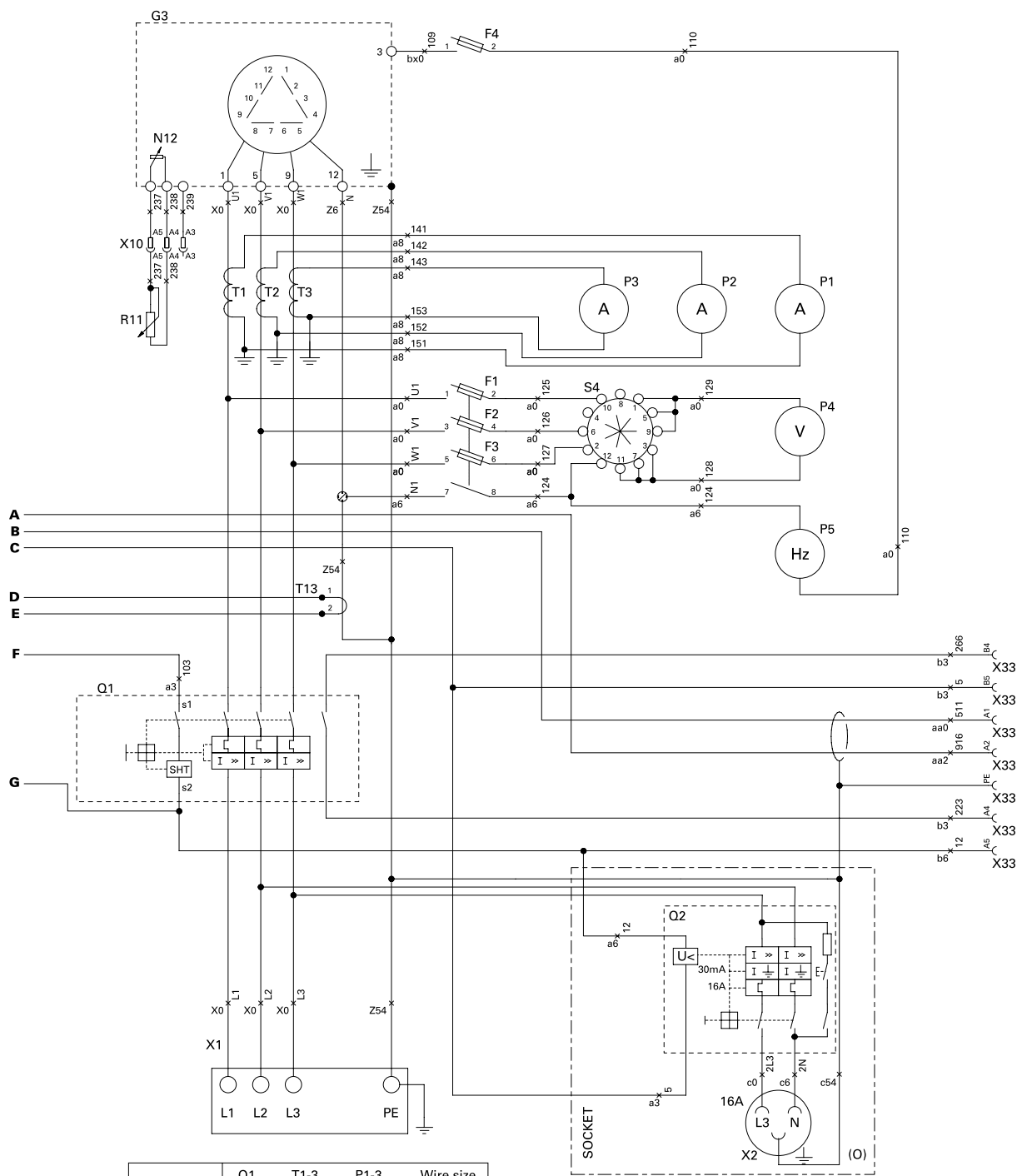


F1-4 Fuse 4 A  
G3 Alternator  
N12 Automatic voltage regulator

N13 Earth fault-current relay  
P1-3 Amperemeter  
P4 Voltmeter 0-500V

P5 Frequencymeter 45-65Hz  
Q1 Circuit breaker  
Q2 Circuit breaker

## CIRCUIT DIAGRAM



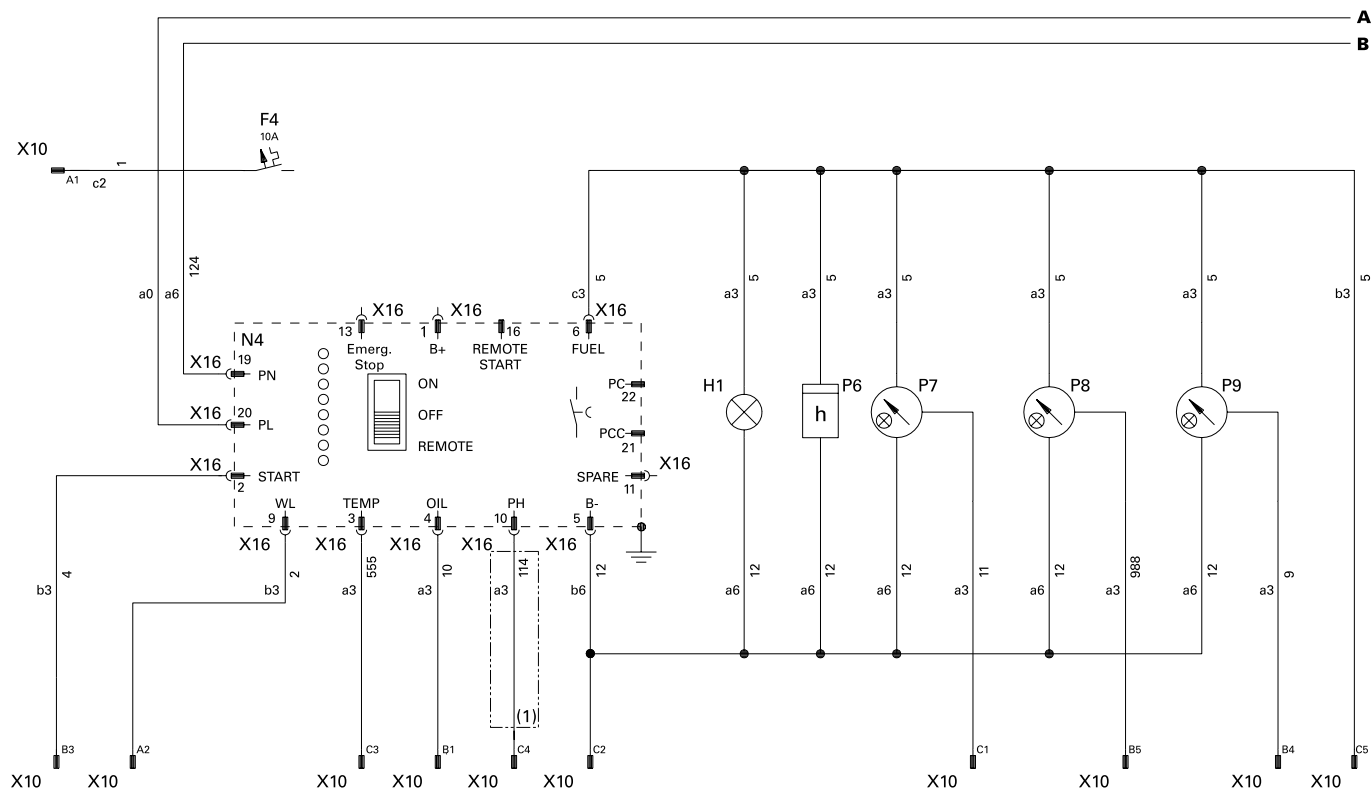
|           | Q1   | T1-3    | P1-3    | Wire size |          |
|-----------|------|---------|---------|-----------|----------|
|           |      |         |         | <u>X</u>  | <u>Z</u> |
| QAS150 LV | 375A | 600/5A  | 0-600A  | 2x l      | l        |
| QAS200 LV | 500A | 600/5A  | 0-600A  | 2x lx     | lx       |
| QAS250 LV | 625A | 600/5A  | 0-600A  | 2x lx     | lx       |
| QAS300 LV | 745A | 1000/5A | 0-1000A | 2x px     | px       |

$l$  has to be set at a value between 3.5 and 4 times  $l_r$ .

|      |                                       |     |                                    |     |  |
|------|---------------------------------------|-----|------------------------------------|-----|--|
| R5   | Coolant heater                        | T13 | Toroid transformer for earth relay | X25 | Terminal strip   |
| S2b  | Emergency stop (S2a: see Engine Circ) | U1  | Static battery charger             | X33 | Par. connector to control cub. (SAPE)                                |
| S4   | Voltmeter change-over switch          | X1  | Terminal board                     | Sx  | Remote Start/Stop  |
| S13  | Earth fault relay lock-out switch     | X2  | Outlet socket                      | Kx  | Contactor generator ready (by voltage free contact, 15 sec. delayed) |
| T1-3 | Current transformer                   | X15 | 10-pole connector                  |     |  |

## CIRCUIT DIAGRAM

**9822 0889 68/01**  
**Applicable for QAS150-200-250-300 Volvo - Remote Start**



### Legend

#### Wire size

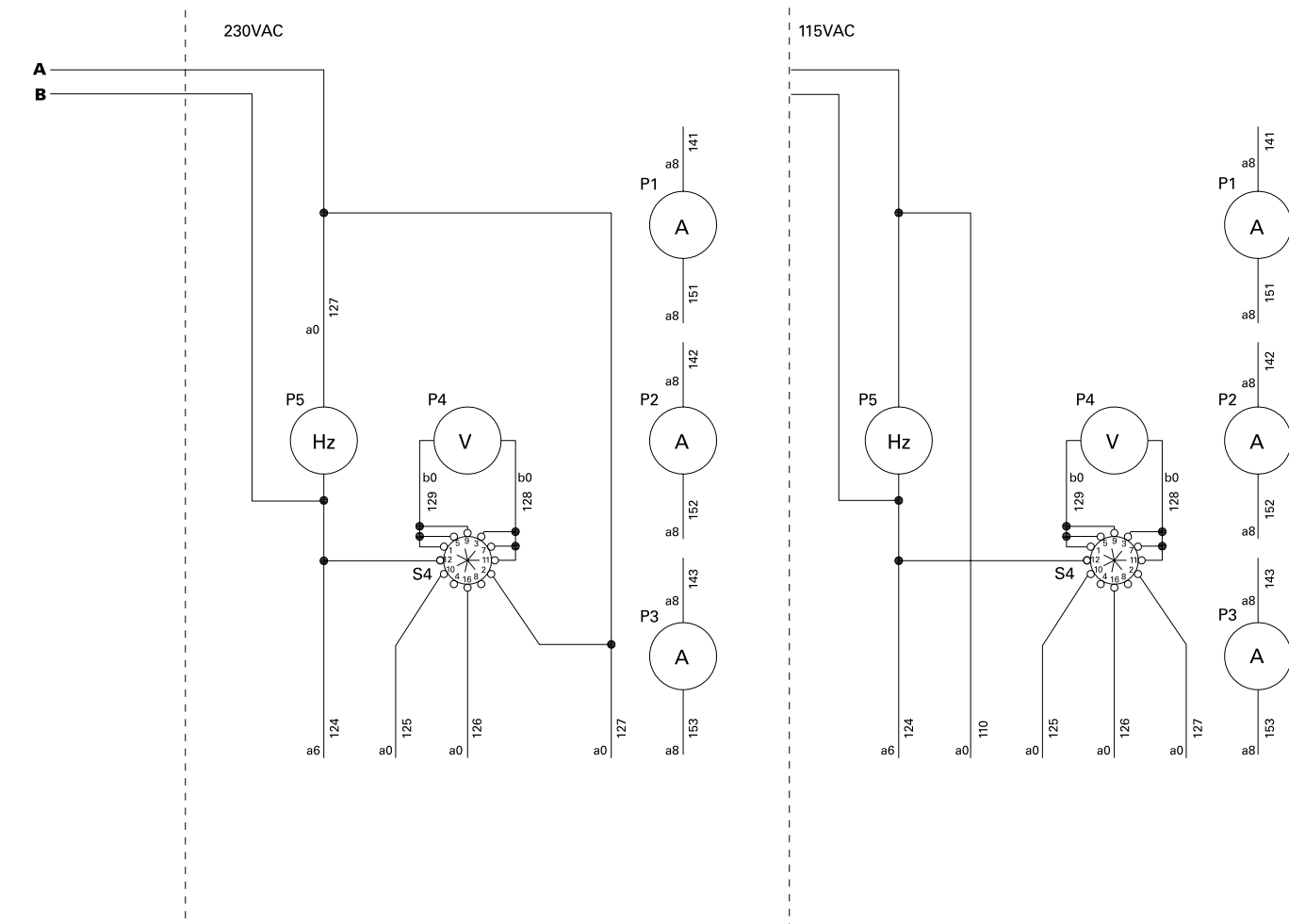
aa = 0.5 mm<sup>2</sup>  
a = 1 mm<sup>2</sup>  
b = 1.5 mm<sup>2</sup>  
c = 2.5 mm<sup>2</sup>  
d = 4 mm<sup>2</sup>  
e = 6 mm<sup>2</sup>  
f = 10 mm<sup>2</sup>  
g = 16 mm<sup>2</sup>  
h = 25 mm<sup>2</sup>  
i = 35 mm<sup>2</sup>  
j = 50 mm<sup>2</sup>  
k = 70 mm<sup>2</sup>  
l = 95 mm<sup>2</sup>  
bx = 1.5 mm<sup>2</sup> NSGAFOeU  
lx = 95 mm<sup>2</sup> STK  
px = 185 mm<sup>2</sup> STK

#### Colour code

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

(1): not for QAS150

CIRCUIT DIAGRAM

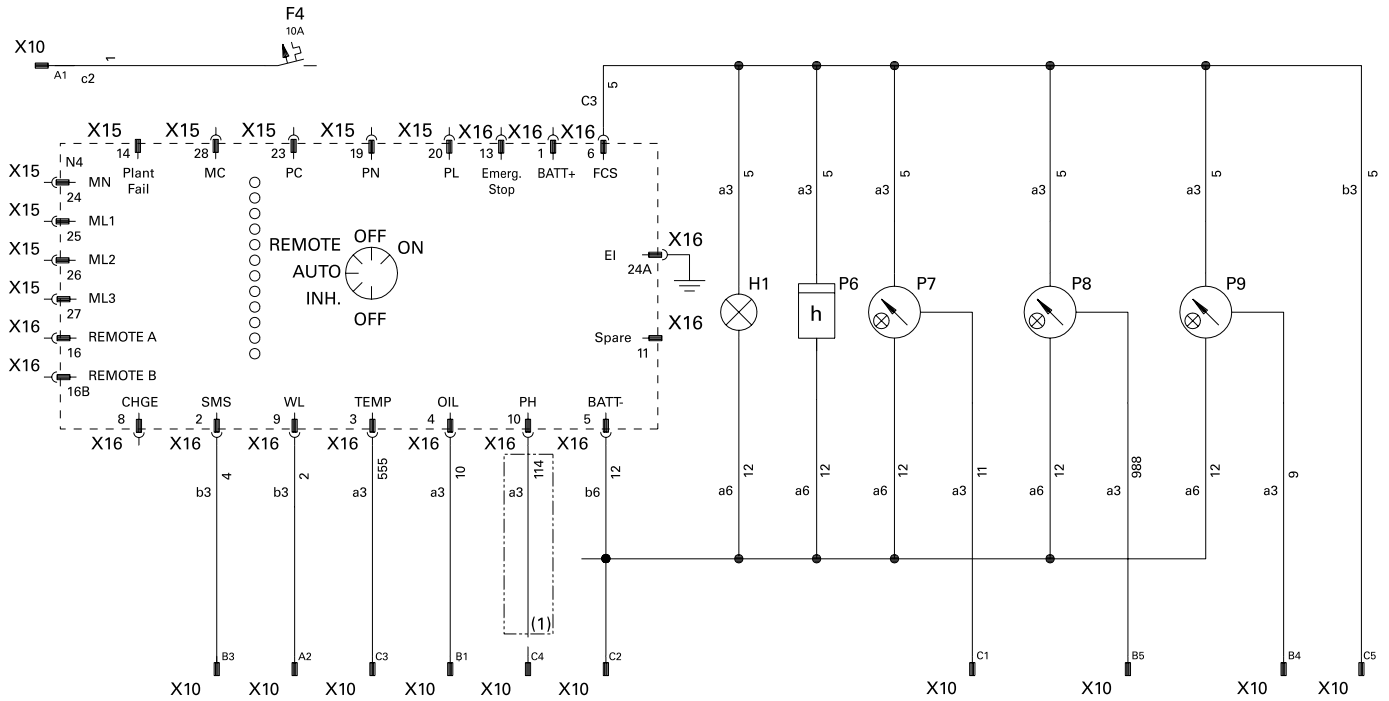


|      |                |    |                           |     |                         |
|------|----------------|----|---------------------------|-----|-------------------------|
| F4   | Fuse (10A)     | P5 | Frequencymeter            | X10 | 15-pole connector       |
| H1   | Panel light    | P6 | Hourmeter                 | X15 | 15-pole connector       |
| N4   | Control module | P7 | Fuel level gauge          | X16 | Module connector        |
| P1-3 | Amperemeter    | P8 | Coolant temperature gauge | S4  | Voltage selector switch |
| P4   | Voltmeter      | P9 | Oil pressure gauge        |     |                         |

## CIRCUIT DIAGRAM

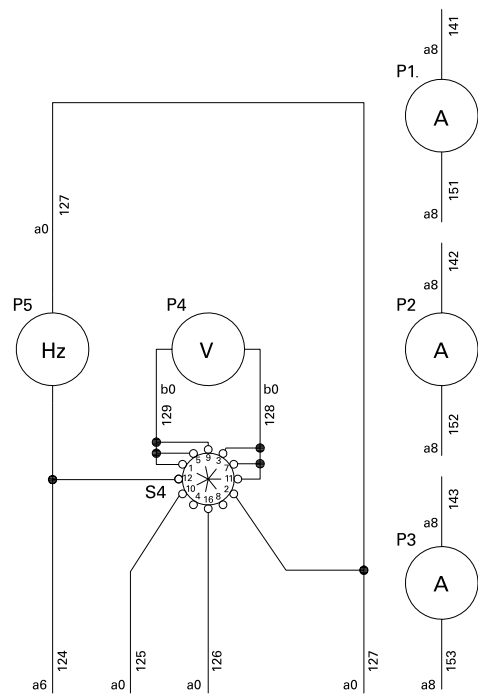
**9822 0889 69/00**

**Applicable for QAS150-200-250-300 Volvo - Automatic Mains Failure, 400V**





CIRCUIT DIAGRAM



Legend

Wire size

aa = 0.5 mm<sup>2</sup>  
a = 1 mm<sup>2</sup>  
b = 1.5 mm<sup>2</sup>  
c = 2.5 mm<sup>2</sup>  
d = 4 mm<sup>2</sup>  
e = 6 mm<sup>2</sup>  
f = 10 mm<sup>2</sup>  
g = 16 mm<sup>2</sup>  
h = 25 mm<sup>2</sup>  
i = 35 mm<sup>2</sup>  
j = 50 mm<sup>2</sup>  
k = 70 mm<sup>2</sup>  
l = 95 mm<sup>2</sup>  
bx = 1.5 mm<sup>2</sup> NSGAFOeU  
lx = 95 mm<sup>2</sup> STK  
px = 185 mm<sup>2</sup> STK

Colour code

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

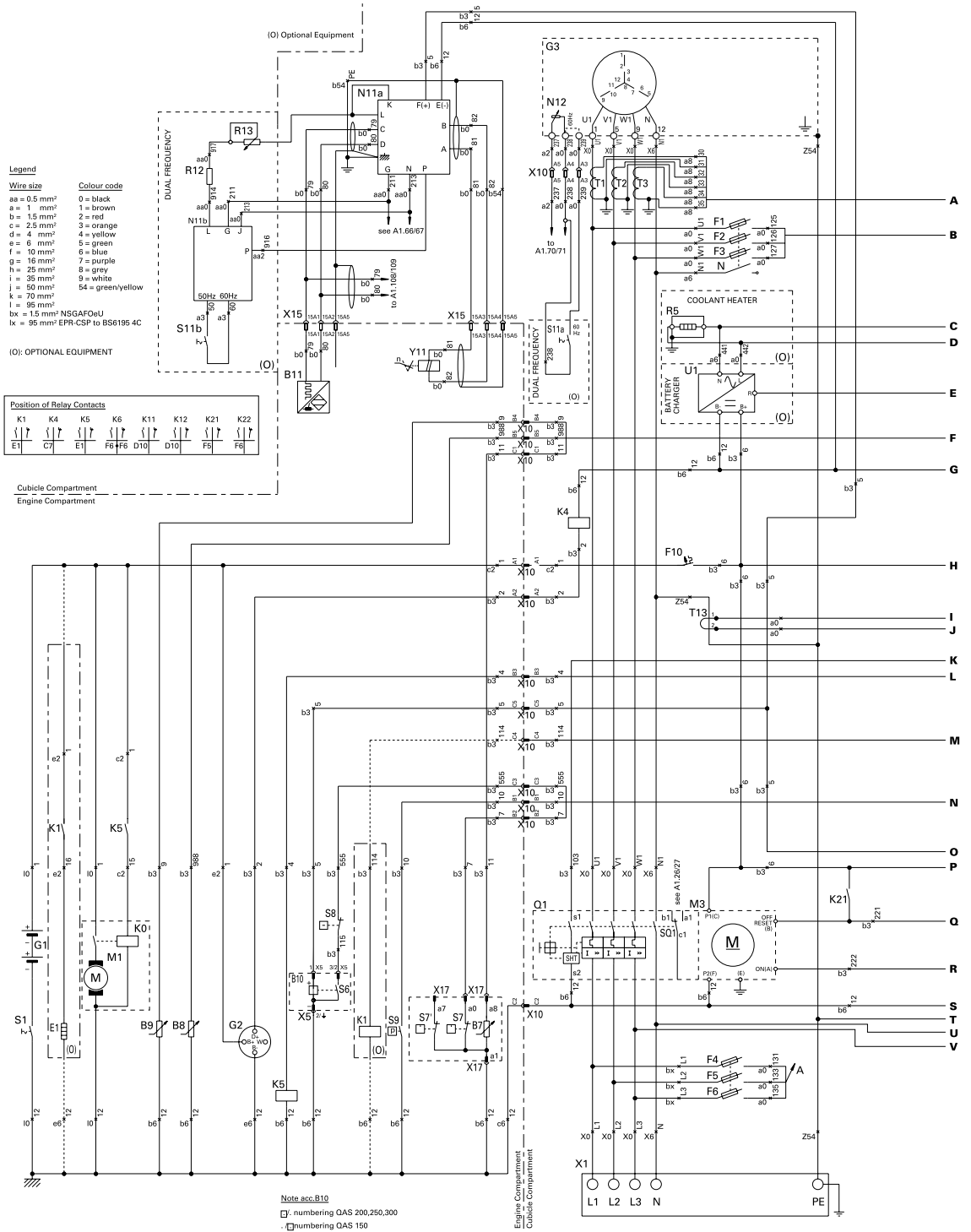
(1): not for QAS150

|      |                |    |                           |     |                         |
|------|----------------|----|---------------------------|-----|-------------------------|
| F4   | Fuse (10A)     | P5 | Frequencymeter            | X10 | 15-pole connector       |
| H1   | Panel light    | P6 | Hourmeter                 | X15 | 15-pole connector       |
| N4   | Control module | P7 | Fuel level gauge          | X16 | Module connector        |
| P1-3 | Amperemeter    | P8 | Coolant temperature gauge | S4  | Voltage selector switch |
| P4   | Voltmeter      | P9 | Oil pressure gauge        |     |                         |

# CIRCUIT DIAGRAM

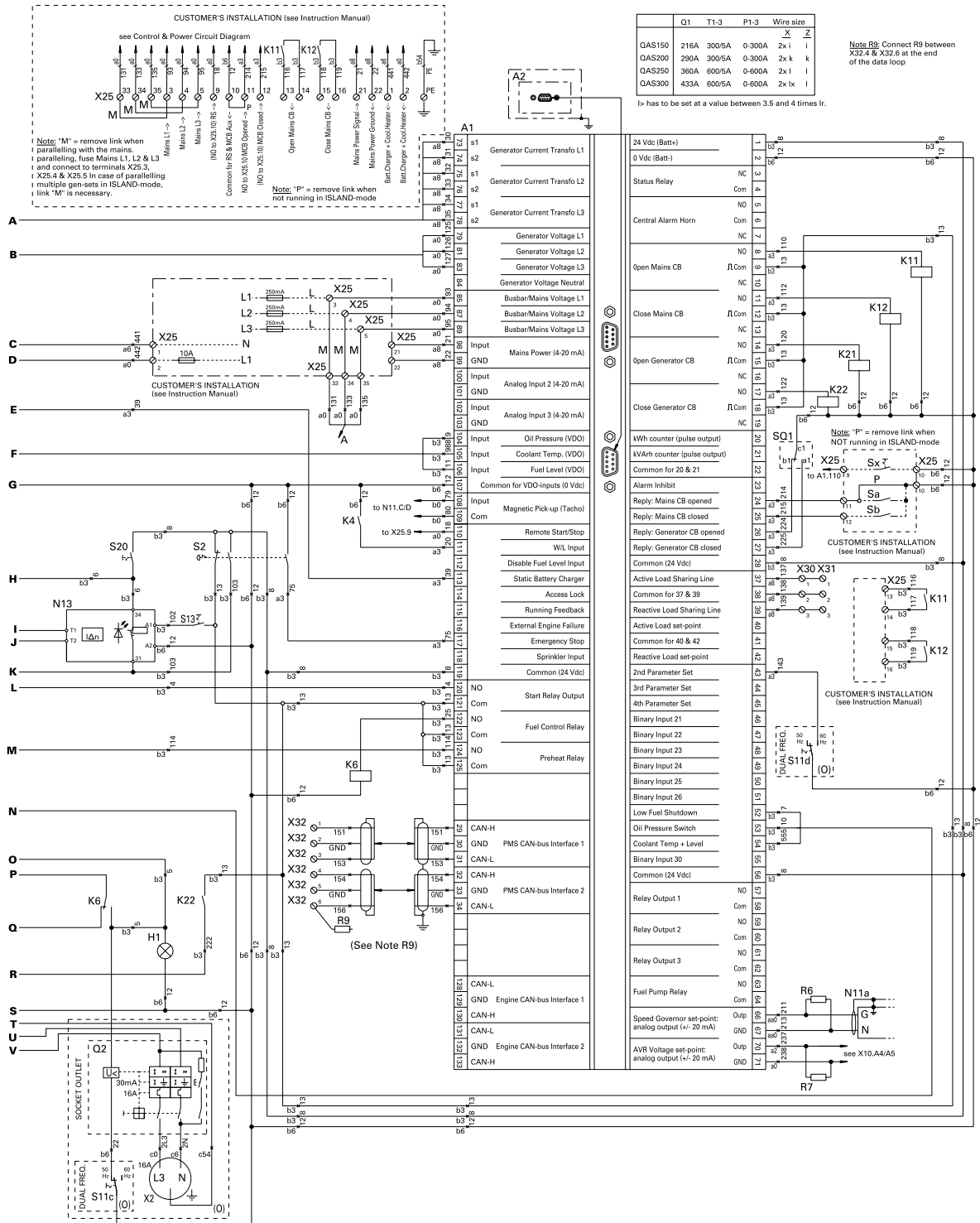
9822 0889 74-01/02

Applicable for QAS150-200-250-300 Volvo - Qc4001™



|     |                            |      |                     |     |                              |
|-----|----------------------------|------|---------------------|-----|------------------------------|
| A1  | Generator control unit     | E1   | Preheat resistors   | K1  | Engine preheat relay         |
| A2  | LCD display                | F1-6 | Fuses 250mA         | K4  | W/L-invertor relay           |
| B7  | Fuel level sensor          | F10  | Fuse 10A            | K5  | Starter relay                |
| B8  | Coolant temperature sensor | G1   | Battery 24Vdc       | K6  | Fuel Solenoid Relay          |
| B9  | Oil pressure sensor        | G2   | Charging alternator | K11 | Aux. relay open mains CB     |
| B10 | Coolant level switch       | G3   | Alternator          | K12 | Aux. relay close mains CB    |
| B11 | Magnetic speed pick up     | H1   | Panel light         | K21 | Aux. relay open generator CB |

# CIRCUIT DIAGRAM

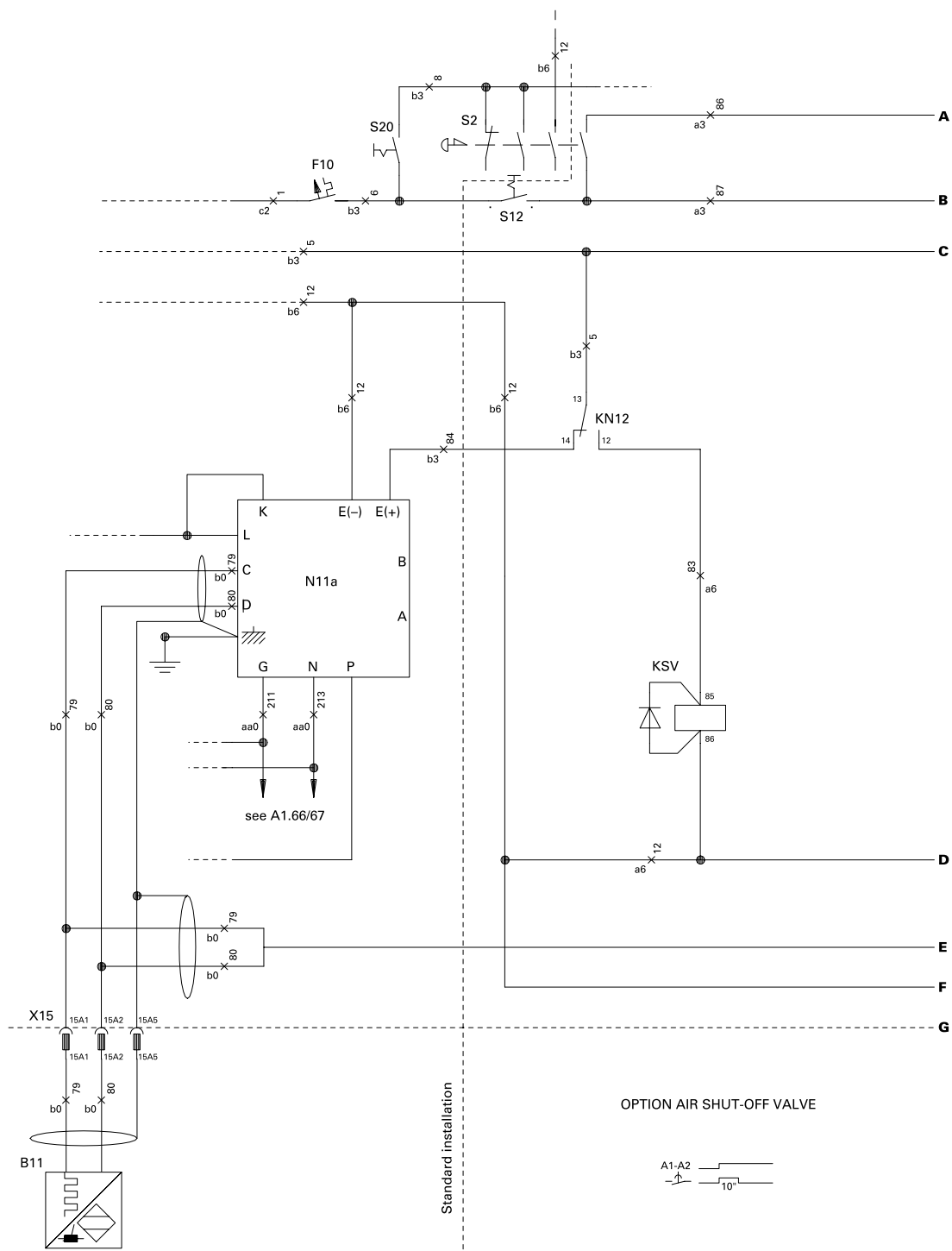


|         |                                  |        |                          |        |   |
|---------|----------------------------------|--------|--------------------------|--------|---|
| K22     | Aux. relay close generator CB    | R5     | Engine coolant heater    | S8     | High coolant temperature switch               |
| M1 + K0 | Starter motor                    | R6, R7 | Resistor 220 Ohm         | S9     | Low oil pressure switch                       |
| M3      | Motor drive for Q1               | R9     | Resistor 120 Ohm         | S11a-d | 50/60Hz-switch                                |
| N11a    | Engine speed controller          | R12    | Resistor dual frequency  | S13    | E.L.R. disable-switch                         |
| N11b    | Dual frequency controller        | R13    | Potmeter dual frequency  | S20    | ON/OFF-switch                                 |
| N12     | Automatic voltage regulator      | S1     | Battery isolator         | Sa     | Aux. contact mains CB opened (mounted in MCB) |
| N13     | Earth leakage relay              | S2     | Emergency stop           | Sb     | Aux. contact mains CB closed (mounted in MCB) |
| Q1      | Generator circuit breaker (3P+N) | S6     | Low coolant level switch | SQ1    | Aux. contact generator CB (mounted inside Q1) |
| Q2      | Circuit breaker 16A (with U-)    | S7     | Fuel level switch        | Sx     | Remote start/stop-switch                      |

## CIRCUIT DIAGRAM

**9822 0889 74-02/02**

**Applicable for QAS150-200-250-300 Volvo - Qc4001™, Power Circuit**



|            |                                    |            |  |     |                    |
|------------|------------------------------------|------------|--|-----|--------------------|
| K12<br>KSV | Timer<br>Aux. Relay Shut Off Valve | N12<br>S12 | Speed switch<br>On-off switch Shut-off valve | YSV | Air Shut-off valve |
|------------|------------------------------------|------------|--|-----|--------------------|

[illegible]

## CIRCUIT DIAGRAM

**9822 0889 76/02**

**Applicable for QAS150-200-250-300 Volvo - Power Circuit, Remote Start, Dual Voltage**

### Legend

#### Wire size

aa = 0.5 mm<sup>2</sup>  
a = 1 mm<sup>2</sup>  
b = 1.5 mm<sup>2</sup>  
c = 2.5 mm<sup>2</sup>  
d = 4 mm<sup>2</sup>  
e = 6 mm<sup>2</sup>  
f = 10 mm<sup>2</sup>  
g = 16 mm<sup>2</sup>  
h = 25 mm<sup>2</sup>  
i = 35 mm<sup>2</sup>  
j = 50 mm<sup>2</sup>  
k = 70 mm<sup>2</sup>  
l = 95 mm<sup>2</sup>

#### Colour code

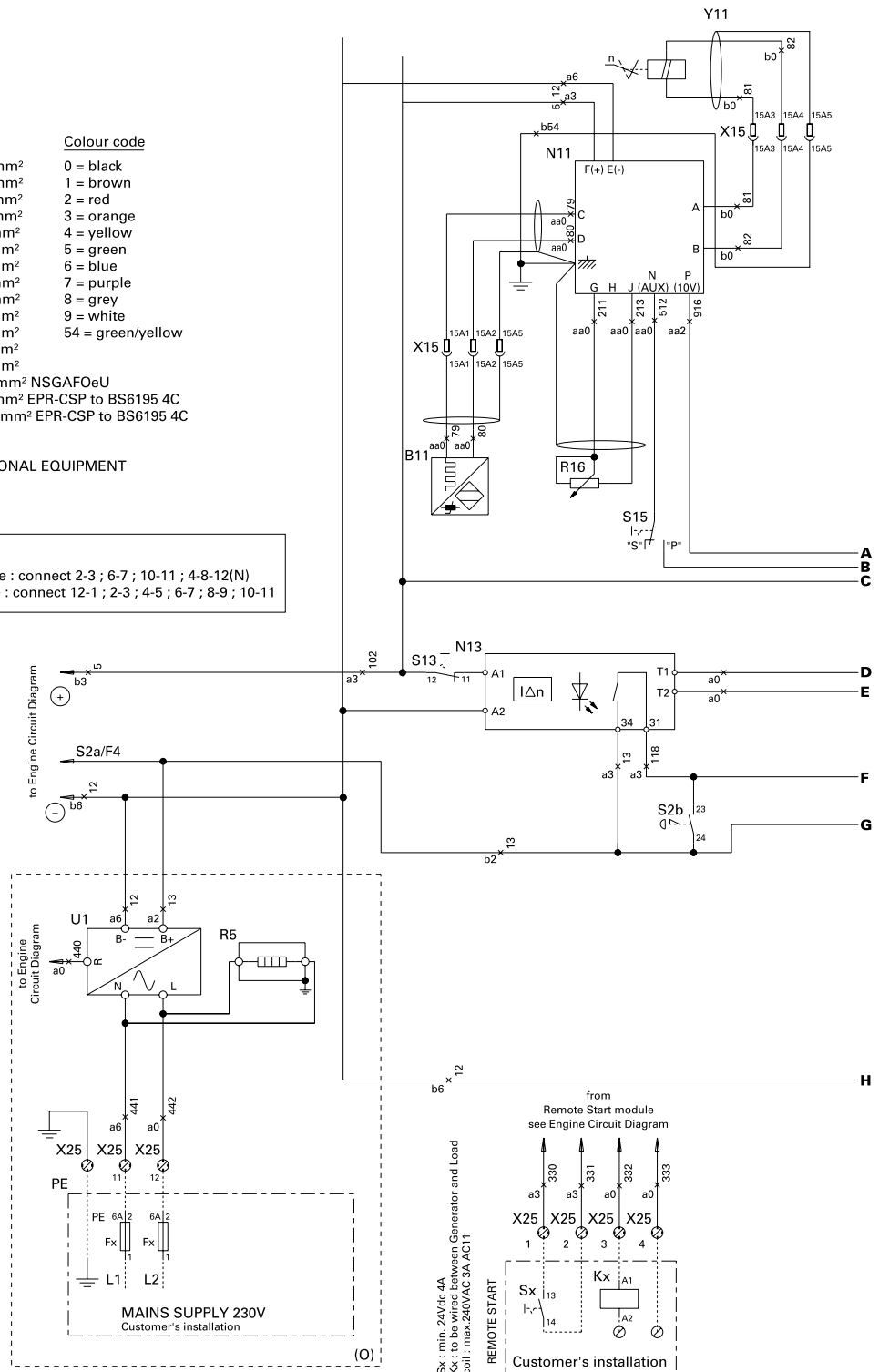
0 = black  
1 = brown  
2 = red  
3 = orange  
4 = yellow  
5 = green  
6 = blue  
7 = purple  
8 = grey  
9 = white  
54 = green/yellow

bx = 1.5 mm<sup>2</sup> NSGAFOeU  
lx = 95 mm<sup>2</sup> EPR-CSP to BS6195 4C  
px = 185 mm<sup>2</sup> EPR-CSP to BS6195 4C

(O): OPTIONAL EQUIPMENT

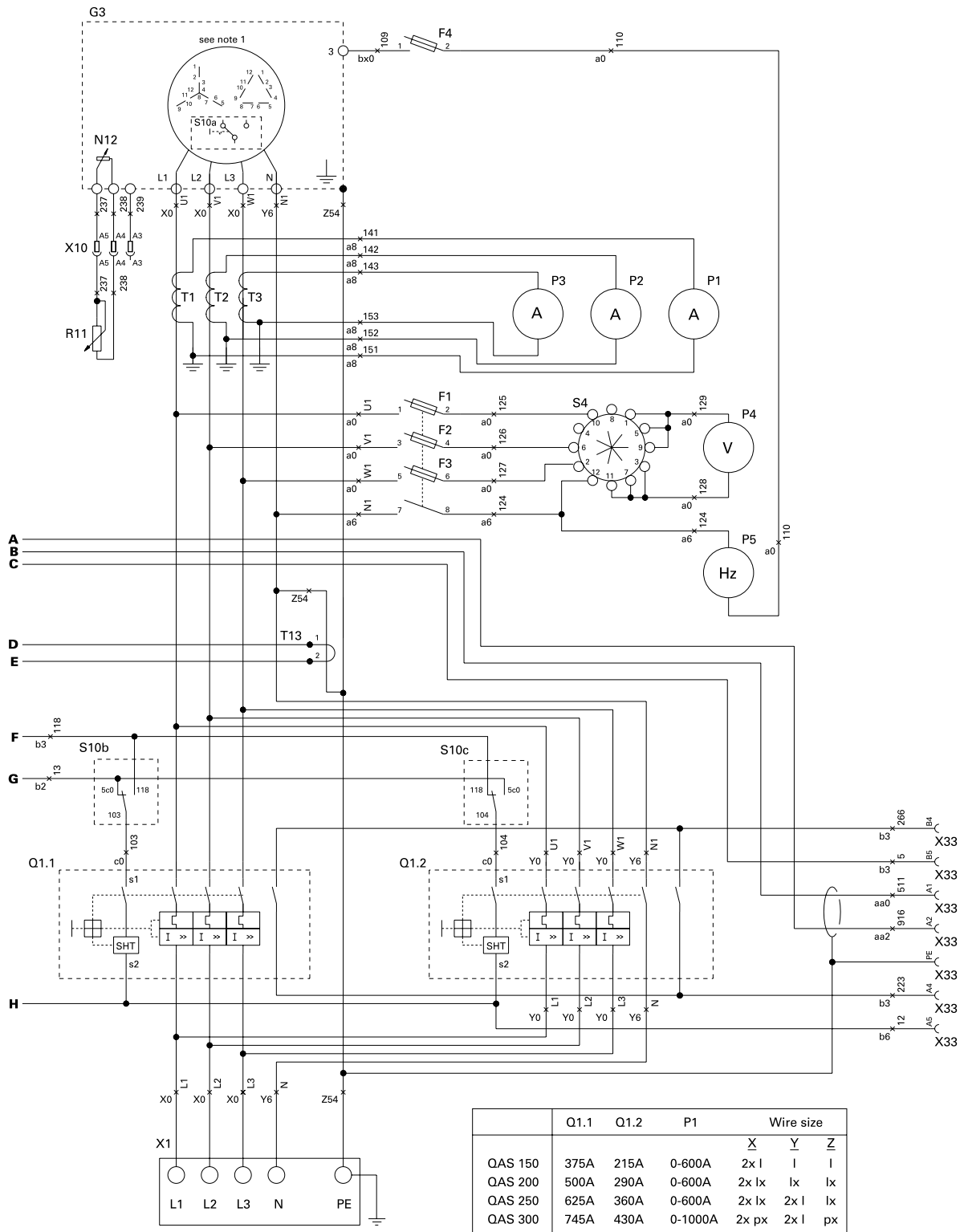
### NOTE 1

3ph higher voltage : connect 2-3 ; 6-7 ; 10-11 ; 4-8-12(N)  
3ph lower voltage : connect 12-1 ; 2-3 ; 4-5 ; 6-7 ; 8-9 ; 10-11



|      |                             |      |                                 |      |                                       |
|------|-----------------------------|------|---------------------------------|------|---------------------------------------|
| B11  | Speed sensor                | N13  | Earth fault-current relay       | Q1.2 | Circuit breaker (higher voltage)      |
| F1-4 | Fuse 4 A                    | P1-3 | Amperemeter                     | R5   | Coolant heater                        |
| G3   | Alternator                  | P4   | Voltmeter 0-500V                | R11  | Supply voltage adjust                 |
| N11  | Speed controller            | P5   | Frequencymeter 45-65Hz          | S2b  | Emergency stop (S2a: see Engine Circ) |
| N12  | Automatic voltage regulator | Q1.1 | Circuit breaker (lower voltage) | S4   | Voltmeter change-over switch          |

# CIRCUIT DIAGRAM

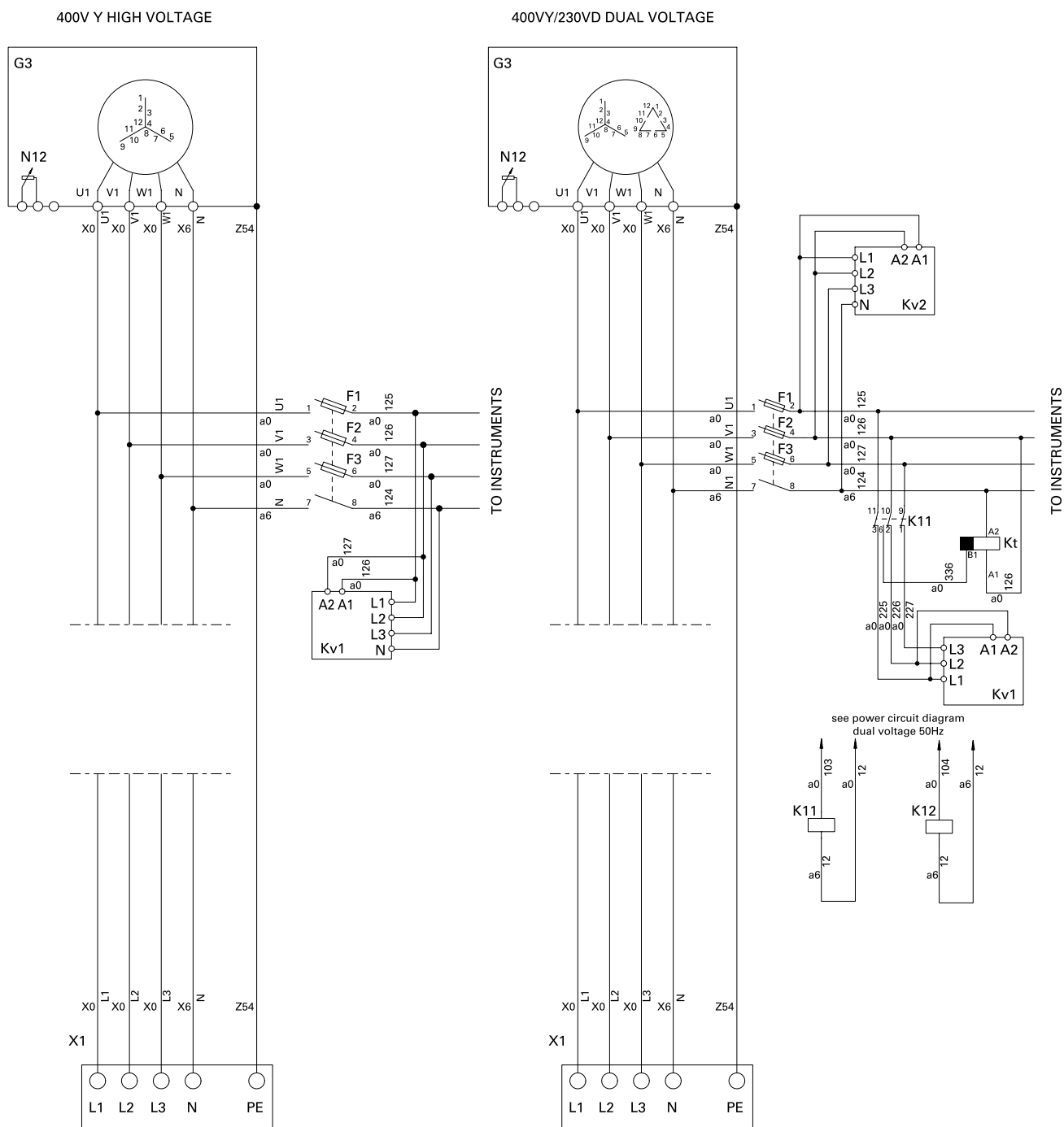


|             |                                   |     |                                       |    |  |
|-------------|-----------------------------------|-----|---------------------------------------|----|--|
| S10 a, b, c | Supply voltage switch             | X1  | Terminal board                        | Kx | Contactor generator ready (by voltage free contact, 15 sec. delayed) |
| S13         | Earth fault relay lock-out switch | X25 | Terminal strip                        | N4 | Control module   |
| T1-3        | Current transformer               | X33 | Par. connector to control cub. (SAPE) |    |  |
| T13         | Earth fault-current detector      | Y11 | Actuator                              |    |  |
| U1          | Static battery conditioner        | Sx  | Remote Start/Stop                     |    |  |

## CIRCUIT DIAGRAM

**9822 0888 89/01**

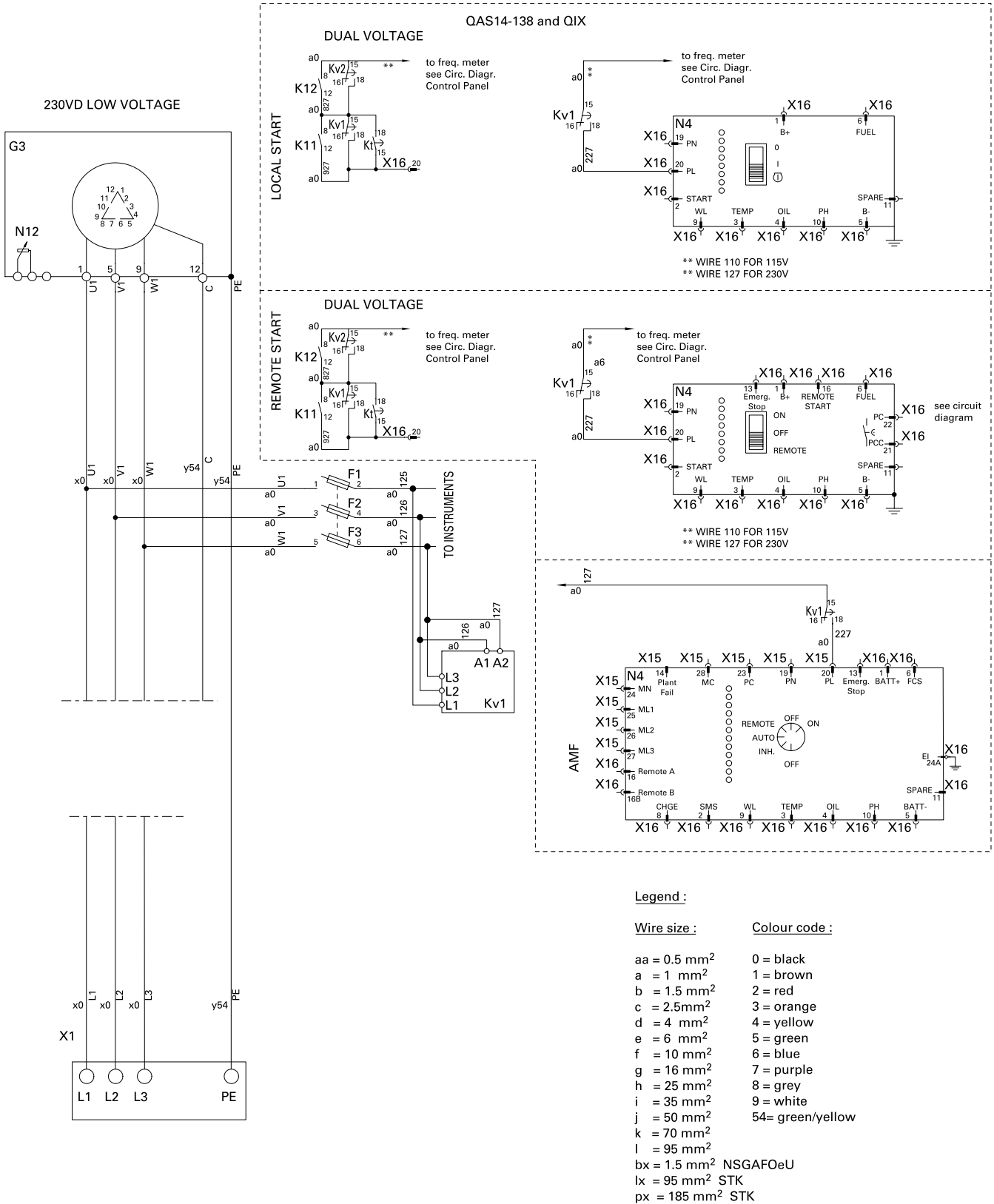
**Applicable for QAS150-200-250-300 Volvo - Over and Under Voltage Relay**



|     |  |     |   |    |                     |
|-----|--|-----|---|----|---------------------|
| K11 | Auxiliary relay u/o voltage low voltage  | Kv1 | Under/overvoltage relay (low voltage)<br>Umax = +8%, Umin = -8%, t1 = 5s<br>To be sealed after adjustment!  | Kt | Timer (Delay = 10s) |
| K12 | Auxiliary relay u/o voltage high voltage | Kv2 | Under/overvoltage relay (high voltage)<br>Umax = +8%, Umin = -8%, t1 = 5s<br>To be sealed after adjustment! |    |                     |



# CIRCUIT DIAGRAM









**Instruction Manual  
for AC Generators**

**QAS150 - 200 - 250  
- 300 Volvo**

