

Atlas Copco Instruction Manual



Portable Generator Sets
Instruction Manual
English

QAC 1100 Sd BQD | 2x DC 13 072A

Atlas Copco

Generator Sets Instruction Manual

QAC 1100 Sd

Important

This manual applies only to:

1. Generator Sets from serial number BQD103946.

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WARRANTIES

Atlas Copco ensures the Contracting Party, during the below referred period and conditions, warranty regarding repair work, free of charge, of the product sold or its components or accessories of its own manufacture, that could show proven manufacturing defects, provided they are not originated from misuse or negligence of the Contracting Party.

Warranty periods are counted from the date of issue of the sales invoices, and they are extended:

- a. for the period of eighteen (18) months after the date of issue of the sales invoice, or twelve (12) months after the technical delivery, whichever comes first.

No repair work, modification or replacement, by way of warranty, will extend the above mentioned periods, either for the equipment itself or for the replaced accessories or components.

The warranties set up by this instrument exclusively refer to components of own manufacture. As regards components, engines and accessories manufactured by third parties, warranties are set up by the respective manufacturers and under their sole responsibility.

The effectiveness of these warranties depends on the immediate communication in writing from the Contracting Party to Atlas Copco about the detected defect, and it is expressly forbidden any intervention of the Contracting Party or of third parties in the product or equipment under penalty of loss of warranty.

The warranty will be lost in the following cases:

- a. generator sets installed or assembled by the Contracting Party, without inspection and approval of Atlas Copco;
- b. lack of Technical Delivery by Atlas Copco;
- c. inadequate or improper maintenance of equipment and products, including: (i) performance of non authorized modifications; and (ii) non observance of Atlas Copco's maintenance instructions, poor or irregular lubrication;
- d. use of parts or accessories not original or not approved by Atlas Copco;
- e. inadequate or improper use of equipment or products;
- f. work overload not previously authorized, in writing, by Atlas Copco;
- g. normal wear of equipment or products;
- h. damages arising from unforeseeable circumstances or force majeure, such as those resulting from fire, floods, depredation, riots or damaging acts of this kind, among others;
- i. inadequate transportation, irregular or extended storage provided by the Contracting Party; and
- j. when the Contracting Party is a situation of default or non compliance with the payment of the price set forth by the Sale and Purchase contract.

No manufacturing defect shall be considered a fair reason for the non compliance of the Contracting Party of the obligations undertaken from this instrument and the attached proposal.

The services related to these warranties will be carried out in workshop previously authorized by Atlas Copco, and the Contracting Party is responsible for the delivery and removal of the products in these sites, and will bear transportation and insurance costs. At the sole discretion of Atlas Copco, warranty services may be carried out at the premises of the Contracting Party. In this case, all the expenses related to mileage reimbursement or air tickets, time of travel, food and lodging of technicians and/or mechanicals shall be paid by the Contracting Party.

Limits of Warranty and Liability

Use only authorized parts.

Breakdowns or malfunctions caused by the use of non authorized spare parts or components, shall not be covered by the Warranty or by the Product Liability.

The manufacturer does not accept any liability for any damages resulting from modifications, additions or conversions made without the written approval of the manufacturer.

Negligent maintenance or changes in the machine configuration may result in serious accident risks, including fire risk.

Although our best was done to ensure that the information in this manual is correct, Atlas Copco does not assume any responsibility for possible mistakes.

Any non-authorized use, or a copy of the contents of any part of it is forbidden.

This particularly applies to trade marks, names of models, part numbers and drawings.

Our products are painted according to ISO 12944, and our corrosive environment category is "C3 medium".

Before using this generator, carefully read the following instructions.

It is a sound, safe and reliable machine that was designed in accordance with state-of-the art technology.

Observe the directions of this instruction manual and we will ensure a seamless machine running.

Keep the manual always at hand and close to the machine.

In all correspondence regarding this machine, especially when ordering spare parts, always mention the serial number engraved on the unit nameplate fixed to the generator.



1028867910	
GRUPO GERADOR/GENSET	
MODELO / MODEL:	
Nº SÉRIE / SERIAL NUMBER:	
ANO FABRICAÇÃO / MANUFACTURING YEAR:	
POTÊNCIA / POWER: COP-PRP-STDby:	kVA
FREQÜÊNCIA / FREQUENCY:	Hz
TENSÃO / VOLTAGE:	V
CORRENTE / CURRENT:	A
MASSA DO CONJUNTO / WEIGHT:	kg
ALTITUDE MÁXIMA / ALTITUDE:	m
MAX. TEMPERATURA AMBIENTE / MAX AMBIENT:	°C
FABRICADO NO BRASIL / MADE IN BRAZIL	
Alameda Arraújo - Tamboré - Barueri - SP	
CNPJ 057.025.431/0001-06 - Registro no CRA: 0251810	
Atlas Copco	

GENERATOR WORKING VOLTAGE

Generator sets QAC 1100 Sd are produced to operate in only one voltage (220, 380 or 440 V), and it is not possible the quick selection/change of the voltage although the alternator is capable to provide any one of the voltages by making changes in the connections of its cables.

To change the working voltage it is necessary to consider the maximum power and current that the generator will be able to supply at the requested voltage, protective components shall be substituted and controls adjustments shall be changed.

1. Technical Delivery:

Atlas Copco's technician or representative will not make the working voltage change of the generator set, which will be at the original voltage, and in case the original voltage has been changed by the customer, this change made by the customer will be described in the service order (OS), and the customer will be warned about the risks arising from this change and notified about the loss of warranty of the items involved in this voltage change in case there is a failure resulting from this action.

Only after having clarified the issue of voltage change, the equipment technical delivery will be completed.

2. Voltage change request after the technical delivery.

Atlas Copco and its representatives will only perform this work with the substitution of the components for the requested voltage.

The equipment warranty does not cover damages resulting

from changes made without the knowledge of Atlas Copco, and mainly due to a voltage change without changing the necessary items and properly configuring the electronic controller.

The costs of these changes will be the entire responsibility of the final user.

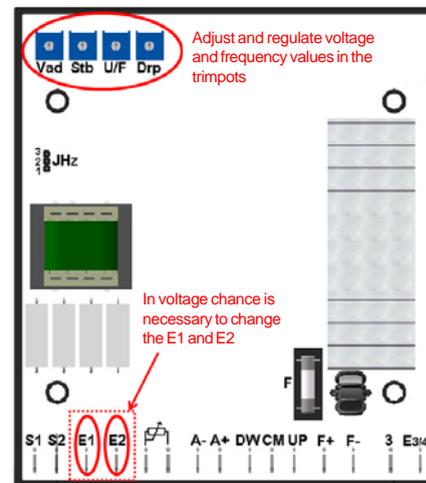
The costs of voltage change at the act of the technical delivery shall be borne by the customer, unless it is proven a delivery mistake on the part of Atlas Copco. If a disagreement between the customer order and the supply is verified, Atlas Copco assumes all the costs, that will be charged to the department responsible for that error.

After having changed the generator working voltage, the following shall be verified:

1. The electric current required by the load will be met by the generator at the selected voltage?
2. The generator protection and control are compatible with the voltage and current?

Generator Voltage Change

In all voltage change the position of E1 and E2 shall be observed in the Voltage Regulating Plate (AVR) according to the table below. Voltage and Frequency values shall also be adjusted in the AVR, **otherwise the Voltage Regulating Circuit Board can burn the connection.**



Circuit board AVR

E1	: Voltage feedback (Low voltage) GRT7-TH4 R2 AM/220M = 160 - 300VAC (single-phase). GRT7-TH4 R2 EM/220M = 180 - 240VAC (single-phase). GRT7-TH4 R2 GM/110M = 85 - 140VAC (single-phase).
E2	: Voltage feedback (Low voltage) GRT7-TH4 R2 AM/220M = 320 - 600VAC (single-phase). GRT7-TH4 R2 EM/220M = 520 - 640VAC (single-phase). GRT7-TH4 R2 GM/110M = 170 - 280VAC (single-phase).

NOTE: Verify signal origin at the alternator connection

Feeding of leakage current to earth relay (Optional)

The leakage current to earth relay shall be always fed with a voltage of 220 V, irrespective of the alternator connection voltage.



Refer to the parts catalog (ASL) to determine the components to be replaced in case of a voltage change.

Which are the risks if this change?

1. Short-circuit protection.

If the main circuit breaker is dimensioned for the voltage and current in the 220-V system, and using the same components applied in the 380 or 440 V where the system electric current will be lower, the same operating time will not be featured. Due to this, in case of a short circuit, the circuit breaker response time will be longer than necessary and although this difference is very small (milliseconds) it may cause the burning of the alternator or its components.

2. AVR calibrations.

When performing the system voltage changes, the voltage adjustment in the AVR controller shall be performed, and there may occur the need of adjusting the stability, and these actions depend on the load applied to the generator; so there is no adjustment "matrix" to be made on the field in order to ensure the stability and the reaction to the load applied to the generator set. During production, the equipment testing is made on controlled load test benches, which allow us to perform the calibration and to ensure the service, with large precision, the loads dimensioned for each model.

3. Changing errors.

Such change is subject to assembly errors, such as poor tightening of cables generating a short circuit or excess of torque on the busbar breaking the insulators or damaging the AVR circuit board due to an improper operation.

Note:After changing the working voltages, the Qc module protection configurations shall be changed.

	QC without program	WORKING VOLTAGE		
PARAMETER	FACTORY	220	380	440
Genset Mode	Island	Island	Island	Island
MF volt delay	5.0	5.0	5.0	5.0
M volt delay	60	60	60	60
MF low volt	92	92	92	92
MF high volt	108	108	108	108
MF freq delay	5.0	5.0	5.0	5.0
M freq delay	60	60	60	60
MF low freq	97	97	97	97
MF high freq	103	103	103	103
Engine I. Comm	Scania SEM S6	Scania SEM S6	Scania SEM S6	Scania SEM S6
Language	Portuguese	Portuguese	Portuguese	Portuguese
Unit	C/bar	C/bar	C/bar	5 seg
Diagnostics	off	off	off	off
St. 1 Reset	No	No	No	No
St. 2 Reset	No	No	No	No
DPF	Auto	Auto	Auto	Auto
Running Time	0	0	0	0
Horn Delay	20.0	20.0	20.0	20.0

Congratulations for purchasing your generator set. It is a resistant, safe and reliable machine, manufactured with the most advanced technology. Before starting to use of the machine, carefully read the instructions below. Although our best was done to ensure that the information in this manual is correct, Atlas Copco does not assume any responsibility for possible mistakes. Atlas Copco reserves the right to make any changes without previous notice.

Table of contents

Safety precautions for portable generator sets	11	Maintenance	37	Circuit diagrams	47
Important information	16	Maintenance chart	37	General information about options	47
General description	16	Engine maintenance	37	Battery automatic charger	47
Frame	18	Alternator insulation resistance measurement	39	Description of optional items	48
Information labels	18	Engine fuel specifications	39	Technical specifications	49
Drain plugs and filler caps	19	Engine oil specifications	39	List of SI unit conversion into British units	54
Qc4002™ control panel and indicating instruments	20	Checking engine oil level	40	Tightening torque table for screws and nuts	54
Running instructions	34	Changing oil filter and engine oil	40	Data plate	54
Installation	34	Engine coolant fluid specifications	41	Electric diagrams	55
Generator connection	34	Engine coolant fluid check	42	Dimensional data	57
Load connection	35	Generator storage	43		
Protection	35	Storage	43		
Before startup	36	Preparation for running after storage	43		
		Inspections and troubleshooting	43		
		Alternator troubleshooting	43		
		Engine troubleshooting	43		

Safety precautions for portable generator sets

To be carefully read and observed before moving, lifting, using and doing maintenance or repair work on the machine.

Introduction

Atlas Copco's policy is based on providing effective, safe and reliable products to its customers. Among others, the following factors are considered:

- planned and intended use of equipment and their environments of use;
- applicable rules, codes and regulations;
- equipment expected service life, based on the principle that service and maintenance are properly made;
- supply of manual updates.

Before using any product, user should read its instruction manual. In addition to presenting detailed instructions for use, the manual also provides information on safety standards, preventive maintenance, etc.

Always keep the manual with the machine in order to facilitate its access to its operators.

Refer also to the safety precautions relating the engine and other type of equipment that has been shipped separately, or is listed on the equipment or machine parts.



These safety precautions are general instructions, but sometimes they may not be applicable to a particular machine.

Only employees with the appropriate expertise should use, make adjustments and carry out maintenance or repair work on Atlas Copco equipment. It is the responsibility of the management the appointment of operators who have the appropriate training and expertise for each task.

Level of expertise 1: Operator

An operator must have received training on all aspects relating the use of the machine and its commands, and should also be familiar with the safety aspects.

Level of expertise 2: Mechanical technician

A mechanical technician is trained to use the unit in the same way as the operator. Moreover, the mechanical technician is trained to perform maintenance and repair works, as described in the instruction manual, and is authorized to change values of the control system. A mechanical technician does not perform tasks on electrical components.

Level of expertise 3: Electrical technician

An electrical technician has the same training and skills than an operator and a mechanical technician. Moreover, the electrical technician is also able to conduct electrical repairs inside the machine. These operations include tasks on live electrical components.

Level of expertise 4: manufacturer's expert

This is an expert sent by the manufacturer, or its agent, to perform complex repairs or modifications to the equipment. In general, it is recommended that the machine is not used by a number greater than two operators. The existence of more operators may create dangerous conditions of use. Take the necessary steps to prevent access by persons not familiar with machine and eliminate all sources of danger related to the machine.

When mechanics handle, use, open and/or make any maintenance tasks or repair on Atlas Copco equipment, they should implement safe procedures and comply with all local regulations and safety rules. The following list presents special safety guidelines and precautions applicable to Atlas Copco equipment.

Failure to observe safety precautions could endanger not only persons, but also the environment and the machines:

- endanger persons due to electrical, mechanical or chemical accidents;
- endanger the environment due to leakage of oil, solvents or other substances;
- endanger the machines due to running failures.

Atlas Copco assumes no responsibility for any damage or injuries resulting from failure to observe these precautions or lack of care required for handling, use, maintenance or repair, even if not expressed in this instruction manual.

The manufacturer does not accept any liability for any damages resulting from the use of non original parts, as well as modifications, additions or conversions made without the written approval of the manufacturer.

If any instruction of this manual does not comply with local laws, the safer indication shall apply.

The instructions in these safety precautions should not be interpreted as suggestions, recommendations or inference used in violation of any applicable laws or regulations.

General safety precautions

- 1 The owner is responsible for maintaining the machine, keeping it in perfect running conditions. Parts and accessories of the machine should be replaced in case they become lost or are damaged, impairing the correct running of the machine.
- 2 The supervisor or responsible person should always make sure that all instructions relating to machinery and running and maintenance of equipment are followed and that the machines, as well as all accessories, safety devices and consumables, are in perfect condition showing no wear, damage or signs of any unauthorized intervention.
- 3 Where there is suspicion or signs of overheating in an internal part of the machine, disconnect it, but avoid removing any inspection cover until a sufficient period of cooling has passed, this may avoid the risk of spontaneous combustion of oil vapor when the air gets in.
- 4 Normal specifications (pressures, temperatures, speeds, etc.) shall be marked in a lasting way
- 5 The machine should only be used for the specified function and complying with the defined specifications (pressure, temperature, speeds, etc.).
- 6 Machinery and equipment should always be clean, i.e. free of oil, dust or other debris.
- 7 To prevent an increase in running temperature, heat transfer surfaces (cooling fins, internal cooling devices, cooling jackets, etc.) should regularly be inspected and cleaned. Refer to the preventive maintenance chart.
- 8 All regulating and safety devices should be inspected with due care, in order to ensure their correct running. They should not be disabled.
- 9 Analog measuring instruments shall be periodically verified to ensure their precision. They shall be replaced whenever they show unacceptable tolerances.
- 10 Safety devices shall be tested as described in the maintenance chart of the instruction manual in order to determine if they are in good running conditions. Refer to the preventive maintenance chart.
- 11 Markings and labels put on the machine shall be complied with.
- 12 If the safety labels are damaged or destroyed, they should be replaced, to ensure operator safety.
- 13 Keep the work area clean and in order. Disorder increases the risk of accidents.
- 14 When working with the equipment, wear the suitable safety clothing. Depending on the type of activity, the clothing may be summarized as follows: protections for the eyes and ears, helmet (including visor), gloves, suitable safety clothing and shoes. Avoid long and uncovered hair (protect long hair with a hair net), baggy clothes or use of jewelry.
- 15 Take every precaution against the outbreak of fires. Take care when handling fuel, oil and antifreeze agent, since these substances are flammable. Do not smoke or allow the use of flames close to these substances. Make sure there is a fire extinguisher nearby.

- 16 Portable generators (with grounding pin): Carefully make generator and load grounding connections.

17 Precautions



In case of principle of fire or an actual fire, a dry powder ABC extinguisher shall be used to fight it. This type of extinguisher is ideal to fight class A, B and C fires.

- A - Solid materials, paper, wood, fabrics.
 - B - Flammable liquids, hydrocarbons, gasoline, oils, paints.
 - C - Electric equipment, motors, electric switches
- 18 The equipment shall be duly grounded according to recommendations of Brazilian NR10 standard.

Safety standards during transportation and installation

In order to lift the machine, all loose or articulated parts, for example, doors and towing bar, should be properly fastened.

Do not connect cables, chains or ropes directly to the hanging bracket, use a hook or other type of support that complies with local safety regulations. Never bend sharply cables, chains or suspension ropes.

Lifting by helicopter is not allowed.

It is strictly forbidden to circulate in the danger zone beneath a suspended load. Never lift the machine above persons or residential areas. The load lifting acceleration and deceleration must comply with the safety limits.

- 1 To lift heavy parts, a large capacity support tested and approved according to local regulations should be used.
- 2 Suspension hooks and brackets, etc., should never be bent and pressure should only be applied on their loading axle. The capacity of the suspension device decreases when the suspension force is exerted in an angle to the axis of loading.
- 3 For maximum safety and effectiveness of the suspension mechanism, all suspension members should be as close as possible to the perpendicular position. If necessary, a bar should be placed between the support and the load.
- 4 Never leave a load when it is suspended.
- 5 Lifting equipment shall be installed in such a way that the object is lifted perpendicularly. If this is not done, the necessary precautions shall be taken to avoid load swing, for example, using a pair of lifting pieces of equipment, places approximately at the same angle, not farther than 30 degrees from the vertical position.
- 6 Position the machine away from walls. Take all necessary precautions to ensure that the air coming from the engine hot air outlets and transmission cooling systems is not reused. The circulation of this air may lead to machine overheating; allowing the entry of this air into the combustion zone will reduce engine power.
- 7 Generators shall be placed on a clean and solid surface, in a clean and ventilated location. If the floor is not leveled or the inclination is not regular, Atlas Copco shall be consulted.
- 8 Electric wiring shall comply with local codes. The machine shall have grounding connections and shall be protected by fuses or circuit breakers.
- 9 Before connecting a load, open the main circuit breaker and check whether the frequency, voltage, current and power to be obtained correspond to the generator specifications.
- 10 Before transporting the unit, disconnect all the circuit breakers.

Safety standards for the use and running

1 When the machine has to be used in an environment with risk of fire, each of the engine exhaust pipes must have a spark arrestor, to avoid the risk of fire.

2 Exhaust gases contain carbon monoxide, which is a lethal gas. When the machine is used in a closed space, the exhaust gases shall be conveyed to the outer atmosphere, through a pipe with sufficient diameter. This operation shall be performed in order to avoid developing an excessive pressure inside the engine. If necessary an extractor shall be installed. Comply with all existing local regulations.

Ensure the machine has enough air intake to perform the operation. If necessary, install additional air ducts.

3 When performing operations in dust-laden environments, position the machine in order to prevent the return of dust by wind action. The use of the machine in dust-free environments significantly extends the intervals set out to clean the air intake filters and the cooling system cores.

4 Never remove the filler cap of the cooling system when the engine is hot. Wait until the engine has cooled.

5 Never fill the engine with fuel while the engine is running. Keep fuel away from hot parts, such as engine exhaust pipes. Do not smoke while refueling. If an automatic pump is used, a ground wire should be connected to the machine in order to discharge static electricity. Never spill or release oil, fuel, coolant or cleaning agents on the machine or around it.

6 All doors must be closed during the machine running, so as not to impair the air flow inside the work area and/or making the noise reduction devices ineffective. It will only be allowed to keep the doors open for short periods, for example, when performing inspection or adjustment tasks.

7 Periodically perform maintenance tasks, complying with the maintenance chart.

8 Fixed guards should be placed on all rotating or moving parts, which are not duly protected and may become dangerous for the personnel. If the guards are removed, do not run the machine before having them reinstalled.

9 Noise, even at acceptable levels, causes irritation and discomfort that, after long periods of exposure, may encourage the emergence of serious injury to the human nervous system.

When the noise level in a workplace is:

- below 70 dB (A): no action is required,
- over 70 dB (A): personal protection equipment (PPE) against the noise should be provided to the personnel that is permanently in place,
- below 85 dB (A): no action is required for occasional visitors that will stay in the location for only a limited time.
- over 85 dB (A): the place should be classified as a noise dangerous area, and a notice should be permanently placed at each of the entrances, warning people willing to enter the site, even for short periods of time, that they should wear protective devices (PPE) for the ears,
- over 95 dB (A): notices at the entrances shall be complemented with a recommendation that even occasional visitors shall use ear protective devices (PPE).

- over 105 dB (A): protective devices (PPE) for the ears special for this noise level shall be made available and a special notice shall be displayed for that purpose at each one of the entrances.

10 Never remove the isolation or guards of parts with temperature above 80 °C where the personnel may inadvertently touch them, until they have cooled down.

11 Never use the machine in an area where there is the risk of absorption of toxic or flammable vapors.

12 If the work process produces fumes, dust or vibrations, etc, the necessary precautions should be taken to eliminate the risk of injury.

13 When using compressed or inert gas to clean the equipment, do it with caution and wear appropriate protective devices (at least eye protections). Do not apply compressed or inert gas on skin, or direct the air or gas flow to other people. Never use these substances to remove dirt from your clothes.

14 When washing parts with a cleaning solvent, make sure the relevant ventilation procedures are complied with and wear appropriate protective devices, such as breathing filters, safety goggles, rubber apron and gloves, etc.

15 Wearing safety shoes should be mandatory in any workplace and if there is any risk, however small, of falling objects, the compulsory wearing of a helmet should be included.

16 If there is any risk of inhalation of dangerous gas, vapor or dust, respiratory organs should be protected and, depending on the nature of the danger, eyes and skin should also be protected.

- 17 Remember that where there is visible dust, the existence of finer and invisible particles should also be checked, yet the fact that dust is not visible does not indicate that these dangerous particles are not in the air.
- 18 Never use the generator beyond the limits imposed by the technical specifications and avoid long periods without load.
- 19 Never use the generator in a humid environment. Excess humidity may deteriorate the generator insulation.
- 20 Do not open electric boxes, boards or other equipment with the power on. If this cannot be avoided, for example, for making measurements, tests or adjustments, this procedure shall only be performed by a qualified electrician, having the suitable tools and wearing the necessary protections (PPE).
- 21 Never touch on the terminals during machine running.
- 22 Whenever a strange situation appears, for example one noise, vibration, a strong smell, place the circuit breakers in the OFF (disconnected) position and switch off the engine. The failure shall be corrected before starting the machine again.
- 23 Periodically check the cables. Damaged cables and poor lighting of connections may cause electric shocks. Whenever the existence of dangerous circumstances is verified, place the circuit breakers in the OFF (disconnected) position and switch off the engine. Replace the damaged wires or remedy the risk situation before starting the machine again. Make sure that all electric wirings are well safe.
- 24 Avoid overloading the equipment. The generator is fitted with overload protection. When a protection is activated, reduce the load before starting the machine again.
25. If the generator was used for supporting the mains power supply, it shall have a control system that automatically switches off the mains when the current is switched on.
26. Never remove the cover of the output terminals with the machine running. Before connecting or disconnecting wires, deactivate the load and the circuit breakers, and make sure that the machine cannot be accidentally started, and there is no residual voltage in the electric circuit.
27. The use of the generator with low loads during prolonged periods reduces the engine service life, increases the oil consumption, and promotes the presence of oil in the engine discharge and vent.
- 28 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.

Safety during maintenance and repair work

Maintenance, opening and repair tasks shall only be performed by qualified personnel and, if necessary, under the supervision of someone qualified for such task.

- 1 Use only the suitable tools for repair and maintenance tasks, and make sure they are in good conditions.
- 2 Parts shall be replaced by genuine Atlas Copco spare parts.
- 3 All the maintenance work, in addition to routine tasks, shall be performed with the machine turned off. All the necessary measures shall be taken to prevent any accidental start. It shall also be placed a sign with the legend "Under maintenance, do not turn on" on the starting equipment.
In machines fitted with diesel engine, the battery shall be disconnected and removed, or the terminals shall be covered with insulating caps.
In the case of electric machinery, the main circuit breaker shall be blocked in the open position and the fuses shall be removed. On the fuse box or on the main circuit breaker a sign with the legend "Under maintenance, do not switch power on" shall be placed.
- 4 Before opening an engine or another machine, or to proceed to more complex repair work, lock everything, so that the moving parts cannot rotate or move.
- 5 Make sure that there are no tools, loose parts or pieces of cloth left inside the machine. Never leave pieces of cloth or loose clothing near the engine air intake zone.

- 6 Never use flammable solvents for cleaning purposes (fire risk).
- 7 Take all the safety measures against toxic vapors from cleaning liquids.
- 8 Never use machinery parts as a support or to help climbing.
- 9 Thoroughly make the cleaning during maintenance and repair work. Avoid the dirt and cover parts and exposed openings with a clean cloth, paper or tape.
- 10 Never perform welding, or perform any task involving heat near the fuel or lubrication systems. Before performing this type of operation, the fuel and oil tanks must be completely empty, for example, through a steam cleaning. Never do welding work on, or modify pressure vessels. Disconnect the alternator wires during any welding work done on the machine.
- 11 When performing any task under the machine, make sure the machine is well supported. Do not rely entirely on the jack.
- 12 Do not remove or modify the sound insulation material. Do not wet or soil this type of material, for example, with fuel, oil or cleaning agents. If the sound insulation material is damaged, replace it in order to avoid any increase in noise level.
- 13 Use only lubricants recommended or approved by Atlas Copco or by the machine manufacturer. Make sure the selected lubricants comply with safety regulations, particularly those related to explosion or fire risk and the possibility of decomposition or creation of dangerous gases. Never mix synthetic and mineral lubricants.
- 14 Protect the engine, alternator, air intake filter, electrical and regulating components, etc., in order to prevent entry of moisture, for example, when using steam cleaning.
- 15 When doing any operation involving heat, flames or sparks, surrounding components should be protected with non-flammable material.
- 16 Never use a flame to illuminate the interior of a machine.
- 17 When you have completed the repairs the machine should make a check rotation of verification, in case of a machine chain, or several rotations, in the case of rotating machinery, to ensure that there is no mechanical interference in the machine or in the transmission system. Check the direction of rotation of electric motors when turning on the machine first and then, after any change in wiring or changing gears, in order to check whether the oil pump and fan are running properly.
- 18 Maintenance and repair tasks of all the machines should be recorded in the operator's logbook. The frequency and nature of maintenance work may show incorrect use conditions.
- 19 When hot parts are to be handled, for example, in assembling by expansion, special heat resistant gloves should be worn, and, if necessary, other protection for the body should also be worn.
- 20 When using filtration cartridges, ensure the correct type of cartridge is used, and that the product service life was not exceeded.
- 21 Ensure that the oil, solvents and other substances likely to pollute the environment are properly disposed.
- 22 Before starting again to use a machine after a maintenance or repair task, it shall be submitted to a test, in order to check if the AC supply performance is correct and if the control and safety devices are working properly.

Safety in use of tools

Use the right tool for each task. If you know the tool that should be used and its limitations, many accidents could be avoided.

There are some special maintenance tools available for specific tasks, which must be used when necessary. The use of these tools will save time and avoid damage to parts.

Specific safety precautions

Batteries

When performing battery maintenance work, protective clothes and goggles should be worn.

- 1 The electrolyte in batteries is a solution of sulphuric acid, which is fatal if it falls in your eyes, and causes burns on contact with skin. So, be careful when handling batteries, such as when checking charge conditions.
- 2 Install a notice prohibiting fire, flame or smoking in the place where the batteries are charged.
- 3 When the batteries are charged, an explosive mixture of gases is formed in the elements that might escape through the openings of vent plugs.

Thus, an explosive atmosphere can form around the battery if ventilation is poor, which can remain in and around the battery for several hours after the charge.

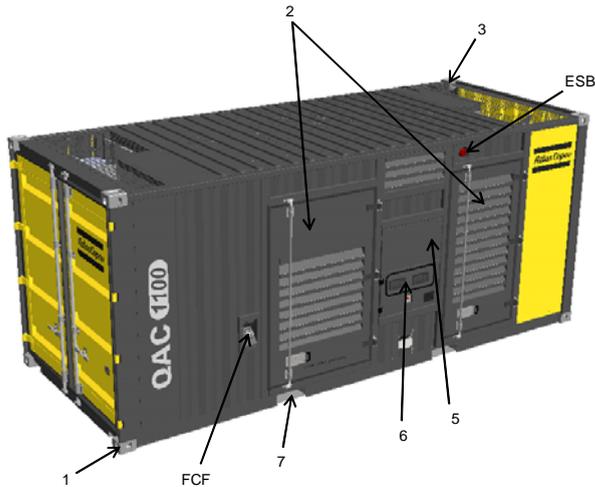
Therefore:

- never smoke near the battery being charged or having recently been charged,
 - never break live circuits at the battery terminals, because this normally forms a spark.
- 4 When connecting an auxiliary battery (AB) in parallel with the compressor battery (CB) with starting connection cables: connect the AB +pole to CB +pole, then the -pole of CB to the compressor chassis ground. Disconnect in the reverse order.

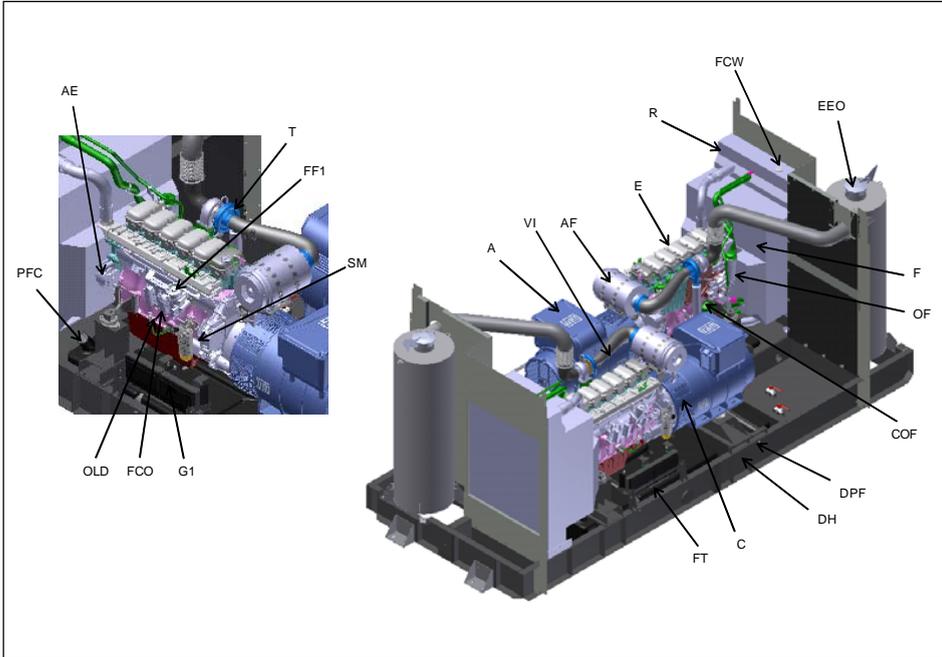
Important information

General description

QAC 11000 Sd are alternating current generators, built to continuously run in places where no electricity is available or as a backup unit, in cases where a power failure of the main network is verified. QAC 1100 Sd generator sets run at 60 Hz with voltages of 220 V, 380 V or 440 V and sets run at 50 Hz with a voltage of 400 V. The generator is driven by a water-cooled diesel engine, manufactured by SCANIA. The main components are shown in the diagram below.



- 1 Lifting eye
- 2 Side doors
- 3 Engine exhaust outlet with rainfall protection
- 4 Name plate
- 5 Control panel and indicator instruments access door
- 6 Output terminals panels
- 7 Chassis
- ESB Emergency stop button
- FCF Fuel filler cap



- A Alternator
- AE Engine alternator
- AF Air filter
- C Coupling
- DPF Fuel drain plug
- DH Chassis access and drain window
- E Engine
- EEO Engine exhaust outlet
- F Fan
- FCO Engine oil filler cup
- FCW Expansion tank cap
- FF1 Fuel primary filter
- FT Fuel tank
- G1 Battery
- OF Oil filter
- COF Centrifugal oil filter
- OLD Oil dip stick
- PFC Fuel filler cap
- R Radiator
- SM Starter
- T Engine turbocharger
- VI Filter restriction indicator

Frame

The alternator, the engine, the cooling system, etc. are contained into a soundproof frame that may be open through lateral doors (and service covers).



Lifting by helicopter is not allowed.

Information labels

A short description follows of all the generator information labels.



This symbol means that there is danger of electric shock. The internal parts marked with these symbols can only be opened by qualified personnel.



This indicates that the gas leaving the engine exhaust pipe is hot and harmful, and it is toxic when inhaled. The unit shall always run outdoors or in a well ventilated room



This indicates that these parts may reach very high temperatures while running (for example, engine, exhaust outlet, etc. Before touching this parts, always check the temperature.



Indicates that the guides cannot be used to lift the generator. Always use for lifting the eye on the upper cover of the generator.



Indicates the lifting point of the generator.



Indicates that the generator can only be refueled with this fuel..



Indicates the engine oil drain hole.



Indicates the coolant fluid drain hole.



Indicates the fuel drain plug.



Mineral oil for Atlas Copco engine.



Indicates the different ground connections of the generator.



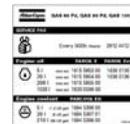
Indicates that the alternator shall not be cleaned with high-pressure water.



Indicates that the unit can automatically start and that the instruction manual shall be referred prior to use.



Read the instruction manual before using the lifting eye.



Indicates the references of the different maintenance kits and the engine oil. These parts may be ordered from the factory.

Drain plugs and filler caps

Engine oil and coolant drain holes and the fuel drain plug are located and identified on the generator frame. Fuel drain plugs are located at the lower portion of the frame.

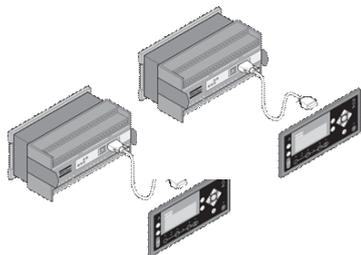
The flexible tube for the engine oil can be removed from the generator through the drain hole.



The drain hole can also serve as a guide for the connecting pipes with an external fuel container. When connecting an external fuel container use a 3-way valve. Refer to Connection of the external fuel reservoir (with/without quick coupling).

The access to the engine coolant filler plug is done through an opening on the upper face of the frame. The fuel filler plug is located on the lateral panel.

Qc4002™ MkII Module, control panel and indicators

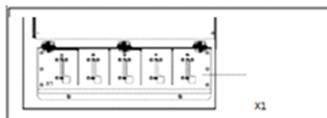


The Qc4002™ MkII module is located inside the control panel and communicates with a screen on the control panel front. This control module performs all the necessary tasks for controlling and protecting a generator, irrespective of the use made with it. This means that Qc4002™ MkII module can be used for several applications.

The Qc4002 modules have operating control of the fuel pump for automatic supply of the internal tank. Through lines of configuration 4350 and 4360 control module can command the automatic shutdown of the supply tank, the instant the percentage value of the fuel volume reaches the stipulated amount. Any questions, looking for Atlas Copco for the correct use of this resource.

Output terminals panels

The cubicle has a terminal panel to facilitate cable connections. It is located under the control and indicating instrument panel.



S2 Emergency stop button
Depress the button to stop the generator in case of emergency. To have the generator running again, release the button rotating it counterclockwise. You can fix the emergency stop button in the lock position with a key, in order to avoid non-authorized use.

N13 Earth leakage relay
It detects a ground fault and activates the main circuit breaker Q1. The detection level can be set to 30 mA fixed with instantaneous dropout, and it can also be set between 30 mA and 250 mA with delayed dropout (0 - 1 s). N13 has to be manually reset after the elimination of the damage (reset button marked with R). It can be overridden by means of an earth leakage circuit breaker (S13), marked as IΔN, but it has to be monthly tested by depressing the test button T13.

S13 Closing earth relay circuit breaker (N13).

This circuit breaker is located inside the cubicle, it is identified as IΔN. Position O: Interrupts the current of the main circuit breaker Q1, when a ground connection failure occurs.

Q1 Circuit breaker for the main circuit
It interrupts the supply current for X1 when a short circuit occurs on the load side or when the overload protection (720 A) is activated. When activated, Q1 interrupts the three phases for X1. It has to be manually reset after clearing the problem.

X1 Main supply current



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

The O position of S13 switch will be only used in connection with a ground connection failure protection unit (e.g. integrated in a distribution panel) or when the generator is used in parallel.

The ground connection failure protection at the outlet connector of a phase is not affected by S13 switch. If S13 is placed in the O position, it is very important the existence of a suitable ground connection for the user protection. The removal of any ground fault protection may cause serious injuries or even death of anyone touching the unit or the load.

Dual frequency

The "Dual frequency" option is not available in this unit, therefore, changes are necessary in the control and the engine program to change between 50 Hz and 60 Hz.

R12 Voltage adjustment potentiometer. Allows adjusting the output voltage.

Battery switch

The battery switch is located inside the soundproof frame. It allows opening or closing the connection between the battery and the engine circuits.



Never disconnect the battery switch with the engine running.

Qc4002™MkII operation and configuration



Before configuring the controller, make sure that the Qc4002™ MkII is NOT in AUTOMATIC mode. To prevent the unit from inadvertently automatically start. Moreover, in the AUTO mode some parameters will not be available.

Start

- Place the battery switch in ON.
- Set S20 button to the ON position (connected) in order to activate the Qc4002™ MkII controller.

- Select the right type of application and the right mode in Qc4002™ MkII module (refer to "Description of applications" at page 44 to know the selections you can make).
- Make the right cable connections and program the applicable parameters (for further information refer to "Standard applications" at page 39).
- When in SEMI-AUTO mode:
 - Depress the ON button to start the generator.
 - Leave the generator start and run until the frequency is OK (U/F indicators OK).
 - Depress the open/close button of the generator breaker (GB) to close the generator breaker.
- When in AUTO mode:
 - The generator automatically starts and closes the contactors, according to the selected application.

During operation

Regularly conduct the following inspections:

- Checking the screen for normal readings. Prevent the engine to run out of fuel.
-  **If this happens, fuel injection accelerates the start.**
- Check for oil, fuel, or cooling water leakages.
-  **Avoid long periods of minimum load (< 30%) If these happens, a high consumption of engine oil may occur. Refer to "Avoid low loads".**

- When connecting single-phase loads to the generator output terminals, keep all loads perfectly balanced.
- If circuit breakers trip during the operation, disconnect the load and stop the generator. Check the load and, if required, reduce it.



Never disconnect the battery switch with the engine running.



During generator running, the related covers can only remain open during short periods, for example, for conducting inspections.

Shutdown

- When in SEMI-AUTO mode:
 - Depress the open/close button of the generator breaker (GB) to open the generator breaker.
 - Depress once the STOP button to stop the generator. The unit will enter the cooling mode and will stop after the cooling period.
 - Depress twice the STOP button to immediately stop the generator, without cooling.



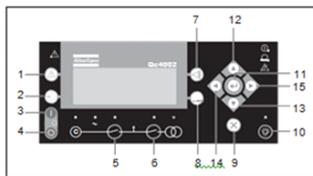
Unit improper cooling may cause serious damage to the engine!

- When in AUTO mode:
 - The generator is automatically disconnected, depending on the selected application.
 - If you want to stop manually the generator, first select the SEMI-AUTO mode and follow the procedure to stop in the SEMI-AUTO mode.

Setting up the Qc4002™ MkII

Functions of pushbuttons and indicator lights

The Qc4002™ MkII has the below listed pushbuttons

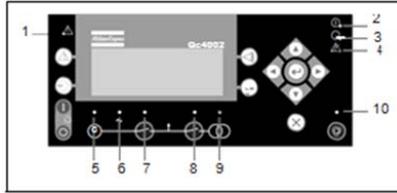


- 1  **INFO:** Changes the screen 3 lines below and displays the alarm list.
- 2  **JUMP:** Introduces the selection of a specific menu number. All the definitions are associated to a specific number. The JUMP button allows the user the selection and display of any definition without having to scroll all the menus.
- 3  **ON:** Starts the generator set if the mode SEMI-AUTO or MANUAL is selected'
- 4  **STOP:** Stops the generator set if the mode SEMI-AUTO or MANUAL is selected.

- 5  **GB:** Manual activation of the closing and opening sequence of the circuit breaker if the SEMI-AUTO mode is selected.
- 6  **MB:** Manual activation of the closing and opening sequence of the circuit breaker if the SEMI-AUTO mode is selected.
- 7  **VIEW:** Changes the display of the first line in the setup menus.
- 8  **LOG:** Displays the LOG SETUP window where you can select between Events, Alarms and Battery records. When the auxiliary current is disconnected, records are not cleared.
- 9  **GO BACK:** Goes one step back in the menu (to the previous screen or to the intake window).
- 10  **MODE:** Changes the menu line (line 4) on the screen for mode selection.
- 11  **SEL:** It is used to select the highlighted entry in the fourth line of the screen.

- 12  **UP:** Increases the selected set value (in the setup menu). In the daily use screen, this button function is used to scroll the viewing lines in V1 or to display the second line (in the setup menu) of the generator values.
- 13  **DOWN:** Decreases the value of the selected definition (in the setup menu). In the daily use screen, this button function is used to scroll the viewing lines in V1 or to display the second line (in the setup menu) of the generator values.
- 14  **LEFT:** Moves the cursor to the left to handle the menus.
- 15  **RIGHT:** Moves the cursor to the right to handle the menus.

The Qc4002™ MkII has the below listed indicator lights.



1 Alarm

A flashing indicator light means that there are non acknowledged alarms.

An indicator light with a steady light means that all the alarms are acknowledged.

2 Power

A lit indicator light means that the auxiliary current is ON.

3 Self Check OK

The indicator light shows that the self-check is stabilized.

4 Alarm inhibit

The indicator light shows that one of the alarm inhibition functions is active.

The indicator light is automatically disconnected. No measures shall be taken.

5 Run

A lit indicator light means that the generator is running.

6 U/F OK

A green lit indicator light means that voltage/frequency is present and stabilized.

7 (GB)LIG.

A green lit indicator light means that the generator breaker (GB) is closed.

A yellow lit indicator light means that the generator circuit breaker (5) has received a closing command but did not close due to an interconnection with GB.

An orange lit indicator light means that the signal "spring loading time" of the circuit breaker is absent.

8 (MB)

A lit indicator light means that the mains current circuit breaker (MB) is closed.

9 Mains voltage

A green lit indicator light means that the mains current is present and stabilized.

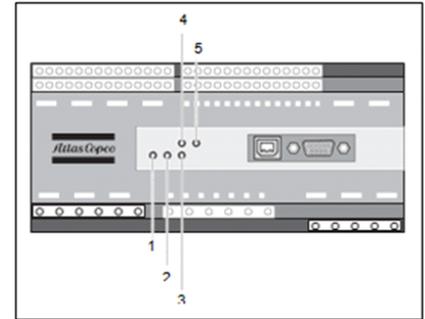
A red lit indicator light means that a mains current fault was detected.

The indicator light flashes with green light when the supply is reestablished during the "waiting time of mains current OK".

10 AUTO

If the indicator light is on, it means that the automatic mode is selected.

The Qc4002™ MkII main control unit has 5 indicator lights.



1 Power

A green lit indicator light means that the current is connected.

2 Self check OK

A green lit indicator light means that the unit is OK.

3 Alarm inhibit

A green lit indicator light means that the inhibition is ON (activated).

4 CAN2

5 CAN1

Both LEDs of CAN networks are data traffic indicators in these networks.

Qc4002™ Menu Description

Main view

The Screen has 4 different lines. The information of the lines may be different, depending the line you are using. There may be 4 main screens: SETUP / V3 / V2 / V1.

Setup screen

```
QC4002 V. 1.00.0
2002-11-21 16:08:11
SETUP MENU
SETUP V3 V2 V1
```

View V1

```
Run Time 0Hour
Fuel Level 100%
2002-11-21 16:08:11
SETUP V3 V2 V1
```

View V2

```
G 0 00A
G 0,001 PF 0kW
G 0kVA 0 kvar
SETUP V3 V2 V1
```

View V3

```
Island SEMI_AUTO
G 0,001 PF 0kW
G 0kVA 0 kvar
SETUP V3 V2 V1
```

The user can scroll the screens with the scroll buttons:

- The SETUP screen displays the module name, the software version, date and time.
- In V1 view the user can scroll 15 configurable screens displaying the different measurements of generator, bulbar and mains current.
- V2 view displays some generator measurements.
- V3 displays the type of application, the mode, as well as some generator measurements. During synchronization, V3 displays a synchronization picture in the first line.

SETUP menu

It allows programming protection and control parameters depending on the application. You can do this, by scrolling the setup menu until the appropriate parameter. Each parameter has a specific channel number and it is listed in one of the 4 SETUP main menus:

- safety and protection parameters (PROT): Channels 1000 to 1999 (at intervals of 10).
- Control parameters (CTRL): Channels 2000 to 2999 (at intervals of 10).

- I/O setups: Channels 3000 to 5999 (at intervals of 10).
- System parameters (SYST): Channels 6000 and above (at intervals of 10).

By selecting SETUP, the following screen is obtained:

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

The fourth line is the input selection for the menu system. By depressing SEL button, the underlined menu is accessed.

By selecting PROT, the following screen is displayed (parameter example):

```
G 0,001 PF 0kW
1000 G-P> 1
Set point -5,00%
SP DEL 0A 0B ENA FC
```

In a protective function, the first input displays the definition of "generator reverse power (G -P> 1)".

By scrolling down, all the protective parameters are displayed:

- The first line shows some generator data
- The second line shows the channel number and the parameter name
- The third line shows the value of one setting of this parameter.
- The fourth line shows the possible settings.In this example:

SP

SET POINT, the definition point of the alarm is set in the definition point menu.The definition is a percentage of the rated values.

DEL

DELAY is the definition of a time interval from the moment of adjusting the alarm until the moment the alarm occurs.

OA

OUTPUT A, a relay can be activated from output A.

OB

OUTPUT B, a relay can be activated from output B.

ENA

ENABLE, the alarm can be activated or deactivated.ON means that it is always activated.

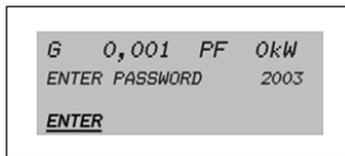
Run means that the alarm is in operation status.This means it is activated when the operating status signal is present.

FC

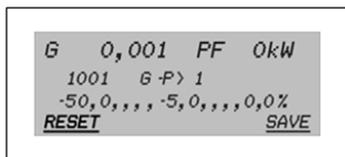
FAIL CLASS, when the alarm occurs, the unit will react depending on the type of selected error.

The user can scroll this list and select a definition with the SEL button.

After having selected SP, the following screen is displayed:



If the right password is entered, the following screen is displayed:



The user may change the SP of parameter "G-P>1".This can be done with the scroll buttons.After this, the user has to select SAVE to save the new definitions.

To exit, the user has to depress several times the GO BACK button until the main screen is displayed.

The **JUMP** button

If the specific parameter channel number is known, instead of browsing throughout the menu, the user can directly go to the desired parameter.

If the JUMP button is depressed, the password window is displayed.Not all the parameters can be changed by the final user.The required password level for each parameter is shown in the setting list.

With the JUMP button, the following menus can be accessed:

- 9000 Software version
- 9020 Service port
- 911X User password

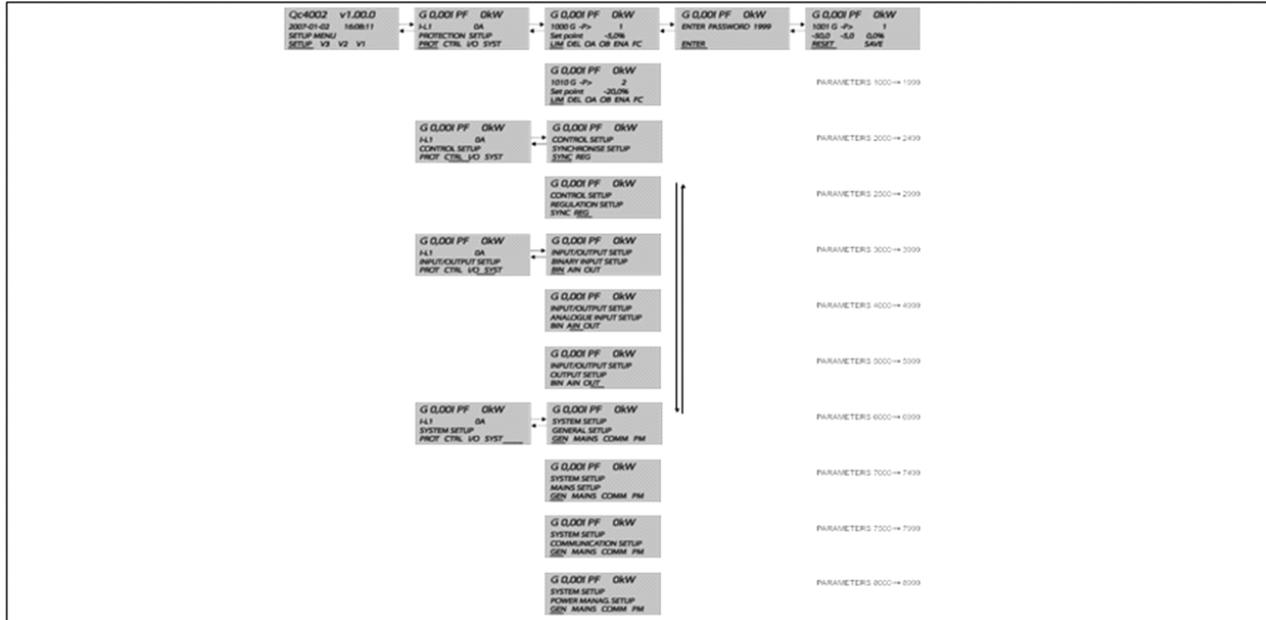
Level 2 and Level 3 passwords can only be defined through the Atlas Copco's utility software for PC.

- 9120 Service menu
- 9130 Single/Split/Three phase
- 9140 Angle comp. BB/G

Use the UP and DOWN to change the settings and the SEL button to write the new settings.

Changing definitions

Menu sequence:



The menu sequence is the same in CONTROL SETUP, I/O SETUP and SYSTEM SETUP.



For further information on the setup menu, refer to the Qc4002™ MkII User Manual.

Enter passwords

To change the different parameters, different password levels are required. For safety reasons, some parameters cannot be changed by the final user.

There are 3 different password levels:

- User password (default value 2003)
- Service password
- Main password

Once having entered the password, the user can change all the parameters he is able to access.

The user can change the customer password (go to channel 9116 with the JUMP button)

Languages

English is the factory default language.

Changing the parameters

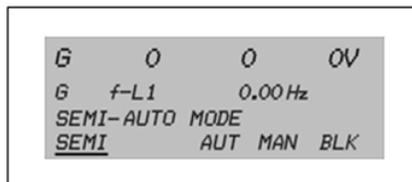
Refer to the Qc4002™ MkII user manual for all the parameters at customer level, that can be accessed through the "2003" password.

For getting default parameters for your unit, contact Atlas Copco customer service.

Standard modes

The unit has four different running modes and one block mode. The desired mode shall be selected through the MODE pushbutton. Depress the button until the desired mode is displayed on the screen, after this, depress SEL to select or GO BACK to cancel.

When the MODE pushbutton is depressed, the following screen is displayed:



Auto mode

In this mode, the Qc4002™ MkII automatically controls the generator set and the circuit breakers (GB of the generator and MB of the mains current) depending on the running status.



In the AUTO mode, STOP button and open/close button of GB do not work.

Semi-Auto mode

In the semi-auto mode the operator has to start all the sequences. This can be done using the functions of pushbutton, modbus commands and digital inputs. The generator set, when stated in the automatic mode, runs at rated values.

Test mode

It allows the user to regularly test the generator. The generator runs a predetermined sequence of actions.

This way, it is possible to run the following tests:

- Simple test
- Load test
- Full test

Manual mode (Man)

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



When the AUTO mode is selected, the Man mode cannot be selected. To go from AUTO to Man mode, it is first necessary to go to SEMI-AUTO mode, in order to have the Man mode available.

Block mode

When the block mode is selected, the unit does not run certain actions. Which means that it is not possible to start the generator set or to run any circuit breaker operations.

To change the running mode from the screen, a password is prompted to the user before making the change. It is not possible to select the block mode when the running feedback is present.

The purpose of the block mode is to make sure that the generator set does not start, for example, during maintenance work. If digital signals are used to change the mode, it is important to know that the setup output for the block mode is a constant signal. When it is active (ON), the unit is at a block status, and when it is deactivated (OFF) it comes back the previously selected mode.

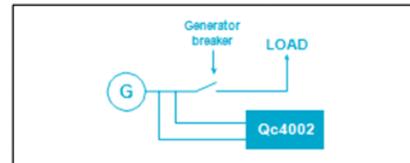
This generator is sized and predefined to run on ISLAND mode, AMF mode or in parallel with other generators.

For other applications refer to Atlas Copco before making the connections.

Generator Set Mode	Running Mode				
	Auto	Semi	Test	Main	Block
Automatic network fault (without advanced synchronization)	X	(X)	X	X	X
Automatic network fault (with advanced synchronization)	X	(X)	X	X	X
Island operation	X	X		X	X
Fixed power/base load	X	X	X	X	X
Peak distribution	X	X	X	X	X
Load take over	X	X	X	X	X
Exporting network power	X	X	X	X	X
Transformer maintenance		X			
Circuit breaker assemblies, load sharing	X	X		X	X
Circuit breaker assemblies, power management	X	(X)	X	X	X

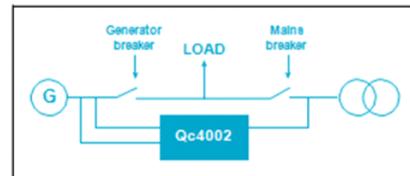
Depending on the application, the user may need to connect additional cables to X25 terminal blocks. These terminal blocks are inside the control box installed on a DIN trough. Refer to the circuit diagram to make the connections properly.

Island operation



This application is only possible in combination with the SEMI-AUTO or AUTO modes. The real-time internal clock can only be used in AUTO. This type of operation is selected for installations with one or more generators, but always without electric mains (= off-line). In practice, a maximum number of 16 generators can be installed in parallel.

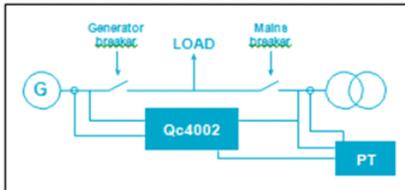
Running with Auto Mains Failure (AMF)



This application is only possible in combination with the AUTO mode. If the SEMI-AUTO mode is selected, AMF running CANNOT be used! The unit automatically starts the generator set and switches to generator current in case of mains failure, from a defined time for starting.

- AMF without advanced synchronization:
When the mains current returns, the unit switches to mains supply, cooling and stopping the generator set. The mains supply return is made without advanced synchronization when the adjusted "waiting time of mains current OK" expires.
- AMF with advanced synchronization:
When the mains current returns, the unit synchronizes the mains circuit breaker with the busbar when the "waiting time of mains current OK" expires. After this, the generator set cools and stops.

Running with Peak Shaving (PS)

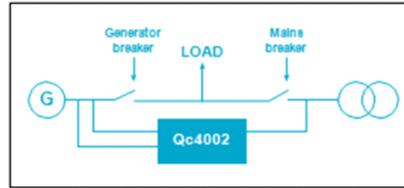


This application is normally used in combination with the AUTO mode. Installation with mains current.

The generator starts if the power from the current imported from the mains (measured with an optional current transducer = PT) exceeds the defined level. The generator synchronizes itself with the busbar and supports the load until the value defined for the imported mains current is achieved.

If the imported mains current power decreases below the defined level of the imported current power, the generator unloads and disconnects itself from the bus. Then it enters in the running-in mode.

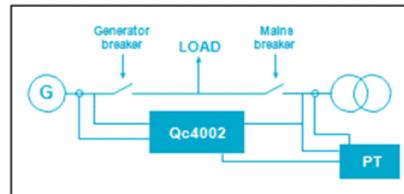
Running with Fixed Power (FP)



This application is only possible in combination with the SEMI-AUTO or AUTO modes. It is normally used in combination with the SEMI-AUTO mode in installations with mains current. The real-time internal clock can only be used in the AUTO mode.

The generator delivers a fixed power to the load or the mains current.

Load Take Over (LTO) running

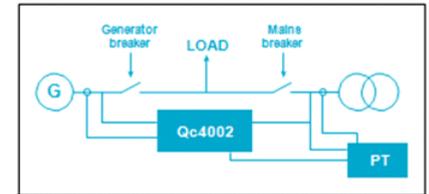


This application is normally used in combination with the SEMI-AUTO or AUTO mode in installations with mains current.

The purpose of the load take over mode is to transfer load imported from the mains to the generator set, just for running with the generator current.

The generator is started, synchronized and gradually released from the current load before opening the current circuit breaker. To make sure that the mains current was fully substituted, an optional power transducer is required.

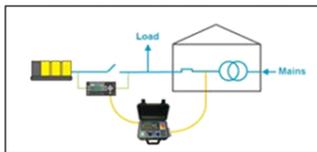
Mains power export (MPE) running



This application is only possible in combination with the SEMI-AUTO or AUTO modes. The real-time internal clock can only be used in the AUTO mode. The installation is run with mains current.

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

Transformer maintenance (TM) operation



This application is normally used in combination with the SEMI-AUTO mode in installations with mains current. It is only applied in combination with a transformer maintenance box.

The objective of the transformer maintenance mode is to make possible the repair or maintenance work in a transformer when disconnecting the mains from the system.

The generator starts and synchronizes itself with the busbar to get connected to the electric system. When the generator is synchronized, the generator circuit breaker closes and the generator starts to take over the load. When the mains power is zero, mains circuit breakers are disconnected and the fuses are removed.

After the transformer repair or maintenance work, the generator will be synchronized again with the mains and the fuses can be restored. The current goes again from the generator to the mains, before disconnecting.

Conjuntos disjuntor múltiplos com partilha de carga.

In this application, the units can share the active and reactive load in equal percent of the rated power. Load sharing is active when each one of the generator sets is running in the island mode, and the generator circuit breaker is closed.

Multiple generator sets with power management (PMS)

PMS (= Power management System) is a system that automatically starts and stops the generators in terms of the current load dependency. This is made by means of a PMS communication between the several connected units.

PMS applications are always in combination with the AUTO mode. If the SEMI-AUTO mode is selected, PMS running CANNOT be used! Qc4002™ MkII controllers of the generators sets shall be programmed as PMS in the AUTO mode. When a mains current controller Qc is installed, it shall be programmed in the application where it is required (AMF, LTO, FP, MPE) and in the AUTO mode.



When parameters are programmed in the AUTO mode, the generator can immediately start. It is recommended to put the generator in the SEMI-AUTO mode when programming all the PMS parameters!

Installations are possible with independent generators with or without the mains current (where

the use of Qc4002™ MkII extra network is necessary). The number of Qc4002™ MkII units is used in the power management application, for example, one for each mains circuit breaker (Qc4002™ MkII mains controller), if installed, and one for each generator (Qc4002™ MkII generator controller). All units communicate by means of an internal CAN bus connection.

In an application with PMS, it is important to correctly program the start and stop signals between the different generators, for the following reasons:

- The maximum load transfer needs to be programmed in the Qc4002™ MkII controllers. It can never exceed the power reserve of the running generators. Otherwise, the generator sets will transfer the overload with a maximum sudden load increase before the next generator getting started and connected to the busbar.
- To prevent the generator sets from entering in a start- stop cycle.

he start signal is the value of the maximum load transfer value.

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

For example: Installation with 3 generator sets G1 = 300 kW; G2 = 200 kW; G3 = 200 kW.

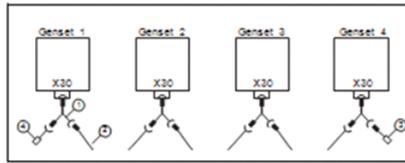
- The start signal is set at 90 kW (maximum load transfer < 90 kW).
Start signal if:
Total necessary power > (total available power of the running generator sets - start signal setpoint).

- Only G1 runs; with a load of 210 kW (300 kW - 90 kW) => G2 starts.
- G1 and G2 are running; with a load of 410 kW (200 kW + 300 kW - 90 kW) => G3 (generator 3) starts.
- The stop signal is defined at 100 kW and the priority is defined for (high) G1 > G2 > G3 (low).
Stop signal if:
Total necessary power <(Total available power of the running generator sets- Power of the generator with lowest priority - defining stop signal).
- G1, G2 and G3 are running; with a load of 400 kW (700 kW - 200 kW - 100 kW) => G3 stops.
- G1 and G2 are running; with a load of 200 kW (500 kW - 200 kW - 100 kW) =>G2 stops.

The priorities for starting and stopping the generators can be selected from the priority definitions or in the number of service hours. In the manual mode, the start and stop sequence is determined by the priority selected between the generators. The generator with the lowest priority will start last and will stop first. If service hours are selected as priority, the start and stop sequence will be defined based on the current service hours of the different generators. The lowest running hours will have the highest priority.



When the generators are operating in parallel with PMS, it is no longer necessary to use the analogous load sharing lines. This will be done through the PMS communication lines.
Use a shielded CAN communication cable, with a maximum total length of 200 meters. Do not ground the cable shield! Use a 120-ohm resistor in both PMS end controllers.



1= Sharer, 2= Cable, 3= End resistor (male), 4= End resistor (female).

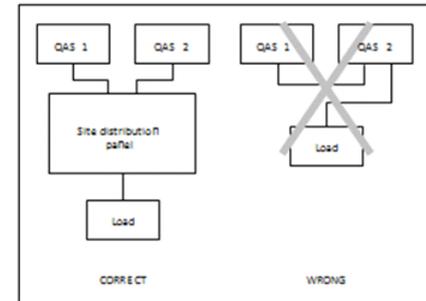
Parallel running (synchronization)

Before starting the parallel running of two generators, the following connections shall be made:

- Connect the communication cable between the two generators when connecting the adapter to X30 outlet.
- Connect the load to the generator.

Though the distribution panel (to be installed by the customer), connect the generator(s) to the load.

Always connect the generator with the load and never directly with a second generator.



When making the parallel connection, make sure the Ground Leakage Relay (if any) was deactivated, setting S13 switch to the OFF position.

Description of the applications

Electrical installations with only 1 generator

Type of application	Mode	Comments
Island operation	SEMI-AUTO mode	= Local start
	AUTO mode	= Remote start
AMF operation	(SEMI-AUTO mode)	The AMF operation will not run correctly!
	AUTO mode	= Emergency start at mains current failure
Peak distribution	SEMI-AUTO mode	Only as Power Transducer (*)
	AUTO mode	Only as Power Transducer (*)
Fixed power	SEMI-AUTO mode	
	AUTO mode	
Load take over	SEMI-AUTO mode	Only as Power Transducer (*)
	AUTO mode	Only as Power Transducer (*)
Exporting network power	SEMI-AUTO mode	Only as Power Transducer (*)
	AUTO mode	Only as Power Transducer (*)
Transformer maintenance	SEMI-AUTO mode	Only as transformer maintenance box



(*) A power transducer is a device that measures the real power of the mains current and converts it into a 4 - 20 mA signal for the Qc4002™ MkII module. For further information, contact Atlas Copco.

Installations with multiple generators

Type of application	Mode	Comments
Island operation	SEMI-AUTO mode	= Make the parallel connection manually between the generators
	AUTO mode	= Make the parallel connection manually between the generators
AMF operation	SEMI-AUTO mode	The AMF operation will not run correctly!
	AUTO mode	PMS QC4002TM MkII Mains module (**)
Peak distribution	SEMI-AUTO mode	PMS QC4002TM MkII Mains module (**)
	AUTO mode	PMS QC4002TM MkII Mains module (**)
Fixed power	SEMI-AUTO mode	PMS QC4002TM MkII Mains module (**)
	AUTO mode	PMS QC4002TM MkII Mains module (**)
Load take over	SEMI-AUTO mode	PMS QC4002TM MkII Mains module (**)
	AUTO mode	PMS QC4002TM MkII Mains module (**)
Exporting network power	SEMI-AUTO mode	PMS QC4002TM MkII Mains module (**)
	AUTO mode	PMS QC4002TM MkII Mains module (**)
Power management system	SEMI-AUTO mode	PMS QC4002TM MkII Mains module (**)
	AUTO mode	PMS QC4002TM MkII Mains module (**)

(**) The power management system (PMS) allows the communication between Qc4002TM MkII modules over the CAN-bus. It is a totally intelligent system that makes the generator start/load/stop depending on the real load and the load status of each generator. The installation can have over 16 Qc4002TM MkII modules. If the mains current is included in the installation, an additional Qc4002TM MkII module is required. The installation can be monitored and controlled by the PMS software package. For further information on this application, contact Atlas Copco.

- Each installation has to be very carefully prepared and reviewed before the startup. Wrong or non complete connections may damage the installation!
- Each application requires a specific combination of the following parameters:
 - Auto / Semi-auto / Test / manual / Block mode.
 - Type of applications Island / AMF / PS / FP / LTO / MPE / PMS / TM (in AUTO PS / FP / LTO mode can be combined with AMF).
 - Activated/deactivated counter synchronization (parameter channel 7080).

The improper setting of parameters can seriously damage the electrical installation!
- To be able to start at low temperatures, parameter 6181 (start preparation) can be changed to a higher value, in order to obtain a preheating stage. Do not set this value at over 60 seconds in order to prevent damages.
- For further information on Qc4002TM MkII module and its applications, refer to the Qc4002TM MkII user manual and the Qc4002TM application data sheets. If further information is needed, contact Atlas Copco.

Running instructions



For your own interest, rigorously comply with all relevant safety instructions.

Never exceed the limitations stated in the generator Technical Specifications. When connecting the load distribution panels, the circuit breakers or the loads to the generator, local regulations shall be complied with regarding low-voltage (below 1000 V) installation connections.

Before a new start and whenever a new load is connected, it is necessary to check the generator ground connection. The ground connections shall be established either through a grounding electrode (if any) or through a suitable grounding installation. The protection system against excessive touch voltage is only effective when an appropriate ground connection exists.

The generator is connected to a Ground-Neutral system as per IEC 364-3, i.e., there is a point in the power supply directly connected to ground, in this case the neutral. The exposed conductive elements of the electrical installation shall be directly connected to the functional ground.



If the generator runs in other power current system, for example, in an IT system, other protective devices shall be installed for those specific types. In any case, only a qualified electrician is authorized to remove the connections between neutral and the ground terminals in the alternator terminal box.

Installation

- Place the generator on an horizontal, leveled and resistant floor. Maximum working inclination 10 degrees.
- Generator doors shall be kept closed, to prevent entry of water and dust. The entry of dust decreases filter duration and may impair the generator performance.
- The engine exhaust pipe shall not be directed to the personnel. If the generator runs in a closed space, install an exhaust pipe with enough diameter to conduct exhaust gases to the outside. Check if there is enough ventilation to prevent cooling air recirculation. If necessary, refer to Atlas Copco.
- Leave enough room for the generator running, inspection and maintenance (at least 1 meter from each side).
- Check if the internal grounding system complies with local legislation.

- Use a coolant in the engine cooling system.
- Check bolt and nut tightness. See page 71.
- Install the grounding cable as close as possible to the generator and make sure that the touch voltage is not higher than 25 V.
- Check if the end of the grounding electrode cable is connected to the grounding terminal.

Generator connection

Precautions in case of non-linear and sensitive loads



Non-linear loads originate current with high harmonics content, causing a distortion in the voltage waveform generated by the alternator.

The most common three-phase, non-linear loads, are loads controlled by thyristor rectifiers, such as converters supplying voltage to variable speed motors, uninterrupted supply currents (UPS) and telecommunication currents. Gas-discharge lighting arranged in single-phase circuits generate high 3rd order harmonics, with a risk of recording an excessive neutral current.

The most sensible loads to voltage distortion include incandescent lamps, discharge lamps, computers, X-ray equipment, audio amplifiers, and elevators.

Refer to Atlas Copco about the measures to be taken against the damaging influence of non-linear loads.

Cable quality, minimum sectional area and maximum length

The cable connected to the generator terminal shall comply with the local regulations.

Cables shall be dimensioned according to Brazilian standard NBR 5410, considering the following conditions: type of installation, current-carrying capacity, working ambient temperature, limits of network/cable voltage drop and cable length.

Voltage drop based on a known conductor sectional area, can be calculated as follows:

$$\Delta V(\%) = \frac{\Delta V_{pu} \cdot \ell \cdot I \cdot 100}{V}$$

$\Delta V(\%)$ = Percent voltage drop (%)

$$\Delta V_{pu} = \text{Unit voltage drop} \left[\frac{V}{A \cdot km} \right]$$

I = Current to be carried [A]

ℓ = circuit length, from the supply point to the load (km)

V = Line rated voltage [V]

The table below suggests the cable sectional area to be used, according to the working model and rated voltage.

For the below given values, shall be used EPR 130°C cables, considering a distance up to 30 m from the equipment supply base.

Consider 2 cables per phase

	220V	380V	400/440V
QAC 1100 Sd	2 X 240 mm ²	2 X 120 mm ²	2 X 95 mm ²

Load connection

Unit distribution panel

If there are output outlets, it shall be mounted in a local distribution panel supplied by the generator terminal panels and in accordance with the local regulations in force for building installations.

Protection



For safety reasons, it is necessary to have an isolator switch or circuit breaker in each load circuit. Local legislation may impose the use of isolator devices that can be blocked.

- Check if the frequency, voltage and current match the generator specification.
- The power supply cable length shall not be excessive, the cable shall be arranged in a safe way, preventing to get bent.
- Open the control panel door and that of the indicating instrument and the transparent door in front of X1 terminal panel.
- Put the ends of proper cable connections on the cable terminals.
- Release the cable fastening clip and introduce the load cable wire ends in the hole and in the clip.
- Connect the wires to the proper X1 terminals (L1, L2, L3, N and PE) and tighten firmly the screws.
- Tighten the cable fastening clip.
- Close the transparent door in front of X1.

Before startup

- With the generator already leveled, check the engine oil level and refill if necessary. The oil level shall be close, but without exceeding the upper mark of the engine oil dip stick.
- Check the coolant fluid level in the expansion tank of the engine cooling system. If necessary, add coolant fluid.
- Drain all the coolant fluid and sediments existing in the fuel pre-filter.
Check the fuel level and refill if necessary. It is recommended to fill the container at the end of a work day to prevent the condensation of coolant fluid vapor that occurs in a nearly empty reservoir.
- Check the air filter vacuum indicator. If the red portion is totally visible, replace the filter element.
- Depress the air filter vacuum valve to remove the dust.
- Make sure that the generator does not show leakages, and check the tightness of wire terminals, etc. Correct, if necessary.
- Check if F10 fuse is not activated and if the emergency stop is in the DEACTIVATED position.
- Check if the load is disconnected.
- Check if Q1 circuit breaker is disconnected.
- Check if the ground fault protection (N13) has not tripped (connect again, if necessary).

Maintenance

Maintenance chart



Before performing any maintenance operation, check if the start switch is in the O position and if there is not any current in the terminals.

It is recommended to weekly check and drain the points indicated in the chassis, since the engine breathing and other fluid may be precipitated in the watertight area.



Attention!

When using non original filters and parts, the engine and alternator service life can be impaired, and this may cause in the engine a fault in the fuel injectors, wear in rings and jackets, piston blocking and/or more severe faults that may cause engine block, leaving the machine out of operation.

Activies	INTERVALS			
	Daily	500h Quartely	1000h Annually	2000h Bi-annually
ALTERNATOR				
Check and remove dust, oil and dirt that may have accumulated inside the Generator. (2)		X	X	X
Check voltage level at the three phases, including the neutral, if necessary adjust at the panel potentiometer.		X	X	X
Check the transient response of U/Hz and adjust in the regulating board if necessary. For this purpose use the regulating board manual. This activity shall be made by a duly trained technician. (2)			X	X
Check the proper positioning of the regulating board and its electric contacts.		X	X	X
Check the supply cables. They shall not touch sharp edges. If necessary, correct cable path.			X	X
Check the tightness of electrical connection, mainly at the supply, neutral and grounding cables		X	X	X
ENGINE				
Check oil level (engine sump) – (2)	X	X	X	X
Replace lube oil and filter (2)		X	X	X
Drain the water in the primary filter and fuel tank	X	X	X	X
Replace the primary and secondary fuel filter (1) (2) (4)		X	X	X
Adjust clearance of intake and exhaust valves (2)			X	X
Inspect belt and adjust if required (2)	X	X	X	X
Replace the belt (2)				X

Activities	INTERVALS			
	Daily	500h	1000h	2000h
		Quarterly	Annually	Bi-annually
ENGINE				
Inspect the coolant fluid (2) (3)	X	X	X	X
Replace coolant fluid (2)				X
Inspect alternator (2)				X
Inspect starter (2)				X
Inspect turbocharger (if fitted) – (2)				X
Inspect water pump (2)				X
UNIT				
Check general condition (damaged parts, loose nuts and bolts, problems in previous operations, color of the exhaust gases)	X	X	X	X
Check the oil, water and fuel level before starting and during operation	X	X	X	X
Clean the dust collector of air filters before starting	X	X	X	X
Replace the air filter elements (1)			X	X
Externally clean the unit (1)		X	X	X
Lubricate door hinges, clamps, towing bar eye and moving parts (1)		X	X	X
Check for possible leaks of fuel oil, lube oil and coolant fluid	X	X	X	X
Internally clean the fuel tank (1) (4)			X	X
Check battery and terminals		X	X	X
Check protection devices (1)			X	X
Clean the drain separator element (where fitted) (5)		X	X	X
Inspection performed by a technician from Atlas Copco			X	X

Notes:

1. More often when the compressor operates in an environment with excessive suspended particles.
2. Refer to the operation and maintenance instruction manual for the engine or alternator.
3. Check additive concentration every 500 hours of operation. Change the coolant fluid every 2000 hours of operation.
4. Replace fuel filters regularly. Glued or clogged filters cause bottlenecks in the passage of fuel and reduce engine performance. **Replacement frequency depends on fuel quality.**
5. Refer to the instruction manual for the generator.



The recommendation of the engine manufacturer regarding the use of biodiesel is "B5" classification (which consists in 5% biodiesel and 95% diesel from conventional petroleum). **The use of biodiesel out from the specification recommended in this manual may cause damage to the engine fuel system and voids the product warranty.**

Engine maintenance

Refer to the engine instruction manual for clarifications about complete maintenance, including instructions about change of oil and coolant fluid and replacement of fuel, oil and air filters.

Alternator insulation resistance measurement

It is required a 500 V mega-ohmmeter to measure the alternator insulation resistance.

If the N terminal is connected to a grounding system, disconnect it from the grounding terminal.

Disconnect the automatic voltage regulator (AVR). Connect the mega-ohmmeter between grounding terminal and L1 terminal, and generate a 500-V voltage. The scale shall indicate a resistance value of at list 100 MΩ.

For further details, refer to running and maintenance instructions.

Engine fuel specifications

For fuel specifications, contact Atlas Copco.

Engine oil specifications



It is recommended the use of lubricating oils with Atlas Copco brand.

It is recommended synthetic or hydraulic hydrocarbon, high-quality mineral oil, with oxidation and rust inhibitors and with anti-foam and anti-wear properties.

The viscosity grade at ambient temperature shall meet ISO 3448, as stated below.

Engine	Type of lubricant
between -15°C and 40°C	PAROIL E 500 ULTRA
between -25°C and 40°C	PAROIL EXTRA



Engine oil change periods refer to the use of Atlas Copco's Par Oil E 500 Ultra. In case of using an oil with lower specification, the engine oil change period will be reduced to 250 hours.

PAROIL specifications

PAROIL Atlas Copco lubricant is the ONLY oil tested and approved to be used in all diesel engines attached to Atlas Copco generators.

Extensive laboratory and field duration tests on Atlas Copco equipment have proven that PAROIL meets all lubrication needs under several conditions.

It meets the severe quality control specifications in order to ensure a safe operation of the equipment.

PAROIL quality lubricant additives allow longer oil change intervals without losing performance or long life.

PAROIL provides wear protection under extreme conditions. Powerful antirust agents and a high chemical stability contribute to corrosion protection, even in the case of machines remaining inoperative over longer periods.

PAROIL contains high-quality antirust agents to control deposits, sludge and contaminants that may form under very high temperatures.

PAROIL detergent additives keep the sludge-forming particles in a fine suspension instead of allowing them to clog its filter in the cover area of the rocker valve.

PAROIL efficiently dissipates excess heat, while keeping an excellent surface protective film of the gauge in order to control oil consumption

PAROIL has an excellent TBN retention and higher alkalinity to control acid formation.

PAROIL prevents soot formation.

PAROIL is optimized for the last generation of low-emission engines as per EURO -3 & -2, EPA TIER II & III, using diesel oil with low sulphur content for lower oil and fuel consumption.

PAROIL E is mineral-based oil for high performance diesel engines with high viscosity coefficient. Atlas Copco PAROIL E 500 Ultra was designed to provide a high level of performance and protection under standard environmental conditions from -15°C (5°F).

PAROIL E 500 ULTRA (Only Brazil Market)	Liters	Ordering number
gallon	4	1028 8735 00
gallon	20	1028 8735 01
barrel	200	1028 8735 02

PAROIL E	Liters	Ordering number
gallon	4	1615 5953 00
gallon	20	1615 5954 00
barrel	200	1615 5955 00

Checking engine oil level

Refer to the engine instruction manual to obtain information on the oil specifications, viscosity recommendations and oil change intervals.

To obtain information on oil change intervals, refer to section "Maintenance chart" at page 37.

Check engine oil level according to the instructions in the engine instruction manual, and add oil if necessary.

Changing oil filter and engine oil

Refer to section "Maintenance chart" at page 37.

Engine coolant fluids specifications



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

The system may be under pressure. Slowly remove the cap and only when the coolant fluid is at ambient temperature. The sudden pressure release, from a hot cooling system, can make the coolant fluid splash and harm somebody.

It is recommended the use of Atlas Copco coolant fluids.

The use of the proper coolant fluid is very important for a good heat transfer and protection of engines cooled by coolant fluid. The coolant fluids used in these engines shall be mixes of good quality water (distilled or non ionized), special coolant fluid additives and, if necessary, antifreeze protection. The use of any coolant fluid that is not recommended by the manufacturer, may cause irreparable damages to the engine.

The coolant fluid freezing point shall be lower than the freezing point of the area where the fluid is used. The difference shall be at least 5°C. If the coolant freezes, it may break the cylinder block, the radiator or the coolant fluid pump.

Refer to the engine instruction manual and observe the manufacturer's instructions.



Never mix different coolant fluids and mix the components out of the cooling system.

PARCOOL EG specifications

PARCOOL EG is the only coolant fluid tested and approved by all the manufacturers of engines currently used in Atlas Copco generator sets.

The Atlas Copco long life PARCOOL EG coolant fluid integrates the new range of organic coolant fluids specially adapted for the demands of modern engines. PARCOOL EG may help to prevent leakages caused by corrosion. PARCOOL EG is also totally compatible with all types of seals and gaskets developed to join the materials used inside the engine.

PARCOOL EG is a ready-to-use coolant fluid based on ethylene glycol pre-mixed in an excellent 50/50 dilution rate, providing and antifreeze protection warranty down to -40°C.

Since PARCOOL EG prevents corrosion, the formation of deposits is highly minimized. This effectively eliminates the problem of an engine coolant fluid, minimizing the risk of engine overheating and possible damages.

It reduces the wear of water pump seals and has an excellent stability when subject to high running temperatures.

PARCOOL EG does not have nitrides and amines to protect health and environment. A longer service reduces the engine coolant fluid amount, minimizing the risk of engine overheating and possible damages generated, and the need of disposal, thus minimizing the environmental impact.

	Liters	Ordering number
gallon	5	1604 5308 00
gallon	20	1604 5307 01
gallon	210	1604 5306 00
gallon	6	1604 8159 00

To ensure the protection against corrosion, cavitation and formation of deposits, the additive concentration in the coolant fluid shall be within the limits established by the manufacturer. It is not allowed to refill the coolant fluid only with water, because this modifies the concentration.

The fluid cooled engine came filled from the factory with this type of coolant fluid mix.

Engine coolant fluid check

Controlling coolant fluid conditions

In order to ensure the product duration and quality and to optimize engine protection, it shall regularly be made an analysis of the coolant fluid conditions.

Product quality may be determined by three parameters.

Visual check

- Check the coolant fluid color and make sure there are no floating loose particles.



Long maintenance intervals, 5-year drain interval, to minimize maintenance costs (when used according to instructions).

pH measurement

- Check the pH value of the coolant fluid using a pH-meter.
- You may order an Atlas Copco refractometer using the ordering number 2913 0029 00.
- EG typical value = 8.6.
- If pH value is lower than 7 or higher than 9.5 the coolant fluid shall be replaced.

Glycol concentration measurement

- In order to optimize the unique PARCOOL EG engine protection functions, the glycol concentration in the water shall be always higher than 33 percent in volume.
- Mixes with a water mix coefficient higher than 68 percent in volume are not recommended since it may cause high engine running temperatures.
- You may order a refractometer to Atlas Copco using the ordering number 2913 0028 00.



In case of a mix with several coolant products, this type of measurement may give incorrect values.

Filling with coolant fluid

- Check if the engine cooling system is in good conditions (without leakages, clean,...).
- Check coolant fluid conditions
- If coolant fluid conditions are not within the allowed limits, replace the whole fluid (refer to section "Replacing coolant fluid").
- Refill always with PARCOOL EG
- Refilling the coolant fluid only with water, modifies the additive concentration and it is not allowed.

Replacing coolant fluid

Draining

- Completely drain the cooling system.
- Throw or send to a recycling facility the used coolant fluid according to local laws and regulations.

Washing

- Wash twice with clean water. Throw or send to a recycling facility the used coolant fluid according to local laws and regulations.
- Find in Atlas Copco instruction manual the necessary PARCOOL EG amount and put it into the radiator upper container.
- If the cleaning work is properly made, the risk of contamination is very low.
- If in the system remains a waste from other coolant fluid, the coolant fluid with the poorer properties influences the quality of the "mixed" fluid.

Refilling

- In order to ensure proper running and air release, run the engine until achieving the normal running temperature. Switch off the engine and let it cool.
- Check again the coolant fluid level and add more if necessary.

Generator storage

Storage

- Store the generator in a dry compartment, with temperature above the freezing point and well ventilated.
- Run the engine regularly, for example once a week, until it warms up. If it is not possible to observe this procedure, take the following additional precaution measures:
 - Refer to the engine operation manual.
 - Remove the battery. Store it in a dry room, with temperature above the freezing point. Keep the battery clean and slightly cover the terminals with lubricating mass. Regularly recharge the battery.
- Clean the generator and keep all the electrical components protected for moisture.
- Place silica-gel bags, volatile corrosion inhibitor (VCI) paper or any other drying agent inside the generator and close the covers.
- With the use of adhesive tape, fasten VCI paper sheets to the frame in order to cover all the openings.
- Wrap the generator, except for the bottom, with a plastic bag.

Preparation for running after storage

Before using again the generator, remove the plastic bag, the VCI paper and the silica-gel bags, and carefully inspect the generator (follow the check list "Before startup").

- Refer to the engine running manual.
- The insulation resistance of the coils should be evaluated by electrical technician if the value reaches values below 100 MΩ.
- Replace the fuel filter and refill the fuel container. Vent the fuel system.
- Install the battery again, recharge it, and if necessary connect it.
- Conduct a generator running test.

Inspections and troubleshooting



Never conduct a running test with the electric cables connected. Never touch an electric terminal without checking the voltage.

In case of failure, always make a report of the situation, before, during and after the damage. In order to obtain a quick fault location, information about the load can be useful (type, dimension, power factor, etc.), vibration, exhaust gas color, insulation check, smells, output voltage, leakages and damaged parts, ambient temperature, daily and normal maintenance and altitude. Also mention all data about humidity and generator location (e.g. close to the sea).

Alternator troubleshooting

<i>Problem</i>	<i>Possible causes</i>	<i>Corrective actions</i>
<i>Alternator outputs 0 Volt</i>	Blown Fuse. Absence of residual voltage.	Replace the fuse. Excite the alternator by applying a 12-V battery voltage with a series resistance of 30 Ω at the + and - terminals of the electronic regulator, observing the polarities..
<i>The alternator continues producing 0V after having been excited.</i>	Broken connections.	Check connection cables, measure winding resistances and compare with values referred in the alternator manual.
<i>No-load low voltage.</i>	Maladjusted voltage potentiometer. Protection operation. Failure in the connections.	Readjust the voltage. Check the frequency/voltage regulator. Check the connections.
<i>No-load high voltage.</i>	Maladjusted voltage potentiometer. Damaged regulator.	Readjust the voltage. Replace the regulator.
<i>Voltage lower than rated value when loaded.</i>	Maladjusted voltage potentiometer. Protection operation. Damaged regulator. Rectifier bridge failure.	Readjust voltage potentiometer. Excessively high current, power factor lower than 0.8, speed lower than 10% of rated speed. Replace the regulator. Check diodes, disconnect cables.
<i>Voltage higher than rated value when loaded.</i>	Maladjusted voltage potentiometer. Damaged regulator.	Readjust voltage potentiometer. Replace the regulator.
<i>Unstable voltage.</i>	Variable engine speed. Maladjusted regulator. Potentiometer STABILITY.	Check rotation regularity. Adjust regulator stability, acting on the control.

Engine troubleshooting

The following table shows a general description of the possible engine troubles and respective causes.

The starter motor switches on the engine too slowly

- Too low battery capacity.
- Bad electrical connection.
- Starter motor failure.
- Wrong lube oil grade.

The engine does not start or is difficult to start

- The starter motor switches on the engine too slowly.
- Empty fuel container.
- Faulty fuel control solenoid.
- Squeezed fuel pipe.
- Faulty fuel pump.
- Dirty fuel filter element.
- Air in the fuel system.
- Faulty atomizers.
- Improperly used cold start system.
- Faulty cold start system.
- Obstructed fuel tank vent openings.
- Wrong fuel type or grade.
- Squeezed exhaust pipe.

Poor power

- Squeezed fuel pipe.
- Faulty fuel pump.
- Dirty fuel filter element.
- Squeezed air filter/purifier or induction system.
- Air in the fuel system.
- Faulty atomizers or wrong atomizer type.
- Obstructed fuel tank vent openings.
- Wrong fuel type or grade.
- Restricted movement of engine speed control.
- Squeezed exhaust pipe.
- Too high engine temperature.
- Too low engine temperature.

Engine fails

- Squeezed fuel pipe.
- Faulty fuel pump.
- Dirty fuel filter element.
- Air in the fuel system.
- Faulty atomizers or wrong atomizer type.
- Faulty cold start system.
- Too high engine temperature.
- Wrong valve clearances.

Too low lube oil pressure.

- Wrong lube oil grade.
- There is not enough lube oil in the collector.
- Damaged indicator.
- Dirty oil filter element.

High fuel consumption.

- Squeezed air filter/purifier or induction system.
- Faulty atomizers or wrong atomizer type.
- Faulty cold start system.
- Wrong fuel type or grade.
- Restricted movement of engine speed control.
- Squeezed exhaust pipe.
- Too low engine temperature.
- Wrong valve clearances.

Black smoke leaving the exhaust pipe.

- Squeezed air filter/purifier or induction system.
- Faulty atomizers or wrong atomizer type.
- Faulty cold start system.
- Wrong fuel type or grade.
- Squeezed exhaust pipe.
- Too low engine temperature.
- Wrong valve clearances.
- Engine overload.

Blue or white smoke leaving the exhaust pipe

- Wrong lube oil grade.
- Faulty cold start system.
- Too low engine temperature.

The engine trips out

- Faulty fuel pump.
- Faulty atomizers or wrong atomizer type.
- Faulty cold start system.
- Wrong fuel type or grade.
- Too high engine temperature.
- Wrong valve clearances.

The engine runs improperly

- Faulty fuel control.
- Squeezed fuel pipe.
- Faulty fuel pump.
- Dirty fuel filter element.
- Squeezed air filter/purifier or induction system.
- Air in the fuel system.
- Faulty atomizers or wrong atomizer type.
- Faulty cold start system.
- Obstructed fuel tank vent openings.
- Restricted movement of engine speed control.
- Too high engine temperature.
- Wrong valve clearances.

Vibration

- Faulty atomizers or wrong atomizer type.
- Restricted movement of engine speed control.
- Too high engine temperature.
- Damaged fan.
- Failure in engine assembling or in the flywheel case.

Too high lube oil pressure

- Wrong lube oil grade.
- Damaged indicator.

Too high engine temperature.

- Squeezed air filter/purifier or induction system.
- Faulty atomizers or wrong atomizer type.
- Faulty cold start system.
- Squeezed exhaust pipe.
- Damaged fan.
- Too much lube oil in the collector.
- Squeezed air tubes or radiator coolant fluid tubes.
- Not enough coolant fluid in the system.

Pressure in engine sump

- Squeezed vent tube.
- Leaking intake tube or faulty exhaust fan.

Bad compression

- Squeezed air filter/purifier or induction system.
- Wrong valve clearances.

Engine starts and stops

- Dirty fuel filter element.
- Squeezed air filter/purifier or induction system.
- Air in the fuel system.

Engine switches off after nearly 15 seconds

- Bad connection to the oil pressure switch/coolant fluid temperature switch.

Circuit diagrams

The engine control circuit diagrams and the power circuit diagrams for the QAC 1100 Sd are:

Current circuit - Qc4002

Unit	Circuit
QAC 1100 Sd:	Complete:1028 8769 17

General information about options

For the QAC 1100 Sd units, the following options are available:

- Spark arrestor
- Earth leakage relay

Battery automatic charger

The automatic charger charges totally the batteries and is disconnected when the unit starts.

In addition to the output terminals (secondary side) the automatic battery charger has a potentiometer for output voltage adjustment. The output voltage can be defined by means of an isolated screwdriver switch or adjustment pin, within an interval of 23.5-27.5 V, respectively 11.8-13.8 V.

The front indicator light shows the unit is operating.

General Description

The CARBAT-0661 battery charger was designed and manufactured with advanced technology and has excellent performance and efficiency; it is ideal for industrial, domestic, marine use, or any other application involving 12V or 24 V lead acid batteries in its system.

The charger is of the HF-switched type, with totally controlled output, where the battery receives constant current during the charge.

With its aluminum case, the product is lightweight and features a fastening support for rails in electric switchboard.

Connection diagram



Figure 01 - Connection

Engine coolant fluid heater

To make sure that the engine is able to start and accept the load immediately after, and external coolant fluid heater (1000 W, 240 V) is installed, which maintains the engine temperature between 38°C and 49°C.

Description of optional items

Spark arrestor

The spark arrestor option prevents burnt particles to leave the exhaust system. This reduces the fire risk under dry conditions to protect the environment and also allows the operation in closed environments where a fire risk exists.

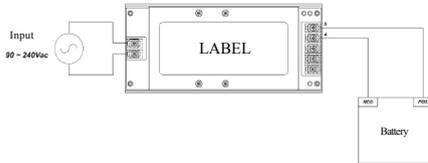
Ground leakage relay

This option is a protection against ground leakage currents.

QC4002TM module

The Qc4002™ MkII module is the controller that allows, among other functions, the synchronization and parallelism between several generators and with the utility company mains. This optional controller is also supplied with a motor-operated circuit-breaker in the generator panel.

Wiring diagram



The automatic battery charger is always supplied with QC4002™ controllers.

Technical specifications

Technical specifications for QAC 1100 Sd

Indicator instrument readings

Indicator	Reading	Unit
Ammeter L3 (P3)	Below the max rated value	A
Voltmeter (P4)	Below the max rated value	V

Switch adjustment

Switch	Function	Actuates at
Engine oil pressure	Total shutdown	0,5 bar
Engine coolant fluid temperature	Total shutdown	103°C

Engine/alternator/unit specifications

	QAC 1100 60Hz	QAC 1100 50Hz
<i>Reference conditions 1) 4)</i>		
Rated frequency	60 Hz	50Hz
Rated speed	1800 rpm	1500 rpm
Generator service	PRP	PRP
Air inlet internal pressure	100 kPa	100 kPa
Air relative humidity	30%	30%
Air inlet temperature	25°C	25°C

QAC 1100 60Hz

QAC 1100 50Hz

Limitations 2)

Maximum ambient temperature	See derating curve	See derating curve
Maximum altitude	5000 m	5000 m
Maximum atmospheric relative humidity	85%	85%
TMinimum starting temperature	-10°C	-10°C

Application data 2) 3) 5)

Active rated power (PRP) 220/400/440V	800,0 kW	800,0 kW
Active rated power (STBy) 220/400/440V	880,0 kW	849,6 kW
Active rated power (COP) 220/400/440V	640,0 kW	640,0 kW
Active rated power (PRP) 380V	800,0 kW	-
Active rated power (STBy) 380V	848,0 kW	-
Active rated power (COP) 380V	640,0 kW	-
Rated power factor (delay)	0,80 cos f	0,80 cos f
Rated power (PRP) 220/400/440V	1000,0 kVA	1000,0 kVA
Rated power (STBy) 220/400/440V	1100,0 kVA	1062,0 kVA
Rated power (COP) 220/400/440V	800,0 kVA	800,0 kVA
Rated power (PRP) 380V	1000,0 kVA	-
Rated power (STBy) 380V	1060,0 kVA	-
Rated power (COP) 380V	800,0 kVA	-
Rated voltage - 50Hz	-	400V
Rated voltage - 60Hz	440 V	-
Rated voltage - 60Hz	380 V	380 V
Rated voltage - 60Hz	220 V	220 V
Rated current (STBy) - 400V	-	1532,9 A
Rated current (STBy) - 440V	1443,4 A	-
Rated current (STBy) - 380V	1610,5 A	-
Rated current (STBy) - 220V	2886,8 A	-
Performance class (acc.ISO 8528-5:1993)	G2	G2
Single step load acceptance (0-PRP)	560,0 kW	440,0 kW
Single step load acceptance (0-PRP)	70%	55%
Frequency reduction	< 10%	< 10%
Frequency reduction	isochronous	isochronous
Maximum sound pressure level at 7 meters measured according to 2000/14/EC OND	103,0 dB(A)	103,0 dB(A)
Fuel tank capacity	1640 l	1640 l
Single step load capability (0-PRP)	800,0 kW	800,0 kW
Single step load capability (0-PRP)	100%	100%

QAC 1100 60Hz**QAC 1100 50Hz****Application data**

Running mode	PRP	PRP
Site	land use	land use
Operation	single	single
Start and control mode	manual/automatic	manual/automatic
Start time	unspecified	unspecified
Portability/Setup according to ISO 8528-1:1993	transportable/D	transportable/D
Assembly	fully resilient	fully resilient
Weather exposure	open air	open air
Estado do neutro NBR 5410	earthed (ELR-config)	earthed (ELR-config)
	insulated (IT-config)	insulated (IT-config)

Design data 4)**Alternator**

Standard	IEC34-1	IEC34-1
	ISO 8528-3	ISO 8528-3
Manufacturer	WEG	WEG
Model	AG10-280MI40AI	AG10-280MI40AI
Rated output, class H temperature increase	550 kVA	550 kVA
Type of rated capacity according to ISO 8528-3	BR	BR
Grau de proteção	IP 23	IP 23
Stator insulating class	H	H
Rotor insulating class	H	H
Number of wires	12	12

Engine 4)

Standard	ISO 3046	ISO 3046
	ISO 8528-2	ISO 8528-2
Type	SCANIA	SCANIA
Model	DC13 072A ref.02-14	DC13 072A ref.02-14
Output rated power	428,0 kW	428,0 kW
Type of rated capacity according to ISO 3046-7	ICXN	ICXN
Production tolerance	± 5%	± 5%
Coolantfluid	Coolant	Coolant
Combustion system	direct injection	direct injection
Intake	turbo-charged	turbo-charged

	QAC 1100 60Hz	QAC 1100 50Hz
Number of cylinders	6	6
Cylinder capacity	12,7 l	12,7 l
Speed regulator	Electronic	Electronic
Oil collector capacity	39 l	39 l
Cooling system capacity	45 l	45 l
Electric system	24 Vdc	24 Vdc
Emission conformity	non-emissioned	non-emissioned
Current circuit		
Circuit breaker, 440V/400V		
Number of poles	3	3
Thermal release It	0.8~1.0 In	0.8~1.0 In (a)
Magnetic release Im	0.8~1.7 In	0.8~1.7 In
Circuit breaker, 380V		
Number of poles	3	
Thermal release It	0.8~1.0 In	(a)
Magnetic release Im	2.5~5.0 In	
Circuit breaker, 220V		
Number of poles	3	
Thermal release It	0.8~1.0 In	(a)
Magnetic release Im	2.5~5.0 In	
Protection against current faults		
Residual current release IDn	0,030 - 30 A	0,030 - 30 A
Insulation resistance	10 - 100 kOhm	10 - 100 kOhm

Notes

- 1) Reference conditions for engine performance according to ISO 3046-1.
- 2) See rated capacity reduction diagrams or refer to the factory for other conditions.
- 3) Under reference conditions, except for otherwise established. At 50Hz only at 400V voltage.
- 4) Rated capacity definition (ISO 8528-1).
STBy: Limited Time Power is the maximum electric power that a set of generators is able to supply (with variable

load) in case of a current failure (of up to 500 hours per year, out of which, maximum 300 hours under continuous running). Overload on these values is not allowed. The alternator has a classification for continuous peaks (as defined in ISO 8528-3) at 25°C.
PRP: Primary Energy is the maximum available power during a power variable sequence, that can run during an unlimited number of hours per year, between stated maintenance intervals and in the stated environmental

conditions. It is allowed 10% overload during 1 hour in 12 hours. The allowable average power during a 24-h period shall not exceed the 100% stated load factor.
COP: The Estimate Continuous Power is the rated power an engine is able to supply at constant load for an unlimited number of hours per year, observing at regular intervals, as per standard ISO 8528-1.
5) Specific mass of the fuel used 0.85 kg/l
(a) Thermal release is higher at 25°C



Normal capacity reduction (%)

Derating Factor %		temperature (°C)											
height (m)	0	0	5	10	15	20	25	30	35	40	45	50	
	0	100	100	100	100	100	100	100	100	100	95	95	95
	500	100	100	100	100	100	100	100	100	100	95	95	95
	1000	100	100	100	100	100	100	100	100	100	95	95	90
	1500	100	100	100	100	100	100	100	100	100	95	90	85
	2000	95	95	95	95	95	95	95	95	95	90	85	80
	2500	90	90	90	90	90	90	90	90	90	85	80	80
	3000	85	85	85	85	85	85	85	85	80	80	80	75
	3500	75	75	75	75	75	75	75	75	75	75	75	70
	4000	70	70	70	70	70	70	65	65	65	65	65	65
	4500	60	60	60	60	60	60	60	60	60	60	60	60
5000	55	55	55	55	55	55	55	55	55	55	55	55	

For the use of the generator under different conditions of those specified, contact Atlas Copco.

List of SI unit conversion into British units

1 bar = 14,504 psi
 1 g = 0,035 oz
 1 kg = 2,205 lb
 1 km/h = 0,621 mile/h
 1 kW = 1,341 hp (RU e EUA)
 1 l = 0,264 US gal
 1 l = 0,220 imp gal (RU)
 1 l = 0,035 cu.ft
 1 m = 3,281 ft
 1 mm = 0,039 in
 1 m³/min = 35,315 cfm
 1 mbar = 0,401 em wc
 1 N = 0,225 lbf
 1 Nm = 0,738 lbf. ft
 t°F = 32 + (1,8 x t°C)
 t°C = (t°F - 32)/1,8

1°C temperature difference = 1.8 °F temperature difference.

Tightening torque table for screws and nuts

Screw / Nut		
Model	Material	Tightening Torque (Nm)
M8	8.8	24.3
M10	8.8	48.2
M12	8.8	89
M16	8.8	205
UNC 1/4-20	8.8	11
UNC 5/16-18	8.8	22
UNC 3/8-15	8.8	40
UNC 7/16-14	8.8	71

Data plate

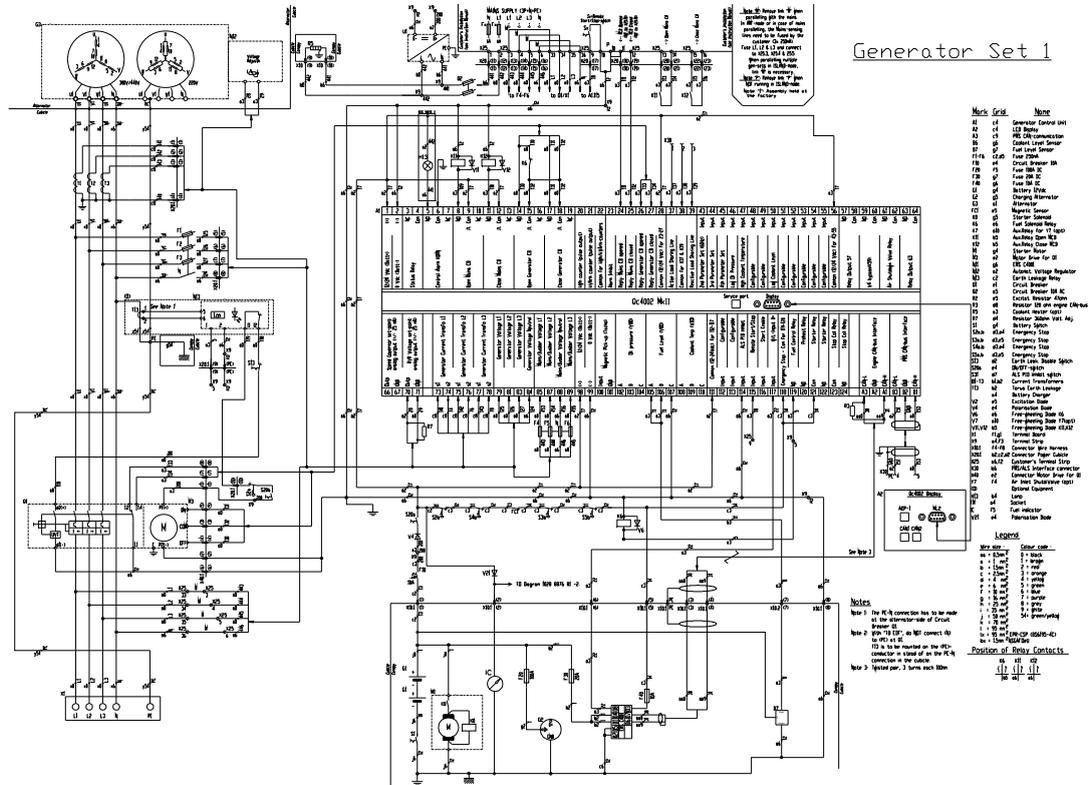
1028667910 **GRUPO GERADOR/GENSET**

MODELO / MODEL:	
Nº SÉRIE / SERIAL NUMBER:	
ANO FABRICAÇÃO / MANUFACTURING YEAR:	
POTÊNCIA / POWER: COP-PRP-STDby:	kVA
FREQÜÊNCIA / FREQUENCY:	Hz
TENSÃO / VOLTAGE:	V
CORRENTE / CURRENT:	A
MASSA DO CONJUNTO / WEIGHT:	kg
ALTITUDE MÁXIMA / ALTITUDE:	m
MAX. TEMPERATURA AMBIENTE / MAX AMBIENT:	°C
FABRICADO NO BRASIL / MADE IN BRAZIL	
Av. Almeida Angélica - Tumbadorá - Barueri - SP CNPJ 057.025.431/0001-08 - Registro no CREA: 0251810	

Atlas Copco

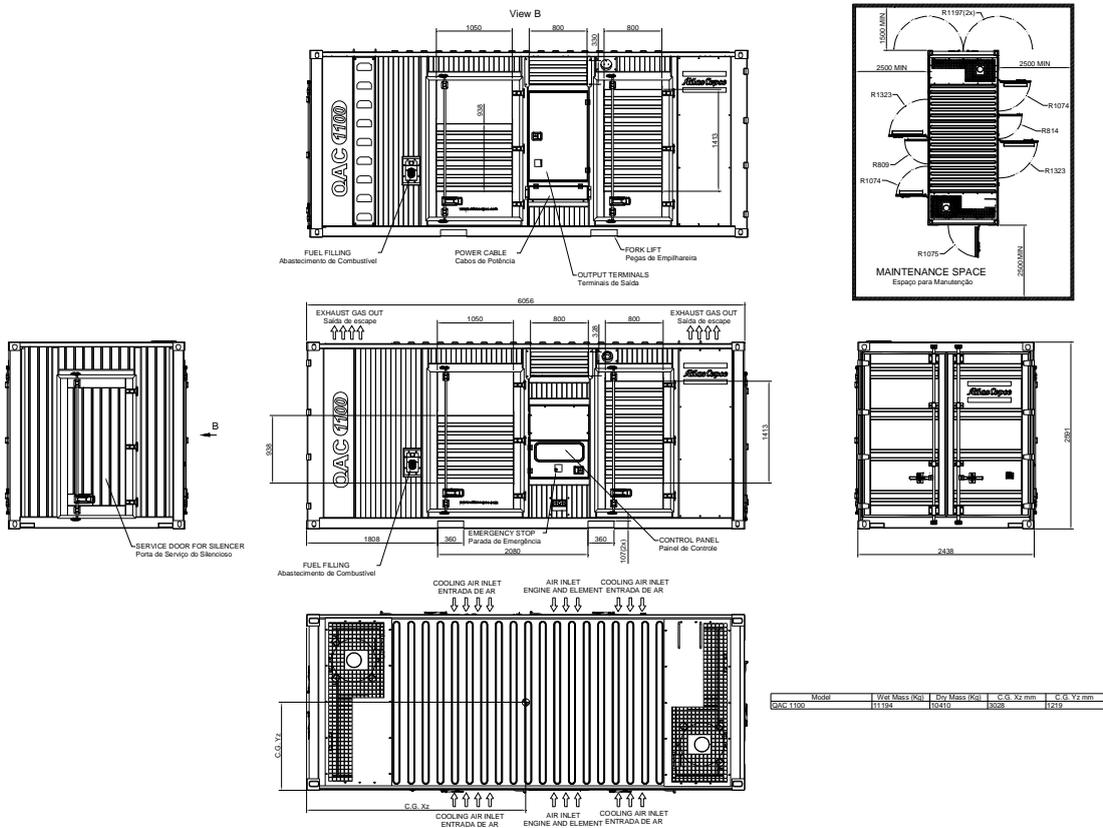
- A Machine model
- B Unit serial number
- C Year of manufacture
- D Prime Power- PRP in the continuous and variable condition /Standby By Power-Maximum power in eventual condition (1 hour/day) / COP is the nominal power an engine is able to supply constant load for an unlimited number of hours per year, observing at regular intervals in accordance with ISO 8528-1 standard
- E Frequency
- F Rated voltage
- G Maximum current (A)
- H Mass (weight) of the whole
- I Maximum operating altitude
- J Maximum operating ambient temperature

Electric diagrams



Electric Diagram - 1028 8876 81-01

Dimensional data



Dimensional - 1028 8875 81



Atlas Copco

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