

Atlas Copco Instruction Manual



Instruction Manual
for AC Generators
English

QEP 3-8 Hd ESF, QEP 4-7 Yd ESF, QEP W210 Hd ESF

QEP R5-14 Hd ESF, QEP R6-7 Yd ESF, QEP R9-10 Ld ESF

QEP S12-14 Hd ESF, QEP S4-7 Yd ESF, QEP S9-10 Ld ESF

Atlas Copco

**QEP 3-8, QEP W210
QEP R5-14, QEP S4-14**

Instruction Manual for AC Generators

Instruction manual	5
Circuit diagrams	85

Original instructions

Printed matter N°
2954 8930 00

10/2015



ATLAS COPCO - PORTABLE ENERGY DIVISION
www.atlascopco.com

Warranty and Liability Limitation

Use only authorized parts.

Any damage or malfunction caused by the use of unauthorized parts is not covered by Warranty or Product Liability.

The manufacturer does not accept any liability for any damage arising from modifications, additions or conversions made without the manufacturer's approval in writing.

Neglecting maintenance or making changes to the setup of the machine can result in major hazards, including fire risk.

While every effort has been made to ensure that the information in this manual is correct, Atlas Copco does not assume responsibility for possible errors.

Copyright 2015, Grupos Electrógenos Europa, S.A.U., Zaragoza, Spain.

Any unauthorized use or copying of the contents or any part thereof is prohibited.

This applies in particular to trademarks, model denominations, part numbers and drawings.

Congratulations on the purchase of your QEP generator set. It is a solid, safe and reliable machine, built according to the latest technology. Follow the instructions in this booklet and we guarantee you years of trouble free operation. Please read the following instructions carefully before starting to use your machine.

While every effort has been made to ensure that the information in this manual is correct, Atlas Copco does not assume responsibility for possible errors. Atlas Copco reserves the right to make changes without prior notice.

Contents

1	Safety precautions for on-site generator sets..... 8	2.7	Description of the mechanical features22	2.8.8	Differential circuit breaker (option).....27
1.1	Introduction.....8	2.7.1	Engine and alternator22	2.8.9	Wireless start/stop module (option).....27
1.2	General safety precautions9	2.7.2	Cooling system.....22	2.8.10	ATS with AMF panel (option).....28
1.3	Safety during transport and installation..... 10	2.7.3	Frame and canopy.....22		
1.4	Safety during use and operation 11	2.7.4	Control panel22	3	Installation and connection 35
1.5	Safety during maintenance and repair..... 12	2.7.5	Data plate and serial number22	3.1	Lifting and transport.....35
1.6	Tool applications safety 14	2.7.6	Drain plugs and filler caps.....22	3.2	Towing35
1.7	Battery safety precautions..... 14	2.7.7	Fuel tank.....22	3.3	Installation36
2	Main parts 15	2.7.8	Welding kit (option).....22	3.3.1	Indoor installation36
2.1	General description QEP Hd 15	2.7.9	Wheel kit (option).....23	3.3.2	Outdoor installation36
2.2	General description QEP Yd..... 16	2.8	Description of the electrical features26	3.4	Connecting the generator set36
2.3	General description QEP R..... 17	2.8.1	Sockets.....26	3.4.1	Precautions for non-linear and sensitive loads36
2.4	General description QEP S..... 18	2.8.2	Safety devices.....26	3.4.2	Quality, minimum section and maximum length of cables.....37
2.5	Markings..... 19	2.8.3	Instrumentation.....26	3.4.3	Connecting the load37
2.6	Overview features.....20	2.8.4	AVR.....26	3.4.3.1	Site distribution panel.....37
		2.8.5	8 position selector switch for welding current26	3.4.3.2	Protection.....37
		2.8.6	12Vdc output.....26		
		2.8.7	Connector for remote start and stop27		

4	Operating instructions38	5.5	Adjustments and service procedures.....51	6	Checks and trouble shooting 63
4.1	Before starting38	5.5.1	Battery care.....51	6.1	Checks63
4.2	Starting39	5.5.1.1	Electrolyte51	6.1.1	Checking the volt meter.....63
4.3	During operation.....39	5.5.1.2	Activating a dry-charged battery51	6.2	Alternator troubleshooting64
4.4	Stopping39	5.5.1.3	Recharging a battery.....51	6.3	Engine troubleshooting.....65
5	Maintenance.....40	5.5.1.4	Make-up distilled water51	6.4	Socket troubleshooting.....67
5.1	Before maintenance.....40	5.5.1.5	Periodic battery service51		
5.2	Maintenance schedules.....41	5.5.2	Service instructions for Yanmar engines52	7	Storage of the generator set 69
5.2.1	Maintenance schedule for QEP 3, QEP 3.5, QEP (R)5, QEP (R)6.5, QEP (R)7.5, QEP (R)8, QEP W21041	5.5.2.1	Inspect/clean air filter.....52	7.1	Storage.....69
5.2.2	Maintenance schedule for QEP R/S12, QEP R/S1443	5.5.2.2	Clean/inspect engine oil filter.....52	7.2	Preparing for operation after storage69
5.2.3	Maintenance schedule for QEP (S)4, QEP 4.5, QEP (R/S)6, QEP (R/S)7.....45	5.5.3	Service instructions for Honda GX270-390 engine.....54		
5.2.4	Maintenance schedule for QEP R/S9, QEP R/S1047	5.5.3.1	Inspect/clean air filter.....54	8	Disposal..... 70
5.2.5	Use of maintenance schedule.....49	5.5.3.2	Inspect/replace spark plug.....55	8.1	General.....70
5.3	Alternator maintenance procedures.....49	5.5.4	Service instructions for Honda GX690 engines56	8.2	Disposal of materials70
5.3.1	Measuring the alternator insulation resistance49	5.5.4.1	Inspect/clean air filter.....56		
5.4	Engine maintenance procedures....49	5.5.4.2	Change oil filter57	9	Technical specifications..... 71
5.4.1	Engine oil level check49	5.5.4.3	Inspect/replace spark plug.....58	9.1	Technical data71
5.4.2	Fuel level check50	5.5.5	Service instructions for Lombardini engines59	9.1.1	Technical data for QEP Petrol units.....71
		5.5.5.1	Inspect/clean air filter.....59	9.1.2	Technical data for QEP Diesel units.....72
		5.5.5.2	Replace oil filter.....59	9.1.3	Technical data for QEP R Petrol units.....73
		5.5.5.3	Replace fuel filter.....60	9.1.4	Technical data for QEP R Diesel units.....74
		5.6	Engine consumable specifications.....61	9.1.5	Technical data for QEP S petrol units.....75
		5.6.1	Engine fuel specifications.....61		
		5.6.2	Engine oil specifications.....61		

9.1.6	Technical data for QEP S Diesel units.....	76
9.2	Derating	77
9.2.1	Diesel units	77
9.2.2	Petrol units.....	78
9.2.3	Carburettor modifications for high altitude operation of Petrol units.....	80
9.3	Socket configurations overview	81
9.4	Overview power outputs	82
9.5	Conversion list of SI units into British units	83
9.6	Data plate	83

1 **Safety precautions for on-site generator sets**

To be read attentively and acted accordingly before towing, lifting, operating, performing maintenance or repairing the generator set.

1.1 **Introduction**

The policy of Atlas Copco is to provide the users of their equipment with safe, reliable and efficient products. Factors taken into account are among others:

- the intended and predictable future use of the products, and the environments in which they are expected to operate,
- applicable rules, codes and regulations,
- the expected useful product life, assuming proper service and maintenance,
- providing the manual with up-to-date information.

Before handling any product, take time to read the relevant instruction manual. Besides giving detailed operating instructions, it also gives specific information about safety, preventive maintenance, etc.

Keep the manual always at the unit location, easy accessible to the operating personnel.

See also the safety precautions of the engine and possible other equipment, which are separately sent along or are mentioned on the equipment or parts of the unit.

These safety precautions are general and some statements will therefore not always apply to a particular unit.

Only people that have the right skills should be allowed to operate, adjust, perform maintenance or repair on Atlas Copco equipment. It is the responsibility of management to appoint operators with the appropriate training and skill for each category of job.

Skill level 1: Operator

An operator is trained in all aspects of operating the unit with the push-buttons, and is trained to know the safety aspects.

Skill level 2: Mechanical technician

A mechanical technician is trained to operate the unit the same as the operator. In addition, the mechanical technician is also trained to perform maintenance and repair, as described in the instruction manual, and is allowed to change settings of the control and safety system. A mechanical technician does not work on live electrical components.

Skill level 3: Electrical technician

An electrical technician is trained and has the same qualifications as both the operator and the mechanical technician. In addition, the electrical technician may carry out electrical repairs within the various enclosures of the unit. This includes work on live electrical components.

Skill level 4: Specialist from the manufacturer

This is a skilled specialist sent by the manufacturer or its agent to perform complex repairs or modifications to the equipment.

In general it is recommended that not more than two people operate the unit, more operators could lead to unsafe operating conditions. Take necessary steps to keep unauthorized persons away from the unit and eliminate all possible sources of danger at the unit.

When handling, operating, overhauling and/or performing maintenance or repair on Atlas Copco equipment, the mechanics are expected to use safe engineering practices and to observe all relevant local safety requirements and ordinances. The following list is a reminder of special safety directives and precautions mainly applicable to Atlas Copco equipment.

Neglecting the safety precautions may endanger people as well as environment and machinery:

- endanger people due to electrical, mechanical or chemical influences,
- endanger the environment due to leakage of oil, solvents or other substances,
- endanger the machinery due to function failures.

All responsibility for any damage or injury resulting from neglecting these precautions or by non-observance of ordinary caution and due care required in handling, operating, maintenance or repair, also if not expressly mentioned in this instruction manual, is disclaimed by Atlas Copco.

The manufacturer does not accept any liability for any damage arising from the use of non-original parts and for modifications, additions or conversions made without the manufacturer's approval in writing.

If any statement in this manual does not comply with local legislation, the stricter of the two shall be applied.

Statements in these safety precautions should not be interpreted as suggestions, recommendations or inducements that it should be used in violation of any applicable laws or regulations.

1.2 General safety precautions

- 1 The owner is responsible for maintaining the unit in a safe operating condition. Unit parts and accessories must be replaced if missing or unsuitable for safe operation.
- 2 The supervisor, or the responsible person, shall at all times make sure that all instructions regarding machinery and equipment operation and maintenance are strictly followed and that the machines with all accessories and safety devices, as well as the consuming devices, are in good repair, free of abnormal wear or abuse, and are not tampered with.
- 3 Whenever there is an indication or any suspicion that an internal part of a machine is overheated, the machine shall be stopped but no inspection covers shall be opened before sufficient cooling time has elapsed; this to avoid the risk of spontaneous ignition of oil vapour when air is admitted.
- 4 Normal ratings (pressures, temperatures, speeds, etc.) shall be durably marked.
- 5 Operate the unit only for the intended purpose and within its rated limits (pressure, temperature, speeds, etc.).
- 6 The machinery and equipment shall be kept clean, i.e. as free as possible from oil, dust or other deposits.
- 7 To prevent an increase in working temperature, inspect and clean heat transfer surfaces (cooler fins, intercoolers, water jackets, etc.) regularly. See the maintenance schedule.
- 8 All regulating and safety devices shall be maintained with due care to ensure that they function properly. They may not be put out of action.
- 9 Pressure and temperature gauges shall be checked regularly with regard to their accuracy. They shall be replaced whenever outside acceptable tolerances.
- 10 Safety devices shall be tested as described in the maintenance schedule of the instruction manual to determine that they are in good operating condition.
- 11 Mind the markings and information labels on the unit.
- 12 In the event the safety labels are damaged or destroyed, they must be replaced to ensure operator safety.
- 13 Keep the work area neat. Lack of order will increase the risk of accidents.
- 14 When working on the unit, wear safety clothing. Depending on the kind of activities these are: safety glasses, ear protection, safety helmet (including visor), safety gloves, protective clothing, safety shoes. Do not wear the hair long and loose (protect long hair with a hairnet), or wear loose clothing or jewellery.
- 15 Take precautions against fire. Handle fuel, oil and anti-freeze with care because they are inflammable substances. Do not smoke or approach with naked flame when handling such substances. Keep a fire-extinguisher in the vicinity.

16a On-site generator sets (with earthing pin):

Earth the generator set as well as the load properly.

16b On-site generator sets IT:

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

Earth the load properly.

1.3 Safety during transport and installation

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

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

Helicopter lifting is not allowed.

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

- 1 In case of transporting a non-trailer unit on a truck, fasten it to the truck by attaching straps via fork lift slots, via the holes in the frame at the front and back or via the lifting beam. To prevent damage, never put straps on the roof surface of the unit.
- 2 Place the unit on level ground and immobilize the unit by placing chocks in front of and/or behind the wheels, if applicable.
- 3 To lift heavy parts, a hoist of ample capacity, tested and approved according to local safety regulations, shall be used.
- 4 Lifting hooks, eyes, shackles, etc., shall never be bent and shall only have stress in line with their design load axis. The capacity of a lifting device diminishes when the lifting force is applied at an angle to its load axis.

- 5 For maximum safety and efficiency of the lifting apparatus all lifting members shall be applied as near to perpendicular as possible. If required, a lifting beam shall be applied between hoist and load.
- 6 Never leave a load hanging on a hoist.
- 7 A hoist has to be installed in such a way that the object will be lifted perpendicular. If that is not possible, the necessary precautions must be taken to prevent load-swinging, e.g. by using two hoists, each at approximately the same angle not exceeding 30° from the vertical.
- 8 Locate the unit away from walls. Take all precautions to ensure that hot air exhausted from the engine and driven machine cooling systems cannot be recirculated. If such hot air is taken in by the engine or driven machine cooling fan, this may cause overheating of the unit; if taken in for combustion, the engine power will be reduced.
- 9 Generator sets shall be stalled on an even, solid floor, in a clean location with sufficient ventilation. If the floor is not level or can vary in inclination, consult Atlas Copco.
- 10 Do not install the generator set outdoors without proper protection (especially when being exposed to rain or snow), as this may impose an electric shock hazard and/or result in faulty operation.
- 11 The electrical connections shall correspond to local codes. The machines shall be earthed and protected against short circuits by fuses or circuit breakers.
- 12 When using extension cables, take in account the maximum cable length. Cables of 1.5 mm² diameter should not exceed 60 m, cables of 2.5 mm² should not exceed 100 m.
- 13 Provide adequate lighting at the working spot to comply with applicable working norms (min. 20 lux).
- 14 Never connect the generator set outlets to an installation which is also connected to a public mains.
- 15 Before connecting a load, switch off the corresponding circuit breaker, and check whether frequency, voltage, current and power factor comply with the ratings of the generator set.
- 16 Before transportation of the unit, switch off all the circuit breakers.

1.4 Safety during use and operation

1 When the unit has to operate in a fire-hazardous environment, each engine exhaust has to be provided with a spark arrestor to trap incendiary sparks.

2 The exhaust contains carbon monoxide which is a lethal gas. When the unit is used in a confined space, conduct the engine exhaust to the outside atmosphere by a pipe of sufficient diameter; do this in such a way that no extra back pressure is created for the engine. If necessary, install an extractor. Observe any existing local regulations.

Make sure that the unit has sufficient air intake for operation. If necessary, install extra air intake ducts.

3 When operating in a dust-laden atmosphere, place the unit so that dust is not carried towards it by the wind. Operation in clean surroundings considerably extends the intervals for cleaning the air intake filters and the cores of the coolers.

4 Never remove a filler cap of the cooling water system of a hot engine. Wait until the engine has sufficiently cooled down.

5 Never refill fuel while the unit is running, unless otherwise stated in the Atlas Copco Instruction Book (AIB). Keep fuel away from hot parts such as air outlet pipes or the engine exhaust. Do not smoke when fuelling. When fuelling from an automatic pump, an earthing cable should be connected to the unit to discharge static electricity. Never spill nor leave oil, fuel, coolant or cleansing agent in or around the unit.

6 All doors shall be shut during operation so as not to disturb the cooling air flow inside the bodywork and/or render the silencing less effective. A door should be kept open for a short period only e.g. for inspection or adjustment.

7 Periodically carry out maintenance works according to the maintenance schedule.

8 Stationary housing guards are provided on all rotating or reciprocating parts not otherwise protected and which may be hazardous to personnel. Machinery shall never be put into operation, when such guards have been removed, before the guards are securely reinstalled.

9 Noise, even at reasonable levels, can cause irritation and disturbance which, over a long period of time, may cause severe injuries to the nervous system of human beings.

When the sound pressure level, at any point where personnel normally has to attend, is:

- below 70 dB(A): no action needs to be taken,
- above 70 dB(A): noise-protective devices should be provided for people continuously being present in the room,
- below 85 dB(A): no action needs to be taken for occasional visitors staying a limited time only,
- above 85 dB(A): room to be classified as a noise-hazardous area and an obvious warning shall be placed permanently at each entrance to alert people entering the room, for even relatively short times, about the need to wear ear protectors,

- above 95 dB(A): the warning(s) at the entrance(s) shall be completed with the recommendation that also occasional visitors shall wear ear protectors,
- above 105 dB(A): special ear protectors that are adequate for this noise level and the spectral composition of the noise shall be provided and a special warning to that effect shall be placed at each entrance.

10 The unit has parts of which the temperature can be in excess of 80 °C (176 °F), and which may be accidentally touched by personnel when opening the machine during or just after operation. Insulation or safety guards protecting these parts shall not be removed before the parts have cooled down sufficiently, and must be re-installed before operating the machine. As it is not possible to insulate or protect all hot parts by guards (e.g. exhaust manifold, exhaust turbine), the operator / service engineer must always be aware not to touch hot parts when opening a machine door.

11 Never operate the unit in surroundings where there is a possibility of taking in flammable or toxic fumes.

12 If the working process produces fumes, dust or vibration hazards, etc., take the necessary steps to eliminate the risk of personnel injury.

13 When using compressed air or inert gas to clean down equipment, do so with caution and use the appropriate protection, at least safety glasses, for the operator as well as for any bystander. Do not apply compressed air or inert gas to your skin or direct an air or gas stream at people. Never use it to clean dirt from your clothes.

- 14 When washing parts in or with a cleaning solvent, provide the required ventilation and use appropriate protection such as a breathing filter, safety glasses, rubber apron and gloves, etc.
- 15 Safety shoes should be compulsory in any workshop and if there is a risk, however small, of falling objects, wearing of a safety helmet should be included.
- 16 If there is a risk of inhaling hazardous gases, fumes or dust, the respiratory organs must be protected and depending on the nature of the hazard, so must the eyes and skin.
- 17 Remember that where there is visible dust, the finer, invisible particles will almost certainly be present too; but the fact that no dust can be seen is not a reliable indication that dangerous, invisible dust is not present in the air.
- 18 Never operate the generator set in excess of its limits as indicated in the technical specifications and avoid long no-load sequences.
- 19 Never operate the generator set in a humid atmosphere. Excessive moisture reduces the generator set insulation.
- 20 Do not open electrical cabinets, cubicles or other equipment while voltage is supplied. If such cannot be avoided, e.g. for measurements, tests or adjustments, have the action carried out by a qualified electrician only, with appropriate tools, and ascertain that the required bodily protection against electrical hazards is applied.
- 21 Never touch the power terminals during operation of the machine.
- 22 Whenever an abnormal condition arises, e.g. excessive vibration, noise, odour, etc., switch the circuit breakers to OFF and stop the engine. Correct the faulty condition before restarting.
- 23 Check the electric cables regularly. Damaged cables and insufficient tightening of connections may cause electric shocks. Whenever damaged wires or dangerous conditions are observed, switch the circuit breakers to OFF and stop the engine. Replace the damaged wires or correct the dangerous condition before restarting. Make sure that all electric connections are securely tightened.
- 24 Avoid overloading the generator set. The generator set is provided with circuit breakers for overload protection. When a breaker has tripped, reduce the concerned load before restarting.
- 25 If the generator set is used as stand-by for the mains supply, it must not be operated without control system which automatically disconnects the generator set from the mains when the mains supply is restored.
- 26 Never remove the cover of the output terminals during operation. Before connecting or disconnecting wires, switch off the load and the circuit breakers, stop the machine and make sure that the machine cannot be started inadvertently or there is any residual voltage on the power circuit.
- 27 Running the generator set at low load for long periods will reduce the lifetime of the engine.
- 28 When operating the generator set in Remote or Auto mode, observe all relevant local legislation.

1.5 Safety during maintenance and repair

Maintenance, overhaul and repair work shall only be carried out by adequately trained personnel; if required, under supervision of someone qualified for the job.

- 1 Use only the correct tools for maintenance and repair work, and only tools which are in good condition.
- 2 Parts shall only be replaced by genuine Atlas Copco replacement parts.
- 3 All maintenance work, other than routine attention, shall only be undertaken when the unit is stopped. Steps shall be taken to prevent inadvertent starting. In addition, a warning sign bearing a legend such as “work in progress; do not start” shall be attached to the starting equipment.
On engine-driven units the battery shall be disconnected and removed or the terminals covered by insulating caps.
On electrically driven units the main switch shall be locked in open position and the fuses shall be taken out. A warning sign bearing a legend such as “work in progress; do not supply voltage” shall be attached to the fuse box or main switch.
- 4 Prior to stripping an engine or other machine or undertaking major overhaul on it, prevent all movable parts from rolling over or moving.

- 5 Make sure that no tools, loose parts or rags are left in or on the machine. Never leave rags or loose clothing near the engine air intake.
- 6 Never use flammable solvents for cleaning (fire-risk).
- 7 Take safety precautions against toxic vapours of cleaning liquids.
- 8 Never use machine parts as a climbing aid.
- 9 Observe scrupulous cleanliness during maintenance and repair. Keep away dirt, cover the parts and exposed openings with a clean cloth, paper or tape.
- 10 Never weld on or perform any operation involving heat near the fuel or oil systems. Fuel and oil tanks must be completely purged, e.g. by steam-cleaning, before carrying out such operations. Disconnect the alternator cables during arc welding on the unit.
- 11 Support the axle(s) securely if working underneath the unit or when removing a wheel. Do not rely on jacks.
- 12 Do not remove any of, or tamper with, the sound-damping material. Keep the material free of dirt and liquids such as fuel, oil and cleansing agents. If any sound-damping material is damaged, replace it to prevent the sound pressure level from increasing.
- 13 Use only lubricating oils and greases recommended or approved by Atlas Copco or the machine manufacturer. Ascertain that the selected lubricants comply with all applicable safety regulations, especially with regard to explosion or fire-risk and the possibility of decomposition or generation of hazardous gases. Never mix synthetic with mineral oil.
- 14 Avoid any direct bodily contact with fuel, engine oil or battery acid. In case of contact with the skin, wash with water and soap and rinse thoroughly; do not use organic solvents. In case of contact with the eyes, wash with water and soap and rinse thoroughly. In case of inhalation and swallowing, consult medical services.
- 15 Protect the engine, alternator, air intake filter, electrical and regulating components, etc., to prevent moisture ingress, e.g. when steam-cleaning.
- 16 When performing any operation involving heat, flames or sparks on a machine, the surrounding components shall first be screened with non-flammable material.
- 17 Never use a light source with open flame for inspecting the interior of a machine.
- 18 When repair has been completed, the machine shall be barred over at least one revolution for reciprocating machines, several revolutions for rotary ones to ensure that there is no mechanical interference within the machine or driver. Check the direction of rotation of electric motors when starting up the machine initially and after any alteration to the electrical connection(s) or switch gear, to check that the oil pump and the fan function properly.
- 19 Maintenance and repair work should be recorded in an operator's logbook for all machinery. Frequency and nature of repairs can reveal unsafe conditions.
- 20 When hot parts have to be handled, e.g. shrink fitting, special heat-resistant gloves shall be used and, if required, other body protection shall be applied.
- 21 When using cartridge type breathing filter equipment, ascertain that the correct type of cartridge is used and that its useful service life is not surpassed.
- 22 Make sure that oil, solvents and other substances likely to pollute the environment are properly disposed of.
- 23 Before clearing the generator set for use after maintenance or overhaul, submit it to a test run, check that the AC power performance is correct and that the control and shutdown devices function correctly.

1.6 Tool applications safety

Apply the proper tool for each job. With the knowledge of correct tool use and knowing the limitations of tools, along with some common sense, many accidents can be prevented.

Special service tools are available for specific jobs and should be used when recommended. The use of these tools will save time and prevent damage to parts.

1.7 Battery safety precautions

When servicing batteries, always wear protecting clothing and glasses.

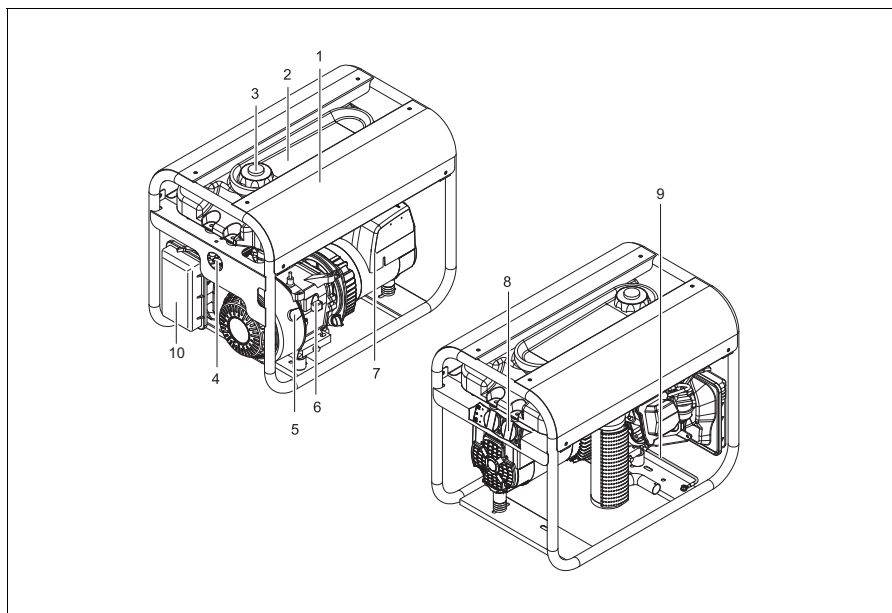
- 1 The electrolyte in batteries is a sulphuric acid solution which is fatal if it hits your eyes, and which can cause burns if it contacts your skin. Therefore, be careful when handling batteries, e.g. when checking the charge condition.
- 2 Install a sign prohibiting fire, open flame and smoking at the post where batteries are being charged.
- 3 When batteries are being charged, an explosive gas mixture forms in the cells and might escape through the vent holes in the plugs.
Thus an explosive atmosphere may form around the battery if ventilation is poor, and can remain in and around the battery for several hours after it has been charged. Therefore:
 - never smoke near batteries being, or having recently been, charged,
 - never break live circuits at battery terminals, because a spark usually occurs.

- 4 When connecting an auxiliary battery (AB) in parallel to the unit battery (CB) with booster cables: connect the + pole of AB to the + pole of CB, then connect the - pole of CB to the mass of the unit. Disconnect in the reverse order.

2 Main parts

2.1 General description QEP Hd

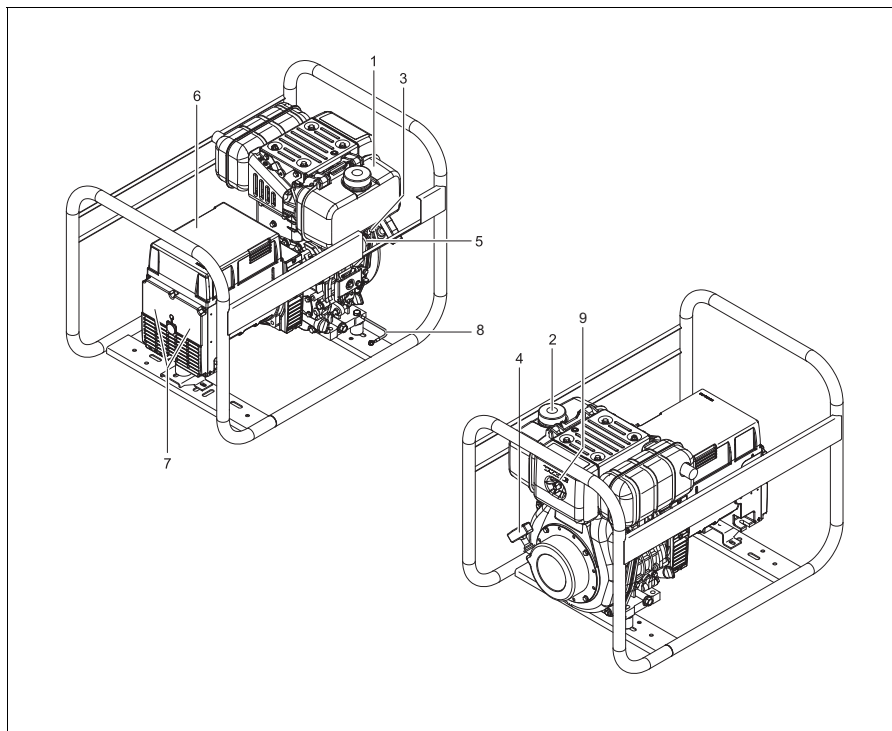
The QEP 3-3.5-5-6.5-7.5-8-W210 Hd are portable air-cooled generator sets, built for running at sites where no electricity is available. The generator sets operate at 50 Hz, 230V (single phase model) or 400/230V (three phase models). The QEP Hd generator sets are driven by an air-cooled petrol engine, manufactured by Honda. An overview of the main parts is given in the diagram below.



- 1 Protective cover
- 2 Fuel tank (large)
- 3 Filler cap fuel
- 4 Fuel cock
- 5 Recoil starter
- 6 Engine oil guard
- 7 Alternator
- 8 Sockets and thermal protection
- 9 Earth pin
- 10 Air filter

2.2 General description QEP Yd

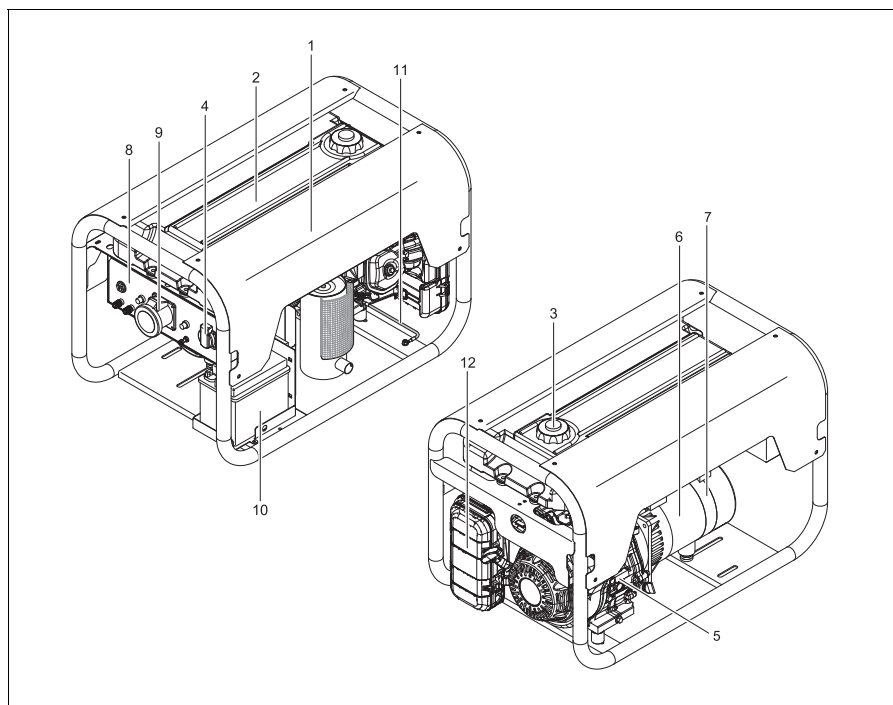
The QEP 4-4.5-6-7 Yd are portable air-cooled generator sets, built for running at sites where no electricity is available. The generator sets operate at 50 Hz, 230V (single phase model) or 400/230V (three phase models) and at 60Hz 240/120V. The QEP Yd generator sets are driven by an air-cooled diesel engine, manufactured by Yanmar. An overview of the main parts is given in the diagram below.



- 1 Fuel tank
- 2 Filler cap fuel
- 3 Fuel cock
- 4 Recoil starter
- 5 Engine oil guard
- 6 Alternator
- 7 Sockets and thermal protection
- 8 Earth pin
- 9 Air filter

2.3 General description QEP R

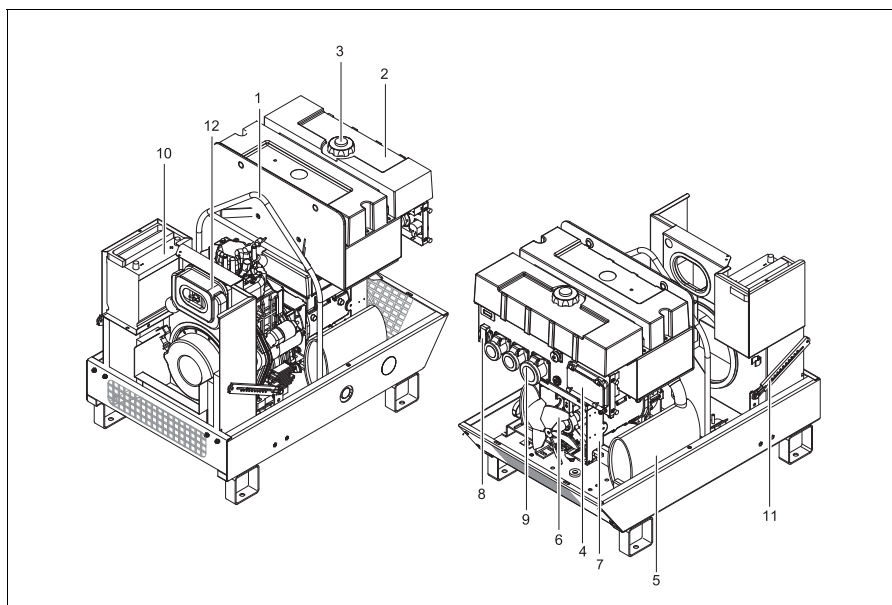
The QEP R5-6.5-7.5-8-12-14 Hd, QEP R6-7 Yd and QEP R9-10 Ld are portable air-cooled generator sets, built for running at sites where no electricity is available. The generator sets operate at 50 Hz, 230V (single phase model) or 400/230V (three phase models). The QEP R Hd generator sets are driven by an air-cooled petrol engine, manufactured by Honda, the QEP R Yd generator sets are driven by an air-cooled diesel engine, manufactured by Yanmar and the QEP R Ld generator sets are driven by an air-cooled diesel engine, manufactured by Lombardini. An overview of the main parts is given in the diagram below.



- 1 Protective cover
- 2 Fuel tank (large)
- 3 Filler cap fuel
- 4 Electrical key start
- 5 Engine oil protection
- 6 Alternator
- 7 AVR
- 8 Sockets and thermal protection
- 9 Volt meter, hour meter, differential circuit breaker, connector for remote start and stop
- 10 Battery
- 11 Earth pin
- 12 Air filter

2.4 General description QEP S

The QEP S2-14 Hd, QEP S4-6-7 Yd and QEP S9-10 Ld are portable air-cooled generator sets, built for running at sites where no electricity is available. The generator sets operate at 50 Hz, 230V (single phase model) or 400/230V (three phase models) and at 60Hz 240/120V. The QEP S Hd generator sets are driven by an air-cooled petrol engine, manufactured by Honda, the QEP S Yd generator sets are driven by an air-cooled diesel engine, manufactured by Yanmar and the QEP S Ld generator sets are driven by an air-cooled diesel engine, manufactured by Lombardini. An overview of the main parts is given in the diagram below.



- 1 Lifting frame
- 2 Fuel tank (large)
- 3 Filler cap fuel
- 4 Electrical key start
- 5 Engine oil protection
- 6 Alternator
- 7 AVR
- 8 Sockets and thermal protection
- 9 Volt meter, hour meter, frequency meter, differential circuit breaker, connector for remote start and stop
- 10 Battery
- 11 Earth pin
- 12 Air filter

2.5 Markings

Markings provide instructions and information. They also warn of hazards. For convenience and safety, keep all markings in legible condition, replacing them when damaged or missing. Replacement markings are available from the factory.

A brief description of all markings provided on the generator set is given hereafter. The precise location of all markings can be found in the parts manual of this generator set.



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



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



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



Indicates the guaranteed sound power level in accordance with Directive 2000/14/ EC (expressed in dB (A)).



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



Indicates that the generator set may be refuelled with petrol only.



Indicates the different earthing connections on the generator set.



Indicates the different earthing connections on the generator set.



Indicates that it is prohibited to ignite a fire during refuelling and a safe distance from flames or sparks must be kept.



Indicates that it is necessary to stop the engine before refuelling.



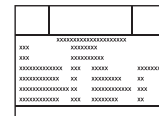
Indicates that the machine has passed all end of production line tests.



Indicates that the engine exhaust is a harmful gas. When the generator set is operated inside, lead the engine exhaust towards the outside and check for sufficient ventilation.



Indicates that the factory-delivered machine is without oil and that the tank should be filled before use, according to the instructions in the engine manual.



Indicates the market name, number, and year of manufacture and the main specifications of the machine.

2.6 Overview features

The below overview indicates for each QEP variant which mechanical and electrical features are standard provided or can be optionally ordered. More detailed information on each feature can be found in the chapters “Description of the mechanical features” and “Description of the electrical features”.

Model	Standard features	Options
QEP range		
QEP petrol	• Recoil start • Large fuel tank • Fuel cock • Engine oil guard • Sockets • Thermal protection • CE noise compliance • Protective top cover	• Wheel kit • AVR • Differential circuit breaker, hour meter
QEP W	• Recoil start • Sockets • Selector 8-positions for welding current • Engine oil guard • CE noise compliance	• Wheel kit • Welding kit
QEP diesel	• Recoil start • Fuel cock • Sockets • Thermal protection	• Wheel kit • Differential circuit breaker, hour meter

Model	Standard features	Options
QEP R range		
QEP R petrol/diesel	• Electrical key start • Large fuel tank • Sockets • AVR • Volt meter, hour meter • Connector for remote start and stop • Thermal protection • Differential circuit breaker • Oil protection • 12 V DC output *	• Wheel kit • ATS panel including AMF • Wireless remote start and stop
QEP R petrol	• CE noise compliance	
QEP S range		
QEP S petrol/diesel	• Electrical key start • Large fuel tank • Sockets • AVR • Volt meter, hour meter, frequency meter • Connector for remote start and stop • Circuit breaker • Differential circuit breaker • Oil protection • CE noise compliance • Soundproof canopy • Lifting frame (except QEP S4)	• Wheel kit • ATS panel including AMF • Wireless remote start and stop

Note: *Not available for QEP R9-10-12-14

2.7 Description of the mechanical features

2.7.1 Engine and alternator

The alternator is driven by an air-cooled engine. The engine's power is transmitted through a direct coupling.

The generator set houses a single bearing alternator. The synchronous alternator has Class H rotor and stator windings in an IP23 housing.

2.7.2 Cooling system

The engine is provided with an air cooler. The cooling air is generated by a fan, driven by the engine.

2.7.3 Frame and canopy

The alternator, the engine, the fuel tank, etc. are installed on the frame.

QEP (R) generator sets can be lifted manually or by attaching slings to the frame for hoisting. QEP (R) petrol generator sets are additionally provided with a protective top cover and are CE noise compliant.

On QEP S generator sets a soundproof canopy and lifting frame are provided.

For all QEP units, an optional wheel kit can be ordered for easy transport on site.

2.7.4 Control panel

The control panel grouping control switch, sockets, fuses, instrumentation etc., is placed at the front of the unit.

The configuration of the control panel depends on the specific QEP model and available options.

2.7.5 Data plate and serial number

The generator set is furnished with a data plate showing the product code, the unit number and the power output (see chapter "Data plate" on page 83).

The serial number is located on the right-hand front side of the frame.

2.7.6 Drain plugs and filler caps

The drain holes for the engine oil and the plug for the fuel, are located and labelled on the frame.

The fuel filler cap is located on top of the fuel tank.

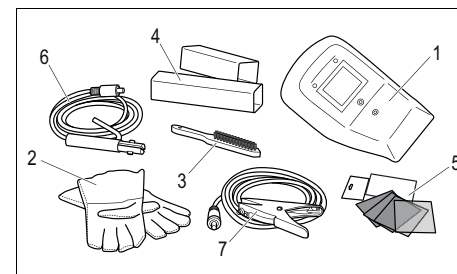
2.7.7 Fuel tank

The fuel tank of the QEP generator sets is provided with a fuel cock supporting improved control of the fuel flow.

The QEP petrol, QEP R and QEP S generator sets are foreseen with a large fuel tank.

2.7.8 Welding kit (option)

The welding kit option includes the following items:



- | | |
|---|--|
| 1 | Welding mask (EN175) |
| 2 | Gloves |
| 3 | Brush |
| 4 | Box for electrodes |
| 5 | Light glasses (90x110mm 5x),
Dark glass (DIN 9 & DIN 11) |
| 6 | Welding cable (35mm ² , 5m),
with plug (dia. 13mm) |
| 7 | Ground wire (35mm ² , 5m),
with plug (dia. 13mm) |

2.7.9 Wheel kit (option)

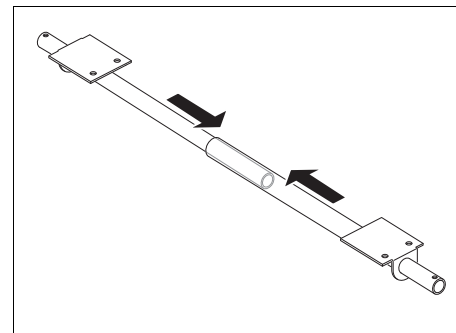
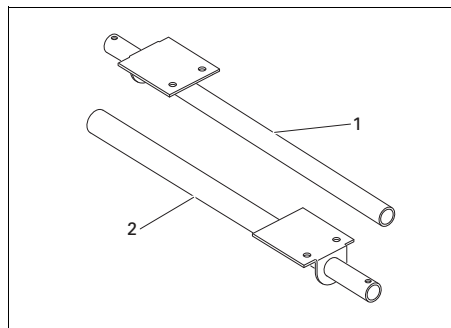
This optional kit provides wheels, support legs and transport handles to allow manual transport of the generator set on site. These items are to be installed by the operator, following the assembly instructions described below.

2.7.9.1 Safety instructions

- The kit should only be used for towing units on flat surfaces. Use on other surfaces could cause damage to the product and/or injure the operator.
- The generator set must operate on flat surfaces. Consequently, make sure this condition exists also after fitting the transport kit.
- Do not move the generator set while it is operating in order to prevent accidents or oil and fuel leaks which could cause serious damage to the generator set or even fires.
- Only use this kit for manual towing. Towing by means of vehicles is strictly forbidden. Never exceed a top speed of 5 km/h. Carrying other objects or persons is forbidden.
- If the generator set mounted on the wheel kit is transported by vehicles, make sure it is firmly secured and cannot move during transport.

2.7.9.2 Assembly instructions for a wheel kit with fixed handles

1. Lift the generator set off the ground using an adequate lifting system (crane, bridge-crane) or rest it directly on a support. Ensure that the generator set does not accidentally fall, as this could seriously injure the operator and damage the generator set.
2. Take the two axles of the wheel kit (wheel kit moving part (1) and wheel kit fixed part (2)) and fit them into one another.

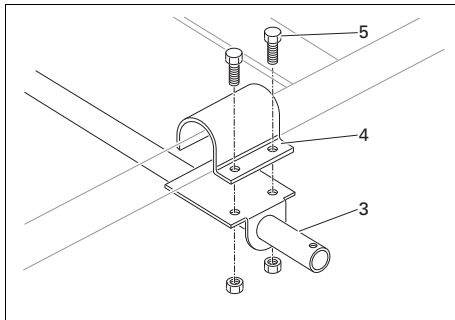


3. Position the assembled axle (3) underneath the generator, at the side of the alternator.

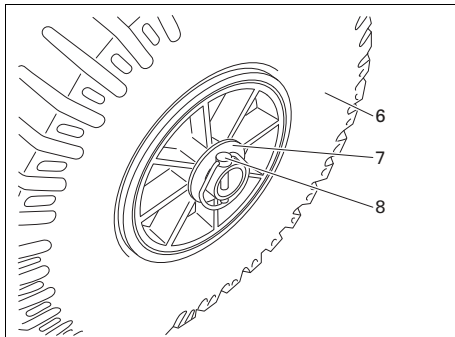
Position the axle so that easy lifting of the generator set is ensured. Also make sure that the axle is not positioned too far to the back to prevent the generator set from easily overturning.

4. Fix the axle with the omega brackets (4).

5. Tighten the screws (5) of the omega brackets, just before and after the motor support crossbar.

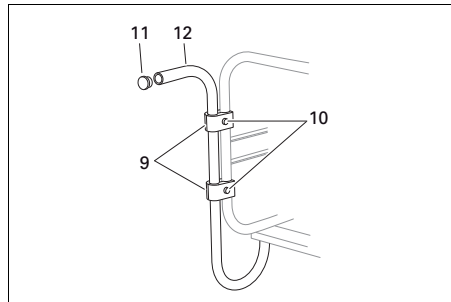


6. Mount the two wheels (6) to the axles and tighten them, fitting first the washer (7) and the split pin (8).



7. Position the wheel kit handle on the opposite side of the wheel axle.

Secure the handle with the two brackets (9) and tighten the provided screws (10). Fit the threaded plug (11) in the handle tube (12).



Before using the wheel kit make sure that all the parts have been correctly installed and that all fastening screws are securely tightened.

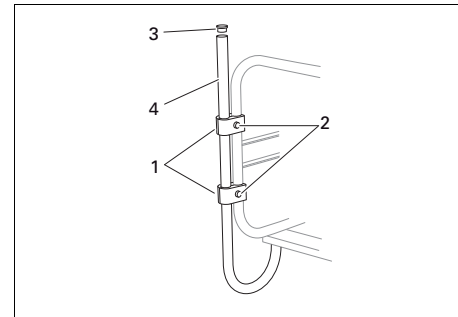
2.7.9.3 Assembly instructions for a wheel kit with folding handles

Thanks to their design, the folding handles can be put in idle position (thus not representing an obstacle) or transport position by simply turning.

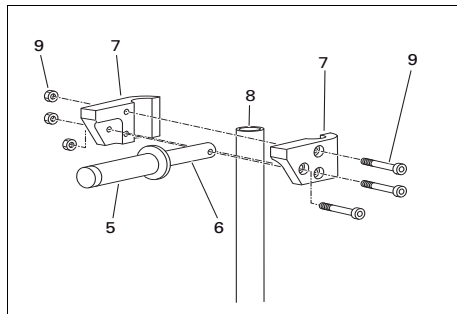
To install the folding handle:

1. Mount the axle and wheels as described in the assembly instructions for the wheel kit with fixed handles.
2. Position the wheel kit handle on the opposite side of the wheel axle.

Secure the handle with the two brackets (1) and tighten the provided screws (2). Fit the threaded plug (3) in the handle tube (4).



3. Then, assemble the articulated handles by fitting the knob (5) onto the tube (6).
4. Mount the two half-shells (7) with the assembled knob on the handle of the transport kit (8) and tighten the respective bolts (9).



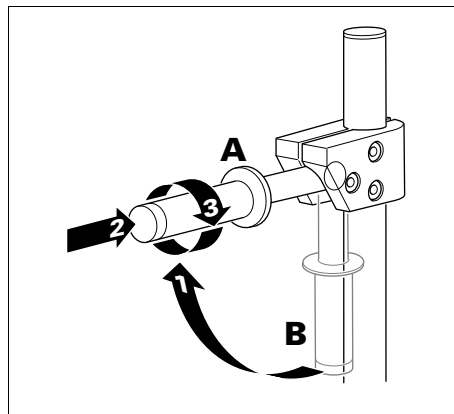
5. Put the handle in the desired position:

Transport position (A):

- put the handle to its horizontal position;
- push it forwards to the limit stop;
- turn clockwise to the limit stop.

Idle position (B):

- to put the handle to idle position, perform the above operations in reverse order.



2.8 Description of the electrical features

2.8.1 Sockets

Depending on the QEP model and its configuration several socket combinations are available.

Following socket types can be installed separately or combined:

- 1-phase socket with following supply possibilities:
 - SCHUKO (230 V, 10A/16A)
 - CE (230 V blue and 115 V yellow, 16A /32A)
- 3-phase socket with several supply possibilities, depending on the voltage (400 V in red, 230 V in blue), the current intensity (16A/32A/63A) and the neutral (with or without neutral)

For each socket a circuit breaker is provided to protect the electrical installation from possible overloads or short circuits.

For all socket configurations, see chapter “Socket configurations overview” on page 81.

2.8.2 Safety devices

The engine is equipped with thermal protection. The QEP petrol units are additionally foreseen with an engine oil guard which offers protection shutdown at low oil level. QEP R and QEP S generator sets are provided with an oil protection system.

The generator set's earth terminal is located at the front of the unit.

2.8.3 Instrumentation

Hour meter

The hour meter indicates the operating hours of the generator set.

The two digits on the right in red indicate hundredths of an hour. The hours will be indicated from the third digit on and will be displayed in white.

Volt meter

The volt meter indicates the generator set voltage.

Frequency meter

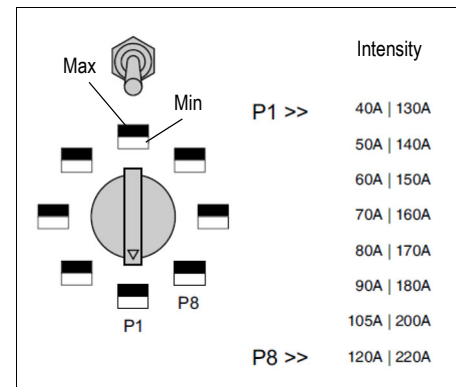
The frequency meter indicates the generator set frequency.

2.8.4 AVR

The digital AVR (Automatic Voltage Regulation) is an electronic, solid-state, microprocessor based control device that regulates the output voltage of the generator set by controlling the current into the generator set exciter field. It offers greater control and precision, reduced downtime and easier maintenance, compared to analogue excitation systems.

2.8.5 8 position selector switch for welding current

The 8-position selector switch allows easy setting of the welding current.



2.8.6 12Vdc output

The 12Vdc output can be used to supply power to small loads at 12Vdc.

2.8.7 Connector for remote start and stop

This 14-pole connector can be used to connect a wireless remote start/stop module or an ATS with AMF panel to the generator set.

2.8.8 Differential circuit breaker (option)

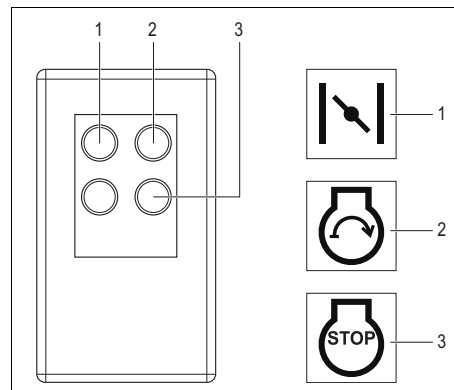
The differential circuit breaker is a protection against earth faults of one of the lines, tripping the main protection switch of the electrical generator set. It is configured to trip when it exceeds 30 mA.



It is the responsibility of the installer to adjust and seal the differential according to the current regulations.

2.8.9 Wireless start/stop module (option)

By using the wireless start and stop module (RSS) the generator can be started/stopped remotely.



- 1 | Engine choke
- 2 | Start engine
- 3 | Shut off engine

To connect the RSS to the generator, use the 14-pole connector. Then switch the key on the generator to “ON” or “1”.

To start from RSS:

1. Press button (1) and button (2).
2. Release button (2).
3. Release button (1) after 5-10 seconds.

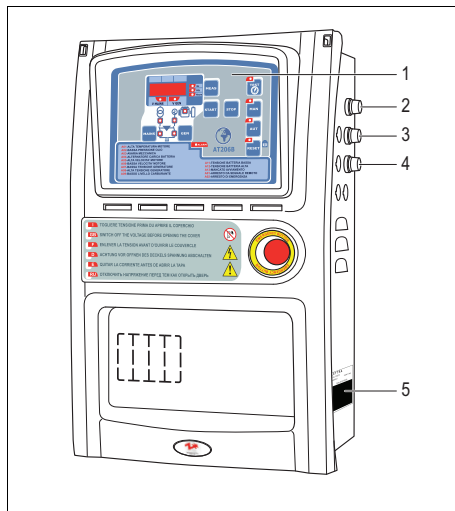
To stop from RSS:

1. Press and release button (3).

2.8.10 ATS with AMF panel (option)

2.8.10.1 General description

The AMF/ATS panel is designed to automatically changeover from mains electricity supply to stand-by generator sets on failure of the mains supply. When the mains supply is restored, the system automatically changes back and stops the generator set.



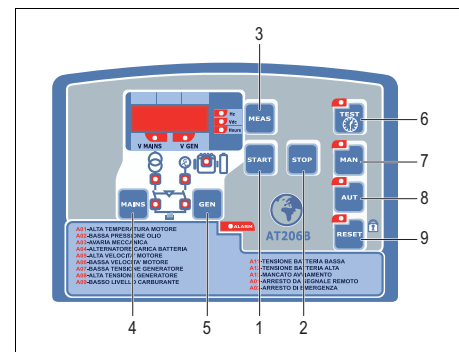
- 1 Control panel
- 2 F1 = F6.3A
Protection for the auxiliary circuits in Vdc
- 3 F2 = F2A
Protection for the remote control switch of the network
- 4 F3 = F2A
Protection for the remote control switch of the group
- 5 Data plate



Before starting with the installation of the panel, check the data plate and make sure that the delivered product corresponds exactly to the ordered one.

Control panel

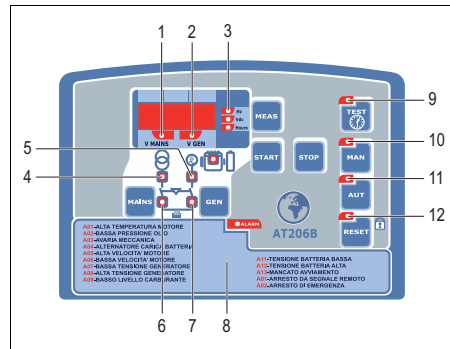
Overview of push buttons



- 1 **START** **START:** Is used to start the engine (manual running mode).
- 2 **STOP** **STOP:** Is used to stop the engine (manual running mode).
- 3 **MEAS** **MEAS:** Is used to change the type of measurement shown on the display.
- 4 **MAINS** **MAINS:** Is used to close the remote control switch of the network (only in MANUAL running mode).

- 5 **GEN** **GEN:** Is used to close the remote control switch of the generator set (only in MANUAL running mode).
- 6 **TEST** **TEST:** Is used to activate the automatic test.
- 7 **MAN** **MAN:** Is used to put the ATS/AMF panel in MANUAL running mode.
- 8 **AUT** **AUTO:** Is used to put the ATS/AMF panel in AUTO MATIC running mode.
- 9 **RESET** **RESET:** Is used to RESET the ATS/AMF panel.

Overview of LEDs



- 1 **V MAINS** LED indicates that the network voltage shown on the display.
- 2 **V GEN** LED indicates that the generator voltage shown on the display.
- 3 **Measurement type** LED indicates the selected measurement type.
- 4 **Line voltage Ok** LED indicates that the line voltage is Ok.
- 5 **Generator voltage Ok** LED indicates that the generator voltage is Ok.
- 6 **Remote control switch network closed** LED indicates that the remote control switch of the network is closed (the network providing power to the users).

- 7 **Remote control switch group closed** LED indicates that the remote control switch of the group is closed (the generator is providing power to the users).
- 8 **Alarm** LED indicates that one or more alarms are present.
- 9 **TEST** LED indicates that the automatic test is active.
- 10 **MAN** LED indicates that the ATS/AMF panel is in MANUAL mode
- 11 **AUT** LED indicates that the ATS/AMF panel is in AUTOMATIC mode
- 12 **RESET** LED indicates that the ATS/AMF panel is in RESET mode.

Data plate

CEI EN60439 - 1		Date 20/07/2006
In A	V~	
I _{max} A	Vaux	
kA	IP	
Hz	Kg	
kVa	Dim.	
kW	Ser.n.	
HP	Model	

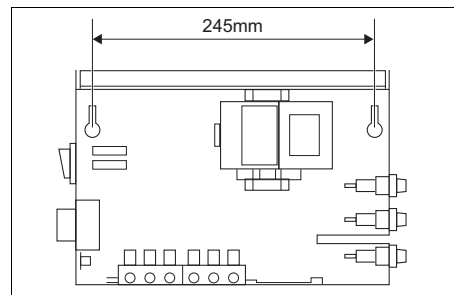
In	Nominal use current
I_{max}	Maximum use current
kA	Maximum breaking capacity against short circuit
Hz	Frequency
kVA	Apparent power (calculated at cos 0,8)
kW	Actual power
HP	Horse power
V	Maximum use voltage of the primaries
Vaux	Maximum voltage of the auxiliary circuits
IP	Degree of protection against external agents
Kg	Approximate weight
Dim	Dimensions Height x Width x Depth
Ser.n	Series number
Model	Product code

2.8.10.2 Installation



The installation of the equipment should be carried out by specialised personnel only!

- The ATS/AMF panel must be installed on the wall by using the two provided fixing hooks at the back (1).



- For aeration reasons, make sure to foresee a free space of at least 10 cm around the panel.
- To keep the front of the panel opened, insert a screwdriver in the provided hole.

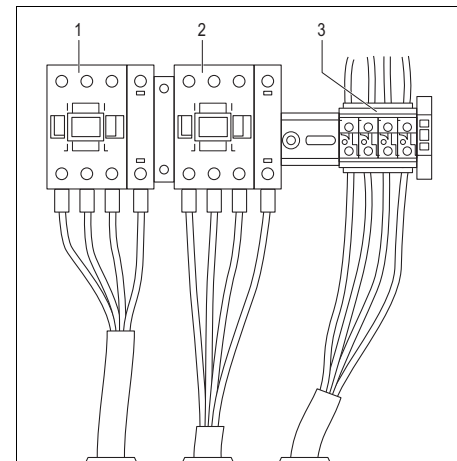


The earthing of the network, group and load connections must be carried out by using the pivot located at the left corner inside the panel.

2.8.10.3 Electrical connections

Check that the type of panel purchased is suitable for the type of electrical system used: single-phase or three-phase. Follow the instructions below to make the correct connections.

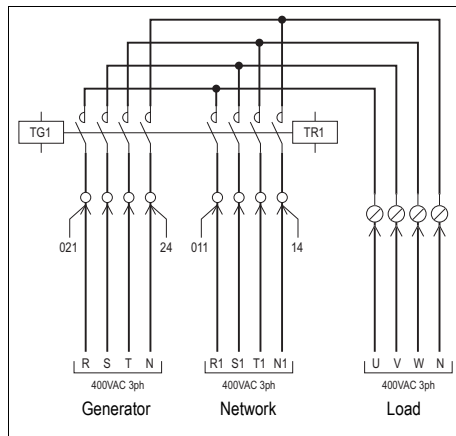
Internal positioning of connections



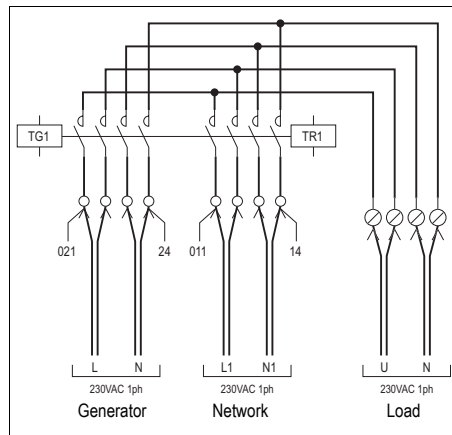
- 1 | Generator connections
- 2 | Network connections
- 3 | Load connections

In order to connect power from the generator set sockets to the AMF panel, proceed as follows:

- Use only **one** socket for the connection,
- Use cables with a suitable section,
- For three-phase systems, connect to terminals R, S, T and N on the contactor.



- For single-phase systems, connect to terminals L and N on the contactor.



To guarantee a maximum single-phase capacity of the panel in single-phase systems, make sure to use all the poles by linking them in parallel two by two, using cables of suitable section for the available clamps.

2.8.10.4 Operation

To use the generator set with 14-pole connector as AMF:

1. Connect the AMF panel to the generator set using the 14-pole connector and the power socket.
2. Switch the key located on the control panel of the generator set to "ON" or "I".

Now the generator set can be used exclusively as AMF.

3. When used as AMF, it is possible to switch on the generator set manually from the generator set control panel and take power from the sockets, in the knowledge that:
 - If it starts in emergency mode, it could cause the generator circuit breakers to trip.
 - If current goes away and returns, the generator set is switched off by the AMF panel.
 - After use, in order to reset it as AMF, the control panel key must be turned back to "ON" or "I".

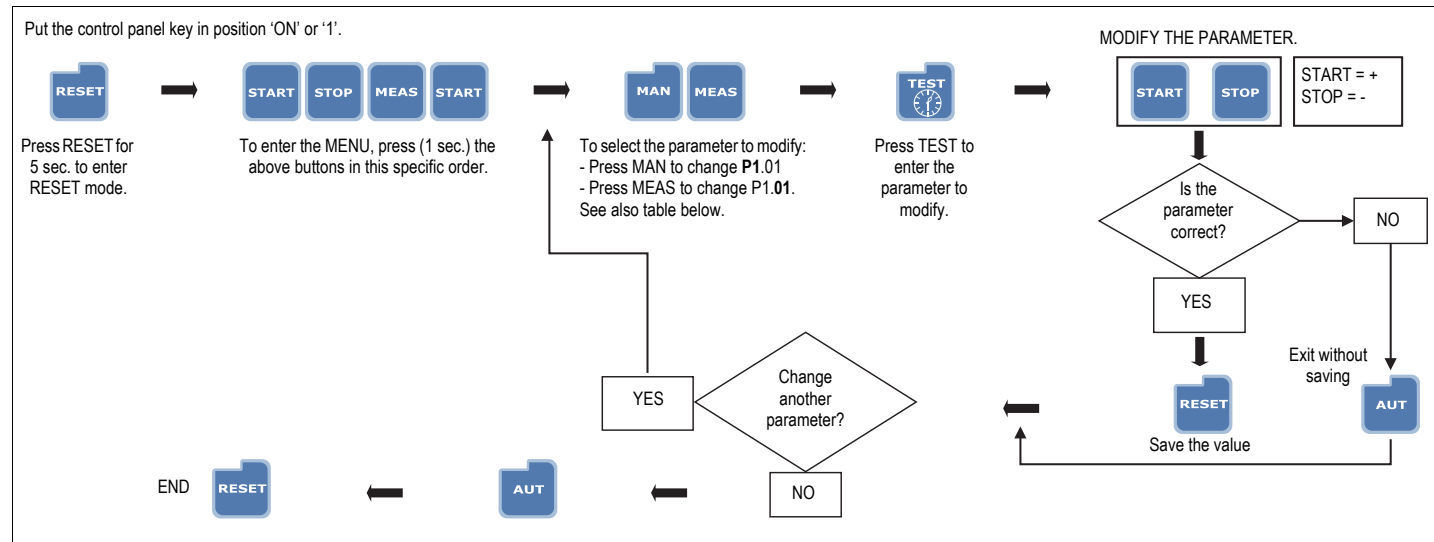
4. It is possible to disconnect the generator set, use it normally and then reconnect it for use as AMF.

If NORMAL USE of the generator set is preferred, disconnect the AMF panel from the generator. Now, power can be taken from the sockets as with a normal generator set.

2.8.10.5 Parameter adjustment

Setting start parameters

Procedure



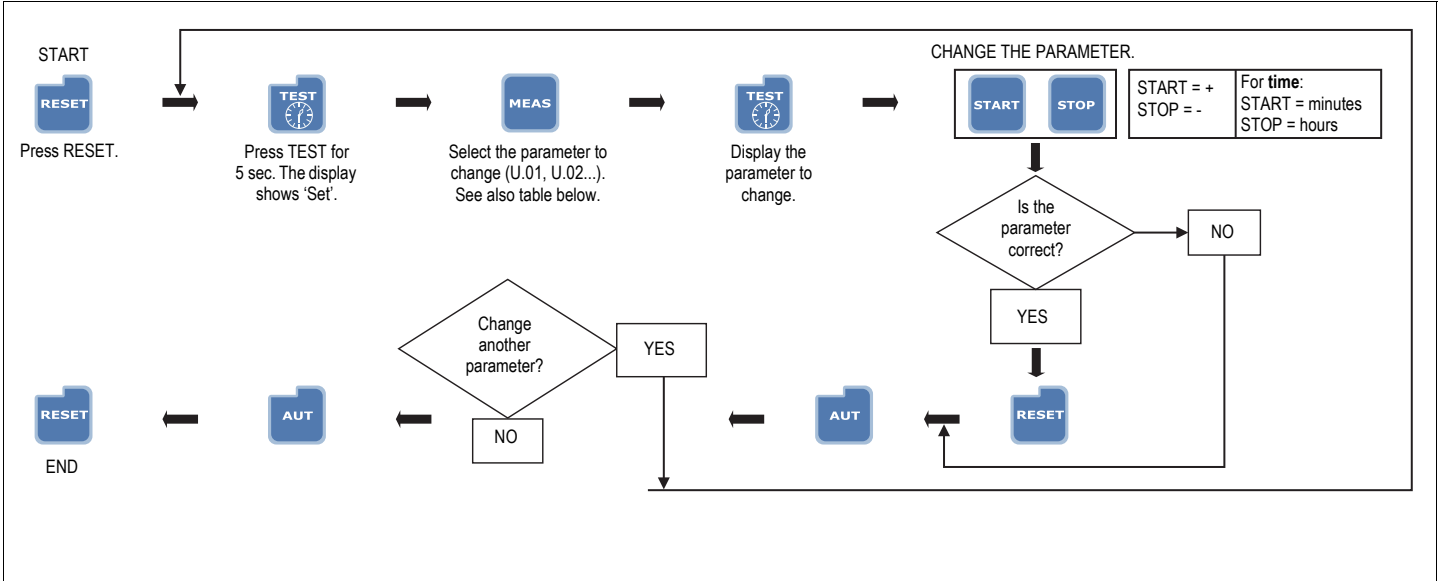
Overview of start parameters

Parameter	Description	Range	Default
P1.01	Rated frequency	0 = 50 Hz, 1 = 60 Hz	0
P1.03	System	0 = 220MF, 1 = 220TF, 2 = 380TF	0
P2.11	Air time	0–20 sec	2*

* HONDA GX270-GX390: 2 sec, HONDA GX620: 15 sec

Setting user parameters

Procedure



Overview of user parameters

Parameter	Description	Range	Default
U.01	Time interval of the automatic test	1 - 30 days	3 days
U.02	Test duration	1 - 30 min	15 min
U.03	Time of test start	00:00 - 23:59	10:00
U.04	Test with load	0 = load, 1 = off-load	1
U.08	Closing time of siren relay	0 - 60 sec	20 sec
U.09	Start delay of EJP start engine	0 - 99 min	25 min
U.10	Switching delay for EJP/T (1 wire)	0 - 30 min	5 min
U.11	Time	00:00 - 23:59	

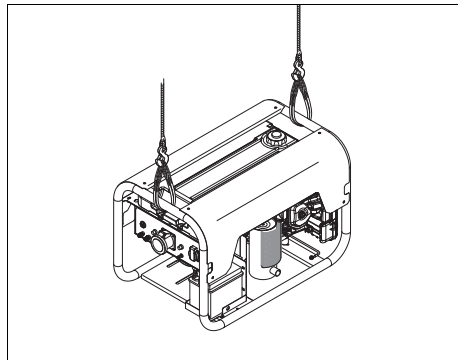
3 Installation and connection

3.1 Lifting and transport

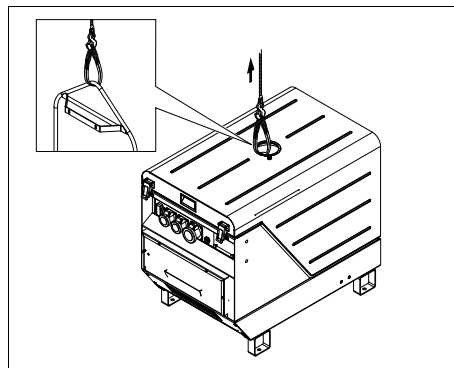
Before lifting and transporting the generator set, ensure that the battery is disconnected and the fuel tank is empty.

Use a cart for transporting the generator set and position it centred on a pallet. The generator set can also be lifted with a hoist.

Therefore properly connect slings to the frame of the QEP (R) and QEP S4 generator set.



Other QEP S generator sets are foreseen with a lifting frame.



When lifting the generator set, the hoist has to be placed in such a way that the generator set, which must be placed level, will be lifted vertically.



Lifting acceleration and deceleration must be kept within safe limits (max. 2 g). Helicopter lifting is not allowed.

Firmly fix the generator set during transport, so that it cannot turn over. Check the overall weight of the unit to be transported by road. Under no circumstances should the generator set be started while inside a truck.

3.2 Towing

If the wheel kit option is provided, the generator set can be towed manually on site.

Check that the wheels are secure and that the tyres are in good condition and inflated correctly before towing.

3.3 Installation

3.3.1 Indoor installation

If the generator set is operated indoors, install an exhaust pipe of sufficient diameter to duct the engine exhaust towards the outside. Check for sufficient ventilation so that the cooling air is not recirculated.



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

3.3.2 Outdoor installation

- Place the generator set on a horizontal, even and solid floor.
- Check that the engine exhaust is not directed towards people.
- Locate the rear end of the generator set upwind, away from contaminated wind streams and walls. Avoid recirculation of exhaust air from the engine. This causes overheating and engine power decrease.
- Leave enough space for operation, inspection and maintenance (at least 1 meter at each side).
- Check that the inner earthing system is in compliance with the local legislation.
- Use coolant for the engine cooling system. Refer to the Engine instruction book for the proper coolant mixture.
- Check the tightness of the bolts and nuts.

- Check that the cable end of the earthing rod is connected to the earth terminal on the generator set.



The generator set is wired for a TN-system to IEC 364-3, i.e. one point in the power source directly earthed - in this case the neutral. The exposed conductive parts of the electric installation must be directly connected to the functional earth.

If operating the generator set in another power system, e.g. an IT-system, other protective devices required for these types must be installed. In any case only a qualified electrician is authorized to remove the connection between the neutral (N) and earth terminals in the terminal box of the alternator.

3.4 Connecting the generator set

3.4.1 Precautions for non-linear and sensitive loads



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

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

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

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

3.4.2 Quality, minimum section and maximum length of cables

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

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

Wire section (mm ²)	Max. current (A)		
	Multiple core	Single core	H07 RN-F
2.5	22	25	21
4	30	33	28
6	38	42	36
10	53	57	50
16	71	76	67
25	94	101	88
35	114	123	110
50	138	155	138
70	176	191	170
95	212	228	205

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

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

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

e = Voltage drop (V)

I = Rated current (A)

L = Length of conductors (m)

R = Resistance (Ω/km to VDE 0102)

X = Reactance (Ω/km to VDE 0102)

3.4.3 Connecting the load

3.4.3.1 Site distribution panel

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

3.4.3.2 Protection



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

- Check whether frequency, voltage and current comply with the ratings of the generator set.
- Provide a load cable, without excessive length, and lay it out in a safe way without forming coils.

4 Operating instructions



In your own interest, always strictly observe all relevant safety instructions.

Do not operate the generator set in excess of the limitations mentioned in the Technical Specifications.

Local rules concerning the setting up of low voltage power installations (below 1000 V) must be respected when connecting site distribution panels, switch gear or loads to the generator set.

At each start-up and at any time a new load is connected, the earthing and protections (GB trip and earth leakage relay) of the generator set must be verified. Earthing must be done either by the earthing rod or, if available, by an existing, suitable earthing installation. The protective system against excessive contact voltage is not effective unless a suitable earthing is made.

4.1 Before starting

- With the generator set standing level, check the engine oil level and top up if necessary. The oil level must be near to, but not exceed the high mark on the engine oil level dipstick.



Running the engine with insufficient oil could cause serious damage.

- Drain any water and sediment from the fuel pre-filter. Check the fuel level and top up if necessary. It is recommended to fill the tank after the day's operation to prevent water vapor in a nearly empty tank from condensing.



Fuel is highly flammable and explosive under certain conditions. Refuel in a well ventilated area with the engine switched off. During refuelling do not smoke and do not approach the equipment with an open flame.

- Check the coolant level in the expansion tank of the engine cooling system. The coolant level must be near to the FULL mark. Add coolant if necessary.
- When starting the generator set for the first time, connect the battery. First connect the positive pole and then the negative pole. Properly tighten the terminal clamps and cover with petroleum jelly.
- Activate the battery: fill the compartments to their maximum level with a 30/40% sulphuric acid solution and wait at least two hours before using.

- Check the air filter: make sure that it is in good conditions and free from dust and dirt.
- Check the generator set for leakage, tightness of wire terminals, etc. Correct if necessary.
- Check that the circuit breakers are switched off.
- Ensure that no appliance is plugged into the generator set or that the load is switched off.
- Check that the differential circuit breaker has not tripped, if installed. Reset if necessary.

4.2 Starting

Manual start-up

The QEP generator sets are to be started manually:

- Open the fuel valve, by turning it to ON.
- Move the choke lever to the CLOSED position.
- Turn the engine switch to the ON position.
- Pull the start cord handle until a certain resistance is felt and then strongly pull until the full length of the cord is reached. Release the starter handle and let it return slowly.
- As the engine begins to warm up, gradually move the choke lever to the OPEN position.
- Connect the appliance(s) to the generator set.

Electrical start-up

The QEP R and QEP S generator sets can be started electrically:

- Open the fuel valve, by turning it to ON.
- Move the choke lever to the CLOSED position.
- Turn the engine switch to the ON position.
- Turn the start key to the “START” position and initiate the start-up by turning the key further towards the right. Once the set is started, release the key.
- Once the engine is warmed up, open the choke by pushing the lever.
- Connect the appliance(s) to the generator set.

4.3 During operation

Regularly carry out following checks:

- Check the analogue meters for normal readings, if applicable.



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

- Check for leakage of oil or fuel.
- When single-phase loads are connected to the generator set output terminals, keep all loads well-balanced.
- If circuit breakers have tripped during operation, switch off the load and stop the generator set. Check and, if necessary, decrease the load.

4.4 Stopping

Manual and electrical shutdown

- Switch off or disconnect all appliances powered by the generator set.
- Let the engine run idle for 2-3 minutes to cool down.
- Turn the engine switch to the OFF position.
- Move the choke lever to the CLOSED position.
- Close the fuel valve, by turning it to OFF.



The engine will remain hot even after being switched off. Make sure the generator set is well ventilated even after engine shut down.

5 Maintenance

The preventive maintenance tasks are required for properly maintaining the material condition of the equipment; this will result in an optimum operation and a longer operating life cycle. Maintenance should only be carried out by qualified personnel using the appropriate personal protective equipment.

The maintenance operations must be carried out with as much care and safety as possible. Special attention must be given to short-circuit hazards that may occur when the equipment comes in contact with metal objects.

The use of non-original parts may cause damage to the generator set. Always use original spares.

5.1 Before maintenance

- Shutdown the engine and let it cool down for 15 minutes prior to carrying out any maintenance task.
- To prevent accidental starts from occurring, place the start switch to the OFF position.
- Disconnect the generator set from the loads.
- Disconnect the battery; first the negative pole and then the positive.

5.2 Maintenance schedules



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

5.2.1 Maintenance schedule for QEP 3, QEP 3.5, QEP (R)5, QEP (R)6.5, QEP (R)7.5, QEP (R)8, QEP W210

Maintenance schedule	Daily	20 hrs after start-up	Every 50 hours	Every 100 hours	Every 300 hours	Yearly
Check/Fill fuel level (3)	x					
Check engine oil level (if necessary top up)	x					
Check on abnormal noise	x					
Check air filter	x					
Clean air filter			x			
Replace air filter element (1)					x	x
Change engine oil (2) (5)		x		x		x
Replace spark plug					x	x
Replace fuel (primary)filter(s) (4)					x	x
Measure alternator insulation resistance (8)					x	x
Test Earth Leakage Relay (9)	x					
Check for leaks in engine-, air-, oil-, or fuel system	x					
Inspect/Replace hoses and clamps					x	x
Check electrical system cables for wear					x	x
Check/Test glow plugs - grid heater					x	x
Check torque on critical bolt connections					x	x
Check electrolyte level and terminals of battery (7)					*x	*x
Check rubber flexibles (6)					x	x

Maintenance schedule	Daily	20 hrs after start-up	Every 50 hours	Every 100 hours	Every 300 hours	Yearly
Drain/Clean fuel tank water and sediments (1) (10)					X	X
Adjust engine inlet and outlet valves (2)					X	
Inspect starter motor					*X	*X
Inspect charging alternator					*X	*X
Check spark arrestor	X					
Check engine speed, and adjust if necessary					X	

Notes:

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

* If applicable

(1) More frequently when operating in a dusty environment.

(2) Refer to engine operation manual.

(3) After a days work.

(4) Gummed or clogged filters means fuel starvation and reduced engine performance. Reduce service interval in heavy duty application.

(5) See chapter “Engine oil specifications”.

(6) Replace all rubber flexibles every 5 years, according to DIN20066.

(7) See chapter “Battery care”.

(8) See chapter “Measuring the alternator insulation resistance”.

(9) The function of this protection should be tested minimum on every new installation.

(10) Water in fuel tank can be detected by means of 2914 8700 00. Drain fuel tank when water is detected.

5.2.2 Maintenance schedule for QEP R/S12, QEP R/S14

Maintenance schedule	Daily	20 hrs after start-up	Every 50 hours	Every 100 hours	Every 300 hours	Yearly
Check/Fill fuel level (3)	x					
Check engine oil level (if necessary top up)	x					
Check on abnormal noise	x					
Check air filter	x					
Clean air filter			x			
Replace air filter element (1)					x	x
Change engine oil (2) (5)		x		x		x
Replace oil filter (2)					x	
Replace spark plug					x	x
Replace fuel (primary)filter(s) (4)					x	x
Measure alternator insulation resistance (8)					x	x
Test Earth Leakage Relay (9)	x					
Check for leaks in engine-, air-, oil-, or fuel system	x					
Inspect/Replace hoses and clamps					x	x
Check electrical system cables for wear					x	x
Check/Test glow plugs - grid heater					x	x
Check torque on critical bolt connections					x	x
Check electrolyte level and terminals of battery (7)					*x	*x
Check rubber flexibles (6)					x	x
Drain/Clean fuel tank water and sediments (1) (10)					x	x
Adjust engine inlet and outlet valves (2)					x	
Inspect starter motor					*x	*x

Maintenance schedule	Daily	20 hrs after start-up	Every 50 hours	Every 100 hours	Every 300 hours	Yearly
Inspect charging alternator					*X	*X
Check spark arrestor	x					
Check engine speed, and adjust if necessary					x	

Notes:

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

* If applicable

- (1) More frequently when operating in a dusty environment.
- (2) Refer to engine operation manual.
- (3) After a days work.
- (4) Gummed or clogged filters means fuel starvation and reduced engine performance. Reduce service interval in heavy duty application.
- (5) See chapter “Engine oil specifications”.
- (6) Replace all rubber flexibles every 5 years, according to DIN20066.
- (7) See chapter “Battery care”.
- (8) See chapter “Measuring the alternator insulation resistance”.

(9) The function of this protection should be tested minimum on every new installation.

(10) Water in fuel tank can be detected by means of 2914 8700 00. Drain fuel tank when water is detected.

5.2.3 Maintenance schedule for QEP (S)4, QEP 4.5, QEP (R/S)6, QEP (R/S)7

Maintenance schedule	Daily	50 hrs after start-up	Every 50 hours	Every 200 hours	Every 400 hours	Every 1000 hours	Yearly
Check/Fill fuel level (3)	x						
Check engine oil level (if necessary top up)	x						
Check on abnormal noise	x						
Check air filter	x						
Clean air filter			x				
Replace air filter element (1)					x		x
Change engine oil (2) (5)		x		x			x
Clean oil filter/replace if damaged (2)		x			x		x
Replace O-ring oil filter (2)					x		
Replace fuel (primary)filter(s) (4)					x		x
Inspect, clean and test fuel injection nozzle						x	
Replace fuel (secondary)filter(s) (4)					*x		*x
Measure alternator insulation resistance (8)					x		x
Test Earth Leakage Relay (9)	x						
Check for leaks in engine-, air-, oil-, or fuel system	x						
Inspect/Replace hoses and clamps					x		x
Check electrical system cables for wear					x		x
Check/Test glow plugs - grid heater					x		x
Check torque on critical bolt connections					x		x
Check electrolyte level and terminals of battery (7)					x		x
Grease locks and hinges							*x
Check rubber flexibles (6)					x		x

Maintenance schedule	Daily	50 hrs after start-up	Every 50 hours	Every 200 hours	Every 400 hours	Every 1000 hours	Yearly
Drain/Clean fuel tank water and sediments (1) (10)					x		x
Check compression cylinder head						x	
Adjust engine inlet and outlet valves (2)					x		
Inspect starter motor					x		x
Inspect charging alternator					x		x
Check spark arrestor	x						
Check engine speed, and adjust if necessary					x		

Notes:

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

* If applicable

- (1) More frequently when operating in a dusty environment.
- (2) Refer to engine operation manual.
- (3) After a days work.
- (4) Gummed or clogged filters means fuel starvation and reduced engine performance. Reduce service interval in heavy duty application.
- (5) See chapter "Engine oil specifications".
- (6) Replace all rubber flexibles every 5 years, according to DIN20066.
- (7) See chapter "Battery care".

(8) See chapter "Measuring the alternator insulation resistance".

(9) The function of this protection should be tested minimum on every new installation.

(10) Water in fuel tank can be detected by means of 2914 8700 00. Drain fuel tank when water is detected.

5.2.4 Maintenance schedule for QEP R/S9, QEP R/S10

Maintenance schedule	Daily	50 hrs after start-up	Every 250 hours	Every 500 hours	Every 1000 hours	Yearly
Check/Fill fuel level (3)	x					
Check engine oil level (if necessary top up)	x					
Check on abnormal noise	x					
Check air filter	x					
Clean air filter		x				
Replace air filter element (1)			x			
Change engine oil (2) (5)			x			
Replace oil filter (2)			x			
Replace fuel (primary)filter (4)			x			
Replace fuel (secondary)filter (4)			x			
Measure alternator insulation resistance (8)				x	x	x
Test Earth Leakage Relay (9)	x					
Check for leaks in engine-, air-, oil-, or fuel system	x					
Inspect/Replace hoses and clamps				x		x
Check electrical system cables for wear				x	x	x
Check/Test glow plugs - grid heater				x	x	
Check torque on critical bolt connections				x		
Check electrolyte level and terminals of battery (7)				x		
Grease locks and hinges				x		
Check rubber flexibles (6)				x		
Drain/Clean fuel tank water and sediments (1) (10)					x	
Adjust engine inlet and outlet valves (2)				x		

Maintenance schedule	Daily	50 hrs after start-up	Every 250 hours	Every 500 hours	Every 1000 hours	Yearly
Inspect starter motor					X	X
Inspect charging alternator					X	X
Inspect/clean injectors			X			

Notes:

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

* If applicable

- (1) More frequently when operating in a dusty environment.
- (2) Refer to engine operation manual.
- (3) After a days work.
- (4) Gummed or clogged filters means fuel starvation and reduced engine performance. Reduce service interval in heavy duty application.
- (5) See chapter "Engine oil specifications".
- (6) Replace all rubber flexibles every 5 years, according to DIN20066.
- (7) See chapter "Battery care".
- (8) See chapter "Measuring the alternator insulation resistance".

(9) The function of this protection should be tested minimum on every new installation.

(10) Water in fuel tank can be detected by means of 2914 8700 00. Drain fuel tank when water is detected.

5.2.5 Use of maintenance schedule

The maintenance schedule contains a summary of the maintenance instructions. Read the respective section before taking maintenance measures.

When servicing, replace all disengaged packing, e.g. gaskets, O-rings, washers.

For engine maintenance refer to Engine Operation Manual.

The maintenance schedule has to be seen as a guideline for units operating in a dusty environment typical to generator set applications. Maintenance schedule can be adapted depending on application, environment and quality of maintenance.

5.3 *Alternator maintenance procedures*

5.3.1 Measuring the alternator insulation resistance

A 500 V megger is required to measure the alternator insulation resistance.

If the N-terminal is connected to the earthing system, it must be disconnected from the earth terminal. Disconnect the AVR.

Connect the megger between the earth terminal and terminal L1 and generate a voltage of 500 V. The scale must indicate a resistance of at least 5 MΩ.

Refer to the alternator operating and maintenance instructions for more details.

5.4 *Engine maintenance procedures*

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

5.4.1 Engine oil level check

Consult the Engine Operation Manual for the oil specifications, viscosity recommendations and oil change intervals. For intervals, see also chapter "Maintenance schedules" on page 41.

- Check the engine oil level by using the oil level dipstick.
- Top up with oil, if necessary.

Refer to the Engine Operation Manual for more detailed instructions.



NEVER overfill the engine with engine oil.

ALWAYS keep the oil level between the upper and lower lines on the oil level dipstick.

Some engines incorporate an engine protection system against low levels of lubricating oil. When this system trips, it automatically stops the engine. If an attempt is made to restart the generator set, the system will prevent this until the crankcase has been completely filled to full capacity.



If the oil is very old and it has not been changed according to the periods indicated by the engine manufacturer, the engine protection system against low oil levels may not work properly resulting in serious damage to the engine, which will not be covered by the warranty.

5.4.2 Fuel level check

For intervals, see section “Maintenance schedules” on page 41.

- Check the fuel level and top up if necessary. It is recommended to fill the tank after the day’s operation to prevent water vapor in a nearly empty tank from condensing.
- Fill the fuel tank up to 95% of its capacity and ensure that the cap is correctly closed after filling. Do not fill up to the cap, because vibration from the running engine could cause fuel spillage.
- Pay attention not to spill fuel while filling the tank. If fuel has been spilt, ensure that the area is completely dry before switching on the engine.
- Avoid any bodily contact with the fuel and do not inhale the vapour. It is important to keep the fuel in a place inaccessible to children. The fuel fumes are highly inflammable.



The warranty does not cover damages as a result of the use of unauthorized fuel. For fuel specifications, please contact your Atlas Copco Customer Center.

5.5 Adjustments and service procedures

5.5.1 Battery care



Before handling batteries, read the relevant safety precautions and act accordingly.

If the battery is still dry, it must be activated as described in chapter "Activating a dry-charged battery".

The battery must be in operation within 2 months from being activated; if not, it needs to be recharged first.

5.5.1.1 Electrolyte



Read the safety instructions carefully.

Electrolyte in batteries is a sulphuric acid solution in distilled water.

The solution must be made up before being introduced into the battery.

5.5.1.2 Activating a dry-charged battery

- Take out the battery.
- Battery and electrolyte must be at equal temperature above 10°C.
- Remove cover and/or plug from each cell.
- Fill each cell with electrolyte until the level reaches 10 to 15 mm above the plates, or to the level marked on the battery.

- Rock the battery a few times so that possible air bubbles can escape; wait 10 minutes and check the level in each cell once more; if required, add electrolyte.
- Refit plugs and/or cover.
- Place the battery in the generator set.

5.5.1.3 Recharging a battery

Before and after charging a battery, always check the electrolyte level in each cell; if required, top up with distilled water only. When charging batteries, each cell must be open, i.e. plugs and/or cover removed.



Use a commercial automatic battery charger according to its manufacturer's instructions.

Apply with preference the slow charging method and adjust the charge current according to the following rule of thumb: battery capacity in Ah divided by 20 gives safe charging current in Amp.

5.5.1.4 Make-up distilled water

The amount of water evaporating from batteries is largely dependant on the operating conditions, i.e. temperatures, number of starts, running time between start and stop, etc...

If a battery starts to need excessive make-up water, this points to overcharging. Most common causes are high temperatures or a too high voltage regulator setting.

If a battery does not need any make-up water at all over a considerable time of operation, an undercharged battery condition may be caused by poor cable connections or a too low voltage regulator setting.

5.5.1.5 Periodic battery service

- Keep the battery clean and dry.
- Keep the electrolyte level at 10 to 15 mm above the plates or at the indicated level; top up with distilled water only. Never overfill, as this will cause poor performance and excessive corrosion.
- Record the quantity of distilled water added.
- Keep the terminals and clamps tight, clean, and lightly covered with petroleum jelly.
- Carry out periodic condition tests. Test intervals of 1 to 3 months, depending on climate and operating conditions, are recommended.
- If doubtful conditions are noticed or malfunctions arise, keep in mind that the cause may be in the electrical system, e.g. loose terminals, voltage regulator maladjusted, poor performance of generator set, etc...

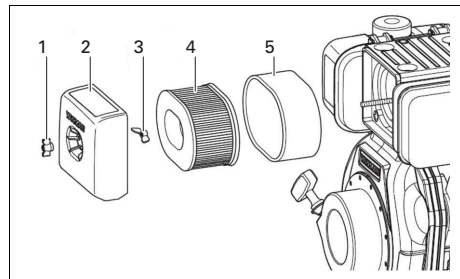
5.5.2 Service instructions for Yanmar engines



Applicable for QEP (S)4, QEP 4.5, QEP (R/S)6, QEP (R/S)7.

5.5.2.1 Inspect/clean air filter

The engine performance is adversely affected when the air cleaner element is clogged with dust. Be sure to clean the air filter element periodically.



- | | |
|---|---------------------|
| 1 | Wing nut |
| 2 | Air cleaner cover |
| 3 | Wing nut |
| 4 | Air cleaner element |
| 5 | Outer foam element |



Never run the generator set without air filter element.

1. Remove the wing nut (1).
2. Remove the air cleaner cover (2).
3. Remove the wing nut (3).
4. Remove the air cleaner element (4) and outer foam element (5).
5. Blow air through both elements using 0.29–0.49 MPa (3.0–5.0kgf/cm²) compressed air to remove the particulates.



Use the lowest possible air pressure to remove the dust without damaging the elements.

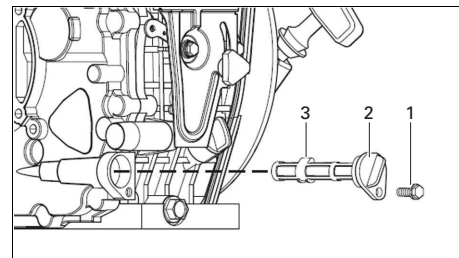
6. If either element is damaged replace both of them (they are not sold individually). Inspect the new elements for tears or punctures before installation.
7. Clean the inside of the air cleaner cover (2).
8. Install the air cleaner element (4) into the air cleaner case.
9. Slide the outer foam element (5) over the air cleaner element (4).
10. Install the wing nut (3) and hand tighten.
11. Install the air cleaner cover (2).
12. Install the wing nut (1) and hand tighten.



Do not over-tighten the wing nuts, as this will damage the air cleaner assembly!

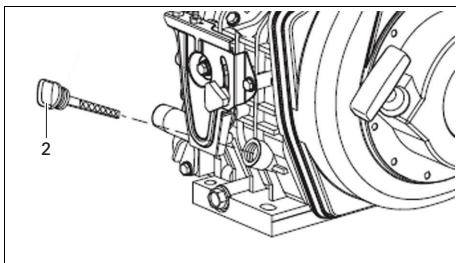
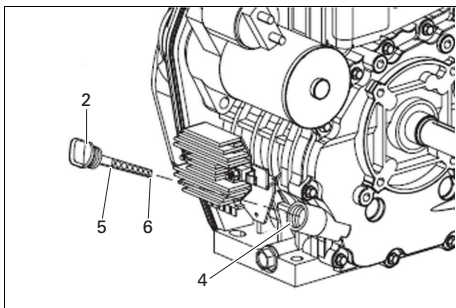
5.5.2.2 Clean/inspect engine oil filter

Clean/inspect the engine oil filter (if installed) as follows:



- | | |
|---|---------------------------|
| 1 | Oil filter retaining bolt |
| 2 | Oil filter cap |
| 3 | Oil filter |

1. Remove the oil filter retaining bolt (1).
2. Pull the oil filter cap (2) out and remove the oil filter (3).
3. Clean the oil filter or replace if damaged.
4. Install the oil filter (3).
5. Make sure the oil filter cap (2) is fully seated.
6. Install and tighten the oil filter retaining bolt (1).
7. Remove the oil cap/dipstick (2).



8. Add new engine oil (4) until the level is between the upper (5) and lower (6) lines on the oil dipstick (2).
9. Insert the oil cap/dipstick (2) and tighten by hand.
10. Warm up the engine by running it for 5 minutes and check for any engine oil leaks.
11. When the engine is warm, shut it off and let it cool down for 10 minutes.
12. Recheck the engine oil level by fully inserting, but not screwing in, the dipstick (2).
13. Add engine oil (4) as needed.
14. Insert the oil cap/dipstick (1) and tighten by hand.



Over-tightening may damage the cap. If any engine oil is spilled, wipe it away with a clean cloth.

5.5.3 Service instructions for Honda GX270-390 engine



Applicable for QEP 3, QEP 3.5, QEP (R)5, QEP (R)6.5, QEP (R)7.5, QEP (R)8, QEP W210.

5.5.3.1 Inspect/clean air filter

A dirty air cleaner will restrict air flow to the carburettor, reducing engine performance. If you operate the engine in very dusty areas, clean the air filter more often than specified in the maintenance schedule (see page 41).



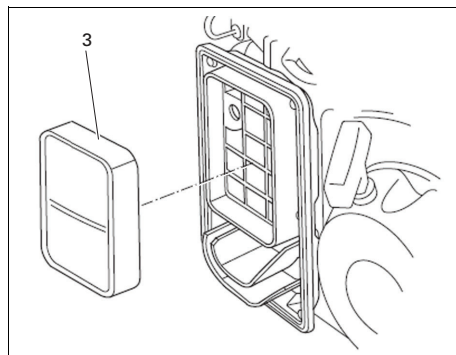
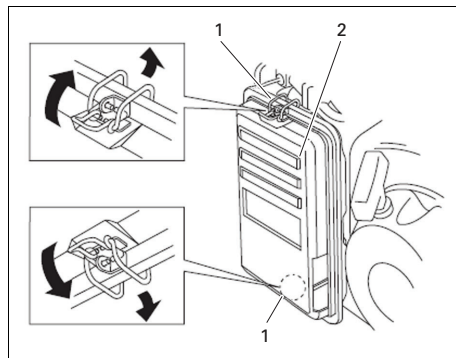
Operating the engine without an air filter, or with a damaged air filter, will allow dirt to enter the engine, causing rapid engine wear. This type of damage is not covered by the distributor's limited warranty.

Inspection

Remove the air cleaner cover (2) and inspect the filter element (3). Clean or replace dirty filter elements. Always replace damaged filter elements.

Inspect the new element for tears or punctures before installation.

Cleaning



- | | |
|---|--------------------|
| 1 | Clip |
| 2 | Air cleaner cover |
| 3 | Air filter element |

1. Unsnap the air cleaner cover clips (1), remove the air cleaner cover (2), and remove the air filter element (3).
2. If the element is in good condition, wash it in a solution of household detergent and warm water, then rinse thoroughly, or wash in non-flammable or high flash point solvent. Allow the element to dry thoroughly.
3. Soak the air filter element in clean engine oil and squeeze out the excess oil. The engine will smoke during initial start-up if too much oil is left in the element.
4. Reinstall the air filter element (3) and the cover (2).

5.5.3.2 Inspect/replace spark plug

Recommendations

- Recommended spark plugs:
 - BPR6ES (NGK)
 - W20EPR-U (DENSO)

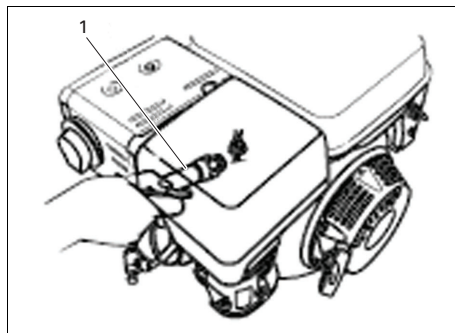


The recommended spark plug has the correct heat range for normal engine operating temperatures. Using an incorrect spark plug can cause engine damage.

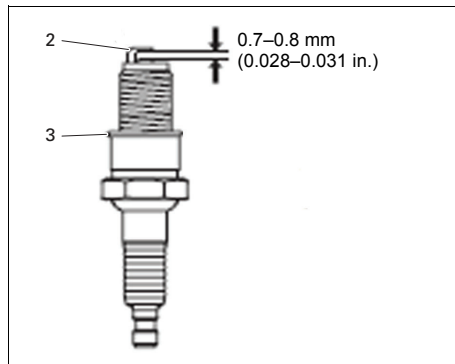
- If the engine has been running, let it cool down before servicing the spark plug.
- For good performance, the spark plug must be properly gapped and free of deposits.

Replacing spark plugs

1. Disconnect the spark plug cap, and remove any dirt from around the spark plug area.
2. Remove the spark plug with a 13/16-inch spark plug wrench (1).



3. Visually inspect the spark plug. Replace if damaged or badly fouled, if the sealing washer (2) is in poor condition or if the electrode is worn.



4. Measure the spark plug electrode gap with a wire-type feeler gauge. Correct the gap, if necessary, by carefully bending the side electrode (3).

The gap should be 0.7–0.8 mm (0.028–0.031 in.).

5. Install the spark plug carefully, by hand, to avoid cross-threading.
6. After the spark plug is seated, tighten with a 13/16-inch spark plug wrench to compress the sealing washer.

When installing a **new** spark plug, tighten 1/2 turn after the spark plug seats to compress the washer.

When reinstalling the **original** spark plug, tighten 1/8–1/4 turn after the spark plug seats to compress the washer.



A loose spark plug can overheat and damage the engine. Over-tightening the spark plug can damage the threads in the cylinder head.

7. Attach the spark plug cap to the spark plug.

5.5.4 Service instructions for Honda GX690 engines



Applicable for QEP R/S12, QEP R/S14.

5.5.4.1 Inspect/clean air filter

A dirty air cleaner will restrict air flow to the carburettor, reducing engine performance. If you operate the engine in very dusty areas, clean the air filter more often than specified in the maintenance schedule (see page 41).



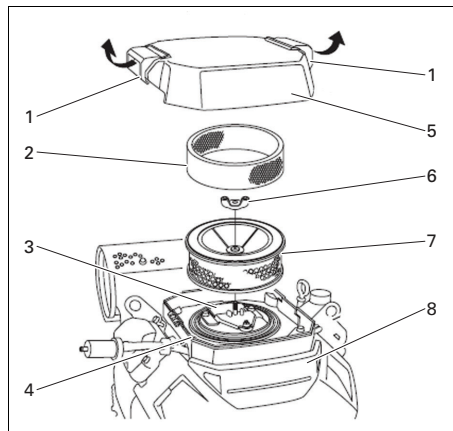
Operating the engine without an air filter, or with a damaged air filter, will allow dirt to enter the engine, causing rapid engine wear. This type of damage is not covered by the distributor's limited warranty.

Inspection

Remove the air cleaner cover (5) and inspect the filter elements (2, 7). Clean or replace dirty filter elements. Always replace damaged filter elements.

Inspect the new elements for tears or punctures before installation.

Cleaning

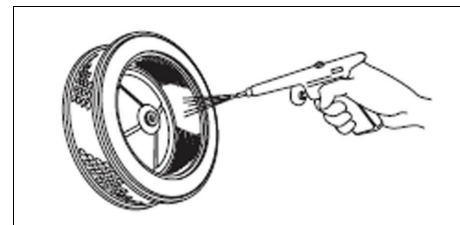


- | | |
|---|-------------------------|
| 1 | Air cleaner cover latch |
| 2 | Foam filter element |
| 3 | Air chamber |
| 4 | Packing |
| 5 | Air cleaner cover |
| 6 | Wing nut |
| 7 | Paper filter element |
| 8 | Air cleaner case |

1. Pull the air cleaner cover latch (1) to the unlocked position, and remove the cover (5).
2. Remove the wing nut (6) from the paper filter element (7).

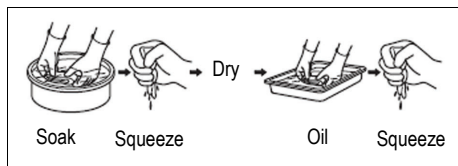
3. Remove the paper filter element (7) and foam filter element (2) from the air cleaner case (8).
4. Remove the foam filter element from the paper filter element.
5. Inspect both filter elements, and replace them if they are damaged. Always replace the paper filter element at the scheduled interval (see page 41).
6. Clean the filter elements if they can be reused.

Paper filter element (7): Tap the filter element several times on a hard surface to remove dirt, or blow compressed air (not exceeding 207 kPa (2.1 kgf/cm², 30 psi) through the filter element from the air cleaner case side.



Never try to brush off dirt; brushing will force dirt into the fibers. Replace the paper filter element if it is excessively dirty.

Foam filter element (2): Clean in warm soapy water, rinse, and allow to dry thoroughly. Or clean in non-flammable solvent and allow to dry. Dip the filter element in clean engine oil, then squeeze out all excess oil. The engine will smoke when started if too much oil is left in the foam.



7. Wipe dirt from the inside of the air cleaner body and cover, using a moist rag. Be careful to prevent dirt from entering the air chamber (3) that leads to the carburettor.
8. Place the foam filter element (2) over the paper filter element (7), and reinstall the assembled filter element. Be sure the packing (4) is in place beneath the filter element. Tighten the wing nut (6) securely.
9. Lock the air cleaner cover latch (1) securely.

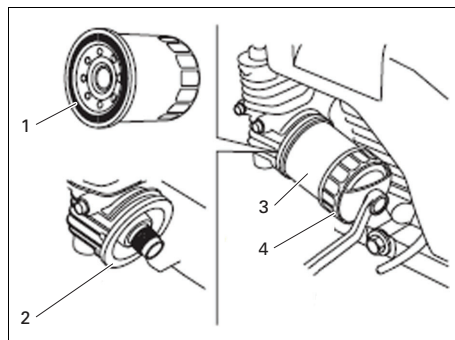
5.5.4.2 Change oil filter

Change the engine oil filter (if installed) as follows:

1. Drain the engine oil, and re-tighten the drain bolt securely.
2. Remove the oil filter (3), and drain the oil into a suitable container. Dispose the used oil and filter in a manner compatible with the environment.



Use an oil filter socket (4), rather than a strap wrench to avoid striking and damaging the oil pressure switch.



- | | |
|---|----------------------|
| 1 | Seal |
| 2 | Filter mounting base |
| 3 | Oil filter |
| 4 | Oil filter socket |

3. Clean the filter mounting base (2), and coat the seal (1) of the new oil filter with clean engine oil.



Use only a Honda genuine oil filter or a filter of equivalent quality specified for your model. Using the wrong filter, or a non-Honda filter which is not of equivalent quality, may cause engine damage.

4. Screw on the new oil filter by hand until the seal contacts the filter mounting base, then use an oil filter socket tool to tighten the filter an additional 3/4 turn.

Oil filter tightening torque: 12 N.m (1.2 kgf.m, 9 lbf.ft).

5. Refill the crankcase with the specified amount of the recommended oil (see page 61). Reinstall the oil filler cap and oil level dipstick.
6. Start the engine, and check for leaks.
7. Stop the engine, and check the oil level as describe on page 49. If necessary, add oil to bring the oil level to the upper limit mark on the oil level dipstick.

5.5.4.3 Inspect/replace spark plug

Recommendations

- Recommended spark plug:

- ZFR5F (NGK)

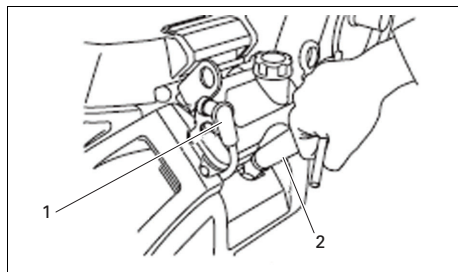


The recommended spark plug has the correct heat range for normal engine operating temperatures. Using an incorrect spark plug can cause engine damage.

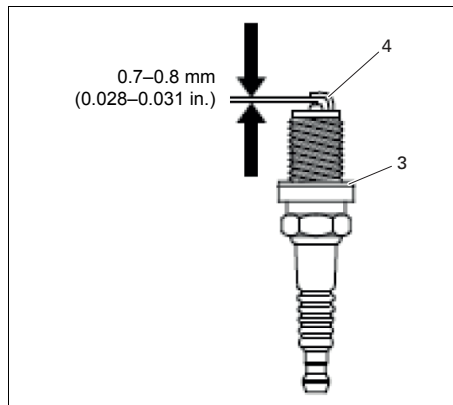
- If the engine has been running, let it cool down before servicing the spark plug.
- For good performance, the spark plug must be properly gapped and free of deposits.

Replacing spark plugs

1. Disconnect the spark plug caps (1), and remove any dirt from around the spark plug area.
2. Remove the spark plugs with a 5/8-inch spark plug wrench (2).



3. Inspect the spark plugs. Replace them if damaged or badly fouled, if the sealing washer (3) is in poor condition or if the electrode is worn.



4. Measure the spark plug electrode gaps with a wire-type feeler gauge. Correct the gap, if necessary, by carefully bending the side electrode (4).

The gap should be 0.7–0.8 mm (0.028–0.031 in.).

5. Install the spark plug carefully, by hand, to avoid cross-threading.
6. After the spark plug is seated, tighten with a 5/8-inch spark plug wrench to compress the sealing washer.

When installing a **new** spark plug, tighten 1/2 turn after the spark plug seats to compress the washer.

When reinstalling the **original** spark plug, tighten 1/8–1/4 turn after the spark plug seats to compress the washer.



A loose spark plug can overheat and damage the engine. Over-tightening the spark plug can damage the threads in the cylinder head.

7. Attach the spark plug cap to the spark plug.

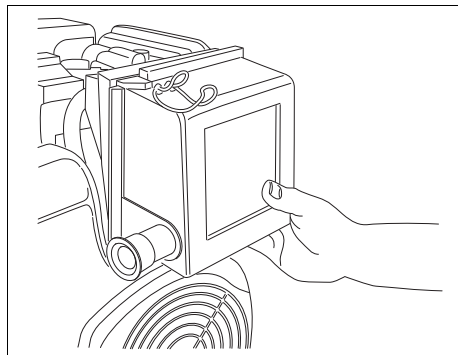
5.5.5 Service instructions for Lombardini engines



Applicable for QEP R/S9, QEP R/S10.

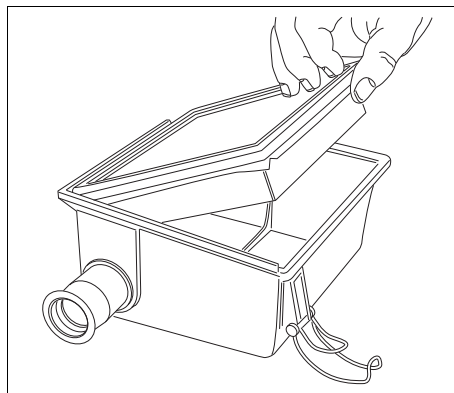
5.5.5.1 Inspect/clean air filter

The engine performance is adversely affected when the air cleaner element is clogged with dust. Be sure to clean the air filter element periodically.



Never run the generator set without air filter element.

1. Open the air cleaner and remove the element.



2. Clean the cartridge by blowing compressed air breadth ways outside and inside the cartridge, at a pressure not exceeding 5 atmospheres, or if necessary by tapping the front of the cartridge several times against a flat surface.
3. Use a lamp to check that the filter element is not damaged or inspect it against the light while slanted. In case of doubt, install a new cartridge. Inspect the new element for tears or punctures before installation. Use only genuine replacement parts.
4. Fit the air filter back in position.

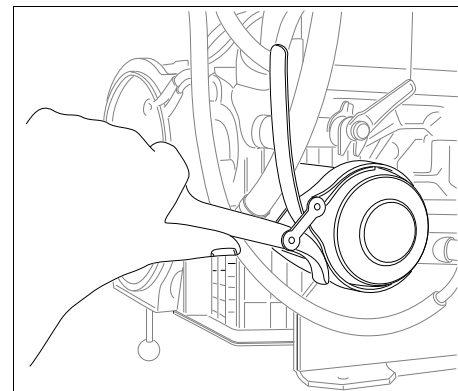


Make sure that the filter is mounted in the correct way, otherwise dust and other impurities could infiltrate into the intake ducts.

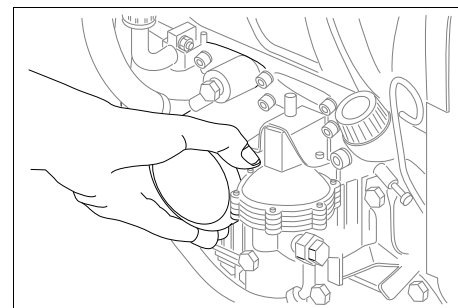
5.5.5.2 Replace oil filter

Replace the engine oil filter (if installed) as follows:

1. Remove the oil filter by using the proper wrench.



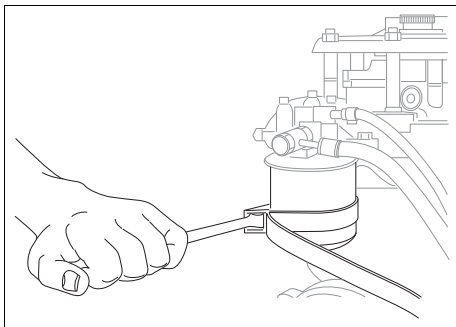
2. Mount the new oil filter and tighten exclusively by hand. Keep the removed oil filter separated from other waste material.



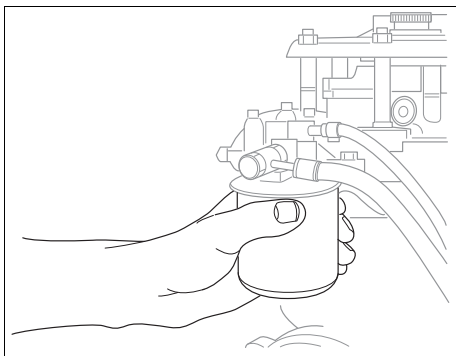
5.5.5.3 Replace fuel filter

Replace the engine fuel filter (if installed) as follows:

1. Remove the fuel filter by using the proper wrench.



2. Mount the new fuel filter and tighten exclusively by hand. Keep the removed fuel filter separated from other waste material.



5.6 Engine consumable specifications

5.6.1 Engine fuel specifications

For fuel specifications, please contact your Atlas Copco Customer Center.

5.6.2 Engine oil specifications

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

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

Engine	Type of lubricant
between -10°C and 50°C	PAROIL E or PAROIL E Mission Green
between -25°C and 50°C	PAROIL Extra



Never mix synthetic with mineral oil.

When changing from mineral to synthetic oil (or the other way around), you will need to do an extra rinse.

After doing the complete change procedure to synthetic oil, run the unit for a few minutes to allow good and complete circulation of the synthetic oil. Then drain the synthetic oil again and fill again with new synthetic oil. To set correct oil levels, proceed as in normal instruction.

Specifications PAROIL

PAROIL from Atlas Copco is the ONLY oil tested and approved for use in all engines built into Atlas Copco compressors and generator sets.

Extensive laboratory and field endurance tests on Atlas Copco equipment have proven PAROIL to match all lubrication demands in varied conditions. It meets stringent quality control specifications to ensure your equipment will run smoothly and reliably.

The quality lubricant additives in PAROIL allow for extended oil change intervals without any loss in performance or longevity.

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

PAROIL contains high quality anti-oxidants to control deposits, sludge and contaminants that tend to build up under very high temperatures.

PAROIL's detergent additives keep sludge forming particles in a fine suspension instead of allowing them to clog your filter and accumulate in the valve/rocker cover area.

PAROIL releases excess heat efficiently, whilst maintaining excellent bore-polish protection to limit oil consumption.

PAROIL has an excellent Total Base Number (TBN) retention and more alkalinity to control acid formation.

PAROIL prevents Soot build-up.

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

PAROIL Extra

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

	Litre	US gal	Imp gal	cu.ft	Order number
can	5	1.3	1.1	0.175	1630 0135 00
can	20	5.3	4.4	0.7	1630 0136 00

PAROIL E

PAROIL E is a mineral based high performance diesel engine oil with a high viscosity-index. Atlas Copco PAROIL E is designed to provide a high level of performance and protection in standard ambient conditions as from -10°C (14°F).

	Litre	US gal	Imp gal	cu.ft	Order number
can	5	1.3	1.1	0.175	1615 5953 00
can	20	5.3	4.4	0.7	1615 5954 00
barrel	209	55.2	46	7.32	1615 5955 00
barrel	1000	264	220	35	1630 0096 00

PAROIL E Mission Green

PAROIL E Mission Green is a mineral based high performance diesel engine oil with a high viscosity-index. Atlas Copco PAROIL E Mission Green is designed to provide a high level of performance and protection in standard ambient conditions as from -10°C (14°F).

	Litre	US gal	Imp gal	cu.ft	Order number
can	5	1.3	1.1	0.175	1630 0471 00
can	20	5.3	4.4	0.7	1630 0472 00
barrel	209	55.2	46	7.32	1630 0473 00

6 Checks and trouble shooting



Never perform a test run with connected power cables. Never touch an electrical connector without a voltage check.

When a failure occurs, always report what you experienced before, during and after the failure. Information with regard to the load (type, size, power factor, etc.), vibrations, exhaust gas colour, insulation check, odours, output voltage, leaks and damaged parts, ambient temperature, daily and normal maintenance and altitude might be helpful to quickly locate the problem. Also report any information regarding the humidity and location of the generator set (e.g. close to sea).

6.1 Checks

6.1.1 Checking the volt meter

- Put a volt meter in parallel with the volt meter on the control panel.
- Check that the read-out of both volt meters is the same.
- Stop the generator set and disconnect one terminal.
- Check that the internal resistance of the volt meter is high.



The volt meter is only provided on some QEP R and QEP S generator sets.

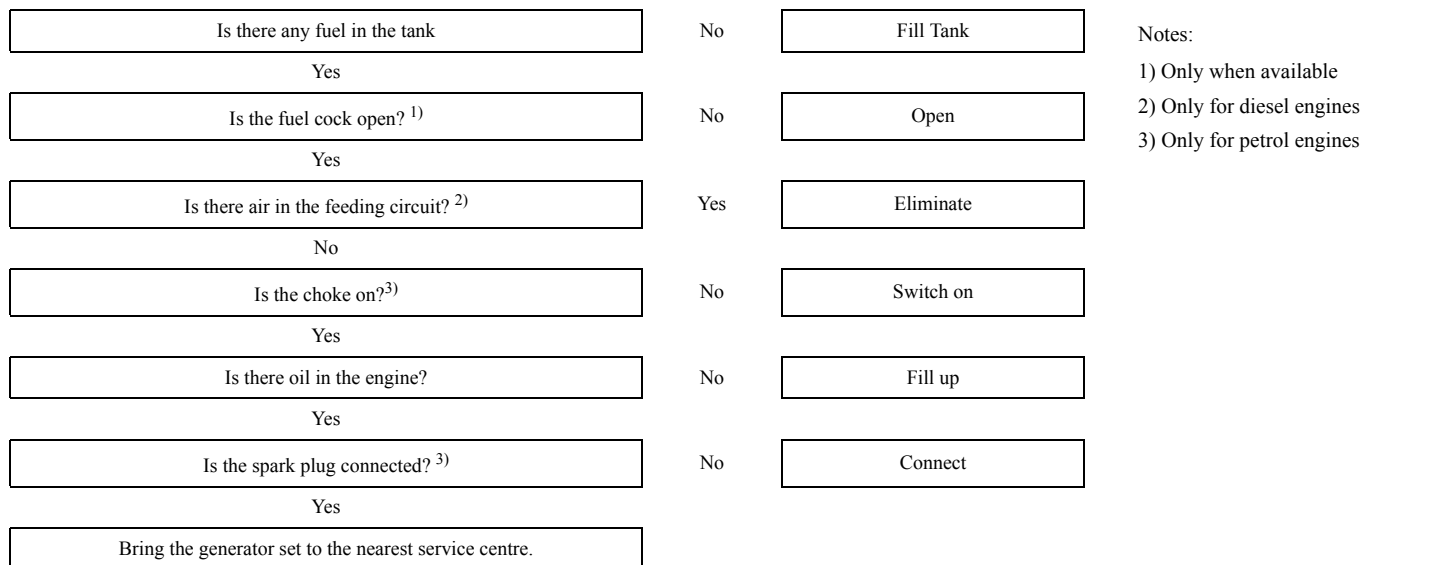
6.2 Alternator troubleshooting

<i>Symptom</i>	<i>Possible cause</i>	<i>Corrective action</i>
<i>The alternator does not work</i>	1. Demagnetised machine 2. Low speed 3. Defective diode bridge 4. Windings failure	1. Apply a voltage between 6-12 V to the outlet terminals, during 1 second. 2. Check the engine rpm and bring it to its nominal value. 3. Check and replace. 4. Contact the alternator supplier.
<i>No-load voltage low</i>	1. Low speed 2. Defective diode bridge 3. Windings failure 4. Compound spark gap low	1. Check the engine rpm and regulate. 2. Check and replace. 3. Contact the alternator supplier. 4. Regulate.
<i>No-load voltage too high</i>	1. Engine speed too high 2. Compound spark gap low	1. Check the engine rpm and regulate. 2. Regulate.
<i>Correct no-load voltage, but voltage too high in load</i>	1. Overcharge 2. Engine slows 3. Defective diode bridge	1. Check the load current. 2. Check the engine adjustment. 3. Check and replace.
<i>Machine overheating</i>	1. Vents partially obstructed	1. Dismount and clean the air inlet and outlet.

6.3 Engine troubleshooting

<i>Symptom</i>	<i>Possible cause</i>	<i>Corrective action</i>
<i>The engine does not start and it does not rotate.</i>	1. Defective battery	1. Change the battery.
	2. Defective start-up system	2. Replace overflow system.
		3. Contact service technician.
<i>The engine does not start, although the starter engine works correctly.</i>	1. Lack of fuel	1. Fill the fuel tank

Flow chart - The engine does not start



6.4 Socket troubleshooting

Flow chart - No voltage in the AC socket			
Is the protection switch on?	No	Activate	Notes: 1) Only when available 2) 1-phase generator sets
Yes			
Is the required voltage selected on the switch? ¹⁾	No	Activate	
Yes			
Are the panel cables in good state?	No	Repair	
Yes			
Is the condenser in good condition? ²⁾	No	Replace	
Yes			
Is there always a lack of voltage when the condenser has been energized at the connectors with a 12V battery? ²⁾	No	generator set OK	
Yes			
Bring the generator set to the nearest service centre.			

Flow chart - No voltage in the charger socket

Is the protection fuse in good condition?

No

Replace

Yes

Is the diode in good condition?

No

Replace

Yes

Are the panel cables in good state?

No

Repair

Yes

Bring the generator set to the nearest service centre.

7 Storage of the generator set

7.1 Storage

- Store the generator set in a dry, frost-free room which is well ventilated.
- Run the engine regularly, e.g. once a week, until it is warmed up. If this is impossible, extra precautions must be taken:
 - Consult the engine's operator manual.
 - Empty the fuel tank.
 - For petrol engine it is important to drain also the carburetor float chamber as petrol left in contact with components for a long period will cause them to deteriorate.
 - Disconnect or remove the battery. Store it in a dry, frost-free room. Keep the battery clean and its terminals lightly covered with petroleum jelly. Recharge the battery regularly.
 - Clean the generator set and protect all electrical components against moisture.
 - Place silica gel bags, VCI paper (Volatile Corrosion Inhibitor) or another drying agent inside the generator set and close the doors.
 - Stick sheets of VCI paper with adhesive tape on the bodywork to close off all openings.
 - Wrap the generator set, except the bottom, with a plastic bag.

7.2 Preparing for operation after storage

Before operating the generator set again, remove the wrapping, VCI paper and silica gel bags and check the generator set thoroughly (go through the checklist in chapter "Before starting" on page 38).

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

8 Disposal

8.1 General

When developing products and services, Atlas Copco tries to understand, address, and minimize the negative environmental effects that the products and services may have, when being manufactured, distributed, and used, as well as at their disposal.

Recycling and disposal policy are part of the development of all Atlas Copco products. Atlas Copco company standards determine strict requirements.

Selecting materials the substantial recyclability, the disassembly possibilities and the separability of materials and assemblies are considered as well as the environmental perils and dangers to health during the recycling and disposal of the unavoidable rates of not recyclable materials.

Your Atlas Copco generator set consists for the most part of metallic materials, that can be remelted in steelworks and smelting works and that is therefore almost infinite recyclable. The plastic used is labelled; sorting and fractioning of the materials for recycling in the future is foreseen.



This concept can only succeed with your help. Support us by disposing professionally. By assuring a correct disposal of the product you help to prevent possible negative consequences for environment and health, that can occur with an inappropriate waste handling.

Recycling and re-usage of material helps to preserve natural resources.

8.2 Disposal of materials

Dispose contaminated substances and material separately, according to local applicable environmental legislation.

Before dismantling a machine at the end of its operating lifetime drain all fluids and dispose of according the applicable local disposal regulations.

Remove the batteries. Do not throw batteries into the fire (explosion risk) or into the residual waste. Separate the machine into metal, electronics, wiring, hoses, insulation and plastic parts.

Dispose all components according to the applicable disposal regulations.

Remove spilled fluid mechanically; pick up the rest with absorbing agent (for example sand, sawdust) and dispose it according the applicable local disposal regulations. Do not drain into the sewage system or surface water.

9 Technical specifications

9.1 Technical data

9.1.1 Technical data for QEP Petrol units

		QEP 3	QEP 3.5	QEP 5	QEP 6.5	QEP 7.5	QEP 8	QEP W210
<i>Electrical data</i>	Voltage (V)	230	230	230	400/230	230	400/230	400/230
	Peak power (W)	2600	3100	4600	5000	6400	6600	5500
	Peak power (VA)	2900	3400	5100	6300	7200	8300	6100
<i>Noise level</i>	Acoustic power [LwA] (dB(A))	96	95	97	97	97	97	97
	Acoustic pressure [LpA] (dB(A) at 7 m)	70	69	71	71	72	72	72
<i>Weight and fuel data</i>	Weight (kg)	41	43	61	75	73	81	80
	Fuel tank capacity (l)	11	11	11	11	11	11	6.1
	Fuel consumption 75% Prime power (l/h)	0.88	1.18	1.67	1.66	2.14	2.15	2.15
	Fuel autonomy 75% Prime power (h)	12.5	9.3	6.6	6.6	5.1	5.1	2.8
<i>Engine</i>	Make	Honda	Honda	Honda	Honda	Honda	Honda	Honda
	Model	GX160	GX200	GX270	GX270	GX390	GX390	GX390
<i>Welding data</i>	Welding current (A)	-	-	-	-	-	-	40-220
	Min/Max welding voltage (V)	-	-	-	-	-	-	21.6 / 28.8
	Welding service at 60% (A)	-	-	-	-	-	-	170

9.1.2 Technical data for QEP Diesel units

		<i>QEP 4</i>	<i>QEP 4.5</i>	<i>QEP 6</i>	<i>QEP 7</i>
<i>Electrical data</i>	Voltage (V)	230	400/230	230	400/230
	Peak power (W)	3500	3700	5300	5500
	Peak power (VA)	3900	4700	5900	6900
<i>Noise level</i>	Acoustic power [LwA] (dB(A))	101	101	105	105
	Acoustic pressure [LpA] (dB(A) at 7 m)	76	76	80	80
<i>Weight and fuel data</i>	Weight (kg)	54	70	94	96
	Fuel tank capacity (l)	3.3	3.3	5.5	5.5
	Fuel consumption 75% Prime power (l/h)	0.93	0.93	1.45	1.46
	Fuel autonomy 75% Prime power (h)	3.8	3.8	3.8	3.8
<i>Engine</i>	Make	Yanmar	Yanmar	Yanmar	Yanmar
	Model	L70N	L70N	L100N	L100N

9.1.3 Technical data for QEP R Petrol units

		<i>QEP R5</i>	<i>QEP R6.5</i>	<i>QEP R7.5</i>	<i>QEP R8</i>	<i>QEP R12</i>	<i>QEP R14</i>
<i>Electrical data</i>	Voltage (V)	230	400/230	230	400/230	230	400/230
	Peak power (W)	4800	5000	6400	6600	10700	11100
	Peak power (VA)	5300	6300	7200	8300	11900	13900
<i>Noise level</i>	Acoustic power [LwA] (dB(A))	97	97	97	97	96	96
	Acoustic pressure [LpA] (dB(A) at 7 m)	71	71	72	72	70	70
<i>Weight and fuel data</i>	Weight (kg)	76	88	96	99	162	165
	Fuel tank capacity (l)	18	18	18	18	24	24
	Fuel consumption 75% Prime power (l/h)	1.7	1.7	2.2	2.2	4.2	4.2
	Fuel autonomy 75% Prime power (h)	10.8	10.8	8.3	8.3	5.7	5.7
<i>Engine</i>	Make	Honda	Honda	Honda	Honda	Honda	Honda
	Model	GX270	GX270	GX390	GX390	GX630	GX630
	Speed (rpm)	3000	3000	3000	3000	3000	3000
	Starter type	Eletrical	Eletrical	Eletrical	Eletrical	Eletrical	Eletrical

9.1.4 Technical data for QEP R Diesel units

		<i>QEP R6</i>	<i>QEP R7</i>	<i>QEP R9</i>	<i>QEP R10</i>
<i>Electrical data</i>	Voltage (V)	230	400/230	230	400/230
	Peak power (W)	5300	5500	7900	8200
	Peak power (VA)	5900	6900	8800	10300
<i>Noise level</i>	Acoustic power [LwA] (dB(A))	105	105	105	105
	Acoustic pressure [LpA] (dB(A) at 7 m)	80	80	80	80
<i>Weight and fuel data</i>	Weight (kg)	99	108	157	160
	Fuel tank capacity (l)	24	24	24	24
	Fuel consumption 75% Prime power (l/h)	1.46	1.46	2.18	2.18
	Fuel autonomy 75% Prime power (h)	16.4	16.4	11.0	11.0
<i>Engine</i>	Make	Yanmar	Yanmar	Lombardini	Lombardini
	Model	L100N	L100N	25LD330	25LD330
	Speed (rpm)	3000	3000	3000	3000
	Starter type	Eletrical	Eletrical	Eletrical	Eletrical

9.1.5 Technical data for QEP S petrol units

		<i>QEP S12</i>	<i>QEP S14</i>
<i>Electrical data</i>	Voltage (V)	230	400/230
	Peak power (W)	10700	11100
	Peak power (VA)	11900	13900
<i>Noise level</i>	Acoustic power [LwA] (dB(A))	89	89
	Acoustic pressure [LpA] (dB(A) at 7 m)	64	64
<i>Weight and fuel data</i>	Weight (kg)	188	185
	Fuel tank capacity (l)	24	24
	Fuel consumption 75% Prime power (l/h)	4.23	4.23
	Fuel autonomy 75% Prime power (h)	5.7	5.7
<i>Engine</i>	Make	Honda	Honda
	Model	GX630	GX630
	Speed (rpm)	3000	3000
	Starter type	Electrical	Electrical

9.1.6 Technical data for QEP S Diesel units

		<i>QEP S4</i>	<i>QEP S6</i>	<i>QEP S7</i>	<i>QEP S9</i>	<i>QEPS10</i>
<i>Electrical data</i>	Voltage (V)	230	230	400/230	230	400/230
	Peak power (W)	3700	5300	5500	7900	8200
	Peak power (VA)	4100	5900	6900	8800	10300
<i>Noise level</i>	Acoustic power [LwA] (dB(A))	96	93	93	97	97
	Acoustic pressure [LpA] (dB(A) at 7 m)	71	67	67	72	72
<i>Weight and fuel data</i>	Weight (kg)	99	186	186	204	207
	Fuel tank capacity (l)	18	24	24	24	24
	Fuel consumption 75% Prime power (l/h)	0.93	1.46	1.46	2.18	2.18
	Fuel autonomy 75% Prime power (h)	19.3	16.4	16.4	11.0	11.0
<i>Engine</i>	Make	Yanmar	Yanmar	Yanmar	Lombardini	Lombardini
	Model	L70N	L100N	L100N	25LD330	25LD330
	Speed (rpm)	3000	3000	3000	3000	3000
	Starter type	Eletrical	Eletrical	Eletrical	Eletrical	Eletrical

9.2 Derating

9.2.1 Diesel units

Temp. (°C) / Alt. (m)	0	5	10	15	20	25	30	35	40
0	100%	100%	100%	100%	100%	98%	96%	94%	92%
100	99%	99%	99%	99%	99%	97%	95%	93%	91%
200	98%	98%	98%	98%	98%	96%	94%	92%	90%
300	97%	97%	97%	97%	97%	95%	93%	91%	89%
400	96%	96%	96%	96%	96%	94%	92%	90%	89%
500	95%	95%	95%	95%	95%	93%	91%	90%	88%
600	94%	94%	94%	94%	94%	92%	90%	89%	87%
700	93%	93%	93%	93%	93%	91%	90%	88%	86%
800	92%	92%	92%	92%	92%	90%	89%	87%	85%
900	91%	91%	91%	91%	91%	90%	88%	86%	84%
1000	90%	90%	90%	90%	90%	89%	87%	85%	83%
1100	90%	90%	90%	90%	90%	88%	86%	84%	83%
1200	89%	89%	89%	89%	89%	87%	85%	83%	82%
1300	88%	88%	88%	88%	88%	86%	84%	83%	81%
1400	87%	87%	87%	87%	87%	85%	83%	82%	80%
1500	86%	86%	86%	86%	86%	84%	83%	81%	79%
1600	85%	85%	85%	85%	85%	83%	82%	80%	79%
1700	84%	84%	84%	84%	84%	83%	81%	79%	78%
1800	83%	83%	83%	83%	83%	82%	80%	79%	77%
1900	83%	83%	83%	83%	83%	81%	79%	78%	76%
2000	82%	82%	82%	82%	82%	80%	79%	77%	75%
2100	81%	81%	81%	81%	81%	79%	78%	76%	75%
2200	80%	80%	80%	80%	80%	79%	77%	75%	74%
2300	79%	79%	79%	79%	79%	78%	76%	75%	73%

Temp. (°C) / Alt. (m)	0	5	10	15	20	25	30	35	40
2400	79%	79%	79%	79%	79%	77%	75%	74%	72%
2500	78%	78%	78%	78%	78%	76%	75%	73%	72%
2600	77%	77%	77%	77%	77%	75%	74%	72%	71%
2700	76%	76%	76%	76%	76%	75%	73%	72%	70%
2800	75%	75%	75%	75%	75%	74%	72%	71%	70%
2900	75%	75%	75%	75%	75%	73%	72%	70%	69%
3000	74%	74%	74%	74%	74%	72%	71%	70%	68%

9.2.2 Petrol units

Temp. (°C) / Alt. (m)	0	5	10	15	20	25	30	35	40
0	100%	100%	100%	100%	99%	98%	97%	96%	95%
100	99%	99%	99%	99%	98%	97%	96%	95%	94%
200	98%	98%	98%	98%	97%	96%	95%	94%	93%
300	97%	97%	97%	97%	96%	95%	94%	93%	92%
400	95%	95%	95%	95%	94%	94%	93%	92%	91%
500	94%	94%	94%	94%	93%	92%	91%	91%	90%
600	93%	93%	93%	93%	92%	91%	90%	90%	89%
700	92%	92%	92%	92%	91%	90%	89%	88%	88%
800	91%	91%	91%	91%	90%	89%	88%	87%	87%
900	90%	90%	90%	90%	89%	88%	87%	86%	86%
1000	89%	89%	89%	89%	88%	87%	86%	85%	85%
1100	88%	88%	88%	88%	87%	86%	85%	84%	84%
1200	87%	87%	87%	87%	86%	85%	84%	83%	83%
1300	86%	86%	86%	86%	85%	84%	83%	82%	82%
1400	85%	85%	85%	85%	84%	83%	82%	81%	81%

Temp. (°C) / Alt. (m)	0	5	10	15	20	25	30	35	40
1500	84%	84%	84%	84%	83%	82%	81%	81%	80%
Carburettor modification required from 1500 m on									
1600	83%	83%	83%	83%	82%	81%	80%	79%	79%
1700	81%	81%	81%	81%	81%	80%	79%	78%	77%
1800	80%	80%	80%	80%	79%	79%	78%	77%	76%
1900	79%	79%	79%	79%	78%	77%	77%	76%	75%
2000	78%	78%	78%	78%	77%	76%	75%	75%	74%

9.2.3 Carburettor modifications for high altitude operation of Petrol units

At high altitude, the standard carburettor air-fuel mixture will be too rich. Performance will decrease and fuel consumption will increase. A very rich mixture will also foul the spark plug and cause hard starting. Operation at an altitude that differs from the one this engine was certified for extended periods of time, may increase emissions.

High altitude performance can be improved by specific modifications to the carburettor. If you always operate your engine at altitudes above 1,500 meters (5,000 feet), have your servicing dealer perform this carburettor modification. When operated at high altitude with the carburettor modifications for high altitude use, this engine will meet each emission standard throughout its useful life.

Even with carburettor modification, engine horsepower will decrease about 3.5% for each 300 meter (1,000 feet) increase in altitude. The effect of altitude on horsepower will be greater than this if no carburettor modification is made.



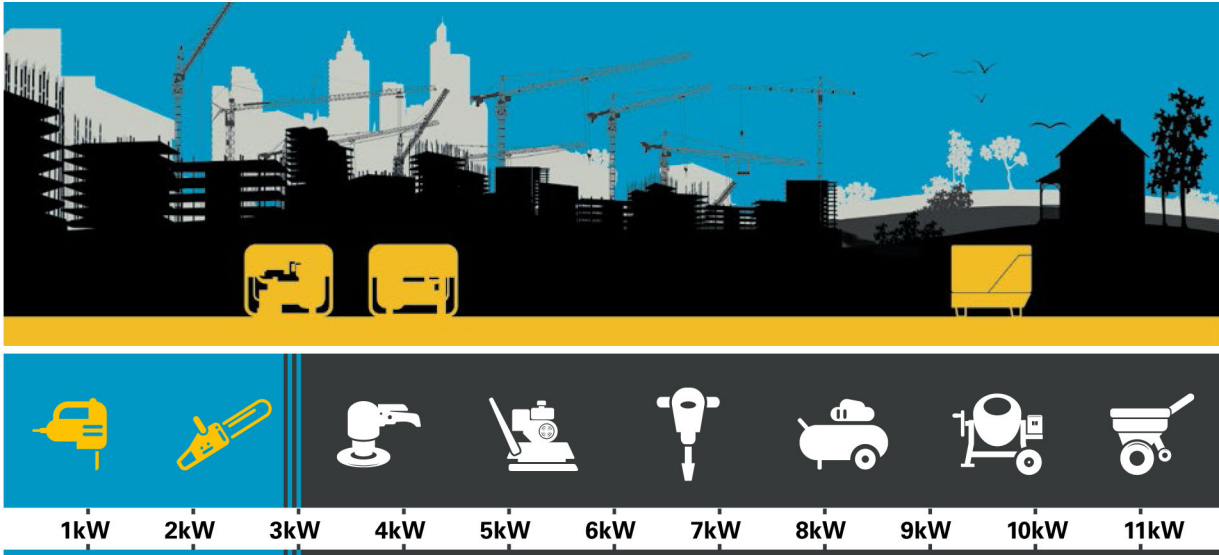
When the carburettor has been modified for high altitude operation, the air-fuel mixture will be too lean for low altitude use. Operation at altitudes below 1,500 metres (5,000 feet) with a modified carburettor may cause the engine to overheat and result in serious engine damage.

For use at low altitudes, have your servicing dealer return the carburettor to original factory setting.

9.3 Socket configurations overview

Model	Schuko	CEE 230V 2P+G 16A	CEE 230V 2P+G 32A	CEE 400V 3P+N+G 16A	12Vdc output
QEP 4	1	1	-	-	-
QEP 6	1	-	1	-	-
QEP 4.5	1	-	-	1	-
QEP 7	1	1	-	1	-
QEP 3	2	-	-	-	-
QEP 3.5	2	-	-	-	-
QEP 5	1	1	-	-	-
QEP 7.5	1	-	1	-	-
QEP 6.5	1	1	-	1	-
QEP 8	1	1	-	1	-
QEP R6	1	1	1	-	1
QEP R9	1	1	1	-	-
QEP R7	1	2	-	1	1
QEP R10	1	-	1	1	-
QEP R5	1	-	1	-	1
QEP R7.5	1	-	1	-	1
QEP R12	1	1	1	-	-
QEP R6.5	1	-	-	1	1
QEP R8	1	-	-	1	1
QEP R14	1	2	-	1	-
QEP S4	1	1	1	-	-
QEP S6	1	1	1	-	-
QEP S9	1	1	1	-	-
QEP S12	1	1	1	-	-
QEP S7	1	2	-	1	-
QEP S10	1	2	-	1	-
QEP S14	1	2	-	1	-

9.4 Overview power outputs

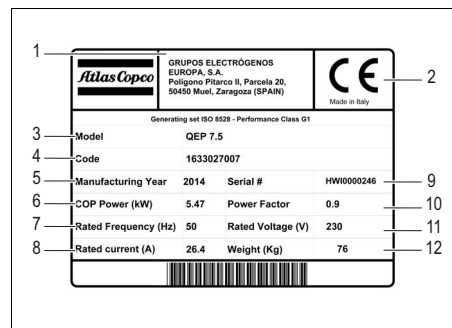


9.5 Conversion list of SI units into British units

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

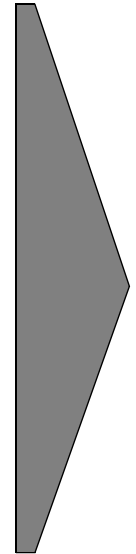
A temperature difference of 1°C = a temperature difference of 1.8°F.

9.6 Data plate



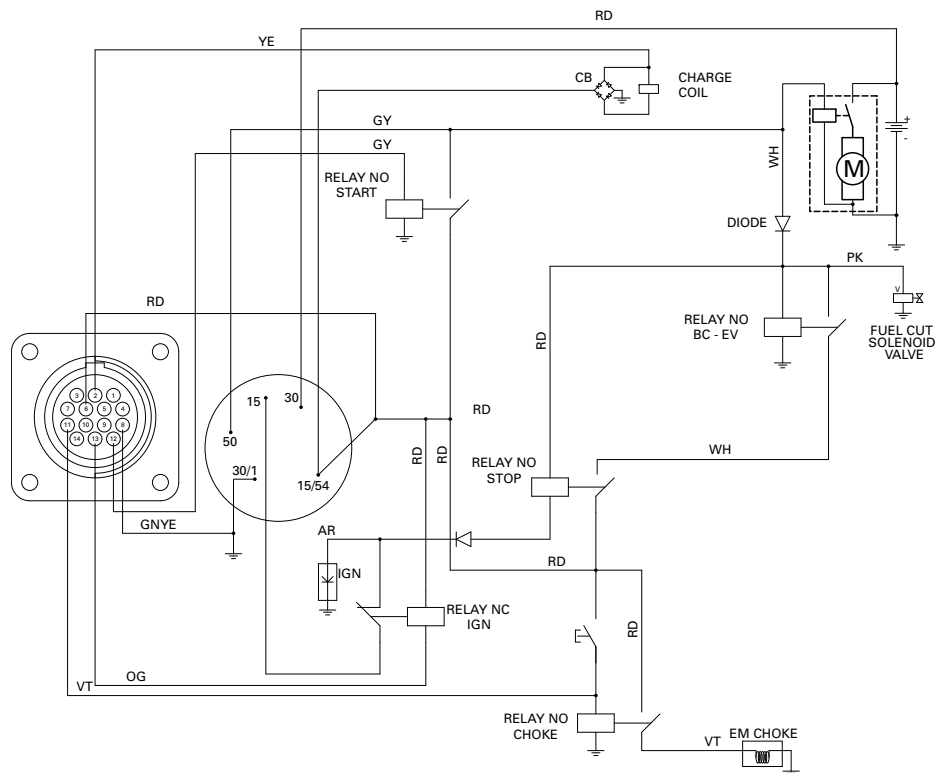
1. Name and address of manufacturer
2. EEC mark in accordance with Machine Directive 89/392E
3. Model name
4. Model number
5. Manufacturing year
6. COP power
7. Rated frequency
8. Rated current
9. Serial number
10. Power factor
11. Rated voltage
12. Weight

Circuit diagrams



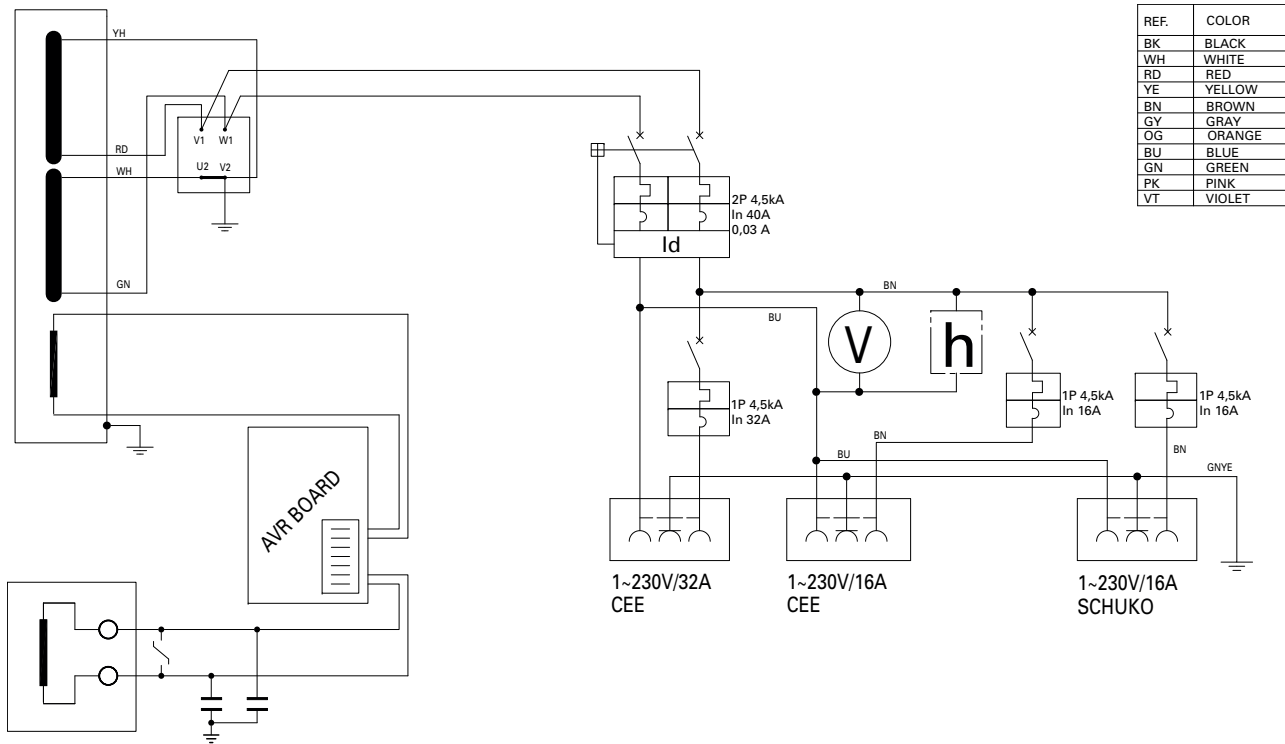
1636 0062 46/00

Applicable for QEP R12/14 50Hz, 1P/3P



REF.	COLOR
BK	BLACK
WH	WHITE
RD	RED
YE	YELLOW
BN	BROWN
GY	GRAY
OG	ORANGE
BU	BLUE
GN	GREEN
PK	PINK
VT	VIOLET

Applicable for QEP R12/14 50Hz, 1P/3P



Applicable for QEP R12/14 50Hz, 1P/3P



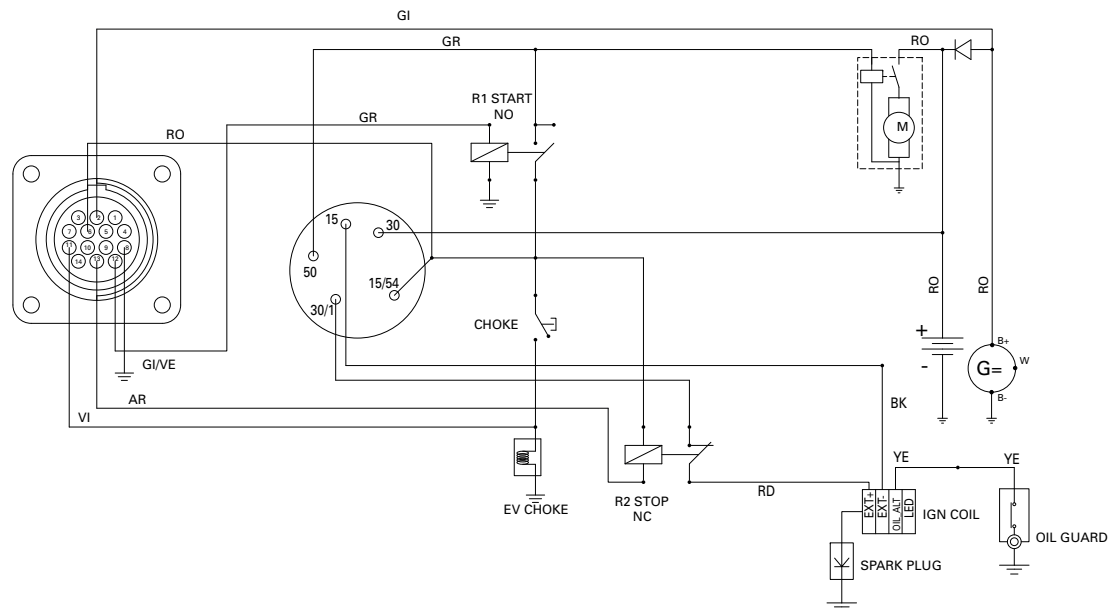
1636 0062 46/00

Applicable for QEP R12/14 50Hz, 1P/3P

14-pole connector		AMF	RSS		Colour
1	Neutral (230 V)	--	IN	0V	Light blue
2	D+ (12V)	--	IN	12V	Yellow
3	+B x (EV or BC supply)	OUT	--	12V	Pink
4	Oil alarm	IN	--	0V	Blue
5	Phase (230V)	--	IN	230V	Brown
6	+Battery (under key switch)	--	IN	12V	Red
7	--	--	--	--	Green
8	-Battery	IN	IN	0V	Black
9	Fuel alarm	IN	--	0V	White
10	Temperature alarm	IN	--	0V	Yellow
11	Choke	OUT	OUT	12V	Pink
12	Start	OUT	OUT	12V	Grey
13	Stop	OUT	OUT	0V	Orange
14	--	--	--	--	Green/Yellow

1636 0064 31/00

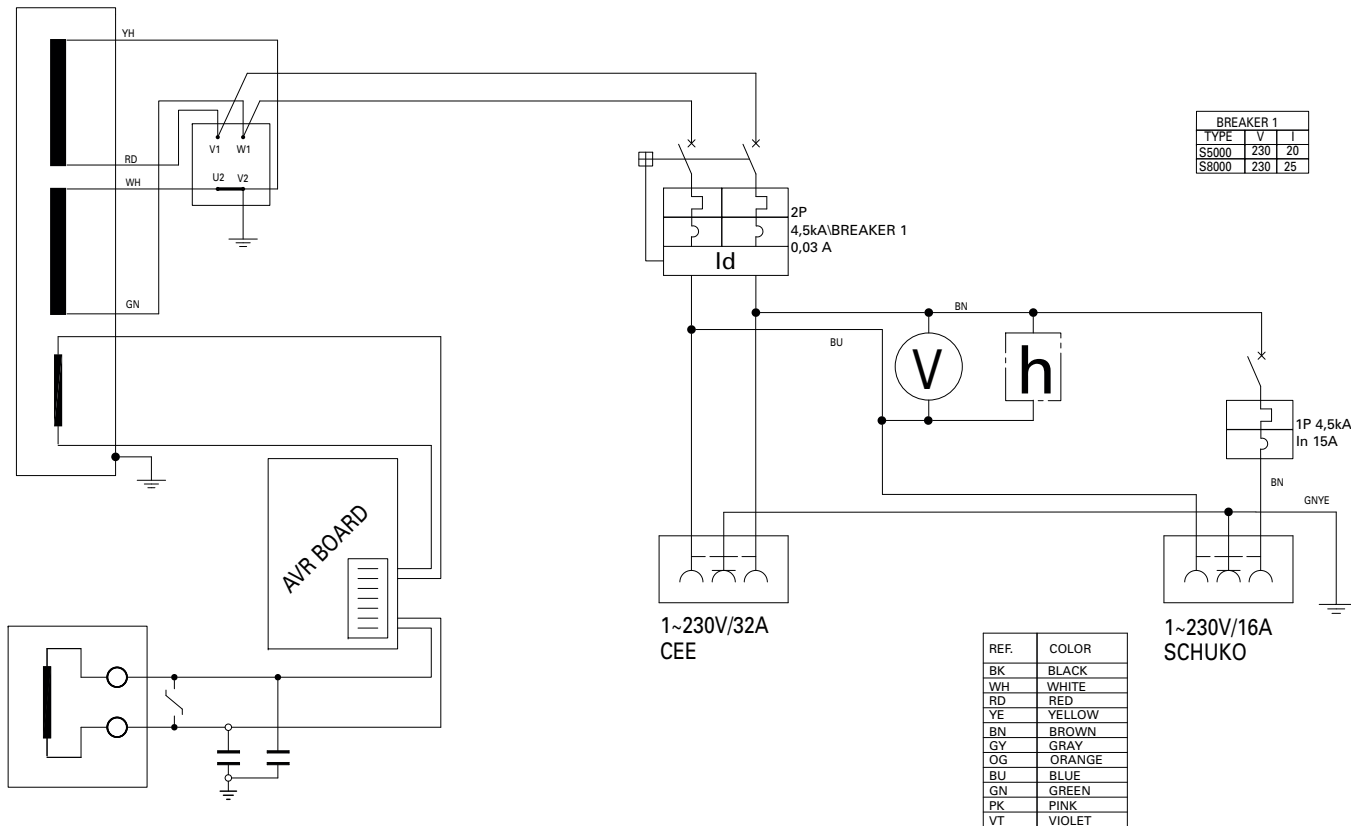
Applicable for QEP R5/R8 50Hz, 1P/3P



REF.	COLOR
BK	BLACK
WH	WHITE
RD	RED
YE	YELLOW
BN	BROWN
GY	GRAY
OG	ORANGE
BU	BLUE
GN	GREEN
PK	PINK
VT	VIOLET

1636 0064 31/00

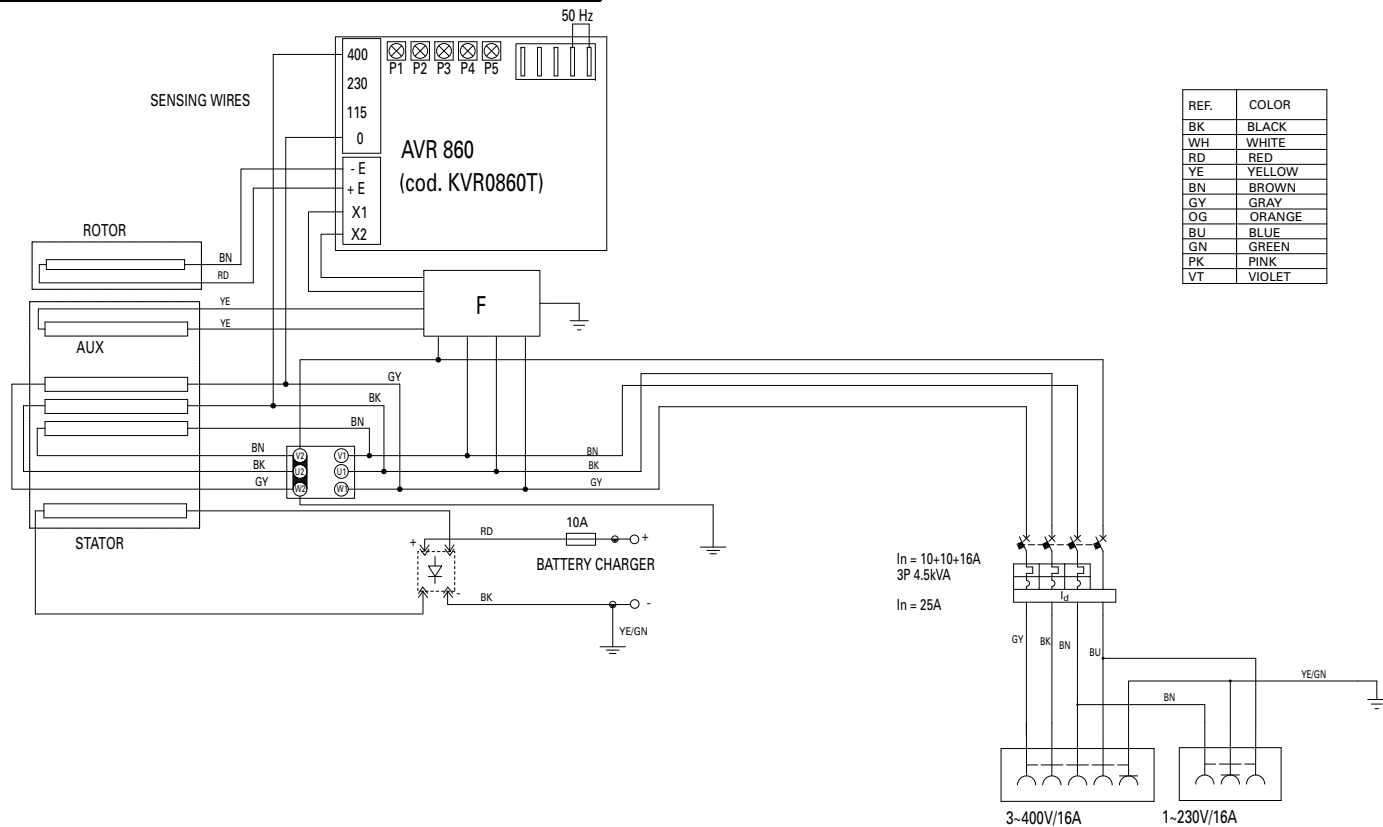
Applicable for QEP R5/R8 50Hz, 1P/3P



BREAKER 1			
TYPE	V	I	
S5000	230	20	
S8000	230	25	

1636 0064 31/00

Applicable for QEP R5/R8 50Hz, 1P/3P



1636 0064 31/00

Applicable for QEP R5/R8 50Hz, 1P/3P

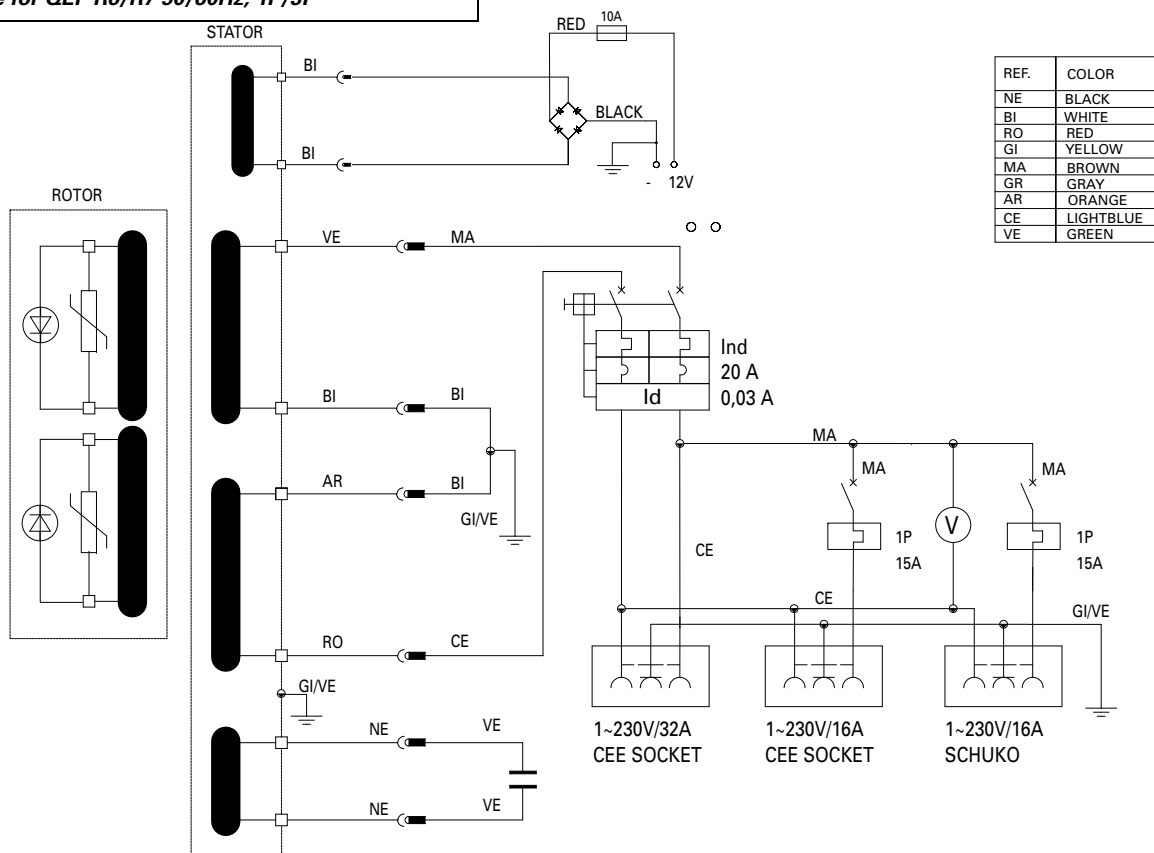
14-pole connector		AMF	RSS		Colour
1	Neutral (230 V)	--	IN	0V	Light blue
2	D+ (12V)	--	IN	12V	Yellow
3	+B x (EV or BC supply)	OUT	--	12V	Pink
4	Oil alarm	IN	--	0V	Blue
5	Phase (230V)	--	IN	230V	Brown
6	+Battery (under key switch)	--	IN	12V	Red
7	--	--	--	--	Green
8	-Battery	IN	IN	0V	Black
9	Fuel alarm	IN	--	0V	White
10	Temperature alarm	IN	--	0V	Yellow
11	Choke	OUT	OUT	12V	Pink
12	Start	OUT	OUT	12V	Grey
13	Stop	OUT	OUT	0V	Orange
14	--	--	--	--	Green/Yellow

Applicable for QEP R6/R7 50/60Hz, 1P/3P



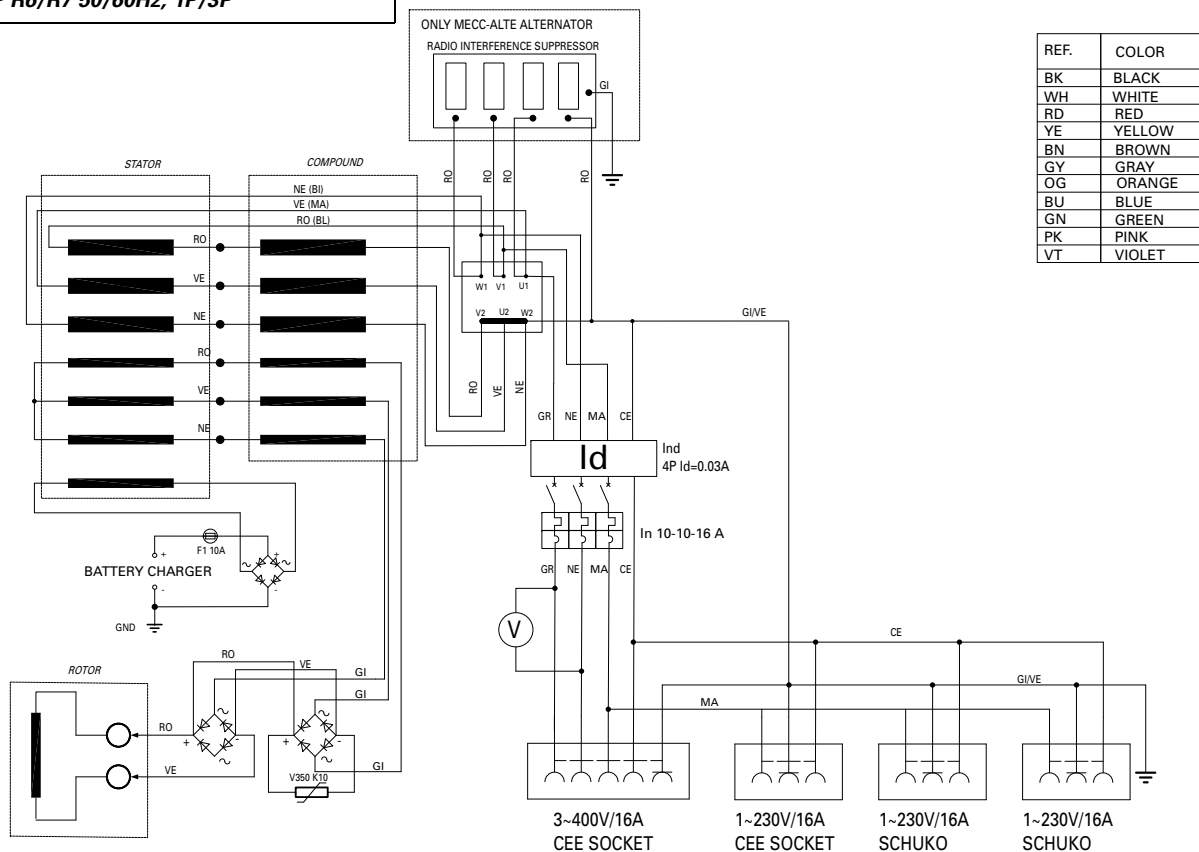
1636 0064 67/00

Applicable for QEP R6/R7 50/60Hz, 1P/3P



1636 0064 67/00

Applicable for QEP R6/R7 50/60Hz, 1P/3P



1636 0064 67/00

Applicable for QEP R6/R7 50/60Hz, 1P/3P

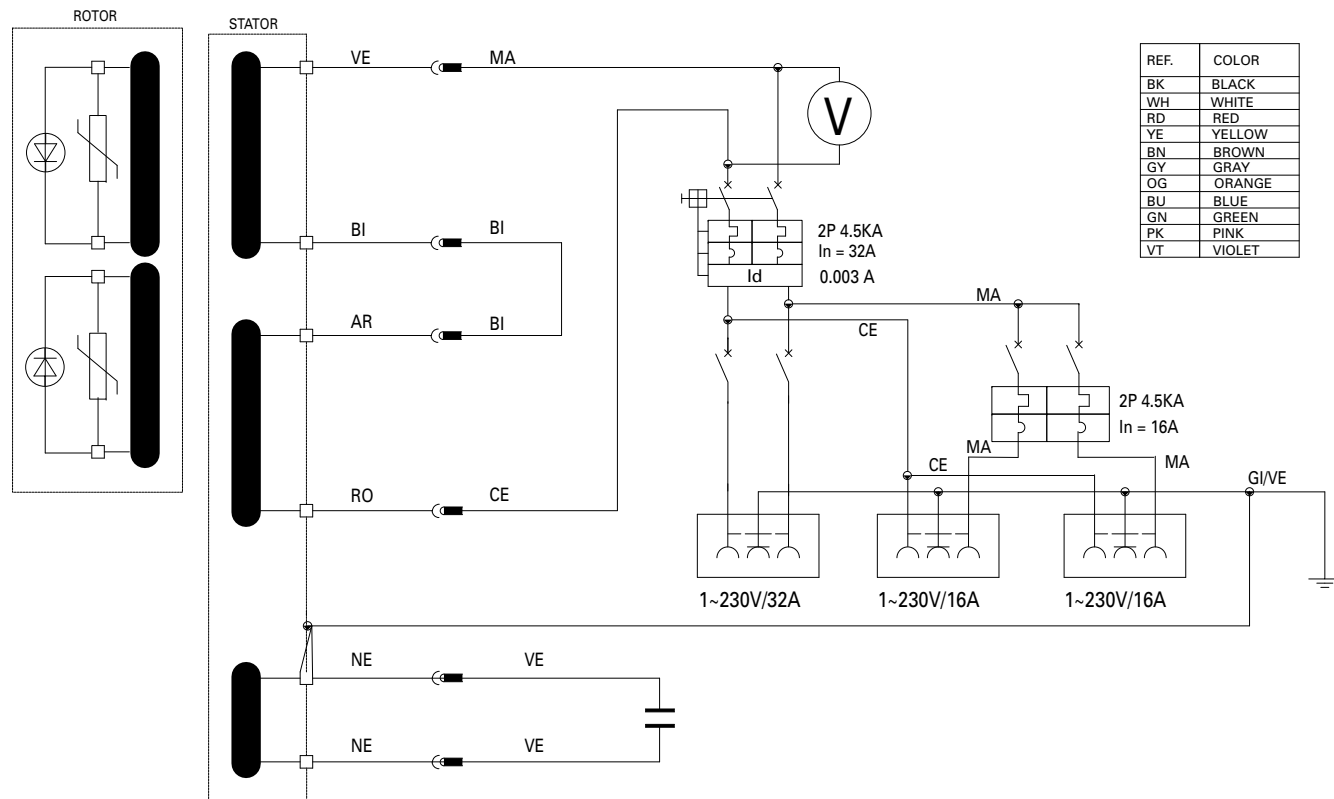
14-pole connector		AMF	RSS		Colour
1	--	--	--	--	--
2	D+ (12V)	--	IN	12V	Yellow
3	+B x (EV or BC supply)	OUT	--	12V	Pink
4	Oil alarm	IN	--	0V	Blue
5	--	--	IN	230V	Brown
6	+Battery (under key switch)	--	IN	12V	Red
7	--	--	--	--	--
8	-Battery	IN	IN	0V	Black
9	Fuel alarm	IN	--	0V	White
10	Temperature alarm	IN	--	0V	Yellow
11	Choke	OUT	OUT	12V	Pink
12	Start	OUT	OUT	12V	Grey
13	Stop	OUT	OUT	0V	Orange
14	--	--	--	--	--

Applicable for QEP R9/R10 50Hz, 1P/3P



1636 0064 70/00

Applicable for QEP R9/R10 50Hz, 1P/3P



Applicable for QEP R9/R10 50Hz, 1P/3P



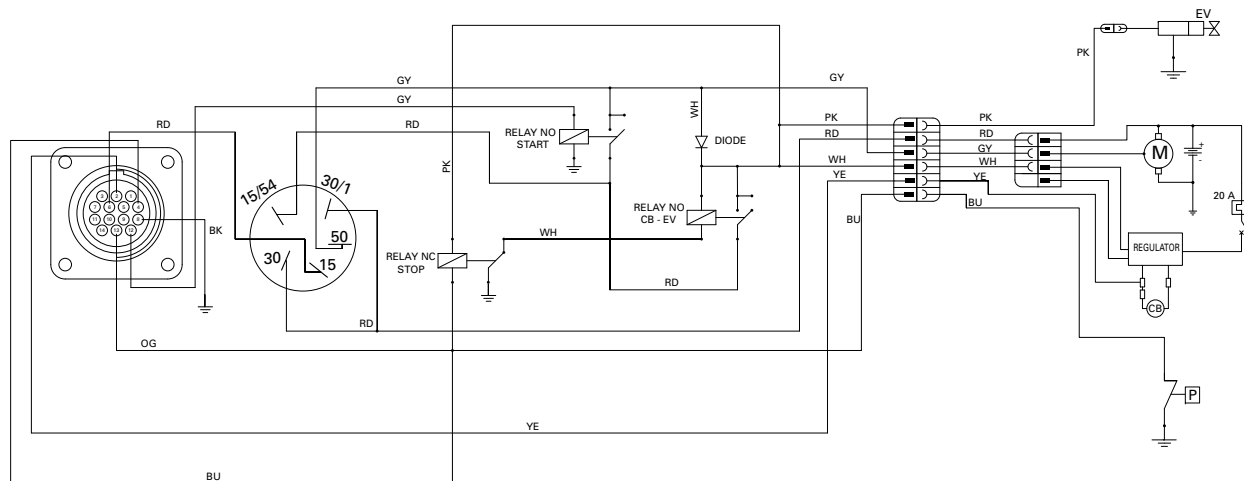
1636 0064 70/00

Applicable for QEP R9/R10 50Hz, 1P/3P

14-pole connector		AMF	RSS		Colour
1	--	--	--	--	--
2	D+ (12V)	--	IN	12V	Yellow
3	+B x (EV or BC supply)	OUT	--	12V	Pink
4	Oil alarm	IN	--	0V	Blue
5	--	--	IN	230V	Brown
6	+Battery (under key switch)	--	IN	12V	Red
7	--	--	--	--	--
8	-Battery	IN	IN	0V	Black
9	Fuel alarm	IN	--	0V	White
10	Temperature alarm	IN	--	0V	Yellow
11	Choke	OUT	OUT	12V	Pink
12	Start	OUT	OUT	12V	Grey
13	Stop	OUT	OUT	0V	Orange
14	--	--	--	--	--

1636 0064 73/00

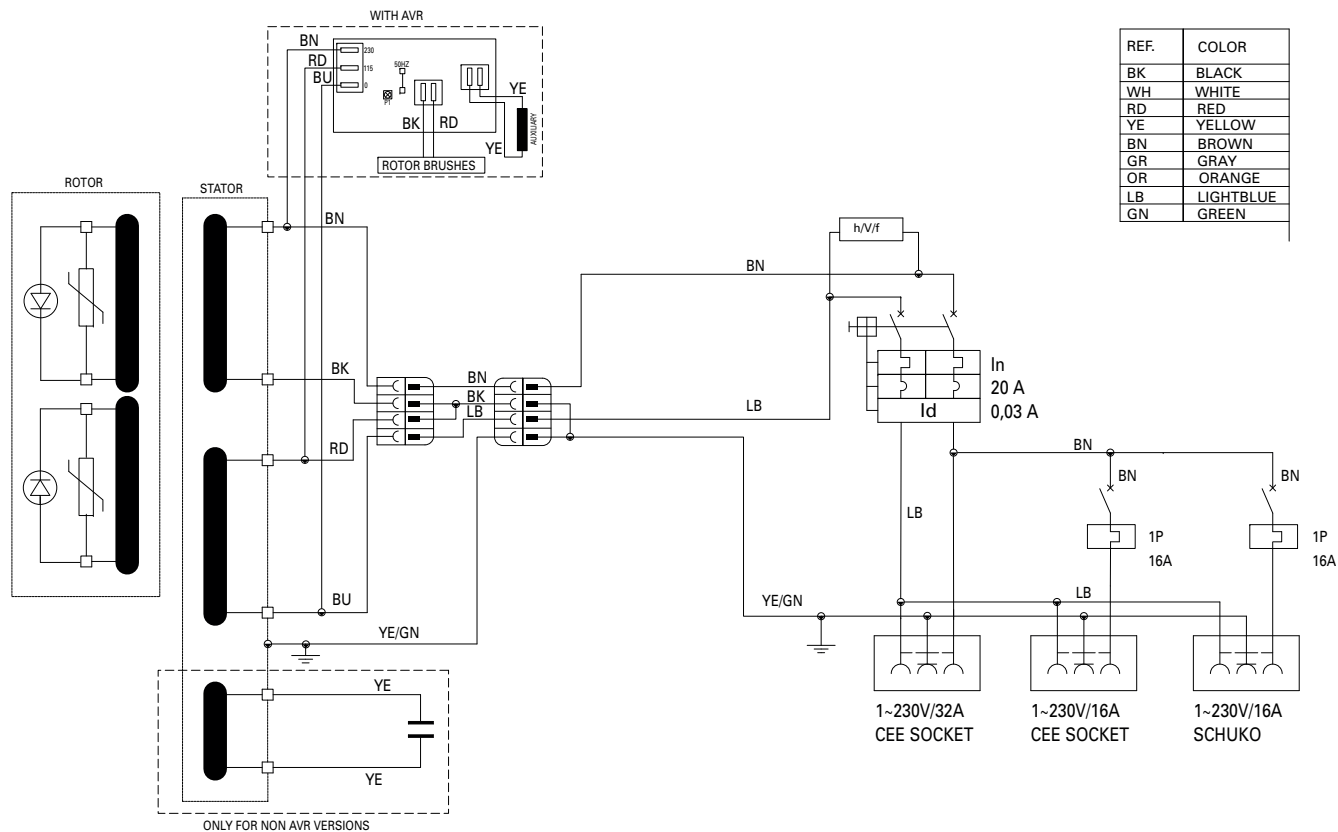
Applicable for QEP S6/7 50/60Hz, 1P/3P



REF.	COLOR
BK	BLACK
WH	WHITE
RD	RED
YE	YELLOW
BN	BROWN
GY	GRAY
OG	ORANGE
BU	BLUE
GN	GREEN
PK	PINK
VT	VIOLET

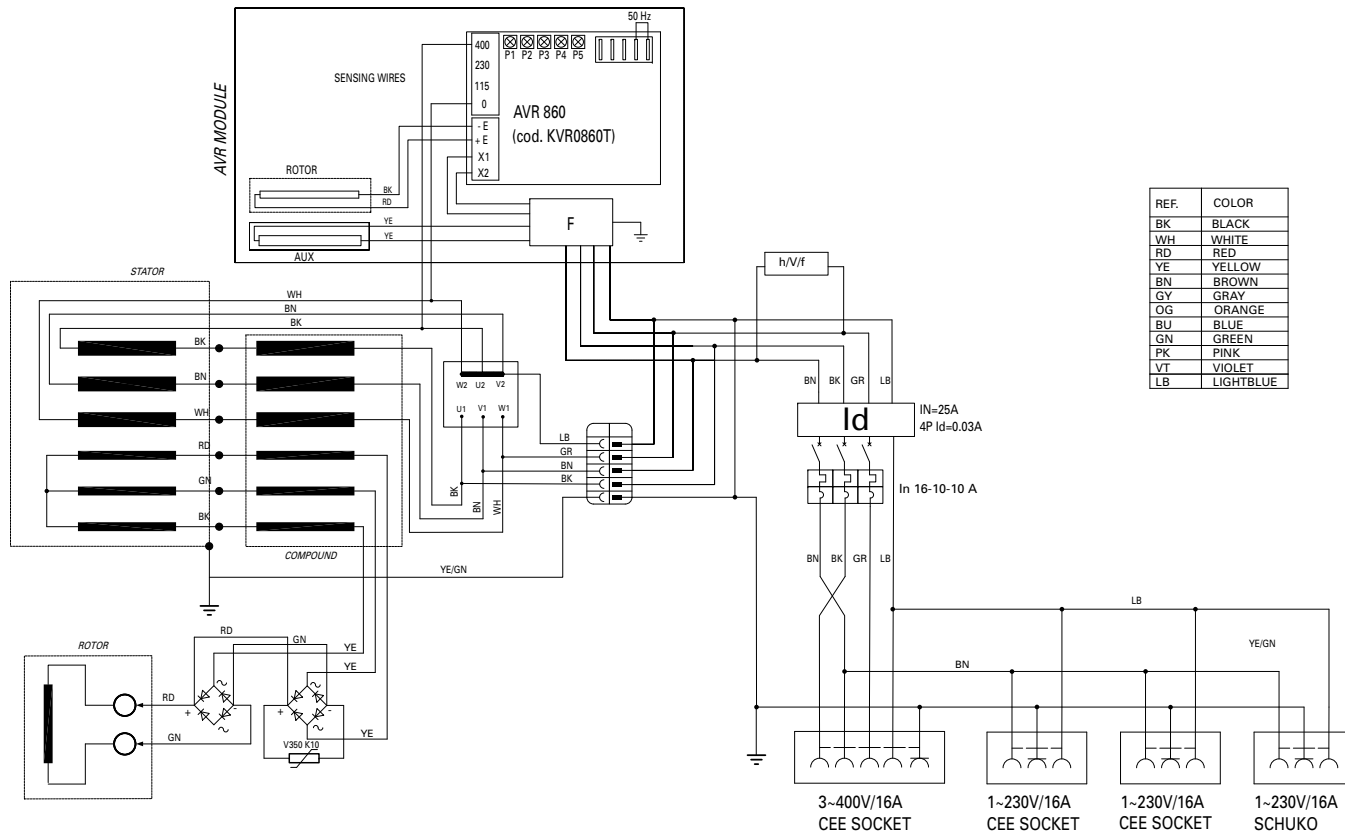
1636 0064 73/00

Applicable for QEP S6/7 50/60Hz, 1P/3P



1636 0064 73/00

Applicable for QEP S6/7 50/60Hz, 1P/3P



1636 0064 73/00

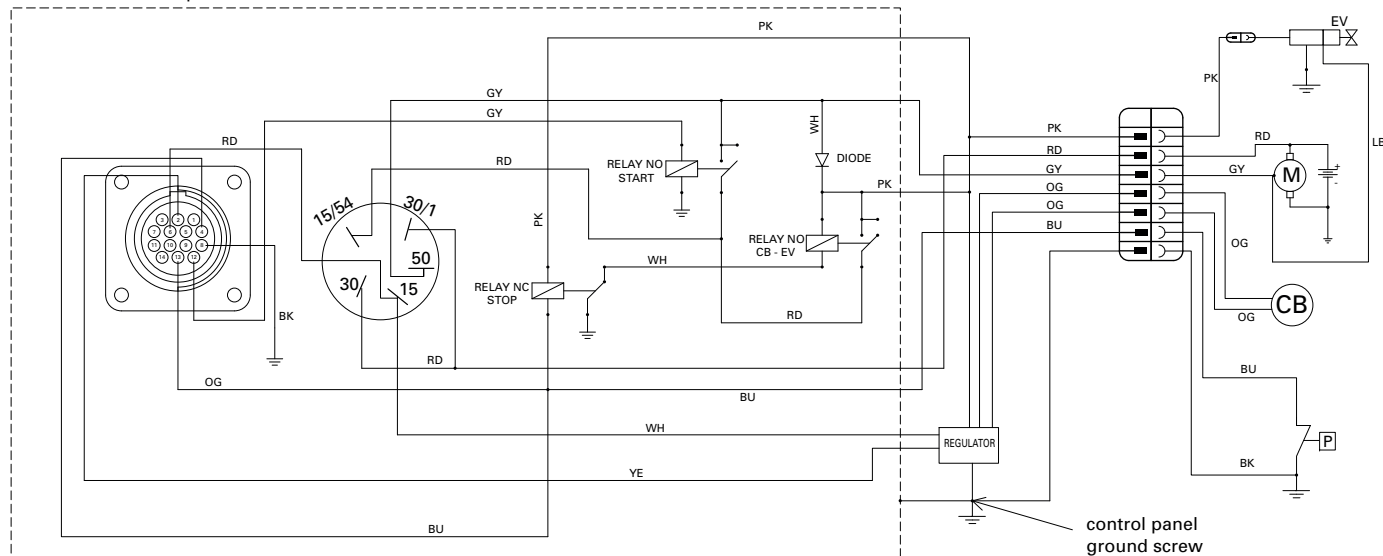
Applicable for QEP S6/7 50/60Hz, 1P/3P

14-pole connector		AMF	RSS		Colour
1	--	--	--	--	--
2	D+ (12V)	--	IN	12V	Yellow
3	+B x (EV or BC supply)	OUT	--	12V	Pink
4	Oil alarm	IN	--	0V	Blue
5	--	--	IN	230V	Brown
6	+Battery (under key switch)	--	IN	12V	Red
7	--	--	--	--	--
8	-Battery	IN	IN	0V	Black
9	Fuel alarm	IN	--	0V	White
10	Temperature alarm	IN	--	0V	Yellow
11	Choke	OUT	OUT	12V	Pink
12	Start	OUT	OUT	12V	Grey
13	Stop	OUT	OUT	0V	Orange
14	--	--	--	--	--

1636 0064 76/00

Applicable for QEP S9/S10 50/60Hz, 1P/3P

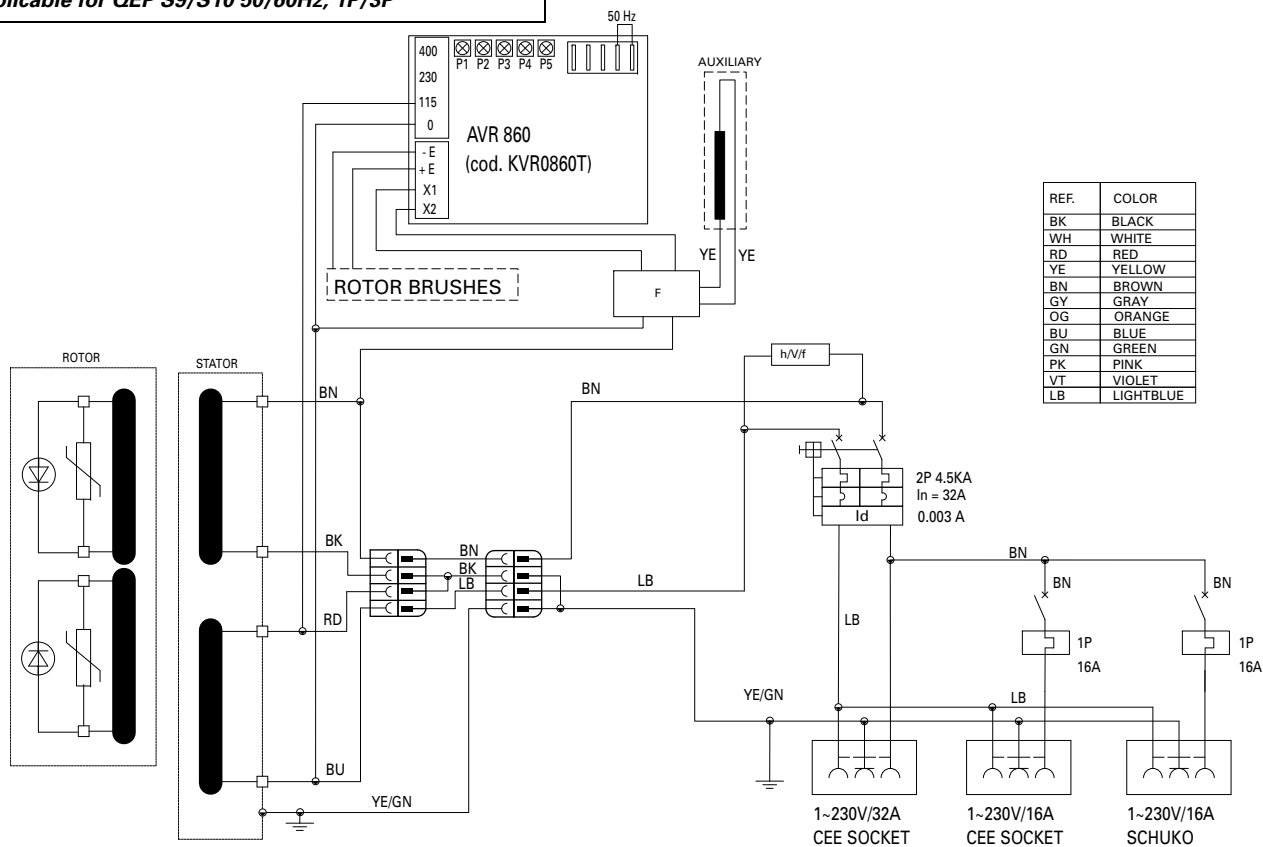
control panel



REF.	COLOR
BK	BLACK
WH	WHITE
RD	RED
YE	YELLOW
BN	BROWN
GY	GRAY
OG	ORANGE
BU	BLUE
GN	GREEN
PK	PINK
VT	VIOLET
LB	LIGHTBLUE

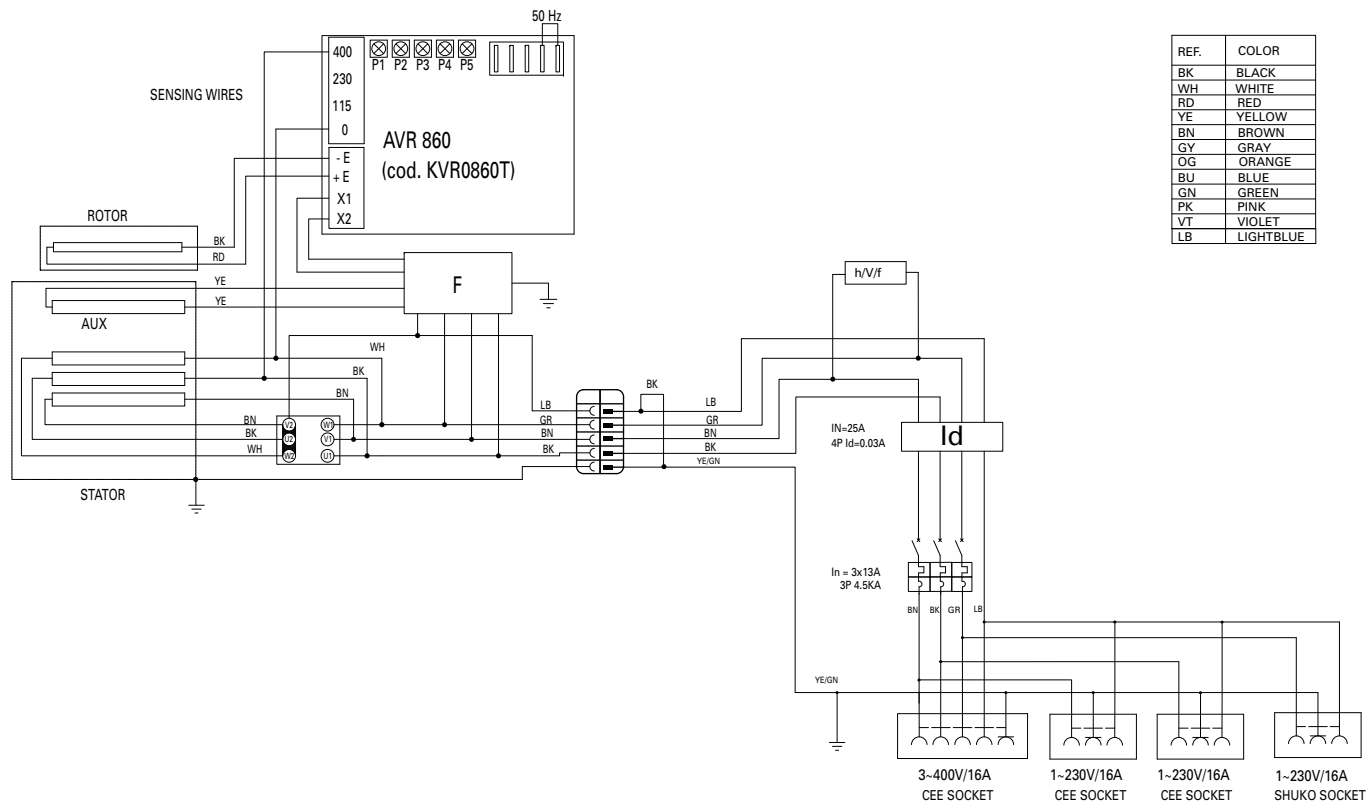
1636 0064 76/00

Applicable for QEP S9/S10 50/60Hz, 1P/3P



1636 0064 76/00

Applicable for QEP S9/S10 50/60Hz, 1P/3P



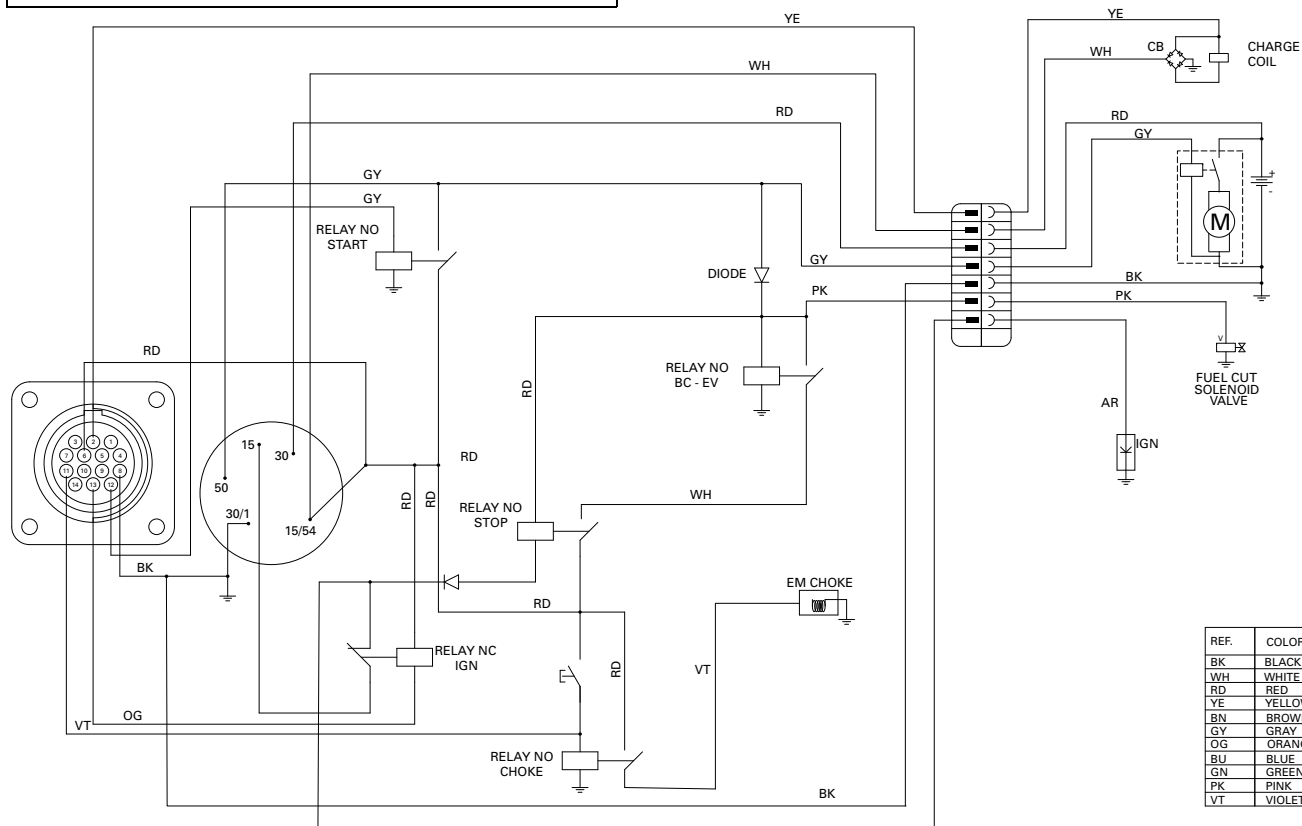
1636 0064 76/00

Applicable for QEP S9/S10 50/60Hz, 1P/3P

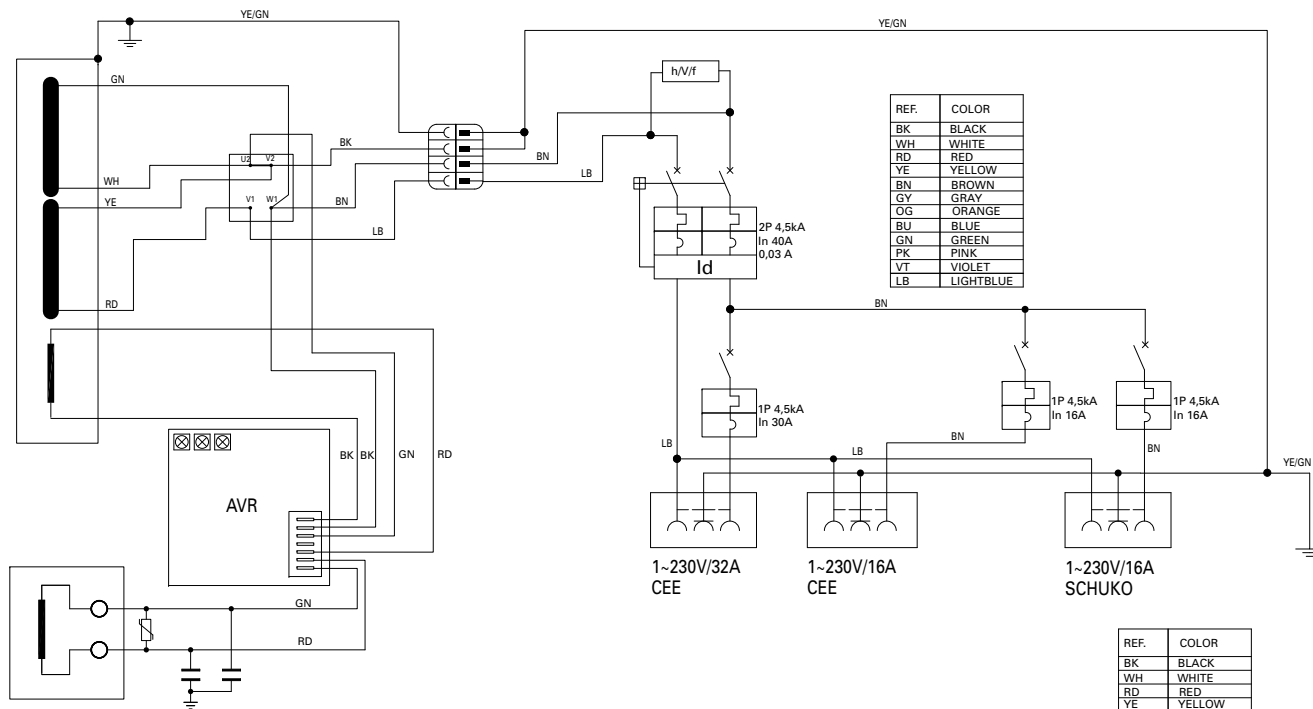
14-pole connector		AMF	RSS		Colour
1	--	--	--	--	--
2	D+ (12V)	--	IN	12V	Yellow
3	+B x (EV or BC supply)	OUT	--	12V	Pink
4	Oil alarm	IN	--	0V	Blue
5	--	--	IN	230V	Brown
6	+Battery (under key switch)	--	IN	12V	Red
7	--	--	--	--	--
8	-Battery	IN	IN	0V	Black
9	Fuel alarm	IN	--	0V	White
10	Temperature alarm	IN	--	0V	Yellow
11	Choke	OUT	OUT	12V	Pink
12	Start	OUT	OUT	12V	Grey
13	Stop	OUT	OUT	0V	Orange
14	--	--	--	--	--

1636 0064 79/00

Applicable for QEP S12/S14 50Hz, 1P/3P

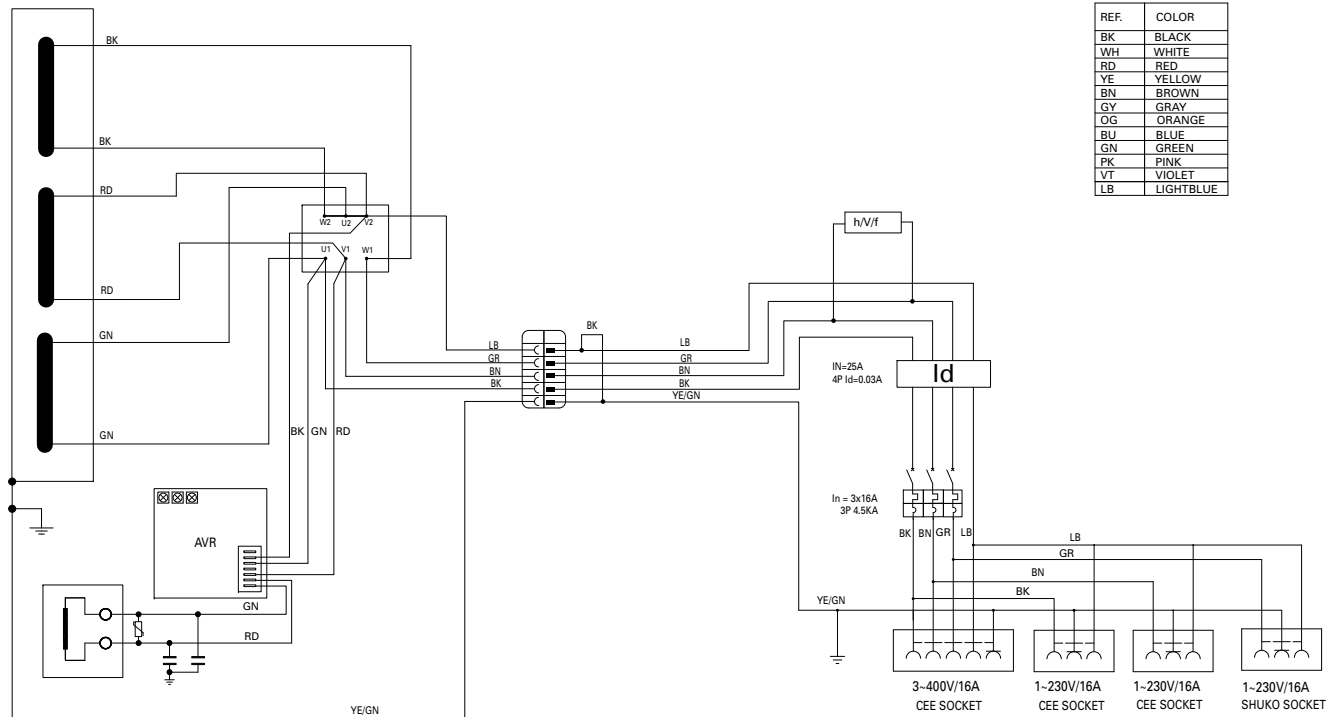


Applicable for QEP S12/S14 50Hz, 1P/3P



REF.	COLOR
BK	BLACK
WH	WHITE
RD	RED
YE	YELLOW
BN	BROWN
GY	GRAY
OG	ORANGE
BU	BLUE
GN	GREEN
PK	PINK
VT	VIOLET
LB	LIGHTBLUE

Applicable for QEP S12/S14 50Hz, 1P/3P



REF.	COLOR
BK	BLACK
WH	WHITE
RD	RED
YE	YELLOW
BN	BROWN
GY	GRAY
OG	ORANGE
BU	BLUE
GN	GREEN
PK	PINK
VT	VIOLET
LB	LIGHTBLUE

1636 0064 79/00

Applicable for QEP S12/S14 50Hz, 1P/3P

14-pole connector		AMF	RSS		Colour
1	Neutral (230V)	--	IN	0V	Light blue
2	D+ (12V)	--	IN	12V	Yellow
3	+B x (EV or BC supply)	OUT	--	12V	Pink
4	Oil alarm	IN	--	0V	Blue
5	Phase (230V)	--	IN	230V	Brown
6	+Battery (under key switch)	--	IN	12V	Red
7	--	--	--	--	Green
8	-Battery	IN	IN	0V	Black
9	Fuel alarm	IN	--	0V	White
10	Temperature alarm	IN	--	0V	Yellow
11	Choke	OUT	OUT	12V	Pink
12	Start	OUT	OUT	12V	Grey
13	Stop	OUT	OUT	0V	Orange
14	--	--	--	--	Green/Yellow

- EC Declaration of Conformity:

- 115 -

