

Atlas Copco

Instruction Manual



Instruction Manual
for Portable Compressors
English

XRV 946 Cd S3A APP- XRV 2000 CD6 T3 APP

TwinAir™



**Instruction Manual
for Portable Compressors**

XRV 946 - XRV 2000 CD6

Original instructions

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ATLAS COPCO - PORTABLE ENERGY DIVISION
www.atlascopco.com

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Use only authorized parts.

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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.

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Preface

Follow the instructions in this manual and we guarantee you years of trouble free operation. It is a solid, safe and reliable machine, built according to the latest technology.

Always keep the manual available near the machine.

In all correspondence always mention the compressor type and serial number, shown on the data plate.

The company reserves the right to make changes without prior notice.

The **TwinAir™** is an answer to customer needs

- safety
- high volume compressed air
- transportability
- fast installation
- robustness
- economic footprint

It is the most robust, energy efficient, transportable & safety enhanced air supply unit for drilling & other specialised applications.

A unique package that delivers the highest volume of compressed air in relation to its economic footprint and consequently, the highest productivity for compressed air needs.

With an array of high value options it is the only standardised Rig-Safe air compressor in the market.

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Safety precautions



To be read attentively and acted accordingly before towing, lifting, operating, performing maintenance or repairing the Atlas Copco equipment.

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 section of the instruction manual. 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, to recognize the messages displayed on the control box and faulty situation.

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.

These safety precautions apply to machinery processing or consuming air. Processing of any other gas requires additional safety precautions typical to the application and are not included herein.

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.

GENERAL SAFETY PRECAUTIONS

Important safety information

Most accidents that involve product operation, maintenance and repair are caused by failure to observe basic safety rules and precautions. An accident can often be avoided by recognizing potentially hazardous situations before the accident occurs.

A person must be alert to potential hazards.

Do not operate or perform any maintenance or repair on this product until you have read and understood the operation, maintenance and repair information.

Safety precautions and warnings are provided in this manual and on the product. If this hazard warnings are not heeded injury could occur to you or to other persons.

Safe operation and use

- 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 The operator is expected to apply all relevant safety precautions. Refer to section **Safety during use and operation**.
- 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 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.
- 7 Care shall be taken to avoid damage to safety valves and other pressure-relief devices, especially to avoid plugging by paint, oil coke or dirt accumulation, which could interfere with the functioning of the device.
- 8 Mind the markings and information labels on the unit.
- 9 In the event the safety labels are damaged or destroyed, they must be replaced to ensure operator safety.
- 10 Keep the work area neat. Lack of order will increase the risk of accidents.

Preventive maintenance

- 11 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.

Fire and explosion prevention

- 12 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.
- 13 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.

SAFETY DURING TRANSPORT AND INSTALLATION

Lifting

- 1 To lift a unit, all loose or pivoting parts, e.g. doors and towbar, shall first be securely fastened.
- 2 Do not attach cables, chains or ropes directly to the lifting eyes, use the lifting slings supplied with the unit or lifting slings meeting local safety regulations. Never allow sharp bends in lifting cables, chains or ropes.
- 3 Helicopter lifting is not allowed.
- 4 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.
- 5 Lifting acceleration and retardation shall be kept within safe limits.
- 6 To lift heavy parts, a hoist of ample capacity, tested and approved according to local safety regulations, shall be used.
- 7 Lifting hooks, eyes, shackles, etc., shall never be bent and shall only have stress in line with their design load axis. The capacity of a lifting device diminishes when the lifting force is applied at an angle to its load axis.
- 8 For maximum safety and efficiency of the lifting apparatus all lifting members shall be applied as near to perpendicular as possible. If required, a lifting beam shall be applied between hoist and load.
- 9 Never leave a load hanging on a hoist.
- 10 A hoist has to be installed in such a way that the object will be lifted perpendicular. If that is not possible, the necessary precautions must be taken to prevent load-swinging, e.g. by using two hoists, each at approximately the same angle not exceeding 30° from the vertical.

Installation

- 11 Locate the unit away from walls. Take all precautions to ensure that hot air exhausted from the engine and driven machine cooling systems cannot be recirculated. If such hot air is taken in by the engine or driven machine cooling fan, this may cause overheating of the unit; if taken in for combustion, the engine power will be reduced.
- 12 Before moving the compressor, switch it off.

SAFETY DURING USE AND OPERATION

Installation

- 1 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.
- 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.

Connecting / disconnecting the compressor

- 3 Distribution pipework and air hoses must be of correct diameter and suitable for the working pressure. Never use frayed, damaged or deteriorated hoses. Replace hoses and flexibles before the lifetime expires. Use only the correct type and size of hose end fittings and connections.

- 4 Close the compressor air outlet valve before connecting or disconnecting a hose. Ascertain that a hose is fully depressurized before disconnecting it. Before blowing compressed air through a hose or air line, ensure that the open end is held securely, so that it cannot whip and cause injury.
- 5 The air line end connected to the outlet valve must be safeguarded with a safety cable, attached next to the valve.
- 6 No external force may be exerted on the air outlet valves, e.g. by pulling on hoses or by installing auxiliary equipment directly to a valve, e.g. a water separator, a lubricator, etc. Do not step on the air outlet valves.
- 7 Never move a unit when external lines or hoses are connected to the outlet valves, to avoid damage to valves, manifold and hoses.
- 8 If the compressor is to be used for sand-blasting or will be connected to a common compressed-air system, fit an appropriate non-return valve (check valve) between compressor outlet and the connected sand-blasting or compressed-air system. Observe the right mounting position/direction.

Safe operation and use

- 9 Never operate the unit at pressures or speeds below or in excess of its limits as indicated in the technical specifications.
- 10 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.
- 11 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.

- 12 The unit has parts, which may be accidentally touched, of which the temperature can be in excess of 80 °C (176 °F). The insulation or safety guard, protecting these parts shall not be removed before the parts have cooled down to room temperature. As it is technically not possible to insulate all hot parts or to install safety guards around hot parts (e.g. exhaust manifold, exhaust turbine), the operator / service engineer must always be aware not to touch hot parts when opening a machine door.
- 13 Before removing the oil filler plug, ensure that the pressure is released by opening an air outlet valve.
- 14 Never remove a filler cap of the cooling water system of a hot engine. Wait until the engine has sufficiently cooled down.

Preventive maintenance

- 15 Periodically carry out maintenance works according to the maintenance schedule.

Fire and explosion prevention

- 16 When the unit has to operate in a fire-hazardous environment, each engine exhaust has to be provided with a spark arrester to trap incendiary sparks.
- 17 Never refill fuel while the unit is running, unless otherwise stated in the Atlas Copco Instruction Book. 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.

- 18 Never spill nor leave oil, fuel, coolant or cleansing agent in or around the unit.
- 19 Never operate the unit in surroundings where there is a possibility of taking in flammable or toxic fumes.

Personal safety

- 20 Do not use compressed air from any type of compressor, without taking extra measures, for breathing purposes as this may result in injury or death. For breathing air quality, the compressed air must be adequately purified according to local legislation and standards. Breathing air must always be supplied at stable, suitable pressure.
- 21 Never operate the unit in surroundings where there is a possibility of taking in flammable or toxic fumes.
- 22 If the working process produces fumes, dust or vibration hazards, etc., take the necessary steps to eliminate the risk of personal injury.
- 23 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.
- 24 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.
- 25 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.
- 26 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.
- 27 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. 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.

- 28 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.

SAFETY DURING MAINTENANCE AND REPAIR

General safety precautions

- 1 Maintenance, overhaul and repair work shall only be carried out by adequately trained personnel; if required, under supervision of someone qualified for the job.
- 2 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.
 - The battery shall be disconnected and removed or the terminals covered by insulating caps. 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.
- 3 Before dismantling any pressurized component, the compressor or equipment shall be effectively isolated from all sources of pressure and the entire system shall be relieved of pressure. Do not rely on non-return valves (check valves) to isolate pressure systems. In addition, a warning sign bearing a legend such as "work in progress; do not open" shall be attached to each of the outlet valves.
- 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 Take safety precautions against toxic vapours of cleaning liquids.

Fire and explosion prevention

- 6 Never use flammable solvents for cleaning (fire-risk).
- 7 Never weld on or perform any operation involving heat near the fuel or oil systems. Fuel and oil tanks must be completely purged, e.g. by steam-cleaning, before carrying out such operations. Never weld on, or in any way modify, pressure vessels. Disconnect the alternator cables during arc welding on the unit.
- 8 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.
- 9 Never mix synthetic with mineral oil.
- 10 When performing any operation involving heat, flames or sparks on a machine, the surrounding components shall first be screened with non-flammable material.

Precautions during maintenance

- 11 Use only the correct tools for maintenance and repair work, and only tools which are in good condition.
- 12 Parts shall only be replaced by genuine Atlas Copco replacement parts.
- 13 Never use machine parts as a climbing aid.
- 14 Observe scrupulous cleanliness during maintenance and repair. Keep away dirt, cover the parts and exposed openings with a clean cloth, paper or tape.

- 15 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.
- 16 Protect the engine, alternator, air intake filter, electrical and regulating components, etc., to prevent moisture ingress, e.g. when steam-cleaning.

Precautions after maintenance

- 17 Make sure that no tools, loose parts or rags are left in, on or around the equipment.
- 18 Never leave rags or loose clothing near the compressor and engine air intake.
- 19 Protect the electrical and controlling equipment, air filters, etc. against penetration of moisture. Never leave spilled liquids such as fuel, oil, coolant and cleansing agents in or around the compressor.

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.

SPECIFIC SAFETY PRECAUTIONS

Batteries

When servicing batteries, always wear protecting clothing and glasses.

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

Pressure vessels

Maintenance/installation requirements

- 1 The vessel can be used as pressure vessel or as separator and is designed to hold compressed air for the following application:
 - pressure vessel for compressor,
 - medium AIR/OIL,and operates as detailed on the data plate of the vessel:
 - the maximum working pressure ps in bar (psi),
 - the maximum working temperature Tmax in °C (°F),
 - the minimum working temperature Tmin in °C (°F),
 - the capacity of the vessel V in l (US gal, Imp gal, cu.ft).
- 2 The pressure vessel is only to be used for the applications as specified above and in accordance with the technical specifications. Safety reasons prohibit any other applications.
- 3 National legislation requirements with respect to re-inspection must be complied with.
- 4 No welding or heat treatment of any kind is permitted to those vessel walls which are exposed to pressure.
- 5 The vessel is provided and may only be used with the required safety equipment such as manometer, overpressure control devices, safety valve, etc.
- 6 Draining of condensate shall be performed regularly when vessel is in use.
- 7 Installation, design and connections should not be changed.
- 8 Bolts of cover and flanges may not be used for extra fixation.

- 9 (Pressure) vessel maintenance is to be performed by Atlas Copco.

Safety valves

Operating & Maintenance

- 1 Only trained and technically competent personnel should consider overhaul, re-set or performance testing of safety valves.
- 2 The safety valve is supplied with either a lead security seal or crimped cover to deter unauthorised access to the pressure regulation device.
- 3 Under no circumstances should the set pressure of the safety valve be altered to a different pressure than that stamped on the valve without the permission of the installation designer.
- 4 If the set pressure must be altered then use only correct parts supplied by Seetru and in accordance with the instructions available for the valve type.
- 5 Safety valves must be frequently tested and regularly maintained.
- 6 The set pressure should be periodically checked for accuracy.
- 7 When fitted, the lifting device should be operated at pressures not less than 75% of the set pressure to ensure free and easy movement of internal parts.
- 8 The frequency of tests is influenced by factors such as the severity of the operating environment and aggressiveness of the pressurised medium.
- 9 Soft seals and springs should be replaced as part of the maintenance procedure.
- 10 Do not paint or coat the installed safety valve (see also **Preventive maintenance schedule**).

Leading particulars

DESCRIPTION OF SAFETY PICTOGRAMS USED IN THIS MANUAL

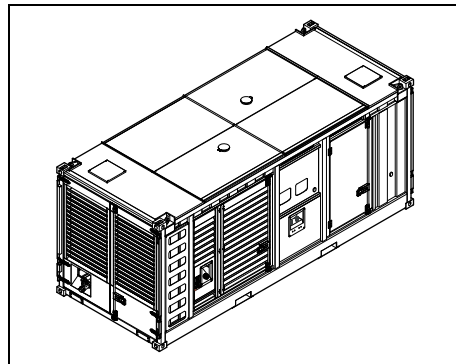


This symbol draws your attention to dangerous situations. The operation concerned may endanger persons and cause injuries.



This symbol is followed by supplementary information.

GENERAL DESCRIPTION



The TwinAir™ consists of two XRV 946 - XRV 2000 CD6 compressors in a 20 ft. container. The compressors are indicated as “alpha” and “bravo”. When facing the control panel, the compressor on the left is “alpha” and consequently the compressor on the right is “bravo”. The compressors can be run simultaneously or separately.

Compressor

Each XRV 946 - XRV 2000 CD6 is a silenced, two-stage, oil-injected screw compressor, built for a nominal effective working pressure of 25 bar (363 psi).

The compressor casing houses two screw-type rotors, mounted on ball and roller bearings. The male rotor, driven by the engine, drives the female rotor. The compressor delivers pulsation-free air.

Injected oil is used for sealing, cooling and lubricating purposes.

Engine

The compressor is driven by a liquid-cooled diesel engine. The engine’s power is transmitted to the compressor element through a heavy-duty coupling.

Compressor oil system

The oil is boosted by air pressure. The system has no oil pump.

The oil is removed from the air, in the air/oil vessel at first by centrifugal force, secondly through the oil separator element.

The vessel is provided with an oil level indicator.

Compressor air system

The air which is drawn through the air filters is compressed in the compressor. The compressor delivers a mixture of compressed air and oil.

Regulation

The compressor is provided with a continuous regulating system which serves to match air delivery to air demand. The regulating system controls air delivery by:

- engine speed regulation
- air intake throttling

When the air consumption increases, the air receiver pressure will decrease and vice versa.

This receiver pressure variation is sensed by the regulating valve which, by means of control air to the unloader and an electronic engine speed regulator, matches the air output to the air consumption. The air receiver pressure is maintained between the pre-selected working pressure and the corresponding unloading pressure.

Cooling system

The engine is provided with a liquid-cooler and intercooler and the compressor is provided with an oil cooler.

The cooling air is generated by a fan, driven by the engine.

FuelXpert™

This is a control module that regulates engine speed and the air inlet to optimise fuel consumption depending on the working conditions, and the output required.

Oiltronix™

The OILTRONIX is an Electronic Oil Management System for compressors providing an optimal oil injection temperature that reduces the condensation of water in the oil. This will result in a longer life of components in the compressor system.

COSMOS™

COSMOS allows technicians to arrive at the right location, at the right time, with the right information and service materials so enabling you to give better customer service, more up-time, and more accurate invoicing than previously possible.

COSMOS provides information on:

- time to maintenance
- operational history (running hours, fuel levels, events)
- utilization data visualized in usage graphs
- the location of the machine
- all measured values and parameters

Aftercooler

An integral after-cooler, with water separator, is available to reduce the outlet air temperature to ambient plus 10°C (18°F) and cut water content to a mere 15%. This performance can be obtained under optimal atmospheric conditions.

When an after-cooler is used in an application where the temperature is critical the air outlet temperature can be monitored by the compressor controller.

A warning can be set at a value between 0°C and 115°C (=default value) and a shut-down can be set at a value between 0°C and 120°C (= default value). The operator has authority to modify these values so the process can be guarded and kept in a safe condition under all circumstances.

See also table **Fault codes**.

The installation includes a by-pass over the after-cooler. For applications that demand quality air, a fine filtration unit can be specified with the after-cooler package. This will remove oil and particles down to 0.01 mg/m³.

For purer, but not breathing, air, an active charcoal filtration unit can be specified with the after-cooler package. This removes oil and oil vapour content to 0.003 mg/m³.

Preheater

The preheater is a device for preheating the cooling fluid before starting when operating at low temperatures. The engine will start more easy. Additionally the preheater will lengthen the life span of the engine as there are no cold starts.

Cold start

High capacity battery and vessel blow-off valve.

Stainless steel braided fuel lines (only on offshore)

High quality stainless steel fuel hoses for additional security.

Battery box (only on offshore)

Aluminium bulb plate box to protect the battery. Stable enough to stand on during servicing the oil separator.

T.Clamps on hose connections (only on offshore)

High quality clamping on hoses.

Roxtec wire seal

Water-tight wire feedthrough.

Etherstart

Caterpillar ECM controlled ether injection system. Functions as a start aid in high altitude and cold temperature.

Jacket water heater

Jacket water heaters for the engine coolant circuit.

STANDARD SAFETY DEVICES

Safety valves

On top of the air receivers a safety valve (ASME/CE) is installed. This valve will open when the pressure exceeds the set valve. When a malfunction should occur this valve avoids that the pressure will rise above the design pressure of the system.

Emergency stop buttons

The unit is equipped with emergency stop buttons. When pressed both engines will stop immediately.

Battery switch

Both compressor systems are equipped with a battery switch. With this switch the complete system can be disconnected from the electric power.

Thermal shut-down sensor

A thermal shut-down sensor protects the compressor against overheating. The air receiver is provided with a safety valve.

Oil pressure and coolant temperature sensors

The engine is equipped with low oil pressure and high coolant temperature shut-down sensors.

Latches

At all doors latches are installed to lock the doors on the "open" position.

OPTIONAL SAFETY DEVICES

Fuel cut-off valves

With the fuel cut-off valves near the fuel filling funnel it is possible to shut off the fuel supply to the engines. In case of an emergency **both** valves have to be shut.

Spark arrestor (standard on offshore units)

The spark arrestor option prevents burning particles leaving the exhaust system. This reduces the fire hazard in dry conditions to protect the environment and also enables units to be operated in closed environments where there is a fire risk.

Inlet shutdown valve (standard on offshore units)

The inlet shutdown provides protection to the diesel engine against over speeding caused by failure of the engine regulator, burning oil from the engine sump due to overfilling or aspiration of combustible fumes in hazardous environments. The inlet shutdown system is fully electronic.

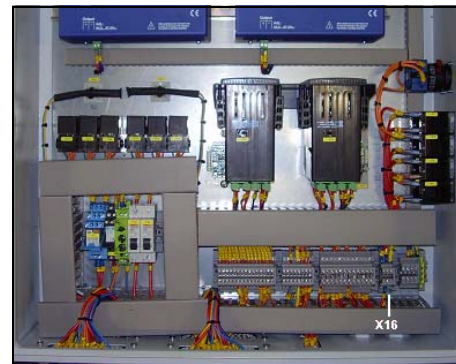
Bartec

Connection with control room, in order to switch-off the power supply from the control room.

Yellow alert platform shutdown

With this option it is possible to shut down the unit from the platform control room.

The TwinAir container can be equipped optionally with "platform shutdown" or "yellow alert". These are the common used terms to describe a remote emergency stop which is controlled by a voltage signal.



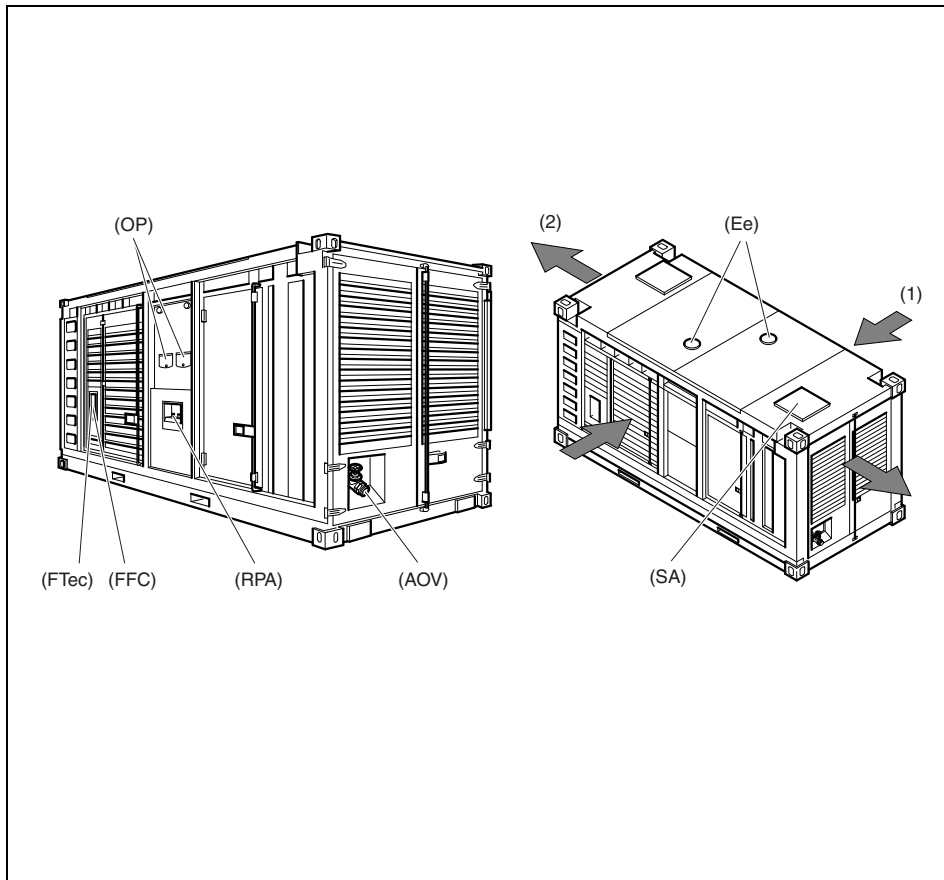
Depending on the customer choice the unit has a solenoid switch with a 110VAC or 240VAC coil. This solenoid (NO) closes a contact in the emergency stop circuit.

As long as the voltage is applied to the solenoid it is possible to run the unit; without this signal the unit shuts down.

The shutdown is failsafe (at wire rupture the unit shuts down). This shutdown can be used over long distance when the unit is running in a remote location.

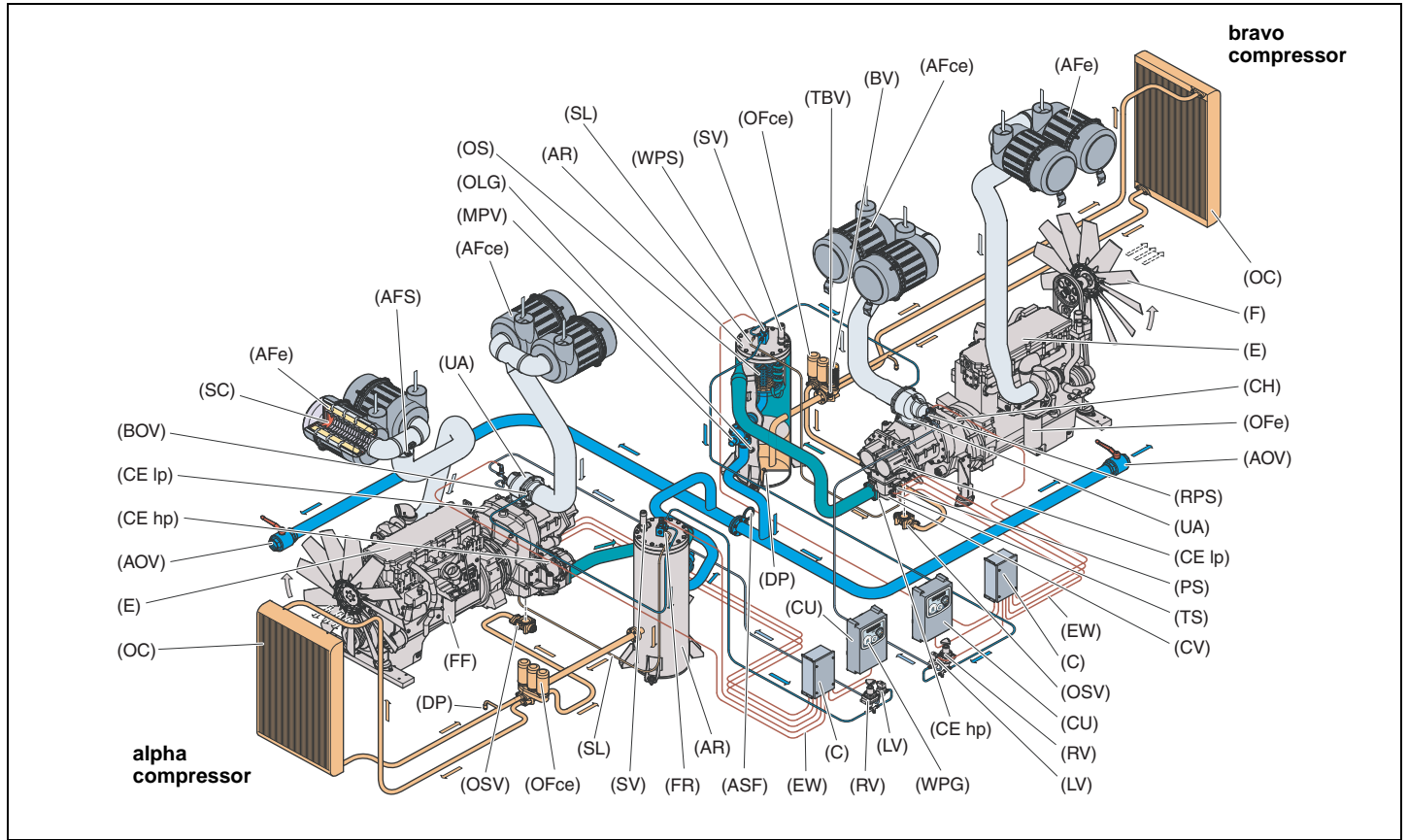
Refer to **Wiring diagram platform shutdown (yellow alert)**. The circuit of the yellow alert is part of the general circuit diagram 9822 0963 31. To connect guide a cable through the Roxtec cable gland into the cubicle of the TwinAir container. There the wires must be connected to contact rail X16.56 and X16.57.

EXTERNAL VIEW



Reference	Name
1	Cooling air in
2	Cooling air out
AOV	Air Outlet Valve
Ee	Engine exhausts
FTec	Fuel Tank (external connections)
OP	Operating Panel
RPA	Regulating Pressure Adjustment
SA	Service access (engine coolant)

Main Parts

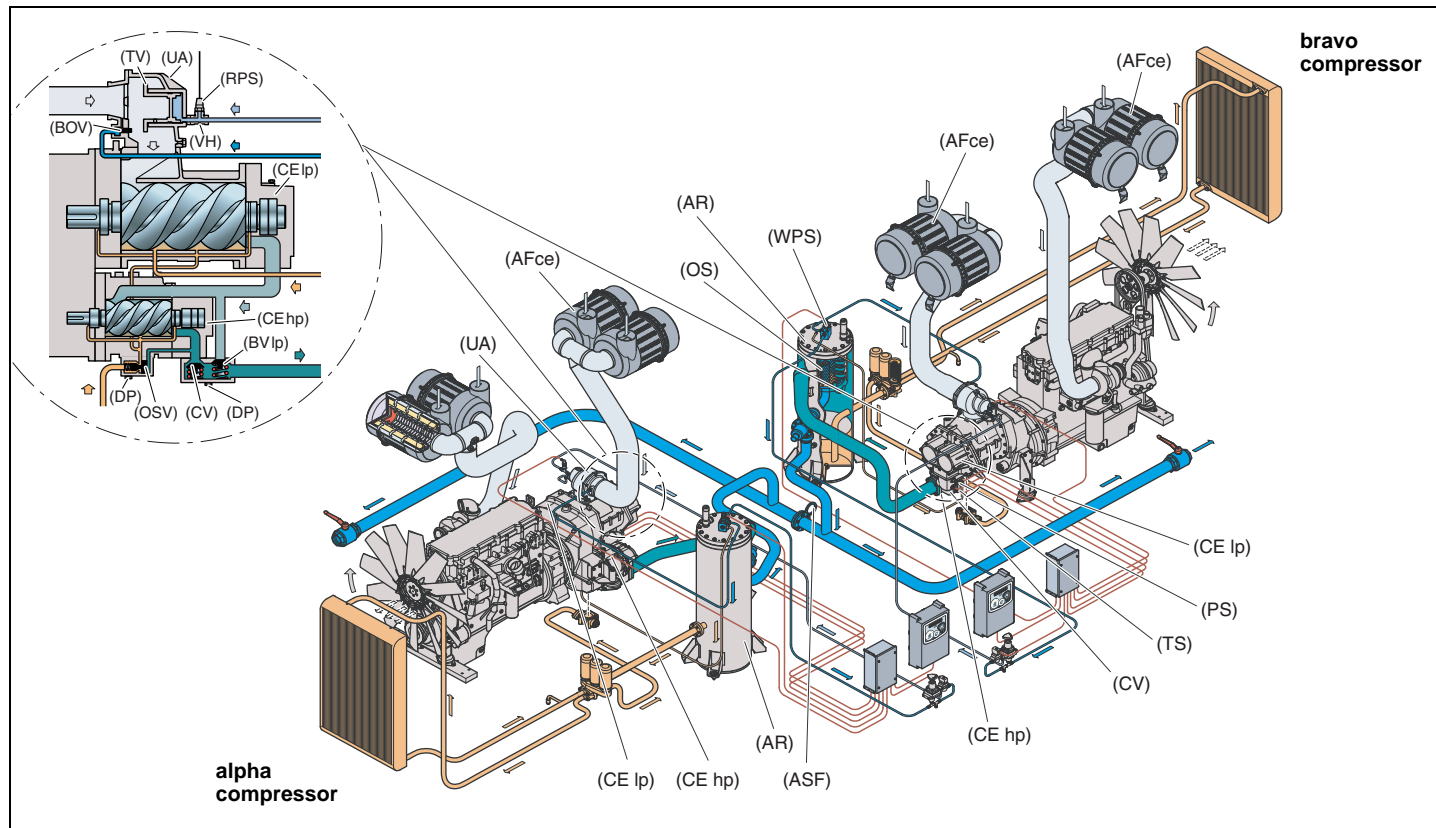


Reference	Name
AFce	Air Filter (compressor/engine)
AFe	Air Filter (engine)
AFS	Air Filter Switch
AOV	Air Outlet Valve
AR	Air Receiver
ASF	Air Separating Flange
BOV	Blow-off Valve
BV	By-Pass Valve Oil Filter
C	Cubicle
CElp	Compressor Element (low pressure)
CEhp	Compressor Element (high pressure)
CH	Coupling Housing
CU	Controller Unit
CV	Check Valve
DP	Drain Plug
E	Engine
EW	Electrical Wiring
FF	Fuel Filter
FR	Flow Restrictor
LV	Loading Valve
MPV	Minimum Pressure Valve
OC	Oil Cooler
OFce	Oil Filter (compressor element)
OFe	Oil Filter (engine)

Reference	Name
OLG	Oil Level Gauge
OS	Oil Separator
OSV	Oil Stop Valve
PS	Pressure Sensor
RPS	Regulating Pressure Sensor
RV	Regulating Valve
SC	Safety Cartridge
SL	Support Leg
SV	Safety Valve
UA	Unloader Assembly
TBV	Thermostatic By-Pass Valve
TS	Temperature Sensor
WPS	Working Pressure Sensor

COMPRESSOR REGULATING SYSTEM

AIR SYSTEM



Reference	Name
AFce	Air Filter (compressor/engine)
AFS	Air Separating Flange
AR	Air Receiver
BOV	Blow-off Valve
BVlp	By-Pass Valve Oil Filter (low pressure)
CElp	Compressor Element (low pressure)
CEhp	Compressor Element (high pressure)
CV	Check Valve
DP	Drain Plug
MPV	Minimum Pressure Valve
OS	Oil Separator
OSV	Oil Stop Valve
PS	Pressure Sensor
RPS	Regulating Pressure Sensor
TS	Temperature Sensor
TV	Throttle Valve
UA	Unloader Assembly
VH	Vent Hole
WPS	Working Pressure Sensor

The figure on the left shows the build-up of the compressor air system.

Air drawn through the air filters (AFce) passes successively through the following components:

- Unloader assembly (UA), see chapter **Compressor regulating system**,
- Compressor elements (CElp/CEhp),
- Check valve (CV), at the outlet of the compressor element.

Air filters remove dust and other pollutants from the air. The pressure drop over a filter element (new) is 15-20 mbar. Pressure drop reduces compressor flow (10 mbar -1%). Because of this changing the filters is extremely important. Filters are monitored by a vacuum switch (50 ± 3 mbar; normally open), which causes a warning (check air filters) on the control box.

The compressor delivers a mixture of compressed air and oil.

The check valve (CV) prevents blow-back of compressed air when the compressor is stopped.

AIR RECEIVER / OIL SEPARATOR

At the element outlet, compressed air and oil pass into the air receiver / oil separator (AR/OS).

The air receiver has 3 functions

- Air receiver
 - evens pulsations
 - stabilizes regulating
- Oil separation (refer to section **Oil system**)
- Oil tank (refer to section **Oil system**)

MINIMUM PRESSURE VALVE (MPV)

The air leaves the receiver via a minimum pressure valve (MPV) which prevents the receiver pressure from dropping below the minimum working pressure, even when the air outlet valves are open (specified in section **Limitations**). This ensures adequate oil injection and prevents oil consumption. The minimum pressure valve (MPV) also functions as a check valve, to prevent blow-back from the air net.

COMPRESSOR SEPARATING FLANGE

The air lines of both compressor systems are normally connected but can be separated for maintenance purposes.

A disc can be installed between the separating flanges (ASF) to service one system while the other system is in operation.

SENSORS

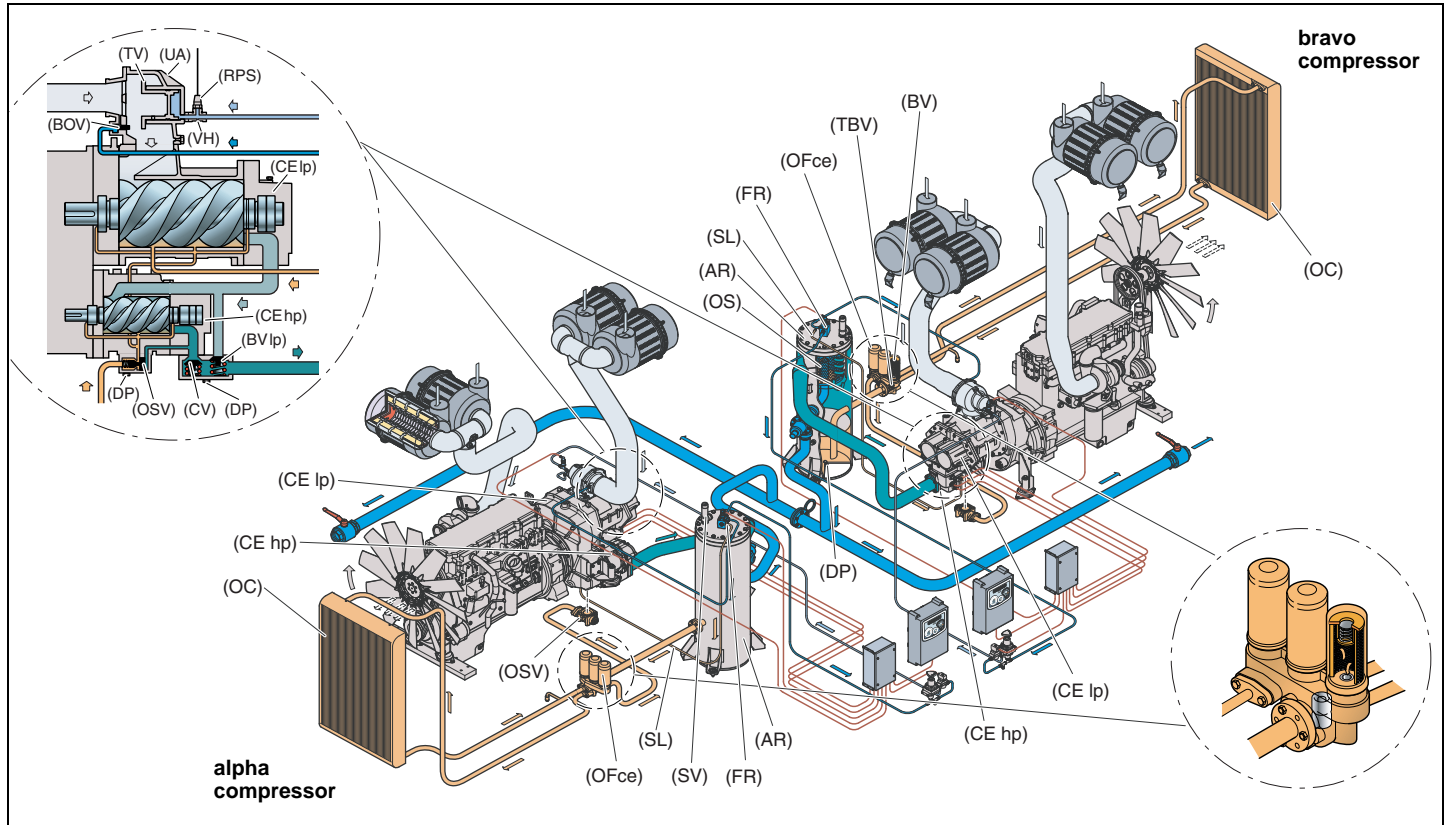
The working pressure sensor (WPS) monitors the pressure in the Air Receiver. It may display a warning on the Control Box or cause a shutdown of the compressor.

The pressure sensor (PS) measures the pressure of the air in the outlet manifold.

This pressure is displayed on the control box (pressure gauge).

The temperature sensor (TS) measures the temperature of the air in the outlet manifold. It may display a warning on the Control Box or cause a shutdown of the compressor.

OIL SYSTEM



Reference	Name
AR	Air Receiver
BOV	Blow-off Valve
BV	By-Pass Valve Oil Filter
BVlp	By-Pass Valve Oil Filter (low pressure)
CEhp	Compressor Element (high pressure)
CElp	Compressor Element (low pressure)
CV	Check Valve
DP	Drain Plug
FR	Flow Restrictor
OC	Oil Cooler
OFce	Oil Filter (compressor element)
OS	Oil Separator
OSV	Oil Stop Valve
RPS	Regulating Pressure Sensor
SL	Support Leg
SV	Safety Valve
TBV	Thermostatic By-Pass Valve
TV	Throttle Valve
UA	Unloader Assembly
VH	Vent Hole

The figure on the left shows the build-up of the compressor oil system.

Oil serves for:

- Cooling: compression heat
- Lubrication: rotors, bearings & gears
- Sealing: clearance compressor chambers & rotor shaft ends
- Corrosion protection

At the outlet of the compressor element (CEhp), compressed air and oil pass into the air receiver/oil separator (AR/OS). In the air receiver/oil separator (AR/OS), most of the oil is removed from the air/oil mixture. The oil collects in the lower part of the air receiver and on the bottom of the separator element. The lower part of the air receiver serves as oil tank.

Air pressure forces the oil from the AR/OS through the oil filters (OFce) and the oil stop valve (OSV) to the compressor element (CEhp/CElp).

When the compressor is stopped and / or there is no pressure in the system, the oil stop valve (OSV) prevents the oil from flowing back into the compressor element.

The oil stop valve (OSV) is kept closed by oil pressure and opens by discharge air from the compressor.

The compressor element has an oil gallery in the bottom of its casing.

The oil for rotor lubrication, cooling and sealing is injected through holes in the gallery. Lubrication of the bearings is ensured by oil injected into the bearing housings. The injected oil, mixed with the compressed air, leaves the compressor element and re-enters the air receiver, where it is separated from the air.

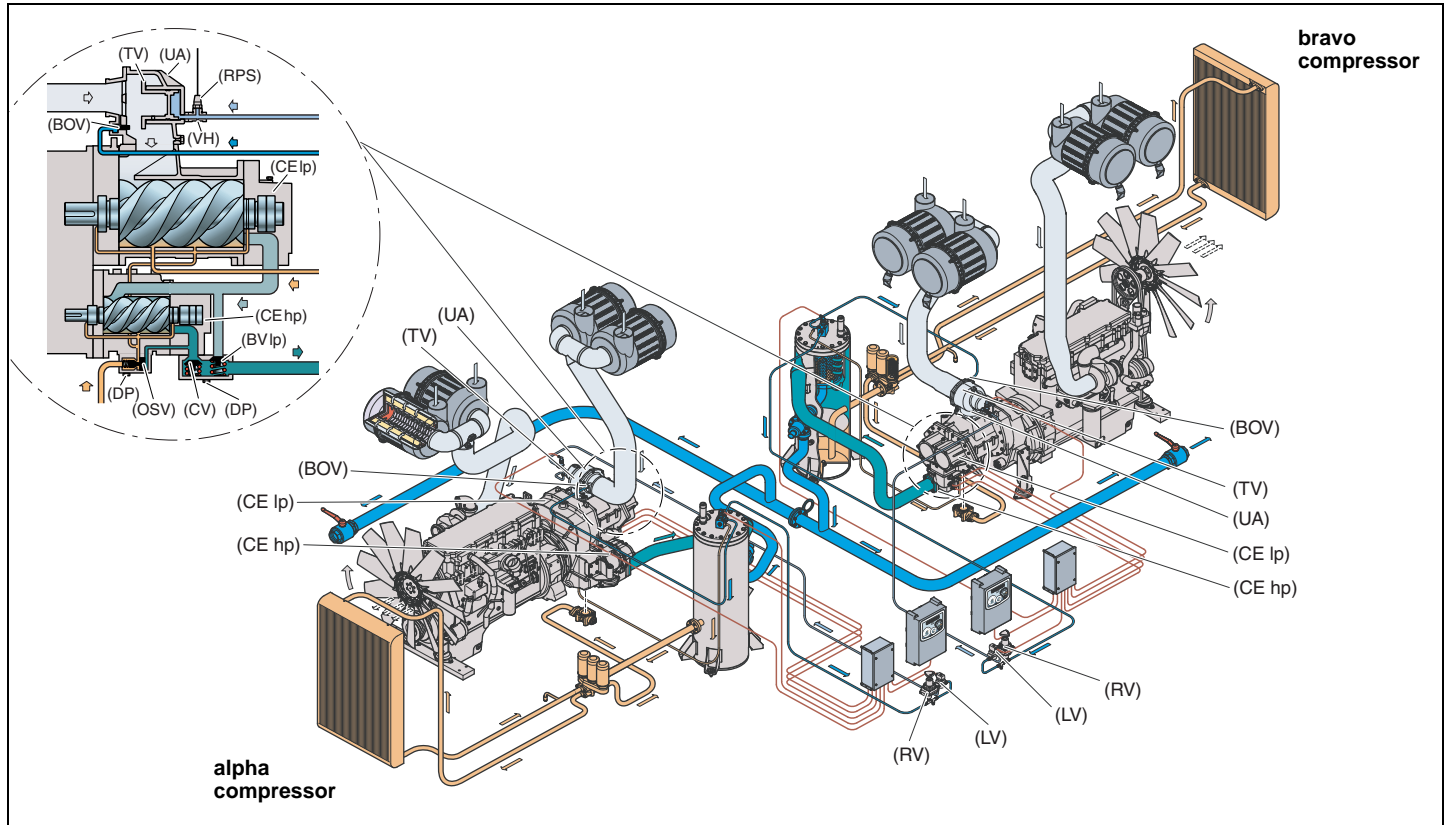
FILTER BY-PASS VALVE

When the oil temperature reaches 80°C (176°F) the thermostatic valve (TV) starts opening. The oil passes first through the oil cooler (OC) and then the oil filters (OF) and the oil stop valve (OSV) to the compressor element (CE).

The oil filter by-pass valve opens when the pressure drop over the filter is above normal (set at 2.5 bar) because of a clogged filter. The oil then by-passes the filter without being filtered. For this reason, the oil filter must be replaced at regular intervals (see chapter **Preventive maintenance schedule**).

The oil that collects on the bottom of the oil separator element is returned to the system through a scavenging line (SL), which is provided with a flow restrictor (FR).

CONTINUOUS PNEUMATIC REGULATING SYSTEM



Reference	Name
BOV	Blow-off Valve
BVlp	By-Pass Valve Oil Filter (low pressure)
CEhp	Compressor Element (high pressure)
CElp	Compressor Element (low pressure)
CV	Check Valve
DP	Drain Plug
LV	Loading Valve
OSV	Oil Stop Valve
RPS	Regulating Pressure Sensor
RV	Regulating Valve
TV	Throttle Valve
UA	Unloader Assembly
VH	Vent Hole

The compressor is provided with a continuous regulating system, which serves to match air delivery to air demand. The regulated system controls air delivery by:

- engine speed regulation
- air intake throttling

UNLOADER

Air drawn through the air filters passes the unloader assembly (UA), which incorporates a blow-off valve (BOV) and a throttle valve (TV).

The blow-off valve (BOV) is closed during operation by outlet pressure of the compressor element and opens by air receiver pressure when the compressor is stopped (by means of loading valve (LV)).

When the air consumption increases, the air receiver pressure will decrease and vice versa. This receiver pressure variation is sensed by the regulating valve (RV), which matches the air output to the air consumption, by means of control air to the unloader assembly (UA).

The air receiver pressure is maintained between the pre-selected working pressure and the corresponding unloading pressure.

The construction of the regulating valve (RV, set pressure 1.5 bar above working pressure) is such that any increase (decrease) of the air receiver pressure above the pre-set valve opening pressure results in a proportional increase (decrease) of the control pressure to the throttle valve and the electronic speed regulator.

Part of the control air is vented into atmosphere, and any condensate discharged, through the vent holes (VH).

When starting the compressor, the throttle valve (TV) is kept closed via receiver pressure. The compressor element (CEhp CElp) takes in air and pressure builds up inside the receiver (AR). The air output is controlled from maximum output (100%) to no output (0%) by:

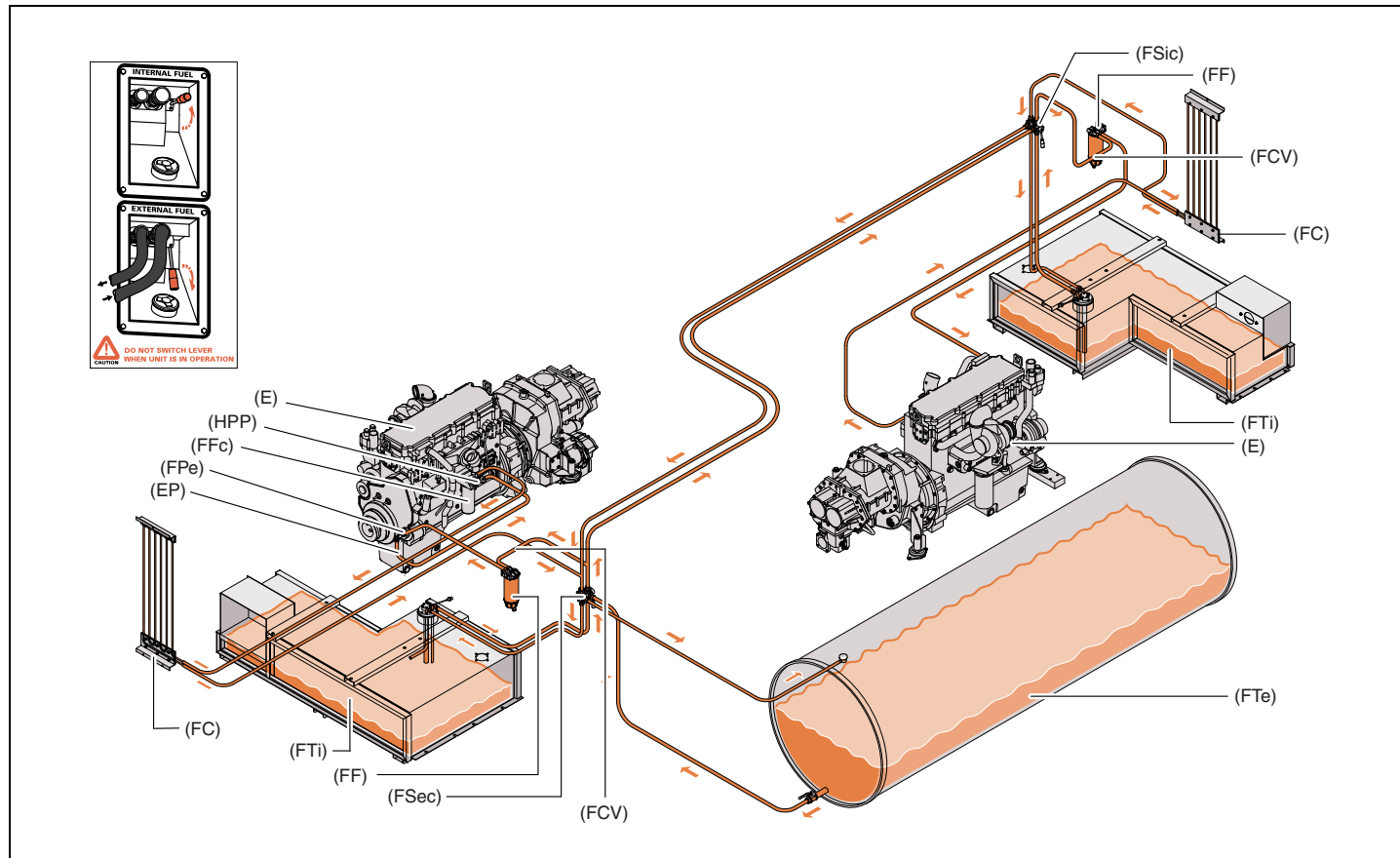
- Speed control of the engine between maximum load speed and unloading speed (the output of a screw compressor is proportional to the rotating speed).
- Air inlet throttling.

If the air consumption is equal to or exceeds the maximum air output, the engine speed is held at maximum load speed and the throttle valve (TV) is fully open.

If the air consumption is less than the maximum air output, air receiver pressure increases and the regulating valve supplies control air to throttle valve (TV) to reduce the air output and holds air receiver pressure between the normal working pressure and the corresponding unloading pressure. Unloading pressure = normal working pressure + 1 bar (14.5 psi).

When the air consumption is resumed, the blow-off valve (BOV) closes and the throttle valve (TV) gradually opens the air intake and the electronic speed regulator increases the engine speed.

FUEL SYSTEM



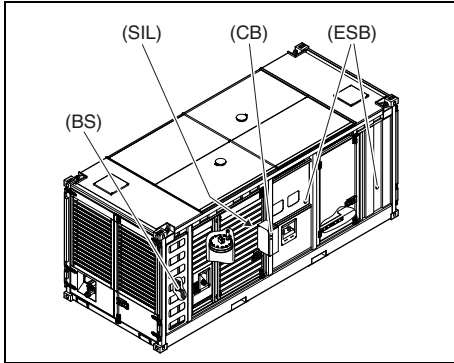
Reference	Name
E	Engine
EP	Engine Part
FC	Fuel Cooler
FCV	Fuel Cut-off Valve
FF	Fuel Filter (Atlas Copco)
FFc	Fuel Filter (Caterpillar)
FPe	Fuel Pump Engine
FSec	Fuel Supply (external connection) + 3-Way Valve
FSic	Fuel Supply (internal connection) + 3-Way Valve
FTe	Fuel Tank (external)
FTi	Fuel Tank (internal)
HPP	Hand Priming Pump

Each compressor unit has its own separate fuel system consisting of fuel tank, fuel filter, and fuel cooler. Each fuel tank is equipped with a fuel filling funnel. As an option additional fuel filters can be installed.

It is also possible to connect the fuel system to an external tank via nipples installed in the wall of the container. Two 3-way valves make it possible to supply fuel to the engines in three ways:

- External supply
- Internal supply, each engine is supplied from its own fuel tank
- Internal supply, internal tanks are connected

ELECTRICAL SYSTEM



Reference	Name
BS	Battery Switch
CB	Circuit Breakers
ESB	Emergency Stop Buttons
SIL	Switch Interior Lighting

Each compressor has its own separate 24V electric system with controls. As an option remote controls and offshore safety controls can be installed. For safety reasons each system is equipped with a battery switch.

The emergency stop immediately stops both engines when pressed.

The container is equipped with internal lights. This lighting circuit can be powered from both electric systems.

WIRING AND CONNECTIONS

For electrical faults always check the condition of wiring and connections, e.g. loose or corroded terminals, damaged wiring.

Make sure tight the wires are clamped tight in the terminals.



Only an electrical technician is allowed to perform maintenance on electric components. This includes work on live electrical components.

COMPRESSOR CONTROL MODULE (CCM)

Inputs

The inputs are used to give the Control Box and the operator information about the compressor's situation.

Some of these inputs are capable of generating warnings and/or shutdowns, when their input status exceeds or equals certain limits.

Warnings are only generated to prompt the operator to a potential problem or issue.

When a warning has been generated, the Control Box's operation is not interrupted, and the compressor keeps running.

When a shutdown is generated, the Control Box goes to the Shutdown status.

Digital inputs

Coolant level Shutdown input (D-IN 01)

This input is activated as long as the Coolant Level stays above the shutdown level.

When this input is not active, a Coolant Level Shutdown is generated.

Coolant level Warning input (D-IN 02)

This input is activated as long as the Coolant Level stays above the warning level.

When this input is not active, a Coolant Level Warning is generated.

Airfilter Switch input (D-IN 03)

This input is activated when the vacuum after the airfilters reaches the switchpoint (depending on switch type).

When this input is active, an Airfilter Warning is generated.

Spare digital inputs (D-IN 04 - 07)

These inputs are spare, and can be programmed to be used for options.

Analogue voltage inputs

Regulating Pressure Sensor input (V-IN 01)

Sensor range: 0 - 3 bar

This input monitors the Regulating Pressure.

It is used in the Engine RPM Calculation.

Vessel Pressure Sensor input (V-IN 02)

Sensor range: 0 - 35 bar

This input monitors the Vessel Pressure:

- The Vessel Pressure is displayed on the pressure gauge.
- When the Vessel Pressure is equal to or higher than the "Vessel Pressure Start Prevention" parameter and the engine is not running, a Vessel Pressure Start Prevention Warning is generated.
- When the Vessel Pressure is equal or higher than the Pressure Max parameter, a Vessel Pressure Shutdown is generated.
- When the Vessel Pressure is equal or lower than "Vessel Pressure Load Prevention" value, Vessel Pressure Load Prevention is generated.

Interstage pressure sensor input (V-IN 03)

Sensor range: 0 - 17 bar

This input is only used for this purpose when the Compressor Type is XRH or XRV.

Otherwise this input is a spare.

It monitors the Interstage Pressure.

Air Discharge Pressure sensor input (V-IN 04)

Sensor range: 0 - 35 bar

This input monitors the Air Discharge Pressure.

Fuel Level Sensor input (V-IN 05)

This input monitors the fuel level in the compressor's fuel tanks.

The fuel level is displayed on the fuel gauge.

When the input level is equal to or smaller than the Fuel Level Warning setting, the Control Box generates a Fuel Level Warning.

When the input level is equal to or smaller than the Fuel Level Shutdown setting, the Control Box generates a Fuel Level Shutdown.

The sensor gives a linear signal according to the amount of fuel in the tank.

An empty tank = 0.5 VDC = 0%

A full tank = 4.5 VDC = 100%

Spare pressure inputs (V-IN 03, V-IN 06 - 07)

These inputs are spare, and can be programmed to be used for any feature.

V-IN 03 is not a spare in the high pressure units. (Interstage Pressure)

Every spare pressure sensor input has an Upper Limit and a Lower Limit parameter named as follows: V-IN xx UL, V-IN xx LL, with xx being the number of the input.

These parameters specify the range of the input.

If a spare pressure sensor input is used, these limits need to be programmed with the external software.

Temperature sensor inputs

Air Discharge Temperature Sensor input (T-IN 01)

This sensor measures the temperature of the air in the outlet manifold.

- When the input level is equal or higher than the Air Discharge Temperature Warning setting, the Control Box generates an Air Discharge Temperature Warning.

LP Element Temperature Sensor input (T-IN 02)

This input monitors the temperature of the LP compressor element.

- When the input level is equal or higher than the LP Element Temperature Warning setting, the Control Box generates a LP Element Temperature Warning.
- When the input level is equal or higher than the LP Element Temperature Shutdown setting, the control box generates a LP Element Temperature Shutdown.

HP Element Temperature Sensor input (T-IN 03)

This input monitors the temperature of the HP compressor element:

- When the input level is equal or higher than the HP Element Temperature Warning setting, the Control Box generates a HP Element Temperature Warning.
- When the input level is equal or higher than the HP Element Temperature Shutdown setting, the Control Box generates a HP Element Temperature Shutdown.

This input is only used for this purpose when the Compressor Type is XRH or XRV.

Otherwise this input is a spare.

Ambient Temperature Sensor input (T-IN 04)

This input monitors the Ambient Temperature.

- When the input level is equal or higher than the Ambient Temperature Warning setting, the Control Box generates an Ambient Temperature Warning.

Spare temperature inputs (T-IN 05 - 06)

These inputs are spare, and can be programmed to be used for any feature.

Battery voltage

The Battery Voltage is measured on the Power Supply of the Control Box.

- When the Battery Voltage is lower than 22.5 VDC, and the engine is not running (RPM < Start detection RPM) the control box generates a battery voltage low warning.
- When the battery voltage is lower than 25.5 VDC, and the engine is running (RPM > Start detection RPM), the Control Box generates a Battery Not Charging warning.

The battery voltage is also not checked when the Cold start output (Feature) is activated, until 5 seconds after the output has been deactivated.

Outputs

Digital high outputs

Power After Contact output (H-OUT 01)

This output powers the engine electronics:

- It is activated when the Power ON/OFF switch is in the ON position.
- In the stopping procedure, the output is deactivated for a certain time.

Starter Motor output (H-OUT 02)

This output controls the starter engine.

The output is used in the Cranking status.

Loading Valve output (H-OUT 03)

This output controls the loading valve:

- When entering the Load/Unload status, the output is activated.
- When a No-load command is given, the output is deactivated.
- The output is also deactivated in the Stopping Procedure.

Flash Lights output (H-OUT 04)

This output controls the Flash Lights:

- It is used in the cranking status.
- This output is also activated when a warning or a shutdown occurs, until the warning disappears, or until the shutdown has been reset.

Horn output (H-OUT 05)

This output controls the Horn:

- It is used in the cranking status.
- This output is also activated when a shutdown occurs, until the shutdown has been reset.

Spare digital high outputs (H-OUT 06 - 10)

These outputs are spare, and can be programmed to be used for any feature.

Digital low outputs

Spare digital low outputs (L-OUT 01 - 03)

These outputs are spare, and can be programmed to be used for any feature.

Communication

CAN J1939

The Control Box communicates with the engine over the CAN J1939 communication line.

Following parameters are monitored:

- Engine Oil Pressure
- Engine Oil Temperature
- Fuel Pressure
- Fuel Temperature
- Fuel Consumption
- Engine Load
- Coolant temperature
- Air Inlet temperature
- Engine RPM
- Engine shutdown and warning codes

The Coolant Water Temperature is used in the Warm-up status and during Cold start.

The Air Inlet temperature is used during Cold start.

Following parameters are sent to the engine:

- RPM setpoint

ELECTRIC SYSTEM

CIRCUIT DIAGRAM INDEX 9822 0963 51

Tag	Desc. 1	Desc. 2	Location	Sheet/ Col.
B1	Combo sensor		Optional	07/1
B2	Proximity switch	Closed	Optional	07/1
B3	Proximity switch	Bypass	Optional	07/1
G1a	Battery		Optional	04/1
G1b	Battery		Machine	03/3
G2a	Battery		Machine	04/1
G2b	Battery		Machine	03/3
G3	Alternator		Machine	04/1
H10	Light	Internal	Machine	03/10
H4	Light	Warning flasher	Machine	05/1
H5	Light	Warning flasher	Machine	05/1
H6	Horn		Machine	05/1
H7	Light	Internal	Machine	03/9
H8	Light	Internal	Machine	03/9
H9	Light	Internal	Machine	03/10
K0	Relay	Starter motor	Machine	04/1
K1	Relay	Air shut-off valve	Optional	07/1
K2	Relay	Aftercooler fans	Optional	08/1
K3	Relay	E-Stop Eberspacher	Optional	08/1
K4	Relay	Timer	Machine	03/7
K5	Relay		Machine	03/7
K6	Relay	Auxiliary starter	Machine	05/1
K7	Relay	Yellow alert	Machine	03/5
K8	Relay	Nordic	Optional	08/1

Tag	Desc. 1	Desc. 2	Location	Sheet/ Col.
K9	Relay	Etherstart	Optional	07/1
LS1	Level switch	Coolant level warning	Machine	05/1
LS2	Level switch	Coolant level shutdown	Machine	05/1
LT1	Level sensor	Fuel level	Machine	05/1
M1	Starter motor		Machine	04/1
M1a	Motor	Aftercooler fan	Optional	08/1
M2a	Motor	Aftercooler fan	Optional	08/1
M3a	Motor	Aftercooler fan	Optional	08/1
M4	Pump	Fuel	Optional	08/1
M5	Pump	Stepper	Optional	07/1
N1	Compressor control module		Machine	06/1
N2	Engine control module		Machine	04/1
N3	Timer	Eberspacher	Optional	08/1
N4	Preheater	Hydronic	Optional	08/1
PS1	Pressure switch	Air filter	Machine	05/1
PT1	Pressure sensor	Vessel pressure	Machine	05/1
PT2	Pressure sensor	Regulating pressure	Machine	05/1
PT3	Pressure sensor	Interstage pressure	Machine	05/1
PT4	Pressure sensor	Oil Stop valve pressure	Machine	05/1
Q13	Fuse	60A	Machine	04/1
Q1a	Fuse	15A	Machine	04/1
Q1b	Fuse	15A	Machine	03/3
Q2	Fuse	10A	Machine	04/1
Q3	Fuse	10A	Machine	04/1

9822 0963 51

Tag	Desc. 1	Desc. 2	Location	Sheet/ Col.
Q4	Fuse	10A	Machine	04/1
Q5	Fuse	10A	Machine	04/1
Q7	Fuse	32A	Optional	08/1
Q8a	Fuse	10A	Machine	03/7
Q8b	Fuse	10A	Machine	03/6
Q9	Fuse	15A	Optional	08/1
R1	Resistor	Termination CAN Bus	Machine	04/1
R2	Resistor	Engine oil heater	Optional	07/1
S1	Switch	Emergency stop	Customer	03/3
S2	Switch	Emergency stop	Customer	03/3
S3	Switch	Emergency stop	Customer	03/3
S4a	Switch	Battery	Machine	04/1
S4b	Switch	Battery	Machine	03/3
S5	Switch	Internal light	Machine	03/6
S6	Switch	Fuel	Machine	05/1
TS1	Temperature switch	Battery charger	Optional	07/1
TT1	Temperature sensor	LP Element temperature	Machine	05/1
TT2	Temperature sensor	HP Element temperature	Machine	05/1
TT3	Temperature sensor	Ambient temperature	Machine	05/1
TT4	Temperature sensor	Aftercooler air discharge	Optional	07/1
U1	Battery charger		Optional	07/1
X13	Connector	Diagnostic	Machine	04/1
X17	Connector	Cosmos	Optional	07/1
X8	Connector	Option box	Machine	03/7

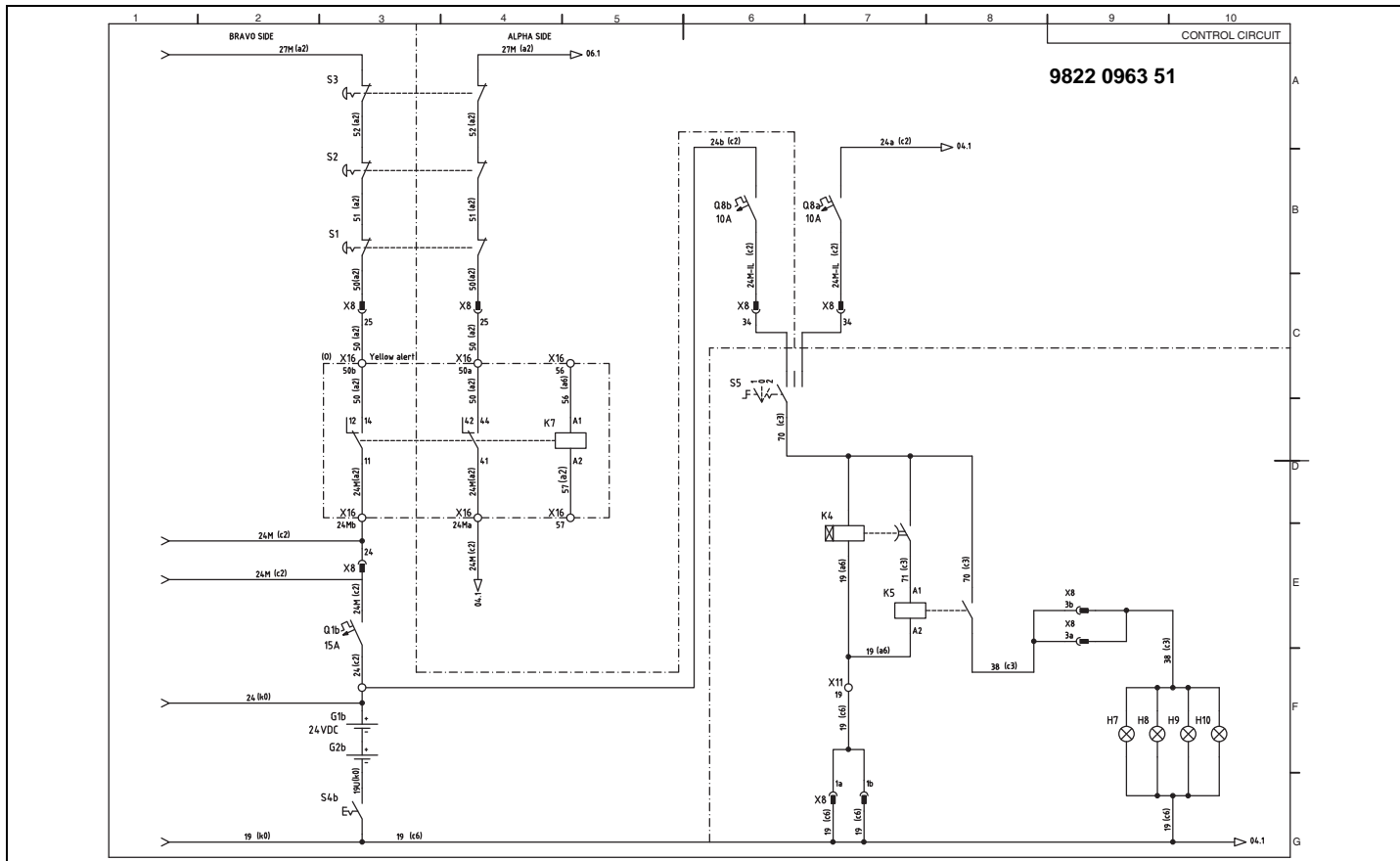
Tag	Desc. 1	Desc. 2	Location	Sheet/ Col.
X9	Connector	Option box	Machine	07/1
Y1	Solenoid valve	Loading	Machine	05/1
Y2	Solenoid valve	Etherstart	Optional	04/1
Y3	Solenoid valve	Air shut-off	Optional	07/1
Y4	Solenoid valve	Bleeder	Optional	07/1

Wire size	Colour code
aaa = 0.35 mm ²	0 = black
aa = 0.5 mm ²	1 = brown
ab = 0.75 mm ²	2 = red
a = 1 mm ²	3 = orange
b = 1.5 mm ²	4 = yellow
c = 2.5 mm ²	5 = green
d = 4 mm ²	6 = blue
e = 6 mm ²	7 = purple
f = 10 mm ²	8 = grey
h = 16 mm ²	9 = white
j = 50 mm ²	54 = green/yellow
k = 95 mm ²	

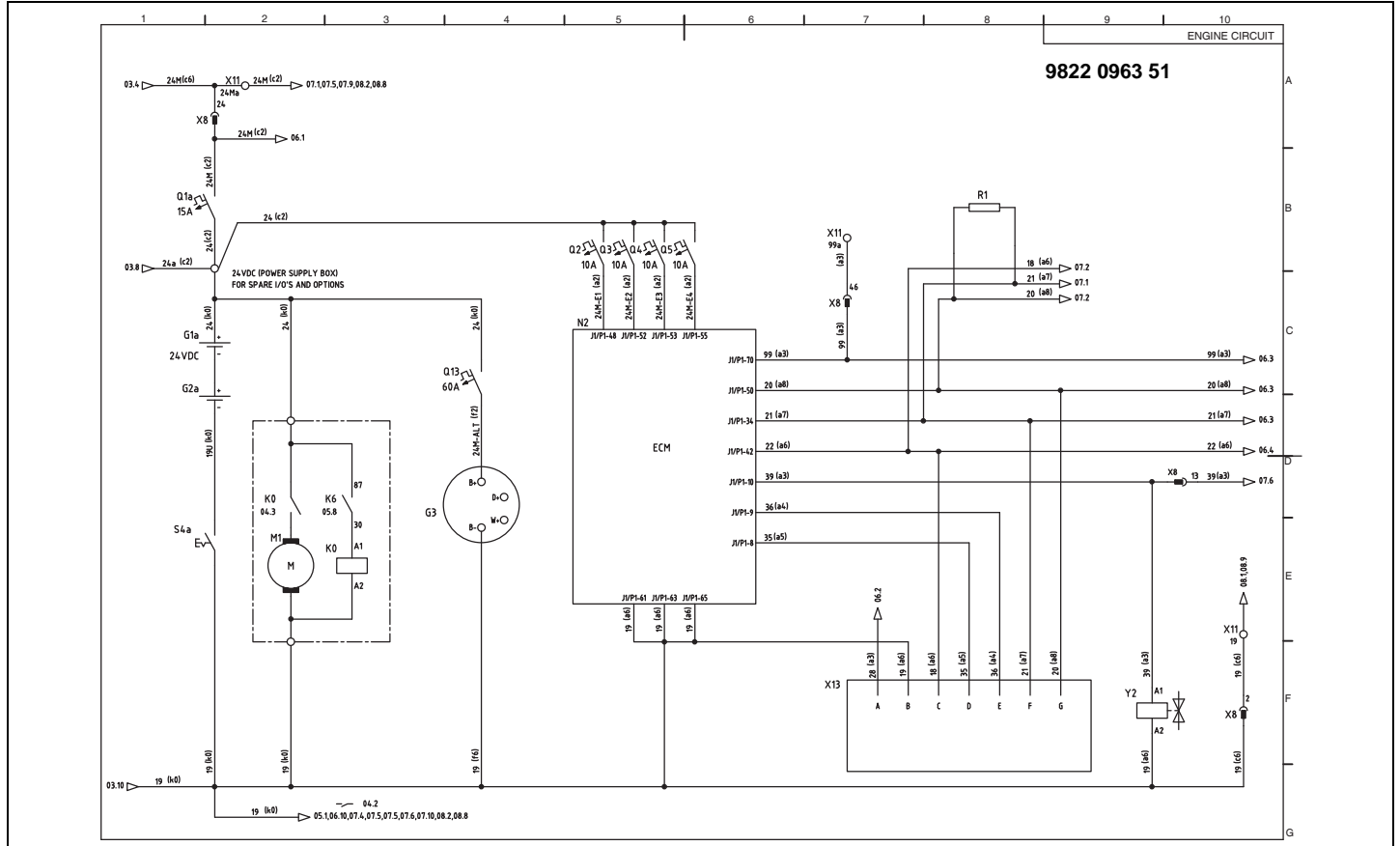


The Alpha side and Bravo side are 100% identical from an electrical point of view where wires or terminals on the Alpha side are labeled with xxa on the Bravo side they are labeled with xxb. Only wire 19 is common for Alpha and Bravo.

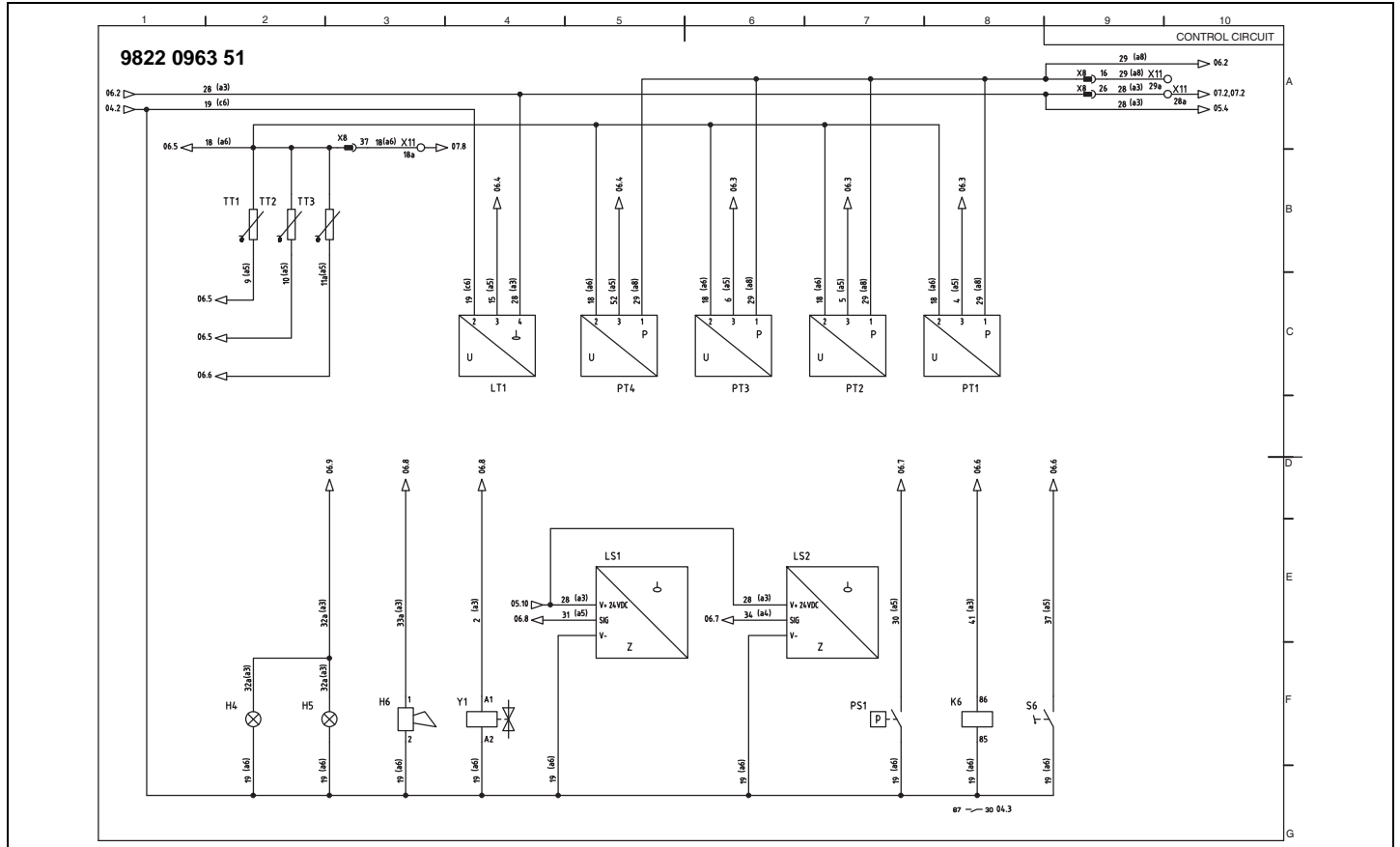
SH 03 CONTROL CIRCUIT



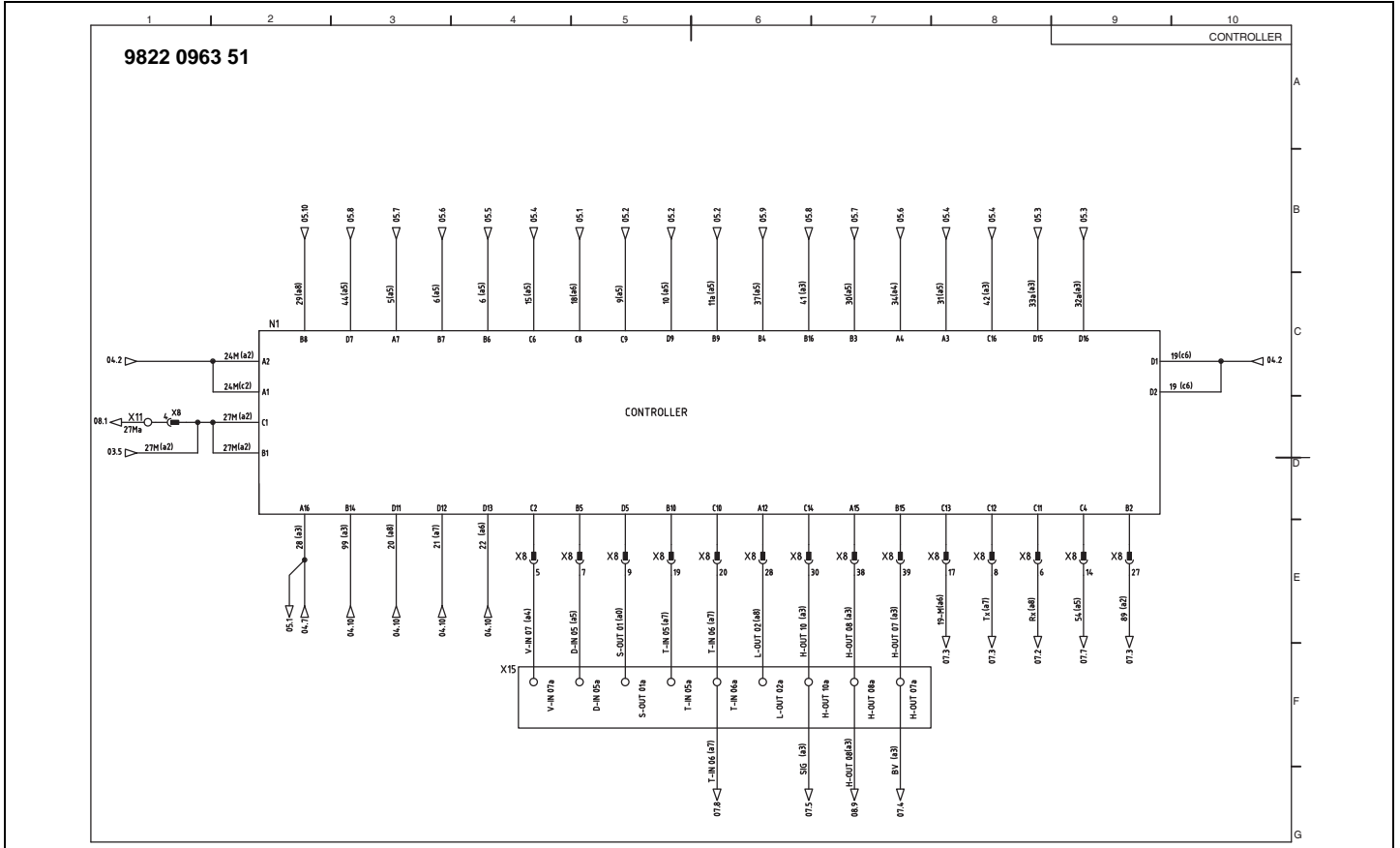
SH 04 ENGINE CIRCUIT



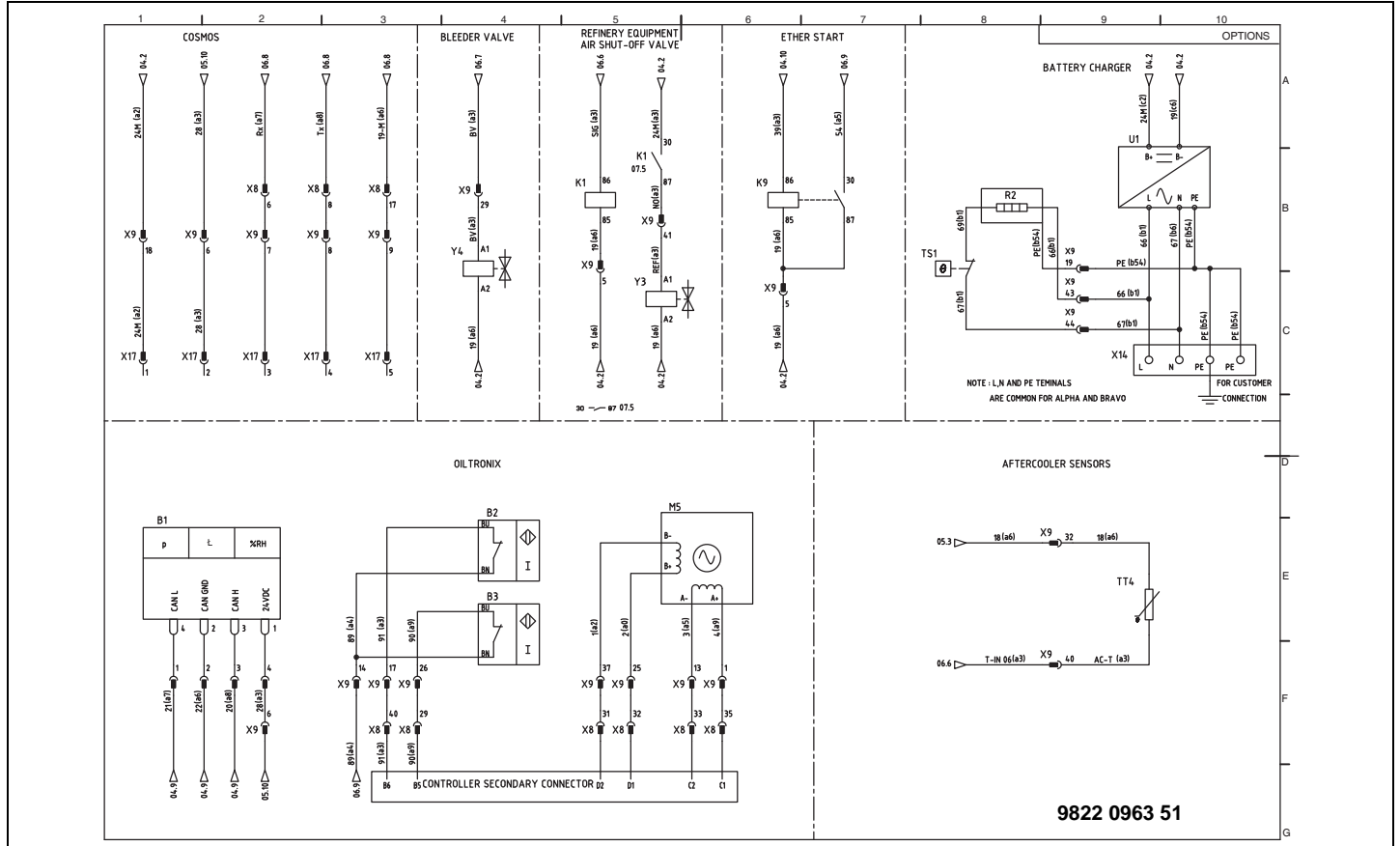
SH 05 CONTROL CIRCUIT



SH 06 CONTROLLER

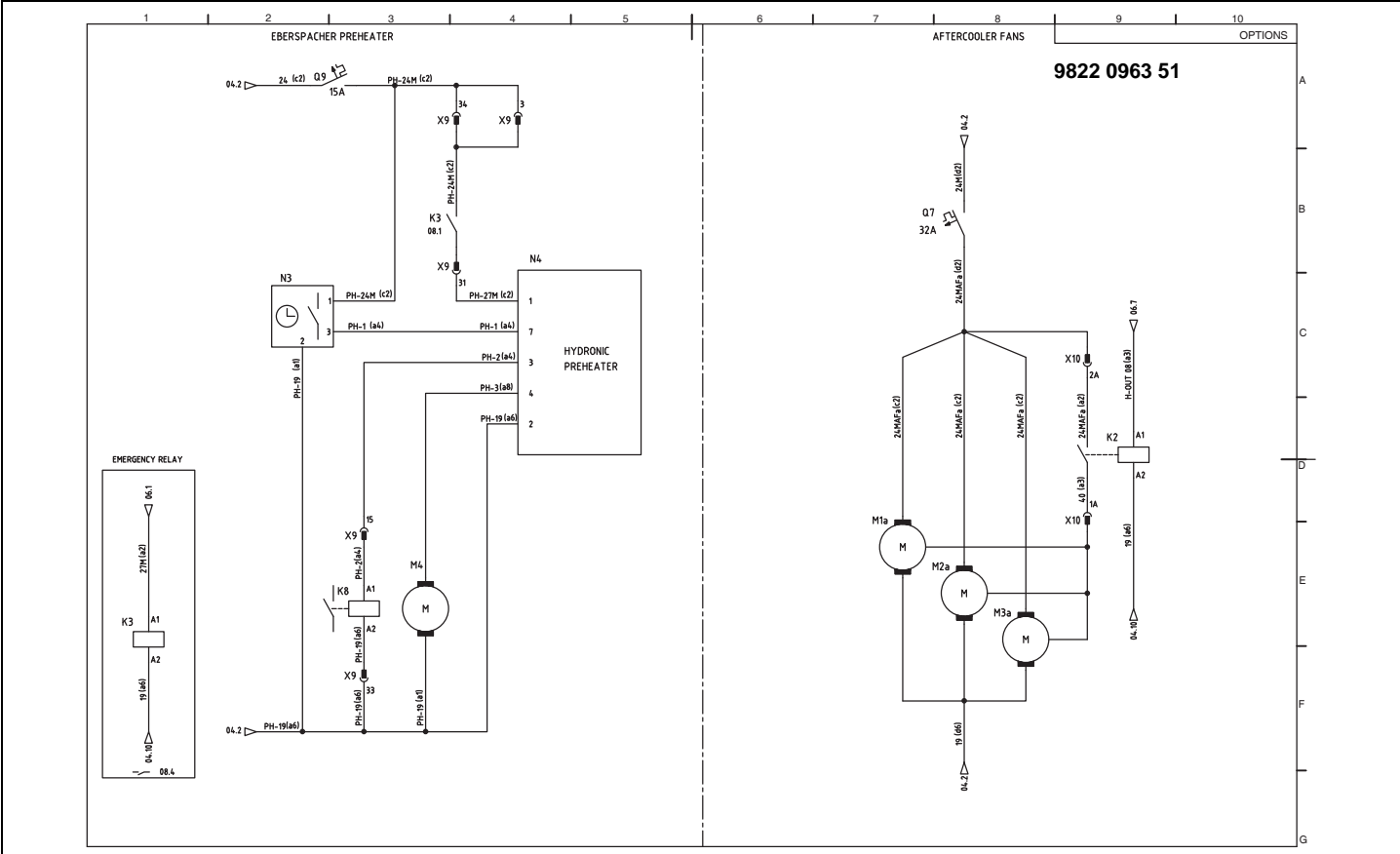


SH 07 OPTIONS



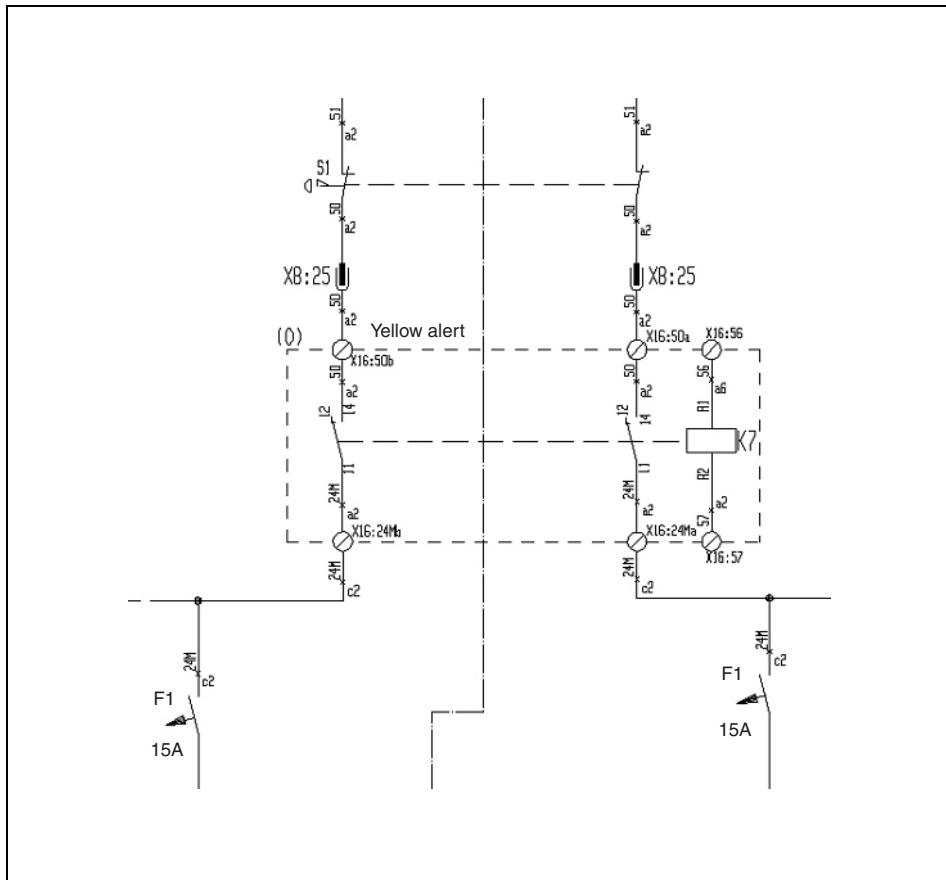
9822 0963 51

SH 08 OPTIONS

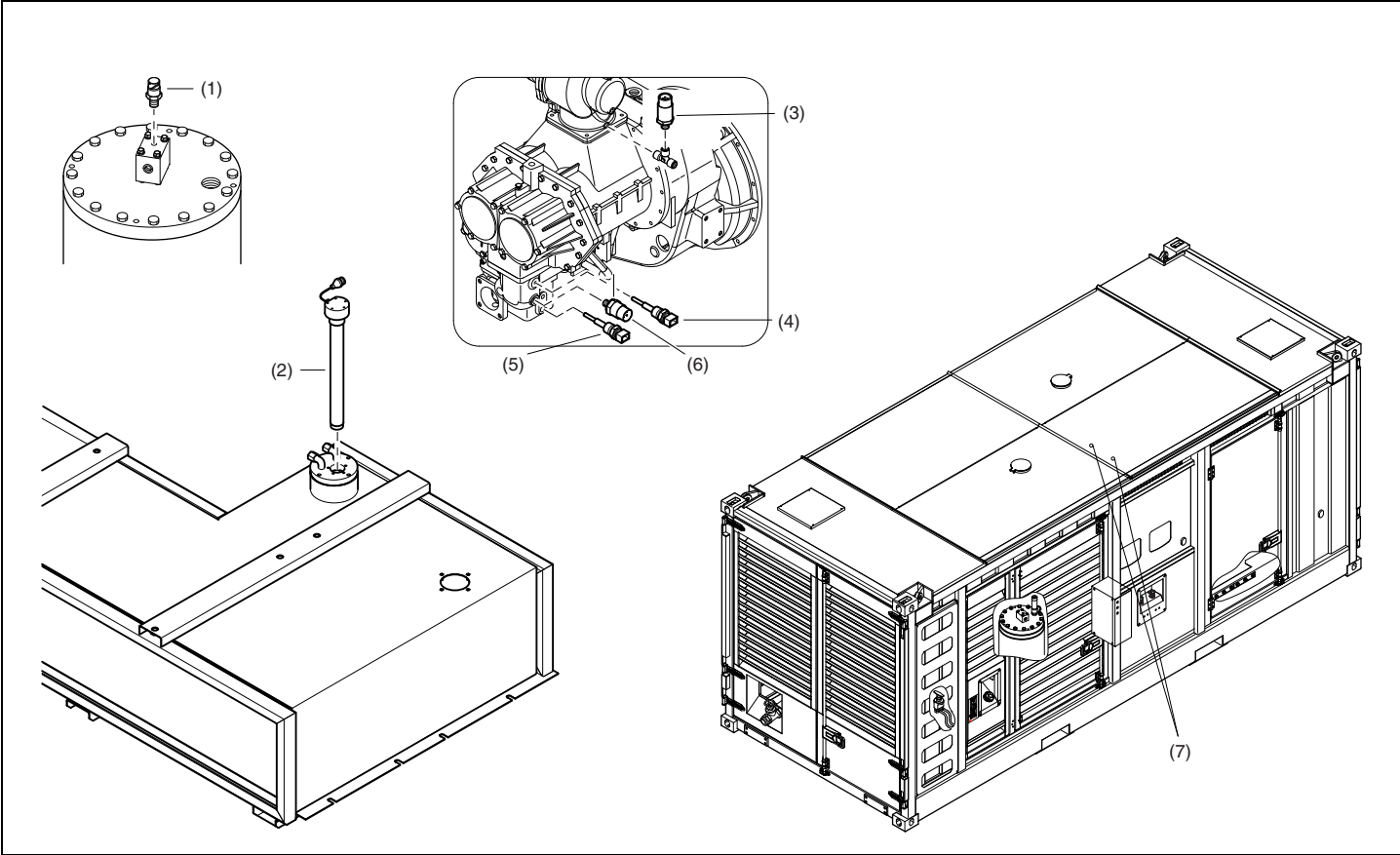


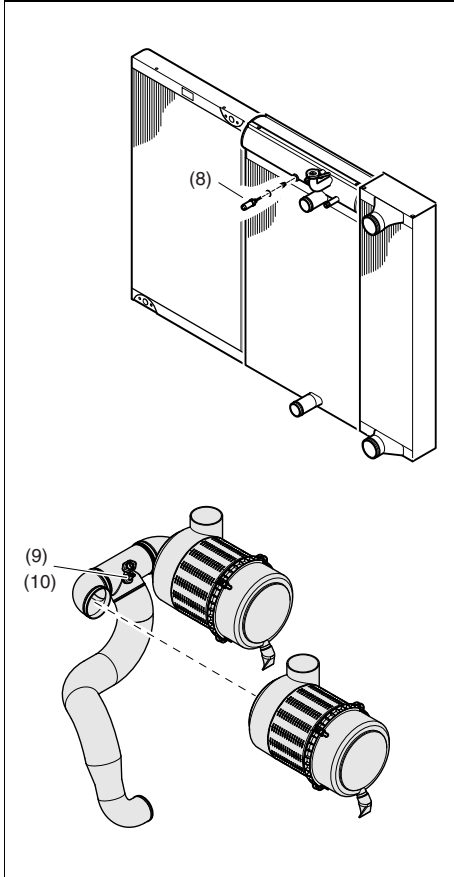
Strip-ID	Term	Wire No.	Ref	Sheet
X11	18a	18	3	05
X11	19		7	03
X11	19	19	10	04
X11	24Ma	24M	2	04
X11	27Ma	27M	1	06
X11	28a	28	10	05
X11	29a	29	10	05
X11	99a	99	7	04
X14	L	66	9	07
X14	N		10	07
X14	PE	PE	10	07
X14	PE	PE	10	07
X15	D-IN 05a	D-IN 05	5	06
X15	H-OUT 07a	H-OUT 07	7	06
X15	H-OUT 08a	H-OUT 08	7	06
X15	H-OUT 10a	H-OUT 10	6	06
X15	L-OUT 02a	L-OUT 02	6	06
X15	S-OUT 01a	S-OUT 01	5	06
X15	T-IN 05a	T-IN 05	5	06
X15	T-IN 06a	T-IN 06	6	06
X15	V-IN 07a	V-IN 07	4	06
X16	24Ma	24M	4	03
X16	24Mb	24M	3	03
X16	50a	50	4	03
X16	50b	50	3	03
X16	56	56	5	03
X16	57	57	5	03

WIRING DIAGRAM PLATFORM SHUTDOWN (YELLOW ALERT)



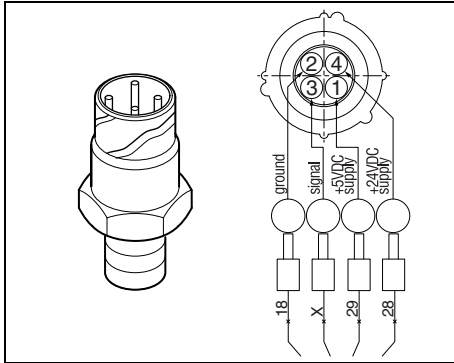
SENSORS





Reference	Name	Part number
1	Working pressure sensor	1089957975
2	Fuel level sensor	1089065903
3	Regulating pressure sensor	1089957980
4	LP-Element temperature sensor	1089057470
5	HP-Element temperature sensor	1089057470
6	Interstage pressure sensor	1089057974
7	Ambient temperature sensor	1089057470
8	Coolant level switch (warning)	1089065953
	Coolant tank (shutdown)	1089065953
9	Pressure switch air filter	1089060708
10	Combo sensor (Oiltronix only)	1089070501
Option Aftercooler		
	Discharge temperature sensor	1089057470
	Discharge pressure sensor	1089957975

PRESSURE SENSORS



Connections:

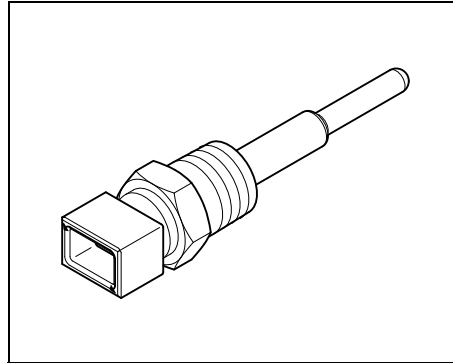
18 digital ground

x signal

29 +5VDC supply

28 +24VDC supply (NA)

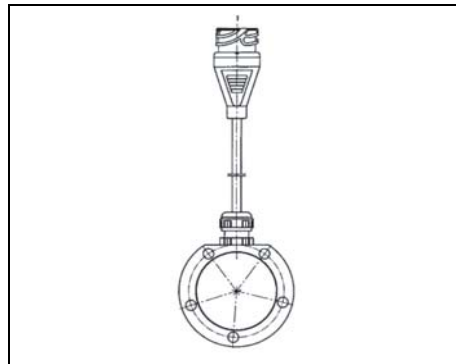
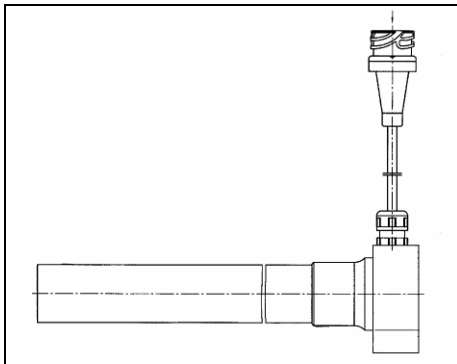
TEMPERATURE SENSORS



- All temperature sensors 1089 0574 40 are PT1000's, with a working range from -40°C to +270°C.
- They work on the principle of resistance
 - At 0°C they have a resistance of 1000 Ω.
 - The resistance increase is approximately 4,0 Ω/°C for Pt 1000 in the range from 0 to 100 °C
 - See table for correct value on each temperature

Temperature	R _{PT1000}
-25 °C	902 Ω
0 °C	1000 Ω
20 °C	1078 Ω
100 °C	1385 Ω
130 °C	1498 Ω

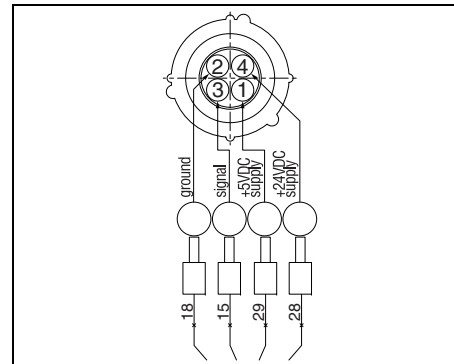
LEVEL SENSORS



Supply voltage 24 VDC

Output voltage

- Empty tank 0.5 VDC = 0%
- Full tank 4.5 VDC = 100%



Connections:












18 digital ground












15 signal










29 +5VDC supply (NA)

28 +24VDC supply

MARKINGS AND INFORMATION LABELS

	Dangerous outlet gases.
	Danger, hot surface.
	Electrocution hazard.
 PAROIL S	Atlas Copco synthetic compressor oil.
 PAROIL SAE 15W40	Atlas Copco mineral engine oil.
	Manual.
	Read the instruction manual before working on the battery.
	Reset fuse.
	On / off button.
	Prohibition to open air valves without connected hoses.
	Rotation direction.

	Inlet.
	Outlet.
	Compressor oil drain.
	Read the instruction manual before starting.
	Service every 24 hours.
	Warning! Part under pressure.
	Do not stand on outlet valves.
	Start-Stop indication of switch.
	Do not run the compressor with open doors.
	Lifting permitted.
	Use diesel fuel only.

	Sound power level in accordance with Directive 2000/14/EC (expressed in dB (A)).
	Fork lifting permitted.
	Don't lift here.
	Read the instruction manual before lifting.
	Filler cap coolant.
	Read the instruction manual before topping up with coolant.
	Service point.
	Circuit breaker.
	Do not run the compressor when the baffles are not in the right position.

Operating instructions

TRANSPORT

General

The units have to be transported horizontally. During transport they must be fastened to the transporting vehicle as normal 20 ft. containers. Switch the battery switches in the OFF position. Lock all doors.

When transported by air, first

- Drain all fluids
- Remove the batteries
- Undo the lifting slings and store these in the battery box
- Lock all doors

Lifting instructions

Always observe the local regulations.

The units are equipped with own lifting slings. If these lifting slings are missing equal lifting devices may be used, however these must be certified for this special lifting job.

It is also possible to lift the unit with a fork lift truck, using the lifting slots in the bottom beams.

Stacking

Please note that there are two different types of containers with different stacking heights:

- CSC approved containers: stacking height:
max 3 pcs
Refer to section **CSC data plate**.
- DNV approved containers: stacking height:
max 8 pcs
Refer to section **DNV data plate**.

Remove lifting slings when stacking and store these in the container.

OPERATIONS OVERVIEW

There are three ways to control the compressor:

- Locally with the Control Box: This is the default control mode.
- Remotely by means of the remote switch inputs, located at the back of the Control Box: In this control mode, the Control Box can only be used for information purposes and parameter changes when the compressor is not running.
- With software running on a PC: In this control mode, the Control Box can only be used for information purposes and parameter changes when the compressor is not running.

When reading this document, mind the difference between a status and a procedure. A status is a state in the control box's operation. A procedure is an action executed by the Control Box.

Example: The "Stopping procedure" is executed in the "Stopping status", the "Start Failure" status and the "Shutdown" status.

During operation



The doors must be closed during operation and may be opened for short periods for inspection and adjustments only.

Regularly carry out following checks:

1. Ensure that the regulating valve (RV) is correctly adjusted, i.e. starts decreasing the engine speed when reaching the preset working pressure in the receiver.
2. Check the display on the control box. Pay attention to parameters such as air outlet temperature, engine oil pressure, coolant temperature. See section **Fault diagnosis**.
3. Avoid the engine running out of fuel. Nevertheless, if this happens, fill the fuel tank and prime the fuel system to speed up starting. See section **Specific start procedure**.

BEFORE STARTING

Measures to be taken before starting

1. Before initial start-up, prepare battery for operation if not already done. See section **Battery care**.
2. With the compressor standing level, check the level of the engine oil. Add oil, if necessary, up to the upper mark on the dipstick. Also check the engine coolant level. Consult section **Maintenance** for the type and viscosity grade of the engine oil.
3. Drain condensate from the air receiver. Remove the air receiver drain plug and open the valve to drain possible condensate. Close the valve when oil comes out and reinstall the drain plug. The interval between draining operations may be determined by experience, as the amount of condensate depends on the operating condition.



Before draining, ensure that the pressure is released.

4. Check the level of the compressor oil. See section **Compressor regulating system**. The pointer of oil level gauge (OLG) should register in the green range. Add oil if necessary. See section **Oil specifications** for the oil to be used.



Before removing oil filler plug (FP), ensure that the pressure is released by opening an air outlet valve.

5. Check that the fuel tank contains sufficient fuel. Top up, if necessary. See section **Maintenance** for the type of fuel.

6. Drain any water and sediment from the fuel filter until clean fuel flows from the drain cock. See section **Maintenance**.
7. Empty the dust trap of each air filter (AF). See section **Cleaning the dust trap**.
8. Clogged air filter(s) will be indicated on the display of the control panel, see section **Fault diagnosis**. If indicated, replace the filter elements. See section **Replacing the filter element and the safety cartridge**.
9. Check coolant level in engine coolant top tank integrated in radiator. Top up, if necessary. Consult section **Maintenance** for coolant specifications.
10. Attach the air line(s) to the closed air outlet valve(s).



No external force may be applied to the air outlet valve(s), e.g. by pulling hoses or by connecting equipment directly to the valve(s).

STARTING/STOPPING

Points of emphasis

1. Do not disconnect power supply to control box in any way when the control box is switched on. This will cause memory loss.
2. Do not switch off the circuit breaker when the control box is switched on. This will cause memory loss.



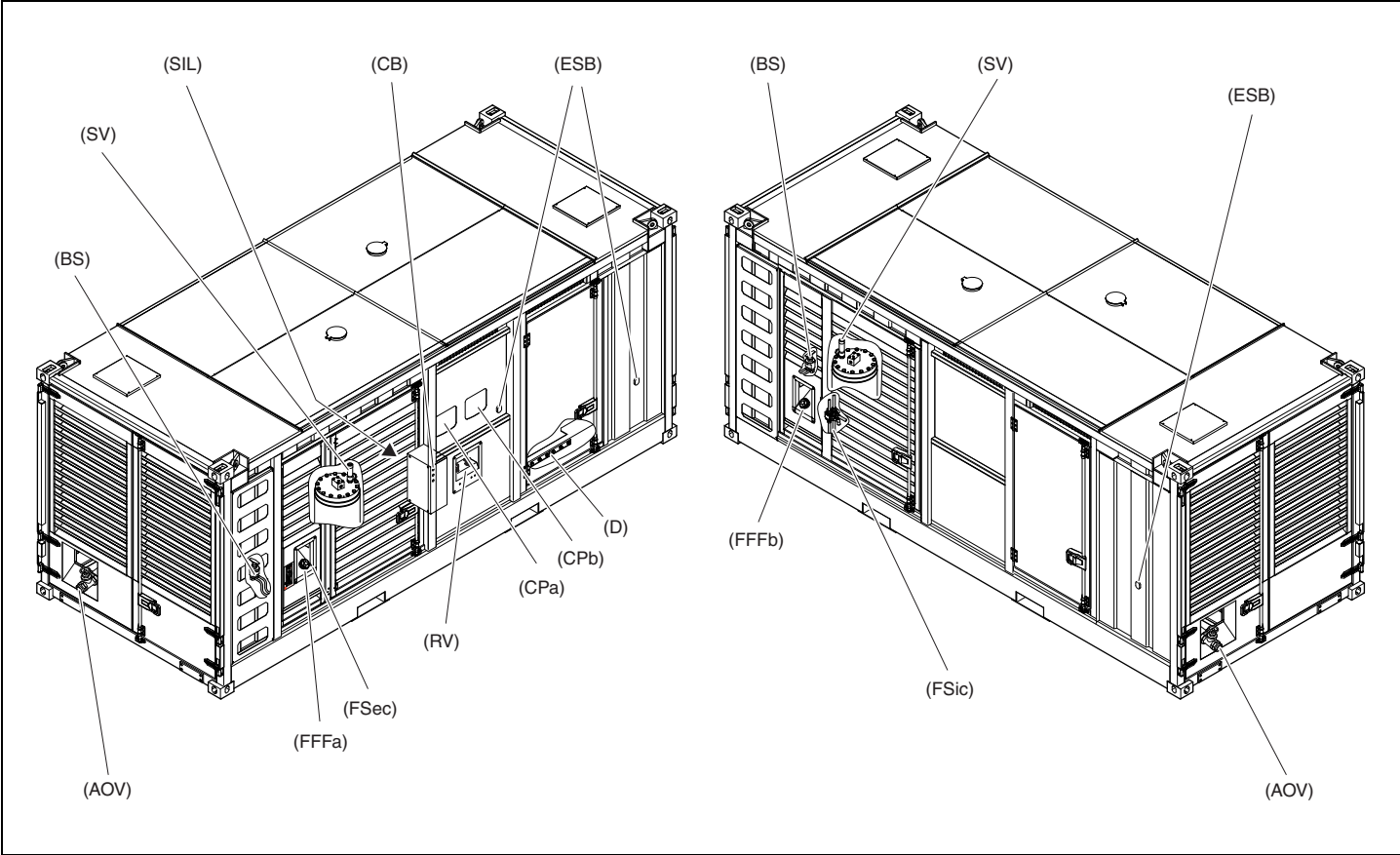
Before draining, ensure that the pressure is released.

3. Remove the air receiver drain plug and open the valve to drain possible condensate. Close the valve when oil comes out and reinstall the drain plug. The interval between draining operations may be determined by experience, as the amount of condensate depends on the operating condition.



When the compressor is put in operation for the first time and after running out of fuel or changing the fuel filter, follow the specific start procedure as described in section Specific start procedure.




CONTROLS










CONTROL PANEL

Reference	Name
AOV	Air Outlet Valve
BS	Battery Switch
CB	Circuit Breakers
CPa	Control Panel (Alpha Unit)
CPb	Control Panel (Bravo Unit)
D	Drains
ESB	Emergency Stop Button
FFFb	Fuel Filling Funnel (Bravo Unit)
FFFa	Fuel Filling Funnel (Alpha Unit)
FSec	Fuel Supply (External Connection) + 3-Way Valve
FSic	Fuel Supply (Internal Connection) + 3-Way Valve
RV	Regulating Valves
SIL	Switch Interior Lighting
SV	Safety Valve



Reference	Name
	POWER OFF / ON switch To switch the control panel on and off
	START button Pressing this button will start the compressor.
	STOP button Pressing this button will stop the compressor in a controlled way.

Reference	Name
	<p>LOAD button. Pressing this button will:</p> <ul style="list-style-type: none"> • initiate the Auto Load function, or commands the compressor to load (depending on actual status). • command the compressor to switch to Not Loaded (when in Load).
	<p>MEASUREMENTS VIEW button By pressing this button you can toggle between Measurements View and Main View.</p>
	<p>SETTINGS VIEW button By pressing this button you can toggle between Settings View and Main View.</p>
	<p>ALARMS VIEW button By pressing this button you can toggle between Alarms View and Main View.</p>
	<p>NAVIGATION buttons These buttons are used to navigate through the display menu's.</p>
	<p>ENTER button Confirms/stores the selection/change.</p>
	<p>BACK button Moves back one level or ignores the change.</p>

Regulating valve

With the regulating valve the working pressure (= air receiver pressure) is pre-set. The working pressure is maintained between the pre-set working pressure and the corresponding unloading pressure. It is recommended that both regulating valves are set to the same working pressure.

Air outlet valves

Each compressor system has its own air outlet valve. As both compressor systems are normally connected, both air outlet valves can be used.

Please note that when the engines are running the air outlet valves must always be fully opened or fully closed.

External 3-way valve fuel supply

Near the fuel filling funnel for the alpha unit there are connections for external fuel supply as well as a selecting valve.

Please note that when using external fuel supply also the (internal) 3-way fuel selecting valve of the beta unit has to be switched.

Fuel filling funnel

Both compressor systems are equipped with a fuel filling funnel with lockable filling cap. The fuel systems are not interconnected, so both systems must be filled separately.

Internal 3-way valve fuel supply

When external fuel supply is used, this 3-way valve also has to be put on external. If not fuel will be consumed from the internal tank.

Battery switch

Each compressor system is equipped with a battery switch. This switch is placed between the battery and ground. When not in use this switch must always be in the OFF position.

For safety reasons during servicing the interior lighting operates independently from the position of the battery switch.

Selector Switch interior lighting

By turning the switch to the left or the right the interior lighting can be powered from the alpha or beta batteries. When switched on also a timer will be started. After a pre-set time the interior light will be switched off automatically.

Circuit breakers

In the electrical circuit of the interior lighting and fans circuit breakers are integrated (F1 General system fuse; F2, F3 Internal lighting; F4 Aftercooler fans). After being activated the cause must be corrected. Subsequently the circuit breakers can be switched on again.

Emergency stop buttons

Press the emergency stop buttons only in case of emergency. Do not use these for stopping the compressor. If not observed the controls can be damaged.

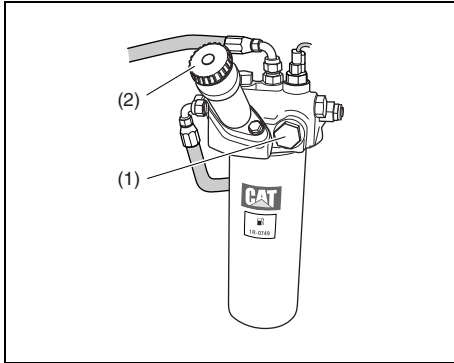
Safety valves

When a malfunction occurs the safety valve avoids that the pressure will rise above the design pressure and in this way prevents damage. The safety valves have to be checked regularly according to the local regulations. Safety valves may only be serviced and tested by the manufacturer.

Timer switch for interior lighting

Timer switch for interior lighting. It is a spring release timer with a preset time of 4 minutes.

SPECIFIC START PROCEDURE



Follow this start procedure when the compressor is put in operation for the first time and after running out of fuel or changing the fuel filter.

- Loosen the vent screw (1) on the fuel filter.
- Operate the hand pump (2) at the filter until fuel comes out of the bore for the vent screw, and air is completely removed from the fuel system.
- Fasten the vent screw (1).
- Switch the “ON/OFF” switch to position “ON”. The instrument panel will now perform a brief selftest.
- Push the start button and the starter motor will automatically try to start the engine.



Do not fill up the engine fuel filter manually. Only use the priming pump.

FUEL SELECTION

There are 2 possibilities for fuel selection:

1. External supply



Do not switch the fuel selecting lever when the unit is in operation!

Connect the supply and return hose to the fuel nipples at the fuel funnel.

Move the lever of the external 3-way valve fuel supply downwards.

Move the lever of the internal 3-way valve fuel supply downwards.

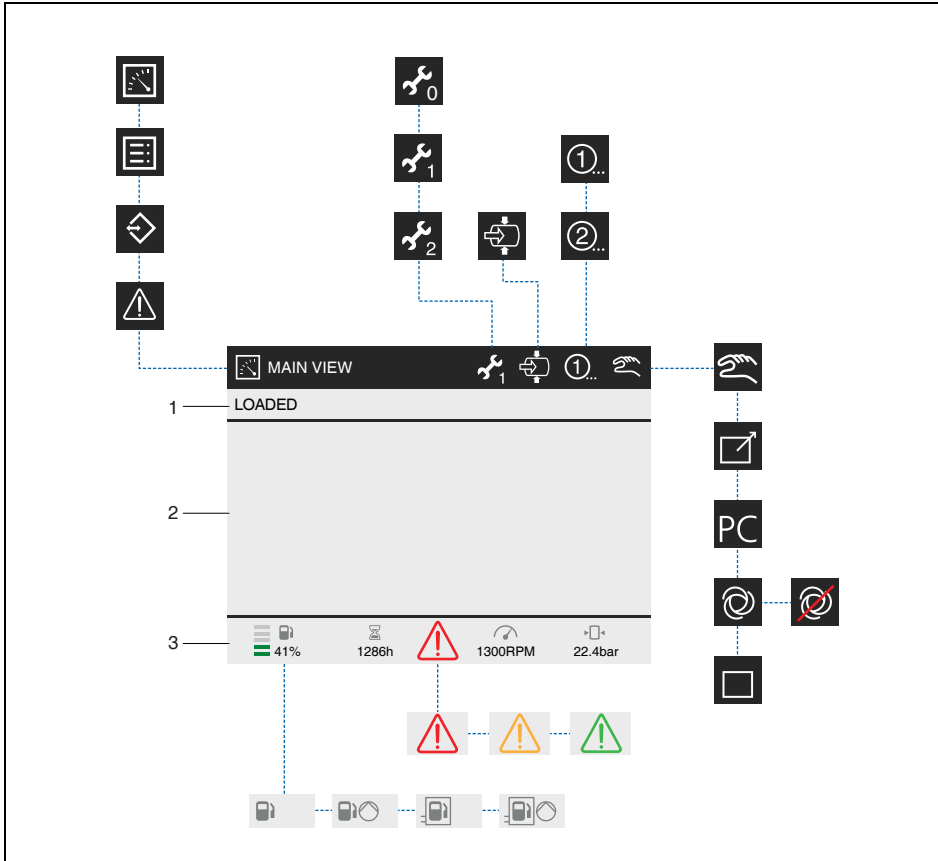
2. Internal supply





(each engine is connected to its own fuel tank)







Move the lever of the external 3-way valve fuel supply upwards.










Move the lever of the internal 3-way valve fuel supply upwards.





OVERVIEW ICONS



Reference	Name
1	Compressor status
2	Vessel pressure indication or info text
3	Compressor info
	Main View Indication
	Measuring View Indication
	Settings View Indication
	Alarm View Indication

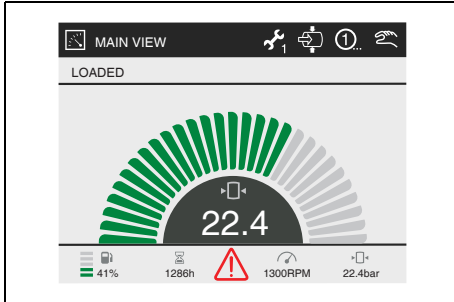
Reference	Name
	OVERHAUL Initial Overhaul required.
	OVERHAUL Minor Overhaul required.
	OVERHAUL Major Overhaul required.
	AUTO LOAD This icon will be shown if the Auto Load functionality is enabled, or by means of a parameter setting, or by means of pressing the load button before the machine is ready to be loaded.
	PRESET Depending of which Pressure (and/ or Flow) setting is active, the controller will show its dedicated icon.
	PRESET Depending of which Pressure (and/ or Flow) setting is active, the controller will show its dedicated icon.

Reference	Name
	OPERATION MODE Local
	OPERATION MODE Remote
	OPERATION MODE PC Control
	OPERATION MODE Automatic
	OPERATION MODE Automatic Mode is active, but the Auto Start and Auto Stop function are both inactive.
	OPERATION MODE Block Mode
	ALARM Active & not-acknowledged Shutdown Alarm.
	ALARM Active & not-acknowledged Non-Shutdown Alarm.
	ALARM Active & acknowledged Alarm.

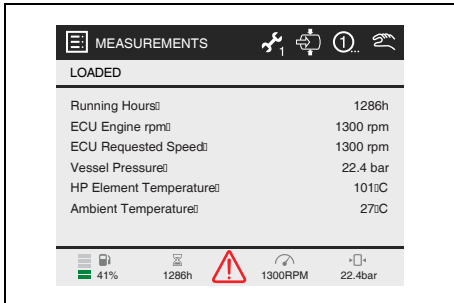
Reference	Name
	FUELTANK Running at internal fueltank.
	FUELTANK Running at internal fueltank & Fuelpump is energized.
	FUELTANK Running at external fueltank, but internal fueltank level is shown.
	FUELTANK Running at external fueltank, but internal fueltank level is shown & fuelpump is energized.

POSSIBLE VIEWS

Main View

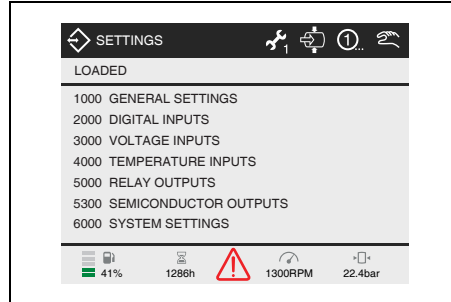


Measuring View



Use the Up and Down navigation buttons to scroll through the full list of measurements.

Setup View

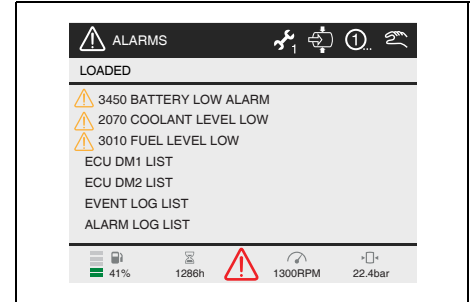


Use the Up and Down navigation buttons to scroll through the full list of settings.

Use the Enter button to enter the selected submenu.

Use the Back button to leave the entered (sub)menu.

Alarm View



Use the Up and Down navigation buttons to scroll through the full list of alarms.

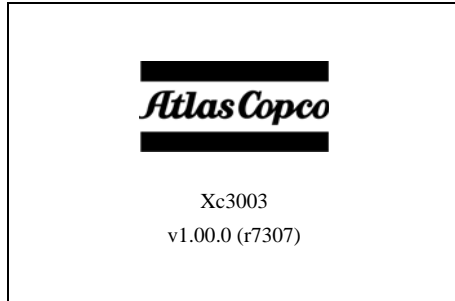
The DM Lists and the Log Lists can be selected and entered to access the sublist.

STARTING

Switch on the battery switch.

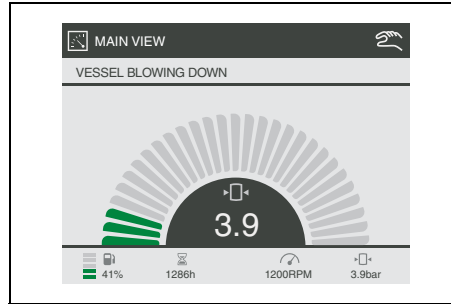
Switch the controller on by switching the Power switch to the position "ON".

The instrument panel will now perform a selftest; the following display will be shown and the controller is initialized:



During initializing all buttons/inputs/outputs/alarms are inactive.




This view will be shown for about 2 seconds, after which the display will show the Main View.



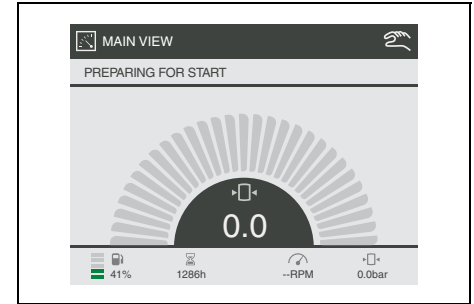
The actual vessel pressure is shown. If the measured vessel pressure is higher than 1.5 bar, the unit will not start. The vessel pressure has to be lowered by opening the blow down valve. After power up, the vessel pressure normally is low enough to proceed with the starting procedure.








If the Power switch is turned to the "OFF" position while the vessel is blowing down, it will not power down for as long as the vessel pressure is higher than 1.5 bar.

Active Buttons	
	Measurement View Button
	Settings View Button
	Alarms View Button

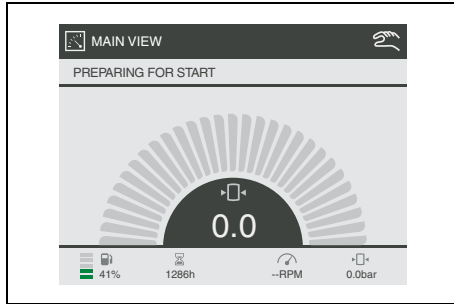
The display now shows








The machine is now ready to be started and is waiting for a start command.

Active Buttons	
	Start Button (to initiate Start command)
	Load Button (to activate Automatic Load)
	Measurement View Button
	Settings View Button
	Alarms View Button

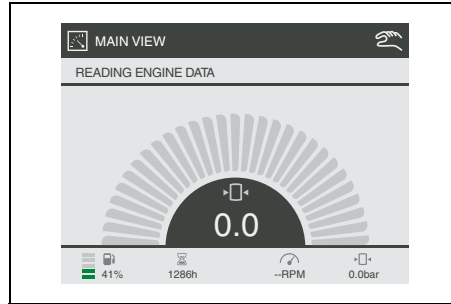
The display now shows



After pressing the START button the machine will activate its horn and flasher light for 5 seconds, to notify that it will start.

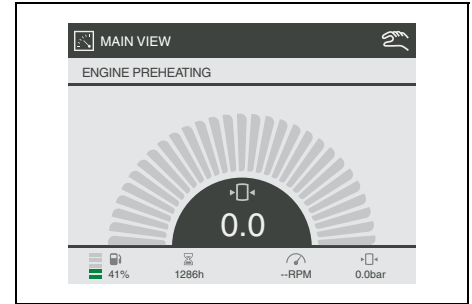
Active Buttons	
	Stop Button (to cancel Start command)
	Load Button (to activate Automatic Load)
	Measurement View Button
	Settings View Button
	Alarms View Button






The display now shows



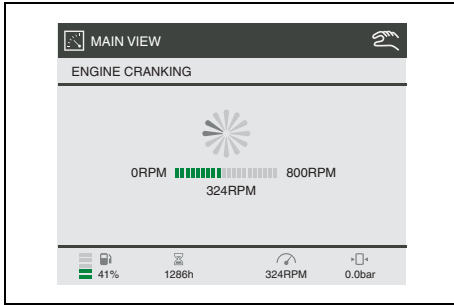
The engine electronics (ECU) will be powered up.

As soon as communication between compressor controller and engine controller is established, the machine will preheat according to the parameters of the engine controller.



Active Buttons	
	Stop Button (to cancel Start command)
	Load Button (to activate Automatic Load)
	Measurement View Button
	Settings View Button
	Alarms View Button

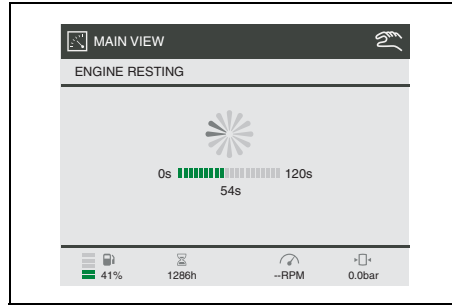
The engine starts cranking, the display shows



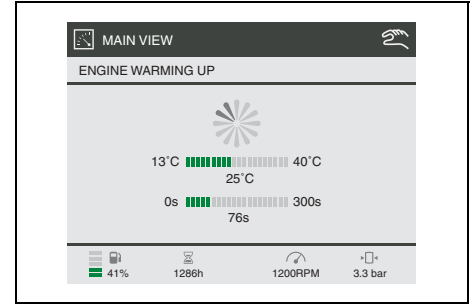
The engine cranks until 800 rpm is reached.

If 800 rpm is not reached within 30 seconds, the starting procedure is cancelled and the engine will rest for some time. (Resting time depends on cranking time).






The display now shows



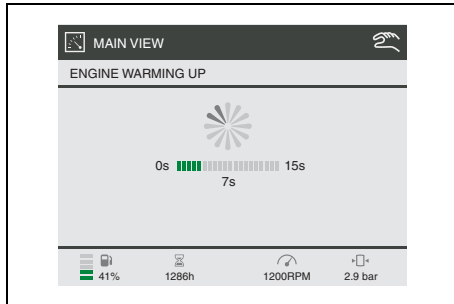
The engine starts running at idle speed. The display shows



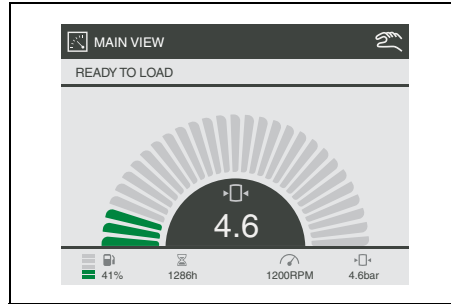
The engine will run at minimum rpm, until the engine's coolant temperature reaches 40°C, with a minimum time of 15 seconds and a maximum time of 300 seconds.






Active Buttons	
	Stop Button (to cancel Start command)
	Load Button (to activate Automatic Load)
	Measurement View Button
	Settings View Button
	Alarms View Button






The display now shows



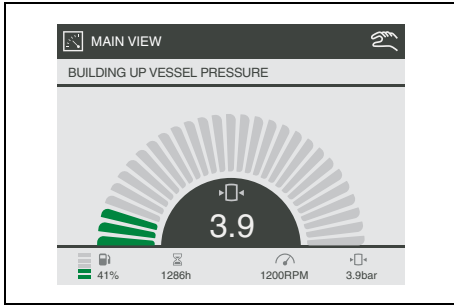
After warming up the machine is ready to be loaded and is waiting for a load command; the display shows








Active Buttons	
	Stop Button (to cancel Start command)
	Load Button (to activate Automatic Load)
	Measurement View Button
	Settings View Button
	Alarms View Button

Active Buttons	
	Stop Button (to cancel Start command)
	Load Button (to initiate Automatic Load)
	Measurement View Button
	Settings View Button
	Alarms View Button

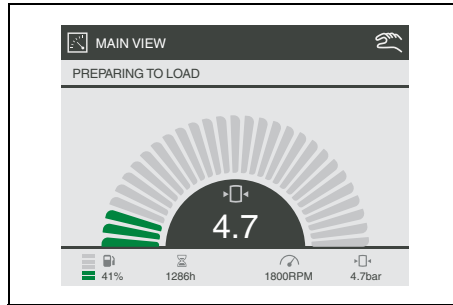
Press the load button, the display will show








When the load button is pressed and the measured vessel pressure is lower than 4.5 bar, the controller will run a specific program to reach the requested 4.5 bar, in order to be able to load the machine. **(Only applicable for 2-stage machines).**

Active Buttons	
	Stop Button (to cancel Start command)
	Load Button (to cancel Load command)
	Measurement View Button
	Settings View Button
	Alarms View Button

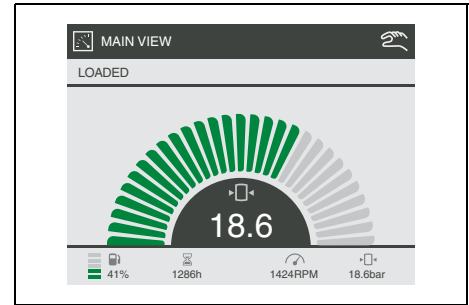
The engine will now run at maximum rpm, the display will show








The loading valve will be energized and pressure starts building up.

Active Buttons	
	Stop Button (to cancel Start command)
	Load Button (to cancel Load command)
	Measurement View Button
	Settings View Button
	Alarms View Button

During loading the following display is shown (default display)

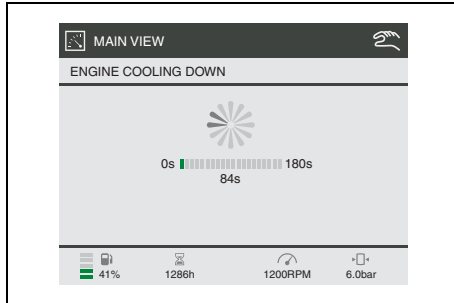


The controller controls the speed of the engine in order to meet the requested working pressure, at the most economical fuel usage.

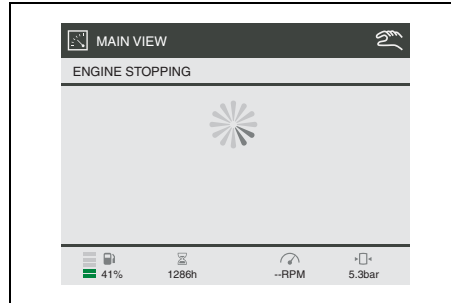
Active Buttons	
	Stop Button (to cancel Start command)
	Load Button (to cancel Load command)
	Measurement View Button
	Settings View Button
	Alarms View Button

STOPPING

After pressing the STOP button the display will show:



After cooling down the engine will stop and the display will show



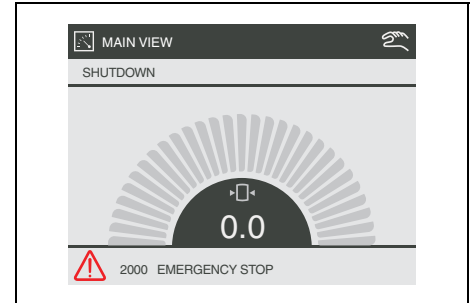
The engine is stopped, and the controller will do a double check to see if the engine is really stopped.

Active Buttons	
	Start Button (to initiate Start command)
	Measurement View Button
	Settings View Button
	Alarms View Button

Active Buttons	
	Start Button (to initiate Start command)
	Measurement View Button
	Settings View Button
	Alarms View Button

SHUTDOWN

When the machine is shutdown due to a critical alarm or an emergency stop the display will show



Active Buttons	
	Measurement View Button
	Settings View Button
	Alarms View Button
	Enter Button (to acknowledge the shown alarm)

POWER OFF

Switch the controller off by switching the Power switch to the position “OFF”.

The compressor is equipped with a battery switch.

When the compressor is not in use, this switch must always be in the “OFF” position.

It is not allowed to use this switch as an emergency switch or for stopping the compressor.

It can damage the controller or the engine’s Electronic Control Unit when using the battery switch for stopping.

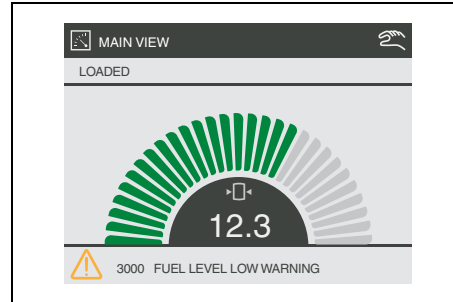
Always first shut off the controller and wait until the display is dark before switching the battery switch to position “OFF”.

SETTINGS

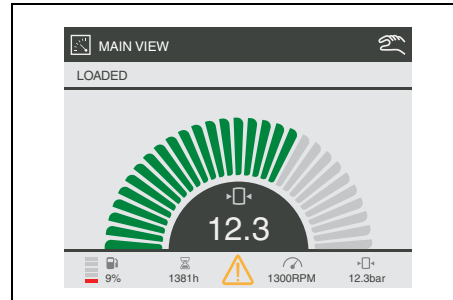
For buttons to be used see “Control Panel”

Acknowledge an Alarm

If an alarm becomes active, for example a Low Fuel Level Warning:



then this alarm can be acknowledged by pressing the ENTER button. If the fuel level is still low, the view will change to:



As soon as the fuel level is higher than the warning level, the alarm icon will automatically disappear.

As long as there is an alarm icon in the middle of the bottom part of the view, all active acknowledged / un-acknowledged alarms can be seen by pressing the ALARM VIEW button

Pressing the ALARM VIEW button again, will bring you back to the Main View.

Set Clock

Press the SETTINGS VIEW button

- scroll to ‘1000 GENERAL SETTINGS’
- press ENTER
- scroll to ‘1290 DATE/TIME’
- ENTER the Date/Time menu
- scroll to the parameter you want to change
- ENTER this parameter.

To change the ‘RTC Month’, scroll to the preferred month and press ENTER.

To change any other RTC setting, the red figure is editable. Scroll up/down and press ENTER to change. Use left/right to shift between editable figures.

Now press BACK until you’re back in the Main View (or in the menu you require).

Set Language

Press the SETTINGS VIEW button.

- scroll to '1000 GENERAL SETTINGS'
- press ENTER
- scroll to '1300 LANGUAGES'
- ENTER the LANGUAGES menu,
- ENTER the 'SETTINGS' parameter
- scroll to the preferred language
- press ENTER.

Now press BACK until you're back in the Main View (or in the menu you require).

Set Units

Press the SETTINGS VIEW button,

- scroll to '1000 GENERAL SETTINGS'
- press ENTER
- scroll to the unit you would like to change:
'1340 TEMPERATURE UNITS'
'1350 PRESSURE UNITS'
'1360 FUEL FLOW UNITS'
'1370 AIR FLOW UNITS'
- ENTER the preferred menu
- ENTER the 'SETTINGS' parameter
- scroll to the preferred setting
- press ENTER.

Now press BACK until you're back in the Main View (or in the menu you require).

Change Display Settings

Press the SETTINGS VIEW button

- scroll to '1000 GENERAL SETTINGS'
- press ENTER
- scroll to '1310 DISPLAY BACKLIGHT'
- ENTER the DISPLAY BACKLIGHT menu
- scroll to the setting you would like to change
- press ENTER.

To change a setting, the red figure is editable. Scroll up/down and press ENTER to change. Use left/right to shift between editable figure.

Now press BACK until you're back in the Main View (or in the menu you require).

Go To Diagnostics

Press the SETTINGS VIEW button

- scroll to '1000 GENERAL SETTINGS'
- press ENTER
- scroll to '1150 DIAGNOSTICS'
- ENTER the Diagnostics menu,
- ENTER the 'ENABLE' parameter
- scroll to 'ON' and press ENTER.

Now the ECU will get PAC (ignition) and one can perform ECU diagnostics (read DM1 List, DM2 List, ECU values, perform engine diagnostics, ...).

Now press BACK until you're back in the Main View (or in the menu you require).

To leave Diagnostics, press the STOP button.

Set the AutoLoad Function

Press the SETTINGS VIEW button

- scroll to '1000 GENERAL SETTINGS'
- press ENTER
- scroll to '1160 AUTO LOAD'
- ENTER the 'FUNCTION' menu,
- scroll to AUTO LOAD setting
- press ENTER.

Now the AutoLoad function is active, and as soon as the unit is Ready To Start, the display will show the Auto Load icon.

Now press BACK until you're back in the Main View (or in the menu you require).

FAULT CODES

There are several parameters that are continuously watched.

When one of these parameters exceeds its specified limit the compressor will react depending the present status of the control box.

Alarmcode	Alarmtext	Failclass	Trigger
1231	FUEL FILL CHECK	Warning	Xc
1503	INITIAL OVERHAUL REQUIRED	Warning	Xc
1522	MINOR OVERHAUL WITHIN ** H	Warning	Xc
1523	MINOR OVERHAUL WITHIN ** D	Warning	Xc
1524	MINOR OVERHAUL REQUIRED	Warning	Xc
1552	MAJOR OVERHAUL WITHIN ** H	Warning	Xc
1553	MAJOR OVERHAUL WITHIN ** D	Warning	Xc
1554	LOAD PREVENTION - FIRE RISK	Inhibit Load	Xc
1558	COMP. OIL CHANGE WITHIN ** H	Warning	Xc
1559	COMP. OIL CHANGE WITHIN ** D	Warning	Xc
2000	EMERGENCY STOP INPUT	Shutdown	Xc
2040	REMOTE EMERGENCY STOP	Shutdown	Xc
2070	COOLANT LEVEL LOW WARNING	Warning	Xc
2080	COOLANT LEVEL LOW SHUTDOWN	Shutdown	Xc
2090	ΔP AIRFILTERS HIGH	Warning	Xc
2100	NO PROJECTFILE DOWNLOADED	Warning	Xc
2752	NAM OILTRONIX BYPASS CIRCUIT	Shutdown After Stop	Xc
2762	NAM OILTRONIX CLOSED CIRCUIT	Shutdown After Stop	Xc
2772	NAM AIRXPRT OPENED CIRCUIT	Shutdown	Xc
2782	NAM AIRXPRT CLOSED CIRCUIT	Shutdown	Xc
3000	FUEL LEVEL LOW WARNING	Warning	Xc
3010	FUEL LEVEL LOW SHUTDOWN	Controlled Stop	Xc
3020	FUEL LEVEL SENSOR CIRCUIT	Warning	Xc
3050	VESSEL PRESSURE HIGH WARNING	Controlled Stop	Xc
3060	VESSEL PRESSURE HIGH SHUTDOWN	Shutdown	Xc
3070	VESSEL PRESSURE SENSOR CIRCUIT	Shutdown	Xc
3120	REGULATING PRESSURE SENSOR CIRCUIT	Shutdown	Xc
3170	AIR DISCHARGE PRESSURE SENSOR CIRCUIT	Warning	Xc

Alarmcode	Alarmtext	Failclass	Trigger
3320	INLET PRESSURE SENSOR CIRCUIT	Shutdown	Xc
3450	BATTERY LOW ALARM	Indication	Xc
3460	BATTERY HIGH ALARM	Warning	Xc
3660	FIRE RISK - CHECK OILSTOPVALVE	Shutdown	Xc
3680	OSV PRESSURE SENSOR CIRCUIT	Controlled Stop	Xc
3720	INTERSTAGE PRESSURE SENSOR CIRCUIT	Warning	Xc
4000	L.P. ELEMENT TEMPERATURE HIGH	Warning	Xc
4010	L.P. ELEMENT TEMP. ALARM 2	Controlled Stop	Xc
4020	L.P. ELEMENT TEMP. ALARM 3	Shutdown	Xc
4040	L.P. ELEMENT TEMP. SENSOR CIRCUIT	Shutdown	Xc
4070	AMBIENT TEMPERATURE SENSOR CIRCUIT	Warning	Xc
4100	AIR DISCHARGE TEMPERATURE ALARM 1	Warning	Xc
4110	AIR DISCHARGE TEMPERATURE ALARM 2	Controlled Stop	Xc
4120	A.D. TEMPERATURE SENSOR CIRCUIT	Warning	Xc
4150	H.P. ELEMENT TEMPERATURE ALARM 1	Warning	Xc
4160	H.P. ELEMENT TEMPERATURE ALARM 2	Controlled Stop	Xc
4170	H.P. ELEMENT TEMPERATURE ALARM 3	Shutdown	Xc
4190	H.P. ELEMENT TEMP. SENSOR CIRCUIT	Shutdown	Xc
4220	AFTERCOOLER AIR TEMP SENSOR CIRCUIT	Warning	Xc
4230	AFTERCOOLER FREEZING DANGER	Indication	Xc
5200	AIR SHUT OFF	Shutdown	Xc
6190	CHARGE MONITORING FAIL	Indication	Xc
6327	START FAILURE	Shutdown	Xc
6329	STARTER SPEED TOO LOW	Shutdown	Xc
6388	VESSEL PRESSURE TOO LOW TO LOAD	Indication	Xc
6426	UNINTENTIONAL RUN	Shutdown	Xc
6427	RUN FAILURE	Shutdown	Xc
6428	STOP FAILURE	Shutdown	Xc
6708	DRAINING 1	Warning	Xc
6709	DRAINING 2	Warning	Xc
6749	OILTRONIX FUNCTIONALITY DISABLED	Warning	Xc
6760	OILTRONIX COUPLING FAILURE	Shutdown After Stop	Xc
6769	OILTRONIX COMPONENT FAILURE	Shutdown	Xc

Alarmcode	Alarmtext	Failclass	Trigger
6981	INLET VALVE POS. FAILURE	Shutdown	Xc
7002	ECU COMMUNICATION	Shutdown	Xc
7007	ECU RED LAMP	Shutdown	ECU
7008	ECU AMBER LAMP	Warning	ECU
7009	ECU PROTECT LAMP	Warning	ECU
7010	ECU ENGINE SPEED TOO LOW	Shutdown	Xc
7020	ECU ENGINE SPEED ALARM 2	Shutdown	Xc
7030	ECU ENGINE COOLANT TEMP. ALARM	Controlled Stop	Xc
7050	ECU ENGINE AIR INLET TEMP. ALARM 1	Controlled Stop	Xc
7100	ECU DPF SOOT LOAD HIGH	Warning	Xc
7110	PLEASE FORCE DPF REGENERATION !	Inhibit Load	Xc
7120	LOAD PREVENTION - HIGH DPF SOOT LOAD	Controlled Stop	Xc
7130	SOOT LOAD TOO HIGH - CALL ATLAS COPCO	Warning	Xc
7222	COMBO COMMUNICATION FAILURE	Warning	Xc
7223	COMBO PA SENSOR WARNING	Warning	Xc
7224	COMBO RHA SENSOR WARNING	Warning	Xc
7225	COMBO TA SENSOR WARNING	Warning	Xc

Details of ECU triggered alarms can be monitored via the ECU DM1 LIST menu

In case of ECU AMBER LAMP or ECU PROTECT LAMP:

- Only possible when engine is running or if Diagnostics Mode is active.
- Access the ECU DM1 LIST menu via Alarm View.

In case of ECU RED LAMP:

- Do NOT acknowledge the ECU RED LAMP alarm. DM1 alarms are automatically copied into the Alarm View, and can be read there.

For all ECU triggered alarms, the respective SPN code is shown in the ECU DM1 LIST

A full list of supported SPN codes is provided by the engine manufacturer.

For following alarms, the Xc controller also shows full text next to the SPN code:

- ECU - FUEL FILTER PRESSURE
- ECU - INTERCOOLER TEMPERATURE
- ECU - FUEL PRESSURE
- ECU - FUEL FILTER PRESSURE
- ECU - WATER IN FUEL
- ECU - OIL LEVEL
- ECU - OIL FILTER PRESSURE
- ECU - OIL PRESSURE
- ECU - TURBO BOOST PRESSURE
- ECU - TURBO OIL PRESSURE
- ECU - INTAKE MANIFOLD TEMPERATURE
- ECU - AIR INLET PRESSURE
- ECU - COOLANT TEMPERATURE
- ECU - COOLANT LEVEL
- ECU - SUPPLY VOLTAGE

- ECU - AMBIENT AIR TEMPERATURE
- ECU - AIR INLET TEMPERATURE
- ECU - FUEL TEMPERATURE
- ECU - OIL TEMPERATURE
- ECU - ENGINE SPEED
- ECU - INJECTOR 1
- ECU - INJECTOR 2
- ECU - INJECTOR 3
- ECU - INJECTOR 4
- ECU - INJECTOR 5
- ECU - INJECTOR 6
- ECU - INJECTOR 7
- ECU - INJECTOR 8
- ECU - SOOT LOAD

Maintenance

LIABILITY

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.

SERVICE PAKS

A Service Pak is a collection of parts to be used for a specific maintenance task, e.g. after 50, after 500 and after 1000 running hours. Service Paks include all genuine parts needed for normal maintenance of both compressor and engine.

It guarantees that all necessary parts are replaced at the same time keeping down time to a minimum and your maintenance budget low.

The order number of the Service Paks are listed in the Atlas Copco Parts List (ASL).

Order Service Paks at your local Atlas Copco dealer.

SERVICE KITS

A service kit is a collection of parts to fit a specific repair or rebuilding task.

It guarantees that all necessary parts are replaced at the same time which improves the uptime of the unit.

The order numbers of the Service Kits are listed in the Atlas Copco Parts List (ASL).

Order Service Kits at your local Atlas Copco dealer.

SERVICE DURING STORAGE

Run the compressor regularly, e.g. twice a week, until warm.

Load and unload the compressor a few times to operate the unloading and regulating components. Close the air outlet valves after stopping.



If the compressor is going to be stored without running from time to time, protective measures must be taken.

COMPRESSOR ELEMENT OVERHAUL

When a compressor element is due for overhaul, it needs to be done by Atlas Copco. This guarantees the use of genuine parts and correct tools with care and precision.

SAFETY PRECAUTIONS



Before performing any maintenance jobs always put the battery switch in the "OFF" position. See section Battery care.

Always observe the applicable safety precautions. See section Safety during maintenance and repair.

Please note that when the battery switch is off there can still be some parts live!

PREVENTIVE MAINTENANCE SCHEDULE



Unauthorised modifications can lead to risk for injury or machine damage.



Always keep the machine tidy in order to prevent fire hazard.



Poor maintenance can void any warranty claims.

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

When servicing, replace all disengaged packings, 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 compressors operating in a dusty environment typical to compressor applications. Maintenance schedule can be adapted depending on application, environment and quality of maintenance.

MAINTENANCE SCHEDULE COMPRESSOR

<i>To determine the maintenance intervals, use of service hours, or calendar time, whichever occurs first.</i>						
Service hours	Daily	50 hrs after initial start-up	Every 250 hours	Every 500 hours	Every 1000 hours	Yearly
Service pak (standard)		supplied with unit		2912 4432 05 2 paks/ container	2912 4432 06 2 paks/ container	
Service pak (off-shore)					2912 4496 06 2 paks/ container	
<i>For the most important subassemblies, Atlas Copco has developed service kits that combine all wear parts. These service kits offer you the benefits of genuine parts, save on administration costs and are offered at a reduced price, compared to individual components. Refer to the parts list for more information on the contents of the service kits.</i>						
Drain water from fuel filter	x					
Drain condensate and water from spillage-free frame (10)	x					
Empty air filter vacuator valves	x					
Check engine oil level (if necessary top up)	x					

(to be continued on page 71)

Maintenance schedule (hrs) <i>(continuation of page 70)</i>	Daily	50 hrs after initial start-up	Every 250 hours	Every 500 hours	Every 1000 hours	Yearly
Check compressor oil level (if necessary top up)	x					
Check coolant level	x					
Check/Fill fuel level (3)	x					
Check function of coolant heater (option)	x					
Check control panel	x					
Check on abnormal noise	x					
Check electrical system cables for wear	x					
Inspect/Adjust fan belt		x	x	x	x	
Check for leaks in engine-, compressor-, air-, oil-, or fuel system		x		x	x	x
Check electrolyte level and terminals of battery		x		x	x	x
Check engine (minimum and maximum) speed		x		x	x	x
Replace compressor oil filter(s) (5)		x			x	x
Check torque on critical bolt connections		x			x	x
Hoses and clamps - Inspect/Replace			x	x	x	
Change engine oil (2) (12)			x	x	x	x
Replace engine oil filter (2)			x	x	x	x
Replace fuel (pre)filters (6)			x	x	x	x
Replace fan belt				x	x	
Clean flow restrictor in oil scavenge line				x	x	x
Adjust engine inlet and outlet valves (2)				x		
Check electrical jacket water heater (option)				x	x	x
Drain/Clean fuel tank water and sediments (1)				x	x	
Clean oil cooler(s) (1)				x	x	x
Clean radiator (1)				x	x	x
Clean intercooler (1)				x	x	x

(to be continued on page 72)

Maintenance schedule (hrs) <i>(continuation of page 71)</i>	Daily	50 hrs after initial start-up	Every 250 hours	Every 500 hours	Every 1000 hours	Yearly
Inspect starter motor				X	X	
Inspect turbocharger				X	X	
Inspect waterpump				X	X	
Check engine protective devices				X		
Check functioning of regulating valve					X	X
Test safety valve (9)					X	X
Replace bleed-off valve unloader					X	X
Check rubber flexibles (11)					X	X
Clean after cooler (option) (1)					X	X
Replace DD/PD/QD filter (option)					X	X
Clean oil stop valve					X	X
Change compressor oil (1) (7)					X	X
Replace oil separator element					X	X
Clean fuel cooler					X	X
Clean crankcase breather filter and check for obstructions					X	X
Replace air filter element (1)					X	X
Check external fuel connection (option)					X	X
Inspection by Atlas Copco service technician					X	X
Grease hinges						X
Check emergency stop						X
Analyse coolant (4) (8)						X
Check/Replace safety cartridge						X
Inspect alternator						X

(to be continued on page 73)

Notes

(continuation of page 72)



1. More frequently when operating in a dusty environment.
2. Refer to engine operation manual.
3. After a day's work.
4. Yearly is only valid when using PARCOOL. Change coolant every 5 years.
5. Use Atlas Copco oil filters, with by-pass valve as specified in the parts list.
6. Gummed or clogged filters means fuel starvation and reduced engine performance.
7. See section **Oil specifications**.
8. The following part numbers can be ordered from Atlas Copco to check on inhibitors and freezing points:
 - 2913 0028 00 : refractometer
 - 2913 0029 00 : pH meter.
9. See section **Safety valve**.
10. See section **Before starting**.
11. Replace all rubber flexibles every 6 years.

For other specific engine and alternator requirements refer to specific manuals.
12. Every 500 hours is only valid for EU, US and Canada, when using PAROIL E or PAROIL E xtra. Other regions change engine oil every 250hrs.



Keep all bolts securely tightened. For torque values see Technical specifications.

OIL SPECIFICATIONS



It is strongly recommended to use Atlas Copco branded lubrication oils for both compressor and engine.



Only use synthetic compressor oil.

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:



Never mix synthetic with mineral oil.

Remark:

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

After doing the complete change procedure to synthetic oil, run the unit for a few minutes to allow proper 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, follow the normal instructions.

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

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

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

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

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

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

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

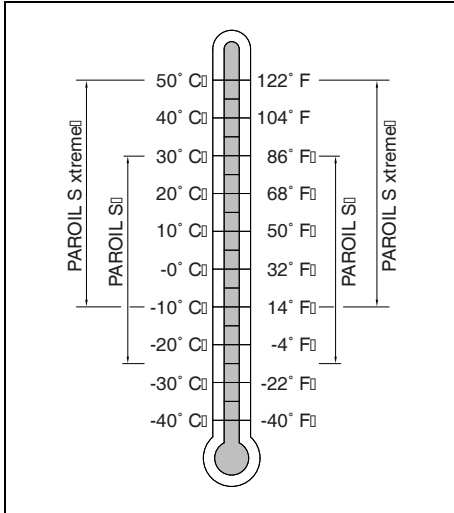
PAROIL prevents Soot build-up

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

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

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 under 'standard' ambient conditions from -15°C (5°F) onward.

COMPRESSOR OIL



Choose your compressor oil based on the ambient temperatures in the actual operating area.

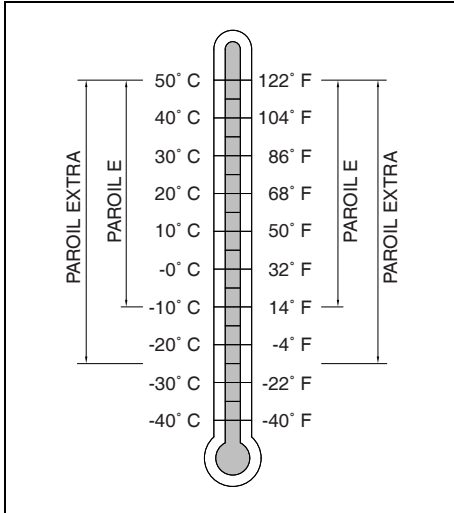
Synthetic compressor oil PAROIL S

	Liter	US gal	Order number
can	5	1.3	1630 0160 00
can	20	5.3	1630 0161 00
barrel	210	55.2	1630 0162 00
container	1000	265	1630 0163 00

Synthetic compressor oil PAROIL S xtreme

	Liter	US gal	Order number
can	20	5.3	1630 0180 00
barrel	210	55.2	1630 0181 00

ENGINE OIL



Choose your engine oil based on the ambient temperatures in the actual operating area.

Synthetic engine oil PAROIL E xtra

	Liter	US gal	Order number
can	5	1.3	1630 0135 00
can	20	5.3	1630 0136 00

Mineral engine oil PAROIL E

	Liter	US gal	Order number
can	5	1.3	1615 5953 00
can	20	5.3	1615 5954 00
barrel	210	55.2	1615 5955 00
container	1000	264	1630 0096 00

COMPRESSOR OIL FLUSHING PROCEDURE



Not respecting compressor oil changing intervals in accordance with the maintenance schedule, can lead to serious problems, including fire hazard! The manufacturer does not accept any liability for damage arising from not following the maintenance schedule or not using genuine parts.

To avoid problems when changing over to a new type of oil (see table) a special Compressor Oil Flushing Procedure has to be followed. The procedure is only valid in case the replaced oil has not exceeded its lifetime. For more information consult Atlas Copco Service dept.

Aged oil can be recognized best by using an oil sampling analysis program. Indicators for aged oil are strong smell, or contamination such as sludge and varnish inside the oil vessel and oil stop valve or a brownish colour of the oil.

Whenever aged oil is discovered, eg. when changing the oil separator, contact Atlas Copco Service dept. to have your compressor cleaned and flushed.

1. First thoroughly drain the system when the oil is warm, leaving as little oil in the system as possible, especially in dead areas, if possible blow out remaining oil by pressurising the oil system. Check the instruction manual for detailed description.
2. Remove the compressor oil filter(s).
3. Open the oil vessel and remove the oil separator element.



Instructions on replacing the oil separator element are available from Atlas Copco Service dept.

4. Check the interior of the oil vessel (see pictures). If varnish deposits are discovered, contact Atlas Copco Service dept. and do not continue.
5. Put in a new oil separator, screw on new compressor oil filter(s) and close the oil vessel according to the instructions.
6. Fill the oil vessel with the minimum amount of replacement oil, run the compressor under light load conditions for 30 minutes.
7. Thoroughly drain the system when the oil is warm, leaving as little oil in the system as possible, especially in dead areas, if possible blow out remaining oil by pressurising the oil.
8. Fill the system with the final oil charge.
9. Run the compressor under light load conditions for 15 minutes and check for leakage.
10. Check the oil level and top up if necessary.
11. Collect all waste lubricant used during the flushing process and dispose of it in accordance with the applicable procedures for managing waste lubricant.



Vessel cover contaminated

clean



Vessel contaminated

clean

PAROIL M	PAROIL M	PAROIL S	PAROIL S xtreme
PAROIL M	draining *	flushing	flushing
PAROIL S	draining **	draining *	draining
PAROIL S xtreme	draining **	draining	draining *

* When changing over to the same oil within the oil changing interval, draining is sufficient

** Change over not recommended

BEFORE MAINTENANCE



All maintenance work shall only be performed when the unit is stopped. Never enter the container when engines are running. The operator is expected to apply all relevant safety precautions, as mentioned in section Safety during maintenance and repair.

- Run the compressor until warm.
- Close the outlet valve(s) and stop the compressor. Wait until the pressure is released through the automatic blow-down valve.



Attach the appropriate warning sign:

To the control box:

Work in progress, do not start

To the outlet valve:

Work in progress, do not open

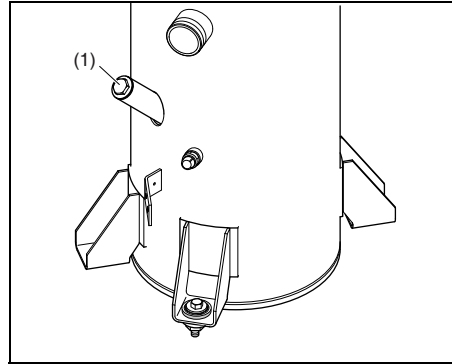
- Unscrew the oil filler plug one turn. This uncovers a vent hole, which permits any pressure in the system to escape.



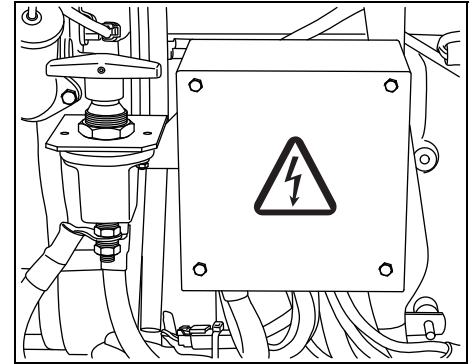
Disconnect the battery by means of the battery switch.

Attach the warning sign:

Work in progress, do not supply power

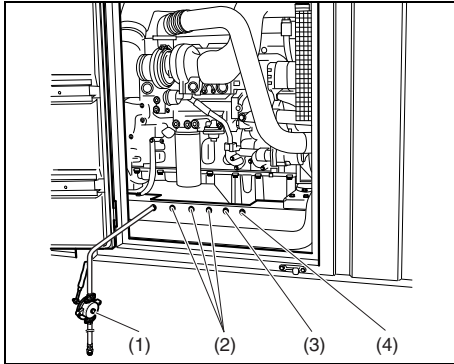


Oil filler plug (1)



COMPRESSOR OIL SYSTEM

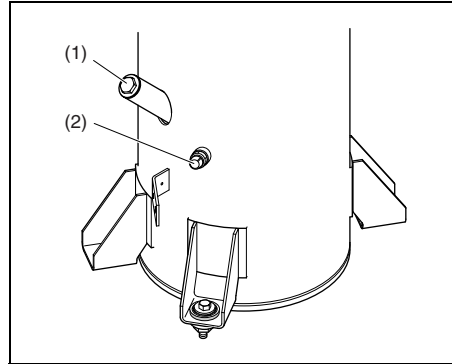
DRAINS



1. Draining pump
2. Compressor oil
3. Motor oil
4. Coolant

For draining purposes a special hand operated draining pump is supplied. This pump must be used at all draining activities to suck out the maximum quantity of compressor oil. If the pump is not used, old oil will be left in the system. This can lead to overfilling and speeded up oil aging.

AIR RECEIVER (OIL TANK)



Daily check compressor oil level.



Compressor not running!

The pointer of the oil level gauge (2) must register in the upper extremity of the green range. Add oil if necessary.

Carry-out the procedure **Topping up the compressor oil**.

TOPPING UP THE COMPRESSOR OIL

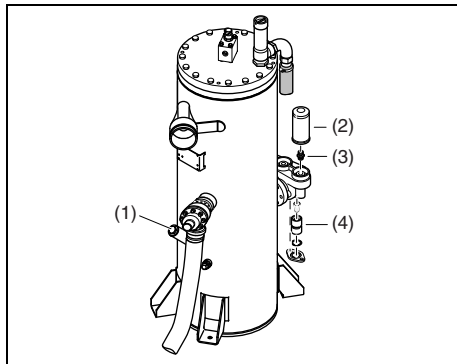
- Carry out the procedure **Before maintenance**.
- Wait a few minutes until the oil level is constant.
- Remove the filler plug (1) and top up with oil until the pointer of the oil level gauge is in the upper part of the green area.



Use synthetic compressor oil Paroil S, see section Oil specifications.

- Reinstall and tighten the filler plug.

COMPRESSOR OIL AND OIL FILTER CHANGE



1. Oil filler plug
2. Oil filter
3. Nipple
4. Thermostatic valve

The quality and the temperature of the oil determine the oil change interval.

When operating in high ambient temperatures, in very dusty or high humidity conditions, it is recommended to change the oil more frequently.



In this case, contact Atlas Copco.

1. Carry out the procedure **Before maintenance**.
2. Drain the oil by removing all relevant drain plugs. Catch the oil in a drain pan. Unscrew the filler plug to speed up draining. Tighten the plugs after draining.



Take care to remove as much as possible of the old compressor oil (vessel, cooler, oil stop). Failure to do so will lead to decrease of lifetime of the refill compressor oil.

3. Remove the oil filter (1), e.g. by means of a special tool. Catch the oil in a drain pan.
4. Clean the filter seat on the manifold, taking care that no dirt drops into the system. Oil the gasket of the new filter element. Turn the filter **anticlockwise** and screw it into place until the gasket contacts its seat, then tighten one half turn only.
5. Fill the air receiver until the pointer of the oil level gauge (3) registers in the upper extremity of the green range. Take care that no dirt drops into the system. Reinstall and tighten the filler plug.



Use synthetic compressor oil Paroil S, see section Oil specifications.

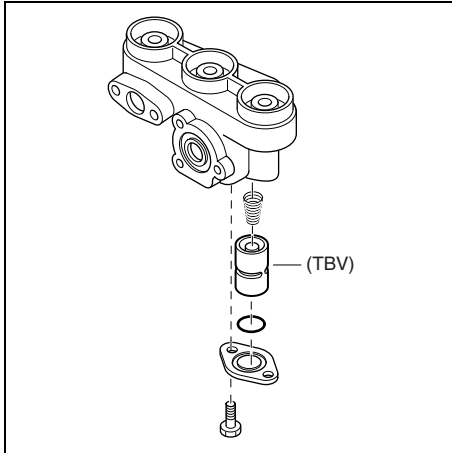
6. Start the compressor and let it run unloaded for a few minutes.
7. Stop the compressor, wait a few minutes and top up with oil until the pointer of the oil level gauge is in the upper part of the green area.



Never add more oil. Overfilling results in oil consumption.

Name	Part number	Qty
Oil filter	1202 8040 02	3
Nipple	2254 7257 00	3

THERMOSTATIC BYPASS VALVE



To inspect the thermostatic bypass valve (TBV) follow the same procedure as for changing the oil filters.

Remove thermostatic bypass valve and check the condition of the components.

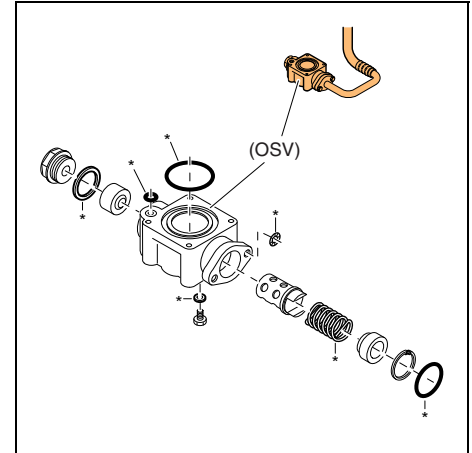
Place a new thermostatic bypass valve if necessary.



Position of spring is critical. The smallest side must be inserted in the valve. When valve and spring are fitted in the wrong way, oil will be continuously cooled, creating a lot of condensate.

Name	Part number	Qty
Thermostatic bypass valve	1615 9720 00	1

OIL STOP VALVE

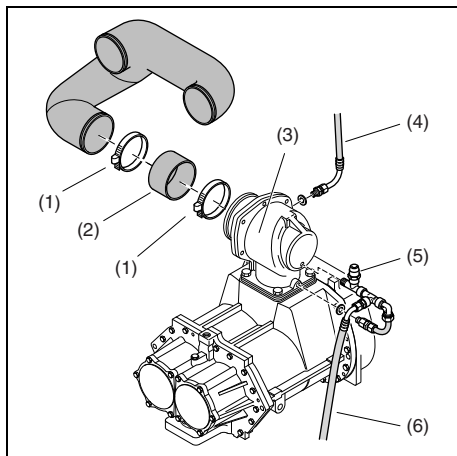


To inspect the oil stop valve (OSV) follow the same procedure as for changing the oil filters.

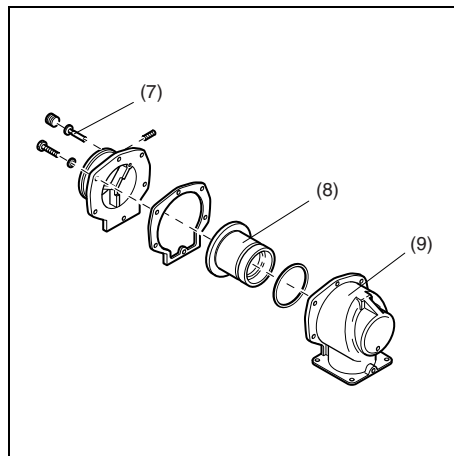
Remove and inspect the valve. Replace if necessary.

Name	Part number	Qty
Service kit	2911 0118 00	1
Oil stop valve	2255 2809 80	1

REGULATING SYSTEM



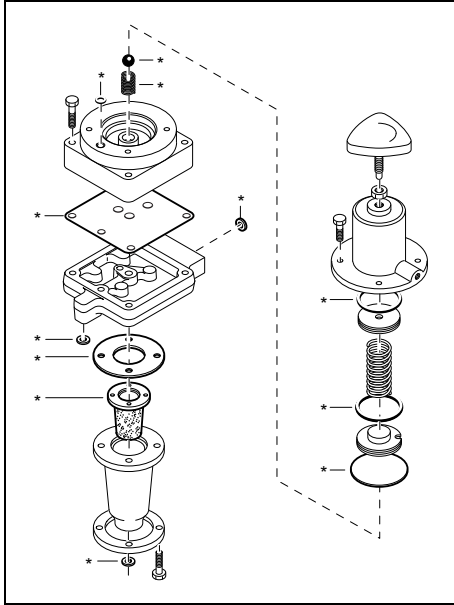
- | | |
|----------------------|----------------------------|
| 1. Clamp | 4. Scavenging line |
| 2. Hose | 5. Working pressure switch |
| 3. Unloader assembly | 6. Hose from loading valve |



1. Carry out the procedure **Before maintenance**.
2. Release the clamps and loosen the hose at the air intake of the unloader. Disconnect the hoses leading to other components.
3. Withdraw the throttle valve from the unloader house and inspect the components.
4. Replace parts if necessary.

Name	Part number	Qty
Unloader assembly (9)	2252 5502 92	1
Blow-off valve (7)	2252 5503 02	1
Throttle valve (8)	2252 5508 00	1

REGULATING VALVE



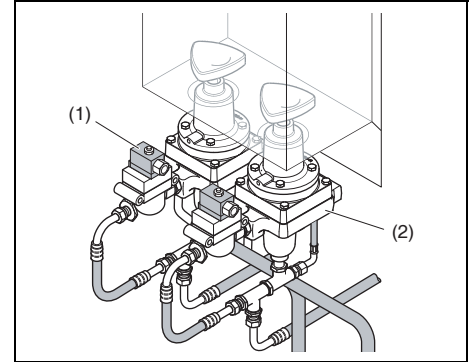
Name	Part number	Qty
Regulating valve	2252 0495 92	1
Service kit	2910 3005 00	1
Filter	1012 0356 00	1

Loading valve

With the compressor running at maximum load speed, disconnect hose leading to unloader. If air leaks from the hose, remove and inspect loading valve. In this case, first carry-out the procedure **Before starting**.

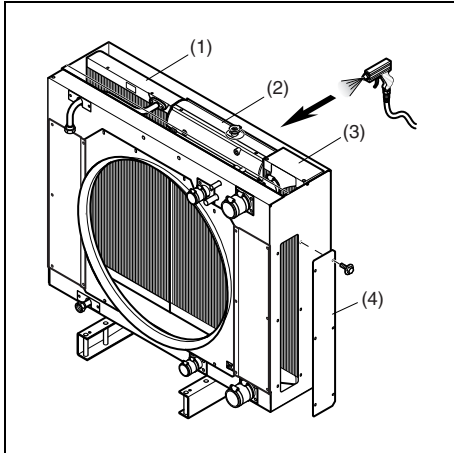
Regulating valve

1. Carry out the procedure **Before maintenance**.
2. Remove and dismantle the regulating valve.
3. Inspect the components, in particular membrane and filter.
4. Replace parts if necessary.
5. Adjust the regulating valve, see **Regulating valve**.



Loading valve (1) and regulating valve (2)

CLEANING COOLERS



Compressor oil cooler (1), radiator (2) and intercooler (3)

Keep the coolers (1), (2) and (3) clean to maintain the cooling efficiency.

Service doors (4) are provided on both sides of the fan cowl to allow easy access to the fan side surface of the coolers.

Protect the electrical and controlling equipment, air filters, etc. against penetration of moisture.

Carry out the procedure **Before maintenance**.



Remove any dirt from the coolers with a fibre brush. Never use a wire brush or metal objects.

Clean by air jet in the direction of the arrow.

Do not use jet at max. power.

Steam cleaning in combination with a cleansing agent may be applied.



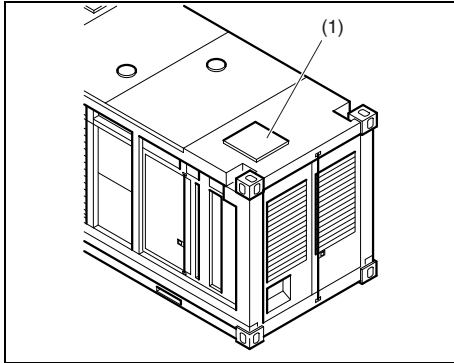
To avoid damaging the coolers, angle between jet and coolers should be approx. 90°.

Close the service door(s).



Never leave spilled liquids such as coolant, oil and cleansing agents in or around the compressor.

COOLING SYSTEM



Service access (engine coolant) (1)

COOLANT SPECIFICATIONS

The use of the correct coolant is important for good heat transfer and corrosion protection of liquid-cooled engines. Coolants used in these engines must be mixtures of good quality water (distilled or de-ionised), special coolant additives and anti-freeze, if required.

Coolant that is not to manufacturer's specification will result in mechanical damage of the engine.

The freezing point of the coolant must be lower than the freezing point that can occur in the area.

The difference must be at least 5 °C (9 °F).

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

If a combined anti-freeze / anti-corrosion additive is used, the mixture should be 50% water and 50% anti-freeze / anti-corrosion.

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

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

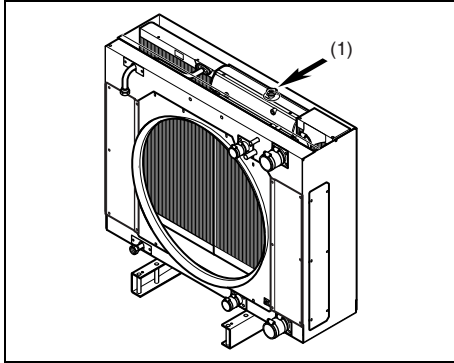
Never mix different coolants and mix the coolant components outside the cooling system.

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



For cleaning radiator and intercooler refer to section Cleaning coolers.

COOLANT LEVEL



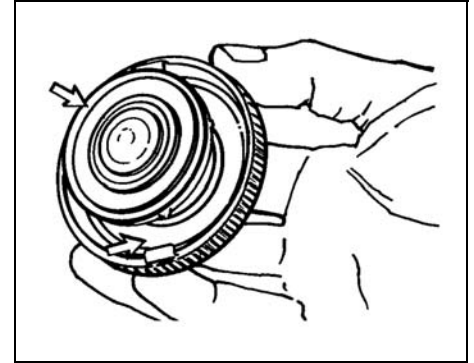
Cooling system filler cap

Check the coolant level when the engine is stopped and cool.



Pressurized System: Hot coolant can cause serious burns. To open the cooling system filler cap, stop the engine and wait until the cooling system components are cool. Loosen the cooling system pressure cap slowly in order to relieve the pressure.

- Remove the cooling system filler cap slowly in order to relieve pressure.
- Maintain the coolant level within 13 mm (0.5 inch) of the bottom of the filler pipe. If the engine is equipped with a sight glass, maintain the coolant level to the proper level in the sight glass.
- Clean the cooling system filler cap and check the condition of the filler cap gaskets. Replace the cooling system filler cap if the filler cap gaskets are damaged. Reinstall the cooling system filler cap.
- Inspect the cooling system for leaks.



Typical filler cap gaskets

COOLING SYSTEM COOLANT

Clean the cooling system and flush the cooling system before the recommended maintenance interval if the following conditions exist:

- The engine overheats frequently.
- Foaming of the coolant.
- The oil has entered the cooling system and the coolant is contaminated.

The fuel has entered the cooling system and the coolant is contaminated.



When the cooling system is cleaned, only clean water is needed when the ELC is drained and replaced.

Inspect the water pump and the water temperature regulator after the cooling system has been drained. This is a good opportunity to replace the water pump, the water temperature regulator and the hoses, if necessary.

Drain



Pressurized System: Hot coolant can cause serious burns. To open the cooling system filler cap, stop the engine and wait until the cooling system components are cool. Loosen the cooling system pressure cap slowly in order to relieve the pressure.

- Stop the engine and allow the engine to cool. Loosen the cooling system filler cap slowly in order to relieve any pressure. Remove the cooling system filler cap.
- Open the cooling system drain valve (if equipped). If the cooling system is not equipped with a drain valve, remove the cooling system drain plugs. Allow the coolant to drain.



Dispose of used engine coolant properly or recycle. Various methods have been proposed to reclaim used coolant for reuse in engine cooling systems. The full distillation procedure is the only-method acceptable by Caterpillar to reclaim the used coolant.

Flush

- Flush the cooling system with clean water in order to remove any debris.
- Close the drain valve (if equipped). Clean the drain plugs. Install the drain plugs. Refer to the Specifications Manual for your particular engine for more specific information on the proper torques. Refer to the **Torque values** for more general information on the proper torques.



Fill the cooling system no faster than 19 l (5 US gal) per minute to avoid air locks.

- Fill the cooling system with clean water. Install the cooling system filler cap.
- Start the engine and run the engine at low idle until the temperature reaches 49 to 66 °C (120 to 150 °F).
- Stop the engine and allow the engine to cool. Loosen the cooling system filler cap slowly in order to relieve any pressure. Remove the cooling system filler cap. Open the drain valve (if equipped) or remove the cooling system drain plugs. Allow the water to drain. Flush the cooling system with clean water. Close the drain valve (if equipped). Clean the drain plugs. Install the drain plugs. Refer to the Specifications Manual for your particular engine for more specific information on the proper torques. Refer to the **Torque values** for more general information on the proper torques.

Fill



Fill the cooling system no faster than 19 l (5 US gal) per minute to avoid air locks.

- Fill the cooling system with PARCOOL EG. Refer to the Operation and Maintenance Manual, “Refill Capacities and Recommendations” topic (maintenance section) for more information on cooling system specifications. Do not install the cooling system filler cap.
- Start the engine and operate the engine at low idle. Increase the engine rpm to high idle. Operate the engine at high idle for one minute in order to purge air from the cavities of the engine block. Stop the engine.
- Check the coolant level. Maintain the coolant level within 13 mm (0.5 inch) below the bottom of the pipe for filling. Maintain the coolant level within 13 mm (0.5 inch) to the proper level on the sight glass (if equipped).
- Clean the cooling system filler cap. Inspect the gasket that is on the cooling system filler cap. If the gasket that is on the cooling system filler cap is damaged, discard the old cooling system filler cap and install a new cooling system filler cap. If the gasket that is on the cooling system filler cap is not damaged, use a 9S-8140 Pressurizing Pump in order to pressure test the cooling system filler cap. The correct pressure for the cooling system filler cap is stamped on the face of the cooling system filler cap. If the cooling system filler cap does not retain the correct pressure, install a new cooling system filler cap.
- Start the engine. Inspect the cooling system for leaks and for proper operating temperature.

COOLING SYSTEM COOLANT SAMPLE - OBTAIN



Always use a designated pump for oil sampling, and use a separate designated pump for coolant sampling. Using the same pump for both types of samples may contaminate the samples that are being drawn. This contaminate may cause a false analysis and an incorrect interpretation that could lead to concerns by both dealers and customers.



Level 1 results may indicate a need for Level 2 Analysis.

Obtain the sample of the coolant as close as possible to the recommended sampling interval. In order to receive the full effect of S-O-S analysis, you must establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent samplings that are evenly spaced.

Supplies for collecting samples can be obtained from your Caterpillar dealer.

Use the following guidelines for proper sampling of the coolant:

- Complete the information on the label for the sampling bottle before you begin to take the samples.
- Keep the unused sampling bottles stored in plastic bags.
- Obtain coolant samples directly from the coolant sample port. You should not obtain the samples from any other location.
- Keep the lids on empty sampling bottles until you are ready to collect the sample.

- Place the sample in the mailing tube immediately after obtaining the sample in order to avoid contamination.
 - Never collect samples from expansion bottles.
 - Never collect samples from the drain for a system.
- Submit the sample for Level 1 analysis.

For additional information about coolant analysis, see Special Publication, SEBU6251, “Caterpillar Commercial Diesel Engine Fluids Recommendations” or consult your Caterpillar dealer.

COOLANT CHECK



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

The system may be under pressure. Remove the cap slowly and only when coolant is at ambient temperature. A sudden release of pressure from a heated cooling system can result in personal injury from the splash of hot coolant.

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

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

Visual check

- Verify the appearance of the coolant with regard to its colour and make sure that no loose particles are floating around.

pH measurement

- Check the pH value of the coolant using a pH-measuring device.
- The pH-meter can be ordered from Atlas Copco with part number 2913 0029 00.
- Typical value for EG = 8.6.
- If the pH-level is below 7 or above 9.5, the coolant should be replaced.

Glycol concentration measurement

- To optimise the unique engine protection features of the PARCOOL EG, the concentration of the Glycol in the water should always be above 33 vol.%.
- Mixtures exceeding a 68 vol.% mix ratio in water are not recommended, as this will lead to high engine operating temperatures.
- A refractometer can be ordered from Atlas Copco with part number 2913 0028 00.



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

TOPPING UP/REPLACING COOLANT

- Verify whether the engine cooling system is in a good condition (no leaks, clean,...).
- Check the condition of the coolant.
- If the condition of the coolant is no longer up to standard, the complete coolant should be replaced (see section **Topping up/replacing coolant**).
- Always top-up with PARCOOL EG Concentrate / PARCOOL EG.
- Topping up the coolant with water only, changes the concentration of additives and is therefore not allowed.

TOPPING UP WITHOUT DRAINING FROM THE COOLING SYSTEM

The quantity of PARCOOL EG Concentrate to be topped up can be estimated with the following formula and/or graph:

Corrections concentrate in measured system towards 50% volume by using PARCOOL EG Concentrate

PN: 1604 8159 00

Example:

Total volume coolant =

14 Liter

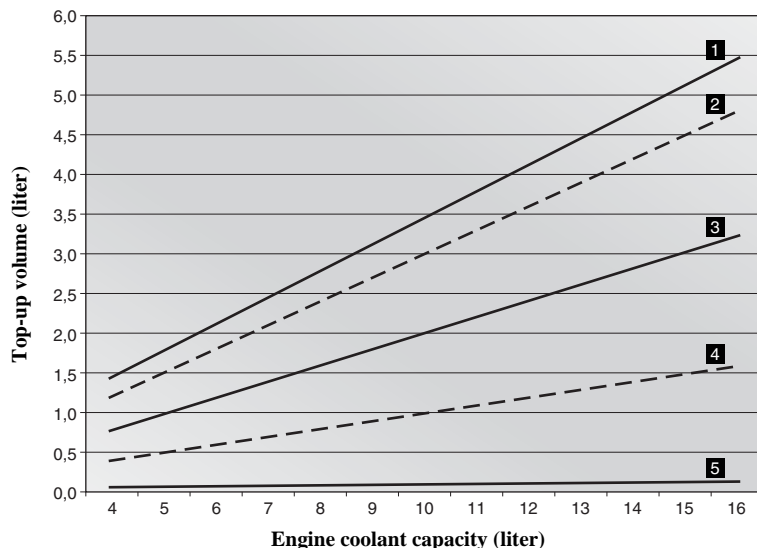
Measured concentration =

33 Vol %

$$50 - \frac{33}{33} = \frac{17}{33} * \frac{14}{50} = 4,8 \text{ Liter PARCOOL EG Concentrate}$$

In case of expansion tank at low level, this quantity is to be filled without draining from the cooling system.

Top-up volume PARCOOL EG Concentrate without drainage



1. Refractometer indication -20° C (33%)
2. Refractometer indication -22° C
3. Refractometer indication -25° C
4. Refractometer indication -30° C
5. Refractometer indication -36° C

TOPPING UP AFTER LIMITED QUANTITY DRAINING FROM THE COOLING SYSTEM

The quantity of PARCOOL EG Concentrate to be topped up after draining a calculated volume from the cooling system, can be estimated with the following formula and/or graph:

Corrections concentrate in measured system towards 50% volume by using PARCOOL EG Concentrate

PN: 1604 8159 00

Example:

Total volume coolant =

80 Liter

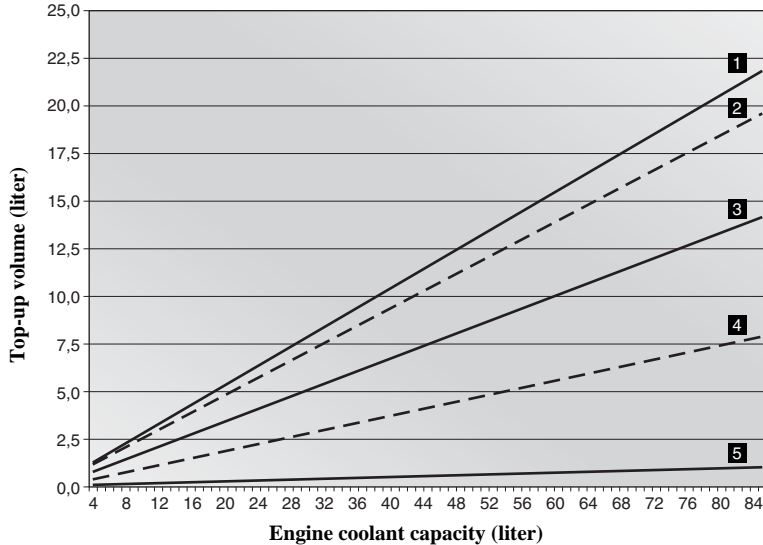
Measured concentration =

33 Vol %

$$50 - \frac{33}{100} = \frac{17}{100} \rightarrow \frac{17}{100} * 80 / \frac{67}{100} = 20 \text{ Liter PARCOOL EG Concentrate}$$

In case of expansion tank at normal level, this quantity is to be drained from the cooling system.

Top-up volume PARCOOL EG Concentrate with drainage



1. Refractometer indication -20° C (33%)
2. Refractometer indication -22° C
3. Refractometer indication -25° C
4. Refractometer indication -30° C
5. Refractometer indication -36° C

COOLING SYSTEM WATER TEMPERATURE REGULATOR

Replace the water temperature regulator before the water temperature regulator fails. This is a recommended preventive maintenance practice. Replacing the water temperature regulator reduces the chances for unscheduled downtime.

A water temperature regulator that fails in a partially opened position can cause overheating or overcooling of the engine.

A water temperature regulator that fails in the closed position can cause excessive overheating. Excessive overheating could result in cracking of the cylinder head or piston seizure problems.

A water temperature regulator that fails in the open position will cause the engine operating temperature to be too low during partial load operation. Low engine operating temperatures during partial loads could cause an excessive carbon buildup inside the cylinders. This excessive carbon buildup could result in an accelerated wear of the piston rings and wear of the cylinder liner.



Failure to replace your water temperature regulator on a regularly scheduled basis could cause severe engine damage. Caterpillar engines incorporate a shunt design cooling system and require operating the engine with a water temperature regulator installed. If the water temperature regulator is installed incorrectly, the engine may overheat, causing cylinder head damage. Ensure that the new water temperature regulator is installed in the original position. Ensure that the water temperature regulator vent hole is open. Do not use liquid gasket material on the gasket or cylinder head surface.

Refer to the Service Manual for the replacement procedure of the water temperature regulator, or consult your Caterpillar dealer.



If only the water temperature regulators are replaced, drain the coolant from the cooling system to a level that is below the water temperature regulator housing.

WATER PUMP

A failed water pump might cause severe engine overheating problems that could result in the following conditions:

- Cracks in the cylinder head
- A piston seizure
- Other potential damage to the engine

Visually inspect the water pump for leaks. If any leaking is observed, replace the water pump seal or the water pump assembly.

ADJUSTMENT OF THE FAN DRIVE BELT

- Remove the belt guard.
- Loosen the mounting bolt for the pulley.
- Loosen the adjusting nut for the pulley.
- Move the pulley in order to adjust the belt tension.
- Tighten the adjusting nut.
- Tighten the mounting bolt.
- Reinstall the belt guard.

If new drive belts are installed, check the drive belt tension again after 30 minutes of engine operation at the rated rpm.

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 section **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.

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.



Always pour the sulphuric acid carefully into the distilled water; never pour the water into the acid.

ELECTROLYTE LEVEL CHECK

When the engine is not run for long periods of time or when the engine is run for short periods, the batteries may not fully recharge. Ensure a full charge in order to help prevent the battery from freezing. If batteries are properly charged, ammeter reading should be very near zero.



All lead-acid batteries contain sulfuric acid which can burn the skin and clothing. Always wear a face shield and protective clothing when working on or near batteries.

- Remove the filler caps. Maintain the electrolyte level to the "FULL" mark on the battery. If the addition of water is necessary, use distilled water. If distilled water is not available use clean water that is low in minerals. Do not use artificially softened water.
- Check the condition of the electrolyte with the 1U-7298 Coolant/Battery Tester (°C) or the 1U-7297 Coolant/Battery Tester (°F).
- Keep the batteries clean.

Clean the battery case with one of the following cleaning solutions:

- A mixture of 0.1 kg (0.2 lb) of baking soda and 1 l (1 qt) of clean water
- A mixture of 0.1 l (0.11 qt) of ammonia and 1 l (1 qt) of clean water

Thoroughly rinse the battery case with clean water.

Use a fine grade of sandpaper to clean the terminals and the cable clamps. Clean the items until the surfaces are bright or shiny. **DO NOT** remove material excessively. Excessive removal of material can cause the clamps to not fit properly. Coat the clamps and the terminals with 5N-5561 Silicone Lubricant, petroleum jelly or MPMG grease.

ACTIVATING A DRY-CHARGED BATTERY

- Take out the battery.
- Battery and electrolyte must be at an equal temperature above 10 °C (50 °F).
- Remove cover and/or plug from each cell.
- Fill each cell with electrolyte until the level reaches the mark on the battery. If there is no mark on the battery, the level must be above the plates for at least 10 mm (0.4 in) to 15 mm (0.6 in).
- 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 compressor.

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 in accordance with the manufacturer's instructions.

Preferably use 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.

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.

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 compressor, etc...

BATTERY REPLACE

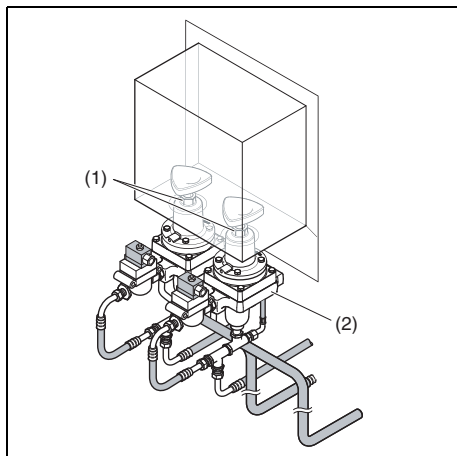


The battery cables or the batteries should not be removed with the battery cover in place. The battery cover should be removed before any servicing is attempted. Removing the battery cables or the batteries with the cover in place may cause a battery explosion resulting in personal injury.

- Turn the start switch to the OFF position. Turn the ignition switch (if equipped) to the OFF position and remove the key and all electrical loads.
- Disconnect the negative battery terminal at the battery that goes to the start switch. Ensure that the cable cannot contact the terminal. When four 12 volt batteries are involved, the negative side of two batteries must be disconnected.
- Tape the leads in order to help prevent accidental starting.
- Proceed with necessary system repairs. Reverse the steps in order to reconnect all of the cables.
- Switch the engine to the OFF position. Remove all electrical loads.
- Turn off any battery chargers. Disconnect any battery chargers.
- The NEGATIVE “-” cable connects the NEGATIVE “-” battery terminal to the NEGATIVE “-” terminal on the starter motor. Disconnect the cable from the NEGATIVE “-” battery terminal.

Adjustments and servicing procedures

ADJUSTING REGULATING VALVE



Locknut (1) and regulating valve (2)

The working pressure is determined by the tension of the spring in the regulating valve (2). This tension can be increased to raise the pressure and decreased to lower it by turning the adjusting wheel clockwise and anti-clockwise respectively. To adjust the normal working pressure, proceed as follows:

- Loosen the lock nut of the regulating valve.
- Release regulating valve (2) (turn out).
- With the outlet valves (AOV) closed, adjust the regulating valve, until a pressure is reached of nominal pressure + 2 bar (+ 29 psi).
- Lock the regulating valve by fixing the lock nut.

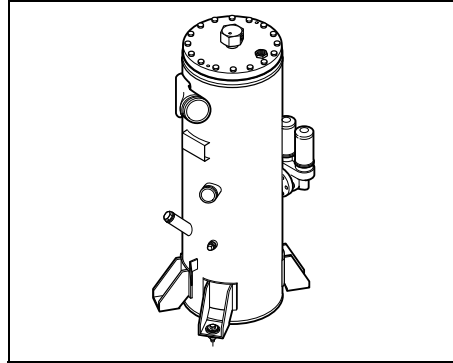
AIR SYSTEM

AIR RECEIVER AND SAFETY VALVE

Only trained and technically competent personnel is allowed to perform maintenance on air receiver and safety valve.

Draining of condensate should be performed daily when the compressor is in use.

AIR RECEIVER SERVICING PROCEDURES

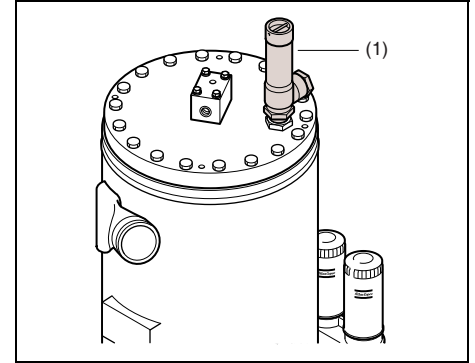


The air receiver is tested according to official standards. Carry out regular inspections in conformity with local regulations.



Daily drain condensate.

SAFETY VALVE



Safety valve (1)

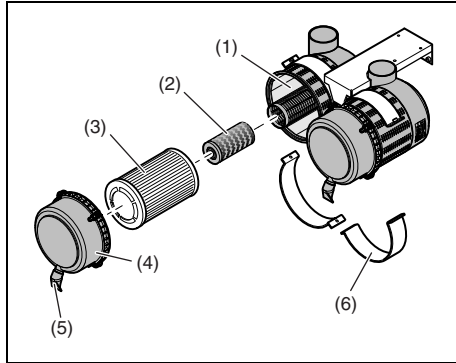


All adjustments or repairs are to be done by an authorized representative of the valve supplier, see section Specific safety precautions.

Following checks must be carried out:

- A check of the opening of the lifting gear, twice a year. This can be done by screwing the cap of the valve anti-clockwise.
- A check of the set pressure once a year according to the local regulations. This check cannot be done on the compressor and must be carried out on a proper test bench.

AIR FILTER ENGINE/COMPRESSOR



- | | |
|---------------------|--------------------|
| 1. Housing | 4. Dust trap cover |
| 2. Safety cartridge | 5. Vacuator valve |
| 3. Filter element | 6. Clamp |



The Atlas Copco air filters are specially designed for the application. The use of non-original air filters may lead to severe damage of the engine and/or compressor element.

Never run the compressor without air filter element.



For off-shore units special filter elements need to be installed. These elements are included in the off-shore service paks.

CLEANING THE DUST TRAP

To remove dust from the dust trap squeeze the vacuator valve (5) several times.

REPLACING THE FILTER ELEMENT AND THE SAFETY CARTRIDGE

The instructions apply to one air filter and should be repeated for both air filters engine and air filters compressor.

- Carry out the procedure **Before maintenance**.
- Release the snap clips and remove the dust trap cover. Clean the inside of the cover.
- Withdraw the filter element and safety cartridge from the housing. A dirty safety cartridge is an indication of a malfunctioning filter element.



Replace filter housing and dust trap cover when damaged. For part numbers see table.

The safety cartridge cannot be cleaned.

- Discard the filter element when damaged.

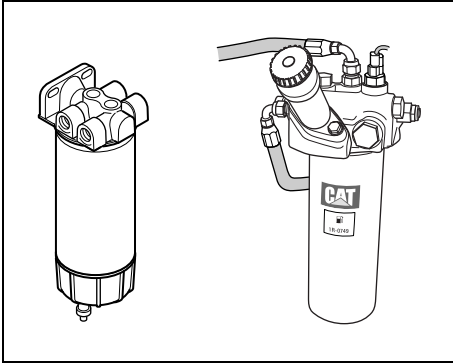


Replace the filter element and the safety cartridge at the same time. New elements should be inspected for tears and punctures before installation.

- Reassemble in reverse order of dismantling.
- Inspect and tighten all air intake connections.

Name	Part number	Qty
Service pak (standard)	2912 4432 06	1
Service pak (off-shore)	2912 4496 06	1
Air filter housing	1604 0120 01	2/Compressor 2/Engine
Cover air filter housing	2914 8663 00	1/Filter

FUEL SYSTEM

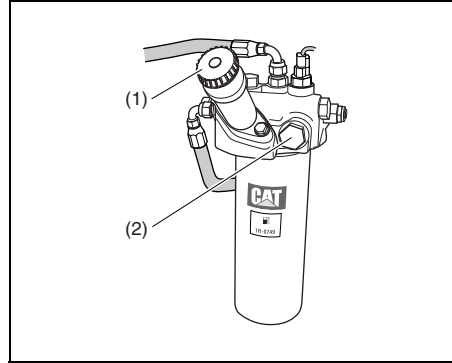


AC prefilter and Caterpillar fuel filter

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire. To help prevent possible injury, turn the start switch off when changing fuel filters or water separator elements. Clean up fuel spills immediately.

- Use a suitable container to catch any fuel that might spill. Clean up any spilled fuel immediately.
- Do not allow dirt to enter the fuel system. Thoroughly clean the area around a fuel system component that will be disconnected. Fit a suitable cover over disconnected fuel system component.

THE SECONDARY FUEL FILTER HAS BEEN REPLACED



1. Turn the ignition switch to the “OFF” position.
2. Open air purge screw (2) for the fuel filter by three full turns. Do not remove the air purge screw.

Do not crank the engine continuously for more than 30 seconds. Allow the starting motor to cool for two minutes before cranking the engine again.
3. Start the engine. The engine should start and the engine should run smoothly.

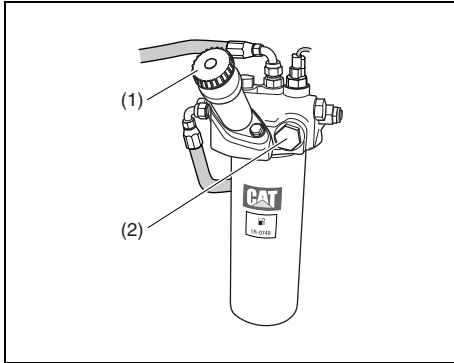
You may use the fuel priming pump (1) for the fuel filter instead of starting the engine and running the engine.

4. While the engine is running, observe air purge screw (2). When a small drop of fuel appears at the threads of the air purge screw, close and tighten air purge screw (2).

There may be a noticeable change in the sound of the running engine when the air purge screw is tightened. The change in the sound of the engine is normal. Failure to tighten all fittings could result in serious fuel leaks.

5. Clean any residual fuel from the engine components.

THE ENGINE HAS BEEN RUN OUT OF FUEL



Use a suitable container to catch any fuel that might spill. Clean up any spilled fuel immediately.

Do not allow dirt to enter the fuel system. Thoroughly clean the area around a fuel system component that will be disconnected. Fit a suitable cover over disconnected fuel system component.

1. Turn the ignition switch to the "OFF" position.
2. Fill the fuel tank(s) with clean diesel fuel.
3. Open air purge screw (2) for the fuel filter by three full turns. Do not remove the air purge screw.

Do not crank the engine continuously for more than 30 seconds. Allow the starting motor to cool for two minutes before cranking the engine again.

4. Crank the engine for 30 seconds. Use a suitable container to catch the fuel while you crank the engine. Allow the starter motor to cool for 2 minutes.

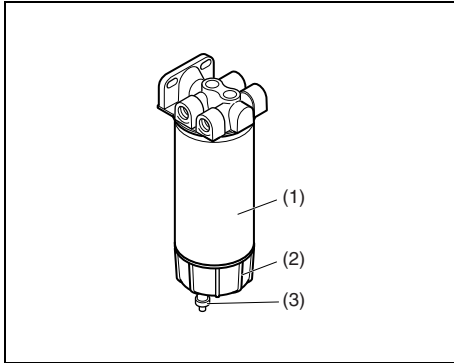
You may use the fuel priming pump (1) for the fuel filter instead of cranking the engine.

5. Crank the engine for 30 seconds. Allow the starter motor to cool for 2 minutes.
6. Repeat step 5 until the engine starts and the engine runs.

Failure to tighten all fittings could result in serious fuel leaks.

7. Clean any residual fuel from the engine components.

PRIMARY FILTER/WATER SEPARATOR



Drain

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire. To help prevent possible injury, turn the start switch off when changing fuel filters or water separator elements. Clean up fuel spills immediately.

- Use a suitable container to catch any fuel that might spill. Clean up any spilled fuel immediately.
- Do not allow dirt to enter the fuel system. Thoroughly clean the area around a fuel system component that will be disconnected. Fit a suitable cover over disconnected fuel system component.

Bowl (2) should be monitored daily for signs of water. If water is present, drain the water from the bowl.

1. Open drain (3). The drain is a self-ventilated drain. Catch the draining water in a suitable container. Dispose of the water properly.
2. Close drain (3).

The water separator is under suction during normal engine operation. Ensure that the drain valve is tightened securely to help prevent air from entering the fuel system.

Replace

Water in the fuel can cause the engine to run rough. Water in the fuel may cause a electronic unit injector to fail. If the fuel has been contaminated with water, the element should be changed before the regularly scheduled interval.

The primary filter/water separator also provides filtration in order to help extend the life of the secondary fuel filter. The element should be changed regularly. If a vacuum gauge is installed, the primary filter/water separator should be changed at 50 to 70 kPa (15 to 20 inches Hg).



Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

1. Close the main fuel supply valve.
2. Remove element (1) from the element mounting base while bowl (2) is attached.
3. Dispose of the contents of the filter. Remove bowl (2) from element (1). The bowl is reusable. Do not discard the bowl. Dispose of the used element.
4. Remove the O-ring from the gland of the bowl. Clean the following components:
 - Bowl
 - O-ring
 - Mounting baseInspect the O-ring for damage and for deterioration. Replace the O-ring, if necessary.
5. Lubricate the O-ring with clean diesel fuel.
6. Install bowl (2) on a new element. Tighten the bowl by hand. Do not use tools in order to tighten the bowl.

The primary filter/water separator may be prefilled with fuel to avoid rough running/stalling of the engine due to air. Do not fill the secondary filter with fuel before installation. The fuel would not be filtered and could be contaminated. Contaminated fuel will cause accelerated wear to fuel system parts.

SECONDARY FILTER

7. Lubricate the top seal of element (1) with clean diesel fuel. The element may be filled with fuel at this time. Install the new element on the mounting base. Tighten the element by hand.

The water separator is under suction during normal engine operation. Ensure that the vent plug is tightened securely to help prevent air from entering the fuel system.

8. Open the main fuel supply valve.
9. Start the engine and check for leaks. Run the engine for one minute. Stop the engine and check for leaks again. Detecting leaks is difficult while the engine is running. The primary filter/water separator is under suction. A leak will allow air to enter the fuel. The air in the fuel can cause low power due to aeration of the fuel. If air enters the fuel, check the components for overtightening or undertightening.

Replace

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire. To help prevent possible injury, turn the start switch off when changing fuel filters or water separator elements. Clean up fuel spills immediately.

- Do not allow dirt to enter the fuel system. Thoroughly clean the area around a fuel system component that will be disconnected. Fit a suitable cover over any disconnected fuel system components.
 - Use a suitable container to catch any fuel that might spill. Clean up any spilled fuel immediately.
1. Stop the engine. Turn the ignition switch to the OFF position or disconnect the battery. Refer to the Operation and Maintenance Manual, "Battery or Battery Cable - Disconnect" topic (maintenance section) for more information. Shut off the fuel supply valve (if equipped).
 2. It may be necessary to relieve residual fuel pressure from the fuel system before the fuel filter is removed. Wait for one to five minutes until the fuel pressure has lowered. Use a suitable container in order to catch any fuel that may spill.
 3. Remove the used fuel filter and discard the used fuel filter.
 4. Clean the gasket sealing surface of the fuel filter base. Ensure that all of the old gasket is removed.

5. Apply clean diesel fuel to the new fuel filter gasket.

Do not fill the secondary fuel filter with fuel before installing. The fuel would not be filtered and could be contaminated. Contaminated fuel will cause accelerated wear to fuel system parts.

In order to maximize fuel system life and prevent premature wear out from abrasive particles in the fuel, a two micron high efficiency fuel filter is required for all Caterpillar Electronic Unit Injectors. Caterpillar High Efficiency Fuel Filters meet these requirements. Consult your Caterpillar dealer for the proper part numbers.

6. Install the new fuel filter. Spin the fuel filter onto the fuel filter base until the gasket contacts the base. Use the rotation index marks on the filters as a guide for proper tightening. Tighten the filter according to the instructions that are on the fuel filter. Do not overtighten the filter.
7. Open the fuel supply valve. The engine will need to be purged of air. Refer to the Operation and Maintenance Manual, "Fuel System - Prime" topic (maintenance section) for more information.

FUEL TANK WATER AND SEDIMENT

Drain

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids. Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products. Dispose of all fluids according to local regulations and mandates.

Fuel tank

Fuel quality is critical to the performance and to the service life of the engine. Water in the fuel can cause excessive wear to the fuel system. Condensation occurs during the heating and cooling of fuel. The condensation occurs as the fuel passes through the fuel system and the fuel returns to the fuel tank. This causes water to accumulate in fuel tanks. Draining the fuel tank regularly and obtaining fuel from reliable sources can help to eliminate water in the fuel.

Drain the water and the sediment

Fuel tanks should contain some provision for draining water and draining sediment from the bottom of the fuel tanks.

1. Open the drain valve on the bottom of the fuel tank in order to drain the water and the sediment. Close the drain valve.
2. Check the fuel daily. Drain the water and sediment from the fuel tank after operating the engine or drain the water and sediment from the fuel tank after the fuel tank has been filled. Allow five to ten minutes before performing this procedure.
3. Fill the fuel tank after operating the engine in order to drive out moist air. This will help prevent condensation. Do not fill the tank to the top. The fuel expands as the fuel gets warm. The tank may overflow.

Some fuel tanks use supply pipes that allow water and sediment to settle below the end of the fuel supply pipe. Some fuel tanks use supply lines that take fuel directly from the bottom of the tank. If the engine is equipped with this system, regular maintenance of the fuel system filter is important.

ALTERNATOR

ALTERNATOR BELT - INSPECTION

Inspect the alternator belt and the fan drive belts for wear and for cracking. Replace the belts if the belts are not in good condition.

Check the belt tension according to the information in the Service Manual, "Specifications".

Slippage of loose belts can reduce the efficiency of the driven components. Vibration of loose belts can cause unnecessary wear on the following components:

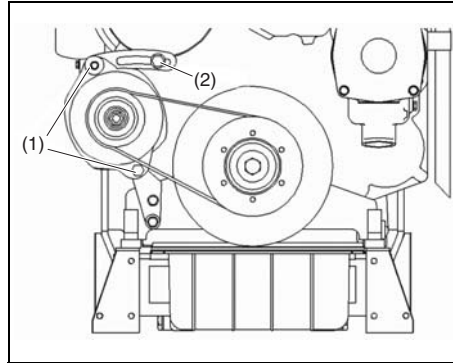
- Belts
- Pulleys
- Bearings

If the belts are too tight, unnecessary stress is placed on the components. This reduces the service life of the components.

ALTERNATOR BELT - REPLACEMENT

For applications that require multiple drive belts, replace the drive belts in matched sets. Replacing one drive belt of a matched set will cause the new drive belt to carry more load because the older drive belts are stretched. The additional load on the new drive belt could cause the new drive belt to fail.

ALTERNATOR BELT - ADJUSTMENT



1. Remove the belt guard.
2. Loosen mounting bolts (1) and adjusting bolt (2).
3. Move the assembly in order to increase or decrease the belt tension.
4. Tighten adjusting bolt (2). Tighten mounting bolts (1).
5. Reinstall the belt guard.
6. If new drive belts are installed, check the drive belt tension again after 30 minutes of engine operation at the rated rpm.

ENGINE MAINTENANCE

PRODUCT STORAGE

If the engine will not be started for several weeks, the lubricating oil will drain from the cylinder walls and from the piston rings. Rust can form on the cylinder liner surface. Rust on the cylinder liner surface will cause increased engine wear and a reduction in engine service life.

To help prevent excessive engine wear, use the following guidelines:

- Complete all of the lubrication recommendations that are listed in this Operation and Maintenance Manual, “Maintenance Interval Schedule” (maintenance section).
- If freezing temperatures are expected, check the cooling system for adequate protection against freezing. See this Operation and Maintenance Manual, “Re-fill Capacities and Recommendations” (Maintenance Section).

If an engine is out of operation and if use of the engine is not planned, special precautions should be made.

If the engine will be stored for more than one month, a complete protection procedure is recommended.

For more detailed information on engine storage, see Special Instruction, SEHS9031, “Storage Procedure For Caterpillar Products”.

Your Caterpillar dealer can assist in preparing the engine for extended storage periods.

WALK-AROUND INSPECTION



Inspect the engine for leaks and for loose connections.

A walk-around inspection should only take a few minutes. When the time is taken to perform these checks, costly repairs and accidents can be avoided.

For maximum engine service life, make a thorough inspection of the engine compartment before starting the engine.

1. Look for items such as oil leaks or coolant leaks, loose bolts, worn belts, loose connections and trash buildup.
2. Make repairs, as needed:

The guards must be in the proper place. Repair damaged guards or replace missing guards.

Wipe all caps and plugs before the engine is serviced in order to reduce the chance of system contamination.

For any type of leak (coolant, lube, or fuel) clean up the fluid. If leaking is observed, find the source and correct the leak. If leaking is suspected, check the fluid levels more often than recommended until the leak is found or fixed, or until the suspicion of a leak is proved to be unwarranted.

Accumulated grease and/or oil on an engine or deck is a fire hazard. Remove this debris with steam cleaning or high pressure water.

3. Inspect the cooling system

Ensure that the cooling lines are properly clamped and that the cooling lines are tight. Check for leaks. Check the condition of all pipes.

Inspect the water pumps for coolant leaks.

The water pump seal is lubricated by coolant in the cooling system. It is normal for a small amount of leakage to occur as the engine cools down and the parts contract. Excessive coolant leakage may indicate the need to replace the water pump seal.

4. Inspect the lubrication system for leaks at the front crankshaft seal, the rear crankshaft seal, the oil pan, the oil filters and the valve cover.
5. Inspect the fuel system for leaks. Look for loose fuel line clamps or for loose fuel line tie-wraps.
6. Inspect the piping for the air inlet system and the elbows for cracks and for loose clamps. Ensure that hoses and tubes are not contacting other hoses, tubes, wiring harnesses, etc.
7. Inspect the alternator belt and the accessory drive belts for cracks, breaks or other damage.
8. Drain the water and the sediment from fuel tanks on a daily basis in order to ensure that only clean fuel enters the fuel system.
9. Inspect the wiring and the wiring harnesses for loose connections and for worn wires or frayed wires.

ENGINE

10. Inspect the ground strap for a good connection and for good condition.
11. Inspect the ECM to the cylinder head ground strap for a good connection and for good condition.
12. Disconnect any battery chargers that are not protected against the current drain of the starting motor. Check the condition and the electrolyte level of the batteries, unless the engine is equipped with a maintenance free battery.
13. Check the condition of the gauges. Replace any gauges that are cracked. Replace any gauge that can not be calibrated.

Personal injury or death can result from high voltage. Moisture can create paths of electrical conductivity.

Make sure that the electrical system is OFF. Lock out the starting controls and tag the controls "DO NOT OPERATE".

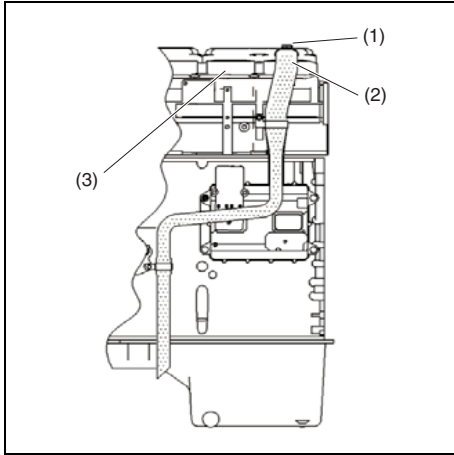
Accumulated grease and oil on an engine is a fire hazard. Keep the engine clean. Remove debris and fluid spills whenever a significant quantity accumulates on the engine.

Periodic cleaning of the engine is recommended. Steam cleaning the engine will remove accumulated oil and grease. A clean engine provides the following benefits:

- Easy detection of fluid leaks
- Maximum heat transfer characteristics
- Ease of maintenance

Caution must be used in order to prevent electrical components from being damaged by excessive water when you clean the engine. Avoid electrical components such as the alternator, the starter, and the ECM.

ENGINE CRANKCASE BREATHER



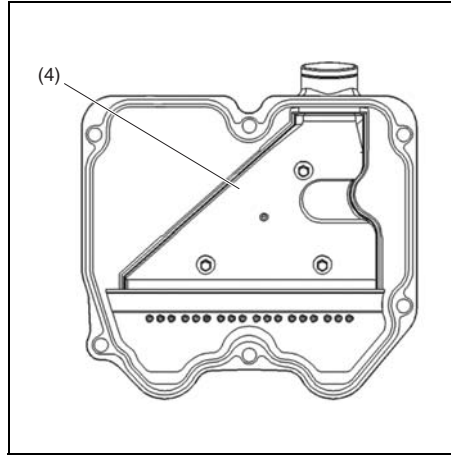
Inspect the engine for leaks and for loose connections.

If the crankcase breather is not maintained on a regular basis, the crankcase breather will become plugged. A plugged crankcase breather will cause excessive crankcase pressure that may cause crankshaft seal leakage.

STARTING MOTOR

Caterpillar Inc. recommends a scheduled inspection of the starting motor. If the starting motor fails, the engine may not start in an emergency situation.

Check the starting motor for proper operation. Check the electrical connections and clean the electrical connections. Refer to the Service Manual for more information on the checking procedure and for specifications or consult your Caterpillar dealer for assistance.



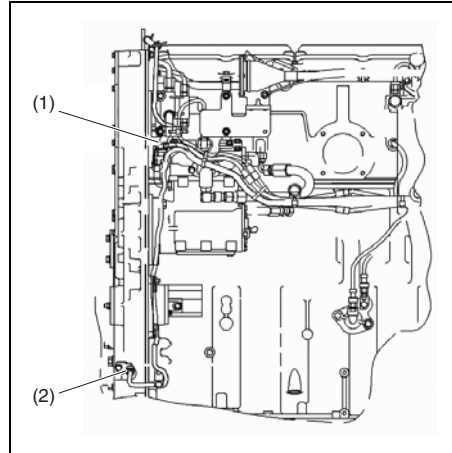
1. Loosen hose clamp (1) and remove hose (2) from valve cover (3).
2. Remove the valve cover (3). Refer to the Disassembly and Assembly Manual.
3. Wash breather (4) in solvent that is clean and nonflammable. Allow the breather to dry before installation.
4. Install the valve cover (7). Refer to the Disassembly and Assembly Manual.
5. Install hose (6) on valve cover (7). Install hose clamp (5).

ENGINE SENSORS

VISUAL INSPECTION

Visually check the condition of all gauges, sensors and wiring. Look for wiring and components that are loose, broken, or damaged. Damaged wiring or components should be repaired or replaced immediately.

ENGINE SPEED / TIMING SENSORS



Left side view

1. Secondary speed/timing sensor
2. Primary speed/timing sensor

CALIBRATION CHECK



During testing, abnormal operating conditions must be simulated.

The tests must be performed correctly in order to prevent possible damage to the engine.

Alarms and shutoffs must function properly. Alarms provide timely warning to the operator. Shutoffs help to prevent damage to the engine. It is impossible to determine if the engine protective devices are in good working order during normal operation. Malfunctions must be simulated in order to test the engine protective devices. To prevent damage to the engine, only authorized service personnel or your Caterpillar dealer should perform the tests.

- For the calibration of temperature contactors, see Special Instruction, SEHS9827, “Calibration of Temperature Contactors”.
- For the calibration of pressure contactors, see Special Instruction, SEHS9828, “Calibration of Pressure Contactors”.

Consult your Caterpillar dealer or refer to the Service Manual for more information.

CRANKSHAFT VIBRATION DAMPER

Damage to the crankshaft vibration damper or failure of the crankshaft vibration damper can increase torsional vibrations. This can result in damage to the crankshaft and to other engine components. A damper that is damaged can cause excessive gear train noise at variable points in the speed range.

The damper is mounted to the crankshaft which is located behind the belt guard on the front of the engine.

Visconic damper

The visconic damper has a weight that is located inside a fluid filled case. The weight moves in the case in order to limit torsional vibration.

Inspect the damper for evidence of fluid leaks. If a fluid leak is found, determine the type of fluid. The fluid in the damper is silicone. Silicone has the following characteristics: transparent, viscous, smooth, and difficult to remove from surfaces.

If the fluid leak is oil, inspect the crankshaft seals for leaks. If a leak is observed, replace the crankshaft seals.

Inspect the damper and repair or replace the damper for any of the following reasons:

- The damper is dented, cracked, or leaking.
- The paint on the damper is discolored from heat.
- The engine has had a failure because of a broken crankshaft.
- Analysis of the oil has revealed that the front main bearing is badly worn.
- There is a large amount of gear train wear that is not caused by a lack of oil.

Refer to the Service Manual or consult your Caterpillar dealer for information about damper replacement.

ENGINE MOUNTS - INSPECT

Inspect the engine mounts for deterioration and for proper bolt torque. Engine vibration can be caused by the following conditions:

- Improper mounting of the engine
- Deterioration of the engine mounts

Any engine mount that shows deterioration should be replaced. Refer to the Service Manual for the recommended torques. Refer to your Caterpillar dealer for more information.

ENGINE VALVE ROTATORS



If noticeable bearing play is felt, the compact bearings should be replaced.

Engine valve rotators rotate the valves when the engine runs. This helps to prevent deposits from building up on the valves and the valve seats.

Perform the following steps after the engine valve lash is set, but before the valve covers are installed:

1. Start the engine according to Operation and Maintenance Manual, "Engine Starting" (operation section) for the procedure.
2. Operate the engine at low idle.
3. Observe the top surface of each valve rotator. The valve rotators should turn slightly when the valves close.

A valve rotator which does not operate properly will accelerate valve face wear and valve seat wear and shorten valve life. If a damaged rotator is not replaced, valve face guttering could result and cause pieces of the valve to fall into the cylinder. This can cause piston and cylinder head damage.



If a valve fails to rotate, consult your Caterpillar dealer.

DRIVEN EQUIPMENT

Check the alignment

To minimize bearing problems and vibration of the engine crankshaft and the driven equipment, the alignment between the engine and driven equipment must be properly maintained.

Check the alignment according to the instructions that are provided by the following manufacturers:

- Caterpillar
- OEM of the drive coupling
- OEM of the driven equipment

Torque all of the fasteners to the proper specifications.

Inspect the drive coupling

Inspect the drive coupling according to the instructions that are provided by the OEM of the coupling. For the following service information, see the literature that is provided by the OEM of the coupling:

- Lubrication requirements
- Specifications for the end play
- “Reusability Guidelines”
- Replacement instructions

Inspect the rear gear train

Inspect the crankshaft gear. If excessive wear is found, replace the crankshaft gear and the large cluster idler.

If any gear causes damage to other gears through failure, replace the entire rear gear train.

For the correct parts, see the Parts Manual for the engine. For removal and replacement instructions, see the Service Manual, “Disassembly and Assembly” module. Consult your Caterpillar dealer for assistance.

ELECTRONIC UNIT INJECTOR

Be sure the engine cannot be started while this maintenance is being performed. To prevent possible injury, do not use the starting motor to turn the flywheel. Hot engine components can cause burns. Allow additional time for the engine to cool before measuring / adjusting the unit injectors. The electronic unit injectors use high voltage. Disconnect the unit injector enable circuit connector in order to prevent personal injury. Do not come in contact with the injector terminals while the engine is running.

The operation of Caterpillar engines with improper adjustments of the electronic unit injector can reduce engine efficiency. This reduced efficiency could result in excessive fuel usage and/or shortened engine component life.

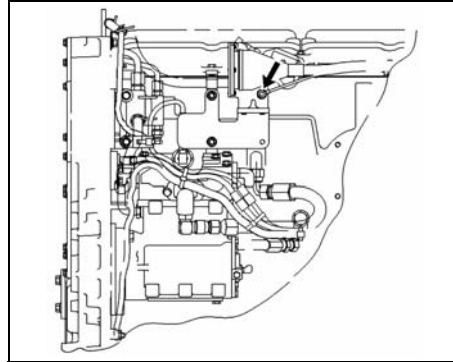
Only qualified service personnel should perform this maintenance. Refer to the following topics for your engine for the correct procedure: Refer to the Systems Operation, Testing and Adjusting, “Electronic Unit Injector - Test” for the test procedure, and Systems Operation, Testing and Adjusting, “Electronic Unit Injector - Adjust” for the correct procedure for adjusting the injectors.

The camshafts must be correctly timed with the crankshaft before an adjustment of the lash for the fuel injector is made. The timing pins must be removed from the camshafts before the crankshaft is turned or damage to the cylinder block will be the result.

ELECTRONICS GROUNDING STUD



The connection of battery cables to a battery and the disconnection of battery cables from a battery may cause an explosion which may result in injury or death. The connection and the disconnection of other electrical equipment may also cause an explosion which may result in injury or death. The procedures for the connection and the disconnection of battery cables and other electrical equipment should only be performed in a non-explosive atmosphere.



Electronics grounding stud (side view)

Inspect the OEM harness for good connections.

Inspect the condition of the OEM harness.

The electronics grounding stud must have a wire ground to the battery. Tighten the electronics grounding stud at every oil change. Ground wires and straps should be combined at engine grounds.

All grounds should be tight and free of corrosion.

- Clean the electronics grounding stud and the terminals for the electronics ground strap with a clean cloth.
- If the connections are corroded, clean the connections with a solution of baking soda and water.

Keep the electronics grounding stud and the strap clean and coated with MPGM grease or petroleum jelly.

Problem solving

It is assumed that the engine is in good condition and that there is adequate fuel flow to the filter and injection equipment.



An electrical fault must be traced by an electrician.

Make sure that the wires are not damaged and that they are clamped tight to their terminals.

FAULT DIAGNOSIS

During operation, the control box executes diagnostic checks on compressor and engine. There are several parameters that are continuously watched.

When one of these parameters exceeds its specified limit the compressor/engine will react according to the actual status of the control box (e.g. Starting, Warming up, Loading and so on).

The display on the control box will show a message which can be a warning, a start failure or a shut down.

TROUBLESHOOTING (COMPRESSOR)

Troubleshooting during starting

1. Compressor is loaded automatically to full capacity after starting.

Possible faults	Corrective actions
Loading solenoid valve stuck in loaded position.	Remove and dismantle. Correct as necessary. See section Regulating valve .
Air intake throttle valve stuck in open position.	Remove, dismantle and inspect pads. Replace as necessary. See section Regulating system .
Air leaks in regulating system.	Check hoses and their fittings. Stop leaks; replace leaking hoses.
Condensate in regulating lines frozen.	Check if venting holes are open and routing of the regulating lines cannot trap condensate.

2. Engine does not speed up immediately after compressor load push button has been pressed and compressor does not deliver air.

Possible faults	Corrective actions
Membrane of regulating valve cracked.	If air blows from venting devices, remove and dismantle valve. Replace membrane. See section Regulating valve .
Air intake throttle valve stuck in closed position.	Remove, dismantle and inspect pads. Replace as necessary. See section Regulating system .
Loading switch, load solenoid valve or load relay defective.	Inspect and replace if necessary. See section Regulating valve .
Minimum loading pressure switch stuck in open position.	Inspect. The switch prevents loading as long as the receiver pressure is below 5 bar. Replace if necessary. See section Regulating system .

Troubleshooting during operation

1. Excessive compressor oil consumption. Oil mist being discharged from air outlet valves.

Possible faults	Corrective actions
Oil level too high due to overfilling or formation of condensate in oil tank.	Unscrew filler plug one turn and wait until all pressure is released. Drain oil until the oil level shows in the sight-glass. See section Air receiver (oil tank) .
Oil separator flange not flat or gaskets not sealing properly.	Check the gaskets for oil marks between 'dry' and 'wet' zone to locate leaks. Replace gaskets and use liquid gasket to close leaks. Contact Atlas Copco.
Oil separator element defective.	Remove and inspect element, replace if necessary. Contact Atlas Copco.
Flow restrictor in the oil scavenging line of air receiver clogged.	Remove hoses and clean flow restrictor. Contact Atlas Copco.
Scavenge pipe bended or wrong length fitted.	Check if pipe is straight and reaches the bottom of the separator, correct if necessary. Contact Atlas Copco.

2. Air consumption varies at pressures above working pressure, but engine does not accelerate nor decelerate.

Possible faults	Corrective actions
Regulating air leaks.	Check for leaks and correct.
Regulating air pressure sensor defective or calibration is out of specification.	Replace sensor Contact Atlas Copco.
Speed regulator defective.	Remove, dismantle and inspect parts. Contact Manufacturer.

3. Compressor capacity or pressure below normal.

Possible faults	Corrective actions
Air consumption exceeds capacity of compressor.	Check equipment connected.
Choked air filter elements.	Remove and inspect elements. Clean or replace, if necessary. See section Cleaning the dust trap and Replacing the filter element and the safety cartridge .
Safety valve leaking.	Remove and inspect. Replace if not airtight after reinstallation. Contact Atlas Copco.
Blow-off valve on oil separator vessel is open.	Inspect / replace. Contact Atlas Copco.

Possible faults	Corrective actions
Oil separator element clogged.	Remove, inspect and replace element. Contact Atlas Copco.
Regulating valve defective.	Dismantle and inspect parts. See section Regulating valve .
Air intake throttle valve remains partially closed.	Remove, dismantle and inspect parts. Replace parts if necessary. See section Regulating system .
Blow-off valve in the unloader is leaking or stuck in open position.	Remove and inspect. Replace if necessary. See section Regulating system .
Engine not up to maximum load speed.	Check speed. If the speed is too low contact manufacturer. Contact Manufacturer.

4. Pressure in air receiver rises above maximum and causes safety valve to blow.

Possible faults	Corrective actions
Regulating valve opens too late or its ball valve spring broken.	Dismantle and inspect parts. See section Regulating valve .
Air leaks in regulating system.	Check hoses and their fittings. Stop leaks; replace leaking hoses.
Air intake throttle valve does not close for some reason.	Remove, dismantle and inspect parts. Replace as necessary. See section Regulating system .
Blow-off valve of unloader malfunctioning.	Remove and inspect valve. See section Regulating system .
Minimum pressure valve malfunctioning.	Remove and inspect valve.
Speed regulator malfunctioning.	Remove, dismantle and inspect piston ring and its o-ring. Replace worn or defective parts. Contact Manufacturer.

5. After working for some time, the unit stops through a shutdown switch.

Possible faults	Corrective actions
Engine oil pressure too low.	Check engine oil level and if the right engine oil (viscosity) is being used. Check if the terminals on the oil pressure switch are well connected and not corroded.
Engine overheated.	Clean radiator if clogged. Check cooling fan and fan belts. Check coolant level and top up if necessary. See section Cleaning coolers .
Low coolant level: clogged.	Top up cooling system. If the level is in order check if the machine is not operated on a slope with too big an inclination. Check routing of coolant hoses for good deaeration of the coolant system. Check if coolant sensor is clogged. Check coolant hoses.

Possible faults	Corrective actions
Fuel tank contains insufficient fuel.	Fill fuel tank.
Compressor overheating.	Refer to 7. Compressor overheating .

6. After working for some time, the unit stops for no apparent reason.

Possible faults	Corrective actions
Air bulbs in the coolant system caused the machine to trip.	Check coolant hoses and correct coolant level if necessary.
Fuel starvation by bended fuel hoses or dirt in the suction lines.	Check and correct if necessary.
Wires on engine temperature switch reversed.	Check and correct if necessary.

7. Compressor overheating.

Possible faults	Corrective actions
Insufficient compressor cooling.	Locate compressor away from walls; when banked with other compressors, leave space between them.
Oil cooler clogged externally.	Clean oil cooler. See section Cleaning coolers .
Oil cooler clogged internally.	Clean cooler internally. Contact Atlas Copco.
Oil filters clogged.	Replace filters. See section Compressor oil and oil filter change .
Oil level too low.	Top up level, if necessary. See section Air receiver (oil tank) .
Thermostatic by-pass valve in oil filter housing remains stuck in open position.	Remove and check for proper opening and closing. Replace if out of order. See section Thermostatic bypass valve .
Oil stop valve malfunctioning.	Remove and inspect valve. See section Oil stop valve .
Oil separator element clogged.	Remove, inspect and replace element. Contact Atlas Copco.
Fan blade(s) broken.	Check and correct as necessary.

8. Air outlet temperature above normal value.

Possible faults	Corrective actions
By-pass valve in check valve housing leaks.	Remove and inspect. Contact Atlas Copco.

9. Air and oil mist expelled from air filters immediately after stopping.

Possible faults	Corrective actions
Check valve at element outlet leaking or broken.	Remove and inspect. Replace valve if necessary. Replace air filter elements and safety cartridges. Check the oil level and add oil if necessary. Run the compressor for a few minutes, stop and recheck oil level. Contact Atlas Copco.
Plunger of oil stop valve jammed.	Proceed as mentioned above. Contact Atlas Copco.

TROUBLESHOOTING (ENGINE)

1. Alternator charging problem.

Possible faults	Corrective actions
Alternator drive belts	<ol style="list-style-type: none">1. Inspect the condition of the alternator drive belts. If the alternator drive belts are worn or damaged, replace the belts.2. Check the tension on the alternator drive belts. Adjust the tension, if necessary.
Charging circuit	Inspect the battery cables, wiring, and connections in the charging circuit. Clean all connections and tighten all connections. Replace any faulty parts.
Regulator or alternator	Verify that the alternator or the regulator is operating correctly. Repair the alternator or replace the alternator, as needed. Refer to Electrical system .

2. Battery. Note: This is not an electronic system problem. Refer to Special Instruction, REHS0354, “Charging System Troubleshooting” for the proper testing procedures.

Possible faults	Corrective actions
Battery	<ol style="list-style-type: none"> 1. Verify that the battery is no longer able to hold a charge. 2. Replace the battery.
An electrical device drains the battery.	<ol style="list-style-type: none"> 1. Verify that an electrical device drained the battery by being left in the ON position. 2. Charge the battery. 3. Verify that the battery is able to maintain a charge.

3. Can not reach top engine RPM.

Possible faults	Corrective actions
Fuel supply	<ol style="list-style-type: none"> 1. Check the fuel lines for the following problems: restrictions, collapsed lines, and pinched lines. If problems are found with the fuel lines, repair the lines and/or replace the lines. 2. Check the fuel tank for foreign objects which may block the fuel supply. 3. Check for air in the low pressure fuel supply system: 4. Cold weather adversely affects the characteristics of the fuel. Refer to the Operation and Maintenance Manual for information on improving the characteristics of the fuel during cold weather operation. 5. Check the fuel pressure during engine cranking. Check the fuel pressure on the outlet side of the fuel filter. <p>Refer to Fuel system.</p>
Air inlet and exhaust system	<ol style="list-style-type: none"> 1. Clean plugged air filters or replace plugged air filters. 2. Check the air inlet and exhaust system for restrictions and/or leaks. <p>Refer to Air system.</p>
Accessory equipment	<p>Check all accessory equipment for problems that may create excessive load on the engine. Repair any damaged components or replace any damaged components.</p>

4. Coolant in engine oil.

Possible faults	Corrective actions
Engine oil cooler core	<ol style="list-style-type: none">1. Check for leaks in the oil cooler core.2. Drain the crankcase and refill the crankcase with clean engine oil. Install new engine oil filters. Refer to Cooling system .
Cylinder head gasket	<ol style="list-style-type: none">1. Remove the cylinder head.2. Check the cylinder liner projection.3. Install a new cylinder head gasket and new water seals in the spacer plate. Refer to Engine maintenance .
Cylinder head	Check for cracks in the cylinder head.
Cylinder liners	Check for cracked cylinder liners. Refer to Engine maintenance .
Cylinder block	Inspect the cylinder block for cracks. Refer to Engine maintenance .

5. Coolant temperature is too high.

Possible faults	Corrective actions
	Refer to Systems Operation/Testing and Adjusting, "Cooling System - Check" for information on determining the cause of this condition.

6. Electronic service tool will not communicate with ECM.

Possible faults	Corrective actions
Start the engine. If the engine starts, but the ECM will not communicate with Cat ET, continue with this procedure. If the engine will not start, refer to 7. Engine cranks but will not start . If the engine will not crank, refer to 14. Engine will not crank .	
Electrical connectors	Check for correct installation of the J1/P1 and J2/P2 ECM connectors and of the service tool connector. Refer to Regulating system .
Electrical power supply to the service tool connector.	Verify that battery voltage is present between terminals A and B of the service tool connector. If the communication adapter is not receiving power, the display on the communication adapter will be blank.

Possible faults	Corrective actions
Electrical power supply to the Electronic Control Module (ECM).	Check power to the ECM. Note: If the ECM is not receiving battery voltage, the ECM will not communicate. Refer to Electrical system .

7. Engine cranks but will not start.

Possible faults	Corrective actions
Starting motor solenoid or starting circuit	<ol style="list-style-type: none"> 1. Test the operation of the starting motor solenoid. 2. Check the engine wiring to the starting motor solenoid. 3. Test the operation of the starting motor. 4. Inspect the starter motor pinion and the fly-wheel ring gear for damage.
Engine speed/timing sensors	If the engine is cranking and Cat ET displays zero rpm, a problem exists in the circuits for the engine speed/timing sensors. Refer to Engine sensors .
Electrical connections to the electronic unit injector	Ensure that the electronic unit injector connector (J300/P300) is fully connected and free of corrosion.
Fuel supply	<ol style="list-style-type: none"> 1. Check the fuel level. 2. Monitor the exhaust for smoke while the engine is being cranked. If no smoke is present, there may be a problem with the fuel quality or there may be a problem with the fuel supply. 3. Check the fuel pressure. 4. Ensure that the fuel system has been primed. 5. Check for fuel supply lines that are restricted. 6. Check the fuel filters. 7. Cold weather adversely affects the characteristics of the fuel. Refer to Fuel system .
Combustion problem	<p>Examples of conditions that may cause combustion problems are shown in the following list:</p> <ul style="list-style-type: none"> - Cold temperatures - Injector misfiring - Low compression - Mechanical problem - Valve lash settings

8. Engine has early wear.

Possible faults	Corrective actions
Incorrect engine oil.	Use engine oil that is recommended and change the engine oil.
Contaminated engine oil	Drain the crankcase and refill the crankcase with clean engine oil. Install new engine oil filters. Refer to Caterpillar manual.
Contaminated air	Inspect the air inlet system for leaks. Inspect all of the gaskets and the connections. Repair any leaks. Inspect the air filter. Replace the air filter, if necessary.
Contaminated fuel	Inspect the fuel filter. Replace the fuel filter, if necessary. Obtain a fuel analysis.
Low oil pressure	When some components of the engine show bearing wear in a short time, the cause can be a restriction in a passage for engine oil.

9. Engine misfires, runs rough or is unstable.

Possible faults	Corrective actions
Electrical connectors	Check for correct installation of the Electronic Control Module (ECM) connectors and the unit injector-connectors. Refer to Regulating system .
Cold mode	Use Cat ET to verify that the engine has exited cold mode. Cold mode operation may cause the engine to run rough and the engine power may be limited.
Throttle signal	Monitor the throttle signal on Cat ET. Verify that the throttle signal is stable from the low idle position to the high idle position.
Unit injectors	<ol style="list-style-type: none">1. Use Cat ET to determine if there are any active diagnostic codes for the unit injectors.2. Perform the injector solenoid test on Cat ET in order to determine if all of the injector solenoids are being energized by the ECM.3. Perform the cylinder cutout test on Cat ET in order to identify any injectors that might be misfiring. Refer to Regulating system .

Possible faults	Corrective actions
Fuel supply	<ol style="list-style-type: none"> 1. Check the fuel lines for the following problems: restrictions, collapsed lines, and pinched lines. If problems are found with the fuel lines, repair the lines and/or replace the lines. 2. Check the fuel tank for foreign objects which may block the fuel supply. 3. Check for air in the low pressure fuel supply system. 4. Purge air from the low pressure fuel supply circuit. Note: Cold weather adversely affects the characteristics of the fuel. 5. Check the fuel pressure during engine cranking. Check the fuel pressure after the fuel filter. Refer to Fuel system.
Air inlet and exhaust system	<ol style="list-style-type: none"> 1. Check for an air filter restriction. 2. Check the air inlet and exhaust system for restrictions and/or for leaks. Refer to Air system .

10. Engine oil in cooling system.

Possible faults	Corrective actions
Engine oil cooler core	<ol style="list-style-type: none"> 1. Inspect the engine oil cooler for leaks. If a leak is found, replace the oil cooler core. 2. Drain the crankcase and refill the crankcase with clean engine oil. Install new engine oil filters. Refer to Cooling system .
Cylinder head gasket	<ol style="list-style-type: none"> 1. Remove the cylinder head. 2. Check the cylinder liner projection. 3. Install a new cylinder head gasket and new water seals in the spacer plate. Refer to Engine maintenance .

11. Engine oil temperature is too high.

Possible faults	Corrective actions
Engine oil level	Inspect the engine oil level. If necessary, add oil.
Coolant temperature	If a high coolant temperature condition is also occurring. Refer to Cooling system .

Possible faults	Corrective actions
Engine oil cooler bypass valve	Clean the engine oil cooler bypass valve and inspect the engine oil cooler bypass valve. Clean the bore for the valve. Ensure that the bypass valve is not stuck in the open position. Replace the bypass valve, if necessary. Refer to Cooling system .
Engine oil cooler core	Clean the engine oil cooler core or replace the engine oil cooler core. Refer to Cooling system .

12. Engine stalls at low RPM.

Possible faults	Corrective actions
Unit injectors	<ol style="list-style-type: none"> 1. Check for correct installation of the J1/P1 and J2/P2 connectors for the Electronic Control Module (ECM). Check for correct installation of the J300/P300 connectors for the unit injectors. 2. Perform the “Injector Solenoid Test” with the Caterpillar Electronic Technician (ET) in order to determine if all of the injector solenoids are being energized by the ECM. 3. Perform the “Cylinder Cutout Test” with Cat ET in order to identify any injectors that might be misfiring. Refer to Regulating system .
Fuel supply	<ol style="list-style-type: none"> 1. Check the fuel pressure. 2. Check the fuel lines for the following problems: restrictions, collapsed lines, and pinched lines. If problems are found with the fuel lines, repair the lines and/or replace the lines. 3. Check the fuel tank for foreign objects which may block the fuel supply. 4. Check for air in the low pressure fuel supply system if any of the following procedures have been performed. 5. Purge air from the low pressure fuel supply circuit. 6. Cold weather adversely affects the characteristics of the fuel. 7. Check the fuel pressure after the fuel filter while the engine is being cranked. Refer to Fuel system .
Accessory equipment	Check all accessory equipment for problems that may create excessive load on the engine. Repair any damaged components or replace any damaged components.

13. Engine vibration.

Possible faults	Corrective actions
Vibration damper	Check the vibration damper for damage. Install a new vibration damper, if necessary. Inspect the mounting bolts for damage and/or for wear. Replace any damaged bolts. Refer to Engine maintenance .
Engine supports	Inspect the mounts and the brackets while you run the engine through the speed range. Look for mounts and brackets that are loose and/or broken. Tighten all of the mounting bolts. Install new components, if necessary.
Driven equipment	Check the alignment and the balance of the driven equipment.

14. Engine will not crank.

Possible faults	Corrective actions
Batteries and/or Battery cables	<ol style="list-style-type: none">1. Inspect the main power switch, battery posts, and battery cables for loose connections and for corrosion.2. Inspect the batteries. Charge the batteries. Load test the batteries. Refer to Electrical system .
Starting motor solenoid or Starting circuit	<ol style="list-style-type: none">1. Test the operation of the starting motor solenoid.2. Check the wiring to the starting motor solenoid.
Starting motor or Flywheel ring gear	<ol style="list-style-type: none">1. Test the operation of the starting motor.2. Inspect the starting motor pinion and the flywheel ring gear for damage.
Transmission or Engine accessories	<ol style="list-style-type: none">1. Ensure free movement of the driveline.2. Ensure that the timing pin was not left in the flywheel housing.3. Remove any engine accessories that may lock up the engine and inspect any engine accessories that may lock up the engine. The following list illustrates examples of engine accessories that may lock up the engine: <ul style="list-style-type: none">- Hydraulic pump that is driven from the rear gear group- Air compressor- Engine oil pump- Other components that are driven by the engine

15. Excessive black smoke.

Possible faults	Corrective actions
Air inlet and exhaust system	<ol style="list-style-type: none"> 1. Check the air inlet system for restrictions and/or leaks. Check for an air filter restriction. Check for derates and for alarms. Perform a visual inspection of the system for restrictions and/or leaks. 2. Ensure that the turbocharger has not failed. 3. Check the exhaust system for restrictions. 4. Repair any leaks that were found. Remove any restrictions that were found. Replace any damaged components that were found.
Engine speed/timing sensor	<ol style="list-style-type: none"> 1. Check the calibration of the engine speed/timing sensor. 2. Verify that the crankshaft and the camshaft drive gears are set with the proper orientation. <p>Refer to Engine sensors.</p>
Atmospheric pressure sensor	<p>Check the atmospheric pressure sensor for dirt and/or for debris. Remove any dirt and/or debris that is present. The correct reading for the atmospheric pressure is between 50 kPa (7.25 psi) and 100 kPa (14.5 psi).</p>
Boost pressure sensor, "Fuel position" and/or "FRC Fuel Limit"	<ol style="list-style-type: none"> 1. Monitor the status of "Fuel Position" and "Rated Fuel Limit" while the engine is operating under full load. If "Fuel Position" equals "Rated Fuel Limit" and "Fuel Position" is less than "FRC Fuel Limit", the electronics are operating correctly. Otherwise, proceed to the next Step. 2. Verify that there are no active diagnostic codes for the boost pressure sensor. 3. Monitor the status of "Boost Pressure" and "Atmospheric Pressure" for normal operation on the Caterpillar Electronic Technician (ET). When the engine is not running, "Boost Pressure" should be 0 kPa (0 psi). <p>Note: A problem with the FRC will only cause black smoke during acceleration. A problem with the FRC will not cause black smoke during steady state operation.</p>
Flash file	<p>Verify that the correct flash file is installed. Refer to Regulating system.</p>
Fuel quality	<p>Cold weather adversely affects the characteristics of the fuel. Refer to Fuel system.</p>
Valve adjustment	<p>Check the valve adjustment. Refer to Engine maintenance.</p>

16. Excessive engine oil consumption.

Possible faults	Corrective actions
Oil leaks	Locate all oil leaks. Repair the oil leaks. Check for dirty crankcase breathers.
Oil level	Remove excess oil. Locate the source of the excess fluid. Repair the leaks that are causing the problems. Recheck all fluid levels.
Engine oil temperature	Refer to 11. Engine oil temperature is too high.
Turbocharger	Check the air inlet manifold for oil. If necessary, repair the turbocharger or replace the turbocharger.
Valve guides	If the valve guides are worn, reconditioning of the cylinder head is required.
Piston rings	Inspect the internal engine components. Replace any worn components.

17. Excessive fuel consumption.

Possible faults	Corrective actions
Engine operation	Use the Caterpillar Electronic Technician (ET) to check the “Current Totals” for excessive idle time and/or for a high load factor which would be indicative of poor operating habits. Note: Engine operation may also be affected by environmental conditions such as wind and snow.
Fuel leaks	Check the fuel pressure during engine cranking. Check the fuel pressure after the fuel filter. If the fuel pressure is low, replace the fuel filters. If the fuel pressure is still low, check the following items: fuel transfer pump, fuel transfer pump coupling, and fuel pressure regulating valve. Refer to Fuel system.
Fuel quality	Cold weather adversely affects the characteristics of the fuel. Refer to Fuel system.
Engine speed/timing	Cold weather adversely affects the characteristics of the fuel. Refer to Fuel system.

Possible faults	Corrective actions
Unit injectors	<ol style="list-style-type: none"> 1. Check for correct installation of the J1/P1 and J2/P2 Electronic Control Module (ECM) connectors and the unit injector connectors. 2. Perform the “Injector Solenoid Test” on Cat ET in order to determine if all of the injector solenoids are being energized by the ECM. 3. Perform the “Cylinder Cutout Test” on Cat ET in order to identify any injectors that might be misfiring. <p>Refer to Regulating system.</p>
Air inlet and exhaust system	<ol style="list-style-type: none"> 1. Inspect the air filter for a restriction. If the air filter shows signs of being plugged, clean the air filter or replace the air filter. 2. Check the air inlet and exhaust system for restrictions and/or for leaks. <p>Refer to Air system.</p>
Accessory equipment	<p>Check all accessory equipment for problems that may create excessive load on the engine. Repair any damaged components or replace any damaged components.</p>

18. Excessive white smoke.

Possible faults	Corrective actions
Starting aids	<p>Air Inlet Heater (if Equipped) Ensure that the air inlet heater is functioning properly.</p> <p>Ether Injection System (if Equipped) Ensure that the ether injection system is programmed to “On”. Ensure that the ether injection system is functioning properly.</p>
Fuel supply	<ol style="list-style-type: none"> 1. Monitor the exhaust for smoke while the engine is being cranked. If no smoke is present, there may be a problem with the fuel quality or there may be a problem with the fuel supply. 2. Check the fuel pressure. 3. Ensure that the fuel system has been primed. 4. Check for fuel supply lines that are restricted. 5. Cold weather adversely affects the characteristics of the fuel. <p>Refer to Fuel system.</p>
Cooling system	<p>Check for an internal coolant leak. Check for coolant in the engine oil, coolant in the cylinders, and coolant in the exhaust system. Refer to Cooling system.</p>

Possible faults	Corrective actions
Diagnostic codes	Connect the Caterpillar Electronic Technician (ET) and check for active diagnostic codes. Troubleshoot any active diagnostic codes before continuing with this procedure.
Electrical connectors	Check for correct installation of the J2/P2 Electronic Control Module (ECM) connector and of the J300/P300 unit injector connectors. Refer to Electrical system .
Air inlet and exhaust system	<ol style="list-style-type: none"> 1. Check the air inlet manifold pressure. Check for air inlet restrictions and/or leaks. 2. Check for leaks between the exhaust manifold and the turbocharger. Check for exhaust restrictions. Refer to Air system .

Technical specifications

TORQUE VALUES

FOR GENERAL APPLICATIONS

The following tables list the recommended torques applied for general applications during assembly of the compressor.

For hexagon screws and nuts with strength grade 8.8

Thread size	Torque value (Nm / lbf.ft)
M6	8 (6) +/-25 %
M8	20 (15) +/-25 %
M10	41 (30) +/-25 %
M12	73 (54) +/-25 %
M14	115 (85) +/-25 %
M16	185 (137) +/-25 %

For hexagon screws and nuts with strength grade 12.9

Thread size	Torque value (Nm / lbf.ft)
M6	14 (10) +/-21 %
M8	34 (25) +/-23 %
M10	70 (52) +/-24 %
M12	120 (89) +/-25 %
M14	195 (144) +/-23 %
M16	315 (233) +/-23 %

FOR IMPORTANT ASSEMBLIES

Assemblies	Torque value (Nm / lbf.ft)
Compressor to frame	
Bolts, elements/gear casing	46 (34) +/- 10%
Bolts, elements/support	80 (59) +/- 10%
Bolts, support/buffer	205 (151) +/- 10%
Bolts, buffer/frame	80 (59) +/- 10%
Engine to frame	
Bolts, engine/support	205 (151) +/- 10%
Bolts, support/buffer	46 (34) +/- 10%
Bolts, buffer/frame	23 (17) +/- 10%



Secure the drain cock and tank cap of the fuel tank handtight.

SETTINGS OF SHUTDOWN SWITCHES AND SAFETY VALVES

Designation		XRV 946 - XRV 2000 CD6
Engine oil pressure	bar(e)	1.6
	psi	23.2
Engine oil temperature	°C	95
	°F	203
Compressor temperature	°C	111
	°F	232
Safety valve opening pressure		
- EC type	bar(e)	30
	psi	435

COMPRESSOR/ENGINE SPECIFICATIONS

REFERENCE CONDITIONS

Designation		XRV 946 - XRV 2000 CD6
Absolute inlet pressure	bar(e)	1
	psi	14,5
Relative air humidity	%	0
Air inlet temperature	°C	20
	°F	68
Nominal effective working pressure	bar(e)	25
	psi	363

The inlet conditions are specified at the air inlet grating outside the canopy.

LIMITATIONS

Designation		XRV 946 - XRV 2000 CD6	
Minimum effective receiver pressure	bar(e)	15.5	
	psi	225	
Maximum effective receiver pressure, compressor unloaded	bar(e)	27	
	psi	392	
Maximum ambient temperature at sealevel	Standard EC / Non EC	°C	45/50
		°F	113/122
	Aftercooler option EC / Non EC	°C	40/45
		°F	104/113
Minimum starting temperature	°C	-10	
	°F	14	
Minimum starting temperature, with coldstart equipment ¹⁾	°C	-25	
	°F	-13	
Altitude capability	m	see curve	

PERFORMANCE DATA

At reference conditions, if applicable, and at normal shaft speed, unless otherwise stated.

Designation		XRV 946 - XRV 2000 CD6	
Engine shaft speed, normal and maximum		r/min	1600
Engine shaft speed, compressor unloaded		r/min	1200
Free air delivery (FAD) ¹⁾	Standard	l/s	460
		cfm	975
	Aftercooler option	l/s	450
		cfm	953
Fuel consumption			
- at 100% FAD	Fuel expert	kg/h	62.1
		lb/h	136.9
	No Fuel expert	kg/h	62.1
		lb/h	136.9
- at 75% FAD	Fuel expert	kg/h	47.0
		lb/h	103.6
	No Fuel expert	kg/h	55.4
		lb/h	122.1
- at 50% FAD	Fuel expert	kg/h	39.2
		lb/h	86.4
	No Fuel expert	kg/h	47.2
		lb/h	104.1
- at 25% FAD	Fuel expert	kg/h	34.6
		lb/h	76.3
	No Fuel expert	kg/h	36.7
		lb/h	80.9
- at unload	Fuel expert	kg/h	30.2
		lb/h	66.6
	No Fuel expert	kg/h	30.2
		lb/h	66.6

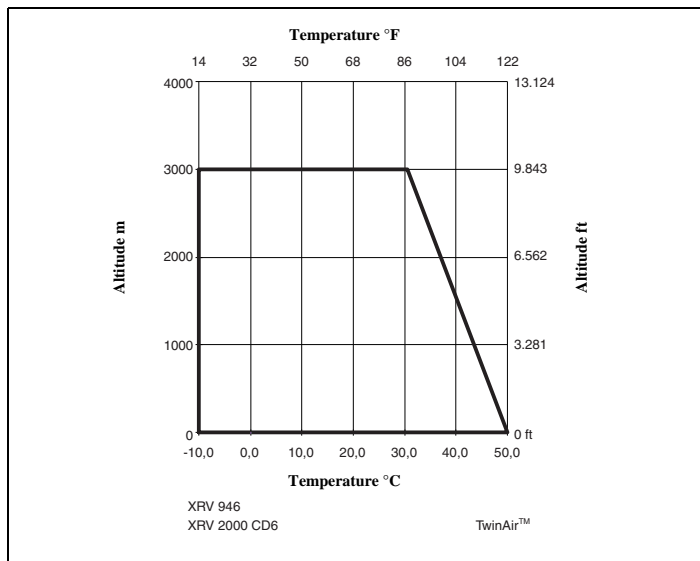
Designation		XR V 946 - XR V 2000 CD6
Specific fuel consumption at 100% FAD	g/m ³	37.5
	lb/1000 cu.ft	2.34
Typical oil content of compressed air	mg/m ³	<3
	oz/1000 cu.ft	< 0.003
Engine oil consumption (maximum)	g/h	155.25
	oz/h	5.48
Compressed air temperature at outlet valve	°C	110
	°F	230
Noise level		
- Sound pressure level (LP), measured according to ISO 2151/EPA under free field conditions at 7 m distance	dB(A)	72/76
- Sound power level (LW) complies with 2000/14/EC	dB(A)	100
- Sound power level (LW) complies with 84/533/EEC and 85/406/EEC limits	dB(A)	104

¹⁾ Free air delivery is measured according to ISO 1217 ed.3 1996 annex D

Tolerance:	<ul style="list-style-type: none"> • +/- 5% 25 l/s (53 cfm) < FAD < 250 l/s (530 cfm) • +/- 4% 250 l/s (530 cfm) < FAD
The international standard ISO 1217 corresponds to following national standards:	<ul style="list-style-type: none"> • British BSI 1571 part 1 • German DIN 1945 Part 1 • Swedish SS-ISO 1217 • American ANSI PTC9

Performance data

Max. allowable working pressure as a function altitude and ambient temperature.



DESIGN DATA

Compressor

Designation	
Number of compression stages	2

Engine

Designation		XRV 946 - XRV 2000 CD6
Make		Caterpillar
Type		C13 ATAAC
Coolant		Liquid
Number of cylinders		6
Bore	mm	130
	in	5.12
Stroke	mm	157
	in	6.18
Swept volume	l	12.5
	cu.in	762.75
Output according to DIN 6271 at normal shaft speed	kW	317.8
	hp	426
- Load factor ¹⁾	%	70
Capacity of oil sump:		
- Initial fill	l	44
	US gal	11.62
- Refill (max.) ²⁾	l	42
	US gal	11.10

Designation		XRV 946 - XRV 2000 CD6
Capacity of cooling system	l	60
	US gal	15.85

1) Typical average load factor.

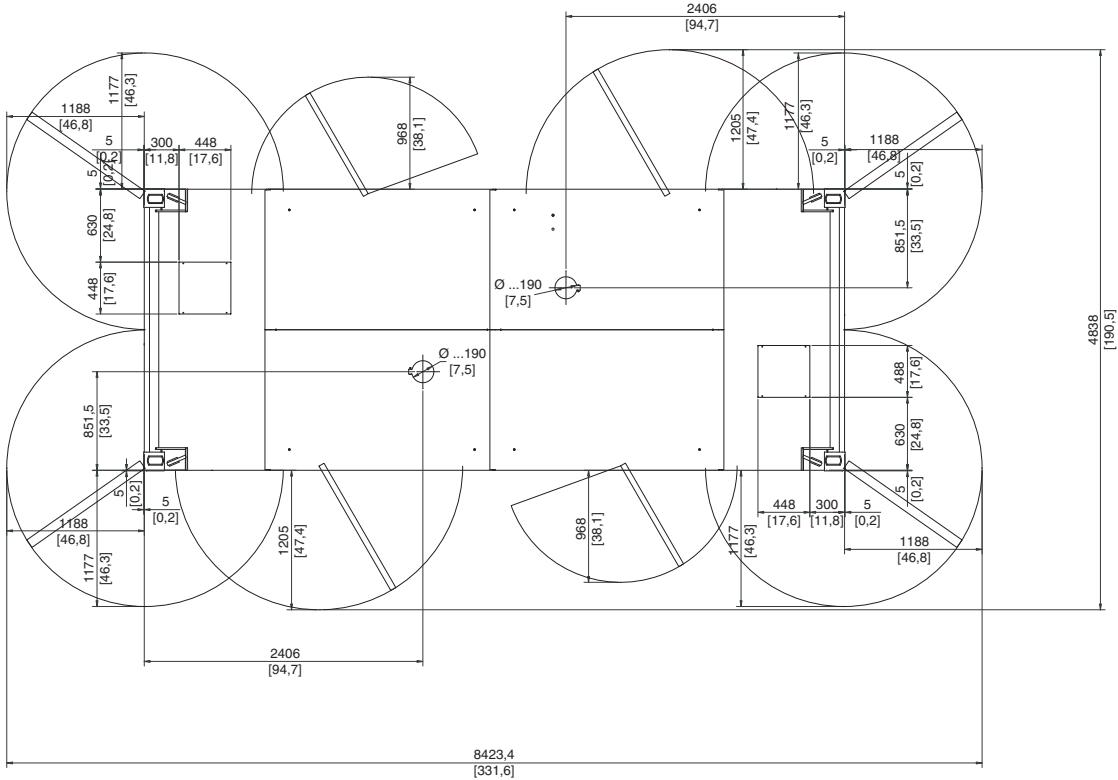
2) With filter change.

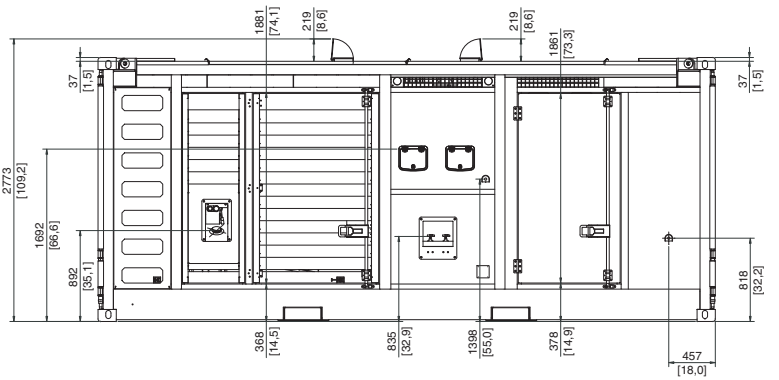
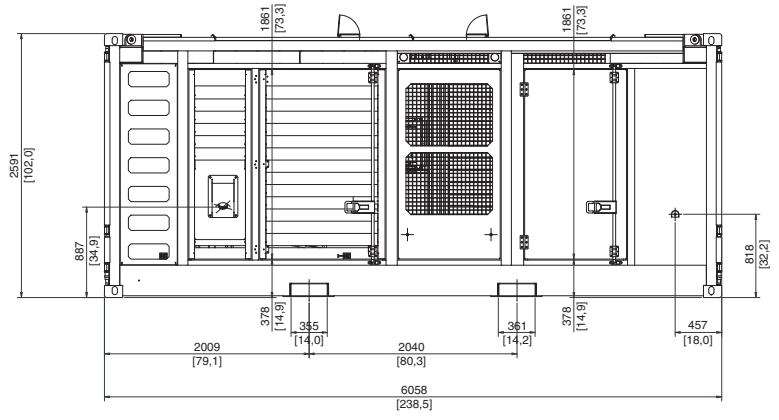
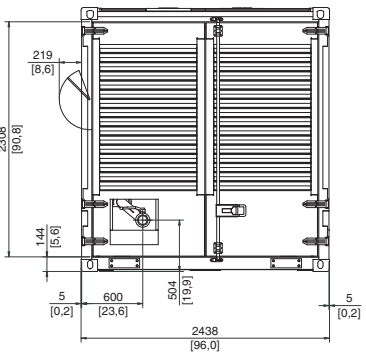
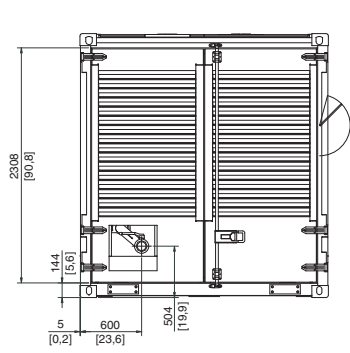
Unit

Designation		XRV 946 - XRV 2000 CD6
Capacity of compressor oil system	l	75
	Imp gal	16.5
Net capacity of air receiver	l	143
	Imp gal	31.5
Capacity of fuel tanks	l	796
	Imp gal	175
Air volume at inlet grating (approx.) ¹⁾	m ³ /s	14.6
	cfm	3.0 x 10 ⁴

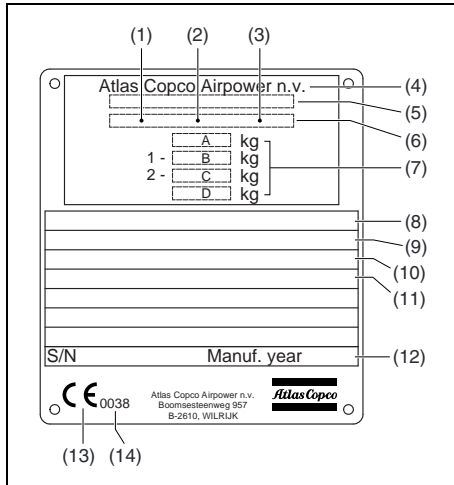
1) Air required for engine and compressor element cooling, for combustion and for compression.

Compressor dimensions





Data plate



- 1 Company code
- 2 Product code
- 3 Unit serial number
- 4 Name of the manufacturer
- 5 EEC or national type approval number
- 6 Identification number
- 7 **A** Maximum permitted total weight
- 8 Model
- 9 Working pressure
- 10 Speed
- 11 Engine power
- 12 Manufacturing year
- 13 CE mark
- 14 Register number or number of notified body

CSC DATA PLATE



All containers are CSC safety approved as indicated by the CSC data plate. This safety approval is valid till the date mentioned at the bottom line. The container has to be tested before this date to get the safety approval prolonged.

DNV DATA PLATE



All containers that are intended to be used off-shore are to be DNV approved. To keep the DNV approval the container has to be tested at regular intervals according to the local regulations.

Disposal

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, used and disposed.

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

Material selection, substantial recyclability, disassembly possibilities and separability of materials and assemblies are considered, as well as environmental perils and dangers to health during the recycling and disposal of the unavoidable rates of non-recyclable materials.

Your Atlas Copco compressor consists for the most part of metallic materials, that can be remelted in steelworks and smelting works and are therefore almost infinitely 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 correct disposal of the product you help prevent possible negative consequences for environment and health as a result of inappropriate waste handling.

Recycling and re-usage of material help preserve natural resources.

DISPOSAL OF MATERIALS

Dispose of contaminated substances and material separately, in accordance with locally applicable environmental legislation.

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

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

Dispose of all components in accordance with applicable disposal regulations.

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

Maintenance Log

Compressor Customer

Serial number

Service hours	Maintenance action	Date	By: initials



Following documents are provided with this unit:

- Test Certificate
- EC Declaration of Conformity:

Atlas Copco			
EC DECLARATION OF CONFORMITY			
1 We, Atlas Copco Airpower n.v., declare under our sole responsibility, that the product 2 Machine name : Compressor (≥ 350 kW) 3 Commercial name : 4 Serial number :			
5 Which falls under the provisions of article 12.2 of the EC Directive 2006/42/EC on the approximation of the laws of the Member States relating to machinery, is in conformity with the relevant Essential Health and Safety Requirements of this directive.			
The machinery complies also with the requirements of the following directives and their amendments as indicated.			
Directive on the approximation of laws of the Member States relating to	Harmonized and/or Technical Standards used	Att	m[nt]
6 Pressure equipment	97/23/EC		x
7 Machinery safety	2006/42/EC	EN ISO 12100-1 EN ISO 12100-2 EN 1012-1	
8 Electromagnetic compatibility	2004/108/EC	EN 61000-6-2 EN 61000-6-4	
9 Low voltage equipment	2006/95/EC	EN 60334 EN 60204-1 EN 60439	
10 The harmonized and the technical standards used are identified in the attachments hereafter 11 Atlas Copco Airpower n.v. is authorized to compile the technical file			
12 Conformity of the specification to the Directives		13 Conformity of the product to the specification and by implication to the directives	
14 Issued by 15 Product engineering		16 Manufacturing	
17 Name 18 Signature			
19 Place, Date			
20 Atlas Copco Airpower n.v. A company within the Atlas Copco Group			
21 Postal address P.O. Box 100 B-2610 Wilrijk-Antwerp Belgium www.atlascopco.com		22 Visitors address Boomslootweg 957 B-2610 Wilrijk-Antwerp Belgium	
23 Phone: +32 (0)3 870 21 11 Fax: +32 (0)3 870 24 43		24 Com. Reg. Antwerp 44851 V.A.T. 403.992.231	
25 For info, please contact your local Atlas Copco representative			
26 p. 1/1			

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