MSP 2000-2500-3000
USER MANUAL

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NOTE ON INSTRUCTIONS

You have acquired a MAC3 mobile compressor.

We thank you and congratulate you for this choice that will bring you satisfaction.
Nevertheless please read carefully these instructions before you use it.

WE INSIST ON THE OBLIGATION TO FULLY INFORM THE OPERATOR IN ORDER TO AVOID ANY RISK OF ACCIDENT.
A COPY OF THIS MANUAL MUST REMAIN IN THE COMPRESSOR AS WELL AS THE INSTRUCTIONS ABOUT THE DIESEL ENGINE.

Registration:

The machines are considered by the French and European authorities to be road trailers and must comply with the highway regulation.

IT IS THEREFORE NECESSARY TO REQUEST A VEHICLE REGISTRATION CERTIFICATE FROM A LOCAL AUTHORITY IN CHARGE.

We provide you with all the documents necessary to obtain the registration certificate.

NON-BRAKED COMPRESSORS must be towed by a vehicle having a net weight at least 2 times higher than the total authorized loaded weight of the towed compressor

This weight is indicated in paragraph 2, line PTAC (total authorized loaded weight) = ___ KG

BRAKED COMPRESSORS must be towed by an adapted vehicle.

Towable weight is in generally specified in the registration certificate of a van or a truck. If in doubt, you can contact the manufacturer of a towing vehicle.

You should check if a category of your driving license corresponds to a towing vehicle.

Insurance

For use on the road, your compressor must be insured as a trailer.
We also encourage you to think about preventive insurance covering against damages to the machine and thefts from construction sites.

1. SAFETY

All MAC3 products are designed and manufactured with aim of user's safety, but the best insurance against an accident is to be cautious. Every operator, regardless of his experience, should read this manual and relating documentation before operating the compressor or any connected equipment. The owner has the obligation to forward these instructions to all operators and train them to use equipment safely.

Be sure to observe the following instructions for safe use.

1.1 FOLLOW THE SAFETY INSTRUCTIONS

- Read this manual carefully before starting to use the compressor.
- Commission and use this compressor only in accordance with all standards and regulations in force.
- Learn how to use and operate this equipment.
- Be aware of capacity and limits of this equipment.
- Before allowing a third party to use your compressor, explain its operation and be sure that the user manual has been read.
- Do not make any modification on the compressor without the manufacturer's written agreement.
- If the compressor does not work properly, call your MAC3 compressor dealer.

1.2 MOVING - TOWING

Before towing make sure that:
- the enclosure is correctly closed and fixed.
- tires are in good condition and inflated to the correct pressure, and all the nuts well tightened.
- all signal lights function correctly and the connection voltage is 12V.
- the compressor is correctly fixed to the trailer in case of this option.
- check that the stand leg is safely locked in the raised position.
- the signal lights and retro-reflectors are clean and not damaged.

CAUTION: the trucks are generally equipped with 24V

- Adjust the drawbar properly to the height of the towing equipment so that the drawbar is as level as possible, block correctly locking levers and pin them.
- Lock the stand leg(s) in the raised position and hitch up the drawbar making sure it is properly locked.
- Connect the signal cable and check the proper functioning of the lights.
- Hook the chains to the attachment points on the towing vehicle (for compressors without brake).
- Attach the safety cable (for compressors fitted with inertia braking).
- Make sure that the chains, electric cables or other doesn't reduce possible movements of the compressor.
- Check that the chains, electric cables or other do not drag nor rub on the road, which might cause wear and make them inoperative.
- Do not allow the transport of persons on the compressor.
- Check that the space behind the compressor is free of all obstacles before maneuvering.

IMPORTANT
When parking a compressor fitted with a European inertia brake, it is necessary to tighten the handbrake strongly enough to compress the compensator spring, to avoid releasing the brakes while driving in reverse.

1.3 OPERATING CONDITIONS

- Park or locate the MAC3 compressor on level and solid ground and closed area with sufficient load-bearing capacity. Do not place it on gradients exceeding 27% (15°).
- Locate the rear-end of the MAC3 compressor upwind so that dust from the construction site does not come in through admission grids and that wind blows exhaust gases and the heated air away.
- Pull the handbrake of the compressor (if equipped with the handbrake option) or immobilize the compressor with wheel chocks in front of or behind the wheels.
- Disconnect all elements connected to the towing vehicle.
- Lower the stand leg and make sure that the compressor is in horizontal position and that the ground is solid enough to bear its load.
- Do not wear loose clothes near the machine that might be caught in rotating or moving parts.
- According to local regulations, the nature of the work and working conditions, use recommended or required personal protective equipment.
- Do not operate the compressor if you are under the influence of medicines, drugs or alcohol or if you feel tired.
- Do not operate the compressor if you know that its safe operation is not ensured.
- Perform, every day, all the maintenance operations recommended.
- Inspect the compressor daily and check the possible leaks, loose, damaged or improperly adjusted parts, as well as the missing parts or components of the compressor.
- Don't wear headphones to listen to the music or the radio when operating the compressor.

1.4 PRESSURE DANGERS

- Do not use equipment and accessories (hoses, fittings...) that are rated below the maximum rating pressure of the compressor, or use a regulator set correctly.
- Do not exceed manufacturer's rated operating pressures for these items.
- Secure all hose connections by suitable devices to prevent them from being accidentally disconnected.
- Do not open fluid filler cap when compressor is running and is pressurized, wait until the internal pressure in the sump tank comes down to zero.
- Vent all internal pressure prior to any intervention on the components such as hoses, drain plugs, filters, line oilers etc.
- Stay out of reach of any point of compressed air discharge.
- Do not use compressed air at pressures higher than 207 kPa (2.07 bar – 30 psi) for cleaning purposes. You must use effective personal protective equipment and chip guarding.
- Be careful and cautious when you use compressed air hoses, because there is a danger of death or serious injury.

1.5 CONTROL CHECKS BEFORE STARTING THE MAC3 COMPRESSOR

- Make sure to check the compressor before using it. Do not operate the compressor if there is a defect. Repair it immediately.
- Check that all protective housings are in place before operating the compressor. Replace any damaged or missing component.
- Make sure that yourself and the other present persons are at safe distance before starting the engine.
- Always keep a compressor at a minimum distance of one meter from buildings and other equipment.
- Do not allow children or animals to approach the machine while the engine is running.
- Do not start the engine by shorting the starter connections, the compressor could start and run.
- Do not bypass and do not disable safety devices.

1.6 KEEP THE COMPRESSOR MAC3 AND ITS ENVIRONMENT CLEAN

- Be sure to completely stop the compressor before cleaning. Stop the compressor at idle by closing the valves.
- Keep the compressor clean and free of any accumulation of dirt, grease and trash to avoid the risk of fire.
- Store flammable liquids in suitable containers and cabinets, away from sources of sparks and heat.
- Detect and repair leaks immediately.

1.7 SAFE HANDLING OF FUEL AND LUBRICANTS

- Always stop the compressor before refueling or lubricating it.
- Do NOT smoke and keep all flames or sparks away from your work area. The fuel is extremely flammable and explosive under certain conditions.
- Refuel in a well-ventilated area or outdoors. If you spill fuel or lubricants, refuel the compressor the after the engine cools down.
- Do NOT mix alcohol nor diesel fuel with gasoline. This mixture may cause a fire or serious damages to the engine.
- Do not use unapproved containers, e.g. buckets, bottles, jars. Use fuel storage containers and approved dispensers.

1.8 EXHAUST GASES AND FIRE PREVENTION

- The engine exhaust gases can be very harmful if they are left to accumulate. Make sure to operate the engine in a well-ventilated space where there is not any person or animal near the engine.
- The exhaust gases coming out of the muffler are very hot. To prevent a fire, do not expose dry grass, the grass cuttings, oil or any other flammable material to the exhaust gases. Always keep the engine and muffler clean.
- To avoid fire, pay attention to possible leakages of inflammable substances from hoses and ducts.
- Check possible leaks from hoses or ducts (fuel, hydraulic fluid) by following the preventive maintenance check list.
- To avoid fire, do not short the cables and electrical wires. Check the shape of all electrical wires and cables. Keep all electrical connections clean. A bare wire or frayed insulation can cause dangerous electric shocks and injuries.

1.9 FLUID LEAKS

- Remove the pressure from air, oil and cooling circuits before disconnecting pipes, fittings or related items.
- Pay attention to the possible residual pressure when you disconnect a device from a pressurized circuit. Do NOT try to detect pressure leaks with your hands. Oil, fuel or compressed air can cause injuries.
- Fluid leaking under pressure has enough force to penetrate under the skin and cause serious bodily injuries.
- It is not always possible to identify a leak from a tiny hole. Use a piece of paper or wood to locate a suspected leakage: do not use your hands or body. Wear safety glasses or other kinds of eye protection when detecting leaks.
- In case of contact with the liquid, contact a doctor immediately. This liquid can cause gangrene or a severe allergic reaction.

1.10 BURNS, FIRE AND EXPLOSION

- To minimize risk of burns, avoid bodily contact with hot components, e.g. muffler, muffler housing, cooler, hoses, engine housing, air end, coolant, engine and compressor oil etc., during operation and after stopping the engine.
- Do NOT remove the cooler cap while the engine is running, or immediately after the engine stops. If you do so, the cooler may eject hot water. Wait until the cooler is completely cold before removing the cap. Protect yourself with safety glasses.
- Don't forget to close the coolant drain valve, block the cooler cap and tighten the hose clamp before running the engine. If these pieces become unfastened or loose, they might cause a risk of serious injuries.
- Battery presents a risk of explosion. When the battery is charging, a highly explosive gas mixture of hydrogen and oxygen is formed.

- Keep flames, sparks and other ignition sources away, especially during recharging the battery and when you refuel. Do not light a match near the battery and the fuel tank.
- Do NOT check the battery charge by placing a metal object between the terminals. Use a voltmeter or a hydrometer.
- Do NOT charge a frozen battery. There is risk of explosion. If the battery is frozen, heat it up to 16° C (61° F) at least.
- Do NOT charge a battery whose temperature exceeds 45°C (113°F)
- When servicing and operating the compressor, keep nearby a suitable fully charged fire extinguisher complying with local regulations.
- If you need to perform welding operations, remove all inflammable items that are nearby.
- Keep oil rags, leaves, litter or other combustibles away from the compressor.
- When working in forest areas, try to place the compressor in an open area and make sure that leaves or branches are not in contact with hot parts of the compressor.
- Keep electrical wiring, including all terminals and other pressure connectors, in good condition. Replace any wiring that is cracked, cut, worn out or with degraded insulation. Change all discolored or corroded connections. Keep all connections clean and tight.

1.11 MOVING PARTS

- Shut off the engine before controlling or adjusting alternator or compressor belt tension.
- Keep hands, arms and other parts of the body away from moving parts, such as fan, V-belt, fan or compressor transmission pulley. Contact with rotating parts might cause serious injuries.
- Do not attempt to operate the compressor with the housings or guards removed. Fasten properly protection guards before starting the compressor.
- Keep access doors closed except when making repairs, adjustments, or starting/stopping the compressor.
- Make sure all personnel are clear of the compressor before starting it.

1.12 TOXIC AND IRRITATING SUBSTANCES

- Do not use air from the compressor for breathing. For this purpose it is necessary to use air treatment equipment in full compliance with EEC standards and any other local codes or regulations.
- Do not use the compressor in closed areas. If you have no alternative and the compressor must be used indoors, you must evacuate the exhaust gases outdoors.
- The exhaust gases should not be directed towards the servicing personnel or towards the air intake of the compressor because it might diffuse it back to the personnel.
- The exhaust gases should not directed towards the air intake of the compressor and the engine because it might damage equipment and impact the performance of the compressor.
- The antifreeze is toxic. Wear rubber gloves to prevent from injuries. In case of contact with the skin, wash immediately.
- Do not mix different types of antifreeze. The mixture may cause a chemical reaction and release harmful substances. Use genuine MAC3 antifreeze.
- In case of contact of the antifreeze with eyes or if its vapors irritate the eyes, wash them with large quantities of clean water. Immediately contact a physician, preferably an ophthalmologist.
- Protect the environment and the nature. Before draining liquids, determine the right way of waste disposal. Respect the regulations for the protection of the environment when you remove oil, fuel, coolant, filters, batteries or brake fluid.
- For draining compressor liquids, put a drain pan under the engine to avoid spillage.
- Do not spill waste liquids on the ground, in sewage systems or in water sources. Make sure waste liquids are processed in accordance with local regulations.

1.13 LIFTING

Before lifting the compressor make sure that:

- There are no cracks in the welding points of the slings, of the attachment points or other elements used for lifting,
- There are no deformations or corrosion on the elements used for lifting.
- Screws and bolts are tightened.
- The lifting hook is equipped with a functional safety device, and that it is fully engaged and latched.
- That the lifting capacity of a whole lifting structure exceeds the weight of the equipment to lift. The weight of the equipment to lift must include the weight of the compressor, the weight of tools or other equipment that

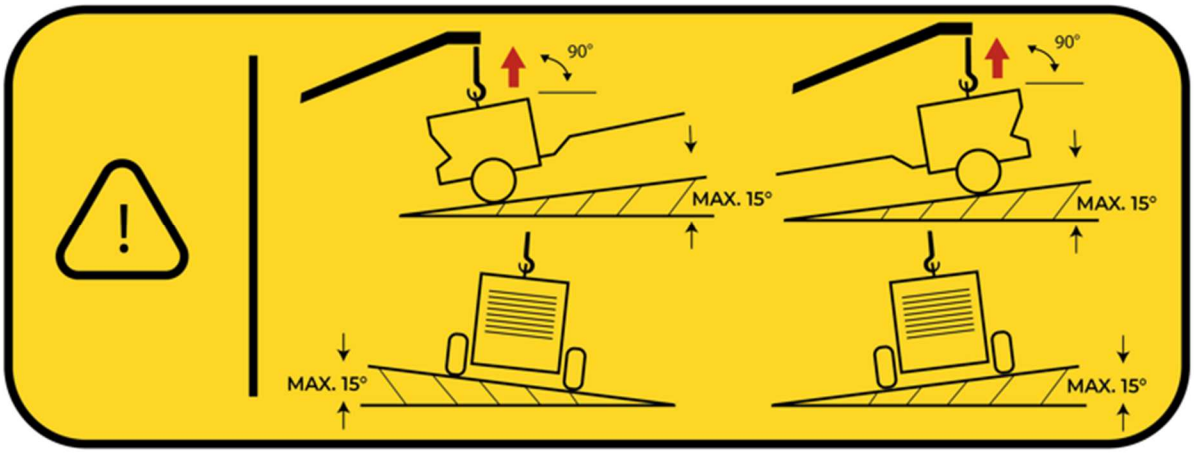
might have been stored in the compressor, mud, snow... If in doubt, it is necessary to weigh the compressor before lifting.

Lifting:

- Tilting movements must be limited and rotation must be prevented.
- Do not lift the compressor in high winds.
- Keep personnel out of the lifting area.
- Do not lift the compressor higher than necessary.
- Keep lift operator in constant attendance during the lifting operation.

Important:

If the compressor needs to be lifted by helicopter, instead of using the lifting ring you should use suitable equipment complying with the regulation in force.
It is strictly forbidden to store the compressor suspended by the lifting ring.

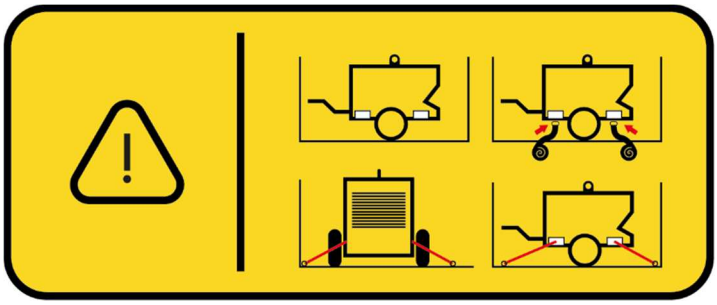


1.14 TRANSPORT AND STOWAGE

Packaging and stowage depend on the transport mode used.
Respect the safety instructions and the good conduct rules to prevent accidents.
Comply with local regulations and directives relating the goods transport.
Stow and secure the machine so that it cannot move, roll or overturn.
Stowing is the driver or carrier responsibility.

MAC3 declines all responsibility in event of damage linked to inappropriate conditions transport.

In general way:
- Use wedges to prevent the machine for rolling.
- Use straps to secure the machine.
    - Be careful, do not strap above the bodywork, this could damage it.
    - You can pass the straps behind the wheels at the axle or in the rims.
    - You can use stowing points available, identified by the following symbol:



1.15 SAFETY AND MAINTENANCE CHECKS

- When you proceed to inspection or maintenance of the compressor, put it first on a large level surface. Do NOT work on it if ONLY placed on a jack or a winch. Always use adapted wheel chocks or safety stands to support the compressor before servicing.
- Disconnect the battery from the compressor before servicing. Place a label "DO NOT USE!" on the ignition key to prevent accidental starting.
- In order to prevent sparks from accidental short-circuiting, first disconnect the earth cable (-) from the battery and reconnect it last.
- Stop the compressor and remove the key before performing any periodic maintenance checks and cleaning.
- Before any checks or servicing, leave the engine, air end, oil, coolant, muffler and muffler housing completely cooled down.
- Always use suitable tools and clamping devices. Before any intervention, make sure they are in good condition. Verify that you know how to use them.
- Use ONLY the correct tools to rotate the engine by hand. Do not attempt to rotate the engine by pulling or prying on the cooling fan and the V-belt. This practice might result in serious injuries or early deterioration of the fan and the belt.
- Replace the fuel and lubricant pipes with their fixing collars according to the recommendations of the maintenance plan. They are made of rubber and wear down gradually.
- If an intervention requires two or more service persons, be sure to work safely.
- Always keep a first aid kit and a fire extinguisher within easy reach.

2. TECHNICAL DATA

2.1 COMPRESSOR DATA

Compressor	MSP 2000	MSP 2500	MSP 3000
• Free air delivery (l/mn - cfm) according to ISO 1217 ± 5%.	2000 - 70	2500 - 90	2900 - 105
• Maximum pressure (bar - psi).....	8 - 116	8 - 116	8 116
• Working pressure (bar - psi)	7 - 100	7 - 100	7 - 100
• Minimum separator pressure (bar - psi)	3.5 - 50	3,5 50	4.6 67
• Safety valve opening pressure (bar - psi)	10 - 145	10 - 145	10 - 145
Compressor oil			
• Total capacity (l).....	15	15	15
• Total oil capacity (l)	6.5	6.5	6.5
Motor			
• Maximum operating speed (rpm)	2500(0+50)	3000(0+50)	2850(0+50
• Minimum operating speed (rpm)	1850	1850	1850
• Engine oil sump capacity, about (l)	4.1	4.1	4.1
Cooling system			
• Quantity of refrigerant (l) …….....	7.5	7.5	7.5
Axle-mounted version			
- Total weight ready for use (kg - lbs)……	516 - 1138	519 - 1144	529 - 1166
- Total authorized loaded weight (kg - lbs)……	750 - 1653	750 - 1653	750 - 1653
Version on skid			
- Total weight ready for use (kg - lbs)……	445 - 981	448 - 988	458 - 1010
Version on trailer			
- Total weight ready for use (kg - lbs)……	581 - 1281	584 - 1287	594 - 1310
- Total authorized loaded weight (kg - lbs)……	750 - 1653	750 - 1653	750 - 1653
Single trailer			
- Unloaded weight (kg - lbs)……	140 - 309	140 - 309	140 - 309
- Total authorized loaded weight (kg - lbs)……	750 - 1653	750 - 1653	750 - 1653

Compressor
Asymmetric rotary with oil injected.

Engine
KUBOTA water cooling, indirect injection, electric starter, and diesel fuel circuit vent.
3 cylinders engine model D1105

Capacity control system
Progressive control system which adjusts the compressor output to match the nominal pressure air demand by regulating the engine speed and by closing the suction valve.

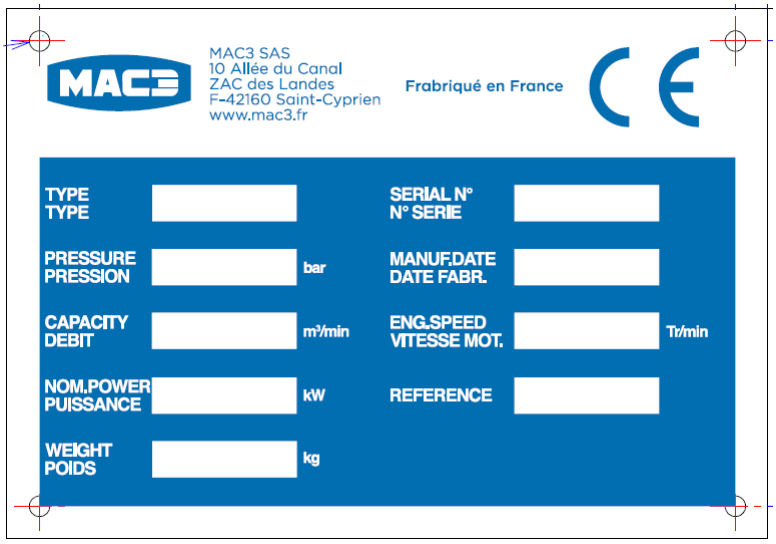
Canopy
Steel sheet chassis with 4 shock absorbers where is positioned the compressor unit, wall which is fixed on the radiator

Undercarriage
Articulated ALKO drawbar

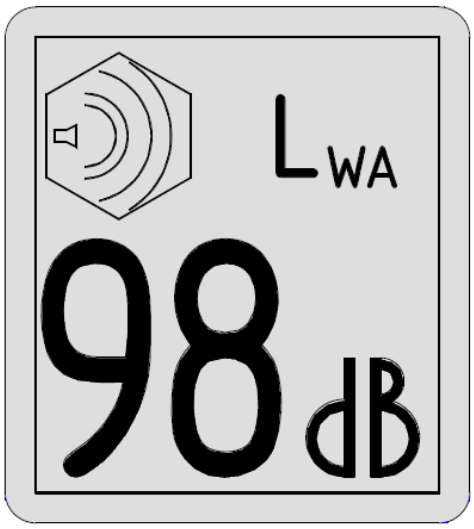
Trailer
Metal plate fixed on articulated ALKO undercarriage.

2.2 COMPRESSOR IDENTIFICATION

The compressor is designated with a serial number, which is stamped on the manufacturer's name plate located inside the compressor.



2.3 EC STAMPED NOISE

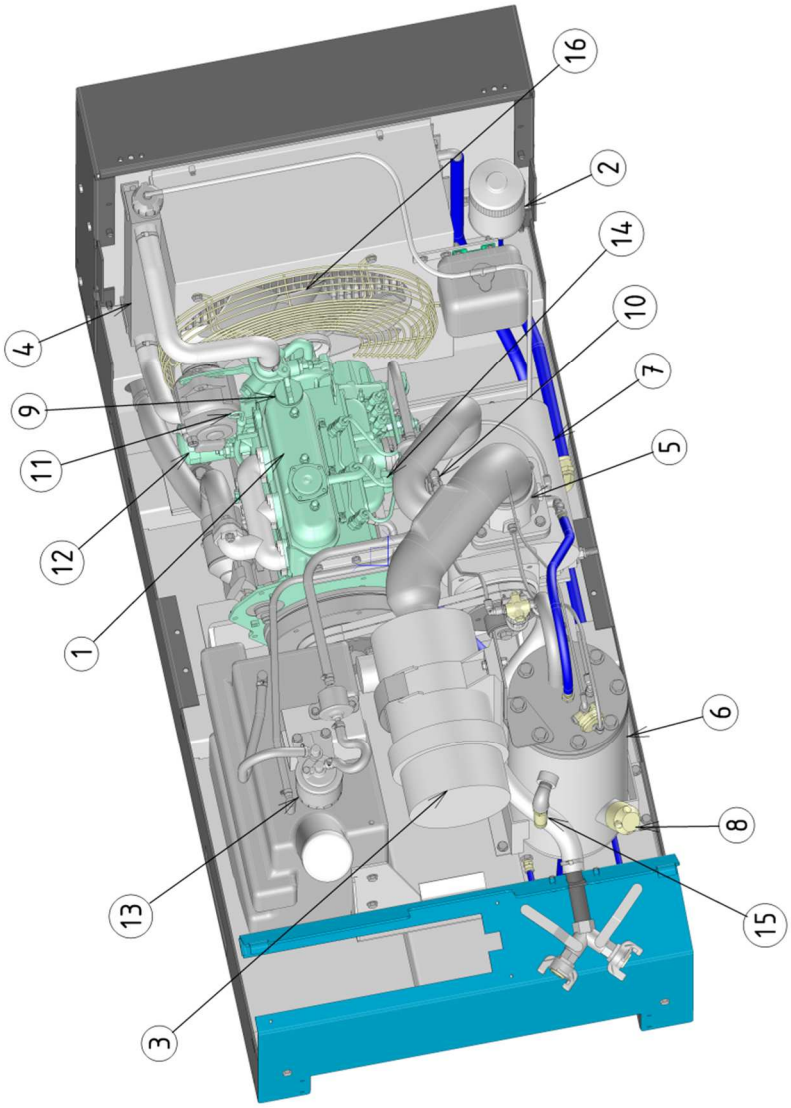


2.4 MAIN DATA

Components which are stamped with a manufacturer's name plate.

- Engine serial number + brand
- Air end serial number + brand
- Separator serial number + brand
- Valve serial number + brand
- Serial No. Undercarriage
- Road homologation number

3. DESCRIPTION



1 - Engine
2 - Compressor oil filter
3 - Compressor air filter / engine
4 - Compressor cooling liquid / engine
5 - Inlet valve
6 - Separator
7 - Ai-end
8 - Filling compressor oil
9 - Filling of engine oil
10 - Motor speed control cylinder
11 - Engine oil dipstick
12 – oil filter
13 - Fuel filter
14 - Stop solenoid
15 - Safety valve
16 - Fan

3.1 COMPONENTS DESCRIPTION

The package includes a diesel KUBOTA 3 cylinders engine (type D1105), an air-end, a capacity control system, a compressor cooling and a battery. Please refer to engine and battery usage manual to get more information. The engine cooling system is comprised of a water radiator and an oil radiator for the air-end. The fan which is common to both radiators is used to exhaust air and to maintain both engine and air-end to the appropriate running temperature. The engine drives the air-end via trapezoidal belts. The compressor's fuel tank has sufficient capacity for a full day's operation. The compressor includes safety devices both on running temperature and pressure.

3.2 SAFETY DEVICES

• Pressure safety valve (15) on the separator (6).
Three safety devices are provided to shut down the engine by an electro (14) stop when a fault occurs. The battery charge lamp on the instrument panel then lights up. These safety devices protect the engine and compressor against the risk of:
• Engine oil pressure drop : pressure switch on the engine (1)
• Compressor overheating: thermal switch on the air-end (7)
• Engine overheating: water thermal switch on the engine (1)
They function by closing their contacts at earth which energize the safety relay. The latter opens its contact and cuts off the electro-stop which in turn cuts the engine injection (even with a passing fault).
The engine stops. The air circuit is decompressed. The load indicator light lights up. The hour meter stops counting.

3.3 COMPRESSOR COOLING

The compressor cooling and lubrication system is designed to provide adequate lubrification as well as maintain the proper operating temperature of the compressor.
• The fan (16) exhausts the heat coming from the compression of the air with the oil, which flows through the cooler (4) and cooled thanks to the air issued from the fan (16)
• In operation, fluid circulates from the separator (6) to the cooler (4). This circulation is caused by the pressure difference between the separator (6) (high pressure) and the low pressure zone of the air-end (7) compressor unit. The fluid is then returned to the main fluid filter (2) where it is filtered prior to being re-injected into the compression chamber and bearings of the compressor unit.

3.4 SEPARATOR

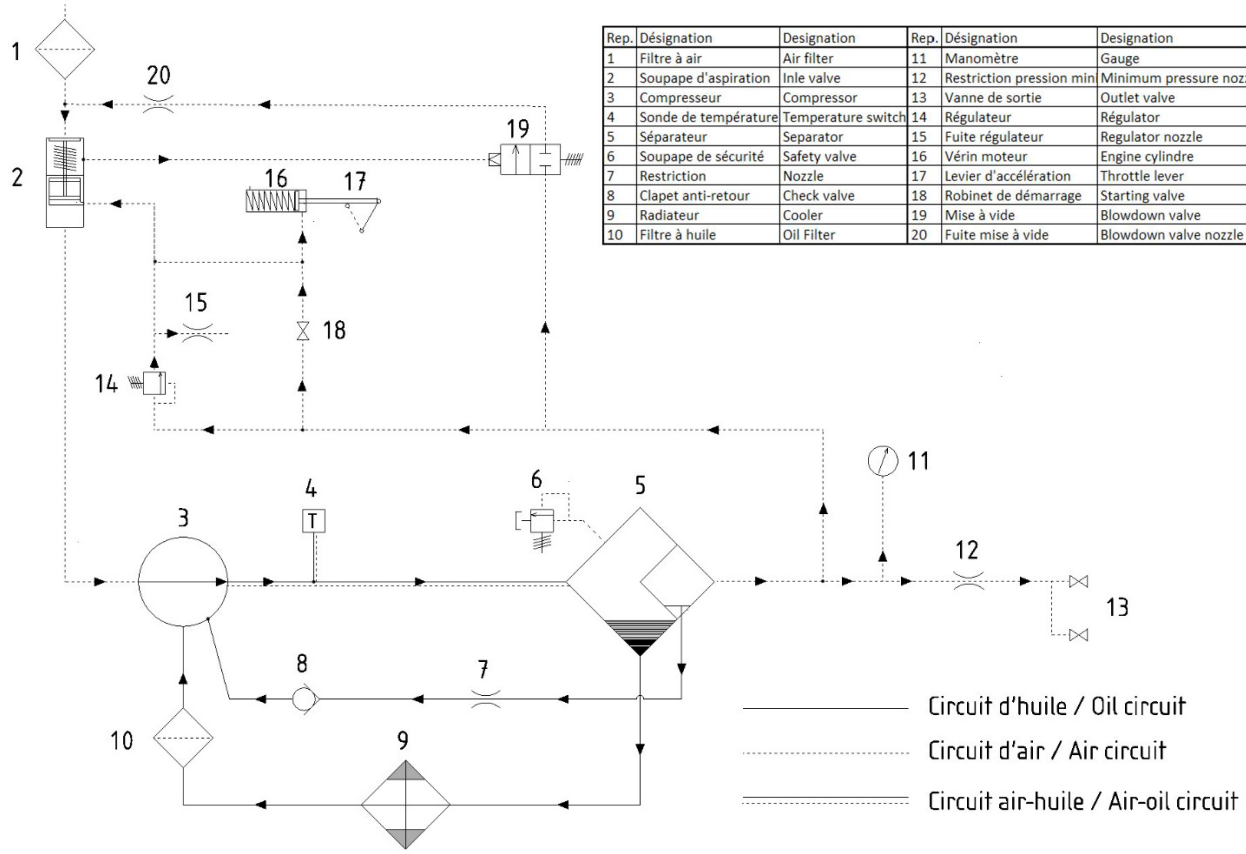
The separator has 4 main functions:
• Primary fluid separation system.
• Final fluid separation system.
• Fluid tank.
• Air reserve for the regulation.

The compressed air/fluid mixture is then pushed into the separator, where it is throw through the separator body. This brutal change of direction slow down the air speed and creates larger droplets of fluid which to the bottom of the sump. The remaining oil contains in the air is separate thanks to the separator cartridge and, per gravity, goes down to the sump where it is pushed by pressure difference in the dip tube that leads back to the air-end suction. The separator is EC certified. A calibrated orifice or a minimum pressure valve, located downstream of the separator, ensures a minimum pressure of the separator indicated on the characteristic table. This pressure is necessary for proper air/fluid separation and proper fluid circulation A safety valve (15), located on the separator, is intended to open when the pressure of the separator exceeds the value indicated in the characteristic table.

3.5 COMPRESSOR FLUID

The fluid has 3 main functions:
• As coolant, it controls the rise of air temperature associated with the heat of compression.
• Seals the leakage paths between the rotor and the stator and also between the rotors themselves;.
• Acts as a lubricating film between the rotors allowing one rotor to directly drive the other, which is an idler.

3.6 PNEUMATIC AND HYDRAULIC DIAGRAM



Rep.	Désignation	Designation	Rep.	Désignation	Designation
1	Filtre à air	Air filter	11	Manomètre	Gauge
2	Soupape d'aspiration	Inle valve	12	Restriction pression min	Minimum pressure nozzle
3	Compresseur	Compressor	13	Vanne de sortie	Outlet valve
4	Sonde de température	Temperature switch	14	Régulateur	Régulator
5	Séparateur	Separator	15	Fuite régulateur	Regulator nozzle
6	Soupape de sécurité	Safety valve	16	Vérin moteur	Engine cylindre
7	Restriction	Nozzle	17	Levier d'accélération	Throttle lever
8	Clapet anti-retour	Check valve	18	Robinet de démarrage	Starting valve
9	Radiateur	Cooler	19	Mise à vide	Blowdown valve
10	Filtre à huile	Oil Filter	20	Fuite mise à vide	Blowdown valve nozzle

3.7 REGULATION

3 possibilities can be presented (with the valve (18) on RUN position):

A. Higher consumption than the compressor delivery.

The pressure inside the separator (5) never rich the operating pressure designed by the pressure regulator (14). The inlet valve (2) is fully opened and the engine runs at maximum speed. The compressor is under dimensioned compared to the application where the air is directly directed outside to clean up the hoses.

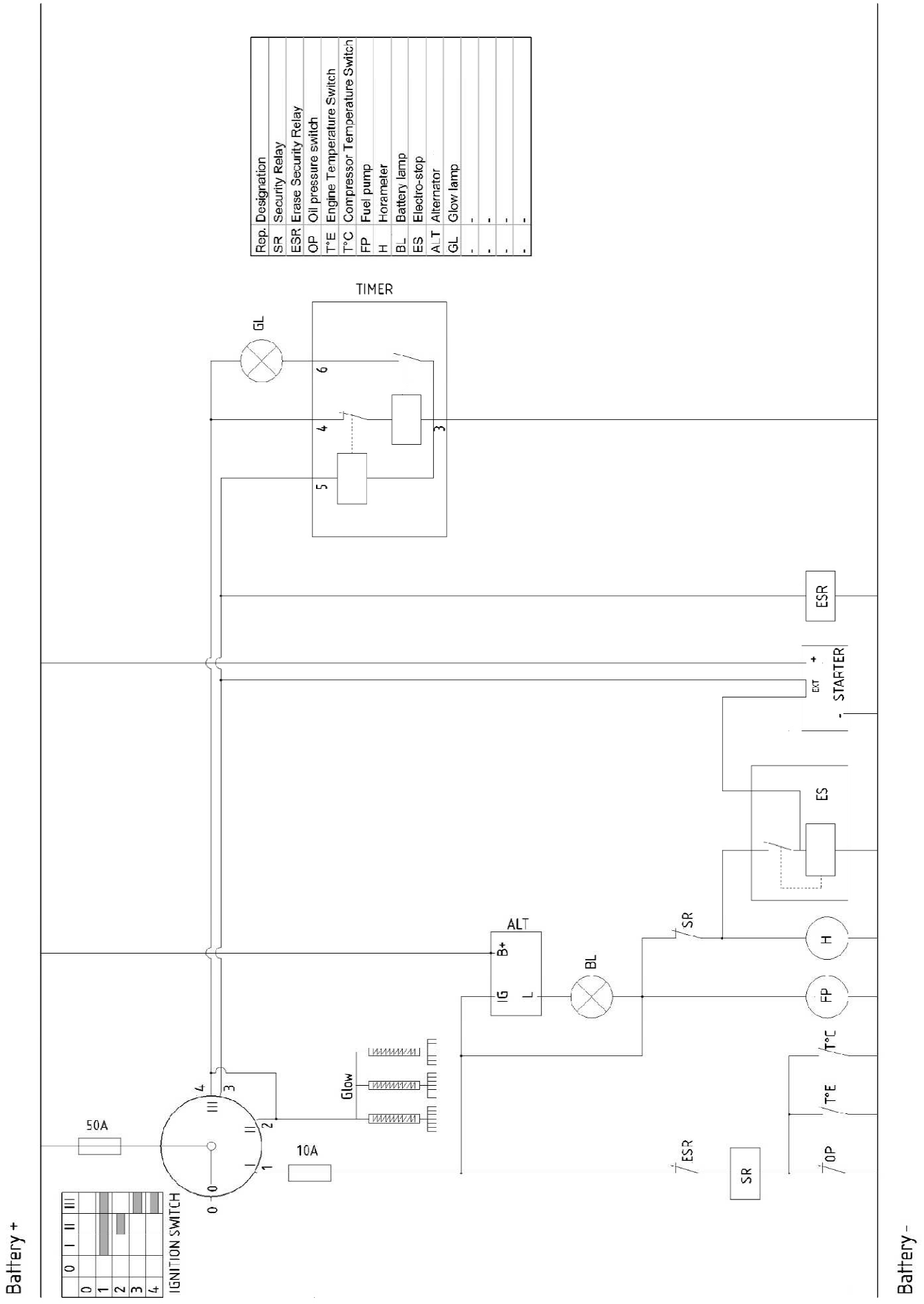
B. Less consumption than the compressor delivery.

The pressure in the separator (5) reaches the working pressure. The pressure regulator (14) opens and supplies the inlet valve (2), which close slightly. It also powers the engine speed control cylinder (16) which drops the engine speed. Lower the air consumption is, higher the pressure is and higher the regulator (14) will flow into the inlet valve (2) and the cylinder (16). Which slightly close the inlet valve (2) and slow down the engine speed. A slightly leakage (15) through the regulator (14) allows a quick stabilized position of the cylinder (16) and then a speed engine which follows slightly the air consumption.
An adequate regulation allows limiting the air consumption and allows also maintaining the compressor reliability.

C. Zero consumption:

The pressure in the air flow is at its maximum. The regulator (14) is open at its maximum and supplies the inlet valve (2) which close down completely and also the cylinder (16) which drives the engine speed (17) which then adjusts the engine to run at idling speed. Only a small quantity of air is flowing in view to ensure that the lubrication system functions correctly. The excess compressed air can escape through the bleeder valve.

3.8 ELECTRICAL DIAGRAM



4. USE

In case of non-usage higher than 6 months, thanks to ask MAC3 representative to make the « long term stop », in order to avoid any trouble when running again.

-

DAILY CONTROL In order to avoid any trouble on the compressor usage, it is important to check the compressor running conditions. Before starting :	
1. Ensure than parts which have been previously damaged, have been changed.	
2. Looking around the compressor	(1) oil r water leakage
	(2) engine oil level and contamination
	(3) gasoil level
	(4) compressor oil level and contamination
	(5) cooling level
	(6) dust inside the air filter canopy
	(7) parts damaged and non-fixed bolt
3. When turning on keys	(1) correct running of the control panel indicators
4. When running the compressor	(1) smoke color
	(2) Unusual motor noise

4.1 PARKING OR LOCATING COMPRESSOR

- The compressor set must always been positioned on a stretch of flat and level ground.
- In a very dusty environment, install the compressor in the least polluted area.
- Never maintain dust or gasoline nearby the battery, the wiring, the exhaust muffler or the engine in order to avoid any fire risk. Check and clean them every day before starting.
- Operate in, a ventilated area.
- Never operating the compressor in an enclosed area unless the latter is of sufficient dimensions and provided with suitable ventilation for the discharge of hot air and exhaust gases and the supply of fresh air.
- To avoid any risk of recycling hot air, never place the fresh air suction ports, hot air discharge ports and exhaust outlet too close to an obstacle.

4.2 PRECAUTIONS TO BE TAKEN PRIOR TO STARTING

NOTE: *for all engine procedures, consult the engine manual.*

- Take out children from the proximity of the compressor.
- Keep your arm our body away from the running parts, as the cooling ventilator, the trapezoidal belt… these parts could injure.
- Never run the compressor after drinking alcohol, or taken medicine or when too tired.
- Never work when wiring too big clothes. They can be taken inside the moving parts and caused an incident. When working, used security devices to be wear accordingly.
- Do not wear radio or Head band Head phones for music when operating the compressor.
- Check that there is enough room from the engine.
- After an engine repair, re-install all the protection devices and keep out all repair tools that have been used.

CHECK:

• The compressor internal cleanliness (oil, fuel, cloths, …).
• The compressor air filter cleanliness if working in a very dusty atmosphere. Pinch dust valve drain.
• That the separator pressure is null.
• That the lever is maintained in acceleration position when the compressor is stopped.

IMPORTANT:

• Be sure to tighten the radiator pressure cap securely after filling up.
• The separator oil level: keep the level at maximum. The maxi level is determined by the filling hole thus it cannot be overfilled.
• Fuel pre-filter cleanliness: the filter should not contain water or dirt. If necessary, change it.
To ensure that oil levels are stabilized, they should always be checked when the compressor set is cold.
Use only the oils recommended in the maintenance section.

4.3 STARTING

Starting should not be attempted until all the operations detailed in the previous section have been accomplished.

IMPORTANT
During cold days, always follow the instruction given in the engine manual.

Steps:

- Close the air outlet valves.
- Turn the starting valve on START-STOP position.
- Turn on the COM selector switch: the battery charge lamp lights up. Securities devices are stopped during the starting process.
- Preheating. Hold down until PRE lamp goes out.
- Turn the key to engage the starter, then release as soon as the engine starts. (*Spark plug preheating are supplied during this phase)*
- Allow the compressor set to warm up for about 5 minutes and turn the starting valve on RUN position to obtain the working pressure.

NOTE:
When temperatures are lower than 5°C, do not insist more than 10 seconds when starting and do gain the operation from the pre-heating phase.

4.4 USAGE

- Check the compressor air exhaust are close and connect the supply hose to the valves. Progressively open the tap to purge them and taken out water which should be inside.
- Shut the valves before connecting the tools which are used with the compressor
- Progressively open the valves.

IMPORTANT
Never open suddenly and quickly the tap to avoid the lashing of flexible hoses and projection of impurity which can generate accident.

4.5 SHUTTING DOWN

- Close the air valves, turn the started valve on START-STOP position and let the compressor idle for 1 or 2 minutes to decrease the pressure and avoid a sudden stop.
- Switch off the ignition switch which turn off the electrical break and stops the engine and the airend.

IMPORTANT

Check that the inside pressure is down to 0 bar after a few seconds.
A blow down valve controlled by the back pressure of the air circuit in the suction valve after compressor stopping vacuum the circuit in the suction hose.

5. MAINTENANCE

IMPORTANT

The operations of maintenance indicated in this manual worker are given for normal conditions of use.. In difficult conditions, temperatures extremes, high hygrometry, polluting atmosphere, high height, etc. some operations must be more made frequently and particular precautions must be taken. Consult on this matter the engine manual and the local agent MAC3. Respect the general regulations of safety and accident prevention (see Ch. 1).

Elimination of lubricants and other products:

The drained products as oil, fuel, grease, coolant, battery electrolyte, cleaning liquid should not penetrate the ground. They must be collected in suitable containers and must be destructed, according to the valid regulations for each product. This procedure is also valid for filter cartridges and spare parts.

ATTENTION!

DO NOT remove the lids, caps and other components, when the compressor is working or under pressure. Stop the compressor, check there is any internal pressure before disassembly.

WASHING THE COMPRESSOR

Always avoid the electrical parts when washing the compressor.

RUNNING IN

The compressor set must be closely monitored during the running in period. Besides the daily operations (or 10 hourly operations), the following specific operations must be done after 50 hours:

5.1 MAINTENANCE - 50 hours

Follow the instructions in the “maintenance plan” document and also carry out these few checks:

COMPRESSOR SET:
- check drive belt tension
- purge the fuel tank and circuit
- check fuel pre-filter
- check tightness of bolts

ENGINE : (see engine manual)
- check and clean the air filter
- drain the sump.
- change the oil filter cartridge
- change the fuel filter cartridge et prefilter (if necessary)
- check fan belt tension
- check valve clearance

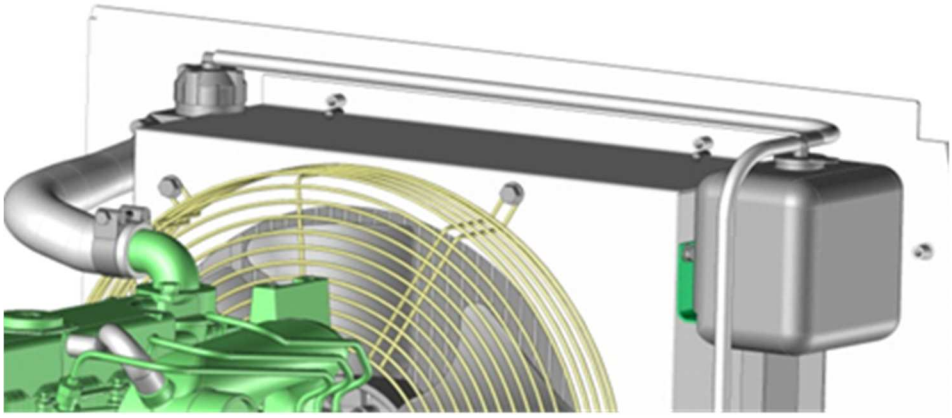
COMPRESSOR
- check and clean the air filter
- change the oil filter
- check the control functioning (speed and pressure

5.2 TABLE OF MAINTENANCE OPERATIONS

Follow the instructions in the “maintenance plan” document and also carry out these few checks:

OPERATION
Daily • check fuel tank level • check oil level (engine and compressor) • check radiator coolant level • check dust drain valve air filter • check fuel prefilter • check battery (electrical connection)
Every 100 Hours or every week (the first reached) • clean air filter (compressor, engine) • clean radiator
Every 100 Hours • clean complete group set • clean separator dip tube mesh strainer (Return oil separator to air end) • control fan belt tension • control compressor belt tension • check battery charge • check the fuel circuit • lubrication of hinge points • check tyre pressure and tightness of wheel nuts
Every 200 Hours • drain engine and change the oil filter • check cooling circuit • change fuel filter • change fuel prefilter
Every 500 hours • change air filter cartridge
Every 500 hours or 6 months (the first reached) • clean complete compressor set • change separator oil • change oil filter compressor • check max speed and idle speed
Every 1000 hours or 1 years (the first reached) • change compressor belt • change fan belt • change separator cartridge
Every 2000 hours or 2 years (the first reached) • change radiator coolant • check regulating system • clean fuel tank

5.3 COOLING



IMPORTANT

-If the cap of the cooler has to be removed, follow the instructions mentioned here below and then tighten it securely.
-If there is a water leak, consult your local dealer.
-Check that sludgy water or sea water doesn't get in the radiator.
-Do not refill the safety tank with refrigerant above the "FULL" mark level.
-Take care to close the cap firmly. If the cap is loose or improperly tightened water can flow out and the motor may overheat.

5.3.1 Safety measures related to refrigerant fluid.

To avoid injuries:

-Wear protective equipment such as rubber gloves for the handling of refrigerant (it contains toxic substances).
-In the case of ingestion of refrigerant, throw it up immediately and consult a doctor.
-In case of contact with skin or clothing, wash with water immediately.
-Do not mix different types of refrigerant. Such a mixture can initiate a chemical reaction generating harmful products.
-The refrigerant is extremely flammable and explosive under certain conditions.
– Keep the coolant away from flames and children.
-To drain fluid from the engine, place a container under the body of the engine.
-Do not directly drain on the floor, into a sewer or a source of water supply.
- For the used refrigerant disposal, comply with the regulations in force on the protection of the environment.

5.3.2 Checking the levels of refrigerant fluid

-Remove the radiator cap and check if refrigerant reaches the supply hole.
-Check the level of refrigerant buffer tank. If the level is between the markings "FULL" and "LOW", refrigerant will last for one full day workshift.

5.3.3 Refrigerant fluid drain

-To drain refrigerant, always open simultaneously both drain valves and open the cooler cap. If the cooler cap remains closed, it is not possible to drain the fluid completely.
-Remove the overflow hose of the radiator pressure cap to drain the expansion tank.
-The volume of the coolant is indicated in the table of characteristics.
-An incorrectly closed radiator cap or an opening between the plug and the seat may cause a leak of refrigerant.

5.3.4 Solutions for a quick drop of refrigerant volume

1. Check that there is no dust or dirt between the cooler cells and the water manifold. If there is some, clean it and remove it.
2. Check that the fan belt is well tightened. If it is loose, tighten it back.
3. Check there is not any obstruction inside the cooler hose. If the hose is clogged with scale, clean it with some descaling agent.

5.3.5 Regular checks

To avoid injuries:

-Be sure to periodically check the cooler hoses and the hose clamps. If a cooler hose is damaged or if the refrigerant leaks, it may cause overheating or serious burns.
Every 200 hours of operation or every 6 months, whichever occurs first, check that the water pipes are securely fixed.
-If the hose clamps are loose, or if there are water leaks, tighten the hose clamps securely.
-Replace the hoses and the hose clamps securely every 2 years or less, if during an inspection you see that that the hoses are swollen, hardened or cracked.

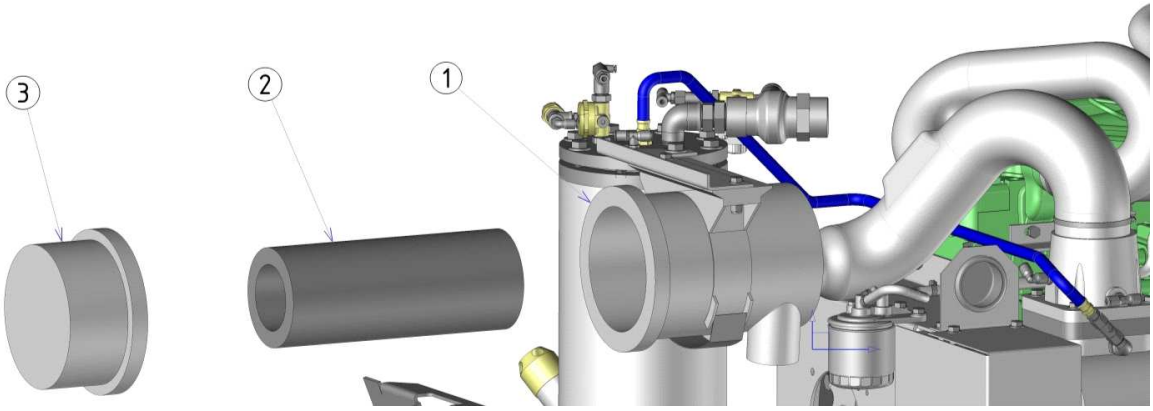
5.3.6 Safety measure in the case of overheating

The case when the refrigerant temperature is close to or exceeds the boiling point is called **"OVERHEATING".**
When trying to operate the machine, perform the following checks to observe that all parts are working properly. **If there is something unusual, inspect it by referring to the corresponding description in the "MAINTENANCE" and " PERIODICAL MAINTENANCE" chapters.**

If the alarm light turns on because of the refrigerant fluid temperature or because steam or refrigerant keeps splashing from the cooler overflow pipe, switch off the load and **operate the engine at idle (COOLING) for at least 5 minutes** to cool it down gradually. Then, stop the engine and inspect the following points:
1. Check if coolant is running out or if there are leaks of the refrigerant;
2. Check if there are any obstacles around the cooling air inlet or outlet;
3. Make sure there is no dust or dirt between the cooler fin and the tube;
4. Check if the fan belt is not too loose.
5. Check if the water hose of the cooler is clogged.

5.3.7 CLEANING:
-Cleaning of the beam of the cooler (outside)
If there is dust between the fins and the water pipe, eliminate it by washing with running water.
Do not clean the cooler with tools such as painting knives or screwdrivers. They may damage the fins or the water manifold. They might also cause refrigerant fluid leakage and reduce its efficiency.
-Cleaning of the cooler (inside)
1. Clean the inside of the refrigerant circuit in the following cases:
-According to the list of the MAINTENANCE PERIODS.
-When changing the refrigerant fluid.
2. Use a **cleaning agent for the cooler.**
This allows removing by washing of scale sediments.

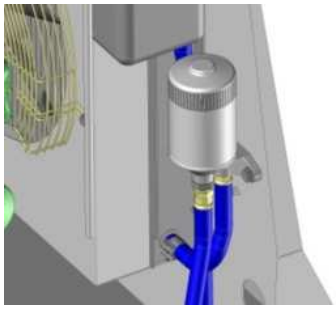
5.4 AIR FILTER



(1) Air filter housing
(2) Filter element
(3) Lid
Since the air cleaner used on this engine is a dry type, never apply oil to it.
1. Open the evacuator valve once a week under ordinary conditions - or daily when used in a dusty place. This will remove large particles of dust and dirt.
2. Wipe the inside of air cleaner with cloth if it is dirty or wet.
3. Avoid touching the element except when cleaning.
4. When dry dust adheres to the element, blow compressed air from the inside turning the element. Pressure of compressed air must be under 205kPa (2.1kgf/cm2, 30psi).
5. Replace the element every year or every 6 cleanings.

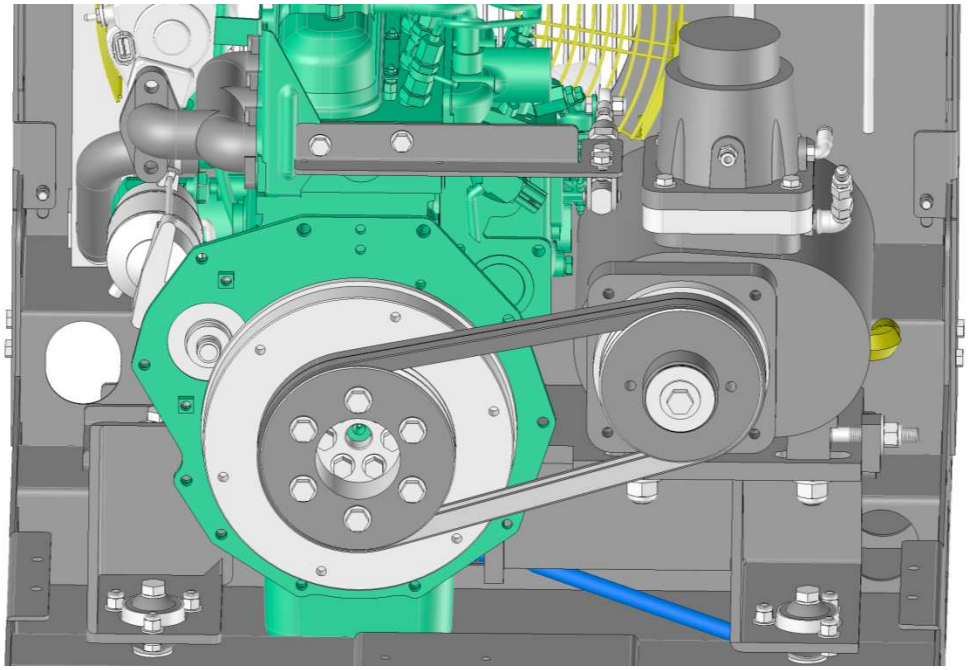
IMPORTANT:
- Make sure the lid (3) is properly closed. If the filter envelope is not sealed, dust and dirt may be sucked in, wearing down the cylinder liner and piston ring earlier, and thereby resulting in poor power output.
- Do not overservice the air cleaner element. Overservicing may cause dirt to enter the engine causing premature wear. Use the dust indicator as a guide on when to service.
- If the dust cup is mounted incorrectly, dust or dirt does not collect in the cup, and direct attachments of the dust to the element will cause its lifetime to shorten to a great extent.

5.5 COMPRESSOR OIL FILTER



- Unscrew the disposable cartridge.
- Refit a new cartridge after slightly greasing the seal.

5.6 COMPRESSOR BELTS



- Adjustment of the belt tension of the compressor
To avoid injury:
- Be sure to stop the engine and remove the ignition key before checking the belt tension compressor.

Correct tension compressor belt	flexion of 4mm when applying a pressure of 4 Kg onto the middle of the belt.

If the tension is inadequate, unscrew the bolts which fixe the air end and use the nut on the side of the air end until the deflection of the belt matches the acceptable limits.
Replace the compressor belt if it is damaged.

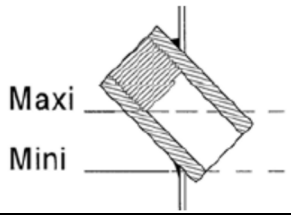
IMPORTANT
- If the belt is loose or damaged, it could result an overheating or insufficient load. In this case, correcting or replacing.

5.7 OIL SEPARATOR

To avoid injury:

- Make sure to stop the engine before changing the oil separator cartridge.
- Let the engine cool down sufficiently, oil can be hot and burn you.
- Check that the air system is not under pressure

1. Replace the oil separator cartridge and flush.
2. Untighten 8 screws of the separator lid.
3. Remove the lid carefully not to damage the components and the dip tube attached to the cover.
4. Apply a thin layer of oil on the seals of the new cartridge.
5. Screw 8 lid screws by hand and do not forget to fasten the air filter bracket. When the lid comes into contact with the surface of the gasket, tighten the screws with a torque wrench in order to avoid damaging the seals of the cartridge.



5.8 IMPLEMENTATION OF THE COMPRESSOR IN THE TRAILER (If trailer option)

- The compressor (2) must be positioned in the trailer (4).
- It must be maintained in this position by four axes (1) which are positioned in the four corners of the compressor (2).
- These axes (1) pass through holes in the compressor (2) and the trailer (4) and are locked in this position by pins Beta (3).

CIRCULATION IS FORBIDDEN IF THE ORIGINAL PINS ARE NOT IN PLACE

5.9 COMPRESSOR UNDERCARRIAGE

MAINTENANCE operations:

-Regularly clean all the components with water.
-During shutdown or storage of galvanized parts, ensure sufficient ventilation.
-After the winter rides, thoroughly clean the galvanized parts with water.
-Grease or lubricate joints and bearings.

Maintenance periods:

Purchasing 20-100km • Tighten the wheel nuts
6 months or after 1500 km • First service control
Every 12 months or every 10000 km • Braking system control must be performed by the authorized service agent
IMPORTANT **The maintenance interval is shortened if:** • **Mountain rides are frequent** -The brake of the trailer may be heavily worn • **Utility trailers** -An early adjusting is necessary in case of heavy load

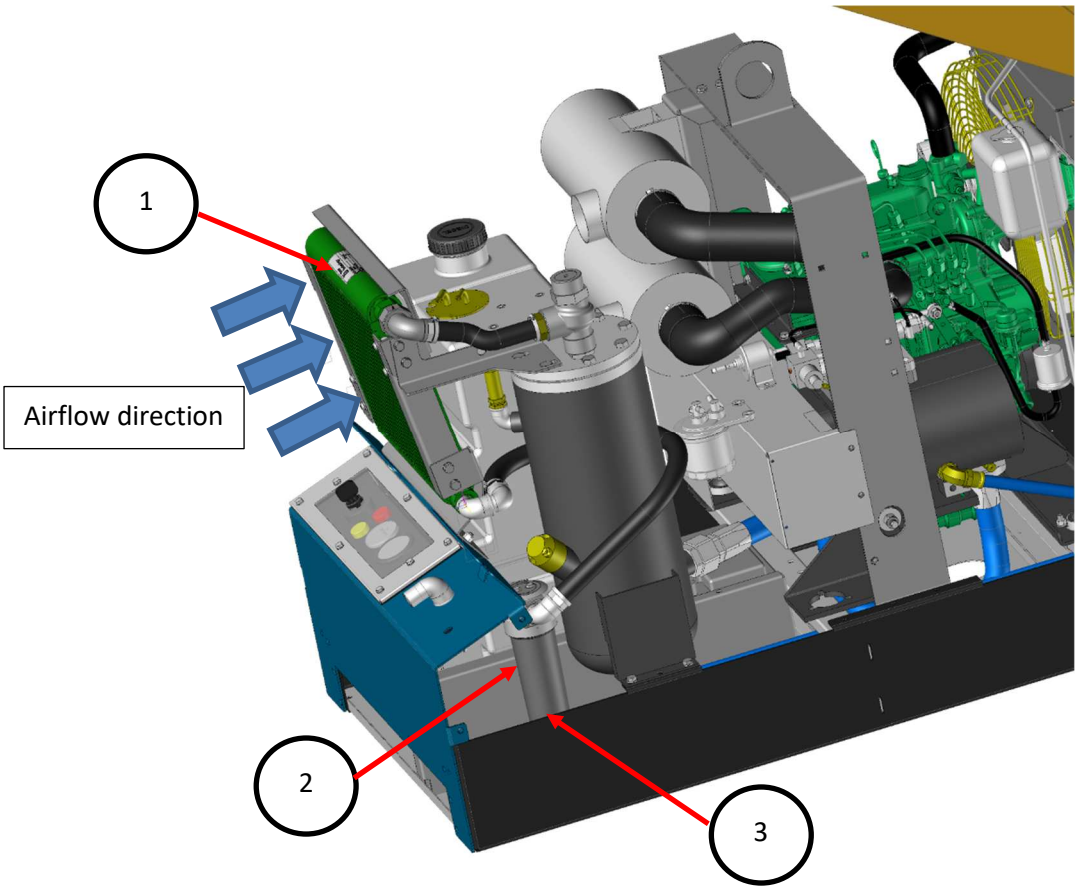
6. OPTION

6.1 AFTERCOOLER

This option has been developed for applications that need a low humidity content in the compressed air such as sandblasting, airbrushing, etc.

Aftercooler

This device consists of a radiator (1), a cyclonic water separator (2) equipped with a drain (3), which allows the condensates to be evacuated.



Working explanation

The compressed air passes through the radiator (1) which is cooled by the air flow generated by the engine fan. The decrease of air temperature causes the humidity contained in the air to condense into fine droplets. These fine droplets passing through the cyclonic water separator (2) are separated from the air and collected in order to be expelled by the condensate drain (3) outside the air circuit.

Cyclonic water separator drains.

A drain adjustment knob allows 2 operating modes:
- Either it's completely closed, a float will trigger the evacuation of the water when the level is high enough.
- Either it's opened slightly to permanently evacuate the water, but be careful, this position creates a permanent leak which, depending on the setting, uses part of the flow of the machine.

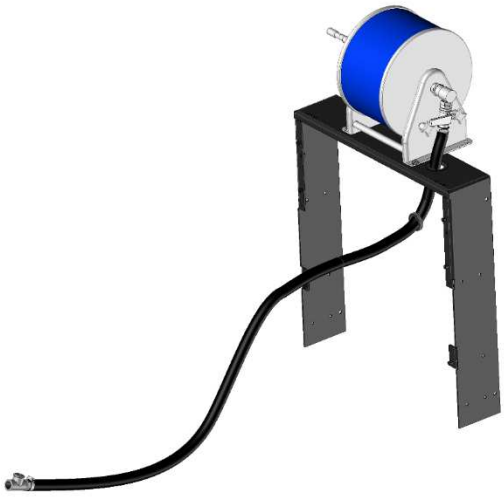
Watching :
The canopy must be closed to ensure proper cooling of the radiator.

For optimum operation, carry out a weekly visual check to check that dust is not obstructing the radiator beams. Indeed, if dust accumulates and clogs the radiator cores, this will have the effect of blocking the flow of air and preventing the cooling of the compressed air.

6.2 HOSE REEL

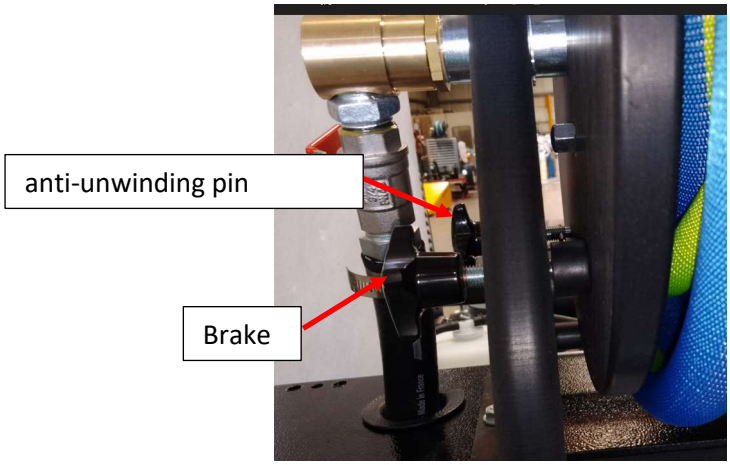
PNEUMATIC HOSSE REEL 20m.

Picture :



Watching:

In use, when unwinding the hose, release the brake and remove the pin.



Always rewind the hose after each use.

In road use, ensure that the hose is perfectly rewound, that the brake is correctly applied and that the anti-unwinding pin is properly engaged.

7. TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	REMEDY
1. Compressor will not start.	1. No fuel 2. Clogged fuel filter 3. Low battery voltage 4. Clogged air filter 5. Engine problems may have developed 6. Defective electrical safety 7. Blown fuse un wining hamess 8. Faulty electro-stop	Check fuel level and add fuel if necessary. Replace the filter cartridge and the secondary pre-filter. a. Check the voltage and recharge or replace if necessary. b. Loose battery cable, tighten cables. c. Dirty battery cables, clean thoroughly. Clean or replace the element. Refer to engine operators manual. Check and replace if necessary. Check continuity and replace if necessary. Check and replace if necessary.
2. Compressor shuts down with air demand present.	1. No fuel 2. Compressor discharge temperature switch is open 3. By cold weather.	Check the level and add fuel if necessary. a. Cooling air flow is insufficient. Clean cooler and check for proper ventilation b. Low fluid sump level. Add fluid. c. Compressor fluid so dirty: change fluid. d. Fluid filter clogged: change cartridge. e. Defective discharge temperature switch. Check for a short or open circuit to the engine fuel rack solenoid should this check out normal; it is possible that the temperature switch is defective. Set the started valve on START-STOP position and let it run for 5 minutes.
3. Compressor will not build up full discharge pressure.	1. Air demand is too great. 2. Dirty air filter. 3. Pressure regulator out of adjustment. 4. Started valve on START-STOP position	Check service lines for leaks or open valves. Check the element and change or clean element if required. Adjust regulator. Turn the started valve to RUN position.
4. Improper unloading with excessive pressure build-up causing pressure safety to open.	1. Pressure regulating valve is set too high. 2. Inlet valve jammed. 3. Restriction in the control system. 4. Clogged regulating jet. 5. Defective pressure regulating valve. 6. Defective cylinder.	Readjust. Free or replace valve. Check all control lines and components. Ice and other contaminants could cause restrictions. Check and replace if necessary. Check and replace if necessary. Check and replace if necessary.
5. Insufficient air delivery.	1. Clogged air filter 2. Clogged air/fluid separator. 3. Defective pressure regulator 4. Engine speed too low 5. Leak in control system causing loss of pressure signal. 6. Defective cylinder 7. Started valve on START-STOP position	Clean or replace. Replace separator element and also change compressor fluid and fluid filter at this time. Adjust or repair. Readjust engine speed Check all control lines. Check and replace if necessary. Turn the started valve to RUN position.
6. Excessive compressor fluid consumption	1. Clogged return line. 2. Leaks in lubrication system. 3. Separator element damaged or not functioning properly. 4. Fluid separator too full.	Clean return line orifice. Check all pipes, connections and components. Change separator element. Drain to correct level.
7. Overheating of the compressor	1. Engine belts too loose or broken. 2. Central part of the oil cooler clogged with dirt. 3. Oil cooler pipes (internal) clogged. 4. Low oil level in the separator. 5. Oil filter clogged. 6. Oil discharge line clogged. 7. Recycling of hot air.	Retighten or replace. Clean it thoroughly. Clean it thoroughly. Refill. Replace the cartridge. Clean the hole and the pipe. Check hood lock and seal ing of partitions.
8. Overheating of the engine	1. Fan belt loose or broken. 2. Central part of the radiator clogged with dirt. 3 Water level too low. 4 Oil level too low. 5 Defective water pump. 6. Cooler clogged. 7. Defective engine thermostat.	Retighten or replace. Clean it thoroughly. Refill. Refill. Replace. Clean it thoroughly. Replace.
9- Braking / the handbrake efficiency too low	1. Incorrect adjustment. 2. Brake pads need to be run in. 3. Brake pads damaged / dirty. 4. Significant losses by friction.	Contact the after-sales service. The brake is getting stronger after a few braking - break-in period. Contact the after-sales service. Lubricate the brake cable.
10- The reverse is difficult or blocked	1. Rigid brake system. 2. The lever of inertia brakes in the wheel brake got stuck.	Contact the after-sales service.

11-Overheating of the brakes in forward gear.	1. Incorrect adjustment. 2. The braking system does not start properly in forward gear. 3 Reversing lever blocked. 4. Support of pushrod bent. 5 Dirty wheel brake. 6 Bent traction or Bowden cable. 7 Return spring loose or damaged 8 Corrosion in a brake drum.	Contact the after-sales service. Release the handbrake and check the mobility of the transmission. Release the handbrake and check the mobility of the transmission. Contact the after-sales service. Clean the wheel brake. Contact the after-sales service. Contact the after-sales service. Contact the after-sales service.