TRANSAIRVAC INTERNATIONAL LTD

Hydraulic Coolers, Pressure Line Filters, Air & Gas Compressors / Vacuum Pumps / Blowers / Booster Packages and Rotary Lobe Pumps for Transport and Industry.

"HC 13"

HYDRAULIC OIL COOLER

INSTALLATION, OPERATION & MAINTENANCE MANUAL

Transairvac International Ltd, Units 28 Croft Road Industrial Estate, Newcastle-Under-Lyme, Staffordshire, England . ST5 0TW, Telephone: 0044 (0)1782) 710282, Fax: 0044 (01782) 710126

Email: office@transairvac.com **Web page:** www.transairvac.com

Contents

1 General Information

To ensure immediate advice on your cooler, and for your own records the following information should be noted:

TYPE:……HC.13 ……..……COOLER…….

SERIAL No: [S] .....…….....

DATE OF SUPPLY …….....…….....

CONTRACT NUMBER: …….

CUSTOMER NAME: ……..

This information will be required should you need further information or parts ordering.

2 HEALTH AND SAFETY

Rotating machinery and pressurised components are potentially dangerous items of equipment if not properly operated and maintained. It is imperative that all users of such equipment fully educate themselves as to the potential dangers and satisfy themselves that the personnel responsible for installing, testing, commissioning, operating and maintaining the machinery are competent to do so. Instruction manuals are provided for guidance but must assume some basic level of competence by user staff. If there are any doubts concerning correct procedures, ask Transairvac International Ltd., who will be pleased to advise, or provide a service engineer. DO NOT TAKE RISKS.

The following, whilst not exhaustive, provide guidance to possible sources of danger to health and safety:

Certain machinery can generate high levels of noise which can be harmful to people exposed to it for lengthy periods of time. Various recommendations and codes of practice are in existence and users must ensure that adequate precautions are taken to prevent a health hazard to employees or third party.

Before attempting to investigate problems, service or maintain equipment, it must be safely depressurised to ambient conditions.

Moving parts of machinery must not be touched and must be adequately guarded. Suitable guards are provided and must be securely retained in position at all times except when maintenance or service is being undertaken. Before commencing maintenance, servicing or making other adjustments, the prime mover and other equipment must be isolated to prevent accidental start-up.

Most machines, certain pipes and ancillaries become hot during operation. If it is possible for personnel to come into contact with such surfaces unknowingly or accidentally they should be guarded.

If, during operation, severe vibration is observed on the compressor it's prime mover, pipework, or ancillaries, the cause of this should be immediately investigated and the situation rectified. Excessive vibration can lead to fatigue and other failures. Similarly, if during operation a significant change is noticed in the level of vibration, noise, temperature or any other parameter, the cause of such changes must be determined, and the cause rectified.

Inlet filters and separators must be inspected regularly so that liquid or debris is not allowed to enter the machine. Drainage systems must also be serviced regularly to ensure that there is no liquid carryover, which could cause damage to the machine and consequently injury to personnel.
Safety trips (pressure relief valve), emergency stop buttons and other such devices should be checked regularly to ensure they function correctly and will protect the machinery and personnel in the event of an emergency.

When maintaining equipment, contact will be made with mage with potentially corrosive substances. Care must be taken not to ingest any of these and to protect skin. Only approved lubricants must be used.

After completion of servicing, all nuts, setscrews, etc must be checked for tightness. Before restarting after servicing, check all joints, etc are gas tight. Also, before any start-up, check that the machine inlet and outlet isolating valves are open.

3 GENERAL INFORMATION AND SAFETY STANDARDS

TransAirVac International Ltd. reserves the right to make changes and improvements to its units at any time without previous notice, and is not liable for any difference existing between the unit features and the descriptions in this manual.

This manual is a guide for the correct use of the Cooling Unit and for maintenance the efficiency of the unit through correct regular maintenance.

After having fully read this manual, it is recommended that it be kept near the machine to facilitate immediate reference.

CAUTION: In case of doubts or problems in understanding this manual or parts of it, Or for any kind of technical service please contact TransAirVac International Ltd.

3.1 Responsibility for use

This cooling unit must be considered as A sub-assembly and it is therefore the users exclusive responsibility to make sure that the final system of which this component represents a sub-assembly is equipped with the suitable safety devices. Moreover, TransAirVac International Ltd. expressly prohibits the commissioning of this unit before the complete system conforms to the prescriptions of directive 98/37 EC and following amendments.

Only suitably trained and qualified personnel must use this system.

3.2 Safety standards

Before using this unit, carefully read this operation and maintenance manual.

3.2.1 Assembly

TransAirVac International Ltd. recommends the use of hoses and pipe fittings of adequate size and to observe the assembly instructions supplied by their supplier.

3.2.2 Lifting

The unit must be only be lifted by qualified and trained personnel. It is absolutely forbidden to use piping or other unit components as lifting points. The device, which is suitable for lifting (that can be possibly supplied as options) present on the unit, must not be used exclusively to lift the unit and not other connected devices that are not part of the unit.

3.2.3 Positioning

The cooler must be positioned in such a way that its stability is ensured; on this respect it is necessary to arrange the possible use of anti-vibration connections or suitable bases.

3.2.4 Insulation

In the complete system in which this unit is annexed, both the hydraulic system must be duly insulated against possible sources of vibrations. Vibrations represent a danger because they can cause a progressive loosening of the pipefitting and, as a consequence, the possible leak of fluid under pressure. We therefore recommend using anti-vibration devices.

3.2.5 Working station

During the operation of this unit, inspections near the components under pressure or any components through which oil passes are forbidden. It is also forbidden to intervene on moving parts if the general power supply has not been previously switched off.

3.2.6 Fire risks

We recommend the maximum caution while using devices under pressure:

The piping which are near heat sources (exhaust manifolds, mufflers, etc.) must be duly protected to prevent oil splashes from coming into contact with them, thus initiating possible fire principles.

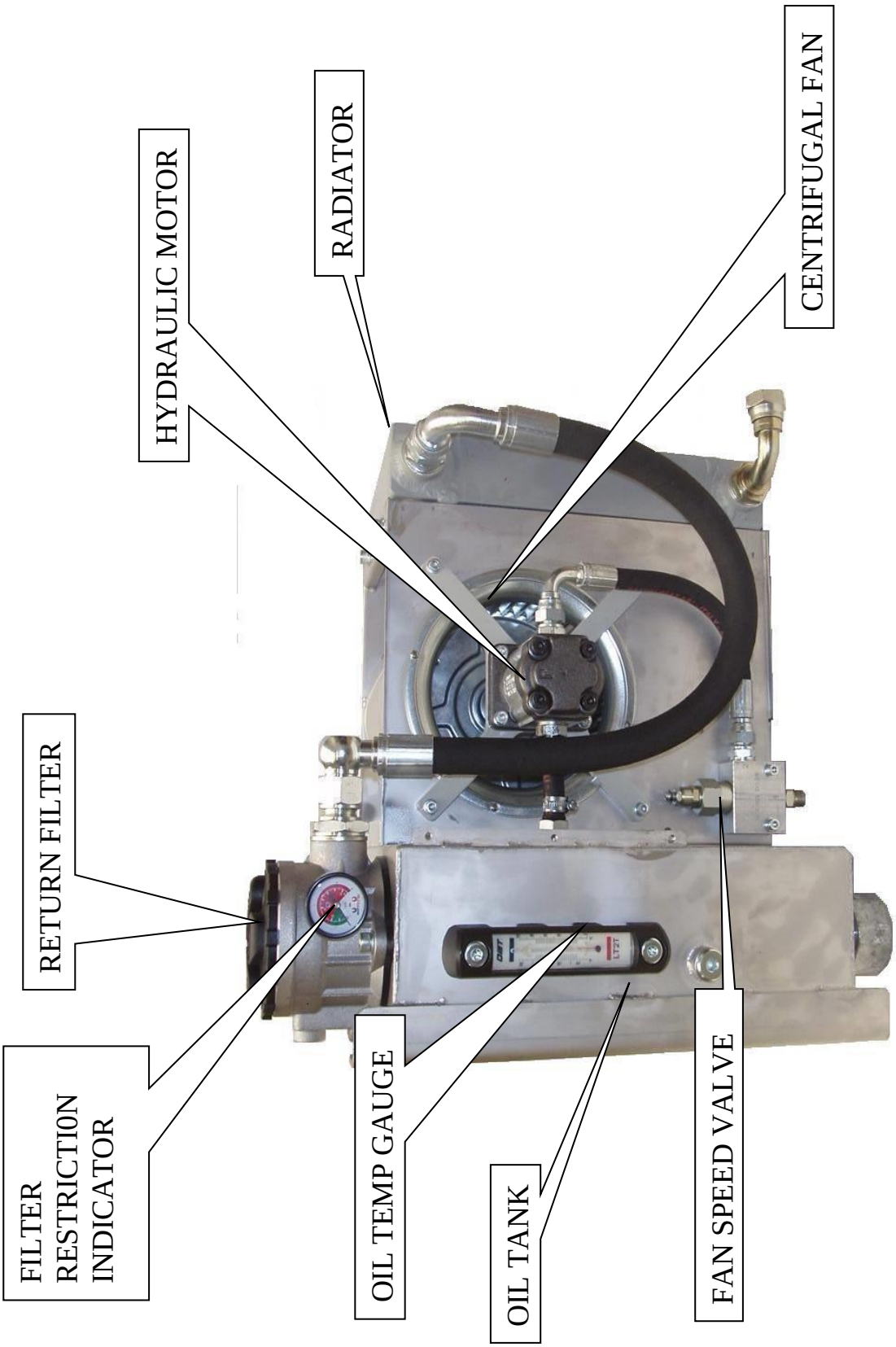
3.2.7 Object projection

It is up to the installer to arrange suitable shields near hoses of those system points that are subject to especially high pressure and not to remove the devices protecting rotating parts.

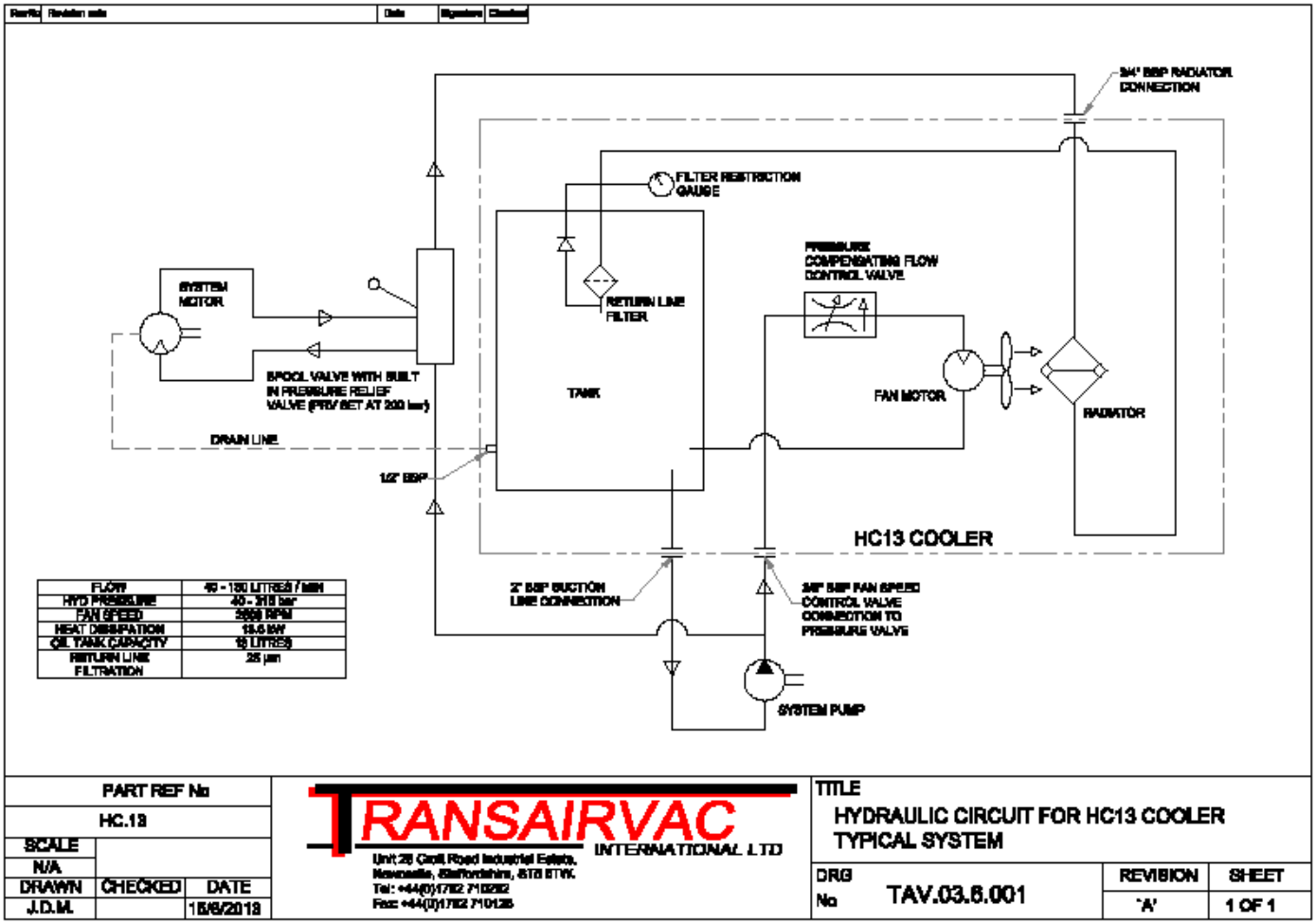
3.2.8 Environmental pollution

During the oil change or other maintenance intervention, **DO NOT DISPOSE OF OIL IN THE ENVIRONMENT**, but arrange its disposal correctly.

HC13 Cooler


HYDRAULIC MOTOR
RADIATOR
CENTRIFUGAL FAN
RETURN FILTER
FILTER RESTRICTI0N INDICATOR
OIL TEMP GAUGE
OIL TANK
FAN SPEED VALVE

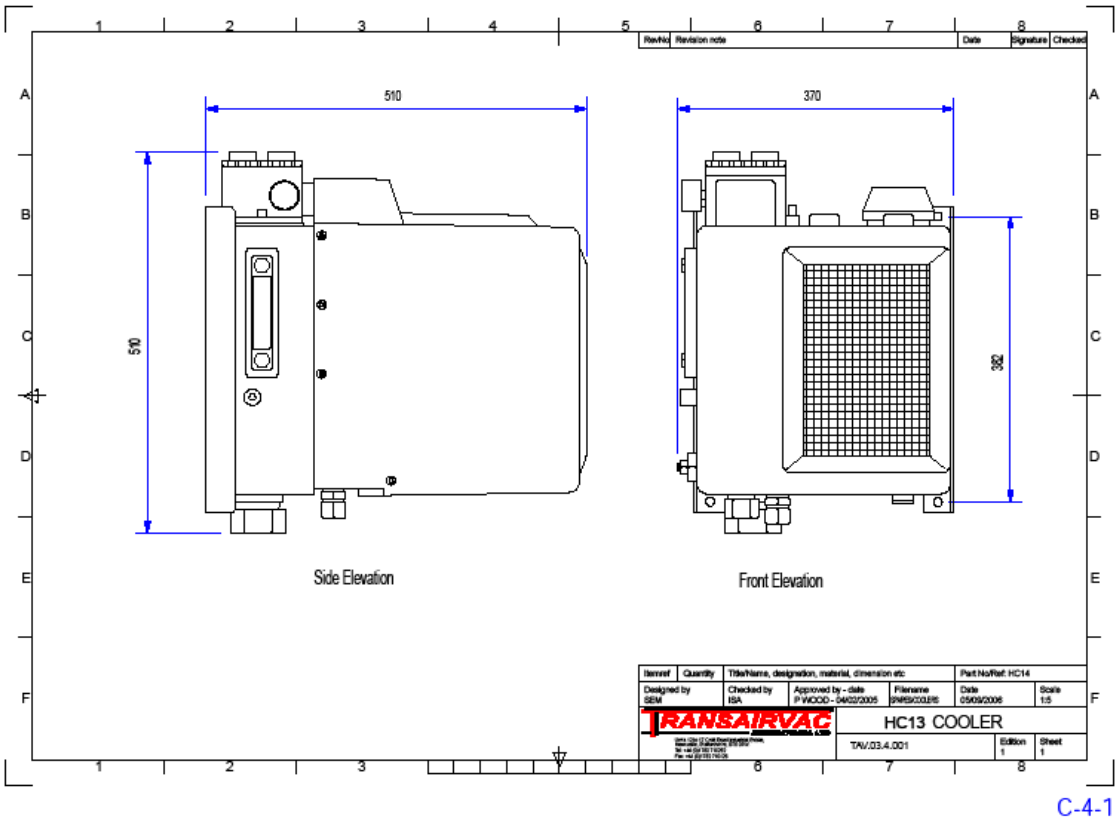
Hydraulic Circuit Diagram



PARTS LIST

POSN.	DESCRIPTION	QTY.	PART / CODE NO.
1	OIL TANK	1	HC14/1
2	OIL LEVEL GAUGE	1	HC14/2
3	OIL FILLER CAP	1	HC14/3
4	RETURN FILTER	1	HC14/4
5	FILTER ELEMENT	1	HC 14/
6	PRESSURE GUAGE – FILTER RESTRICTION INDICATOR	1	HC14/17
7	FAN SPEED BLOCK		
8	PRESS. COM PENS. FLOW CONTROL VALVE	1	HC14/10
9	FAN MOTOR	1	HC14/24
10		1	
11	CENTRIFUGAL FAN	1	HC14/13
12	HYDRAULIC MOTOR	1	HC14/12
13			
14	AIR-OIL HEAT EXCHANGER	1	HC14/14
17			
18			
19	2” HOSETAIL	1	HC14/19
20	PLASTIC COVER	1	HC14/20
22	TANK DRAIN VALVE	1	HC14/22
23	BLANKING PLUG	1	HC14/23
24			
26			
27	CORK PADS	4	HC14/27

OVERALL DIMENSIONS OF HC13



SPECIFICATION	
Hydraulic Flow	From 40 To 130 Litres Per Minute
Hydraulic Pressure	From 40 To 315 bar
Fan Motor Speed	2,500 rpm max 3000 rpm
Heat Dissipation	13.6 kW
Oil Tank Capacity	13 Litres
Return Line Filtration	25 µm

4 Installation

4.1 Operating principle and unit composition

The cooling unit operates by means of a tank (integrated in the unit frame) through the sleeve located inside the lower part. The pump of the outer circuit sucks the oil (which has been duly

filtered) and sends it to the integrated block equipped with an off-take valve checking its pressure. Afterwards, the oil comes out to feed the actuator.

The oil coming out from the actuator is conveyed to the radiator (protected by a shockproof valve) to reach the return filter equipped with visual optical indicator.

The cooling takes place through the double-suction radial fan rotated by the hydraulic gear motor, whose speed is determined by the off-take capacity depending on the flow adjuster which is compensated by the main delivery circuit. This motor turns on or off when the pressure control valve is respectively unloaded or loaded by using three systems: manual, electrical or pneumatic mode according to the arrangement.

4.1.1 Accessories

Other accessories and components connected to the essential elements making up this cooling unit are more strongly dependant on the final use conditions of the system; they are generally elements that contribute to supply further control parameters for the special intended use situations.

4.2 Starting-up the system

4.2.1 Checking the tank

The tank is a component that is especially subject to contamination by impurities or dirt that can infiltrate in the component during the transport from the producer to the installation place. Any intermediate storage periods may also cause an introduction of impurities. For these reasons, before filling the tank with oil it is absolutely necessary to carry out a check of the tank and to clean it if necessary.

4.2.2 Filling the tank

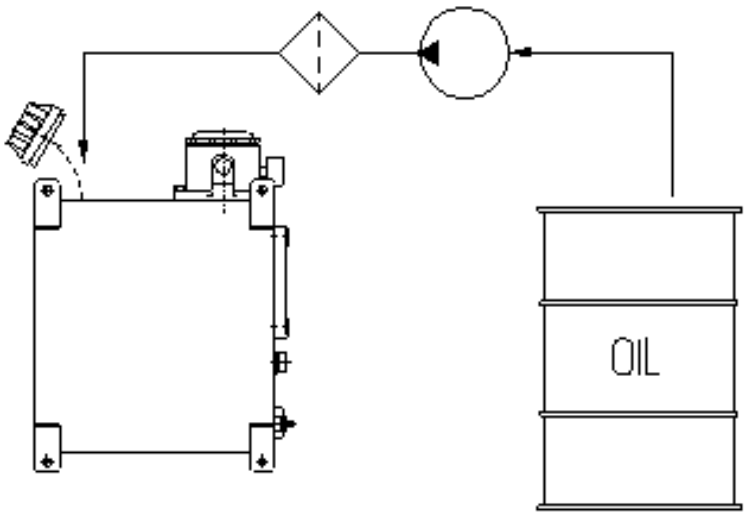
As the hydraulic oil is the fluid through which power is conveyed and transmitted, it is of fundamental importance that it is of good quality.

While filling the tank, we recommend to use a filter with filtering power of 10 absolute microns. To carry out the filling, it is necessary to unscrew the loading and filler cap, fill through this duct making the oil reach the tank until the visual level indicator signals the maximum level. At the end of this operation, insert the loading plug by repositioning it in the correct way. To change the oil, unscrew the lower plug, empty the tank and let the oil flow out collecting it in a container.

NOTE: At the first starting-up, the hydraulic oil is pumped into the system, therefore the tank level can decrease a lot. Carry out a suitable re-filling (with unit at a standstill).

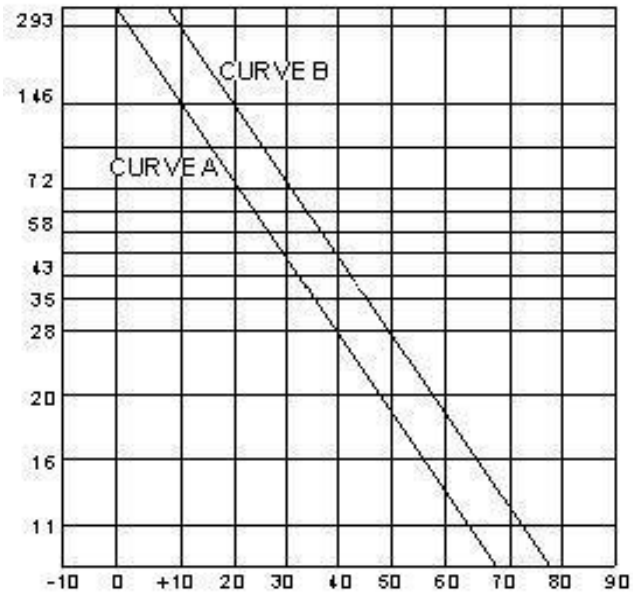
CAUTION: During the filling operations, observe a strict cleaning in order to avoid the contamination of the hydraulic fluid.

DIAGRAM OF THE RECOMMENDED FILLING PROCEDURE



4.2.3 Recommended oils

In this system, the oil is the mean that, beyond transmitting power, ensures the lubrication and protection of the unit devices; therefore we recommend using high-grade oil with anti-foam and anti-oxidation additives. Below is a quality classification of the mean viscosity-temperature curves of oils according to two viscosity categories specified in the table on the right:



CURVE	A	B
Spec. DIN 51524	H-LP32	H-LP46
Viscosity CST @50^{O}C	16-20	24-28
AGIP	OSO 32	OSO 46
IP	Hydrus 32	Hydrus 46
BP	Energol HLP 32	Energol HLP 46
CASTROL	Hyspin AWS 32	Hyspin AWS 46
ESSO	Nuto H 24	Nuto H 46
MOBIL	DTE 24	DTE 25
SHELL	Tellus 32	Tellus 46
CHEVRON	EP Hydraulic Oil 32	EP Hydraulic Oil 46

Taking into account that the optimal use conditions for the system are those in which the oil viscosity is around 28 CST in operating conditions, from the reported tables it is possible to determine the most suitable oil category and to choose between the proposed brands (not binding).

4.2.4 Connection

The piping connection must be carried out only by using flex hoses; for different connections, contact the technical department of Transairvac International Ltd.

4.3 Operating the system

4.3.1 Operators

When operating the system, a qualified operator must be present.

4.3.2 Before operating the system

Before operating the system, make sure that the tank is full with oil up to the maximum visible outer level and that all piping are tightened in the suitable way.

4.4 System operation

The hydraulic motor activates the double suction fan, at a factory set speed of 2500rpm. The value can be checked using a tachometer, and if necessary changed using the capacity adjuster equipped with an adjustable screw. Turn screw in clockwise direction to INCREASE (maximum speed 3000 rpm) and in counter-clockwise direction to DECREASE the speed of this fan.

The fluid level in the tank and extent of return filter (part number 4 on hydraulic diagram) contamination should be checked on a regular basis.

4.5 Foreword

A hydraulic system installed in the correct way, connected and started up following the given indications ensures a long duration and only needs simple maintenance works. The operating fluid that has the important task of transmitting power is among the main causes for *out-of-service.* To help prevent problems the oil should be replaced yearly, but checked on a daily basis.

4.6 Maintenance of main components

It is important to ensure that the maintenance interventions are carried out in a clean environment and in the absence of dust. If it is necessary to remove temporarily some components like for instance pumps and distributors, they must be protected by closing their connections with protection plugs that must be removed up to their re-connection of the same to the system.

4.6.1 Hydraulic oil change

The change of the hydraulic oil must be carried out using oil **of** the same type of the one used before and proceed as described on points 2.2.2 and 2.2.3. Re-fill each time the level reaches the minimum (never allow for any reason that the level decreases below this limit with running system). By using the same type of oil, the interaction of chemically different fluids will be avoided, which can cause changes of the physical and functional features of the mixture.

4.6.2 Oil Return Line Filter

It is located on the return line and has the task of eliminating some contaminant particles contained in the oil before returning to tank.

4.6.3 Filler Cap

It is located on the upper part of the cover and ensures a protection against foreign particles entering the system during its operation. The plug cannot be disassembled; it should be replaced as an item when damaged.

4.6.4 Air-oil heat exchanger

- Clean radiator on discovery of dirt.
- If you notice vibrations when running the unit, the most likely cause is dirt on the fan blades, which makes the fans unbalanced. To rectify the situation it is necessary to remove the blades using suitable tools.
- IMPORTANT when removing the blades do not move or remove the counter-weight inserted on the fan (balancing) when mounting the unit.

4.7 Maintenance intervals

Below is a proposal of the recommended maintenance intervals to maintain the central perfect efficiency and grant its duration in time, protected against early wear and sudden control unit in failures:

COMPONENT MAINTENANCE	Every day	Every week	Every month	Every 500 working hours	Every 1,000 working hours
Oil filter check gauge		**X**			
Oil filter replacement				**X**	
Oil level check	**X**				

Oil change					**X**
Radiant plate cleaning				X	
Outer cleaning		X			

4.7.1 Standstill

In case this power unit is not used for long periods of time, it is necessary to cover the open lights with plastic or metal plugs in order to prevent dust and dirt from entering. The storage must take place in dry rooms and protected from weathering.

When re-starting the unit, observe the instructions as for the system starting-up.

4.7.2 Troubleshooting

Analysis of the possible causes of some problems and intervention hypothesis can be viewed on next page.

	Problem	**Possible causes**	**Intervention hypothesis**
A	**Pressure too low and pressure fall in comparison to the prescribed value**	**Max. pressure valve partially open**	**Calibration pressure too low**
			Seal seats worn
			Impurities under the seal seats
			Spring broken
		Defect pump	**See point B**
		Excessive inner leaks	**Worn seats in the cylinders or hydraulic motors**
			Valves and distributors worn
			Oil viscosity too low
		Excessive load falls	**Oil viscosity too high**
			Insufficient dimensioning of oil passages
			Partially obstructed oil passages
B	**Defect pump for null capacity or capacity lower than nominal values**	**Obstructed suction**	**Obstructed suction filter**
			Obstructed suction pipe
			Suction pipe too small or with too twisted path
		Air in the hydraulic circuit	**Air in the suction intake of the tank**
			Air in the suction connections
			Air in the seal on the pump shaft
			Suction of oil with foam
		No air in the tank	**Air breathing in the obstructed tank**
		Defect driving	**Check the coupling**
			Speed too high or too low
		Oil viscosity too high	**See the prescriptions for the pump**
		Pump inner failures	**Broken inner seals**
			Glued vanes, washers or pistons
			Pump head not tightened
			Broken inner parts to be replaced
		Pump too worn	**See point F**
			Pump to be replaced
C	**Anomalous pump noise**	**Cavitation**	**Obstructed suction, see point B**
			Viscosity too high, see point B
		Air entrance	**See point B**

		Inner wear	**Excessive clearance in supports and washers**
		System vibrations	**Defect installation because of resonance or lacked insulation**
D	**Oil overheating beyond 50 – 60°C**	**Max. pressure too high**	**Calibration too high for the max. valve**
		Useless power use	**Ineffective cut-off valve**
			Short circuit at cycle end not working
			Hydraulic circuit to be modified
		Excessive inner leaks	**See point A**
		Excessive load falls	**See point A**
		Oil capacity too low	**Fill to correct level**
		Insufficient cooling	**Check if the rpm of the fan is correct**
			Check if the radiant plate is clean
		Excessive frictions	**Defect inner assembly of the pump**
			Lack of lubrication where necessary
			Use of oil with reduced lubricating capacities
E	**Wrong movements in the hydraulic activation organs**	**Air in the hydraulic circuit**	**Breathe air from the highest points of the circuit**
			Eliminate possible air entries (point B)
		Valve locking	**Locked valves in closing due to rubber elements or others**
			Semi-open valves due to impurities
		Cylinder locking	**Defect inner assembly of the cylinder**
			Excessive axle loads
			Engaging of connection pivots
		Excessive load falls	**See point A**
F	**Excessive wear of components**	**Oil containing abrasives**	**Oil too old**
			Inefficient filters
		Insufficient lubrication	**Poor-quality oil**
			Oil viscosity too low at working temperature
		High working pressure	**Pumps and valves not suitable for the pressure**
		Defect couplings	**Anomalous efforts on shafts and/or stems**

MACHINERY DIRECTIVE

(89/392/EEC: amended by 91/386/EEC and 93/68/EEC)

CERTIFICATE OF INCORPORATION

In accordance with article 4(2) and
Annexe 11B of the above directive.

We,

Transairvac International Limited
Unit 12/17 Croft road industrial est
Newcastle
Staffordshire
ST5 0TW
England.

Declare that all Hydraulic Coolers, Pressure Line Filters, Air & Gas Compressors / Vacuum Pumps / Blowers / Booster Packages and Rotary Lobe Pumps Associated Equipment supplied by us, which may include Electric Motors, must be installed in accordance with our installation instructions and must not be put into service until the machinery/system into which they are incorporated has been declared to be in conformity with the Machine Directive.

P.A. Wood

.....

Technical Director