Reavell

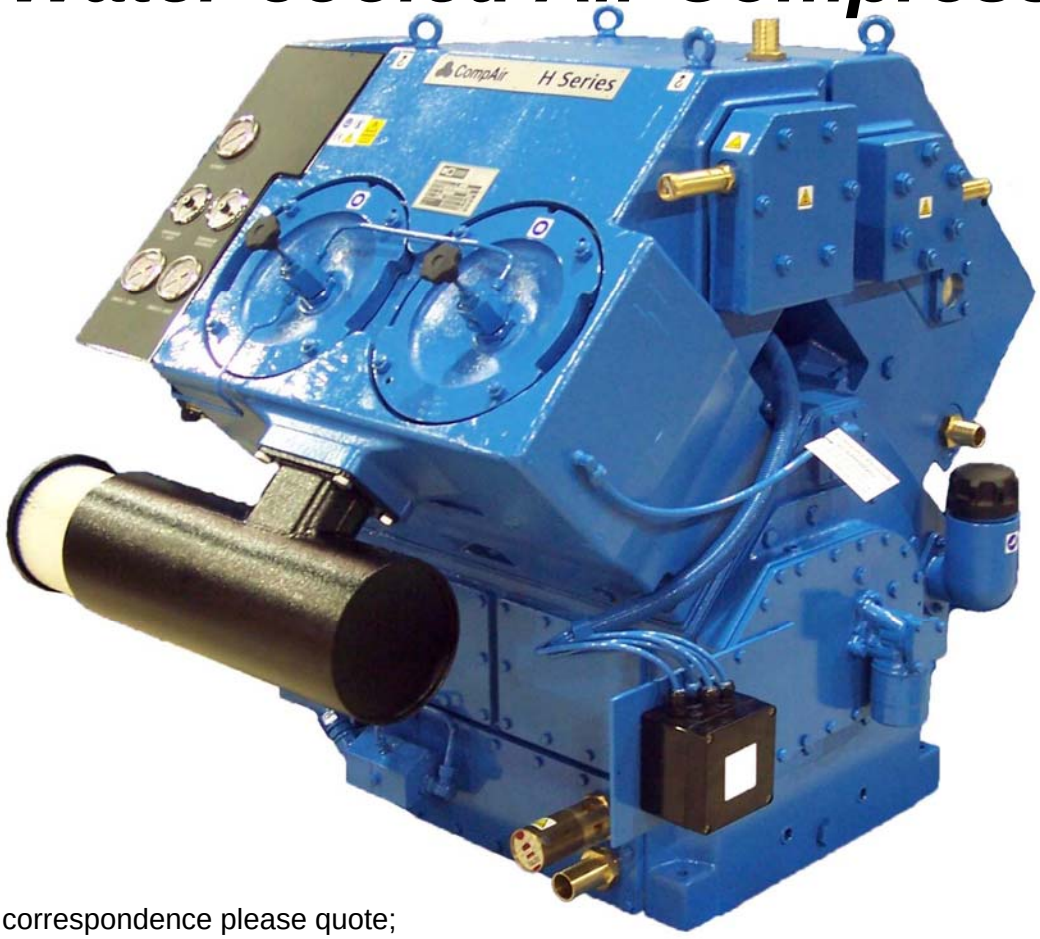
Gardner Denver Ltd

OPERATOR HANDBOOK

For a

5236.2.IA

Water-cooled Air Compressor



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OPERATOR HANDBOOK FOR A 2365.2.IA COMPRESSOR

TABLE OF CONTENTS

1 SAFETY

5000 SERIES COMPRESSORS

WARNING

The use of replacement parts or lubricating oils not supplied, recommended or approved by **CompAir UK Ltd Ipswich**, or the failure to maintain this equipment in accordance with the maintenance instructions, may invalidate the WARRANTY, cause equipment failure, create unsafe or hazardous conditions or result in damage to the equipment.

CompAir UK Ltd Ipswich cannot accept responsibility for damage, injury or failure caused by these situations.

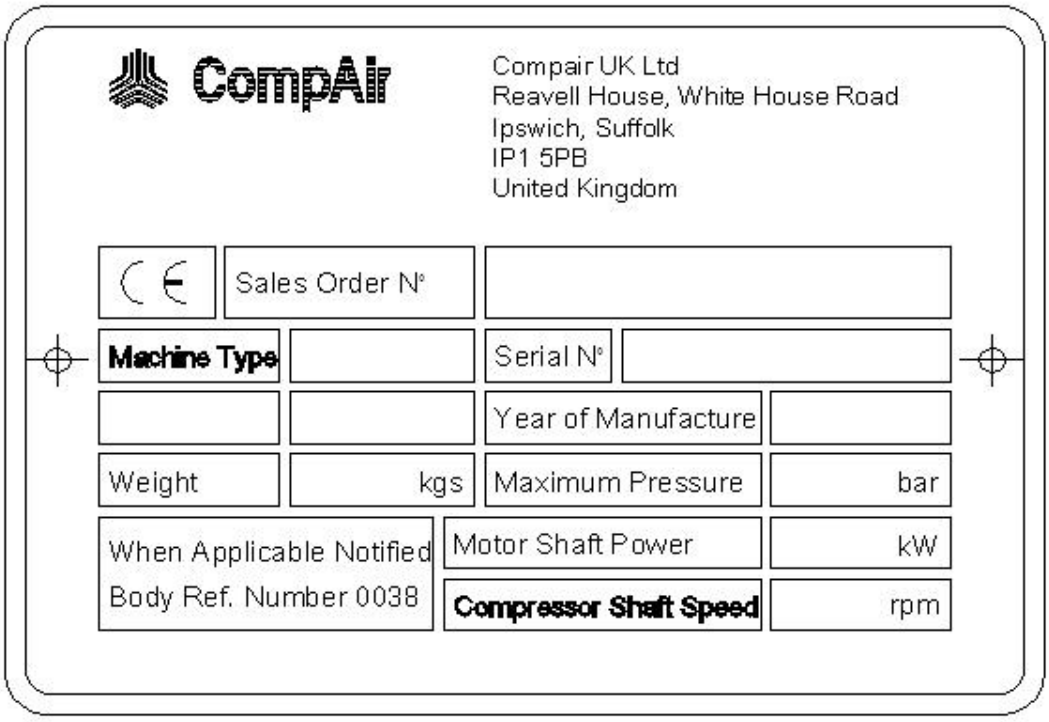
USE ONLY

CompAir UK Ltd Ipswich

GENUINE PARTS
AND
AUTHORISED SERVICE AGENTS

1.1 OWNERSHIP DATA

TECHNICAL DATA
It is recommended that details taken from the compressor and motor nameplates are recorded below.



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For any comments or queries about the contents of this manual, please write to CompAir UK Ltd. at the above address, marked for the attention of Mr. Owen Dale, Technical Author.

1.2 FOREWORD

SPECIAL ATTENTION
The **STANDARD BUILD** of all CompAir UK Ltd (Ipswich Operations) products are not intended for use in either Explosive or Potentially Explosive Atmospheres as defined in Directive 95/9/EC.

An Explosive atmosphere is a mixture with air, under atmospheric conditions, of flammable gases, vapours, hazes or dusts in which, after ignition has occurred, combination propagates to the entire unburned mixture and may cause a hazard.

A Potential Explosive atmosphere is an atmosphere, which could become explosive due to local conditions.

CompAir UK Ltd Ipswich H5000 Series compressors are designed and manufactured to give optimum performance, with long life and reliability.

This Manual will help you to obtain the best performance from your compressor. It provides the information required to install, commission and operate the compressor and carry out regular maintenance schedules, which will ensure the maximum satisfactory service life.

Included within the Manual is a comprehensive Parts List to allow the user to order spare parts for servicing.

Servicing facilities and the supply of genuine replacement parts are provided through a world-wide network of CompAir companies and CompAir UK Ltd. distributors, backed by the **Service tel+44 (0)1473 242097 and Parts department tel (+44 (0) 1473 242000) Fax (+44 (0) 1473 743468 and Sales (+44 (0) 1473 242000 Fax (+44 (0) 1473 743482 at CompAir UK Ltd., Ipswich (UK)**

The information in this Manual was correct at the time of printing but modifications to parts and procedures may be made without notice which could affect the servicing requirements of the compressor. Before any servicing or maintenance work is undertaken the user is advised to contact the local CompAir Company or CompAir UK Ltd Distributor for revised or up-dated information.

In any communication concerning the compressor it is essential to quote the MODEL, SERIAL No. and any CONTRACT Ref.

It is important this Manual is retained with the compressor for reference and should remain with the compressor if it is sold or transferred to another user. Ensure that the new user is made fully aware of the need to study the Safety Section and any Warnings for safe operation given throughout the text.

Protect the environment by using only approved method of disposal of condensates lubricating oil etc.

Please note:

a. Throughout the Manual all pressures quoted are gauge pressures.

b. Whilst recyclable materials are used as far as possible, please ensure when disposing of condensate, spent oil, used filter elements and any discarded parts or waste material of any kind make sure that there is no pollution to any natural water-course, drain system and that no burning waste takes place which could cause pollution of the atmosphere.

1.3 CAUTION

Use only **CompAir UK Ltd Ipswich Genuine Parts** when carrying out routine maintenance or repair. The use of replacement parts or lubricating oils not supplied or recommended by **CompAir UK Ltd Ipswich** can lead to expensive failures, which will not be covered by warranty.

Substitution of parts not manufactured or approved by CompAir UK Ltd Ipswich can create a potential personnel hazard.

This is a High Pressure Compressor, for safe and reliable operation use only genuine CompAir UK Ltd Ipswich Parts

To ensure continued trouble free operation it is important that periodic servicing is carried out in accordance with the information given in this manual - refer to the “Maintenance Section”.

Conditions of CompAir UK Ltd Ipswich warranty are stated in our Conditions of Sale. Details of warranty for a particular unit may be obtained from the local CompAir Company or authorised Distributor.

1.4 SAFETY PROCEDURES

- **WARRANTY**
  The Conditions of the CompAir UK Ltd Ipswich Warranty are set out in the Standard Conditions of Sale.

- **MAINTENANCE**
  To ensure continued trouble free operation of the compressor it is important that periodic maintenance and servicing are carried out in accordance with the information given in the "Maintenance" section of this Manual. If any replacement or repair is needed use genuine CompAir UK Ltd Ipswich parts.

* ***WARNING***
  The use of replacement parts or lubricating oils not supplied or approved by CompAir UK Ltd Ipswich may lead to failures in service which would not be covered by warranty.

Any unauthorised modifications or failure to maintain this equipment in accordance with maintenance instructions may make it unsafe. ***The use of replacement parts not supplied by CompAir UK Ltd Ipswich may create hazardous conditions over which CompAir UK Ltd Ipswich has no control.***

Such hazardous conditions may lead to accidents that can be life threatening, cause substantial bodily injury or result in damage to the equipment. ***CompAir UK Ltd Ipswich can bear no responsibility for equipment for which unapproved replacement parts are included.***

SPECIAL NOTE:

THE FOLLOWING HEALTH AND SAFETY PRECAUTIONS MUST BE READ IN CONJUNCTION WITH ANY OTHER MANUFACTURERS EQUIPMENT SUPPLIED.

1.4.1 GENERAL

CompAir UK Ltd Ipswich compressor safety relates to the document BS EN1012-1 Compressors and Vacuum Pumps - Safety requirements and the UK Pressure Systems Health & Safety Regulations S.I. No. 128.

- Most accidents which occur during the operation and maintenance of machinery result of failure to observe basic safety rules or precautions. Recognising a situation that is potentially hazardous can often prevent an accident.

- When handling, operating or carrying out maintenance on the unit, personnel must observe safe engineering practices and all relevant local regulations. The attention of users is drawn to the Health and Safety at Work Act 1974, and the regulations of the Institution of Electrical Engineers.

- CompAir *UK Ltd* cannot anticipate every possible circumstance, which might represent a potential hazard. The WARNINGS in this manual are therefore not all inclusive. If the user employs an operating procedure, an item of equipment or a method of working which is not specifically recommended by CompAir *UK Ltd* then they must ensure that the unit will not be damaged or made unsafe and that there is no risk to persons or property.

- Failure to observe these precautions given under "Safety Precautions" may be considered dangerous practice or misuse of the compressor

- Read and understand all WARNINGS, CAUTION AND MANDATORY LABELS on the unit before operating or carrying out maintenance or servicing.

1.4.2 WARNINGS, CAUTIONS & NOTES

The following details for this Safety Section relate to ESSENTIAL SAFETY REQUIREMENTS referred to in Machinery Directive 89/392/EEC, Amended 91/286/EEC.

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* Warnings call for attention to operating procedures involving specific hazards which could cause injury or death and are identified by the following

RISK OF DANGER

RISK OF HIGH PRESSURE

RISK OF GAS EXHAUST

RISK OF ELECTRIC SHOCK

RISK OF HOT SURFACE

CONSULT MANUAL

1.4.3 GENERAL SAFETY PRECAUTIONS

- When using cleaning solvents, local Health and Safety Regulations must be complied with. Provide good ventilation and use suitable protection such as a breathing filter mask, safety glass, protective apron and gloves.
- Safety footwear should be compulsory in all workshops. Safety helmets must be worn if there is any risk of falling objects.
- If using compressed air for cleaning purposes, ensure safety regulations are complied with and appropriate clothing worn.
- Never direct compressed air onto your skin or at other people. Never use compressed air to clean loose dirt from clothing.
- Before releasing compressed air through a hose make sure the free end is held securely so that it cannot whip and cause injury.
- Avoid injury by using a hoist to lift heavy loads. Check that all chains, hooks, shackles and slings are in good condition and are of the correct capacity. They must be tested and approved according to local safety regulations.
- Cables, chains or ropes should never be applied to lifting eyes. Always use an appropriate shackle or hook, properly positioned. Arrange lifting cables so that there are no sharp bends. Use a spreader bar to avoid side loads on hooks, eyes and shackles and never leave a heavy load unattended.
- When a load is on a hoist stay clear of the danger area beneath and around it. Keep lifting acceleration and speed within safe limits.

1.4.4 INSTALLATION PRECAUTIONS

- Competent personnel under a qualified supervisor must only carry out installation work.
- A fused isolator switch must be fitted between the main power supply and the compressor.
- Precautions must be taken to ensure that no injury is caused to passers-by through loose clothing being sucked into compressor intake.
- Ensure that the discharge pipe from the compressor to the user pipework, receiver or storage is free to expand and that no flammable material is within the vicinity. If any such material is close-by take steps to preclude ignition.
- A manual shut-off valve should be fitted in the discharge line to allow the compressor to be isolated. Non return valves cannot be relied upon for isolating parts from a pressure system. A safety valve must be installed between any compressor unit and the isolating valve.
- A pressure-reliving device must be fitted to every pressure vessel, or equipment containing air or gas above atmospheric pressure. Never remove or tamper with safety devices, guards or insulation fitted. In order to limit the risk of Legionnaires Disease, CompAir *UK LTD* advise caution with the use of cooling towers for water cooling the compressor. Closed circuit or direct mains cooling is preferred.
- Pipework or other parts with a surface temperature above 70°C, which may be accidentally touched in normal operation, must be guarded or insulated. Other high temperature pipework should be clearly marked and all pipework should be clearly marked.

1.4.5 OPERATIONAL PRECAUTIONS

- Competent personnel under a qualified supervisor must only operate the compressor.
- *Do not operate compressor with any removable inspection cover removed e.g. crankcase doors, valve covers etc.*
- Never remove or tamper with safety devices, guards or insulation materials.
- The compressor must only be operated at the supply voltage and frequency for which it is designed. Always isolate power before maintenance or servicing.
- When mains power is ON, lethal voltages are present in the electrical circuits and extreme caution is need when essential work is carried out on the electrical system. ***ALWAYS CONSULT A QUALIFIED ELECTRICIAN BEFORE ANY SUCH ESSENTIAL WORK.***

- Do not open starter compartment to touch electrical components while voltage is applied unless it is necessary for measurement, test or adjustment. Such work should always be carried out by a qualified. Electrician with appropriates tools and protection against an electrical hazard.
- If the unit is equipped with a Remote Control device, attach warning notices stating ***"THIS UNIT CAN BE STARTED REMOTELY"*** in prominent locations, one on the outside of the unit, the other inside the control compartment.
- As a further safeguard, take adequate precautions that no one is working or checking the unit before attempting to switch on remotely controlled equipment. Attach a ***"CHECK THAT ALL PERSONNEL ARE CLEAR OF UNIT BEFORE STARTING"*** or similar notice.
- Compressed air and gas piping, together with cooling water piping and other parts, with surface temperature greater than 70°C and may be accidentally touched, should be guarded or insulated.
- If there is any indication that the compressor is overheating it must be shutdown. (A high air or gas temperature switch is fitted as standard to guard against operating with excessive temperature). Beware of burns from hot oil and water when working on a unit recently shutdown.
- Do not operate the unit when guards provided for protection for all rotating and reciprocating parts have been removed for essential maintenance. Secure guards following any servicing or repair.
- Local noise regulations must be observed. Ear defenders are suggested by Noise at Work Regulations 1989 when the level is greater than 85 dB A at one meter. Be aware high noise levels can interfere with communication.

1.4.6 MAINTENANCE & REPAIR PRECAUTIONS

- Competent persons under qualified supervisor must carry out maintenance repair and modifications.
- The compressor will have a preserving oil applied to interior surfaces (Oil lubricated models). Oil free models will have desiccant bags in valve covers and distance pieces.
- Handling components such as seals, gaskets and diaphragms should not present a personnel hazard. Preservation oils again should not present a personnel hazard if handled under normal handling practices.
- Whilst compressors are asbestos free, treat all damaged gaskets as asbestos - when the Asbestos at work regulations apply.
- Viton 'O' seals under normal operating conditions are safe.
- However, should there be a fire within the compressor or these seals are likely to exceed a temperature of 300°C the material will decompose.

- **Degraded Viton gives off Hydrogen Fluoride fumes and if in contact with the skin an acid formed causes severe burns.**

- If Viton seals appear charred or gummy do not touch with unprotected hands: use neoprene or PVC gloves.
- Wash the area with limewater and avoid breathing any fumes. If contamination of the skin occurs washes with limewater and seeks medical advice.

Pre-Maintenance Operation

- Isolate the compressor from the main electrical supply. Lock the isolator in the OFF position and remove fuses.
- Attach a label ***" WORK IN PROGRESS - DO NOT APPLY VOLTAGE"***.
- Close the isolating valve between the compression unit and user's pipework. Close the isolating valve in the cooling water inlet pipe. Attach a label ***"WORK IN PROGRESS - DO NOT OPEN".***
- Check that all pressurised gas trapped in the system is released to atmosphere or safely to gas storage. Check that all pressure gauges register zero.
- Ensure that the cooling water system has been drained.
- Check that the drain valve on the delivery manifold is clear and gas pressure has been released.
- Check that all interstage drains are open to ensure any gas trapped between stages has been released.

- Stand clear of all valve covers when removing the securing screws.
- When removing valve covers for valve replacement, ensure a minimum of two threads is left engaged on the valve cover securing screws. Lever the valve cover until the 'O' seal is disengaged from the port in the cylinder head. Remove the securing screws and take out valve cover.
- ***Use only lubricating oils and greases approved by CompAir UK LTD to avoid potential hazards especially the risk of explosion or fire and the possibility of decomposition or generation of hazardous gases****.*
- Always clean oil spills from the surrounding floor before and after maintenance work.
- Make sure all instructions concerning operation and maintenance are strictly followed and that the complete unit, with all accessories and safety devices, is kept in good order.
- The accuracy of pressure gauges and temperature switches should be regularly checked at least 13 month intervals and thoroughly examined at least every 48 months. They must be renewed or service exchanged when acceptable tolerances are exceeded.
- Protection devices should be tested at each regular service interval and replaced or service exchanged if not functioning correctly. The maximum pressure for safety valves under fault conditions is 1.10 times the set pressure, the set pressure being a minimum of 1.05 times the maximum operating pressure to ensure seat tightness.
- Never use a light source with an open flame for inspection.
- Before dismantling any part of the compressor be sure that all heavy movable parts are secure.
- After completion of any maintenance or repair ensure that no tools, loose items or rags are left on or inside the compressor.
- Do not use any flammable liquid to clean valves, filter elements, cooler passages, pipe bores or any component carrying a flow of air or gas during normal operation. If chlorinated hydrocarbon substances are used for cleaning, safety precautions must be taken against toxic vapours, which may be released.

DO NOT USE CARBON TETRACHLORIDE.

- Precautions must be taken against using acids, alkalis and chemical detergents for cleaning machined parts. These materials cause irritation and are corrosive to the skin, eyes, nose and throat. Avoid splashes and wear suitable protective clothing and safety glasses. Do not breathe mists. Ensure water and soap is readily available.
- When disposing of condensate, old oil, used filter elements and other parts and waste material of any kind make sure that there is no pollution to any drain or natural water course and that no burning of waste takes place which could cause pollution of the atmosphere.
- Keep the compressor clean at all times.
- Protect components and exposed openings by covering with a clean cloth or tape during repair or maintenance work.
- Protect the motor, intake, electrical and regulation components against the entry of moisture e.g. steam cleaning.
- Precautions must be taken when carrying out welding or any repair operation which generates flames or sparks. The adjacent components must be screened with non-flammable material and if oil present, the system must first be cleansed thoroughly by steam cleaning.
- Condensate (oil and water mixture from compression process) must be regarded as trade effluent and is therefore not suitable for discharge into a surface water sewer, soakaway or watercourse.

PROTECT THE ENVIRONMENT USE APPROVED METHODS OF DISPOSAL*.*

1.4.7 PRECAUTIONS IN THE EVENT OF FIRE

- Use extreme caution when handling components that have been subjected to fire or very high temperature. Some components may contain fluoroelastomer materials, which decompose under these conditions to form highly corrosive residues. Skin contact can cause painful and penetrating burns resulting in permanent skin and tissue damage.

2 AMENDMENTS

ISSUE No.	MOD NOTE No.	M/C SERIAL No.	DATE	SECTION
1	NEW	-	NOV 1997	ALL
2	2	-	MAY 1999	9E
3	R005122	Change to Main Bearing Bush/thrust washer	AUGUST 2001	9A
4		Add Studs & Nuts to Service Plans Major Overhaul	JULY 2002	10
5		Add check condition of crankcase to cylinder studs & 2nd stage piston rings to 6000 hours service plan.	NOV 2002	10
6		Replace RSP's with new HSK Service Plan	Oct 2008	9.6
7		Minimum pressure for suction unloaders added, Alternative water valve added	Feb 2009	4.11 13.13
8		Standard Wiring Terminal Numbers added	March 2012	14
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3 LOGSHEET

COMPRESSOR LOG SHEET												REF NO:		
COMPRESS0R		PRIME MOVER		INSTALLED AT:								OIL GRADE USED:		
TYPE:		TYPE:										CHECK OIL LEVEL		
SPEED:		POWER:										CHECK WATER IN/OUT TEMPS.		
SERIAL NO		DRIVE:		DATE INSTALLED:								CHECK COOLING FAN		
DATE	TIME	HRS RUN	STAGE TEMP °C	DELY TEMP °C	STAGE PRESSURES BAR / PSI					DELY PRESS. BAR/PS	SERVICE PLAN NUMBER	REMARKS. SEE OVER FOR MORE	SIGNED	
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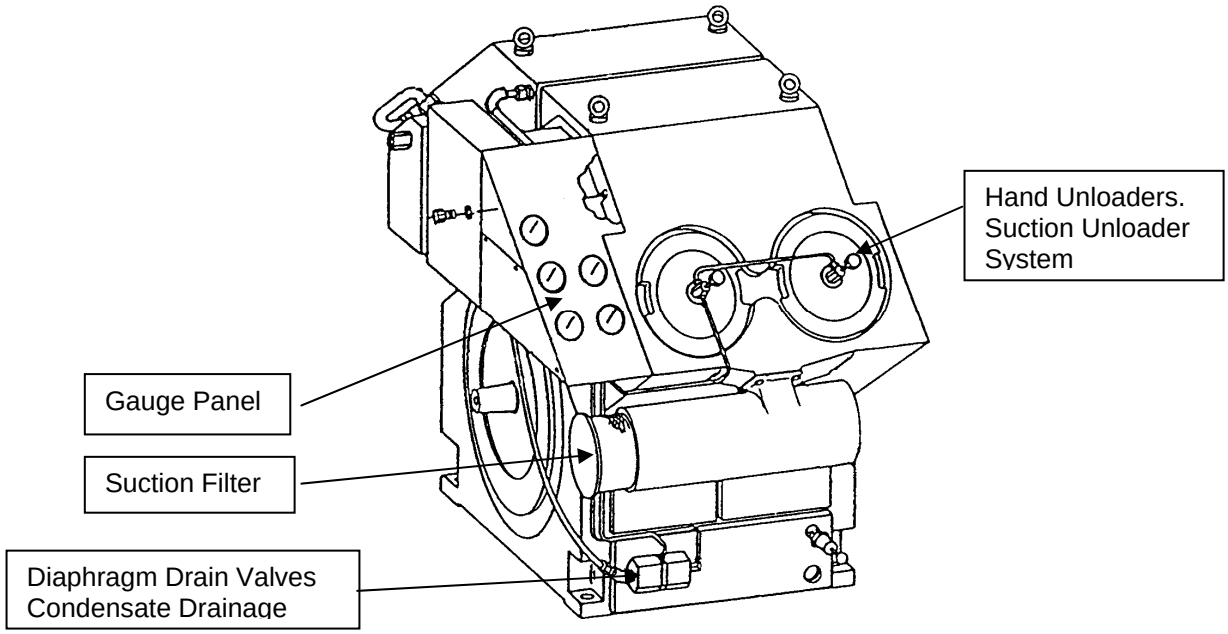
4 GENERAL DESCRIPTION AND OPERATION



4.1 CONFIGURATION

The 5236 Mk2 is a four cylinder, single acting, two stage, 90° vee configuration, water cooled machine. It has complete primary balance when fitted with aluminium first stage pistons, giving excellent balance characteristics.

4.2 LUBRICATION

The forced feed system is shown on following page.

The specified lubricant must be used at all times to ensure safe and efficient operation with minimum wear and maximum protection against moist air corrosion.

Recommendations are the result of extensive research at Ipswich Works and all responsibility for the use of an oil other than that recommended is placed on the purchaser and his oil company.

THE NORMAL GUARANTEE MAY BE INVALIDATED SHOULD A FAILURE BE ATTRIBUTED, BY IPSWICH WORKS, TO THE USE OF A LUBRICANT NOT RECOMMENDED.

4.3 SYNTHETIC OILS

These are oils which are arrived at by chemical synthesis from petroleum feed stocks, although in some cases they would be from vegetable and mineral oils rather than by straight run distillation of crude.

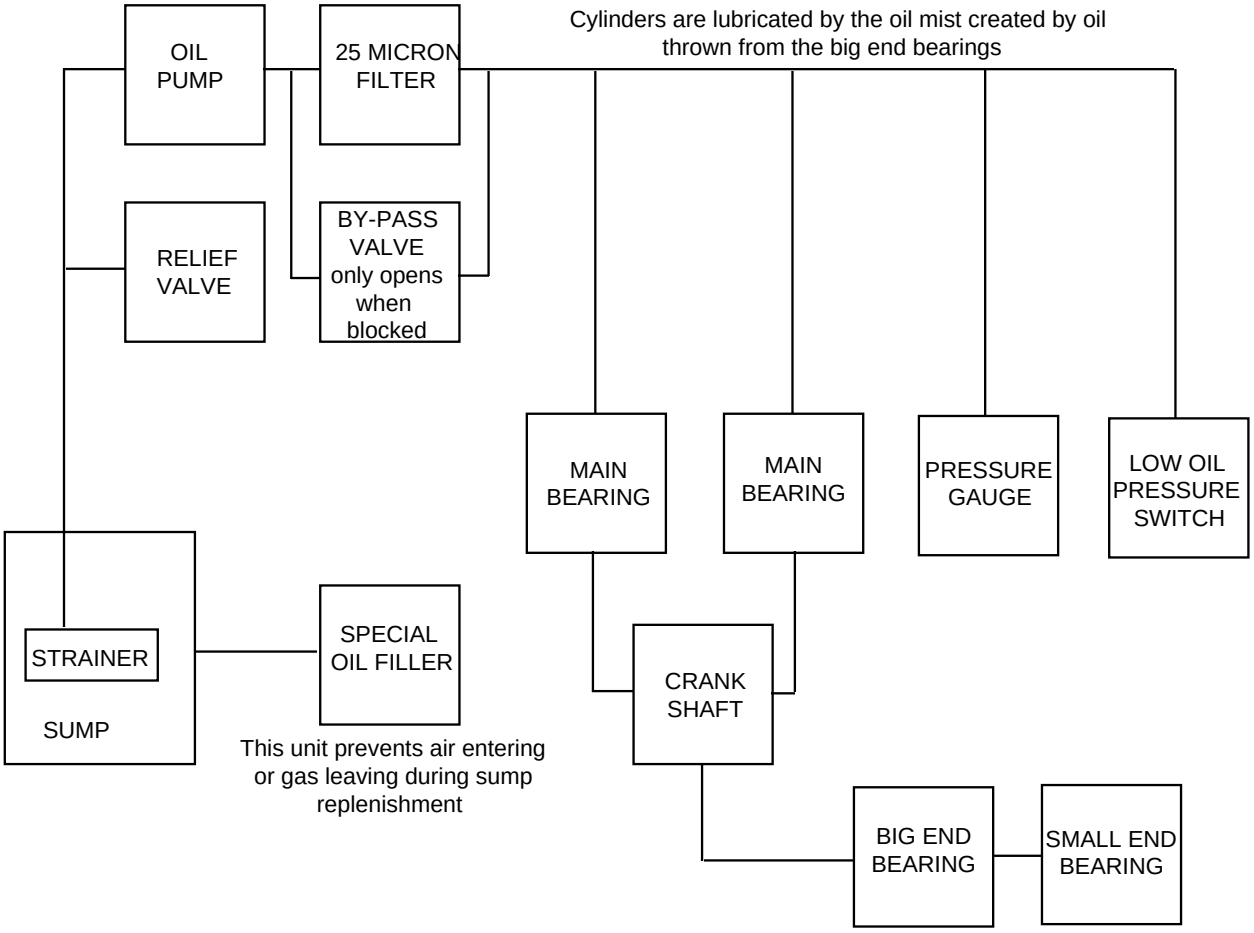
Advantages

1. Carbon deposits are reduced compared with mineral type oils. However, the lack – or very low level – of oxygen in the gas being compressed, means carbon deposits are much less than in an air compressor, so this advantage of synthetic oil is less noticeable.
2. It may be possible to extend oil change periods in some cases.
3. Wear rates are reduced.
4. These oils, being produced to close tolerances, have properties and performance which are consistent from batch to batch.
5. Oil consumption and carry-over can be reduced by up to 35%.

Disadvantages

1. There are some materials, e.g. certain rubbers, paints, plastics and metals which are not compatible with synthetic oils (see: Compatibility of Materials Chart). Components on the 5000 series compressors are compatible with synthetic lubricants but a problem may exist with auxiliary equipment, so consult their manufacturer to determine compatibility.

4.4 LUBRICATION SCHEMATIC FLOW DIAGRAM



4.5 COOLING

Cooling is by water flowing through the jackets and passages, either from the mains or a closed circuit system using a radiator or cooling tower. A bursting disc is fitted to prevent excessive pressure build up in the water spaces if a leak should occur from the coolers.

Electrolytic corrosion of the cooler tubes and fittings is prevented by the provision of a sacrificial anode (corrosion rod) in the water jacket which will be chemically attacked before the machine components.

4.6 DRIVE

Drive can be by flange mounting or vee belt transmission from a suitable power source, such as an electric motor or Diesel engine. See Section 10 for details of belt maintenance.

4.7 RUNNING GEAR

Main bearing bushes, big and small end bearings are all replaceable.

4.8 VALVES

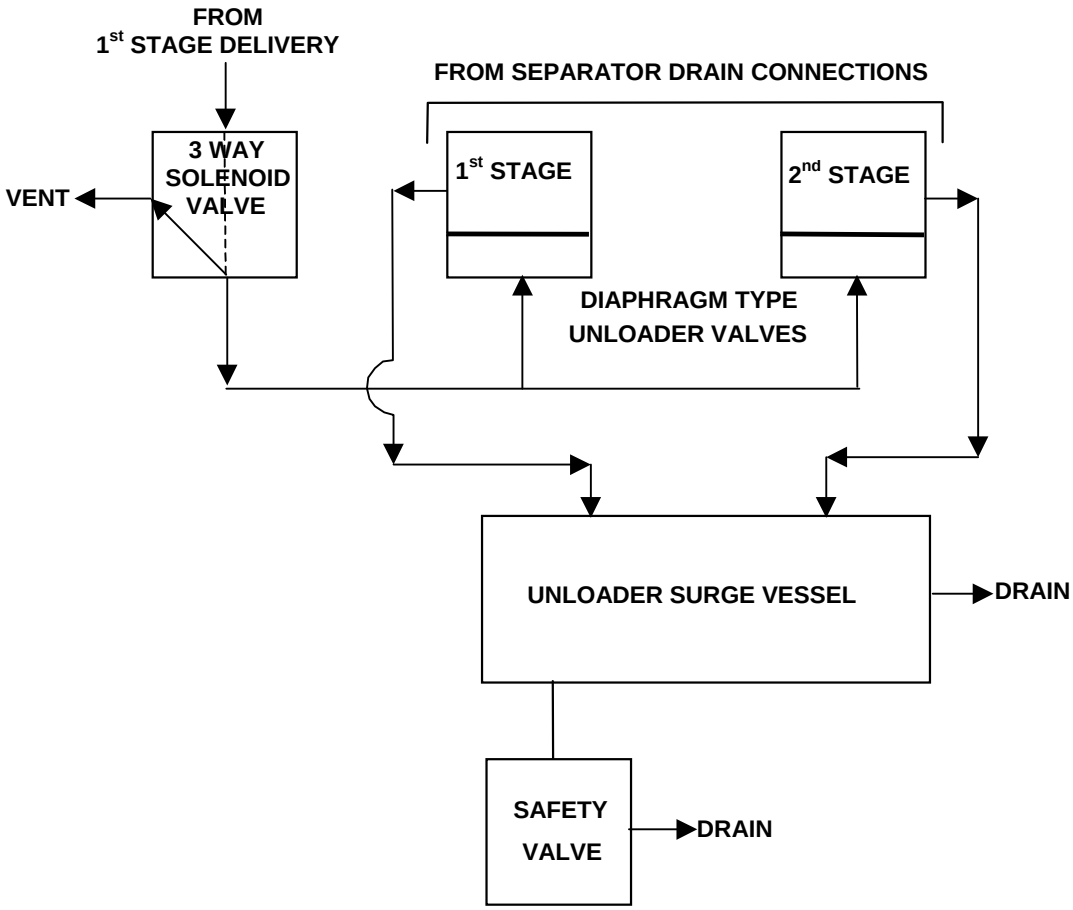
Both stage valves are of the flat, low lift, multi-ported type and combine suction and delivery functions. All valves are easily accessible for maintenance and replacement when required. One valve cover per cylinder and good flow characteristics are a feature of this reliable valve design.

4.9 INSTRUMENTATION

Pressure gauges are fitted to both stages, also an oil pressure gauge.

One temperature cut-out switch is fitted to the first stage delivery before cooling, another to the final delivery after cooling. These monitor temperatures and provide a signal to the starter/control panel to shutdown the compressor in the event of the set point being exceeded. High temperatures can result from the effects of valve leakage and reduced water flow. Compressor temperature is monitoried by a temperature switching gauge and a sensor fitted in the first stage air stream.

4.10 CONDENSATE DRAINAGE SYSTEM



This system comprises a pilot unloader valve, (PUV), and two diaphragm drain valves, (DDV's). The PUV comprises a three way air valve operated by a solenoid in one direction and a combination of air and spring pressure in the opposite direction and is automatically actuated by a signal from the motor starter or a electronic timer. It is of the normally closed mode (compressor unloaded) when de-energised.

The DDV's are positioned below the crankcase doors mounted on the door of the surge vessel, this being an integral part of the crankcase, they are piped to the first and second stage separators and function as unloaders and condensate drain valves.

When the PUV solenoid is energised, first stage air pressure activates flexible diaphragms within the DDV's which forces the valve onto their seats, thus bringing the compressor onto load. When the PUV solenoid is de-energised the first stage is released to atmosphere via the PUV exhaust port and air pressure from both the compressor separators forces the DDV's open allowing condensate to drain from the separators and the compressor to run in an unloaded condition. The system is designed so that the DDV's are open during starting, for condensate draining whilst running on load and on shutdown.

It is essential that a timer is fitted in the unloading circuit to provide a timed drainage facility to prevent accumulation of condensate. Time between drainage cycles should be set to a 30 minute period with an approximate 5/6 second duration to clear condensates fro the separators.

Note: in high humidity/temperature atmospheric conditions the drain cycle time must be reduced, Contact compare UK Ltd for more information.

4.11 SUCTION UNLOADING

The unloading of the suction valves during compressor start-up is necessary to reduce starting torque and prevent motor overload.

This system comprises a PUV and two first stage suction unloaders. The PUV comprises a three-way air valve operated by a solenoid in one direction and a combination of air and spring pressure in the opposite direction this is automatically actuated by a signal from the starter/control panel. It is of the normally open mode (compressor unloaded) when de-energised.

The first stage suction unloaders are positioned on the first valve covers and are used to automatically unload the compressor during starting and when running unloaded.

When the PUV solenoid is de-energised , second stage (i.e. receiver) air pressure forces the unloader piston down to unload the first stage suction valve until the solenoid is re-energised, bring the compressor on to load.

The suction unloaders can also be used manually, by means of the hand operated knobs.
Manual operation is necessary when the system pressure is lower than 10 barg. Lower system pressures may prevent correct operation of unloaders and cause motor overload.

To operate by hand, screw down knobs fully in a clockwise direction, this moves the push rod which operates the valve unloader fork to hold the suction valve plate off its seat thus allowing air to flow freely in and out of the compressor cylinder without compressing the air. **Note: It is important to unscrew the knob fully (anti-clockwise) when full operational speed is attained.**

WARNING:

SUCTION UNLOADERS MUST ONLT BE USED BY HAND TO SUPPLIMENT AUTOMATIC DDV SYSTEM AND RELEASED IMMEDIATELY THE DDV'S ARE ACTIVATED TO LOAD COMPRE4SSOR. FAILURE TO OBSERVE THIS PROCEDURE CAN LEAD TO UNACCEPTABLE HIGH SECOND STAGE TEMPERATURES.

4.12 AUTOMATIC STOP/START CONTROL

On initial starting the compressor is unloaded by the diaphragm drain valves and first stage suction unloaders. After approximately 10 seconds when full operational speed is reached the two PUV solenoids for operating the DDV's and suction unloaders are energised and the compressor delivers air normally. When the receiver pressure reaches the pre-determined setting, the pressure switch signals the motor starter to stop and unload the compressor or, if a run-on timer if fitted, the compressor will run in an unloaded condition for a period of ten minutes before being shut-down automatically. If the low set point is reached during this period the compressor will come back onto load.

5 LEADING PARTICULARS

5.1 UNIT DESIGNATION

Model 5236 Mk.2

5.2 TECHNICAL DATA – GENERAL

Type ..... Four cylinder, 2 stage, vee configuration
Cooling ..... Water
Direction of rotation, viewed from drive end ..... Anti-clockwise
Number of valves ..... One combined suction and delivery per cylinder
Type of valve ..... Flat plate, low lift
Mounting ..... Three point, anti-vibration mounts

5.3 TEMPERATURES

Minimum ambient temperature ..... 0°C
Maximum ambient temperature ..... 45°C
Maximum ambient for radiator sets *(Contact CompAir UK Ltd for lubricant/duty restrictions)* ..... 30/40°C
Maximum water inlet temperature ..... 37°C
Temperature rise across machine ..... 10°C to 12°C

5.4 SPEEDS

Minimum speed ..... 750 rpm
Maximum speed ..... 1800 rpm

5.5 PRESSURES

Minimum working pressure ..... 10 bar
Maximum working pressure ..... 40 bar
Maximum inlet pressure ..... 0.14 bar
Maximum water pressure ..... 5.1 bar
Water jacket test pressure ..... 10.3 bar
Oil pressure ..... 2 to 2.75 bar
Oil pressure (minimum worn compressor ..... 1 bar

5.6 INTERNAL DIMENSIONS

Piston stroke ..... 75 mm
First stage cylinder bore (2 off) ..... 185 mm
Second stage cylinder bore (2 off) ..... 75 mm

5.7 LUBRICATION

Crankcase oil capacity ..... 42.5 litres
Recommended oil – Mineral ..... Mobil Rarus 427
– Synthetic ..... Reavellite
Recommended grease (for assembly) ..... Shell Alvania R3

5.8 COOLING

Cooling water flow @ 15°C ..... 75 l/h/kw

5.9 CONNECTIONS

Suction connection Rp3
Final stage delivery connection Rp1
Water inlet and outlet connections Rp1 1/4

5.10 RUNNING CLEARANCES

Description	Stage	As Fitted (mm)	Max Permissible (mm)
Piston vertical clearance	1	0.5/1.2	1.2
	2	0.25/1.35	1.35
Piston ring gaps	1	0.2/0.45	1.43
	2	0.07/0.1	1.3
Piston ring axial width clearance	1	0.05/0.1	0.15
	2	0.01/0.045	0.08
Piston/Plunger Diameter----------Cast Iron	1	184.85/184.82	184.77
----------Aluminium	1	184.77/184.74	184.69
----------Above top ring	1	184.54/184.49	184.44
----------Cast Iron	2	74.91/74.89	74.84
Cylinder/Liner diameter	1	185.05/185.00	185.11
	2	75.03/75.00	75.09
Small end bearing diametral clearance in conn rod	1	0.010/0.050	0.1
	2	needle roller	-
----------in piston	1	0.003/0.013	0.03
	2	0.025/0.044	0.09
Big end bearing diametral clearance	all	0.066/0.12	0.24
Small end bearing end float	1	0.15/0.64	1.0
	2	0.15/0.55	1.0
Crankshaft end float	-	0.19/0.54	0.75
Main bearing diametral clearance	-	0.05/0.135	0.2
Oil pump outer rotor diametral clearance	-	-	0.26
Oil pump innerr rotor lobe clearance	-	-	0.15
Oil pump outer axial clearance cover to rotor	-	-	0.13
Coupling face distance Direct Coupled sets	-	2-6	6

5.11 TORQUE WRENCH SETTINGS

5.11.1 CLASS A – CRITICAL

(All figures ± 5%)

ASSEMBLY OPERATION	SIZE	NEWTON METRE (Nm
Big End Bearing Bolts	M16	203
First, Second Stage Cylinders to Crankcase	M12	95
First Stage Cooler Cover – Floating End	M12	95
First Stage Cooler Cover – Fixed End	M12	95
Second Stage Cooler Cover – Floating End	M16	235
Second Stage Cooler Cover - Fixed End	M16	235
Fixed End Tubeplates to Cylinders	M10	55
First Stage Valve Cover	M12	54
Second Stage Valve Cover	M20	121
Flywheel Bolt	¾ UNF	162
Coupling Ring to Flywheel	M10	55

5.11.2 CLASS B – NON-CRITICAL

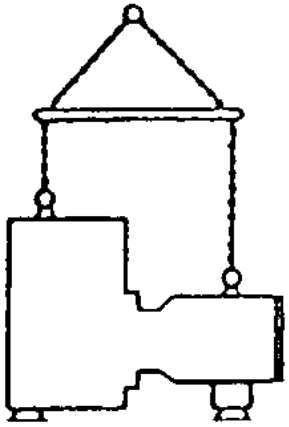
(All figures + 5% - 15%)

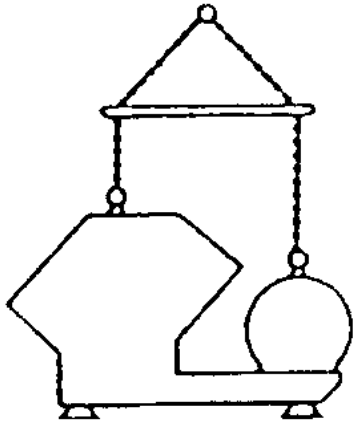
ASSEMBLY OPERATION	SIZE	NEWTON METRE (Nm
First Stage Valve	M10	21
Second Stage Valve	M8	11
Driving End Main Bearing Housing to Crankcase	M12	95
Outer End Main Bearing Housing to Crankcase	M12	95
Outer End Cover	M8	27
Oil Pump	M8	27
Oil Filter to Crankcase	M8	54
Breather to Crankcase	M6	11
Bell Housing to Crankcase	M12	95
Bell Housing to Motor	M16	162
Motor Bracket to Crankcase	M16	162
Bursting Disc Cover	M10	54
Crankcase Door	M8	27
Surge Vessel Door	M8	27
DDV to Surge Vessel Door	M8	27

6 INSTALLATION

6.1 HANDLING OF UNIT

When using the compressor and motor eyebolts as the slinging attachment, it is essential that a spreader is used. The lift should always be made vertical, as inclined loadings drastically reduce the eyebolts' strength. Suitable shackles should be used for this operation.

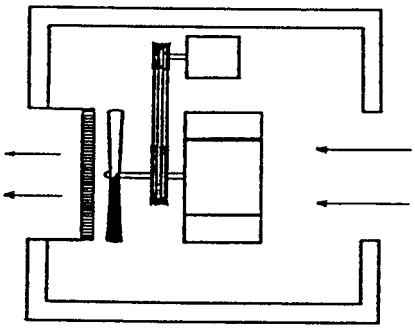




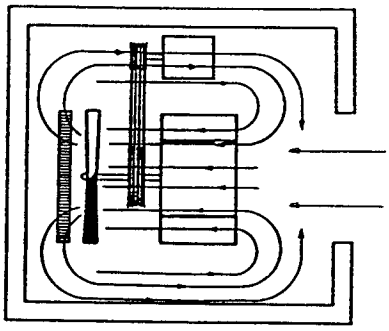
6.2 LOCATION

Compressor should be installed in a cool, level, well ventilated position, clear of fumes, heat or high humidity, to ensure efficient performance and also to prevent temperature problems.

RADIATOR SETS



RECOMMENDED INSTALLATION
COOLING AIR ENTERS, PASSES OVER MACHINE AND AS HEATED AIR, IT IS EXHAUSTED FROM THE MACHINE ENVIRONMENT



INCORRECT INSTALLATION
COOLING AIR ENTERS, PASSES OVER MACHINE AND THEN AS HEATED AIR, RE-CIRCULATES IN MACHINE ENVIRONMENT.

It is imperative that the radiator fan works in a cool, clean, direct air flow and that there is a reasonable air gap around the radiator or it is fixed into a wall. As a large percentage of the compressor cooling water heat is dissipated via the radiator to the inducted air stream, it is essential that expired cooling air has an unobstructed passage and exit and does not, under any circumstances, re-circulate in the immediate compressor environment. If more than one compressor set is installed, each must have its own direct air flow and in small buildings and enclosures the radiator(s) should be sealed to an outside wall by means of a duct of a sufficient area for the ventilation required.

Allow sufficient space around the installation to enable safe maintenance working conditions.

Protection from severe weather conditions is desirable.
Maximum allowable ambient cooling air temperature for radiator cooled sets is dependant on many variables eg, pressure, speed and type of oil. Contact Ipswich Works to ascertain allowable temperature for operating conditions.

6.3 MOUNTING

Under normal circumstances a special foundation is unnecessary but verification must be obtained that the support floor is structurally adequate as well as flat and level. If installed adjacent to vibrating machinery it may be necessary to bolt down the isolation pads but when tightening, ensure the isolation pads are not distorted.

If bedplate mounted, ensure floor is level and even surfaced, to prevent distortion.

6.4 CONNECTIONS, PIPEWORK AND FITTINGS

Full consideration must be given to system and pipework layout. Check piping and connections are suitable for pressures and capacities and if the compressor is flexibly mounted, adjacent pipework must also be flexible.

Pipework adjoining the compressor should consist of short flexible sections to facilitate maintenance removal of pipework and absorb any vibration.

It is essential that all pipework is made and installed so that it is not constrained or distorted when connected to the compressor. Where ever possible use 90° bends with 8" (0.2m) radius, not elbows. This should provide the discharge pipework with the necessary flexibility to allow for thermal expansion.

Before completing pipework assembly, ensure all port protection plugs and blanks are removed and suction pipe sections are clear of jointing compound, scale, swarf, dirt or other foreign substance. The system must be suitably braced to prevent vibration and coupling strain on the compressor. Flexible suction piping should be suitable to withstand suction collapse.

If suction is from a gas main, prevent transfer of liquid from the main to the compressor pipe by connecting the latter to the top of the main pipe.

Separators and drain traps of adequate capacity should be fitted in an easily accessible low section of the pipework system to prevent condensate or oil carry-over build up. These must be drained regularly.

The delivery line should incorporate non-return valves, especially for large capacity systems or where two or more compressors are linked to a common main.

Unloading and control gear piping must be as short as possible.

CompAir UK Ltd compressors incorporate safety valves at all stages as standard equipment to protect the compressor. They will NOT give protection to downstream piping or equipment. Separate safety valves should be fitted for these areas.

6.5 DRIVE RECOMMENDATIONS

Belt Drive: SEE APP012 SECTION 10 For details

It is very important that the driving and driven pulley grooves are in line and both pulley shafts parallel. V-belt tensioning procedures follow normal BS.3790, 1981 practice.

Direct Drive: SEE APP011 SECTION 10 For details

6.6 COOLING

Satisfactory compressor operation depends on correct cooling, which requires positive circulation of cool, clean water, free from suspended particles.

Check water is flowing in mains installations or, if closed circuit, that radiator is full.

It is recommended that a filter be fitted in the inlet water line (mains).

Maximum permitted water pressure within the compressor is 5 bar equivalent to 52 metres of water head.

Cooling water flow rate is determined by temperature rise across the machine adjusted on site to 10°C to 12°C.

Maximum recommended water inlet temperature is 30°C.

It is recommended that temperature gauges are fitted to water inlet and outlet pipes to monitor water temperature (mains).

Water flow rate at 15°C inlet temperature will be 75 l/h/kw approximately (mains).

Prevent overcooling by shutting off flow when compressor is not running (mains).

A CompAir UK Ltd automatic water valve can be fitted to control water supply when stopping or starting the compressor (mains). If one has been ordered, details will be found in SECTION 10.

Trip arrangements should be fail safe to ensure that compressor will only run on full load for a short period without water flow before shutting down.

During freezing weather conditions, cooling water should be drained from the system if the compressor is not being used (mains) or anti-freeze added to radiator sets to manufacturers specified concentrations.

NOTE:-
It is essential that anti-freeze used is suitable for use with neoprene rubber water pump impeller when Jabsco cooling water pump is supplied with compressor or radiator set.

The following are suppliers that have indicated that their products are suitable for use with neoprene rubber.

Ethylene Glycol

Crown Anti-freeze *	–	Smallman Lubricants Ltd.
Bluecol 'U' *	–	Smiths Industries
Thelson Universal FF6 *	–	Croda Application Chemicals Ltd.
Thermocal C *	–	Cargo Fleet Chemicals Co. Ltd.
Ro-Freeze	–	Rochem Chemicals

*The above named anti-freeze followed by * suffix includes a rust inhibitor.*

Cooling Towers and Chillers	–	Consult the local Water Authority and specialists dealing with these systems for frost protection recommendations.

6.7 ELECTRICAL CONNECTIONS

Ensure compressor is installed to comply with local electricity authority stipulations and that necessary electrical work is carried out by a competent electrical engineer. Check electrical requirements for machine with manufacturer before commencing installation wiring. Read "Hazardous Area Operation" section at the start of this book.

An overload device must always be fitted to motors.

Manufacturers terminal box wiring instructions must be observed.

An hours run meter fitted to the motor starter/control panel is recommended for efficient maintenance scheduling.

6.8 RECOMMENDED ANCILLARIES SUMMARY

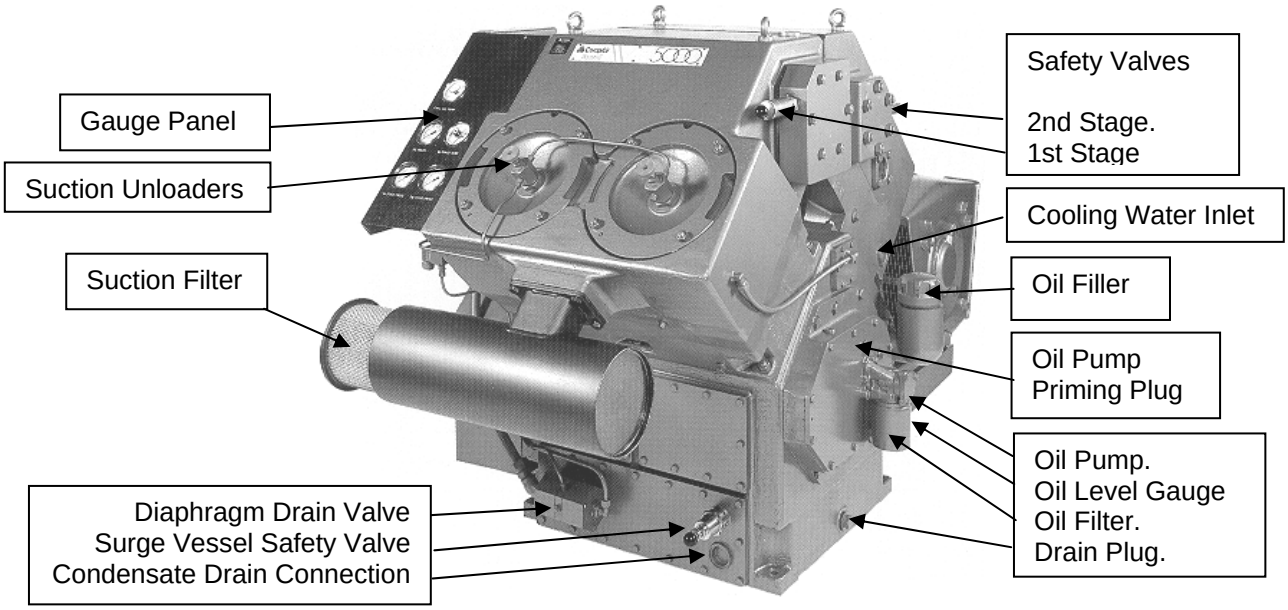
1. Flexible pipe at final delivery.
2. Overload trips.
3. Water inlet and outlet thermometers.
4. Water flow control.
5. Separators and drain traps.
6. Non-return valves.

7 COMMISSIONING OR RECOMMISSIONING

W A R N I N G :-

BEFORE OPERATING THIS EQUIPMENT USERS SHOULD BE MADE AWARE OF AND ENSURE COMPLIANCE WITH THE HEALTH AND SAFETY REGULATIONS APPROPRIATE TO THIS CLASS OF WORK. ATTENTION OF U.K. USERS IS DRAWN TO THE HEALTH AND SAFETY AT WORK ACT, 1974.
& CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH REGULATIONS 1988

TAMPERING WITH SAFETY VALVES IS DANGEROUS AND ALSO INVALIDATES THE GUARANTEE.



7.1 BEFORE STARTING

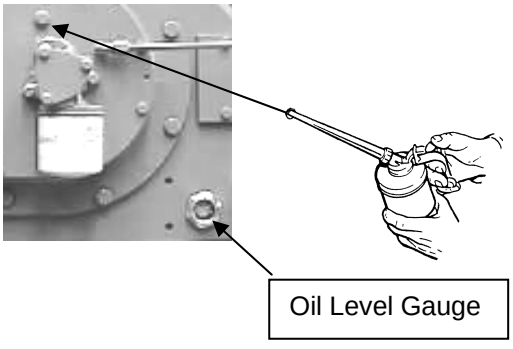
Ensure familiarity with safety devices and type of control.

NOTE: Low oil pressure and high air temperature switches are pre set and should not be adjusted.

Ensure suction filter is in good condition and filter element is fitted. Make sure that any protective blank fitted to the first stage suction is removed. Check that silencer bore (if fitted) and any suction pipework is clean before reassembling.

Check that the inside of the crankcase is clean and filled with the correct grade of lubricant until oil level sight glass is up to maximum level. Maintain oil level no lower than sight glass centre line.

Important:- Do not overfill.



Remove plug from outer end cover, above force feed pump and prime with recommended lubricant. Replace plug.
Turn over the compressor at least one revolution by hand, to ensure freedom of movement.

7.2 START-UP PROCEDURE

NOTE: It is not necessary to remove any inhibition lubricant which may have been applied before despatch, unless there are specific instructions attached to the compressor stating otherwise.

Screw down fully the first stage suction unloaders.

Check radiator is topped up on radiator sets or water is flowing in correct volume in mains water installations.

Operate starter.

Check immediately that the direction of rotation is counterclockwise looking on driving end.

Check that oil pressure is above 2 bar.

W A R N I N G:-

THE COMPRESSOR SHOULD NOT BE RUN FOR LONGER THAN 30 SECONDS WITH NO OIL PRESSURE.

Check there are no uncharacteristic noises.

Run for 30 minutes unloaded.

Stop and isolate the compressor and release all pressures. Check that outer surface of machine is cool

Remove crankcase doors and check that bearings and running gear are not over-heating. Replace doors, ensuring joints are correctly seated.

Close drain valves and/or replace plugs.

Restart the compressor, unscrew the first stage suction unloaders and bring slowly onto load. Build up to full pressure within 1 hour.

If appropriate, set the compressor for automatic operation.

Check and adjust the control equipment settings, if applicable (for example, pressure switch).

Continue to check that machine is functioning correctly and not over-heating.

Observe stage pressures and temperatures are normal.

Check for air, water or oil leaks.

WARNING:-

Do not try to correct leaks when items are pressurized.

Ensure the automatic controls (if applicable) are operating correctly.

If machine is manually controlled, open all condensate drains at 30 minute intervals.

Adjust cooling water flow to give 11°C rise across machine.

Run at full load for one and a half hours and record compressor rpm, oil pressure and stage pressures at 30 minute intervals.

8 OPERATION AND ROUTINE MAINTENANCE

8.1 OPERATION AND GENERAL MAINTENANCE

The commissioning procedure (Section 4) should be used:–

(a) For the first commissioning run;
(b) Following overhaul;
(c) After standing idle for an extended period.

External cleanliness of the compressor pipework and jointing is imperative in order that any leakages may be readily detected. Monitor and record stage pressures and temperatures in order to give advanced warning of any malfunction. Ambient conditions, especially temperatures, will vary readings but they are usually within plus or minus 4%.

Marking the pressure gauge glass at the normal running pressure will allow easy comparisons of pressure to be made.

8.2 STARTING UP

Ensure operator is fully conversant with controls and safety devices.

Check oil level in crankcase and top up if necessary, using recommended oil until sight glass is up to high level mark.

Set stop valves in control pipework correctly.

Ensure trip circuits, if fitted, are correctly set.

Check V belts are in good condition and correctly tensioned. see Section 10.

Check that compressor and ancillary equipment are clear of all loose equipment and tools.

Ensure that there is adequate water in the cooling system (radiator sets) or supply from the mains.

Manually operate suction unloaders if receiver pressure is unavailable to achieve this.

Operate main control or motor starting gear.

As soon as Diaphragm Drain Valves (DDV's) are actuated to load machine, release suction unloaders if previously manually operated.

8.3 RUNNING ON LOAD

Set automatic timer (when fitted) to vent diaphragm drain valves every 30 minutes for 5 seconds duration, or more frequently if high humidity prevails. Contact CompAir UK Ltd Ipswich, for more details.

Monitor gauges for normal pressures and temperatures.

Check water temperature rise 10°C to 12°C across machine and adjust to suit.

Observe compressor is functioning correctly without undue vibration or noise.

8.4 STOPPING

Stop compressor by depressing stop button on motor control panel. Turn off cooling water flow if no automatic water valve or water pump is fitted. The machine will automatically unload via unloader system.

8.5 STANDING IDLE

The unloaders will automatically be left open.

For ambient temperatures below 0°C protect machine by draining off cooling water system, unless protected by anti-freeze.

After one week standing idle, turn the machine over by hand before starting to ensure it turns freely.

If the compressor is to stand idle for more than four weeks or shorter period if ambient conditions are unfavourable, it is advised to consult CompAir UK Ltd Ipswich for correct inhibition procedure.

9 MAINTENANCE SCHEDULE

W A R N I N G :-

1. BEFORE PROCEEDING WITH MAINTENANCE ON THE COMPRESSOR IT MUST BE STOPPED AND ISOLATED ELECTRICALLY AND MECHANICALLY AND VISIBLE WARNING NOTICES DISPLAYED.

2. IN ADDITION ALL INTERNAL PRESSURE MUST BE RELEASED WITH THE UNIT ISOLATED FROM THE SUPPLY AND STORAGE RESERVOIR AND THE WATER SUPPLY SHUT OFF.

NOTE:-

An O&M manual must cater for a wide variety of operating duties, ambient conditions and methods of control, as well as the use of mineral or synthetic lubricants. Periods given in this manual allow for the worst combination and are also based on preventative maintenance rather than operation until failure occurs.

9.1 GENERAL

It is useful to record pressure, temperatures, oil used etc. in a log against hours run, as this builds up a detailed record of the machine's condition. It can also give an indication of impending problems.

9.2 DAILY

Check oil level in crankcase and top up as necessary.

Check stage pressures, oil pressure and temperatures.

9.3 WEEKLY

Check for oil, air or water leaks, rectify if necessary.

Check correct operation of all controls.

Check all nuts, screws and fittings for tightness.

9.4 AFTER THE FIRST 100 HOURS RUNNING TIME ON MINERAL OIL

Change oil filter. If it is desired to use synthetic lubricant, follow directions below.

9.5 CHANGING OVER FROM MINERAL TO SYNTHETIC LUBRICANT

Compressor components in contact with the lubricant should be as clean as is practical before changing over. This is necessitated by the excellent solvency of synthetic oils which tend to loosen and remove existing deposits.

There are some materials, e.g. certain rubbers, paints, plastics and metals, which are not compatible with synthetic oils. Components on these compressors are synthetic oil compatible but a problem may exist with ancillary equipment. Consult equipment manufacturer to determine compatibility.

1. Drain the old mineral lubricant completely whilst the oil is warm.
2. Thoroughly clean interior of the crankcase. Clean suction strainer.
3. Renew oil filter.
4. Remove, thoroughly clean and refit all valves. See SECTION 7.
5. When inspecting valves, also remove as far as is possible carbon deposits in valve pockets, passageways, pipes and separators.

9.6 SERVICE PLAN

Service Plan - 5236

	Service Kit Number													
	HSK2283	**HSK2291**	**HSK2305**	**HSK2313**	**HSK2321**	**HSK2291**	**HSK2356**	**HSK2291**	**HSK2348**					
	12 Months From Installation/Last Service Or													
COMMISSION	100	1500	3000	4500	6000	7500	9000	10500	12000	Task	Preparatory Task	Task Description	Parts Provided	Qty
	X	*X*	*X*	*X*	*X*	*X*	*X*	*X*		1		Change air intake element (air compressor only)	Suction filter element	1
	X	*X*	*X*	*X*	*X*	*X*	*X*	*X*	*X*	*2*		Inspect Belt Tension		
		X	*X*	*X*	*X*	*X*	*X*	*X*	*X*	*2A*	*OR*	Inspect Drive Coupling		
		X	*X*	*X*		*X*	*X*	*X*				Inspect corrosion rods		
					X				*X*	*3*		Replace corrosion rods	Corrosion rod assy	1
X	*X*		*X*		*X*		*X*		*X*	*4*		Remove crankcase doors	Door joints	4
X	*X*		*X*		*X*		*X*		*X*			*Clean sump*		
X									*X*	5	*+7+4*	Replace oil	CompAir Minerell lubricant 20 Litres	3
	X		X		X		X			6	+7+4	Replace oil	Reavellite S lubricant 20 Litres	2
	X		X		X		X						Reavellite S lubricant 5 Litres	1
X	X	X	X	X	X	X	X	X	X	7		ReplaceOil filter	Oil filter	1
		X	X	X	X	X	X	X	X	8		Replace water pump impellor	Impellor kit	1
				X			*X*		*X*	*9*		*Remove 2nd stage valve covers*	*Cover O ring*	*2*
													Cover O ring	*2*
				X			*X*			11	+9	Service 2nd stage valves	Valve kit	2
									X	12	+9	Replace 2nd stage valves	Valve assy	2
									X			*Inspect 2nd stage pistons*		
									X	*14*		*Deglaze 2nd stage liners*		
									X	15	+14+ 9+4	Replace 2nd stage piston rings	Piston ring kit	2
				X			*X*					*Service 2nd stage valves*		
									X	16	+14+ 9+4	Replace 2nd stage small ends	Bearing S/E	2
													Gudgeon pins	2
													Circlips	4
									X	17	+4	Replace 2nd stage big end bearings	Bearing Shells Pairs	2
													Big end bolts	4
				X		*X*			*X*	*18*		*Remove 1st stage valve*	*Cover O ring*	*4*

Service Plan - 5236

	Service Kit Number													
	HSK2283	**HSK2291**	**HSK2305**	**HSK2313**	**HSK2321**	**HSK2291**	**HSK2356**	**HSK2291**	**HSK2348**					
	12 Months From Installation/Last Service Or													
COMMISSION	100	1500	3000	4500	6000	7500	9000	10500	12000	Task	Preparatory Task	Task Description	Parts Provided	Qty
												covers		
				X		X				20	+18	Service 1st stage valves	Valve kit	2
									X	21	+18	Replace 1st stage valves	Valve assy	2
									X			*Inspect 1st stage pistons*		
									X	22		*Deglaze 1st stage liners*		
									X	23	+22 + 4	Replace 1st stage piston rings	Piston Ring Kit	2
				X		X			*X*			*Inspect 1st stage liners*		
									X	24	+32 + 4	Service 1st stage piston/small ends	Bush	2
													Gudgeon pin	2
													Circlip	4
									X	25	+4	Replace 1st Stage big end bearings	Bearing Shells Pairs	2
													Big end bolts	4
									X			*Inspect cranshaft*		
									X	26	IF FITTED	Service water valve-U231.F	Service kit	1
									X	27		Replace main bearing & oil seal D/E	Bearing bush	1
													Joint	1
													Oil seal	1
									X	28		Replace suction filter silencer	suction filter silencer	1
													suction filter joint	1
									X	29		Remove end cover -oil pump plate O/E	joint end cover	1
									X	30	+29	Replace main brg.O/E	Main bearing bush	1
													joint	1
									X	31	+29	Replace oil pump	Oil pump with coupling & gasket	1
									X	32	+29 IF FITTED	Replace water pump drive chain	chain	1
										33	+29 IF	Service water pump	seal & impellor kit	1

Service Plan - 5236

	Service Kit Number													
	HSK2283	**HSK2291**	**HSK2305**	**HSK2313**	**HSK2321**	**HSK2291**	**HSK2356**	**HSK2291**	**HSK2348**					
	12 Months From Installation/Last Service Or													
COMMISSION	100	1500	3000	4500	6000	7500	9000	10500	12000	Task	Preparatory Task	Task Description	Parts Provided	Qty
											FITTED			
													Joint-water pump bracket	1
													Joint-water pump	1
													Joint-water pump IN/OUT	2
					X				*X*	*34*		Replace bursting discs (Radiator Set @9000hrs.)	Bursting discs kit	1
					X				*X*	*35*		Replace drain valve diaphragm	Service kit	1
													Joint-drain to surge vessel	4
													Screw seal	2
									X	*36*		Replace diaphragm drain valves &seats	1st valve &seat	1
									X	37		Inspect test 1st stage cooler	Joint-stack to cover fixed end	1
													Joint-stack to cylinder fixed end	1
													O ring floating end	1
													Joint-stack to cover floating end	1
									X	38		Inspect test 2nd stage cooler	Joint-stack to cover fixed end	1
													Joint-stack to cylinder fixed end	1
													O ring floating end	1
													Joint-stack to cover floating end	1
												Test safety valves in accordance with regional requirements		
									X				1st stage	1
									X				2nd stage	1
									X				Surge vessel	1
									X			Test pressure gauges	1st stage	1
									X				2nd stage	1
									X				Oil	1
									X			Test temperature switches	1st stage	1
									X				Final stage	1
									X			Test low oil pressure switch	L.O.P	1

Service Plan - 5236

	Service Kit Number								
	HSK2283	**HSK2291**	**HSK2305**	**HSK2313**	**HSK2321**	**HSK2291**	**HSK2356**	**HSK2291**	**HSK2348**
	12 Months From Installation/Last Service Or								
COMMISSION	100	1500	3000	4500	6000	7500	9000	10500	12000	Task	Preparatory Task	Task Description	Parts Provided	Qty
									X			Test non return valve	non return valve	1
									X				Seal	1

10 DISMANTLING AND REASSEMBLY OF VALVES

10.1 GENERAL

Keep a spare oiled and maintained set of valves in store for quick compressor servicing.

Valves should have a thin carbon layer and be slightly moist with oil.

Valve removal is a simple procedure but the following guidelines should be observed.

NOTE:-
Unless replacement of the springs and plates is intended, the order in which these components are removed should be carefully noted so that the valves may be reassembled with the same seating faces in contact.

10.2 CLEANING AND INSPECTION – ALL STAGES

The valve components should be degreased using a suitable solvent and stiff brush. Carbon deposits may be removed scraping with a soft, blunt instrument, e.g. a piece of wood.
WARNING:- Great care should be taken when removing carbon deposits to ensure that the seating faces of the valve components are not damaged.

These faces should be clean and bright over their whole area, with no evidence of uneven contact. Renew any plates which are indented, cracked, warped, or have wear grooves.

If the seats show severe wear or indentations the complete valve assembly must be renewed. The remaining components should be checked for cracks, distortion or other damage liable to impair valve operation.

10.3 FIRST STAGE VALVES – WITH SUCTION UNLOADERS

10.3.1 REMOVAL

Remove the first stage suction unloader pipework and the nuts securing each of the two valve covers and withdraw the covers from the locating studs using forcing screws in the tapped holes provided in each cover.

Screw valve lifters to each valve and lift from the cylinders. A gentle rocking action pulling at the same time will free the valve from any carbon build up in the pocket.

10.3.2 DISMANTLING

Lay the valve on a clean, flat surface with the unloader fork uppermost. Remove and discard 'O' ring (10). Remove the cap by pulling, unscrew and remove nut (16) and washer (17) and remove unloader fork (13) and spring (14). Unscrew and remove nut (11) whilst holding the valve in a soft jawed vice with just sufficient force to prevent it from turning. The valve can then be removed from the vice and the upper valve body half (15) can be lifted clear of the stud. Remove the delivery plate springs (3), delivery plate (2), lower lift washer (7), suction valve plate (6), middle lift washer (5) and the suction plate springs (4).

10.3.3 REASSEMBLY

Invert upper valve body (15) and place on clean, open vice jaws or a similar support. Place lower lift washer (7) and suction plate (6) on the valve body, engaging them with location pegs (8). Place middle lift washer (5) onto pegs.

Fit suction springs (4) with the angled arms pointing downwards. Align the holes in the springs with location pegs.

Fit delivery springs (3) with angled arms pointing upwards and place in valve body (15) and engage with location pegs (9). Fit delivery plate (2), engaging it with location pegs in the same manner as delivery springs.

Assemble valve body halves by carefully passing central stud of lower valve body (1) through the centre of upper body (15), taking care not to disturb the alignment of the plates and springs. Align holes in lower valve body with the pegs and carefully push the valve body halves together against the spring plate force.

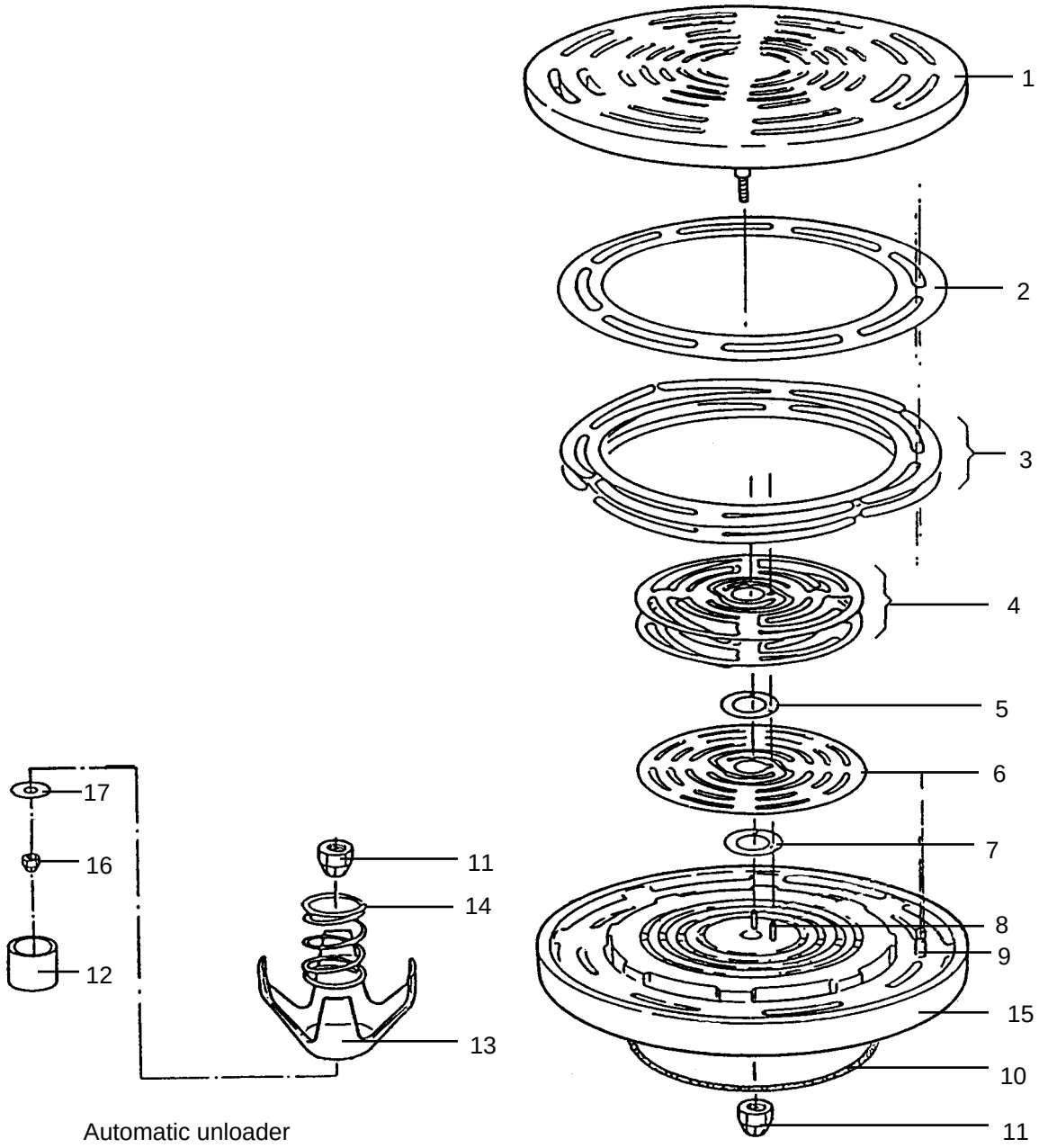
Holding the valve halves together, lift the assembly and fit nut (11). Tighten nut to correct torque.

Replace unloader spring (14), fork (13), washer (17) and nut (16) and tighten to correct torque. Check valve plates for free movement, refit unloader cap (12).

Lightly smear 'O' ring (10) with silicon grease and fit to groove in upper body (15).

10.3.4 REFITTING

Check valve pocket and seat for cleanliness before refitting valve. Fit valve and ensure it is correctly seated by checking that it is free to rotate on its seat. Replace 'O; rings on valve cover if damaged and smear with silicon grease before refitting cover to cylinder. Refit cover retaining nuts and tighten down evenly to correct torque (see SECTION 2). Replace suction unloader pipework.



Automatic unloader

1st STAGE CONCENTRIC VALVE

Note: Valve is shown inverted for ease of assembly

10.4 FIRST STAGE VALVES – WITHOUT SUCTION UNLOADERS

10.4.1 REMOVAL

Remove the nuts securing each of the two valve covers from the locating studs using forcing screws in the tapped holes provided in each cover.

Screw valve lifters to each valve and lift from the cylinders. A gentle rocking action pulling at the same time will help to free the valve if necessary.

10.4.2 DISMANTLING

Lay the valve on a clean, flat surface with the stud and nut uppermost. Remove and discard 'O' ring (10). Unscrew and remove nut (11) whilst holding the valve in a soft jawed vice with just sufficient force to prevent it from turning. The valve can then be removed from the vice and the upper valve body half (12) can be lifted clear of the stud. Remove the delivery plate springs (3), delivery plate (2), lower lift washer (7), suction valve plate (6), middle lift washer (5) and the suction plate springs (4).

10.4.3 REASSEMBLY

Invert upper valve body (12) and place on clean, open vice jaws or a similar support. Place lower lift washer (7) and suction plate (6) on the valve body, engaging them with location pegs (8). Place middle lift washer (5) onto pegs.

Fit suction springs (4) with the angled arms pointing downwards. Align the holes in the springs with location pegs.

Fit delivery springs (3) with angled arms pointing upwards and place in valve body (12) and engage with location pegs (9). Fit delivery plate (2), engaging it with location pegs in the same manner as delivery springs.

Assemble valve body halves by carefully passing central stud of lower valve body (1) through the centre of upper body (12), taking care not to disturb the alignment of the plates and springs. Align holes in lower valve body with the pegs and carefully push the valve body halves together against the spring plate force.

Holding the valve halves together, lift the assembly and fit nut (11). Tighten nut to correct torque.

Lightly smear 'O' ring (10) with silicon grease and fit to groove in upper body (12).

10.4.4 REFITTING

Check valve pocket and seat for cleanliness before refitting valve. Fit valve and ensure it is correctly seated by checking that it is free to rotate on its seat. Replace 'O' rings on valve cover if damaged and smear with silicon grease before refitting cover to cylinder. Refit cover retaining nuts and tighten down evenly to correct torque (see SECTION 2).

10.5 SECOND STAGE VALVES

10.5.1 REMOVAL

As 7.3 A. i) except for removal of suction unloader pipework.

10.5.2 DISMANTLING

Remove and discard 'O' ring (7). Unscrew and remove nut (8) whilst holding the valve in a soft jawed vice with just sufficient force to prevent it from turning. The valve can then be removed from the vice and the upper valve body half (9) can be lifted clear of the stud. The delivery valve/backing plates (2), delivery spring plates (3), suction valve spring plates (4) and suction valve plate (5) can then be removed.

10.5.3 REASSEMBLY

Invert upper valve body (9) centrally on open vice jaws or a similar support.

Place suction valve plate (5) on the valve body, engaging locating slot with peg (6). Fit the suction plate springs (4) with the angled arms pointing downwards and align with locating peg. Fit the first delivery valve/backing plate into the recess in the upper valve body. Place delivery valve springs (3) onto valve/backing plate having first positioned them as follows:–

Assemble the delivery plate springs (3) in pairs, rotating one spring in each pair until the inner and outer circumferences are matched perfectly.

Hold the two pairs of springs together with the concave faces facing each other and then rotate one pair until their outer edges touch all round the circumference and there is a constant gap around the inner edge.

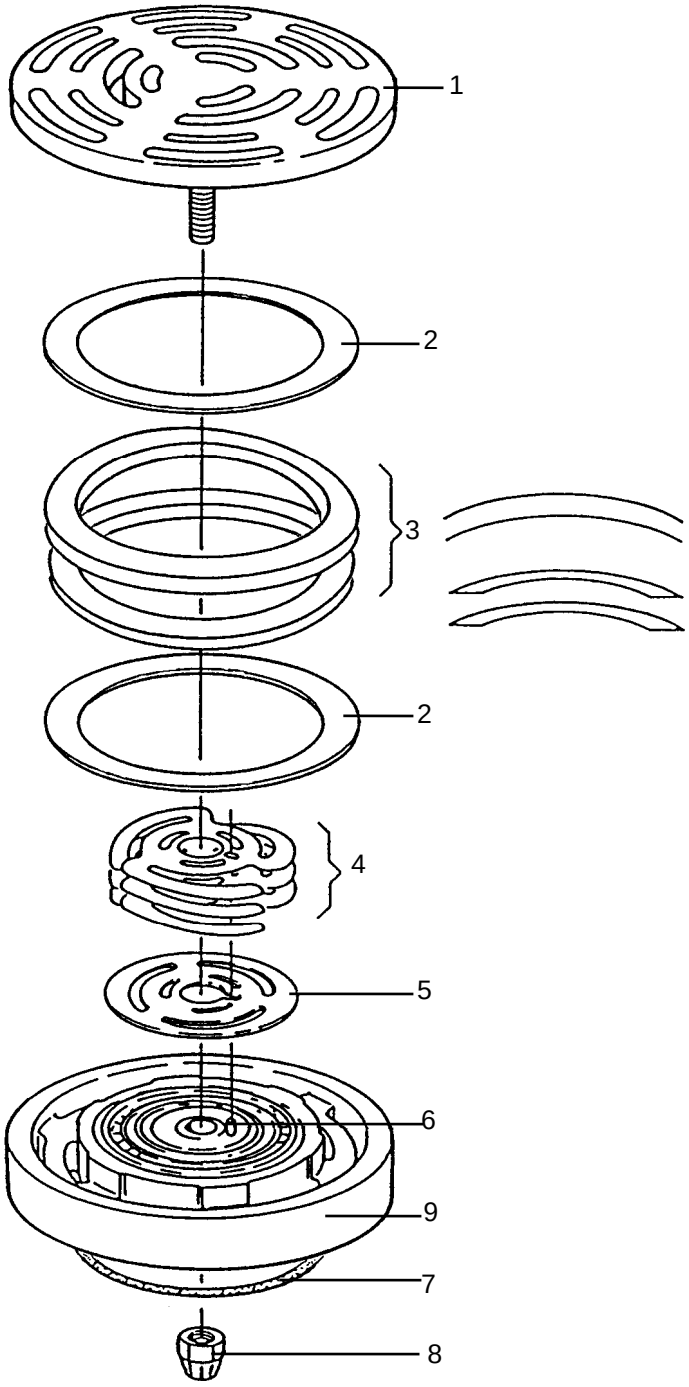
Place second delivery valve/backing plate on valve springs ensuring the plates and springs are correctly aligned, carefully assemble valve body halves by passing central stud of lower body (1) through the centre of upper body, taking care not to disturb the plate and spring positions. Align hole in lower body with peg (6) and carefully push the valve halves together.

Keeping the valve halves firmly engaged remove assembly from the support and fit nut (8). Tighten nut to correct torque, check valve plates for free movement.

Lightly smear new 'O' ring (7) with silicon grease and fit to the upper valve body.

10.5.4 REFITTING

As 7.3 A. iv) except for replacement of suction unloader pipework.



2nd STAGE CONCENTRIC VALVE

Note: Valve is shown inverted for ease assembly

11 FAULT GUIDE

W A R N I N G :-

1. BEFORE PROCEEDING WITH MAINTENANCE ON THE COMPRESSOR IT MUST BE STOPPED AND ISOLATED ELECTRICALLY AND MECHANICALLY AND VISIBLE WARNING NOTICES DISPLAYED.

2. IN ADDITION ALL INTERNAL PRESSURE MUST BE RELEASED WITH THE UNIT ISOLATED FROM THE STORAGE RESERVOIR AND THE WATER SUPPLY SHUT OFF.

NOTE:– A Safety valve opening indicates excessive pressure and under NO CIRCUMSTANCES must a safety valve be screwed down to accommodate excessive pressure. THIS IS DANGEROUS. If safety valve opens or appears faulty, shut down compressor immediately and investigate.

If fault appears immediately or shortly after a service, first examine those parts disturbed during the service.

Following is a list covering the probable causes of possible operational faults, together with their suggested remedies.

Fault	Probable Cause	Recommendation(s)
11.1 LOW FIRST STAGE PRESSURE	Intake filter element dirty or blocked	Remove, clean and renew element.
	First stage suction/delivery valve fault.	Remove and service valves.
	Gas leakage from compressor system.	Renew parts, joints and seals as necessary.
	Unloader/drain valves not closing.	Check solenoid valves are operating correctly and the drain valves seat properly. Check that operating gas pipework is not damaged or blocked at 1st stage separator end. Renew diaphragms and valves if necessary.
	Pressure gauge restriction.	Ensure pressure gauge snubber is not blocked. Check calibration of pressure gauge.
	Vee belt drive slipping.	Check and re-tension vee belts.
11.2 1ST STAGE SAFETY VALVE BLOWING AND/OR HIGH FIRST STAGE PRESSURE	Faulty safety valves.	Replace safety valve.
	'O' ring failure.	Renew 'O' rings on 2nd stage valve cover.
	2nd stage suction valves faulty.	Service valves.
11.3 2ND STAGE SAFETY VALVE BLOWING	Restriction in non-return valve, pressure switch fault, pipeline blockage.	***Existing Installation:*** Check functioning and setting of all control valves, clean pipeline filters and service elements. Check operation of pressure switch. ***New Installations:*** Ensure all protective plugs are removed from ports and control valves are set correctly. Ascertain pipework is of adequate dimensions with minimum of bends, check joint gaskets for correct positioning and size. Check operation of pressure switch.

Fault	Probable Cause	Recommendation(s)
11.4 COMPRESSOR RUNS LONGER TO ACHIEVE SYSTEM PRESSURE	Check LOW FIRST STAGE PRESSURE symptoms.	
	Piston ring wear.	Check components, renew rings and liners on 1st and 2nd stages as necessary. Check blowby on crankcase breather pipe.
11.5 OVERHEATING	Incorrect grade of lubricant.	Drain, clean and refill with correct lubricant. Check condition of valves and air passageways.
	Insufficient water flow, reduced cooling efficiency.	Examine condition of water circuit, remove sludge or scale.
11.6 OVERHEATING – R ADIATOR SETS	Water pump faulty or drive slipping. Insufficient water flow.	Renew pump, re-adjust drive, add inhibitor.
	Incorrect siting.	Resite to give correct cooling airflow.
	Radiator blocked.	Clean and blow out.
11.7 LOW OIL PRESSURE	Oil filter blocked	Fit new oil filter element.
	Worn bearings.	Check bearing clearances.
	Bearing end plate gasket distorted partially blocking suction port.	Examine gasket, replace if necessary.
	Loose pipe couplings in crankcase.	Trace and rectify.
	Loose big end bearing bolts or incorrectly fitted big end bearings.	Examine and retighten to correct torque.
11.8 CUTS OUT ON START UP	Overload set too low.	Consult competent electrician.
	Insufficient electrical supply causing low voltage.	Consult competent electrician.
	Star/Delta timer.	Full speed should be obtained by star before switching to delta. Extend timer period to suit.
	Low oil pressure switch operating.	Consult fault symptom 'LOW OIL PRESSURE' or reset star/delta timer.
11.9 UNUSUAL NOISE (ON LOAD)	Loose components.	Trace and rectify.
	Gas leaks (usually hissing or whistling).	Trace, stop compressor, depressurise, renew seal.
	Worn bearings, cylinders and rings (usually heavy knocking, rumbling or slapping).	Check clearances and renew as necessary.
11.10 UNUSUAL NOISE (UNLOADED)	Piston knocking	Check top dead centre clearance.
	Compressor set-up or pipework system vibration.	Check compressor pipework system is firmly secured, check clearances and alignment of couplings and tension of vee belts.
11.11 HIGH OIL CONSUMPTION	Incorrect grade of lubricant.	Change to recommended lubricant.
	Piston rings/cylinder worn or damaged.	Check for wear and renew as necessary. When renewing, break glaze on cylinder walls.
	Excessive unloaded running.	Reduce unloaded running periods.
11.12 PREMATURE WEAR	Faulty intake pipeline filter.	Check to ensure filter element is fitted and ensure it fits well.
	Incorrect lubricant.	Change to recommended lubricant.

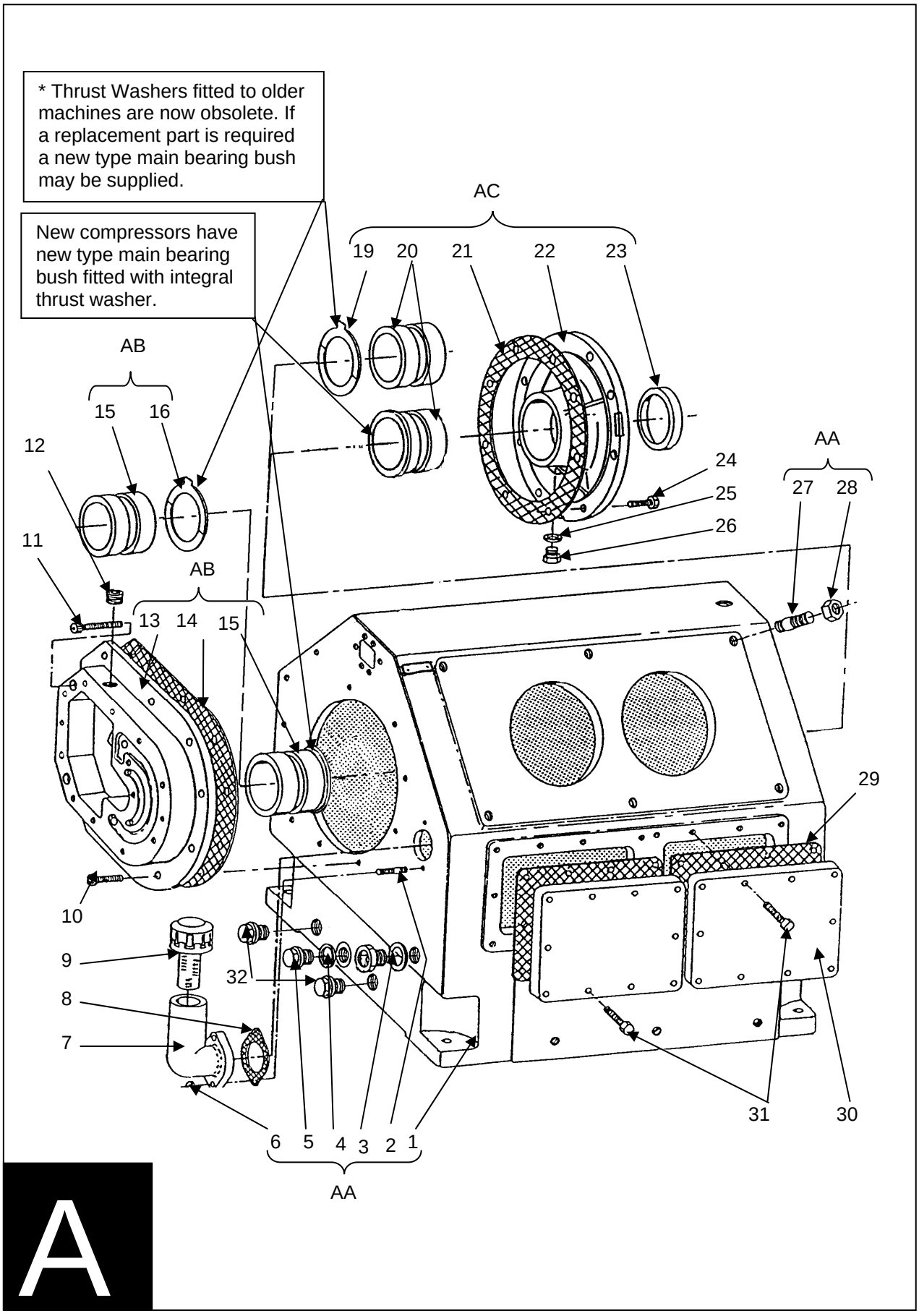
12 ILLUSTRATED PARTS LIST

CONTENTS

NOTE :

Standard parts are available where indicated by either a number or letters. The letters indicate that an item is available as a component of an assembly. Non-listed or individual items of assemblies where reference numbers are not indicated, are not standard replacement parts and can only be obtained at the discretion of CompAir UK Ltd. The assemblies have been chosen based on the experience gained by our own Parts and Service Departments.

The right is reserved to modify the contents of this list, without notice, and the information given is in no way binding on the manufactures


* Thrust Washers fitted to older machines are now obsolete. If a replacement part is required a new type main bearing bush may be supplied.
New compressors have new type main bearing bush fitted with integral thrust washer.
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12.1 CRANKCASE

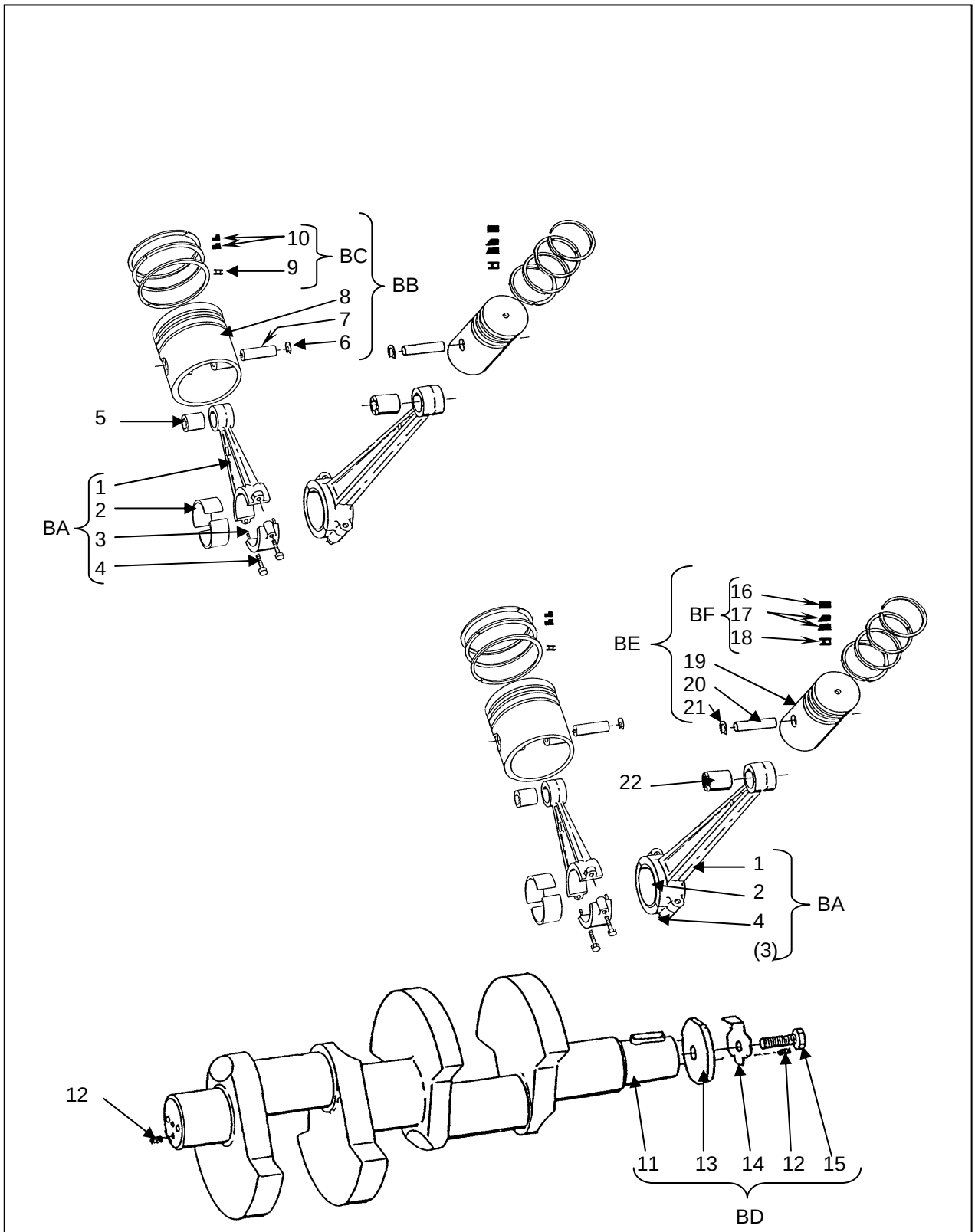
PARTS ASSEMBLIES

ASSY REF	DESCRIPTION	No PER MACHINE	COMPRISING OF ITEMS	PARTS ASSEMBLY No
AA	CRANKCASE ASSEMBLY	1	A1, 2, 3, 4, 5, 6, 27, 28 & 32	A30051.50
AB	BEARING HOUSING ASSEMBLY	1	A13, 14, 15, 16*, & 17	E60010.50
AC	BEARING HOUSING ASSEMBLY	1	A18, 19*, 20, 21, 22, & 23	D66384.50

*** IF FITTED - LATER COMPRESSORS HAVE A MODIFIED MAIN BEARING BUSH, AS THE THRUST WASHERS ARE NOW OBSOLETE.**

INDIVIDUAL PARTS

ITEM REF	DESCRIPTION	No OFF	PART No	ASSEMBLY REF
A1	CRANKCASE	1	A30051	AA
A2	STUD	2	D54109.8.28	AA
A3	OIL LEVEL SIGHT GLASS	1	98281.1002	AA
A4	SEAL	1	98660.1156	AA
A5	PLUG	1	PS1068.5	AA
A6	NUT	2	95111.5	AA
A7	OIL FILLER BODY	1	D100622	--
A8	JOINT	1	C201829	RA
A9	CRANKCASE OIL FILLER WITH FILTER	1	98262.1147	--
A10	SETSCREW	8	95000.314	--
A11	CAPSCREW	2	95018.274	--
A12	PLUG	1	PS1454.4	--
A13	BEARING HOUSING	1	E60010	AB
A14	JOINT	1	D100354	BA&RA
A15	BUSH	1	C85736.2	AB
A16	THRUST WASHER (IF FITTED* SEE NOTE)	1	98074.1004	AB
A17	NOT USED			
A18	NOT USED			
A19	THRUST WASHER (IF FITTED* SEE NOTE)	1	98074.1004	AC
A20	BUSH	1	C85736.2	AC
A21	JOINT	1	D100353	AC&RA
A22	BEARING HOUSING	1	D66384	AC
A23	OILSEAL	1	95605.135	AC
A24	SETSCREW	8	95000.314	--
A25	SEAL	1	98660.1153	--
A26	PLUG	1	PS1068.2	--
A27	STUD	12	D66720.12.53	AA
A28	NUT	12	95111.7	AA
A29	JOINT	4	C201821	RA
A30	CRANKCASE DOOR	4	C201802	--
A31	SETSCREW	40	95000/256	--
A32	PLUG	1	PS1454.2	--



B

RUNNING GEAR

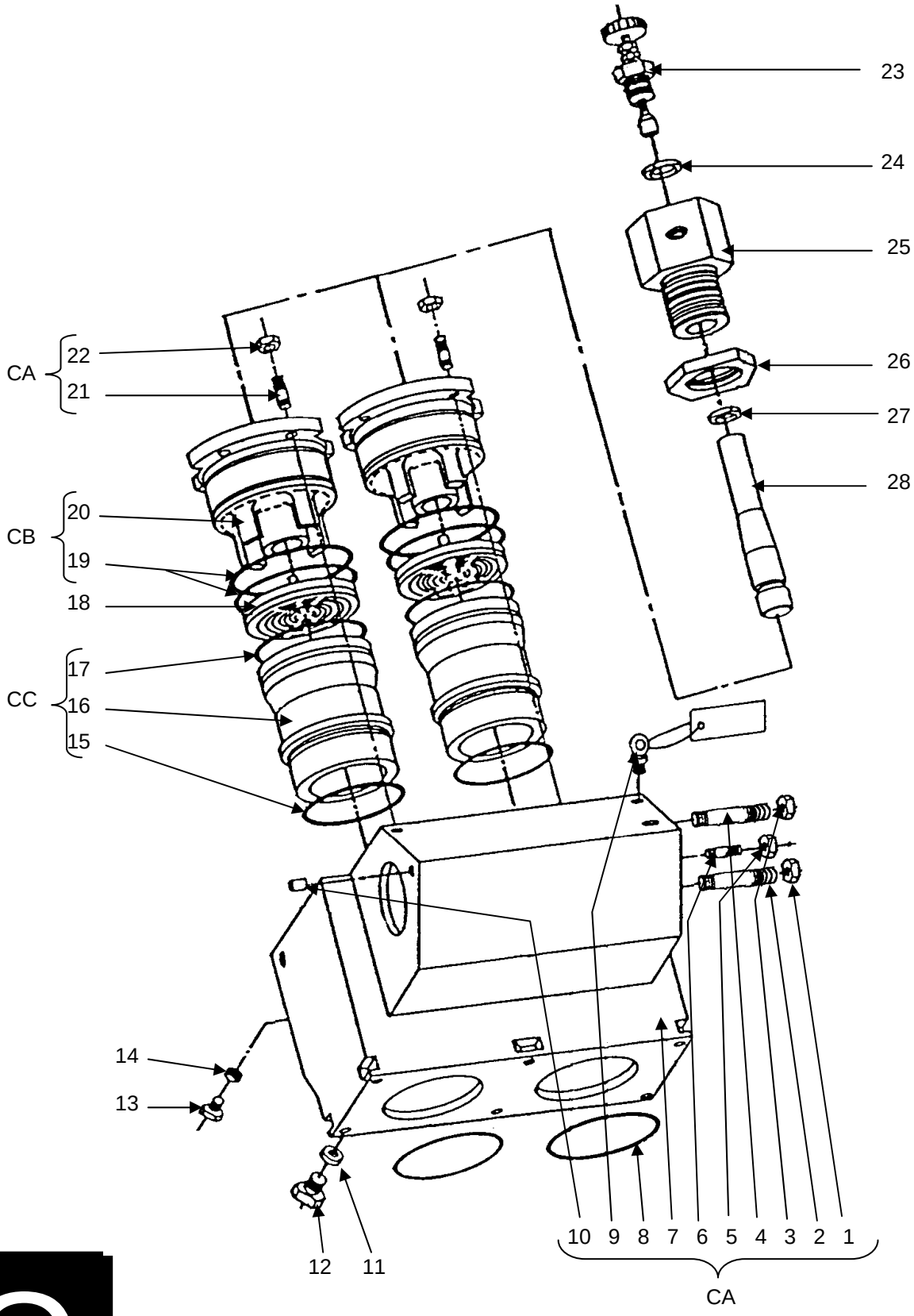
12.2 RUNNING GEAR

PARTS ASSEMBLIES

ASSY REF	DESCRIPTION	No PER MACHINE	COMPRISING OF ITEMS	PARTS ASSEMBLY No
BA	CONN-ROD ASSEMBLY	4	B1, 2, 3 & 4	U.270.A
BB	PISTON ASSEMBLY	2	B6, 7, 8, 9 & 10	D66376.50
BC	PISTON RING SET	2	B9 & 10	98477.1085
BD	CRANKSHAFT ASSEMBLY	1	B11, 12, 13, 14 & 15	D66397.100
BE	PISTON ASSEMBLY	2	B16, 17, 18, 19, 20, & 21	D101194.50
BF	PISTON RING SET	2	B16, 17 & 18	98477.1124

INDIVIDUAL PARTS

ITEM REF	DESCRIPTION	No OFF	PART No	ASSEMBLY REF
B1	CONN-ROD & CAP	4	--	BA
B2	BIG END BEARING	4	C201109	BA
B3	DOWEL	8	95502.366	BA
B4	BOLT	8	95006.237	BA
B5	SMALL END BEARING	2	C200016	--
B6	CIRCLIP	4	95650.30	BB
B7	GUDGEON PIN	2	--	BB
B8	PISTON	2	--	BB
B9	OIL CONTROL RING	2	--	BB&BC
B10	PISTON RING	4	--	BB&BC
B11	CRANKSHAFT	1	--	BD
B12	GRUBSCREW	2	--	BD
B13	KEEP PLATE	1	PS1813.1	BD
B14	TAB WASHER	1	PS1813.2	BD
B15	SETSCREW	1	C75163.3	BD
B16	PISTON RING NO LONGER FITTED		OLD MACHINES ONLY	
B17	PISTON RING	4	--	BE&BF
B18	OIL CONTROL RING	2	--	BE&BF
B19	PISTON	2	--	BE
B20	GUDGEON PIN	2	--	BE
B21	CIRCLIP	4	95650.25	BE
B22	SMALL END BEARING	2	96072.74	--



C

1st STAGE CYLINDERS

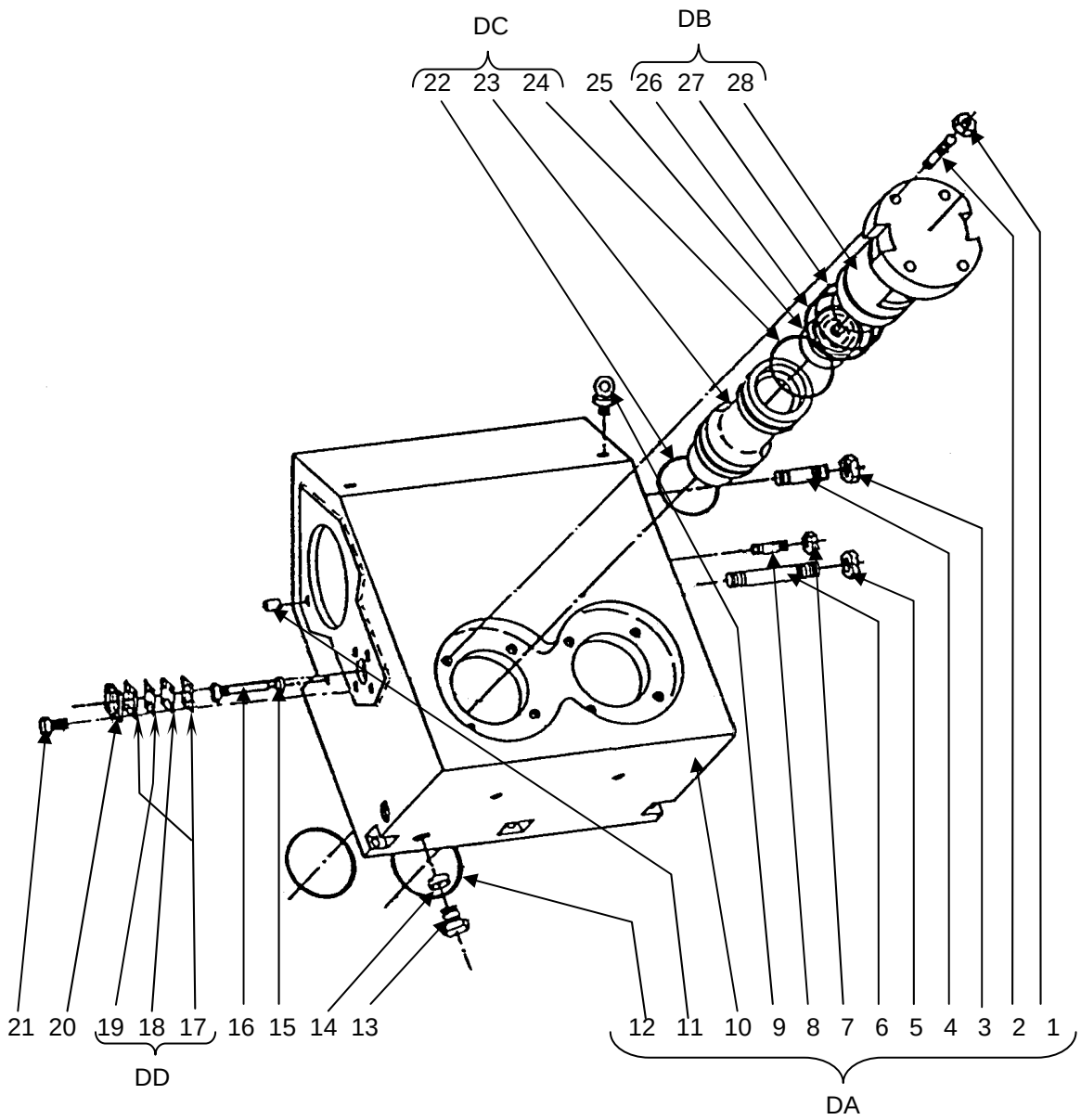
12.3 1ST STAGE CYLINDERS

PARTS ASSEMBLIES

ASSY REF	DESCRIPTION	No PER MACHINE	COMPRISING OF ITEMS	PARTS ASSEMBLY No
CA	CYLINDER & COOLER BODY ASSY	1	C1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 21, & 22	A30053.50
CB	VALVE COVER ASSEMBLY	2	C19 & 20	D100609.50
CC	CYLINDER LINER ASSEMBLY	2	C15, 16 & 17	D100802.50

INDIVIDUAL PARTS

ITEM REF	DESCRIPTION	No OFF	PART No	ASSEMBLY REF
C1	NUT	2	95111.7	CA
C2	STUD	2	D66720.12.108	CA
C3	NUT	6	95111.7	CA
C4	STUD	6	D66720.12.63	CA
C5	NUT	1	95111.6	CA
C6	STUD	1	D66720.10.40	CA
C7	CYLINDER AND COOLER BODY	1	A30053	CA
C8	'O' RING	2	95602.155	CA&RA
C9	EYE BOLT	2	95242.2	CA
C10	TENSION PIN	1	95540.357	CA
C11	SEAL	1	PS1322.3	--
C12	PLUG	1	PS1068.3	--
C13	PLUG	2	PS1068.1	--
C14	SEAL	2	98660.1152	--
C15	'O' RING	2	95602.151	CC&RA
C16	CYLINDER LINER	2	D100802	CC
C17	'O' RING	2	95602.152	CC&RA
C18	VALVE	2	98650.1520	--
C19	'O' RING	4	95602.153	CB.RA.RD
C20	VALVE COVER	2	D100609	CB
C21	STUD	8	D66720.12.58	CA
C22	NUT	8	95111.7	CA
C23+	HAND UNLOADER ASSEMBLY	2	C202291	CAS
C24+	SEAL	2	98660.1155	--
C25+	SUCTION UNLOADER CYLINDER	2	C201798	--
C26+	NUT	2	95410.266	--
C27+	SEAL	2	98504.1073	--
C28+	SUCTION UNLOADER PISTON	2	C201797	--



D

2nd STAGE CYLINDERS

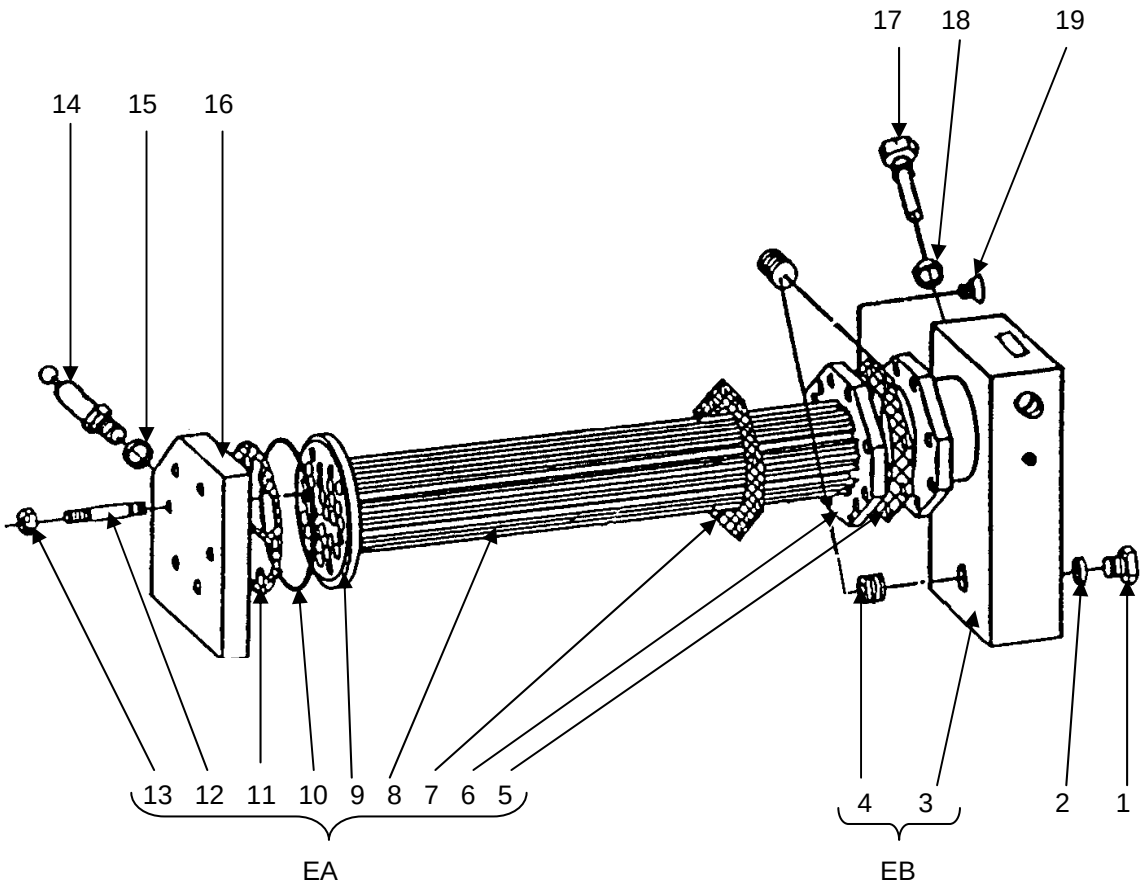
12.4 2ND STAGE CYLINDERS

PARTS ASSEMBLIES

ASSY REF	DESCRIPTION	No PER MACHINE	COMPRISING OF ITEMS	**PARTS ASSEMBLY No**
DA	CYLINDER & COOLER BODY ASSY	1	D1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11& 12	A30052.50
DB	VALVE COVER ASSEMBLY	2	D26, 27 & 28	D100604.50
DC	CYLINDER LINER ASSEMBLY	2	D22, 23 & 24	D100801.50
DD	BURSTING DISC ASSEMBLY	1	D17, 18 & 19	C201556.100

INDIVIDUAL PARTS

ITEM REF	DESCRIPTION	**No OFF**	**PART No**	**ASSEMBLY REF**
D1	NUT	8	95111.11	DA
D2	STUD	8	D66720.20.75	DA
D3	NUT	8	95111.9	DA
D4	STUD	8	D66720.16.84	DA
D5	NUT	2	95111.9	DA
D6	STUD	2	D66720.16.134	DA
D7	NUT	1	95111.6	DA
D8	STUD	1	D66720.10.50	DA
D9	EYEBOLT	2	95242.2	DA
D10	CYLINDER & COOLER BODY	1	A30052	DA
D11	TENSION PIN	1	95540.357	DA
D12	'O' RING	2	95602.149	DA&RA
D13	PLUG	1	PS1068.3	--
D14	SEAL	1	PS1322.3	--
D15	SEAL	1	PS1322.3	--
D16	CORROSION ROD	1	U753-C	--
D17	JOINT	2	C81788	DD&RA
D18	BURSTING DISC	1	C200053	DD
D19	BURSTING DISC	1	C201658.2	DD
D20	BURSTING DISC COVER	1	C200584	--
D21	SETSCREW	4	95000.282	--
D22	'O' RING	2	95602.138	DC&RA
D23	CYLINDER LINER	2	D100801	DC
D24	'O' RING	2	95602.140	DC&RA
D25	VALVE	2	98650.1039	--
D26	'O' RING	2	95602.140	DB,RA,RD
D27	'O' RING	2	95602.141	DB,RA,RD
D28	VALVE COVER	2	D100604	DB



E

1st STAGE COOLER

12.5 1ST STAGE COOLER

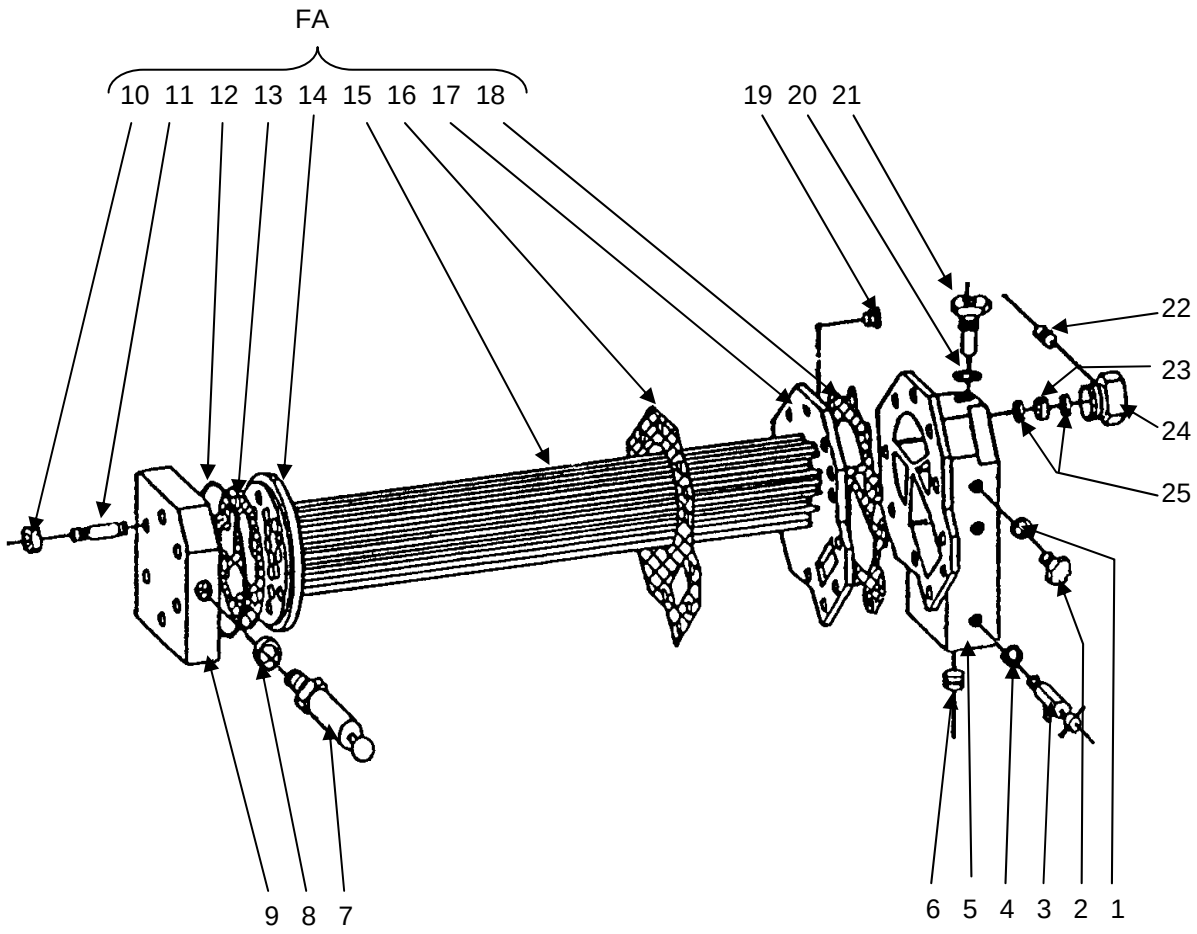
PARTS ASSEMBLIES

ASSY REF	DESCRIPTION	No PER MACHINE	COMPRISING OF ITEMS	PARTS ASSEMBLY No
EA	TUBESTACK ASSEMBLY	1	E5, 6, 7, 8, 9, 10, 11, 12 & 13.	D100619.100
EB	COOLER COVER/SEPARATOR ASSY	1	E3 & E4	E60659.50

INDIVIDUAL PARTS

ITEM REF	DESCRIPTION	No OFF	PART No	ASSEMBLY REF
E1	PLUG	1	PS1068.5	--
E2	SEAL	1	98660.1156	--
E3	COOLER COVER	1	E60659	EB
E4	PLUG	2	C33584	EB
E5	JOINT	1	C201826	EA&RA
E6	TUBEPLATE - FIXED	1	--	EA
E7	JOINT	1	C201825	EA&RA
E8	TUBE	60	C200675.8	EA
E9	TUBEPLATE - FLOATING	1	--	EA
E10	'O' RING	1	95602.147	EA&RA
E11	JOINT	1	C200692	EA&RA
E12	STUD	6	D67972.12.98	EA
E13	NUT	7	95111.7	EA
E14	RELIEF VALVE	1	98650.1768	--
E15	SEAL	1	98660.1156	--
E16	COOLER COVER	1	C201771	--
E17	POCKET	1	C201707	--
E18	SEAL	1	98660.1155	--
E19	SCREW	2	95028.155	--

Items may alter depending on individual requirements, if in doubt contact CompAir Uk Ltd Ipswich Works for specific details



F

2nd STAGE COOLER

12.6 2ND STAGE COOLER

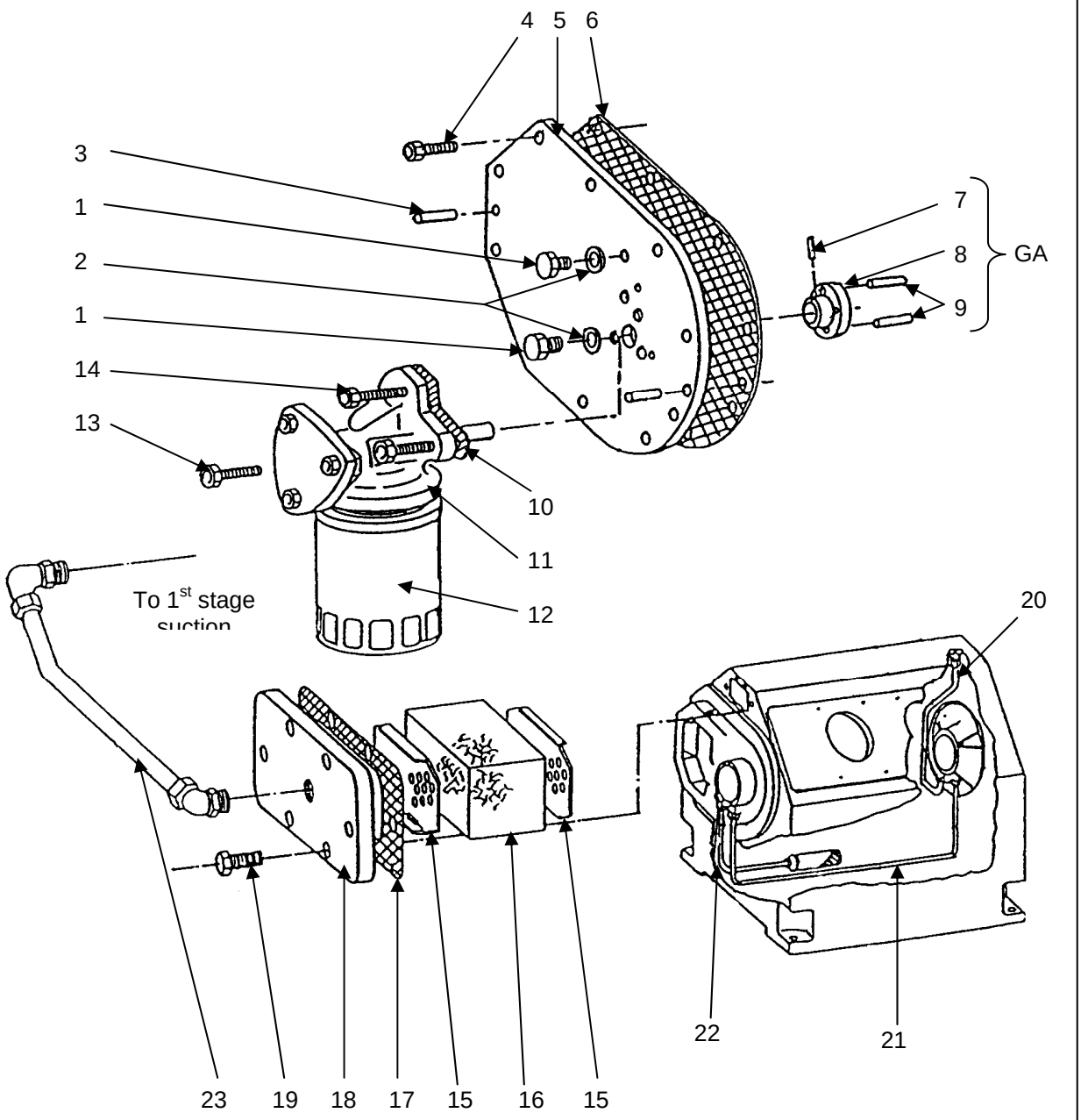
PARTS ASSEMBLY

ASSY REF	DESCRIPTION	No PER MACHINE	COMPRISING OF ITEMS	PARTS ASSEMBLY No
FA	TUBESTACK ASSEMBLY	**1**	F10, 11, 12, 13, 14, 15, 16, 17, & 18.	
EB	NON RETURN VALVE ASSEMBLY	1	F22, 23, 24 & 25	

INDIVIDUAL PARTS

ITEM REF	DESCRIPTION	No OFF	PART No	ASSEMBLY REF
F1	SEAL	1	98660.1154	--
F2	PLUG	1	PS1068.3	--
F3	DRAIN	1	C200659	--
F4	SEAL	1	98660.1153	--
F5	COOLER COVER	1	E60701	--
F6	PLUG	2	PS1454.7	--
F7	RELIEF VALVE	1	98650.1186	--
F8	SEAL	1	98660.1155	--
F9	COOLER COVER	1	C201770	--
F10	NUT	1	95111.9	FA
F11	STUD	6	D67972.16.95	FA
F12	'O' RING	1	95602.142	FA&RA
F13	JOINT	1	C201824	FA&RA
F14	TUBEPLATE - FLOATING	1	--	FA
F15	TUBE	36	C200675.10	FA
F16	JOINT	1	C201823	FA&RA
F17	TUBEPLATE - FIXED	1	--	FA
F18	JOINT	1	C201822	FA&RA
F19	SCREW	2	95028.157	--
F20	SEAL	1	98660.1155	--
F21	POCKET	1	C201707	--
F22	PLUG	1	PS1454.1	FB
F23	NON RETURN VALVE	1	98650.1189	FB
F24	NON RETURN VALVE PLUG	1	C201795	FB
F25	SEAL	2	98660.1108	FB

Items may alter depending on individual requirements, if in doubt contact CompAir UK Ltd Ipswich Works for specific details



G

LUBRICATION

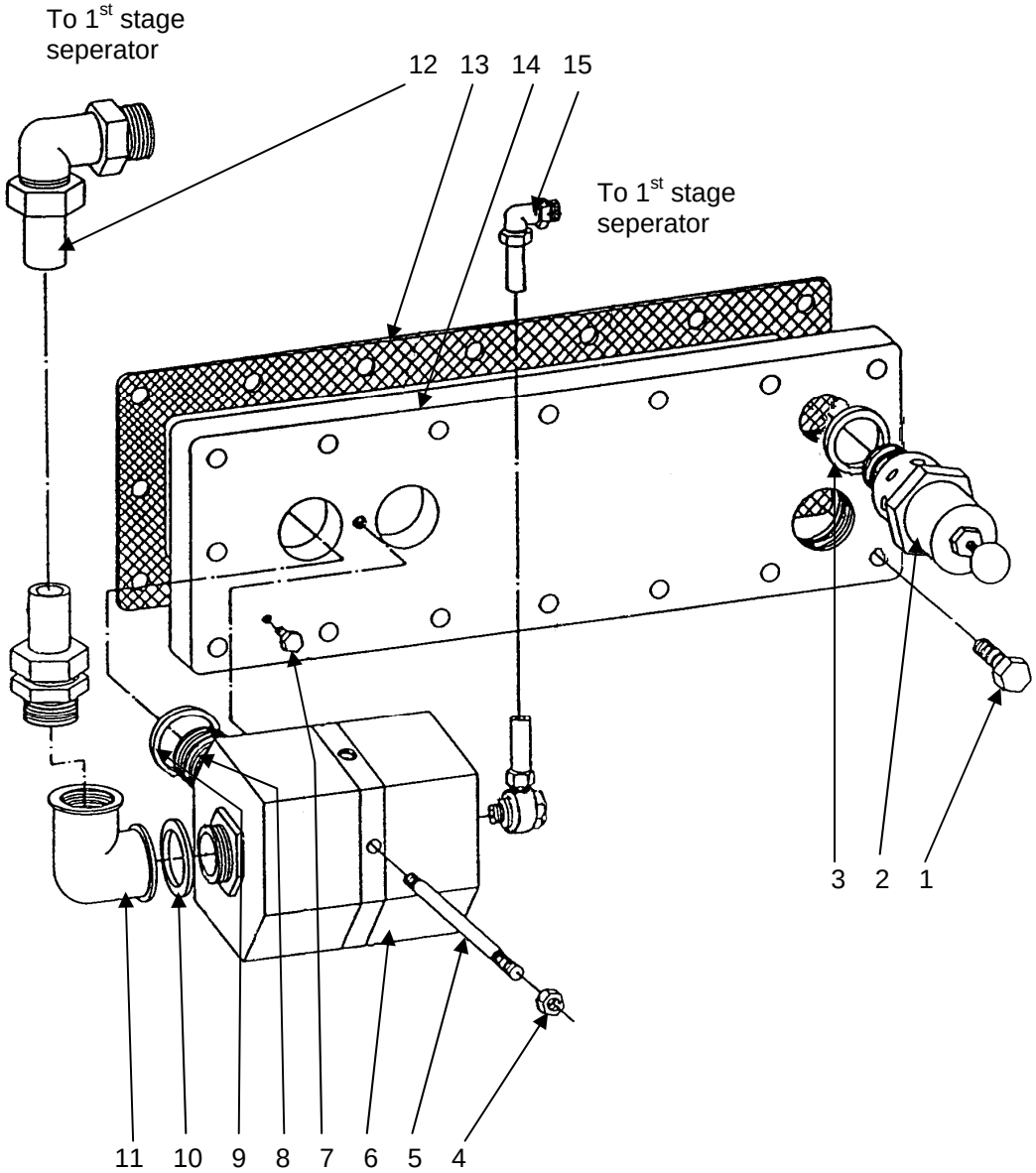
12.7 LUBRICATION

PARTS ASSEMBLIES

ASSY REF	DESCRIPTION	No PER MACHINE	COMPRISING OF ITEMS	PARTS ASSEMBLY No
GA	OIL PUMP DRIVE ASSEMBLY	1	G7, 8 & 9	C85737.3

INDIVIDUAL PARTS

ITEM REF	DESCRIPTION	No OFF	PART No	ASSEMBLY REF
G1	PLUG	2	PS1068.2	**--**
G2	SEAL	2	98660.1153	--
G3	DOWEL	2	95502.366	--
G4	SETSCREW	10	95000.255	--
G5	COVER	1	D100234	--
G6	JOINT	1	C200869	RA
G7	TENSION PIN	1	95540.100	GA
G8	DRIVE FITTING	1	--	GA
G9	PIN	2	--	GA
G10	JOINT	1	C200900	RA
G11	OIL PUMP	1	98446.1001	--
G12	OIL FILTER	1	98262.1009	--
G13	SETSCREW	1	95000.256	--
G14	SETSCREW	2	95000.257	--
G15	BREATHER RETAINING PLATE	2	C201816	--
G16	BREATHER ELEMENT	1	98262.1132	--
G17	JOINT	1	C201819	RA
G18	CRANKCASE BREATHER COVER	1	C201815	--
G19	SETSCREW	6	95000.228	--
G20	OIL SERVICE PIPE ASSEMBLY	1	D100973.1	--
G21	OIL FEED PIPE ASSEMBLY	1	D100809.2	--
G22	OIL SUCTION PIPE ASSEMBLY	1	D100809.1	--
G23	CRANKCASE BREATHER PIPE ASSEMBLY	1	D100973.6	--


To 1st stage seperator
12 13 14 15
To 1st stage seperator
3 2 1
11 10 9 8 7 6 5 4

H

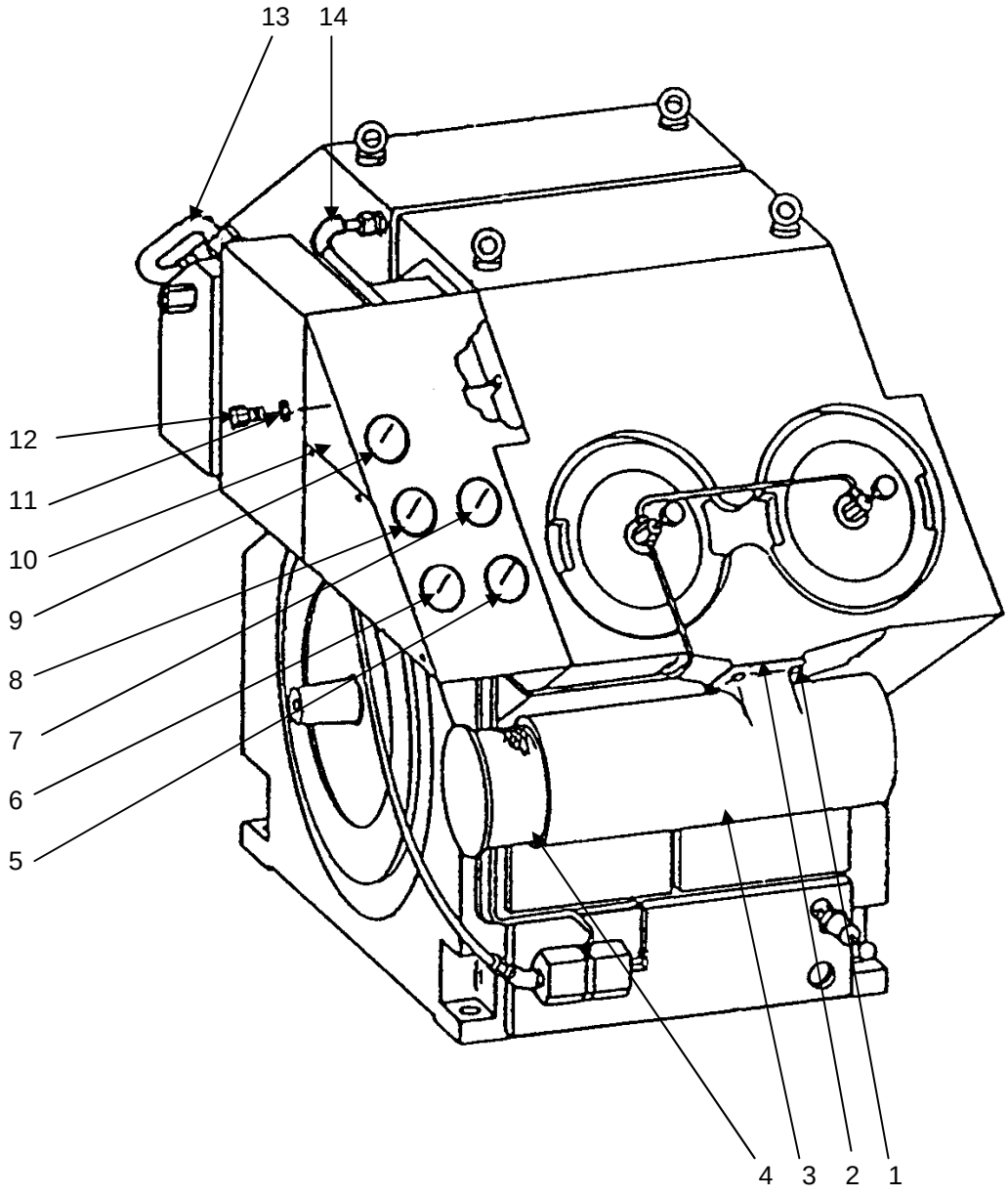
UNLOADERS

12.8 UNLOADERS

INDIVIDUAL PARTS

ITEM REF	DESCRIPTION	No OFF	PART No	ASSEMBLY REF
H1	SETSCREW	16	95000.256	--
H2	RELIEF VALVE	1	98650.1011	--
H3	SEAL	1	98660.1157	--
H4	NUT	1	95111.5	--
H5	STUD	1	D66720.8.102	--
H6	DIAPHRAGM DRAIN VALVE	1	U334-L	--
H7	PLUG	1	98156.2560	--
H8	NIPPLE	2	95414.165	--
H9	SEAL	2	98504.1143	--
H10	SEAL	1	98660.1156	--
H11	ELBOW	1	95405.97	--
H12	DRAIN PIPE ASSEMBLY - 1st Stage	1	D100973.3	--
H13	JOINT	1	C201820	RA
H14	SURGE VESSEL PLATE	1	C201812	--
H15	DRAIN PIPE ASSEMBLY - 2nd Stage	1	D100973.2	--

= Not Illustrated



J

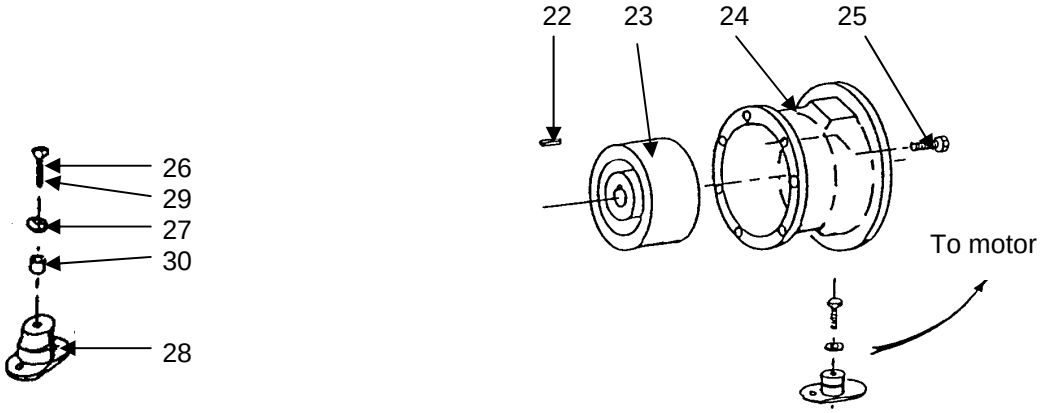
EXTERNAL COMPONENTS

12.9 EXTERNAL COMPONENTS

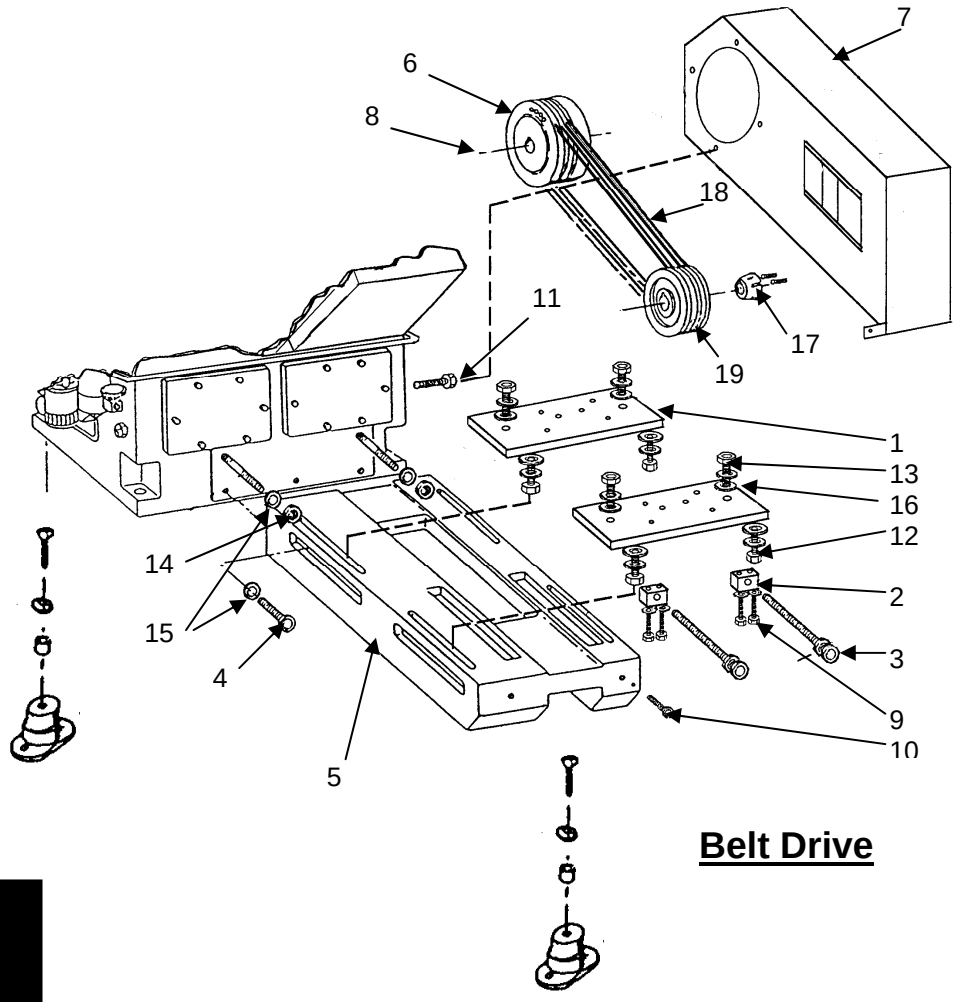
INDIVIDUAL PARTS

ITEM REF	DESCRIPTION	No OFF	PART No	ASSEMBLY REF
J1	SETSCREW	4	95000.312	--
J2	JOINT	1	PS1813.20	RA
J3	SUCTION FILTER SILENCER	1	98262.1010	--
J4	SUCTION FILTER SILENCER ELEMENT	1	98262.1063	--
J5	PRESSURE GAUGE - 2ND STAGE	1	98288.1027	--
J6	PRESSURE GAUGE - 1ST STAGE	1	98288.1026	--
J7	THERMOMETER FINAL DELIVERY	1	98288.1085	--
J8	THERMOMETER 1ST STAGE	1	C202556.5	--
J9	PRESSURE GAUGE - OIL	1	98288.1028	--
J10	GAUGE PANEL	1	E60710	--
J11	WASHER	4	95149.13	--
J12	CAP SCREW	4	95149.166	--
J13	2nd STAGE SUCTION PIPE ASSEMBLY	1	D100973.4	--
J14	WATER TRANSFER PIPE ASSEMBLY	1	D100973.5	--

Due to individual requirements, equipment fitted to the compressor suction may alter. If in the slightest doubt contact CompAir UK Ltd Ipswich Works for specific details.



Direct Drive



Belt Drive

K

TYPICAL DRIVE ARRANGEMENTS

12.10 TYPICAL DRIVE ARRANGEMENTS

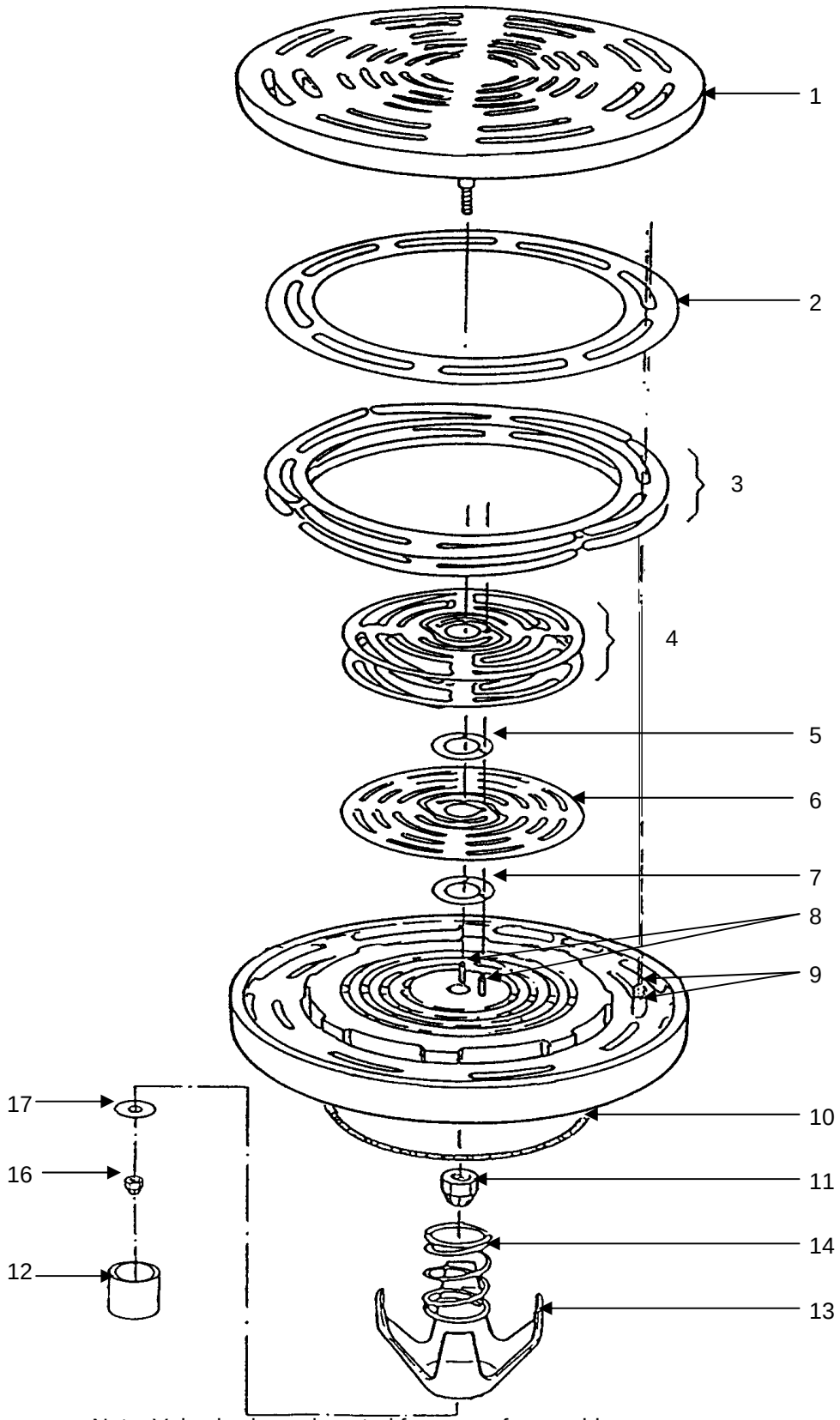
INDIVIDUAL PARTS

ITEM REF	DESCRIPTION	No OFF	PART No	ASSEMBLY REF
K1	**BELT DRIVE**	2	C200716	
K2	MOTOR PLATES	2	C86469	--
K3	ADJUSTING BLOCKS	2	C86470.1	--
K4	ADJUSTING SCREWS	2	D66720.16.20	--
K5	STUD M16 X 36	1	E60017	--
K6	MOTOR BRACKET	1	E.60249	--
K7	PULLEY	1	E60253	--
K8	BELT GUARD	1	PS1130.21	--
K9	KEY	4	95000.260	--
K10	SETSCREWS- Blocks	1	95000.281	--
K11	SETSCREWS- Motor to plates	4	95000.315	--
K12	SETSCREWS- Plates to bracket, bracket to Cr/Case	7	95000.344	--
K13	SETSCREWS- Plate to Motor Bracket	4	95000.374	--
K14	NUTS – M16	2	95111.9	--
K15	PLAIN WASHERS M16	5	95148.18	--
K16	PLAIN WASHERS M20	4	95148.20	--
K17	TAPER BUSH (SP For Contract. Sample Only)	1	98074.1120	--
K18	DRIVE BELT (SP For Contract. Sample Only)	5	98080.1052	--
K19	PULLEY (SP For Contract. Sample Only)	1	98080.1217	--
	DIRECT DRIVE			
K22	KEY	1	PS1130.21	--
K23	FLYWHEEL	1	E60248.2	--
K24	BELL HOUSING	1	PS1813.11	--
K25	SETSCREW	10	95000.315	--
K26	SETSCREW	1	95000.312	--
K27	WASHER	3	95148.16	--
K28	ANTI-VIBRATION MOUNT	3	98418.1015	--
K29	BOLT	2	95000.202	--
K30	SPACER	2	C200854	--

= Not Illustrated

NOTE**: This section has been included to detail items which would normally be required to make a bare shaft machine into a configuration that can easily be assembled into an operational package by means of the addition of widely available commercial equipment.**

For specific drive details, refer to CompAir UK Ltd Ipswich Works.



Note: Valve is shown inverted for ease of assembly

L

1ST STAGE CONCENTRIC VALVE

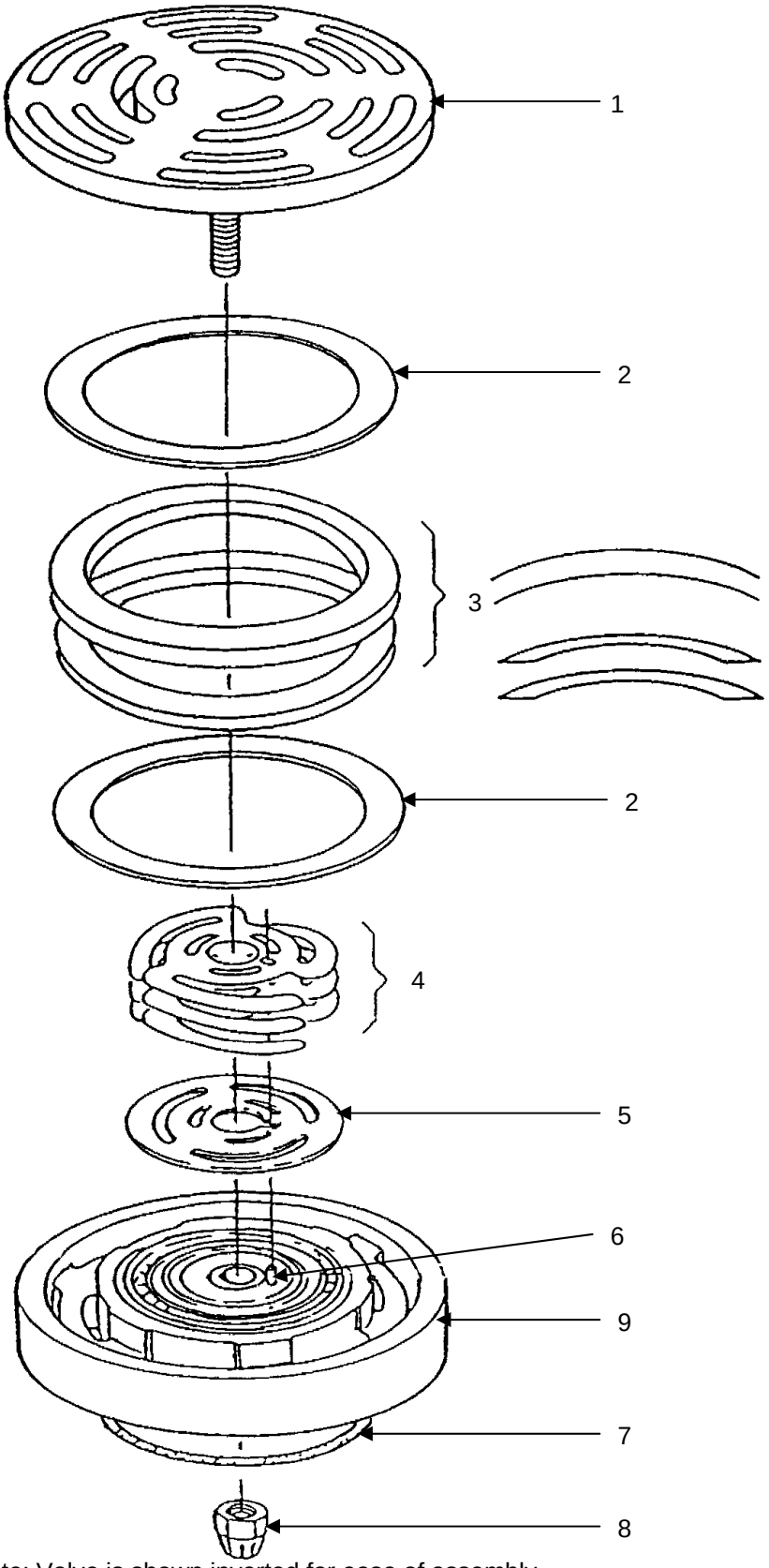
12.11 1ST STAGE CONCENTRIC VALVE

(AUTOMATIC UNLOADER VERSION)
INDIVIDUAL PARTS

ITEM REF	DESCRIPTION	No OFF	PART No	ASSEMBLY REF
--	CONCENTRIC VALVE COMPLETE	1	98650.1520	--
L1/1	LOWER BODY (including stud)	1	--	--
L1/2	VALVE PLATE	1	--	RB
L1/3	VALVE SPRING	2	--	RB
L1/4	VALVE SPRING	2	--	RB
L1/5	LIFT WASHER - Lower (0.8mm)	1	--	RB
L1/6	VALVE PLATE	1	--	RB
L1/7	LIFT WASHER - Upper (0.6mm)	1	--	RB
L1/8	PEG	2	--	--
L1/9	PEG	2	--	--
L1/10	'O' RING	1	95602.93	RA,RB,RD
L1/11	NUT	1	--	RB
L1/12	UNLOADER FORK CAP	1	--	--
L1/13	UNLOADER FORKS	1	--	--
L1/14	SPRING	1	98650.1526	--
L1/15	UPPER BODY	1	--	--
L1/16	NUT	1	--	RB
L1/17	WASHER	1	--	RB

1ST STAGE CONCENTRIC VALVE
(NON UNLOADER VERSION)
INDIVIDUAL PARTS

ITEM REF	DESCRIPTION	No OFF	PART No	ASSEMBLY REF
--	CONCENTRIC VALVE COMPLETE	1	98650.1519	--
L2/1	LOWER BODY (including stud)	1	--	--
L2/2	VALVE PLATE	1	--	RB
L2/3	VALVE SPRING	2	--	RB
L2/4	VALVE SPRING	2	--	RB
L2/5	LIFT WASHER - Lower (0.8mm)	1	--	RB
L2/6	VALVE PLATE	1	--	RB
L2/7	LIFT WASHER - Upper (0.6mm)	1	--	RB
L2/8	PEG	2	--	--
L2/9	PEG	2	--	--
L2/10	'O' RING	1	95602.93	RA,RB,RD
L2/11	NUT	1	--	RB
L2/12	UPPER BODY	1	--	--



M

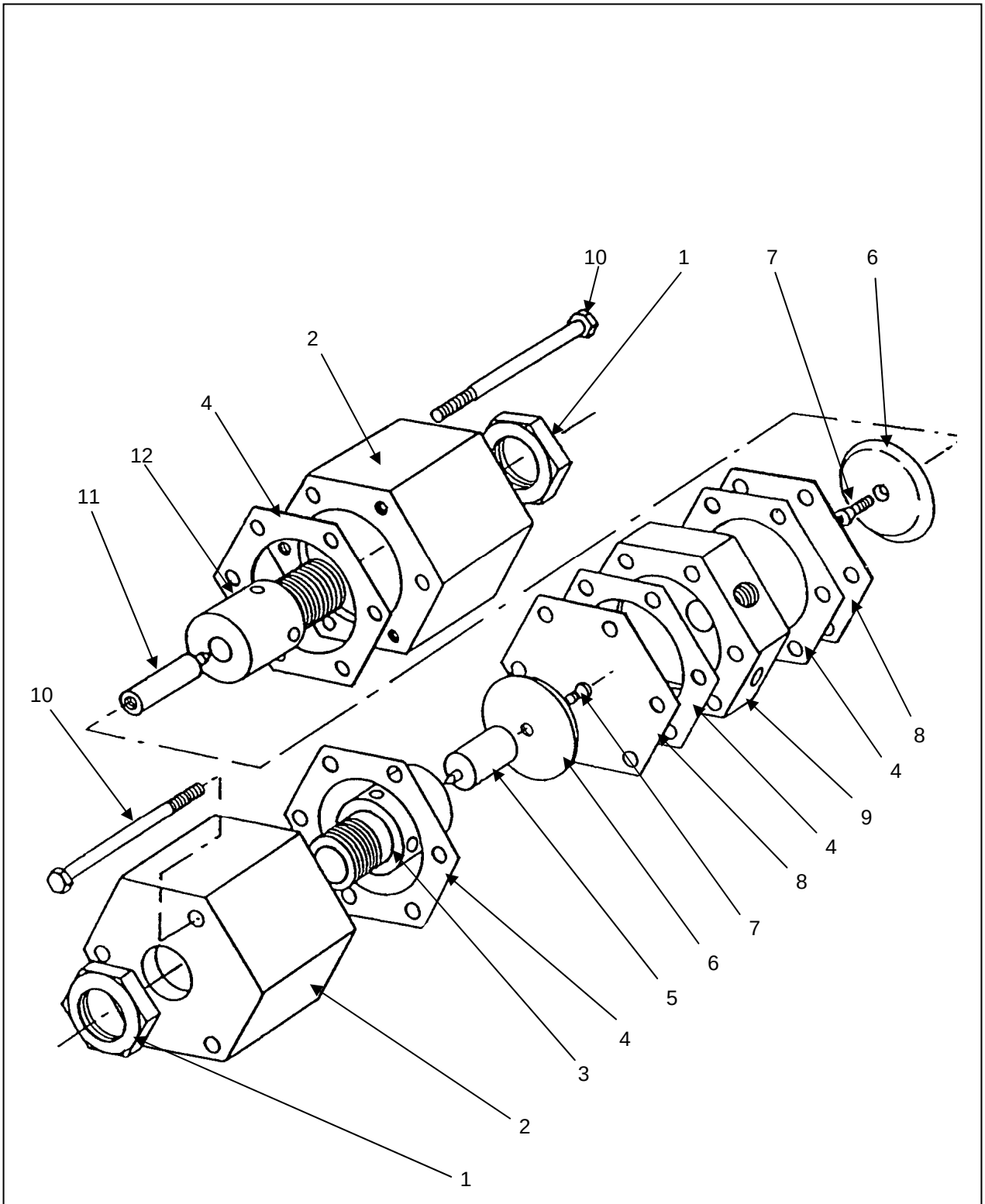
Note: Valve is shown inverted for ease of assembly

2ND STAGE CONCENTRIC VALVE

12.12 2ND STAGE CONCENTRIC VALVE

INDIVIDUAL PARTS

ITEM REF	DESCRIPTION	No OFF	PART No	ASSEMBLY REF
--	CONCENTRIC VALVE COMPLETE	1	98650.1039	--
M1	LOWER BODY (including stud)	1	--	--
M2	VALVE/BACKING PLATE	2	--	RC
M3	SPRING PLATE	4	--	RC
M4	SPRING PLATE	3	--	RC
M5	VALVE PLATE	1	--	RC
M6	PEG	1	--	--
M7	'O' RING	1	95602.55	RA,RC,RD
M8	NUT	1	--	RC
M9	UPPER BODY	1	--	--



N

DIAPHRAGM DRAIN VALVE

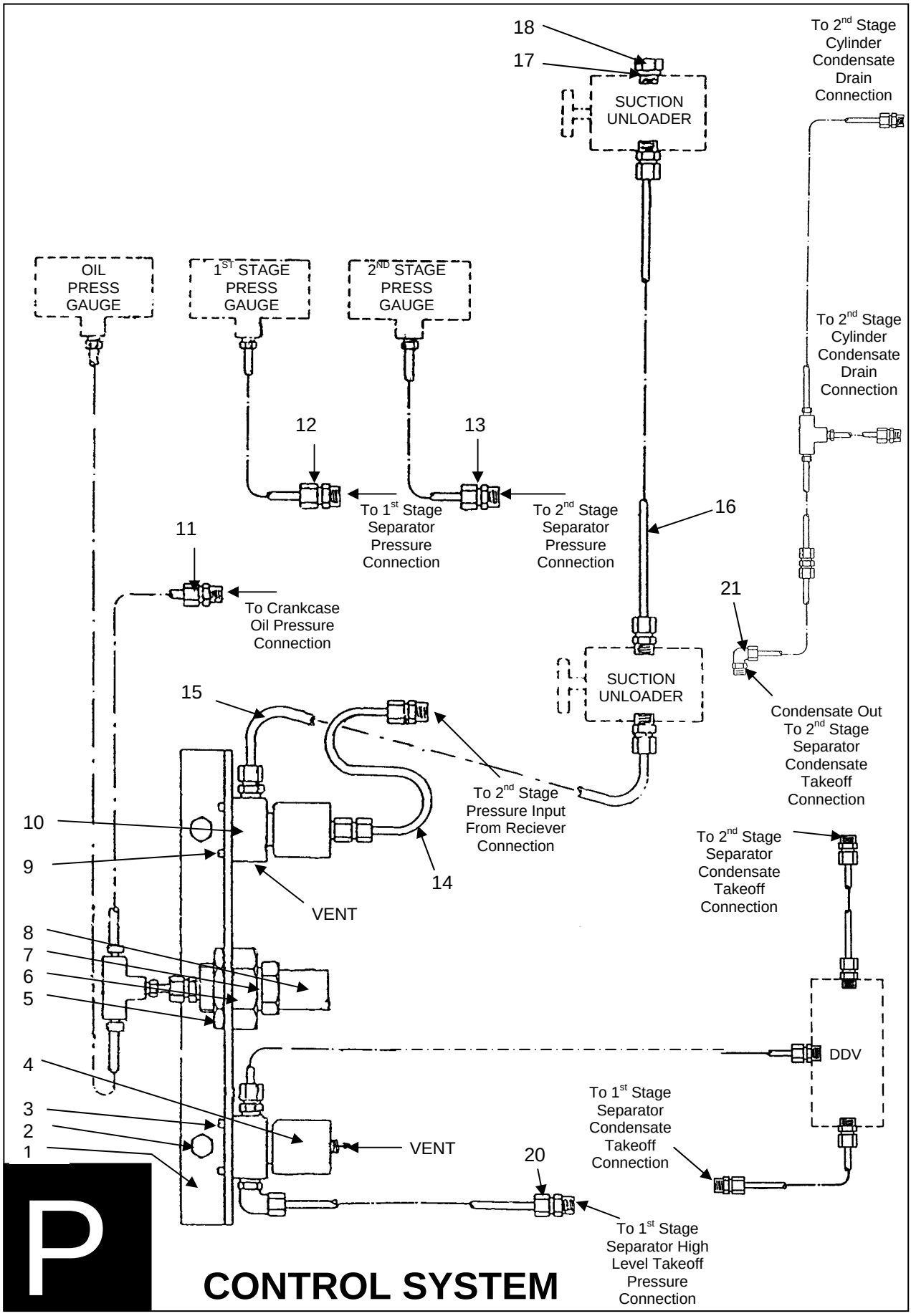
12.13 DIAPHRAGM DRAIN VALVE

PARTS ASSEMBLIES

ASSY REF	DESCRIPTION	No PER MACHINE	COMPRISING OF ITEMS	PARTS ASSEMBLY No
NA	MAINTENANCE KIT - 1st and 2nd stage Diaphragm Valve	1	N3, 5, 6, 7, 11 & 12	98650.1531
NB	SERVICE KIT - 1st and 2nd stage Diaphragm Valve	1	N4 & 8	98650.1535

INDIVIDUAL PARTS

ITEM REF	DESCRIPTION	No OFF	PART No	ASSEMBLY REF
--	DIAPHRAGM VALVE COMPLETE	1	U334.L	--
N1	BACKNUT	2	PS1290.4	--
N2	DRAIN VALVE BODY	2	--	--
N3	VALVE SEAT	1	--	NA
N4	DIAPHRAGM JOINT	4	--	NB
N5	VALVE	1	--	NA
N6	MUSHROOM PLATE	2	--	NA
N7	SETSCREW - Countersunk	2	--	NA
N8	DIAPHRAGM	2	--	NB
N9	DRAIN VALVE COVER CENTRE	1	--	--
N10	BOLT - Hexagon Head	6	95006.133	--
N11	VALVE	1	--	NA
N12	VALVE SEAT	1	--	NA


18
17
SUCTION UNLOADER
To 2nd Stage Cylinder Condensate Drain Connection
OIL PRESS GAUGE
1ST STAGE PRESS GAUGE
2ND STAGE PRESS GAUGE
To 2nd Stage Cylinder Condensate Drain Connection
12
13
To 1st Stage Separator Pressure Connection
To 2nd Stage Separator Pressure Connection
16
11
To Crankcase Oil Pressure Connection
21
SUCTION UNLOADER
15
Condensate Out To 2nd Stage Separator Condensate Takeoff Connection
To 2nd Stage Pressure Input From Reciever Connection
10
9
14
VENT
To 2nd Stage Separator Condensate Takeoff Connection
8
7
6
5
DDV
4
3
2
1
VENT
20
To 1st Stage Separator Condensate Takeoff Connection
To 1st Stage Separator High Level Takeoff Pressure Connection
P
CONTROL SYSTEM

12.14 CONTROL SYSTEM

INDIVIDUAL PARTS

ITEM REF	DESCRIPTION	No OFF	PART No	ASSEMBLY REF
P1	BRACKET	1	C202283	--
P2	SETSCREW	3	95000.227	--
P3	CAPSCREW	2	95018.132	--
P4#	PILOT UNLOADING VALVE	1	PS2197	--
P5	NUT	1	95410/264	--
P6	PLUG	1	C73732/7	--
P7	WASHER	1	98660/1153	--
P8	LOW OIL PRESSURE SWITCH	1	98524/1042	--
P9	CAPSCREW	2	95018.100	--
P10#	SUCTION UNLOADING VALVE	1	98650.1658	--
P11	OIL SERVICES PIPE	1	D100973/7	--
P12	PRESSURE GAUGE PIPE - 1st Stage	1	D100973/8	--
P13	PRESSURE GAUGE PIPE - 2nd Stage	1	D100973/9	--
P14	SUCTION UNLOADER SIGNAL PIPE	1	D100973.11	--
P15	SUCTION UNLOADER FEED PIPE	1	D100973.12	--
P16	SUCTION UNLOADER LINK PIPE	1	D100973.14	--
P17	WASHER	5	98660/1152	--
P18	PLUG	1	PS1454/1	--
P19	DIAPHRAGM DRAIN VALVE FEED PIPE	1	D100573.10	--
P20	DIAPHRAGM DRAIN VALVE SIGNAL PIPE	1	D100573.13	--
P21	CYLINDER DRAIN PIPE	1	D100973.15	--

CHECK VOLTAGE
Due to individual requirements, parts within the unloading system may alter. If in the slightest doubt contact CompAir Uk Ltd Ipswich Works for specific details.

13 ANCILLARY EQUIPMENT

13.1 VEE BELT ADJUSTMENT & TENSIONING – APP011

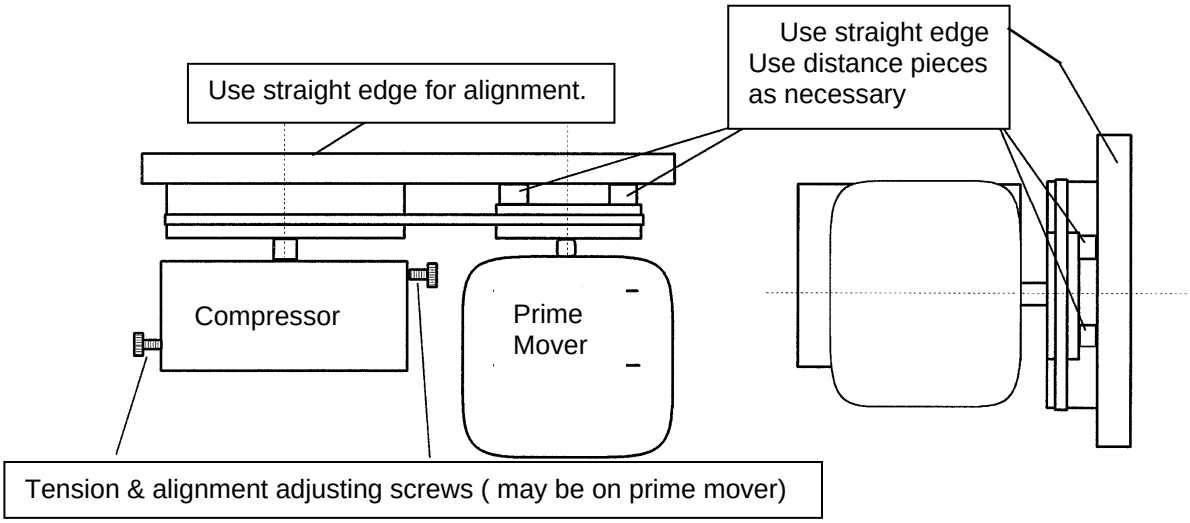
DRIVE RECOMMENDATIONS (V-BELT TRANSMISSION)

Details of drive arrangements and non isolation pad mountings are available from Reavell Works, Ipswich.
An overload device must always be fitted to motors.
Manufacturers terminal box wiring instructions must be observed.
An hours run meter fitted to the motor starter is recommended for efficient maintenance scheduling.

Belt Drive:

It is very important that the driving and driven pulley grooves are in line and both pulley shafts parallel. V-belt tensioning procedures follow normal BS.3790, 1981 practice.

TYPICAL DRIVE ARRANGEMENT



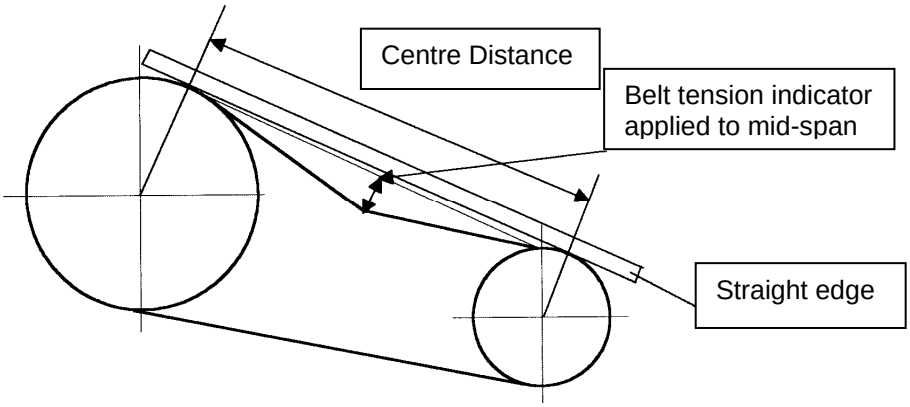
Belt Drive Tensioning:

Recommended Practice for Installation Tension in Belt Drives:-
It is necessary to be able to measure the belt tensions with sufficient accuracy to avoid belt slip or overloaded bearings or to meet particularly arduous conditions.
Measure the length of the span in millimetres. At the centre of the span apply a force with a spring scale in a direction perpendicular to the span, until the belt is deflected from the normal by an amount equal to 0.015 mm for every millimetre of span length. For example, the deflection for a span of 1 metre would be 1000 mm x 0.015 mm or 15 mm.
In all cases it is essential that the pulley centres be fixed and that the larger pulley be then rotated at least four times before making the measurement. On a multiple belt drive it is essential that a matched set of belts be used and the above procedure be carried out on each belt.
A measured forced below the lower value in the table indicates under tensioning, whilst a measured force above the higher value indicates over tensioning. However, when starting up a drive with new belts, the drive should be tensioned to the higher value since the tension falls rapidly in the early stages of running in. All belts should be watched carefully during the running in period after initial start-up. Retensioning and checking for wear should be carried out every 2000 hours using the above procedure for alignment and tensioning.

BELT DEFLECTION MEASUREMENT

Required Deflection Force "P" at Centre of Span For Compressor Speed Ranges (Newtons)
Above follows current BS3790 practice.

RECOMMENDED TENSIONING FORCE



ADJUSTMENT METHOD

If belt tension is incorrect, release the compressor holding down screws enough to allow the adjustment screws to be free to slide the compressor on its adjustment slots without being too loose.
Using a suitable straight edge (long enough to span both pulleys), use method as described on page 3 to tension the belt. Note: - When using the adjusting screws it is important to maintain both the correct belt tension and pulley alignment.
Having established the correct deflection and pulley alignment tighten compressor holding down screws, check deflection is correct. If not repeat the whole sequence again.

TABLE

Belt Section	Force required to deflect belt 16 mm per metre of span		
	Small Pulley Ø mm	**Newton (N)**	**Kilogram force (kgf)**
SPZ	67 to 95	10 to 15	1.0 to 1.5
	100 to 140	15 to 20	1.5 to 2.0
SPA	100 to 132	20 to 27	1.5 to 2.7
	140 to 250	27 to 35	2.7 to 3.5
SPB	160 to 224	35 to 50	3.5 to 5.1
	236 to 315	50 to 65	5.1 to 6.6
SPC	224 to 355	60 to 90	6.1 to 9.2
	375 to 560	90 to 120	9.2 to 12.2
8V	335 & above	150 to 200	15.3 to 20.4
Z	56 to 100	5 to 7.5	0.5 to 0.8
A	80 to 140	10 to 15	1.0 to 1.5
B	125 to 200	20 to 30	2.0 to 3.1
C	200 to 400	40 to 60	4.1 to 6.1
D	355 to 600	70 to 105	7.1 to 10.7

Method of Belt, Tensioning. Using a Belt Tension Indicator.

1. Calculate the deflection distance in mm, on a basis of 16 mm per metre of span. Centre distance (m) X 16 = Deflection (mm). If distance & deflection is known, go to .2.

2. Set the lower marker ring at the deflection distance required in mm on the lower scale.

3. Set the upper marker ring against the bottom edge of the top tube.

4. Place the belt tension indicator on top of the belt at the centre of span. And apply a force at right angles to the belt deflecting it to the point where the lower marker ring is level with the adjacent belt, on single belt drives place a straight edge across the two pulleys to act as a datum.

5. Read off the force value indicated by the top edge of the upper marker ring.

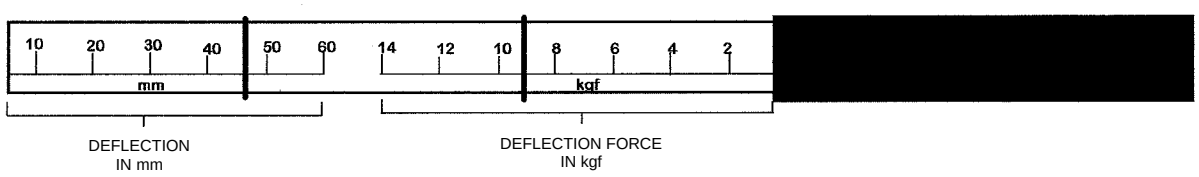
6. Compare this force to kgf value shown in the table above.

7. Tighten or loosen belt tensioning screws to achieve the correct value.

8. If the measured force falls within the values given, the drive should be satisfactory.

Note:- If a belt tension indicator is not available, a suitably scaled spring balance and rule will suffice.

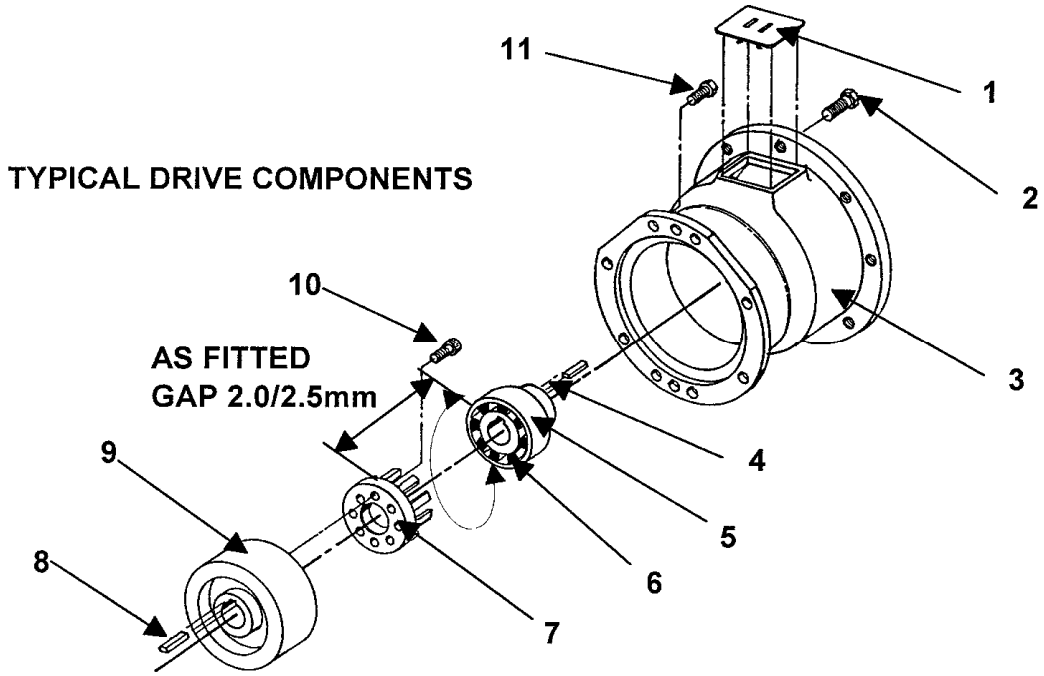
BELT TENSION INDICATOR



13.2 DIRECT DRIVE – APP011B

DIRECT DRIVE:

Ensure compressor and drive motor is correctly aligned as the flexible couplings are for vibration duties only and not as non-alignment couplings. Note direct coupled sets with bell type housing (see below) are self aligning.

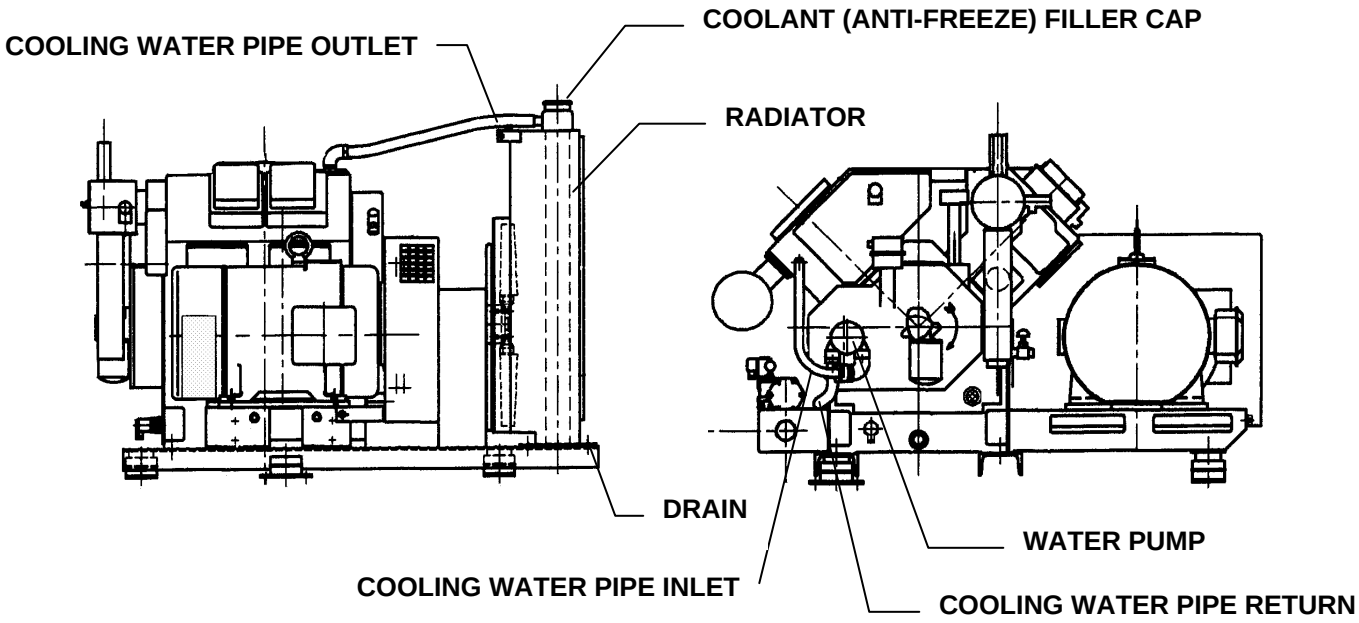


DIRECT DRIVE CHECKING FOR FREE PLAY AND WEAR.

After the first 500 hours and every 2000 hours, more frequently on arduous duties such as more than 6 starts per hour on auto stop/start operation, check the following:-
Ensuring compressor is isolated from mains supply, remove inspection cover (1) from bell housing (3) to expose drive components (5, 6 & 7), then by gripping the motor half coupling (5) firmly check for free movement by rotating backwards and forwards. The amount of free movement should be minimal 0.5 to 1.0 mm, excessive movement i.e. 3 to 4 mm or more should be investigated and the rubber couplings (6) replaced (complete set) as necessary.

13.3 RADIATOR FILLING WATER COOLING SYSTEM – APP077

TYPICAL RADIATOR WATER COOLING SYSTEM
SPECIAL INSTRUCTIONS FOR STARTING COMPRESSOR



BEFORE INITIAL STARTING

1. FILLING AND BLEEDING THE WATER SYSTEM.

COMPRESSOR SET	APPROXIMATE CAPACITY
5315, 5317, 5415 & 5417	40 LITRES
5236	112 LITRES
5336, 5436, 5436.3.HA & 5437	100 LITRES

See before starting procedure in HANDBOOK in conjunction with the following.

1. Ensure all water drain plugs/cocks etc. are closed.
2. Remove radiator filler cap.
3. Fill system with clean coolant. (Antifreeze mixture should be used in low temperature environments)
4. Replace filler cap.
5. Start compressor, run for 2 minutes and stop.
6. Gently release filler cap, remove and top-up.
7. Replace filler cap.
8. Re-start compressor, if any large air bubbles are evident in the pipework stop compressor.
9. Repeat (6), (7) & (8) until air bubbles are evacuated.
   Note: any small air bubbles will evacuate during normal running through the vent pipe.

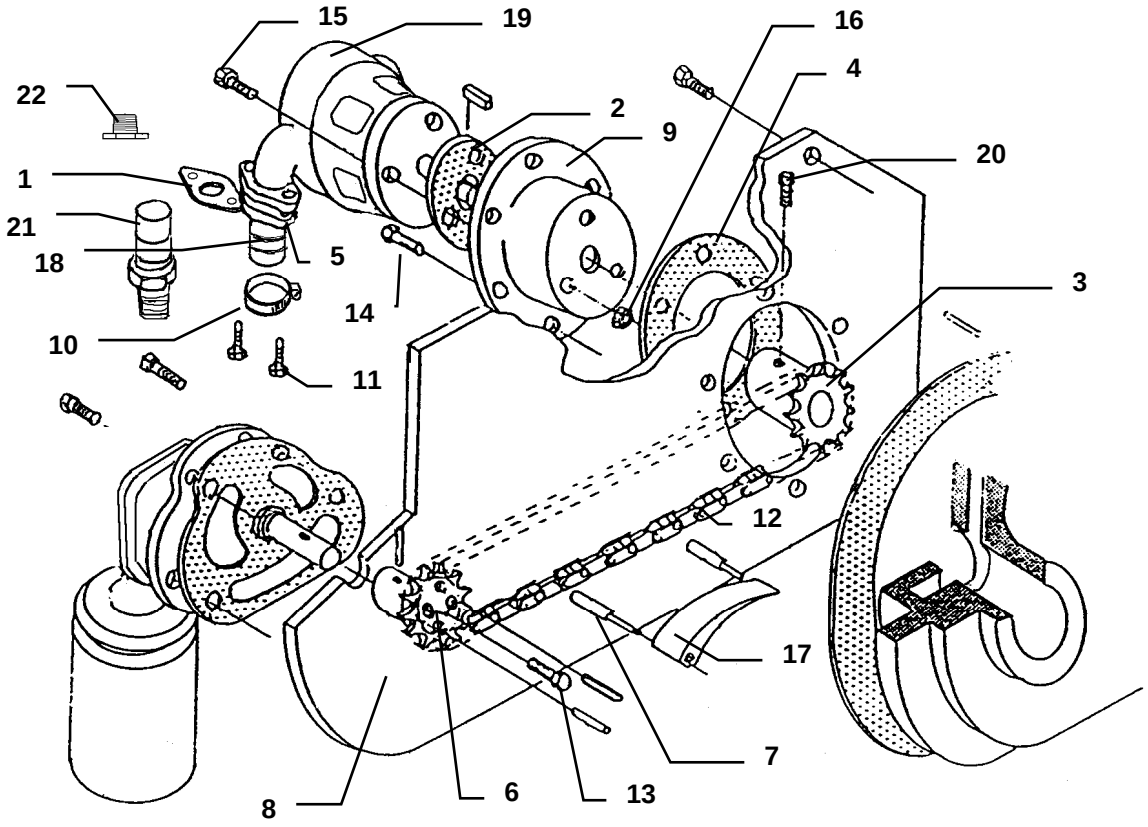
2. TOPPING UP.

If hot, it is best to leave until cool before attempting to top-up cooling water.

1. Gently release filler cap,
2. Remove and top-up to required level.
3. Replace filler cap.
4. Start compressor, check for air bubbles in water pipes as above.

13.4 WATER PUMP ASSEMBLY & DRIVE – APP073

WATER PUMP DRIVE 5236, 5336, 5436 MK2, 5436.3 & 5437.1



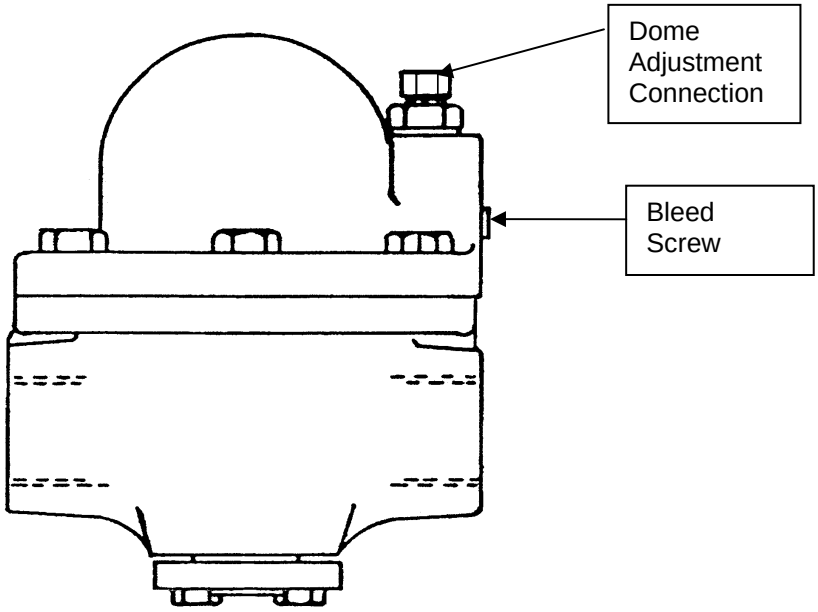
Item No	Part No	Description	No Off
1	C201503	Gasket water pump	2
2	C201504	Gasket water pump	2
3	C201537	Sprocket water pump drive	1
4	C201538	Gasket water pump bracket	1
5	C201809	Flange water pump	2
6	C85739/1	Sprocket water pump drive	1
7	C85740/1	Pillar chain tensioner (if fitted)	2
8	D100526	Cover outer end	1
9	D100527	Bracket water pump housing	1
10	PS1180/9	Clip hose	6
11	PS1923/3	Capscrew	4
12	PS2062	Chain water pump drive	1
13	95000/227	Setscrew	2
14	95000/254	Setscrew	6
15	95000/256	Setscrew	3
16	95111/5	Nut	3
17	98146/1001	Tensioner chain (if fitted)	1
18	98315/1102	Hose plastic	2
19	98446/1009	Pump water	1
20	95071/27	Screw cone point	1
21	98156/3113	Hose adaptor	2
22	95405/869	Bush hexagon male & female (5236) only	1

13.5 PRESSURE MAINTAINING VALVE – APP057

PRESSURE MAINTAINING VALVE
(BACK PRESSURE REGULATING VALVE)
98650.1759

Maximum Pressure	40 bar
Temperature Range	- 10 to 100°C
Flow Rate	300m³/hr
Connections	1" BSPP

This valve is fitted to maintain a back pressure through the separators, filters and the dryers (if fitted). This ensures that these items of equipment reach their optimum working pressure as soon as possible, to give long filter life, good oil separation and low oil consumption.



SETTING & ADJUSTMENT.

1. Ensure all pipes and connections are clean
2. Using a remote pressure supply. i.e. suitable for desired working pressure.
3. Connect suitable air pipe to Dome adjustment connector.
4. Undo bleed screw.
5. Allow air into dome until desired pressure is obtained.
6. Close bleed screw.
7. Start compressor, bring up to desired working pressure.
8. If the required maintained pressure is correct, disconnect remote pressure from dome.
9. If not satisfactory, adjust remote pressure and repeat steps 3, 4 & 5 until the desired level is obtained.
10. Disconnect remote pressure supply.
11. Plug dome connection with a plastic cap.

MAINTENANCE.

The only maintenance required, other than routinely checking for leaks, is to replace all elastomers and plastic parts at two yearly intervals

13.6 SOLENOID VALVES – APP138

3 WAY SOLENOID VALVE
PS2197

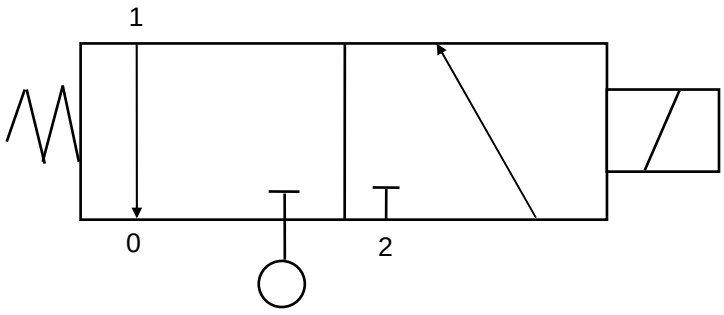
OPERATION

3 way normally closed energise to open, continuous duty.
On starting the solenoid valve opens (energised) this operates the diaphragms which in turn closes the valves within the D.D.Vs. (Diaphragm Drain Valves) thus allowing pressure to build up in the system to the desired pressure. On shutdown the solenoid valve closes (de-energised) this takes the pressure of diaphragms thus allowing the drains to blow any condensate collected within the stage separators.

INSTALLATION

Technical Details			Current consumption	
Part No	Voltage	Hz	Current Inrush	Hold
PS2197.1	230	50 AC	26 VA	16 VA
PS2197.2	110	50 AC	26 VA	16 VA
PS2197.3	220	60 AC	26 VA	16 VA
PS2197.4	110	60 AC	26 VA	16 VA
PS2197.5	24	DC	-	10 watts
PS2197.6	110	DC	-	10 watts
PS2197.7	230	DC	-	10 watts
PS2197.8	24	50 AC	26 VA	16 VA
PS2197.9	12	DC	-	10 watts
PS2197.10	24	60 AC	26 VA	16 VA
PS2197.11	125	DC		10 watts
PS2197.12	48	50AC	26VA	16VA

Electrical connection Amps pin to DIN 46242
Connector To DIN 43650
Protection IP65
Cable thread size PG9
Coil Class 'H' 180°C insulation
Coil duty Continuous
Voltage tolerance from normal -10% to +10%
Port Size G 1/8"
Orifice Size Ø1.6mm
Maximum working pressure 12 bar g.
Working fluid Air, water, gas, fuel oil & non corrosive liquids.
Ambient temperature range -15°C to +50°C



13.7 SAFETY VALVE – APP167

Installation and Operating Instructions

SAFETY VALVES

INTRODUCTION

Due consideration should be taken of climatic. Process or other conditions which might adversely affect the performance of the safety valve. Installation must be undertaken by qualified technicians and to good engineering practice. In addition, user's attention is drawn to our joint responsibility to ensure that the Health and Safety at Work Act is not contravened by incorrect installation. Commissioning or servicing. It is important that the valve to be installed is correct in every aspect, i.e. set pressure, size, material and type etc. for the application.

STORAGE OF VALVE BEFORE INSTALLATION

Valves should be stored preferably between-5°C and +25°C and a relative humidity of less that 75%. Very moist or dry conditions should be avoided. If a safety valve is installed after six months, or more, of storage, it must be subjected to functional test before commissioning. Thread protectors should not be removed until immediately, prior to testing or installation, as they also prevent the ingress of foreign matter, which could harm the valve.

INSTALLATION

VALVE INLET: Under no circumstances should it be possible to isolate the safety valve from the protected system. Safety valves should be mounted as close as possible to the protected system. The connecting pipe should be straight and as short as possible. The inlet line to the safety valve should have an effective area of flow, at least equal to that of the safety valve inlet. CompAir Limited should be consulted if the safety valve is to be mounted in any position other than vertically. The maximum pressure drop through the inlet line to the safety valve should not exceed 3% of the set pressure when the valve is discharging at its rated capacity.

VALVE OUTLET*:* No isolating devices shall be fitted to the outlet pipe. Discharge pipes should be as short as possible and of such a size that the pressure developed therein not reduce the relieving capacity. Ensure arrows indicating the direction of the flow are pointing in the correct direction. The cross-sectional area of the discharge pipe should not be less than the area of the safety valve outlet. Where safety valves are discharged into a manifold, the manifold must be capable of accommodating simultaneous discharge of all valves connected to the manifold. Atmospheric discharge or discharge pipes should terminate at a location which will not cause a hazard to personnel, particular attention being given to hazardous fluids or particles.

GENERAL*:* Inlet and outlet piping should be capable of supporting the safety, valve so that no unacceptable mechanical load or vibration is transmitted to the valve, and be sufficiently strong to withstand 'the effects of the reaction forces when the valve is discharging. All pipework or pressure vessels to which the safety valve is connected should be thoroughly cleaned before fitting the safety valve, to ensure that foreign matter does not pass through the valve. **Particular care should be taken with the use of scaling compounds and P.T.F.E. tape to ensure that they do not enter the valve.**

Atmospheric discharge valves should not be painted or coated with any substance, which could possibly obstruct or restrict free and full discharge through the valve. Suitable protection should be provided to prevent environmental build up or ingress of foreign matter. Any condition that could lead to blockage of discharge piping or discharge ports on safety valves must be avoided. Where appropriate, discharge pipes should be provided to a non-hazardous location. Where there is a possibility of a liquid head forming in a discharge pipe, a drain should be provided which leads to a safe discharge location. To prevent unnecessary lifting of the safety valve it is recommended that there is a margin of at least 10% between the maximum operating pressure and the set pressure of the safety valve.

FUNCTIONAL TESTING

Once installed in service. Valves should be tested at least once every six months to ensure free movement of parts. This should be carried out by operating the easing gear when the valve is under a pressure of not less than 75'% of the set pressure. Where valves are supplied without easing gear, the test should be in accordance with the full functional test described overleaf. Due regard must be paid to the safety personnel. Testing should not create a hazard, particular attention being given to foreign matter located in discharge outlets.

CONFIGURATION

The valves have a base number for different type valve arrangement from this information the valve set pressure can be obtained, examples:-

98650.2073 is the base unit number.

98650.2073-16.2 -16.2 being to the setting in bar g - wire locked.

98650.2073-96.25 -96.25 being to the setting in bar g - wire locked.

98650.1164 is the base unit number.

98650.1164-28 -28 being to the setting in bar g - wire locked.

98650.1163 is the base unit number.

98650.1163-7.6 -7.6 being to the setting in bar g - wire locked.

98650.1020 is the base unit number.

98650.1020-3.8T -3.8 being to the setting in bar g - wire locked and tagged.

98650.1021 is the base unit number.

98650.1021-9.6 -9.6 being to the setting in bar g - wire locked.

98650.1022 is the base unit number.

98650.1022-90T -90 being to the setting in bar g - wire locked and tagged.

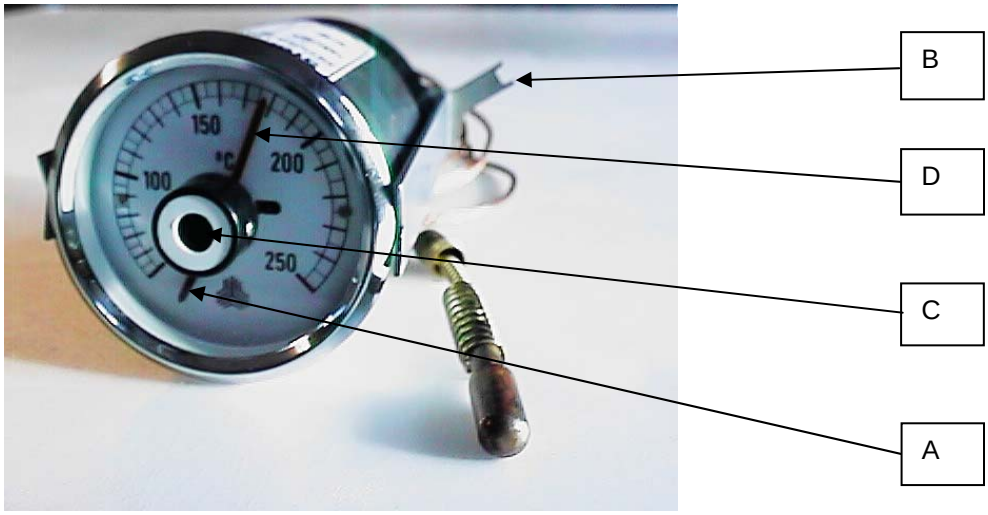
Note the valves cannot be interchanged as the range of setting is limited

13.8 TEMPERATURE CONTROLLER – APP090C

THERMOMETER SWITCHES
C202556, C202749, C202960 & C202964
98288.1093, 98288.1094 & 98288.1215

THESE THERMOMETER SWITCHES ARE SET TO THE FIGURES QUOTED BELOW, THE FOLLOWING INFORMATION IS FOR SETTING INFORMATION ONLY, IF THE TEMPERATURE SWITCH HAS TO BE REPLACED OR RE-ADJUSTED.

IF THE SWITCH NEEDS TO BE RE-ADJUSTED DUE TO A HIGHER AMBIENT TEMPERATURE OR ANY REASONS PLEASE CONTACT COMPAIR UK LTD. IPSWICH FOR MORE INFORMATION.



TO SET TRIP INDICATOR POINTER.

RUN COMPRESSOR TO ESTABLISH NORMAL RUNNING TEMPERATURE OF BLACK POINTER [A].

WHEN READING IS STABLE, REMOVE ADJUSTING KEY [B] FROM REAR OF SWITCH AND INSERT INTO FRONT OF CENTRAL KNOB ADJUSTER [C].

ROTATE KEY TO ADJUST RED POINTER [D] TO 10°C ABOVE RUNNING TEMPERATURE POINTER [A].

ADJUSTMENT OF TRIP POINTER MUST BE WITHIN RANGE THAT HAS BEEN PRE-SET AT COMPAIR BEFORE DESPATCH, BUT MAY BE ADJUSTED WITHIN THIS RANGE DEPENDING ON AMBIENT CONDITIONS.

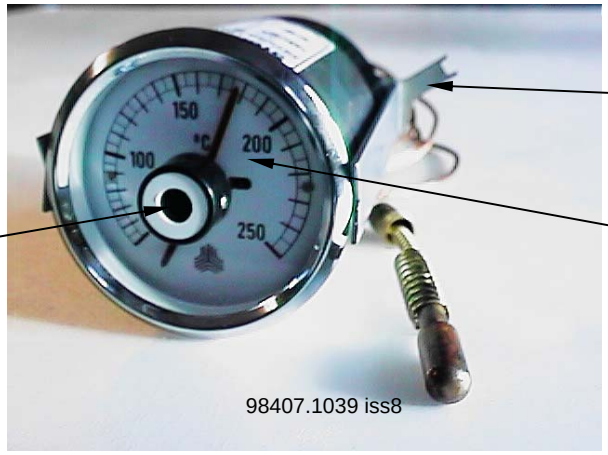
NOTE: DO NOT RESET TEMPERATURE CONTROLLER SETTING IF IT TRIPS, ALWAYS LOCATE AND CORRECT POSSIBLE FAULT BEFORE ANY ATTEMPT IS MADE TO ALTER SETTING.
CONTACT **CompAir UK Ltd IPSWICH** ENGINEERING DEPARTMENT FOR MORE INFORMATION IF THE COMPRESSOR TRIPS WHEN SWITCH IS SET AT MAXIMUM VALUE.

CONTROLLER PART No	TRIP POINTER STOP SETTING °C	USED ON COMPRESSOR MODEL
C202556.1	125	5236.1
C202556.2	140	5212
C202556.3	150	5336,5415
C202556.4	155	5215 & 5217
C202556.5	170	5236.2,5315
C202556.6	180	5415E5317,5417.5417N
C202556.7	205	5436(CU TUBES)
C202556.8	220	5436.1 &.2,5436H,5436N,5436SN & 5437
C202749.1	200	5280
C202749.2	210	5280
C202749.3	175	5409
C202960.1	75	WATERCOOLED M/C'S DELIVERY
C202960.2	60	5211
C202960.3	55	WATER OUTLET
C202960.4	80	5207,5209,5213
C202960.5	50	5417N,5436N
C202964.1	75	5280,5281,5282,5283, DELY
C202964.2	60	5450,5470 DELY
CONTROLLER PART No	**TEMPERATURE RANGE °C**	**USED ON COMPRESSOR MODEL**
98288.1089	50 - 250	WATERCOOLED 5000 SERIES
98288.1121	0 - 120	WATERCOOLED 5000 SERIES
CONTROLLER PART No	**WHERE FITTED**	**USED ON COMPRESSOR MODEL**
98288.1093	1^{st} – 5^{th} STG. DELIVERY	5450 & 5470
98288.1094	FINAL DELIVERY	5450 & 5470

98288.1215

THE PURPOSE OF THIS SWITCH IS TO PREVENT THE COMPRESSOR FROM STARTING IN LOWER THAN RECOMMENDED AMBIENT TEMPERATURES.IT IS FITTED AT THE COMPRESSOR GAS INLET PORT.THE MINIMUM TEMPERATURE OF -10°C HAS BEEN SET AT THE FACTORY, BUT THIS CAN BE RAISED ON SITE IF REQUIRED BY FOLLOWING THE PROCEDURE BELOW.
TO SET.
RELEASE ADJUSTING KEY (A) FROM BACK OF INSTRUMENT BY REMOVING SECURING NUT.
INSERT END OF KEY INTO CENTRAL ADJUSTER KNOB (B) AND TURN TO ADJUST SET POINTER TO REQUIRED MINIMUM TEMPERATURE **ABOVE -10°C.**
REPLACE ADJUSTING KEY AND SECURE WITH NUT.

CONTROLLER PART No	TEMPERATURE RANGE	TRIP POINTER STOP SETTING °C	USED ON COMPRESSOR MODEL
98288.1215	-40° / +80°C	-10°C FALLING	5000 SERIES WATER-COOLED
			COMPRESSORS



13.9 PRESSURE GAUGE – APP070

PRESSURE GAUGES

GENERAL

The pressure gauge should be installed such as to avoid exposure to heat and vibration and to enable easy observation of the dial indication.

IMPORTANT

It is common practise to install the pressure gauge without an isolating device, so to facilitate calibration or replacement the system must be de pressurised before any work is carried out.

The pressure gauge is liquid filled to provide better damping from pulsation's.

INSTALLATION & COMMISSIONING

The tightening and loosening of torque applied to the connection should be by means of the spanner flats provided on the stem and should not be by means of grasping the case as this may damage the gauge.

No pressure higher than indicated by the working pressure symbol ▼ must be applied to the gauge during hydrostatic pressure testing of the system. Otherwise the gauge must be isolated or removed during this operation.

No attempt should be made to remove a pressurised gauge. The pressure system must be totally relieved if the gauge can not be isolated otherwise.

The remainder of the pressure medium contained in the element may be hazardous or toxic. This should be considered when handling and storing the removed pressure gauge.

PRESSURE GAUGES IN SERVICE.

Always open isolating devices always gently and never abruptly, as this may generate sudden pressure surges that may damage the gauge.

The maximum working pressure for which the gauge is suitable, or also the minimum working pressure in cases of vacuum, is indicated on the dial by corresponding marks ▼. Fluctuating pressure always reduces the maximum working pressure of the gauge.

Correct zeroing may be inspected by closing the isolating valve and relieving the gauge from pressure. The pointer must fall within the thickened portion of the zero mark. Unless the gauge temperature is considerably higher or lower than 20°C, a pointer not returning to zero may indicate serious damage to the gauge.

On-site testing of the pressure gauge is feasible by means of special isolating devices enabling connection of a test gauge together with a suitable pressure source.

13.10 PRESSURE SWITCH – APP086 & 088

HIGH AIR/GAS PRESSURE SWITCHES

PART NO: 98524/1025, 1049, 1094, 1095, 1096, 1102, 1103, 1104, 1107, 1128, 1135, 1136, 1137, 1210 & 1212

OPERATION - MANUAL START/AUTO STOP
Located as close as possible to the delivery, inlet air/gas line, the pressure switch stops the compressor when the air/gas pressure rises or falls above or below the pre-set pressure setting.

TYPICAL SETTINGS - Set to actual operating pressures or check contract for details.

Set pressures:	98524/1025	Setting Range 30"hg vac - 15 psig rising	
	98524/1094	Setting Range 0.14 - 4 psig rising	
	98524/1095	Setting Range 0.35 - 11 psig rising	
	98524/1096	Setting Range 1.4 - 28 psig rising	
	98524/1102	Setting Range 0.2 - 4 bar g rising	Reset Differential 0.07 bar
	98524/1103	Setting range 2 - 28 bar g rising	Reset Differential 0.6 bar
	98524/1107	Setting range 0.2 - 4 bar g rising	Reset Differential 0.6 bar
	98524/1128	Setting Range 2.5 mbar - 125 mbar	To withstand 2.2 bar overload.
	98524/1135	Setting Range 0.2 - 4 bar g rising	Reset Differential 0.07 bar
	98524/1136	Setting Range 3 - 70 bar g rising.	
	98524/1137	Setting Range 3 - 66.5 bar g rising.	
	98524/1210	Setting Range 5 – 40 mbar	
	98524/1212	Setting Range 70mbar – 70bar	

The switch transforms a change of pressure into an electrical "On" or "Off" signal.
When a pre-set pressure is reached the snap action contact stops the compressor.

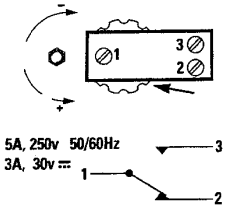
OPERATION - AUTO START/STOP
Located as close as possible to the delivery air/gas line, the pressure switch stops the compressor when the upper pre-set pressure setting is attained and triggers off the start when the lower differential pressure limit is reached.

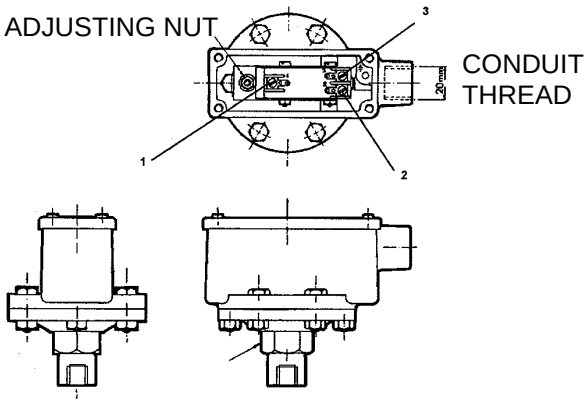
TYPICAL SETTINGS - Set to actual operating pressures or check contract for details.

Set pressures:	98524/1049	Setting Range 2 - 42 bar g rising	
		Set Pressure HIGH 31 bar g rising	Set Pressure LOW 28 bar g falling.
	98524/1104	Setting Range 2 - 70 bar g rising	
		Set Pressure HIGH 40 bar g rising	Set Pressure LOW 36 bar g falling.
	98524/1137	Setting Range 3 - 66.5 bar g rising	
		Set Pressure HIGH 42 bar g rising	Set Pressure LOW 39 bar g falling.

The switch transforms a change of pressure into an electrical "On" or "Off" signal.

When a pre-set high pressure is reached the snap action contact stops the compressor, after dropping to the lower setting, the compressor restarts.





INSTALLATION
Mount the switch by the bracket provided.
It is usual to connect 1 (C) and 2 (NC) to the compressor electrical control circuit terminals marked "Pressure Switch".

Remove cover to set pressure setting, using a pressure gauge. Note:- Switches are pre-set and do not usually need adjusting. Please confirm with Engineering at CompAir UK Ltd Ipswich if switches are to be adjusted.

a. Turn adjusting nut clockwise to lower set point.
b. Turn adjusting nut anti clockwise to raise set point.
c. To adjust differential use notched wheel below the microswitch.

LOW OIL PRESSURE SWITCH

PART NO: 98524.1042, 98524.1122, 98524.1140 & 98524.1170

OPERATION

Located in the crankcase on water-cooled & large air-cooled compressors, in the oil filter body on air-cooled, the pressure switch stops the compressor when the oil pressure drops to pre-set pressure setting.

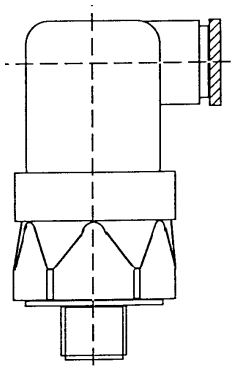
PART NO.	COMPRESSOR TYPE	INLET PRESSURE	SETTING
98524.1042	WATERCOOLED	Standard	1 bar (15 psi) falling
98524.1122	AIRCOOLED	Standard	0.5 bar (7.5 psi) falling
98524.1042	AIRCOOLED – GAZPACKS	over 0.1 bar	1 bar (15 psi) falling
98524.1042	AIRCOOLED – 5450/5470	Standard	1 bar (15 psi) falling
98524.1122	AIRCOOLED – GAZPACKS	up to 0.1 bar	0.5 bar (7.5 psi) falling
98524.1140	AIRCOOLED – GAS	Standard	1 bar (15 psi) falling
98524.1169	AIRCOOLED – IZAR	up to 0.1 bar	0.5 bar (7.5 psi) falling
98524.1170	WATERCOOLED – GAS	24 VDC Gold Contacts	1 bar (15 psi) falling

The switch transforms a change of pressure into an electrical "On" or "Off" signal.

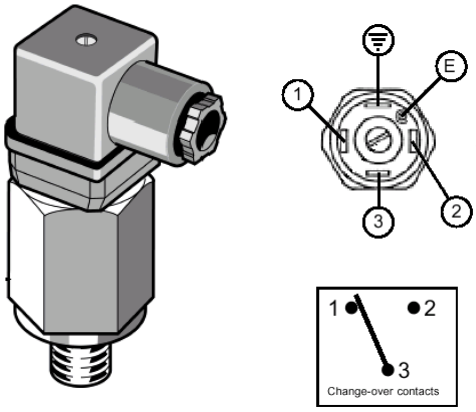
When a pre-set pressure is reached the snap action contact stops the compressor.

INSTALLATION

Either of two makes of low oil pressure switch may be fitted as shown below. Terminal connections are shown for clarity.



Connect Common (1) and Normally Open (4) terminals to compressor control panel



Connect Common (3) and Normally Open (2) terminals to compressor control panel

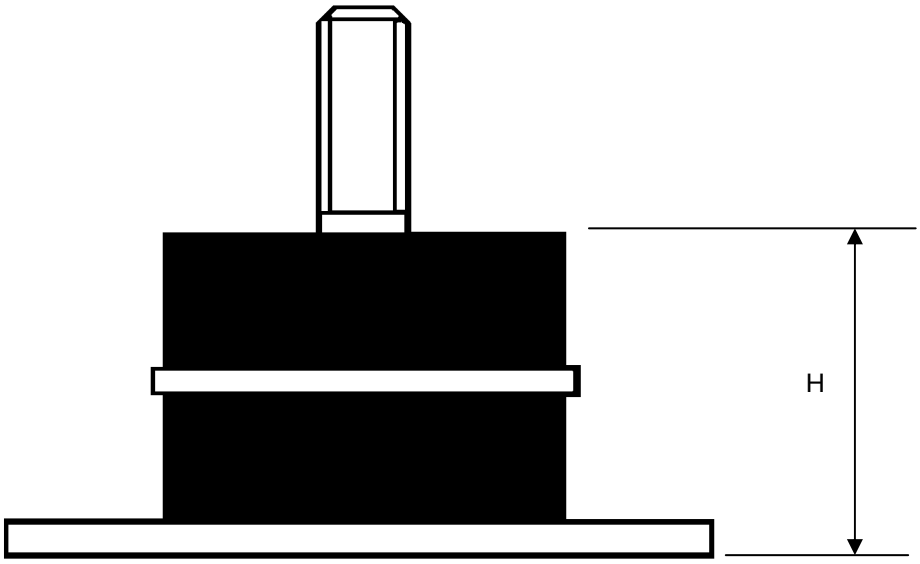
13.11 ANTI-VIBRATION MOUNTS – APP003

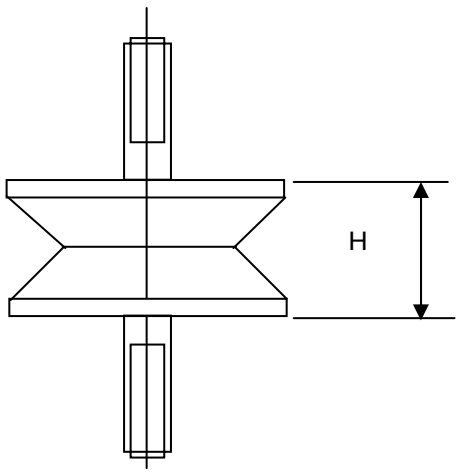
AVA TYPE

PART NUMBERS VARIOUS

PREVENTIVE MAINTENANCE

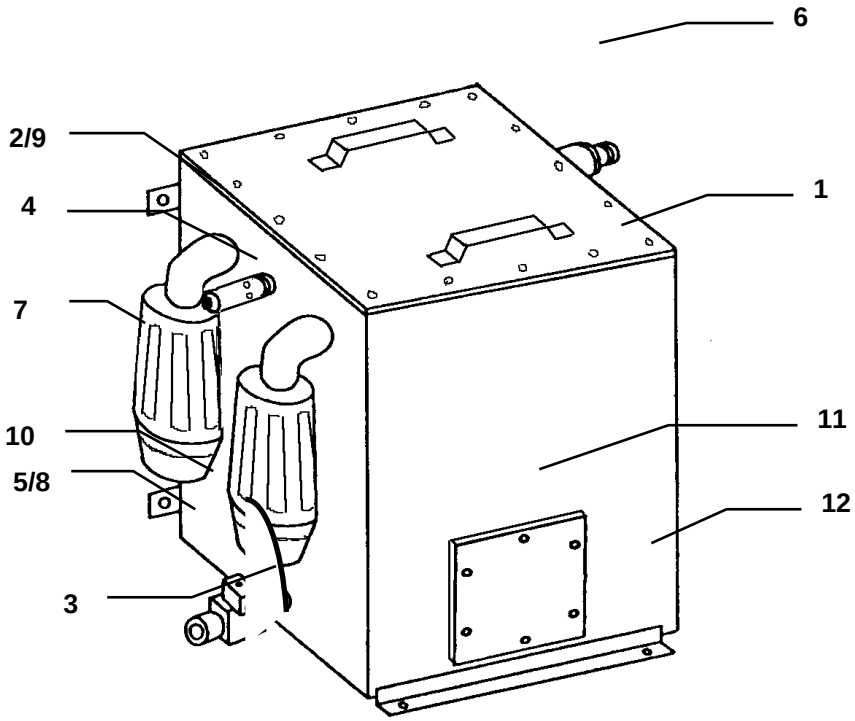
1) After installation and initial running in. Record height dimension (H) of each mount.
2) After a week or 100 hours running time recheck and record dimension (H)
3) Check this dimension every 3 to 6 months depending on usage i.e. regular usage every 3 months.
   Note: This dimension may only change a small amount during the life of the mount approximately 1mm.
4) Any oil or paint contact with the rubber mount will affect the life and performance, so keep to a minimum by regularly cleaning and clearing any contamination from the surrounding area.
5) Under normal working conditions the life expectancy will be 5 to 8 years.
6) Temperatures in excess of 70° C will have an adverse effect on the rubber and will shorten the life expectancy.





13.12 DEMISTER – APP043

OIL/MOISTURE DEMISTER VESSELS



TYPICAL ARRANGEMENT

GENERAL DESCRIPTION

These Demister Vessels are designed to separate condensate from the compressor drainage blowdown system, discharging clean air through coalescer filters to the atmosphere. The discharge air contains less than 0.5-mg/M³-oil mist with a noise level hardly above the compressor noise. A safety valve is fitted to prevent accidental overpressure.

INSTALLATION NOTES

1. The unit should be mounted in an elevated position to allow free drainage of the condensate into a storage vessel. Lugs (12) are provided for base or side mounting.
2. The inlet (6) should be connected to the outlet of the drain valves or surge vessel with a suitable hose; the bore should not be reduced below the size of the inlet connection to the vessel.
3. The unit is normally supplied with a 2-way solenoid valve (8) on the condensate drain. This should be wired in parallel with DDV solenoid to close when the drains blow and remain open whilst the compressor is running to allow the condensate to drain into a suitable vessel such as a 40 gallon drum. If a solenoid valve is not used a short length of pipe, Ø8mm bore, should be fitted to the drain discharge. A needle valve or orifice should not be used.

OPERATION & MAINTENANCE

1. Condensate drainage is automatic but the amount collected must be monitored and arrangements made for disposal form the collecting drum. A small amount of oil may collect in the base of the coalescer filter(s) (7). Periodically the valve in the bottom of the filter should be opened to drain away any oil collected; this may be piped as necessary. The element is also replaceable and should be replaced when heavily contaminated.
2. Periodically the demister vessel should be cleaned to remove any accumulated sludge. A removable cover (11) is provided for this purpose.

DEMISTER VESSELS PARTS

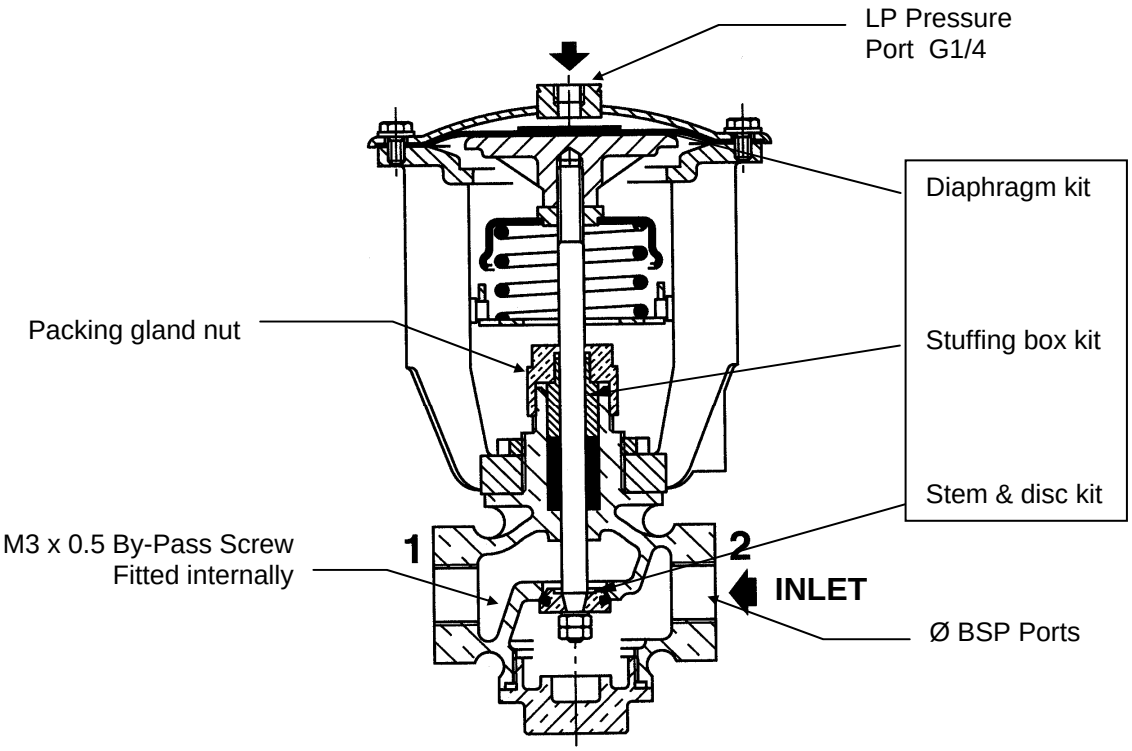
Item No.	Description	E61201	E61187	E61198	E61106
	Used on	**5215/5217 5236**	**5315/5317 5415/5417/5420 5417N/5420N**	**5280/5336 5436/5437**	**5436N/5437N**
1	Demister Tank	E61200	E61188	E61197	E61105
2	Dowty Seal	PS1322.8	PS1322.8	PS1322.8	PS1322.8
3	Cable	PS1481	PS1481	PS1481	PS1481
4	Bend	95405.184	95405.185	95405.185	95405.185
5	Nipple	95405.799	95405.799	95405.799	95405.799
6	Adaptor	98156.3113	98156.3178	98156.3178	98156.3179
7	Filter Silencer	98262.1216	98262.1211	98262.1211	98262.1211
8	Valve Solenoid voltage 240VAC/1PH/50HZ	E61201.240.50	E61187.240.50	E61198.240.50	E61106.240.50
8	Valve Solenoid 110VAC/1PH/60HZ	E61201.110.60	E61187.110.60	E61198.110.60	E61106.110.60
8	Valve Solenoid voltage 24VAC/1PH/50HZ	E61201.24.50	E61187.24.50	E61198.24.50	E61106.24.50
8	Valve Solenoid voltage 24 VDC	E61201.24.DC	E61187.24.DC	E61198.24.DC	E61106.24.DC
9	Safety Valve	98650.1011	98650.1011	98650.1011	98650.1011
10	Din Plug	98241.1079	98241.1079	98241.1079	98241.1079

13.13 WATER INLET CONTROL VALVE – APP071 & 704

WATER VALVE
NORMALLY CLOSED
U231.F & U231.H

OPERATION

Located on the water inlet to the compressor the valve stops water flowing through the compressor on shut down. This is achieved by means of a diaphragm-operated valve piped to the compressor LP pressure, on shut down the air pressure is released from the diaphragm thus closing the valve. A by pass screw is provided, this can be removed to give an adequate cooling flow of water when running the compressor continuously on/off load even when the valve is closed.



TEMPERATURE

Fluids : water, gas, air, oil and steam.	+ 5° to + 180°C
Ambient	+ 5° to + 60°C

PART NUMBERS	Ø Port Size BSP	Ø orifice mm	*M.S.P bar
98560.1291	1/2"	15	16
U231.F - 98650.1292	3/4"	20	16
U231.H - 98650.1293	1"	25	16

* Maximum Service Pressure (LP pressure)

MAINTENANCE AND SPARES KITS

Part Number	Description	Makers Part Number	Used on
98405.1004	Stem & Disc Kit Stuffing Box & Nut Kit Diaphragm Kit	97701319 97701320 97700017	98650.1291
98504.1005	Stem & Disc Kit Stuffing Box & Nut Kit Diaphragm Kit	97701321 97701320 97700017	98650.1292 U231.F
98405.1006	Stem & Disc Kit Stuffing Box & Nut Kit Diaphragm Kit	97701322 97701320 97700018	98650.1293 U231.H
98650.2208	Stem & Disc Kit	97701319	98650.1291
98650.2209	Stuffing Box & Nut Kit	97701320	98650.1291 98650.1292 - U231.F 98650.1293 - U231.H
98650.2210	Diaphragm Kit	97700017	98650.1291 98650.1292 - U231.F
98650.2211	Stem & Disc Kit	97701321	98650.1292 - U231.F
98650.2212	Stem & Disc Kit	97701322	98650.1293 - U231.H
98650.2213	Diaphragm Kit	97700018	98650.1293 - U231.H

DISMANTLING AND REASSEMBLING

Tightening Sequence for all water valves

The procedure outlined below is to be used when dripping or pooled water is noticed around the water control valve. The procedure described below is intended for the technician to stop the water from dripping around the water control valve packing. All adjustments are to be achieved while the compressor is running.

Step 1:
Obtain a pair of adjustable pliers. “Multigrip pliers” work best.

Step 2:
Grasp the packing gland nut on the water control with the " Multigrip pliers ". The packing gland nut is located between the water control valve cross-members and is of the cylindrical design. The packing nut is knurled.

Step 3:
Rotate the packing gland nut clockwise, looking from the top, 1/16 of a turn.

Step 4:
Observe the water control valve shaft while the compressor is running. When the compressor system unloads and reloads, the shaft running through the packing gland nut should move freely. Observe the packing gland while the shaft is moving. Check for additional water leaks. If water continues to leak repeat step 3 and 4 until no leaks are detected.

WATER VALVE
NORMALLY OPEN
98650.1298
IF FITTED

OPERATION

Located on the water inlet to the compressor this valve is often used as a by pass valve when compressors are operating in tandem and using the same water supply i.e. a normally closed and normally open valve fitted. Water flowing through the compressor is shut down by means of the normally closed valve whilst the water is by passed by to other compressors means of the normally open valve. This is achieved by means of diaphragm operated valves piped to the compressors LP pressure, on shut down the air pressure is released from the diaphragm thus closing the normally closed valve, at the same time opening the normally open valve. A by pass screw is provided in the normally closed valve, this can be removed to give an adequate cooling flow of water when running the compressor continuously on/off load even when the valve is closed.

APP704
PNEUMATIC WATER VALVE
COMPAIR PART NUMBERS:

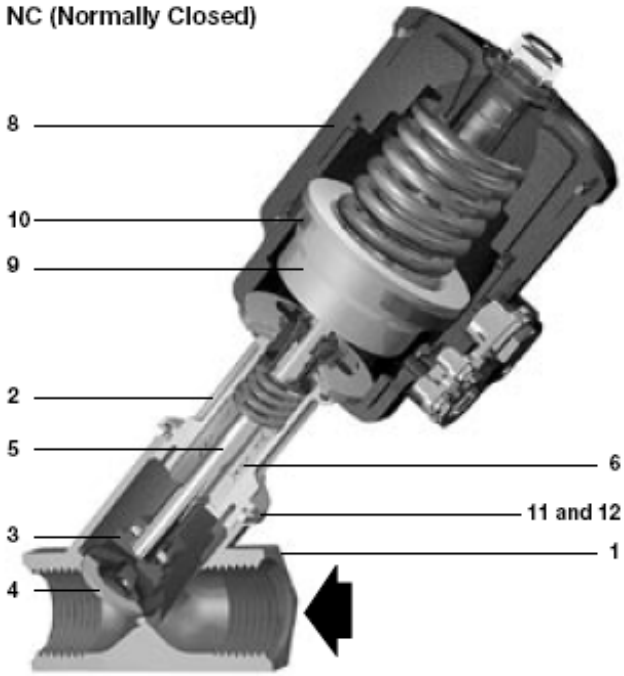
	PORT SIZE	BODY MATERIAL
98650.2584.1	1” BSP	BRONZE
98650.2584.2	1” BSP	STAINLESS STEEL
98650.2585.1	¾” BSP	BRONZE
98650.2585.2	¾” BSP	STAINLESS STEEL

DESCRIPTION
A 2-port pneumatically actuated on/off valve for use on water, air, oil and gasses.
A pneumatic signal acts on the actuator piston to open or close the valve with a spring return action. The valve plugs have a PTFE soft seal to provide a tight shut-off. A valve position indicator is included on standard and flow regulator models.

The valves are normally closed and flow is from port 1 to port 2.

BRONZE BODY

NO	PART	MATERIAL
1	BODY	BRONZE
2	BONNET	BRASS
3	PLUG	STAINLESS STEEL
4	PLUG SEAL	PTFE
5	VALVE STEM	STAINLESS STEEL
6	STEM SEALS	PTFE CHEVRONS
7	STEM O-RING	VITON
8	ACTUATOR HOUSING	GLASS FILLED POLYMIDE
9	PISTON	GLASS FILLED POLYMIDE
10	PISTON LIP SEAL	VITON
11	GASKET	PTFE
12	O-RING	FKM



STAINLESS STEEL BODY

NO	PART	MATERIAL
1	BODY	STAINLESS STEEL
2	BONNET	STAINLESS STEEL
3	PLUG	STAINLESS STEEL
4	VALVE PLUG SEAL	TFM 1600
5	VALVE STEM	STAINLESS STEEL
6	STEM SEAL	PTFE + FKM CHEVRON
7	STEM O-RING	FKM
8	ACTUATOR HOUSING	30% GLASS FILLED POLYMIDE
9	PISTON	50% GLASS FILLED POLYMIDE
10	PISTON LIP SEAL	NBR
11	GASKET	PTFE
12	O-RING	FKM

14 STANDARD WIRING TERMINAL NUMBERS

WHEN THE MOTOR AND / OR STANDARD COMPRESSOR CONTROL DEVICES HAVE BEEN PRE-WIRED INTO LOCAL MARSHALLING BOXES OR DIRECTLY INTO A STARTER / CONTROL PANEL, THE FOLLOWING TERMINAL NUMBERS ARE USED.

ALL OTHER TERMINALS ARE AS SPECIFIC CONTRACT DRAWINGS

STANDARD TERMINAL IDENTIFICATION FOR SET WIRING

DEVICE	***TERMINAL NUMBER***	***DEVICE***	***TERMINAL NUMBER***
MAINS SUPPLY	L1, L2, L3 N	INLET SOLENOID	37, 38
EARTH	E	LOW INLET TEMPERATURE	39, 40
D.O.L. MOTOR	U, V, W	HIGH INLET TEMPERATURE	41, 42
STAR DELTA MOTOR	U1, V1, W1, U2, V2, W2	NOT USED	43, 44
FINAL DELIVERY PRESSURE SWITCH (CONTROL)	1, 2	CRANKCASE/SUMP HEATER	45, 46
LOW OIL PRESSURE	3, 4	MOTOR ANTI CONDENSATION HEATER	47, 48
4TH STAGE TEMPERATURE	5, 6	DRYER 1phase	L=49 N=50
SUCTION UNLOADING SOLENOID	7, 8	DRYER 3phase	L1=51 L2=52 L3=53 N=54
DDV SOLENOID	9, 10	MOTOR THERMISTOR	TH1 = 55 TH2 = 56
DEMISTER SOLENOID	11, 12	NOT USED	57, 58
1ST STAGE TEMPERATURE	13, 14	EMERGENCY STOP	59, 60
2ND STAGE TEMPERATURE	15, 16	FLOW SWITCH	61, 62
NOT USED	17, 18	NOT USED	63, 64
TRACE HEATING	19, 20	WATER TEMPERATURE	65, 66
3RD STAGE TEMPERATURE	21, 22	TRANSFER SWITCH	67, 68
FINAL DELIVERY TEMP	23, 24	RECLAIM SWITCH	69, 70
1ST STAGE PRESSURE	25, 26		
2ND STAGE PRESSURE	27, 28		
3RD STAGE PRESSURE	29, 30		
4TH STAGE PRESSURE	31, 32		
LOW INLET PRESSURE	33, 34		
HIGH INLET PRESSURE	35, 36		

WARNING

The use of replacement parts or lubricating oils not supplied, recommended or approved by **Reavell**, may lead to failure in service which would not be covered by the warranty.

Any unauthorised modifications or failures to maintain this equipment is accordance with the manufacturer's maintenance instructions may make it unsafe. The use of replacement parts not supplied by or recommended by **Reavell** may create unsafe and hazardous conditions or result in damage to the equipment over which **Reavell** has no control. Such hazardous conditions may lead to accidents that can be life threatening, cause substantial bodily injury or result in damage to the equipment.

Reavell can bear no responsibility for equipment in which unapproved replacement parts are included.

Reavell

GENUINE PARTS

Use ***Synteck*** compressor lubricant.
Advantages:

- Longer life.
- Longer time between oil changes.
- Longer valve life.
- Can be used in new or old compressors.
- Reduces carbon build up.
- Reduces oil consumption.

Reavell

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