JABSCO

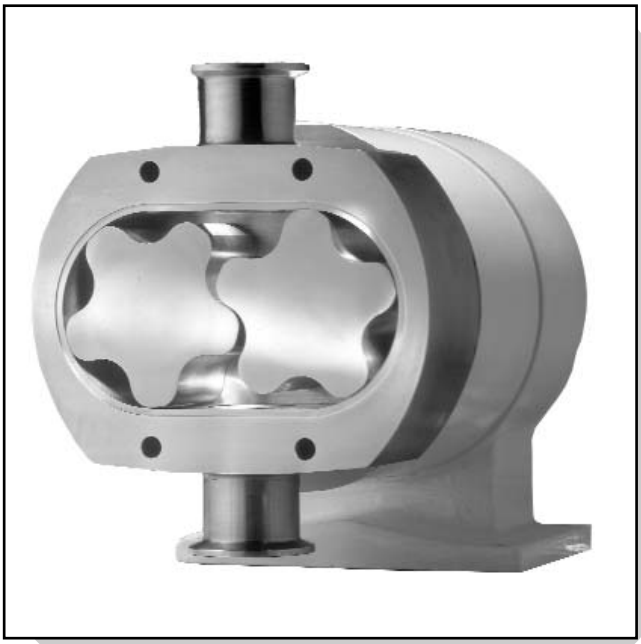
55 Series Lobe Pumps

09/03

Installation, Operating, Maintenance and Spares Manual

55 Series

Rotary Lobe Pump



Jabsco

ITT Industries

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Contents

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Installation Operating and Maintenance Manual

1. INTRODUCTION

55 Series are positive displacement rotary lobe pumps designed to pump delicate, viscous and particle-laden fluids as well as thin liquids which require an all stainless steel pump. The construction of 55 Series provides an exceptionally high standard of hygiene and cleanability.

It is essential that anyone who will install, operate, or be involved with this equipment shall read the whole of this manual **before installing the pump**, as it contains important safety information. **Failure to follow these instructions could result in damage to the pump or injury to yourself or other people.**

Adherence to the procedures and specifications outlined in the following chapters will assist in providing economical and reliable operation throughout the life of the pump.
If service or repair other than that described in this manual should become necessary, contact your supplier for assistance.

Any pump returned to the supplier for any reason must be fully cleaned and decontaminated and accompanied by details of what fluids have been pumped, including full Health and Safety information (MSDS sheets) if any of those fluids are hazardous.

All figures in brackets ( ) throughout this manual refer to the component key numbers used on the cross-sectional drawings and the spare parts lists.

1.01 SAFETY

Throughout this manual your attention is drawn to certain procedures which must be followed to ensure safe operation and servicing of this product.

⚠ **DO NOT** ignore safety instructions.

⚠ **DO NOT** remove, by-pass or tamper with safety devices.

⚠ **DO NOT** use this equipment if the end cover (40) is removed, guards are missing or inlet & outlet pipework is not connected.

⚠ **DO NOT** forget the hazards of moving parts, high fluid pressure, extremes of temperature, hazardous liquids, electricity. Always isolate and lock-out pump drive motor before inspecting or servicing pump.

1.02 PRINCIPLE OF OPERATION

55 Series pumps have 2 rotors which turn in opposite directions. Fluid enters the pump from the inlet port and fills the space between the rotors. This fluid is carried around the outside of the rotors and is forced out of the discharge port as the rotor lobes mesh together see Figure 1. Each rotor is supported on a shaft and when the pump is running within its operating limits, the rotors never touch the inside of the rotor case, or each other.

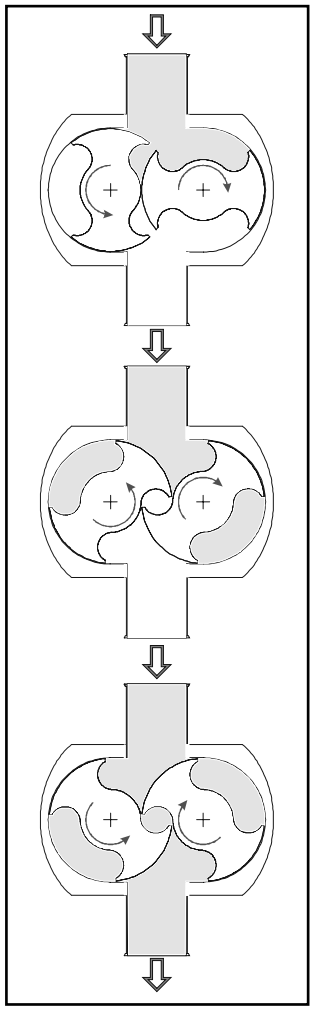


Figure 1
Principle of Operation

1.03 OPERATING CONDITIONS

55 Series pumps are designed using modern design techniques and manufactured from high quality materials. However, there are certain limitations to the operating conditions of the pump to ensure long life and trouble-free running. During pump selection and specification these limitations are taken into account and must not be exceeded.

Every pump is supplied with a Performance Data Sheet which gives details of these limitations. These are:-

Maximum **Pressure**
Maximum **Temperature**
Maximum **Viscosity**
Maximum **Particle Size**
Maximum **Speed**
Maximum Input Shaft **Torque**
Maximum Input Shaft **Radial Load**

These limitations and performance characteristics vary from one pump size to another, and from one pump specification to another within the same pump size.
Take particular care over the following:-

Materials: Ensure that <u>all</u> the fluids to be pumped, including cleaning and sterilizing agents, are compatible with the materials from which the pump is constructed.

See section 2.09 for details of shaft or seal types and section 2.10 for alternative seal materials, i.e. seal faces and elastomers.

55 Series pumps can be used for duties other than those for which each pump was originally selected but the new application must be checked against the Performance Data Sheet to ensure safe and reliable operation. Unless you have experience in the use of this Data Sheet, we strongly recommend that, if a change of duty is required, you contact the distributor who supplied the unit or the manufacturer. Change of duty means changing any of the parameters listed opposite.

1.04 MODEL NUMBERING SYSTEM

A metal plate is fixed to the pump showing model number and serial number.

The MODEL NUMBER gives important information about the specification of the pump, see Section 7 for details. It is important that the pump specification is established using Section 7 before any work is carried out on the pump or parts are ordered.

The SERIAL NUMBER is unique to each pump.

Both numbers should be quoted with all queries or orders for spares.

1.05 INSPECTION UPON RECEIPT

55 Series pumps are factory inspected and tested before packing and shipping, to ensure safe delivery and satisfactory service. We would, however, recommend that you carry out the following actions upon receipt of your lobe pump:-

a) Remove packing material from container and check contents against packing list. Look carefully for small parts and special tools included.

b) Check the pump for any physical damage sustained in shipping. If loss or damage is found, notify your carrier and supplier immediately.

c) Use lifting equipment as necessary when unpacking heavy items. See Performance Data Sheet for weights of bareshaft pumps. Drives and baseplates will increase weight above those shown.

2. INSTALLATION

Careful attention to correct installation of 55 Series lobe pumps, and recognition of certain limitations to the operating conditions of the pump, will ensure long life and trouble-free running.

⚠ **Failure to follow these instructions could result in personal injury or loss of life.** Take particular care over the following:-

2.01 OPERATING LIMITATIONS

PRIMING: 55 Series pumps are not truly self-priming and should be installed in a “flooded inlet” pipe arrangement i.e. with the pump lower than the level of liquid to be pumped and with the supply pipe falling continuously to the pump with no loops.

PRESSURE: Do not operate the pump above the maximum differential pressure shown on the Performance Data Sheet, not even for a few seconds, as damage to the pump components will result, leading to metal particles in the pumped fluid, ineffective cleaning and possibly complete pump seizure.

⚠ NEVER run the pump against a closed valve. Note that the pressure limit varies with temperature.

SOLIDS: 55 Series lobe pumps can handle soft solids in suspension but will be damaged by hard particles. Take care pumping solids, crystals, etc.

Never allow metal parts to enter pump, e.g. weld metal, screws, tools, etc. as these will stop the pump, leading to damaged rotors, rotorcase and shafts.

CAVITATION: The pumps cannot operate without sufficient pressure of liquid at the inlet port to supply the pump. Normally atmospheric pressure is sufficient but the actual pressure needed (Nett Inlet Pressure Required or NIPR), is higher for:-

High Viscosities
High Temperature
High Pump Speeds
Volatile Liquids

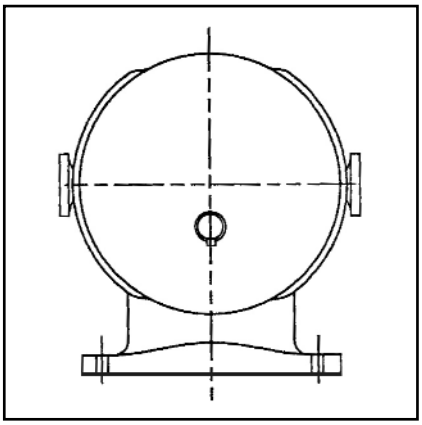
Insufficient inlet pressure will cause the pump to cavitate leading to low performance, noise and short pump life. Ensure inlet pipes are short, large bore and do not collapse under vacuum. Refer to Performance Data Sheet for Nett Inlet Pressure Required (NIPR) charts. If in doubt consult your supplier before operating the pump.

2.02 LOCATION & POSITIONING

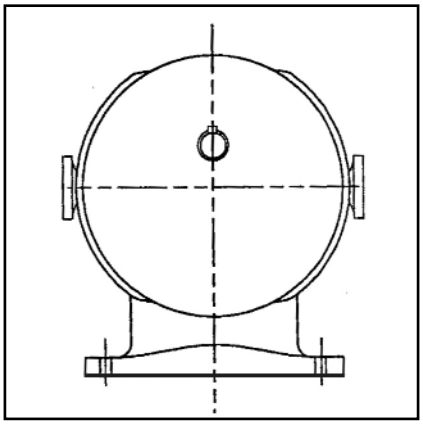
Pump should be located:

- As close as possible to the fluid source and as low as possible to maximize the nett inlet pressure available to the pump.
- In a clear area allowing access all around pump and drive for easy servicing.
- With space above for lifting equipment if required.
- With port axis vertical if pump is required to be self draining.

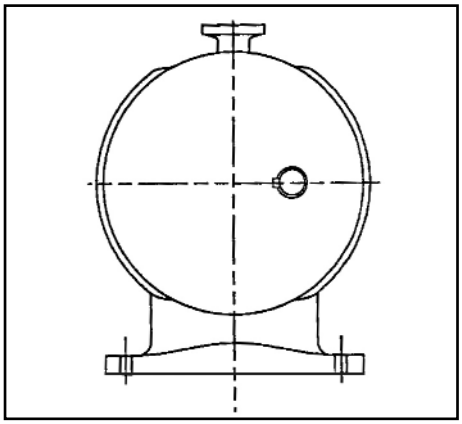
Figure 2



Horizontal Pipe Orientation, low shaft drive position



Horizontal Pipe Orientation, high drive shaft position



Vertical pipe orientation

All 55 Series pumps are equally suitable for both directions of rotation.

55 Series lobe pumps can be rotated to give vertical or horizontal port orientation with high/low or right input shaft positions. This is achieved by re-positioning the gear cover/foot (26). (see Figure 2)

To change any pump from vertical to horizontal pipework or vice versa, re-position the bearing carrier in the gear housing as follows :-

Remove key (19) from the drive shaft end. Remove the 4 bolts (14) from the gear housing (22) and slide the housing off of the shaft end, being careful not to damage the inside of the lip seal on the edges of the keyway in the shaft. Press out the relevent lip seal (18) and plug and re-fit into new positions.

Rotate the bearing carrier (24) to the desired position and re-fit. It is wise to fit new sealing washers (36) to the heads of the bolts before re-fitting.

2.03 DRIVES

55 Series lobe pumps can be supplied in bareshaft form i.e. without a drive motor. Drives must be selected and supplied to suit each individual application.
The prime mover will most likely be an electric motor but hydraulic or air motors may also be suitable.

Pay attention to special motor requirements.
e.g. Explosion/flame proof
Hose proof/splash proof
High ambient temperature
Frequent stop/starts
Materials of construction

Provision of a variable motor speed (e.g. by frequency inverter), is always recommended to enable flow to be accurately set, to accommodate changes in fluid viscosity, temperature or required flow rate, or to run pump faster for cleaning. Variable speed motors must selected to accommodate the full power and torque requirements throughout the operating speed range.

Transmission to the pump shaft will normally be by one of the following:

a) **Direct Coupling:** If synchronous motor speeds can be matched to the required pump speed, the drive can be via a proprietary flexible shaft coupling. A torque limiting coupling can protect the pump against overload.

In all cases the coupling manufacturer's limits should be adhered to. See Performance Data Sheet to calculate torque. Pump and motor shafts should be accurately aligned in accordance with the coupling manufacturer's instructions.

b) **Reduction Gearbox:** For pump speeds lower than synchronous motor speeds, a proprietary gearbox or geared motor may be fitted. Variable ratio units are available to allow pump speed to be adjusted. Coupling to the pump will be as in (a) above.

⚠ Maximum shaft radial load stated on Performance Data Sheet must not be exceeded.

2.04 BASEPLATE

The pump and drive will normally be mounted on a common baseplate or frame which must be strong and rigid enough to withstand the drive reaction forces as well as to support the equipment without vibration. Ensure base is level - distortion could affect coupling alignment. Always check pump to drive alignment after installation and before starting pump. For maximum hygiene the pump feet should be sealed to the base.

2.05 GUARDS AND SAFETY

All moving parts must be guarded. Local safety regulations and codes of practice will specify the minimum acceptable standard but as a guide:

- Couplings, belts and pulleys must be enclosed to prevent fingers, clothing or tools from touching moving parts.
- Guards must be made from corrosion resistant materials.
- Guards in hazardous areas must be made from non -sparking material.
- Guards must be securely fixed.
- Pump must not be operated with guards removed.

2.06 ELECTRICAL

Electricity can cause injury or death - follow good practice and local regulations. In particular: -

⚠ Connect electric motor in accordance with the manufacturer's recommendations.

⚠ All electrical work must be carried out by competent personnel to local safety regulations and codes of practice.

⚠ Take special note of requirements of the area, e.g. hose-down, high humidity, explosion proof, etc.

⚠ Provide facility to isolate motor during maintenance, service and cleaning of pump.

⚠ Ensure motor rating plate corresponds to supply.

⚠ Ensure rating of motor and controls are adequate for duty, especially if application details have changed from original specification.

⚠ Allow for exceptional circumstances, e.g. cold start-up.

⚠ Provide adequate motor overload protection.

2.07 PIPEWORK

Pipe runs and sizes should be established at the time the pump is selected. When installing pump do not deviate from this design without rechecking pump selection:-

- Keep pipe runs short and pipe diameters large; pipes may need to be larger diameter than pump ports especially when pumping viscous liquids.
- Inlet pipe must be as short as possible and as large bore as possible to prevent cavitation.
- Use large radius bends and full bore valves. Avoids globe or needle valves on viscous fluids.
- Fit isolation valves each side of the pump to simplify maintenance.
- Fit vacuum/pressure gauges each side of pump to monitor pressure conditions. Once process is established (and will not change), these can be removed.
- Avoid filters on the inlet side of pump if possible. A clogged filter will cause cavitation. A strainer - maximum hole size 50 microns - will help to protect pump from damage by particles but must be kept clear.

⚠ It is advisable to fit a temporary inlet strainer during system commissioning in order to avoid pump damage by welding particles or other foreign bodies. Remove strainer once system has been cleaned.

- Support pipework - do not allow weight of pipe (and the fluid within) to be taken on pump ports.
- Fit expansion joints if necessary to prevent thermal expansion forces being transmitted to pump.
- Ensure all pipe joints are adequately sealed to be a) Air-tight under vacuum b) Liquid tight under pressure and c) Steam tight where applicable.
- Take special precautions when pumping hazardous, hot, toxic or bacteriological fluids - special joints (e.g. aseptic) and high specification seals may be required.
- Use hot water/steam jackets or electrical resistance tape to heat pipes carrying liquids which thicken when cool. Provide an interlock to prevent pump from running unless liquid in pipes is at correct temperature to avoid over pressure, cavitation. or excessive drive shaft loads.

2.08 TEMPERATURE-CONTROL JACKETS

Pumps are available with an optional jacketed end cover**.** These allow hot or chilled water, hot oil or steam to be piped to the pump to maintain product temperature in the pump or to heat the pump prior to starting.

Application limits are:

Jacket Pressure:	2 bar (30 psi).
Temperature:	130ºC (265ºF).

2.09 SEALS AND FLUSHING

Two basic types of mechanical face shaft seal are available on the 55 Series pumps. The correct type should have been selected when the pump was originally selected but you must establish that the seal fitted is suitable for the application before starting pump. (See Section 7 to identify seal type by pump model number).
Provide flushing system as required.

The **single mechanical seal** is suitable for many clean fluids which do not require a more sophisticated seal type. (See Figure 3).

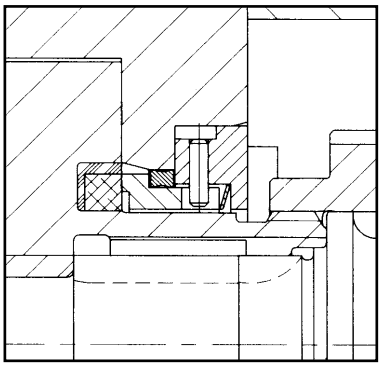


Figure 3
Single
Mechanical
Seal

Note that code 2, silicon carbide-on-silicon carbide, seals are not recommended for steam-purged applications as the seal faces can bind together - see Cleaning and Sterilizing.

Pumps fitted with single seals require no special installation but pumps must never be run completely dry for more than 30 seconds, as this will cause excessive heating of the seal faces. Use flushed seals in pumps that need to run dry.

The **double mechanical seals** fitted to the 55 Series provide the facility to contain a high pressure fluid behind the primary seal. This allows the pump to be used for applications where the single seal is unsuitable. Double seals Codes 1 and 4 are run with a fluid between the primary and secondary mechanical seals to form a barrier between the pump and the atmosphere.

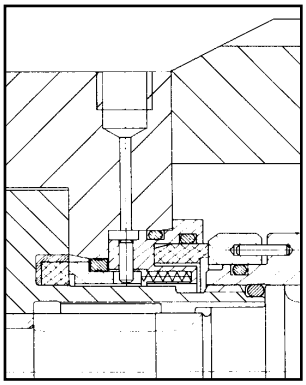


Figure 4: Double Mechanical Seal

Double Mechanical Seal with a low pressure liquid flush when:

- The pumped fluid is toxic or hazardous and must not escape from pump even in minute quantities.
- Pumped fluid changes state in contact with air, e.g. crystallises, forms a film, dries out or precipitates solids. The flush dissolves and rinses away the small amount of reside which could build up on the edges of the seal faces.
- Pumped fluid is close to it's boiling point, e.g. water over 80°C (175°F). The flushing fluid is used to cool the seal faces.
- Pumped fluid is temperature sensitive and degrades when heated by the shearing action of the seal faces. The flushing fluid is used to cool the seal faces.
- Pump must run 'dry', i.e. no liquid in pump chamber.
- Pump is under high vacuum.
- A low pressure sterile barrier is required

The system can be installed as in Figure 5a but must be capable of withstanding the full pressure within the pumped fluid pipe system.

- Liquid must be compatible with the pumped fluid; water is the most commonly used liquid.
- Pressure shall typically be 0.5 bar (7 psi) gauge. Maximum of 1.0 bar (14.5 psi) gauge.
- Temperature shall be maximum of 70°C (160°F) for water, less for volatile liquids (maximum 20°C (68°F) below boiling point of liquid).
- Flow rate shall preferably be 2 to 3 litres/min. (0.5 to 0.75 US gal/min per seal.
- Flush fluid should be connected to flow in at the lowest point on the seal housing and out at the highest point to vent air pockets.

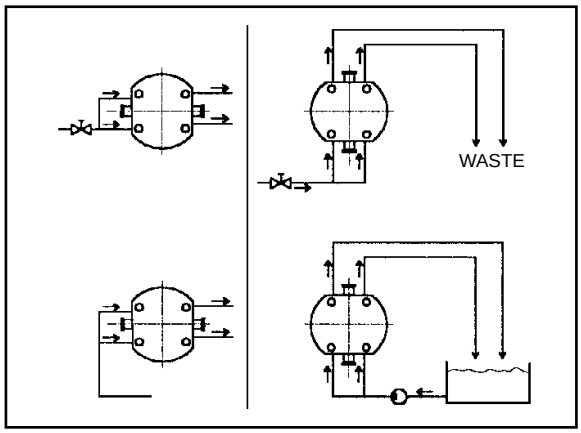


Figure 5a: Suggested Low Pressure Flushing System

Double Mechanical Seal with a high pressure liquid flush when:

- The pumped fluid has no lubricating properties and cannot be allowed onto seal faces
- Pumped fluid is highly viscous, i.e. over 150,000 cps.
- A high pressure sterile liquid barrier is required.

When the double seal is used with a high-pressure liquid flush for the reasons described above, a flushing system must be installed as follows:

- The flushing liquid used must itself be compatible with the pumped fluid and must itself not require a complex seal, i.e. must be non hazardous, non abrasive and lubricating.
- Flush liquid must be at a pressure of 1 bar (15psi) above the discharge pressure of the Jabsco lobe pump and should flow at 35 to 55 litres/hour (10 to 15 US gal/hour) per seal.
- Flush fluid should be connected to flow in at the lowest point on the seal housing and out at the highest point to vent air pockets.

See drawing for suggested liquid flush system (see figure 5b).

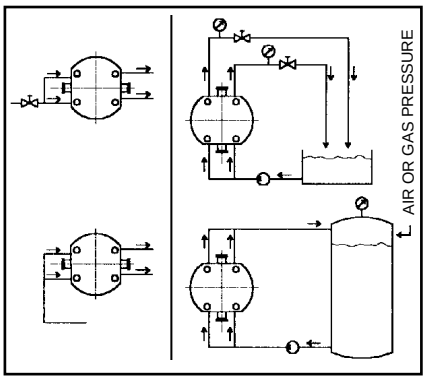


Figure 5b: High Pressure Liquid Supply System for Double Seals

Double Mechanical Seal with steam when:

No bacteria or contamination can be allowed to enter pump, i.e. an aseptic system. A steam barrier system must be installed as follows:

- Wherever possible, sterile liquid e.g. steam condensate should be used as a flush. Condensate should be connected to flow in at the lowest point on the seal housing and out at the highest point to vent air pockets.
- Where steam is essential, great care must be taken with the design of pipework, steam traps and controls.
- Steam must be clean, filtered and wet, i.e. not superheated.
- The pressure of steam should be as low as possible consistent with the desired temperature
- Steam should be connected in at the highest point on the seal housing and out at the lowest point to allow any condensate to drain from the lowest point
- See figure 6 for suggested steam connection.

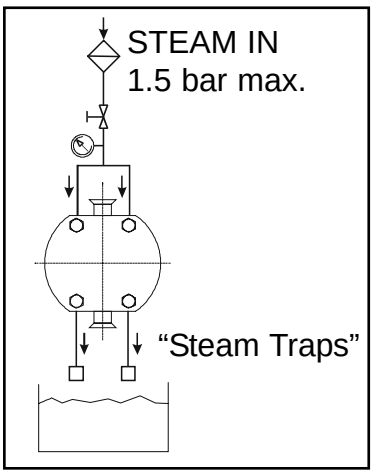


Figure 6: Steam Barrier Flush System For Double Mechanical Seal

⚠ Silicon carbide on silicon carbide seals are not recommended for steam flushed applications.

2.10 MECHANICAL SEAL MATERIALS

SEAL FACES

All primary seals are available with carbon-on-silicone carbide faces (Codes 3 or 4) for non abrasive fluids and silicon carbide-on-silicon carbide faces (Codes 1 or 2) for abrasive fluids containing crystals, powders or particles or when no particles of wear can be allowed to enter the pumped fluid.
Silicon carbide-on-silicon carbide (Code 1 or 2) seals are not recommended for steam flushed applications.
All secondary double mechanical seals (Codes 1 or 4) are with carbon on silicon carbide faces.

ELASTOMERS

Product contacting primary elastomers must be selected to be compatible with the product and the process operation. Consideration must be given to chemical compatibility, temperatures and material standards. 55 Series are available with a selection of elastomers, see below.

EPDM- FDA grade
Viton®- FDA grade
PTFE/Kalrez®

Consult supplier for more information.

2.11 END COVER BARRIER (CODE 5)

55 Series pumps may also be fitted with an end cover to accommodate a barrier of sterile liquid or steam. This offers additional security when no bacteria or contamination can be allowed to enter pump, i.e. an aseptic system. (see Figure 7)

Liquid Barriers: The flushing liquid used must itself be compatible with the pumped fluid. Fluid should be connected to flow in at the lowest point on endcover and out at the highest point to vent air pockets. Barrier fluid maximum pressure for the end cover is 2 bar. (See Figure 8).

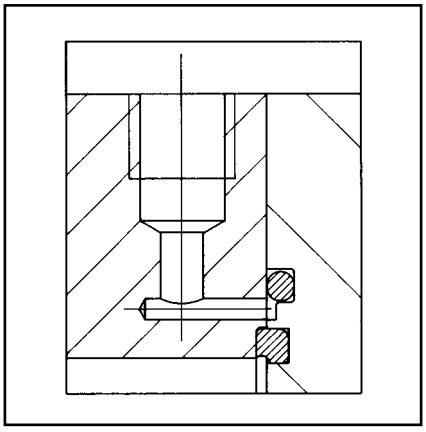


Figure 7: 55 Series Barrier End Cover

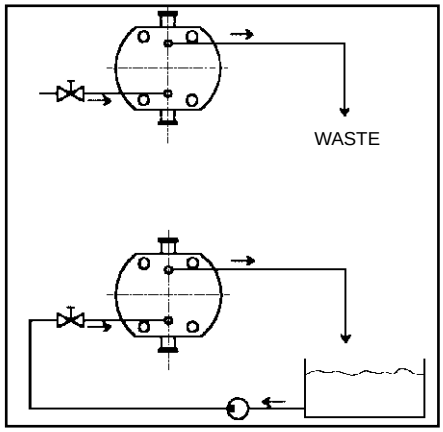


Figure 8 : Liquid Barrier System for Barrier End Cover

Steam Barriers: The pressure of steam should be as low as possible consistent with the desired temperature. Steam should be connected in at the highest point on the end cover and out at the lowest point to allow any condensate to drain from the lowest point. (See Figure 6).

2.12 OVERLOAD PROTECTION

To prevent injury to personnel or damage to pump or system caused by excessive pressures, a protection device should be fitted such as:-

a) Pressure switch or sensor wired to stop the drive motor. Ideally, the motor should be fitted with a brake.

b) Pressure relief valve or bursting disc fitted downstream of the pump and piped to direct excess fluid away safely.

c) Torque limiting coupling between drive and pump shaft.

d) Motor current sensor.

Note: The level of protection provided by methods a) and b) above is superior to that provided by methods c) and d) which can be difficult to set accurately, especially when pumping viscous fluids.

Protection devices must be set to operate at, or below, the safe operating pressure of the pump or of the system, whichever is the lower. (See performance data sheet). Note that maximum pressure varies with temperature.

3. LUBRICATION

55 Series lobe pumps are supplied fully lubricated. The shaft bearings are greased for life and the timing gears are oil lubricated.

- Before running pump for the first time check oil level as Figure 9.

- After the first 120 hours of operation, drain oil from lower plug hole and refill with fresh oil as Figure 9. Use correct grade of oil as below or other reputable manufacturer's equivalent gear oil:

Shell : Vitrea 220
BP : Energol CS220
Castrol : Magna 220

See performance Data Sheet for oil capacity.

- Oil should be changed as above after every 12 months or 2,500 hours running.

- When pumping hot liquids or when bearing carrier temperature exceeds 80°C during operations, use a high temperature oil and change oil every 6 months or 1,000 hours running.

- Bearing grease should be changed when the shafts are removed for inspection or repair. Use correct grade of grease as below or other manufacturer's equivalent bearing grease.

Castrol : Spheerol EPL 2

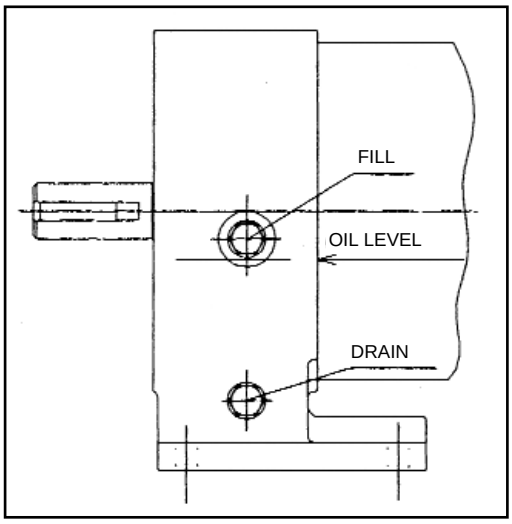


Figure 9

4. START UP & ROUTINE CHECKS

4.01 START UP

Before starting pump for the first time or after servicing or maintenance work, check the following - failure to do so could damage equipment or cause injury to personnel.

- All pump head and mounting bolts are tight.
- All pipe connections are secure.
- All guards, safety and protection devices, are in place and effective.
- Flushing fluid, if required, is flowing - see Section 2.09.
- All valves are open - **NEVER** run pump against a closed valve.
- Pipes and pump head, if heated, are to normal operating temperature.
- Pump and pipes are clear of welding flash or other debris.

⚠ **NEVER** use 55 Series pumps to flush the system the first time. Flush the whole system with suitable cleaning agents before starting the 55 Series pump, using another more suitable pump if necessary. Be aware that heavy or metal debris tends to collect at the lowest point in the system.

- Pump is correctly lubricated - see Section 3.
- Motor is wired for correct direction of rotation - see Figure 10.

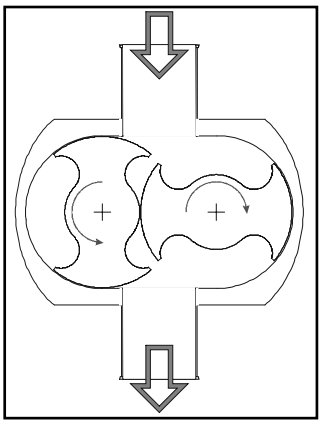


Figure 10. Direction of rotation - viewed from pump head. (Principles applies to all mounting orientations)

DIRECTION OF FLOW				
	VIEWED FROM PUMP HEAD END		VIEWED FROM DRIVE SHAFT END	
DIRECTION OF DRIVE SHAFT	Clockwise	Counter Clockwise	Clockwise	Counter Clockwise
Horizontal Ports Top Shaft Drive	Left to Right	Right to Left	Left to Right	Right to Left
Horizontal Ports Bottom Shaft Drive	Right to Left	Left to Right	Right to Left	Left to Right
Vertical Ports	Bottom to Top (up)	Top to Bottom (down)	Top to Bottom (down)	Bottom to Top (up)

When possible, start pump slowly and increase speed gradually.

- Listen for unexpected noises.
- Check for leaks.
- Check that pump gives desired flow rate at normal operating speed.
- Do not continue to run pump if fluid is not flowing; dry running can damage seals - see Section 2.09.
- Observe pump during first few hours of operation - check for noises and excessive heating of pump bearing housing, i.e. if above 80°C (176°F), unless pumping hot liquids when 110°C (230°F) may be reached.
- If operating at high speeds or with hot liquids, surface temperatures can exceed 50°C (122°F), safety labels may be required to comply with local safety regulations.

⚠ All pumps and equipment surfaces which become hot, i.e. above 60°C (140°F), during operation should carry warning labels.

4.02 DAILY CHECKS

- Visual checks of all joints for signs of leakage of product, flushing liquid (if used) and oil or grease from the gearbox.
- Listen and look for any unusual noises, vibration or temperature change.
- If minor problems are identified these should be rectified at the end of the shift and if major they should be attended to at once.

4.03 WEEKLY CHECKS

- As Daily Checks.
- Remove end cover of pump and inspect for signs of damage or wear. Repair or replace as necessary.
- Check lubrication level and top up as necessary. This must be done with the pump stopped.
- Check lubrication level on drive unit and top up as necessary. Follow the manufacturer's instructions.

4.04 MONTHLY CHECKS

- As Weekly Checks.
- Remove end cover and rotors and inspect seal faces for wear and condition of elastomers. Replace as necessary or note for planned maintenance.

4.05 SIX MONTHLY CHECKS

- As Monthly Checks.
- Change end cover gasket.

4.06 ANNUAL CHECKS

- Possible change mechanical seals if fitted.
- Change all L-cups, O-rings and/or gaskets on pump head.
- Inspect gearbox oil seals and gear housing O-ring for signs of leakage and replace as necessary.
- Check bearing wear by seeing if there is any movement of the shaft side to side or forwards and backwards. If movement is perceived remove gear cover and dismantle bearings for inspection, replace if necessary.

- Drain and change oil in pump gearbox.

By ensuring a visual inspection daily and regular checks at planned intervals, pumps can be maintained to maximum performance for many years.

5. CLEANING & STERILIZATION

55 Series pumps are designed for use with products that require the process equipment and pumps to be cleaned. The standard (level) of cleaning or sanitization required depends on the needs of the process and product. This information is provided for guidance only. It is the responsibility of the pump user to satisfy him/herself that the cleaning protocol chosen is adequate to achieve the desired levels of cleanliness and Jabsco cannot accept any responsibility for contamination or loss.

In order to clean the pump it must either be dismantled (manual cleaning), or cleaned in place (CIP) as part of the procedure for cleaning the entire process. The higher the standard required, the more sophisticated the cleaning process.

5.01 CLEANING IN PLACE (CIP) AND MANUAL OR STRIP CLEANING

Cleaning Systems

The type of cleaning system used depends partly on the level of cleaning required but also on what is to be removed. Organic materials such as oils, fats, proteins need a different system to inorganic materials such as mineral salts. Detergent manufacturers can give advice on the correct use of chemicals and temperature. CIP usually needs a velocity of 1.5 m/sec (5 ft/sec) through the pipeline to achieve the turbulent flow required.

Procedure For Cleaning In Place (CIP)

Each pump is supplied in a generally clean condition but it is the responsibility of the user to establish suitable cleaning and sterilizing regimes appropriate to the fluid and process. These should be implemented before the pump is first used and as often as require thereafter. The following guidelines will help with effective cleaning of 55 Series pumps and minimise risk of damage to the pump.

1. Rinse through system with a suitable liquid, usually water at approximately 50°C (120°F), as soon as possible after completion of process to remove bulk of residues before they dry onto surfaces.
2. If CIP will not be carried out immediately after rinsing, leave pump and system full of rinse liquid.
3. Choose chemical cleaning agents to suit the nature of the contamination to be removed and use them in accordance with manufacturer's recommended dilution, temperature and circulation time but do not exceed 90°C (195°F). Confirm compatibility with pump materials of construction.
4. CIP fluid flow should result in a mean pipeline velocity of at least 1.5 m/sec. (5 ft/sec).

The table below gives a guide to the required flow rates.

Model	Port Size	Flow l/min
55210	½" (12mm)	7
55320	¾" (19mm)	18
55420	1" (25mm)	35

If using the lobe pump to circulate the CIP fluid, refer to the Performance Data Sheet for pump speed to give required flow, taking account of pressure losses through pipework. Note that all pumps are more susceptible to cavitation when pumping hot liquids. Ensure adequate Net Inlet Pressure available.

If using a separate pump to circulate CIP fluids, the lobe pump may need to be rotated at a speed sufficiently high to allow the fluid to pass freely through. If sufficient pipe velocity cannot be achieved, fit a by-pass loop to divert excess flow past the pump.

CIP fluid pressures must equal or exceed process pressure at all points in the system to ensure fluid reaches all contact surfaces. It may be necessary to restrict flow in discharge pipework to achieve this but do not exceed differential pressure and temperatures shown on pump Performance Data Sheet. A minimum differential pressure of 1 bar is recommended for effective cleaning.

5. After CIP, rinse through with neutralisers and clean water to remove all traces of cleaning agents.

⚠ Do not pass cold liquid through pump immediately after hot - allow temperature to change slowly. Failure to observe can result in pump seizure.

Procedure for Manual Cleaning

See elsewhere in this manual for procedures to dismantle and re-assemble fluid contact parts.

⚠ Take care not to scratch or damage pump parts. One part of the seal face remains in the rotor when it is removed. Be extremely careful not to damage this seal face.

Do not use steel abrasive wool or brushes on fluid wetted surfaces as particles may become embedded in the surface and cause corrosion.

Use suitable cleaning agents in accordance with their manufacturer's instructions regarding temperatures, dilutions, skin contact precautions and other safety information. Thoroughly clean all fluid contact surfaces and rinse as required.

As a minimum it will be necessary to remove the end cover and rotors. Re-assemble pump in accordance with this manual.

5.02. STERILIZING IN PLACE

It is possible to pass steam through the complete assembled system to sterilize the internal surfaces without dismantling the pump.

To achieve 100% sterility, it is important to steam through for a period long enough for the coldest part of the system to reach the correct temperature and hold for the time period required to kill off the organisms.

Procedure for Sterilizing In Place (SIP)

If using chemical sanitizers, follow guidelines as for CIP above. If using steam, pump specification must be chosen at time of selection noting:

- EPDM elastomers offer best resistance to repeated steam contact but will need to be changed periodically.
- PTFE (Teflon®) is least suitable for steam contact - PTFE end cover joints may need to be replaced every time the pump is sterilized.

Pump should be mounted with the port axis vertical to avoid collecting liquid pools.

1. Thoroughly clean pump and process lines prior to sterilization.

2. If pump is fitted with sterile barriers (on seals, end cover) for the purpose of maintaining sterility, barrier fluid must be connected throughout SIP cycle to avoid re-infection.

3. Pass clean, wet steam through system until all component temperatures have stabilised. Steam must be free of scale, rust and particles - a filter may be necessary. Typically steam will be at 121°C (250°F) and 1 bar (15 psi). Soak time, to bring the pump up to temperature, is typically 20 minutes but this should be established, e.g. using thermocouples, as the required soak time will vary with individual installations.

⚠ Do not rotate the lobe pump during this heating phase.

⚠ Do not loosen or remove any pump components or pipe connections during steam sterilisation as escaping steam may cause serious injury.

4. Continue to pass wet steam through the lobe pump and process lines during the hold time. Hold time will be determined by the user to achieve desired level sterility. Typically this will be between 20 and 60 minutes.

   The lobe pump should not be rotated during this hold time unless absolutely essential to achieve sterility, due to increased risk of pump seizure. All pump components will normally reach desired temperature by thermal conduction without rotating the pump.

   If essential, the lobe pump can be rotated by hand during hold time - beware of danger of hot surfaces - or at a maximum of 50 rpm but only if the pump is fitted with either:
   Single carbon/silicon carbide seals (Code 3) or double seals (codes 1 or 4) provided a liquid flush, e.g. condensate, is connected and operating at a pressure above the steam pressure within the pump during SIP.

⚠ If the lobe pump is fitted with single silicon carbide/silicon carbide seals (Code 2) it **must not** be rotated during hold time as the seal faces can bind together.

5. At the end of hold time, pump must be allowed to cool naturally or can be purged with sterile air/inert gas.

⚠ Pump must not be rotated during cooling.

6. Do not allow cool liquid to enter the lobe pump before pump temperature has fallen to 60°C (140°F) or lower.

If the pump is fitted with silicon carbide/silicon carbide seals (Code 1 or 2), flood it with liquid to lubricate the seals before rotating it.

6. INSPECTION AND REPAIR

55 Series pumps need no adjustment during normal operation. It is advisable though to check oil levels and inspect pump head components (especially seals and joints) periodically so that they may be cleaned or replaced before they fail in service.

All primary fluid contact components of the pump can be inspected and serviced without removing the pump rotor case from the bearing carrier and without removing either the pump or drive unit from the baseplate, as follows:-

⚠ **For your safety:**
Before commencing any repair or inspection, isolate power to pump and drive motor. Depressurise, drain and isolate pipework, seal flush and temperature control jackets (if fitted).

6.01 END COVER
(see Figure 10 and 11)

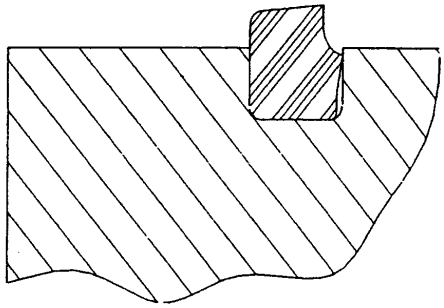


Figure 10

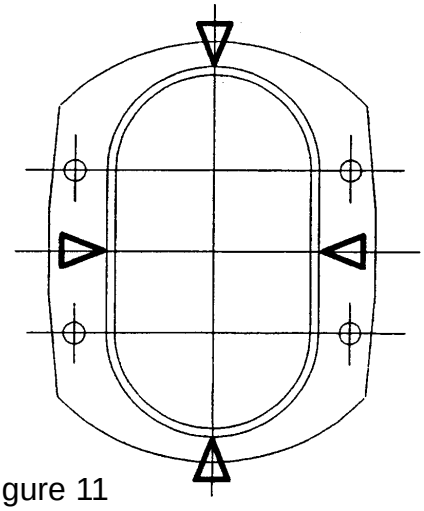


Figure 11

Removal

Before removing the end cover (65), ensure the pump & drive are isolated, the pump is cool enough to safely touch, drained of any fluids (take special care with hazardous fluids) and ensure that pump, seal flushing system and jackets are isolated and depressurised.

a) Remove bolts (68) and remove cover (65). If it is stuck tap carefully sideways with a soft hammer, do not lever off.

b) Do not damage face of cover or joint ring(s); place face upwards on a clean surface.

Re-fitting:-

a) 55 Series - Fit end cover joint ring (66) in end cover as Figure 10. Press in, in 4 places first, see Figure 11, then press in the rest to avoid forming loops.

b) To refit, reverse the procedure, ensuring the end cover is correctly located on rotor case by using the gasket to locate it before tightening screws to the correct torque. (See performance data sheet).

6.02 ROTORS

Removal

The rotors (40) are held in place by threaded retainers (28) behind the rotor case. To remove rotors proceed as follows:-

a) Remove end cover - see Section 6.01. Loosen two hexagon socket screws (29) in each rotor retainer by **HALF TURN ONLY**.

b) Lock the pump rotors with a soft spacer - a plastic block (92) is supplied for this purpose. Unscrew each rotor retainer (28) in turn, to push the rotors forwards, using the tool supplied (91) - see Figure 13.

c) When the retainers are free to turn, pull the rotors off their shafts, you may wish to mark or label the components. Factory-built pumps have the letters DS engraved on the sleeve of the Drive Shaft rotor.

d) Keep each rotor with its respective shaft to ensure correct mating of sealing faces on re-assembly - you may wish to mark or label the components at this stage.

e) Take care not to damage the rotors and especially the smooth face of the mechanical seal (56) which is pressed in the back. Do not attempt to remove the seat unless you intend to fit a new seal (56) or cup rubber (49).

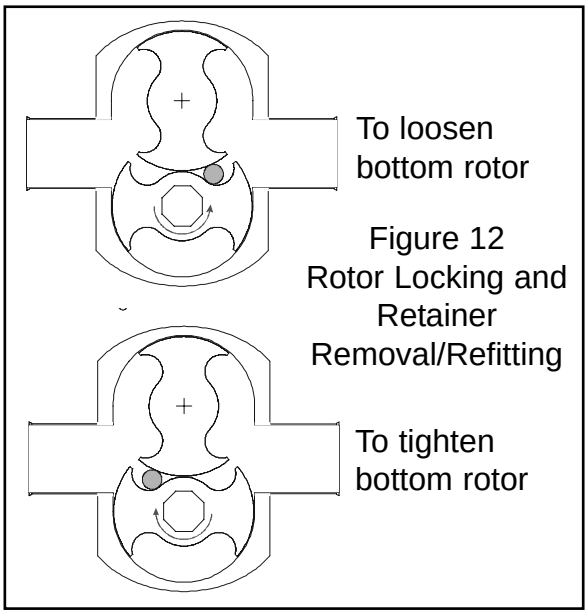


Figure 12
Rotor Locking and Retainer Removal/Refitting

Re-fitting:

a) With the seal and cup rubber correctly fitted within the back of the rotor, clean and dry the seal faces with a soft tissue before re-fitting. Do not lubricate seal faces.

b) Slide the rotor assemblies into their respective shafts. When fitting each rotor it should slide freely on its drive key.

c) Engage the thread on the end of the rotor sleeve with the rotor retainer, then rotate the retainer to draw the rotor into the rotor case.

d) Tighten each retainer using the plastic block to lock the pump. Do not hit the tool handle with another tool - hand tight is sufficient. Tighten the two hexagon screws in each rotor retainer to prevent it from loosening (See Figure 13).

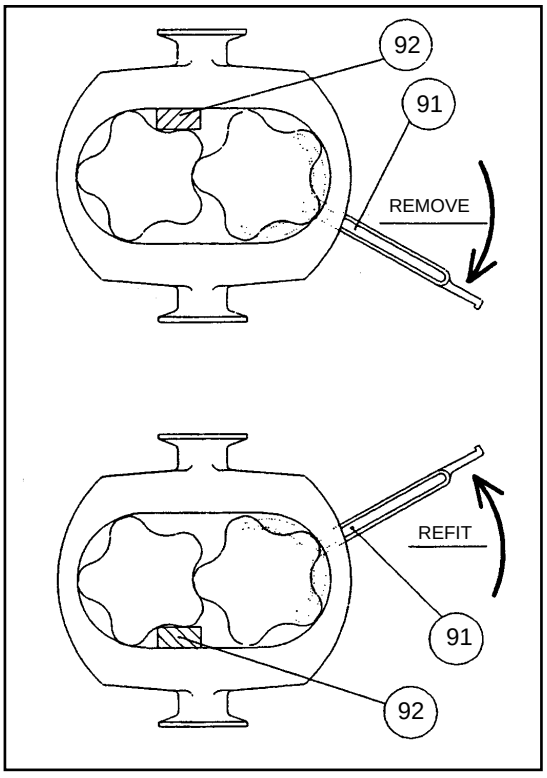


Figure 13

6.03 MECHANICAL SHAFT SEALS – SINGLE SEAL & PRIMARY SEAL OF A DOUBLE SEAL

When the rotors have been removed (see Section 6.02) the primary seals can be inspected for wear, cracks, chips, scratches or signs of burning caused by running dry.

Inspect rubber joints for damage or deterioration. Clean the seal faces with soft lint-free tissue before re-assembly.

It is advisable to purchase and fit new elastomer trim kits from your local distributor, when removing and re-fitting seal faces. As a precaution it is also advisable to have a spare set of seal faces available as these parts are very brittle and are easily broken.

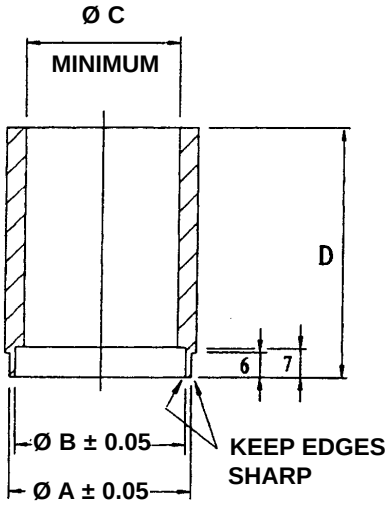
To dismantle mechanical seals:

a) Carefully remove the static seal seats (56) from their bores in the rotor case (38). Take great care not to scratch or damage the smooth face of the seal. Keep each seal with its respective shaft to ensure correct mating of the seal faces on re-assembly.

b) The joint ring (50) may come out with the seal face. If not, then remove it from the rotorcase bore and keep it together with the seal face. You may wish to label the components. The 55210 size pump has a wave spring which can also be removed at this time.

c) Only remove the rotary seal seat (56) from the back of the rotor (40) if you intend to fit a new seal or cup rubber (49).

d) Make up or purchase a sleeve (90) as Figure 14. Press ring down onto cup rubber to force out seat. Do not try to prise out the seat with screwdrivers or similar tools. **Seat materials are brittle.** If seal seat is to be fitted later, note which way up it was fitted - seats are not reversible.



DIM	55210	55320	55420
A	31.85	42.85	48.85
B	29.1	40.1	46.1
C	20	31	37
D	40	60	60

Figure 14

To Re-assemble Mechanical Seals:

Note: if refitting previously used seal faces ensure that rotary and static faces are in their original pairs.

⚠ Fit the seal face with the narrow face track into the rotorcase. The seal face with the wide face track should be fitted into the rotor.

a) 55210 pump - insert wave springs (55) into housings. 55320 and 55420 pumps - check that coil springs (54) are in place in housings. Fit joint ring (50) to seal face and lubricate bore in rotor case with a suitable lubricant compatable with the pumped fluid and process. Do not use mineral-oil based lubricants on EP rubber joints; silicone grease is suitable. Align one slot with pin in rotor case and push in seal face; seals should slide freely against their springs.

b) To fit seat to rotor, first fit a new cup rubber to rotor (See Figure 15). Ensure seat is fitted the correct way round, i.e. with smooth working face exposed.

Note: The back, i.e. non-working face is identified by a groove or white mark. Lubricate outside diameter of seat with a suitable lubricant (see above) and press seat evenly into cup rubber. Do not damage seat face. When correctly fitted, seat is flush with back face of rotor and must not be tilted. Any ‘run out’ of seat will cause seal leakage. Seal assembly is now complete.

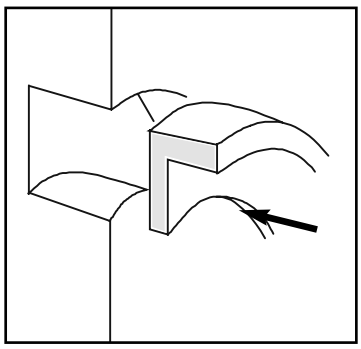


Figure 15 Cup Rubber Insertion in Rotor

Note: if the rotorcase has been removed (see section 6.06), static seal seats should be inserted into the rotorcase, before mounting the rotorcase onto the bearing housing.

Carefully clean all seal faces with a soft lint-free cloth and to remove all dust and grease. It may be necessary to use a compatible solvent to remove oil or grease.

6.04 SHAFT SEALS - DOUBLE MECHANICAL

(See section 6.03 for servicing of primary (product) seal face.)

Pumps fitted with double seals have secondary seals in order to retain a flushing or barrier fluid. To service primary seals see section 6.03. To service secondary seals it is necessary to remove the rotor case - see Section 6.06-Then proceed as follows:

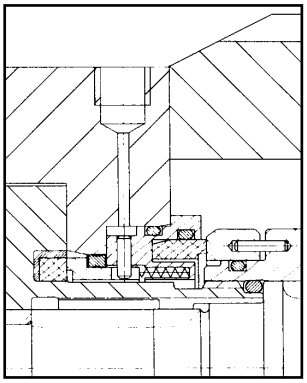


Figure 16
Double
Mechanical
Seal

Removal:

a) Remove 6 screws (47) and clamp (48) from back of rotor case and withdraw seal housings (45).

b) Remove static faces (57) from housings (45). This can be done by inserting a small pin through the holes in the housing and pushing on the rear of the seal face.

c) If fitting new O-rings (51) prise them out of the housing (45).

d) Pull rotary seats (57) off of rotor retainers. Take care not to scratch or damage the smooth faces of the seals. Keep each seal with its respective shaft to ensure correct mating of seal faces on re-assembly - you may wish to label the components at this stage.

e) If fitting new O-Rings (46) prise them out of the groove in the rotor retainer (28).

Re-assembly:

a) To re-assemble, place O- Ring (51) in double seal housing (45), lubricate outside of static seat with a suitable lubricant compatible with the barrier fluid. Align holes in seal face with pins in seal housing (see figure 16) and push seat fully in.

b) Fit O ring (46) to rotor retainer (28). Gently push seal seat squarely on to rotor retainer, aligning hole in rear of seal face with pin on the support ring. Ensure that the face is free to move against the springs.

c) Clean seal faces with soft lint-free tissue to remove any grease or dust - do not lubricate. Refit rotor case taking care that shafts do not damage secondary seal faces. (See section 6.06)

6.05 SEAL HOUSINGS

It is not normally necessary to remove the seal housings (45) from the back of the rotor case except to check condition of springs (54). If required to do so, proceed as follows:

Note: Seal housings vary for single & double seals (See section 2.10).

Removal:

a) Remove end cover (see section 6.01), rotors (see 6.02), rotorcase (see 6.06).

b) Position rotorcase (38) face down on a clean smooth surface, seal housings (45) uppermost. Taking care not to damage the front of the rotorcase.

c) Loosen screws (47) and remove clamp plates (48). Carefully withdraw the seal housings.

d) If double seals are fitted remove static seal seats (57) from the housings (45), keeping mating seal faces together. You may wish to label the components.

e) Inspect components for wear, replace as required.

Re-fitting:

a) **Single Seal** - Insert seal housing (45) into rotor case (38). Re-fit clamp plates (48) and tighten screws (47).

6.06 ROTOR CASE

Disconnect process pipes and any flush/barrier connections, first ensuring fluid is not under pressure. The rotor case can be removed after withdrawing the end cover (see section 6.01), the rotors (see section 6.02) and the two hexagon socket screws (37) holding the rotor case (38) to the bearing carrier (24). Note that the rotor case is dowelled and can only be re-fitted one way round.

If primary or secondary static seal seats are still fitted to the rotorcase take care not to damage them on the shaft ends (16 & 17).

To re-fit, reverse the above procedure. Torque the two hexagon head socket screws (37) to the correct setting. (see Performance Data Sheet).

6.07 ROTOR FRONT & REAR CLEARANCE ADJUSTMENT

The 55 Series pump has very small, carefully controlled clearances between rotors and rotor case - see Performance Data Sheet. These can be checked by feeler gauges (shims) or inspection tools (micrometer, vernier caliper).

If the end clearances are incorrect they can be adjusted without removing the pump from it's baseplate.

If pump is being re-built using new components, first fit 0.5mm thick shim pack (39), fit rotor case and rotors and check clearances/protrusion.

Continue as follows:

a) Remove rotors and rotor case as Section 6.02 to 6.06.

b) Loosen screws (29) in rotor retainers (28) until pins (30) can be removed. Remove rotor retainers from shafts, taking care not to lose shims (39).

c) Add shims to shim pack to reduce front clearance, remove shims to increase front clearance - see Figure 17. Shims are available in increments of 0.025mm (0.001 inch).

d) Re-fit rotor retainers, rotor case and rotors and re-check clearances. Re-adjust shims as necessary.

e) Check rear clearance.

When setting the front clearance the rear clearance should automatically be correct and will be approximately the same as the front clearance ± 0.01mm (0.0005”). If the rear clearance is less than this then the front and rear clearances should be adjusted so that they are equal.

If any side-to-side movement of the rotors can be detected or if the radial clearance is incorrect, - see Figure 18 - check condition of bearings - see Section 6.10 & 6.11. There is no adjustment for radial clearance - replace shafts and/or bearings if worn.

5 - Lobe Rotors only

If the meshing, i.e. rotor to rotor clearance is incorrect, - see Figure 18 - re-time pump or replace timing gears - see Section 6.12.

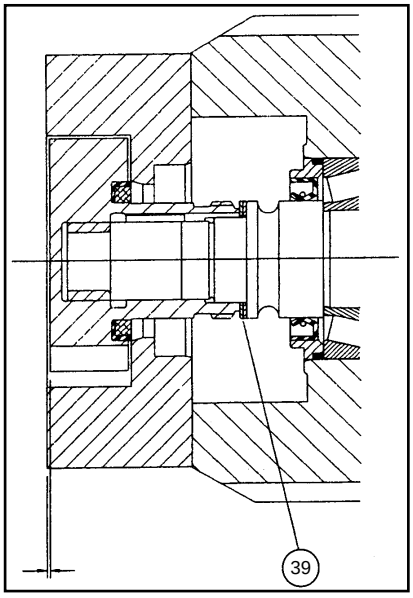


Figure 17

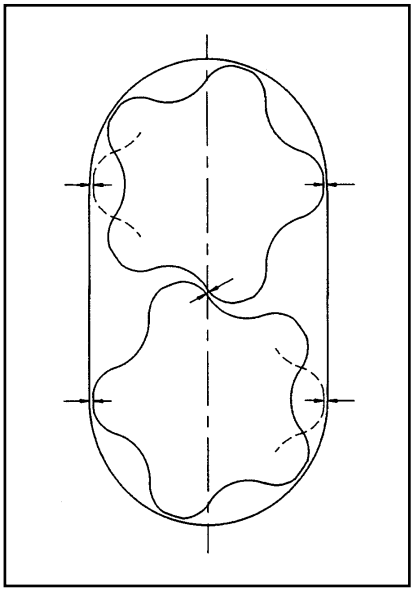


Figure 18
5 Lobe Rotor shown

6.08 THERMAL JACKET - END COVER

Ensure that the liquid feed to the jacket is switched off before attempting to service it.

a) Dismantle the jacket (81) from the cover (79 or 80) by removing the screw(s) (84) from the centre of the jacket

b) Remove the inner O-ring(s) (82) from the groove(s) around the screws and the outer O-ring(s) (83) from the groove around the outside edge of the jacket.

c) Replace the O-rings and re-fit the jacket.

d) Tighten the screws to the correct torque.

6.09 BEARING CARRIER

Power input to the pump is via the drive shaft (17). The gearbox has two contra-rotating shafts (16 & 17), supported by taper roller bearings (23). The shafts are synchronized by a pair precision cut gears (20) that distribute power between the drive shaft (16) and driven (lay) shafts (17).

55 Series pump gearboxes have been designed for easy inspection and maintenance. Care must be taken, as correct gearbox assembly is essential for effective pump operation and long-life. If in doubt consult your supplier or the manufacturer. (See Figure 19).

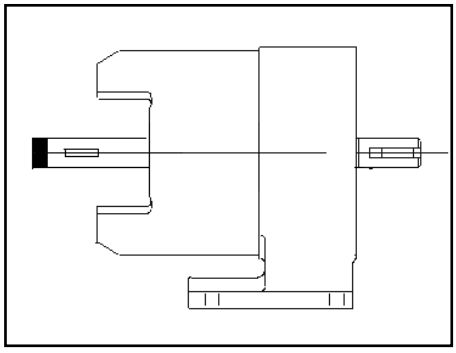


Figure 19
Pump
Gearbox

Inspection:

Bearing carrier (24) and gearbox internals can be inspected by removal from the gear housing (22). Before removing the gear housing for inspection it is advisable to purchase, a new gearbox O-ring (6) and four gearcover screw seals (36). Then proceed as follows:

a) Disconnect pump from drive and remove shaft coupling.

b) Drain lubricating oil from pump gearbox via drain plug (9).

c) Remove four gear cover securing screws (14) and plastic sealing washers (36).

d) Remove drive shaft key (19) and slide bearing carrier assembly out of gear housing (22), taking care not to damage the drive shaft oil seal on the drive shaft key-way.

e) Preliminary inspection can now be carried out without further dismantling. e.g. condition of timing gears or movement in the bearings.

f) If all is found to be satisfactory, refit in reverse order using new O-ring (6) & seals (36).

Repair:

To repair the bearing carrier assembly you will need the parts contained within the appropriate Repair Kit (E), in addition to any new gears (20) or bearings (23) required, which should be purchased before commencing.

6.10 GEARBOX SHAFTS, GEARS & BEARINGS

a) If the shafts are to be removed for any reason, label all components including bearing outer races, shims etc. and keep in their correct positions.

b) With the pump disconnected from its drive, remove rotorcase (see section 6.06), drain oil via plug (9) and remove bearing carrier (24) from gear housing (22), bend down the tab washers (11) which lock the gearnuts (12).

c) Before loosening the gearnuts (12) lock the rotors on the shaft using the plastic block (92) supplied for this purpose. Loosen the gearnuts (12) using a C-spanner (91).

d) Remove gearnuts (12), tab washers (11), timing gears (20) and drive shaft keys (10), from the shafts.

e) Remove the six screws (27) and washers (26) from the front of the bearing carrier.

f) Using a light press or soft hammer, drive out the shafts (16 & 17) towards the front (rotorcase end) of the bearing carrier (24) (See Figure 20). This will push out the front bearing retainers (2). The outer race of the front bearing (23) will also slide out off the bearing carrier.

The outer race of the rear bearings (23) can be pulled out of the of the housing (24) using your fingers.

To remove the inner race of the front bearing a press will be required.

Re-assemble in the reverse order, checking and re-adjusting the bearing pre-loads. (See section 6.11).

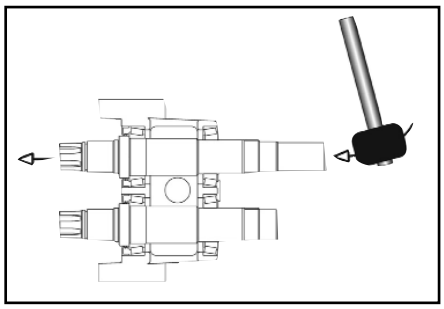


Figure 20 Removing Shafts

6.11 BEARING PRE-LOAD ADJUSTMENTS

a) Whenever the shafts are removed from the bearing carrier, the bearing shields (4) should be removed and all grease cleaned from shafts, bearings and bearing carrier. Press out lip seals (7) from bearing carrier and lip seals (1) from retainers.

b) If new bearings are fitted, these must be pressed fully against the shoulder on the shaft and against the bearing spacer. Check surfaces where lip seals run are smooth.

c) Stand bearing carrier vertically on gear housing on wooden blocks. Push outer race of rear bearing into bore in bearing carrier and fit one shaft.

d) Fit outer race of front bearing and tap it down whilst rotating shaft, to fully seat bearings.

e) Fit shim pack (25) under bearing retainer and add or remove shims until retainer face protrudes 0.02 to 0.05mm (0.001'' to 0.002'') above unpainted areas of bearing carrier - see Figure 21.

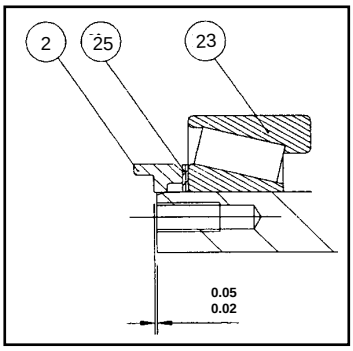


Figure 21

f) Fit clamp washers (26) and Screws (27). Tighten screws and check that shaft is free to turn but with some resistance. If shaft is very tight remove shims to reduce pre-load. If shaft can be moved from side-to-side, add shims to increase pre-load.

g) Remove shaft and fit new lip seals to bore in bearing carrier and to bearing retainers.

h) Fill space between bearings on shaft with grease - see Section 3 - and fit bearing shields. Re-fit shaft in it's correct bore in bearing carrier. Fit outer race shims and bearing retainer with a new O-ring (3). Fit clamp washers and tighten screws.

i) Repeat instructions b) to h) for other shaft.

j)Fit gear spacers (8) gears (20), tab washers (11) and gear nuts (12) and adjust timing (not required for scimitar rotors) as in Section 6.12

6.12 TIMING ADJUSTMENTS - 5 LOBE ROTOR ONLY

a) Fit timing gears to shafts - ensure marks are aligned as Figure 22. Fit rotors but do not fit rotor case or rotor retainers. Do not fit gear nuts (12) yet.

b) Pinch a 0.15mm (0.006 inch) feeler blade between two lobes - see Figure 23.

c) Push both gears forward. If both gears contact their gear spacers, fit tab washers (11) and nuts (12) to both shafts, then continue from (d) below.

If one gear leaves a gap "A" - see Figure 24 - measure this gap with feeler gauges. Fit tab washer (11) and nut (12) to the <u>other</u> shaft, hand tight only. Still gripping the feeler between the rotors, pull the loose gear back and measure the gap "B" - see Figure 25.

Remove both rotors and the loose gear. Fit a shim pack (21) equal to the average of the two measurements of the gap :

$$\text{Shim pack thickness} = \frac{A + B}{2}$$

Re-fit gear nuts and fit second tab washers and nut.

d) Tighten both nuts to correct torque. <u>DO NOT</u> wedge the <u>rotors</u> to prevent shafts from turning - hold each gear in turn in a vice with soft jaws as Figure 26.

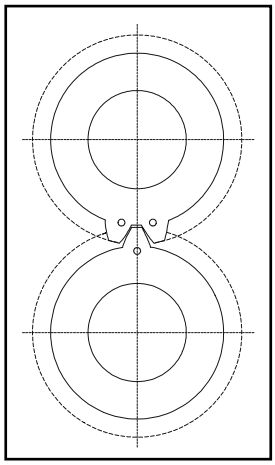


Figure 22
Gear Timing Marks

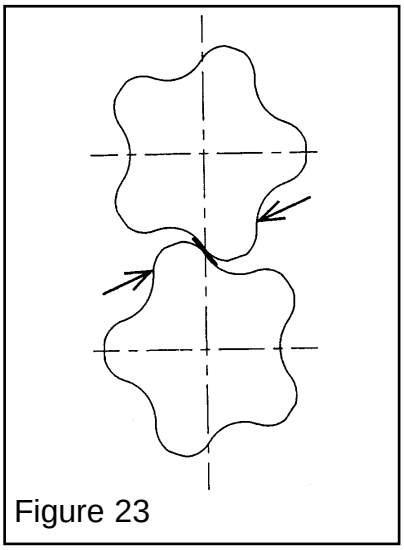


Figure 23

e) Slide rotors onto their correct shaft and check clearance between every lobe with feeler gauges. At no point should lobes touch each other when pinched together. If necessary add or remove shims to give as close to equal clearance as possible between lobes at every point of rotation. Shims are available in increments of 0.025mm (0.001 inch). Note that 0.10mm (0.004 inch) of shims will rotate one rotor relative to the other by 0.03mm (0.001 inch) at the mid-meshing point.

f) Tighten nuts to correct torque and finally check timing. Bend up tab washers and re-assemble gear housing. Re-fill with oil - see Section 5.

Continue to assemble pump as Section 6.09 paragraph f).

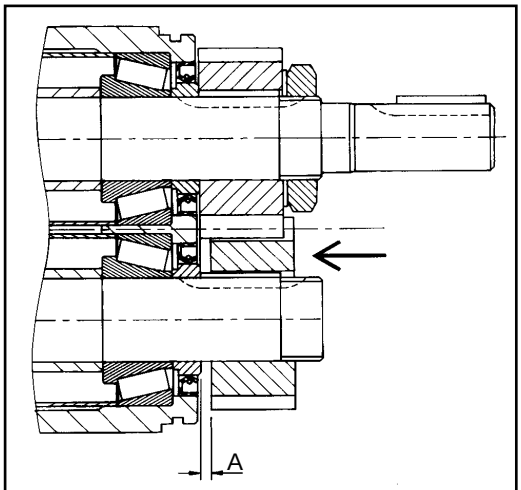


Figure 24

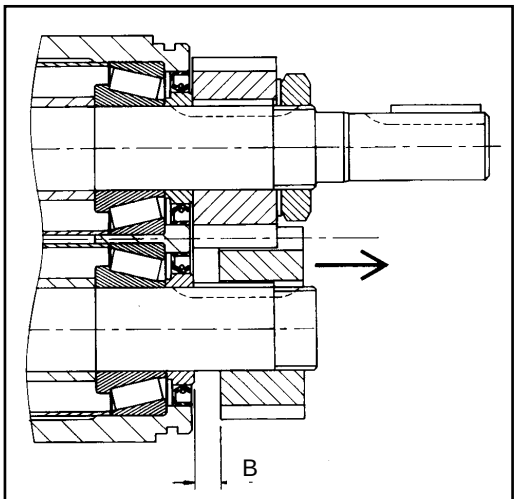


Figure 25

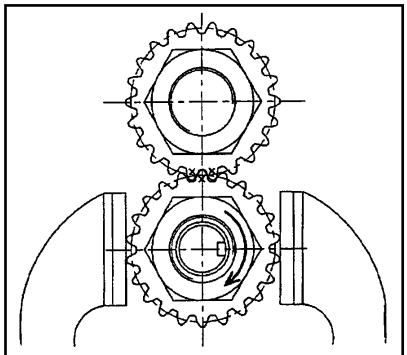
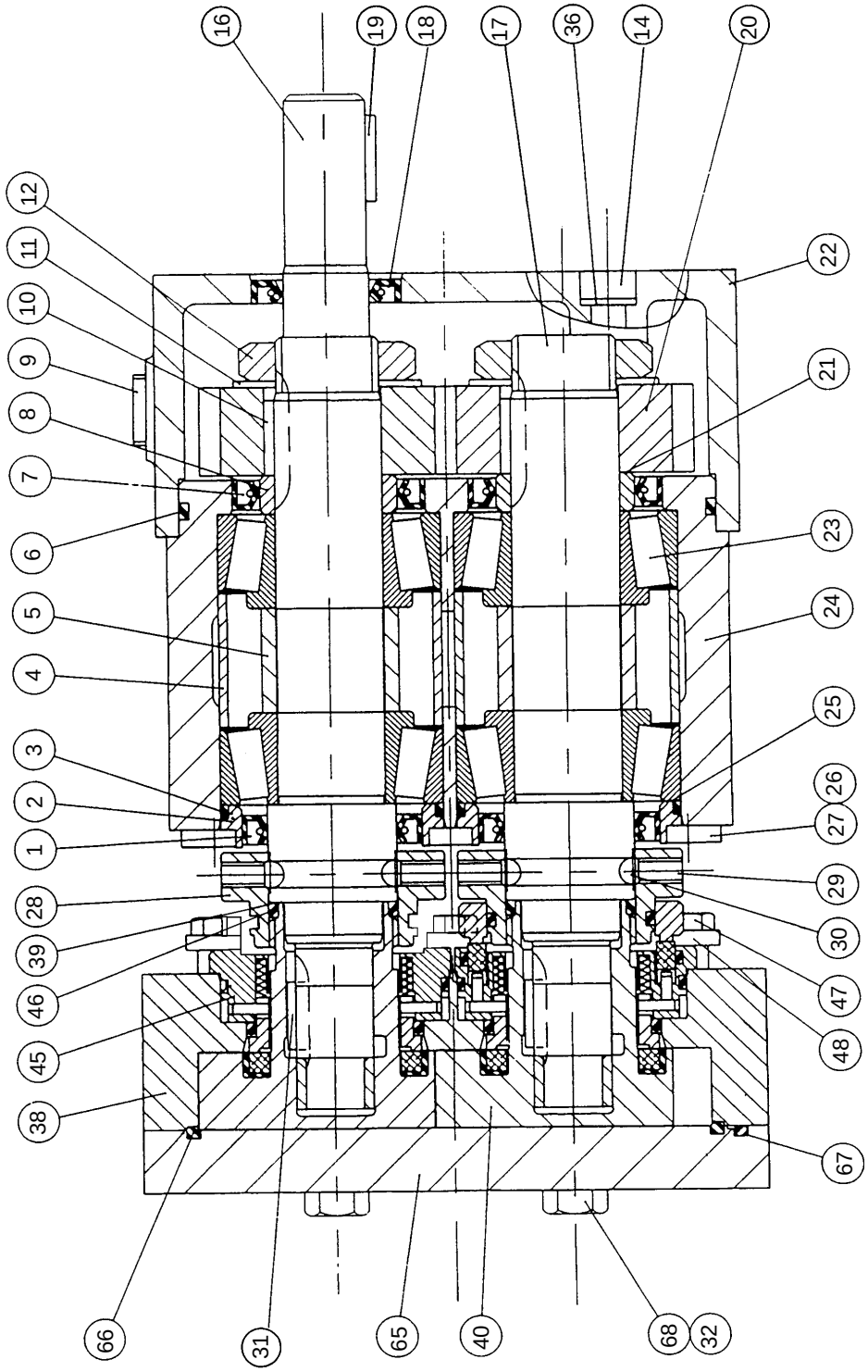


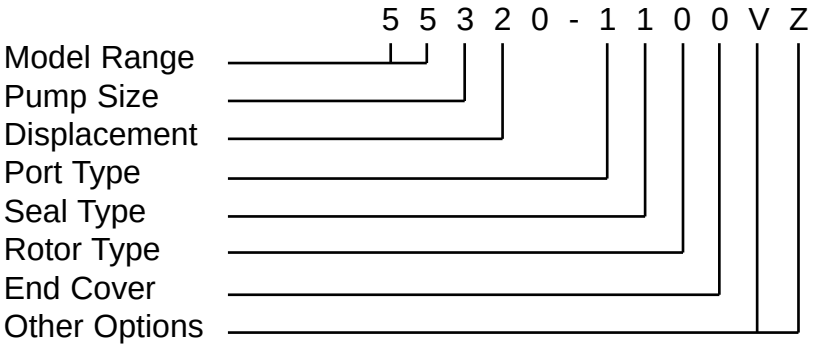
Figure 26

6.13 SECTIONAL DRAWING



7.00 MODEL NUMBERING SYSTEM

Standard Pumps - Example



Model Range :
55 = 55 SERIES LOBE PUMP

Pump Size :
Code 2 = 200 size
3 = 300 size
4 = 400 size

Displacement :
Code 1 = Standard flow, short shaft
2 = Standard flow, long shaft

Port Type :
Code 1 = Clamp (“Tri-clamp”)

Seal Type :
Code 1 = Double, SiC/SiC front, C/SiC rear
2 = Single SiC/SiC
3 = Single C/SiC
4 = Double, C/SiC front, C/SiC rear

Rotor Type :
Code 0 = 5-lobe high efficiency
1 = 5-lobe standard
2 = 5-lobe high pressure
8 = Scimitar - Stainless Steel (Non-Galling alloy on 55210)
9 = Scimitar - Stainless Steel (55210 only)

End Cover :
Code 0 = Plain
4 = Heating/cooling jacket
5 = Aseptic barrier
7 = Jacket & barrier

Other Options :
Code B = Horizontal ports / Bottom Shaft Drive.
H = Horizontal ports / Top Shaft Drive
P = PTFE/Kalrez® trim
V = Viton® trim
Y = Electropolish only
Z = 240 grit polish & electro-polish

NOTE : Standard elastomer trim is EPDM unless otherwise specified.

HOW TO IDENTIFY AND ORDER SPARE PARTS

1. From the pump nameplate identify the pump MODEL NUMBER and SERIAL NUMBER.
2. Use the MODEL BUILD CODE on page 29 to identify the pump specification.
3. Refer to the exploded view of the pump (page 32) and the sectional views of the options (page 33) in order to ascertain the parts required.
4. Use the parts list on pages 30 & 31 to cross check the item with the description.
5. Order spare part by **KEY** number and **DESCRIPTION** also quoting the **MODEL NUMBER** and **SERIAL NUMBER.**

Key No.	Description	Qty	Used with pump code	Kit No.
1	**Lip Seal Kit**	1	All	**A**
2	Bearing Retainer	2	All	
3	O-Ring - bearing retainer	2	All	
4	Bearing Shield	2	All	
5	Bearing Spacer	2	All	
6	O-Ring, bearing carrier	1	All	
7	Lip Seal	Use Key No. 1	All	
8	Gear Spacer	2	All	
9	Plug, oil level / drain	2	All	
10	Key, timing gear drive	2	All	
11	Tab Washer - gear nut	2	All	
12	Gear Nut	2	All	
14	Screw - gear housing / bearing carrier	4	All	
15	End Cap	2	All	
16	Shaft, driven	1	All	
17	Shaft - driving	1	All	
18	Lip Seal - Rear	Use Key No. 1	All	
19	Key - drive shaft	1	All	
20	Timing Gear Set, 2 gears per set	1	All	
21	**Shim Kit, timing gear**	1	All	**B**
22	Gear Housing	1	All	
23	Bearing	4	All	
24	Bearing carrier	1	All	
25	**Shim Kit, bearing**	1	All	**C**
26	Washer - bearing retainer	6	All	
27	Screw - bearing retainer	6	All	
28	**Rotor Retainer Assembly:**	2	All	**D**
29	Screw - rotor retainer	4	All	
30	Pin - rotor retainer	4	All	
31	Key - rotor drive	2	All	
32	Locating Sleeve	2	All	
33	Guard	1	All	
34	Screw - guard	1	All	
35	Washer - guard	1	All	
36	Washer (nylon) - gear cover	4	All	

Key No.	Description	Qty	Used with pump codes	Kit No.
E	**Repair Kit, bearing carrier**	1	All	**E**
37	Screw - Rotor case / Bearing carrier	2	All	
38	Rotor Case (clamp ports):	1		
39	**Shim Kit, rotor**	1	All	**F**
40	**Rotor Kit (2 rotors per kit)**	1	All	**G**
41	**Pump Head Trim Kit**	1	All	**H**
45	**Seal Housing Kit**	2	All	**J**
46	O-Ring, Secondary seal face	2	Seal code 1 or 4	
47	Screw, seal housing	6	All	
48	Clamp, seal housing	6	All	
49	Cup Rubber - Seal rotary face	2	All	
50	Joint Ring - Seal static face	2	All	
51	O-Ring - Seal face , static	2	Seal code 1 or 4	
52	O-Ring - Seal face, rotary	2	Seal code 1 or 4	
53	O-Ring - Rotor retainer	2	Seal code 1 or 4	
54	Coil Spring, mechanical seal (Quantity - 12 - Single Seal, 24 Double Seal	12 or 24	55320 55420	
55	Wave Spring, mechanical seal	2	55210	
56	**Primary Seal Face Kit**	2	All	**K**
57	**Secondary Seal Face Kit (Codes 1,4)**	2	Seal code 1 or 4	**L**
58	**Seal Trim Kit**	2	All	**M**
N	**Conversion Kit - Single Seal to Double Seal**	1	Seal Code 1 or 4	**N**
65	End Cover:	1		
66	Joint Ring, end cover (inner)	1		
67	O-Ring, Barrrier end cover (outer)	1	End Cover code 5 or 7	
68	Bolt, end cover	4	All	
P	**End Cover Kit - Temperature Control Jacket**	1	End cover code 4	**P**
79	End Cover - for Temperature Control Jacket	1	End Cover Code 4 or 7	
80	Jacket	1	End Cover Code 4 or 7	
81	O-Ring - Inner	1	End Cover Code 4 or 7	
82	O-Ring - Outer	1	End Cover Code 4 or 7	
83	Screw	1	End Cover Code 4 or 7	
R	**End Cover Kit -Temperature Control Jacket + Barrier**	1	End cover code 7	**R**
84	End Cover - for Temperature Control Jacket +Barrier	1	End cover code 7	

Key No.	Description	Qty	Used with Pump code	55210 Part No.	55320 Part No.	55420 Part No.	55430 Part No.	Kit No.
90	Seal seat removal sleeve	1	All	55274-0000	55374-0000	55474-0000	55474-0000	
91	Rotor retainer - 'C' spanner	1	All	55276-0000	55376-0000	55476-0000	55476-0000	
92	Rotor locking pad	1	All	55027-0000	55027-0000	55027-0004	55027-0004	

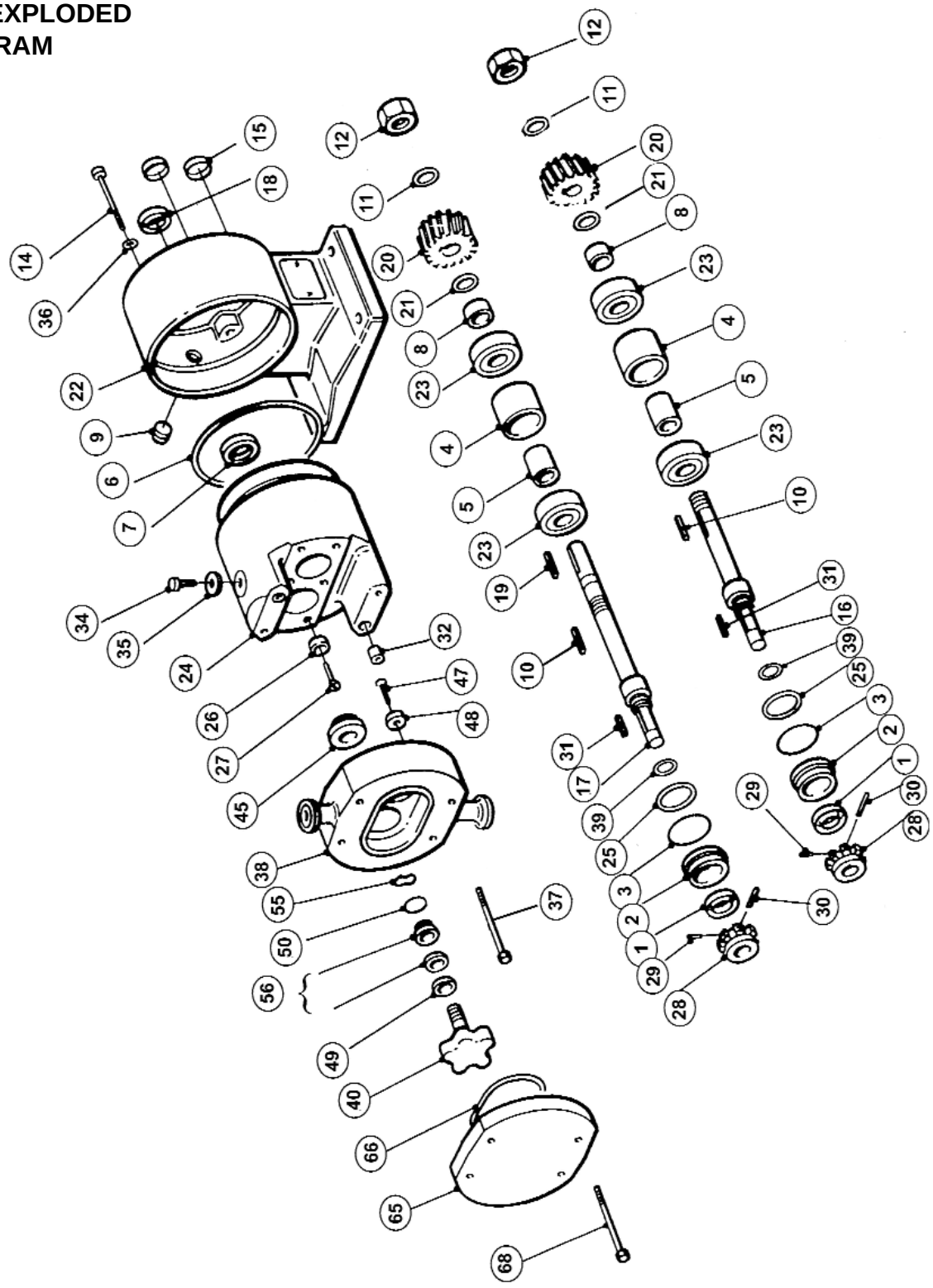
Table continued...

CONTENTS OF KITS			
Kit No.	**Key No.**	**Description**	**Qty per Kit**
A		**Lip Seal Kit**	
	3	O-Ring - Bearing Retainer	2
	6	O-Ring - Bearing Carrier	1
	1	Lip Seal - Front	2
	7	Lip Seal - Mid	2
	18	Lip Seal - Rear	1
B		**Shim Kit - Timing**	
	21	Shim	8
C		**Shim Kit - Bearings**	
	25	Shim	8
D		**Rotor Retainer Assembly**	
	28	Rotor retainer	1
	29	Screw , rotor retainer	2
	30	Pin, rotor retainer	2
E		**Repair Kit**	
	2	Lip Seal Kit	1
	4	O-Ring	2
	7	O-Ring	1
	15	Tab Washer	2
	19	End Cap	2
	25	Shim Kit, timing gear	1
	29	Shim Kit, bearing	1
	38	Shim Kit, rotor	1
	46	Washer (nylon)	4
	60	Rotor locking pad	1
	61	End Cover screw spacer	4
F		**Shim Kit - Rotor**	
	39	Shim	16
G		**Rotor Kit**	
	40	Rotor	2
H		**Pump Head Trim Kit**	
	3	O-Ring, rotor retainer	2*
	36	Joint Ring, end cover (inner)	1
	49	Cup Rubber, seal seat	2
	50	Joint Ring, seal face	2
	51	O-Ring, seal housing	2*
	52	O-Ring, double seal static	2*

CONTENTS OF KITS			
Kit No.	**Key No.**	**Description**	**Qty per Kit**
J		**Seal Housing Kit**	
	45	Seal Housing	1
	54	Used on 55320 & 55420 - Coil Spring	6 off single seal 12 off double seal
	55	Used on 55210 - Wave Spring	1
K		**Primary Seal Face Kit**	
	56	Rotary Face	1
	56	Static Face	1
L		**Secondary Seal Face Kit**	
	57	Rotary Face, secondary	1
	57	Static Face, secondary	1
M		**Seal Trim Kit**	
	3	O-Ring, rotor retainer	2*
	49	Cup Rubber, seal seat (Rotary)	2
	50	Joint Ring, seal face (Static)	2
	51	O-Ring, seal housing	2*
	52	O-Ring, double seal static	2*
	53	O-Ring, double seal rotary	2*
N		**Conversion Kit - Single Seal to Double Seal**	
	45	Seal Housing Kit	2
	57	All parts needed to convert a pump fitted with seals into a double seal. Excludes rotor case. Includes drawings to show where to drill rotor case. Alternatively order key no 20	2
	58	Seal Trim Kit	2
P		**End Cover Kit - Temperature Control Jacket**	
	79	End Cover	1
	81	Jacket	1
	82	O-Ring - Inner	1
	83	O-Ring - Outer	1
	84	Screw	1
R		**End Cover Kit - Temperature Control Jacket + Barrier**	
	80	End Cover	1
	81	Jacket	1
	82	O-Ring - Inner	1
	83	O-Ring - Outer	1
	84	Screw	1
	67	O-Ring - Barrier end cover (outer)	

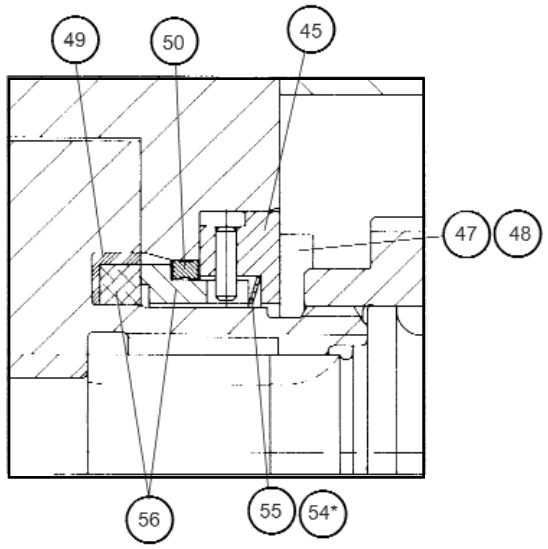
* - not supplied in kits used for 55210 model

8.02 EXPLODED DIAGRAM



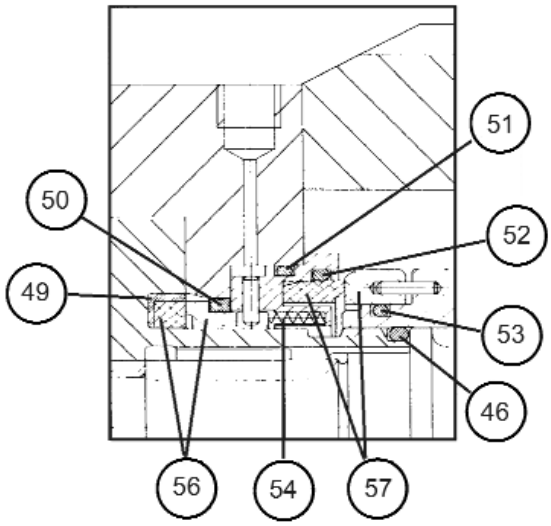
8.03 OPTION & EXTRAS - SECTIONAL VIEWS

Single Seal



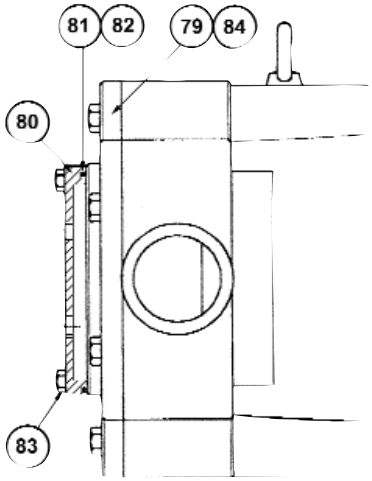
*** - Wave Spring shown (55210 only). On 55320 & 55420 models this part is a Coil Spring.**

Double Seal

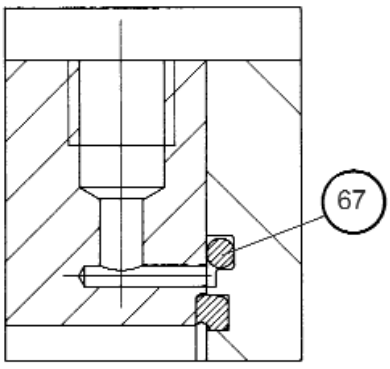


47 48 - Not shown

Thermal Jacket - End Cover



Aseptic Barrier - End Cover



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JABSCO

Declaration of Incorporation

Subject **Machinery Directive** **98/37/EC**

ITT Jabsco declares that the products listed below conform to all relevant parts of the above directive, and should not be put in to service until the relevant machinery into which they are to be incorporated have been declared in conformity with provisions of the Machinery Directive.

ITT Jabsco declare que les produits ci-listés se conforment à la norme CE 98/37/EC et ne doivent pas etre utilisés dans des machines qui ne sont pas conformes aux normes en question ci-dessus.

ITT Jabsco bestätigt, daß alle untenaufgelisteten Produkte den zutreffenden Teilen der Vorschrift entsprechen. Die produkte sollten aber erst dann in Betrieb genommen werden, nachdem die Machine, in die diese Teile eingebaut werden, für Richtlinien konform erklärt worden ist.

Product Type **55 Series Rotary Lobe Pumps**
with the following model prefixes:

55210
55320
55420
55430

Signed **Engineering Manager** D. [signature] **Date** 26/01/01

Quality Manager [signature] **Date** 30 JAN 01

55 Series Lobe Pumps

09/03

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