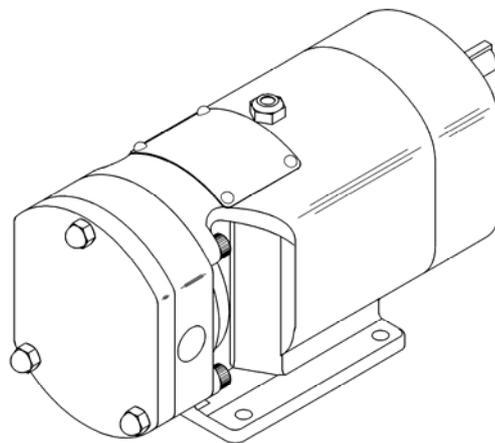




# Series N

Stainless Steel Positive Displacement Rotary Lobe Pumps

Operating Manual



Represented By:

**KGO** *Group Ltd.*  
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# Alfa Laval Pumps Ltd

Birch Road, Eastbourne,  
East Sussex BN23 6PQ

Tel No : (01323) 412555 Fax (01323) 412515

## EC DECLARATION OF INCORPORATION

We hereby declare that the following machinery is intended for installation into a machine or to be assembled with other machines into a machine. It must **not** be put into service until the machinery into which it is incorporated has been declared in conformity with the provisions of the Machinery Directive 89/392/EEC, amendments 91/368/EEC, 93/44/EEC, 93/68/EEC.

Machine Description Rotary Lobe Pump

Type/Size \_\_\_\_\_

Serial Number \_\_\_\_\_

This machinery has been designed and manufactured in accordance with the following transposed harmonised European Standards:-

EN292 Parts 1 and 2 : 1991 Safety of Machinery - Basic Concepts, general principles

for design.

EN294 : 1992 Safety distances to prevent danger zones being reached by the upper

limbs.

ISO9001: 1994 Quality Management System.

Conforms to Directive 90/128/EEC Plastic Materials and Articles in contact with Foodstuffs

A technical construction file for this machinery is retained at the above address.

Signed \_\_\_\_\_



**(Authorised Person)**

Date \_\_\_\_\_

Name \_\_\_\_\_

**P. SWEET**

Position \_\_\_\_\_

**Quality Manager**



# Alfa Laval Pumps Ltd

Birch Road, Eastbourne,  
East Sussex BN23 6PQ

Tel No : (01323) 412555 Fax (01323) 412515

## EC DECLARATION OF CONFORMITY

We hereby declare that the following machinery conforms to the machinery directive 89/392/EEC as amended by 91/368/EEC, 93/44/EEC and 93/68/EEC and to the following other relevant directives. The machinery has been designed and manufactured in accordance with the transposed harmonised European standards; European and national standards as listed:

Machine Description Rotary Lobe Pump - Motorised

Type/Size \_\_\_\_\_ Serial Number \_\_\_\_\_

Other Applicable Directives Electrical Equipment Low Voltage Directive 73/23/EEC

Plastic Materials and Articles in contact with Foodstuffs Directive 90/128/EEC

Applicable Standards/Specifications \_\_\_\_\_

EN292 Parts 1 and 2 : 1991 Safety of Machinery - Basic concepts, general principles for design.

EN294 : 1992 Safety distances to prevent danger zones being reached by the upper limbs.

EN60204 Part 1 : 1993 Safety of Machinery - Electrical equipment of machines - specification for general requirements.

BS5304 : 1988 Code of Practice for Safety of Machinery.

ISO9001 : 1994 Quality Management System.

A technical construction file for this machinery is retained at the above address.

Signed  Date \_\_\_\_\_  
(Authorised Person)

Name P. SWEET Position Quality Manager





# Operating Manual

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## General

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### 1.1 Pump Limits of Application or Use

This range of pumps has been designed for pumping difficult or corrosive fluids and with the requirements of hygienic processes. Typical areas of application include laboratories, pilot plants, chemical processing, food processing electroplating and film processing.

Pressures of up to 7 bar, speeds to 1000rpm and temperatures to 100°C can be obtained on this range of pumps depending on type/size. These conditions cannot always be obtained simultaneously. The model type/size will be shown on the nameplate positioned on the pump.

The pump/pump unit will have been selected for the pump users specific application when known and the pump serial number will relate to this.

If the user has not specified the pumping application or needs to change it, it is important to confirm that the materials of construction and product seals are compatible with the pumping application and that adequate NPSH is available.

For specific guidelines contact your supplier quoting :- pump model/size, serial number and system details (e.g. product, pressure, flow rate).

Where the application requires the pump should be mounted with ports vertical to ensure self draining e.g. food media.

### 1.2 Pump Duty Conditions

The pump should only be used for the duty for which it has been specified. The operating pressure, speed and temperature limits have been selected at the time of order and **MUST NOT** be exceeded for the pump. These details are stated on the original documentation and if not available may be obtained from your supplier quoting :- pump model and serial number.

### 1.3 Noise Levels

Depending upon the pumping system and duty conditions the pump noise levels may vary. The sound pressure level measurement stated is given for typical pumps/pump units at maximum pressures/speeds. The results being taken on water at ambient temperature:-

Recorded sound pressure level :- 75 dB(A).

**Note** :- Readings taken in accordance with ISO3746.

### 1.4 Utility Requirements

#### Electrical Supply :-

This pump may be supplied bare shaft or coupled to a drive unit for which a drive unit/electrical supply will be required.

# Operating Manual

## 1.5 Safety Requirements

All warnings in this manual are summarised on this page.

Pay special attention to the instructions below so that severe personal injury or damage to the pump can be avoided.

Personnel performing installation, operation and maintenance of the pump must have the relevant experience required.

## Warnings Signs:



General safety instructions are preceded by this symbol.



Electrical safety instructions are preceded by this symbol.



Take great care when using caustic agents.

### INSTALLATION



: **Always** observe the technical data.



: The pump **must** be electrically connected by authorised personnel. (See the motor instructions supplied with the drive unit).



: **Never** start in the wrong direction of rotation with liquid in the pump.



: **Never** put your hands or fingers inside the port connections

### OPERATION



: **Always** observe the technical data.



: **Never** touch the pump or the pipelines when pumping hot liquids.



: **Never** stand on the pump or pipelines.



: **Never** run the pump with both the suction side and the pressure side blocked.



: **Always** handle toxic and acidic liquids with great care.



: **Never** put your hands or fingers inside the port connections.

### MAINTENANCE



: **Always** observe the technical data.



: **Always** disconnect the pump from the drive unit and power supply when servicing the pump.



: The pump must **never** be hot when servicing it.



: The pump and pipelines must **never** be pressurised when servicing the pump.



: **Never** put your hands or fingers inside the port connections.

**STUDY THIS MANUAL CAREFULLY**

## 1.6 Health and Safety Information

### Potential Safety Hazards

The following section gives information on handling, storage and disposal of parts and materials used in the pumps which may be considered hazardous to health.

Please pass this information on to your Safety Officer, he may need it to comply with Health and Safety, and COSHH regulations.

Electric motors - the pump may have an electric motor fitted, ensure that the relevant fire equipment is available.

The information contained here is brief.

### General First Aid

If potentially hazardous substances are accidentally inhaled, or skin or eyes contaminated, then the following basic precautions should be taken

Inhalation - Remove to fresh air

Skin - Wash with soap and water

Eyes - Flush with water, seek medical attention

In all cases, if symptoms persist, seek medical attention.

MATERIAL	USE	MAJOR HAZARD
SILICON SEALANT	GEARBOX SEAL RETAINERS, REAR COVER, GENERAL SEALANT.	RELEASES VAPOUR AT ROOM TEMPERATURE.
SEALANT (RED HERMETITE)	GEARBOX SEAL RETAINERS, REAR COVER, GENERAL SEALANT.	RELEASES VAPOUR AT ROOM TEMPERATURE, HIGHLY FLAMMABLE, TREAT AS FIRE HAZARD.
ANTI-SEIZE COMPOUNDS	BEARINGS	APPLIED FROM AEROSOL. RELEASES VAPOUR. DISPOSE OF CONTAINER AS IF PRESSURISED.
ADHESIVES (E.G. PERMABOND)	BEARING NUTS, ADJUSTMENT NUTS.	RELEASES VAPOUR AT ROOM TEMPERATURE.
OIL AND GREASE	OIL - GENERAL LUBRICATION GREASE - PRODUCT SEALS, TIMING GEARS, GENERAL LUBRICATION.	SKIN AND EYE IRRITANT.
PLASTIC COMPOUNDS (PTFE, POLYPROPYLENE, PVC)	PTFE - 'O' RINGS, LIP SEALS, PACKING. POLYPROPYLENE - GLAND GUARDS. PVC - GLAND GUARDS.	RELEASES FUMES WHEN HEATED.
ELASTOMERIC COMPOUNDS (EP, VITON, NITRILE, NEOPRENE)	ALL - 'O' RINGS, LIP SEALS. NITRILE,	RELEASES FUMES WHEN HEATED.
ARAMID FIBRE	GLAND PACKING.	EMMITS HARMFUL DUST. RELEASES FUMES WHEN HEATED.
PAINT	EXTERNAL PUMP SURFACES.	RELEASES DUST AND FUMES IF MACHINED. TREAT AS A FIRE HAZARD.

# Operating Manual

## **2.0 Unpacking, Handling and Storage**

To avoid any problems, on receipt of your pump always use the following procedure:-

### **2.1 Documents**

1. Check the delivery note against the goods received.
2. Check if the pump has been delivered with an electric motor that the motor instructions are available.

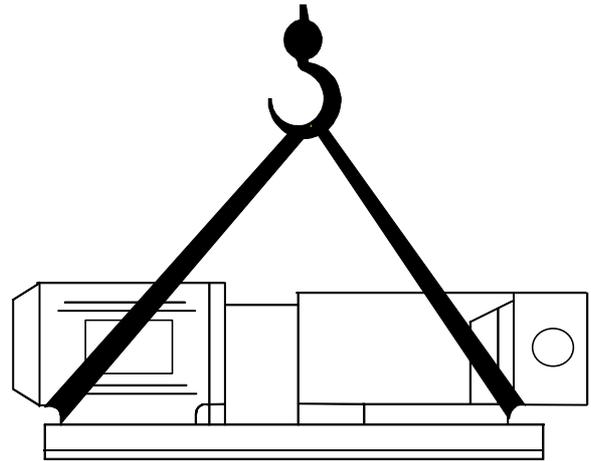
### **2.2 Unpacking**

Care must be taken when unpacking the pump, and the following stages must be completed:-

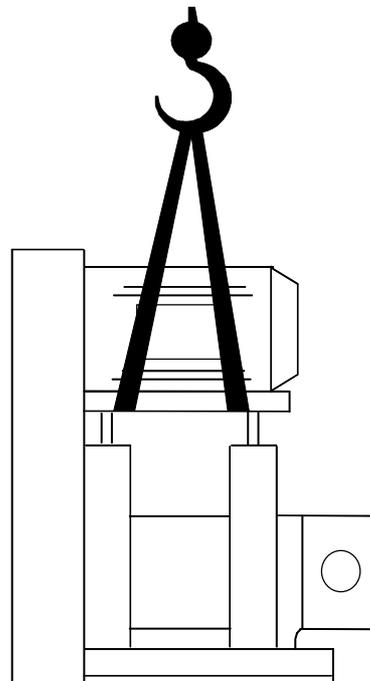
1. Inspect the packing for any possible signs of damage in transit.
2. Carefully remove the packing away from the pump.
3. Inspect the pump for any visible signs of damage.
4. Clean away the packing from the pump port connections.
5. Ensure that any additional equipment such as seal flushing pipework is not damaged.

### **2.3 Handling**

Refer to the pump weights guide, prior to using any lifting gear. Use the correct lifting straps for the pump weight (or pump and drive if applicable). (See below).



**PUMP WITH DRIVE UNIT**



**PUMP PEDESTAL MOUNTED**

## 2.4 Pump Storage

After receipt and inspection if the pump is not to be installed immediately the pump should be repacked and placed in suitable storage. The following points should be noted:-

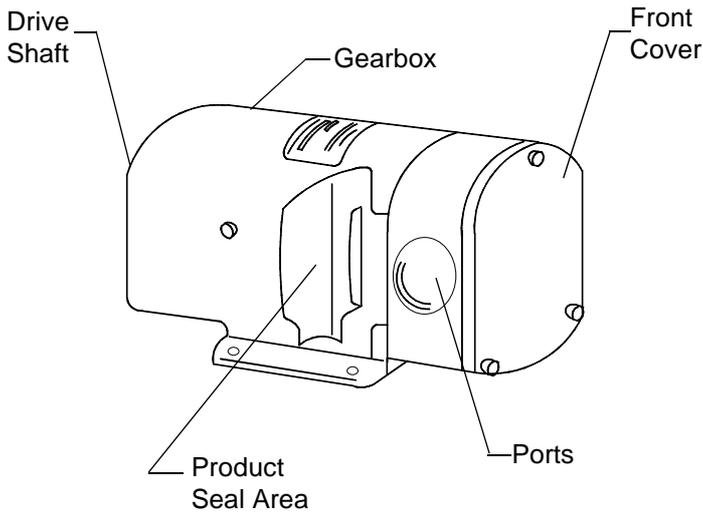
1. Plastic or gasket type port covers should be left in place.
2. Pumps received wrapped with corrosion inhibiting treatment material should be rewrapped.
3. A clean, dry storage free from vibration location should be selected. When a moist dusty atmosphere must be used for storage, further protect the pump or unit with a moisture repellent cover until it is to be installed.
4. Rotate pump/pump unit by hand, weekly to prevent bearing damage.
5. All associated ancillary equipment should be treated similarly.

# Operating Manual

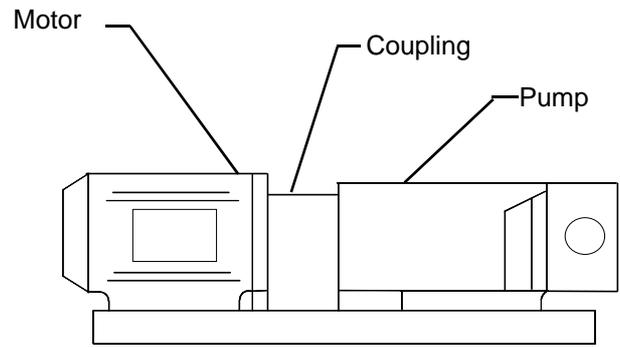
## 3.0 Description Of Pump Or Pump Unit

### 3.1 General Pump Description

The pump supplied is a positive displacement pump, which may be supplied with or without a drive unit (see below). The drawing below indicates various parts of the pump.



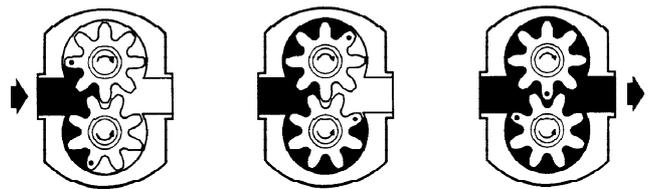
**BARESHAFT PUMP**



**PUMP WITH DRIVE UNIT**

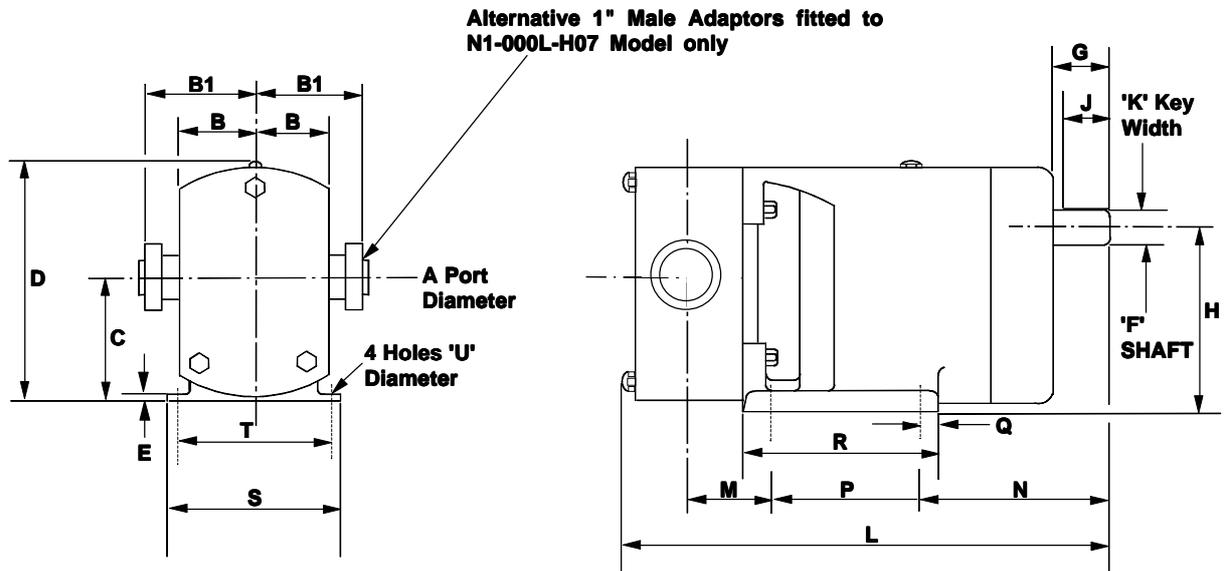
### 3.2 Working Principle

The pumps are of the positive displacement rotary type. The volume at the inlet increases when the gears rotate and the product is drawn into the pump. It is then transported in the space between the gears and the periphery of the body to the discharge side. The volume between the gears is reduced here and the product is forced out through the outlet.



# Operating Manual

## 3.3 Pump Dimensions

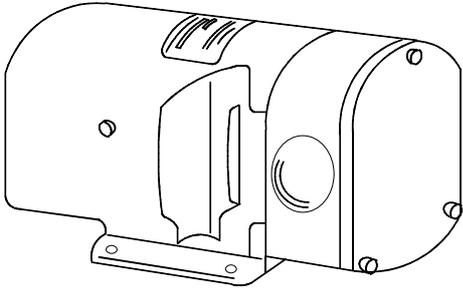


PUMP SIZE	A	B	B1	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U
N1-000S-H07	¼in BSPT	42	-	54	115	6.5	12	30	71	25	4	250	25	103	80	11	102	105	90	7
N1-000L-H07	½-1in BSPT	42	68	54	115	6.5	12	30	71	25	4	266	31	103	80	11	102	105	90	7

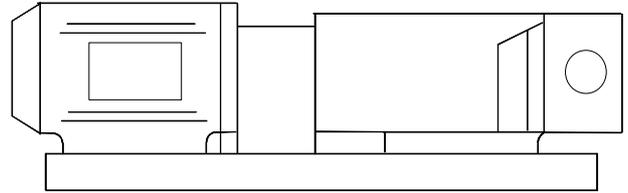
**Dimensions are give for guidance only and should not be used for installation purposes. Certified drawings will be supplied on request. Dimensions in millimetres.**

# Operating Manual

## 3.4 Pump and Pump Unit Weights



**BARESHAFT PUMP**



**PUMP UNIT - PUMP COMPLETE WITH DRIVE UNIT**

PUMP MODEL	BARESHAFT PUMP KG	PUMP WITH DRIVE UNIT KG
N1-000S and L	10	40

The above weights are for guidance only and will vary depending upon the specification of the pump and drive unit.

## 3.5 Pump Displacement and Capacities

The following table details the pump capacities for the pump models. This figure will change depending upon speed, pressure, temperature and product being pumped.

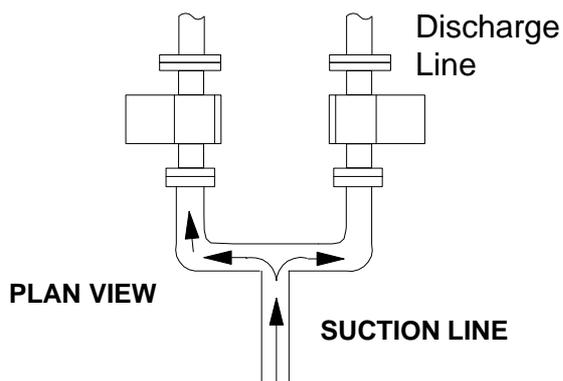
PUMP MODEL	MAXIMUM SPEED (RPM)	APPROX DISPLACEMENT LITRES/HOUR
N1-000S-H07	1000	1230
N1-000L-H07	1000	2316

## 4.0 System Design and Installation

### 4.1 System Design Advice

When designing the pumping system :-

- DO** - confirm with the supplier the Net Positive Suction Head (NPSH) requirements for the system, as this is crucial for ensuring the smooth operation of the pump and preventing cavitation.
- DO** - avoid suction lifts and manifold/common suction lines for two pumps running in parallel, as this may cause vibration or cavitation.
- DO** - install non-return valve to prevent turbinning when high pressures are applied to the pump whilst it is not in use. Valves are also recommended if two pumps are to be used on manifold/common discharge lines.
- DO** - provide a hose cleaning facility to assist maintenance, ensuring the drive unit meets the specification for hose cleaning.



- DO NOT-** subject the pump to rapid temperature changes during C.I.P. (Cleaning in Place) procedures. **PUMP SEIZURE CAN RESULT FROM THERMAL SHOCK.** The differential pressure across the pump should be near zero when cleaning. A suitable by-pass is recommended.
- DO** - protect the pump against blockage from hard solid objects e.g. nuts, bolts etc. Also protect the pump from accidental operation against a closed valve by using one of the following methods :- relief valves, pressure switch, current monitoring device.
- DO** - fit suction and discharge pressure gauges to monitor pressures for diagnostic purposes.

# Operating Manual

## 4.2 Pump and Base Foundations

Depending on your requirements the pump and drive (if supplied) may arrive mounted on a baseplate. Our standard baseplates have pre-drilled fixing holes to accept base retaining bolts.

To provide a permanent, rigid support for securing the pump unit a foundation is required, this will also absorb vibration, strain or shock on the pumping unit.

### Foundation Size

The foundation should be approximately 100mm longer and wider than the mounting base of the unit. The depth of the foundation should be proportional to the size of the pump unit. (Pump coupled to drive unit.)

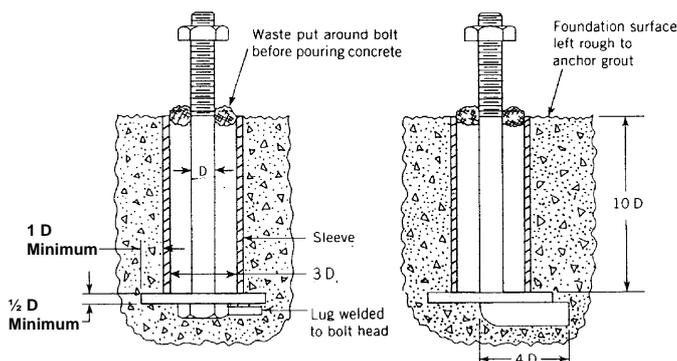
### Bolt Location Dimensions

The location and sizes of the relevant bolting down holes can be provided on a certified drawing from your supplier.

### Typical Foundation Bolts

The drawing below shows two methods for foundation bolt retaining. The sleeve allows for 'slight' lateral movement of the bolts after the foundation is poured. Use rag or paper to prevent the concrete from entering the sleeve while the foundation is poured. A minimum of 14 days is required to allow the airing of the concrete prior to operation.

D = Diameter of foundation bolt



## 4.3 Installation

Before the pump is installed it is advisable to consider the following:

**Always -** Ensure that the mounting surface is flat to avoid distortion of the pump and drive unit.

**Always -** Allow at least one metre for pump access/maintenance all around the pump.

**Electrical - Supply** Ensure that there is an adequate electrical supply close to the pump drive unit. This should be compatible with the electric motor selected.

## 4.4 Pipework

All pipework **MUST** be supported. The pump **MUST NOT** be allowed to support any of the pipework weight.

**Remember-** Pipework supports must also support the weight of the product being pumped.

**Always :-**

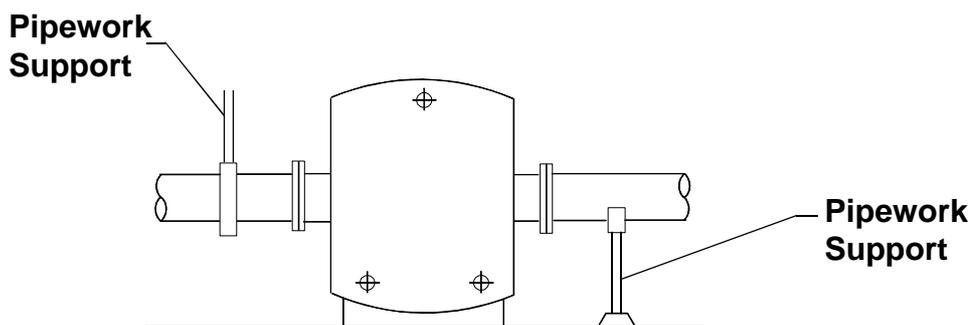
**Have -** Short straight suction lines to reduce friction losses in the pipework thereby improving the NPSH available.

**Avoid -** Bends, tees and any restraints close to either suction or discharge side of pump. Use long radius bends wherever possible.

**Provide -** Isolating valves on each side of the pump to isolate the pump when necessary.

**Keep -** Pipework horizontal where applicable to reduce air locks. Include eccentric reducers on suction lines.

**Check -** Coupling alignment during installation to highlight pipework alignment/support problems.



# Operating Manual

## 5.0 Start Up, Shut Down and Cleaning

### 5.1 Pump Start Up Check List

	YES	NO
1. Is the location of the 'stop' button clear?	<input type="checkbox"/>	<input type="checkbox"/>
2. Has the pipework system been flushed through to purge welding slag and any other hard solids.	<input type="checkbox"/>	<input type="checkbox"/>
3. Have all the <b>obstructions</b> been removed from the pipework or pump?	<input type="checkbox"/>	<input type="checkbox"/>
4. Are the pump <b>connections</b> and pipework joints <b>tight</b> and <b>leak-free</b> ?	<input type="checkbox"/>	<input type="checkbox"/>
5. Are the pipework <b>valves open</b> ?	<input type="checkbox"/>	<input type="checkbox"/>
6. Are <b>all safety guards</b> in place?	<input type="checkbox"/>	<input type="checkbox"/>
7. Start then stop the pump, is the product <b>flowing</b> in the correct <b>direction</b> ?	<input type="checkbox"/>	<input type="checkbox"/>
8. Are the pump <b>speed/pressure</b> settings below the pump maximum limitations?	<input type="checkbox"/>	<input type="checkbox"/>

**ALL ANSWERS SHOULD BE YES BEFORE PROCEEDING**

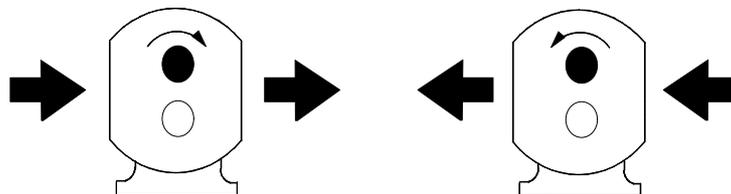
**IF THERE ARE ANY PUMPING PROBLEMS  
REFER TO THE FAULT FINDING CHART**

### 5.2 Pump Shut Down Procedure

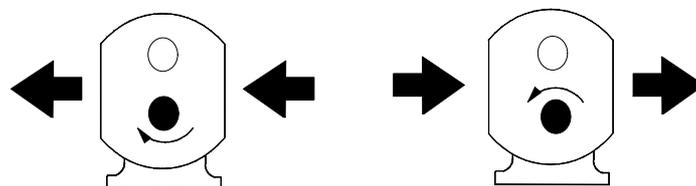
1. Turn the pump off.
2. Isolate the pump/drive unit from all power and control supplies.
3. Close the pipework valves to isolate the pump.
4. If the pump is to be dismantled refer to the dismantling section.

### 5.3 Direction of Rotation

The direction of flow is dictated by the direction of rotation of the drive shaft. Reversing the direction of rotation will reverse the flow direction. Top and bottom shaft drive pumps have opposite flow directions as illustrated.



**TOP SHAFT DRIVE**



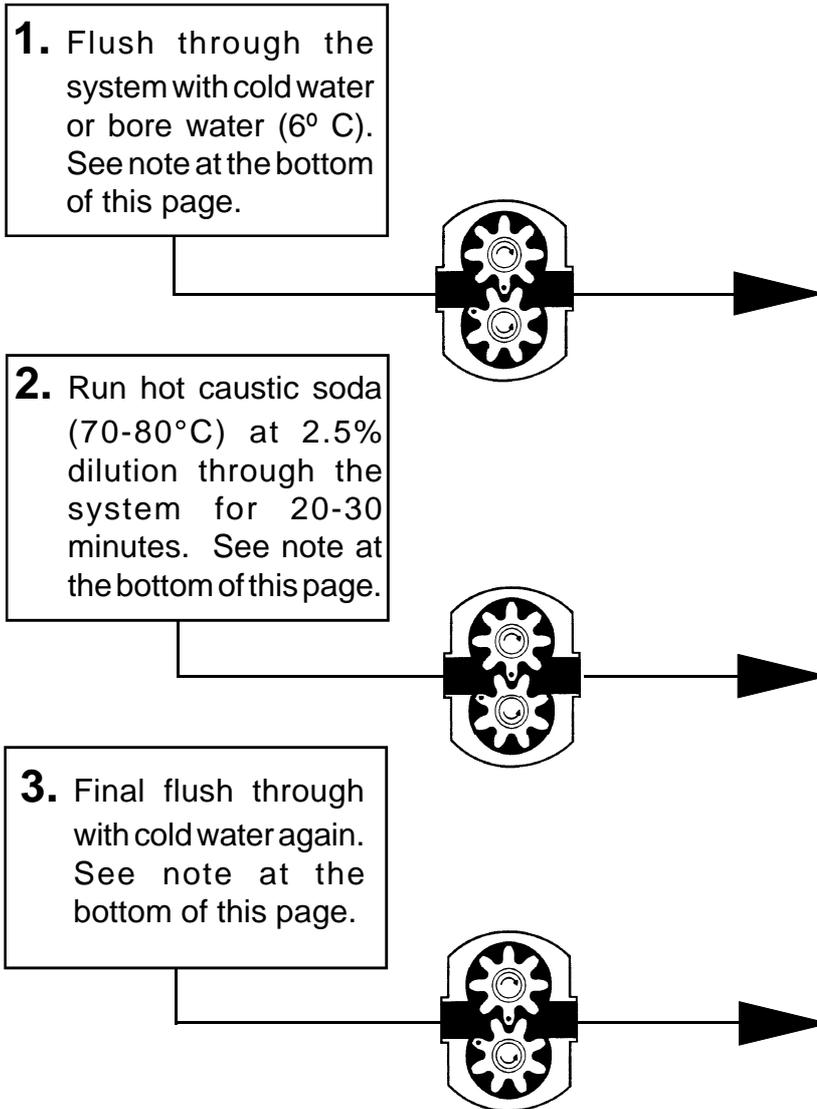
**BOTTOM SHAFT DRIVE**

←    → = Direction of flow

# Operating Manual

## 5.4 Cleaning in Place (CIP)

The pump can be manually cleaned or cleaned in place (CIP). The following is an example of a typical CIP procedure. However specific advice for each application should be sought from the pump supplier.



-  **NEVER** touch the pump or pipes as they will be extremely HOT!
-  **DO NOT** subject the pump to rapid temperature changes during C.I.P. procedures, as pump seizure can result from thermal shock. A suitable by-pass is recommended.
-  **ALWAYS** use rubber gloves and protective goggles when handling caustic agents.
-  **ALWAYS** rinse well with clean water after using a cleaning agent.
-  **ALWAYS** store/discharge cleaning agents in accordance with current rules/directives.

## **6.0 Maintenance and Inspection**

### **6.1 Maintenance Schedule**

It is advisable to install pressure gauges either side of pump so that any problems within the pump/pipework will be highlighted.

#### **YOUR WEEKLY SCHEDULE SHOULD INCLUDE:**

- CHECKING THE **MECHANICAL SEALS** FOR LEAKAGE AND REPLACING AS NECESSARY.
- CHECK **PUMPING PRESSURES**.
- CHECKING THE **OIL SEALS** FOR LEAKAGE.
- ADJUSTING THE **PACKED GLANDS** TO CONTROL LEAKAGE

### **6.2 Recommended Spare Parts**

The following table details the recommended spare parts which should be retained within your maintenance stock.

<b>Part Description</b>	<b>Quantity</b>
Lip Seal Drive End	2
'O' Ring Front Cover	1
Lip Seal Gland End	2
Rotors	2
Product Seals	2

## 7.0 Disassembly

---

### 7.1 Before Dismantling the Pump

Before starting to dismantle the pump  
ALWAYS:-



#### **Purge -**

the pump and system if any noxious products have been pumped.



#### **Isolate -**

pump/drive unit from all power and control supplies.



#### **Close -**

pipework valves to isolate the pump



#### **Disconnect -**

the pump from the drive unit.

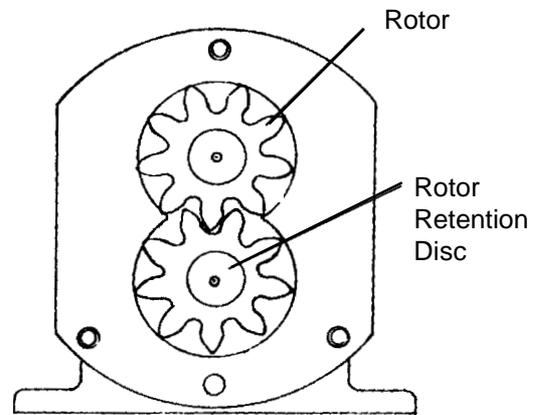
**READ THIS SECTION FIRST BEFORE  
CONTINUING TO DISMANTLE THE PUMP**

# Operating Manual

## 7.2 Dismantling the Pump

### Removing the Rotors

1. Carefully loosen the front cover retaining nuts, as there may still be residual pressure in the system.
2. Remove the front cover nuts followed by the cover.
3. Slacken and remove the rotor retention discs.
4. To assist extraction of the rotors insert a radiused end tool into the front recess of the rotor.
5. Flush out the rotorcase before continuing.



### Removing the Rotorcase

Pumps fitted with packed gland :-

1. Remove the gland follower nuts and withdraw the gland follower.
2. Ease the rotorcase off the dowel pins.
3. Tap the rotorcase with a soft mallet on both sides of the rotorcase. The rotorcase must be supported during this operation and not allowed to drop onto the shafts.

Pumps fitted with externally mounted mechanical seals :-

1. Ease the rotorcase off the dowel pins.
2. Take care not to damage the mechanical seals on removing the rotorcase.
3. Keep in complete sets and label top or bottom.

The pump head components may be reassembled by reversing the above procedures.

COMPONENT	Nm	lbft
Rotorcase Front Cover Nut	8.0	6.0
Rotor Retention Disc Screw	5.0	3.7

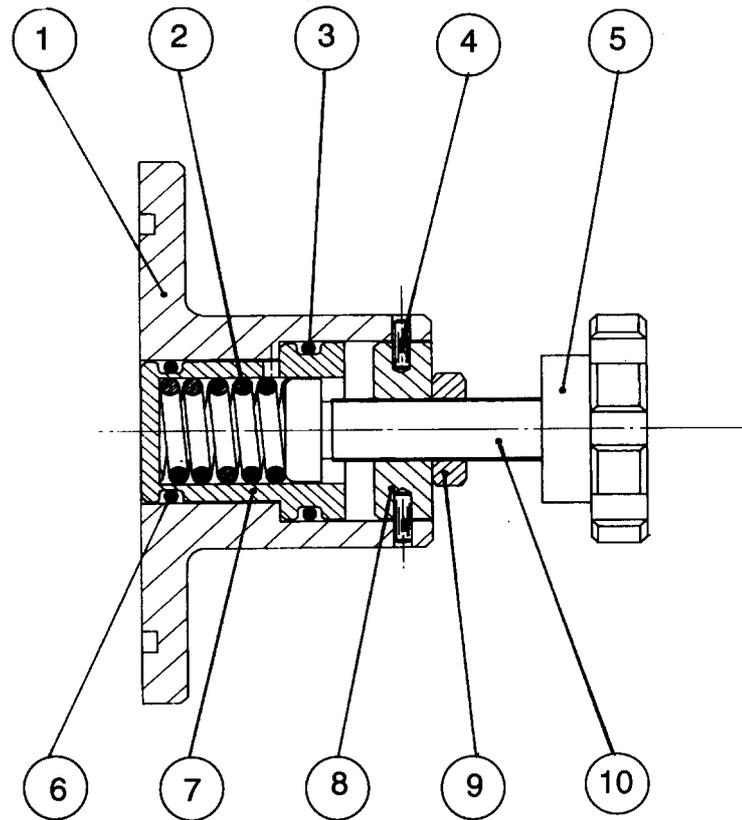
# Operating Manual

## 7.3 Fitting New Oil Seals

1. Remove gearcase cover or front seal retainer and press out the old seal.
2. Before fitting examine the new seal to ensure that it is clean and undamaged. If a spring is provided see that it is correctly located.
3. Examine the shaft and remove all roughness, sharp edges of key ways, screw threads of shoulders over which the sealing lip is passed. The slightest scratch on the sealing edge of an oil seal may cause leakage.
4. Smear the outside diameter of the seal with grease.
5. Press the seal into the housing (see that the spring will face the sealed liquid) a firm uniform pressure should be exerted preferably by means of an arbour press in combination with a suitable tool. (The diameter of the tool should be 0.1-0.4mm smaller than the housing diameter). Care must be taken to ensure the seal does not enter the recess in a tilted position as this will cause damage to the seal.
6. Smear the sealing lip with clean grease.
7. Pass the seal and housing along the shaft, a slight rotary action will assist the operation. Fasten the housing in position, using jointing compound on metal to metal faces.
8. Do not allow the assembly to rest for any length of time at an incomplete stage of fitting where it may cause the weight of the shaft or housing to be borne by the seal resulting in damage or distortion of the seal.

# Operating Manual

## 7.4 Automatic Pressure Relief Valve



ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	Rotorcase Cover (vented)	6	'O' Ring Guide
2	Spring	7	Valve
3	'O' Ring Valve Guide	8	Valve Guide
4	Valve Guide Retaining Pin	9	Lock Nut
5	Handwheel	10	Valve Shaft

### Dismantling :-

1. Turn the Valve Lock Nut (9).
2. Turn the Valve Handwheel (5) to release the Valve Shaft (10) and Guide (8) from the cover.
3. Push out the Valve complete with Spring (2) from the front cover (1).
4. Inspect and replace parts where necessary.

### Assembly :-

1. Lubricate 'O' Rings (3,6) and fit into the Valve recesses.

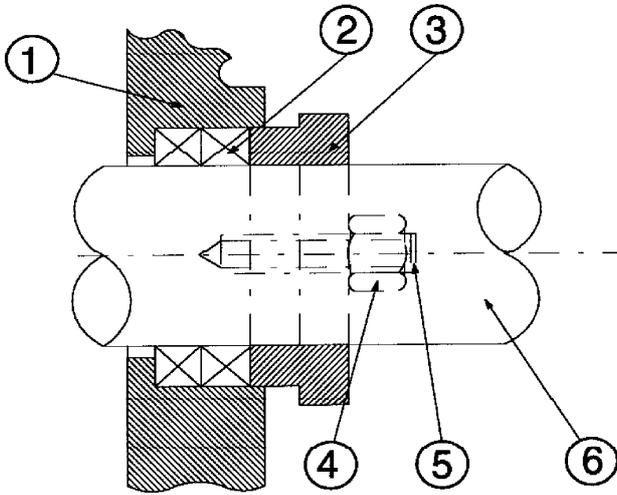
2. Insert the Spring (2) into the Valve and push the Valve into the Cover(1).
3. Screw Valve Locking Nut (9) and Guide (8) onto the Valve Shaft (10).
4. Push in and turn the assembly into the front cover (1).

### Setting the Valve :-

Run the pump, applying pressure to the system. If the Valve relieves at too low a pressure increase the spring tension by winding in the handwheel. Alternatively, should the Valve relieve at too high a pressure wind out the handwheel. Continue this procedure until the correct setting pressure has been attained.

## 8.0 Product Seals Removal and Fitting

### 8.1 Packed Gland



ITEM	DESCRIPTION
1	Rotorcase
2	Gland Packing
3	Gland Follower
4	Gland Nut
5	Gland Stud
6	Shaft

**PACKED GLANDS ARE DESIGNED TO BE ADJUSTED**

#### Removing The Packing

1. Release and pull back the gland follower.
2. Remove the rotorcase with gland housing packing and gland follower still assembled.
3. Inspect and replace the packing as necessary.

#### Fitting The Packed Gland

1. Insert the packing rings making sure they are in the correct order and positioned with the scarf points 120° apart.
2. Loosely locate the gland follower and nuts.
3. Refit the rotorcase with packed assembly over the shaft sleeves.

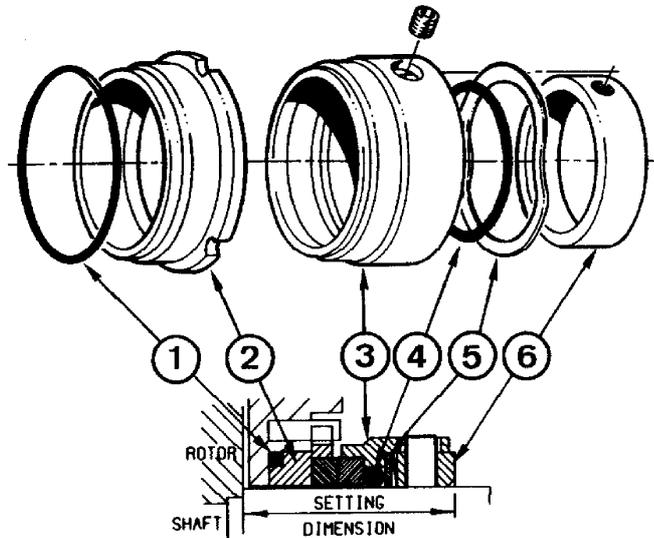
#### Adjusting the Packed Gland

**DRIP LEAKAGE IS ESSENTIAL TO PREVENT OVER HEATING OF THE GLAND AREA WHICH WILL CAUSE SEAL FAILURE**

1. Lightly tighten up the gland follower.
2. Flood the pump head and determine if the gland leakage is acceptable. Tighten the gland follower nuts until an acceptable leakage is achieved.
3. Start the pump and allow to run for 10 minutes. If the gland becomes significantly hotter than other parts of the pump, the gland is too tight.
4. Stop the pump and allow it to cool then repeat the above until the gland temperature is stable and gland slightly weeping.
5. Run the pump at 10 minute intervals tightening the gland follower nuts by a 1/6 of a turn until the leak is at an acceptable rate.

8.2 Single Mechanical Seal

Single Mechanical Seal



ITEM	DESCRIPTION
1	Stationary Face 'O' Ring
2	Stationary Face
3	Rotary Face
4	Rotary Face 'O' Ring
5	Wave Spring
6	Drive Spring

SEAL TYPE	SETTING DIMENSION
CARBON (UNPINNED) TUNGSTEN CARBIDE SILICON CARBIDE	27.8mm
CARBON (PINNED)	30.0mm

The seal comprises of a rotary face which is sealed to the shaft by an 'O' ring. A wave spring provides a force to maintain face to face contact. Rotation is provided by socket set screws which are tightened onto the shaft. The stationary face is located in the rotorcase.

**SEAL FACES ARE BRITTLE, TAKE EXTREME CARE WHEN HANDLING**

**REMOVING THE SINGLE MECHANICAL SEAL**

1. To release the seal from the shaft loosen the socket set screws.
2. Remove the rotorcase with the stationary sealing face still within its bore, taking care not to chip the face.
3. Carefully remove the remaining part of the seal from the shaft.

**Fitting the Single Mechanical Seal**

1. Using a solvent cleaner wipe the lapped surface of the seal faces until perfectly clean.
2. Lubricate the 'O' ring and shaft end with a silicon grease (food quality if necessary).
3. Firmly press the stationary face 'O' ring onto the stationary face edge and locate within the rotorcase bore.
4. Mark the shaft to indicate the seal setting length.
5. Push the 'O' ring within seal assembly face bore and gently slide the seal onto the shaft until it reaches the setting position.
6. Tighten the socket set screw.

## 9.0 Faults, Causes and Remedies

No Discharge	Under Capacity	Irregular Discharge	Prime lost after starting	Pump stalls when starting	Pump overheats	Motor overheats	Excessive power absorbed	Noise & vibration	Pump element wear	Excessive gland seal wear	Product loss through gland	Seizure	CAUSES	REMEDIES
*													Incorrect direction of rotation.	Reverse motor.
*													Pump un-primed.	Expel gas from supply line and pumping chamber and introduce liquid.
*	*	*	*					*					Insufficient NPSH available.	Increase supply line diameter. Increase suction head. Simplify supply line configuration and reduce length. Reduce speed
*	*	*	*					*					Product vapourising in supply line.	Decrease product temperature - check effect of increased viscosity on available and permitted power inputs.
*	*	*	*					*					Air entering supply line.	Remake pipework joints. Adjust or repack gland.
*	*	*	*					*					Gas in supply line.	Expel gas from supply line and pumping chamber and introduce liquid.
*	*	*	*					*					Insufficient head above supply vessel outlet.	Raise product level. Lower outlet position. Increase submergence of supply line.
*	*	*	*					*					Foot valve strainer obstructed or blocked.	Service fittings.
*	*	*	*					*					Product viscosity above rated figure.	Decrease pump speed. Increase product temperature.
*	*	*	*					*					Product viscosity below rated figure.	Increase pump speed. Decrease product temperature.
*	*	*	*					*	*			*	Product temperature above rated figure.	Cool the product pumping chamber. (Check with pump maker).
*	*	*	*					*	*				Product temperature below rated figure.	Heat the product pumping chamber. (Check with pump maker).
*	*	*	*					*	*				Unexpected solids in product.	Clean the system. Fit strainer to supply line.
*	*	*	*					*	*				Delivery pressure above rated figure.	Check for obstructions. Service system and revise to prevent problem recurring. Simplify delivery line.
*	*	*	*					*	*				Gland over-tightened.	Slacken and re-adjust gland.
*	*	*	*					*	*				Gland under-tightened.	Adjust gland. See not on packed glands under "Installation and Maintenance" heading.
*	*	*	*					*	*				Gland flushing inadequate.	Check that fluid flows freely into gland. Increase flow rate.
*	*	*	*					*	*				Pump speed above rated figure.	Decrease pump speed.
*	*	*	*					*	*				Pump speed below rated figure.	Increase pump speed.
*	*	*	*					*	*				Rotorcase strained by pipework.	Check alignment of pipes. Fit flexible pipes or expansion fittings. Support pipework.
*	*	*	*					*	*				Belts drive slipping.	Re-tension to maker's recommendations.
*	*	*	*					*	*				Flexible coupling misaligned.	Check large alignment and adjust mountings accordingly.
*	*	*	*					*	*				Insecure pump driver mountings.	Fit lock washers to slack fasteners and re-tighten.
*	*	*	*					*	*				Shaft bearing wear or failure.	Refer to pump maker for advice and replacement parts.
*	*	*	*					*	*				Worn un-synchronised timing gears.	Refer to pump maker for advice and replacement parts.
*	*	*	*					*	*				Geacase oil quantity incorrect.	Refer to pump maker's instructions.
*	*	*	*					*	*				Metal to metal contact of pumping element.	Check rated and duty pressures. Refer to pump maker.
*	*	*	*					*	*				Worn pumping element.	Fit new components.
*	*	*	*					*	*				Front cover relief valve leakage.	Check pressure setting and re-adjust if necessary. Examine and clean seating surfaces. Replace worn parts.
*	*	*	*					*	*				Relief valve chatter.	Check for wear sealing surfaces, guides etc - replace as necessary.
*	*	*	*					*	*				Relief valve incorrectly set.	Readjust spring compression. Valve should lift about 10% above duty pressure.

DIAGNOSIS WILL BE GREATLY ASSISTED BY TAKING ON-STREAM PRESSURE READINGS AT THE PUMP'S INLET AND OUTLET PORTS

## 10.0 Technical Data

### 10.1 Pump Information Chart

The following table details technical data regarding the pump range, for further details contact your supplier.

PUMP MODEL	PORT SIZE		DISPLACEMENT		MAXIMUM DISCHARGE PRESSURE		MAXIMUM SPEED
	in	mm	gal/100rev	l/100rev	lbf/in <sup>2</sup>	bar	rpm
N1-000S-H07	¼	6	0.45	2.05	100	7	1000
N1-000L-H07	½	12	0.85	3.86	100	7	1000
	1	25					

### 10.2 Lubrication

Pumps are to be filled with 0.3 litres of oil prior to operation with the recommended oil grades as follows:

BP Energol GR-XP150  
 Castrol Alpha SP150  
 Mobil Gear 629  
 Shell Omala 150  
 Texaco Meropa 150  
 Esso Spartan EP150

#### Oil Filling

Fill with oil through the filler plug on top of the gearbox to the level plug on the side of the gearbox.

#### Oil Changing

The oil must be changed with the pump static.

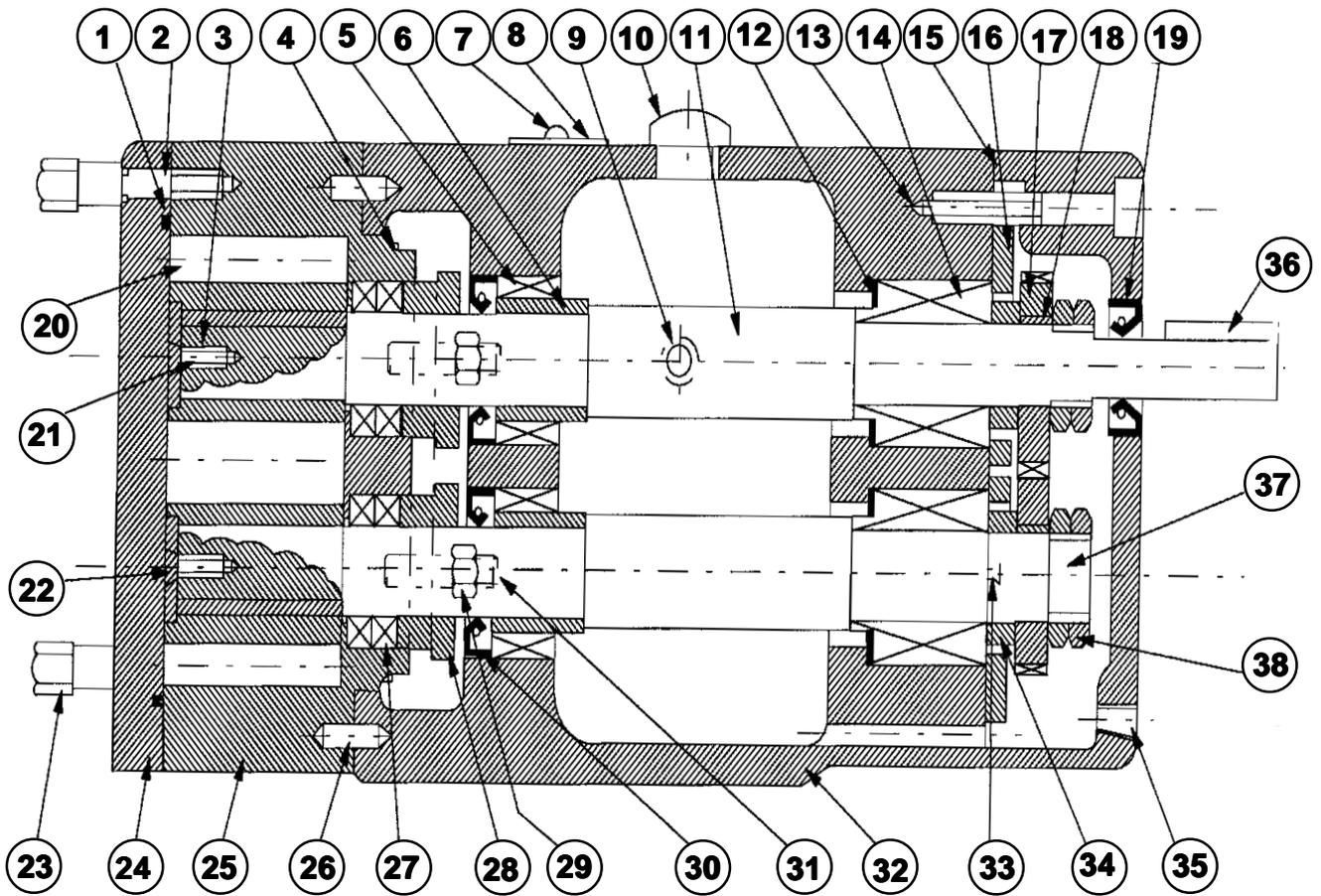
First change should be after 150 hours of operation, thereafter every 3000 hours of operation or a period of 2 years, whichever is the soonest.

# Operating Manual

## 11.0 Typical Sectional Arrangement

Item	Description	Qty
1	'O' Ring Rotorcase	1
2	Stud Rotorcase Cover	3
3	Key, Rotor	2
4	Screw, Gearcase	4
5	Bearing Needle	2
6	Bearing, Needle Ring	2
7	Screw, Hammer Drive	2
8	Nameplate	1
9	Plug, Level	1
10	Plug, Filler	1
11	Shaft, Drive	1
12	Shim, Bearing	2 Packs
13	Screw, Gearcase Cover	4
14	Bearing, Duplex	2
15	Cover, Gearcase	1
16	Retainer, Bearing	2
17	Gear, Timing	2
18	Key, Gear	2
19	Lip Seal, Drive End	1
20	Rotor, Roloid Gear	2
21	Screw, Disc Retention	2
22	Disc, Rotor Retention	2
23	Nut, Closed	3
24	Cover, Rotorcase	1
25	Rotorcase	1
26	Dowel	2
27	Gland Packing	2 Packs
28	Gland Follower	2
29	Nut, Gland Stud	4
30	Lip Seal, Gland End	2
31	Stud Gland	4
32	Gearcase	1
33	Screw, Bearing Retainer	4
34	Sleeve, Timing Gear	2
35	Plug, Drain	1
36	Key, Drive	1
37	Shaft, Auxiliary	1
38	Nut, Bearing	4

# Operating Manual







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