



INSTALLATION, OPERATION
AND
MAINTENANCE MANUAL
FOR THE



RANGE OF PUMPS



Installation, Operation and Maintenance Manual **For the Sterilobe Range of Rotary Lobe Pumps**

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1.0 Safety Information.

INCORRECT INSTALLATION, OPERATION, OR MAINTENANCE OF EQUIPMENT MAY CAUSE SEVERE PERSONAL INJURY OR DEATH AND/OR EQUIPMENT DAMAGE AND MAY INVALIDATE THE WARRANTY.

THIS INFORMATION MUST BE READ FULLY BEFORE BEGINNING INSTALLATION, OPERATION, OR MAINTENANCE AND MUST BE KEPT WITH THE PUMP. SUITABLY TRAINED OR QUALIFIED PERSONS MUST UNDERTAKE ALL INSTALLATION AND MAINTENANCE ONLY.

Danger - Failure to follow the listed precautionary measures may result in serious injury or death is identified by the following symbol:



Warning - Safety instructions which shall be considered for reasons of safe operation of the pump or pump unit and/or protection of the pump or pump unit itself are marked by the sign:

WARNING

DANGER

DO NOT OPERATE PUMP IF:



- The front cover is not installed correctly.
- Any guards are missing or incorrectly installed.
- The suction or discharge piping is not connected.



DO NOT place fingers, etc. into the pumping chamber or its connection ports or into any part of the gearbox if there is ANY possibility of the pump shafts being rotated. Severe injury will occur.



DO NOT exceed the pumps rated pressure, speed, and temperature, or change the system/duty parameters from those for which the pump was originally supplied, without confirming its suitability for the new duty. Running the pump outside of its operating envelope can cause mechanical contact in the pump head, excessive heat and can represent a serious risk to health and safety.



Installation and operation of the pump must always comply with health and safety regulations.

WARNING

A device must be incorporated into the pump, system, or drive to prevent the pump exceeding its stated duty pressure. It must be suitable for both directions of pump rotation where applicable. Do not allow pump to operate with a closed/blocked discharge unless a pressure relief device is incorporated. If an integral relief valve is incorporated into the pump, do not allow re-circulation through the relief valve for extended periods, refer to section 3.8



The mounting of the pump or pump unit should be solid and stable. Pump orientation must be considered in relation to drainage requirements. Once mounted, shaft drive elements must be checked for correct alignment. Rotate pump shaft by at least one full revolution to ensure smoothness of operation. Incorrect alignment will produce excessive loading and will create high temperatures and increased noise emissions. It may also be necessary to earth the pump to avoid the build up of a potential charge difference that could cause a spark.



The installation must allow safe routine maintenance and inspection (to check for leakage, monitor pressures, etc) and provide adequate ventilation necessary to prevent overheating.

WARNING

Sterilobe are shipped fully lubricated with a lithium based extreme pressure Grease suitable for sealed for life units.

WARNING

Before operating the pump, be sure that it and all parts of the system to which it is connected are clean and free from debris and that all valves in the suction and discharge pipelines are fully opened. Ensure that all piping connecting to the pump is fully supported and correctly aligned with its relevant connections. Misalignment and/or excess loads will cause severe pump damage. This could result in unexpected mechanical contact in the pump head and has the potential to be a source of ignition.

WARNING

Be sure that pump rotation is correct for the desired direction of flow (refer to section 3.1).

WARNING

Do not install the pump into a system where it will run dry (i.e. without a supply of pumped media) unless it is equipped with a flushed shaft seal arrangement complete with a fully operational flushing system. Mechanical seals require a thin fluid film to lubricate the seal faces. Dry running can cause excessive heat and seal failure.

WARNING

Pressure gauges/sensors are recommended, next to the pump suction and discharge connections to monitor pressures.



Caution must be taken when lifting the pump. Suitable lifting devices should be used as appropriate. Lifting eyes installed on the pump must only be used to lift the pump, not pump with drive and/or base plate. If pump is base plate mounted, the base plate must be used for all lifting purposes. If slings are used for lifting, they must be safely and securely attached.



DO NOT attempt any maintenance or disassembly of the pump or pump unit without first ensuring that:

- The pump is fully isolated from the power source (electric, hydraulic, pneumatic).
- The pumping chamber, pneumatic relief valve and any shaft seal support system are depressurised and purged.
- Any temperature control devices (jackets, heat-tracing, etc) are fully isolated, that they are depressurised and purged, and components are allowed to reach a safe handling temperature.



DO NOT attempt to dismantle a pressure relief valve, which has not had the spring pressure relieved, is still connected to a pressurised gas/air supply or is mounted on a pump that is operating. Serious personal injury or death and/or pump damage may occur.

WARNING

Use only genuine Viking Pump Hygienic parts.

All certification, standards, guarantees & warranties originally supplied with this pump will be invalidated by the use of non-genuine Service Parts.



DO NOT loosen or undo the front cover, any connections to the pump, shaft seal housings, temperature control devices, or other components, until sure that such action will not allow the unsafe escape of any pressurised media.



Pumps and/or drives can produce sound power levels exceeding 85dB (A) under certain operating conditions. When necessary, personal protection against noise must be taken



Avoid any contact with hot parts of pumps and/or drives that may cause injury. Certain operating conditions, temperature control devices (jackets, heat-tracing, etc.), bad installation, or poor maintenance can all promote high temperatures on pumps and/or drives.

WARNING

When cleaning, either manually or by CIP (cleaning in place) method, the operator must ensure that a suitable procedure is used in accordance with the system requirements. During a CIP cleaning cycle, a pump differential pressure of between 2 and 3 bar (30 and 45 psi) is recommended to ensure suitable velocities are reached within the pump head. The exterior of the pump should be cleaned periodically.



Surface temperature of pump is also dependent on the temperature of pumped medium.

1.1 Risk assessment relating to the use Viking Pump Sterilobe rotary lobe pumps units in potentially explosive atmospheres

Note: - For a feature to be suitable for an application, the feature must be fit for its designated purpose and also suitable for the environment where it is to be installed.

Source Of Hazards	Potential Hazards	Frequency Of Hazards	Recommended Measures
Unvented cavities	Build up of explosive gas	Very Rare	Ensure that pump is totally filled. Consider mounting ports vertically. See Chapter 1.0
Rotorcase / Rotors / Front Cover	Unintended mechanical contact	Rare	Ensure that operating pressures are not exceeded. Ensure that sufficient NPSH to prevent cavitation. See Chapter 1.0/3.4.1 Service plan.
Pump external surfaces	Excess temperature. Electrostatic charging	Rare	User must ensure temperature limits. Do not overfill gearboxes with lubricant. Provide a ground contact for pump. See Chapter 1.0/6.3 / Service plan.
Cover 'O' ring	Pump liquid leakage. Build up of explosive gas.	Very Rare	Check selection of elastomers are suitable for application. Ensure cover retaining nuts are tight. Service plan.
Pump casing / cover	Pump liquid leakage. Build up of explosive gas.	Very Rare	Stainless steel, Corrosion resistant.
Shaft seals	Excess temperature. Unintended mechanical contact. Leakage. Build up of explosive gas.	Rare	Selection of seal system must be suitable for application. See Chapter 5.0. Service plan. Seals must never run dry.
Auxiliary system for shaft sealing	Pump liquid leakage. Build up of explosive gas.	Rare	Selection of auxiliary seal system must be suitable for application. Seals must never run dry.
Rotation direction test	Excess temperature	Very Rare	If flushed seals are installed ensure that flush is applied to seal assemblies. Only allow pump to run for minimum period - just a few seconds.
Closed valve condition	Excess Temperature. Excess Pressure. Mechanical contact.	Rare	Can cause excessive pressure, heat and mechanical contact. See Chapter 1.0
Shaft	Random induced current	Very Rare	Provide a ground contact for pump. See Chapter 1.0.
Mechanical shaft coupling (Torque Protection)	Temperature from friction Sparks from break up of shear pins. Electrostatic charging	Rare	Coupling selection must suit application. See Chapter 1.0.
Mechanical shaft coupling (standard)	Break up of spider. Unintended mechanical contact. Electrostatic charging	Rare	Coupling selection must suit application. Service plan. See Chapter 1.0.

2.0 Introduction.

2.1 General.

Sterilobe rotary lobe pumps are manufactured Viking Pump, a unit of the IDEX Corporation.

This manual includes all the necessary information for Sterilobe pumps and should be read prior to beginning installation, operation, or maintenance.

Should you require any additional information regarding the Sterilobe pumps contact Viking Pump or their local Viking Pump Hygienic authorised distributor, refer to section 2.2.

When asking for assistance please provide the pump model and serial number. This information can be obtained from the pump nameplate which is located on the side of the bearing housing, refer to section 2.7. Should the nameplate be unreadable or missing the serial number is also stamped on either side of the rotorcase refer to section 2.7.

If the system or product characteristics are to be changed from the original application for which the pump was selected, Viking Pump or their Viking Pump Hygienic authorised distributor should be consulted to ensure the pump is suitable for the new application.

2.2 Viking Pump Hygienic Distributors.

Viking Pump distributes its products internationally via a network of authorised distributors. Throughout this manual where reference is made to Viking Pump, service and assistance will also be provided by any Viking Pump Hygienic authorised distributor for Sterilobe pumps.

2.3 Receipts and Storage.

Upon receipt of the pump, immediately examine it for any signs of visible damage. If any damage is noted, contact Viking Pump or your Viking Pump Hygienic distributor and clearly mark upon the carriers' paperwork that the goods have been received in a damaged condition, with a brief description of damage.

If the pump is not required for immediate installation then it should be stored in a clean, dry environment. It is recommended that storage temperature should be between -10°C and 40°C (14°F and 105°F). Further to the above, if the pump is not intended for installation or use within 18 months or more then refer to Viking Pump, or the Viking Pump Hygienic authorised distributor for storage recommendations.

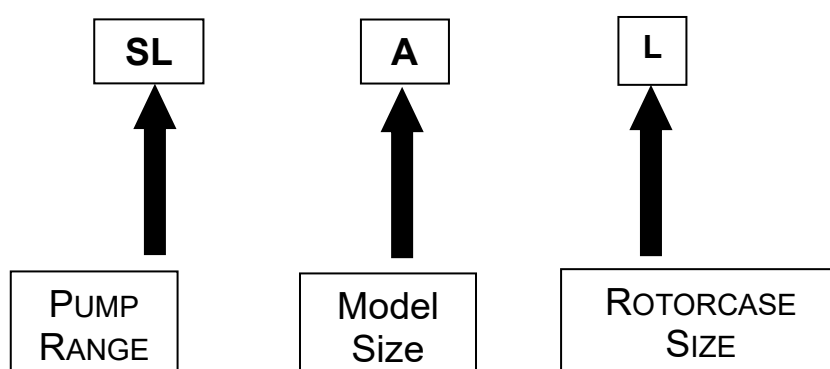
2.4 Pump Model Designation.

The designations of pump models are as follows:

SLAS ⇒ SLBS ⇒ SLCS ⇒ SLDS ⇒ SLES ⇒ SLFS ⇒ SLGS
SLAL ⇒ SLBL ⇒ SLCL ⇒ SLDL ⇒ SLEL ⇒ SLFL ⇒ SLGL

This information, together with the pump serial number, should be provided when requesting additional information on the pump or when ordering spare parts. The pump serial number is stamped on the pump nameplate and the rotorcase, (refer to section 2.7, Figs 3 and 4).

For the maximum operating pressures, temperatures and speeds refer to section 3.3, Fig 7.



2.5 Cleaning.

The Sterilobe pump range is suitable for manual cleaning, CIP (Clean In Place) and SIP (Sterilisation In Place) refer to section 3.4.1.

The mechanical seals are mounted directly behind the rotor and are designed and to minimise product entrapment and maximise the effects of cleaning.

This strategic positioning of the mechanical seals, combined with their ease of access provides an arrangement that can be more effectively cleaned by both manual and CIP/SIP procedures.

Whenever the pump head is dismantled, and at regular intervals as determined by local operating conditions and verified cleaning procedures, including installations where the pump is only operated using CIP procedures, the areas behind the rotor case adjacent to the mechanical seals and the seals/area behind the rotor retainers including the threads in the shafts should be inspected for seal deterioration or product contamination. If any is found then the pump head should be fully disassembled, cleaned and sanitised using a combination of appropriate cleaning solutions and brushes and new seals installed. Refer to Section 5 and 6 for seal assembly instructions.

It is recommended that the exterior of the pump be cleaned periodically with a non-aggressive, non-abrasive cleaning solution.

2.6 ATEX Information

ATEX Pump Requirements

Mechanical seals are a source of heat and must never be allowed to run dry. We would recommend provision be made to ensure that there is always flow or fluid around the pump seals. If there is a risk of the supply being interrupted, then a temperature monitoring system must be applied to ensure the pump does not exceed the Atex rating. The surface temperature of the pump is dependent on the temperature of the pumped fluid and a due account of this should be taken whilst undertaking your risk assessment of the installation. These pumps are Atex rated T3.

WARNING

Only use genuine spare parts that have been designed and verified Atex compliant by Viking Pump Hygienic, failure to use genuine spare parts will invalidate the Atex certification.

WARNING

Pumps that have the Atex certification will have an earthing point on the front cover, this needs to be electrically earthed before use.

WARNING


The service and maintenance intervals are increased on certified Atex units, refer to section 3.6.1 for the required routine maintenance. Failure to maintain the pumps to these intervals will result in the Atex certification being invalidated.

WARNING

When installing the unit make sure so far as reasonably practicable that the pump is aligned within 5 degrees to the horizontal – failure to align the unit could adversely affect the gearbox lubrication and could cause heat to build up.

It is the end user's responsibility to ensure that the Atex rating of the equipment supplied meets the requirements of the installation.

2.6.1 Equipment Groups & Categories

The pump range has been rated as  h II – 2 – G/D TEMP – T3

Temperature Class T3

Group II.

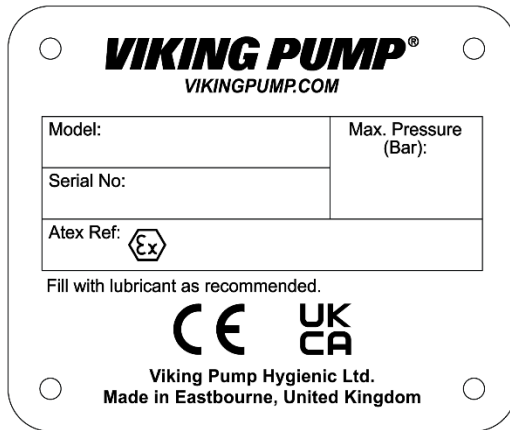
Category 2

Unit is suitable for environments containing dust or gas G/D

Equipment-groups (Annex I of the EC-Directive 94/9/EC)							
Group I (mines, mine gas and dust)		Group II (other explosive atmospheres gas/dust)					
Category M		Category 1		Category 2		Category 3	
1	2	G (gas) (Zone 0)	D (dust) (Zone 20)	G (gas) (Zone 1)	D (dust) (Zone 21)	G (gas) (Zone 2)	D (dust) (Zone 22)
for equipment providing a very high level of protection when endangered by an explosive atmosphere	for equipment providing a high level of protection when likely to be endangered by an explosive atmosphere	for equipment providing a very high level of protection when used in areas where an explosive atmosphere is very likely to occur		for equipment providing a high level of protection when used in areas where an explosive atmosphere is likely to occur		for equipment providing a normal level of protection when used in areas where an explosive atmosphere is less likely to occur	

The Atex rating is displayed on the pump nameplate see fig 2

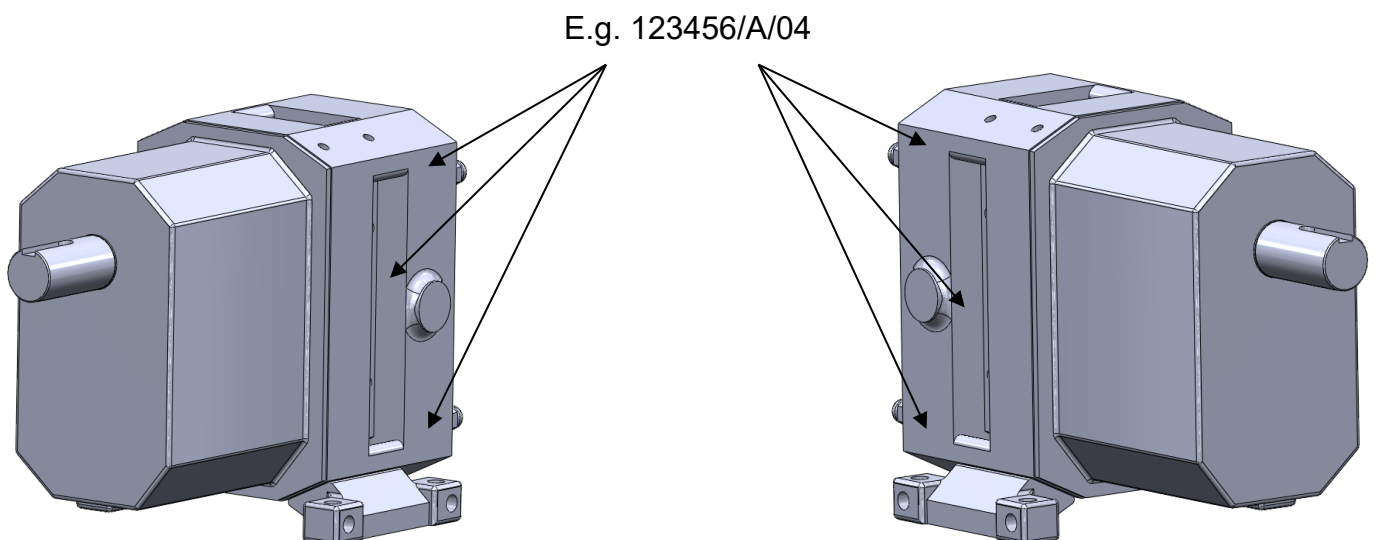
Fig 2 Nameplate.



2.6 Pump Model and Serial Number.

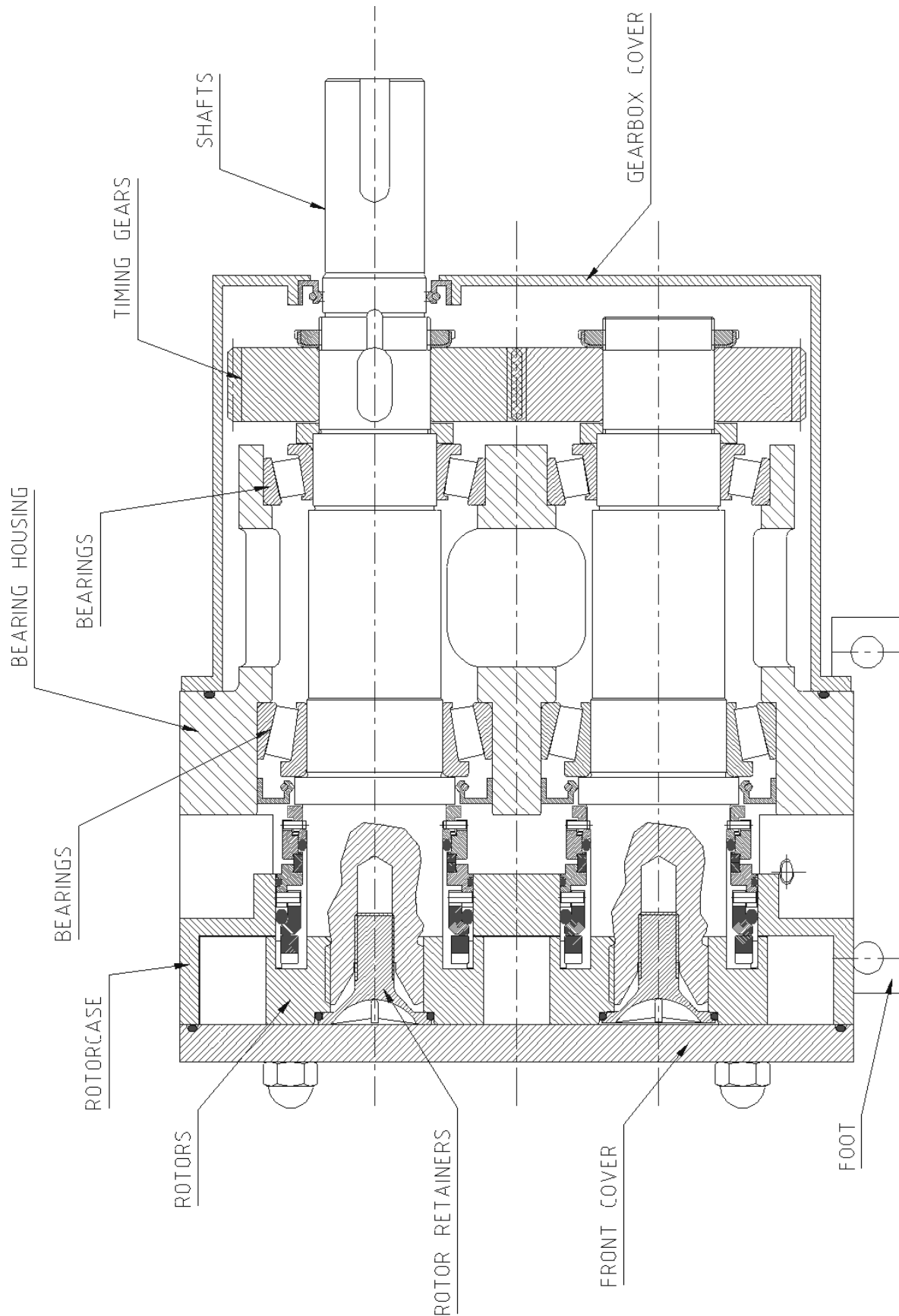
Should you require any information regarding your RTP™ rotary lobe pump contact Viking Pump or your Viking Pump Hygienic distributor, providing the pump model and serial number as stated on the pump nameplate, see Fig 2 in section 2.5.2, which is fixed to the pump gearbox cover. Should this be damaged or missing, the pump serial number is also stamped on opposite corners of the rotorcase, (see Fig 3).

Fig 4



2.8 Standard Pump Component Terms.

Fig 5



3.0 General.

3.1 Sterilobe Pumping Principle.

The pumping action of the rotary lobe pump principle is generated by the contra-rotation of two pumping elements (rotors) within a chamber (rotorcase) see Fig 6.

The rotors are located on shafts that in turn are held within a bearing housing mounted to the back of the rotorcase. The shaft assemblies comprise of, the shaft support bearings and the timing gears. The gears transfer the energy from the drive shaft to the driven shaft, synchronising the rotors such that they rotate without contact with each other.

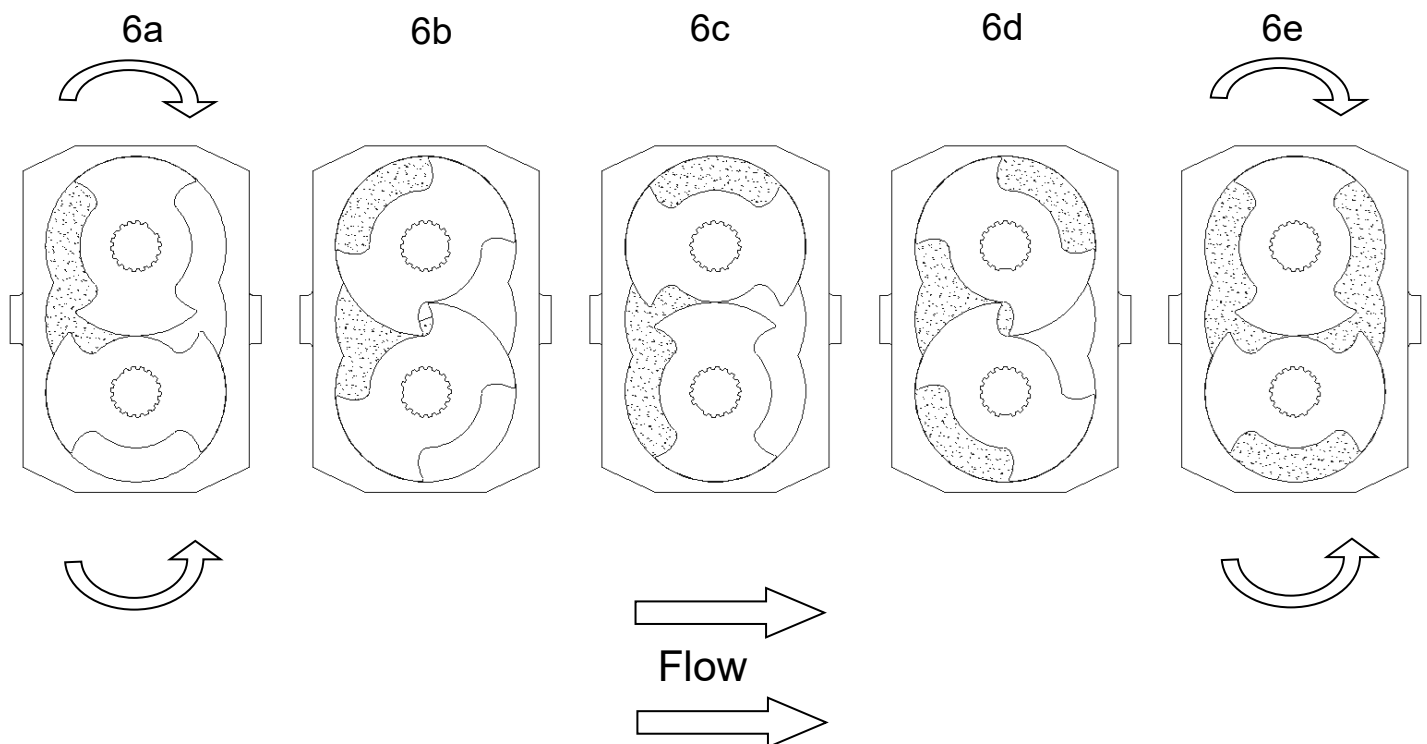
As the rotors pass the suction port, Fig 6a, the cavity increases creating a pressure decrease, which induces the pumped medium to flow into the rotorcase.

The pumped medium is carried around the rotorcase by the rotors, Fig 6b and 6c, to the discharge side of the pump, Fig 6d. Here the cavity decreases and the pumped medium is discharged from the rotorcase, Fig 6e.

For pump component terms see Fig 5.

3.2 Rotary Lobe Pump Principle.

Fig 6



3.3 Sterilobe Pump Operating Parameters.

The maximum pressure and speed operating parameters are given in Fig 7. In practice these may be limited due to the nature of the product to be pumped and/or design of the system in which the pump is to be installed. contact Viking Pump or your Viking Pump Hygienic distributor for assistance.

Fig 7

Pump Series	Theoretical Displacement			Nominal Connection Size		Max Diff. Pressure		Max Speed	Max Temp	
	Litre/rev	Imp. Gal /100 rev	US gal /100 rev	mm	inches	bar	psi	rev/min	°C	°F
SLAS	0.039	0.86	1.03	19	3/4"	15	218	1400	150	300
SLAL	0.059	1.30	1.56	25	1"	10	145	1400	150	300
SLBS	0.081	1.78	2.14	25	1"	15	218	1200	150	300
SLBL	0.122	2.68	3.22	38	1 1/2"	10	145	1200	150	300
SLCS	0.169	3.72	4.46	38	1 1/2"	15	218	1200	150	300
SLCL	0.254	5.59	6.71	50	2"	10	145	1200	150	300
SLCX	0.35	7.70	9.25	50	2"	6	87	1000	150	300
SLDS	0.352	7.74	9.30	38	1 1/2"	15	218	1000	150	300
SLDL	0.528	11.61	13.95	50	2"	10	145	1000	150	300
SLES	0.732	16.10	19.34	50	2"	15	218	800	150	300
SLEL	1.099	24.18	29.03	76	3"	10	145	800	150	300
SLFS	1.524	33.52	40.26	76	3"	15	218	600	150	300
SLFL	2.285	50.26	60.36	101	4"	10	145	600	150	300
SLFX	2.98	65.55	78.73	101	4"	6	87	600	150	300
SLGS	3.17	69.73	83.74	101	4"	15	218	600	150	300
SLGL	4.754	104.58	125.59	152	6"	10	145	600	150	300

WARNING

If the system or product characteristics are to be changed from the original application for which the pump was selected, Viking Pump or their Viking Pump Hygienic distributor should be consulted to ensure the pump is suitable for the new application.

The pump should not be subjected to sudden temperature changes to avoid the risk of damage from sudden expansion/contraction of components. Care should be taken when selecting pumps for handling liquids containing abrasive particles as these may cause wear of pump head components. For advice or assistance contact Viking Pump or your Viking Pump Hygienic distributor.

3.4 System Design and Installation.

When incorporating any pump into a system it is considered good practice to minimize piping runs and the number of pipe fittings (tees, unions, bends etc.) and restrictions. Particular care should be taken in designing the suction line, which should be as short and straight as possible with a minimum of pipe fittings to minimise restricting product flow to the pump. The following should be considered at the design stage of any system



Be sure ample room is provided around the pump to allow for:

- Access to the pump and drive for routine inspection and maintenance, i.e. to remove pump front cover and rotors.
- Ventilation of the drive to prevent overheating.



The exterior of the pump unit may exceed 68°C (154°F),
Appropriate measures must be taken to warn or protect operators.

WARNING

The pump must not be used to support piping. All piping to and from the pump unit must be independently supported. Failure to observe this may distort the pump head components or assembly and cause serious consequential damage to the pump.

Valves should be provided adjacent to the pump suction and discharge connections to allow the pump to be isolated from the system for routine inspection and maintenance.



Rotary lobe pumps are of the positive displacement type and therefore an overload protection device must be provided. This can take the form of:

- An in-line pressure relief system, i.e. external to the pump.
- Incorporation of a torque-limiting device in the drive system.

WARNING

It is recommended that all piping and associated equipment from the tank to the discharge point is thoroughly cleaned before installation of the pump to avoid the possibility of debris entering the pump and causing damage.

WARNING

Pressure gauges should be installed adjacent to the pump suction and discharge connections such that system pressures can be monitored. These gauges will provide a clear indication of changes in operating conditions and where a relief valve is incorporated in the system, will be necessary for setting and checking the functioning of the valve.

WARNING

It is imperative that the suction condition at the pump inlet meets the Net Positive Suction Head required (NPSHr) by the pump. Failure to observe this could cause cavitation, resulting in noisy operation, reduction in flow rate and mechanical damage to the pump and associated equipment.

WARNING

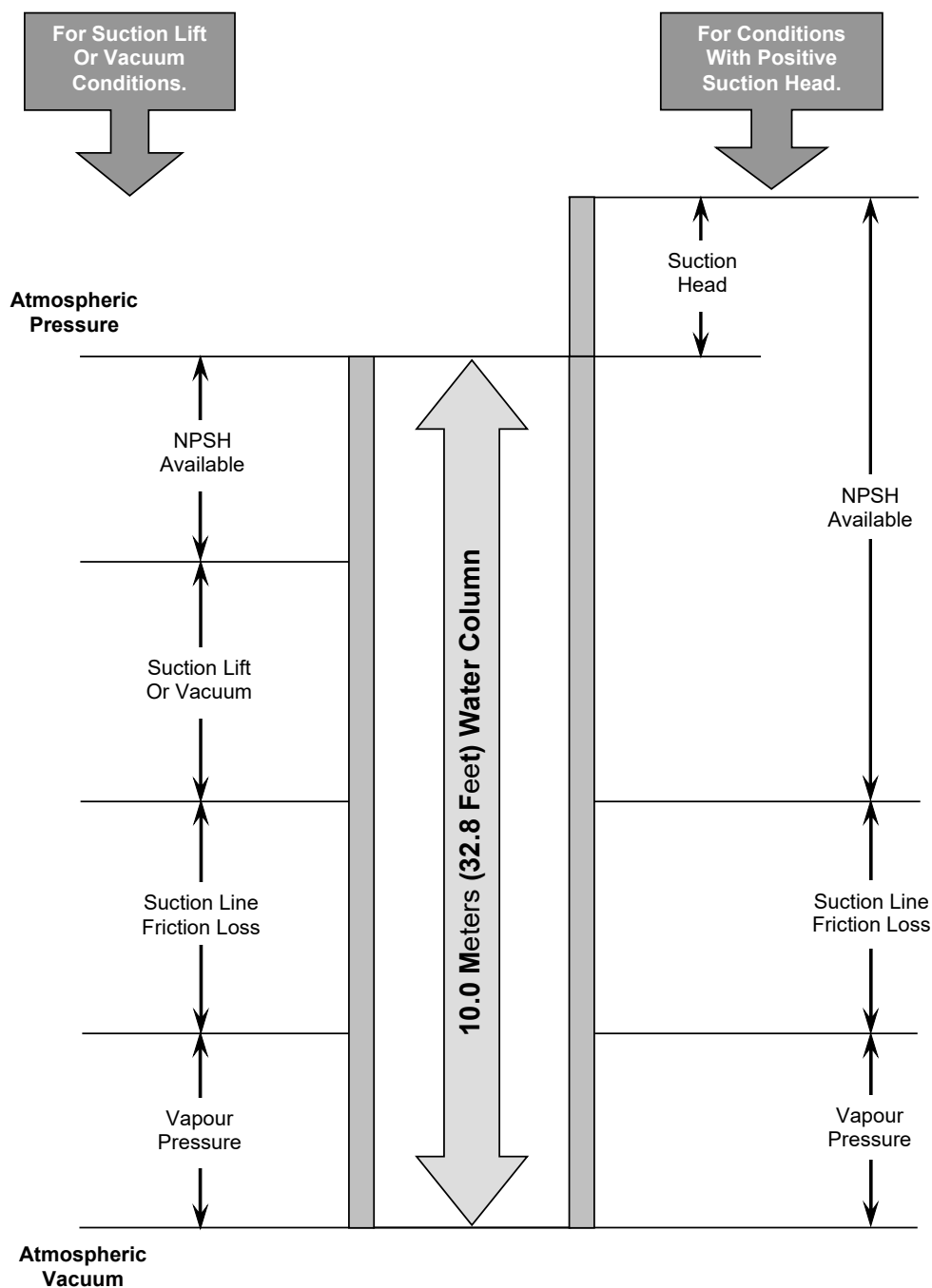
The Net Positive Suction Head available (NPSHa) from the system must always exceed the Net Positive Suction Head required (NPSHr) by the pump.

Observing the following general guidelines should ensure the best possible suction condition is created.

- Suction piping is at least the same diameter as the pump connections.
- The length of suction piping is kept to the absolute minimum.
- The minimum number of bends, tees and pipework restrictions are used.
- Calculations to determine system NPSHa are carried out for the worst condition see below.

Should advice on pump or system NPSH characteristics be required, contact the factory or their authorised distributor.

Fig 8



Where motor mounted options are to be installed follow the manufactures recommended guidelines. However, when installing a pump complete with base and drive the following guidelines must be observed:

- The preferred drive arrangement for any rotary lobe pump is in-line direct coupled.
- Flexible couplings must always be incorporated and correctly aligned within the limits recommended by the coupling manufacturer. To check coupling alignment rotate the shaft by at least one full revolution and ensure that the shaft rotates smoothly.



Couplings of a non-flexible design must never be used.

- Couplings must always be enclosed in a suitable guard to prevent contact with rotating parts that could result in personal injury. Guards should be of suitable material, and of sufficiently rigid design to prevent contact with rotating parts under normal operating conditions.



- When installing pump sets in flammable or explosive environments, or for handling flammable or explosive materials, special consideration must be given not only to the safety aspects of the drive unit enclosure but also to the materials used for both the coupling and the guard to eliminate the risk of explosion.



- Baseplates must be secured to a flat level surface such that distortion and misalignment are avoided. **Once baseplates are fastened in position the drive alignment must be re-checked.**
- When using electric motor drives, ensure that the electrical supply is compatible with the drive and controls and that the method of wiring is correct for the type of starting required by the motor i.e. Direct On Line, or other similar method. Ensure all components are correctly grounded.



3.4.1 Installation with CIP Systems.

The Sterilobe range has been designed to be effectively cleaned by the CIP procedures recommended for in place cleaning of process plant. To assist in maximising the effectiveness of cleaning within the pump head it is recommended that during the cleaning cycle a flow rate equivalent to a velocity of 1.5 metres per second; in a pipe of equal diameter to the rotor case connections is achieved. With a differential pressure of 2 to 3 bar (30 to 45 psi) being developed across the pump head

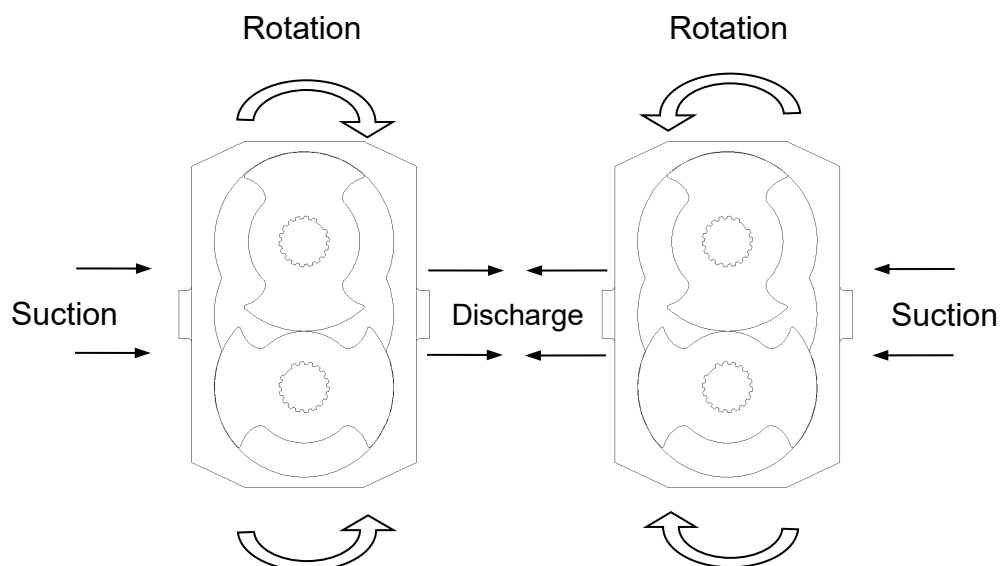
For applications where maximum drainage of the pump head is required, for example in the handling of 'Agri-Foodstuffs' and / or where CIP is employed, the pump ideally should be mounted with the rotor case connections in the vertical orientation. A procedure must be determined to ensure that the pump is effectively cleaned. It is recommended that this cycle would typically include a combination of some or all of the following: Acidic or Caustic based Detergents, 'Sanitisers', Disinfectants and Water rinses. These must be appropriate to both the products being handled and the materials of construction of the pump.

The Sterilobe pump range is also suitable for SIP treatment.

3.5 Start Up Procedure.

- WARNING** - Check that all piping and associated equipment are clean and free from debris and that all pipe connections are secure and leak free.
- WARNING** - For pumps installed with flushed product seals check that all auxiliary services are in place and connected and provide sufficient flow and pressure for flushing purposes
- WARNING** - Ensure lubrication is provided for both pump and drive. Sterilobe pumps are shipped pre-filled with grease; refer to section 8.4 grease capacities and grades.
- WARNING** - If an external relief valve is incorporated in the system check that it is set correctly. For start up purposes it is considered good practice to set the relief valve lower than the system design pressure. On completion of start up the relief valve should be set for the application. The required setting should never exceed the lower of either the pumps maximum pressure rating or the system design pressure. For setting integral relief valves, refer to sections 3.8.1 and 3.8.2.
- WARNING** - Ensure both suction and discharge valves are fully open, and pipe work is free from all obstructions. Sterilobe pumps are of the positive displacement type and should therefore never be operated against a closed valve as this would result in pressure overload, resulting in damage to the pump and possibly the system.
- WARNING** - Ensure rotation of the drive shaft is correct for the direction of flow required see Fig 9.

Fig 9



- Ensure product is available in the tank before starting pump. This is very important for pumps installed with un-flushed product seals, as these sealing arrangements must never be allowed to run dry.

- Before beginning operation it is considered good practice to momentarily start/stop the pump to check the direction of rotation and ensure that the pump is free of obstructions. Once this has been carried out, begin operation keeping a visual check on suction and discharge pressure gauges and monitor pump temperature and power absorbed where possible.

3.6 Shutdown Procedure.



After shutting the pump down close both the suction and discharge valves and ensure that the necessary safety precautions are taken:

- The prime mover power source has been isolated.
- If installed, the pneumatically operated integral relief valve has been depressurised.
- If installed, flushed product seal auxiliary services have been isolated and depressurised.
- Pump head and piping have been drained and purged.
- Before undertaking any work on a pump please refer to sections 4, 5, 6 and 7.

3.7 Routine Maintenance – Non Atex units.

Grease

- Check for any signs of lubricant leakage
- Low maintenance gearbox, factory filled with EP 00 semi-fluid grease. The grease should not require replacement during the lifetime of the bearings or until 20,000 hours of operation.

Oil

WARNING

- Check oil levels regularly.
- Change the oil every 12 months or 3000 operating hours, whichever is the sooner.

For lubricant capacities and grades refer to section 5.3.

Seal Replacement Interval:

It is recommended that the Rotor Retainer O-ring seal is replaced every 12 months to maintain a bacteria-tight seal.

Rotor Retainer Seal Inspection:

Periodically inspect the Rotor Retainer O-ring seal for any discolouration, nicks, or cracks. If any of the defects above are noticed, the O-ring seal must

be replaced. Inspection and replacement refer to the seal replacement procedure.

3.7.1 Additional Routine Maintenance – Atex units.

Grease

- Check for any signs of lubricant leakage on startup.
- Check for any signs of overheating.

Low maintenance gearbox, factory filled with EP 00 semi-fluid grease. The grease should not require replacement during the lifetime of the bearings or until 14,000 hours of operation.

Oil

WARNING

- Check oil levels on startup.
- Check for any signs of overheating.
- Change the oil every 6 months or 1500 operating hours, whichever is the sooner.

For lubricant capacities and grades refer to section 5.3.

After 14000 hours of use, the pump will need a general overhaul and it will need to be re-certified for use within the Atex environment.

WARNING

A general overhaul must include a full disassembly of all components and the following work carried out.

- Clean all pump components
- Examination of all components for damage/wear
- Replacement of all taper roller bearings
- Replacement of all elastomeric components
- Replacement of all seals, radial seals, and Gamma rings

The general overhaul must be carried out by qualified personnel in a specialist workshop with the appropriate equipment. Re-certification must then be carried out.

We highly recommend that the general overhaul is carried out by Viking Pump.

3.8 Integral Pressure Relief Valves. See Figs 10, 11, 12, 13, 14, and 15.

Most models in the Sterilobe series can be supplied with integral pressure relief valves with both spring and air loaded versions available. The function of the valves can be further enhanced with the option of manual or airlift override offering particular benefits where CIP or SIP is employed. Valves incorporating this option can be opened to regulate the volume of the cleaning media within the pump chamber thereby avoiding the need for manual cleaning or external by-pass.

Where the pump is mounted onto a portable base plate complete with motor and drive to be used as a mobile set, it is strongly recommended that an integral pressure relief valve is installed.

The Sterilobe integral pressure relief valves available include:

Spring Loaded - see Fig 10, 11, 12, & 13

Valve can be set to required pressure relief setting.

Spring Loaded with Manual Lift - see Fig 11.

Valve can be set to required pressure relief setting. Manual lift override can be used to open valve without disturbing pressure relief setting

Spring loaded with airlift - see Fig 13.

Valve can be set to required pressure relief setting. Airlift override, which operates on an air supply of up to 7 Bar (105-psi) depending on pressure relief setting, can be used to open valve without disturbing pressure relief setting

Air loaded with airlift - see Fig 14.

Valve, which operates on an air supply of up to 7 Bar (100 psi) for SLA - E, and 10 Bar (145 psi) for SLF, can be set to required pressure relief setting. Airlift override, which operates on an air supply of up to 7 Bar (100 psi) for SLA - E and 10 Bar (145 psi) for SLF, depending on pressure relief setting, can be used to open valve without disturbing pressure relief setting.

Air actuated relief valves can be operated remotely and interfaced with other elements of the system or process control.

WARNING

Integral pressure relief valves are normally used to protect the pump from the effects of increases in system pressure caused, for example, by a restricted or closed discharge line. In response to a pressure increase the valve opens and internally circulates the pumped media within the pump chamber.

When the valve opens, because the volume of fluid circulating is relatively small, the temperature of the fluid in the pump chamber may rise if the pump continues to operate for an extended period. In severe cases this may result in temperatures in excess of the pumps operating limits or vaporisation of the fluid, both of which should be avoided. For these reasons when the valve is activated the cause of the system pressure increase should be eliminated as continuous operation of the pump with the valve open is not recommended and may cause severe damage to the pump.

If the pump on which the valve is installed is to be installed in either a pressurised system or one incorporating a vessel under vacuum, the application of the valve should be referred to Viking Pump or Viking Pump Hygienic distributor.

The selection, setting and application of integral relief valves is influenced by the viscosity and nature of the pumped media, the pump operating speed and the required pressure relief setting and mode of operation. For these reasons, and to cover the diverse range of products, the conditions under which they are pumped, and application demands, it is not practical to factory set integral relief valves. The setting of the valve should be carried out on site under the proposed duty conditions for which the pump and valve were selected. Before beginning the relief valve setting procedure the pump should be installed, (see section 3.4) with a pressure gauge in the discharge line adjacent to the pump discharge port.



3.8.1 Setting and Operating Spring Loaded Valves. See Figs 10, 11, 12 and 13.

- Remove cover (108). For integral relief valve with manual lift, see Fig 11; first remove nut (129) and hand wheel (111).
- Loosen nut (107) using a pry bar in the holes provided, to relieve spring compression. For integral relief valve with airlift, see Fig 13, the air cylinder must be exhausted prior to unscrewing the nut (107).
- Start pump, refer to section 3.5.
- Screw in nut (107) using pry bar in holes provided until required pressure relief setting is reached.



WARNING

Note: Care should be taken not to exceed the lower of either the pumps maximum pressure rating or the system design pressure.

- Reinstall cover (108). For integral relief valve with manual lift, see Fig 11; reinstall hand wheel (111) and nut (129).
- The relief valve is now set.

For Integral Relief Valve with Manual Lift - see Fig 11.

- To operate the manual lift, turn the hand wheel (111) clockwise, which will lift the valve head (102/128). To resume normal operation turn the hand wheel (111) counter-clockwise.

For Integral Relief Valve with airlift - see Fig 13.

- To actuate the air lift connect an air supply not exceeding 7 Bar for SLA -E and 10 Bar for SLF to the cylinder (123) which will lift the valve head (112). To resume normal relief valve operation, exhaust the Cylinder (123).

3.8.2 Setting and Operating Air Loaded Valve. See Fig 14.

- Connect an air supply, via a regulating valve to the relief valve connection A in the cylinder (114). Do not turn on the air supply.
- Start the pump, refer to section 3.5.
- Using the regulating valve gradually increase the air pressure until required pressure relief setting is reached. The air pressure must not exceed 7 Bar SLA - E and 10 Bar SLF.
- The relief valve is now set.
- **SLF Only - If the valve assembly is disassembled, e.g. for maintenance or repair, it is necessary to apply a thread locking compound (Loctite 270 or similar) to the piston retaining screw (120).**

WARNING

Note: Care should be taken not to exceed the lower of either the pumps maximum pressure rating or the system design pressure.

- To use the air lift system the regulated air supply must be routed through a change over valve in order to transfer air from the relief valve load air chamber, connection A, to the lift air chamber, connection B while depressurising the load chamber and vice versa. The change over valve will actuate the air lift which will lift when the air supply is diverted to connection B, and will close, restoring normal relief valve operation, when the air supply is diverted back to connection A.

Danger

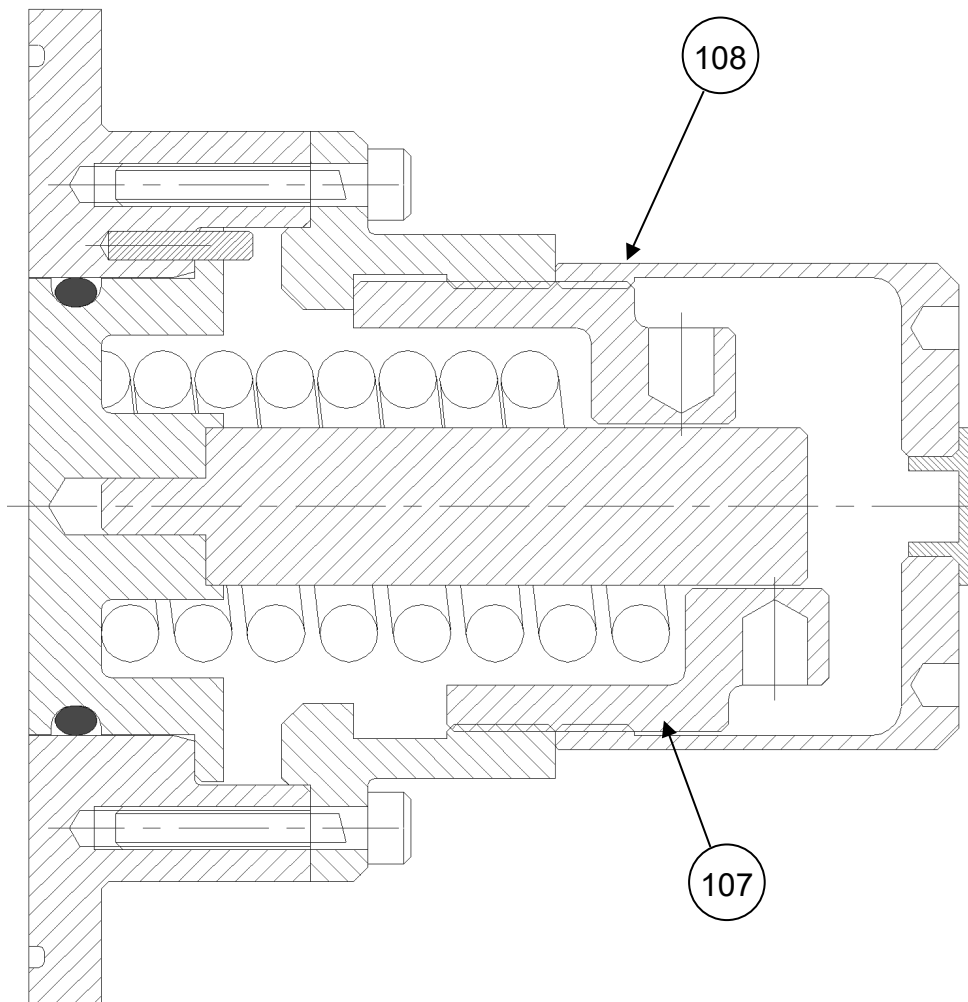


Under no circumstances should any attempt be made to dismantle a pressure relief valve which has not had the spring pressure relieved, is still connected to a pressurised air supply, or is mounted on a pump that is operating. Serious personal injury or pump damage may occur.

Spring Loaded Integral Pressure Relief Valve

SLA – E Typical.

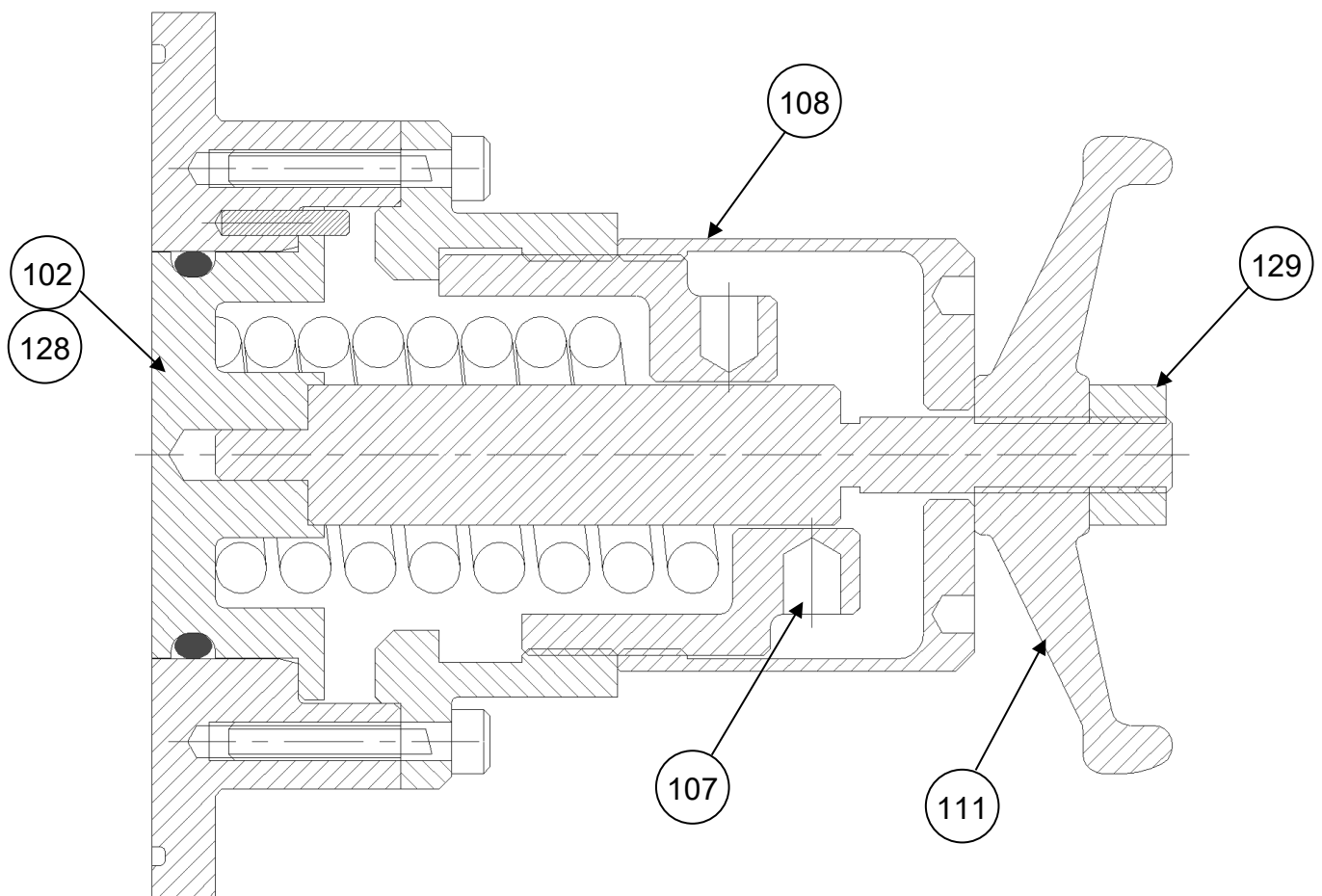
Fig 10



Spring Loaded Integral Pressure Relief Valve with Manual Lift

SLA - E Typical.

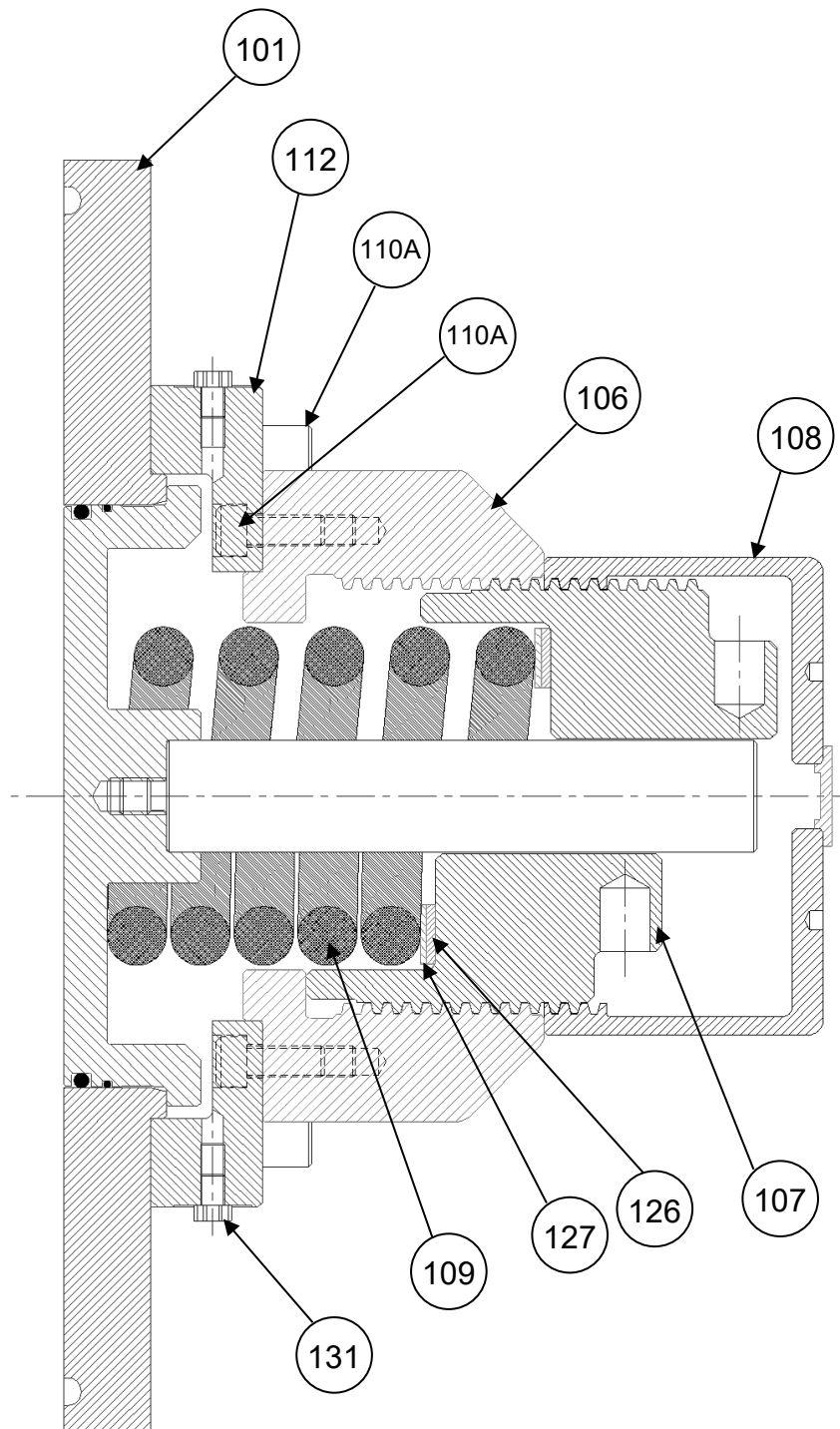
Fig 11



Spring Loaded Integral Pressure Relief Valve

SLF Typical.

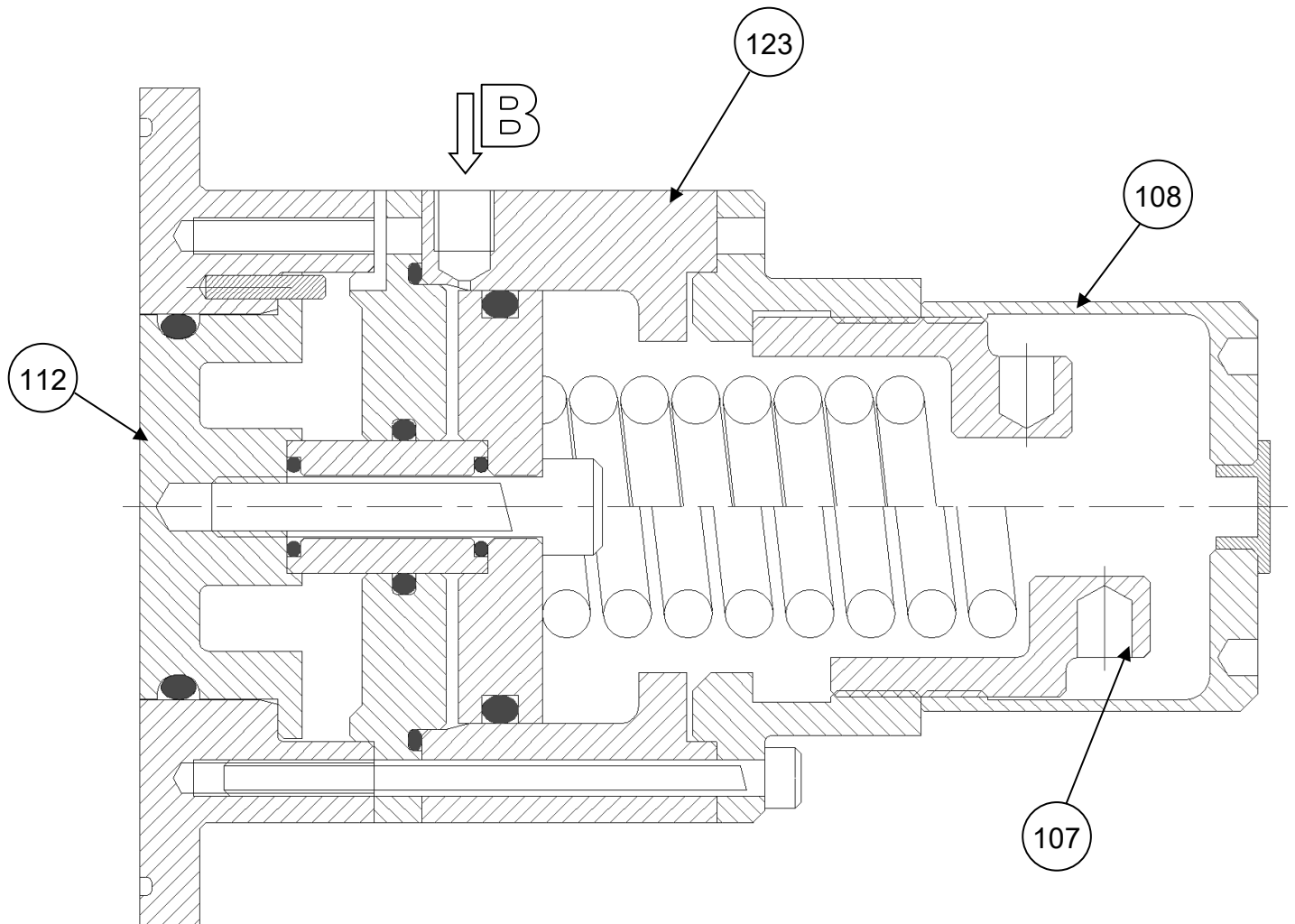
Fig 12



Spring Loaded Integral Pressure Relief Valve with Airlift

SLA – E Typical.

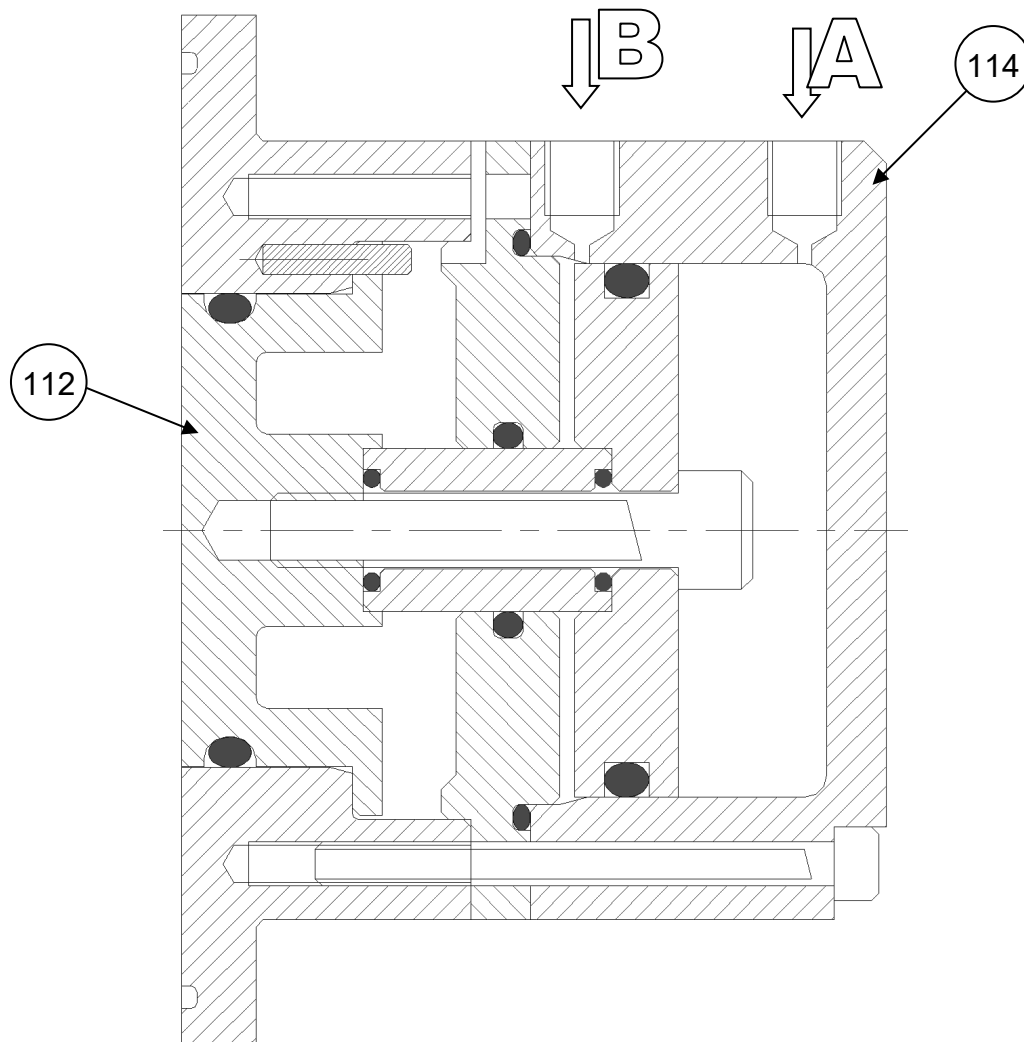
Fig 13



Air Loaded Integral Pressure Relief Valve with Airlift

SLA – E Typical.

Fig 14



3.9 Rectangular Inlet.

Fig 16

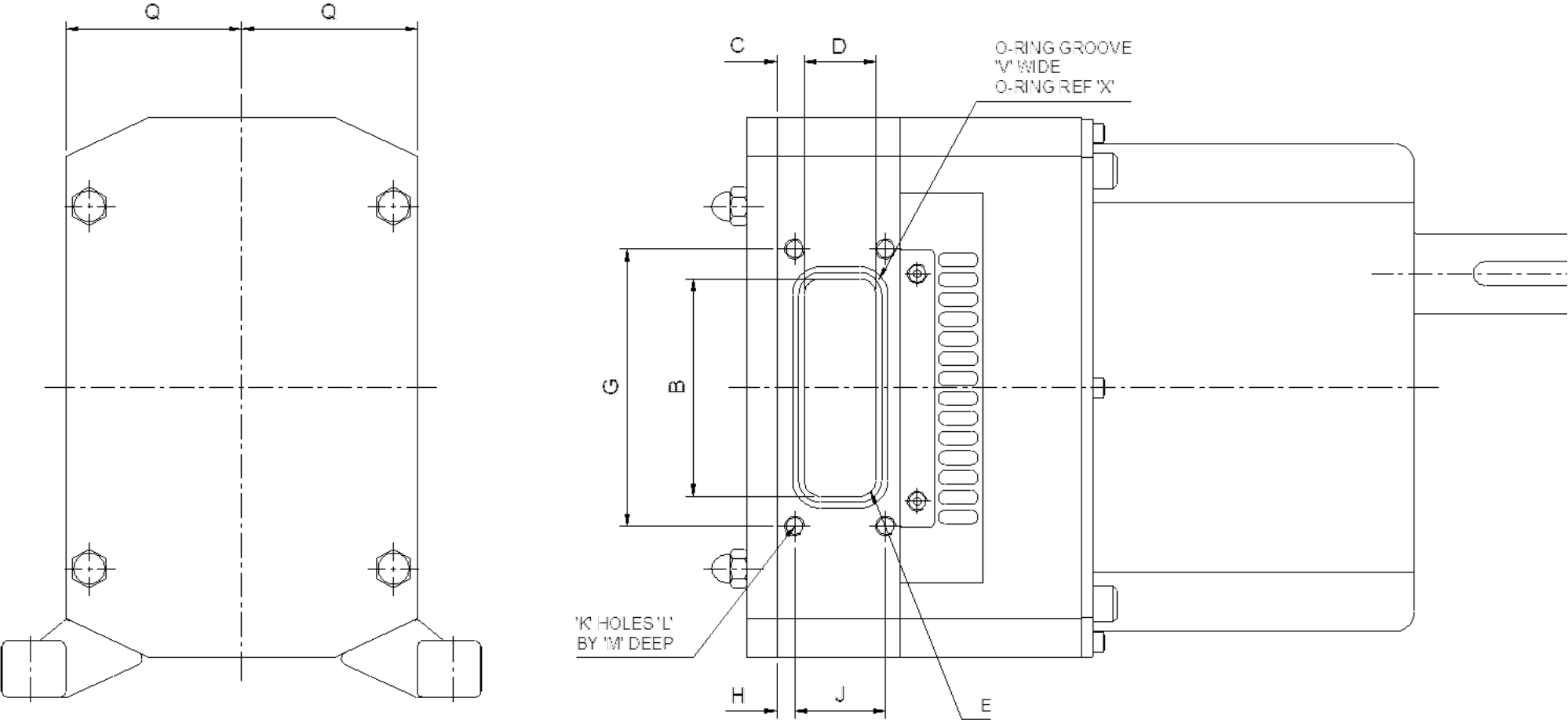
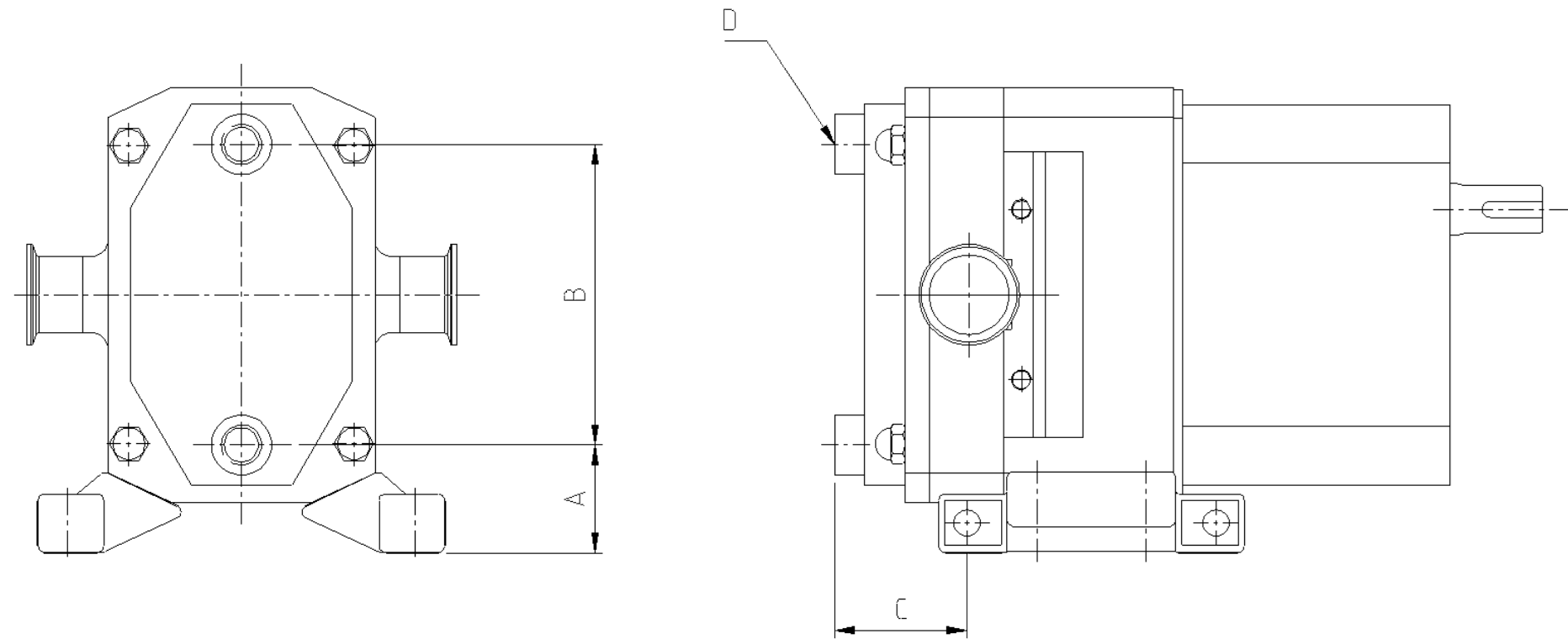


Fig 17

	SLAS	SLAL	SLBS	SLBL	SLCS	SLCL	SLDS	SLDL	SLES	SLEL	SLFS	SLFL	SLGS	SLGL
B	64	64	64	64	80	80	110	110	138	138	156	156	188	188
C	6	6	8	8	9	9	11	11	11	11	11	11	11	11
D	11.5	20	15	27	21	35	23	42	34	58	56	90	96	149
E	5	5	5	5	8	8	8	8	8	8	8	8	8	8
G	80.2	80.2	86.2	86.2	102.2	102.2	140.3	140.3	188.3	188.3	216.3	216.3	248.3	248.3
	79.8	79.8	85.8	85.8	101.8	101.8	139.7	139.7	187.7	187.7	215.7	215.7	247.7	247.7
H	11.75	6	7	7	9	9	10	12	10	10	15	15	20	20
J	N/A	20.2	17.2	29.2	21.2	35.2	25.3	40.3	36.3	60.3	48.3	82.3	78.3	131.3
		19.8	16.8	28.8	20.8	34.8	24.7	39.7	35.7	59.7	47.7	81.7	77.7	130.7
K	2	4	4	4	4	4	4	4	4	4	4	4	4	4
L	M6	M6	M8	M8	M8	M8	M10	M10	M12	M12	M16	M16	M16	M16
M	8	8	10	10	10	10	12	12	14	14	18	18	18	18
Q	45	45	60	60	66.5	66.5	89	89	117	117	132	132	149	149
V	3	3	3	3	3	3	3	3	3	3	3	3	3	3
X	134	137	137	141	144	150	152	154	156	158	160	163	167	173

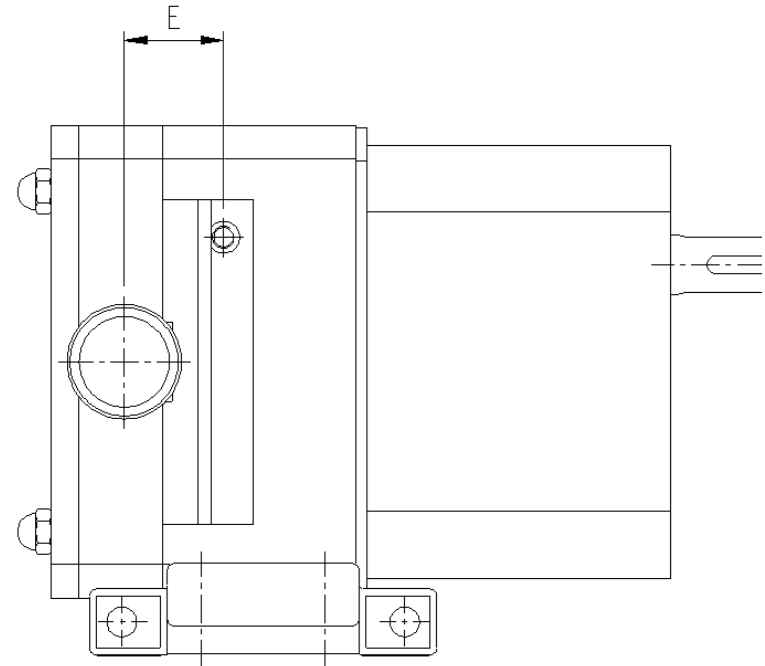
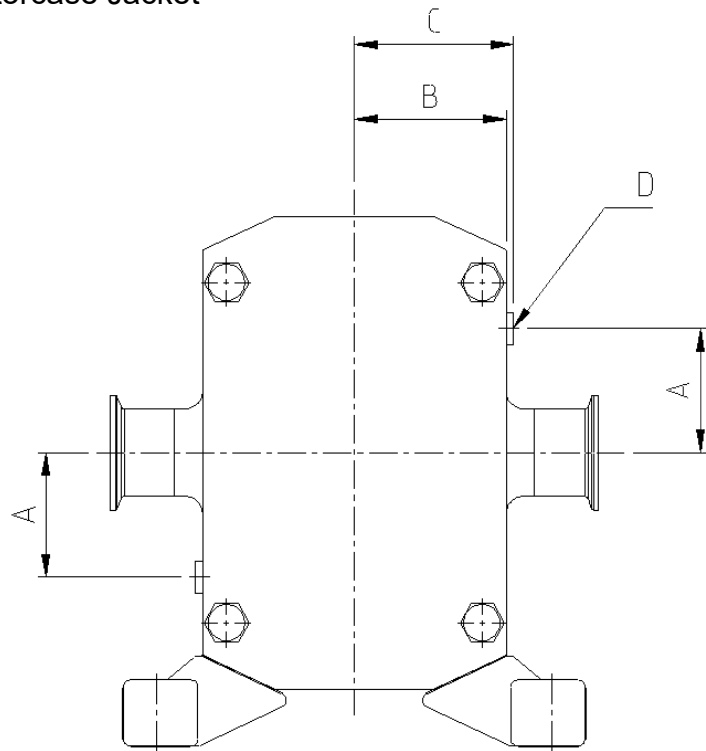
Notes: Dimensions are in mm and are for guidance only and should not be used for installation purposes.
Certified dimensions will be supplied on request

3.9.1 Front Cover Jacket



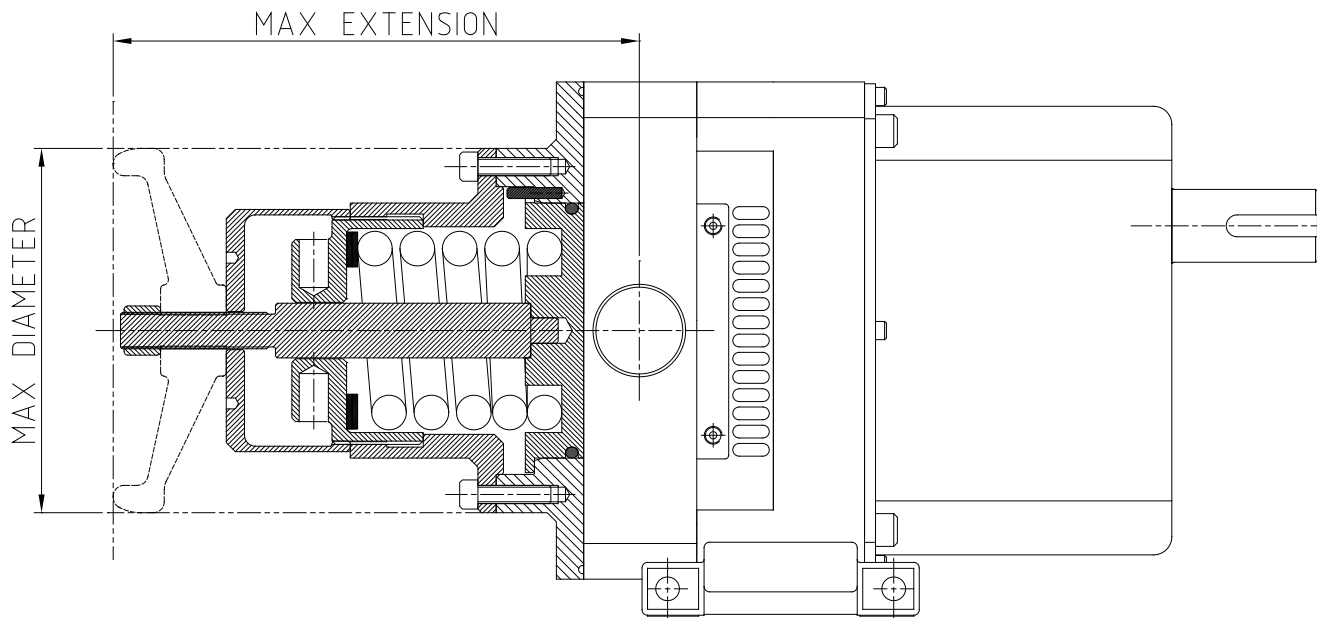
	SLAS	SLAL	SLBS	SLBL	SLCS	SLCL	SLDS	SLDL	SLES	SLEL	SLFS	SLFL	SLGS	SLGL
A	43		46.5		54		52		62		66		66	
B	90		110		150		210		260		300		370	
C	67.3	76	83.5	95.5	65.9	79.9	77	96	67.2	91.2	102.5	136.5	154	207
D	1/4" BSP		1/2" BSP											

3.9.2 Rotorcase Jacket



	SLAS	SLAL	SLBS	SLBL	SLCS	SLCL	SLDS	SLDL	SLES	SLEL	SLFS	SLFL
A	28		42.4		54.5		65.5		86		67	
B	54.5		62		70		93		95		102	
C	45		60		66.5		89		117		132	
D	1/8" BSP											
E	37 - 39	41 - 43	41 - 43	46 - 48	44 - 46	52 - 54	51 - 53	61 - 63	53 - 55	65 - 67	65 - 67	80 - 82

3.9.3 Relief Valve Maximum Dimensions



Note: Max Diameter may be valve body or Hand-wheel (if fitted).

All Dimensions in mm

Sterilobe Model	Spring Loaded Integral Pressure Relief Valve		Spring Loaded Integral Pressure Relief Valve with Manual Lift (Hand- Wheel)		Spring Loaded Integral Pressure Relief Valve with Airlift		Air Loaded Integral Pressure Relief Valve with Airlift	
	Max Diameter	Max Extension	Max Diameter	Max Extension	Max Diameter	Max Extension	Max Diameter	Max Extension
SLAS	105	142	105	171	105	199	105	106
SLAL		146		175		203		110
SLBS	105	147	105	176	105	204	105	110
SLBL		154		183		211		118
SLCS	150	171	160	219	150	237	150	124
SLCL		177		225		243		130
SLDS	200	222	200	280	200	286	200	131
SLDL		231		289		295		140
SLES	200	230	200	288	200	294	200	139
SLEL		242		300		306		151
SLFS	265	288					263	179
SLFL		307						198

4.0 Sterilobe pump Dismantling and Assembly.



Before undertaking any work on the pump the recommended shutdown procedure should be followed, refer to section 3.6, and site safety practices must be observed.



While dismantling or assembling the pump it is essential to ensure that the pump and/or components are secured to provide adequate stability.



Large pump components or sub assemblies should be lifted using suitable devices. Use threaded holes for the attachment of lifting eyes where appropriate.

During dismantling or before assembly all components should be inspected for fit, wear, and damage. If worn or damaged the components should be replaced before re-assembly.

The position of all parts should be identified as they are removed to ensure they are reinstalled in the same position.

Lipseals and o-rings are incorporated within the bearing housing assemblies and the gearbox cover to contain the lubricant for the bearings and timing gears. Regular inspection and correct maintenance of these items will ensure that the lubrication is sustained and the pump maximum working life is achieved. To ensure this, it is extremely important that care is taken when removing and installing new o-rings and lipseals. When removing and replacing lipseals ensure that the location bore for the outside diameter and the seat for the back of the lipseal is not damaged as this may create a leak path for the lubricant.

When removing and refitting lipseals or o-rings care should be taken to avoid cutting or tearing the sealing faces as they pass over keyways, splines, threads or other potentially sharp or abrasive edges. All lipseals and o-rings should be carefully examined and if damaged in any way, replaced on assembly.

All o-rings and sealing lips of lipseals should be lightly lubricated with a suitable lubricant (silicon grease, etc.) before installing.

When installing lipseals do not allow the rear face to come into contact with bearings see section 8.3 for details

Prior to beginning assembly, ensure all parts are clean and free from burrs or damage. Where a vice is to be used, it should have protective jaws to avoid damage to components. Do not hammer or apply undue force to install or position components.

All fasteners are required to be tightened to the required torque setting during assembly, refer to section 8.2.



The preferred method of installing bearing cones is to heat them to approximately 120°C (250°F) prior to installation. During this operation protective gloves should be used. Once bearing cones are installed in correct position they should be allowed to cool before proceeding with assembly. As an alternative, bearing cones may be pressed into position providing the proper equipment is employed and the necessary procedures are used to prevent component damage.

Under no circumstances should bearing cones or cups be hammered into position.

4.1 Pump Assembly SLA to SLF.

4.1.1 Shaft Assembly.

Fig 18

- Install a nominal 0.1mm (0.003") shims (5.12) and bearing cone (5.03) onto shaft (5.01 / 5.02)

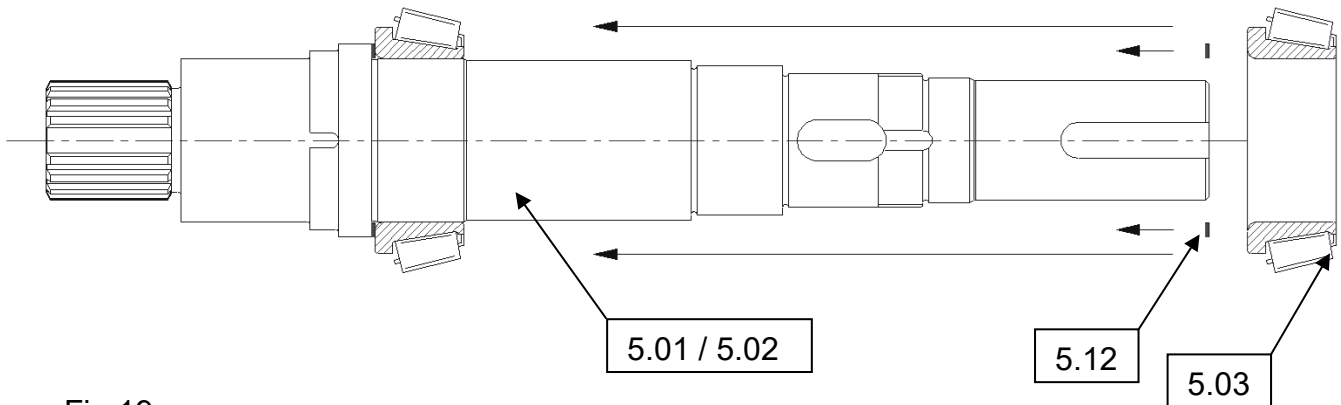
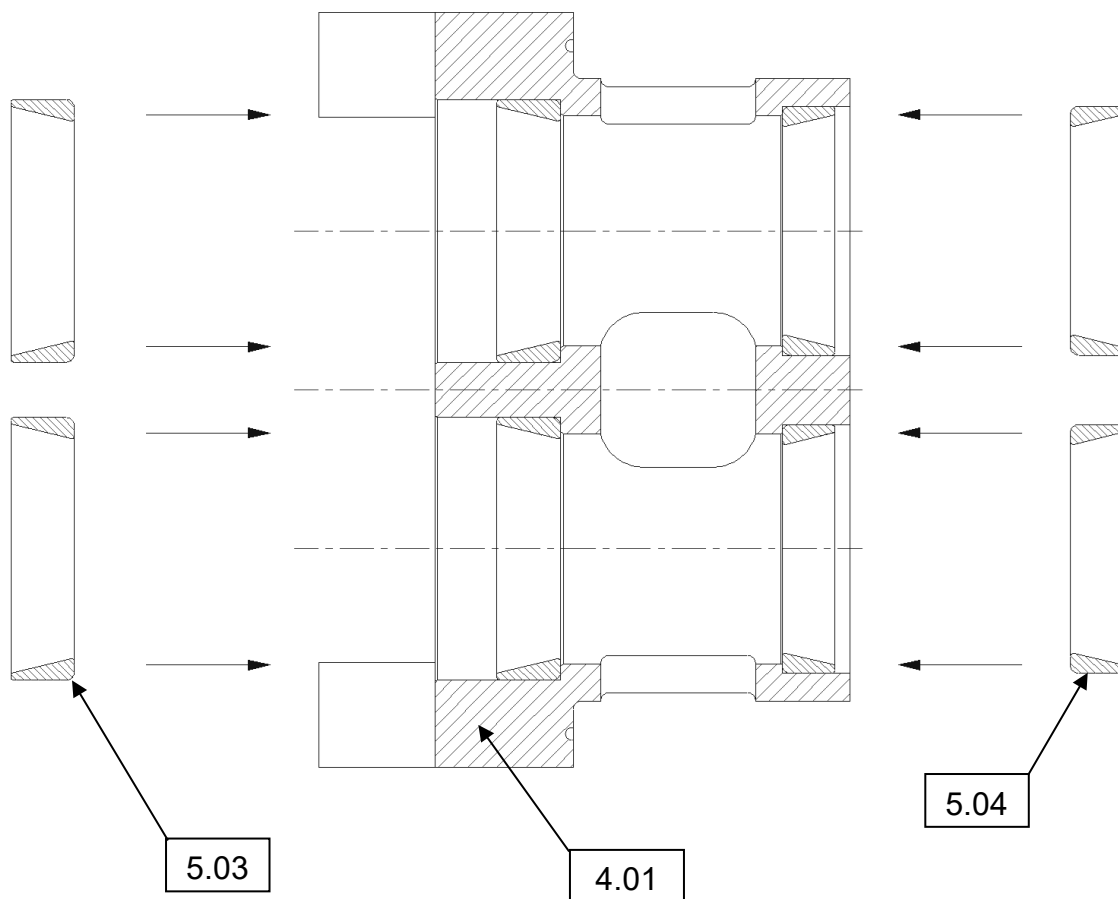


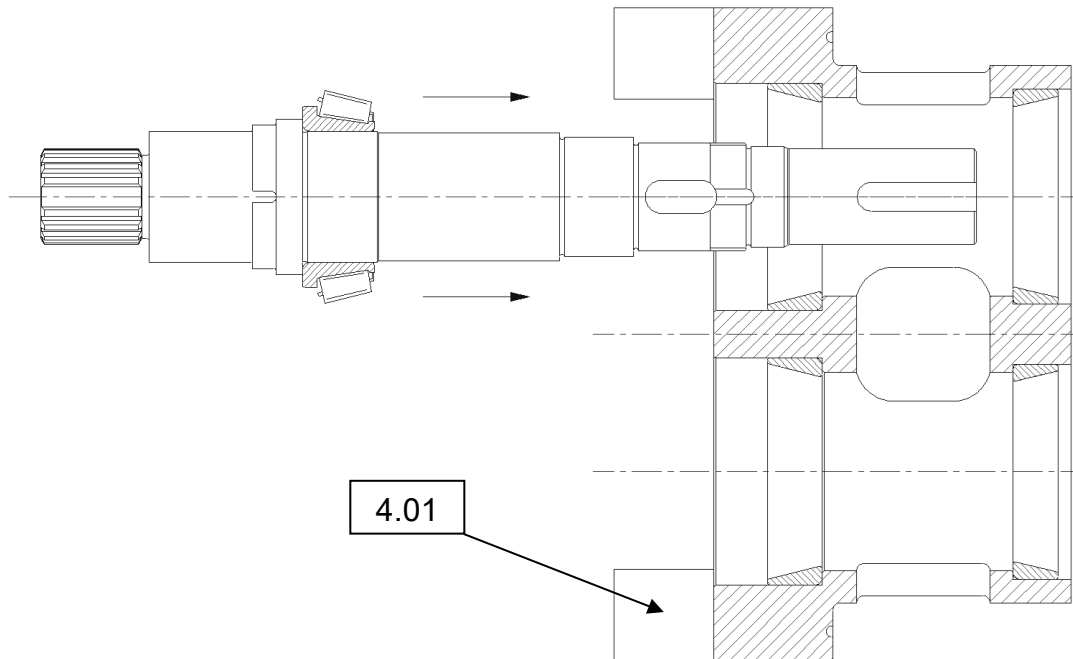
Fig 19

- Install bearing cups (5.03 / 5.04) into the bearing housing (4.01)



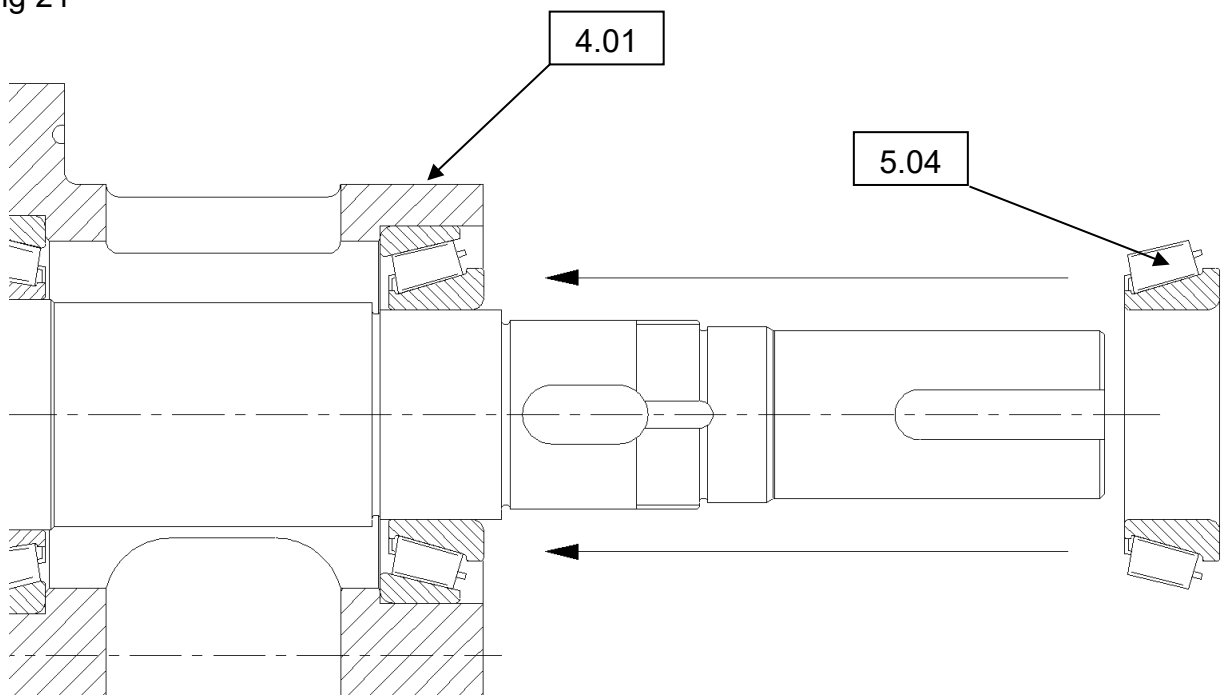
- Install shafts assemblies into the bearing housing (4.01)

Fig 20



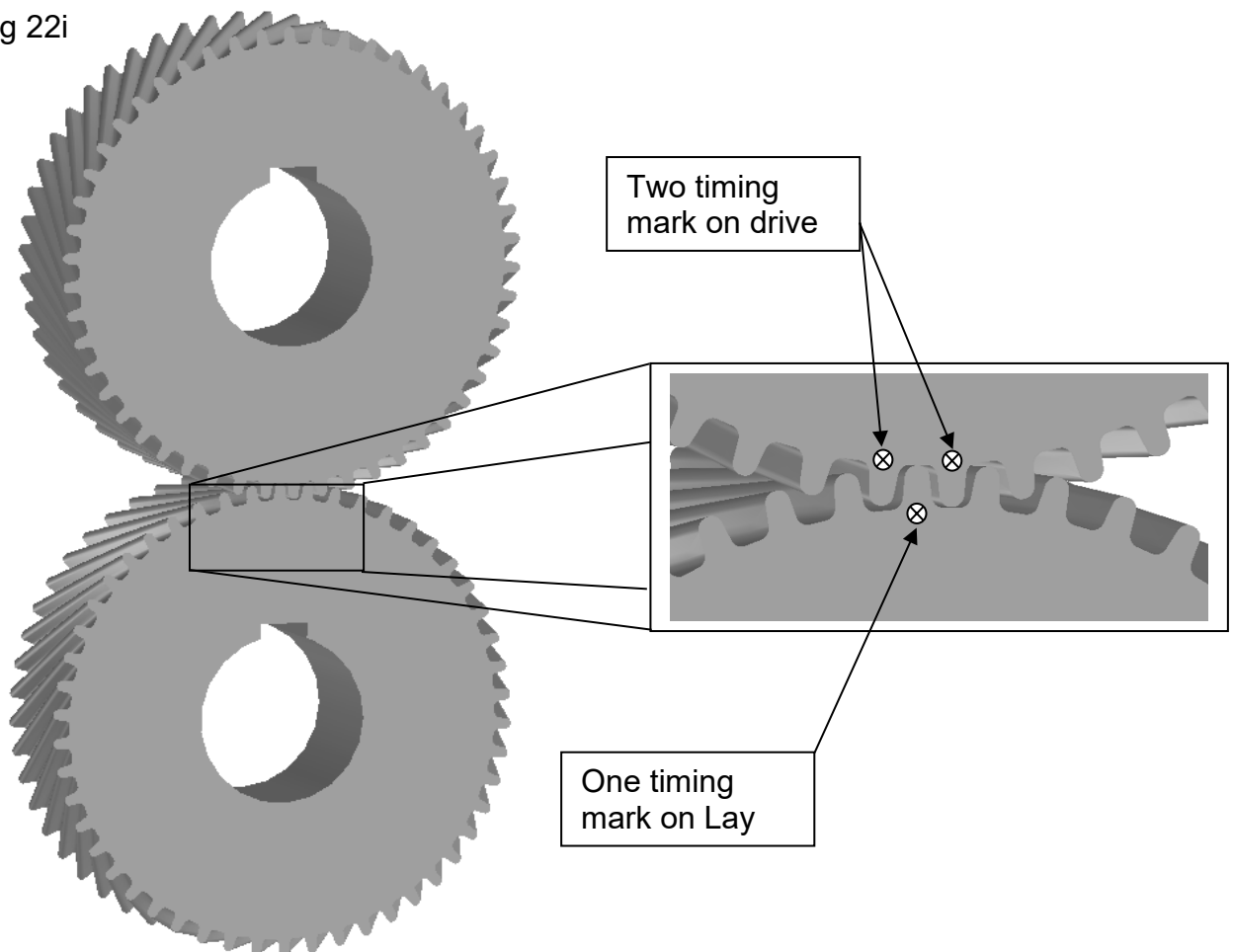
- Install rear bearing cone (5.04) into the bearing housing (4.01)

Fig 21



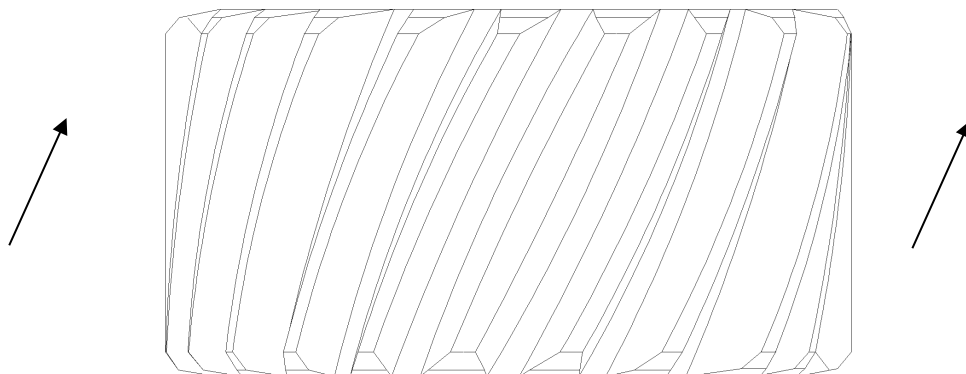
- To set the timing marks on the gears (5.06) place the gears next to each other and line up the keyways, you can now punch three timing marks correct alignment of the gears see Fig 22i

Fig 22i



Note: - When installing the gears onto the shaft make sure that you use the right hand helical gear on the drive shaft (See Fig 22ii) The right hand helical gear will have the letter 'D' stamped on the face.

Fig 22ii



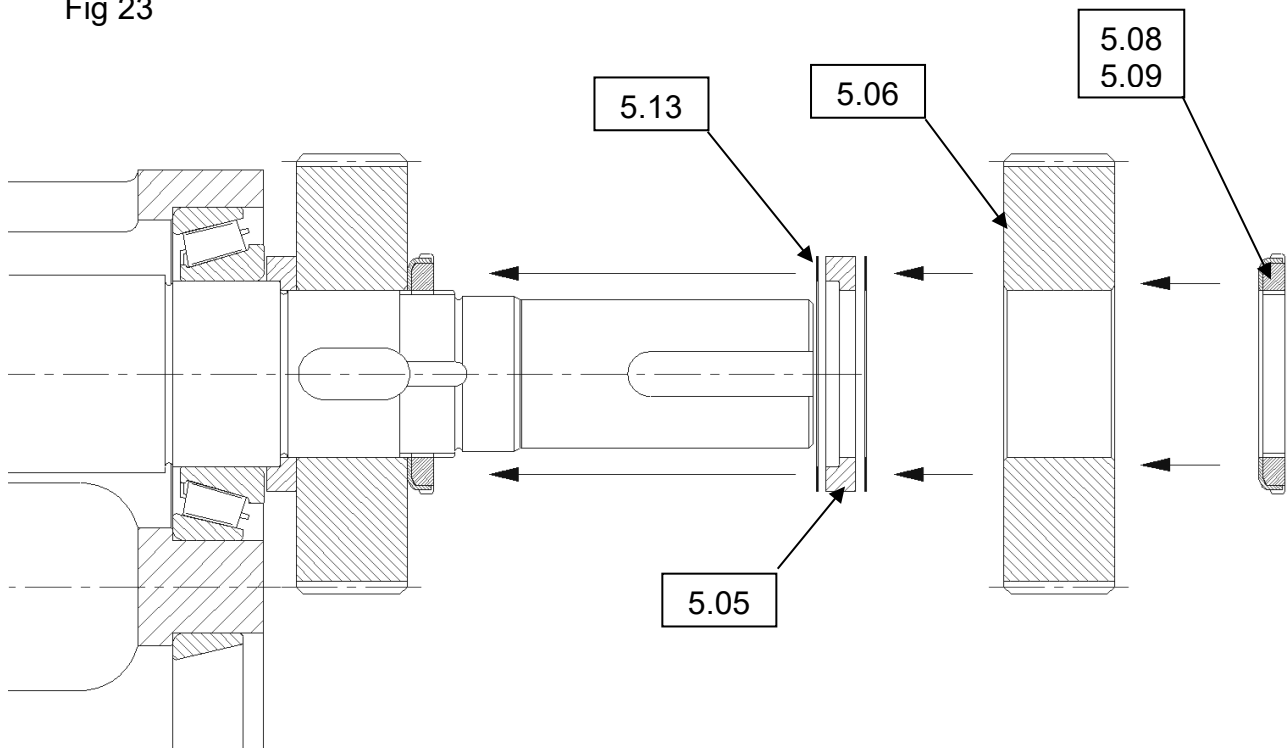
Note: - On a right hand helical gear the form of the teeth slants to the right

Install 0.25mm (0.009") of shims (5.13), pre-load spacer (5.05), gear (5.06), tab washer (5.08) and locknut (5.09)

Note: - Do not install the gear key or tab washer at this time

When setting the pre-load on the shafts note the pre-load has to be set on individual shafts, so only install one gear at a time.

Fig 23

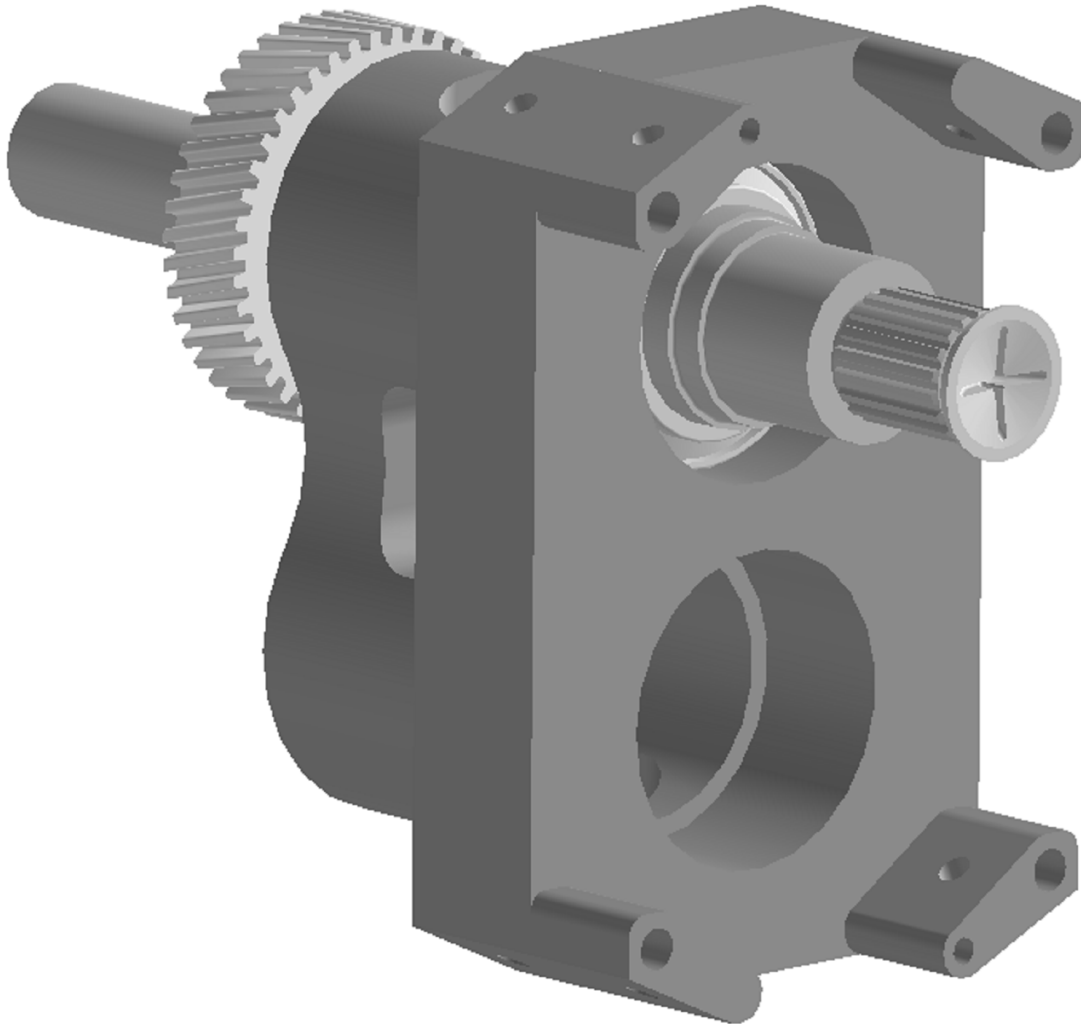


4.1.2 Rolling Torque / Pre-load.

Use a torque meter to check the rolling torque see section 8.2 for torque settings

If the rolling torque is under / over the required amount add / remove shims to adjust the pre-load to suit (See section 8.2 Fasteners & Torque Settings)

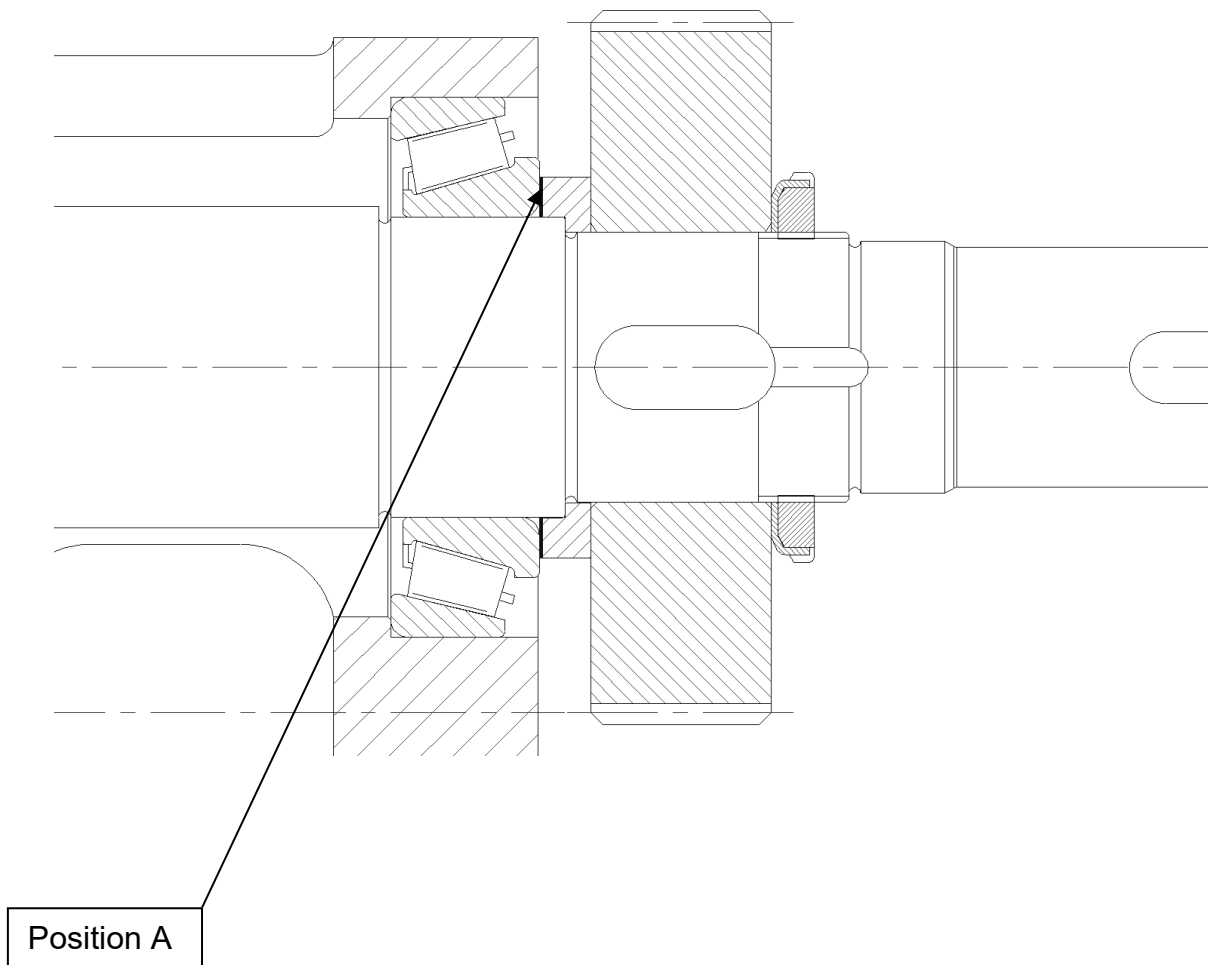
Fig 24



Note: - Rolling torque can only be set on new bearings, with no sealing devices installed i.e. lip-seals or o-rings.

When checking the rolling torque is it important to make sure the shaft is rotating freely, completely rotate the shaft 10 times before checking the rolling torque.

The pre-load is set by adding or removing shims in position A (See Fig 25)
Fig 25



To increase the pre-load add shims to position A
To decrease the pre-load remove Shims from position A
See section 8.2 for pre-load settings.

Note: - The pre-load must be set one shaft at a time.

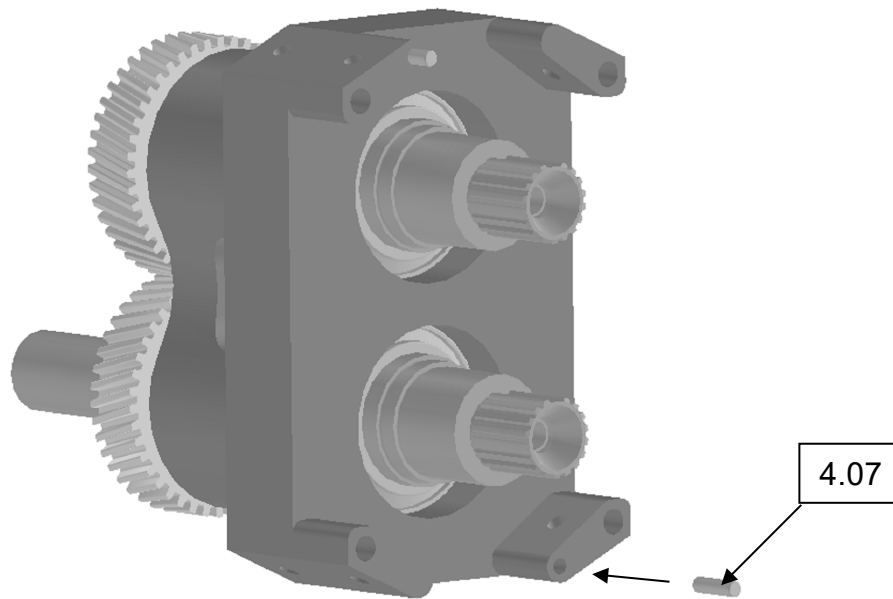
When the pre-load is set remove the gear and install the gear keys (5.07)

This procedure must be repeated for the second shaft

4.1.3 Rotorcase Assembly.

- Install the dowels (4.07) into the bearing housing (See Fig 26)

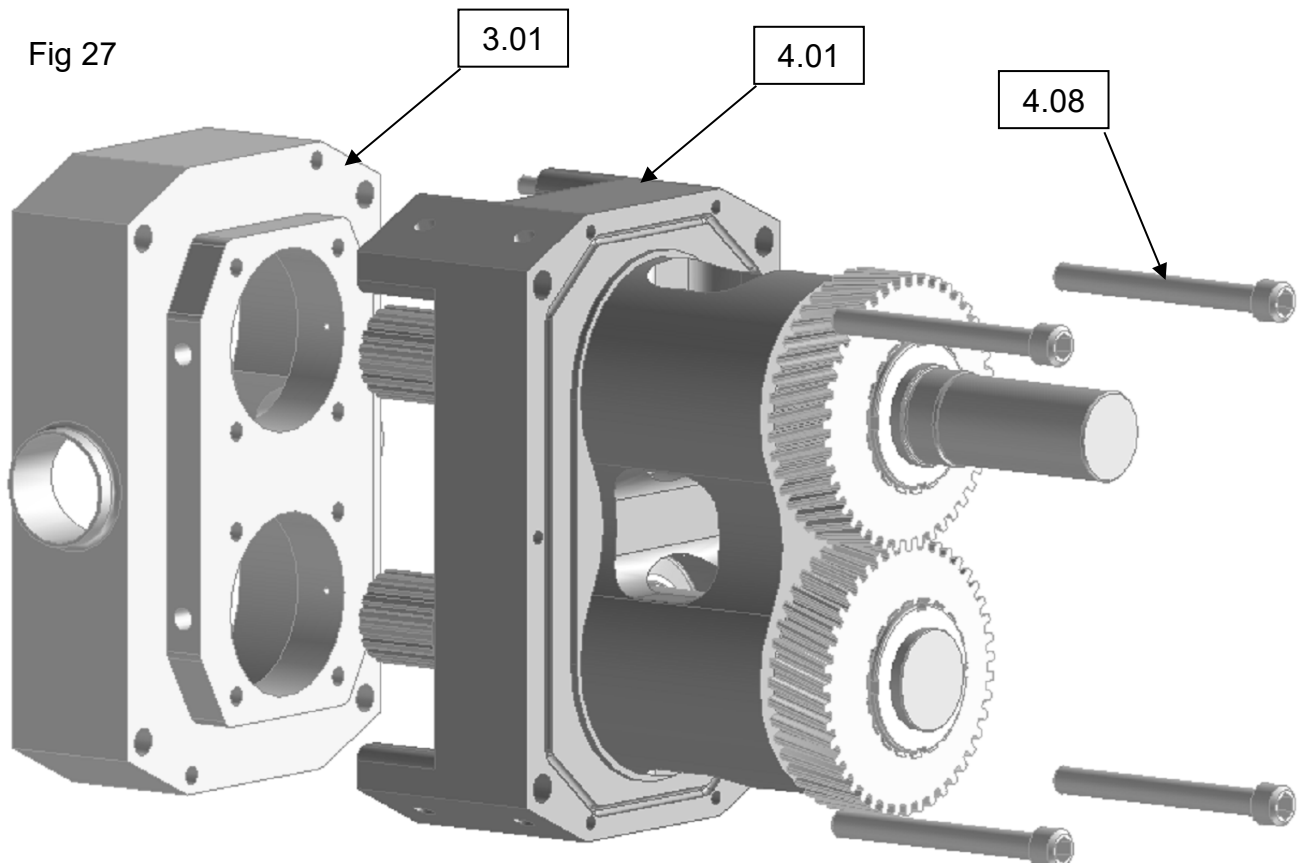
Fig 26



- Install the rotorcase (3.01) onto the bearing housing (4.01) and use the bolts (4.08) to secure the rotorcase (3.01)

Note without the gearbox cover spacers may be required to ensure the rotorcase is fully clamped in position

Fig 27

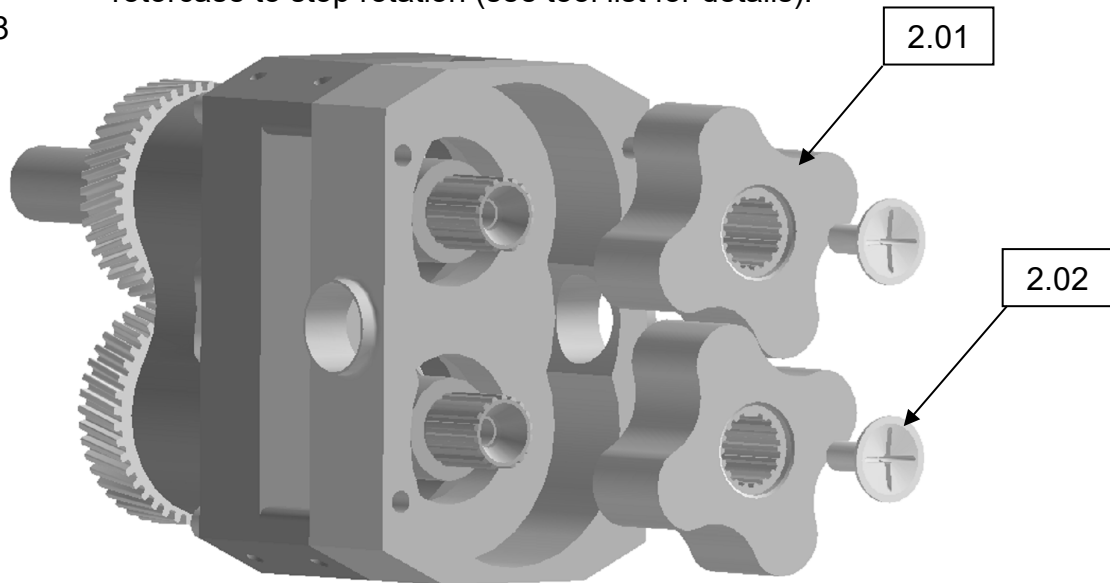


4.1.4 Rotor Assembly.

Note: - For SLE and SLF build see section 4.1.6

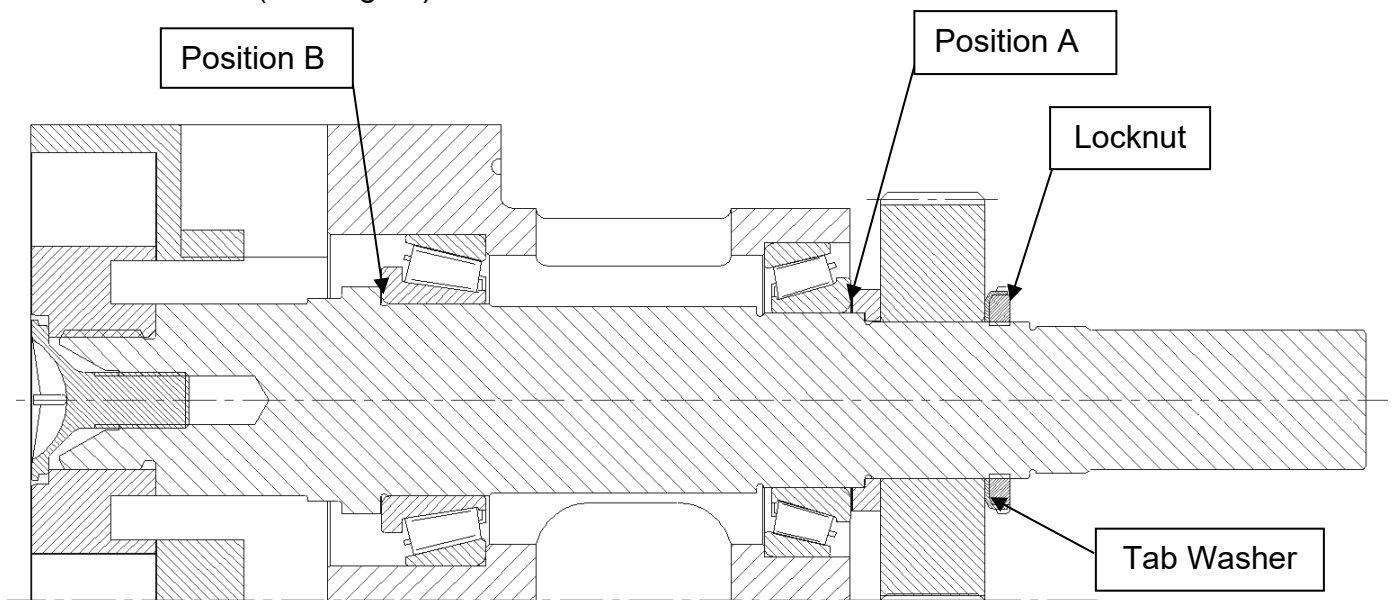
- Install the Rotors (2.01) and Rotor retainers (2.02)
- To tighten rotor retainers (2.02), place rotor lock tool between rotor and rotorcase to stop rotation (see tool list for details).

Fig 28



4.1.5 Setting Front Clearances SLA – SLD.

- Set the front clearance by adding / removing shim from position B (See Fig 29)



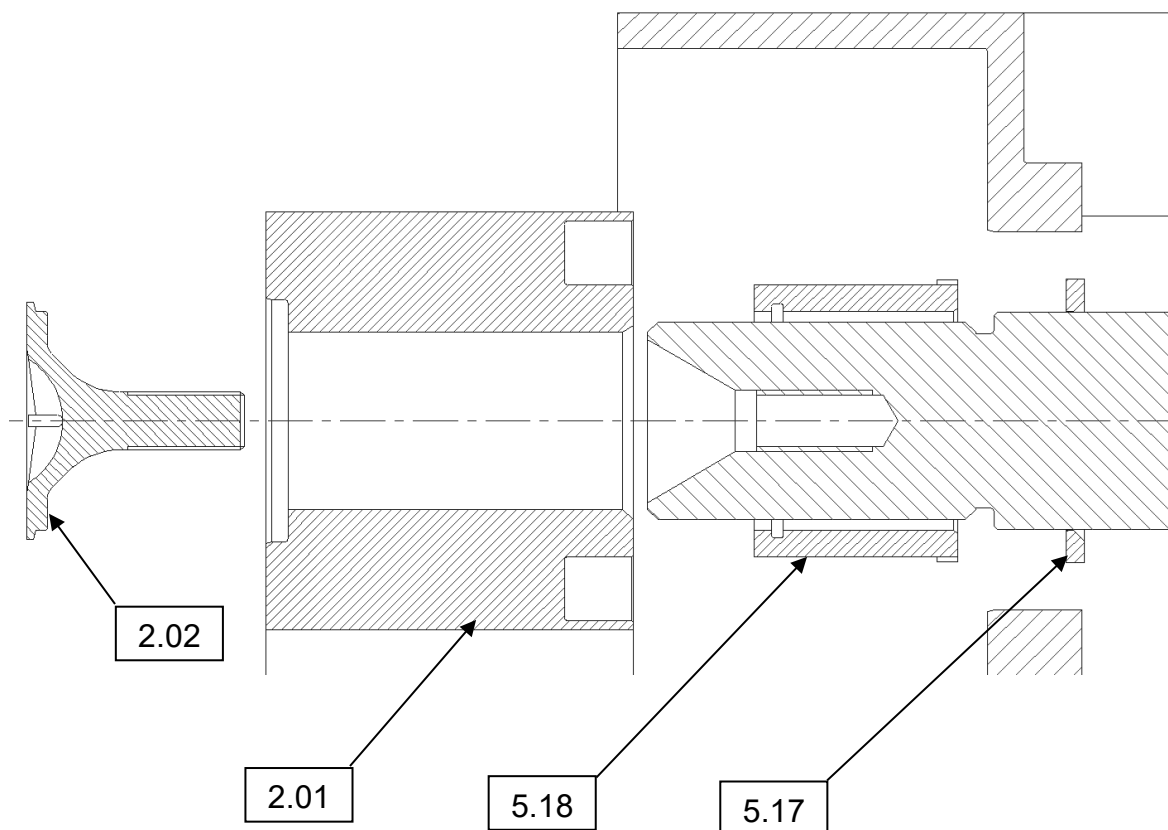
Note: - If any shims are added (or removed) from position B then the corresponding thickness of shims needs to be removed (or added) to position A to maintain the bearing pre-load. Adding additional shim in position B will reduce the front clearance (See section 8.1 for Clearance Charts)

- When the front clearance is set install the tab washer and lock nut, bend one of the tabs onto the locknut to secure the assembly

4.1.6 Setting Front Clearance SLE and SLF

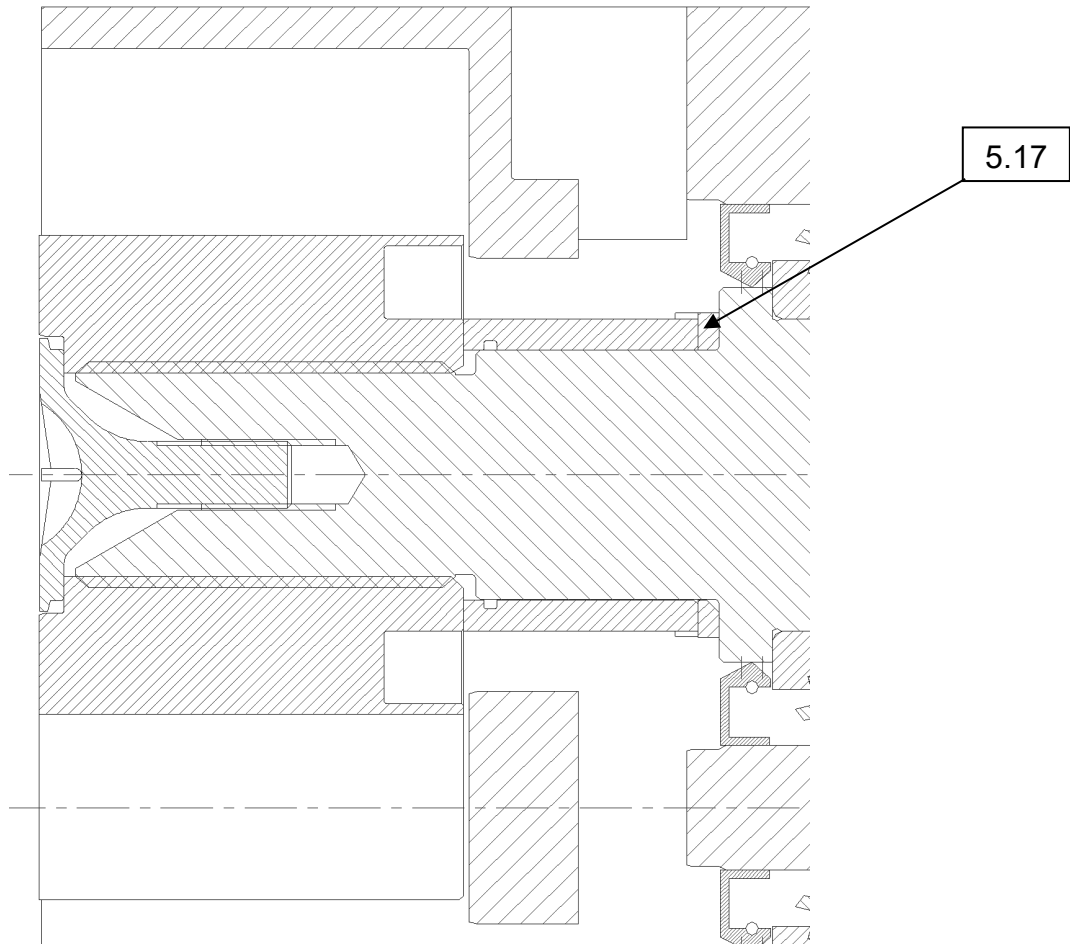
- Install the clearance spacer (5.17), shaft sleeve (5.18), rotor (2.01) and rotor retainer (2.02)
- To tighten rotor retainers (2.02), place rotor lock tool between rotor and rotorcase to stop rotation (see tool list for details).

Fig 29ii



- The front clearance is set by machining the clearance spacer (5.17)

Fig 29iii



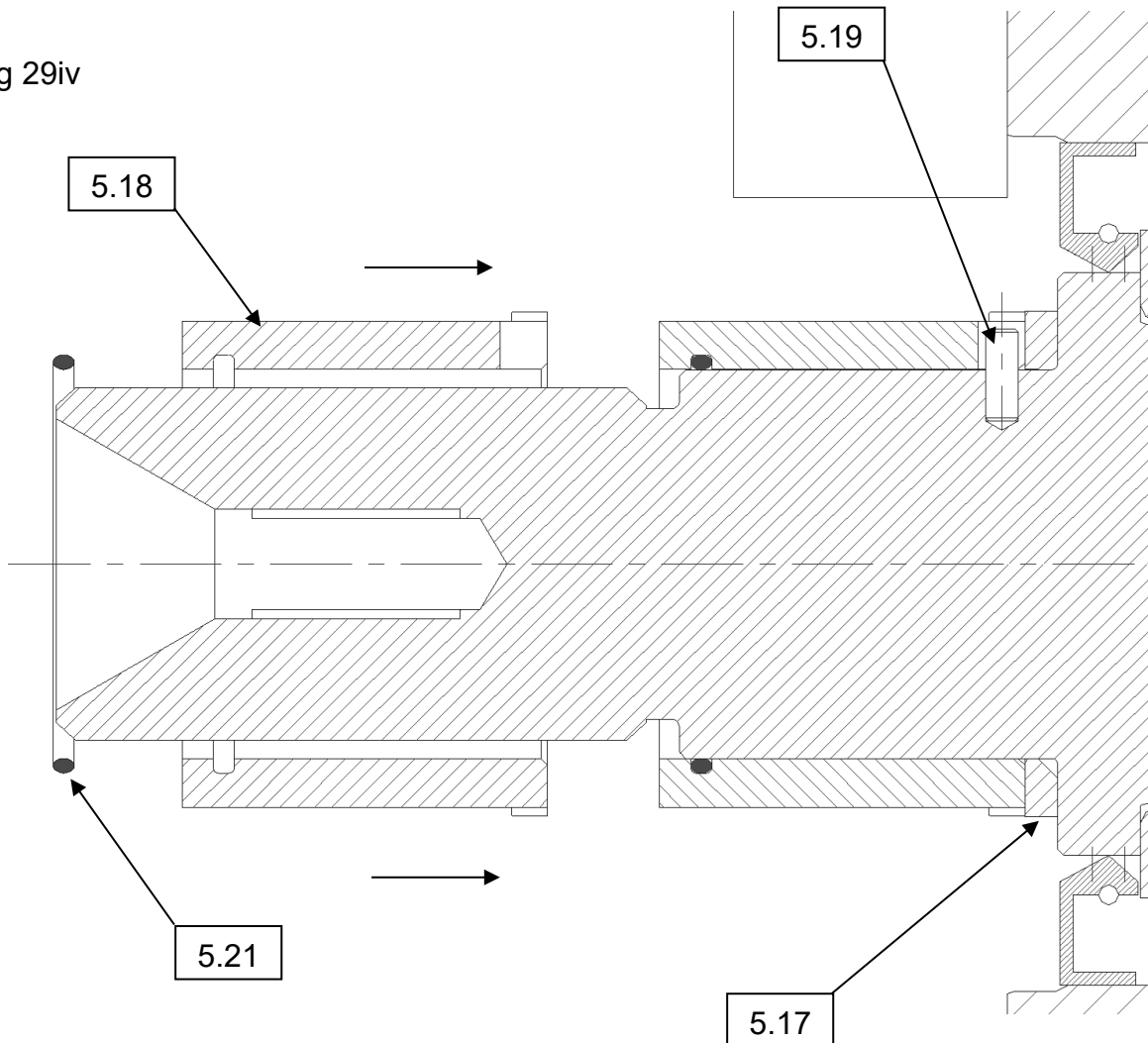
- Using a depth micrometer check the front clearance (distance from the front of the rotor to the front of the rotorcase) and adjust the width of the front clearance spacer as necessary to set the front clearance see section 8.1 for pump head clearances

Note: - When assembling the pump with a new front clearance spacer the rotor will Be proud of the rotorcase.

When the front clearance spacer has been machined to the correct width make sure that the spacer kept with the respective shaft.

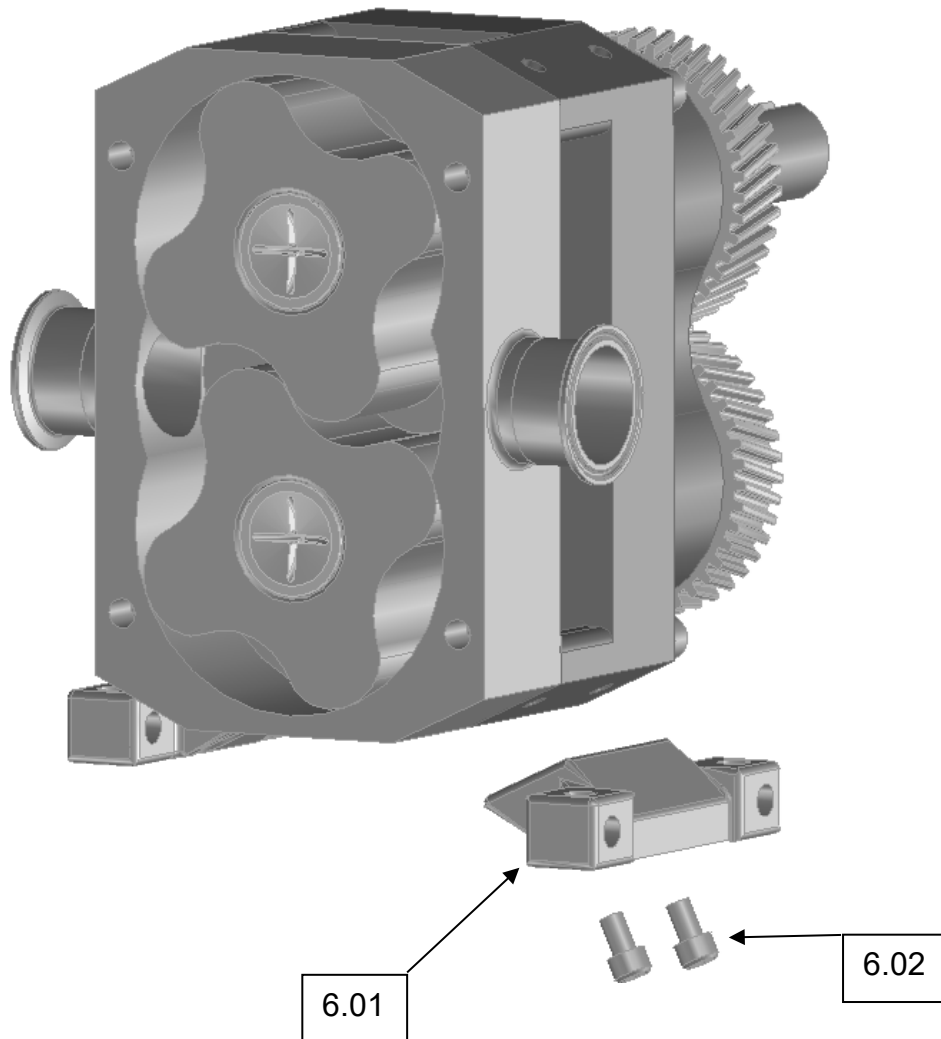
- When the front clearance has been set Install the clearance spacer (5.17) and secure in place using the dowel (5.19).
- Install the o-ring (5.21) into the shaft sleeve (5.18) and assemble it onto the shaft. Note that the shaft sleeve has a drive slot which lines up with the dowel

Fig 29iv



4.1.7 Foot Assembly.

Fig 30

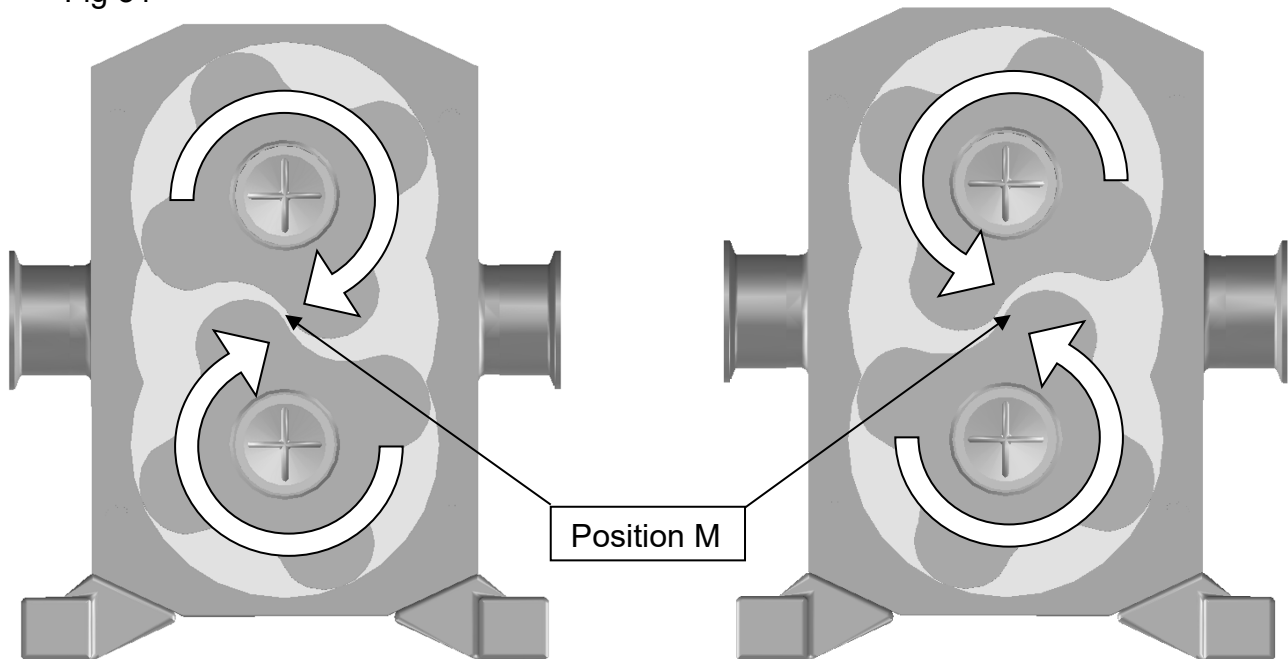


- Install the foot (6.01) and secure with screws (6.02)

4.1.8 Timing – Multilobe Rotors Only.

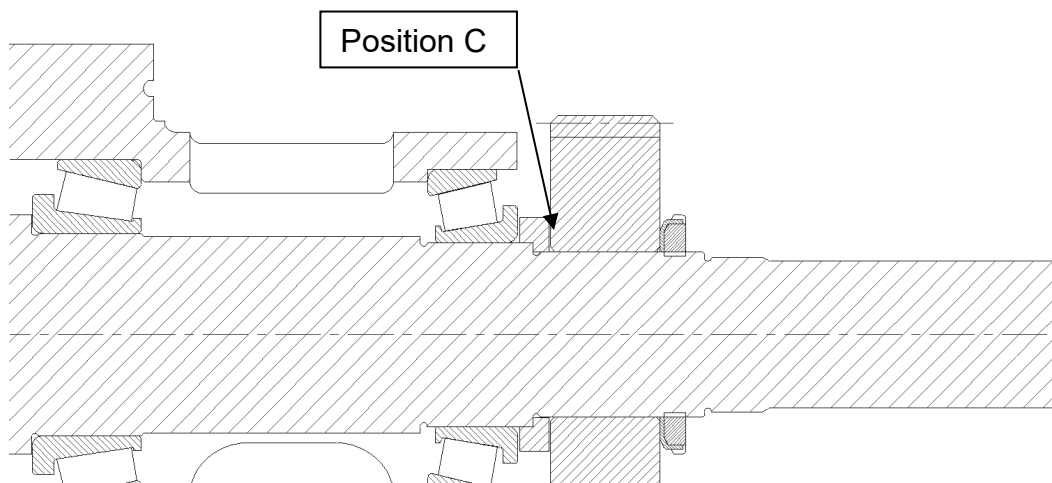
- Using feeler gauge to check the mesh clearance in position 'M', ensure the rotor is turned in the correct orientation to minimise the mesh clearance.

Fig 31



- To change the rotor timing add / remove shims from position C

Fig 32



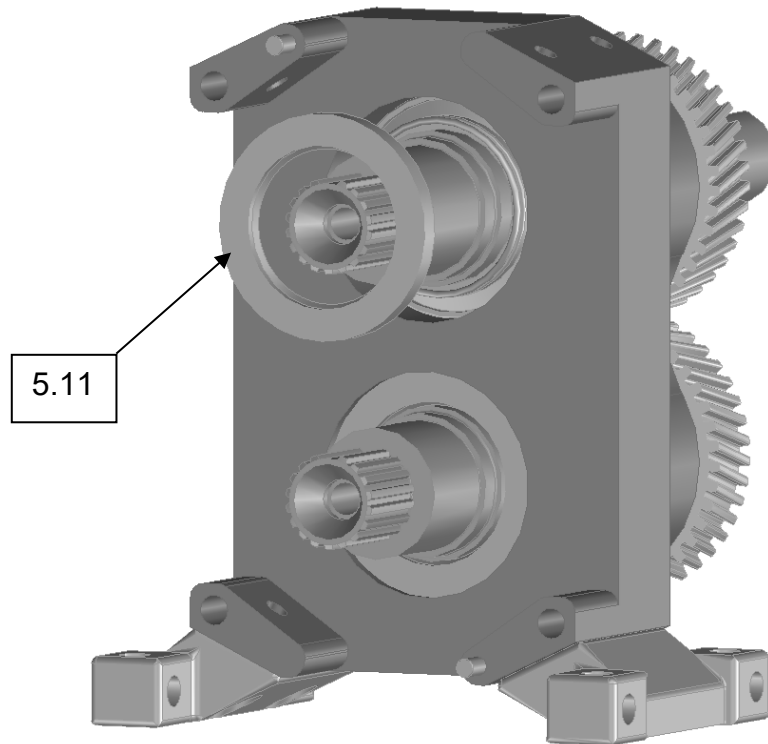
- To adjust the drive rotor clockwise you need to add shim in position C on the drive shaft
- When the mesh clearance is set within tolerance (See clearance chart 8.1), remove the rotor retainers, rotors and rotorcase

Note: - When the gears are installed, tighten the locknut up to the correct torque (see section 8.2) and secure by knocking down one of the tabs on the tab washer

- Install the Front Lip-seals (5.11)

Note see lip-seal fitting table for installation depths (Section 8.3)

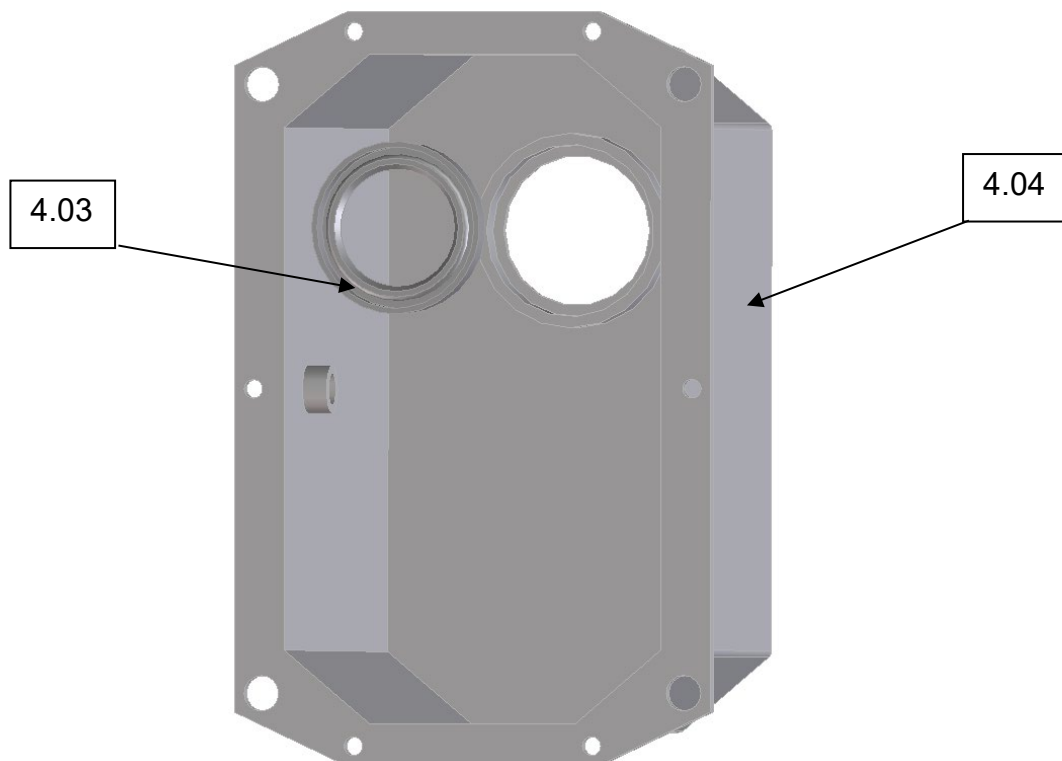
Fig 33



4.1.9 Gearbox Assembly.

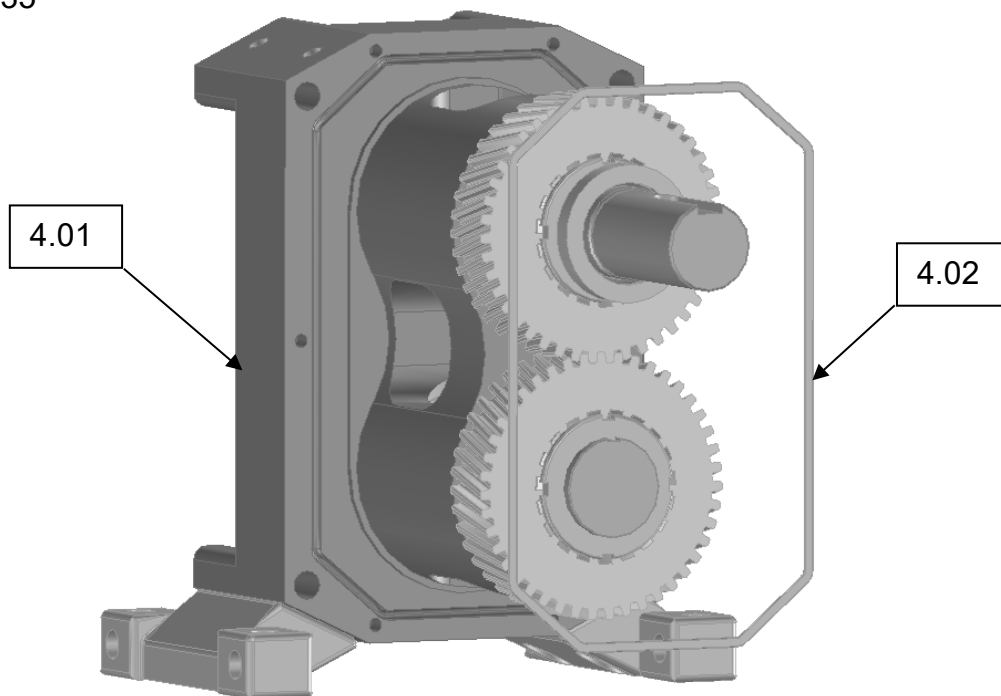
- Install the rear lip-seal (4.03) into the bearing housing cover (4.04)

Fig 34



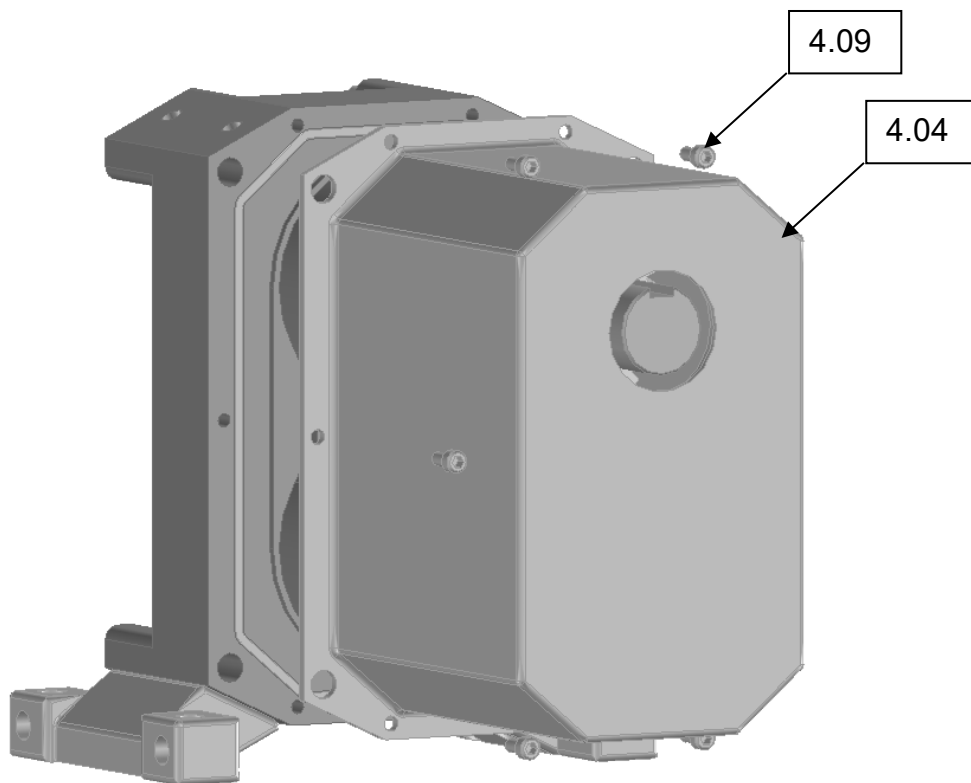
- Install the bearing housing o-ring (4.02) into the bearing housing (4.01)

Fig 35



- Install the bearing housing cover (4.04) and the retaining screws (4.09)

Fig 36

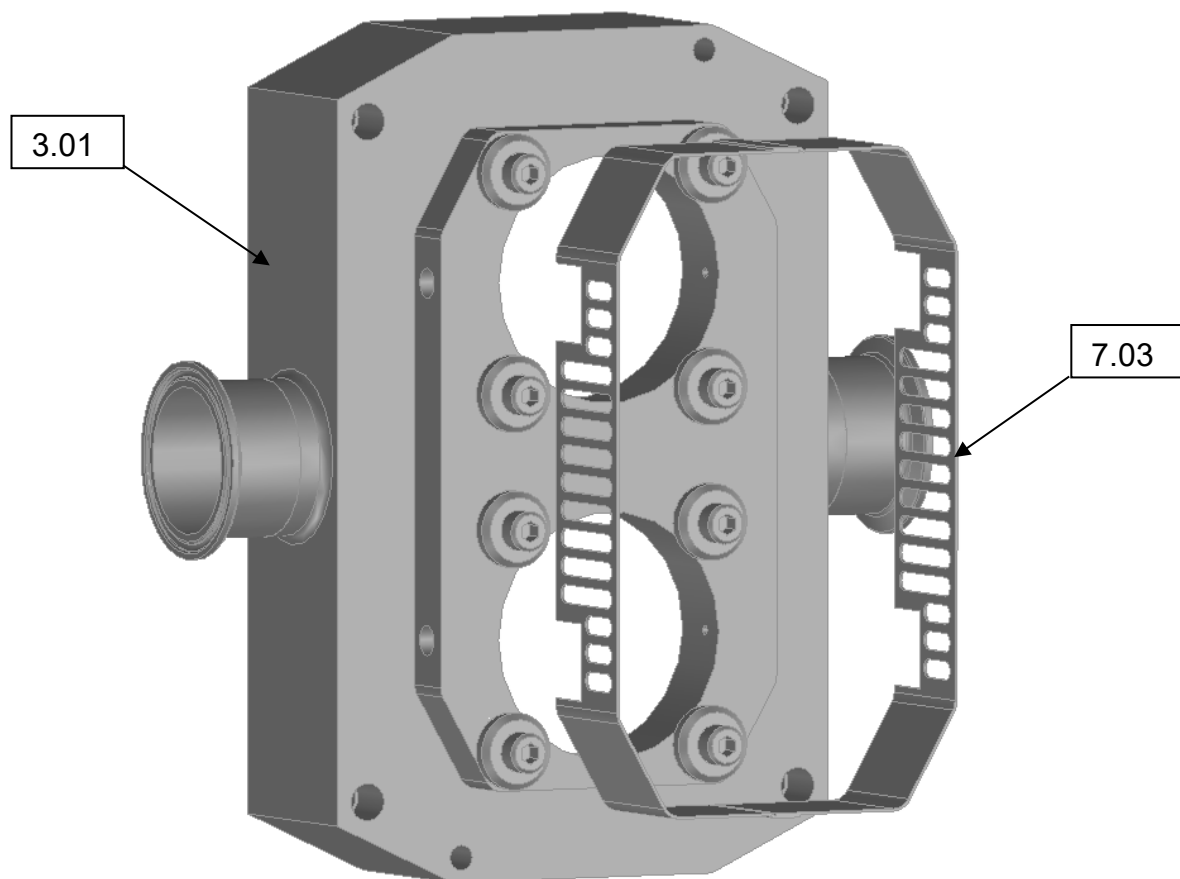


4.1.10 Final Assembly.

Note: - Before re-assembling the rotorcase refer to the seal section for assembly instructions

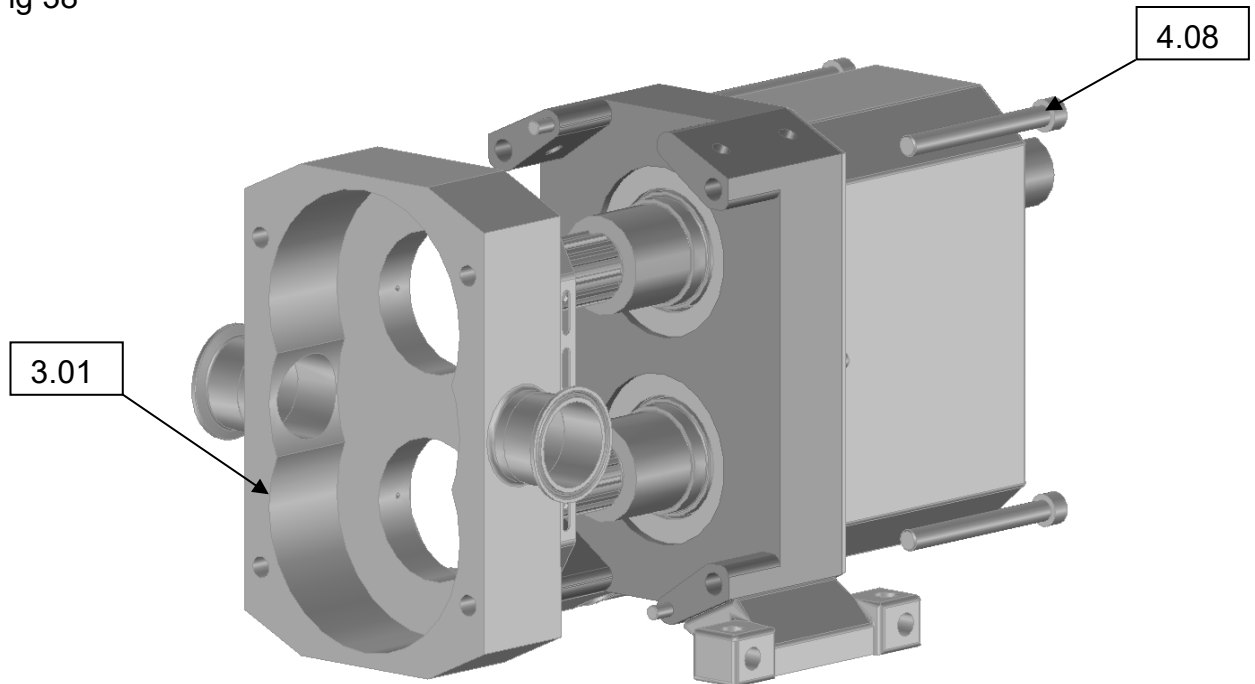
- Install the guard (7.03) onto the rear of the rotorcase (3.01)

Fig 37



- Install the rotorcase (3.01) and secure with screws (4.08)

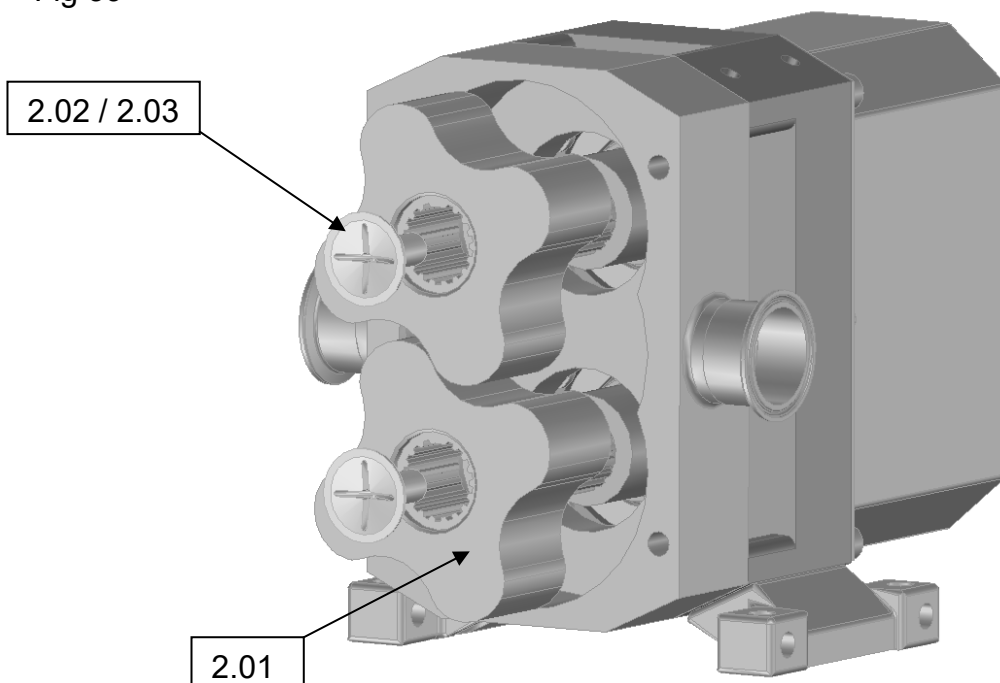
Fig 38



Note: - For the SLF

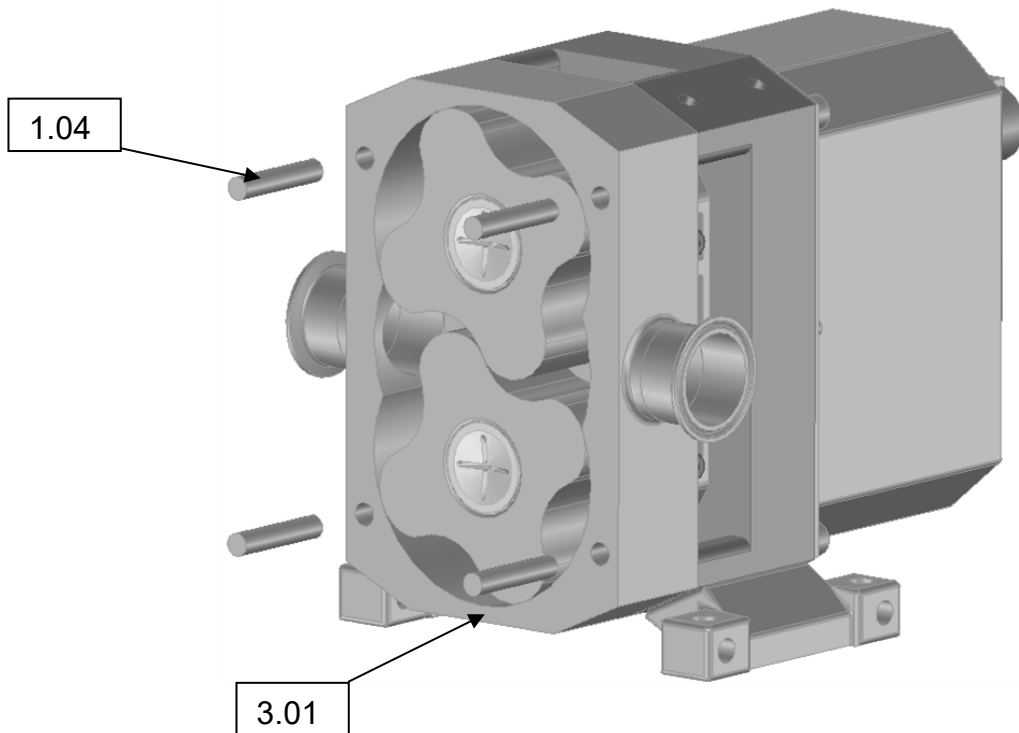
- Install the rotors (2.01) and rotor retainer o-ring (2.03) and secure with rotor retainers (2.02) (See section 8.2 for torque settings)
- To tighten rotor retainers (2.02), place rotor lock tool between rotor and rotorcase to stop rotation (see tool list for details).

Fig 39



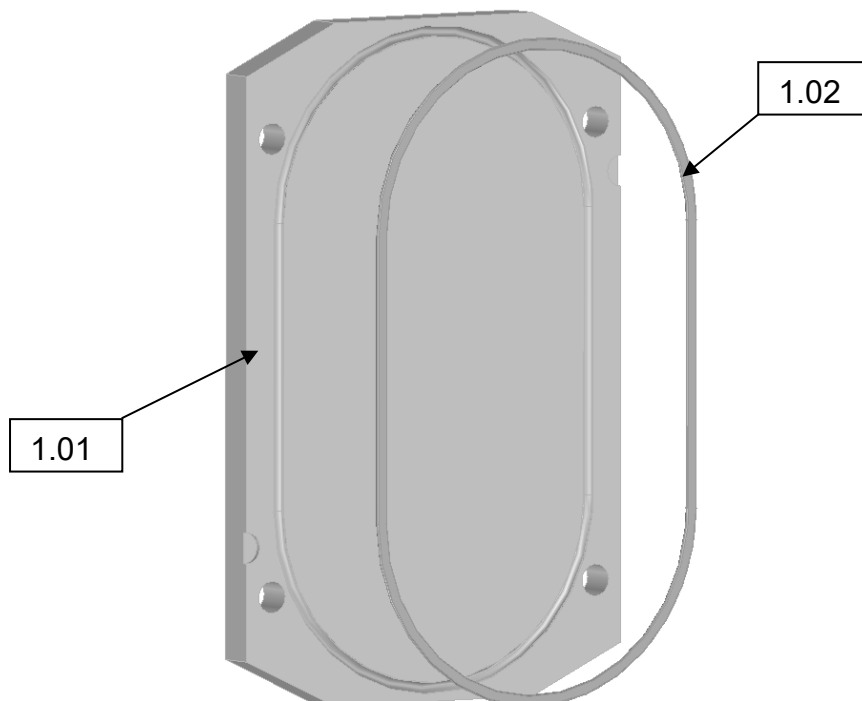
- Install the front cover studs (1.04) into the rotorcase (3.01)

Fig 40



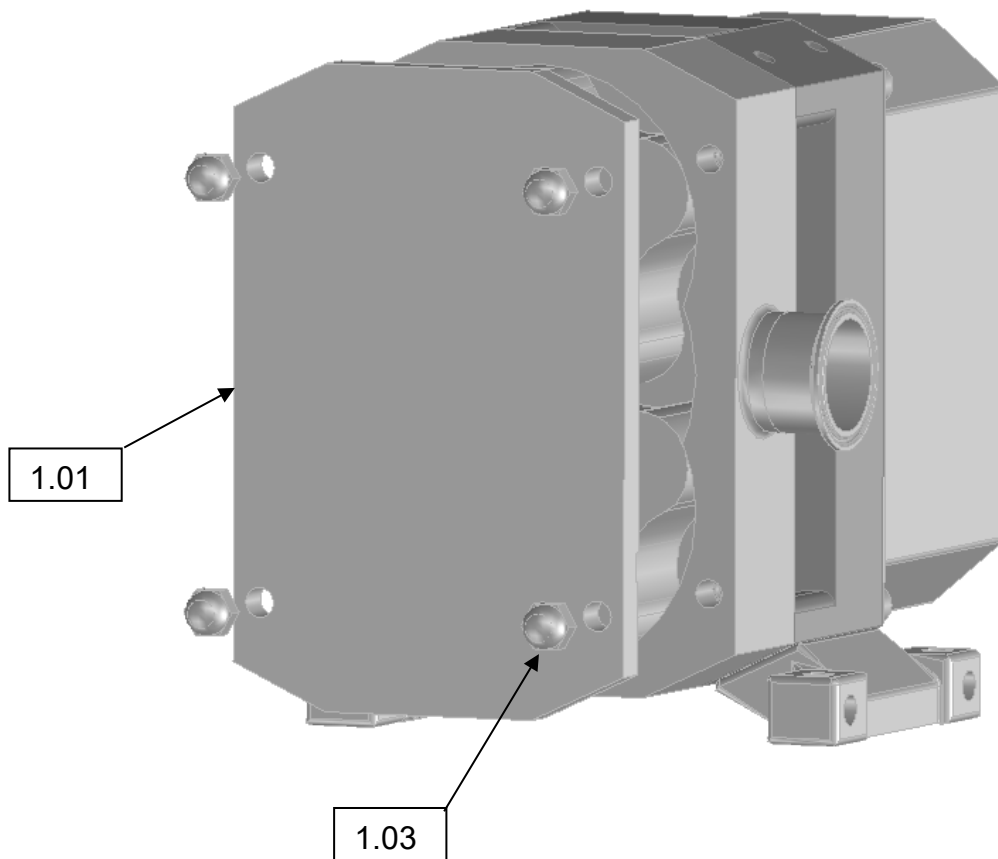
- Install the front cover o-ring (1.02) into the front cover (1.01)

Fig 41



- Install the front cover (1.01) and secure with the dome nuts (1.03).
(See section 8.2 for torque settings)

Fig 42



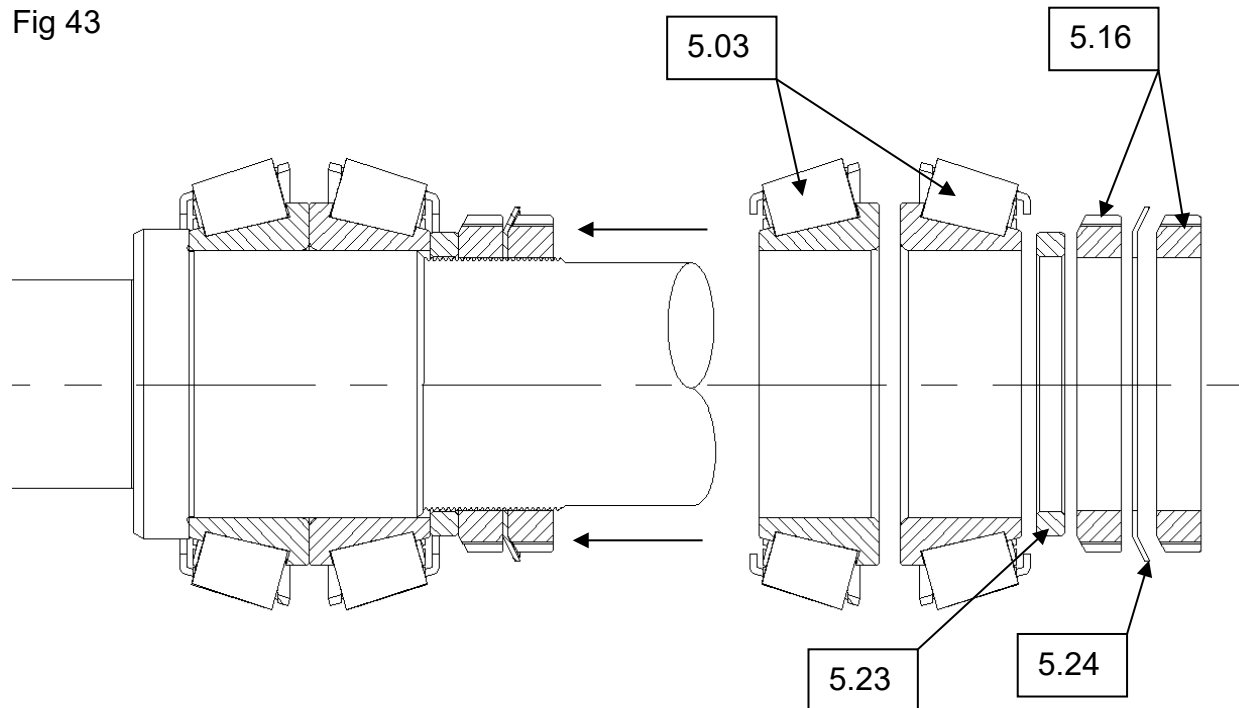
4.2 Pump Assembly SLG.

4.2.1 Shaft Assembly.

- Install the bearing cones (5.03), the bearing spacer (5.23) and secure them using one of the locknuts (5.16), add the tab washer (5.24) and the locknut (5.16). see Fig 43

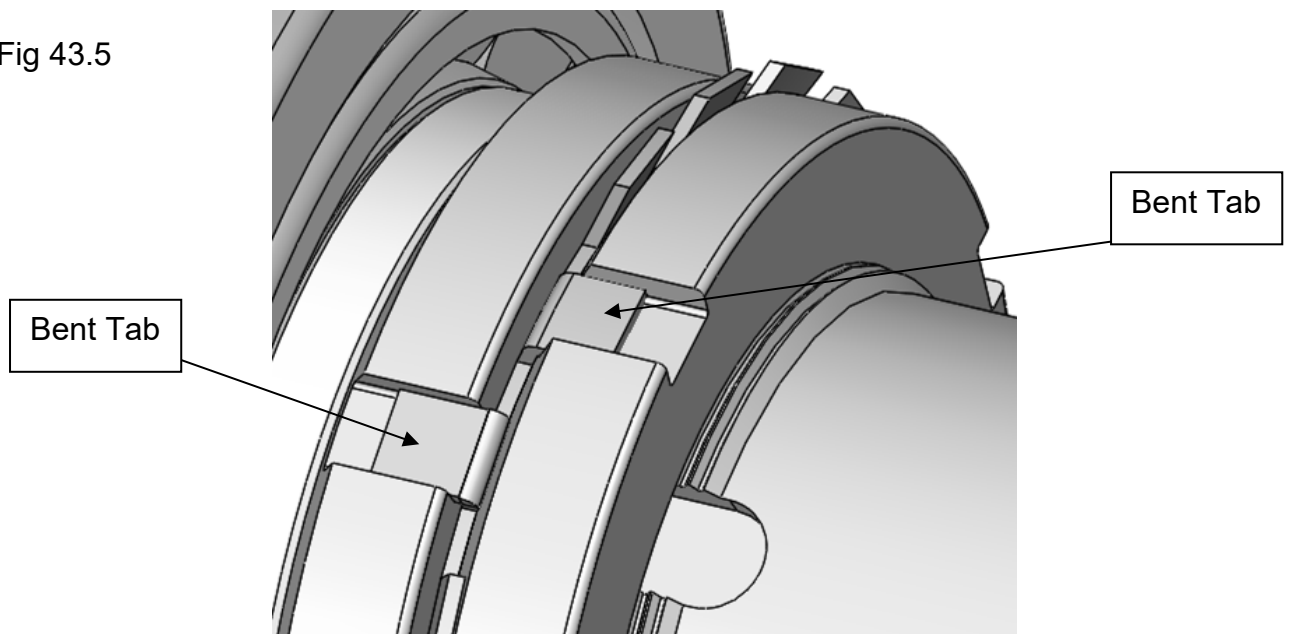
Note: - both locknuts must be set to the correct torque settings, see section 8.2

Fig 43



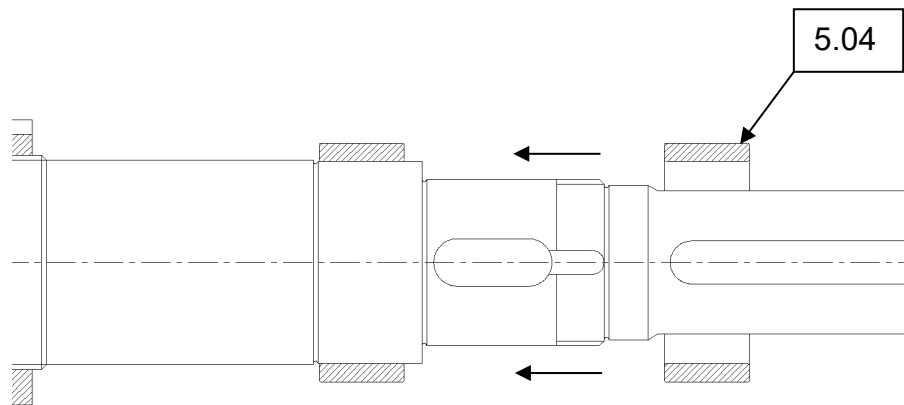
- Bend the tabs of the tab washer (5.24) into the location lugs of the locknuts (5.16) as show in fig 43.5

Fig 43.5



- Install the needle roller inner race (5.04)

Fig 44

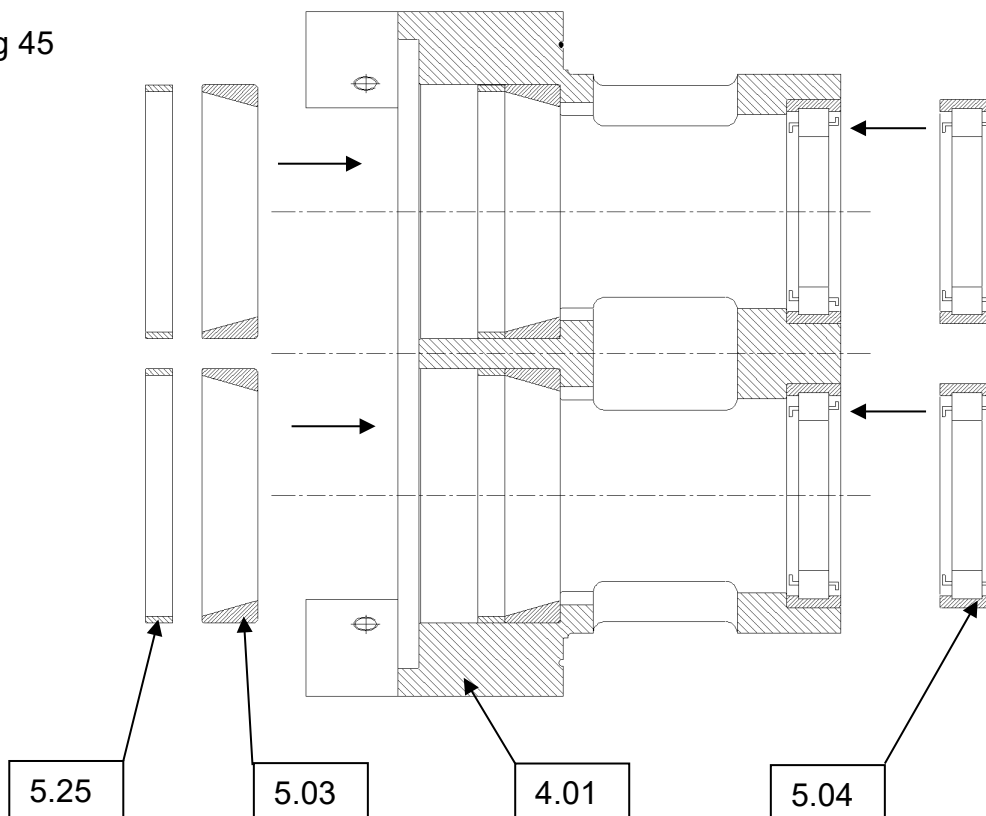


Note: - The preferred method of installing bearing cones is that they are heated to approximately 125°C (250°F) prior to installation. During this operation protective gloves should be used. Once bearing cones are installed in correct position they should be allowed to cool before proceeding with assembly. As an alternative, bearing cones may be pressed into position providing the proper equipment is employed and the necessary procedures are used to prevent component damage.

Under no circumstances should bearing cones or cups be hammered into position.

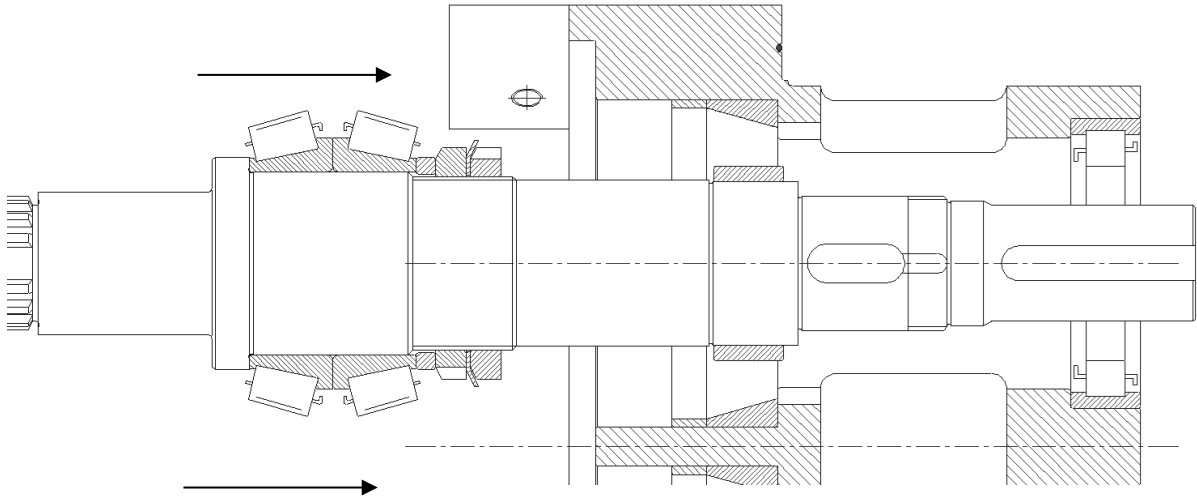
- Install Bearing cups (5.03, 5.04) and the bearing pre-load adjustment spacer (5.25) into the bearing housing (4.01) Note the fit of item 5.04 requires Loctite 640, four small drops equispaced on the outside diameter.

Fig 45



- Install the shaft assembly into the bearing housing

Fig 46



- Install the bearing cone (5.03) and the bearing retainer plate (5.05) secure using the screws (5.20) see fig 48 for the correct order to tightening the screws also see section 8.2 for torque settings

Fig 47

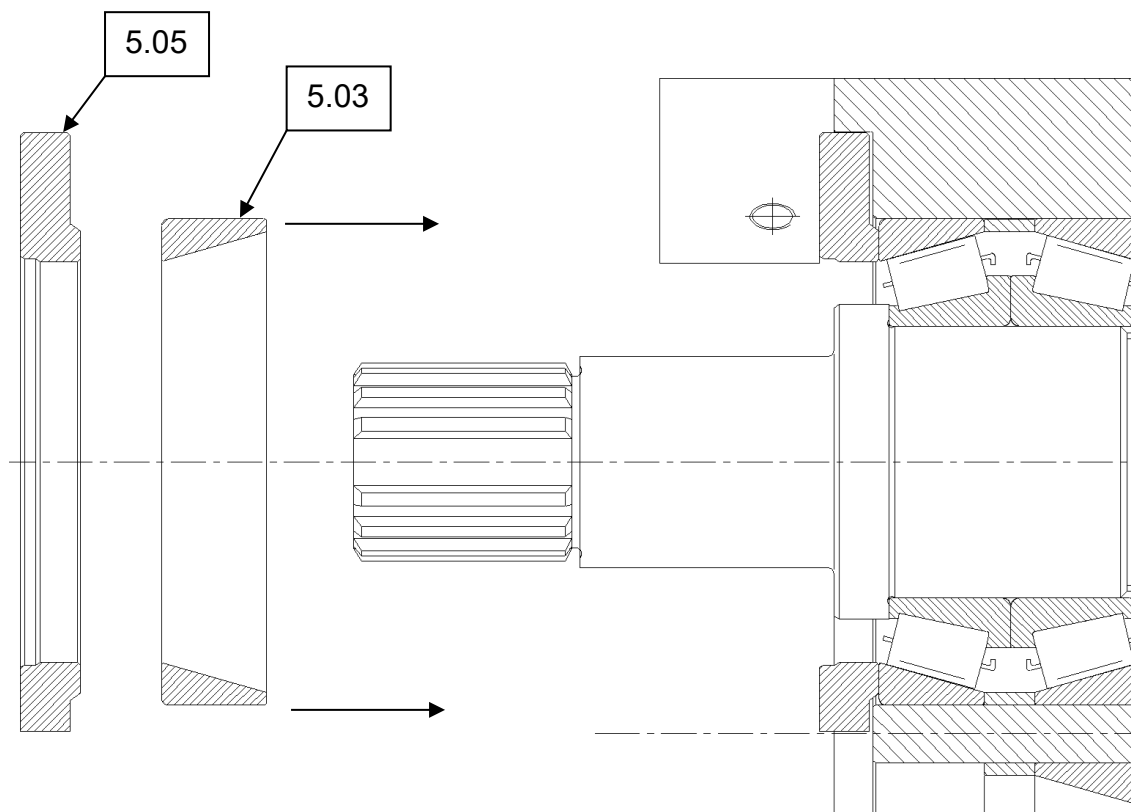
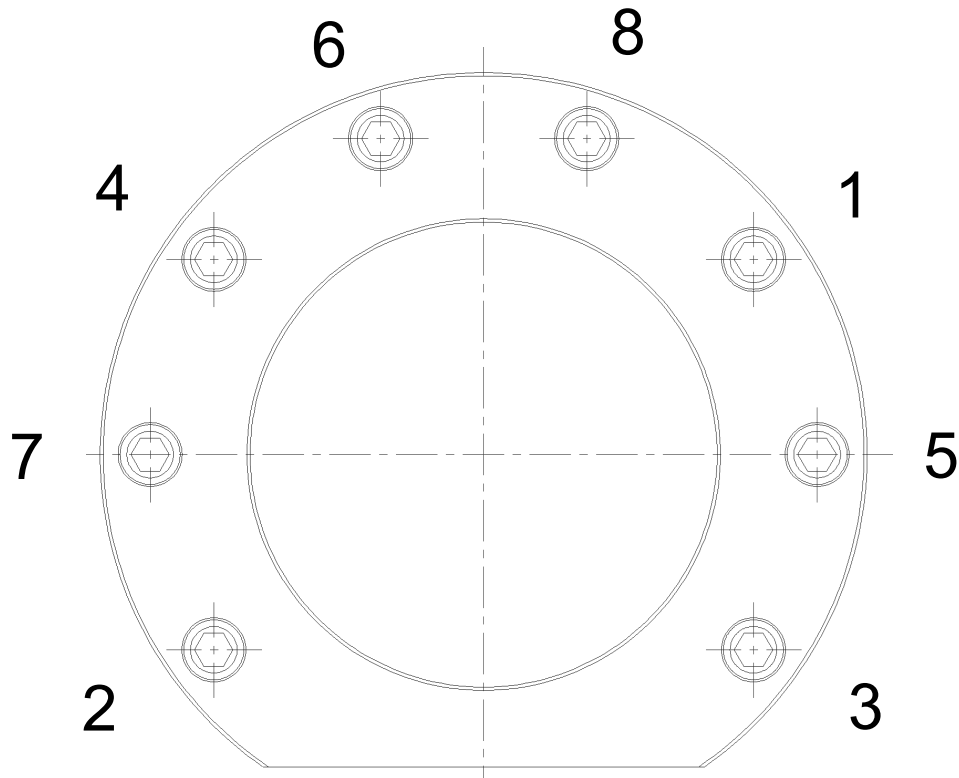


Fig 48



4.2.2 Rolling Torque / Pre-load.

Use a torque meter to check the rolling torque see section 8.2 for torque settings

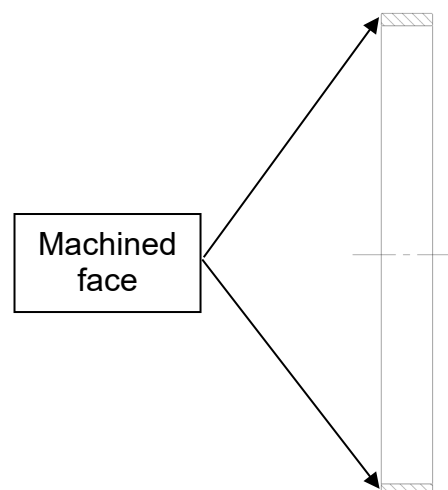
The rolling torque as standard with new components will be under the required amount and will require adjustment.

- To adjust the pre-load modify the size of the bearing pre-load adjustment spacer (4.10)

Note: - When machining the spacer make sure small cuts are taken i.e. 0.02mm – 0.03

Viking Pump does offer a shim set if the spacer has been machined too small (5.26)

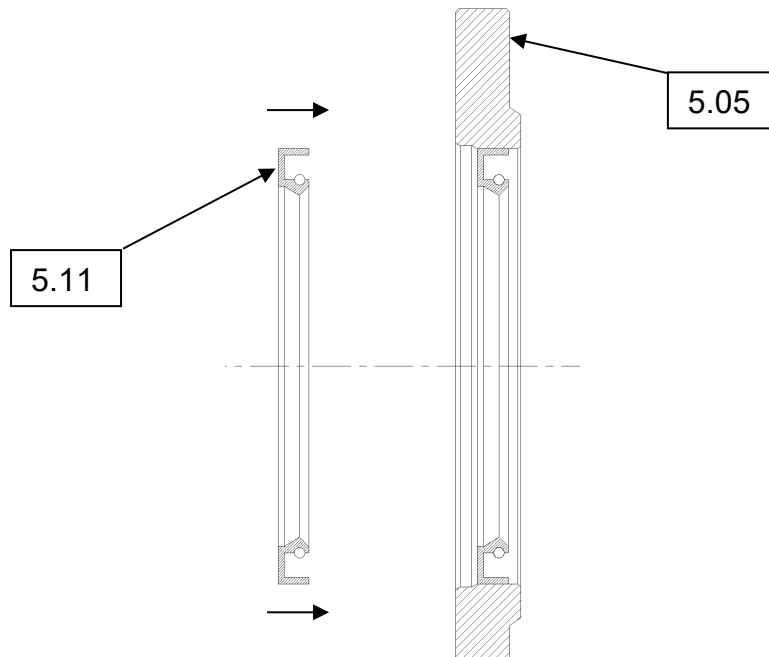
Fig 49



4.2.3 Final Pre-load Assembly.

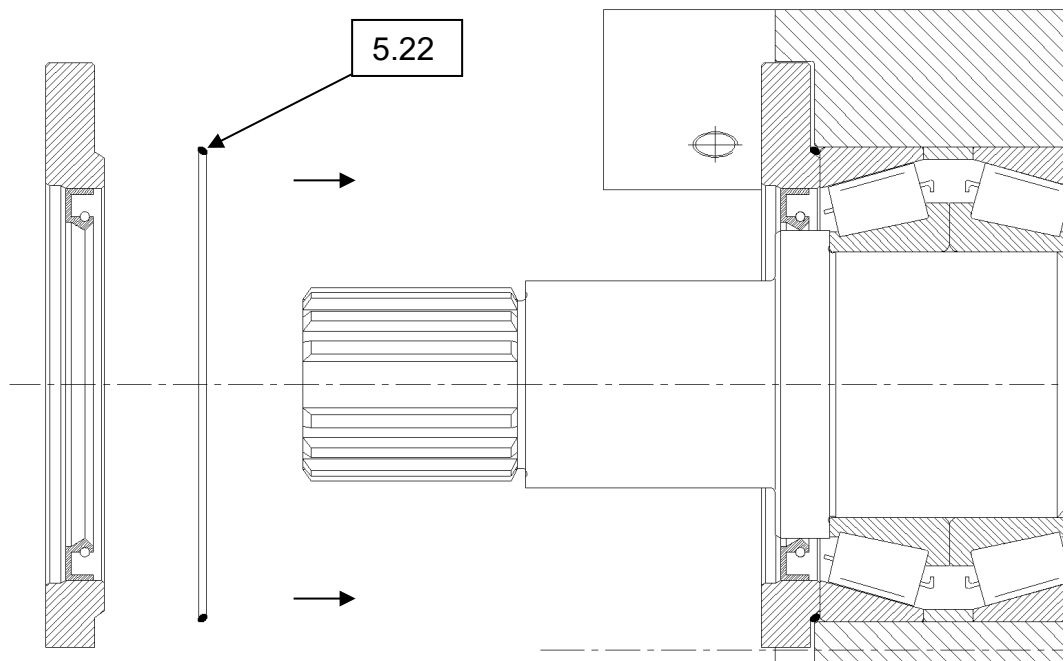
- When the pre-load is set remove the bearing retainer plate (5.05) and install the front lip-seals (5.11) – refer to lip-seal setting distances section 8.3

Fig 50



- Install the gearbox o-ring (5.22) and secure the bearing retainer plate (5.05)
With the screws (5.20) see fig 48 for the correct order to tightening the screws, also see section 8.2 for torque settings

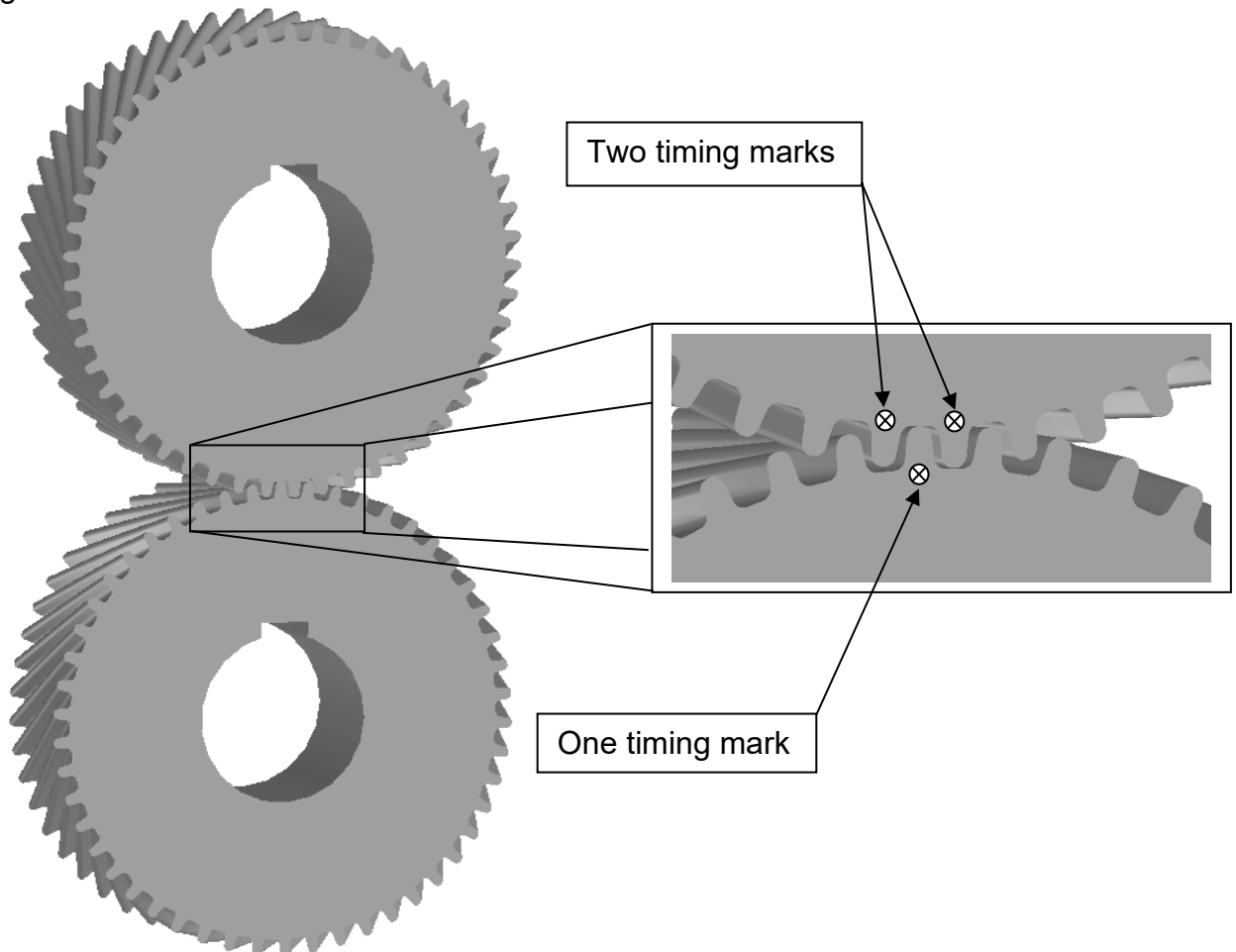
Fig 51



4.2.4 Timing – Multilobe Rotors only.

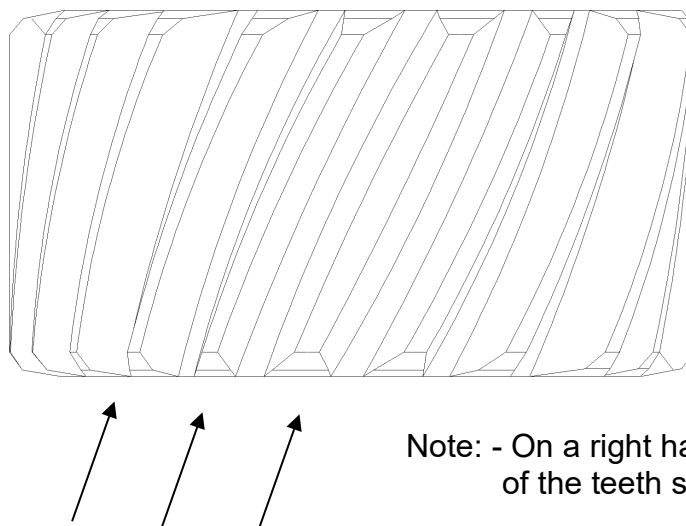
- To set the timing marks on the gears (5.06) lay the gears next to each other and line up the keyways, you can now punch three timing marks to show the correct alignment of the gears see Fig 52

Fig 52



Note: - When installing the gears onto the shaft make sure that you use the right hand helical gear on the drive shaft (See Fig 53) The right hand helical gear will have the letter 'D' stamped on the face.

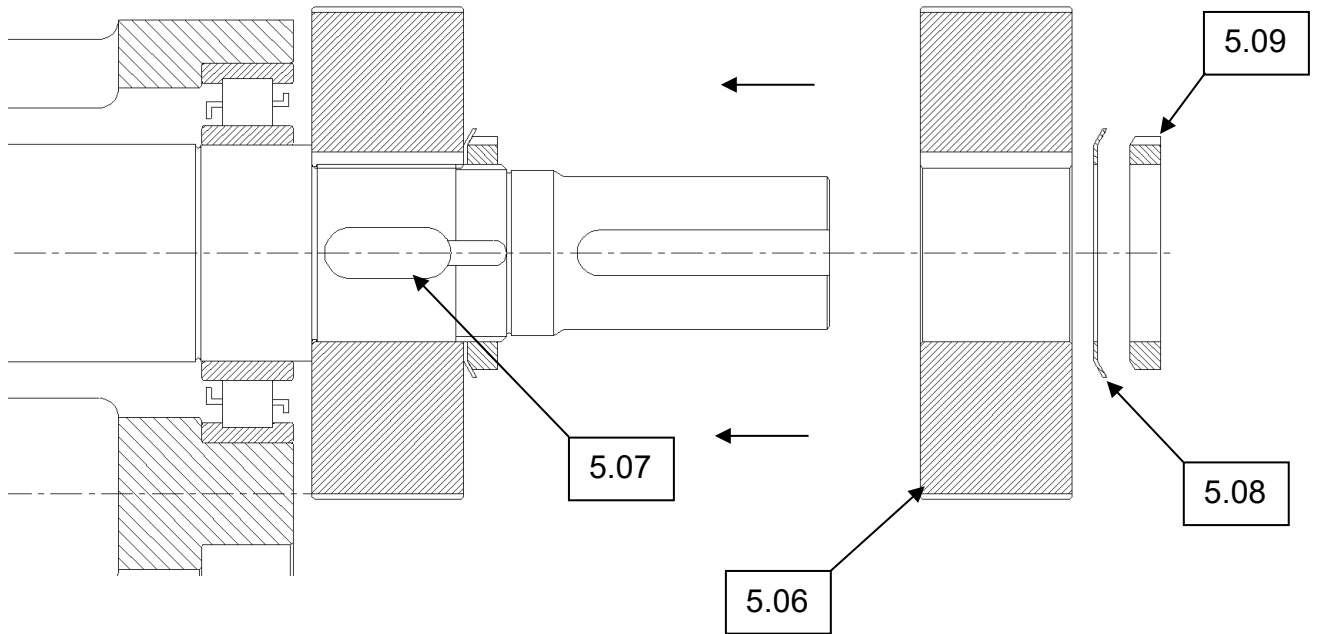
Fig 53



Note: - On a right hand helical gear the form of the teeth slants to the right

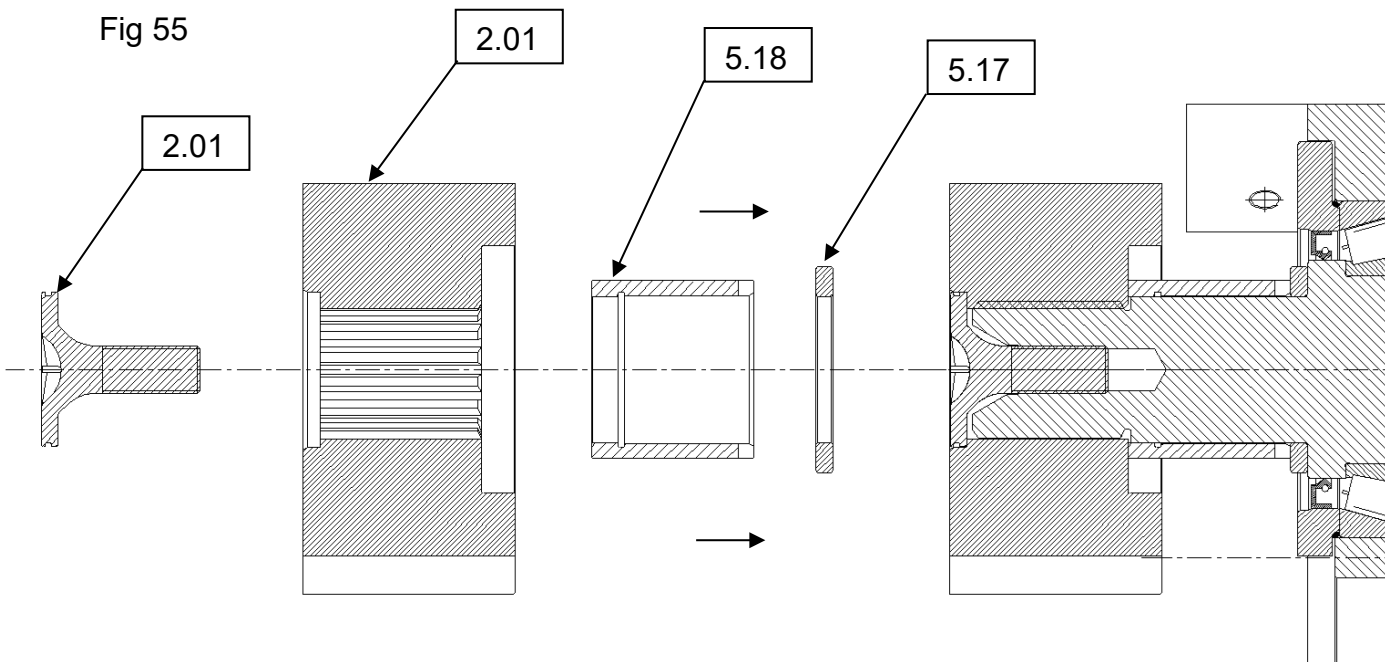
- Install the gear key (5.07) into the shaft, (5.01) then install the gear (5.06), tab washer (5.08) and locknut (5.09) – See section 8.2 for torque settings

Fig 54



- Install the front clearance spacer (5.17), seal sleeve (5.18), Multilobe rotors (2.01) and rotor retainers (2.02) See section 8.2 for rotor retainer torque setting

Fig 55



- Using feeler gauge to check the mesh clearance in position 'M', ensure the rotor is turned in the correct orientation to minimise the mesh clearance.

Fig 56

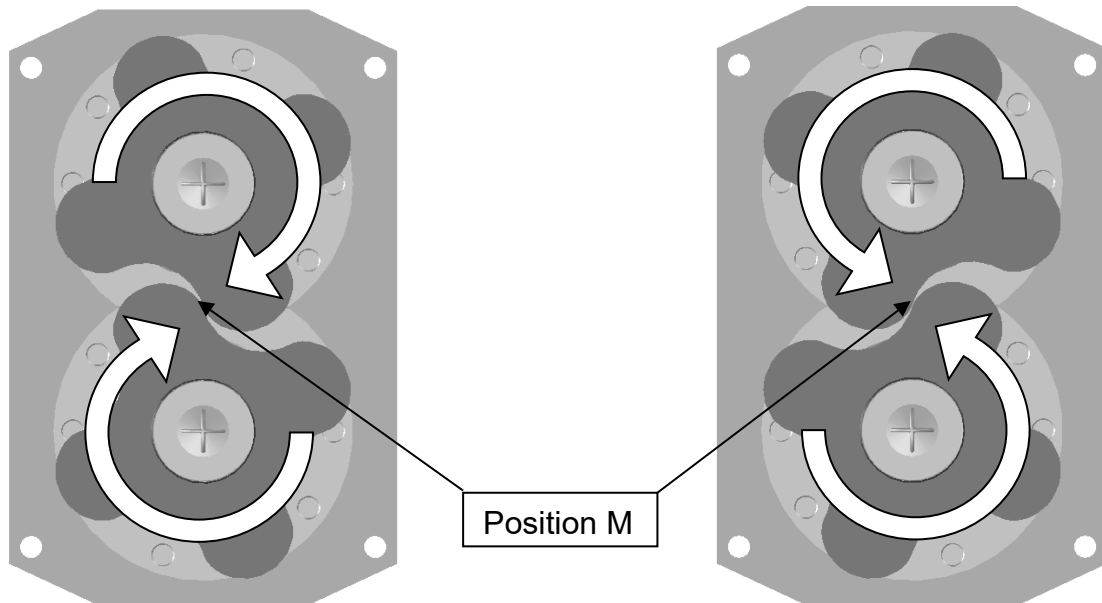
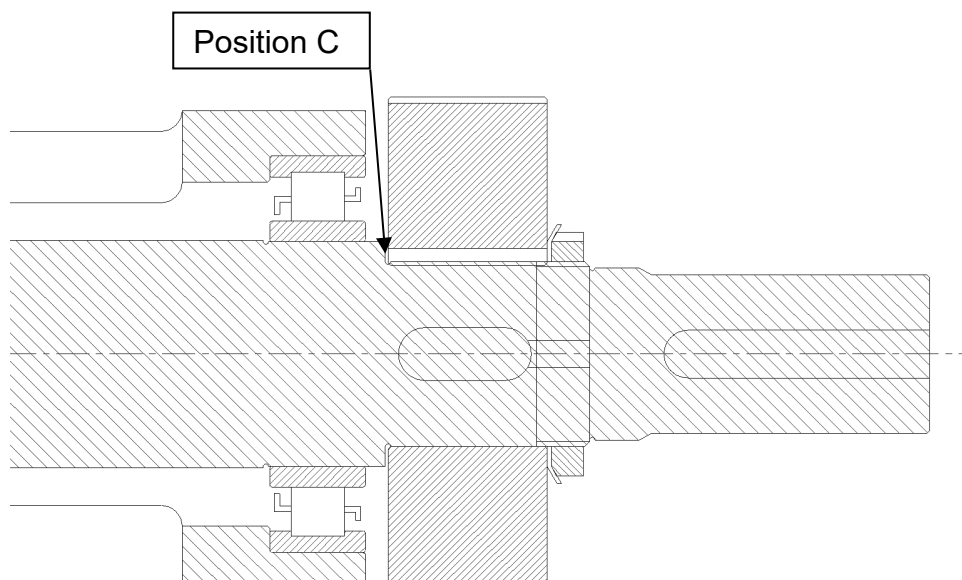


Fig 57

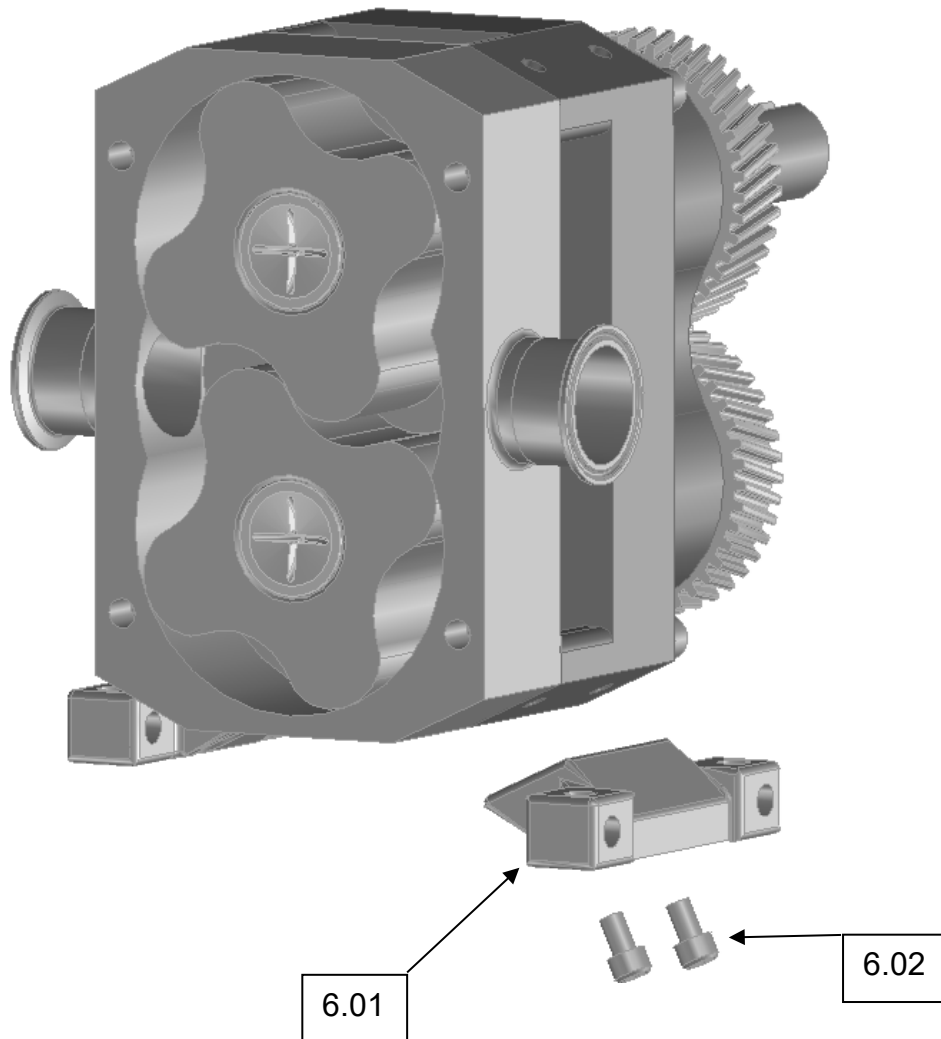
- To change the rotor timing add / remove shims from position C



- To adjust the drive rotor clockwise you need to add shim in position C on the drive shaft
- When the mesh clearance is set and is within tolerance (See clearance chart 8.1), secure the locknut to the correct torque and knock down one of the tabs on the tab washer to secure the assembly (See assembly 8.2 for torque settings)

4.2.5 Foot Assembly.

Fig 58

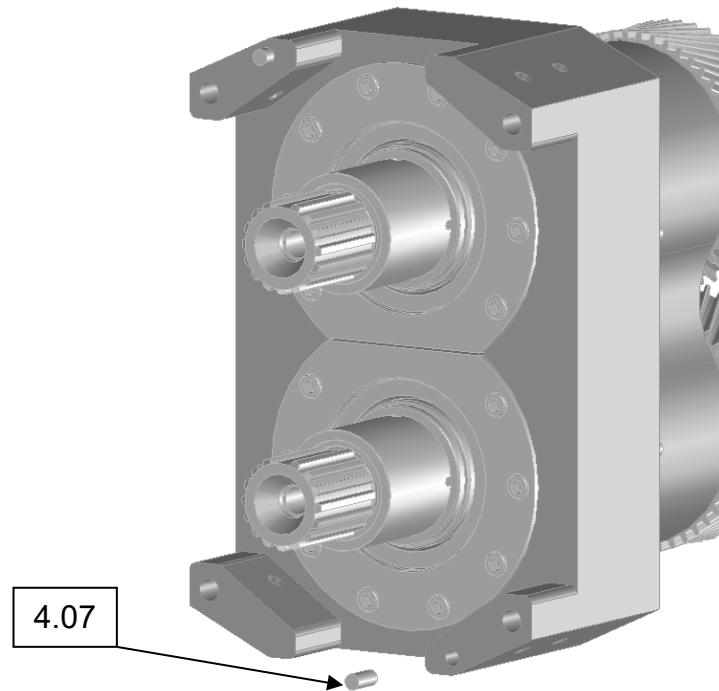


- Install the foot (6.01) and secure with screws (6.02)

4.2.6 Setting Front Clearance SLG

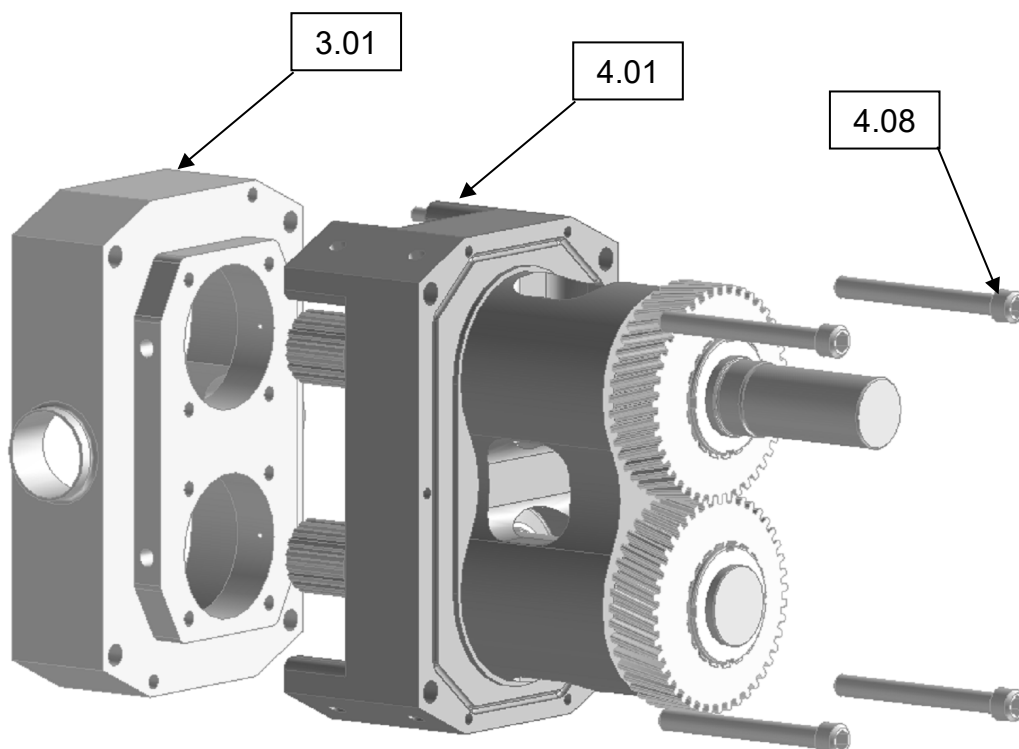
- Remove the rotor retainers (2.02), rotors (2.01) and install the dowels (4.07) into the bearing housing (4.01)

Fig 59



- Install the rotorcase (3.01) onto the bearing housing (4.01) and use the bolts (4.08) to secure the rotorcase (3.01)

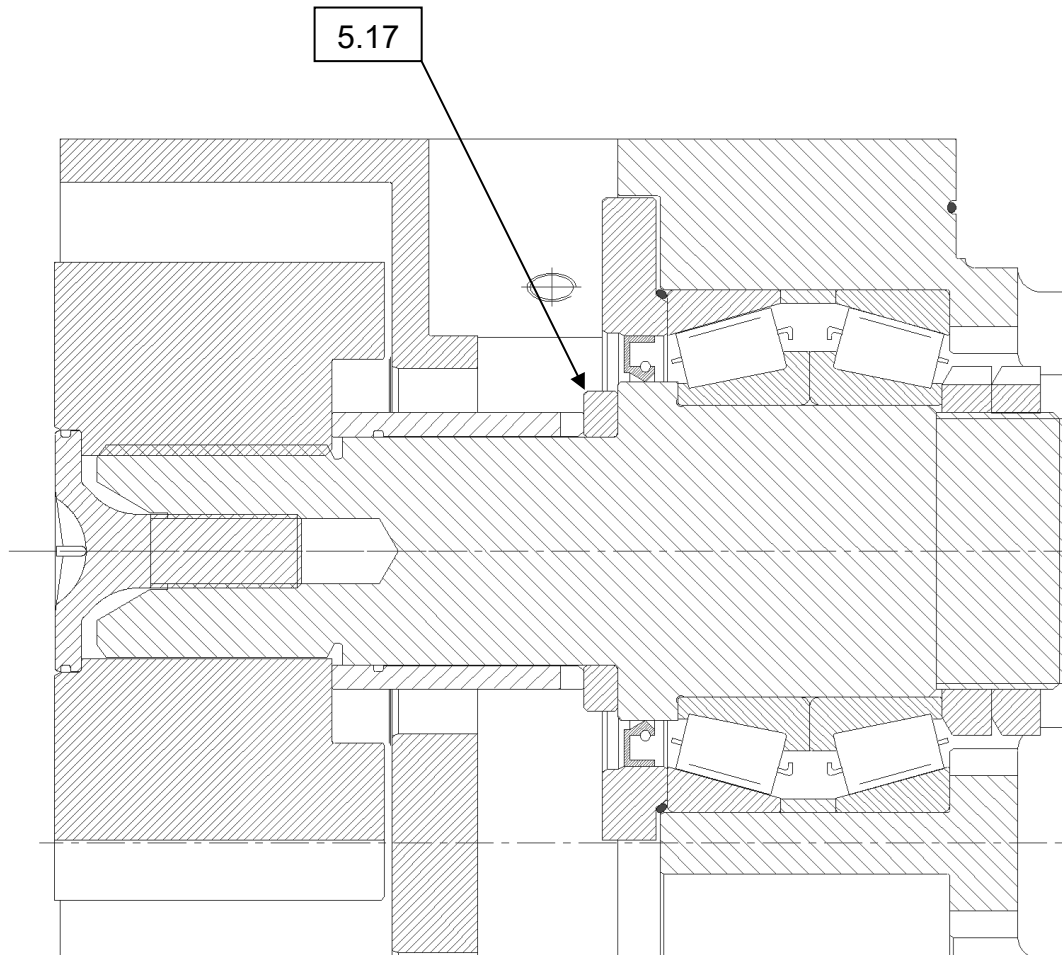
Fig 60



Note: - without the gearbox cover spacers are required to ensure the rotorcase is fully clamped

- The front clearance is set by machining the clearance spacer (5.17)

Fig 61



- Using a depth micrometer check the front clearance (Distance from the front of the rotor to the front of the rotorcase) and adjust the width of the front clearance spacer as necessary to set the front clearance see section 8.1 for pump head clearances

Note: - When assembling the pump with a new front clearance spacer the rotor will Be proud of the rotorcase.

When the front clearance spacer has been machined to the correct width make sure that the spacer kept with the respective shaft.

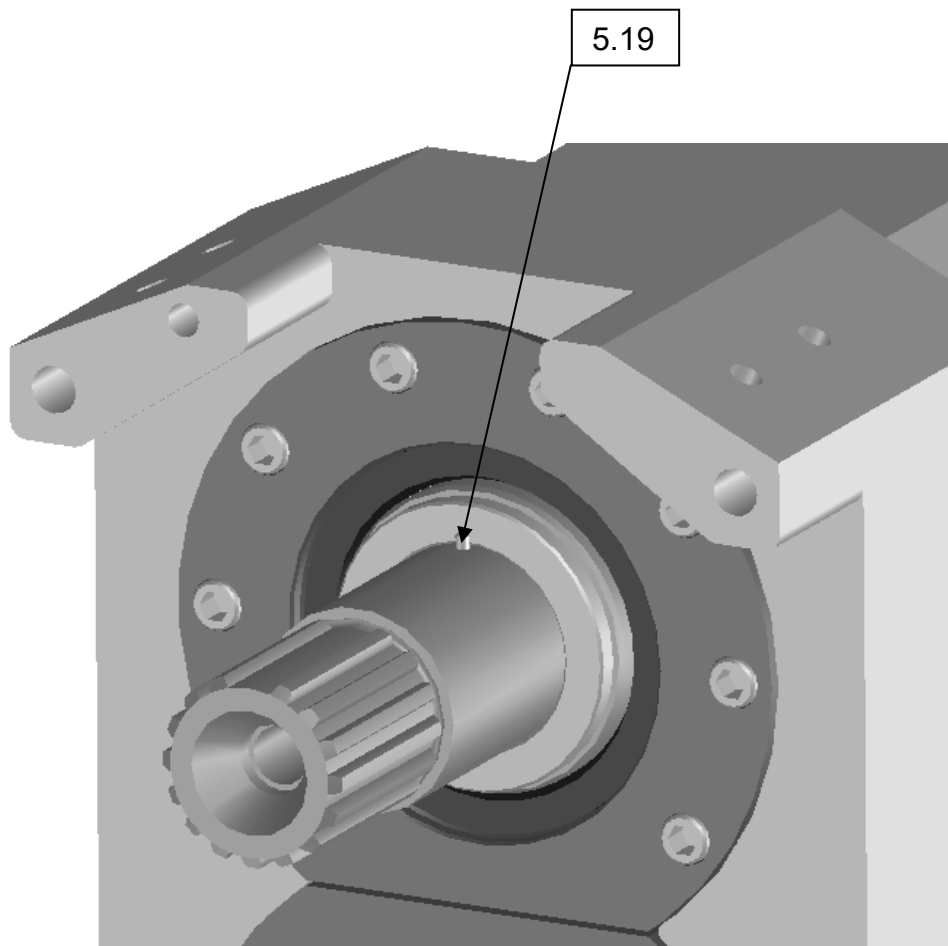
4.2.7 Final Assembly.

- When the front clearance spacers have been set install the pins (5.19) one per shaft.

The pin serves two main purposes

- 1) They secure the front clearance spacer
- 2) It provides anti-rotation for the seal sleeve and the seals

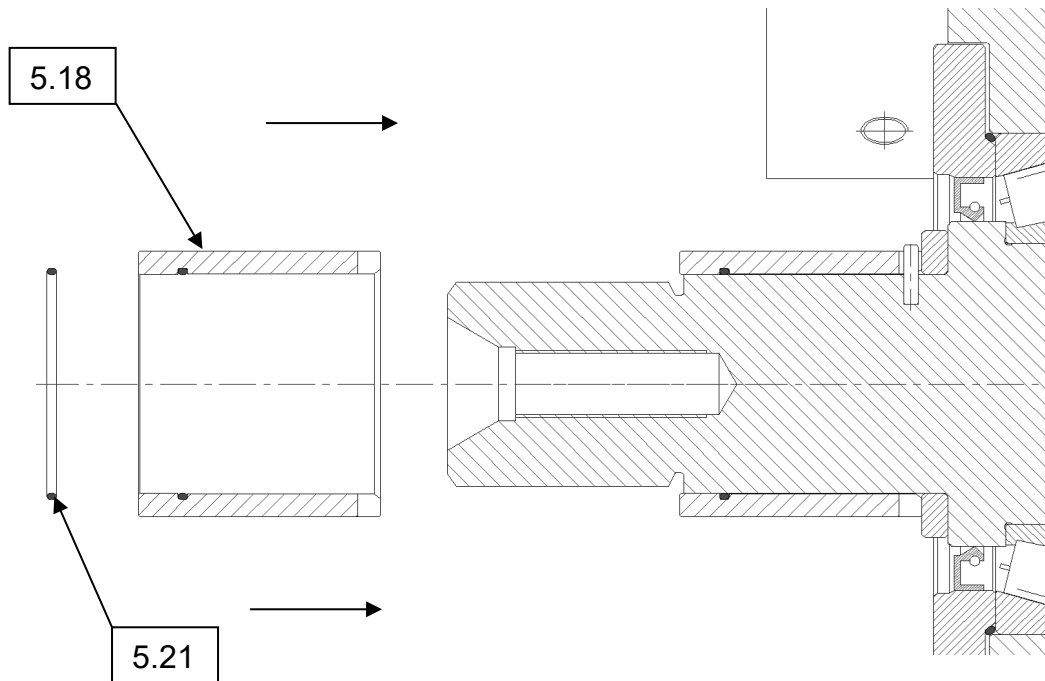
Fig 62



Note: - When installing the pins use a locking compound like Loctite 648 or similar

- Install the shaft sleeve o-ring (5.21) into the shaft sleeve (5.18) and then install the assembly onto the shaft

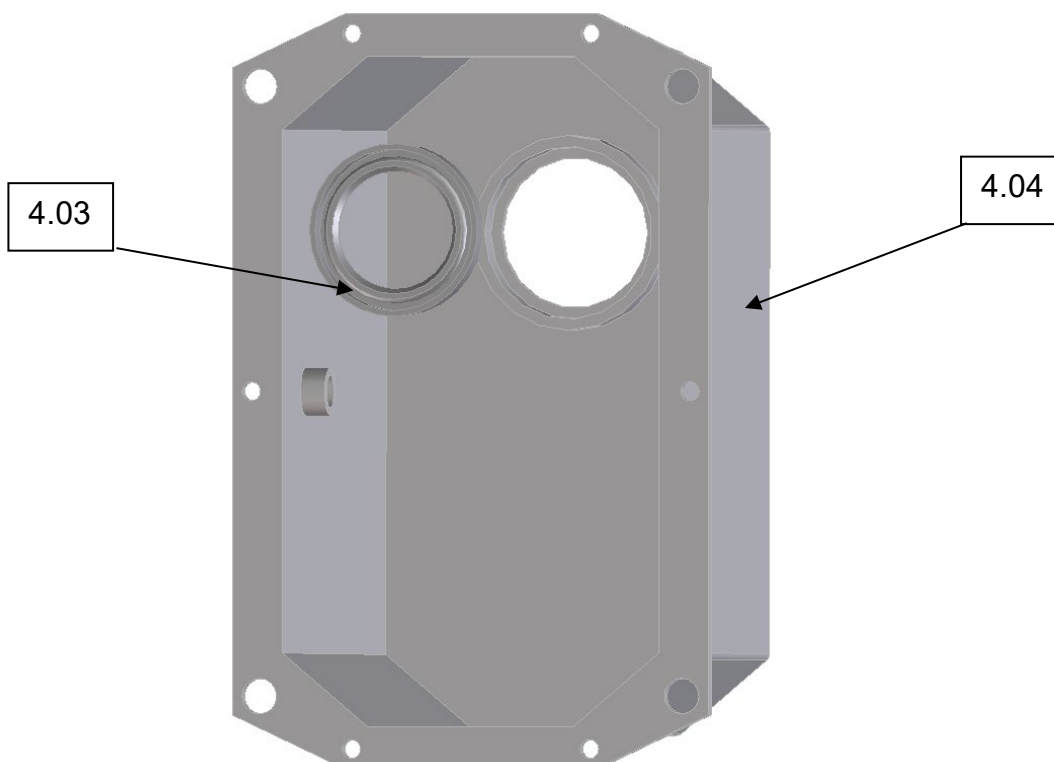
Fig 63



4.2.8 Gearbox Assembly.

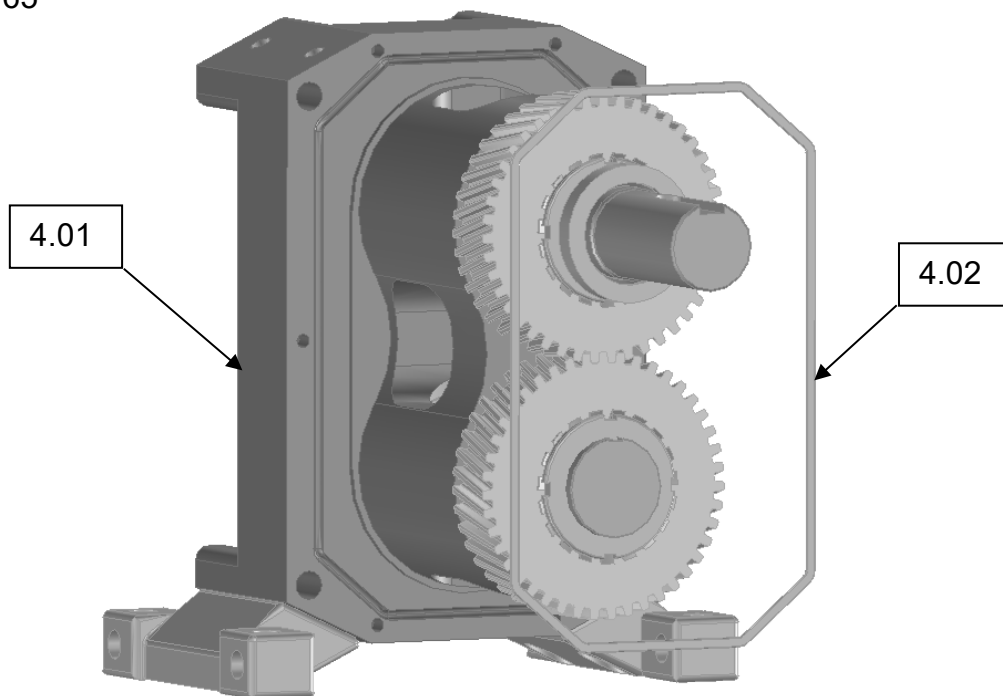
- Install the rear lip-seal (4.03) into the bearing housing cover (4.04)

Fig 64



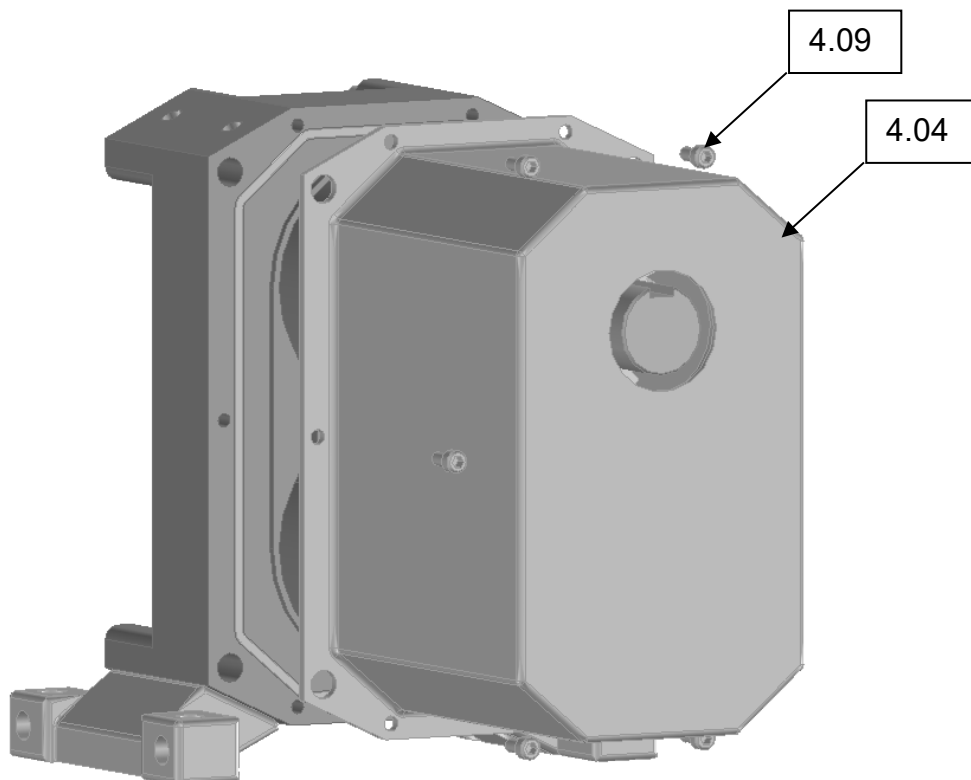
- Install the bearing housing o-ring (4.02) into the bearing housing (4.01)

Fig 65



- Install the bearing housing cover (4.04) and the retaining screws (4.09)

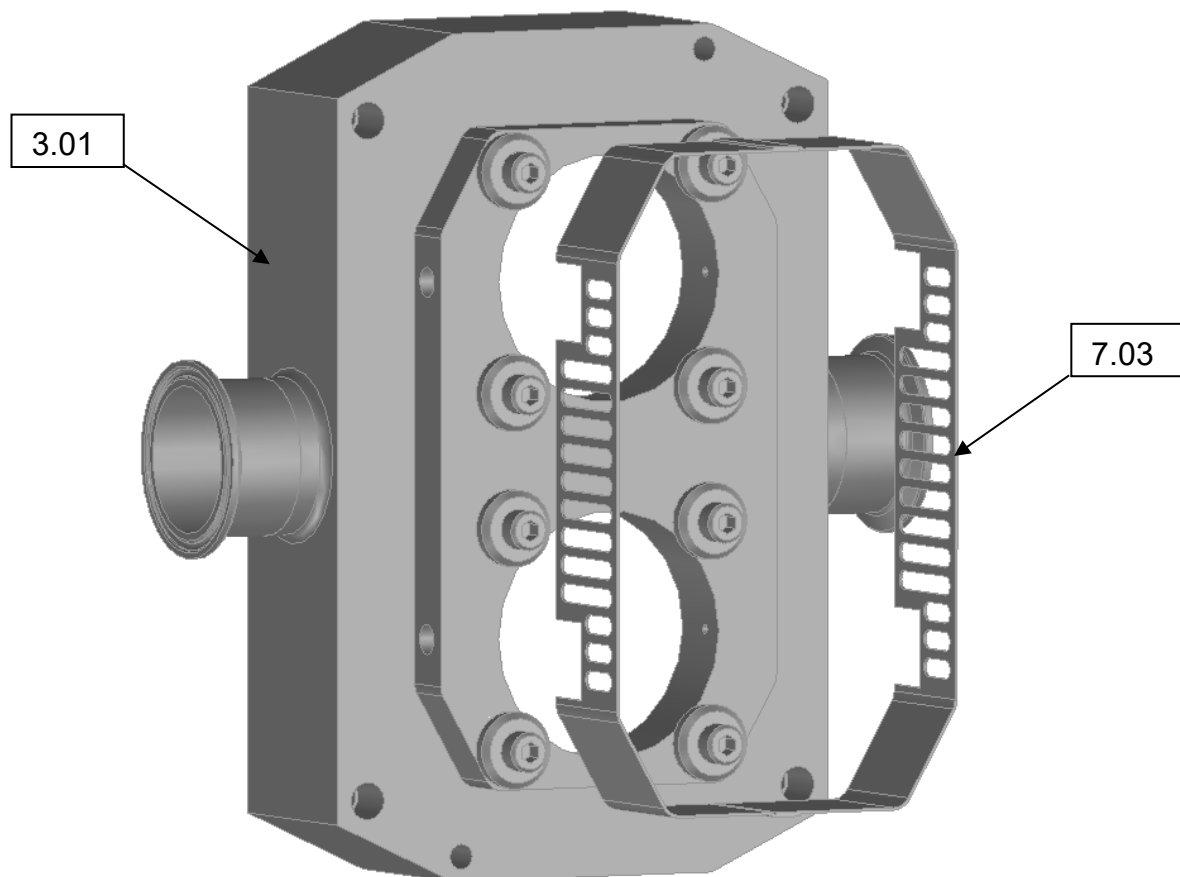
Fig 66



Note: - Before re-assembling the rotorcase refer to the seal section for instructions

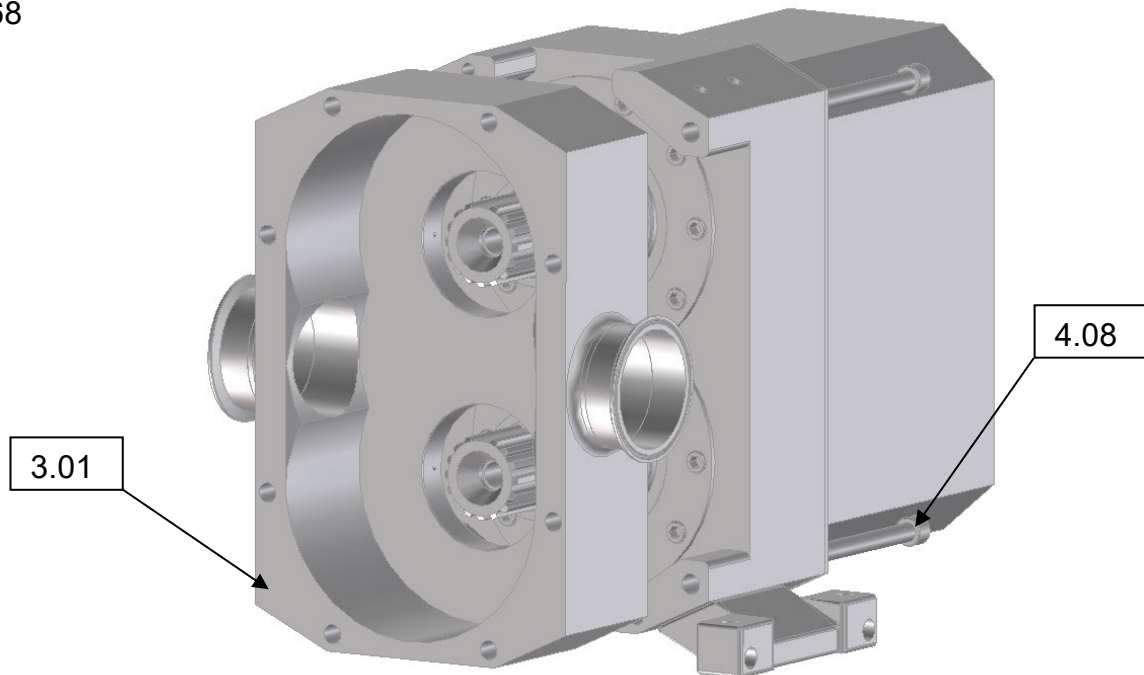
- Install the guard (7.03) onto the rear of the rotorcase (3.01)

Fig 67



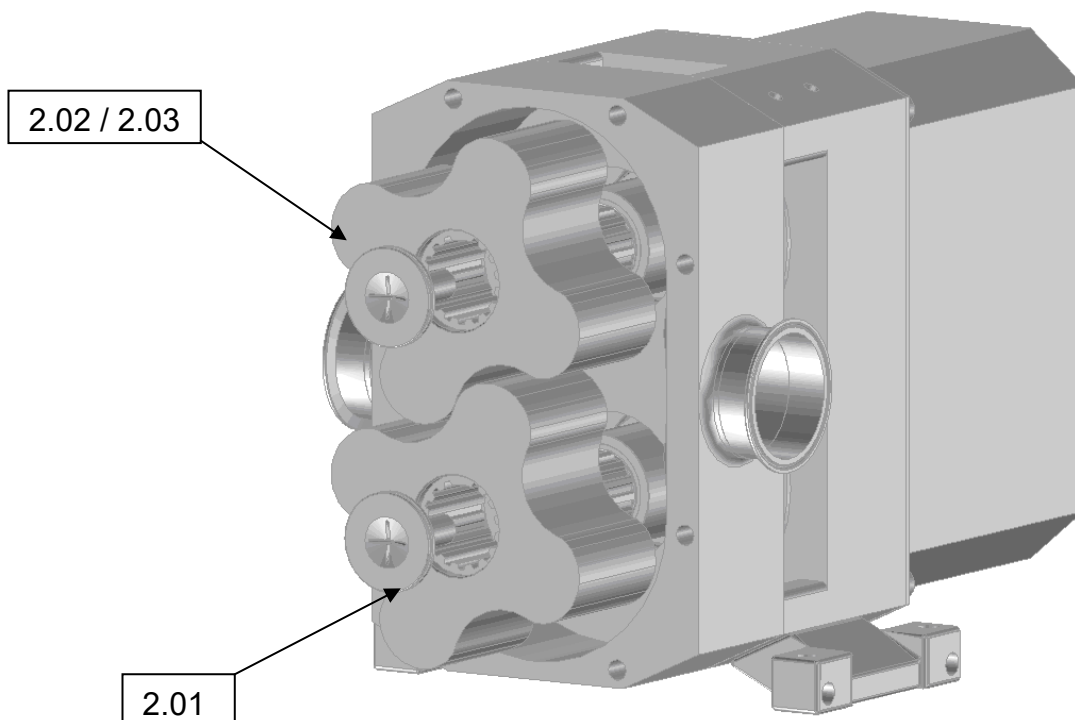
- Install the rotorcase (3.01) and secure with screws (4.08)

Fig 68



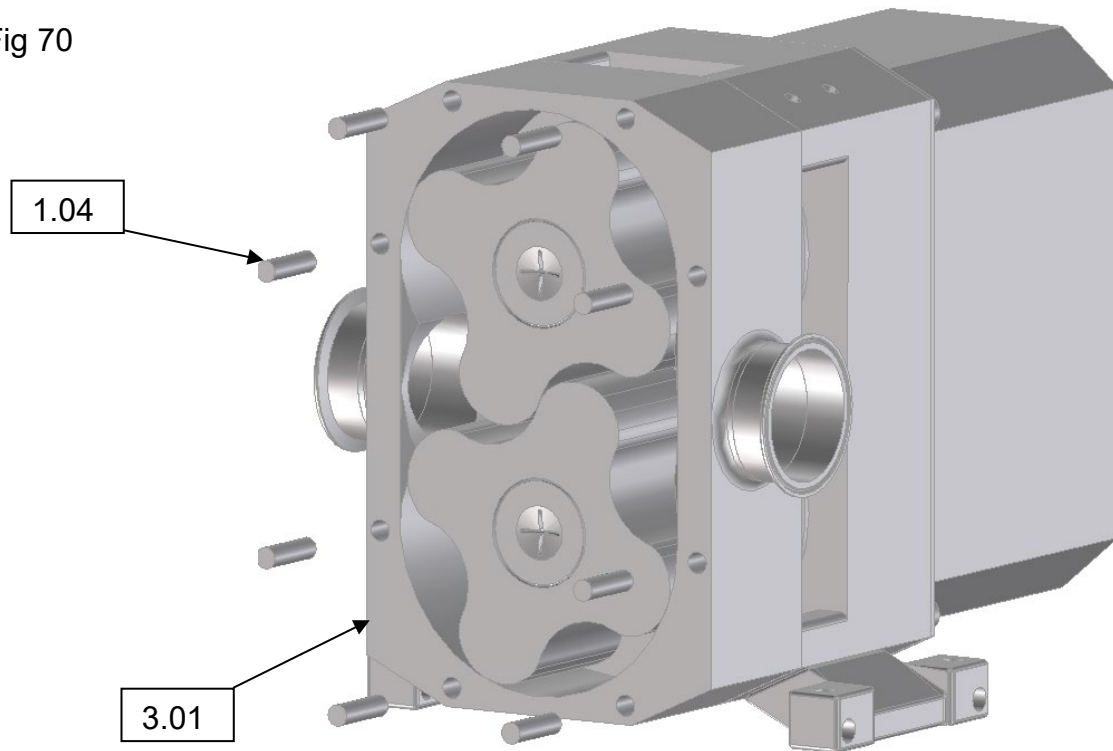
- Install the rotors (2.01) and rotor retainer o-ring (2.03) and secure with rotor retainers (2.02) (See section 8.2 for torque settings)
- To tighten rotor retainers (2.02), place a soft plastic strip between rotor and rotorcase to stop rotation (see tool list for details).

Fig 69



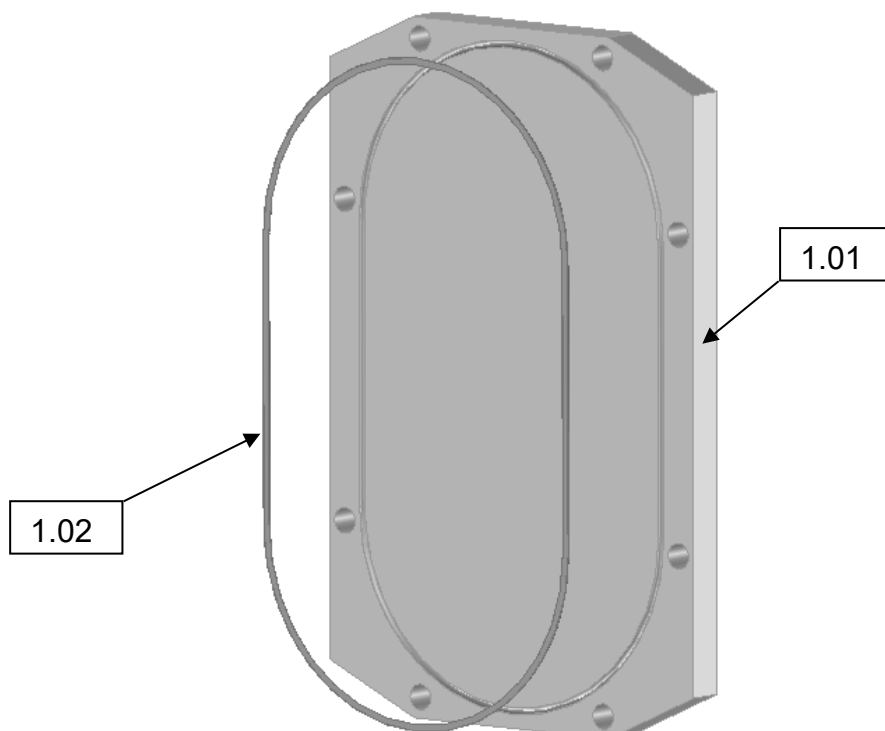
- Install the front cover studs (1.04) into the rotorcase (3.01)

Fig 70



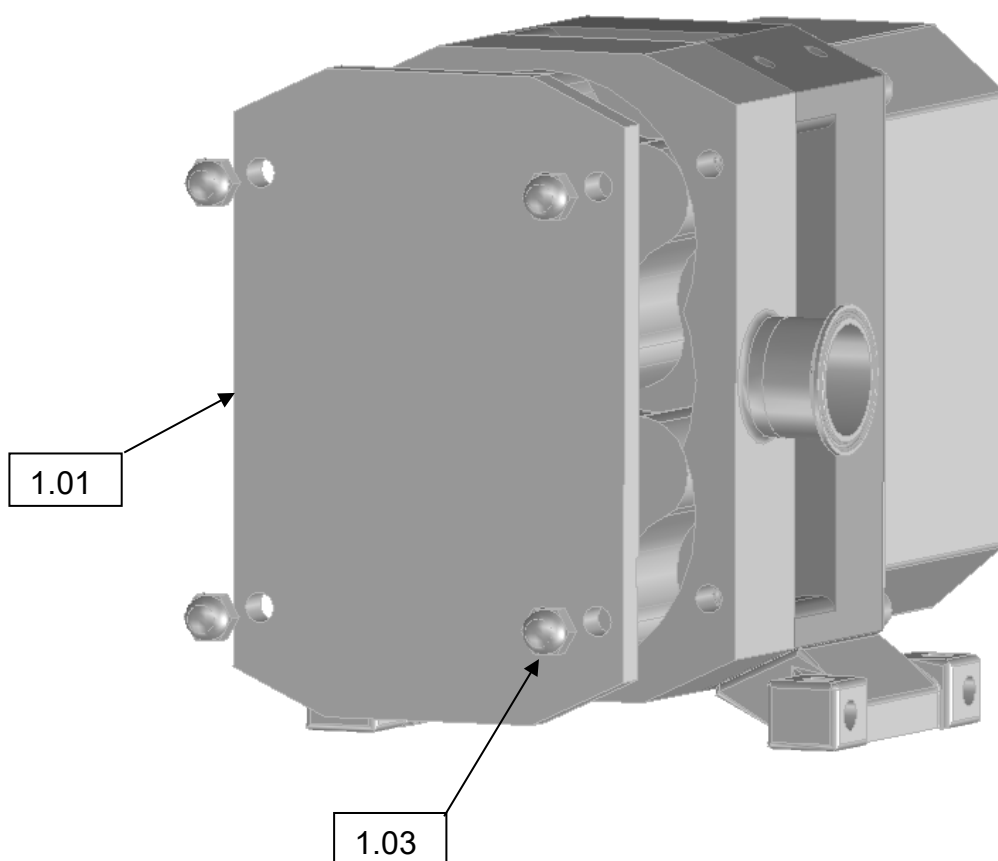
- Install the front cover o-ring (1.02) into the front cover (1.01)

Fig 71



- Install the front cover (1.01) and secure with the dome nuts (1.03).
(See section 8.2 for torque settings)

Fig 72



5.0 Seals.

5.1 General Procedures for Installing Mechanical Seals.

"Quick summary" of mechanical seal installation

- Mechanical seals are precision-engineered assemblies incorporating finely lapped seal faces and seats. They must be handled with care and will not give optimum performance unless installed carefully and according to instructions.
- When mechanical seals are to be reused, ensure seal components are kept in their appropriate sets. Do not mix old and new seal faces on the same seal.
- Remove any sharp corners and burrs that may damage any elastomers such as o-rings or lipseals.
- Be sure that all seal component fitting bores and housings are thoroughly cleaned before installation.
- The seal faces and seats must be handled with care and cleaned thoroughly before installation.
- Be sure that seal faces are undamaged and the o-rings are not cut, swollen or cracked.
- All o-rings should be lightly lubricated with a suitable lubricant (silicon grease, soap etc.) before installation but ensure there is no excessive amount of lubricant especially around the seal face area.
- Ensure when installing seals with brittle faces and seats such as silicon carbide that extra care is taken.
- Do not use any excessive force to install a mechanical seal. If it is difficult to position and assemble the seal then something is wrong.
- If you drop or damage a seal, do not install it before an inspection has been carried out.
- Do not run a mechanical seal dry.

WARNING

5.2 Single Mechanical Seal SLA to SLG.

Fig 73

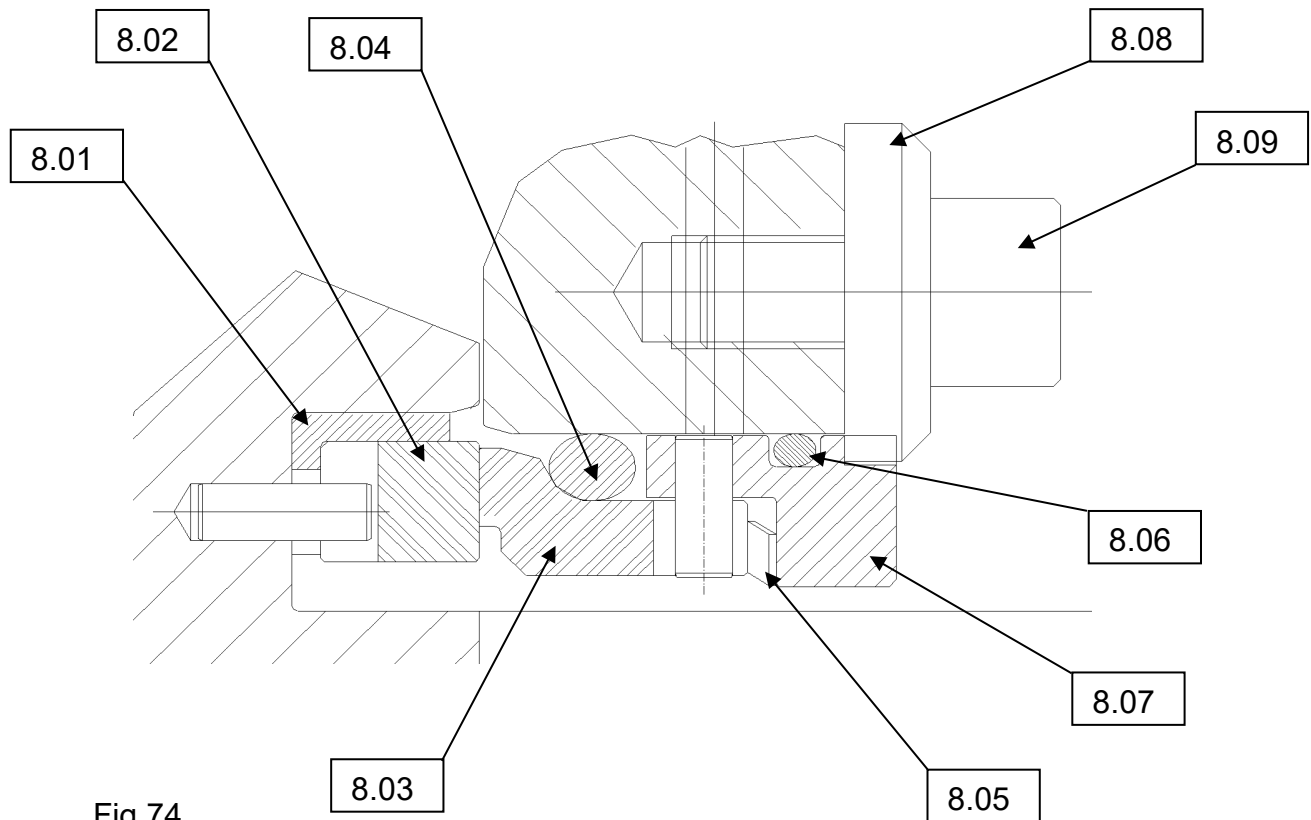
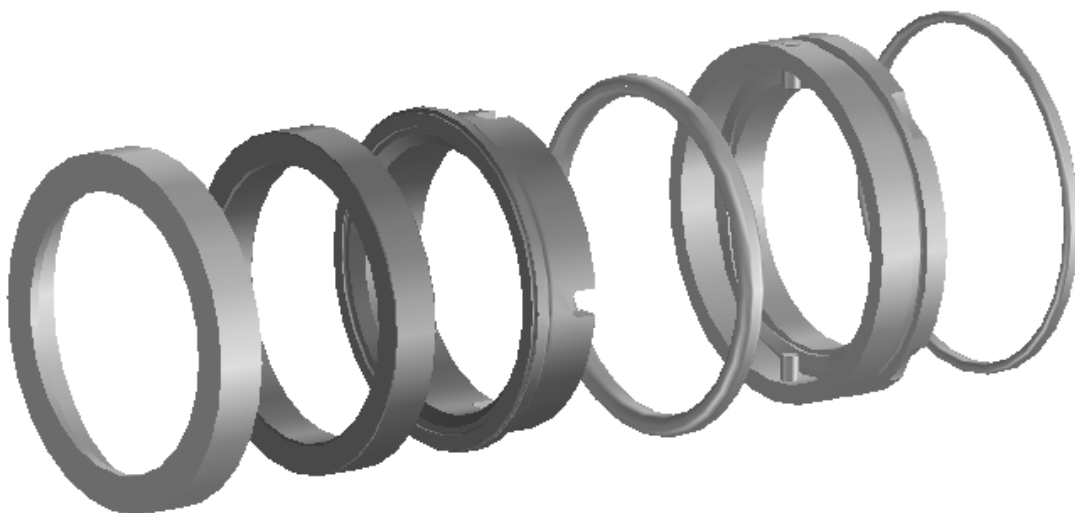
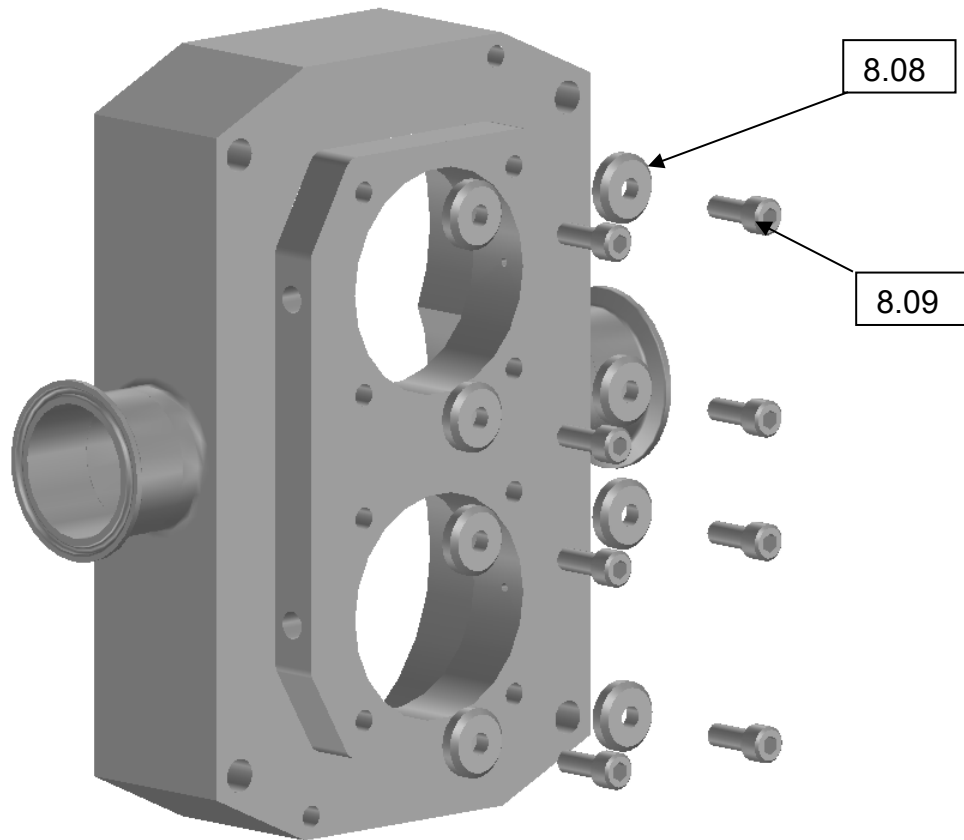


Fig 74



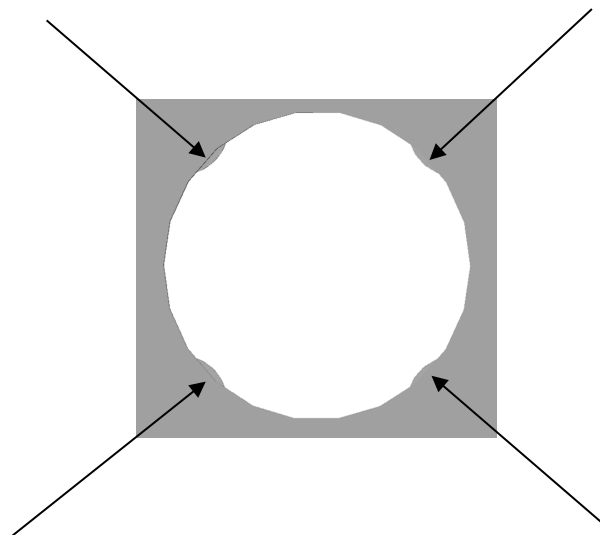
- Install the seal washers (8.08) and the seal screws (8.09)

Fig 75



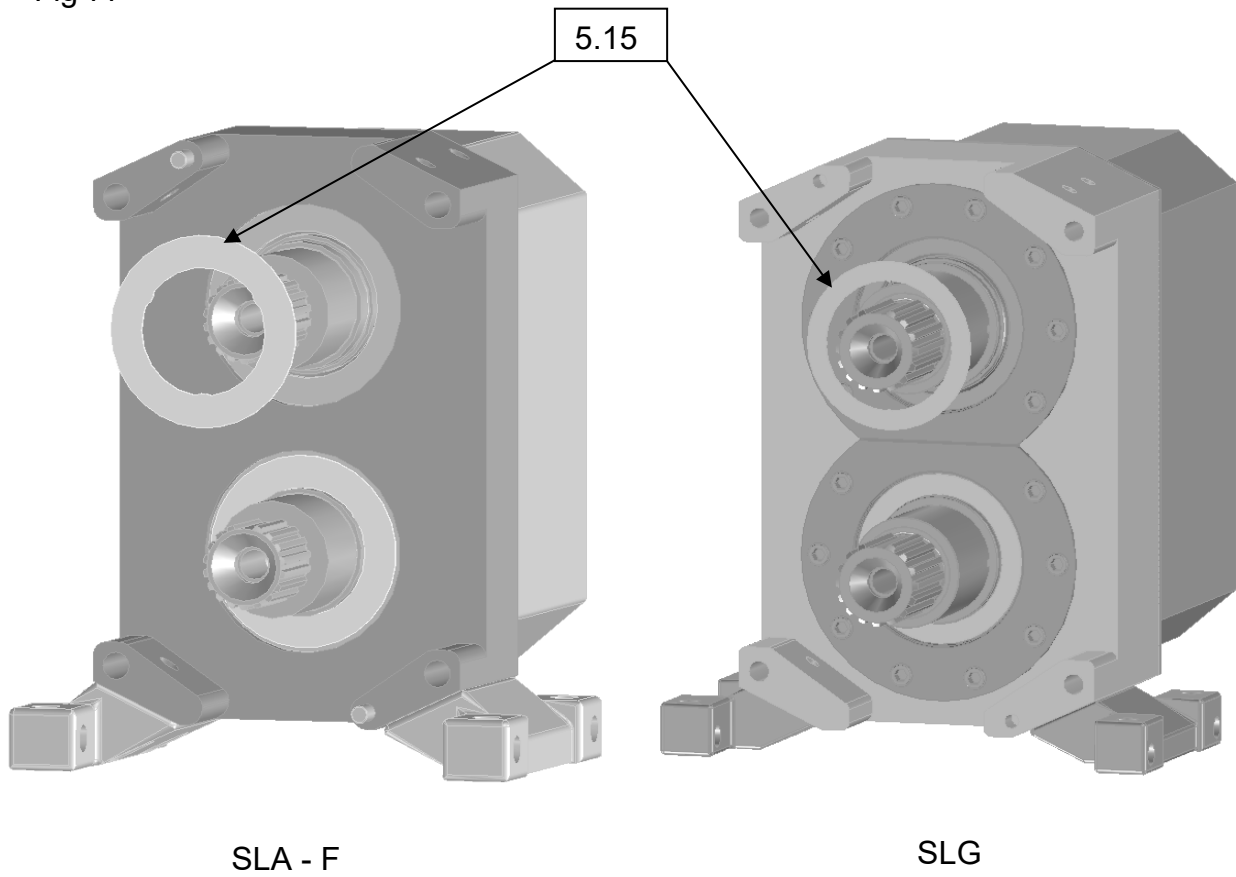
The washers overlap the seal bore – this locates and provides drive to the seal.

Fig 76



- Install the slinger (5.15)

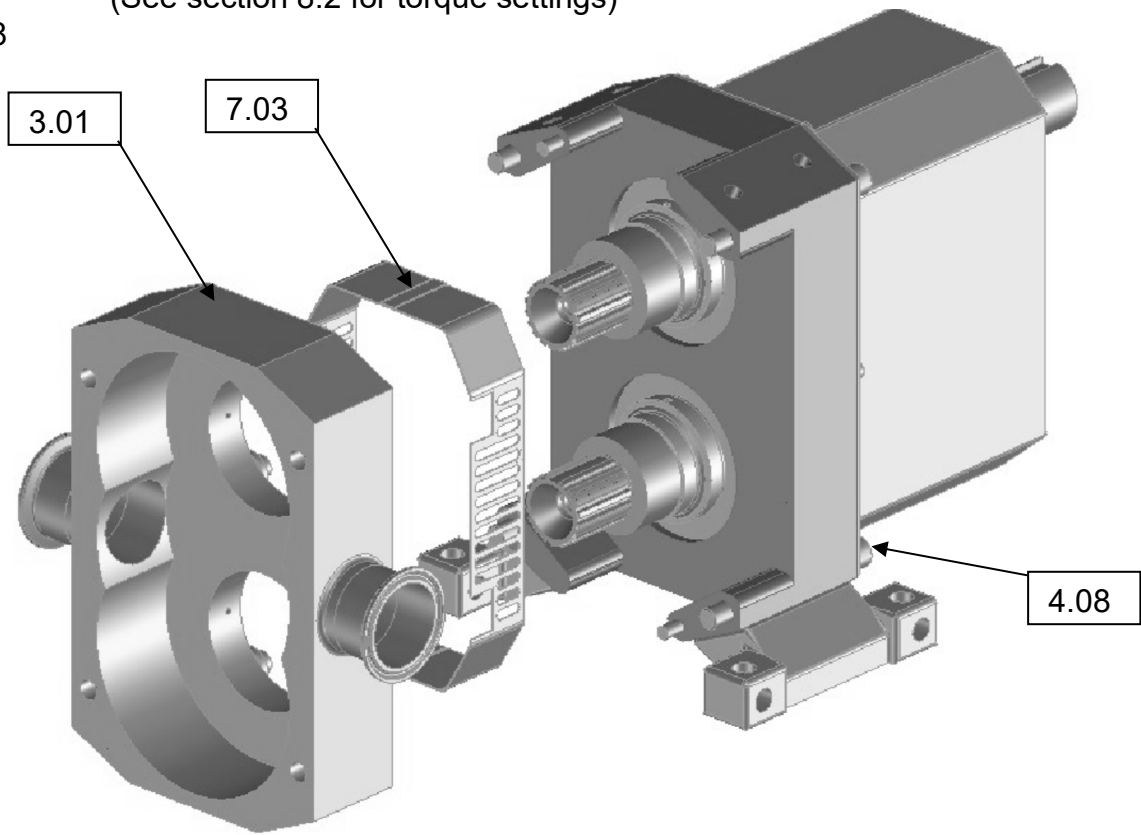
Fig 77



Note: - Depending on the seal arrangement the slinger will fit on the shaft or the rear half of the seal

- Install the guard (7.03) and rotorcase (3.01) and secure with screws (4.08)
(See section 8.2 for torque settings)

Fig 78



- Install the o-ring (8.06) into the seal housing and then install the seal housing (8.07) into the rotorcase - making sure that the location recesses line up with the seal washers (8.07)

Fig 79

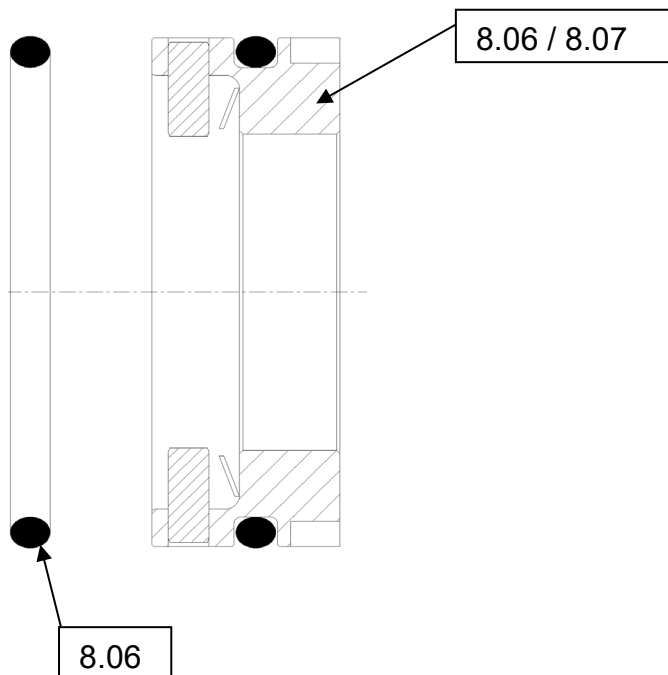
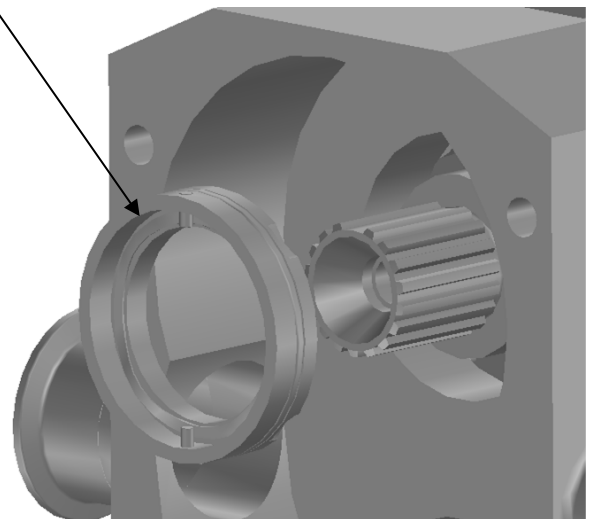
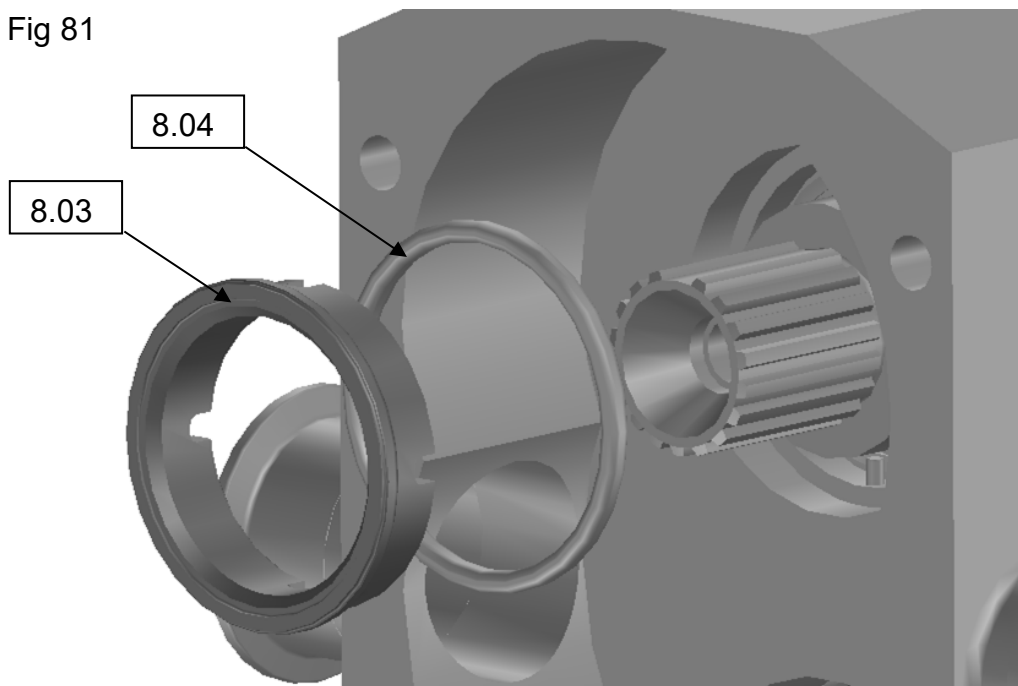


Fig 80



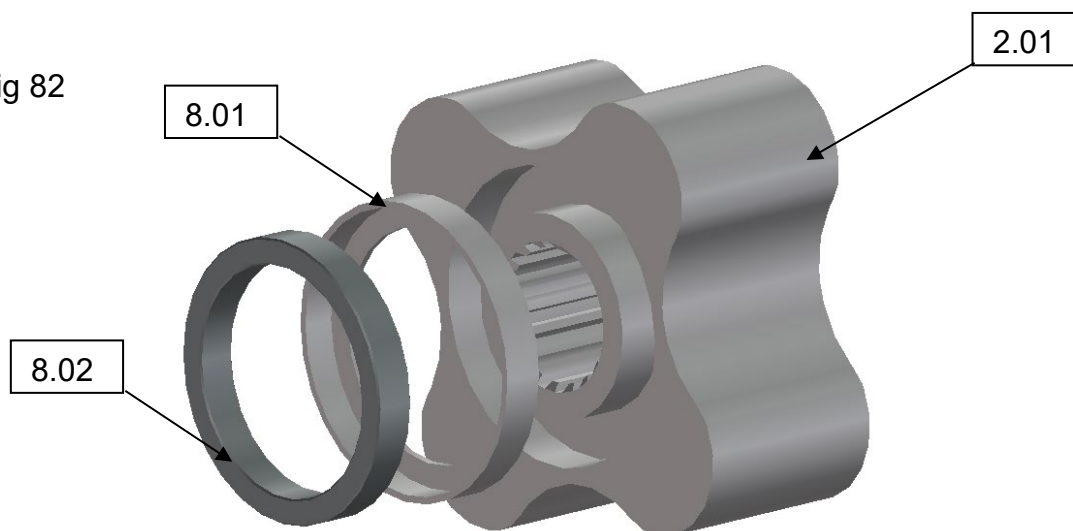
- Install the o-ring (8.04) onto the static seal (8.03) and then install the static seal into the rotorcase – make sure that the location slots line up with the pins in the seal housing

Fig 81



- Install the L-cup (8.01) and the rotary face (8.02) into the rotor (2.01)

Fig 82



Note: - the rotary face has a cut out in the rear of the face – this is not the sealing face and must be installed in the correct orientation. The cut out in the seal face should be lined up with the cut out in the L-cup

The seals are now assembled.

For rotor and front cover installation see pump assembly section

5.3 Single Flushed Mechanical Seal SLA to SLF.

Fig 83

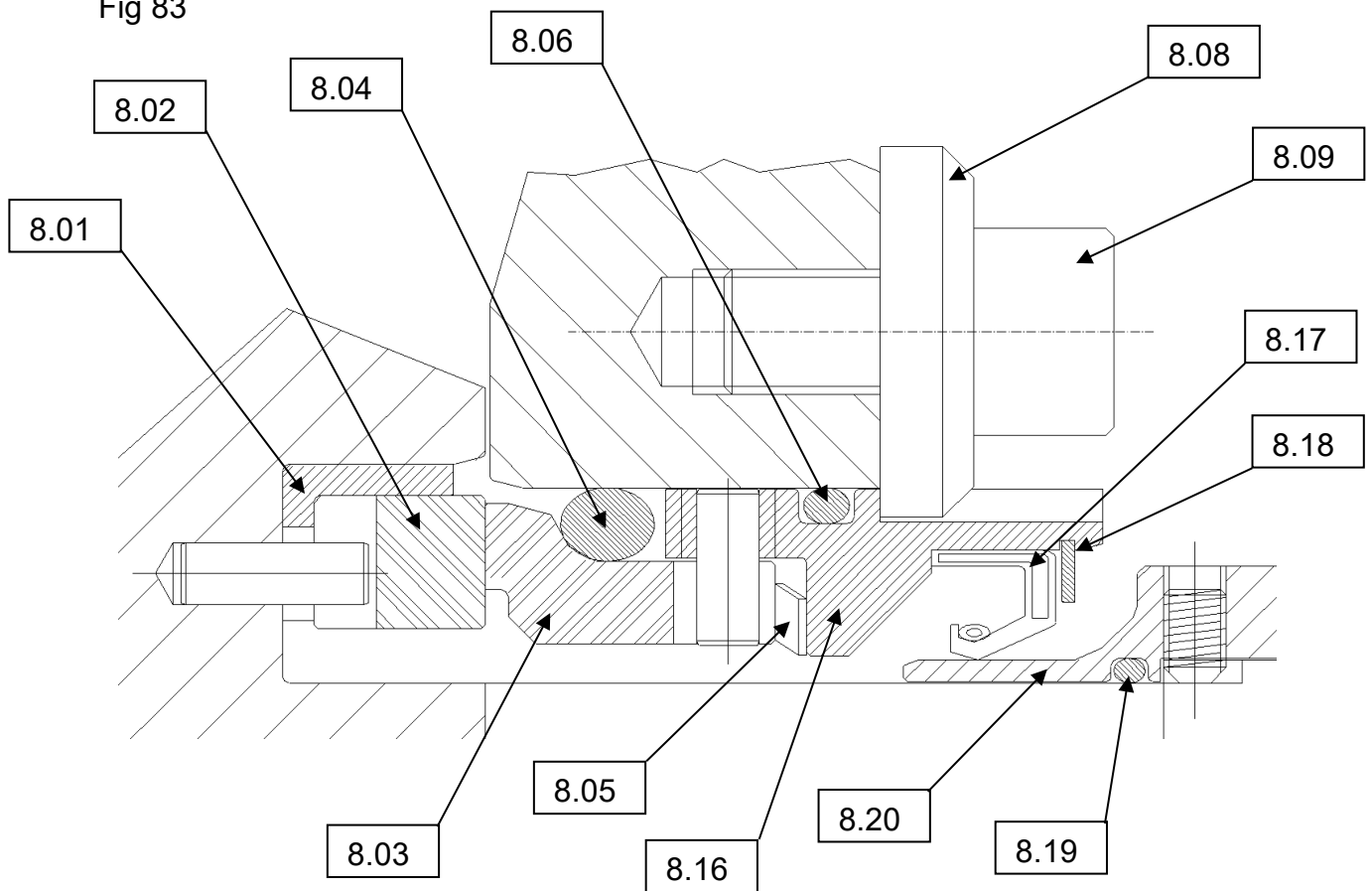
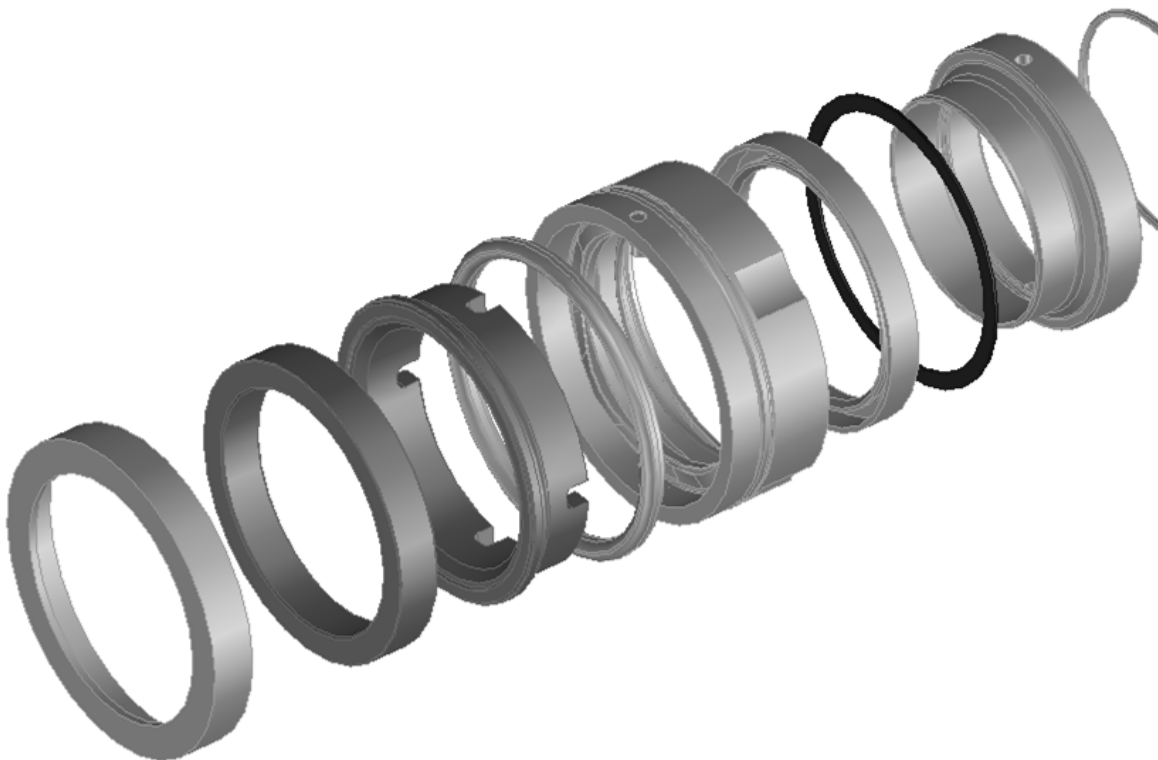
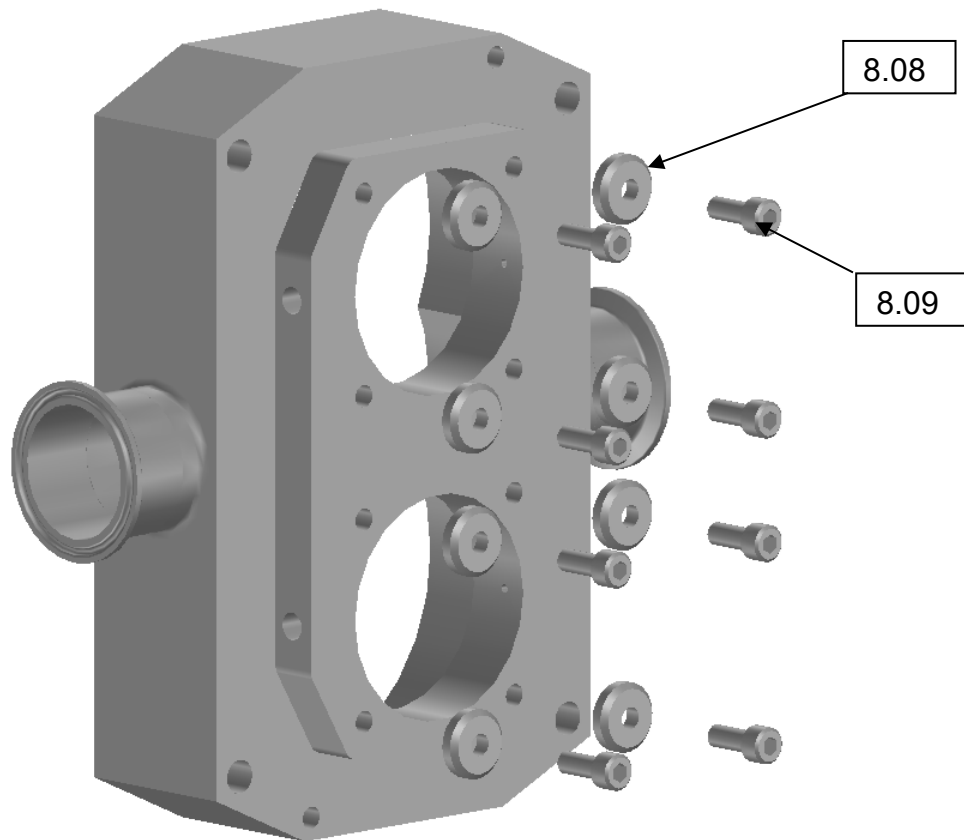


Fig 84



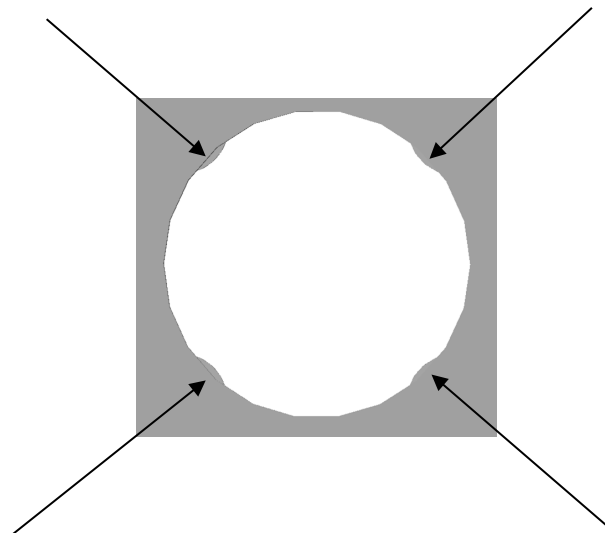
- Install the seal washers (8.08) and the seal screws (8.09)

Fig 85



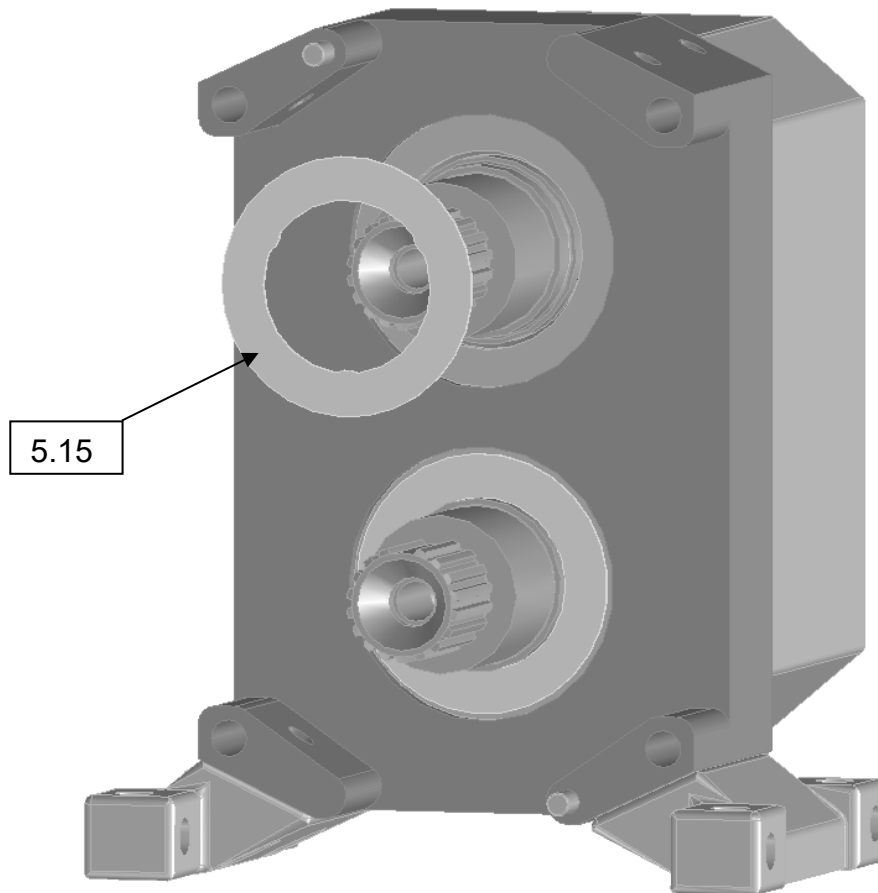
The washers overlap the seal bore – this locates and provides drive to the seal.

Fig 86



- Install the slinger (5.15)

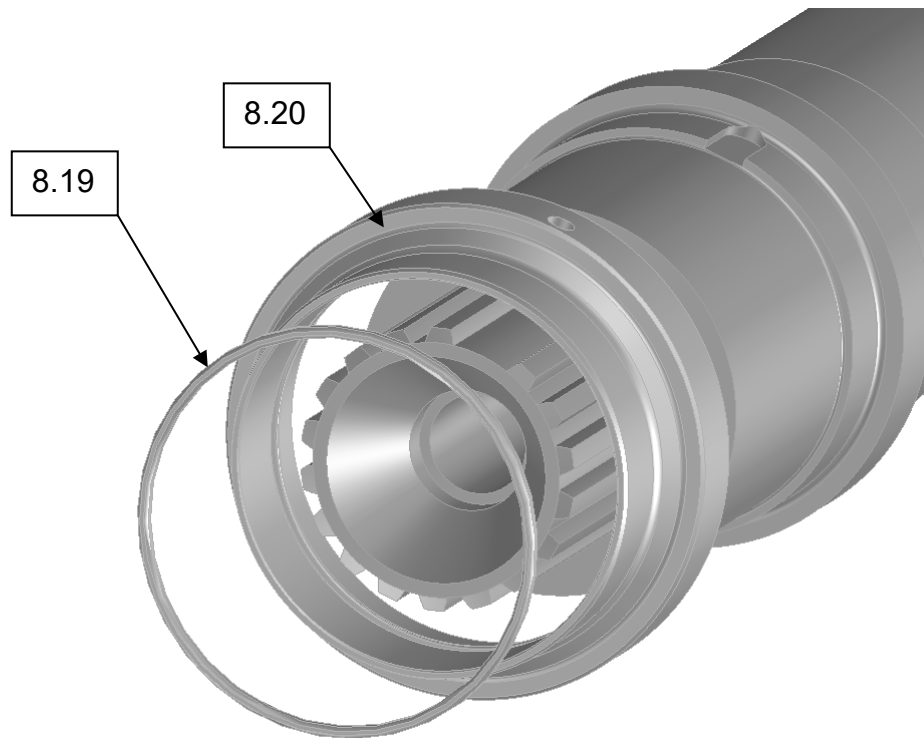
Fig 87



Note: - Depending on the seal arrangement the slinger will fit on the shaft or the rear half of the seal.

- Install the o-ring (8.19) onto the sleeve (8.20) and then install the sleeve onto the shaft and secure with the grub screws (8.14)

Fig 88

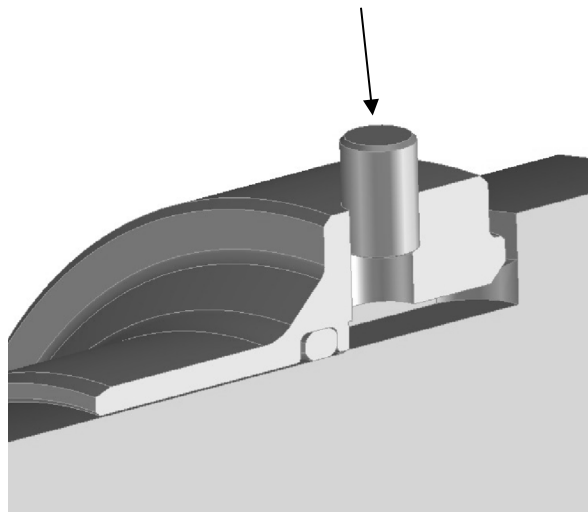


Note: - The shaft has two location grooves which the grub screws in the seal sleeve locate into. (See fig 89 and fig 90)

Fig 89

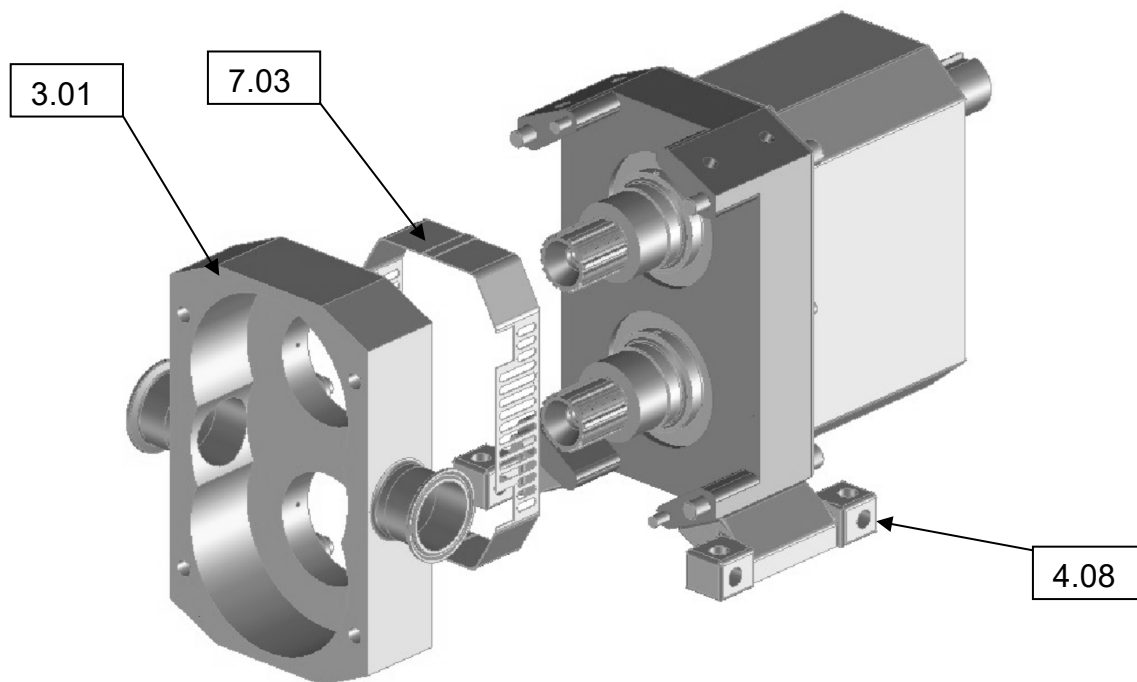


Fig 90



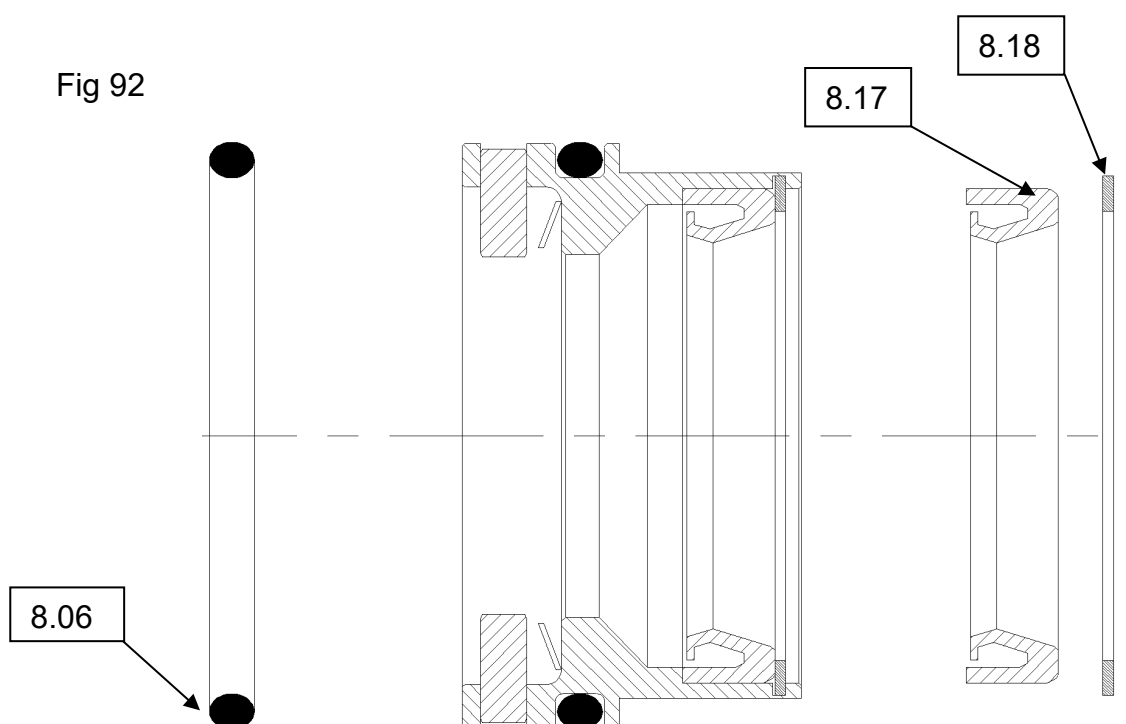
- Install the guard (7.03) and rotorcase (3.01) and secure with screws (4.08)
(see section 8.2 for torque settings)

Fig 91



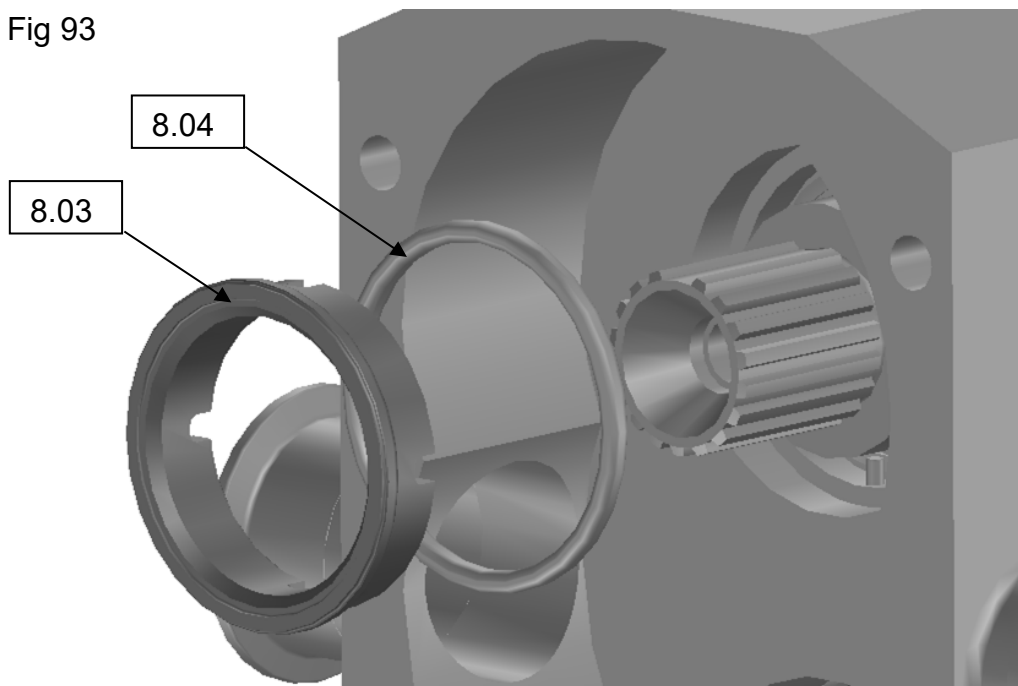
- Install the o-ring (8.06), lip-seal (8.17) and the cir-clip (8.18) into the seal housing and then install the seal housing (8.16) into the rotorcase

Fig 92



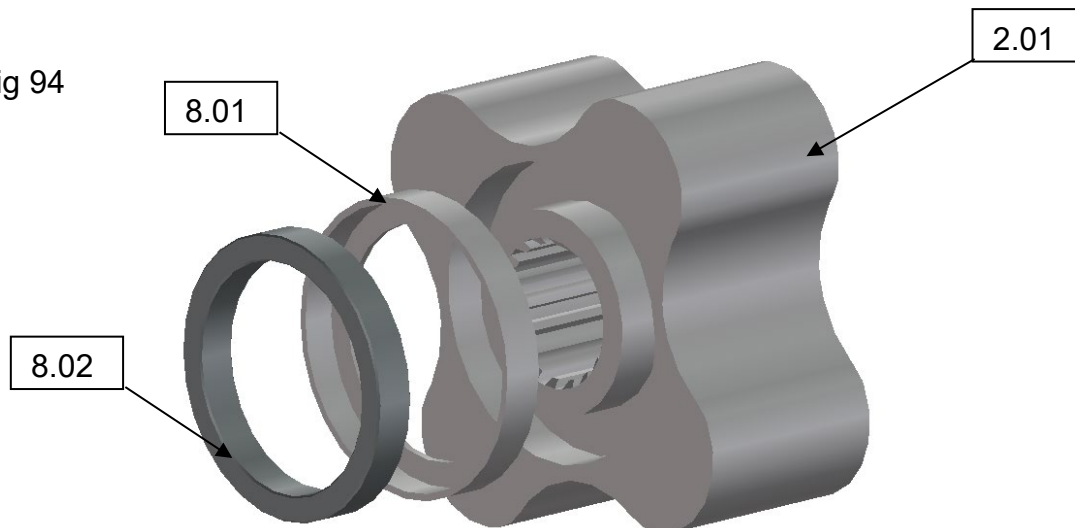
- Install the o-ring (8.04) onto the static seal (8.03) and then install the static seal into the rotorcase – ensure that the location slots line up with the pins in the seal housing

Fig 93



- Install the L-cup (8.01) and the rotary face (8.02) into the rotor (2.01)

Fig 94



Note: - the rotary face has a cut out in the rear of the face – this is not the sealing face and must be installed in the correct orientation. The cut out in the seal face should be lined up with the cut out in the L-cup

The seals are now assembled.

For rotor and front cover installation see pump assembly section

5.4 Single Flushed Mechanical Seal SLG.

Fig 95

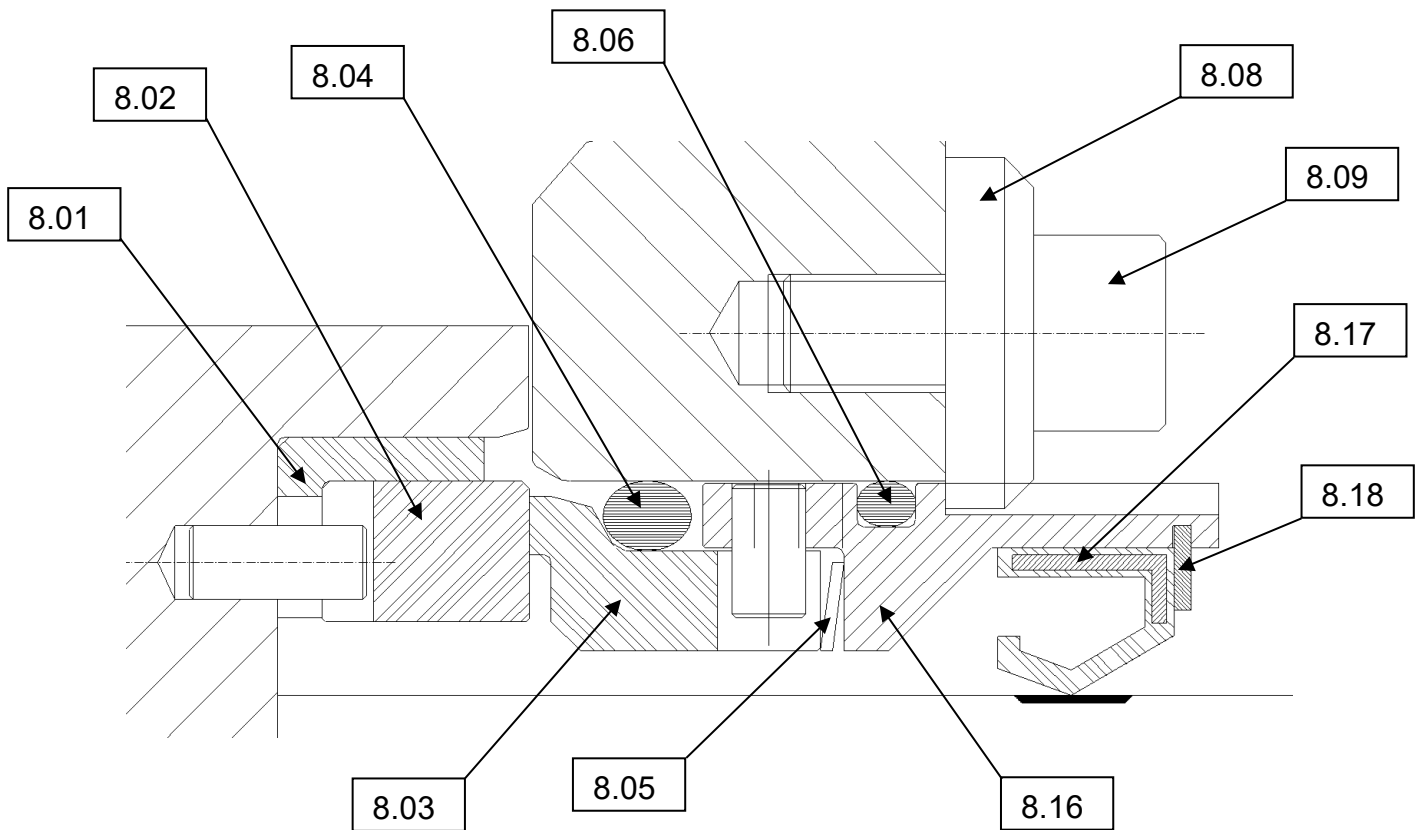
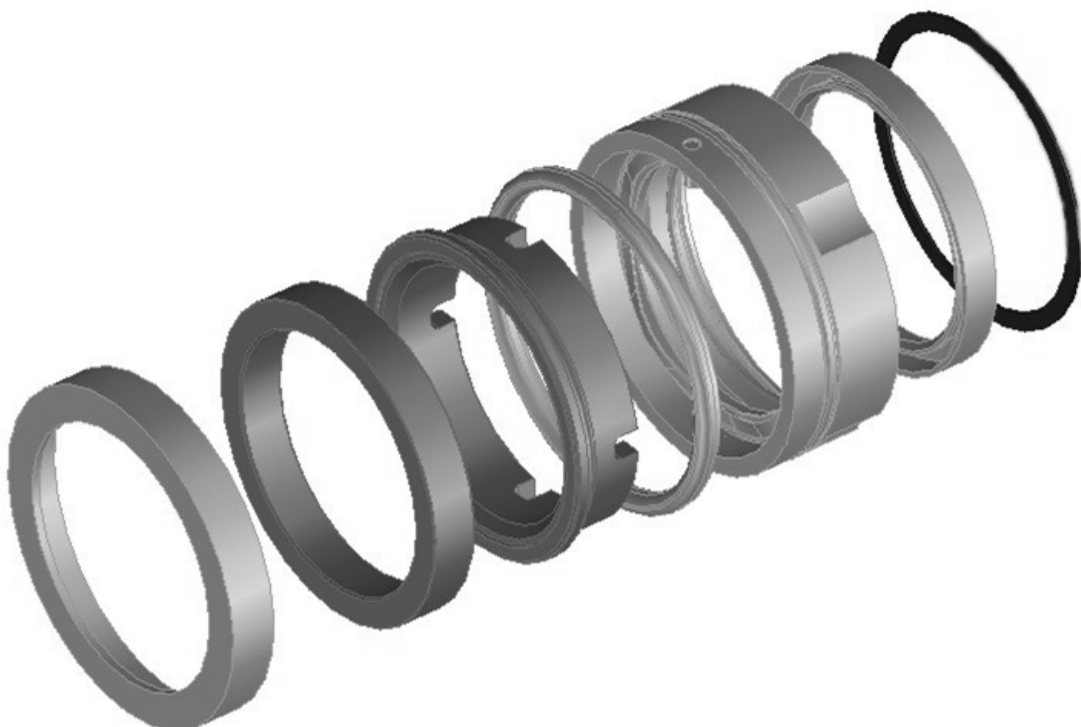
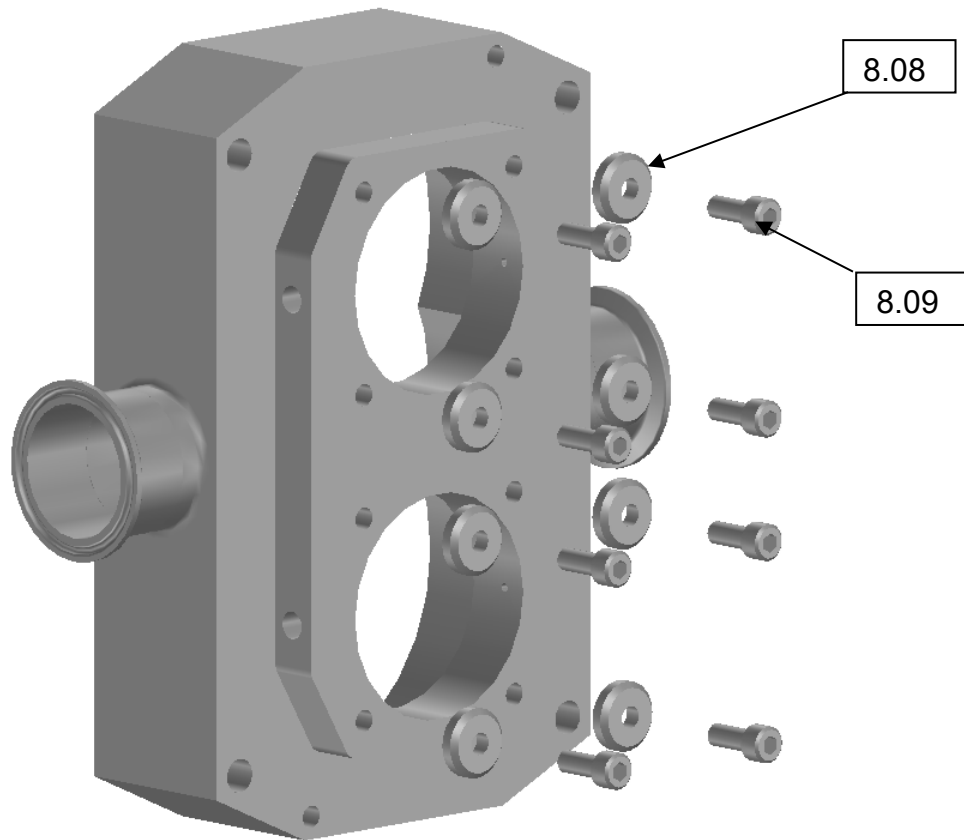


Fig 96



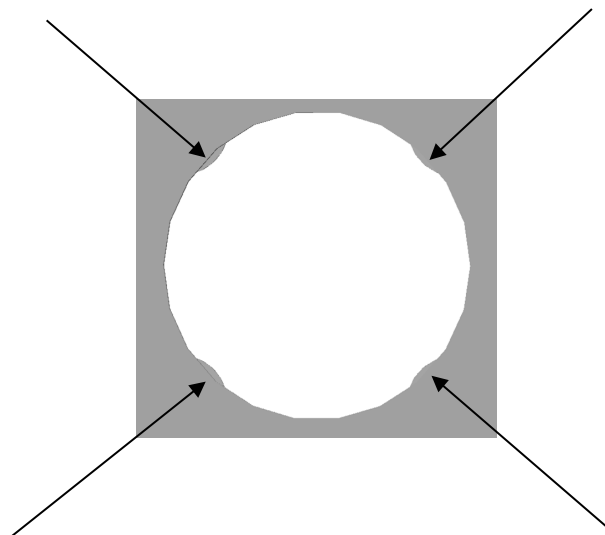
- Install the seal washers (8.08) and the seal screws (8.09)

Fig 97



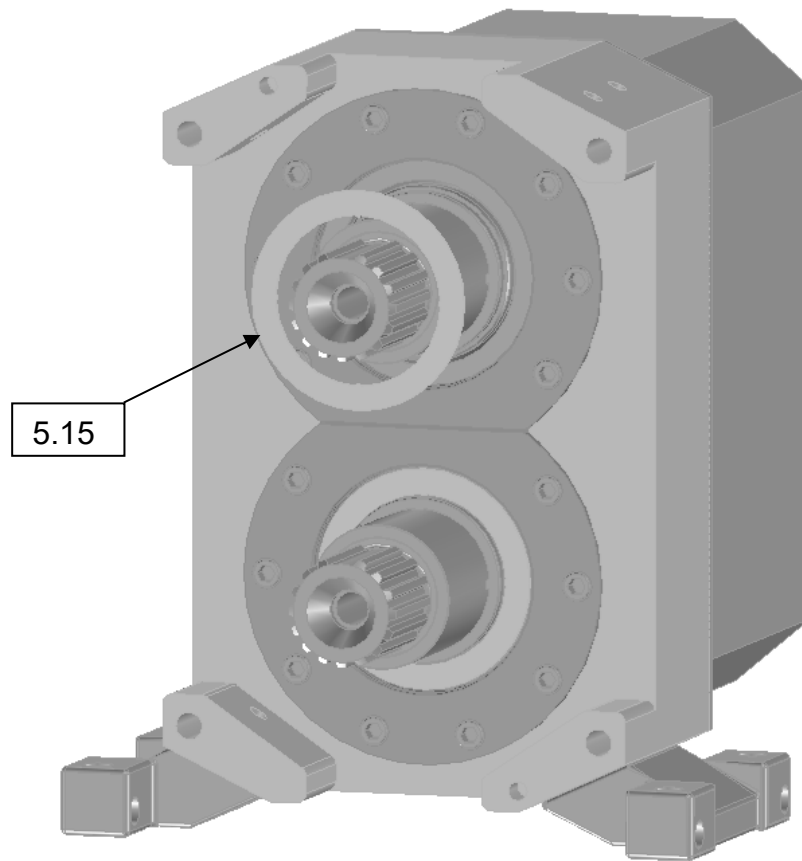
The washers overlap the seal bore – this locates and provides drive to the seal.

Fig 98



- Install the slinger (5.15)

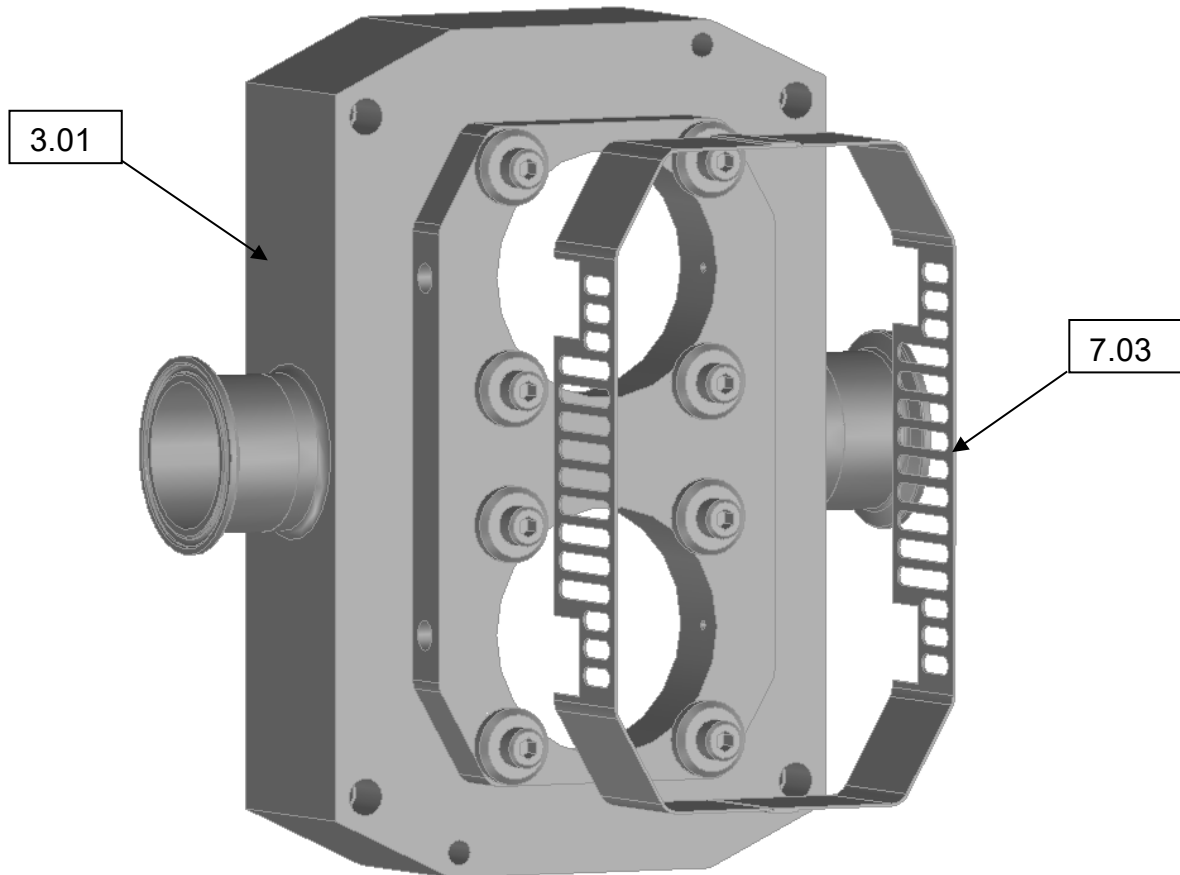
Fig 99



Note: - Depending on the seal arrangement the slinger will fit on the shaft or the rear half of the seal

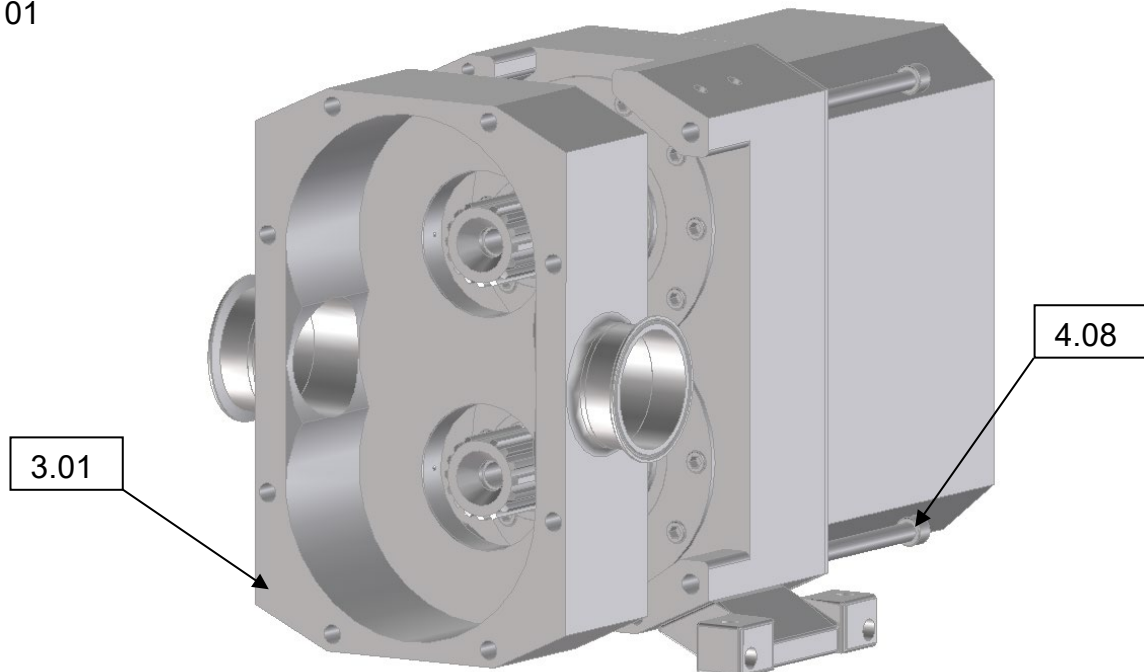
- Install the guard (7.03) onto the rear of the rotorcase (3.01)

Fig 100



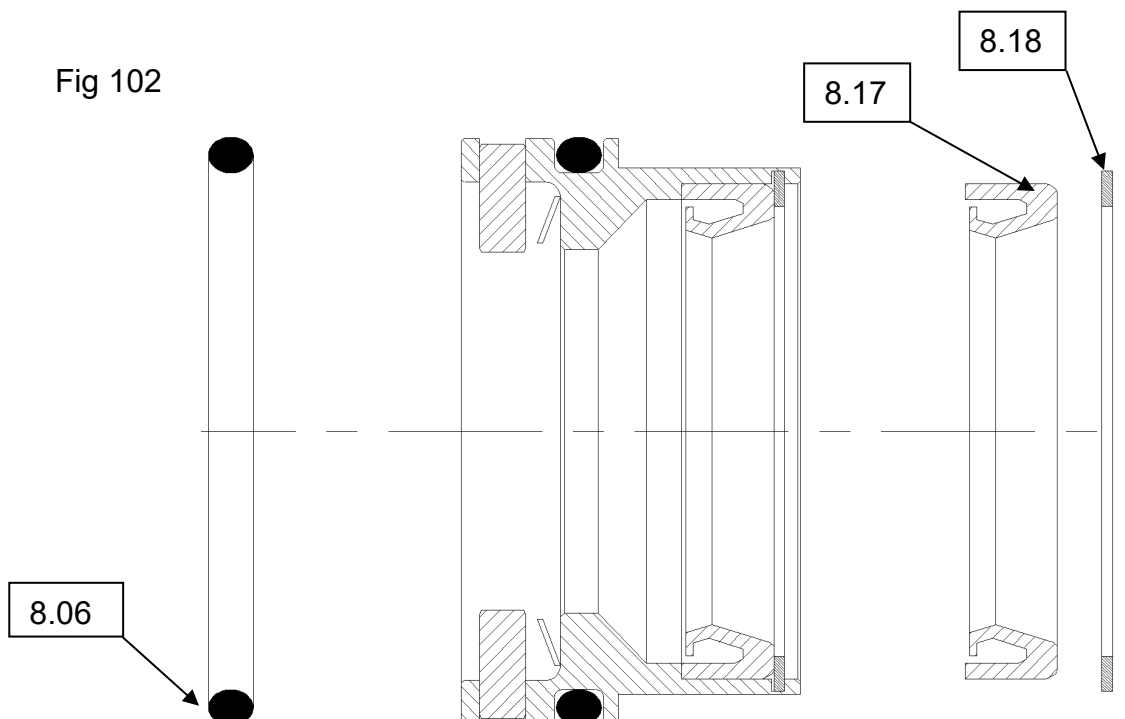
- Install the rotorcase (3.01) and secure with screws (4.08)
(See section 8.2 for torque settings)

Fig 101



- Install the o-ring (8.06), lip-seal (8.17) and the cir-clip (8.18) into the seal housing and then install the seal housing (8.16) into the rotorcase

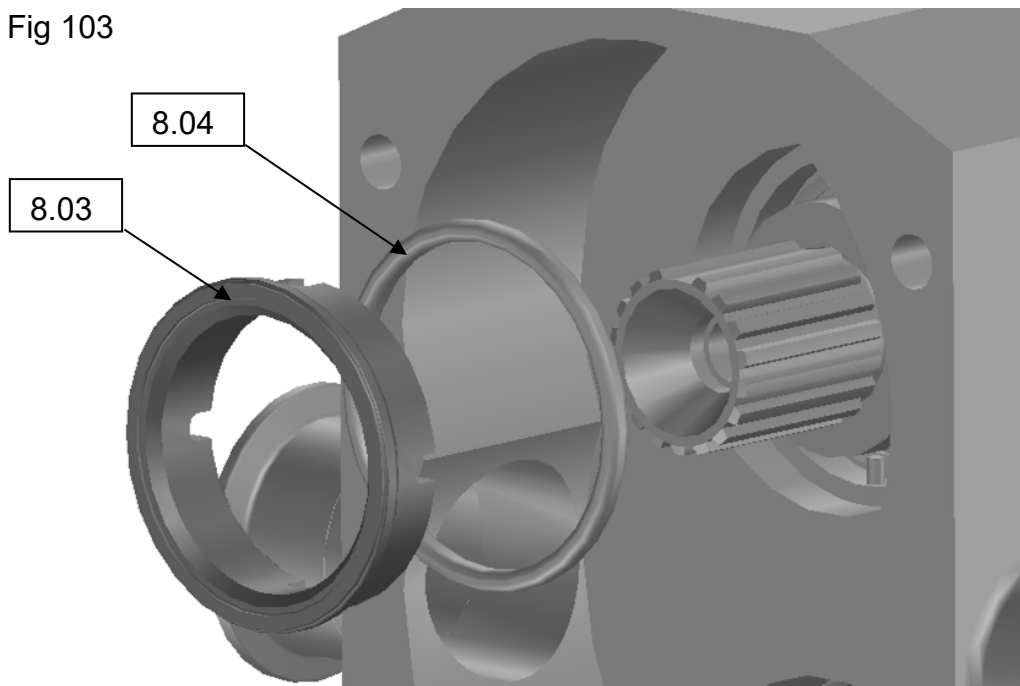
Fig 102



Note: - On the SLG only the lipseal runs directly on the pump shaft and not a sleeve

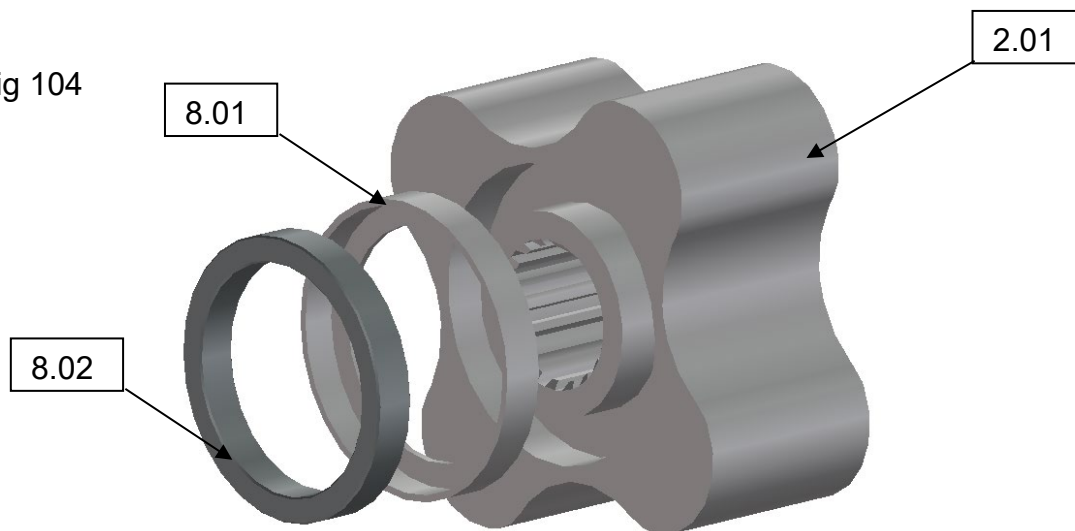
- Install the o-ring (8.04) onto the static seal (8.03) and then install the static seal into the rotorcase – ensure that the location slots line up with the pins in the seal housing

Fig 103



- Install the L-cup (8.01) and the rotary face (8.02) into the rotor (2.01)

Fig 104



Note: - the rotary face has a cut out in the rear of the face – this is not the sealing face and must be installed in the correct orientation. The cut out in the seal face should be lined up with the cut out in the L-cup

The seals are now assembled.

For rotor and front cover installation see pump assembly section

5.5 Double Flushed Mechanical Seal SLA, SLB, SLC.

Fig 105

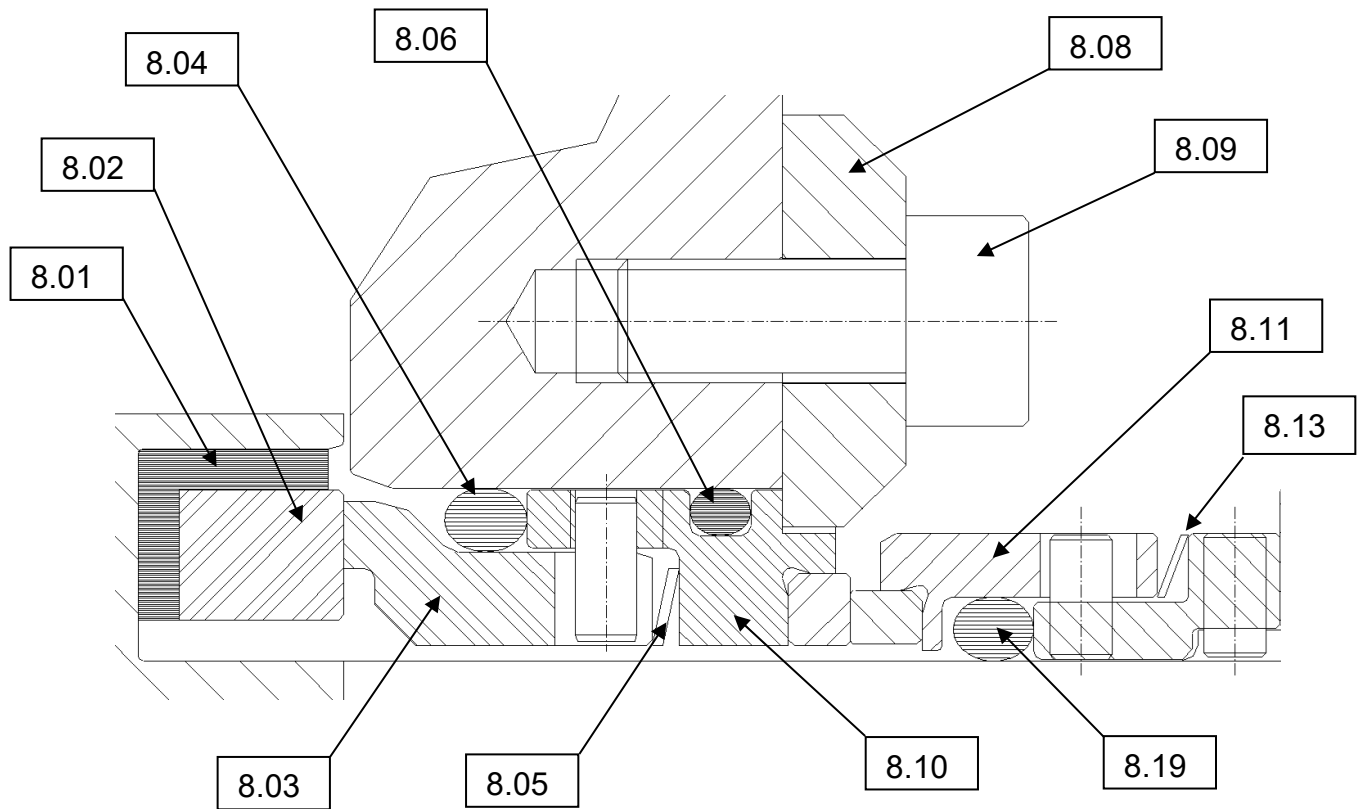
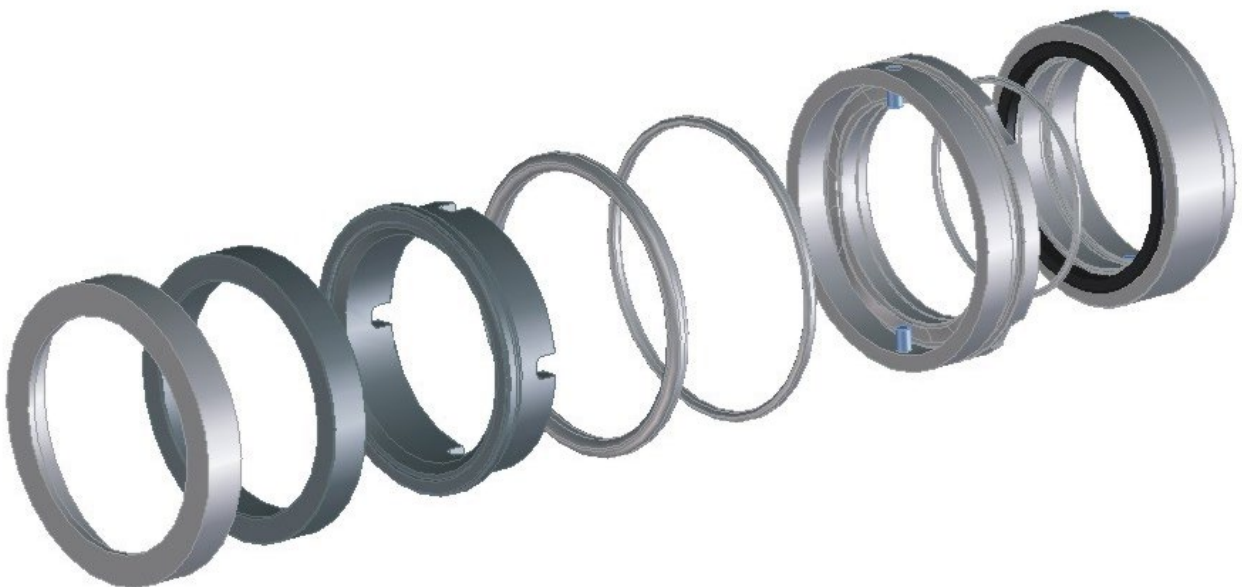
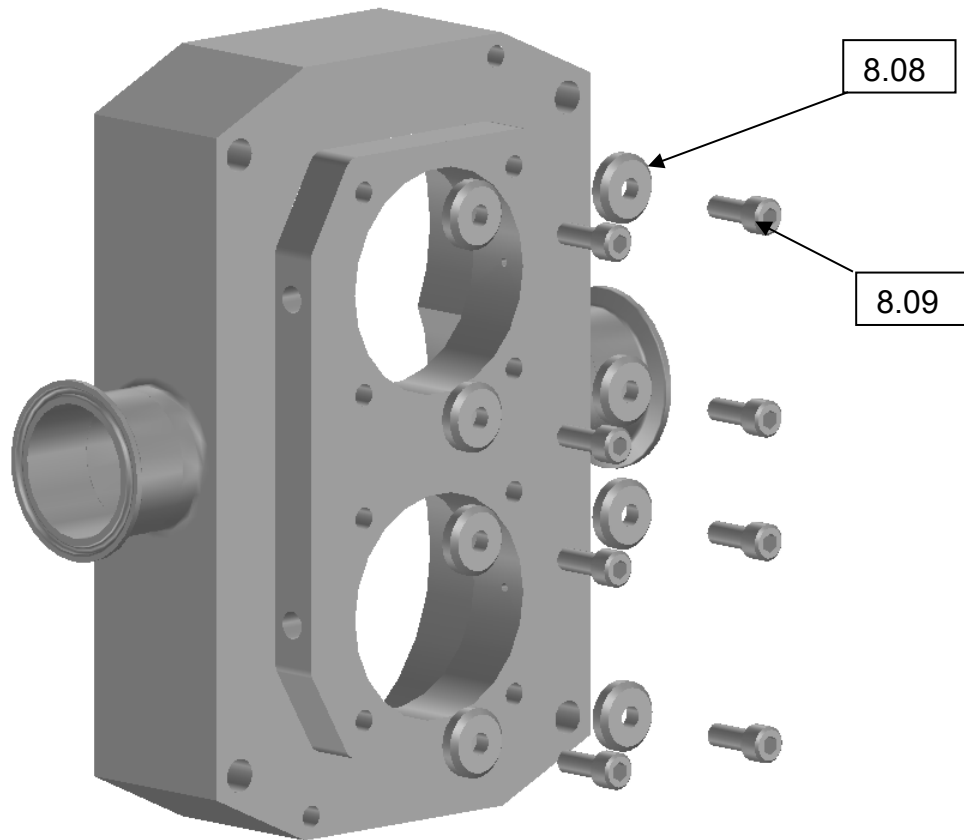


Fig 106



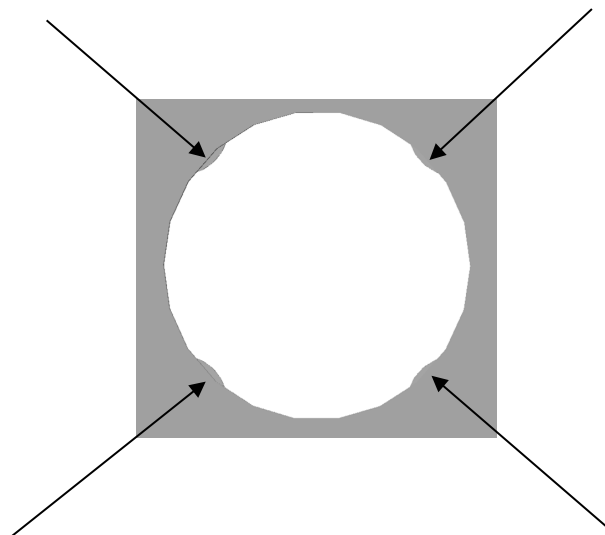
- Install the seal washers (8.08) and the seal screws (8.09)

Fig 107



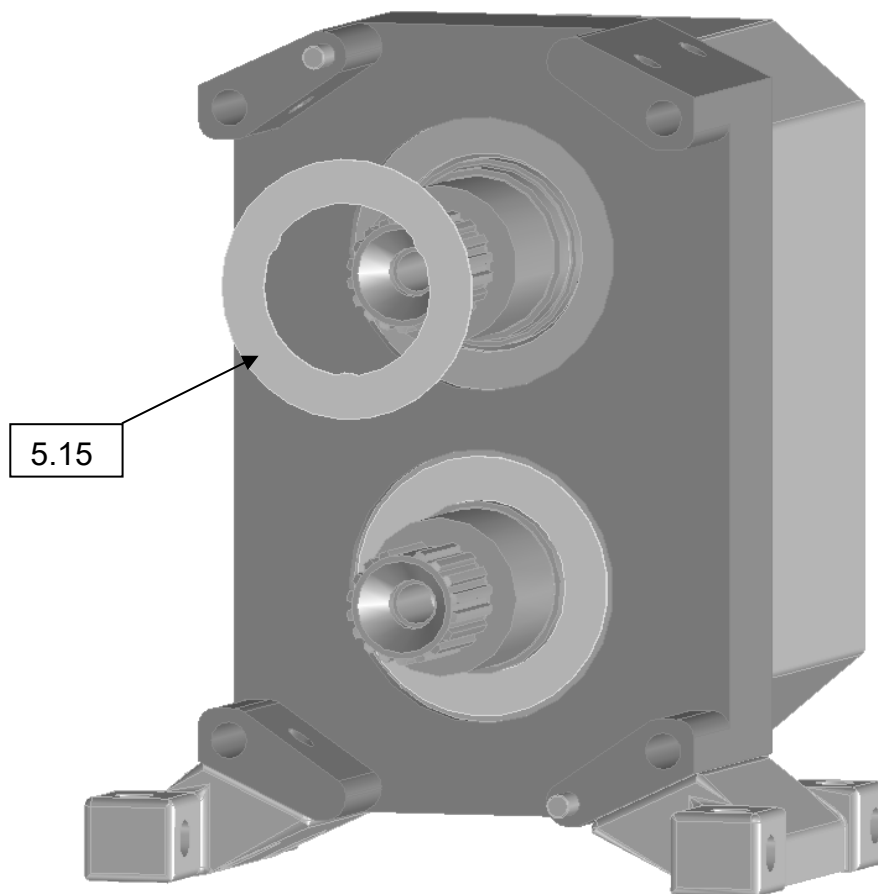
The washers overlap the seal bore – This locates and provides drive to the seal.

Fig 108



- Install the slinger (5.15)

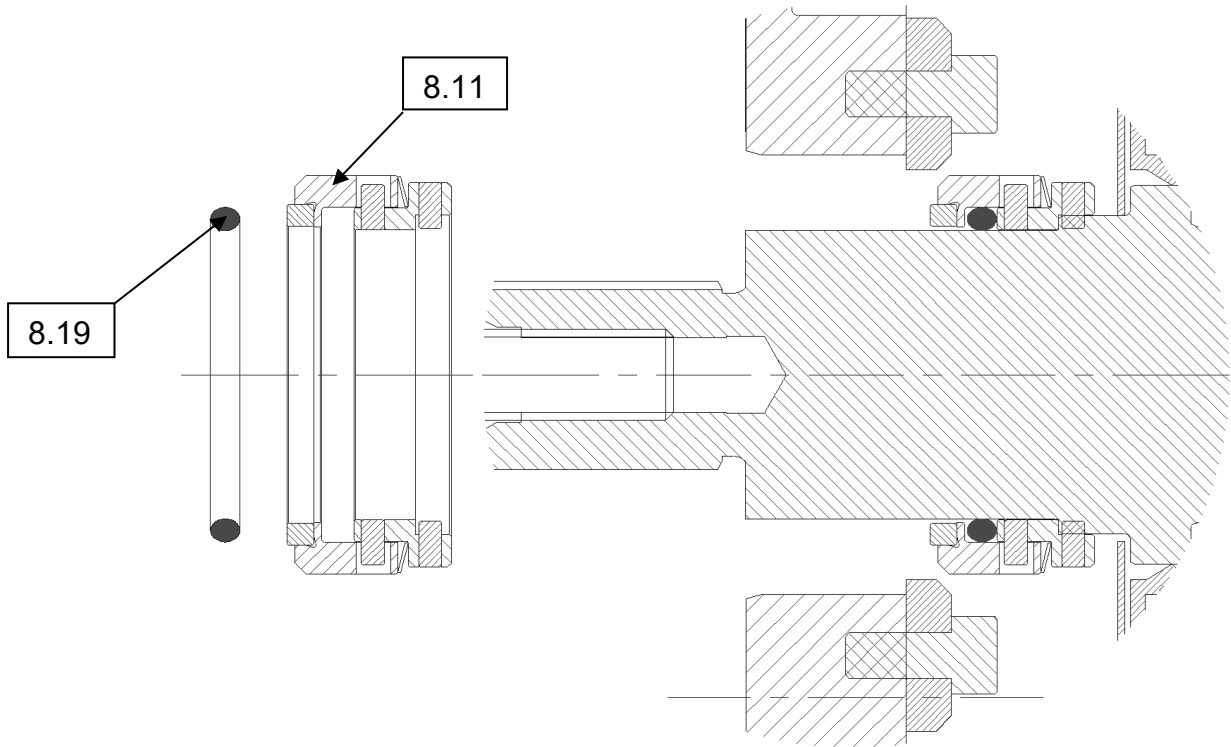
Fig 109



Note: - Depending on the seal arrangement the slinger will fit on the shaft or the rear half of the seal

- Install the o-ring (8.19) into the sleeve (8.11) and then install the assembly onto the shaft.

Fig 110

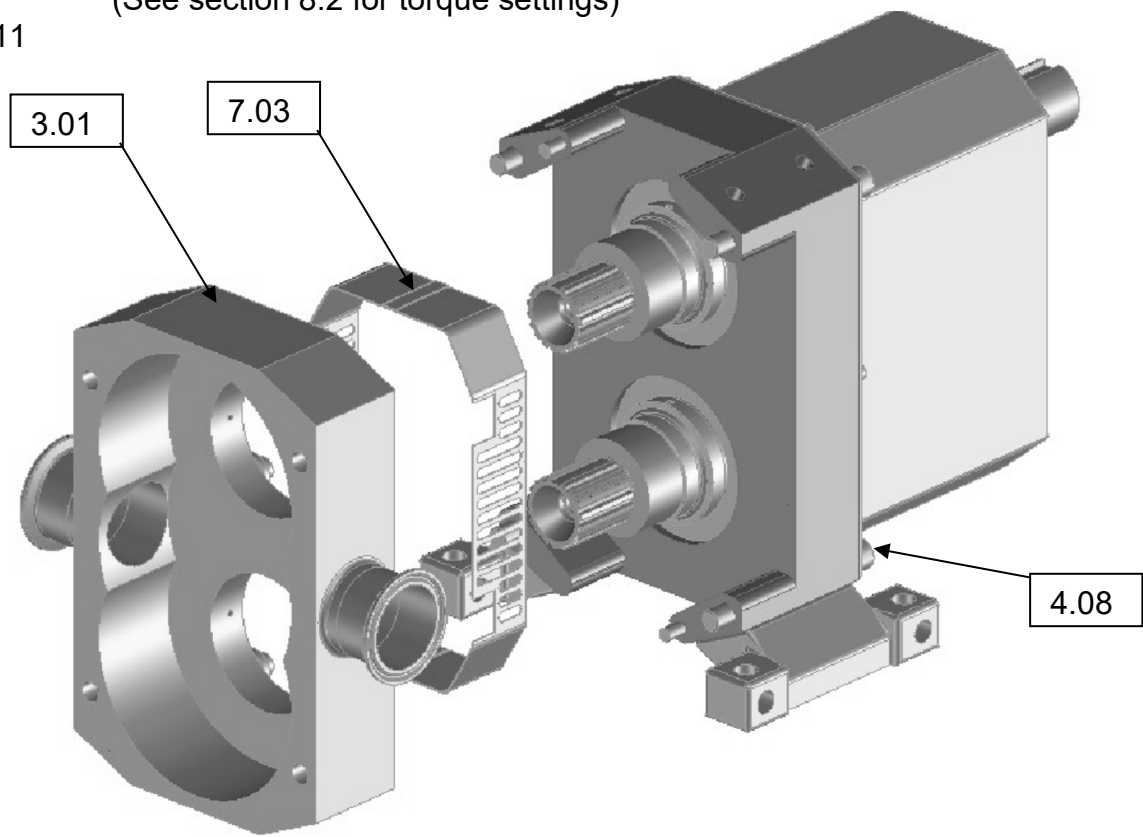


Note: - There are two drive slots in the shaft which must be lined up with the drive pins on the sleeve.

Note: - The SLA utilises four grub screws instead of the drive pins to locate the housing onto the shaft

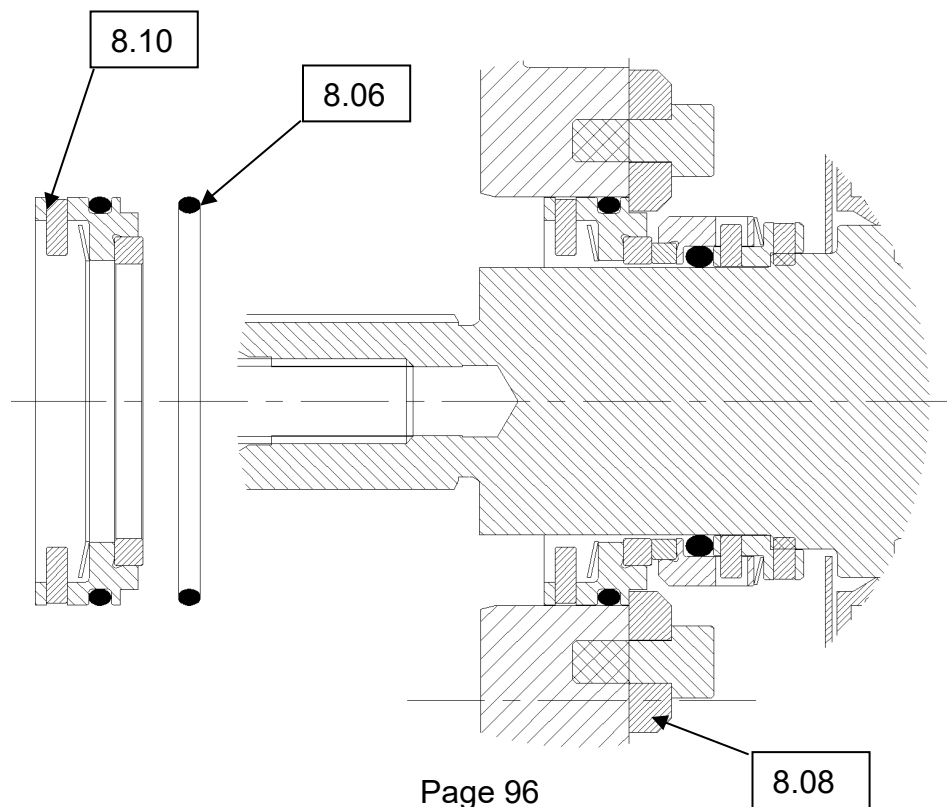
- Install the guard (7.03) and rotorcase (3.01) and secure with screws (4.08)
(See section 8.2 for torque settings)

Fig 111



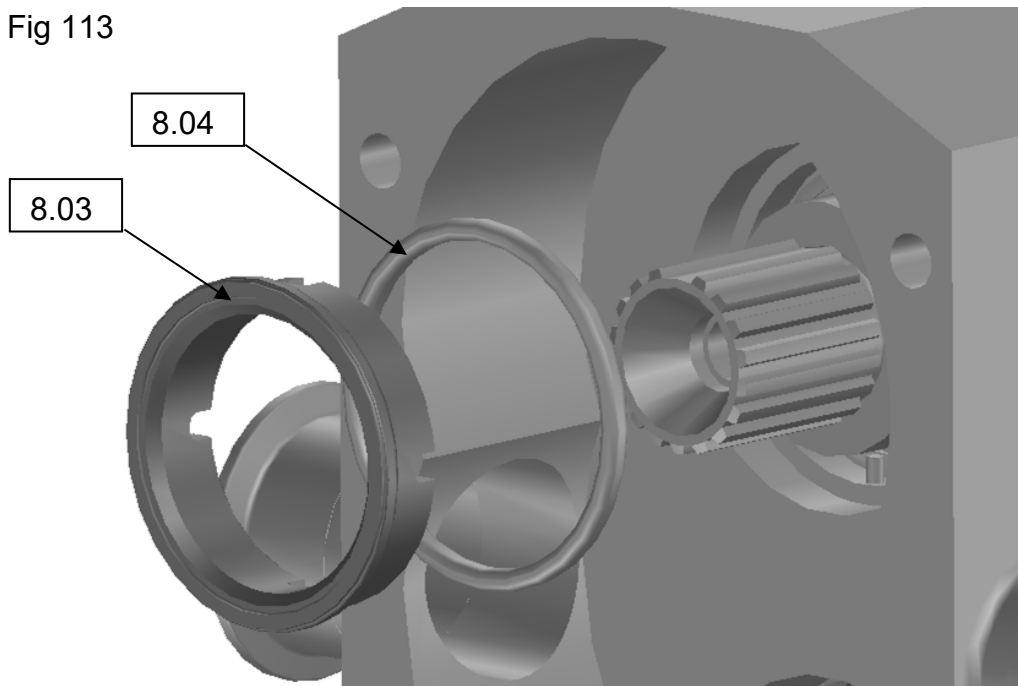
- Install the o-ring (8.06) into the seal housing and then install the seal housing (8.10) into the rotorcase - Making sure that the location recesses line up with the seal washers (8.08).

Fig 112



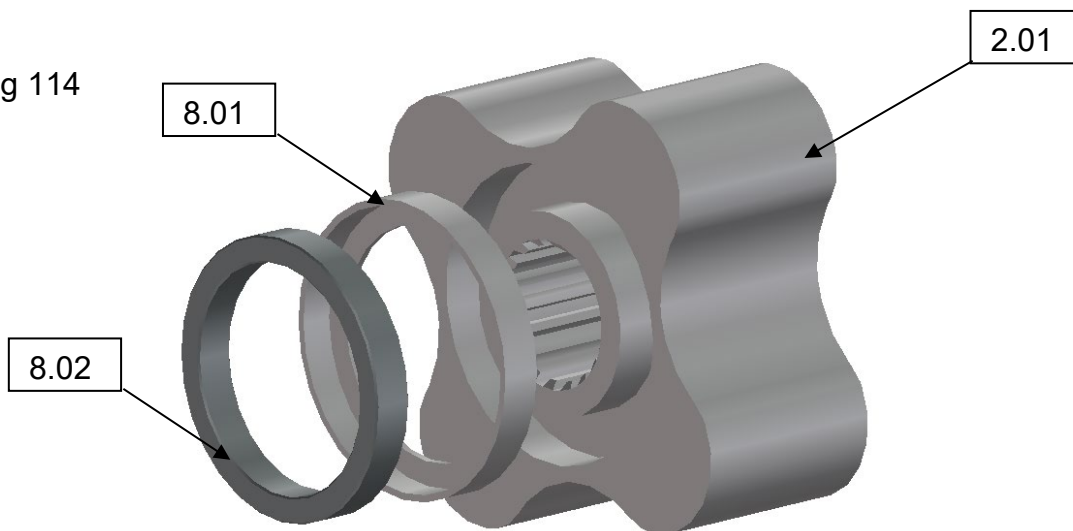
- Install the o-ring (8.04) onto the static seal (8.03) and then install the static seal into the rotorcase – Make sure that the location slots line up with the pins in the seal housing

Fig 113



- Install the L-cup (8.01) and the rotary face (8.02) into the rotor (2.01)

Fig 114



Note: - the rotary face has a cut out in the rear of the face – this is not the sealing face and must be installed in the correct orientation. The cut out in the seal face should be lined up with the cut out in the L-cup

The seals are now assembled.

For rotor and front cover installation see pump assembly section

5.6 Double Flushed Mechanical Seal SLD to SLG.

Fig 115

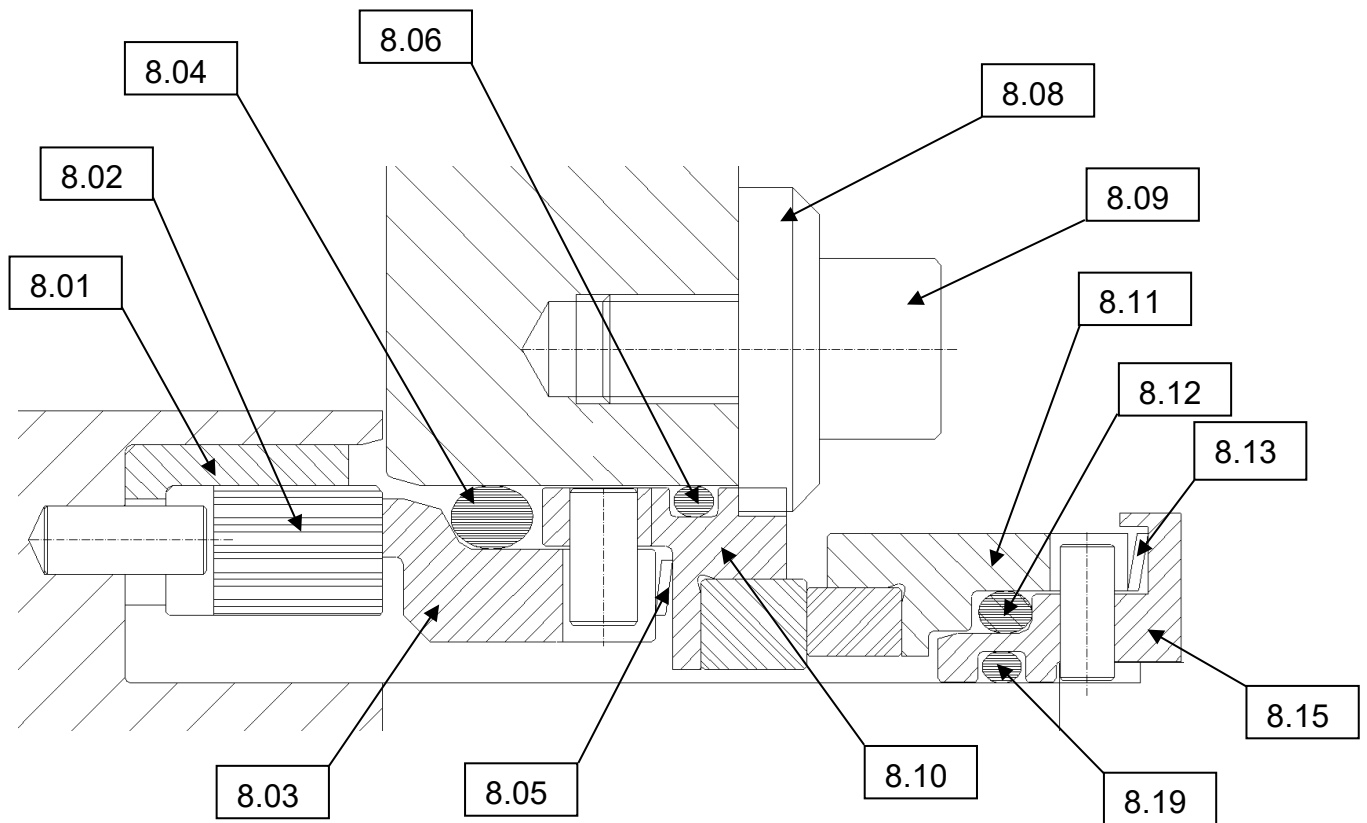
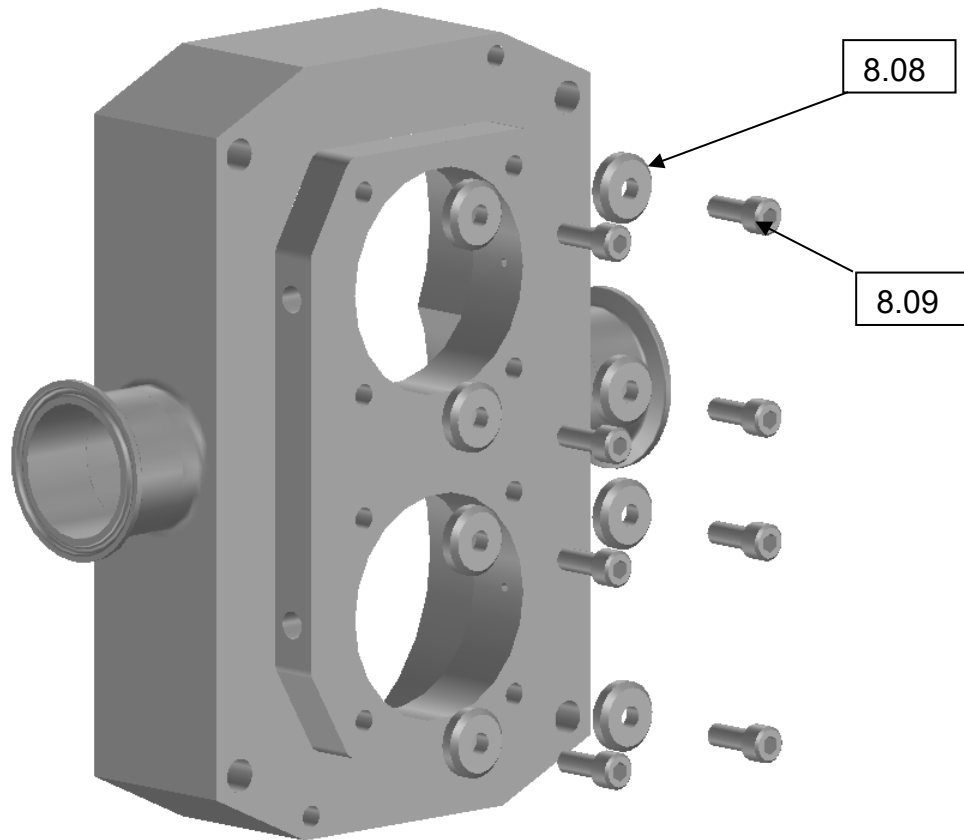


Fig 116



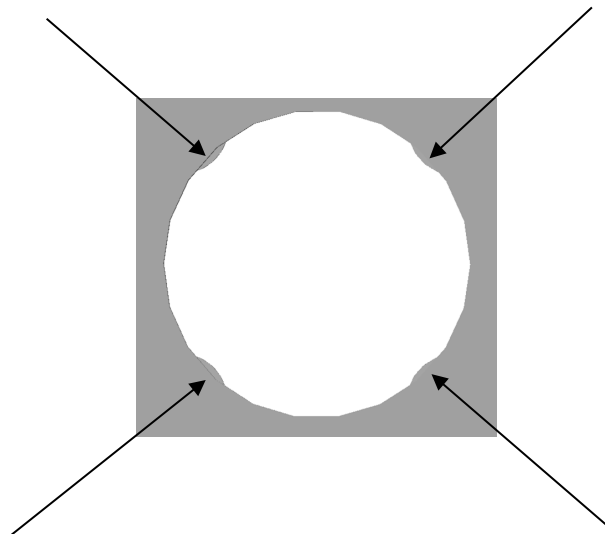
- Install the seal washers (8.08) and the seal screws (8.09)

Fig 117



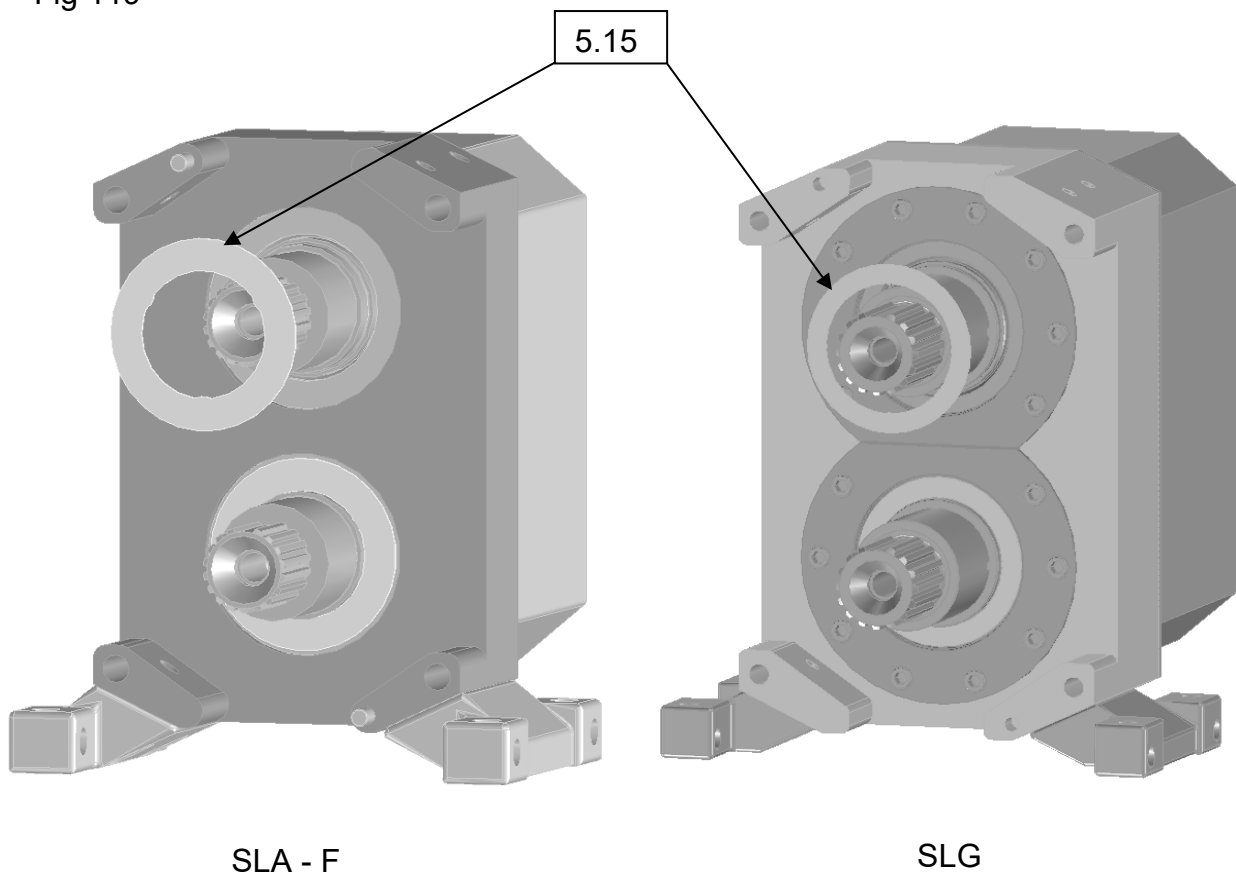
The washers overlap the seal bore – this locates and provides drive to the seal.

Fig 118



- Install the slinger (5.15)

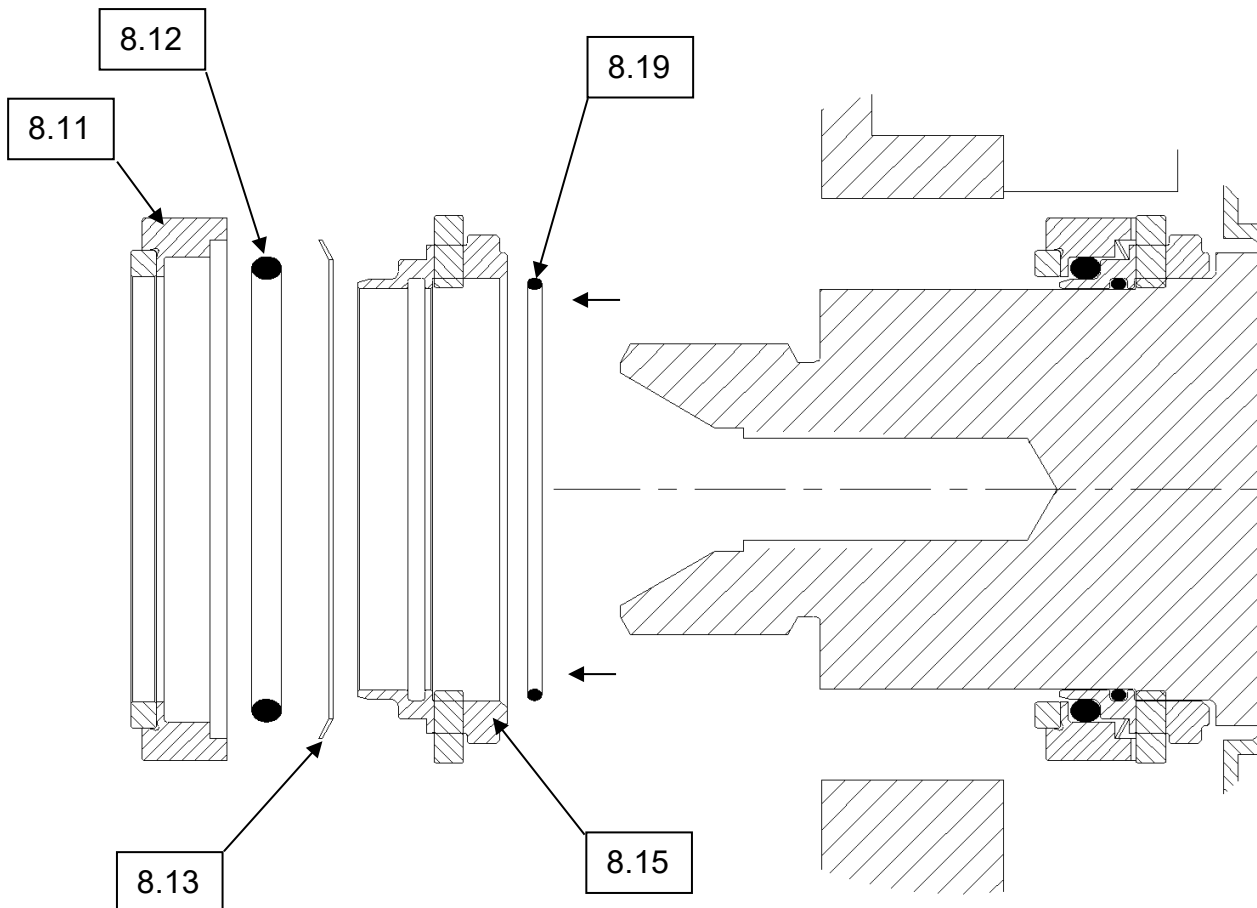
Fig 119



Note: - Depending on the seal arrangement the slinger will fit on the shaft or the rear half of the seal

- Install the o-rings (8.12)(8.19) and the wave spring (8.13) into the sleeve (8.15) and then install the housing (8.10) onto the sleeve, Install the assembly onto the shaft.

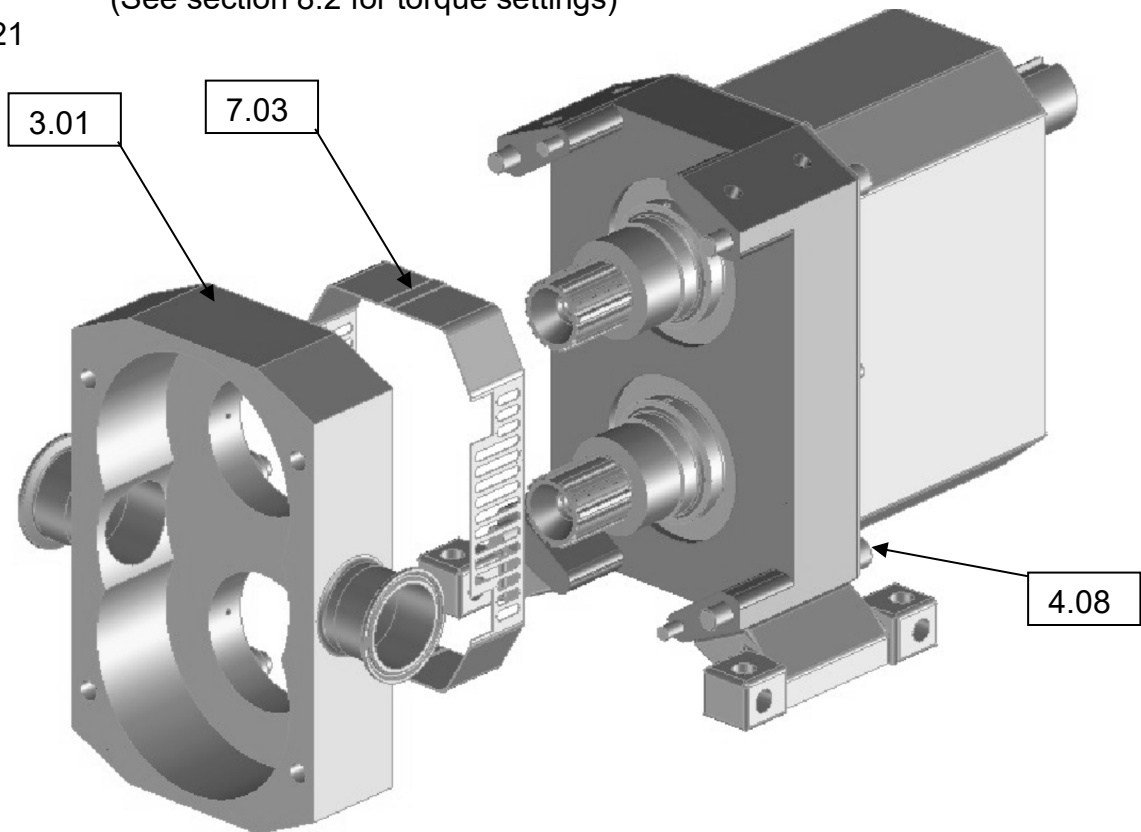
Fig 120



Note - There are two drive slots in the shaft which must be lined up with the drive pins on the sleeve.

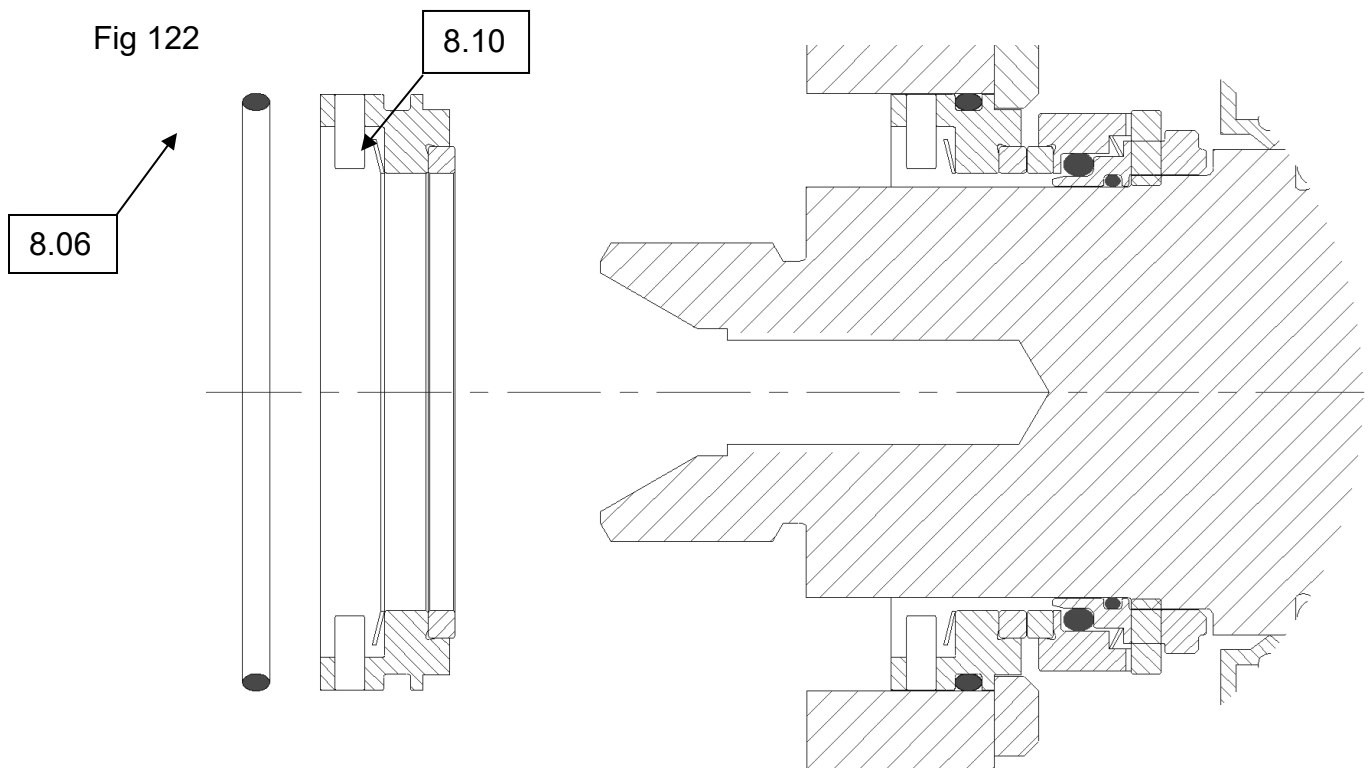
- Install the guard (7.03) and rotorcase (3.01) and secure with screws (4.08)
(See section 8.2 for torque settings)

Fig 121



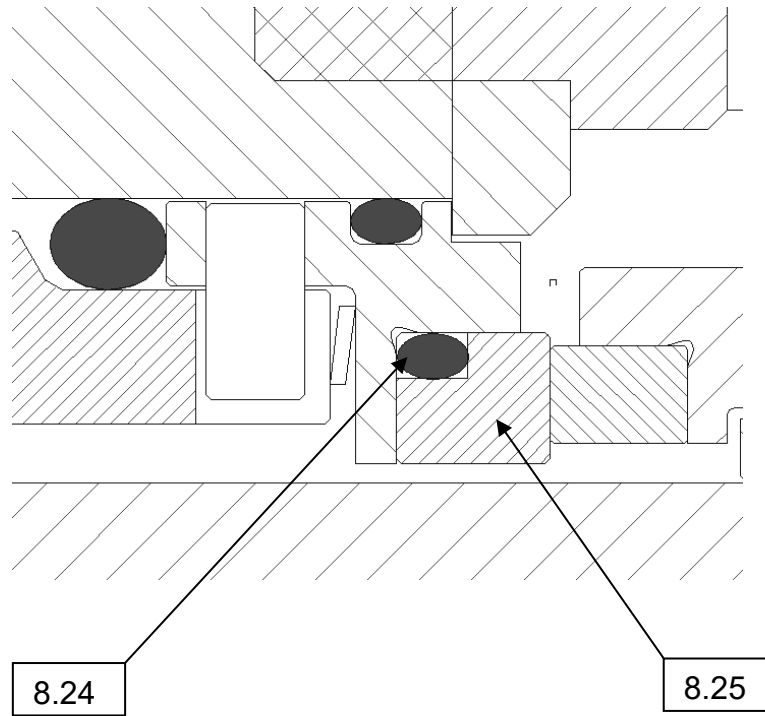
- Install the o-ring (8.06) into the seal housing and then install the seal housing (8.10) into the rotorcase - making sure that the location recesses line up with the seal washers (8.08).

Fig 122



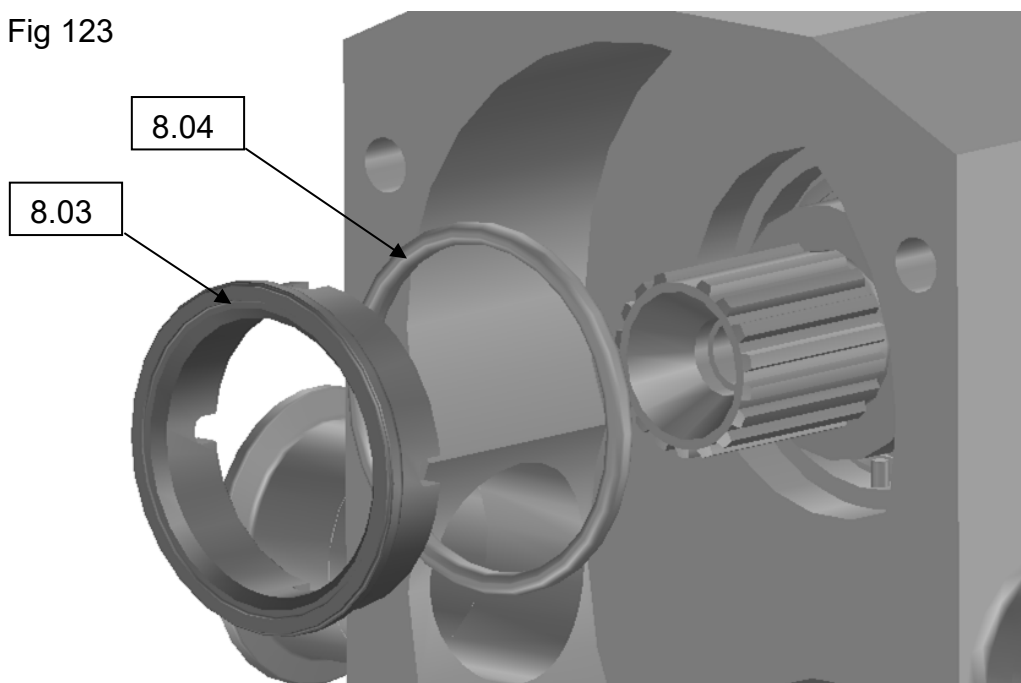
Note: - The SLF has separate o-ring (8.24) and seal face (8.25) which need to be installed in the housing (8.10) on fig 122 before installing them into the rotorcase

Fig 122.5

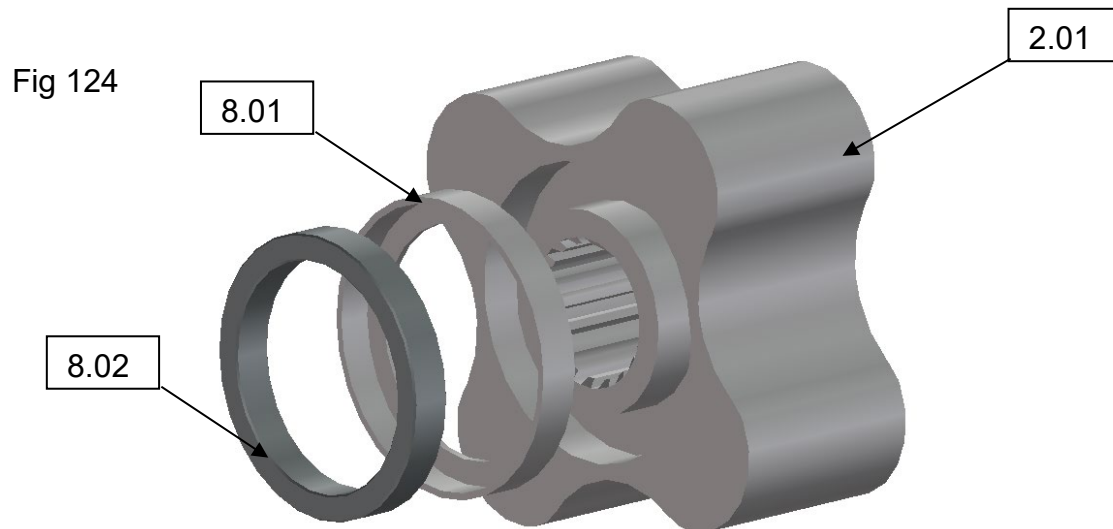


- Install the o-ring (8.04) onto the static seal (8.03) and then install the static seal into the rotorcase – make sure that the location slots line up with the pins in the seal housing

Fig 123



- Install the L-cup (8.01) and the rotary face (8.02) into the rotor (2.01)



Note: - the rotary face has a cut out in the rear of the face – this is not the sealing face and must be installed in the correct orientation. The cut out in the seal face should be lined up with the cut out in the L-cup

The seals are now assembled.

For rotor and front cover installation see pump assembly section

5.7 Removal of Rotary (Dynamic) Seal Face from Rotor

- To remove the seal face in the rotor use the seal face removal tool
- The tool locates on the rubber L-cup and when pressed in the seal face will extrude up into the tool allowing ease of the seal face removal (A press tool may be required)

Fig 125

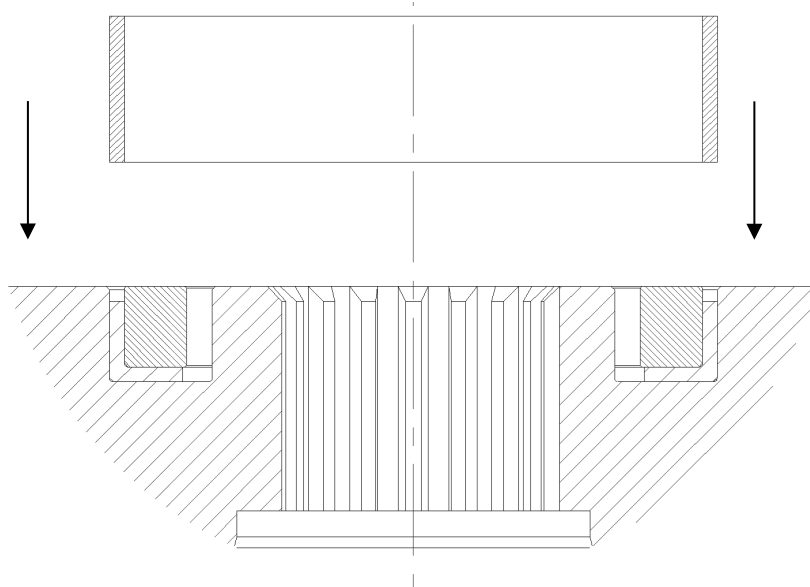
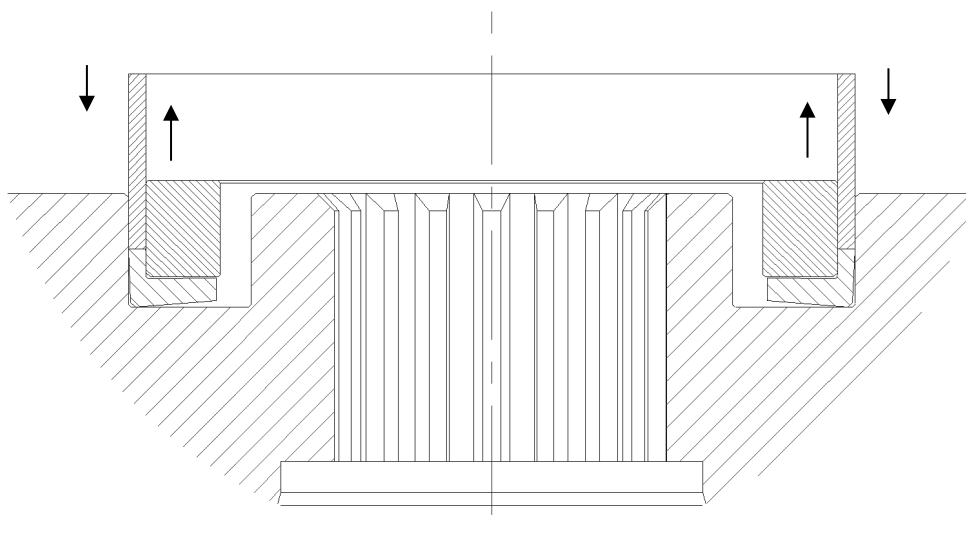


Fig 126



6.1 General Procedures for Fitting Single O-Ring Seals

"Quick Summary" of O-Ring seal installation.

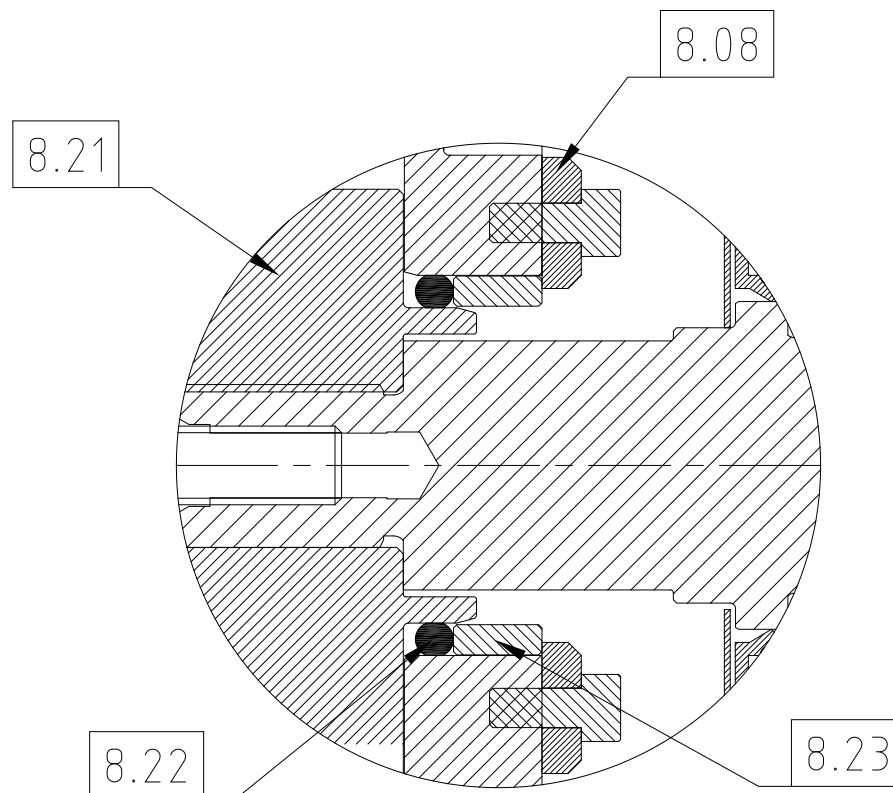
- O-Ring seals are a simple but effective means of shaft sealing. They will provide optimum performance only if installed carefully in accordance to the following instructions below and sections 6.2.
- Remove any sharp corners and burrs that could damage O-Rings.
- Always inspect for wear, the diameter on the rotor where the O-Ring seal is located.
- Be sure that all seal component fitting bores, housings, followers, sleeves etc. are thoroughly cleaned before installation.
- All O-Rings should be lightly lubricated with an appropriate lubricant (suitable for application) before installation.

WARNING

Note: Do not run an O-Ring seal dry.

6.2 O-Ring Seal Assembly and Removal for Sterilobe SLA to SLG Pumps

Fig 127



- Before assembly or disassembly of the seals, ensure the pump is fully shutdown, refer to section 3.6.
- Install O-Ring seal spacer ring (8.23) into the rotorcase (3.01) ensuring that it is fully located against the seal washers (8.08).
- Install O-Ring (8.22) into the rotorcase (3.01).

Note: During installation of the rotors to the shafts, care must be taken not to damage or unseat the O-Ring seal when inserting the rotor into the O-Ring.

- Install rotor as per general assembly instructions for the pump model as detailed in the relevant section in chapter 4.
- To disassembly reverse the above procedure.

Flushed Product Seals Auxiliary Services.

i) Terminology.

a) "Quench"

- To provide a liquid barrier that is not induced to flow through the seal area by any external means.

b) "Flush"

- To provide a liquid barrier that is induced to flow through the seal area by an external means.

ii) Quench or Flush Media

WARNING



The media used for quenching or flushing a seal area must be fully compatible with the pumped media, and the relevant materials of construction of the pump.

Special consideration must be given to the temperature limitations of the media to ensure that no hazards are created, e.g. risk of fire or explosion.

7.0 Single Mechanical Seal for Low-Pressure Quench or Flush

Refer to section 5.3 for Sterilobe Models SLA, SLB, SLC, SLD, SLE and SLF.
Refer to section 5.4 for Sterilobe Model SLG.

This seal arrangement requires a supply of media to the outboard side of the mechanical seal to quench or flush the seal area. The nature of the pumped media and the specific duty conditions will determine whether a quench or a flush is required.

A quench provides a static head. The quench media vessel should be mounted a minimum of 0.5m (1.5 Feet) above the pump, preferably directly above the seal area. The interconnecting pipe work should be as straight as possible, avoiding horizontal runs, and with the minimum number of bends and restrictions.

For a suitable flush, the media must be supplied at a flow rate of 4.5 Litres per minute per shaft seal.

WARNING

Note: The limiting flush or quench pressure in any application is 0.7 Bar (10 psig).

Note: The liquid supply connections to flushed seals are made using the threaded ports as shown in section 7.3.

The pipe work should be arranged to provide an independent flush to each seal.

7.2 Double Mechanical Seal for High Pressure Flush

Refer to section 5.5 for Sterilobe Models SLA, SLB and SLC.
Refer to section 5.6 for Sterilobe Models SLD, SLE, SLF and SLG.

This seal arrangement requires a supply of media to be circulated between the inboard and outboard mechanical seals.

$$Q = \frac{(0.6 \times p + 0.25) \times n \times d^3 \times T}{c_p \times \rho \times 2.5 \times 10^9}$$

Q = Flow rate	[l/hr]
p = Applied buffer / barrier pressure	[bar]
n = Shaft speed	[rpm]
d = Shaft diameter	[mm]
T = Temperature of processed media	[°C]
ρ = Specific gravity of buffer / barrier fluid	[kg/dm ³]
c _p = Specific heat capacity for buffer / barrier fluid	[kJ/(kg x K)]

Typical values for some common barrier fluids:

Media	Density [kg/dm ³]	Specific Heat [kJ/(kg x K)]
Water	1.0	4.2
Olive Oil	0.9	1.6
Mineral Oil	0.9	1.7
Acetone	0.8	2.2

The flush media must be supplied at a minimum flow rate of 0.5 Litres/ Minute per seal, this can be worked out by the following equation where “Q” is the flow rate.

The flush pressure must be a minimum of 1 Bar (15 psi) greater than the maximum discharge pressure created by, or the maximum suction pressure applied to, the pump, whichever is the greater.

WARNING

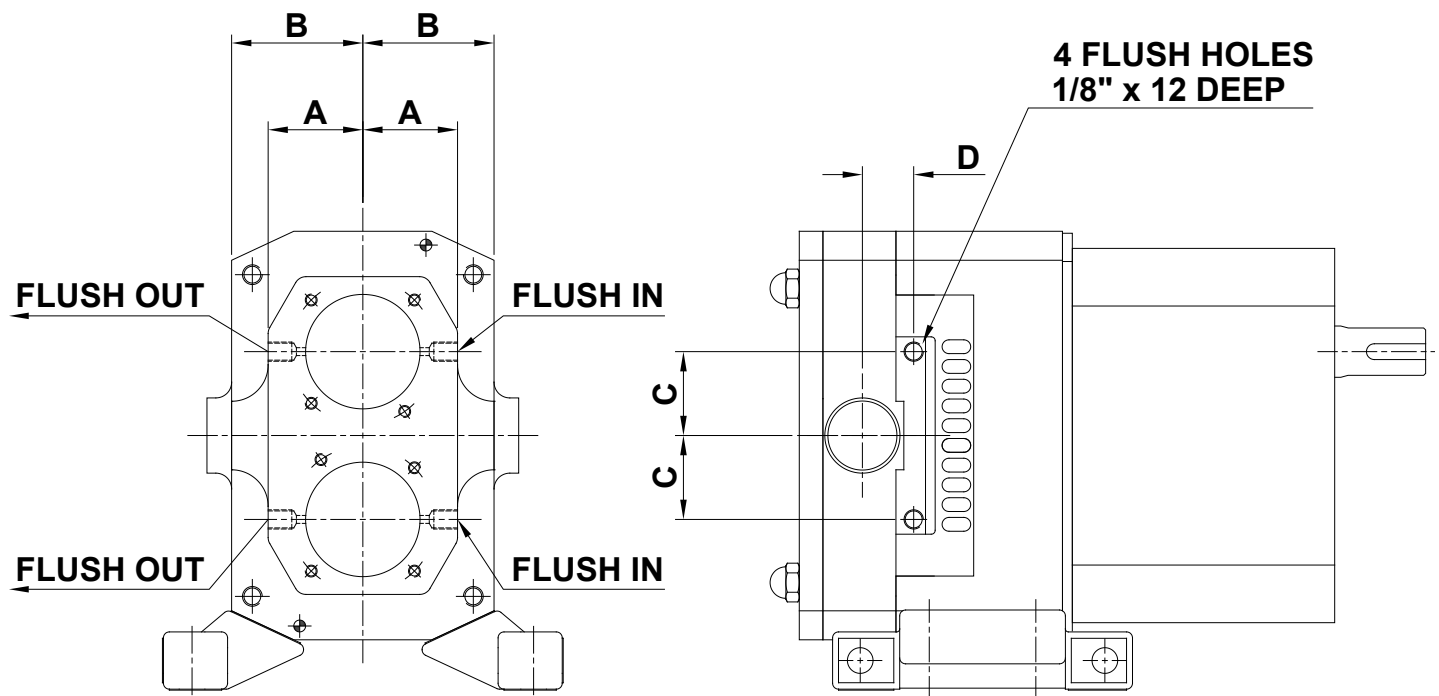
Note: The limiting flush pressure in any application is 16 Bar (232 psig).

Note: The liquid supply connections to flushed seals are made using the threaded ports as shown in section 7.3.

The pipe work should be arranged to provide an independent flush to each seal.

7.3 Flush Connections

Fig 128



REAR VIEW OF ROTORCASE

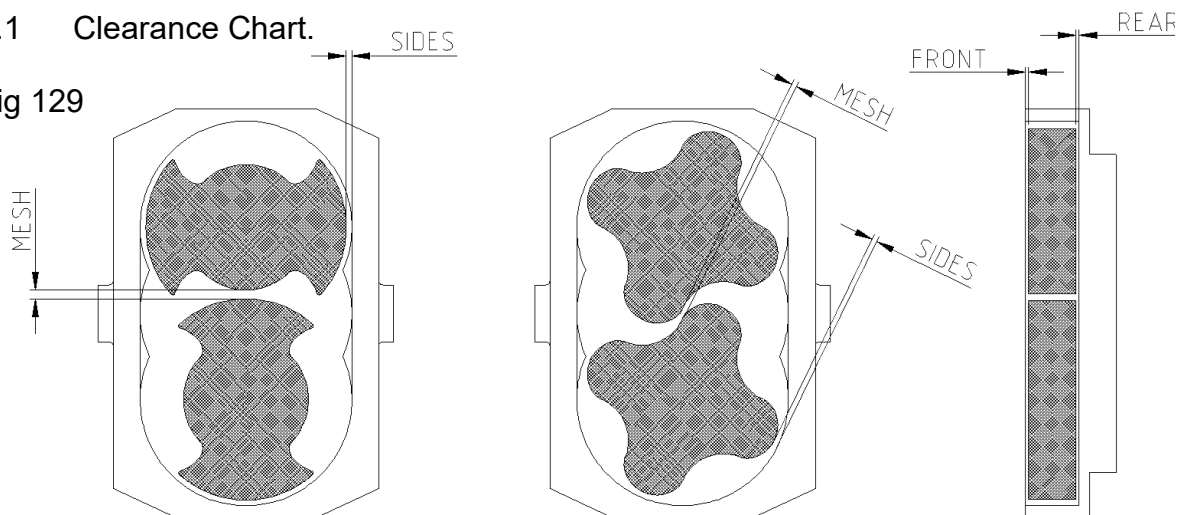
All Dimensions in mm

Sterilobe Model	A	B	C	D
SLAS	45	45	27.5	17.8
SLAL				22.2
SLBS	41	60	34	23.5
SLBL				28.2
SLCS	48	66.5	42.5	26
SLCL				34
SLDS	61	89	57.5	30.5
SLDL				40.5
SLES	65	117	70	33
SLEL				45
SLFS	71	132	80	47
SLFL				62
SLGS	79	49	95	69.8
SLGL				69.8

8.0 Specifications.

8.1 Clearance Chart.

Fig 129



Clearances Charted Metric (mm)							
Pump Model	Sides		Front		Back		Mesh
	Min	Max	Min	Max	Min	Max	Nominal
SLAS	0.10	0.18	0.10	0.13	0.08	0.16	0.15
SLAL	0.10	0.18	0.11	0.14	0.11	0.19	0.15
SLBS	0.14	0.22	0.11	0.14	0.09	0.18	0.18
SLBL	0.16	0.24	0.14	0.17	0.13	0.22	0.18
SLCS	0.15	0.25	0.14	0.17	0.12	0.20	0.22
SLCL	0.17	0.27	0.16	0.19	0.14	0.22	0.22
SLDS	0.20	0.30	0.18	0.22	0.12	0.22	0.25
SLDL	0.22	0.32	0.21	0.25	0.20	0.30	0.25
SLES	0.18	0.32	0.20	0.25	0.21	0.31	0.30
SLEL	0.18	0.30	0.21	0.26	0.22	0.32	0.30
SLFS	0.24	0.35	0.28	0.33	0.27	0.37	0.40
SLFL	0.30	0.40	0.29	0.36	0.29	0.38	0.40
SLGS ML	0.70	0.90	0.40	0.60	0.30	0.55	0.45
SLGL ML	1.00	1.20	0.45	0.65	0.35	0.60	0.45
SLGS BW	1.00	1.20	0.45	0.65	0.35	0.60	0.45
SLGL BW	1.00	1.20	0.45	0.65	0.35	0.60	0.45

Imperial Clearances (x 0.01")							
Pump Model	Sides		Front		Back		Mesh
	Min	Max	Min	Max	Min	Max	Nominal
SLAS	0.39	0.71	0.39	0.51	0.31	0.63	0.59
SLAL	0.39	0.71	0.43	0.55	0.43	0.75	0.59
SLBS	0.55	0.87	0.43	0.55	0.35	0.71	0.71
SLBL	0.63	0.94	0.55	0.67	0.51	0.87	0.71
SLCS	0.59	0.98	0.55	0.67	0.47	0.79	0.87
SLCL	0.67	1.06	0.63	0.75	0.55	0.87	0.87
SLDS	0.79	1.18	0.71	0.87	0.47	0.87	0.98
SLDL	0.87	1.26	0.83	0.98	0.79	1.18	0.98
SLES	0.71	1.26	0.79	0.98	0.83	1.22	1.18
SLEL	0.71	1.18	0.83	1.02	0.87	1.26	1.18
SLFS	0.94	1.38	1.10	1.30	1.06	1.46	1.57
SLFL	1.18	1.57	1.14	1.42	1.14	1.50	1.57
SLGS ML	2.76	3.54	1.57	2.36	1.18	2.17	1.77
SLGL ML	3.94	4.72	1.77	2.56	1.38	2.36	1.77
SLGS BW	3.94	4.72	1.77	2.56	1.38	2.36	1.77
SLGL BW	3.94	4.72	1.77	2.56	1.38	2.36	1.77

8.2 Fasteners &

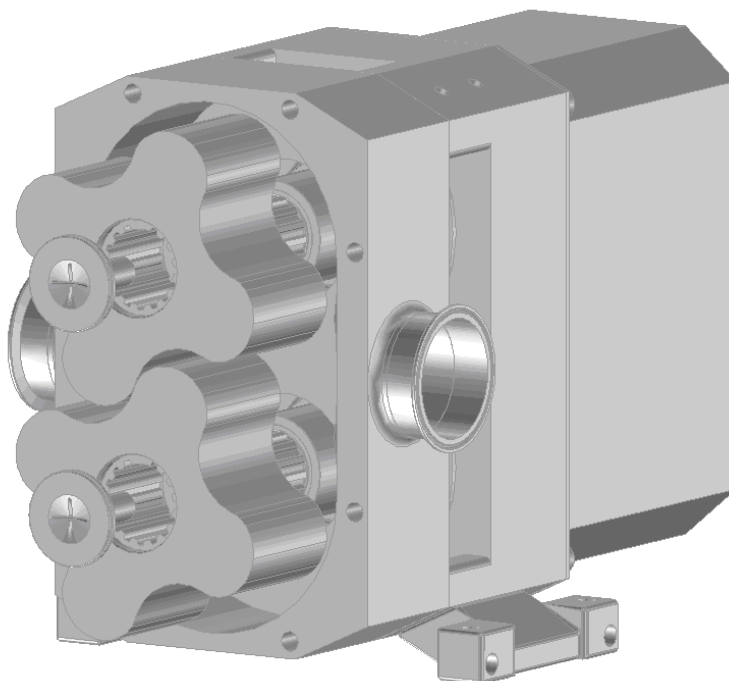
Torque Settings.

Notes:- ML = Multilobe BW = Bi-wing

Item	Description	Position		Multilobe Pump Model						
				SLA	SLB	SLC	SLD	SLE	SLF	SLG
6.02	Socket Head Cap Screw	Foot / Bearing Housing	Quantity / Pump	4	4	4	4	4	4	4
			Size	M8 x 16	M8 x 16	M10 x 16	M10 x 16	M12 x 25	M12 x 25	M12 x 25
			Torque N/m	17	17	45	45	55	55	55
			Torque lbf ft	12.5	12.5	33.2	33.2	40.6	40.6	40.6
4.08	Socket Head Cap Screw	Bearing Housing / Rotorcase	Quantity / Pump	4	4	4	4	4	4	4
			Size	M8 x 65	M8 x 100	M10 x 100	M12 x 110	M16 x 130	M16 x 130	M16 x 200
			Torque N/m	17	17	45	55	100	100	100
			Torque lbf ft	12.5	12.5	33.2	40.6	73.8	73.8	73.8
5.09 5.16	Lock Nuts	Gear / Shaft	Quantity / Pump	2	2	2	2	2	2	4 / 2
			Size	M17	M25	M30	M45	M55	M60	M90 / M70
			Torque N/m	40	60	100	125	170	250	200 / 60
			Torque lbf ft	29.5	44.3	73.8	92.2	125.4	184.4	147.5 / 44.3
4.09	Socket Head Cap Screw	Gearbox / Gearbox Cover	Quantity / Pump	4	4	4	6	6	8	8
			Size	M6 x 12	M6 x 12	M6 x 12	M6 x 12	M8 x 16	M8 x 16	M8 x 16
			Torque N/m	7	7	7	7	17	17	17
			Torque lbf ft	5.2	5.2	5.2	5.2	12.5	12.5	12.5
-	Rolling Torque	Bearing / Shaft	Quantity / Pump	2	2	2	2	2	2	2
			Torque N/m	0.5 - 1	1.5 - 2	2 - 2.5	3 - 3.5	4 - 4.5	5 - 5.5	9 - 12
			Torque lbf ft	0.36 - 0.74	1.1 - 1.48	1.48 - 1.84	2.21 - 2.58	2.95 - 3.31	3.69 - 4.05	6.64 - 8.85
2.02	Retainer (See section 8.2.1)	Rotor / Shaft	Quantity / Pump	2 (M8)	2 (M10)	2 (M12)	2 (M16)	2 (M16)	2 (M16)	2 (M24)
			Torque N/m	17	30	40	108	108	108	245
			Torque lbf ft	12.5	22.1	29.5	79.7	79.7	79.7	180.7
1.03	Dome Nut (Acorn)	Front Cover / Rotorcase	Quantity / Pump	4	4	4	4	8	8	8
			Size	M8	M10	M10	M12	M12	M16	M16
			Torque N/m	17	45	45	55	55	100	100
			Torque lbf ft	12.5	33.2	33.2	40.6	40.6	73.8	73.8
1.04	Stud	Front Cover / Rotorcase	Quantity / Pump	4	4	4	4	8	8	8
			Size	M8 x 35	M10 x 35	M10 x 35	M12 x 45	M12 x 49	M16 x 55	M16 x 55
			Torque N/m	17	45	45	55	55	108	108
			Torque lbf ft	12.5	33.2	33.2	40.6	40.6	79.7	79.7
7.02	Hammer Drive Screw	Nameplate / Gearbox	Quantity / Pump	4	4	4	4	4	4	4
9.09	Socket Head Cap Screw	RV Cylinder / Front Cover	Quantity / Pump	6	6	6	6	6	8	-
			Size	M6 x 35	M6 x 35	M8 x 40	M10 x 40	M10 x 40	M16 x 50	
			Torque N/m	7	7	17	45	45	108	
			Torque lbf ft	5.2	5.2	12.5	33.2	33.2	79.7	
9.07	Socket Head Cap Screw	RV Cylinder / Nut	Quantity / Pump	1	1	1	1	1	1	-
			Size	M63	M63	M80	M125	M125	M140	
			Torque N/m	-	-	-	-	-	-	
			Torque lbf ft	-	-	-	-	-	-	
9.16	Socket Head Cap Screw	RV Cylinder / Front Cover	Quantity / Pump	-	-	-	-	-	10	-
			Size						M10 x 25	
			Torque N/m						45	
			Torque lbf ft						33.2	

8.2.1 Pumps fitted with Spirallock threads

Spirallock® is a unique and proprietary preload locking internal (female) thread form that's exceptionally resistant to transverse vibration



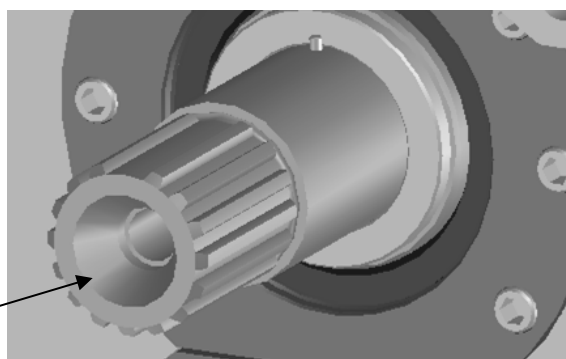
Due to the way the Spirallock thread form works any pumps fitted with the Spirallock shafts must have the Rotor Retainer Torque increased.

SLG Rotor retainers need to be torqued up to 245Nm

WARNING

When tightening to torque settings make sure the tool is fully engaged within rotor retainer socket if there is any damage to either parts they will need to be replaced

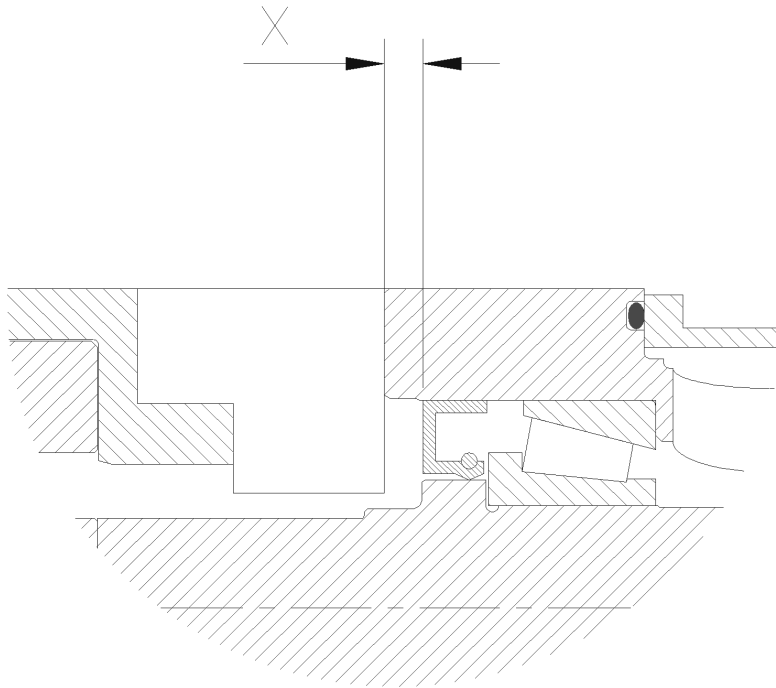
**Identification
Location**



Please note that the Spirallock thread is available as a standard option since mid-2017 – The Spirallock shaft is identified with the initial's SL – located in the end of the shaft see picture above, if you are unsure if your pump contains a Spirallock thread please contact your Viking Pump Hygienic Distributor.

8.3 Lip-Seal Setting Distances.

Fig 130



Pump Model	Dimension X (mm)	Dimension X (inch)
SLA	4	0.163
SLB	6	0.245
SLC	5	0.204
SLD	6	0.245
SLE	6	0.245
SLF	8	0.327
SLG	7	0.286

8.4 Lubricants.

The recommended lubricant for use in the Sterilobe is an EP00 grade, lithium based, extreme pressure grease intended for 'sealed' units. Suitable for operating temperatures between -30°C and 120°C (-22°F to 266°F) and a base viscosity in the region of 200 cSt at 40°C (104°F).

The unit is shipped as standard with the recommended grade listed above. Refer to manufacturers recommended operating conditions concerning limitations, servicing and application. In case of doubt, please consult the factory for details.

SLA = 0.38 Litres	(0.10 US gallons)
SLB = 0.8 Litres	(0.21 US gallons)
SLC = 1.3 Litres	(0.34 US gallons)
SLD = 2.6 Litres	(0.68 US gallons)
SLE = 5.6 Litres	(1.47 US gallons)
SLF = 8.6 Litres	(2.27 US gallons)
SLG = 13.2 Litres	(3.48 US gallons)

During the filling operation, lubricant should be directed at the front bearings to ensure good circulation and coverage in this area.

Gearbox oil recommended for use with Sterilobe is an 'EP (Extreme Pressure) grade gear lube' for the following temperature ranges.

EP150 -2 – 0°C (0 – 32°F)

EP220 0 – 30°C (32 - 85°F)

EP320 30°C (85°F) and higher

Used the above quantities as approximate for oil filled gearboxes.

Note: Always add oil to the level of the sight glass and install the breather. The sight glass must be located in the uppermost position on the side of the gearbox.

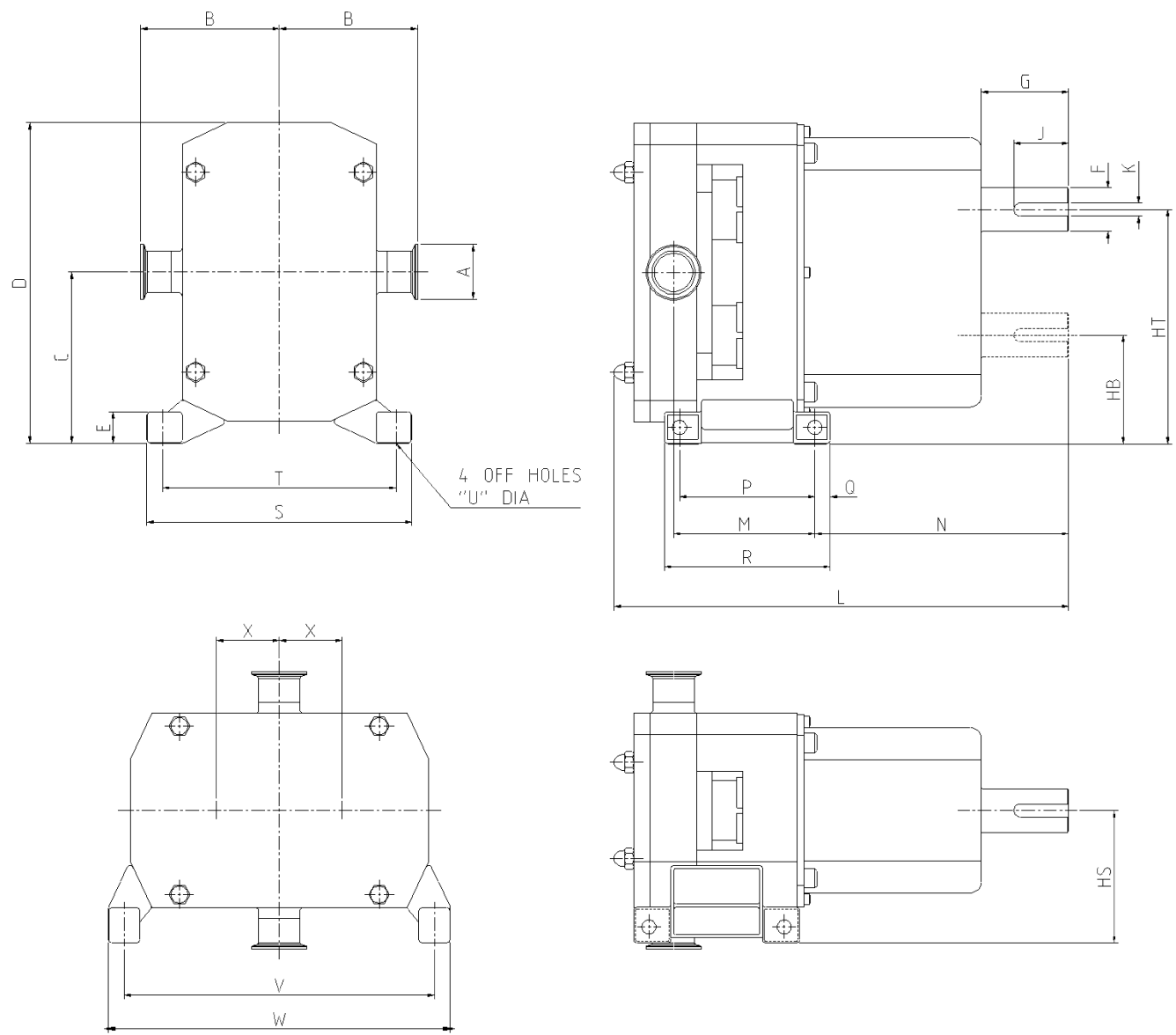
Care should be taken not to overfill the gearbox.

8.5 Material Specification.

Rotors	316L Stainless Steel
Rotorcase	316L Stainless Steel
Shafts	316L Stainless Steel
Front Cover	316L Stainless Steel
Rotor Retainer	316L Stainless Steel
Bearing Housing	Grade 220 Grey Cast Iron, Coated

8.6 Sterilobe Foundation Dimensions.

Fig 131



Dimensions in Millimetres

Sterilobe Model	A	B1	B2	B3	B4	B5	C	D	E	F	G	HB	HS	HT	J	K	L	M	N	P	Q	R	S	T	U	V	W	X
SLAS	19	69	83	N/A	97	97	88.4	160.5	22.5	14	25.4	60.9	74.8	115.9	20	5	237.7	83.8	118.5	62	11	84	149.6	128.6	9	156.7	176.7	27.5
SLAL	25	83	83	N/A	97	97	88.4	160.5	22.5	14	25.4	60.9	74.8	115.9	20	5	246.5	88.2	118.5	62	11	84	149.6	128.6	9	156.7	176.7	27.5
SLBS	25	101	101	115	115	115	101.5	187.7	22.5	20	36.3	67.5	85.2	135.5	35	6	302.3	85	173.8	62	11	84	170.6	149.6	9	182.9	202.9	34
SLBL	40	101	123	115	115	115	101.5	187.7	22.5	20	36.3	67.5	85.2	135.5	35	6	314.3	89.7	173.8	62	11	84	170.6	149.6	9	182.9	202.9	34
SLCS	40	107	129	121	121	121	129.2	233.4	29.5	24	46.1	86.7	99.6	171.7	30	8	335.6	122.9	162.7	124	14	152	199.4	170.4	13	229.3	258.3	42.5
SLCL	50	107	129	121	121	129	129.2	233.4	29.5	24	46.1	86.7	99.6	171.7	30	8	349.6	130.9	162.7	124	14	152	199.4	170.4	13	229.3	258.3	42.5
SLCX	50	107	129	121	121	129	129.2	233.4	29.5	24	46.1	86.7	99.6	171.7	30	8	366	141	162.7	124	14	152	199.4	170.4	13	229.3	258.3	42.5
SLDS	40	127	139	131	131	131	156.5	294	29	40	79.2	100	121.7	215	50	12	417	129.5	232.2	124	14	152	243	214	13	286	313.5	57.5
SLDL	50	127	139	131	131	139	156.5	294	29	40	79.2	100	121.7	215	50	12	435.5	139.8	232.2	124	14	152	243	214	13	286	313.5	57.5
SLES	50	158	167	159	159	167	192	360	43	48	80	122	180	262	60	14	494	155	276	170	16	202	360	320	20	354	384	70
SLEL	80	158	167	159	167	172	192	360	43	48	80	122	180	262	60	14	518	167	276	170	16	202	360	320	20	354	384	70
SLFS	80	173	205	187	195	200	216	409	43	50	80	136	191	296	65	14	572	176.5	305	170	16	202	382	342	20	402	432	80
SLFL	100	177	220	187	195	200	216	409	43	50	80	136	191	296	65	14	606	191.5	305	170	16	202	382	342	20	402	432	80
SLFX	100	177	220	187	195	200	216	409	43	50	80	136	191	296	65	14	630	209.5	305	170	16	202	382	342	20	402	432	80
SLGS	100	194	237	204	212	217	251	480	43	60	108	156	202	346	90	18	742	211	419	170	16	202	405	366.2	20	472	502	95
SLGL	150	194	237	204	212	217	251	480	43	60	108	156	202	346	90	18	795	237	419	170	16	202	405	366.2	20	472	502	95

Dimensions in Inches

Sterilobe Model	A	B1	B2	B3	B4	B5	C	D	E	F	G	HB	HS	HT	J	K	L	M	N	P	Q	R	S	T	U	V	W	X
SLAS	0.75	2.72	3.27	N/A	3.82	3.82	3.48	6.32	0.89	0.55	1.00	2.40	2.94	4.56	0.79	0.20	9.36	3.30	4.67	2.44	0.43	3.31	5.89	5.06	0.35	6.17	6.96	1.08
SLAL	1	3.27	3.27	N/A	3.82	3.82	3.48	6.32	0.89	0.55	1.00	2.40	2.94	4.56	0.79	0.20	9.70	3.47	4.67	2.44	0.43	3.31	5.89	5.06	0.35	6.17	6.96	1.08
SLBS	1	3.98	3.98	4.53	4.53	4.53	4.00	7.39	0.89	0.79	1.43	2.66	3.35	5.33	1.38	0.24	11.90	3.35	6.84	2.44	0.43	3.31	6.72	5.89	0.35	7.20	7.99	1.34
SLBL	1.5	3.98	4.84	4.53	4.53	4.53	4.00	7.39	0.89	0.79	1.43	2.66	3.35	5.33	1.38	0.24	12.37	3.53	6.84	2.44	0.43	3.31	6.72	5.89	0.35	7.20	7.99	1.34
SLCS	1.5	4.21	5.08	4.76	4.76	4.76	5.09	9.19	1.16	0.94	1.81	3.41	3.92	6.76	1.18	0.31	13.21	4.84	6.41	4.88	0.55	5.98	7.85	6.71	0.51	9.03	10.17	1.67
SLCL	2	4.21	5.08	4.76	4.76	5.08	5.09	9.19	1.16	0.94	1.81	3.41	3.92	6.76	1.18	0.31	13.76	5.15	6.41	4.88	0.55	5.98	7.85	6.71	0.51	9.03	10.17	1.67
SLCX	3	4.21	5.08	4.76	4.76	5.08	5.09	9.19	1.16	0.94	1.81	3.41	3.92	6.76	1.18	0.31	14.41	5.55	6.41	4.88	0.55	5.98	7.85	6.71	0.51	9.03	10.17	1.67
SLDS	1.5	5.00	5.47	5.16	5.16	5.16	6.16	11.57	1.14	1.57	3.12	3.94	4.79	8.46	1.97	0.47	16.42	5.10	9.14	4.88	0.55	5.98	9.57	8.43	0.51	11.26	12.34	2.26
SLDL	2	5.00	5.47	5.16	5.16	5.47	6.16	11.57	1.14	1.57	3.12	3.94	4.79	8.46	1.97	0.47	17.15	5.50	9.14	4.88	0.55	5.98	9.57	8.43	0.51	11.26	12.34	2.26
SLES	2	6.22	6.57	6.26	6.26	6.57	7.56	14.17	1.69	1.89	3.15	4.80	7.09	10.31	2.36	0.55	19.45	6.10	10.85	6.69	0.63	7.95	14.17	12.60	0.79	13.94	15.12	2.76
SLEL	3	6.22	6.57	6.26	6.57	6.77	7.56	14.17	1.69	1.89	3.15	4.80	7.09	10.31	2.36	0.55	20.39	6.57	10.85	6.69	0.63	7.95	14.17	12.60	0.79	13.94	15.12	2.76
SLFS	3	6.81	8.07	7.36	7.68	7.87	8.50	16.10	1.69	1.97	3.15	5.35	7.52	11.65	2.56	0.55	22.52	6.95	12.01	6.69	0.63	7.95	15.04	13.46	0.79	15.83	17.01	3.15
SLFL	4	6.97	8.66	7.36	7.68	7.87	8.50	16.10	1.69	1.97	3.15	5.35	7.52	11.65	2.56	0.55	23.86	7.54	12.01	6.69	0.63	7.95	15.04	13.46	0.79	15.83	17.01	3.15
SLFX	5	6.97	8.66	7.36	7.68	7.87	8.50	16.10	1.69	1.97	3.15	5.35	7.52	11.65	2.56	0.55	24.80	8.25	12.01	6.69	0.63	7.95	15.04	13.46	0.79	15.83	17.01	3.15
SLGS	4	7.64	9.33	8.03	8.35	8.54	9.88	18.90	1.69	2.36	4.25	6.14	7.95	13.62	3.54	0.71	29.21	8.31	16.50	6.69	0.63	7.95	15.94	14.42	0.79	18.58	19.76	3.74
SLGL	6	7.64	9.33	8.03	8.35	8.54	9.88	18.90	1.69	2.36	4.25	6.14	7.95	13.62	3.54	0.71	31.30	9.33	16.50	6.69	0.63	7.95	15.94	14.42	0.79	18.58	19.76	3.74

B1 applies for all threaded connections except BSPT and NPT
B2 applies for BSPT and NPT thread connections
B3 applies for all flange connections except ASA150, BS4504 and ASA300
B4 applies for ASA150 and BS4504 flange connections
B5 applies for ASA300 flange connections

Approx. Pump Weights – including grease

SLAS = 12kg SLAL = 15kg
SLBS = 20kg SLBL = 22kg
SLCS = 35kg SLCL = 38kg
SLDS = 65kg SLDL = 70kg
SLES = 124kg SLEL = 135kg
SLFS = 181kg SLFL = 205kg
SLGS = 350kg SLGL = 382kg

8.7 Trouble Shooting.

No Flow	Irregular Flow	Under Capacity	Pump Overheats	Motor Overheats	Excessive Rotor Wear	Excessive Seal Wear	Noise / Vibration	Seizure	Pump Stalls On Start UP	Causes	Action
										Incorrect Direction Of Rotation.	Reverse Motor.
										Pump Not Primed.	Expel Gas From Suction Line / Pump Chamber & Prime.
										Insufficient NPSH Available.	Increase Suction Line & Static Suction Head Diameter. Simplify Suction Line & Reduce Length. Reduce Pump Speed & Product Temperature.
										Product Vaporising In Suction Line.	
										Air Entering Suction Line.	Remake Pipework Joints.
										Gas In Suction Line.	Expel Gas From Suction Line / Pump Chamber.
										Insufficient Static Suction Head.	Raise Product Level To Increase Static Suction Head.
										Product Viscosity Too High.	Decrease Pump Speed / Increase Product Temperature.
										Product Viscosity Too Low.	Increase Pump Speed / Increase Product Temperature.
										Product Temperature Too High.	Cool Product / Pumping Chamber.
										Product Temperature Too Low.	Heat Product / Pumping Chamber.
										Unexpected Solids In Product	Clean System / Fit Strainer On Suction Side Of Pump.
										Discharge Pressure Too High	Check For Blockages / Simplify Discharge Line.
										Rotorcase Strained By Pipework.	Check Pipe Alignment / Support Pipework.
										Pump Speed Too High	Decrease Pump Speed.
										Pump Speed Too Low	Increase Pump Speed
										Seal Flush Inadequate	Increase Seal Flush To Required Pressure / Flow.
										Bearing / Timing Gear Wear	Replace Worn Components.

8.8 Tool List.

Listed below are tools required for the maintenance of the Sterilobe pump.

Type	Size or Range	SLA	SLB	SLC	SLD	SLE	SLF	SLG
Combination Spanner	13mm	●						
	17mm		●	●				
	19mm				●	●		
	24mm						●	●
Hexagon (Allen) Key	5mm	●	●	●	●	●	●	●
	6mm	●	●	●	●	●	●	●
	8mm			●	●	●	●	●
	10mm				●	●	●	●
Hexagon (Allen) Key Socket Driven	5mm	●	●	●	●	●	●	●
	6mm	●	●	●	●	●	●	●
	8mm			●	●	●	●	●
	10mm				●	●	●	●
Torque Wrench	0 - 75	●	●					
	0 - 150			●	●			
	0 - 300					●	●	●
Depth Micrometer	0 - 25mm	●	●	●	●	●	●	●
Feeler Gauge Set		●	●	●	●	●	●	●
Rolling Torque Meter	0 - 5 NM	●	●	●	●			
Rolling Torque Meter	0 - 10 NM					●	●	●
Socket for Rotor Retainers	Supplied with Pump	●	●	●	●	●	●	●
Seal Removal Tool	Supplied with Pump	●	●	●	●	●	●	●
Rotor Lock Tool (Plastic Strip 50x25x7) Recommend Acetyl Copolymer	Supplied with Pump	●	●	●	●	●	●	●
C - Spanner	To Suit M17 Nut	●						
	To Suit M25 Nut		●					
	To Suit M30 Nut			●				
	To Suit M45 Nut				●			
	To Suit M55 Nut					●		
	To Suit M60 Nut						●	
	To Suit M70 Nut							●
Soft Face Mallet		●	●	●	●	●	●	●
Pin Punch		●	●	●	●	●	●	●
Steel Hammer		●	●	●	●	●	●	●
Long Reach Pointed Nose Pliers		●	●	●	●	●	●	●
For Pumps with Relief Valve								
Tommy Bar	Diameter 8 - 200 long	●	●					
	Diameter 13 - 400 long			●				
	Diameter 16 - 600 long				●	●		
Pin Spanner		●	●	●	●	●		

8.9 Service History.

Pump Model:

Pump Serial No:

[illegible]

8.10 Notes.

The information contained in this document is correct at time of print but may be subject to change without prior notice. The latest updated copies are available from our website



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