



INSTALLATION, OPERATION
AND
MAINTENANCE MANUAL
FOR THE

A large, stylized, grey letter 'c' that forms a partial circle, with a small grey triangle at its top point.

classic+

Range of Pumps



Installation, Operation & Maintenance Manual For The Classic+ 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 are 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 of the pump outside of its operation envelope can cause mechanical contact, 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/cavity ventilation 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 head 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 replenish lubricants, check for leakage, monitor pressures, etc) and provide adequate ventilation necessary to prevent overheating.

WARNING

Fill all gearboxes with the recommended grades and quantities of lubricant (refer to section 3.4 and 8.3). Beware of over/under filling the gearbox as this could cause the pump to overheat and mechanical damage to occur.

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 an ignition source.

WARNING

Be sure that pump rotation is correct for the desired direction of flow (refer to section 3.4).

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. For weights of bare shaft pumps refer to section 8.5.



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 85-dB (A) under certain operating conditions. When necessary, personal protection against noise must be taken. Typical noise emission data can be found in section 8.8 and 8.9.



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 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 of Viking Pump Classic+ rotary lobe pumps and pump 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.

Classic+ rotary lobe pumps are manufactured by Viking Pump, a unit of the IDEX Corporation.

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

Should you require any additional information regarding the Classic+, contact Viking Pump or their local 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 pump gearbox cover, refer to section 2.6.

Should the nameplate be unreadable or missing, the serial number is also stamped on either side of the rotorcase refer to section 2.6.

If the system or product characteristics are to be changed from the original application for which the pump was selected, Viking Pump or their 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 Classic+.

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° 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 Cleaning.

The Classic+ pump series is suitable for both manual cleaning and CIP (Cleaning In Place), refer to section 3.3.2.

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

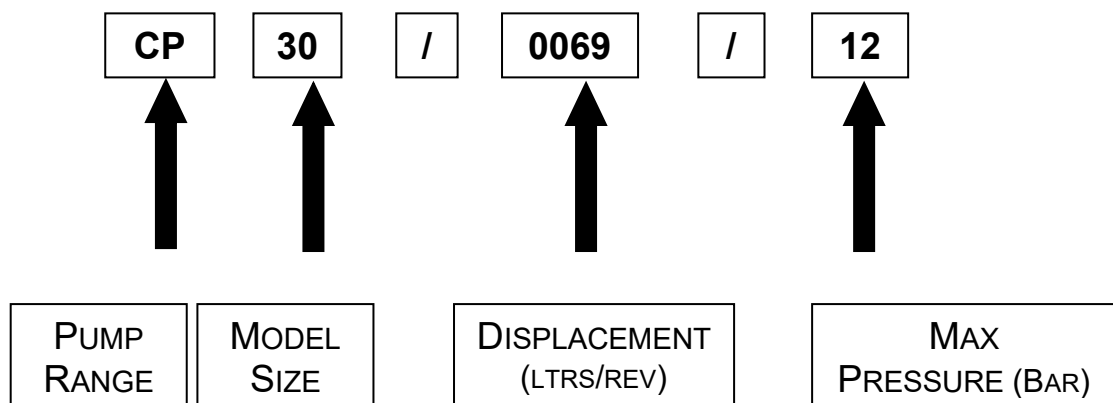
2.5 Pump Model Designation.

The designations of pump models in the Classic+ range are as follows:

CP10/0005/12	CP20/0020/12	CP30/0069/12	CP40/0180/12	CP50/0351/12
CP10/0008/08	CP20/0031/07	CP30/0113/07	CP40/0250/07	CP50/0525/08
CP10/0011/05				

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 2.6, Figs 2 and 3).

For the maximum operating pressures, temperatures and speeds refer to section 3.2, Fig 6.



2.5.1 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.

2.5.2 Equipment Groups & Categories

Temperature Class T3

The pump range has been rated as



h II – 2 – G/D TEMP – T3

Group II.

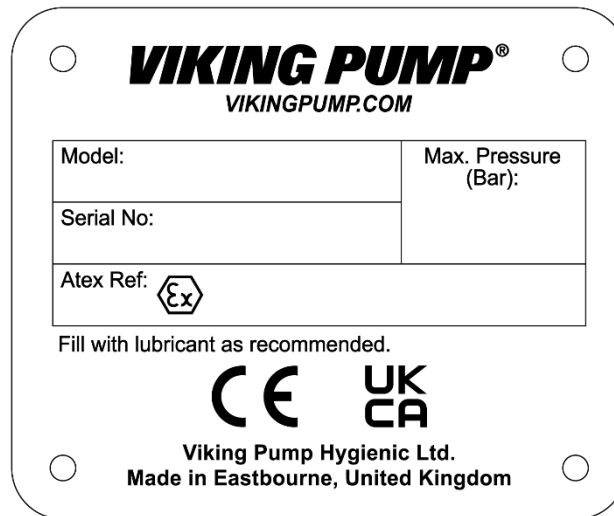
Category 2

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 Classic+ 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, 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 or on the rear face of the rotorcase, (see Fig 3).

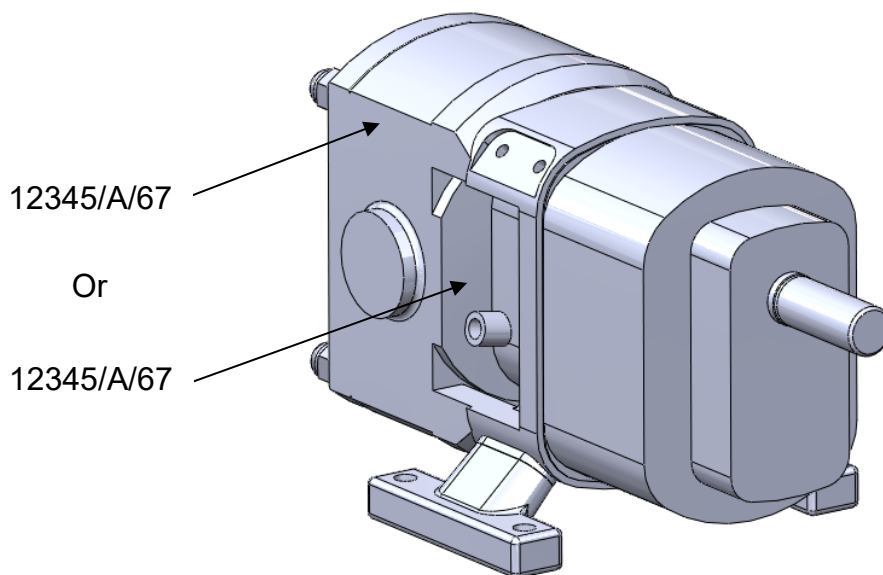


Fig 3 Serial Number Position on Rotorcase

2.7 Standard Pump Component Terms.

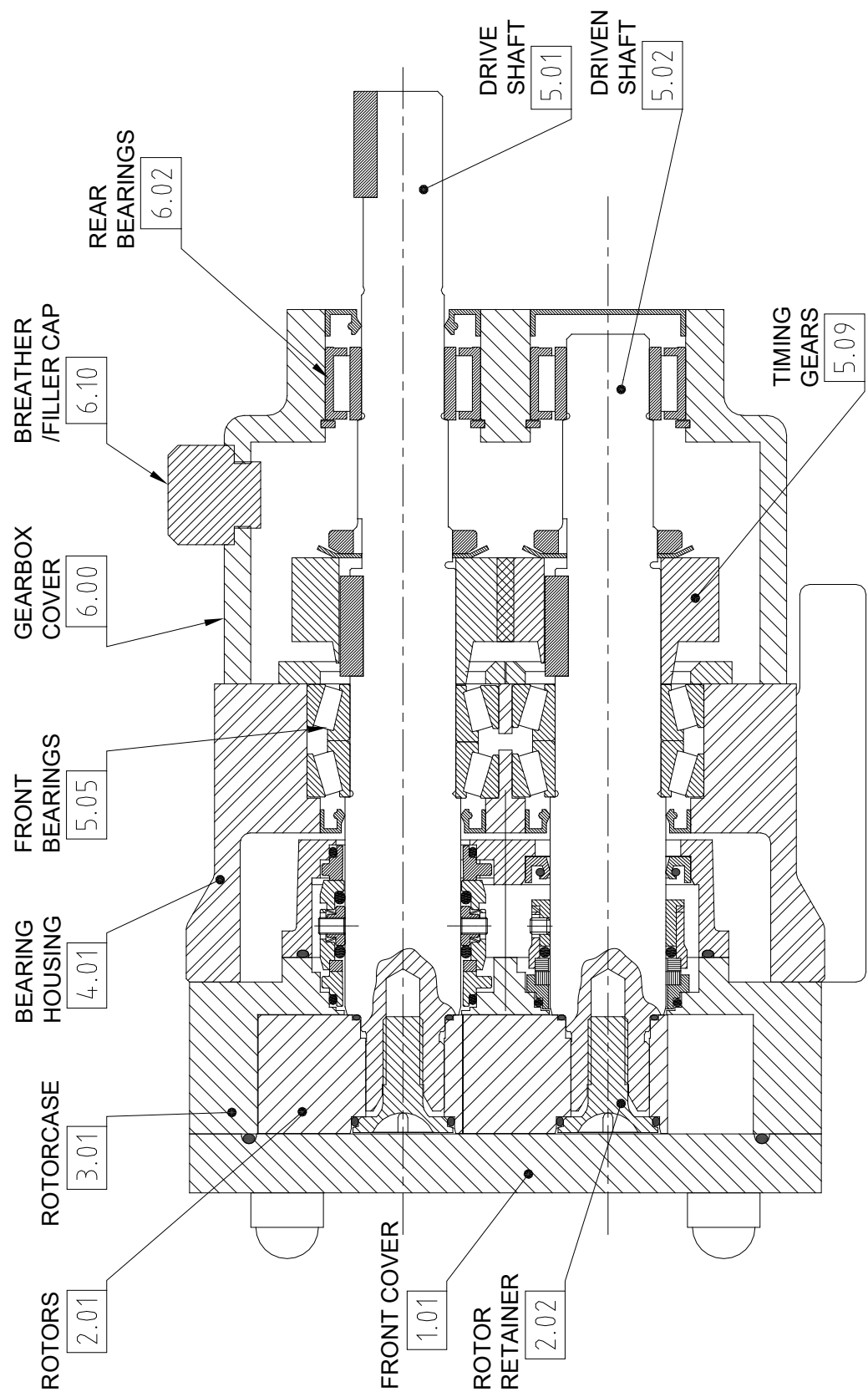


Fig 4 Pump Component Terms

3.0 General.

3.1 Classic+ Pumping Principal.

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 5. The rotors are located on shafts, which in turn are mounted within an external gearbox and supported by the bearings; the timing gears are also located on the shafts. The timing 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, see Fig 5a, the cavity generated 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; see Fig 5b and 5c, to the discharge side of the pump, Fig 5d. Here the cavity decreases and the pumped medium is discharged from the rotorcase, Fig 5e.

For pump component terms see Fig 4.

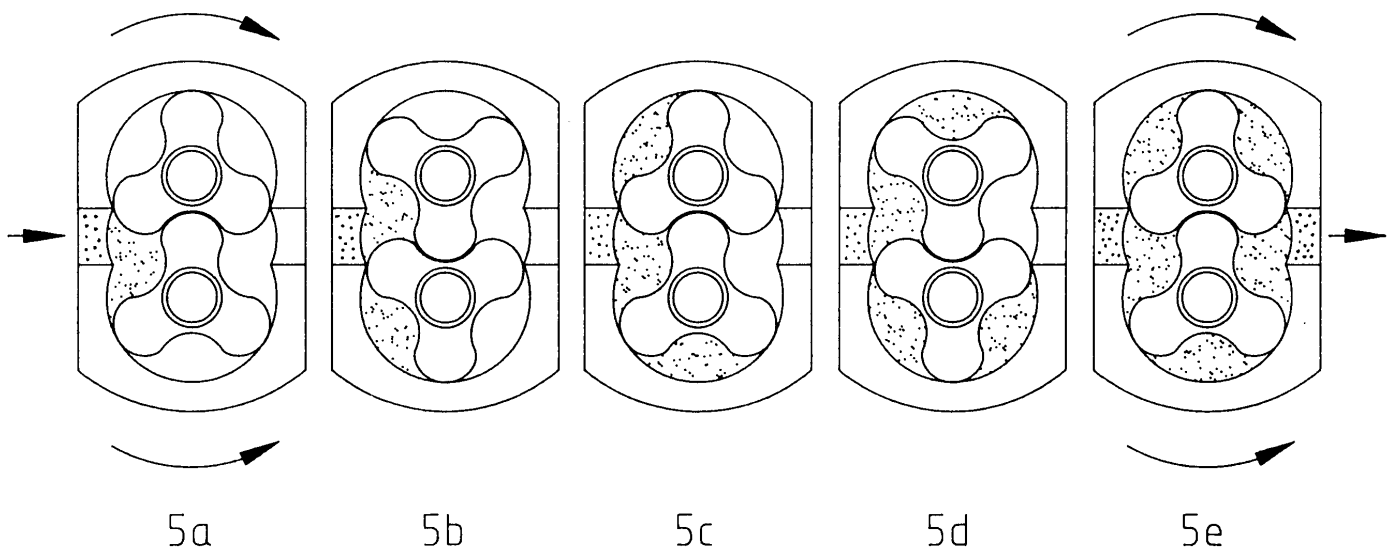


Fig 5 Rotary Lobe Pumping Principle.

3.2 Classic+ Range Operating Parameters.

The maximum pressure and speed operating parameters are given in Fig 6. 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. Consult Viking Pump or your Viking Pump Hygienic distributor for assistance.

The operating temperature limit of the pump is determined by the rotor clearance. For the CP10, CP20, CP30 and CP40 series pumps there are three rotor clearance bands (class A, B and C), and two (class B and D) for the CP50 series pumps.

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 authorized 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.

Pump Range	Theoretical Displacement			Nominal Connection Size		Max Diff. Pressure		Max. Speed	Max Speed @ Max Diff. Pressure	Max Diff. Pressure @ Max Speed	
	ltr/rev	Imp.gal /100 rev	US gal /100 rev	mm	inches	bar	psi	rev/min	rev/min	bar	psi
CP10/0005/12	0.046	1.01	1.22	25	1	12	175	1400	1000	8.5	120
CP10/0008/08	0.083	1.83	2.19	38	1.5	8	120	1400	1000	5.5	75
CP10/0011/05	0.111	2.44	2.93	38	1.5	5	70	1400	1000	3.5	50
CP20/0020/12	0.202	4.44	5.34	38	1.5	12	175	1000	750	8.5	120
CP20/0031/07	0.313	6.89	8.27	50	2	7	100	1000	750	5.0	70
CP30/0069/12	0.694	15.27	18.34	50	2	12	175	750	550	8.5	120
CP30/0113/07	1.125	24.75	29.72	76	3	7	100	750	550	5.0	70
CP40/0180/12	1.800	39.60	47.56	76	3	12	175	700	520	8.5	120
CP40/0250/07	2.500	55.00	66.05	101	4	7	100	700	520	5.0	70
CP50/0351/12	3.514	77.31	92.84	101	4	12	175	650	420	8.5	120
CP50/0525/08	5.250	115.50	138.70	152	6	8	115	600	420	5.5	75

CP20/CP30 High Efficiency Operating Parameters.

CP20/0020/07	0.202	4.44	5.34	38	1.5	7	100	1000	750	5.0	70
CP20/0031/04	0.313	6.89	8.27	50	2	4	55	1000	750	3.0	40
CP30/0069/07	0.694	15.27	18.34	50	2	7	100	750	520	5.0	70
CP30/0113/04	1.125	24.75	29.72	76	3	4	55	750	520	3.0	40

Classic+ Series	Operating Temperature Limit (°C)			
	Class A	Class B	Class C	Class D
CP10, 20, 30, 40	70	100	150	N/A
CP50	N/A	100	N/A	180

N/A = Not Available

Fig 6 Operating Parameters

3.3 System Design.

3.3.1 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 over heating.



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.

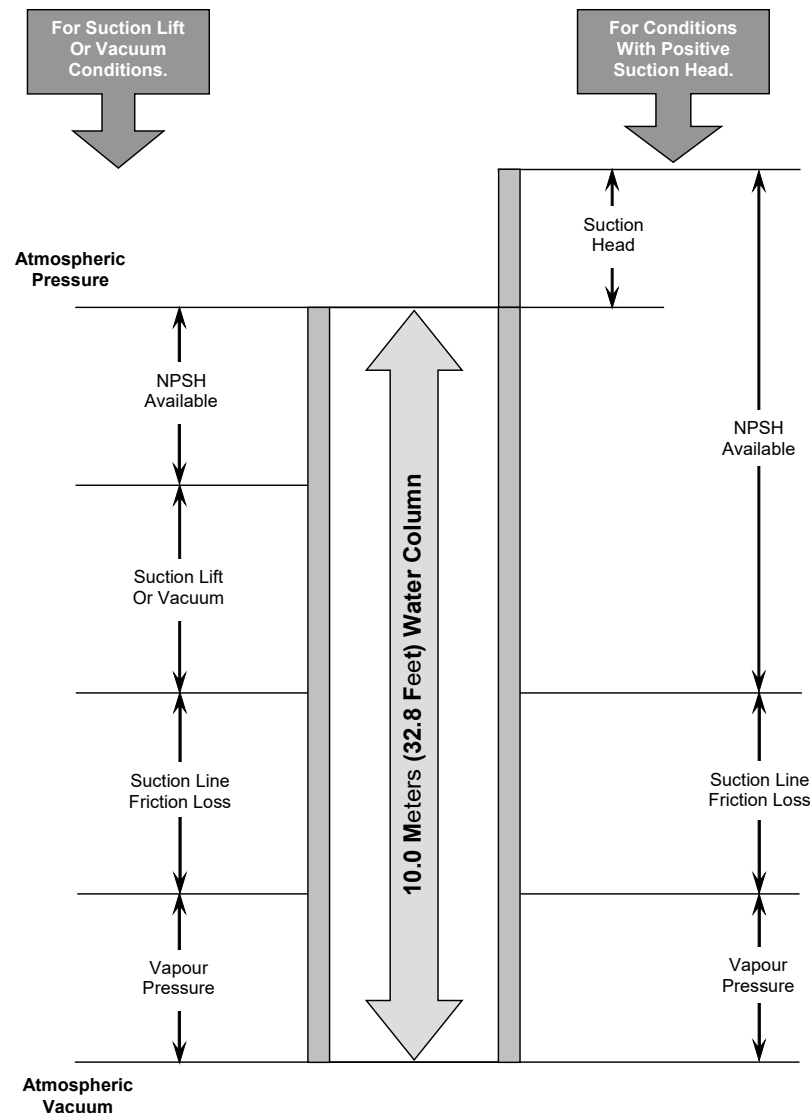


Fig 7 NPSH

When installing a pump complete with base plate, motor and drive, the following guidelines must be observed:

- a) The preferred drive arrangement for any rotary lobe pump is in-line direct coupled. If an alternative is required please contact Viking Pump or your Viking Pump Hygienic distributor.



- b) 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.



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



- d) When the pump is installed in a flammable or explosive environment, or is used 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.



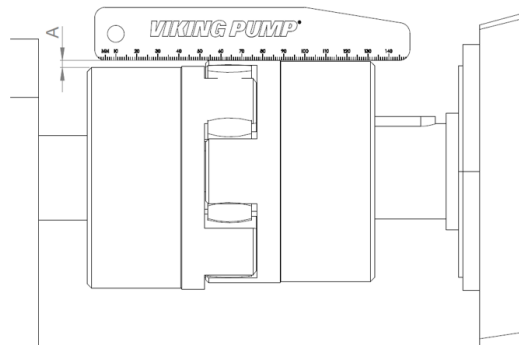
- e) Base plates must be secured to a flat level surface such that distortion and misalignment are avoided. Once base plates are fastened in position the drive alignment must be re-checked, (see b).

- f) 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.

3.3.2 Pump and Motor Alignment

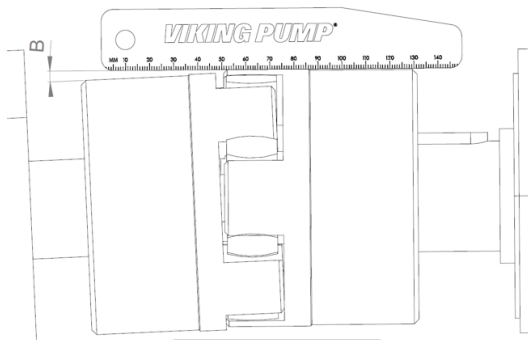
Before the pump unit is installed it is important to ensure that the mounting surface is flat to avoid distortion of the baseplate, which may cause pump/motor shaft misalignment and pump/motor unit damage. Once the baseplate has been secured, the pump shaft to motor shaft coupling alignment should be checked and adjusted as necessary. This is achieved by checking the maximum angular and parallel misalignment for the couplings as stated below, the recommended couplings are KTR Rotex. Shaft alignment that is outside the stated tolerances can be corrected by applying shims under the motor or pump foot, or, by moving the pump or driving sideways on the baseplate. All bolts that have been loosened should be re-tightened to the stated torque figure.

Radial tolerance: - Measure 4 positions at 90° around coupling



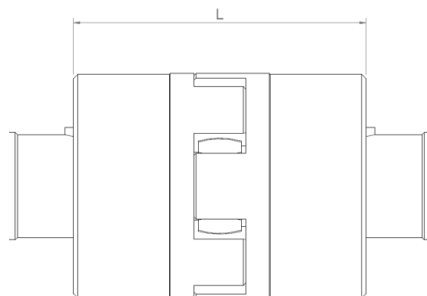
Size RX		14	19	24	28	38	42	48	55	65	75	90	100	110	125	140	160	180
Max. Radial (mm) Displacement "A" upto	1500 RPM	0.17	0.22	0.22	0.25	0.28	0.32	0.36	0.38	0.42	0.48	0.5	0.52	0.55	0.6	0.62	0.64	0.68
Max. Radial (Inch) Displacement "A" upto	1500 RPM	0.007	0.009	0.009	0.010	0.011	0.013	0.014	0.015	0.017	0.019	0.020	0.020	0.022	0.024	0.024	0.025	0.027

Angular tolerance: - Measure 4 positions at 90° around coupling



Size RX		14	19	24	28	38	42	48	55	65	75	90	100	110	125	140	160	180
Max. Angular (°) Displacement "B" upto	1500 RPM	1.1	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.1	1.1	1.1	1.1	1.2	1.0	1.1	1.1	1.1

Length Tolerance:-



Size RX		14	19	24	28	38	42	48	55	65	75	90	100	110	125	140	160	180
Dimension L ± 1.0mm	1500 RPM	35	66	78	90	114	126	140	160	185	210	245	270	295	340	375	425	475
Dimension L ± 0.039"	1500 RPM	1.378	2.598	3.071	3.543	4.488	4.961	5.512	6.299	7.283	8.268	9.646	10.630	11.614	13.386	14.764	16.732	18.701

3.3.3 Installations with CIP Systems.

The Classic+ pump range is designed to be effectively cleaned by the CIP procedures recommended for in place cleaning of process plant. It is recommended that a differential pressure of 2 to 3 Bar (30 to 45 psi) be developed across the pump head during cleaning in order to develop the necessary fluid velocities required for thorough cleaning.

3.4 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 fitted with flushed product seals check all auxiliary services are in place and connected and provide sufficient flow and pressure for flushing purposes, refer to section 7.0.

WARNING

- Ensure lubrication is provided for both pump and drive. The Classic+ is shipped **without oil** as standard and should be filled to the level of the oil sight glass - refer to section 8.3 for pump oil 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 reset to the required setting 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

- Be sure both suction and discharge valves are fully opened and that pipe work is free from all obstructions. The Classic+ is a positive displacement type pump 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

- Make sure that the drive shaft rotation is correct for the direction of flow required. See Fig 8.

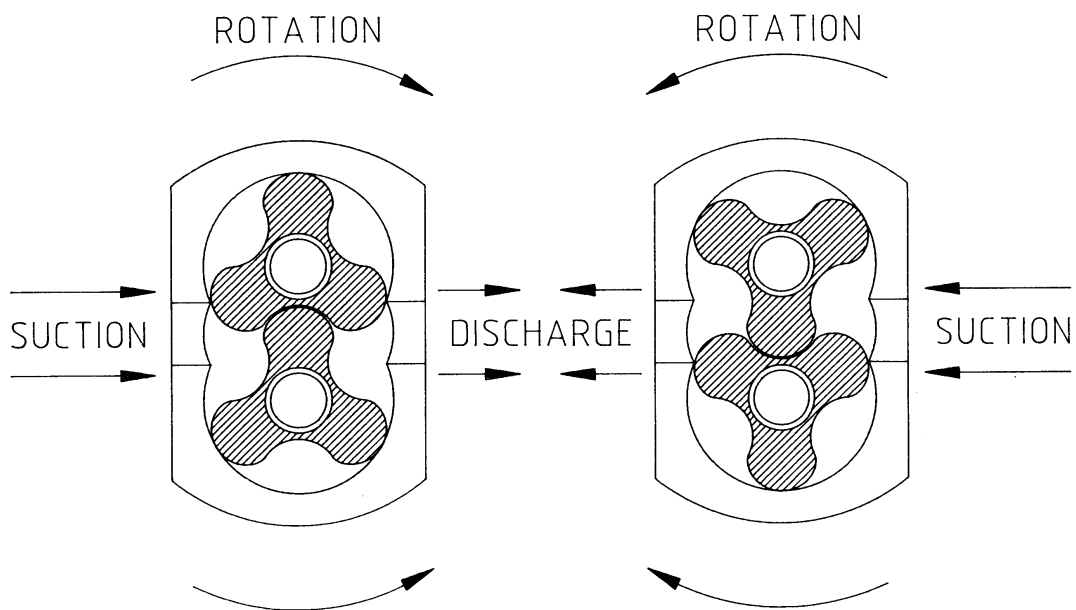


Fig 8 Rotation against Suction and Discharge

WARNING

- Be sure product is available in the suction vessel before starting the pump. This is very important for pumps fitted 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 the pump temperature and absorbed power where possible.

3.5 Shutdown Procedure.



When shutting the pump down, stop pump, 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, pneumatically operated integral relief valve has been depressurised.
- Flushed product seal auxiliary services have been isolated and depressurised.
- Pump head and piping have been drained and purged.
- Before undertaking any work on the pump refer to sections 4, 5, 6 and 7.

3.6 Routine Maintenance – Non Atex units.

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.

3.6.1 Additional Routine Maintenance – Atex units.

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.

3.7 Heating and Cooling Jackets

See Fig 9 and Fig 10.

The Classic+ can be supplied with a jacketed front cover and rotorcase for circulation of a heating/cooling media.

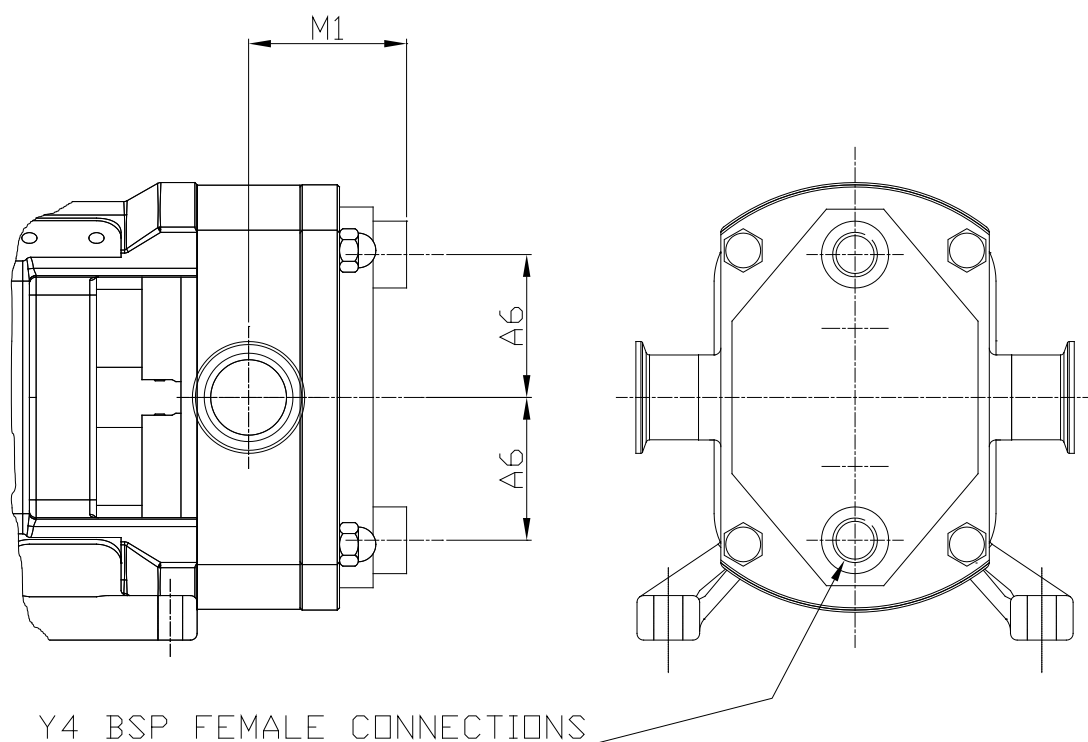
The front cover and rotorcase jacket ports are strategically positioned such that the required thermal effect acts on the pumping chamber.



The pressure rating of the Classic+ series jacketed front cover and rotorcase is 3 Bar (50 psi) and this should not be exceeded without consulting Viking Pump or your local Viking Pump Hygienic distributor.

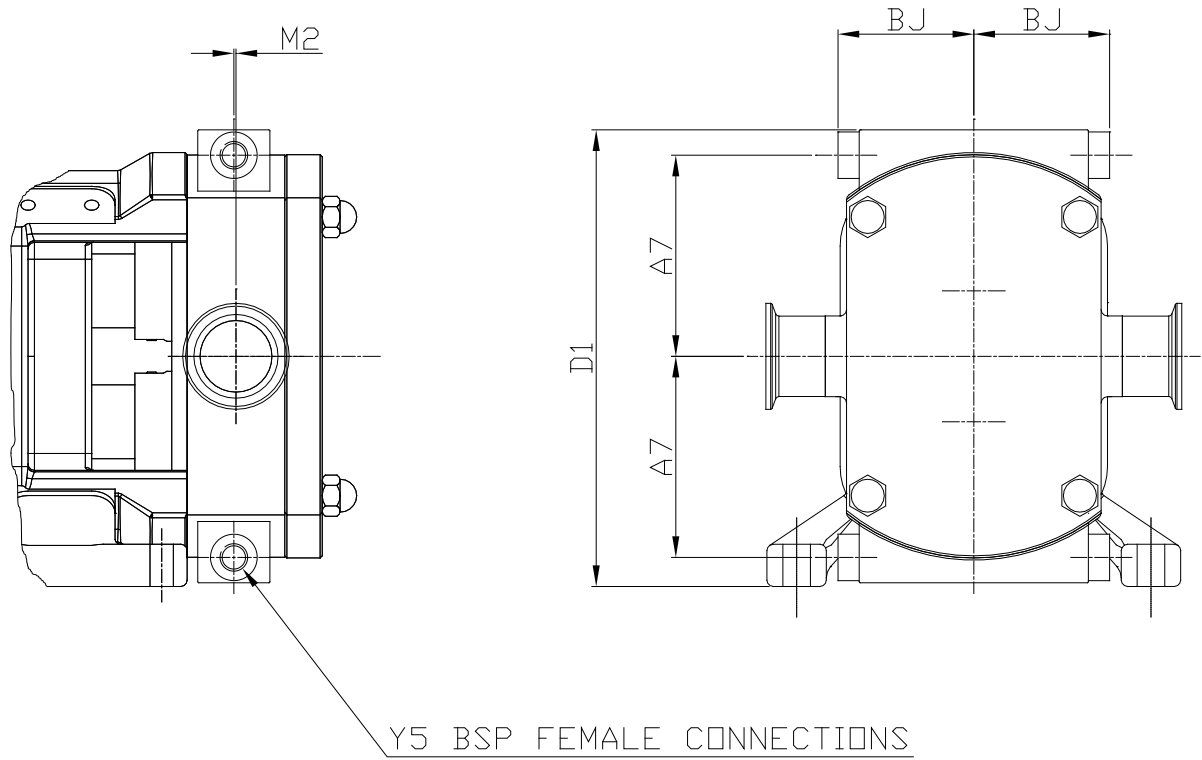
Heating/cooling of the pump head is used to maintain, rather than increase/decrease the temperature of the pumped media and should be used as part of a complete system where suction and discharge lines and vessels are also heated/cooled.

Where heating/cooling devices are employed, the heating/cooling media should be circulated 15-20 minutes prior to pump start-up and should be allowed to continue for a similar period of time after the pump has been shut down. Where a CIP cycle is employed as part of the process, then the heating/cooling media should continue to be circulated during the cleaning cycle.



Model	Millimetres		Inches		
	A6	M1	A6	M1	Y4
CP10/0005/12	50.0	52.0	1.97	2.05	1/4"
CP10/0008/08	50.0	61.0	1.97	2.40	1/4"
CP10/0011/05	50.0	61.0	1.97	2.40	1/4"
CP20/0020/12	64.0	71.0	2.52	2.80	1/2"
CP20/0031/07	64.0	81.0	2.52	3.19	1/2"
CP30/0069/12	92.5	81.0	3.64	3.19	1/2"
CP30/0113/07	92.5	96.0	3.64	3.78	1/2"
CP40/0180/12	130.0	108.0	5.12	4.25	1/2"
CP40/0250/07	130.0	123.0	5.12	4.84	1/2"
CP50/0351/12	175.0	115.0	6.89	4.53	1/2"
CP50/0525/08	175.0	138.0	6.89	5.43	1/2"

Fig 9 Dimensions of Front Cover Jacket for Heating/Cooling.



Model	Millimetres				Inches				
	A7	BJ	D1	M2	A7	BJ	D1	M2	Y5
CP10/0005/12	70.0	56.0	156.0	3.0	2.76	2.20	6.14	0.12	¼
CP10/0008/08	70.0	56.0	156.0	2.0	2.76	2.20	6.14	0.08	¼
CP10/0011/05	70.0	56.0	156.0	7.5	2.76	2.20	6.14	0.30	¼
CP20/0020/12	80.0	64.0	216.0	0.0	3.15	2.52	8.50	0.00	¼
CP20/0031/07	80.0	64.0	216.0	1.0	3.15	2.52	8.50	0.04	¼
CP30/0069/12	118.0	93.0	280.0	1.0	4.65	3.66	11.02	0.04	½
CP30/0113/07	118.0	93.0	280.0	3.5	4.65	3.66	11.02	0.14	½
CP40/0180/12	156.0	125.0	352.0	2.5	6.14	4.92	13.86	0.10	½
CP40/0250/07	156.0	125.0	352.0	3.5	6.14	4.92	13.86	0.14	½
CP50/0351/12	191.0	155.0	430.0	8.0	7.52	6.10	16.93	0.31	½
CP50/0525/08	191.0	155.0	430.0	10.0	7.52	6.10	16.93	0.39	½

Fig 10 Dimensions of Rotorcase Jacket for Heating/Cooling.

3.8 Integral Pressure Relief Valves

See Fig 11, 12, 13 and 14.

The Classic+ models CP10, CP20, CP30 and CP40 can be supplied with integral pressure relief valves. For the CP10, CP20 and CP30 both spring and air loaded versions are 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 procedures are employed. Valves incorporating this option can be opened to regulate the flow of the cleaning media through the pump chamber, thereby avoiding the need for manual cleaning or external bypass.

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

The Classic+ integral pressure relief valves available include:

Spring Loaded - see Fig 11.

- Valve can be set to the required pressure relief setting.

Spring Loaded with Manual Lift - see Fig 12.

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

Spring Loaded with Air Lift - see Fig 13.

- Valve can be set to the required pressure relief setting. Airlift override, which operates on an air supply of up to 7 Bar (102 psi) depending on pressure relief setting, can be used to open valve without disturbing pressure relief setting.

Air Loaded with Air Lift - see Fig 14.

- Valve, which operates on an air supply of up to 7 Bar (102 psi) regulated for required setting, can be set to the required pressure relief setting. Airlift override, which operates on an air supply of up to 7 Bar (102 psi) 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 liquid circulating is relatively small, the temperature of the liquid 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 liquid, 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 fitted is to be installed within either a pressurised system or one incorporating a vessel under vacuum then the application of the valve should be referred to Viking Pump.

The selection, setting and application of integral relief valves is influenced by the viscosity and nature of the pumped media, the pumps 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 and the setting of the valves should be carried out on site, under the proposed duty conditions for which the pump and valve were selected.

For setting and operating Classic+ integral relief valves refer to sections 3.8.1 and 3.8.2. Before beginning the relief valve setting procedure the pump should be installed, refer to section 3.3.1, paragraph (vi), with a pressure gauge in the discharge line adjacent to the pump discharge port.

3.8.1 Setting and Operating Spring Loaded Valves

See Fig 11, 12 and 13.



- Remove cover (108). For integral relief valve with manual lift, see Fig 12; first remove nut (129) and hand wheel (111).
- Unscrew nut (107) using pry bar in 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 3.4.
- Screw in nut (107) using pry bar in holes provided until the required pressure relief setting is reached.

WARNING

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

- Reinstall cover (108). For integral relief valve with manual lift, see Fig 12; reinstall hand wheel (111) and nut (129).
- The relief valve is now set.

For Integral Relief Valve with Manual Lift - see Fig 12.

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

For Integral Relief Valve with Air Lift - see Fig 13.

- To actuate the airlift, connect an air supply not exceeding 7 Bar (102 psi) to the cylinder (123), connection 'B', 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 Integral Pressure Relief Valves

See Fig 14.

- Connect an air supply, not exceeding 7 Bar (102 psi), 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 3.4.
- Using the regulating valve, gradually increase the air pressure until required pressure relief setting is reached. The air pressure must not exceed 7 Bar (102 psi).
- The relief valve is now set.

WARNING

Note: Care should be taken not to exceed the lower of either the pump's 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 depressurizing 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 disassemble a pressure relief valve which has not had the spring pressure relieved, is still connected to a pressurized air supply or is mounted on a pump that is operating. Serious personal injury or pump damage may occur.

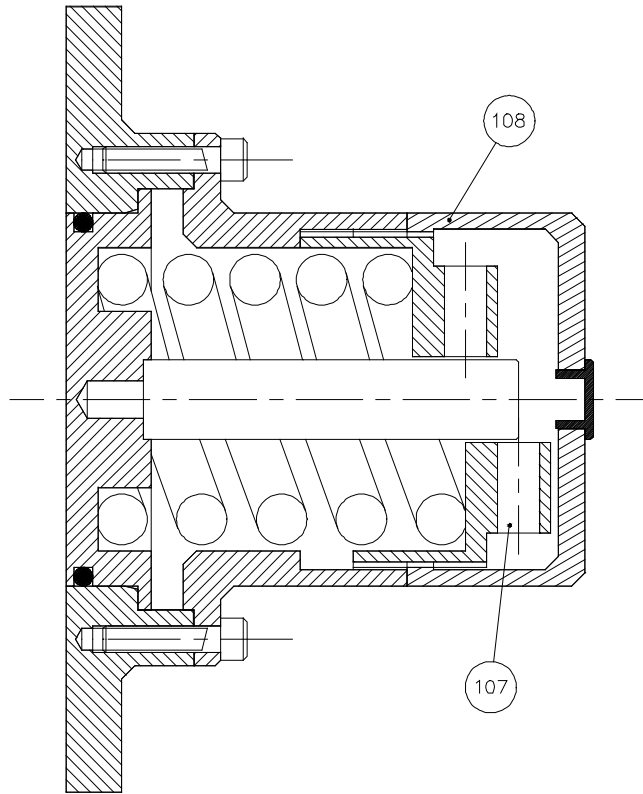


Fig 11 Spring Loaded Integral Pressure Relief Valve CP10, CP20, CP30, CP40.

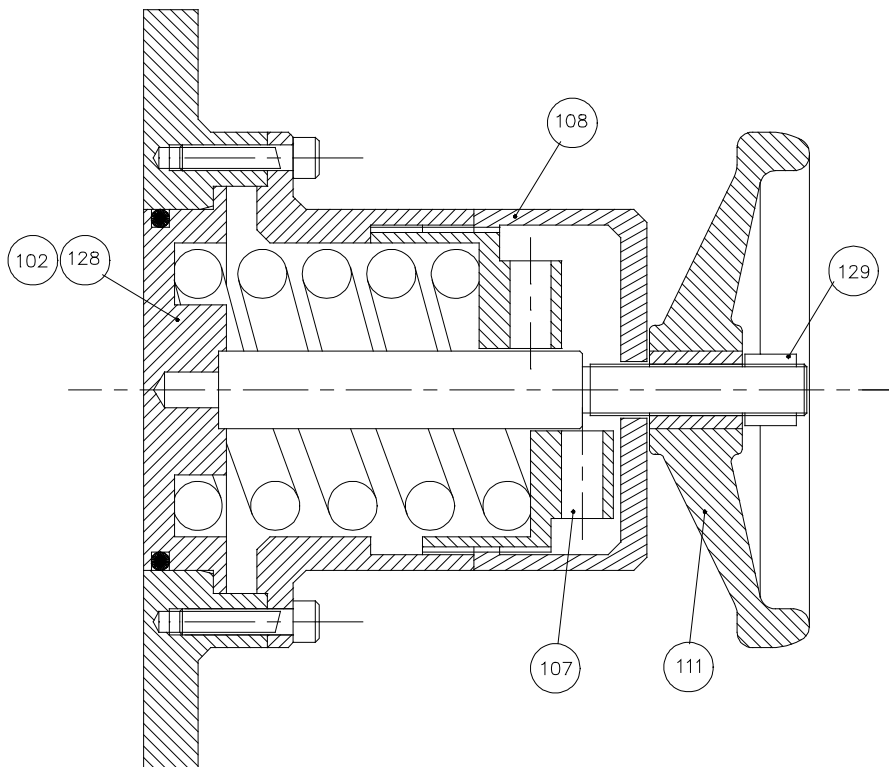


Fig 12 Spring Loaded Integral Pressure Relief Valve with Manual Lift CP10, CP20 and CP30.

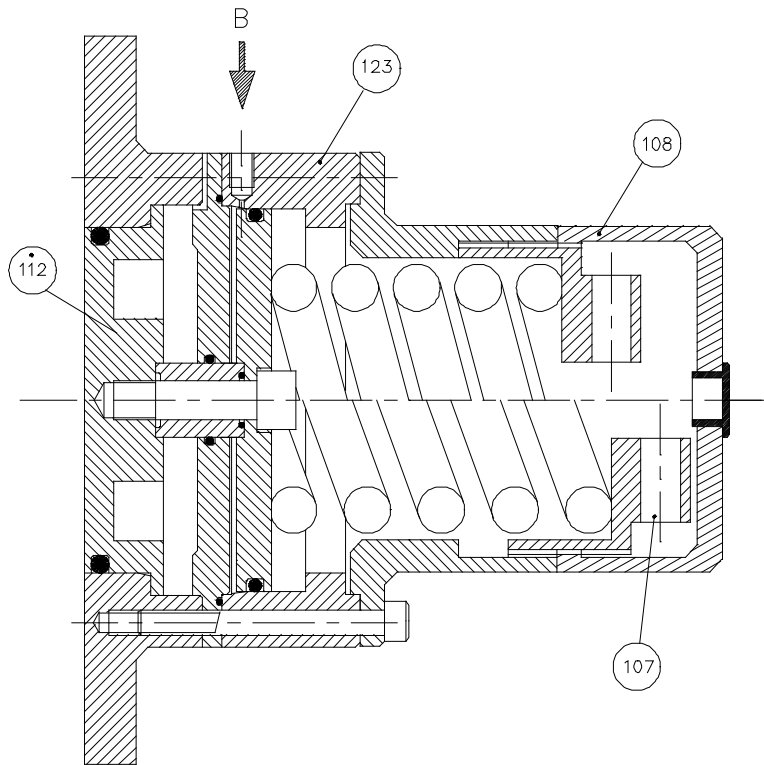


Fig 13 Spring Loaded Integral Pressure Relief Valve with Air Lift CP10, CP20 and CP30.

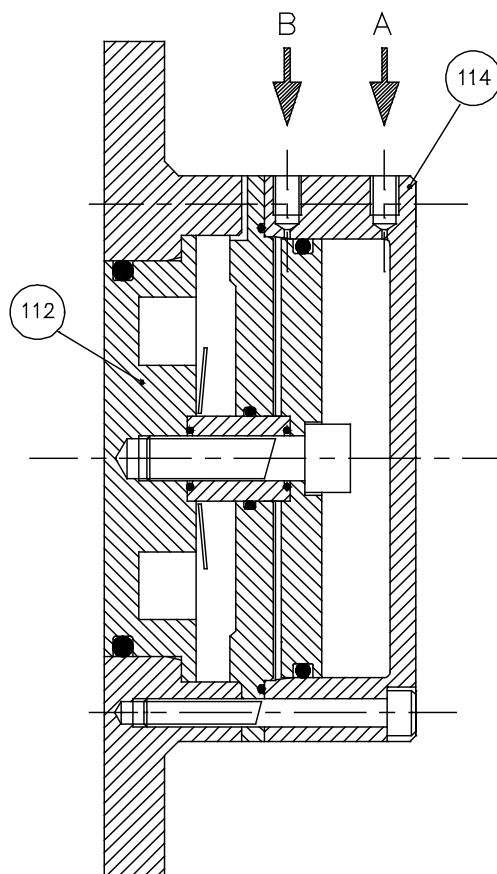


Fig 14 Air Loaded Integral Pressure Relief Valve with Air Lift CP10, CP20, CP30 and CP40.

4.0 Classic+ Disassembly and Assembly.



Before starting any work on the pump the recommended Shutdown Procedure should be followed, refer to section 3.5.



While disassembling 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 installed using suitable devices. Use threaded holes for the attachment of lifting eyes where appropriate.

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

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 gearbox assembly 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 replacing 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 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, be replaced.

All o-rings and sealing lips of lipseals should be lightly lubricated with an appropriate lubricant (suitable for application) before installing.

When installing lipseals do not allow the rear face to come into contact with bearings or other rotating parts.

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

WARNING

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 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 the 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 utilised and the necessary procedures are used to prevent component damage.

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

4.1 CP10, CP20 and CP30 Pump - Disassembly and Assembly.

4.1.1 CP10, CP20 and CP30 Front Cover and Rotor Removal

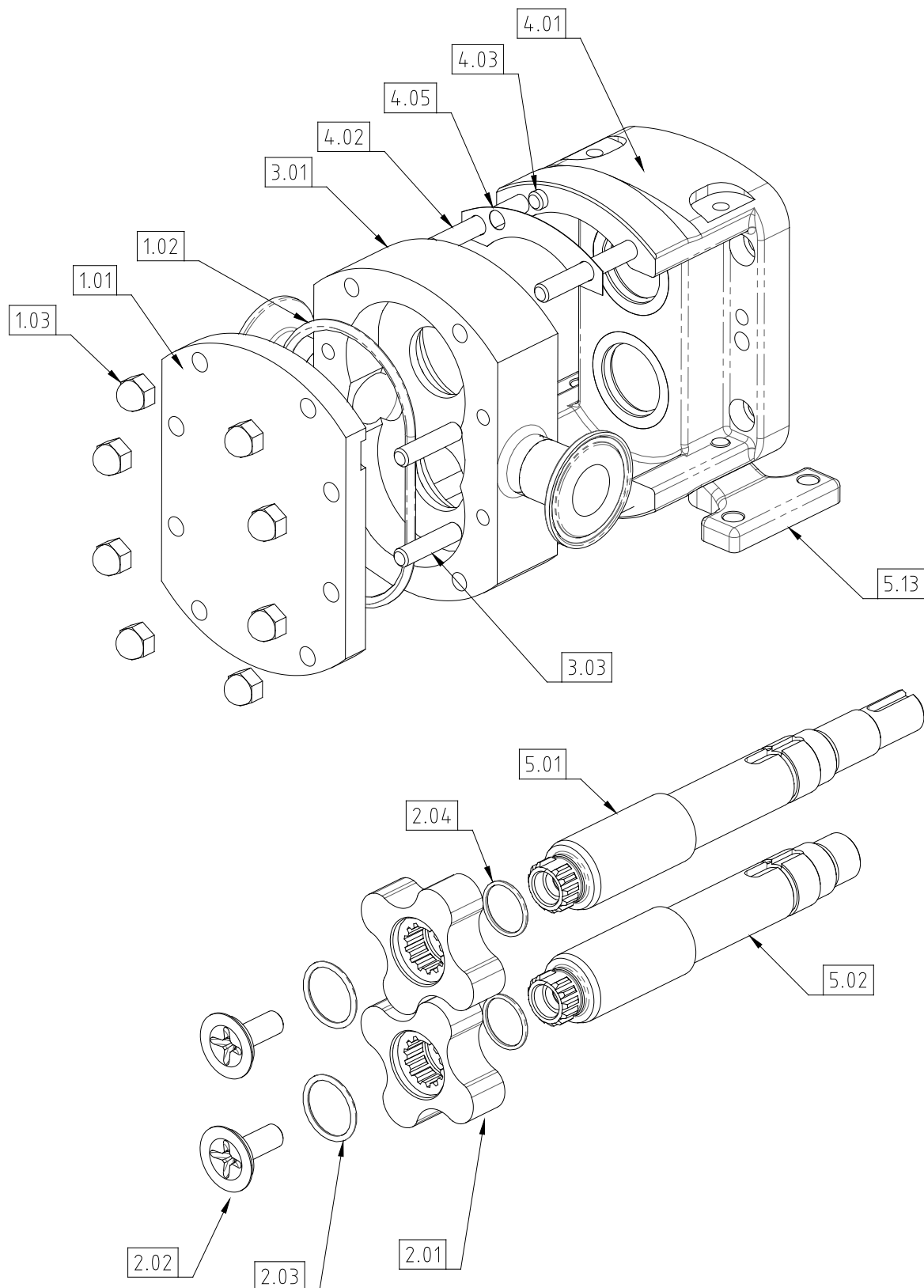


Fig 15 CP10 Exploded View of Rotorcase and Rotor Assembly

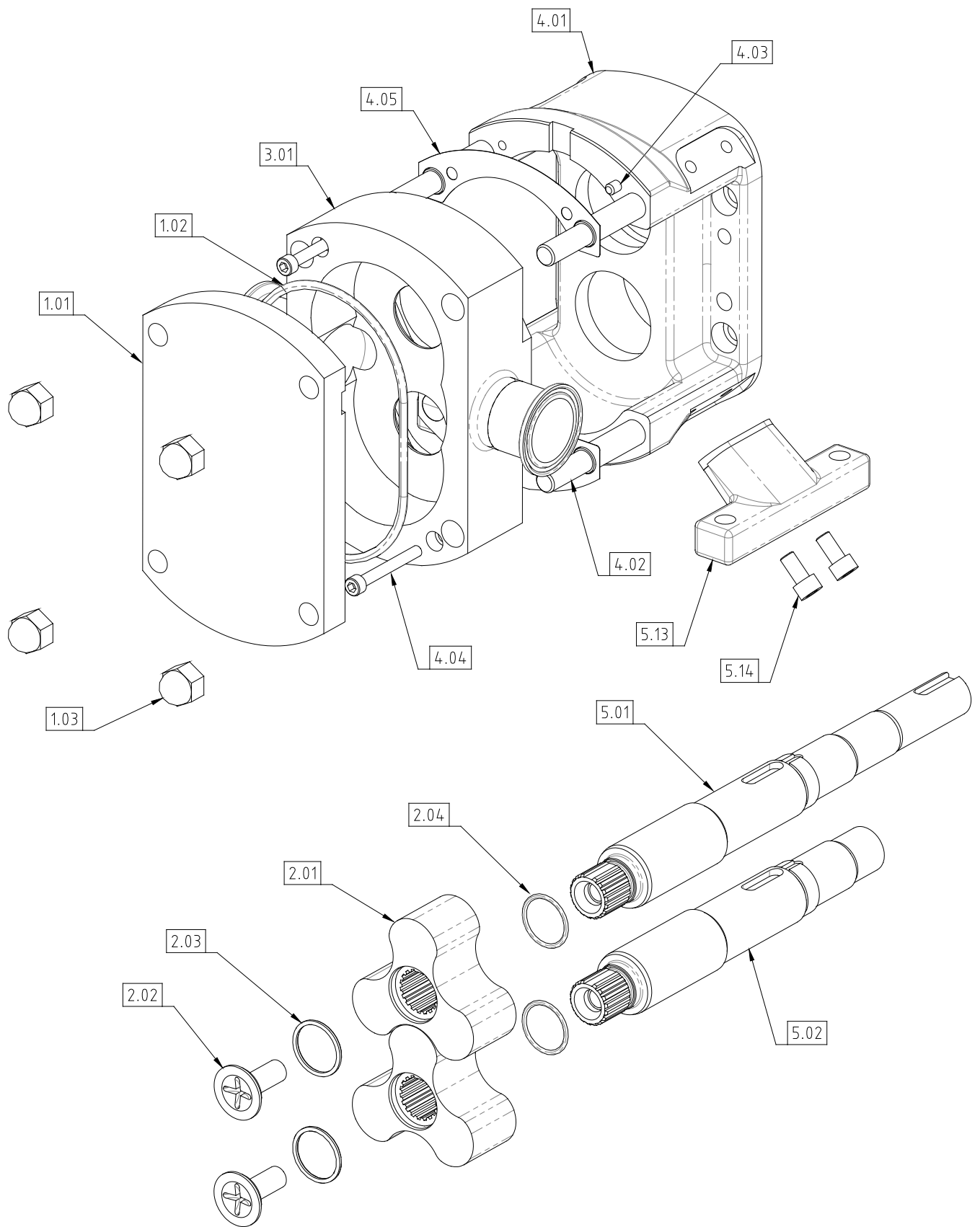


Fig 16 CP20 / CP30 Exploded View of Rotorcase and Rotor Assembly



- Follow recommended shutdown procedure. Refer to section 3.5.
- For CP10 Pump – refer to Fig 15.
- For CP20 Pump – refer to Fig 16.



- Gradually loosen front cover retaining dome nuts (1.03). Care should be taken as there may still be residual product and pressure in the pump head and as the dome nuts are loosened, this will vent to atmosphere.
- Remove dome nuts (1.03).

WARNING

Note: CP10 Pump Only - Do not rotate shafts at this stage as the rotorcase is held in place by the front cover retaining dome nuts (1.03).

- Failure to observe this will result in damage to the pump.
- Remove front cover (1.01) using lever slots where necessary and the front cover o-ring (1.02) or optional gasket (not shown).
- Remove rotor retainers' (2.02) with socket supplied (not shown).

WARNING

Note: The socket tool should always be used, the use of other tools may damage the retainer.

- Remove retainer o-rings (2.03).
- Remove rotors (2.01) from shafts (5.01 and 5.02).
- Remove rotor o-rings (2.04) – Not fitted on O-Ring seal version of CP10.

Note: If the pump is fitted with o-ring Seals (instead of mechanical seals) then the o-ring seal will now be visible – Chapter 6.0 for further information.

4.1.2 CP10, CP20 and CP30 Rotorcase Removal

WARNING

Note: Ensure all pipe work is disconnected before commencing rotorcase removal.

4.1.2.1 CP10, CP20 and CP30 Rotorcase Removal for Pumps fitted with Single Un-Flushed Mechanical Seals and Single O-Ring Seals

CP10 Pump Only

(After completing section 4.1.1)

- Slide rotorcase (3.01) from bearing housing (4.01), noting it is located on dowels (4.03), keep arch shims (4.05) in appropriate sets if they are to be reused.

CP20 and CP30 Pump Only

(After completing section 4.1.1)

- Remove rotorcase retention socket cap head screws (4.04) with appropriate metric allen key (not supplied).
- Slide rotorcase (3.01) from bearing housing (4.01), noting it is located on dowels (4.03), keep arch shims (4.05) in appropriate sets if they are to be reused.

Single Un-Flushed Mechanical Seal as shown in Fig 17.

- See section 5.2.1 for removal and section 5.2.2 for replacement.

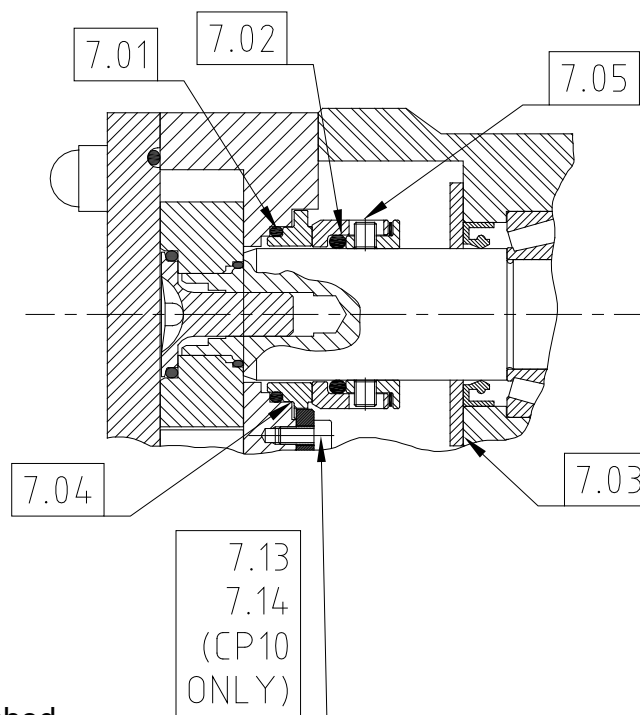


Fig 17 Single Un-flushed Mechanical Seal

Single O-Ring Seal as shown in Fig 18 – see section 6.2.1 for removal and replacement.

- Remove rotor (2.01).
- Remove O-Ring seal (7.04) from rotorcase (3.01).

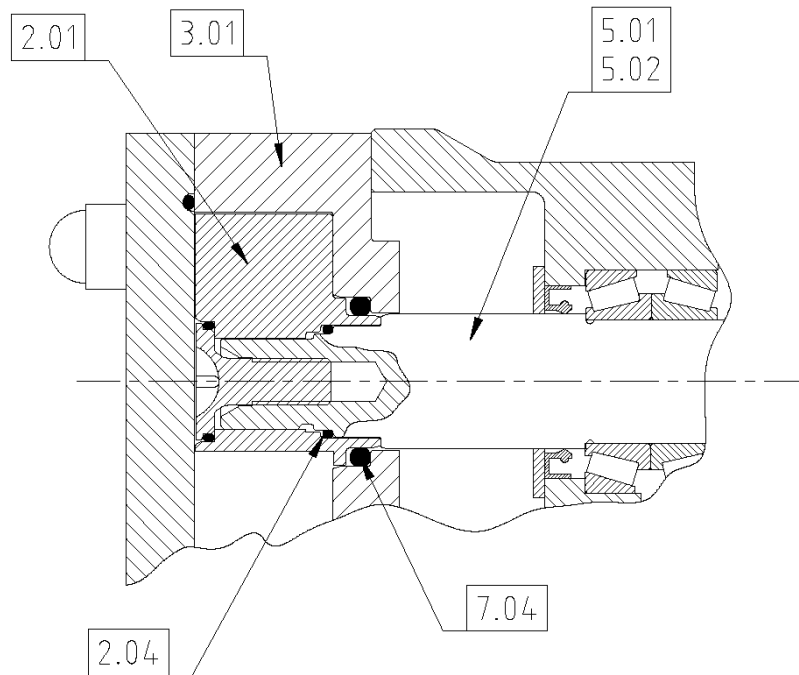


Fig 18 O-Ring Seal

4.1.2.2 CP10, CP20 and CP30 Rotorcase Removal for Pumps Fitted with Single Flushed or Double Flushed Mechanical Seals.

Prior to removal of rotorcase (3.01) for CP10, CP20 and CP30, remove seal housing screws (7.10) and separate housing (7.06) from rotorcase (3.01) noting it is located on dowels (7.09).

CP10 Pump Only

(After completing section 4.1.1) - see Fig 15.

- Slide rotorcase (3.01) from bearing housing (4.01), noting it is located on dowels (4.03), keep arch shims (4.05) in appropriate sets if they are to be reused.

CP20 and CP30 Only

(After completing section 4.1.1) - see Fig 16.

- Remove rotorcase retention socket cap head screws (4.04) with appropriate metric allen key (not supplied).
- Slide rotorcase (3.01) from bearing housing (4.01), noting it is located on dowels (4.03), keep arch shims (4.05) in appropriate sets if they are to be reused.

Single Flushed Mechanical Seal as shown in Fig 19.

- See section 5.2.3 for removal and section 5.2.4 for replacement.

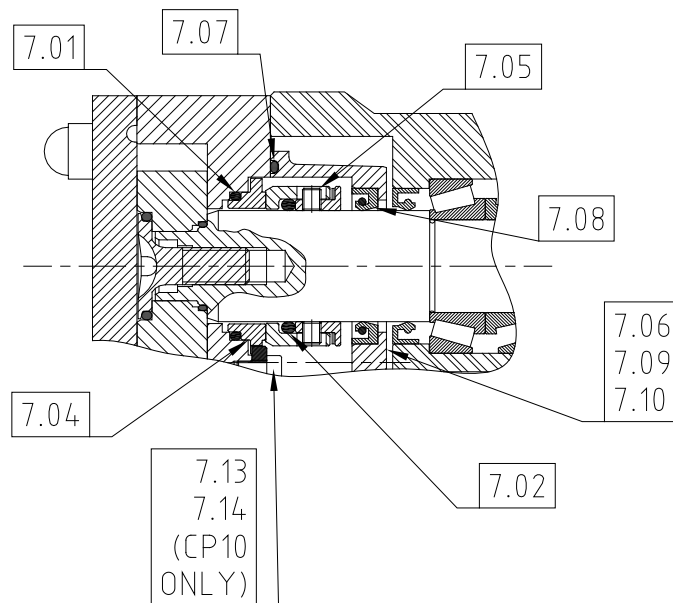


Fig 19 Single Flushed Mechanical Seal.

Double Flushed Mechanical Seal as shown in Fig 20 and Fig 21.

- CP10 Pump - see section 5.2.5 for removal and 5.2.6 for replacement.
- CP20 and CP30 Pumps – see section 5.2.7 for removal and 5.2.8 for replacement.

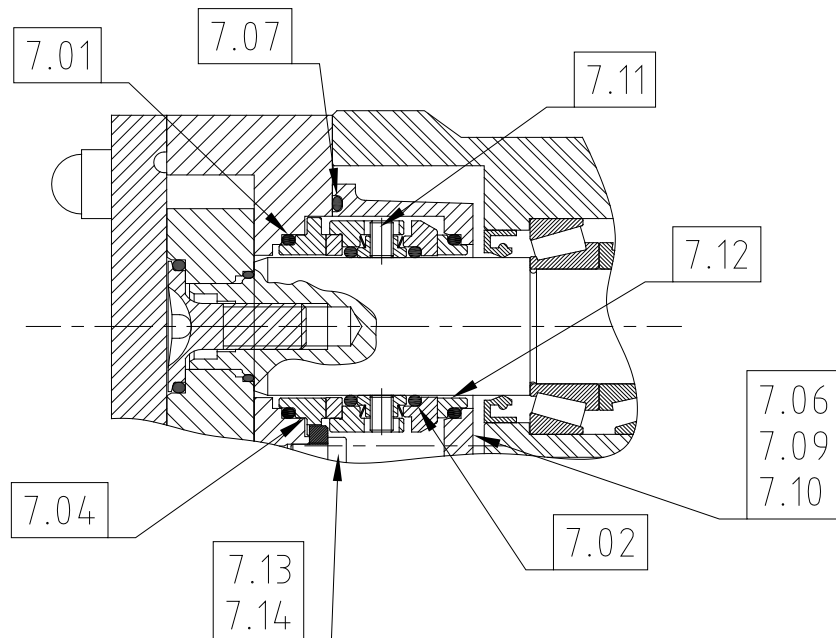


Fig 20 Double Flushed
Mechanical Seal – CP10

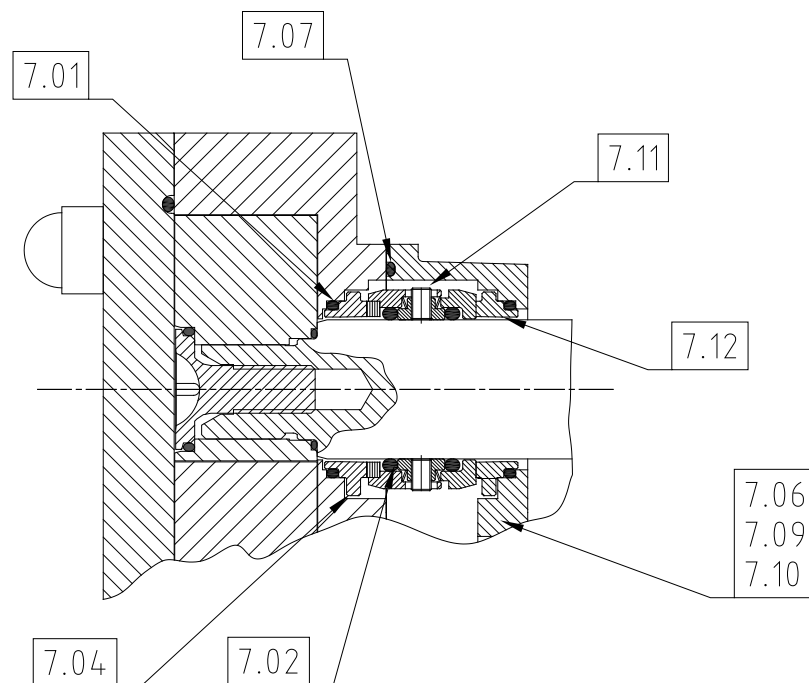


Fig 21 Double Flushed
Mechanical Seal – CP20 and CP30

4.1.3 CP10, CP20 and CP30 Gearbox Disassembly (After completing 4.1.1 or 4.1.2).

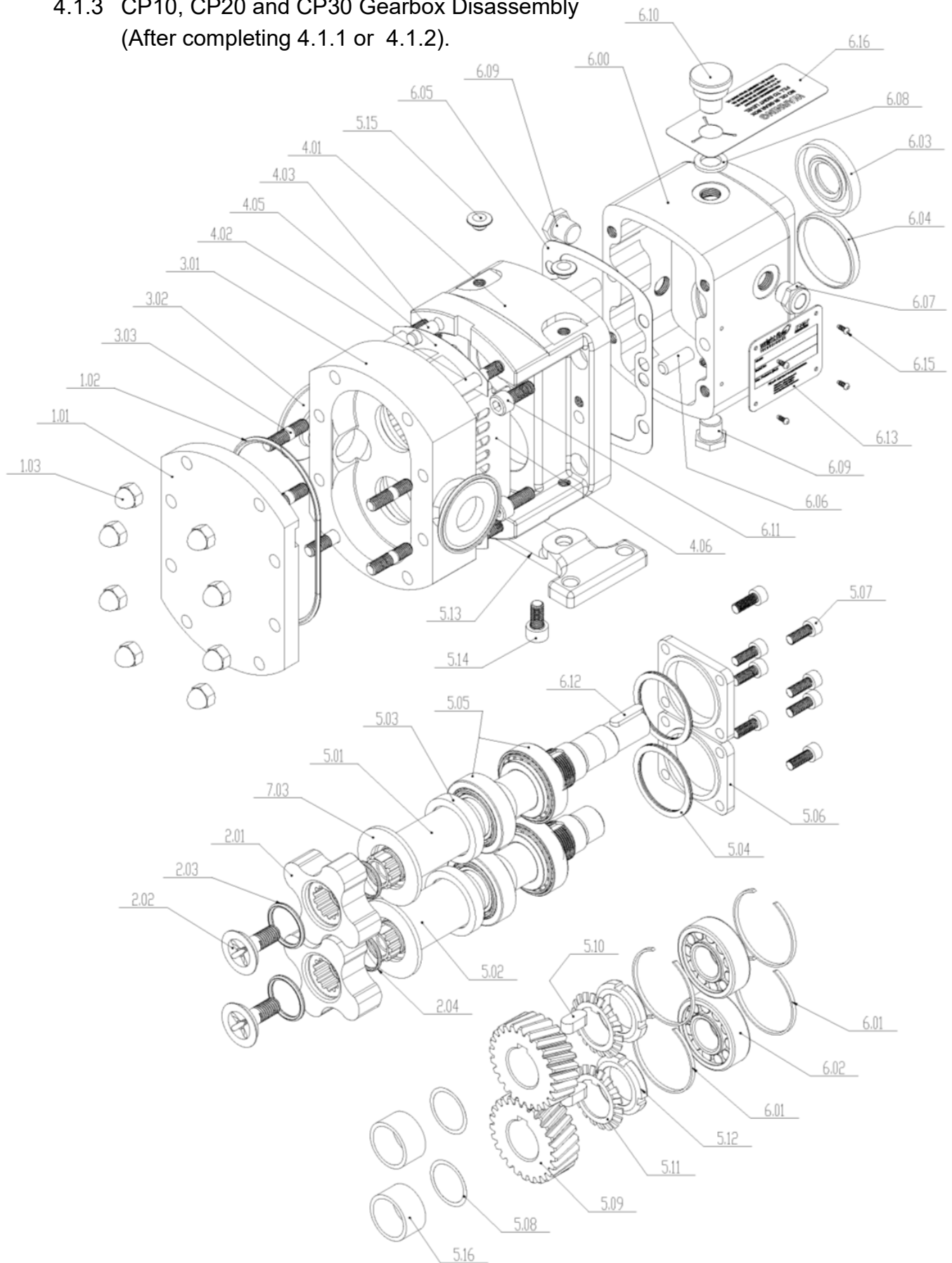


Fig 22 CP10 Component Parts

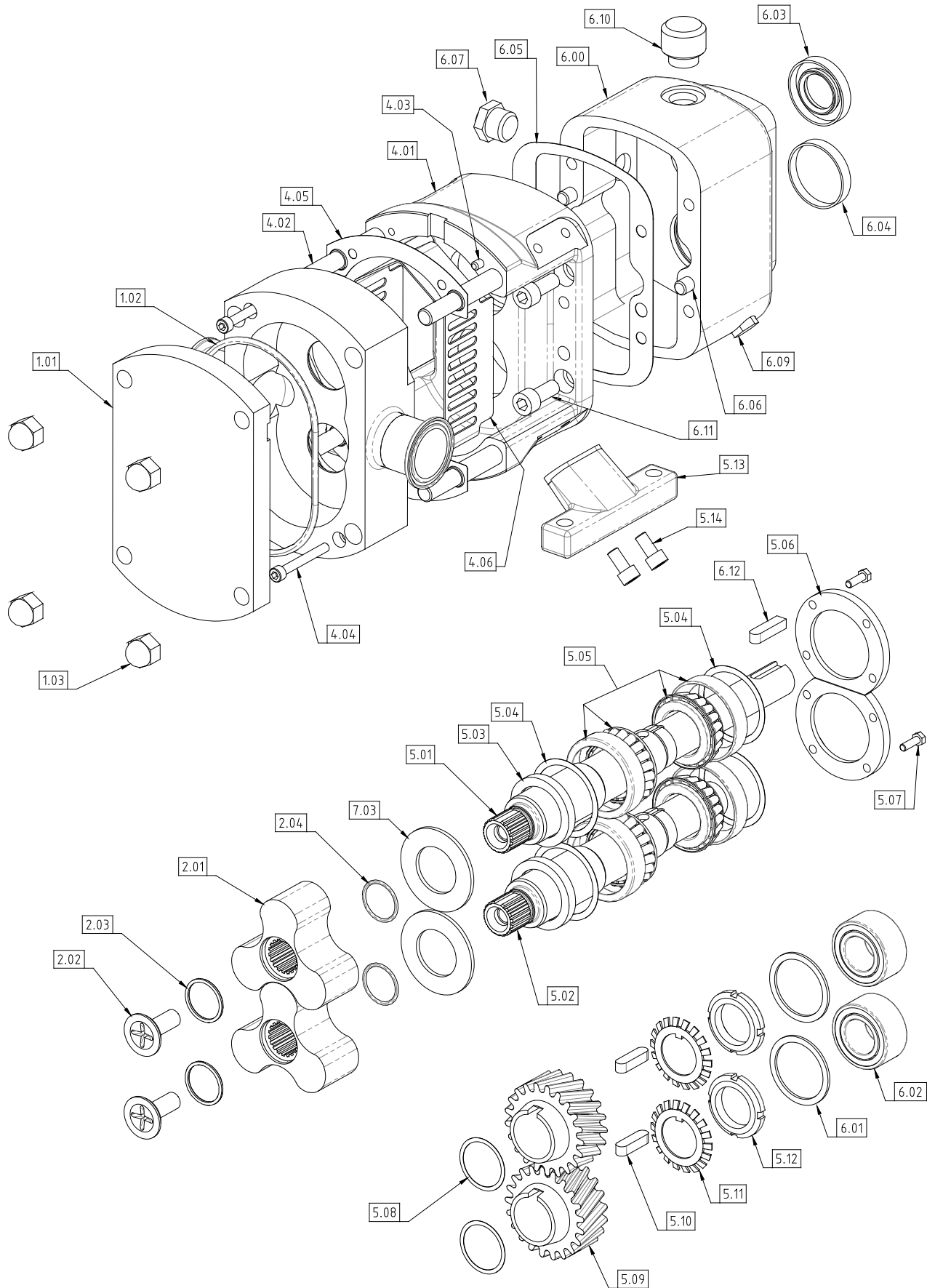


Fig 23 CP20 and CP30 Component Parts

Before starting disassembly of the gearbox remove product seals; refer to section 5.0 for Mechanical Seals, or section 6.0 for O-Ring seals.

The following procedure describes complete disassembly of the gearbox.

- Refer to Fig 22 for CP10; Refer to Fig 33 for CP20 and CP30.
- Remove guard (5.06).
- Remove drive key (6.12).
- Remove oil drain plug (6.09) and breather (6.10), drain oil into suitable container and retain if later inspection is required.
- Remove screws (6.11) and separate gearbox cover (6.00) from bearing housing (4.01). The gearbox cover (6.00) is located on dowels (6.06)

Note: The bearing housing (4.01) is provided with two jacking holes (tapped M8 on CP10; M10 on CP20; M12 on CP30), which can be used to separate the gearbox cover (6.00) from the bearing housing (4.01).

- Remove gasket (6.05) from gearbox cover (6.00) or bearing housing (4.01) depending upon which part the gasket is adhered to.
- Remove oil seal (6.03) and blanking cap (6.04) from gearbox cover (6.00).
- Remove retaining rings (6.01) from gearbox cover (6.00) and press out bearing outer rings (6.02).
- Remove bearing inner ring (6.02) from shafts (5.01 and 5.02).
- **CP10 & CP20 Pumps Only** - Remove lock nuts (5.12) and tab washers' (5.11).
- **CP30 Pumps Only** – Loosen locking screws from and lock nuts (5.12).
- Remove timing gears (5.09) and gear keys (5.10).
- **CP10 Pumps Only**
Remove shims (5.08) and spacers (5.16), keep shims and spacers in sets and identify position.
- **CP30 Pumps Only**
Remove shims (5.08) in sets and identify position
- Remove screws (5.07) and retainers (5.06) from bearing housing (4.01).

- Remove shafts (5.01 and 5.02) from bearing housing (4.01). Shafts (5.01 and 5.02) will be complete with bearings (5.05) and shims (5.04), keep shims in sets and identify position.
- Remove oil seals (5.03) from bearing housing (4.01).
- Remove bearing cups (5.05) and any associated shims (5.04) from bearing housing (4.01), keep bearing cups (5.05) and shims (5.04) in sets and identify position.
- Remove bearing cones (5.05) from shafts (5.01 and 5.02).

4.1.3 CP10, CP20 and CP30 Gearbox Assembly

Refer to Fig 22 for CP10 or Fig 23 for CP20 and CP30.

- Install bearing cones (5.05) to shafts (5.01 and 5.02) ensuring they locate against shaft shoulder. The cones are installed as shown in Fig 24.

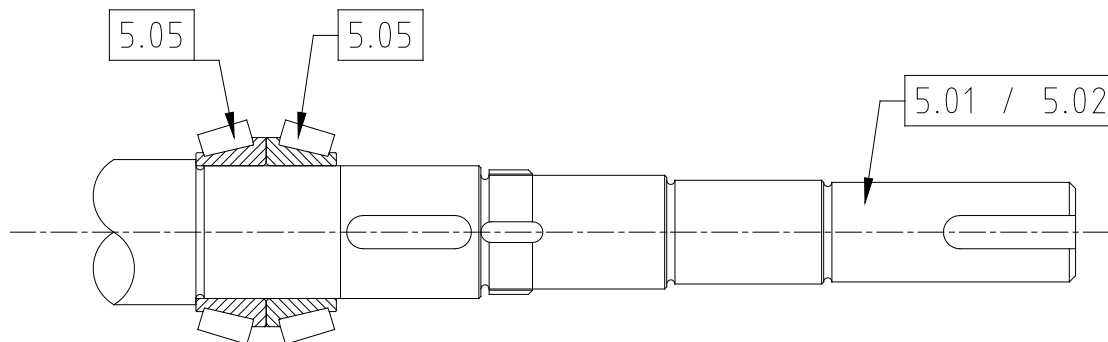


Fig 24 Installation of bearing cones onto shafts

- Install two bearing cups (5.05) to bearing housing (4.01).
- Install shafts (5.01 and 5.02) in bearing housing (4.01).
- Install remaining bearing cups (5.05), shims (5.04) to nominal value of 0.60mm (0.024"), retainers (5.06) and secure with screws (5.07) tightened to correct torque refer to section 8.2.
- Using a torque wrench, check the rolling torque of each shaft assembly, referring to section 8.2. If necessary, adjust amount of shim (5.04), either by adding shim (5.04) to increase rolling torque or removing shim (5.04) to decrease rolling torque, until correct rolling torque has been achieved. If shim (5.04) is adjusted ensure screws (5.07) are tightened to correct torque before final check of rolling torque.
- Install rotors (2.01) on to shafts (5.01 and 5.02) with rotor retainers (2.02).

WARNING

Note: The socket tool (not shown) should always be used, the use of other tools may damage the retainer.

- Using a depth micrometer or similar device measure any difference (X) in rotor front face alignment, see Fig 25. If a difference is found move shims (5.04) of thickness equal to the difference (X) from beneath the forward rotor's bearing retainer (5.06) and reposition under the front bearing (5.05) cup.
- After adjusting shim (5.04) check rotor front face alignment and rolling torque.
- Remove rotor retainers' (2.02) and rotors (2.01).
- **CP10 Pumps Only**
Install spacers (5.16) and gear keys (5.10) to shafts (5.01 and 5.02).
- **CP20 and CP30 Pumps Only**
Install gear keys (5.10) to shafts (5.01 and 5.02).

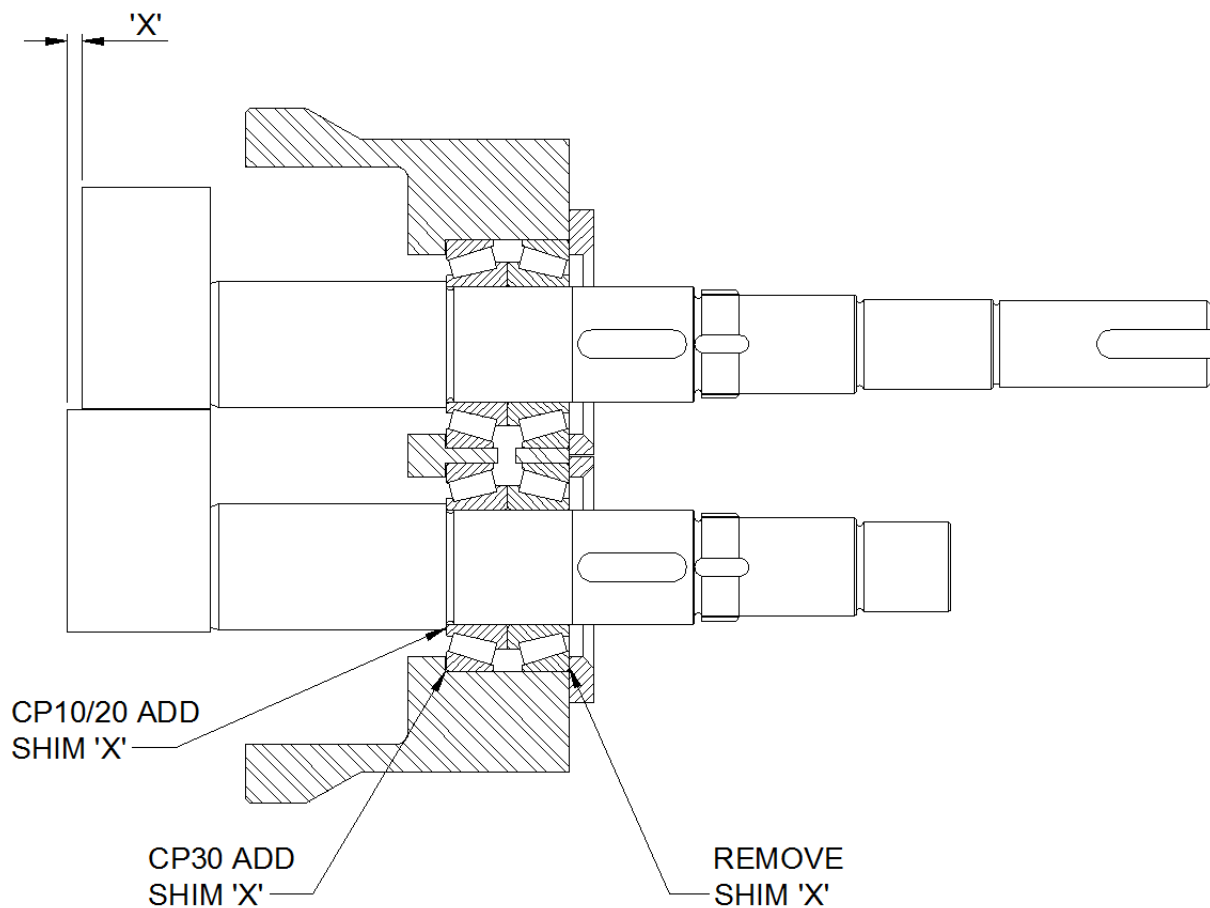


Fig 25 Rotor / Bearing abutment setting.

- **CP10 Pumps Only**

Timing marks and gear marks 'D' and 'L' on gears (5.09) should be visible when viewed on the drive end of the drive shaft.

- **CP20 and CP30 Pumps Only**

Timing marks and gear marks 'D' and 'L' on gears (5.09) should be visible when viewed on the drive end of the shafts (5.01 and 5.02), and the tapered shoulder on the gear (5.09) should face the bearings (5.05).

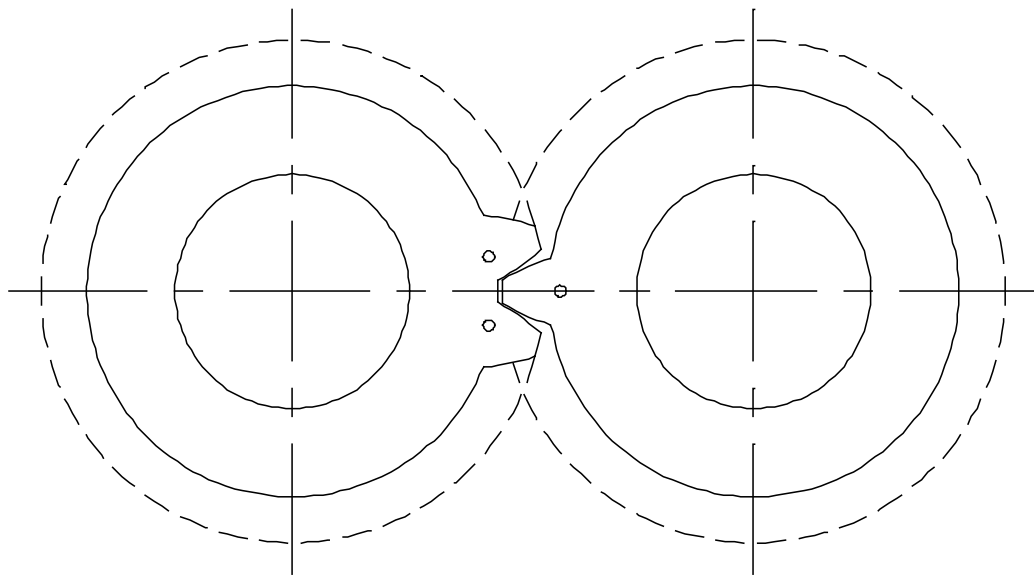


Fig 26 Timing marks on gears

- Install gears (5.09) to shafts (5.01 and 5.02). Gear marked 'D' should be installed to drive shaft (5.01). Gear marked 'L' should be installed to lay shaft (5.02) ensuring correct alignment of timing marks, see Fig 26.

- **CP10 and CP20 Pumps Only**

Install tab washers (5.11) and lock nuts (5.12) tightened to correct torque, refer to section 8.2. Do not secure tab washers (5.11).

- **CP30 Pumps Only**

Install locknuts (5.12) and tighten to correct torque (refer to section 8.2). Install, but do not tighten lock-screws (5.12) which are fitted in the locknuts (5.12).

- Install rotors (2.01) and rotor retainers (2.02)
- Check mesh clearance against the Clearance Chart (refer to section 8.1).
- To adjust mesh clearance shims (5.08) will need to be inserted between the spacer (5.16) and the gear (5.09). As a guide for a mesh clearance change of one unit (say 0.1mm or 0.004"), shims (5.08) of four units' thickness (say 0.4mm or 0.016") need to be inserted. Further, for clockwise movement of the rotor (when viewed from the rotor end) insert shim (5.08) in between the spacer (5.16) on the CP10; or bearing (5.05) on the CP20 and CP30; and the gear (5.09) having a right hand helix, and vice versa, see Fig 27.
- Having installed shim (5.08) ensure lock nuts (5.12) are tightened to correct torque (refer to section 8.2), before checking mesh clearance (refer to section 8.1).
- **CP10 and CP20 Pumps Only.**
Having achieved optimum mesh clearances the tab washers' (5.11) can be secured.
- **CP30 Pump Only.**
Having achieved optimum mesh clearances the lock screws in the locknuts (5.12) can be secured.

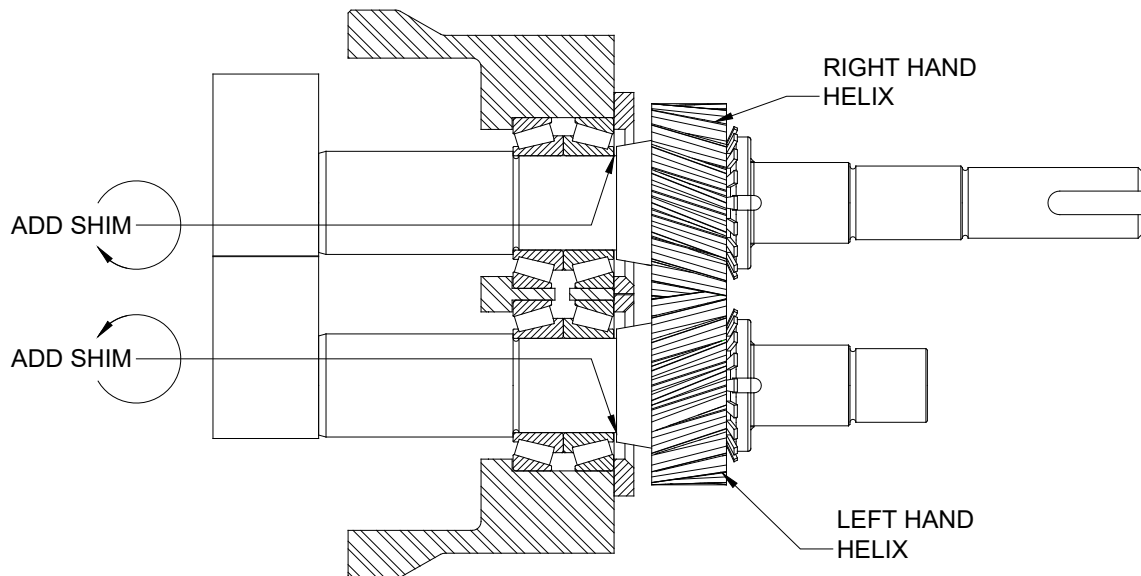


Fig 27 Preload setting

- Remove rotor retainers' (2.02) and rotors (2.01).
- Install bearing (6.02) inner races to shafts (5.01 and 5.02), positioning against shoulder on shaft.

- Install inner retaining rings (6.01), bearing (6.02) outers, outer retaining rings (6.01), lipseal (6.03), blanking cap (6.04), filler plug (6.10), sight glass (6.07) and drain plug (6.09) to cover (6.00).
- Install cover (6.00) to bearing housing (4.01) with gasket (6.05), locating on dowels (6.06), and secure with screws (6.11) tightened to correct torque, refer to section 8.2.

4.1.4 CP10, CP20 and CP30 Rotorcase, Rotor and Front Cover Assembly

- see Fig 15 for CP10.
- see Fig 16 for CP20 and CP30.
- Install rotorcase (3.01) to bearing housing (4.01) locating on dowels (4.03).
- **CP10 Pump Only.**
Secure rotorcase (3.01) in position with nuts (1.03) using four temporary spacers (12mm long x 9mm bore or 0.472" long x 0.354" bore).
- **CP20 and CP30 Pumps Only.**
Secure rotorcase (3.01) in position with socket cap head screws (4.04) using appropriate metric allen key (not supplied), tightened to correct torque, refer to section 8.2. For additional clamping whilst checking the clearances clamp the rotorcase on the opposite corners to the socket cap screws using washers (not supplied) and nuts (1.03).

WARNING

Note: The rotorcase must be clamped in position as above to enable front and rear rotor clearances to be checked.

- Install rotors (2.01) to shafts (5.01 and 5.02) with retainers (2.02).
- Using a depth micrometer or similar device measure front clearance (refer to section 8.1 Clearance Chart) between the rotorcase and rotor front faces and check that this corresponds to the appropriate clearance as indicated on the Clearance Chart.
- To adjust front clearance, remove rotors (2.01) and rotorcase (3.01) and insert arch shims (4.05) between the rotorcase (3.01) and bearing housing (4.01).

WARNING

Note: It is essential that the thickness of arch shim (4.05) inserted is the same at both the top and bottom of the rotorcase (3.01).

- Install product seals; refer to section 5.0 or 6.0.
- Install guard (5.06).
- Install rotorcase (3.01) securing in position with temporary spacers (CP10) or socket cap head screws, washers and nuts (CP20 and CP30) as before.

- Install rotors (2.01) with o-rings (2.03 and 2.04) and retainers (2.02) tightened to correct torque, refer to section 8.2, using socket tool (not shown).
- Check all rotor clearances i.e. front, rear, top/bottom, sides' and mesh. (Refer to section 8.1 Clearance Chart.)
- **CP10 Pump Only.**
Remove temporary spacers retaining rotorcase (3.01).
- **CP10, CP20 and CP30 Pumps Only.**
Install front cover (1.01) with o-ring (1.02) or gasket and secure with nuts (1.03) tightened to correct torque, refer to section 8.2.

4.2 CP40 Pumps - Disassembly and Assembly

4.2.1 CP40 Front Cover and Rotor Removal

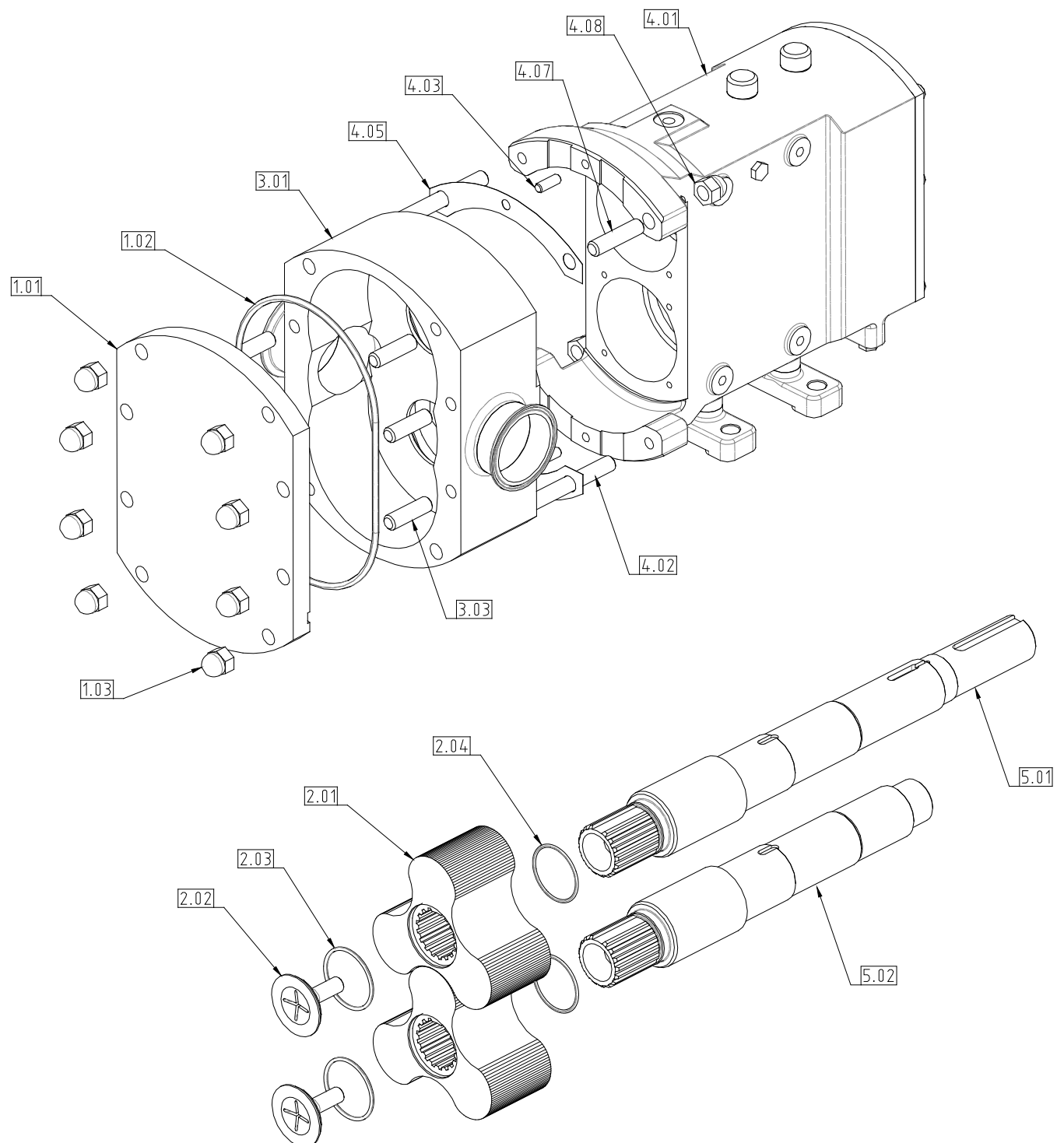


Fig 28 Front Cover and Rotorcase Removal for CP40



Follow recommended shutdown procedure - refer to section 3.5.

- Refer to Fig 28.



- Gradually loosen front cover retaining dome nuts (1.03). Care should be taken as there may still be residual product and pressure in the pump head and as the dome nuts are loosened, this will vent to atmosphere.
- Remove dome nuts (1.03).
- Remove front cover (1.01), using lever slots as necessary.
- Remove front cover o-ring (1.02).
- Remove rotor retainers' (2.02) with socket (not shown).

Note: The socket tool supplied (not shown) should always be used to remove the retainer. The use of other tools may damage the retainer.

- Remove retainer o-rings (2.03).
- Remove rotors (2.01) from shafts (5.01 and 5.02).
- Remove rotor o-rings (2.04).

4.2.2 CP40 Rotorcase Removal

WARNING

Note: Ensure all pipe work is disconnected before commencing rotorcase removal.

4.2.2.1 CP40 Rotorcase Removal for Pumps fitted with Single Un-flushed Mechanical Seals and O-Ring Seals (After completing 4.2.1)

- Remove dome nuts (4.08) fastening rotorcase (3.01) to gearbox (4.01).

Single Un-flushed Mechanical Seal for CP40 - see Fig 29 and sections 5.2.1 for removal and section 5.2.2 for replacement.

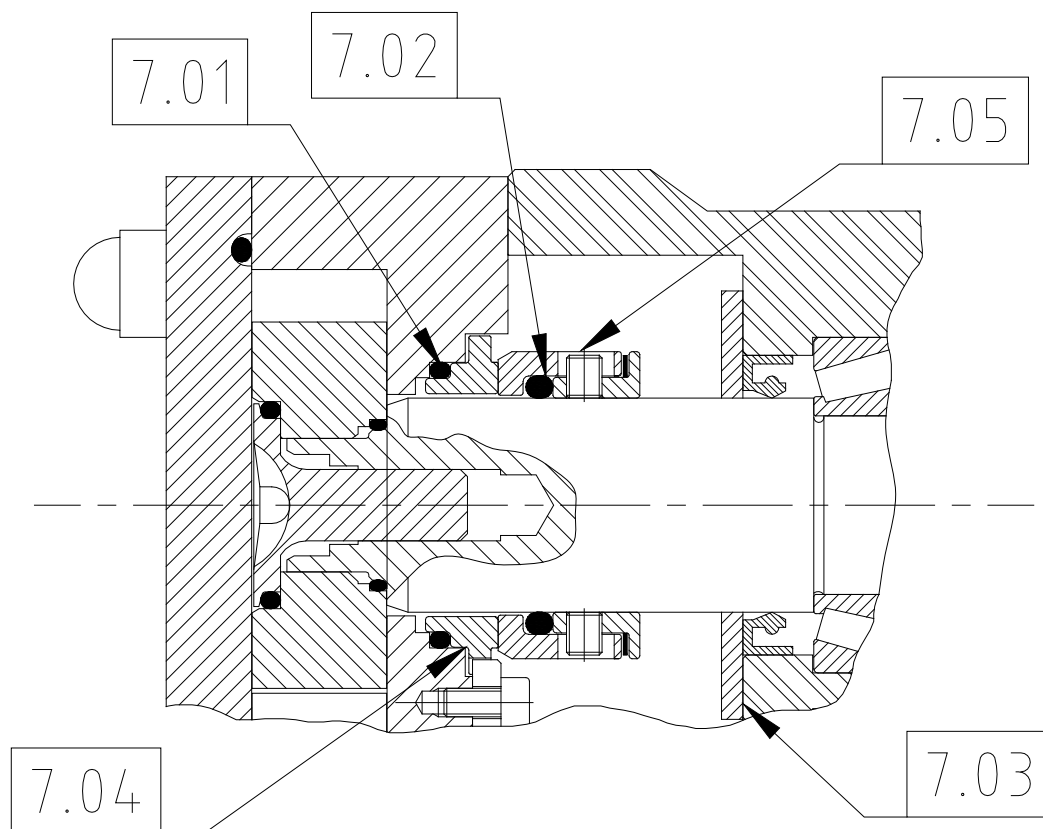


Fig 29 Single Un-Flushed Mechanical Seal – CP40

- Slide rotorcase (3.01) from gearbox (4.01) noting it is located on dowels (4.03), keep arch shims (4.05) in appropriate sets if they are to be reused.

Single O-Ring Seal as shown in Fig 30 – see section 6.2.1 for removal and replacement.

- Remove O-Ring seal (7.04) from rotorcase (3.01).

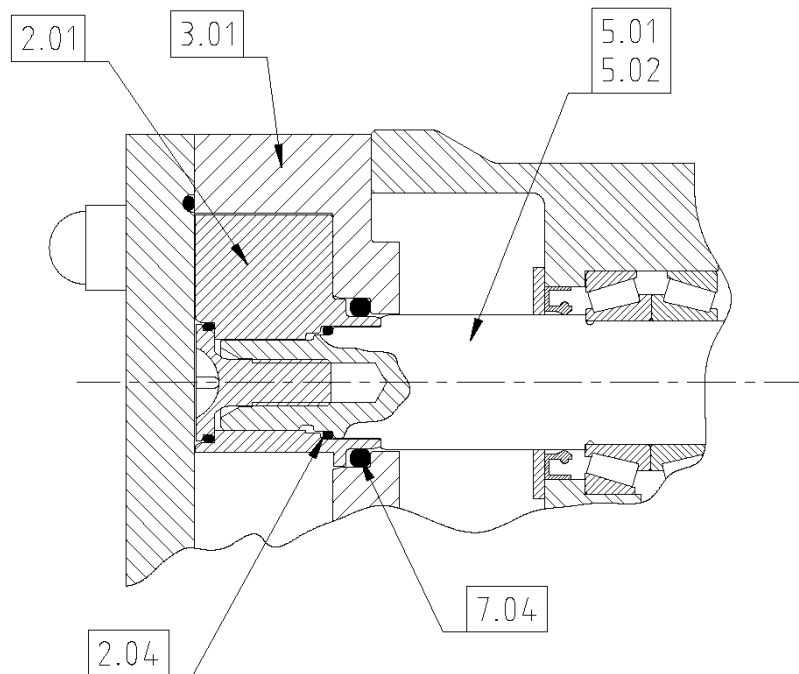


Fig 30 O-Ring Seal

- Slide rotorcase (3.01) from gearbox (4.01) noting it is located on dowels (4.03), keep arch shims (4.05) in appropriate sets if they are to be reused.

4.2.2.2 CP40 Rotorcase Removal for Pumps Fitted with Single Flushed or Double Flushed Mechanical Seals.

- Prior to removal of rotorcase (3.01) remove seal housing screws (7.10) and separate housing (7.06) from rotorcase (3.01) noting it is located on dowels (7.09).
- Slide rotorcase from bearing housing (4.01), noting it is located on dowels (4.03), keep arch shims (4.05) in appropriate sets if they are to be re-used

Single Flushed Mechanical Seal as shown in Fig 31 and see sections 5.2.3 for removal and 5.2.4 for replacement.

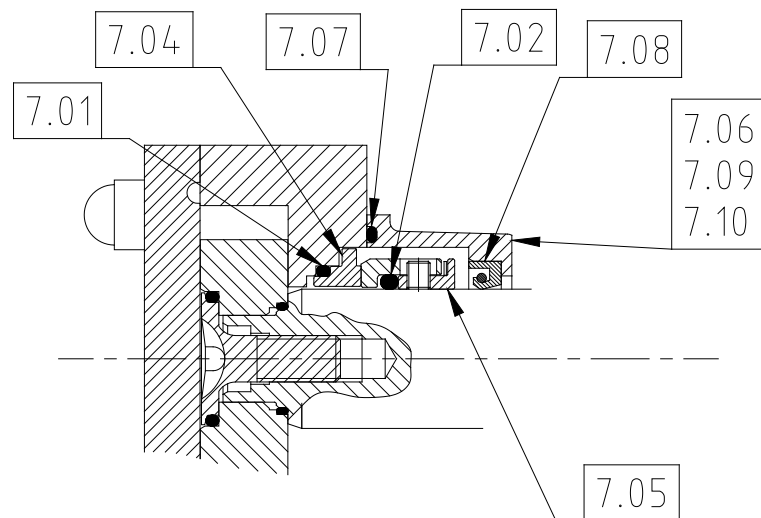


Fig 31 – Single Flushed Mechanical Seal – CP40

Double Flushed Mechanical Seal as shown in Fig 32 and see section 5.2.7 for removal and 5.2.8 for replacement.

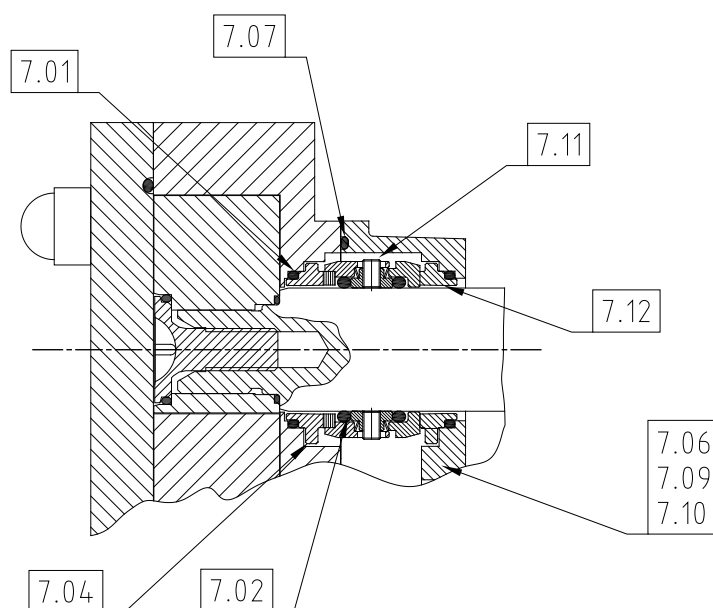


Fig 32 – Double Flushed Mechanical Seal – CP40

4.2.3 CP40 Gearbox Disassembly

(After completing 4.3.1 and 4.3.2) - see Fig 33

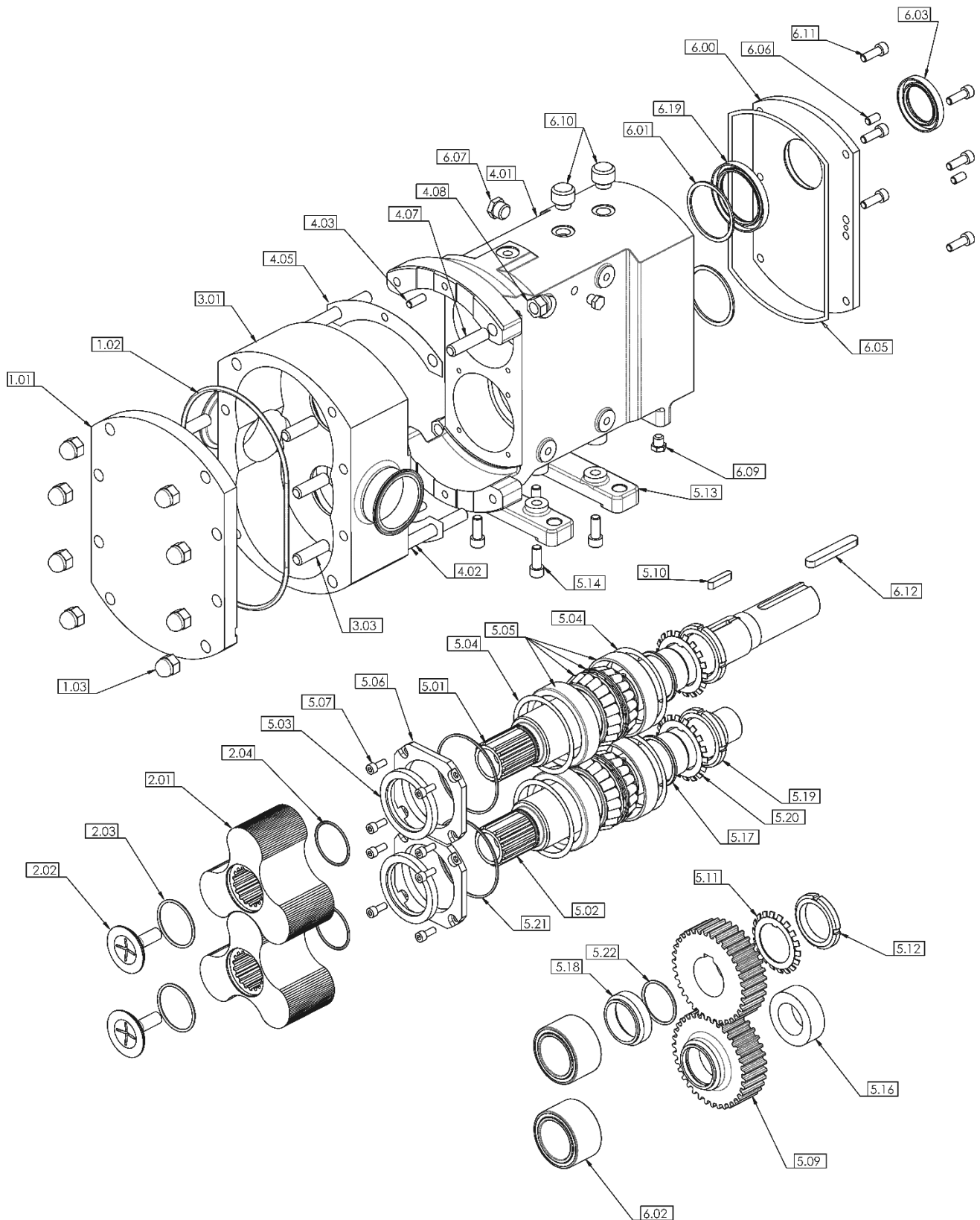


Fig 33 CP40 Components

Before proceeding with disassembly of the gearbox remove product seals; refer to sections 5.0 for Mechanical Seals or section 6.0 for O-Ring seals.

The following procedure describes complete disassembly of the gearbox, refer to Fig 33.

- Remove drive key (6.12), oil drain (6.09) and breather plugs (6.10), drain oil into suitable container and retain if later inspection is required.
- Remove screws (6.11) and gearbox cover (6.00). The gearbox cover (6.00) is located on dowels (6.06) and sealed with suitable liquid sealer.
- Remove oil seal (6.03) from gearbox cover (6.00).
- Loosen by 2 full turns all screws in retainer (5.16). Once this is done, the retainer may release its grip. If it does not become free, remove the two screws, which differ in colour (these may also have a washer under the head). Once these screws are removed, tapped holes will be revealed. Insert two jacking M8 x 40 setscrews into the tapped holes and tighten until the retainer's grip is broken. Remove the retainer.
- Remove lock nut (5.12) and tab washer (5.11).
- Remove timing gears (5.09), gear key (5.10), o-ring (5.22), spacer (5.18) and lipseal (6.19).
- Support pump with shafts in the vertical position with rotor end up.
- Remove guard (4.06) and slingers (7.03) – (only fitted on single un-flushed mechanical and single oring seal pumps).
- Remove screws (5.07).
- Remove bearing retainers' (4.01), o-rings (5.21) and shims (5.04), keep shims (5.04) in sets and identify position.
- Remove lipseals (5.03) from bearing retainers' (5.06).
- Remove shafts (5.01 and 5.02) from gearbox (4.01). Shafts (5.01 and 5.02) will be complete with bearings (5.05), spacers (5.18), lock nuts (5.19), lock washers (5.20) and bearing inner races (6.02).
- Remove bearing cups (5.05) from gearbox (4.01), keep any further shims (4.05) in sets and identify position.
- Remove lock nuts (5.19), lock washers (5.19), spacers' (5.18) and bearing cones (5.05) from shafts (5.01 and 5.02).
- Remove retaining rings (6.01) and bearing outers (6.02) from gearbox (4.01).

4.2.4 CP40 Gearbox Assembly

Refer to Fig 33.

- Install bearing cones (5.05) to shafts (5.01 and 5.02) ensuring they locate against the shaft shoulder. The cones are installed as shown in Fig 34.

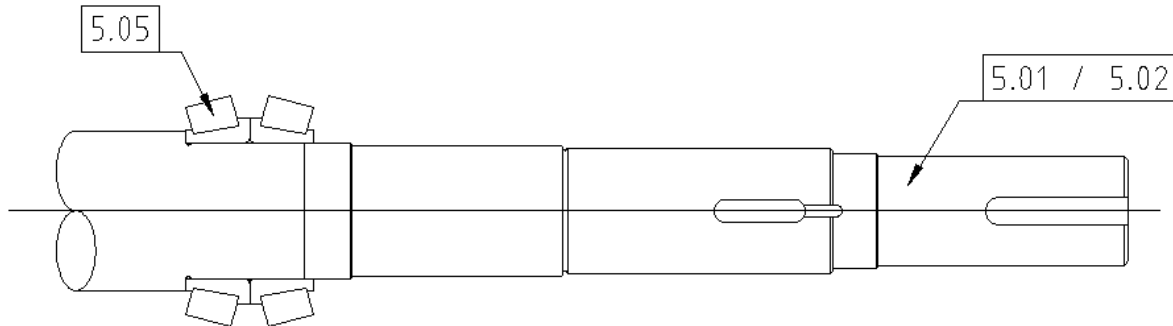


Fig 34 Installation of Bearing cones onto shafts

- Install spacers (5.17), tab washers (5.20) and lock nuts (5.14) to shafts (5.01 and 5.02) tightening to correct torque, refer to section 8.2. Secure tab washers.
- Install bearing (6.02) inner races to shafts (5.01 and 5.02) positioning against shoulder on shaft.
- Install bearing (6.02) outer races and retaining rings (6.01) to gearbox (4.01).
- Install two bearing cups (5.05) to gearbox (4.01).
- Support gearbox (4.01) in a vertical position and install shafts (5.01 and 5.02) to gearbox (4.01).
- Install remaining bearing cups (5.05), shims (5.04) to nominal value of 0.6mm (0.024"), o-rings (5.21), retainers (5.06) and secure with screws (5.07) tightening to correct torque, refer to section 8.2.
- Using a torque wrench, check rolling torque of each shaft assembly, refer to section 8.2, if necessary adjust amount of shim (5.04) either by adding shim (5.04) to increase rolling torque or removing shim (5.04) to decrease rolling torque until correct rolling torque has been achieved. If shim is adjusted ensure screws (5.07) are tightened to correct torque before final check of rolling torque.
- Install rotors (2.01) onto shafts (5.01 and 5.02) with rotor retainers (2.02).

WARNING

Note: The socket tool (not shown) should always be used to remove the retainer. The use of other tools may damage the retainer.

- Using a depth micrometer or similar device measure any difference (X) in rotor front face alignment, see Fig 35. If a difference is found move shims (5.04) of thickness equal to the difference (X) from beneath the lower rotors bearing retainer (5.06) and reposition under the front bearing (5.05) cup.

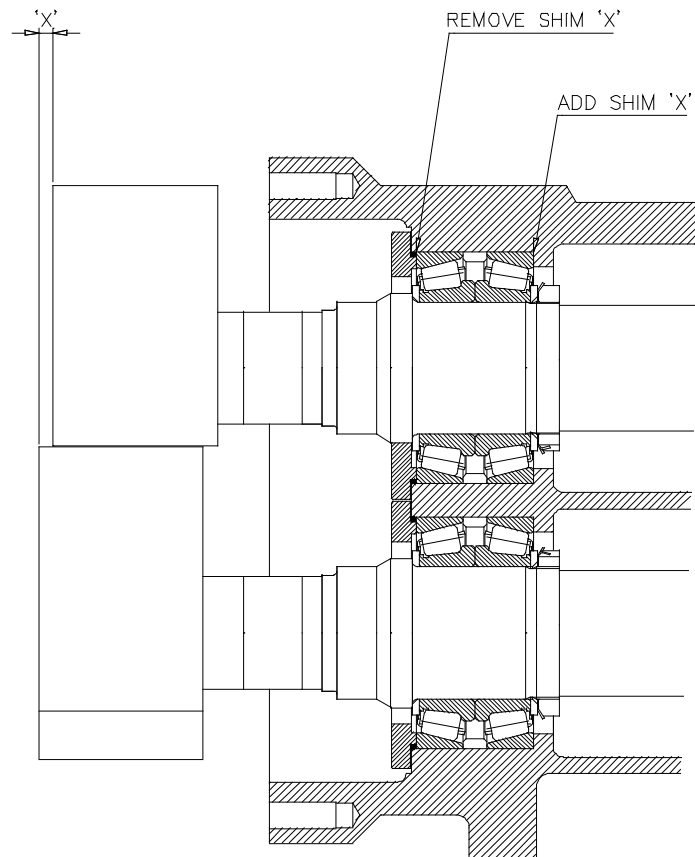


Fig 35 Rotor face alignment.

- After adjusting shim (5.04) check rotor front face alignment and rolling torque.
- Remove rotor retainers' (2.02) and rotors (2.01).
- Install lipseals (5.03) to bearing retainers' (5.06).
- Return pump to normal horizontal mounting position.
- Install lipseal (6.19) to gearbox (4.01). Install spacer (5.18) and o-ring (5.22) to drive shaft (5.01). Install gear key (5.10) to drive shaft (5.01).
- Install timing gears (5.09) to shafts (5.01 and 5.02).
- Install tab washer (5.11) and lock nut (5.12) tightening to correct torque - refer to section 8.2. Secure tab washer (5.11).
- Rotate shafts (5.01 and 5.02) so as to position the gaps made by the missing splines in the vertically uppermost positions, see Fig 36.

- Lubricate retainer (5.16) with oil and mount to timing gear (5.09). Do not tighten.

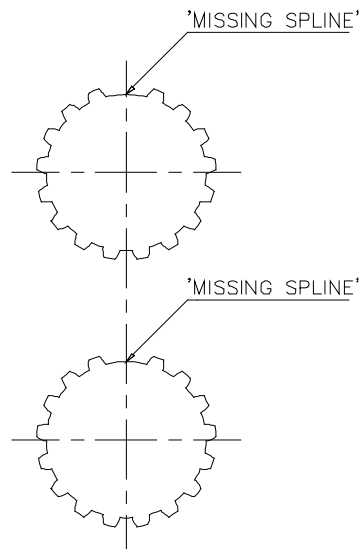


Fig 36 Missing spline alignment.

- Install rotors (2.01) and rotor retainers (2.02) to shafts (5.01 and 5.02).
- Check rotor mesh clearance against Clearance Chart - refer to section 8.1. To adjust the mesh clearance rotate shafts (5.01 and 5.02). Having achieved optimum mesh clearance, retainer (5.16) can be tightened to correct torque, refer to section 8.2, taking note of typical tightening sequence, see Fig 37.

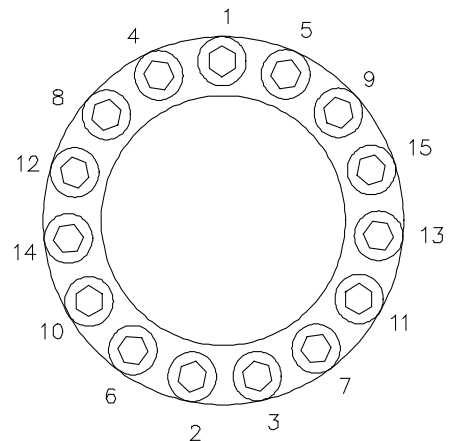


Fig 37 Retainer tightening sequence

- After tightening of retainer (5.16) check mesh clearance, refer to section 8.1, Clearance Chart.
- Remove rotors (2.01) and retainers (2.02).
- Install oil seal (6.03) to gearbox cover (6.00).
- Install gasket (6.05) to gearbox cover (6.00) and install to gearbox (4.01), locating on dowels (6.06) and securing with screws (6.11), tightened to correct torque, refer to section 8.2.

4.2.5 CP40 Rotorcase, Rotor and Front Cover Assembly

- Fit shaft slingers and guard (if fitted, depending upon seal configuration).
- Install rotorcase (3.01) to gearbox (4.01) locating on dowels (4.03) and secure with nuts (4.08) tightened to correct torque, refer to section 8.2.
- Install rotors (2.01) and rotor retainers (2.02). Using a depth micrometer or similar device measure front clearance (refer to section 8.1, Clearance Chart), between the rotorcase and rotor front faces and check that this corresponds to the appropriate clearance.

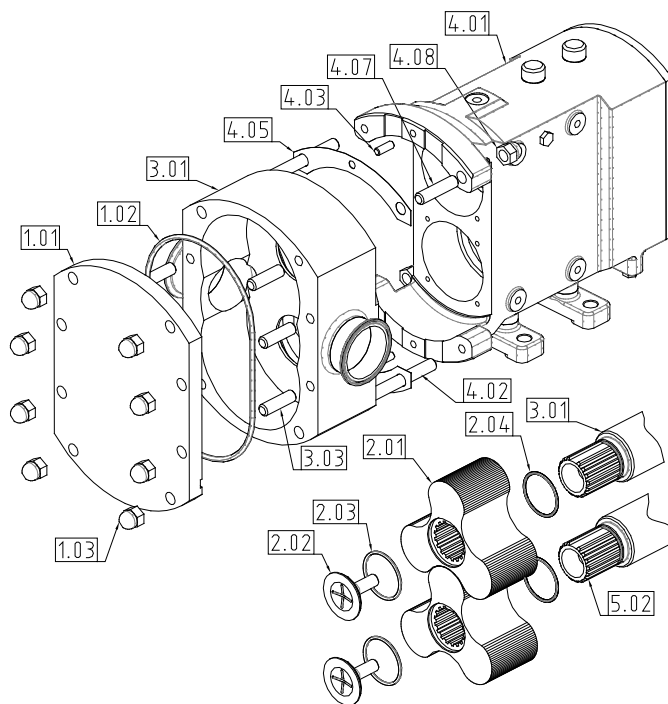


Fig 38 - CP40 Rotorcase Assembly

- To adjust front clearance remove rotor retainers' (2.02), rotors (2.01), nuts (4.08) and rotorcase (3.01) and insert arch shims (4.05) between the rotorcase (3.01) and gearbox (4.01).

Note: It is essential that the thickness of arch shims (4.05) inserted is the same at both the top and bottom of the rotorcase.

- Install product seals; refer to section 5.0 or section 6.0.
- Install rotorcase (3.01) to gearbox (4.01), noting it locates on dowels (4.03), securing with dome nuts (4.08).
- Install rotors (2.01) with o-rings (2.03 and 2.04) and retainers (2.02) tightening to correct torque, refer to section 8.2, using socket tool supplied (not shown).
- Check all rotor clearances, front, rear, top/bottom, sides' and mesh, refer to section 8.1, Clearance Chart.
- Install front cover (1.01) with o-ring (1.02) and secure with nuts (1.03) tightened to correct torque, refer to section 8.2.

4.3 CP50 Pumps - Disassembly and Assembly

4.3.1 CP50 Front Cover and Rotor Removal

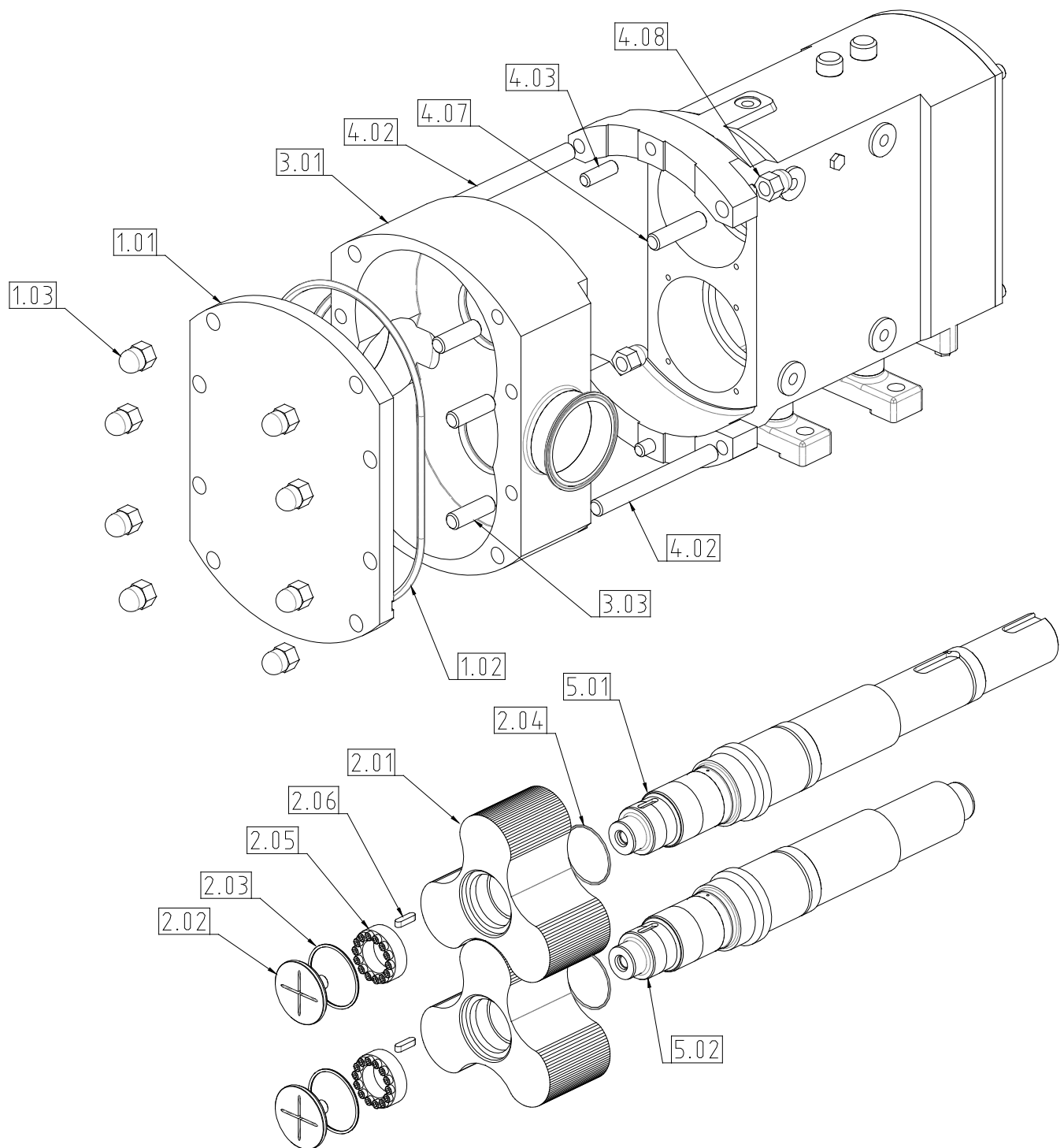


Fig 39 – Front Cover and Rotor Components



Follow recommended shutdown procedure - refer to section 3.5.

- Refer to Fig 39.



- Gradually loosen front cover retaining dome nuts (1.03). Care should be taken as there may still be residual product and pressure in the pump head and as the dome nuts are loosened, this will vent to atmosphere.
- Remove dome nuts (1.03).
- Remove front cover (1.01), using lever slots where necessary and the front cover o-ring (1.02).
- Remove rotor caps (2.02) with tool (supplied, not shown).

WARNING

Note: The tool provided should always be used to remove the rotor cap. The use of other tools may damage the rotor cap.

- Remove rotor cap o-rings (2.03).
- Loosen by 2 full turns all screws in rotor retainer (2.05). Once this is done the retainer may release its grip. If it does not, loosen further the screws until the assembly becomes free to remove.
(On some brands of locking device there are two screws that are different in colour (these may also have a washer under the head). Once these screws are removed tapped holes will be revealed. By inserting two jackscrews (M8 x 40 setscrews), into the tapped holes and tightening, the retainer's grip is broken. Remove the retainers' (2.05).
- Remove rotors (2.01) from shafts (5.01 and 5.02).
- Remove o-rings (2.04) and keys (2.06).

4.3.2 CP50 Rotorcase Removal

WARNING

Note: Ensure all pipe work is disconnected before commencing rotorcase removal.

4.3.2.1 CP50 Rotorcase Removal for Pumps fitted with Single Un-flushed Mechanical Seals and O-Ring Seals

(After completing 4.3.1)

- Remove dome nuts (4.08).
- Slide rotorcase (3.01) from gearbox (4.01), noting it is located on dowels (4.03).

Single Un-flushed Mechanical Seals as shown in Fig 40 and see sections 5.3.1 for removal and 5.3.2 for replacement.

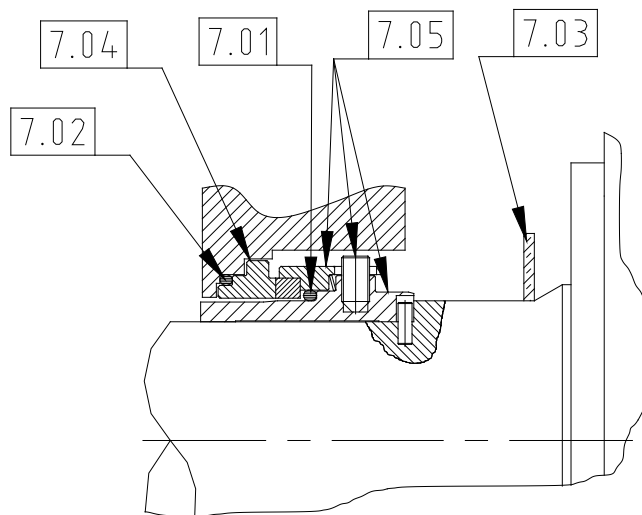


Fig 40 Single Un-flushed Mechanical Seal – CP50

Single O-Ring Seal for CP50 see Fig 41 and see section 6.3.1 for removal and replacement.

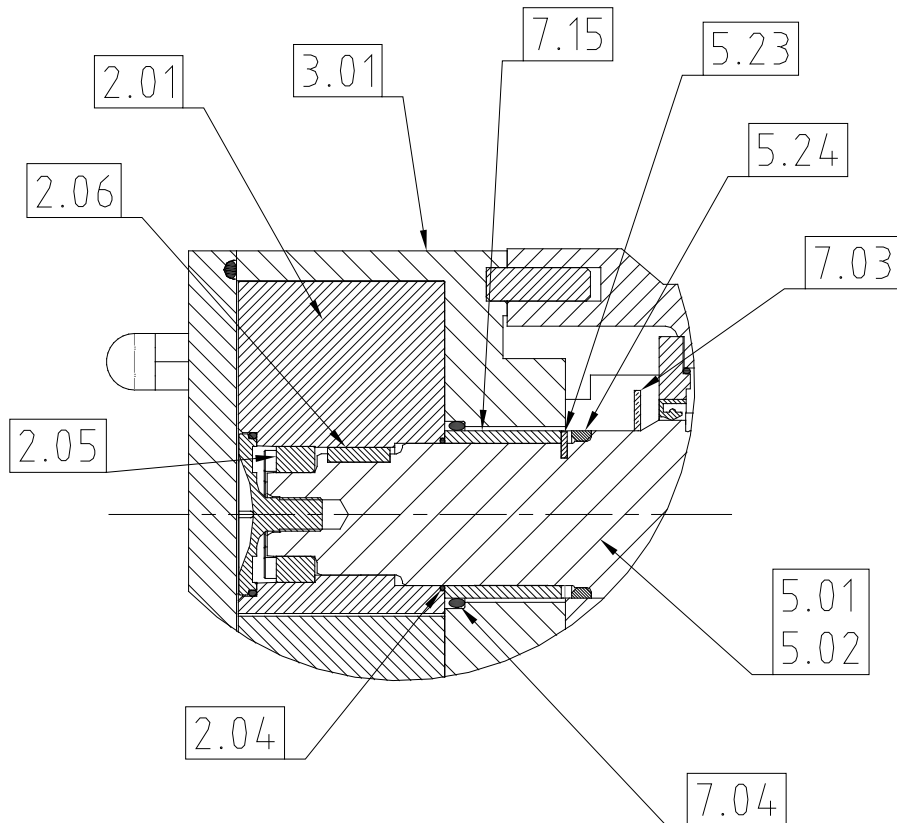


Fig 41 Single O-Ring Seal CP50

- Remove O-Ring seal (7.04) from rotorcase (3.01).
- Slide rotorcase (3.01) from gearbox (4.01) noting it is located on dowels (4.03).

4.3.2.2 CP50 Rotorcase Removal for Pumps fitted with Single Flushed and Double Flushed Mechanical Seals

- Refer to Fig 42 for Single flushed mechanical seal for CP50.
- Refer to Fig 43 for Double flushed mechanical seal for CP50.
- Prior to removal of rotorcase (3.01), remove seal housing nuts (7.18) from studs (7.17) and separate housing (7.06) from rotorcase (3.01).
- Remove dome nuts (4.08).
- Slide rotorcase from bearing housing (4.01), noting it is located on dowels (4.03).

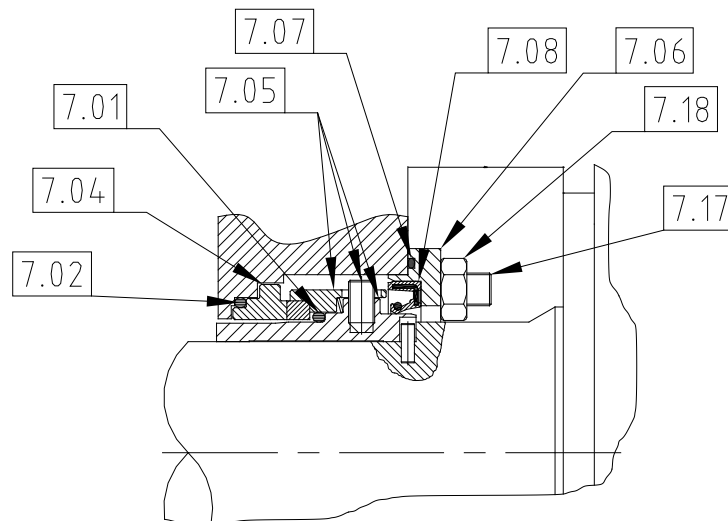


Fig 42 Single Flushed Mechanical Seal for CP50

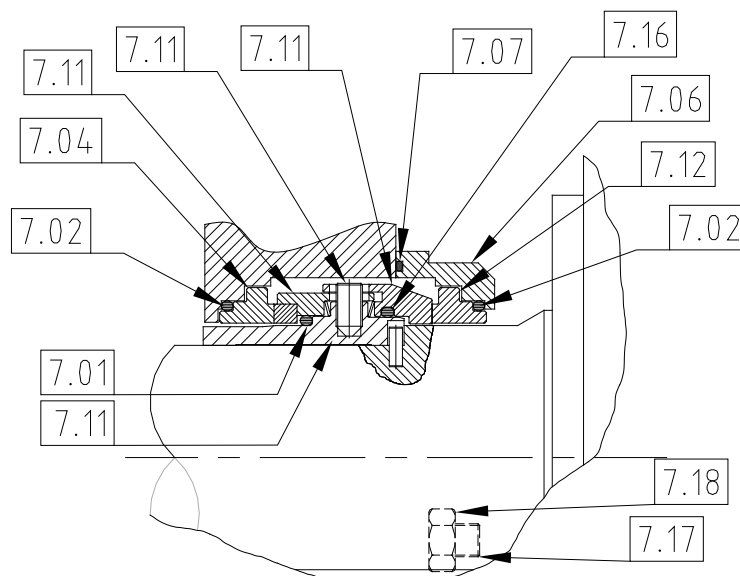


Fig 43 Double Flushed Mechanical Seal for CP50

4.3.3 CP50 Gearbox Disassembly (After completing 4.3.1 and 4.3.2)

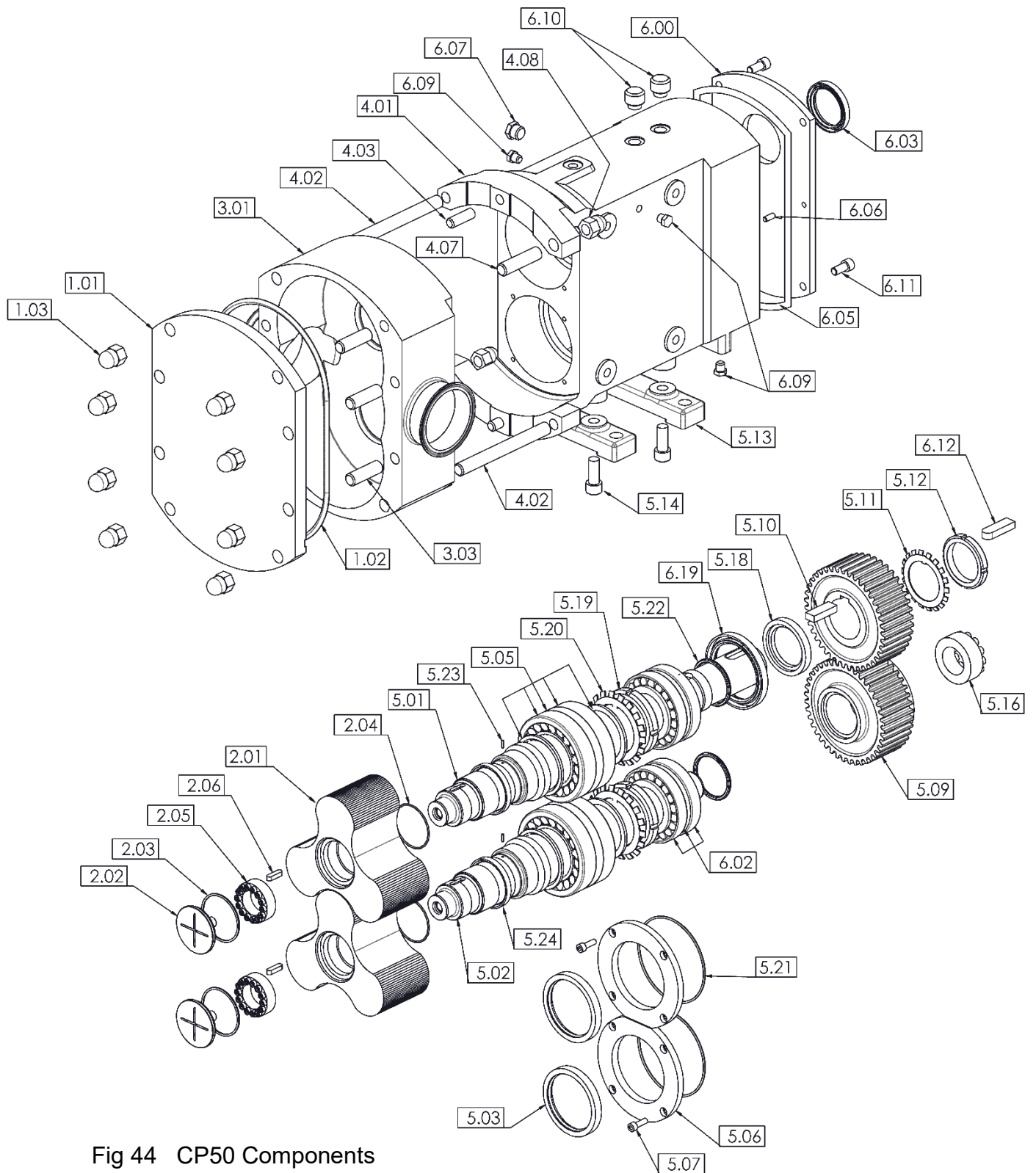


Fig 44 CP50 Components

Before proceeding with disassembly of the gearbox remove product seals; refer to section 5.3 for Mechanical Seals and 6.3 for O-Ring Seals.

The following procedure describes complete disassembly of the gearbox, refer to Fig 44.

- Remove guard (4.06) and shaft slingers (7.03) if fitted.
- Remove drive key (6.12).
- Remove oil drain plugs (6.09) and breather plugs (6.10), drain oil into suitable container and retain (inspection may later be required).
- Remove screws (6.11) and gearbox cover (6.00). The gearbox cover (6.00) is located on dowels (6.06) and sealed with suitable liquid sealant.
- Remove oil seal (6.03) from gearbox cover (6.00).
- Loosen by two full turns all screws in retainer (5.16) on the lay shaft (5.02). Once this is done the retainer may release its grip. If it does not become free identify and remove the three screws which differ in colour (these may also have a washer under the head). Once these screws are removed tapped holes will be revealed. Insert three jackscrews (M10 x 40 setscrews), into the tapped holes and tighten until the retainer's grip is broken. Remove the retainer.
- Remove lock nut (5.12) and tab washer (5.11), then remove timing gears (5.09), gear key (5.10), spacer (5.18), o-ring (5.22) and lipseal (83).
- Support pump with shafts in the vertical position with rotor end up.
- Remove screws (5.07), and then remove bearing retainers' (5.06) and o-rings (5.21), then remove lipseals (5.03) from bearing retainers' (5.06).
- Remove shafts (5.01 and 5.02) from gearbox (4.01). Shafts (5.01 and 5.02) will be complete with pins (5.23), spacers (5.24), bearings (5.05), spacers (5.05), tab washers (5.20), lock nuts (5.19), bearings (6.02) and spacers (6.02).
- Remove bearings (6.02) complete with spacers (6.02) from shafts (5.01 and 5.02) keep them in matched sets and identify position.
- Remove lock nuts (5.19) and tab washers' (5.07).
- Remove bearings (5.05) complete with spacers (5.05) from shafts (5.01 and 5.02), keep them in matched sets and identify position.
- Remove shaft sleeve drive pins (5.23) from shafts (5.01 and 5.02), remove spacers (5.24), note fitting position.

4.3.4 CP50 Gearbox Assembly

The following procedure describes the assembly of the gearbox, refer to Fig 44.

- Install bearings (5.05) complete with spacers (5.05) to shafts (5.01 and 5.02) ensuring correct positioning of all components as either removed in 4.3.3. Above or supplied as new replacement set, see Fig 45.
- Install spacers (5.24), product seal sleeves (28 or 66), rotor keys (78) and rotors (41) to shafts (5.01 and 5.02) and secure with rotor retainers (35) using tool (58).

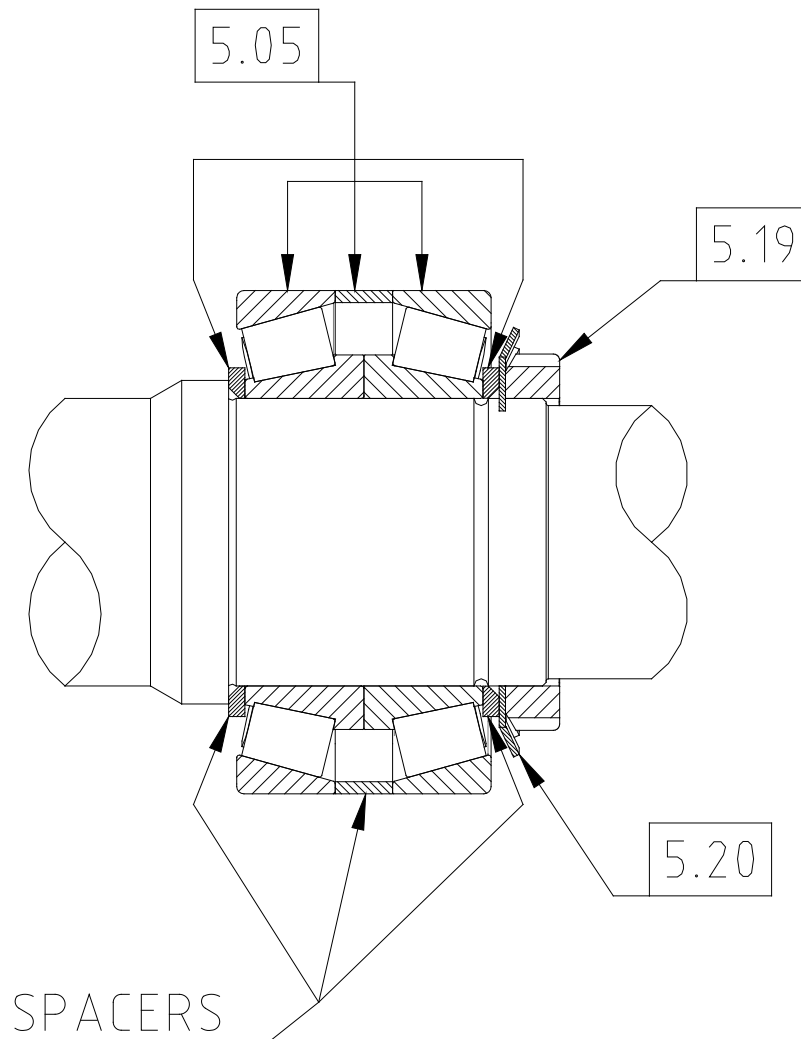


Fig 45 Front bearing assembly – CP50

- Install tab washers (5.07) and lock nuts (5.19) tightening to correct torque, refer to section 8.2. Secure tab washers.

Note: Ensure that the cups of the rear most bearings (5.05) are in position on inner races before proceeding.

- Install bearings (6.02) complete with spacers (6.02) to shafts (5.01 and 5.02) ensuring correct positioning of all components as either removed in 4.3.3 above or as supplied as new replacement set, see Fig 46.

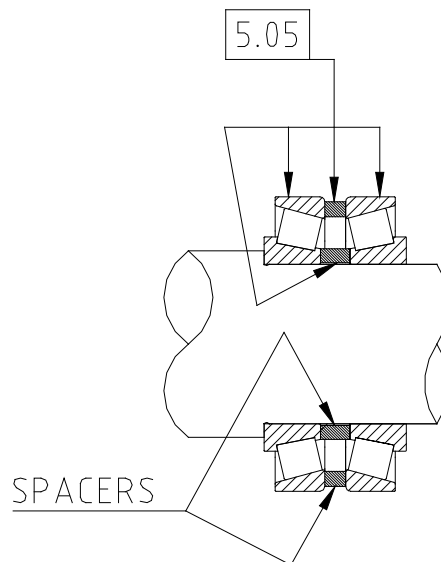


Fig 46 Rear bearing assembly – CP50

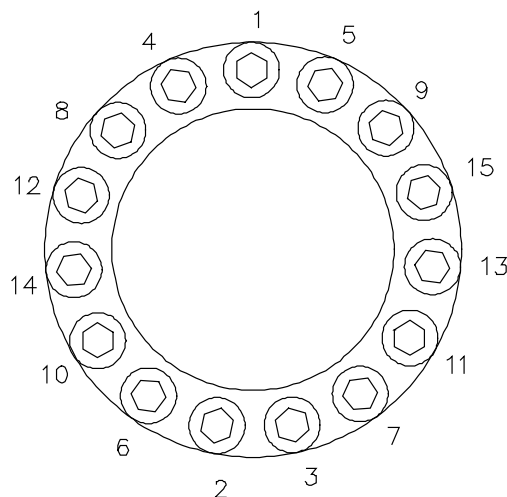
- Support gearbox (4.01) in a vertical position and install shafts (5.01 and 5.02) to gearbox (4.01).
- If not already installed install cups of front most bearings (5.05).
- Install lipseals (5.03) to bearing retainers' (5.09).
- Install retainers' (5.09) and o-rings (5.21) and secure with screws (5.07) tightening to correct torque, refer to section 8.2.
- Return pump to normal horizontal mounting position.
- Install lipseal (6.19) to gearbox (4.01). Install o-ring (5.22), spacer (5.18) and key (5.10) to drive shaft (5.01).
- Install timing gears (5.09) to shafts (5.01 and 5.02).
- Install tab washer (5.11) and lock nut (5.12) tightening to correct torque, refer to section 8.2. Secure tab washer (5.11).

- Rotate shafts (5.01 and 5.02) such that keyways for rotor keys are vertically upwards.
- Lubricate retainer (5.16) with oil and install to timing gear (5.09). Do not tighten.

Note: Pins (5.23) should not be installed at this stage.

- Clamp gear (5.09) to shaft (5.02) using tool (supplied) and associated stud and nut, ensuring that two screws in retainer (5.16) are visible through holes in tool.
- Check rotor mesh clearance against Clearance Chart, refer to section 8.1. Adjustment of mesh clearance is made by rotating the shafts (5.01 and 5.02). Having achieved optimum mesh clearance, partially tighten visible screws in retainer (5.16), to clamp gear in place. Remove tool and associated studs and nuts. Fully tighten screws in retainer (5.16) to correct torque, refer to section 8.2, taking note of typical tightening sequence, see Fig 47.
- After tightening of retainer (5.16) check rotor mesh clearance; refer to section 8.1 (Clearance Chart).

Fig 47 Retainer Tightening Sequence



- Install oil seal (6.03) to gearbox cover (6.00).
- Install gasket (6.05) to gearbox cover (6.00) and install to gearbox (4.01), locating on dowels (6.06) and securing with screws (6.11), tightened to correct torque, refer to section 8.2.
- Install drive key (6.12).
- Install drain plugs (6.09) and breather plugs (6.10).
- Remove rotor retainers (2.02) using tool, rotors (2.01) and spacers (5.24)

4.3.5 CP50 Rotorcase, Rotor and Front Cover Assembly

Referring to Fig 33 and Fig 44.

- Install spacers' (5.24) and product seal sleeves (7.15) to shafts (5.01 and 5.02).

Note: Pins (5.23) should not be installed at this stage.

- Install rotorcase (3.01) to gearbox (4.01) locating on dowels (4.03) and secure with dome nuts (4.08) tightened to correct torque, refer to section 8.2.
- Install rotors (2.01) to shafts (5.01 and 5.02).
- Clamp one rotor (2.01) to shaft (5.01 or 5.02) using tool and associated stud and nut see Fig 48.

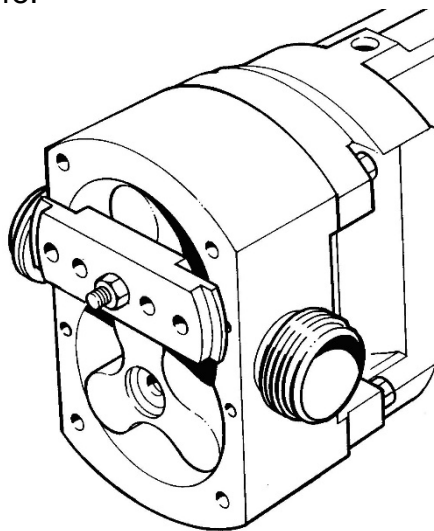


Fig 48 Rotor Clamping Tool Fitment

- Using a depth micrometer or similar device, measure front clearance; refer to section 8.1, Clearance Chart, between the rotorcase and clamped rotors front face and check that this corresponds to the appropriate clearance as indicated on the Clearance Chart. Note any discrepancy in front clearance.
- Remove tool and associated stud and nut (shown above).
- Repeat clamping and front clearance measurement for other rotor (again note any discrepancy in front clearance).
- Remove tool and associated stud and nut.
- Remove rotors (2.01), rotorcase (3.01) and product seal sleeves (7.15).
- If any discrepancies were noted in front clearances, between rotors and front face of rotorcase, then spacers (5.24) will require machining to shorten them to achieve the correct front clearance, refer to section 8.1.

Note: If it is found that the measured front clearance is greater than that shown in the Clearance Chart, refer to section 8.1, then new spacers (5.24) will need to be obtained and machined to the correct lengths to achieve correct front clearance.

- Be sure faces of spacers' (5.24) are parallel after machining.
- After any machining of spacers' (5.24), check front clearances for both rotors, refer to section 8.1, Clearance Chart.
- Install spacers (5.24) to shafts (5.01 and 5.02) ensuring they are correctly located.
- Install pins (5.23) to shafts (5.01 and 5.02) using a liquid retainer (Loctite 648 or similar).
- Install product seals; refer to section 5.3 and 6.3.
- Install rotorcase (3.01) to gearbox (4.01) locating onto dowels (4.03) and securing with dome nuts (4.08) tightened to correct torque, refer to section 8.2.
- Install o-rings (2.05) and rotors (2.01) to shafts (5.01 and 5.02).
- Lubricate retainers' (53) with oil and install to shafts (5.01 and 5.02).
- Clamp one rotor (2.01) to shaft (5.01 or 5.02) using tool and associated stud and nut, see Fig 48, ensuring that two of the screws in retainer (2.05) are visible through holes in tool.
- Moderately tighten visible screws in retainer (2.05) in clamped rotor to lock rotor in position. Remove tool and associated stud and nut, tighten fully screws in retainer (2.05) to correct torque, refer to section 8.2, taking note of typical tightening sequence, see Fig 47.
- Repeat clamping and retainer (2.05) tightening procedure for other rotor.
- Remove tool and associated stud and nut.
- Install o-rings (2.03) and retainers (2.02) tightening to correct torque refer to section 8.2, using tool.
- Check all rotor clearances, front, rear, top/bottom, sides' and mesh, refer to section 8.1, Clearance Chart.
- Install front cover (1.01) with o-ring (1.02) and secure with nuts (1.03) tightened to correct torque, refer to section 8.2.

5.0 Classic+ Mechanical Seal Removal & Replacement.

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 CP10, CP20, CP30 and CP40 Mechanical Seals

5.2.1 CP10, CP20, CP30 and CP40 Single Mechanical Seal Removal

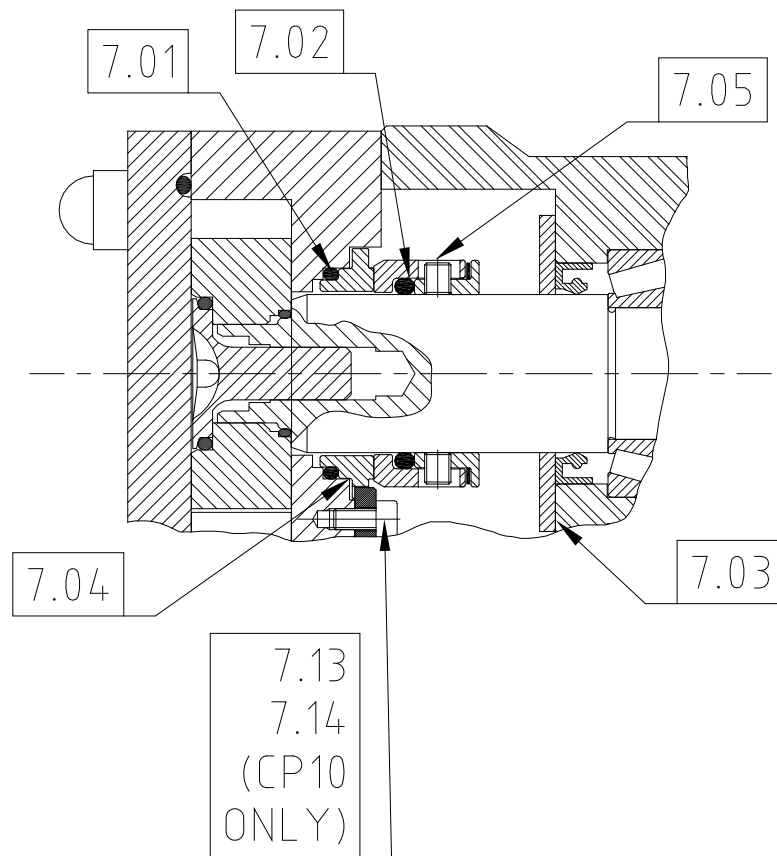


Fig 49 Single Un-flushed Mechanical Seal

- Remove front cover (1.01), rotor retainers (2.02), o-rings (2.04) and rotorcase (3.01), refer to section 4.1.2.1 (CP10, CP20 and CP30) or section 4.2.2.1 (CP40).
- Loosen but do not remove screws in rotary cartridge assembly (7.05) which secure rotary seal cartridges to shafts (5.01 and 5.02).
- Remove rotary seal cartridges (7.05) with o-ring (7.02) from shafts (5.01 and 5.02).
- Remove stationary seal seats (7.04) and o-rings (7.01) from rotorcase (3.01).

5.2.2 CP10, CP20, CP30 and CP40 Single Mechanical Seal Replacement

Refer to Fig 50 for CP10, CP20, CP30 and CP40

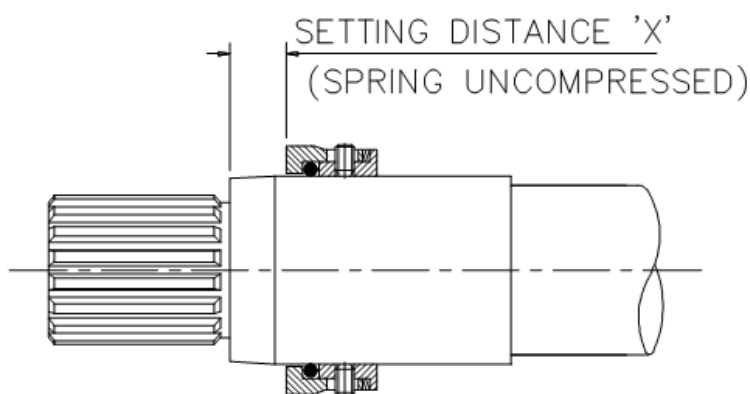
- Install o-rings (7.01) to stationary seal seat (7.04).
- Install stationary seal seats (7.04) to rotorcase (3.01) ensuring correct location of o-rings (7.01).

WARNING

Note: On CP10 models the stationary seal seat (7.04) has a location recess which fits over the anti-rotation washer (7.13).

Note: On CP20, CP30 and CP40 models the stationary seal seat (7.04) has a triangular shape, which must locate fully into the rotorcase (3.01) bore.

- Install rotary seal cartridges (7.05) with o-ring (7.02) to shafts (5.01 and 5.02) positioning to correct setting distance, see Fig 50 and tighten screws (7.05) to correct torque, refer to section 8.2.



Pump Model	X (mm)	X (inches)
CP10	14.3	0.5630
CP20	10.8	0.4252
CP30	13.4	0.5276
CP40	17.5	0.6890

Fig 50 Setting Distance for Seals

- Install rotorcase (3.01), o-rings (2.04), rotors (2.01), o-rings (2.03), rotor retainers (2.02) and front cover (1.01), refer to sections 4.1.4 (CP10, CP20 and CP30) or 4.2.5 (CP40).

5.2.3 CP10, CP20, CP30 and CP40 Single Flushed Mechanical Seal Removal

Refer to Fig 51 for CP10, CP20, CP30 and CP40

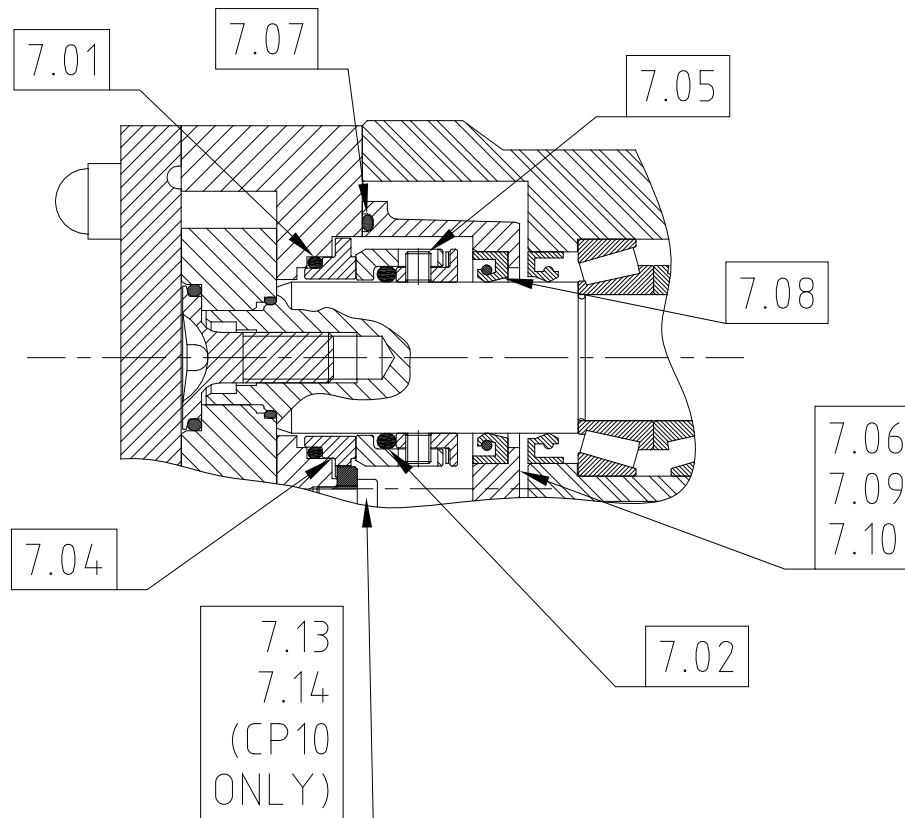


Fig 51 Single Flushed Mechanical Seal

- Remove front cover (1.01), rotor retainers' (2.02), o-rings (2.03), rotors (2.01), o-rings (2.04) and rotorcase (3.01), refer to sections 4.1.2.1 and 4.1.2 (CP10, CP20 or CP30) or 4.2.2.1 (CP40).
- Loosen but do not remove screws in rotary seal cartridge assemblies (7.05), which secure rotary seal cartridges to shafts (5.01 and 5.02).

Note: Access to screws in rotary seal cartridge (7.05) is through the flush pipe connections of housing (7.06).

- Remove rotary seal cartridges (7.05) with o-ring (7.02) from shafts (5.01 and 5.02).
- Remove housing(s) (7.06) complete with lipseals (7.08) and o-ring(s) (7.07) from shafts (5.01 and 5.02).
- Remove lipseals (7.08) and o-ring (s) (7.07) from housing(s) (7.06).
- Remove stationary seal seats (7.04) and o-rings (7.01) from rotorcase (3.01).

5.2.4 CP10, CP20, CP30 and CP40 Single Flushed Mechanical Seal Replacement

Refer to Fig 51 for CP10, CP20, CP30 and CP40

- Install o-rings (7.01) to stationary seal seats (7.04).
- Install stationary seal seats (7.04) to rotorcase (3.01) ensuring correct location of o-rings (7.01).

Note: On CP10 models the stationary seal seat (7.04) has a location recess which fits over the anti-rotation washer (7.13).

WARNING

Note: On CP20, CP30 and CP40 models the stationary seal seat (7.04) has a triangular shape, which must locate fully into the rotorcase (3.01) bore.

- Install lipseals (7.08) and o-rings (7.07) to housing(s) (7.06).
- Install housing(s) (7.06) to shafts (5.01 and 5.02).
- Install rotary seal cartridges (7.05) to shafts (5.01 and 5.02) positioning to correct setting distance, see Fig 50 and tightening screws in rotary seal cartridge assemblies (7.05) to correct torque, refer to section 8.2.

Note: Access to screws in rotary cartridge seal assemblies (7.05) is through the flush pipe connections of housing (7.06).

- Install rotorcase (3.01), o-rings (2.04), rotors (2.01), o-rings (2.03), rotor retainers (2.02) and front cover (1.01), refer to sections 4.1.4 (CP10, CP20 and CP30) or 4.2.5 (CP40).
-
- Secure housing(s) (7.06) to rotorcase (3.01) with screws (7.10) ensuring correct location onto dowels (7.09).

5.2.5 CP10 Double Flushed Mechanical Seal Removal

Refer to Fig 52.

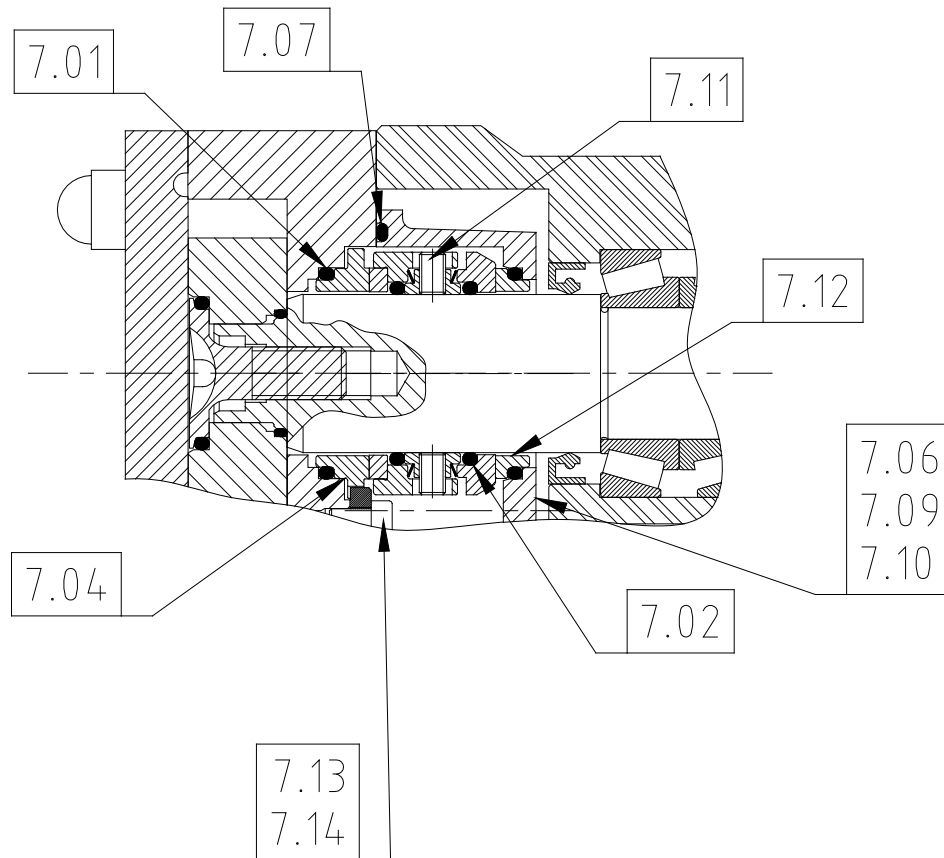


Fig 52 Double Flushed Mechanical Seal

- Remove front cover (1.01), rotor retainers' (2.02), o-rings (2.03), rotors (2.01), o-rings (2.04) and rotorcase (3.01), refer to sections 4.1.1 and 4.1.2.
- Loosen but do not remove screws (7.11), which secure rotary seal cartridge assemblies (7.11) to shafts (5.01 and 5.02).

Note: Access to screws (7.13) is through the flush pipe connections of housing (7.06)

- Remove rotary seal cartridges (7.11) with o-rings (7.02) from shafts (5.01 and 5.02).
- Remove housing (7.06) complete with o-ring (7.07), stationary seal seats (7.12) and o-rings (7.01) from shafts (5.01 and 5.02).
- Remove stationary seal seats (7.12), o-rings (7.01) and o-ring (7.07) from housing (7.06).
- Remove stationary seal seats (7.04) and o-rings (7.01) from rotorcase (3.01).

5.2.6 CP10 Double Flushed Mechanical Seal Replacement

Refer to Fig 52

- Install o-rings (7.01) to stationary seal seats (7.04 and 7.12).
- Install stationary seal seats (7.04) to rotorcase (3.01) ensuring correct location of o-rings (7.01).

WARNING

Note: The stationary seal seat (7.04) has a location recess which fits over the anti-rotation washer (7.13).

- Install o-rings (7.01) to stationary seal seats (7.11).
- Install stationary seal seats (7.11) to housing (7.06) ensuring correct location of o-ring (7.01).
- Install housing (7.06) to shafts (5.01 and 5.02).
- Clean faces of outboard seal (7.11 and 7.12) use a soft tissue and suitable solvent based cleaner for best results.
- Install rotary seal cartridges (7.11) with o-ring (7.02) to shafts (5.01 and 5.02).

Note: For pumps installed with flange type rotorcase (3.01) connections, it may be easier to set the position of the rotary seal cartridge (7.11) onto the shafts (5.01 and 5.02) using the setting distance, see fig 50, before installing the rotorcase (3.01). Screws in rotary seal cartridge assemblies (7.11) must be tightened to the correct torque refer to section 8.2.

- Install rotorcase (3.01), o-rings (2.04), rotors (2.01), o-rings (2.03), rotor retainers (2.02) and front cover (1.01) - refer to section 4.1.4.
- Secure housing (7.06) to rotorcase (3.01) with screws (7.10) ensuring correct location onto dowels (7.09).
- Rotate pump shafts by two or three full revolutions.
- If not already tightened, tighten screws (7.11) to correct torque, refer to section 8.2.

Note: Access to screws (7.11) is through the flush pipe connections of housing (7.06)

5.2.7 CP20, CP30 and CP40 Double Flushed Mechanical Seal Removal

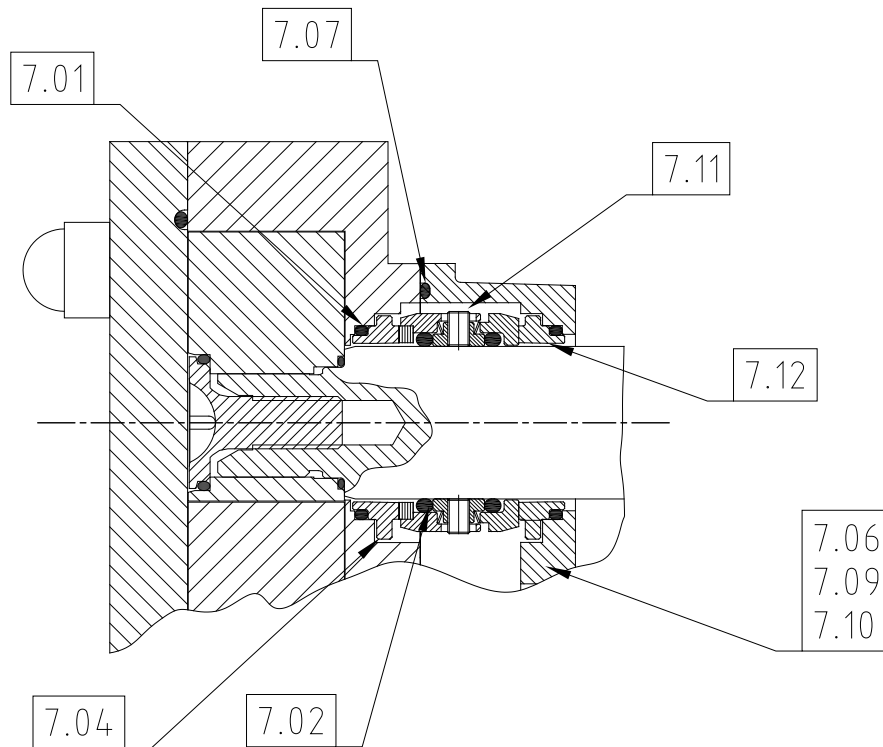


Fig 53 Double Flushed Mechanical Seal

- Remove front cover (1.01), rotor retainers' (2.02), o-rings (2.03), rotors (2.01), o-rings (2.04) and rotorcase (3.01), refer to sections 4.1.1 and 4.1.2 (CP20/CP30) or sections 4.2.1 and 4.2.2 (CP40).
- Loosen but do not remove screws in rotary seal cartridge assemblies (7.11), which secure rotary seal cartridge assemblies (7.11) to shafts (5.01 and 5.02).

Note: Access to screws (7.11) is through the flush connections of housings (7.06).

- Remove rotary seal cartridge assemblies (7.11) with o-ring (32) from shafts (5.01 and 5.02).
- Remove housings (7.06) from shafts (5.01 and 5.02) complete with stationary seal seats (7.12), o-rings (7.01) and o-rings (7.07).
- Remove stationary seal seats (7.04), o-rings (7.01) and o-rings (7.07) from housings (7.06).
- Remove stationary seal seats (7.04) and o-rings (7.01) from rotorcase (3.01).

5.2.8 CP20, CP30 and CP40 Double Flushed Mechanical Seal Replacement

Refer to Fig 53.

- Install o-rings (7.01) to stationary seal seats (7.04).
- Install stationary seal seats (7.04) to rotorcase (3.01) ensuring correct location of o-rings (7.01).

WARNING

Note: The stationary seal seats (7.04) have a triangular shape which must locate fully into the rotorcase (3.01) bore.

- Install o-rings (7.01) to stationary seal seats (7.12).
- Install stationary seal seats (7.12) to housings (7.06) ensuring both correct locations of o-ring (7.01) and stationary seal seats (7.04) in housings (7.06).

WARNING

Note: The stationary seal seats (7.12) have a triangular shape which must locate fully into the housing (7.06) bore.

- Install housings (7.06) to shafts (5.01 and 5.02).
- Clean faces of outboard seal (7.11 and 7.12) use a soft tissue and a suitable solvent based cleaner for best results.
- Install rotary seal cartridge assemblies (7.11) to shafts (5.01 and 5.02).

Note: For pumps installed with flange type rotorcase (3.01) connections, it may be easier to set the position of the rotary seal cartridge (7.11) onto the shafts (5.01 and 5.02) using the setting distance, see Fig 50, before installing the rotorcase (3.01). Screws in rotary seal cartridge assemblies (7.11) must be tightened to the correct torque refer to section 8.2.

- Install rotorcase (3.01), o-rings (2.04), rotors (2.01), o-rings (2.03), rotor retainers (2.02) and front cover (1.01) refer to sections 4.1.4 (CP20/CP30) or 4.2.5 (CP40).
- Secure housings (7.06) to rotorcase (3.01) with screws (7.10) ensuring correct location onto dowels (7.09).
- Rotate pump shafts by two or three full revolutions.
- If not already tightened, tighten screws in rotary seal cartridge assemblies (7.11) to correct torque, refer to section 8.2.

Note: Access to screws in rotary seal cartridge assemblies (7.11) is through the flush connections of housings (7.06).

5.3 CP50 Mechanical Seals

5.3.1 CP50 Single Mechanical Seal Removal

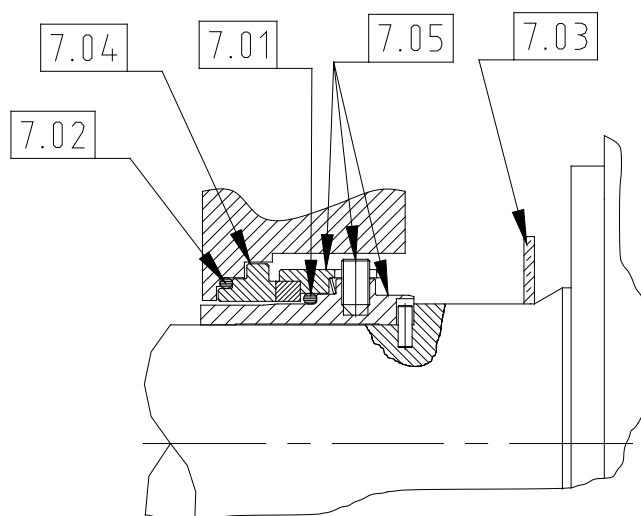


Fig 54 Single Un-Flushed Mechanical Seal CP50

- Remove front cover (1.01), rotor caps (2.02), o-rings (2.03), retainers' (2.05), rotors (41), o-rings (2.04) and rotorcase (3.01), refer to sections 4.3.1 and 4.3.2.
- Remove rotary seal cartridge assemblies (7.11) with o-ring (7.01) from shafts (5.01 and 5.02) by simply sliding off. Do not loosen screws in rotary seal cartridge assemblies (7.05).
- Remove stationary seal seats (7.04) and o-rings (7.02) from rotorcase (3.01).

5.3.2 CP50 Single Mechanical Seal Replacement

- Install o-rings (7.02) to stationary seal seats (7.04).
- Install stationary seal seats (7.04) to rotorcase (3.01) ensuring correct location of o-rings (7.02).

WARNING

Note: The stationary seal seat (7.04) has a triangular shape, which must locate fully into the rotorcase (3.01), bore.

- Install rotary seal cartridge assemblies (7.11) with o-ring (7.01) to shafts (5.01 and 5.02) ensuring engagement of drive slots with pins (5.23) in shafts (5.01 and 5.02).
- Install rotorcase (3.01), o-rings (2.04), rotors (2.01), retainers (2.05), o-rings (2.03), rotor caps (2.02) and front cover (1.01) - refer to section 4.3.5.

5.3.3 CP50 Single Flushed Mechanical Seal Removal

Refer to Fig 55.

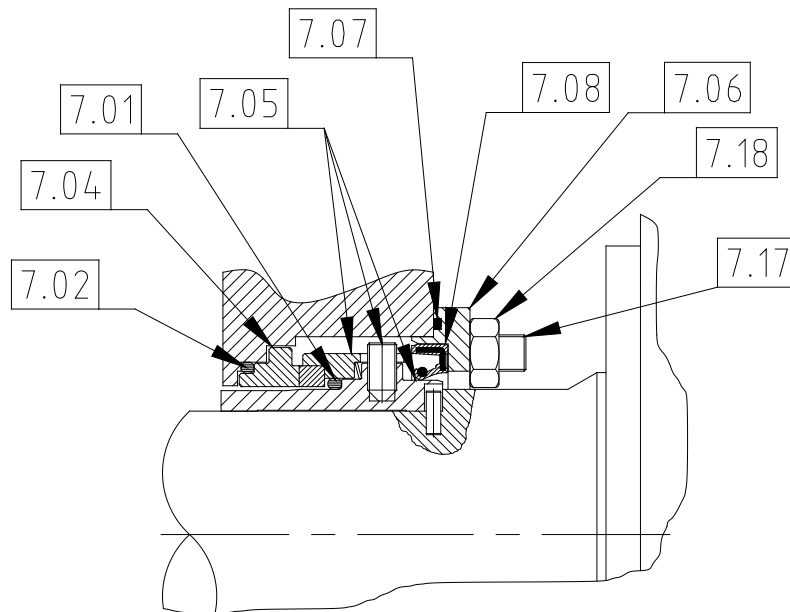


Fig 55 Single Flushed Mechanical Seal CP50

- Remove front cover (1.01), rotor caps (2.02), o-rings (2.03), retainers (2.05), rotors (2.01), o-rings (2.04) and rotorcase (3.01) refer to sections 4.3.1 and 4.3.2.
- Remove rotary seal cartridge assemblies (7.05) with o-ring (7.01) from shafts (5.01 and 5.02) by simply sliding off. Do not loosen screws in rotary seal cartridge assemblies (7.05).
- Remove housings (7.06) complete with lipseals (7.08) and o-rings (7.07) from shafts (5.01 and 5.02).
- Remove lipseals (7.08) and o-rings (7.07) from housings (7.06).
- Remove stationary seal seats (7.04) and o-rings (7.02) from rotorcase (3.01).

5.3.4 CP50 Single Flushed Mechanical Seal Replacement

Refer to Fig 55

- Install o-rings (7.02) to stationary seal seats (7.04).
- Install stationary seal seats (7.04) to rotorcase (3.01) ensuring correct location of o-rings (7.02).

WARNING

Note: The stationary seal seat (7.04) has a triangular shape, which must locate fully into the rotorcase (3.01), bore.

- Install lipseals (7.08) and o-rings (7.07) to housings (7.06).
- Install housings (7.06) to shafts (5.01 and 5.02).
- Install rotary seal cartridge assemblies (7.05) with o-ring (7.01) to shafts (5.01 and 5.02) ensuring engagement of drive slots with pins (5.23) in shafts (5.01 and 5.02).
- Install rotorcase (3.01), o-rings (2.04), rotors (2.01), retainers (2.05), o-rings (2.03), rotor caps (2.02) and front cover (1.01) - refer to section 4.3.5.
- Secure housings (7.06) to rotorcase (3.01) with nuts (7.18).

5.3.5 CP50 Double Flushed Mechanical Seal Removal

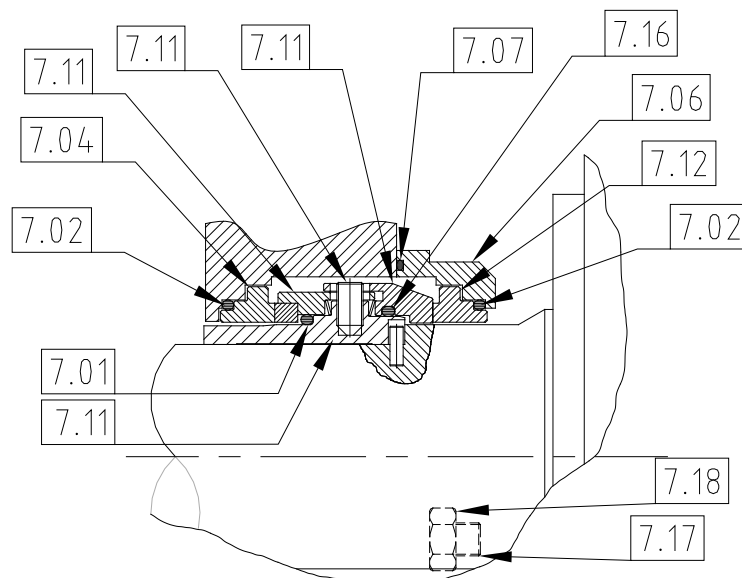


Fig 56 Double flushed mechanical seal CP50

- Remove front cover (1.01), rotor caps (2.02), o-rings (2.03), retainers (2.05), rotors (2.01), o-rings (2.04) and rotorcase (3.01), refer to sections 4.3.1 and 4.3.2.
- Remove rotary seal cartridge assemblies (7.11) with o-rings (7.01) and (7.16) from shafts (5.01 and 5.02) by simply sliding off. Do not loosen screws in rotary seal cartridge assemblies (7.11).
- Remove housings (7.06) from shafts (5.01 and 5.02) complete with stationary seal seats (7.04), o-rings (7.02) and o-rings (7.07).
- Remove stationary seal seats (7.04), and o-rings (7.07) from housings (7.06).
- Remove stationary seal seats (7.04) and o-rings (7.02) from rotorcase (3.01).

5.3.6 CP50 Double Flushed Mechanical Seal Replacement

Refer to Fig 56.

- Install o-rings (7.02) to stationary seal seats (7.04).
- Install stationary seal seats (7.04) to rotorcase (3.01) ensuring correct location of o-rings (7.02).

WARNING

Note: The stationary seal seat (7.04) has a triangular shape, which must locate fully into the rotorcase (3.01), bore.

- Install o-rings (7.02) to stationary seal seat (7.04).
- Install stationary seal seats (7.04) to housings (7.06) ensuring correct locations of o-rings (7.02) and stationary seal seats (7.04) in housings (7.06).

WARNING

Note: The stationary seal seat (7.04) has a triangular shape, which must locate fully into the housing (7.06), bore.

- Install housings (7.06) to shafts (5.01 and 5.02).
- Clean faces of outboard seal (7.11 and 7.04) use a soft tissue and a suitable solvent based cleaner for best results.
- Install rotary seal cartridge assemblies (7.11) with o-ring (7.01) and (7.16) to shafts (5.01 and 5.02) ensuring engagement of drive slots with pins (5.23) in shafts (5.01 and 5.02).
- Install rotorcase (3.01), o-rings (2.04), rotors (2.01), retainers (2.05), o-rings (2.03), rotor caps (2.02) and front cover (1.01), refer to section 4.3.5.
- Secure housings (7.06) to rotorcase (3.01) with nuts (7.18).

6.0 Classic+ Single O-Ring Seals

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 and 6.3.
- 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 Seals for CP10, CP20, CP30 and CP40 Pumps

6.2.1 CP10, CP20, CP30 and CP40 O-ring Seal Assembly and Removal

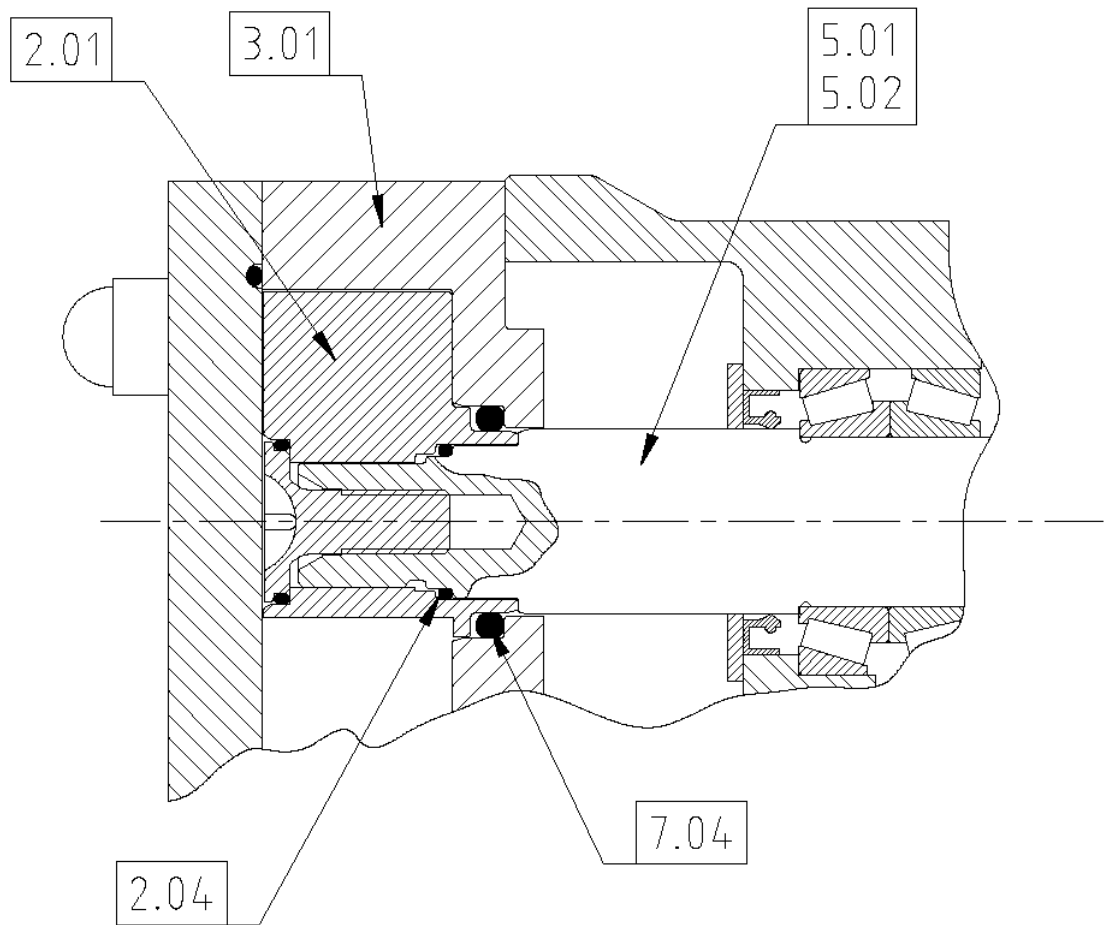


Fig 57 O-Ring Seal for an CP10, CP20, CP30 and CP40.



- Before assembly or disassembly of the seals, ensure pump is fully shutdown, refer to section 3.5.
- Install o-ring (7.04) into the rotorcase (3.01).
- Install o-ring (2.04) onto shaft (5.01 and 5.02).

Note: During installing of the rotors to shafts care must be taken not to damage or unseat the o-ring seal when inserting the rotor (2.01) into o-ring (7.04).

- To disassemble reverse the above procedure.

6.3 O-Ring Seal for CP50 Pump

6.3.1 CP50 O-Ring Seal Assembly and Removal

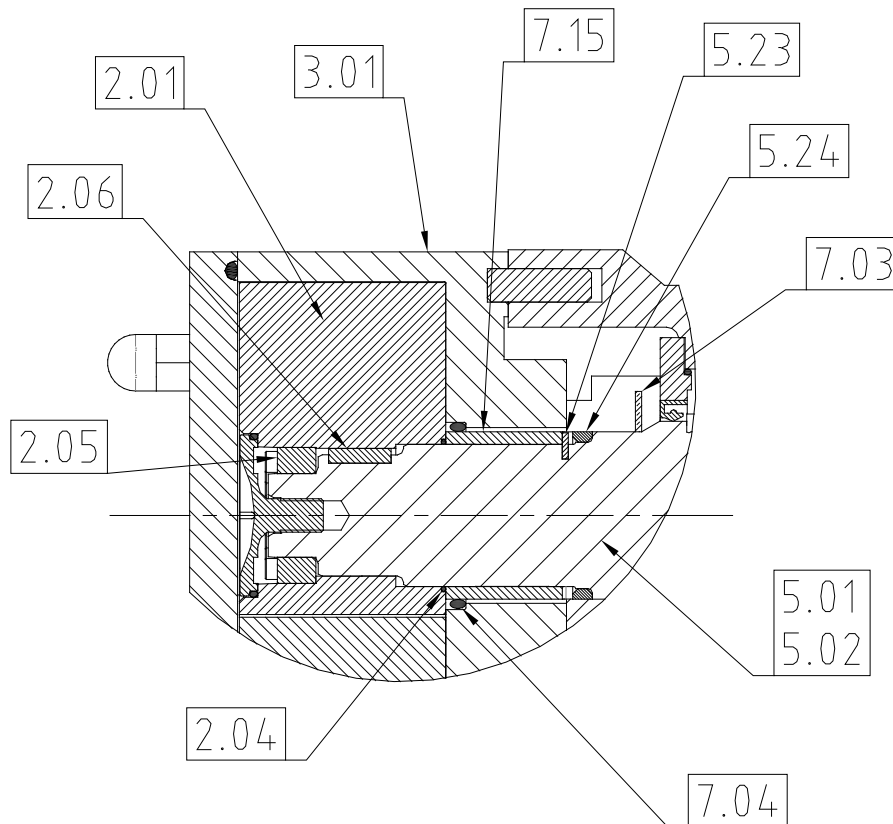


Fig 58 CP50 O-Ring Seal.



- Before assembly or disassembly of the seals, ensure pump is fully shutdown, refer to section 3.5.
- Install o-ring (7.04) into the rotorcase (3.01).
- Install rotary seal sleeves (7.15) onto shafts (5.01 and 5.02), ensuring engagement of slots in rotary seal sleeves (7.15) and drives pins (5.230)
- Install o-ring (2.04) onto shaft (5.01 and 5.02).

Note: During installing of the rotors to shafts care must be taken not to damage or unseat the o-ring seal when inserting the rotor (2.01) into o-ring (7.04).

- To disassemble reverse the above procedure.

6.4 Classic+ Packed Gland Seals

6.4.1 General Procedures For Fitting Packed Gland Seals

"Quick Summary" of packed gland seal installation.

- Packed gland seals are a simple but effective means of shaft sealing. They will provide optimum performance only if installed carefully and according to instructions.

WARNING

- **For satisfactory lubrication purposes the pumped media or the flushing media must always weep slowly out of the rear of the packed gland seal assembly. Never tighten so much as to completely stop leakage.**
- Remove any sharp corners and burrs that may damage packing rings or any elastomers such as o-rings or lipseals.
- Always inspect shaft sleeves for wear when the packed gland seal is dismantled or serviced.
- Be sure that all seal component fitting bores, housings, followers, sleeves etc. are thoroughly cleaned before installation.
- When inserting packing rings ensure that they are installed neatly to the rotorcase bores without loose strands.
- Be sure that ring joint gaps are set at approximately 120° to each other around the rotorcase bores so as not to create a leakage path.
- All o-rings should be lightly lubricated with a suitable lubricant (silicon grease, soap etc.) before installation.
- When installing PTFE encapsulated o-rings it is important to immerse them in hot water for several minutes to soften them.
- Where installed ensure lantern rings are positioned so as to match correctly the flushing ports.

WARNING

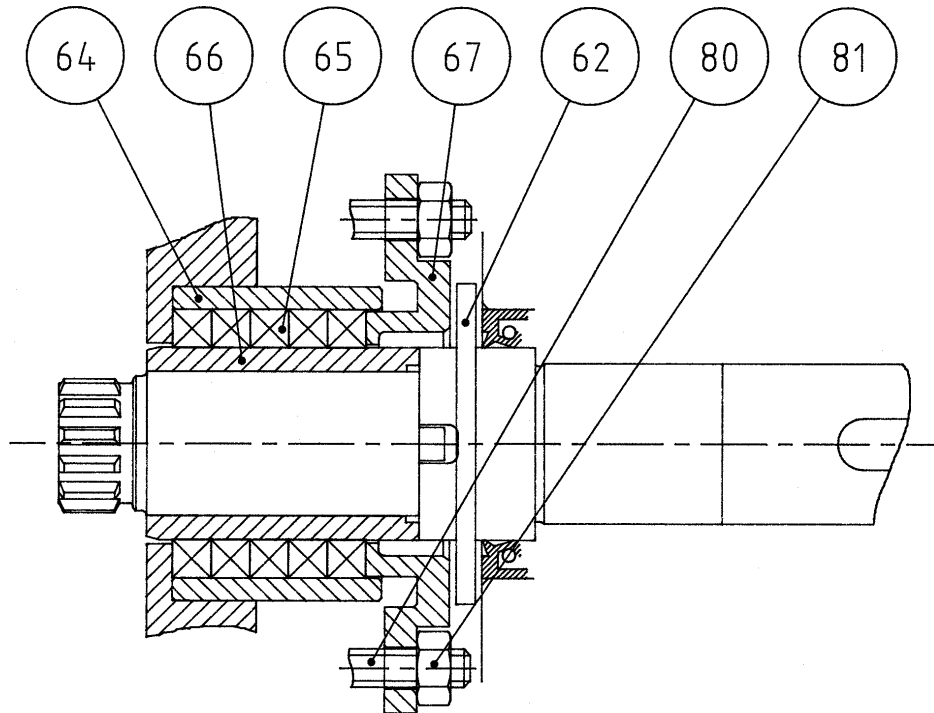
- **Do not run a packed gland seal dry.**

6.5 Packed Gland Seals - CP10, CP20, CP30 and CP40 Series Pumps

6.5.1 Packed Gland Seal Removal

See Fig 71

Fig 71



- Remove front cover (38), rotor retainers (35), o-rings (34), rotors (41), o-rings (25), dome nuts (87) and rotorcase (40) refer to sections 4.1.1 and 4.1.2 (CP10/CP20/CP30) or 4.2.1 and 4.2.2 (CP40).
- Remove nuts (81), which secure followers (67) to rotorcase (40).
- Remove followers (67) and packing rings (65).

Note: It is not recommended that gland tubes (64) are removed unless replacement is necessary. They may be damaged during removal.

- Remove sleeves (60) and slingers (62) from shafts (9 and 10).

6.5.2 Packed Gland Seal Replacement

See Fig 71

- Install slingers (62) and sleeves (66) to shafts (9 and 10).
- Install spacers (63), if previously removed.

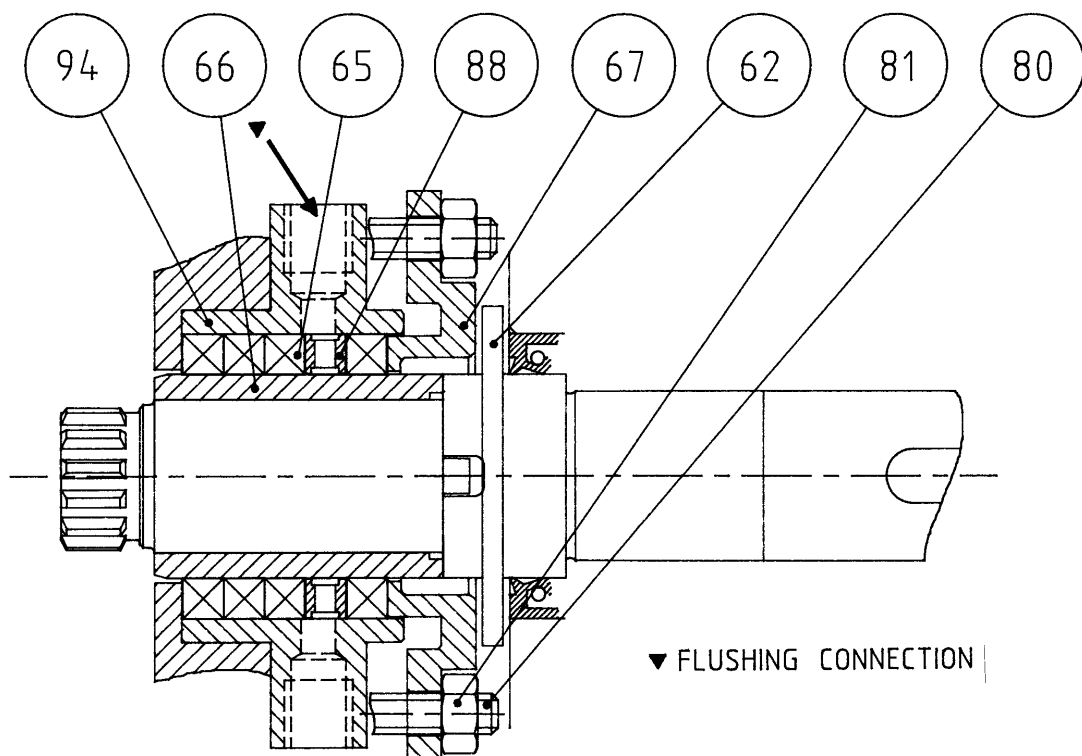
Note: If gland tubes (64) have been removed from rotorcase (40) they should be installed at this point. Apply liquid retainer (Loctite 640 or similar) to one end of tubes (64) on outside diameters to a width of approximately 5mm (3/16"), and similarly apply to inside diameters of rotorcase (40) bores. Press tubes (64) into rotorcase (40) bores. Remove any excess liquid retainer. Allow sufficient time for liquid retainer to fully cure.

- Install packing rings (65) and followers (67) to gland tubes (64).
- Install nuts (81) to studs (80) but do not tighten.
- Install rotorcase (40), dome nuts (87), o-rings (25), rotors (41), o-rings (34), rotor retainers (35) and front cover (38), refer to section 4.1.1 (CP10/CP20/CP30) or 4.2.1 (CP40).
- Once pump is installed and started adjust packed gland seals by a slow and even tightening of nuts (81).

6.5.3 Flushed Packed Gland Seal Removal

See Fig 72

Fig 72



- Remove front cover (38), rotor retainers (35), o-rings (34), rotors (41), o-rings (25), dome nuts (87) and rotorcase (40), (which is located on dowels (57)), refer to sections 4.1.1 and 4.1.2, (CP10/CP20/CP30) or 4.2.1 and 4.2.2, (CP40).
- Remove nuts (81), which secure followers (67) to rotorcase (40).
- Remove followers (67).
- Remove packing rings (65) and lantern ring (88) from housing (94) bores, carefully noting location of lantern rings (88).

Note: It is not recommended that housings (94) be removed unless replacement is necessary as they are tight press fit into rotorcase (40) and may be damaged during removal. For models CP30, it is necessary to remove additional nuts (81) before housings (94) can be removed.

- Remove sleeves (66) and slingers (62) from shafts (9 and 10).

6.5.4 Flushed Packed Gland Seal Replacement

See Fig 72

- Install slingers (62) and sleeves (66) to shafts (9 and 10).

Note: If housings (94) have been removed from rotorcase (40) they should be installed at this point. Apply liquid retainer (Loctite 640 or similar) to outside diameter of location spigots of housings (94), and similarly apply to inside diameters of rotorcase (40) bores. Install housings (94) over studs (80) and press into rotorcase (40) bores. Remove any excess liquid retainer. For models CP30, install nuts (81) to studs (80).

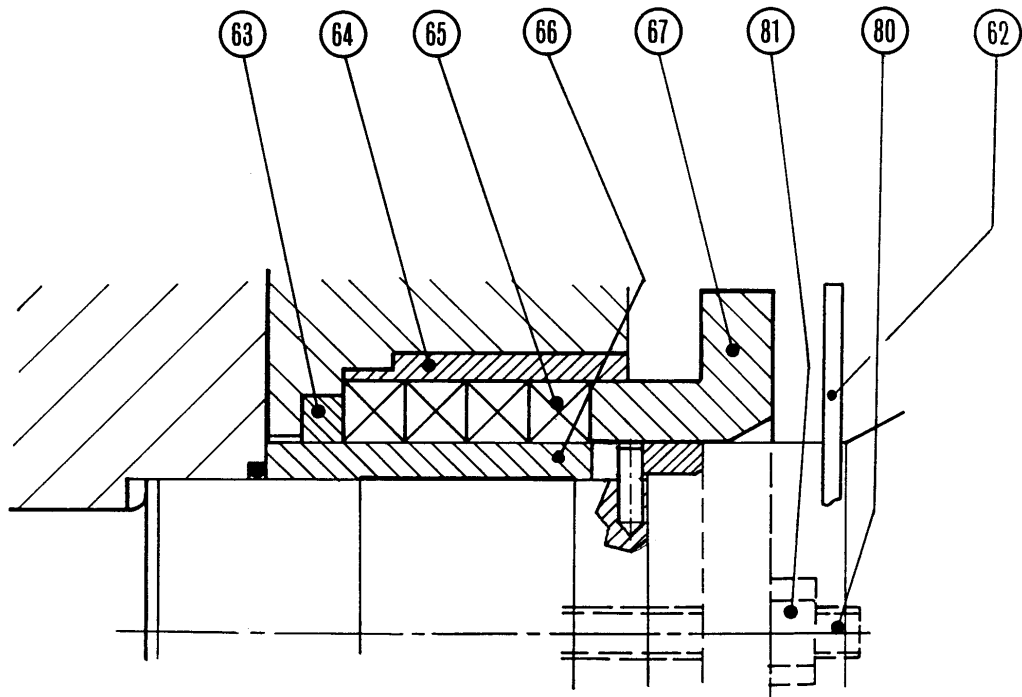
- Install packing rings (65) and lantern rings (88) to housing (94) bores, ensuring correct location of lantern rings such that they align with the liquid supply connection holes in housings (94).
- Install followers (67) to rotorcase (40) locating on studs (80).
- Install nuts (81) to studs (80) but do not tighten.
- Install rotorcase (40), (which locates onto dowels (57)), dome nuts (87), o-rings (25), rotors (41), o-rings (34), rotor retainers (35) and front cover (38), refer to section 4.1.4 (CP10/CP20/CP30) or 4.2.5 (CP40).
- Once pump is installed, ensure flush/quench supply is connected and operating correctly, refer to section 6.3, then start pump. Adjust the packed gland seals by a slow and even tightening of nuts (81).

6.6 Packed Gland Seals - CP50 Series Pumps.

6.6.1 Packed Gland Seal Removal

See Fig 73.

Fig 73



- Remove front cover (38), rotor caps (35), o-rings (34), retainers (53), rotors (41), o-rings (25), dome nuts (87) and rotorcase (40), refer to sections 4.3.1 and 4.3.2.
- Remove nuts (81), which secure followers (67) to rotorcase (40).
- Remove followers (67), sleeves (66), slingers (62), packing rings (65) and sleeves (63).

6.6.2 Packed Gland Seal Replacement

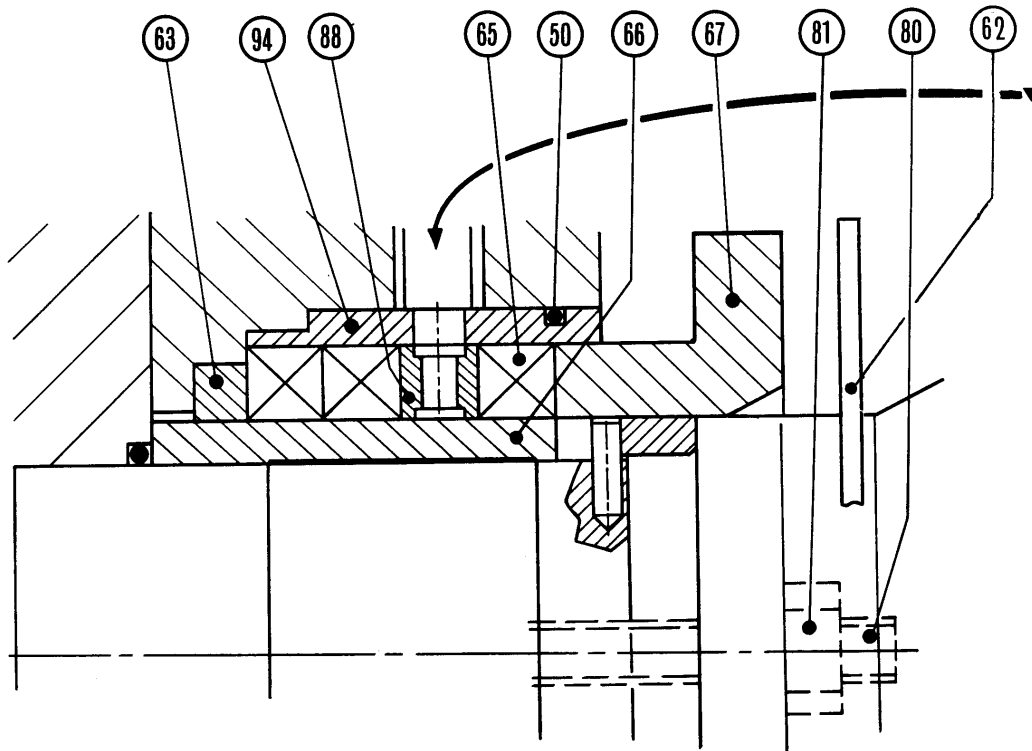
See Fig 73

- Install slingers (62) and sleeves (66) to shafts (9 and 10) ensuring engagement of drive slots with pins (76) in shafts (9 and 10).
- Install sleeves (63), packing rings (65) and followers (67) to gland tubes (64).
- Install nuts (81) to studs (80) but do not tighten.
- Install rotorcase (40); dome nuts (87), o-rings (25), rotors (41), retainers (53), o-rings (34), rotor caps (35) and front cover (38) refer to section 4.3.5.
- Once pump is installed and started adjust packed gland seals by slow and even tightening of nuts (81).

6.6.3 Flushed Packed Gland Seal Removal

See Fig 74.

Fig 74



▼ FLUSHING CONNECTION

- Remove front cover (38), rotor caps (35), o-rings (34), rotors (41), o-rings (25), dome nuts (87) and rotorcase (40) (which is located on dowels (57)) - refer to sections 4.3.1 and 4.3.2.
- Remove nuts (81), which secure followers (67) to rotorcase (40).
- Remove followers (67).
- Remove packing rings (65) and lantern rings (88) from tube (94) bores, carefully noting location of lantern rings (88).
- Remove sleeves (66) and slingers (62) from shafts (9 and 10).

6.6.4 Flushed Packed Gland Seal Replacement

See Fig 74

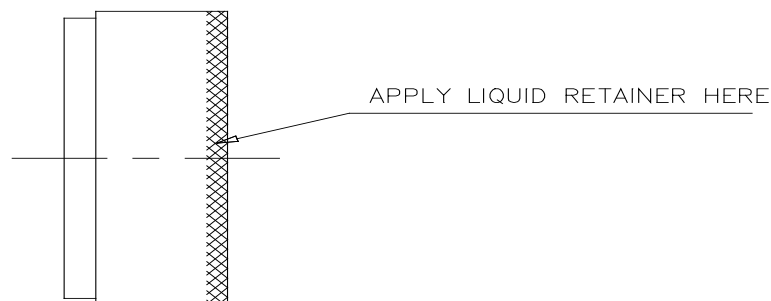
- Install slingers (62) and sleeves (66) to shafts (9 and 10) ensuring engagement of drive slots over pins (76) in shafts (9 and 10).
- Install packing rings (65) and lantern rings (88) to gland tube (94) bores, ensuring correct location of lantern rings such that they align with the liquid supply connection holes in tubes (94).
- Install followers (67) to rotorcase (40) locating on studs (80).
- Install nuts (81) to studs (80) but do not tighten.
- Install rotorcase (40), (which locates onto dowels (57)), dome nuts (87), o-rings (25), rotors (41), retainers (53), o-rings (34), rotor caps (35) and front cover (38) - refer to section 4.3.5.
- Once pump is installed, ensure flush/quench supply is connected and operating correctly, refer to section 7.3, then start pump. Adjust the packed glands seals by a slow and even tightening of nuts (81).

6.6.5 Seal Conversion to Packed Gland (With Shaft Sleeve)

See Fig 73.

- Remove front cover (38), rotor caps (35), o-rings (34), retainers (53), rotors (41), o-rings (25), dome nuts (87) and rotorcase (40) (which is located on dowels 57)), refer to sections 4.3.1 and 4.3.2
- Remove all parts of the existing shaft seal arrangement including any stationary and rotary parts, housings, sleeves, o-rings etc.
- Apply liquid retainer (Loctite 640 or similar) to outer end of tubes (64) on outside diameters to a width of approximately 5mm (3/16") - see Fig 75.

Fig 75



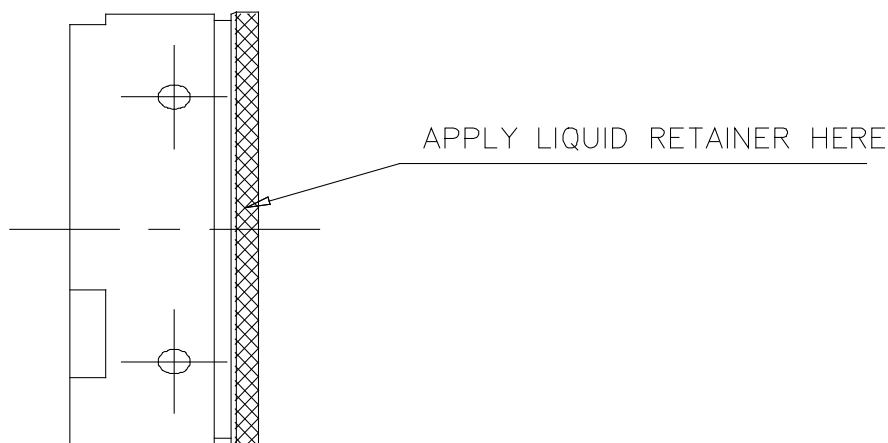
- Press tubes (64) into rotorcase (40) bore. Remove any excess liquid retainer.
- Apply liquid retainer (Loctite 270 or similar) to studs (80) and install studs (80) to rotorcase (40).
- Follow instructions for packed gland replacement, refer to section 6.3.2.

6.6.6 Seal Conversion to Flushed Packed Gland (With Shaft Sleeve)

See Fig 75

- Remove front cover (38), rotor caps (35), o-rings (34), retainers (53), rotors (41), o-rings (25), dome nuts (87) and rotorcase (40) (which is located on dowels (57)), refer to sections 4.3.1 and 4.3.2.
- Remove all parts of the existing shaft seal assembly including any stationary and rotary parts, housings, sleeves o-rings etc.
- Install o-rings (50) to tubes (94).
- Apply liquid retainer (Loctite 640 or similar) to outside diameter of tubes (94) adjacent to o-ring (50), see Fig 77.

Fig 77



- Install tubes (94) to rotorcase (40) bores. Remove any excess liquid retainer.

Note: The tubes (94) have a triangular shape, which must locate fully into the rotorcase (40) bores.

- The tubes (94) have two sets of drillings for the flush/quench liquid to pass through. Ensure that one set of drillings aligns with the liquid supply connection holes in rotorcase (40) bores.
- Apply liquid retainer (Loctite 270 or similar) to studs (80) and install studs (80) to rotorcase (40).
- Follow instructions for flushed packed gland seal replacement - refer to section 6.6.4.

7.0 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.

7.1 Single Mechanical Seal (for Low-Pressure Quench or Flush)

See Fig 17 (CP10), Fig 27 (CP20, CP30, CP40) and Fig 50 (CP50).

Refer to section 4.3.3.

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).

7.2 Double Mechanical Seal (for High Pressure Flush)

- See Fig 18 (CP10) and Fig 28 (CP20, CP30, CP40) and Fig 51 (CP50)

Refer to section 4.3.4.

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]

- CP10/0005, 0008, 0011 – 30 mm

- CP20/0020, 0031 – 35 mm

- CP30/0069, 0113 – 50 mm

- CP40/0180, 0250 – 70 mm

- CP50/0351, 0525 – 80 mm

T = Temperature of processed media [°C]

ρ = Specific gravity of buffer / barrier fluid [kg/dm³]

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 13 Bar (188 psig).

Note: The liquid supply connections to flushed seals are made using the threaded ports on the sides of the seal housings (two per seal, except CP10 & CP20 models, which have common seal housings encompassing both shaft seals). For models CP30 to CP50 inclusive, one port on each housing should be used for flush 'in' and the other for flush 'out'. The pipe work should be arranged to provide an independent flush to each seal.

7.3 Flushed Packed Gland Seal

- See Fig 73 (CP10, CP20, CP30 & CP40) & Fig 75 (CP50)

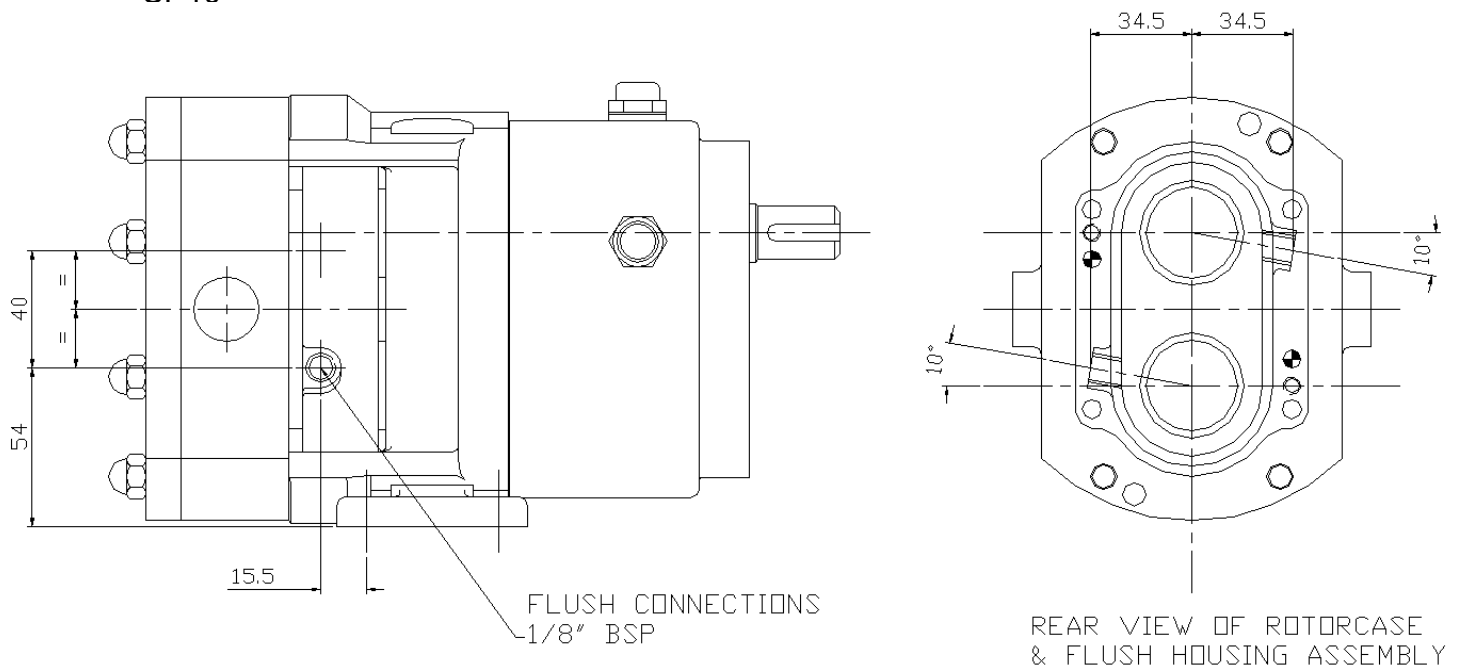
This seal arrangement requires a supply of compatible liquid to be fed to the lantern ring, which is, located part way along the length of the packed seal so as to quench or flush the seal area, or to provide suitable lubrication.

WARNING

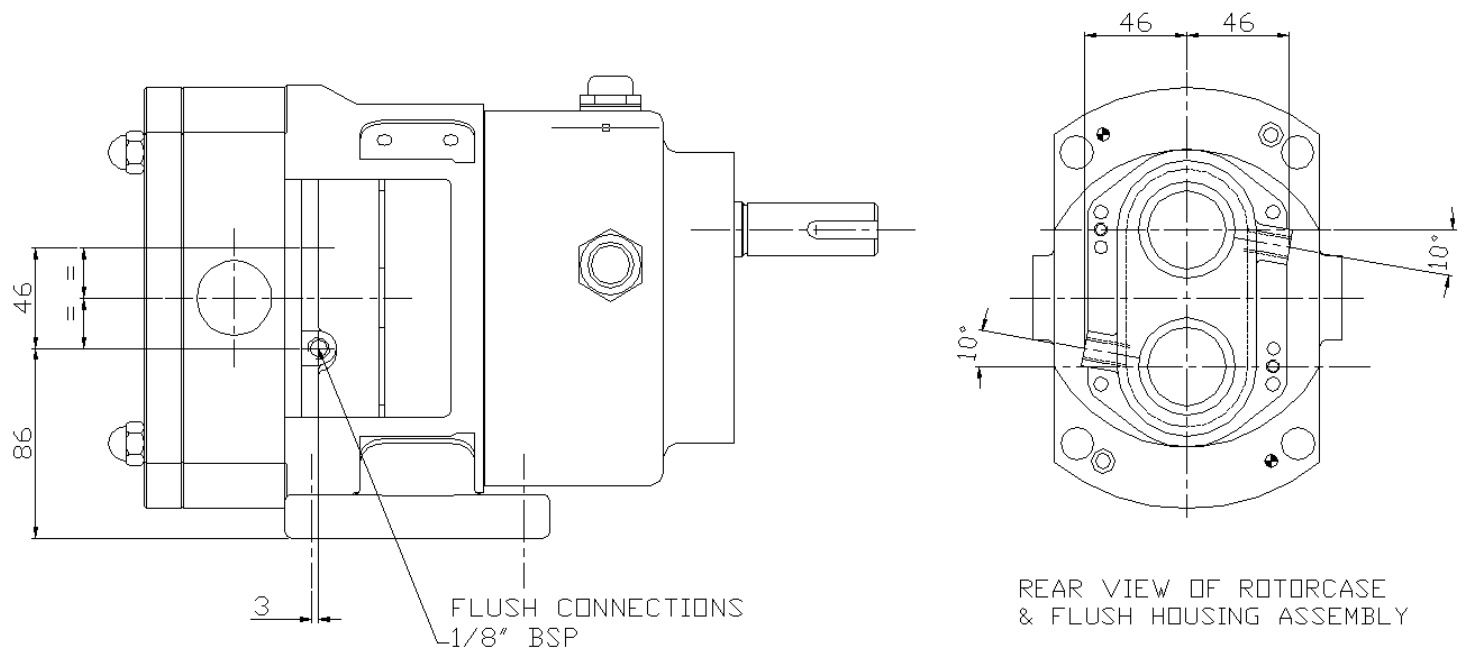
The flushing media should be supplied at a suitable flow rate and pressure so as to ensure, at minimum, a continuous weep out of the rear of the packed gland seal assembly.

7.4 Flushing Dimensions

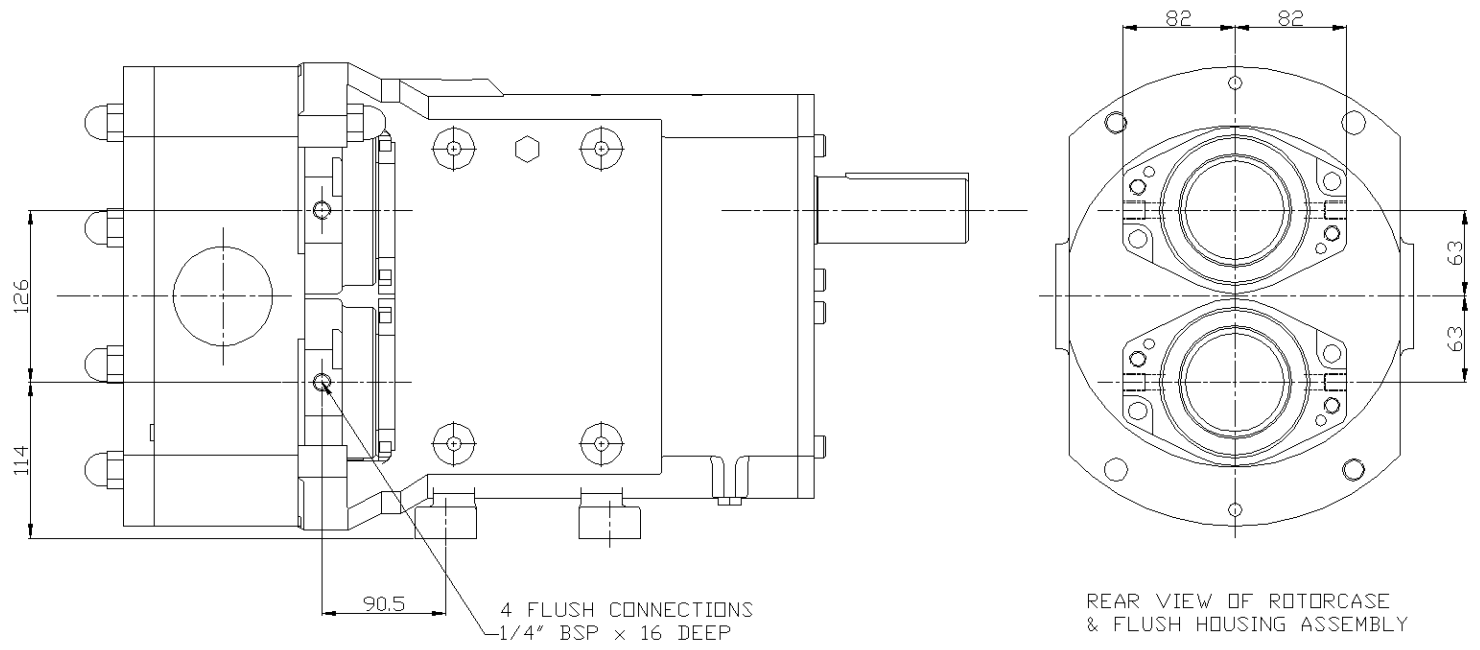
CP10



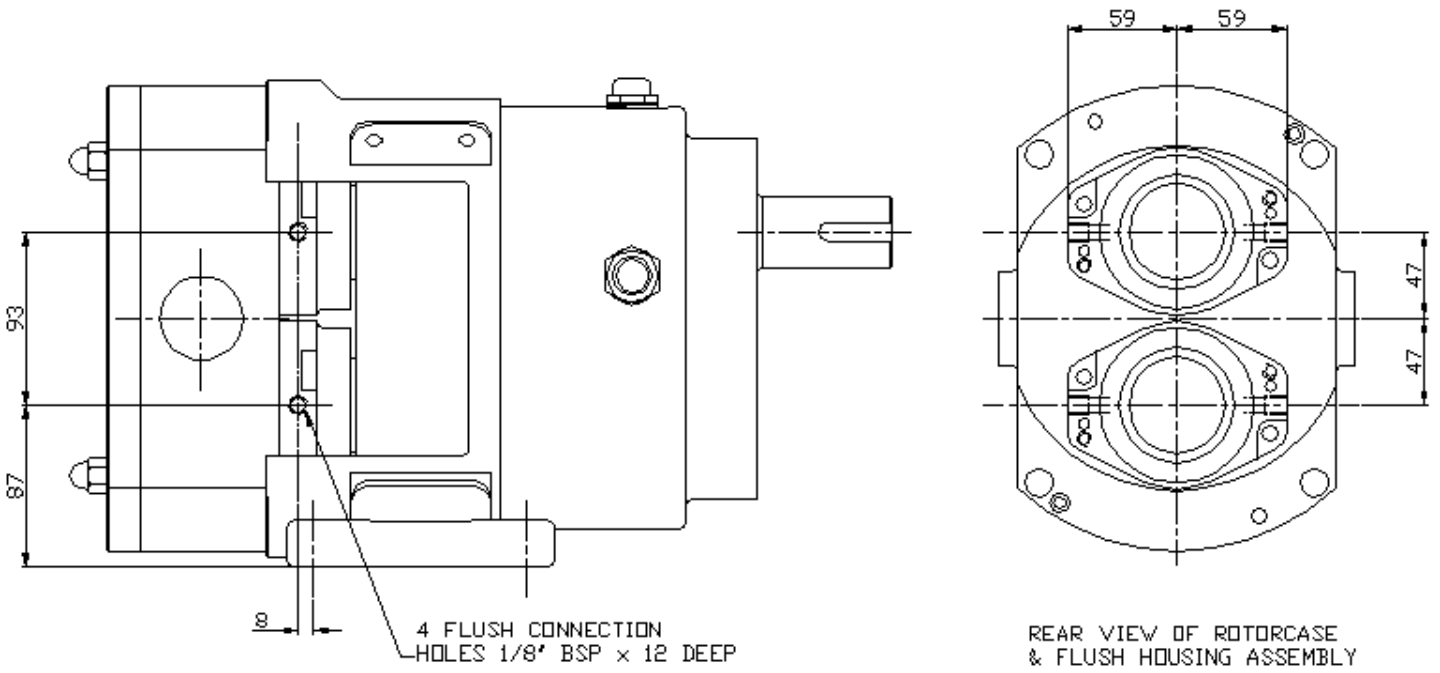
CP20



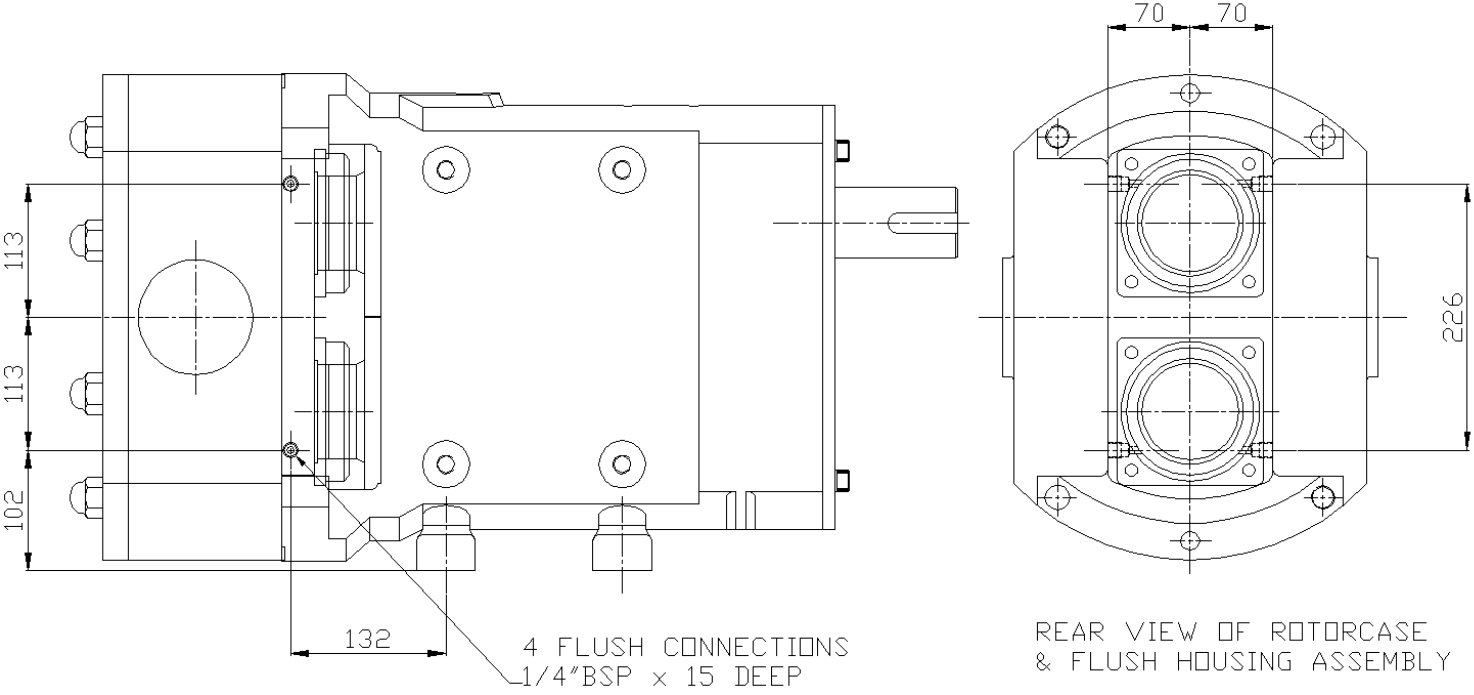
CP30



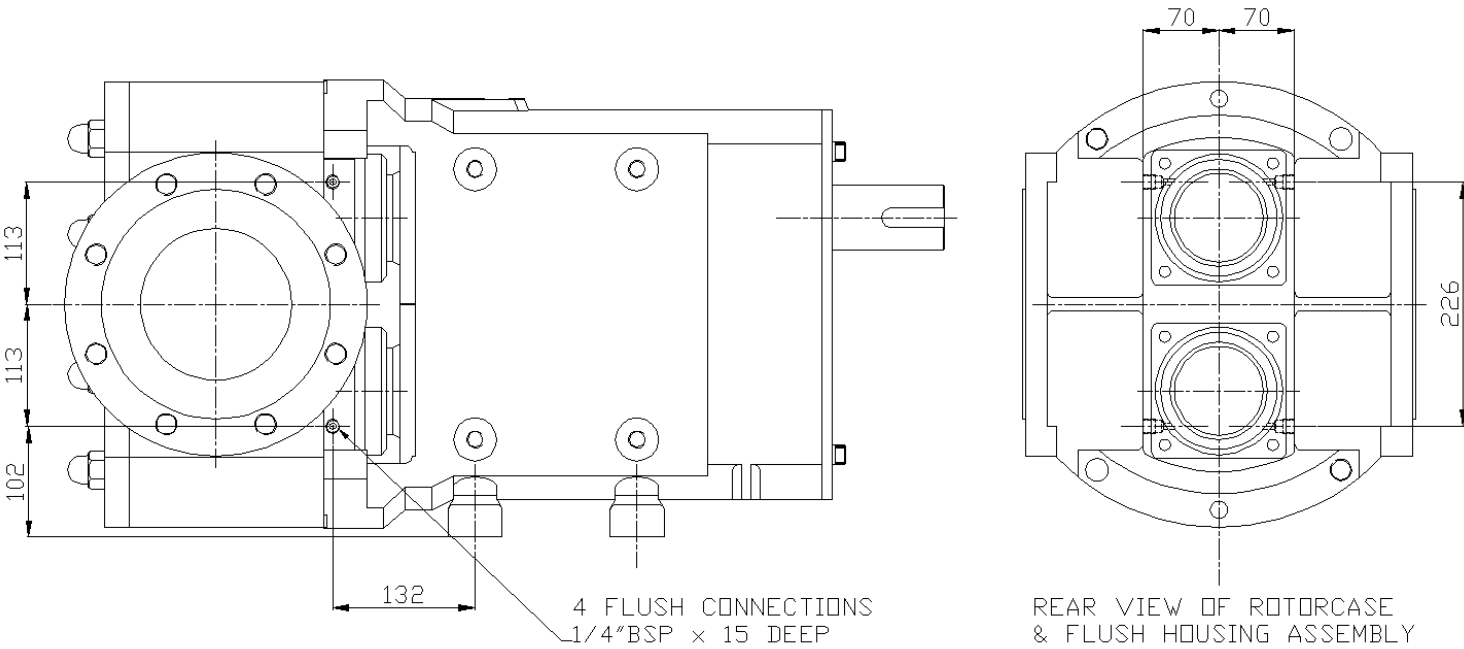
CP40



CP50 short

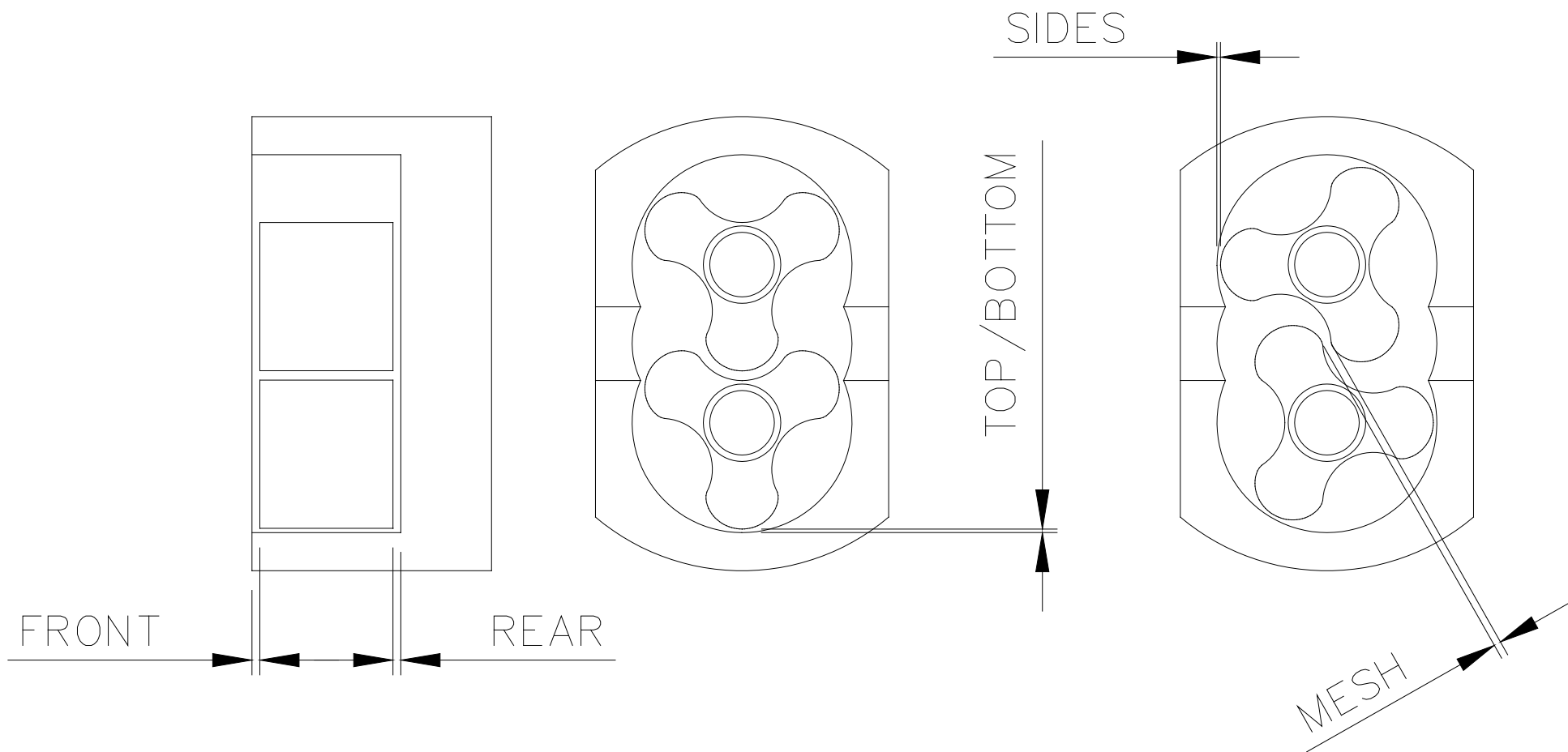


CP50 Long



8.0 Specifications

8.1 Clearance Chart



Millimetres x 0.01

Model	Rotor Class	Temp Max (°C)	Front		Rear		Top/Bottom		Side		Mesh
			Min	Max	Min	Max	Min	Max	Min	Max	
CP10/0005	A	70	0.06	0.09	0.03	0.1	0.05	0.13	0.12	0.19	0.12
	B	100	0.09	0.12	0.05	0.12	0.06	0.14	0.14	0.21	0.12
	C	150	0.11	0.14	0.06	0.13	0.08	0.16	0.17	0.24	0.12
CP10/0008	A	70	0.1	0.13	0.06	0.13	0.08	0.16	0.15	0.22	0.12
	B	100	0.12	0.15	0.09	0.16	0.09	0.17	0.17	0.24	0.12
	C	150	0.14	0.17	0.11	0.18	0.13	0.21	0.21	0.28	0.12
CP10/0011	A	70	0.13	0.16	0.09	0.16	0.1	0.18	0.18	0.25	0.12
	B	100	0.16	0.19	0.13	0.2	0.13	0.21	0.21	0.28	0.12
	C	150	0.19	0.22	0.17	0.24	0.16	0.24	0.24	0.31	0.12
CP20/0020	A	70	0.14	0.17	0.09	0.16	0.13	0.23	0.23	0.31	0.28
	B	100	0.16	0.19	0.13	0.2	0.18	0.28	0.25	0.33	0.28
	C	150	0.18	0.21	0.14	0.21	0.2	0.3	0.28	0.36	0.28
	D	180	0.19	0.22	0.15	0.22	0.23	0.33	0.31	0.39	0.28
CP20/0031	A	70	0.15	0.18	0.16	0.23	0.23	0.33	0.3	0.38	0.28
	B	100	0.19	0.22	0.19	0.26	0.29	0.39	0.37	0.45	0.28
	C	150	0.21	0.24	0.22	0.29	0.32	0.42	0.39	0.47	0.28
	D	180	0.23	0.26	0.25	0.32	0.36	0.46	0.43	0.51	0.28
CP30/0069	A	70	0.18	0.21	0.16	0.23	0.22	0.35	0.3	0.41	0.35
	B	100	0.22	0.25	0.21	0.28	0.27	0.4	0.35	0.46	0.35
	C	150	0.24	0.27	0.24	0.31	0.33	0.46	0.4	0.51	0.35
	D	180	0.27	0.3	0.26	0.33	0.37	0.5	0.45	0.56	0.35
CP30/0113	A	70	0.24	0.28	0.25	0.32	0.44	0.58	0.51	0.63	0.35
	B	100	0.29	0.33	0.3	0.37	0.47	0.61	0.54	0.66	0.35
	C	150	0.33	0.37	0.33	0.4	0.51	0.65	0.59	0.71	0.35
CP40/0180	A	70	0.32	0.37	0.28	0.39	0.3	0.45	0.46	0.58	0.4
	B	100	0.35	0.4	0.32	0.43	0.35	0.5	0.51	0.63	0.4
	C	150	0.4	0.45	0.38	0.49	0.42	0.57	0.57	0.69	0.4
CP40/0250	A	70	0.4	0.45	0.4	0.53	0.45	0.6	0.61	0.73	0.4
	B	100	0.49	0.54	0.46	0.59	0.5	0.65	0.66	0.78	0.4
	C	150	0.55	0.6	0.53	0.66	0.59	0.74	0.75	0.87	0.4
CP50/0351	B	100	0.43	0.48	0.41	0.54	0.41	0.64	0.66	0.86	0.45
	D	180	0.58	0.63	0.56	0.69	0.41	0.64	0.66	0.86	0.45
CP50/0525	B	100	0.5	0.55	0.48	0.62	0.51	0.74	0.7	0.9	0.45
	D	180	0.65	0.7	0.63	0.77	0.51	0.74	0.7	0.9	0.45

Inches x 0.001

Model	Rotor Class	Temp Max (°F)	Front		Rear		Top/Bottom		Side		Mesh
			Min	Max	Min	Max	Min	Max	Min	Max	
CP10/0005	A	158	2.36	3.54	1.18	3.94	1.97	5.12	4.72	7.48	4.72
	B	212	3.54	4.72	1.97	4.72	2.36	5.51	5.51	8.27	4.72
	C	302	4.33	5.51	2.36	5.12	3.15	6.30	6.69	9.45	4.72
CP10/0008	A	158	3.94	5.12	2.36	5.12	3.15	6.30	5.91	8.66	4.72
	B	212	4.72	5.91	3.54	6.30	3.54	6.69	6.69	9.45	4.72
	C	302	5.51	6.69	4.33	7.09	5.12	8.27	8.27	11.02	4.72
CP10/0011	A	158	5.12	6.30	3.54	6.30	3.94	7.09	7.09	9.84	4.72
	B	212	6.30	7.48	5.12	7.87	5.12	8.27	8.27	11.02	4.72
	C	302	7.48	8.66	6.69	9.45	6.30	9.45	9.45	12.20	4.72
CP20/0020	A	158	5.51	6.69	3.54	6.30	5.12	9.06	9.06	12.20	11.02
	B	212	6.30	7.48	5.12	7.87	7.09	11.02	9.84	12.99	11.02
	C	302	7.09	8.27	5.51	8.27	7.87	11.81	11.02	14.17	11.02
	D	356	7.48	8.66	5.91	8.66	9.06	12.99	12.20	15.35	11.02
CP20/0031	A	158	5.91	7.09	6.30	9.06	9.06	12.99	11.81	14.96	11.02
	B	212	7.48	8.66	7.48	10.24	11.42	15.35	14.57	17.72	11.02
	C	302	8.27	9.45	8.66	11.42	12.60	16.54	15.35	18.50	11.02
	D	356	9.06	10.24	9.84	12.60	14.17	18.11	16.93	20.08	11.02
CP30/0069	A	158	7.09	8.27	6.30	9.06	8.66	13.78	11.81	16.14	13.78
	B	212	8.66	9.84	8.27	11.02	10.63	15.75	13.78	18.11	13.78
	C	302	9.45	10.63	9.45	12.20	12.99	18.11	15.75	20.08	13.78
	D	356	10.63	11.81	10.24	12.99	14.57	19.69	17.72	22.05	13.78
CP30/0113	A	158	9.45	11.02	9.84	12.60	17.32	22.83	20.08	24.80	13.78
	B	212	11.42	12.99	11.81	14.57	18.50	24.02	21.26	25.98	13.78
	C	302	12.99	14.57	12.99	15.75	20.08	25.59	23.23	27.95	13.78
CP40/0180	A	158	12.60	14.57	11.02	15.35	11.81	17.72	18.11	22.83	15.75
	B	212	13.78	15.75	12.60	16.93	13.78	19.69	20.08	24.80	15.75
	C	302	15.75	17.72	14.96	19.29	16.54	22.44	22.44	27.17	15.75
CP40/0250	A	158	15.75	17.72	15.75	20.87	17.72	23.62	24.02	28.74	15.75
	B	212	19.29	21.26	18.11	23.23	19.69	25.59	25.98	30.71	15.75
	C	302	21.65	23.62	20.87	25.98	23.23	29.13	29.53	34.25	15.75
CP50/0351	B	212	16.93	18.90	16.14	21.26	16.14	25.20	25.98	33.86	17.72
	D	356	22.83	24.80	22.05	27.17	16.14	25.20	25.98	33.86	17.72
CP50/0525	B	212	19.69	21.65	18.90	24.41	20.08	29.13	27.56	35.43	17.72
	D	356	25.59	27.56	24.80	30.31	20.08	29.13	27.56	35.43	17.72

8.2 Fasteners & Torque Settings.

Item No	Description	Position		Classic + Model				
				CP10	CP20	CP30	CP40	CP50
1.03	Dome Nut	Front Cover / Rotorcase	Qty / Pump Size - mm Torque - Nm (lbf.ft) Torque - lbf ft	8 M8 17 12.54	4 M12 55 40.56	4 M12 55 40.56	10 M16 100 73.75	10 M20 130 95.88
2.02	Rotor Retainer	Rotor / Shaft	Qty / Pump Torque - Nm Torque - lbf ft	2 (M10) 30 22.13	2 (M12) 40 29.50	2 (M16) 108 79.65	2 (M16) 108 79.65	2 (M16) 108 79.65
2.05	Ring Feder Retainer	Rotor / Shaft	Qty / Pump Torque - Nm Torque - lbf ft	N/A	N/A	N/A	N/A	2 15 11.06
3.03	Stud	Front Cover / Rotorcase	Qty / Pump Size - mm Torque - Nm Torque - lbf ft	4 M8 x 31 17 12.54	N/A	N/A	6 M16 x 55 100 73.75	6 M20 x 70 130 95.88
4.02	Stud	Bearing Housing / Front Cover	Qty / Pump Size - mm Torque - Nm Torque - lbf ft	4 M8 17 12.54	4 M12 55 40.56	4 M12 55 40.56	N/A	N/A
4.04	Socket Cap Head Screw	Rotorcase / Bearing Housing	Qty / Pump Size - mm Torque - Nm Torque - lbf ft	N/A	2 M6 7 5.2	2 M6 7 5.2	N/A	N/A
5.01	Drive Shaft	Rolling Torque	Rolling Torque Nm	0.3 - 0.5	1.0 - 1.2	3 - 4	5 - 6	N/A
5.02	Driven Shaft	Rolling Torque	Rolling Torque lbf ft	0.22 - 0.37	0.74 - 0.89	2.21 - 2.95	3.69 - 4.43	
5.07	Socket Cap Head Screw / Hex.Head Screw	Bearing Retainer	Qty / Pump Size - mm Torque - Nm Torque - lbf ft	8 M6 x 16 16 11.80	8 M5 x 16 9 6.64	8 M5 x 16 9 6.64	8 M8 x 20 25 18.44	8 M8 x 25 25 18.44
5.12	Locknut	Timing Gear / Shaft	Qty / Pump Size - mm Torque - Nm Torque - lbf ft	2 M25 60 44.25	2 M30 110 81.13	2 33-0141-0 125 92.19	1 M55 125 92.19	1 M65 130 95.88
5.12	Grub Screw	Timing Gear Locknut	Qty / Pump Size - mm Torque - Nm Torque - lbf ft	N/A	N/A	6 M8 x 8 20 14.75	N/A	N/A
5.14	Socket Cap Head Screw	Feet	Qty / Pump Size - mm Torque - Nm Torque - lbf ft	2 M8 x 16 17 12.54	4 M8 x 16 17 12.54	4 M10 x 25 45 33.19	4 M12 x 30 55 40.56	4 M16 x 40 100 73.75
5.16	Ring Feder Retainer	Timing Gear Shaft	Qty / Pump Torque - Nm Torque - lbf ft	N/A	N/A	N/A	1 45 33.19	1 45 33.19
5.19	Locknut	Shaft / Bearing	Qty / Pump Size - mm Torque - Nm Torque - lbf ft	N/A	N/A	N/A	2 M60 180 132.75	2 M80 200 147.50
6.11	Socket Cap Head Screw	Gearbox Halves / Rear Cover	Qty / Pump Size - mm Torque - Nm Torque - lbf ft	4 M8 x 20 25 18.44	4 M10 x 25 45 33.19	6 M12 x 25 80 59.00	4 M10 x 30 45 33.19	4 M12 x 25 55 40.56
6.15	Hammer Drive	Nameplate	Qty / Pump	4	4	4	4	4
7.11	Grub Screw	Rotary Seal Cartridge	Qty / Pump Size - mm Torque - Nm Torque - lbf ft	6 or 8 M5 1.5 1.11	6 or 8 M5 1.5 1.11	6 or 8 M6 4 2.95	6 M8 9.5 7.01	N/A

* Torque values above indicate nominal values. Deviation of +/-2.5% allowed.

8.3 Lubricants.

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

EP150	-20 – 0°C (0 – 32°F)
EP220	0 – 30°C (32 - 85°F)
EP320	30°C (85°F) and higher

Approximate lubricant capacities for the Classic+:

Pump Model	Mounting Attitude with Suction and Discharge ports in:			
	Horizontal Plane		Vertical Plane	
	Litres	US Pints	Litres	US Pints
CP10	0.25	.53	0.18	0.38
CP20	0.50	1.06	0.45	0.95
CP30	1.00	2.11	0.80	1.69
CP40* (Top Cavity)	0.35	0.74	See Note below referring to Sight Glass Oil Level.**	
CP40* (Bottom Cavity)	0.90	1.90		
CP50* (Top Cavity)	0.60	1.27		
CP50* (Bottom Cavity)	0.80	1.69		

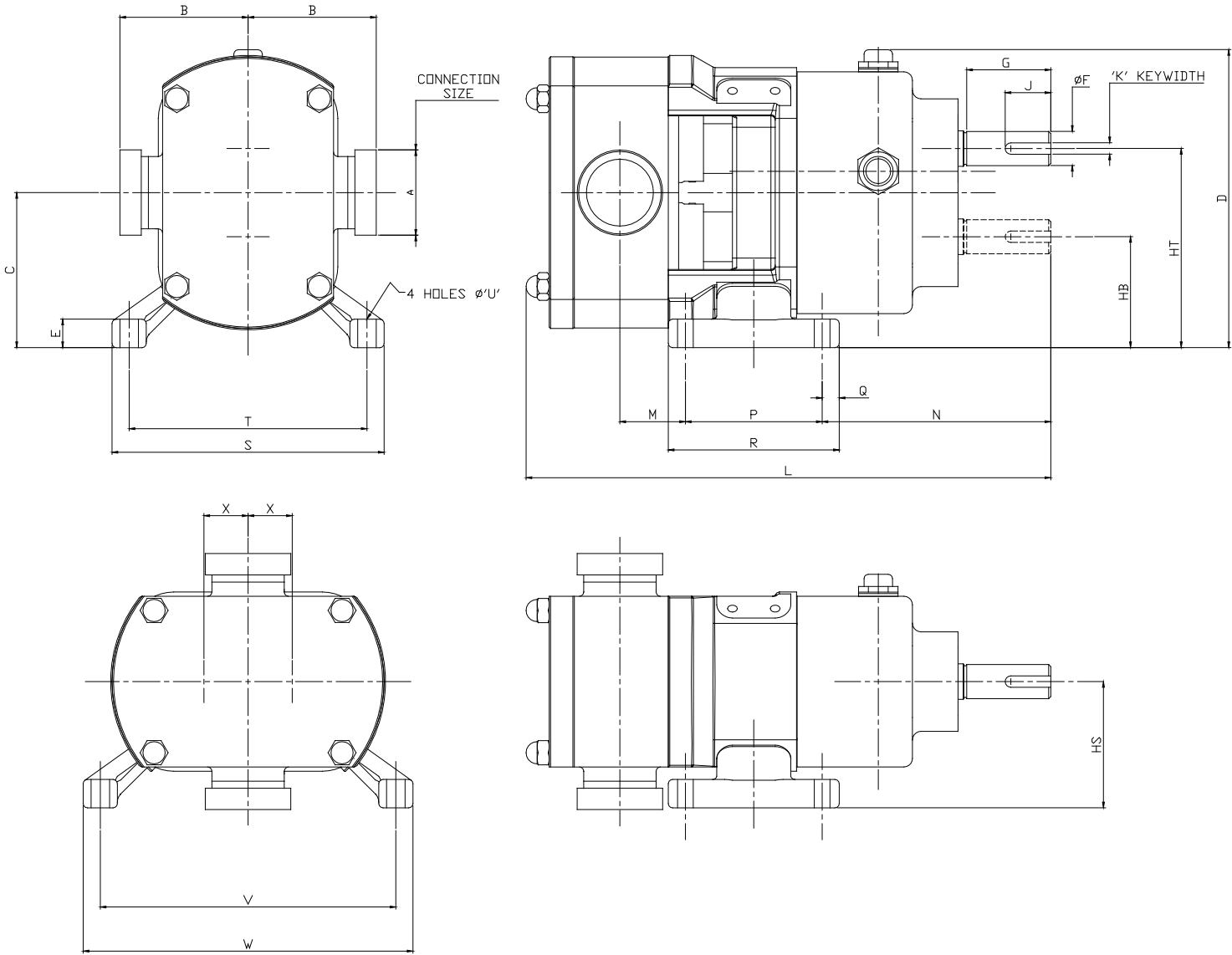
*** Note: The CP40 and CP50 have two gearbox cavities that should be subject to the same maintenance program.**

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

8.4 Material Specifications.

	CP10	CP20	CP30	CP40	CP50
Rotorcase	316 St.Steel	316 St.Steel	316 St.Steel	316 St.Steel	316 St.Steel
Front Cover	316 St.Steel	316 St.Steel	316 St.Steel	316 St.Steel	316 St.Steel
Rotors	316 St.Steel	316 St.Steel	316 St.Steel	316 St.Steel	316 St.Steel
Rotor Retainers	316 St.Steel	316 St.Steel	316 St.Steel	316 St.Steel	316 St.Steel
Shafts	316 St.Steel	316 St.Steel	316 St.Steel	316 St.Steel	416 St.Steel
Shaft Sleeves	N/A	N/A	N/A	N/A	316 St.Steel
Gearbox	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron
Bearing Housing	Cast Iron	Cast Iron	Cast Iron	N/A	N/A
Gearbox Cover	N/A	N/A	N/A	Mild Steel	Mild Steel

8.5 Foundation Dimensions and Weights.



Millimetres

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	Weight (Kg)
							(mm)						(mm)																
CP10/0005	25	89	89	103	103	103	74	152	10	18 j6	28	48	63	100	25	6	251	48	116.3	45	10	65	146	126	8.5	162.6	183.1	26	13
CP10/0008	40	89	111	103	103	103	74	152	10	18 j6	28	48	63	100	25	6	267	55	116.3	45	10	65	146	126	8.5	162.6	183.1	26	14
CP10/0011	40	89	111	103	103	103	74	152	10	18 j6	28	48	63	100	25	6	278	66	116.3	45	10	65	146	126	8.5	162.6	183.1	26	15
CP20/0020	40	98	120	112	112	112	109	206.7	20	24 j6	59	78	89	140	32	8	354.5	35.2	160.5	96	12	120	195	167	11	207.2	235.2	31	28
CP20/0031	50	98	120	112	112	120	109	206.7	20	24 j6	59	78	89	140	32	8	374.6	46.2	160.5	96	12	120	195	167	11	207.2	235.2	31	31
CP30/0069	50	124	146	138	138	146	133.3	264.8	25	38 k6	69.5	86.8	111.4	179.8	40	10	445.6	61.5	196.6	115	15	145	258.4	228.4	13	272.3	302.3	46.5	71
CP30/0113	80	124	156	138	146	151	133.3	264.8	25	38 k6	69.5	86.8	111.4	179.8	40	10	480.8	81.8	196.6	115	15	145	258.4	228.4	13	272.3	302.3	46.5	77
CP40/0180 Horizontal	80	159	191	173	181	186	177	348	25	48 k6	110	114	175	240	90	14	647.4	163.6	262.75	120	22.5	165	220	184	18	-	-	63	150
CP40/0180 Vertical																		131.6	230.75	184	18	220	-	-		228	273		
CP40/0250 Horizontal	100	163	206	173	181	186	177	348	25	48 k6	110	114	175	240	90	14	679.4	180.6	262.75	120	22.5	165	220	184	18	-	-	63	162
CP40/0250 Vertical																		148.6	230.75	184	18	220	-	-		228	273		
CP50/0351 Horizontal	100	188	235	202	210	215	215	422	30	60 m6	104	135	205	295	59	18	756.3	213	285.3	150	25	200	260	220	20	-	-	80	252
CP50/0351 Vertical																		169	241.3	238	20	278	-	-		250	300		
CP50/0525 Horizontal	150	N/A	N/A	182	182	N/A	215	422	30	60 m6	104	135	205	295	59	18	815.3	240	285.3	150	25	200	260	220	20	-	-	80	274
CP50/0525 Vertical																		196	241	238	20	278	-	-		250	300		

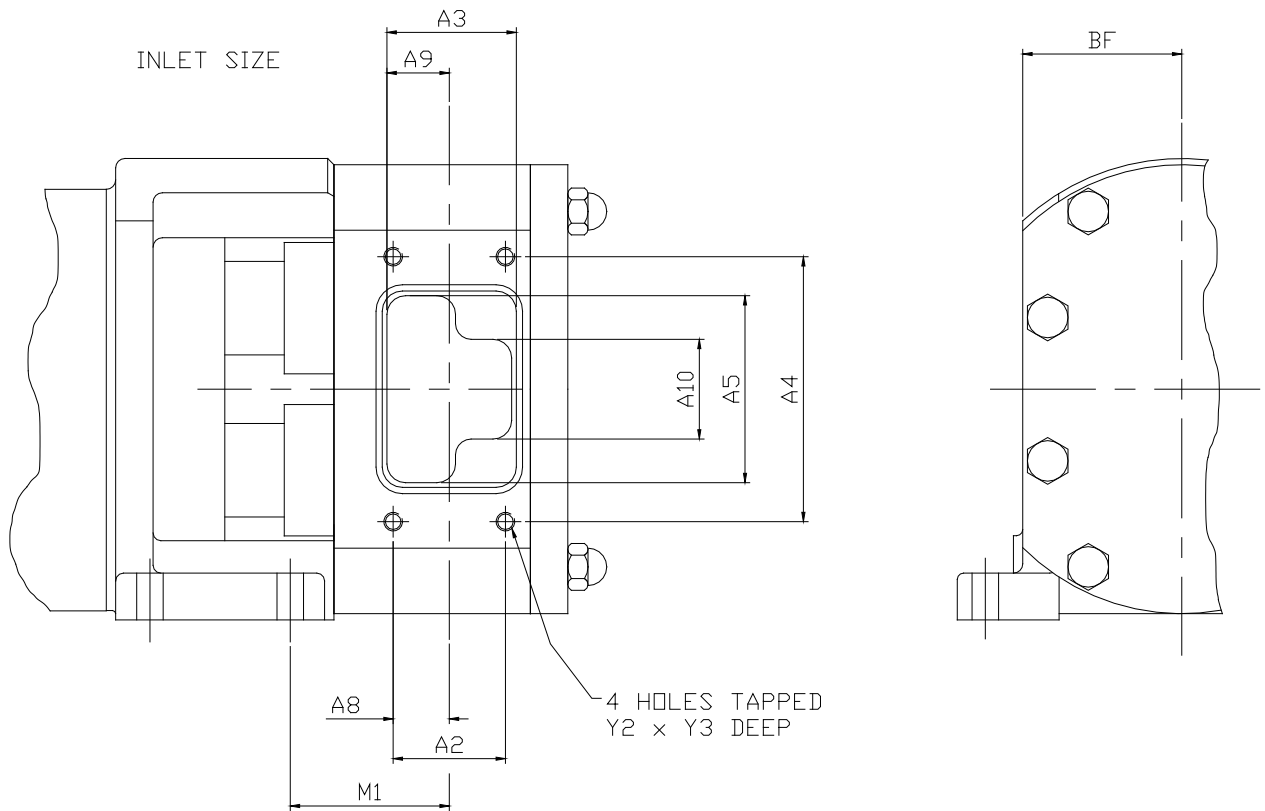
Inches

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	Weight (lbs)
							(mm)						(mm)																
CP10/0005	0.984	3.5	3.5	4.06	4.06	4.06	2.9134	5.984	0.39	18 j6	1.1	1.89	2.4803	3.937	0.98	6	9.882	1.8898	4.5787	1.77	0.39	2.559	5.748	4.961	0.33	6.4	7.2087	1.02	28.6
CP10/0008	1.5	3.5	4.37	4.06	4.06	4.06	2.9134	5.984	0.39	18 j6	1.1	1.89	2.4803	3.937	0.98	6	10.51	2.1654	4.5787	1.77	0.39	2.559	5.748	4.961	0.33	6.4	7.2087	1.02	30.8
CP10/0011	1.5	3.5	4.37	4.06	4.06	4.06	2.9134	5.984	0.39	18 j6	1.1	1.89	2.4803	3.937	0.98	6	10.94	2.5984	4.5787	1.77	0.39	2.559	5.748	4.961	0.33	6.4	7.2087	1.02	33
CP20/0020	1.5	3.86	4.72	4.41	4.41	4.41	4.2913	8.138	0.79	24 j6	2.32	3.071	3.5039	5.512	1.26	8	13.96	1.3858	6.3189	3.78	0.47	4.724	7.677	6.575	0.43	8.157	9.2598	1.22	61.6
CP20/0031	2	3.86	4.72	4.41	4.41	4.72	4.2913	8.138	0.79	24 j6	2.32	3.071	3.5039	5.512	1.26	8	14.75	1.8189	6.3189	3.78	0.47	4.724	7.677	6.575	0.43	8.157	9.2598	1.22	68.2
CP30/0069	2	4.88	5.75	5.43	5.43	5.75	5.248	10.43	0.98	38 k6	2.74	3.417	4.3858	7.079	1.57	10	17.54	2.4213	7.7402	4.53	0.59	5.709	10.17	8.992	0.51	10.72	11.902	1.83	156.2
CP30/0113	3	4.88	6.14	5.43	5.75	5.94	5.248	10.43	0.98	38 k6	2.74	3.417	4.3858	7.079	1.57	10	18.93	3.2205	7.7402	4.53	0.59	5.709	10.17	8.992	0.51	10.72	11.902	1.83	169.4
CP40/0180 Horizontal	3	6.26	7.52	6.81	7.13	7.32	6.9685	13.7	0.98	48 k6	4.33	4.488	6.8898	9.449	3.54	14	25.49	6.4409	10.344	4.72	0.89	6.496	8.661	7.244	0.71	-	-	2.48	330
CP40/0180 Vertical																		5.1811	9.0846	7.24	0.71	8.661	-	-		8.976	10.748		
CP40/0250 Horizontal	4	6.42	8.11	6.81	7.13	7.32	6.9685	13.7	0.98	48 k6	4.33	4.488	6.8898	9.449	3.54	14	26.75	7.1102	10.344	4.72	0.89	6.496	8.661	7.244	0.71	-	-	2.48	356.4
CP40/0250 Vertical																		5.8504	9.0846	7.24	0.71	8.661	-	-		8.976	10.748		
CP50/0351 Horizontal	4	7.4	9.25	7.95	8.27	8.46	8.4646	16.61	1.18	60 m6	4.09	5.315	8.0709	11.61	2.32	18	29.78	8.3858	11.232	5.91	0.98	7.874	10.24	8.661	0.79	-	-	3.15	554.4
CP50/0351 Vertical																		6.6535	9.5	9.37	0.79	10.94	-	-		9.843	11.811		
CP50/0525 Horizontal	6	N/A	N/A	7.17	7.17	N/A	8.4646	16.61	1.18	60 m6	4.09	5.315	8.0709	11.61	2.32	18	32.1	9.4488	11.232	5.91	0.98	7.874	10.24	8.661	0.79	-	-	3.15	602.8
CP50/0525 Vertical																		7.7165	9.4882	9.37	0.79	10.94	-	-		9.843	11.811		

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

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 & ASA300
B4 applies for ASA150 and BS4504 flange connections
B5 applies for ASA300 flange connections

8.6 Rectangular Inlet



Millimeters

Model	A2	A3	A4	A5	A8	A9	A10	BF	M1	Y2	Y3	Inlet Area (mm ²)	Equivalent Bore Diameter (mm)
CP10/0005/12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CP10/0008/08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CP10/0011/05	36.0	40.0	85.0	60.0	18.0	20.0	32.0	51.0	63.5	M6	10.0	1860	48.7
CP20/0020/12	25.0	28.0	105.0	80.0	12.5	14.0	NA	60.0	36.0	M8	10.0	2209	53.0
CP20/0031/07	45.0	48.0	105.0	80.0	22.5	24.0	NA	60.0	46.0	M8	10.0	3809	69.6
CP30/0069/12	40.0	43.0	145.0	114.0	20.0	21.5	NA	85.5	59.6	M10	12.0	4847	78.6
CP30/0113/07	70.0	78.0	145.0	114.0	35.0	39.0	NA	85.5	77.4	M10	12.0	8837	106.1
CP40/0180/12	62.0	70.0	190.0	152.0	31.0	35.0	70.0	121.0	166.0	M10	15.0	8914	106.5
CP40/0250/07	94.0	102.0	190.0	152.0	47.0	51.0	70.0	121.0	182.0	M10	15.0	13778	132.4
CP50/0351/12	80.0	86.0	250.0	200.0	40.0	43.0	98.0	145.0	213.0	M10	15.0	15444	140.2
CP50/0525/08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

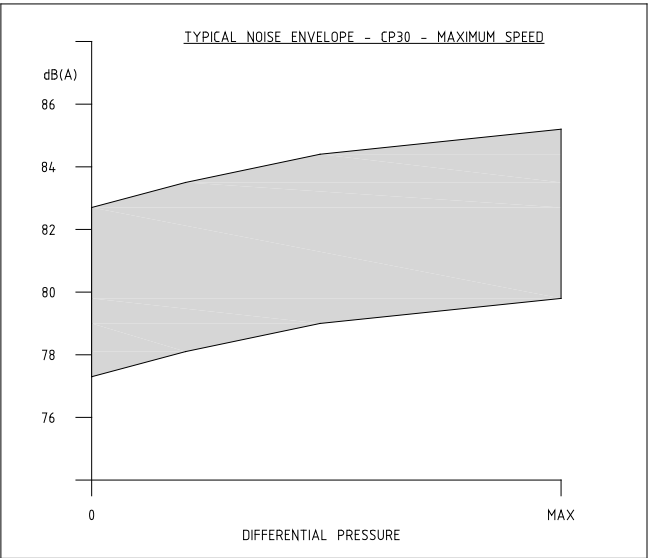
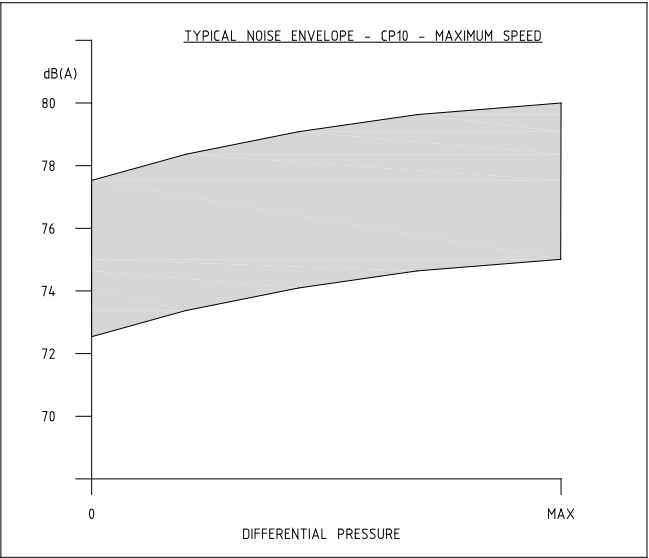
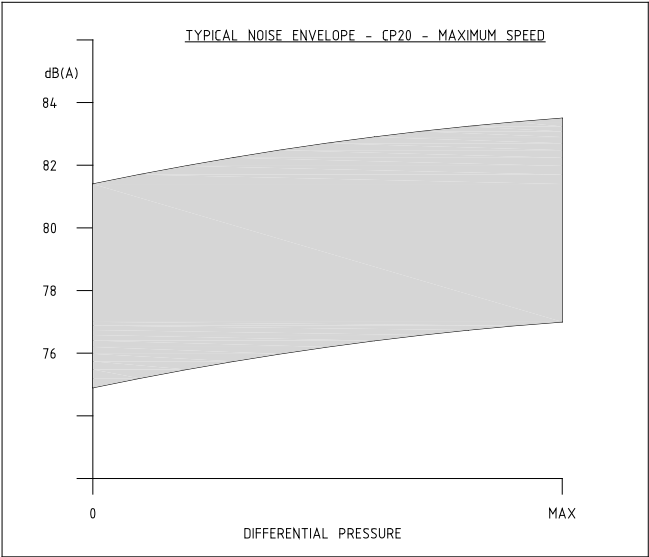
Inches

Model	A2	A3	A4	A5	A8	A9	A10	BF	M1	Y2	Y3	Inlet Area (In ²)	Equivalent Bore Diameter (In)
CP10/0005/12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CP10/0008/08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CP10/0011/05	1.42	1.57	3.35	2.36	0.71	0.79	1.26	2.01	2.50	M6	0.4	73.23	1.92
CP20/0020/12	0.98	1.10	4.13	3.15	0.49	0.55	NA	2.36	1.42	M8	0.4	86.97	2.09
CP20/0031/07	1.77	1.89	4.13	3.15	0.89	0.94	NA	2.36	1.81	M8	0.4	149.96	2.74
CP30/0069/12	1.57	1.69	5.71	4.49	0.79	0.85	NA	3.37	2.35	M10	0.5	190.83	3.09
CP30/0113/07	2.76	3.07	5.71	4.49	1.38	1.54	NA	3.37	3.05	M10	0.5	347.91	4.18
CP40/0180/12	2.44	2.76	7.48	5.98	1.22	1.38	2.76	4.76	6.54	M10	0.6	350.94	4.19
CP40/0250/07	3.70	4.02	7.48	5.98	1.85	2.01	2.76	4.76	7.17	M10	0.6	542.44	5.21
CP50/0351/12	3.15	3.39	9.84	7.87	1.57	1.69	3.86	5.71	8.39	M10	0.6	608.03	5.52
CP50/0525/08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

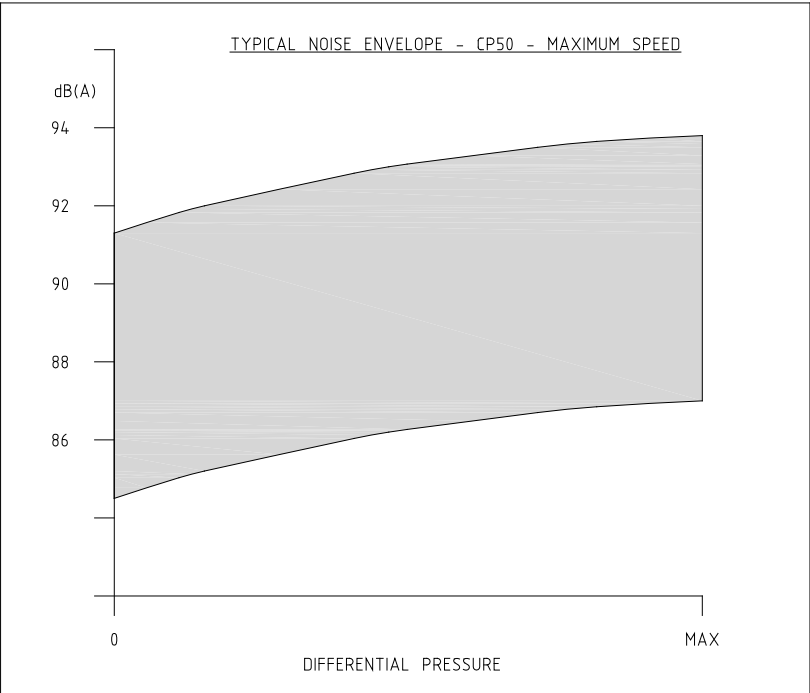
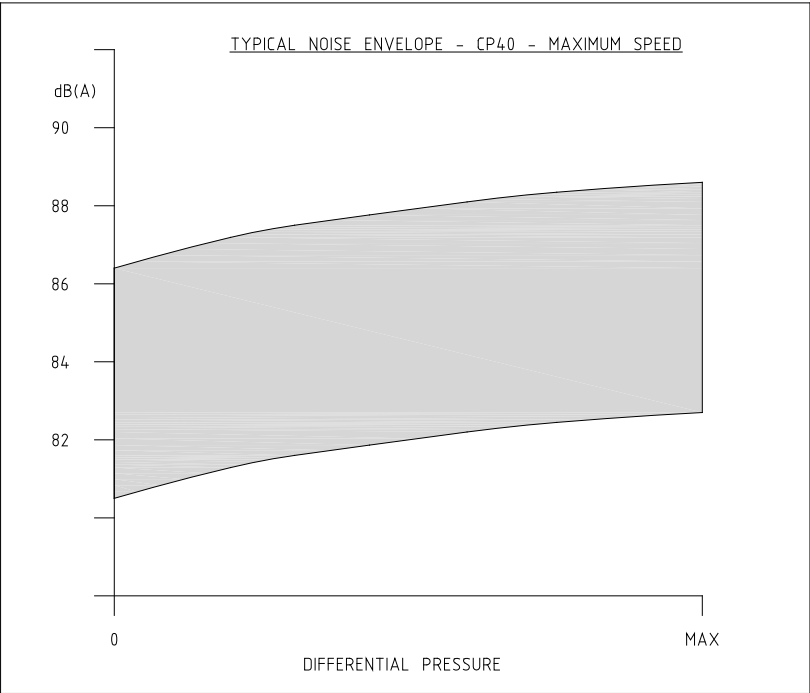
8.7 Trouble Shooting.

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
X										INCORRECT DIRECTION OF ROTATION	REVERSE MOTOR
X										PUMP NOT PRIMED	EXPEL GAS FROM SUCTION LINE/PUMP CHAMBER & PRIME
X	X	X					X			INSUFFICIENT NPSH AVAILABLE	INCREASE LINE DIA. & STATIC SUCTION HEAD. SIMPLIFY SUCTION LINE & REDUCE LENGTH. REDUCE PUMP SPEED AND PRODUCT TEMPERATURE.
	X	X					X			PRODUCT VAPOURIZING IN SUCTION LINE	
	X	X					X			AIR ENTERING SUCTION LINE	
X	X	X					X			GAS IN SUCTION LINE	EXPEL GAS FROM SUCTION LINE/PUMP CHAMBER
	X	X					X			INSUFFICIENT STATIC SUCTION HEAD	RAISE PRODUCT LEVEL TO INCREASE STATIC SUCTION HEAD
			X	X			X		X	PRODUCT VISCOSITY TOO HIGH	DECREASE PUMP SPEED/INCREASE PRODUCT TEMPERATURE
		X								PRODUCT VISCOSITY TOO LOW	INCREASE PUMP SPEED/DECREASE PRODUCT TEMPERATURE
		X	X		X		X		X	PRODUCT TEMPERATURE TOO HIGH	COOL PRODUCT/PUMPING CHAMBER
				X					X	PRODUCT TEMPERATURE TOO LOW	HEAT PRODUCT/PUMPING CHAMBER
					X	X	X	X		UNEXPECTED SOLIDS IN PRODUCT	CLEAN THE SYSTEM/FIT STRAINER ON SUCTION SIDE OF PUMP
		X	X	X	X		X	X	X	DISCHARGE PRESSURE TOO HIGH	CHECK FOR BLOCKAGES/SIMPLIFY DISCHARGE LINE
			X	X	X		X	X		ROTORCASE STRAINED BY PIPING	CHECK PIPE ALIGNMENT /SUPPORT PIPING
				X			X			PUMP SPEED TOO HIGH	DECREASE PUMP SPEED
		X								PUMP SPEED TOO LOW	INCREASE PUMP SPEED
			X	X	X	X	X	X		SEAL FLUSH INADEQUATE	INCREASE SEAL FLUSH TO REQUIRED PRESSURE/FLOW
			X	X	X	X	X	X	X	BEARING/TIMING GEAR WEAR	REPLACE WORN COMPONENTS

8.8 Typical Noise Emission Data - CP10, CP20 and CP30 Pumps.



8.9 Typical Noise Emission Data – CP40 and CP50 Pumps.



8.10 Service History.

Pump Model:

Pump Serial No:

[illegible]

8.11 Tool List.

Listed below are tools required for the maintenance for the Classic+.

TYPE	SIZE OR RANGE	CP10	CP20	CP30	CP40	CP50
Combination Spanner	8 mm			•		
Combination Spanner	10 mm	•				
Combination Spanner	13 mm	•	•	•		
Combination Spanner	17 mm	•			•	•
Combination Spanner	19 mm		•	•		
Combination Spanner	24 mm		•	•	•	•
Combination Spanner	30 mm					•
Combination Spanner	65 mm				•	

Hexagon (Allen) Key	1/4"	•	•	•	•	•
Hexagon (Allen) Key	2.5 mm	•	•			
Hexagon (Allen) Key	3 mm	•	•	•		
Hexagon (Allen) Key	4 mm	•	•	•		
Hexagon (Allen) Key	5 mm	•	•	•	•	•
Hexagon (Allen) Key	6 mm	•		•	•	•
Hexagon (Allen) Key	8 mm		•	•	•	
Hexagon (Allen) Key	10 mm			•		•

Hexagon (Allen) Key (Socket Driven)	3 mm	•	•	•		
Hexagon (Allen) Key (Socket Driven)	4 mm	•	•	•		
Hexagon (Allen) Key (Socket Driven)	5 mm	•		•	•	•
Hexagon (Allen) Key (Socket Driven)	6 mm	•			•	•
Hexagon (Allen) Key (Socket Driven)	8 mm		•		•	
Hexagon (Allen) Key (Socket Driven)	10mm			•		•

TYPE	SIZE OR RANGE	CP10	CP20	CP30	CP40	CP50
Torque Wrench	Adjustable to Min. 39 NM (28.76 ft-lb.)	•				
Torque Wrench	Adjustable to Min. 107 NM (78.91 ft-lb.)		•			
Torque Wrench	Adjustable to Min. 135 NM (99.56 ft-lb.)			•		
Torque Wrench	Adjustable to Min. 130 NM (95.87 ft-lb.)				•	
Torque Wrench	Adjustable to Min. 160 NM (117.99 ft-lb.)					•

Depth Micrometer	0 - 25 mm (0 - 1")	•	•	•	•	•
Feeler Gauge Set		•	•	•	•	•
Micrometer	0 – 25 mm (0 – 1")	•	•	•	•	•
Rolling Torque Meter	0 - 5 Nm (0 - 3.688 ft-lb.)	•	•			
Rolling Torque Meter	0 - 10 Nm (0 - 7.376 ft-lb.)			•	•	
Rotor Retainer Socket	Supplied with Pump	•	•	•	•	•

C – Spanner	To Suit Locknut Ø38.0 mm (1.496")		•			
C – Spanner	To Suit Locknut Ø45.0 mm (1.772")			•		
C – Spanner	To Suit Locknut Ø75.0 mm (2.953")				•	
C – Spanner	To Suit Locknut Ø85.0 mm (3.346")					•
Soft Faced Mallet		•	•	•	•	•
Screwdriver	Flat Blade, Medium	•	•	•	•	•
Circlip Pliers	Internal	•	•	•	•	
Pin Punch	Small	•	•	•	•	•
Steel Hammer	Small	•	•	•	•	•

FOR PUMPS WITH RELIEF VALVE INSTALLED

Pry Bar	Diameter 8.0 By 200 Long (0.315" By 7.874")	•				
Pry Bar	Diameter 13.0 By 400 Long (0.512" By 15.748")		•			
Pry Bar	Diameter 16.0 x 600 Long (0.63" By 23.622")			•		
Pin Spanner	Adjustable	•	•	•		

9.0 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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