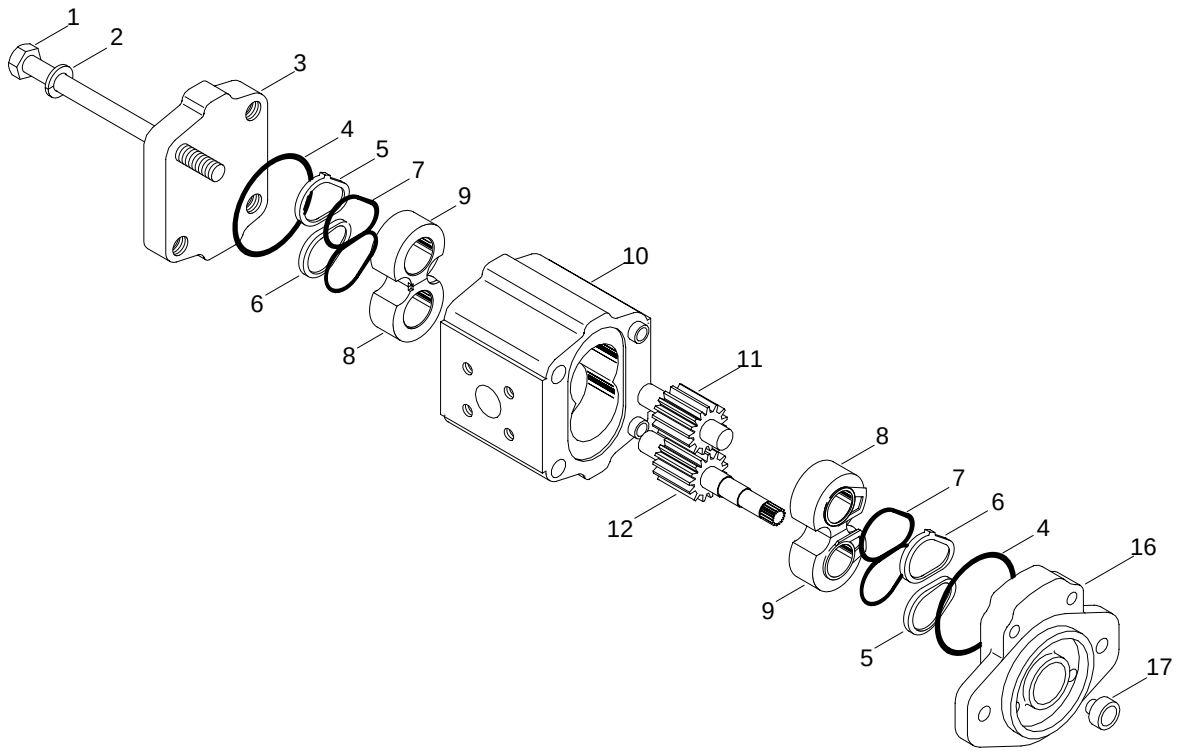
1. BRAKE PUMP

1) STRUCTURE



1	Bolt	6	Backing ring	11	Driven gear
2	Spring washer	7	Bushing lobe seal	12	Splined drive shaft
3	End cover	8	Bushing	16	Mounting flange
4	Body O-ring	9	Bushing	17	Shaft seal
5	Backing ring	10	Body		

2) GENERAL

(1) Introduction

Each unit comprises an end cover, body housing, the bush/gear assembly and a mounting flange bolted together. The gear/bush assembly consists of a pair of meshing gears supported by plain bearings in the bushes. The drive gear journal extends through the mounting flange to form the drive shaft. A lip type shaft seal and O-rings provide external sealing whilst special lobe seals and backing rings are used internally.

(2) Routine maintenance

No maintenance is necessary other than periodic checks for tightness of the mounting bolts and visual examination for oil leakage. The unit should be kept externally clean, especially in the area of the shaft seals as dirt can accelerate seal wear and cause leakage.

The unit must be operated only with clean oil and the system manufacturer's directions for periodic renewal of system oil filter elements must be strictly observed.

(3) Field servicing

Seal kits and spare parts are available to enable units to be serviced.

(4) Direction of rotation

The manufactured direction of rotation is indicated by an arrow and the word **rotate** on the body. The first letter of the code reference following the number stamped on the body also denotes rotation.

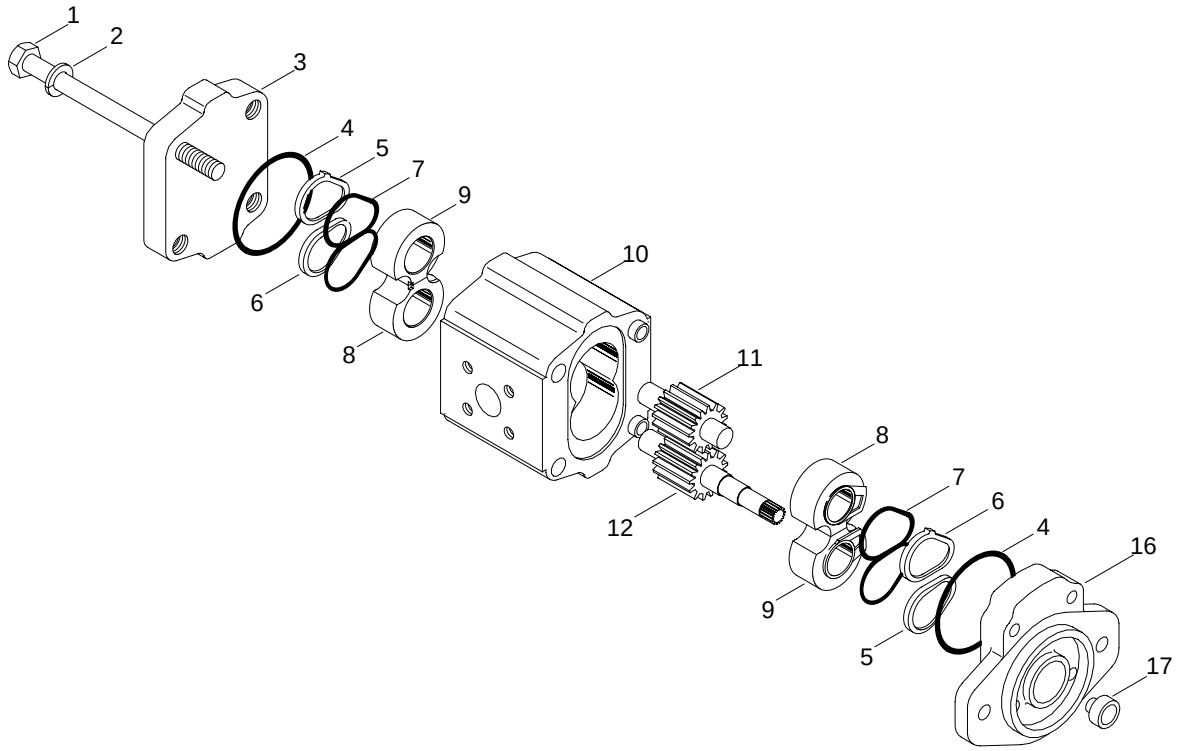
A : Anti-clockwise

C : Clockwise

Rotation is always specified as viewed on the end of the drive shaft.

For identification the inlet port is arrowed or stamped with the word **inlet** for pumps.

3) DISASSEMBLY



※ Before disassembling ensure that the unit itself, bench and tools are thoroughly clean.

(1) Withdraw the drive coupling from the drive shaft using a suitable puller. The coupling must not be levered or hammered off the shaft as this will result in internal damage.

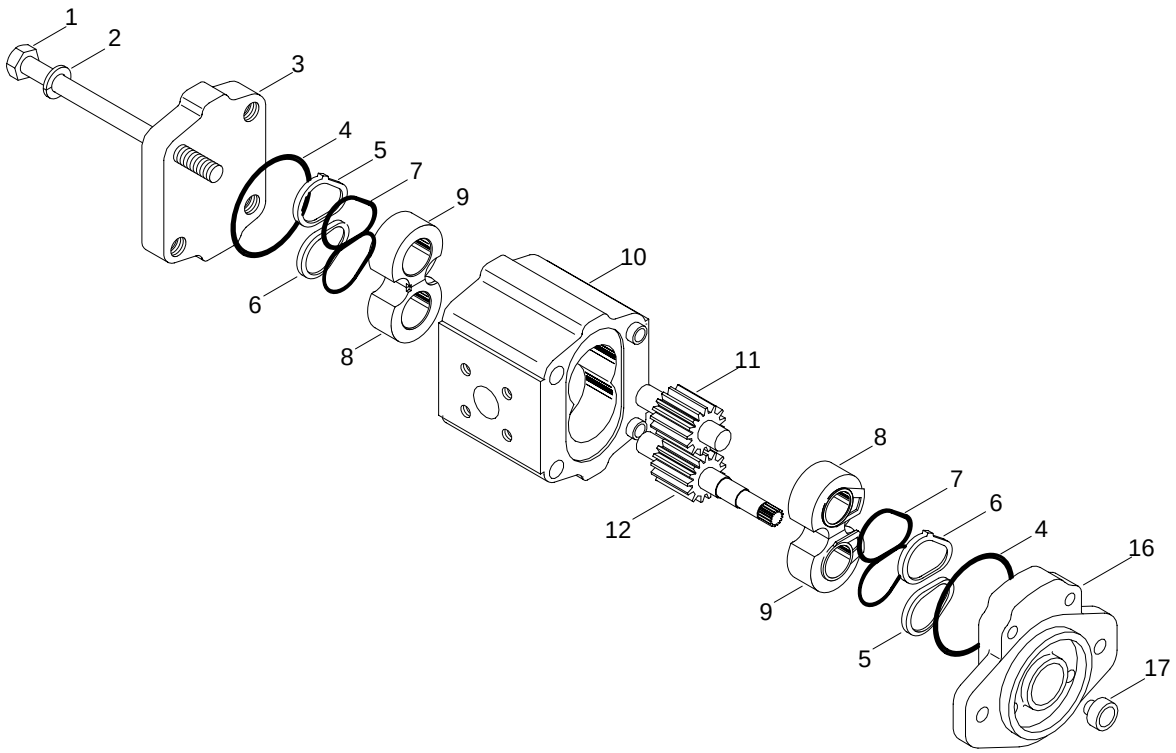
(2) Lightly mark the end cover(3), body(10) and mounting flange(16) to ensure reassembly in the correct position and take note of the direction of rotation.

(3) Remove the bolts(1).

(4) Remove the end cover(3), backing rings(5, 6), bush lobe seal(7) and the body O-ring(4).

(5) At the other end of the unit, after ensuring there are no burrs on the shaft, lightly tap the mounting flange to disengage it from the locating dowels and slide it squarely off the shaft.

DISASSEMBLY



(7) Remove push shaft seal(17) squarely out of the mounting flange(16), taking care not to damage any sealing surfaces.

(8) Remove the body O-ring(4), backing rings(5) and the bushing lobe seal(7).

(9) Before removing the internal components each bushing(8 and 9) must be marked to denote its location within the body. On the plain area of the bush away from the seal location, lightly mark:
FD = Flange Drive Shaft
FI = Flange Driven(Idler) Gear
CD = Cover Drive Shaft
CI = Cover Driven (Idler) Gear

(10) With the unit laying on its side grasp hold of the drive shaft(12) and pull it squarely out of the body (10) bringing the bushes(8, 9) with it.

(11) Remove the driven gear(11) and the two remaining bushes.

4) INSPECTION AND REPAIR

(1) Assessment

Each components should be thoroughly cleaned, carefully examined and assessed for suitability re-use. Below is a guide for inspecting the various components.

(2) Body

① Inspect the body bore cut-in where both gears wipe into the body.

② The body can only be re-used if the **cut-in** is bright and polished in appearance and the depth does not exceed 0.08㎜(0.003").

③ The body should be replaced if the surface is scored, has a matt appearance or shows signs that the tip of the gears have dug in and torn away the surface material.

④ The body should be inspected to ensure that there is no superficial damage which may adversely effect performance or sealing. Pay particular attention to the port threads and body O-ring seal recesses.

(3) Mounting flange and end cover

① The inner surfaces should be inspected to ensure that there is no unusual wear or scoring in the regions where the body O-rings and backing rings contact, which result in external leakage.

② Check the shaft seal recess for scoring or damage that could result in oil leakage around the outer diameter of the shaft seal. Replacement shaft seals can be refitted with Loctite hydraulic sealant to overcome slight damage in this area.

(4) Bushes

① The side faces which abut the gears should be perfectly flat showing no sign of scoring. Characteristically there are bright polished areas on this surface caused by loading against the gear side faces, which is often more pronounced on the low pressure side. The bush should be replaced if there is any general scoring or fine scoring with a matt appearance or tearing of the surface material. Often there is a witness where the tips of the opposing gears have wiped an overlap reassembling a half moon shape. There must be no noticeable wear step as it is critical that the bush side face is completely flat to the gear side face.

② The bearing liners are acceptable providing that they are not scored or show other damage. The general outside area of the bush should not show any prominent signs of wear.

(5) Gears

① The gear side faces should be examined for bruising or scoring. Often operation on contaminated fluid shows scoring between the root of the gear and the journal undercut, which leaves a wear step. If a wear step can be felt, coincidental with the root diameter, by drawing a sharp pointed tool across the surface from the undercut outwards towards the tip of the gear, then the gear is unserviceable.

② The gear teeth should then be carefully examined to ensure that there are no signs of bruising or pitting.

③ The journal bearing surfaces should be completely free from scoring or bruising. The surface should appear highly polished and smooth to touch.

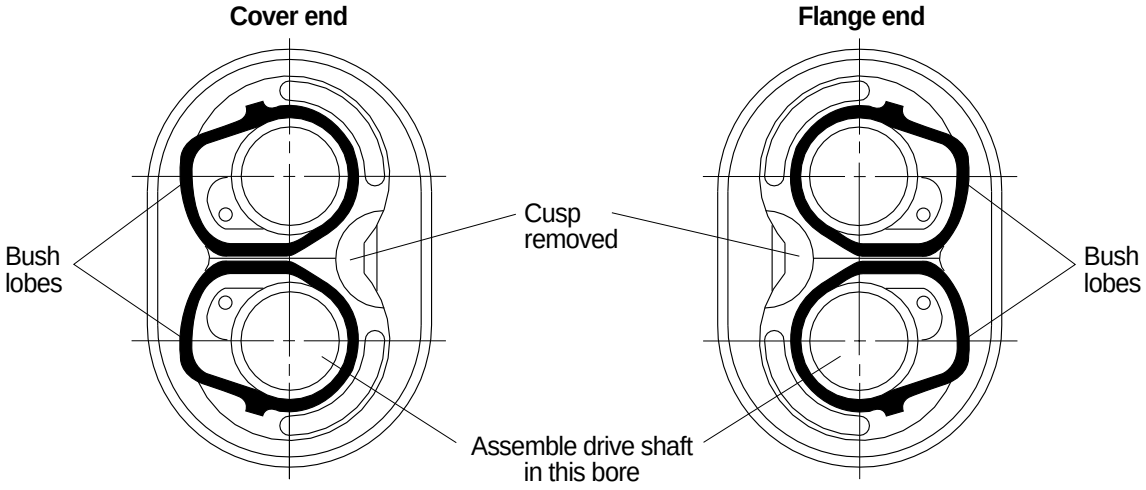
④ Examine the area where the shaft seal lips run on the drive shaft, this shows up as a polished ring or rings. If a noticeable groove can be felt or there is scoring the shaft should be replaced.

⑤ Provided the drive shaft is not damaged from the drive-coupling and the gears have not been harmed as described above, then the gears can be re-used. If, however, the gears are damaged they must be replaced as a matched pair.

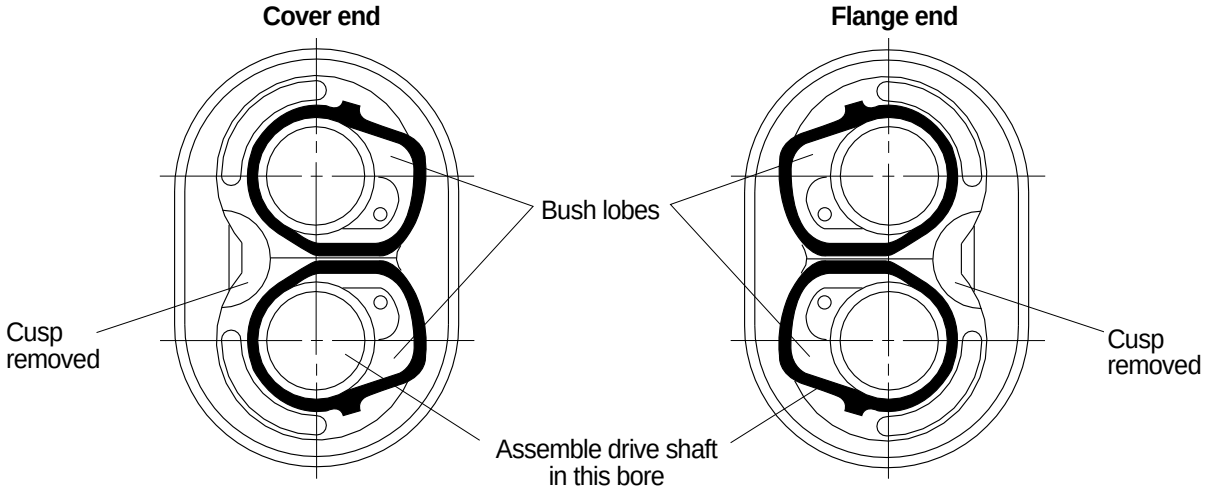
⑥ As a matter of good practice, when pumps have been disassembled, all the seals should be replaced. It is most important that only the genuine seals are used.

(6) Arrangement of bushes in body

① Clockwise pump



② Anti-clockwise pump

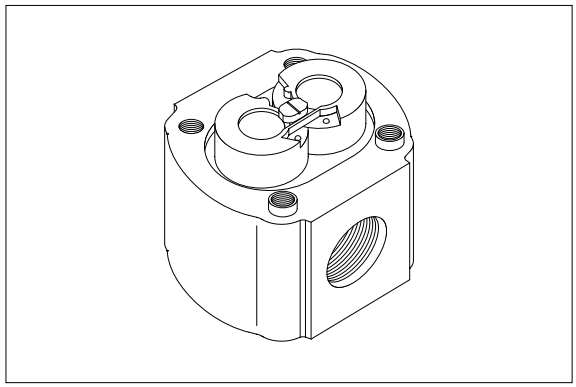


※ In the bushes are always assembled in the body with the C shape mating with the cusp removal flat the body.

5) ASSEMBLY

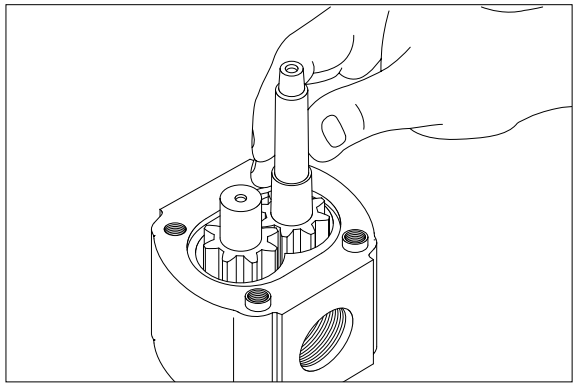
※ Ensure that all parts are perfectly clean and lightly lubricate the bushes and gear with hydraulic oil.(Ensure body O-ring recess and end faces remain free from oil.) This will assist with their assembly when they are later fitted into the body.

(1) Refit the cover drive shaft bush CD(8) and cover driven bush CI(19) into the body(10) from where they were removed. (The C shape of the bushes should mate with the cusp removal flat in the bodys, see fig at page 4-45.)

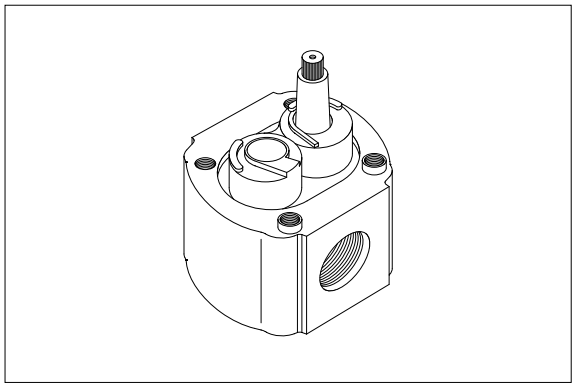


(2) Place the end cover(3) against the body(10) and then stand the assembly on the cover so that the hollow dowels are uppermost, i.e. the bushes shown in fig at page 4-45 should be at the bottom with the lobes against the cover.

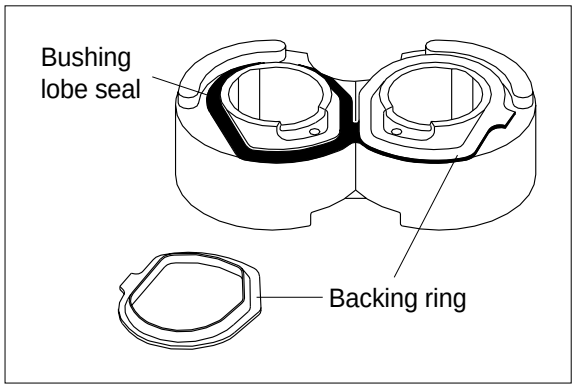
(3) Fit the drive shaft(12) and driven gear(11) back into their original positions in the body(10).



(4) Refit the flange drive shaft bush FD(9) and the flange driven bush FI(8) into their original bores. (The C shape of the bushes should mate with the cusp removal flat in the body and match the cover bushes, see fig at page 4-45.)

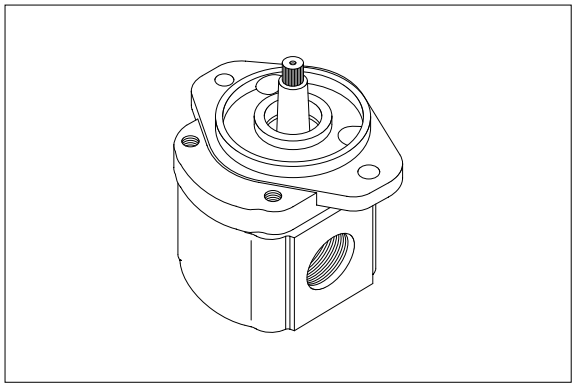


(5) Fit the new bushing lobe seal(7) and backing rings(5, 6) to the bush lobes.
Fit the new body O-ring(4).

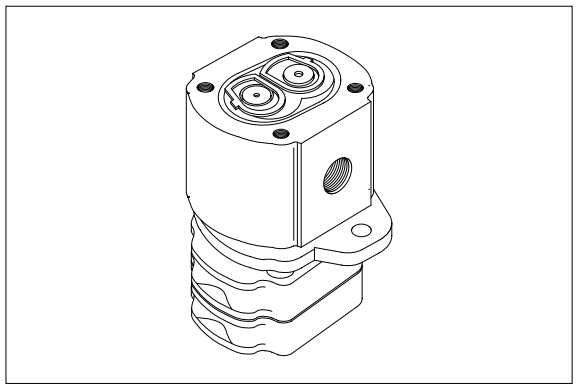


(6) Push shaft seal(17) squarely into the recess in the mounting flange(16) with the garter spring facing in towards the pump.
Remember that if the seal recess was scored then Loctite hydraulic sealant must be applied to the outer diameter of the replacement seal to prevent leakage.
Apply a coating of high melting point grease between the lips of the shaft seal for lubrication.

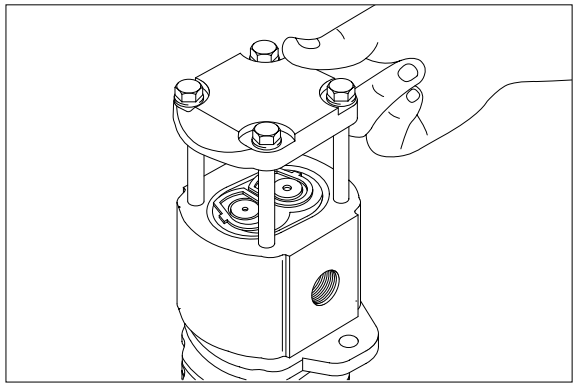
(7) Carefully refit the mounting flange(16) to the body(10). If the mounting flange is not fitted sequarely the backing rings may become misplaced and trapped, resulting in internal damage if the unit is run in this condition.



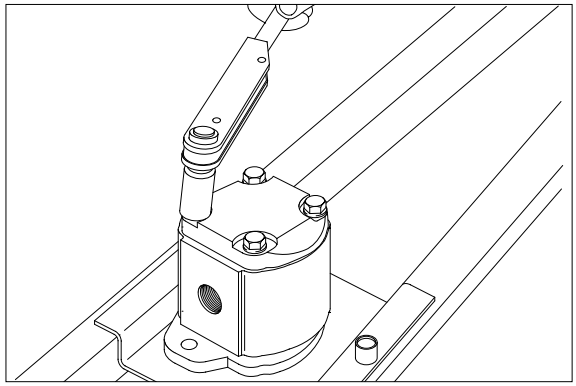
(8) Holding the whole unit together carefully turn it over, making sure it is supported on the mounting flange not the shaft.
Slide off the end over and fit bushing lobe seal(7) and backing ring(5, 6) as in above.



(9) Fit the end cover(3), taking care not to dislodge the backing rings(6) and bolt(1) the unit together.

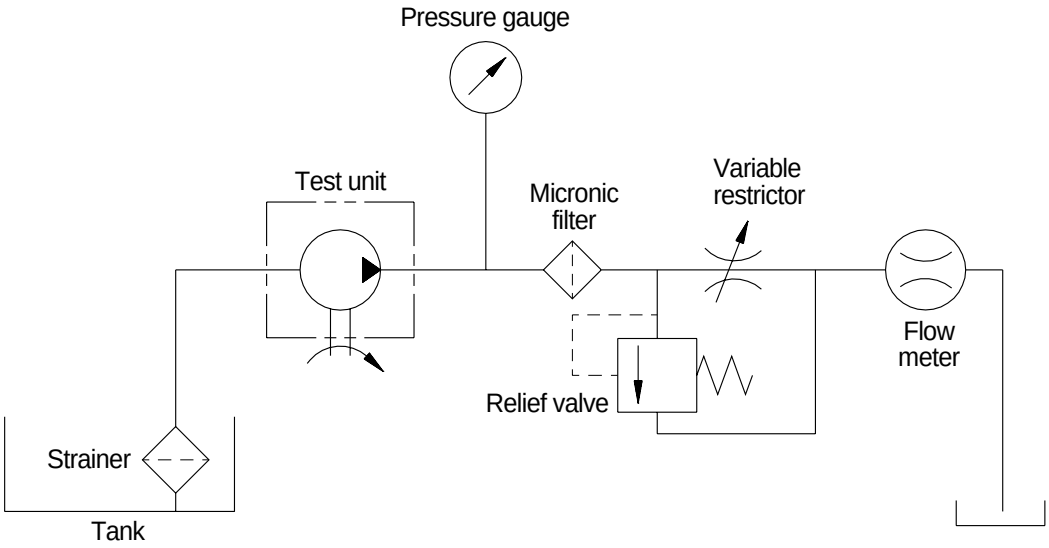


(10) Tighten the bolts to the torque figures stated below.
・Tightening torque : 5.0±0.3kgf・m
(36.2±2.2lbf・ft)



(11) Pour a small amount of oil into a port and check that the shaft can be rotated without redue force using a smooth jawed hand wrench around the shaft or a suitable half coupling locked against the key.

6) RUNNING-IN



(1) A unit which has been reassembled with either new gears, bushes or body, must be carefully run-in before it is subjected to full working conditions.

(2) Ideally this should be done on a test rig(See figure) where pressure can be gradually applied and any pipings from the body cut-in arrested by filters.

(3) It is recommended that the unit is run-in at 1500rpm, initially, at zero pressure for one minute then in stages with the pressure increased by 500psi every minute, until maximum rated pressure has been attained. Frequently check the system temperature, ensuring that it does not exceed the maximum permissible figure of 80℃. If the temperature exceeds the system or unit specification the test must be delayed and operated off-load until acceptable temperatures are obtained.

7) CHANGE DIRECTION OF ROTATION

The direction of rotation of units can be changed but this is not recommended on units which have seen long periods in service.

(1) Procedure

① Remove bolts, keeping the unit together stand it on the end cover drive shaft uppermost.
② Remove mounting flange, body O-ring, backing seals and bush lobe seal.
③ Keeping the driven gear in its bore remove the drive shaft, together with the top bushes.
④ Reposition the driven gear in the bore vacated by the drive shaft, replace the drive shaft in the now vacant driven gear bore.
⑤ Refit the bushes in their original position then fit seals, flange, etc as previously described.
⑥ Restamp directional code letter(A : Anti clockwise and C : Clockwise) and the arrow to suit the new direction of rotation.
⑦ Check the effort required to rotate the shaft to ensure seals have not been trapped.