

OPERATION AND MAINTENANCE INSTRUCTIONS

Important! Check regularly to ensure elbow pipes do not overheat.

If pipes become very hot (indication of seal wear), stop pump immediately and examine seals and plungers (see maintenance section).

- Listen carefully for an even running sound.

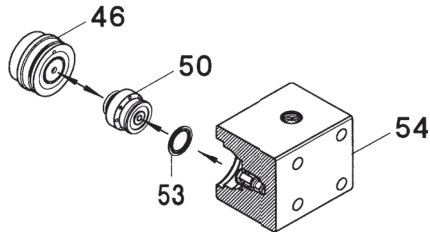
If the pump begins to run irregularly or pulsate strongly, it can be that one of the three plungers is not vented. In this case, the pump should be started and stopped at short intervals to ease venting. Venting is also made easier if the vent tap in the discharge line is opened.

6. Maintenance and Repair

To Check Valves:

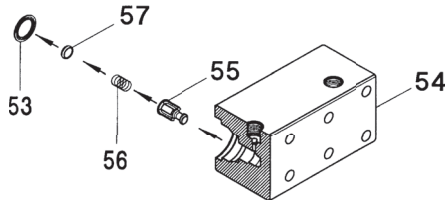
When replacing the pressure and suction valves, the tolerance disc (31C) must always be renewed.

Discharge Valves: Remove hexagon screws (59) and remove valve casing (54). Pull seal case (46) out of valve casing (54). Pull valve body (50) and seal case (46) apart.

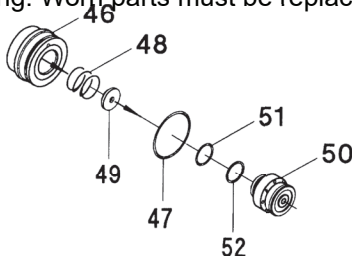


Using pliers, pull spring guide (55) out of the valve casing. Remove discharge valve plate (57) together with spring (56) from spring guide (55). Check sealing surfaces of the valve body (50) and discharge valve plate (57). Check discharge valve spring (56) and border seal ring (53) and replace where necessary.

Important! A damaged border seal ring (53) must be replaced before reassembling.

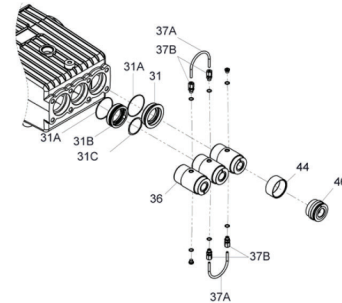


Suction Valves: Remove suction valve spring (48) with valve plate (49) from seal case (46). Check sealing surfaces of the valve plate (49) and valve body (50). Check O-rings (47), (51) and support ring (52) before reassembling. Worn parts must be replaced.



To Check Seals and Plungers

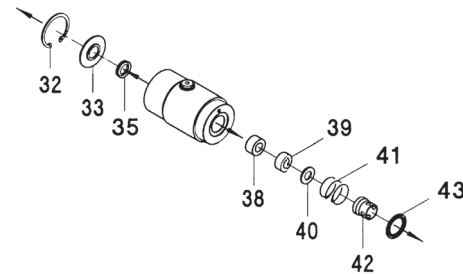
Remove hexagon screws (59), and take off valve casing (54). Remove the screw-in joints (37B) and take off the elbow pipes (37A). Remove drip-return ring (44) from seal sleeve (36). Pull seal sleeve (36) out of the centering rings (31/31B) which are inserted in the crankcase. Take out the centering rings (31/31B) from the crankcase using two screwdrivers. Replace the tolerance disc (31C). Check the o-ring (31A) and replace if necessary.



Take the seal tension spring (41) out of seal sleeve (36). Using a pliers, remove the clip ring (32) situated on the other side of the sleeve; then take out support ring (33) and grooved ring (35) using an extractor tool (either $\varnothing 14$ or $\varnothing 16$).

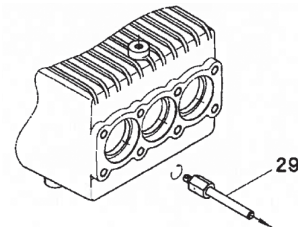
Using a seal extractor tool ($\varnothing 16.4$), carefully press the seal unit comprising guide ring (38), spiral ring (39) and support ring (40) out of the seal sleeve (36) from the side (36) closest to the drive.

Check spiral ring (39), guide ring (38) and grooved ring (35) and replace where necessary.



Check surface of plunger (29) for damage. A worn plunger (29) must be removed (22 mm wrench) and replaced. Due to reasons of precision, the ceramic plunger alone cannot be exchanged.

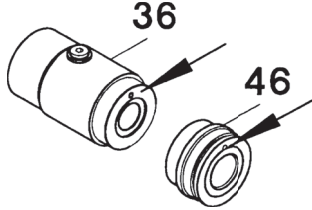
Coat the threads of the plunger lightly with an appropriate bonding agent and tighten plunger to 26 Ft-Lbs. (35 Nm).



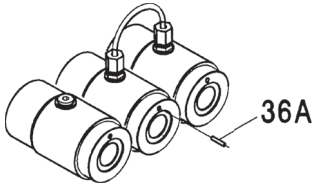
MAINTENANCE INSTRUCTIONS

Important! Check the leakage bores $\varnothing 4$ of the seal sleeves (36) and seal cases (46) for dirt and clean if necessary.

The elbow screw-in joints (37B) and elbow pipes (37A) must also be checked for dirt and cleaned if necessary.



Important! The $\varnothing 4$ leakage bore of the middle seal sleeve must be closed by a rubber plug (36A) to ensure water circulation from seal sleeve 1 to seal sleeve 3.

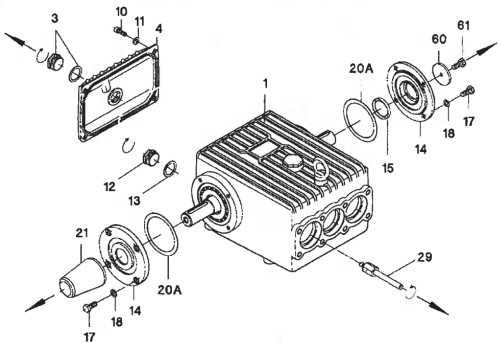


Fit the drip-return unit (32/33/35), the high-pressure seal unit (38, 39, 40) and tension spring (41) into the seal sleeve. Then push the assembled seal sleeves (36) carefully over the plungers and into centring rings (31) in the drive; thereafter mount elbow pipes (37A) as per the exploded view and tighten the screw-in joints (37B) carefully. Check O-rings on the drip-return ring (45) as well as border seal ring (43) and replace where necessary.

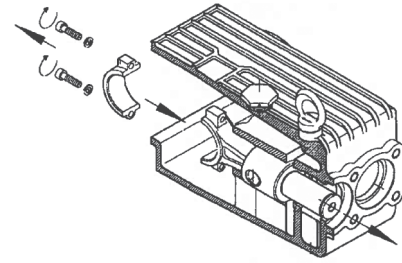
Push the valve casing (54) with its seal cases (46) and drip-return rings (44) onto the seal sleeves (36). Tighten valve casing nuts (59) evenly to 88.5 Ft-Lbs. (120 Nm).

To Dismantle Gear

First, disassemble valve casing and seal sleeves. Then, remove oil plug (12) and drain oil. Thereafter, remove gear cover (4) and bearing cover (14).

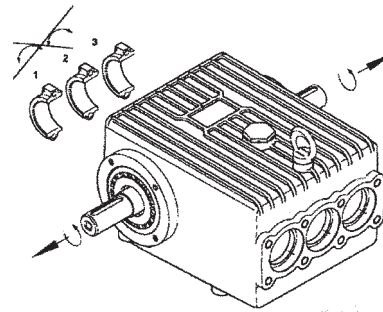


Remove connecting rod (connecting rod) screws, and push the front of the connecting rod parts forward as far as possible into the crosshead guide.



Important! Connecting rods are marked for identification. Do not twist connecting rod halves. When reassembling, connecting rods are to be fitted back onto the shaft journals in their exact original position.

Turning the crankshaft gently, tap it out carefully to one side using a rubber hammer.



Important! Do not bend connecting rod shafts. Check the running surface of the shaft and connecting rods as well as the shaft seal rings and tapered roller bearings.

To Reassemble

Using a soft tool, press in outer bearing ring on one side of the crankcase until its outer edge sits evenly on the bearing bore. Then screw on bearing cover together with shaft seal ring and O-ring. Insert shaft through the bearing hole on the opposite side. Press in outer bearing ring and tension inwards with bearing cover, keeping the shaft in vertical position and turning it slowly so that the tapered rollers of the bearing sit evenly on the outer bearing ring. Adjust axial bearing clearance to at least 0.1mm and maximum 0.15mm by placing fitting discs (20A) under one of the bearing covers.

Important! After assembly has been completed, the shaft should turn easily with very little clearance. Tighten connecting rod screws to 22 Ft-Lbs. (30 Nm).

