

# MAINTENANCE INSTRUCTIONS

## To Check Valves

Remove hexagon socket screws (58), lift discharge casing (50B) up and away. Take out pressure springs (57A). Pull out assembled valves (51 and 52) with fitting tool (07662).

Dismantling valves: the spring tension cap (51A, 52A) is screwed together with the valve seat (51B/52B). Remove spring tension cap, take out springs (51E/52E) and valve plate (51C/52C). Check sealing surfaces and O-rings (51D/52D).

Replace worn parts.

Coat threads of the valve seat with silicon grease or molycote anti-seize Cu-7439 when reassembling. Before refitting the valves, clean the sealing surfaces in the casing and check for any damage.

Tighten screws (58) at 132 ft.-lbs. (180 Nm); check torque tension after 8-10 operating hours.

## To Check Seals and Plunger Pipe

Remove hexagon nuts (49A). Remove the pump head (50/50B) together with seal case (38) from crankcase (1). If necessary, carefully tap the valve casing past the centring stud (50A) using a rubber hammer.

**IMPORTANT!** If necessary, support the pump head (50/50B) by resting it on wooden blocks or by using a pulley.

Remove tension screw (36C) and take seal sleeve (39) together with all mounted parts out of the drive.

Pull the plunger pipe (36B) out of the seal assembly (40-43) and check for any damage. Pry seal rings (40) and sleeves (42) out of the seal sleeve (39) with a screwdriver.

**IMPORTANT!** Be careful not to damage seal sleeve (39) and pressure ring (41). Check the inner diameter of the pressure ring for wear and if necessary replace together with seals (40) and (42). Clean all parts. New parts should be lightly coated with silicon grease before fitting.

Insert the seal unit (40-43) into the sleeve. Push the ceramic plunger (36B) carefully through the seals from the crankcase side. If necessary, the seals can be held tightly using a suitable pipe support held on the other side of the seal sleeve.

Take the seal case (38) out of the valve casing (50) and check O-rings (38A). If necessary secure two screwdrivers in the front O-ring groove to remove the seal casing from the valve casing. Coat seals with silicon grease before fitting.

**IMPORTANT!** Mounting surfaces of the crankcase (1) and valve casings (50-50B) must be clean and free of damage. The components must lie exactly and evenly on one another. The same exactness applies for all centring positions in the crankcase and valve casings.

Coat the seal sleeve lightly with anti-corrosive grease (e.g. molycote no. Cu-7439) in its fitted area towards the crankcase. Insert seal sleeves (39) into their crankcase fittings. Coat the threads of the tension screw (36C) lightly with thread glue and insert it together with a new copper ring (36D) through the ceramic pipe (36B). Turn the pump by hand until the plunger (25) rests against the plunger pipe. Tighten tension screw at 30 ft.-lbs. (40 Nm).

**IMPORTANT!** Thread glue must never come between the plunger pipe (36B) and centring sleeve (36E). Overtensioning of the plunger pipe by excessive tightening of the tension screw and/or dirt or damage on the mounting surfaces can lead the plunger pipe to fracture. Insert the seal tension spring (45) and O-ring (39A) into the seal sleeve (39).

## Mounting the Valve Casing:

Put seal cases (38) in the centring holes of the valve casing (50), then carefully push the valve casing onto the centring studs (50A).

Tighten hexagon screws (49A) evenly and crosswise at 265 ft.-lbs. (360 Nm).

**IMPORTANT!** With no pressure in the pump, the torque tension on the screws (49A) must be checked after 8-10 operating hours. Thereafter the tension is to be checked every 200 operating hours.

## To Dismantle the Reduction Gear

Remove screws (67). Press off gear cover (66) by screwing two screws into both thread bores. Remove screw (72) and take off plate (69). Remove the cogwheel from the shaft with a removal tool. Using a rubber hammer, tap out the crankshaft towards bearing cover (14).

Check the surfaces on the connecting rods (24), crankshaft (22) and crossheads (25). And check the surfaces of the crosshead guides in the crankcase for any unevenness.

Reassemble in reverse order. Thread the crankshaft (22) in from the bearing cover side until the bearing rests cleanly in the outer ring on flange (19).

Press in the outer ring from bearing (20) and using shims (21A/B), adjust the bearing to be free of play. To achieve this, add shims, screw on cover (14) and turn the crankshaft until it can no longer be turned by hand.

Then remove a shim and establish whether the crankshaft can now be turned. A crankshaft that can be too easily turned may cause damage later to the bearings and connecting rods due to wobble movements in the conical bearing shells.

If bearings (20 and 21) have been replaced, the flange (19) must be taken off and a new bearing outer ring pressed in until the surfaces are even. Then mount the holding flange to push the bearing outer ring in deeper.

Mount connecting rod halves in their exact original position and tighten at 37 ft.-lbs. (50 Nm).

**IMPORTANT!** A little clearance must exist to enable slight sideward movement of the connecting rod on its journal.

Mount cooler plate (K1) and gear cover (K3) with their respective seals (K2). When assembling the cooling circuit line, make sure that the oil cooler connection (K7) is always joined to the upper connection (K3) of the gear cover.

## To Mount Reduction Gear

Heat ball bearings (75 and 74) first before pressing them onto the pinion. Press the cogwheel slightly onto the crankshaft so that the pinion (69) together with the bearing (74) can still be inserted.

Move the pinion (69) against the cogwheel and make them mate perfectly when mounting. Then, carefully tap the cogwheel and the pinion simultaneously onto the crankshaft and into the bearing seat.

Fit fitting disc (75A), and secure screw (72) with Loctite.

Fit the seal (76) onto the cylindrical pins (68).

Push the gear cover (66) carefully onto the bearing (75).

Make sure that the radial shaft seal (73) is not get damaged (during fitting onto the pinion).

Before putting into operation again, turn the reduction gear shaft per hand at least four full turns to make sure the gear is correctly aligned.