

MAINTENANCE INSTRUCTIONS - P465 / P485

1. Inlet and Discharge Valves

Unscrew plugs (32) using a 32mm socket wrench. Using a pair of flat pliers, remove the discharge valve (27B). Disassemble valve. Unscrew (8) hexagon socket screws (34) and remove valve casing (26) by pulling off to the front. Remove inlet valves (27A) with flat pliers and disassemble. Examine spring tension caps (30,30A), valve springs (29), valve plates (28), valve seats (27) and o-rings (31,33). Replace worn parts. Take care to reassemble in the correct order. Coat the threads of plug (32) with *Loctite* and tighten to 125 ft.-lbs. (170 NM).

2. Seals

Remove the seal cases (25) from the seal casing (21) and examine o-rings (25A) and support rings (25B). The seal case (25) has a groove which enables one to pry it out with two standard screwdrivers. Remove seal adapter (20) from the seal casing. Check o-rings (20A), grooved rings (18) and grooved seal pack (23) and the guide rings (24) for wear. Grease new seal rings and o-rings with a light coating of lubricant.

IMPORTANT Mounting tools are available for fitting the seals into the seal casing and seal adapters. If mounting tools are not available carefully insert the grooved seal pack (23) little by little into the bore of the seal casing by using the flat side of a screwdriver, making sure that the seal lip faces into the seal casing (21). Press grooved seal (18), flat side first, into the seal retainer. Under no circumstances must the seal surface in the valve casing or the seal lip of the grooved seal be damaged. Carefully check the surfaces of the plungers (16B). Damaged surfaces cause accelerated seal wear. Deposits of all kinds must be removed from the plungers. Plunger surfaces must not be damaged during this procedure. If there are lime deposits in the pump, care must be taken that the drip-return bores in parts (21) and (28) are open to ensure trouble-free drip return. If the plunger pipe (16B) is worn, loosen tension screw (16D) and remove together with plunger pipe. Check and clean plunger surface (16A), check oil scraper (16H) and replace with new plunger pipe and copper gasket (16G). Cover thread of tension screw (16D) with a thin film of *Loctite* 243 and tighten carefully to 247 in.-lbs. (28 NM).

IMPORTANT Glue / *Loctite* must never come between the plunger pipe (16B) and the centring support on the plunger (16A). Deformation of the plunger pipe due to improper tightening of the tension screw as well as dirt or damage on the front surface can fracture the plunger pipe. When remounting the valve casing, tighten the hexagon socket screws (34) to 30 ft.-lbs. (40 NM).

3. Gear End

If oil leaks where the plunger (16) extends from the crankcase (1), the oil seals (19) and plungers (16) must be examined and replaced if necessary. Remove oil plug (5) and drain oil; remove crankcase cover (3). Remove valve casing (26), seal casing (21) and seal adapters (20). Then remove plunger pipes (16B) and oil scrapers (16H) as described above.

IMPORTANT Before removing connecting rods be aware of their position on the crankshaft so as to return them to the same location when re-assembling.

Remove screws from connecting rods (15), separate the back connecting rod half from the crankshaft and the front connecting rod half by threading a screw into the center back bore of the connecting rod. The connecting rod halves must be kept as pairs - do not mix them up. Push connecting rod shaft as far as possible into the crosshead guide. Remove screws (10) and pry bearing covers (7,8) off gently with a screwdriver.

Carefully remove crankshaft (13) by threading it through the connecting rods (15), making sure not to bend the connecting rods. Remove and disassemble connecting rods and plungers (16) paying close attention not to damage the plungers. Pry out oil seal (19) using a screwdriver. Examine plunger surfaces (16A) and replace if necessary.

To re-assemble, first press the oil seal (19) into the crankcase. Then insert connecting rods with plungers remembering their original location. Thread in the crankshaft (13). Replace bearing cover (7) and o-ring (9) together with the radial shaft seal (11) and roller bearing (12) and fix in place with screws (10). Replace roller bearing (12), bearing cover (8) and o-ring (9). Adjust the clearance by fitting shims (8A,8B) under the bearing cover as required to ensure that the crankshaft (13) turns easily without play being felt. Finally, mount connecting rod halves on crankshaft matching them with other half and tighten screws (15) to 97 in.-lbs. (11 Nm). Replace crankcase cover (3) and o-ring (4). When remounting the valve casing (26), tighten hexagon socket screws (34) to 30 ft.-lbs. (40 Nm).

4. To Move Crankshaft to Opposite Side

Remove the valve casing (26) and seal casing (21) together with the seal adapters (20) then rotate the crankcase 180°. Interchange the oil plug ((5B) with oil dipstick (2). Rotate the crankcase cover (3) 180°. Remount the valve casing together with the seal casing and the seal adapters (20). Make sure that the seal adapters are rotated in order that the bores face downwards.