Serie SR-TR
HIGH FLOW

SR (50-55-60-65-70-75)
TR (50-55-60-65-70-75)
SRR (50-55-60-65-70-75)
TRR (50-55-60-65-70-75)



SR-TR ORIZZONTALE



SR-TR VERTICALE

Manuale di riparazione
Repair Manual
Manuel de réparation
Reparaturanleitung
Manual de reparación
Manual de reparação
Руководство по ремонту
维修手册

دليل الإصلاح

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1 INTRODUCTION

This manual contains instructions for repairing SR-TR series pumps and must be read carefully and understood before performing any work on the pump.
Proper pump operation and duration depend on the correct use and maintenance.
Interpump Group disclaims any responsibility for damage caused by negligence or failure to observe the standards described in this manual.

2 REPAIR GUIDELINES



2.1 REPAIRING MECHANICAL PARTS

Mechanical parts must be repaired after the oil has been drained from the crankcase.
To drain the oil you must first remove the dipstick, pos. ①, Fig. 1 and then the drain plug pos. ②, Fig. 1 located on the rear side of the crankcase. Use the plug in pos. (2/a) on the vertical version.

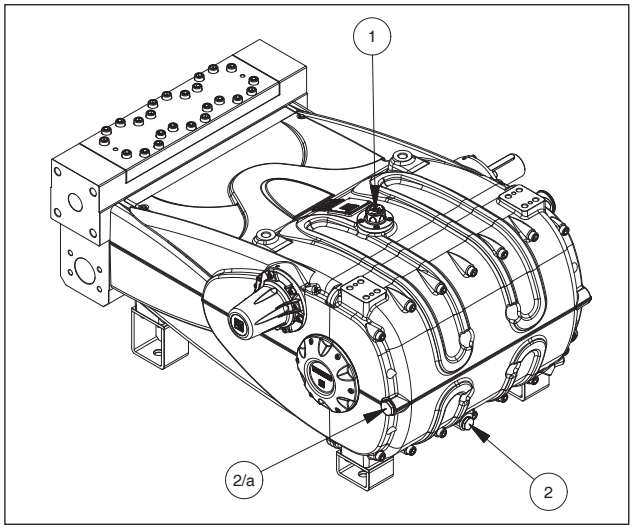


Fig. 1

The used oil must be poured unto a suitable container and consigned to an authorized recycling center.
Do not release used oil into the environment under any circumstances.

2.1.1 Dismantling the mechanical part

The correct sequence is as follows:
Completely empty the pump of oil, as indicated in point 2.1.
Remove the upper inspection cover by unscrewing the 4 M6 fixing screws as indicated in point 2.2.3.
Remove the valve lifters from the manifold and undo the screws that secure the piston sleeve pack as indicated in point 2.2.1.
Move piston and sleeve pack backward and undo the screw securing the piston. Remove sleeve pack with piston and repeat the procedure for the other cylinders; this done, undo the M24 manifold fixing screws and disassemble the manifold from the pump crankcase as indicated in point 2.2.1.
Remove the splashguards.

Undo the two M6 fixing screws of the three oil seal covers (pos. ①, Fig. 2).

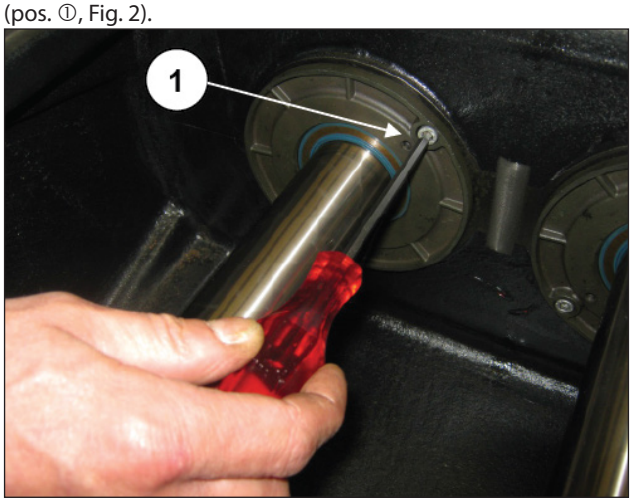


Fig. 2

Screw a threaded bar or M6 screw, to function as an extractor, into the holes in the oil seal covers (pos. ①, Fig. 3) and remove the covers from the pump unit (pos. ①, Fig. 4).

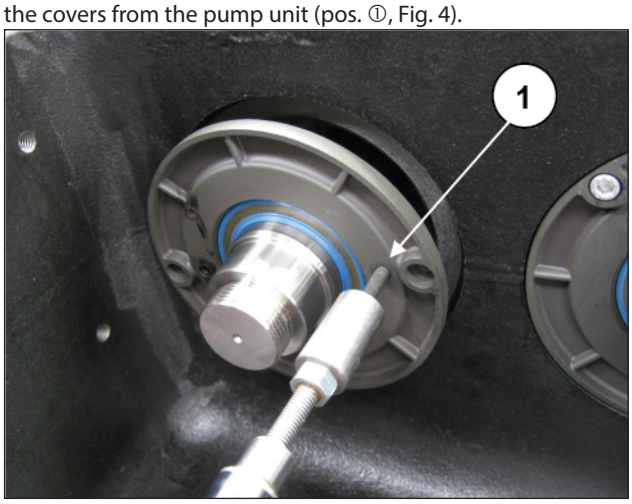


Fig. 3

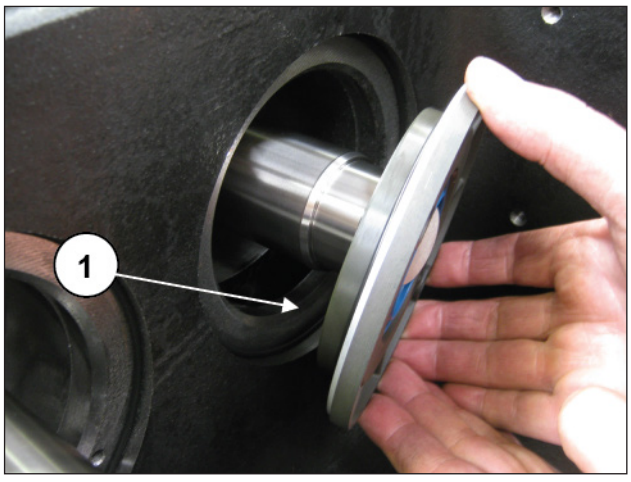


Fig. 4

Remove the radial seal ring (pos. ①, Fig. 5) and the external O-ring (pos. ①, Fig. 6).

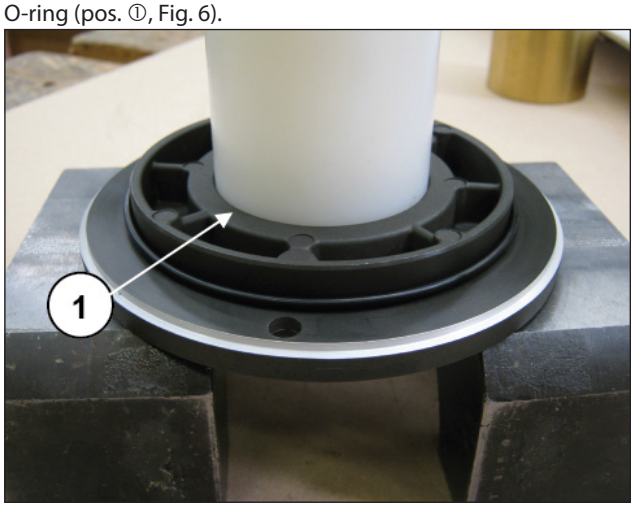


Fig. 5

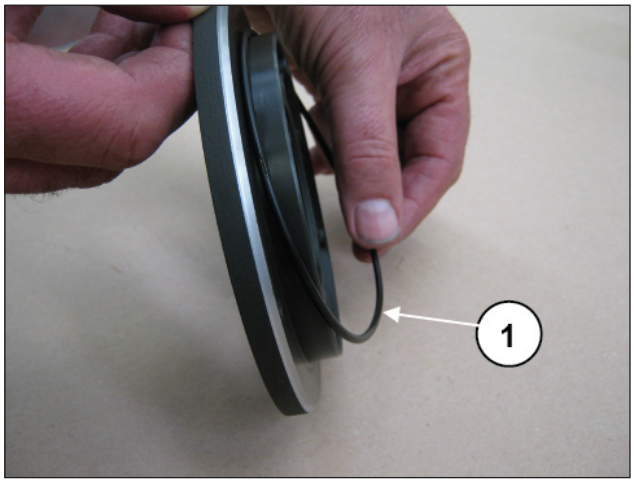


Fig. 6

Remove the key from the PTO shaft (pos. ①, Fig. 7).

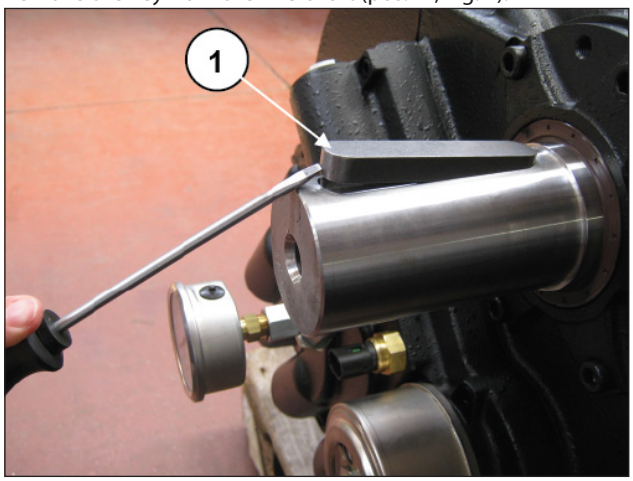


Fig. 7

Undo the fixing screws of the shaft end cover (pos. ①, Fig. 8) and unscrew the cover from the underneath PTO shaft and remove it. Remove all the O-rings and renew them if necessary.

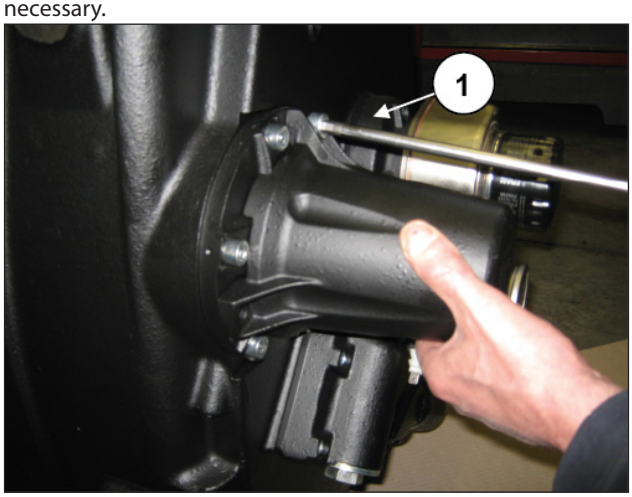


Fig. 8

Undo the PTO pinion cover fixing screws (pos. ①, Fig. 9) and remove it. Remove all the O-rings and renew them if necessary.

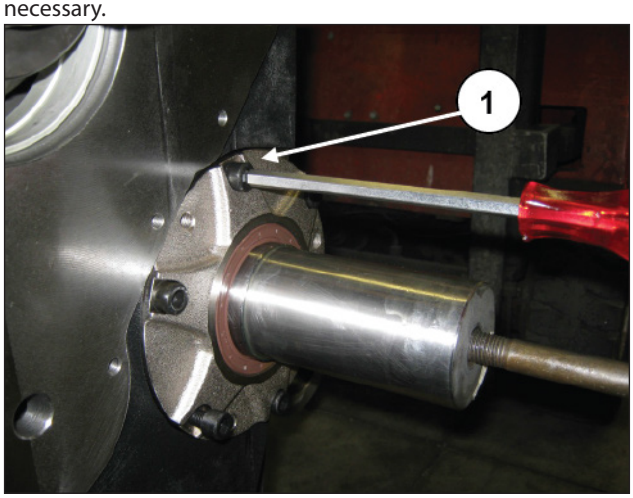


Fig. 9

To facilitate the disassembly procedure use two or three M10 studs or screws (pos. ①, Fig. 10) with the function of extractors, alternatively, use a slap hammer.

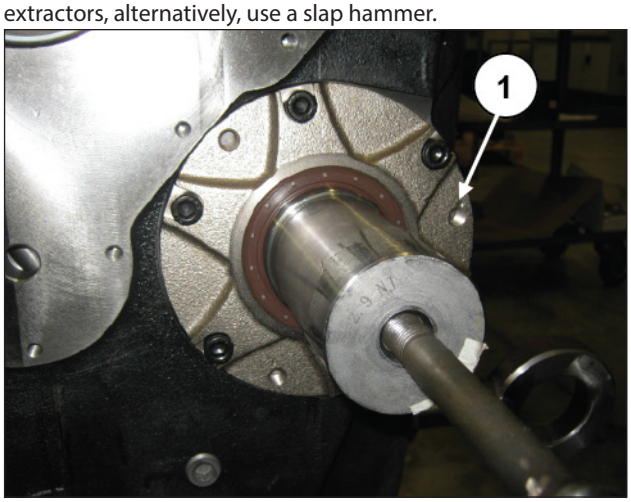


Fig. 10

Remove the crankshaft cover by undoing the associated screws (pos. ①, Fig. 11) remove the flat gasket and replace it if necessary (pos. ①, Fig. 12).

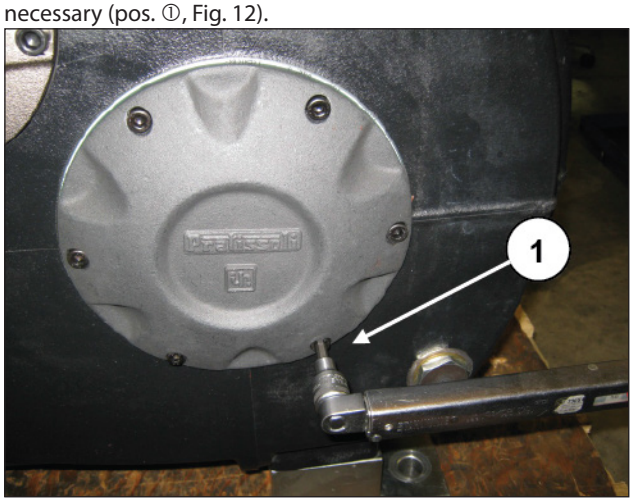


Fig. 11

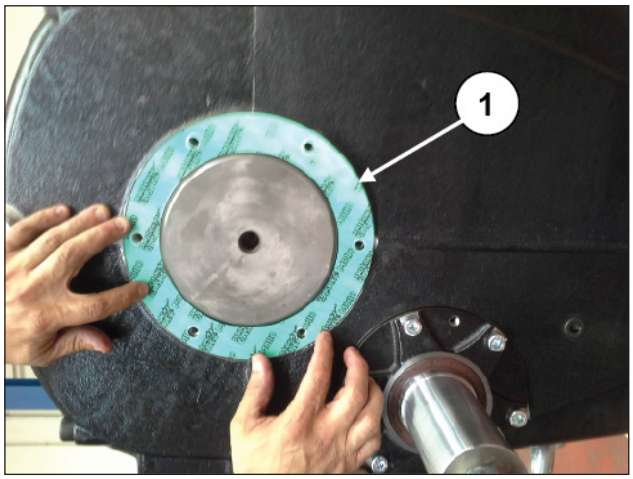


Fig. 12

Remove the oil filter cartridge (pos. ①, Fig. 13). Unscrew and remove the pressure gauge (pos. ①, Fig. 14).

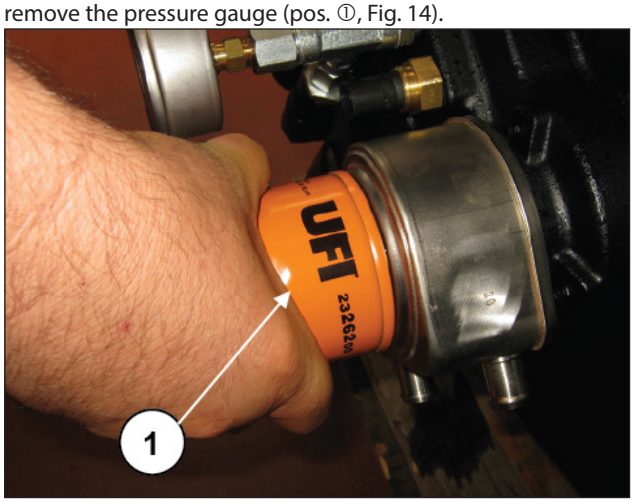


Fig. 13

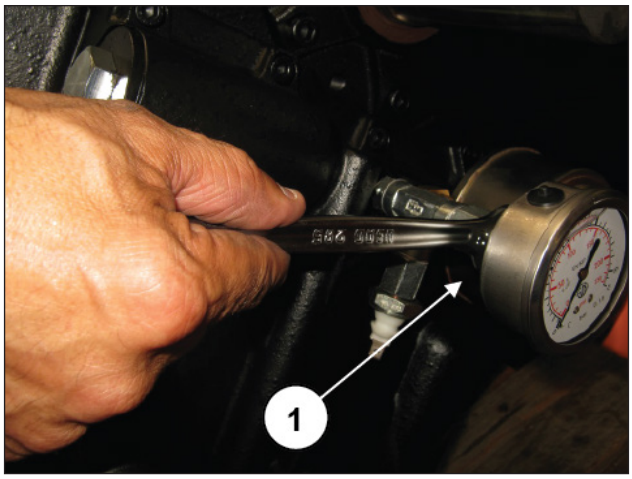


Fig. 14

Remove the sensor fittings, the pressure switch and the oil temperature probe (pos. ① ②, Fig. 15).
Remove the water-oil heat exchanger (pos. ①, Fig. 16).

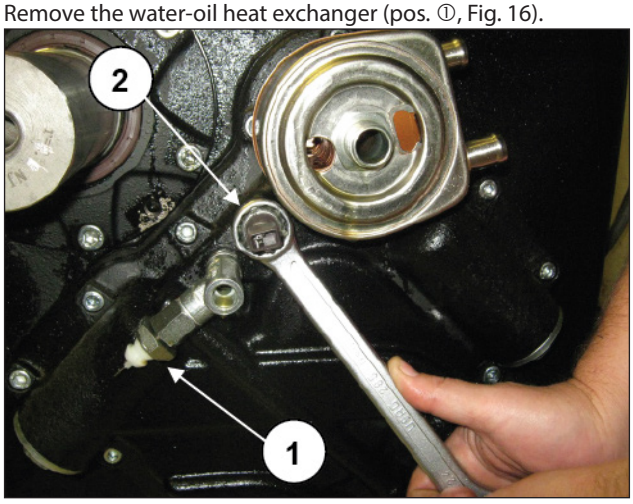


Fig. 15

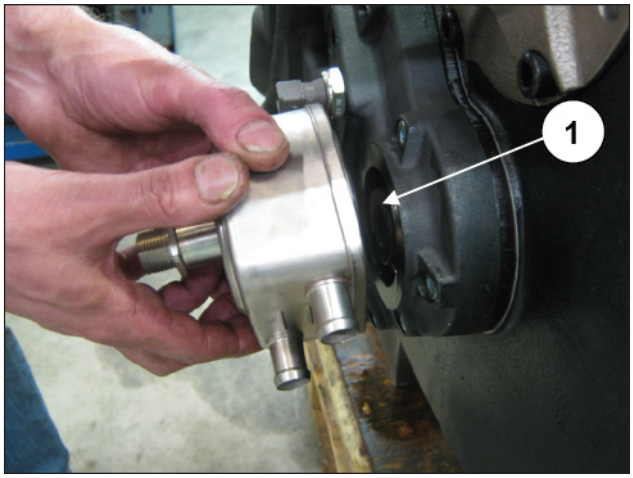


Fig. 16

Remove the lube pump body by undoing the related screws (pos. ①, Fig. 17). Remove the gasket and renew it if necessary (pos. ①, Fig. 18).

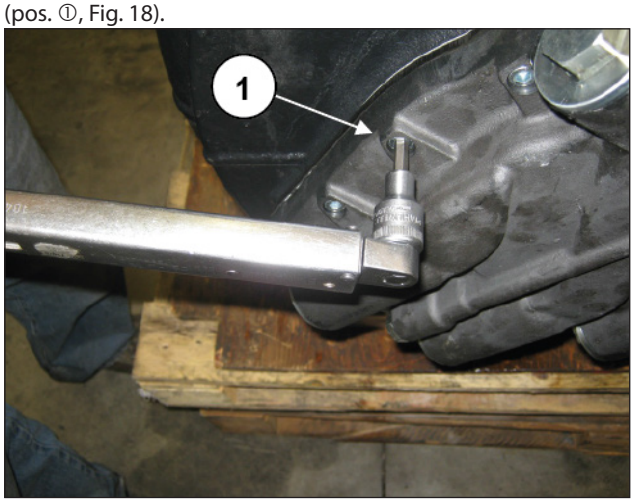


Fig. 17

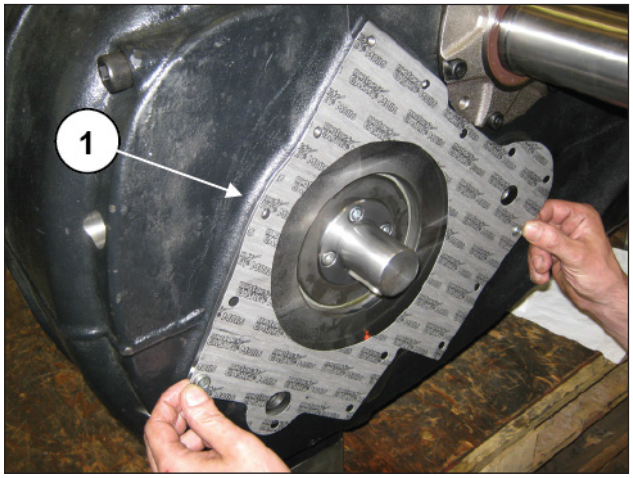


Fig. 18

Remove the key from the lube pump drive shaft (pos. ①, Fig. 19).
Undo the four M8 screws (pos. ①, Fig. 20) and remove the lube pump drive shaft from the crankshaft.

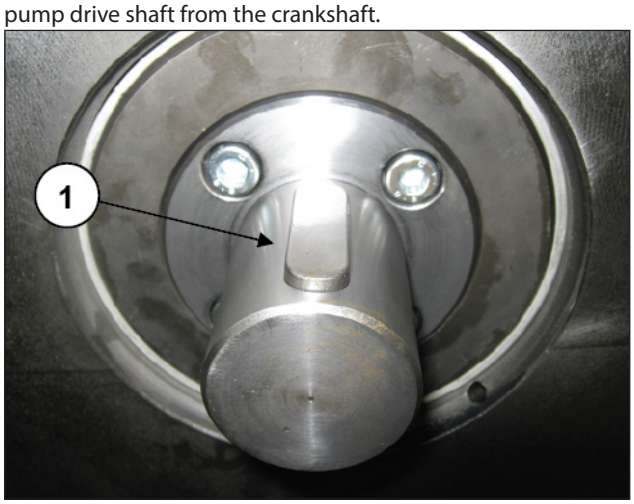


Fig. 19

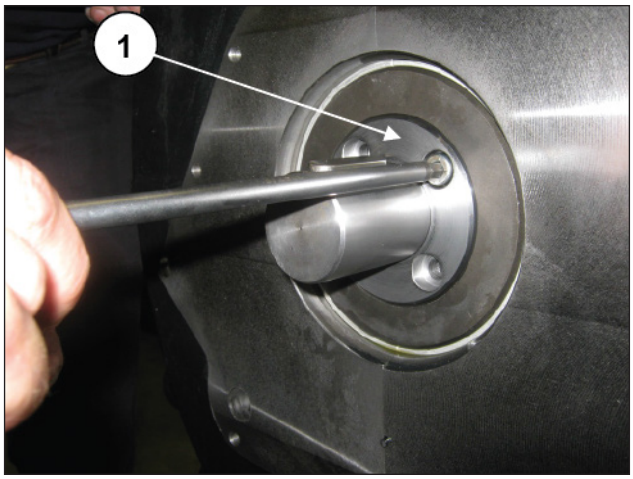


Fig. 20

Undo the 22 M16 rear casing fixing screws (pos. ①, Fig. 21) and remove them.



Fig. 21

To remove the rear casing first remove the feet affixed to it and use four M16 threaded holes to fit the lifting eyebolts (pos. ①, Fig. 22).

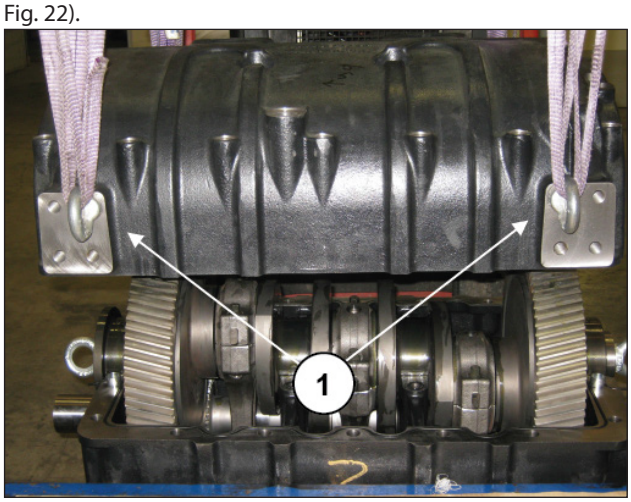


Fig. 22

Keep the main bearing shells (pos. ①, Fig. 23) in their seats in the rear casing to avoid the risk of inadvertently swapping the positions.

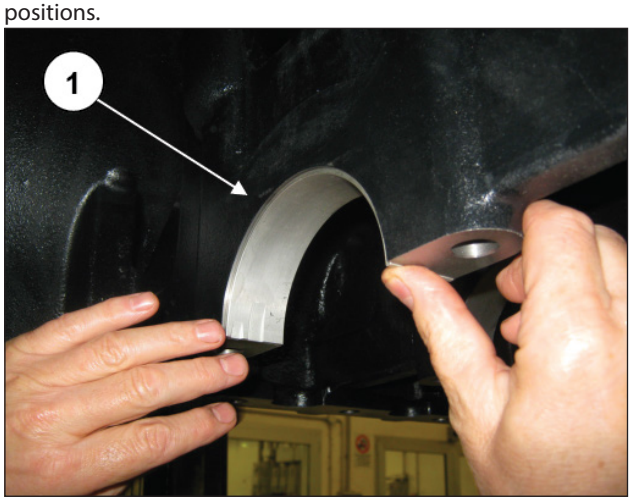


Fig. 23

In the event of disassembly, the main bearing shells must be refitted in exactly the same seats from which they were removed.

Unscrew the conrod screws (pos. ①, Fig. 24).

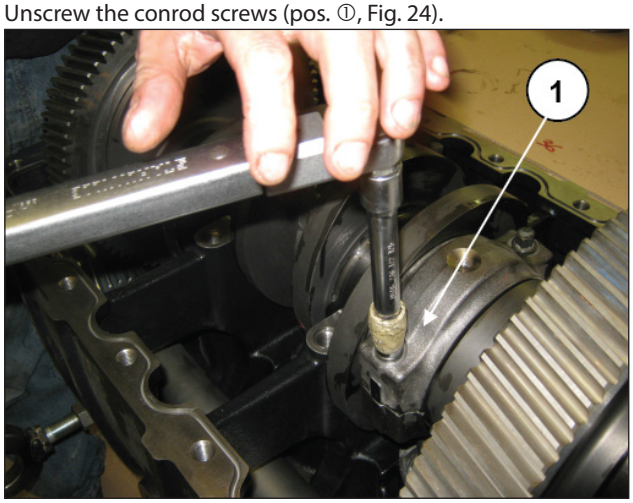


Fig. 24

Remove the conrod caps with the bearing shells, taking special care to note the sequence in which they are removed.

The conrod caps and associated conrods must be reassembled in exactly the same order and coupling with which they were disassembled.

To avoid possible errors, caps and conrods have been numbered on one side (pos. ①, Fig. 26).



Fig. 25

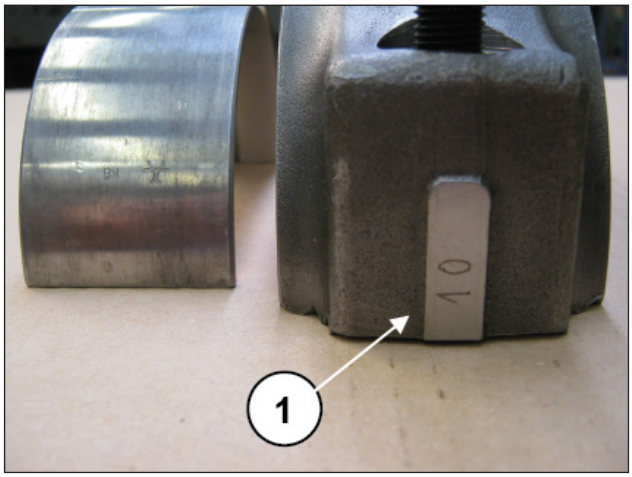


Fig. 26

Keep the conrod caps coupled to their bearing shells to avoid the risk of inadvertently swapping the positions (Fig. 27).



Fig. 27

Advance the three conrods as far as possible in the direction of the manifold.
Remove the three upper half-bearings of the conrods (pos. ①, Fig. 28).

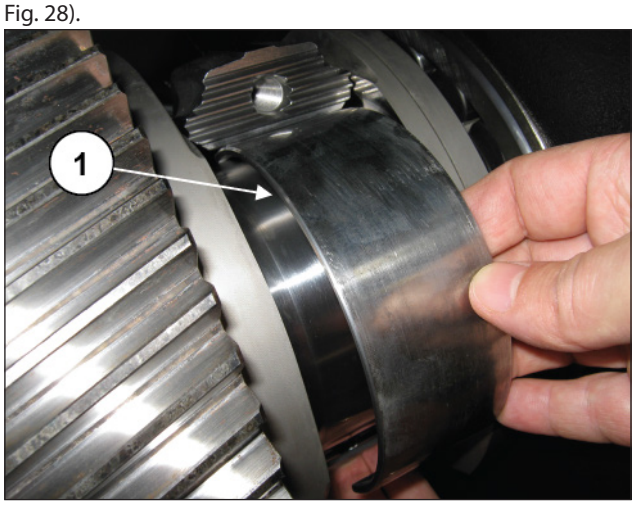


Fig. 28

Remove the two crankshaft clearance half-rings (pos. ①, Fig. 29 and Fig. 30).

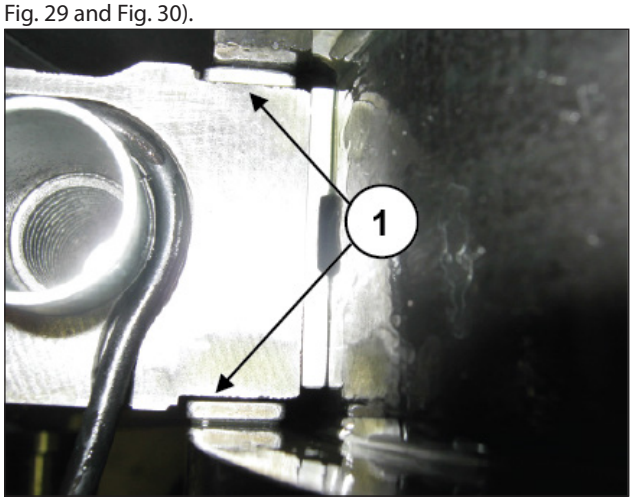


Fig. 29

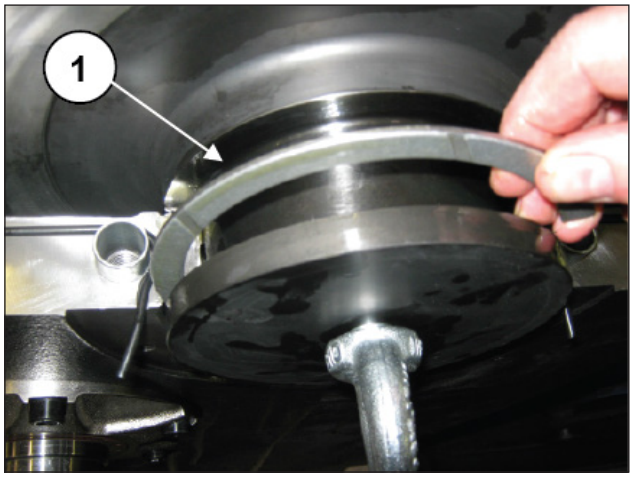


Fig. 30

The clearance rings must be refitted in precisely the same direction from which they were removed, taking care to position the grooves towards the crankshaft shoulders.

Remove all the O-rings from the seats on the front casing mating surface and renew them if necessary (pos. ①, Fig. 31, Fig. 32).

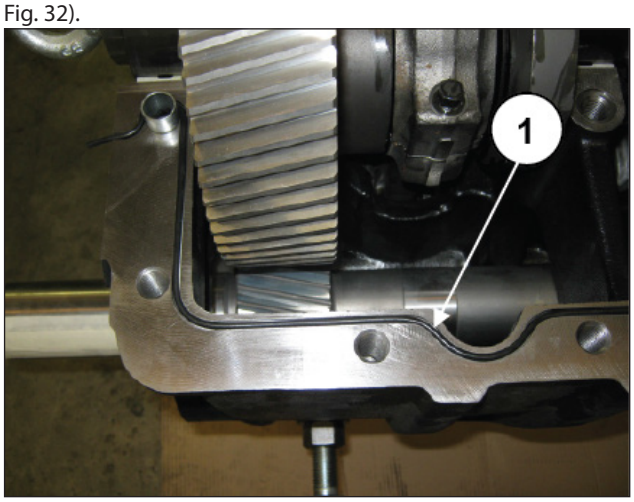


Fig. 31

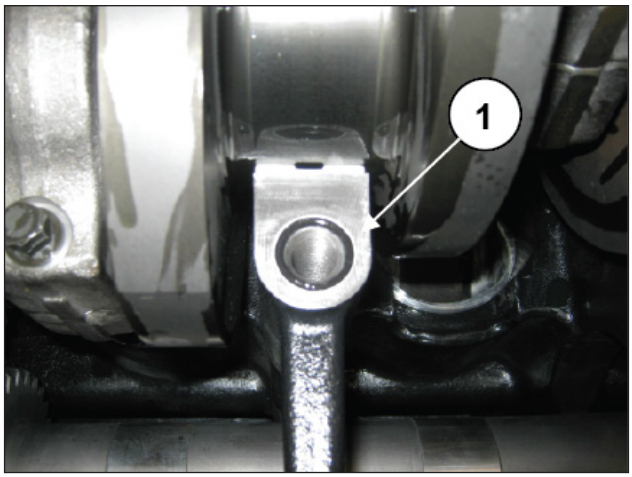


Fig. 32

Withdraw the crankshaft from the front casing (Fig. 33).

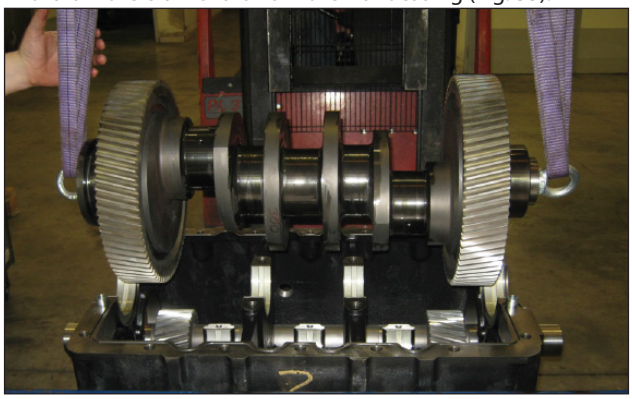


Fig. 33

Unscrew the fixing screws of the left and right PTO bearing cover (pos. ①, Fig. 34) and withdraw two covers from the PTO shaft. To facilitate the disassembly procedure use three M10 screws (pos. ①, Fig. 35) with the function of extractors; alternatively, use a slap hammer.

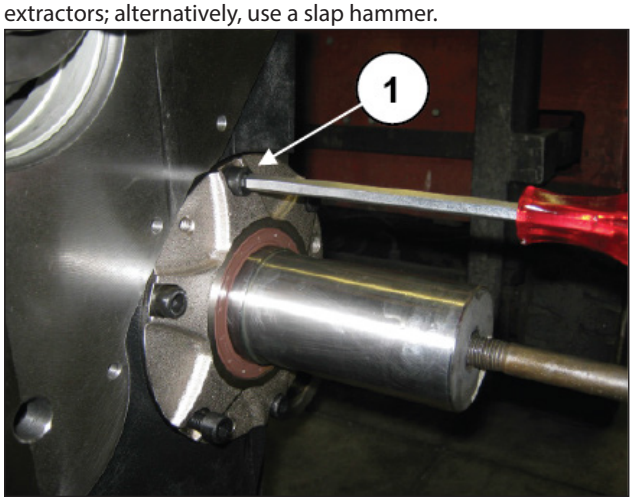


Fig. 34

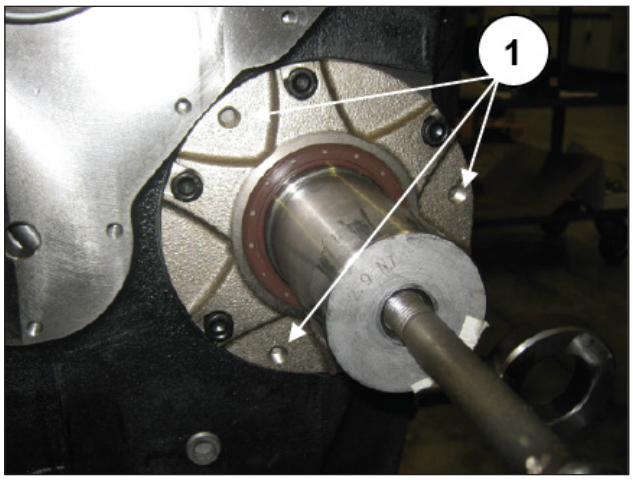


Fig. 35

Remove the radial seal ring (pos. ①, Fig. 36) and the O-rings (pos. ①, Fig. 37).

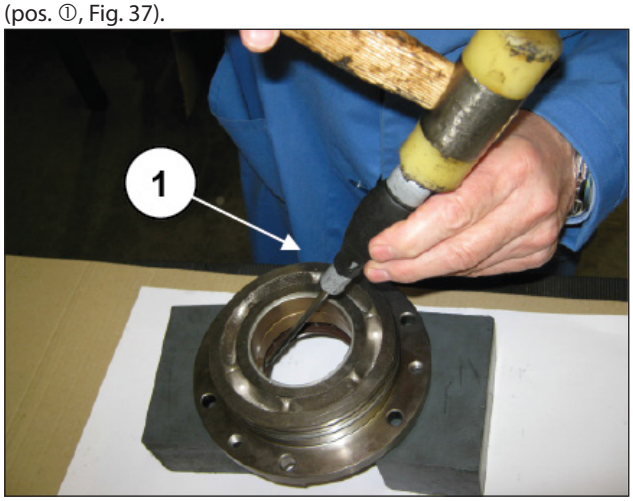


Fig. 36

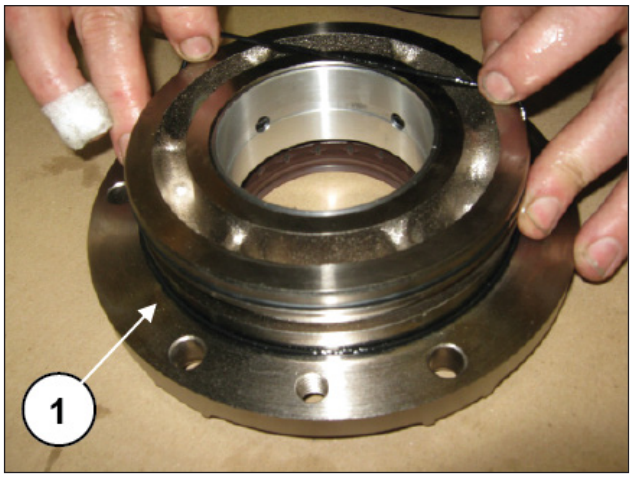


Fig. 37

Keep the main bearing shells (pos. ①, Fig. 38 and Fig. 39) in their seats in the front casing to avoid the risk of inadvertently swapping their positions.

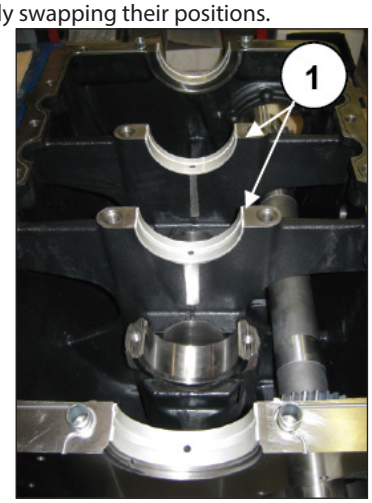


Fig. 38

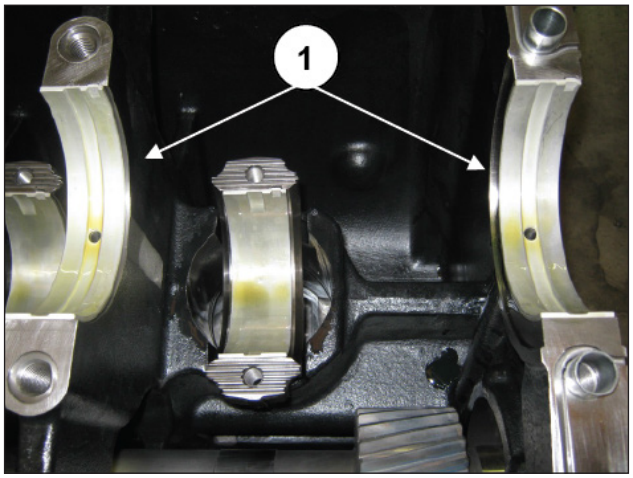


Fig. 39

Extract the PTO shaft from either one of the two sides (pos. ①, Fig. 40).

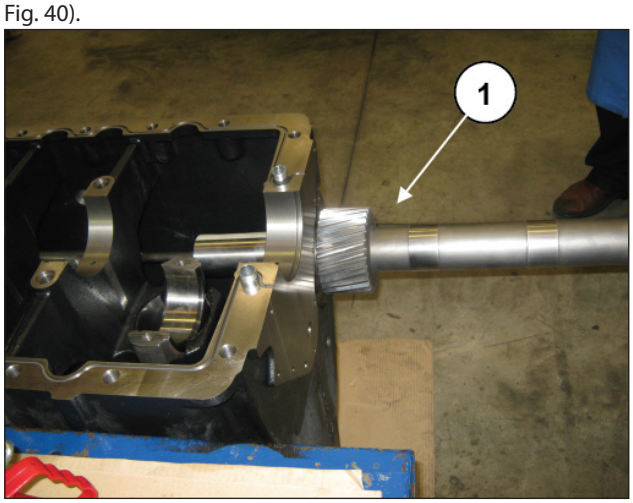


Fig. 40

Now remove the conrod from its cylinder (pos. ①, Fig. 41) and then extract the conrod-piston guide assemblies (pos. ①, Fig. 42).

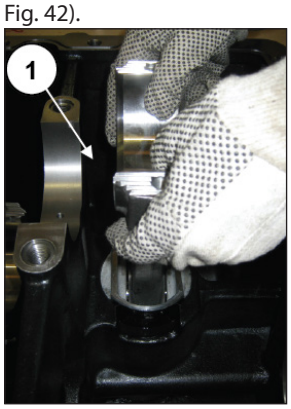


Fig. 41

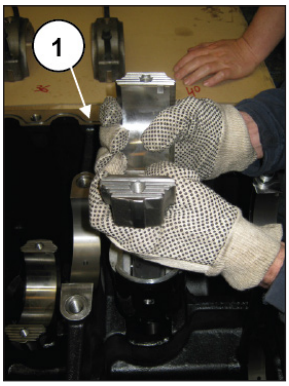


Fig. 42

Couple the conrods to the previously disassembled caps, referring to the numbering (pos. ①, Fig. 43).



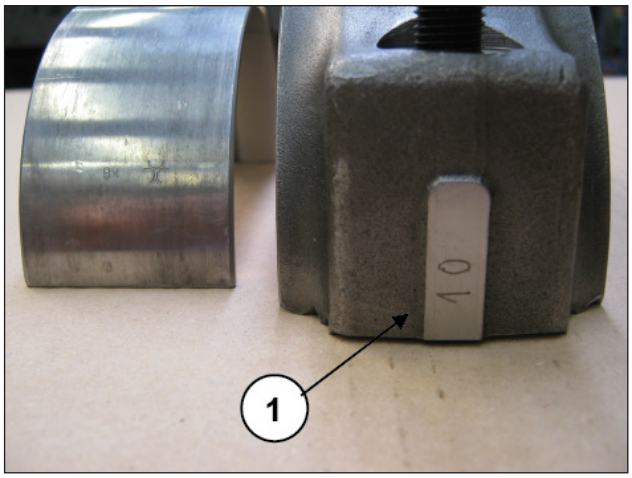


Fig. 43

Remove the two spindle pin circlips using circlip pliers (pos. ①, Fig. 44).

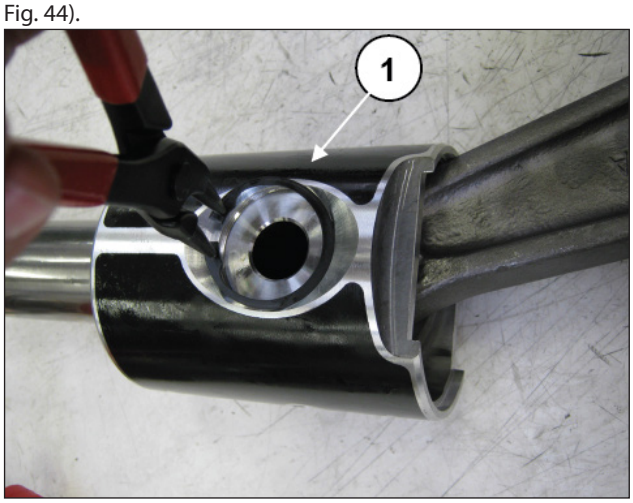


Fig. 44

Remove the spindle (pos. ①, Fig. 45) and extract the conrod (pos. ①, Fig. 46).

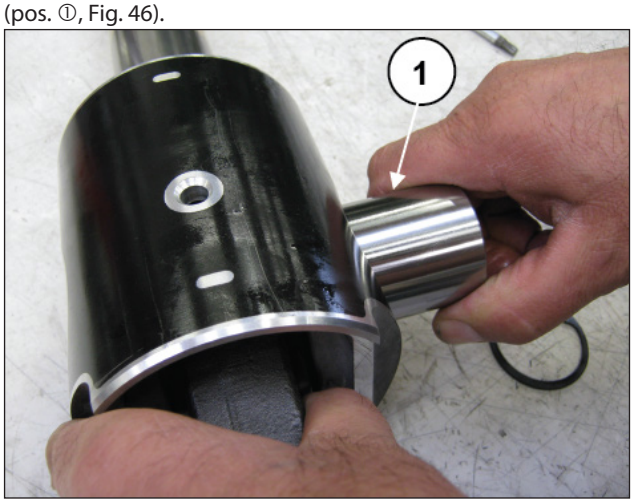


Fig. 45

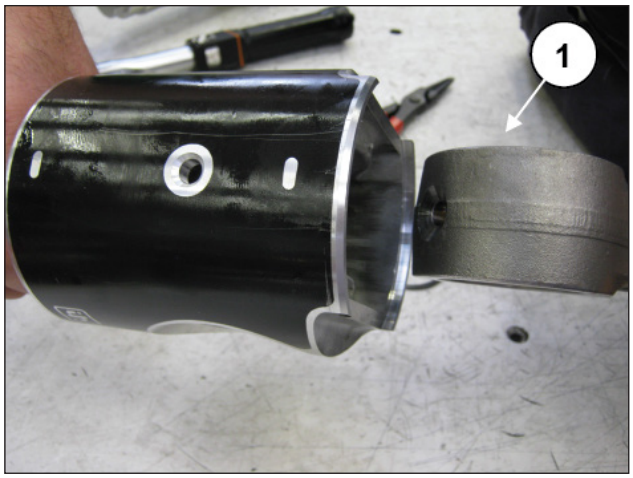


Fig. 46

To separate the rod from the piston guide, unscrew the round head M6 screws with a special wrench (pos. ①, Fig. 47).

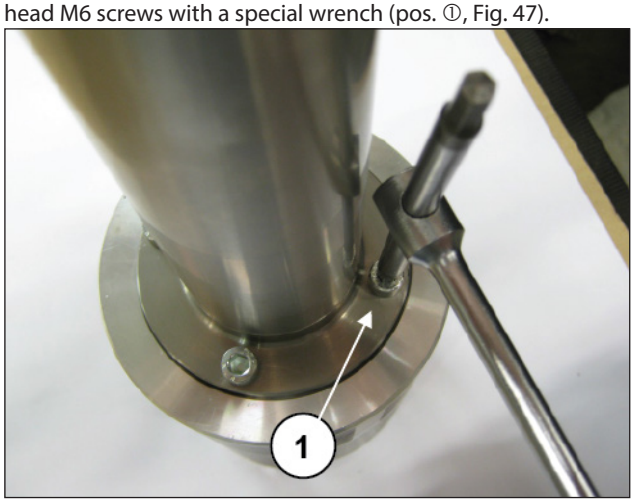


Fig. 47

Remove the four filter mesh fixing screws to access the lube pump suction cavity and check that the interior is clean (pos. ①, Fig. 48).

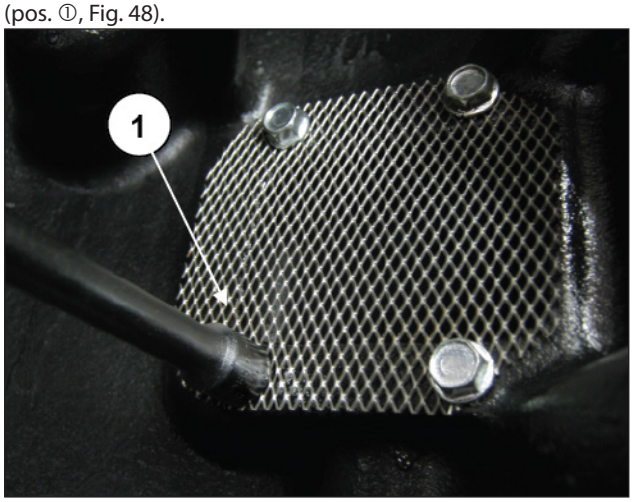


Fig. 48

2.1.1.1 Removing the lube pump

The correct removal procedure for the lube pump is described below. Remove the lube pump rear plate by undoing the three M6 screws (pos. ①, Fig. 49) to gain access to the lube pump rotors, then remove the rotors (pos. ①, Fig. 50).

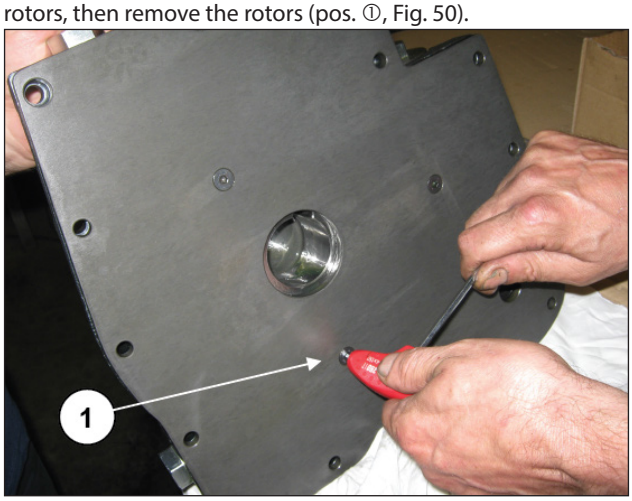


Fig. 49

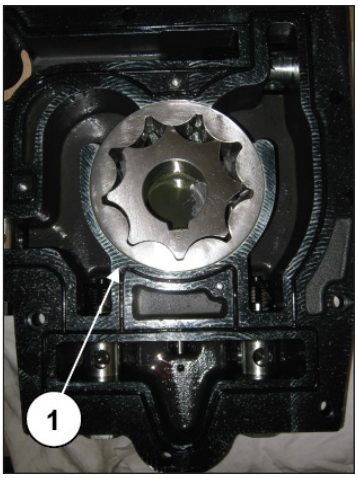


Fig. 50

Remove the shaped O-ring and renew it if necessary (pos. ①, Fig. 51).

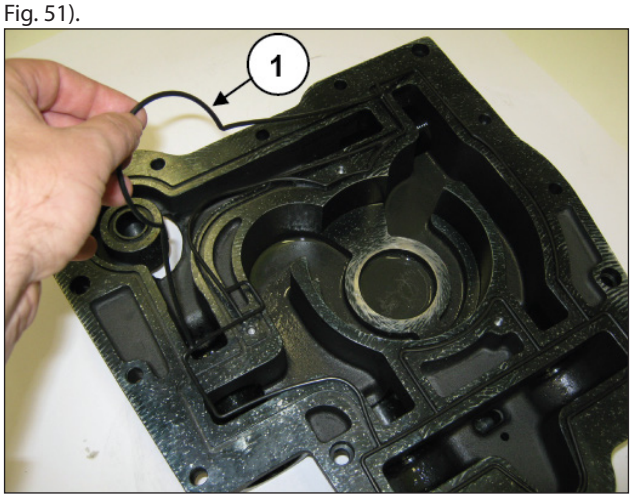


Fig. 51

Undo the M14 plug (pos. ①, Fig. 52) and extract the pressure relief valve with related spring (pos. ①, Fig. 53).



Fig. 52

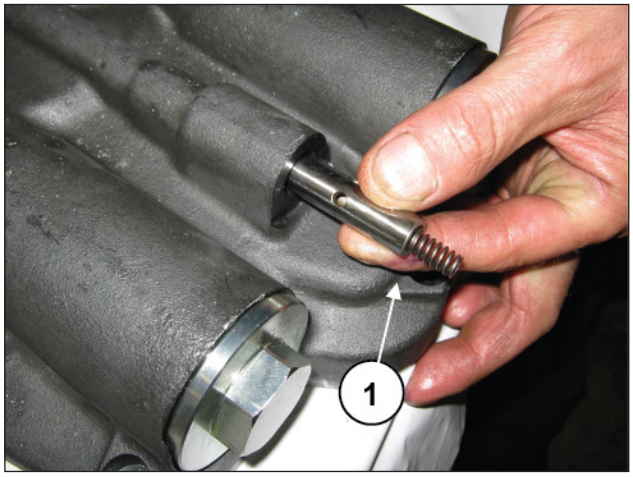


Fig. 53

Undo the four M40 plugs (pos. ①, Fig. 54) and remove the complete directional control valve insert (pos. ①, Fig. 55).

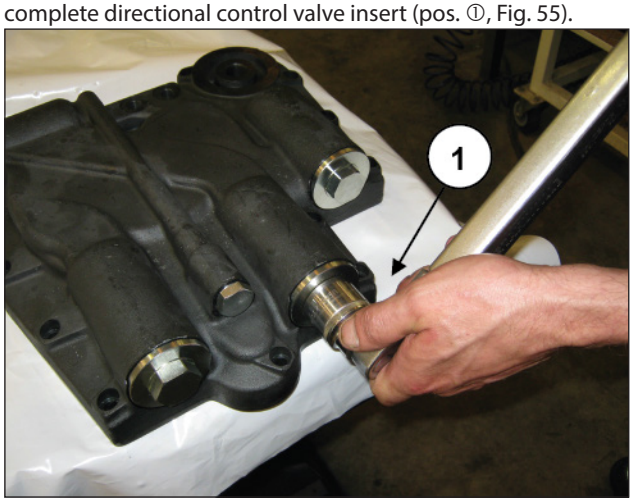


Fig. 54

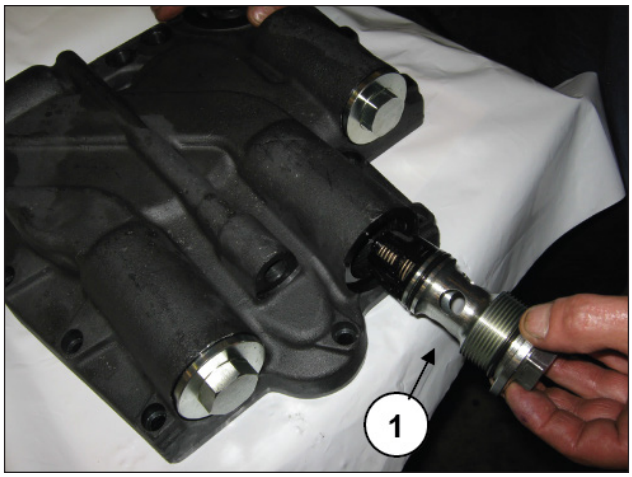


Fig. 55

2.1.2 Assembly of the mechanical part

Reassemble the unit following the procedure indicated in point 2.1.1 in reverse.
The correct sequence is as follows:
Preparation of front and rear crankcase halves:
Fit the oilway closing grub screws in the threaded holes on the front and rear casings, first smearing them with LOX-EAL 5314 threadlocker or an equivalent product. (Fig. 56 and pos. ① Fig. 57).

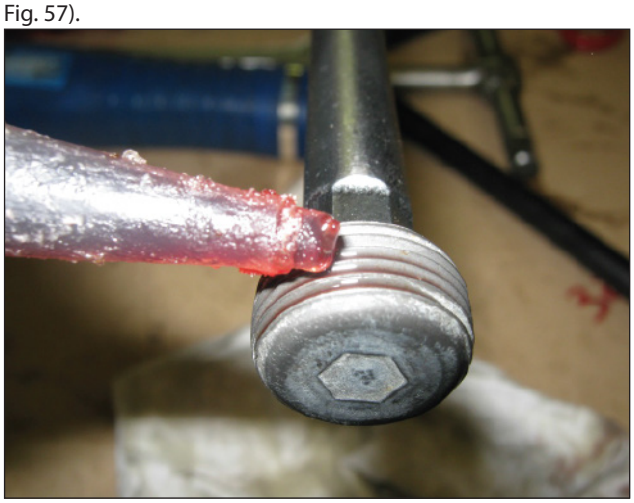


Fig. 56

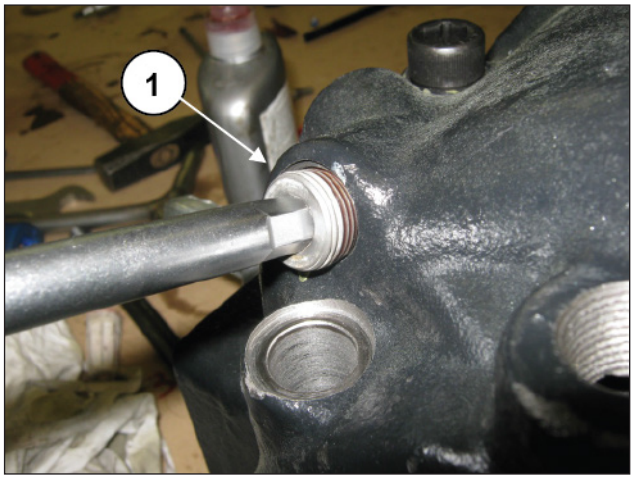


Fig. 57

Fit the locating bushes into the holes on the crankshaft main bearings (pos. ①, Fig. 58).

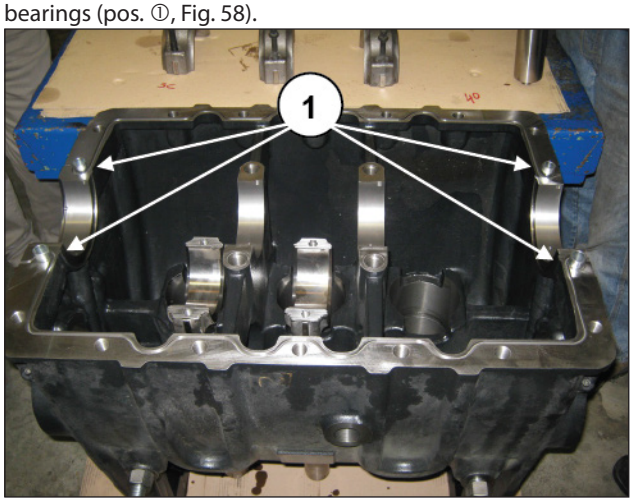


Fig. 58

Fix the oil filter mesh on the rear casing using four M6 screws (pos. ①, Fig. 59).

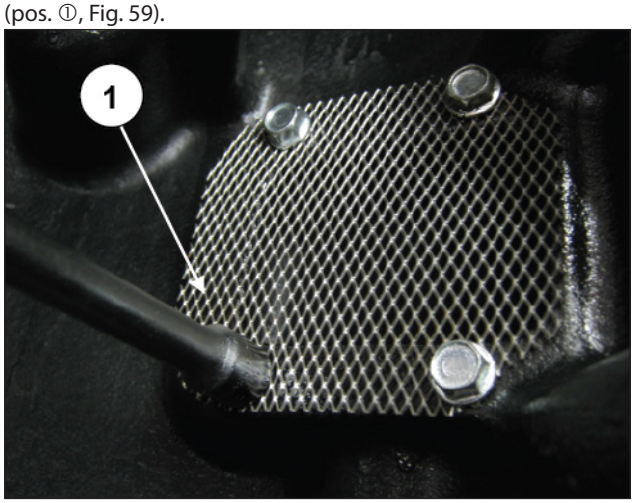


Fig. 59

Preparing the crankshaft:
Fit the oilway closing grub screws in the two threaded holes on the crankshaft, after smearing them with LOX-EAL 5314 threadlocker or an equivalent product. (Fig. 60 and pos. ① Fig. 61).



Fig. 60

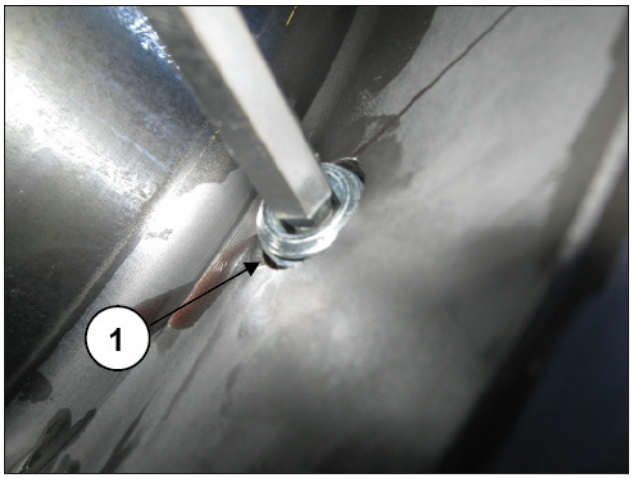


Fig. 61

Assemble the red to the piston guide.
Insert the piston guide rod into its seat on the piston guide (pos. ①, Fig. 62) and fix the rod to the piston guide by means of the 4 M6x25 screws (pos. ①, Fig. 63).



Fig. 62



Fig. 63

Clamp the piston guide in a vice with the aid of a special tool and torque the screws with a torque wrench (pos. ①, Fig. 64) as described in heading 3.

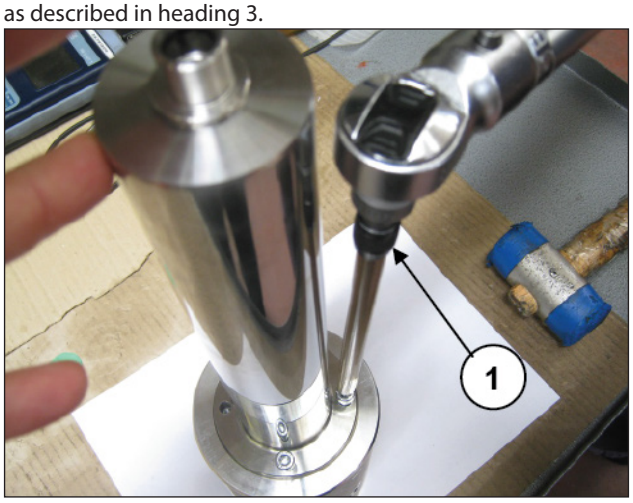


Fig. 64

When torquing the piston guide rod screws take care not to damage the rod to avoid the risk of oil leaks from the radial oil seal.

Insert the conrod in the piston guide (pos. ①, Fig. 65) and then insert the spindle (pos. ①, Fig. 66). Fit the two circlips with the circlip pliers (pos. ①, Fig. 67).

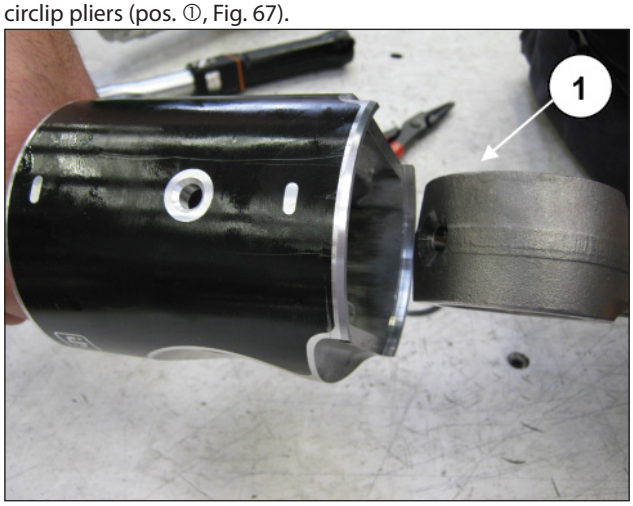


Fig. 65

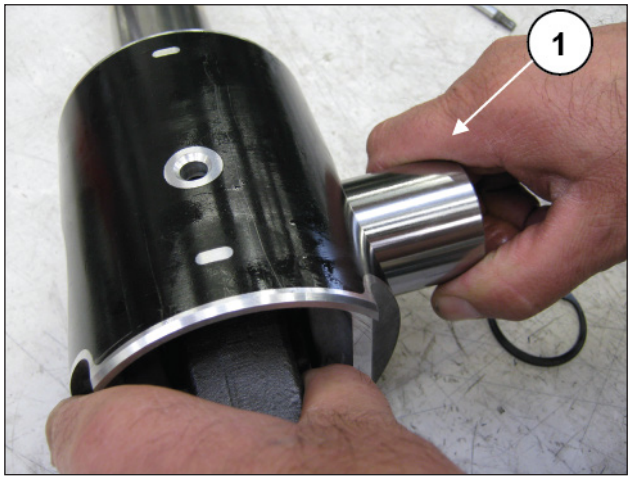


Fig. 66

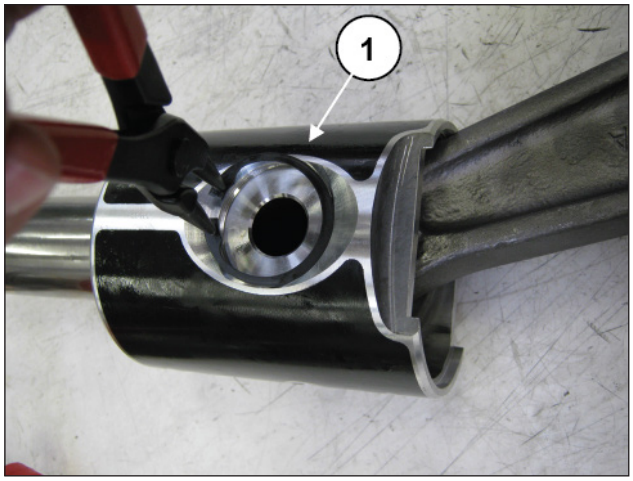


Fig. 67

Assembly has been carried out properly if the conrod small end, piston guide and spindle pin rotate freely.

Separate the caps from the conrods. Proper coupling can be verified by the numbering on the side (pos. ①, Fig. 68).

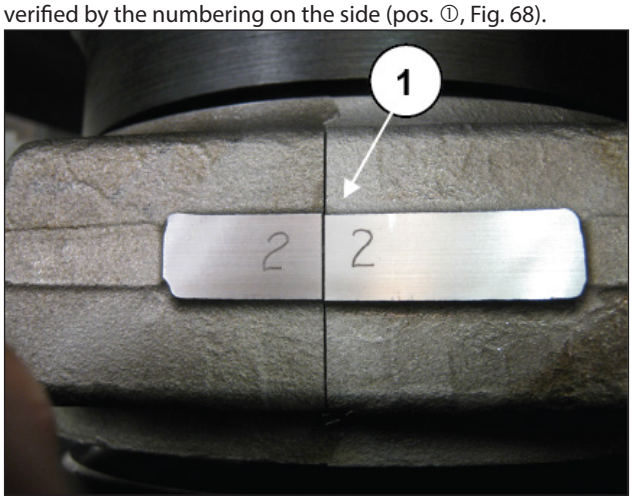


Fig. 68

After having checked perfect cleaning of the crankcase, proceed with assembly of conrod shank-piston guide unit inside crankcase cylinders (Fig. 69).



Fig. 69

Insertion of the conrod-piston guide unit in the casing must be made with the half bearings set in the direction in which numbers are visible from above.

Insert the PTO shaft from either of the sides and position it in the center of the front casing (Fig. 70 and Fig. 71).

The PTO shaft must be fitted before installing the crankshaft.

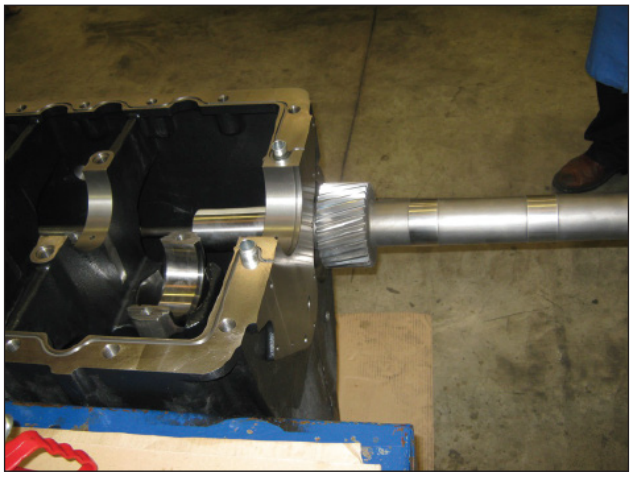


Fig. 70

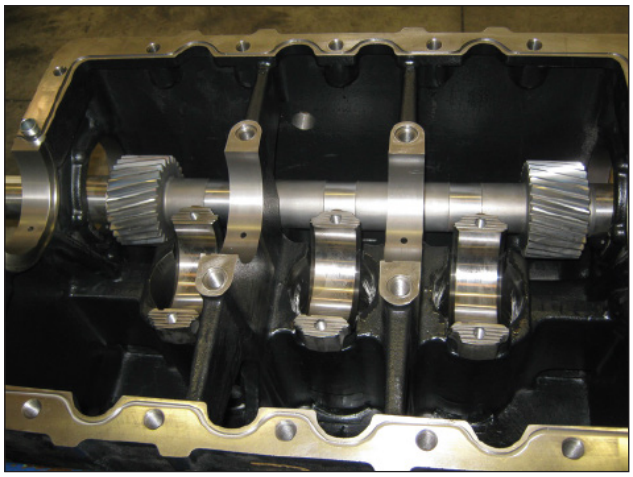


Fig. 71

Fit the bearing shells on the three conrod caps and on the main bearings of the front casing (Fig. 72 pos. ①, ②).
Position the three assemblies with the big ends on the wall of the associated cylinders.

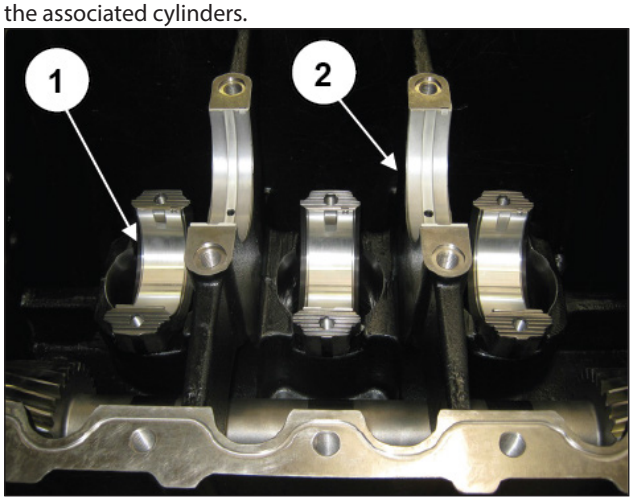


Fig. 72

To avoid possible swapping of bearing shells adhere strictly to the above figure (Fig. 72); specifically, the conrod bearing shells have no notch (pos. ①) while the main bearing shells have a notch and an oilway (pos. ②). Before fitting the crankshaft recheck the correct positions of the bearing shells.
For correct assembly of the main bearing shells make sure the reference keys are positioned in their locations (pos. ①, ②, Fig. 73).

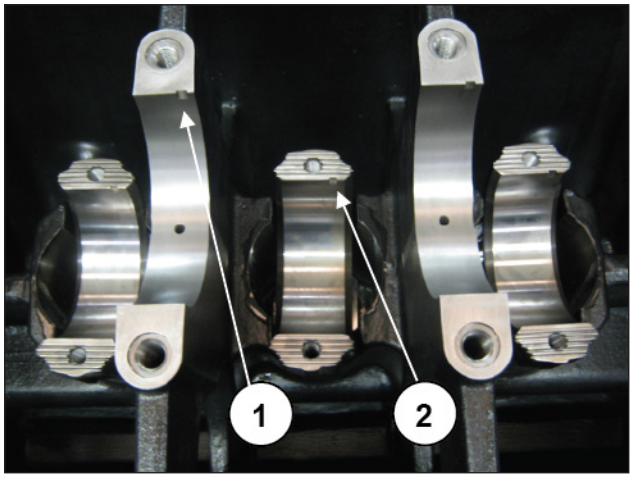


Fig. 73

Lower the crankshaft into position (Fig. 74).



Fig. 74



Fig. 75

The crankshaft shaft must be inserted into the crankcase so that the teeth on the ring gears are oriented as shown in Fig. 75. The two helical directions defined by the ring gear teeth cross at the opposite side to the oil dipstick head.

Insert the two crankshaft clearance half-rings (pos. ①, Fig. 76 and Fig. 77).

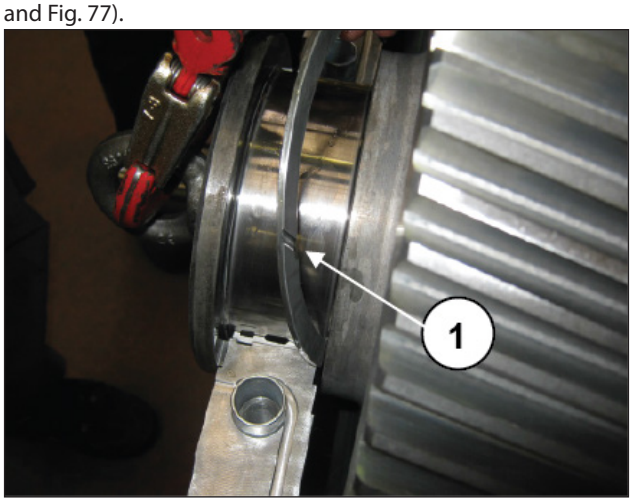


Fig. 76



Fig. 77

The clearance rings must be fitted taking care to position the grooves facing the internal and external shoulders of the crankshaft (pos. ①, Fig. 76 and Fig. 78).

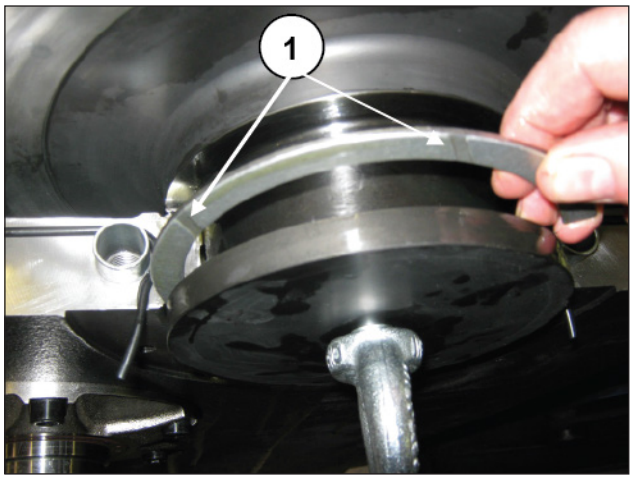


Fig. 78

Fit the lower bearing shells to the conrod caps (pos. ①, Fig. 79) ensuring that the half-bearing reference notches are positioned in their housing on the cap (pos. ②, Fig. 79).

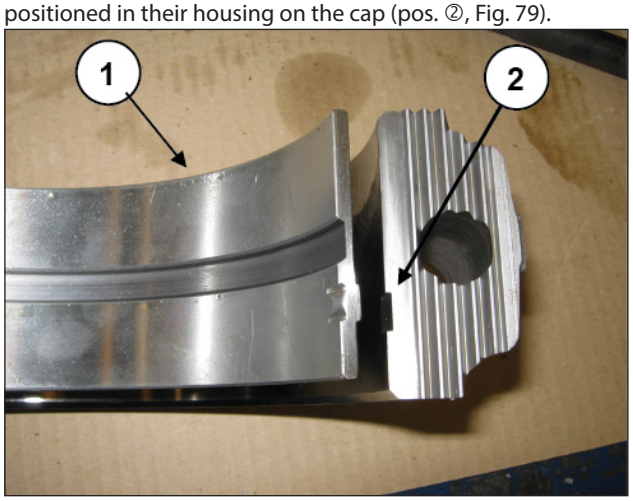


Fig. 79

Make sure the conrod cap bearing shells feature an oilway groove.

Offer up the conrods to the crankshaft pins and fix the caps to the conrods using the M12x1.25 screws (pos. ①, Fig. 80). Tighten the screws with a torque wrench as described in chapter 3, ideally reaching the prescribed tightening torque on both screws simultaneously.

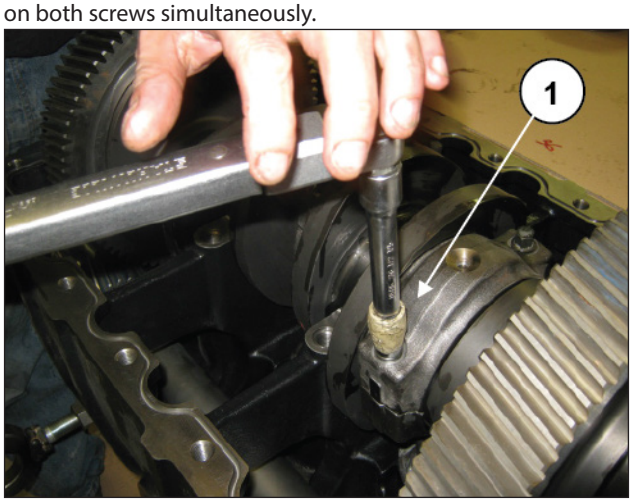


Fig. 80

After having completed the tightening procedure, check that the big ends have some clearance on both sides (Fig. 80/a).

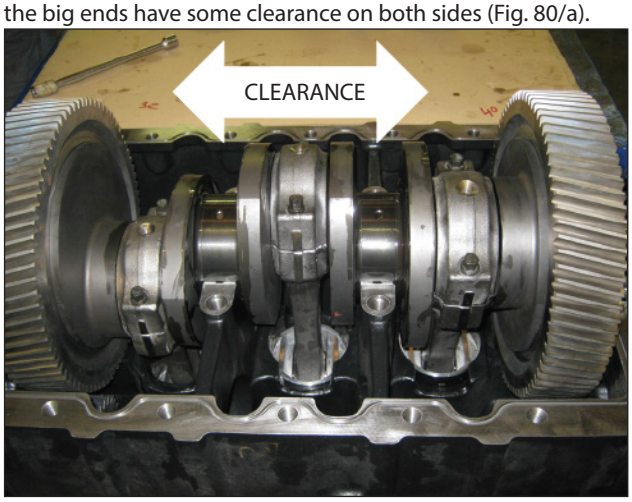


Fig. 80/a

Note the correct assembly direction of the caps. The numbers must face upward.

Fit the O-rings in their locations on the front casing mating surface (pos. ①, Fig. 81 – Fig. 82 – Fig. 83 - Fig. 84).



Fig. 81

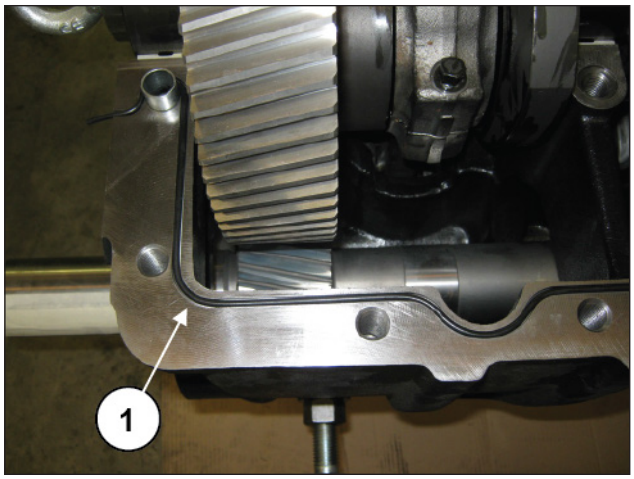


Fig. 82

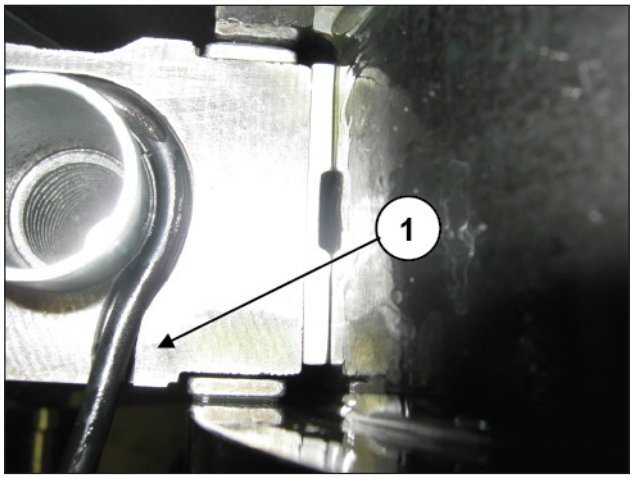


Fig. 83

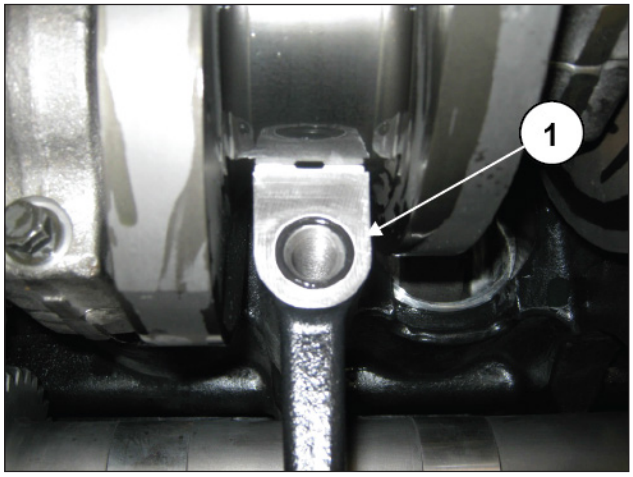


Fig. 84

Fit the main bearing shells (pos. ①, Fig. 85) in their seats on the rear casing.

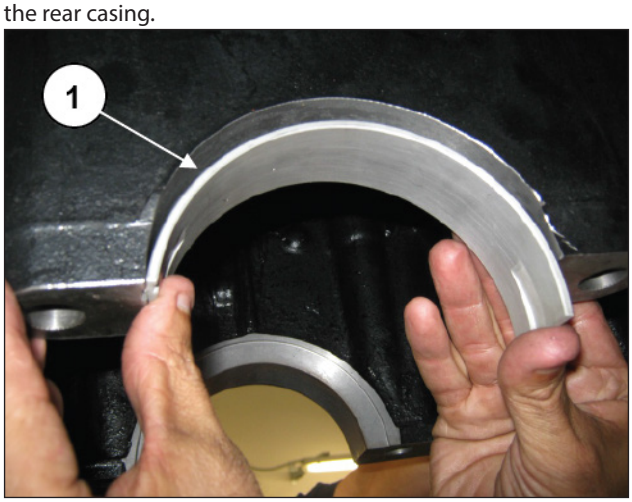


Fig. 85

For correct assembly of the main bearing shells make sure the reference keys are seated in their locations (pos. ①, Fig. 86). Also ensure that the bearing shells have the correct interference with the seat; the shells must protrude with respect to the crankcase surface before they are lodged fully home (pos. ①, Fig. 86/a).

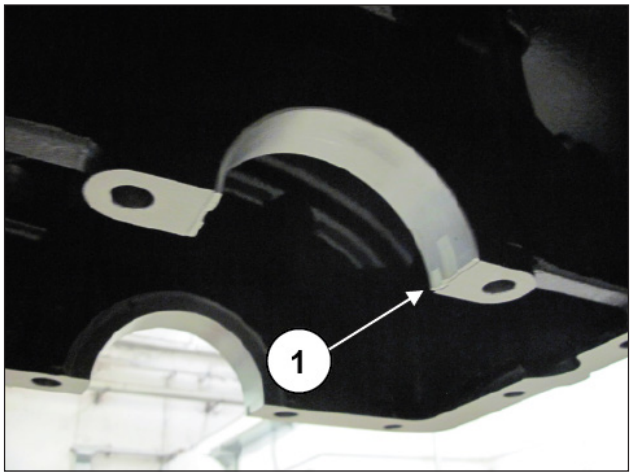


Fig. 86

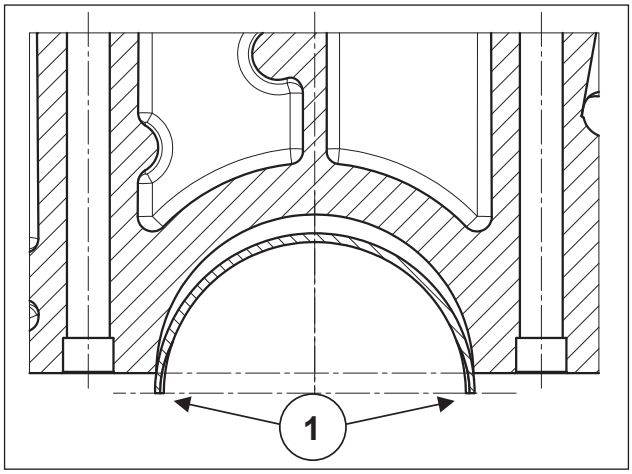


Fig. 86/a

Fit the rear casing (Fig. 87) checking alignment on the front casing locating bushes (pos. ①, Fig. 88).

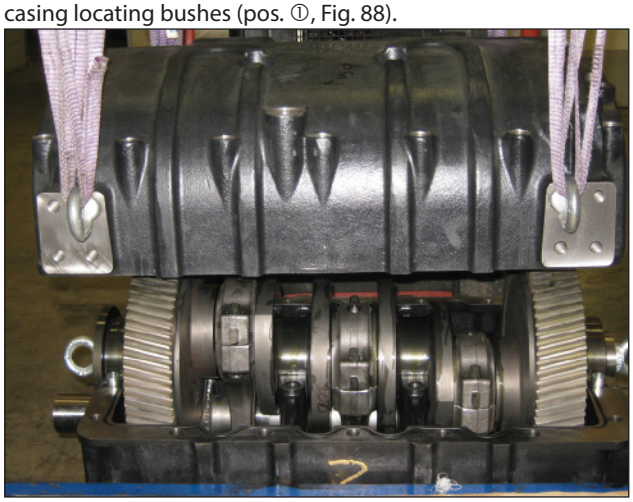


Fig. 87

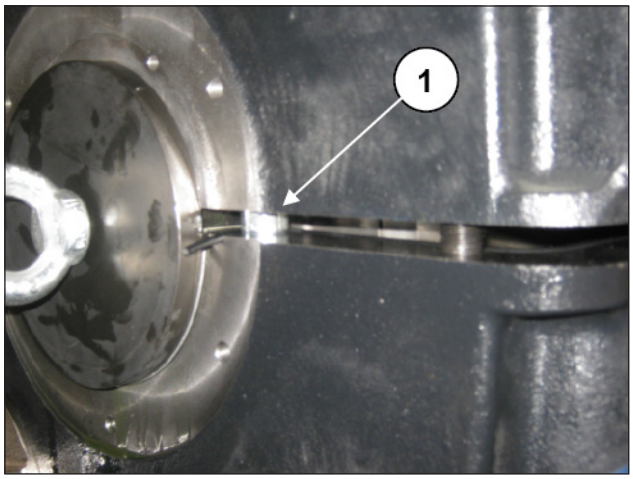


Fig. 88

Fix the rear casing by means of the 22 M16 screws (pos. ①, Fig. 89) as shown in the diagram in Fig. 89/a.
Tighten the screws with a torque wrench as described in heading 3.

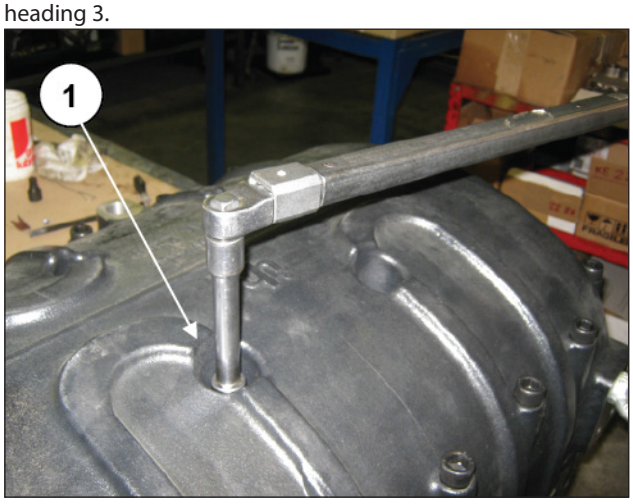


Fig. 89

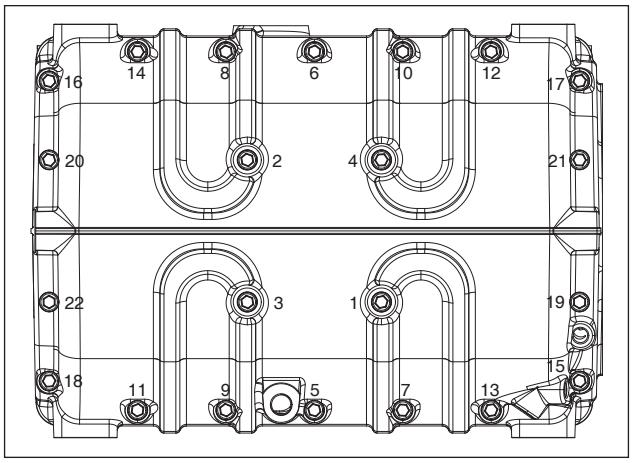


Fig. 89/a

Use a craft knife and feeler gauge to cut the surplus portion of the O-rings protruding from the front and rear casing joint in correspondence with the crankshaft flange (pos. ①, Fig. 90 and Fig. 91).

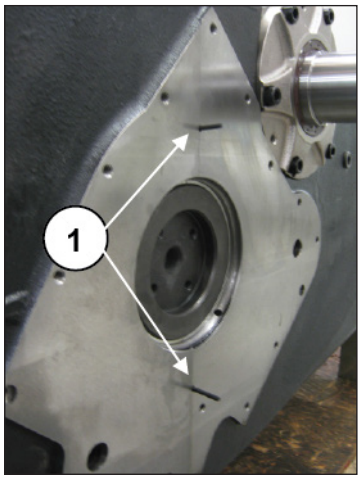


Fig. 90

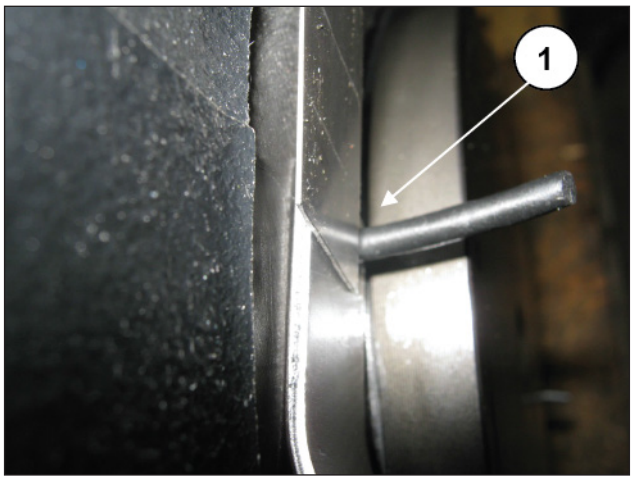


Fig. 91

The O-rings should protrude by 2 mm (pos. ①, Fig. 92).

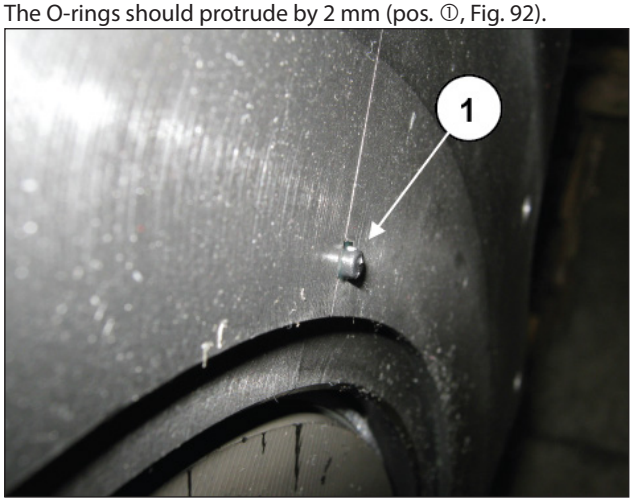


Fig. 92

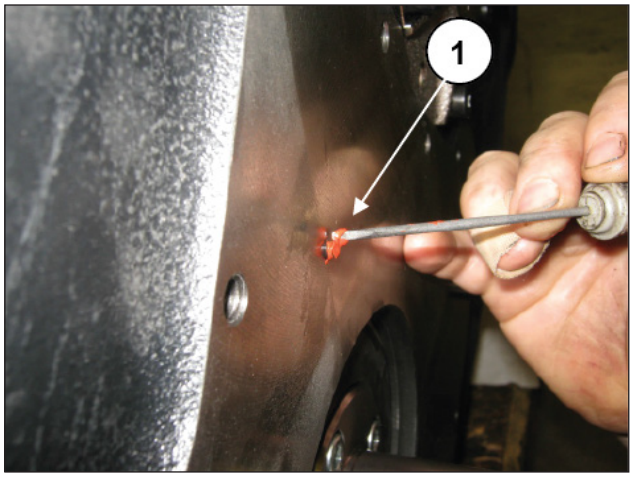


Fig. 93

Smear a silicone sealant such as MOTORSIL D (Arexons) over all the areas of protrusion of the O-rings in contact with the flat gaskets (Fig. 93, pos. ①).

Pre-assemble the left and right PTO bearing covers:
Fit the radial seal ring into the PTO bearing cover and fit the O-rings (pos. ①, Fig. 94 - Fig. 95).

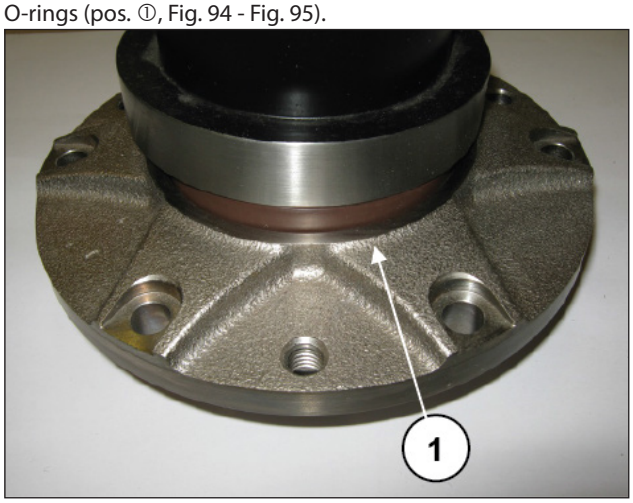


Fig. 94

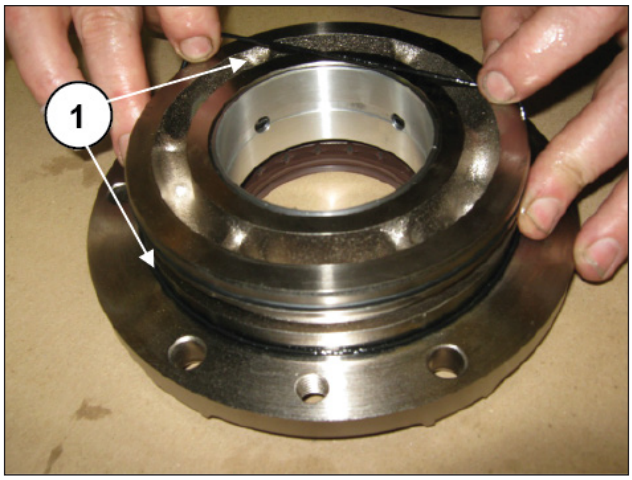


Fig. 95

Before proceeding with the assembly of the radial seal ring, verify the condition of the seal lip. If it is necessary to replace it, position the new ring as shown in Fig. 96.

If the PTO shaft shows diameter wear corresponding to the seal lip, then to avoid grinding you can position the ring as a second step as shown in Fig. 96.

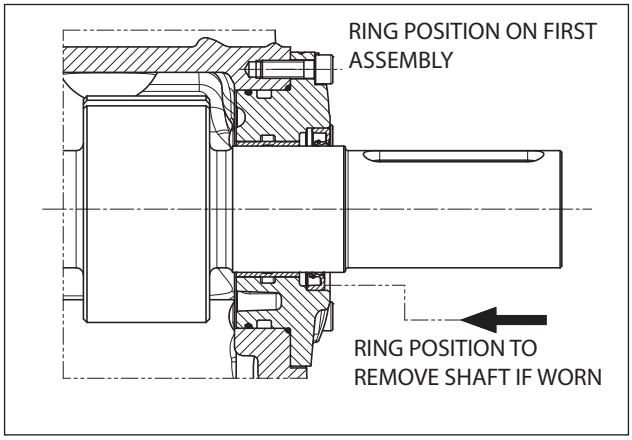


Fig. 96

Fit the PTO bearing covers on both sides and tighten the M10 fixing screws (pos. ①, Fig. 97 - Fig. 98)
Tighten the screws with a torque wrench as described in heading 3.

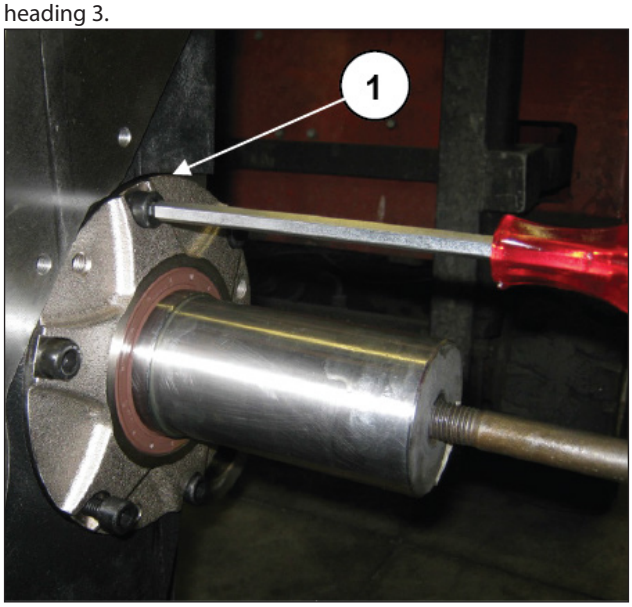


Fig. 97

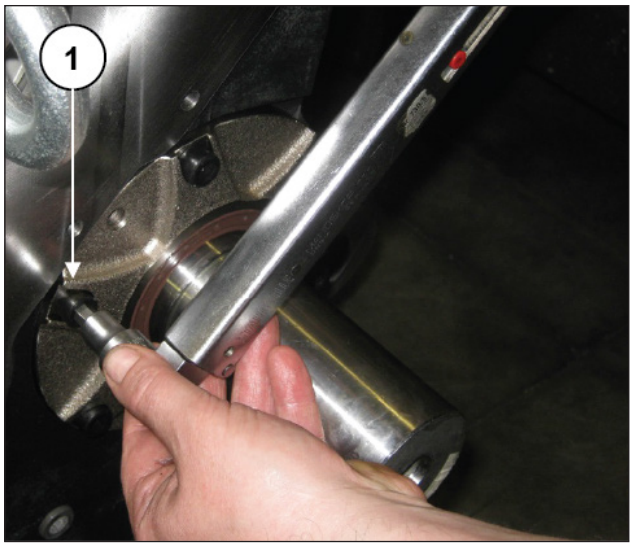


Fig. 98

Fit the crankshaft cover with associated gasket (after smearing silicone sealant - see Fig. 93 - on the protruding O-rings, and then tighten the M8 fixing screw (pos. ①, Fig. 99 - Fig. 100).

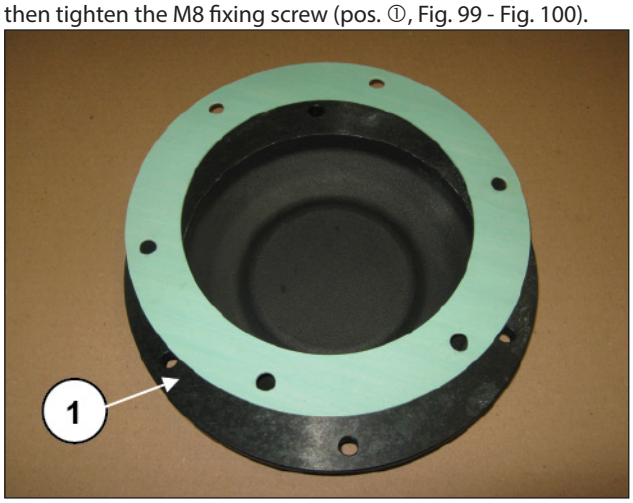


Fig. 99

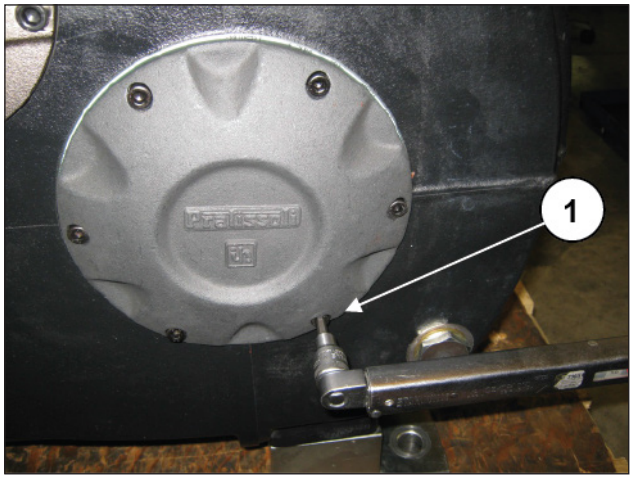


Fig. 100

Tighten the screws with a torque wrench as described in heading 3.

Assemble the lube pump drive shaft to the crankshaft and fix with the four M8 screws (pos. ①, Fig. 101) then tighten with a torque wrench to the value prescribed in heading 3.

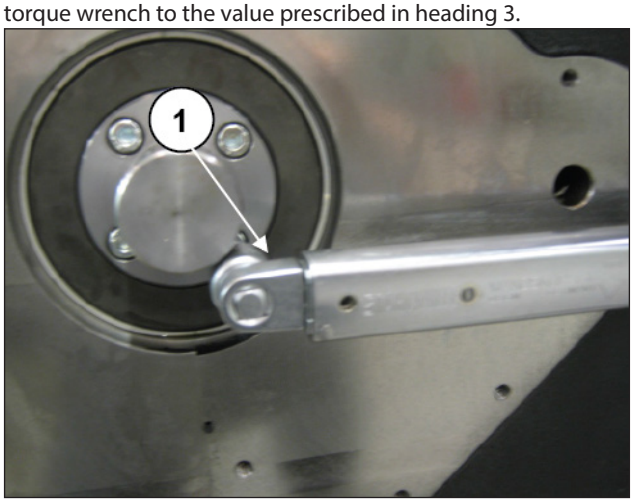


Fig. 101

Insert the key in the keyway on the lube pump drive shaft (pos. ①, Fig. 102).

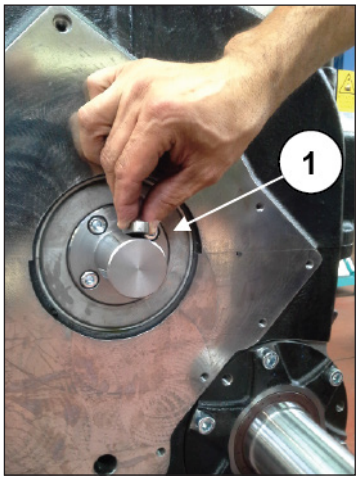


Fig. 102

Fit the 2 lube pump body locating bushes (pos. ①, Fig. 103).

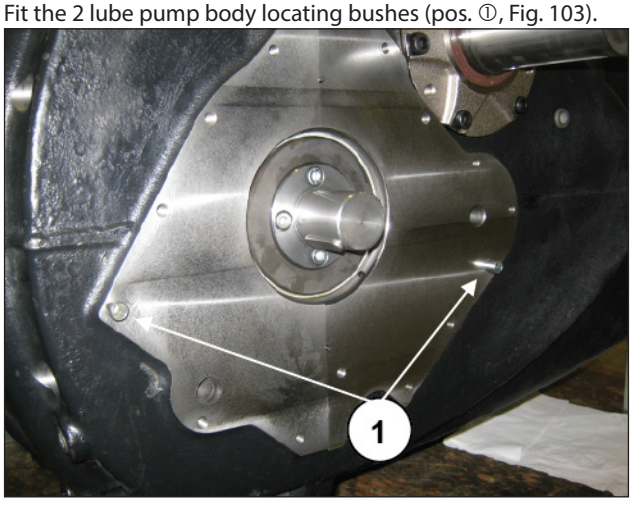


Fig. 103

Fit the flat gasket (pos. ①, Fig. 104) after smearing silicone sealant on the protruding O-rings (see Fig. 93).

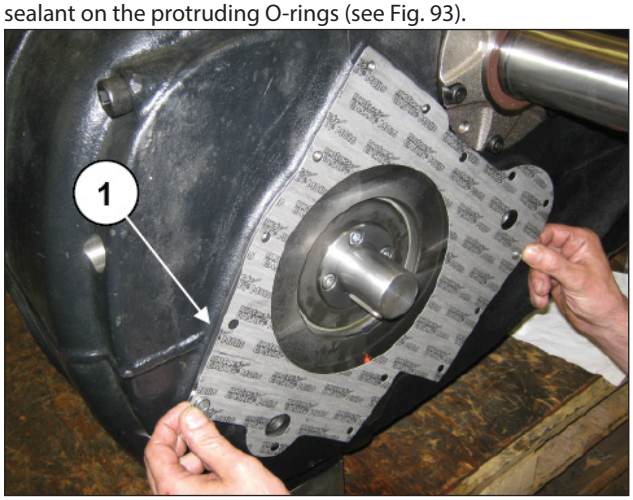


Fig. 104

Fit the lube pump body (Fig. 105).

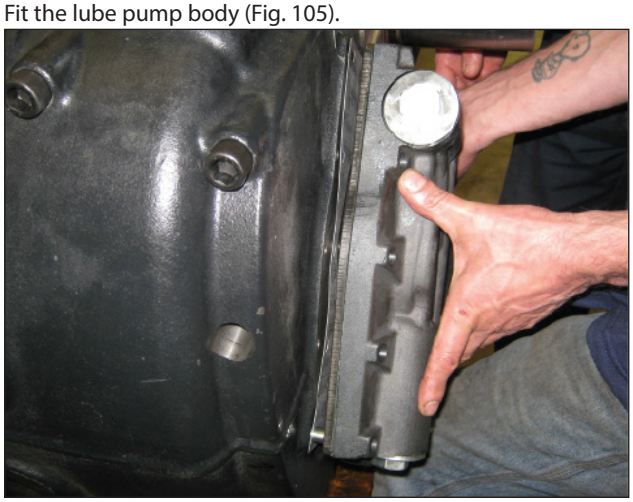


Fig. 105

Tighten the pump body by means of the M8 screws (pos. ①, Fig. 106) and calibrate them with a torque wrench as described in heading 3.

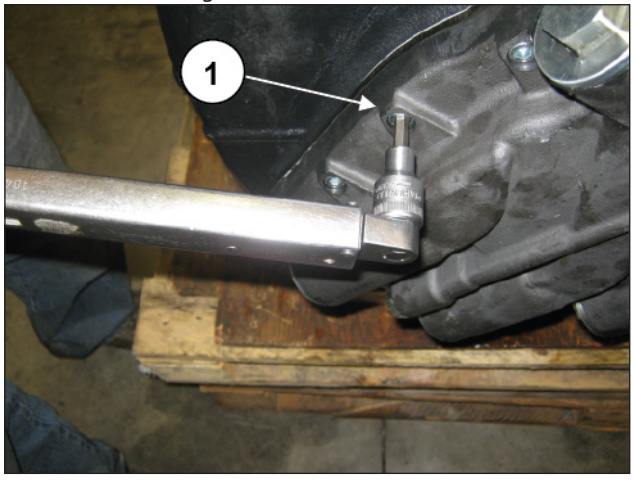


Fig. 106

Check correct positioning of the seal on the water-oil heat exchanger (pos. ①, Fig. 107).



Fig. 107

Fit the water-oil heat exchanger (pos. ①, Fig. 108) and tighten the union with a torque wrench (pos. ①, Fig. 109) as described in heading 3.

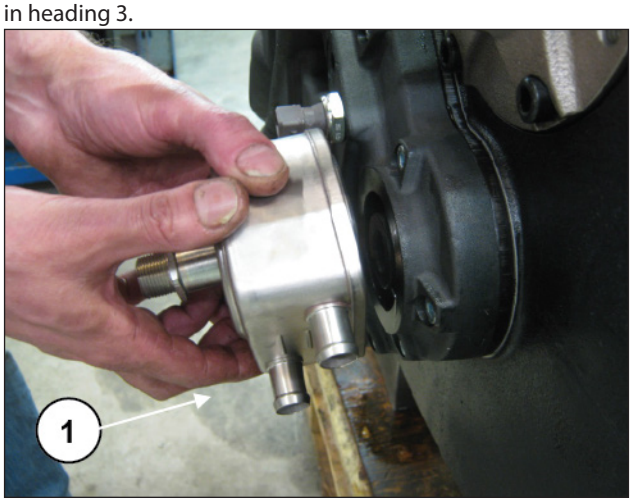


Fig. 108

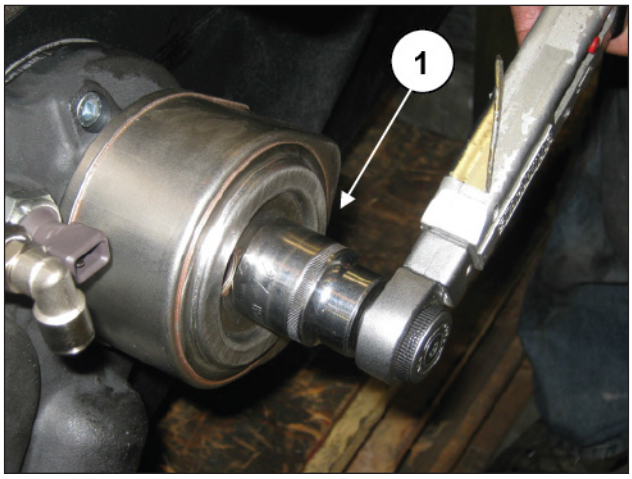


Fig. 109

Use LOX-EAL 53-14 union sealant or similar to smear on the Tee fitting and pressure switch fitting (pos. ① ②, Fig. 110), then assemble the fitting.
Fit the oil temperature probe (pos. ③, Fig. 110).

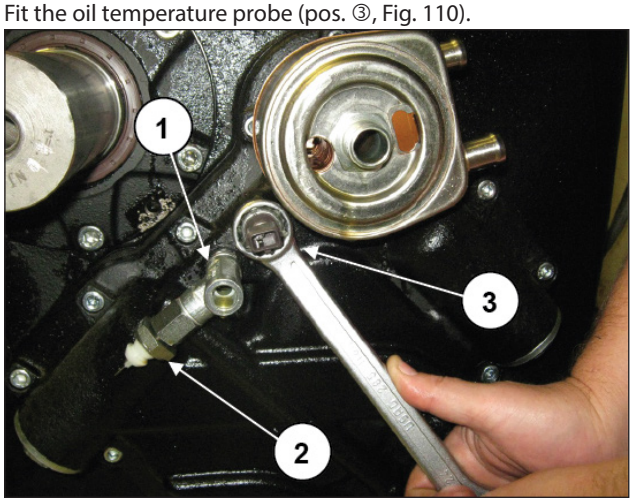


Fig. 110

Use LOX-EAL 53-14 union sealant or similar to smear on the pressure gauge fitting (pos. ①, Fig. 111), then assemble the fitting.

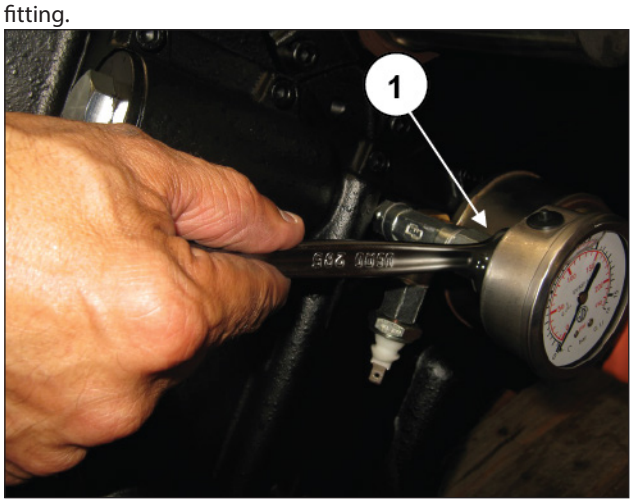


Fig. 111

Fit the oil filter cartridge by screwing it on by hand (pos. ①, Fig. 112).

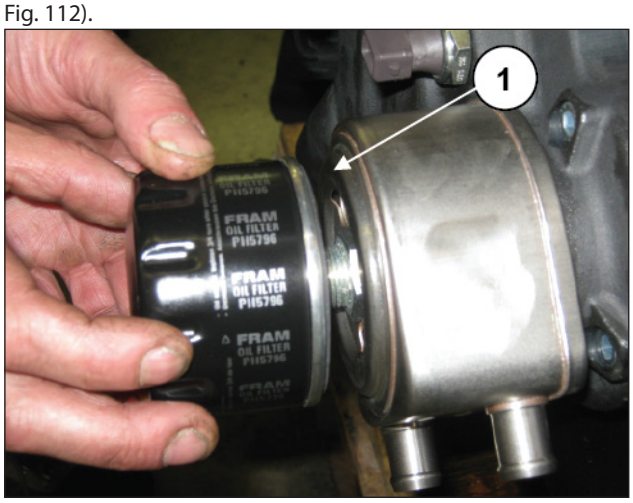


Fig. 112

Attach the connector (pos. ①, Fig. 113) to the oil temperature probe.



Fig. 113

Mount the radial seal ring onto the oil seal cover (pos. ①, Fig. 114) using a drift or equivalent tool (special tool code 27643500).

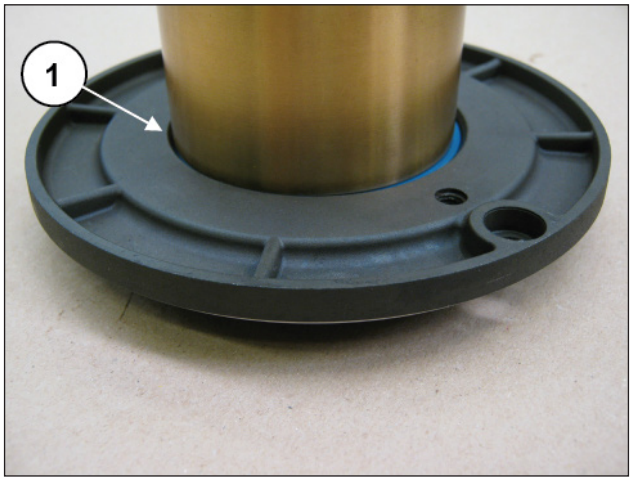


Fig. 114

Fit the O-ring in the seat on the oil seal cover (pos. ①, Fig. 115); insert the assembly into the front casing in the seat provided, making sure that the cover completely is pressed fully home in its seat (Fig. 116).

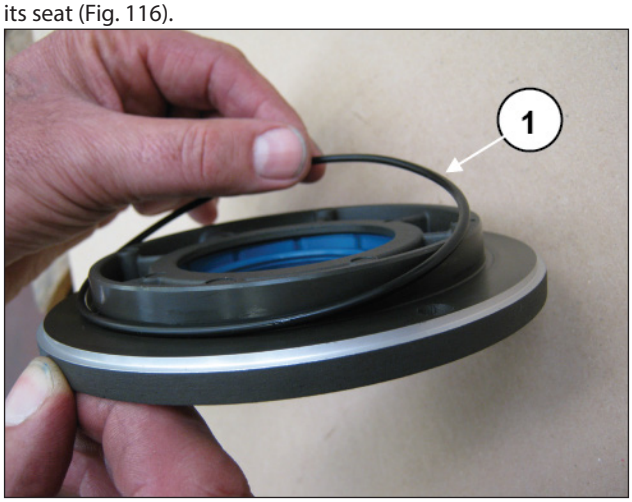


Fig. 115

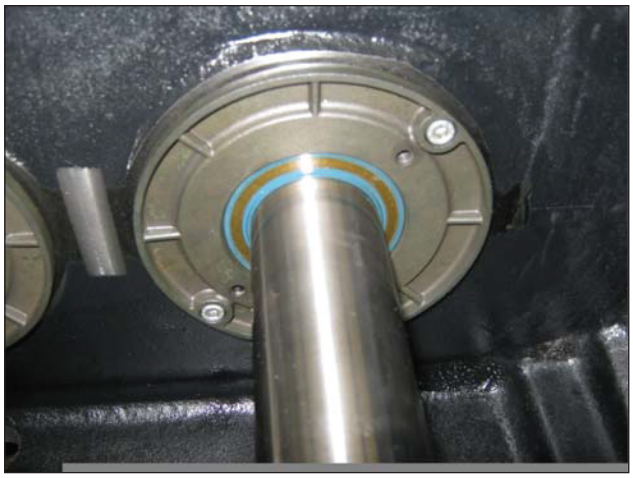


Fig. 116

Tighten the two M6 screws (pos. ①, Fig. 117) using a torque wrench, calibrating them as described in heading 3.

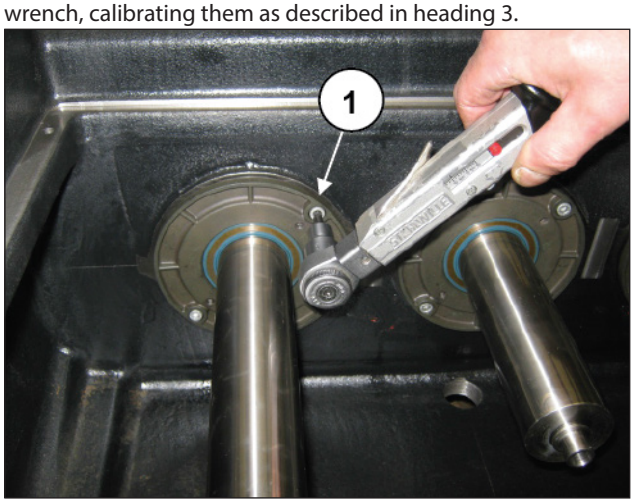


Fig. 117

Fit the O-ring (pos. ①, Fig. 118) and splashguard (pos. ①, Fig. 119) on the piston guide rod with the groove facing the front of the casing (pos. ②, Fig. 119).

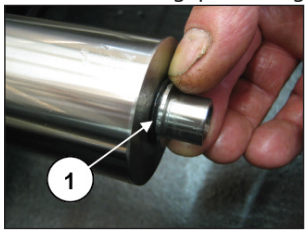


Fig. 118

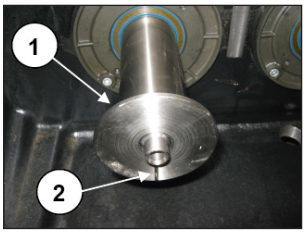


Fig. 119

When assembling the SR pump in both the horizontal and vertical versions fit the piston spacer (pos. ①, Fig. 119/a) between splashguard and piston.

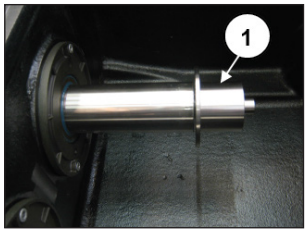


Fig. 119/a

Fit the oil drain plugs (pos. ①, Fig. 120) and manifold locating pins (pos. ①, Fig. 120/a).



Fig. 120

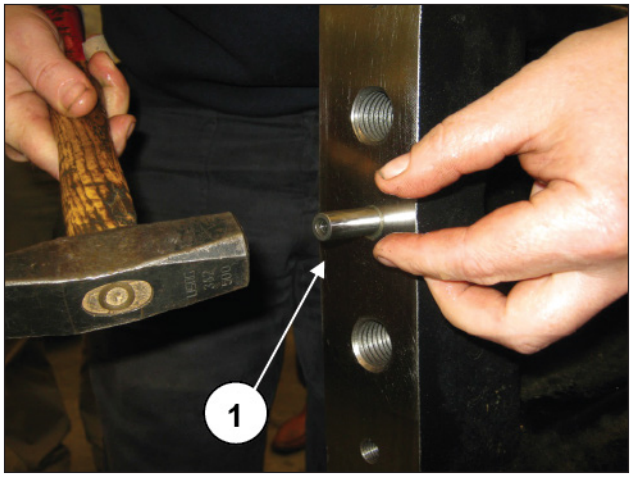


Fig. 120/a

Mount the shaft end cover and affix it to the casing using 3 x M10x20 screws (pos. ①, Fig. 121).

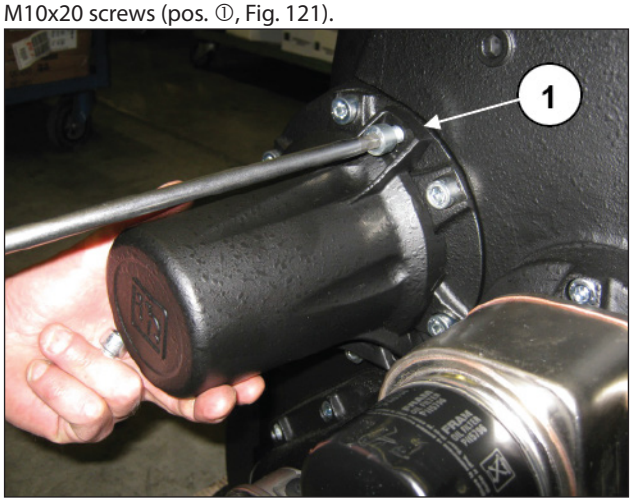


Fig. 121

Apply the tab to the PTO shaft (pos. ①, Fig. 122).
Tighten the screws with a torque wrench as described in heading 3.

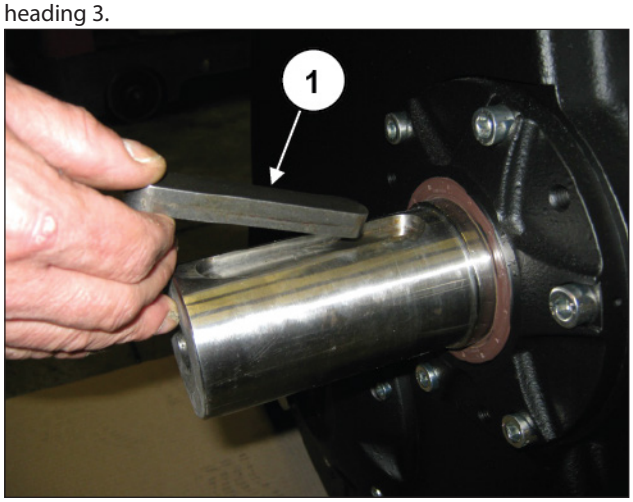


Fig. 122

2.1.2.1 Fitting the lube pump

Reassemble the unit following the procedure indicated in point 2.1.1.1 in reverse.
The correct sequence is as follows:
Assemble the 4 directional valve inserts as shown in Fig. 123.



Fig. 123

Fit the complete directional valve inserts (pos. ①, Fig. 124) and tighten the four M40 plugs (pos. ①, Fig. 125) using a torque wrench with the torque setting prescribed in heading 3.
N.B.: the torque settings of the units is the same so they can be fitted and torqued freely.



Fig. 124

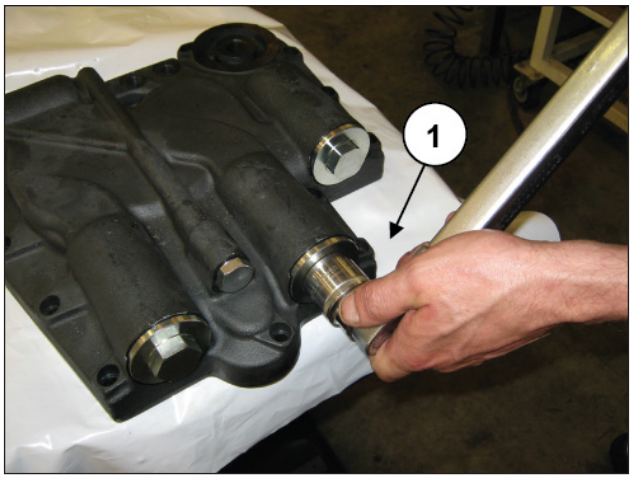


Fig. 125

Insert the pressure relief valve with related spring (pos. ①, Fig. 126) and tighten the M14 plug (pos. ①, Fig. 127) using a torque wrench with the torque setting prescribed in heading 3.

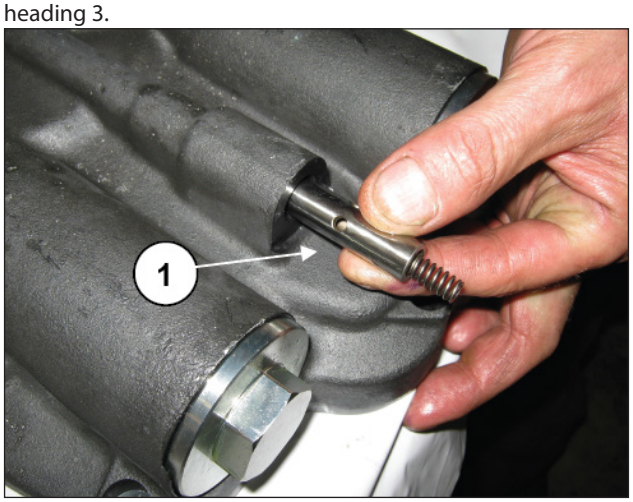


Fig. 126

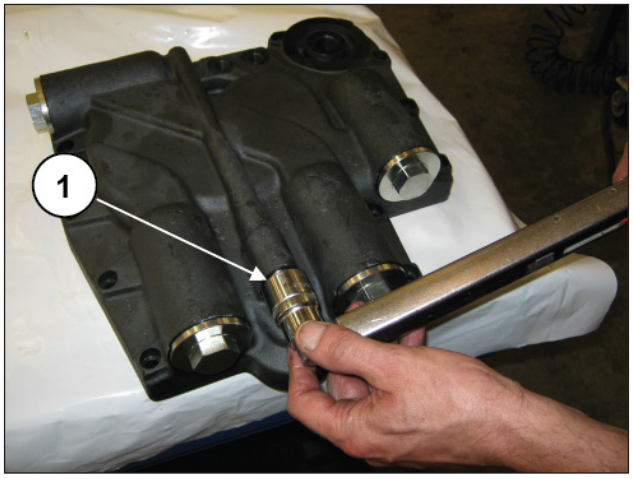


Fig. 127

Insert the shaped O-ring in its seat on the lube pump body (pos. ①, Fig. 128).

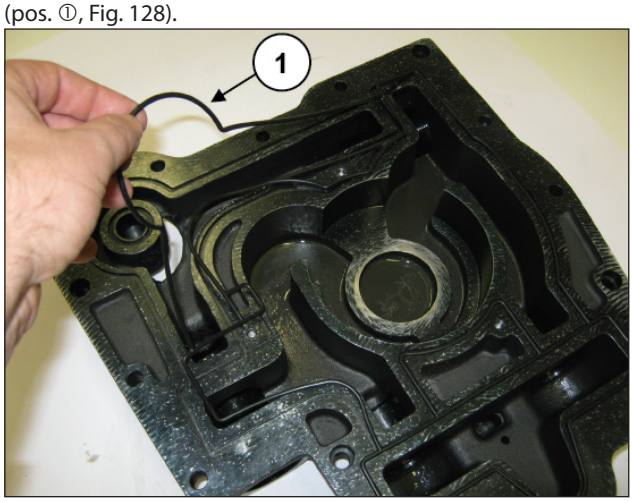


Fig. 128

Fit the lube pump rotors (pos. ①, Fig. 129).

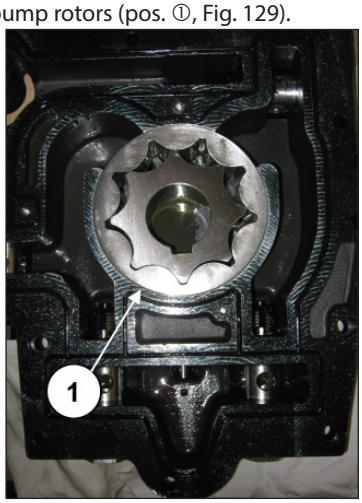


Fig. 129

When assembling the lube pump rotors orient the markings on the two parts as shown in Fig. 130 pos. ①.

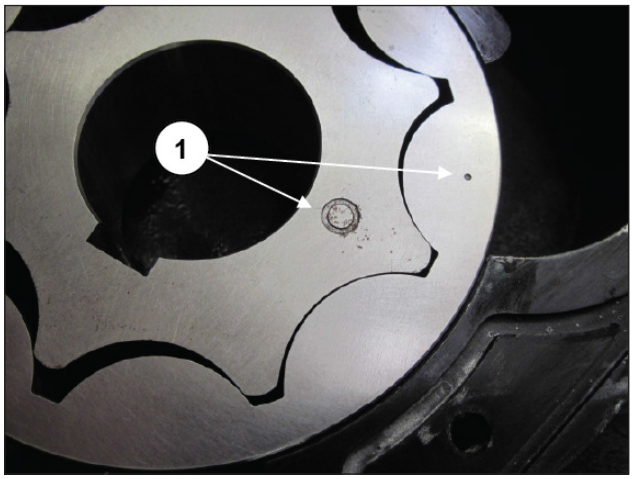


Fig. 130

Fit the lube pump rear plate and tighten the three M6 screws (pos. ①, Fig. 131) using a torque wrench with the torque setting prescribed in heading 3.

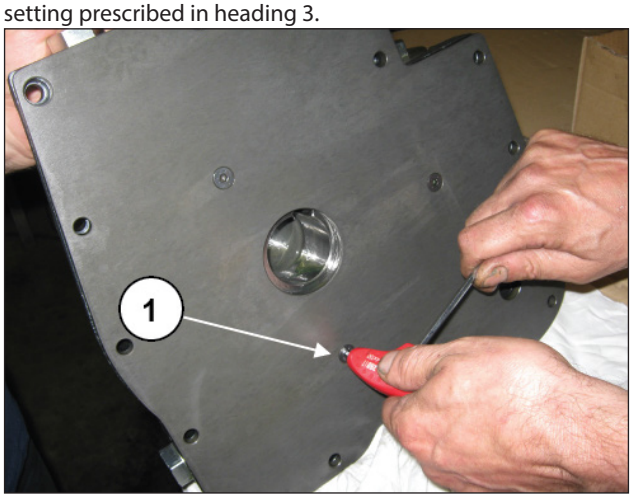


Fig. 131

For the first priming comply with the following procedure:

1) **Remove the outlet cartridge complete with the valve indicated in the photo below and fill the oilways with lube oil using a syringe or alternative means.**



Fig. 131/a

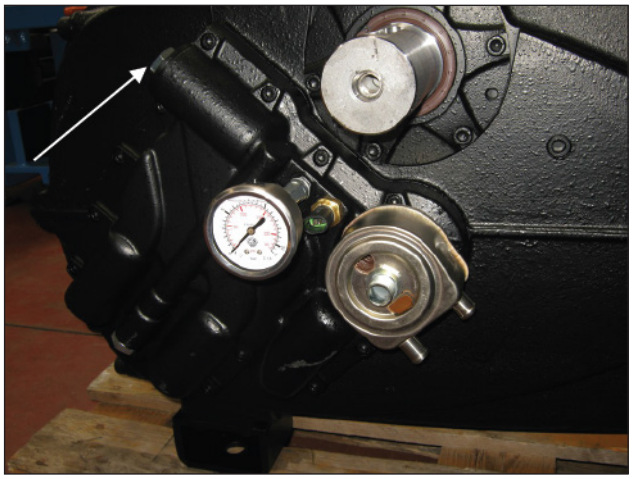


Fig. 131/b

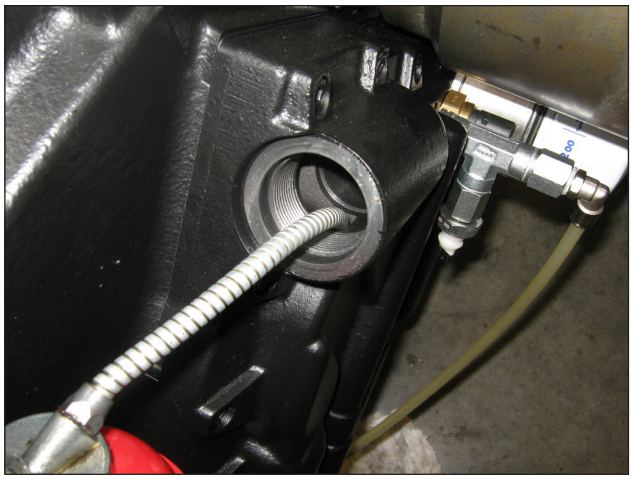


Fig. 131/c

2) **Refit the cartridge and tighten it with a torque wrench to 120 Nm then start the pump at the following minimum speeds:**
   a) **Pump with 1500 RPM pinion, start at 725 RPM.**
   b) **Pump with 1800 RPM pinion, start at 865 RPM.**
   c) **Pump with 2200 RPM pinion, start at 1060 RPM.**

2.1.3 Bellows removal – vertical versions

The correct sequence is as follows:
Completely empty the pump of oil, as indicated in point 2.1.
Remove the upper inspection cover by unscrewing the 4 M6 fixing screws as indicated in point 2.2.3.
Remove the valve lifters from the manifold and undo the screws that secure the piston sleeve pack as indicated in point 2.2.1.
Move piston and sleeve pack backward and undo the screw securing the piston. Remove sleeve pack with piston and repeat the procedure for the other cylinders; this done, undo the M24 manifold fixing screws and disassemble the manifold from the pump crankcase as indicated in point 2.2.1.
Loosen the clips securing the bellows (pos. ①, Fig. 132) before loosening the pistons and, after having removed the pistons, remove the bellows splashguard (Fig. 133).

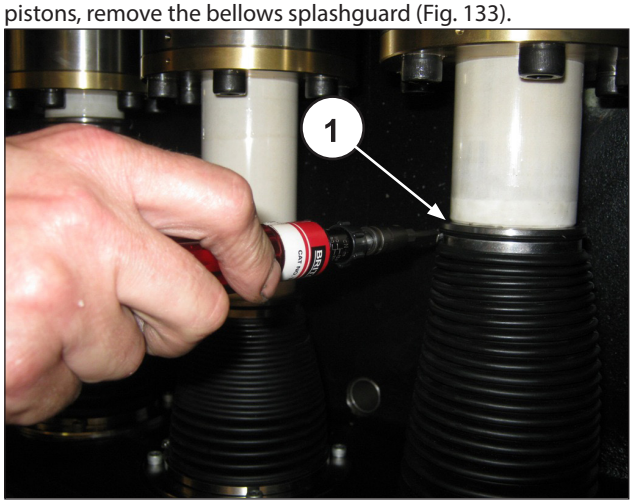


Fig. 132



Fig. 133

Remove the bellows and undo the four M6 fixing screws of the three bellows flanges (pos. ①, Fig. 134).



Fig. 134

2.1.3.1 Fitting the bellows – vertical versions

Fit the O-ring on the bellows flange (pos. ①, Fig. 135) and insert the flange into the front casing in the seat provided, making sure the flange is pressed fully home in its seat (Fig. 136).



Fig. 135



Fig. 136

Tighten the four M6 screws (pos. ①, Fig. 137) using a torque wrench, calibrating them as described in heading 3.

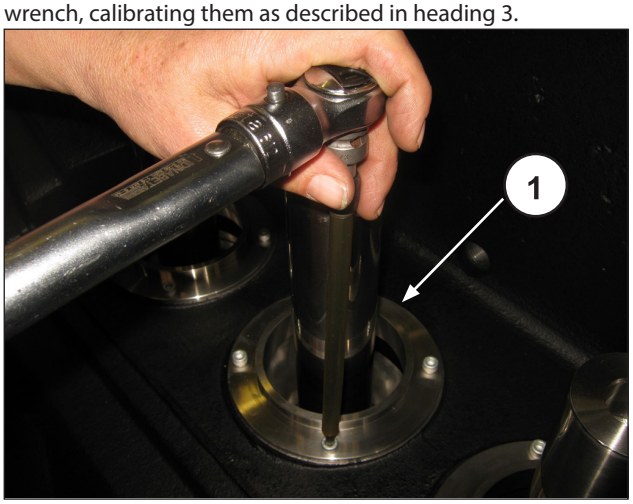


Fig. 137

Fit the bellows on the flange and secure it with the clip (pos. ①, Fig. 138), tightening the clip with a torque screwdriver as described in heading 3. Now compress the bellows with your hand and fit the bellows splashguard with associated clip, leaving it loose (pos. ①, Fig. 139).

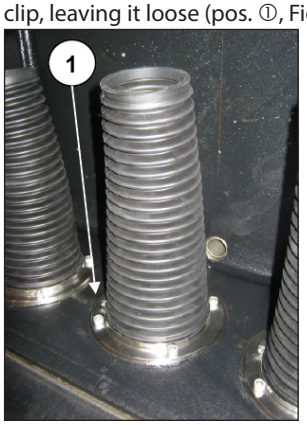


Fig. 138

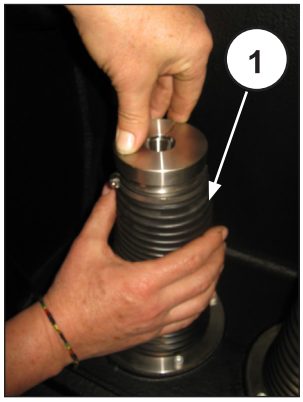


Fig. 139

The bellows must be refitted to the splashguard and the clip securing the bellow to the splashguard must be tightened only after having mounted the manifold **and secured the piston** (pos. ①, Fig. 140).

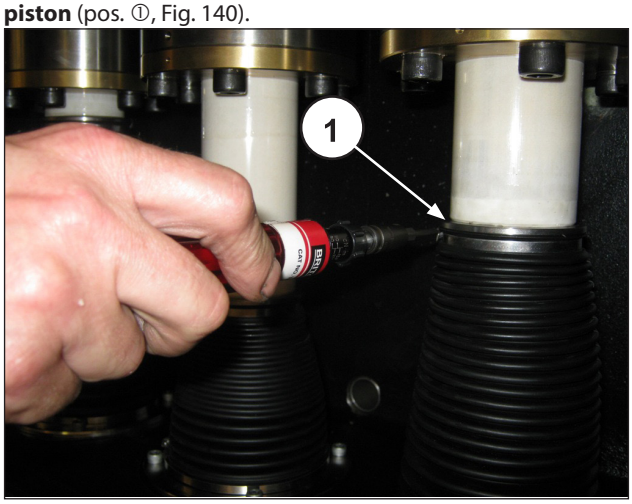


Fig. 140

Tighten the clip with a torque screwdriver as described in heading 3.

2.1.4 Oversize classes

OVERSIZES TABLE FOR CRANKSHAFT AND CONROD BEARING SHELLS				
Recovery classes (mm)	**Bearing shells kit code**	**Upper Half-Bearing Code**	**Lower Half-Bearing Code**	**Correction on the shaft pin diameter (mm)**
0.25	34218701	90932100	90932400	Ø109.75 0/-0.03 Ra 0.4 Rt 3.5
0.50	34218801	90932200	90932500	Ø109.50 0/-0.03 Ra 0.4 Rt 3.5

OVERSIZES TABLE FOR CRANKSHAFT AND MAIN BEARING SHELLS				
Recovery classes (mm)	**Bearing shells kit code**	**Upper Half-Bearing Code**	**Lower Half-Bearing Code**	**Correction on the shaft pin diameter (mm)**
0.25	34226601	90934800	90935100	Ø119.75 0/-0.03 Ra 0.4 Rt 3.5
0.50	34226701	90934900	90935200	Ø119.50 0/-0.03 Ra 0.4 Rt 3.5

OVERSIZES TABLE FOR PUMP CASING AND PISTON GUIDE		
Recovery classes (mm)	**Piston Guide Code**	**Pump casing seat regrinding (mm)**
1.00	79050243	Ø106 H6 +0.022/0 Ra 0.8 Rt 6

2.2 REPAIRING HYDRAULIC PARTS

The piston-sleeve units and the valves can be disassembled without disassembling the head.

2.2.1 Dismantling the manifold in the horizontal version – valve inserts

The manifold requires preventive maintenance as indicated in the use and maintenance manual.
Operations are limited to inspection or replacement of valves, if necessary.
Proceed as follows to extract the valve units:
Unscrew the valve opening device using a 30 mm wrench (pos. ①, Fig. 141).

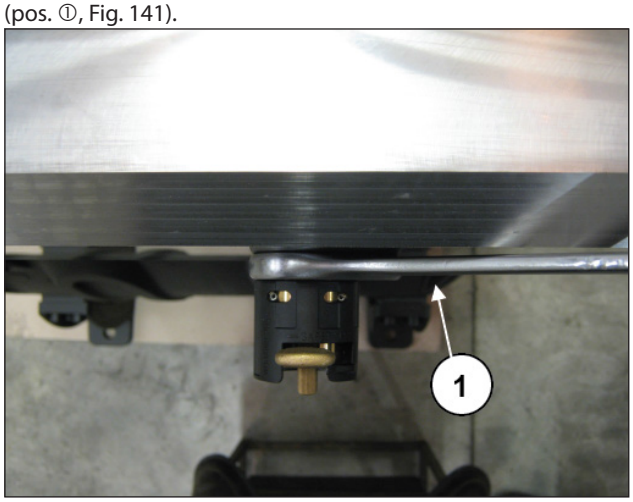


Fig. 141

Disassemble the piston-sleeve units as described in point 2.2.3.
Undo the M16 screws and remove the valves cover (pos. ①, Fig. 142). Now extract the valve plugs with a slap hammer to be applied to the M10 hole of the valve plug (pos. ①, Fig. 143).

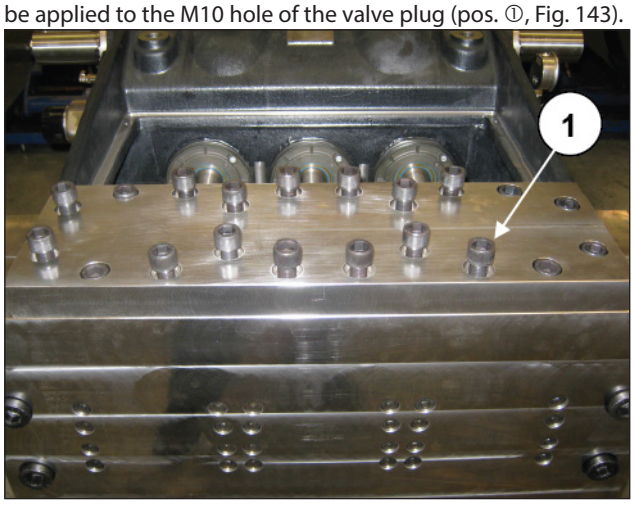


Fig. 142

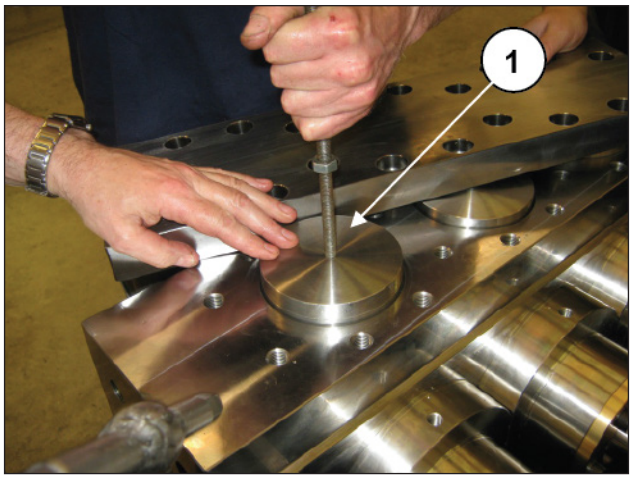


Fig. 143

Fit two M24 eyebolts in the outlet flange fixing holes (pos. ①, Fig. 144) and then undo the 4 M24 screws fixing the manifold to the front casing (pos. ①, Fig. 145).

In the vertical version the manifold is separated from the crankcase with the aid of two M24 eyebolts screwed into the holes on the front.

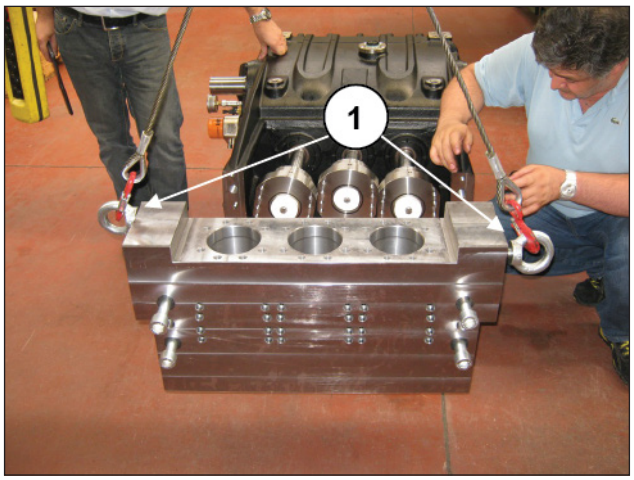


Fig. 144

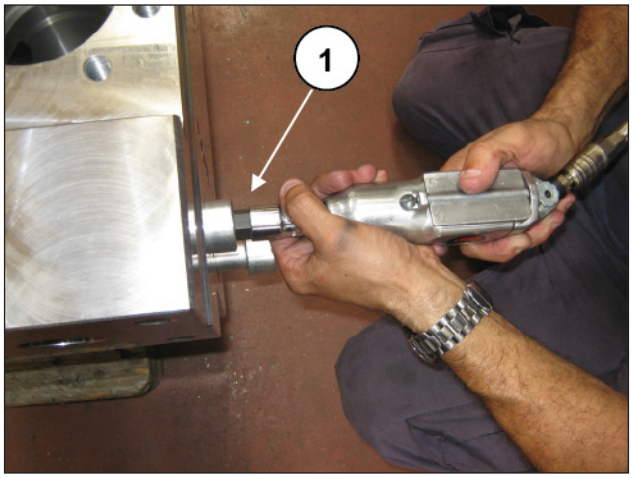


Fig. 145

Take care not to damage the locating pins on the crankcase while removing the manifold.

Remove the outlet valve spacer (pos. ①, Fig. 146).

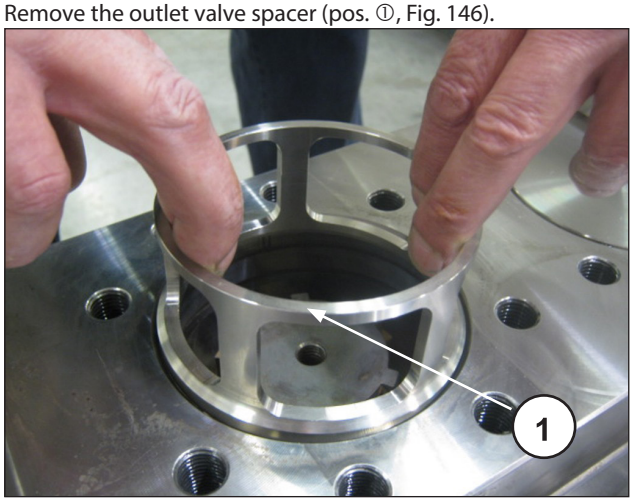


Fig. 146

Extract the outlet valve unit with a slap hammer to be applied to the M12 hole of the valve guide (pos. ①, Fig. 147).

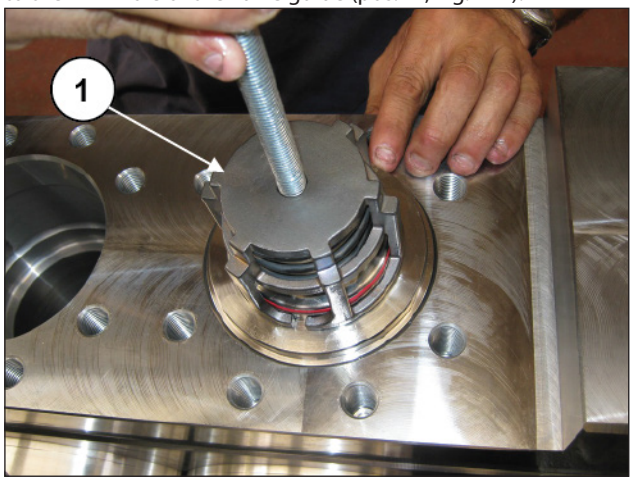


Fig. 147

If removing the outlet valve insert proves to be particularly difficult (for example because of incrustations due to prolonged inactivity of the pump), use the extractor tool code 27781300.

Take out the valve guide spacer using pliers or your hands (pos. ①, Fig. 148).

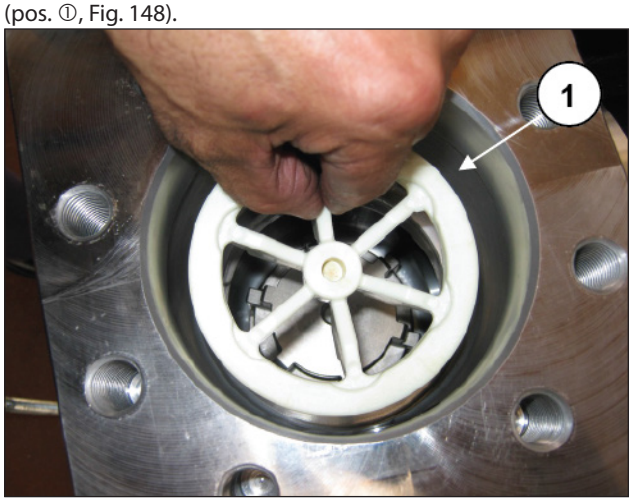


Fig. 148

Extract the suction valve insert with a slap hammer to be applied to the M12 hole of the valve guide (pos. ①, Fig. 149).

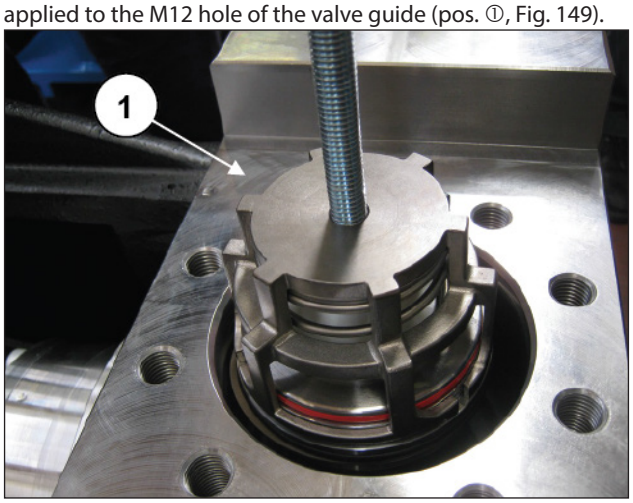


Fig. 149

If removing the suction valve insert proves to be particularly difficult (for example because of incrustations due to prolonged inactivity of the pump), use the extractor tool code 27781200 (Fig. 150) and proceed as instructed.

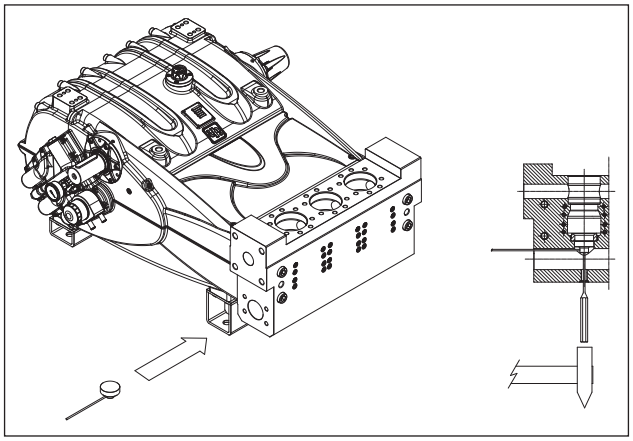


Fig. 150

Disassemble the suction and outlet valve inserts by prising with a screwdriver between the valve guide and valve seat (pos. ①, Fig. 151).

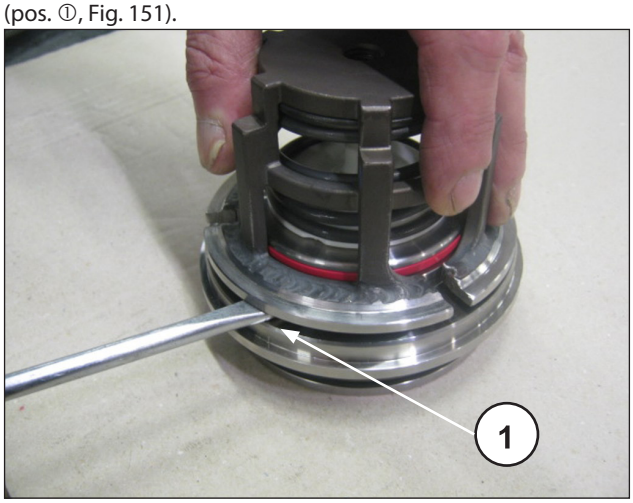


Fig. 151

2.2.2 Assembling the manifold – valve units

Pay particular attention to the conditions of the various components and replace if necessary. At every valve inspection, replace all O-rings both in the valve inserts and in the valve plugs.

Before repositioning the valve inserts, thoroughly clean and dry the relative housings in the manifold as indicated by the arrows (Fig. 152).

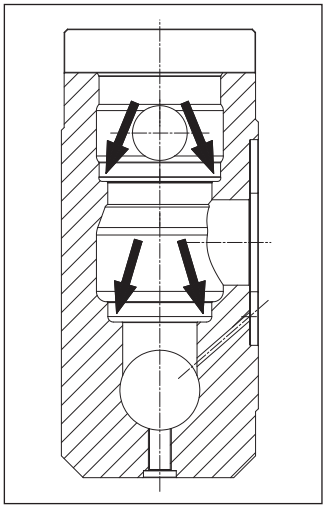


Fig. 152

Proceed with reassembly following the dismantling procedure described in point 2.2.1 in reverse.
Assemble the suction and outlet valve units (Fig. 153 and Fig. 154) taking care not to invert the previously disassembled springs.

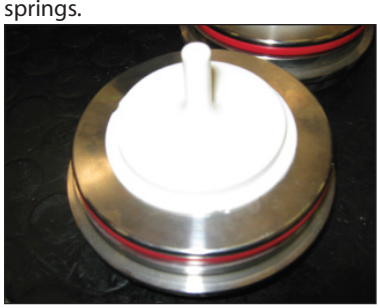


Fig. 153

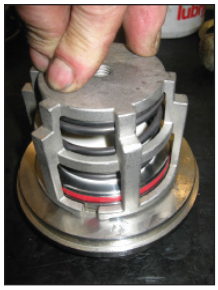


Fig. 154

To facilitate insertion of the valve guide in its housing, you can use a pipe resting on the horizontal guide planes (Fig. 155) and use an extractor hammer acting on the whole circumference.



Fig. 155

Proceed to insert the valves (suction and outlet) into the manifold, taking care to follow the correct insertion sequence of O-rings and back-up rings.

The proper sequence of valve assembly in the manifold is as follows:
Insert the back-up ring (pos. ①, Fig. 156).

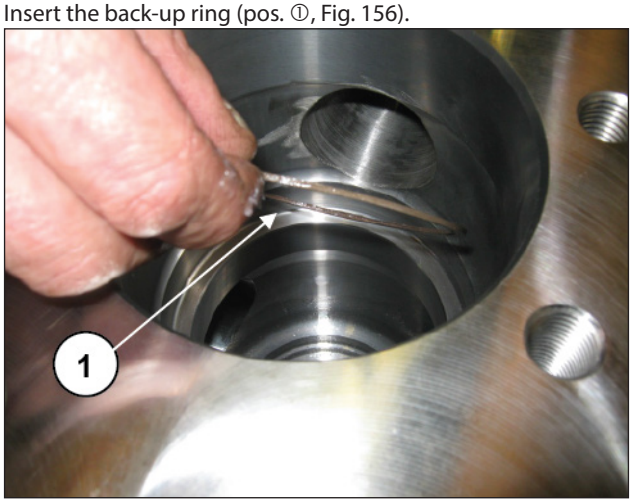


Fig. 156

Insert the O-ring (pos. ①, Fig. 157).



Fig. 157

Ensure the O-ring and back-up ring are perfectly seated.
Insert the suction valve insert (pos. ①, Fig. 158) and then the spacer (pos. ①, Fig. 159).

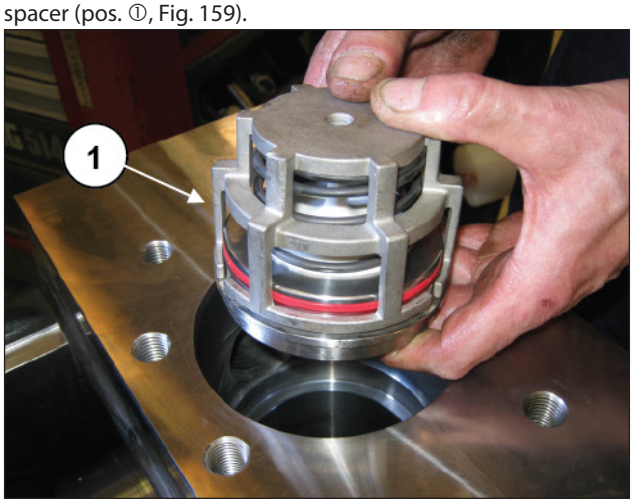


Fig. 158

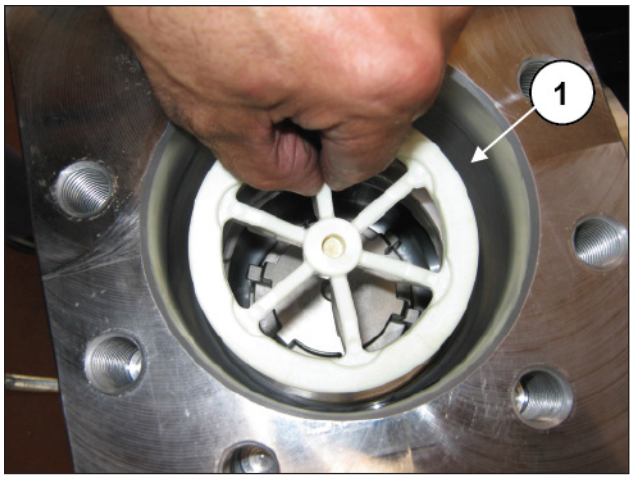


Fig. 159

The complete valve unit must be driven fully home and should appear as shown in pos. ①, Fig. 160.

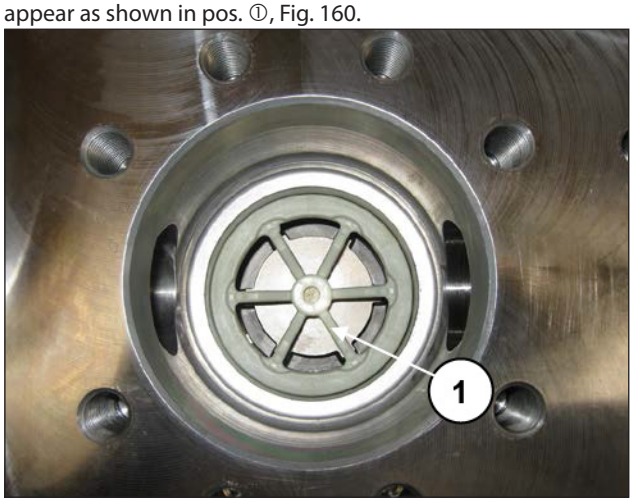


Fig. 160

Fit the O-ring (pos. ①, Fig. 161) and back-up ring (pos. ②, Fig. 161) on the outlet valve housing.

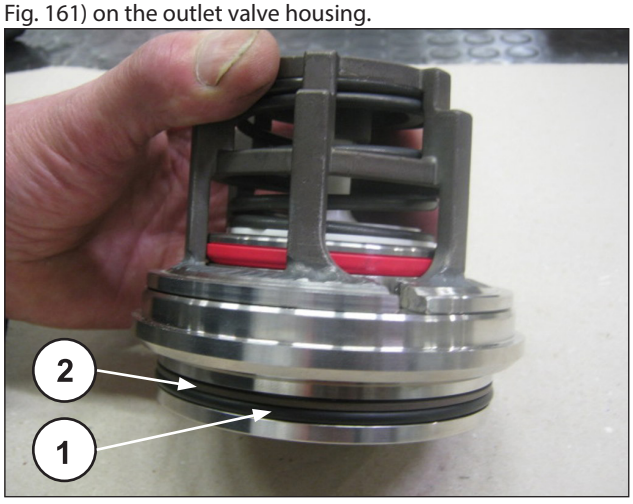


Fig. 161

Insert the outlet valve unit (pos. ①, Fig. 162). The valve unit must be fully inserted into the bottom and should look like the image in pos. ①, Fig. 163.

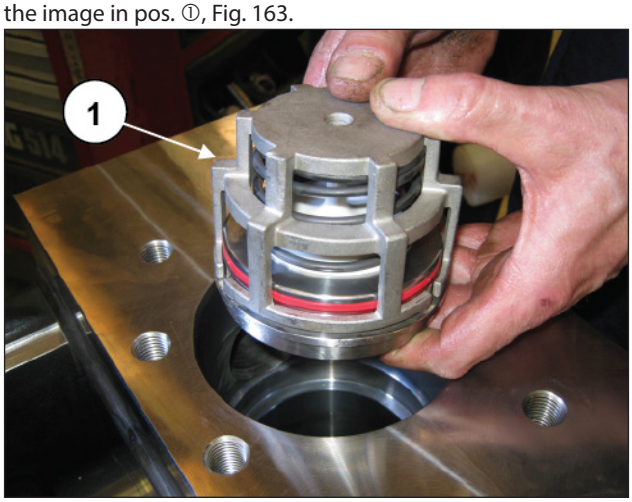


Fig. 162

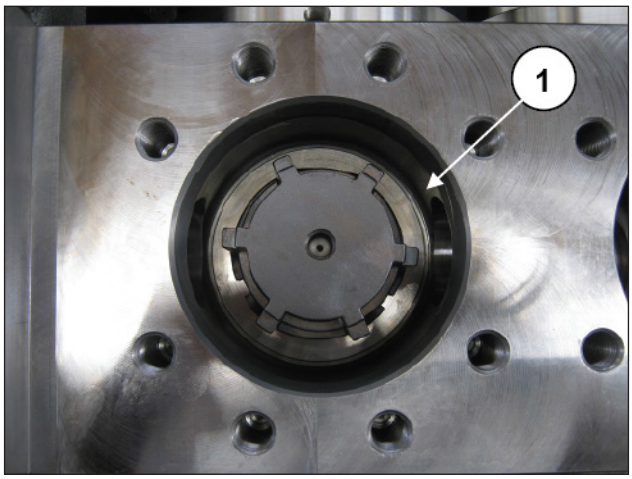


Fig. 163

Insert the back-up ring (pos. ①, Fig. 164).

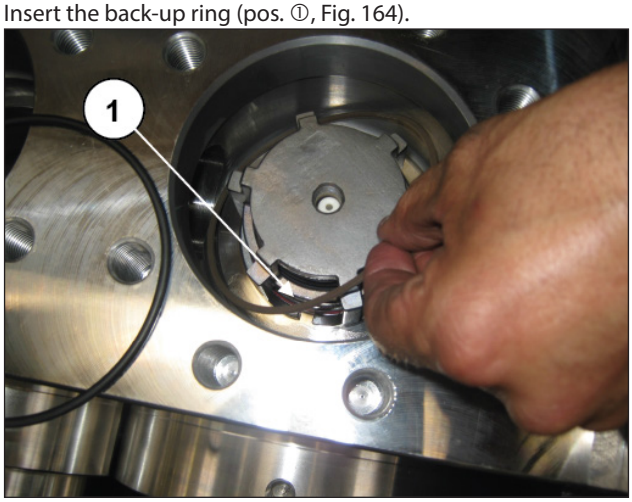


Fig. 164

Insert the O-ring (pos. ①, Fig. 165).

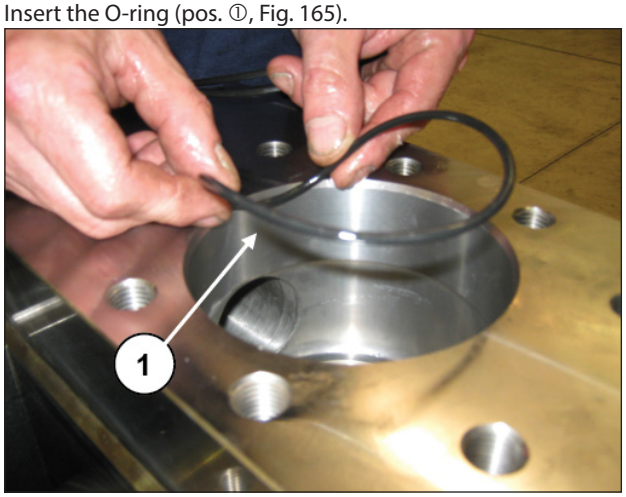


Fig. 165

Pay special attention to fitting the O-ring shown in pos. ①, Fig. 166.
Use a special tool code 27760700 to prevent that O-ring severing during the insertion procedure.

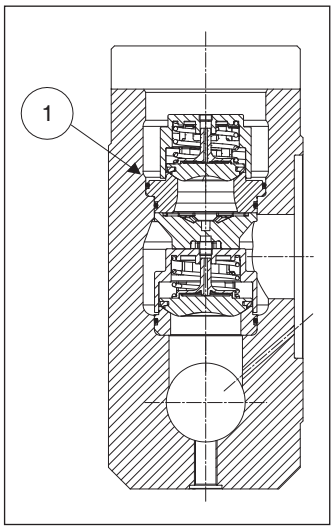


Fig. 166

Insert the outlet valve spacer (pos. ①, Fig. 167) and (pos. ①, Fig. 168).



Fig. 167

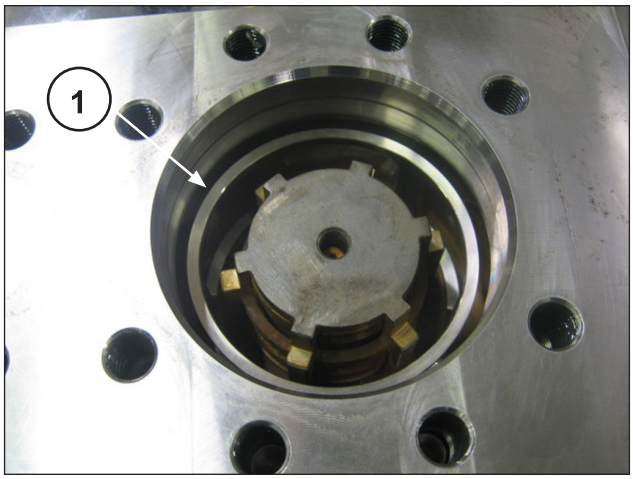


Fig. 168

Fit two M24 eyebolts in the outlet flange fixing holes (pos. ①, Fig. 169) and then refit the manifold to the front casing, taking care not to damage the locating pins in the casing (pos. ①, Fig. 170) and secure it with the 4 M24 screws.
Tighten the M24 screws with a torque wrench as described in heading 3.

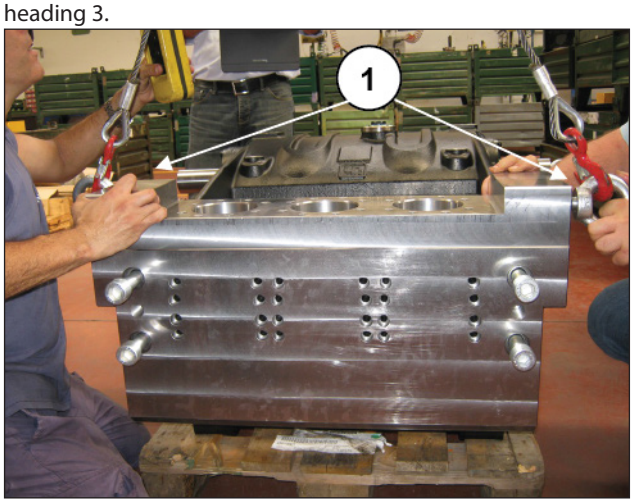


Fig. 169

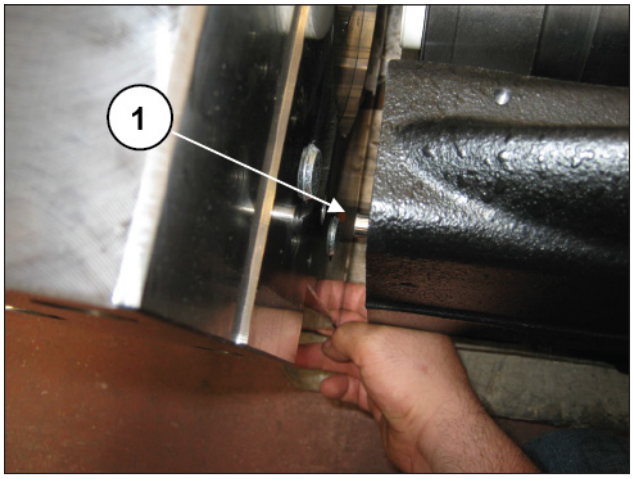


Fig. 170

Fit the O-ring (pos. ①, Fig. 171) and back-up ring (pos. ②, Fig. 171) on the outlet valve plug.

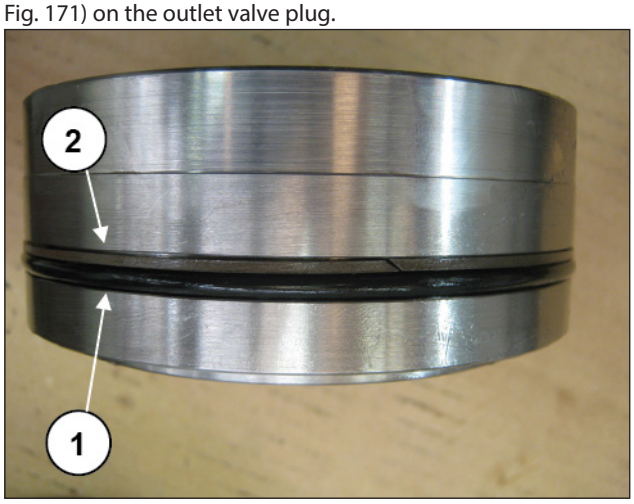


Fig. 171

Insert the valve plugs complete with O-ring and back-up ring and fit the valves cover (pos. ①, Fig. 172) then and screw in the 24 M16 screws (pos. ①, Fig. 173).
Tighten the M24 screws with a torque wrench as described in heading 3.

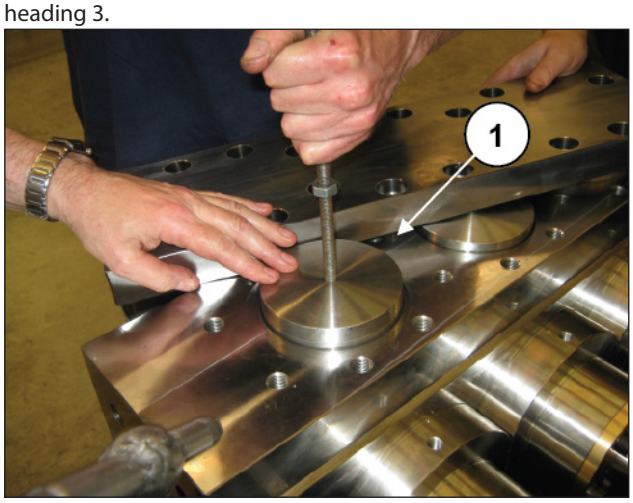


Fig. 172

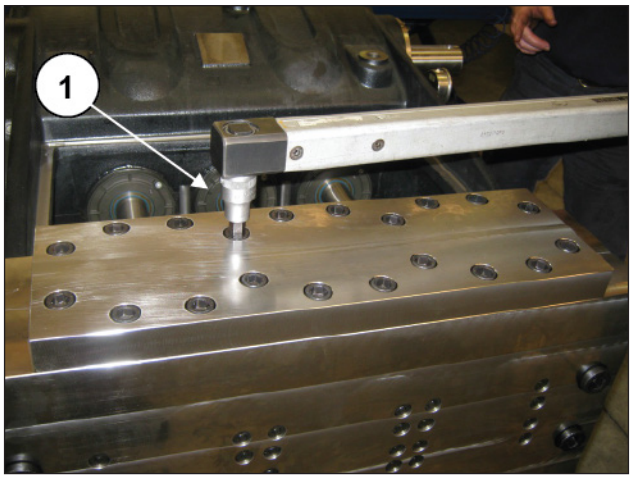


Fig. 173

Tighten the 24 M16 screws as shown in the diagram in Fig. 174.

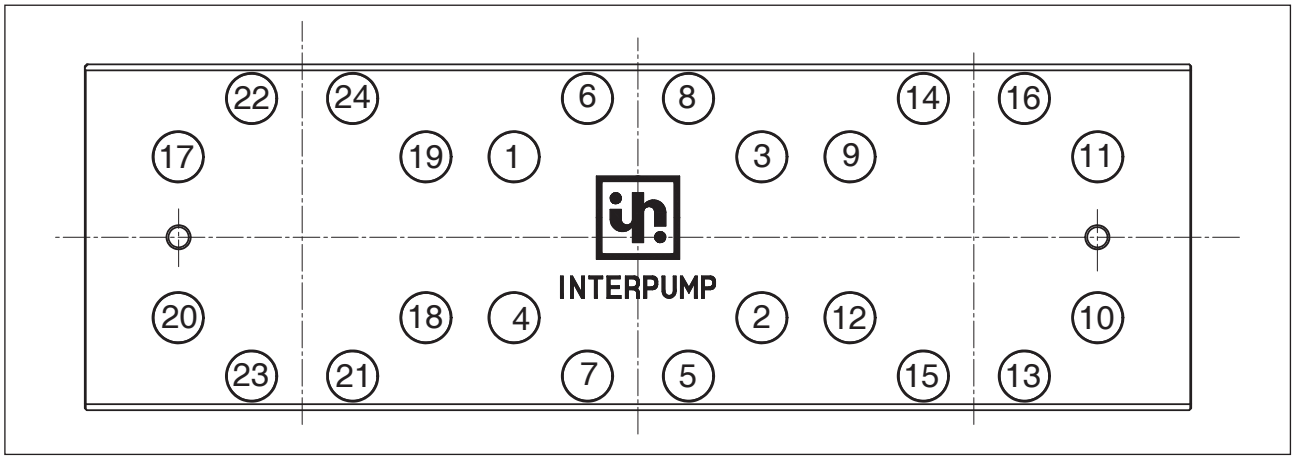


Fig. 174

Fit the valve opening devices (pos. ①, Fig. 175) and screw them in using a 30 mm wrench (pos. ①, Fig. 176).

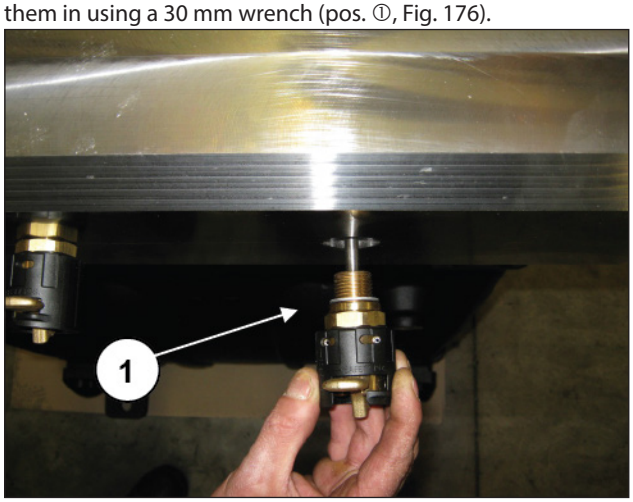


Fig. 175

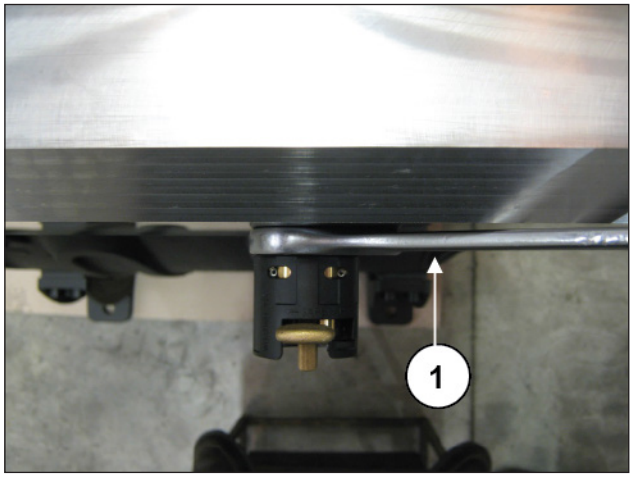


Fig. 176

2.2.3 Disassembly of piston unit – supports – seals

The piston unit requires preventive checks as indicated in the preventive maintenance table in the use and maintenance manual.
Maintenance is limited to a visual check for drainage from the hole in the base of the front casing sump. If abnormalities / fluctuations on the outlet pressure gauge or dripping from the drainage hole circuit are detected, the seal pack must be checked and replaced.

Proceed as follows to extract piston units:
To gain access to the piston unit undo the 4 M6 screws and remove the upper inspection cover (pos. ①, Fig. 177 and Fig. 178).

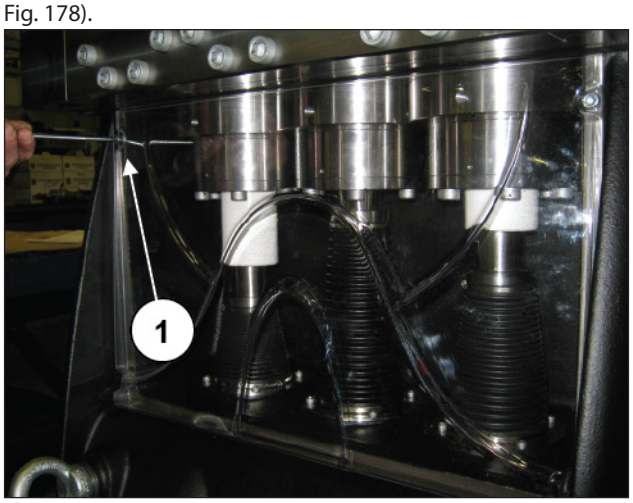


Fig. 177

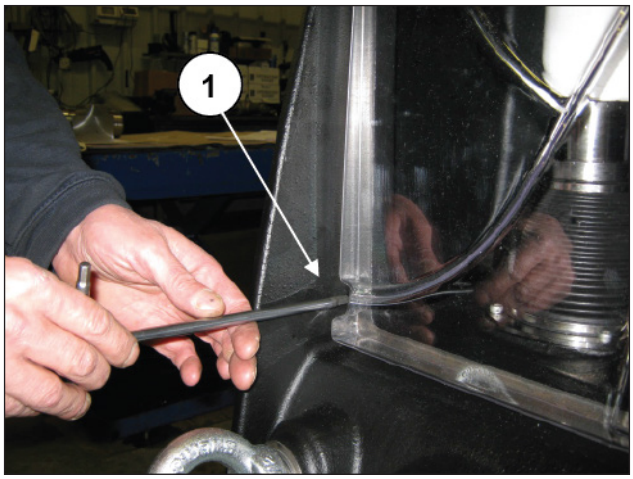


Fig. 178

Disassemble the piston unit by unscrewing the sleeve fixing screws (pos. ①, Fig. 179), after fitting the special unit support tool (pos. ①, Fig. 180) or special tool code 27781100.

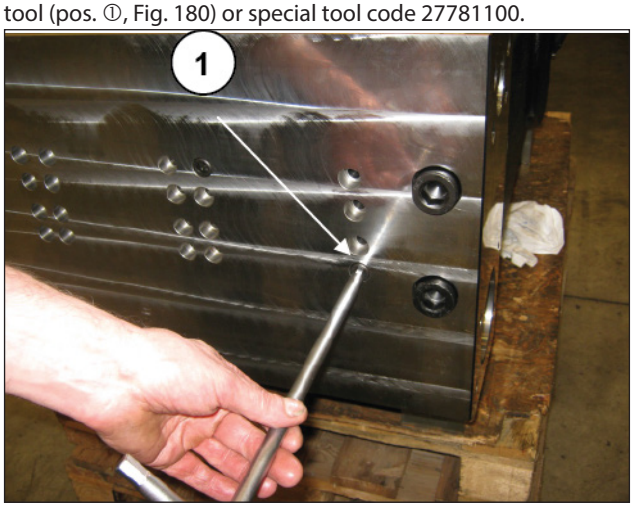


Fig. 179



Fig. 180

Withdraw the sleeve support from the head by sliding it on the piston while supported at the eyebolt (pos. ①, Fig. 181) then undo the M10 piston fixing screw thus freeing the entire assembly, which can now be removed from the front casing (pos. ①, Fig. 182 and Fig. 183).

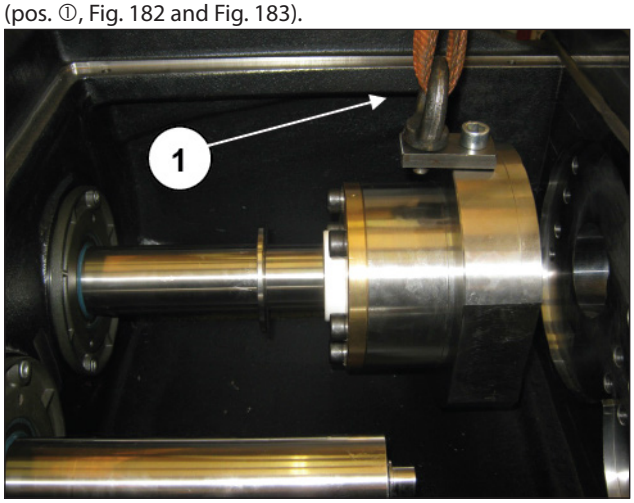


Fig. 181

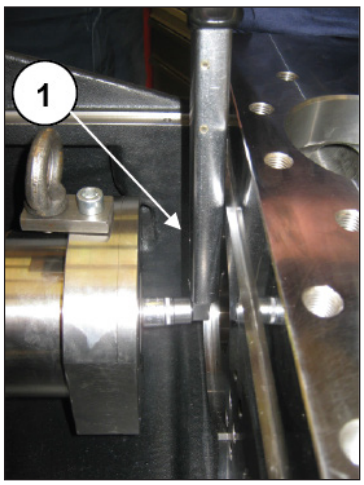


Fig. 182



Fig. 183



Fig. 184

After removing the piston (Fig. 184) from the sleeve support, sleeve and gasket support unit, remove the O-rings from the sleeve support and clamp the sleeve support in a vice (pos. ①, Fig. 185); now remove the gasket support ring by undoing the 6 M12 screws (pos. ①, Fig. 186).

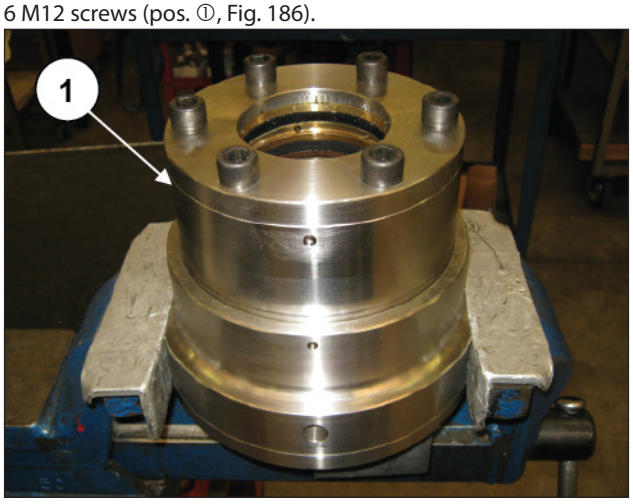


Fig. 185



Fig. 186

Disassemble the piston sleeve and remove the O-rings with which it is equipped (pos. ①, Fig. 187 and Fig. 188).

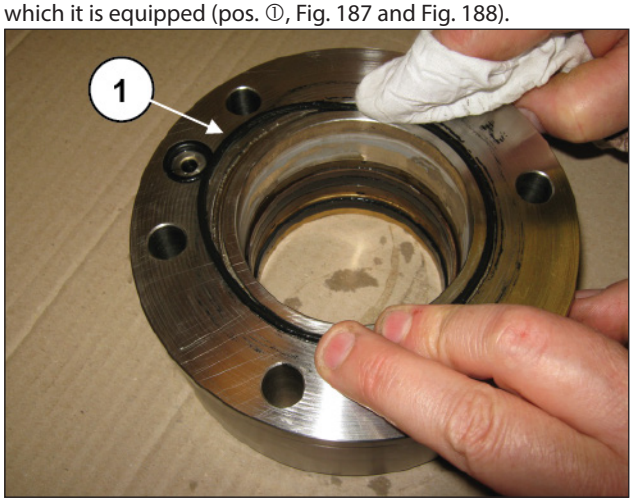


Fig. 187

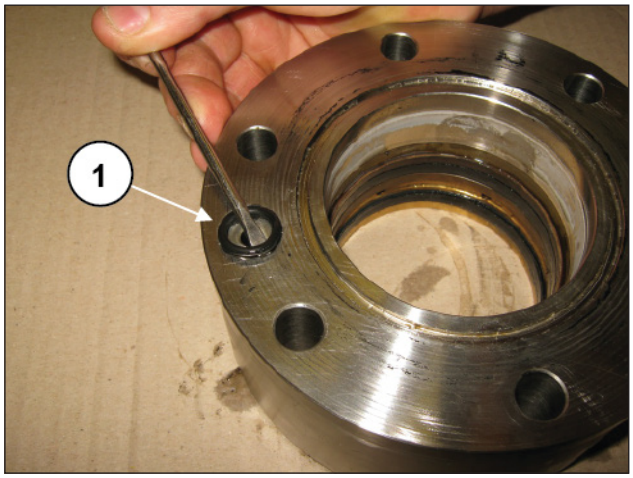


Fig. 188

Use the plastic special tool and a slap hammer to extract and remove the seals support (pos. ①, Fig. 189 and Fig. 190).

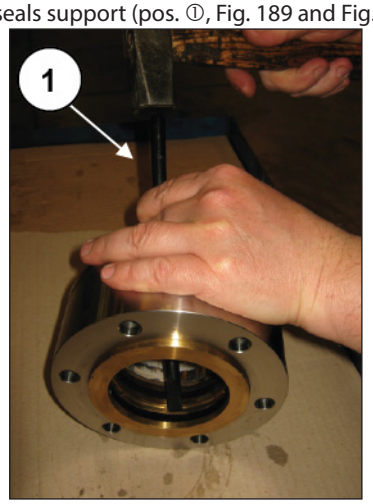


Fig. 189

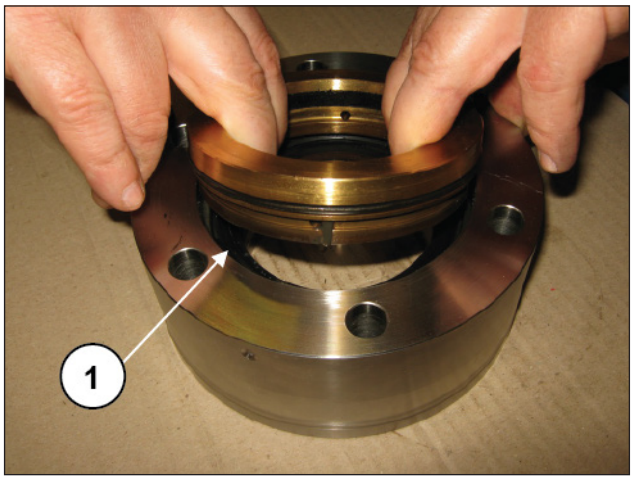


Fig. 190

Remove the O-ring (pos. ①, Fig. 191) and the low pressure seal (pos. ①, Fig. 192) with the aid of a screwdriver.

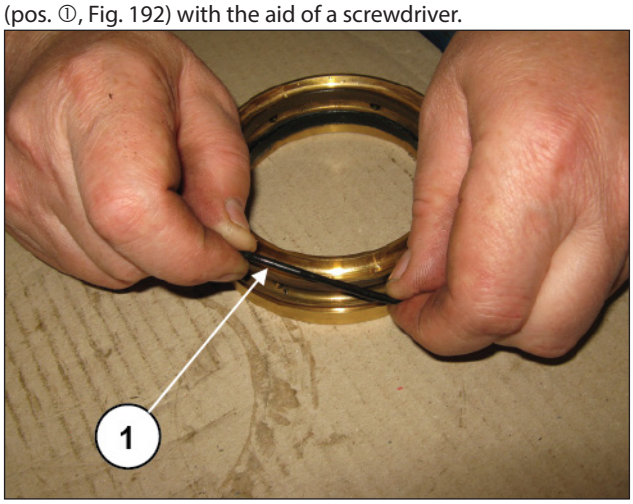


Fig. 191

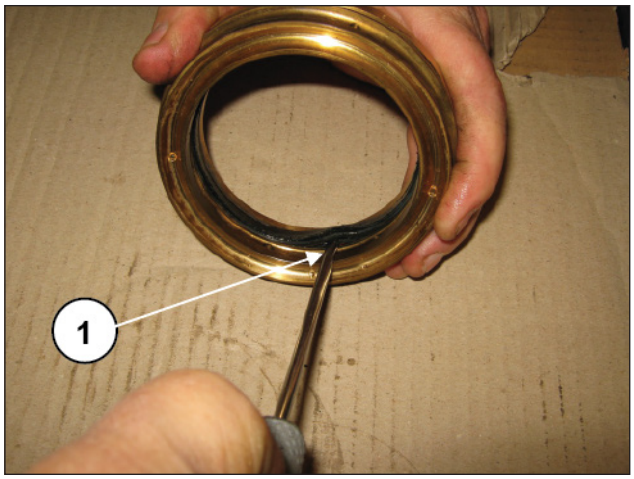


Fig. 192

Extract the following from the sleeve in sequence: the restop ring (pos. ①, Fig. 193), the seal ring (pos. ①, Fig. 194 - Fig. 195) with the piston head ring, and separate them (pos. ①, Fig. 196).

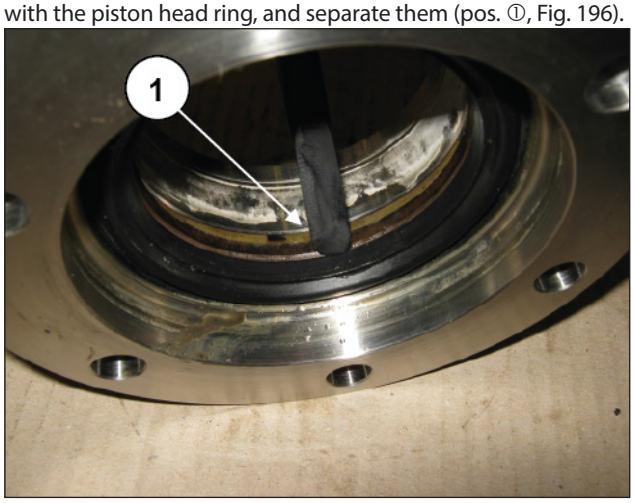


Fig. 193

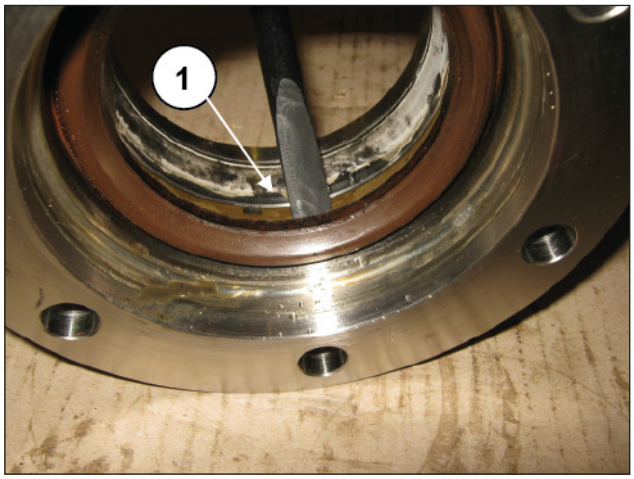


Fig. 194

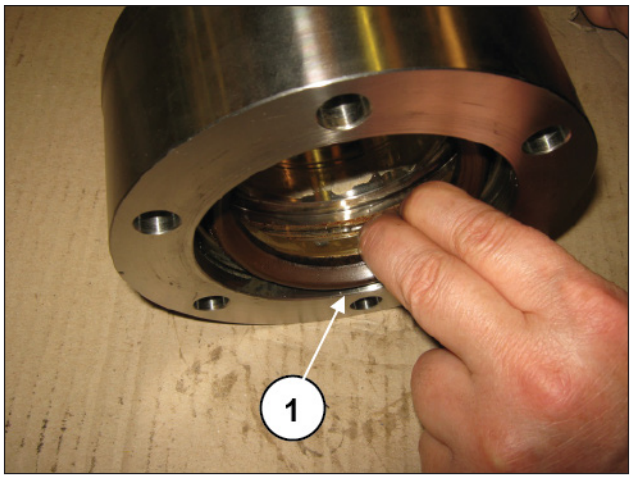


Fig. 195

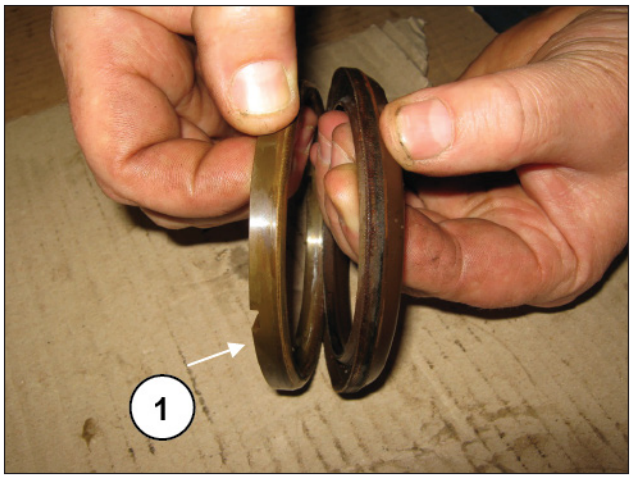


Fig. 196

2.2.4 Assembly of piston unit – supports – seals

Proceed with reassembly following the dismantling procedure described in point 2.2.3 in reverse.

Replace the pressure seals moistening the lips with silicone grease (without spreading it), taking extra care not to damage them during liner insertion.

After each disassembly renew all pressure seals and O-rings before reassembling.

Insert the O-ring (pos. ①, Fig. 197) and the low pressure seal in the seal support (pos. ①, Fig. 198) paying attention to the mounting direction which requires that the sealing lip be set forward (towards the head).

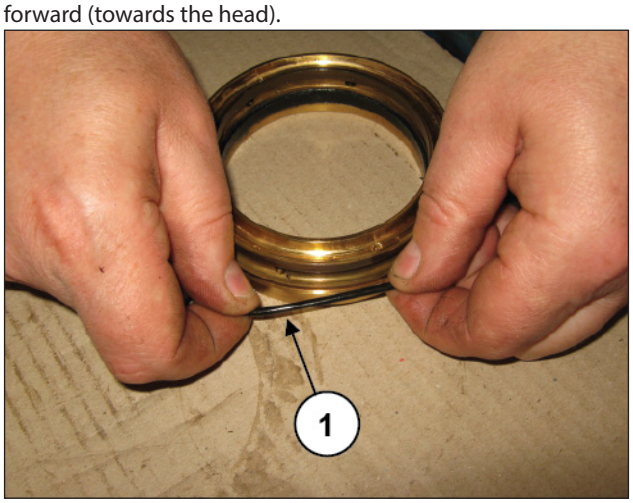


Fig. 197

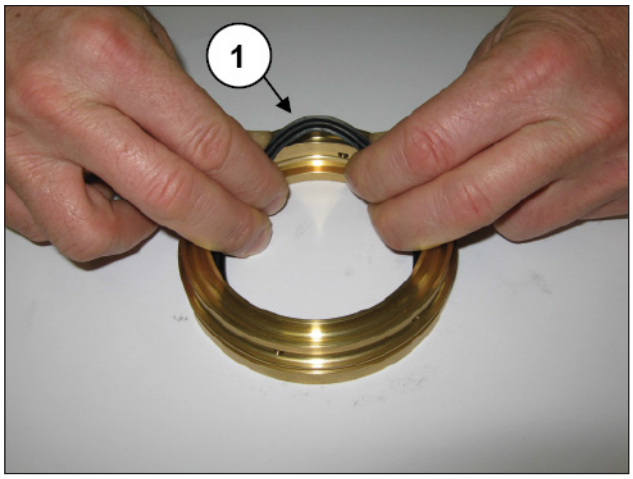


Fig. 198

Install the head ring (pos. ①, Fig. 199), the high pressure seal (pos. ①, Fig. 200) and the restop ring (pos. ①, Fig. 201).

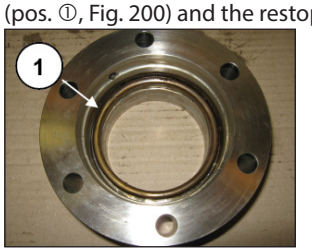


Fig. 199

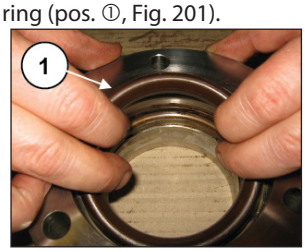


Fig. 200



Fig. 201

Mount the seals support to the sleeve (pos. ①, Fig. 202) fit the O-rings (pos. ①, Fig. 203) to the sleeve mating surface.

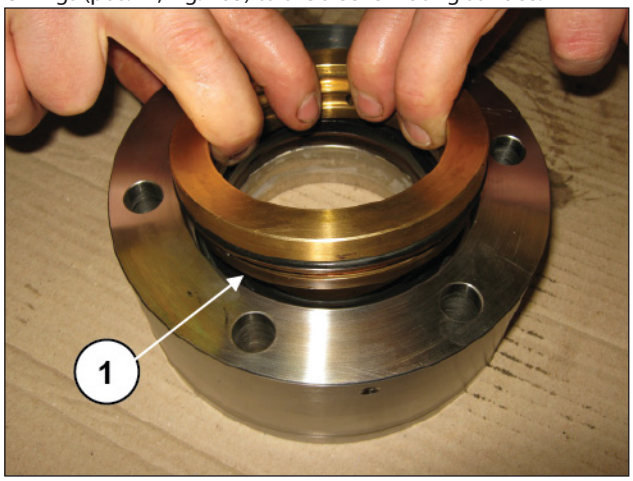


Fig. 202

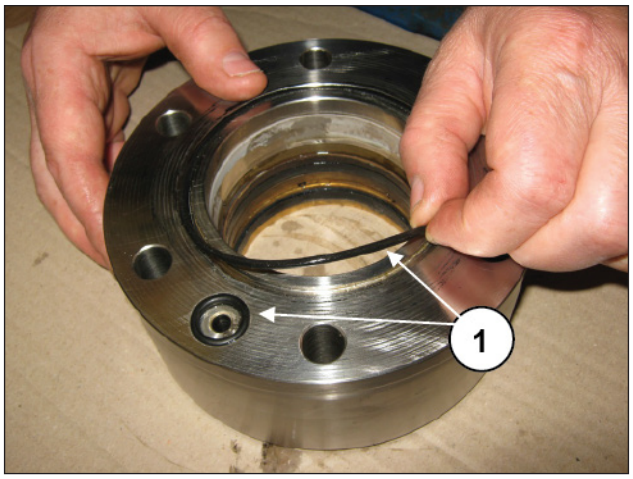


Fig. 203

Fit the sleeve to the support (pos. ①, Fig. 204), taking care to ensure the O-rings remain correctly seated and aligning the punch marks (pos. ②, Fig. 206), then fit the seal support ring (pos. ①, Fig. 205).

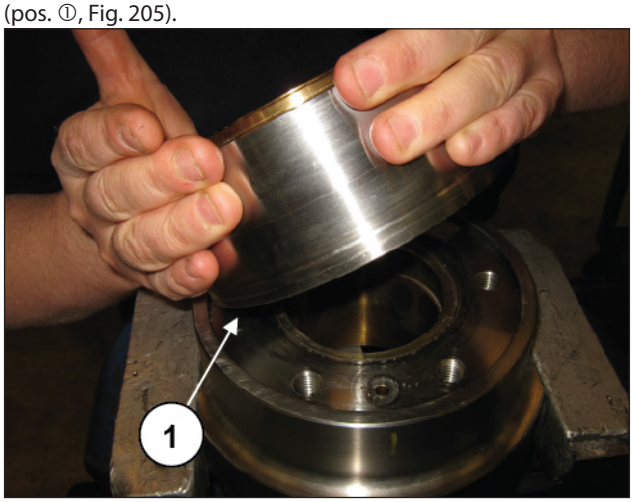


Fig. 204

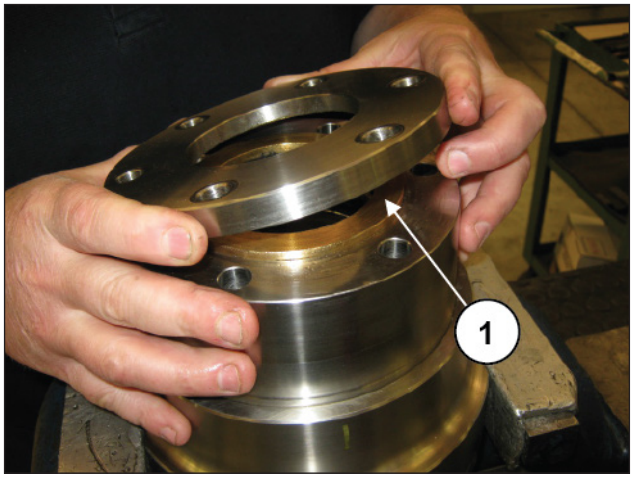


Fig. 205

After positioning the fixing screws of the seals support ring (pos. ①, Fig. 206), tighten them using a torque wrench (pos. ①, Fig. 207) as indicated in heading 3.

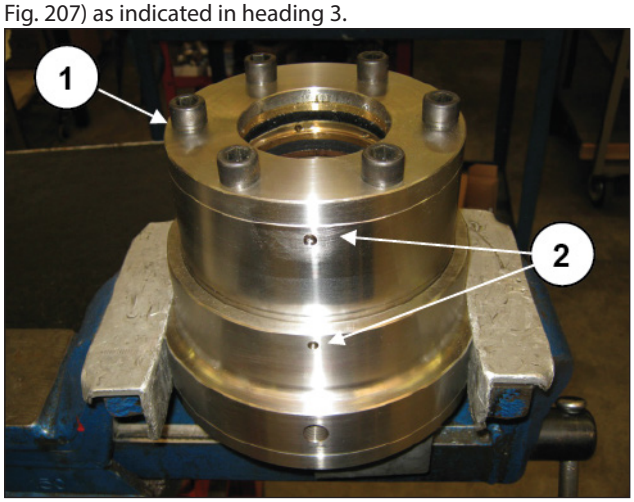


Fig. 206

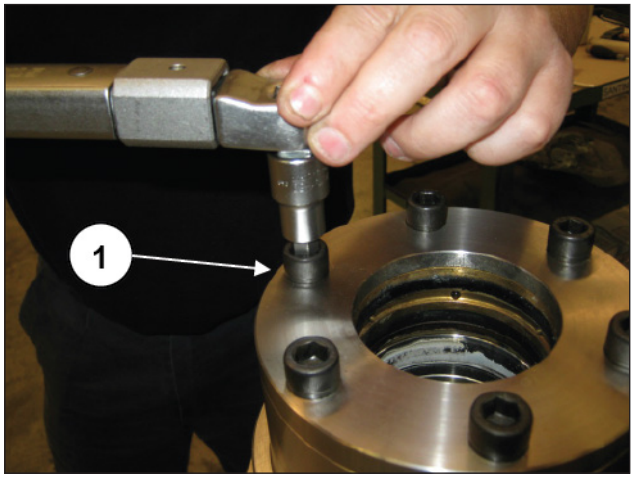


Fig. 207

Insert the piston, positing the face that will come into contact with the splash guard aligned with the mating surface of the sleeve support (Fig. 208) and place the washer on the piston fixing M10 screw (pos. ①, Fig. 209).



Fig. 208

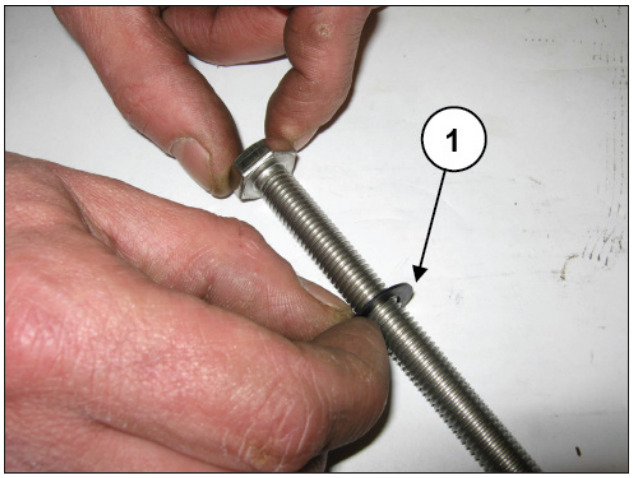


Fig. 209

Position the lifting accessory (pos. ①, Fig. 210) and the O-rings on the support mating surface (pos. ②, Fig. 210) then insert the piston fixing screw from the side opposite the seals support ring (pos. ①, Fig. 211).

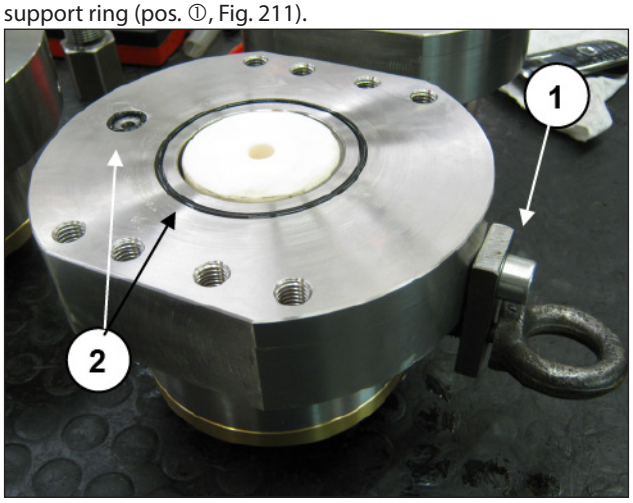


Fig. 210



Fig. 211

Lift the complete support and insert it into the front casing behind the manifold, after positioning the piston guide rod at bottom dead center (Fig. 212), then fix the piston to the rod (pos. ①, Fig. 213), tightening the screw with a torque wrench as described in heading 3.

Calibration of piston fixing screw tightening torque must be carried out using the following procedure:

1. **Tighten the screw with a torque wrench as described in heading 3.**
2. **Undo the screw and then re-tighten it with a torque wrench as described in heading 3.**

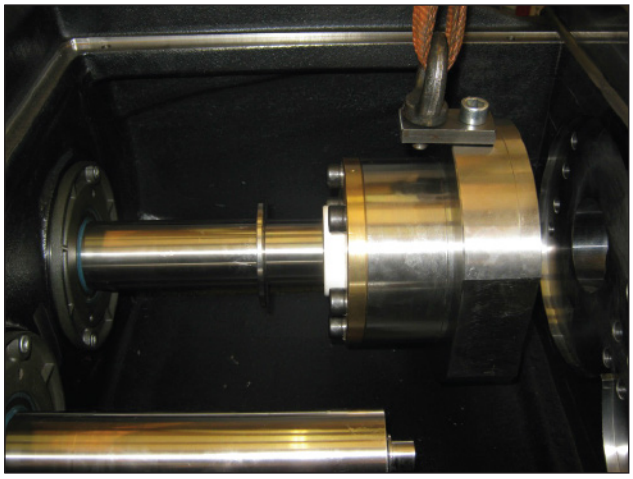


Fig. 212

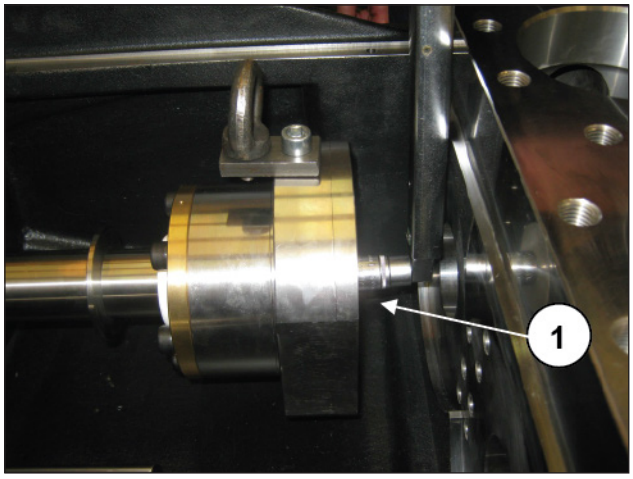


Fig. 213

Remove the lifting accessory (pos. ①, Fig. 214) and fit an M12 screw or threaded bar in the threaded hole on the support (pos. ①, Fig. 215) in order to aid orientation of the assembly when positioning it on the manifold.

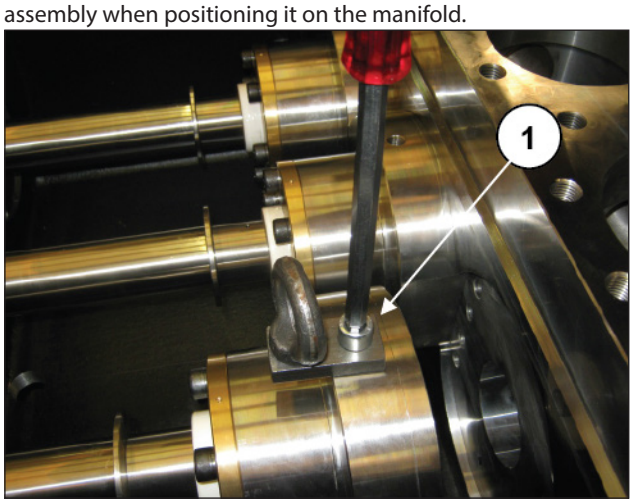


Fig. 214

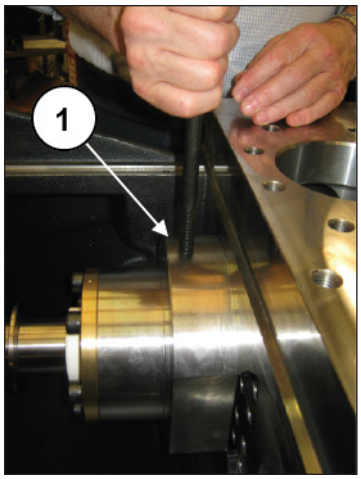


Fig. 215

Insert the M12 screws for fixing of the sleeve support in the related seats on the front of the manifold (pos. ①, Fig. 216) and tighten them using a torque wrench (pos. ①, Fig. 217) as described in heading 3.

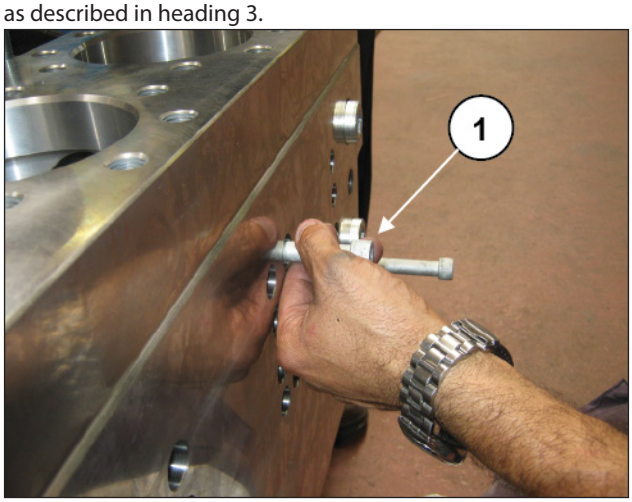


Fig. 216

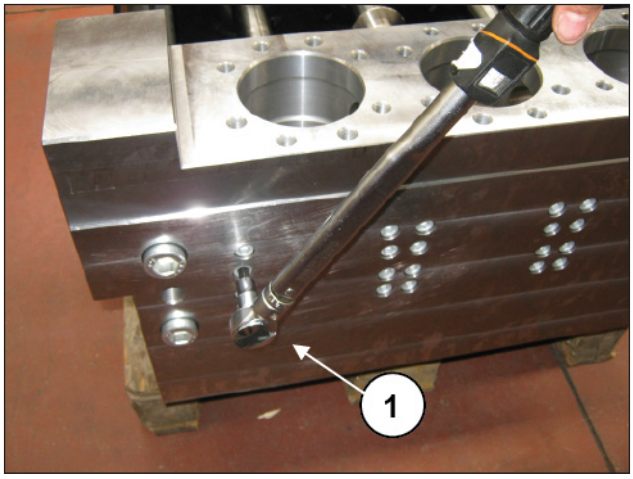


Fig. 217

In vertical SR-TR pumps the sole difference lies in the sleeve support lifting accessory that holds the assembly in the vertical position (Fig. 218 and Fig. 219); the remainder of the removal/installation procedure remains unchanged. Also in vertical versions you can use sleeves unit disassembly tool code 27781100.

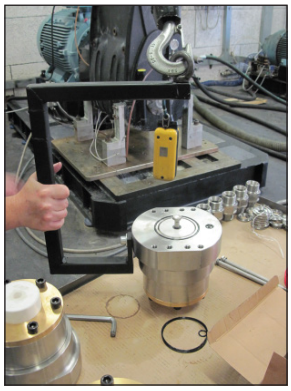


Fig. 218



Fig. 219

Now refit the upper inspection cover and secure it by carefully tightening the 4 M6 fixing screws (pos. ①, Fig. 220 and Fig. 221).

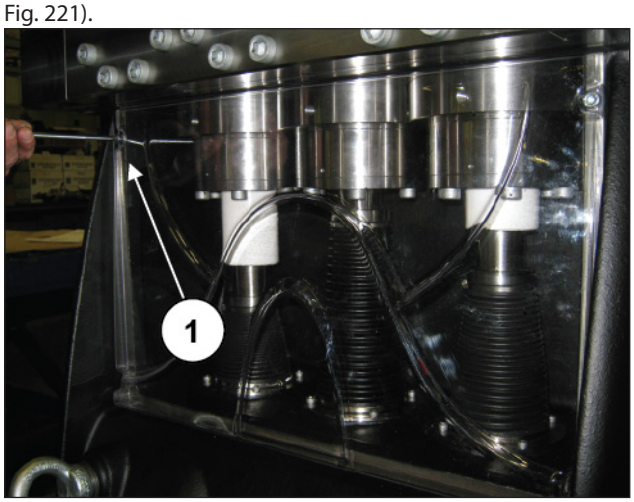


Fig. 220

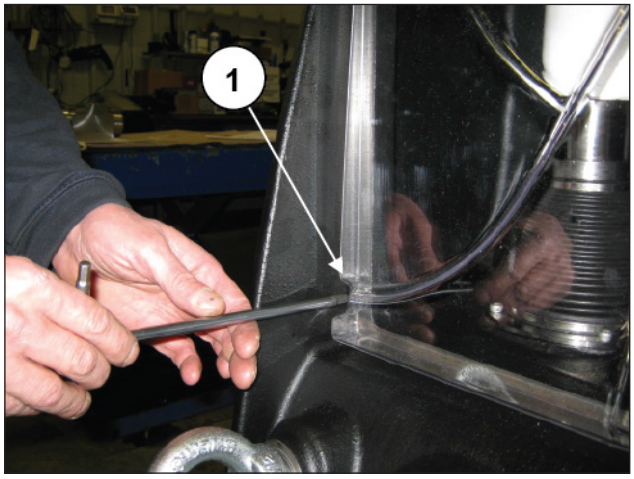


Fig. 221

3 SCREW TIGHTENING CALIBRATION

Screw tightening must only be performed with a torque wrench.

SR – TR HORIZONTAL VERSION

Description	Exploded Drawing Position SR-TR	Tightening torque Nm
Rear casing fixing screw M16x200	14	334***
Plug G1"x17 rear side casing	8	100
Plug G3/4" rear casing	49	60
Front casing M8 tapered plug	41	15
Front and rear casing M20 tapered plug	61	40
Screw M8x20	20	20
Crankshaft screw M12x12	143(TR) – 144(SR)	40
M12x1.25x87 screw for connecting rod tightening	95	75*
Piston guide screw M6x20	49	10
PTO shaft cover screw M10x30	82	45
Piston guide oil seal cover screw M6x16	22	10
Piston guide rod screw M6x25	39	10
Lube pump body rear plate screw M6x16	78	10
Lube pump body screw M8x40	83	20
Valve opening device	141(TR) – 142(SR)	40
Lube pump directional control valve plug M40	71	120
Lube pump pressure relief valve plug M18x11	72	40
Lube pump drive coupling screw M8x16	76	20
MM union – 1/4" NPT-1/4"G	90	20
T -FFF- union 1/4"G	91	20
M-F reducer nipple 1/4"G	92	20
Pressure gauge	93	20
MF union 1/4"G-M10x1	88	20
N.O. pressure switch 0.3 M10x1	87	15
Temperature indicator switch M14	84	40
Oil filter exchanger unions	64	30
Oil filter mesh fixing screw M6x12	17	10
Upper cover fixing screw M6x12	17	6
Pump lugs fixing screw M16x35	45	206
Coupling end cover screw M10x20	145(TR) – 146(SR)	45
Piston fixing screw M10x200	126(TR) – 127(SR)	35
Sleeve pack screw M12x90	127(TR) – 128(SR)	135
Valve cover screw M16x65	100	334**
Manifold fixing screw M24x2x220	98	716
Sleeve support screw M12x180	101	135

* Achieve coupling torque tightening screws at the same time.
** Tighten the screws as shown in the diagram given in Fig. 174.
*** Tighten the screws as shown in the diagram given in Fig. 89/a.

SR – TR VERTICAL VERSION

Description	Exploded Drawing Position SR-TR	Tightening torque Nm
Vertical lug screw M16x45	45	206 Nm
Clamps for bellows	36 - 44	**70 Ncm**

4 REPAIR TOOLS

Pump maintenance can be carried out with simple component disassembly and reassembly tools. The following tools are available:

For assembly:

Piston head radial seal ring	code 27643500
PTO shaft radial seal ring	code 27744100
O-ring, outlet valve seat	code 27760700

For disassembly:

Inlet valve seat	code 27781200
Outlet valve seat	code 27781300
Sleeve pack	code 27781100

5 SPECIAL VERSIONS

The instructions for repairing special versions are given below. Unless specified otherwise, refer to the information above for the standard SR-TR pumps.

- SRR-TRR pumps: for repair, follow the instructions for the standard SR-TR pumps with the exception of the pressure seals, for which it is necessary to follow the dedicated paragraph.

5.1 SRR-TRR VERSION PUMP

5.1.1 Disassembly of the piston unit – supports – seals

Separate the seal support from the liner, remove the spring ring and scraper ring (pos. ①②, Fig. 222, Fig. 222/a) to access the pressure seals (pos. ①, Fig. 223).



Fig. 222



only for SRR75- TRR75 Fig. 222/a

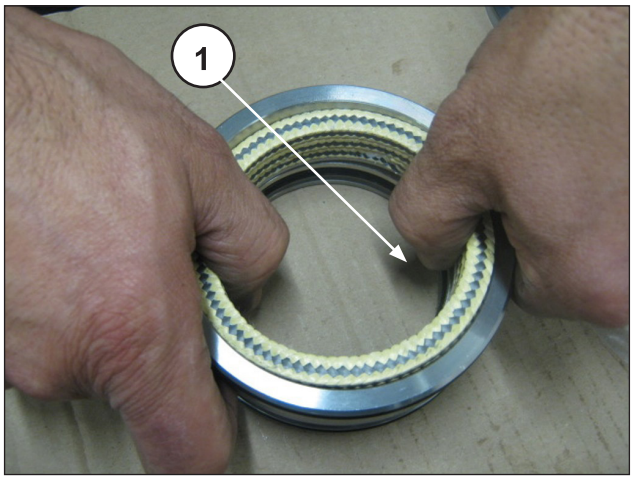


Fig. 223

To remove the low pressure seal, use a thickness gauge or another tool which will not damage the seal support housing (pos. ①, Fig. 224).

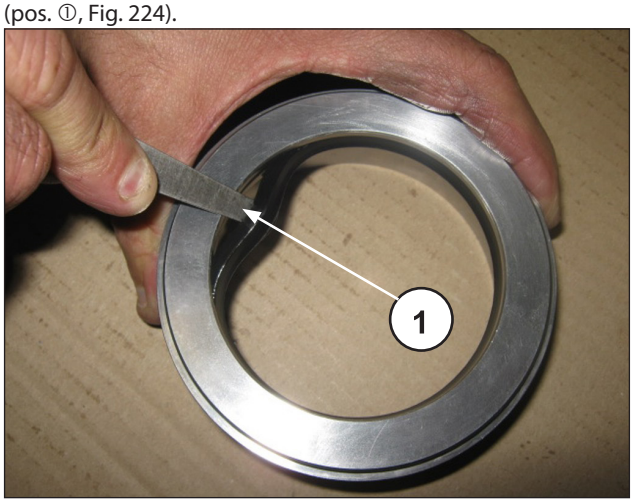


Fig. 224

5.1.2 Assembling the piston unit - supports - seals

Proceed with re-assembly following the procedure indicated in par. 2.2.2 and 2.2.4.

Replace the pressure seals taking extra care not to damage them during liner insertion.

The O-rings and the pressure seals must be replaced at each disassembly.

At every installation be careful to the presence of burrs on the components that will be eliminated.

Insert the low pressure seal in the packing support (pos. ①, Fig. 225) paying attention to the mounting direction which requires that the sealing lip is facing forward (towards the head) and packing housing diameter.



Fig. 225

Make sure that the energizing O-ring on the seals is correctly positioned (pos. ①, Fig. 226).

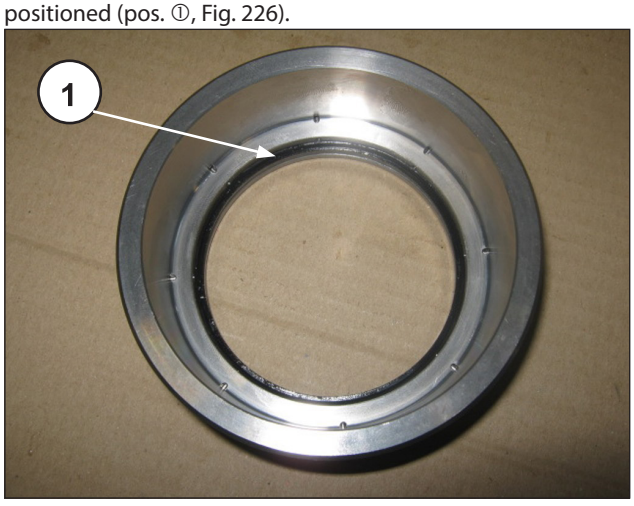


Fig. 226

Assemble the support ting and the anti-extrusion ring (pos. ①②, Fig. 227), the three packings, making sure the notches are at 120° from each other (pos. ①, Fig. 228), the packing scraper ring and the spring ring (pos. ①②, Fig. 229).

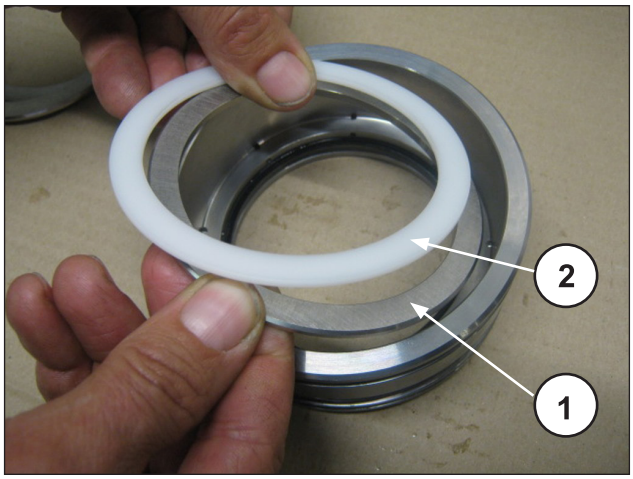


Fig. 227

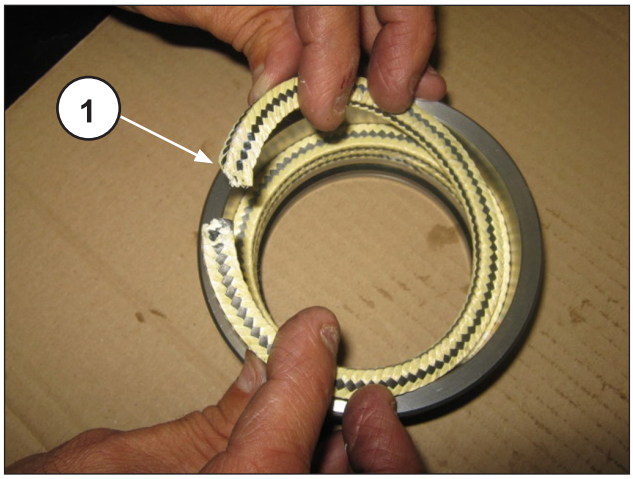


Fig. 228

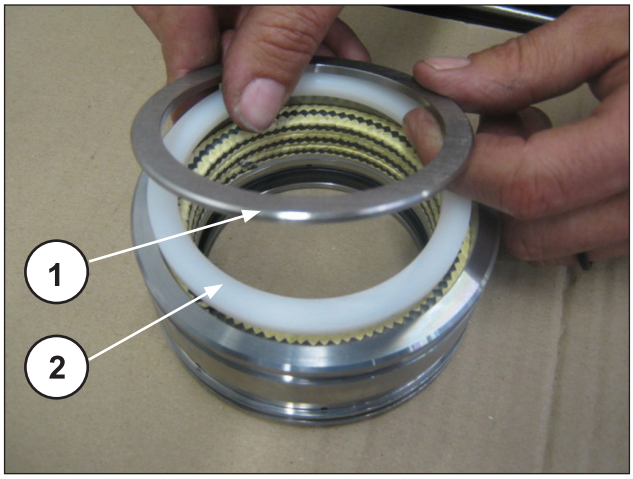
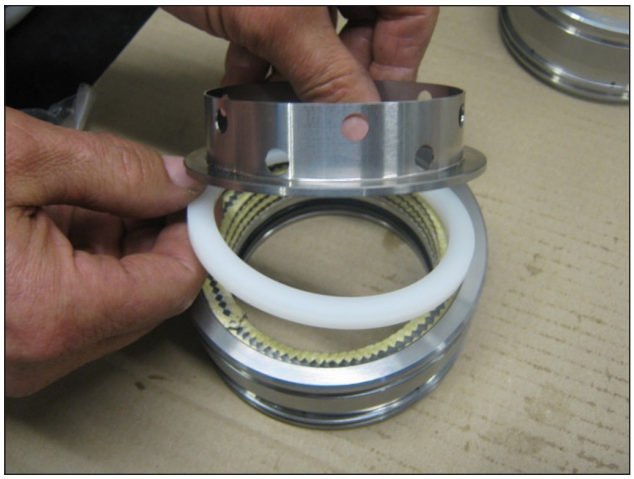


Fig. 229



only for SRR-TRR 75 Fig. 229/a

Now install the O-ring and the back-up ring on the packings support (pos. ①, Fig. 230) on the packing head ring and position it in the seat on the head.

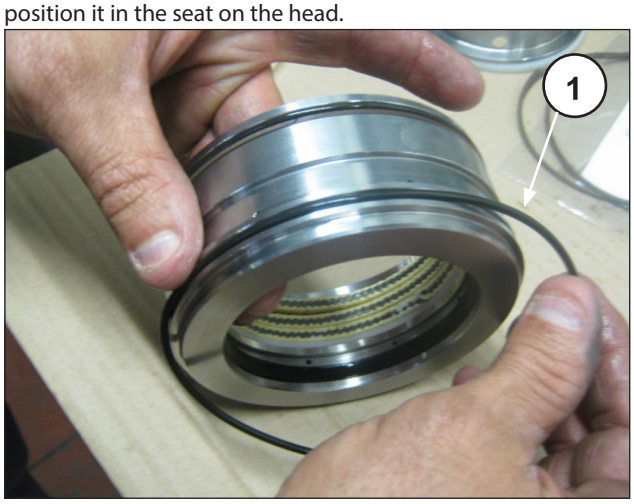


Fig. 230

To facilitate the installation of the packing support on the sleeve, mount the spring on it (Fig. 231).



Fig. 231

Now position the sleeve on the packing support (Fig. 232).



Fig. 232

Position the O-rings on the sleeve (Fig. 233, pos. ①):

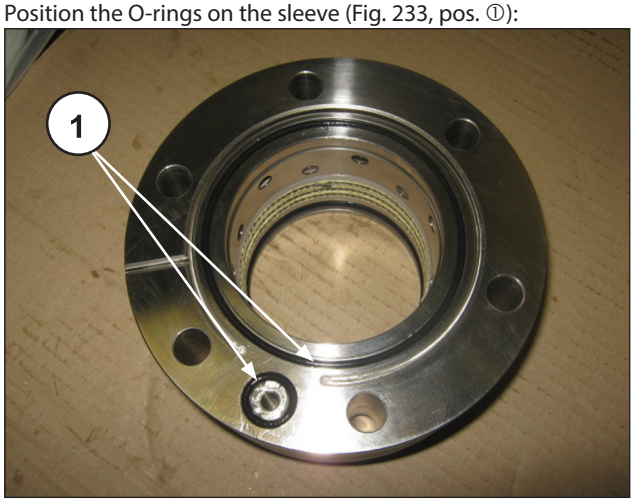


Fig. 233

Install the sleeve to the support, making sure that the O-rings stay in their seat with the punch marks aligned, then mount and secure the ring supporting the gaskets (Fig. 234 and Fig. 235).

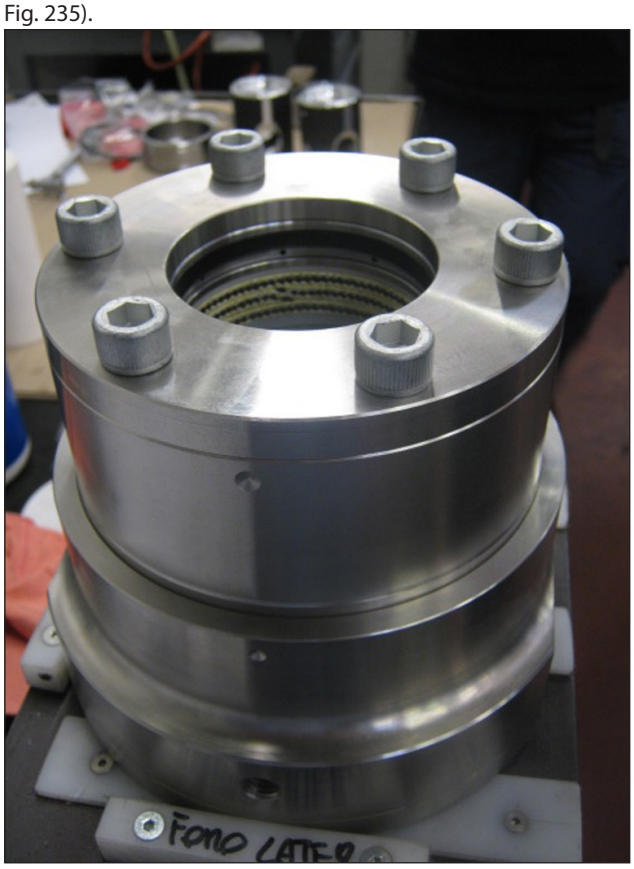


Fig. 234



Fig. 235

Proceed as indicated in par. 2.2.2 - 2.2.4.

6 REPLACING THE CON-ROD FOOT BUSH

Perform cold-driving of the bush and the subsequent work bearing in mind the dimensions and tolerances shown in Fig. 236 below.

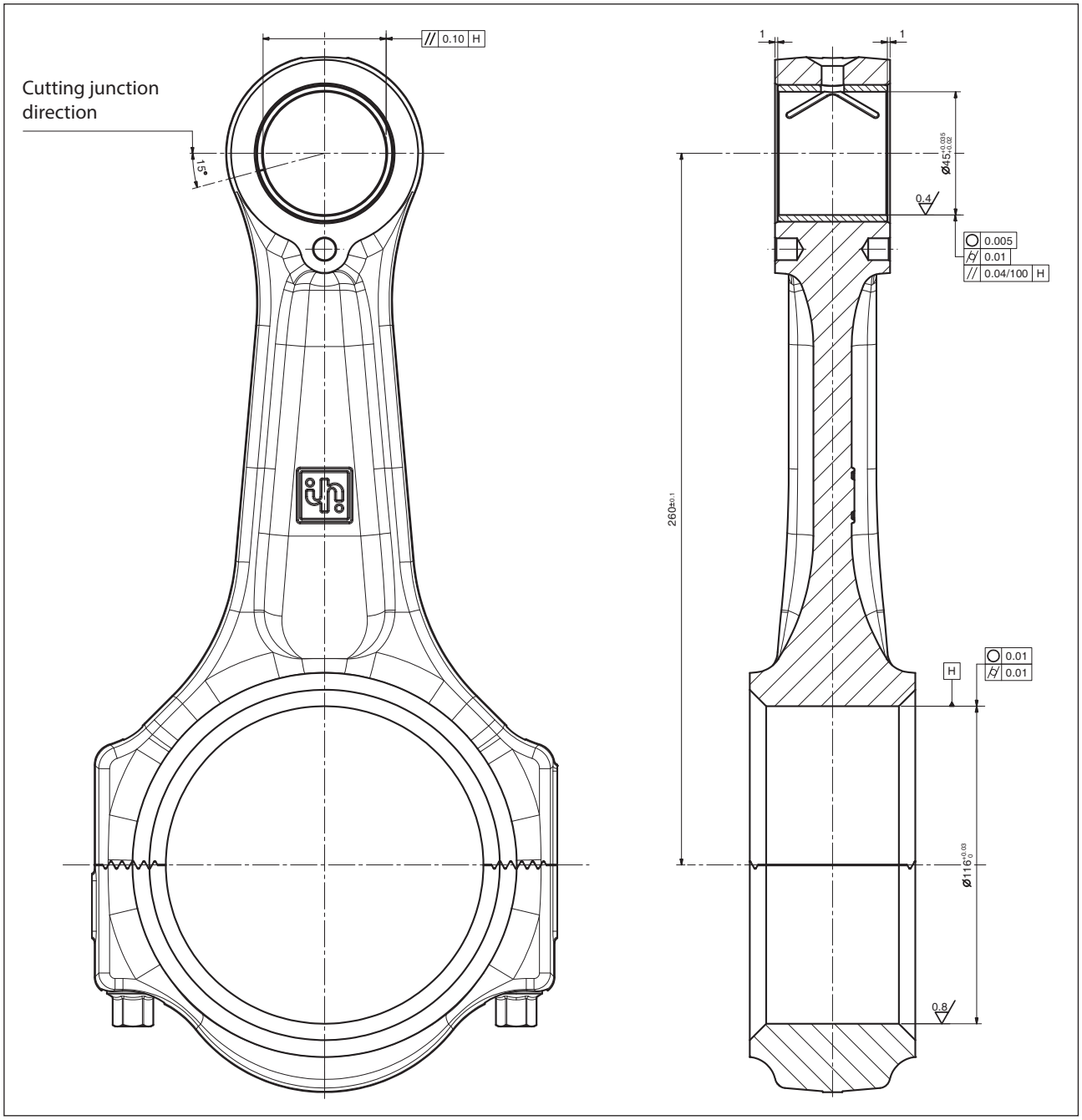


Fig. 236

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