



TR50/60/70/75-SR50/60/75

Repair Manual



General Pump is a
member of the
Interpump Group

Pratissoli

Ref 300972 Rev.A
05-15

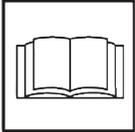
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1. INTRODUCTION

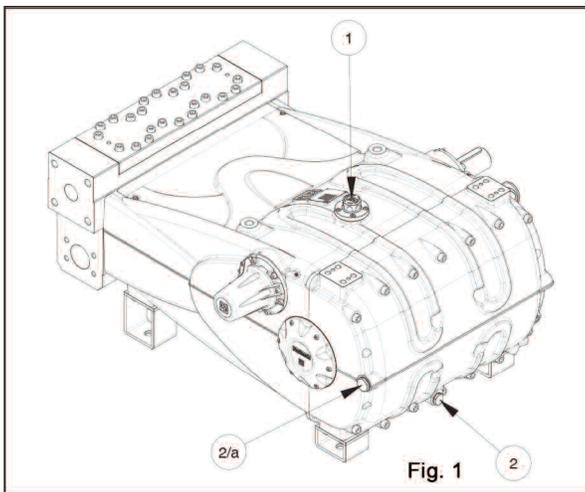
This manual describes the instructions for repairing TR-SR Series pumps, and must be carefully read and understood before performing any repair intervention on the pump. Proper pump operation and longevity depend on the correct use and maintenance. General Pump declines any responsibility for damage caused by the misuse or the non-observance of the instructions described in this manual.

2. REPAIR INSTRUCTIONS



2.1 Repairing Mechanical Parts

Mechanical parts repair must be performed after removal of oil from the casing. To drain the oil, remove the oil dipstick, (1, fig. 1) and then the draining plug (2, fig. 1) on the rear side of the crankcase. Use the plug in pos. 2a on the vertical version.



The oil must be placed in a suitable container and disposed of in special centers. It absolutely must not be discarded into the environment.

2.1.1 Disassembly of Mechanical Parts

The correct sequence is as follows:
 Completely empty the pump of oil, as indicate in point 2.1. Remove the upper inspection cover by unscrewing the (4) M6 fixing screws as indicated in 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

Disassemble the manifold from the pump crankcase as indicated in point 2.2.1. Remove the splashguards. Undo the (2) M6 fixing screws of the three oil seal covers (1, fig. 2).

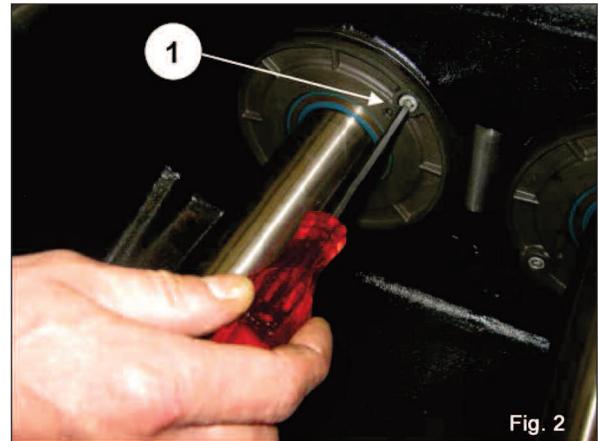


Fig. 2

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

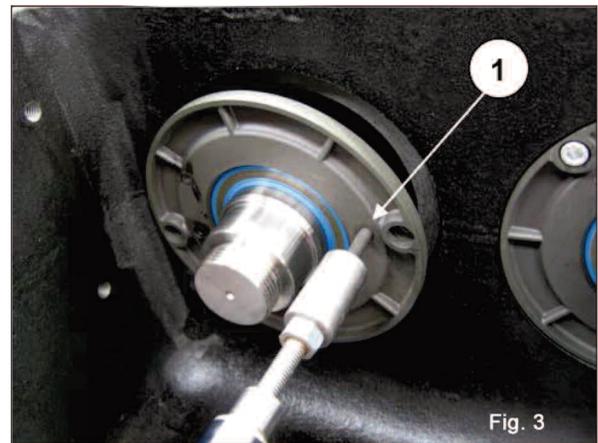


Fig. 3

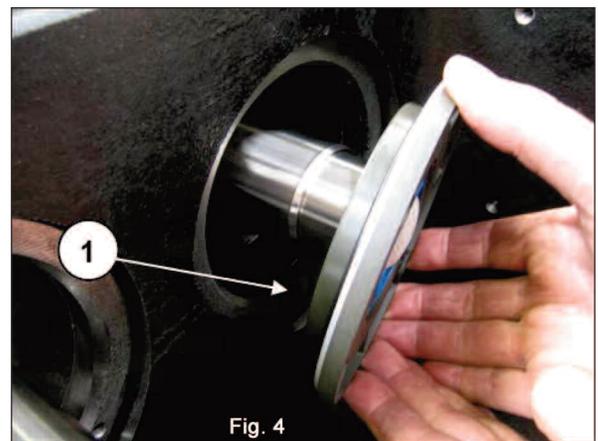


Fig. 4

Remove the radial oil seal (1, fig. 5) and the external o-ring (1, fig. 6).

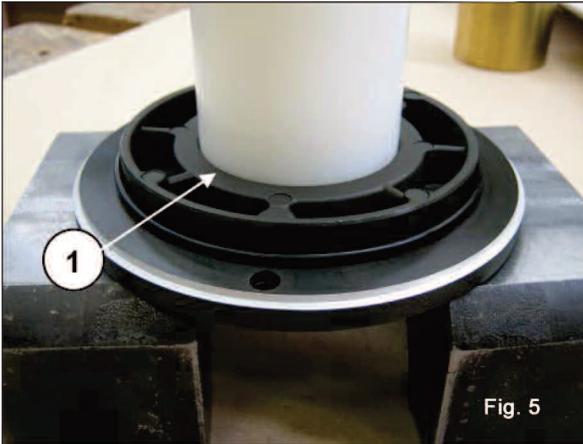


Fig. 5

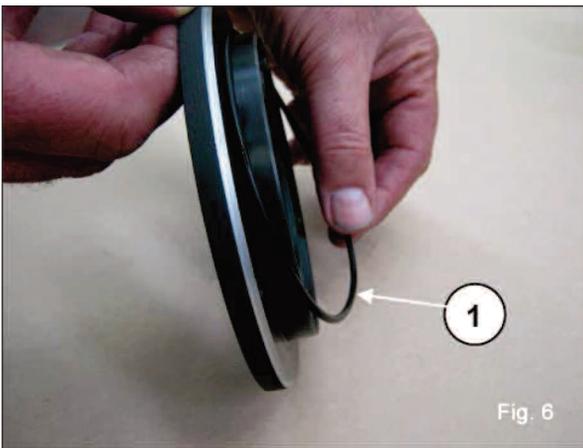


Fig. 6

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

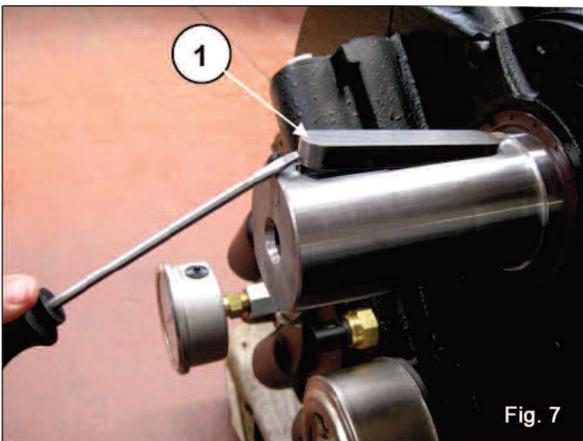


Fig. 7

Undo the fixing screws of the shaft end cover (1, fig. 8) and unscrew and remove the cover thus revealing the PTO shaft. Remove all the o-rings and remove them if necessary.



Fig. 8

Undo the PTO pinion cover fixing screws (1, fig. 9) and remove the cover. Remove all the o-rings and replace them if necessary.

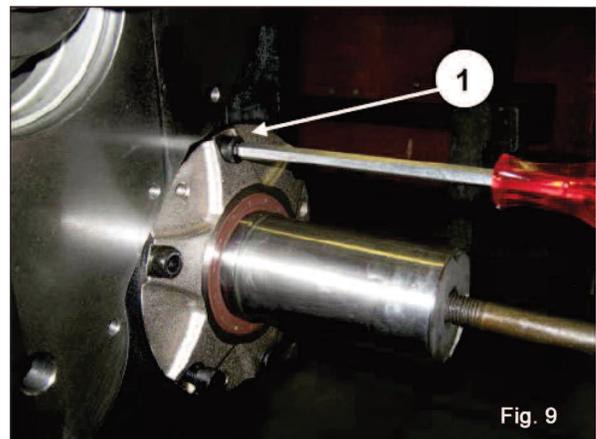


Fig. 9

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

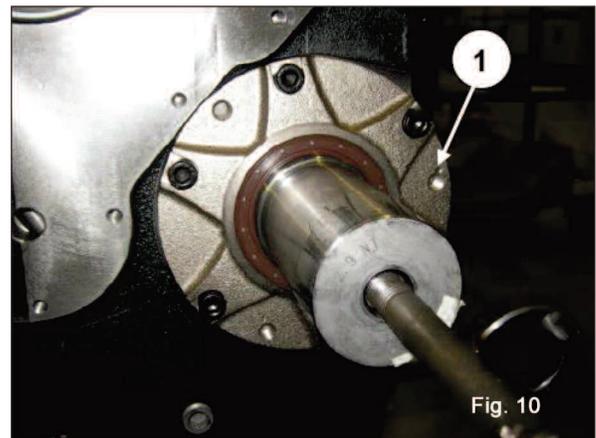
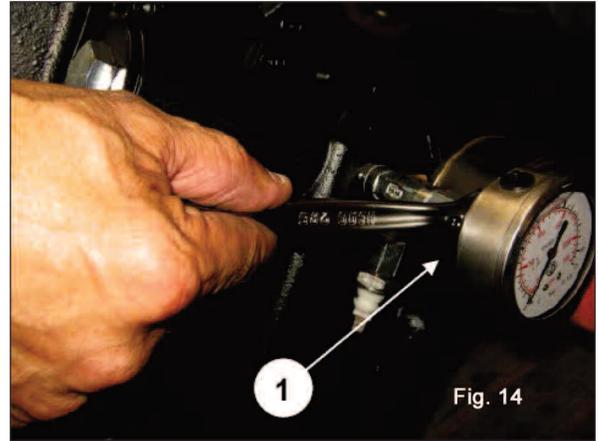
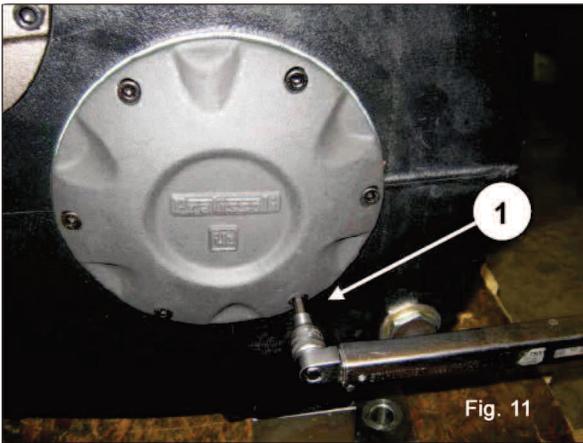
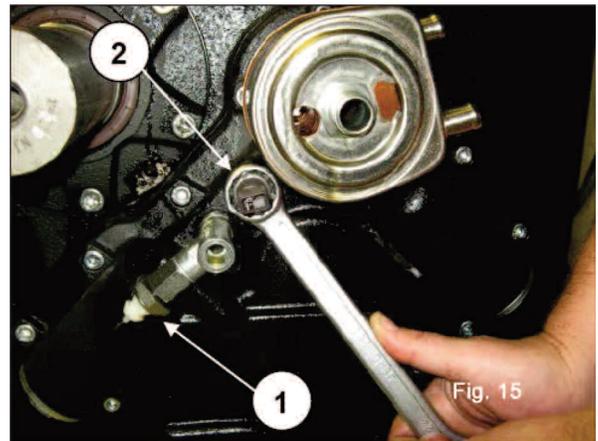
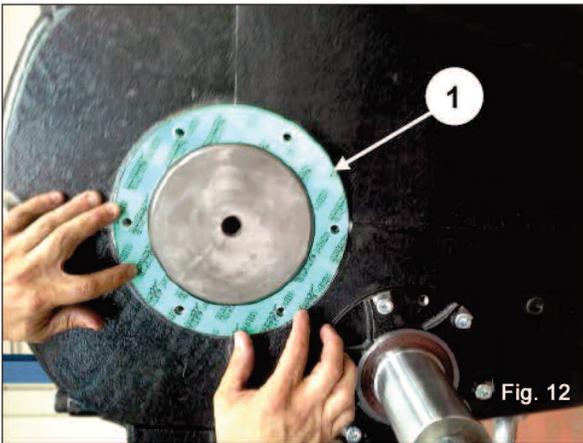


Fig. 10

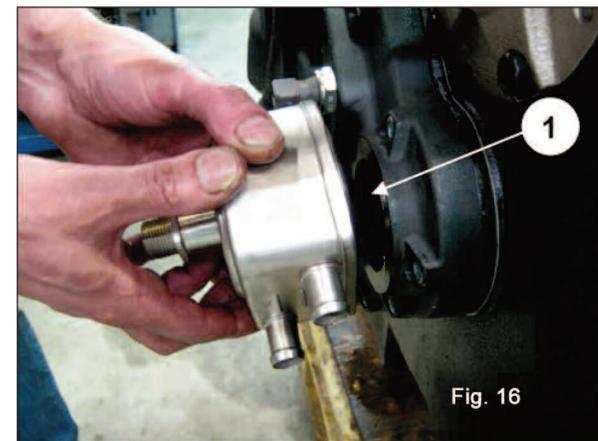
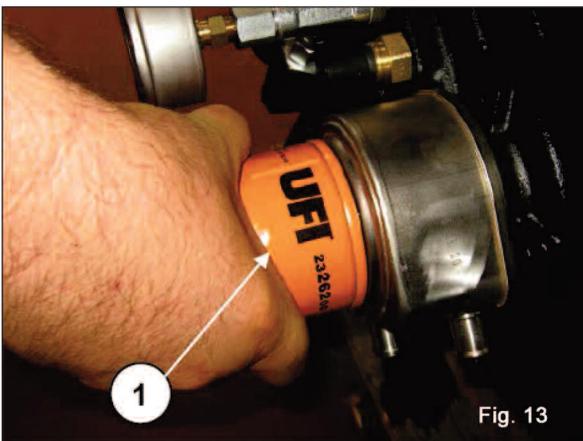
Remove the crankshaft cover by undoing the associated screws (1, fig. 11); remove the gasket and replace if necessary (1, fig. 12).



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



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



Remove the lube pump body by undoing the related screws (1, fig. 17). Remove the gasket and replace if necessary (1, fig. 18).

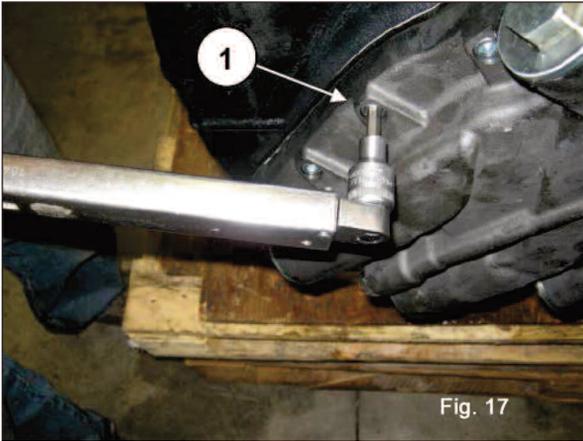


Fig. 17

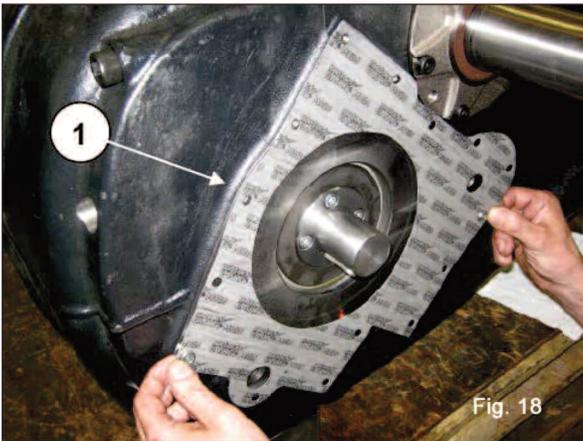


Fig. 18

Remove the key from the lube pump drive shaft (1, fig. 19). Undo the (4) M8 screws (1, fig. 20) and remove the lube pump drive shaft from the crankshaft.

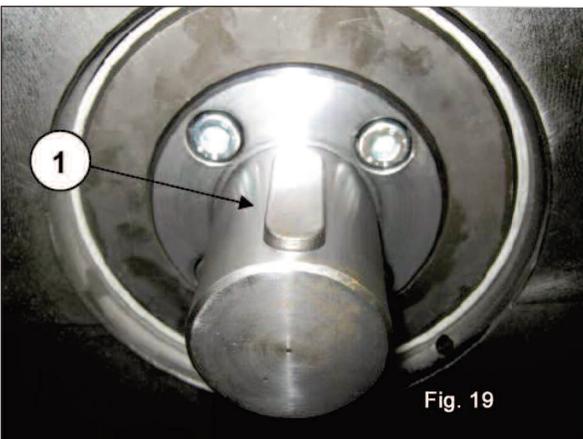


Fig. 19

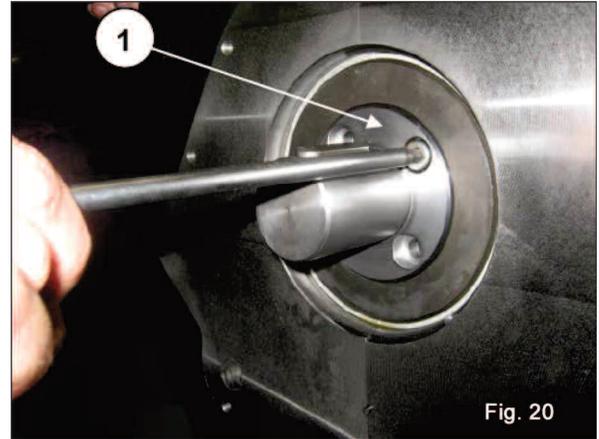


Fig. 20

Undo the M16 rear casing fixing screws (1, fig. 21) and remove the screws.

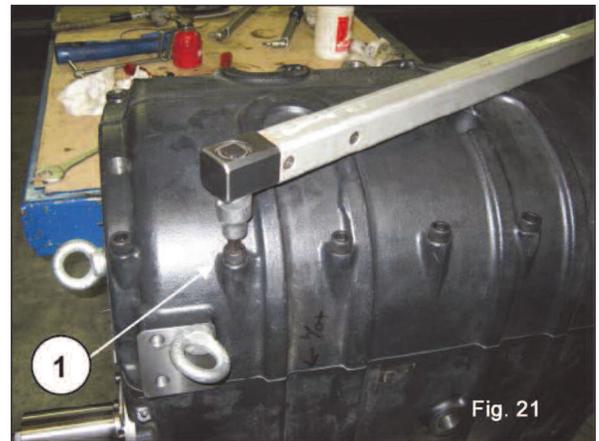


Fig. 21

To remove the rear casing first remove the feet affixed to it and use (4) M16 threaded holes to fit the lifting eye-bolts (1, fig. 22)

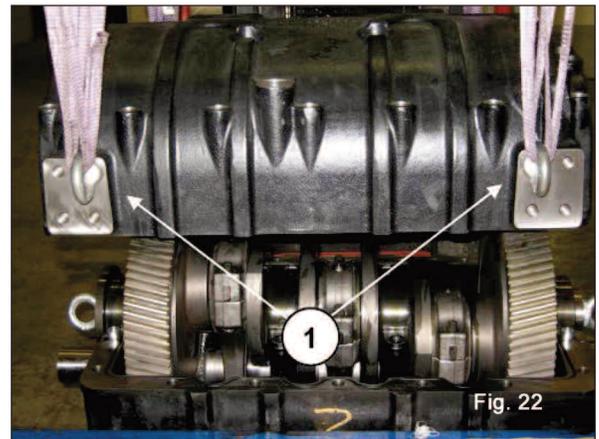
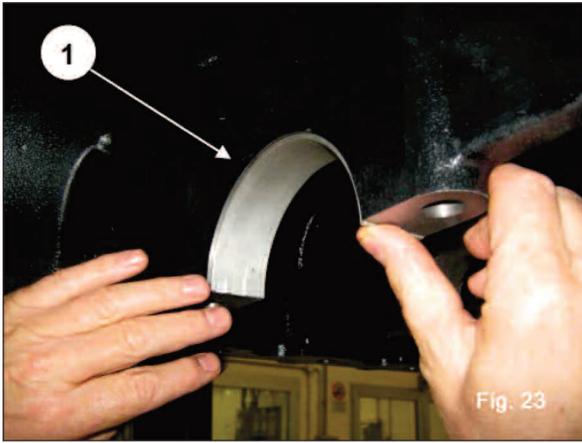


Fig. 22

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



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 (1, fig. 24).

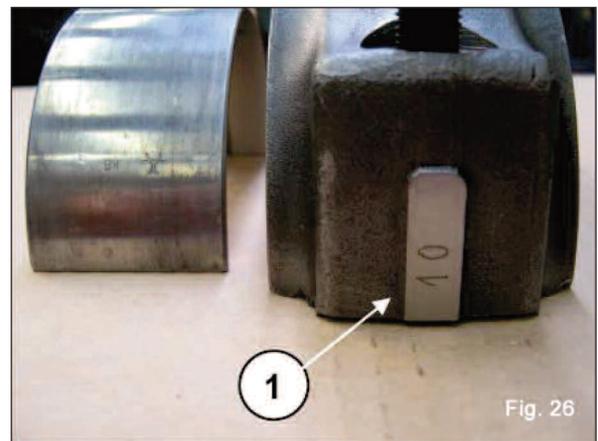


Remove the conrod caps with the bearing shells, taking special care to note the sequence in which they are removed.

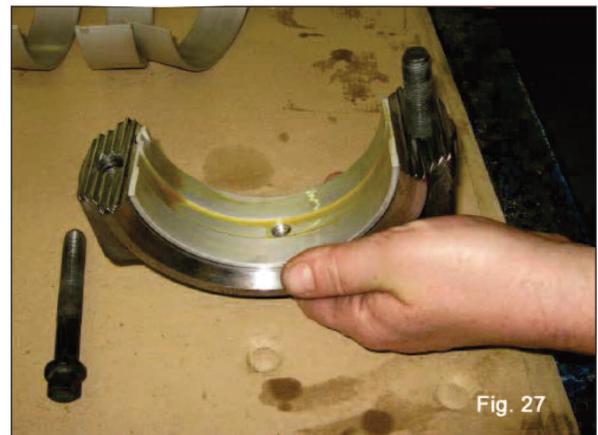


The conrod caps and their conrods must be reassembled in exactly the same order and pairing with which they were disassembled.

To avoid possible errors, conrod caps and conrods are numbered on one side (1, fig. 26).



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



Advance the three conrods as far as possible in the direction of the manifold. Remove the three upper bearing shells of the conrods (1, fig. 28).

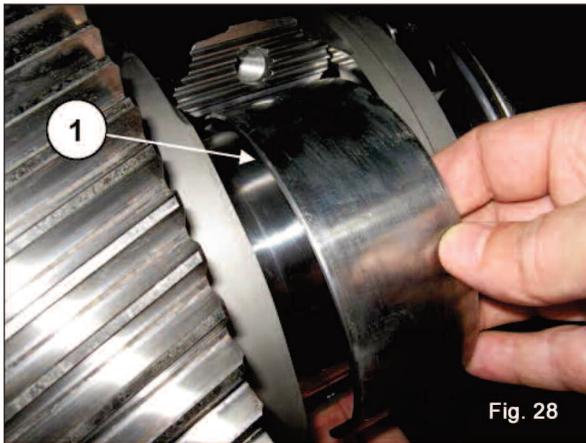


Fig. 28

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

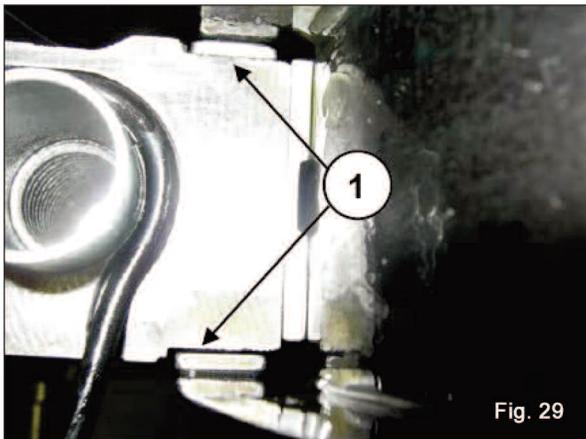


Fig. 29

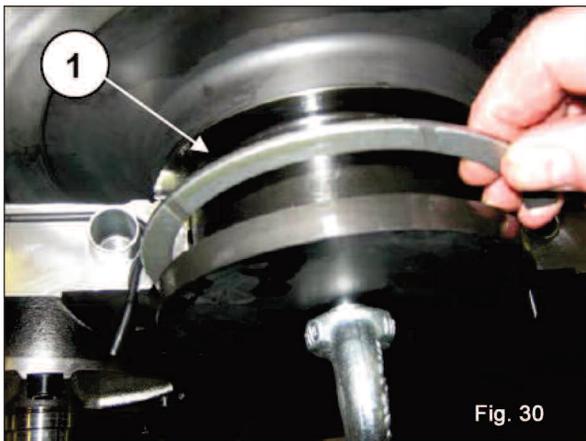


Fig. 30

Remove all the o-rings from the seats on the front casing mating surface and replace them if necessary (1, fig. 31 and fig. 32).

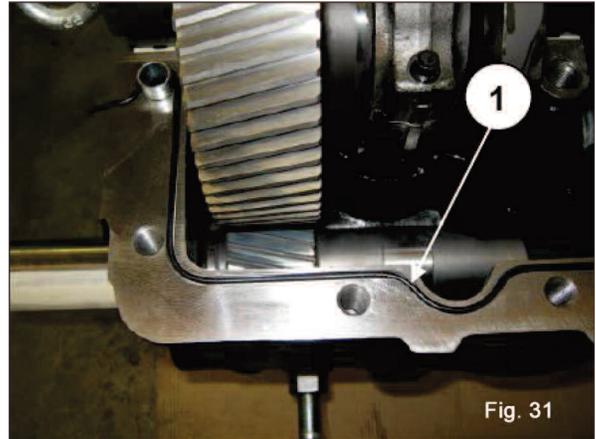


Fig. 31

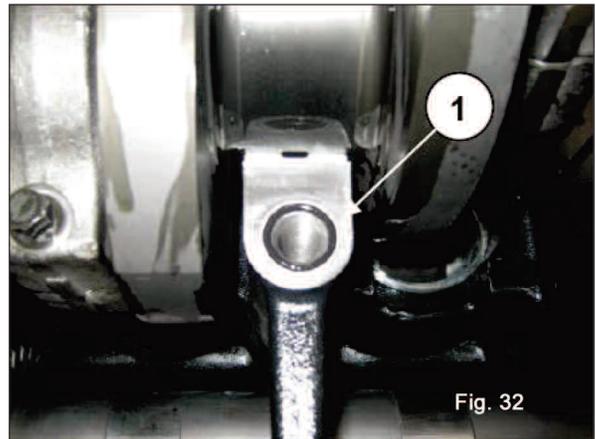


Fig. 32

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

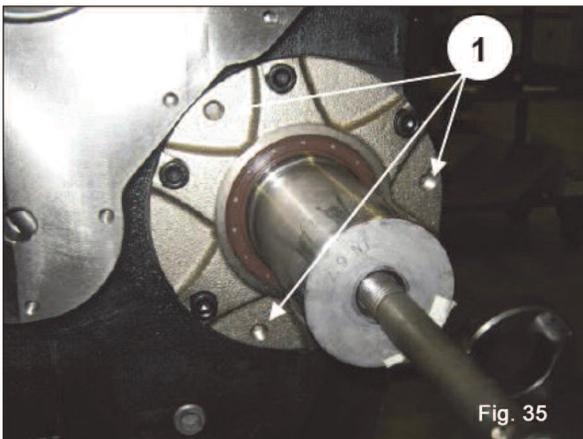
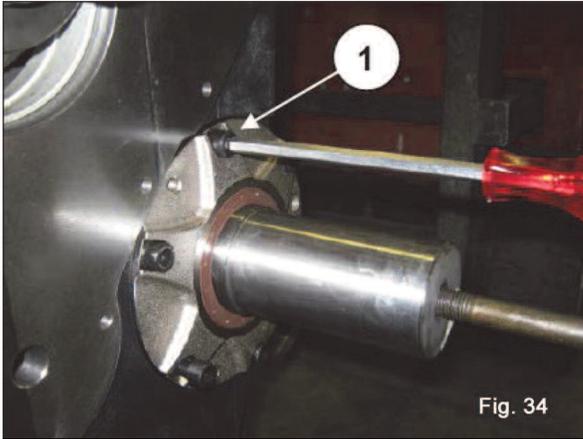


Fig. 33

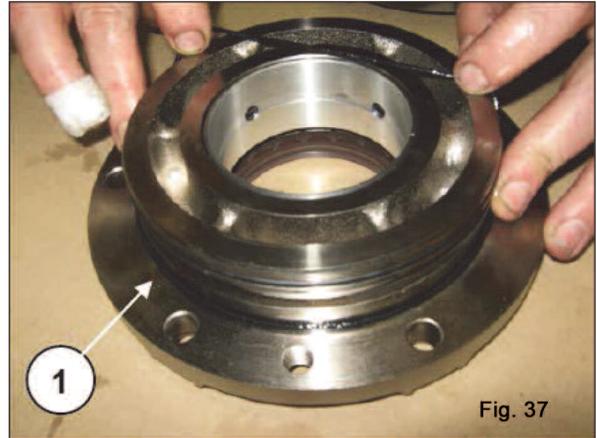
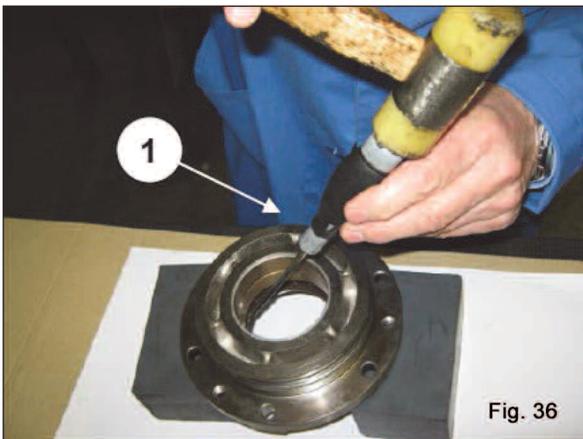


The clearance rings must be refitted in exactly the same direction from which they were removed. taking care to position the grooves towards the crankshaft shoulders.

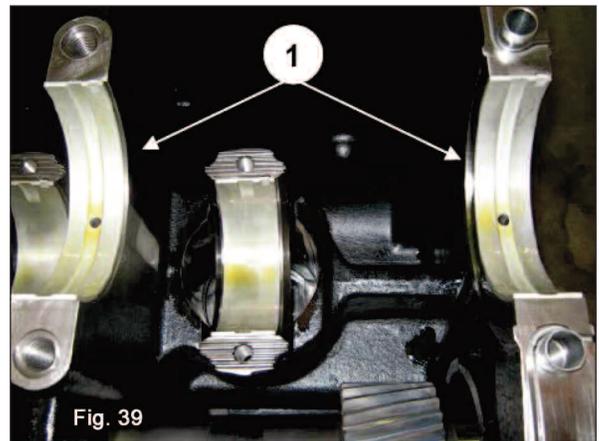
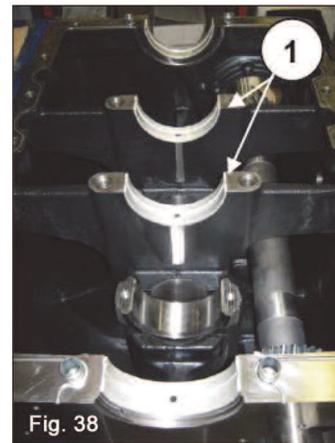
Unscrew the fixing screws of the left and right PTO bearing covers (1, fig. 34) and withdraw two covers from the PTO shaft. To facilitate the disassembly procedure use three M10 screws (1, fig. 35) functioning as extractors; alternatively use a slap hammer.



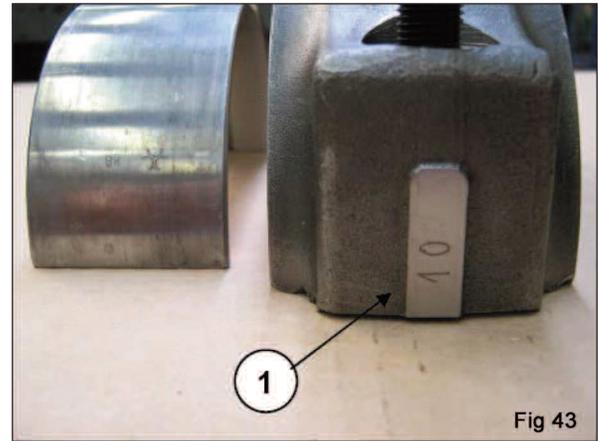
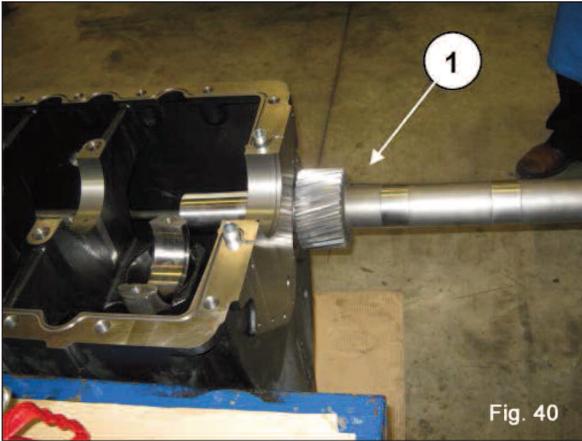
Remove the radial seal ring (1, fig. 36) and the o-rings (1, fig. 37).



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

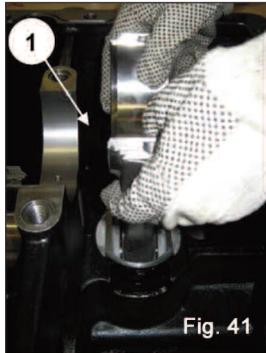
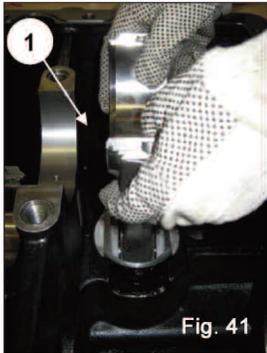
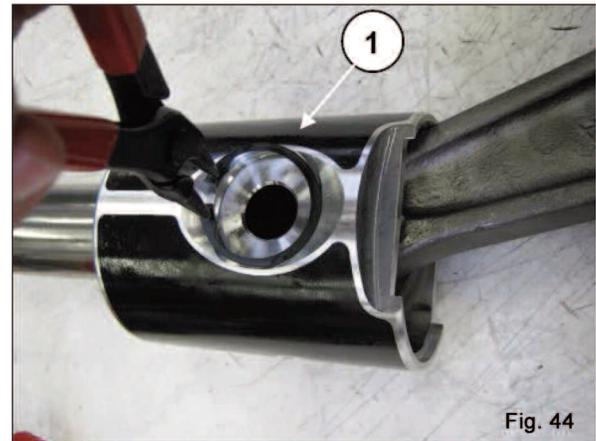


Extract the PTO shaft from either one of the two sides (1, fig. 40).



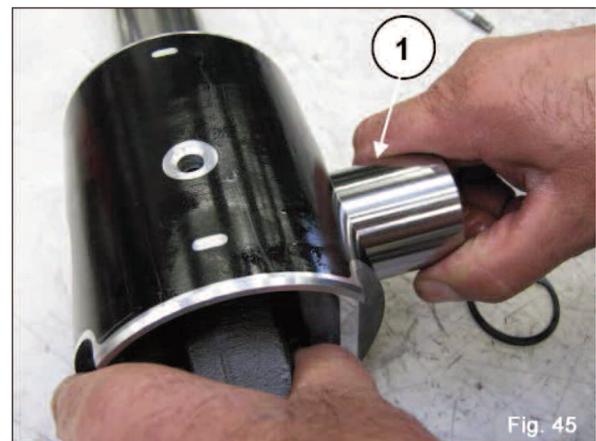
Remove the two piston pin circlips using circlip pliers (1, fig. 44).

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



Couple the half-supports to the previously disassembled caps, referring to the numbering (1, fig. 43).

Remove the piston pins (1, fig. 45) and extract the conrod (1, fig. 46).



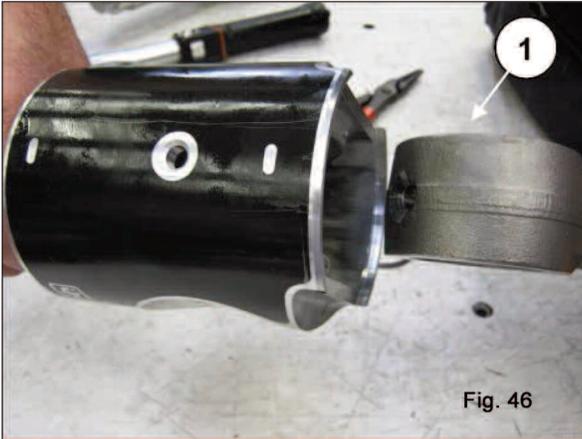


Fig. 46

To separate the rod from the piston guide, unscrew the round hex head socket M6 screws with the specific wrench (1, fig. 47).

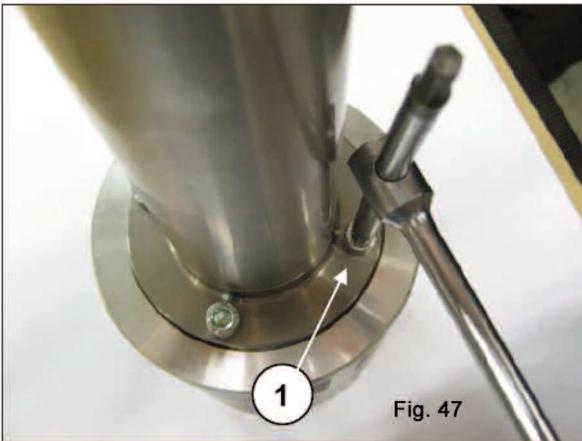


Fig. 47

Remove the (4) filter mesh fixing screws to access the lube pump suction cavity and check that the interior is clean (1, fig. 48).

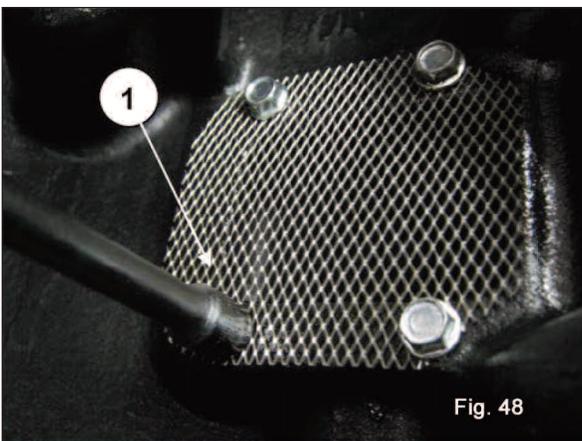


Fig. 48

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 (3) M6 screws (1, fig. 49) to gain access to the lube pump rotors, then remove the rotors (1, fig. 50).

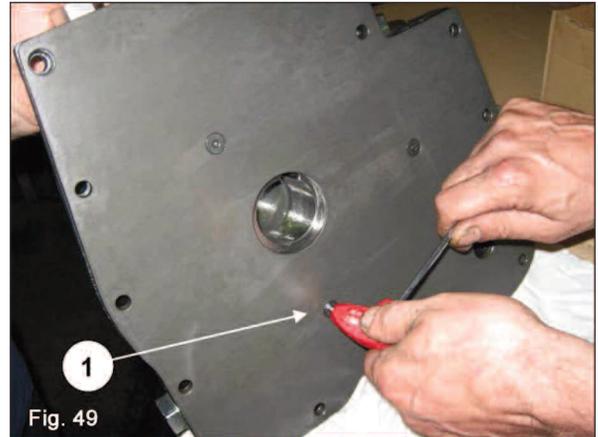


Fig. 49

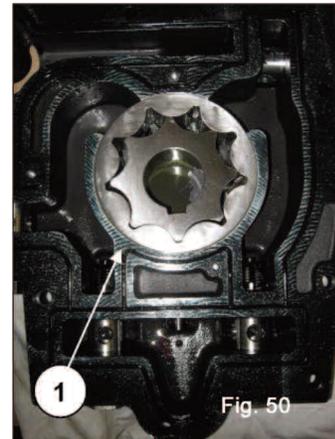


Fig. 50

Remove the shaped o-ring and replace if necessary (1, fig. 51).

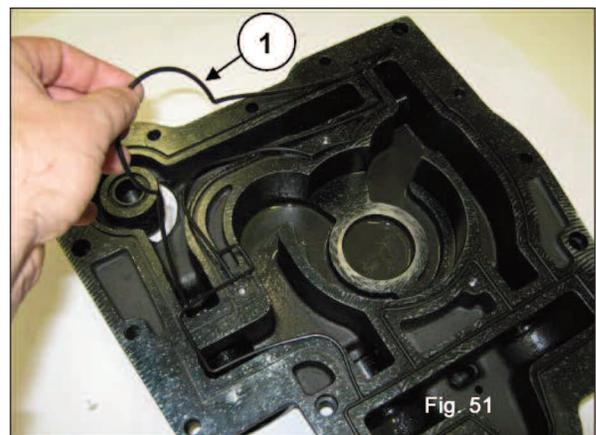
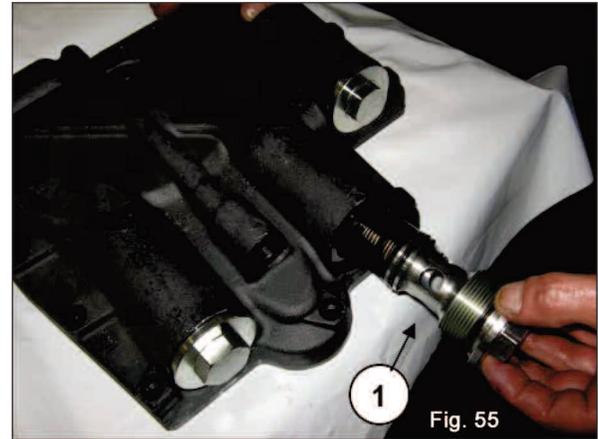


Fig. 51

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



2.1.2 Assembly of the Mechanical Part

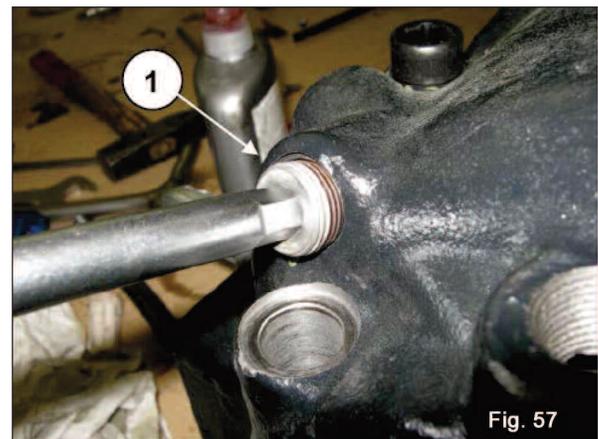
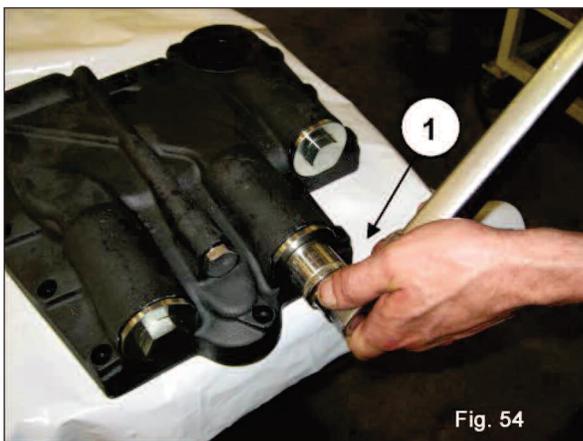
Reassemble the unit following the procedure indicated in point 2.1.1, in reverse.

The correct sequence is as follows:

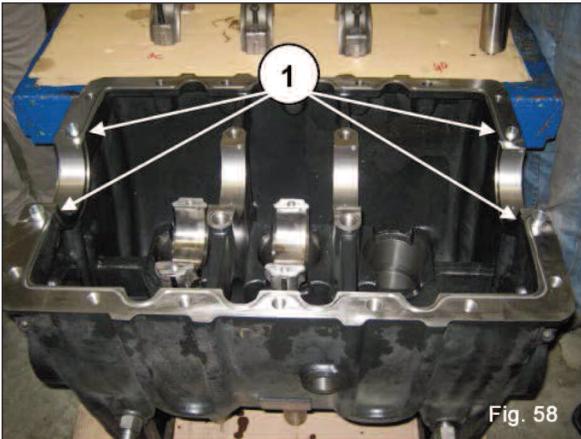
Preparation of front and rear crankcase halves:

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 1, fig. 57).

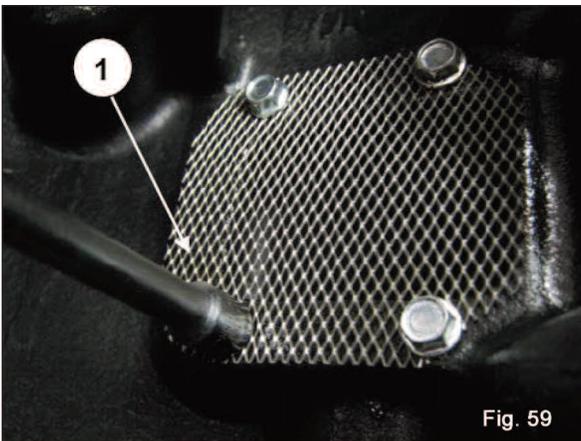
Undo the (4) M40 plugs (1, fig. 54) and remove the complete directional control valve insert (1, fig. 55)



Fit the locating brushes into the holes on the crankshaft main bearings (1, fig. 58).

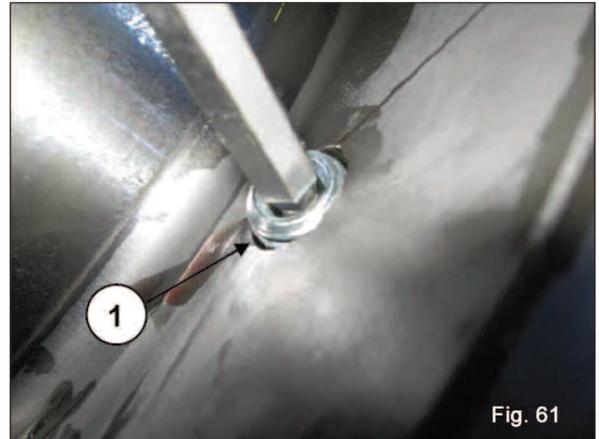


Fix the oil filter mesh on the rear casing using (4) M6 screws (1, fig. 59).



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 1, fig. 61).



Assemble the rod to the piston guide. Insert the piston guide rod into its seat on the piston guide (1, fig. 62) and fix the rod to the piston guide by means of the (4) M6x20 screws (1, fig. 63).



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



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 into the piston guide (1, fig. 65) and then insert the piston pin (1, fig. 66). Fit the two circlips with circlip pliers (1, fig. 67).

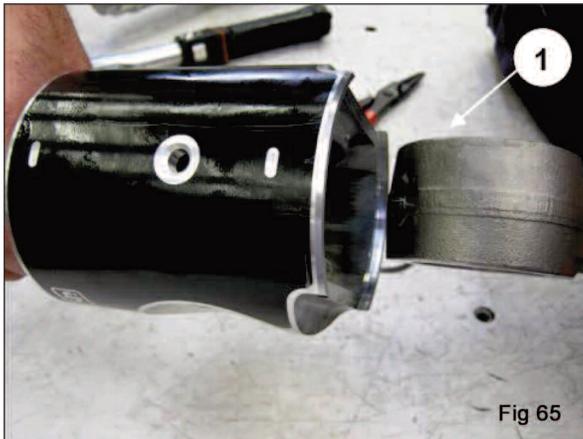


Fig. 65



Fig. 66

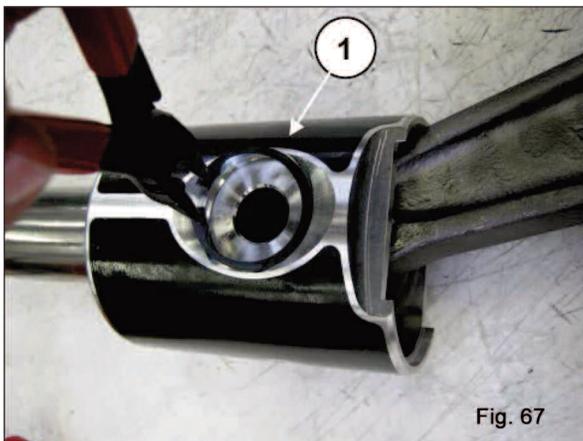


Fig. 67



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

Separate the caps from the conrod shanks; correct pairing is guaranteed by the numbering on the side (1, fig. 68).

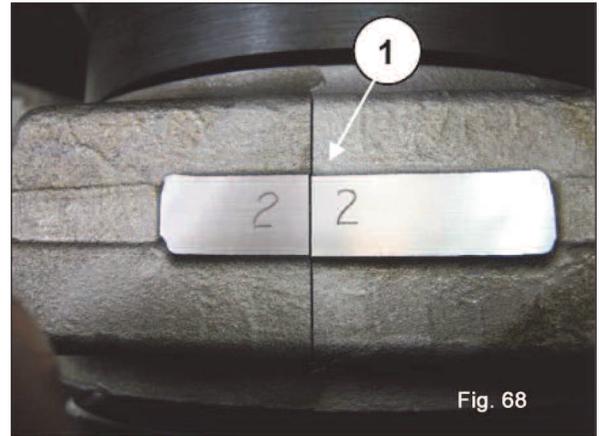


Fig. 68

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 shank-piston guide unit in the crankcase must be carried out orienting the conrods so that the numbering is 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.

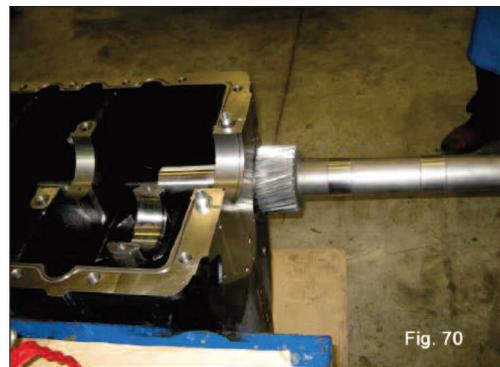


Fig. 70

Lower the crankshaft into position (fig. 74).

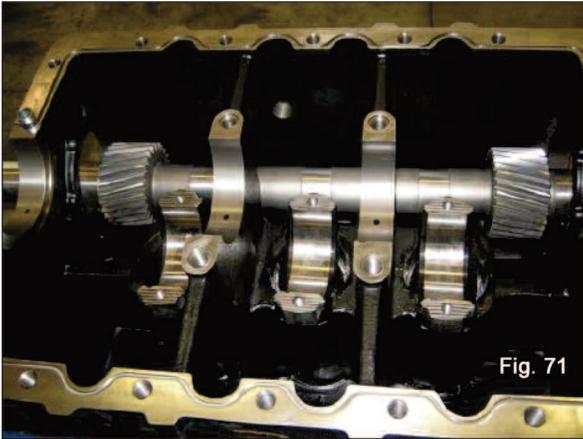


Fig. 71

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

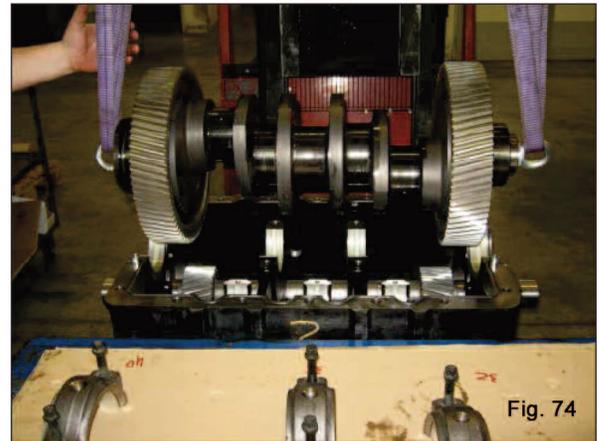


Fig. 74

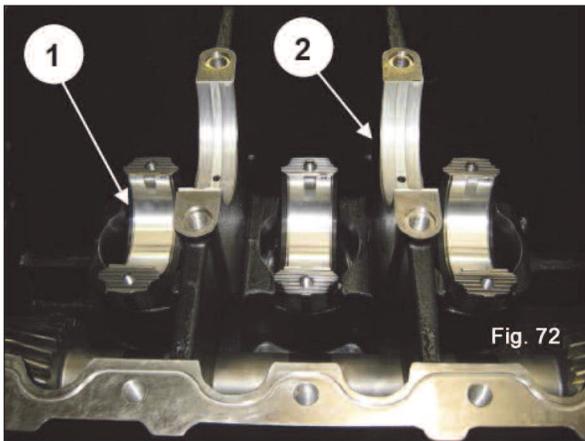


Fig. 72



Fig. 75



To avoid possible swapping of bearing shells adhere strictly to the above figure (fig. 72); specifically, the conrod bearing shells have no notch (1) while the main bearing shells have a notch and an oilway (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 (1 and 2, fig 73).



The crankshaft 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 (1, fig. 76 and fig. 77).

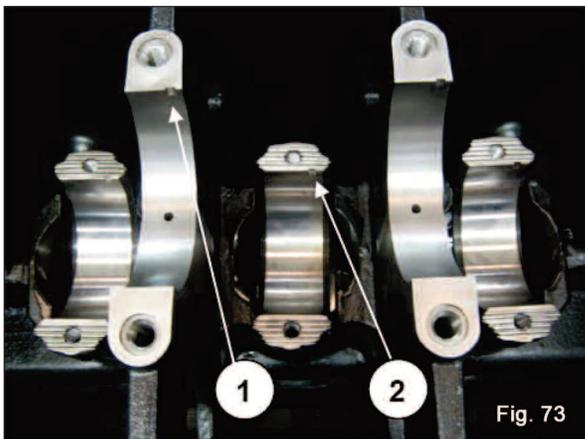


Fig. 73

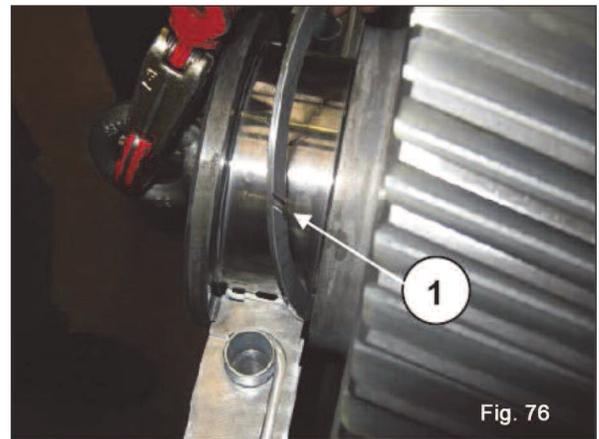


Fig. 76

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



Fig. 77



The clearance rings must be fitted taking care to position the grooves facing the internal and external shoulders of the crankshaft (1, fig. 77 and fig. 78).

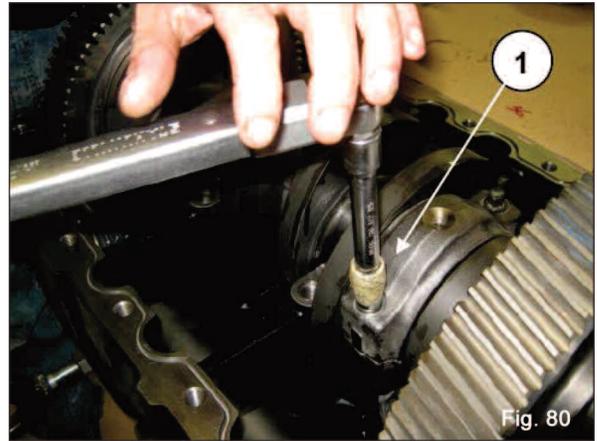


Fig. 80

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

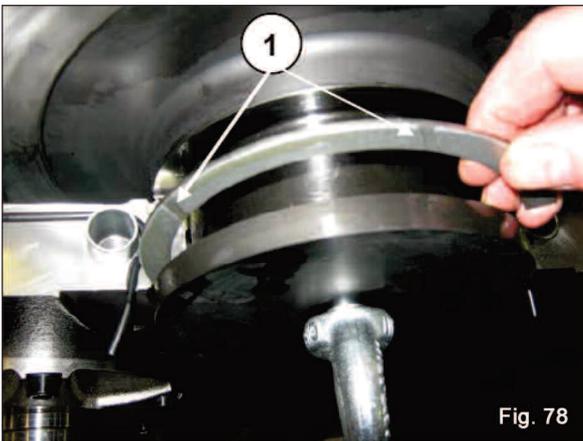


Fig. 78

Fit the lower bearing shells of the conrod caps (1, fig. 79) ensuring that the shell reference keys are lodged in their location on the cap (2, fig. 79).

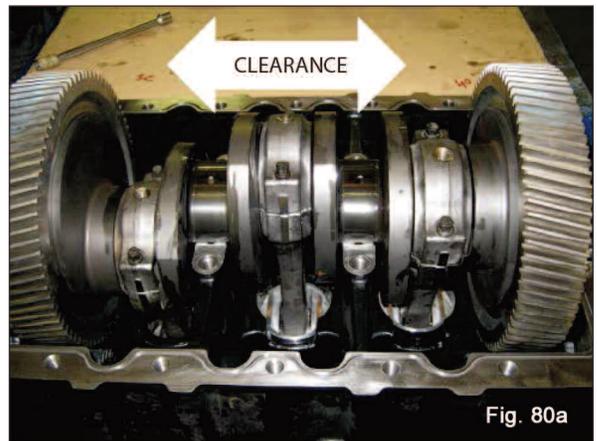


Fig. 80a

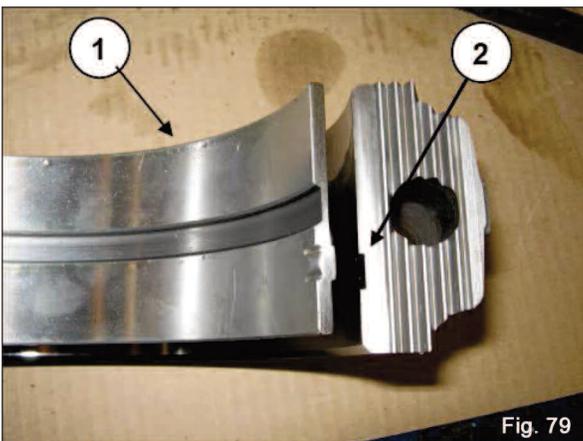


Fig. 79



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

Fit the o-ring in their locations on the front casing mating surface (1, fig. 81, fig. 82, fig. 83 and fig. 84).



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

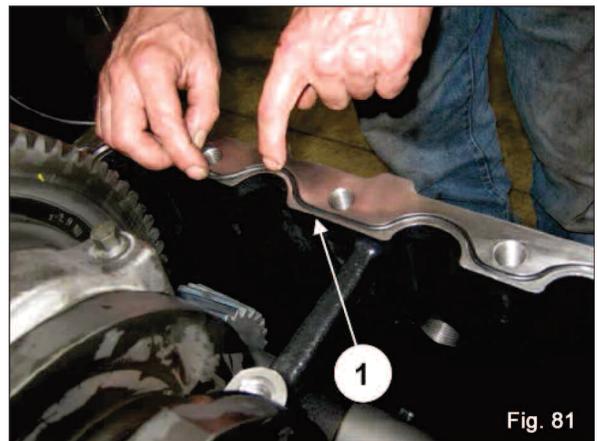
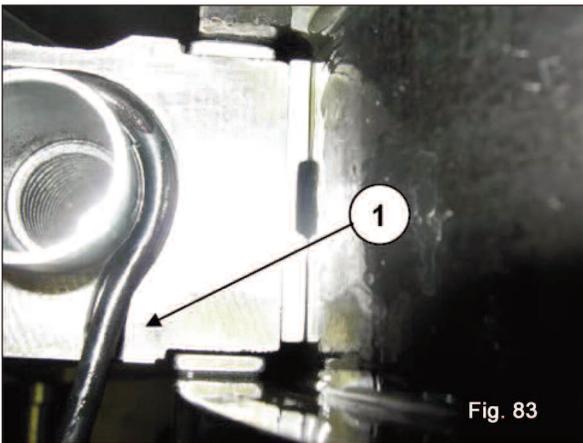
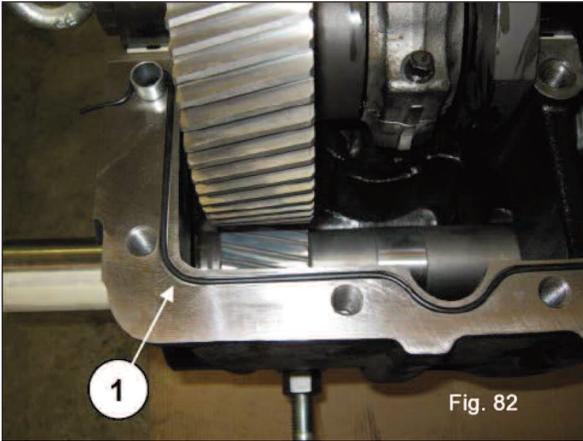
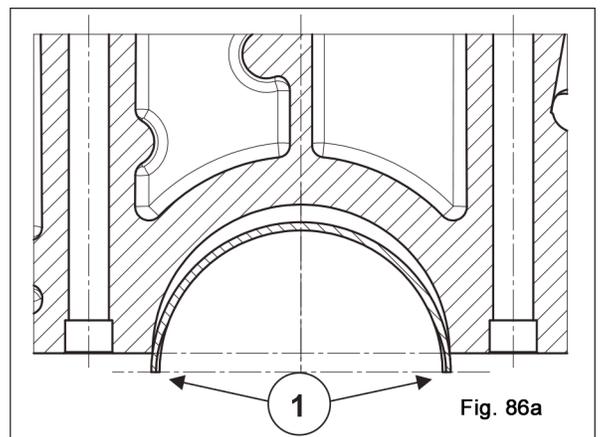
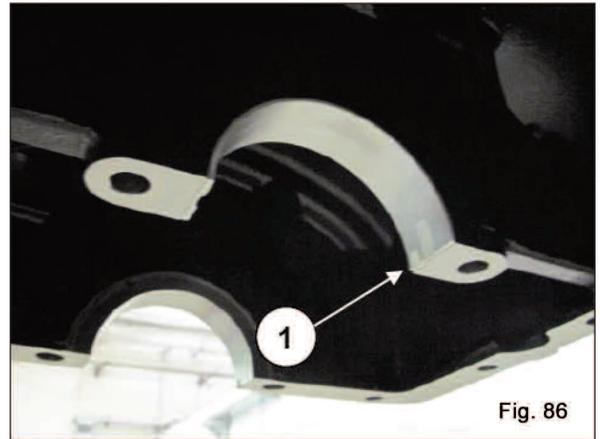
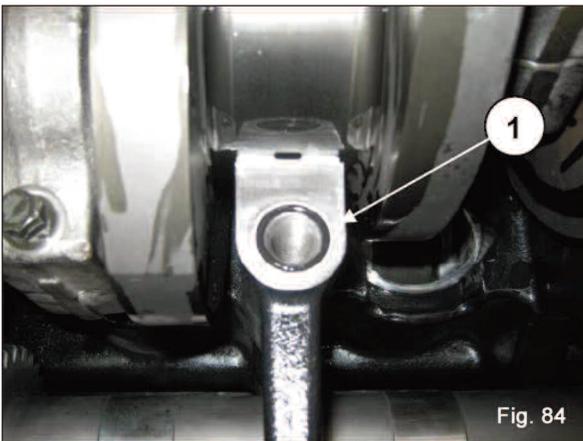


Fig. 81

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



For correct assembly of the main bearing shells make sure the reference keys are seated in their locations (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 (1, fig. 86a).



Fit the rear casing (fig. 87) checking alignment on the front casing locating bushings (1, fig. 88).



Fig. 87

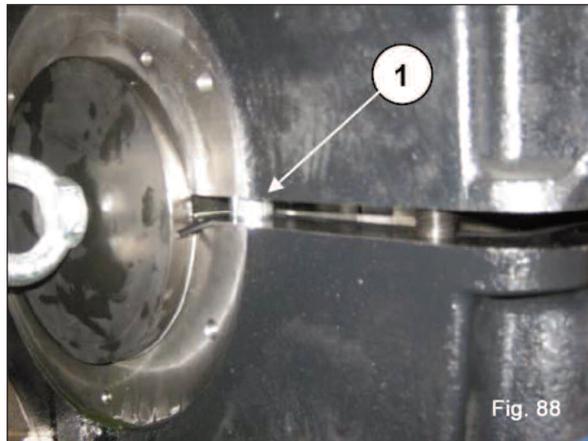


Fig. 88

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



Fig. 89

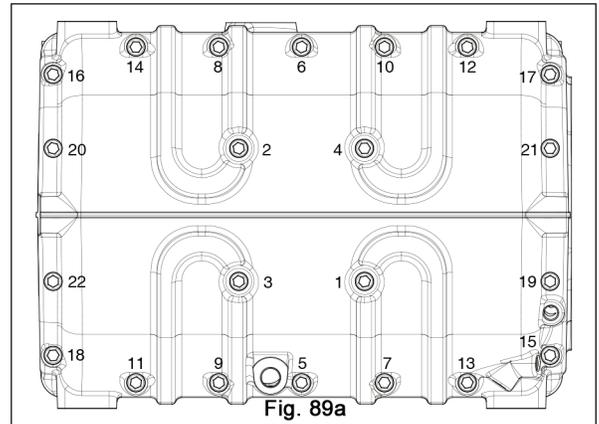


Fig. 89a

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 (1, fig. 90 and fig. 91).

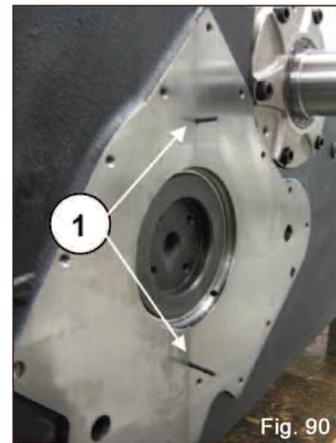


Fig. 90



Fig. 91

The o-rings should protrude by 2 mm (1, fig. 92).

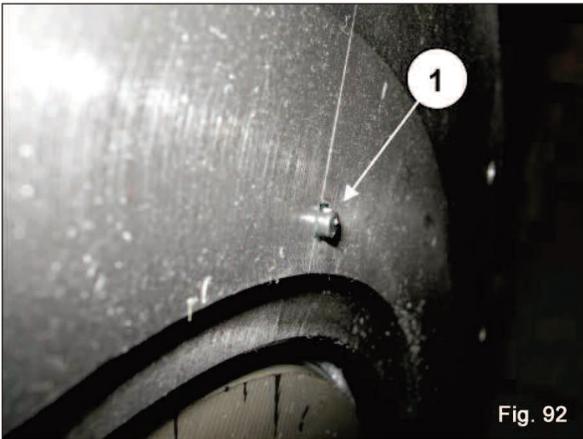


Fig. 92

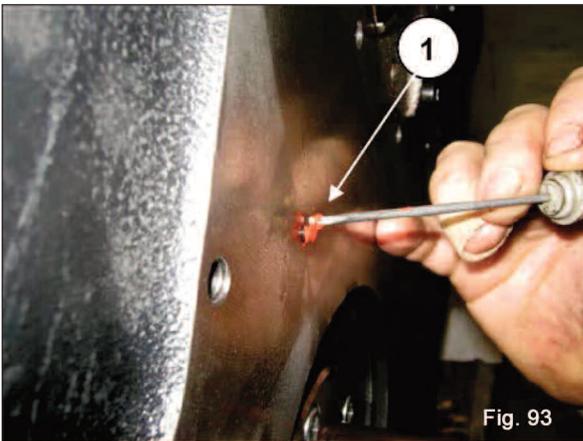


Fig. 93



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 (1, fig. 93).

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

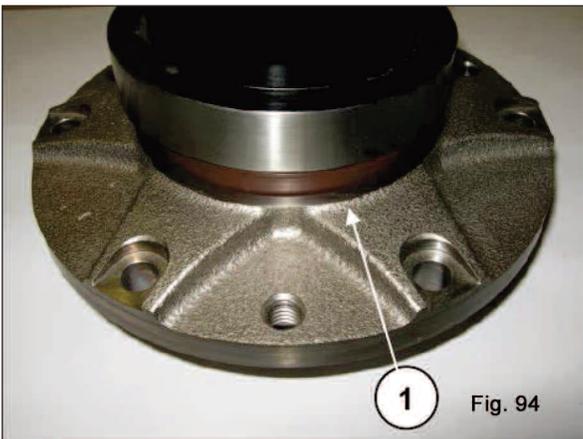


Fig. 94

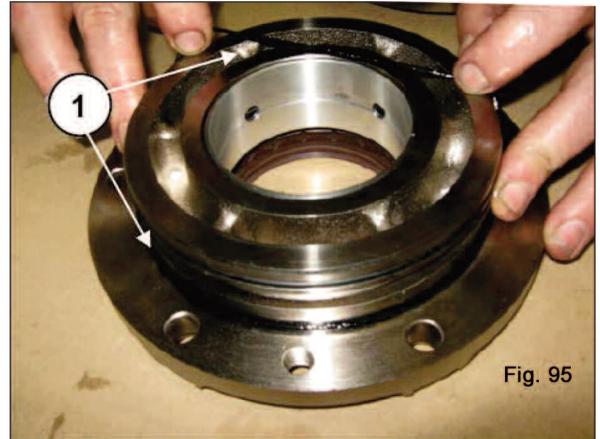


Fig. 95

Before proceeding with the assembly of the radial seal ring, check 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).

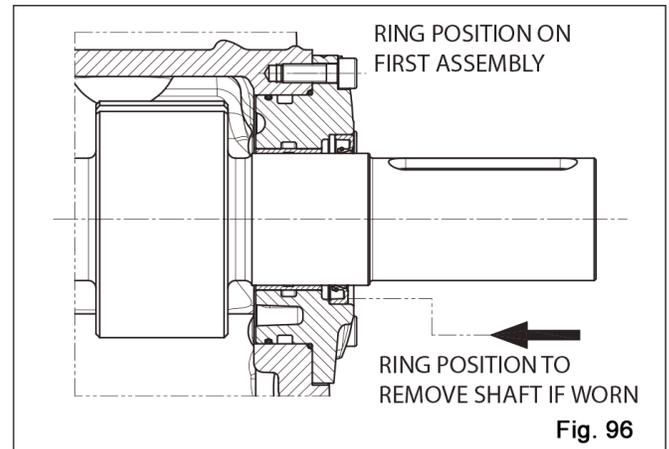


Fig. 96

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

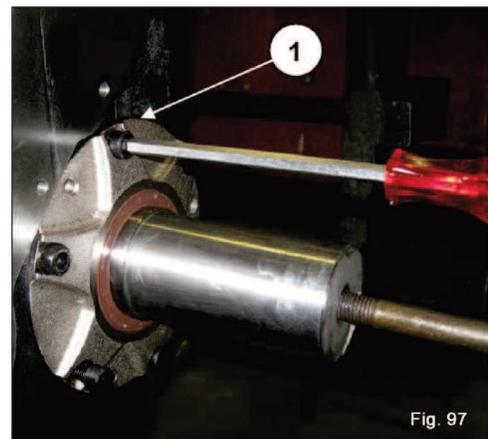


Fig. 97

Assemble the lube pump drive shaft to the crankshaft and fix with the (4) M8 screws (1, fig. 101) then tighten with a torque wrench to the valve as prescribed in Section 3.

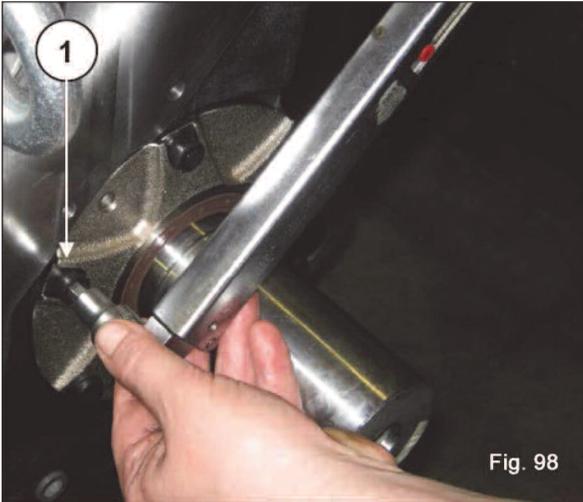


Fig. 98

Fit the crankshaft cover with associate gasket (after smearing silicone sealant - see fig. 93 - on the protruding o-rings, and then tighten the M8 fixing screws (1, fig. 99 and fig. 100).

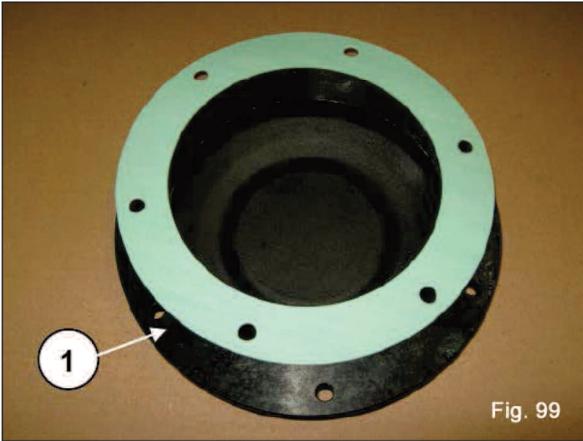


Fig. 99

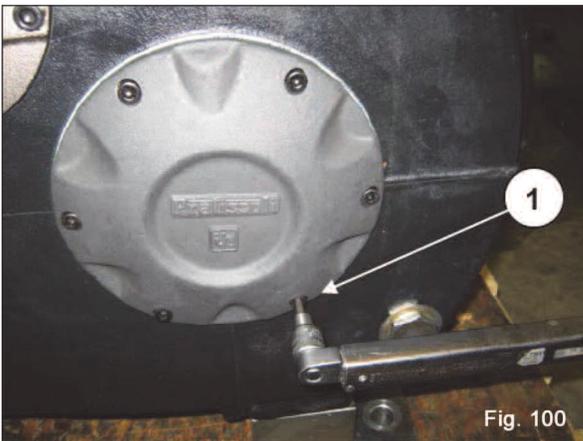


Fig. 100

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

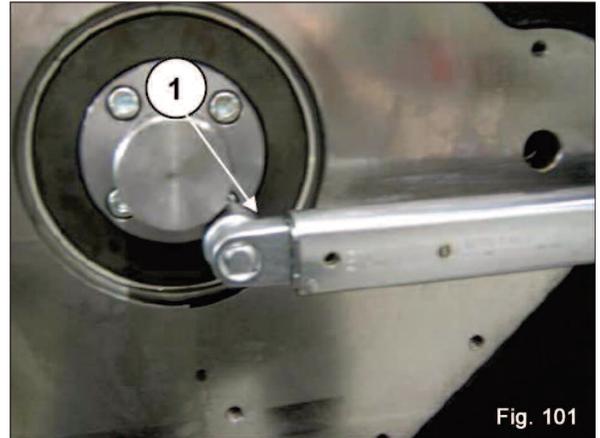


Fig. 101



Fig. 102

Fit the 2 lube pump body locating bushings (1, fig. 103).

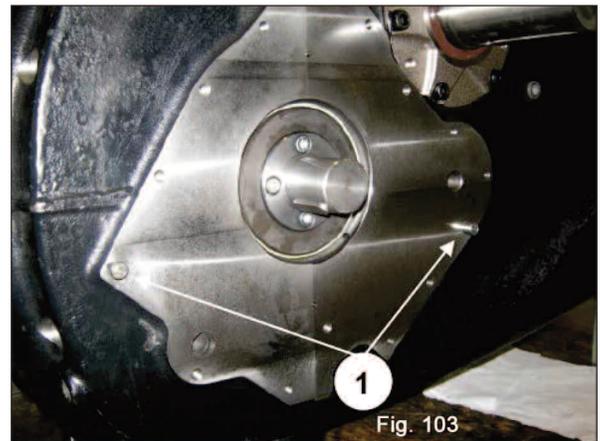
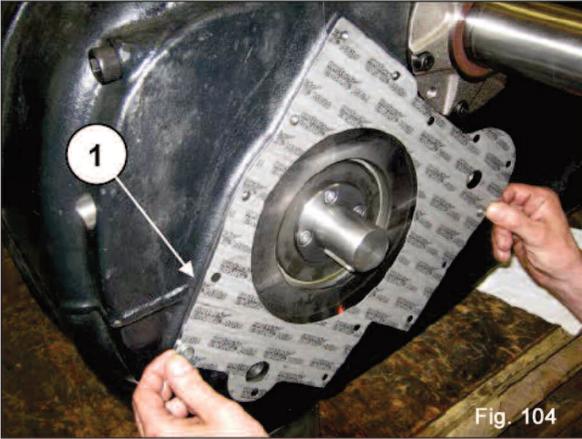
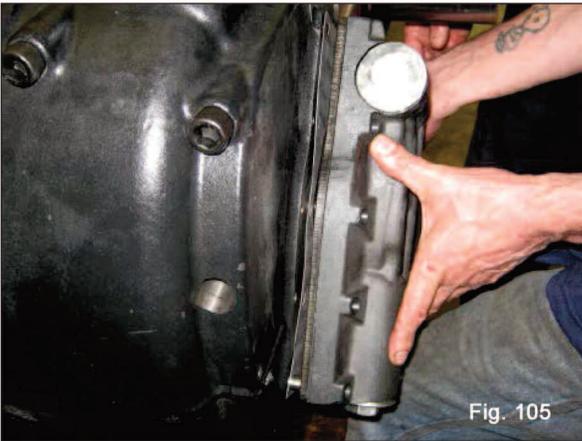


Fig. 103

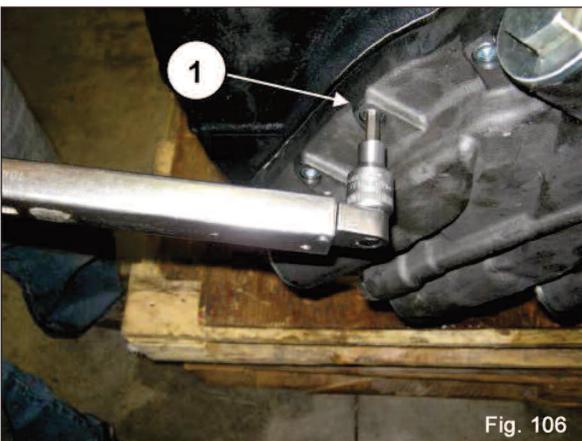
Fit the gasket (1, fig. 104) after smearing silicone sealant on the protruding o-ring (see fig. 93).



Fit the lube pump body (fig. 105).



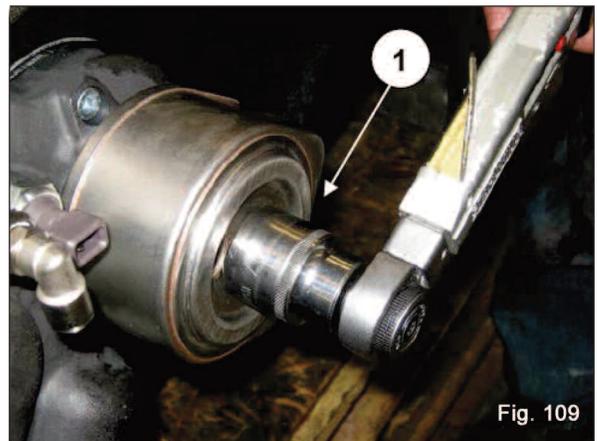
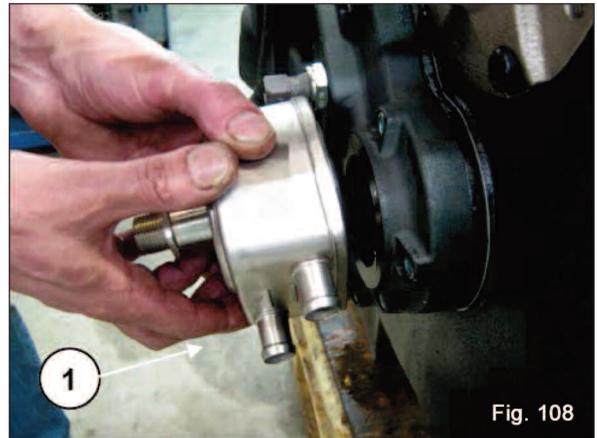
Tighten the pump body by means of the M8 screws (1, fig. 106) and calibrate them with a torque wrench as described in Section 3.



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



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



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

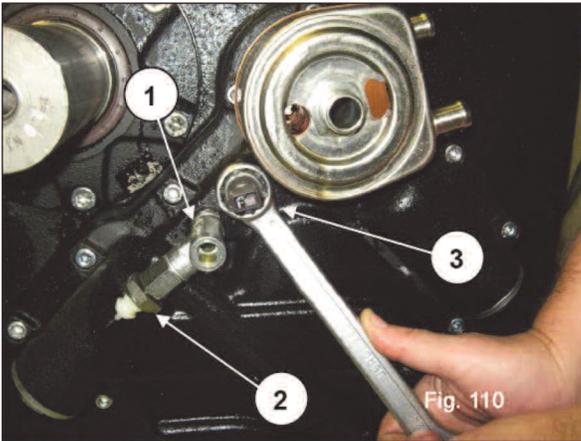


Fig. 110

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

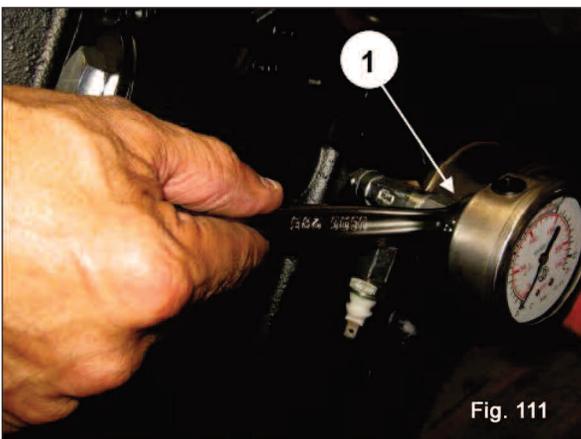


Fig. 111

Fit the filter cartridge by screwing it on by hand (1, fig. 112).



Fig. 112

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



Fig. 113

Mount the radial seal ring onto the oil seal cover (1, fig. 114) using a drift or equivalent tool (special tool part #F27643500).



Fig. 114

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

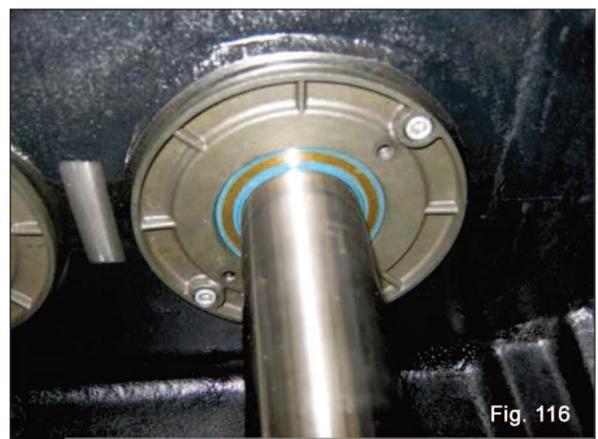


Fig. 116

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

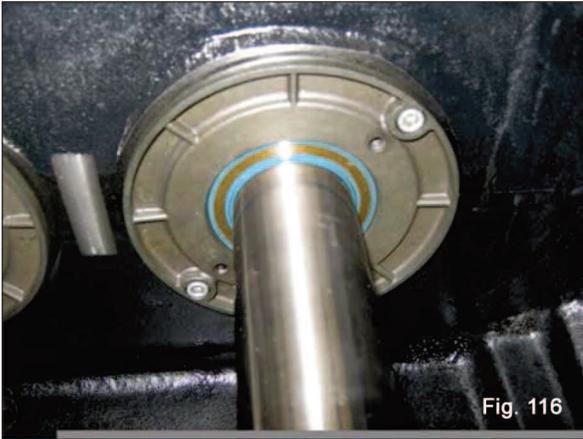


Fig. 116

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

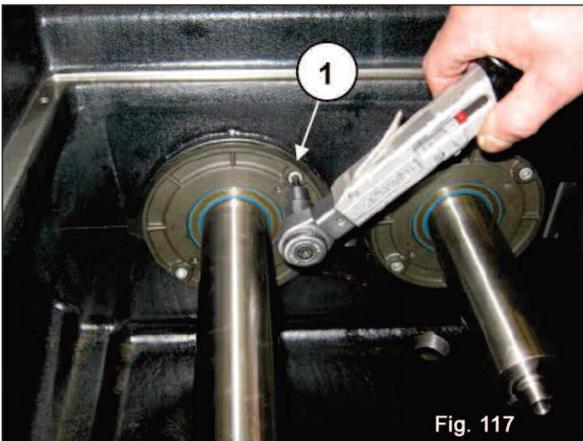


Fig. 117

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

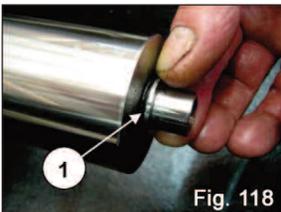


Fig. 118

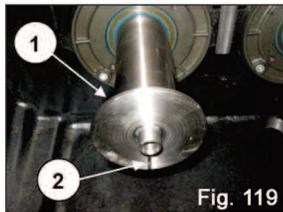


Fig. 119



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

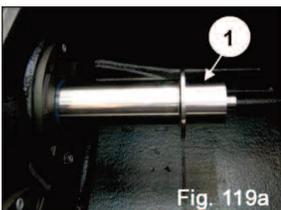


Fig. 119a



Fig. 120

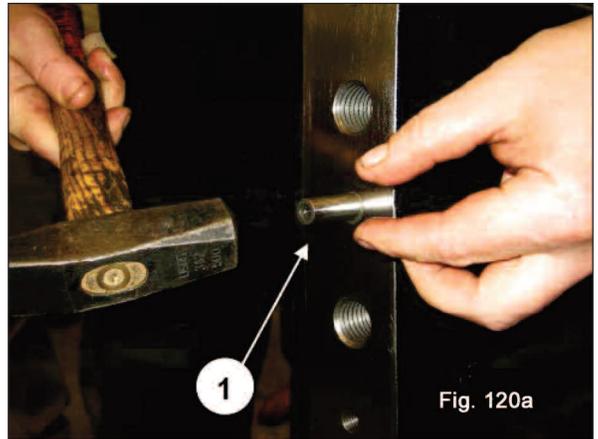


Fig. 120a

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

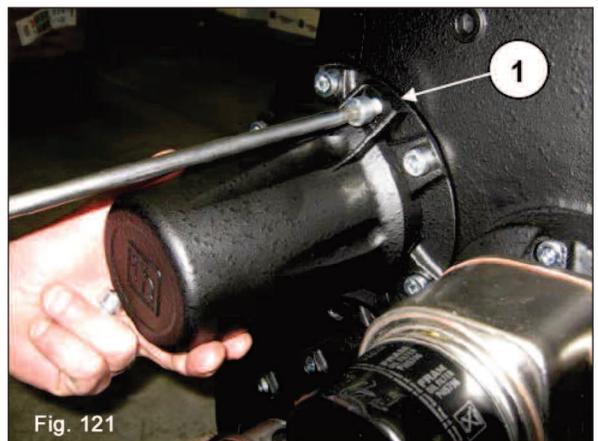


Fig. 121

Fit the key in the PTO shaft (1, fig. 122). Tighten the screws with a torque wrench as described in Section 3.

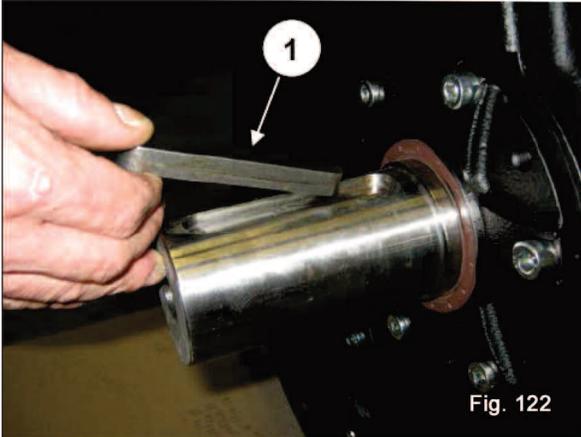


Fig. 122

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:

Assembly the 4 directional valve inserts as shown in fig. 123.



Fig. 123

Fit the complete directional valve inserts (1, fig. 124) and tighten the (4) M40 plugs (1, fig. 125) using a torque wrench with the torque setting prescribed in Section 3).

NOTE: the inserts share the same torque setting so they can be fitted and torqued freely.



Fig. 124

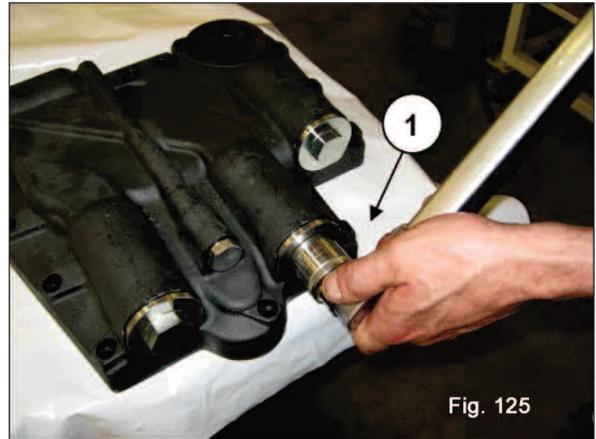


Fig. 125

Insert the pressure relief valve with relate spring (1, fig. 126) and tighten the M14 plug (1, fig. 127) using a torque wrench with the torque setting prescribed in Section 3.

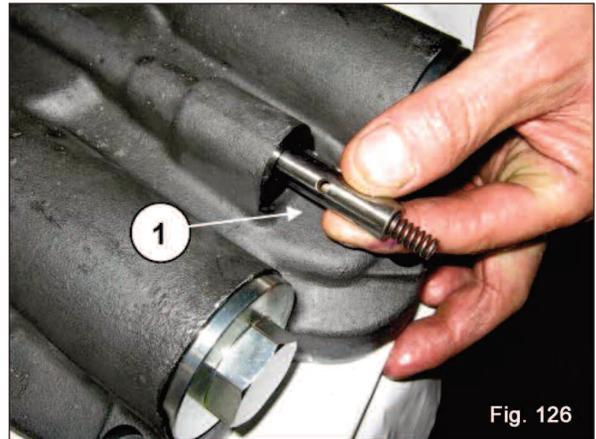
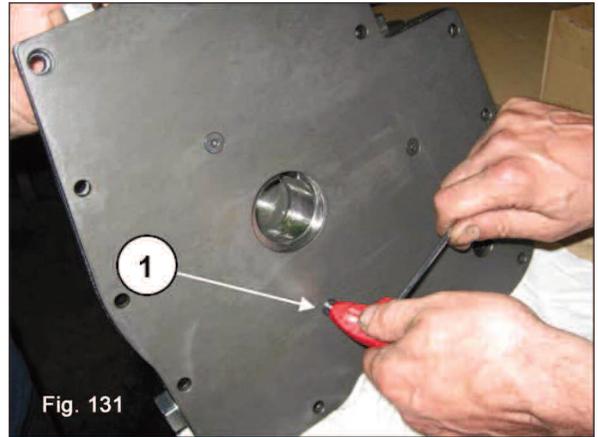
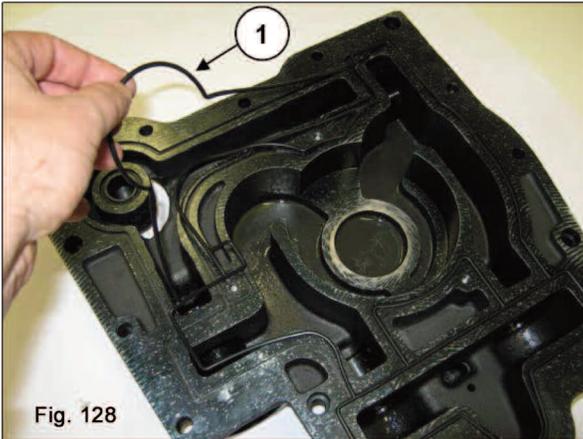


Fig. 126

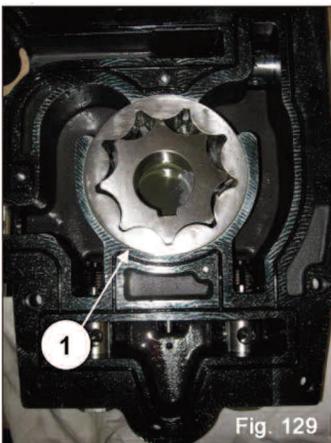


Fig. 127

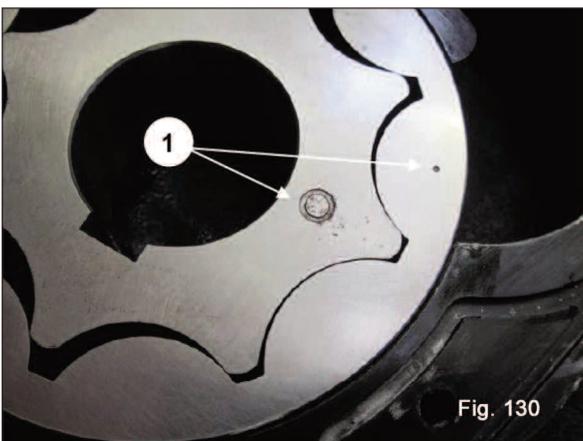
Insert the shaped o-ring in its seat on the lube pump body (1, fig. 128).



Fit the lube pump rotors (1, fig. 129).



When assembling the lube pump rotors orient the markings on the two parts as shown (1, fig. 130).

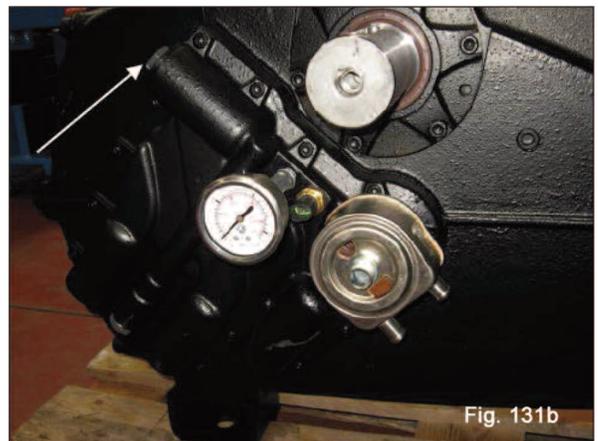


Fit the lube pump rear plate and tighten the (3) M6 screws (1, fig. 131) using a torque wrench with the torque setting prescribed in Section 3).

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.



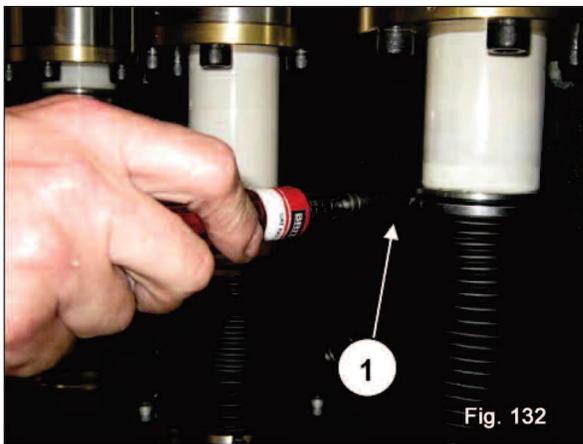
- 2) Refit the cartridge and tighten it with a torque wrench to 120 Nm then start the pump at the following minimum speeds:
- a. Pump with 1500 RPM pinion, start at 725 RPM.
 - b. Pump with 1800 RPM pinion, start at 865 RPM.
 - c. Pump with 220 RPM pinion, start at 1060 RPM.

2.1.3 Removing the Bellows - 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 indicate 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 clamps securing the bellows (1, fig. 132) before loosening the pistons and, after having removed the pistons, remove the bellows splashguard (fig. 133).



Remove the bellows and undo the (4) M6 fixing screws of the three bellows flanges (1, fig. 134).



2.1.3.1 Fitting the Bellows - Vertical Versions

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



Tighten the (4) M6 screws (1, fig. 137) using a torque wrench, calibrating as described in Section 3.

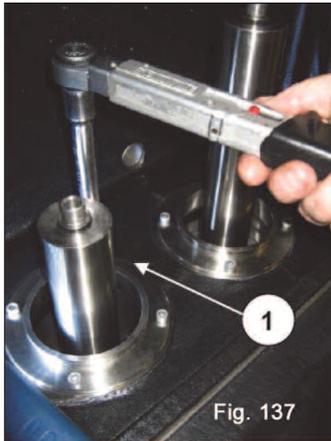


Fig. 137

Fit the bellows on the flange and secure it with th clamp (1, fig. 138), tightening the clamp with a torque screwdriver as described in Section 3. Now compress the bellows with your hand and fit the fellows splashguard with associated clamp, leaving it loose (1, fig. 139).



Fig. 138

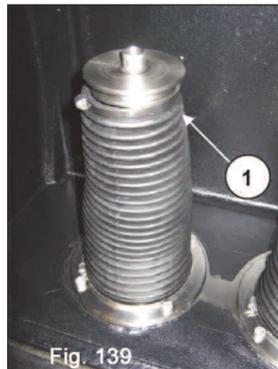


Fig. 139

2.1.4 Oversize Classes

OVERSIZES TABLE FOR CRANKSHAFT AND CONROD BEARING SHELLS

Recovery classes (mm)	Bearing shells kit p/n	Upper bearing shell p/n	Lower bearing shell p/n	Crank pins regrinding (mm)
0.25	F34218701	F90932100	F90932400	Ø109.75 0/-0.03 Ra 0.4 Rt 3.5
0.50	F34218801	F90932200	F90932500	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 p/n	Upper bearing shell p/n	Lower bearing shell p/n	Crank pins regrinding (mm)
0.25	F34226601	F90934800	F90935100	Ø119.75 0/-0.03 Ra 0.4 Rt 3.5
0.50	F34226701	F90934900	F90935200	Ø119.50 0/-0.03 Ra 0.4 Rt 3.5

OVERSIZES TABLE FOR PUMP CASING AND PISTON GUIDE

Recovery classes (mm)	Piston Guide P/N	Pump casing seat regrinding (mm)
1.00	F7905023	Ø106 H6 +0.022/0 Ra Rt 6

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

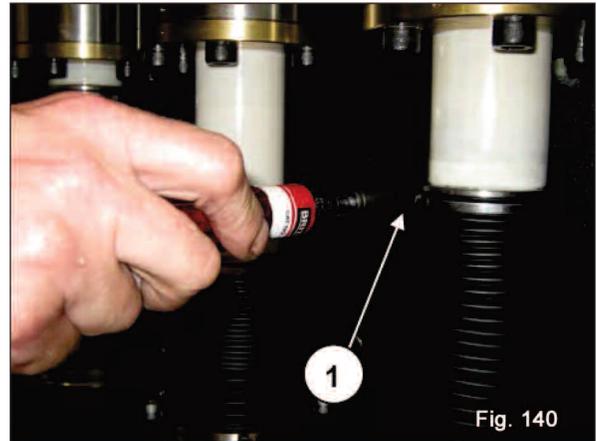


Fig. 140

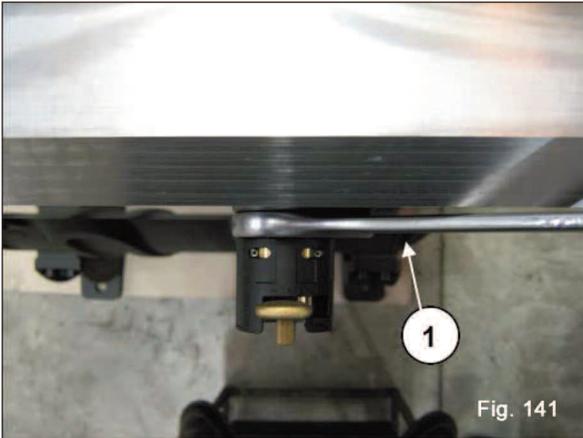
Tighten the clamp with a torque screwdriver as described in Section 3).

2.2 REPAIR OF THE HYDRAULIC PART

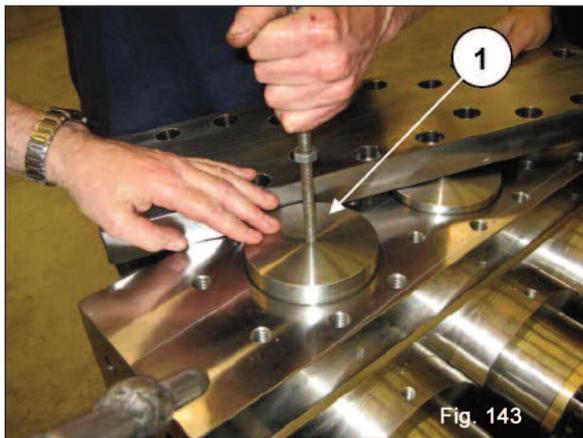
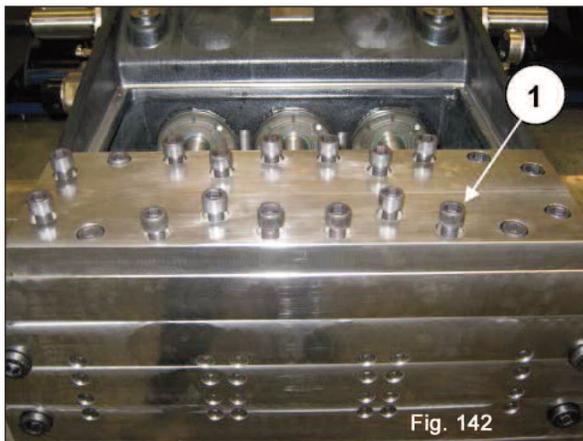
2.2.1 Dismantling the manifold in the horizontal version - valve inserts

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 inserts:

Unscrew the valve opening device using a 30 mm wrench (1, fig. 141).



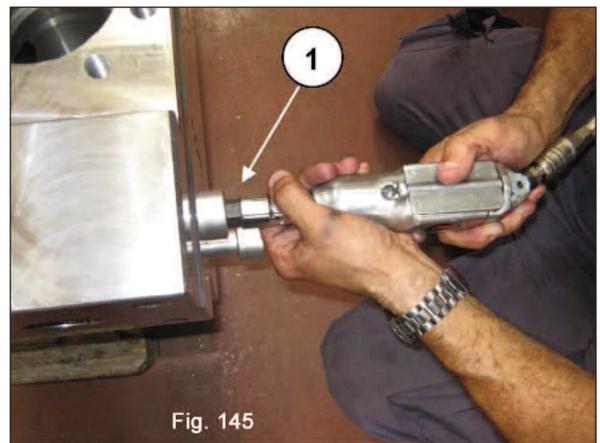
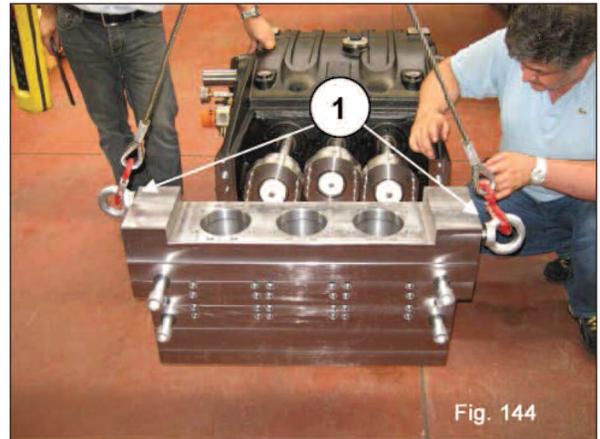
Disassemble the piston-sleeve units as described in point 2.2.3. Undo the M16 screws and remove the valves cover (1, fig. 142). Now extract the valve plugs with a slap hammer to be applied to the M10 hole of the valve plug (1, fig. 143).



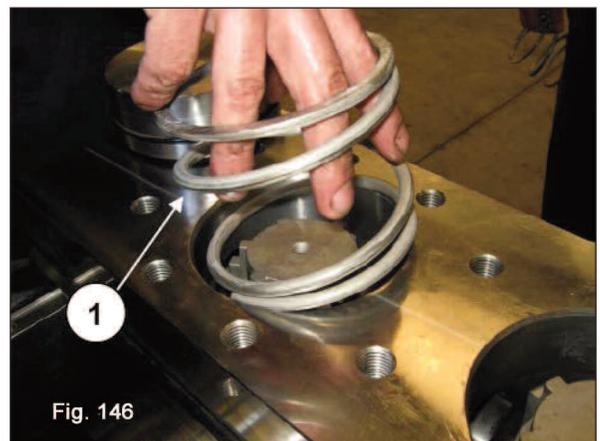
Fit two M24 eyebolts in the outlet flange fixing holes (1, fig. 144) and then undo the (4) M24 screws fixing the manifold to the front casing (1, fig. 145).



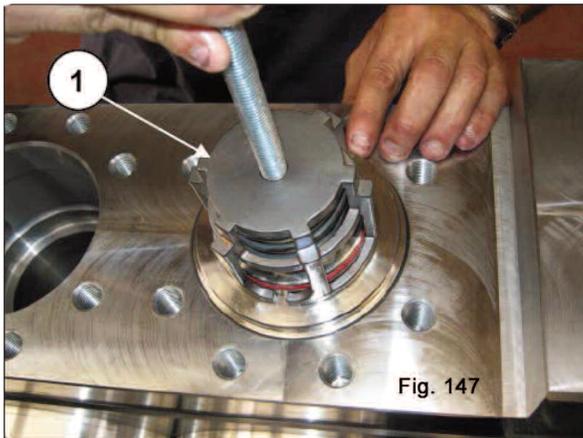
In the vertical version the manifold is separated from the crankcase with the aid of (2) M24 eyebolts screwed into the holes on the front.



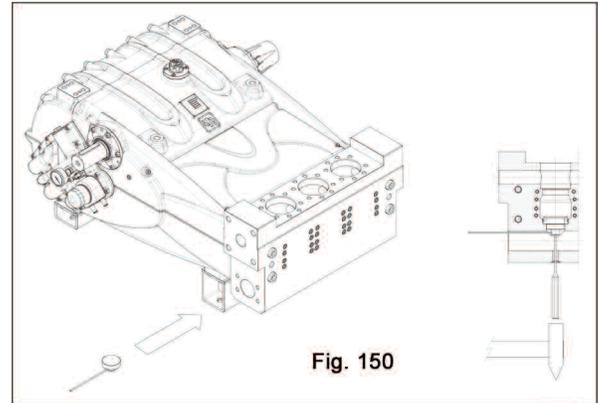
Take care not to damage the locating pins on the crankcase while removing the manifold. Remove the spring (1, fig. 146).



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



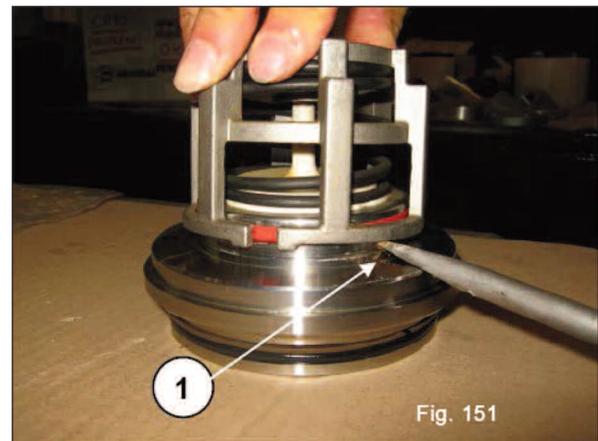
If removing the suction valve insert proves to be particularly difficult (for example because of incrustations due to prolonged inactivity of the pump), use the extractor p/n F27781200 (fig. 150) and proceed as instructed.



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 p/n F27781300.

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

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

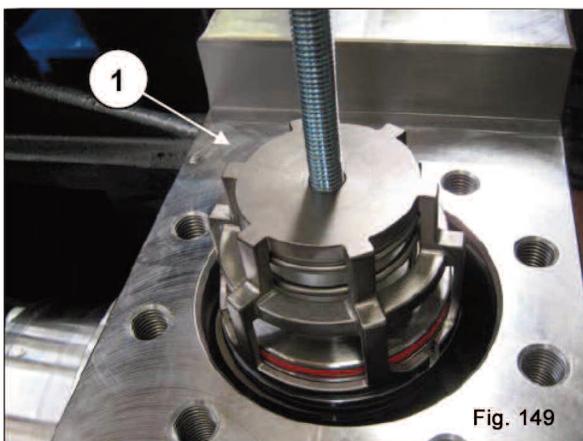


Extract the suction valve insert with a slap hammer to be applied to the M12 hole of the valve guide (1, fig. 149).

2.2.2 Assembling the Manifold



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).

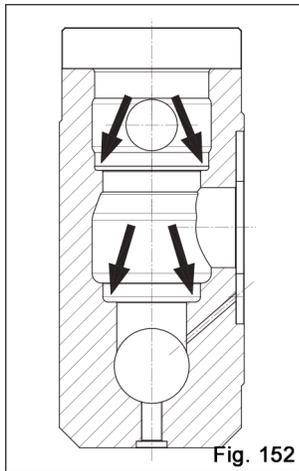


Fig. 152

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 removed springs.

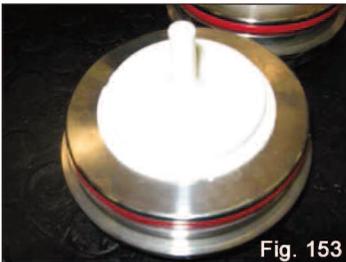


Fig. 153



Fig. 154

To facilitate insertion of the valve guide in its housing, you can use a pipe resting on the horizontal guide plans (fig. 155) and use a slap 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 (1, fig. 156).

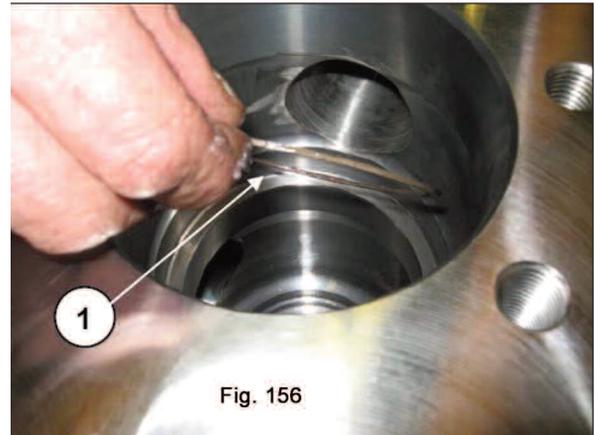


Fig. 156

Insert the o-ring (1, fig. 157).



Fig. 157

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

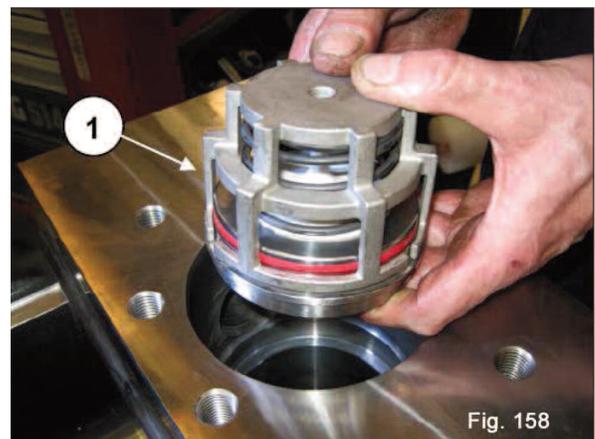


Fig. 158

Insert the outlet valve unit (1, fig. 162). The valve unit must be fully inserted into the bottom and should appear as shown in (1, fig. 163).

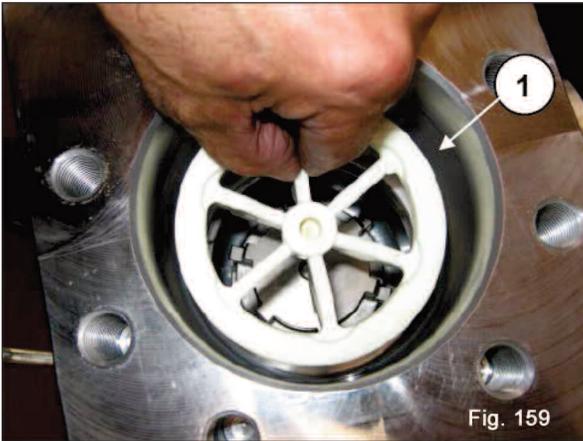


Fig. 159

The complete valve insert must be lodged fully home and should appear as shown in (1, fig. 160).

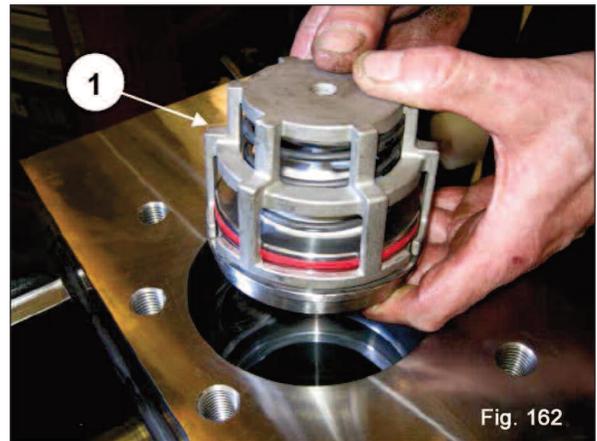


Fig. 162

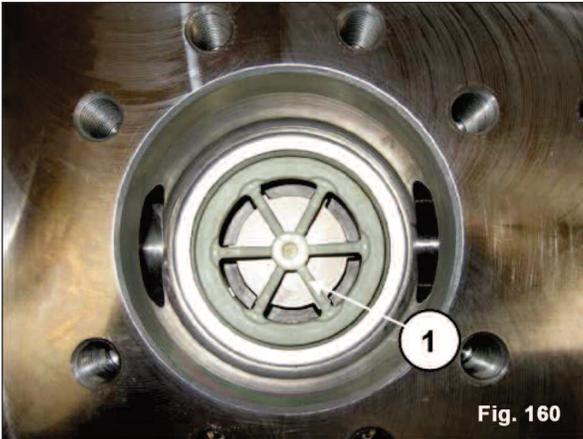


Fig. 160

Fit the o-rings (1, fig. 161) and back-up rings (2, fig. 161) on the outlet valve housing.

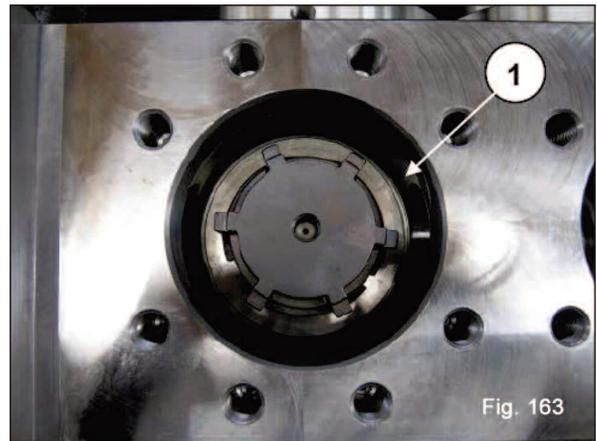


Fig. 163

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

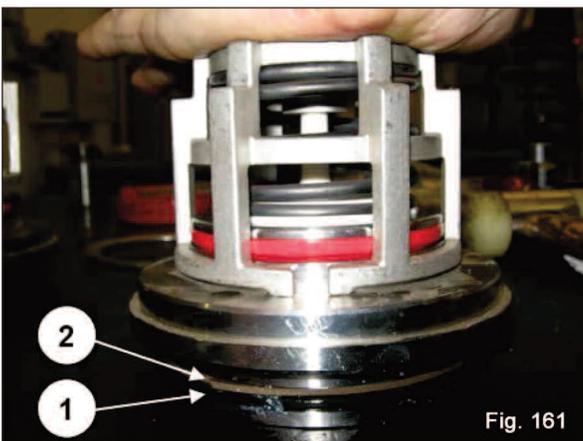


Fig. 161



Fig. 164

Insert the o-ring (1, fig. 165).

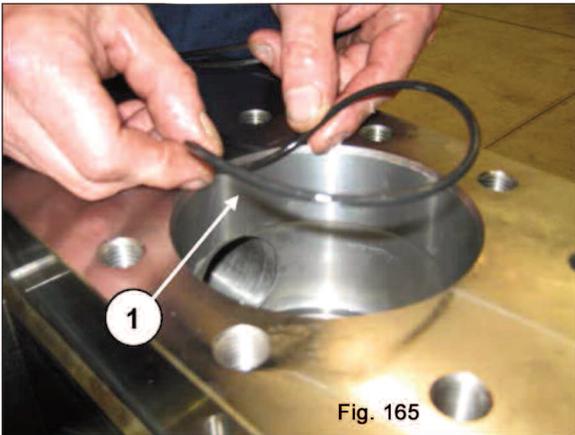


Fig. 165



Pay special attention to fitting the o-ring shown in (1, fig. 166). Use special tool p/n F27760700 to prevent o-ring severing during the insertion procedure.

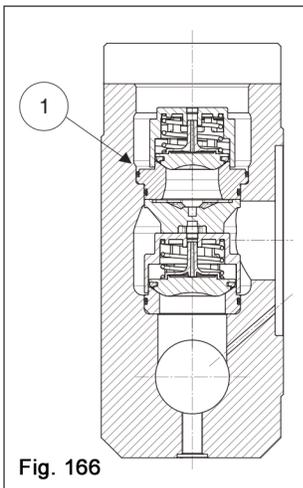


Fig. 166

Insert the valve seat ring (1, fig. 167) and the spring (1, fig. 168).



Fig. 167

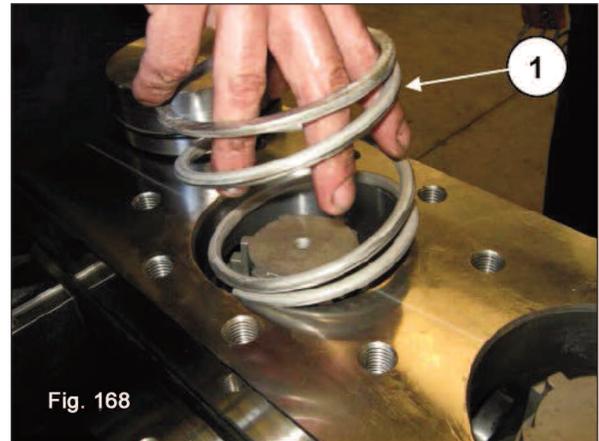


Fig. 168

Fit (2) M24 eyebolts in the outlet flange fixing holes (1, fig. 169) and then refit the manifold to the front casing, taking care not to damage the locating pins in the casing (1, fig. 170) and secure it with the (4) M24 screws. Tighten the M24 screws with a torque wrench as described in Section 3.

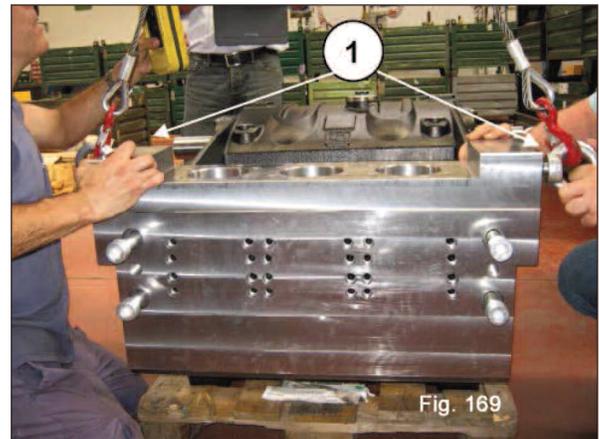


Fig. 169

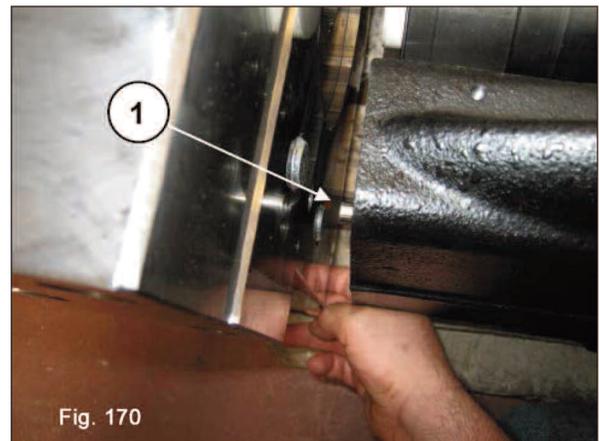
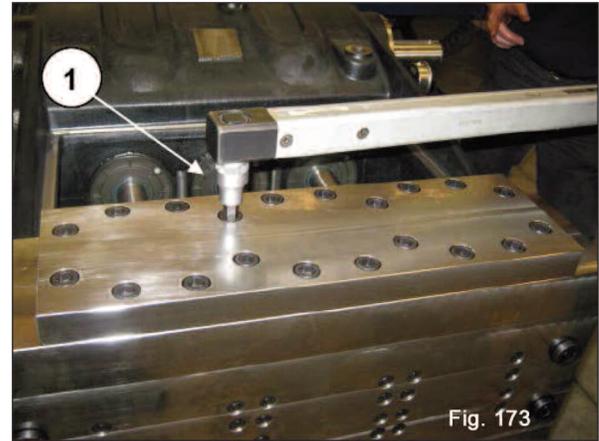
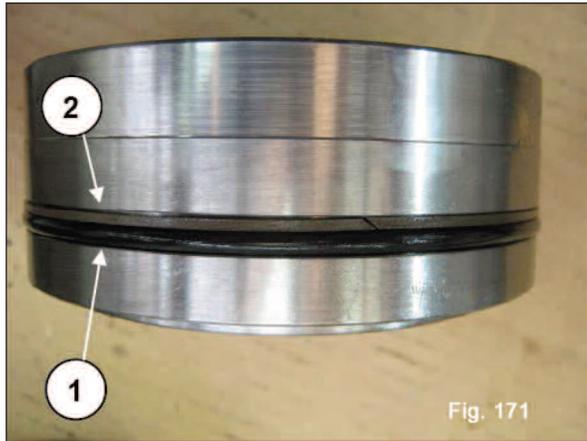


Fig. 170

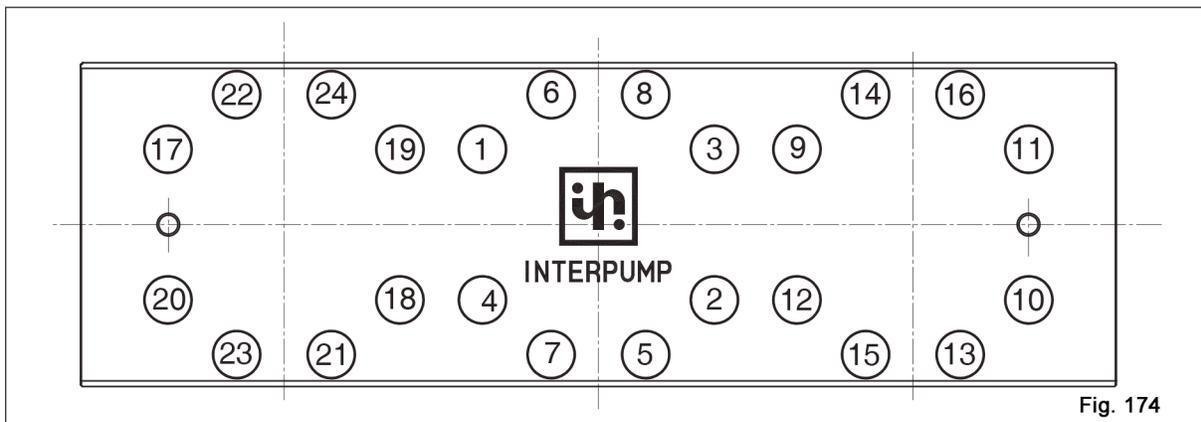
Fit the o-ring (1, fig. 171) and back-up ring (2, fig. 171) on the outlet valve plug.



Insert the valve plugs complete with o-ring and back-up ring and fit the covers (1, fig. 172) then and screw in the (24) M16 screws (1, fig. 173). Tighten the M24 screws with a torque wrench as described in Section 3.



Tighten the (24) M16 screws as shown in the diagram in fig. 174.



Fit the valve lifters (1, fig. 175) and screw them in using a 30 mm wrench (1, fig. 176)

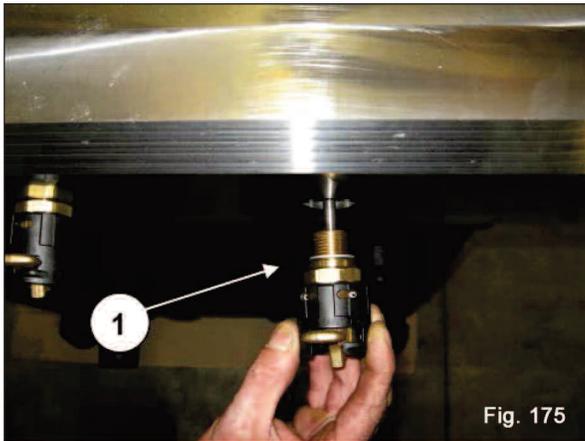


Fig. 175

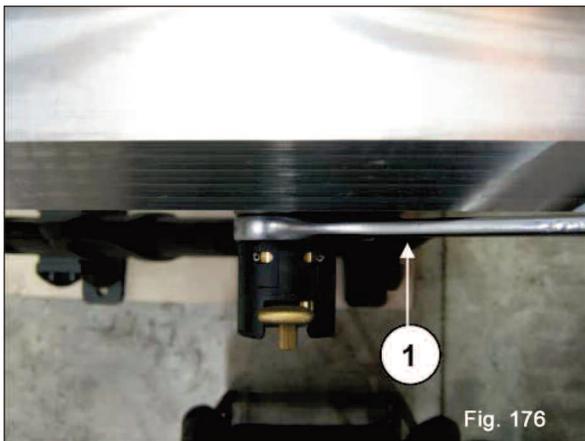


Fig. 176

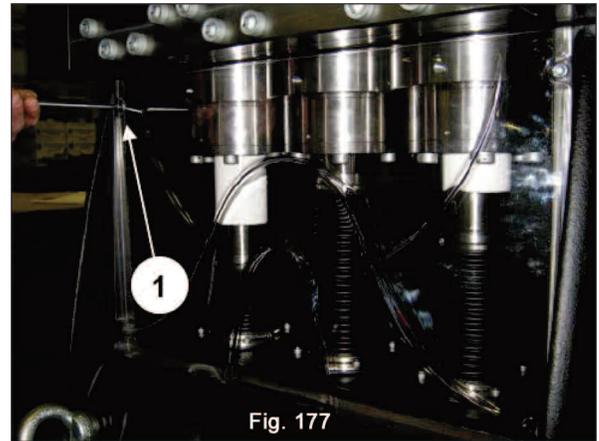


Fig. 177

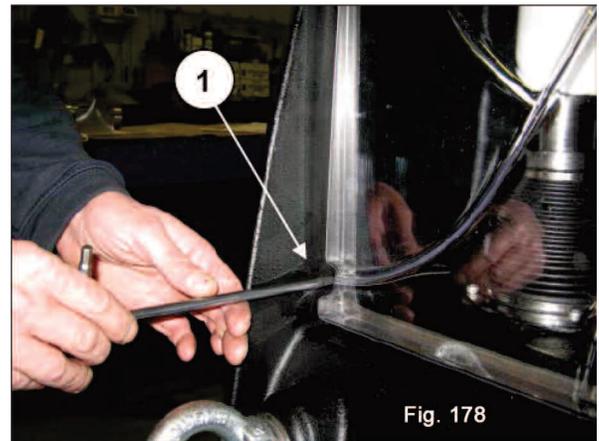


Fig. 178

Disassemble the piston unit by unscrewing the sleeve fixing screws (1, fig. 179), after fitting the special unit support tool (1, fig. 180) or special tool p/n F27781100.

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 (1, fig. 177 and fig. 178).

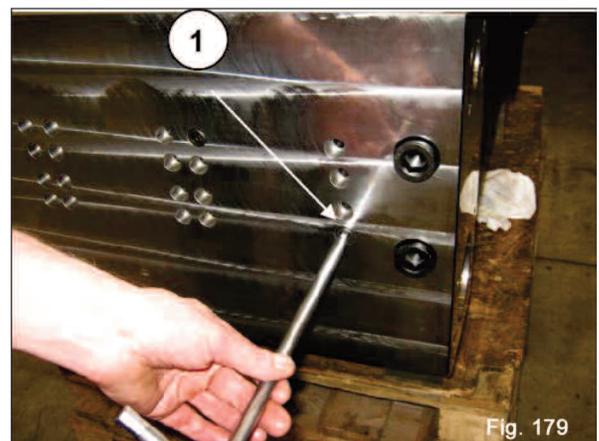


Fig. 179



Fig. 185

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



Fig. 183

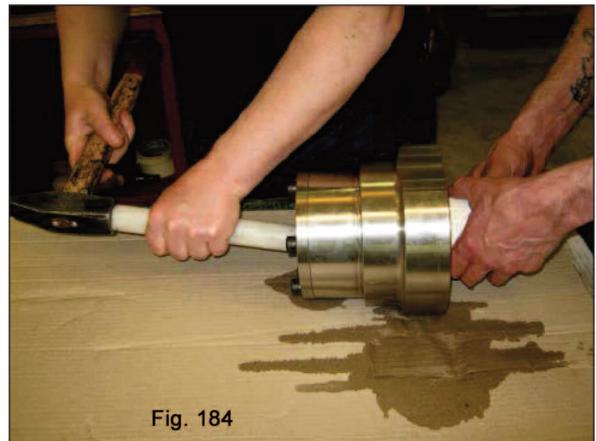


Fig. 184

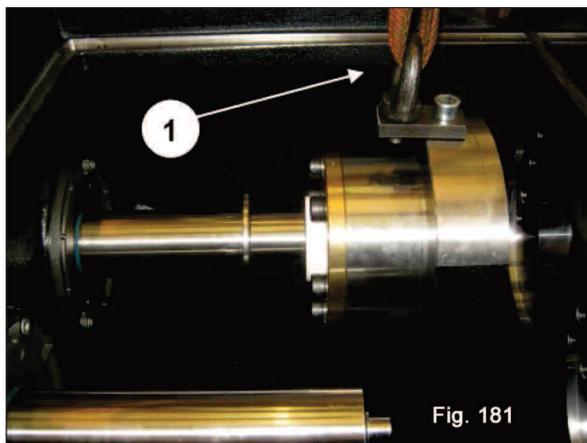


Fig. 181

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 (1, fig. 185); now remove the gasket support ring by undoing the (1) M12 screws (1, fig. 186)

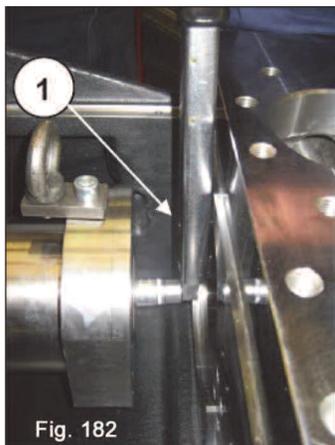


Fig. 182

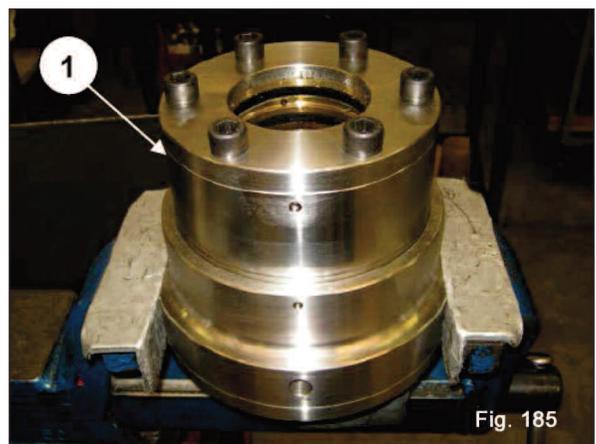
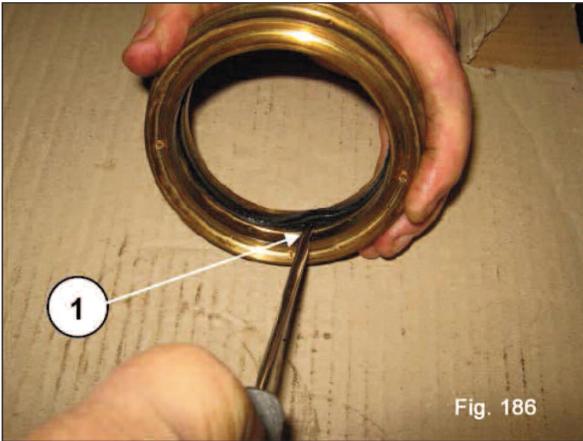
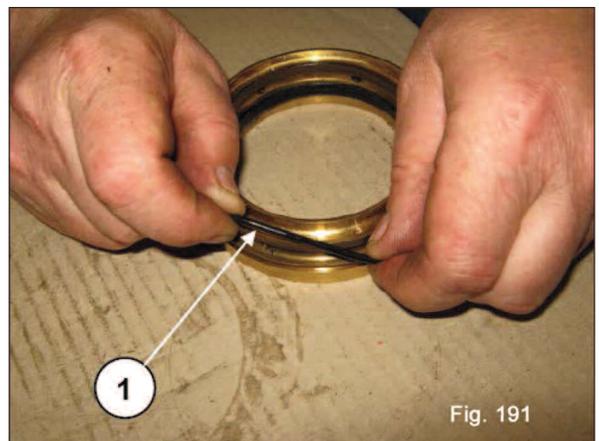
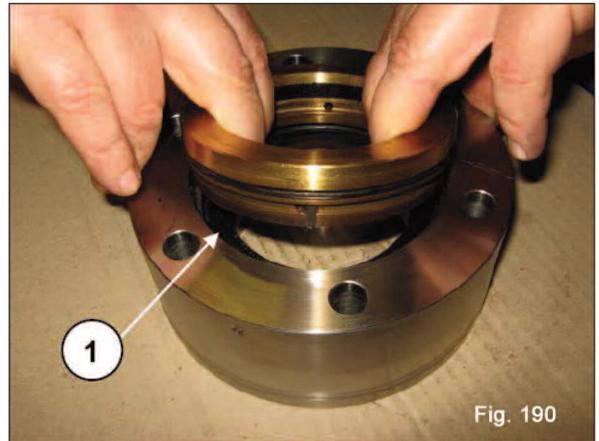
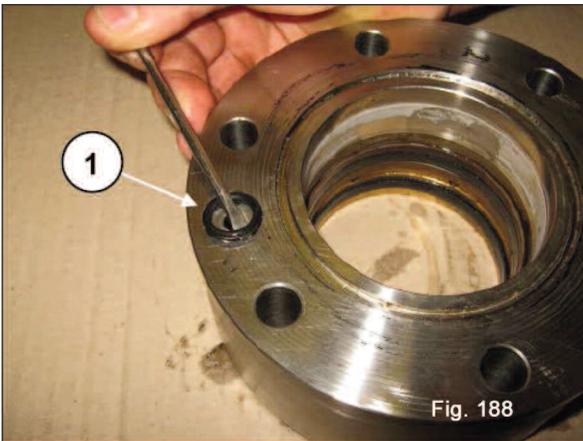


Fig. 185

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



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



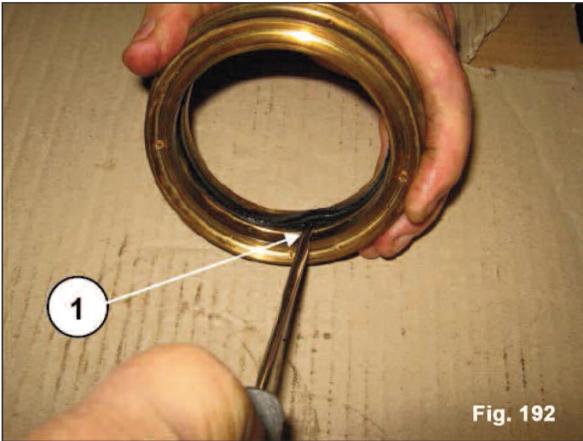


Fig. 192

Extract the following from the sleeve in sequence: the restop ring (1, fig. 193), the seal ring (1, fig. 104 and fig. 195) with the piston head ring, and separate them (1, fig. 196).

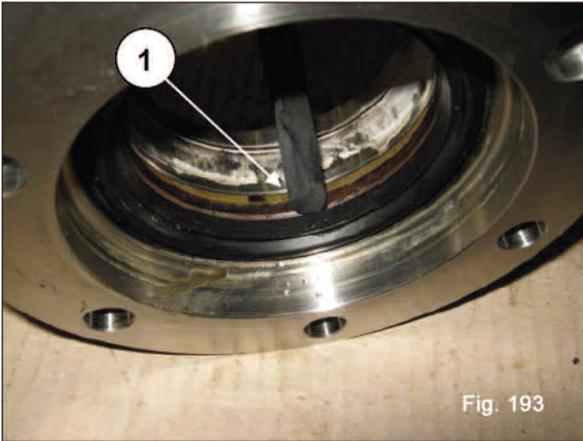


Fig. 193

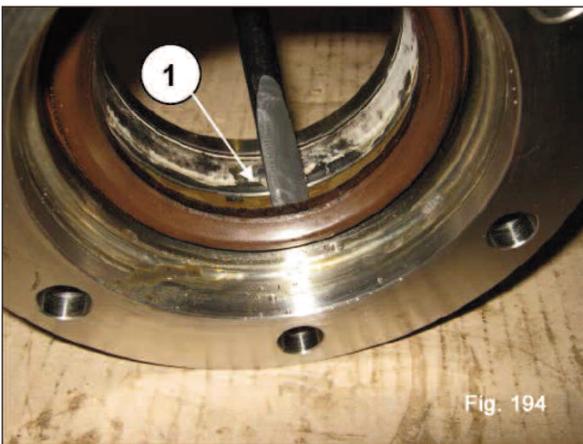


Fig. 194

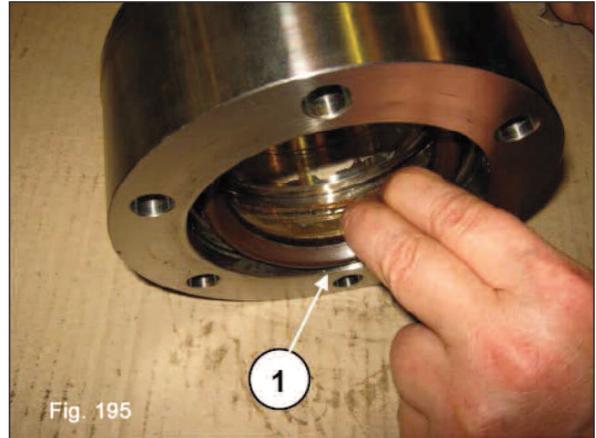


Fig. 195

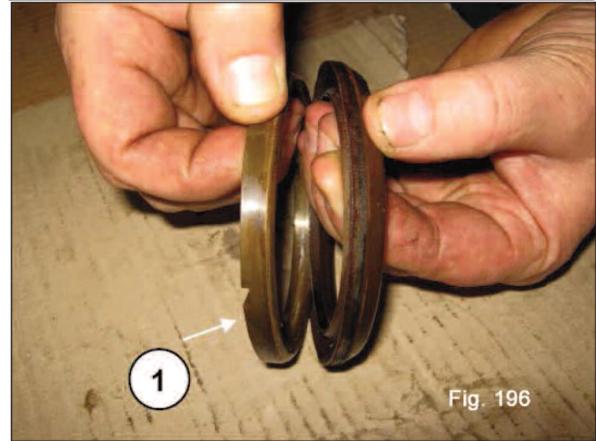


Fig. 196

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 sleeve insertion.



After each disassembly replace all pressure seals and o-rings before reassembling.

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

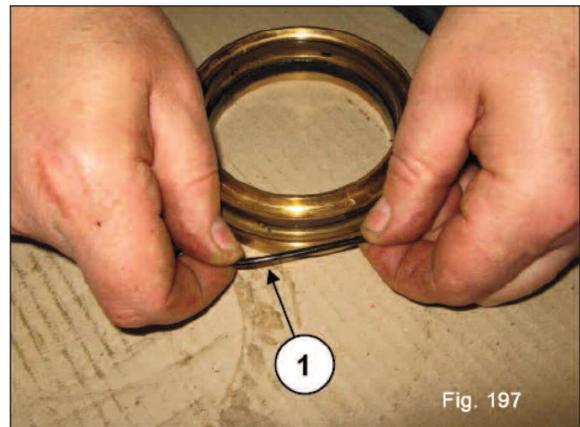


Fig. 197

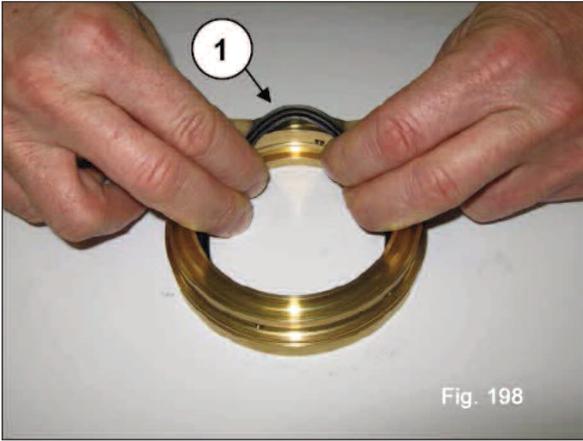


Fig. 198

Install the head ring (1, fig. 199), the high pressure seal (1, fig. 200) and the restop ring (1, fig. 201) on the sleeve.



Fig. 199

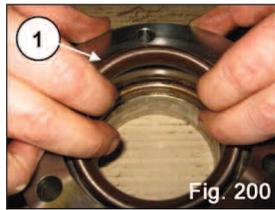


Fig. 200



Fig. 201

Mount the seals support to the sleeve (1, fig. 202) fit the o-rings (1, fig. 203) to the sleeve mating surface.

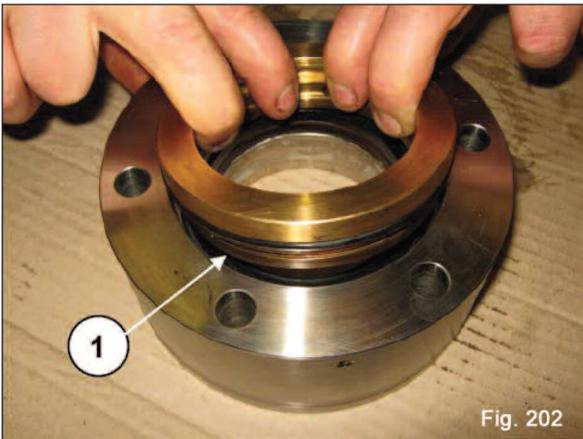


Fig. 202



Fig. 203

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

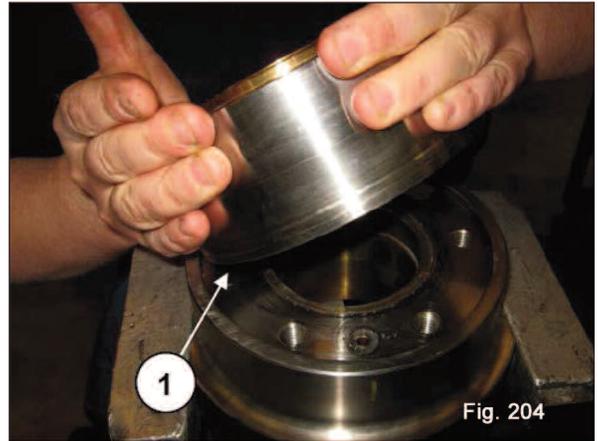
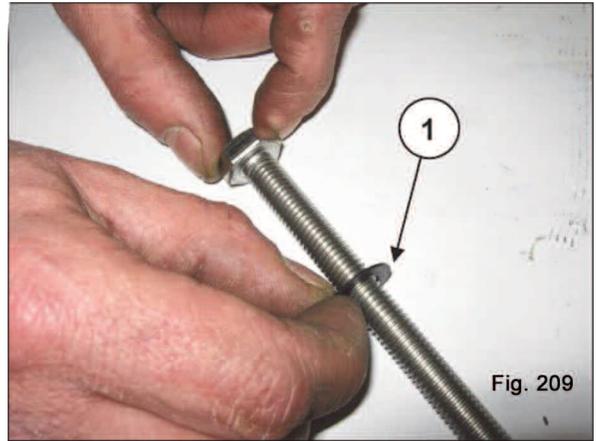
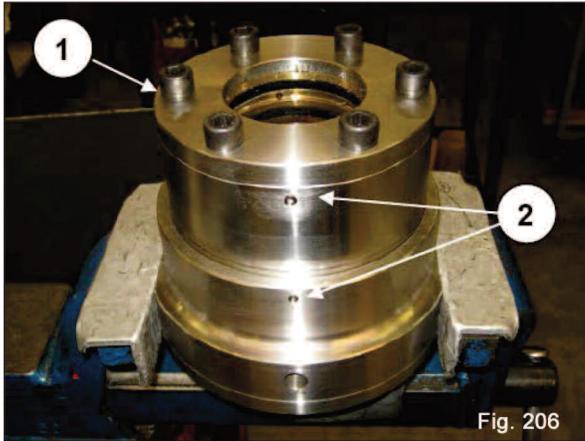


Fig. 204

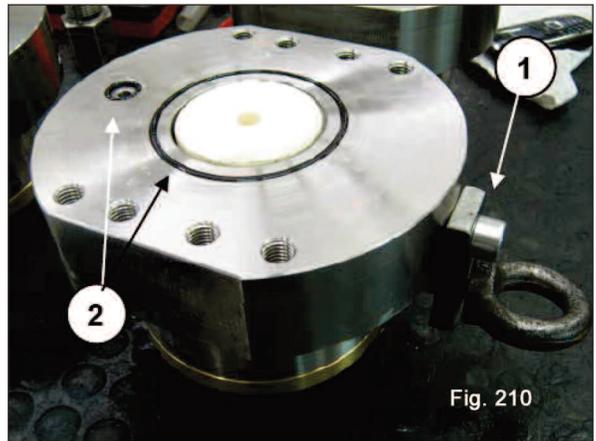
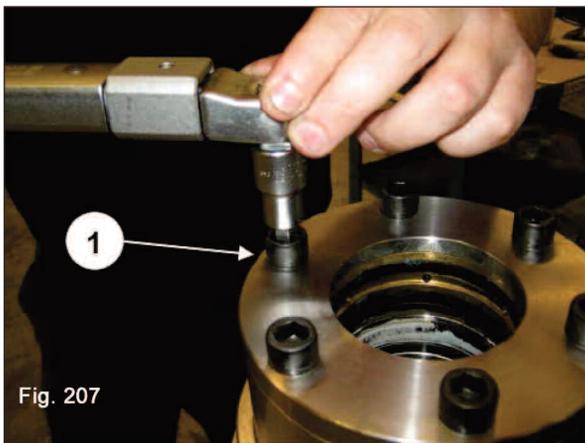


Fig. 205

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



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



Insert the piston, positioning the face that will come into contact with the splashguard aligned with the mating surface on the sleeve support (fig. 208) and place the washer on the piston fixing M10 screw (1, fig. 209).



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 (1, fig. 213), tightening the screw with a torque wrench as described in Section 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 Section 3.
2. Back off the screw and then re-tighten it with a torque wrench as described in Section 3.

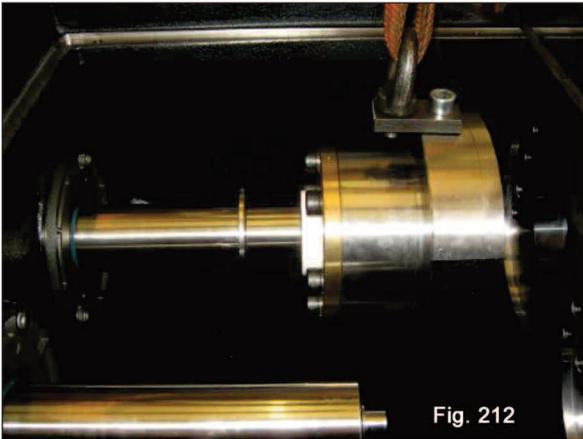


Fig. 212

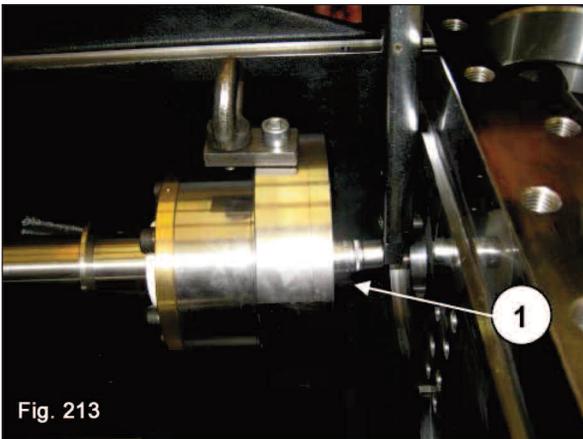


Fig. 213

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

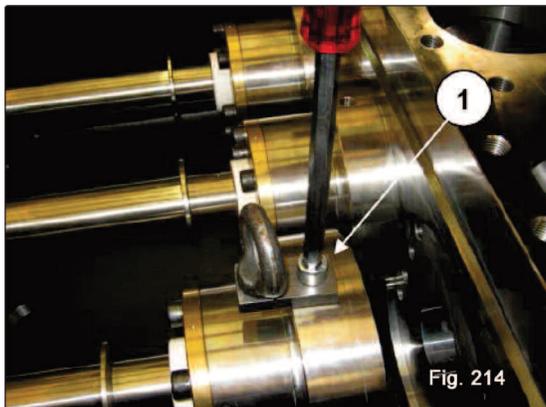


Fig. 214

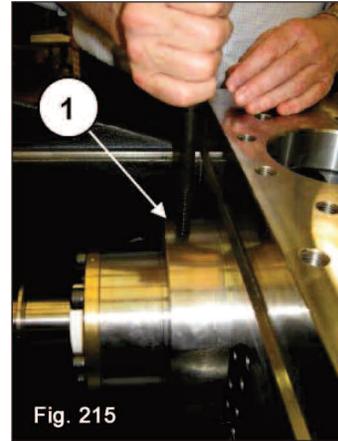


Fig. 215

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

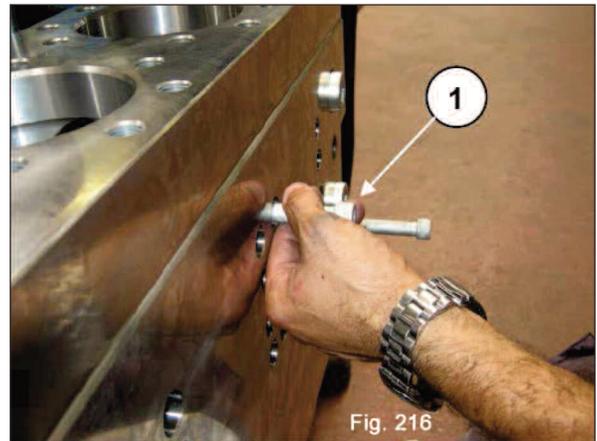


Fig. 216

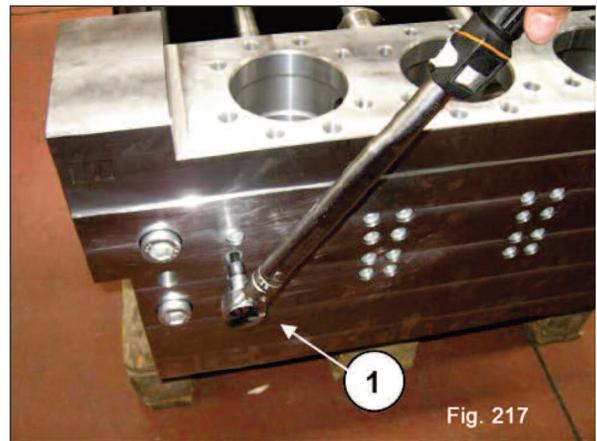


Fig. 217



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 p/n F27781100.



Fig. 218



Fig. 219

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

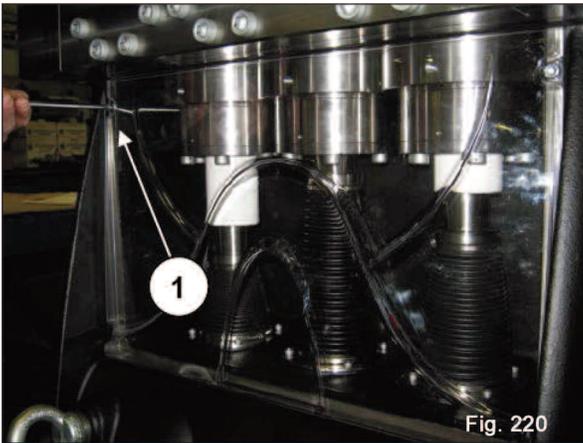


Fig. 220

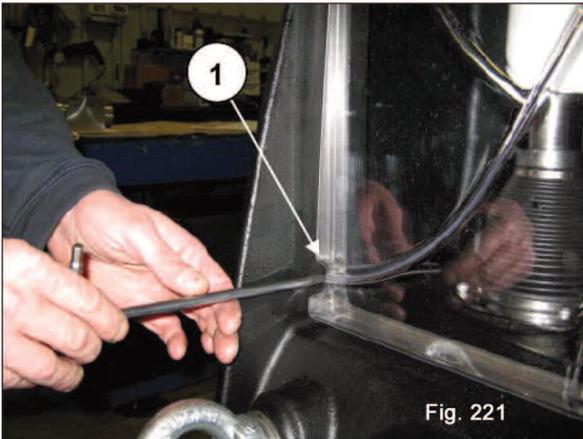


Fig. 221

3. SCREW TIGHTENING TORQUE CALIBRATION

Screw tightening must only be performed with a torque wrench.

TR - SR HORIZONTAL VERSION

DESCRIPTION	EXPLODED DRAWING POSITION SR-TR	TIGHTENING TORQUE (Ft.lbs.)	TIGHTENING TORQUE (Nm)
Screw, rear casing fixing, M16x20	14	246.3	334
Plug, 1"x17, rear side casing	8	73.8	100
Plug, 3/4", rear casing	49	44.3	60
Plug, front casing, M8, tapered	41	11	15
Front and rear casing M20 tapered plug	61	29.5	40
Screw, M8x20	20	14.8	20
Crankshaft screw, M12x12	143 (TR) - 144 (SR)	29.5	40
Screw, conrod, M12x1.25x87	95	55.3	75*
Screw, piston guide, M6x20	49	7.4	10
Screw, PTO shaft cover, M10x30	82	33.2	45
Screw, piston guide oil seal cover, M6x16	22	7.4	10
Screw, piston guide rod, M6x25	39	7.4	10
Screw, lube pump body rear plate, M6x16	78	7.4	10
Screw, lube pump body, M8x40	83	14.8	20
Valve lifter	141 (TR) - 142 (SR)	29.5	40
Plug, lube pump directional control valve, M40	71	88.5	120
Plug, lube pump pressure relief valve, M18x11	72	29.5	40
Screw, lube pump drive coupling, M8x16	76	14.8	20
Union, M-M, 1/4" NPT-1/4"BSP	90	14.8	20
Union, T, FFF, 1/4" BSP	91	14.8	20
Reducer nipple, M-F, 1/4" BSP	92	14.8	20
Pressure gauge	93	14.8	20
Union, M-F, 1/4" BSP, M10x1	88	14.8	20
N.O. pressure switch, 0.3, M10x1	87	11	15
Temperature indicator switch, M14	84	29.5	40
Union, oil filter exchanger	64	22.1	30
Screw, oil filter mesh fixing, M6x12	17	7.4	10
Screw, upper cover fixing, M6x12	17	4.4	6
Screw, pump feet fixing, M16x35	45	1.9	206
Screw, coupling end cover, M10x20	145 (TR) - 146 (SR)	33.2	45
Screw, piston fixing, M10x200	169 (TR) - 127 (SR)	25.8	35
Screw, sleeve pack, M12x90	127 (TR) - 128 (SR)	99.6	135
Screw, valve cover, M16x65	100	246.3	334**
Screw, manifold fixing, M24x2x220	98	527.4	715
Screw, sleeve support, M12x180	101	99.6	135

* Reach the prescribed torque value by 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. 89a

TR - SR VERTICAL VERSION

DESCRIPTION	EXPLODED DRAWING POSITION SR-TR	TIGHTENING TORQUE (Ft.lbs.)	TIGHTENING TORQUE (Nm)
Screw, vertical foot, M16x45	45	151.9	206
Clamps for bellows	36 - 44		70 Ncm

4. REPAIR TOOLS

Pump repairs can be facilitated by special tools. Part numbers are as follows:

For assembly:

Piston guide radial seal ring.....	F27643500
PTO shaft radial seal ring	F27744100
O-ring, outlet valve seat.....	F27760700

For disassembly:

Inlet valve seat.....	F27781200
Outlet valve seat	F27781300
Sleeve pack.....	F27781100

5. REPLACING THE CONROD SMALL END END BRUSH

Perform cold-driving of the bushing and the subsequent operations bearing in mind the dimensions and tolerance shown in Fig. 222 below.

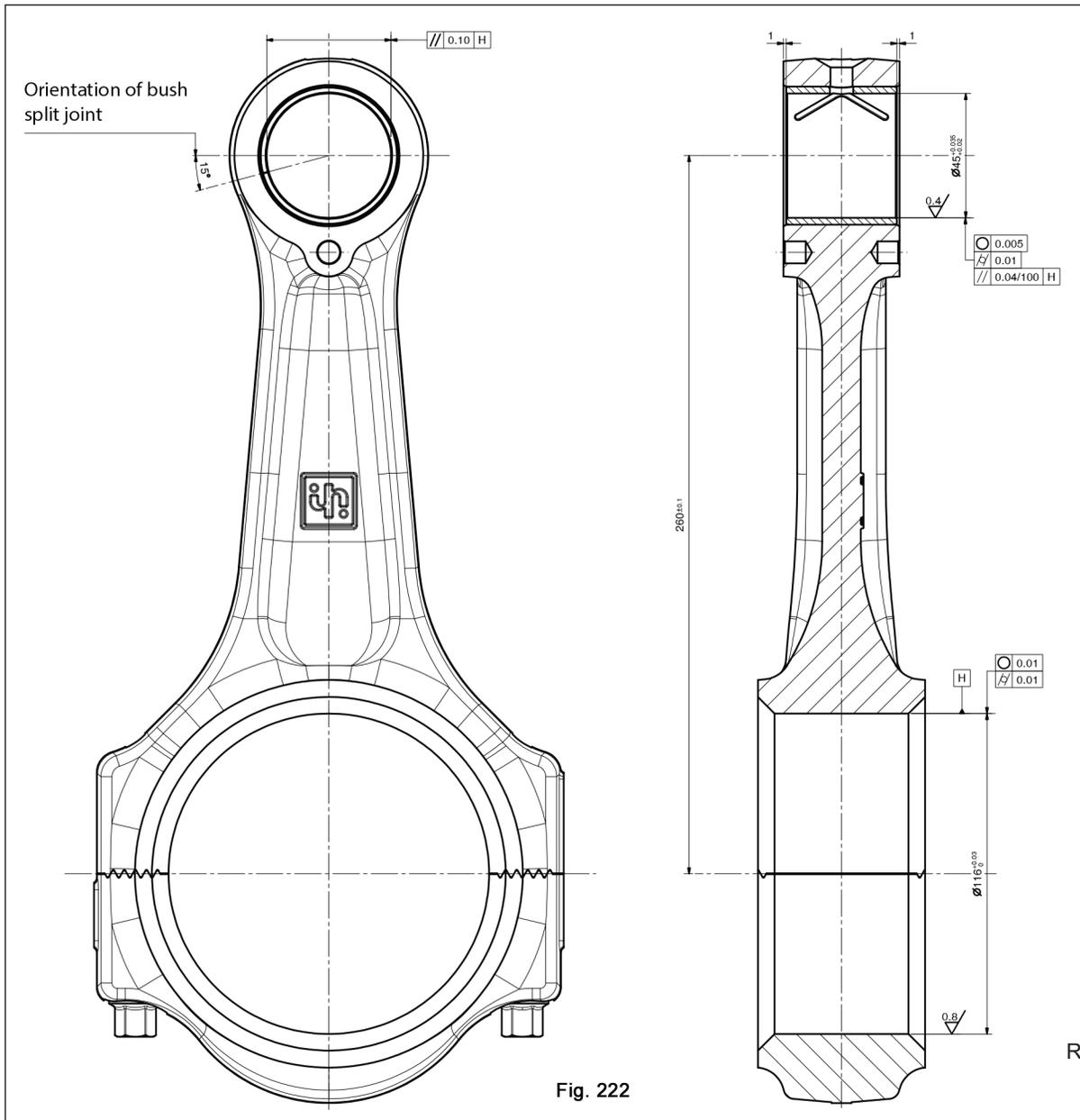


Fig. 222

Ref 300972 Rev.A
05-15

6. MAINTENANCE LOG

HOURS & DATE

OIL CHANGE							
GREASE							
PACKING REPLACEMENT							
PLUNGER REPLACEMENT							
VALVE REPLACEMENT							



GP Companies, Inc.
1174 Northland Drive
Mendota Heights, MN 55120
Phone:651.686.2199 Fax: 800.535.1745
www.generalpump.com email: sales@gpcompanies.com

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