

# Repair Manual



**MK40A-MK45A-MK50A**



**MK55A-MK60A-MK65A**

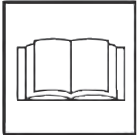
## **INDEX**

|                                                               |         |
|---------------------------------------------------------------|---------|
| <b>1. INTRODUCTION</b> .....                                  | Page 3  |
| <b>2. REPAIR INSTRUCTIONS</b> .....                           | Page 3  |
| 2.1 Crank Mechanism Repair .....                              | Page 3  |
| 2.1.1 Crank Mechanism Disassembly .....                       | Page 4  |
| 2.1.2 Crank Mechanism Assembly .....                          | Page 13 |
| 2.1.3 Refurbishing the Crank Mechanism .....                  | Page 23 |
| 2.2 Fluid End Repair .....                                    | Page 24 |
| 2.2.1 Head Disassembly - Valve Units .....                    | Page 24 |
| 2.2.2 Head Assembly - Valve Units .....                       | Page 27 |
| 2.2.3 Disassembling the Plunger Unit - Supports - Seals ..... | Page 33 |
| 2.2.4 Assembly of the Plunger Unit - Supports - Seals .....   | Page 36 |
| 2.2.5 Manifold Refurbishment .....                            | Page 41 |
| <b>3. SCREW CALIBRATION</b> .....                             | Page 43 |
| <b>4. REPAIR TOOLS</b> .....                                  | Page 44 |
| <b>5. MAINTENANCE LOG</b> .....                               | Page 45 |

## 1. INTRODUCTION

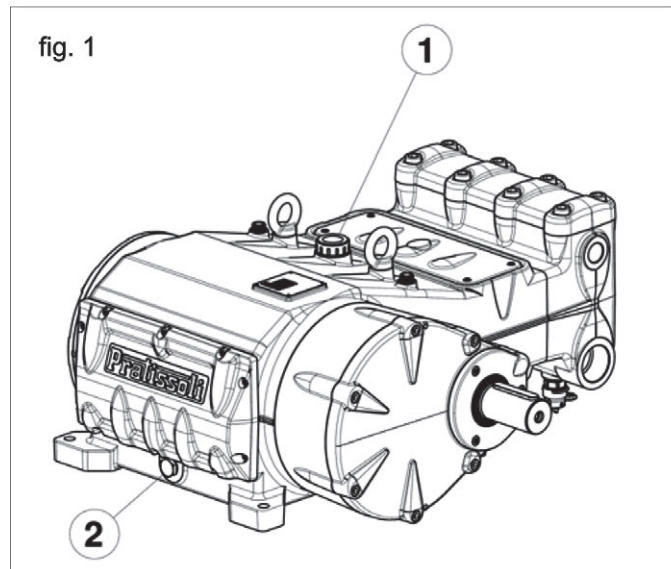
This manual describes the instructions for Repairing MK Series pumps, and must be carefully read and understood before performing any repair intervention on the pump. Correct use and adequate maintenance is fundamental for the pump's regular operation and long wear. General Pump declines any responsibility for damage caused by the misuse or the non-observance of the instructions described in this manual.

## 2. REPAIR INSTRUCTIONS



### 2.1 Crank Mechanism Repair

Crank mechanism repair operations must be carried out after draining the oil from the crankcase. To drain the oil, remove the oil refill cap 1, Fig. 1, and then the draining plug (2, fig. 1).

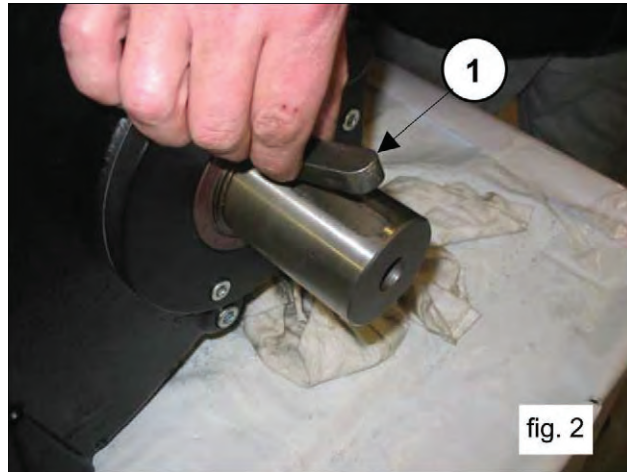


Exhausted oil must be collected in an appropriate receptacle and disposed of in designated locations. In absolutely no case may it be disposed of in the environment.

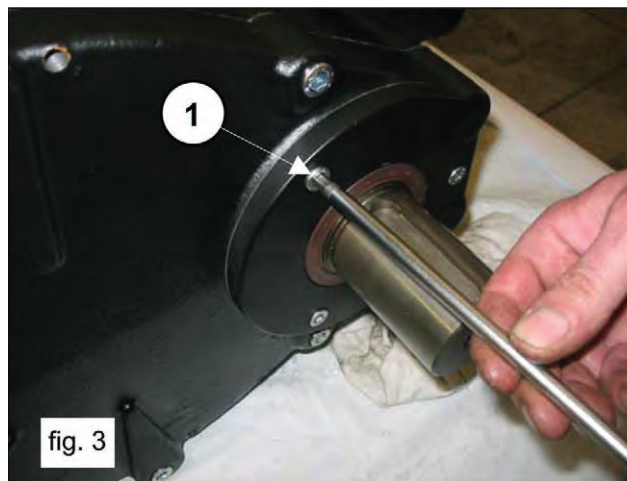
## 2.1.1 Crank Mechanism Disassembly

The correct sequence is the following

Completely drain the oil from the pump, then remove the key from the shaft (1, fig.2).



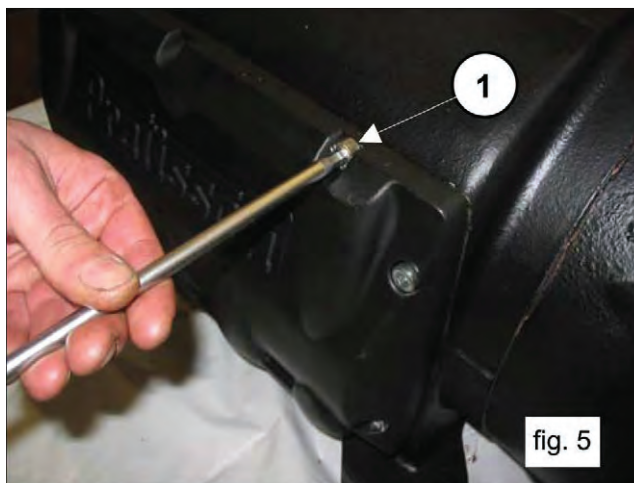
Unscrew the reducer flange fastening screws (1, fig. 3) and remove the flange from the shaft.



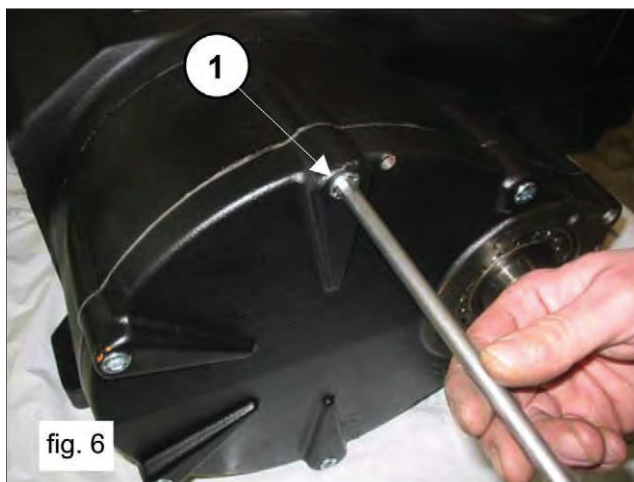
On the opposite side, unfasten the screws (1, fig. 4) and therefore remove the bearing cover.



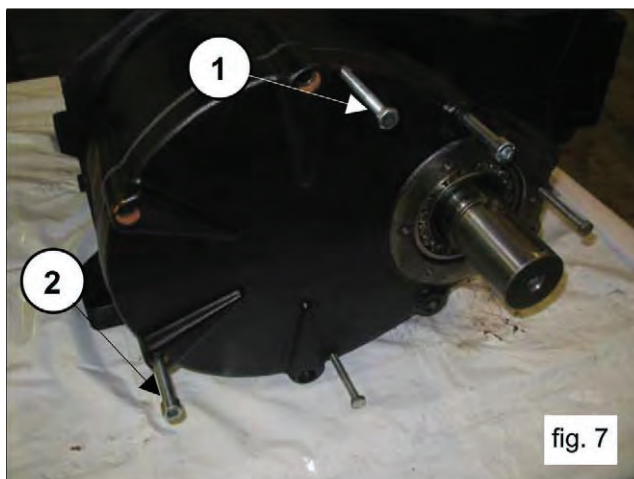
Disassemble the crankcase cover by unfastening the relevant screws (1, fig. 5).



Unfasten the reducer cover screws (1, fig. 6).

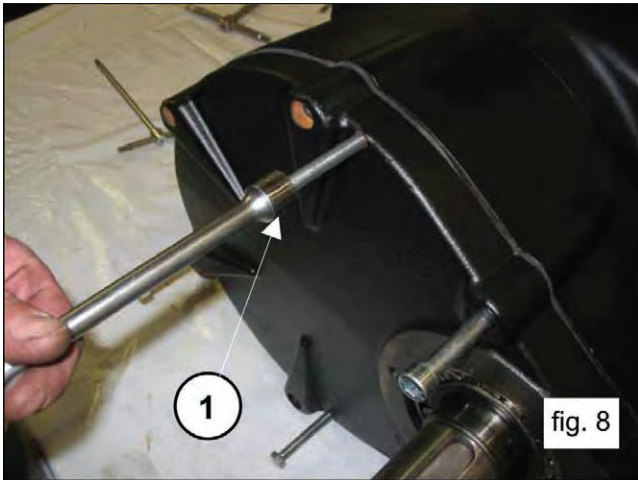


Insert 3 dowels, or 3 M8 threaded screws (1, fig. 7) in the appropriate holes to aid extraction, and two sufficiently long M10 screws in order to support the cover (2, fig. 7).

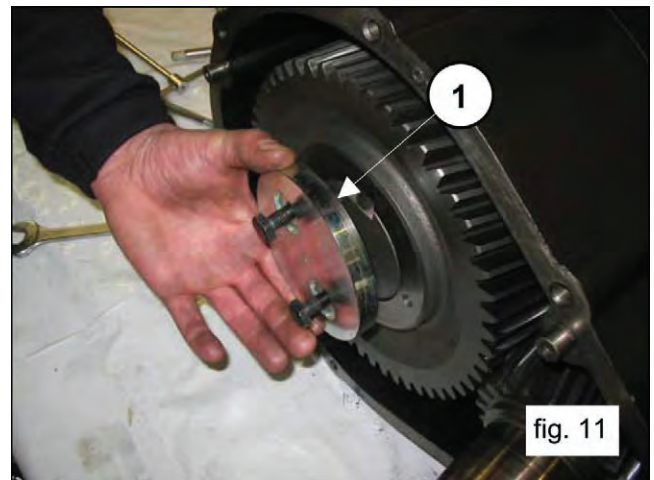
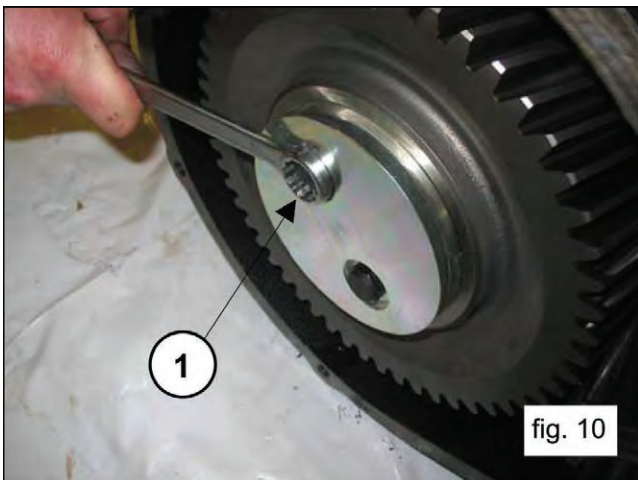




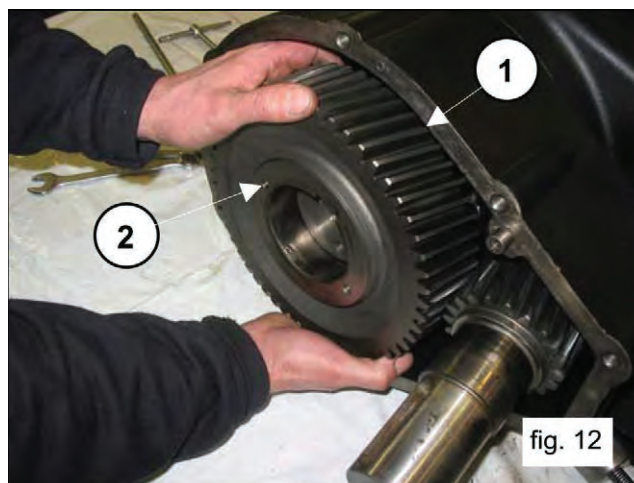
Screw on the 3 threaded screws (1, fig. 8) and simultaneously, using the appropriate tool (p/n 27516700), hammer on the tool itself so that the bearing remains on the pinion when extracting the cover (1, fig. 9).



When this operation is complete, remove the reducer cover and then slip off the bearing from the pinion. Remove the screws that fasten the ring gear stopper (1, fig. 10), and remove the stopper itself (1, fig. 11).



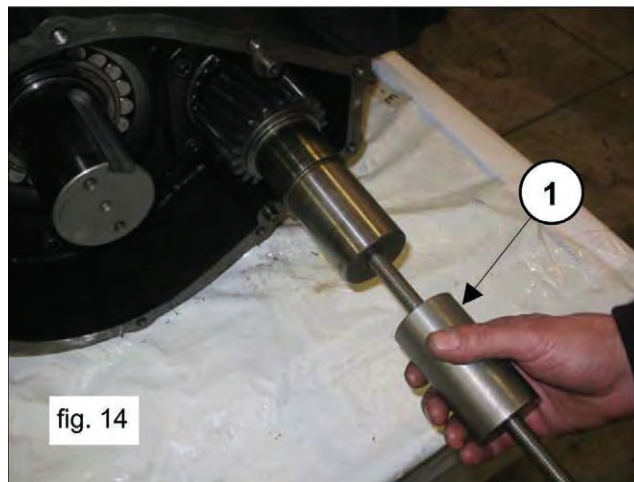
Remove the ring gear (1, fig. 12). If necessary, use a slide hammer applying it to the 2 M8 holes (2, fig. 12).



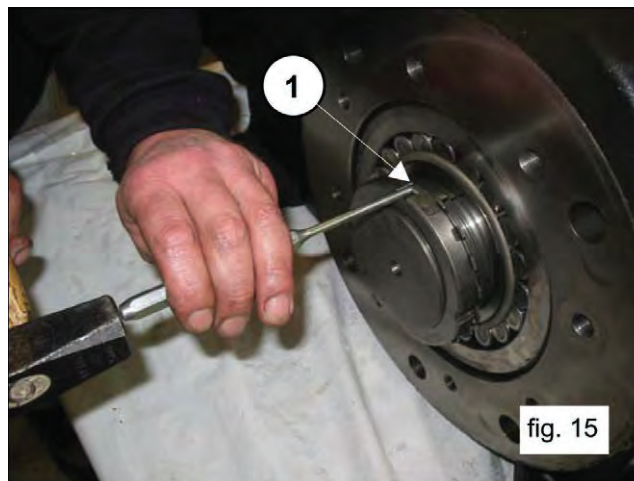
Remove the key from the shaft (1, fig. 13).



Remove the pinion by using a slide hammer applying it to the M14 hole (1, fig. 14).

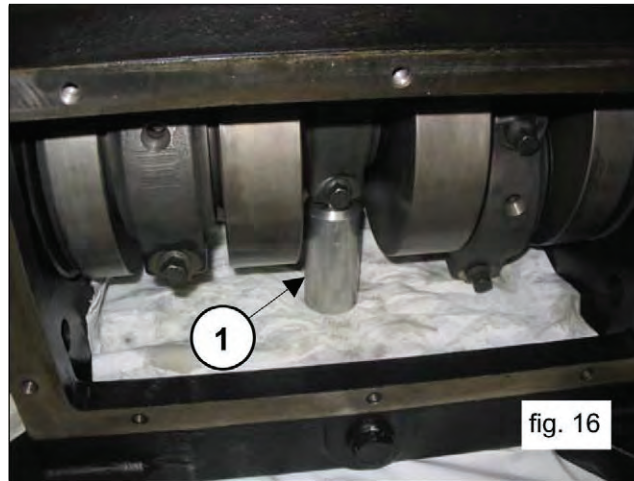


Lift the safety washer key (1, fig. 15)

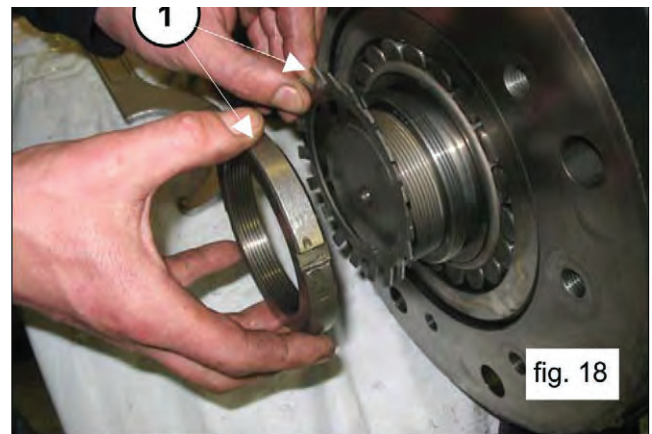
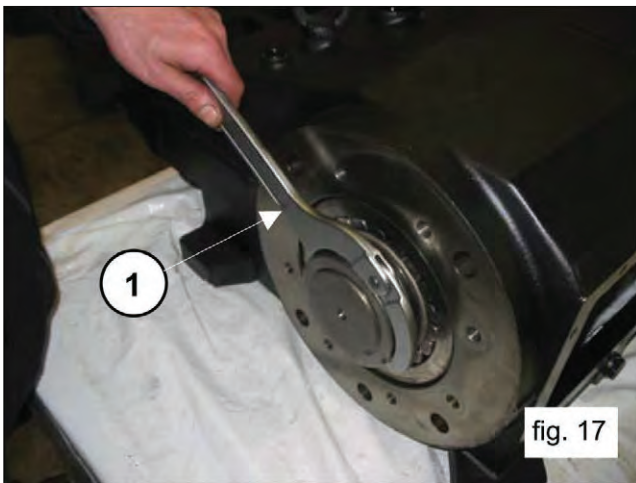




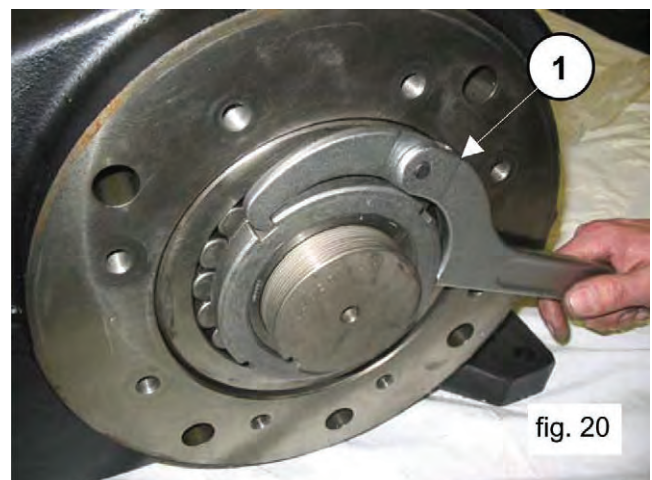
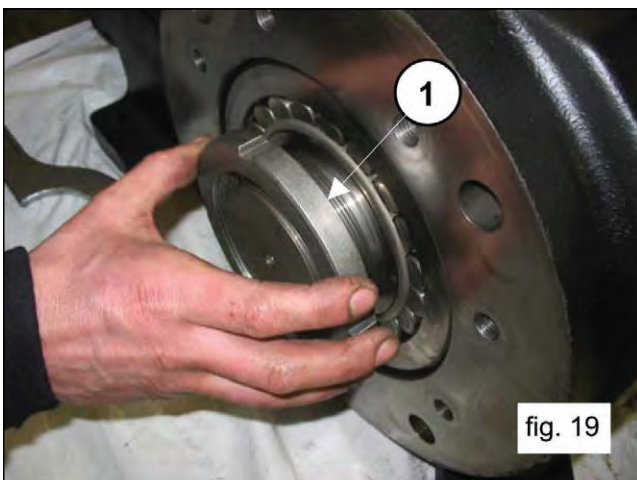
Insert a spacer under the connecting rod to block shaft rotation (1, fig. 16).



Using an appropriate wrench, unscrew and remove the ring nut (1, fig. 17) and then remove the safety washer (1, fig 18).

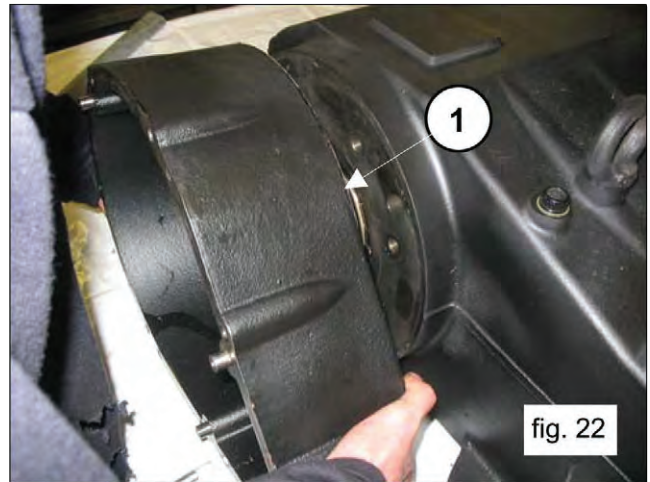
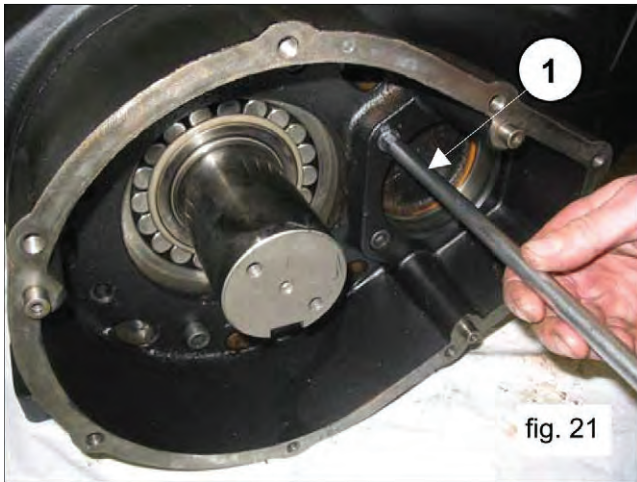


Screw a SKF KM19 type ring nut onto the pressure sleeve (1, fig. 19), then loosen the sleeve using an appropriate wrench (1, fig. 20).





On the opposite side, unfasten the reducer case screws (1, fig. 21), and then remove the case (1, fig. 22).



Unscrew the connecting rod screws (1, fig. 23).

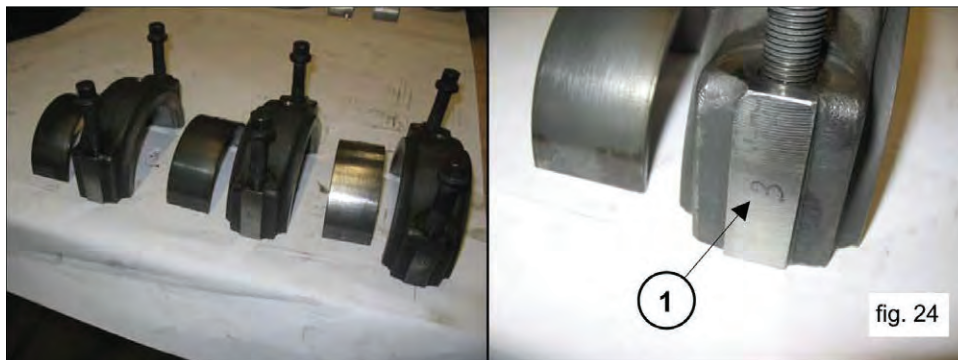


Disassemble the connecting rod caps with the split bearings; be particularly aware of disassembly order.

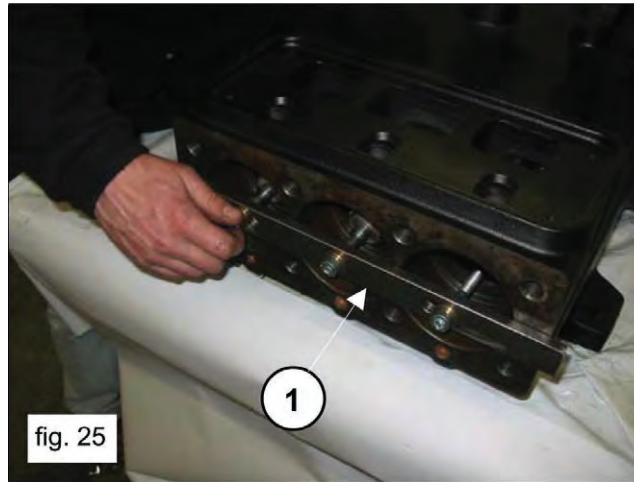


**The connecting rod caps and the related connecting rods must be reassembled in the exact order and coupling as during disassembly.**

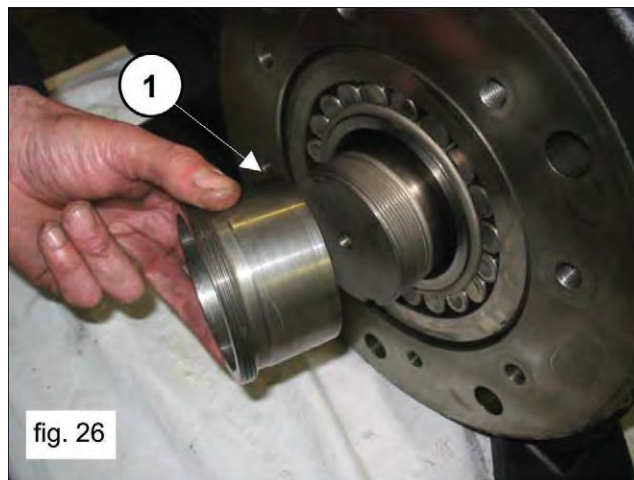
To avoid error, caps and connecting rods are numbered on one side (1, fig. 24).



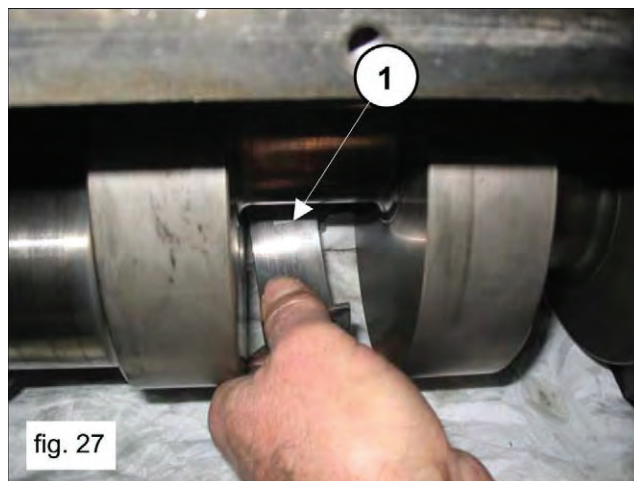
Push the connecting rods forward in the direction of the hydraulic side in order to push out the crankshaft. Use the appropriate tool (p/n 27566200) to facilitate this operation (1, fig. 25)



Remove the pressure sleeve (1, fig. 26).

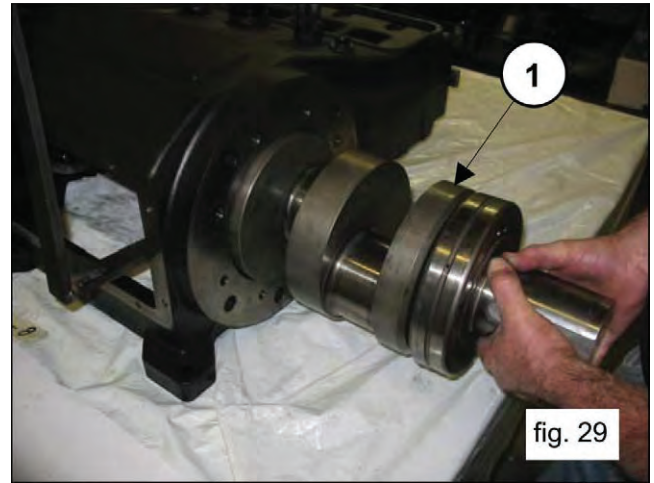
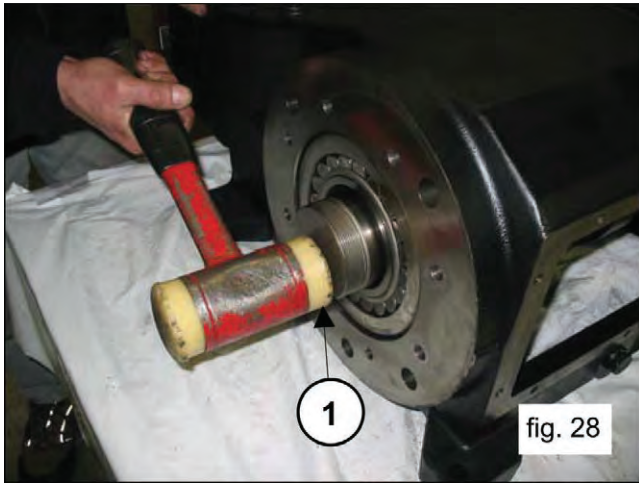


Remove the upper split bearing of the connecting rods (1, fig. 27).





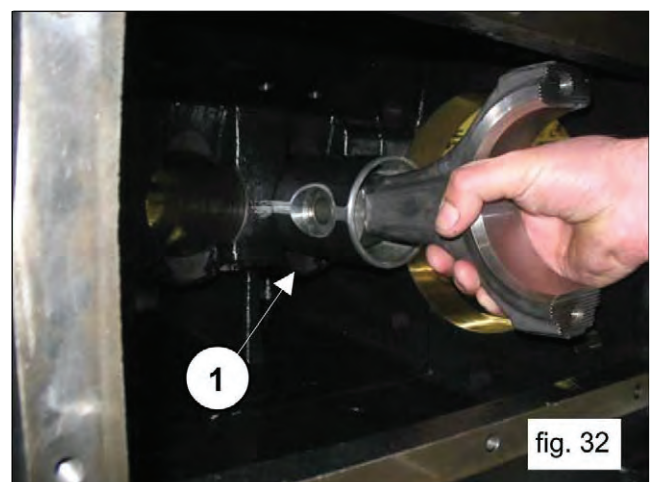
Remove the crankshaft with the help of a hammer on the PTO side (1, fig. 28). Remove the shaft and the bearing (1, fig. 29).



On the opposite side, extract the bearing (1, fig. 30)

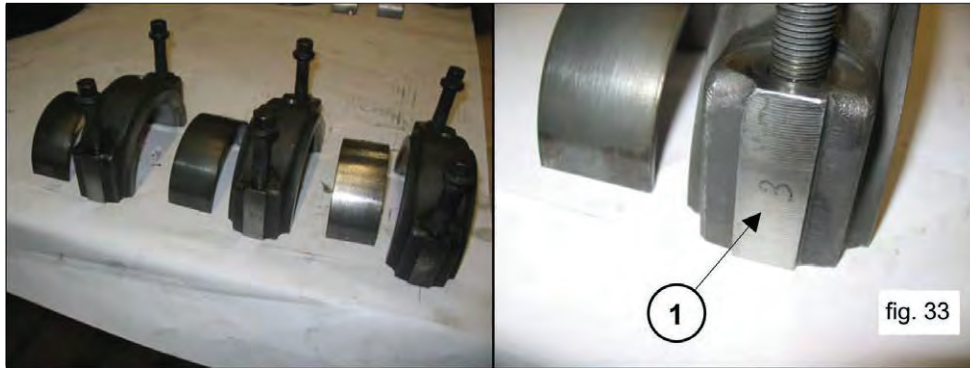


If the replacement of one or more connecting rods or plunger guides is necessary, please operate as follows: Unfasten the screws of the tool (p/n 27566200 to unlock the connecting rods (1, fig. 31) and therefore extract the connecting rod-plunger guide units from the opening behind the crankcase (1, fig. 32).

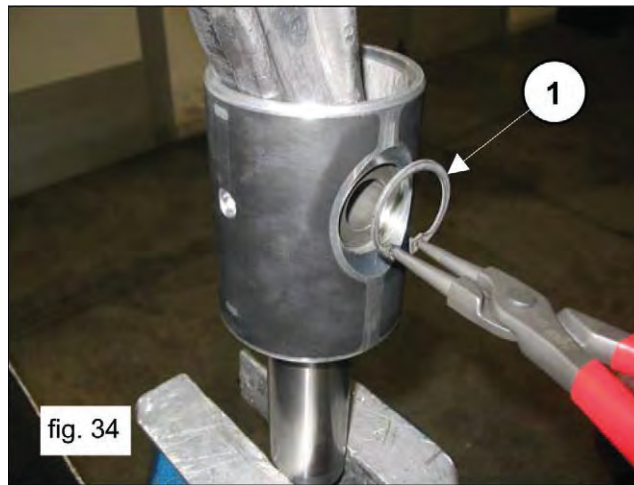




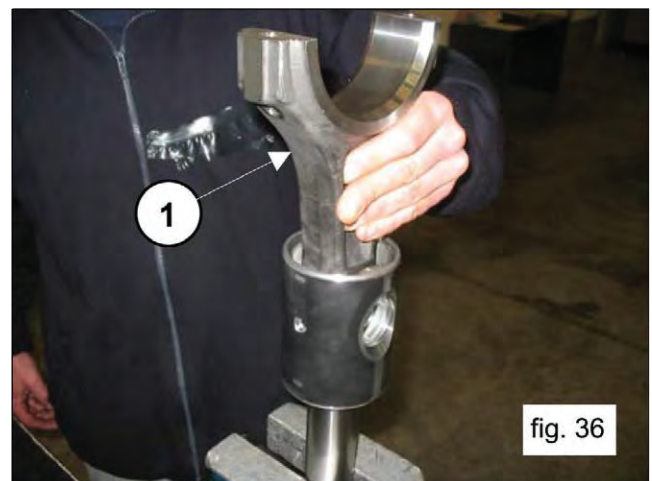
Couple the connecting rods with the previously disassembled caps; be sure to respect numbering (1, fig. 33).



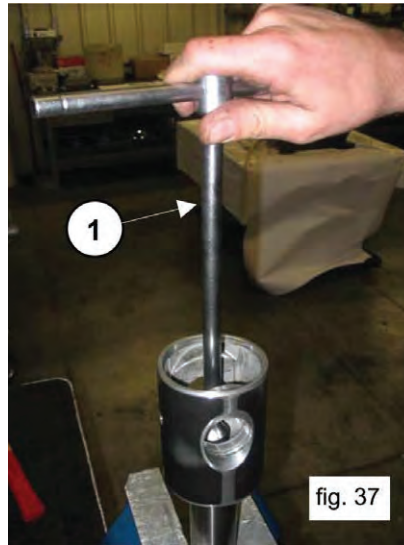
Remove the two seeger rings that block the plunger pin by using the appropriate tool (1, fig. 34).



Remove the pin (1, fig. 35) and then remove the connecting rod (1, fig. 36).



To separate the rod from the plunger guide, unfasten the M10 hexagonal-head screws using a size 17 socket wrench (1, fig. 37).

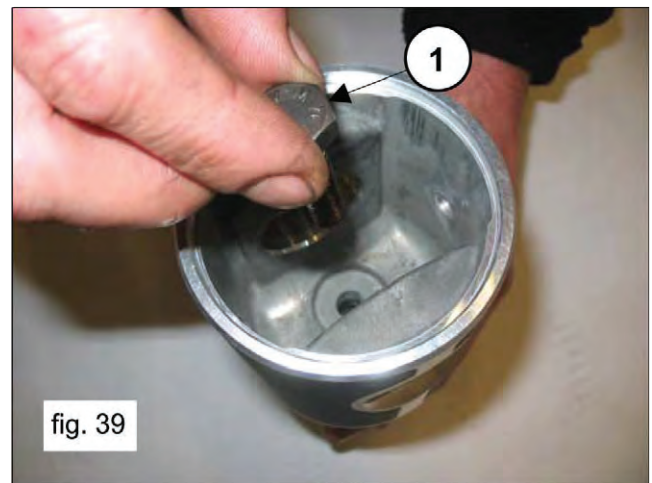
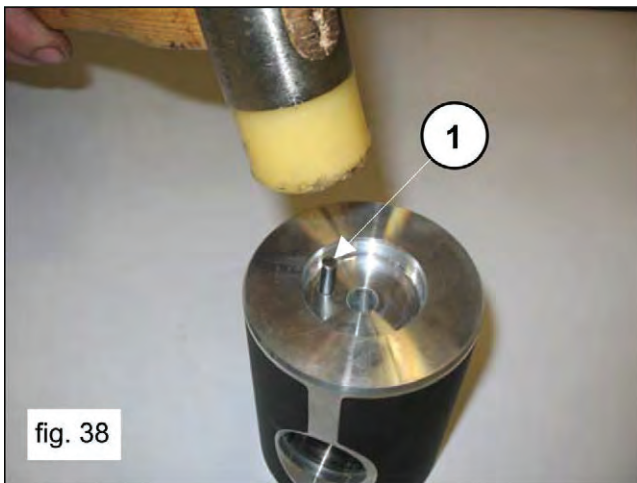


### 2.1.2 Crank Mechanism Assembly

Proceed with assembly by inverting the procedure indicated in paragraph 2.1.1. The correct sequence is the following:

Connect the rod to the plunger guide

Insert the Ø5 pin in the appropriate hole on the plunger guide (1, fig. 38) and connect the rod to the plunger guide using M10 x 35 screws (1, fig. 39).



Block the rod using a clamp, and proceed with calibration using a torque wrench (1, fig. 40) as indicated in paragraph 3. "SCREW CALIBRATION"



fig. 40

Insert the connecting rod in the plunger guide (1, fig. 36) and then insert the pin (1, fig. 35). Apply the two seeger rings using the correct tool (1, fig. 34).



**Make sure that conrods, plunger guides and wrist pins can move freely after being assembled.**

Separate the caps from the connecting rod; correct coupling is guaranteed by the numbering on the side (1, fig. 33).

After verifying the perfect cleaning of the crankcase, insert the connecting rod-plunger guide unit inside the cylinders of the crankcase (1, fig. 32).



**The insertion of the connecting rod-plunger guide unit inside crankcase must be done by positioning the connecting rods with the numbering visible from above.**

Block the three units using the correct tool, p/n 27566200(1, fig 31).

Pre-assemble the bearing, PTO side, on the shaft (1, fig. 41) and assemble the bearing on the opposite side on the crankcase (1, fig. 42).



**The bearing in fig. 42 has a tapered internal ring. Verify that the taper goes from the outside towards the inside in order to allow the subsequent insertion of the sleeve.**

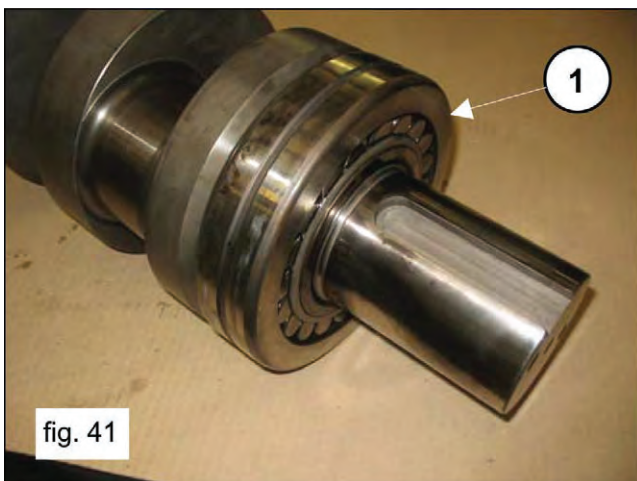


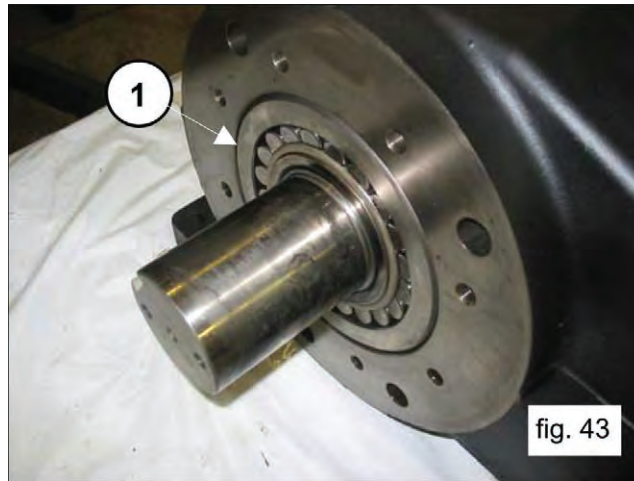
fig. 41



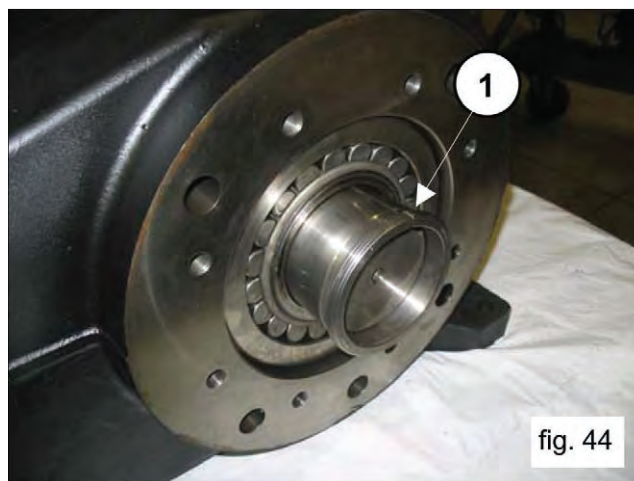
fig. 42



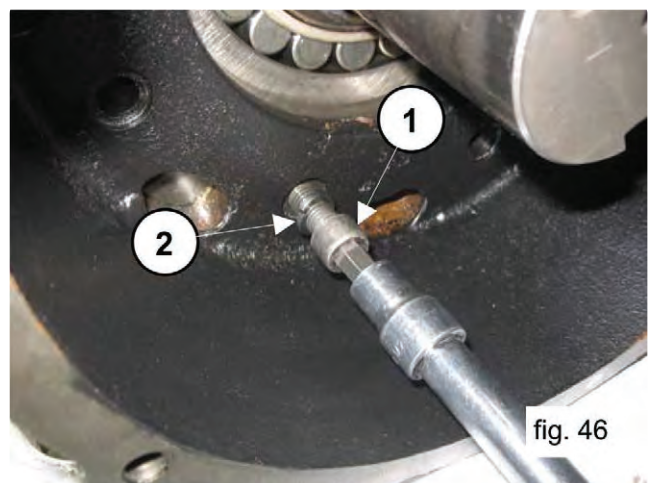
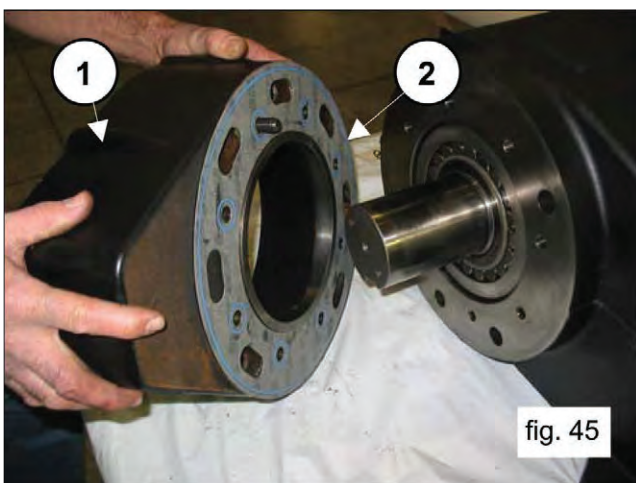
Insert the shaft (1, fig. 29) until the pre-assembled bearing is aligned with the edge of the crankcase (1, fig. 43).

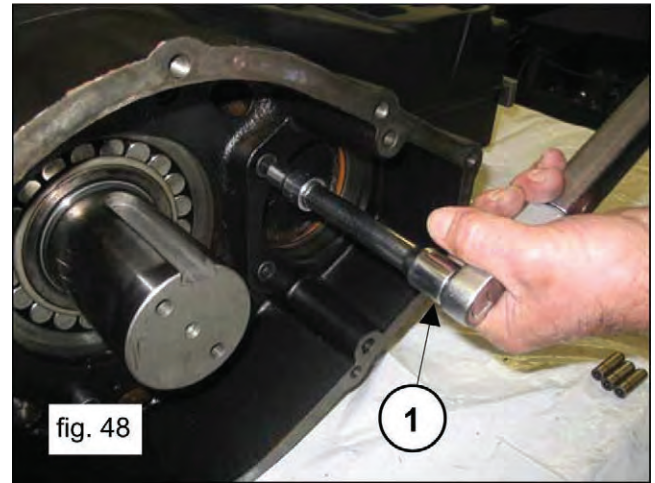
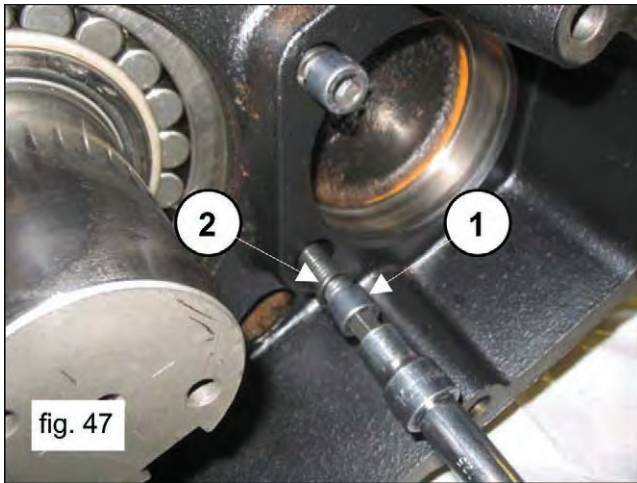


Manually insert the pressure sleeve to maintain the shaft alignment (1, fig. 44).

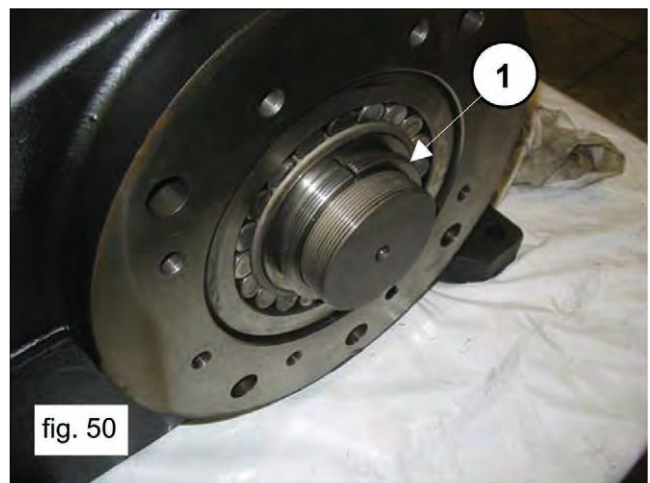


Assemble the reducer case (1, fig. 45) and the related gasket (2, fig 45) using the 6 M12 x 40 screws (1, fig. 46), the 2 M12 x 50 screws (1, fig. 47) and the Ø 12 Grower washers (2, fig. 46 and fig. 47). Calibrate the screws with a torque wrench (1, fig. 48) as indicated in paragraph 3. "SCREW CALIBRATION"





Completely insert the pressure sleeve on the shaft from the opposite side of the PTO (1, fig. 49 and fig. 50).

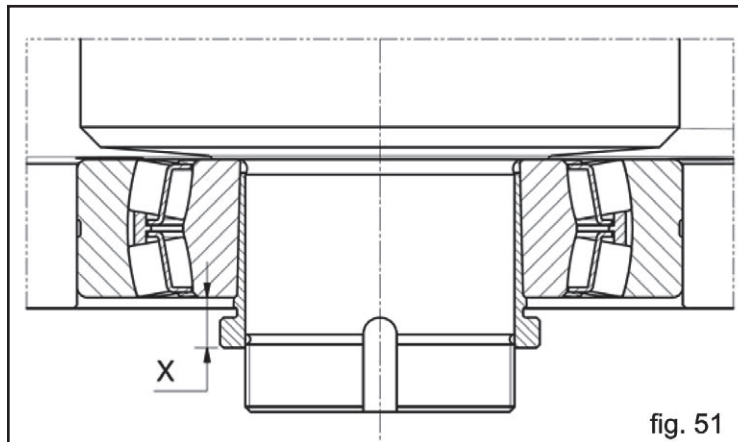


**Pressure sleeve insertion must be done without oil or lubricants.**

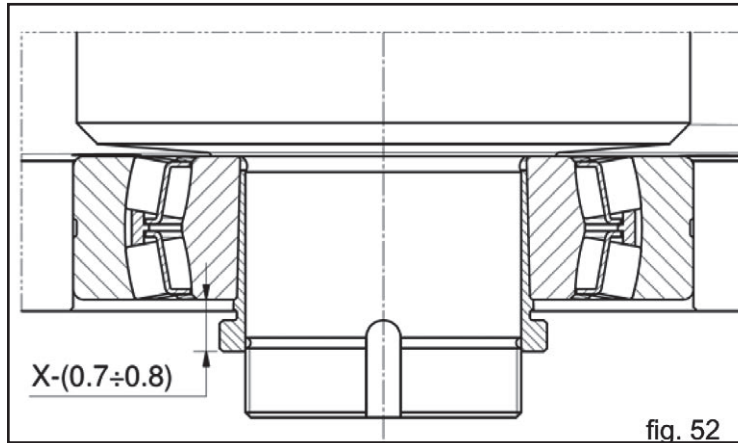
Insert the sleeve until the external surface (tapered) couples perfectly with the inside of the bearing. During insertion, be sure that the bearing remains in contact with the shaft shoulder.

Measure the dimension "X" indicated in fig. 51.

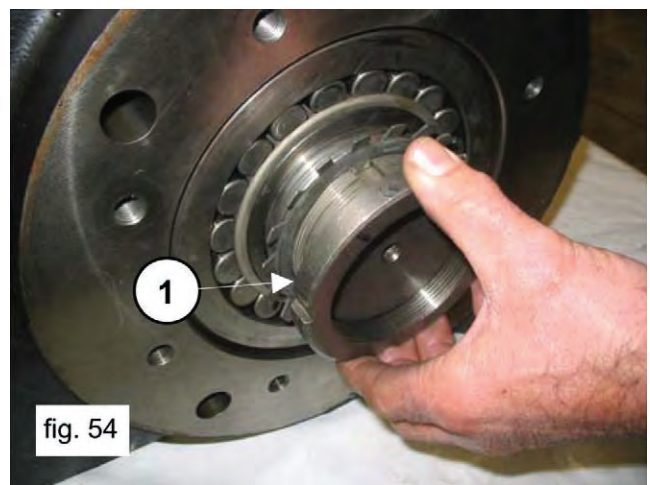




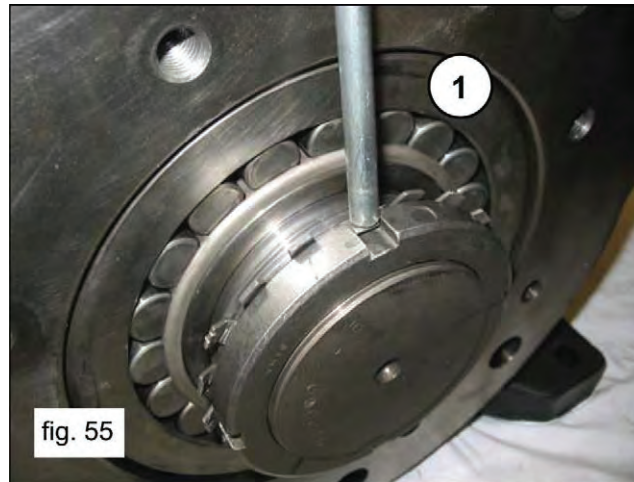
Screw the ring nut and fasten the sleeve until the dimension "X" is reduced by a value ranging between 0.7 and 0.8 mm (fig. 52).



Unscrew the ring nut, insert the safety washer (1, fig. 53) and completely screw the ring nut (1, fig. 54); then fold the washer's locking key (1, fig. 55).





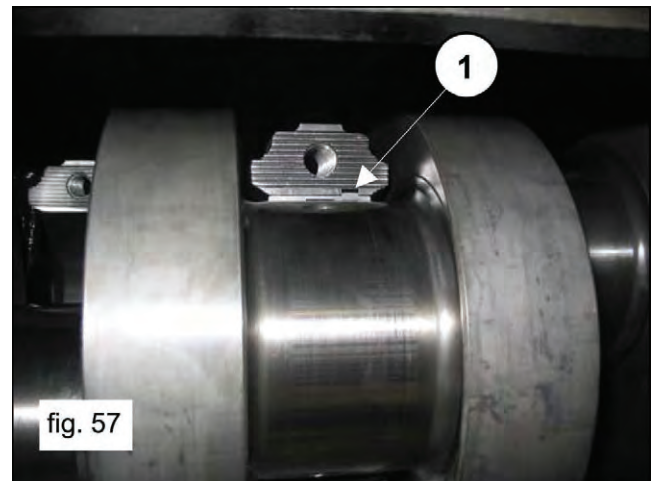
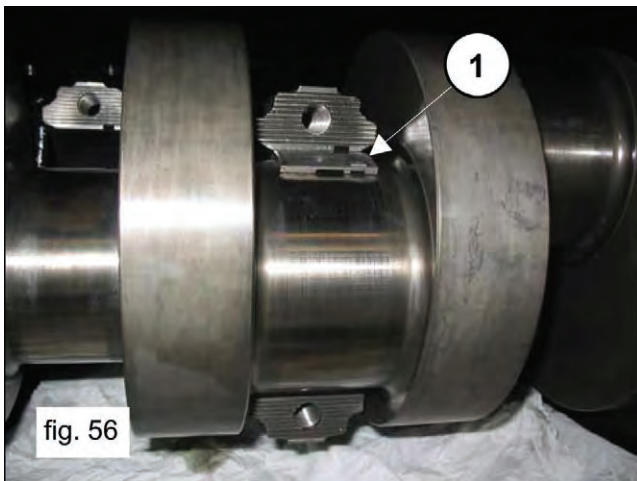


Remove the device that blocks the connecting rods using p/n 27566200 (1, fig. 31).

Insert the upper split bearings between the connecting rods and the shaft (1, fig. 56)



**In order to correctly assemble the split bearings, be sure that the split bearings' reference key is in the appropriate seat on the connecting rod (1, fig. 57).**



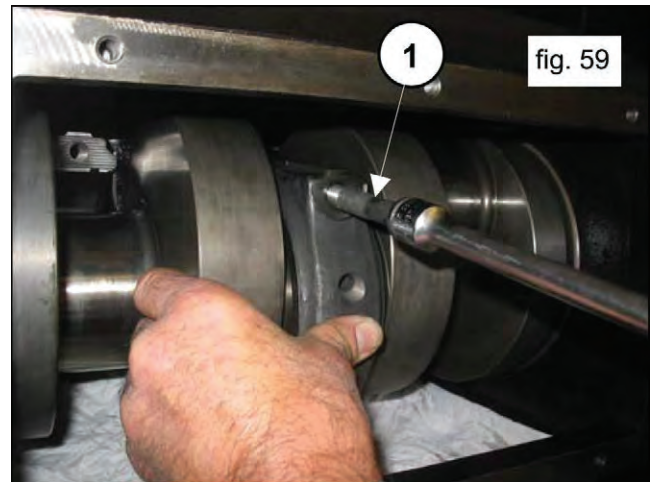
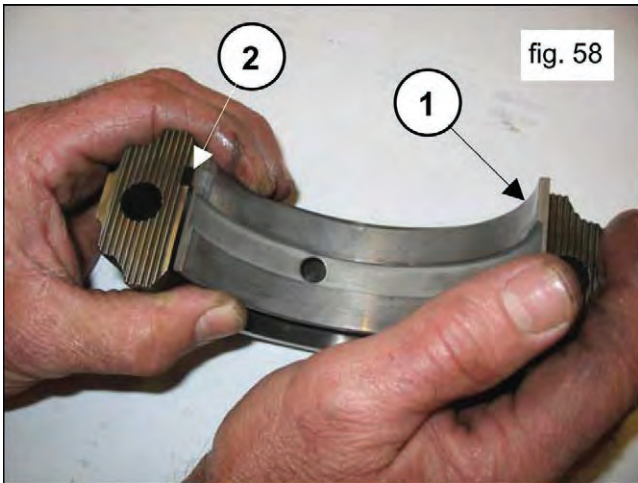
Apply the lower split bearings to the caps, (1, fig. 58) being sure that the split bearings' reference key is positioned in the appropriate seat on the cap (1, fig. 58).

Fasten the caps to the connecting rods using the M12 x 1.25 x 87 screws (1, fig. 59).



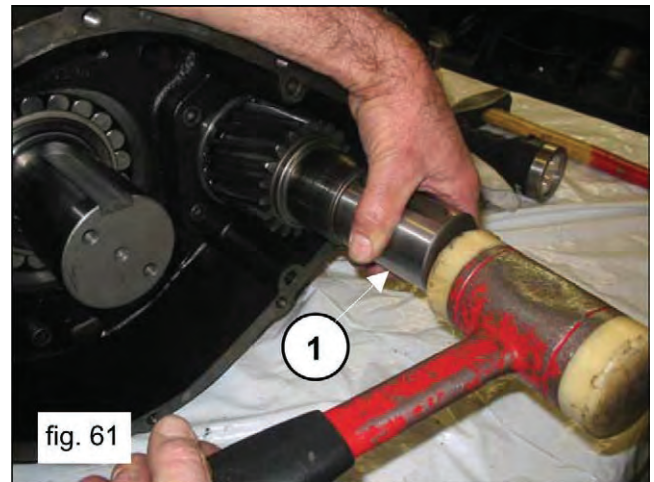
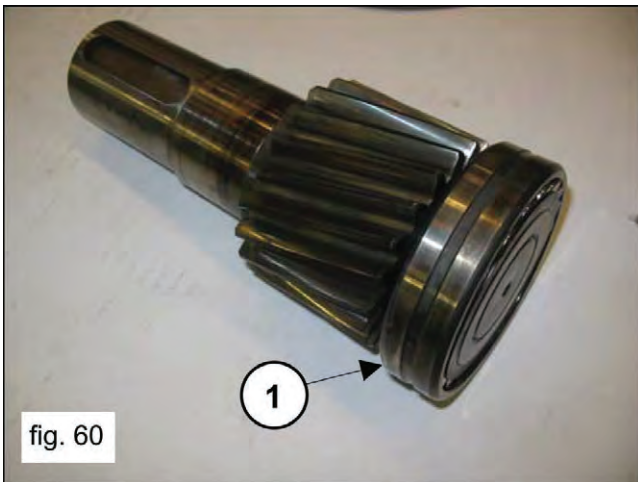
**Pay attention to the correct assembly of the caps. the numbering must face upwards.**

Tighten the screws with a torque wrench set as indicated in the SCREW CALIBRATION chart of paragraph 3. The conrod screws should be tightened at intermediate incremental values.

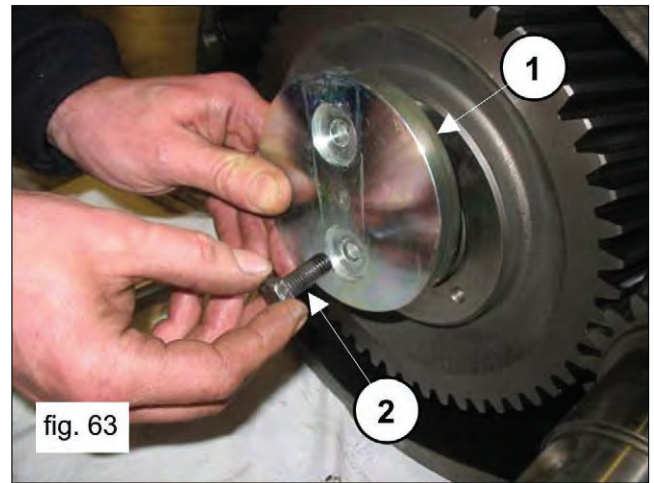
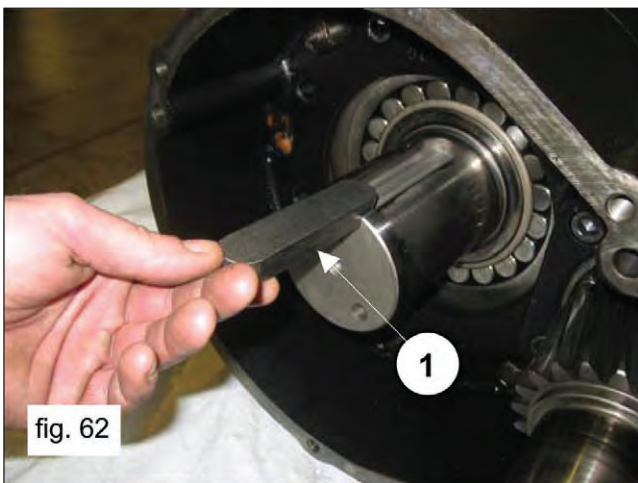


Once tightened on the crankshaft, make sure that conrods still have axial right-left endplay.

Reassemble the bearing on the pinion (1, fig. 60) and fully insert the pinion in the seat on the reduccase (1, fig. 61) by using a hammer.

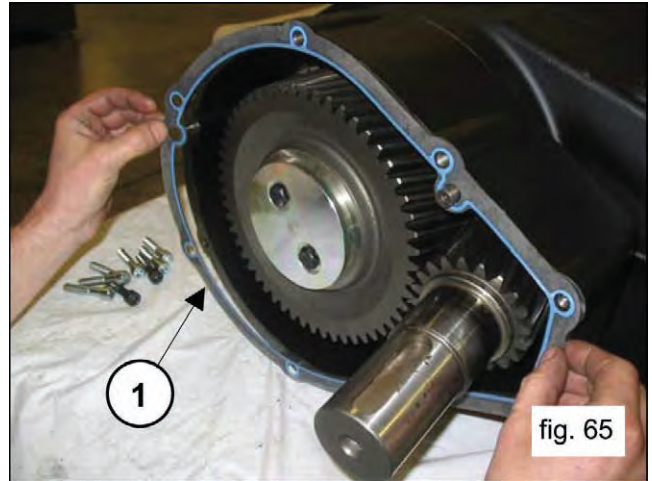


Apply the 22 x 14 x 100 key in the seat on the shaft (1, fig. 62) and insert the ring gear on the shaft. Fasten the ring gear stopper (1, fig. 63) using the 2 M10 x 25 screws (2, fig. 63). Calibrate the screws with the torque wrench as indicated in paragraph 3. "SCREW CALIBRATION"

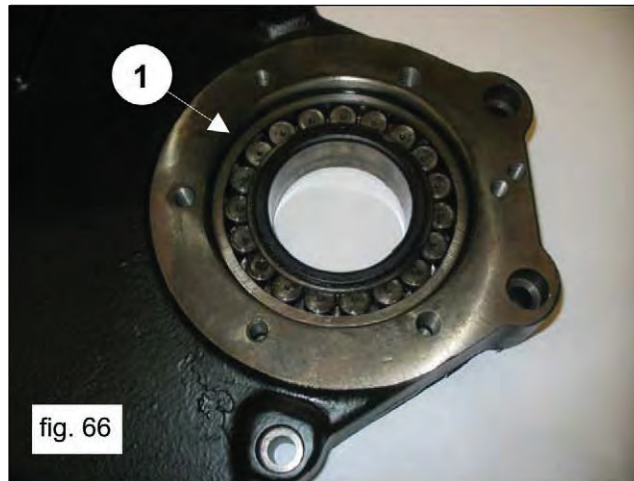




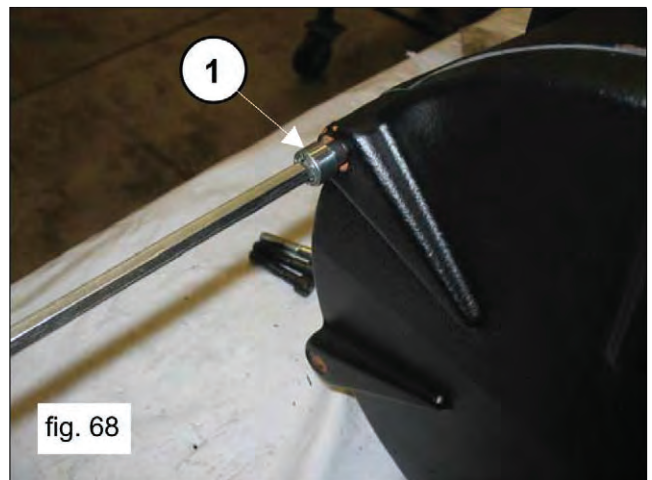
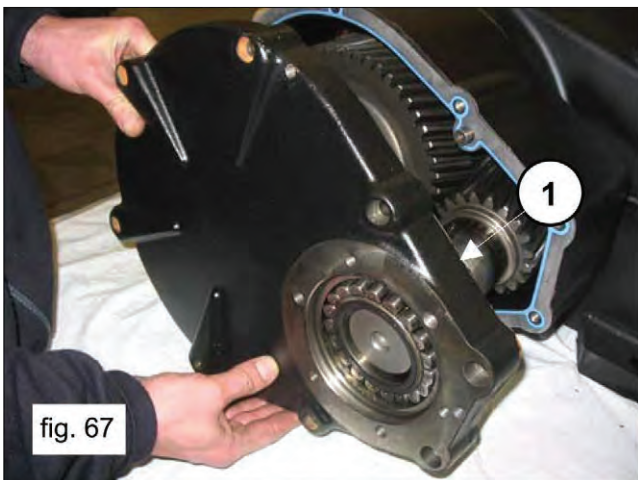
Apply the 3 Ø 12 x 40 pins to the reducer case (1, fig. 64) and insert the gasket (1, fig. 65).



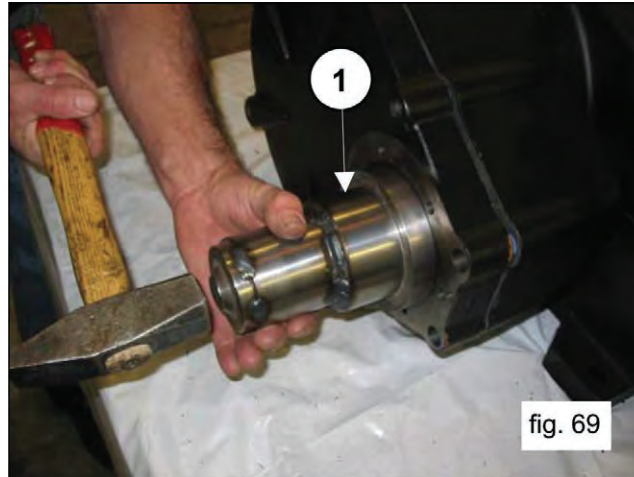
Assemble the bearing on the reducer cover (1, fig. 66).



Assemble the reducer cover (1, fig. 67) and fasten it using 8 M10 x 50 screws (1, fig. 68). Use a stopper to avoid the bearing coming out of the seat (1, fig. 69). Calibrate the screws with the torque wrench as indicated in paragraph 3. "SCREW CALIBRATION"



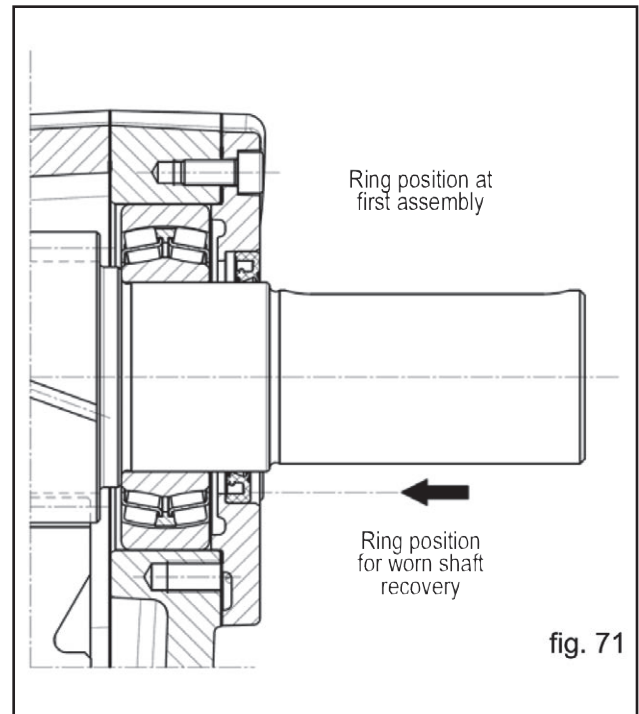
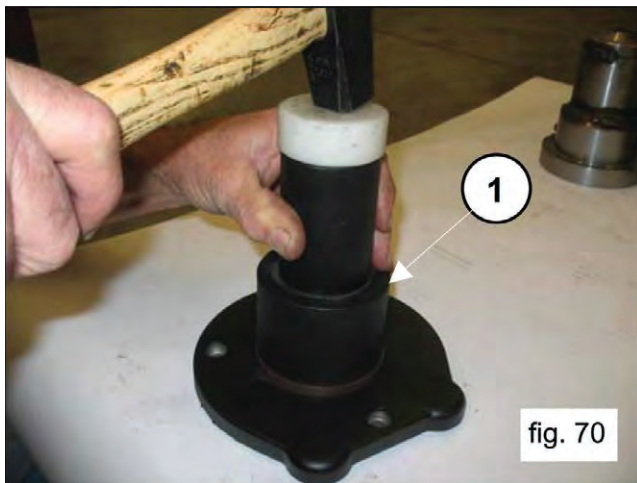




Insert the oil seal inside the reducer flange using the proper tools, p/n 27515900 and 27548200 (1, fig. 70). Before proceeding with oil seal assembly, verify the conditions of the sealing lip. If replacement is necessary, position the new ring as indicated in fig. 71.



**If the shaft presents diameter wear corresponding to the sealing lip, to avoid the need for grinding it's possible to position the ring as indicated in fig. 71.**

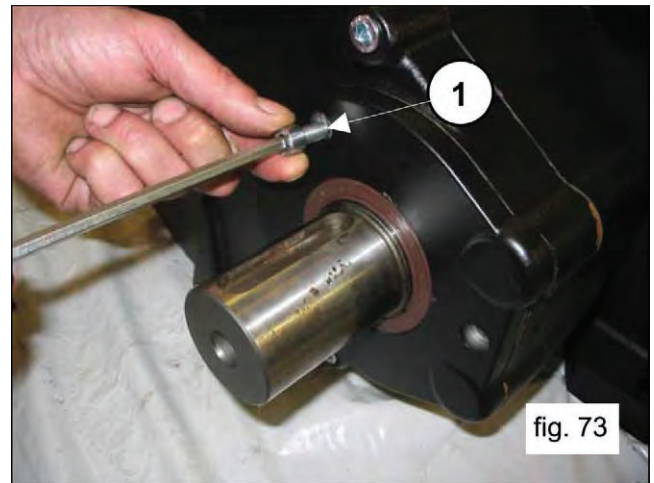
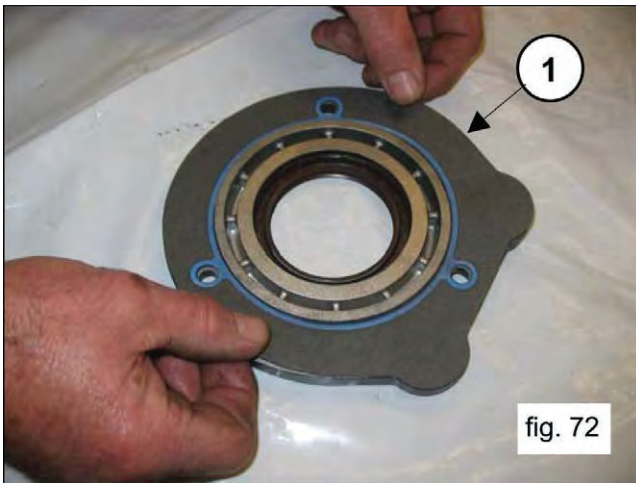


Apply the reducer flange with its gasket to the reducer case (1, fig. 72) and fasten it using 3 M8 x 18 screws (1, fig. 73).



**To avoid damaging the oil seal, pay particular attention when inserting the flange on the pinion.**

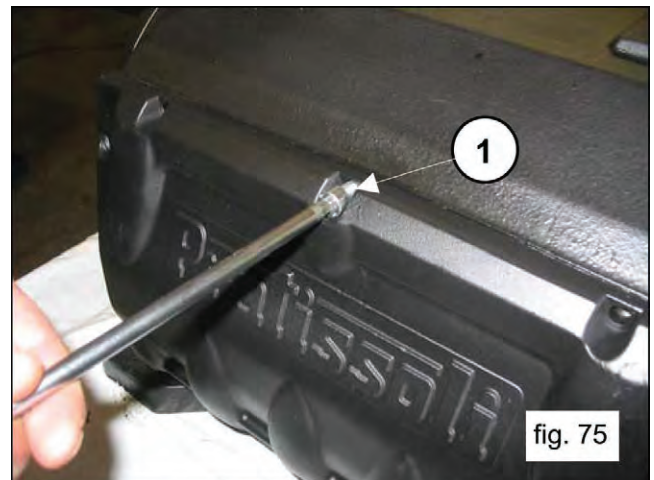
Calibrate the screws with the torque wrench as indicated in paragraph 3. "SCREW CALIBRATION"



Insert the key 16 x 10 x 90 in the pinion.

Insert the O-ring in the rear cover (1, fig. 74) and fasten it to the crankcase using 10 M8 x 18 screws (1, fig. 75).

Calibrate the screws with the torque wrench as indicated in paragraph 3. "SCREW CALIBRATION"



Assemble the bearing cover (and related gasket) (1, fig. 76) using 8 M12 x 30 screws (1, fig. 77).

Calibrate the screws with the torque wrench as indicated in paragraph 3. "SCREW CALIBRATION"



Complete the assembly of the crank mechanism by applying the plugs and lifting eyebolts with the related sealing O-ring.

Fill the crankcase with oil as indicated in the use and maintenance manual, paragraph 7.4.

### 2.1.3 Refurbishing the crank mechanism

| <b>TABLE UNDERSIZED DIAMETERS FOR CRANKSHAFT AND CONROD BUSHINGS</b> |                               |                               |                                            |
|----------------------------------------------------------------------|-------------------------------|-------------------------------|--------------------------------------------|
| <b>Max. Undersize (mm)</b>                                           | <b>Upper half bushing p/n</b> | <b>Lower half bushing p/n</b> | <b>Crank pin grinding measures (mm)</b>    |
| 0.25                                                                 | 90931100                      | 90930100                      | Ø 92.75 0/-0.03<br>Roughness Ra 0.4 Rt 3.5 |
| 0.50                                                                 | 90931200                      | 90930200                      | Ø 92.50 0/-0.03<br>Roughness Ra 0.4 Rt 3.5 |

| <b>TABLE OVERSIZED DIAMETERS FOR CRANKCASE CYLINDER BORES AND PLUNGER GUIDES</b> |                          |                                           |
|----------------------------------------------------------------------------------|--------------------------|-------------------------------------------|
| <b>Max. oversize (mm)</b>                                                        | <b>Plunger guide p/n</b> | <b>Crank pin grinding measures (mm)</b>   |
| 1.00                                                                             | 74050243                 | Ø 81 H6 + 0.22/0<br>Roughness Ra 0.8 Rt 6 |