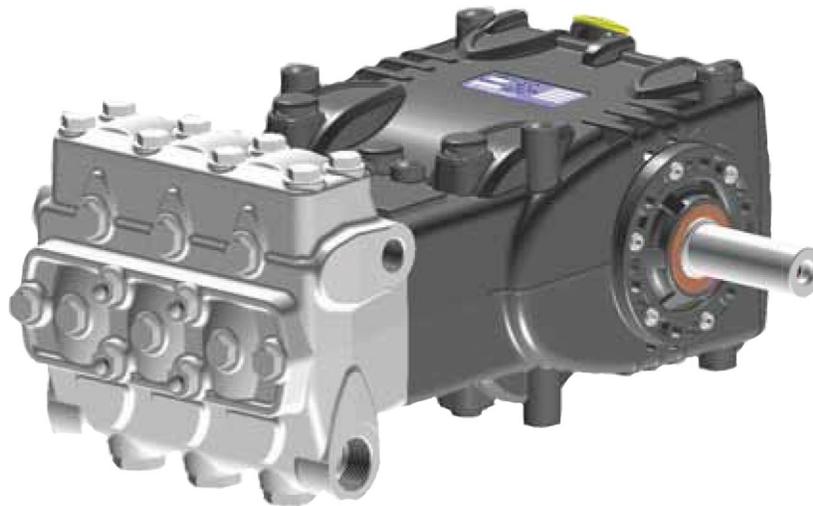




# KT4M



# Repair Manual



**KT4M5B**



General Pump  
is a member of  
the Interpump Group

Ref 310080 Rev. A  
07-17

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## 1. INTRODUCTION

This manual describes the instructions for repairing KT4M 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 dipstick, 1, Fig. 1, and then the draining plug (2, fig. 1).

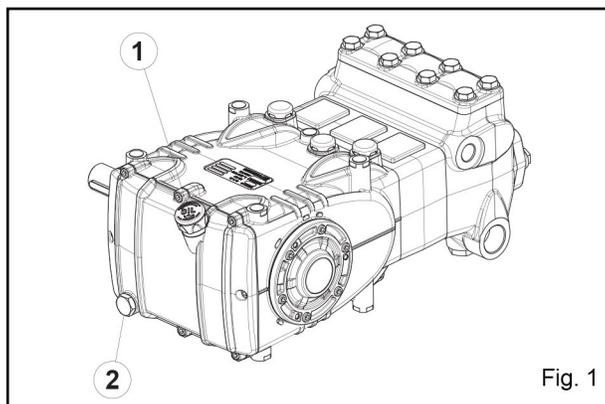


Fig. 1



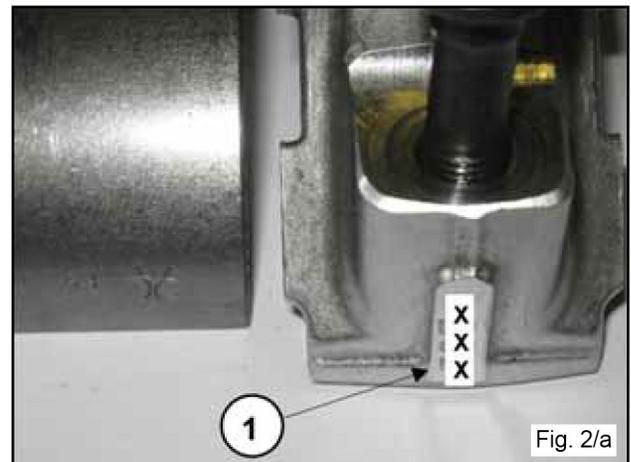
Exhausted oil must be collected in an appropriate receptacle and disposed of in designated locations. In absolutely no case may it be disposed of in the environment.

## 2.1.1 Crank Mechanism Disassembly

Remove in the following order:

- Pump shaft key
- Rear cover
- The con-rod as follows: unscrew the cap fixing screws, remove the con-rod caps with their lower half-bearings (fig. 2) paying attention to the numbered sequence during disassembly.

To avoid possible errors, caps and con-rod shanks have been numbered on one side (1, fig. 2/a)



- Side covers using 3 fully threaded M6 x 50 screws, inserting them in the threaded holes as indicated in fig. 3.



- Push the plunger guides forward with their con-rods to facilitate side extraction of the pump shaft as shown in fig. 4.



- Remove the pump shaft
- Complete disassembly of the con-rod units by removing them from the crankcase and removing the plunger guide pins.
- Remove the pump shaft seal rings using standard tools.
- Remove the plunger guide seal rings as described below:  
Use the extractor hammer (#F26019400) (1, fig.5) and the pliers (#F27503800) (2, fig. 5). Insert the gripper as far as possible onto the seal ring with the aid of a hammer (fig. 5/a), subsequently screwing the extractor to the gripper, and use the extractor hammer (fig. 5/b) until the ring to be replaced is removed (fig. 5/c).

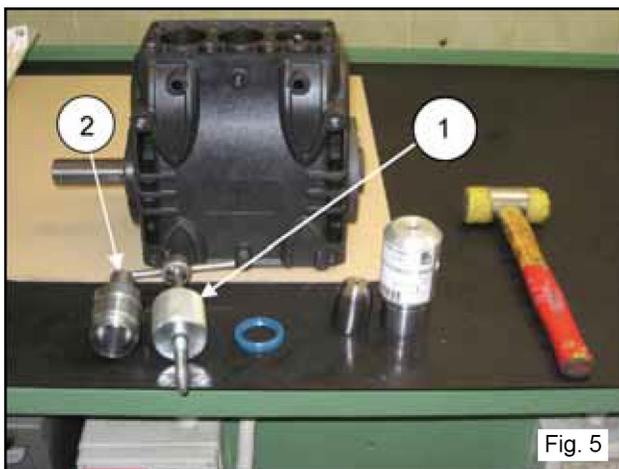




Fig. 5/b



Fig. 5/c

### 2.1.2 Crank Mechanism Assembly

After cleaning the crankcase, reassemble the crankcase mechanism as follows:



- Assemble the upper and lower half-bearings in their seats in the con-rods and caps. **Make sure that the reference marks on the upper half-bearings (1, fig. 6) and lower half-bearing (2, fig. 6/a) are positioned in their respective seats in the con-rod and cap.**

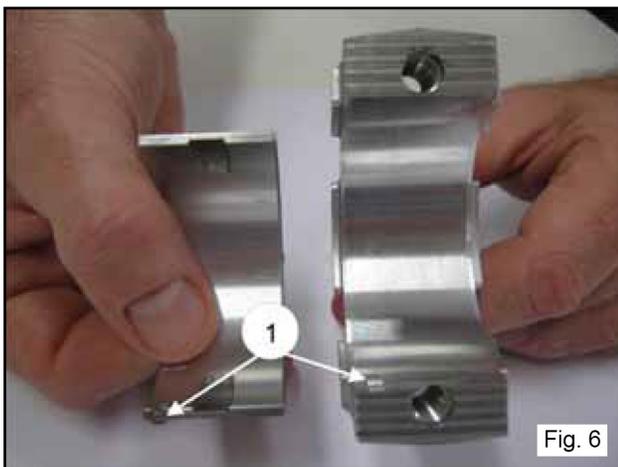


Fig. 6

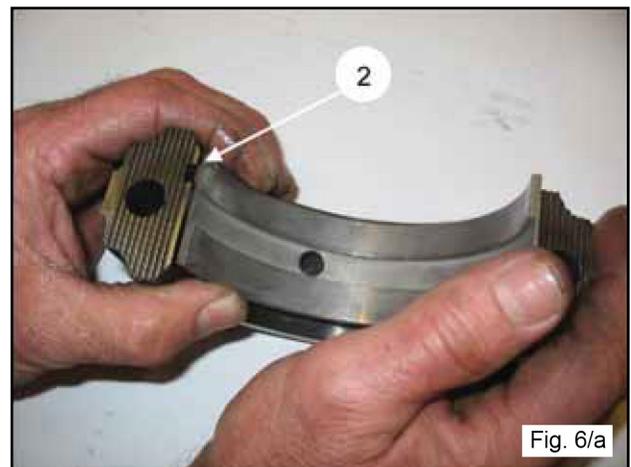


Fig. 6/a

- Insert the plunger/con-rod guide units into the crankcase, directing the numbering on the con-rod shank towards the top of the casting.

To facilitate pump shaft insertion (without the key), it is essential to repeat the operation performed during disassembly, pushing the plunger/con-rod guide units as far down as possible (paragraph. 2.1.1).

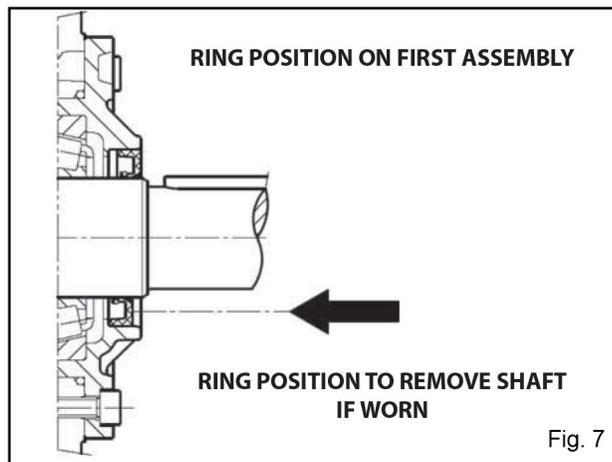
- Before assembling the side cover on the PTO side, check the conditions of the radial ring lip seal and relative contact area on the shaft. If replacement is necessary, position the new ring using a tool (#F27904500) as shown in fig. 7.



**If the pump shaft shows diametrical wear in the area of contact with the lip seal, in order to prevent the grinding operation, it is possible to reposition the ring in abutment with the cover as shown in fig. 7.**

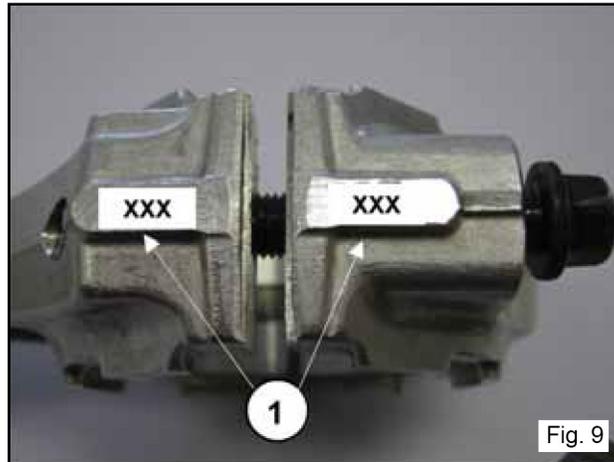
Before assembling the side covers, make sure there are O-rings on both of them and shim rings on the indicator side cover only.

To facilitate filling of the first section and relative press fitting of the covers on the crankcase, we recommend using 3 partially-threaded M6 x 40 screws (1, fig. 8), then completing the operation with screws supplied (M6 x 16).





- Couple the con-rod caps to their shanks, referring to the numbering (1, fig. 9).  
**Not the correct assembly direction of the caps.**



- Fasten the caps to their respective con-rod shanks by means of M8 x 1 x 48 screws (fig. 10) lubricating both the underhead and the threaded shank, proceeding in two different stages:



1. Manually turn the screws until they begin to tighten.
2. Tightening torque 22.13 ft lbs (30 Nm)

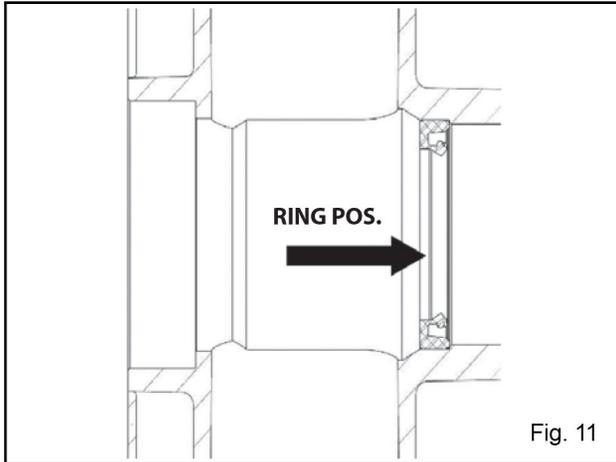
Alternatively, ensure:

1. Pre-tightening torque 7.38-11.06 ft lbs (10-15 Nm)
2. Tightening torque 22.13 ft lbs (30 Nm)



- After having completed tightening operations, check that the con-rod head has a side clearance in both directions.

- Insert the new plunger guide seal rings as far as possible into the relative seat on the crankcase (fig. 11), following the procedure described:  
Use tool (#F27904200) composed of a tapered bush and a buffer. Screw the tapered bush into the hole in the plunger guide (fig. 11/a), insert the new seal ring on the buffer as far as it will go (determined by the height of the buffer) into its seat on the crankcase (fig. 11/b), remove the tapered bush (fig. 11/c).



- Mount the rear cover complete with O-ring, positioning the dipstick hole upward.
- Insert oil in the casing as indicated in the **Owner's Manual**.

### 2.1.3 Reduction Classes

| TABLE OF REDUCTION FOR CRANKSHFT AND CON-ROD HALF-BEARINGS |                         |                         |   |
|--|-------------------------|-------------------------|---|
| Recovery classes (mm)                                      | Upper Half-bearing code | Lower Half-bearing code | Grinding on the shaft pin diameter (mm) |
| 0.25   | F90922100               | F90922400               | Ø39.75 0/-0.02 Ra 0.4 Rt 3.5            |
| 0.50   | F90922200               | F90922500               | Ø39.50 0/-0.02 Ra 0.4 Rt 3.5            |

### 2.1.4 Assembly / Disassembly of Bearings and Shims

The type of bearings (taper roller) ensures the absence of axial clearance on the crankshaft. The shims are defined to meet this necessity. For disassembly / reassembly and for any replacements, carefully observe the following directions:

#### A) Assembly / Disassembly of the crankshaft without replacing the bearings

After removing the side covers, as indicated in paragraph 2.1.1, check the rollers and their tracks for wear; if all parts are in good condition, fully clean the components with a suitable degreaser and grease them again evenly using the same oil in the crankcase. The same shims can be used again, being careful to insert them only under the indicator side cover. After installing the complete unit (sight glass side flange, shaft and engine side flange), check that the shaft's rolling torque - with the connecting rods free - is at least 3 Ft. Lbs. (4 Nm), Max 4.5 Ft. Lbs. (6 Nm). To position the two side covers on the crankcase, initially use 3 M6 x 40 screws as shown in fig. 8, and then the fastening screws. The shafts rolling torque (with connecting rods coupled must not exceed 6 Ft. Lbs. (8 Nm).

#### B) Disassembly / Assembly of the Crankshaft With Bearings Replacement

After disassembling the side covers as indicated in paragraph 2.1.1, remove the outer ring nut of the bearings from their covers and the inner ring nut, with the remaining part of the bearing, from the two shaft extremities using a standard pin extractor or similar tool as indicated in fig. 12, fig. 12/a, and Fig. 13.





The new bearings can be mounted cold with a press or rocker, supporting it on the lateral surface of the ring nuts involved in press fitting with the rings. The press fitting operation can be assisted by heating the involved parts to a temperature between 250°F - 300°F (120°C - 150°C), ensuring that the ring nuts fit fully into their seats.



**Never exchange the parts of the two bearings.**

#### **Determining the shim pack:**

Perform the operation with the plunger/con-rod guide units are assembled, the con-rod caps are disconnected and the con-rods are pushed backwards.

- Insert the crankshaft without tab into the crankcase, making sure that the P.T.O. shank comes out of the correct side.
- Secure the P.T.O. side flange to the crankcase, making sure the lip seal as described previously and tighten the screws to the recommended torque.
- Feed the flange on the indicator side without shims in the cover and start to move it closer, manually screwing the M6 x 40 service screws in equally, with small rotations to move the cover in slowly and correctly. At the same time check that the crankshaft rotates freely by turning it manually.
- Continue tightening screws until hardness in crankshaft rotations is experienced. At this point loosen the screws completely.
- Use a thickness gauge to measure the clearance between the side cover and crankcase (see fig. 14).



Determine the shim pack as indicated in the table below:

| Measurement        | Shim Type    | No. of Pieces |
|--------------------|--------------|---------------|
| From: 0.05 to 0.10 | -            | -             |
| From: 0.11 to 0.20 | 0.1          | 1             |
| From: 0.21 to 0.30 | 0.1          | 2             |
| From: 0.31 to 0.35 | 0.25         | 1             |
| From: 0.36 to 0.45 | 0.35         | 1             |
| From: 0.46 to 0.55 | 0.35<br>0.10 | 1<br>1        |
| From: 0.56 to 0.60 | 0.25         | 2             |
| From 0.61 to 0.70  | 0.35<br>0.25 | 1<br>1        |



- Insert the shims under the cover on the sight glass side (see fig. 15), secure the cover to the crankcase, following the procedure in paragraph 2.1.2, and tighten the screws to the recommended torque. Verify that the shaft rotation stall torque is between 3-4.5 ft lbs (4-6 Nm).
- If the torque is correct, connect con-rods to the crankshaft, if torque is not correct reposition the shims again repeating the operations.

## 2.2 Fluid End Repair

### 2.2.1 Valve Units

#### 2.2.1.1 Dismantling the Valve Units

Operations are limited to inspection or replacement of valves, if necessary. Proceed as follows to extract the valve units:





- A) Unscrew the 13 M10x35 screws and the 4 M10 nuts fastening the valve cover and the front cover, then remove the cover (fig. 16).
- B) Remove the valve plugs using a M10 extractor hammer (fig. 16/a).
- C) Extract the balls using a magnet or similar tool (fig. 16/b).
- D) Move the inlet and outlet valve housings using the tool (#F27929500) (see mechanical drawings in par. 5.1) as indicated in fig. 17, fig. 17/a, and 17/b.



Before working on point D, make sure that the plunger is at bottom dead center.



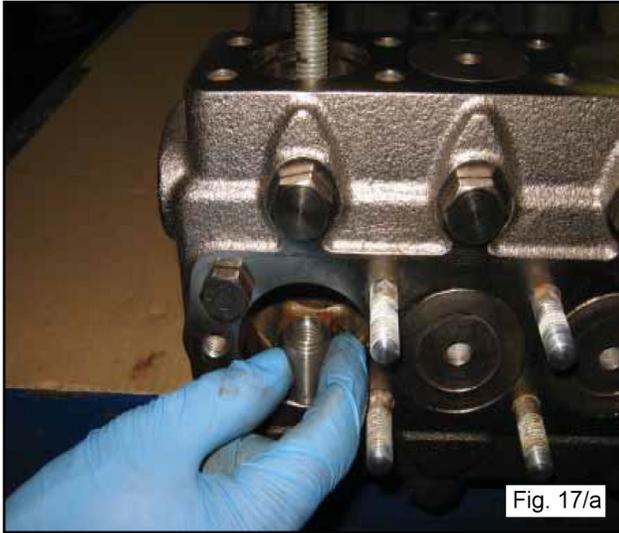


Fig. 17/a



Fig. 17/b

### 2.2.1.2 Head Assembly Valve Units



Pay careful attention to the state of wear of the various components; replace if necessary, and in any case within the intervals indicated in the “PREVENTIVE MAINTENANCE” table in chapter 11 of the Owner’s Manual. It is plausible that the state of wear of the components will be strongly correlated with the type of fluid and the percentage of the presence of solid residues. At each valve inspection, replace all O-rings and all anti-extrusion rings on the valve units and valve plugs.



Before repositioning the valve units, clean and completely dry the relative seats in the head as shown in fig. 18.

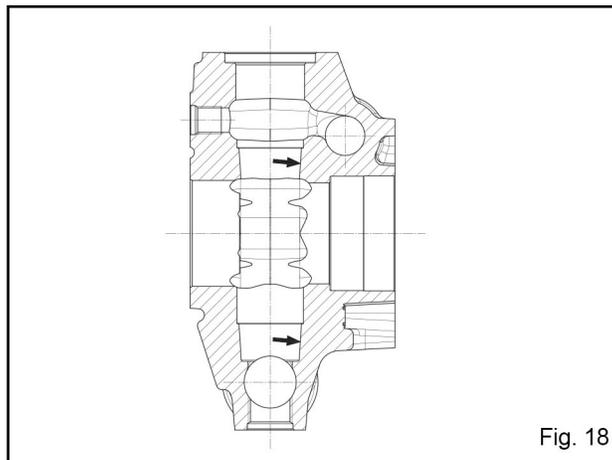


Fig. 18

To reassemble the various components, perform the operations listed above in a reverse order in par. 2.2.1.1.

In summary:

Assemble the inlet and outlet valve seats using the buffer (#F27783000) (see mechanical drawings in par. 5.1), ensuring that the tapered surfaces of the seats are locked in the tapered seats on the head (fig. 19 and fig. 20). Now position the ball in the seat (fig. 20/a), reassemble the valve caps and, at the front, reposition the valve covers. At the front, calibrate the respective M10x35 screws and M10 nuts with torque wrench as indicated in chapter 3.



## 2.2.2 Wiper

### 2.2.2.1 Wiper Disassembly

Wiper replacement is necessary whenever bentonite leaks are detected from the second drainage chamber present between the spacer and the crankcase (fig. 21). Indication of estimated component replacement intervals is present in the table in fig. 14 in chapter 11 of the **Owners Manual**.



A) Remove the front cover as indicated in fig. 21/a and unscrew the M10 screws as indicated in fig. 21/b.



B) Remove the head and the head spacer from the pump casting.

C) Extract the wiper support (fig. 22) and remove the wiper using a simple tool as indicated in fig. 22/a, making sure not to damage the seat. If necessary, remove the plunger spacer (pos. 1), before extracting the wiper support (see par. 2.2.3.1).



### 2.2.2.2 Wiper Assembly

To replace the wiper, proceed as follows:

- A) Assemble the wiper in the housing on the support (fig. 23), using a buffer as necessary and taking care not to damage the seal lip.



- B) Reposition the wiper support with lubrication on the bush (fig. 24), in the crankcase seat (fig. 24/a). If removed, replace the plunger spacer unit with bush lubrication after assembling the wiper support (see par. 2.2.3.2). Make sure not to damage the seal lip.



- C) Reposition the head spacer and the head on the crankcase.
- D) Fasten the head, tightening the 4 M10 screws and then replace the front cover.

For torque values and tightening sequences follow the instructions contained in chapter 3.

## 2.2.3 Plunger Spacer Unit

### 2.2.3.1 Plunger Spacer Unit Disassembly

The plunger spacer unit does not require any routine maintenance. Maintenance is limited to visual checks only.

Proceed as follows to extract the unit:

- A) After having removed the head and the head spacer, free the units as indicated in fig. 25.



- B) Check and verify their conditions, replace if necessary. Check and verify the conditions of the bushes assembled on the spacer (1, fig. 25); replace them if necessary.

### 2.2.3.2 Plunger Spacer Unit Assembly

- A) Fit the bush on the spacer (fig. 26) and tighten the unit on the plunger guide rod (fig. 26/a).



Fig. 26



Fig. 26/a



In the event that replacement is being carried out with the wiper already assembled, lubricate the bush and make sure, during insertion, not to damage the wiper seal lip.

For the tightening torques, follow the instructions in chapter 3.

## 2.2.4 Plunger Seal

### 2.2.4.1 Plunger Seal Disassembly

Plunger seal replacement is necessary whenever heavy bentonite leaks are detected from the opening under the head spacer. Indication of estimated component replacement intervals is present in the table fig. 14 in chapter 11 in the **Owner's Manual**. It is plausible that the state of wear of the components will be strongly correlated with the type of fluid and the percentage of the presence of solid residues.

To extract the plunger seal, bring the entire unit to top dead center and operate as follows:

- A) Remove the front cover as indicated in fig. 21/a.
- B) Remove the front plugs by means of an M10 extractor hammer
- C) Unscrew the M8 screws on the plunger unit and remove them together with seal fastening bush (fig. 27).

- D) Using an M10 cover screws, tighten using a T-handle wrench on the seal support so that it acts as an extractor (fig. 27/a). Once the seat has come out, extract the pack, composed of the support and the plunger seal (fig. 28).



The O-ring on the seal support must be replaced at each disassembly.

## 2.2.4.2 Plunger Seal Assembly

- A) Assemble the plunger seal with the seal support (on which the O-ring will be replaced), the seal fastening bush and the M8 screw (fig. 28).
- B) Lubricate the plunger seal with abundant OCILIS 250 silicone grease (#F12001600) (fig. 30).



- C) With the aid of a T-handle wrench, insert the plunger seal pack inside the cylinder (fig. 31) with the plunger spacer unit at TDC, making sure not to damage the seal lip. Screw the M8 screws in so that the seal pack positions itself in the seat and tighten it with the tightening torque contained in chapter 3.



## 2.2.5 Cylinder

### 2.2.5.1 Cylinder Disassembly

Cylinder replacement is necessary whenever consistent bentonite leaks are detected from the opening under the head spacer. It is plausible to think that the state of wear the component will be strongly correlated with the type of fluid and the percentage of the presence of solid residues.

Proceed as follows to extract the liner:

- A) Remove the front cover as indicated in (fig. 21/a) and unscrew the M10 screws as indicated (fig. 21/b).
- B) Separate the head from the crankcase (fig. 32) and extract the liner (fig. 33), with the aid of adjustable pliers, and the relative seal (fig. 34).



### 2.2.5.2 Cylinder Assembly

To replace the cylinder and the head, proceed as follows:

- A) Insert the seal (fig. 35) and the cylinders (fig. 36) in the cylinder seat on the head.



Fig. 35



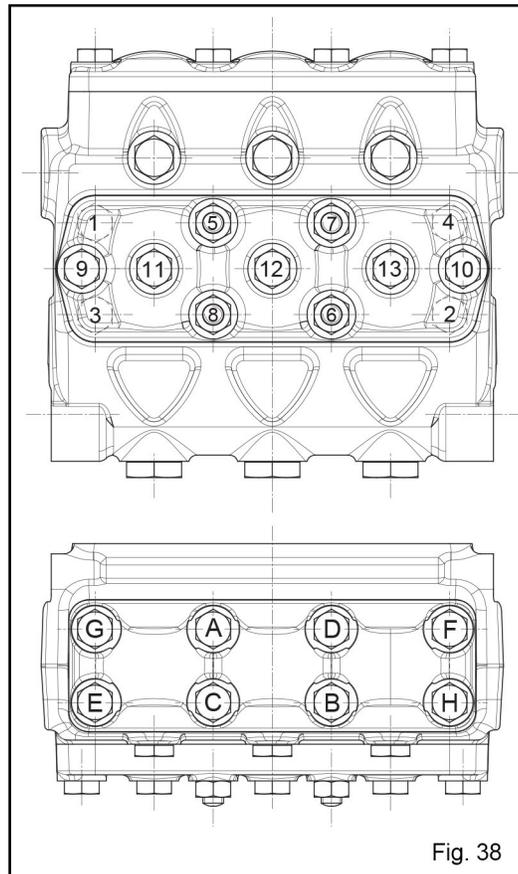
Fig. 36

- B) Assemble the head valves of the tightening torques and sequences are contained in chapter 3.

## 3. SCREW CALIBRATION

| Description                   | Exploded view pos. | Material            | Tightening torque<br>ft lbs / (Nm) |
|-------------------------------|--------------------|---------------------|------------------------------------|
| Cover Fixing Screw            | 60                 | 8.8                 | 7.38 (10)                          |
| Plunger Fixing                | 21                 | Stainless steel A2  | 14.75 (20)                         |
| Con-rod Cap Fixing Screw      | 48                 | 12 R                | 22.13* (30)                        |
| Head Fixing Nut - Cover       | 6                  | 8.8                 | 29.50*** (40)                      |
| Head Fixing ScREW             | 31                 | 8.8                 | 29.50** (40)                       |
| Stud Bolt M10                 | 7                  | 8.8                 | 15                                 |
| Screw Fix. Cov. Valves - frt. | 9                  | 8.8                 | 29.50*** (40)                      |
| Stud Bolt M7                  | 22                 | C40                 | 14.75**** (20)                     |
| Plunger Spacer                | 25                 | Stainless steel     | 14.75 (20)                         |
| Oil Drain Plug                | 45                 | Zinc plated steel   | 14.75 (40)                         |
| Plug G 1/4"                   | 10                 | Nickel plated brass | 14.75 (40)                         |
| Plug G 1/2"                   | 30                 | Zinc plated steel   | 14.75 (40)                         |

- \* The con-rod cap fixing screws must be tightened respecting the phases indicated on page 20.
- \*\* The head fixing screws exploded view pos. 31 must be tightened with a torque wrench, lubricating the threaded shank, following the order shown in the diagram in fig. 38.
- \*\*\* The cover fixing screws and nuts exploded view pos. 9 and 6 must be tightened with a torque wrench, lubricating the threaded shank, following the order shown in the diagram in fig. 38.
- \*\*\*\* The stud bolt M7 exploded view pos. 22, is to be mounted on the spacer exploded view pos. 25 with loctite 243 (#F12006400).



## 4. REPLACING THE CON-ROD FOOT BUSHING

During maintenance, if it becomes necessary to replace the con-rod foot bush, proceed as follows:



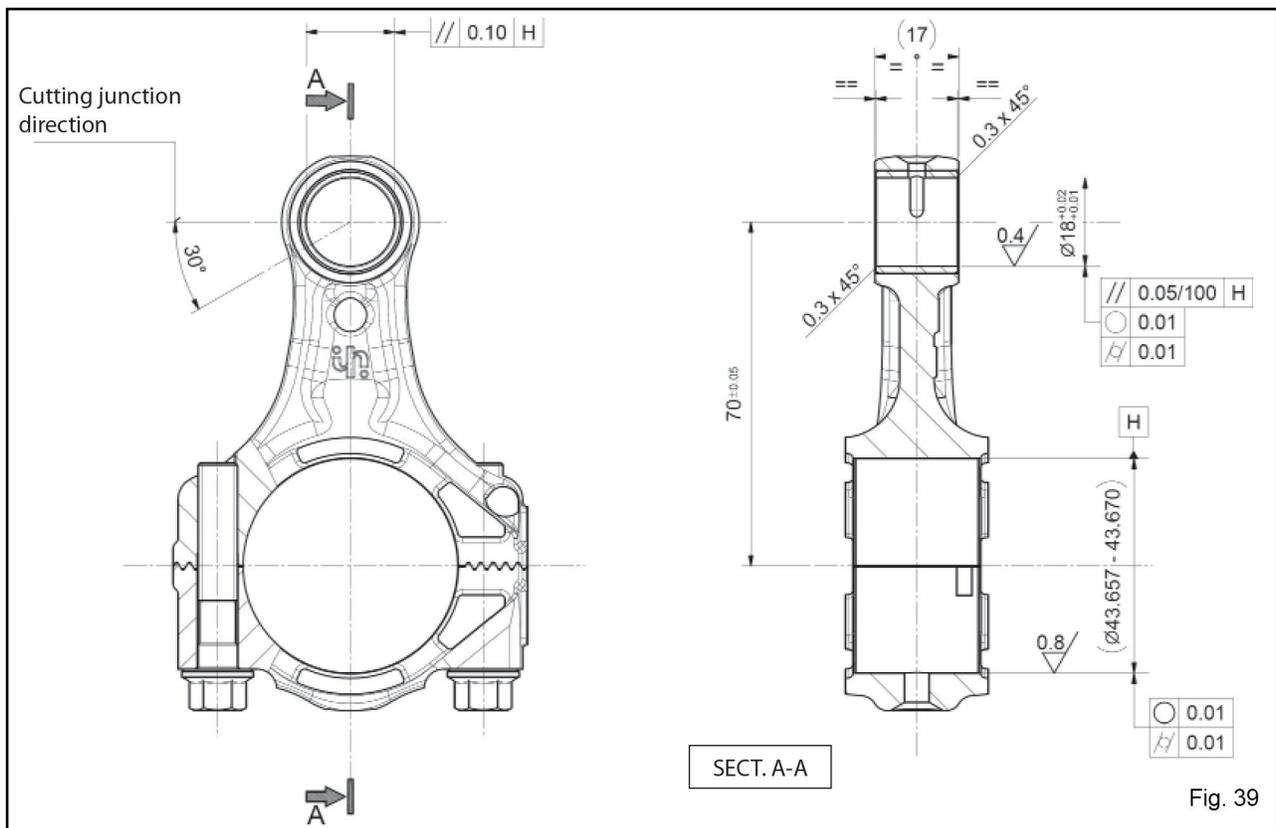
When removing the worn bushing, take great care not to damage or scratch the seat on the con-rod.

Preform cold press fitting of the new bushing. During this operation, ensure that:

- The lubrication hole coincides with the corresponding hole on the con-rod;
- The cutting junction is directed as shown in fig. 39.



Then preform mechanical processing. The dimensions and tolerances shown in fig. 39 **MUST** be respected.



## 5. REPAIR TOOLS

Pump repairs can be facilitated by special tool part numbers as follows:

### For assembly phases:

|   |            |
|---|------------|
| Valve seat assembly tool (see par. 5.1) | #F27783000 |
| Buffer for pump shaft oil seal          | #F27904500 |
| Buffer for plunger guide oil seal       | #F27904200 |

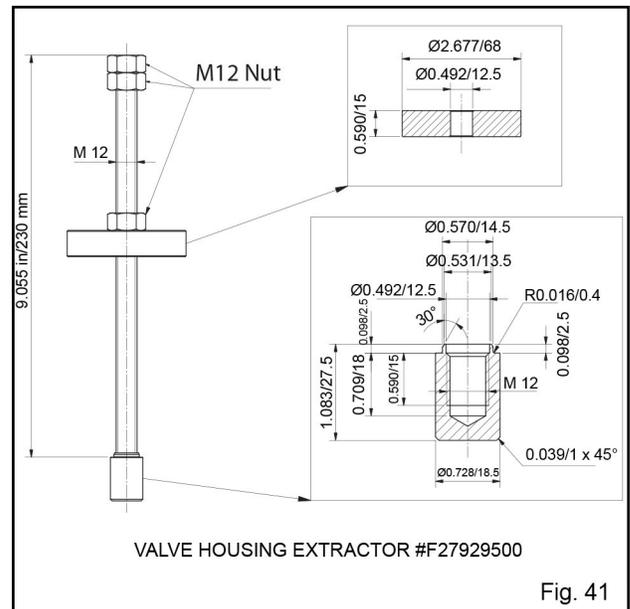
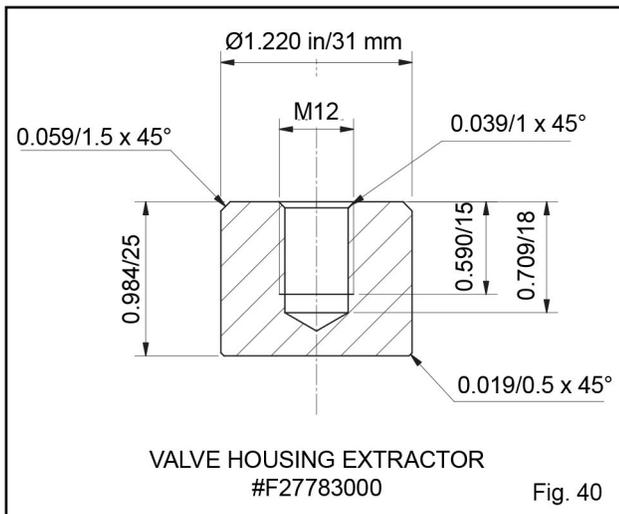
### For disassembly phases:

|   |                  |
|---|------------------|
| Inlet / outlet valve seats (see par. 5.1) | #F27929500       |
| Inlet and outlet valve plug               | Extractor hammer |
| Plunger guide oil seal                    | #F27503800       |



For proper assembly of the valve seats and relative disassembly, use tool (#F27783000) and (#F27929500).

### 5.1 Valve Seat Assembly / Disassembly Tool Mechanical Drawings.



## 6. MAINTENANCE LOG

### HOURS & DATE

|                            |  |  |  |  |  |  |  |
|----------------------------|--|--|--|--|--|--|--|
| <b>OIL CHANGE</b>          |  |  |  |  |  |  |  |
| <b>GREASE</b>              |  |  |  |  |  |  |  |
| <b>PACKING REPLACEMENT</b> |  |  |  |  |  |  |  |
| <b>PLUNGER REPLACEMENT</b> |  |  |  |  |  |  |  |
| <b>VALVE REPLACEMENT</b>   |  |  |  |  |  |  |  |



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