Repair Manual
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1. INTRODUCTION
This manual describes the instructions for repairing KF 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 Crank Mechanism Repair
Crank mechanism repair operations must be performed after removal of oil from the crankcase. To drain the oil, remove the oil dipstick, (1, fig. 1) and then the draining plug (2, fig. 1).

The used 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 Crank mechanism disassembly
The correct sequence is the following:
Disassemble:
- The pump shaft key
- The rear cover
- The connecting rod cap
- The side covers using for extraction 3 fully threaded M6x50 screws, inserting them in the threaded holes as indicated in fig. 2.

B) Push the plunger guides and connecting rods forward to facilitate lateral extraction of the pump shaft. Two marks are visible on the crankshaft (3, fig. 3 and 3a); they must be turned towards the operator in order to facilitate extraction.

Note: To extract the plunger guide it is necessary to remove the ceramic plunger and wiper first.

C) Disassemble the crankshaft oil seals and the plunger guides using standard tools.
2.1.2 Crank mechanism assembly
After cleaning the crankcase, reassemble the crankcase mechanism as follows:

A  Thoroughly fit the plunger guide seals into their seat on the crankcase as shown in fig 4a, using the appropriate tool, part #F27904900.

B  Introduce the pre-assembled plunger guide / connecting rod units into their seat; to facilitate tightening of the connecting rod cap, we advise to position the connecting rod so you can easily read the number. To easily introduce the crankshaft, without the key, fully push in the plunger guide / connecting rod unit, as indicated in section B, paragraph 2.1.1, and shown in figure 4.

c) Before reassembly of the side covers, check the condition on the radial ring lips. If replacement is needed, position the new ring using the tool part #F27904800 as shown in fig. 6.

![fig 4](image)

![fig 5](image)

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 shown in fig. 5.
Before assembling the cover (sight glass side), be sure that the shim rings have been inserted. To help the covers fit onto the crankcase, we advise using 3 screws M6x40, and then finish the operation with the screws supplied (M6x18) as shown in fig. 6.

D) Install the connecting rod cap respecting numbering, and fasten the relevant bolts (lubricating both the head and the threaded stem) proceeding in three different steps, see fig. 8:

1. Approaching torque 4.4-6 ft. lbs. (6-8 Nm)
2. Pre-fastening torque 18.4-20.6 ft. lbs. (25-28 Nm)
3. Fastening torque 28 ft. lbs. (38 Nm)

E) Install the rear cover positioning the oil dipstick hole upward.

F) Fill the crankcase with oil as indicated in the Owner’s Manual in Section 7.4.

2.1.3 Disassembly/Assembly of Bearing and Shims
The type of bearings (tapered roller bearings) ensures the absence of axial play on the crankshaft. The shims are to be determined to reach this purpose. To disassemble / assemble, or to replace them if needed, carefully follow the instructions below.
A) Disassembly/Assembly of the crankshaft without replacing the bearings
After removing the side covers, as indicated in paragraph 2.1.1, check the rollers and their races for wear; if all parts are in good condition, thoroughly clean the components with a suitable degreaser and grease them again evenly using the same oil used in the crankcase.
The same shims can be used again, being careful to fit them under the cover on the sight glass side. After installing the complete unit (sight glass flange + shaft + engine side flange), check that the shaft’s rolling torque - with the connection rods free - is at least 3 ft. lbs (4 Nm), max 5 ft. lbs (7 Nm).
To position the two side covers on the crankcase, initially use 3 M6x40 screws as shown in fig. 6, and then the fastening screws.
The shaft’s rolling torque (with connecting rods coupled) must not exceed 6 ft. lbs (8 Nm).

B) Disassembly/Assembly of the crankshaft with bearing 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 figures 8-9.

The new roller bearing can be mounted at room temperature with a press or fly press; it is necessary to lay them on the lateral side of the relevant ring nuts with appropriate rings. The driving operation can be facilitated by heating the relevant parts at a temperature ranging between 250°-300° F(120°-150° C), making sure that the ring nuts are correctly fitted into their seats

Never invert the parts of the two bearings.

The shim pack must be redefined as follows:
A) Insert the crankshaft in the crankcase, being sure that the PTO shank comes out of the correct side.
B) Fit the PTO side flange to the crankcase paying great attention to the seal lip as indicated in paragraph 2.1.2., section C.
C) Position the flange on the sight glass side as indicated in paragraph 2.1.
D) 2 using a thickness gauge (see fig. 10).

Determine the shim pack as indicated in the table below:

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Shim Type</th>
<th>No. of Pieces</th>
</tr>
</thead>
<tbody>
<tr>
<td>From: 0.05 to: 0.10</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>From: 0.11 to: 0.20</td>
<td>0.1</td>
<td>1</td>
</tr>
<tr>
<td>From: 0.21 to: 0.30</td>
<td>0.1</td>
<td>2</td>
</tr>
<tr>
<td>From: 0.31 to: 0.35</td>
<td>0.25</td>
<td>1</td>
</tr>
<tr>
<td>From: 0.36 to: 0.45</td>
<td>0.35</td>
<td>1</td>
</tr>
<tr>
<td>From: 0.46 to: 0.55</td>
<td>0.35 0.10</td>
<td>1 1</td>
</tr>
<tr>
<td>From: 0.56 to: 0.60</td>
<td>0.25</td>
<td>2</td>
</tr>
<tr>
<td>From: 0.61 to: 0.70</td>
<td>0.35 0.25</td>
<td>1 1</td>
</tr>
</tbody>
</table>

E) Insert the shims of the cover on the sight glass side (see fig. 11), fixing it to the crankcase using the appropriate screws, and verifying that the stall torque is between 3-5 ft. lbs. (4-7 Nm).

F) If the torque value is correct, connect the rods to the crankshaft; otherwise, redefine the shims again repeating the operations from point C.

2.2 Fluid End Repair

2.2.1 Disassembly of the head - valve units
Service operations are limited to valve inspection or replacement if needed
To extract the valve units proceed as follows:
A) Unfasten the (7) M12x35 valve cover screws, and remove the cover, fig. 12.
B) Extract the valve plugs using a slide hammer (part #F26019400, fig. 12.
C) Extract the valve units using the same slide hammer used for the valve plugs (part #F26019400): it is applied to the M10 hole of the valve guide.

If the extraction of the delivery and suction valve units is particularly difficult (for example due to incrustations caused by prolonged pump inactivity), use the extraction tool (part #27516900 combined with part #F26019400).

Disassemble the suction and delivery valve units by screwing on an M10 screw long enough to act on the valve and extract the valve guide from the valve seat (4, fig. 13).

Remove the pinion using a slide hammer applying it to the M12 hole (fig. 17).
Unfasten the reducer case screws; then remove the reducer case (fig. 18).

2.2.2 Head assembly - valve units

Pay careful attention to state of wear of the various components; replace them when necessary, and in any case within the intervals indicated in the table in fig. 14, chapter 11 of the Owner’s Manual. At each valve inspection, replace all valve plugs, O-rings and anti-extrusion rings.

Before positioning the valve units, clean and perfectly dry the relevant seats in the head as indicated in fig. 14.
Proceed with reassembly by inverting the procedure indicated in paragraph 2.2.1.

⚠️ During the assembly of the suction and delivery valves (fig. 15 - fig. 16) do not invert the springs with the previously disassembled delivery springs:
   a) Suction spring “white”
   b) Delivery spring “black”

To facilitate the insertion of the valve guide into its seat, use a pipe that lays on the horizontal shoulders of the guide (fig. 16a) and use a hammer acting on the entire circumference.

Insert the suction and delivery valve units checking that they are thoroughly inserted in the head seat. Therefore apply the valve covers and proceed with calibrating the related M12x35 screws with a torque wrench as indicated in Chapter 3.

### 2.2.3 Disassembly of the head - seals
The replacement of the seals is necessary if water leaks are detected from the draining holes located at the rear of the crankcase, and in any case within the intervals indicated in the table in fig. 14, Chapter 11 of the Owner’s Manual.

A) Unfasten the M12x150 head screws as shown in fig. 17.
B) Remove the head from the crankcase.
C) Extract the high pressure seals from the head, and the low pressure seals from their related support by using standard tools as shown in 5, fig. 18; be careful not to damage the seats.

Pay careful attention to the order of sealing pack disassembly as shown in fig. 19, composed of:

1. Head ring
2. HP seal
3. Re-stop ring
4. Packings support
5. LP seal
6. Sealing ring
7. Circlip
8. O-ring
2.2.4 Plunger unit disassembly
The plunger unit does not require periodical maintenance. Service interventions are limited to visual inspections only. For plunger unit extraction, operate as follows:

A) Unfasten the M7x1 plunger screws as shown in fig. 20.

Check for wear; replace them if necessary.

At each disassembly, all the o-rings of the plunger unit must be replaced (1, fig. 42).

2.2.5 Head assembly - seals - plunger unit
Reassemble the various components by inverting the previously listed operations as indicated in paragraph 2.2.3, paying particular attention to the following:

A) The sealing packs: respect the same order of disassembly.
B) Lubricate the components (2,3 and 5) with OCILIS type silicone grease part #F12001600; this operation is also considered necessary to facilitate the settling of the sealing lips on the plunger.
C) For correctly assembling the HP seals in their related seats on the head without damaging the lips, use the appropriate tools depending on the pumping assembly diameters as indicated in Chapter 4.
D) Reassemble the plungers by fastening the screws with an appropriate torque wrench, respecting the fastening torque value indicated in Chapter 3.
E) Assemble the head: for fastening torque values and fastening sequences, respect the indications of Chapter 3.
3. SCREW CALIBRATION

Screws are to be fastened exclusively using a torque wrench.

<table>
<thead>
<tr>
<th>Description</th>
<th>Exploded View Position (From Owner's Manual)</th>
<th>Fastening Ft. Lbs.</th>
<th>Fastening Nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cover Fastening Screws</td>
<td>9</td>
<td>7.4</td>
<td>10</td>
</tr>
<tr>
<td>Plunger Fastening Screws</td>
<td>29</td>
<td>14.8</td>
<td>20</td>
</tr>
<tr>
<td>Connecting Rod Fastening Screws</td>
<td>16</td>
<td>28</td>
<td>38*</td>
</tr>
<tr>
<td>Head Fastening Screws</td>
<td>39</td>
<td>59</td>
<td>80**</td>
</tr>
<tr>
<td>Valve Cover Screws</td>
<td>40</td>
<td>88.5</td>
<td>120***</td>
</tr>
<tr>
<td>Lifting Bracket Fastening Screws</td>
<td>56</td>
<td>73.8</td>
<td>100</td>
</tr>
<tr>
<td>Oil Discharge Plug</td>
<td>11</td>
<td>29.5</td>
<td>40</td>
</tr>
<tr>
<td>Delivery Duct Plug</td>
<td>58</td>
<td>29.5</td>
<td>40</td>
</tr>
</tbody>
</table>

* The connecting rod fastening screws must be fastened simultaneously respecting the phases indicated in Point D on page 6.

** The head fastening screws, exploded view position 39, must be tightened with a torque wrench, lubricating the threaded stem with molybdenum disulphide grease part #F12001500, respecting the order shown in the scheme in fig. 21.

*** The valve cover cover screws, exploded view position 40, must be tightened with a torque wrench, lubricating the threaded stem with molybdenum disulphide grease part #F12001500, respecting the order indicated in the scheme in fig. 21.
4. REPAIR TOOLS

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

For assembly:

<table>
<thead>
<tr>
<th>For Assembling Part:</th>
<th>Tool Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasket Bushing Øe 45; H.P. alternative sealing ring Ø 28x45x5.5/5</td>
<td>F27473000</td>
</tr>
<tr>
<td>Gasket Bushing Øe 45; H.P. alternative sealing ring Ø 30x45x7.5/4.5</td>
<td>F27473000</td>
</tr>
<tr>
<td>Gasket Bushing Øe 48; H.P. alternative sealing ring Ø 36x48x6/3.5</td>
<td>F27473300</td>
</tr>
<tr>
<td>Gasket Bushing Øe 55; H.P. alternative sealing ring Ø 40x55x7.5/4.5</td>
<td>F27473100</td>
</tr>
<tr>
<td>Gasket Bushing Øe 36; L.P. alternative sealing ring Ø 28x36x5.5</td>
<td>F27470900</td>
</tr>
<tr>
<td>Gasket Bushing Øe 38; L.P. alternative sealing ring Ø 30x38x5</td>
<td>F27471000</td>
</tr>
<tr>
<td>Gasket Bushing Øe 44; L.P. alternative sealing ring Ø 36x44x5.5</td>
<td>F27471100</td>
</tr>
<tr>
<td>Gasket Bushing Øe 48; L.P. alternative sealing ring Ø 40x48x5.5</td>
<td>F27471300</td>
</tr>
<tr>
<td>Pump Shaft Oil Seal Stopper</td>
<td>F27904800</td>
</tr>
<tr>
<td>Plunger Guide Oil Seal Stopper</td>
<td>F27904900</td>
</tr>
</tbody>
</table>

For Disassembly:

<table>
<thead>
<tr>
<th>For Disassembling Part:</th>
<th>Tool Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suction / Delivery Valves</td>
<td>F26019400</td>
</tr>
<tr>
<td></td>
<td>F27516900</td>
</tr>
<tr>
<td>Suction and Delivery Valve Plug</td>
<td>F26019400</td>
</tr>
<tr>
<td>Plunger Guide Oil Seal</td>
<td>F27503900</td>
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## 5. MAINTENANCE LOG

<table>
<thead>
<tr>
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<th>HOURS &amp; DATE</th>
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<tbody>
<tr>
<td><strong>OIL CHANGE</strong></td>
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<tr>
<td><strong>GREASE</strong></td>
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<tr>
<td><strong>PACKING REPLACEMENT</strong></td>
<td></td>
</tr>
<tr>
<td><strong>PLUNGER REPLACEMENT</strong></td>
<td></td>
</tr>
<tr>
<td><strong>VALVE REPLACEMENT</strong></td>
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</tbody>
</table>

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