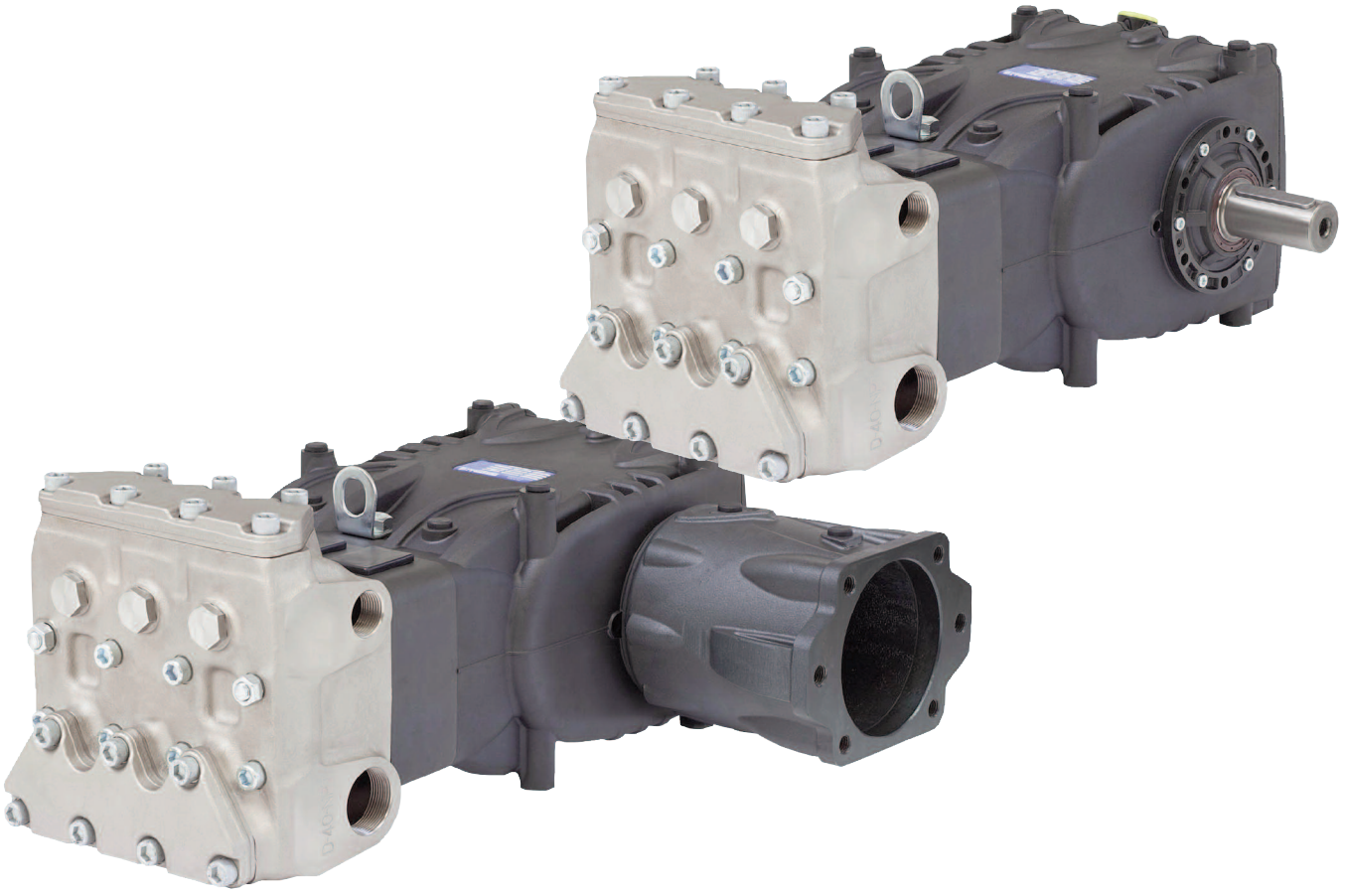
GENERAL PUMP

KFM

Repair Manual



INDEX

1. INTRODUCTION

This manual describes the instructions for repairing the KFM 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 duration. General Pump declines any responsibility for damage caused by 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), and then the plug (2), in fig. 1.

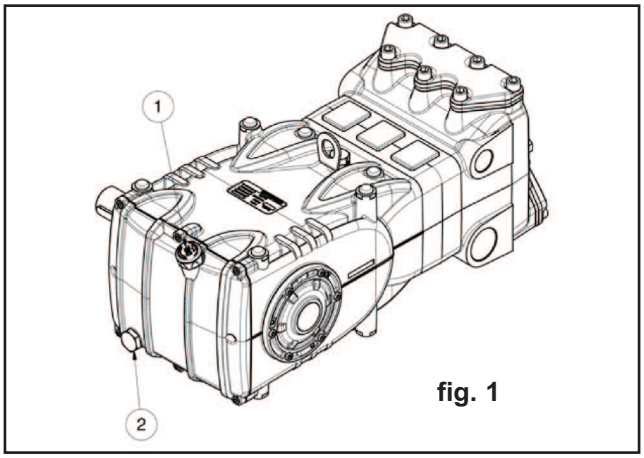


fig. 1

Exhausted oil must be collected in an appropriate container and disposed of in appropriate 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:

A) Dissasemble:

- pump shaft key
- rear cover
- connecting rod cap
- side covers, using 3 wholly threaded M6 x 50 screws, inserting them in the holes as shown in fig. 2.

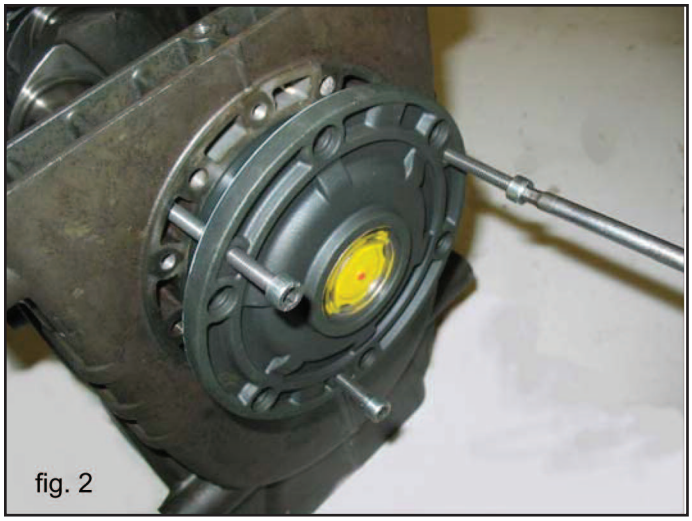


fig. 2

B) Push the plunger guides and connecting rods forward in order to facilitate the lateral extraction of the crankshaft. Two marks are visible on the crankshaft (3), as shown in fig. 3 and fig. 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, spacer and wiper first.

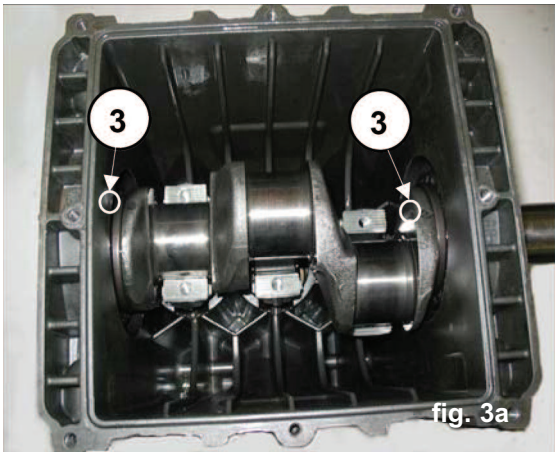


fig. 3a

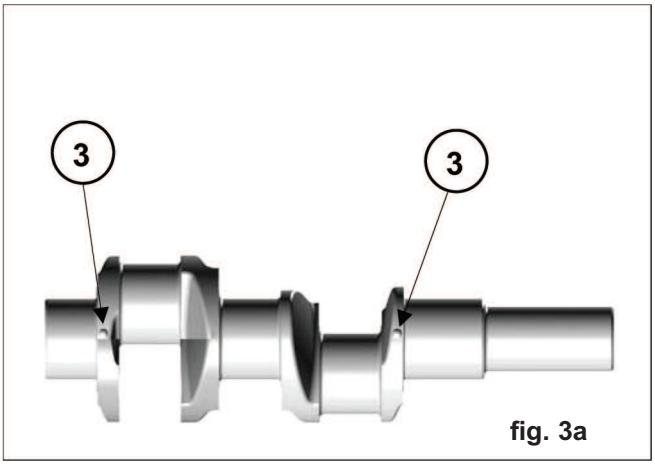


fig. 3a

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. 5a using the proper tool (p/n 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 fig. 4.


fig. 4

C) Before reassembly of the side covers, check the seal lips for wear. If replacement is necessary, position the new ring using the correct tool (#F27904500) as shown in fig. 5.

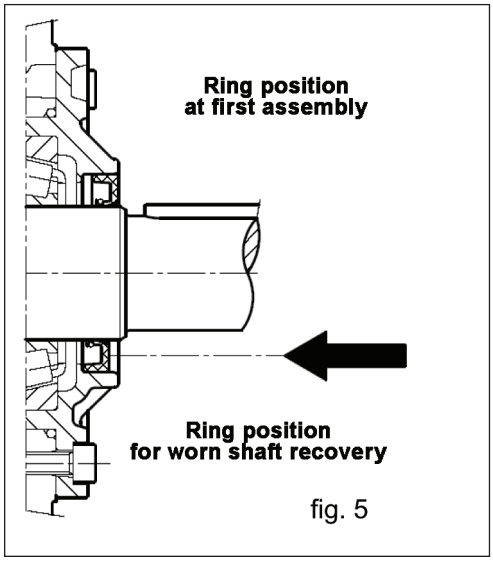


fig. 5

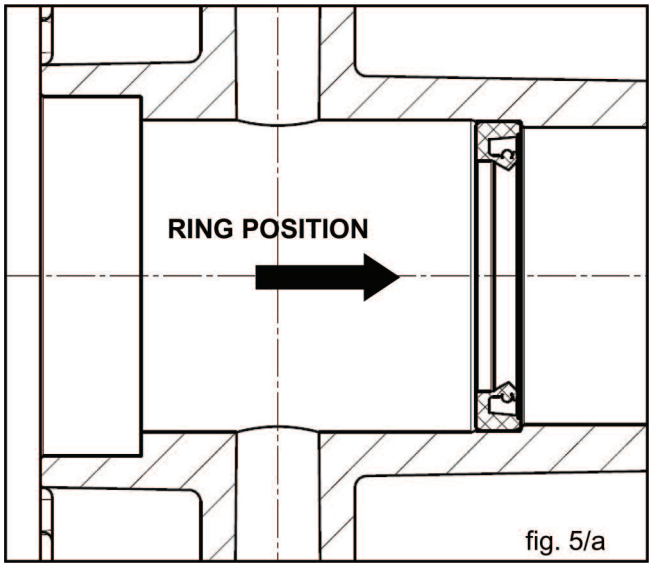


fig. 5/a

If the shaft presents diameter wear corresponding to the sealing lip, to avoid the need for griding it's possible to position the ring as indicated 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 M6 x 40, and then finish the operation with the screws supplied (M6 x 8) as shown in fig. 6.

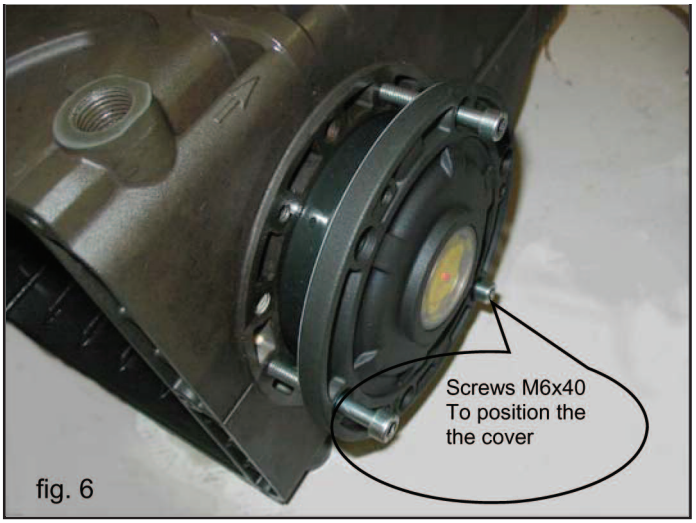


fig. 6

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. 7.

1. Approaching torque 4-6 ft. lbs. (6-8 Nm)
2. Pre-fastening torque 18-20 ft. lbs. (25-28 Nm)
3. Fastening torque 28 ft. lbs. (38 Nm)

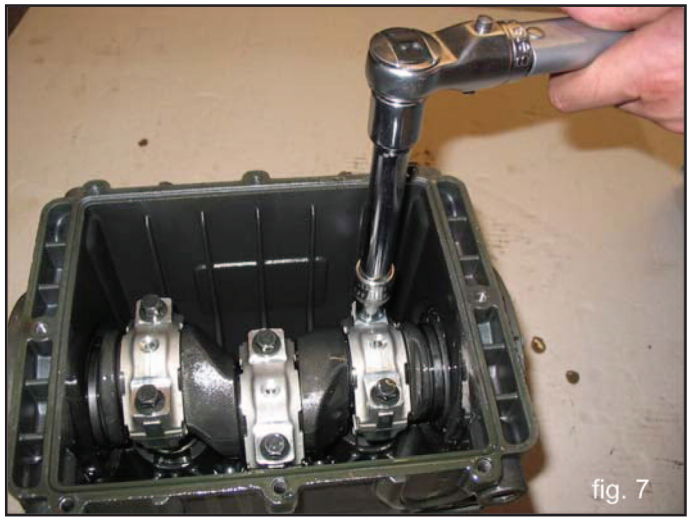


fig. 7

E) Install the rear cover positioning the oil dipstick hole upward.
F) Fill the crankcase with oil as indicated in the owner's manual paragraph 7.4

2.1.3 Disassembly / Assembly of bearings and shims

The type of bearings used (tapered roller bearings) ensures the absence of axial play on the crankshaft; the shims are to be determined to reach this purpose. Tp disassemble/assemble, or to replace them if needed, carefully follow the instructions below.

A) Disassembly/Assembly of the crankchaft without replacing the bearings
After removing the side covers, as indicated in paragraph 2.1.1, check the rollers and their faces for wear; if all parts are in good condition, accurately 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 connecting rods free - is a least 3 ft. lbs. (4 Nm), max 4 ft. lbs. (6 Nm). To position the two side covers on the crankcase, initially use 3 screws, M6 x 40 as shown in fig. 6, and then fastening the screws. The shaft's rolling torque (with the 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 extremeties using a standard pin extractor or similar tool as indicated in figures 8 and 9.

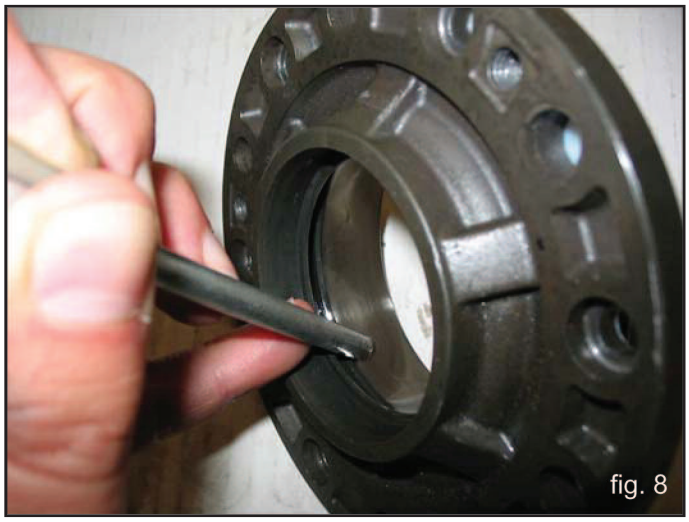


fig. 8


fig. 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 correct rings. The driving operation can be facilitated by heating the relevant parts at a temperature ranging between 250^0-300^0F (120^0-150^0C), 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 P.T.O. shank comes out of the correct side.
B) Fit the P.T.O. 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 2.1.2.
D) Use a thickness gauge (see fig. 10).


fig. 10

Determine the shim pack as indicated in the table below.

Measurement	Shim Type	# 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 0.10	1 1
From: 0.56 to: 0.60	0.25	2
From: 0.61 to: 0.70	0.35 0.25	1 1


fig. 11

E) Insert the shims under 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 3-4 ft. lbs. (4-6 Nm).

F) If the torque values is correct, connect the rods to the crankshaft; other wise, 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:

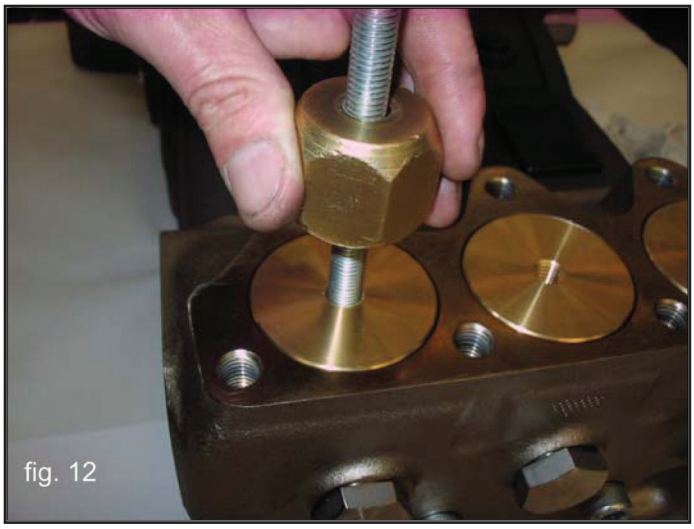


fig. 12

A) Unfasten the 7 M12 x 35 valve cover screws, and remove the cover (fig. 12).
B) Extract the valve plugs using a slide hammer M10 (fig, 12).
C) Extract the valve guides using the same slide hammer extractor used for the valve covers. (pos. 4, fig. 13) and the specific components of the valve group.
D) Extract the suction/delivery valve seats using the tool p/n F27913300 (see construction drawings in paragraph 4.1) as shown in fig. 12a and fig. 13b.

Before working as explained in point “D”, make sure that the plunger is located at bottom dead center.

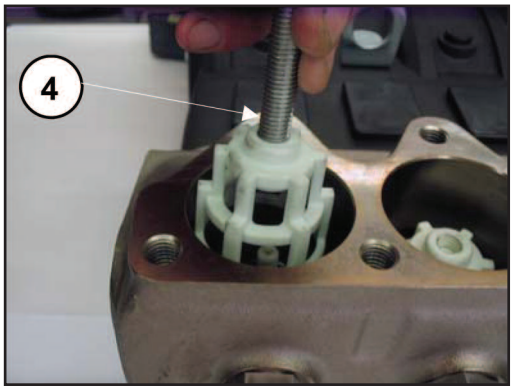


fig. 13


fig. 13a


fig. 13b

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 inspection, replace all valve units and valve plugs, o-rings and enti-extrusion rings.

Before repositioning the valve seats and the H.P. seals, clean and perfectly dry the relevant seats in the head as indicated in fig. 14.

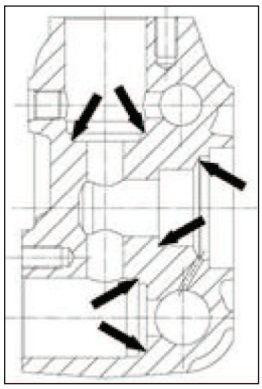


fig. 14

Proceed with reassembly by inverting the proceedure indicated in paragraph 2.2.1.

During the assembly of the suction and delivery valve units (fig. 15 - fig. 16) do not invert the suction springs with the previously disassembled delivery springs:

a) Suction springs "white"
b) Delivery springs "black"

To facilitate insertion of the valve guide on the seat, you can use a pad placed on the horizontal surfaces of the guide (fig. 16) and drive it with a sliding hammer.

fig. 15

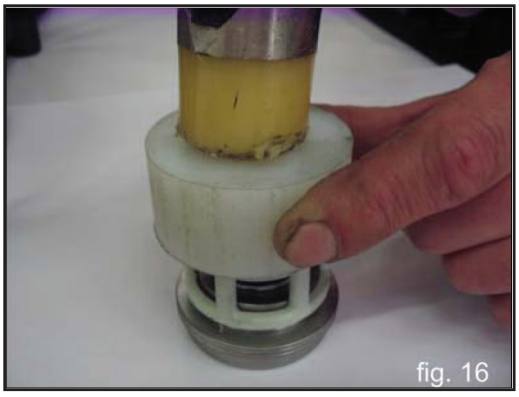


fig. 16

fig. 16/a

Mount the suction and delivery valve groups with the tool p/n F27576300 (see construction diagrams in paragraph 4.1) making sure that they are abutting with the bottom of the seat on the head (fig. 16a). Then put on the valve covers and proceed with calibration of the M12 x 35 screws with dynamometric key as shown in Chapter 3.

2.2.3 Disassembly of the head - seals

Replacing the seals is necessary from the moment high losses of bentonite begin appearing from the opening under the spacer, and in any case at the intervals specified in the table in (fig. 14) Chapter 11 of the Owner's Manual.

A) Unscrew the M12 x 220 head fastening screws as shown in fig. 17 and the M12 nuts as shown in fig. 17a.

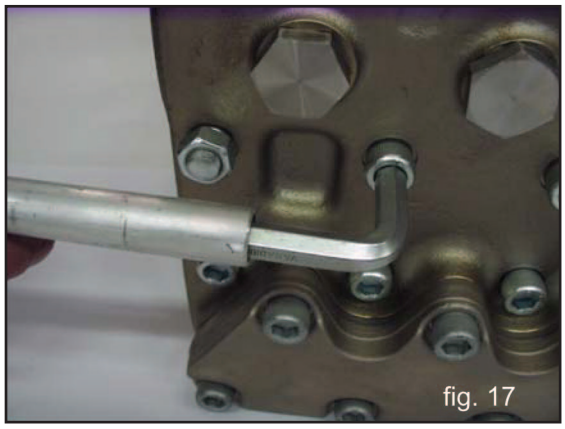


fig. 17

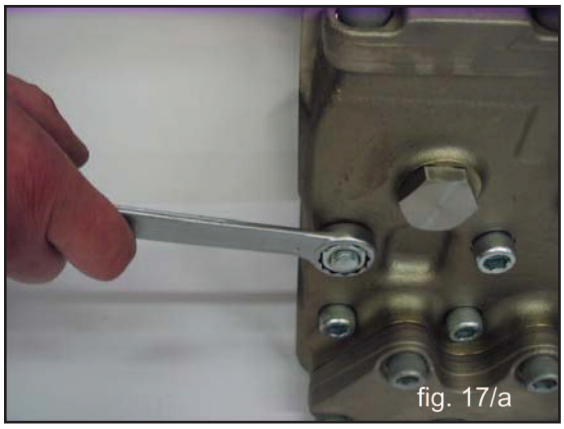


fig. 17/a

B) Separate the head from the pump housing.
C) Extract the high-pressure seal from the head after removing the seal packing / seal lip and the scraper with its packing after removing the plungers (see paragraph 2.2.4) using simple tools as shown in fig. 18 pos. 5 and fig. 18a, taking care to not damage their respective seats.

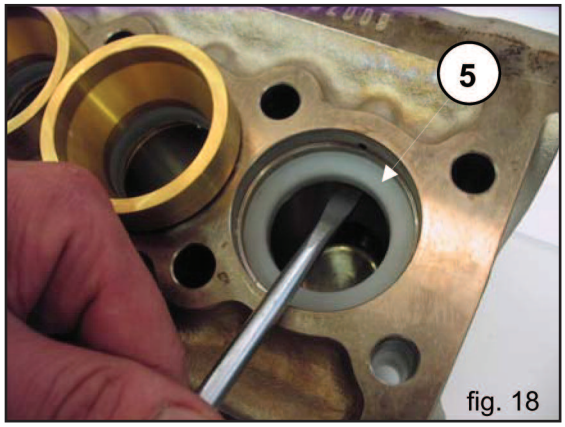


fig. 18

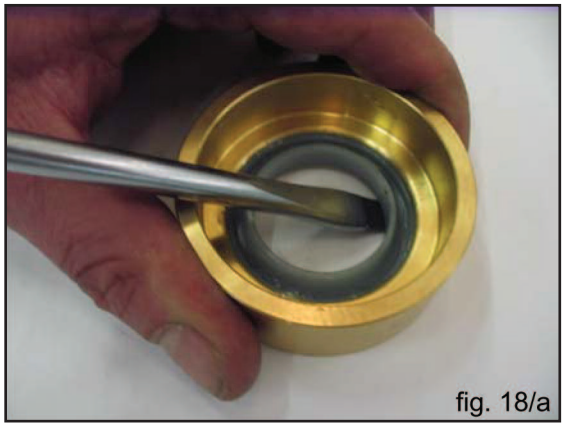
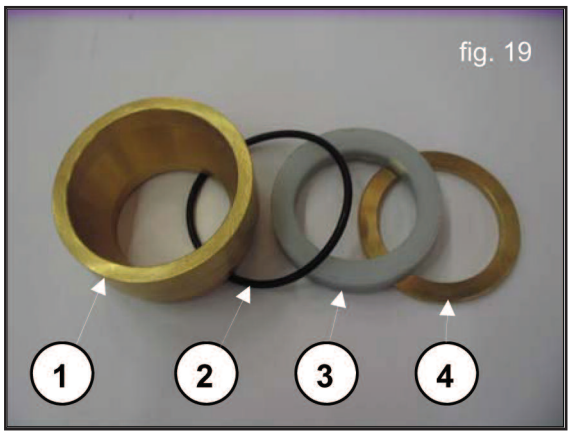
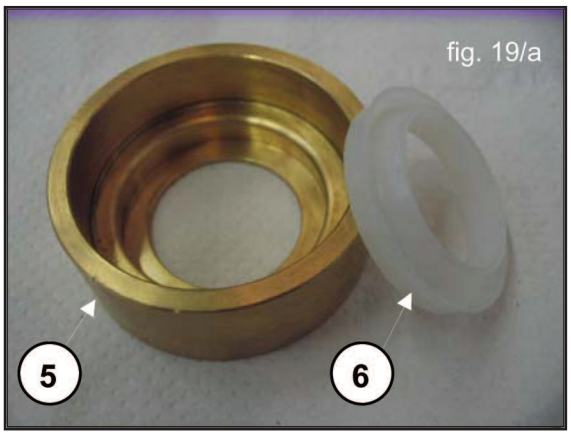


fig. 18/a

Pay careful attention to the order of seal packing disassembly as shown in fig. 19 and fig. 19a composed of:

1. Seal packing
2. O-ring
3. H.P. Seal
4. Head ring
5. Scraper packing
6. Scraper ring

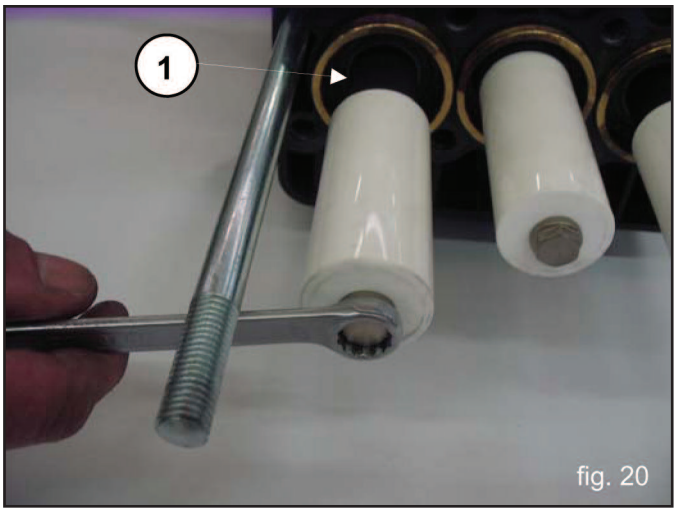




2.2.4 Plunger Unit Disassembly

The plunger unit does not require periodical maintenance. Service interventions are limited to visual inspections only. For plunger unit extraction, operate as follows:

A) Pull out the spacer and loosen the M7 x 1 plunger fastening screws as shown in fig. 20.



B) Check and verify their state of wear, and replace them if necessary. Check and verify the state of wear of the spacers located behind the plunger (fig. 20, pos. 1), and replace them if necessary.

At each disassembly, all plunger unit O-rings MUST be replaced.

2.2.5 Head assembly - seals - plunger unit

Reassemble the various components by inverting the operations previously listed in paragraph 2.2.3, paying careful attention to the following:

A) Seal packing: respect the same order followed during disassembly.
B) Lubricate components 2, 3 and 6 with silicone grease type (#F12001600); this operation is also considered necessary in order to facilitate the setting of the seal lip pn the plunger.
C) For correctly assembling the HP seals in their related seats on the head without damaging the lips, use the correct tools depending on the plumbing assembly diameters as indicated in Chapter 4.
D) Reassemble the plungers by fastening the screws with a torque wrench, respecting the fastening torque value inicated in Chapter 3.
E) Assemble the head: for fastening torque values and fastening sequences, follow the instructions in Chapter 3.

13. SCREW CALIBRATION

Description	Exploded View Position	Material	Fastening Torque (ft. lbs.)	Fastening Torque (Nm)
Cover fastening screws	9	8.8	7	10
Plunger fastening screws	54	AISI 416	15	20
Connecting rod caps fastening screws	18	12 R	28*	38*
Head fastening nut	45	8.8	59**	80**
Head fastening screws	48	8.8	59**	80**
Valve cover screws	29	12.9	89***	120***
Lifting bracket fastening screws	17	8.8	74	100
Oil Discharge plug	11	Plated Brass	30	40
Delivery duct plug	42	AISI 316L	30	40

* The connecting rod caps fastening screws must be tightened respecting the phases indicated in “Point D” of page 6.
** The head screws and nuts, exploded view position 45 and 48, must be fastened using a torque wrench, lubricating the threaded stem, respecting the order shown in the scheme in fig. 21
*** The valve cover screws, exploded position 29, must be fastened using a torque wrench, lubricating the threaded stem, respecting the order shown in the schematic in fig. 21.

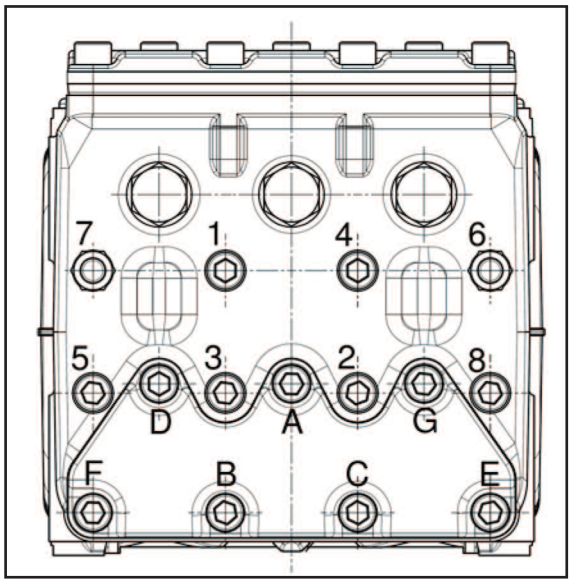


fig. 21

4. REPAIR TOOLS

Pump repair may be facilitated by using the proper tools. See Below.

For Assembly:

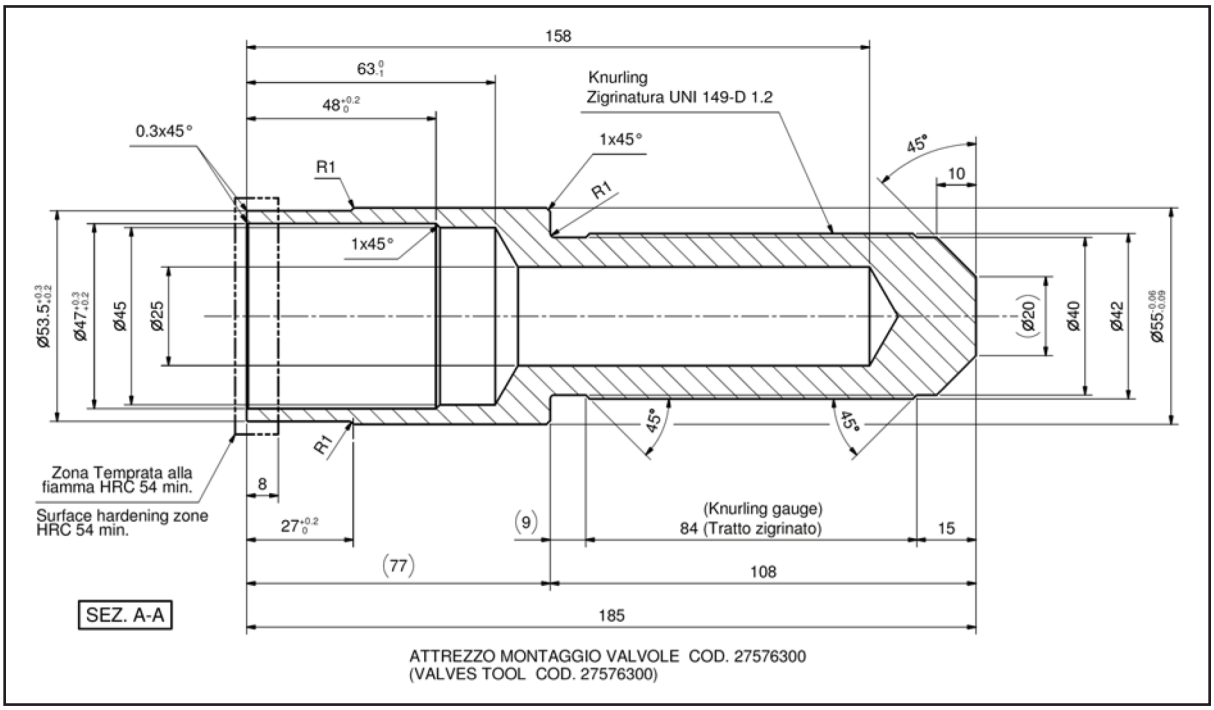
Valve Assembly Tool	F27576300
Pump Shaft Oil Seal Stopper	F27904800
Plunger Guide Oil Seal Stopper	F27904900

For Disassembly:

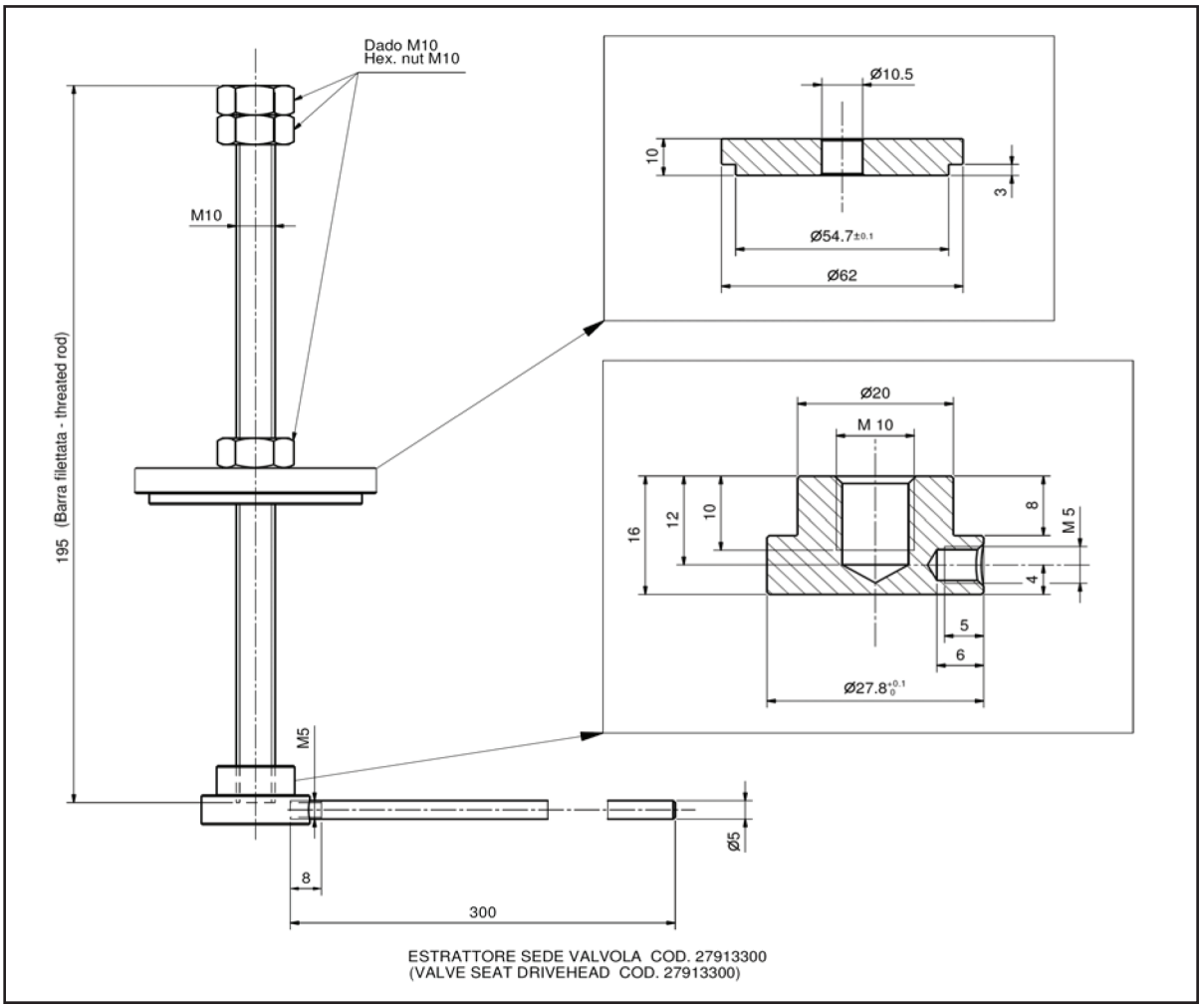
Suction/Delivery Valves	Sliding Hammer
Suction/Delivery Valve Seats	F27913300
Suction and Delivery Valve Plug	Sliding Hammer
Plunger Guide Oil Seal	F27503900

For correct assembly of the valve groups and disassembly of the valve seats, it is essential to use tools p/n F27576300 and F27913300.

4.1 Construction Drawings for Valve Seat Assembly/Disassembly Tools



ATTREZZO MONTAGGIO VALVOLE COD. 27576300
(VALVES TOOL COD. 27576300)



ESTRATTORE SEDE VALVOLA COD. 27913300
(VALVE SEAT DRIVEHEAD COD. 27913300)

MAINTENANCE LOG

	HOURS & DATE						
OIL CHANGE							
GREASE							
PACKING REPLACEMENT							
PLUNGER REPLACEMENT							
VALVE REPLACEMENT							

GENERAL PUMP

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