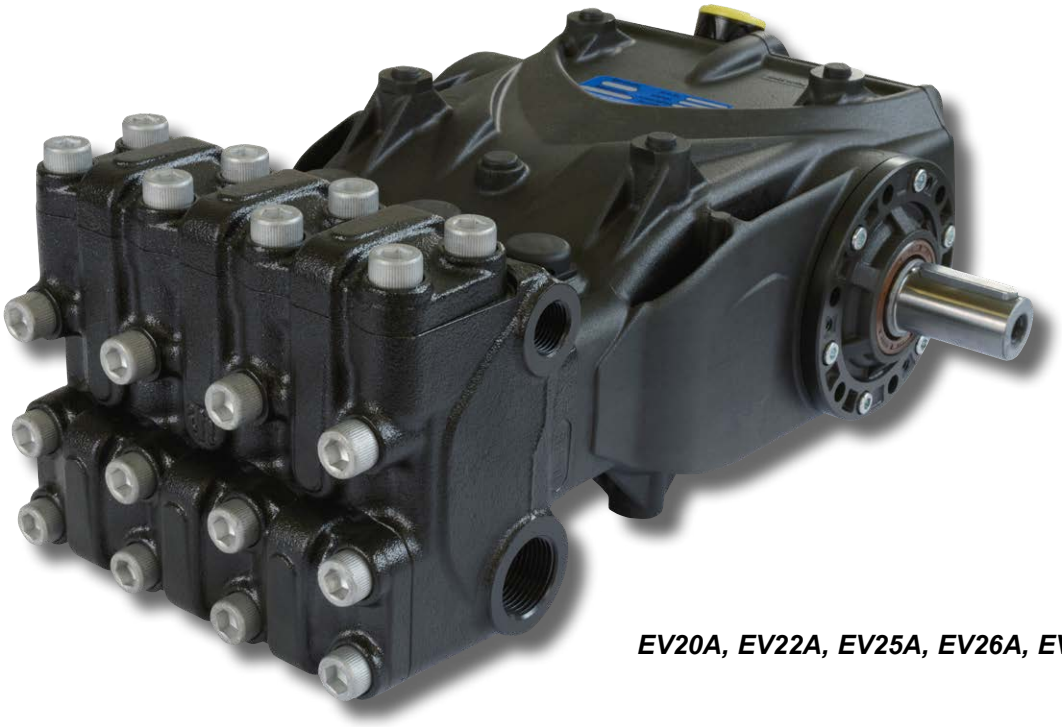
GENERAL PUMP

EV

Repair Manual



EV20A, EV22A, EV25A, EV26A, EV28A

General Pump is a member of the Interpump Group

QUALITY SYSTEM CERTIFICATION DNV·GL ISO 9001

Ref 301038 Rev. C
09-21

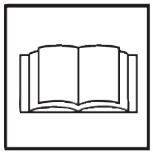
INDEX

1. INTRODUCTION

This manual describes the instructions for Repairing EV 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.

1.1 DESCRIPTION OF SYMBOLS

Warning
Potential Danger



Read carefully and understand the manual before operating the pump

Danger
Wear goggles

Danger
Wear protective gloves

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)

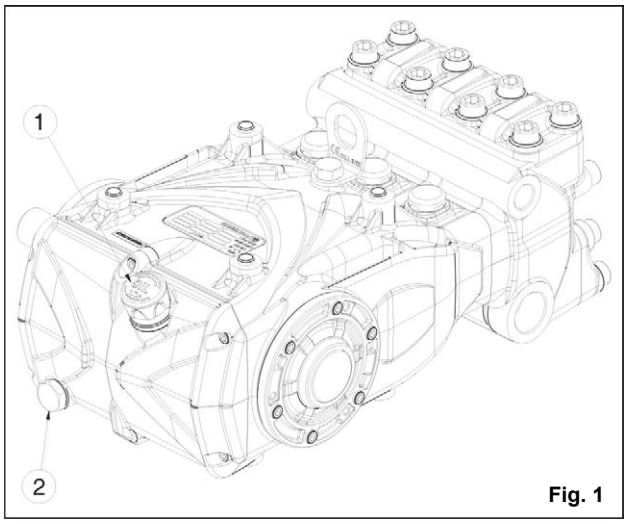


Fig. 1

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 the mechanical part. The operations described must be performed after removing the hydraulic part, ceramic plungers and splash guards from the pump (par. 2.2.3, 2.2.4).
Remove in the following order:

- The pump shaft tab
- The rear cover
- The con-rod cap as follows: unscrew the cap fixing screws, remove the con-rod caps (Fig. 2) paying attention to the sequence during disassembly.


Fig. 2

- The side covers using for extraction 3 fully threaded M6x50 screws, inserting them in the threaded holes as indicated in Fig. 3.


Fig. 3

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


Fig. 4

- Remove the pump shaft
- Complete disassembly of the connecting rods units by removing them from the pump casing and removing the piston guide pins.
- Remove the pump shaft seal rings using common tools.
- Remove the piston guide seal rings as described below: Use the extractor code 26019400 (Fig. 5, pos. 1) and the pliers code 25027000 (Fig. 5, pos 2). 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. 6) until the ring to be replaced is removed (Fig. 7).

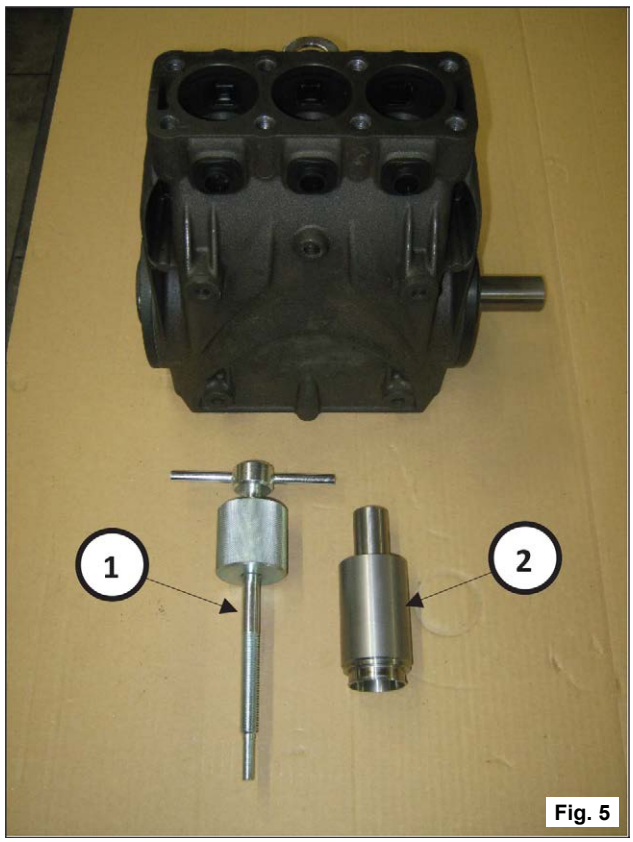


Fig. 5


Fig. 5/a

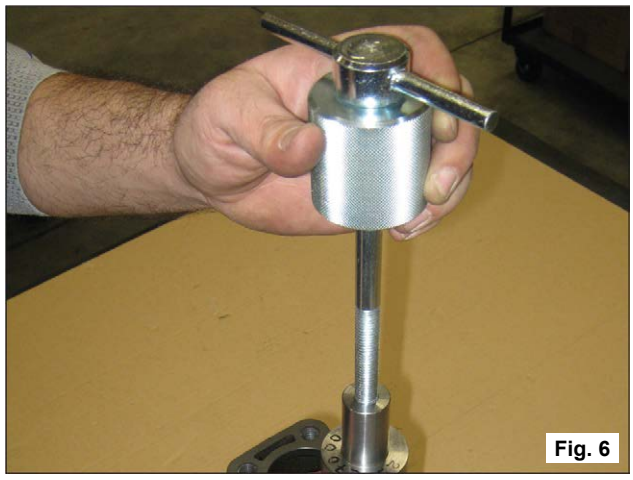


Fig. 6


Fig. 7

2.1.2 Assembly of mechanical parts

After having checked that the casing is clean, proceed with assembly of the mechanical part as described below:

- Insert the piston / con-rod guide units into the pump crankcase.

To facilitate pump shaft insertion (without the tab), it is essential to repeat the operation performed during disassembly, pushing the piston/con-rod guide units as far down as possible (par. 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 (code 27904500) as shown in Fig. 8.

If the crankshaft 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. 8.

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 fitting of the covers on the crankcase, it is recommended to use 3 partially-threaded M6 x 40 screws, (Fig. 8/a) to then complete the operation with the screws supplied (M6x16).

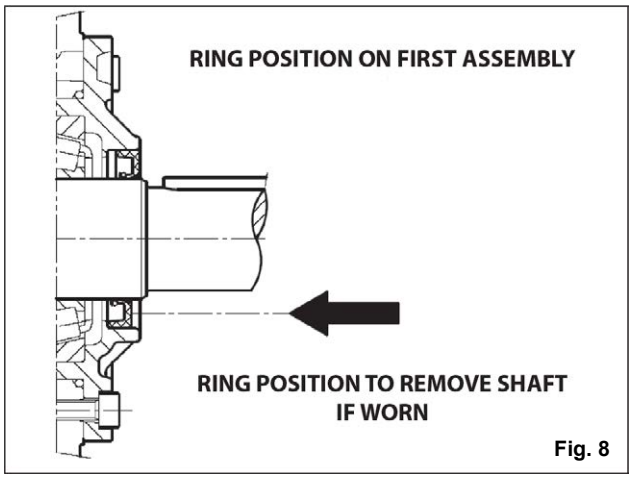


Fig. 8

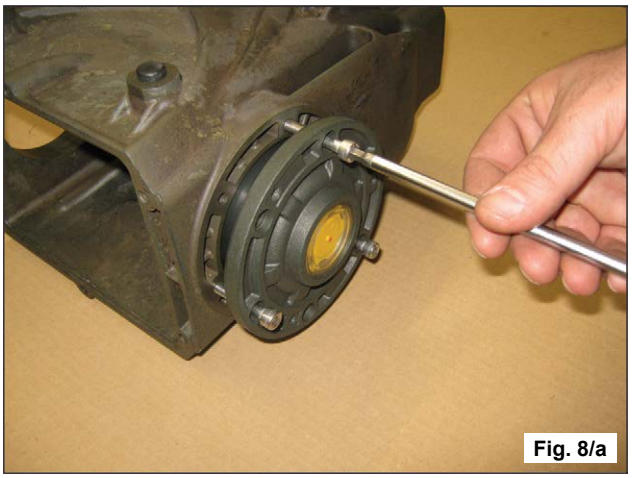


Fig. 8/a

- Couple the con-rod caps to their shanks (Fig. 9, pos. 1).

Note the correct assembly direction of the caps.

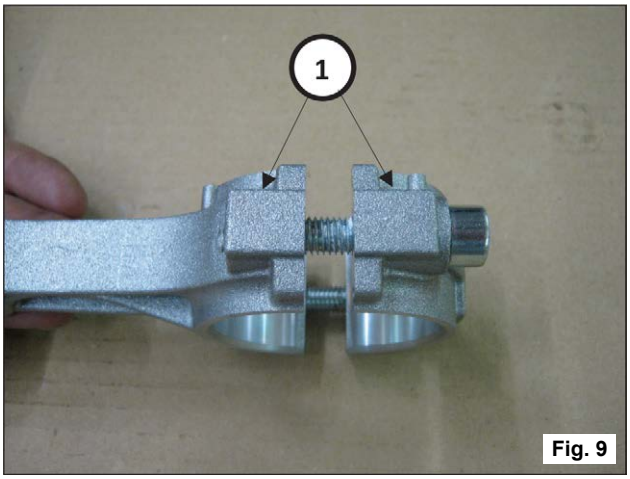


Fig. 9

- Fasten the caps to their respective con-rod shanks by means of M8x35 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: 4.5 ft lbs. (20 Nm)

Alternatively, ensure:
1. Pre-tightening torque: 2.25 ft lbs. (10 Nm)
2. Tightening torque: 4.5 ft bs. (20 Nm)

- Fasten the caps to their respective con-rod shanks by means of M8x35 screws (Fig. 10) lubricating both the underhead and the threaded shank, proceeding in two different stages:

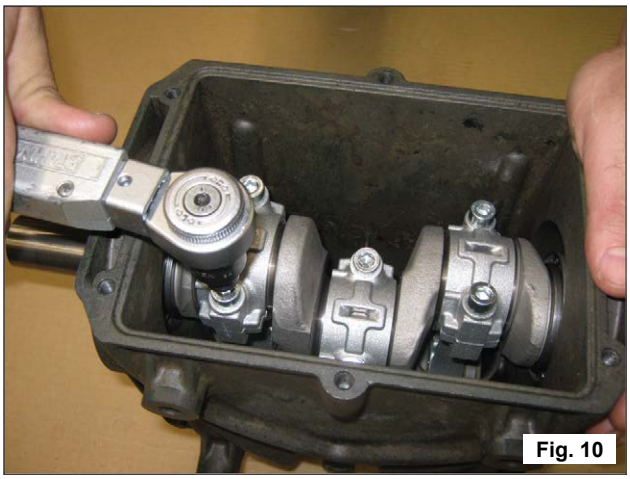


Fig. 10

- After having completed tightening operations, check that the con-rod head has a side clearance in both directions.
- Insert the new piston guide seal rings as far as possible into the relative seat on the pump casing (Fig. 11), following the procedure described:
use tools code 25027100 and code 27936600 composed of a tapered bush and a buffer. Screw the tapered bush into the hole in the piston 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 pump casing (Fig. 11/b), remove the tapered bush (Fig. 11/c).

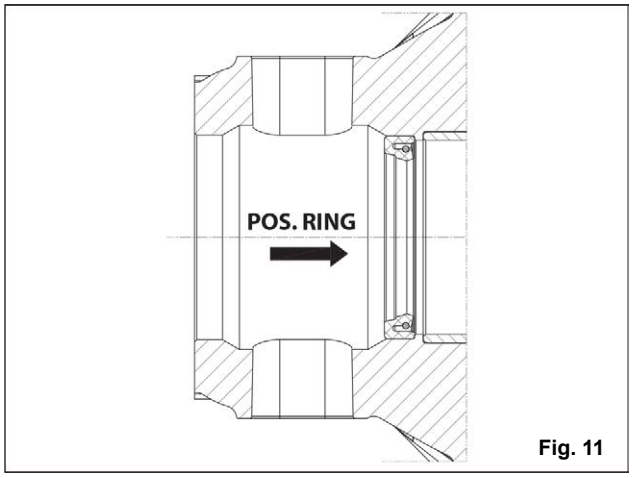


Fig. 11

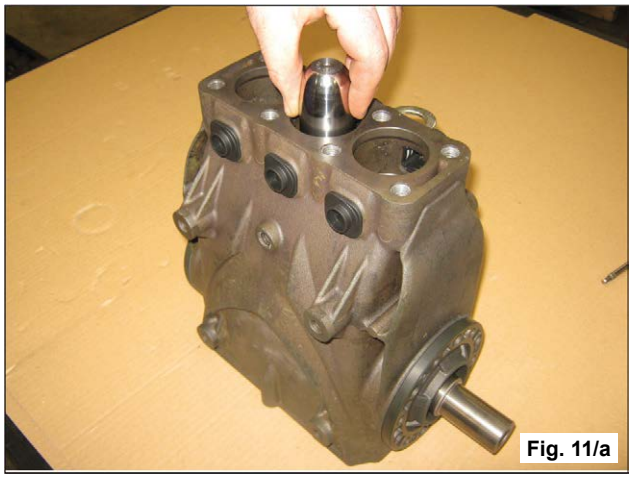


Fig. 11/a


Fig. 11/b

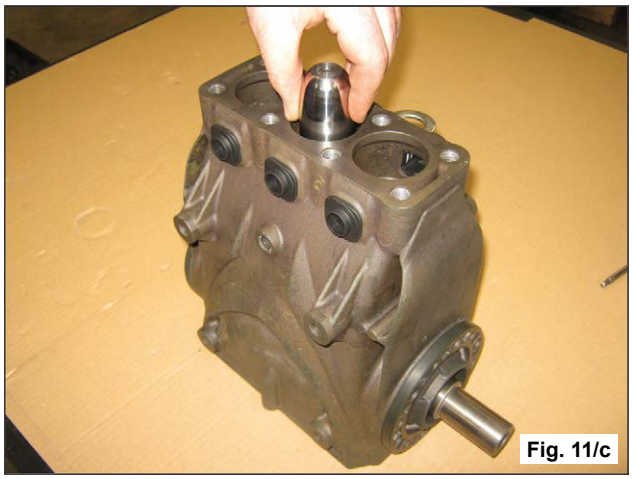


Fig. 11/c

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

2.1.3 Disassembly / Assembly of bearings and shims

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

A) Disassembly / Reassembly of the bend shaft without replacement of the bearings

After having removed the side covers as indicated in par. 2.1.1, check the conditions of the rollers and their relative tracks. If all parts are in good condition, clean the components carefully with a degreaser and redistribute lubricant oil uniformly.

The previous shims can be reused, taking care to insert them only under the indicator side cover.

Once the complete unit is mounted (Indicator side flange + shaft + motor side flange), check that the rotation torque of the shaft - with the con-rod disconnected - is a between 0.9 ft lbs. (4 Nm) and 1.35 ft lbs. (6 Nm).

To transition the two side covers closer to the crankcase, it is possible to use 3 M6x40 screws for the first positioning phase, as already indicated above Fig. 8/a, and the screws provided for final fastening.

Shaft rotation torque (with the con-rod connected) should not exceed 1.8 ft lbs. (8 Nm).

B) Disassembly / Reassembly of the bend shaft with replacement of the bearings

After removing the side covers, as described above, remove the outer ring nut on the bearings from its seat on the covers, using an appropriate extractor as shown in (Fig. 12 and Fig. 12/a).

Remove the inner ring nut on the bearings from the two ends of the shaft, again using an appropriate extractor or, alternatively, a simple “pin punch” as shown in Fig. 13

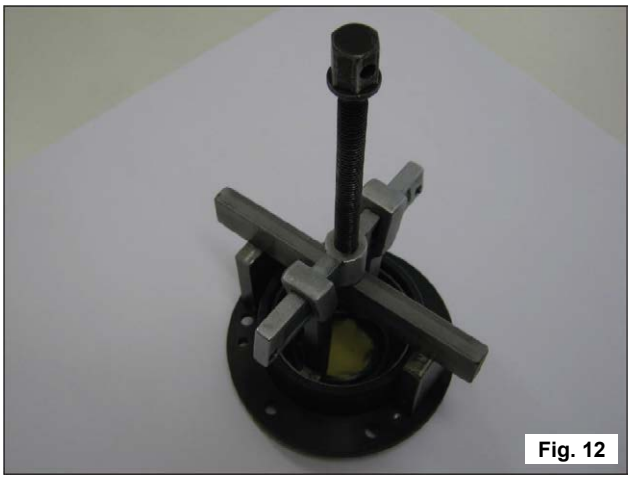


Fig. 12

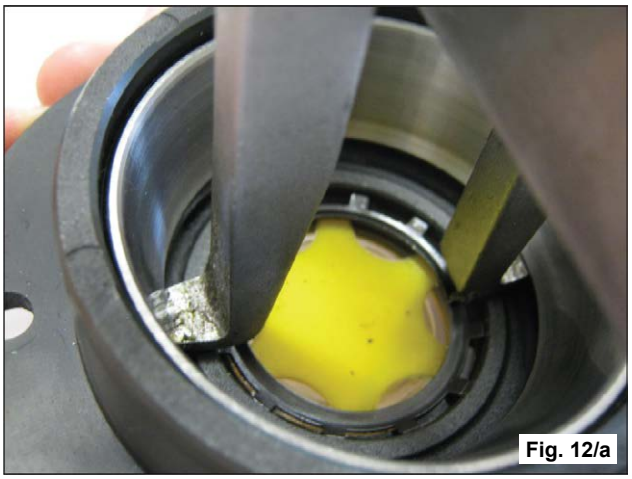


Fig. 12/a

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 fitting operation could be facilitated by heating the parts involved at a temperature between 250° - 300 °F (120° - 150 °C), making sure that the ring nuts are fully fitted in their respective seats.

Never exchange the parts of the two bearings.

Determining the shim pack:
Perform the operation while the piston/con-rod guide units are assembled, the con-rod caps are disconnected and the con-rods are pushed downwards. Insert the pump shaft without tab into the casing, making sure the PTO shaft comes out of the correct side.
Secure the PTO side flange to the casing, taking care with the lip seal as described previously and tighten the fixing screws to the recommended torque.
Then feed the flange on the indicator side without shims in the crankcase and start to move it closer, manually screwing the M6x40 service screws in equally, with small rotations such as to move the cover in slowly and correctly.
At the same time, check that the shaft rotates freely by turning it manually.
Continuing the procedure in this way, a sudden increase in hardness during shaft rotation will soon be experienced.
At this point, halt the forward movement of the cover and loosen the fixing screws completely.
With the aid of a feeler gauge, measure the clearance between the side cover and pump casing (Fig. 14).


Fig. 14

Proceed to determine the shim pack, using the table below:

Detected Measurement	Shim type	No. of Pieces
From: 0.05 - 0.10	/	/
From: 0.11 - 0.20	0.1	1
From: 0.21 - 0.30	0.1	2
From: 0.31 - 0.35	0.25	1
From: 0.36 - 0.45	0.35	1
From: 0.46 - 0.55	0.35 0.10	1 1
From: 0.56 - 0.60	0.25	2
From: 0.61 - 0.70	0.35 0.25	1 1

Fig. 15

Once the type and number of shims have been determined using the table, check the following: assemble the shim pack on the indicator side cover centering (Fig. 15), secure the cover to the casing, following the procedure in par. 2.1.2, and tighten the screws to their recommended torque.
Check that the shaft rotation stall torque is between 2.95 ft lbs. and 4.43 ft lbs. (4 Nm and 6 Nm).
If this torque is correct, connect the con-rods to the bend shaft and to the next stages. If it is not, redefine the shim pack, repeating the operations.

2.2 Repairing Hydraulic Parts

2.2.1 Disassembly of The Head Valve Units

Operations are limited to inspection or replacement of valves, if necessary and, however, at the intervals indicated in the “PREVENTIVE MAINTENANCE” table in chapter 11 of the **Owner’s Manual**.
The valve units are assembled inside the head.
Operate as follows to extract them:

- Unscrew the 4 M12x130 and 4 M12x45 suction valve cover fixing screws and the 8 M12x35 outlet valve cover fixing screws (Fig. 16 and Fig. 17);
- Extract the suction and outlet valve units using an extractor hammer code 26019400 (Fig. 18).

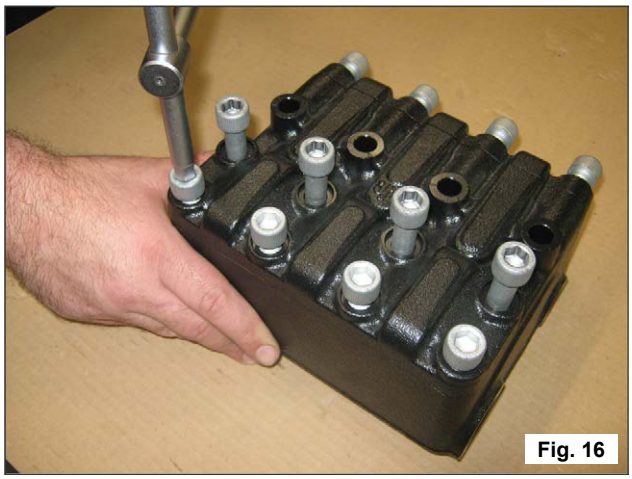


Fig. 16

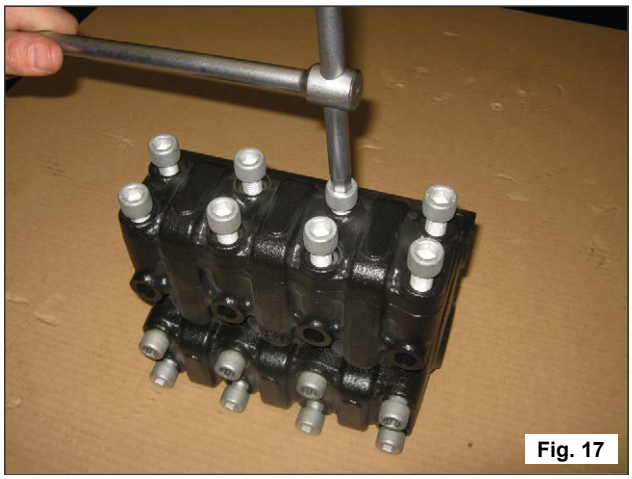


Fig. 17

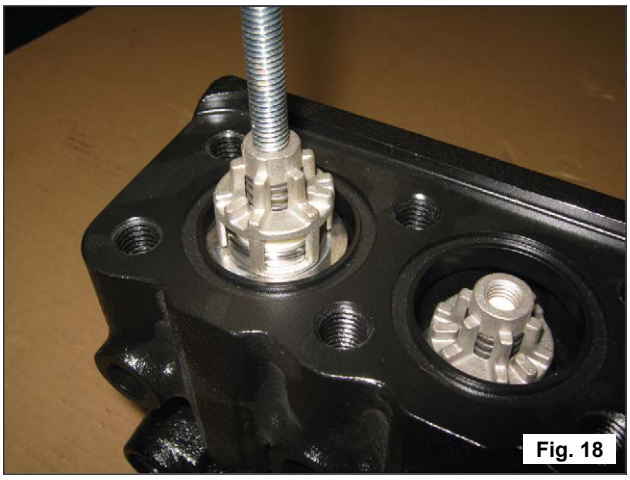


Fig. 18

The suction and outlet valve units dismantling can be carried out by levering with simple tools (Fig. 19).

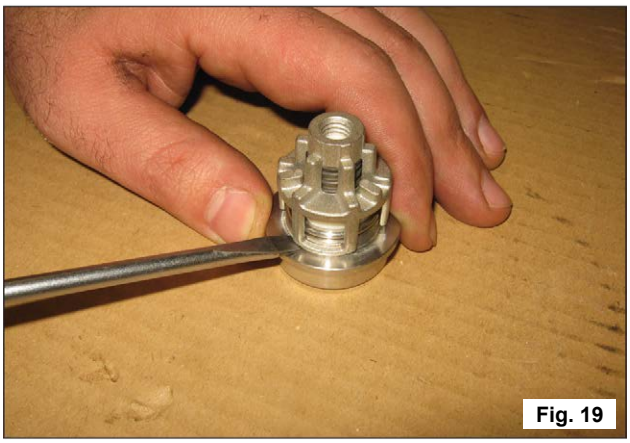


Fig. 19

Fig. 19 If the suction and outlet valve seats remain stuck on the head (for example scaling due to a prolonged pump inactivity), operate as follows:

Suction and outlet valves

Use tools code 26019400, code 27513700 (Fig. 20);

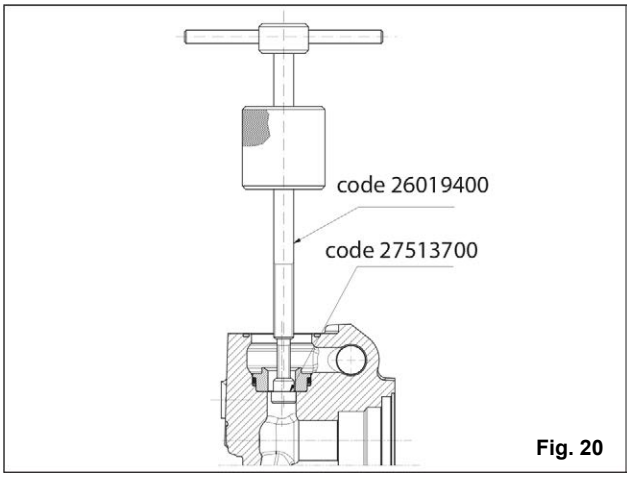


Fig. 20

2.2.2 Assembly of The Head - Unit Valves

Pay particular attention to the conditions of the various components and replace them if necessary, and at the intervals indicated in the “PREVENTIVE MAINTENANCE” table in chapter 11 of the **Owner’s Manual**.

At every valve inspection, replace all O-rings and all anti-extrusion rings in the valve units. Before repositioning the valve units, thoroughly clean and dry the relative seats in the head as shown in (Fig. 21).

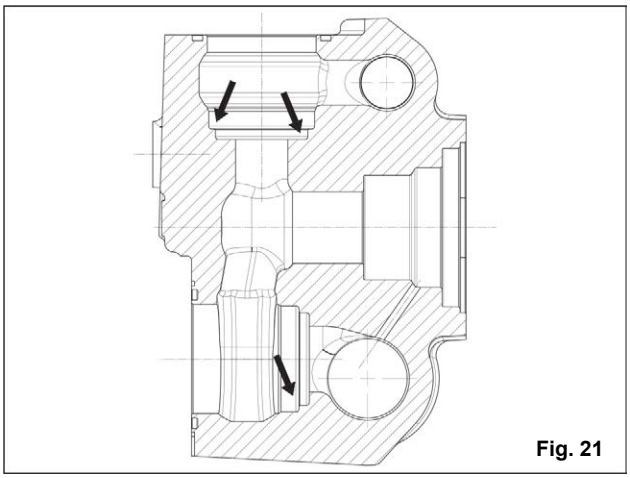


Fig. 21

To reassemble the various components, perform the operations listed above in reverse order to par. 2.2.1. Reassemble the valve units (Fig. 22 and Fig. 22/a) to facilitate insertion of the valve guide in the seat, use a hammer, acting on the whole circumference (Fig. 23).

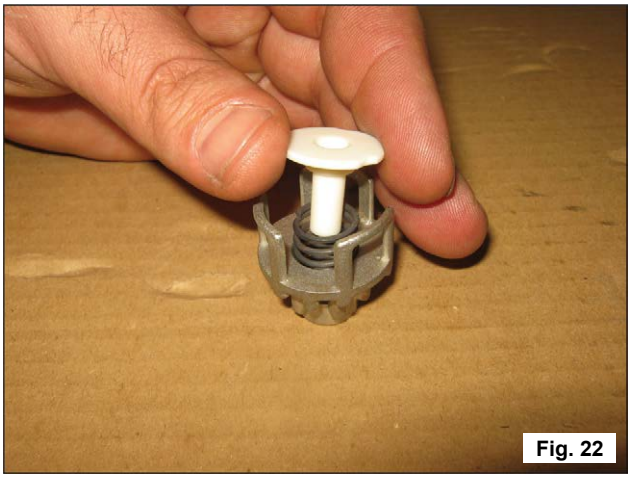


Fig. 22

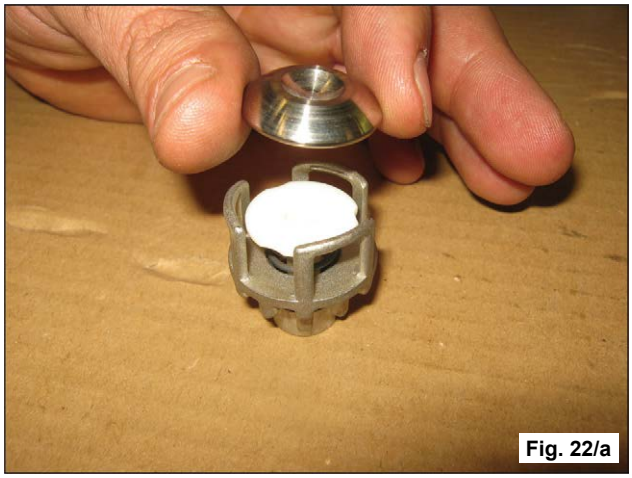


Fig. 22/a

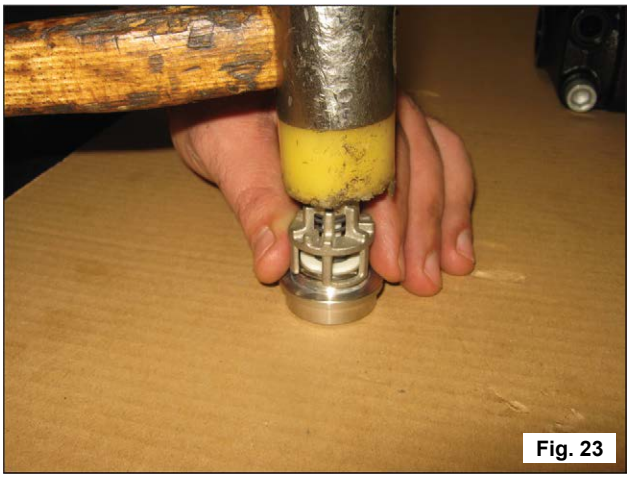


Fig. 23

Insert the suction and outlet valve units, checking that they are fully inserted in the head seat.
Then apply the valve covers and calibrate the respective M12x130 + M12x45 screws (Inlet valve cover) and M12x35 (outlet valve cover) screws, for the values of the torques and tightening sequences follow the instructions in chapter 3.

2.2.3 Disassembly of The Head-Seals

Replacement of the seals is necessary from the moment you begin to detect water leaks from the drainage holes provided on the back of the pump casing, and at the intervals indicated in the “PREVENTIVE MAINTENANCE” table in chapter 11 of the **Owner’s Manual**.

A) Unscrew the M12x130 head fixing screws as indicated in (Fig. 24).

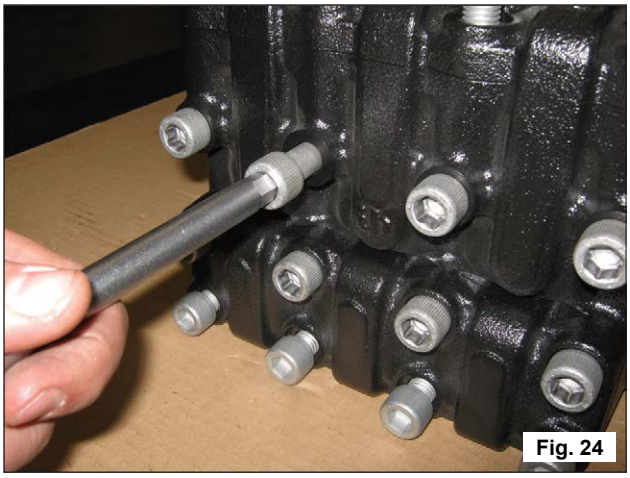


Fig. 24

B) Separate the head from the pump casing.

C) Extract the high pressure seals from the head and the low pressure ones from the support, using simple tools as indicated in (Fig. 25), being careful not to damage the respective housings.

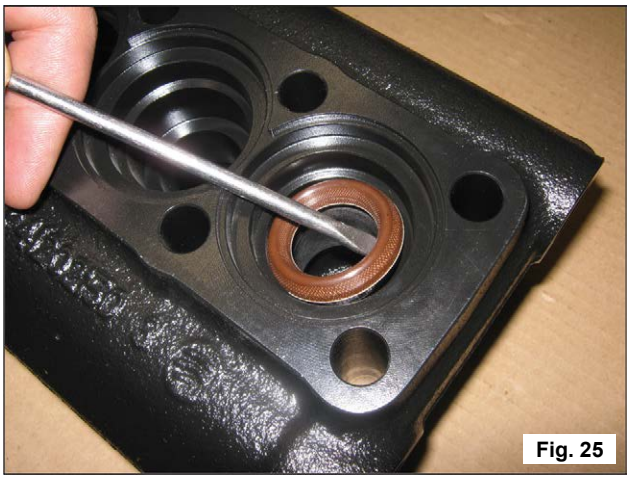


Fig. 25

Pay attention to the order of seal pack disassembly as indicated in Fig. 26 composed of:

1. Head Ring
2. HP Seal
3. Re-stop Ring
4. Intermediate Ring
5. LP Seal
6. LP Seal Retainer
7. O-Ring

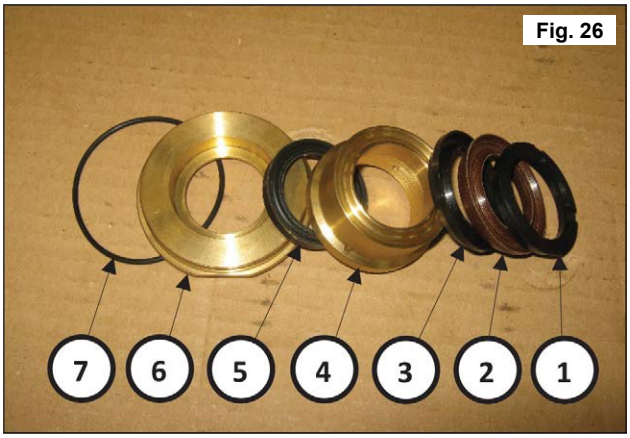


Fig. 26

2.2.4 Disassembly of The Piston Unit

The piston unit does not require any routine maintenance. Maintenance is limited to visual checks only.
To extract piston units: Loosen the M 7x1 piston fixing screws as indicated in (Fig. 27)

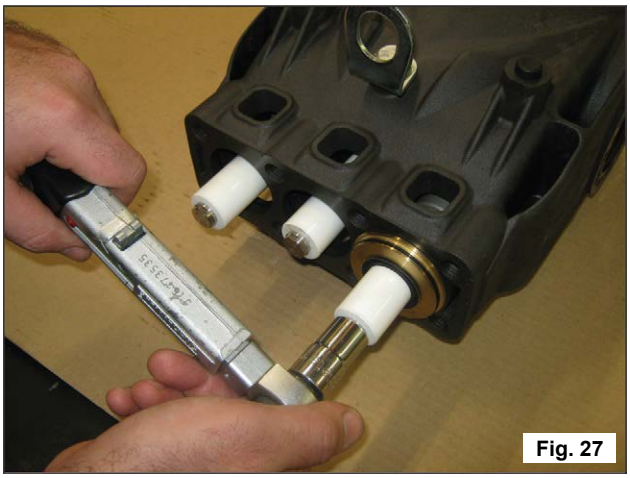


Fig. 27

Check and verify their conditions, replace if necessary.

At every disassembly, all O-rings on the piston unit must be replaced.

2.2.5 Assembly of The Head - Seals - Piston Unit

To reassemble the various components, perform the operations listed above in reverse order to par. 2.2.3, taking particular care with the following:

A) Seals pack: respect the same order used during disassembly operations.

B) Lubricate 2,3,5 components with OCILIS silicone grease code 12001600. This operation is deemed necessary to facilitate the lip seal adjustment on the piston.

C) For correct assembly of HP seals in their seats on the head without causing any damage to lip seals, use suitable tools according to the pump diameters as indicated in chapter 4.

D) Remount the pistons, tightening the screws with a torque wrench, respecting the tightening torque value as indicated in chapter 4.

E) Replace the head as follows:
1. Using two screws – service pins (code 27508200), fasten the crankcase as indicated in (Fig. 28). Position the complete head, making sure that it is centered only on the central piston.
2. Complete operations, following the tightening procedure. For the values of the torques and tightening sequences follow the instructions in chapter 3.

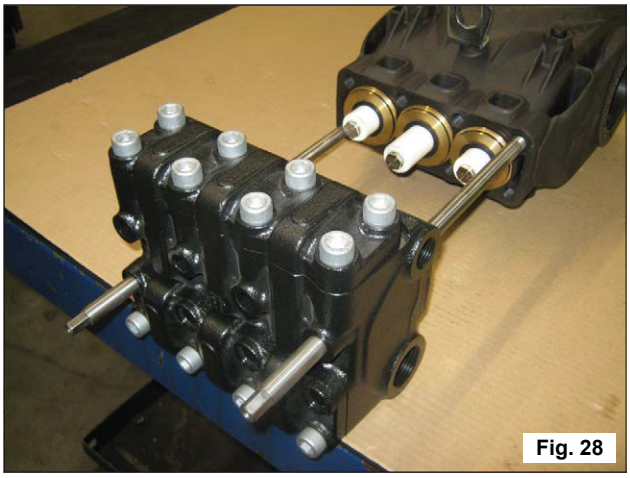


Fig. 28

3. SCREW TIGHTENING CALIBRATION

Screw tightening must only be performed with a torque wrench.

Description	Exploded View No.	Torque (ft lbs./Nm)
Cover Fixing Screws	42	7.38/10
Oil Drain Plug	47	29.50/40
Piston Screws	14	14.75/20
Con-rod Screws	39	14.75/20*
Outlet Valve Cover Screws	22	88.50/120***
Inlet Valve Cover Screws	10-13	88.50/120***
Manifold Screws	13	59/80**
Pressure Gauge Plug	68	29.50/40

*	The con-rod cap fixing screws must be tightened simultaneously, respecting the phases indicated on page 15.
**	The head fixing screws exploded view pos. 13 must be tightened with a torque wrench respecting the order shown in the diagram in Fig. 29.
***	The valve cover fixing screws exploded view pos. 10-13 and exploded view pos. 22 must be tightened with a torque wrench respecting the order shown in the diagram in Fig. 29.

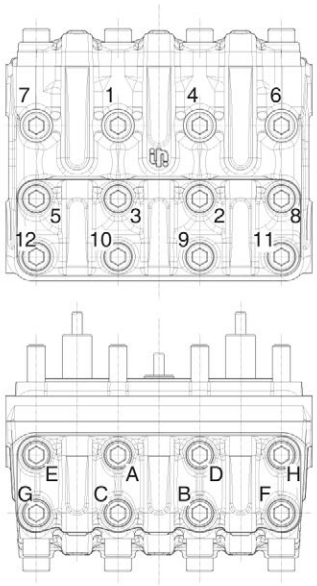


Fig. 29

4. REPAIR TOOLS

Pump repairs can be facilitated by special tools coded as follows:

For assembly phases:

Seal bush extØ 35; HP alternative seal ring Ø 20x35x7.5/4.5	Code 26134600
	Code 25027200
Seal bush extØ 35; HP alternative seal ring Ø 22x35x7/4.5	Code 26134600
	Code 25027200
Seal bush extØ 38; HP alternative seal ring Ø 25x38x7/4.6	Code 27385400
	Code 27472900
Seal bush extØ 38; HP alternative seal ring Ø 26x38x6/3.5	Code 27385400
	Code 27472900
Seal bush extØ 45; HP alternative seal ring Ø 28x45x8.5/5	Code 26406300
	Code 25027300
Pump shaft oil seal	Code 27936600
	Code 25027100
Piston guide oil seal	Code 27904200
Head Support Pins	Code 27508200

For disassembly phases:

Inlet/outlet valve seats	Code 26019400
	Code 27513700
Inlet/outlet valve units	Code 26019400
Piston guide oil seal	Code 26019400
	Code 25027000
Packing Retainer	Code 26019400
20 mm Collet	Code 26093400
Packing Retainer	Code 26019400
22 mm Collet	Code 26093500
Packing Retainer	Code 26019400
25 mm Collet	Code 520385
Packing Retainer	Code 26019400
26 mm Collet	Code 520384
Packing Retainer	Code 26019400
28 mm Collet	Code 520383

5. MAINTENANCE LOG

HOURS & DATE

OIL CHANGE							
GREASE							
PACKING REPLACEMENT							
PLUNGER REPLACEMENT							
VALVE REPLACEMENT							

GENERAL PUMP

GP Companies, Inc.
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