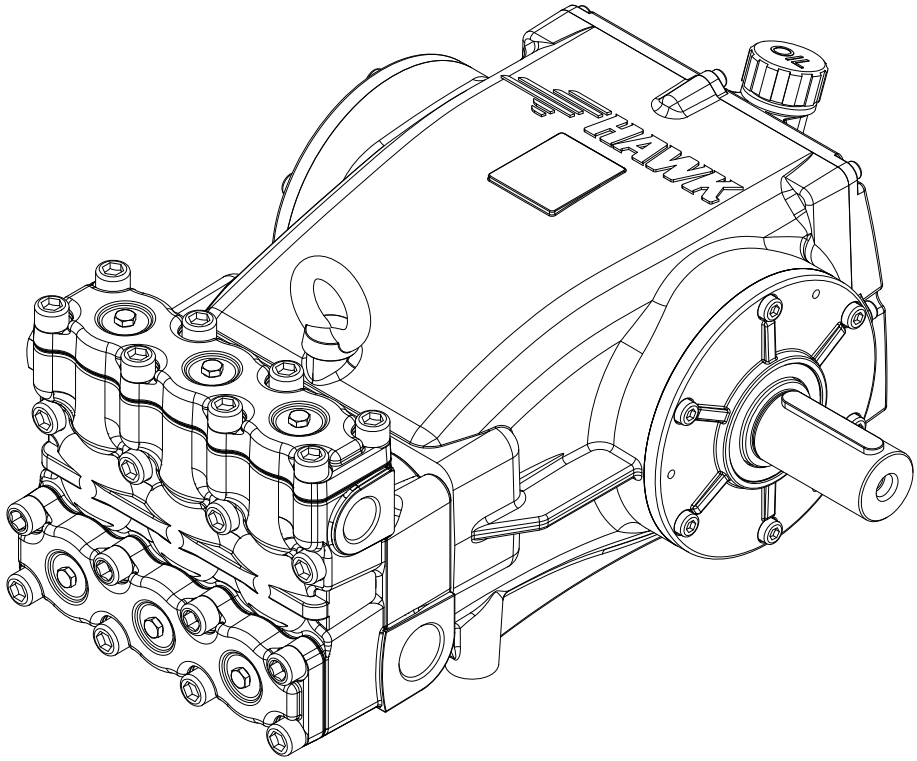
HAWK INTERNATIONAL

HFR Series



USE AND MAINTENANCE MANUAL

PUMP MODELS: HFR40S - HFR60S - HFR40F - HFR60F - HFR80F
HFR80S - HFR105S - HFR120S

Rev. 03/2013

CONTENTS

1 INTRODUCTION

This manual contains instructions for the use and maintenance of HFR pumps and should be carefully read and understood before handling the devices. Proper use and appropriate maintenance are crucial to ensuring the smooth functioning of the equipment. The company LEUCO S.p.A. expressly disclaims liability for damages caused by negligence or failure to follow the instructions contained in this manual. Upon receiving the pump, it should be inspected for damage or shortages. Report any anomalies before installing and starting the pump or refrain from carrying out these operations if it is considered potentially dangerous to do so.

1.1 Symbols used in this manual

Safety in the workplace warning sign

This symbol is shown in the instructions to warn users that the operating conditions may present a serious safety risk to operators.

Risk of crushing hands or feet warning sign

There is a danger of crush injuries being sustained to the hands or feet, which may have serious consequences. You must therefore use gloves, safety shoes and/ or adequate protection for the operation that is being carried out.

Pay attention to the following

This symbol is used throughout this manual to draw attention to topics of special importance.

2 SAFETY

2.1 General recommendations

The misuse of pumps and high pressure units as well as the non-compliance of installation and maintenance instructions may cause severe injury to people and/or damage to property.
The staff responsible for the construction and use of high pressure equipment must possess the necessary skills, be familiar with the characteristics of the equipment's components and take all possible precautions in order to ensure maximum safety in all operating conditions. In order to protect the safety of installers and operators, there must be no omissions when taking the applicable reasonable precautions

2.2 Safety when using high-pressure circuits

High pressure circuits should always be fitted with a safety or pressure relief valve.
Components of the high pressure circuits, particularly those that mainly operate outdoors, must be imperviousness to weather conditions such as rain, frost or heat. All electrical parts should have adequate protection against direct or indirect sprays of water and be suitable for use in wet environments.
High pressure hoses must be sized in accordance with the maximum operating pressure of the circuit and always within the field of operation specified by the hose manufacturer. These precautions should also be respected for all the components found within high pressure circuits. The ends of the high pressure hoses should be sheathed or, in any event, secured to a structure in order to prevent dangerous whiplash in the event of a blast or a rupture in the connections. Lastly, appropriately sized crankcases must be provided in order to protect the rotating component parts for the motion transmission (flexible couplings and universal joints, belts, pulleys, etc.).

2.3 Safety when using the pump

The area and environment that the high pressure system operates in must be clearly signposted and prohibited to unauthorised personnel. The area should also be restricted and defined. The staff responsible for carrying out the work must first undergo workplace conduct training as well as training on the risks arising from high pressure system damages or defects. Prior to starting-up the system, the operator or operators are required to check:

- that the system has the correct power supply;
- that the electrical parts are correctly and adequately protected and work efficiently;

- that the high pressure hoses and hose fittings do not exhibit signs of abrasion or excessive wear.

Any defect, damage or reasonable doubt that might arise before or during the operation must be reported and verified by qualified staff. Should this happen, the system must be stopped immediately and the pressure brought down to zero.

2.4 Rules of conduct regarding the use of high pressure nozzles

Those who operate high pressure nozzles must always put their own safety - as well as the safety of third parties likely to be affected by their actions - before any other assessment or action in respect of the situation. Their work must always be guided by common sense and an awareness of responsibility and precautions.
The operator must always acquire appropriate personal protective equipment (helmet with protective visor, waterproof overalls and rubber boots) that guarantee good grip and stability on the ground in wet conditions.
Adequate clothing is effective against splashes of water, but cannot withstand the direct impact of water jets or splashes at close range. In these circumstances, additional protection is recommended.
It is also desirable to have the operators work in teams of at least two people in order that they may provide mutual assistance in case of need or danger, and have them organise an appropriate rota that will provide cover in the event of long and tiring shifts.
The area affected by the water jet must be prohibited and free from objects which, if hit by the jet, might be damaged or projected elsewhere.
The jet should always be aimed in the direction of the workspace, including during preliminary or trial operations.
Attention must always be paid to the trajectory of debris removed from the jet. If necessary, anything that might be exposed to the jet should be given adequate protection.
The operator should not be distracted for any reason while carrying out his or her work. Those wishing to enter the workspace must wait for the operator to suspend work on his or her own initiative and make their presence immediately known.
Team members must always be aware of each other's intentions in order to avoid potentially dangerous situations.
The system must never be started-up and pressurized before each team member is at their own station and the operator has aimed the jet into the workspace.

2.5 Safe system maintenance

Maintenance of the high pressure system should take place as scheduled by the manufacturer, who bears liability according to law.
Maintenance must only be performed by qualified personnel.
All pump and system maintenance operations are to be carried out using appropriate equipment in order to avoid causing damage to the components during the execution of work.
In order to ensure adequate reliability and safety, use only original spare parts.

3 PUMP IDENTIFICATION

The pump is equipped with a nameplate bearing the following information:

- Serial number
- Model
- Rotation speed
- Power consumption
- Maximum operating flow and pressure

For further information on the size and technical features of each HFR series pump model, please consult the table on page 5.

4 INSTRUCTIONS FOR USE

The HFR pump is designed to work with clean water and at a maximum temperature of 40°C.
The duration of the seals will depend on the temperature of the water: the warmer the water, the more likely that deleterious cavitation phenomena - known to reduce the useful life of seal components - will occur.
The various performance indicators (flow, pressure, speed) given in this booklet and in the catalogue are the maximum that the pump can offer and should not be exceeded in any way.
HFR pumps are equipped with two intake ports and two exhaust ports (for sizes, please consult page 5).
Whether the system is connected to one or both of the intake or exhaust ports has no bearing on the functioning of the pump.
Unused ports must, however, be hermetically sealed.

Caratteristiche Tecniche

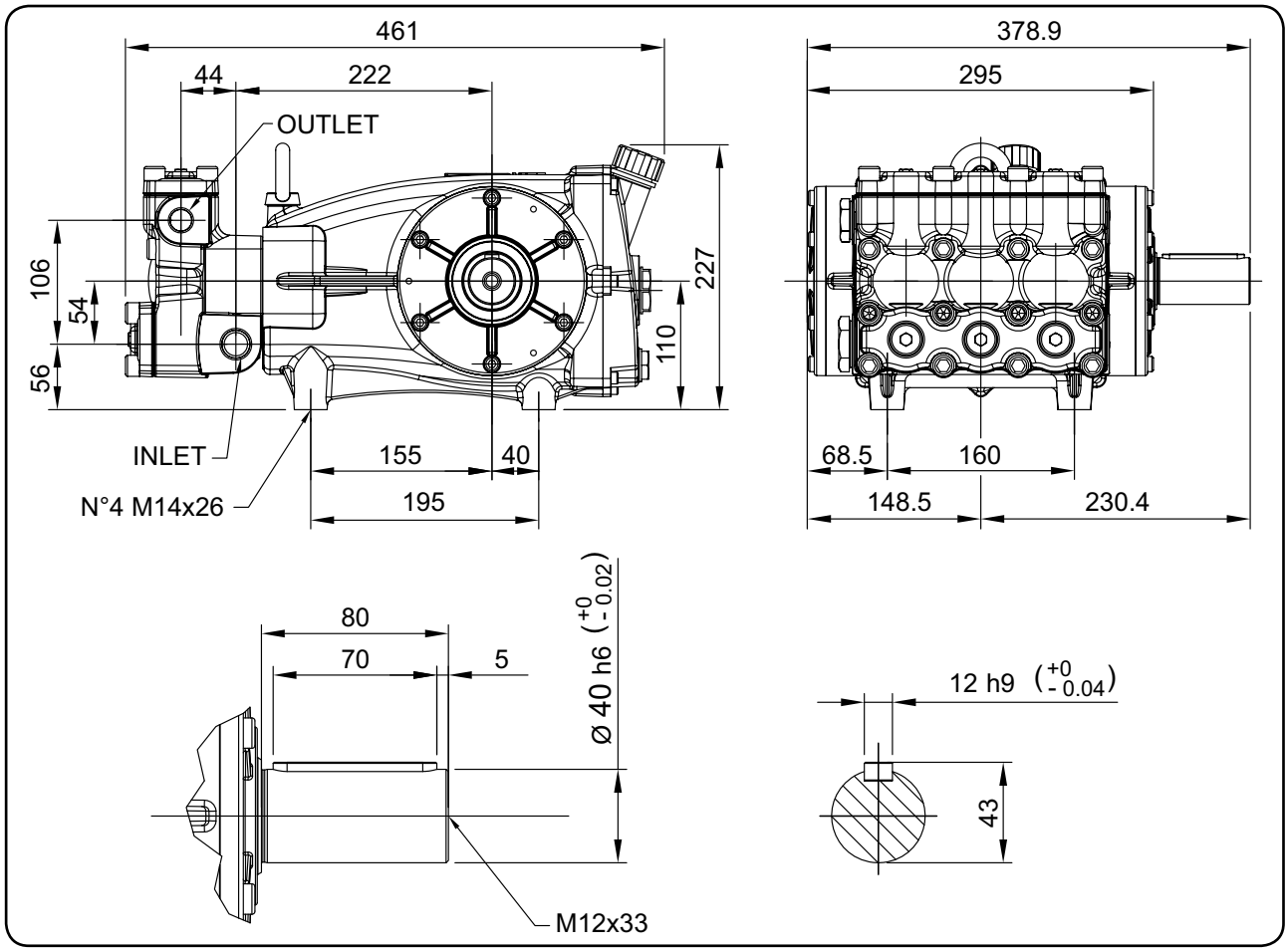
HFR 2011 Series

Technical Characteristics

Pump Pompe Pumpen Pompa	Pressure Pression Druck Pressione		Volume Dèbit Wassermenge Portata		RPM t o u r s / min u.p.m. giri/min	Required Puissance Leistung Potenza		Inlet port Entrèe Eingang Aspirazione	Outlet Sortie Ausgang Mandata	Weight Kg Poids Kg Gewicht Kg Peso Kg
	bar	PSI	l/min	GPM		HP	Kw			
HFR40S	280	4060	40	10.6	1000	28.6	21.1	G 1	G 3/4	48
HFR60S	280	4060	60	15.9	1000	42.9	31.6	G 1	G 3/4	48
HFR40F	280	4060	40	10.6	1450	28.7	21.1	G 1	G 3/4	48
HFR60F	280	4060	60	15.9	1450	43	31.6	G 1	G 3/4	48
HFR80F	280	4060	80	21.1	1450	57.5	42.3	G 1	G 3/4	48
HFR80S	150	2175	80	21.1	1000	30.5	22.4	G1 1/4	G 3/4	48
HFR105S	150	2175	105	27.7	1000	40.3	29.7	G1 1/4	G 3/4	48
HFR120S	150	2175	120	31.7	1000	46.1	33.9	G1 1/4	G 3/4	48

Dimensioni d' ingombro

Overall dimensions



Lubrificazione: Olio SAE 10W40
Capacità 3.5 Litri

Lubrification: SAE 10W40 Oil
Capacity 3.5 Litres

Figure 1

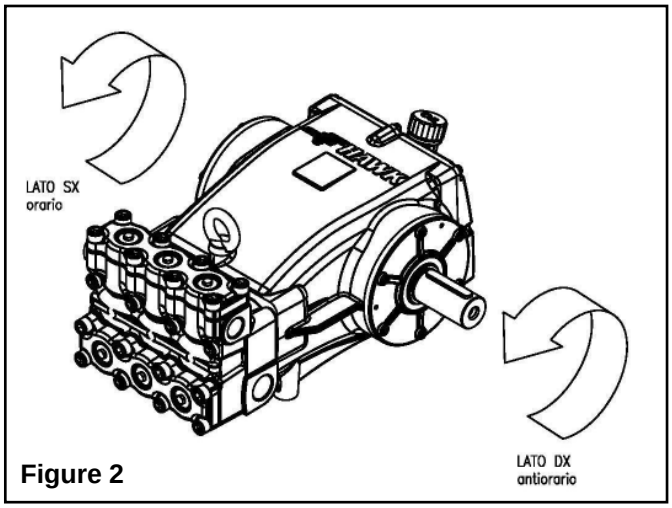


Figure 2

5 PUMP INSTALLATION

5.1 Placing

The pump must be placed horizontally using the M14 support feet provided.
The base used must be sufficiently flat and rigid so as to avoid bending and misalignment on the pump/ transmission axis due to the output torque transmitted during operation.
You might also require vibration dampers, to be placed between the floor and the pump support.

The pump is equipped with a lifting hoop to facilitate handling and installation (Figure 1).

You must replace the crankcase end cap for transportation with the dipstick plug, verifying the correct amount of fluid in the pump.

The oil level plug must always be accessible with the pump mounted.

Rigid connections on the pump shaft should be avoided.

We therefore recommend the following types of transmission:

- Flexible coupling
- Belts and pulleys
- Universal joints
- Motion reducer

5.2 Rotation direction

The direction in which the pump shaft operates shall have no bearing; it is, however, advisable that the operating rotation shown in Figure 2 be applied.

5.3 Plumbing connections

We recommend the use of flexible piping to isolate the system from the vibrations induced by the pump. The stiffness of the flexible suction hose should be sufficient to prevent it from becoming deformed due to the depression produced by the pump.

5.4 Suction line

In order to ensure smooth operation of the pump, the intake duct should be as described in the following recommendations:

- It should have a diameter that is proportional to the suction port connection; localized narrowing should therefore be avoided as it can generate pressure drop and cavitation phenomena;
- It should maintain as steady and as straight a flow as possible and be made in such a way as to facilitate the evacuation of any air pockets;
- It should be free from leaks and made to ensure tightness over time;
- It should be as free as possible from 90° bends, connections with other pipelines, bottlenecks, counterslopes, inverted U-shaped curves and T-joints;
- It should be designed in such a way as to prevent the circuit from emptying when the pump stops;

- Avoid hydraulic type fittings;
- Avoid the presence of Venturi-type injectors for chemical suction;
- Avoid the presence of foot valves or other one-way valves;
- When connected to a supply tank, ensure that the dimensions of the intake duct are such that no eddies and turbulence are generated in the vicinity of the pump suction pipe outlet;
- It should avoid the use of by-pass valves with direct discharge to suction;
- It should provide any bulkheads inside the suction tank, if any, for the purpose of preventing the flow coming from the by-pass valve from creating eddies and turbulence near the pump suction pipe outlet;
- Ensure the intake duct is always clean.

5.5 Filter

Should you plan to install a suction filter on the pump, follow the recommendations below:

- Place the filter as close as possible to the pump and in such a way as to allow easy inspection;
- The minimum flow rate should be three times higher than the pump capacity;
- The diameter of the inlet and outlet should be the same as the pipe and the pump suction pipe outlet;
- Perform regular and frequent cleaning in accordance with the specific working conditions of the application.

5.6 Discharge line

The discharge line should be as described in the following rules and recommendations:

- The initial section of the discharge pipe should be made via a flexible hose in order to dampen the vibrations induced by the pump.
- Use high-pressure pipes and fittings to guarantee a wide safety margin in all operating conditions;
- Always ensure the presence of properly-adjusted pressure relief valves;
- It is preferable to use glycerine filled pressure gauges that are designed to withstand the shock loads and water hammers that are typical of piston pumps;
- Always bear in mind that pressure drops along the pipe result in a reduction of the effective pressure at the end of the line compared to the pressure measured at the pump;
- Should the effects of the pulse be particularly harmful, use a pulse damper.

6 START-UP AND OPERATION

6.1 Preliminary checks

Before each start-up, you must ensure that:

- The suction line is connected and full as the pump must never run dry;
- There are no leaks;
- Any shut-off valves on the suction circuit are open and the water can freely enter the pump;
- The discharge line is an open drain type in order to ensure the speedy evacuation of air in the circuit, thereby encouraging pump priming;
- All fittings and connections are properly tightened;
- The pump/transmission alignment falls within the acceptance tolerance range;
- The oil level inside the crankcase is correct; this can be checked by means of the dipstick found in the airtight stopper cap or by looking at the oil level indicator light.

6.2 Start-up

Upon starting up the pump for the first time, you must check:

- That the rotation direction of the pump is correct;
- Always avoid operating the pump under load. Always discharge the pressure regulating valve or use the discharge mechanisms, where present.
- Check that the speed does not exceed the value indicated on the nameplate.
- Wait a few minutes before pressurizing the circuit, making sure that the pump is sucking properly.
- Before stopping the pump, reset the pressure to zero by discharging the pressure regulating valve or using the circuit's discharge mechanisms, where present. If the pump is coupled to an endothermic motor, bring the motor down to its lowest speed before stopping it altogether.

- Where there is a feed pump on the suction circuit, wait until it has reached the expected pressure before starting up the piston pump.

7 MAINTENANCE RULES

7.1 Routine mechanical maintenance

Below are the routine mechanical maintenance operations:

Check the oil level periodically (usually every week) and top up to the correct level if necessary. The oil level is checked at room temperature, while the oil is changed, using the cap provided, at working temperature.

Caution: If the pump has been running for several minutes, the oil could be very hot and so it is recommended that protective gloves be worn before changing the oilo.

The first oil change should take place after 50 hours, and then every 1000 hours or at least once a year. The required quantity is 3.5 litres.

7.2 Mechanical dismantlement

Carry out the disassembly as follows:

Drain the oil from the crankcase using the drain plug provided;

- Remove the key from the shaft;
- Remove the cylinder head;
- Remove the back cover;
- Remove the connecting rod feet, taking care to memorize the position of each one in relation to the relevant connecting rod (Figure 3);
- Unscrew the flange bearing units and remove them from the crankcase (Figure 4);
- Push the connecting rods to the bottom of the crankcase and rotate the connecting rod opposite the power take-off by 45 degrees;
- Remove the shaft sideways via the flange hole (power take-off side) (Figure 5);
- Extraction of the piston rods and their connecting rods requires prior removal of the ceramic piston and splash shield.

7.3 Mechanical installation

Reassemble the mechanical parts as described below:

- Reinsert the piston rods with their connecting rods if these too were removed, pushing them to the bottom of the crankcase;
- After rotating the connecting rod opposite the power take-off by 45 degrees, insert the shaft sideways via the flange hole (power take-off side), taking care to keep the power take-off on the correct side of the crankcase (in any event, it is recommended that the shaft be inserted from the side without the power take-off, which can be propped up by hand);
- Insert the two flange bearing units into the holes of

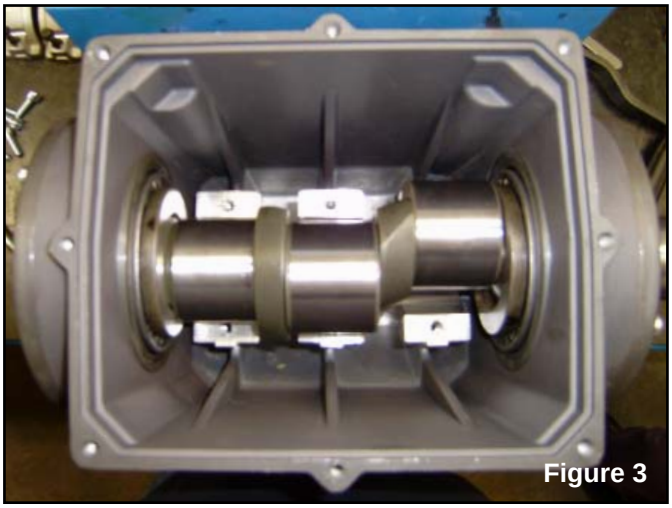


Figure 3


Figure 4

the crankcase, having already replaced the oil seal ring in the event that this was worn, remembering to check that the wearing rings are in place. Tighten the 6 screws to a torque of 20 Nm;
- Reassemble the connecting rod feet, taking care not to mix up their positions and to respect the proper torque of 38 Nm;
- Reassemble new oil seal rings on the piston rods in the event that these too were removed;
- Replace the back cover, tightening the screws to a torque of 10 Nm;
- If dismantled to remove the connecting rods and their shafts, reassemble the pistons that are fitted with a splash shield, tightening the screws to a torque of 20 Nm;
- Replace the cylinder head, with the help of a few studs positioned on the crankcase;
- Return the key to the shaft.

7.4 Roller bearings inspection

After having disassembled the mechanical part, as described in the previous point, you should proceed to visually inspect the rollers and their tracks.
Unless any abnormal wear is noted, proceed to clean the rollers and tracks with a solvent; once that is done, cover them with a thin layer of lubricating oil (the same as the oil contained in the crankcase).
Once this operation is complete, you may replace the mechanical part as shown above.
If, on the other hand, the tracks or rollers show signs of wear, replace them as specified in the next step.

Figure 5

7.5 Roller bearings replacement

Once the flange bearing units and the shaft have been removed as set out in the paragraphs above, proceed to remove, using a pin punch or similar, the outer rings of the bearings from their respective flanges and the inner rings from the shaft.
New bearings can be assembled with a press or barbell, using the rings provided to assist you in the operation.
Avoid mixing up the outer rings of the bearings inside the flange during the assembly operation.

8 PUMPING UNIT MAINTENANCE

The maintenance of the pumping unit is connected to VAM valve replacement every 800 hours and seal replacement each time a water leak is detected or, in any event, in the presence of a significant drop in flow (and therefore the maximum pressure reached by the pump).

8.1 VAM valve replacement

To replace the VAM valves inside the cylinder head, follow these steps:

- Remove the three M6 hexagonal head screws found on each VAM cover (Figure 6).
- Unscrew the eight M12 Allen head bolts securing the VAM cover and remove.
- With the aid of a screw or an M6 threaded bar, screwed into the threaded hole of each VAM cap (or using the appropriate tool-kit equipment), remove the VAM valves.
- Again, using a screw or an M6 threaded bar screwed into the threaded hole found at the top of the VAM cage (or using the appropriate tool-kit equipment), you can now remove the entire package consisting of seat, cage, plate and spring. Be careful when doing this as there is the possibility that the cage might detach from the seat (Figure 7). If this should happen, reposition the cage on the seat before giving the VAM package removal operation another attempt. If, at each removal attempt, the seat should remain stuck inside the cylinder head, remove the cage, spring and plate, as described above, and proceed to remove the seat with the help of the bent nose pliers provided with the tool-kit.
- The cage is attached to its respective seat through

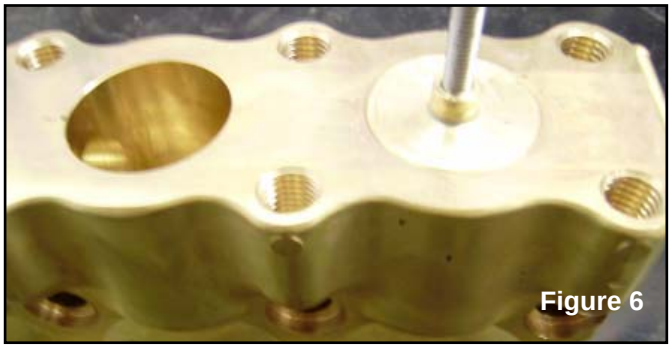


Figure 6


Figure 7


Figure 8


Figure 9


Figure 10

pressure and so the assembly and disassembly can easily be carried out using simple tools such as a hammer and screwdriver (Figure 8).

- When reassembling the new VAMs, pay attention to their positioning, ensuring that they are pushed right to the bottom of their groove and preventing them from remaining slightly raised or tilted to one side. This also applies for the replacement of the relative caps; you must ensure that the O-rings do not extrude or cut against the edge of the cylinder head (use the appropriate equipment from the tool-kit if necessary).
- Lastly, secure the VAM lids, tightening the screws to a torque of 80 Nm.

8.2 Seal replacement

When replacing a seal, follow the instructions below:

- Unscrew the eight M12 Allen head bolts that attach the cylinder head to the crankcase and pull it away from the piston. You can use a screwdriver to do this, taking care not to damage the contact planes between cylinder head and crankcase.
- With the help of the bent nose pliers found in the tool-kit, remove the entire gasket pack. If the removal proves to be especially difficult, you can enlist the help of a screwdriver; you should always be careful, however, not to damage the surface and edges of the seal groove. For versions equipped with a threaded O-ring, use the appropriate equipment from the tool-kit if necessary (Figures 9, 10 and 11).
- To reassemble the new gasket pack, respect the sequence of components shown in Figure 12.
- To mount the high pressure seal, use the tool-kit equipment that has been provided for this purpose; spreading the edge of the seal groove with grease will further facilitate the operation (Figures 13, 14 and 15).
- The low pressure seal can be assembled inside the pressure pressor by hand.
- Spread the edge of the seal groove with grease in order to facilitate the mounting of the low pressure pressor.
- Once the gasket pack has been inserted into the cylinder head, replace the cylinder head or, if necessary, enlist the help of a few studs, screwed into the crankcase, and then, lastly, tightening the 8 screws to a torque of 80 Nm.

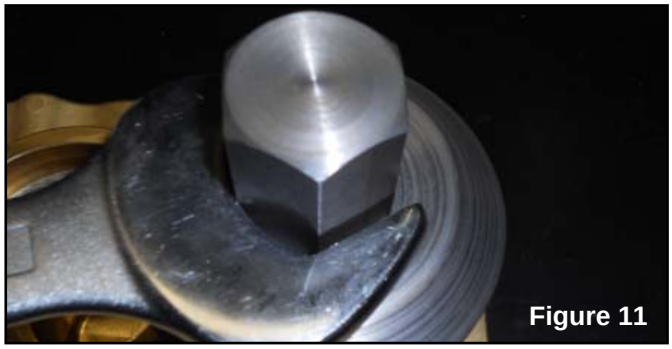


Figure 11


Figure 12


Figure 13


Figure 14

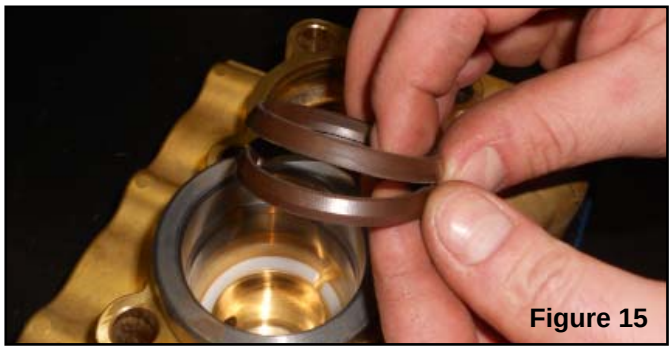


Figure 15

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- The low pressure seal can be assembled inside the pressure pressor by hand.
- Spread the edge of the seal groove with grease in order to facilitate the mounting of the low pressure pressor.
- Once the gasket pack has been inserted into the cylinder head, replace the cylinder head or, if necessary, enlist the help of a few studs, screwed into the crankcase, and then, lastly, tightening the 8 screws to a torque of 80 Nm.

8.3 Piston replacement

Whenever the need arises to replace one or more pistons, proceed as follows:

- Once the cylinder head has been removed following the instructions given at the beginning of the last paragraph, unscrew the piston screws using the spanner provided for this purpose. Once these are removed, you can easily remove the piston from the shaft.
- To reassemble, carry out the reverse of the above, tightening the piston screws to a torque of 20 Nm (Figure 17).

9 MAINTENANCE TOOLS

When carrying out pump maintenance, we recommend that you use the specially-provided tool-kit equipment to facilitate the maintenance of certain parts of this product. In the absence of this tool-kit, everyday-use tools can also be used (screwdrivers, pin punches, etc.), taking care not to damage the pump's components.

10 LONG PERIODS OF INACTIVITY

It is wise to check the oil level, inspect the VAM valves (where necessary) and follow the procedure given for the initial start-up before starting the pump when it has been inactive for a long period of time.
In the event of a long period of inactivity, completely drain all of the water circuits and run the pump for a few seconds so that any water inside the pump also leaves.

11 PRECAUTIONS AGAINST FROST DAMAGE

In caso di utilizzo con climi freddi a rischio gelo, prevedere le seguenti precauzioni: a fine lavoro scaricare tutti i circuiti dell'acqua mediante appositi scarichi posizionati nei punti più bassi della linea; far girare la pompa per alcuni secondi al fine di scaricare anche la quantità residua d'acqua presente nella pompa.
In presenza di ghiaccio evitare sempre di procedere all'avviamento dell'impianto finché il circuito non sia completamente sgelato, al fine di evitare gravi danni alla pompa.

12 WARRANTY

LEUCO S.p.A. guarantees that HAWK products are free from defects in materials and workmanship for a period of one year from the date of their departure from the factory.
This warranty is limited to the repair and replacement of parts or products which, at the sole discretion of LEUCO S.p.A., are considered defective at the time of delivery.
All products subject to this limited warranty shall be returned, using prepaid freight, for inspection, repair or replacement (where applicable) by the manufacturer.
The limited warranty established herein is in lieu of all other warranties, express or implied, including any warranties of merchantability or fitness for a particular purpose; such warranties are hereby excluded and rejected by the manufacturer.
Repairs or replacements of defective products shall be made with the sole and exclusive procedures set forth herein and LEUCO S.p.A. shall not be liable for any loss, claim or expense for either direct or consequential damage caused, either directly or indirectly, by the sale or use of these products.

The unauthorised use of parts not originally produced by LEUCO S.p.A. shall automatically exclude warranty coverage, which is subject to the installation and operating instructions provided herein. There are no other warranties that extend beyond the description on the face hereof.

13 PREVENTIVE MAINTENANCE CYCLE

CHECK	DAILY	WEEKLY	50h	800h	1000h	2000h
Filter cleaning	X					
Oil level/quality	X					
Oil/water leakage	X					
Hydraulics		X				
Oil replacement			X		X	
VAM replacement				X		
Seal replacement						X

14 TECHNICAL FAILURES AND THEIR POSSIBLE CAUSES

14.1 The pump does not make any noise when started up

- The pump has not been primed and is running without water;
- There is no water in the power supply circuit;
- The pump valves are blocked or damaged;
- The discharge line is closed and is not allowing the air inside the pump to escape;


Figure 16

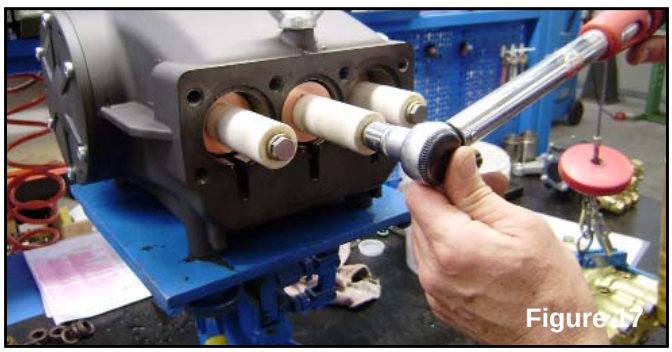
Figure 17

14.2 The pump is operating erratically

- Air intake;
- Insufficient power supply;
- There are couplings and bends on the power supply line preventing the passage of water;
- The suction filter is clogged or the wrong size;
- The feed pump is inadequate or provides insufficient pressure/flow;
- The pump will not prime because of insufficient swing or because the outlet is closed during the priming;
- The pump is unable to prime due to a blocked or damaged VAM;
- The seals are too worn;
- The pressure regulating valve is damaged or is operating erratically;
- Motion transmission problems (misalignments, plays, loose or worn belts, etc.);
- The number of rotations is not as expected.

14.3 The pump is not performing as many rotations as expected

- Insufficient power supply (see above);
- The number of rotations is lower than the target;
- Excessive leakage from the pressure control valve;
- Worn or damaged VAMs;
- Worn or damaged seals;

14.4 The pump is not reaching the expected pressure

- The mounted nozzle is too large or else it has become too large through use;
- The number of rotations is insufficient;
- The seals are worn or damaged;
- Excessive leakage from the pressure control valve;
- Worn or damaged VAMs;

14.5 The pump is copiously losing prime

- The seals have become too worn or damaged due to normal wear and tear or cavitation problems.

14.6 The pump is overheating:

- The rotation direction is wrong;
- The pump is operating at too high a pressure;
- The number of rotations is higher than prescribed;
- The oil level is insufficient or inappropriate or the oil is now exhausted and must be replaced;
- Water has mixed with the oil due to damaged or excessively worn piston oil seals;
- The motion transmission belt power is excessive or the joint connecting the motor or speed reducer is not aligned properly.

14.7 Vibrations or shocks on the pipes

- Air intake;
- Erratic operation or damage to the pressure regulating valve;
- The discharge line regulating valve is undersized;
- Worn or damaged VAMs;
- Irregularities in the motion speed.

15 RULES REGARDING DISPOSAL

The packaging materials are recyclable. Please do not dispose of the packaging with household waste, but instead send it for recycling.

The pump contains valuable recyclable materials, which should therefore be sent for recycling in order to ensure their re-use. The oil should not be released into the environment. Please therefore dispose of the used pump by taking it to an appropriate collection.

16 NOTE

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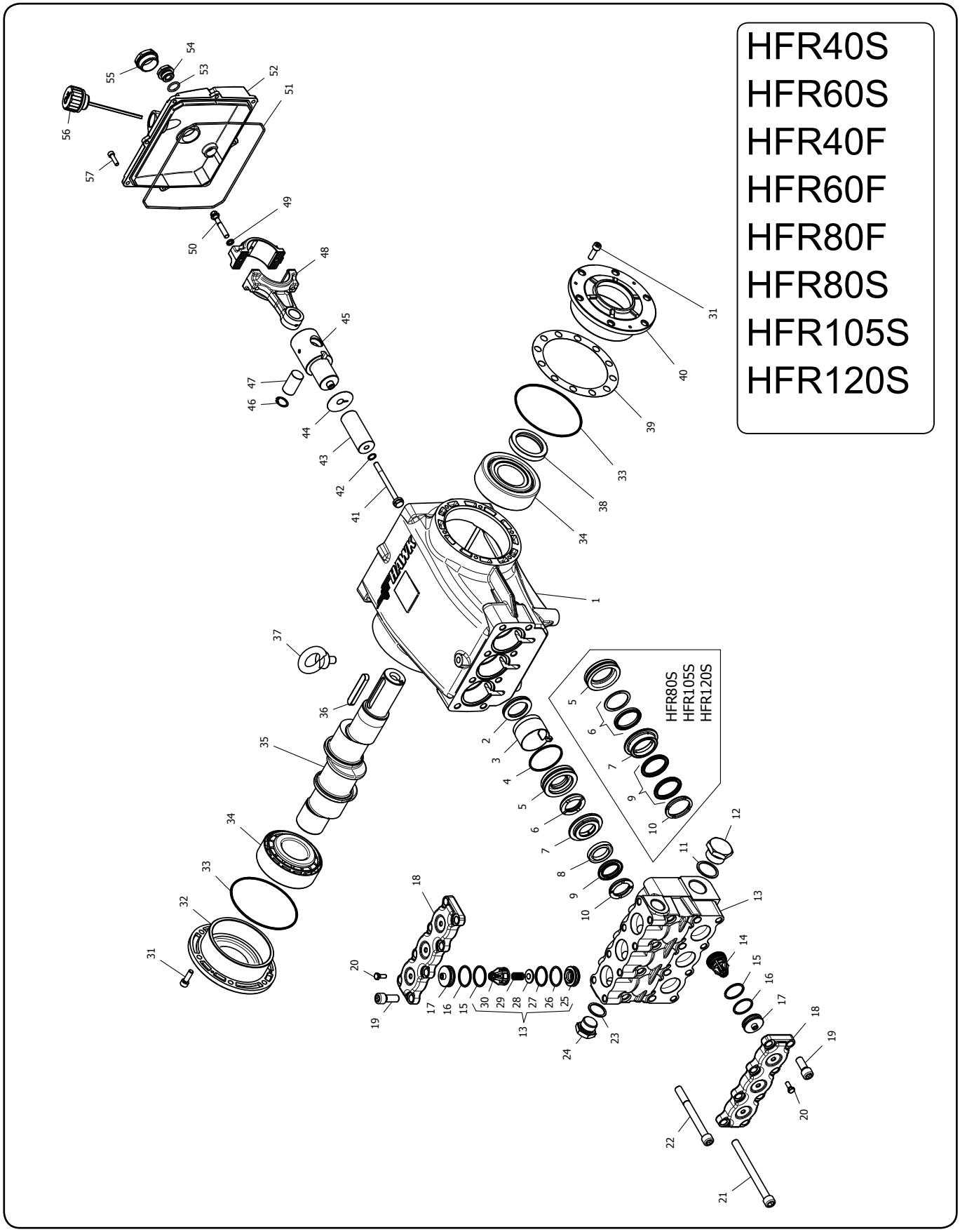
17 EXPLODED VIEW DRAWING AND PARTS LIST



Posizioni incluse *Included Positions*	Codice e Descrizione *Part Number & Description*	Q.tà per Pompa *Q.ty by Pump*	HFR40S	HFR60S	HFR40F	HFR60F	HFR80F	HFR80S	HFR105S	HFR120S
4 - 6 - 8 - 9 - 10	2600.60 - Guarnizioni pistone Ø30 / Plunger Seals 30 mm	1	♦	♦	♦	♦	♦			
4 - 6 - 9 - 10	2600.95 - Guarnizioni pistone Ø40 / Plunger Seals 40 mm	1						♦	♦	♦
4 - 5 - 6 - 7 - 8 - 9 - 10	2600.61 - Pacco completo guarnzioni pistone Ø30 / *Complete Seals Packing 30 mm*	3	♦	♦	♦	♦	♦			
4 - 5 - 6 - 7 - 9 - 10	2600.94 - Pacco completo guarnzioni pistone Ø40 / *Complete Seals Packing 40 mm*	3						♦	♦	♦
41 - 42 - 43 - 44	2600.62 Pistone Ø30 / *Plunger 30 mm*	3	♦	♦	♦	♦	♦			
	2600.91 Pistone Ø40 / *Plunger 40 mm*	3						♦	♦	♦
14 - 15 - 16	2600.63 VAM / *Complete check valve*	6	♦	♦	♦	♦	♦			
	2600.93 VAM / *Complete check valve*	6						♦	♦	♦
2 - 3	2600.64 Anelli tenuta olio asta / *Plunger Oil Seals*	1	♦	♦	♦	♦	♦	♦	♦	♦
4 - 5 - 6 - 7 - 8 - 9 - 10 - 11 - 12 - 13 - 14 - 15 - 16 - 17 - 18 - 19 - 20 - 23 - 24	2600.65 Testata completa / *Complete Manifold*	1	♦	♦	♦	♦	♦			
	2600.92 Testata completa / *Complete Manifold*	1						♦	♦	♦
	2412.03 Tool Kit / *Tool Kit*	1	♦	♦	♦	♦	♦	♦	♦	♦

LISTA RICAMBI / *PARTS LIST*												***HFR* Pompe / *Pumps***
Pos. *Item*	Codice *Part number*	Descrizione *Description*	Q.tà per Pompa	HFR40S	HFR60S	HFR40F	HFR60F	HFR80F	HFR80S	HFR105S	HFR120S
1	0202.94	Carter / *Carter*	1	♦	♦	♦	♦	♦	♦	♦	♦
****2***	0001.15	Anello radiale / *Plunger oil seal*	3								
****3***	0101.24	Boccola corteco aste / *Plastic Bushing*	3								
****4***	0601.16	"O" Ring Ø2,62x56,82 / *"O" Ring Ø2.62x56,82*	3								
****5***	1201.51	Pressore Ø30 / *Pressure ring Ø30*	3	♦	♦	♦	♦	♦			
	1201.55	Pressore Ø40 / *Pressure ring Ø40*	3						♦	♦	♦
****6***	0002.11	Anello tenuta VB Ø30x45 / *"VB" seal, Ø30x45*	3	♦	♦	♦	♦	♦			
	0002.74	Anello tenuta VB Ø40 LP / *"VB" seal, Ø40 LP*	3						♦	♦	♦
****7***	0300.69	Diffusore Interm. Ø30 / *Intermed.ring Ø30*	3	♦	♦	♦	♦	♦			
	0300.72	Diffusore Interm. Ø40 / *Intermed.ring Ø40*	3						♦	♦	♦
****8***	0009.35	Anello antiestrusione Ø 30 / *Back ring Ø30 mm*	3	♦	♦	♦	♦	♦			
****9***	0002.12	Anello tenuta "V" Ø30x45 / *"V" seal, Ø30x45*	3	♦	♦	♦	♦	♦			
	0002.75	Anello tenuta "V" Ø40x45x5,5 / *"V" seal, Ø40x45x5,5*	6						♦	♦	♦
****10***	0300.18	Diffusore "V" Ø30 / *Support ring Ø30*	3	♦	♦	♦	♦	♦			
	0300.73	Diffusore "V" Ø40 / *Support ring Ø40*	3						♦	♦	♦
****11***	1601.57	Tappo G 1" ottone / *Brass plug G 1"*	1	♦	♦	♦	♦	♦			
	1601.65	Tappo G 1" 1/4 ottone / *Brass plug G 1" 1/4*	1						♦	♦	♦
****12***	0603.12	Guarnizione rame G 1" / *Copper washer G 1"*	1	♦	♦	♦	♦	♦			
	1408.14	Guarnizione di tenuta *1" 1/4 NBR / Bonded seal 1" 1/4 NBR*	1						♦	♦	♦
****13***	1602.32	Testata / *Manifold housing*	1	♦	♦	♦	♦	♦			
	1602.38	Testata / *Manifold housing*	1						♦	♦	♦
****14***	3604.01	Valvola premontata / *Valve assembly*	6	♦	♦	♦	♦	♦			
	3604.04	Valvola premontata / *Valve assembly*	6						♦	♦	♦
****15***	0601.13	"O" Ring Ø2,62x31,42 / *"O" Ring Ø2.62x31.42*	6	♦	♦	♦	♦	♦	♦	♦	♦
****16***	0009.37	Anello antiestrusione / *Back ring*	6								
****17***	1601.56	Tappo valvola / *Valve plug*	6								
****18***	0203.54	Coperchio VAM / *Valves cover*	2								
****19***	1801.07	Vite TCEI M12x30 UNI 5931 / *Screw M12x30 UNI 5931*	16								
****20***	1802.01	Vite TE M6x16 UNI 5739 / *Screw M6x16 UNI 5739*	6								
****21***	1801.09	Vite TCEI M12x140 UNI 5931 / *Screw M12x140 UNI 5931*	4								
****22***	1801.10	Vite TCEI M12x120 UNI 5931 / *Screw TCEI M12x120 UNI 5931*	4								
****23***	0603.11	Guarnizione rame G3/4" / *Copper washer G3/4"*	1								
****24***	1601.58	Tappo G 3/4" inox / *Brass plug G 3/4" stainless steel*	1								
25	1503.29	Sede valvola / *Valve seat*	6	♦	♦	♦	♦	♦			
	1503.34	Sede valvola / *Valve seat*	6						♦	♦	♦

LISTA RICAMBI / *PARTS LIST*												**HFR Pompe / *Pumps***
Pos. *Item*	Codice *Part number*	Descrizione *Description*	Q.tà per Pompa	HFR40S	HFR60S	HFR40F	HFR60F	HFR80F	HFR80S	HFR105S	HFR120S
26	0009.36	Anello antiestrusione / *Back ring*	6	♦	♦	♦	♦	♦	♦	♦	♦
27	0601.58	"O" Ring Ø2,62x28,25-3112 / *"O" Ring Ø2.62x28.25-3112*	6								
28	1202.13	Piattelo valvola / *Valve plate*	6								
29	0900.39	Molla valvola / *Valve spring*	6								
30	0604.12	Gabbia valvola / *Valve cage*	6	♦	♦	♦	♦	♦			
	0604.12	Gabbia valvola / *Valve cage*	6						♦	♦	♦
31	1801.06	Vite TCEI M8x25 UNI 5931 / *Screw M8x25 UNI 5931*	12	♦	♦	♦	♦	♦	♦	♦	♦
32	0500.98	Flangia chiusa / *Closed bearing housing*	1								
33	0601.12	"O" Ring Ø2,62x120,32 NBR / *"O" Ring Ø2.62x120.32*	2								
34	0200.12	Cuscinetto 32310 rulli conici / *Roller bearing 32310*	2								
35	0006.20	Albero singola P.d.F. / *Single - endend crankshaft*	1	♦							
	0006.21	" " " " " "	1		♦						
	0006.22	" " " " " "	1			♦					
	0006.23	" " " " " "	1				♦		♦		
	0006.24	" " " " " "	1					♦		♦	
	0006.25	" " " " " "	1								♦
36	0206.07	Chiavetta / *Crankshaft key*	1	♦	♦	♦	♦	♦	♦	♦	♦
37	1800.12	Golfare M12 / *Eyebolt*	1								
38	0001.14	Anello radiale / *Crankshaft seal*	1								
39	0301.12	Distanziale / *Shim*	1								
40	0500.97	Flangia aperta / *Bearing housing*	1								
****41***	1800.11	Vite pistone / *Plunger bolt*	3								
****42***	0601.15	"O" Ring Ø1,78x11,11 / *"O" Ring Ø1.78x11.11*	3								
****43***	1200.26	Pistone Ø30 / *Plunger Ø30 mm*	3	♦	♦	♦	♦	♦			
	1200.28	Pistone Ø40 / *Plunger Ø40 mm*	3						♦	♦	♦
****44***	1400.55	Rosetta rame pistone / *Copper spacer*	3	♦	♦	♦	♦	♦	♦	♦	♦
45	0003.22	Asta pattino / *Plunger rod*	3								
46	1501.05	Anello Ø22 / *Ring Ø22*	6								
47	1502.05	Spinotto / *Connecting rod pin*	3								
48	0100.09	Biella / *Connecting rod*	3								
49	1403.05	Rosetta elastica Ø8 / *Spring washer Ø8*	6								
50	1800.13	Vite biella / *Connecting rod screw*	6								
51	0601.11	"O" ring Ø 2,62x209,23 / *"O" ring Ø 2.62x209.23*	1								
52	0203.55	Coperchio carter / *Cranckcase cover*	1								
53	0601.19	"O" Ring Ø2,62x17,13 / *"O" Ring Ø2.62x17.13*	1								
54	1601.20	Tappo G 1/2" ottone / *Brass plug G 1/2"*	1								
55	0700.06	Spia livello olio G 1" / *Sight glass G 1"*	1								
56	1600.13	Tappo sfiato olio G 3/4" / *Oil dip stick G 3/4"*	1								
57	1801.26	Vite TCEI M6x22 UNI 5931 / *Screw TCEI M6x22 UNI 5931*	8								

LISTA RICAMBI / *PARTS LIST*												HFR Pompe / *Pumps*
Pos. *Item*	Codice *Part number*	Descrizione *Description*	Q.tà per Pompa	HFR40S	HFR60S	HFR40F	HFR60F	HFR80F	HFR80S	HFR105S	HFR120S	

		Particolare disponibile solo in kit / *Part available in kit only*

*		Particolare disponibile anche in kit / *Part available in kit also*