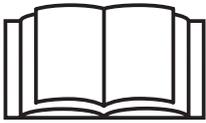


Pratissoli

SH series



Instruction Manual

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1. INTRODUCTION

Pratissoli SH high pressure water plunger pumps have been designed for long life industrial duties and provided they are correctly installed and maintained will give long time trouble free operation. Read and understand this manual before using your pump: it contains the necessary information for the correct installation, use and maintenance as well as some practical suggestions for trouble shooting.

When receiving your pump make sure of the good state of the supply and that no items are missing. Any missing item or damage should be reported before installing and starting the pump.

2. SYMBOLS DESCRIPTION



Warning
Potential danger



Read carefully and understand the manual before operating the pump



Danger
high voltage



Danger
Wear protective mask.



Danger
Wear goggles.



Danger
Wear protective gloves.



Danger
Wear safety boots

3. SAFETY

3.1 General warnings for safe operation

The misuse of an high pressure water unit and the non-observance of the pump installation and maintenance instructions may cause serious damages and/or injuries to people or properties or both.

Any Manufacturer/Operator requested to assemble/use an high pressure water unit should be competent to do so, should have the necessary knowledge on every high pressure component installed in the unit and on the precautions to be taken in order to guarantee the largest safety margins during operation. No precaution, so far as is reasonably practicable, should be left out in the interest of safety, both from the Manufacturer and the Operator.

3.2 High pressure unit safety requirements

1. a safety valve should be installed in any delivery line and should be sized to discharge or by-pass the entire pump flow rate.
2. high pressure unit components, with particular regard for those units working outside, should be adequately protected against rain, frost and heat.
3. electric components and wirings should be provided with an adequate degree of protection, able to protect them against spray coming from any direction. They should also be suitable for working in a wet environment.
4. high pressure hoses and any other accessory under pressure should be sized in accordance with the max unit working pressure and must always work within the safety margins indicated by the hose/accessory Manufacturer.
5. high pressure hose ends should be fastened to a steady body in order to prevent them from dangerous sweeping around, should they burst or come off their end fittings.
6. proper safety guards should be provided to adequately cover transmission joints, pulleys, belts, auxiliary drives.



3.3 Safety of operation

The access into the area where an high pressure unit is working should be strictly prohibited to unauthorised personnel. The area should be suitably enclosed and its perimeter, so far as is reasonably practicable, cordoned off and proper warning notices displayed in prominent positions.

Personnel authorised to enter that area should have been previously trained to do so and informed on the risks arising from failures, misuse and any unforeseeable circumstance which may occur during operation. Before starting the pump unit and bringing it up to pressure the Operator is requested to carry out the following checks:

1. make sure that a correct water supply to the pump is provided.
2. make sure that water inlet filters are properly clean.
3. electrical components and wirings, with special emphasis on connections, junction boxes, switches and supply cables should be free from external damages (i.e. exposed and broken wires) and adequately protected against water.
4. high pressure hose should not show apparent external wear and the fittings at both ends should be free from signs of erosion or corrosion.
5. make sure that all fluids (lubricating oil for pump and engine, cooling water, hydraulic fluids) are at proper level and in good condition.
6. make sure the safety guards are in good conditions.

The work should stop immediately and the pressure must be released in the event that leakages become apparent or if any person becomes aware of any change in condition or any hazard existing or being introduced. Any failure must be promptly reported and then checked by competent personnel.



3.4 General procedures for high pressure guns/lances operation.

1. the Operator should take reasonable care of the safety of himself and of other persons who may be affected by his acts or omission at work. His actions should be always governed by his good sense and responsibility.
2. The Operator should wear suitable waterproof protective clothings, having regard to the type of work being undertaken. The clothing set should include adequate hand protections, suitable boots able to ensure proper grip on wet floors, helmet provided with full face shield, waterproof garment providing full cover to the Operator, including his arms.

As most of water jets produce noise levels in excess

of 90 dB(A) suitable ear protection is advised.

Note: it must be emphasised that whereas protective clothing provides adequate protection against spray and flying particles, it does not constitute complete protection against the direct impact of the water jet. Additional protections in the form of suitable metal shields or barriers may be necessary for certain jetting operations.

3. in most jetting operations it is an accepted practise to employ a team of Operators consisting of two members at least, in order to provide mutual assistance in case of need and to rotate their duties in case of long and heavy work. While the first Operator holds the gun, the second Operator attends the pump unit, keeping close watch on the first Operator for signs of difficulties or fatigues, and watching the surrounding area for intrusion by other persons or unsafe situations. If required, he will shut off the pressure until it is safe to continue.
4. the area in which the work is to proceed should be clear of loose items and debris to prevent tripping and slipping hazards.
5. the water jet should be directed only and always against the workpiece, even during preliminar operating tests prior to starting work.
6. where applicable, proper side shields should be suitably placed to safeguard personnel and equipment against contact with grit or particles removed by the water jet.
7. on no account must the Operator be distracted during operation until the jet has been stopped. Personnel having reason to enter the water jetting area should wait until the jet is stopped and his presence known.
8. each team member must always be aware of the actions and intentions of other team members in order to prevent any dangerous misunderstanding occurring during jetting operation.
9. the pump unit should not be started and brought up to pressure unless each team member is in his designated position, the nozzle directed to the workpiece and the lance or gun securely held.

3.5 Safety of maintenance.

Apart from the working pressure regulation no attempt should be made to adjust any nut, hose, fitting, ect, while that part of the system is under pressure. The pump should be stopped and any pressure in the line released prior to make any adjustment.

1. the high pressure water unit should be maintained in accordance with the Manufacturer's instructions.
2. the unit should be maintained only by competent personnel.
3. service and maintenance should be carried out with proper tools in order to prevent any damage on high pressure connections and fittings.
4. use of other than original spare parts is strictly forbidden.

4. PUMP IDENTIFICATION

Each pump is fitted with a rating plate 1 Fig.1 containing the following information:

2. pump model and version.
3. serial number.
4. max r.p.m.
5. max operating pressure (bar).
6. oil capacity (ltr.) and oil specification.
7. gear box ratio
8. max flow rate (l/min).

Pump model, pump version and serial number should be specified when ordering spare parts. Should the pump be modified (i.e. by changing the original version) then any change should be mentioned on the rating plate for future reference.

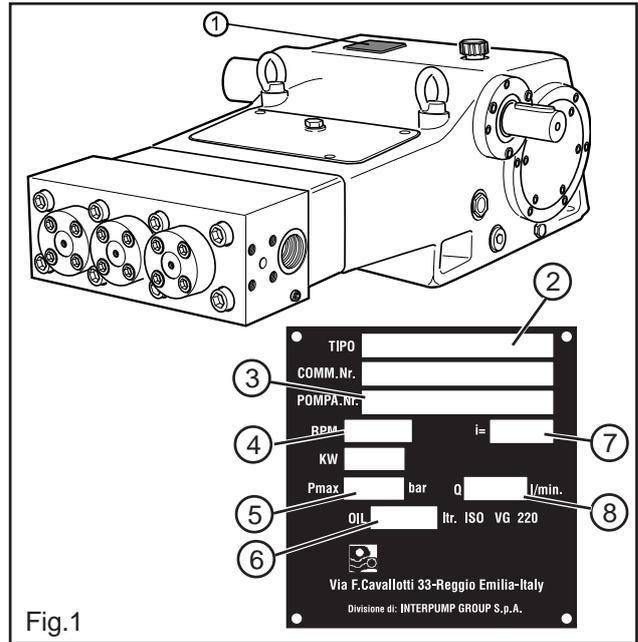


Fig.1

5. TECHNICAL FEATURES

Model	1750 rpm (R = 1:3,389)						1500 rpm (R = 1:2,95)					
	Flow rate		Pressure		Power		Flow rate		Pressure		Power	
	l/min	Gpm	bar	psi	kW	Hp	l/min	Gpm	bar	psi	kW	Hp
SH 20	44	11,6	1400	20300	117	160	43	11,3	1400	20300	117	160
SH 22	53	14,0	1100	15950	110	151	52	13,7	1100	15950	110	151
SH 24	63	16,6	950	13800	114	155	62	16,3	950	13800	112	153
SH 26	74	19,5	800	11600	113	153	72	19,2	800	11600	110	150
SH 28	86	22,7	700	10150	115	156	84	22,3	700	10150	113	153
SH 30	98	25,9	600	8700	112	152	96	25,6	600	8700	110	150

6. DIMENSIONS AND WEIGHT

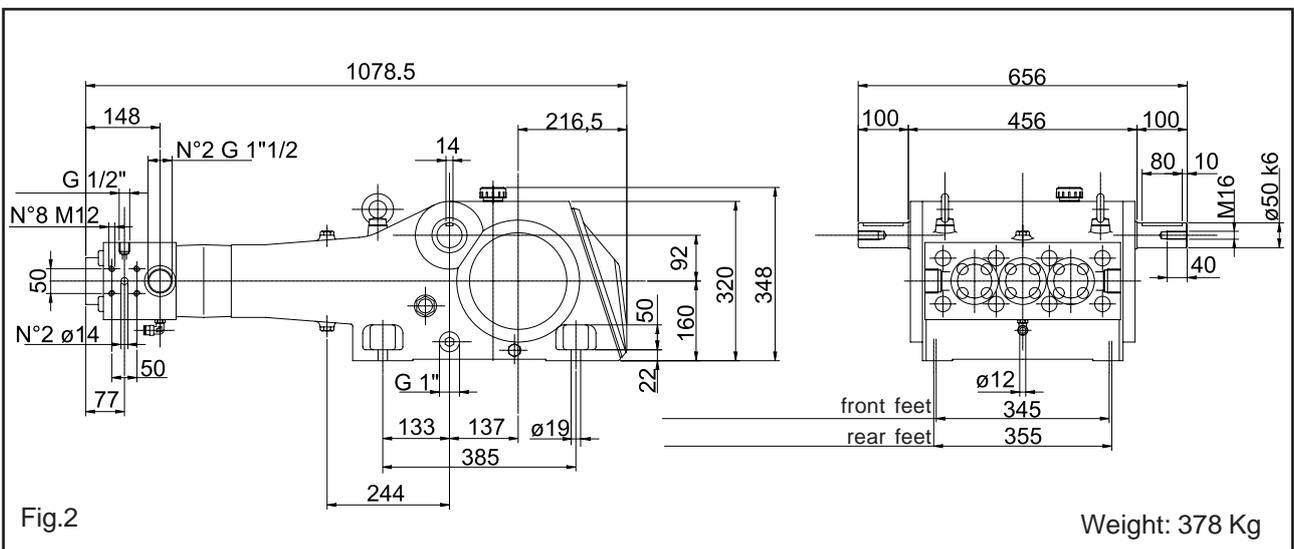


Fig.2

Weight: 378 Kg

7. GENERAL INFORMATION ABOUT THE PUMP USE



The SH pump has been designed to pump fresh and filtered water at room temperature.

7.1 Water temperature



The max admitted water temperature is 30°C.

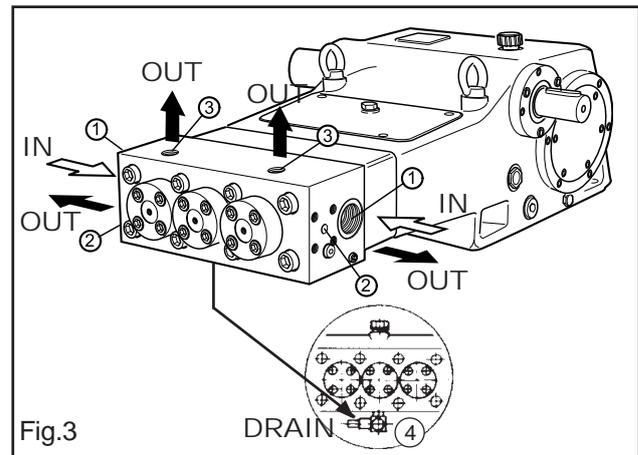
7.2 Max flow and pressure ratings

The performance data indicated in the catalogue and in the rating plate refer to the maximum performance of the pump. The use of the pump below the rated performances does not allow the drop in power absorbed to be balanced by altering the pressure or volume of the pump above its maximum value.

7.3 Lowest operating rpm

The lowest operating speed for all SH's (all versions) is 350 rpm.

8. CONNECTIONS AND PLUGS



SH pumps are provided with (Fig.3):

1 - N°2 inlet ports IN G 1"1/2.

Suction line connection to either inlet port is acceptable, the port not being used should be hermetically sealed with the correct plug.

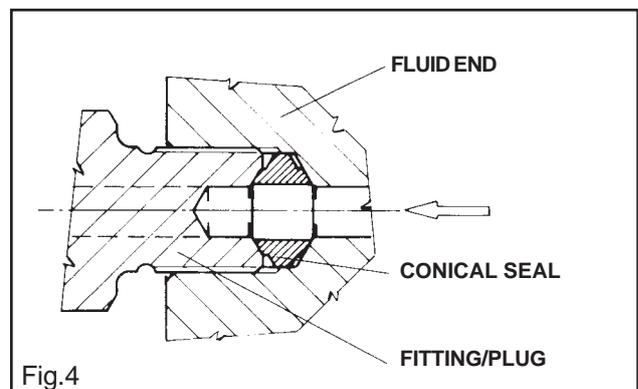
2 - N°2 outlet ports OUT Ø 14 mm.

3 - N°2 outlet ports OUT G1/2" (designed for pressure gauge and safety valve only).

4 - N°1 DRAIN port provided with quick coupling for connection with Rilsan air hose Ø 10 mm., it collects the water drainage from the cooling system and should be connected back to the suction line BEFORE the feed pump.

The SH pump is supplied with 4 conical seals (Fig.4) made of stainless steel and designed to provide total sealing of the outlet connections. They must be used in either the outlet ports of the head or in the outlet ports of the optional outlet mounting flanges.

The conical seals should be replaced at any disassembling and not re-used.



9. PUMP INSTALLATION

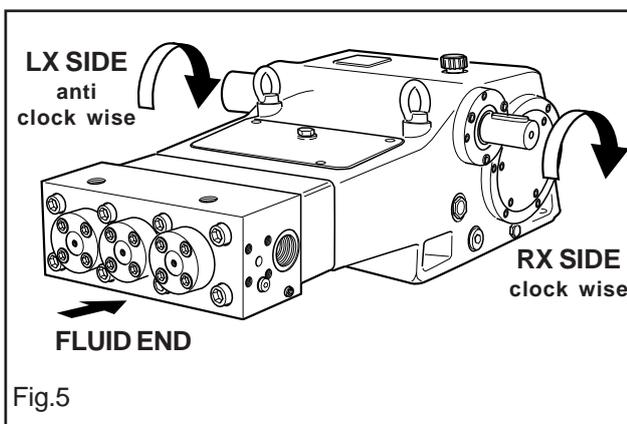
9.1 Positioning

The pump should be installed flat on a rigid base by means of the four feet \varnothing 19 mm.

The base should be rigid enough to avoid any misalignment or flexing of the pump/transmission coupling axis due to the torque involved during operation.

9.2 Direction of rotation

The fig. 5 shows the correct direction of rotation looking at the pump from the fluid end side. Two arrows stamped on the crankcase nearby the crankshaft provide the information as well.



9.3 Water connections

In order to isolate the high pressure equipment from the pump vibrations it is suggested, where applicable, to use flexible hoses for both suction and delivery lines at least for the first length.

9.4 Pump feeding

SH pumps require an inlet pressure at the suction port of at least 5 bar (73 psi) up to 7 bar (100 psi).

The feeding pump should be of a centrifugal type, supply at least twice the rated SH pump flow rate at the above required pressures in any working condition at any pump speed. The feeding pump should be operated independently from the plunger pump.

The SH pump should be started only when the inlet pressure is 5 bar (73 psi) at least.

A pressure switch to control the correct inlet pressure should be always installed in the suction line after the filters.

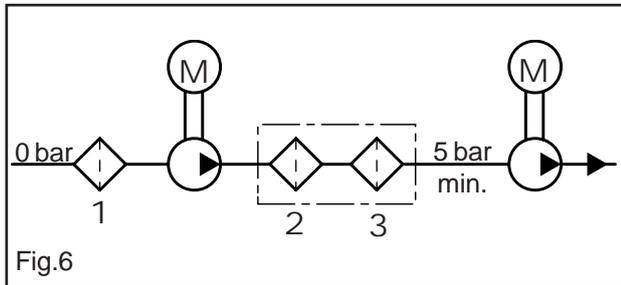
9.5 Suction line

For the correct pump operation make sure that the suction line meet with the following specifications:

1. Internal diameter should be at least 38 mm. in any point, possibly larger depending of the drop in pressure due to the length and shape of the line.
2. should be as straight as possible minimizing changes in size and direction and positioned in such a way to allow air pockets and bubbles to escape.
3. should be perfectly airtight.
4. should be completely free from 90° elbows, diameter reductions, counter slopes, "T" connections and should not be connected to other pipelines.
5. should be positioned in such a way to prevent the pipe emptying after the pump stops.
6. do not use high pressure flexible hoses for the suction line.
7. do not use high pressure hydraulic fittings like 90° elbows, high pressure adaptors, high pressure 3 or 4 ways nipples and so on.
8. do not install any kind of detergent injector along the suction line.
9. do not install standing valves, check valves or other kind of one-way valves.
10. make sure that the feed tank capacity and the water minimum level do not give rise to turbulence at the tank outlet port, which, in turn, might create cavitation at the feeding pump.
11. do not connect the by-pass line from the valve directly to the pump suction line.
12. the water flow from the valve and the cooling system should be directed back in the tank. Make sure that the by-pass and tank feeding flows do not give rise to turbulence at the tank outlet port, which, in turn, might create cavitation at the feeding pump. Proper baffle plates should be provided inside the tank.
13. before connecting the suction line to the pump inlet port make sure the pipe is perfectly clean inside.

9.6 Filtration

VS pumps require 10 to 20 microns water filtration degree. For a correct filtration system three individual filter units should be provided and positioned as shown by Fig 6.



The filters should be installed as close as possible to the pump, allow easy inspection and have the following specifications:

- capacity of each filter should be at least three times the rated pump flow rate.
- filter port diameters should not be smaller than the pump inlet ports.
- Filtration degree of each filter should be as follows:
 - Filter n°1: 250 microns
 - Filter n°2: 70 - 100 microns
 - Filter n°3: 10 - 20 microns

IMPORTANT NOTE: in order to properly safeguard the pump it is very important to plan cleaning of the filter **with a frequency depending on the water quality, filtration degree and number of hours of each application.**

9.7 Delivery line

For a correct delivery line comply with the following instructions:

- the first length of delivery hose should be flexible in order to isolate the pump vibrations from the rest of the system.
- use only high pressure hoses and fittings able to guarantee the largest possible safety margins in any working conditions.
- a suitable relief valve should be installed in the delivery line.
- use glycerin filled pressure gauges, being the most suitable for pulsating loads.
- When designing the delivery line, take into proper account the unavoidable drop in pressure, due to its length and size.

10. START UP AND RUNNING PROCEDURES

10.1 Before start up

Before start up make sure that the following conditions have been complied with:

- suction line should be connected: **the pump must never run dry.**
- suction line must be perfectly air-tight.
- any ON-OFF valve in between pump and water source should be open and make sure the water gets into the pump freely.
- set the pressure line in dump mode in order to let the air in the pump get out easily thus facilitating the pump priming.
- make sure all suction/delivery line connections are fully tightened.
- Joint alignment, belt tightening and PTO shaft inclination tolerances should remain within the values indicated by the transmission Manufacturer.
- make sure of the correct oil level.

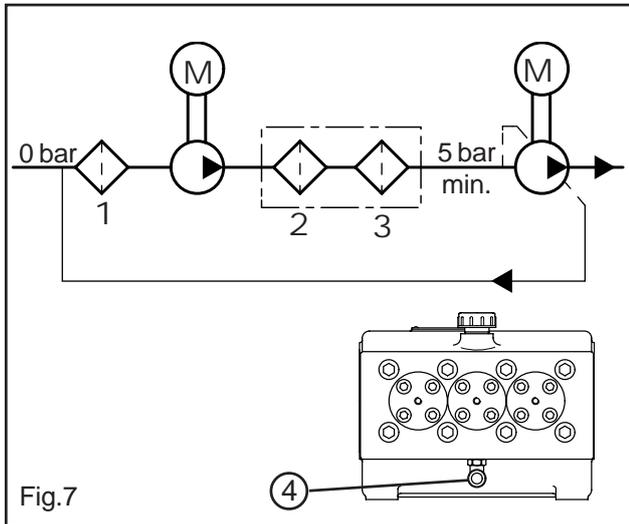
Note: in case the pump has not run for a long period check the suction and delivery valves for scaling

10.2 Starting up

- pump and motor/engine should start offload, set the regulating valve to zero or set the pressure line in dump mode by means of proper dumping devices.
- make sure the pump starts only when the correct inlet pressure is provided.
- when starting the pump up for the first time or after every wiring re-connection check for the proper direction of rotation.
- check that the rotating speed does not exceed the rated value.
- before putting the pump under pressure let it run for some time until the oil flows freely.
- before stopping the pump release the pressure from the system by operating the dump device or by releasing the regulating valve and reduce rpm to a minimum (diesel applications).

10.3 Water cooling system

During operation the cooling water is drained out of the pump through the port (4, Fig.7) located underneath the pump head. The cooling water line should be connected to the inlet line **BEFORE** the feed pump as shown below.

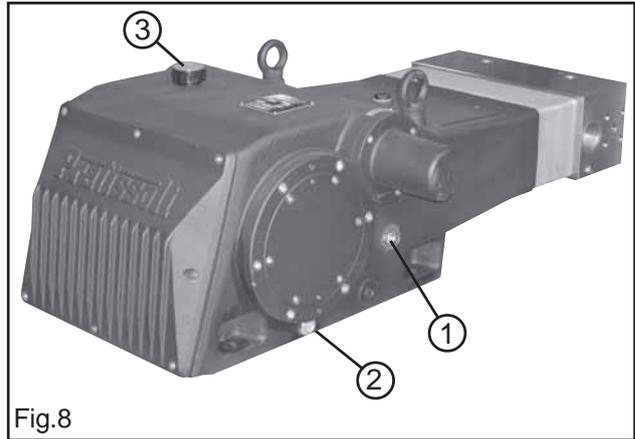


11. MAINTENANCE INSTRUCTIONS



11.1 Crank mechanism maintenance.

Check oil level through the oil level indicator (1, Fig.8) at least on a weekly basis.



If necessary, top up from the oil plug 3, Fig.8. Check the oil when cold and change the oil when still hot (pump still at working temperature). In order to drain the oil from the pump remove the magnetic plug 2, Fig.8. At every oil change clean the magnetic plug 2 Fig.8 and check the lower cover of Fig.7 for sediments or deposits.

OIL CHANGES	hours	Q.ty Lt.	Oil type
1° change	50	14	ISO 220
further changes	500		

Oil should be changed at least once a year.

Recommended oils:

BRAND	TYPE
AGIP	ACER 220
ARAL	MOTANOL HP 220
AVIA	AVILUB RSL 220
BP	ENERGOL HL 220
CASTROL	ALPHA ZN 220
ESSO	NUTO 220
FINA	SOLNA 220
IP	HYDRUS 220
MOBIL	DTE OIL BB
SHELL	TELLUS C 220
TEXACO	REGOL OIL 220
TOTAL	CORTIS 220

11.2 Fluid end maintenance

The fluid end does not require periodical maintenance. Service operations are limited to the valves inspection and/or replacement, when necessary.

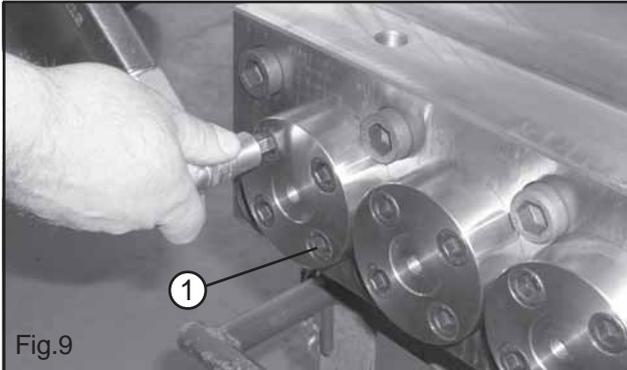


Fig.9

In order to have access to the delivery valves loose the 12 valve cover screws (1, Fig.9) and remove the valve covers.



Fig.10

Once removed, take out the delivery valve guide with the spring and valve disk. An M10 threaded bolt to be used as a simple extractor would help the operation (see Fig.10).

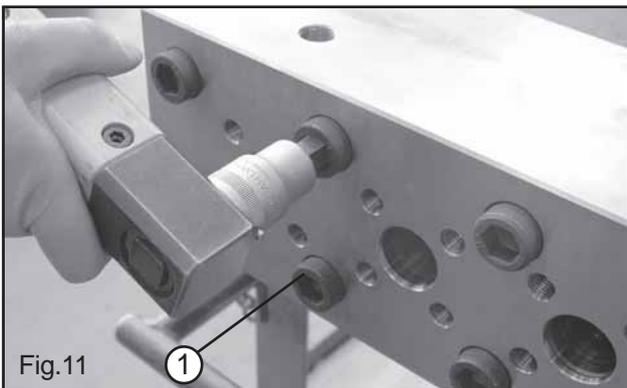


Fig.11

Loose and remove the 8 head screws (1 Fig.11).



Fig.12

Remove the pump head (Fig.12).

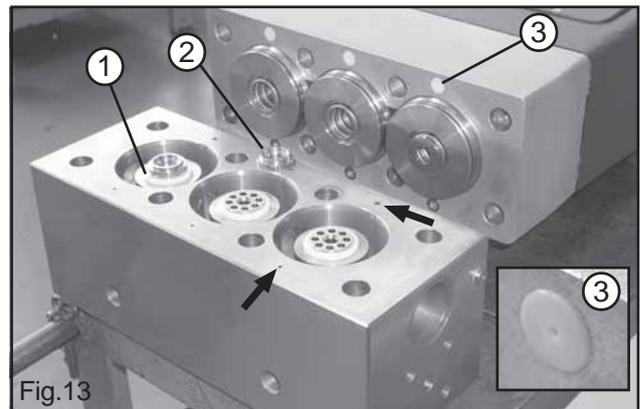


Fig.13

When removing the head from the pump pay attention to the valve seats (1, Fig.13) and the suction valve disks (2 Fig.13) which may fall off the head.

Check the cooling system orifices of the head (see arrows) and the relevant white tips (3, Fig.13) for deposits or sediments that may prevent cooling water from flowing through.

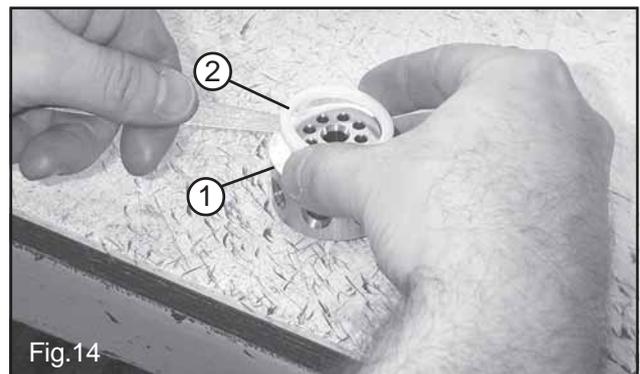


Fig.14

Remove the valve seats (1, Fig.14) from the head, check them for wear and replace if necessary.

BEFORE REPOSITIONING THE VALVE UNITS BACK IN PLACE CLEAN AND PERFECTLY DRY ALL VALVE HOUSINGS INSIDE THE HEAD.

VALVE RINGS (2, FIG.14) AND ALL O'RINGS SHOULD BE REPLACED AT EVERY INSPECTION.



Reassemble valves and head back in place by following the disassembling steps in the opposite sequence and use a torque wrench at the following settings for the valve cover screws and head screws :

-Valve cover screws: 20 kgm.

-Head screws: 55 kgm.

NOTE:

In order to facilitate reassembling operation use our tool 1, Fig.15 (p/n 2000.3014.0 for SH20-24, p/n 2000.3013.0 for SH26-30) or equivalent, able to hold the valve seat and valve disk in place when mounting the head on the pump (see arrow Fig.16).

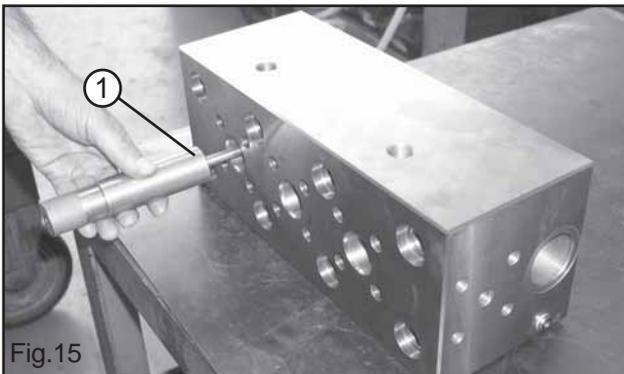


Fig.15

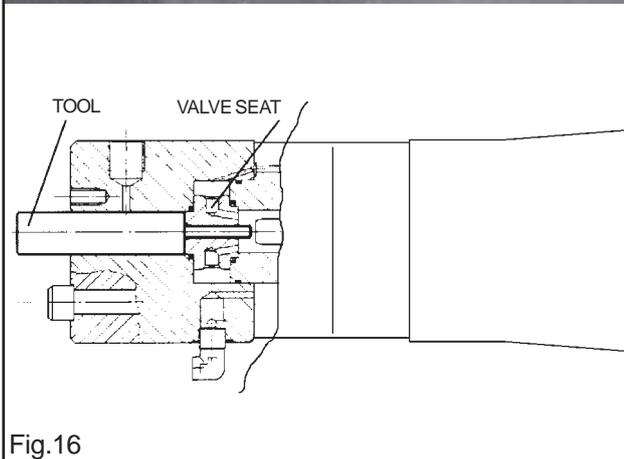


Fig.16

11.3 Pumping unit maintenance.

The only maintenance operation required for the pumping unit is the visual check of the amount of water drained out by the cooling system through the hole provided underneath the head (Fig.7, page 9). It clearly shows the pressure packing state of wear. Pressure packings should be replaced when vibration and/or drop in the operating pressure start to occur during operation.

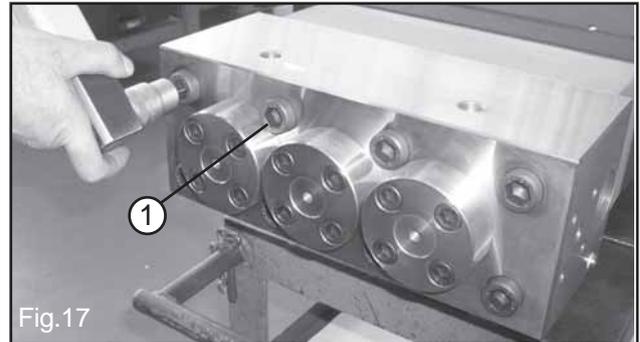


Fig.17

Remove the eight head screws (1 Fig.17).

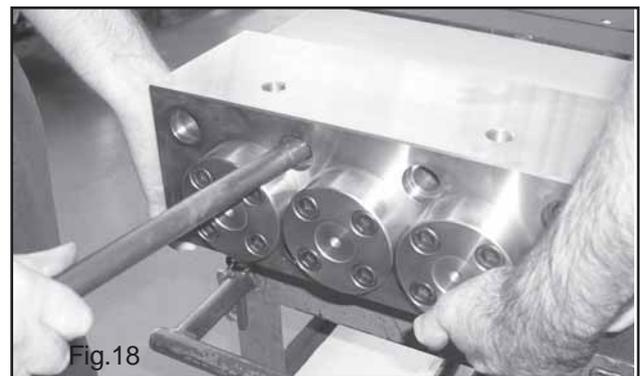


Fig.18

Remove the pump head (see chapter 11.2).

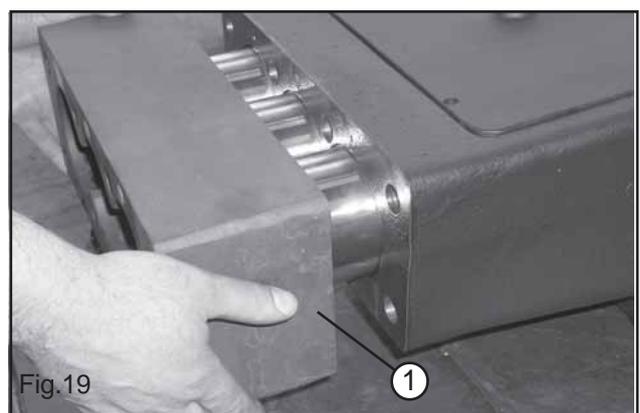


Fig.19

Take out the collector (1, Fig.19).

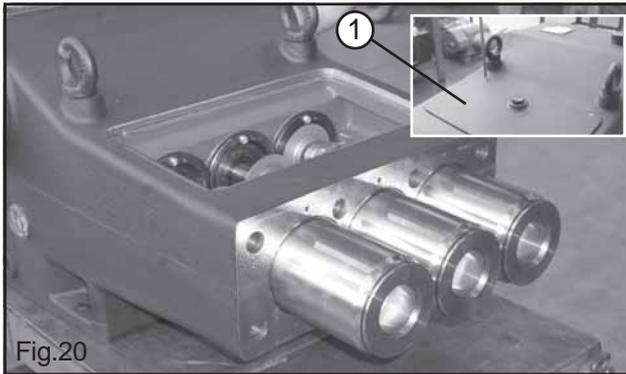


Fig.20

Remove the upper cover (1, Fig.20).

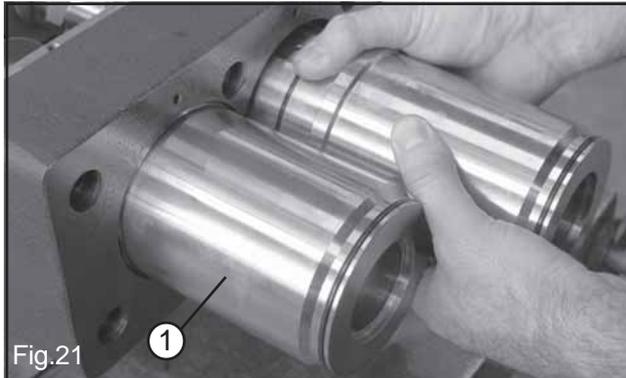


Fig.21

Once head and collector are removed the cylinders 1, Fig.21 are free to be taken out of the pump body. Beating the cylinders all around with a plastic hammer helps to loose them from possible scaling or deposit accumulated during operation.

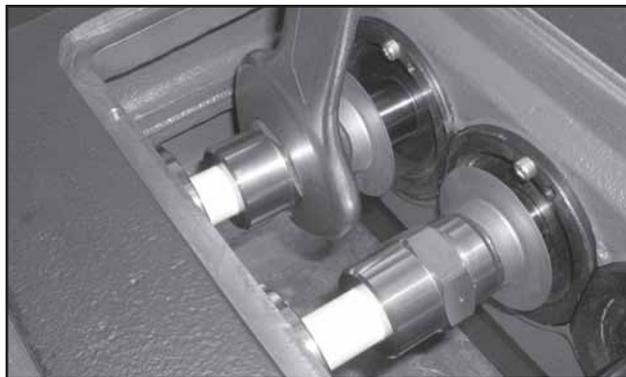


Fig.22

Once the cylinders are removed, loose the plungers and check them for wear (Fig.22). Replace if necessary.



Fig.23

Remove the seeger 1, Fig.23.

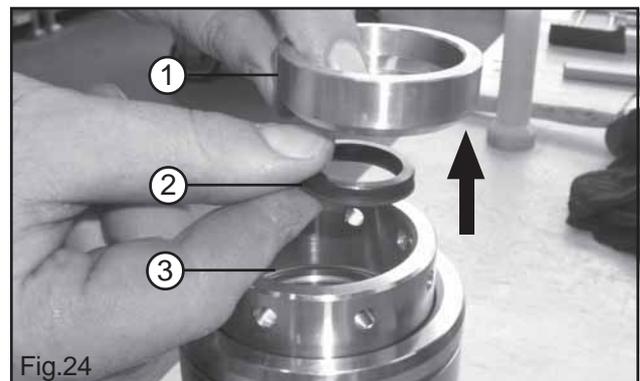


Fig.24

Remove the rear seal support 1, the rear seal 2 and the O'ring 3, Fig.24.

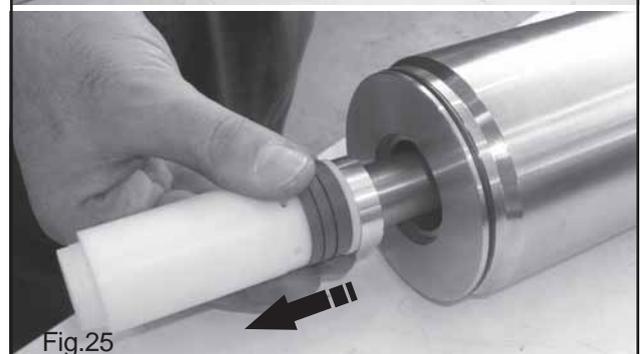


Fig.25

Insert a pin of adequate dimensions and smartly beat till the complete pressure packing set is out (Fig.25). **Replace pressure packing set at every inspection.**

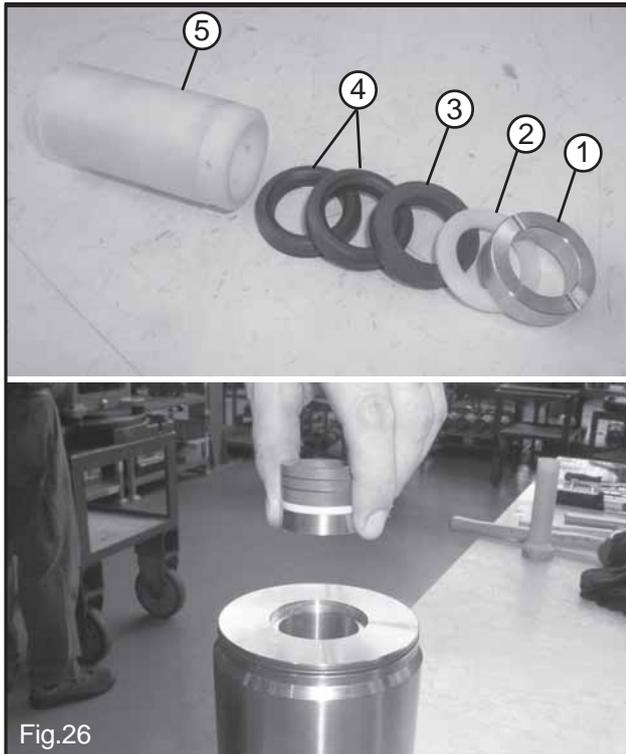


Fig.26

Fit each new component of the pressure packing set in the cylinder making sure of the correct order as shown in Fig.26:

- 1 Packing bushing
- 2 Packing ring
- 3 Back packing
- 4 Pressure packings
- 5 Pressure packing retaining bush



Fig.27

Each pressure packing set component should fit tight in the cylinders because of a little interference designed in the ext. diameter. A pin of adequate dimensions (1, Fig.27) helps in guiding each component straight and alligned all the way down in the cylinder.

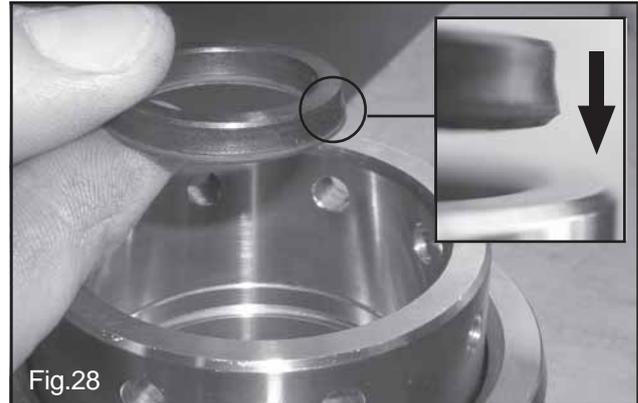


Fig.28

The new rear seal should be mounted with the larger diameter side first in, as shown in Fig.28.



Reassemble the pump following the disassembling steps in the opposite sequence and use a torque wrench for the screws listed below:

- Plunger screws: 10 kgm
- Head screws: 55 kgm
- Valve cover screws: 20 kgm.

12. SCREW CALIBRATION



Screw calibration is to be carried out by means of a torque wrench only:

DESCRIPTION	Kgm.
valve cover screws	20
head screws	55
plunger screws	10
connecting rod screws	7,5

13. MAINTENANCE TOOLS



The following tools are designed to facilitate mounting and dismounting operations of some pump components:

for disassembling:

- cylinder extractor cod. 2000.0019.0

for assembling:

- head/valve seat tool SH20-24 cod. 2000.3014.0

- head/valve seat tool SH26-30 cod. 2000.3013.0

14. PUMP STOPPED FOR LONG TIME



Before starting the pump up for the very first time after a long period from the date of shipment check for the correct oil level, check the valves as indicated in the chapter 11 and then comply with the starting procedures indicated in the chapter 10. When a long inactivity is scheduled drain the entire suction and delivery line and then run the pump dry **only for a few seconds** in order to drain out the water collected inside the fluid end.

15. PRECAUTIONS AGAINST FREEZING



In the risk of freezing the following precautions should be taken:

- after use drain the entire suction and delivery lines (filter included) by means of discharging devices, provided and positioned specifically for this purpose along the lowest point of the lines.
 - run the pump **only for a few seconds** in order to drain the water collected inside the fluid end
- Or, when applicable
- add a recommended amount of anti-freeze into the water tank and run the pump until the anti-freeze works all through the system.



If a pump is frozen or appears frozen ON NO ACCOUNT SHOULD THE PUMP BE OPERATED until the entire system has been thawed out.

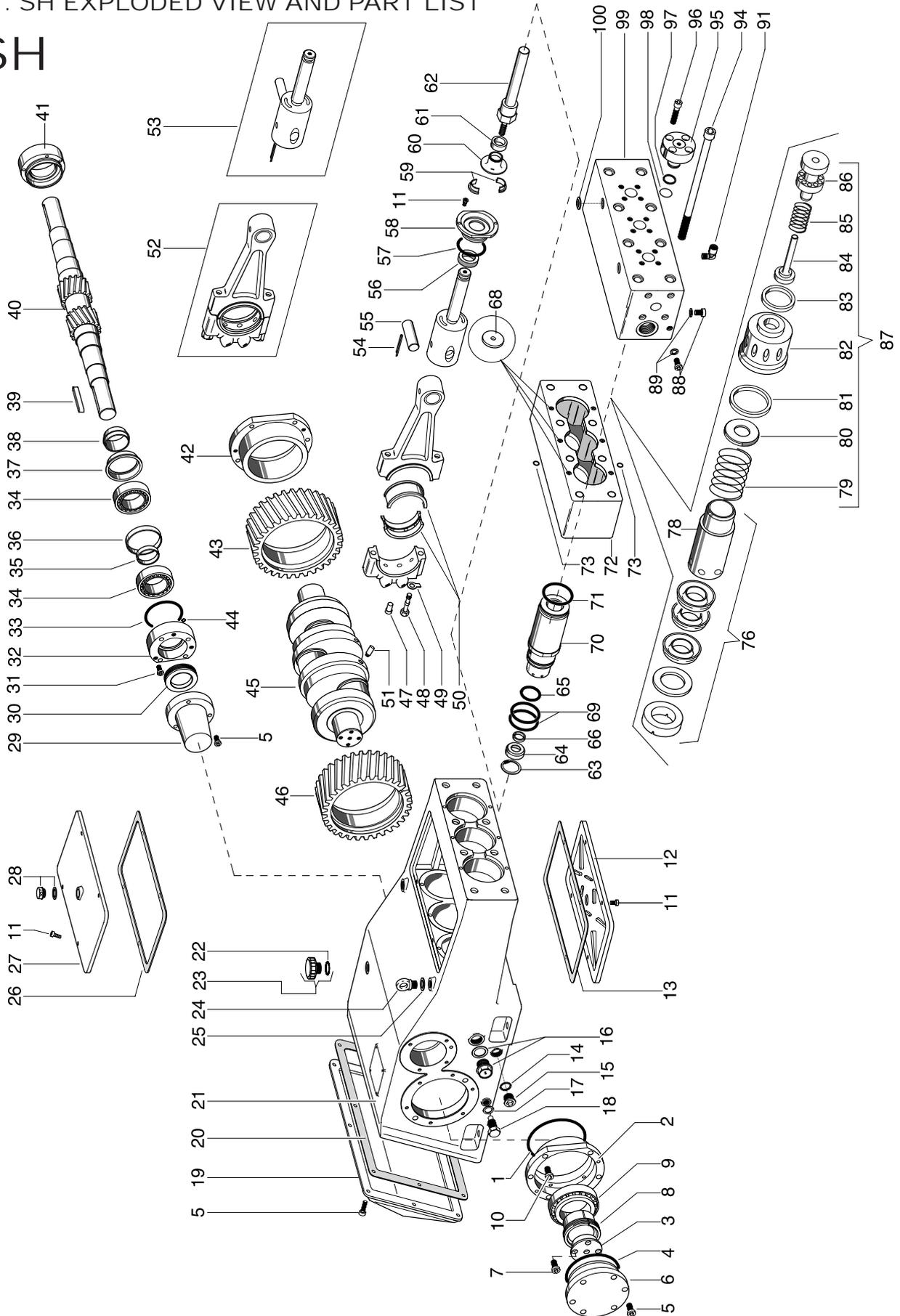
16. WARRANTY TERMS

Pratissoli products are warranted to be free from defects in workmanship and material for 12 months from the date of shipment. This warranty is limited to repairing or replacing products which Manufacturer's investigation shows were defective at the time of shipment. All products subject to this warranty shall be returned free of any freight charges to Pratissoli Pompe division of Interpump Group S.p.a., via Felice Cavallotti 33, 42100 Reggio Emilia, Italy.

The express warranty set forth herein is in lieu of all other warranties, express or implied, including without limitation any warranties of merchantability of fitness for a particular purpose and all such warranties are hereby disclaimed and excluded by the Manufacturer. Repair or replacement of defective products as provided above is the sole and exclusive remedy provided hereunder and the Manufacturer shall not be liable for any further loss, damages or expenses, including incidental or consequential damages, directly or indirectly arising from the sale or use of this product. For items not manufactured by Pratissoli Pompe, the warranty terms applied will be those of the original Manufacturer. The use of other than Pratissoli original spare parts automatically voids the warranty.

17. SH EXPLODED VIEW AND PART LIST

SH



POS	CODE	KIT	DESCRIPTION	Qt.
1	8810.1013.3	C	OR Ø 183,82 x 2,62	2
2	0101.0007.0		Left bearing support	1
3	0300.0001.0		Bearing bush retainer flange	2
4	8810.1013.2	C	OR Ø 152,07 x 2,62	2
5	8711.2115.2		Screw TCEI M8 x 20	23
6	0634.0028.0		Bearing cover	2
7	8711.3110.2		Screw TCEI M12 x 25	8
8	0300.0002.0		Bearing bush	2
9	8111.1101.7		Bearing 22218 CCK	2
10	8711.2515.4		Screw TCEI M10 x 30	12
11	8711.1515.2		Screw TCEI M6 x 14	14
12	0404.0005.0		Lower cover	1
13	0806.0003.0	C	Lower cover gasket	1
14	8720.4300.8		Aluminium washer Ø 1"	2
15	8212.0300.6		Plug G 1"	2
16	8010.5301.2		Oil level indicator G 1"	2
17	8720.4300.2	BC	Aluminium washer Ø 1/2"	2
18	8010.5700.2		Magnetic plug G 1/2"	2
19	0634.0024.0		Back cover	1
20	0806.0001.0	C	Back cover gasket	1
21	0601.0016.0		Pump body	1
22	8810.1011.6	C	OR Ø 29,82 x 2,62	1
23	8010.5402.7		Oil filling plug G 1"	1
24	8720.2600.3		Eyebolt M16	2
25	0300.0003.0		Eyebolt spacer	2
26	0806.0002.0	C	Upper cover gasket	2-4
27	0404.0003.0		Upper cover	1
28	8010.5600.2		Venting plug G 1/2"	1
29	0404.0007.0		Crankshaft end cap	1
30	8810.8002.6	C	Oil seal Ø 55 x 75 x 10	2
31	8711.2110.5		Screw TCEI M8 x 30	8
32	0634.0030.0		Left bearing cover	1
33	8810.1013.0	C	OR Ø 94,92 x 2,62	2
34	8111.0101.9		Bearing NJ 2211	4
35	0310.0002.0		Internal bearing spacer	2
36	0310.0001.0		External bearing spacer	2
37	0610.0000.0		Lubricating bush	2
38	0314.0000.0		Lubricating cone	2
39	8720.9701.3		Pinion key	1
40	0520.0002.0		Pinion 1500 rpm (Z20)	1
41	0520.0016.0		Pinion 1750 rpm (Z18)	1
42	0634.0031.0		Right bearing cover	1
43	0101.0008.0		Right bearing support	1
44	0520.0000.0		Gear 1500 rpm (Z59, left tothing)	1
45	0520.0014.0		Gear 1750 rpm (Z61, left tothing)	1
46	8810.1000.3		OR Ø 8,73 x 1,78	2
47	0500.0006.0	C	Crankshaft	1
48	0520.0001.0		Gear 1500 rpm (Z59, right tothing)	1
49	0520.0015.0		Gear 1750 rpm (Z61, right tothing)	1
50	0340.0000.0		Con rod pin	3
51	0350.0007.0		Con rod screw	6
52	8720.6700.6		Locking washer Ø 12	6
53	0233.0000.0		Brass bearing	3
54	0020.0000.0	C	Crankshaft pin	2
55	2500.0003.0		Con rod (complete)	3
56	2500.0111.0		Piston (complete)	3
57	8721.4201.5		Retainer pin Ø 5 x 36	3
58	0710.0005.0		Wrist pin Ø 35	3
59	8810.8100.1	C	Oil seal Ø 35 x 47 x 8,5 Spec.	3
60	8810.1012.8		OR Ø 72,69 x 2,62	3
61	0634.0042.0		Oil seal cover	3
62	0300.0007.0		Wiper bush	3
63	0412.0001.0		Wiper	3
64	0312.0044.0		Wiper spacer	3
65	1242.0022.0		Plunger SH20	3
66	1242.0023.0		Plunger SH22	3
67	1242.0024.0		Plunger SH24	3
68	1242.0025.0		Plunger SH26	3
69	1242.0026.0		Plunger SH28	3
70	1242.0027.0		Plunger SH30	3

POS	CODE	KIT	DESCRIPTION	Qt.
71	8720.7153.0		Seeger Ø 52 SH20 22 24	3
72	8720.7153.3		Seeger Ø 58 SH26 28 30	3
73	0313.0017.0		Scraper ring SH20	3
74	0313.0018.0		Scraper ring SH22	3
75	0313.0022.0		Scraper ring SH24	3
76	0313.0021.0		Scraper ring SH26	3
77	0313.0020.0		Scraper ring SH28	3
78	0313.0019.0		Scraper ring SH30	3
79	8810.1012.2	AC	OR Ø 47,30 x 2,62 SH20 22 24	3
80	8810.1014.0	AC	OR Ø 52,07 x 2,62 SH26 28 30	3
81	8810.3000.9	AC	Seal ring SH20	3
82	8810.3001.0	AC	Seal ring SH22	3
83	8810.3004.0	AC	Seal ring SH24	3
84	8810.3004.1	AC	Seal ring SH26	3
85	8810.3001.2	AC	Seal ring SH28	3
86	8810.3001.3	AC	Seal ring SH30	3
87	0835.0002.0	AC	Cooling system tip	3
88	8810.1014.2	AC	OR Ø 75,87 x 2,62	6
89	1622.0005.0		Cylinder SH20	3
90	1622.0006.0		Cylinder SH22	3
91	1622.0007.0		Cylinder SH24	3
92	1622.0008.0		Cylinder SH26	3
93	1622.0009.0		Cylinder SH28	3
94	1622.0010.0		Cylinder SH30	3
95	8810.1014.3	AC	OR Ø 82,22 x 2,62	3
96	0644.0002.0		Collector	1
97	8810.1010.0	AC	OR Ø 9,19 x 2,62	9
98	2050.0005.0	AC	Pressure packing kit SH20	3
99	2050.0006.0	AC	Pressure packing kit SH22	3
100	2050.0007.0	AC	Pressure packing kit SH24	3
101	2050.0008.0	AC	Pressure packing kit SH26	3
102	2050.0009.0	AC	Pressure packing kit SH28	3
103	2050.0010.0	AC	Pressure packing kit SH30	3
104	0315.0019.0		Pressure packing retaining bush SH20	3
105	0315.0020.0		Pressure packing retaining bush SH22	3
106	0315.0021.0		Pressure packing retaining bush SH24	3
107	0315.0022.0		Pressure packing retaining bush SH26	3
108	0315.0023.0		Pressure packing retaining bush SH28	3
109	0315.0024.0		Pressure packing retaining bush SH30	3
110	0902.0018.0		Suction valve spring SH20 22 24	3
111	0902.0020.0		Suction valve spring SH26 28 30	3
112	0822.0023.0		Suction valve disk SH20 22 24	3
113	0822.0027.0		Suction valve disk SH26 28 30	3
114	0805.0017.0	BC	Ring (suction side) SH20 22 24	3
115	0805.0020.0	BC	Ring (suction side) SH26 28 30	3
116	0812.0057.0		Valve seat SH20 22 24	3
117	0812.0065.0		Valve seat SH26 28 30	3
118	0805.0016.0	BC	Valve seat ring (delivery side)	3
119	0822.0022.0		Delivery valve disk SH20 22 24	3
120	0822.0026.0		Delivery valve disk SH26 28 30	3
121	0902.0017.0		Delivery valve spring SH20 22 24	3
122	0902.0021.0		Delivery valve spring SH26 28 30	3
123	0213.0039.0		Delivery valve guide	3
124	2080.0671.0		Valve assembly SH20 22 24	3
125	2080.0672.0		Valve assembly SH26 28 30	3
126	8212.0310.0		Plug G 1/8"	4
127	8720.4200.0	C	Aluminium washer Ø 10	4
128	8012.0303.0		Quick coupling G 3/8"	1
129	8711.5193.2		Screw TCEI M20 x 300 Spec.	8
130	0632.0015.0		Valve cover	3
131	8711.3595.3		Screw TCEI M14 x 45 Spec.	12
132	0105.0005.0	ABC	Antiextrusion ring	3
133	8810.1020.7	ABC	OR Ø 28,17 x 3,53	3
134	0642.0032.0		Manifold	1
135	0832.0021.0		Conical seal G 1/2"	2



18. TROUBLE SHOOTING



THE PUMP DOES NOT PRODUCE ANY NOISE: the pump is not primed and is running dry !

- no water in the inlet line.
- the valves are blocked.
- the pressure line is closed and does not allow the air to get out of the fluid end.



THE PUMP KNOCKS:

- air suction.
- insufficient feeding.
- bends, elbows and fittings along the suction line throttle the amount of water which passes through.
- too small inlet filter.
- dirty inlet filter.
- the feeding pump, where provided, is not of the suitable type or provides insufficient pressure or volume.
- the pump is not primed due to insufficient feeding or the delivery line is closed during start up.
- the pump is not primed because some valves are stuck (i.e. pump inactivity for long time).
- jammed or worn-out valves.
- worn-out pressure packings.
- the pressure regulating valves do not work properly.
- clearance in the drive system.
- r.p.m. are higher than rated.



THE PUMP DOES NOT DELIVER THE RATED VOLUME:

- insufficient feeding (due to the cause listed above).
- r.p.m. are less than rated.
- excessive amount of water by-passed by the pressure regulating valve.
- worn out valves.
- excessive leakage from pressure packings.



INSUFFICIENT PUMP PRESSURE:

- the nozzle is (or has become) too large.
- r.p.m. are less than rated.
- excessive leakage from pressure packings.
- excessive amount of water by-passed by the pressure regulating valve or faulty valve operation.
- worn out valves.



EXCESSIVE WATER LEAKAGE FROM THE PUMP:

- pressure packings are excessively worn out (due to normal wear or excessive cavitation).
- worn out plungers.



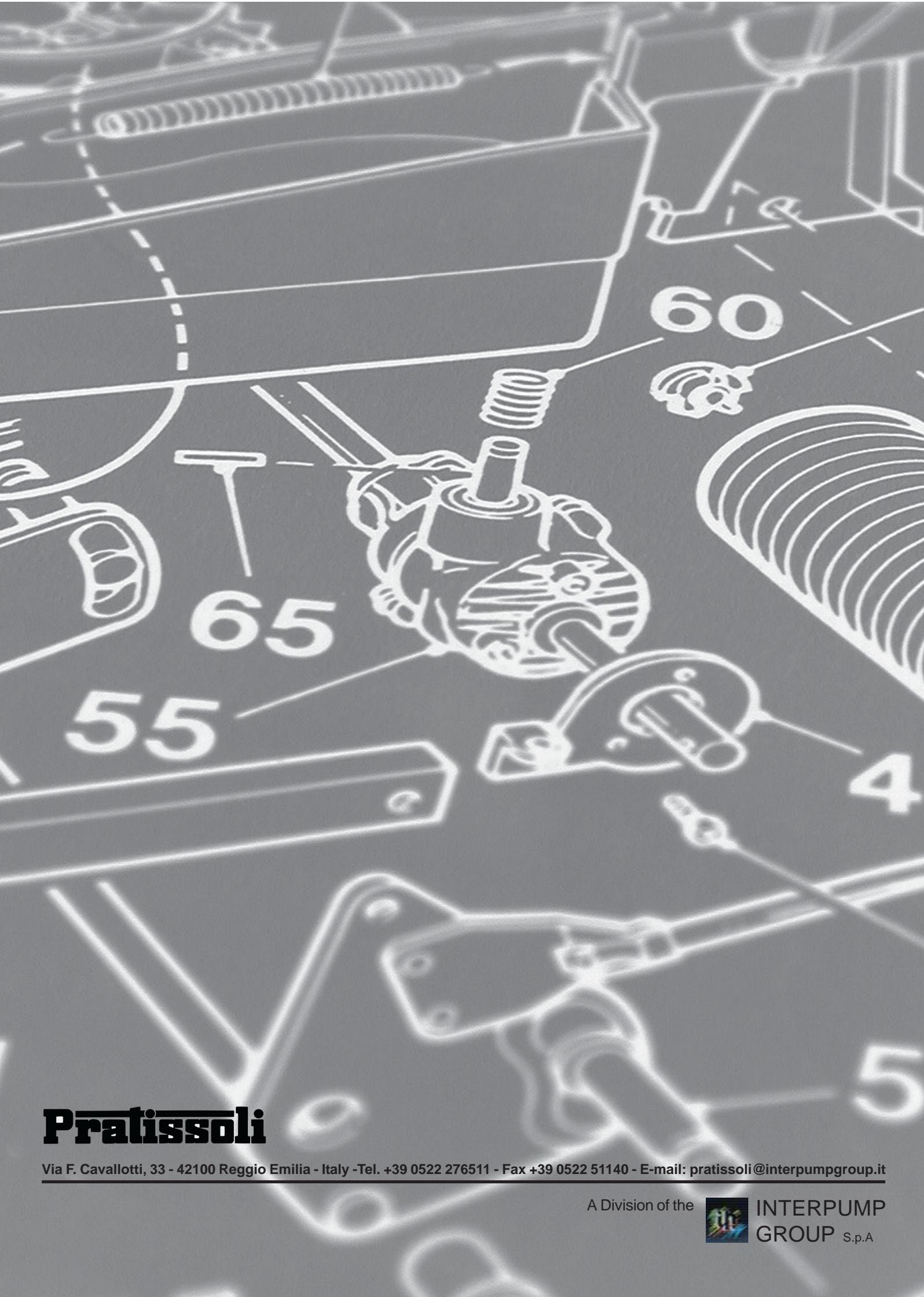
OVERHEATED PUMP:

- the direction of rotation is not correct.
- pump is overloaded (pressure or rpm over the rated values).
- the oil level is too low or the oil is not of a suitable type or fully used.
- water in the oil.
- excessive belt tension or incorrect alignment of the joint (where provided) .
- excessive inclination of the pump during operation.



PIPE VIBRATIONS OR KNOCKINGS:

- air suction.
- the pressure regulating valve does not work properly.
- the by-pass line is undersized.
- jammed up valves.
- drive transmission motion is irregular.



Pratissoli

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