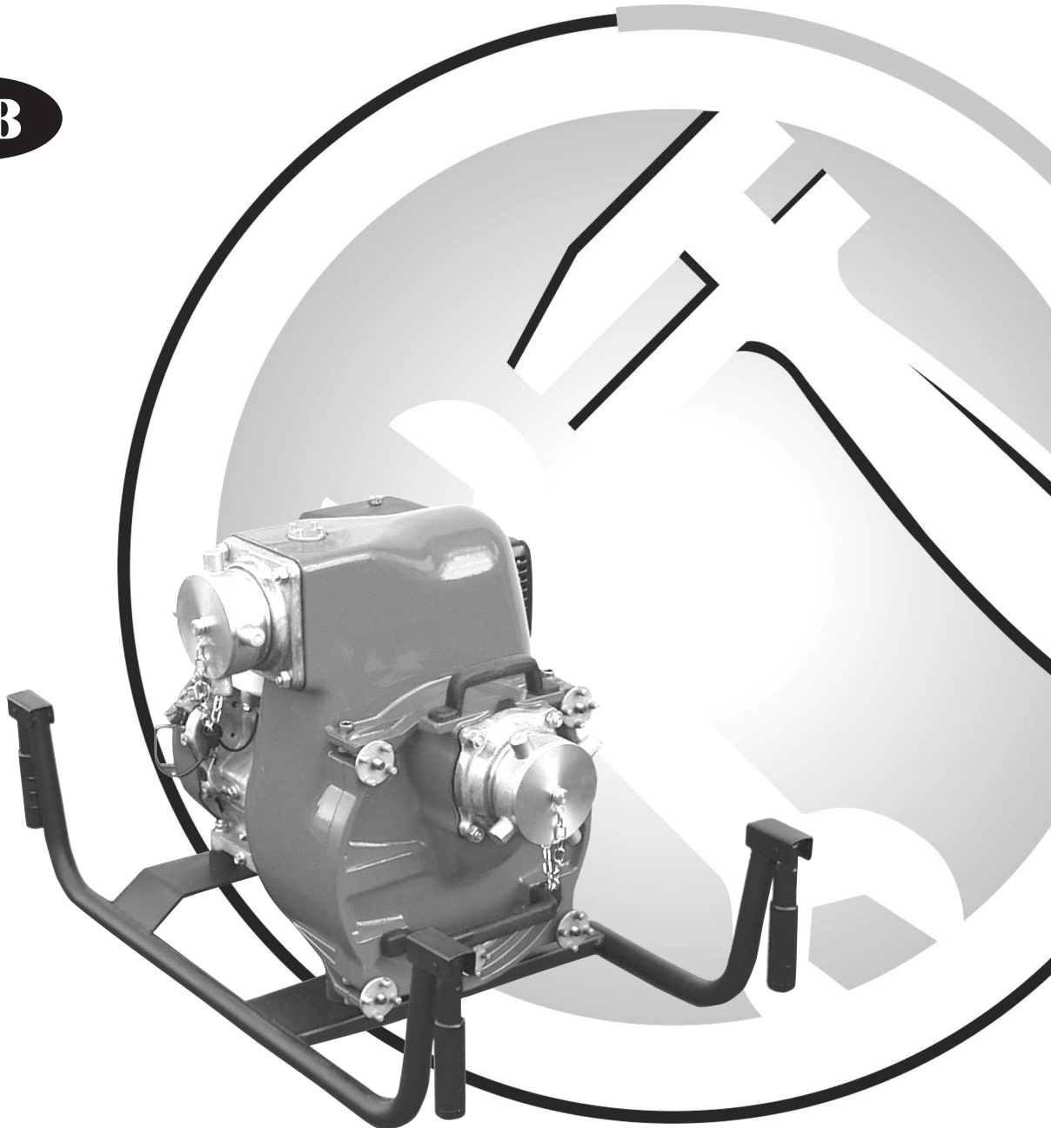




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Instructions for use and
maintenance of ETP-
series self-priming
centrifugal pumps

ETP



Before putting the unit into operation, read the instructions herein carefully.

The unit has been thoroughly tested, for several hours, prior to delivery; performance has been checked and relevant requirements met, within the acceptable tolerance limits.

If the instructions for use and maintenance are observed, the unit will give full performance for a long time. This manual also contains information for the prevention and elimination of most common operating problems.

CONTENTS

| | | |
|-----------|---|--------|
| 1 | IDENTIFICATION | Page 4 |
| 1.1 | Manufacturer | 4 |
| 1.2 | Type of pump | 4 |
| 1.3 | Model | 4 |
| 1.4 | Year of manufacture | 4 |
| 1.5 | Instruction book identification | 4 |
| 1.6 | Nameplate information | 4 |
| 1.7 | Field of application | 4 |
| 1.8 | In case of breakdown | 4 |
| 2 | WARRANTY | 4 |
| 3 | GENERAL INSTRUCTIONS | 4 |
| 4 | IN CASE OF EMERGENCY | 5 |
| 5 | HANDLING AND TRANSPORT | 5 |
| 5.1 | Method of transport | 5 |
| 5.2 | Installation | 5 |
| 6 | STORAGE | 5 |
| 6.2 | Pipework | 5 |
| 7 | STARTING | 5 |
| 7.1 | Checking the seal | 5 |
| 7.2 | Filling the pump casing | 5 |
| 7.3 | Priming | 5 |
| 8 | MAINTENANCE | 6 |
| 8.1 | Inspection and checks | 6 |
| 8.2. | Replacing the impeller | 6 |
| 8.3 | Replacing wear parts | 6 |
| 8.4 | Replacing the valve | 7 |
| 8.5 | Replacing the seal | 7 |
| 9 | TROUBLESHOOTING: CAUSES AND REMEDIES | 7 |
| 9.1 | the pump does not prime | 7 |
| 9.2 | the pump does not deliver liquid | 7 |
| 9.3 | the pump does not deliver enough liquid | 8 |
| 9.4 | the pump does not provide enough pressure | 8 |
| 9.5 | the pump absorbs too much power | 8 |
| 9.6 | the pump vibrates and is noisy | 8 |
| 9.7 | the pump jams | 8 |
| 9.8 | the seal leaks | 8 |
| 9.9 | the seal overheats | 8 |
| 10 | RESIDUAL HAZARDS | 8 |
| 11 | REPAIRS | 8 |
| 12 | SPARE PARTS | 9 |
| 12.1 | Ordering spare parts | 9 |
| 13 | DISPOSAL | 9 |

1 IDENTIFICATION

1.1 Manufacturer

VARISCO POMPE Srl Zona Ind. Nord - Terza Strada, 9 - 35129 PADOVA - ITALY

1.2 Type of pump

Horizontal self-priming centrifugal pump with open impeller for handling liquids containing solids in suspension. These pumps can operate satisfactorily with liquids containing air or dissolved gases.

1.3 Model

ET2P, ET3P, ET4P. The model is given on the pump's nameplate.

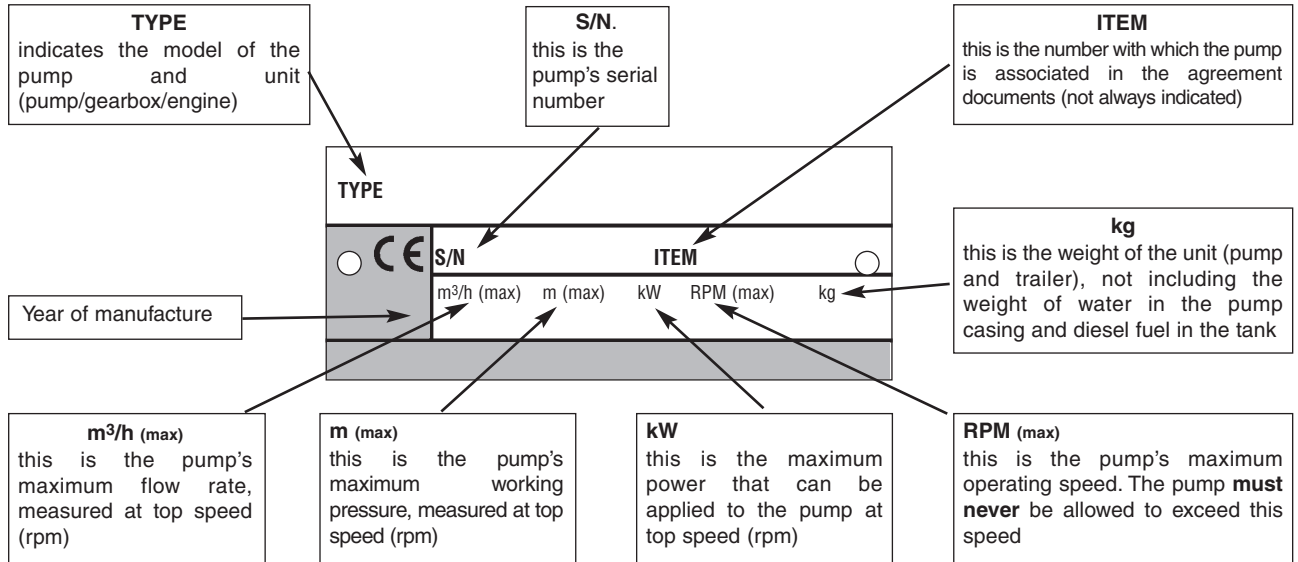
1.4 Year of manufacture

The year of manufacture is given on the pump's nameplate.

1.5 Instruction book identification

Prepared : January 2002 Edition : 04 Rev.: 00 Date of revision :

1.6 Nameplate information



1.7 Field of application

Pumps are suitable for handling liquids of viscosity up to 50 cSt containing solids in suspension. They are used in industry, civil engineering and shipbuilding as emergency pumps.

1.8 In case of breakdown

Call the following number: **+39 049 82 94 111**

2 WARRANTY

- VARISCO POMPE guarantees that only top-quality materials are used in the construction of their pumps and that machining and assembly are carried out to high standards.
- The company also guarantees units supplied, in conformity with general terms of sale, against defective materials or faulty workmanship for a period of one year from the material's date of delivery unless specifically stated otherwise in writing.
- **The warranty is not valid if the unit has been tampered with by third parties**
- Replacement of parts or of the unit itself can only be carried out after careful examination in an authorized workshop by qualified personnel. The unit should be sent carriage paid.
- This warranty does not cover materials subject to deterioration or normal wear and tear (seals, diaphragms, pressure and vacuum gauges, rubber or plastic items, etc.) or damage caused by misuse or improper handling of the unit by the end user.
- Materials replaced under warranty become the property of VARISCO POMPE.

3 GENERAL INSTRUCTIONS

The goods must be examined on arrival to ascertain any damage, particularly that incurred in transit. Also check that the goods correspond exactly to the description on the shipping documents. Report any differences or damage to the forwarding agent straight away, and inform the Padua office or local distributor within 48 hours (see next page, or look under "Pumps - Production" in the Yellow Pages).

Always quote the pump type printed on the relevant nameplate, or the serial number.

The pumps must be used only for applications for which the Manufacturer has specified:

- construction materials
- operating conditions (pressure, speed, temperature, etc.)
- fields of application

For any applications not contemplated by the Manufacturer, contact VARISCO POMPE's Servicing Department.

+39 049 82 94 111

4 IN CASE OF EMERGENCY

Shut off the engine.
Notify the person responsible for running the plant.

5 HANDLING AND TRANSPORT

5.1 Method of transport

The unit must be transported horizontally.

5.2 Installation

During installation and maintenance, all components used must be handled securely using suitable slings. Handling must be carried out by specialized personnel to avoid damage to the pump and injury of personnel.

The lifting rings attached to the various components should only be used to lift the components for which they are supplied.

The lifting point is highlighted with a heavy black mark in the figure (1).

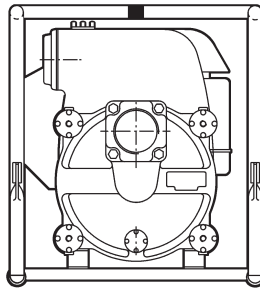
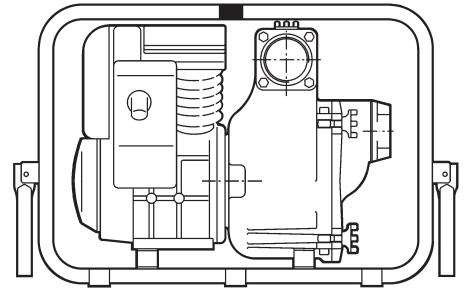


fig. 1



6 STORAGE

Store the pump under cover wherever possible. If the pump must be stored in the open, cover it with a tarpaulin. Prevent moisture from building up around the pump.

Do not leave liquid in the pump casing. Drain through the drain plug (16) (fig. 3). During winter months and in cold weather, the liquid could freeze and damage the pump. If the liquid is hazardous, take all necessary precautions to avoid damage and injury before draining the pump casing.

For petrol engines: when left idle for some time (over 40/60 days), fuel loses its volatility properties required to assure dependable starting. Hence it is advisable to empty the tank and carburettor or to use additives that will lengthen the fuel's service life to as much as 12 months and more.

6.1 Pipework

Clean pipework thoroughly before connecting it to the pump.

Suction pipes must have the same diameter as the pump's suction port (for larger diameters, seek Vasrico's advice). Where possible, avoid curves, elbows or constrictions liable to limit the flow of liquid to the pump. Do not fit the foot valve: the pump comes with a built-in nonreturn valve (14.1) (fig. 3).

Install the pump as near to the liquid to be pumped as possible. Where possible, try to reduce the length of the suction pipe.

Suction pipe connections must be completely airtight: check pipe threads, flange gaskets, quick couplings etc..

The delivery pipe must let air escape from the system while the pump is priming.

The suction and delivery pipes must be fitted so that they do not cause strain on the pump casing.

The engine-driven pump units **must** have lengths of flexible rubber hose to isolate pipework from vibrations generated by the internal combustion engine.

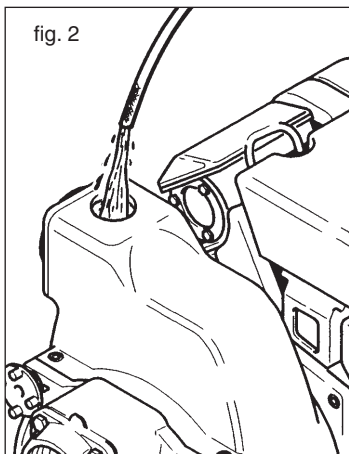
7 STARTING

Before operating the pump, check that the system has been completed properly.

Make sure all safety devices are operative.

7.1 Checking the seal

The seal should be greased during assembly. It does not require maintenance for the pump's first 300 hours of operation.



7.2 Filling the pump casing

Fill the pump casing completely with the liquid to be pumped through the relevant cap on the top of the casing (fig. 2). When the pump is stopped, the casing does not empty so there is no need to refill it.

7.3 Priming

Warning: if the pump does not prime, do not operate it for more than 2 minutes to avoid overheating the liquid and damaging the seal.

If the pump does not prime, refer to section 9.1

Engine-driven pumps should be brought up to running speed gradually. **Never** change the accelerator lever limit stop: at speeds higher than those for which the engine is set, the pump absorbs more power than the engine can supply.

Never exceed the maximum speed given on the pump's nameplate.

When the pump has primed:

- Check the shaft seal for leaks.
- If the pump does not seem to be operating normally, it is imperative to stop the pump and determine the cause(s). (see section 9)

8 MAINTENANCE

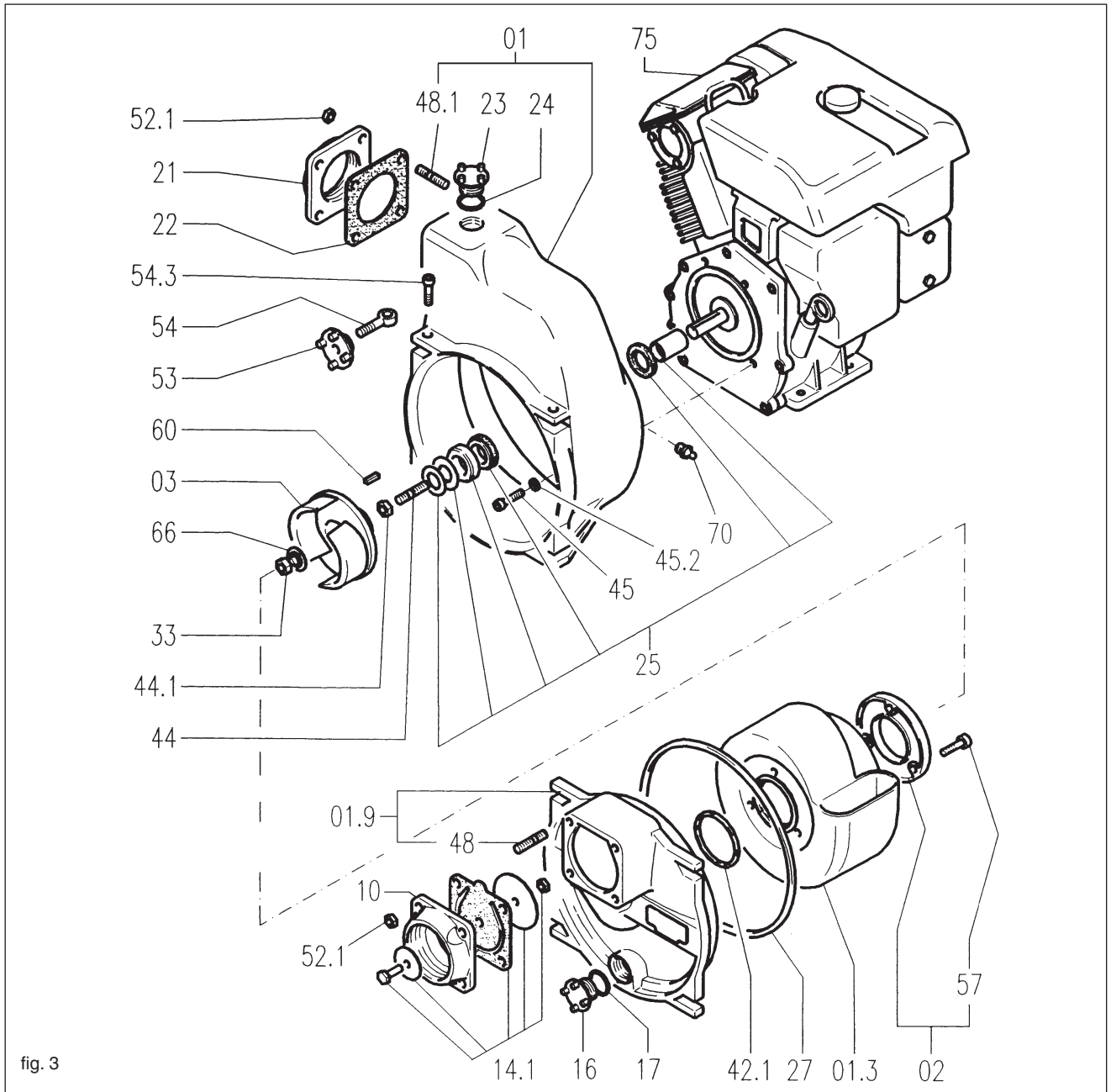
Maintenance must be performed with the unit stopped.

Warning: residual liquid may be found in the pump casing and suction pipe. Take necessary precautions if the liquid is hazardous (flammable, corrosive, poisonous, infected etc.).

8.1 Inspection and checks

Check the pump is working correctly at regular intervals. Use the instruments installed in the system (pressure gauge, vacuum gauge) to check the pump is still fit for duty.

We recommend periodic maintenance of the various parts subject to wear, particularly the impeller and wear plate.



8.2 Replacing the impeller (03) (fig. 3)

- Empty the pump casing through the relevant drain plug (16).
- Unscrew the wrenches** (53) and remove the cover (01.9).
- Block the impeller (03) and unscrew the self-locking nut (33).
- Remove the impeller and replace it with a new one.
- To reassemble, repeat the procedure in reverse.
- Check that the distance between the tip of the impeller blades and surface of the wear plate (02) is in the range 0.3 — 0.6 mm (A-B) (figs. 5, 6) .

8.3 Replacing the wear plate (02) (fig. 3)

- Empty the pump casing through the relevant drain plug (16);
- Unscrew the Allen screws (57);
- Remove and replace the wear plate (02);
- To reassemble, repeat the procedure in reverse.
- Check that the distance between the tip of the impeller blades and surface of the wear plate (02) is in the range 0.3 ÷ 0.6 mm (A-B) (figs. 5, 6).

8.4 Replacing the valve (14.1) (fig. 3)

- Empty the pump casing through the relevant drain plug (16).
- remove the nuts (52)
- slip off the suction flange (10)
- slip off the valve (14)
- fit the new valve with the hinge towards the top
- clean the valve seat on the suction flange (10) and refit it

8.5 Replacing the seal (figs. 3, 4)

- Empty the pump casing through the relevant drain plug (16).
- Unscrew the wrenches** (53) and remove the cover (01.9)
- block the impeller (03) and unscrew the self-locking nut (33)
- remove the impeller
- slip off the rotating part of the seal
- unscrew the cheese-headed Allen screws (45) and remove the pump casing
- slip the seal's stationary seal with relevant gasket off the pump casing (01)
- remove the lip seal, wash with solvent to remove any grease residues and clean the seats of the lip seal and stationary seal thoroughly
- fit a new lip seal. To make assembly easier, oil the seat and lip seal slightly
- mount the stationary seal (39) (fig. 4) complete with gasket (38). To make the operation easier, oil the seat and gasket slightly. If necessary, use a wooden plunger or similar tool to push the stationary seal (39) into its seat
- **fit the casing back in place and fasten it on, being careful not to knock the stationary seal with the shaft as ceramic ones are prone to break or chip.**
- smear the seal (40) and shaft sleeve (31) with oil and slip the seal on to one end of the shaft sleeve
- slip the sleeve and seal on to the shaft and push to overcome the slight resistance offered by the lip seal. **Be careful the seal does not slip off the shaft sleeve;**
- slip on the two seal support rings (25.1). Push them forward until the key (60) can be reassembled
- refit the impeller (03), washer (66) and screw on the nut (33);

- check that the distance between the impeller and the front plate is in the range $0.3 \div 0.6$ mm. ($A-B=0.3 \div 0.6$ mm - see figs. 5, 6). Spare seal rings also have 1 or 2 shims (25.2). Said rings serve to position the impeller further forward if it is too far from the front wear plate. Shims should be fitted between the end of the shaft sleeve and where the driving shaft touches.

9 TROUBLESHOOTING: CAUSES AND REMEDIES

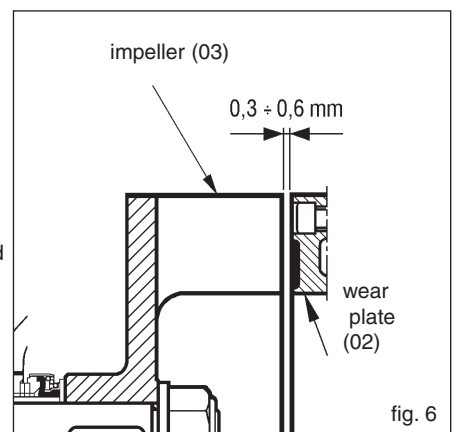
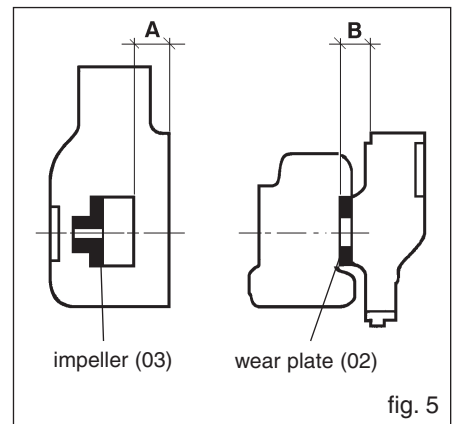
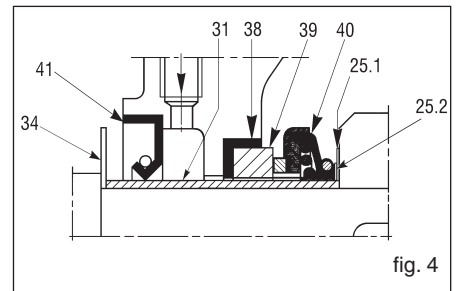
Warning: before commencing troubleshooting, make sure testing instruments (vacuum gauge, pressure gauge, revolution counter, flow recorder etc.) are working properly.

9.1 the pump does not prime

- 1 the pump casing is empty or not full enough**
fill the pump casing through the filler cap (fig. 2)
- 2 liquid inside the pump casing is overheating**
add cold liquid inside the pump casing through the filler cap (fig. 2)
- 3 air may be getting in at joints or cracks in the suction pipe**
check joints are airtight and inspect the suction pipe
- 4 delivery pipe under pressure**
bleed the delivery pipe
- 5 pump rotation speed low**
only increase speed once you have checked the contract data and pump performance curves
- 6 impeller may be worn or broken**
check state of impeller through the cover 01.9, or remove the pump casing as described in section 8.2;
- 7 the cutwater (leading edge of the volute) may be worn**
remove the pump casing as illustrated in section 8.2. Build up the cutwater with weld and shape it to restore the original profile. If the cutwater is severely worn, replace the volute (01.3)
- 8 the suction strainer, where applicable, may be clogged**
remove obstructions
- 9 suction lift is too high**
reduce suction lift
- 10 air entering through the seal**
disassemble the seal and clean it (see section 8.5); if the problem persists, change the seal
- 11 impeller clogged by foreign matter**
disassemble the casing and remove foreign matter

9.2 the pump does not deliver liquid

- 12 the pump is not primed**
see causes given under point 9.1



- 13 the head required by the system is higher than the pump's rated head**
see the system's design or reselect the pump
- 14 excessive flow resistance along suction line**
revise distribution of elbows, valves, constrictions etc. ; where necessary, increase diameter of pipework
- 15 impeller clogged by foreign matter**
disassemble the casing and remove foreign matter
- 16 suction/delivery pipes may be obstructed or clogged** locate the obstructed or clogged point and clean
- 9.3 the pump does not deliver enough liquid**
- 17 air leaks in the suction line**
check joints are airtight and inspect the suction pipe
- 18 impeller and/or wear plate may be worn**
replace them by disassembling the pump as described in the sections (8.2: 8.3)
- 19 diameter of the suction pipe too small**
replace the suction pipe
Refer to section 9.2 for other possible causes
- 9.4 the pump does not provide enough pressure**
- 20 viscosity of the liquid is higher than expected**
contact the pump manufacturer once you have measured the viscosity of the liquid. Viscosity for centrifugal pumps should not exceed 50 cSt. Check for other possible causes: see point 5 in section 9.1, and section 9.2
- 9.5 the pump absorbs too much power**
- 21 rotation speed is too high**
check correct rotation speed
- 22 pump working with data other than those specified in the contract**
check the pump's operating conditions and compare them to those on the pump's nameplate
- 23 the specific gravity of the liquid is higher than specified**
measure the liquid's specific gravity and compare it to that specified in the contract
- 24 possible friction inside the pump between rotating and stationary components**
remove the pump casing as described in section 8.2 and check for scratches on surfaces
- 25 foreign matter in the impeller**
disassemble the pump casing as described in section 8.2 and remove foreign matter
- 9.6 the pump vibrates and is noisy**
- 26 pump is operating with a flow rate that is too low**
check settings of the valves in the system and readings on the pressure and vacuum gauges
- 27 the pump or pipework are not fixed well**
check that the system's pipework is correctly clamped
- 28 pump cavitates**
see section 9.2
Refer to section 9.1 for possible causes
- 29 foreign matter in the impeller**
disassemble the pump casing as described in section 8.2 and remove foreign matter
- 9.7 the pump jams**
- 30 foreign matter in the impeller**
inspect the pump casing inside through the cover (01.9) (fig. 3), otherwise disassemble the pump casing as described in section 8.2
- 9.8 the seal leaks**
The seal is suitable for pumping dirty liquids. Grease every 500 hours through the relevant grease nipple until grease comes out. If well lubricated, it can run dry for approx. 2 minutes. If the pump leaks during operation, the seal must be replaced. (see section 8.5)
- 9.9 the seal overheats**
the pump does not prime (see section 9.1)
- 10 RESIDUAL HAZARDS**
Residual hazards are any hazards that cannot be eliminated through pump design:
- knocks
- anomalous pressure rises
- misuse
- manoeuvring errors in the pump's vicinity.
- 11 REPAIRS**
Before carrying out repairs on the unit, it is essential to:
- stop the pump
- close the pump's suction and delivery gate valves
- if the liquid pumped is hot, allow the pump to cool down to ambient temperature
- **if the liquid pumped is hazardous, follow the safety procedures for handling hazardous liquids**
- drain liquid from the pump casing through the drain plug (16) (see section 8.2)
- remove and clean the liquid pumped of any residues.

12 SPARE PARTS

To assure the pump's lasting efficiency, it is advisable, when ordering the pump, to purchase the spare parts recommended for the first maintenance operation:

- seal
- impeller
- wear plate
- complete set of gaskets
- check valve
- self-locking impeller nut

12.1 ordering spare parts

To order spare parts, specify the following:

- type of pump
- the pump's serial number
- reference number and description of the part as shown in the exploded drawing.

13 DISPOSAL

- Do not release to the environment.
- Metal parts can be recycled as scrap.
- Grease and oil must be recovered and stored as prescribed by the relevant legislation for disposal by approved agencies.
- Elastomer gaskets must be kept separate and disposed of through an authorized waste disposal agency.



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