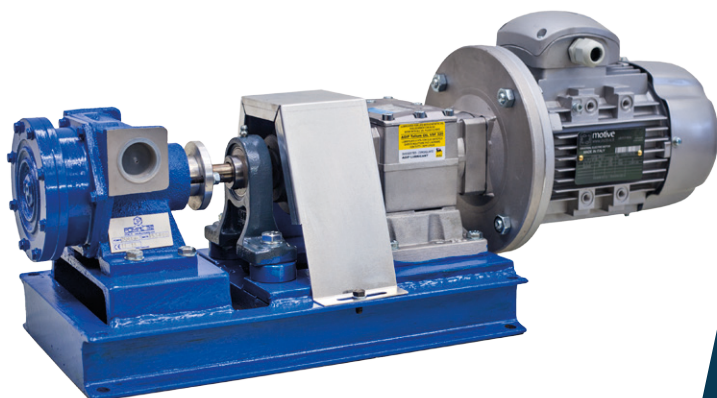




/ INSTRUCTION & MAINTENANCE MANUAL

M Series





DECLARATION OF INCORPORATION

- MANUFACTURER:

3P PRINZ S.r.l. - Via Enrico Mattei, n.293/R,
55100 - Mugnano (Lucca) Italy

PUMP IDENTIFICATION

- Model:

- Serial Number:

- Date of Manufacturing:

- Applicable Directives:

2006/42/CE

- Applicable Standards:

UNI EN ISO 12100:2010;
UNI EN ISO 13732-1:2009;
UNI EN 809:2009;
UNI EN 953:2009

3P Prinz S.r.l. hereby declares, under its sole responsibility, that the above-mentioned pump is in conformity with the provisions of the Machinery Directive, as an incomplete Equipment to be incorporated in another Machinery (Directive 2006/42/CE).

The above-mentioned pump must not be put into service until the relative piece of Machinery, in which it is to be incorporated, is declared in conformity with the provisions of Machinery Directive 2006/42/CE and the other Directives eventually applicable.

Lucca: / /

Silvia Marianetti

Legal Representative



CE DECLARATION OF CONFORMITY

- MANUFACTURER:

3P PRINZ S.r.l. - Via Enrico Mattei,
n.293/R, 55100 - Mugnano (Lucca) Italy

PUMP IDENTIFICATION

- Model:

- Serial Number:

- Date of manufacturing:

- Applicable Directives:

2006/42/CE; 2006/95/CE; 2004/108/CE

- Applicable Standards:

UNI EN ISO 12100 :2010;
UNI EN ISO 13732-1:2009;
UNI EN 809:2009;
UNI EN 953:2009

- Marking:



3P Prinz S.r.l. hereby declares, under its sole responsibility, that the above-mentioned electric pump is in conformity with the provisions of the Machinery Directive (Directive 2006/42/CE).
The above-mentioned electric pump has undergone a risk evaluation as per Directive 2006/42/CE, designed and tested in accordance with the above-mentioned Standards.

Lucca: / /

Silvia Marianetti

Legal Representative



CE DECLARATION OF CONFORMITY

- MANUFACTURER:

3P PRINZ S.r.l. - Via Enrico Mattei, n.293/R,
55100 - Mugnano (Lucca) Italy

PUMP IDENTIFICATION

- Model:

- Serial Number:

- Date of manufacturing:

- Applicable Directives:

94/9/CE, 2006/42/CE

DIRECTIVE 94/9/CE (ATEX)

- Applicable Standards:

EN 1050, EN127-1, EN 13463-1, EN 13463-5, EN 13463-8

- Technical Dossier:

MCA 01.01

- Marking:



II 2 G c k TX



3P Prinz S.r.l. hereby declares, under its sole responsibility, that the above-mentioned electric pump satisfies the Directive for equipment and protective systems intended for use in potentially explosive atmospheres as per 94/9/CE (ATEX) (D.P.R. 23/03/98 no. 126) applicable to it.

The above-mentioned electric pump has undergone a risk evaluation as per Machinery Directive and ATEX, including an ignition risk evaluation in accordance with Standards UNI EN 13463-1, EN 13463-5 and EN 13463-8.

DIRECTIVE 2006/42/CE (MACHINERY)

- Applicable Standards:

UNI EN 1127-1:2011;

UNI EN 13463-1:2009;

UNI EN 13463-5:2011, UNI EN 13463-8:2004

3P Prinz S.r.l. in addition declares that the above-mentioned pump is in conformity with the provisions of the Machinery Directive, as an incomplete equipment to be incorporated in another machine (Directive 2006/42/CE). The above-mentioned pump must not be put into service until the relative piece of Machinery, in which it is to be incorporated, is declared in conformity with the provisions of Machinery Directive 2006/42/CE and the other Directives eventually applicable.

Lucca: / /

Silvia Marianetti

Legal Representative

3P Prinz s.r.l - PUMPS MANUFACTURING COMPANY
Via Enrico Mattei, n.293/R, 55100
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CE DECLARATION OF CONFORMITY

- MANUFACTURER:

3P PRINZ S.r.l. - Via Enrico Mattei, n.293/R,
55100 - Mugnano (Lucca) Italy

PUMP IDENTIFICATION

- Model:
- Serial Number:
- Date of Manufacturing:
- Electric Motor Power / Polarity:
- Voltage / Phase / Frequency:

DIRECTIVE 2006/42/CE; 2006/95/CE; 2004/108/CE (MACCHINE)

- Applicable Standards:

UNI EN ISO 12100 :2010;
UNI EN ISO 13732-1:2009
UNI EN 809:2009;
UNI EN 953:2009

3P Prinz S.r.l. hereby declares, under its sole responsibility, that the above-mentioned electric pump is in conformity with the provisions of the Machinery Directive (Directive 2006/42/CE).

DIRECTIVE 94/9/CE (ATEX)

- Applicable Standards:

UNI EN 1127-1:2011, UNI EN 13463-1:2009,
UNI EN 13463-5:2011, UNI EN 13463-8:2004

- Technical Dossier:

MCA 01.01

- Marking:



II 2 G c k TX



3P Prinz S.r.l. hereby declares, under its sole responsibility, that the above-mentioned electric pump satisfies the Directive for equipment and protective systems intended for use in potentially explosive atmospheres as per 94/9/CE (ATEX) (D.P.R. 23/03/98 no. 126) applicable to it.

The above-mentioned electric pump has undergone a risk evaluation as per Machinery Directive and ATEX, including an ignition risk evaluation in accordance with Standards UNI EN 13463-1, EN 13463-5 and EN 13463-8.

Lucca: / /

Silvia Marianetti

Legal Representative

3P Prinz srl - PUMPS MANUFACTURING COMPANY
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CH.1 PREFACE

1.1 INTRODUCTION

3P Prinz S.r.l. thanks you very much for choosing a 3P volumetric pump; please also be advised that all pumps manufactured by the company are produced while taking into account the most advanced technologies and selecting the most appropriate materials.

All pump parts are subject to strict controls, the castings are pressure tested and, following the assembly stage, the pump is tested; material analysis, hydraulic test and functional test certificates are provided on request.

As it can be seen from the pump you have purchased, the body that contains the impeller, i.e. the actual pumping part, is fixed onto the base, bearing the inlet and outlet ports, with a series of screws; this detail allows the replacement of the pumping body with the greatest of ease and with minimal expense in case of wear, so as to make the pump operate as new.

Pompe 3P® and Pera-Prinz® are trademarks belonging to 3P Prinz® s.r.l..

Please bear in mind that "Pompe 3P®" pumps are produced with flow rates ranging from 10 to 3000 litres/l' and are divided into:

- "Pompe 3P®" "M" series (single body) pumps from 10 to 1500 litres/l'
- "Pompe 3P®" "D" series (double-body pumps) from 500 to 3000 litres/l'

This instruction manual, containing manufacturer and pump identification data, must be carefully preserved in a well-known place that can be easily accessed by possible users. It is essential that each operator read this manual in all its parts prior to installation, use, maintenance or repair.

Do not remove or damage the nameplates and labels placed on the pump and on any accessories.

After delivery of the pump, check that the packaging is not damaged and that the pump shows no signs of impact; otherwise alert 3P Prinz S.r.l. Technical Assistance in Lucca.

The installation, use and maintenance manual of the electric motor, if supplied together with the pump, belongs to this manual and shall be read in all its parts.

In case some matters are not clear or in case there are additional questions on this manual, please do not hesitate to contact 3P Prinz S.r.l. Technical Assistance in Lucca.

The pump and this manual are intended to a professional use by qualified and instructed operators, with experience on the operation and with knowledge of the risks for these machines. 3P Prinz reserves the right to modify, either this manual, either the pump and its accessories, without prior notification, in order to improve and develop further this product. In case the operator requires eventual updates, please contact 3P Prinz S.r.l. Technical Assistance when needed.

3P Prinz® reserves all rights to this manual: its reproduction, either complete or partial is not allowed unless prior written authorization has been given by 3P Prinz®.

THE INSTRUCTIONS CONTAINED IN THIS MANUAL ARE INTENDED TO USERS (OPERATORS, MAINTENANCE PERSONNEL, ETC.)

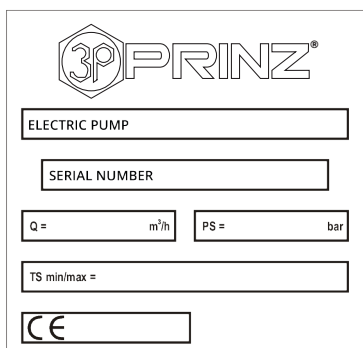


The instructions shall be:
known, available, understood and followed

Before putting in operation the pump, please read carefully the technical instructions in this publication and follow carefully the shown information and recommendations.

Keep this manual and all the annexed publications (where applicable) in an easily accessible place and that is known to all users (operators and maintenance personnel). It is recommended that a copy of this manual is made and kept in a safe place

TYPICAL PUMP NAMEPLATE



3P PRINZ®

ELECTRIC PUMP

SERIAL NUMBER

Q = m³/h PS = bar

TS min/max =

CE

The typical nameplate of the pump is mounted on the pump itself and shows:

- The serial number: this number shall always be given to 3P Prinz in case of request for information, spare parts or interventions or in case of claims;
- The operational data of the pump: the pump installer / operator, before commissioning the machinery, shall carefully verify that the shown parameters in this tagplate shall **never be exceeded (DANGER)** and, in case of doubts, please contact 3P Prinz Technical Assistance in Lucca;
- Some parts of the nameplate may not be filled: this means that these parts are not applicable for the purchased machinery

In case the pums is supplied together with a motor, there will also be a motor nameplate that will describe the data and serial number of the latter one.

1.2 WARRANTY

The company commits to provide systems compliant to what has been agreed, that are free of defects that could compromise the use for which such systems are intended. The company shall not be liable for defects arising from normal deterioration of those parts that are subject to natural wear.

The seller shall not be liable for damage caused by the misuse, negligent or incorrect use by the buyer who shall be held liable therefore for all intents and purposes.

The system is protected by warranty for a period of 12 (twelve) months from the date of delivery shown on the shipping document; the parts replaced during the warranty period are guaranteed until expiration of the warranty for the system itself.

The buyer, under penalty of invalidation of the warranty, must notify the seller of flaws or defects within 10 (ten) days from the detection of the fault; moreover, the buyer must give permission for any control and return the defective parts replaced within a reasonable period of time and duty paid, if requested.

On confirming the defect, the seller may arrange the following at its own expense:

- A) Replacement of the defective part
- B) Repair by a third party

Replacement parts shall be delivered ex works 3P Prinz workshop in Italy; in the event of the intervention of a technician, the relevant out-of-pocket expenses actually incurred (travel, technical performance, etc.), shall be charged.

The warranty expires if the machinery is opened for maintenance, inspection, or attempt of repair of the same, by not qualified personnel (not recognized by 3P Prinz) unless in front of 3P Prinz technical personnel.

The warranty is not valid if the machinery is installed and put in operation without conforming strictly to the instructions shown in this manual, or if not original spare parts are used, or if it has been damaged, or if lubricants not shown in this manual have been used.

Without prejudice to the seller's liability, any compensation for any damage may not exceed the amounts pursuant to points A) and B) above and however shall never exceed the monetary selling price of the product.

The Court of Lucca shall have jurisdiction in any disputes. The warranty is Ex Works 3P Prinz S.r.l. Workshop in Italy.

CH. 2 CARRIAGE, PACKAGING AND HANDLING

2.1 CARRIAGE AND PACKAGING

The carriage and shipment of the pump takes place by truck for both domestic and international shipments.

Based on the type and dimension of the components to be shipped and on the destination, 3P Prinz S.r.l. - Lucca uses packaging suitable for ensuring the integrity and preservation during carriage until customer delivery.

Packaging can be performed in two ways:

- packaging with a wooden or cardboard box is envisaged for international shipments (see figures 2.1 and 2.2);

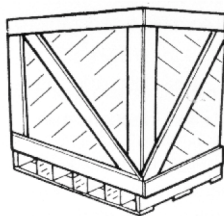


Fig. 2.1

- packaging on a pallet or with cardboard box is envisaged for domestic carriage (see figures 2.3 and 2.2).

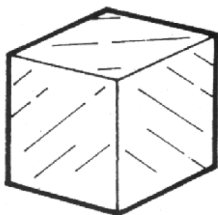


Fig. 2.2

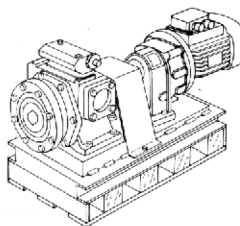
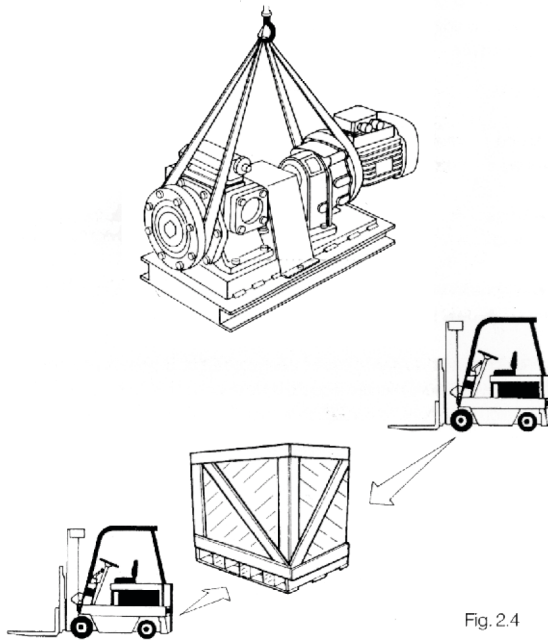


Fig. 2.3

2.2 HANDLING

Packages of large dimensions can be handled by fork-lift truck (see figure 2.4), while small packages, generally not exceeding 25 Kg approximately, can be handled manually (see figure 2.5).



CH. 3 INSTALLATION

3.1 GENERAL INSTALLATION REGULATIONS

Generally the Pompe 3P® “M” series pumps are supplied complete with motor reduction gear or motor variator and mounted on a suitable base plate; in this case, it is sufficient to fix the group assembly with anchor bolts.

In case the pumps are supplied bare shaft, whoever will take care of providing the motor shall take care of the following recommendations:

- a) Fix the pump to the base plate through 4 bolts
- b) Place the motor in a way so that, whatever type of transmission is used (trapezoidal belts, gears, reduction gear etc.), the motor axis and the pump one will be aligned.

Then follow the below instructions:

- 1) Ensure that the number of pump revolutions is as recommended by us, in relation to the characteristics of the liquid to be transported.
- 2) Connect the flanges of the pipes with those of the pump, while interposing a gasket between them, so as to completely prevent air intakes from the suction side.
- 3) Prevent the vibrations and the weight of the pipes from being supported by the pump (it is useful to provide supports in proximity of the pumps themselves).
- 4) System pipes must be suitable for the type of pump selected and the diameter thereof should not, in any case, be less than that of the pump inlets. In the presence of very dense liquids, it is recommended that pipes having a greater diameter shall be used, particularly on suction.
- 5) During the construction of the plant, bottlenecks should be avoided and wide-radius curves should be used; if the pipes are very long, with possible thermal expansion, expansion joints should be envisaged where necessary

6) Place the pump as close as possible to the suction point.

7) The Pompe 3P pumps automatically self-prime in any installation position and do not therefore require foot valves, unless volatile liquids are to be pumped. In this case, the valves must have a passage that is at least equal to the inside diameter of the suction pipe. Only on first startup, it is useful to fill the pump with the liquid to be pumped.

8) If the pumps are to be installed outdoors, it is recommended to protect them with suitable shelter, so as to avoid direct exposure to weather conditions.

9) Once the pump has been installed, check that the shaft is rotating freely by manually operating the flexible coupling or the electric motor fan.

10) In designing the installation of the pumps, sufficient free space should be provided around them to allow for possible checks, maintenance and miscellaneous interventions; it is also vital to ensure that the electric motor receives the necessary ventilation.

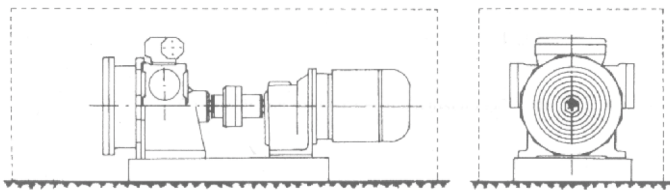


Fig. 3.1

In order to remove the pump from the system without loss of liquid from the pipes, Shut-off valves shall be provided.

All the pumps are provided with threaded 1/4" G ports, at the flanges, which can be used for the installation of pressure gauge and vacuum gauge and for checking the actual pressure in the system.

Check that the pipes, especially the suction pipe, are perfectly air-tight.

Even the slightest infiltration of air can prevent priming of the pump, or compromise its flow. Then also check connections, fittings, valves, suction filter etc.

CH. 4 SAFETY DEVICES

4.1 GENERAL SAFETY REGULATIONS

For a correct use of the pump, the following rules must be complied with:

- Please read and follow the instruction, installation, use and maintenance manual supplied with the pump.
- Read and follow all the instructions and warnings provided.
- The pump must be stopped, while warning those concerned, in the event of defects or anomalous performance (e.g. suspicious noises, damaged parts, erroneous movements, etc.).
- Do not use water to extinguish fires on control panels and/or electrical equipment.
- It is necessary to establish a regular inspection and maintenance schedule.
- Wear safety shoes (figure 4.1).
- Use gloves (fig. 4.2).
- Lift loads without flexing your back, keeping the torso straight (fig. 4.3)

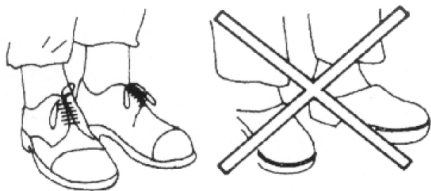


Fig. 4.1

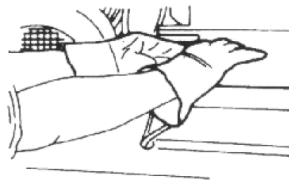


Fig. 4.2



Fig. 4.3

**The use of pumps without the envisaged protections is prohibited.
Tampering of the safety devices and pump protection devices is prohibited.**

4.2 INFORMATION ON THE RISKS THAT CANNOT BE ELIMINATED BY THE MEASURES TAKEN BY THE DESIGNER

Mechanical risks can occur on the pump due to impacts or sliding.
Risks associated with micro-leaks due to the packing rings.

CH. 5 NOISE LEVEL

5.1 NOISE LEVEL

The noise level in an environment with several pumps can be very high. The following security measures should be applied on the basis of the sound pressure level:

- less than 70 dB (A): no protection is necessary.
- greater than 70 dB (A) : people who stay in the room must protect their ears
- greater than 85 dB (A) : environment with a dangerous level of noise level. Every door must have a warning signal inviting people not to enter without ear protection.

Sound pressure level detected as being less than 85 dB (A) according to the processing point in accordance with ISO 3746.

CH.6 DESCRIPTION OF THE PUMPS

6.1 VOLUMETRIC PUMPS "M" SERIES (single body)

The design of these pumps is suitable to the transportation of fluids with medium, high and very high viscosity, also containing solids in suspension.

MATERIALS:

A= Body and Cover in Cast Iron, Impeller and Axis in Carbon Steel

B= Body and Cover in Cast Iron, Impeller and Axis in Stainless Steel

C= Body and Cover in Bronze, Impeller and Axis in Stainless Steel

D= Body and Cover in Nickel Plated Cast Iron, Impeller in Nickel Plated Carbon Steel and Axis in Stainless Steel

E= Body and Cover in Stainless Steel, Impeller and Axis in Nitrided Stainless Steel

F= Body and Cover in Chromium Plated Cast Iron, Impeller in Chromium Plated Carbon Steel and Axis in Nitrided Carbon Steel

NR= Body and Cover in Ni-Resist

SEALS:

*= Packing type seal with Braided Teflon

0= Radial seal with double Viton O-ring

1= Internal mechanical seal Viton/Graphite – Viton/Widia

2= Internal mechanical seal Teflon/Widia/Widia

3= Unified external mechanical seal, Viton or Teflon/Widia/Widia

4= Unified external mechanical seal, Viton or Teflon/Graphite/Stainless Steel

5= Internal bellow type mechanical seal, Stainless Steel/Widia/Widia

Pump	Pipe diameter	Liters per turn	Standard Turns per Minute
25M	1"	0,085	350
35M	1" 1/4	0,20	350
50M	2"	0,41	290
60M	2" 1/2	0,84	290

Pump	Pipe diameter	Liters per turn	Standard Turns per Minute
80M	3"	1,336	230
100M	4"	2,527	230
160M	6"	6,890	180

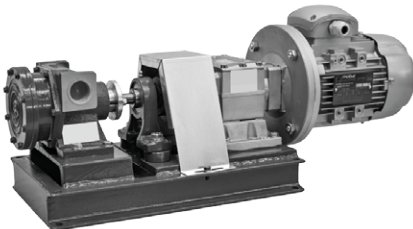


Fig. 6.1

Technical Details	
DN ports [mm]	From 25 to 200
Flow rate [m3/h]	From 0 to 200
Max. pressure [bar]	8
Max. temperature [°C]	280
Rotation speed [RPM]	From 0 to 500
Viscosity [cSt.]	200,000

CH.6 DESCRIPTION OF THE PUMPS

6.2 WORKING PRINCIPLE OF THE HOLLOW DISK PUMP

In Figure 6.2, the dashed area represents the suction liquid, while the blank area represents the liquid to be pushed, or otherwise the volume to be filled during the suction (depending on the rotation direction).

The hollow disk is pivoted eccentrically to the pump shaft and it is guided by the diaphragm that separates the suction port from the supply port.

The axis rotation will cause the disk to oscillate and to adhere either with the internal circumferential area of the pump casing either with the eccentric end of the shaft and the diaphragm, thus creating two separate leak-tight chambers.

Figure 6.2 shows the four sequential positions of the hollow disk and highlights how the impeller moves and how the volume changes progressively from the suction towards the supply, either on the external and on the internal part of the disk.

Between the shaft and the disk pin, there is an elastic device that allows the disk itself to overcome, without inconveniences, the passage of solid particles of dimensions dependant to the type of pump, and that eventually are in suspension inside the pumped fluid; in addition, it allows a self-recover of eventual wear-out effects and allows the pump to be scarcely sensitive to expansions caused by high temperature variations.

In a more detailed way, the working principle can be explained as below:

The axis, while rotating, causes the impeller (or oscillating hollow disk) to roll, adhering along one of its generatrix to the internal surface and ppheriferal to the fixed pump body.

This creates a depression in the suction, suctioning fluid into the pump and it pushes to the supply the liquid enclosed inside the pump itself, please refer to Figulre 6.2 in its working sequences, while the pump is fill with fluid and begins one new turn.

The internal left side of the impeller is full with suction liquid, while in the right internal side and in all the external part of the impeller there will be supply fluid.

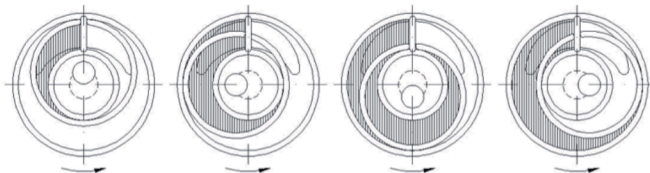
The liquid that is external to the impeller is pushed through the supply port, while the pump suctions fluid from the inlet port, creating a depression that can reach, in optimal rotating speed and supply pressure conditions, 7/8 meters of water column.

It should be highlighted that what happens in the external part of the impeller, happens also in the internal hollow part of the impeller itself. In other wordk the impeller, during its rotation-oscillation, creates two volumes, one external and one internal.

While on the right side the fluid is being expelled on the external part of the impeller, the left part of the body and all the internal of the impeller are fill with suctioned fluid.

Also the fluid contained internally to the impeller is pushed to the supply side together with the last residues of the fluid external to it.

After these sequences, the impeller comes back to the position from which it started and there will be a new cycle.



CH. 7 PUMP OPERATION

7.1 OPERATING INSTRUCTIONS FOR POMPE 3P® "M" SERIES PUMPS

Before start-up, please ensure that no valves are closed and that there are no blocked or occluded pipes in the system.

- Check the direction of pump rotation (see figure 7.1 and 7.2).

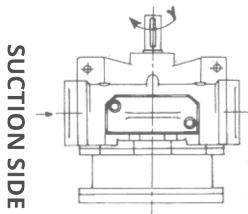


Fig. 7.1

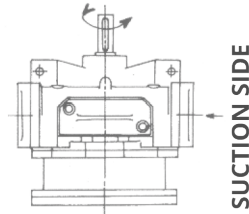


Fig. 7.2

- Since the pump is reversible, in order to reverse the flow direction in the piping it is sufficient to reverse the rotation direction of the pump.

- Check that the connections of the electric motor are correct on the basis of the voltage of the power line. For high power motors, a star-delta startup is recommended.

- Before putting in service the pump, check the reduction gear lubrication and grease the foreseen areas/points

- It is necessary to protect the pump from the danger of operation with the supply pipe closed or blocked. Because of this reason, or when it is required to close the supply line for short periods, a Pressure Relief Valve (temporary By-pass) is foreseen to be applied. These valves are supplied in double-version, working on both the rotation senses of the pump.

- In case the supply pipeline is foreseen to be closed frequently (for example in applications for some types of drums or tanks like kilolitre drums or with an exorbitant flow rate), it is essential to foresee the application of an actual bypass line to be connected between the suction and the supply line (see Fig. 7.3).

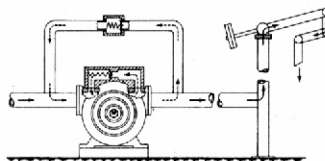


Fig. 7.3

Adjustment of the pressure relief valve requires intervention on the adjusting screw **b**, which is located on the suction side as indicated in figure 7.4.
The pressure relief valve must be adjusted as follows, depending on the pressure required by the system (Fig. 7.4):

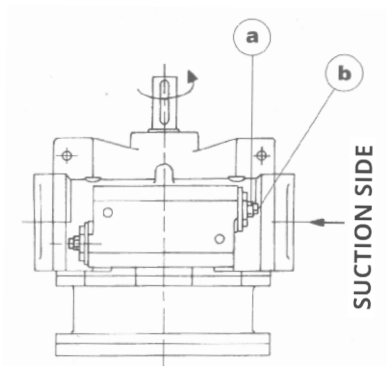


Fig. 7.4

- loosening the locknut **a**.
- turning the screw **b** in a counter-clockwise direction, if the pressure on the spring is to be reduced.
- turning the screw **b** in a clockwise direction if the pressure on the spring is to be increased, until the maximum pressure foreseen for the pump is reached.
- Please bear in mind that the screw placed on side **A** regulates the delivery pressure on side **B** and the screw located on side **B** regulates the delivery pressure on side **A** (see figure 7.5).

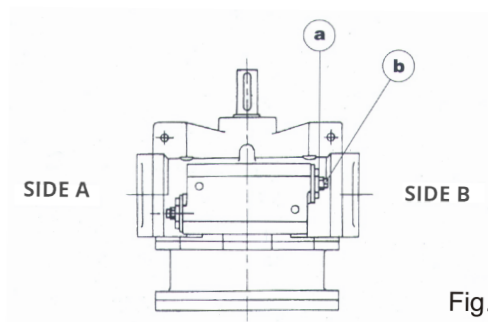


Fig. 7.5

CH. 8 MAINTENANCE

8.1 GENERAL RULES

The Pompe 3P® “M” series pumps are designed to minimise maintenance needs. The following rules must be complied with in all cases in order to ensure a long life and trouble-free operation.

There must be, in any case, compliance with certain general rules to keep the pumps in perfect running condition:

- keep the pumps clean and in order.
- ensure that provisional or urgent repairs do not become systematic.

Strict observance of the rules of periodic maintenance is extremely important; all machine components must be checked on a regular basis in order to prevent the occurrence of any anomalies thereby anticipating the necessary timeframes and means necessary for the possible maintenance work.

All interventions on the pump must be compatible with and strictly comply with the operator's safety regulations.

When work is to be carried out on the electrical circuit, it is essential that the master wall switch be turned to the “0” position in order to guarantee safe access to the inside of the control cabinet.

8.2 MAINTENANCE OF POMPE 3P® “M” SERIES PUMPS

The Pompe 3P “M” Series pumps, if correctly used, require a limited maintenance. They are supplied already lubricated and ready for operation. There is only one greasing point, clearly visible, on which a greasing intervention shall be done every 2000 hours of operation.

Periodic checks should be carried out on the condition of the pump to prevent corrosion, wear and operating irregularities, particularly in the presence of liquid that are dry or contain substances with abrasive characteristics.

It is recommended that pumps used to pump paints or resins are cleaned with suitable solvents during each period of downtime.

When the pumps are expected to be inactive for long periods, it is necessary to protect them with suitable protective oils and clean them before they come back in operation.

3P Prinz s.r.l. is able to perform, on every type of pump, every type of maintenance or revision that is necessary, and to supply all the spare parts.

CH.9 ACCESSORIES

9.1 FILTER

In order to prevent foreign bodies from being sucked by the pump, it is recommended that it will be equipped with a filter to be applied to the suction inlet (see figure 9.1).

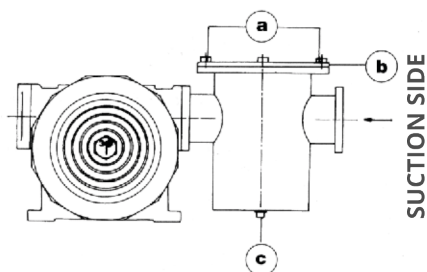


Fig. 9.1

The filter must be periodically cleaned. Cleaning is carried out as follows:

- unscrew the bolts (a) and remove the cover (b);
- unscrew the cap (c) located on the bottom;
- remove the bulkhead filter and proceed with the cleaning process.
- re-assemble everything while ensuring that the gasket of the cover is housed in the special slot in order to prevent the intake of air;
- firmly tighten the bolts (a)

9.2 HEAT COVERS

If very viscous liquids, with viscosity that increases with a decrease in room temperature, are to be pumped, it is essential to equip the pump with a heating cover (see fig 9.2) and to insulate eventually the pipes. Said cover can be heated by circulating hot water, steam or diathermic oil.

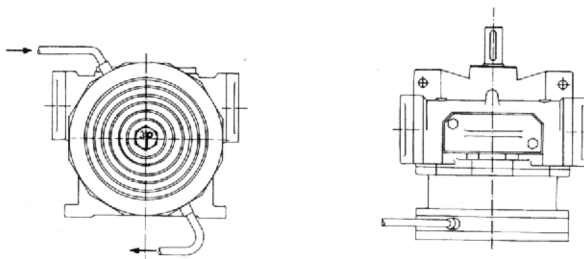
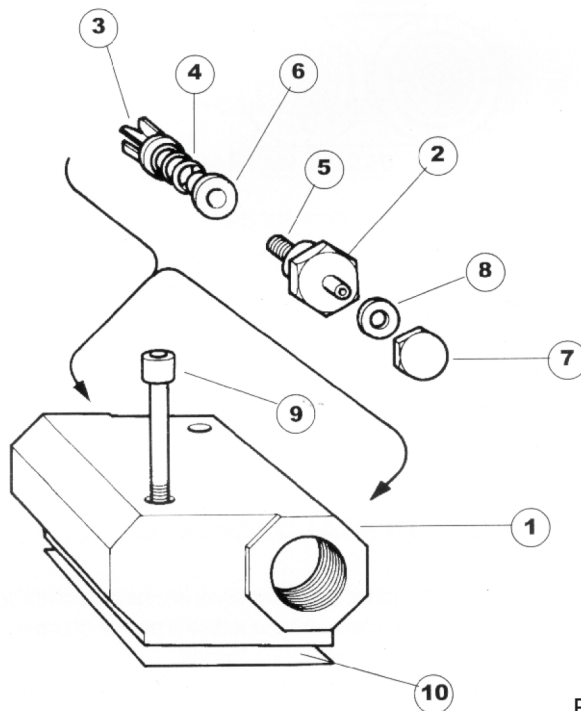


Fig. 9.2

9.3 PRESSURE RELIEF VALVE

As previously mentioned, the pumps can be equipped with pressure relief valve (temporary bypass).

This accessory protects the pump from the risk of operating with a closed supply pipe.



1. BODY
2. THREADED CAP
3. HEAD
4. SPRING
5. ADJUSTMENT SCREW
6. SPRING BUSH
7. LOCK NUT
8. WASHER
9. FASTENING SCREW
10. GASKET

Fig. 9.3

CH. 10 TROUBLESHOOTING

10.1 CAUSES OF MALFUNCTION

The pumps will provide customer an outstanding performance if installed and used correctly. Please refer to the below notes in the event of operating faults or anomalies.

10.1.1 LACK OF SUCTION

- Inlet of intake air
- Air or gas bubbles in the liquid
- Improperly adjusted stuffing box (that allows inlet of air)
- Excessive suction lift
- Suction pipe closed or blocked, even partially
- Wrong pump rotating direction
- Worn-out pump

10.1.2 INSUFFICIENT FLOW

- Inlet of intake air
- Air or gas bubbles in the liquid
- Stuffing box that allows inlet of air
- Excessive suction lift
- Partially blocked suction pipe
- Excessive viscosity of the pumped liquid in relation to the diameter of the pipes and to the pump rotational speed.

- Pressure relief valve set too low or with possible foreign bodies therein
- Delivery pipe closed or partially blocked
- Delivery pressure higher than envisaged and consequent opening of the pressure relief valve
- Worn-out pump

10.1.3 ZERO FLOW RATE

- Pump rotating in wrong direction
- Excessive suction lift
- Inlet of intake air
- Blocked suction pipe
- Pressure relief valve set too low or with possible foreign bodies therein
- Solidified liquid in the pumping part

10.1.4 EXCESSIVE POWER ABSORPTION

- Incorrect electrical connections
- Rotational speed too high
- Delivery pressure higher than foreseen
- Pumped product more dense and more viscous than foreseen
- Blocked pipes
- Meshing or jamming of some rotating parts
- Stuffing box too tight

10.1.5 NOISE AND VIBRATIONS

- Pipes not secured
- Rotational speed too high
- Air or gas inside the pump or the system (expel through the appropriate vent cap on the pump)
- Suction difficulty due to excessive viscosity of the liquid
- Cavitation due to excessive suction lift
- Vapour pressure too high
- Suction pipes, valves, fittings or connections are on inadequate size (too small)
- Lack of lubricant in the reduction gear
- Breakage of a pump part
- Breakage of a reduction gear part
- Breakage of a motor part



CAP. 11 DECOMMISSIONING

11.1 PUMP DECOMMISSIONING

In our pumps, there are no particular materials that require special disposal procedures or special handling.



CAP. 12 SPARE PARTS

12.1 SPARE PARTS FOR "M" SERIES (single-body) PUMPS

Use figure 12.1, 12.2, 12.3, 12.4 to request the spare parts, while specifying the serial number of the pump, the part number and the type of seal.

12.1.1 EXPLODED VIEW FOR "M" SERIES PUMPS (double radial ring seal)

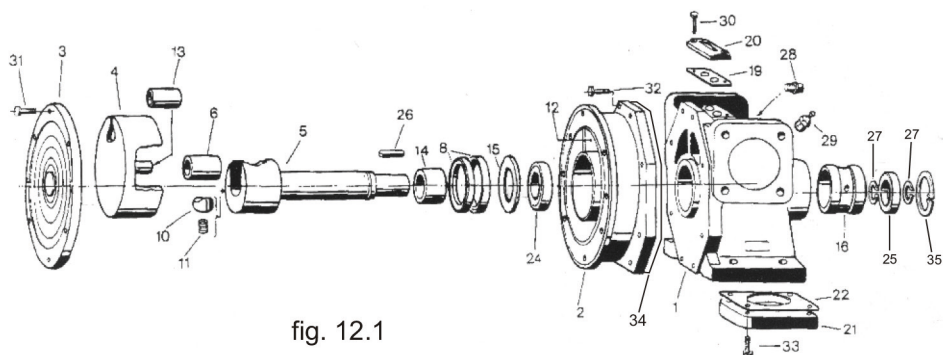


fig. 12.1

- | | |
|---------------------------|-------------------------------------|
| 1. BASE | 19. PLATE GASKET |
| 2. BODY | 20. PLATE |
| 3. COVER | 21. COUNTER-FLANGE |
| 4. IMPELLER | 22. COUNTER-FLANGE GASKET |
| 5. SHAFT | 24. FRONT BEARING |
| 6. SHAFT HEAD BUSHING | 25. REAR BEARING |
| 8. RADIAL SEAL RING | 26. KEY |
| 10. CAP SPRING | 27. CIRCLIP |
| 11. SPRING | 28. THREADED PLUG |
| 12. DIAPHRAGM | 29. GREASER |
| 13. IMPELLER STEM BUSHING | 30. EXH. HEAD SCREW (PLATE) |
| 14. SLIP RING | 31. EXH. HEAD SCREW (COVER) |
| 15. RADIAL RING SPACER | 32. EXH. HEAD SCREW (BODY) |
| 16. REAR BEARING SPACER | 33. EXH. HEAD SCREW (COUNTERFLANGE) |
| | 34. GASKETS BODY/BASE |
| | 35. CIRCLIP |

12.1.2 EXPLODED VIEW FOR "M" SERIES PUMPS (internal mechanical seal)

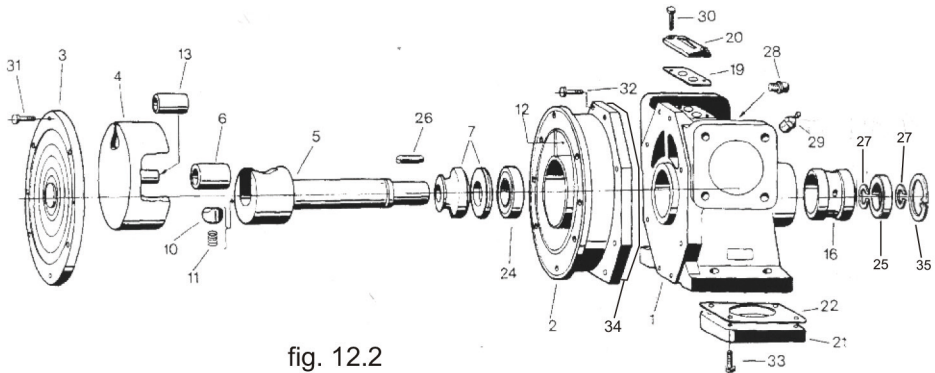


fig. 12.2

- | | |
|---------------------------|-------------------------------------|
| 1. BASE | 21. COUNTER-FLANGE |
| 2. BODY | 22. COUNTER-FLANGE GASKET |
| 3. COVER | 24. FRONT BEARING |
| 4. IMPELLER | 25. REAR BEARING |
| 5. SHAFT | 26. KEY |
| 6. SHAFT HEAD BUSHING | 27. CIRCLIP |
| 7. MECHANICAL SEAL | 28. THREADED PLUG |
| 10. CAP SPRING | 29. GREASER |
| 11. SPRING | 30. EXH. HEAD SCREW (PLATE) |
| 12. DIAPHRAGM | 31. EXH. HEAD SCREW (COVER) |
| 13. IMPELLER STEM BUSHING | 32. EXH. HEAD SCREW (BODY) |
| 16. REAR BEARING SPACER | 33. EXH. HEAD SCREW (COUNTERFLANGE) |
| 19. PLATE GASKET | 34. GASKETS BODY/BASE |
| 20. PLATE | 35. CIRCLIP |

12.1.3 EXPLODED VIEW FOR "M" SERIES PUMPS (external mechanical seal)

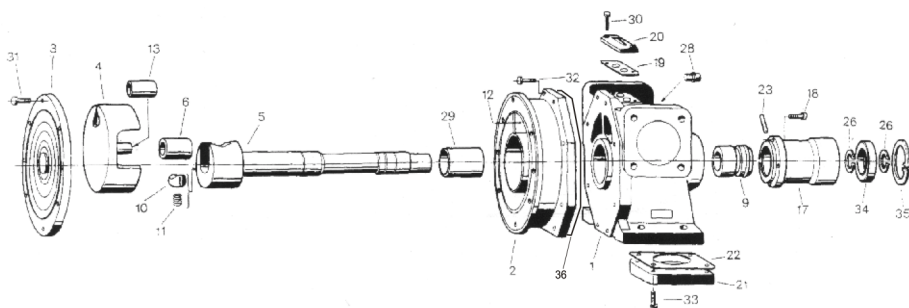
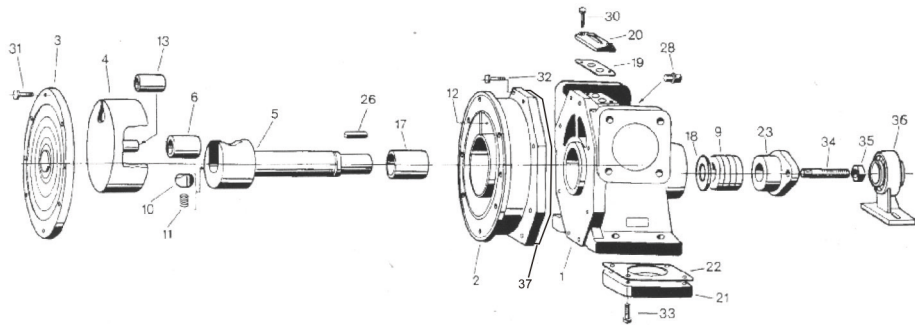


fig. 12.3

- | | |
|------------------------------|-------------------------------------|
| 1. BASE | 19. PLATE GASKET |
| 2. BODY | 20. PLATE |
| 3. COVER | 21. COUNTER-FLANGE |
| 4. IMPELLER | 22. COUNTER-FLANGE GASKET |
| 5. SHAFT | 23. PIN |
| 6. SHAFT HEAD BUSHING | 26. CIRCLIP |
| 7. MECHANICAL SEAL | 28. THREADED PLUG |
| 10. CAP SPRING | 29. BUSHING |
| 11. SPRING | 30. EXH. HEAD SCREW (PLATE) |
| 12. DIAPHRAGM | 31. EXH. HEAD SCREW (COVER) |
| 13. IMPELLER STEM BUSHING | 32. EXH. HEAD SCREW (BODY) |
| 17. EXTERNAL SLEEVE | 33. EXH. HEAD SCREW (COUNTERFLANGE) |
| 18. EXH. HEAD SCREW (SLEEVE) | 34. BEARING |
| | 35. CIRCLIP |
| | 36. GASKETS BODY/BASE |

12.1.4 EXPLODED VIEW FOR "M" SERIES PUMPS (Packing type seal)



1. BASE
2. BODY
3. COVER
4. IMPELLER
5. SHAFT
6. SHAFT HEAD BUSHING
9. PACKING SEAL
10. CAP SPRING
11. SPRING
12. DIAPHRAGM
13. IMPELLER STEM BUSHING
17. BUSHING
18. STOP RING
19. PLATE GASKET

20. PLATE
21. COUNTER-FLANGE
22. COUNTER-FLANGE GASKET
23. GLAND
26. CIRCLIP
28. THREADED PLUG
30. EXH. HEAD SCREW (PLATE)
31. EXH. HEAD SCREW (COVER)
32. EXH. HEAD SCREW (BODY)
33. EXH. HEAD SCREW (COUNTERFLANGE)
34. STUD BOLT
35. NUT
36. BEARING SUPPORT
36. GASKETS BODY/BASE



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