

# **INSTRUCTION MANUAL**

**PRECISION ENGINEERING CO.  
MUMBAI – 400 053.**

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The **PMP** series of **Precision Engineering Co.** is a highly standardized series of Magnetic drive Chemical pumps. Your pump will give you a highly satisfactory and trouble free service, if this instruction manual is meticulously followed. The pump is guaranteed as per the GUARANTEE clause specified in our finally accepted terms & conditions of sale. If the pump is to be used for any operating conditions other than those specified in our final order acceptance including all amendments (e.g. change of head, capacity, NPSH, temperatures, liquid, environment, prime mover etc.) our written confirmation for suitability of the pump under such changed conditions should be obtained.

### **The Guarantee is not valid if,**

- a) The instructions in this manual are not followed and due skill and care is not exerted in doing so.
- b) Our written confirmation for suitability of the pump under changed operating conditions is not obtained.
- c) Any repairs dismantling or changes are not undertaken by our personnel or with our written permission.
- d) Parts replacement is done by parts not made or supplied by us.

#### **CAUTION :**

This instruction manual does not take any account of any safety regulations which may apply to the installation site. Your site engineer or operator is responsible for complying with such regulations.

#### **WARRANTEE CLAUSE:**

We stand guarantee only to the genuineness of material used in our pumps but do not stand guarantee for any kind of chemical, physical and toxicological effect on the same by chemical handled with our pumps. We assume no liability for injuries, damages or penalties resulting from our pumps, whether or not our recommendations are followed.

**CAUTION:** No part of this publication may be reproduced in any form or any means.

## General Instruction:

### 1) **Handle the pump carefully**

Strong impacts caused by dropping the pump on the floor or striking it may result in damage or faulty performance.

### 2) **Priming water**

Be sure to fill the pump unit with feeding liquid as priming water before pump operation.

### 3) **Range of liquid temperature 0 ~ 80°C**

The above range may differ slightly from one liquid to another. However, any liquid that freezes cannot be used. For details, contact 'Precision'

4) As there is a powerful magnet inside the pump unit, do not use any liquid that contains metallic substances such as iron, nickel, etc.

5) Do not operate the pump in the following places.

- The pump unit is not designed to be dust-resistant or water-resistant.

- a) Places exposed to rain and/or wind.

- b) Places where the temperature falls below 0°C.

- c) Places where corrosive gas (such as chlorine gas) is generated.

- d) Places exposed to splashing or dropping water.

- e) Places where the ambient temperature is 40°C or above.

6) Do not position the motor unit in a confined environment. The relative humidity should be 90% or below. Be careful not to allow dust and water inside the motor unit. The motor should not be splashed with water; otherwise it may short-circuit or burn.

7) Do not operate the pump with the following liquids.

- Applicable liquid is pure water or a liquid equivalent to pure water. For the use of corrosive liquid or any special liquid, contact the Precision sales representative.

- **Liquids that significantly swell ETFE.**

- a) Halogenated hydrocarbons such as trichloroethylene and carbon tetrachloride.

- b) Ether and low-grade ester.

- **Slurry (Never use slurry, which wears out the pump bearing.)**

**Read this note before starting the installation work of the magnet pump.**

## Caution

- When chemical liquid is specified for operation, be sure to wear safety gear such as protective suit, face protector, goggles and gloves) all through pump operation or while engaged in any work carried out near the pump. Further protective measures shall be taken depending on the type of the liquid applied.
- Installation, piping, and wiring shall be conducted only by operators who have been officially trained and qualified for inspection and installation procedures. For more information, contact your supplier.

## Installation

### 1) Installation site

An installation site with an ambient temperature of 0-40°C and a relative humidity of lower than 90% must be selected. Select a site that allows ease and efficiency in the conducting of maintenance and inspection work.

### 2) Pump installation method

This pump is not of the self-priming variety. The pump shall be installed in a position lower than the liquid surface of the suction-side tank.

### 3) Flooded suction system (Recommended system)

Priming completes instantly as the suction-side hose is filled with liquid. In addition, the chance that the priming liquid may escape is extremely reduced.

### 4) Piping size

Select a right size of pipe according to the pump port.

A reliable connection is not guaranteed if a piping other than the one specified is used.

### 5) Valve Installation

Install a valve between the piping connected with the pump and the line side.

#### a) Suction side valve

For easy removal or maintenance of the pump.

#### b) Discharge side valve

For adjustment of the discharge rate of head of the pump.

# PIPING

## Piping Instructions

To minimize the friction resistance of the liquid, the shortest piping possible with the minimum number of bends should be utilized.

Select fluoro plastic piping or fluoro plastic line piping which have enough chemical resistance, and also piping which has enough pressure resistance against pump spec. When Plumbing employs PTFE seal tape in order to prevent air sucking or leakage. Especially, if sealing at the suction side is not complete, pump sucks up air and then Pump performance is reduced.

If the connection on the suction side is inadequate, air may be mixed in. This lowers the pumping power, resulting in dry operation. Dry operation causes seizure of the impeller, and its rotation may disable.

## Suction Piping

1. The suction pipe should be employed the flooded suction method if possible. The shortest pipe possible, with the minimum number of bends, should be used. Arrange a proper support under the suction pipe such as an expansion joint or the like so that the weight and thermal stress of the pipe are not applied to the pump.
2. Attach the coupling on the suction pipe carefully so as not to allow air inside the line. Air in the suction pipe may damage the system.
3. When using an elbow pipe on the suction side, install a straight pipe with a length of at least 500mm or 8 times the suction port diameter before the pump suction port. Provide the largest radius possible for the R of the bend.
4. Do not allow any projection where air may be trapped along the suction pipe.
5. If the diameters of the pump suction port and the suction pipe are different, use an eccentric reducer pipe. Connect the eccentric reducer pipe such that the upper surface is level. In any case, never use a suction pipe with a diameter smaller than that of the suction port.
6. It is also recommended, in the case of flooded suction, that a gate valve be installed on the suction pipe for easier overhaul inspection of the pump. Keep the gate valve fully open during ordinary pump operation; it is required to be closed only during an overhaul inspection.

7. When circulating a dangerous liquid, arrange the flushing pipes so that internal cleaning is possible when disassembling the pump.
8. The diameter of the suction pipe must be larger than that of the pump suction port.
9. The end of the suction pipe should be located 500 mm or more below the surface of the liquid.
10. A screen should be provided at the inlet in the suction tank to prevent the entry of foreign matter into the suction pipe. The end of the suction pipe should be 1-1.5 D (D: diameter of suction pipe) or more away from the bottom of the suction tank.

Note that the entry of foreign matter may cause the pump to malfunction.

## Discharge piping

- Use a support so that the weight of the pipes is not applied to the pump as load.
- If a method other than flooded suction is employed, install a priming pipe.
- If the pipe is too long the piping resistance may increase, hampering the pumps performance. The diameter of the pipe should be determined by calculating the piping resistance.
- A check valve should be installed if any one of the following conditions is present. When selecting the check valve, consider the check valve pressure limit (including) the influence of water hammer or back flow onto the pump.
  - The discharge piping is very long.
  - The discharge lift exceeds 15 m
  - The end of the discharge pipe is 9 m higher than the surface of the suction
  - Several pumps are connected parallel to one another on the same piping.

## Caution:

Do not run pump dry (without liquid)

Please fill the suction pipe line & pump casing full of liquid to be pumped before starting the pump.

## Operation instructions

Before operating the pump, confirm that the hoses connected with the discharge port and suction port are firmly fixed in position.

Dry Operation of the pump (operation without liquid in the pump) damages it. Be sure to fill the pump with priming water in advance.

Do not open or close the suction or discharge port suddenly, otherwise the magnet coupling may be detached, disabling the rotation of the impeller. (Under such circumstances, turn off the power supply. When the motor stops rotating, the coupling will return to its original position)

## Draining Method

### **Warning**

- Before starting the draining procedure, turn off the power supply.
- Be sure to wear proper safety gear (gloves, protective shoes, etc.) during draining work. When chemical liquid is used, wear rubber gloves, goggles).

## Caution

- Pay special attention to the remaining liquid which may run out of the discharge port or the suction port when removing the hose. Exercise caution not to allow the motor or electric parts to come into contact with the liquid.
- Never discharge hazardous liquid, including but not limited to chemical liquid, over the ground or floor in the plant. Instead, use a draining pan (or container). Observe each applicable local law of regulation for the handling or disposal of hazardous liquids.

## Causes of Trouble

### Symptoms:

- 1) Pump does not deliver liquid.  
Remedy : Possible causes Nos.-1,2,3,4,39
- 2) Insufficient capacity delivered.  
Remedy : Possible causes Nos.-6,7,8,9,10,11,14,16,23,40,41,42,44,46
- 3) Insufficient pressure developed.  
Remedy : Possible causes Nos.-5,7,8,9,10,11,12,13,14,15,16,,17,18,47,45
- 4) Pump loses prime after starting.  
Remedy : Possible causes Nos.-4,5,6,7,40,41,,46,

- 5) Pump requires excessive power.  
Remedy : Possible causes Nos.–15,16,17,18,19,20,21
- 6) Pump vibrates or creates noise.  
Remedy : Possible causes Nos.–6,7,20,24,25,26,27,28,32,35,36,37,38
- 7) Bearing have short life.  
Remedy : Possible causes Nos.–38,48
- 8) Pump overheats & seizes.  
Remedy : Possible causes Nos.–17,18,19,20,21,31,

## **Suction Troubles:**

- Pump not primed
- Pump or suction pipe not completely filled with liquid.
- Suction lift too high.
- Insufficient margin bet<sup>n</sup> suction pressure & vapors pressure.
- Excessive amount of air or gas in liquid.
- Air pocket in suction line.
- Air leaks in to suction line.
- Suction port is blocked with foreign matter.
- Discharge port is blocked with foreign matter.
- Foot valve is too small.
- Foot valve is partially clogged.
- Suction strainer is clogged.
- Inlet of suction pipe insufficiency submerged.

## **System Trouble:**

- Speed is too low.
- Speed is too high.
- Wrong direction of rotation.
- Total head of system higher than design head pump.
- Total head of system lower than design head pump.
- Specific gravity of liquid different from design.
- Viscosity of liquid differs from that for which designed.
- Operations at very low capacity.
- Parallel operation of pumps unsuitable for such operation.

## Mechanical Troubles:

- Foreign matter in impeller.
- Foundation not rigid.
- Rotating part rubbing on stationary part
- Bush bearing warm.
- Mouth ring warm
- Impeller damaged.
- Casing gasket/ 'O' ring defective permitting internal leakage.
- The voltage has dropped greatly.
- The ambient temperature is too high.
- Installation bolts are loosened.
- Suction pipe is blocked or closed, resulting in cavitation.
- Pump bearings are worn or melted.
- Spindle is damaged.
- The dynamic balance of the driving magnet has changed.
- The motor bearing is worn.
- The pump is operated dry.
- The magnet coupling has disconnected.
- The pump is positioned too high.
- The suction pipe is too long.
- The suction pipe is deformed.
- An air pocket has been created inside the suction pipe.
- The suction pipe has an air pocket or other type of piping resistance.
- The discharge pipe has a resistant section or the actual pump head & loss of head are too high.
- ID of suction pipe line is smaller than discharge pipeline.
- Faulty pressure gauge.