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Maxflow Pumps India Ltd.

An ISO 9001-2000 Company



General Instructions

INSTALLATION, OPERATION AND MAINTENANCE OF MAXFLOW VERTICAL SUMP PUMPS

**RBV
SMP**

Important !

- Always quote serial number of the equipment when ordering spare parts or any accessories as required against supply of specific equipment(s).
- This pump has been supplied to meet specifications of your purchase order. In case of any change in specifications, consult Maxflow Pumps India Ltd. before putting pump in operation.

1. HANDLING AND STORAGE

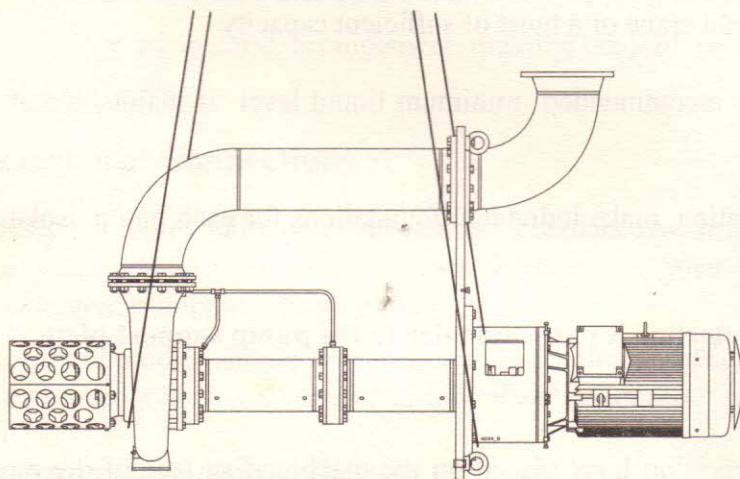
Immediately after receipt of the equipment, it must be checked against the delivery and transport documents for its completeness and condition. Any shortage and damage should be reported immediately to Maxflow Pumps India Limited with a copy to the transport agency for any damage claims etc.

Check all boxes and packings for any separately packed spare parts and accessories or any wrappings attached to the sidewalls of the boxes.

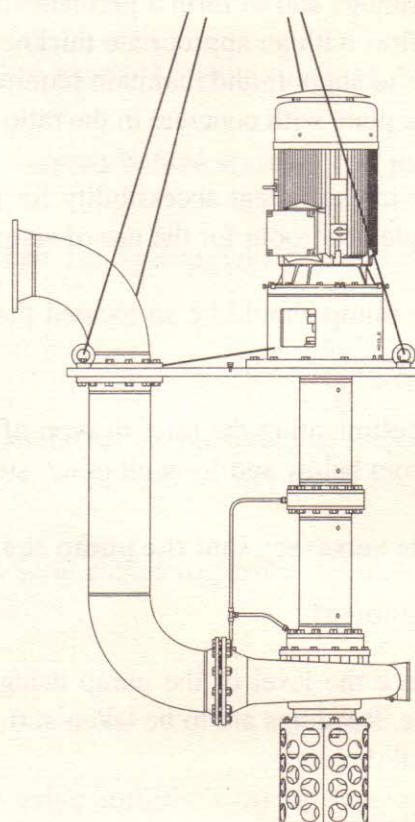
Check serial number of the equipment corresponding with documents.

Boxes, crates, pallets or cartons should be unloaded using forklifts or slings and not to be dropped on the floor while unloading, without being supported.

Fig.1



Lifting instruction horizontal.



Lifting instruction vertical.

Storage:

Pumps should be stored in a clean and dry location away from undue vibrations. Suction and delivery connections should be kept covered to keep dirt and any foreign materials away from the pump interiors.

Vertical storage in a dry sump is the preferred method for vertical pumps to prevent sagging of the shaft. Alternatively, the unit can be stored vertically along a wall if it is properly supported. In case vertical storage is not possible, store the pump in a horizontal position without the motor, and can be even with wooden supports under the unit.

Turn the pump at intervals, by hand from the coupling end of the shaft, for preventing seizure.

Consult Maxflow pumps India Ltd. if the pump is to be stored for more than six months.

Refer to the motor manufacturer's instructions and recommendations for storage of motors.

2. INSTALLATION

Location

RBV pumps should be mounted directly in a sump or a tank, with a proper mounting support from a base plate.

Foundation

Depending upon the type of pump, the foundation should be sufficiently strong to absorb any vibrations and to form a permanently rigid support for the pump base frame. The foundation should be firm with an appropriate thickness of quality concrete or a sturdy steel framework and should be able to support and maintain required alignment of the equipment. When alignment is correct, grout base plate with concrete in the ratio of 1:2. After grout is hardened, tighten the foundation bolts.

Provide sufficient accessibility for inspection and maintenance of the pump. Allow clear space and ample headroom for the use of an overhead crane or a hoist of sufficient capacity.

The pump should be so located that the recommended minimum liquid level is maintained at all times.

For eliminating the transmission of vibration, make individual foundations for each pump, isolating it from below and from all other sides.

It is necessary that the pump shaft centerline is perpendicular to the pump support plate.

Alignment

Check the level of the pump using a precision level placed on the machined surface of the motor base. Readings are to be taken at 0, 90, 180 and 270 degrees and must be within 0.10 mm per Meter in all directions.

Piping

The piping to the delivery connection must not be subject to stress during operation. The piping is to be supported independently.

3. COMMISSIONING

Final Checks

- Check that the gland nuts have not been over tightened. If necessary, loosen the gland nuts and retighten them by hand.
- Check that the shaft runs freely, by turning the shaft end coupling a few times by hand.

- Check that all safety fuses are in place.
- Connect the supply piping in case the lubrication is being provided with a clean external liquid connection. If required check and install the lubrication lines from the external or self liquid, as indicated in the assembly drawing.
- Check the tightness of all bolts on the foundation and also discharge pipeline connections with the pump.
- Clean inside of the tank/sump and piping system as dirt and scale might have entered the piping during installation, which could lead to pump damage.
- After connecting the piping to the pump, **check free rotation of the pump shaft. This can be done by rotating the pump shaft by hand from the coupling end side.**
- **Ensure that the delivery piping is supported independent of the pump.** No pipe stresses should be transmitted to the pump. Never draw piping into its place by applying force to the pump flange connections.
- For pumps handling hot liquids, it is recommended that any external sealing/flushing to be continued after stopping the pump.
- **External lubrication at recommended pressure should be started before starting the pump and continued for some time even after stopping the pump.**
- In all cases general arrangement drawing should be checked for sealing/lubrication system arrangement.

~Electrical Connections ~

- Electric motor must be connected in accordance with the manufacturer's instructions, including any temperature, earth connections, current and other protective devices. A device to provide emergency stopping must be fitted.
- Electric motors should be connected by means of sufficiently long cables to permit the motor to be moved a little without dismantling the connections.

Starting the pump

1. Close the delivery valve and start the pump.
2. As soon as the pump is under pressure, slowly open the stop valve until the working pressure is attained.

The pump should never be run dry.

Adjusting the shaft sealing

The pump with stuffing boxes should be adjusted for proper sealing. After the pump is started, the stuffing box will show a certain amount of leakage. This shall be further reduced with the expansion of packing. But if leakage is still excessive, the gland should be adjusted as following;

- Tighten both the gland nuts, one after another.
- Wait 10 to 15 minutes after each adjustment before making the next adjustment.
- Continue this way until the drop wise leakage has been attained.

4. MAINTENANCE

Daily maintenance

- Regularly check the discharge pressure and adjust if required for correct value.
- If gland packing starts to leak excessively, new packing rings may have to be mounted.
- In case of grease lubricated stuffing box, give two turns to the grease follower in grease cup for lubrication.
- Check the pressure of external sealing/ lubricating liquid.
- Liquid levels in the sump should be in the operating range.

Weekly Checks

- Strainer and sump should be clear of debris
- Note any unusual noise
- Record bearing temperature. Lubricate bearings as per schedule.
- Check for leakage from the flanges, shaft packing or mechanical seals.

Lubrication of bearings

The bearings require regreasing after about every 2000 hrs of operation. In case the pump is overhauled, the bearing housing and the bearings have to be cleaned and provided with new grease. Recommended greases are as following;

Indian Oil	Servogem 3
Caltex	Starfax 3
Hindustan Petroleum	Natra 3
Shell alvania	EP3

It is important to keep a check on the bearing temperatures. After start up temperature rise should be gradual, reaching to a maximum after approximately 1.5 to 2 hrs. This rise should then remain contained within an allowable limit, and not more than 80 deg C or 55 deg C above ambient, whichever is lower.

5. DISASSEMBLY AND INSPECTION

Following procedure is recommended for dismantling of the pump for inspection, repair and replacement of various parts. The numbers () referred are the item numbers for each component shown on the sectional drawing of the pump.

Prior to any repair or disassembly, all safety precautions must be met. All systems should be isolated from the pump for which the pump is connected. Liquids must be removed from the system to prevent undue hazards to personnel and the environment. Power to the equipment should be disconnected. Onsite maintenance and safety guidelines must be observed before proceeding with the maintenance activity.

Disassembly

1. Remove all piping and electrical connections which are connected to the pumping system, observing required safety practices to prevent personnel injury and equipment damage.
2. Remove motor and coupling guards. Loosen setscrews on the pump half coupling flange and disengage coupling rubber (17).
3. Unscrew and remove shaft adjusting nut and pump coupling (26), along with coupling pins, if provided for non-reverse ratchet.
4. Remove ratchet plate (15), if provided and also the bearing sleeve (25), along with the inner race of the bearing.
5. Outer race of the bearing can be removed by tapping on a pin through holes in the back of the bearing housing.
6. In case of a separate bearing housing, it can be removed by unscrewing it from the bottom stool, on which it is mounted.
7. Remove the grease seal (37).
8. Remove top spider (32), and top column pipe (32) by unscrewing hex. hd screws (50).
9. In case the pump is fitted with a stuffing box, then in the place of step 7, remove the stuffing box from the bottom stool by removing hex. hd. Screws which connect the stuffing box to the bottom stool.
10. In case of gland packed pumps, remove all intermediate column pipes (7), and Line spiders (9). Also remove the old shaft packing and the spider bush (33).
11. Top, Line and Pump Shafts can be removed by unscrewing line shaft and pump shaft couplings (10 & 36). These should be unscrewed in CCW direction for CW rotation of the pump and vice versa.
12. Disconnect the bearing block (5) and the casing cover (in some constructions, it might be used).
13. Pull out the pump shaft with the impeller and disassemble pump impeller by disengaging the impeller nut (3).

Inspection of the components

Inspect all parts, giving particular attention to the following;

- Spider bearings, block bush and stuffing box sleeve are required to stabilize the shaft and are provided for a smooth operation of the pump. It is recommended that all bearings / bushes should be replaced whenever the pump is dismantled, because bearing/shaft clearance is critical to the pump operation.

To remove the sleeve bearings from the spider or pump block, press out the bearings from the housing after removing set screws, if provided.

Replace sleeve bearings if clearance between shaft and bearing is more than 0.60 mm diametrically.

- Shafts and sleeves are subject to wear at the sleeve bearing and the stuffing box locations. If the shaft is badly scored to more than 0.2mm depth over $\frac{1}{4}$ of the bearing area, or bent, it should be replaced. Minor scoring may be removed by polishing with emery.
- Inspect the Impeller carefully for any signs of rubbing, mechanical damage or material loss due to corrosion, erosion or cavitation.

Replace if scoring is more than 1mm. Check wear ring clearances and replace if it is more than 0.5 mm.

- If pump has been in service for a long period, it is a good practice to replace the thrust bearings when the pump is dismantled for maintenance. Do not reinstall worn bearings.
- Clean and inspect all the fasteners. Replace fasteners which have damaged threads.

6. ORDERING OF SPARE PARTS

When ordering spare or replacement parts please include the following information;

- Pump model, size and serial number.
- Write the name, part number from the sectional drawing and material of each component required.
- Quantity of components required.
- Complete shipping instructions.

7. ASSEMBLY INSTRUCTIONS

Before reassembling, all the parts should be thoroughly cleaned in kerosene, petrol or benzene to remove dirt, rust etc. Replace all seals and packings.

1. Assembly shall be done in the reverse order to disassembly. Align all flanged components, match marks when reassembling.
2. Bronze or Teflon/GFT bearings should be press fitted in their housings and locked in position with set screws. Similarly, the stuffing box bush should also be positioned in place.
3. A continuous, straight-line motion must be used while pressing non-metallic bearings into their place. Immerse bearings in water before pressing into the housing.

~ CAUTION ~

Use proper lifting equipments, rated for load to be lifted, as the failure to do so could result in a injury to the personnel and/or damage to the pump components.

4. Assemble intermediate bearing spiders in the fittings of the column flanges. Housings equipped with lubrication tapping must be assembled with the tappings faced towards lubrication source.
5. All column flange fasteners must be tightened evenly to ensure solid seating of the intermediate housing in the fitting of column flange.
6. Install the thrust bearing onto the bearing sleeve and press into the bearing housing / bottom stool housing as per construction.
7. Mount ratchet plate and pump coupling in place.
8. Check alignment, as described under "Installation", on the machined surface of the motor base.
9. Install motor, along with the coupling.
10. Finally check that all lubrication lines are securely in their place.
11. In case of grease lubricated stuffing box, check that grease has been injected by screwing in two turns of grease cup cover.

8. LOCATING PUMP TROUBLES

1. Pump not primed. Minimum water level not maintained.
2. Suction lift is too high, in case of extended suction pipe in the sump.
3. Air or gas in liquid.
4. Air or vapour pockets in suction line.
5. Air leakage in suction line.
6. Air leakage in case of extended suction pipe in the sump.
7. Foot valve too small or partially clogged.
8. Suction pipe insufficiently submerged.
9. Total head higher than the specifications.
10. Total head lower than the specifications.
11. Specific gravity of liquid different from the specifications.
12. Viscosity of liquid different from the specifications.
13. Operating pump at a very low capacity.
14. Operating pump at a higher capacity.
15. Misalignment due to pipe strain.
16. Improper foundation.
17. Shaft bent.
18. Rubbing of rotating parts.
19. Bearings worn
20. Worn wearing rings.
21. Impeller damaged or worn out.
22. Stuffing box improperly installed.
23. Incorrect stuffing box packing
24. Abrasive solids in liquid.

25. Stuffing box packing runs dry.
26. Excessive grease in bearings.
27. Lack of lubricant in bearings.
28. Improper installation of bearings.
29. Damaged bearings.
30. Wrong direction of rotation.
31. Low speed of motor.

Faults	Check Points
Pump does not deliver liquid	1, 2, 4, 8
Insufficient capacity	2, 3, 4, 5, 6, 7, 8, 9, 12, 20, 21, 30, 31
Insufficient Head	3, 9, 12, 20, 21, 30, 31
Pump loses prime after starting	2, 3, 4, 5, 6, 8
Pump requires excessive power	10, 11, 12, 14, 15, 17, 8, 19, 22, 23, 24,
Pump vibrates or is noisy	2, 7, 8, 13, 14, 15, 16, 17, 18, 19, 21, 28, 29
Bearings have a short life	14, 15, 17, 18, 19, 26, 27
Pump overheats or seizes	1, 2, 13, 15, 17, 18, 20