



Estd. 1972

Maxflow Pumps India Pvt. Ltd.

An ISO 9001-2008 Company



General Instructions

INSTALLATION, OPERATION AND MAINTENANCE OF MAXFLOW CENTRIFUGAL PUMPS

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 Pvt. Ltd. before putting pump in operation.

1. HANDLING AND STORAGE

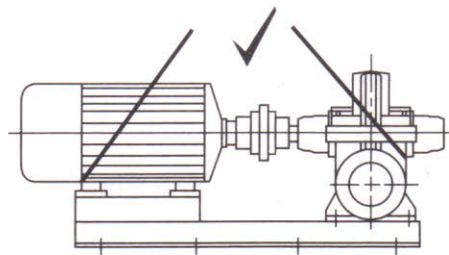
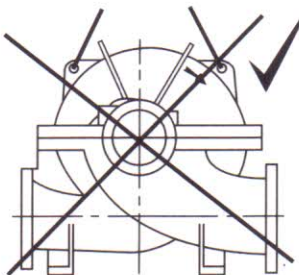
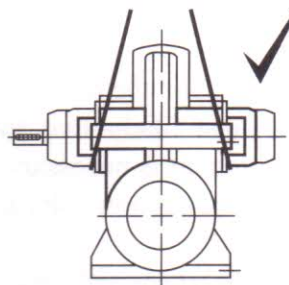
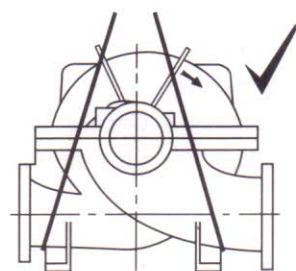
Immediately after receipt of the equipment, it must be checked against the delivery and transport documents for its completeness and condition. Any shortage and damage should be reported immediately to Maxflow Pumps India Pvt. Ltd. with a copy to the transport agency for any damage claims etc.

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



When there are no specific lifting points on the baseplate

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 pump interiors.

Turn the pump at intervals, by hand from the coupling end of the shaft, for keeping away from seizing. Consult Maxflow pumps India Pvt. Ltd. if pump is to be stored for more than six months.

2. INSTALLATION

Location

The pump should be located as near the liquid source as possible and allowing proper space for access, ventilation, maintenance and inspection. Ample headroom should be provided for lifting and installation.

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 1:2. After grout is hardened, tighten foundation bolts.

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

Alignment

Although the pump and the driver mounted on a common base plate are aligned at the factory before dispatch, it is most likely that this alignment would have been disturbed during transport or handling. Realignment is necessary after complete unit has been leveled on the foundation and after grout has set and foundation bolts are tightened.

The pump and the motor will normally have to be aligned at ambient temperature and should be corrected to allow for thermal expansion at the operating temperature. In pump installations involving high temperatures, the unit should be run at the actual temperature, shut down and alignment checked immediately.

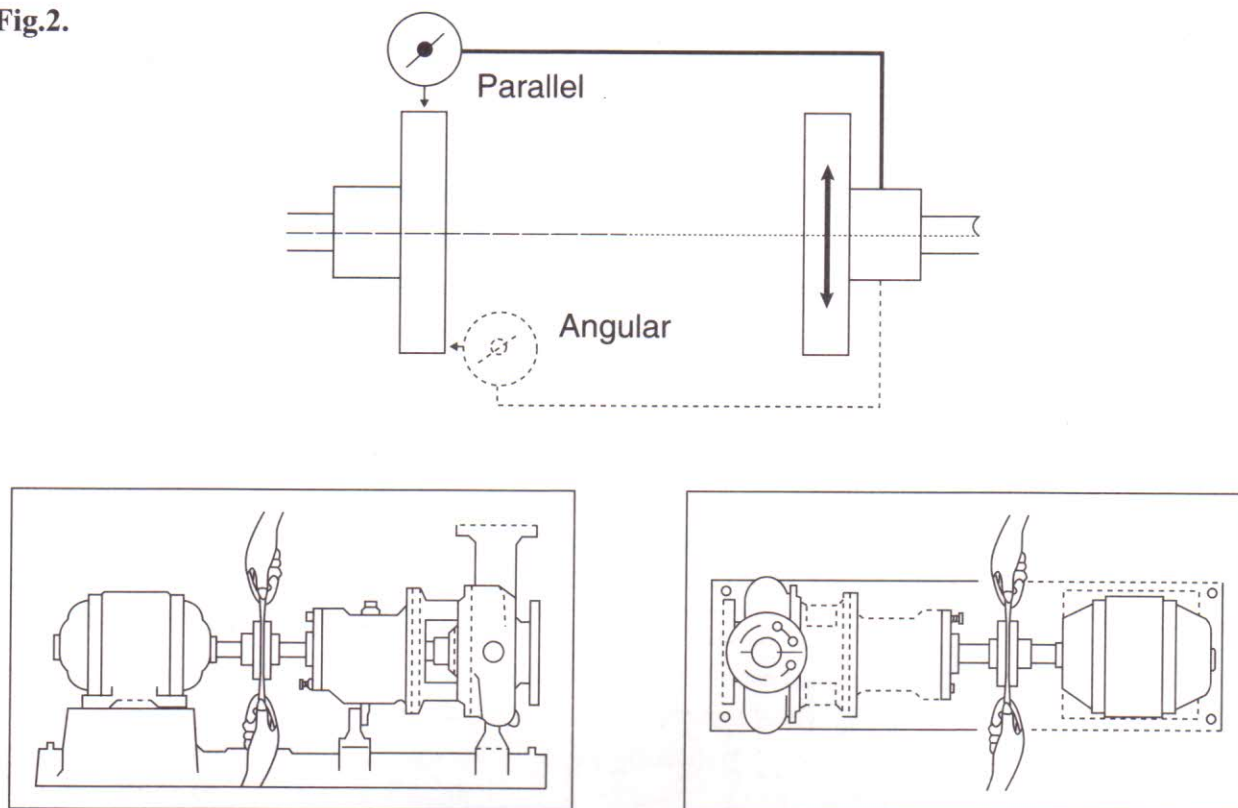
Alignment methods

- Ensure pumps and the driver are isolated and coupling bolts disconnected.
- Alignment is achieved by adding or removing shims under the motor feet and moving the motor horizontally, as required. In some cases it may also be necessary to move the pump for achieving the recommended alignment.
- The unit has to be aligned for two types of misalignments.;
 1. Angular misalignment
 2. Parallel misalignment

Pumps with non-spacer flexible couplings can be aligned by using a straightedge across the outside diameter of the coupling hubs and measuring the gap between the machined faces using feeler gauges. The unit will be in parallel alignment when the straightedge rests evenly on both the couplings at all positions. Care should be taken to place straight edge parallel to the axis of the shaft.

Coupling alignment can also be checked accurately by the use of a dial indicator, which is necessary for spacer type couplings.

Fig.2.



While maximum parallel and angular misalignment must not exceed 0.1 mm TIR at working temperature, optimal pump reliability is achieved by near perfect alignment of 0.05 mm TIR parallel and 0.05 mm per 100 mm of coupling flange diameter as angular misalignment.

The unit should be periodically checked for alignment.

3. PIPING

Before connecting any pipes remove protective covers fitted to the suction and delivery ports of the pump.

It is a good practice to install pipes which are one size larger than the pump suction and discharge, or as per recommendation from Maxflow Pumps India Pvt. Ltd. This would minimize frictional losses in the pipework.

CAUTION: Never use the pump as a support for piping.

Suction Pipe

Suction pipe should be as short as possible and preferably one or two sizes larger than the pump inlet. Pipe bends should be of large radius.

For pumps operating on suction lift, the piping should have a gradual rise towards the pump inlet and eccentric reducers should be used for preventing air locks.

Inlet strainers should have a net free area of at least three times the inlet pipe area.

Pump should never be throttled on the suction side and a valve should never be placed directly on the inlet.

Minimum submergence over the end of the suction pipe should be three to four times of the nominal size of the pipe.

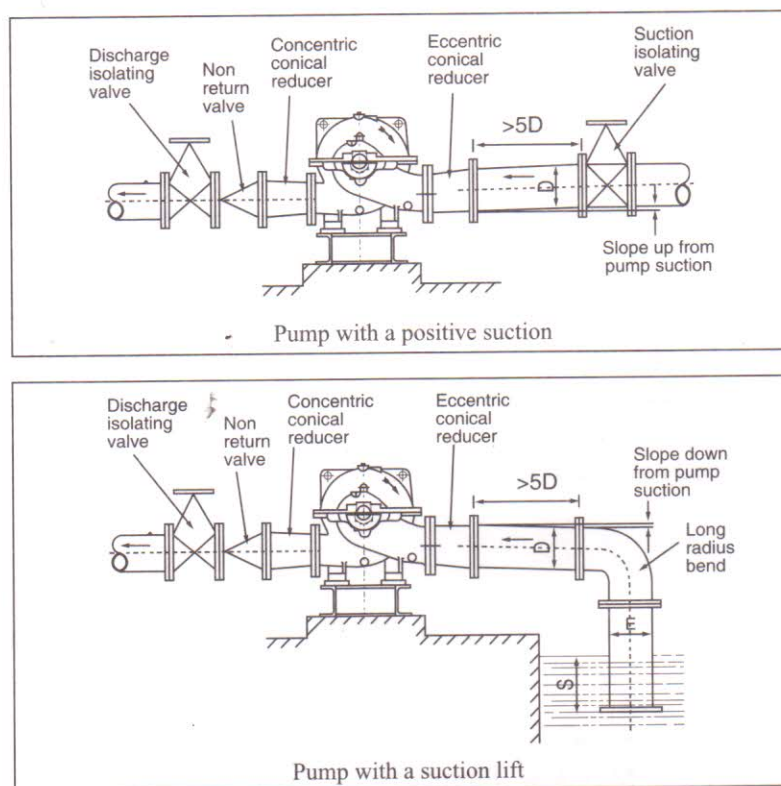
Suction line should be airtight and free from any foreign deposits and welding residuals etc.

Discharge Pipe

A non-return valve and a regulating valve should be installed in the discharge pipework. The non return valve, is necessary to protect the pump from excessive back pressure and also to reverse the rotation when the pump is stopped.

A typical layout of suction and discharge pipelines is shown as following.

Fig. 3



Auxiliary Piping

Following piping may also be required as per requirement.;

- Drain pipe for connecting casing drain and gland leakage for disposal.
- Pumps fitted with a gland packing may require external or internal feed pipes to the gland packing when suction pressure is below the ambient pressure. A separate clean liquid supply to the gland at about 1 bar above the pump pressure shall be required if the pump liquid is dirty and cannot be used for sealing.
- Pumps fitted with a mechanical seal shall require piping for flushing / quenching as per sealing plan

4. FINAL CHECKS

- Check tightness of all bolts on the foundation, suction and discharge pipeline connections with the pump.
- After connecting 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.
- Recheck the coupling alignment.
- Ensure that no piping is supported independent of the pump. No pipe stresses should be transmitted to the pump. Never draw piping into place by applying force to pump flange connections.

5. SEALING

Shaft sealing is necessary to keep the pump in operation. Stuffing box packing and mechanical seals are the two methods used for sealing of pumps. Operation of both generates friction and heat and they require cooling and lubrication.

Stuffing boxes should be carefully cleaned and required packing should be placed in it. If necessary, lantern ring is placed at the specified location. Choice of stuffing box lubrication depends on the type of liquid being pumped, temperature and pressure. In case if the liquid pumped is not suitable for lubrication or it contains abrasive particles, packing can be severely damaged. In such cases external sealing liquid should be used with the manufacturer's recommendation.

If the pump has a packed gland, there must be some leakage from the gland. Gland nuts should be therefore adjusted evenly to give visible leakage. Concentric tightening of the gland should be made to avoid excess temperature. The pump should be run with steady leakage for about 30 minutes then reduced to about 60 to 100 drops per minute.

CARE MUST BE TAKEN WHEN ADJUSTING THE GLAND ON A RUNNING PUMP.

Mechanical seals requiring re-circulation will normally be provided with the auxiliary piping from pump casing. If the seal requires an auxiliary quench then a connection must be made to a suitable source of liquid flow. Recommended pressure is less than 0.5 bar.

Some seals may require different auxiliary piping. For that supplier's recommendations must be followed.

For pumps handling hot liquids, it is recommended that any external sealing/flushing be continued after stopping the pump.

In all cases general arrangement drawing should be checked for sealing system arrangement.

6. OPERATION

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.

Diesel Engine driven pumps

When using pumps driven by an internal combustion engine, vibrations may occur in the system. It is recommended to mount the unit on vibration dampers and to install compensators between the pump and pipelines.

Before starting the pump, check the following.

- a. Pump rotates freely by hand.
- b. Motor should be checked for correct rotation as indicated by the directional arrow on the pump.
- c. Sealing connections, if any, are proper.
- d. The pump and suction pipe is fully primed with the liquid.
- e. Suction valve on the pump is fully opened and all air is vented from the pump casing.

Lubrication

Ensure that correct type, quantity and quality of lubricant is available with the pump bearings. For oil lubricated pumps, fill the bearing housings with a correct grade of oil to the correct level as indicated. For grease lubricated pumps, smear grease thoroughly into the bearings and also fill bearing covers with a 1/3 to 1/2 of free space.

Normally following grades of lubricants are used for grease-lubricated bearings

Indian Oil	Servogem 3 / Servogem 2
Caltex	Starfax 3 / Starfax 2
Hindustan Petroleum	Natra 3 / Natra 2

Recommended oil lubricants should normally meet ISO VG HL/HLP 32 or HL/HLP 68.

It is recommended to follow the pump supplier's instructions for the correct grade of lubricant to be used.

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 allowable limits and not more than 80 deg C or 55 deg C above ambient whichever is lower.

Priming

When pump is installed above the liquid level, a foot valve is necessary to be placed at the end of suction line. Fill the pump with liquid till all air is vented out and the liquid flows from the air vent. In case provision is available for a vacuum pump to be connected to the pump, then close the delivery valve and start the vacuum pump for evacuation of air from the pump. In this case, a foot valve may not be necessary.

When the pump is installed below the liquid level, open suction line valve for allowing liquid to flow into the pump under gravity.

Starting

When the preceding preparations and installations have been completed, the pump can be started. The Centrifugal pump must be provided with a bypass if it has to operate for long periods with closed valve on the discharge side. Otherwise, strong heating and expansion of the pump medium will occur.

Also check that the pump shaft can be freely turned by hand. Pumps with a mechanical shaft seal must be protected against impurities and dry running. Supply of liquid or oil to the mechanical shaft seal is imperative. Please note that clogged filters will cause considerable frictional losses, which may decisively affect the suction capacity and the output of the pump. Also check when starting the pump that the direction of rotation is correct as shown with an arrow on the pump, and open the discharge valve slowly. At a normal discharge head the pump should run smoothly without abnormal noises and vibrations.

Stopping

Close the discharge valve before stopping the pump for preventing water hammer effect on the check valve.

7. LOCATING PUMP TROUBLES

1. Pump not primed.
2. Suction lift too high.
3. Air or gas in liquid.
4. Air or vapour pocket in the suction line.
5. Air leak from the suction line.
6. Air leak through the mechanical seals, sleeves or joints.
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 the liquid different from the specifications.
12. Viscosity of the liquid different from the specifications.
13. Operating the pump at a very low capacity.
14. Operating the pump at a higher capacity.
15. Misalignment due to pipe strain.
16. Improper foundation.
17. Shaft bent.
18. Rubbing on the rotating parts.
19. Bearings worn
20. Worn wearing rings.
21. Impeller damaged or worn out.
22. Mechanical seal improperly installed.
23. Incorrect mechanical seal.
24. Abrasive solids in the liquid.
25. Mechanical seal running dry.
26. Excessive grease in the bearings.
27. Lack of lubricant in the bearings.
28. Improper installation of the 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,
Mechanical seal leaks excessively	15, 17, 19, 22, 23
Short life of mechanical seal	15, 17, 19, 22, 23
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