

Horizontal Multistage Pump Instruction Manual

I. Overview

The MD abrasion-proof multistage centrifugal pump for many fields is successfully developed by our company on the basis of introducing, digesting and absorbing advanced technologies. This product not only has high efficiency and good cavitation performance, but also runs smoothly and reliably.

II. Structural features and working principles

1. Overall structure

The MD pump is a horizontal single-suction multi-stage segmented centrifugal pump. The suction port is located on the water inlet section in a horizontal direction, and the discharge port is vertically upward on the water outlet section. The water inlet section, the middle section and the water outlet section of the pump are connected as a whole with tension bolts. The pump lift can be increased or decreased according to the needs of pump stages.

2. Main parts

(1)The main parts of the pump: water inlet section, water outlet section, guide vane, water outlet section guide vane, middle section, impeller, shaft, shaft sleeve, sealing ring, balance ring, balance plate, tail cover, etc..

The rotor consists of the impeller mounted on the shaft , balance plate and other parts, the two ends of the rotor are supported by rolling bearings,

and the bearings are lubricated with grease.

(2) The working chamber of the pump is formed by the water inlet section, the middle section, the guide vane, the water outlet section guide vane, the water outlet section and the tail cover. The liquid enters along one side of the axial direction, and the axial force generated when the pump working is balanced by the balance plate.

(3) ① Shaft seal: It adopts soft packing seal, and can also provide mechanical seal structure

according to user requirements.

② Transmission: The pump is directly driven by the motor through the elastic coupling.

③ Sealing ring: prevent the high-pressure water in the pump from leaking back to the water

inlet part, and can be replaced after wear and tear.

④ Balance plate: located between the water outlet section and the tail cover, used to balance the axial force.

⑤ Balance ring and balance sleeve: fixed on the water outlet section, and form a balance device together with the balance plate.

⑥ Shaft sleeve: between the two packing chambers, it can be replaced after wear and tear.

3. Rotating direction

Viewed from the direction of the motor, the pump rotates clockwise.

4. Working principle

The prime motor drives the impeller to rotate through the pump shaft, and works on the liquid to increase its energy, so that the required amount of liquid passes through the inlet section, impeller, guide vane, middle section, outlet section guide vane, and outlet section of the pump from the suction pool. After the vertical water outlet, the liquid is continuously transferred to the required high place or the place where the pressure is required.

III. Installation and commissioning

1. Preparation before installation

① Lay a solid foundation according to the installation size requirements, and prepare relevant tools and lifting machinery.

② Check the water pump and motor to make sure it no damage.

2. Installation order

① Put the base on the foundation, pad wedge-shaped iron blocks near the anchor bolts, raise the base by 20-40mm, and fill it with cement after leveling.

② Use a spirit level to check the levelness of the base. After leveling, tighten the anchor nuts and fill the base with cement slurry. Check the levelness after the cement is dry.

③ Remove the dirt on the support plane of the base, the plane of the water pump feet and motor feet, and put the pump and motor on the base.

④.Adjust the level of the pump shaft, and tighten the nut properly after leveling to prevent walking, and then install the motor after adjustment; a gap of 4~6mm should be left between the pump coupler and the electrical coupler.

⑤Check whether the axis line of the pump and the axis line of the motor coincide Inspection method: If the axial deviation of the coupling does not exceed 0.2mm and the radial deviation does not exceed 0.1mm, it can be considered that the unit has been well aligned. The inspection points are at least 4 symmetrical points, and the readings of all points must be uniform. Use shims or wedge pads when adjusting direction.

⑥Both the suction pipe and the discharge pipe should be supported by their own weight to prevent damage to the flange of the pump. For the suction pipe with a bottom valve, the horizontal suction pipe connected to the flange should be kept horizontal or inclined toward the bottom valve. , to prevent the trapping of air in the tube.

⑦After the pump is connected to the pipe, the axis needs to be corrected for the last time, because the pump is easy to shift when connecting the pipe.

⑧Measure the rotation direction of the motor before the motor coupling is not docked with the water pump coupling to ensure that the rotation direction of the motor is consistent with the rotation direction required by the water pump.

⑨Connect the motor coupling and water pump coupling and install the coupling protective cover.

IV. Operation of pump

1. Before starting the pump, check whether the base is fastened to the foundation.
2. Check the tightness of the packing and whether the lithium-based lubricating grease in the bearing body is adequate.
3. Check whether the rotation direction of the motor is correct.
4. The pump must be filled with water before starting.
5. Close the valve and pressure gauge cock on the discharge pipe and start the motor. After normal operation, open the pressure gauge cock and gradually open the valve until the rated pressure range of the pump.
6. When the water pump stops running, the valve on the drainage pipeline must be gradually closed first, and then the power supply should be cut off.
7. Pay attention to the temperature of the water pump bearing, which must not exceed 35°C than the ambient temperature, and the limit temperature shall not exceed 75°C.
8. It is advisable for the normal water dripping in the packing chamber that the water flow does not form a line. The amount of dripping water can be adjusted by adjusting the compression degree of the packing gland. Regularly check the coupling and pay attention to the motor.

V. Fault Analysis and Elimination

Table 1 Possible faults and their solutions

Symptom	Possible causes	Solution
1.The pump not lift water	<ul style="list-style-type: none"> a. The pump not filled with liquid b. The suction pipe leaks c. The inlet and outlet valves not opened, and the pipelines blocked, the flow path of the impeller blocked d. The rotation direction of the motor not right, the speed of the motor very slow due to lack of phase, the suction lift too high, or the bottom valve leakings. e. Suction range is too high, the bottom valve is leaking 	<ul style="list-style-type: none"> a. Fill the pump with water b. Tighten each sealing parts and remove air c. Check, remove obstructions d. Adjust the running direction of the motor and fasten the motor wiring e. Reduce the suction height and change the bottom valve condition
2.The flow rate lower than the design one	<ul style="list-style-type: none"> a. The water pump and pipeline are blocked, and the opening of the valve is not enough b. Low voltagec. Excessive wear of the sealing ringd. The liquid flow in the pump inlet pipe is not smooth 	<ul style="list-style-type: none"> a. Remove the blockage and re-adjust the valve opening b. Voltage regulation c. Replace the sealing ring d. Check for twisted or deformed tubing and correct it,if the resistance is too large, change the inlet line
3.Too much power consuming	<ul style="list-style-type: none"> a. The packing gland is too tight, and the packing room is hot b. Impeller wear c. Excessive water supply d. Pump bearing wear 	<ul style="list-style-type: none"> a. Disentwine the packing gland b. Replace the impeller c. Turn down the valve to reduce the flow d. Replace the bearing
4.The sound inside the pump is abnormal, and the water pump does not lift the water	<ul style="list-style-type: none"> a. The resistance in the suction pipe is too large b. There is air infiltration at the water absorption place c. The water absorption height is too large 	<ul style="list-style-type: none"> a. Check the water pump and water pipe, check the bottom valve and troubleshoot b. Tighten to plug the air leak c. Reduce water suction height
5.Noise vibration	<ul style="list-style-type: none"> a. Pipeline support is unstable b. Generate cavitation c. Bearing damage d. The pump shaft and the motor shaft are not on the same centerline e. The motor is overloaded and running with heat 	<ul style="list-style-type: none"> a. Stabilize the pipeline b. Reduce the vacuum c. Replace the bearing d. Align the shaft centerline of the motor and water pump e. Refer to 6(motor heating)
6. Motor heating	<ul style="list-style-type: none"> a. Excessive flow, overload running b. Insufficient voltage c. Motor bearing damage d. Friction 	<ul style="list-style-type: none"> a. Close the outlet valve b. Stabilize the pressure c. Replace the bearing d. Check and eliminate
7. Bearing overheating	<ul style="list-style-type: none"> a. Lack of oil in the bearing b. The pump shaft and the motor shaft not on the same center line 	<ul style="list-style-type: none"> a. Add oil b. Align the shaft center line

VI. Safety protection device and accident handling

In order to avoid accidents, it is forbidden for the pump to work without the coupling guard installed. If there is any abnormal sound during the operation of the pump, stop the pump immediately and check the cause.

VII. Maintenance instructions

1. Upkeep of the pump in running

Pumps should be inspected hourly and daily, and operating conditions recorded. The inspection items should be done every day as follows:

- ① Check the bearing temperature and lubricate the bearing with oil regularly
- ② Check the water leakage of the stuffing box, if the water leakage is too large, properly tighten the packing gland.
- ③ Observe the operation of the balance system.
- ④ Observe the outlet water pressure gauge, if the pressure of the water pump changes, adjust the operating conditions of the water pump in time.
- ⑤ Regularly check the vibration of the water pump every day.
- ⑥ The pump cannot run for a long time with the outlet valve closed.
- ⑦ The pump not allowed to run dry.

2. If the pump is out of service for a long time, the water pump should be disassembled, the water on the parts should be wiped dry, and the sliding surface should be coated with anti-rust oil and stored properly.

3. Maintenance of the pump

The following work should be done every six months:

- ① Check the free displacement of the packing gland, clean and lubricate the bolts of the gland, and check the packing to determine whether it needs to be replaced.

② Check and correct the neutrality of the water pump and motor.

③ Check the bearing to see if the bearing contains the right amount of grease and still has a suitable consistency.

4. Assembly sequence of water pump during maintenance

① The sealing ring is installed on the water inlet section and each middle section, and the sleeve is set on the guide vane

② Install the O-ring, packing gland and packing ring on the water inlet section and the tail cap respectively.

③ Install the guide vanes on all the middle sections, and install the balance ring, balance sleeve, and outlet guide vanes on the water outlet section.

④ Put the shaft with the sleeve and key through the water inlet section, put an O-ring on the shaft head at the coupling end, and then put on the water retaining sleeve.

⑤ Put a paper pad on the water inlet section, install the bearing body, install the bearing, and tighten it with nuts.

⑥ Apply a layer of molybdenum disulfide or ordinary butter on each sealed surface of the middle section, install the impeller and the middle section in sequence, and then install the water outlet. The water inlet section, the middle section and the water outlet section are fastened together with pull-in bolts.

⑦ Install the balance device and shaft sleeve, put a paper pad on the outlet

section and install the tail cover.

⑧Put the O-ring on the shaft and install the water retaining sleeve, put the paper pad on the tail cover, then install the bearing body, and tighten it with nuts after installing the bearing.

⑨Put the bearing into the body and inject an appropriate amount of grease, put a paper pad on the bearing cover, and fasten the bearing cover on the bearing body with screws.

⑩Install the return pipe parts and coupling parts, install the vent cock and all the plugs.

5. Disassembly of the water pump during maintenance: when disassembling, refer to the assembly sequence and proceed in reverse.

6. To avoid accidents, the pump cannot work without the coupling guard.

VIII. Transport and Storage

1. Cover the water inlet and outlet with a dust cover to prevent debris from entering the pump.

2. Pay attention to safety when hoisting the pump, and avoid collisions during transportation.

3. The pump should be protected from corrosion and damage during storage.