

High-Pressure Axial Piston Pump Installation, Operation and Maintenance Manual

1. Pump steering

There is steering arrow on the pump, please follow the direction of the arrow on the pump head.

I: Water Inlet

O: Water Outlet

2. Water Inlet Requirements:

- The pump water inlet pressure is recommended to be within the range of 2bar-5bar. At pressures lower than 1 bar, it is easy to produce in the working fluid bubbles, causing cavitation, which in turn causes damage to the pump.
- The flow rate of the water supply pump at the water inlet should be greater than 1.2 times the rated flow rate of the piston pump to ensure sufficient water inlet. There must be no shortage of water supply.
- The diameter of the water inlet pipe shall not be smaller than the diameter of the piston pump water inlet. Avoid using elbows, throttles and small diameter pipes. For long distance water supply, it is recommended to use larger diameter pipes.
- The inlet pressure protection device should be located after the outlet end of the filter and close to the water inlet of the piston pump.
- The working medium should be filtered before entering the pump body, and particles above 10 microns are not allowed to enter the pump body.
- The water inlet pipe must be strictly sealed and there must be no leakage at all joints to prevent air from entering.
- The inlet pressure can never be greater than the outlet pressure.

3. Filter

A good filtration is extremely importance to extend the life of your pump. Therefore, the choice of the filter is extremely important.

- Material: It should be considered that the material of the filter should match the media.
- Filtration Precision requirements: filter with filtration precision of 10 microns and filtration efficiency $\beta_{10} > 5000$.
- Pressure Loss: The pressure loss of the filter should be detected and matched

with a suitable water supply pump.

- Cleaning: Check regularly and clean. Or replace the filter element in time to avoid clogging of the filter or substandard filtration accuracy.

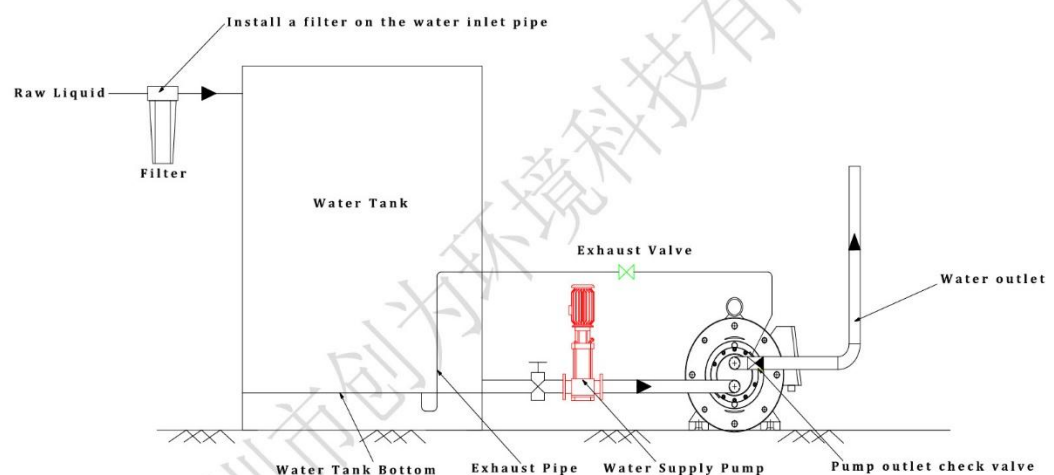
4. Temperature:

Fluid temperature: +2°C to +50°C

Ambient temperature: +2°C to +50°C

5. Exhaust

- Evacuating the air in the pump body is particularly important for the normal operation of the pump.
- Before running the pump, unscrew the exhaust nut on the pump casing to drain out the air inside, and then tighten it. The longer the water inlet pipe, the longer exhaust time required.
- For fluids that may vaporize during working, it is recommended to install an exhaust pipeline in the exhaust hole for continuously exhausting gas (the exhaust pipe can be introduced into the bottom of the water supply tank).
- After the pump stops working, as long as the pump body is always filled with water and no air enters, it can be started directly without exhausting when running again.
- Once negative pressure appears in the water inlet pipeline or there is a lack of water in the pump body, the exhaust operation must be performed again.



6. Vibration

Utilize elastic hoses to minimize vibration and noise. Since the pump(set) is usually mounted on a bell housing or base, the noise level is determined by the entire system. Therefore, the correct use of shock-absorbing components is extremely important to

reduce vibration and noise. Noise levels are affected by:

- Pump speed. High speed produces more noise than low speed.
- Rigid installation of the pump produces more noise than flexible installation.
- Piping directly to the pump increases noise levels as opposed to connecting via elastic hoses.
- High pressure makes larger noise than low pressure does.

7. Installation

7.1 Preparation before pump installation.

Check carefully whether the data on the product label, such as flow rate and pressure are consistent with the order.

- 1) Confirm that the pump is installed under the water tank/reservoir.
- 2) Confirm that all pipes, joints and other materials used are corrosion-resistant or not and will not produce rust or scale.
- 3) Confirm that the inlet pipeline can provide sufficient water flow (pipe size, sufficient water volume in the water tank).
- 4) Make sure that the working water entering the water pump has been filtered first. (less than 0.01mm).
- 5) Confirm that a safety valve is installed in the water outlet pipeline. The outlet of the safety valve can be directly connected to the water supply tank, but cannot be directly connected to the water inlet of the water pump.
- 6) Confirm that the inner wall of the pipe is clean (remove burrs and other impurities).
- 7) Confirm the rotation direction of the motor. Viewed from the pump end, the motor spindle should rotate counterclockwise; The position should be locked and fixed.

7.2 Pump Installation

The pump is now allowed to have any axial load during installation and use.

- 1) Install the elastic coupling on the main shaft of the motor and pump to ensure that the coupling and main shaft are installed smoothly. Do not use knocking methods to complete the installation.
- 2) Fix the pump to the motor frame through the bolt holes on the pump flange. You can use a bell housing to ensure that the pump and motor are coaxial and concentric (the eccentricity of the two axes should not exceed 0.25mm). Do not make the pump and motor axes cross at an angle, otherwise the pump will easily be damaged.
- 3) For high pressure over 30bars, it is recommended to install a pump body support frame to prevent the high-pressure pump from deforming and

damaging the bell housing under the action of long-term load and gravity.

- 4) After the pump is installed, check the coupling to ensure:
 - ①Leave a gap of about 3-5MM between the pump coupling and the motor coupling.
 - ②There should be a gap more than 3MM between the bottom end of the pump coupling and the pump cover.
 - ③Tighten the screws on the coupling.
 - ④The coupling is only fixed to the shaft and cannot contact or rub with other objects when stationary/rotating.
- 5) Confirm the inlet and outlet of the pump, and install the inlet and outlet joints and pipes correctly. The seal should be sealed with O-ring or rectangular gasket. It is not recommended to use raw material tape. If glue is used for sealing, the amount of glue must be strictly controlled and no excessive use is allowed.
- 6) After installation, fill the pump with water and ensure sufficient water in the water tank. Drain the air from the exhaust holes on both sides of the pump. It is recommended to exhaust the pump twice. You can exhaust it again after inching to ensure that the air in the pump is completely exhausted.
- 7) After turning on the inlet water replenishing pump (original water pump) and running for 60 seconds, start the high-pressure piston pump.
- 8) Open the water outlet pipe, start the high-pressure piston pump, and observe the pump's water outlet flow, sound and sound for any abnormalities. No exception then can work normally.
- 9) It is forbidden to start the piston pump with the rear end valve closed, otherwise it may cause the safety valve to work or even the pipeline to burst.
- 10) If there is a water cutoff or insufficient water supply at the water inlet end of the pump, it should be stopped in time for inspection. Before starting the pump again, it must be followed the above steps to start the exhaust operation.

Note: When starting a new pump for the first time, it is recommended to use low pressure.

8. Shutdown Operation

When the piston pump is shut down during normal operation, it needs to be stopped slowly (slowly shut down from high operation to low operation).

In the event of an emergency, a power-off emergency shutdown is required to reduce damage to the piston pump (the piston pump will be seriously damaged if it is

operated with insufficient or even no water inflow).

The normal shutdown sequence of the piston pump is to stop the piston pump first, and then stop the raw water pump after the piston pump has completely stopped.

In the event of an emergency, a brake-type emergency stop (power-off shutdown) is required, and all operations are terminated.

9. Piston pump cleaning

Water treatment pollutants such as hydrated metal oxides, calcium-containing sediments, organic matter and organisms. Dirt refers to adhesion. Certain deposits on various parts of the pump, including scale in the water.

The purpose of pump cleaning treatment is to minimize the above-mentioned contamination of various parts of the pump, thereby reducing abnormal wear and tear of the pump.

During normal operation, the accessories inside the pump will be affected by inorganic salt scale, microorganisms, colloidal particles and insoluble organic substances of pollution. During operation, these contaminants adhere to the surface of pump accessories, causing abnormal wear and tear of the pump, reduced volumetric efficiency, shortened service life, and a series of other problems. It is recommended that the interval between pump cleanings should not exceed 24/h.

Cleaning safety precautions:

- The pump unit operates normally or at low pressure during cleaning.
- The water temperature should not exceed 50°C during working operation or circulation of cleaning fluid (use clean water for cleaning).
- After the piston pump is shut down, the pump should be flushed with fresh water to prevent the working fluid from crystallizing or corroding the pump body.
- For acid, alkali and salt working fluids, we strongly recommend that the high-pressure piston pump be flushed with clean water every 24 hours of operation, and the piston pump be operated at a low pressure of 600-800RPM for 5-10 minutes. For working conditions with high pH or easy crystallization, the interval time can be reduced and the flushing frequency can be increased.

10. Monitoring

In order to protect and extend the service life of the pump, it is recommended to continuously monitor the following working conditions:

1. High pressure pump inlet pressure

When the inlet pressure of the high-pressure pump is lower than 2bar, the pump will automatically stop. At the same time, inspect the sealing of water supply pipelines, water supply pumps and Filter element.

2. High pressure pump outlet pressure

When the outlet pressure of the high-pressure pump is higher than the set value, an alarm should be made in time or the pump should be stopped urgently to protect the pump and equipment.

3. High pressure pump temperature

For closed circulation systems, a temperature monitoring device should be installed to prevent the internal circulation from causing excessive temperature of the working fluid.

4. High pressure pump flow

The flow rate of the piston pump is proportional to the speed, and the rated speed corresponds to the rated flow rate; when adjusting the high-pressure piston pump flow rate, do not operate the high-pressure piston pump above the minimum and maximum speed for a long time.

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