Hyperflow Rotary Lobe Pump Operator Manual

I. Overview

The Hyperflow HL Series Twin-Blade Rotor Pump is a positive displacement pump featuring a non-contact rotor.

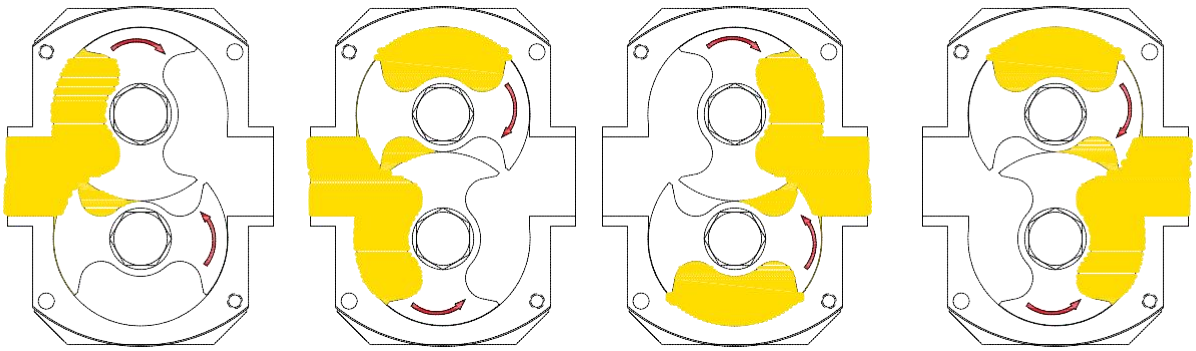
The HL series twin-blade rotor pump features an easy-to-maintain design, is easy to clean, provides gentle handling of materials, and ensures high reliability. With nine pump models and a comprehensive range of options, it can precisely meet your process requirements.

The Hyperflow HL series rotary pump can accommodate any required connection type and can be installed with inlet and outlet connections either horizontally or vertically. The pump should be connected to the correctly specified motor/drive unit to achieve the desired performance.

This product utilizes two synchronously rotating rotors, which are driven by an external pair of synchronous gears; the rotors rotate in synchrony but in opposite directions under the drive of the transmission shaft, thereby achieving a high vacuum level and discharge pressure, making it particularly suitable for the conveyance of sanitary-grade and highly corrosive high-viscosity media.

II. Working Principle

The rotor pump operates by utilizing two rotors that rotate in opposite synchronous directions; during their rotation, these rotors generate an suction force at the inlet (i.e., a vacuum), thereby drawing in the material to be conveyed. The two rotors partition the rotor chamber into several small compartments, which operate in the sequence ABCD: when the rotor reaches position A, only Compartment I is filled with the medium; at position B, part of the medium is enclosed within Compartment B; at position C, part of the medium is also enclosed within Compartment A; at position D, Compartment A and Compartment B become connected to Compartment II, at which point the medium is conveyed to the outlet.



A B C D

III. Product Features

● 3A sanitary standard design, compliant with FDA design standards

● High-strength 17-4PH shaft design, engineered to withstand high-pressure applications.

● Balanced rotor design that minimizes wear between the rotor and the pump chamber to the greatest extent possible.

● Minimal operating clearance, stable flow rate, and virtually no pulsation.

● The product features gentle conveying; pumping large soft solid particle streams will not cause damage.

● Suitable for medium-and high-viscosity products (≤ 100,000 cp)

● Flow-through components – Material: 316L

●Suitable for CIP/SIP

● The rotor and pump chamber form a relatively long sealing surface; this extended sealing surface minimizes backflow, resulting in low backflow, high efficiency, and excellent suction performance.

● Single-or double-face sealing design to meet the diverse operating conditions of customers.

● Capable of bidirectional fluid pumping

●Horizontal/Vertical installation options available

● Simple assembly and disassembly, easy maintenance, and low vibration and noise levels

IV. Scope of Application

1. Food and Beverage Category: Dairy products, latex, chocolate, syrup, cheese, malt juice, beer, soda, fruit juice beverages

2. Fruit concentrates: pudding, jam, jelly, tomato sauce Salad dressing, mayonnaise

3. Starch-based products: fats, oils, etc.

4. Cosmetics: facial creams, detergents, hair styling gels, fragrances, oils, etc.

5. Pharmaceutical preparations: extract, emulsion, pill paste, etc.

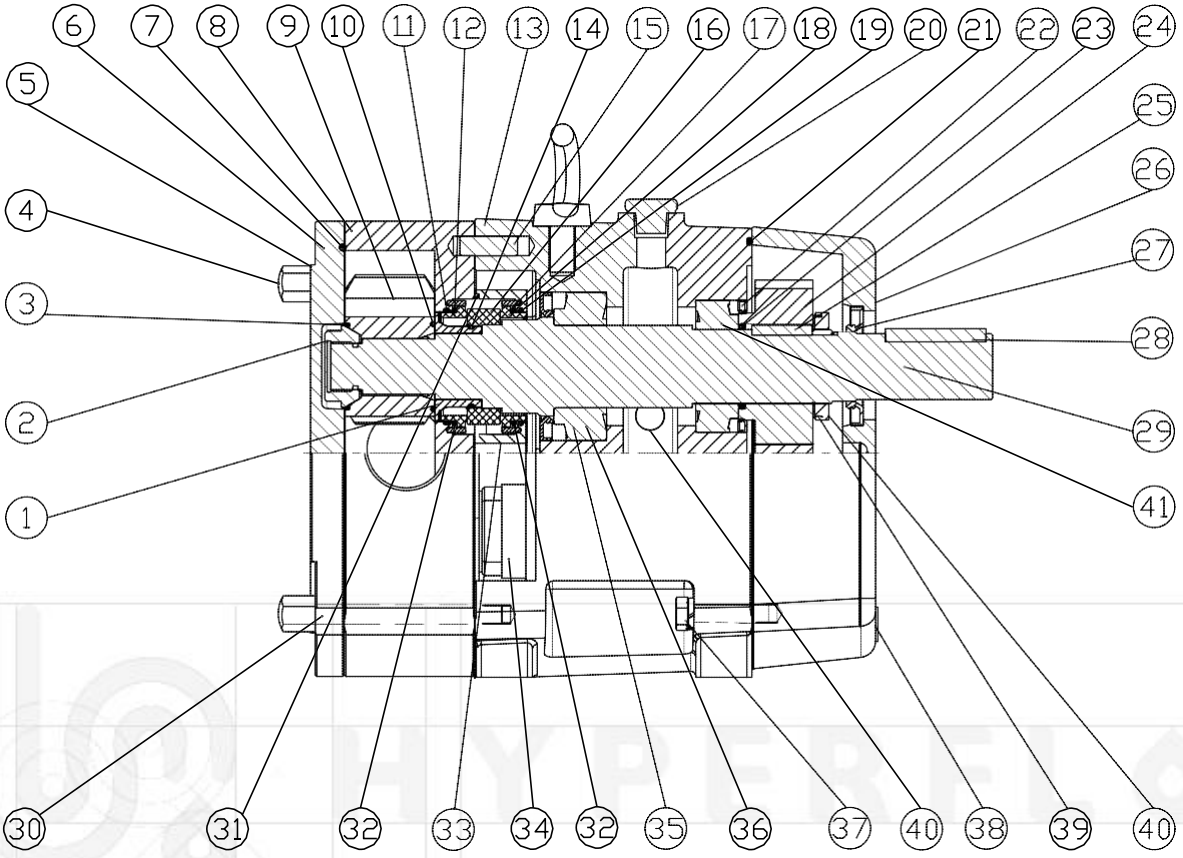
6. Chemical Industry: dyes, fats, solvents, resins, and polymers

V. Technical Specifications

- Maximum pressure: 1.2 MPa
- Operating temperature range: -30°C to 150°C

model	displacement (L/r)	Maximum flow rate (L/min)	Import/Export Dimensions (mm)	Maximum rotational speed (L/min)
HL50	0.021L	38	DN20	900
HL55S	0.102L	100	DN25	900
HL55L	0.144L	150	DN40	900
HL75S	0.27L	216.6	DN40	700
HL75L	0.37L	300	DN50	700
HL100S	0.67L	400	DN50	600
HL100L	1.04L	600	DN80	600
HL130S	1.76L	1050	DN80	400
HL130L	2.4L	1467	DN100	400

VI. Structural Diagram



1. Adjustment Block
2. Rotor nut;
3. O-ring
4. Pump cover nut
5. Washer
6. Pump cover;
7. O-ring
8. Pump casing
9. Rotor
10. O-ring
11. O-ring
12. Sleeve
13. Front gearbox;
14. O-ring;
15. Positioning pin
16. Rotating seal ring
17. Stationary seal ring
18. Static ring wave-shaped spring;
19. O-ring
20. Exhaust cap
21. O-ring
22. Frame oil seal
23. O-ring
24. Gear
25. Key
26. Rear gearbox
27. Frame oil seal
28. Key
29. Long shaft
30. Double-headed screw
31. Sealing Ring
32. Static-ring wave-shaped spring
33. Seal and flush the housing
34. Short shaft
35. Frame oil seal
36. Conical roller bearing
37. Hex head screw
38. Oil plug
39. Locking washer
40. Locking nut
41. Conical roller bearing

VII. Installation

1. The product has undergone inspection and testing prior to leaving the factory; installation must be performed correctly; otherwise, significant vibration may occur, which will adversely affect its service life.

2. The foundation for the pump shall have a level surface; therefore, first, based on the installation dimensions, pre-excavate four foundation holes; then, insert the anchor bolts into the poured concrete; once the concrete has fully cured, use bearing plates to level the base plate; finally, tighten the anchor bolts evenly.

3. The diameter of the imported pipeline shall not be less than the pump's inlet diameter to prevent flow restriction at the inlet or the occurrence of cavitation.

4. The pipelines connected to the pump shall each have their own supports; the pump body shall not be used as a pipeline support.

5. To ensure that the pump body and motor are not damaged, a safety valve shall be installed at the pump outlet; the pressure setting of the safety valve shall not exceed 1.5 times the operating pressure, and it shall be equipped with an over-current protection device.

6. When installing the new pump, please install a filter upstream of the pump inlet; the mesh size of the filter element shall be no less than 120 mesh. The effective surface area of the filter must be greater than twice the diameter of the pump outlet to prevent fluid flow restriction.

7. During pump installation, a vacuum gauge should be installed at the inlet and a pressure gauge at the outlet to monitor the pump's operating condition. An instrument valve should be installed before both the pressure gauge and the vacuum gauge to facilitate the replacement of faulty gauges.

8. After installation of the pump, please ground it at the motor grounding mark in accordance with national safety grounding regulations.

9. When the equipment is intended for mobile use, the inlet and outlet pipelines shall be connected using flexible hoses; in such cases, no valves or pressure gauges shall be installed. The pump base plate is equipped with four wheels (including two universal wheels); the pump may only be dragged on a level surface. If the ground is inclined or if large turns are made during dragging, care must be taken to prevent tipping or sliding.

10. When installing a single-face mechanical seal, the pump shall not be allowed to operate in dry conditions; when installing a double-face mechanical seal, an external flushing water supply must be provided, and the pressure shall not exceed 0.2MPa。

VIII. Pump Starting, Operation, and Stopping

A、 Starting

1. The pump drive gearbox has been filled with lubricating oil prior to shipment; however, before operation, it is essential to check whether the oil level in the transmission box is within the normal range by observing the transparent oil window— the recommended oil level should be approximately half of the window height.

2. Lubricating oil should be replaced periodically. Under normal conditions, the gear oil should be completely replaced after 4,000 hours of operation; for both N220 and N320 grades (for detailed information, please refer to the accompanying gear reducer manual). For continuously variable transmissions, please refer to the specific manual. The bearing lubricant shall be SAE 15W-40.

3. Before starting the pump, open all inlet and outlet valves of the pipeline; once the medium flows into the chamber and manual rotation of the pump shows no abnormalities, a no-load test may be performed first; only after confirming the pump's rotation direction and the proper flow of the medium should formal operation commence. Once the pump reaches its normal operating speed, monitor the pump's pressure readings.

4. When the pump installation location has suction head requirements, the inlet pipeline and pump chamber should be filled with the process material.

5. When the process flow requires heating or cooling of the medium, the heating or cooling unit should be activated before starting the pump; typically, the heating source should be turned on 10 minutes in advance before starting the pump.

B、Operation

1. During pump operation, attention should be paid to the motor power and the pump's operating condition; if any abnormality is detected, the pump should be shut down immediately to investigate the cause.

2. The mechanical seal shall exhibit no leakage or heating.

3. The speed regulation is achieved using a mechanical continuously variable transmission (CVT); after starting the machine, the speed should be adjusted gradually based on the numerical display of the rotational speed. It is strictly prohibited to rotate the speed adjustment dial when stopping the machine; otherwise, the CVT may be damaged.

4. Regularly inspect the heating conditions of the pump and motor; when the pump is operating under water cooling conditions, the bearing temperature rise shall be 40 °C; when the pump is operating under hot water insulation conditions, the bearing housing temperature may exceed the pump body temperature by up to 30 °C.

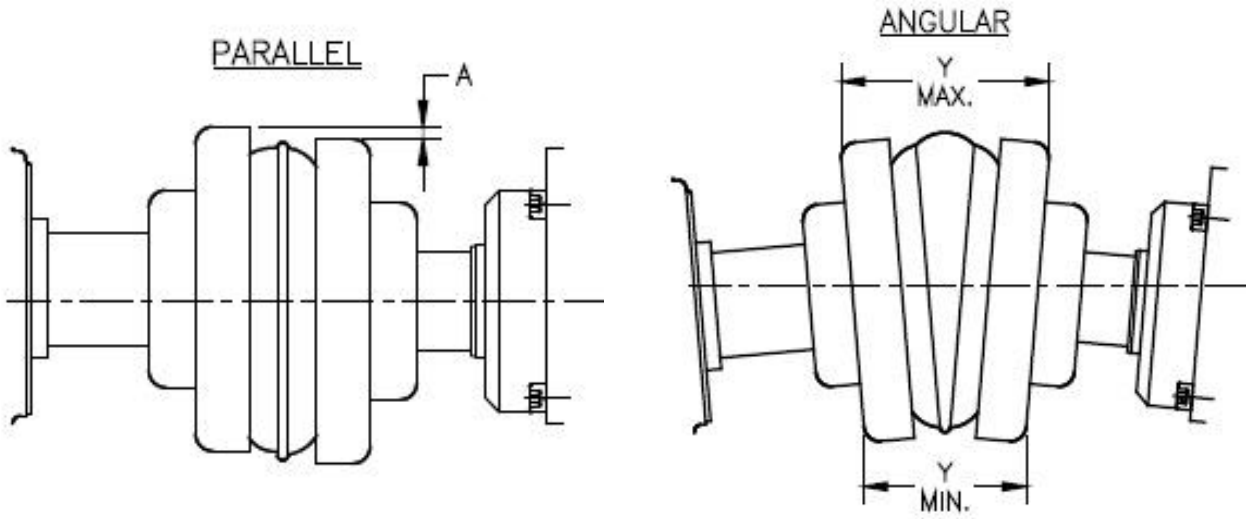
5. Do not use valves from imported piping systems to regulate flow; this prevents cavitation, which could cause pump vibration.

6. During pump operation, it is strictly prohibited to close the inlet or outlet valves.

C. Stopping

1. After the pump has been idle for a relatively long period, before putting it back into operation, the coupling should first be manually rotated; there must be no jamming or obstruction.

2. When reinstalling the pump and the reduction motor, the coaxiality between the pump shaft and the motor shaft should be verified, and the radial and axial misalignment of the coupling's outer circle should be measured; the values must satisfy: A ≤ 0.25 mm and Y ≤ 0.4 mm. Failure to meet these requirements may cause vibration in the pump.



IX. Pump Disassembly and Assembly

A. Disassembly and assembly of hydraulic components

1. First, remove the pump head connection piping, disassemble the nut (4), remove the pump cover (30), and simultaneously remove the O-ring (5) from the pump body (8).

2. Remove the rotor nuts (2) and O-rings (3) from the long shaft and short shaft; then remove the rotor (9) and the O-ring (10).

3. Pull out the pump body (8), then remove the double-threaded stud (30); if a dual-end face seal is installed, disassemble the dual-end seal housing (33).

4. The assembly procedure is the inverse of the disassembly procedure.

B. Disassembly and installation of mechanical seals

1. First, follow the disassembly procedure for hydraulic components.

2. After disassembling the pump body (8), place it on the workbench; disassemble the inner static ring (11), and remove the O-ring (12) and the corrugated spring (32). If a double-end face mechanical seal is installed, disassemble the outer static ring (19), and remove the O-ring (20) and the corrugated spring (32).

3. Disassemble the dynamic ring (16)

4. The assembly procedure is the inverse of the disassembly procedure.

C. Disassembly and assembly of transmission components

1. First, follow the disassembly procedure for hydraulic components and mechanical seals. Place the transmission assembly on the workbench, disassemble the coupling, unscrew the oil plug (38), and drain the engine oil from the bearing housing into an appropriate container.

2. Remove the key (28); use a wrench to loosen bolt (37), then disassemble the rear gearbox (26) and remove the O-ring (22).

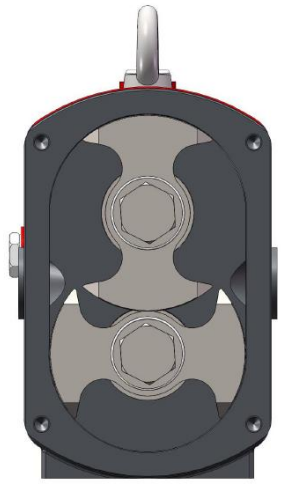
3. Use a crowbar wrench to loosen the locking nut (39), remove the locking washer (40), and then remove the gear (24) and the key (25).

4. Remove the long shaft (29) and the short shaft (34) from the bearing housing (13).

5. Disassemble the inner ring of the front bearing (36) and the inner ring of the rear bearing (41).

6. Remove the exhaust cap (20) and the windshield (42).

7. The assembly procedure is the inverse of the disassembly procedure.



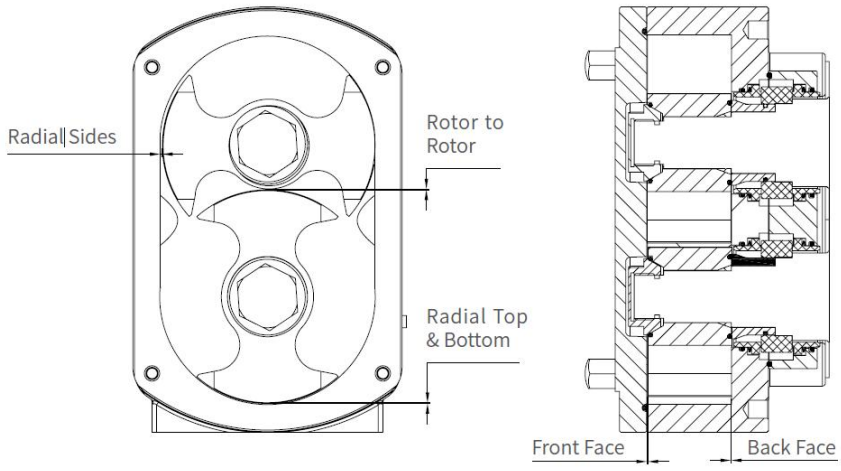
matters need attention：

1. When installing the front-end tapered roller bearing (36), the inner ring of the bearing must be heated; the temperature shall not exceed 120°C.

2. When installing the lip seal (35) (27), care must be taken to follow the correct installation direction; prior to installation, apply lubricating oil to the installation location.

3. After positioning the rotor at the 12 o'clock position, install the gears to ensure that the rotor does not collide when rotated.

4. The clearance between the rotor and each pump housing after installation is shown in the table below.



model	Back Face	Front Face	Radial Sides	Radial Top & Bottom	Rotor to Rotor
HL50	0.06~0.08	0.07~0.15	0.09~0.12	0.07~0.10	0.07~0.12
HL55S	0.1~0.13	0.14~0.23	0.175~0.205	0.115~0.145	0.12~0.16
HL55L	0.1~0.13	0.14~0.23	0.175~0.205	0.115~0.145	0.12~0.16
HL75S	0.14~0.17	0.20~0.29	0.264~0.294	0.14~0.20	0.125~0.185
HL75L	0.14~0.17	0.20~0.29	0.325~0.358	0.19~0.25	0.175~0.235
HL100S	0.19~0.23	0.23~0.33	0.4~0.446	0.18~0.34	0.19~0.265
HL100L	0.19~0.23	0.23~0.33	0.485~0.531	0.26~0.43	0.275~0.35
HL130S	0.19~0.23	0.23~0.33	0.46~0.53	0.26~0.35	0.26~0.34
HL130L	0.21~0.25	0.32~0.42	0.55~0.62	0.35~0.44	0.35~0.43

X. Fault Causes and Resolution Methods

fault phenomenon	Possible causes	Removal method
No traffic, The pump does not rotate.	1. The drive motor is not operating. 2. Key cut or lost. 3. Transmission belt; power transmission 4. Rotor or gear meshing.	1. Check the reset switch, fuse, and circuit breaker. 2. renewal 。 3. Replace or adjust. 4. When necessary, inspect and replace parts.
idling	1. Incorrect steering. 2. The safety valve is improperly installed.	1. Check the motor connections 2. and reverse the motor direction. Adjust the valve.
Without flow, the pump cannot self-priming.	1. The suction pipeline 2. valve is closed. The 3. suction pipeline is 4. clogged. 5. Air leakage may result from improper 6. sealing or piping connections. The 7. pump rotational speed is too low. 8. During pump shutdown, 9. the liquid is drained. The medium contains vapor. The rotor clearance is too large, leading to pump wear. The clean inlet pressure is too low. The inlet vacuum system is malfunctioning.	1. Open the valve. 2. Clean pipelines, filters, etc.; 3. replace seals; inspect 4. electrical wiring; increase 5. pump rotational speed. 6. Install a bottom drain or check valve; fill 7. the system with material before starting 8. operation. Install a manual or automatic vent valve. 9. Increase the pump speed. Check the available net inlet pressure and the required net inlet pressure, and adjust the inlet system as needed. Install a check valve on the outlet pipe.
Insufficient traffic	1. The pump speed is too low. 2. Rotor or chamber wear. 3. Improper sealing can lead to air leakage. 4. Flow bypass, valve opening, etc. 5. The safety valve is malfunctioning or 6. The export pressure is high.	1. Check the performance curve and adjust the rotational speed. 2. Replace the rotor or pump housing, and 3. Replace the seal and inspect the wiring. 4. Inspect the system and controls. 5. Clear or adjust the valve. 6. Reduce stress by adjusting system settings or hardware.

overload	1. Exceeding expected viscosity loss. 2. Poor contact or missing phase in the 3. power supply. Excessively high 4. pressure or flow rate, or excessively 5. high viscosity of the medium. 6. Introduction of foreign debris causing pump jamming. Fluid sedimentation during pump shutdown. Condensation of the fluid on the pump surface.	1. Within permissible limits, increase the drive 2. unit specifications. Reconnect the power 3. supply. Adjust the pressure and flow rate, 4. and heat the medium to reduce its viscosity. 5. Remove debris; if necessary, replace any worn parts. Heat the piping system, install a 6. "soft start" device, install a circulation bypass system, and flush the system. Select a high-capacity pump and operate it at low rotational speeds.

fault phenomenon	Possible causes	Removal method
Cavitation (noise)	1. Inhalation circuit obstruction. 2. The inhalation tubing is too small, too The valves, bottom valves, and filters are 3. The NPSHA is too low. 4. The medium viscosity is higher than 5. The medium temperature is higher than 6. Pipeline air leakage.	1. Clean pipelines, clean filters, etc. 2. Increase the import pipeline dimensions, and Minor changes: reduce the number of spare 3. Increase the liquid level tank height to raise the NPSHr pump 。 4. Reduce the pump speed and accept a lower Reduces pipeline losses and increases the dynamic viscosity 。 5. Reduce the temperature, reduce the rotational Modifying the system to increase net import 6. Check the system and repair any issues.
Vibration noise	1. Improper assembly may cause contact 2. between the rotor and the pump casing. 3. Improper pipeline installation may cause 4. contact between the rotor and the pump 5. casing. The pressure may exceed the pump's rated pressure. Bearing wear may 6. cause contact between the rotor and the 7. pump casing. Loose gears or incorrect 8. positioning may cause contact between the rotor and the rotor. Key shear may cause contact between the	1. Inspect the clearance and make adjustments. 2. Modify the pipeline installation to eliminate 3. pipeline stress and pump body deformation. 4. Reduce the outlet pressure. Replace the 5. bearings and perform regular lubrication. If severe component damage has occurred, all 6. affected parts must be replaced with new 7. ones. 8. Replace with new parts.
Bearing overheating	1. Spindle bending. 2. bearing failure 。 3. Insufficient lubrication	1. Replace the spindle. 2. Replace the bearings. 3. Add lubricant.
The pump has a short service life.	1. Pumping-induced wear. 2. Operating at flow rates 3. and pressures higher 4. than the rated values. Lack of lubrication leads to wear of the bearings and gears; misalignment between the drive and the pipeline.	1. Switch to larger-sized, lower-speed pumps; 2. reduce the flow rate and pressure within the 3. system; inspect and replace bearings and gears as needed; adjust the lubrication 4. schedule to shorten the lubrication intervals; check the alignment of the pipelines and drive components; and make adjustments as necessary.

XI. When using this pump, please observe the following precautions:

1. During pump operation, increases in viscosity, flow rate, or pressure may easily cause the motor to overload; therefore, the pressure gauge, safety valve, and over-current protection device should be inspected regularly to ensure they are functioning correctly.

2. Before starting the hot water heat preservation pump, first supply hot water; once the pump temperature has risen to the required level for conveying, then start the pump. Before shutting down, stop the pump first, followed by turning off the hot water supply.

3. For mechanical seal units equipped with cooling water systems, the cooling water should be turned on before starting the pump; the pump should then be started. The operation of the cooling water system should be monitored regularly to ensure proper flow; it is strictly prohibited to start the pump when no cooling water flow is present.

4. Within one year after installation of the new pump, the filter and filter screen shall be cleaned monthly to prevent clogging, which could render the pump unable to operate normally. The use of Y-type pipeline filters is strictly prohibited, as their effective cross-sectional area is too small, thereby adversely affecting the flow velocity of the medium.

5. For the transport of low-viscosity media, there are no special requirements when stopping the pump. For the transport of highly viscous media that may solidify, the medium within the pump should be diluted prior to stopping the pump to prevent the high-viscosity medium from solidifying inside the pump; if necessary, a cleaning solution may be circulated through the pump for several minutes (for cleaning).

6. For transporting cooled and thickened condensate: after completing operation, the device should be run with cleaning solution for 5–10 minutes promptly to clean the internal cavity; if necessary, change the cleaning solution several times and extend the cleaning duration accordingly.

7. For newly installed pipelines, all weld slag, hard particles, and foreign objects within the pipeline must be removed to prevent them from entering the pump's working chamber and causing damage to the rotor, pump body, mechanical seals, etc.

8. Regularly inspect all connections and fastening screws for any looseness.

9. Regularly check the gearbox oil sump; if no oil level is visible, add oil until the oil level reaches approximately half of the sump capacity.

10. The built-in safety valve adjustment screw has been properly adjusted at the factory; unauthorized adjustments are strictly prohibited.

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