dooch

DSC Series

Horizontal Single-stage Single-suction
Centrifugal Pump

Operation Instruction Manual

www.doochpump.com.cn

Contents

I General Description：

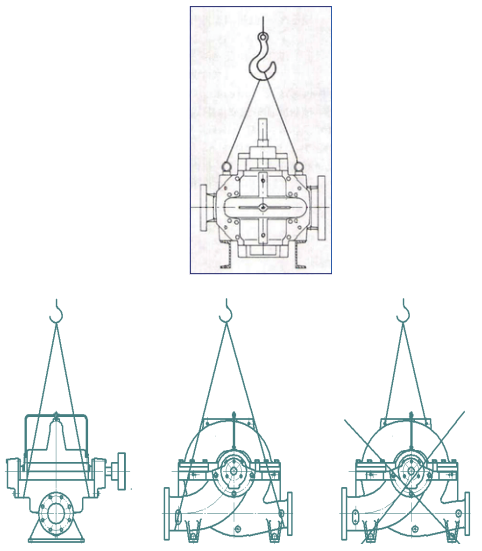
Only with proper installation and maintenance can the centrifugal pump be able to work satisfactorily without failure. Operate in strict accordance with this manual and please do not run the pump outside the working conditions we require.

his instruction and manual does not take into account any safety regulations that may exist on site, and it is the responsibility of the site manager or field operator to inform our engineers of all such specifications and to ensure that they will comply.

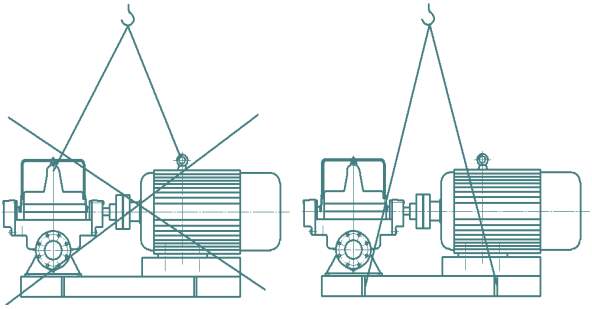
Note: The pump model, specifications, main operating data and plant serial number are indicated on the pump nameplate. If you have any questions or re-subscribe order, especially for spare parts order, please attach the information on the nameplate.

1 Lifting

Highly cautious must be taken when lifting the pump, motor or pump unit. The lifting ring on the motor is only used to lift the motor and not to lift the pump unit; the lifting ring on the pump cover is only used to lift the pump cover and not to lift the pump.



Pump lifting



Pump lifting

II Site Installation

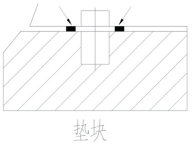
1 Foundation

1.1 The foundation must be strong before installation, the surface should be smooth and flat, and must be sufficient to support 1.5 times the unit (package) Including the accessories such as motors, the weight is generally based on reinforced concrete.

1.2 When the foundation is grouted for the first time, the position of the bolt holes of the water pump and the motor should be discharged, and the inspection of one grouting should be carried out. The surface should be 20mm~40mm below the bottom plane of the unit for the second grouting.

2 Unit installation

Insert the anchor bolt into the screw hole on the base and place the pump or unit on the base. On the basis of the level, adjust the level at the shaft end or the outlet end, at the base and The spacers must be placed near the anchor bolts between the foundations. If the anchor bolts distance each is over 800mm, and a spacer must be added between the anchor bolts. All spacers must be flat. (As shown on the right)



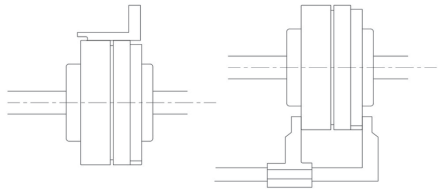
After the pump is adjusted to a good level, grout the anchor bolts when the mortar is firm. Tighten the bolt evenly and re-adjust the level, then grout the base and fill the height of the slurry should be submerged more than 25mm.

Note: Regardless of the first or second grouting, care should be taken to ensure that the grouting is sufficient and there are no voids, and the grouting should not be interrupted continuously. Because the quality of the grout will directly affect the vibration and noise of the unit, and it is extremely difficult to find and eliminate the fault.

3 Adjustment of Pump and Motor

It must be ensured that the pump and motor are accurately centered with coupling, even if the pump and motor are supplied as a complete unit.

Method: If the axial direction of the coupling And radial deviation does not exceed 0.1mm, Then you can think that the pump unit is very good alignment, each time in the coupling two uniform rotation gauge with 90°, used Vernier caliper or micrometer inspection, A little toxin deviation value must be within 0.1mm.



4 Pipe installation

（1）Do not use the pump as a support point for the pipeline. The piping should be provided with reliable support points on the pump's accessories. Their weight must not exert any load on the pump. Otherwise it will cause the pump to vibrate and even the pump inlet and outlet pipes will break.

（2）The suction pipe should be arranged with an upward slope. The eccentric pipe should be straight at the top and the back pipe should be laid down. The eccentric pipe is straight and below.

（3）For short tubes, the nominal diameter must be at least equal to the nominal diameter of the pump inlet and outlet. For long tubes, the most economical nominal diameter should be as appropriate. Too small pipe diameter if chosen may cause cavitation of the pump.

（4）When using elbows, the length of the straight pipe before and after the pump inlet and outlet should be 5 to 10 times larger than the pipe diameter.

（5）The thermal stress deformation caused by the welding of the outer tube flange is one of the most common causes of the breakage of the pump inlet and outlet pipes. After welding, the connecting bolts of the pump should be loosened and tightened after the welding stress is released.

（6）The expansion joint should be fixed after the pump is installed. Otherwise, the pump will be vibrated due to water tension. In severe cases, it will be dragged to the installation base of the pump, resulting in serious accidents.

（7）The filter screen installed at the suction port of the pump shall have an effective area larger than the cross-sectional area of the suction pipe.

（8）In order to prevent the reverse flow caused by the pump stop and the water hammer damage the pump, it is recommended to install a check valve in the outlet pipe. The check valve should be installed between the pump and the gate valve.

（9）Auxiliary pipe connection

The mechanical seal must be flushed with an external clean rinse.

Note: This is the main cause of damage to the mechanical seal. Components with coolant connections should be suitably cooled.

The above external flushing liquid and coolant are provided according to the random instructions. Unless otherwise stated, please follow the requirements below:

The flushing fluid pressure should be higher than the pump inlet pressure by 0.1~0.2MPa, and the flow rate is 1~2m3/h. The coolant pressure is 0.3MPa and the flow rate is 1~2m3/h.

5 Protective cover of coupling

Safety requirements: The pump must be fitted with a protective cover to operate.

6 Final inspection

（1）Check whether the pump and the prime mover are reliable. Toggle the coupling by hand and rotate the pump rotor for more than one week. The rotation should be uniform, no friction and obvious abnormal noise.

（2）Confirm that the prime mover is in same with the pump rotation mark.

Note: Do not attempt to connect the pump and check the steering of the prime mover. A short reversal may result in damage to the machine during future operations.

III Start Operation Stop and Storage

Please be sure to follow the requirements below to avoid failures caused by non-compliance with the rules and regulations.

1 Inspection before running

The following items/steps must be checked before starting up the pump:

① If the base of the pump fastened to the foundation.
② Whether the coupling and the pump unit are aligned.
③ If the tubing connected as required?
④ Whether the motor is installed according to the user's book.
⑤ The rotor of the pump can rotate normally (at least one week).
⑥ Is the coupling guard installed?
⑦ Is the operator fully aware of the possible failures and the relevant safety regulations to be followed.
⑧ Whether the shaft seal flushing fluid and coolant are connected as required.
⑨ If the shaft seal installed according to the instructions for use.
⑩ If auxiliary devices are provided, they are installed according to the instructions for use.
⑪ Whether all the bearings have been well lubricated, especially to ensure that the new pump lubrication grease or thin oil has not deteriorated or reduced.
⑫ The pump is vented already.

2 Shaft seal

When the packing gland is sealed, the water seal and water valve should be fully open.

3 Air exhusted

Pumps and tubing must be filled with media before the pump is started by following two ways: vacuum or infusion. When sucking up, use the screw plug hole on the upper part of the pump cover to vent.

Note: When vacuuming, use the screw plug hole on the upper part of the pump cover to exhaust; when filling, open the low pressure vortex chamber and the top wire plug on both sides of the pump cover; in order to avoid residual air in the pump, the pump will vibrate during operation.

4 Start

① close the outlet valve;
② fully open the inlet valve;
③ Open all auxiliary lines (cooling, heating, sealing, flushing and lubricating fluid) and check the flow and pressure;
④ After completing the steps described above, start the motor;

⑤ When the system starts pumping media, to check the pressure rise on the gauge and slowly open the outlet valve.

Note: The pump only closes the outlet valve when starting and stopping, otherwise the pump will be damaged by overheating.

5 Running

（1）Confirmation of running point

According to the QH characteristic curve of the pump, the flow rate Q is changed according to the actual running head of the pump, and the actual running head of the pump is the head of the device outside the pump (including the height difference of the inlet and outlet, the pipeline, the valve, the heat exchanger, etc.) decided. Therefore, the actual operating parameter point B of the pump is determined by the intersection of the pump characteristic curve Q-H and the device characteristic curve Q-HA.

Once the flow rate of the pump is determined, the shaft power, efficiency, and allowable NPSH of the pump are determined accordingly.

The range of work allowed by the pump is limited. The minimum flow rate is marked as Qmin in the Q-H characteristic curve. Said that the maximum flow can be based on the capacity of the pump Xu NPSH and device NPSH determined at the intersection of NPSHA. Therefore, through adjusting the valve can change the device characteristic curve Q-HA and to adjust the running performance of the pump, Make the pump run smoothly and efficiently.

（2）Running managment

Below points should be noticed during running:

①The pump must run smoothly;

②The pump is not allowed to run dry;

③In order to prevent the temperature rise of the medium, the pump cannot be operated for a long time without the outlet valve being closed;

④The general bearing temperature is not higher than the ambient temperature of 35 ° C, but the absolute operating temperature cannot exceed 100 ° C;

⑤If the oil is used to lubricate the bearing, the oil level should be checked regularly. The grease-lubricated deep groove ball bearing does not require routine maintenance;

⑥If there is an inlet valve, it cannot be closed while the pump is running;

⑦Regularly check and start the backup pump;

⑧Check that the auxiliary line is well connected;

⑨ Check the elastic elements on the coupling and replace them with wear and tear;

⑩If the pump is a packing seal, a small amount of dripping water must be placed at the stuffing box during operation, and gently press the packing gland to drip at least (about 15~30 drops/min);

If it is mechanical seal, there will be a certain amount of leakage during the first few hours operation of the starting equipment. Generally, after a short period of time, the leak of the seal should be gradually reduced, and finally about 0~5 drops/min. However, if the leak is gradually increased, the mechanical seal should be checked or adjusted when it is about 30~60 drops/min.

⑪ The pump is prohibited to run at excess of specified flow rate.

6 Stop

Close outlet valve

When turning off the motor, make sure that the unit can stop gently. The pump should have an appropriate post-operation period during which the heat source is switched off ,so that the delivered medium is completely cooled down, thereby avoiding any heat in the pump.

The inlet valve must be closed when the pump is stopped for a long time.

Close the auxiliary line and the shaft seal of the pump should be lubricated with a sealing fluid even when it is stopped.

When freezing or long-term use, the medium in the pump and piping should be drained to avoid cracking.

7 Storage

Each pump of undergoes strict inspection at the factory. When storing the pump, the following steps are recommended.

（1）New pump storage

If the pump is kept indoors as required, the maximum storage period is up to 12 months, and the pump should be stored in a dry place.

（2）measures to be taken when stop for a long time

①The pump should be assembled and the work should be checked regularly. Start the pump every three months (about five minutes). Check the pump operation to ensure that there is enough liquid in the pump to start.

②Disassemble the pump from the pipeline, spray the inner wall of the pump casing, especially the impeller clearance with a protective agent, spray the suction port and the discharge port, and then cover the inlet and outlet.

（3）Operation after storage

Before the pump is running, it should be fully inspected and repaired according to the previous requirements. Especially the bearing lubricant in the shaft seal part. All safety devices must be installed as required before starting.

IV Maintenance and Repair

1 Maintenance

（1）General requirments

It must be ensured that all repairs, inspections, and installations are performed by qualified engineer who are familiar with this instruction manual.

Regular maintenance schedules can help to avoid expensive cost of repairs and to keep the pump from malfunction and allow the pump to operate reliably at low maintenance costs

All of the above work must be handled under the power off to avoid a sudden start of the pump unit to cause accident.

When the pump delivers liquid that is harmful to health, it must be sterilized. Only when the media is exhausted completely will be no harm to the environment. At the same time, it must also comply with relevant regulations.

（2）Bearing lubrication

Grease-lubricated structural bearings are replenished with grease every three months,

and must be replaced every two years. The company recommends the use of molybdenum disulfide lithium grease as a lubricant (allowing the use of higher grade greases such as lithium complex grease); The bearing must be removed each time the grease is replaced. Clean the bearings, bearing body and bearing gland with gasoline or similar media before cleaning the grease and wipe it clean. Fill the ball bearing or cylindrical roller bearing with 1/2~2/3 grease, and use oil gun to add oil to the nozzle on the upper part of the bearing body.

The oil-lubricated structural bearing must be replaced for the first time after one month of operation, the second time after the operation for four months, and the lubricant should be replaced every six months, and the oil condition and oil level should be checked regularly. , timely replacement and replenishment. The company recommends N46 mechanical oil or 30# turbine oil as the lubricant, and the oil level should be within the specified range of the oil level gauge.

The sliding bearing is lubricated with medium or external water source. To prevent bearing blockage, the bearing must be cleaned every 8000 hours or up to two years to ensure smooth lubrication.

（3）Shaft seal maintenance

If the shaft seal leaks a lot or after a long shutdown, install or replace the packing before starting the pump. When the pump is running, a small amount of water is dripped at the stuffing box. If the packing is pressed too tightly, the sleeve will heat up and wear. Therefore, the packing should be evenly and moderately pressed

Mechanical seal: Pay attention to check whether the pump body is hot every day. If the mechanical seal has obvious leakage, it must be disassembled and inspected. If necessary, replace the mechanical seal.

2 Repair

（1）Repair items

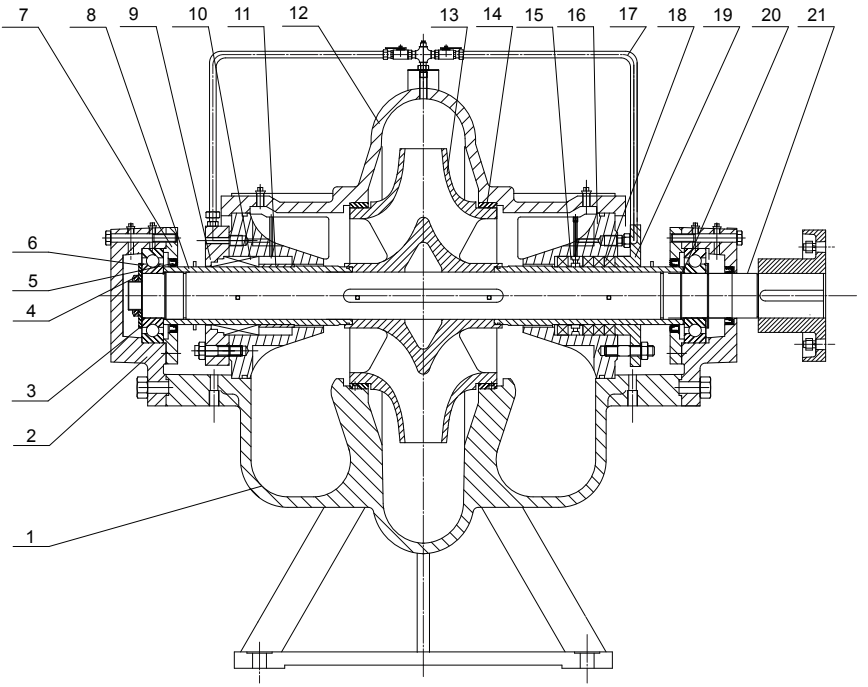
1 Minor repair items:
Press packing or overhaul mechanical seal
Check bearings ,adjust clearance or align coupling concentricity
Check and repair defects, tighten fasteners
Clean and repair oil level display, coolant and lubrication system
2 Major repairs
All minor repairs
Disassembly check all parts wear and erosion repair
Check and adjust the bending degree of the shaft to calibrate the rotor sway
Check rotor balance if necessary
Check and repair bearings and replace if necessary
Check the clearance of seals such as the ring
Check and adjust the level of the pump
Inspection pressure gauge
Replacement of lubricant

（3）Disassembly

The entire rotor part can be removed only by disassembling the pump cover and without having to disassemble the inlet and outlet lines.

Due to the difference in the structure of different types of pumps, please disassemble according to the product model and the corresponding product structure.

Construction drawing I



NO.	Part name
11	Seal bushing
10	Mechanical seal
9	Mechanical seal cover
8	Shaft sleeve
7	Bearing cover
6	Bearing ring
5	Skeleton oil seal
4	Lock nut
3	Deep groove ball bearing
2	Bearing support
1	Casing

NO.	Part name
21	Shaft
20	Bearing liner
19	Packing gland
18	Gland packing
17	Water sealing pipe
16	Seal housing
15	Seal cage
14	Impeller ring
13	Impeller
12	Casing cover

Applicable Model：

DSC80-210\DSC80-270\DSC80-370\DSC100-200\DSC100-250\DSC100-310\

DSC100-375\DSC125-230\DSC125-290\DSC125-365\DSC125-500\DSC150-290\

DSC150-360\DSC150-450\DSC150-605\DSC200-320\DSC200-420\DSC200-520\

DSC200-670\DSC250-370\DSC250-480\DSC250-600\DSC250-800\DSC300-300\

DSC300-435\DSC300-560\DSC300-700\DSC350-360\DSC350-430\DSC350-510\

DSC350-575\DSC350-630\DSC350-690\DSC400-525\DSC400-665\DSC400-705\

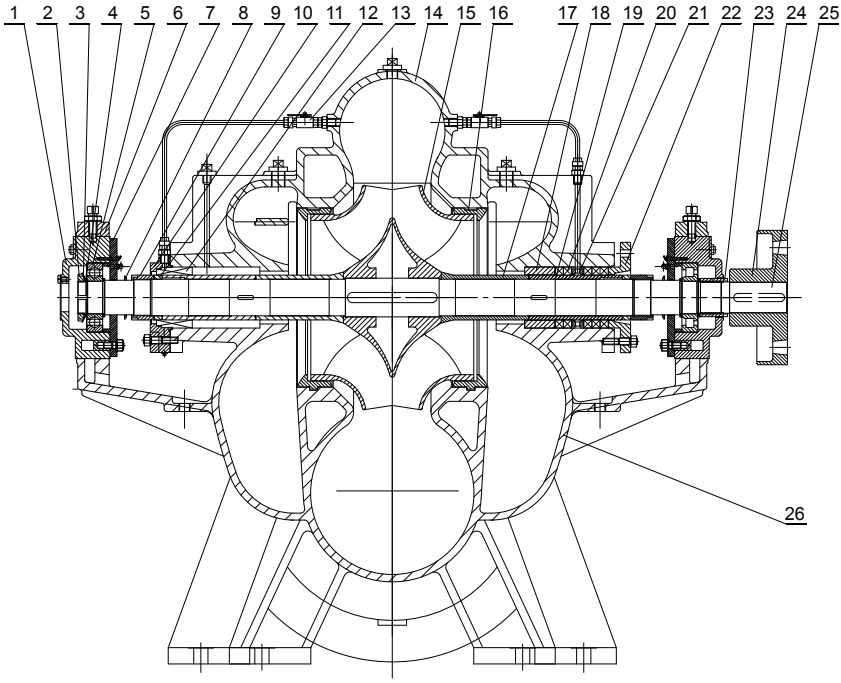
DSC400-935\DSC500-585\DSC500-685\DSC500-835\DSC500-870\DSC500-1015\

DSC500-1050\DSC600-600\DSC600-705\DSC600-1075\DSC700-980

Disassembly steps:

1) Disconnect the power connector;
2) Close the inlet and outlet valves, open the drain plug and the vent plug to drain the water and gas;
3) Remove the auxiliary line of the pump;
4) Remove the coupling guard;
5) Loosen the fastener between the pump coupling and the motor coupling;
6) Loosen and press out the shaft seal gland;
7) Loosen the connecting bolt between the pump cover and the pump body, lift the pump cover with the top screw and lift it to check the inside of the pump;
8) If the oil is lubricated, drain the thin oil, loosen the connecting bolt between the bearing body and the bearing bracket, and loosen the nut and connecting bolt of the non-drive end bearing cap;
9) Pull the bearing body out of the groove and lift the rotor from the pump body; 10) Remove the bearing body of the non-transmission bearing;
11) Loosen and remove the round nut;
12) Remove the deep groove ball bearing from the shaft including the bushing;
13) Remove the bearing cap;
14) Remove the skeleton oil seal from the bushing;
15) Remove the sealing body;
16) Remove the bushing;
17) There is a clearance fit between the impeller and the shaft. All the impellers are easily removed. If they cannot be removed, the hub is tapped with a wooden hammer;
18) Remove the other bushing, including the seal and the shaft seal;
19) Remove the pump coupling;
20) Remove the bearing body;
21) Loosen the retaining ring and exit the deep groove ball bearing.

Construction drawing II



NO.	Part name
1	Bearing support
2	Lock nut
3	Butterfly spring
4	Bearing liner
5	Bearing
6	Bearing support cover
7	Bearing cover
8	baffle water ring
9	Sleeve nut
10	Mechanical seal cover
11	Shaft sleeve
12	Mechanical seal
13	Water sealing pipe

NO.	Part name
14	Casing cover
15	Impeller
16	Impeller ring
17	mpeller sleeve
18	Gland packing sleeve
19	Shaft sleeve
20	Gland packing
21	Seal cage
22	Packing gland
23	Sleeve nut
24	Coupling
25	Shaft
26	Casing

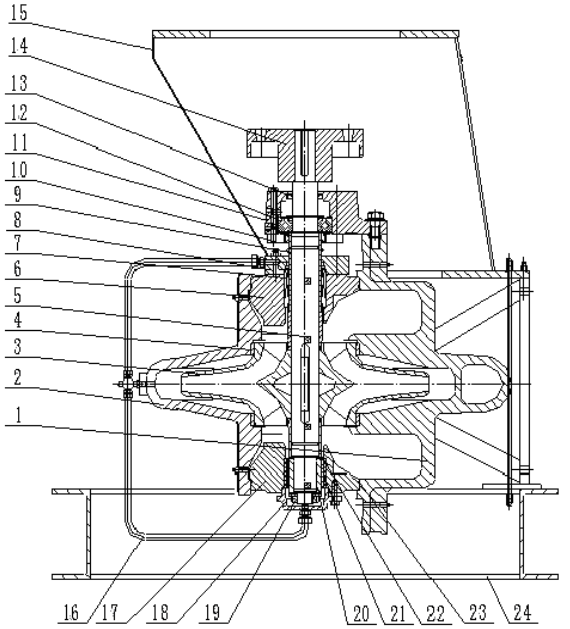
Applicable Model:

DSC400-560\DSC400-600\DSC500-520\DSC500-650\DSC500-710\DSC500-800\
DSC500-860\DSC600-560\DSC600-630\DSC600-710\DSC600-860\DSC700-600\
DSC700-710\DSC700-800\DSC800-800\DSC800-900\DSC900-970\DSC900-1030\
DSC900-1050\DSC1000-1170

Disassembly steps:

1)Disconnect the power connector;
2) Close the inlet and outlet valves, open the drain plug and the vent plug to drain the water and gas;
3) Remove the auxiliary line of the pump;
4) Remove the coupling guard;
5) Loosen the fastener between the pump coupling and the motor coupling;
6) Loosen and press out the shaft seal gland;
7) Loosen the connecting bolt between the pump cover and the pump body, lift the pump cover with the top screw and lift it to check the inside of the pump;
8) Loosen the connecting bolts of the bearing body and the bearing bracket, and drain the lubricated thin oil
9) Lift the rotor from the pump body;
10) Remove the pump coupling, key and V-ring (skeleton oil seal);
11) Remove the bearing gland and bearing end cap;
12) Loosen the round nut;
13) Press the bearing from the shaft to include the bearing body to ensure uniform pressure. Do not use the hammer, otherwise the bearing will be damaged;
14) Press the bearing out of the bearing body. The pump with more than 400 diameters has two M8 bolts (and gaskets) in the bearing body. Remove the two bolts and tighten the two long M8 bolts. The bearing is easy to press out from bearing body
15) Remove the skeleton oil seal from the shaft;
16) Remove the bearing gland;
17) Pressing the packing, packing ring and bushing from the shaft;
18) Loosen the bushing nut and remove the bushing;
19) There is a clearance fit between the impeller and the shaft. All the impellers are easily removed. If cannot, tap the hub with a wooden hammer.

Vertical pump structure drawing



NO.	Part name	NO.	Part name
1	Casing	14	Coupling
2	Casingcover	15	Motorstool
3	Impeller	16	Watersealingpipe
4	Wearingring	17	Guidebearingsealhousing
5	Shaft	18	Guidebearinggland
6	Sealhousing	19	Locknut
7	Packingsealsormechanical	20	Shaftsleeve
8	Packingglandormechanical	21	Guidebearing
9	Shaftsleeve	22	Shaftsleeve
10	Bearingcover	23	O-ring
11	Bearingsupport	24	Base
12	Bearing		
13	Frameworkoilseal		

Applicable model：

Vertical pump for structural drawings

Disassembly step：

Just remove the pump cover, the entire rotor component can be removed without disassembling the inlet and outlet lines. (refer to Part number marked in structure diagram)

1)Disconnect the power connector;
2) Close the inlet and outlet valves, open the drain plug and the vent plug to drain the water and gas;
3) Remove the auxiliary line of the pump;
4) Remove the coupling guard;
5) Loosen the fastener between the pump coupling and the motor coupling;
6) Loosen the connecting bolt between the pump cover and the pump body and remove the pump cover;
7) Loosen the connecting bolt between the bearing body and the pump body and remove the rotor parts;
8) Loosen and remove the guide bearing gland and round nut;
9) Remove the guide bearing from the shaft together with the bearing body;
10) Remove the bushing;
11) There is a clearance fit between the impeller and the shaft, all the impellers are relatively easy to remove, if not removed, use wooden hub to hit the hub;
12) Loosen the connecting bolt between the bearing gland and the bearing body, and remove the pump coupling and bearing body;
13) Loosen the retaining ring and push the bearing out of the shaft to include the bearing gland to ensure uniform pressure. Do not use the hammer otherwise the bearing will be damaged;
14) Remove the skeleton oil seal;
15) Loosen and press out the packing gland or mechanical seal gland;
16) Remove the seal body;
17) Remove the stuffing box packing, packing ring and bushing, and remove the bushing. If it is a mechanical seal, remove the mechanical seal box bushing.

Note:

① When heating the impeller for removal, the outer circumference of the cover should be heated first and then slowly led to the hub. If initially heated at the hub, the impeller will be tighter.

② If the shaft sleeve is too difficult and is not intended to be used again, it can be cut as follows: drill a small hole in the sleeve, be careful when drilling, and drill at least 1mm off the shaft surface with steel boring the hole to cut and the sleeve can be removed.

Reassembly：

Reassembly can be carried out in the opposite direction of the above disassembly steps.

①All mating surfaces must be cleaned to ensure that there are no rust or adhesions and that all burrs and deformations caused by disassembly are repaired;

② Replace all gaskets and O-rings

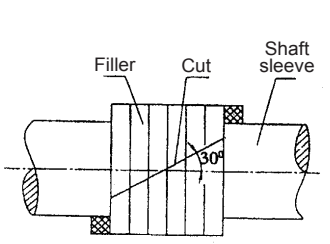
The sealing surface is determined by a sealant or a gasket according to the design of the water pump. The edge of the gasket must be flush with the inner wall of the pump body and the edge of the processing position

It is easy to cut the O-ring when assembling the pump cover, resulting in seal failure. Therefore, be sure to select the appropriate size O-ring and handle it carefully during the assembly process.

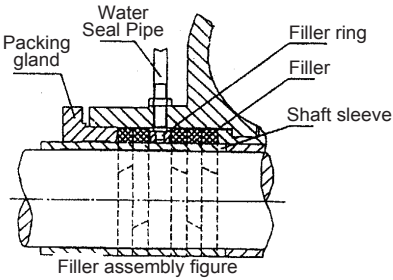
③ Carefully clean the bearing body and bearing to ensure that there is no residual lubricating oil or sediment, and replace the specified lubricating oil; the amount of thin oil added according to the oil mark scale, too much or too little will affect the pump operation

④ Replace the packing

Select the size and quantity of the packing according to the general map. Cut and assemble as shown below



Filler assembly figure



Filler assembly figure

⑤Wipe the seal cavity and bushing. Inspect the surface of the bushing. If the surface is rough or scratched, replace the bushing. Put the packing into the sealing body in turn and press the gland. The packing slits must be deflected by 120 °C. Make sure that the packing ring is aligned with the sealing water outlet and evenly press the packing gland until cannot tightened more.

⑥All mating, threading and clearance fits must be cleaned and coated with an assembly adhesive;

⑦It is required to install the bearing by heating; if it must be assembled by hammering, should also ensure that the bearing fit portion is struck. For example, when assembling a cylindrical roller bearing, the inner ring of the bearing should be assembled on the main shaft or the bushing. The outer ring of the bearing should be assembled on the bearing body to ensure that the end faces of the inner and outer rings are on one plane.

⑧For pumps with mechanical seals, it is required to assemble the coupling by heating to avoid damage to the mechanical seal;

⑨If there is no additional explanation, the tightening torque is required to comply with the relevant standards and be consistent;

⑩When assembling the impeller, special attention taken not to install to wrong direction, otherwise the output water will be small or the outlet pressure will be low;

⑪ After assembly, the joint position of the pump body and the bearing body must be checked to ensure that there is no gap between them;

⑫ Pay attention to the difference between the end caps of the two ends, and ensure that the end of the bearing and end cover of the driven end is in contact with the outer ring of the bearing to play the role of axial positioning.

⑬ The middle opening machine seal should be clean and flat. Especially when assembling the machine seal, the shaft seal position and sealing cavity position of the seal should be in good contact with the end cover sealing surface. Any gap may cause the mechanical seal to fail. ;

⑭ Part of the model's impeller and runner alignment is guaranteed by product design and manufacturing, and some adjust the bushing nut to center the impeller and pump body flow, the bushing nut should be tightened after adjusting.

（3）Inspection

After the assembly is completed, the coupling is rotated by hand, and the rotor should be smooth, uniform, and free of obvious mechanical friction.

V Spare part storage and Interchangeability

1. Description

Please provide the factory number and pump model when you have any questions or re-order (the information is indicated on the nameplate)

To order spare parts, the part name must also be provided (as indicated in the structure drawing).

2. Two years spare parts recommended

Two years spare part quantity recommended	Spare Name	Pump quantity(Backup pump included)						
		2	3	4	5	6	8	≧10
		Spare parts quantity						
1	Impeller	1	1	1	2	2	3	30%
2	Seal Ring	4	4	4	6	6	8	50%
3	Shaft and bushing nut	1	1	2	2	2	3	30%
4	Bearing	2	2	4	4	6	8	100%
5	Bushing	4	4	4	6	6	8	50%
6	Gland packing	32	32	48	48	48	64	40%
7	Mechanical seal	4	6	8	8	9	12	150%

Note: The number of spare parts that need to be replaced multiple times has been included.

VI Trouble-shooting

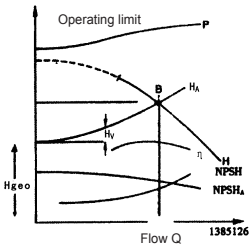
1 Definition

The following chart is easy to understand the cause of the fault with troubleshooting methods.

P : shaft power Hgeo : net head

H : pump head HA : device lift

n : efficiency



NPSH ： pump allowable NPSH

$NPSH_A$：device NPSH

Many operational failures of the pump are usually caused by hydraulic forces.

The hydraulic characteristics of the pump are represented by the pump characteristic curves H, P, η and NPSH and the device characteristic curves HA and NPSHA. The operating point B is the intersection of the device characteristic curve HA and the pump characteristic curve H, and is also the actual operating point of the pump.

Troubles	Reasons	Solutions
1、Starting load is too large	1. The gate valve on the outlet pipe is not closed when starting; 2. the packing is pressed too tightly, so that the lubricating water cannot enter; 3. Misleading due to overcurrent protector failure.	1. Close the valve to start; 2. Relax the packing or check whether the sealing valve of the water seal is opened and closed, and whether the packing ring is aligned with the lubricating water nozzle; 3. Adjust the current limit or repair the overcurrent protector
2、Excessive power consumption during operation	1. Friction occurs in the rotating part of the pump body, such as friction between the impeller and the ring; 2. The pump sucks in sediment or other debris to block the flow path; 3. The bearing parts are worn or worn out; 4. The packing is too tightly pressed or the filler body does not enter the water; 5. the flow is too large; 6. the speed is too large; 7. The shaft is bent or the axis is twisted; 8. The proportion of the transport medium is too large.	1. Empty and stop pump for inspection, and repair; 2. Disassembly and cleaning; 3. Replace the damaged bearing; 4. Relax the packing gland and check the water sealing tube; 5. Properly close the outlet valve of the outlet pipe; 6. reduce the speed; 7. Remove the shaft for straightening and repair; 8. Cutting the impeller to reduce the flow.
3、No water after starting, the pressure gauge and the vacuum gauge pointer vibrated seriously	1. Insufficient watering in the pump before pump driving; 2. The suction pipe or instrument leaks or has a balloon; 3. The immersion depth of the suction port is not enough, and there is a large amount of air inhalation; 4. The packing body is too loose or the packing is seriously worn, and the water sealing tube is blocked, so that air seeps into the water pump.	1. Stop the pump to fill up water . 2. Check the suction pipe and the instrument, and eliminate the leaking part to eliminate the bulging part of the pipeline, so that the horizontal pipe of the water pump to the water inlet has a descending gradient of five thousandths;3. Lower the suction port so that the water-immersed part exceeds 1.5 times of the pipe diameter (but not less than 500mm), or add water to the surface to prevent vortex generation;4. Tighten the filler body cover screws. If the filler is hard and deteriorated, it should be soaked with oil. The wear and tear should be replaced with new ones. Clean the water seal pipe.
4、No water after starting, vacuum gauge indicates high vacuum	1. The bottom valve is not opened or the filter is partially blocked; 2. The resistance of the suction part is too large; 3. The suction stroke is too high; 4. The rotation speed is too high.	1. Repair the bottom valve or clean the filter water; 2. Clean or change the suction pipe; 3. Reduce the water absorption height properly; 4. Eliminate the fault.
5、No water after starting, no pressure on the pressure gauge	1. The drainage resistance is greater than the highest lift of the pump; 2. The pump is reversed; 3. The impeller is blocked; 4. The speed is too low; 5. The unsuitable pumps are operated in parallel.	1. Adjust the system working condition, increase the front pump or replace the pump model; 2. Use the electric motor as the power machine to reverse any two-phase wiring of the three-phase power supply, and use the belt drive to change from open drive to cross drive; 3. Clean the impeller; 4. troubleshoot; 5. re-set the system operating point and pump lift.
6、Too small flow	1. Working condition point B is not a design point; 2. Air is introduced into the pump inlet and shaft seal; 3. Air bubbles are not allowed in the medium; 4. Inhaled part of the water filter net is blocked;5. The immersion depth of the water absorption part is not enough;6. Inappropriate pump loss due to improper pump inlet pipe; 7. The inlet pipe is too densely arranged or the inlet pipe is not deep enough to enter the water source surface, the vortex appears on the nearby water surface, and the air is sucked into the water pump;8. The water level drops too much; 9.Ring wear, so that the gap between the ring and the impeller is too large; 10. debris mixed into the impeller and blocked; 11. drain pipe leakage ;12. the outlet valve is not open enough; 13. the steering direction is reversed; 14. speed is too low; 15. parallel operation is not allowed.	1. Adjust the working condition point or replace the water pump; 2. Find and eliminate; 3. Import the exhaust valve; 4. Clean; 5. Increase the water level or reduce the inlet suction depth; 6. Increase the inlet pipe diameter and reduce the elbow. Adopt import throttling method to increase import pressure;7. Drain the wooden board on the water inlet of the inlet pipe, the area should be larger (thin thickness is not limited) to prevent the board from inhaling the inlet pipe. The board is preferably with a hole in the middle and can be placed in the inlet pipe. Outside to prevent drifting, the inlet pipe should be arranged too densely to increase the spacing; 8. increase the water level; 9. replace the mouth ring; 10. lean; 11. eliminate; 12. open the outlet valve;13. change; 14. adjust operating point or pump configuration.
7、Over heating of gland packing	1. The packing ring is pressed too tightly; 2. The cooling water in the stuffing box cannot enter; 3. The shaft and the sleeve surface are damaged.	1. Appropriately loosen the packing; 2. Relax the packing tube or check the water sealing tube for blockage; 3. Repair the shaft and the surface of the bushing.

8、Too much water leakage in gland packing	1. Packing wear; 2. Packing pressure is not tight; 3. The shaft has bending or swinging; 4. The packing method is wrong; 5. The sealing water is not clean, causing the shaft to wear; 6. The bushing is worn; 7. The packing material Error; 8. the seal chamber pressure is too high or too low.	1. Replace the packing; 2. Tighten the packing gland or add a layer of packing; 3. Straighten or replace the shaft; 4. Re-package the packing; 5. Filter or externally clean the sealing water and repair the shaft wear; 6. Replace Bushing; 7, replace the packing; 8, adjust the flow and pressure of the sealing liquid, or external sealing liquid.
9、Mechanical seal leakage	1. The nominal pressure of the machine seal is lower than the actual working pressure; 2. The compression of the machine seal is unreasonable, and the friction pair is not effectively contacted; 3. The surface of the bushing is corroded, causing the machine to seal the sealing process; 4. the O-ring is due to the medium Physical or chemical properties lead to elastic failure; 5. dynamic spring due to physical or chemical properties of the media caused by elastic failure; 6. the friction between the pair of impurities into the surface caused by damage; 7. the surface of the friction between the volatilization of the friction caused by surface burnout.	1. Replace the machine seal model; 2. Re-install; 3. Clean the bushing to rust or replace the bushing material; 4. Replace the material; 5. Replace or change the moving spring material; 6. Filter the flushing liquid or external clean flushing liquid; 7.Adjust the rinse media or rinse protocol.
10、Over heating of bearing	1. The unit is not well aligned; 2. The pump is improperly adjusted or has resonance in the pipeline; 3. The axial force is too large; 4. The rotor is unbalanced; 5. The foundation rigidity is not enough; 6. The bearing is not installed correctly or the gap Inappropriate; 7. the bearing has worn or loose; 8. bearing lubrication is poor; 9. the bearing with the oil ring may not oil on the oil ring; 10. the oil in the pressure lubricant is poor.	1. Re-adjust; 2. Re-adjust; if necessary, reduce piping layout, connect the pipeline with shock-absorbing material; inspect and repair; 3. Check the operating point and adjust, check the operating status, check the suction flow; 4.Re-balancing; 5. strengthen the basic rigidity; 6. check and select the appropriate clearance of the bearing, not the higher the better; 7. repair or replace the bearing; 8. the focus is to check whether the oil is reasonable, too much or too little will be The use is influential, followed by ensuring the quality of the oil, especially the applicable temperature of the oil; 9. Checking and eliminating the cause of no oil; not wearing the oil, speed, oil level, oil ring wear and back Oil condition related; 10, check the pressure lubricant system.
11、Vibration and Noise	1. Working condition point B is not a design point. If it is too large or too small, it will cause vibration and noise; 2. The foundation is not strong; 3. The anchor bolts are loose; 4. The pipeline bracket is not strong; 5. The pipeline has resonance; 6. cavitation; 7. intake pipe or medium containing air bubbles; 8. impeller inlet or inlet pipe blockage; 9. the unit is not good; 10. pump rotor or motor rotor imbalance; 11. coupling Pin wear, poor coupling of the coupling; 11. bearing wear; 13. shaft bending; 14. the rotating part is friction; 15. rotating parts are loose or broken.	1. Adjust the system working conditions or adjust the pump design parameters; 2. Reinforce the foundation; 3. Tighten the anchor bolts;4. Strengthen the pipeline brackets; 5. Extend the pump outlet to the elbow distance, connect the pipeline connection with shock absorbing materials, Adjust the pipeline layout; 6. Increase the water inlet height, reduce the water inlet pipeline loss, increase the inlet water pressure by throttling, and improve the pump cavitation performance;7. Check and eliminate and increase the exhaust valve;8. Clean the impeller, check the equipment Impurities, clean up the plugs in the pump and pipeline, check the filter screen and inlet diameter; 9. re-centering; 10. rebalance; 11. replace the pin, rotate the water pump coupling 180 degrees, eliminate the pin hole error Adjust the unit to ensure the necessary clearance between the coupling; 12. repair or replace the bearing; 13. straighten or replace the shaft; 14. find out the cause, eliminate friction; 15. eliminate the loose phenomenon, replace the wear parts.
12、Water hammer	Gas builds up in the pump or pipeline.	Release the accumulated gas and eliminate the cause.
13、No more outlet of water	1. The water inlet pipe or impeller is blocked; 2. Bubbles are formed in the pipeline; 3. The suction stroke is too high (effective NPSH is too low); 4. The shaft seal enters the air; 5. The water level drops too much; 6. The pump inlet enters the air; 7. Parallel operation is not allowed; 8. Working condition B is not a design point; 9. The water supply is insufficient.	1. Clean the plugs in the impeller, filter screen and inlet pipe; 2. Improve the inlet conditions, adjust the pipeline arrangement, and increase the exhaust valve;3. Increase the inlet pressure, reduce the pump installation height by throttling suction pressure, If the pipeline loss is too large, change the inlet pipeline; 4. Check whether the sealant pressure and supply can meet the requirements for use, replace the packing and other shaft seals, check the installation position of the water seal ring; 5. Increase the minimum water level and increase the inlet pressure. Through the throttling suction pressure; 6. check the airtightness of the inlet pipe, if necessary, add a gasket, replace the bad pipeline;7. re-set the system operating point and pump lift; 8. adjust the system operating point or Change the design parameters; 9. To ensure the amount of water supply.

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