Gol Pumps Technology Company

MAINTENANCE AND COMMISSION MANUAL

SLURRY PUMP

GAZ SERIES

GAZ Series slurry pump maintenance and commission manual

Note: All the gaps of all parts of the pump have been adjusted before assembly. Please Do Read the Operation Manual Carefully. Incorrect operation and dismantling of the pump without permission will invalidate the warranty!

As the use time increases, the tensile strength of the pump parts decreases, and the wear performance of the wet end parts gradually decreases. Pay attention to inspection and replacement.

The motor is not waterproof, please take waterproof measures when using outdoor.

The pump must not be operated for a long time at low or zero flow. Otherwise, it will cause the pump vibration or even pumping liquid vaporization to damage the equipment.

The pump is rotating equipment, the power must be cut off before installing and maintaining the pump. Otherwise, may cause personal injury.

The outlet pipe must be equipped with a gate valve or a shut-off valve to adjust the flow rate, while controlling and adjusting the motor current. It is also recommended to install a pressure gauge in the outlet pipeline.

Note: The concentricity of the motor and the pump may change during transportation and installation, so after the whole pump is installed on site, the concentricity of the motor and the pump must be checked. Avoid unconcentric vibration of the motor and the pump and damage in the accessories.

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General

GAZ series slurry pump is suitable for handling slurry with abrasive and corrosive solids, which maximum weight density of 45% (ash and coal slurry) and 60% (ore and heavy slurry). It widely used in power, metallurgy, mining, coal, construction materials and other sectors. GAZ series can be installed in series according to end user's requirements. GAZ, AZL series slurry pumps lead in various technical performance in our domestic counterparts. With most of the approaching the quality, high performance, best service advanced world level in efficiency, the pumps are used all over the world and exported to Europe, America and Africa.

Application

Widely used in delivery slurry with solids in electric power, metallurgy, coal, building material and other industries. Such as hydraulic removing ash for thermal power plants, pump mill slurry in metallurgy delivery coal slurry and heavy slurry for coal.

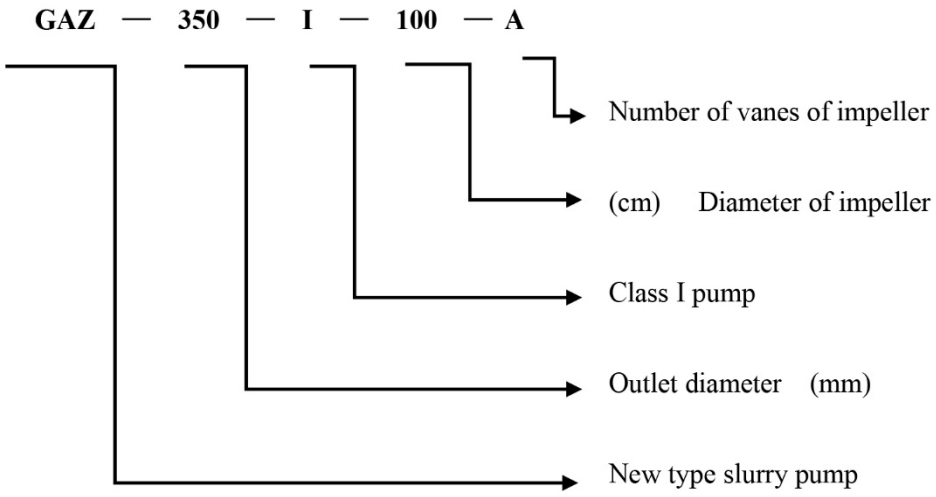
- Mine: black, colored slurry feed pump and delivery for kinds of concentrates and tailings.
- Metallurgy: transport of various kinds of aluminum and steel mill slurry.
- Coal: delivery for coal mining, washing, all kinds of coarse and fine coal slurry.
- Electricity: transport for power plant ash, ash washing, various ash slurry, or mortar.
- Building Materials: delivery for all kinds of including sediment slurry (such as cement plant slurry).
- Chemical: delivery of phosphate fertilizer, potash fertilizer plants all kinds of abrasive slurry.
- Water Works: lake, river dredging, sediment, gravel, clay high plastic suction and discharge.

Working Conditions

Medium temperature:
General ≤80 ℃
Special up to 110 ℃

Solid-liquid mixture concentration by weight:
Mortar concentration ≤45% ≤60% pulp density
Flow Range: 30 ~ 2000 m3 / h
Head range: 15 ~ 130 m

Model Meaning

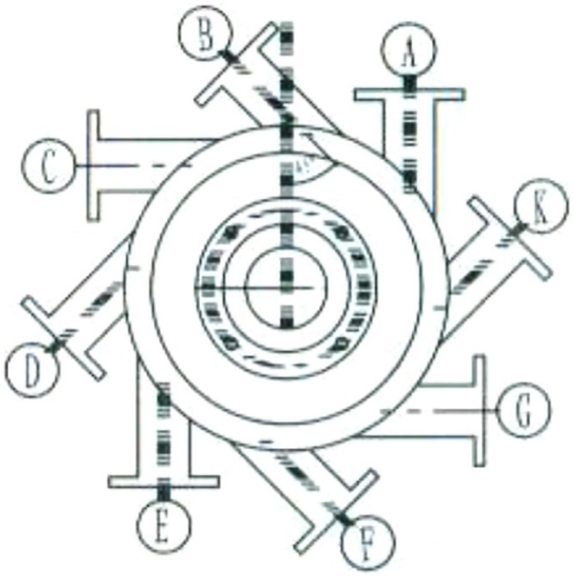


Mode and Features of Structure

Model structure: GAZ horizontal

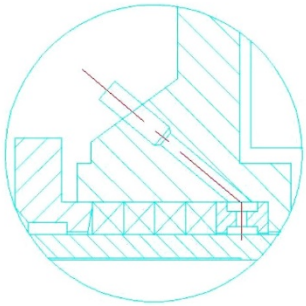
Outlet diameters of the pumps: From 600mm, 400mm, 350mm, 300mm, 250mm, 200mm, 150mm, 100mm, 80mm, 65mm, 50mm, 40mm.

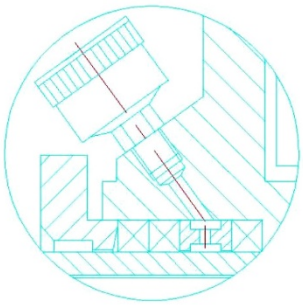
Structural Features: The pump is split vertical direction double casing structure. Discharge port can be positioned at 8 different positions at an interval 45°.



Shaft Seal

- Expeller seal with gland packing
- Gland packing seal
- Mechanical seal





Features of use

- High in efficiency
- Long in service life
- Steady in operation

Features of materials

- Metal
- High-abrasive metal material
- High-abrasive and corrosion resisting metal
- materials Corrosion resisting metal materials

1. It must be ensured that the direction of the pump shaft is consistent with the direction indicated by the arrow on the pump casing. When test the motor rotating directly, it must be completely disconnected from the pump, it is strictly forbidden for the motor to drive the pump shaft to rotate in the opposite direction, otherwise it will cause damage to the parts.

2. The pumps with mechanical seals must ensure the supply of shaft seal water. It is strictly prohibited to run without water to avoid the damage without water. When installing the pump coupling or the pump pulleys, in order to protect the mechanical seal from damage due to impact force, it must be heated and installed without hammering strongly. Otherwise, the impact force may cause the dynamic and static rings of the mechanical seal to rupture.

3. The pumps with thin oil lubrication should be refueled according to the oil level line of the oil standard before start. It is strictly forbidden to operate without oil lubricated. Otherwise, the bearing will be burned.

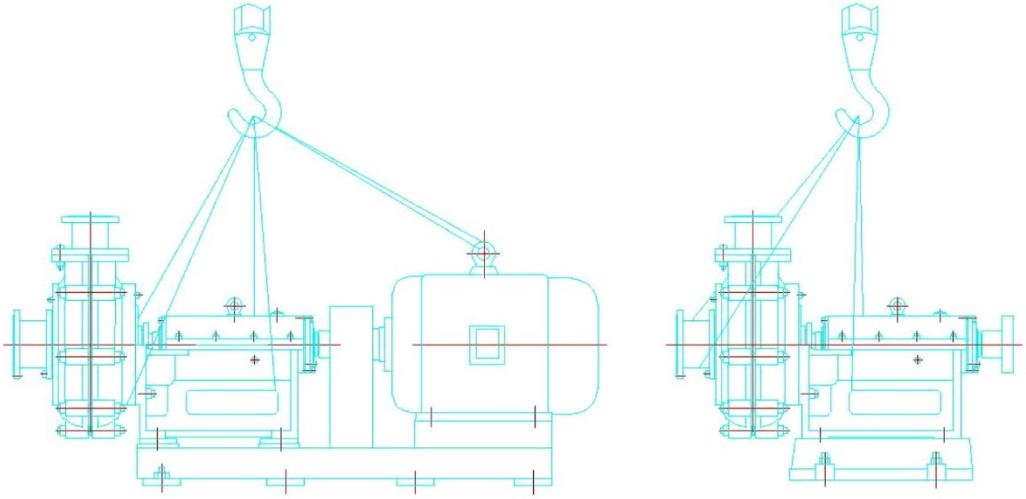
The Pump Lifting, Installation, Adjustment and Commissioning

The Pump Lifting

To lift the pump with a packing box, a steel wire rope or lifting belt of sufficient strength should be used. When lifting, do not subject the bottom or sides of the box to impact or violent vibration, the packaging box must not be excessively tilted and the packaging box must not be placed on objects with sharp edges or let the package upside down.

Lift the pump without the packing box, according to the following requirements:

1. To lift the horizontal pump without the base or with a separate basement, the lifting center should be at the side of the frame near the bare shaft pump and the wire rope should be connected here by vertical upwards with the lifting hook. To maintain the balance of the pump, it should be on the pump casing lifting bolt setting auxiliary hoist wire rope with lifting hook. The lift screw on the frame cover and the pump cover plate & frame plate are provided for disassembly of the frame cover and the pump cover plate & frame plate which shall not be used solely for the lifting of the integral pump to avoid the accidents.
2. To lift the horizontal pump with the motor and the common basement, the lifting center of gravity is at the square hole of the bracket near the coupling. The wire rope passes through here and connects with the lifting hook vertically upwards. To maintain balance, an auxiliary lifting wire rope must be set between the eye bolts above the pump casing, the motor eye bolts and the lifting hook.



Installation

Inspection Before Installation

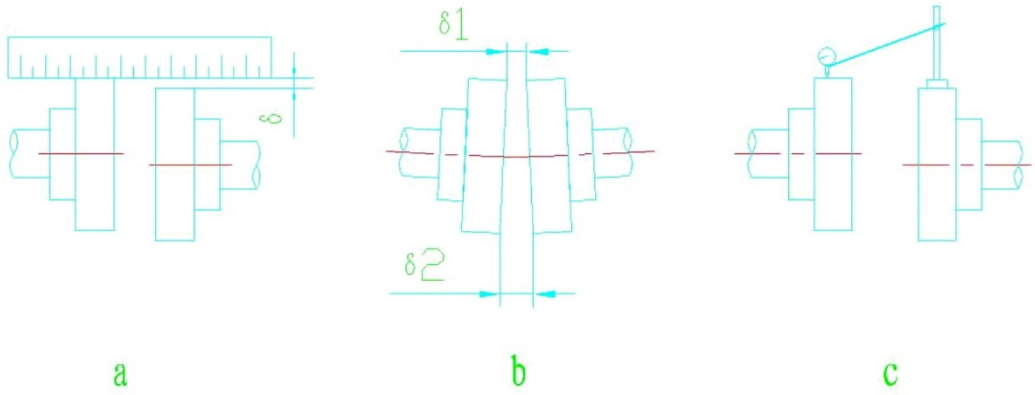
The pump has been inspected and tested before leave the factory. To ensure it is in good working conditions, it must be installed correctly.

Pump Installation and Alignment

The horizontal pump unit should be installed with twice grouting method. After installation, the centerline of the unit should be consistent with the centerline of the foundation; the deviation of the center of the unit and the design value should not exceed± 2mm, the horizontal tolerance of the unit is 0.1 / 1000.

The concentricity deviation of the unit may be caused during the hoisting process. After the unit is installed, the concentricity of the pump unit needs to be rechecked.

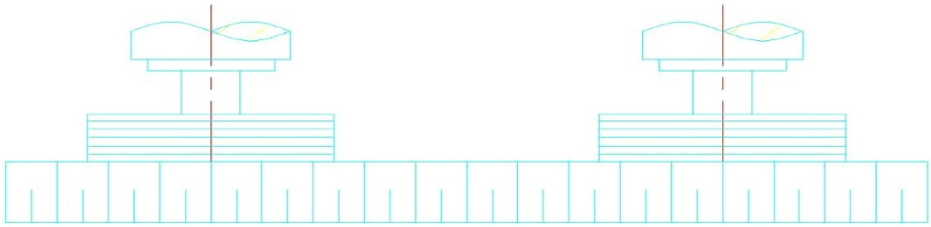
For pump units with direct coupling transmission, the coaxiality of the unit is generally ensured by the alignment of the coupling. There are two ways to align the coupling: One is to cooperate with the knife-edge gauge and the feeler gauge. Align the outer circle of the coupling with a knife-edge ruler to ensure that each pair of couplings are flush in all directions, and the maximum error δ should not exceed 0.10mm *(imagen a)*. Check the gap between each pair of couplings with a feeler gauge. The maximum error Δ (Δ=δ1-δ2) should not be greater than 0.10mm *(imagen b)*.



The other method is to use a magnetic dial indicator with a feeler gauge to align the coupling. Fix the magnetic dial indicator on the outer circle of one side of the coupling and turn the wheel, place the dial indicator probe on the outer circle of the opposite coupling, and watch the dial indicator's run out should not exceed 0.15mm *(imagen c)*. The gap of the coupling is measured with a feeler gauge, and the maximum error should not exceed 0.10mm.

For the belt-drive pump unit, the parallelism between the pump shaft and the motor shaft should be ensured, the belt pulley is usually used for alignment. If the center distance is small, you can

use a straightedge to align the end face of the flat pulley. When the center distance is large, you can use the rope to align the flat belt end face.



The inlet and outlet pipelines of the pump and the attached valves should have their own brackets. The weight of the pipeline is not allowed to press on the pump, and Forcible installation where the pump and the pipeline are not on the same line is not allowed.

The Suction Line

The suction pipe diameter: The suction pipe diameter should be the same as the inlet diameter of the pump or slightly larger than the inlet diameter of the pump. The rule is to avoid cavitation of the pump and prevent the slurry from forming deposits in the pipeline.

The inlet gate valve: In order to facilitate the maintenance of the pump, a suction gate valve should be installed, the diameter of which is the same as the suction pipe. A expansion joint should be provided between the suction port of the pump and the suction pipe to facilitate disassembly and assembly of the pump.

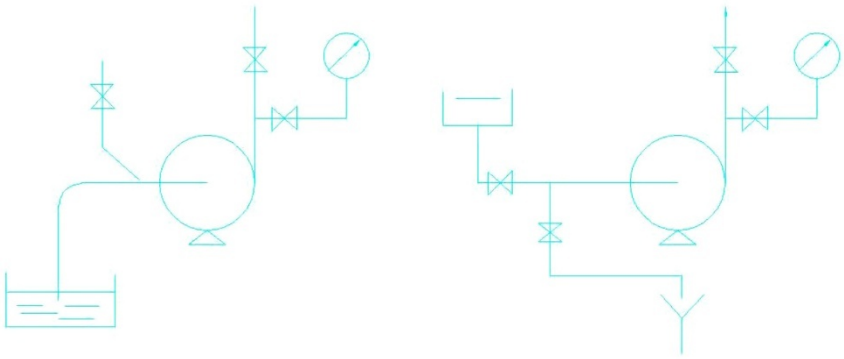
The Discharge Line

The discharge pipe diameter: The discharge pipe diameter is related to the properties of the slurry and the sedimentation flow rate. In general, the discharge pipe diameter is equal to or slightly larger than the pump outlet diameter.

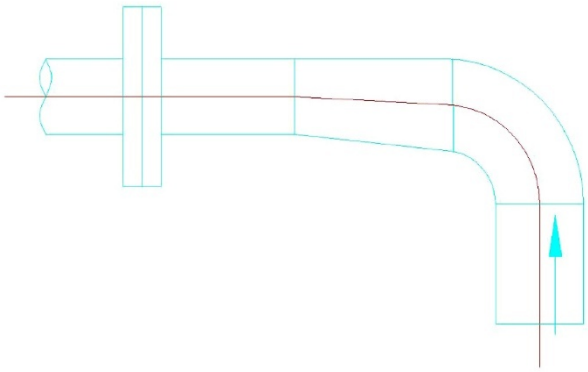
The outlet gate valve: The outlet gate valve should be the same diameter as the discharge pipe.

The pressure gauge: Located on the straight pipe between the pump outlet and the first valve.

Piping system tips: as below picture.



The size of the pipe diameter should consider the comprehensive factors such as the system resistance and the critical sedimentation velocity of the slurry. The suction pipe should be as short and straight as possible. At the suction port of the pump, it is best to equip a straight pipe with the same diameter as the inlet and its length should not be less than 3 times of the inlet diameter. The flow velocity in the suction pipe is generally 1.5～2.5 m/s, depending on the sedimentation velocity of the conveying slurry. Recommends the horizontal up highway variable diameter tube. *The figure below.*



When using a valve to adjust the flow, the regulating valve should be located at the pump outlet, and it is not allowed to use a valve to adjust the inlet pipeline to avoid cavitation.

Shaft Sealing Water and Cooling Water Piping Configuration and Requirements

The shaft seal part of the mechanical seal pump has two exposed pipe joints. The side where the pressure gauge is installed is the water inlet and the other side is the water outlet.

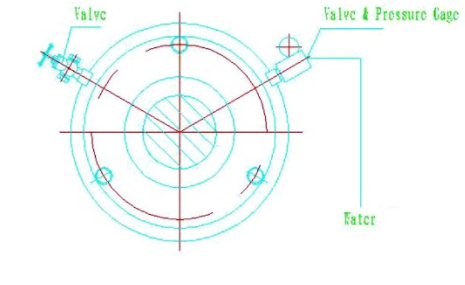
The shaft seal water pressure and flow according to *Table 1*.

Table 1. The shaft seal water pressure and flow

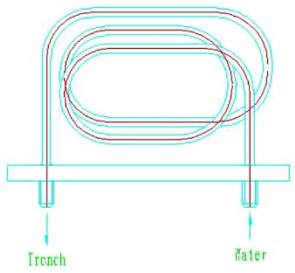
Seal Type	Shaft seal water pressure	The shaft seal water flow（m3/h）
Mechanical seal	pi'(MPa) pi'= Pout	It is less than 0.1-1% of the pump flow, when the pump flow larger taking at small value, smaller to taking at large value, but the minimum shaft seal water volume is not less than 1m3 / h.
Expeller+Gland packing seal	pi'=0.5Pout	1-5m3/h

Note: Pout is the pump outlet pressure.

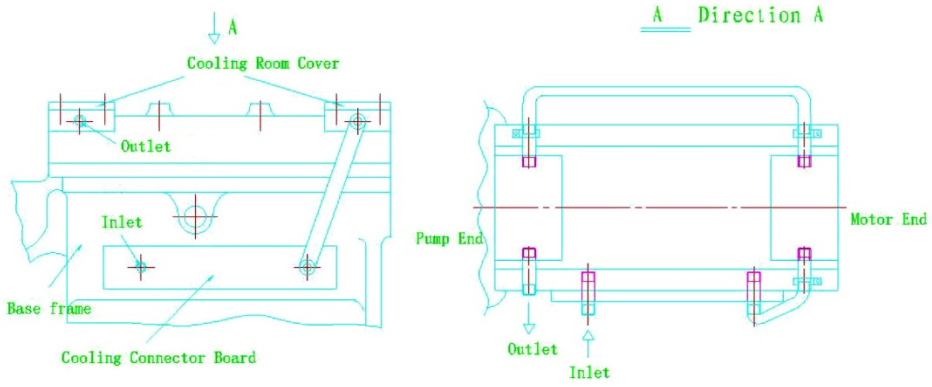
The cooling water pressure is 0.05 ~ 0.2 MPa, the cooling water flow rate is 1 ~ 5m3 / h.



a. Mechanical seal water



b. Cooling water



c.Cooling Water Tube Schematic

The Mechanical Seal

The mechanical seal is a kind of end face seal, which has the characteristics of no leakage and low power consumption etc.

The special attention should be paid to the following issues when mechanical seals are used in slurry pumps

1. The mechanical seals used in our factory are generally double-end face mechanical seals, equipped with shaft seal water copper pipes, pressure gauge, tees and other accessories. The users should install the accessories before the pump is installed and commission.
2. The mechanical seals used by our factory are manufactured by professional mechanical seal factory for our factory and it have been installed and debugged before leaving the factory, then users don't need recheck it.
3. ⚠ Before using the pump equipped with a mechanical seal, the shaft seal water must be connected first and the shaft seal water should be turned off after stopping the pump 3 minutes later.
4. When providing users with mechanical seal spare parts, they are supplied as one set.
5. When the pumps equipped with mechanical seals and the mechanical seal spare parts are not been used for a long time, the mechanical seal part should be filled with N46 mechanical oil to prevent rusting of mechanical seal parts and failure of internal rubber parts.

Lubricant Filling Requirements

The frame with thin oil lubrication should be filled with N32 (winter) or N46 (summer) oil according to the oil marked line position before working.

⚠ Never work without oil lubricated!! The tubular oil level gauge is installed by the user before the pump is installed and commission.

The Pump Adjustment

The pump should be rechecked and adjusted after installation and alignment.

1. The clearance between the impeller and the throat bush should be inspected and adjusted.
2. Adjustment of the motor steering

The steering of the motor should be ensured same with the steering of the pump specified direction and must not be rotated in the opposite direction, otherwise the impeller will release or the other components will be damaged.

When adjusting the steering of the motor, it should be completely disconnected from the pump (that is, the coupling pin or belt is not attached) and only when it is confirmed that the steering of the motor in right direction, the motor can be connected to the pump. Never start the motor blindly.

3. The transmission adjustment

When the elastic pin coupling is used for transmission, the pin and protective cover should be installed.

When the belt drive is adopted, the belt should be installed, the tension should be adjusted to make the tension of each belt consistent and the protective cover should be installed.

4. When the speed regulating device is used for transmission, it should be adjusted according to the requirements of the corresponding manual.
5. The fastener adjustment Tighten all fasteners with a wrench.
6. Clean up the tools and debris placed on the pump set to prevent accidents during the pump operation.

The Pump Commissions

Be sure to pay attention to the allowable particle range of the pump medium. It is not allowed to run or test with large-particle stones that exceed the allowable range, which will cause serious damage to the wet end parts in a short time!

After the pump set is installed and adjusted, it can be tested. If it is possible, the users should first use clean water for trial operation then transport the slurry after normal operation.

Start the Single Stage Pump

1. Open the shaft seal water and cooling water then adjust the pressure to the specified value.
2. Fully open the inlet valve.
3. Open the water injection valve to inject water into the pump (No need inject water when flood suction work).
4. Adjust the outlet valve opening to 1/4.
5. Start the pump set. After the speed is normal, open the outlet pressure gauge. If the pressure is normal and stable, slowly open the outlet valve until it is fully opened or meets the requirements of the working conditions.

Note: Starting the pump with the outlet valve fully opened will cause the motor overload; Turning down the inlet valve to control the flow will cause pump cavitation, which should be avoided!!!

Start the Pumps In Series

The transmission pipelines of the pumps in series are relatively long. When designing and calculating the pipeline friction, it is considered that all pipelines are filled with slurry but when the pump is started, the pipeline is not filled with slurry. If the valve is fully opened, the pipeline friction is very low and the instantaneous flow of the pump is biased to a large flow and causing the motor overload or causing the pump in cavitation and vibration to be work in failure. Therefore, it is recommended to be started according to the following steps:

1. Close the outlet valve, fully open the inlet valve.
2. Open the shaft seal water and cooling water then adjust the pressure to the specified value.
3. Open the water injection valve to inject water into the pump (No need inject water when flood suction work).
4. Start the first pump and gradually open the outlet valve to 1 / I (i is the series stages No).
5. When it is estimated that the slurry is filled to 1/i pipeline, start the second stage pump and gradually open the outlet valve to 2/i.
6. When it is estimated that the slurry is filled to 2/i pipeline, start the third stage pump and gradually open the outlet valve to 3/i.
7. The rest can be deduced by analogy until the slurry is filled with the whole pipeline and it operates normally.

Precautions When Starting The Pump

For the pumps equipped with water injection mechanical seals, if there is no shaft seal water, dry friction between the dynamic and static rings will instantly burn the mechanical seal. Make sure that the shaft seal water is supplied normally before starting.

After normal operation, the following items should be observed:

1. Whether the water of the mechanical seal supply is normal, the mechanical seal temperature rise ≤ 35 ℃, the maximum temperature ≤ 75 ℃.
2. Whether the pump flow, head (out, inlet pressure) is stable and meet the process requirements.
3. Whether the current is stable.
4. Whether the pump set has abnormal sound, whether the noise and vibration are too large.
5. The bearing temperature rise less than 35 ℃, the maximum temperature shall not exceed 75 ℃.

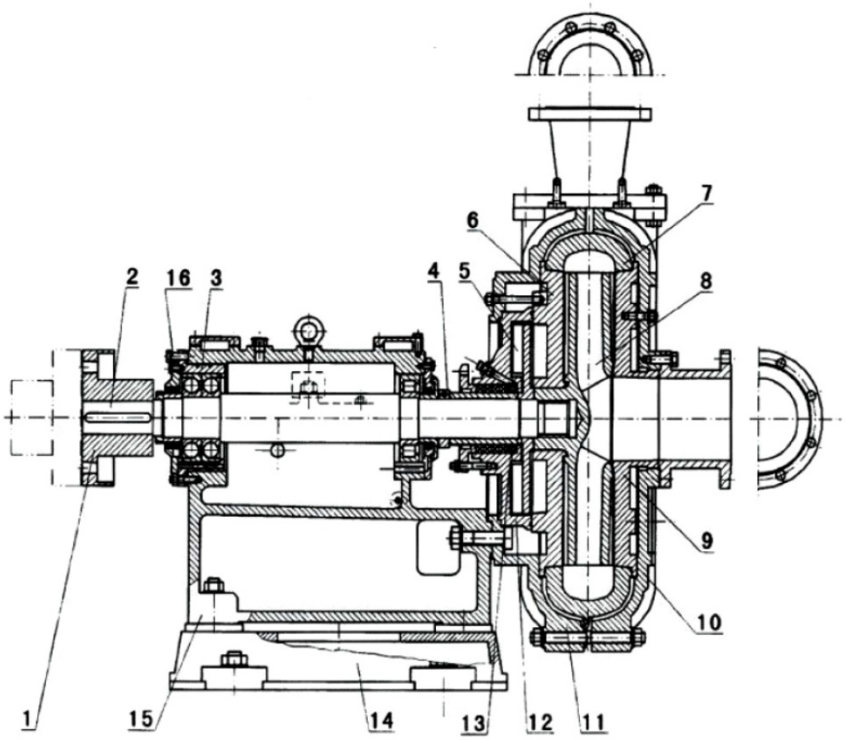
Stop The Pump

1. Before stopping the pump, pumping clean water for 30 minutes to clean the slurry in the pump and the pipe.
2. Close the final stage pump outlet valve.

3. From the last stage pump to the first stage pump, stop step by step, and turn off the corresponding shaft seal water and cooling water.
4. Close the inlet valve of the first stage pump.

⚠ Note: It is not allowed to stop all the pumps at the same time when the outlet valve is fully open, otherwise it is easy to form water hammer and cause damage to the pumps or pipes.

Construction Drawing



1.	Coupling	7.	Volute casing	12.	Stuffing box
2.	Shaft	8.	Impeller	13.	Water-seal
3.	Bearing housing	9.	Front liner plate	14.	Base
4.	Disassemble ring	10.	Front casing	15.	Support
5.	Expeller	11.	Rear casing	16.	Adjusting bolts
6.	Rear liner plate				

Common Faults and Handling Measures

Table 3 The common faults and troubleshooting methods

No	Fault	Reason Analysis	Troubleshooting methods
1	There is no water come out off, The pressure gauge and vacuum gauge pointer violent beating.	There is no water full filled in the suction pipe	Fill the pump full with water
		The suction line is blocked or the valve is not open	Open the entrance and clean up the pipeline blockage
		The pump inlet pipe, instrument side or the stuffing box in leak	Check if the packing is wet or tight at the block or leakage position.
2	There is no water come out off, the vacuum table shows a high degree vacuum.	The inlet valve is not open or blocked	Open the valve or clean up the block
		The suction pipe friction is too large or blocked	Improving the design of suction pipe or clean up the block
		The suction lift height too big	Reduce suction lift height
3	There is no water come out off, the pressure gauge shows pressure	The outlet pipeline friction lost is too large	Check and adjust the outlet pipeline
		Impeller blocked	Clean the impeller
		The speed is not high enough	Higher the pump speed
4	The pump is not run	The volute is blocked by Solid hard sediment	Remove blockages

		The pump outlet valve is not closed tightly and the pump cavity leaks into the slurry to settle	Repair or replace the outlet valve, remove the sediment

5	The flow is not enough	Impeller or inlet and outlet pipe blockage	Clean the impeller or pipeline
		Impeller wear serious	Change the Impeller
		The speed is lower than the specified value	Adjust the speed
		The pump installation is unreasonable or the inlet pipe line is leaky	Re-install or plug the leak
		Delivery height is too high, the friction loss is too large	Reduce the transmission height or decrease the friction lost
		The inlet valve is too small or obstructed	Open valve more
		Packing leaks	Compress the packing
		The pump selection is unreasonable	Re-selection
6	The pump motor overload	The pump head is larger than the working condition needed. The duty point to the big flow deviation	Turn down the outlet valve, cutting impeller or reduce the speed

		When selecting the motor not consider the slurry proportion	Re-selection the motor
		The packing is too tight	Adjust the packing gland nut
7	The pump internal sound abnormal and there is no water come out off	The suction friction lost is too large	Clean the suction line and the gate valve
		the suction lift is too high	Reduce height on the suction lift
		Cavitation	Adjust the outlet valve to operate within the specified range
		The suction leakage the air	Plug the leak

		The liquid temperature pumping is too high	Reduce the liquid temperature
8	The pump vibration	Cavitation	Close the outlet valve and reduce the installation height, reduce the inlet friction lost
		Impeller single leaf obstruction	Clean the Impeller
		The pump shaft is not concentric with the motor shaft	Realign
		Fasteners or foundation loose	Tighten the tightening bolts, reinforce the foundation bolts and reinforce the foundation
9	Bearing heat	Not open cooling water	Open the cooling water

		Lubrication is not good	Adjust the amount of oil according to the instructions
		Lubricant is not clean	Cleaning bearings, change oil
		Thrust bearing direction is wrong	In view of the inlet pressure and adjust the direction of thrust bearing
		The bearing has problem	Change the bearing
10	The packing life is short	Packing material is not good	Change the good packing
		Not have the shaft seal water	Add the shaft seal water
11	The pump oil spill	The oil level is high	Reduce the oil level
		The rubber parts have problem	Change the rubber parts
		Assembly problems	Adjust the assembly
12	The pump is leak	Not press good the rubber parts	Re-adjust or press

Maintenance and Disassembly

Maintenance

The GAZ series slurry pump set has been adjusted before leaving the factory. The user does not need to disassemble and inspect the unused pump within 6 months after the purchase. Only check whether the rotation is flexible, rust and oiling.

- Keep the equipment clean, dry, no oil, no leakage.
- Daily check whether the oil level in the bracket is appropriate, the correct oil level is near the position of the oil level line, and should not exceed ±2 mm.
- Often check the pump operation if have abnormal sound, vibration and leakage etc., handled it in time if any problem.
- It is strictly forbidden to run the pump in the evacuated state, because the pump runs in the evacuated state not only vibrates severely, but also affects the life of the pump, so the special attention must be paid.

- The metal objects and large solids that exceed the allowable passage of the pump are strictly prohibited entering the pump, the flexible materials such as rubber, cotton silk and plastic cloth are strictly prohibited entering the pump to avoid damaging the wet end parts and blocking the impeller flow path, making the pump unable to work normally.
- Frequently check whether the pressure and the flow of the shaft seal water and cooling water appropriated by the way of check the opening of the shaft seal water pipe valve or check the temperature of the stuffing box. When the temperature is high, the water supply is insufficient. For the pumps that use grease to lubricate the packing,

add oil regularly once or twice a day to ensure that the packing is in good lubrication state.

- In order to ensure the efficient operation of the pump, it is necessary to adjust the gap between the impeller and the throat bush regularly (after a period of use, under the same operating conditions, when the current drops slowly) to keep it between 0.75-1.00mm. The adjustment steps are as follows:

1. For the pump with middle open bracket

The gap between the impeller and the throat bush should be 0.75~1.00mm, which is generally adjusted before leaving the factory. If it does not meet the requirements in the process, it should be adjusted; if there is a problem in operation, it should be stopped and adjusted. The pump with middle open bracket is adjusted as follows:

- Loosen the bracket cover and tighten the nut.
- Loosen the bearing box adjust screw.
- Tighten the compression nut of the bearing box evenly to make the rotor assembly move toward the pump head. Tighten and rotating the shaft at the same time until the shaft does not move. The direction of rotating the shaft should be steered according to the work of the pump.
- Using the feeler gauge to measure the gap between the flange of the bearing box and the end face of the column δ=a; at this time, the gap between the impeller and the throat bush is 0.
- Loosen the bearing box pressure nut.
- Tighten the adjustment screws of the bearing box evenly to move the rotor assembly toward the motor. Use the feeler gauge to check the gap δ until δ = a + (0.75 ~ 1.00) mm (larger pump takes the larger value), pay attention to the gap should be uniform.
- Tighten the pressure nut of the bearing box to completely fix the axial position of the rotor.

2. The gap between the impeller and the throat bush should be 0.75 ~ 1.00 mm, which is generally adjusted before leaving the factory. If it is found that this gap does not meet the requirements, it should be adjusted as follows:

- Loosen the bracket nut
- Adjust the screw rod to make the rotor move forward and rotating the shaft at the same time until the shaft does not move, pay attention to the direction of rotating the shaft should be consistent with the steering of the pump.
- Scribe a straight line on the joint between the bracket and the bearing body with a scribe as a mark.
- Adjust the screw nut to make the rotor move back 0.75～1.00mm (larger pump takes the larger value) and tighten the adjusting nut to fix the axial position of the rotor.
- Tighten the frame plate nut.

- Frequently check the bearing temperature and it should not exceed 75 ℃.
- ⚠ The pump lubricated oil should be completely replaced after 800 hours continuous operation.
- When the pump is not used for a long time, the shaft should be rotated 1/4 times a week so that the bearing can bear the static load and external vibration evenly. Store in a dry and ventilated warehouse without corrosive substances.
- If the shutdown time is long, backwash water should be used to flush the sediment in the pump before starting again.
- Frequently check the looseness of the support conditions of the inlet and outlet water piping system to ensure that the support is firm and the pump casing is not been pressed in working.
- Always check the fastening of the pump on the foundation and the connection should be firm and reliable.
- Before starting the pump, turn on the shaft seal water and cooling water, and then turn on the pump; after stopping the pump, turn off the shaft seal water and cooling water after 3 minutes.

Disassembly and Assembly

Before the pump is assembled, all parts should be thoroughly inspected and cleaned to check whether the parts meet the requirements for use. If they are damaged, they must be replaced (or repaired) with new parts before assembly.

Assembly sequence and assembly of the basic requirements:

Rotor Assembly

- Must use the bearing inspected as qualified.
- Check the parallel and surface roughness of the bearing inner diameter, outer diameter, width and raceway, whether it is rust, speckle, etc., whether it is flexible.

- For angular contact bearings, double-row self-aligning bearings should check the bearing clearance separately, find the center of the ball raceway, and determine whether to add pads and pad thickness according to the height of the inner ring relative to the outer ring. The pad thickness is in accordance with the guaranteed bearing standard. The gap is ok. The radial thrust bearing shall not be reversed.
- When assembling the detachable (separated inner and outer ring) bearings, they must be installed according to the alignment marks of the inner and outer rings, and no disorder is allowed.
- For the bearings with adjustable head assembly, the numbered end should be outwards for identification during assembly.

The Shaft Assembly

• In order to avoid seizure with the mating surface, a layer of lubricant should be applied to the mounting surface before assembly to protect the shaft hole from damage.

• The bearing installation adopts the hot-loading method, that is, the bearing is put into a heating box filled with organic oil and heated to 80～100℃ with the oil. The mating surface should be immersed in oil. A thermometer should be placed in the oil tank and the temperature should be strictly controlled to not exceed 100℃. After hot-installing, it should be cooled naturally, no sudden cooling is allowed to avoid damage or deformation of the parts. a- Install the rear bearing, then install the retaining, round nut and tighten the bearing. b- Check whether the bearing and the shaft shoulder are tight and the rotation should be flexible and stable. Then install the bearing box. The assembly of the bearing box also adopts the hot mounting method and the requirements are the same as above. c- Finally install the front bearing and requested same as above. d- Install sealing ring on the bearing box.

e- Other parts of the shaft are installed according to the drawing assembly after the main shaft and the frame assembly.

Assembly of The Frame Parts

1. Clean up the cover of the frame and the oil tank. Clean the bearing hole.

2. After cleaning the joint surface of the bracket body and the bracket cover, make sure that the upper and lower bearing holes meet the tolerance of the drawing and allow the thickness of the paper pad to be within ±0.015mm (when adjusting the thickness, no more than three layers of pads are allowed). The joint surface of the bracket body is evenly coated with sealant, the pad is placed on the bracket body, and the stud bolts are tightened.

3. Install the oil tank M16X1.5 hexagonal screw plug and the oil mark and draw a 0.2～0.5mm horizontal line through the center of the circle on the oil mark plate and apply red paint to show the oil level.

4. Install oil tank cooler parts and water-cooling cavity cover (2mm rubber gasket under the cover. Note: some pumps do not have this cover).

5. Shaft assembly and bracket assembly

Lift both ends of the main shaft, install the main shaft assembly into the matching hole of the bracket, lift the bracket cover, apply oil-resistant sealant on the blue shell paper on the joint surface of the frame and close the bracket cover. The gap between the inner end face of the bearing box flange and the end face of the bracket is first reserved as 3 mm. Drive in the taper pin, pre-tighten the bolt.

6. The front bearing gland is equipped with an oil seal, cushioned with green shell paper and installed on the shaft to connect with the bracket with bolts.

7. Check the size of the gap between the stop of the bearing gland and the stop of the bearing box. You can machine the height of the gland or use padding to ensure that there is a 0.05-0.10mm gap between the gland and the bearing. After processing, the rear bearing gland is equipped with an oil seal, and is filled with green paper, installed on the shaft, and connected with the bearing box with bolts.

8. Install the water retaining plate and disassembly ring. When installing and disassembling the ring, a small amount of grease must be added to the bolt hole, and the disassembling ring must be tightly pressed against the water retaining plate.

9. Install the adjusting bolt and tighten screw on the bearing box.

10. A magnetic dial indicator is installed on the shaft to detect the coaxiality and perpendicularity of the semicircular positioning hole connecting the bracket and the rear pump casing and the end face to the center of rotation of the shaft, and all cannot be greater than 0.25 mm.

11. Install the pump coupling or the pump pulley. In order to protect the mechanical seal from damage due to impact force, the pump coupler or the pulley must be driven before the mechanical seal can be installed. If the assembled pump is equipped with a mechanical seal, first remove the part near the bare shaft pump and the mechanical seal then install the pump coupling or the pulley and finally restore the mechanical seal and the bare shaft pump. Otherwise, the impact force may cause the mechanical seal dynamic and static ring to rupture.

The Mechanical Seal Installation

1. Check the mechanical seal model according to the drawing or instruction manual and prepare the relevant accessories.
2. Clean up the mechanical seal box and all surface related.
3. Put the mechanical seal assembly into the mechanical seal box, install the mechanical seal gland bolts, do not tighten.

Installation of Frame Plate and The Front Plate Liner Insert

1. Install the frame plate on the bracket. (Note: It is recommended not to remove the frame plate from the frame during overhaul).
2. Install a sealing rubber ring on the shaft sleeve and install it on the shaft then install the packing gland the water seal ring on the shaft sleeve.
3. Install the stuffing box and install the sealing ring in the groove, install the expeller sealing ring and install the expeller.
4. Install the double-end studs of the frame plate first, hoist the FPL insert with a lifting tool, install it on the frame plate and tighten the bolts. Measure whether the gap between the frame plate and expeller hub is uniform and rotating the shaft to observe whether there is friction.

Install The Impeller, Volute

1. Impeller "T" type thread coated with grease, the impeller mounted on the shaft, tighten, compaction of the expeller.
2. Install the seal ring.
3. Lift the volute with a volute hoisting tool, assemble it on the FPL insert, install the frame plate connecting bolts and clamping plate, adjust the distance from the top surface of the volute outlet to the top surface of the FPL insert to be 5mm and then jam the volute.

Installation of The Cover Plate and Throat Bush

1. The cover plate is raised and placed flat on the ground, the throat bush is installed with stud bolts and it is hoisted into the front the cover plate with a lifting tool and fastened together with the cover plate.
2. Install throat bush seal ring and cover plate lift rings screw.
3. Lift up the cover plate and the throat bush, push the cone outer circle of the throat bush into the cone hole of the volute, adjust the distance from the top surface of the volute outlet to the top surface of the cover plate outlet to be 5 mm, and tighten all frame plate bolts.
4. Adjust the gap between the impeller and the throat bush at 0.75-1.00 mm, the adjustment method is the same as above.

Install the Inlet and Outlet Short Nipple

1. Put 3 mm thick pad respectively at the pump inlet & outlet and tightening the bolts, check the pad if pressed. If not, it should be thicker pad here, inlet and outlet flange and pump inlet and outlet gap is not less than 1 mm.
2. The expansion joint need in front of the short nipple for easy disassembly.
3. Manual rotating the shaft, the pump rotating should be brisk, evenly without tightness before pressed the packing.

Other Parts Assembly

1. Install motor coupling and the pulley.
2. After the motor and the pump are aligned, check the motor's rotation direction, then install the coupling pin and rubber ring or belt.
3. Install the coupling or the pulley guard.
4. Fill the stuffing box with packing according to requirements.
5. Tighten mechanical seal gland bolts.

Commission

During trial operation, attention should be paid to detecting the leakage, vibration, temperature rise, etc. of the pump, and adjust the packing loosening in time until it is suitable.

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