Brief introduction

The GSC Series Pumps are horizontal double suction split casing pumps which feature – high efficiency, rugged construction, compact design, foot mounted volute, center drop out coupler, and regreasable bearings. These features, along which the horizontal split case, make installation, operation, and service easy to perform.

This operation manual includes the basic principles of installing, using and maintaining GSC Horizontal Double Suction Split Casing Pumps. Installers and professionals must read this manual carefully before installing and starting pumps.

General warning

▲Safety Instruction

This safety alert symbol will be used in this manual and on the pump safety instruction decals to draw attention to safety related instruction. When used the safety alert symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED! FAILURE TO FOLLOW THE INSTRUCTIONS MAY RESULT IN A SAFETY HAZARD.

Your GSC Pump should have safety instruction decals displayed. If the decals are missing or illegible contact your local Goulds representative for a replacement.

Additional Safety Requirements:

1. Electrical connections to be made by qualified Electrician in accordance with all national, state and local codes.
2. Motor must have properly sized starter with properly sized heaters to provide overload and under voltage protection.
3. If pump, motor or piping are operating at extremely high or low temperatures, guarding or insulation is required.
4. The maximum working pressure of the pump is listed on the pump nameplate, do not exceed this pressure.

Electrical safety

▲CAUTION: Electrical Shock Hazard

Electrical connections to be made by qualified electrician in accordance with all applicable codes, ordinances, and good practices. Failure to follow these instructions could result in serious personal injury or death, or property damage.

▲CAUTION: Electrical Overload Hazard

Three phase motors must have properly sized heaters to provide overload and under voltage protection. Single phase motors have built-in overload protectors. Failure to follow these instructions could result in serious personal injury or death, or properly damage.

Thermal safety

▲CAUTION: Extreme Temperature Hazard

If pump, motor, or piping are operating at extremely high or low temperatures, guarding

or insulation is required. Failure to follow these instructions could result in serious personal injury or death, or property damage.

Mechanical safety

▲CAUTION: Unexpected Startup Hazard

Disconnect and lockout power before servicing. Failure to follow these instructions could result in serious personal injury or death, or property damage.

▲CAUTION: Excessive System Pressure Hazard

The maximum working pressure of the pump is listed on the nameplate, do not exceed this pressure. Do not use air to hydro-test pump. Failure to follow these instructions could result in serious personal injury or death, or property damage.

▲CAUTION: Excessive Pressure Hazard Volumetric Expansion

The heating of water and other fluids causes volumetric expansion. The associated forces may cause failure of system components and release of high temperature fluids. This will be prevented by installing properly sized and located compression tanks and pressure relief valves. Failure to follow these instructions could result in serious personal injury or death, or property damage.

Technical information

Application

The GSC Series pumps are suitable for application in the civil, agricultural and industrial fields, to pump chemically or mechanically non-aggressive liquids. Following are a few typical applications:

- **Water Supply** Primary lift and secondary booster stations
- **Building Service** HVAC water transfer & district heating systems
- **Agriculture** Irrigation drainage and flood control
- **Industry** Power plant filtration, water treatment, filtration and cleaning in pulp and paper
- **Marine** Cooling system and fire fighting

General data

- Capacities: up to 18000m3/h
- Heads: up to 180m
- Temperatures: up to 105℃
- Pressures: up to 10 bar
  (special version up to 16bar)
- Speed: up to 3500rpm
- Suction: DIN150-DIN1200
- Discharge: DIN100-DIN1000
  40 Sizes available

Construction features

- **Pump Casing** Heavy duty casing, durable foot-mounted and design to resist

external forces and vibration.

- **Impeller** Owing to its unique and innovative design, optimum flow behavior is guaranteed and thus the impeller features low NPSH requirement, low pulsation and high efficiency.
- **Shaft** Heavy duty shaft with minimum deflection is designed to ensure vibration free operation. Two-sided drive provides the flexibility of installation requirement.
- **Shaft seal** Shaft can be sealed by either gland packing or mechanical to meet different applications.

Models and Constructions

Construction □：

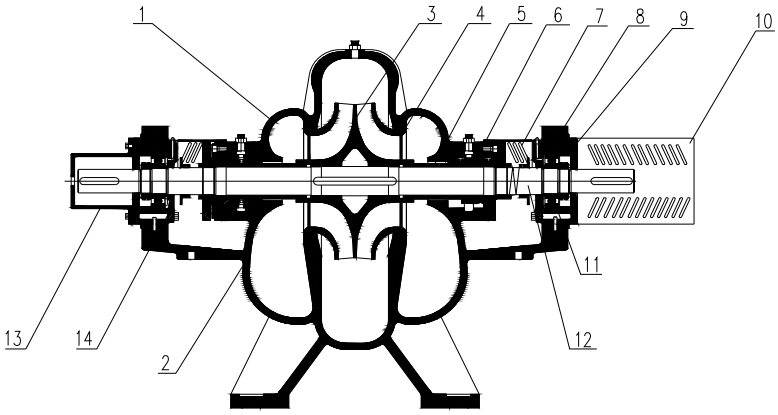
300-10	500-10	200-15	350-15	250-20	400-20	200-25	300-25	100-30
150-30	250-30	300-35	350-35	150-40	200-40	100-50	350-50	150-60
250-60	150-65	250-65	100-80	200-90	125-95	200-125	200-130	150-140

Construction □：

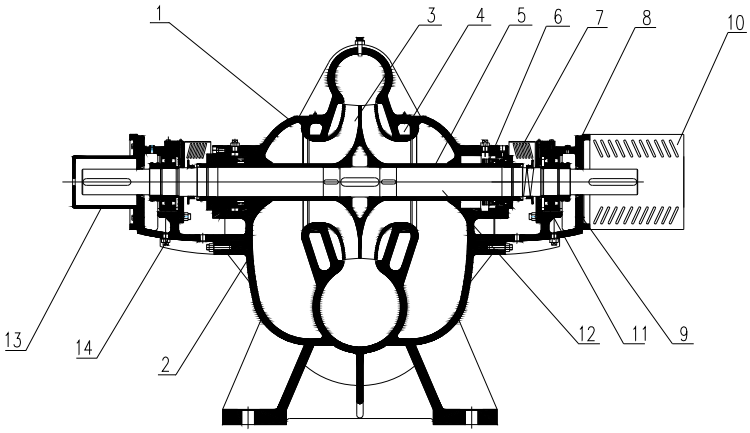
600-20	700-20	500-50	700-50	900-50	1000-50	500-60	400-70	700-70
800-70	900-90	700-105	500-115					

Construction View

1. Upper Casing
2. Lower Pump Casing
3. Impeller
4. Wear rings
5. Shaft sleeve
6. Mechanical seal assembly
7. Shield Guard
8. Bearing housing cover
9. Bearing housing
10. Coupling guard
11. Bearing
12. Shaft
13. Shaft end shield
14. Bearing cover



Construction I



Construction II

Installation

▲CAUTION: Unexpected Start-up Hazard

Disconnect and lock out power before servicing. Failure to follow these instructions could result in serious personal injury or death and property damage.

NOTE: Do not spread the inner and outer guards more than necessary for guard removal or installation. Over spreading the guards may alter their fit and appearance.

Coupler Guard

Removal

a. Remove the two screws that hold the outer (motor side) coupler guard to the support brackets.
b. Spread the outer guard and pull it off the inner guard.
c. Remove the screw that holds the inner guard to the support bracket.
d. Spread the inner guard and pull it over the coupler.

Installation

a. Check coupler alignment before proceeding. Correct if necessary.
b. Spread the inner guard and place it over the coupler.
c. With the inner guard straddling the support bracket, install a screw through the hole in the support bracket and guard located closest to the pump. Do not tighten the screw.
d. Spread the outer guard and place it over the inner guard.
e. Install the outer guard screws by following the step stated below which pertains to your particular pump:
   i. For pumps with a motor saddle support bracket: Ensure the outer guard is straddling the support arm, and install but do not tighten the two remaining screws.
   ii. For pumps without a motor saddle support bracket: Insert the spacer washer between the holes located closest to the motor in the outer guard, and install, but do not tighten, the two remaining screws.
f. Position the outer guard so it is centered around the shaft, and so there is less than a 1/4" of the motor shaft exposed. On guards that utilize a slotted support bracket, the inner guard will have to be positioned so there is only a 1/4" of the pump shaft exposed.
g. Holding the guard in this position, tighten the three screws.

Final Alignment

Final alignment cannot be accomplished until the pump has been operated initially for a sufficient length of time to attain operating temperature. When normal operating temperature has been attained, secure the pump to re-check alignment and compensate for temperature accordingly.

▲CAUTION: Rotating Components Hazard

Do not operate pump without all guards in place. Failure to follow these instructions could result in serious personal injury or death and property damage.

▲CAUTION: Extreme Temperature and/or Flying Debris Hazard

Eye protection and gloves required. Failure to follow these instructions could result in

serious personal injury or death and property damage.

NOTE: Pump may have been doweled to base at factory.

Doweling

Dowel the pump and driving unit as follows:

a. Drill holes through diagonally opposite feet and into the base. Holes must be of a diameter 1/64 inch less than the diameter of the dowel pins. Clean out the chips.

b. Ream the holes in feet and base to the proper diameter for the pins. Clean out the chips.

c. Insert pins to be approximately flush with feet.

Suction and Discharge Piping

▲**CAUTION:** Both the suction and discharge piping should be supported independently near the pump and properly aligned, so that no strain is transmitted to the pump when the flange bolts are tightened.

Suction Piping

▲**CAUTION:** When installing the pump piping, be sure to observe the following precautions: Piping should always be run to the pump; Do not move pump to pipe. This could make final alignment impossible.

When installing the suction piping, observe the following precautions:

a. The sizing and installation of the suction piping is extremely important. It must be selected and installed so that pressure losses are minimized and sufficient liquid will flow into the pump when started and operated.

b. Friction losses caused by undersized suction piping can increase the fluid's velocity into the pump. In some situations pipe velocity may need to be further reduced to satisfy pump NPSH requirements and to control suction line losses. Pipe friction can be reduced by using pipes that are one to two sizes larger than the pump suction nozzle in order to maintain pipe velocities less than 5 feet/second.

Please see the following illustration of Suction Pipe Installations:

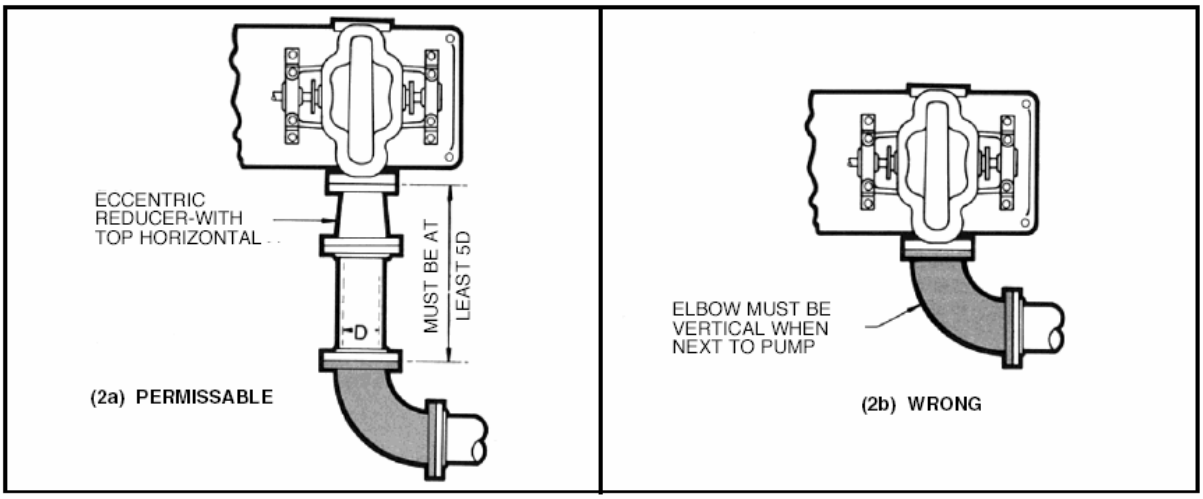


Fig. 1 Elbows At Pump Suction

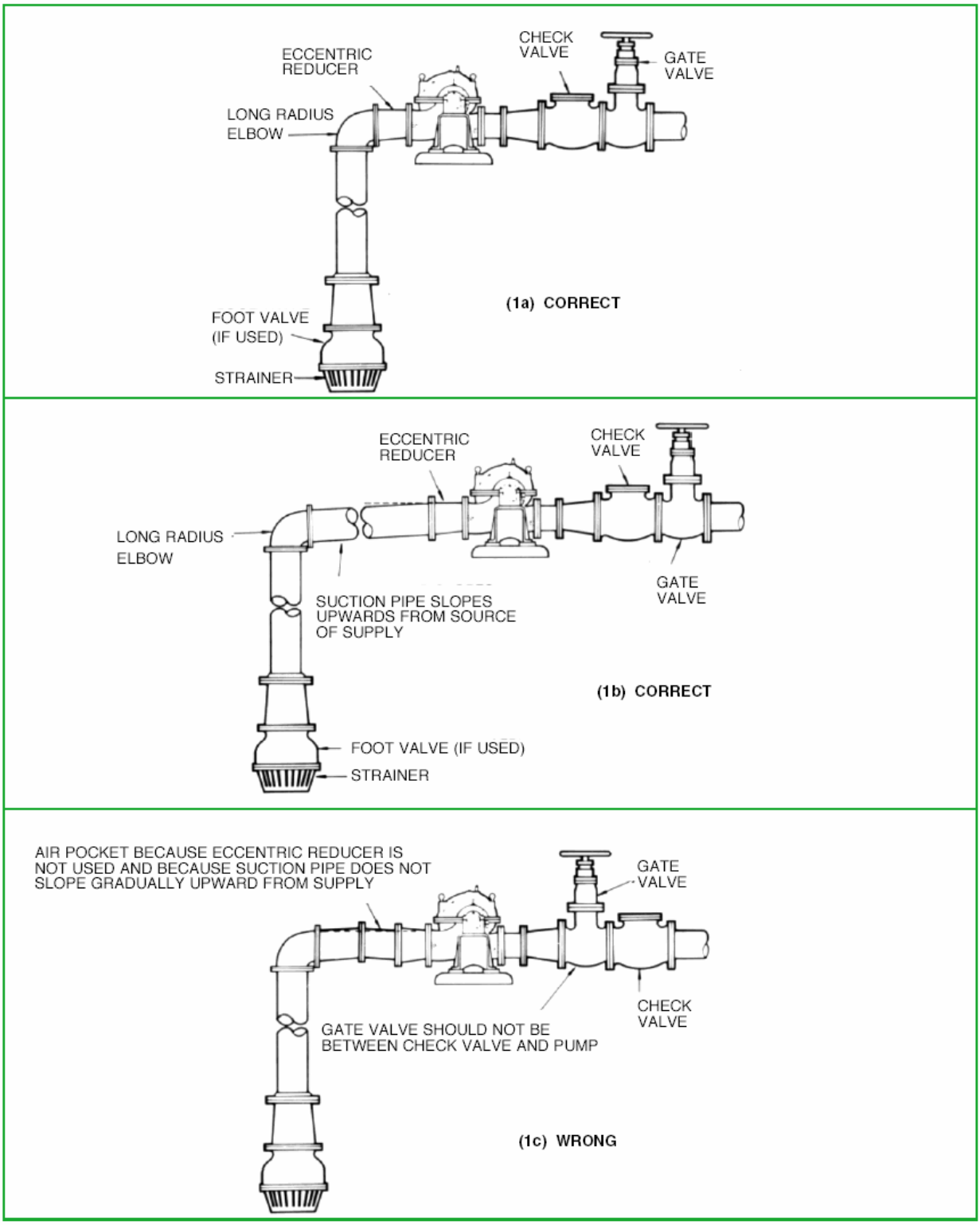


Fig. 2 Air Pockets in Suction Piping

Valves in Suction Piping

When installing valves in the suction piping, observe the following precautions:

a. If the pump is operating under static suction lift conditions, a foot valve may be installed in the suction line to avoid the necessity of priming each time the pump is started. This valve should be of the flapper type, rather than the multiple spring type, sized to avoid excessive friction in the suction line.
b. When foot valves are used, or where there are other possibilities of “water hammer,” close the discharge valve slowly before shutting down the pump.
c. Where two or more pumps are connected to the same suction line, install gate valves so that any pump can be isolated from the line. Gate valves should be installed on the suction side of all pumps with a positive pressure for maintenance purposes. Install gate valves should not be used, particularly where NPSH is critical.
d. The pump must never be throttled by the use of a valve on the suction side of the pump. Suction valves should be used only to isolate the pump or maintenance purposes, and should always be installed in position to avoid air pockets.
e. A pump drain valve should be installed in the suction piping between the isolation valve and the pump.

Discharge Piping

If the discharge piping is short, the pipe diameter can be the same as the discharge opening. If the piping is long, pipe diameter should be one or two sizes larger than the discharge opening. On long horizontal runs, it is desirable to maintain as even a grade as possible. Avoid high spots, such as loops, which will collect air and throttle the system or lead to erratic pumping.

Valves in Discharge Piping

A triple duty valve should be installed in the discharge. The triple duty valve placed on the pump protects the pump from excessive back pressure, and prevents liquid from running back through the pump in case of power failure.

Pressure Gauges

Properly sized pressure gauges should be installed in both the suction and discharge nozzles in the gauge taps. The gauges will enable the operator to easily observe the operation of the pump, and also determine if the pump is operating in conformance with the performance curve, if cavitation, vapor binding, or other unstable operation should occur, widely fluctuating discharge pressure will be noted.

Pump Insulation

On chilled water applications most pumps are insulated. As part of this practice, the pump bearing housings should not be insulated since this would tend to “trap” heat inside the housing. This could lead to increased bearing temperatures and premature bearing failures.

Starting and Shutting off

Pre-starting

- Before starting the pump, check the pump to see whether there are additional things to avoid damaging shaft seal and impeller.
- Add lubricant or oil to lubricate the pump rotor and make sure it works smoothly.
- Check the pump coupling to see whether it is symmetrical or not.
- Check the rotation of the motor to make sure it rotates correctly. Generally speaking, when inspecting from pump inlet to outlet, the motor should be installed on the left side of pump.
- Completely open the pump suction valve.
- Shut pump discharge valve, pour water into the pump and make sure the pump suction pipe is full of water.
- Open the sealed suction valve.
- Start motor.

▲**CAUTION:** No matter which side the motor is installed, inspecting form the inlet to outlet, the left whorl of the shaft must be on the left side.

▲**CAUTION:** Do not run pump dry, or it will damage the shaft seal.

▲**CAUTION:** Must supply the water before start if the pump has an out-washing pipe.

▲**CAUTION:** Don't close or try to close the inlet valve when the pump is in operating.

▲**CAUTION:** Forbid starting pump when shut the small suction pipe.

▲**CAUTION:** If the pump is installed with a positive head on the suction, it can be primed by opening the suction and vent valve and allowing the liquid to enter the casing; If the pump is installed with a suction lift, priming must be done by other method such as foot valves, ejectors, or by manually filing the casing and suction line.

After starting

- Open the discharge valve
- Check the seal to see if it leaks.
- Check bearings temperature and sound to see if there is something wrong.
- Check inlet and outlet pipes to inspect if they have been fixed firmly and if there is heavy vibration.
- Check pump to inspect if there is heavy vibration.
- If there is something unusual, shut off pumps at once and check.

Shutting off

- Shut off the valve of discharge pipe.
- Turn off the power.
- Shut off the seal valve.
- If pump is installed in low temperature environment, it should be protected by one of the following methods:
    a. Drain water from the pump in order not to freeze the pump body.
    b. If the pump hasn't been operated for a long time, it must be disassembled and preserved well.

Disassembly and Assembly

Disassembly

▲CAUTION: Unexpected Start-up Hazard

Disconnect and lock out power before servicing. Failure to follow these instructions could result in serious personal injury or death and property damage.

1. Close valves on suction and discharge sides of pump. (If no valves have been installed, it will be necessary to drain the system.)
   Remove coupler guard and disconnect coupler.
   Remove external tubing if supplied.

▲CAUTION: Extreme Temperature Hazard

Allow pump temperatures to reach acceptable levels before proceeding. Open drain valve, do not proceed until liquid stops coming out of drain valve. If liquid does not stop flowing from drain valve, isolation valves are not sealing and should be repaired before proceeding. After liquid stops flowing from drain valve, leave drain valve open and continue. Remove the drain plug located on the bottom of the pump housing. Do not reinstall plug or close drain valve until reassembly is completed. Failure to follow these instructions could result in property damage and/or moderate personal injury.

2. Loosen but do not remove main joint screws. Insert a screwdriver or pry bar into the slots between the upper and lower casing halves – separate joint.

▲CAUTION: Excessive Pressure Hazard

Make certain the internal pressure is relieved before continuing. Failure to follow these instructions could result in serious personal injury or death and property damage.

3. Remove all casing main joint screws and dowel, lift off the upper casing half.
4. Tap the stuffing boxes with a soft-headed hammer to break the seal between the stuffing box and lower casing half, and lift the rotating element out of the lower casing.
5. Remove four screws from bearing housing and remove the bearing housings from the shaft.
6. Using a puller, remove the bearing from the shaft. Remove the drive end bearing in the same manner.
   IMPORTANT: Do not reuse the ball bearings.
7. Slide stuffing boxes off of the shaft, working deflector ring off the shaft at the same time.
8. Drive oil seal from the stuffing box.
9. Drive mechanical seal seat from the stuffing box.
10. Remove two casing rings from the impeller and remove O ring and locating pin from each casing ring.
11. Remove mechanical seal head from the pump shaft.
12. Remove the impeller retaining ring with a retaining ring pliers. Heat the impeller hub on both ends and pull or push the impeller from the shaft.
    NOTE: For impellers with replaceable rings – remove the rings by cutting the rings with a cold chisel.

▲CAUTION: Extreme Temperature and/or Flying Debris Hazard

Eye protection and gloves required. Failure to follow these instructions could result in property damage and/or moderate personal injury.

Assembly

NOTE: The sequences of assembly are just opposite to the disassembly.

Maintenance

General Maintenance

Operating conditions vary so widely that to recommend one schedule of preventative maintenance for all centrifugal pumps is not possible. Yet some sort of regular inspection must be planned and followed. We suggest a permanent record be kept of the periodic inspections and maintenance performed on your pump. This recognition of maintenance procedure will keep your pump in good working condition, and prevent costly breakdown.

One of the best rules to follow in the proper maintenance of your centrifugal pump is to keep a record of actual operating hours. Then, after a predetermined period of operation has elapsed, the pump should be given a thorough inspection. The length of this operating period will vary with different applications, and can only be determined from experience. New equipment, however, should be examined after a relatively short period of operation. The next inspection period can be lengthened somewhat. This system can be followed until a maximum period of operation is reached which should be considered the operating schedule between inspections.

Maintenance of Pump Due to Flood Damage

The servicing of centrifugal pumps after a flooded condition is a comparatively simple matter under normal conditions.

Bearing are a primary concern on pumping units. First, dismantle the bearings; clean and inspect them for any rusted or badly worn surfaces. If bearings are free from rust and wear, reassemble and re-lubricate them with one of the recommended pump lubricants. Depending on the length of time the pump has remained in the flooded area, it is unlikely that bearing replacement is necessary; however, in the event that rust or worn surfaces appear, it may be necessary to replace the bearings.

Next, inspect the stuffing box, and clean out any foreign matter that might clog the box. Mechanical seals should be cleaned and thoroughly flushed.

Couplings should be dismantled and thoroughly cleaned.

Any pump that is properly sealed at all joints and connected to both the suction and discharge should exclude outside liquid. Therefore, it should not be necessary to go beyond the bearings, stuffing box, and coupling when servicing the pump.

Bearing Lubrication – Grease

Grease lubricated ball bearings are packed with grease at the factory and ordinarily will require no attention before starting, provides the pump has been stored in a clean, dry place prior to its first operation. The bearings should be watched the first hour or so after the pump has been started to see that they are operating properly.

The importance of proper lubrication cannot be over emphasized. It is difficult to say how often a bearing should be greased, since that depends on the conditions of operation. It is well to add one ounce of grease at regular intervals, but it is equally important to avoid adding too much grease. For average operating conditions, it is recommended that 1 oz. Of grease be added at intervals of three to six months, and only clean grease be used. It is always best if unit can be stopped while grease is added to avoid overloading.

▲**CAUTION:** Check the bearing lubricating periodically, add or replace grease or lubricating oil every 1500 hours. For the terrible environment, lubricating period should be shortened.

▲**CAUTION:** Use 3# calcium base grease and 30# lubricating oil.

The table below is the reference quantity of grease:

Item	Reference Quantity of Using Grease (mm^3)	Suitable Pump Model
1	6700 – 8900	200-15 100-30 150-30 150-40 100-50 150-60 100-80
2	14100 – 18800	300-10 350-15 250-20 200-25 200-40 125-95
3	21200 – 28300	500-10 300-25 250-30 250-60 150-65
4	29000 – 38600	400-20 300-35 350-35 250-65 200-90 150-140
5	62500 – 83400	350-50 200-125 200-130
6	74200 – 98900	600-20 700-20 500-50 500-60 400-70
78	175700 – 234300	700-50 700-70 500-115
8	375000 - 500000	900-50 1000-50 800-70 900-90 700-105

▲**CAUTION:** Excess grease is the most common cause of overheating.

▲**CAUTION:** Greases made from animal or vegetable oils are not recommended due to the danger of deterioration and forming of acid. Do not use graphite. Using of an ISO VG 100 mineral base oil with rust and oxidation inhibitors is recommended.

▲**CAUTION:** The maximum desirable operating temperature for ball bearings is 80℃. Should the temperature of the bearing frame rise above 80℃, the pump should be shut down to determine the causes.

Mechanical Seals

a. Mechanical seals are precision products and should be treated with care. Use special care when handling seals. Clean parts are essential to prevent scratching the finely lapped sealing faces. Even light scratches on these faces could result in leaking seals.

b. Normally, mechanical seals require no adjustment or maintenance, except routine replacement of worn, or broken parts.

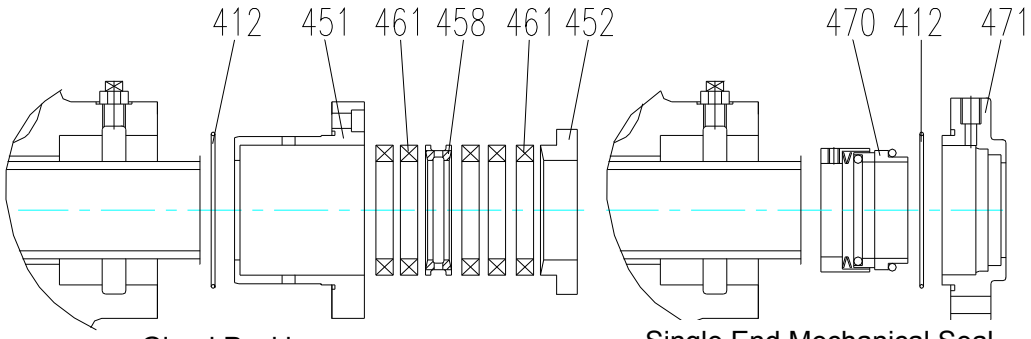
c. Replace the single end mechanical seal

- Dismantle the bearing, and ring (507)
- Dismantle the seal cover (471) and seal rings
- Daub Vaseline on the shaft sleeve (524) and then put on new seal rings and tighten
- Find the screw hole and tighten the setscrew
- Press the ring into seal cover (471) and tighten it

d. Replace the double ends mechanical seal

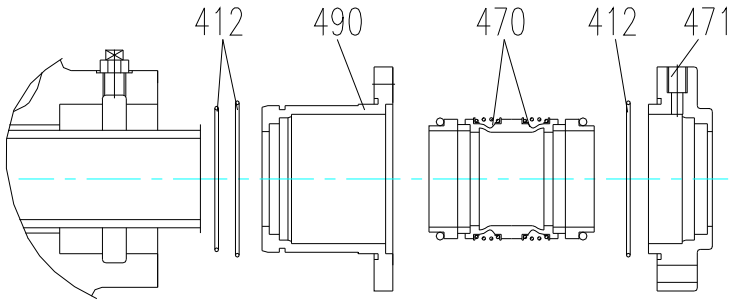
- Dismantle the bearing, and ring (507);
- Remove all the mechanical parts from shaft sleeve and replace them with new. Press the rings into bearing housing (490) and cover (471)
- Daub Vaseline on the shaft sleeve
- Put new mechanical seal onto shaft sleeve.
- Put on mechanical cover (471) and tighten it.

Please see the following picture of Double Ends Mechanical Seal



Gland Packing

Single End Mechanical Seal



Double End Mechanical Seal

▲**CAUTION:** If the mechanical seal and o ring is damaged, it needs to be replaced.

▲**CAUTION:** Do not burn rubber, o rings of pumps for the gas will pollute environment and cause harm to health.

Replacing bearing

Structure Ⅰ

- Dismantle coupling cover and end coupling of the pump
- Dismantle bearing cover (393)
- Remove all the rotation parts from the pump
- Loosen bearing cover (360Z or 360A)
- Dismantle the bearing (382) with a puller, and take out the oil seal(420)
- Replace the bearing, oil seal and seal paper gasket, then set them up following the opposite sequences.

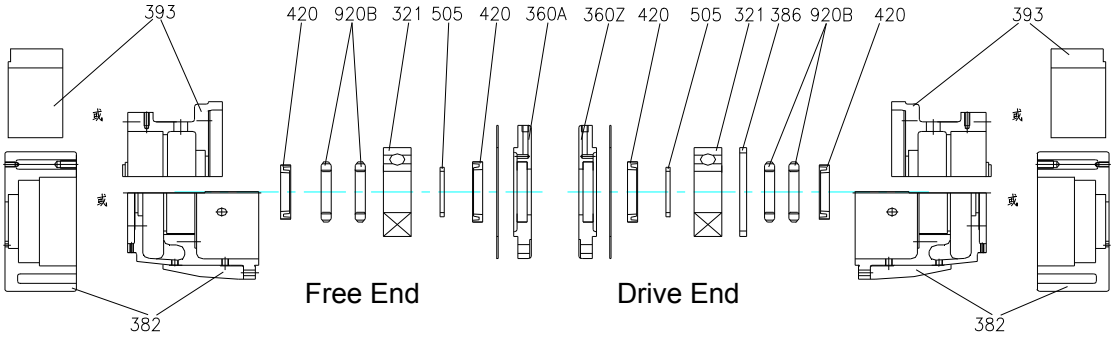
Structure Ⅱ

- Dismantle coupling cover and end coupling of the pump
- Loosen bearing cover (360Z or 360A) and dismantle the bearing cover (393)
- Remove all the rotation parts from the pump.
- Take out the oil seal from the bearing
- Remove screw nut (920B), use a puller to remove bearing (321)
- Take out gasket (505) and bearing cover (360Z or 360A) and the oil seal.
- Replace the bearing, oil seal and seal paper gasket, then set them up following the

opposite sequences.

▲**CAUTION:** The method of heating or hammering can be used when install the bearing. However, when using a hammer to install the bearing, it can only strike on the inside circle.

Please see the following picture:



Cleaning Without Dismantling Pump

A short section of pipe so designed that it can be readily dropped out of the line can be installed adjacent to the suction flange. With this arrangement, any matter clogging the impeller is accessible by removing the pipe section.

If the pump cannot be freed of clogging after the above methods have been tried, dismantle the unit as previously described to locate the trouble.

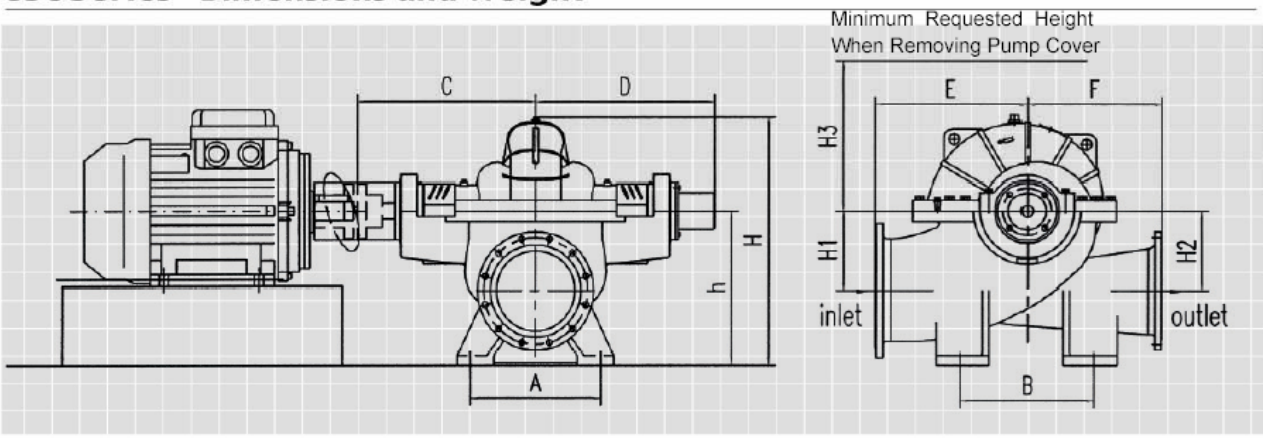
TROUBLE SHOOTING

Between regular maintenance inspections, be alert for signs of motor or pump trouble. Common symptoms are listed below. Correct any trouble immediately and AVOID COSTLY REPAIR AND SHUTDOWN.

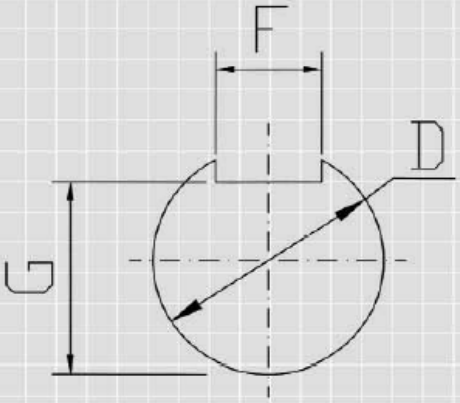
CAUSES	CURES
No Liquid Delivered	
1. Lack of prime.	Fill pump and suction pipe completely with liquid.
2. Loss of prime.	Check for leaks in suction pipe joints and fittings; vent casing to remove accumulated air.
3. Suction lift too high.	If no obstruction at inlet, check for pipe friction losses. However, static lift may be too great. Measure with mercury column or vacuum gauge while pump operates. If static lift is too high, liquid to be pumped must be raised or pump lowered.
4. Discharge head too high.	Check pipe friction losses. Large piping may correct condition. Check that valves are wide open.
5. Speed too low.	Check whether motor is directly across-the-line and receiving full voltage. Or frequency may be too low; motor may have an open phase.
6. Wrong direction of rotation.	Check motor rotation with directional arrow on pump casing.
7. Impeller completely plugged.	Dismantle pump and clean impeller.
Not Enough Liquid Delivered	
8. Air leaks in suction piping.	If liquid pumped is water or other non-explosive, and explosive gas or dust is not present, test flanges for leakage with flame or match, or by plugging inlet and putting line under pressure. A gauge will indicate a leak with a drop of pressure.
9. Speed too low.	See item 5.
10. Discharge head too high.	See item 4.
11. Suction lift too high.	See item 3.
12. Impeller partially plugged.	See item 7.
13. Cavitation; insufficient NPSH (depending on installation)	a. Increase positive suction head on pump by lowering pump. b. Sub-cool suction piping at inlet to lower entering liquid temperature. c. Pressurization suction vessel.
14. Defective impeller.	Inspect impeller, bearings and shaft. Replace if damaged or vane sections badly eroded.
15. Foot valve too small or partially obstructed.	Area through ports of valve should be at least as large as area of suction pipe – preferably 1 1/2 times. If strainer is used, net clear area should be 3 to 4 times area of suction pipe.
16. Suction inlet not immersed deep enough.	If inlet cannot be lowered, or if eddies through which air is sucked persist when it is lowered, chain a board to suction pipe. It will be drawn into eddies, smothering the vortex.
17. Wrong direction of rotation.	Symptoms are an overloaded drive and about 1/3 rated capacity from pump. Compare rotation of motor with directional arrow on pump casing.
18. Too small impeller diameter. (Probable cause if none of above.)	Check with factory to see if a larger impeller can be used; otherwise, cut pipe losses or increase speed – or both, as needed. But be careful not to seriously overload drive.
19. Speed too low.	See item 5.
20. Air leaks in suction piping.	See item 8.

Not Enough Pressure	
CAUSES	**CURES**
21. Mechanical defects.	See item 14 and 15.
22. Obstruction in liquid passages.	Dismantle pump and inspect passages of impeller and casing. Remove obstruction.
23. Air or gases in liquid. (Test in laboratory, reducing pressure on liquid to pressure in suction line. Watch for bubble formation.)	May be possible to over rate pump to point where it will provide adequate pressure despite condition. Better to provide gas separation chamber on suction line near pump, and periodically exhaust accumulated gas. See item 13.
24. Too small impeller diameter. (Probable cause if none above.)	See item 18.
Pump Operates For Short Time, Then Stops	
25. Incomplete priming.	Free pump, piping and valves of all air. If high points in suction line prevent this, they need correcting. See page 19.
26. Suction lift too high.	See item 3.
27. Air leaks in suction piping.	See item 8.
28. Air or gases in liquid.	See item 23.
Pump Takes Too Much Power	
29. Head lower than rating; thereby pumping too much liquid.	Machine impeller's OD to size advised by factory.
30. Cavitation	See item 13.
31. Mechanical defects.	See items 14 and 15.
32. Suction inlet not immersed enough.	See item 16.
33. Liquid heavier (in either viscosity or specific gravity) than allowed for.	Use larger driver. Consult factory for recommended size. Test liquid for viscosity and specific gravity.
34. Wrong direction of rotation.	See item 6.
35. Casing distorted by excessive strains from suction or discharge piping.	Check alignment. Examine pump for friction between impeller and casing. Replace damaged parts.
36. Shaft bent due to damage – through shipment, operation, or overhaul.	Check deflection of rotor by turning on bearing journals. Total indicator run-out should not exceed 0.002 on shaft and 0.004 inch on impeller wearing surface.
37. Mechanical failure of critical pump parts.	Check bearings and impeller for damage. Any irregularity in these parts will cause a drag on shaft.
38. Misalignment.	Realign pump and driver.
39. Speed may be too high (brake hp of pump varies as the cube of the speed; therefore, any increase in speed means considerable increase in power demand).	Check voltage on motor.
40. Electrical defects.	The voltage and frequency of the electrical current may be lower than that for which the motor was built; or there may be defects in motor. The motor may not be ventilated properly due to a poor location.
41. Mechanical defects in turbine, engine or other type of drive exclusive of motor.	If trouble cannot be located, consult factory.

GSC Series– Dimensions and Weight

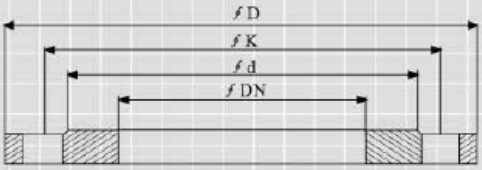


No.	Type	Suction	Discharge	A	B	C	D	E	F	h	H	H1	H2	H3	Weight
1	300–10	300	300	450	550	535	581	500	500	510	808	265	265	434	500
2	500–10	500	500	580	800	717.5	738.5	775	775	800	1251	410	410	656	1280
3	200–15	250	200	350	450	485	510	415	330	450	709	210	215	390	305
4	350–15	350	350	500	600	620	634	584	584	620	970	310	310	504	755
5	250–20	300	250	450	550	537	559	500	400	510	803	250	260	446	445
6	400–20	500	400	580	800	750	787	820	640	800	1266	410	410	703	1740
7	600–20	700	600	850	850	935	973	900	800	1050	1622	534	514	960	2640
8	700–20	800	700	1000	1200	1010	1048	1200	1000	1200	1845	605	605	957	3330
9	200–25	250	200	350	400	501	539	450	400	450	738	230	230	450	375
10	300–25	350	300	500	600	632	659	580	460	620	963	290	300	530	690
11	100–30	150	100	250	270	419	442	270	250	320	474	150	140	260	150
12	150–30	200	150	280	280	453	481	285	285	370	565	170	150	298	180
13	250–30	300	250	450	450	610	624	470	410	510	824	260	270	500	550
14	300–35	350	300	500	500	675	717	570	510	620	982	300	300	572	895
15	350–35	500	350	580	800	756	768	720	630	800	1270	415	415	752	1350
16	150–40	200	150	250	250	415	442	320	300	355	547	170	170	304	205
17	200–40	250	200	350	400	511	549	450	440	450	745	200	260	483	390
18	100–50	150	100	280	280	400	432	300	250	285	435	140	140	265	160
19	350–50	400	350	700	700	768	781	605	580	670	1055	335	400	615	1460
20	500–50	700	500	850	850	955	993	900	760	1050	1624	547	547	900	2320
21	700–50	800	700	1000	1200	1150	1203	1100	1000	1200	1868	590	590	1005	4190
22	900–50	1000	900	1200	1300	1305	1328	1350	1200	1450	2400	772.5	772.5	1388	8160
23	1000–50	1200	1000	1460	1600	1455	1478	1742	1340	1750	2750	944.5	944.5	1488	9780
24	150–60	200	150	280	280	410	437	320	300	355	544	170	170	315	210
25	250–60	300	250	450	550	626	643	540	530	510	852	250	310	572	575
26	500–60	700	500	850	850	970	1008	900	780	1050	1650	579	579	955	3250
27	150–65	250	150	450	550	603	624	480	400	510	856	240	290	575	500
28	250–65	350	250	500	500	709	724	650	600	620	1118	274	356	766	1225
29	400–70	500	400	700	750	905	943	690	600	800	1267	441	441	735	1840
30	700–70	800	700	1000	1200	1225	1278	1050	1100	1250	1946	670	670	1092	4290
31	800–70	1000	800	1460	1500	1360	1383	1380	1200	1600	2510	882	882	1430	8850
32	100–80	150	100	250	270	401	410	300	250	285	455	140	155	305	175
33	200–90	300	200	450	450	674	701	576	470	510	898	268	325	666	760
34	900–90	1200	900	1750	1500	1570	1599	1800	1360	1800	2840	985	985	1620	12300
35	125–95	200	125	280	280	475	516	350	330	355	555	170	170	353	255
36	700–105	900	700	1000	1200	1325	1348	1250	1080	1370	2150	755	755	1227	6650
37	500–115	600	500	940	860	1170	1223	950	810	1000	1555	523	523	873	3200
38	200–125	350	200	500	600	775	787	660	550	620	1080	330	410	800	1450
39	200–130	300	200	450	600	705	731	630	500	620	1040	325	325	745	1600
40	150–140	200	150	350	390	515	545	380	320	425	650	188	188	403	450



Shaft End Dimensions

order	D	G	F	size
1	30	26	8	200-15、100-30、150-30、150-40、150-50、150-60、150-80
2	40	35	12	300-10、350-15、250-25、200-25、200-40、125-95
3	50	44.5	14	500-10、300-25、250-30、250-60、150-65
4	60	53	18	400-20、300-35、350-35、250-65、200-90
5	75	67.5	20	350-50、200-125
6	85	76	22	600-20、700-20、500-50、400-70
7	115	104	32	700-50、700-70
8	155	142	40	900-50、1000-50、800-70



Flange Dimensions

Order	DN	d	K	N × ϕL	Pressure (kg/cm^3)
1	100	156	180	8 × ϕ18	10
2	125	184	210	8 × ϕ18	10
3	125	184	210	8 × ϕ18	16
4	150	211	240	8 × ϕ22	10
5	200	266	295	8 × ϕ22	10
6	200	266	295	12 × ϕ22	16
7	250	320	350	12 × ϕ22	10
8	300	370	400	12 × ϕ22	10
9	350	428	460	16 × ϕ22	10
10	350	429	470	16 × ϕ28	16
11	400	480	515	16 × ϕ28	10
12	500	582	620	20 × ϕ28	10
13	600	682	725	20 × ϕ31	10
14	700	794	840	24 × ϕ31	10
15	800	901	950	24 × ϕ34	10
16	900	1001	1050	28 × ϕ31	10
17	1000	1112	1160	28 × ϕ37	10
18	1200	1328	1380	32 × ϕ40	10