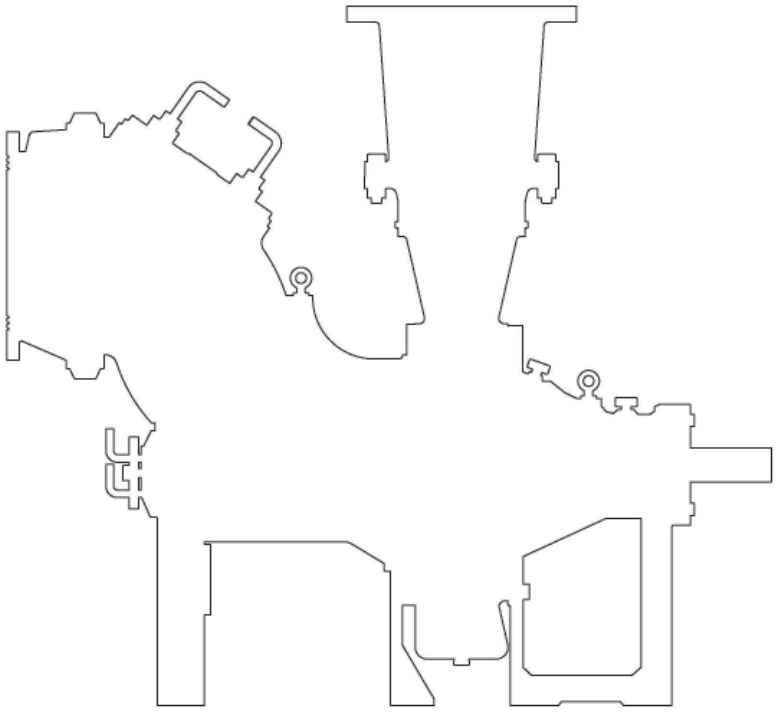
INSTALLATION, OPERATION & MAINTENANCE MANUAL

with PARTS LIST

S Series Pumps



Model

S-12

All Prime Pumps
a Division of Power & Pumps, Inc.
803 N. Myrtle Ave.
Jacksonville, FL 32204
phone: 800-803-0353
phone: 904-356-5881
fax: 904-356-8717
e-mail: sales@allprimepumps.com

date: 07/2013

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INTRODUCTION

This Installation, Operation, and Maintenance manual is designed to help you get the best performance and longest life from your All Prime pump.

This pump is an S-Series, semi-open impeller, self-priming centrifugal model with a suction check valve.

The pump is designed for handling mild industrial corrosives, mud or slurries containing large entrained solids. The basic material of construction is gray iron, with ductile iron impeller and steel wearing parts.

If there are any questions regarding the pump or its applications which are not covered in this manual or in other literature accompanying this unit, please contact your All Prime distributor, or:

ALL PRIME PUMPS
803 N. Myrtle Ave.
Jacksonville, FL 32204
phone: 904-356-5881
fax: 904-356-8717

For information or technical assistance on the power source, (i.e. - electric motor, engine, etc.) contact the power source manufacture's local dealer or representative.

The following are used to alert maintenance personnel to procedures which require special attention, to those which could damage equipment, and to those which could be dangerous to personnel:

 **DANGER!**

Immediate hazards which WILL result in severe personal injury or death. These instructions describe the procedure required and the injury which will result from failure to follow procedure.

 **CAUTION!**

Hazards or unsafe practices which COULD result in minor personal injury, product or property damage. These instructions describe the requirements and the possible damage which could result from failure to follow the procedure.

NOTE:

Instructions to aid in installation, operation, and maintenance or which clarify a procedure.

SAFETY – SECTION A

These warnings apply to S-series basic pumps. All Prime has no control over or particular knowledge of the power source which will be used. Refer to the manual accompanying the power source before attempting to begin operation.

WARNING!

Before attempting to open or service the pump:

1. Familiarize yourself with this manual.
2. Disconnect or lock-out the power source to ensure that the pump will remain inoperative.
3. Allow the pump to cool if overheated.
4. Check the temperature before opening any covers, plates, or plugs.
5. Close the suction and discharge valves.
6. Vent the pump slowly and cautiously.
7. Drain the pump

WARNING!

This pump is designed to handle mild industrial corrosives, mud or slurries containing large entrained solids. Do not attempt to pump volatile, corrosive, or flammable materials which may damage the pump or endanger personnel as result of pump failure.

WARNING!

After the pump has been positioned, make certain that the pump and all piping connections are tight, properly supported and secure before operation.

WARNING!

Do not operate the pump without the guards in place over the rotating parts. Exposed rotating parts can catch clothing, fingers, or tools, causing severe injury to personnel.

WARNING!

Do not remove plates, covers, gauges, pipe plugs, or fittings from an overheated pump. Vapor pressure within the pump can cause parts being disengaged to be ejected with great force. Allow the pump to cool before servicing.

WARNING!

Do not operate the pump against a closed discharge valve for long periods of time. If operated against a closed discharge valve, pump components will deteriorate, and the liquid could come to a boil, pressurize, and cause the pump casing to rupture or explode.

WARNING!

Use lifting and moving equipment in good repair and with adequate capacity to prevent injuries to personnel or damage to equipment. Suction & Discharge hoses and piping must be removed before lifting.

INSTALLATION – SECTION B

Review all SAFETY information in Section A.

Since pump installations are seldom identical, this section offers only general recommendations and practices required to inspect, position and arrange the pump and piping.

Most of the information pertains to a standard static lift application where the pump is positioned above the level of liquid to be pumped.

If installed in a flooded suction application where the liquid is supplied to the pump under pressure, some of the information such as mounting, line configuration, and priming must be tailored to the specific application.

Since the pressure supplied to the pump is critical to performance and safety, be sure to limit incoming pressure to 50% of the maximum permissible operating pressure as shown on the pump performance curve.

For further assistance, contact your All Prime distributor or All Prime Pumps.

Pump Dimensions

See Figure 1 below for the physical dimensions of this pump.

OUTLINE DRAWING

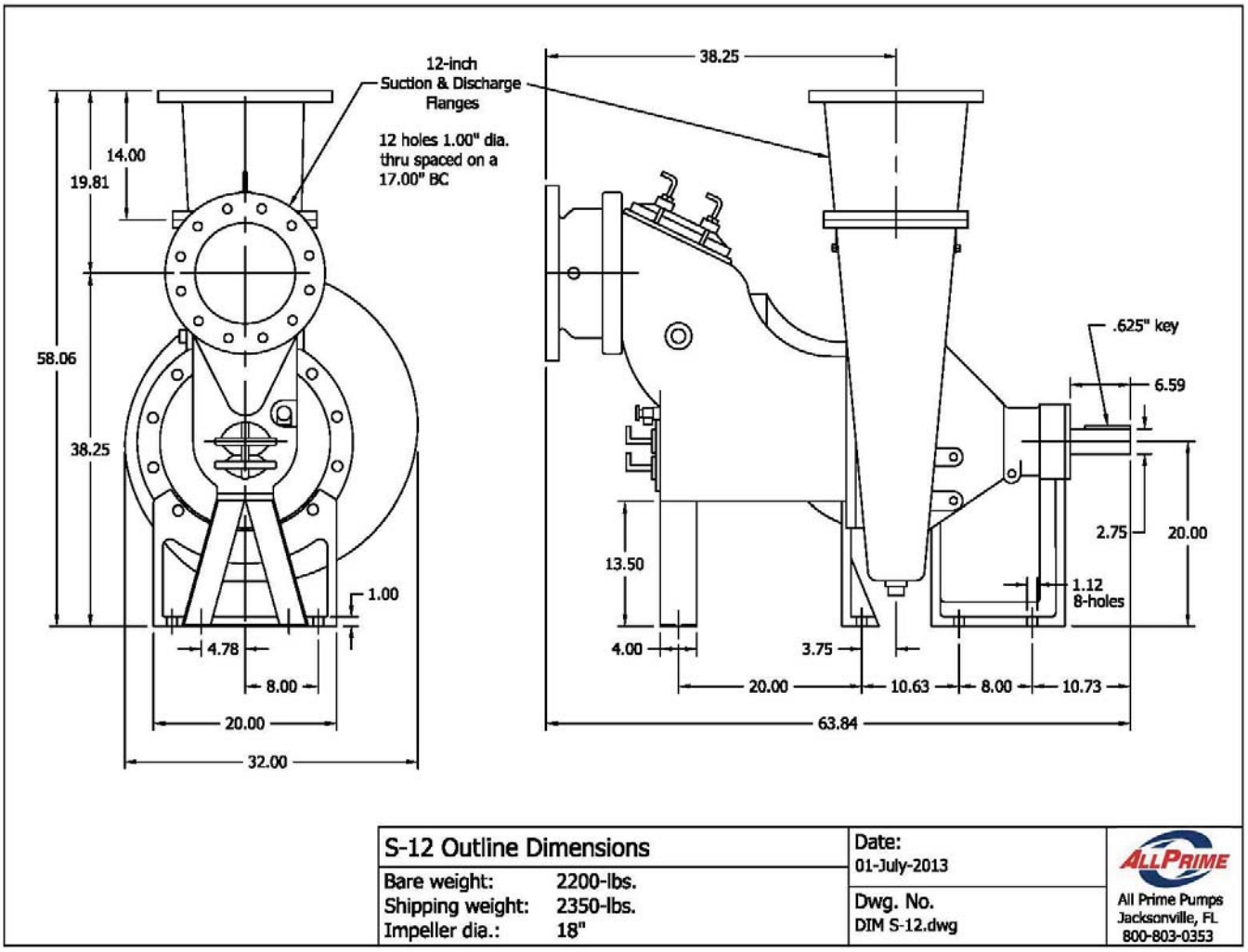


Figure 1. Pump Model S-12

PRE-INSTALLATION INSPECTION

The pump was inspected and tested before shipping from the factory. Before installation, inspect the pump for damage which may have occurred during shipment. Check as follows:

a. Inspect the pump for cracks, dents, damaged threads, and other obvious damage.

b. Check for and tighten loose attaching hardware. Since gaskets tend to shrink after drying, check for loose hardware at mating surfaces.

c. Carefully read all warnings and cautions contained in this manual or affixed to the pump, and perform all duties indicated. Note the direction of rotation indicated on the pump. Check that the pump shaft rotates counterclockwise when facing the back cover plate assembly / impeller end of the pump.

CAUTION!
Only operate this pump in the direction indicate by the arrow on the pump body and on the accompanying decal. Refer to ROTATION in OPERATION, Section C. (page 15)

d. Check levels and lubricate as necessary. Refer to LUBRICATION in the MAINTENANCE AND REPAIR section of this manual and perform duties as instructed. (page 31)

e. If the pump and power source have been stored for more than 12 months, some of the components or lubricants may have exceeded their maximum shelf life. These must be inspected or replaced to ensure maximum pump service.

If the maximum shelf life has been exceeded, or if anything appears to be abnormal, contact your All Prime distributor or the factory to determine the repair or updating policy. Do not put the pump into service until appropriate action has been taken.

POSITIONING PUMP

Lifting

This pump weighs approximately 2200-pounds not including the weight of any accessories, base-frame, motor, etc. Use the proper lifting equipment with adequate capacity. Customer installed equipment such as suction and discharge piping must be removed before attempting to lift.

CAUTION!
The pump assembly can be seriously damaged if the cables or chains used to lift and move the unit are improperly wrapped around the pump.

Mounting

Locate the pump in an accessible place as close as practical to the liquid being pumped. Level mounting is essential for proper operation.
The pump may have to be supported or shimmed to provide for level operation or to eliminate vibration.

Clearance

When positioning the pump, allow a minimum clearance of 18 inches in front of the back cover to permit removal of the cover and easy access to the pump interior.

SUCTION & DISCHARGE PIPING

Pump performance is adversely affected by increase suction lift, discharge elevation and friction losses. See the performance curve and operating range shown on Page 22 to ensure your overall application allows pump to operate within the safe operation range.

Materials

Either pipe or hose maybe used for suction and discharge lines: however, the materials must be compatible with liquid being pumped.

If hose is used in suction lines, it must be the rigid-wall, reinforced type to prevent collapse under suction. Using piping couplings in suction lines is not recommended.

Line Configuration

Keep suction and discharge lines as straight as possible to minimize friction losses. Make minimum use of elbows and fittings, which substantially increase friction loss. If elbows are necessary, use the long radius type to minimize friction loss.

Connections to Pump

Before tightening a connecting flange, align it exactly with the pump port. Never pull a pipe line into place by tightening the flange bolts and/or couplings.

Lines near the pump must be independently supported to avoid strain on the pump which could cause excessive vibration, decrease bearing life, and increased shaft and seal wear.

If hose-type lines are used, they should have adequate support to secure them when filled with liquid and under pressure.

Gauges

Most pumps are drilled and tapped for installing discharge pressure and vacuum suction gauges. If these gauges are desired for pumps that are not tapped, drill and tap the suction and discharge lines not less than 18 inches from the suction and discharge ports and install the lines. Installation closer to the pump may result in erratic readings.

SUCTION LINES

To avoid air pockets which could affect pump priming, the suction line must be as short and direct as possible. When operation involves a suction lift, the line must always slope upward to the pump from the source of the liquid being pumped. If the line slopes down to the pump at any point along the suction run, air pockets will be created.

Fittings

Suction lines should be the same size as the pump inlet. If reducers are used in suction lines, they should be the eccentric type, and should be installed with the flat part of the reducers uppermost to avoid creating air pockets. Valves are not normally used in suction lines, but if a valve is used, install it in a manner to avoid air pockets.

Strainers

If a strainer is furnished with the pump, be certain to use it. Any spherical solids which pass through a strainer furnished with the pump will also pass through the pump itself.

If a strainer is not furnished with the pump, but is installed by the pump user, make certain that the total area of the openings in the strainer is at least three or four times the cross section of the suction line, and that the openings will not permit passage of solids larger than the solids handling capability of the pump.

This pump is designed to handle up to 3-inch (3”) diameter spherical solids.

Sealing

Since even a slight leak will affect priming, head, and capacity, especially when operating with a high suction lift, all connections in the suction line should be sealed with pipe dope to ensure an airtight seal. Follow the sealant manufacturer’s recommendations when selecting and applying the pipe dope. The pipe dope should be compatible with the liquid being pumped.

Suction Lines in Sumps

If a single suction line is installed in a sump, it should be positioned away from the wall of the sump at a distance equal to 1-½ times the diameter of the suction line.

If there is a liquid flow from an open pipe into the sump, the flow should be kept away from the suction inlet because the inflow will carry air down into the sump, and air entering the suction line will reduce pump efficiency.

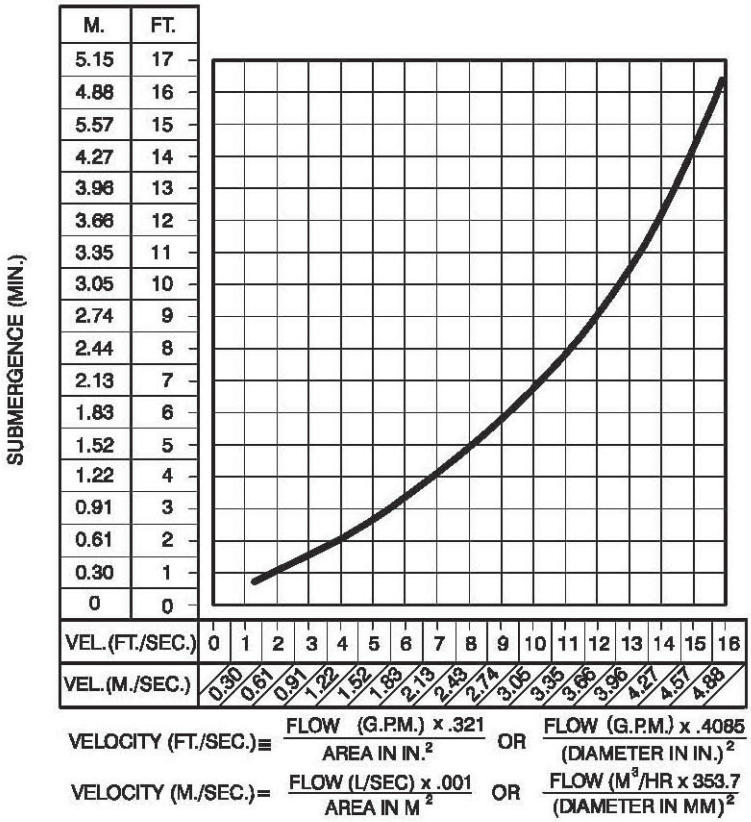
If it's necessary to position inflow close to the suction line, install a baffle between the inflow and the suction line. The baffle will allow entrained air to escape from the liquid before it is drawn into the suction inlet.

If two suction lines are installed in a single sump, the flow paths may interact, reducing the efficiency of one or both pumps. To avoid this, position the suction inlets so that they are separated by a distance equal to at least 3 times the diameter of the suction pipe.

Suction Line Positioning

The depth of submergence of the suction line is critical to efficient pump operation. Figure 2 shows recommended minimum submergence vs. velocity.

NOTE:
The pipe submergence required may be reduced by installing a standard pipe increaser fitting at the end of the suction line. The larger opening size will reduce the inlet velocity. Calculate the required submergence using the following formula based on the increased opening size (area or diameter).



Recommended Minimum Suction Line Submergence vs. Velocity

DISCHARGE LINES

Siphoning

Do not terminate the discharge line at a level lower than of the liquid being pumped unless a siphon breaker is used in the line. Otherwise, a siphoning action causing damage to the pump could result.

Valves

If a throttling valve is desired in the discharge line, use a valve as large as the largest pipe to minimize friction losses. Never install a throttling valve in a suction line.

With high discharge heads, it is recommended that a throttling valve and a system check valve be installed in the discharge line to protect the pump from excessive shock pressure and reverse rotation when it is stopped.

CAUTION!
If the application involves a high discharge head, gradually close the discharge throttling valve before stopping the pump.

Bypass Lines

Self-priming pumps are not air compressors. During the priming cycle, air from the suction line must be vented to atmosphere on the discharge side. If the discharge line is open, and a check valve has been installed in the discharge line, the discharge side of the pump must be opened to atmospheric pressure through a bypass line installed between the pump discharge an the check valve. A self-priming centrifugal pump will not prime if there is sufficient static liquid head to hold the discharge check valve closed.

NOTE:
The bypass line should be sized so that it does not affect pump discharge capacity; however, the bypass line should be at least 1 inch in diameter to minimize the chance of plugging.

In **LOW** discharge head applications (less than 30 feet or 9 meters), it is recommended that the bypass line be run back to the wet well, and locate 6 inches below the water level or cut-off point of the level pump. In some installations, this bypass line may be terminated with a six-to-eight foot length of 1-¼ inch ID smooth-bore hose; air and liquid vented during the priming process will then agitate the hose and break up any solids, grease, or other substances likely to cause clogging.

CAUTION!
A bypass line that is returned to a wet well must be secured against being drawn into the pump suction inlet.
It is also recommended that pipe unions be installed at each 90º elbow in a bypass line to ease disassembly and maintenance.

In **HIGH** discharge head applications (more than 30 feet), an excessive amount of liquid may be bypassed and forced back to the wet well under the full working pressure of the pump; this will reduce overall pumping efficiency. Therefore, it is recommended that a All Prime Automatic Air Release Valve be installed in the bypass line.

All Prime Automatic Air Release Valves are reliable, and require minimum maintenance. See AUTOMATIC AIR RELEASE VALVE in this section for installation and theory of operation of the Automatic Air Release Valve. Contact All Prime Pumps for selection of an Automatic Air Release Valve to fit your application.

If the installation involves a flooded suction such as below-ground lift station - A pipe union and manual shut-off valve may be installed in the bleed line to allow service of the valve without shutting down the station, and to eliminate the possibility of flooding. If a manual shut-off valve is installed anywhere in the air release piping, it must be a full-opening ball type valve to prevent plugging by solids.

DANGER!
If a manual shut-off valve is installed in a bypass line, it must not be left closed during operation. A closed manual shut-off valve may cause a pump which has lost prime to continue to operate without reaching prime, causing dangerous overheating and possible explosive rupture of the pump casing. Personnel could be severely injured.

Allow an over-heated pump to cool before servicing. Do not remove plates, covers, gauges, or fittings from an overheated pump. Liquid within the pump can reach boiling temperatures, and vapor pressure within the pump can cause parts being disengaged to be ejected with great force. After the pump cools, drain the liquid from the pump by removing the casing drain plug. Use caution when removing the plug to prevent injury to personnel from hot liquid.

AUTOMATIC AIR RELEASE VALVE

When properly installed and correctly adjusted to the specific hydraulic operating conditions of the application, the All Prime Automatic Air Release Valve will permit air to escape through the bypass line, and then close automatically when the pump is fully primed and pumping at full capacity.

Theory of Operation

Figures 3 and 4 show a cross-sectional view of the Automatic Air Release Valve, and a corresponding description of operation.

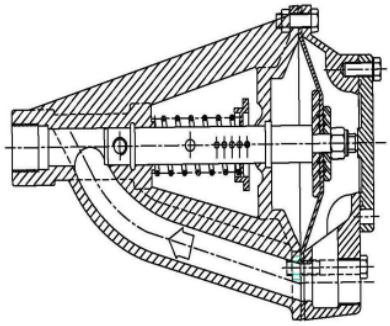


Figure 3. Valve in Open Position

During the priming cycle, air from the pump casing flows through the bypass line, and passes through the Air Release valve to the wet well Figure 3.

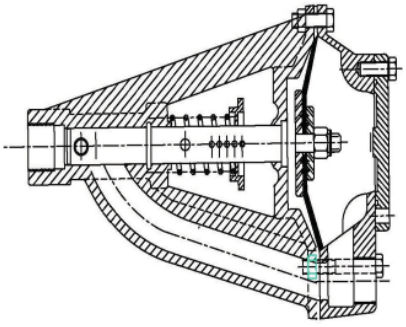


Figure 4. Valve in Closed Position

When the pump is fully primed, pressure resulting from flow against the valve diaphragm compresses the spring and closes the valve Figure 4.

The valve will remain closed, reducing the bypass of liquid to 1 to 5 gallons per minute, until the pump loses prime or stops.

WARNING!

Some leakage (1 to 5 gallons per minute) will occur when the valve is fully closed. Be sure the bypass line is directed back to the wet well or tank to prevent hazardous spills.

When the pump shuts down, the spring returns the diaphragm to its original position. Any solids that may have accumulated in the diaphragm chamber settle to the bottom and are flushed out during the next priming cycle.

NOTE:

The valve will remain open if the pump does not reach its designed capacity or head. Valve closing pressure is dependent upon the discharge head of the pump at full capacity. The range of the valve closing pressure is established by the tension rate of the spring as ordered from the factory. Valve closing pressure can be further adjusted to the exact system requirements by moving the spring retaining pin up or down the plunger rod to increase or decrease tension on the spring. Contact your All Prime distributor or All Prime Pumps for information about an Automatic Air Release Valve for your specific application.

Air Release Valve Installation

The Automatic Air Release Valve must be independently mounted in a horizontal position and connected to the discharge line of the self-priming centrifugal pump. See Figure 5 on next page.

NOTE:

If the Air Release Valve is to be installed on a staged pump application, contact the factory for specific installation instructions.

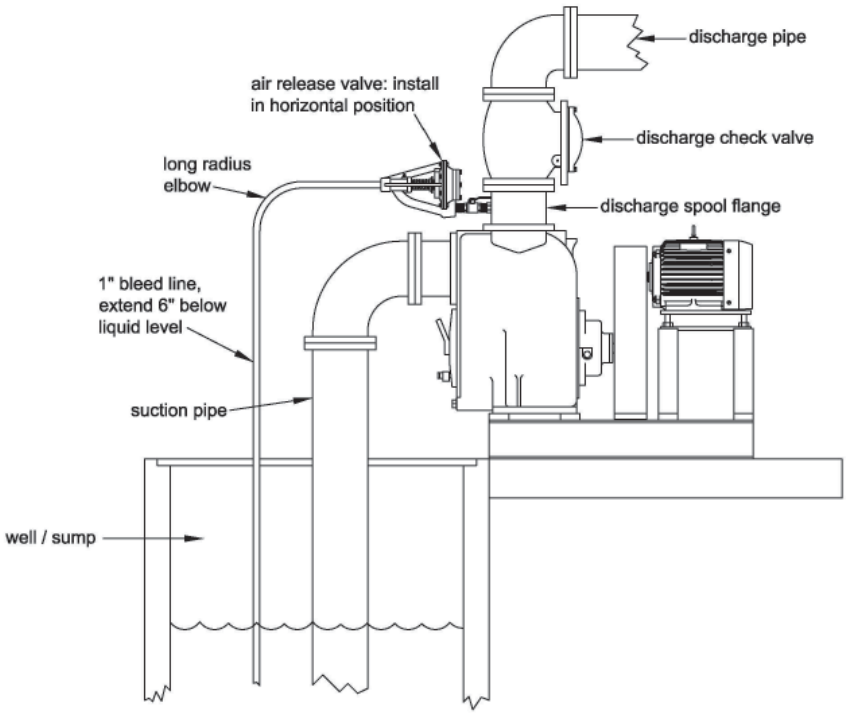


Figure 5. Typical Automatic Air Release Valve Installation

The valve inlet must be installed between the pump discharge port and the non-pressurized side of the discharge check valve. The valve inlet is it at the large end of the valve body, and is provided with standard 1-inch NPT pipe threads.

The valve outlet is located at the opposite end of the valve, and is also equipped with standard 1-inch NPT pipe threads. The outlet should be connected to a bleed line which slopes back to the wet well or sump. The bleed line must be the same size as the inlet piping, or larger. If piping is used for the bleed line, avoid the use of elbows whenever possible.

NOTE:
It is recommended that each Air Release Valve be fitted with an independent bleeder line directed back to the wet well. However, if multiple air Release Valves are installed in a system, the bleeder lines may be directed to a common manifold pipe. Contact your All Prime distributor or All Prime Pumps for information about installation of an Automatic Air Release Valve for your specific application.

ALIGNMENT

The alignment of the pump and its power source is critical for trouble-free mechanical operation. In either a flexible-coupling or V-belt driven system, the driver and pump must be mounted so that their shafts are aligned with and parallel to each other. It is imperative that alignment be checked after the pump and piping are installed, and before operation.

NOTE:
Check 'Rotation, Section C', before alignment of the pump. (page 15)

When mounted at All Prime Pumps, the driver and pump are aligned before shipment. Misalignment may occur in transit and handling. Pumps must not be operated prior to checking alignment. The pump casing-feet and/or pedestal-feet, and the driver mounting bolts should also be tightly secured.

WARNING!

When checking alignment, disconnect the power source to ensure that the pump will remain inoperative.

CAUTION!

Adjusting the alignment in one direction may alter the alignment in another direction. Check each procedure after altering alignment.

Coupled Drives

When using couplings, the axis of the power source must be aligned with the axis of the pump shaft in both the horizontal and vertical planes. Most couplings require a specific gap or clearance between the driving and the driven shafts. Refer to the coupling manufacturer's service literature.

Align spider insert type couplings by using calipers to measure the dimensions on the circumference of the outer ends of the coupling hub every 90 degrees. The coupling is in alignment when the hub ends are the same distance apart at all points. (see Figure 6A)

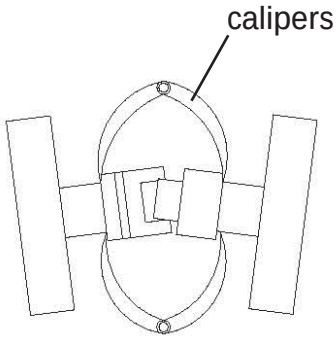


Figure 6A. Aligning Spider Type Couplings

Align non-spider type couplings by using a feeler gauge or taper gauge between the coupling halves every 90 degrees. The coupling is in alignment when the hubs are the same distance apart at all points. (see Figure 6B)

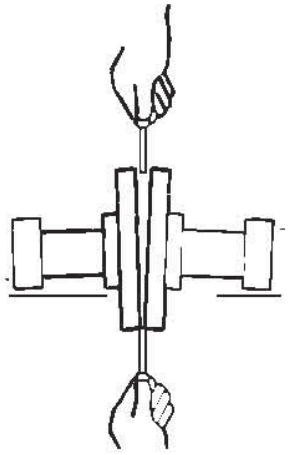


Figure 6B. Aligning Non-Spider Type Couplings

Check parallel adjustment by laying a straightedge across both coupling rims at the top, bottom, and side. When the straightedge rests evenly on both halves of the coupling, the coupling is in horizontal & parallel alignment. If the coupling is misaligned use a feeler gauge between the coupling and the straightedge to measure the amount of misalignment. (see Figure 6C)

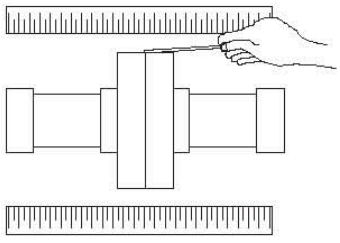
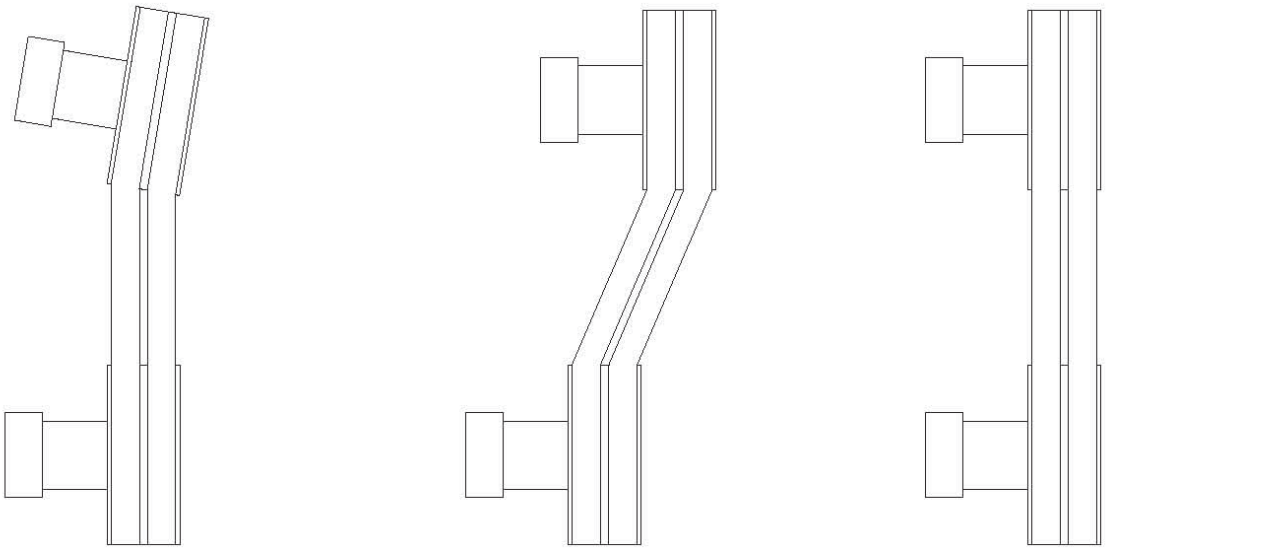


Figure 6C. Aligning Non-Spider Type Couplings

V-Belt Drives

When using V-belt drives, the power source and the pump must be parallel. Use a straightedge along the sides of the pulleys to ensure that the pulleys are properly aligned (see Figure 6D). In drive systems using two or more belts, make certain that the belts are a matched set; unmatched sets will cause accelerated belt wear.



WRONG
MISALIGNED: SHAFTS
NOT PARALLEL

WRONG
MISALIGNED: SHAFTS
NOT IN LINE

CORRECT
ALIGNED: SHAFTS PARALLEL
AND SHEAVES IN LINE

Figure 6D. Alignment of V-Belt Driven Pumps

Tighten the belts in accordance with the belt manufacturer's instructions. If the belts are too loose, they will slip; if the belts are too tight, there will be excessive power loss and possible bearing failure. Select pulleys that will match the proper speed ratio; over speeding the pump may damage both pump and power source.

DANGER!

Do not operate the pump without the guard in place over the rotating parts. Exposed rotating parts can catch clothing, fingers, or tools, causing severe injury to personnel.

OPERATION – SECTION C

Review all SAFETY information in Section A.

Follow instructions on all tags, labels and decals attached to the pump.

WARNING!
This pump is designed to handle mild industrial corrosives, mud or slurries containing large entrained solids. Do not attempt to pump volatile; corrosive, or flammable liquids which may damage the pump or endanger personnel as a result of pump failure.

CAUTION!
Pump speed and operating conditions must be within the performance range shown on Page 22.

PRIMING

Install the pump and piping as describe in INSTALLATION. Make sure that the piping connections are tight, and that the pump is securely mounted. Check that the pump is properly lubricated (see LUBRICATION in MAINTENANCE AND REPAIR).

CAUTION!
Never operate this pump unless there is liquid in the pump casing. The pump will not prime when dry. Extended operation of a dry pump will destroy the seal assembly.

Add liquid to the pump casing when:

1. The pump is being put into service for the first time.
2. The pump has not been used for a considerable length of time.
3. The liquid in the pump casing has evaporated.

Once the pump casing has been filled, the pump will prime and reprime as necessary.

WARNING!
After filling the pump casing, reinstall and tighten the fill plug. Do not attempt to operate the pump unless all connecting piping is securely installed. Otherwise, liquid in the pump forced out under pressure could cause injury to personnel.

To fill the pump, remove the 'fill-cover' in the top of the casing, and add clean liquid until the casing is filled. Replace the fill-cover before operating the pump.

STARTING

Consult the operations manual furnished with the power source.

Rotation

The correct direction of pump rotation is:
counter-clockwise - from impeller 'end'
-or- clockwise - from drive 'end'
(see 'arrow' photos below)
The pump will be damaged by incorrect rotation. If pump performance is not within the specified limits (see curve Page 22), check the direction of power source rotation before further troubleshooting.

Remove v-belts, couplings, or otherwise disconnect the pump from the motor before checking motor rotation. Operate the motor independently while observing the direction of the motor shaft, or cooling fan.

drive 'end'

If rotation is incorrect on a three-phase motor, have a qualified electrician interchange any of the phase wires to change direction. If rotation is incorrect on a single-phase motor, consult the literature supplied with the motor for specific instructions.

OPERATION

Lines With a Bypass

If an All Prime Automatic Air Release Valve has been installed, the valve will automatically open to allow the pump to prime, and automatically close after priming is complete (see INSTALLATION for Air Release Valve operation.

Lines Without a Bypass

Open all valves in the discharge line and start the power source. Priming is indicated by a positive reading on the discharge pressure gauge or by a quieter operation. The pump may not prime immediately because the suction line must first fill with liquid. If the pump fails to prime within five minutes, stop it and check the suction line for leaks.

After the pump has been primed, partially close the discharge line throttling valve in order to fill the line slowly and guard against excessive shock pressure which could damage pipe ends, gaskets, etc. connected to the line. When the discharge line is completely filled, adjust the throttling valve to the required flow rate.

WARNING!
Do not operate the pump against a closed discharge throttling valve for long periods of time. If operated against a closed discharge throttling valve, pump components will deteriorate, and the liquid could come to a boil, build pressure, and cause the pump casing to rupture or explode.

Leakage

No leakage should be visible at pump mating surfaces, or at pump connections or fittings. Keep all line connections and fittings tight to maintain maximum pump efficiency.

Liquid Temperature & Overheating

The maximum liquid temperature for this pump is 160º F (71º C). Do not apply it at a higher operating temperature.
Overheating can occur if operated with the valves in the suction or discharge lines closed. Operating against closed valves could bring the liquid to a boil, build pressure, and cause the pump to rupture or explode. If overheating occurs, stop the pump and allow it to cool before servicing it. Refill the pump casing with cool liquid.

DANGER!
Allow an over-heated pump to cool before servicing. Do not remove plates, covers, gauges, or fittings from an overheated pump. Liquid within the pump can reach boiling temperatures, and vapor pressure within the pump can cause parts being disengaged to be ejected, with great force. After the pump cools, drain the liquid from the pump by removing the casing drain plug. Use caution when removing the plug to prevent injury to personnel from hot liquid.

As safeguard against rupture or explosion due to heat, this pump is equipped with a pressure relief valve which will open if vapor pressure within the pump casing reaches a critical point. If overheating does occur, stop the pump immediately and allow it to cool before servicing it. Approach any overheated pump cautiously. It is recommended that the pressure relief valve assembly be replaced at each overhaul, or any time the pump casing overheats and activates the valve. Never replace this valve with a substitute which has not been specified or provided by All Prime Pumps.

Strainer Check

If a suction strainer has been shipped with the pump or installed by the user, check the strainer regularly, and clean it as necessary. The strainer should also be checked if pump flow rate begins to drop. If a vacuum suction gauge has been installed, monitor and record the readings regularly to detect strainer blockage.

Never introduce air or steam pressure into the pump casing or piping to remove a blockage. This could result in personal injury or damage to the equipment. If back flushing is absolutely necessary, liquid pressure must be limited to 50% of the maximum permissible operating pressure show on the pump performance curve.

Pump Vacuum Check

With the pump inoperative, install a vacuum gauge in the system, using pipe dope on the threads. Block the suction line and start the pump. At operating speed the pump should pull a vacuum of 20 inches or more of mercury. If it does not, check for air leaks in the seal, gasket, or discharge valve.

Open the suction line, and read the vacuum gauge with the pump primed and at operation speed. Shut off the pump. The vacuum gauge reading will immediately drop proportionate to static suction lift, and should then stabilize. If the vacuum reading falls off rapidly after stabilization, an air leak exists. Before checking for the source of the leak, check the point of installation of the vacuum gauge.

STOPPING

Never stop the flow of liquid suddenly. If the liquid being pumped is stopped abruptly, damaging shock waves can be transmitted to the pump and piping system. Close all connecting valves slowly.
On engine driven pumps, reduce the throttle speed slowly and allow the engine to idle briefly before stopping.

CAUTION!
If the application involves a high discharge head, gradually close the discharge throttling valve before stopping the pump.
After stopping the pump, lock out or disconnect the power source to ensure that the pump will remain inoperative.

WARNING!
Do not operate the pump against a closed discharge throttling valve for long periods of time. If operated against a closed discharge throttling valve, pump components will deteriorate, and the liquid could come to a boil, build pressure, and cause the pump casing to rupture or explode.

Cold Weather Preservation

In below freezing conditions, drain the pump to prevent damage from freezing. Also, clean out any solids by flushing with a hose. Operate the pump for approximately one minute; this will remove any remaining liquid that could freeze the pump rotating parts. If the pump will be idle for more than a few hours, or if it has been pumping liquids containing a large amount of solids, drain the pump, and flush it thoroughly with clean water. To prevent large solids from clogging the drain port and preventing the pump from completely draining, insert a rod or stiff wire in the drain port, and agitate the liquid during the draining process. Clean out any remaining solids by flushing with a hose.

BEARING TEMPERATURE CHECK

Bearings normally run at higher than ambient temperatures because of heat generated by friction. Temperatures up to 160º F (71º C) are considered normal for bearings, and they can operate safely to at least 180º F (82º C). Checking bearing temperatures by hand is inaccurate. Bearing temperatures can be measured accurately by placing a contact-type thermometer against the housing. Record this temperature for future reference.

A sudden increase in bearing temperature is a warning that the bearings are at the point of failing to operate properly. Make certain that the bearing lubricant is of the proper viscosity and at the correct level (see LUBRICATION in MAINTENANCE AND REPAIR).

Bearing overheating can also be caused by shaft misalignment and/or excessive vibration.

When pumps are first started, the bearings may seem to run at temperatures above normal. Continued operation should bring the temperatures down to normal levels.

TROUBLESHOOTING - SECTION D

Review all SAFETY information in Section A.

WARNING!
Before attempting to open or service the pump:

1. Familiarize yourself with this manual.
2. Lock out or disconnect the power source to ensure that the pump will remain inoperative.
3. Allow the pump to cool if overheated.
4. Check the temperature before opening any covers, plates, or plugs.
5. Close the suction and discharge valves.
6. Vent the pump slowly and cautiously.
7. Drain the pump.

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP FAILS TO PRIME	Not enough liquid in casing.	Add liquid to casing. See PRIMING.
	Suction check valve contaminated or damaged.	Clean or replace check valve.
	Air leak in suction line.	Correct leak.
	Lining of suction hose collapsed.	Replace suction Hose.
	Leaking or worn seal or pump gasket.	Check pump vacuum. Replace leaking or worn seal or gasket.
	Suction lift or discharge head too high.	Check piping installation and install bypass line if needed. See INSTALLATION.
	Strainer clogged.	Check strainer and clean if necessary.

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
PUMP STOPS OR FAILS TO DELIVER RATED FLOW OR PRESSURE	Air leak in suction line.	Correct leak.
	Lining of suction hose collapsed.	Replace suction hose.
	Leaking or worn seal or pump gasket.	Check pump vacuum. Replace leaking or worn seal or gasket.
	Strainer clogged.	Check strainer and clean if necessary.
	Suction intake not submerged at proper level or sump too small.	Check installation and correct submergence as needed.
	Impeller or other wearing parts worn or damaged.	Replace worn or damaged parts. Check that impeller is properly centered and rotates.
	Impeller clogged.	Free impeller of debris.
	Pump speed too slow.	Check driver output; check belts or couplings for slippage.
	Discharge head too high.	Install bypass line.
	Suction lift too high.	Measure lift w/vacuum gauge. Reduce lift and/or friction losses in suction line.
PUMP REQUIRES TOO MUCH POWER	Pump speed too high	Check driver output; check that sheaves or motor rpm are correctly sized.
	Discharge head too low.	Adjust discharge valve.
	Liquid solution too thick.	Dilute if possible.
	Bearing(s) frozen.	Disassemble pump and check bearing(s).
PUMP CLOGS FREQUENTLY	Liquid solution too thick.	Dilute if possible.
	Discharge flow too slow.	Open discharge valve fully to increase flow rate, and run power source at maximum governed speed.
	Suction check valve or foot valve Clogged or binding.	Clean valve.

TROUBLE	POSSIBLE CAUSE	PROBABLE REMEDY
EXCESSIVE NOISE	Cavitation in pump.	Reduce suction lift and/or friction losses in suction line. Record vacuum and pressure gauge readings and consult local representative or factory.
	Pumping entrained air.	Locate and eliminate source of air bubble.
	Pump or drive not securely mounted.	Secure mounting hardware.
	Impeller clogged or damaged.	Clean out debris; replace damaged parts.
BEARINGS RUN TOO HOT	Bearing temperature is high, but within limits.	Check bearing temperature regularly to monitor any increase.
	Low or incorrect lubricant.	Check for proper type and level of lubricant.
	Suction and discharge lines not properly supported.	Check piping installation for proper support.
	Drive misaligned.	Align drive properly.

PREVENTIVE MAINTENANCE

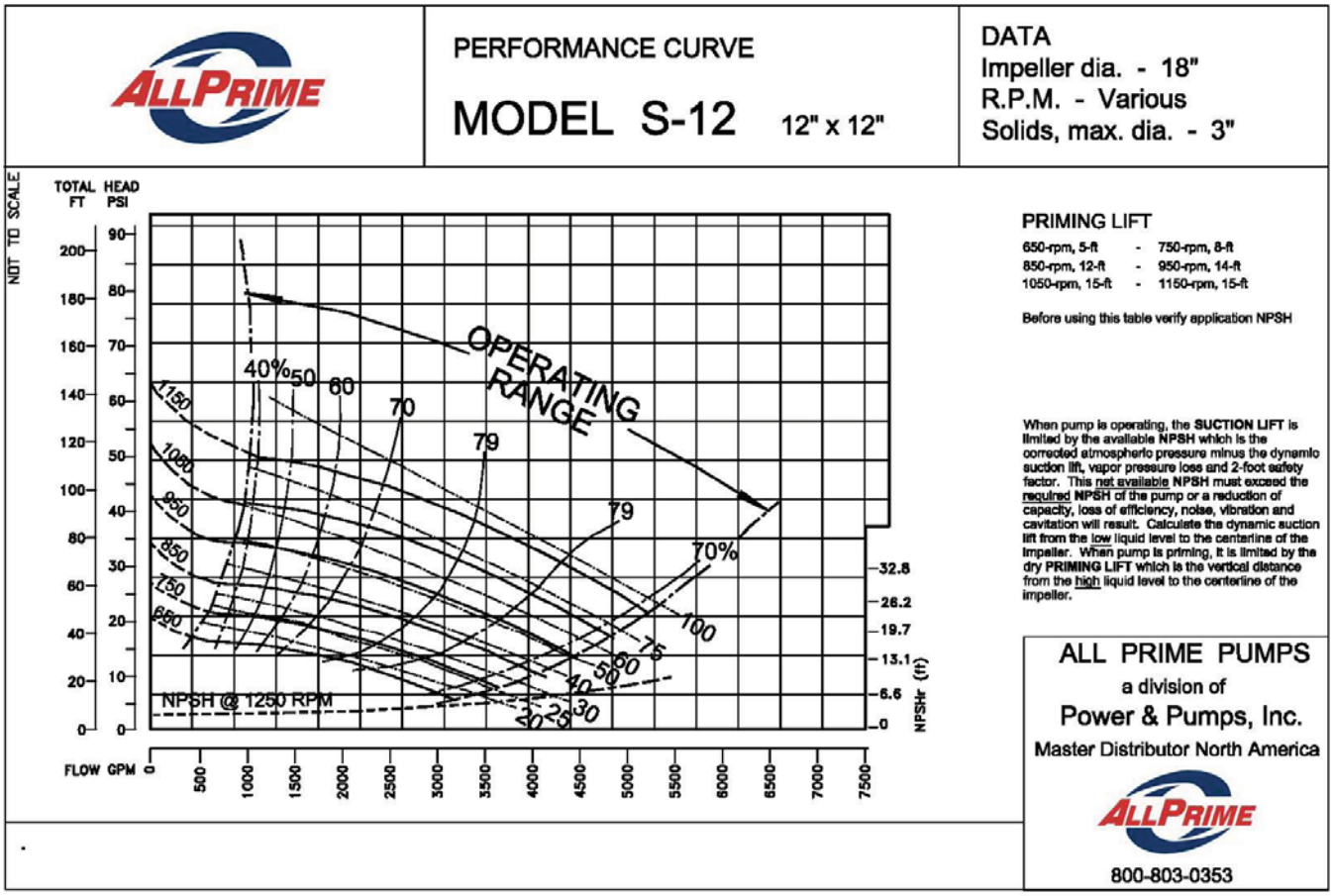
Pump applications are seldom identical and wear is directly affected by abrasive qualities, pressure & temperature of the liquid being pumped. Below are general recommendations for routine preventive maintenance. The following schedule will help assure trouble-free performance and long life from your pump. New applications should be inspected after 250 hours and subsequent inspections should be performed as indicated below.

- Daily: check general condition (temp., unusual vibration & noises, cracks, leaks, loose hardware) pump performance (gauges, speed, flow)
- Weekly: check lubrication in bearing & seal chamber
- Monthly: check v-belts or shaft coupling, clean air release valve plunger (if equipped)
- Semi-Annually: check clearance: impeller to wear-plate, & impeller to seal-plate
- Annually: change lubrication in bearing & seal chamber, clean relief valve, inspect: check valve, pump & driver alignment, bearings, & piping

* Above schedule based on intermittent duty cycle equal to approx. 4000 hours annually. Adjust schedule as required for lower or higher duty cycles or extreme operating conditions.

MAINTENANCE AND REPAIR OF THE WEARING PARTS OF THE PUMP WILL MAINTAIN PEAK OPERATING PERFORMANCE.

Performance Curve



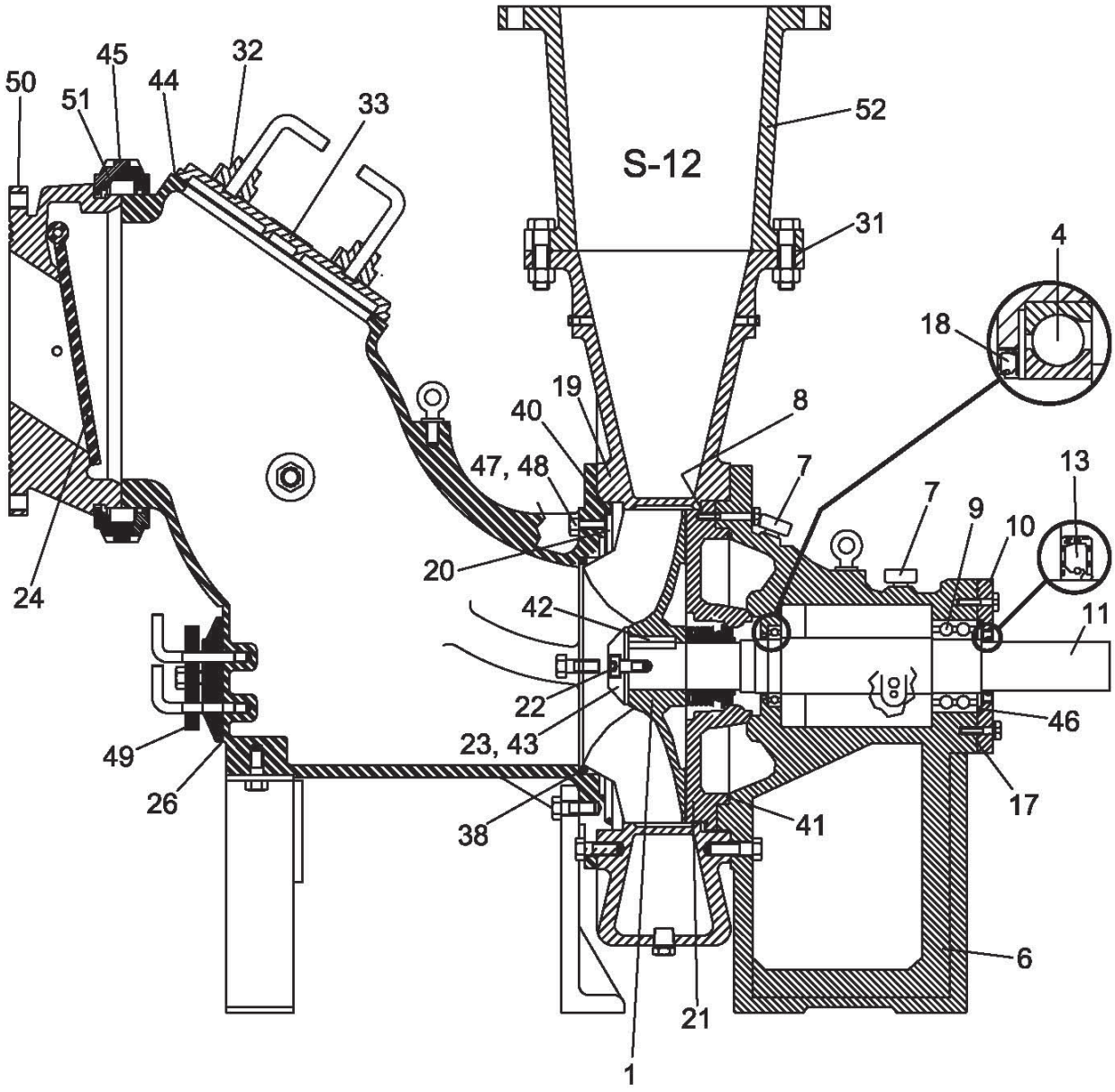
STANDARD PERFORMANCE FOR PUMP MODEL S-12

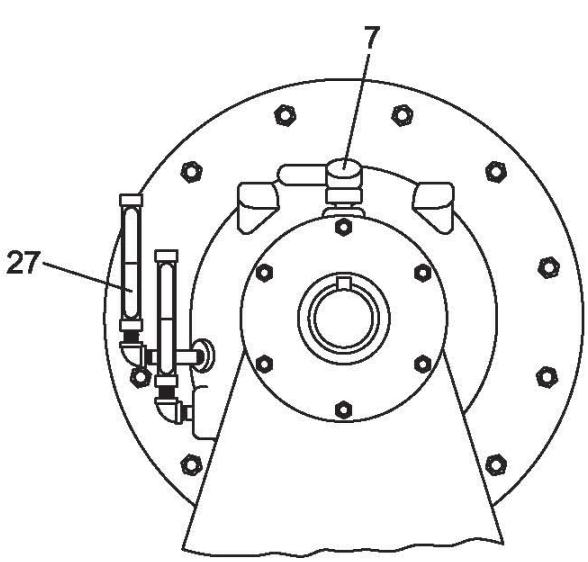
Based on 70º F (21º C) clear water at sea level with minimum suction lift. Since pump installations are seldom identical, your performance may be difference due to such factors as viscosity, specific gravity, elevation, temperature, and impeller trim.

CAUTION!

Pump speed and duty-points must be within the 'operating range' shown on the curve.

S-12 Parts





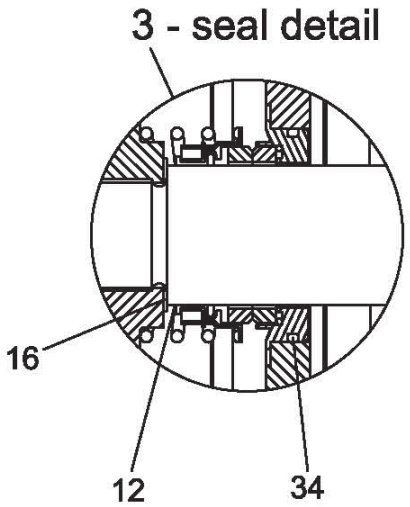


Figure 1. & 2. - Pump Model S-12

S-12 Parts

item	description	AP part no.	GR part no.
1*	impeller S-12 - C/I	316.010.100	38615-710-11030
3*	seal, mech. - 2.75"	316.010.300	46512-061
4*	bearing, I/B - S-12	316.011.300	23413-216
6	housing, bearing S-12 - std.	316.010.400	38257-511-10010
7	vent, air	310.010.601	S1703
8*	o-ring, casing - Buna	316.011.600	25152-283
9*	bearing, O/B - S-12	316.012.300	23421-417
10	cap, bearing S-12 - std.	316.010.900	38322-419-10010
11	shaft S-12 - std.	316.011.100	38512-519-16040
12*	shaft sleeve	316.012.400	31513-015-17200
13*	oil seal O/B - Nitrile	316.011.200	25258-851
15	o-ring, sleeve - Buna	310.139.000	25152-139
16*	shims, impeller	316.011.500	48261-033
17*	o-ring, bearing cap - Buna	315.013.800	S1874
18*	oil seal I/B - Nitrile	316.011.200	25258-851
19	casing S-12 - std.	316.030.000	46471-534
20*	wear plate S-12 - std.	316.210.000	38691-808-1103
21	seal plate S-12 - std.	316.011.900	38272-706-10010
22	screw, impeller - std.	316.011.700	BD1206-15990
23	washer, impeller - std.	316.011.800	31167-012-15030
24*	check valve S-12 - Neoprene	316.120.000	46411-068
26*	gasket, cleanout cover S-12	316.190.000	38682-016-20000
27	sight gauge	316.011.400	26714-011
31*	gasket, disch & suction flg S-12	316.040.000	2751G-18000
32	clamp bar, fill cover S-12 - std.	316.270.000	12872-11000
33	plate, fill cover S-12 - std.	316.300.000	48271-026
34*	o-ring, seal plate - Buna	316.011.650	25152-256
38*	o-ring, wear plate ID - Buna	316.013.100	25152-278
40*	o-ring, wear plate OD - Buna	316.011.600	25152-283
41*	o-ring, pedestal - Buna	316.013.200	25152-282
42*	key, impeller	316.012.900	N0812-15990
43*	pin, impeller	316.012.800	S2197
44*	gasket, cover plate S-12	315.191.000	38688-015-20000
45	victaulic coupling S-12	316.013.600	25552-214
46*	washer, wave	316.012.700	23963-333
47	screw, wear plate adj.	316.013.300	31871-040
48	nut, wear plate jam	316.013.400	AT08-15991
49	clamp bar, cleanout cvr. S-12	316.190.100	38111-310 11010
50	check valve body S-12 - std.	316.030.300	38341-806-10010
51	gasket, victaulic S-12 - rubber	316.013.610	
52	discharge adapter S-12 - std.	316.030.100	25512-035

ALL PRIME PUMPS
p. 800-803-0353

Notes:

1. p/n 316.010.300 mechanical seal, component - includes sleeve o-ring, & impeller shim set.
2. parts are FOB Jacksonville, FL
3. * indicates recommended spares

July 2013

PUMP & SEAL DISASSEMBLY & REASSEMBLY

Review all SAFETY Information in Section A.

Follow the instructions on all tags, label and decals attached to the pump.
This pump requires little service due to its rugged, minimum-maintenance design. However, if it becomes necessary to inspect or replace the wearing parts, follow these instructions and use with the sectional views and parts lists. (Pages 23 & 24)

Many service functions may be performed by draining the pump and removing the access covers. If major repair is required, the piping and/or power source must be disconnected. The following instructions assume complete disassembly is required.

Before attempting to service the pump, disconnect or lock out the power source and take precautions to ensure that it will remain inoperative. Close all valves in the suction and discharge lines.

For power source disassembly and repair, consult the literature supplied with the power source, or contact your local power source representative.

WARNING!
Before attempting to open or service the pump:
1. Familiarize yourself with this manual.
2. Disconnect or lock out the power source to ensure that the pump will remain inoperative.
3. Allow the pump to cool if overheated.
4. Check the temperature before opening any covers, plates, or plugs.
5. Close the suction and discharge valves.
6. Vent the pump slowly and cautiously.
7. Drain the pump.

WARNING!
Use lifting and moving equipment in good repair and with adequate capacity to prevent injuries to personnel or damage to equipment.

Suction Check Valve Disassembly

Remove the pump casing drain plug and drain the pump. Clean and reinstall the drain plug.

For access to the flap valve, loosen the cover clamp screws and remove the cover clamps. Remove the clean out cover and gasket.

Reach through the access opening and remove the capscrews, lockwasher and pivot caps which secure the flap valve assembly. Remove the flap valve thorough the access opening.

Inspect the flap valve for wear or damage. Remove the four stainless steel flat washers from the pivot arm. Tie and tag the washers for future reference.

If the check valve body must be removed, disconnect the suction flange hardware and loosen the “victaulic” coupling clamp. Separate the valve body from the suction elbow. Inspect the rubber “victaulic” gasket for damage

Pump Disassembly

Service to the wear plate, impeller, or seal assembly may be accomplished from either side of the pump casing. The following instructions are based on service from the suction side.

Install a lifting eye bolt in the 5/8-11 UNC tapped located in the suction elbow. Tighten the eye bolt completely until the threads bottom out.

Remove the suction piping. Remove the suction check valve assembly if additional clearance is required.

Remove the foundation hardware from the elbow support and pedestal support. Tie and tag any shims used under the supports.

Support the suction elbow using a suitable hoist. Separate the elbow the pump casing by removing the capscrews, hex nut, and lockiwashers.

WARNING!
Do not attempt to lift the complete pump unit using the lifting eye. It is designed to facilitate removal or installation of individual components only. Additional weight may result in damage to the pump or failure of the eye bolt.

NOTE!
To ease removal of the suction elbow the pump casing, it may be necessary to loosen the wear plate retaining hardware. If the wear plate is loosened, the impeller face clearance will require adjustment. See Pump Reassembly.

Inspect the wear plate and O-ring for damage or wear. If the wear plate must be replaced, remove the rex nuts and lockwashers from the wear plate studs. Loosen the jam nuts and the adjusting screws out until the wear plate is free. Inspect the O-ring for damage.

To loosen the impeller, remove the socket head capscrew, the impeller washer, and roll pin.

Install two capscrews in the 3/8-16 UNC tapped holes located in the impeller hub, and use a gear puller to slide the impeller from the shaft. Retain the shaft key. Replace the impeller if cracked or badly worn.

Remove the impeller adjusting shims. For ease of reassembly tie and tag the shims, or measure and record their thickness.

Seal Disassembly

NOTE!
There is an air filled cavity with an open drain hole located directly behind the seal plate. If oil escapes from the drain, the seal plate would be required. The drain hole is tapped, but installation of a pipe plug is not recommended.

Before removing the seal, disconnect the feed tube from the barbed elbow and plug the tube to stop the flow of oil. Remove the seal cavity drain plug and drain the cavity. Clean and reinstall the drain plug.

Carefully remove the spring, retainer, rotating and stationary seal elements, and the shaft sleeve, using a stiff wire with a hooked end if necessary. Be sure to remove the two O-rings located under the shaft sleeve.

Clean the seal cavity and shaft with a soft cloth soaked in cleaning solvent.

 **WARNING!**
Most cleaning solvents are toxic and flammable. Use them only in a well-ventilated area free from excessive heat, sparks, and flame. Read and follow all precautions printed on solvent containers.

If no further disassembly is required, refer to Seal Reassembly.

Shaft & Bearing Disassembly

Disconnect the discharge adaptor from the piping system by removing the attaching hardware. If additional clearance in required, remove the capscrews, lockwashers, and hex nuts securing the discharge adaptor and gasket to the pump casing.

Remove the capscrews, lockwashers, and flat washers securing the sight gauge brackets to the pedestal. Inspect the sight gauge and attaching parts for leaks or cracks.

Support the pump casing using a suitable hoist and remove the remaining capscrews ant lockwasher. Separate the casing from the pedestal assembly.

Remove the pump casing O-ring and inspect for damage.

Install a lifting eye bolt in the 5/8-11 UNC tapped hole located on top of the pedestal. Tighten the eye bolt completely until the threads bottom out.

Remove the foundation mounting hardware from the pedestal feet. Tie and tag any shims used under the pedestal.

Separate the pedestal assembly from the power source. Retain the shaft key.

 **WARNING!**
Do not attempt to lift the complete pump unit using the lifting eye. It is designed to facilitate removal or installation of individual components only. Additional weight may result in damage to the pump or failure of the eye bolt.

Separate the seal plate from the pedestal by removing capscrews and lockwashers. Remove the pedestal O-ring and seal plate O-ring.

Before opening the pedestal cavity, drain the oil by removing the pedestal drain plug. Clean and reinstall the plug.

Remove the bearing cap and wave washer and inspect the bearing cap O-ring for damage. Press the oil seal out of the cap, if required.

Place a block of wood against the impeller end of the shaft and drive the shaft and bearings from the pedestal bore.

Use a bearing puller to remove the inboard bearing and outboard bearing from the impeller shaft.

Press the inboard oil seal from the pedestal bore if badly worn.

Shaft & Bearing Reassembly

Clean the bore of the pedestal and seal plate, as well as the shaft and component parts with a cloth soaked in cleaning solvent. Inspect the parts for wear and replace as necessary.

WARNING!

Most cleaning solvents are toxic and flammable. Use them only in a well-ventilated area free from excessive heat, sparks, and flame. Read and follow all precautions printed on solvent containers.

NOTE!

Be sure the oil return grooves provided under the bearings are clean and free of dirt.

Soak the bearings in cleaning solvent free of grit or metallic particles. Inspect the bearings and replace as necessary.

Position the inboard bearings onto the shaft so that the largest shoulder of the outer race faces toward the impeller. Press the bearing on until it seats squarely against the shaft shoulder.

Press the outboard bearings onto the shaft until it is fully seated.

Press the shaft and assembled bearings into pedestal bore until the inboard bearing seats squarely against the pedestal shoulder.

NOTE!

Heat the pedestal bearing bore to approx. 200°F before installing the shaft and bearings. Use a resistance type heating element or sun lamp as a source of heat.

Install the required number of bearing shims to permit proper shaft end play.

NOTE!

Shaft end play should be between .004 and .010 inch.

Replace the bearing cap o-ring and oil seal. Position the lip of the oil seal toward the oil cavity. Align the oil groove in the bearing cap with the oil return grooves under the bearings. Secure the bearing cap and check the shaft end play. Adjust the shaft travel as required.

Press the front oil seal into the pedestal bore with the lip positioned toward the bearing oil cavity.

Replace the seal plate o-rings and secure the seal plate to the pedestal.

NOTE!

Apply a light coating of petroleum jelly or oil to o-rings to ease reassembly.

Lubricate the bearing, pedestal as indicated in the lubrication section

NOTE!

It is recommended that the seal assembly and impeller be reassembled at this point. Refer to the Seal Reassembly and Pump Reassembly sections.

Connect the pedestal assembly to the power source and secure it with the foundation mounting hardware. Be certain the pump and power slurce are properly aligned. See ALIGNMENT IN INSTALLATION section.

Replace the pump casing O-ring and secure the casing to the pedestal assembly.

Replace the discharge flange gasket and reinstall the discharge adaptor.

Seal Reassembly - Component Type

The seal is not normally reused because of the high polish on its lapped faces, but if it is necessary to reuse the old seal, wash all metallic parts in cleaning solvent and dry thoroughly.

Inspect the seal components for wear, scoring, grooves, and other damage that might cause leakage. If any components are worn, replace the complete seal; never mix old and new seal parts. Clean and polish the shaft sleeve, or replace it if there nicks or cuts on the end.

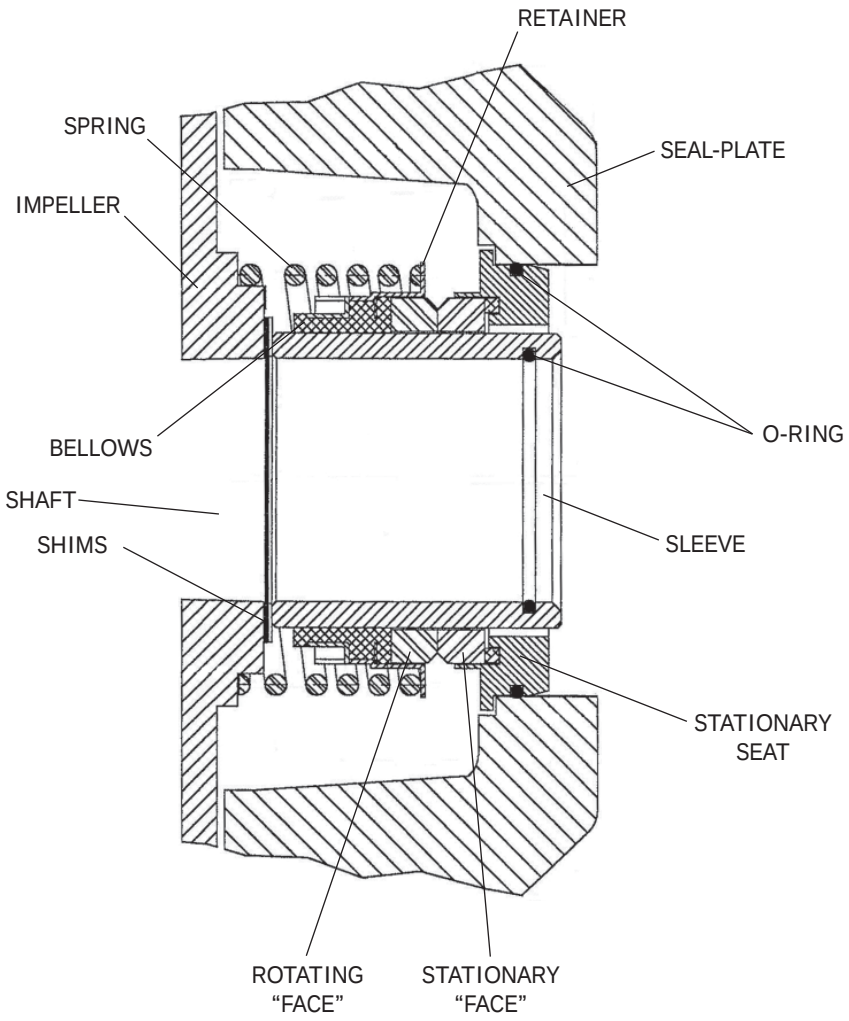


Figure 5. Component Seal Assembly

CAUTION!

This seal is not designed for operation at temperatures above 160º F (71º C). Do not use at higher operating temperatures.

Lubricate the o-rings and reinstall the shaft sleeve. Be sure the o-rings are properly positioned and not damaged during installation.

Lubricate the O-rings and bellows with petroleum jelly or oil when installing the seal, and place a drop of light lubricating oil on the lapped faces. Assemble the seal as shown in figure 5.

Pump Reassembly

Reinstall the impeller adjusting shims.

Reinstall the impeller key, and press the impeller onto the shaft. A clearance of .010 to .020 inch between the impeller and the seal plate is necessary for maximum pump efficiency. Measure this clearance and add or subtract impeller shims until it is reached.

After the proper clearance has been attained, reinstall the impeller washer and roll pin. Reinstall the impeller nut and torque to 145-ft./lbs. Recheck the impeller back clearance.

Prime the threads of the socket head capscrew with “Loctite Primer-T” and apply four drops of “Loctite 242-31” adhesive sealant around the circumference of the threads, one inch from the end. Reinstall the socket head capscrews and torque to 300 ft. lbs.. Recheck the impeller back clearance.

NOTE!
Secure the pump casing and O-ring to the seal plate and pedestal assembly if not already done.

If the wear plate was removed, lubricate the O-ring with petroleum jelly and press the assembly into the suction elbow and secure.

Replace the wear plate O-ring, and lubricate it with petroleum jelly. Reinstall the suction elbow and pedestal support to the pump casing. Secure the elbow supports with the foundation mounting hardware.

A clearance of .010 to .020 inch between the impeller and the wear plate is necessary for maximum pump efficiency. This clearance can be reached by adjusting the wear plate. Back off the jam nuts until they contact the heads of the wear plate adjusting screws. Tighten the adjusting screws evenly, no more than a half turn at a time, while rotating the impeller shaft until the wear plate makes contact with the impeller. Back off each of the adjusting screws a half turn, and tighten the jam nuts until they are snug against the suction head. The clearance should now be correct.

Lubricate the seal as indicated in the LUBRICATION section.

Suction Check Valve Reassembly

Install the stainless steel flat washers onto the pivot arm; two on each side of the flap valve.

Secure the flap valve and pivot caps to the check valve body using the attaching hardware.

NOTE!
The flap valve must be positioned so that ½” diameter core holes face toward the interior of the pump.

Secure the check valve assembly to the suction elbow with the “victaulic” coupling. Be sure the rubber gasket is properly seated and not damaged.

Reach through the access opening and check the operation of the check valve to insure proper seating and free movement.

Replace the access cover gasket and secure the cover using the clamps and cover screws.

Reinstall the suction and discharge piping.

Before starting the pump, make certain the pump and power source are properly aligned, the piping is secure, the casing filled with liquid, and all connecting valves are open.

LUBRICATION

Seal Chamber

Sight-glass tube should be kept approx. 1-1/2” to 2” above the bottom of the glass. Clean and reinstall the vented plug. Maintain the oil at this level.

Bearing Chamber

The bearing housing was filled when it was shipped from the factory. Check the oil level regularly through the sight glass tube which should be kept approx. 1/2” to 3/4” below center line of the shaft.

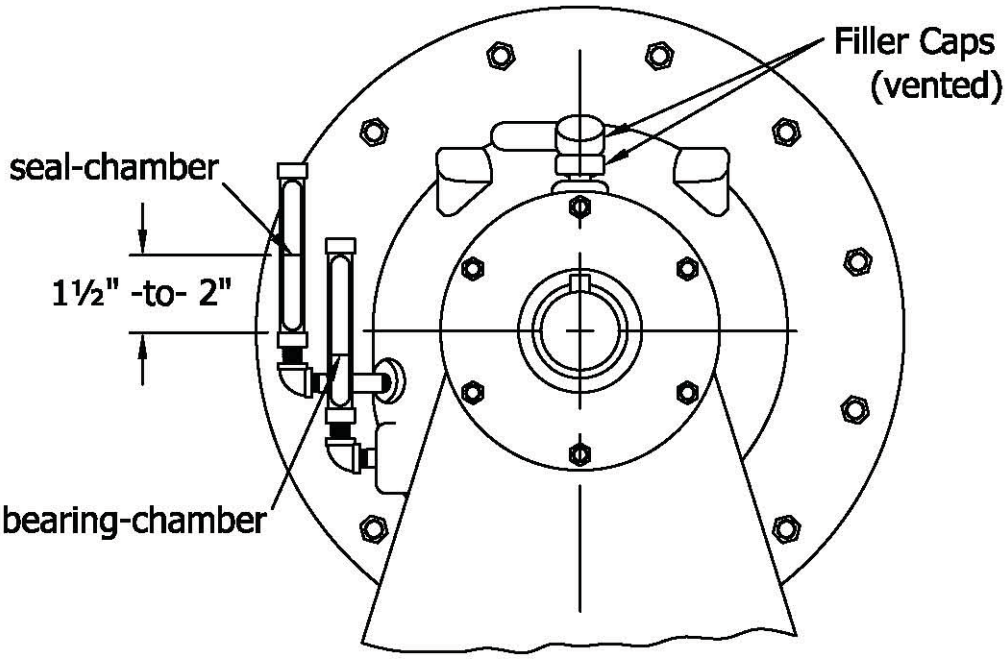
Oil Requirement:

A high quality turbine type oil with rust and oxidation inhibitors should be used.

ISO viscosity grade 68

- Chevron GTS Oil 68
- Shell Tellus Oil 68
- or equal

Do not over-lubricate. Over-lubrication can cause the oil to foam and leak from vent plug.
If it’s cloudy or contaminated as seen by inspection through the sight glass, it should be changed immediately.



Seal-Chamber = sight-glass tube should be kept approx. 1½" to 2" above the bottom of the glass.

Bearing-Chamber = sight-glass tube should be kept approx. ½" to ¾" below center line of shaft.

BOTH levels are when the pump is turned OFF and NOT running. Over filling will cause oil leakage and foaming.

CAUTION!

Monitor the condition of the bearing lubricant regularly for evidence of rust or moisture condensation. This is especially important in areas where variable and cold temperatures are common.

For cold weather operation, consult the factory or a lubricant supplier for the recommended grade of oil.

Bearings

The bearing housing oil level must be maintained at the midpoint of the oil level sight gauge.

When oil is required, remove the pedestal air vent, and fill the bearing housing with oil to the midpoint of the oil level sight gauge. Clean and reinstall the pedestal air vent. Do not overfill. Overfilling will cause excessive heat resulting in shortened bearing life.

Under normal conditions, change the oil each 5000 hours of operation, or at 12 month intervals, which ever occurs first. In dirty or humid conditions change more frequently.

For cold weather operation, consult factory or lubricant supplier for recommended grade of oil.

ALL PRIME PUMPS

- 12 MONTH LIMITED WARRANTY -

WARRANTY / REPAIRS BY MANUFACTURER

Unless otherwise agreed in writing by Manufacturer, the Equipment shall be warranted in accordance with this Warranty.

Company, unless otherwise authorized by Manufacturer, shall instruct its customers to send all Warranty claims to it rather than to Manufacturer, and Company shall send all customer Warranty claims received, or its Warranty claims, to Manufacturer in writing, immediately on learning of the claim.

Except as otherwise set forth in this document, the provisions of this document shall not confer any rights or remedies upon any party other than the parties hereto and their respective successors and permitted assigns.

Manufacturer warrants that Equipment, subject to this document, substantially conforms to Manufacturer's specifications and is free from defect in material and workmanship, for 12 (twelve) months from installation by Company's customer or 18 (eighteen) months after shipment from Manufacturer's facility, whichever shall occur first. With respect to repairs or replacement made pursuant to this Warranty, the warranty shall extend for 6 (six) months from delivery, but in no event shall such warranty exceed the date that is 6 (six) months after expiration of the original warranty period.

Equipment may be returned for repairs whether within or beyond applicable warranty periods. Company shall pay the costs of transportation to return the Equipment to Manufacturer and Manufacturer will pay the cost of return shipping to Company. Manufacturer shall not be responsible for the costs of removal, reinstallation or gaining access to the Equipment. Company shall be responsible for material and labor charges for all repairs not covered by an applicable warranty. Manufacturer will notify the Company of the estimated charge for any out-of-warranty repair and, upon receipt of prior written approval of Company, the repair will be made by Manufacturer.

Manufacturer, at its sole option, shall either repair or replace Equipment that does not meet the applicable Warranty ("Remedy"). The Warranty is void if the Equipment has been repaired, altered, or modified in any manner by persons other than Manufacturer or a party duly authorized by Manufacturer to service the Equipment. The Warranty excludes nonconformities resulting from: (i) normal wear and tear; (ii) failure to properly store, install, operate, or maintain the Equipment in accordance with Manufacturer's published installation and operation instructions; or (iii) corrosion and erosion. The Remedy is Manufacturer's sole obligation, and Company's sole and exclusive remedy, for all claims of nonconformities.

MANUFACTURER MAKES NO OTHER WARRANTY OF ANY KIND WHATSOEVER, WHETHER STATUTORY, WRITTEN, ORAL, EXPRESSED OR IMPLIED. ALL WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED.

ALL PRIME PUMPS
Division of Power & Pumps, Inc.
803 North Myrtle Avenue
Jacksonville, Florida 32204