Glacier Tanks LLC
OREGON EST. 2006

Centrifugal PUMP Manual

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Centrifugal PUMP Introduction

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  0~150 m^3 /hr
- VISCOSITY
  0~1500cps
- MEDIA TEMPERATURE
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- ROTATIONAL SPEED
  50hz:1~2930RPM
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- STANDARD OUTFIT
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  - ✔ Pump connections: Clamp Type
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  - ✔ Type D of Seal: External Balanced Seal w/Clamp-In Seat
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Installation

Unpack all parts of your equipment and inspect for damages that may have occurred during shipping. Report any damage to the carrier. All ports are covered at the factory to keep out foreign objects during transit. If the covers are missing or damaged, a thorough inspection of fluid head, by removing the pump cover, is recommended. Be sure pumping head is clean and free of foreign material before rotating shaft.

1. Pump Location

1.1 Locate pump as near as practical to the liquid supply.
1.2 Keep supply piping short and straight to keep pump supplied with liquid and prevent damaging cavitation.
1.3 Pump should be accessible for service and inspection during operation.
1.4 Motor must be protected from flooding.

2. Pump Leveling

Level the pump by loosening the set screws (See Figure 1 item A) to adjust the length of the legs.

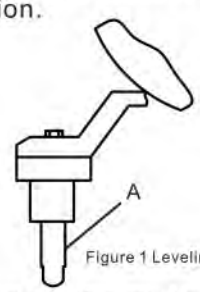

Figure 1 Leveling Leg Set Screw Location

3. Supply And Discharge Piping/ Valves

3.1 Use line size equal to, or larger than, connection size on pump, especially the inlet supply line.
3.2 Keep supply line as short and straight as possible and use as few elbows as possible, valves or other types of restriction. Avoid up and down rises that will trap air.
3.3 Be certain all joints in suction line are well sealed to prevent air leaks.
3.4 Maintain a straight length of pipe (See Figure 2 item A) at least 8 diameters long at the pump inlet.

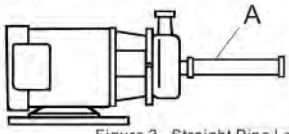

Figure 2 - Straight Pipe Length

3.5 The pump casing may be rotated with the discharge connection pointing in any direction; best pump performance will be with the outlet up, to the left or positions in between; these positions insure a flooded casing and prevent problems due to air in the system. (See Figure 3).
3.6 All joints in suction line must be well sealed to prevent air from being sucked into the system.
3.7 Support supply and discharge piping near the pump so that no strain is put onto pump casing. (See Figure 4).

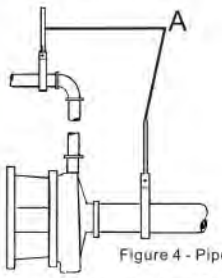

Figure 4 - Pipe Supports

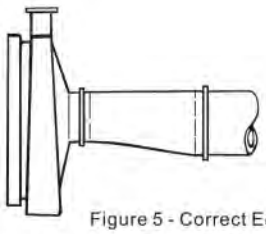
Figure 5 - Correct Eccentric Installation

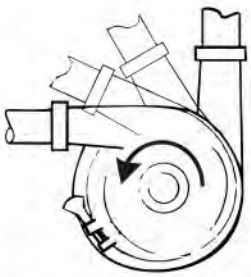
Figure 3 - Recommended Discharge Positions)

3.8 If an expansion joint is used, install a pipe anchor between it and the pump.
3.9 If a reducer is connected to inlet, use eccentric type to prevent problems due to trapped air. (See Figure 5).

WARING
The pump and piping may contain sharp edges. Wear gloves to help avoid injuries from these hazards.

3.10 Line slope will depend on application requirements; best pump operation is with supply line sloped slightly upward toward pump to prevent trapped air. If system must drain into pump casing, keep downward slope to a minimum or priming problems may occur.
3.11 Install shutoff valves to isolate pump from supply and discharge lines to allow pump service without draining system.
3.12 This pump is not self priming. If pump is installed above supply liquid level, install foot valve or other system check valve to keep system flooded for priming. (See Figure 6 item A).
3.13 A throttling valve may be required to control pump flow rate to prevent motor overload. Always install throttling valve (See Figure 6 item B) in discharge piping and at least 10 diameters from pump outlet.

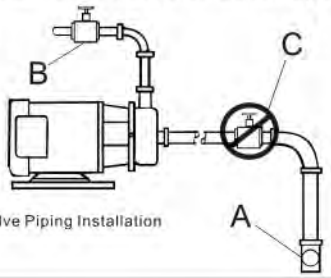

Figure 6 - Valve Piping Installation

4. Installations That May Cause Operation Problems

4.1 Any system throttling valves or similar devices to control flow rate must be installed in the discharge line. Do not install any system throttling valves or similar devices to control flow rate in the supply line. Restriction in the supply line may cause cavitation and pump damage.

4.2 "Water hammer" in the system can damage the pump and other system components. Water hammer often occurs when valves in the system are suddenly closed causing lines to move violently and with a loud noise. When this condition is present, find and eliminate the source of the water hammer. One way to eliminate water hammer is to slow down the actuation speed of the valve.

4.3 Do not expose pump to freezing temperatures with liquid in casing. Frozen liquid in casing will damage pump. Drain casing before exposing to freezing temperatures.

5. Electrical Connections

WARNING

To avoid electrocution, ALL electrical installation should be done by a registered Electrician, following Industry Safety Standards. All power must be OFF and LOCKED OUT during installation.

5.1 Read motor manufacturer's instructions before making installation. Follow manufacturer's lubrication schedules.

5.2 Check motor nameplate to be sure motor is compatible with electrical supply and all wiring, switches, starters. Make sure all overload protections are correctly sized.

5.3 Check pump rotation following electrical installation. Correct rotation is counterclockwise when facing pump inlet connection. (See Figure 3).

6. Flush Seal Option

When this option is ordered, a fitting assembly (Part Number 60112) (See Figure 7 item B) is supplied for directing a flow of water onto the backplate/seal area.

6.1 The water cascade block (See Figure 7 item A) must be above the seal on the assembled backplate to flow water onto the seal face.

6.2 The connection is 1/4 inch O.D. tubing.

6.3 Required flow is approximately 0.25~0.35L/min.

6.4 The recommended water supply is - cool and filtered. If product solidifies at cool temperature, warm or hot water can be used

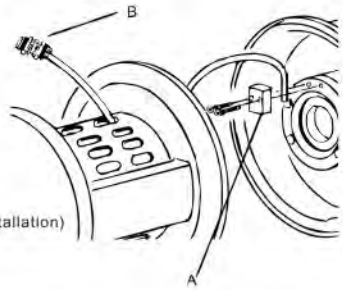

Figure 7 - Cascade System Installation)

7. Before First Startup

7.1 Clean Pump And Piping

Disassemble pump and clean all product contact parts and seal parts prior to first operation.

7.2 Cleaning Safety Procedures

7.2.1 Manual Cleaning

7.2.1.1 Do not use toxic and/or flammable solvents.

7.2.1.2 Lock out electrical power and shut off all air prior to cleaning equipment.

7.2.1.3 Keep electrical panel covers closed and power off when washing equipment.

7.2.1.4 Clean up spills as soon as possible.

7.2.1.5 Never attempt cleaning equipment while it is operating.

7.2.1.6 Wear proper protective clothing.

7.2.2 Cleaning-In-Place (CIP)

7.2.2.1 Make certain that all connections in cleaning circuit are properly applied and tight to avoid contact with hot water or cleaning solutions.

7.2.2.2 When cleaning cycle is controlled from remote or automated cleaning center, establish safe procedures to avoid automatic start-up while servicing equipment in the circuit.

8. Preliminary Test Run

The system should be tested using a preliminary run with the materials that will be pumped.
DO NOT run the pump at this time to produce final product

9. Check For Possible Motor Overload Condition

Certain combinations will overload motor when operated with open unrestricted discharge which results in too high flow rate. Additional discharge restriction may be required to lower flow rate and lower horsepower requirement. DO NOT add restriction to supply line. If pump was incorrectly selected, a smaller impeller may be required or a higher motor horsepower may be required. If uncertain about pump selection and application, temporarily install an ammeter in the electrical service.

10. Ammeter Test

Operate pump under process conditions and check motor amp draw versus nameplate full load rating. If amp draw exceeds motor rating, a system change or pump change is required. If process conditions and/or liquid changes (higher viscosity, higher specific gravity) recheck motor amp draw. Contact your authorized distributor for assistance.

Operation

1.Starting the Pump

The following is the procedure for starting the pump.

1.1 If pump has the flush seal option, start flow of flush water (approximately 15~30L/hr recommended rate) before operating the pump.

1.2 Prime the pump by flooding the pump casing with liquid BEFORE starting pump to avoid damage to pump parts.

1.3 Start pump motor.

1.4 Check the pump to see that liquid is flowing and that all piping connections and seals are leak free.。

1.5 Make sure that the pump is not operating against a closed discharge. Continued operation against a closed discharge will heat liquid in casing to boiling and lead to pump damage

1.6 Slowly open discharge valve until desired flow is obtained. Observe pressure gages and if pressure is not attained quickly, stop pump and prime again.

2.Priming the Pump

2.1 Priming the pump with the feed source above pump level

2.1.1 Fill supply tank with liquid; open supply line valve (suction) (See Figure 8 item B).

2.1.2 Vent any air trapped in supply line or casing by opening the discharge valve. (See Figure 8 item A).

2.1.3 Start pump.

2.2 Priming the pump with the feed source below pump level

The pump will not self prime if liquid supply is below pump level. When liquid supply is below pump level, an outside source must be provided for priming.

2.2.1 Close discharge valve (See Figure 9 item C) and open air vents.

2.2.2 Open valve in outside supply line (See Figure 9 item A) until liquid flows from vent valves.

2.2.3 Close vent valves.

2.2.4 Close outside supply line.

NOTE: Use a type of check valve system (See Figure 9 item B) to keep supply line and pump casing flooded with liquid. Otherwise the pump must be primed before each operation.

3.Stopping The Pump

3.1 To stop pump, shut off power to pump motor.

NOTE: Liquid in system can flow freely through the pump; the pump does not act as a shut off valve.

3.2 Shut off supply and discharge lines.

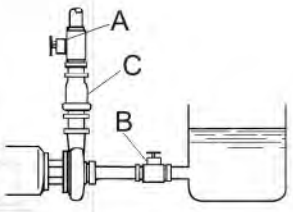

Figure 8 - Pump Below Supply

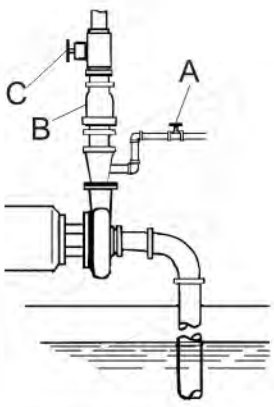

Figure 9 - Pump Above Supply

Maintenance

1. Scheduled Maintenance

A routine maintenance program can extend the life of your pump. Keep maintenance records. These will help pinpoint potential problems and causes.

1.1 Routine Maintenance

1.1.1 Check for unusual noise, vibration and bearing temperatures.

1.1.2 Inspect pump and piping for leaks.

1.1.3 Check Mechanical Seal area for leakage. No leakage is desired.

1.1.4Check backplate gasket for wear/damage.

1.1.5 Bearing lubrication (See Motor Manufacturer for correct specifications).

1.1.6 Seal Monitoring.

1.1.7 Vibration analysis.

1.1.8 Discharge pressure.

1.1.9 Temperature monitoring.

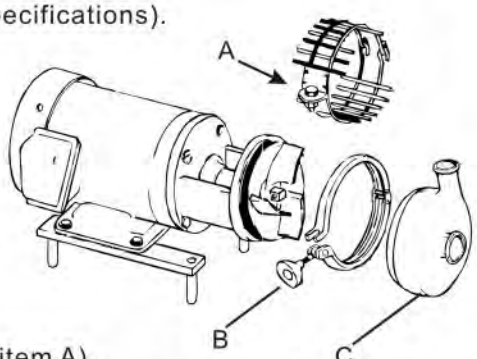

Figure 10 - Casing Assembly

2. Pump Disassembly

2.1 Shut off product flow to pump and relieve any product pressure.

2.2 Shut off and lock out power to pump.

2.3 Disconnect the suction and discharge pipe fittings.

2.4 Using a wrench remove the seal guard assembly (See Figure 10 item A).

2.5 Loosen clamp wing nut and swing clamp open. On C100, remove casing wing nuts.

2.6 Inspect clamp saddles and the casing for damage or wear and replace if necessary. (See Figure 10 item B and C).

2.7 Push back on the impeller and position the retaining pin in the center of the stub shaft. This will allow the impeller to pulled off the stub shaft.

2.8 Rotate the backplate to disengage the backplate pins from the adapter pins. Remove the backplate with gasket attached (See Figure 11 item B and C), by pulling straight off the adapter. (See Figure 11 item A).

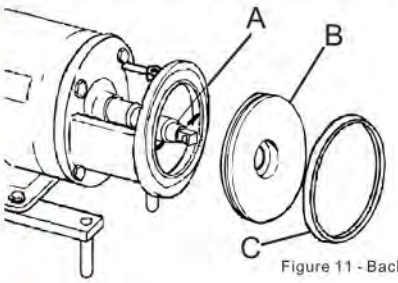

Figure 11 - Backplate Gasket

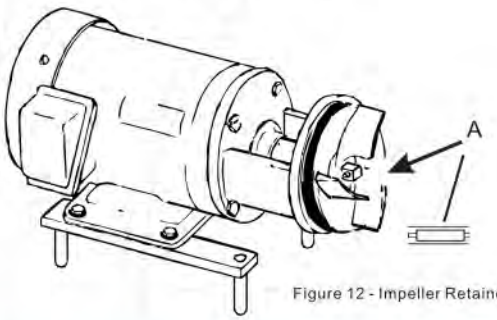

Figure 12 - Impeller Retainer Pin

2.9 Remove the backplate gasket and inspect it for wear and sealing failure.

NOTE: Take care to protect the sealing face and edges of the backplate from nicks and scratches.

2.10 Pull the carbon seal, O-ring, seal cup and spring straight off the stub shaft to remove. (See Figure 13).

2.11 Carefully inspect the O-ring (See Figure 13 item D) and the carbon seal (See Figure 13 item E) for signs of abrasions, cuts or other wear that could cause leakage.

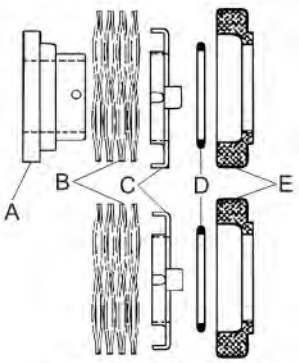

Figure 13 - Seal Arrangement

Figure 14 - Carbon Seal Measurements

NOTE: When the extension end of the carbon seal is less than 0.8mm, (See Figure 14 item A) replace seal.

2.12 After cleaning, inspect the seal, O-ring and gasket again. Replace as necessary.

2.13 Remove the water cascade attachment from the adapter if included. (See Figure 15 item A). Remove the rubber shaft deflector (See Figure 15 item B) by pulling it straight off the stub shaft. Examine it for tearing, loose fit or other defects that would allow liquid leakage into the motor along the shaft.

3. Replacing Motor

3.1 To replace or service motor, disassemble the pump as outlined in "Pump Disassembly" on page 6.

3.2 Remove the bolts securing the adapter (See Figure 16 item A and B) to the motor frame and remove the adapter.

3.3 Loosen the two (2) set screws securing the stub-shaft to the motor shaft (See Figure 17 item A and B). Carefully remove the stubshaft. The stub-shaft is a tight fit, but can be removed by applying pressure around the periphery of the shaft with a pry-bar.

NOTE: Examine the shaft sealing surfaces for nicks or scratches which can cause excessive O-ring wear or leaking.

3.4 Remove the bolts securing the motor to the mounting brackets. Bolt new motor to the mounting brackets.

NOTE: Motor maintenance, repair and wiring are not covered in this manual. For specific information, contact the motor manufacturer.

3.5 If required, level the motor by adjusting the legs individually and secure them in place with the set screws. See "Pump Leveling" on page 2.

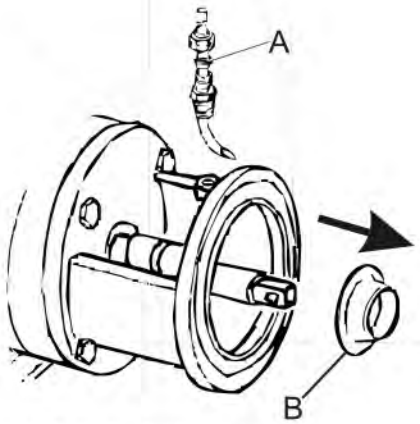

Figure 15 - Removal of Cascade System

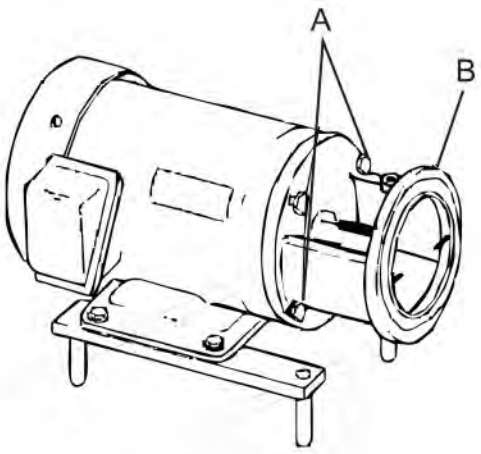

Figure 16 - Removing the Adaptor

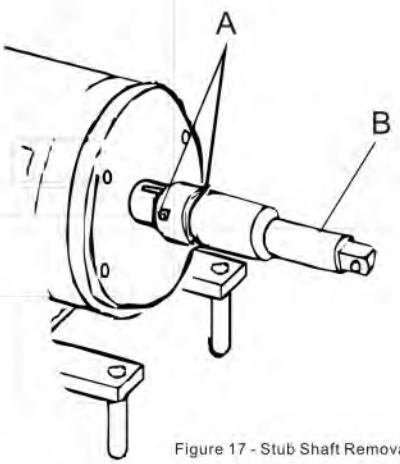

Figure 17 - Stub Shaft Removal

4. Installing the Adaptor

4.1 Install the adapter to the motor, with the drain cavity at the bottom. Insert the four bolts to secure the adapter to the motor. Tighten the bolts. (See Figure 18 item A).

4.2 Install the key in the motor shaft.

4.3 Place the stub-shaft assembly onto the motor shaft. (See Figure 18 item B). Do not tighten the shaft set screws.

4.4 Install the backplate on the adapter and rotate until the backplate pins engage the adapter pins, (See Figure 18 item D and C), assuring solid contact of the backplate to the adapter.

4.5 Rotate the stub shaft until the impeller retaining hole is in a horizontal position. Insert the impeller retainer pin, and center it in the stub-shaft.

4.6 Slide the impeller on the shaft. Hold the impeller tight against the shoulder in the shaft and rotate the shaft one-quarter turn until the impeller pin engages with the impeller. (See Figure 19).

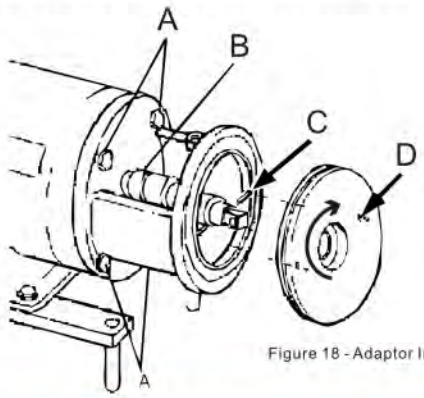

Figure 18 - Adaptor Installation

NOTE: For Models C-114 through C-328. See "Stub Shaft Adjustment (Models C-114 through C-328)" on page 6.

4.6.1 Place a 0.060" ± .010" (1.52 mm ±.25 mm) Feeler Gauge between the front face of the backplate and the impeller. (See Figure 18 item A).

4.6.2 Push the stub-shaft/impeller assembly toward the motor until the impeller (See Figure 18 item E) rests against the Feeler Gauge.

4.6.3 Tighten the two set screws on the stubshaft. (See Figure 18 item B).

4.6.4 Check with at Feeler Gauge that the clearance between rear face of the impeller and the front (inside) face of the backplate is 0.060" ± .010" (1.52 mm ± .25 mm) (See Figure 18 item A).

4.6.5 Remove the impeller retainer pin, impeller and the backplate.

4.6.6 Slide the deflector (large diameter end first) onto the shaft until it seats in the shaft groove. (See Figure 19 item A).

NOTE: If the deflector can not be forced on with the fingers, use a blunt tool to tap it evenly into place.

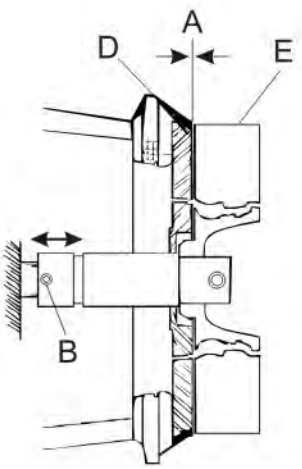

Figure 19 - Setting Backplate/Impeller Clearance

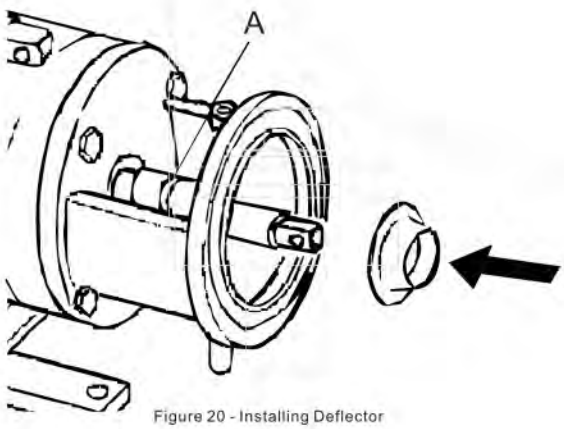

Figure 20 - Installing Deflector

5. Stub Shaft Adjustment (Models C-114 through C-328)

5.1 Slide the seal drive collar onto the stub shaft as shown in Figure 21.

- Use the "A" and "B" dimensions in the Seal Chart to properly locate the drive collar on the stub shaft. See Figure 20. Tighten the set screws to secure in place.

▶Table 7: Seal Chart

NOTE: C-100 pump does not require drive collar.

Model	A(mm)	B(mm)
C114	14.2	36.5
C216	14.2	43.6
C218	14.2	41.6
C328	14.2	41.6

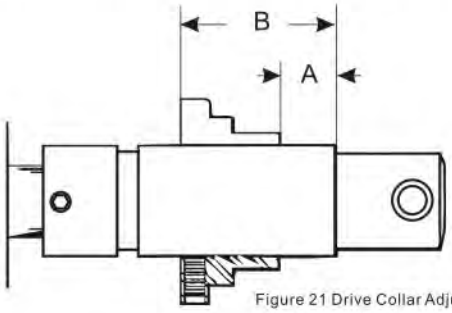

Figure 21 Drive Collar Adjustment

5.2 See Figure 22. Assemble the spring (item B), seal cup (item C), o-ring (item D) and Carbon Seal (item E), and install as a unit, taking care that slot in seal cup aligns with the pin on shaft. Gentle pressure on the o-ring will overcome resistance on the shaft.

NOTE: Do not lubricate seals with any type of oil or grease, the seal faces will be lubricated by the product being pumped.

5.3 Assemble the gasket to the backplate.

5.4 Install the backplate on the adapter. Check that the seal cup slot is engaged with the pin on the drive collar. (See Figure 21).

5.5 Rotate the backplate until the backplate pins engage the adapter pins. (See Figure 22 item A and B).

5.6 Rotate the shaft until the pin hole in the end is in a horizontal position. Insert the impeller pin (See Figure 22 item C), center it in the shaft end and slide the impeller (See Figure 27 item D) on the shaft.

- Hold the impeller tight against the stub shaft and rotate the shaft one-fourth turn until the impeller pin drops and secures the impeller.

5.7 Place the casing over the impeller/ backplate, close and tighten the clamp. See Figure 23.

5.8 Assemble the cascade water fitting if included. Install seal guard and tighten in place. Assemble the suction line and the discharge line to the casing.

NOTE: Check for strain or misalignment of piping to the casing. Re-adjust the casing ports and/or entire motor leveling as necessary.

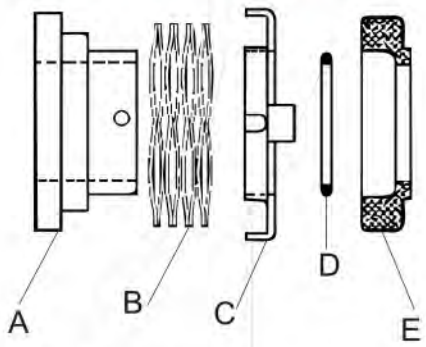

Figure 22 - Carbon Seal

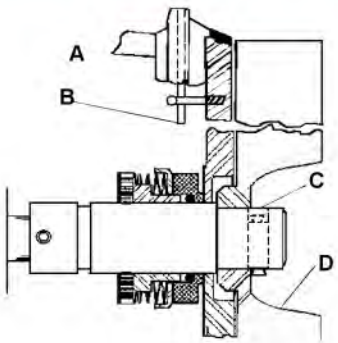

Figure 23 - Backplate Installation

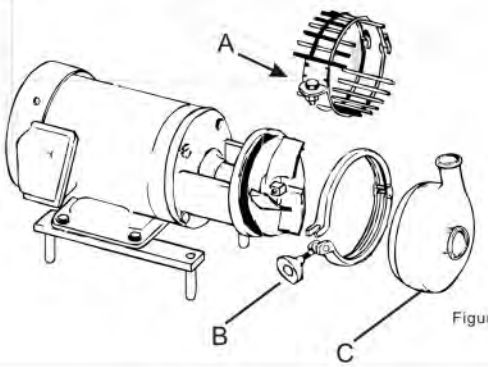

Figure 24 - Casing Clamp Guard Assembly

Troubleshooting

PROBLEM	POSSIBLE CAUSE	SUGGESTED ACTION
Not Enough Liquid Delivered.	Pump not primed.	Prime pump. Install a priming system if possible.
	Suction or discharge plugged or closed.	Open suction. If plugged, shut down pump and remove blockage.
	Air leak in supply or at seal area.	Check system for air leaks and repair as necessary. Replace seals if required.
	Wrong direction of rotation.	Adjust motor electrical wiring to correct rotation.
	Discharge head too high.	Lower discharge head until pump can move material without turning to freely causing overload
	Suction lift too high.	Lower pump in system until the pump is easily supplied with material.
	Speed too slow (low voltage, wrong frequency, wrong motor).	Adjust voltage and frequency. Change motor if necessary.
	Excessive air in material.	Adjust system to remove excess air from material before it reaches the pump.
	Insufficient	Adjust system to provide correct.
	Impeller diameter too small for duty.	Contact your customer service representative for sizing information.

PROBLEM	POSSIBLE CAUSE	SUGGESTED ACTION
Not Enough Pressure.	Air leak in supply or at seal area.	Check system for air leaks and repair as necessary. Replace seals if required.
	Wrong direction of rotation.	Adjust motor electrical wiring to correct rotation.
	Speed too slow (low voltage, wrong frequency, wrong motor).	Adjust voltage and frequency. Change motor if necessary.
	Excessive air in material.	Adjust system to remove excess air from material before it reaches the pump.
	Impeller diameter too small for duty.	Contact your customer service representative for sizing information.

Troubleshooting

PROBLEM	POSSIBLE CAUSE	SUGGESTED ACTION
Motor Overload	Faulty electrical connections.	Check wiring and repair/replace as necessary
	Unrestricted discharge resulting in too high a flow rate.	Add discharge restriction to lower flow rate.
	Impeller interference.	Disassemble pump and inspect for damage. Remove interference if still present. Replace worn/damaged parts.
	Seal binding.	Disassemble pump and inspect for damage. Check for material crystallization on seals.
	Discharge head too low allowing pump to deliver too much liquid.	Raise discharge head until pump achieves proper resistance to flow.
	Liquid heavier or more viscous than rating.	Contact your customer service representative for sizing information.
	Overload heaters too small for motor.	Inspect and replace as necessary.
	Incorrect electrical supply, voltage, frequency.	Adjust voltage and frequency. Change motor if necessary.
	Impeller diameter too large for duty.	Contact your customer service representative for sizing information.
	Defective motor.	Replace motor.

PROBLEM	POSSIBLE CAUSE	SUGGESTED ACTION
Rapid Seal Wear.	Incorrect impeller shaft location; excessive spring loading.	Adjust pump alignment to motor and piping.
	Water Hammer.	Adjust system to reduce air in system and sudden starts or stops in flow.
	Impeller shaft loose or bent.	Disassemble pump and inspect for damage. Replace worn/damaged parts.
	Abrasive product.	Contact your customer service representative for alternate seal information.
	Prolonged "dry" running.	Adjust process to insure pump has a continual fresh supply of product during operation.
	Abrasive solids (unfiltered) in flush water supplied to seal.	Use only filtered water in seal flush system.

Troubleshooting

PROBLEM	POSSIBLE CAUSE	SUGGESTED ACTION
Vibration/Noise.	Pump not level.	Make sure all legs are touching the floor. Level pump.
	Piping not supported.	Support all piping as described in the installation section.
	Starved suction/Supply line blocked.	Shutdown pump and remove blockage.
	Foreign material in pump.	Disassemble pump, remove all foreign material and inspect for damage. Replace worn/damaged parts.
	Starved suction/ Insufficient (Net Positive Suction Head) available	Adjust system to provide correct.
	Impeller hub/Impeller shaft worn.	Disassemble pump and inspect for damage. Replace worn parts.
	Impeller shaft loose or bent.	Disassemble pump and inspect for damage.
	Impeller out of balance.	Disassemble pump and inspect for damage. Replace impeller.
	Motor bearings worn.	Disassemble motor and inspect for damage. Replace worn parts.
	Starved suction/Supply line too long.	Shorten system supply line.
	Starved suction/Supply line too small.	Install larger supply lines.
	Excessive air in material.	Adjust system to remove excess air from material before it reaches the pump.

PROBLEM	POSSIBLE CAUSE	SUGGESTED ACTION
Seal Leaks	Gasket damaged or worn.	Disassemble pump and inspect for damage.
	Seal not installed correctly.	Disassemble pump and inspect seal for damage (replace if necessary). Install seal correctly and assemble pump.
	Carbon seal worn or damaged.	Disassemble pump and inspect seal for damage (replace if necessary).
	Inlet/Outlet connection loose or no gasket.	Inspect inlet/outlet connection for gasket and tighten connection.
	Casing clamp loose.	Tighten clamp.