

SUMMIT PUMP, Inc

Model SN

Self-priming, Non-clogging Centrifugal Pump Installation, Operation, and Maintenance Manual



SUMMIT™
PUMP, Inc

WARRANTY

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This Warranty does not obligate Summit Pump, Inc. to bear the cost of labor or transportation charges in connection with replacement or repair of defective parts; nor shall it apply to a pump upon which repairs or alterations have been made unless authorized by Summit Pump, Inc.

No warranty is made in respect to engines, motors, or trade accessories, such being subject to warranties of their respective manufacturers.

No express implied or statutory warranty, other than herein set forth is made or authorized to be made by Summit Pump, Inc.

In no event shall Summit Pump, Inc. be liable for consequential damages or contingent liabilities arising out of the failure of any Summit Pump, Inc. pump or parts thereof to operate properly.

SUMMIT PUMP, INC. Green Bay, WI

LIABILITY

Summit Pump, Inc. shall not be liable for personal physical injury, damage or delays caused by failure to follow the instructions and procedures for installation, operation and maintenance contained in this manual.

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INTRODUCTION

1. INTRODUCTION

This pump is a centrifugal, self-priming, non-clogging pump with a semi open impeller. It is designed to pump liquids, i.e. water, mild corrosive slurries including solids up to 3” diameter.

It is imperative to your safety, and the safety of others, that the pump be used only in applications for which it has been designed. If you have any questions regarding a specific application, call Summit Pump, Inc at (920) 869-4800. It is equally as important that the pump is operated according to this manual and all personnel in contact with this pump fully understand it.

For information or technical assistance on the power source, contact the power source manufacturer’s local dealer or representative.

SAFETY

The following messages are used throughout this manual to alert maintenance and operating personnel to procedures that require special attention for the protection and safety of both personnel and equipment.



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in property damage.

2. RECEIPT AND STORAGE

LIFTING



WARNING

Inspect all lifting equipment and rigging before lifting pump. Rig pump securely allowing for a proper safety factor. Refer to *Table 1* for pump weights.

Table 1

Pump Size	Weight in Lbs
2"	292
3"	432
4"	664
6"	934
8"	1710
10"	1750

RECEIVING THE PUMP

Immediately upon arrival, carefully inspect the pump for evidence of damage during transit. Locate, read and understand the following tags:

⚠ CAUTION	
Do not use for pumping explosive or corrosive liquids. Read and understand the operation manual. To obtain a copy of the manual call (920) 869-4800.	
Check the following before startup:	
<ul style="list-style-type: none"> • Motor rotation agrees with pump rotation. • Pump is lubricated. • Guards are securely in place. • Priming chamber is filled with liquid. • Suction valve is open. • Discharge line is properly vented. 	

⚠ CAUTION	
Contents may be hot and/or pressurized. Check the following before servicing:	
<ul style="list-style-type: none"> • Power source is disconnected or locked out. • Pump and liquid have cooled to room temperature. • Suction valve is closed. • Discharge valve is closed. 	
Remove drain plug cautiously before opening pump.	

⚠ CAUTION	
Do not operate pump without pressure safety valve installed and in working order.	
Replace valve after it has been activated. This valve is not intended for on/off duty.	
Replace valve with each pump rebuild.	

SUMMIT PUMP, Inc TM		
WWW.SUMMITPUMP.COM		
SERIAL NUMBER	PUMP NUMBER	
SIZE	MATL CODE	IMP DIA
SEAL TYPE	SEAL MATL	
MODEL SN		
SELF-PRIMING, NON-CLOGGING CENTRIFUGAL PUMP		

Immediately report any damage or missing tags to your Summit Distributor.

STORING THE PUMP

Store the pump in a clean dry place. **Do not remove piping connection covers.** If the pump has been used prior to storage, be sure to drain the casing.

CAUTION

Rotate the pump shaft at least once per week.

Rotate the pump shaft at least once per week to maintain a protective film of oil on bearings and seals. Gaskets can dry out and become brittle over time. Check all gasketed joints before putting pump in service. If you anticipate long-term storage, special treatment is available for purchase from Summit Pump, Inc.

3. INSTALLATION



WARNING

Operation of this pump without guards and other safety devices in place could result in severe personal injury.

LOCATION

Locate the pump as close to the liquid supply as practical. This pump is designed to operate with a negative suction supply. Although, it can operate with a positive suction supply. The suction pressure must never exceed 50% of the maximum pressure published on the pump curve.



CAUTION

Suction pressure must never exceed 50% of the maximum pressure published on the pump curve.

Locate the pump for accessibility. The pump requires clearance in front of the back cover to permit removal of the cover and easy access to the pump for cleaning and service. See Appendix A – Pump Drawings.

FOUNDATION

Use a foundation that is sufficient to support pump and driver. It is recommended that the foundation mass be five times the equipment mass.

PIPING

Pipe or hose can be utilized for suction and discharge lines. Line material must be compatible with the liquid being pumped and able withstand the maximum pressure in the system plus a conservative safety factor. If hose is used on the suction side it must be rigid wall, reinforced type to prevent collapse when pump is operating.

All piping must be independently supported and accurately aligned to the pump flanges. Never use force to align piping to the pump flanges.

CAUTION

Never use force to align piping to the pump flanges.

Whenever practical, run the system piping from the pump.

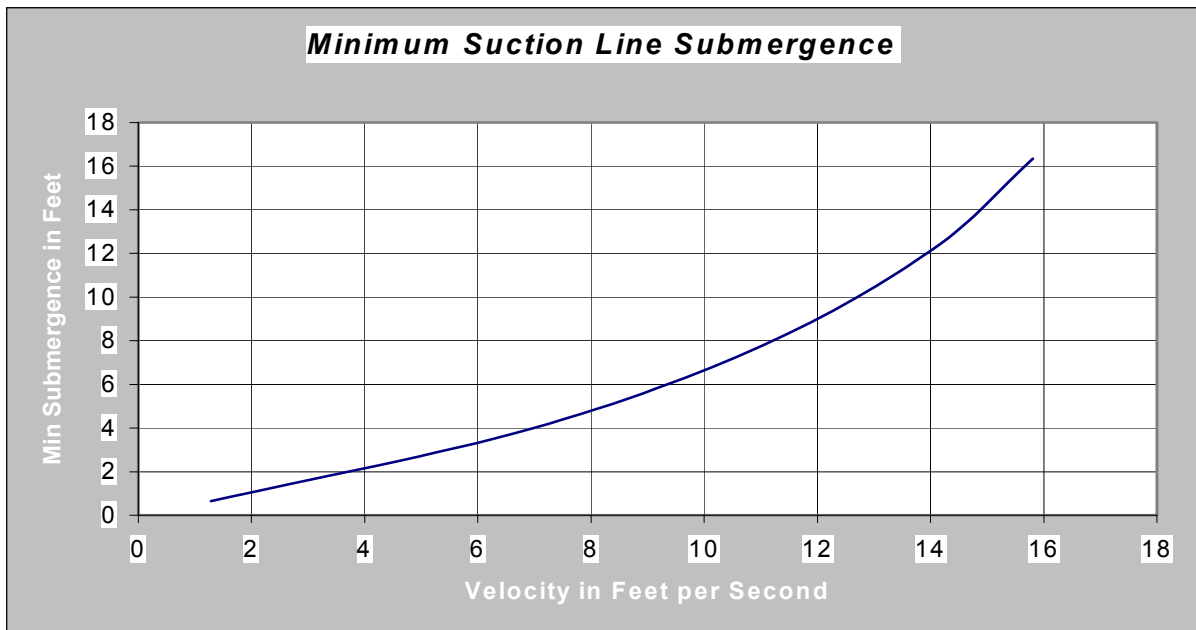
Table 2

Pump Size	Max Solid
3	2.5"
4	3"
6	
8	
10	

Piping should be as short and straight as possible, while minimizing fittings which increase friction losses. Suction line size must be the same size of the pump suction flange. If a reducer is used, it should be the eccentric type, and installed with the flat portion on top. The suction line should slope up to the suction flange to help reduce air pockets.

Piping placed in a sump should be positioned away from any wall by a distance of at least 1.5 times the diameter of the suction line. The submergence of the end of the suction line is vital to efficient pump operation. Recommended submergence is shown in *figure 1*.

Figure 1



Velocity in feet per second = G.P.M. X 321 / Pipe Area

CAUTION

A valve should never be used to throttle the suction line.

The discharge line should include a valve that can be used to throttle flow and shutoff. The size of this valve should be equal to the size of the largest discharge line. A check valve in the system should be installed to prevent excessive shock pressure and reverse rotation flow which could cause pump damage

BYPASS LINE



WARNING

Do not operate pump with a closed manual shut off valve in the bypass line. This may cause the unprimed pump to circulate while not regaining its prime. This will create overheating and possible explosion.

A bypass line is needed when a check valve is in the discharge line. During the priming cycle, air in the suction piping side must be vented to the atmosphere. If a check valve is installed in the discharge line, the discharge side of the pump must be opened to vent the air in the system. The pump will not prime if there is sufficient static head to keep the discharge check valve closed.

The bypass line should be at least 1 inch diameter to minimize plugging yet small enough to prevent significantly impacting pump performance.



CAUTION

The bypass line must discharge into the sump or an appropriate vessel to prevent a hazardous spill.



CAUTION

A bypass line that returns to the sump must be secured to prevent being drawn into the suction.

In applications with less than 30 feet of discharge head, the bypass line should run back to the wet well. Locate discharge end 6 to 8 inches below the minimum liquid level of the sump.

In applications with more than 30 feet of discharge head a significant amount of liquid could be bypassed. This will negatively impact pump efficiency. To improve this condition an automatic air release valve should be installed in the bypass line. See the section *Automatic Air Release Valve*.

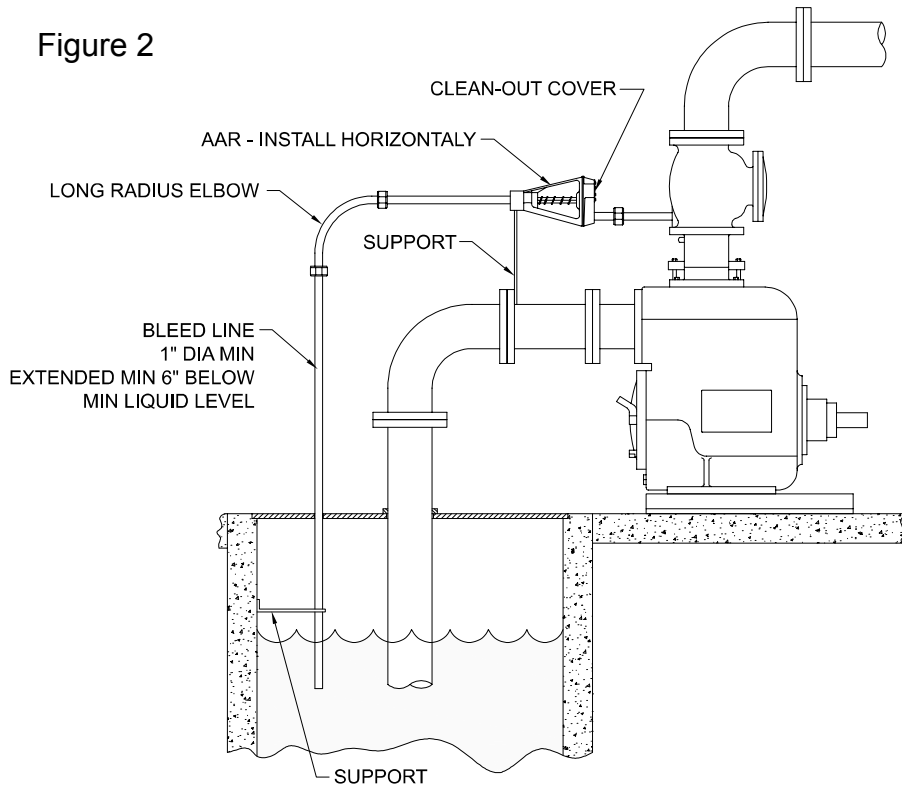
AUTOMATIC AIR RELEASE VALVE (AARV)

The AARV is designed to allow ventilation of air during the priming cycle. Once the pump is primed, the AARV will close due to the discharge pressure generated by the pump. A small amount of liquid (1 to 5 gallons per minute) will still bypass when the valve is in the closed position. Each AARV must sized and adjusted for its specific application.

CAUTION

Each AARV must sized and adjusted for its specific application.

The AARV is installed in the discharge line between the discharge flange and inlet side of the check valve as shown in figure 2. The inlet must be installed below the center line of the AARV. The discharge of the valve must be safely directed back to the sump or appropriate vessel through a bleed line. The bleed line must slope towards the sump or vessel and be one inch or larger in size.



ALIGNMENT

Alignment of the driver to the pump is imperative to the operating life of the equipment. Misalignment can lead to bearing failures, coupling wear, and shortened V-belt.

Power sources mounted by Summit Pump are aligned prior to shipment. Shipping and handling may cause misalignment. Units must be checked prior to operation.

DIRECT COUPLED PUMP

1. Use flexible spacer couplings to achieve proper alignment.
2. Check and adjust the parallel and angular alignment to within .005 inches prior to connecting the coupling halves.
3. Check that driver rotation agrees with pump rotation.
4. Install a coupling guard when alignment is complete.

BELT DRIVEN PUMP

Locate driver shaft parallel to pump shaft. Use a straight edge and belt tensioner to properly set up V-belts.

4. Assembly Procedures

Rotating Assembly

(See Appendix A for Cross-Section of Pump and rotating assembly)

To assemble rotating assembly:

1. Clean the disassembled bearing housing (199);
2. Secure the bearing frame to bench or holding stand;
3. Install vent, oil and cavity plugs (409, 410, 414, 415,416);
4. Install sight glass (319)
5. Install outboard bearing (118) on shaft (106) retaining ring towards end of shaft;
6. Install inboard bearing (116) on shaft (106);
7. Install outboard lip seal (149) in bearing cap (237);
8. Install inboard lip seal (147) in bearing housing (199);
9. Slide shaft bearing assembly into bearing housing (199) from drive end of frame until outboard bearing retaining ring is in its groove in frame;
10. Slide bearing cap (237) and gasket (601) over shaft (106);
11. Insert bearing cap bolts through cap (237) and gasket (601).
12. Slide back seal plate (184) and gasket (606) over impeller end of shaft;
13. Install bolt (377) and lock washer (344) into bearing frame (199) and back seal plate (184) and tighten;
14. Slide mechanical seal assembly (189) over end of shaft (106);
15. Install impeller shims (450) over shaft (106) between impeller (102) and mechanical seal assembly (189);
16. Install impeller bolt (379) and impeller washer (345) on to shaft (106)
17. Measure space between impeller (102) and back plate (184). Correct clearance is .026-inches. If not, remove impeller (102) and add or subtract from shim stack (450). Repeat step 16 and 17;
18. When impeller (102) to back seal plate (184) clearance is correct, install impeller bolt (379) and tighten. Rotating assembly is now complete and ready for installing in pump or storing as spare.

Back Cover Assembly

SN03A, SN04A, SN06A, SN08A

1. Cover plate assembly (260) wear plate (205) is cleaned inspected;
2. If wear plate (205) is worn, replace. Remove 2 bolts (340) SN03A, SN04; 4 bolts (340) SN06A, SN08A;
3. Install new wear plate (205) using bolts detailed in step 2; replace cover o-ring (521)
4. Install cover plate assembly (260) into casing (100) and tighten hand nut (377)
5. The pump is now ready to accept the rotating assembly

SN010A Suction Head Assembly

1. Install the suction head gasket (square suction ring). Use silicone grease to aid holding gasket in place;
2. Use a lifting device and sling to hold suction casing in place;
3. Insert the two large suction to casing bolts in the twelve and six-o-clock positions. Tighten the bolts, being careful that the gasket stays in place. Insert the four smaller suction to casing bolts and tighten;
4. The pump is now ready to accept the rotating assembly.

Installing Rotating Assembly

CAUTION

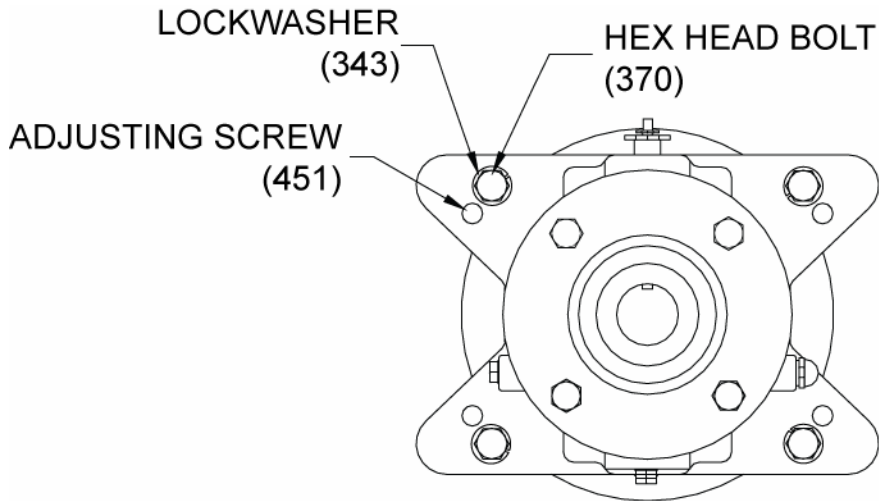
When installing rotating assembly, be sure it has been filled with proper oil, SAE 30 (non-detergent)

CAUTION

Use suitable hoist and rigging to lift assembly.

1. Screw adjusting screws (451) into casing;
2. Install new “O” rings(496) (498) on assembly (103),
3. Slide rotating assembly (103) into the casing (100);
4. Insert the bearing housing to casing bolts (370) into the bearing housing (199), tighten until impeller (102) rubs on front wear plate (205);
5. Refer to the impeller clearance section; follow steps 8 through 15 to adjust impeller (102) clearance.

5. IMPELLER CLEARANCE



WARNING

Electricity can cause electric shock. Lockout power prior to working on pump.



WARNING

Running pumps can create heat and cause hot gasses to form that if not properly released can cause serious burns. Allow pump to cool completely before servicing. Do not remove any cover plates, fittings or gauges from a heated pump.

CAUTION

Check impeller clearance prior to starting the pump. Settings may have changed during transport.

Impeller clearance is the measurement between the impeller (102) and the wear plate (205). This clearance is set at .013 inches during assembly but may need to be adjusted before initial startup.

PROCEDURE TO SET IMPELLER CLEARANCE

(See Appendix A for cross section of corresponding model)

To set the impeller clearances use the following procedures:

1. Lockout power to the pump motor.
2. Allow pump to cool if it has been operating.
3. Close the suction and discharge valves.
4. Remove the casing drain plug (510)
5. Loosen flap valve pin (372) and remove priming cover clamp bar (269)
6. Loosen priming cover (604).
7. Allow pump to drain if it has been operating.
8. Remove 4 hex head bolts (370) and then remove the lock washers (343). Reinsert the hex head bolts (370) into these holes.
9. Slowly turn the 4 adjusting screws (451) into the casing in a criss cross pattern.
10. Use the hex head bolts (370) minus the lock washers (343) to move the rotating element until the impeller comes in contact with the wear plate (205).
11. Loosen the 4 hex head bolts (370) until a .010 - .015 feeler gauge can be inserted against the bearing housing (199) hex head bolts (370).
12. Turn the 4 adjusting screws (451) out of the casing until they are tight against the bearing housing (199).
13. Remove the 4 hex head bolts (370) and add the lock washers (343).
14. Reinstall the 4 hex head bolts (370) and tighten in a criss cross pattern to 60 ft·lbs (lubed) or 88 ft·lbs (dry).
15. Turn the pump shaft 360 degrees to check for rubbing/binding. If there is binding, repeat steps 8 thru 15. If there is no rubbing /binding the impeller clearance is correct
16. Reinstall the casing drain plug (510) Reinstall the priming cover (604) then insert the clamp bar (269) and tighten the flap valve pin (372)

6. OPERATION



WARNING

Do not pump volatile, highly corrosive or flammable liquids with this pump. Death or severe injury could result.



WARNING

Do not operate pump outside its design envelope. Death or severe injury could result.

PRIMING

Make sure the pump and piping are installed as detailed in this manual. Check all piping joints for tightness and that the pump and driver are secured.

CAUTION

Do not operate pump without the casing be filled with liquid.

Pump should never be operated with an empty casing. The pump casing is filled by removing the fill cover (604), loosening the hand screw (267), swing the clamp bar (269) away, removing the cover plate, and filling the casing with pumpage or compatible liquid. Replace the cover, swing the clamp bar into the closed position, tighten the clamp screw.

The liquid level in the casing should be checked when:

1. The pump is first put into service.
2. The pump has not been in service for an extended time period.
3. The liquid has had a chance to evaporate.

The pump will prime and reprime as necessary only if the casing remains full.

STARTING



WARNING

Read and understand the operation manual supplied with the driver.



WARNING

Do not operate without guards which comply with ASME B15.1.



CAUTION

Driver rotation must agree with pump rotation.

LINES WITH A BYPASS

If an automatic air release valve (AARV) has been installed it will automatically open allowing air to be evacuated out of the suction line and the pump to prime. It will automatically close after prime is complete. A small amount of liquid (1 to 5 gallons per minute) will continue to be bypassed during regular operation.

If an AARV has not been installed, air from the suction line will be discharged through the bypass line. Liquid will continue to circulate through the bypass line during regular operation.



WARNING

Do not attempt to prime pump without properly ventilating the discharge line. Pressure head against a check valve can prevent ventilation and cause an explosion.

See the section “BYPASS LINE” for complete instructions.

LINES WITHOUT A BYPASS



WARNING

Do not attempt to prime pump without properly ventilating the discharge line. Pressure head against a check valve can prevent ventilation and cause an explosion.

Open all valves in the discharge line and start the driver. Priming will be indicated by a positive pressure reading on the discharge gauge. The pump will not prime until the air has been evacuated and the suction line is filled with liquid. Shut down the driver if the pump fails to prime within five minutes. Check for clogs and leaks in the suction line.

When the pump has primed, partially close the discharge throttling valve. This step will fill the line slowly guarding against excess shock pressure. When line is full, adjust valve to required flow.



WARNING

Do not operate pump against a closed discharge valve for extended periods. Operation could cause liquid to boil, building pressures that will damage pump casing, causing rupture or explosion which could cause personal injury or death.

LIQUID TEMPERATURE

The maximum liquid temperature for this pump is 160° F. The temperature of a liquid can increase due to the pumping action. The liquid temperature must be monitored to insure it remains below 160° F at the discharge of the pump.

This is particularly true when pumping against a closed or restricted discharge or suction valve as in the case of operating on the left side of the performance curve. Also be aware of changes in the ambient temperature of the liquid e.g. seasonal changes.



CAUTION

An overheated pump must be allowed to cool prior to servicing. Do not remove any cover plates, fittings or gauges from an over-heated pump. Allow the pump to cool completely. When cooling is complete, drain the casing by removing the casing drain plug (510). Use extreme care when removing the plug to prevent serious burns.

BACK FLUSHING

Never back flush the pump with high pressure air or steam. The high pressure could damage the pump and result in personal injury. Never use more than 50% of the maximum operating pressure indicated on the pump curve during back flushing.



WARNING

Do not exceed 50% of the maximum operating pressure during back flushing.

SHUTDOWN

CAUTION

Do not stop the pump suddenly.

Do not stop the pump suddenly, the resulting hammer or shock wave is transmitted across the entire system including the pump. Damage to the system and/or the pump may result. Gradually close the discharge valve before shutting down the driver.



WARNING

Do not operate pump against a closed discharge valve for extended periods. Operation could cause liquid to boil, building pressures that will damage pump casing, causing rupture or explosion which could cause personal injury or death.

If the pump is engine driven, throttle it slowly and allow it to briefly idle before shutting it down.



WARNING

Lockout or disable the driver from being operated.

BEARING TEMPERATURE

CAUTION

Do not check bearing temperature by using your hand. Burns can result.

Do not check bearing temperatures by hand as it is unsafe and inaccurate. Check the temperature with a contact or inferred gun type instrument. 180° F is the maximum temperature for operation. Higher temperatures may be the result of conditions that require attention, such as a damaged bearing, low lubricant level, wrong lubricant, misalignment between pump to driver.

LUBRICATION

SEAL ASSEMBLY

Prior to starting the pump, remove the vented plug (410) and fill with approximately 20 ounces of SAE No. 30 non-detergent oil. The oil level should be just below the plug's tapped hole.

BEARINGS

SAE No. 30, non-detergent oil is the recommended lubricant. Check the lubricant level regularly in the sight glass (319), maintain level exactly at center of glass. Fill if need through vented plug (409).

DISASSEMBLY PROCEDURES

(See Appendix A for cross section of corresponding model)

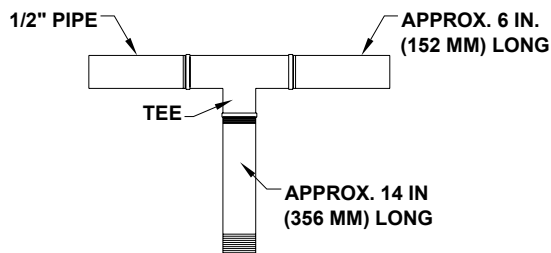
Back cover and wear plate.

1. Lock out power supply at motor starter.
2. Close off discharge suction valves.
3. If pumping hot liquid, allow pump to cool.
4. Drain casing and flush as needed (510).
5. Loosen two hand nuts (377) and remove. Pull front cover assembly plate (260) from casing.
6. Loosen wearplate nut (340) and remove wearplate (205). Inspect for wear and replace if necessary.
7. If directly driven, remove coupling and motor. If belt driven, remove belts and sheaves.
8. Drain seal cavity lubricant, remove drain plug (414).
9. Wedge a wooden block between the impeller (102) vanes and casing (100). Using a strap wrench turn the pump shaft (106) counter clockwise when facing the drive.
10. Remove vent plug (410)

CAUTION

The rotating assembly is heavy and not well counter balanced. Use two people for removal to avoid personal injury from lifting the assembly.

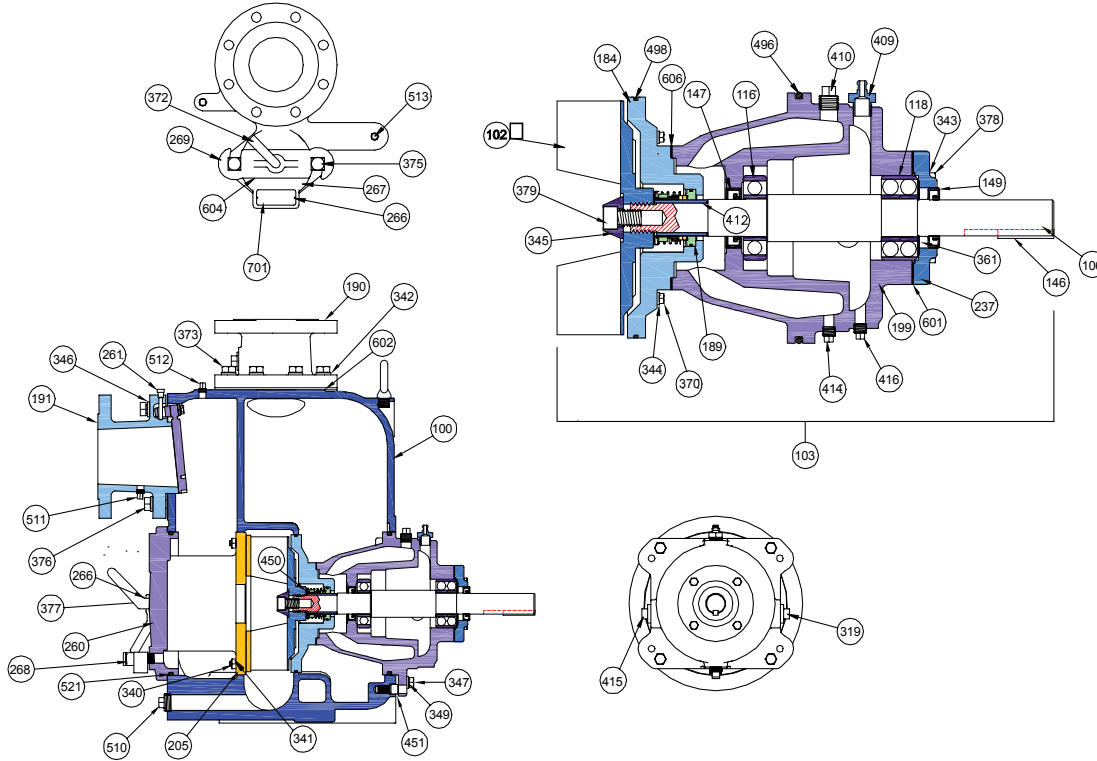
11. Remove the four housing to case bolts (347). Because the rotating assembly (103) is heavy and not well counter balanced, the lifting tool shown is helpful.



12. Remove seal plate gasket (606) and bearing housing o-ring (496).
13. Remove impeller from assembly, loosen and remove impeller socket head screw (379) and washer (345).
14. Remove impeller adjusting shims (450) and record thickness - this will aid re-assembly.

15. Pull the seal assembly off the shaft, use two stiff wires to pull the stationary element and seat.
16. Remove bearing housing drain plug (416), drain oil.
17. Remove bearing cap (237) and oil seal (149).
18. Slide shaft (260) out of bearing housing (199).
19. Remove radial oil seal (147).
20. Press radial bearing (116) and thrust bearing (180) off from shaft.
21. Clean bearing housing (199) and bearing cup (237).
22. Inspect all parts removed, replace as required.

APPENDIX A – PUMP CROSS SECTION AND PARTS LIST



MODEL SN PARTS LIST								
ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
100	1	CASING	319	1	SIGHT GLASS	409	1	PLUG, VENTED
102	1	IMPELLER	340	2	NUT, WEARPLATE	410	2	PLUG, VENT
103	1	ROTATING ASSY	341	2	WASHER, WEARPLATE	412	1	O-RING, SLEEVE
106	1	SHAFT	342	4	WASHER, DISH FLANGE	414	1	PLUG, SEAL CAVITY DRAIN
116	1	BEARING, IB	343	4	LOCKWASHER, OB COVER	415	1	PLUG
118	1	BEARING, OB	344	4	LOCKWASHER, HSG TO SEAL PLATE	416	1	PLUG, BRG HSG DRAIN
126	1	SHAFT SLEEVE	345	1	WASHER, IMPELLER	450	1	SHIM SET - IMPELLER
146	1	COUPLING KEY	346	4	WASHER, SUCT FLANGE	451	4	ADJUSTING SCREW, ROT ASSY
147	1	LIP SEAL, IB	347	4	BOLT, HSG TO CASE	496	1	O-RING, ROT ASSY
149	1	LIP SEAL, OB	349	4	WASHER, HSG TO CASE	498	1	O-RING, SEAL PLATE
184	1	SEAL PLATE	361	1	RETAINING RING, OB	510	1	PLUG, CASING DRAIN
189	1	SEAL ASSEMBLY WITH SLEEVE	370	4	BOLT - HSG TO SEAL PLATE	511	1	PLUG, SUCT FLG
190	1	DISCHARGE FLG - STD - FLANGED	372	1	CLAMP BAR SCREW	512	1	PLUG, VENT
191	1	SUCTION FLG- STD - FLANGED	373	4	BOLT, DISH FLANGE	513	1	PLUG, VENT
192	1	DISCHARGE FLG - OPTION - THREADED	374	4	DRIVE SCREW, WARNING PLATE	521	1	O-RING, COVER TO CASE
193	1	SUCTION FLG - OPTION - THREADED	375	2	BOLT, PRIMING COVER	601	1	GASKET - BRG CAP
199	1	BEARING HOUSING	376	4	BOLT, SUCTION FLANGE	602	1	GASKET - DISCHARGE FLG
205	1	WEAR PLATE	377	2	HAND NUT, FRONT COVER	603	1	GASKET - PRIMING COVER
237	1	BEARING CAP	378	4	BOLT, OB COVER TO HSG	604	1	COVER, PRIMING WITH WARNING PLATE
260	1	COVER PLATE ASSY	379	1	BOLT, IMPELLER	606	1	GASKET, SEAL PLATE
261	1	FLAPPER VALVE ASSY	380	1	HANDLE, FRONT COVER	700	1	WARNING PLATE, FRONT COVER
266	4	DRIVE SCREW - WARNING PLATE	381	2	BOLT, HANDLE TO FRONT COVER	701	1	WARNING PLATE, PRIMING COVER
267	1	PRIMING COVER	382	2	WASHER, HANDLE TO FRONT COVER			
268	1	RELIEF VALVE	407	1	BUSHING, REDUCING - VENT			
269	1	CLAMP BAR, PRIMING COVER	408	1	AIR VENT			

Purchase Date: _____

Purchase Order#: _____

Serial Number: _____

Equipment Number: _____

PO Box 12145 Green Bay, WI 54307

www.summitpump.com

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