

# SERVICE MANUAL

## 67102 PLUNGER PUMP



PUMP MODEL	FLOW		PRESSURE		RPM		TEMPERATURE		SHAFT DIA.		OIL CAPACITY	
	gpm	lpm	psi	bar	Pump	Motor	°F	°C	in	mm	oz	l
67102	100.0	378.5	1,000	69	680	—	140	60	1.772	45	320	9.46
67102C	100.0	378.5	1,000	69	680	—	140	60	1.772	45	320	9.46

### IMPORTANT SAFETY INSTRUCTIONS

It is the responsibility of the user to read and understand all instructions, important safeguards, and safety precautions before operating or servicing any pump. Failure to do so may result in property damage, personal injury or death.

#### General Safety Information and Symbols

Pay special attention to the following signal words, safety alert symbols and statements:

**⚠ DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.

**⚠ WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury.

**⚠ CAUTION** indicates a hazardous situation which, if not avoided, could result in minor or moderate injury or property damage.

**NOTICE** indicates a hazardous situation which, if not avoided, could result in property damage.

**⚠** Indicates a potential personal injury hazard. Obey all safety messages that follow this symbol to avoid possible injury or death.

### SERVICING THE 67102 PLUNGER PUMP SERIES

#### **⚠ WARNING**

**Do not service pump or electrical equipment while energized.**

**Electricity can cause personal injury, death or property damage.**

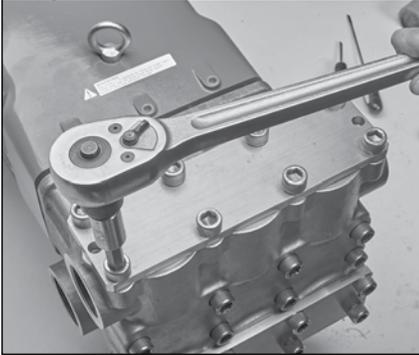
1. Adhere to "Lock Out" and "Tag Out" procedures for electrical equipment.
2. Before commencing pump service, turn power supply off.
3. Keep water away from electrical outlets and electrical devices.
4. Electrical components must be installed by a qualified electrician to avoid risk of electrocution.

# Servicing the Valves

## DISASSEMBLY

**NOTE:** Two (2) valve kits are required to repair the pump (see data sheet PN 99DAT023).

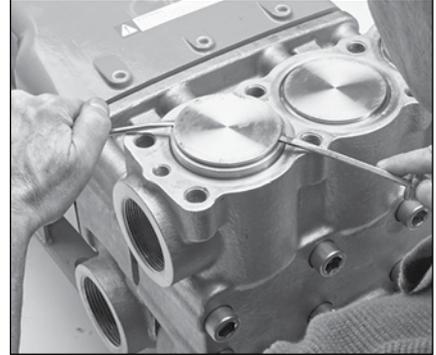
**NOTE:** Discharge and inlet valve assemblies are identical (use procedure below for disassembly and reassembly of discharge and inlet valves).



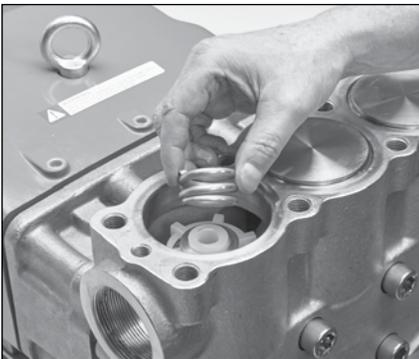
1.0 Use a M14 socket wrench to remove the eight (8) M16 x 30 Hex Socket Head (HSH) screws from the valve plate.



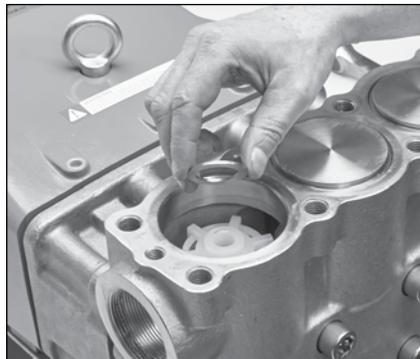
1.1 Remove valve plate.



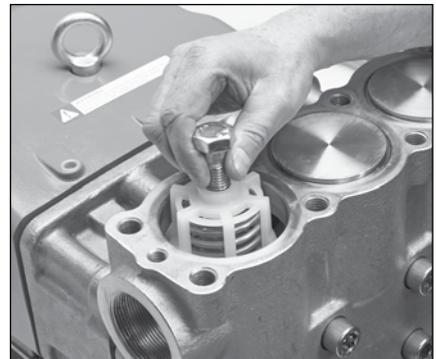
1.2 Insert two (2) flat tip screw drivers into grooves on opposite sides of valve plug and pry upward to remove valve plug with o-ring.



1.3 Remove coil spring.



1.4 Remove spring washer.



1.5 Use one of the discharge manifold HSH screws (M16 x 120) and hand thread into threaded hole of spring retainer. Grasp M16 screw and pull upward to remove complete valve assembly.



1.6 To separate spring retainer from valve seat, insert a flat tip screw driver between spring retainer and top of valve and pry upward until there is small gap.

1.7 If spring retainer separates from valve seat, remove spring and valve. Use a reverse pliers to remove valve seat.



1.8 Complete valve assembly.

**NOTE:** Examine valve seats, valves and springs for grooves, pitting or wear and replace with a new valve kit as needed.

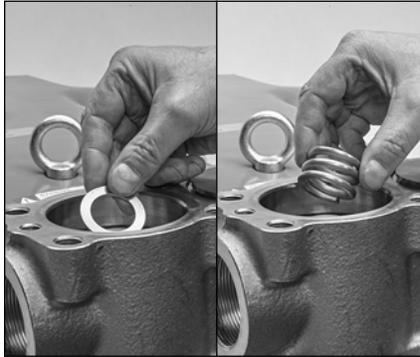
**NOTE:** Examine o-rings for cuts or wear and replace with a new valve kit as needed.

## REASSEMBLY

**NOTE:** Lubricate o-rings on valve seats and valve plugs prior to reassembly.



1.9 Place new preassembled valve assembly into each valve chamber.



1.10 Install spring washer onto spring retainer and then coil spring.

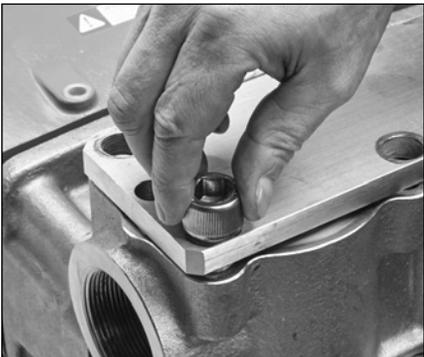
1.11 Install new o-ring onto valve plug.



1.12 Install valve plug by hand and then tap with a rubber hammer to seat properly.

1.13 Place cover plate onto manifold.

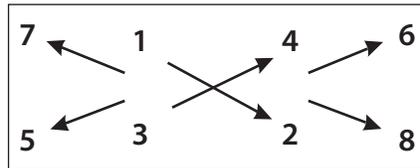
1.14 Apply anti-seize (PN 6119) to threads of HSH screws.



1.15 Hand thread in eight (8) M16 x 30 HSH screws.

1.16 Use a M14 socket wrench to torque all eight (8) HSH screws to 1416 in/lbs, 118 ft/lbs or 160 Nm in sequence show.

### TORQUE SEQUENCE

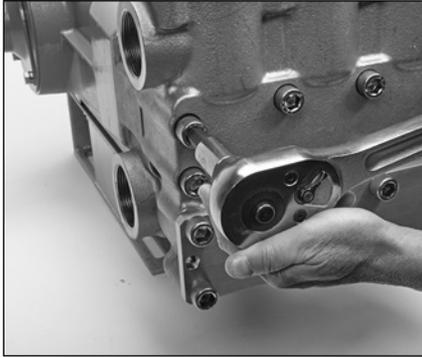


# Servicing the Seals and Plungers

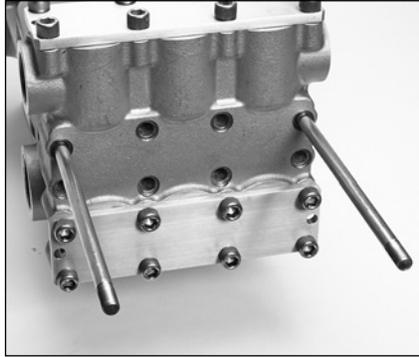
## DISASSEMBLY FOR SEALS

**NOTE:** One (1) seal kit is required to repair pump (see data sheet PN 99DAT023).

**NOTE:** In order to replace seals, remove discharge and inlet manifolds.



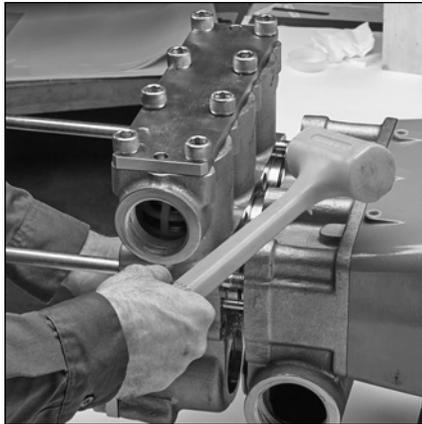
2.0 Use a M14 socket wrench to remove the top outside two (2) M16 x 120 HSH screws on the discharge manifold.



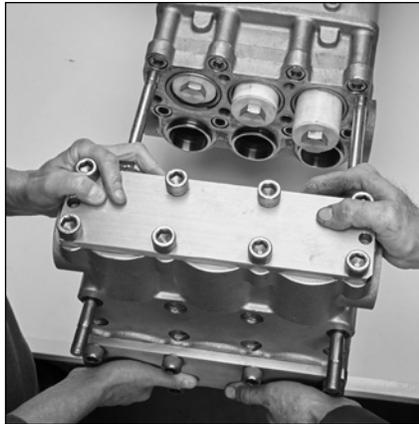
2.1 Hand thread in two (2) M16 x 277 studs (PN 88902). These studs will assist in guiding the discharge manifold over the plungers and evenly distribute the load.

### **CAUTION**

Exercise extreme caution when removing discharge manifold. Manifold is very heavy and will require two (2) individuals. The weight of manifold or any twisting action can damage the ceramic plungers.



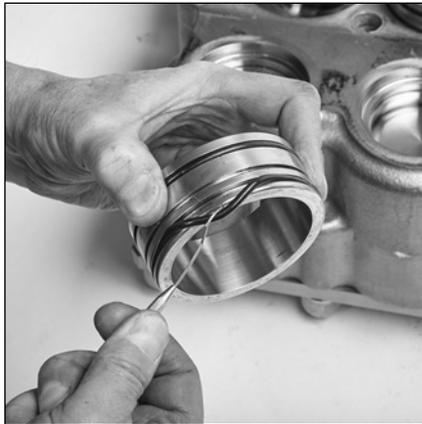
2.2 Use a rubber hammer to tap back side of discharge manifold to separate from inlet manifold.



2.3 **CAUTION** Two (2) individuals are required to safely remove the discharge manifold. Place discharge manifold on work surface with spacers facing upward.



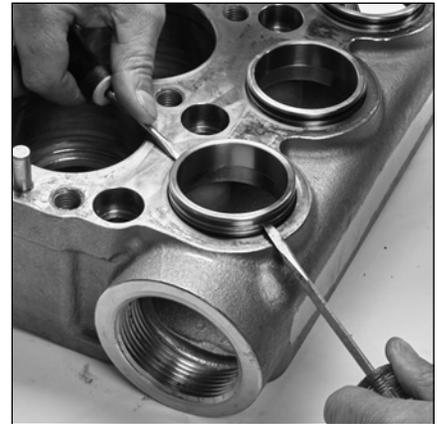
2.4 Insert two (2) flat tip screws into the groove on opposite sides of v-packing spacer and pry upward.



2.5 Use a pick to remove o-rings from both ends of the v-packing spacer.



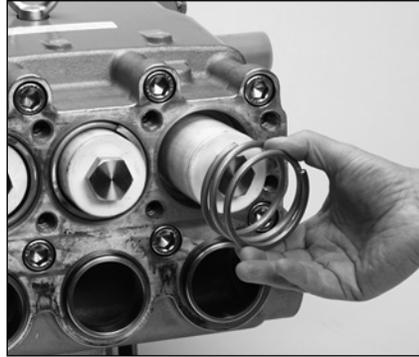
2.6 Use a pick to remove o-ring from top of inlet spacer.



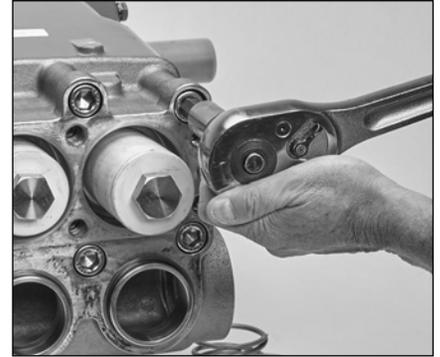
2.7 Carefully insert two (2) flat tip screws into the groove on opposite sides of inlet spacer and pry upward. Do not scratch o-ring sealing area.



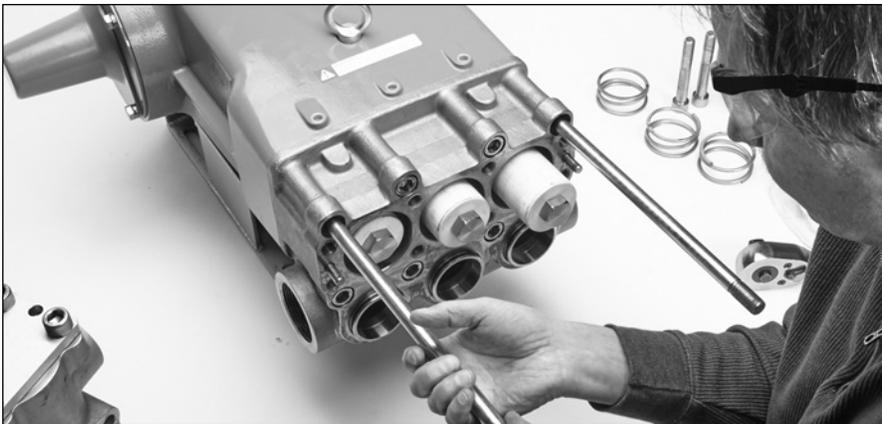
2.8 Use a pick to remove o-ring from the one end of the inlet spacer.



2.9 Remove large coil spring positioned around each plunger.

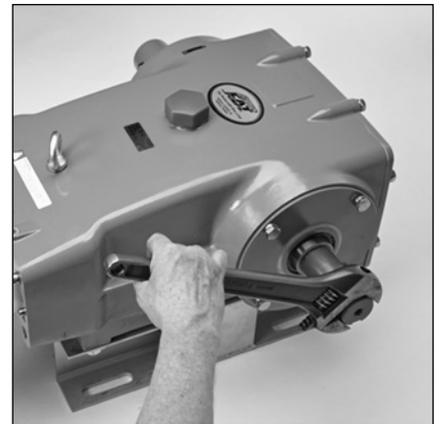


2.10 Use a M14 socket wrench to remove the top outside two (2) M16 x 110 HSH screws on the inlet manifold.

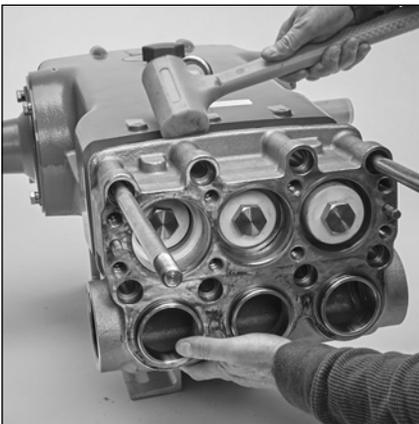


2.11 Hand thread in two (2) M16 x 277 studs (PN 88902). These studs will assist in guiding the inlet manifold over the plungers and evenly distribute the load.

2.12 Use a M14 socket wrench to remove the remaining six (6) M16 x 110 HSH screws on the inlet manifold.



2.13 Use a crescent wrench to turn the pump's crankshaft to assist in separating the inlet manifold from the crankcase.



2.14 Use a rubber hammer to tap back side of inlet manifold to further assist in separation from the crankcase.

**⚠ CAUTION**  
Exercise extreme caution when removing inlet manifold. Manifold is very heavy. The weight of manifold or any twisting action can damage the ceramic plungers.



2.15 Remove inlet manifold and place on work surface with crankcase side down.

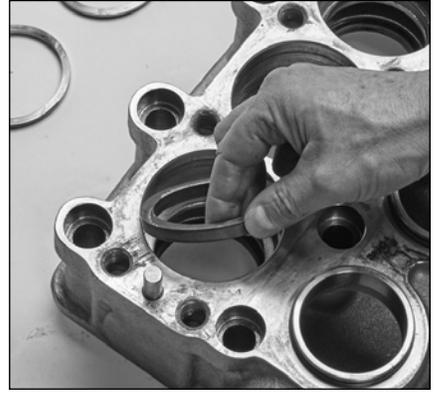
**DISASSEMBLY FOR SEALS CONTINUED**



2.16 Remove male adapter from each seal chamber.



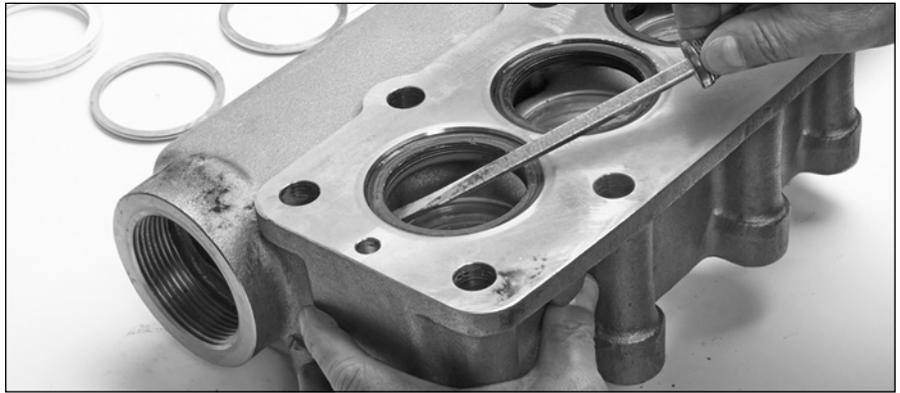
2.17 Remove the pair of white v-packings from each seal chamber.



2.18 Remove female adapter from each seal chamber.



2.19 V-Packing assembly arrangement.



2.20 Turn inlet manifold over so crankcase side is facing upward.

2.21 Use a large flat tip screwdriver to remove low-pressure seal from each seal chamber.

## REASSEMBLY FOR SEALS

**NOTE:** Examine inlet and discharge manifolds, spacers, male and female adapters for grooves, pitting or wear and replace as needed.

**NOTE:** Examine o-rings, low-pressure seals and v-packings for cuts or wear and replace with a new seal kit as needed.

2.22 With crankcase side of inlet manifold facing upward, install low-pressure seals with coil spring facing down.

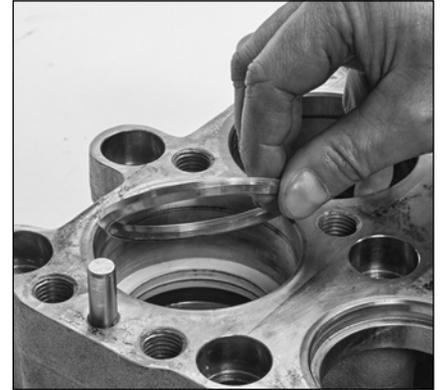
2.23 Turn inlet manifold over.



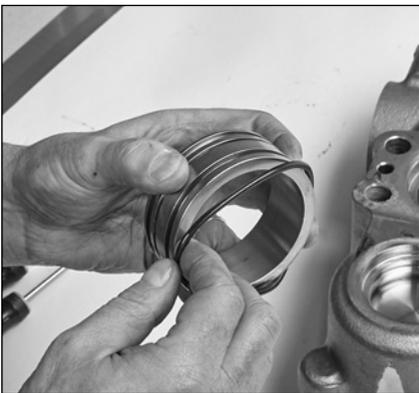
2.24 Install female adapter in each seal chamber with flat surface facing down.



2.25 Install the pair of v-packings in each seal chamber with v-shape facing down.



2.26 Install male adapter in each seal chamber with v-shape facing down.



2.27 Install and lubricate o-rings on both ends of v-packing spacer.

2.28 Install v-packing spacer in each seal chamber of discharge manifold.



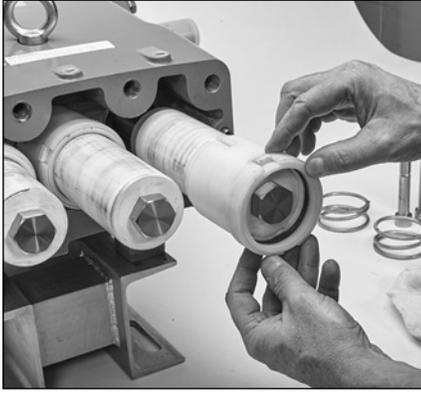
2.29 Install and lubricate o-rings on both ends of inlet spacer.



2.30 Install inlet spacer in each seal chamber.

**NOTE:** The seal kit contains three (3) plunger retainer o-rings and should be replaced at this time prior to re-installing manifolds.

**DISASSEMBLY FOR PLUNGERS**



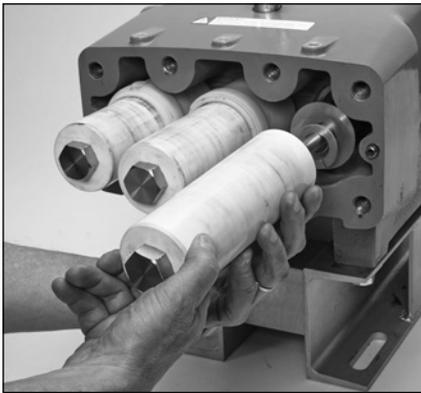
2.31 Remove seal retainers.



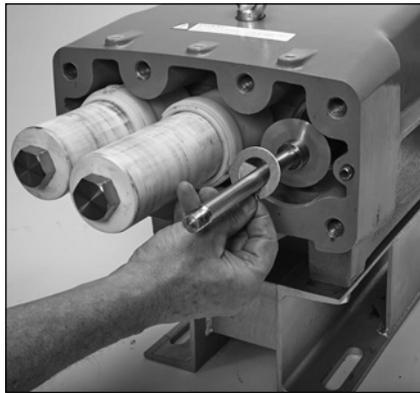
2.32 Seal retainer assembly



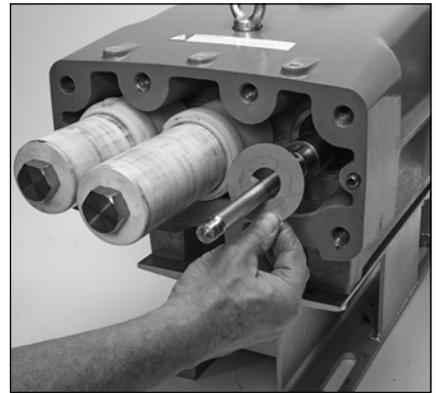
2.33 Use a M30 hex wrench to loosen the plunger retainers.



2.34 Grasp ceramic plunger and turn counterclockwise to remove plunger from plunger rod.



2.35 Remove keyhole washer.



2.36 Remove barrier slinger.  
2.37 Remove plunger retainer from ceramic plunger.



2.38 Use a pick to remove o-ring, backup-ring and gasket from plunger retainer.



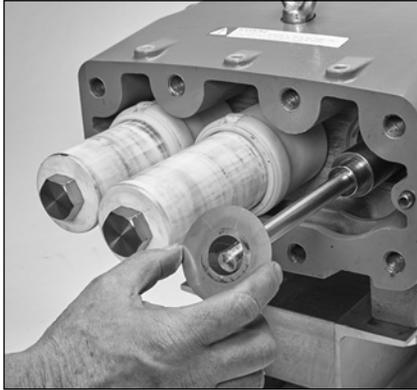
2.39 Ceramic plunger assembly.

**NOTE:** Examine o-rings and backup-rings for cuts or wear and replace with new parts as found in the seal kit as needed.

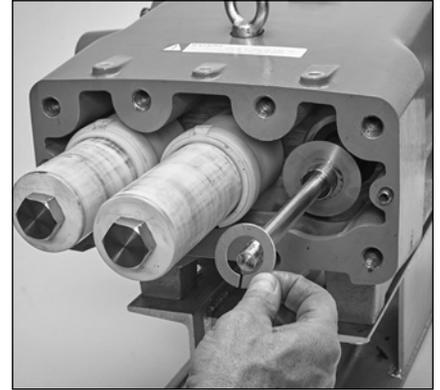
## REASSEMBLY OF PLUNGERS

**NOTE:** Lubricate o-rings and backup-rings on plunger retainers prior to reassembly.

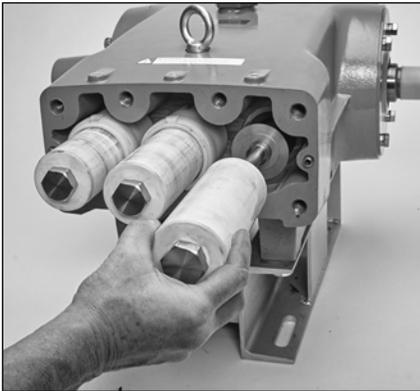
- 2.40 Install gasket onto each plunger retainer.
- 2.41 Position o-ring into groove of each plunger retainer.
- 2.42 Position backup-ring into groove on top of o-ring of each plunger retainer.
- 2.43 Insert plunger retainer assembly into ceramic plunger.



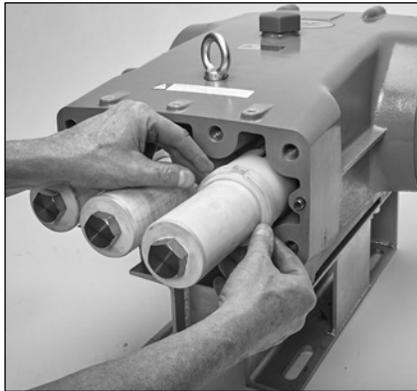
2.44 Slide barrier slinger over plunger rod and position against step on plunger rod.



2.45 Slide keyhole washer over plunger rod and position against barrier slinger.  
2.46 Place a drop of Loctite®242® on the end of each plunger rod.



- 2.47 Hand thread ceramic plunger assembly onto each plunger rod.
- 2.48 Use a M30 hex wrench to tighten the plunger retainers. Torque to 588 in/lbs, 49 ft/lbs or 66 Nm.



2.49 Slide seal retainer assembly over each plunger rod. Position wick downward.

## REASSEMBLY OF MANIFOLDS

2.50 Place inlet manifold onto two (2) M16 x 277 studs and slide up against crankcase.

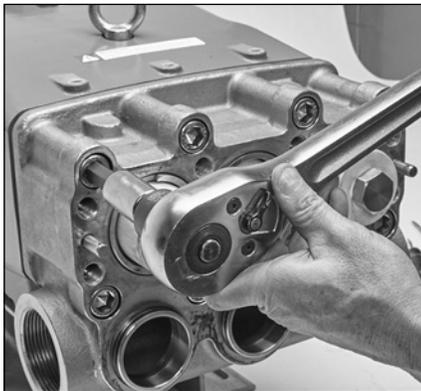


2.51 Install large coil spring over each ceramic plunger and press into place.

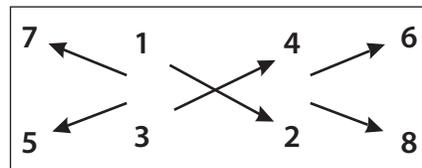
2.52 Apply Loctite®242® to six (6) M16 x 110 HSH screws; insert screws into inlet manifold and hand tighten.

2.53 Remove two (2) M16 x 277 studs.

2.54 Apply Loctite®242® to remaining two (2) M16 x 110 HSH screws and install.



### TORQUE SEQUENCE



2.55 Use a M14 socket wrench to torque all eight (8) HSH screws to 1152 in/lbs, 96 ft/lbs or 130 Nm in sequence show.

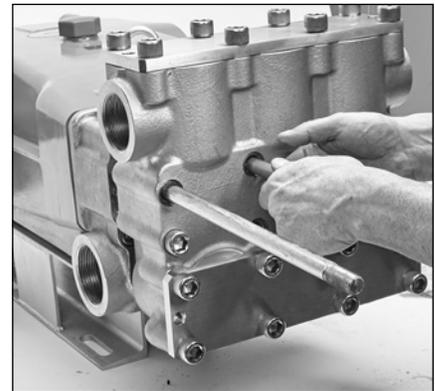
2.56 Hand thread in two (2) M16 x 277 studs (PN 88902) into upper outside holes of inlet manifold. These studs will assist in guiding the discharge manifold over the plungers and evenly distribute the load.

**NOTE:** Ensure guide pins are in place.

2.57  Line up holes on discharge manifold with studs and slide over ceramic plungers and press against inlet manifold.

### CAUTION

**Exercise extreme caution when reinstalling discharge manifold. Manifold is very heavy and will require two (2) individuals. The weight of manifold or any twisting action can damage the ceramic plungers.**



2.58 Apply anti-seize (PN 6119) to six (6) M16 x 120 HSH screws; insert screws into discharge manifold and hand tighten.

2.59 Remove two (2) M16 x 277 studs.

2.60 Apply anti-seize (PN 6119) to remaining two (2) M16 x 120 HSH screws and install.

2.61 Use a M14 socket wrench to torque all eight (8) HSH screws to 1416 in/lbs, 118 ft/lbs or 160 Nm in sequence shown.

# Preventive Maintenance Schedule

Many application factors determine proper pump maintenance intervals. Variation in duty cycle, operating performance, fluid temperature, fluid type, inlet conditions and application environment can affect maintenance schedules. **Every application should be evaluated and serviced based on its own requirements.** The following checklist is intended as a reference guide only.

Check	Daily	Weekly	50 Hrs.	1500 Hrs.	3000 Hrs.
Filters	•	or	•		
Oil Level/Quality	•	or	•	①	
Water Leaks	•	or	•		
Oil Leaks	•				
Plumbing		•			
Belts, Pulley		•			
Accessories				•	
Seals				②	
Valves					③

Water leaks or loss of system performance can be an indicator of seal wear. Seal wear has many causes, including contaminated liquid or high-temperature/run dry operation. If the low-pressure seals show wear, the high-pressure seals most likely are in a similar condition. It is a good practice to replace both low and high pressure seals and inspect plungers when leaks are present.

- ① Cat Pumps recommends using our custom-blend premium grade hydraulic oil formulated to meet Cat Pumps specifications. For best results, perform an initial oil change after the first 50 hours of operation and every 500 hours thereafter. If other oil is used, oil change should be performed every 300 hours of operation.
- ② Every system operates under different conditions. Past performance and maintenance history are the best indicators of future performance. **If system performance degrades or changes, check seals and valves immediately. Service as required to restore system performance.** Depending upon operating conditions, maintenance intervals for seals kits range between 1,500 and 8,000 hours.
- ③ Pump valves typically require changing every other seal change. Depending upon operating conditions, maintenance intervals for valve kits range between 3,000 and 16,000 hours.

# General Safety Information and Symbols

## **⚠ DANGER**

### **A. FLAMMABLE OR EXPLOSIVE LIQUID HAZARD**

Do not operate pump with flammable or explosive liquids unless extraordinary safety precautions are observed. Leaks of flammable or explosive liquids, if exposed to elevated temperatures, static electricity, sparks or other hazards, will result in flame or possible explosion, causing serious personal injury, death or property damage.

1. Before operating pump with flammable or explosive liquids, ensure proper maintenance has been performed.
2. Do not operate pump with flammable or explosive liquids if leaks are detected.
3. Only pump flammable or explosive liquids that are compatible with pump component materials.
4. Do not operate pump with flammable or explosive liquids without safeguards or safety systems to detect leaks, elevated temperatures, spark prevention or any other hazards defined by the NFPA systems.
5. Do not remove Flammable Liquids Product Suitability Hang Tag to assure proper safety.
6. Follow ATEX guidelines for potentially explosive atmospheres.

## **⚠ WARNING**

### **A. ELECTRICAL SHOCK HAZARD**

Do not service pump or electrical equipment while energized. Electricity can cause personal injury, death or property damage.

1. Adhere to "Lock Out" and "Tag Out" procedures for electrical equipment.
2. Before commencing pump service, turn power supply off.
3. Keep water away from electrical outlets and electrical devices.
4. Electrical components must be installed by a qualified electrician to avoid risk of electrocution.

### **B. ROTATING PARTS HAZARD**

Do not service pump while energized. Moving, rotating or reciprocating parts can crush and cut, causing personal injury, death or property damage.

1. Adhere to "Lock Out" and "Tag Out" procedures for electrical equipment.
2. Before commencing pump service, turn power supply off, turn water supply off, squeeze trigger on gun to relieve system pressure.
3. For mobile equipment, be sure engines and hydraulics are turned off and secured to avoid accidental start.
4. Do not operate with safety guards removed.
5. Always use safety guards on all belt drives, couplings and shafts.

### **C. HOT SURFACE HAZARD**

Do not touch pump, accessories or drive system while operating and until cool down is complete. Touching hot surface areas of the pump, accessories or drive system can cause severe burns or personal injury.

### **D. SKIN PUNCTURE HAZARD**

Do not allow spray to contact any part of the body or animals. Pumped liquids under high pressure can pierce skin and underlying tissue or can deflect debris leading to serious personal injury or death.

1. Relieve all line pressure in the inlet line to the pump and discharge line from the pump before performing any maintenance on the pump.
2. When high pressure gun is not in use, set safety trigger lock (safety latch) to avoid accidental high pressure operation and personal injury or property damage.
3. Do not check for leaks with hand. Use a piece of cardboard to check for leaks.
4. Review cleaning procedures to minimize heavy back blasting.
5. Wear adequate safety equipment and clothing when operating high pressure sprayer. Never use high pressure spray with bare feet or exposed skin, and always wear safety glasses.

### **E. PUMPING LIQUIDS HAZARD**

Do not operate pump with hot water, chemicals, or other hazardous liquids unless extraordinary safety precautions are observed. Pumping hot water, chemicals, or other hazardous liquids can expose personnel to serious injury.

1. Provide guards or shields around equipment to protect personnel.
2. Wear mask, goggles or eye protection while operating high pressure equipment.
3. Obtain a Safety Data Sheet (SDS) and take appropriate safety measures for the liquid being handled.

## F. OVER PRESSURIZATION HAZARD

Do not operate high pressure pumping system unless extraordinary safety precautions are observed. A high pressure pumping system can deadhead or over pressurize causing serious personal injury and property damage.

1. All high pressure systems require a primary pressure regulating device (i.e., regulator or unloader) and a secondary pressure safety relief device (i.e., pop-off valve, safety valve, rupture disc) to assure proper pressure setting and overpressure protection.
2. All high pressure systems require a pressure gauge to monitor pressure settings and avoid overpressure of equipment or personal harm.
3. Install primary pressure relief device on the discharge side of the pump.
4. Install secondary pressure relief device between the primary device and pump.
5. Install pressure gauge onto the discharge manifold or in the discharge line near the manifold.
6. Open all valves on discharge side of plumbing before operation.

## G. OXYGEN HAZARD

Do not charge Pulsation Dampeners with Oxygen. Oxygen may cause an explosion causing personal injury, death or property damage.

1. Use Nitrogen only when charging pulsation dampeners, DO NOT USE OXYGEN.
2. Use proper charging tools to charge pulsation dampeners.
3. Charge pulsation dampener within specifications stated on data sheet to assure proper pulsation dampening and prevent failure of bladder.

## H. FALL HAZARD

Do not operate pressure washer while standing on slippery or unstable surface unless extraordinary safety precautions are observed. Pressure washing may create slippery surface on which a person may slip and fall causing personal injury or death.

1. Wear suitable footwear to maintain a good grip on wet surfaces.
2. Do not stand on ladders or scaffolding.
3. Do not over reach or stand on unstable supports.
4. Keep good footing and balance and hold gun with both hands to control kick back.

## CAUTION

### A. IMPROPER USE OF FITTINGS HAZARD

Do not operate the pump with improperly connected, sized, worn or loose fittings, pipes or hoses. Operating the pump under these conditions could result in personal injury and property damage.

1. Ensure all fittings, pipes and hoses are properly rated for the maximum pressure rating and flow of the pump.
2. Check all fittings and pipes for cracks or damaged threads.
3. Check all hoses for cuts, wear, leaks, kinks or collapse before each use.
4. Ensure all connections are tight and secure.
5. Use PTFE thread tape or pipe thread sealant (sparingly) to reconnect plumbing. Do not wrap tape beyond the last thread, this will prevent tape from becoming lodged in the pump or accessories.
6. Apply proper sealants to assure secure fit or easy disassembly when servicing.

### B. FROZEN LIQUID HAZARD

Do not operate the pump with frozen liquid. Operating the pump under this condition could over pressurize and jettison the manifold from the crankcase causing personal injury and property damage.

1. Store pump or pumping system in an environmentally controlled room protected from freezing temperatures.
2. Follow procedures in TECH BULLETIN 083 to winterize pump.

### C. CLEANING PUMP HAZARD

Do not use solvents that are flammable and toxic to clean or degrease equipment. Use of these solvents could result in personal injury and property damage.

1. Follow safety instructions as found in SDS or on packaging of each liquid.
2. Clean equipment in a well ventilated area.
3. Disposal of solvents to be in accordance with local, state and federal regulations.

### D. OPERATING BEYOND SPECIFICATIONS HAZARD

Do not operate the pump outside the specifications of individual pump data sheet or service manual. Operating the pump under these conditions could result in personal injury and property damage.

1. Do not operate the pump faster than the maximum recommended rpm.
2. Do not operate the pump at pressures higher than the maximum recommended pressure.
3. Do not operate the pump at temperatures higher than the maximum recommended temperatures.
4. Do not use accessories that are not compatible or rated for the pump.

## **E. LIFTING DEVICE HAZARD**

**Do not lift pump with unsuitable lifting devices. Use of unsuitable lifting devices may cause pump to fall resulting in personal injury, damage to pump and/or pump with drive/base plate.**

1. Lifting eyes installed on the pump must be used only to lift the pump.
2. Special lifting eyes should be installed on the base for lifting the pumping system (i.e. base, drive and accessories)
3. If slings or chains are used for lifting, they must be safely and securely attached to properly balance the weight of the unit.
4. Inspect slings and chains prior to use and replace worn and damaged slings and chains.

## **NOTICE**

### **A. OIL HAZARD**

**Use only genuine Cat Pumps custom-blend, premium grade, petroleum-based hydraulic oil. Use of other oil may not provide proper lubrication of drive-end components and may result in damage to the crankcase of the pump.**

1. Cat Pumps custom-blend oil is available worldwide in 21 oz. bottles, cases, or 5 gallon twin packs. Use of other oils may void the warranty.
2. Fill pump crankcase to specific capacity indicated on data sheet or service manual prior to startup.

### **B. ROTATION OF PUMP HAZARD**

**Do not rotate pump crankshaft in reverse direction. Rotation of pump crankshaft in reverse direction may not provide proper lubrication and may result in damage to the drive-end components.**

1. Forward rotation is the top of the crankshaft turning towards the manifold head of the pump.
2. Ensure oil is filled to the center red dot on sight gauge for forward rotation.
3. Ensure oil is filled to slightly above center red dot on sight gauge for reverse rotation.

### **C. BELT TENSION HAZARD**

**Do not operate pump with excessive belt tension. Excessive belt tension may damage the pumps bearings or reduce horsepower.**

1. Rotate pump crankshaft before starting to ensure shaft and bearings are moving freely.
2. Ensure pulleys are properly sized.
3. Periodically replace belts to assure full horsepower transmission.
4. Ensure center distance dimensions between pulleys is correct.

### **D. BY-PASS OPERATION HAZARD**

**Do not operate the pump in by-pass for extended lengths of time. Operating the pump under this condition can quickly cause heat build-up resulting in damage to the pump.**

1. Route by-pass line to supply reservoir to dissipate heated by-pass liquid into a large reservoir of cool water to reduce excessive temperature build-up.
2. Route by-pass line to inlet of pump using a thermo valve in the by-pass line or auto shut-off assembly that will sense temperature rise and either by-pass or shut down system before damage occurs.

### **E. DRY OPERATION HAZARD**

**Do not operate the pump without water or liquid. Operating pump under these conditions could result in damage to the pump.**

1. Open all valves on inlet side of pump before starting operation to prevent starving the pump.
2. Do not exceed inlet suction pressure limit specified in pump data sheet.
3. Ensure inlet feed exceeds the maximum flow being delivered by the pump.
4. Ensure all fittings, pipes and hoses are properly sized for the pump to avoid restricted flow.
5. Review and implement all other recommendations appropriate for your system from the Inlet Condition Check-List.



## DIAGNOSIS AND MAINTENANCE

One of the most important steps in a high pressure system is to establish a regular maintenance program. This will vary slightly with each system and is determined by various elements such as the duty cycle, the liquid being pumped, the actual specifications vs rated specifications of the pump, the ambient conditions, the inlet conditions and the accessories in the system. A careful review of the necessary inlet conditions and protection devices required before the system is installed will eliminate many potential problems. Cat Pumps are very easy pumps to service and require far less frequent service than most pumps. Typically, only common tools are required, making in-field service convenient, however, there are a few custom tools, special to certain models, that do simplify the process. This service manual is designed to assist you with the disassembly and reassembly of your pump. The following guide will assist in determining the cause and remedy to various operating conditions. You can also review our **FAQ** or **SERVICE** sections on our **WEB SITE** for more facts or contact Cat Pumps directly.

PROBLEM	PROBABLE CAUSE	SOLUTION
<b>Low pressure</b>	<ul style="list-style-type: none"> <li>• Worn nozzle.</li> <li>• Belt slippage</li> <li>• Air leak in inlet plumbing.</li> <li>• Pressure gauge inoperative or not registering accurately.</li> <li>• Relief valve stuck, partially plugged or improperly adjusted.</li> <li>• Inlet suction strainer (filter) clogged or improperly sized.</li> <li>• Abrasives in pumped liquid.</li> <li>• Leaky discharge hose.</li> <li>• Inadequate liquid supply.</li> <li>• Severe cavitation.</li> <li>• Worn seals.</li> <li>• Worn or dirty inlet/discharge valves.</li> </ul>	<ul style="list-style-type: none"> <li>• Replace with proper size nozzle.</li> <li>• Tighten belt(s) or install new belt(s).</li> <li>• Tighten fittings and hoses. Use PTFE liquid or tape.</li> <li>• Check with new gauge. Replace worn or damaged gauge.</li> <li>• Clean/adjust relief valve. Replace worn seats/valves and o-rings.</li> <li>• Clean filter. Use adequate size filter. Check more frequently.</li> <li>• Install proper filter.</li> <li>• Replace discharge hose with proper rating for system.</li> <li>• Pressurize inlet or install inlet stabilizer.</li> <li>• Check inlet conditions.</li> <li>• Install new seal kit. Increase frequency of service.</li> <li>• Clean inlet/discharge valves or install new valve kit.</li> </ul>
<b>Pulsation</b>	<ul style="list-style-type: none"> <li>• Faulty Pulsation Dampener.</li> <li>• Foreign material trapped in inlet/discharge valves.</li> </ul>	<ul style="list-style-type: none"> <li>• Check precharge. If low, recharge, or install a new dampener.</li> <li>• Clean inlet/discharge valves or install new valve kit.</li> </ul>
<b>Water leak</b>		
<ul style="list-style-type: none"> <li>• Under the manifold</li> <li>• Into the crankcase</li> </ul>	<ul style="list-style-type: none"> <li>• Worn V-Packings or Lo-Pressure Seals.</li> <li>• Worn adapter o-rings.</li> <li>• Humid air condensing into water inside the crankcase.</li> <li>• Excessive wear to V-Packings and Lo-Pressure seals.</li> </ul>	<ul style="list-style-type: none"> <li>• Install new seal kit. Increase frequency of service.</li> <li>• Install new o-rings.</li> <li>• Install new oil cap protector. Change oil every 3 months or 500 hours.</li> <li>• Install new seal kit. Increase frequency of service.</li> </ul>
<b>Knocking noise</b>		
<ul style="list-style-type: none"> <li>• Inlet supply</li> <li>• Bearing</li> <li>• Pulley</li> </ul>	<ul style="list-style-type: none"> <li>• Inadequate inlet liquid supply.</li> <li>• Broken or worn bearing.</li> <li>• Loose pulley on crankshaft.</li> </ul>	<ul style="list-style-type: none"> <li>• Check liquid supply. Increase line size or pressurize or install inlet stabilizer.</li> <li>• Replace bearing.</li> <li>• Check key and tighten set screw.</li> </ul>
<b>Oil leak</b>		
<ul style="list-style-type: none"> <li>• Crankcase oil seal</li> <li>• Crankshaft oil seal and o-ring</li> <li>• Drain plug</li> <li>• Dipstick</li> <li>• Rear cover</li> <li>• Filler cap</li> </ul>	<ul style="list-style-type: none"> <li>• Worn crankcase oil seal.</li> <li>• Worn crankshaft oil seal or o-ring on bearing cover.</li> <li>• Loose drain plug or worn drain plug o-ring.</li> <li>• Loose dipstick or worn flat gasket.</li> <li>• Loose rear cover or worn rear cover o-ring.</li> <li>• Loose filler cap or excessive oil in crankcase.</li> </ul>	<ul style="list-style-type: none"> <li>• Replace crankcase oil seals.</li> <li>• Remove bearing cover and replace o-ring and/or oil seal.</li> <li>• Tighten drain plug or replace o-ring.</li> <li>• Tighten dipstick or replace flat gasket.</li> <li>• Tighten rear cover or replace o-ring.</li> <li>• Tighten filler cap. Fill crankcase to specified capacity.</li> </ul>
<b>Pump runs extremely rough</b>		
<ul style="list-style-type: none"> <li>• Inlet conditions</li> <li>• Pump valves</li> <li>• Pump seals</li> </ul>	<ul style="list-style-type: none"> <li>• Restricted inlet or air entering the inlet plumbing.</li> <li>• Stuck inlet/discharge valves.</li> <li>• Leaking V-Packings or Lo-Pressure seals.</li> </ul>	<ul style="list-style-type: none"> <li>• Correct inlet size plumbing. Check for air tight seal.</li> <li>• Clean out foreign material or install new valve kit.</li> <li>• Install new seal kit. Increase frequency of service.</li> </ul>
<b>Premature seal failure</b>		
	<ul style="list-style-type: none"> <li>• Scored plunger.</li> <li>• Over pressure to inlet manifold.</li> <li>• Abrasive material in the liquid being pumped.</li> <li>• Excessive pressure and/or temperature of pumped liquid.</li> <li>• Running pump dry.</li> <li>• Starving pump of adequate liquid.</li> <li>• Eroded manifold.</li> </ul>	<ul style="list-style-type: none"> <li>• Replace plungers.</li> <li>• Reduce inlet pressure per specifications.</li> <li>• Install proper filtration at pump inlet and clean regularly.</li> <li>• Check pressure and inlet liquid temperature.</li> <li>• DO NOT RUN PUMP WITHOUT LIQUID.</li> <li>• Increase hose one size larger than inlet port size. Pressurize or install inlet stabilizer.</li> <li>• Replace manifold. Check liquid compatibility.</li> </ul>



### CAT PUMPS

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