



*Please read and save these instructions. Read carefully before attempting to assemble, install, operate, or maintain. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage in which Pumptec, Inc. will not assume any liability! Retain instructions for future reference.*

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# X-SERIES PUMP

## PERFORMANCE FEATURES

- Long Life
- High-Pressure
- High-Efficiency
- Serviceability
- Durability
- Application Flexibility
- Chemical Compatibility
- Compact Design
- Enhanced Priming



The Pumptec X-series high flow pump is designed for flawless operation. With a solid ceramic 4 plunger design you can count on having the pressure and high flow you need regardless of your application. Like all Pumptec pumps, you can look forward to a long and problem free life. The X-series features an aircraft-grade anodized aluminum pump with Teflon hard-coat body and is nearly indestructible compared to pumps made of castings. The body offers compatibility with a wide variety of chemicals and is perfect for Area Sprays, Pest Control, Fire Protection, Turf, Lawn & Agricultural applications.

## UNPACKING

Remove all packing materials. Carefully remove the plunger pumps from the shipping carton. Inspect for any damage that may have occurred during transit. Check for any loose, missing, or damaged parts.

The contents include 1 Pumptec pump and motor assembly.

## SPECIFICATIONS

Maximum specifications refer to individual performance levels. Maximum performance ratings are maximums and may be conditional on other factors. Consult Troubleshooting section when operating near any performance maximum. Refer to individual pump data sheets for complete specifications, parts list and exploded view.

Model X-Series – Double Plunger Pump

**SEALS** ..... **T-SEAL**  
**O-RINGS** ..... **FKM**  
**INLET PORT** ..... **1/2" F NPT**  
**DISCHARGE PORT** ..... **1/2" F NPT**  
**MAX FLUID TEMP** ..... **TO 140°F**  
**RPM (MAX)** ..... **2000**  
**MATERIALS OF CONSTRUCTION**  
**BODY** ..... **HARDCOAT ALUMINUM**  
**PLUNGER** ..... **CERAMIC**  
**VALVES** ..... **STAINLESS STEEL**  
**FASTENERS** ..... **STAINLESS STEEL**

SERIES	MAX FLOW (GPM)	MAX PRESSURE (PSI)
X-3	3.6	300
X-4	5.1	300
X-5	6.1	225
X-6	6.5	175

## GENERAL SAFETY INFORMATION

Please read this manual before installing or operating pump to provide safe operation and prevent equipment problems. Observe the following symbols and definitions.

**NOTE:** Indicates important instructions which are not related to hazards.

**IMPORTANT:** Indicates factors concerned with assembly, installation, operation, or maintenance which could result in damage to the machine or equipment if ignored.

### CAUTION!

*Warns about hazards that MAY cause minor personal injury or property damage if ignored.*

### WARNING!

*Warns about hazards that COULD cause serious personal injury, death or major property damage if ignored.*

### DANGER!

*Warns about hazards that WILL cause serious person injury, death or major property damage if ignored.*

## PLEASE READ, SAVE AND REFER TO SAFETY INSTRUCTIONS BELOW:

### CAUTION!

*Pumps build up heat and pressure during operation. Allow time for pumps to cool before handling or servicing. Only qualified personnel should install, operate, and repair pump.*

**IMPORTANT:** For pumping liquids other than water, contact your supplier.

### DANGER!

*Do not pump hazardous materials (flammable, caustic, etc.) unless the pump is specifically designed and designated to handle them.*

### WARNING!

*To reduce risk of electric shock, always disconnect pump from power source before handling or servicing.*

### WARNING!

*Any wiring of pumps should be performed by a qualified electrician.*

### CAUTION!

*These pumps are not intended to be submersed.*

Pumpteck, Inc. is not responsible for losses, injury, or death resulting from a failure to observe these safety precautions, misuse or abuse of pumps or equipment.

## INSTALLATION

### MOUNTING

Pump motor set can be mounted in any position EXCEPT with pump head higher than motor. To minimize amp draw, noise and vibration, use appropriate flexible hose to inlet and discharge ports.

### LOCATION

#### CAUTION!

*If the pump is used in extremely dirty or humid conditions, it is recommended pump be enclosed. Do not store or operate in excessively high temperature areas or without proper ventilation.*

The pumping system can be mounted where it is visible, but it must be protected from rain, dirt and chemical spray or splashing. The pump must never be installed on a vertical surface with the pump head higher than motor.

## PRE-OPERATION

### DISCHARGE CONDITIONS

Open all valves in system prior to operation to avoid excessive load on motor and system from a pressure spike. Follow the instructions for proper system design. Refer to supplier if assistance is needed.

### PRESSURE REGULATION

Verify pressure regulation devices are operating correctly.

### NOZZLES

Nozzles create pressure in most systems and they become larger with use. Larger nozzles decrease system pressure. Verify the quality of nozzles prior to operation.

### MOTOR SHAFT ROTATION

#### CAUTION!

*Motor shaft rotation must always be counterclockwise in order to assure proper function of pump or warranty may be void.*

### PUMPED LIQUIDS

Some liquids may require a flush between operations or before storing. For pumping liquids other than water, contact your supplier.

## OPERATION

### GENERAL OPERATING INFORMATION

Pressure is often created by forcing a volume of fluid (flow) through a specific size hole (nozzle). Additionally, pressure can be created by pumping into a non-expanding chamber. Pressure is measured and stated in PSI – pounds per square inch.

Flow is created based upon the pump displacement and speed (RPM) of the motor. Pump plunger size affects flow based upon the same RPM. The faster the motor speed, the greater the flow. Flow is measured and stated in GPM – gallons per minute.

The pump, driven by a motor or engine, draws fluid through a set of valves into the pumping chamber and the fluid is then forced out of a set of valves to exit the pump. The back and forth movement of the plunger in the sealed pumping chamber creates the suction and discharge actions.

Once the fluid has exited the pump it must be controlled until it exits the nozzle or reaches the place it needs to go. This control is achieved via the use of system components such as an unloader or regulating valve. The pumps are positive displacement pumps providing a specific amount of fluid constantly while operating. This volume of fluid must be directed out thru a nozzle or back to a tank because it cannot be stopped completely without creating excessively high pressure and risk of damage to pump, components, property and person. It is recommended a safety device such as a regulating valve be installed directly on pump head as protection in case of a failure of another component. Pressure switches can be used to automate pump operation, but they must have a pressure regulating device installed as a safety device.

Fluid can enter a pump either from a filtered tank or pressurized fluid line.

It is common to use a tank with pumps that are mounted above the pump. Filtration is important to maintain proper function of the pump and system. The extent of filtration may be greater based upon some uses such as misting with ultra-fine nozzles.

## INLET CONDITION CHECKLIST

Inadequate inlet conditions can cause serious malfunctions in the best designed pump. Surprisingly, the simplest of things can cause the most severe problems or go unnoticed to the unfamiliar or untrained eye. REVIEW THIS CHECKLIST BEFORE OPERATION OF ANY SYSTEM. Remember, no two systems are alike so there can be no ONE best way to setup a system. All factors must be carefully considered.

**INLET SUPPLY** should exceed the maximum flow being delivered by the pump to assure proper performance.

- Open inlet shut-off valve and turn on water supply to avoid starving the pump.
- Avoid closed loop systems especially with high temperature, ultra-high pressure or large flows. Conditions vary with regulating/unloader valve.
- When using an inlet supply reservoir, size it to provide adequate liquid to accommodate the maximum output of the pump, generally a minimum of 6-10 times the GPM (however, a combination of system factors can change this requirement).

**INLET LINE SIZE** should be adequate to avoid starving the pump

- Line size must be a minimum of one size larger than the pump inlet fitting. Avoid tees, 90-degree elbows or valves in the inlet line of the pump to reduce the risk of flow restriction and cavitation.
- The line **MUST** be a FLEXIBLE hose, NOT a rigid pipe, and reinforced on SUCTION systems to avoid collapsing.
- The simpler the inlet plumbing the less the potential for problems. Keep the length to a minimum, the number of elbows and joints to a minimum (ideally no elbows) and the inlet accessories to a minimum.
- Use pipe sealant to assure airtight, positive sealing pipe joints.

**INLET PRESSURE** should fall within the specifications of the pump.

- High RPM, high temperatures, low vapor pressures or high viscosity may increase acceleration loss of liquids.
- Optimum pump performance is obtained with +20 PSI (1.4 BAR) inlet pressure. With adequate inlet plumbing, most pumps will perform with flooded suction.
- After prolonged storage, pump should be purged of air to facilitate priming. Disconnect the discharge port to allow liquid to pass through pump and measure flow.

**BYPASS TO INLET** – care should be exercised when deciding the method of bypass from control valves.

- It is recommended that the bypass be directed to a baffled reservoir tank, with at least one baffle between the bypass line and the inlet line to the pump.
- Although not recommended, bypass liquid may be returned to the inlet line of the pump if the system is properly designed to protect your pump.
- A low-pressure, flexible hose should be used from the bypass connection to the inlet of the pump.
- Caution should be exercised to avoid undersizing the bypass hose diameter and length.

- Check the pressure in the bypass line to avoid over-pressurizing.

## USING CHEMICALS

Chemicals can be mixed into the fluid and it is necessary to understand whether these chemicals will damage the pump or other system components. Another way to put chemicals into the fluid is with a downstream injector.

An injector works as a result of the difference of pressure between the inlet side of injector and discharge side. In most cases, the pressure on the discharge side cannot exceed 1/2 of the inlet pressure. For example, 1000 PSI into an injector should allow up to 500-600 PSI spray pressure on discharge side. There are dual-function nozzles that permit high pressure, chemical free rinse and low pressure, chemical spray. These are convenient for the operator and will not harm a properly designed system.

The advantages of an injector are:

Fewer items touching chemical, the chemical injection rate can be controlled, and applying chemical at lower pressure increases chemical use efficiency.

## HEATING FLUID

The pumps may sometimes be used with downstream heaters and precautions need to be taken to protect the system and persons from harm. Refer to the skilled staff at the equipment manufacturer for guidance and proper system care. Please be aware that heated water expands and additional pressure release safety devices may be required.

## SYSTEM DESIGN

A pump is the heart of every system and proper selection is critical to equipment function and durability. If a pumping set with excess flow is chosen, then energy and fluid is wasted. Equipment effectiveness can decrease if excess pressure results, and so can pump life.

## TYPICAL APPLICATIONS AND THEIR PERFORMANCE CONSIDERATIONS

### PEST SPRAYING

This application can have specific chemical usage requirements and application pressure limits, so use the included information as a guide only. Refer to label requirements for each specific chemical.

### LINE LOSS

When choosing a pump for spraying, pressure loss in the hose must be considered. The pressure is greatest at pump and decreases over the length of the hose. Typically, these systems utilize very long hoses, 200-300 ft. is common, and requires a certain minimum amount of performance to move the flow through the lengths of hose. For example, a 3 GPM system will require (lose) 50 PSI per 50 ft. of 3/8" ID hose. A pump with only 60-70 PSI may not provide the desired performance at the end of the hose. See reference charts to assist in system design.

DO NOT return bypass fluids from regulating valve directly back to inlet of pump. The returned fluid will contain large amounts of air bubbles that will cause cavitation and damage in the pump head. Also, the small amount of returned fluid can heat up rapidly and lead to further cavitation and component damage. It is recommended to route bypass back to inlet of filter to allow air bubbles to dissolve and water to cool prior to entering pump.

The pumps are shipped assembled to a custom-made motor based upon your specifications. It is not necessary to order a motor separately. Communicate your specification requirements and the supplier will assist with pump options.

Please use the following charts as a guide to understand the basic system requirements.

**NOTE:** Nozzle sizes in the performance chart are additive. For example, 2 pieces of '02 nozzle equals the performance of 1 piece of '04.

Nozzles create restriction (pressure) in the system. If unsure of the nozzle size needed for desired performance, refer to Nozzle Performance Chart. If you are sure of your nozzle size, but unsure of which pump set to choose, use the Nozzle Performance Chart along with the Horsepower Chart to determine your required pump specification. See next page.

### STORING

For extended storing, or between uses in cold climates, drain all pumped liquids from pump and flush with antifreeze solution to prevent freezing and damage to the pump. **DO NOT RUN PUMP WITH FROZEN LIQUID.**

**NOTE:** Each system's maintenance cycle will be unique. If system performance decreases, check immediately. If no wear at 500 hours, check again at 1000 hours and each 500 hours until wear is observed. Valves typically require changing every seal change. Duty cycle, temperature, quality of pumped liquid and inlet feed conditions all affect the life of a pump's wear parts and service cycle.

**NOTE:** Remember to service the regulator/uploader at each seal servicing and check all system accessories and connections before resuming operation.

### NOZZLE PERFORMANCE CHART FLOW RATE VS. PRESSURE

	GPM (gallons per minute) @ PSI (pounds per square inch)						
	PSI						
SS TIP #	60	80	100	200	300	400	500
2	0.25	0.28	0.32	0.45	0.55	0.64	0.71
3	0.37	0.42	0.47	0.67	0.82	0.96	1.10
4	0.49	0.57	0.63	0.89	1.10	1.26	1.40
6	0.73	0.85	0.95	1.34	1.64	1.90	2.10
8	0.98	1.13	1.26	1.79	2.20	2.52	2.80
10	1.22	1.41	1.58	2.24	2.74	3.16	3.50
12	1.47	1.70	1.90	2.68	3.29	3.79	4.24
15	1.84	2.12	2.37	3.35	4.11	4.74	5.30
20	2.45	2.83	3.16	4.47	5.48	6.32	7.07
30	3.67	4.24	4.74	6.71	8.22	9.49	10.61

### HORSEPOWER CHART

Flow in GPM	Horsepower required @ PSI (pounds per square inch)											
	25	50	75	100	125	150	175	200	225	250	275	300
3	0.047	0.094	0.141	0.188	0.235	0.282	0.329	0.376	0.423	0.471	0.518	0.565
3.25	0.051	0.102	0.153	0.204	0.255	0.306	0.357	0.408	0.459	0.510	0.561	0.612
3.5	0.055	0.110	0.165	0.220	0.274	0.329	0.384	0.439	0.494	0.549	0.604	0.659
3.75	0.059	0.118	0.176	0.235	0.294	0.353	0.412	0.471	0.529	0.588	0.647	0.706
4	0.063	0.125	0.188	0.251	0.314	0.376	0.439	0.502	0.565	0.627	0.690	0.753
4.25	0.067	0.133	0.200	0.267	0.333	0.400	0.467	0.533	0.600	0.667	0.733	0.800
4.5	0.071	0.141	0.212	0.282	0.353	0.423	0.494	0.565	0.635	0.706	0.776	0.847
4.75	0.074	0.149	0.223	0.298	0.372	0.447	0.521	0.596	0.670	0.745	0.819	0.894
5	0.078	0.157	0.235	0.314	0.392	0.471	0.549	0.627	0.706	0.784	0.863	0.941
5.25	0.082	0.165	0.247	0.329	0.412	0.494	0.576	0.659	0.741	0.823	0.906	0.988
5.5	0.086	0.173	0.259	0.345	0.431	0.518	0.604	0.690	0.776	0.863	0.949	1.035
5.75	0.090	0.180	0.271	0.361	0.451	0.541	0.631	0.721	0.812	0.902	0.992	1.082
6	0.094	0.188	0.282	0.376	0.471	0.565	0.659	0.753	0.847	0.941	1.035	1.129
6.25	0.098	0.196	0.294	0.392	0.490	0.588	0.686	0.784	0.882	0.980	1.078	1.176
6.5	0.102	0.204	0.306	0.408	0.510	0.612	0.714	0.816	0.917	1.019	1.121	1.223

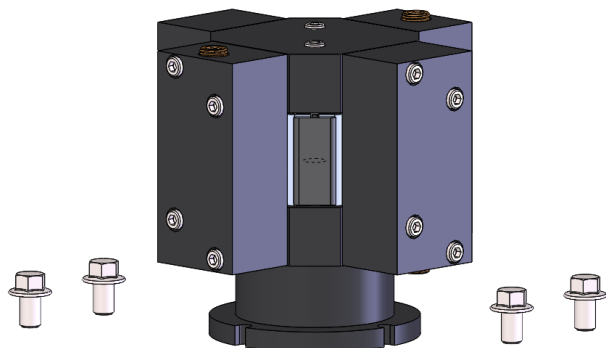
(\*) Where pump efficiency is 93%



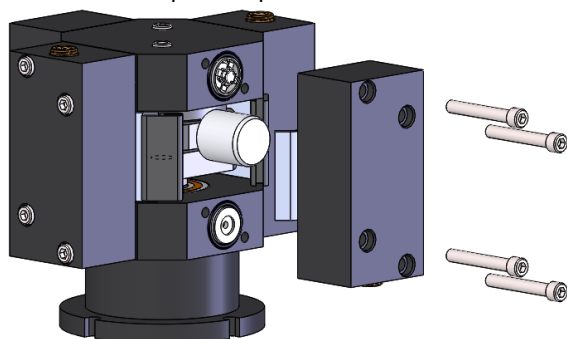
## MAINTENANCE

### DISASSEMBLY AND REASSEMBLY

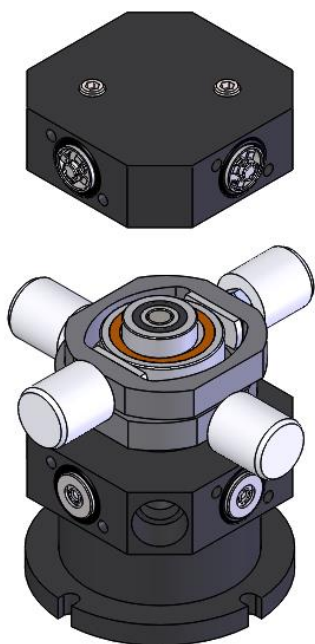
1. Remove pump from motor by removing flange head bolts and tip pump so inlet is up. Remove inlet and outlet labels.



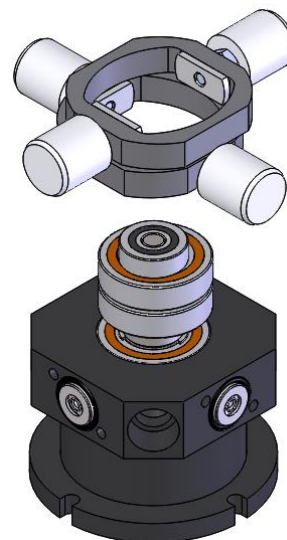
2. Separate heads from pump. Rubber protectors can also be removed. Repeat step for other 3 heads.



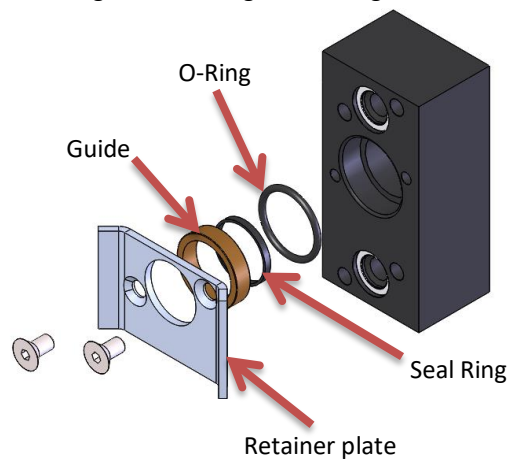
3. The inlet manifold can now be removed by lifting them off of the driveshaft.



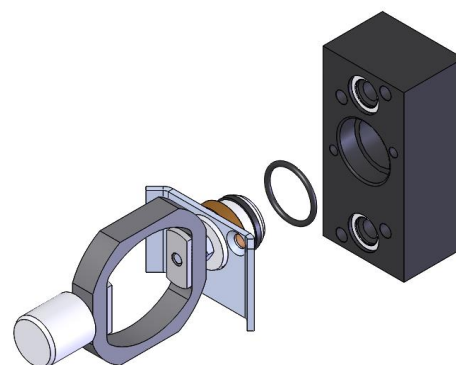
4. The hoop plungers can also be removed. Clean parts that are being reused.



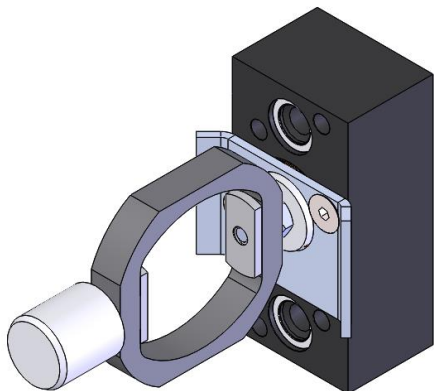
5. Remove bolts and then retaining plate from head. Remove guide, seal ring, and O-ring from head.



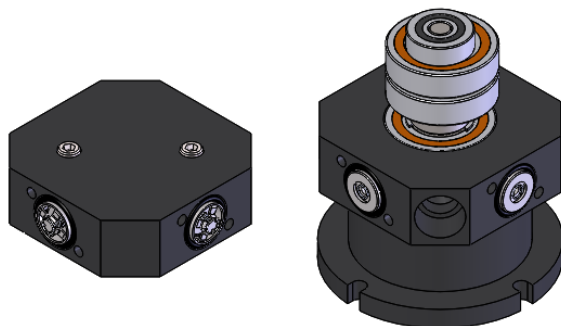
6. Grease seal ring and O-ring. Place O-ring into head. Slide retainer plate, guide, and then seal ring onto the plunger and install into head.



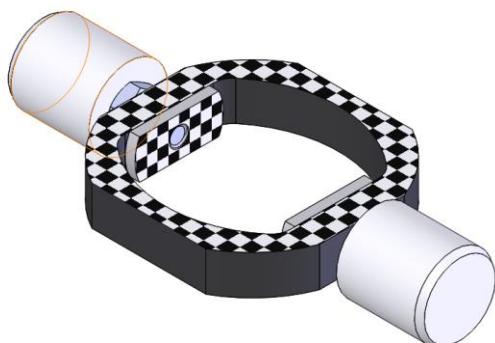
7. Tighten bolts to secure retainer plate. Remove hoop plunger. Replace valve washers if needed. A small amount of grease helps keep the washers in the pockets. Repeat steps 5, 6, and 7 for other three heads.



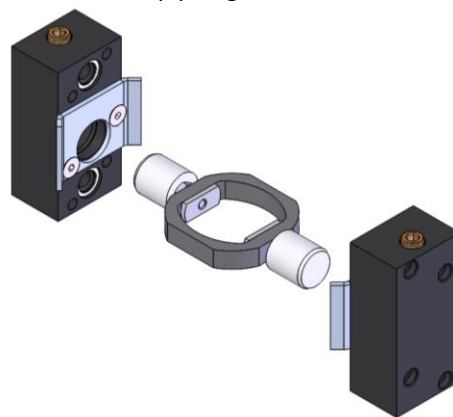
8. Replace valves and O-rings in both outlet and inlet manifolds. Note valve orientation. A little bit of grease on the O-ring will make the valves stay in the pockets.



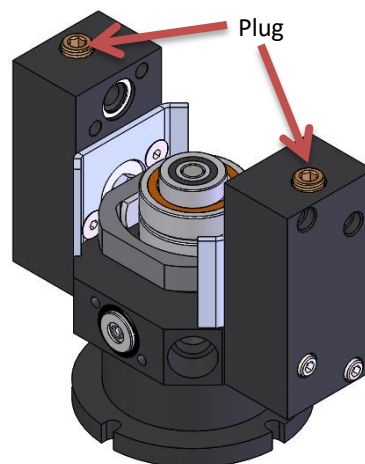
9. Apply grease to checkered areas of both hoop plungers.



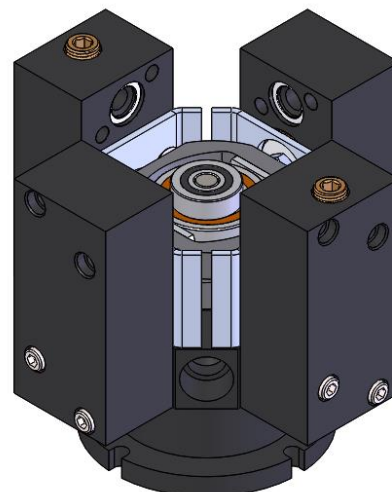
10. Place one head onto each end of plunger hoop. Do this for both hoop plungers.



11. Slide hoop plunger/head assembly onto driveshaft with the plugs facing up. Start bottom bolts on heads.

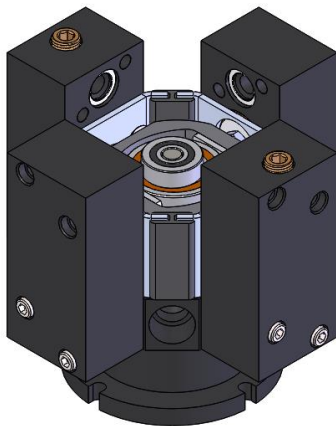


12. Flip other hoop assembly so plugs are down. Slide hoop onto driveshaft. Start bottom bolts on heads.

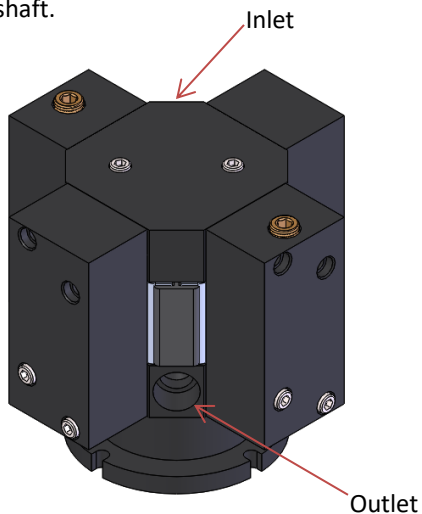




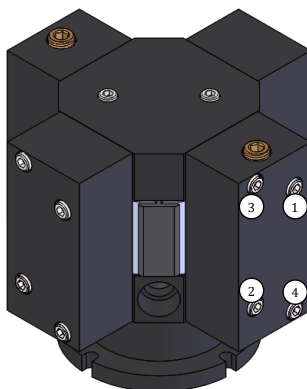
13. Slide all 4 rubber protectors between retainer plates.



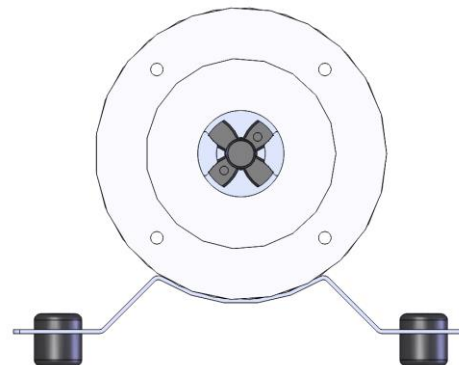
14. Pull heads apart slightly. Note orientation of inlet is opposite of outlet before sliding manifold into place. Slide inlet manifold with bearing housing onto top of driveshaft.



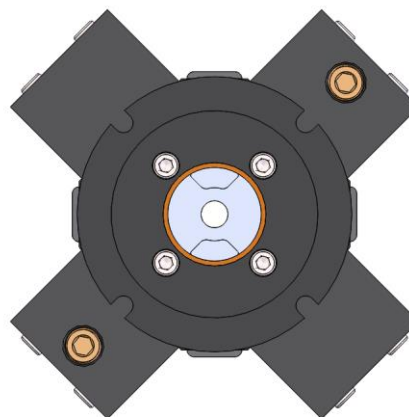
15. Push heads together onto manifolds. Manifold should slide easily and completely over valves. Insert and tighten bolts in each head in order shown below. Tighten 1<sup>st</sup> bolt again after 4<sup>th</sup> bolt is tightened.



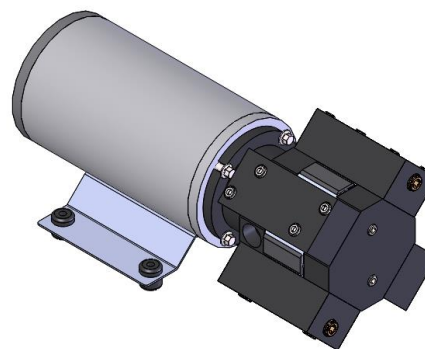
16. Line up coupling on motor so gaps are vertical.



17. Orient coupling in pump so jaws are vertical.



18. Slide pump onto motor and tighten flange head bolts.



### PREVENTIVE MAINTENANCE CHECKLIST

Check	Daily	Weekly	50 Hrs.	1500 Hrs.	3000 Hrs.
Clean Filters	X				
Water Leaks	X				
Descale Pump		X	X		
Cam & Bearing					X
Seal Change				X	X
Valve Change				X	X

### TROUBLESHOOTING CHART

SYMPTOM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
No water flow	1. Tank is empty or water is not turned on	1. Fill tank or turn on water supply
	2. Filter clogged	2. Clean filter
	3. Pump valves clogged or damaged	3. Examine valves and clean or replace
	4. Pump has lost prime	4. Follow priming procedure
Low pressure	1. Worn nozzle	1. Replace nozzle with new one of same size
	2. Leak in high pressure hose or connections	2. Check hose and connections
	3. Filter clogged	3. Clean filter
	4. Pump valves clogged or damaged	4. Examine valves and clean or replace
Pump pulsates when spraying	1. Filter clogged	1. Clean filter
	2. Pump valves clogged or damaged	2. Examine valves and clean or replace
Motor does not operate	1. Blown fuse or circuit breaker	1. Replace circuit breaker or fuse. Check circuit for wire damage or component damage
Leaks seen under pump	1. Worn pump seals	1. Replace with new plunger and seals
	2. Abrasives in solution have damaged pump seals	2. Mix chemical thoroughly and improve filter
Regulator leaks fluid from cap	1. Pressure is set too low	1. Set pressure higher to keep internals from moving too much
		2. Replace seal

**For Repair Parts, call 763-433-0303**

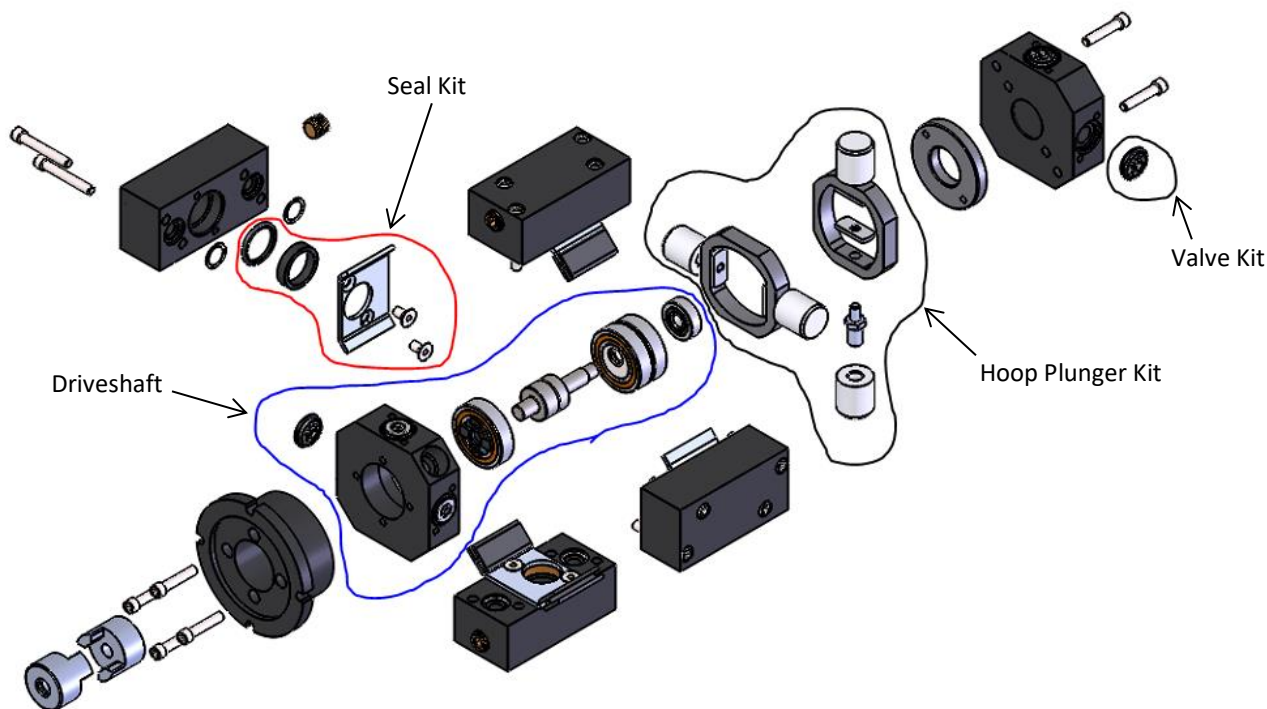
Please provide following information:

-Model number

-Serial number (if any)

-Part description and number as shown in parts list

## Repair Parts Illustration for X-Series Pump



## EXPLODED VIEW IMAGE

## REPAIR PARTS LIST FOR X-SERIES PUMP

DESCRIPTION	PART NO.	CONTENTS
Replacement Driveshaft X-3	10099	Outlet manifold with assembled driveshaft and large packet of grease. * Valves not included.
Replacement Driveshaft X-4	10100	^
Replacement Driveshaft X-5	10101	^
Replacement Driveshaft X-6	10102	^
Hoop Plunger Kit	10056	2 assembled Hoop Plungers and large packet of grease
Seal Kit	10057	Viton O-Rings, seal ring, plunger guide, installation hardware, and small grease packet * Retainer plate not included.
Valve Kit	10058	Viton O-Rings, check valves, plastic washers, and small grease packet

**LIMITED WARRANTY**

**PUMPTEC ONE-YEAR LIMITED WARRANTY.** PUMPTEC PLUNGER PUMPS, MODELS COVERED IN THIS MANUAL, ARE WARRANTED BY PUMPTEC, TO THE ORIGINAL USER AGAINST DEFECTS IN WORKMANSHIP OR MATERIALS UNDER NORMAL USE FOR ONE YEAR AFTER DATE OF PURCHASE. ANY PART WHICH IS DETERMINED TO BE DEFECTIVE IN MATERIAL OR WORKMANSHIP AND RETURNED. AS PUMPTEC DESIGNATES, SHIPPING COSTS PREPAID, WILL BE, AS THE EXCLUSIVE REMEDY, REPAIRED OR REPLACED AT PUMPTEC'S OPTION. FOR LIMITED WARRANTY CLAIM PROCEDURES, SEE "PROMPT DISPOSITION" BELOW. THIS LIMITED WARRANTY GIVES PURCHASERS SPECIFIC LEGAL RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION.

**LIMITATION OF LIABILITY.** TO THE EXTENT ALLOWABLE UNDER APPLICABLE LAW, PUMPTEC'S LIABILITY FOR CONSEQUENTIAL AND INCIDENTAL DAMAGES IS EXPRESSLY DISCLAIMED. PUMPTEC'S LIABILITY IN ALL EVENTS IS LIMITED TO AND SHALL NOT EXCEED THE PURCHASE PRICE PAID.

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