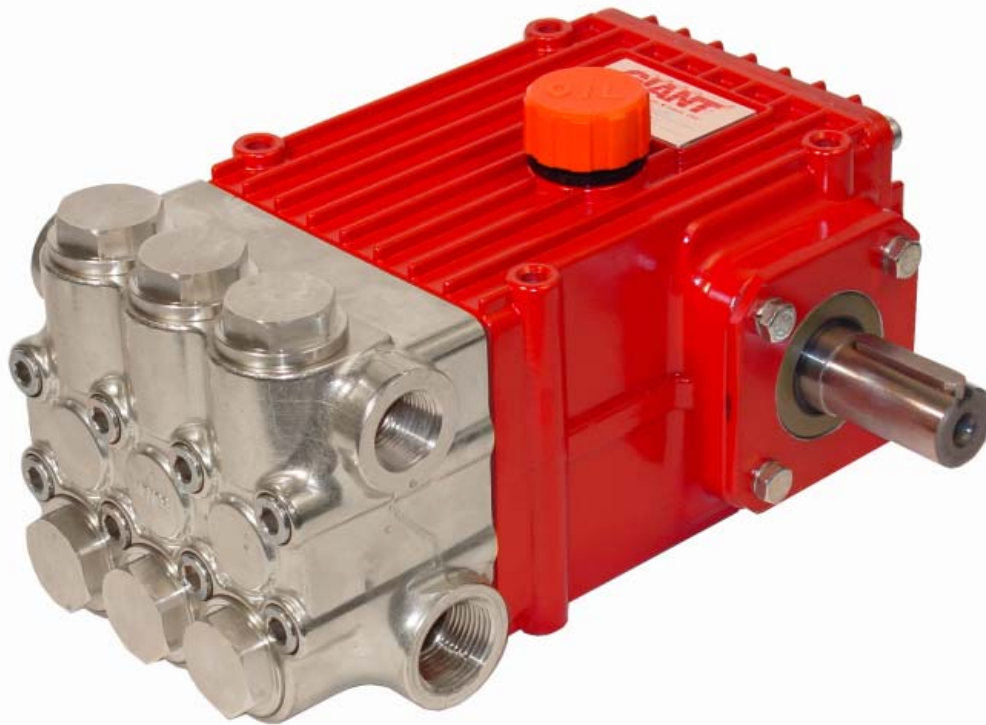


Triplex Ceramic
Plunger Pump
Operating Instructions/
Repair and Service
Manual

Models

**P420A-3100, P420A-5100,
P422-5100, P423-5100,
P450-5100**

Corrosion Resistant Pumps



GIANT

Contents:

Installation Instructions:	page 2
Specifications:	pages 3-5
Parts List/Torque Specs: Recommended	page 6
Spare Parts List	page 6
Exploded View/Kits:	page 7
Repair Instructions:	pages 8-9
Pump mounting selection Guide:	page 9
Trouble Shooting:	page 10
Dimensions:	page 11
Warranty Information	back page

Updated 01/2010

INSTALLATION INSTRUCTIONS

Installation of the Giant Industries, Inc., pump is not a complicated procedure, but there are some basic steps common to all pumps. The following information is to be considered as a general outline for installation. If you have unique requirements, please contact Giant Industries, Inc. or your local distributor for assistance.

1. The pump should be installed flat on a base to a maximum of a 15 degree angle of inclination to ensure optimum lubrication.
2. The inlet to the pump should be sized for the flow rate of the pump with no unnecessary restrictions that can cause cavitation. Teflon tape should be used to seal all joints. If pumps are to be operated at temperatures in excess of 160° F, it is important to insure a positive head to the pump to prevent cavitation.
3. The discharge plumbing from the pump should be properly sized to the flow rate to prevent line pressure loss to the work area. It is essential to provide a safety bypass valve between the pump and the work area to protect the pump from pressure spikes in the event of a blockage or the use of a shut-off gun.

4. Use of a dampener is necessary to minimize pulsation at drive elements, plumbing, connections, and other system areas. The use of a dampener with Giant Industries, Inc. pumps is optional, although recommended by Giant Industries, Inc. to further reduce system pulsation. Dampeners can also reduce the severity of pressure spikes that occur in systems using a shut-off gun. A dampener must be positioned downstream from the unloader.

5. Crankshaft rotation on Giant Industries, Inc. pumps should be made in the direction designated by the arrows on the pump crankcase. Reverse rotation may be safely achieved by following a few guidelines available upon request from Giant Industries, Inc. Required horsepower for system operation can be obtained from the charts on pages 3-5.

6. Before beginning operation of your pumping system, remember: Check that the crankcase and seal areas have been properly lubricated per recommended schedules. Do not run the pump dry for extended periods of time. Cavitation will result in severe damage. Always remember to check that all plumbing valves are open and that pumped media can flow freely to the inlet of the pump.

Finally, remember that high pressure operation in a pump system has many advantages. But, if it is used carelessly and without regard to its potential hazard, it can cause serious injury.

IMPORTANT OPERATING CONDITIONS

Failure to comply with any of these conditions invalidates the warranty.

1. Prior to initial operation, add oil to the crankcase so that oil level is between the two lines on the oil dipstick. **DO NOT OVERFILL.**

Use Recommended Giant Oil

Crankcase oil should be changed after the first 50 hours of operation, then at regular intervals of 500 hours or less depending on operating conditions.

2. Pump operation must not exceed rated pressure, volume, or RPM. A pressure relief device must be installed in the discharge of the system.

3. Acids, alkalines, or abrasive fluids cannot be pumped unless approval in writing is obtained before operation from Giant Industries, Inc.

4. Run the pump dry approximately 10 seconds to drain the water before exposure to freezing temperatures.

NOTE: Contact Giant Industries for Service School Information. Phone: (419)-531-4600

Specifications

Model P420A-3100/5100

	U.S.	(Metric)
Volume	13.0 GPM	(49 lm)
Discharge Pressure	2000 PSI	(138 bar)
Inlet Pressure	140 PSI	(9.7 bar)
Stroke	0.94"	24mm
RPM		Up to 1450 RPM
Plunger Diameter	0.98"	25mm
Temperature of Pumped Fluids	160 °F	(71 °C)
Inlet Ports		(2) 3/4" BSP (P420A-5100)
Inlet Ports		(2) 3/4" NPT (P420A-3100)
Discharge Ports		(2) 1" BSP (P420A-5100)
Discharge Ports		(2) 3/4" NPT (P420A-3100)
Shaft Rotation		Top of pulley towards fluid end
Crankshaft Diameter		28mm
Key Width		8mm
Shaft Mounting		Either side ¹
Weight	36lbs. 11oz.	(0.52 kg)
Crankcase Capacity	30fl.oz.	(0.89 liters)
Volumetric Efficiency @ 1460		0.95
Mechanical Efficiency @ 1460		0.86

Consult the factory for special requirements that must be met if the pump is to operate beyond one or more of the limits specified above.

PULLEY INFORMATION

Pulley selection and pump speed are based on a 1725 RPM motor and "B" section belts. When selecting desired GPM, allow for a ±5% tolerance on pumps output due to variations in pulleys, belts and motors among manufacturers.

1. Select GPM required, then select appropriate motor and pump pulley from the same line.
2. The desired pressure is achieved by selecting the correct nozzle size that corresponds with the pump GPM.

HORSEPOWER INFORMATION

Horsepower ratings shown are the power requirements for the pump. Gas engine power outputs must be approximately twice the pump power requirements shown above.

We recommend that a 1.15 service factor be specified when selecting an electric motor as the power source. To compute specific pump horsepower requirements, use the following formula:

$$\frac{\text{GPM} \times \text{PSI}}{1450} = \text{hp}$$

P420A-3100/5100 PULLEY SELECTION & HORSEPOWER REQUIREMENTS							
PUMP PULLEY	MOTOR PULLEY	RPM	GPM	1000 PSI	1500 PSI	1700 PSI	2000 PSI
7.75	4.50	785	7.0	4.8	7.2	8.2	9.6
7.75	5.00	900	8.0	5.5	8.3	9.4	11.0
7.75	5.75	1010	9.0	6.2	9.3	10.5	12.4
7.75	6.00	1120	9.9	6.9	10.3	11.7	13.7
7.75	6.75	1240	11.0	7.6	11.4	12.9	15.2
7.75	7.75	1460	13.0	8.9	13.4	15.2	

Specifications

Model P422A-5100

	U.S.	(Metric)
Volume	10 GPM	(38 lm)
Discharge Pressure	2500 PSI	(172 bar)
Inlet Pressure	140 PSI	(9.7 bar)
Stroke	0.94"	24mm
RPM		1450RPM
Plunger Diameter87"	22mm
Temperature of Pumped Fluids	160 °F	(71 °C)
Inlet Ports		(2) 3/4" BSP
Discharge Ports		(2) 1" BSP
Shaft Rotation		Top of pulley towards fluid end
Crankshaft Diameter		28mm
Key Width		8mm
Shaft Mounting		Either side ¹
Weight	36lbs. 11oz.	(0.52 kg)
Crankcase Capacity	30fl.oz.	(0.89 liters)
Volumetric Efficiency @ 1450		0.95
Mechanical Efficiency @ 1450		0.86

Consult the factory for special requirements that must be met if the pump is to operate beyond one or more of the limits specified above.

PULLEY INFORMATION

Pulley selection and pump speed are based on a 1725 RPM motor and "B" section belts. When selecting desired GPM, allow for a ±5% tolerance on pumps output due to variations in pulleys, belts and motors among manufacturers.

1. Select GPM required, then select appropriate motor and pump pulley from the same line.
2. The desired pressure is achieved by selecting the correct nozzle size that corresponds with the pump GPM.

HORSEPOWER INFORMATION

Horsepower ratings shown are the power requirements for the pump. Gas engine power outputs must be approximately twice the pump power requirements shown above.

We recommend that a 1.15 service factor be specified when selecting an electric motor as the power source. To compute specific pump horsepower requirements, use the following formula:

$$\frac{\text{GPM} \times \text{PSI}}{1450} = \text{hp}$$

P422-5100 HORSEPOWER REQUIREMENTS						
RPM	GPM	1000 PSI	1500 PSI	2200 PSI	2500 PSI	3000 PSI
900	6.2	4.3	6.4	9.3	10.7	12.8
1050	7.2	5.0	7.4	10.8	12.4	14.9
1160	8.0	5.5	8.3	12.1	13.8	16.6
1300	8.9	6.1	9.2	13.4	15.3	18.4
1450	10.0	6.9	10.3	15.1	17.2	20.7

Specifications

Model P423A-5100

	U.S.	(Metric)
Volume	8.3 GPM	(31 lm)
Discharge Pressure	2600 PSI	(180 bar)
Inlet Pressure	140 PSI	(9.7 bar)
Stroke	0.79"	24mm
RPM		Up to 1450RPM
Plunger Diameter	0.98"	25mm
Temperature of Pumped Fluids	160 °F	(71 °C)
Inlet Ports		1" NPT
Discharge Ports		(2) 3/4" NPT
Shaft Rotation		Top of pulley towards fluid end
Crankshaft Diameter		28mm
Key Width		8mm
Shaft Mounting		Either side ¹
Weight	36lbs. 11oz.	(0.52 kg)
Crankcase Capacity	30fl.oz.	(0.89 liters)
Volumetric Efficiency @ 1460		0.95
Mechanical Efficiency @ 1460		0.86

Consult the factory for special requirements that must be met if the pump is to operate beyond one or more of the limits specified above.

PULLEY INFORMATION

Pulley selection and pump speed are based on a 1725 RPM motor and "B" section belts. When selecting desired GPM, allow for a ±5% tolerance on pumps output due to variations in pulleys, belts and motors among manufacturers.

1. Select GPM required, then select appropriate motor and pump pulley from the same line.
2. The desired pressure is achieved by selecting the correct nozzle size that corresponds with the pump GPM.

HORSEPOWER INFORMATION

Horsepower ratings shown are the power requirements for the pump. Gas engine power outputs must be approximately twice the pump power requirements shown above.

We recommend that a 1.15 service factor be specified when selecting an electric motor as the power source. To compute specific pump horsepower requirements, use the following formula:

$$\frac{\text{GPM} \times \text{PSI}}{1450} = \text{hp}$$

P423-5100 HORSEPOWER REQUIREMENTS					
RPM	GPM	1000 PSI	1500 PSI	2000 PSI	2650 PSI
900	5.1	3.5	5.3	7.0	9.3
1050	6.0	4.1	6.2	8.2	11.0
1160	6.6	4.6	6.8	9.0	12.1
1300	7.4	5.1	7.7	10.1	13.5
1450	8.3	5.7	8.6	11.4	15.2

P420A-3100/5100 PUMP PARTS LIST

A=P420-3100 B= P420-5100 C=P422-5100 D=P423-5100

<u>ITEM</u>	<u>PART</u>	<u>DESCRIPTION</u>	<u>QTY.</u>	<u>ITEM</u>	<u>PART</u>	<u>DESCRIPTION</u>	<u>QTY.</u>
1	08377	Crankcase	1	17	06927	Crosshead Pin (C,D)	3
2	08378	Oil Fill Plug with Gasket	1	19	08366	Oil Seal	3
3	06479	Crankcase cover	1	20	08098	Seal Case (A,B)	3
3A	07186	Oil Sight Glass w/ Gasket	1	20	08443-0100	Seal Case (C,D)	3
4	08380	O-Ring	1	21	07266-0001	O-Ring (A)	3
5	12137	Oil Drain Plug	1	21	07266	O-Ring (B,C,D)	3
5A	07182	Gasket for Oil Drain Plug	1	22	08059	O-Ring	3
5B	08092-0100	Plug with Gasket	1	23	12254	V-Sleeve (A,B)	3
6	08093	Screw	4	23	06249	V-Sleeve (C,D)	3
6A	08094	Spring Washer	12	23A	08099	Spacer Ring (A,B)	3
7	08471	Bearing Cover, Open	1	23A	06251-0100	Spacer Ring (C,D)	3
8	08472	Bearing Cover, Closed	1	23B	12255	Weep Seal (A,B)	3
8A	06245	Shim	1	23B	13390	Weep Seal (C,D)	3
9	01016	O-Ring (A,B)	2	24	08376	Pressure Ring (A,B)	6
9	06925	O-Ring (C,D)	2	24	06252	Pressure Ring (C,D)	3
10	08095	Screw with Washer	8	25	06373	Weep Return Ring (A,B)	3
11	07459	Radial Shaft Seal	1	25	06254-0100	Weep Return Ring (C,D)	3
12	08473	Bearing	1	26	06614	Manifold (A)	1
12A	08474	Bearing	1	26	06374	Manifold (B,C,D)	1
13	08475	Crankshaft (A,B)	1	27A	06615	Valve Assembly (A)	6
13	08482	Crankshaft (B,D)	1	27A	08408-0100	Valve Assembly (B,C,D)	6
14	08091	Fitting Key	1	27	08370-0100	Valve Seat	6
15	08390	Connecting Rod Assembly	3	28	06791-0100	Valve Plate	6
15A	07311	Screw with Washer	6	29	06377-0100	Valve Spring	6
16	06611	Plunger Assy. Items 16A-16G (A,B)	3	30	08372	Valve Spring Retainer	6
16	06622-0100	Plunger Assy. Items 16A-16G (C,D)	3	31	07212-0001	O-Ring, Viton (A)	6
16A	08096	Plunger Base	3	31	07212	O-Ring (B,C,D)	6
16B	08398	Plunger Pipe (A,B)	3	32	06616	Plug (A)	6
16B	06247	Plunger Pipe (C,D)	3	32	06379	Plug (B,C,D)	6
16C	07256	Centering Sleeve	3	33	07214-0001	O-Ring, Viton (A)	6
16D	08097	Tensioning Screw	3	33	07214	O-Ring (B,C,D)	6
16E	07023	O-Ring	3	34	06612	Inner Hexagon Screw	8
16F	07203	Backup Ring	3	36	13150	Plug, G 3/4" (B,C,D)	1
16G	07161-0100	Copper Washer	3	37	13321-0100	Plug, G 1" (B,C,D)	1
17	07314	Crosshead Pin (A,B)	3				

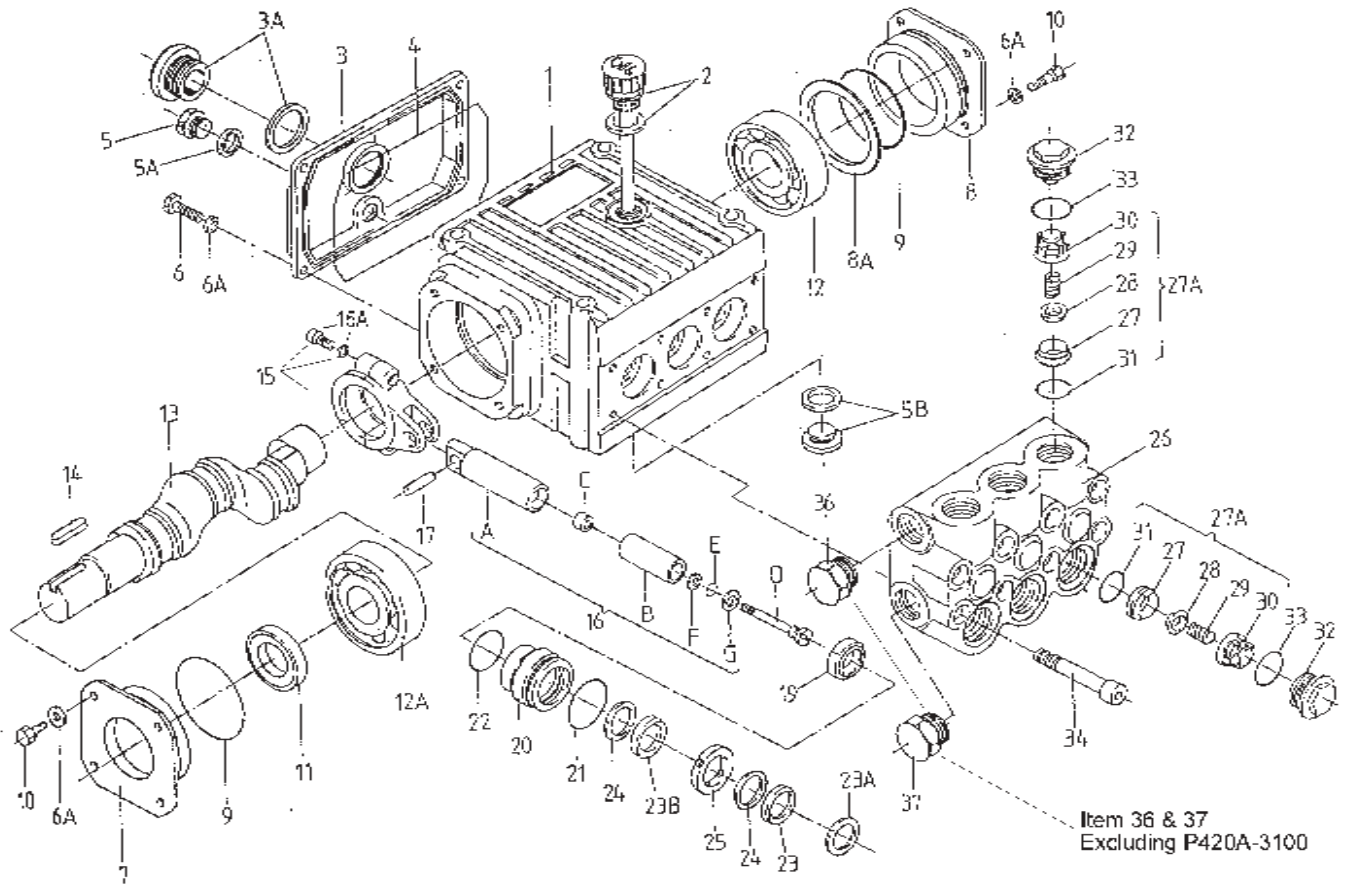
P420A-3100/5100 PUMP TORQUE SPECIFICATIONS

<u>Position</u>	<u>Item#</u>	<u>Description</u>	<u>Torque Amount</u>
15A	07311	Screw with Washer	216 in.-lbs.
16D	08097	Tensioning Screw	240 in.-lbs.
32	06616/06379	Plug (P420A-3100/P420A-5100)	125 ft.-lbs.
34	06612	Inner Hexagon Screw	35 ft.-lbs.

Preventative Maintenance Check-List & Recommended Spare Parts List

<u>Check</u>	<u>Daily</u>	<u>Weekly</u>	<u>50hrs</u>	<u>Every 500 hrs</u>	<u>Every 1500 hrs</u>	<u>Every 3000 hrs</u>
Oil Level/Quality	X					
Oil Leaks	X					
Water Leaks	X					
Belts, Pulley		X				
Plumbing		X				
Recommended Spare Parts						
Oil Change			X	X		
Seal Spare Parts (1 kit/pump) (See page 7 for kit list)					X	
Oil Seal Kit (1 kit/pump) (See page 7 for kit list)					X	
Valve Spare Parts (1 kit/pump) (See page 7 for kit list)						X

EXPLODED VIEW - P420A-3100/5100 PUMPS



P420A-3100/5100 PUMP REPAIR KITS

Plunger Packing Kits

09542 (P420-3100)

Item	Part #	Description	Qty.
21	07266-0001	O-Ring	3
22	08059	O-Ring	3
23	12254	V-Sleeve	3
23B	12255	Weep Seal	3
24	08376	Pressure Ring	6

Plunger Packing Kits

09140 (P420-5100)

Item	Part #	Description	Qty.
21	07266	O-Ring	3
22	08059	O-Ring	3
23	12254	V-Sleeve	3
23B	12255	Weep Seal	3
24	08376	Pressure Ring	6

Plunger Packing Kit

09295 (P422-5100, P423-5100)

Item	Part #	Description	Qty.
21	07266	O-Ring	3
22	08059	O-Ring	3
23	06249	V-Sleeve	3
23B	13390	Weep Seal	3
24	06252	Pressure Ring	3

Oil Seal Kit

09306

Item	Part #	Description	Qty.
19	08366	Oil Seal	3

Valve Assembly Kit

09522 (P420A-3100)

Item	Part #	Description	Qty.
27A	06615	Valve Assembly, Complete	6
33	07214-0001	O-Ring, Viton	6

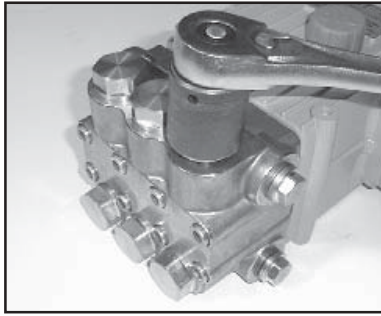
Valve Assembly Kit

09478 (P420A-5100, P422-5100, P423-5100)

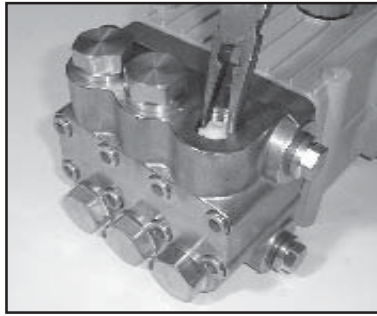
Item	Part #	Description	Qty.
27A	08408-0100	Valve Assembly, Complete	6
33	07214	O-Ring	6

REPAIR INSTRUCTIONS - P420A-3100/5100

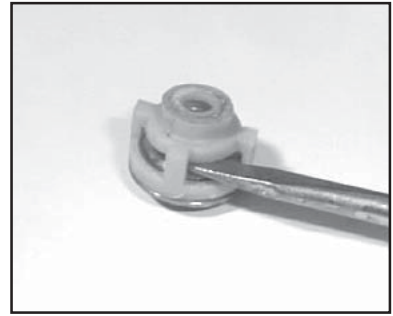
Note: Always take time to lubricate all metal and nonmetal parts with a light film of oil before reassembly. This step will ensure proper fit, at the same time protecting the pump nonmetal parts (i.e., the elastomers) from cutting and scoring.



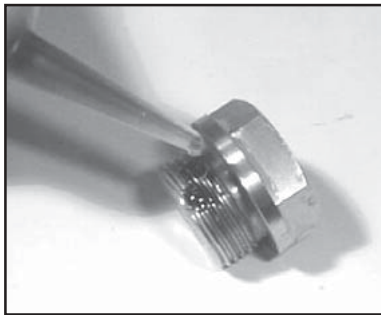
- 1) With a socket wrench, remove the three discharge valve plugs and three inlet valve plugs (32). Inspect the o-ring (33) for wear and replace if damaged.



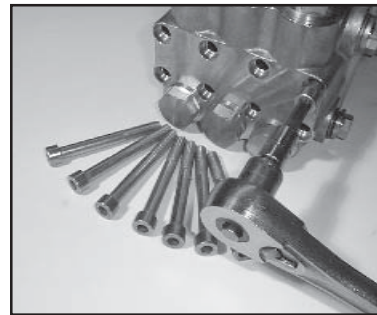
- 2) Using needle nose pliers, remove the inlet and discharge valve assemblies (27A). Note: It may become necessary to remove the valve seat (27) from the valve casing using a slidehammer.



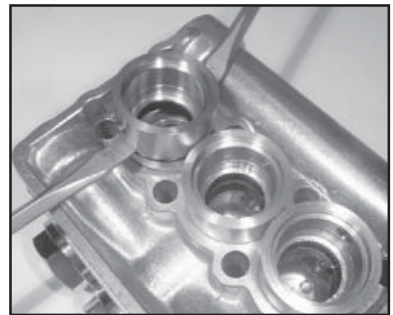
- 3) By inserting a small screw driver between the valve seat (27) and the valve spring retainer (30), the valve assembly can be separated.



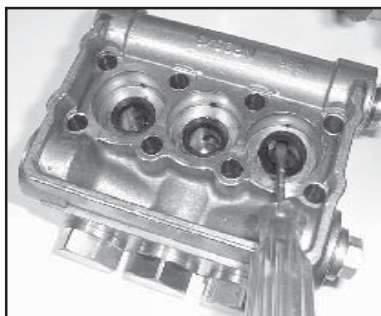
- 4) Remove the o-ring (31). Inspect all parts for wear and replace as necessary. Apply one drop of loctite 243 to the valve plugs (32) and tighten to 125 ft. lbs.



- 5) Use a 8mm allen wrench to remove the 8 socket head cap screws (34). Carefully slide the valve casing (26) out over the plungers.



- 6) Remove seal adaptors (20) and weep return rings (25) from the valve casing.



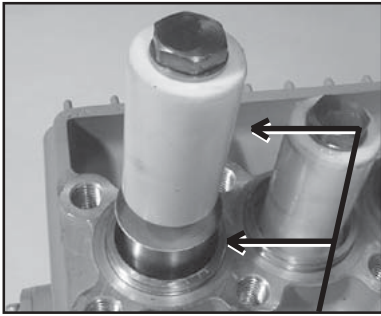
- 7) Remove the pressure rings (24) and v-sleeves (23 - Note: P422 & P423 pumps have a support ring) from the valve casing (26).



- 8) Remove the weep grooved seal (23 or 23B) together with pressure ring (24 - P420 and P425 only) out of the seal adaptor (20). Check O-rings (21).

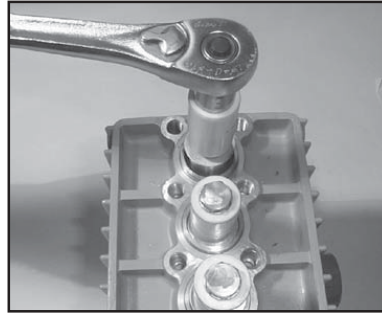
IMPORTANT! The grooved seal (23) or respectively grooved seal pack (23A) on the high-pressure side is to be fitted carefully into the valve casing (26) using a screwdriver. Under no circumstances must the seal surface in the valve casing or the seal lip be damaged.

REASSEMBLY INSTRUCTIONS - P420A-3100/5100



- 9) Check surfaces of plunger (16). Damaged surfaces cause accelerated seal wear. Deposits of all kinds must be removed from the plungers.

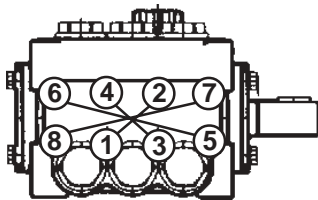
IMPORTANT! Plunger surfaces are not to be damaged. If there are lime deposits in the pump, care must be taken that the drip-return bore in parts (25) and (26) ensure trouble-free drip-return.



- 10) If the plunger pipe (16B), or oil seal (19) is worn, remove tension screw (16D) and remove along with plunger pipe (16B). Check and clean plunger surface (16A), check oil scraper (16H). Remove the gear seal adapter (20A) and, if necessary, replace oil seals with seal lips facing crankcase (1). Cover thread of tension screw (16D) with a thin film of Loctite and tighten carefully to 26 ft.-lbs. (35NM).

IMPORTANT! Care must be taken that glue does not get between the plunger pipe (16B) and centring sleeve (16C). The plunger pipe should not be strained by eccentric tightening of the tension screw or through damage to front surface of plunger, otherwise it is liable to fracture.

- 11) After installation of high pressure seals (23 - Note: P422 and P423, also have a support ring), place seal adaptor (20) with weep seals & pressure ring installed, weep return ring (25) and high pressure weep return ring (24) over plungers. Slide valve casing over plungers and seat firmly. Replace the 8 socket head cap screws (34) and tighten to 35 ft.-lbs. in a crossing pattern (as shown below).



Pump Mounting Selection Guide

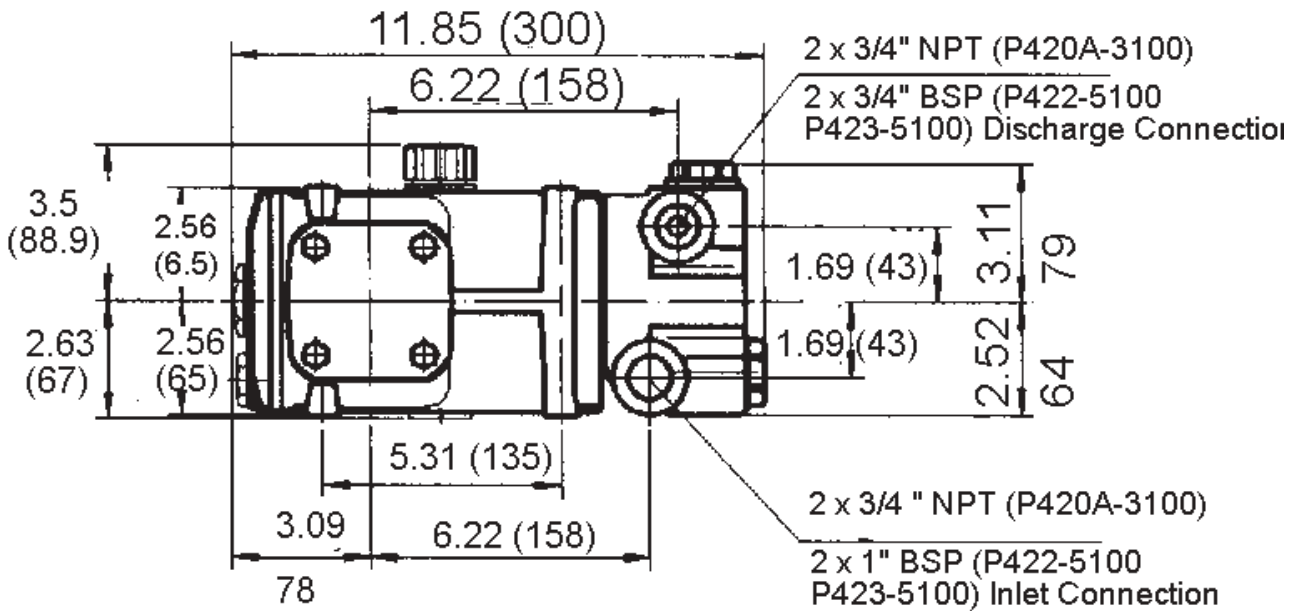
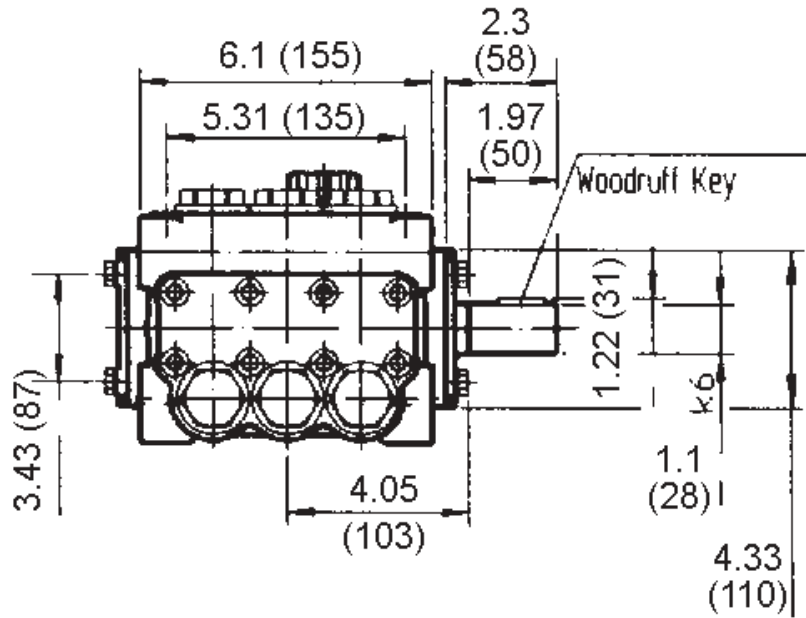
<p>Bushings 07175 - 28 mm Tapered H Bushing</p>
<p>Pulley & Sheaves 01055 - 7.75" Cast Iron - 2 gr. - AB Section 01062 - 7.75" Cast Iron - 2 gr. - AB Section</p>
<p>Rails 07358 - Plated Steel Channel Rails (L=9.18"x W=1.88"x H=3.00")</p>

Contact Giant Industries for service school information. Phone: (419) 531-4600

PUMP SYSTEM MALFUNCTION

<u>MALFUNCTION</u>	<u>CAUSE</u>	<u>REMEDY</u>
The Pressure and/ or the Delivery Drops	Worn packing seals Broken valve spring Belt slippage Worn or Damaged nozzle Fouled discharge valve Fouled inlet strainer Worn or Damaged hose Worn or Plugged relief valve on pump Cavitation pump for restrictions Unloader	Replace packing seals Replace spring Tighten or Replace belt Replace nozzle Clean valve assembly Clean strainer Repair/Replace hose Clean, Reset, and Replace worn parts Check suction lines on inlet of Check for proper operation
Water in crankcase	High humidity Worn seals	Reduce oil change interval Replace seals
Noisy Operation	Worn bearings oil with Cavitation	Replace bearings, Refill crankcase recommended lubricant Check inlet lines for restrictions and/or proper sizing
Rough/Pulsating Operation with Pressure Drop	Worn packing Inlet restriction Accumulator pressure Unloader Cavitation	Replace packing Check system for stoppage, air leaks, correctly sized inlet plumbing to pump Recharge/Replace accumulator Check for proper operation Check inlet lines for restrictions and/or proper size
Pump Pressure as Rated, Pressure Drop at Gun	Restricted discharge plumbing	Re-size discharge plumbing to Flow Rate of Pump
Excessive Leakage	Worn plungers Worn packing/seals Excessive vacuum Cracked plungers Inlet pressure too high	Replace plungers Adjust or Replace packing seals Reduce suction vacuum Replace plungers Reduce inlet pressure
High Crankcase Temperature	Wrong Grade of oil Improper amount of oil in crankcase	Giant oil is recommended Adjust oil level to proper amount

P420A-3100/5100 PUMP DIMENSIONS - INCHES (MM)



GIANT INDUSTRIES LIMITED WARRANTY

Giant Industries, Inc. pumps and accessories are warranted by the manufacturer to be free from defects in workmanship and material as follows:

1. For portable pressure washers and self-service car wash applications, the discharge manifolds will never fail, period. If they ever fail, we will replace them free of charge. Our other pump parts, used in portable pressure washers and in car wash applications, are warranted for five years from the date of shipment for all pumps used in NON-SALINE, clean water applications.
2. One (1) year from the date of shipment for all other Giant industrial and consumer pumps.
3. Six (6) months from the date of shipment for all rebuilt pumps.
4. Ninety (90) days from the date of shipment for all Giant accessories.

This warranty is limited to repair or replacement of pumps and accessories of which the manufacturer's evaluation shows were defective at the time of shipment by the manufacturer. The following items are NOT covered or will void the warranty:

1. Defects caused by negligence or fault of the buyer or third party.
2. Normal wear and tear to standard wear parts.
3. Use of repair parts other than those manufactured or authorized by Giant.
4. Improper use of the product as a component part.
5. Changes or modifications made by the customer or third party.
6. The operation of pumps and or accessories exceeding the specifications set forth in the Operations Manuals provided by Giant Industries, Inc.

Liability under this warranty is on all non-wear parts and limited to the replacement or repair of those products returned freight prepaid to Giant Industries which are deemed to be defective due to workmanship or failure of material. A Returned Goods Authorization (R.G.A.) number and completed warranty evaluation form is required prior to the return to Giant Industries of all products under warranty consideration. Call (419)-531-4600 or fax (419)-531-6836 to obtain an R.G.A. number.

Repair or replacement of defective products as provided is the sole and exclusive remedy provided hereunder and the MANUFACTURER SHALL NOT BE LIABLE FOR FURTHER LOSS, DAMAGES, OR EXPENSES, INCLUDING INCIDENTAL AND CONSEQUENTIAL DAMAGES DIRECTLY OR INDIRECTLY ARISING FROM THE SALE OR USE OF THIS PRODUCT.

THE LIMITED WARRANTY SET FORTH HEREIN IS IN LIEU OF ALL OTHER WARRANTIES OR REPRESENTATION, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND ALL SUCH WARRANTIES ARE HEREBY DISCLAIMED AND EXCLUDED BY THE MANUFACTURER.



GIANT INDUSTRIES, INC., 900 N. Westwood Ave., P.O. Box 3187, Toledo, Ohio 43607
PHONE (419) 531-4600, FAX (419) 531-6836, www.giantpumps.com
© Copyright 2003 Giant Industries, Inc.

01/10 P420A-3100/5100.PMD