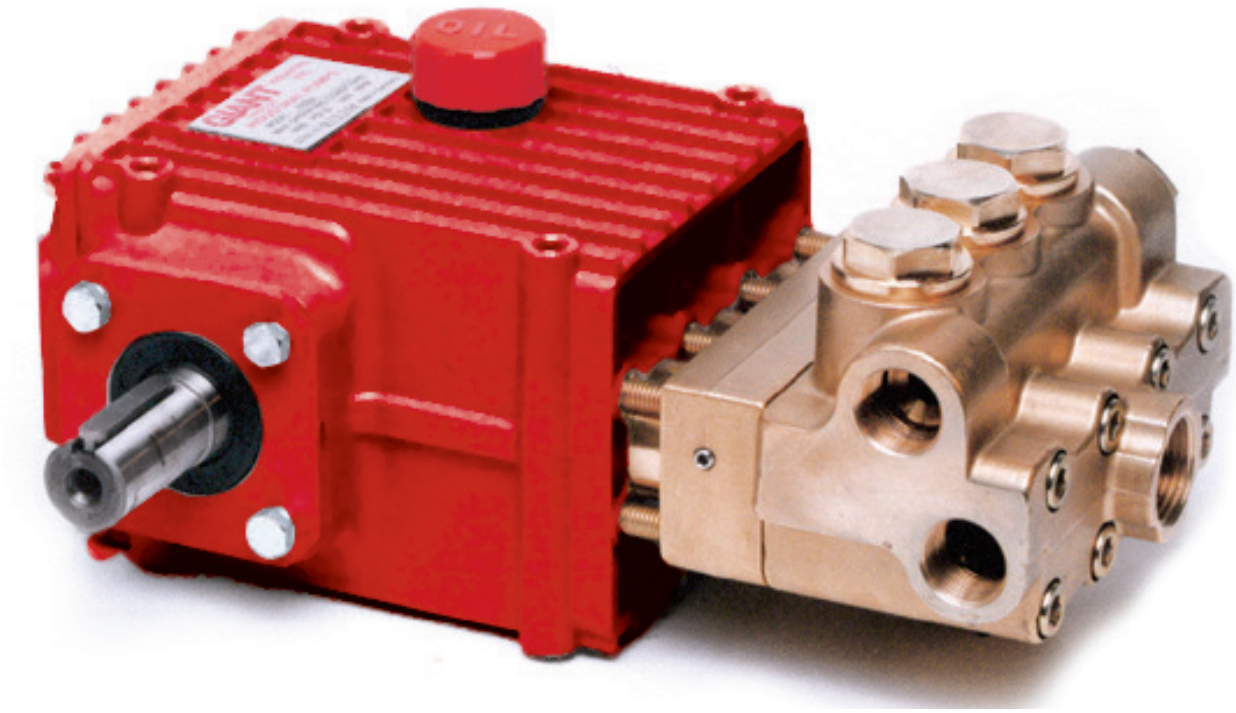
P400HP Series -
22 and 25mm Versions

Triplex Ceramic Plunger Pump Operating Instructions/ Repair and Service Manual

For Models:
P420HP
P422HP
P423HP
P425HP



GIANT

Contents:

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 3-6.

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 SAE 80-90W or Giant's p/n 01154 or ISO VG220 industrial gear lube 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.

Model P420HP Specifications

	U.S.	(Metric)
Maximum Flow	Up to 13.0 GPM	(48.8 LPM)
Maximum Discharge Pressure	Up to 3045 PSI	(210 bar)
Maximum Inlet Pressure	145 PSI	(10 bar)
Stroke	0.945"	(24 mm)
RPM		Up to 1450 RPM
Plunger Diameter	0.98"	(25 mm)
Temperature of Pumped Fluids	Up to 158° F	(70° C)
Inlet Ports		(1) 1" BSP, (2) 3/4" BSP
Discharge Ports		(2) 3/4" BSP
Shaft Rotation	Top of pulley towards fluid end	
Crankshaft Diameter		(28 mm)
Key Width		(8 mm)
Shaft Mounting		Either side[1]
Weight	42 lbs.	(19 kg)
Crankcase Capacity	30.4 fl.oz.	(0.9 liters)
NPSHR	32.8 ft. of head	10.0 meters of head

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.

NOTES:

In order to drive the pump from the side opposite the present shaft extension, simply remove the valve casing from the crankcase and rotate the pumps 180 degrees to the desired position. Be certain to rotate the seal case (item #20) as well, so that the weep holes are down at the six o'clock position. Exchange the oil fill and the oil drain plugs, also. Refer to the repair instructions as necessary for the proper assembly sequence.

P420HP HORSEPOWER REQUIREMENTS					
RPM	GPM	1000 PSI	1500 PSI	2000 PSI	3045 PSI
785	7.1	4.9	7.3	9.7	14.8
900	8.1	5.6	8.4	11.2	17.0
1010	9.1	6.3	9.4	12.5	19.1
1120	10.1	6.8	10.2	13.9	21.2
1240	11.2	7.7	11.5	15.4	23.4
1450	13.0	8.8	13.4	17.9	27.3

SPECIAL NOTE:

The theoretical gallons per revolution (gal/rev) is 0.009. To find specific outputs at various RPM, use the formula: GPM = 0.009 x RPM

HORSEPOWER RATINGS:

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

We recommend 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:
HP = (GPM X PSI) / 1450

Model P422HP Specifications

	U.S.	(Metric)
Maximum Flow	9.9 GPM	(37.3 LPM)
Maximum Discharge Pressure	4060 PSI	(280 bar)
Maximum Inlet Pressure	145 PSI	(10 bar)
Stroke	0.94”	(24 mm)
RPM		Up to 1450 RPM
Plunger Diameter	0.87”	(22mm)
Temperature of Pumped Fluids	158° F	(71° C)
Inlet Ports		(1) 1” BSP, (2) 3/4” BSP
Discharge Ports		(2) 3/4” BSP
Shaft Rotation	Top of pulley towards manifold	
Crankshaft Diameter		(28 mm)
Key Width		(8 mm)
Shaft Mounting		Either side[1]
Weight	42 lbs.	(19 kg)
CrankcaseCapacity	30.4 fl.oz.	(0.9 liters)
NPSHR	32.8 ft. of head	10.0 meters of head

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.

NOTES:

In order to drive the pump from the side opposite the present shaft extension, simply remove the valve casing from the crankcase and rotate the pumps 180 degrees to the desired position. Be certain to rotate the seal case (item #20) as well, so that the weep holes are down at the six o’clock position. Exchange the oil fill and the oil drain plugs, also. Refer to the repair instructions as necessary for the proper assembly sequence.

P422HP HORSEPOWER REQUIREMENTS					
RPM	GPM	1000 PSI	2000 PSI	3000 PSI	4060 PSI
900	6.1	4.2	8.4	12.6	17.1
1050	7.2	5.0	10.0	15.0	20.3
1160	7.9	5.4	10.9	16.3	22.1
1300	8.9	6.1	12.3	18.4	24.9
1450	9.9	6.8	13.7	20.5	27.7

SPECIAL NOTE:

The theoretical gallons per revolution (gal/rev) is 0.00683. To find specific outputs at various RPM, use the formula: GPM = 0.00683 x RPM

HORSEPOWER RATINGS:

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

We recommend 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:
HP = (GPM X PSI) / 1450

Model P423HP Specifications

	U.S.	(Metric)
Maximum Flow	8.2 GPM	(31.1 LPM)
Maximum Discharge Pressure	4060 PSI	(280 bar)
Maximum Inlet Pressure	145 PSI	(10 bar)
Stroke	0.79”	(20 mm)
RPM		Up to 1450 RPM
Plunger Diameter	0.87”	(22 mm)
Temperature of Pumped Fluids	Up to 158 °F	(70 °C)
Inlet Ports		(1) 1” BSP, (2) 3/4” BSP
Discharge Ports		(2) 3/4” BSP
Shaft Rotation	Top of pulley towards manifold	
Crankshaft Diameter		(28 mm)
Key Width		(8 mm)
Shaft Mounting		Either side[1]
Weight	42 lbs.	(19 kg)
CrankcaseCapacity	30.4 fl.oz.	(0.9 liters)

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.

NOTES:

In order to drive the pump from the side opposite the present shaft extension, simply remove the valve casing from the crankcase and rotate the pumps 180 degrees to the desired position. Be certain to rotate the seal case (item #20) as well, so that the weep holes are down at the six o’clock position. Exchange the oil fill and the oil drain plugs, also. Refer to the repair instructions as necessary for the proper assembly sequence.

P423HP HORSEPOWER REQUIREMENTS

RPM	GPM	1000 PSI	2000 PSI	3000 PSI	4060 PSI
900	5.1	3.5	7.1	10.7	14.4
1050	5.9	4.1	8.1	12.2	16.5
1160	6.6	4.6	9.2	13.7	18.6
1300	7.4	5.1	10.3	15.4	20.8
1450	8.2	5.7	11.3	17.0	23.0

SPECIAL NOTE:

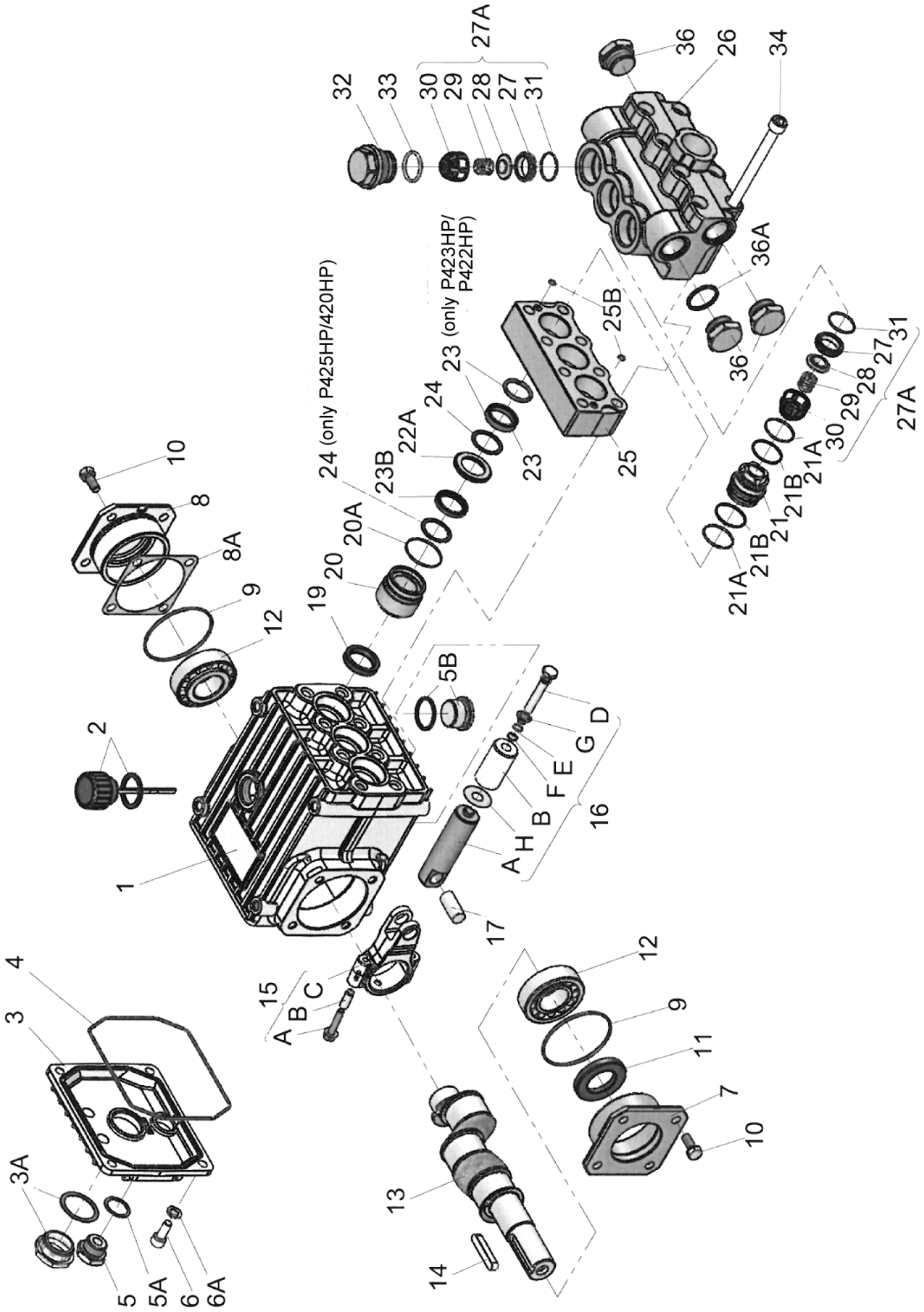
The theoretical gallons per revolution (gal/rev) is 0.00566. To find specific outputs at various RPM, use the formula: GPM = 0.00566 x RPM

HORSEPOWER RATINGS:

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

We recommend 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:
HP = (GPM X PSI) / 1450

P400HP Series Exploded View



P400HP Series Spare Parts List

A = P423HP B = P422HP C = P425HP D = P420HP

ITEM	PART	DESCRIPTION	QTY.
1	08377	Crankcase	1
2	08378	Oil Fill Plug with Gasket	1
3	06479	Crankcase Cover	1
3A	07186	Oil Sight Glass w/ Gasket	1
4	08380	O-Ring	1
5	07109	Oil Drain Plug	1
5A	07182	Gasket for Oil Drain Plug	1
5B	08092	Plug with Gasket	1
6	01010	Screw	4
6A	01011-0400	Spring Washer	4
7	05290	Bearing Cover Open	1
8	05291	Bearing Cover Closed	1
8A	05292	Shim	1-3
8B	05293	Shim	1
8C	05964	Shim	2
9	01016	O-Ring	2
10	07114	Screw with Washer	8
11	07459	Radial Shaft Seal	1
12	05350	Taper Roller Bearing	2
13	08482	Crankshaft (A, C)	1
13	08475	Crankshaft (B, D)	1
14	08091	Fitting Key	1
15	08390	Connecting Rod Assembly	3
15B	05349	Connecting Rod Screw	6
15C	05348	Adapter Sleeve	6
16	05351	Plunger Assy., 25mm, (C, D) for items 16A-16H	3
16	05353	Plunger Assy., 30mm, (A, B) for items 16A-16H	3
16A	05352	Plunger Base	3
16B	06247	Plunger Pipe, 30mm (A, B)	3
16B	08398	Plunger Pipe, 25mm (C, D)	3
16D	08399	Tensioning Screw	3
16E	07023	O-Ring	3
16F	07203	Backup Ring	3
16G	07258	Copper Washer	3
16H	06431	Oil Scraper	3
17	06790	Crosshead Pin	3
19	05444	Oil Seal	3
20	05601	Seal Case (A, B)	3
20	05443	Seal Case (C, D)	3
20A	07266	O-Ring	3
21	05965	Seal Sleeve (A, B)	3
21	05966	Seal Sleeve (C, D)	3
21A	07281	O-Ring	6
21B	05967	Support Ring	6
22A	06254	Drip Return Ring (A, B)	3
22A	05968	Drip Return Ring (C, D)	3
23	06249	V-Sleeve with Support Ring, 30mm (A, B)	3
23	12254	V-Sleeve, 25mm (C, D)	3
23B	13390	Weep Seal (A, B)	3
23B	12255	Weep Seal (C, D)	3
24	06252	Pressure Ring (A, B)	3
24	08376	Pressure Ring (C, D)	6
25	05969	Seal Casing	3
25B	02009	O-Ring	2
26	05970	Manifold	1
27A	06936	Valve Assembly	6
27	06937	Valve Seat	6
28	06938	Valve Plate	6
29	06377-0100	Valve Spring	6
30	06939	Valve Spring Retainer	6
31	07212	O-Ring	6
32	05971	Plug	3
33	05972	O-Ring	3
34	05973	Cap Screw	8
36	07703	Plug, 3/4” BSP	3
36A	07704	Copper Seal	1

P400HP Series Repair Kits

Plunger Packing Kits

P422HP, P423HP - # 09722

Item	Part #	Description	Qty
20A	07266	O-Ring	3
21	05965	Seal Sleeve	3
23	06249	V-Sleeve with Support Ring	3
23B	13390	Weep Seal	3
24	06252	Pressure Ring	3

P420HP, P425HP - # 09723

Item	Part #	Description	Qty
20A	07266	O-Ring	3
21	05966	Seal Sleeve	3
23	12254	V-Sleeve	3
23B	12255	Weep Seal	3
24	08376	Pressure Ring	6

Valve Assembly Kit

P400HP Series - # 09724

Item	Part #	Description	Qty.
27A	06936	Valve Assembly, Complete	6
33	05972	O-Ring	6

Oil Seal Kit

P400HP Series - # 09641

Item	Part #	Description	Qty
19	05444	Oil Seal	3

Model P425HP Specifications

	U.S.	(Metric)
Maximum Flow	10.7 GPM	(40.6 LPM)
Maximum Discharge Pressure	3045 PSI	(210 bar)
Maximum Inlet Pressure	145 PSI	(10 bar)
Stroke	0.787"	(20mm)
RPM		Up to 1450 RPM
Plunger Diameter	0.98"	(25mm)
Temperature of Pumped Fluids	Up to 158 °F	(70 °C)
Inlet Ports		(1) 1" BSP, (2) 3/4" BSP
Discharge Ports		(2) 3/4" BSP
Shaft Rotation	Top of pulley towards manifold	
Crankshaft Diameter		(28mm)
Key Width		(8mm)
Shaft Mounting		Either side[1]
Weight	42 lbs.	(19 kg)
CrankcaseCapacity	30.4 fl.oz.	(0.9 liters)

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.

NOTES:

In order to drive the pump from the side opposite the present shaft extension, simply remove the valve casing from the crankcase and rotate the pumps 180 degrees to the desired position. Be certain to rotate the seal case (item #20) as well, so that the weep holes are down at the six o'clock position. Exchange the oil fill and the oil drain plugs, also. Refer to the repair instructions as necessary for the proper assembly sequence.

P425HP HORSEPOWER REQUIREMENTS					
RPM	GPM	1000 PSI	1500 PSI	2500 PSI	3045 PSI
750	5.6	3.8	5.7	9.5	11.7
900	6.7	4.6	6.9	11.4	14.0
1010	7.5	5.2	7.7	12.8	15.7
1120	8.3	5.7	8.6	14.2	17.4
1240	9.2	6.3	9.5	15.7	19.3
1450	10.7	7.4	11.1	18.4	22.5

SPECIAL NOTE:

The theoretical gallons per revolution (gal/rev) is 0.0074. To find specific outputs at various RPM, use the formula: GPM = 0.0074 x RPM

HORSEPOWER RATINGS:

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

We recommend 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:

HP = (GPM X PSI) / 1450

P420HP / P422HP / P423HP / P425HP Repair Instructions

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. Changing the Seals

Remove the 8 socket screws (34) (photo 1) on the valve casing (26).

Photo 1

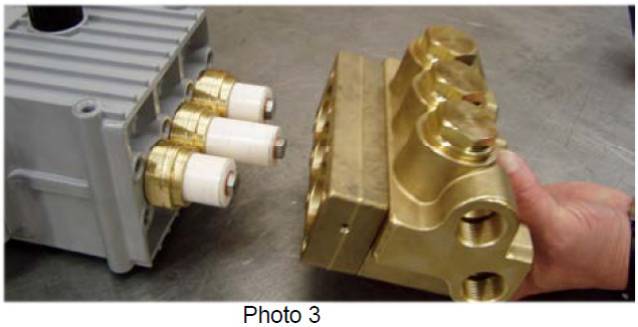


Photo 3

Using a plastic hammer, tap off the valve casing (photo 2). The seal retainers (20) will remain either in the drive casing or in the seal casing (25) (photo 3).

Photo 2

Carefully lever the seal casing off the valve casing by placing two screwdrivers in the seal casing side notches. Be careful not to damage casing surfaces (photo 4). The seal sleeves (21) will remain either in the seal casing (25) or in the valve casing (26) (photo 5).

Lever seal sleeves (21) out of the valve casing or respectively the seal casing (25) using two flat screwdrivers placed in the sleeve grooves (photo 6 and 7).

Then lever seal retainers (20) out of the seal casing (25) with two flat screwdrivers if necessary (photo 8).

Examine O-rings (20A/21A/25B) and support rings (21B) and replace if necessary. Cover new O-rings lightly with oil before fitting.

Photo 4

Photo 5

Photo 6

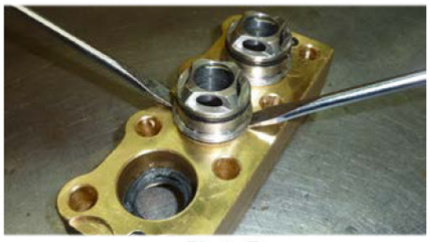


Photo 7

Photo 8

Remove drip return ring (22A) and support ring (24) from seal case (photo 9).

The high pressure seal (23) in the seal casing (25) can be pushed out carefully by hand (photo 10). Drip return ring (23B) must be carefully levered out with a flat screwdriver (photo 11).

Next take support ring (24) out of seal retainer (20) (applies only to P245HP and P420HP)

Examine grooved rings (23 and 23B) and support rings (24) and replace if necessary (to fit see photo 16 and 17).

Photo 9

Photo 10

Important! Pay careful attention not to damage the surfaces in the seal casing as these are sealing surfaces.

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

Photo 11

Photo 13

Important! Plunger surfaces are not to be damaged. If there are lime desposits in the pump, care must be taken that the drip-return bores in parts (25) and (26) are clean and ensure trouble-free drip-return (photo 20).

When fitting the drip return seal, put in the support ring (24) first (only for P245HP and P420HP). Then make sure that the seal is fitted with its profile facing up (photo 13). Then carefully press the greased seal into its recess in the seal retainer (20) (photo 14).

Photo 14

Photo 15

To fit the high pressure seal (23), put the seal sleeves (21) into the seal casing (25) (photo 15). Place the seal casing onto the seal sleeves (21). Then put the greased seal (23) into the fitting sleeve with its ***profile*** facing ***down*** (photo 16) and press it into its recess in the seal casing (25) (photo 17).

Lever out the O-rings (25B) (photo 18) with a small screwdriver; examine them and replace if necessary (photo 19). Coat the O-rings with silicon grease and place them in their recesses in seal casing (25).

Important! Make sure that the drip return bores in the in the seal casing and valve casing are free of lime and other deposits (photo 20).

Photo 18

Photo 19

Photo 20

Carefully put the seal retainers (20) together with the greased drip return seal (22) and support ring (24) onto the plunger (photo 21). Using a fitting sleeve, press the seal retainers (20) over the plunger and into their recess in the drive casing (photo 22 and 23). Then turn seal retainers (20) so that the ø8 side bore faces down (photo 23).

Photo 21

Photo 22

Photo 23

Finally push drip return ring (22A) then support ring (24) onto the plungers (photo 24 and 25).

Photo 24

Photo 25

2. Checking the Valves

To check suction valves: The spring tension cap (30) of the suction valve can now be removed by carefully levering it off the valve seat (27) with a screwdriver (photo 26).

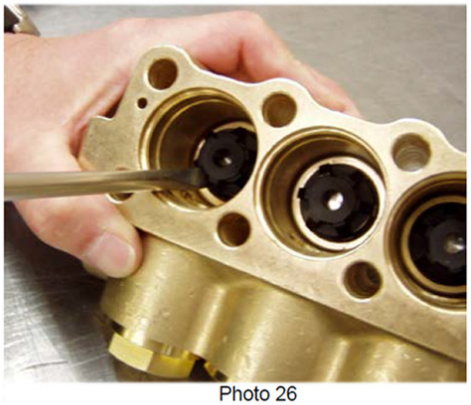
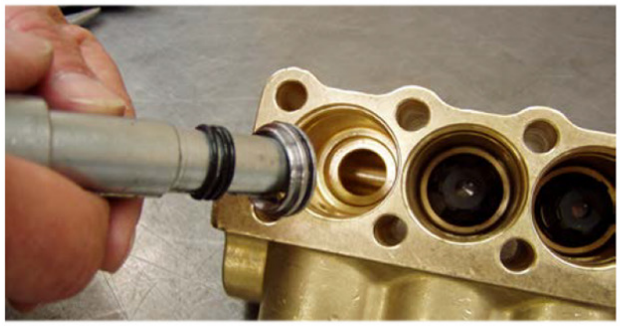


Photo 26

Photo 27

Then pull out the exposed valve seat (27) (photo 27) using a size 4 (20-30 mm) extractor tool (photo 28).



Examine the individual suction valve parts (photo 27 & 28) and replace if necessary. Check O-rings (31) and replace if necessary.
When refitting, place the valve plate (28) on the valve seat (27); put the valve spring (29) onto the centring neck of the valve plate (photo 29).

Then place the spring tension cap (30) on top and press it down with the thumb until it clicks into the valve seat (photo 30).

Photo 29

Photo 30

Photo 31

Place the suction valve onto its recess in the valve casing (26), and press it down with the thumb until it clicks into position (Photo 31).

To check discharge valves: Screw off plugs (32) (tool size 32) (photo 32). Using a screwdriver, lever out the spring tension cap (30) (photo 33). Remove the valve parts and take out the valve seat using a size 4 (20-30 mm) extractor tool (photo 34).

Examine the individual discharge valve parts (photo 34) and replace if necessary. When refitting, place valve plate (28) on valve seat (27); put the valve spring (29) onto the centring neck of the valve plate (photo 35).
Then place spring tension cap (30) on top and press it down with the thumb until it clicks into the valve seat (photo 36).

Photo 32

Photo 33

Photo 34

Photo 36

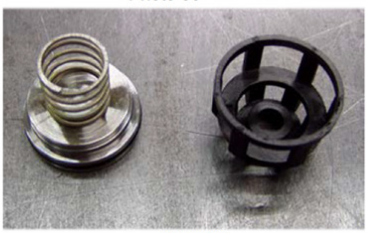


Photo 35

Place the discharge valve onto its recess in the valve casing (26) and press it down with the thumb until it clicks into position (photo 37).

Photo 37

Photo 38

Screw in plugs (32) and tighten at 145 Nm (107 ft-lbs) (photo 38).

Photo 39

Now put seal casing (25) together with the mounted seal sleeves (21) onto the valve casing (26) (photo 39). Then using a plastic hammer, tap the seal casing until it lies evenly on the valve casing (photo 40).

Important! When refitting the seal casing, make sure that the greased O-rings (25B) are fitted and do not fall out during positioning (photo 18 and 20).

Push the valve casing together with the seal casing over the plungers and onto the drive (photo 41 and 42).
Screw in the hexagon socket screws (34) and tighten evenly and crosswise at 40 Nm (29.5 ft-lbs) (photo 43).

Photo 40

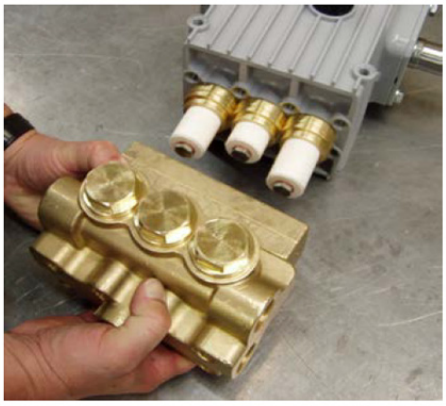


Photo 41

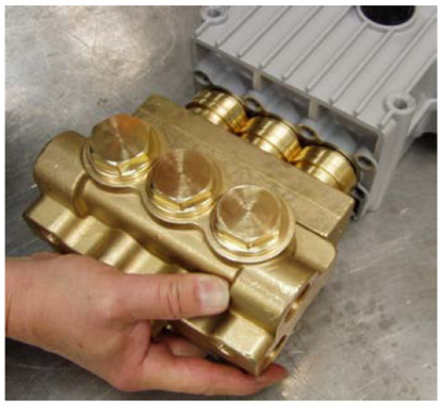


Photo 42

Photo 43

Torque Specifications
P420HP / P422HP / P423HP / P425HP

Item #	Part #	Description	U.S	Metric
10	07114	Screw with Washer	97 in.-lbs.	11 NM
16D	08399	Tensioning Screw	22 ft.-lbs.	30 NM
32	05971	Plug	107 ft.-lbs.	145 NM
34	05973	Cap Screw	30 ft.-lbs.	40 NM

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

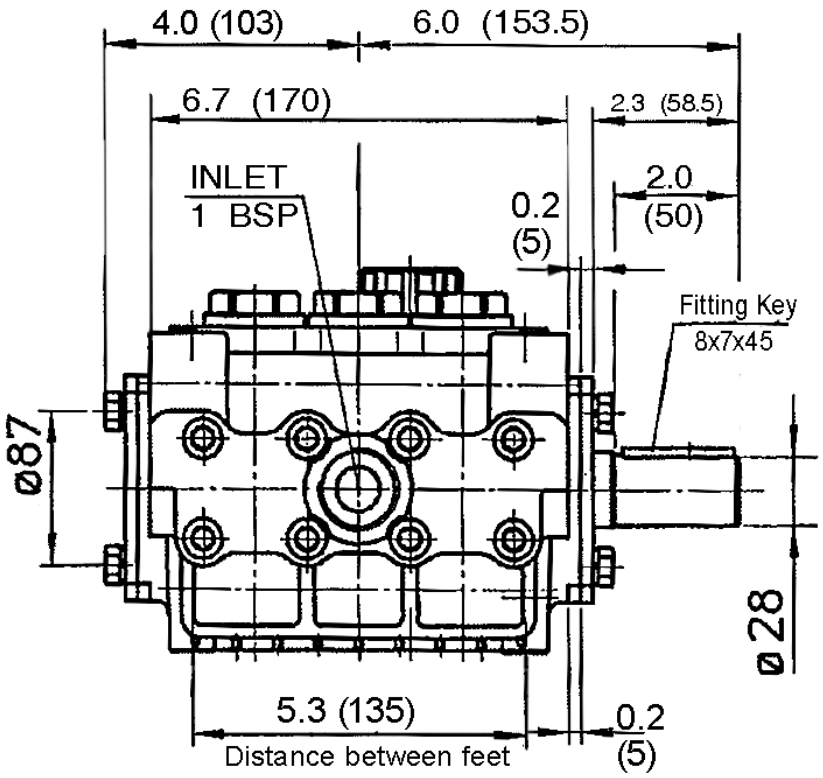
PUMP SYSTEM MALFUNCTION

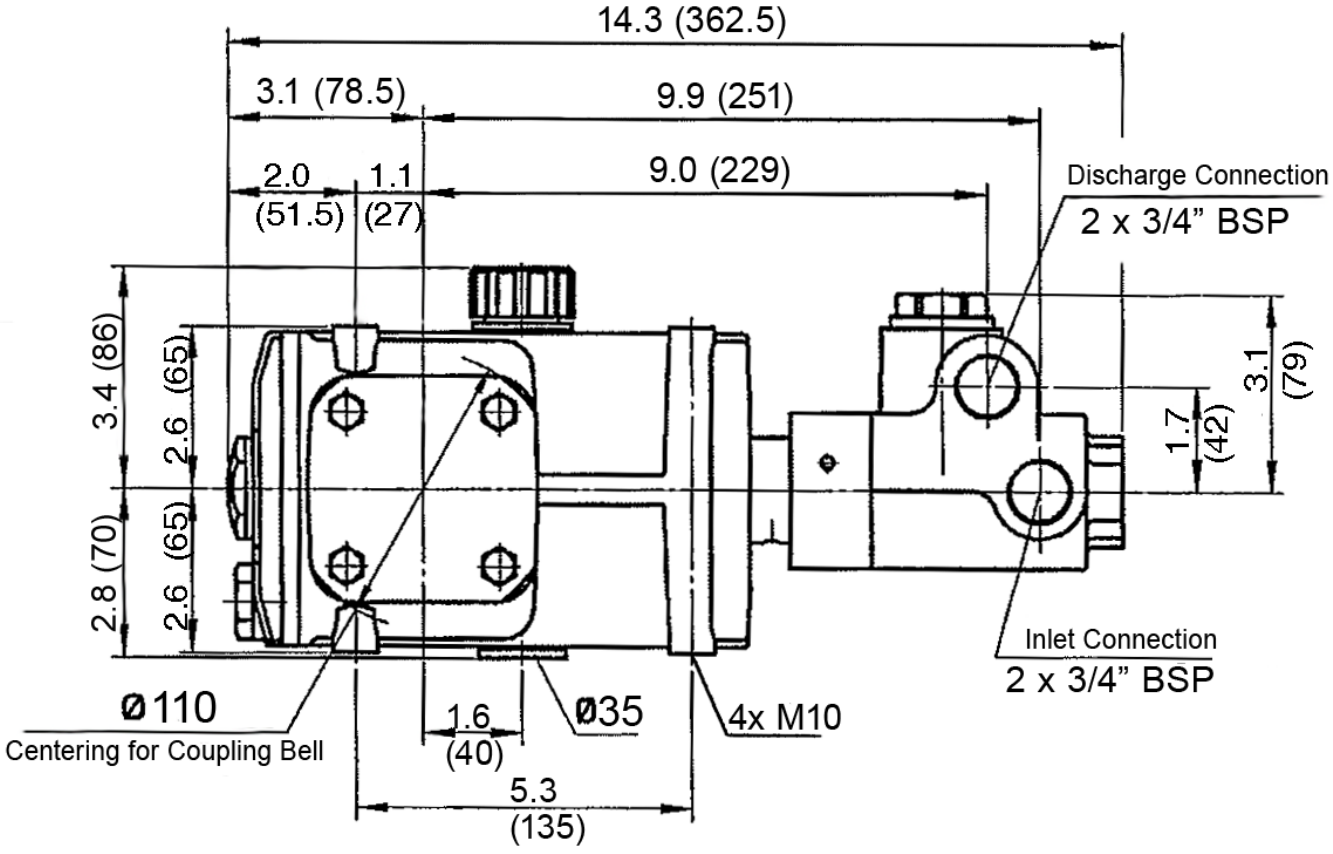
MALFUNCTION	CAUSE	REMEDY
The Pressure and/ or the Delivery Drops	Worn packing seals	Replace packing seals
	Broken valve spring	Replace spring
	Belt slippage	Tighten or Replace belt
	Worn or Damaged nozzle	Replace nozzle
	Fouled discharge valve	Clean valve assembly
	Fouled inlet strainer	Clean strainer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

Preventative Maintenance Check List & Recommended Spare Parts List

Check	Daily	Weekly	50 hrs	Every 500 hrs	Every 1500 hrs	Every 3000 hrs
Oil Level/Quality	X					
Oil Leaks	X					
Water Leaks	X					
Belts, Pulley		X				
Plumbing		X				
	Recommended Spare Parts					
Oil Change p/n 01154			X	X		
Plunger Packing Kit (1 kit/pump) (see page 8 for kit list)						X
Oil Seal Kit (1 kit/pump) (see page 8 for kit list)					X	
Valve Spare Parts (1 kit/pump) (see page 8 for kit list)						X

Dimensions - P420HP / P422HP / P423HP / P425HP - 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-serve 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.

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