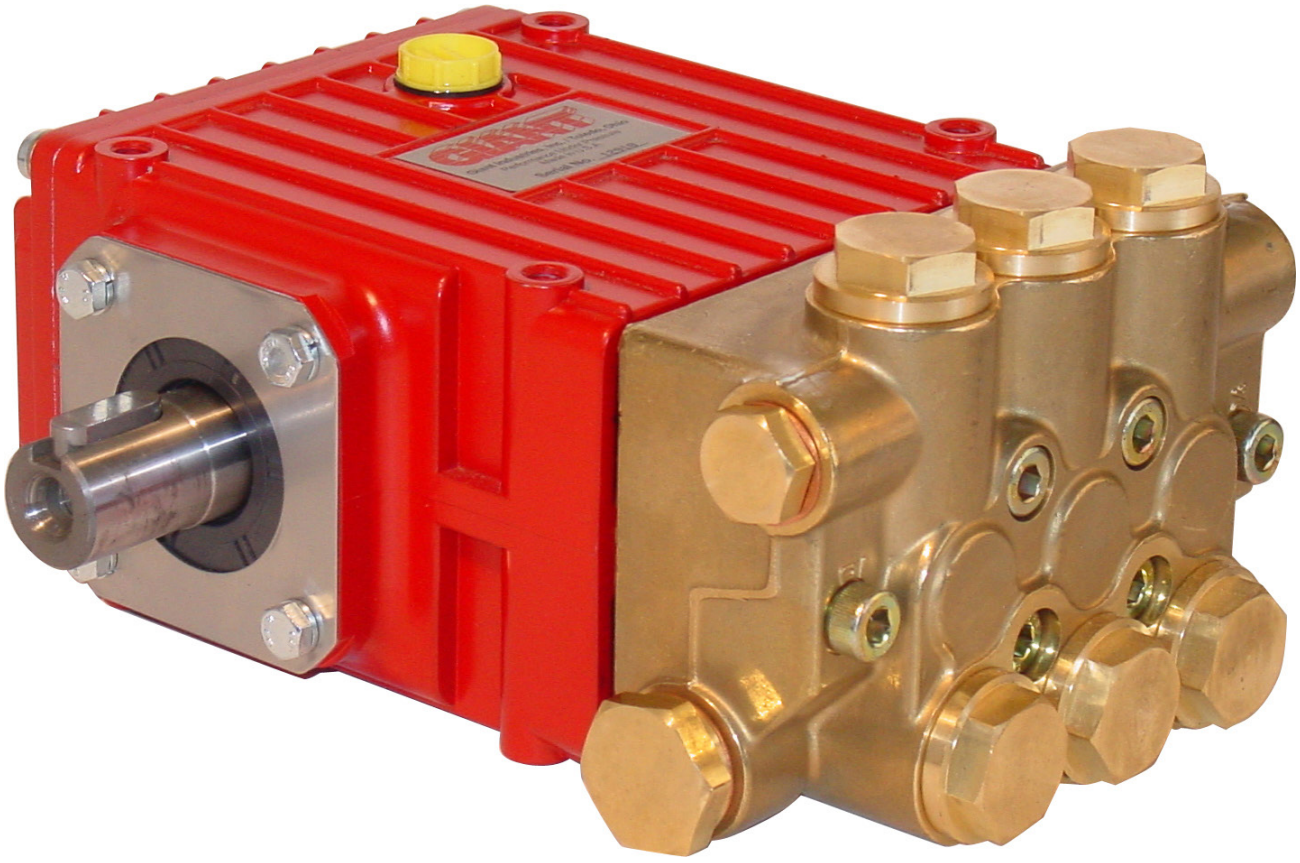
Model P324-0021

Triplex Ceramic Plunger Pump Operating Instructions/ Repair and Service Manual



GIANT
Performance Under Pressure

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 160^0 F, it is important to insure a positive head to the pump to prevent cavitation.

*Make sure that suction pulsation is sufficiently dampened - water column release must be avoided.

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. When viewed from the side of the pump, crankshaft rotation is clockwise on pumps with left handed shafts and counterclockwise on pumps with right handed shafts. Reverse rotation may be safely achieved by removing 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. Required horsepower for system operation can be obtained from the date located on page 3.

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.
Important! If there is a **danger of frost,** the water in the pump and in the pump fittings (particularly the unloader valve) must be emptied. The second discharge port can also be used and the pump run "dry" for 1-2 minutes for this purpose.

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 Giant oil - P/N 01153 (20W-50 non-detergent motor 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.

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

Pump Specifications

U.S. Measurements

	Max. Flow	Nominal/ Intermittent Pressure	Max. Speed	Power Req'd	Max. Temp.	Plunger Diameter	Stroke
Model	**GPM**	**PSI**	**RPM**	**BHP**	**°F**	**in**	**in**
P324	4.8	2200	1450	7.3	160	0.79	0.56
P324	5.8	1100	1750	4.4	160	0.79	0.56

Metric Measurements

	Max. Flow	Nominal/ Intermittent Pressure	Max. Speed	Power Req'd	Max. Temp.	Plunger Diameter	Stroke
Model	**L/min**	**Bar**	**RPM**	**kW**	**°C**	**mm**	**mm**
P324	18.2	150	1450	5.4	70	20	14.1
P324	22.0	75	1750	3.3	70	20	14.1

Horsepower Ratings:
We recommend a 1.15 service factor be specified when selecting an electric motor as the power source.
To compute electric motor horsepower required, use the following formula: HP = (GPM X PSI) / 1450.
The formula to determine the horsepower required for a gas engine is: HP = (GPM X PSI) / 1150.
The formula to determine the horsepower required for a diesel engine is: HP = (GPM X PSI) / 1250.

For the Application of a Hydraulic Motor:
To Determine the Torque of a Hydraulic Motor -- (GPM x PSI x 36.77) / RPM = Torque (in-lbs)

Calculating RPM / GPM of Pump:
A pump must be connected to an electric motor or gas or diesel engine with the correct ratio of pulleys and belts to attain the required speed and GPM. The use of a Variable Frequency Drive (VFD) may also be used to control the RPM of a properly sized electric motor when variable flows are required.

(Max. Pump RPM / Rated Pump GPM) x Required Pump GPM = **Required Pump RPM**

To calculate a pulley diameter one (1) pulley diameter and the required pump RPM must be known:
(Pump RPM x Pump Pulley Diameter) / Motor RPM = Motor Pulley Diameter
(Motor RPM x Motor Pulley Diameter) / Pump RPM = Pump Pulley Diameter

Common Specifications:

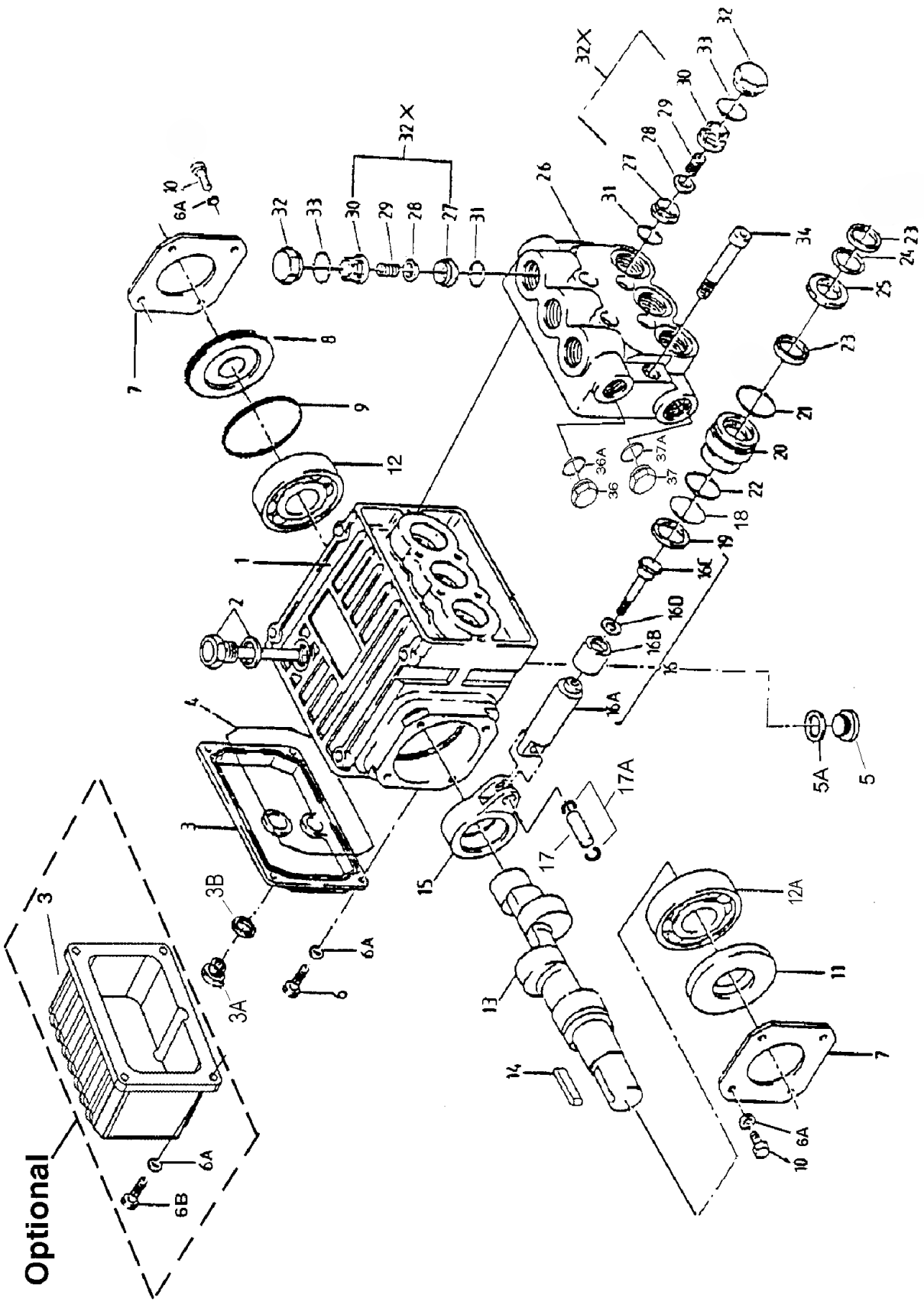
Inlet Pressure ..... 145 PSI (10 Bar)*
Crankshaft Diameter..... 0.94" (24mm)
Oil Capacity (short)..... 14.2 fl. oz. (0.42 L)
Oil Capacity (extended)..... 17.0 fl. oz. (0.5 L)
Inlet Ports ..... (2) 1/2" BSP
Discharge Ports..... (2) 3/8" BSP
Weight ..... 16 lbs (7.3 kg)
Shaft Rotation ..... Top of Pulley Towards Fluid End

Materials Used for P300 Pumps:

Manifold..... Forged Brass
Plungers ..... Solid Ceramic Oxide
Valves..... High Grade Stainless Steel
Seals..... Nitrile with Fabric Reinforcing
Gear End ..... Aluminum Die-Cast

*see note page 2

Exploded View - P324-0021



P324-0021 SERIES PARTS LIST

ITEM	PART#	DESCRIPTION	QTY.
1	08326	Crankcase	1
2	06773	Dipstick Assembly	1
3	08410B	Crankcase Cover, Short	1
3	08410-LG	Crankcase Cover, Extended	1
3A	07190	Oil Drain Plug	1
3B	13262A	Gasket for Plug	1
4	08328	O-Ring	1
5	06273	Oil Drain Plug	1
5A	08192	Gasket	1
6	07188	Screw, Short Cover	4
6A	01176-2	Spring Washer	12
6B	01196	Screw, Long Cover	4
7	08303	Bearing Cover I	2
8	08491	Sight Glass	1
9	07193	O-Ring	1
10	07225	Screw with Lock Washer	8
11	08331	Radial Shaft Seal	1
12	01086A	Ball Bearing	1
12A	07760	Roller Bearing	1
13	08332	Crankshaft	1
14	06207	Straight Key	1
15	08333	Connecting Rod	3
16	08452	Plunger Assembly	3
16A	08367	Plunger Base	3
16B	08449	Plunger Pipe	3
16C	08450	Tension Screw	3

ITEM	PART NO.	DESCRIPTION	QTY.
16D	08451	Copper Washer	3
17	06542	Wrist Pin	3
17A	22723	Clip Ring	6
18	07770-0001	O-Ring, Viton	3
19	08356	Oil Seal	3
20	08357	Seal Case	3
21	07780-0001	O-Ring, Viton	3
22	12027-0001	O-Ring, Viton	3
23	07039-0020	V-Sleeve, Teflon	6
24	08346	Pressure Ring	3
25	08361	Weep Return Ring	3
26	06413	Valve Casing	1
27	07849	Valve Seat	6
28	07491	Valve Plate	6
29	07906	Valve Spring	6
30	07907	Valve Spring Retainer	6
31	07853-0001	O-Ring, Viton	6
32	06350	Valve Plug	6
32X	07946A	Valve Assembly, Complete	6
33	07913-0001	O-Ring, Viton	6
34	08363	Hex Head Cap Screw	6
36	13338	Plug, 3/8” BSP	1
36A	08486	Copper Crush Washer, 3/8”	1
37	07109	Plug, 1/2” BSP	1
37A	07661	Seal	1

P324-0021 SERIES REPAIR KITS

Plunger Packing Kit - # 09145-0021

Item	Part #	Description	Qty.
18	07770-0001	O-Ring, Viton	3
21	07780-0001	O-Ring, Viton	3
22	12027-0001	O-Ring, Viton	3
23	07039-0020	V-Sleeve, Teflon	6
24	08346	Pressure Ring	3

Valve Assembly Kit - # 09116-0001

Item	Part #	Description	Qty.
31	07853-0001	O-Ring, Viton	6
32X	07946A	Valve Assembly	6
33	07913-0001	O-Ring, Viton	6

Oil Seal Kit - # 09144

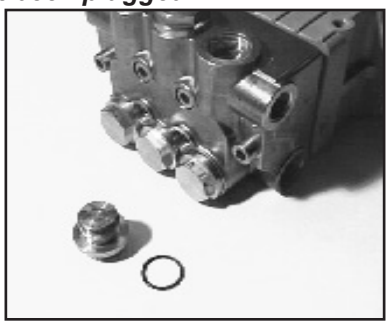
Item	Part #	Description	Qty.
19	08356	Oil Seal	3

TORQUE SPECIFICATIONS

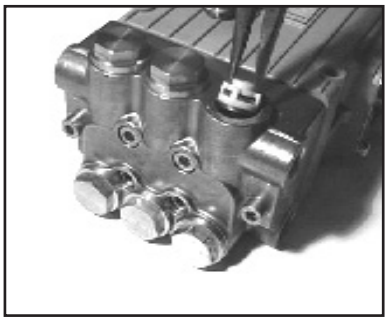
Position	Item	Description	Lubrication Info	Torque Amount
3A	07190	Oil Drain Plug		22 ft.-lbs. (30 Nm)
5	06273	Oil Drain Plug		22 ft.-lbs. (30 Nm)
6	07188/01196	Screw		88 in.-lbs. (10 Nm)
10	07225	Screw w/Lock Washer		88 in.-lbs. (10 Nm)
16B	08449	Plunger Pipe	Loctite 243	
16C	08450	Tension Screw		200 in.lbs. (22.5 Nm)
16D	08451	Copper Washer	Loctite 243	
32	06350	Valve Plug	Loctite 243	55 ft.-lbs. (75 Nm)
34	08363	Hex Head Cap Screw		221 in.lbs. (25 Nm)

REPAIR INSTRUCTIONS - P324-0021

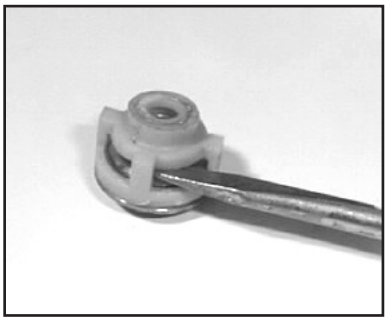
NOTE: Always take time to lubricate all metal and nonmetal parts with a light film of oil before reassembly. This step will ensure proper fit, at the same time protecting the pump nonmetal parts (i.e., the elastomers) from cutting and scoring. If there are deposits of any kind (i.e., lime deposits) in the valve casing, be certain the weep holes in the weep return ring (#25) and valve casing (#26) have not been plugged.



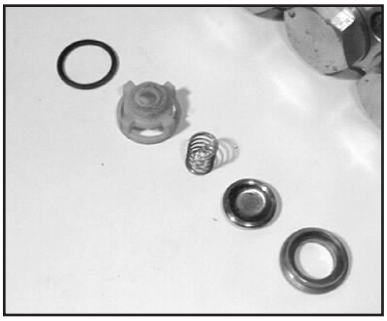
1. With a 24mm socket wrench, remove the (3) discharge valve plugs and (3) inlet valve plugs (#32). Inspect the o-ring (#33) for wear and replace if damaged.



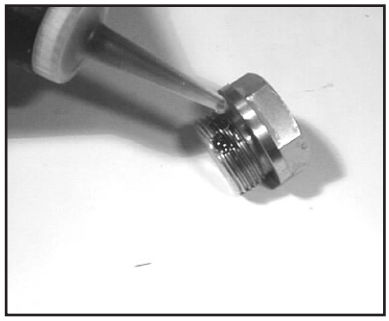
2. Using a needle nose pliers, remove the inlet and discharge valve assemblies (#32X).



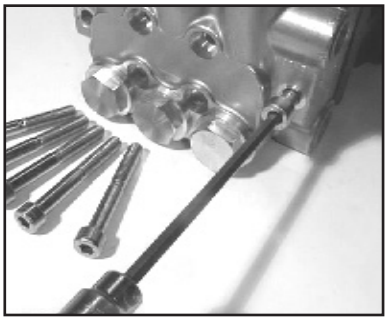
3. The valve assemblies can be separated by inserting a small screw driver between the valve seat (#27) and its valve spring retainer (#30).



4. Remove each o-ring (#31). Inspect all parts for wear and replace as necessary. Reassemble valve assy's (#32X) & place in valve casing (#26).



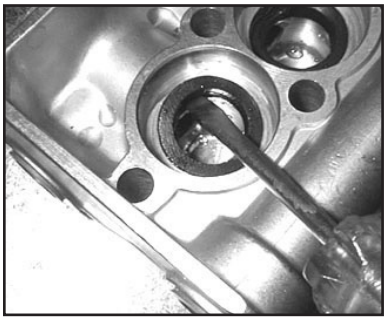
5. Apply one drop of Loctite 243 to valve plugs (#32) and tighten to 55 ft.-lbs. (75 Nm).



6. Next, use a 6mm allen wrench to remove the 6 hex head cap screws (#34).

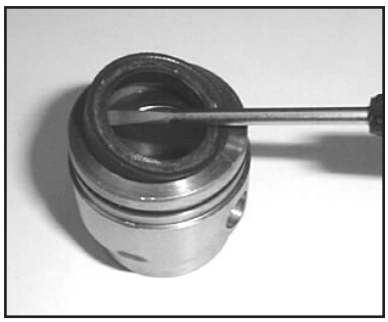
7. Carefully slide the valve casing (#26) out over the plungers with a screwdriver placed between the valve casing and crankcase.

8. Remove weep return rings (#25) from the plungers (#16). Remove the seal case (#20) from either crankcases (#1) or manifold (#26) by using a screwdriver as shown above.

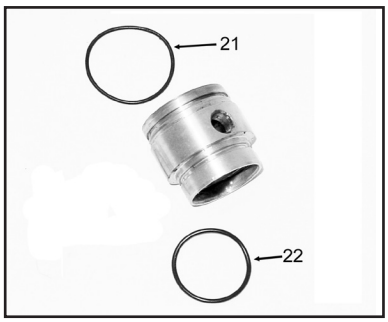


9. Remove the pressure rings (#24) and grooved seals (#23) from the valve casing (#26). Inspect parts for wear and replace if necessary.

REPAIR INSTRUCTIONS - P324-0021

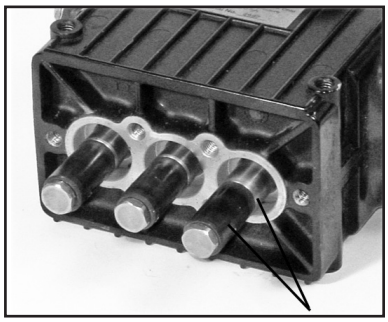


10. Remove the weep grooved seals (#23) from the seal case (#20).

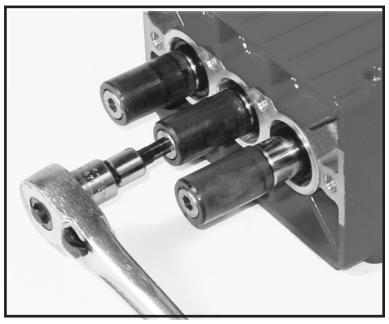


11. Inspect o-rings (#18, #21 and 22) and replace as necessary.

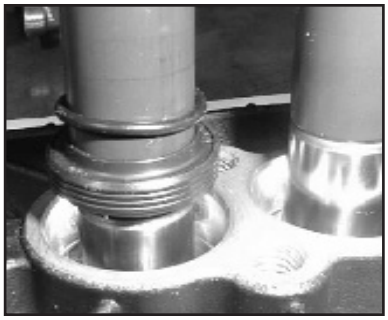
12. Use a 6mm allen wrench to first loosen and remove the tension screw (#16C) from the plunger pipes (#16B). Use a flat screwdriver to pry the oil seals loose from the crankcase (#1).



13. Check surfaces of the plunger bases and plunger pipes (#16B). A damaged surface will cause accelerated wear on the seals. Deposits of any kind must be carefully removed from the plunger surface. A damaged plunger must be replaced!



13A. Clean the old sealant from the threads of the tension screw and the plunger base (#16A). Replace the copper washer (#16D). Place plunger pipes over plunger base and secure with tension screw to 200 in.-lbs. (22.5 Nm).



Reassembly Sequence

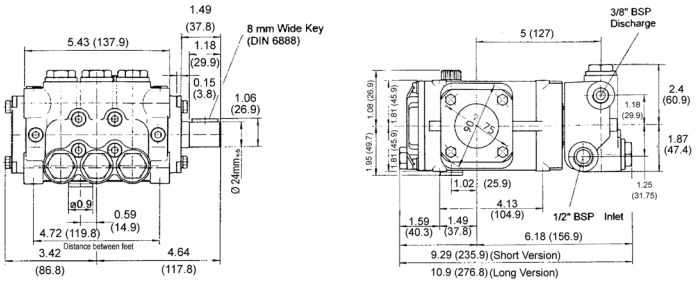
14. If the oil seals (#19) were removed, replace them with the primary seal lip (grooved side) towards the crankcase and the dust lip (tapered end) towards the valve casing (#26). Lubricate the seal before replacing. Install the oil scraper (#18) over the plunger.

15. Place each seal case (#20) with o-rings (#21, 22) over the plungers (#16). Be certain the oil seal is centered with the seal case and tap firmly until the seal case is seated squarely on the crankcase (#1).

16. With the grooved side pointed toward the valve casing, place the weep grooved seals (#23) over each plunger and into each seal case (#20).

17. Generously lubricate the grooved seals (#23) and assemble these items into the valve casing. Place the weep return rings (#25) onto each plunger (#16). Place the pressure rings (#24) over the plungers. Slide the valve casing over the plungers and seat firmly. Replace the 6 hex head cap screws (#34) and tighten to 221 in.-lbs. (25 Nm) in a crossing pattern.

P324-0021 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. Five (5) years from the date of shipment for all pumps used in portable pressure washers with NON-SALINE, clean water applications.
2. Two (2) years from the date of shipment for Giant pumps used in car wash applications.
3. One (1) year from the date of shipment for all other Giant industrial and consumer pumps.
4. Six (6) months from the date of shipment for all rebuilt pumps
5. 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.

WARNING: This product might contain a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm.
For more information go to www.P65Warnings.ca.gov

GIANT
Performance Under Pressure

GIANT INDUSTRIES, INC., 900 N. Westwood Ave., Toledo, Ohio 43607
PHONE (419) 531-4600, FAX (419) 531-6836, www.giantpumps.com