

Drive Source Installation

This manual will cover the installation of the basic drive configurations available for the Hypro Big Twin Piston pumps. Consult the manufacturer of your motor or engine

for additional information. Read all instructions and general safety information before attempting to install or operate the pump.

Belt/Pulley Drive Installation

Mounting Belts and Pulleys

Mount pulleys as close to pump and motor engine shaft bearings as possible. Check alignment with a straight edge as shown in Fig. 1. Make sure that belt has proper tension. (Too much tension will cause bearing wear; too little will cause slippage.) See Fig. 2. Check with belt and pulley sources for specific recommendation.

To figure proper diameter of pump pulley, multiply the motor/engine rpm by the diameter of the motor/engine pulley and divide that figure by desired pump speed.

$$\text{Pump Pulley Size} = \frac{\text{Motor RPM} \times \text{Motor Pulley Size}}{\text{Desired Pump Speed}}$$

Refer to the pump performance chart on Page 5 to determine the desired speed to obtain the desired maximum flow.

NOTE: Shaft rotation can be either clockwise or counter clockwise.

Four points of contact indicate alignment.

NOTE: Pump may be mounted in other orientations with respect to the motor or engine.

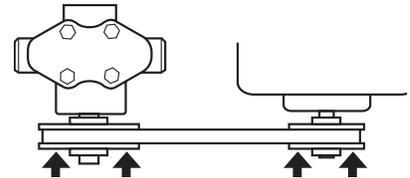


Figure 1

Push the belt midway between the pulleys, check the deflection (d) and adjust:

$$d = 0.016 \times L$$

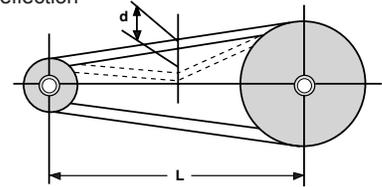


Figure 2

⚠ Caution:
For safety, always install a shield over rotating shafts and belts.

Direct Drive - Flexible Coupling Installation

First, slide coupling ends onto motor/engine and pump shafts as far as possible (Fig 3). Mount motor/engine and pump onto base, shimming pump or power unit so that shafts are aligned. Leave enough space between ends of shafts to allow coupling disc to be inserted. When alignment is made, slide coupling ends over coupling disc. Leave clearance between coupling ends and center disc. Tighten screws in both coupling ends. For electric motor drive, use couplings rated at least twice the horsepower required to operate pump. For gas engine drive, select couplings rated at three times the required pump horsepower.

⚠ Caution:
For safety, always install a shield over rotating shafts and couplings.

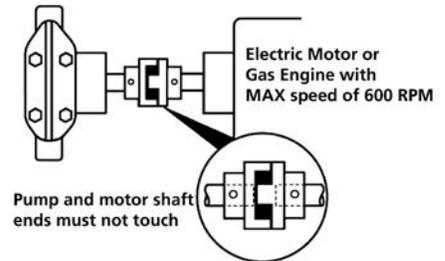


Figure 3

Direct Drive - Hollow Shaft Installation

Hollow shaft models may be mounted directly onto power shaft — motor or engine shaft, truck or tractor PTO shaft. **Important:** When direct mounting a hollow shaft pump, **Do Not** rigidly mount the pump base. The pump must be allowed to “float”. Secure a torque arm with a chain or flexible fastener to the frame or base, directly below and in-line with the pump. This prevents the pump from rotating with the shaft. Always check to see if the pump will turn by hand to ensure that the pump rotates freely. **Do Not** apply power to a pump where the shaft doesn't rotate freely.

⚠ Caution:
For safety, always install a shield over rotating shafts and couplings.

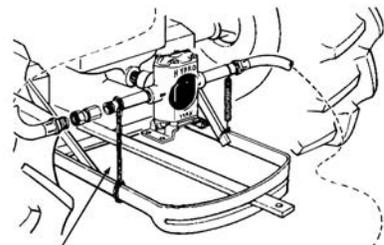
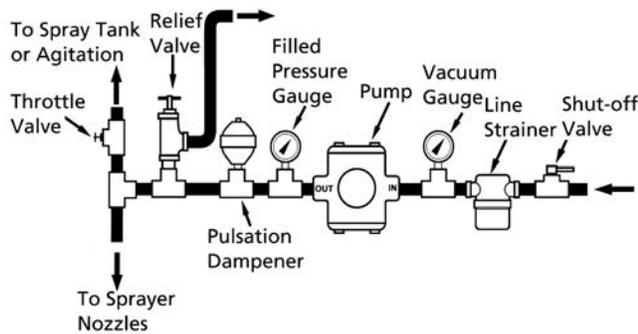


Figure 4

System Installation

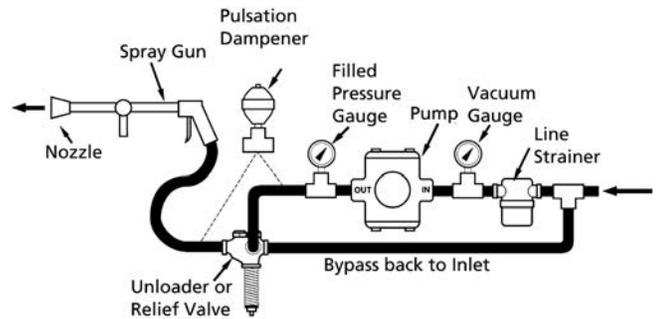
Series 5200 Pump Hookup to Boom for Chemical Spraying



Note: A pulsation dampener such as our Model No. 3375-0017 or 3375-0015 must be installed on the outlet side for optimum performance and maximum life. For the proper operation of some unloader valves, it may be necessary to install a pulsation dampener downstream from the unloader valve; however, for optimum system dampening, it may be installed upstream from the unloader valve provided that the unloader valve will still function properly.

Figure 5

Series 5200 Pump Hookup for Pressure Washing



Piston Pump Installation

Accessories should be installed with solid piping and be mounted as close to the pump as possible. Hose must be used right after accessories. **Note:** If remaining installation is solid piping, a two to four foot length of hose must be installed between accessories and solid piping.

Hose

Selection of the right size and type of hose is vital to good performance. Be sure to hook up to proper ports on pump (note markings "IN" and "OUT" on pump castings).

Suction Hose

Always use genuine suction hose of at least the same inside diameter as pump ports. Hose should have some elasticity, but not overly soft so that it collapses. Use 3/4" (ID) hose or larger for a Series 5200 pump. If suction hose is over 6 feet long on Series 5200 use next larger size hose. Keep suction hose as short as possible and restrictions such as elbows, check valves, etc. at a minimum.

Discharge Hose

High pressure pumps require the use of special high pressure discharge hose (2 rayon braid or equivalent). Use a hose rated at least 50% greater than the highest operating pressure required of pump. Example: If required pump pressure is 200 psi, use discharge hose rated at minimum of 300 psi working pressure.

Unloader or Relief Valve

The unloader or relief valve has a very important safety function in your piston pump hook-up. The valve protects the pump by unloading or bypassing the pump's flow when gun is shut off or discharge is otherwise blocked.

Strainers

Use a suction line strainer with an open screen area of at least 3 to 5 times the suction port area. For example, an area of approximately 2-1/3 to 4 square inches for a 1" suction port. Be sure the screen is suitable for the liquid being pumped. Keep filter clean. A clogged strainer will cause cavitation, which usually leads to a poor performance, wear and failure of pump parts.

Vacuum Gauge (Optional)

Pump should not be subjected to high suction line vacuums. To check on this, install a vacuum gauge at pump inlet. Generally, it should not read over 5 inches of mercury.

Suction Line Shut-Off

This suction line accessory allows the pump to be removed for service without draining the tank. Be sure valve is open before starting pump.

Pulsation Dampener

A Series 3375-0015 pulsation dampener is recommended for all models. This device absorbs the shock and smooths out the pump discharge pulsations, providing smoother operation. A charge of 50% of operating pressure is normally optimum.

Pressure Gauge/Dampener

Use gauge capable of reading double the pump working pressure. Use a filled gauge or a gauge dampener to protect the gauge needle against pressure surges to provide easier reading and longer life.

Spray Gun

Use a Model No. 3381-0010 spray gun or a 3381-0013 Turbo 400 spray gun with the correct nozzle. For 5206 models, use a 3385-3000 nozzle and for the 5210 models use a 3385-4000 to obtain a maximum pressure of 400 psi.

Operation

Priming

If liquid is below level of pump, some means should be provided in installation to prime pump - such as a riser pipe. If there is a suction lift, use a foot valve or check valve to hold prime. In general, keep suction lift to minimum and avoid unnecessary bends in suction line. Before starting pump, make sure air bleeder valve or spray gun is open - or unloader/relief valve is adjusted to its lowest pressure. After starting pump, open and close gun several times if necessary to aid priming the pump. If pump does not prime within a few seconds, stop motor and inspect installation for suction line leaks or obstructions. Make sure that strainer is not clogged. Be sure that suction line is not obstructed, kinked or blocked.

If pump is to operate hours at a time, check frequently for:

1. Adequate liquid supply. Pump must not run dry for more than 30 seconds.
2. Temperature rise. Overheating is harmful to bearings and piston cups.

Care of Pump

Your pump will last longer and give best performance when properly taken care of. Proper pump care depends a lot on the liquid being pumped and when the pump will be used again.

Generally, after each use, flush pump with a neutralizing solution for the liquid just pumped. Follow with a clear water rinse. This is especially important for corrosive chemicals. Then flush out pump with a 50% solution of automotive radiator anti-freeze (ethylene glycol-type such as Prestone, Zerex, etc.) containing a rust inhibitor.

While this flushing is not absolutely necessary for short periods of idleness (as over night) it is good practice to clean the pump after each use to prevent deposits from forming and damaging the pump. The antifreeze not only coats the interior of the pump with an inhibitor, but acts as a lubricant as well, keeping the valves from sticking and protecting against any remaining moisture freezing in cold weather.

For infrequent use and before long periods of storage, drain pump thoroughly. Open any drain plugs, remove suction hose from liquid and run pump "dry" from 0 to 30 seconds (not longer). Flush with a 50% solution of anti-freeze and water. Then, plug both ports to keep out air until pump is used again.

Lubrication

Use a small push-type grease gun to lubricate Hypro Series 5200 Piston Pumps. **Do not use airpowered or hand lever operated grease guns** as they develop too much pressure and may cause damage to the sealed cam bearing. Lubricate a minimum every 100 hours or when bearing appears to need grease. Use Moly-Lithium No. 2 wheel bearing grease.

Exception: In applications where FDA approval is required, use one of these greases: Chevron FM#2, Mobile FM#2 Keystone (Penwalt Corp.) Nevastane SP Medium.

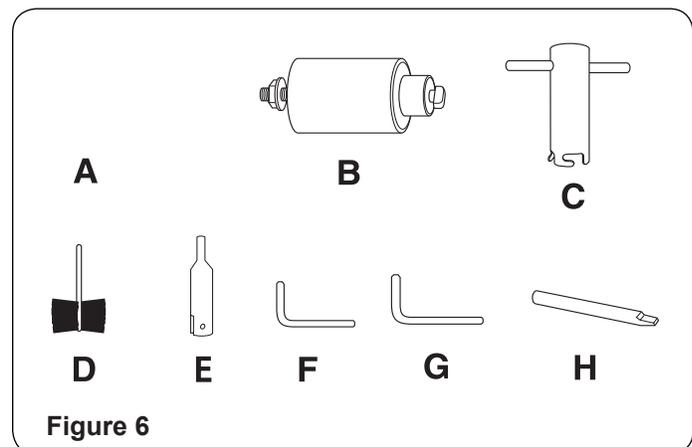
Do not under-grease or premature bearing failure may result.

Do not grease excessively. Remove (do not **WASH** out) any excess grease from pump cavity to prevent grease buildup.

Repair Instructions

Recommended Repair Tools For Hypro Big Twin Piston Pumps

Ref.	Description	Part No.
A	Internal External Pliers (not shown)	3010-0084
B	Valve Seat Extractor	3010-0130
C	Valve Cage Extractor	3010-0052
D	Wire Brush	3010-0066
E	Wire Brush Holder	3010-0067
F	Allen Wrench	3020-0009
G	Allen Wrench	3020-0008
H	Sleeve Extractor	3010-0064
	Tool Box (not shown)	3010-0168



Model 5206C Performance

	25 PSI		100 PSI		200 PSI		300 PSI		400 PSI	
RPM	GPM	HP	GPM	HP	GPM	HP	GPM	HP	GPM	HP
400	3.9	.26	3.9	.40	4.0	.66	3.9	.89	3.9	1.1
500	4.9	.29	5.0	.46	5.0	.75	5.0	1.1	4.9	1.4
540	5.4	.31	5.4	.50	5.4	.81	5.3	1.2	5.3	1.5
600	6.0	.34	6.0	.56	6.0	.90	5.9	1.3	5.9	1.6
700	7.0	.40	7.0	.65	6.9	1.1	6.9	1.5	6.9	1.9
800	8.0	.46	7.9	.74	7.8	1.2	7.7	1.7	7.7	2.2

Model 5210C Performance

	25 PSI		100 PSI		200 PSI		300 PSI		400 PSI	
RPM	GPM	HP	GPM	HP	GPM	HP	GPM	HP	GPM	HP
400	7.3	.39	7.3	.69	7.2	1.2	7.2	1.7	7.2	2.1
500	8.9	.57	8.9	.87	8.8	1.5	8.8	2.0	8.7	2.6
540	9.4	.66	9.4	.94	9.3	1.6	9.3	2.2	9.2	2.7
600	10.0	.73	9.9	1.10	9.9	1.7	9.8	2.3	9.8	3.0

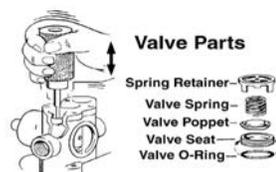
Disassembly

1. Remove nameplate and both cylinder heads with a 9/16" combination wrench or socket.
2. Remove both piston cap screws with 1/4" allen wrench.
3. Remove piston cup spreader seal ring with O-ring piston guide and support ring.
4. Place the body into a vise as shown in Fig. 7. With care, drive out the cylinder sleeves using the sleeve extractor tool and a hammer.
5. Remove connecting rod.

Figure 7



Figure 8



6. Remove the four valves, using the valve seat extractor to pry out the seat (See Fig. 8). Use a valve cage extractor tool to remove each spring retainer. Lift out the other parts, using penetrating oil as necessary to loosen parts.
7. Place the pump body onto an arbor press with the shaft end of the pump up. Press the crankshaft and bearing out of the pump body (See Fig. 9). The main bearing will come out with the crankshaft.
8. Sand the body ends and cylinder heads (mating surfaces) lightly to remove all foreign material. Use a belt sander, flat sanding block or flat file.
9. With wire brush mounted in an electric drill, clean all valve cavities, sleeve cavities and ports. Wash pump body out with solvent and let dry.

Inspection of Pump Parts

Before reassembling the pump, thoroughly inspect all parts, with special consideration given to following points:

- a. Inspect the pump body for erosion at all O-ring seal points and in valve and sleeve holes. Check main bearing housing for proper bearing fit. Check for cracks at the ports.
- b. Check for excessive wear in the cylinder heads. This can result from erosion and/or valve seat hammer.
- c. Check crankshaft assembly for general wear. Rotate main and cam bearing to check for roughness due to moisture or lack of grease damage. If bearings do not turn smoothly or appear to be damaged, they should be replaced. See section on **replacing bearings** in this manual.
- d. Carefully inspect cylinder sleeves. Polish sleeves not more than .008" — using No. 120 grit emery cloth. For final finish use a fine No. 320 grit emery cloth. If at this point all grooves have not been removed, replace the parts. **Note:** If there is some pitting only at the top of the sleeves, they can still be used. Grooves are more likely to be the problem here instead of pitting.

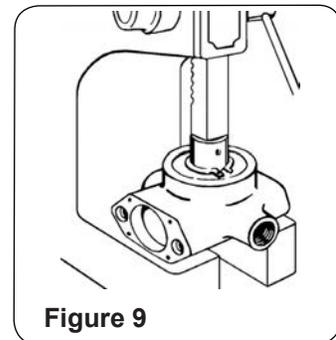


Figure 9

- e. Inspect the piston guides for chips, cracks and score marks. Compare guides with new one, If there is noticeable amount of clearance between the guide and sleeve wall, the guide should be replaced.
- f. Check for erosion on the underside of piston cup screw head. **Note:** The condition of the screws is very important - if there is erosion or grooves, leakage will occur.

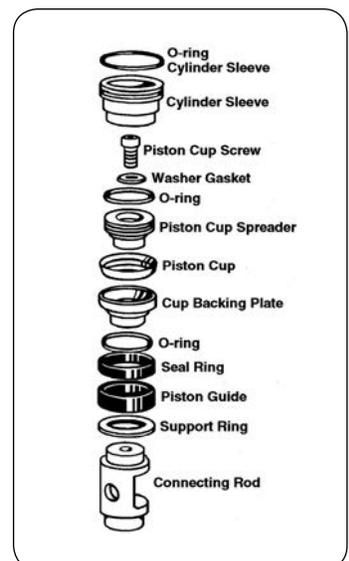
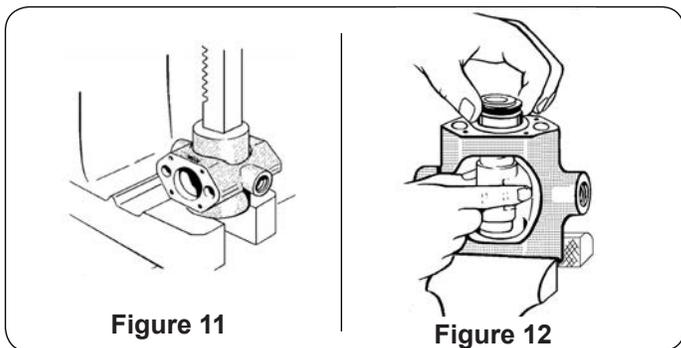


Figure 10

- g. Next check the connecting rod for wear. If there are visible signs of wear or damage to the hard coating, the connecting rod should be replaced. If there is more than .005" of wear, the connecting rod should be replaced. A worn connecting rod results in low volume, low pressure and a hammering sound. If not replaced, this situation will damage the cam bearing as well.
- h. The valve seat, poppet, spring and guide in valve sets should be carefully inspected for cracks, pitting, etc. and replaced as necessary. Note in particular the seat and matching poppet; replace both - as a set - if one new part will not mate with other old part.
- i. When repairing the Series 5200 pump it is usually a good idea to replace the piston cups. Piston repair kits are available with either leather, fabric (rubber-impregnated) or pure rubber (Buna-N) cups.
- j. Inspect complete crankshaft assembly for general wear. If the pump has had as much as 500 hours of use, it is suggested to replace the assembly. If broken cam bearing is found - the reason is usually that the pump has been operating over the 400 psi maximum. Another possible cause is that the pump has not been equipped with the proper surge tank or pulsation dampener to smooth out the pressure surges inherent in a large displacement 2-cylinder pump.
- k. Check all fittings - make certain that all sizes are correct for port size of the pump. Thoroughly inspect and clean before reinstalling.
- l. At this point all parts should have been inspected and cleaned. All parts should now be oiled (particularly the o-rings) and placed on a clean work bench for reassembly.

Reassembly

1. Using bearing seat tool, press the crankshaft assembly into the pump body (see Fig. 11).



2. Insert connecting rod over the cam bearing.
3. Insert both cylinder sleeves with oiled o-rings in cylinder bores.
4. Place pump in vise with ports horizontal (See Fig. 12). Rotate crankshaft to raise connecting rod to its highest position. Place support ring over top of connecting rod.
5. Insert piston guide.

6. Place seal ring on top of guide.
7. Place cup backing plate with o-ring in place over seal ring.
8. Insert piston cup.
9. Insert cup spreader with new o-ring in place. Press into hollow of the piston cup.
10. Place a new copper washer gasket in the countersunk screw hole of cup spreader.
11. Tighten piston cap screw securely with 1/4" allen wrench.
12. Insert inlet and outlet valves with o-ring seals (See Fig. 13). These are identical, but in reverse positions.

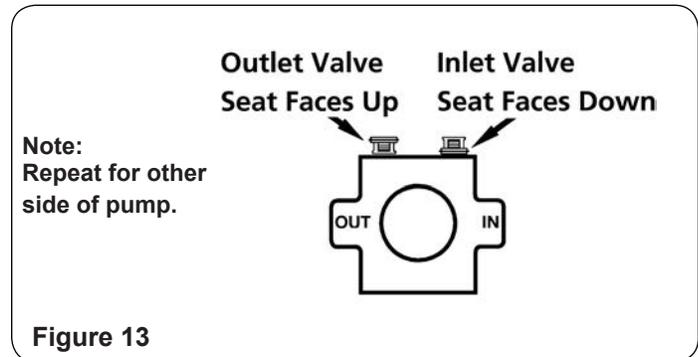


Figure 13

Note the pump ports which are the "IN" and "OUT" sides.

13. Install cylinder head with a new o-ring seal and tighten head bolts securely with a 9/16" wrench or socket.
 14. Repeat steps 5 through 13 for assembling the other half of the pump.
- Note:** Follow proper lubrication procedures as listed in the Operating the Pump section of this manual.
15. Replace the nameplate. The pump can now be tested - pumping clear water.

Main Bearing Replacement

1. Remove set screws, bolts or keys from the shaft and smooth off any burrs or rough spots.
2. Remove retainer rings from shaft with external pliers. For convenience, you can remove just the one closest to the drive end of the shaft.
3. Support bearing in arbor press and press shaft out as shown in Fig. 14.
4. New bearing is pressed on in reverse manner. Front retainer ring (closest to cam bearing) should be in place to provide a stop for the bearing.
5. After bearing has been pressed into place, install the other retainer ring in shaft groove with the external pliers as before.

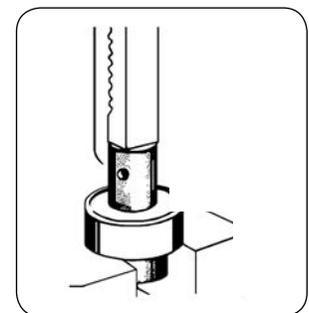
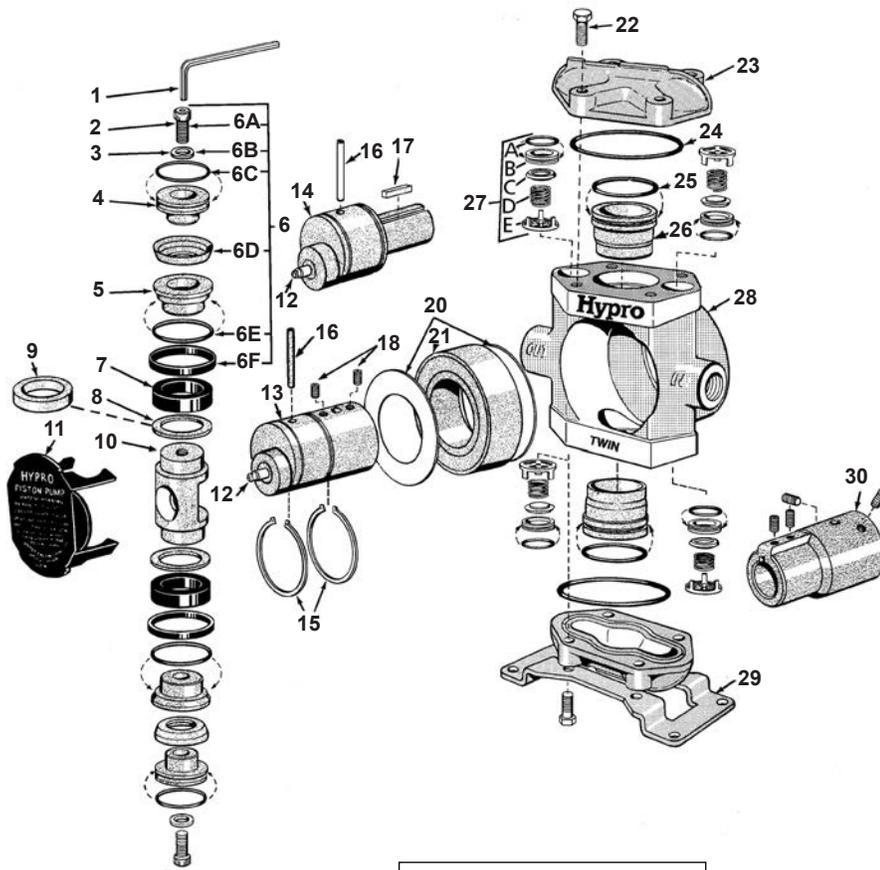


Figure 14



NOTE: When ordering parts, give **quantity, part number, description, and complete model number.** Reference numbers are used **ONLY** to identify parts in the drawing and are **NOT** to be used as order numbers.

Piston Stack Parts Kits

Leather Cup Kit No. 3430-0037 (STD)

Consists of two each of the following parts: No. 2220-0013 Piston Cap Screw (Ref. 6A), No. 2270-0012 Washer (Ref. 6B), No. 1720-0030 O-Ring (Ref. 6C), No. 2150-0001 Leather Cup (Ref. 6D), No. 1720-0065 O-Ring (Ref. 6E) and No. 1440-0012 Seal Ring (Ref. 6F).

Fabric Cup Kit No. 3430-0039

Same as Leather Cup Kit except with two No. 2150-0012 Fabric Cups.

Rubber Cup Kit No. 3430-0189

Same as Leather Cup Kit except with two No. 2150-0042 Rubber Cups.

Crankshaft Assemblies

Sub-Assemblies

Include Grease Fitting (Ref. 12), Crankshaft with cam bearing (Ref. 13 or 14) and Crankpin Retainer (Ref. 16).

Complete Assemblies

Include Sub-Assembly components plus Retaining Rings (Ref. 15), slinger rings (Ref. 20) and Bearing (Ref. 21).

Complete Sub-Assembly PART NO.	Pump Assembly PART NO.	Model Number
with 1-3/8" Hollow PTO Shaft (Ref. 13)		
5503-5206	5501-5206	5206C-H
5503-5210	5501-5210	5210C-H
with 1" Solid Shaft (Ref. 14)		
5003-5206	5001-5206	5206C
5003-5210	5001-5210	5210C

Ref. No.	Qty. Req'd.	Part No.	Description
1	1	3020-0008	Allen Wrench (Optional)
2	2	2220-0013	Piston Cap Screw
3	2	2270-0012	Washer
4	2	1830-0039	Piston Cup Spreader
5	2	1410-0054	Cup Backing Plate
6	1	3430-0037	Piston Stack Parts Kit with Leather Cups (Standard)
6	1	3430-0039	Piston Stack Parts Kit with Fabric Cups (Model 5200-F)
6	1	3430-0189	Piston Stack Parts Kit with Buna-N Cups (Model 5200-R)
7	2	1440-0005	Piston Guide
8	2	1410-0018	Support Ring For 5210 Models Only
9	2	1410-0020	Support Ring For 5206 Models Only
10	1	0503-5200	Connecting Rod
11	1	0602-5200	Safety Cover
12	1	2405-0006	Grease Fitting Assembly
13	1	See Listing	Crankshaft (Hollow Shaft Models)
14	1	See Listing	Crankshaft (Solid Shaft Models)
15	2	1810-0001	Retainer Ring
16	1	1600-0013	Crankpin Retainer

Ref. No.	Qty. Req'd.	Part No.	Description
17	1	1610-0005	Key (Solid Shaft Models)
18	2	2230-0003	Set Screw
20	2	1410-0006	Slinger Ring
21	1	2005-0006	Main Bearing
22	8	2210-0062	Cylinder Head Bolt
23	2	0203-5200CB	Cylinder Head
24	2	1720-0028	O-Ring – for cylinder head
25	2	1720-0019	O-Ring – for cylinder sleeve
26	2	3550-0007	Cylinder Sleeve
27	4	3400-0038	Valve Assembly—Consists of: O-ring (Ref. A), Valve Seat (Ref. B), Valve Poppet (Ref. C), Valve Spring (Ref. D) and Valve Spring Retainer (Ref. E)
28	1	0100-5200C	Body
29	1	1510-0024	Base
30	1	1320-0081	Adapter—Adapts 1" solid shaft to 1- 3/8" 6-spline PTO hollow shaft (Includes set screws.)



Hazardous Substance Alert

1. Always drain and flush pump before servicing or disassembling for any reason (see instructions).
2. Always drain and flush pumps prior to returning unit for repair.
3. Never store pumps containing hazardous chemicals.
4. Before returning pump for service/repair, drain out all liquids

and flush unit with neutralizing liquid. Then, drain the pump. Attach tag or include written notice certifying that this has been done. Please note that it is illegal to ship or transport any hazardous chemicals without United States Environmental Protection Agency Licensing.

Troubleshooting

Symptom	Probable Cause(s)	Corrective Action(s)
Low Discharge	Pump not primed	See Priming section of this manual.
	Clogged suction strainer	Clear strainer screen.
	Suction hose collapsed	Replace suction hose with stronger wall hose.
	Excessive vacuum on inlet	Reduce inlet restrictions by eliminating items such as elbows, valves or too small of inlet hose.
	Pump running at wrong speed	Check speed of pump and adjust accordingly.
	Valves worn or hung-up	Inspect valves and replace if necessary.
Low Pressure	Unloader or Relief Valve set improperly	Readjust unloader or relief valve.
	Nozzle worn or damaged	Check nozzle and replace.
	Valves worn or hung-up	Inspect valves and replace if necessary.
	Insufficient power from gas engine or electric motor	Check performance chart to find proper HP needed for flow and pressure desired.
Liquid leaking from center of pump	Seals worn	Replace with new seal kit.

Limited Warranty on Hypro/SHURflo Agricultural Pumps & Accessories

Hypro/SHURflo (hereafter, "Hypro") agricultural products are warranted to be free of defects in material and workmanship under normal use for the time periods listed below, with proof of purchase.

- Pumps: one (1) year from the date of manufacture, or one (1) year of use. This limited warranty will not exceed two (2) years, in any event.
- Accessories: ninety (90) days of use.

This limited warranty will not apply to products that were improperly installed, misapplied, damaged, altered, or incompatible with fluids or components not manufactured by Hypro. All warranty considerations are governed by Hypro's written return policy.

Hypro's obligation under this limited warranty policy is limited to the repair or replacement of the product. All returns will be tested per Hypro's factory criteria. Products found not defective (under the terms of this limited warranty) are subject to charges paid by the returnee for the testing and packaging of "tested good" non-warranty returns.

No credit or labor allowances will be given for products returned as defective. Warranty replacement will be shipped on a freight allowed basis. Hypro reserves the right to choose the method of transportation.

This limited warranty is in lieu of all other warranties, expressed or implied, and no other person is authorized to give any other warranty or assume obligation or liability on Hypro's behalf. Hypro shall not be liable for any labor, damage or other expense, nor shall Hypro be liable for any indirect, incidental or consequential damages of any kind incurred by the reason of the use or sale of any defective product. This limited warranty covers agricultural products distributed within the United States of America. Other world market areas should consult with the actual distributor for any deviation from this document.

Return Procedures

All products must be flushed of any chemical (ref. OSHA section 1910.1200 (d) (e) (f) (g) (h)) and hazardous chemicals must be labeled/tagged before being shipped* to Hypro for service or warranty consideration. Hypro reserves the right to request a Material Safety Data Sheet from the returnee for any pump/product it deems necessary. Hypro reserves the right to "disposition as scrap" products returned which contain unknown fluids. Hypro reserves the right to charge the returnee for any and all costs incurred for chemical testing, and proper disposal of components containing unknown fluids. Hypro requests this in order to protect the environment and personnel from the hazards of handling unknown fluids.

Be prepared to give Hypro full details of the problem, including the model number, date of purchase, and from whom you purchased your product. Hypro may request additional information, and may require a sketch to illustrate the problem.

Contact Hypro Service Department at 800-468-3428 to receive a Return Merchandise Authorization number (RMA#). Returns are to be shipped with the RMA number clearly marked on the outside of the package. Hypro shall not be liable for freight damage incurred during shipping. Please package all returns carefully. All products returned for warranty work should be sent **shipping charges prepaid** to:

HYPRO / PENTAIR
Attention: Service Department
375 Fifth Avenue NW
New Brighton, MN 55112

For technical or application assistance, call the **Hypro Technical/Application number: 800-445-8360**, or send an email to: technical@hypropumps.com. To obtain service or warranty assistance, call the **Hypro Service and Warranty number: 800-468-3428**; or send a fax to the **Hypro Service and Warranty FAX: 651-766-6618**.

*Carriers, including U.S.P.S., airlines, UPS, ground freight, etc., require specific identification of any hazardous material being shipped. Failure to do so may result in a substantial fine and/or prison term. Check with your shipping company for specific instructions.



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