HYPRO®

Series 9300 Hydraulically-Driven Centrifugal Pumps

Form 325C

Installation, Operation, Repair and Parts Manual

08/02

Description

Hypro centrifugal pumps are designed for agricultural and industrial spraying and transfer of a variety of fluids: water, insecticides, herbicides, wettable powders, emulsives, liquid fertilizers, etc. Polypropylene centrifugal pumps can also be used to pump acid fertilizer, calcium chloride and other highly corrosive liquids such as sulfuric and phosphoric acids.

Hypro Series 9300 hydraulic motor-driven centrifugal pumps provide smooth performance. They can be conveniently mounted on the tractor or sprayer, becoming part of the vehicle's hydraulic system and freeing the PTO for other uses. The Hypro "close coupled" design reduces the mounting space required, eliminating long shafts and couplers between the pump and motor.

SERIES 9302C

Data in Process

Max. Flow Rate: ..... 72 gpm
Max. Pressure: ..... 150 psi
Ports: ..... 1-1/4" NPT Inlet
..... 1" NPT Outlet
Hydraulic Ports: .... 1/2" NPT Inlet
..... 1/2" NPT Tank

SERIES 9303C & 9303S

Cast Iron & Stainless Steel Centrifugal Pumps

Max. Flow Rate: ..... 114 gpm
Max. Pressure: ..... 180 psi
Ports: ..... 1-1/2" NPT Inlet
..... 1-1/4" NPT Outlet
Hydraulic Ports: .... 1/2" NPT Inlet
..... 1/2" NPT Tank

SERIES 9305C-HM3C

Cast Iron Centrifugal Pump

Max. Flow Rate: ..... 160 gpm
Max. Pressure: ..... 120 psi
Ports: ..... 2" NPT Inlet
..... 1-1/2" NPT Outlet
Hydraulic Ports: .... 1/2" NPT Inlet
..... 1/2" NPT Tank

SERIES 9304C

Cast Iron & Stainless Steel Centrifugal Pumps

Max. Flow Rate: ..... 190 gpm
Max. Pressure: ..... 130 psi
Ports: ..... 2" NPT Inlet
..... 1-1/2" NPT Outlet
Hydraulic Ports: .... 1/2" NPT Inlet
..... 1/2" NPT Tank

SERIES 9303C-SP

Cast Iron Centrifugal Pump

Max. Flow Rate: ..... 122 gpm
Max. Pressure: ..... 120 psi
Ports: ..... 1-1/2" NPT Inlet
..... 1-1/4" NPT Outlet
Hydraulic Ports: .... 1/2" NPT Inlet
..... 1/2" NPT Tank

SERIES 9305C-HM3C-SP, BSP

Cast Iron Centrifugal Pump

Max. Flow Rate: ..... 160 gpm
Max. Pressure: ..... 120 psi
Ports: ..... 2" NPT or BSP Inlet
..... 2" NPTor BSP Outlet
Hydraulic Ports: .... 1/2" NPT Inlet
..... 1/2" NPT Tank

SERIES 9303P

Polypropylene Centrifugal Pump

Max. Flow Rate: ..... 90 gpm
Max. Pressure: ..... 100 psi
Ports: ..... 1-1/2" NPT Inlet
..... 1-1/4" NPT Outlet
Hydraulic Ports: .... 1/2" NPT Inlet
..... 1/2" NPT Tank

SERIES 9306C & 9306S

Cast Iron & Stainless Steel Centrifugal Pumps

Max. Flow Rate: ..... 210 gpm
Max. Pressure: ..... 140 psi
Ports: ..... 2" NPT Inlet
..... 1-1/2" NPT Outlet
Hydraulic Ports: .... 1/2" NPT Inlet
..... 1/2" NPT Tank

General Safety Information

NOTE

Notes are used to notify of installation, operation, or maintenance information that is important but not safety related.

⚠ CAUTION

Caution is used to indicate the presence of a hazard, which will or can cause minor injury or property damage if the notice is ignored

⚠ WARNING

Warning denotes that a potential hazard exists and indicates procedures that must be followed exactly to either eliminate or reduce the hazard, and to avoid serious personal injury, or prevent future safety problems with the product.

⚠ DANGER

Danger is used to indicate the presence of a hazard that will result in severe personal injury, death, or property damage if the notice is ignored.

⚠ DANGER

Do not pump flammable or explosive fluids such as gasoline, fuel oil, kerosene, etc. Do not use in explosive atmospheres. The Pump should be used only with liquids compatible with the Pump component materials. Failure to follow this notice can result in severe personal injury and/or property damage and will void the product warranty.

⚠ CAUTION

1. **Do not pump at pressures higher than the maximum recommended pressure.**
2. **Maximum liquid temperatures is 140° F for Series 9300 centrifugal pumps.**
3. **Disconnect power before servicing.**
4. **Release all pressure within the system before servicing any component.**
5. **Drain all liquids from the system before servicing any component. Flush with water.**
6. **Secure the outlet lines before starting the pump. An unsecured line may whip, causing personal injury and/or property damage.**
7. **Check hose for weak or worn condition before each use. Make certain that all connections are tightly secured.**
8. **Periodically inspect the pump and the system components. Perform routine maintenance as required (See Repair Instructions).**
9. **Use only pipe, hose and fittings rated for the maximum psi rating of the pump.**
10. **Do not use these pumps for pumping water or other liquids for human or animal consumption.**

Hazardous Substance Alert

⚠ CAUTION

1. **Always drain and flush pump before servicing or disassembling for any reason.**
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. It is illegal to ship or transport any hazardous chemicals without United States Environmental Protection Agency Licensing.**

⚠ DANGER

Never use your hand to check the condition of hydraulic lines or hoses. If hydraulic fluid penetrates the skin, get medical help immediately. Failure to get proper medical help may result in loss of limb or life. The safest way to check hydraulic lines or hoses is by holding a piece of cardboard next to the hydraulic line or hose.

⚠ WARNING

The sound pressure level of the Pump is 80dBA. Observe all safety precautions when operating the Pump within close proximity for extended periods of time by wearing hearing protectors. Extended exposure to elevated sound levels will result in permanent loss of hearing acuteness, tinnitus, tiredness, stress, and other effects such as loss of balance and awareness.

Hydraulic Pumps
Hydraulic pumps come in two basic types:

- **Constant displacement** - which will continue to put out its rated flow regardless of pressure, until the relief valve bypasses the flow.
- **Variable displacement** - which will produce only the flow needed by the implement until the total pump output is reached. If less than the full pump output is required, an automatic stroke control mechanism decreases the pump output to maintain a constant pressure and flow. The output varies according to demand.

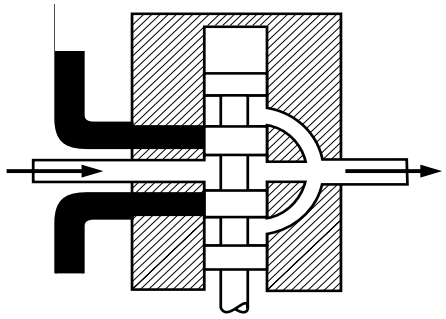


Figure 1

Spool Valves
There are two basic types of spool valves used in conjunction with these pumps — Open and Closed Center. In the Open Center Valve (See Figure 1), the flow goes straight through the valve when in the neutral position. This type is used for constant displacement pumps where the flow should never be shut off.

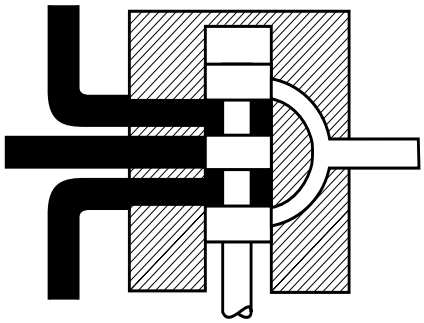


Figure 2

The Closed Center Valve (See Figure 2) is used with variable displacement pumps. The flow is completely shut off in the neutral position, causing the pump stroke to adjust to zero flow. The flow stops, but the pump maintains a static pressure up to the valve.

Hydraulic Motors
Figure 3 shows an internal gear motor (Gerotor) where pressure causes the cavities between the gears to expand on one side, developing torque. The Gerotor type of hydraulic motor is used on Hypro pumps for its superior performance characteristics, including cooler running and higher rpm capabilities.

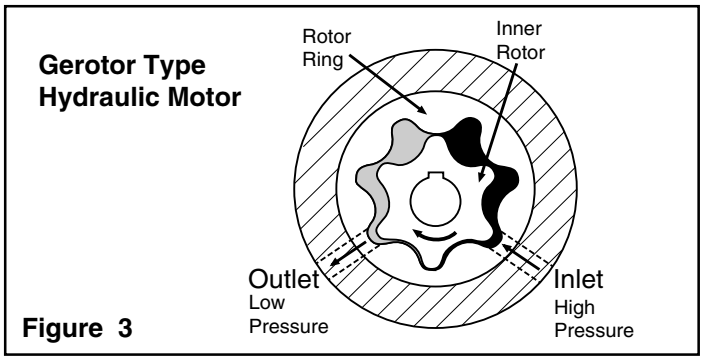


Figure 3

Three Systems
Fitting these components together and installing a motor, we have one of the three types of systems: Open Center, Closed Center (pressure compensated) and Closed Center Load Sensing (flow and pressure compensated).

Open Center Systems
In an Open Center System, the hydraulic pump puts out a constant flow. If the pump puts out more oil than the motor can use, a portion of the oil must be bypassed around the motor. When the oil is bypassed around a loop and does no work, the energy put into it by the pump turns into heat. Therefore, the amount of oil bypassed should be kept to a minimum. Use the largest motor possible.

Closed Center (Pressure Compensated) Systems
The Closed Center Pressure Compensated system has a variable displacement pump which will deliver flow at the necessary rate to maintain a specified pressure. It is desirable to equip implements with a motor of a low flow range that will cause the pump to operate between 1800 and 2100 psi [124 and 145 BAR]. A motor that requires a large volume to obtain the correct implement speed usually causes the hydraulic pump in a closed center system to operate at a lower pressure than desirable. This low pressure results in unnecessary flow and the generation of heat that lowers the lubricating quality of the oil and can damage transmission parts. Use the smallest motor possible.

Closed Center Load Sensing Systems
(Flow and Pressure Compensating)
The Closed Center Flow Compensated System is a variation of the pressure compensated system, designed primarily for more efficient operation and the generation of less heat. It works on the principle of maintaining a constant pressure drop from the pump to the work port of the selector valve. Any variation in demand at the motor will cause a change in flow. The system senses this change in flow due to the change in pressure drop across the valve, and causes the pump to compensate by varying the pump flow. No restrictor is used in the pressure line and no oil is bypassed.

All Models — Open Center Systems

Models include Tank Port Adapter with built-in Check Valve Assembly and Pressure Port Adapter.

HM2C and HM4C Models Only — Closed Center and Small Open Center Systems.

Models include Tank Port Adapter with built-in Check Valve Assembly and Pressure Port Adapter with three different size metering orifices and HM4C models. Remove orifice for use with closed center systems with flow control such as John Deere closed center systems. Also remove for small open center systems with a maximum flow of 8 gpm [30.28 lpm] for HM2C Model; 10 gpm [37.85 lpm] for HM4C Model. If necessary, the pressure port adapter may be used without a metering orifice installed in any closed center system, provided the pressure differential across the hydraulic motor does not exceed 2200 psi (15.2 Mpa).

NOTE: For applications over 2200 psi hyd: use HM1 or HM5.

Preliminary to Mounting

Consult the owners manual to determine the type and capacity of the hydraulic system. Make sure the hydraulic system is recommended to operate with a continuous load. Refer to the Pump Selection Guide to confirm you have the proper pump for your hydraulic system.

Check to see that the Pump Impeller can be turned by hand. (Turn the shaft clockwise using a deep socket wrench on the impeller nut.) If it cannot be turned, open the Pump Casing to look for obstructions. Clean out any corrosion build up where the casing fits over the eye of the Impeller.

The Inlet Line

To get the full capacity from the pump, the inlet line should be the same size as the pump inlet port. A smaller size line can be used to lower pump output, but the inlet line must be at least one size larger than the outlet line. (Example: If the outlet line is 3/4"[19 mm], use 1" [25.4 mm] inlet line.) The line must be free of air leaks. Use good quality hose that cannot be collapsed by suction. Relief valves are not normally recommended to regulate spray pressure with centrifugal pumps.

Strainer Installation

While line strainers are recommended on the inlet side for roller pumps, piston pumps and other positive displacement pumps, the recommended placement of a strainer for a centrifugal pump is in the outlet line. This will eliminate any possible restriction that the strainer could create if it were installed in the inlet side.

The best location in the discharge line is immediately after the pump. The alternate location is in the inlet side if the strainer's capacity is adequate for the pump's required flow. If the strainer is installed in the inlet side, the strainer screen should be checked regularly to prevent clogging that will result in cavitation.

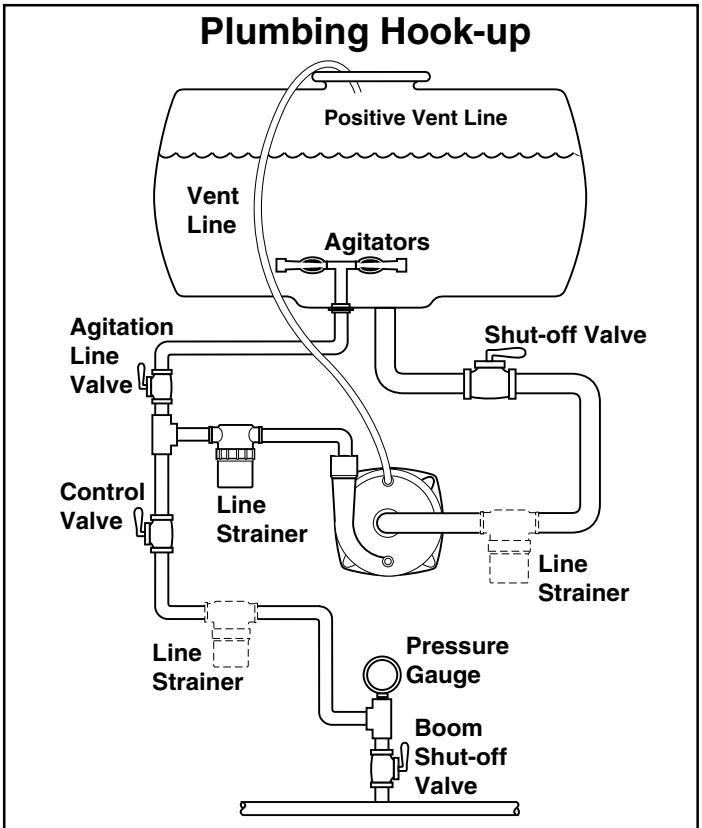


Figure 4

Priming the Pump

NOTE

The Pump must not be run dry.

Before starting the pump, the inlet line and pump must be filled with liquid and all discharge lines must be open. On self-priming models, only the pump chamber needs to be filled with liquid. The pump must not be run unless it is completely filled with liquid because there is a danger of damaging the mechanical seal, which depends on the liquid for its lubrication.

Non-self-priming models should be mounted below the level of the liquid. The suction line should slope down to the pump and be free of dips and bends. If this cannot be done, a foot valve should be installed in the end of the inlet line so that the line can be completely filled with liquid before starting the pump.

For best priming results, the top vent plug should be removed from the pump casing, and a vent line (1/4" [6.35 mm] tubing is sufficient) should be installed running back to the top of the tank. This line prevents air lock, and allows the pump to prime itself by bleeding off trapped air. The small stream of liquid that returns to the tank during operation is negligible. The discharge from this line should be positioned in the tank above the high liquid level. Self-priming models can be primed by removing the top vent plug and filling the priming chamber. The priming chamber will fill to the level of the inlet port. After use, the priming

chamber should be flushed and drained to avoid chemical corrosion and damage from freezing. Drain by removing the lower drain plug.

Controlling the Pump Flow
The best way to control the flow is by incorporating two control valves in a pipe tee immediately after the strainer in the discharge line. This permits controlling agitation flow independently of nozzle flow.

In any centrifugal pump, it is the large volume of liquid which puts load on the drive. Use only the flow needed to develop the pressure required at the boom and to maintain adequate agitation. Hydraulic motor-driven centrifugal pumps are easily adjusted to the exact flow required, as explained in the Operating Instructions of this manual.

Hooking Up the Hydraulic Motor to the Tractor Hydraulic System
Hypro Series 9300HMC hydraulic motor-driven pumps can be mounted on either the tractor or sprayer. When hooking up, make sure that no dirt or liquid gets into the hydraulic motor. **Keep all hydraulic connections clean.** Be sure to connect the hydraulic motor into the system correctly by putting the pressure line to the Pressure Port Adapter and return line to the Tank Port Adapter. The port adapters on the hydraulic motor are sized to accommodate 1/2" NPT fittings. For maximum performance, the hydraulic lines should also be at least 1/2" [12.7 mm] in size. For lines longer than 8 feet [2.44 m] or for the HM3C models, hydraulic line size should be at least 3/4" [19.05 mm] in order to reduce heat generation.

The tank (**OUT**) port adapter with a built-in check valve assembly will guard against reverse operation — allowing you to reverse oil flow to operate other equipment. **This adapter must not be removed**. On HM2C and HM4C model pumps, the pressure (**IN**) port adapter is a two-piece assembly consisting of an open (unrestricted) adapter with three orifices packed loose with the pump (See the Operations Section).

When using the HM2C or HM4C unit on any flow compensated (load sensing) closed center system, or any small open center system with a maximum flow of 8 gpm [30.28 lpm] for HM2C or 10 gpm [37.85 lpm] for HM4C, the metering orifice should be removed from the pressure port adapter. When using these units on flow compensated systems, connect to the motor priority circuit if your tractor has one.

Standard spool valves, which are found on all tractor hydraulic systems, can cause potentially damaging high peak pressures in the hydraulic system when closed, because of abrupt shut-off of oil flow in both the supply and return lines. When shutting off the pump, move the selector to the **FLOAT** position to allow the centrifugal pump to come to a stop gradually.

Operation

Open Center Systems— All Models
Adjusting Centrifugal Pump Output

NOTE

HM1C and HM3C motors have a bypass screw set 1-1/2 turns from fully closed at the factory. HM2C and HM4C have the bypass screw fully closed from the factory.

1. Open the bypass adjustment screw 2-1/2 turns from fully closed. Turn the bypass screw in to achieve the flow for the desired gpm and psi.

2. Start the tractor. Leave the directional valve in the neutral position and allow hydraulic oil to circulate for approximately 10 to 15 minutes or until adequately warmed.

4. Prime the centrifugal pump with all valves open (See the Installation Instructions and System Configuration Diagram).

5. Close the agitation line valve and keep the control valve and the boom shut-off valve open. Note the spray pressure.

7. Open the agitation line valve until you have desired circulation in the tank. Recheck the spray pressure. If it is too low, close down the agitation line valve until the desired spray pressure is reached. If the spray pressure is too high, throttle the centrifugal pump by closing down the control valve.

Closed Center (Pressure Compensated) — HM2C and HM4C models only

On a pressure compensated system the amount of oil that is allowed to flow through the hydraulic motor is regulated by a metering orifice in the pressure port adapter. Three different sizes of orifices are supplied with the HM2C and HM4C model pumps to allow flexibility in the flow required for individual sprayer needs.

The smaller the orifice the less hydraulic oil goes through the motor, so the pump will run slower and the flow of liquid pumped and the spray pressure will also be less. As the hydraulic oil flow is increased (by installing a larger orifice), the amount of liquid being pumped and the spray pressure is also increased.

Installing and Removing Metering Orifice

1. Shut off the hydraulic system.

2. Disconnect the line to the pressure port of the hydraulic motor.

3. Remove the adapter from the motor using a 1-1/16" wrench.

4. Make sure the O-ring is on the metering orifice before installing into port adapter.

5. The orifice is removed or installed in the port adapter by tapping either in or out of the adapter.

   A. To remove — tap the orifice out from the small end of the adapter.

   B. To install — tap the orifice in from the large end of the adapter. The orifice is seated when a **snap** sound is heard.

Adjusting Centrifugal Pump Output

1. Open the Bypass Adjusting Screw in the Hydraulic Motor three (**3**) turns.

2. Start the tractor and allow the hydraulic oil to circulate for approximately 10 to 15 minutes or until adequately warmed.

3. Close and lock down the bypass adjusting screw in the hydraulic motor.

4. Prime the centrifugal pump with all valves open (See Installation Instructions and System Configuration Diagram).

5. Close the agitation line valve and the control valve; open the boom shut off valve.

6. With the pump running, open the control valve until the pressure gauge indicates the desired spraying pressure.

7. Open the agitation line valve until sufficient agitation is observed. Then, if spray pressure drops, readjust the control valve to restore to the desire pressure.

8. If a sufficient boom pressure cannot be attained, install the #2 size orifice and repeat Steps **5** through **7**.

9. If a sufficient boom pressure still cannot be attained with the #2 size orifice, install the #3 size orifice and repeat Steps **5** through **7**.

10. If a sufficient boom pressure still cannot be attained with the #3 size orifice, remove the orifice and repeat Steps **5** through **7**.

Closed Center (Load Sensing) — All Models

Many tractors are being introduced with load sensing systems (also referred to as flow and pressure compensated systems) which simplify system setup and eliminate many of the problems associated with using the wrong size pump motors on a given hydraulic system. Usually, any of Hypro's 9300HMC models may be used on this type of system, provided the hydraulic system produces sufficient oil flow for the hydraulic motor being used (Refer to the Pump Selection Guide).

This system maintains a constant flow of hydraulic oil for a given pressure drop. The flow is adjustable with a flow control valve installed in the hydraulic system (Such as the Tortoise/Hare control on John Deere tractors). Because this system has adjustable flow, there is no need to bypass hydraulic oil as in an open center system, or to restrict the flow with orifices as in a closed center pressure compensated system.

Adjusting Centrifugal Pump Output

1. Make sure the orifice from the pressure port adapter of the hydraulic motor has been removed (HM2C and HM4C models only).

2. Close and lock down the bypass adjusting screw in the hydraulic motor.

3. Set the tractor hydraulic flow control valve for minimum hydraulic oil flow to the remote outlet (Tortoise position).

4. Start the tractor and allow the hydraulic oil to circulate for approximately 10 to 15 minutes or until adequately warmed.

5. Prime the centrifugal pump with all valves open (See the installation instructions and system configuration diagram).

6. Close the agitation line valve and open the control valve and the boom shut-off valve.

7. Slowly adjust the tractor hydraulic flow control valve until the desired boom pressure is attained.

8. Open the agitation line valve until sufficient agitation is observed. If spray pressure drops, readjust the tractor hydraulic flow control valve to restore it to the desire pressure.

Flush Pump After Use

One of the most common causes for faulty pump performance is gumming or corrosion inside the pump. Flush the pump and entire system with a solution that will chemically neutralize the liquid pumped. Mix this solution according to the manufacturer's directions. This will dissolve most residue remaining in the pump, leaving the inside of the pump clean for the next use.

To Prevent Corrosion

After cleaning the pump as directed above, flush it with a permanent type automobile antifreeze (Prestone®, Zerex®, etc.) containing a rust inhibitor. Use a 50% solution, half antifreeze and half water, or fill the pump with FLUID FILM® and then drain it. A protective coating of FLUID FILM® will remain on the inner pump surfaces. Save the excess FLUID FILM® for the next application. Plug the ports to keep out air during storage. For short periods of idleness, noncorrosive liquids may be left in the pump, **but air must be kept out**. Plug the ports or the seal port connections.

Hypro Repair Tools:
Tool Box No. 3010-0168 • 1/4" Allen Wrench No. 3020-0008 Support Bars (2) No. 3010-0064 • Port Brush No. 3010-0066 1/16" Allen Wrench No. 3020-0009 • Brush Holder No. 3010-0067 • Large Retaining Ring Pliers No. 3010-0084 • Small Retaining Ring Pliers No. 3010-0167

Shop Tools Needed
Bench Vice • Arbor Press • Air or Hand Drill • Small Knife
Metal Pipe — 1" dia. x 4" high (Bearing Seating Tool)
PVC Pipe — 3/4" dia. x 4" - 6" high (Seal Seating Tool)
12" Crescent Wrench • Two Flat Screwdrivers (approx. 10" Long)
1/2", 9/16", 5/8" and 7/8" sockets • Hammer or Rubber Mallet
Small Screwdriver (recommended) • Large File (optional)
1/2" and 9/16" Box End Wrench • Lubricating Spray (WD-40 or LPS)
Small amount Hydraulic Oil • Cleaning Solvent Tank (recommended)

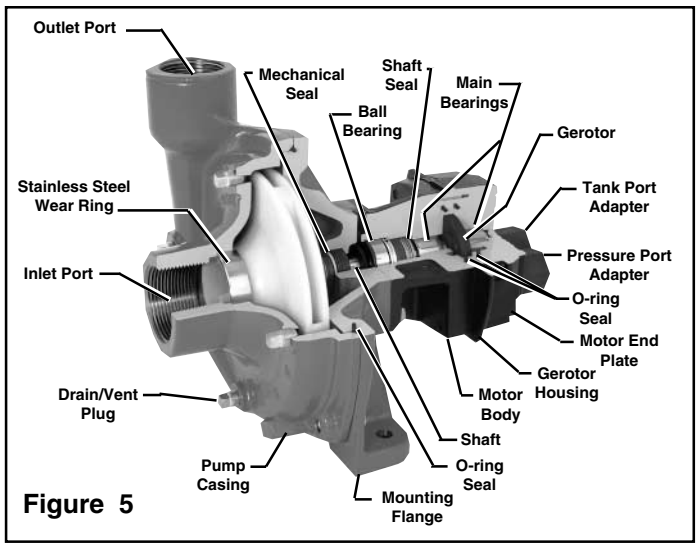


Figure 5

Pump Housing Disassembly

NOTE

Instructions in italics describe procedures for the Series 9300P Polypropylene Centrifugal Pumps, when different than the cast iron pumps.

1. Using a 9/16" box end wrench, remove the four Hex Head Bolts holding the Pump Casing to the Mounting Flange. (If necessary, tap Pump Casing Outlet Port with rubber mallet or hammer to separate.) [*Using a 1/2" wrench, remove the six bolts from the front. For the two bottom bolts securing the Base, you will need to hold the two nuts with another 1/2" wrench. Also remove the 5/16" screw from the rear near the outlet port.*]

2. To remove the Impeller Nut, insert a large screwdriver or file (at least 10" [254 mm] long) into Impeller Vanes to prevent Impeller from turning when loosening nut. Use a 5/8" socket wrench to remove the Impeller Nut by turning it counterclockwise (See Figure 6). [*Use 7/8" deep socket wrench to remove Plastic Seal Nut, then 9/16" deep socket to remove Metal Jam Nut and Washer.*]

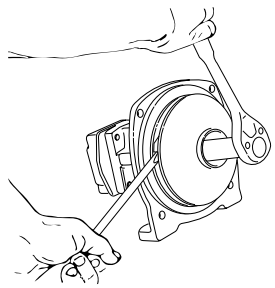


Figure 6

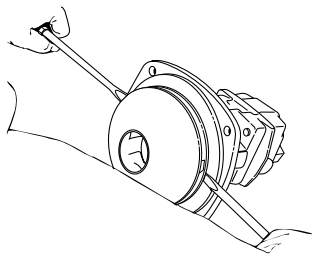


Figure 7

3. Once nut [*and washer*] is removed, place a screwdriver on each side behind the Impeller and pry away from the Mounting Flange (See Figure 7). Remove Woodruff Key from the Shaft. Remove O-ring from the Mounting Flange.

Pump Seal Removal

1. Lightly lubricate the Shaft for easier removal of the Seal. Using two screwdrivers positioned opposite each other, pry the rotary portion of the Seal from the Shaft (See Figure 8).

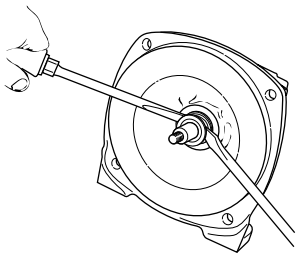


Figure 8

NOTE

In the case of a severe Pump Seal leak, inspect the Shaft/Bearing Assembly in the Hydraulic Motor for possible contamination.

2. Using a 1/2" box end wrench, remove the four bolts holding the Motor to the Mounting Flange. Remove Motor. [*Remove the Plastic Back Cover flange. Knock the Seal out from back with a hammer and screwdriver. Use a 1/2" socket wrench and 1/2" box end wrench to remove the Mounting Flange from the Hydraulic Motor.*]

3. Using a screwdriver and hammer, tap out the stationary portion of the Mechanical Seal from the Motor side of the Mounting Flange. (If the Motor is not removed, the Seal can be pried out with a small screwdriver.

NOTE

The seal will be damaged by removal in this manner. A new seal must be used when pump is reassembled.

Clean-Up Of Pump Housing

1. Using a circular bottle-type wire brush with air or hand drill, clean the Outlet Port, Inlet Port and the sealing areas of the O-ring on the Pump Casing and Mounting Flange. Using the port brush, clean the seal cavity in the Mounting Flange. [*The last step should not be performed on the 9300P.*]
2. After wire brush cleaning, it is recommended that the Pump Casing and Mounting Flange be further cleaned in a solvent tank to remove rust and corrosion particles.

Seal Replacement/Pump Housing Reassembly

NOTE

If the Hydraulic Motor requires repair, proceed to Disassembly and Repair of the Hydraulic Motor.

1. Lubricate the seal cavity in the Mounting Flange with WD-40®, LPS or equivalent. Do not lubricate the shaft.
2. Install the stationary portion of the Mechanical Seal by sliding over the Shaft with the ceramic side out.

NOTE

Make sure both the seal cavity and seal are clean and lubricated.

3. To seat the Seal in the seal cavity, use a piece of 3/4" PVC pipe 4" to 6" [101.6 to 152.4 mm] in length. Lubricate sealing surface on seal after it is seated. Do not lubricate the shaft.

4. To install the rotary portion of the mechanical seal, place it over the shaft with the carbon side facing in, and press against the stationary portion (See Figure 9).

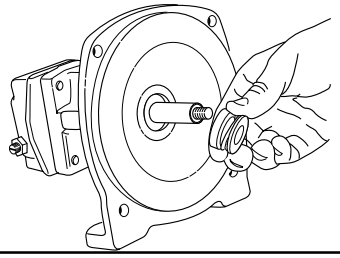


Figure 9

5. Install rubber gasket 1700-0100 over shaft against rotary portion of seal.

NOTE

On Models 9305C-HM3C-SP, 9505C-HM3C-BSP, and 9305C-HM3C install the Washer on the Shaft prior to installing the Impeller Nut.

⚠ CAUTION

The threads of the Plastic Seal Nut are fine and can be easily cross threaded. To prevent cross threading, turn the Plastic Seal Nut counter clockwise until area of thread engagement is detected; then, turn the Plastic Seal Nut clockwise until it is secure. Do not over tighten the Plastic Seal Nut.

6. Insert a Woodruff Key into the Shaft key slot; then, place the Impeller on the Shaft and align it with the Key and press against the Mechanical Seal Assembly. Apply a blue thread locking compound to the Impeller Nut and using a 5/8" socket wrench and using a screwdriver to hold the Impeller, install the Impeller Nut. [*On polypropylene models insert the Woodruff Key into the Shaft key slot. Place the Impeller on the Shaft and align it with the Key; then, press against the Mechanical Seal Assembly. Place the Metal Seal Washer on the Shaft. Apply a drop of blue thread locking compound on the Impeller Nut and secure the Impeller to the Shaft as described previously.]*
7. Install the O-ring on the Mounting Flange. Replace the O-ring if worn or damaged.
8. Place the pump casing on the mounting flange, insert and tighten the bolts.

Disassembly and Repair of the Hydraulic Motor

NOTE

The work area and Motor should be as clean as possible to prevent contamination of parts.

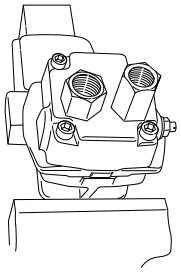


Figure 10

1. Remove the Mounting Flange from the Motor body and place Hydraulic Motor in vise (Figure 10).
2. Remove Tank Port Adapter and Pressure Port Adapter with large crescent wrench or 1-1/16" box end wrench (See Figure 10).
3. Using a 9/16" box end wrench, loosen the Nut on the Bypass Adjusting Screw (See Figure 10).
4. Using a small screwdriver, remove the Bypass Adjusting Screw from the Motor. (This will remove the Screw, Nut, Washer and Thread-Seal Gasket.)
5. Using a 1/4" Allen wrench, remove the Socket Head Cap Screws from the Motor End Plate (See Figure 10).
6. If Motor End Plate will not lift off easily, use a small screwdriver to carefully pry apart the boss portion of the End Plate and Gerotor Housing until free (See Figure 11). If Gerotor Housing will not lift off easily, carefully pry apart

the boss area between the Gerotor Housing and the Motor Body. (It may be necessary to alternate sides when prying apart Motor sections.)

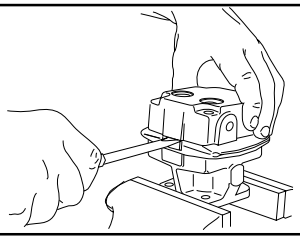


Figure 11

7. Remove both parts of the Gerotor.
8. On HM3C models, remove the Woodruff Key from the Shaft. On HM1C, HM2C and HM4C models, remove the Roll Pin from the Shaft.
9. Remove the O-ring from the Motor End Plate and Body with a flat instrument such as a knife blade.
10. Inspect Motor End Plate, Body and Gerotor Housing for wear and/or gouging. If gouging has occurred in both the Motor End Plate and Body, the Motor is not repairable. If gouging has occurred in the Motor End Plate, Body or Gerotor Housing, the part that is worn must be replaced. If Gerotor Housing is damaged, Gerotor parts must also be replaced.

To Remove the Shaft Assembly from the Motor Body

1. Remove the Slinger Ring from the Motor Shaft.

⚠ WARNING

Special attention should be exercised when working with retaining rings. Always wear safety goggles when working with spring or tension loaded fasteners or devices.

2. Using the large retaining ring pliers, remove the Retaining Ring next to the Ball Bearing in the Motor Body.

NOTE

If Bearing is binding against the Retaining Ring so that it cannot easily be removed, place the Motor Body (threaded portion of the shaft up) and place on arbor press. Using a piece of un-threaded metal pipe (1" dia. x 4" high [254. mm x 101.6 mm high]), slide over the Shaft and gently press down with the arbor press just enough to relieve the pressure on the Retaining Ring.

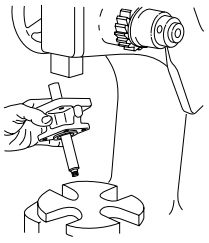


Figure 12

3. Place Body in position on arbor press. Threaded portion of the Shaft should be inside the fixture. Press out Shaft assembly with arbor press (See Figure 12).

Hydraulic Motor Shaft Disassembly and Repair

1. Remove Large Retaining Ring from Shaft with a screwdriver. Remove Thrust Bearing Assembly from Shaft (includes the Thrust Bearing and two Thrust Bearing Races) and the Seal Spacer.
2. Remove the Small Retaining Ring next to the Shaft Ball Bearing.
3. To remove the Bearing from the Shaft, place the Shaft (threaded end up) in the arbor press fixture. Place the two support bars provided in the repair kit opposite each other and between the Seal on the Shaft and the arbor press fixture. Using an arbor press, press the Shaft through the Bearing, Seal Spacer and Seal (See Figure 13).

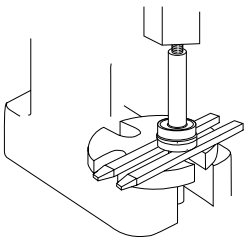


Figure 13

4. Inspect the sealing area of the Shaft for wear. Inspect other Shaft Assembly Components for wear and replace if necessary.
5. While Motor is completely disassembled, clean all parts in a solvent bath.

To Install New Shaft Seal

1. The sealing lips on a new Seal must be expanded to fit on the Shaft. Press seal onto large end of Shaft with seal lip facing out. Do not push Seal past keyway on Shaft.
2. Once seal lip has been expanded, remove the Seal from the Shaft.
3. With the seal lip facing the large end of the Shaft, slide the Seal over the threaded end of Shaft and gently push onto the raised area of the Shaft, stopping approximately 1/4" [6.35 mm] from the Large Retaining Ring groove.
4. Over the large end of the Shaft, install the Seal Spacer, Thrust Bearing Race, Thrust Bearing, second Thrust Bearing Race and the Large Retaining Ring.

To Install Shaft Bearing

1. Over the threaded end of the Shaft, install the Spacer Ring and the Ball Bearing.
2. Insert the Shaft (threaded end down) into the arbor press fixture. Place the two support bars opposite each other and between the Bearing and the fixture. Place on an arbor press and carefully press the Shaft down allowing just enough room for the Retaining Ring next to the Bearing to be installed.

NOTE

Make sure the Spacer ring between the seal and Bearing is free floating (not binding).

NOTE

Should the Main Needle Bearings in the Hydraulic Motor need replacement, a new Body and/or End Plate, with the Main Bearing already installed, must be used. If this occurs, check other internal parts of the Motor for damage and wear.

To Install the Shaft Assembly in the Motor Body

1. Place the Shaft Assembly into the Motor Body bearing bore with threaded end up (See Figure 14).

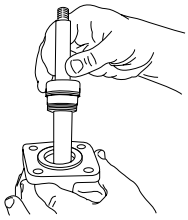


Figure 14

2. On arbor press, place Body on arbor press fixture.

NOTE

Make sure the surface edge of the fixture is smooth and clean.

NOTE

An un-threaded piece of pipe (1" dia. x 4" [25.4 mm x 101.6 mm] high) is needed to support the outer bearing race on the shaft ball bearing. Place this pipe over the shaft and press shaft assembly down until retaining ring can be installed in its groove in the bearing core of the motor body (Figure 15).

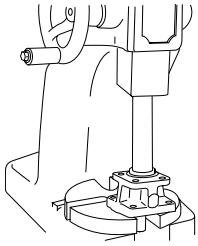


Figure 15

Reassembly of Remaining Hydraulic Motor Parts

1. Place Motor Body in a vise with large end of Shaft facing up.
2. Install the O-ring in the Body.
3. Install the Woodruff Key or Roll Pin on the Shaft. Place the Inner Gear of the Gerotor onto the Shaft making sure Gerotor slot lines up with the key in the shaft.

NOTE

The Woodruff Key can slide up behind the Inner Gear of the Gerotor when the Gear is installed. Make sure the Key is visible in the slot after the Gear is in place.

4. Install the outer portion of the Gerotor, making sure the Gerotor is centered within the O-ring groove on the Body.
5. Install the Gerotor Housing, making sure the pins in the Gerotor Housing line up with their respective holes in the Body.
6. Lightly lubricate the area between the Inner and Outer Gerotor and the Outer Gerotor and Gerotor Housing with hydraulic oil or mineral oil.

⚠ WARNING

Special attention should be exercised when working with retaining rings. Always wear safety goggles when working with spring or tension loaded fasteners or devices.

7. Install O-ring on the motor end plate.
8. Place end plate on gerotor housing, making sure holes in end plate line up with pins in the gerotor housing.
9. Install four Socket Head Cap Screws in Motor End Plate and, using a 1/4" Allen wrench, tighten Cap Screws alternately and evenly, in a crisscross pattern to approximately 15 foot pounds [20 Nm] of torque.
10. Install the Thread Seal Gasket on the Bypass Adjusting Screw. Put the Gasket on from the slotted end and turn until four threads on the Screw are showing. Install the Washer and the Nut. Install Bypass Adjusting Screw in the Motor end plate.
    A. For closed center hydraulic systems, turn the Bypass Adjusting Screw in until it bottoms out in the End Plate. Tighten nut down with 9/16" box end wrench.
    B. For open center hydraulic systems, turn the Bypass Adjusting Screw in until it bottoms out in the End Plate; then turn back out 1½ full turns. Holding the Bypass Adjusting Screw with a screwdriver, tighten Nut. (Motor will then have to be readjusted to tractor system.)
11. Replace O-ring on both port adapters.
12. Install Pressure Port Adapter and Tank Port Adapter back onto the Motor. (For ease of installation, tighten the Pressure Port Adapter first, then the Tank Port Adapter.)
13. Remove Hydraulic Motor from the vise. Turn Shaft by hand to check for binding.
14. Install Slinger Ring over Motor Shaft.
15. Install Motor into Pump Mounting Flange. Insert four Hex Head Bolts; then, alternately and evenly tighten them. *[For polypropylene models secure the Hydraulic Motor to the Mounting Flange with four Hex Head Cap Screws and Nuts. The Nuts should be visible when the assembly is complete.]*

Troubleshooting

If the proper Hydraulic Pump Unit has been selected according to Hypro recommendations, and the unit has been correctly plumbed into the hydraulic system, operation should be quite satisfactory. If spraying performance is unsatisfactory or hydraulic system heat is excessive etc., check the following troubleshooting guide for possible problems and solutions.

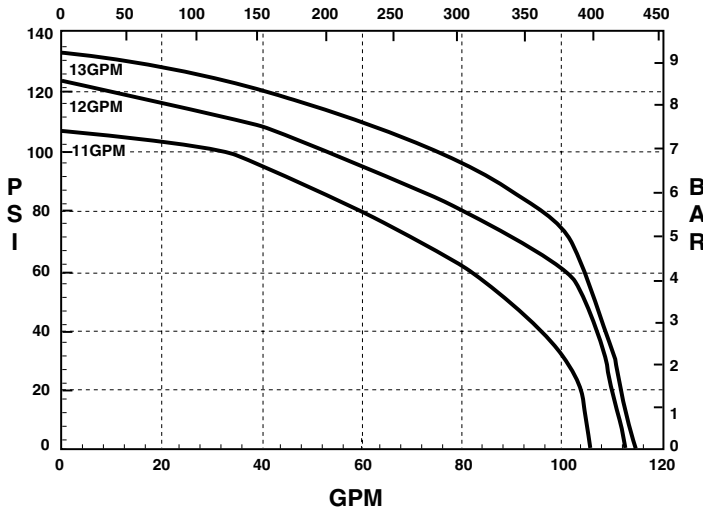
Troubleshooting Guide

Symptom	Probable Cause(s)		Corrective Action(s)
Low Discharge	Pump not primed.	—	Remove topmost vent plug from face of pump and run pump to expel trapped air (See Installation Instructions).
	Air leaks in inlet line.	—	Check and reseal inlet fittings.
	Blocked or clogged line strainer.	—	Inspect strainer and clear any debris from screen.
	Impeller plugged.	—	Inspect and clear obstruction.
	Undersize inlet line or collapsed hose.	—	Suction line should be the same diameter as inlet port of pump or larger.
	Improperly sized hydraulic motor.	—	Refer to Pump Selection Guide to determine proper size hydraulic motor for your hydraulic system.
	Bypass Adjustment Screw not set properly.	—	Adjust bypass screw on side of hydraulic motor in until the desired output is attained.
	Eye of impeller rubbing on volute.	—	Remove volute (front cover) and inspect the impeller. If wear detected, sand the impeller eye O.D. with emery cloth.
Hydraulic system overheating	Improper hydraulic motor size.	—	Refer to Pump Selection Guide to determine proper size for your hydraulic system.
	Bypass Adjustment Screw set to bypass too much oil.	—	Close adjustment screw on side of hydraulic motor to lessen the amount of oil being bypassed.
	Improper metering orifice installed in pressure port.	—	Install proper size orifice. Refer to Installation section for proper sizing. .
	Insufficient hydraulic hose size.	—	Check hydraulic hose size. Hose should be at least 1/2" [12.7 mm]. For large open-center systems 3/4" [19.05 mm].

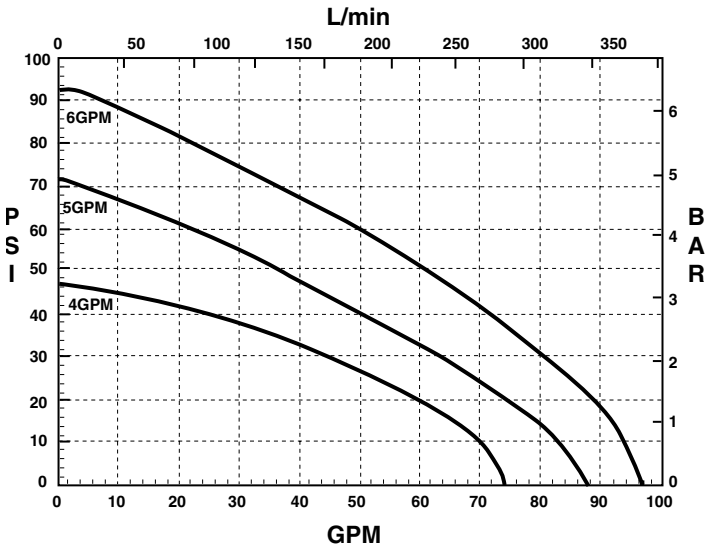
Performance Graphs

GRAPHS FOR HYDRAULICALLY-DRIVEN CENTRIFUGALS

9303C-HM1C & 9303S-HM1C



9303C-HM2C & 9303S-HM2C



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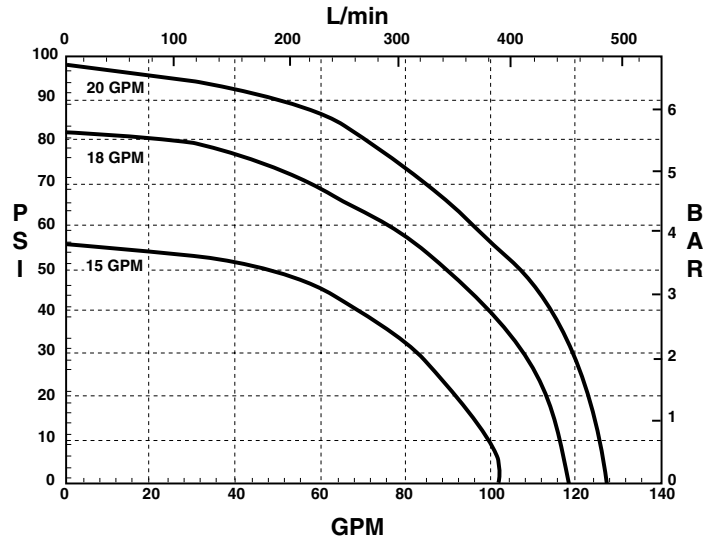

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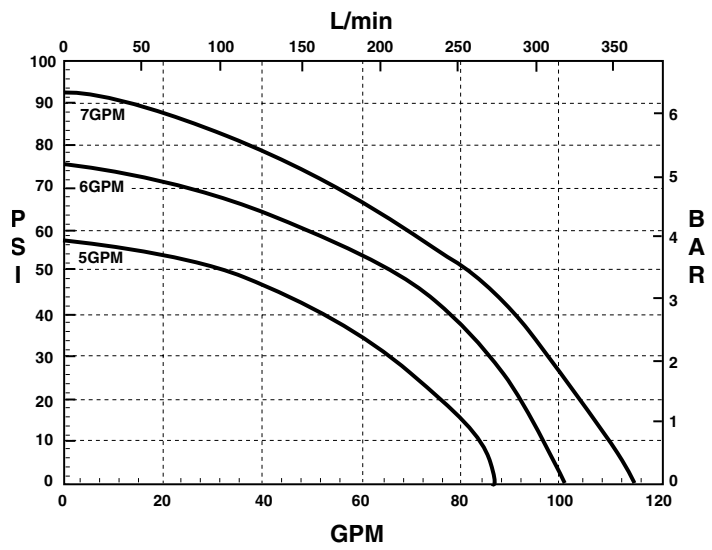

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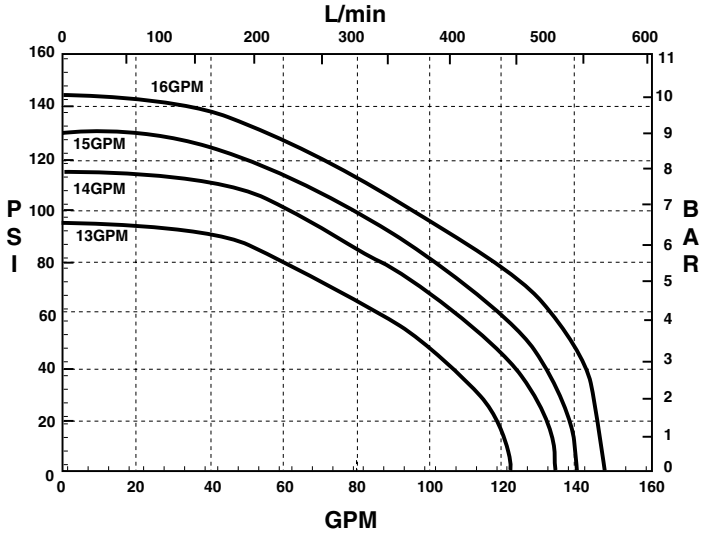
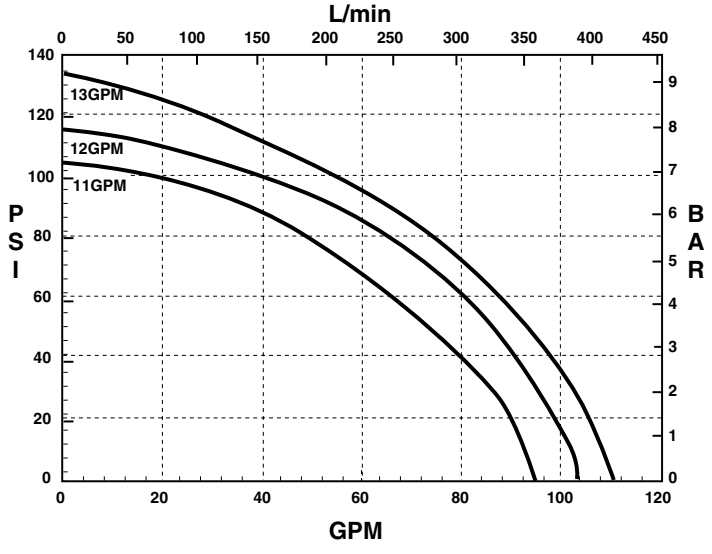
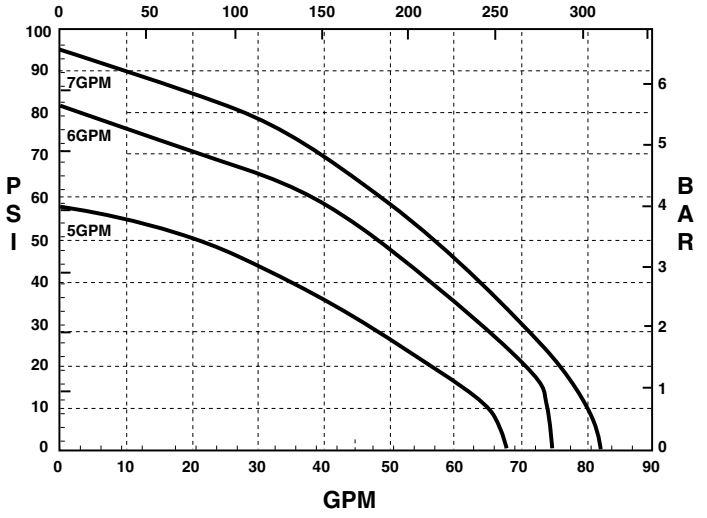


9303P-HM1C



Performance Graphs

9303P-HM2C



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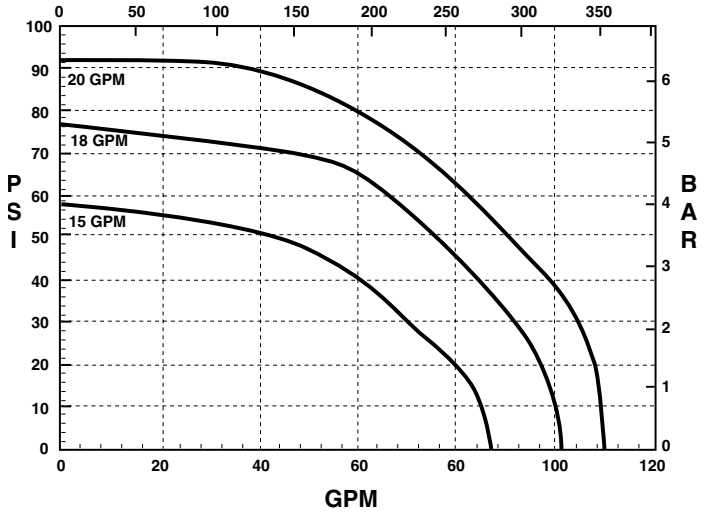
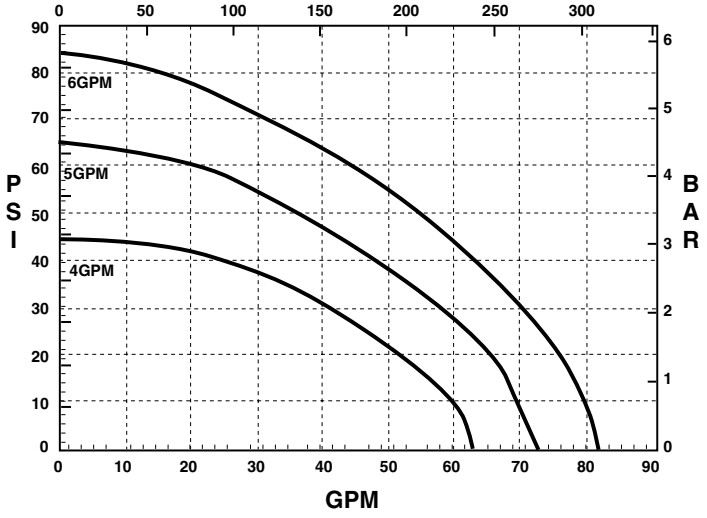


9303P-HM4C



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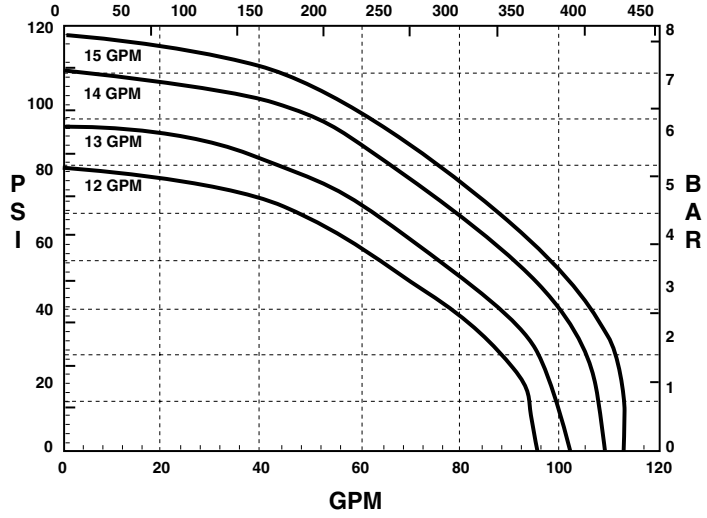
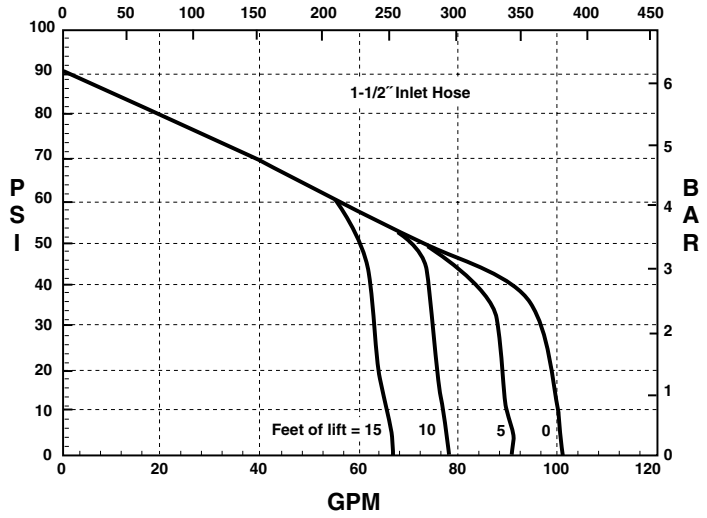
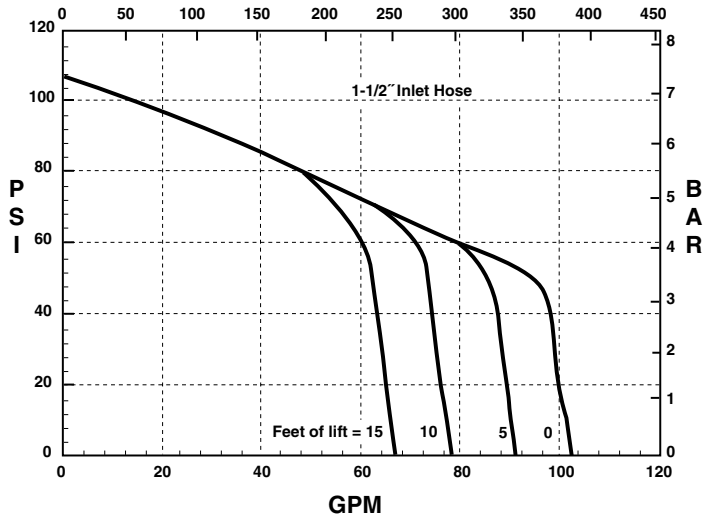


9303C-HM1C-SP Performance at 11 GPM

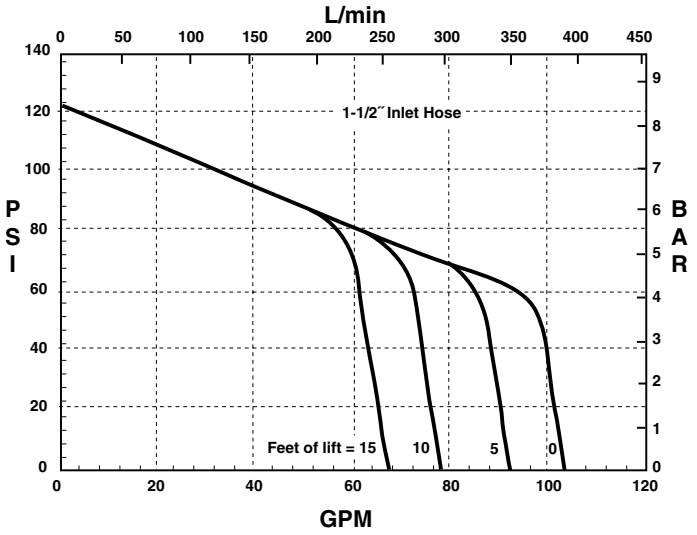


9303C-HM1C-SP Performance at 12 GPM

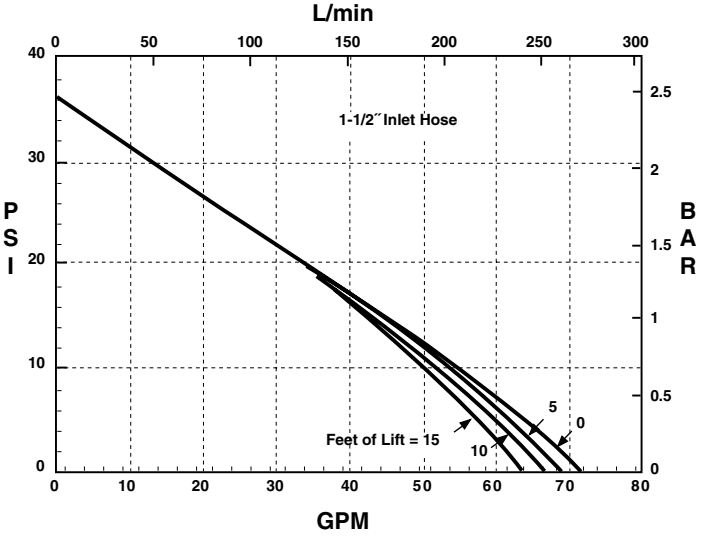


Performance Graphs

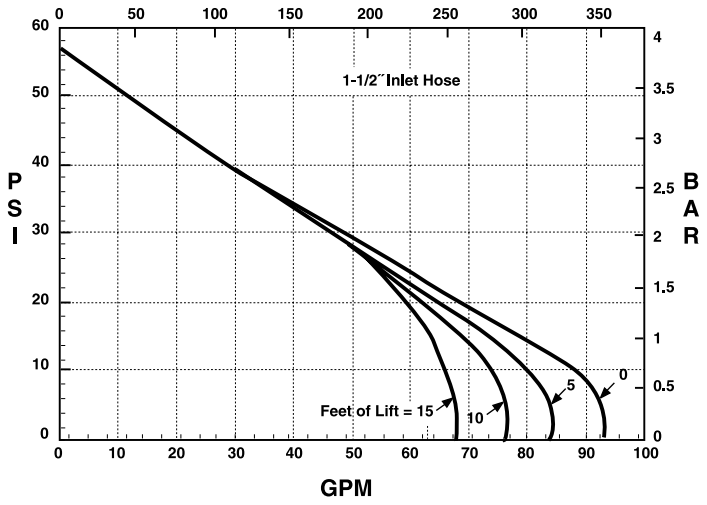
9303C-HM1C-SP Performance at 13 GPM



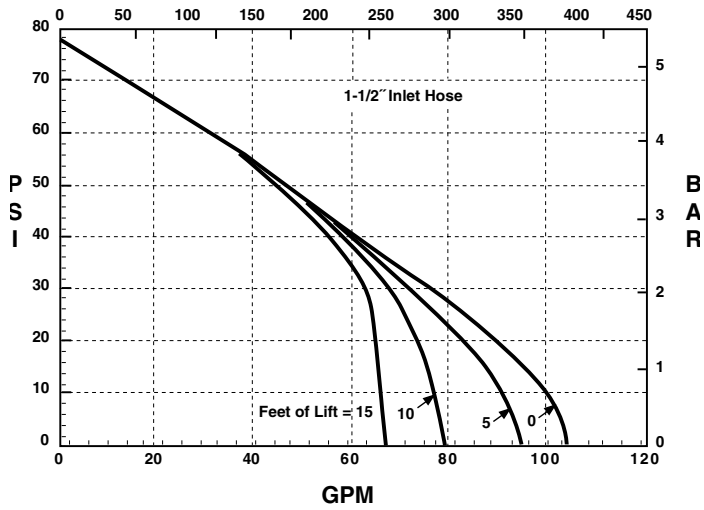
9303C-HM2C-SP Performance at 4 GPM



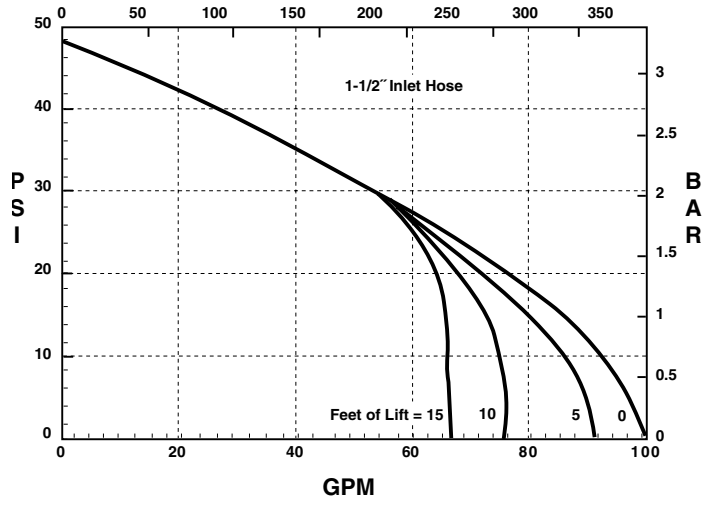
9303C-HM2C-SP Performance at 5 GPM



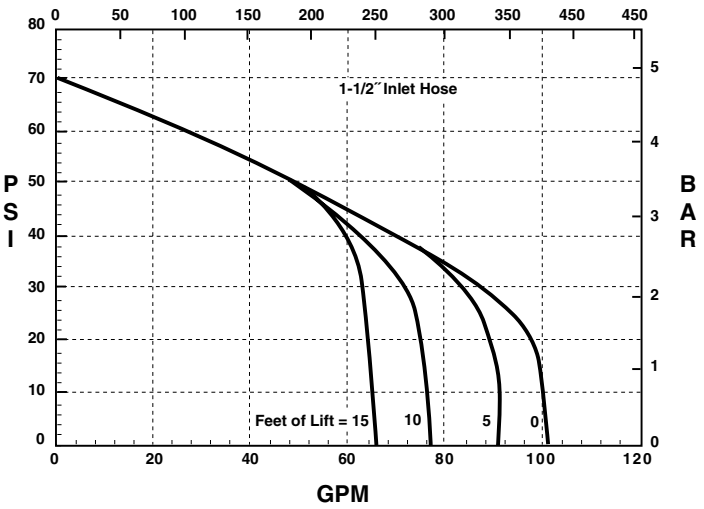
9303C-HM2C-SP Performance at 6 GPM



9303C-HM3C-SP Performance at 15 GPM

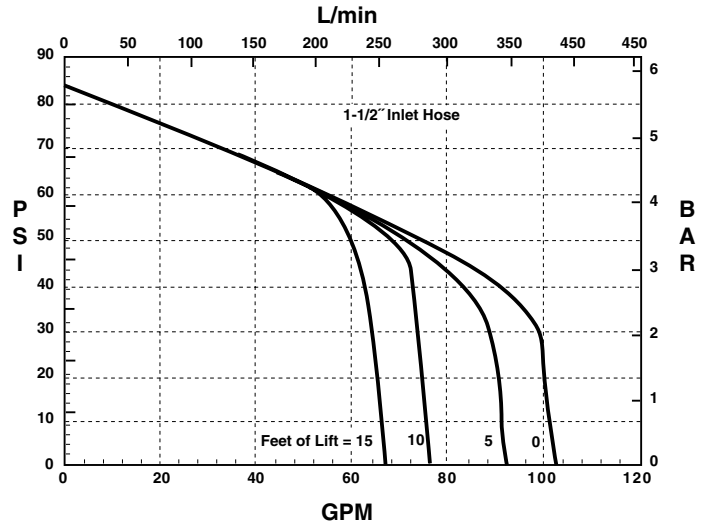


9303C-HM3C-SP Performance at 18 GPM

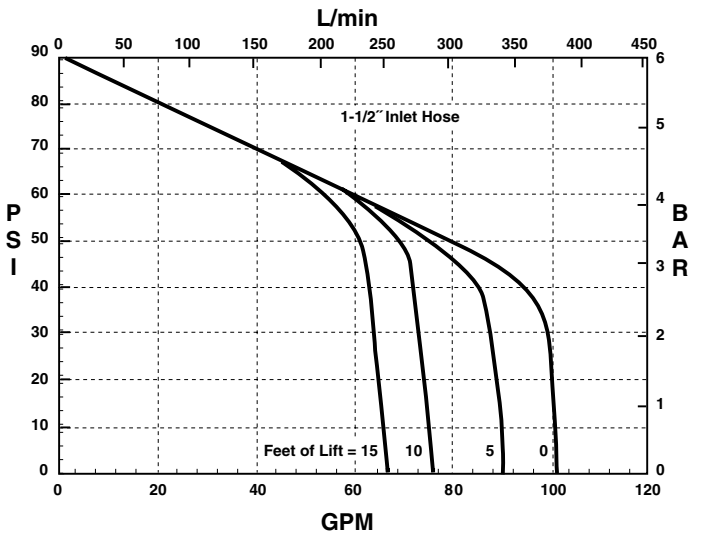


Performance Graphs

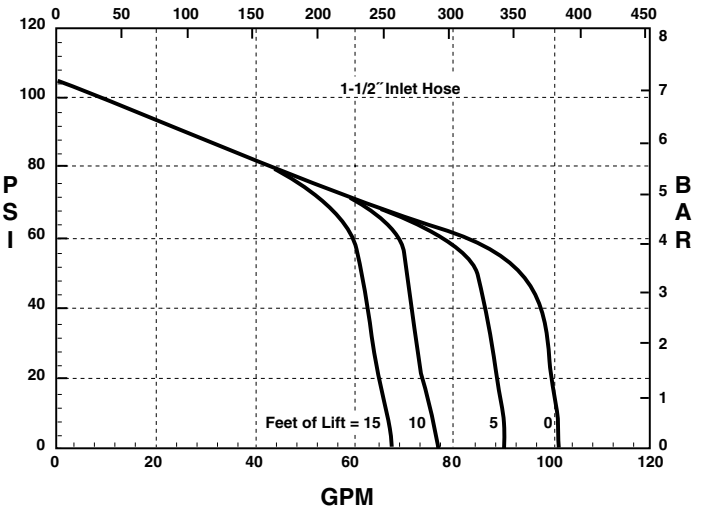
9303C-HM3C-SP Performance at 20 GPM



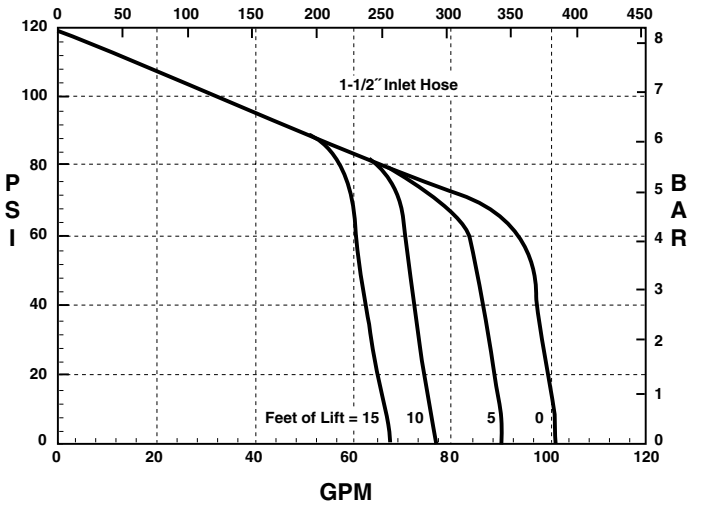
9303C-HM5C-SP Performance at 13 GPM



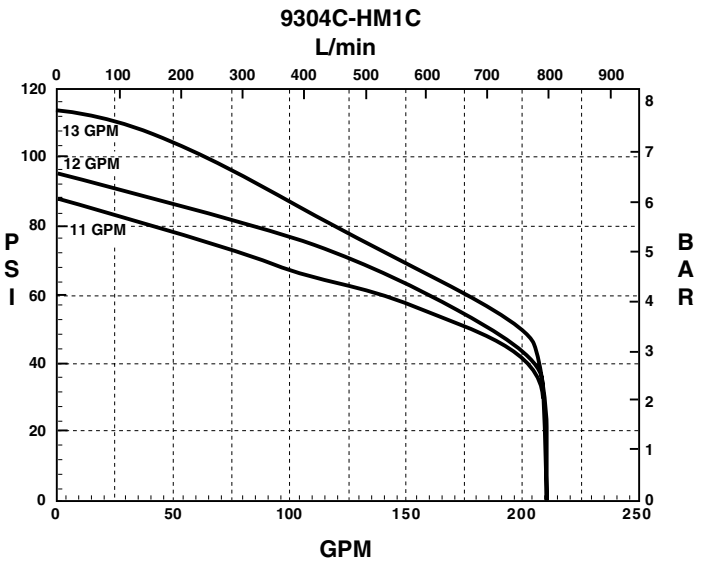
9303C-HM5C-SP Performance at 14 GPM



9303C-HM5C-SP Performance at 15 GPM



9304C-HM1C



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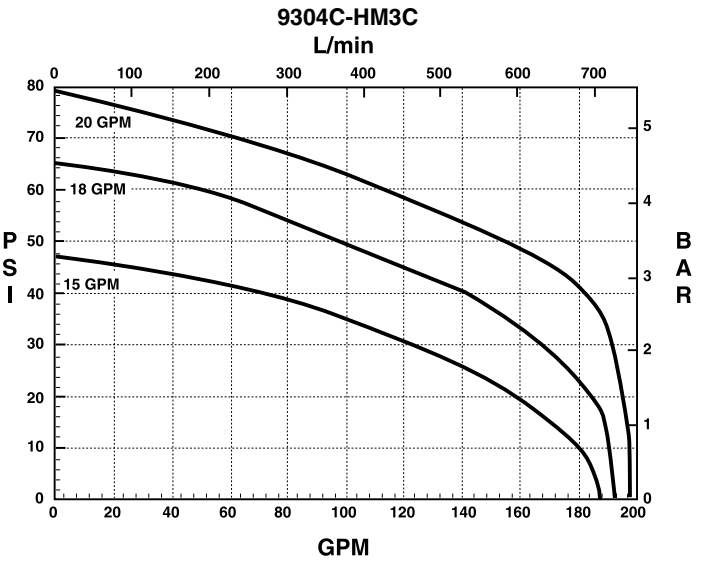
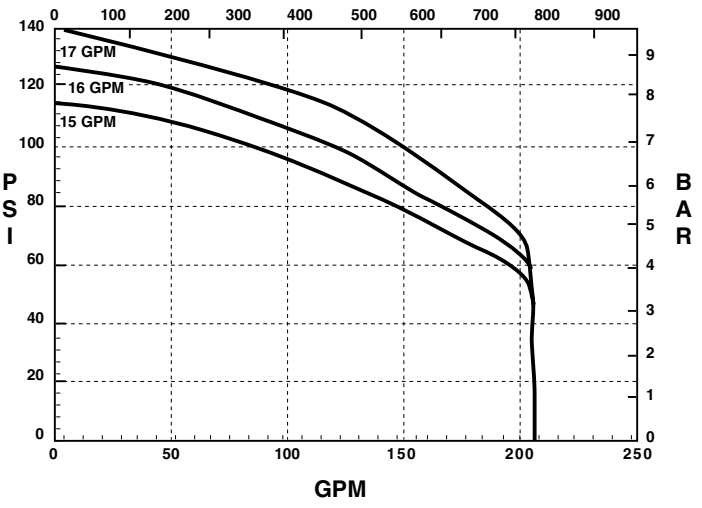


Performance Graphs

9304C-HM5C



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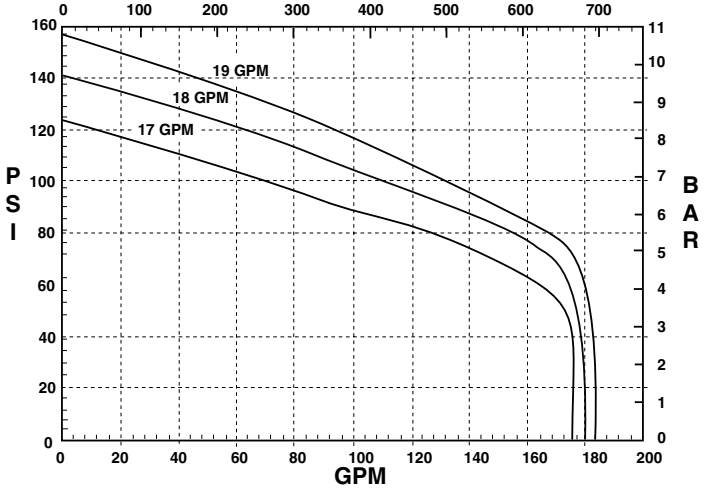
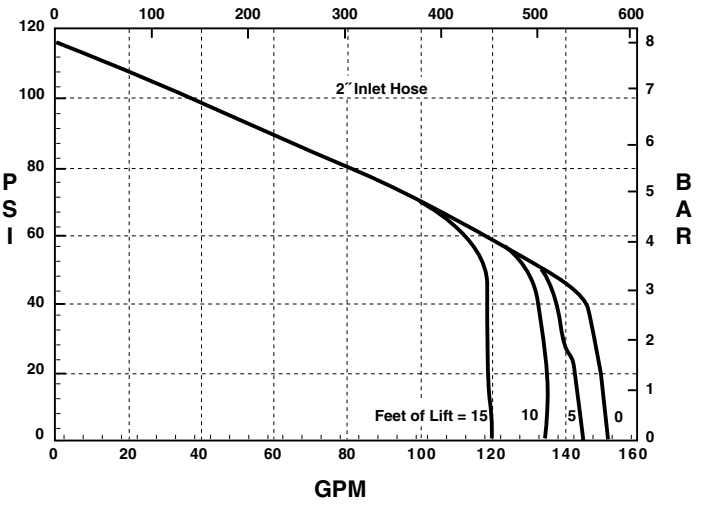
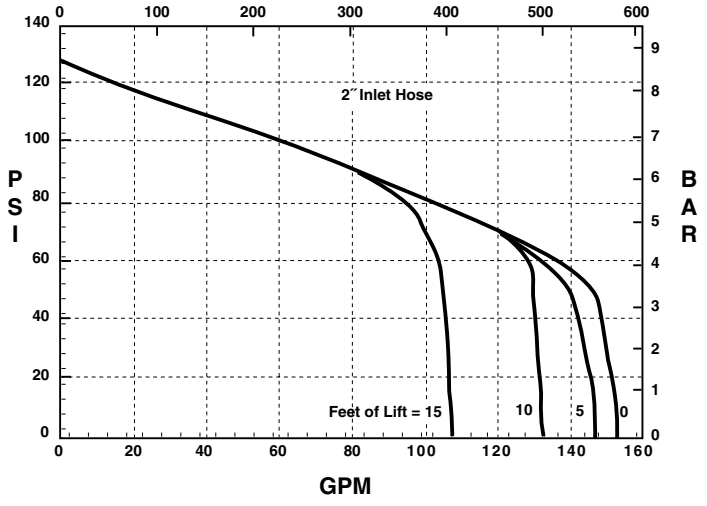


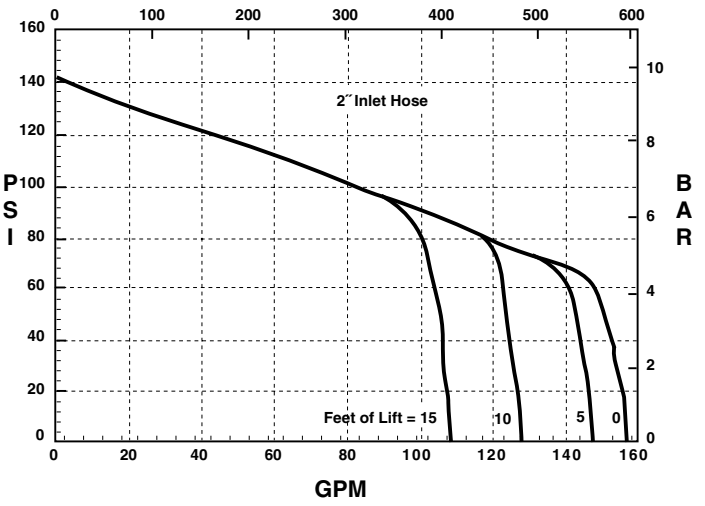
9305C-HM3C-SP, BSP Performance at 17 GPM



9305C-HM3C-SP, BSP Performance at 18 GPM

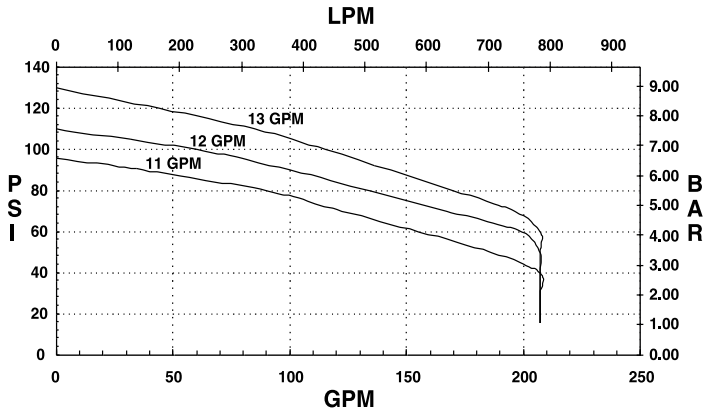


9305C-HM3C-SP, BSP Performance at 19 GPM

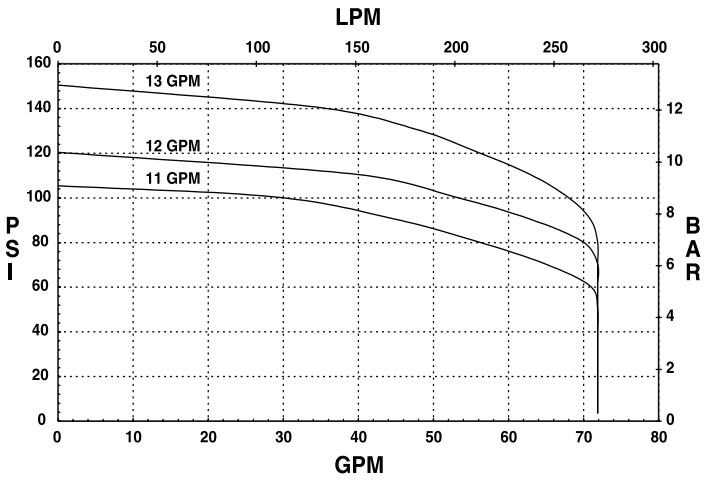


Performance Graphs

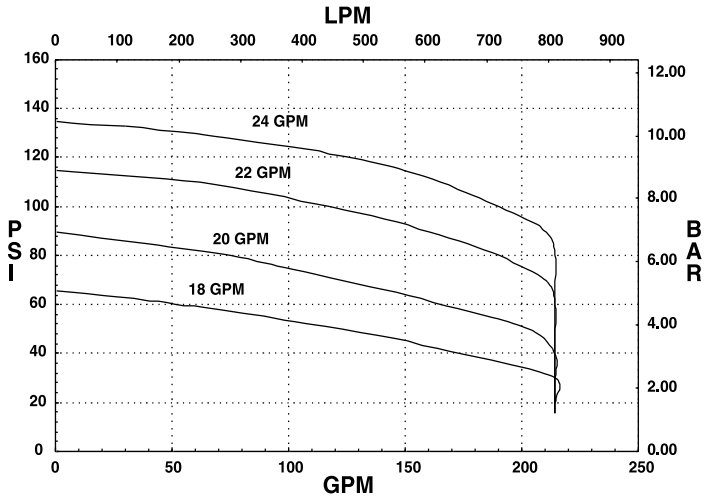
9306C-HM1C & 9306S-HM1C



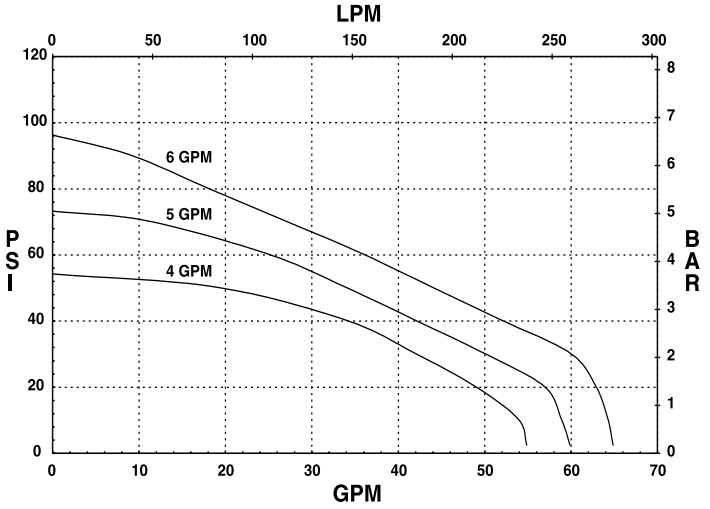
9302C-HM1C & 9302S-HM1C



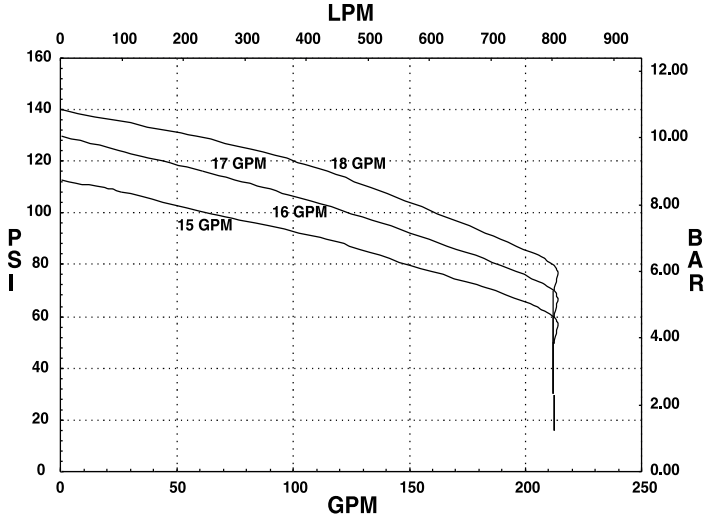
9306C-HM3C & 9306S-HM3C



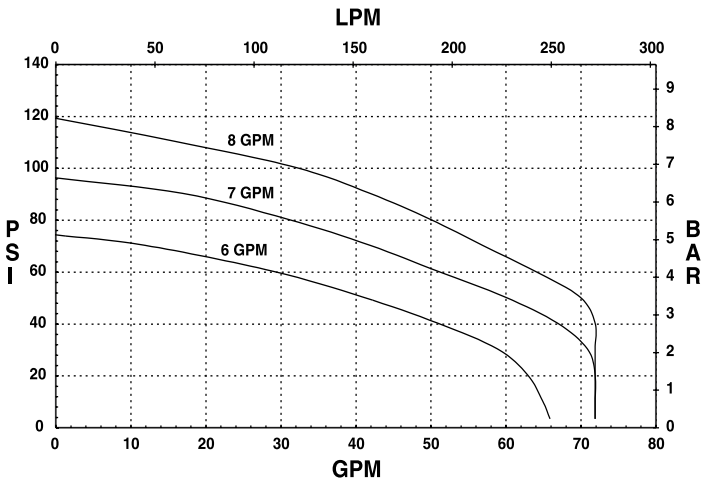
9302C-HM2C & 9302S-HM2C



9306C-HM5C & 9306S-HM5C



9302C-HM4C & 9302S-HM4C



Performance Charts

Models 9303C-HM1C, 9303C-HM2C, 9303C-HM3C, 9303C-HM4C, 9303C-HM5C, 9303S-HM1C, 9303S-HM2C, 9303S-HM3C, 9303S-HM4C, 9303S-HM5C & 9305C-HM3C

9303C-HM1C 9303S-HM1C

Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI	GPM at 120 PSI	GPM at 130 PSI
11 GPM	105	104	101	96	90	82	71	60	47	31			
12 GPM	112	110	109	107	105	101	92	81	67	53	36	9	
13 GPM	114	112	111	109	107	104	102	96	85	76	63	33	13

9303C-HM2C 9303S-HM2C

Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI
4 GPM	70	60	45	25					
5 GPM	83	75	64	51	37	22	4		
6 GPM	94	89	81	72	62	50	37	22	7

9303C-HM3C 9303S-HM3C

Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI
15 GPM	100	92	83	69	47				
18 GPM	116	114	108	100	90	76	55	33	
20 GPM	125	123	120	114	107	96	85	71	50

9303C-HM4C 9303S-HM4C

Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI
5 GPM	84	76	66	52	34				
6 GPM	97	92	86	78	67	50	25		
7 GPM	110	104	98	91	82	69	55	38	14

9303C-HM5C 9303S-HM5C

Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI	GPM at 120 PSI	GPM at 130 PSI	GPM at 140 PSI
13 GPM	120	118	113	105	97	86	73	59	44					
14 GPM	133	131	128	123	116	108	98	88	74	61	44			
15 GPM	139	138	135	132	126	119	110	100	89	77	66	50	20	
16 GPM	147	146	145	142	137	132	126	117	107	95	83	70	55	37

Models 9304C-HM1C, 9304C-HM3C, 9304C-HM5C, 9304S-HM1C, 9304S-HM3C, & 9304S-HM5C

9304C-HM1C

Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI
11 GPM	210	209	208	203	178	140	89	44			
12 GPM	210	210	209	206	187	160	130	87	35		
13 GPM	211	211	210	208	200	175	149	120	93	64	26

9304C-HM3C

Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI
15 GPM	180	158	122	72			
18 GPM	189	185	164	140	99	49	
20 GPM	197	193	190	182	154	110	63

9304C-HM5C

Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI	GPM at 120 PSI	GPM at 130 PSI
15 GPM	206	206	205	205	205	195	170	145	119	85	40		
16 GPM	206	206	205	205	205	204	188	165	143	120	87	49	
17 GPM	206	206	205	205	205	204	200	184	168	150	128	96	52

Models 9303P-HM1C, 9303P-HM2C, 9303P-HM3C, 9303P-HM4C, & 9303P-HM5C

9303P-HM1C

Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI	GPM at 120 PSI	GPM at 130 PSI
11 GPM	93	90	86	80	74	67	59	49	36	18			
12 GPM	102	99	95	91	87	81	74	66	55	39	19		
13 GPM	109	106	103	99	94	88	82	74	65	54	42	28	10

9303P-HM2C

Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI
5 GPM	65	56	46	38	20				
6 GPM	74	72	64	56	48	38	21		
7 GPM	80	75	70	62	57	48	40	28	9

9303P-HM3C

Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI
15 GPM	85	80	70	60	44				
18 GPM	100	97	92	84	76	63	48		
20 GPM	109	108	104	99	90	82	71	60	39

9303P-HM4C

Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI
5 GPM	60	52	41	26				
6 GPM	70	66	58	48	37	21		
7 GPM	80	76	70	63	55	45	32	15

9303P-HM5C

Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI
13 GPM	94	92	86	78	68	58	44	15			
14 GPM	100	98	94	88	79	70	60	48	25		
15 GPM	108	107	104	100	94	86	77	68	57	42	
16 GPM	113	112	110	106	100	93	86	78	68	56	40

Models 9303C-HM1C-SP at 0' Lift, 5' Lift, 10' lift, & 15' Lift

9303C-HM1C-SP at 0´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI
	11 GPM	100	99	97	91	73	55	39	20			
	12 GPM	101	100	99	98	94	79	62	47	32	14	
	13 GPM	102	101	100	99	98	94	79	62	48	33	20

9303C-HM1C-SP at 10´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI
	11 GPM	77	75	74	73	71	55	39	20			
	12 GPM	77	76	74	73	72	71	62	47	32	14	
	13 GPM	77	76	74	73	72	71	70	62	48	33	20

9303C-HM1C-SP at 5´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI
	11 GPM	90	89	88	84	73	55	39	20			
	12 GPM	90	89	88	87	85	79	62	47	32	14	
	13 GPM	91	90	88	87	86	85	79	62	48	33	20

9303C-HM1C-SP at 15´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI
	11 GPM	66	64	63	62	60	55	39	20			
	12 GPM	66	65	64	63	61	60	55	47	32	14	
	13 GPM	66	65	63	62	61	60	59	57	48	33	20

Models 9303C-HM2C-SP at 0' Lift, 5' Lift, 10' lift, & 15' Lift

9303C-HM2C-SP at 0´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI
	4 GPM	55	34	12			
	5 GPM	88	68	49	28	11	
	6 GPM	100	89	76	60	46	31

9303C-HM2C-SP at 10´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI
	4 GPM	52	33	12			
	5 GPM	74	61	46	28	11	
	6 GPM	77	74	68	58	46	31

9303C-HM5C-SP at 5´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI
	13 GPM	90	89	88	85	76	59	40	21			
	14 GPM	90	89	88	87	85	78	61	43	27	10	
	15 GPM	90	89	88	87	86	84	79	66	50	33	16

9303C-HM2C-SP at 15´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI
	4 GPM	50	33	12			
	5 GPM	66	59	46	28	11	
	6 GPM	66	65	63	55	44	31

Models 9303C-HM3C-SP at 0' Lift, 5' Lift, 10' lift, & 15' Lift

9303C-HM3C-SP at 0´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI
	15 GPM	92	77	53	26			
	18 GPM	100	98	88	71	49	28	
	20 GPM	100	99	98	90	74	52	31

9303C-HM3C-SP at 10´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI
	15 GPM	75	68	53	26			
	18 GPM	76	75	72	63	49	28	
	20 GPM	75	74	73	72	68	52	31

9303C-HM3C-SP at 5´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI
	15 GPM	86	72	53	26			
	18 GPM	91	89	84	71	49	28	
	20 GPM	91	90	88	83	71	52	31

9303C-HM3C-SP at 15´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI
	15 GPM	66	64	53	26			
	18 GPM	65	64	63	60	49	28	
	20 GPM	66	65	64	62	59	52	31

Models 9303C-HM4C-SP at 0' Lift, 5' Lift, 10' lift, & 15' Lift

9303C-HM4C-SP at 0´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI
	5 GPM	78	58	36	11			
	6 GPM	89	76	61	43	27	10	
	7 GPM	96	85	74	62	49	35	21

9303C-HM4C-SP at 10´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI
	5 GPM	69	55	36	11			
	6 GPM	76	72	59	43	27	10	
	7 GPM	75	74	72	62	49	35	21

9303C-HM4C-SP at 5´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI
	5 GPM	75	58	36	11			
	6 GPM	86	74	61	43	27	10	
	7 GPM	88	83	73	62	49	35	21

9303C-HM4C-SP at 15´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI
	5 GPM	62	51	36	11			
	6 GPM	65	64	59	43	27	10	
	7 GPM	66	65	64	60	49	35	21

Models 9303C-HM5C-SP at 0' Lift, 5' Lift, 10' lift, & 15' Lift

9303C-HM5C-SP at 0´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI
	13 GPM	101	100	99	95	80	59	40	21			
	14 GPM	101	100	99	98	94	82	61	43	27	10	
	15 GPM	101	100	99	98	97	95	87	66	50	33	16

9303C-HM5C-SP at 10´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI
	13 GPM	75	74	73	72	69	59	40	21			
	14 GPM	76	74	73	72	71	69	61	43	27	10	
	15 GPM	76	75	74	73	72	71	70	66	50	33	16

9303C-HM5C-SP at 5´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI
	13 GPM	90	89	88	85	76	59	40	21			
	14 GPM	90	89	88	87	85	78	61	43	27	10	
	15 GPM	90	89	88	87	86	84	79	66	50	33	16

9303C-HM5C-SP at 15´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI
	13 GPM	66	65	64	63	61	54	40	21			
	14 GPM	67	65	64	63	62	60	54	43	27	10	
	15 GPM	67	65	64	63	62	61	60	58	50	33	16

Models 9305C-HM3C-SP at 0' Lift, 5' Lift, 10' lift, & 15' Lift

9305C-HM3C-SP at 0´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI	GPM at 120 PSI	GPM at 130 PSI
	17 GPM	152	150	148	146	135	119	99	81	58	37			
	18 GPM	153	152	150	149	147	137	120	102	82	61	40	16	
	19 GPM	156	155	153	152	150	148	137	117	102	82	63	43	22

9305C-HM3C-SP at 10´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI	GPM at 120 PSI	GPM at 130 PSI
	17 GPM	135	135	134	133	130	119	99	81	58	37			
	18 GPM	133	132	131	131	130	129	120	102	82	61	40	16	
	19 GPM	127	126	125	124	123	122	121	117	102	82	63	43	22

9305C-HM3C-SP at 5´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI	GPM at 120 PSI	GPM at 130 PSI
	17 GPM	145	143	140	138	134	119	99	81	58	37			
	18 GPM	147	146	144	142	140	132	120	102	82	61	40	16	
	19 GPM	147	146	145	143	142	140	134	117	102	82	63	43	22

9305C-HM3C-SP at 15´ Lift	Hydraulic Flow	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI	GPM at 120 PSI	GPM at 130 PSI
	17 GPM	120	119	119	119	118	113	99	81	58	37			
	18 GPM	108	107	107	106	105	104	100	95	82	61	40	16	
	19 GPM	107	107	106	106	105	104	102	100	95	82	63	43	22

Models 9306C-HM1C, 9306S-HM1C, 9306C-HM3C, 9306S-HM3C, 9306C-HM5C & 9306S-HM5C

9306C-HM1C 9306S-HM1C	Hydraulic Flow	GPM at 16 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI	GPM at 120 PSI
	11 GPM	207	207	207	207	186	155	122	90	37			
	12 GPM	207	207	207	207	207	199	167	134	100	60		
	13 GPM	207	207	207	207	207	207	196	170	143	115	85	44
	BAR	**1.10**	**1.38**	**2.07**	**2.76**	**3.45**	**4.14**	**4.83**	**5.52**	**6.21**	**6.89**	**7.58**	**8.27**

9306C-HM3C 9306S-HM3C	Hydraulic Flow	GPM at 16 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI	GPM at 120 PSI	GPM at 130 PSI
	18 GPM	214	214	214	175	123	55							
	20 GPM	214	214	214	214	203	167	123	75					
	22 GPM	214	214	214	214	214	214	210	190	160	118	62		
	24 GPM	214	214	214	214	214	214	214	214	210	190	165	128	60
	BAR	**1.10**	**1.38**	**2.07**	**2.76**	**3.45**	**4.14**	**4.83**	**5.52**	**6.21**	**6.89**	**7.58**	**8.27**	**8.96**

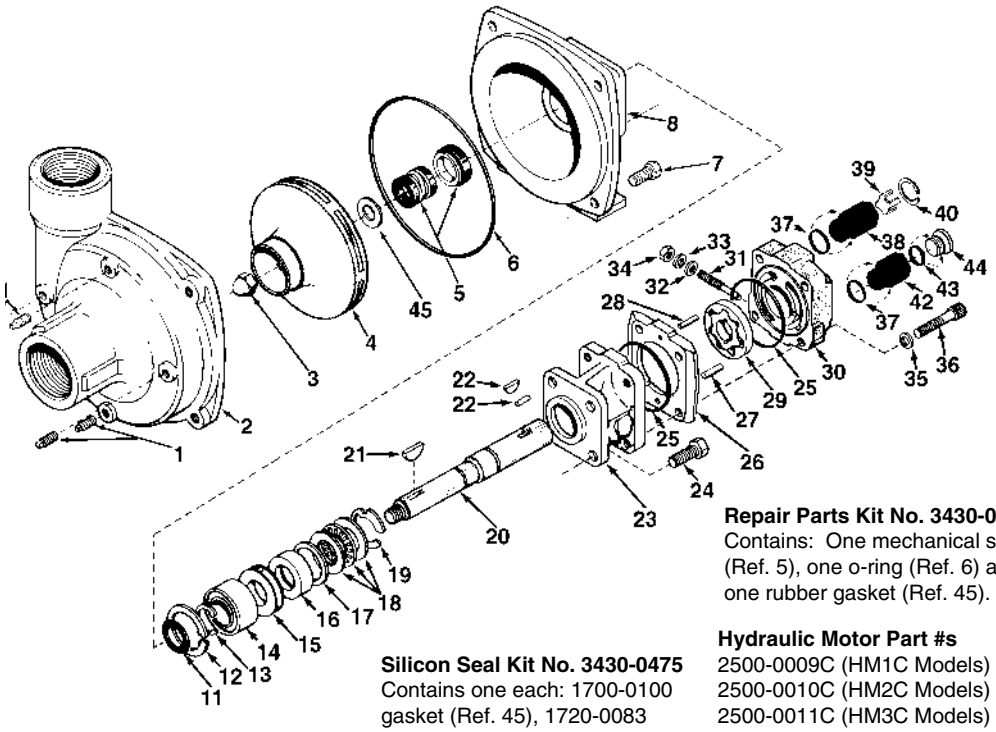
9306C-HM5C 9306S-HM5C	Hydraulic Flow	GPM at 16 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI	GPM at 120 PSI	GPM at 130 PSI
	15 GPM	212	212	212	212	212	212	187	150	117	65	26		
	16 GPM	212	212	212	212	212	212	212	189	158	125	87	35	
	17 GPM	212	212	212	212	212	212	212	212	189	158	133	102	57.4
	18 GPM	212	212	212	212	212	212	212	212	210	189	163	133	108
	BAR	**1.10**	**1.38**	**2.07**	**2.76**	**3.45**	**4.14**	**4.83**	**5.52**	**6.21**	**6.89**	**7.58**	**8.27**	**8.95**

Models 9302C-HM1C, 9302S-HM1C, 9302C-HM2C, 9302S-HM2C, 9302C-HM4C & 9302S-HM4C

9302C-HM1C 9302S-HM1C	Hydraulic Flow	GPM at 2 PSI	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI	GPM at 120 PSI	GPM at 130 PSI	GPM at 140 PSI
	11 GPM	72	72	72	72	72	72	71	65	56	45	29				
	12 GPM	72	72	72	72	72	72	72	72	70	63	53	40			
	13 GPM	72	72	72	72	72	72	72	72	72	71	68	63	56	48	35
	Bar	0.14	0.69	1.38	2.07	2.76	3.45	4.14	4.83	5.52	6.21	6.89	7.58	8.27	8.96	9.65

9302C-HM2C 9302S-HM2C	Hydraulic Flow	GPM at 2 PSI	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI
	4 GPM	55	54	49	42	34	19				
	5 GPM	60	59	57	50	42	34	25	11		
	6 GPM	65	65	63	60	52	44	36	27	18	9
	Bar	0.14	0.69	1.38	2.07	2.76	3.45	4.14	4.83	5.52	6.21

9302C-HM4C 9302S-HM4C	Hydraulic Flow	GPM at 2 PSI	GPM at 10 PSI	GPM at 20 PSI	GPM at 30 PSI	GPM at 40 PSI	GPM at 50 PSI	GPM at 60 PSI	GPM at 70 PSI	GPM at 80 PSI	GPM at 90 PSI	GPM at 100 PSI	GPM at 110 PSI
	6 GPM	66	65	63	59	51	41	29	12				
	7 GPM	72	72	72	71	67	60	51	42	31	17		
	8 GPM	72	72	72	72	72	70	64	57	50	42	32	16
	Bar	0.14	0.69	1.38	2.07	2.76	3.45	4.14	4.83	5.52	6.21	6.89	7.58



Silicon Seal Kit No. 3430-0475
Contains one each: 1700-0100 gasket (Ref. 45), 1720-0083 o-ring (Ref. 6) and 2120-0032 seal (silicon carbide) (Ref. 5).

Repair Parts Kit No. 3430-0332
Contains: One mechanical seal (Ref. 5), one o-ring (Ref. 6) and one rubber gasket (Ref. 45).

Hydraulic Motor Part #s
2500-0009C (HM1C Models)
2500-0010C (HM2C Models)
2500-0011C (HM3C Models)
2500-0012C (HM4C Models)
2500-0018C (HM5C Models)

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.

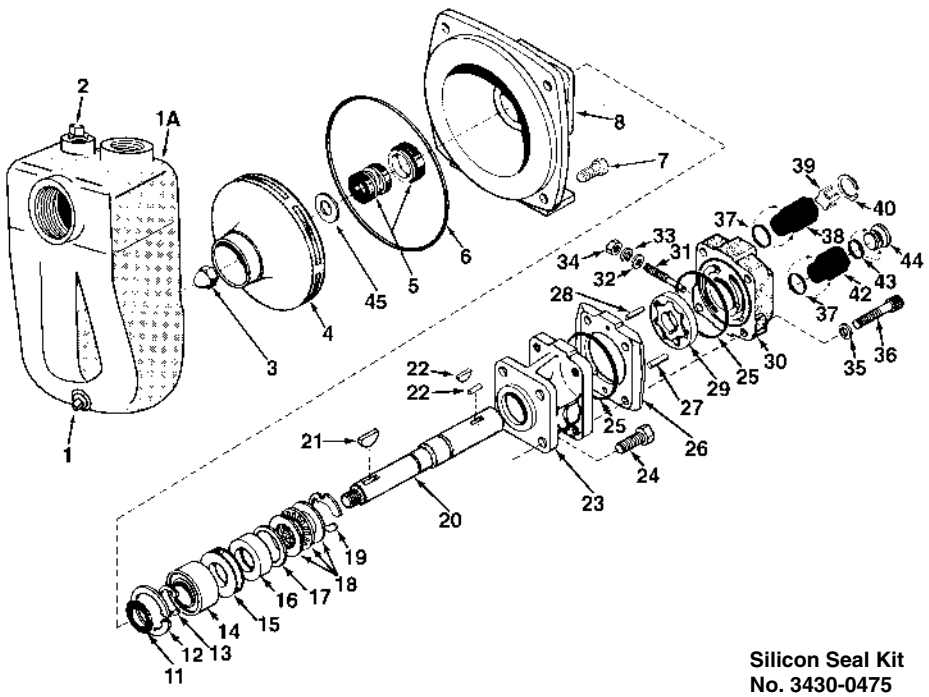
Parts Kit No. 3430-0178
Contains: One each ball bearing (Ref. 14), motor shaft seal (Ref. 16), thread seal gasket (Ref. 32), and washer (Ref. 33), two each motor housing o-rings (Ref. 25), and port adapter o-rings (Ref. 37).

Adapter Kit No. 3430-0187 (HM4 Models Only):
Includes one each Ref. 37, Ref. 42, and Ref. 44, three Ref. 43, three metering orifices one No. 3373-0020 (Size #1), one No. 3373-0021 (Size #2) and one No. 3373-0022 (Size #3).

Ref. No.	Qnty. Req'd.	Part No.	Description
1	4	2406-0007	Drain/Vent Plug
2	1	0150-9000C	Pump Casing (Volute) (Includes a stainless steel wear ring) (Model 9303C)
2	1	0150-9000S	Pump Casing (Model 9303S)
2	1	0150-9200C	Pump Casing (Model 9302C)
2	1	0150-9200S	Pump Casing (Model 9302S)
3	1	2253-0002	Impeller Nut
3	1	2253-0002	Impeller Nut (Model 9302S & 9303S)
4	1	0401-9100P	Impeller (Nyglass, std.)
4	1	0402-9100P	Impeller (Optional Polypropylene) (Std 9302S & 9303S)
5	1	2120-0008	Mechanical Seal (Buna-N) (9301C & 9302S)
5	1	2120-0009	Mechanical Seal (Viton) (9302C & 9303C)
5	1	2120-0032	Mechanical Seal (Silicon Carbide) (9302S & 9303S)
6	1	1720-0083	O-ring
7	4	2210-0020	Hex Head Cap Screw
7	4	2210-0125	Hex Head Cap Screw (Model 9302S & 9303S)
8	1	0750-9300C	Mounting Flange
8	1	0750-9300S	Mounting Flange (Model 9302S & 9303S)
11	1	1410-0056	Slinger Ring
12	1	1820-0013	Retaining Ring
13	1	1810-0014	Snap Ring
14	1	2000-0010	Ball Bearing
15	1	1410-0073	Spacer
16	1	2104-0005	Shaft Seal
17	1	1410-0074	Seal Spacer
18	1	2029-0014	Thrust Bearing Assembly—Consists of: (1) Thrust Bearing & (2) Thrust Brg. Races
19	1	1810-0026	Snap Ring
20	1	0509-2500	Shaft (HM2C & HM4C Models) 6 ¾" Long
20	1	0511-2501	Shaft (HM1C & HM5C Models) 7" Long
20	1	0510-2500	Shaft (HM3C Models) 7 ½" Long
21	1	1610-0012	Woodruff Key
21	1	04432	S.S. Woodruff Key (Model 9302S & 9303S)
22	1	1610-0032	Roll Pin (HM2C & HM4C Models)
22	1	1610-0031	Roll Pin (HM1C & HM5C Models)
22	1	1610-0030	Woodruff Key (HM3C Models)
23	1	0151-2500C	Motor Body (Includes Main Bearing)

Ref. No.	Qnty. Req'd.	Part No.	Description
24	4	2210-0005	Hex Head Cap Screw
25	2	1720-0110	O-ring
26	1	0701-2500C	Gerotor Housing (HM2C Models) ¼" Wide
26	1	0700-2500C	Gerotor Housing (HM1C Models) ½" Wide
26	1	0703-2500C	Gerotor Housing (HM4C Models) 5/16" Wide
26	1	0702-2500C	Gerotor Housing (HM3C Models) 1" Wide
26	1	0704-2500C	Gerotor Housing (HM5C Models) ⅜" Wide
27	1	1600-0045	Dowel Pin (HM2C & HM4C Models)
27	1	1600-0044	Dowel Pin (HM1C & HM5CModels)
27	1	1600-0052	Dowel Pin (HM3C Models)
28	1	1600-0042	Dowel Pin (HM2C & HM4C Models)
28	1	1600-0037	Dowel Pin (HM1C & HM5C Models)
28	1	1600-0068	Dowel Pin (HM3C Models)
29	1	3900-0022	Gerotor (HM1C Models)
29	1	3900-0023	Gerotor (HM2C Models)
29	1	3900-0024	Gerotor (HM3C Models)
29	1	3900-0025	Gerotor (HM4C Models)
29	1	3900-0048	Gerotor (HM5C Models)
30	1	0251-2500C	Motor End Plate (Includes Main Bearing)
31	1	3220-0029	Bypass Adjusting Screw
32	1	1700-0047	Gasket
33	1	2270-0027	Washer
34	1	2250-0038	Lock Nut
35	4	2270-0039	Washer
36	4	2220-0045	Cap Screw (HM2C & HM4C Models)
36	4	2220-0021	Cap Screw (HM1C & HM5C Models)
36	4	2220-0044	Cap Screw (HM3C Models)
37	2	1720-0108	O-ring
38	1	3320-0016	Tank Port Adapter
39	1	3260-0039	Poppet
40	1	1820-0023	Retaining Ring
42	1	3360-0021	Pressure Port Adapter
43	1	1720-0105	Orifice O-ring (HM2C & HM4C Models Only)
44	1	3373-0020	Metering Orifice
		3373-0021	(HM2C & HM4C Models Only)
	or	3373-0022	
45	1	1700-0100	Rubber Gasket

Self-Priming, Hydraulically-Driven Centrifugals



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.

SP Chamber Kit No. 3430-0480SP
Contains: One chamber with wear ring, (Ref. 1A), one o-ring (Ref. 6), one drain/vent plug (Ref. 1) and one vent plug (Ref. 2).

Repair Parts Kit No. 3430-0332
Contains: One mechanical seal (Ref. 5), one o-ring (Ref. 6) and one rubber gasket (Ref. 45).

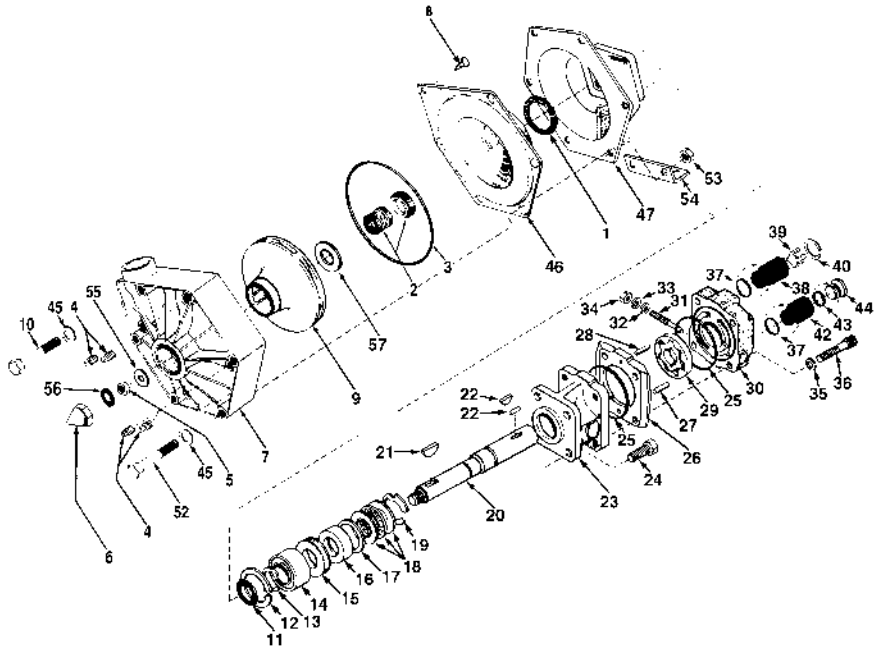
Parts Kit No. 3430-0178
Contains: One each ball bearing (Ref. 14), motor shaft seal (Ref. 16), thread seal gasket (Ref. 32), and washer (Ref. 33), two each motor housing o-rings (Ref. 25), and port adapter o-rings (Ref. 37).

Silicon Seal Kit
No. 3430-0475

Hydraulic Motor Part #s
2500-0009C (HM1C Models)
2500-0010C (HM2C Models)
2500-0011C (HM3C Models)
2500-0012C (HM4C Models)
2500-0018C (HM5C Models)

Adapter Kit No. 3430-0187
(HM4 Models Only):
Includes one each Ref. 37, Ref. 42, and Ref. 44, three Ref. 43, three metering orifices one No. 3373-0020 (Size #1), one No. 3373-0021 (Size #2) and one No. 3373-0022 (Size #3).

Ref. No.	Qnty. Req'd.	Part No.	Description
1A	1	3430-0480SP	Pump Casing (Self Priming) (Includes a stainless steel wear ring, plug and o-ring)
1	1	2406-0007	Drain/Vent Plug
2	1	2406-0001	Vent Plug
3	1	2253-0002	Impeller Nut
4	1	0401-9100P	Impeller (Nyglass, std.)
4	1	0402-9100P	Impeller (Optional Polypropylene)
5	1	2120-0008	Mechanical Seal (Buna-N) 9301 Models
5	1	2120-0009	Mechanical Seal (Viton) 9303 Models
6	1	1720-0083	O-ring
7	4	2210-0020	Hex Head Cap Screw
8	1	0750-9300C	Mounting Flange
11	1	1410-0056	Slinger Ring
12	1	1820-0013	Retaining Ring
13	1	1810-0014	Snap Ring
14	1	2000-0010	Ball Bearing
15	1	1410-0073	Spacer
16	1	2104-0005	Shaft Seal
17	1	1410-0074	Seal Spacer
18	1	2029-0014	Thrust Bearing Assembly—Consists of: (1) Thrust Bearing & (2) Thrust Brg. Races
19	1	1810-0026	Snap Ring
20	1	0509-2500	Shaft (HM2C & HM4C Models) 6 ¾" Long
20	1	0511-2501	Shaft (HM1C & HM5C Models) 7" Long
20	1	0510-2500	Shaft (HM3C Models) 7 ½" Long
21	1	1610-0012	Woodruff Key
22	1	1610-0032	Roll Pin (HM2C & HM4C Models)
22	1	1610-0031	Roll Pin (HM1C & HM5C Models)
22	1	1610-0030	Woodruff Key (HM3C Models)
23	1	0151-2500C	Motor Body (Includes Main Bearing)
24	4	2210-0005	Hex Head Cap Screw
25	2	1720-0110	O-ring
26	1	0701-2500C	Gerotor Housing (HM2C Models) ¼" Wide
26	1	0700-2500C	Gerotor Housing (HM1C Models) ½" Wide
26	1	0703-2500C	Gerotor Housing (HM4C Models) 5/16" Wide
26	1	0702-2500C	Gerotor Housing (HM3C Models) 1" Wide
26	1	0704-2500C	Gerotor Housing (HM5C Models) ⅜" Wide
27	1	1600-0045	Dowel Pin (HM2C & HM4C Models)
27	1	1600-0044	Dowel Pin (HM1C & HM5C Models)
27	1	1600-0052	Dowel Pin (HM3C Models)
28	1	1600-0042	Dowel Pin (HM2C & HM4C Models)
28	1	1600-0037	Dowel Pin (HM1C & HM5CModels)
28	1	1600-0068	Dowel Pin (HM3C Models)
29	1	3900-0023	Gerotor (HM2C Models)
29	1	3900-0022	Gerotor (HM1C Models)
29	1	3900-0024	Gerotor (HM3C Models)
29	1	3900-0025	Gerotor (HM4C Models)
29	1	3900-0048	Gerotor (HM5C Models)
30	1	0251-2500C	Motor End Plate (Includes Main Bearing)
31	1	3220-0029	Bypass Adjusting Screw
32	1	1700-0047	Gasket
33	1	2270-0027	Washer
34	1	2250-0038	Lock Nut
35	4	2270-0039	Washer
36	4	2220-0045	Cap Screw (HM2C & HM4C Models)
36	4	2220-0021	Cap Screw (HM1C & HM5C Models)
36	4	2220-0044	Cap Screw (HM3C Models)
37	2	1720-0108	O-ring
38	1	3320-0016	Tank Port Adapter
39	1	3260-0039	Poppet
40	1	1820-0023	Retaining Ring
42	1	3360-0021	Pressure Port Adapter
43	1	1720-0105	Orifice O-ring (HM2C & HM4C Models Only)
44	1	3373-0020	Metering Orifice
		3373-0021	(HM2C & HM4C Models Only)
	or	3373-0022	
45	1	1700-0100	Rubber Gasket



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.

Pump Repair Parts Kit No. 3430-0445 contains: One mechanical seal (Ref. 2), one o-ring (Ref. 3), one washer (Ref. 55), one gasket (Ref. 56) and one rubber gasket (Ref. 57).

Hyd. Motor Parts Kit No. 3430-0178 contains: One each ball bearing (Ref. 14), motor shaft seal (Ref. 16), thread seal gasket (Ref. 32), and washer (Ref. 33), two each motor housing o-rings (Ref. 25) and port adapter o-rings (Ref. 37).

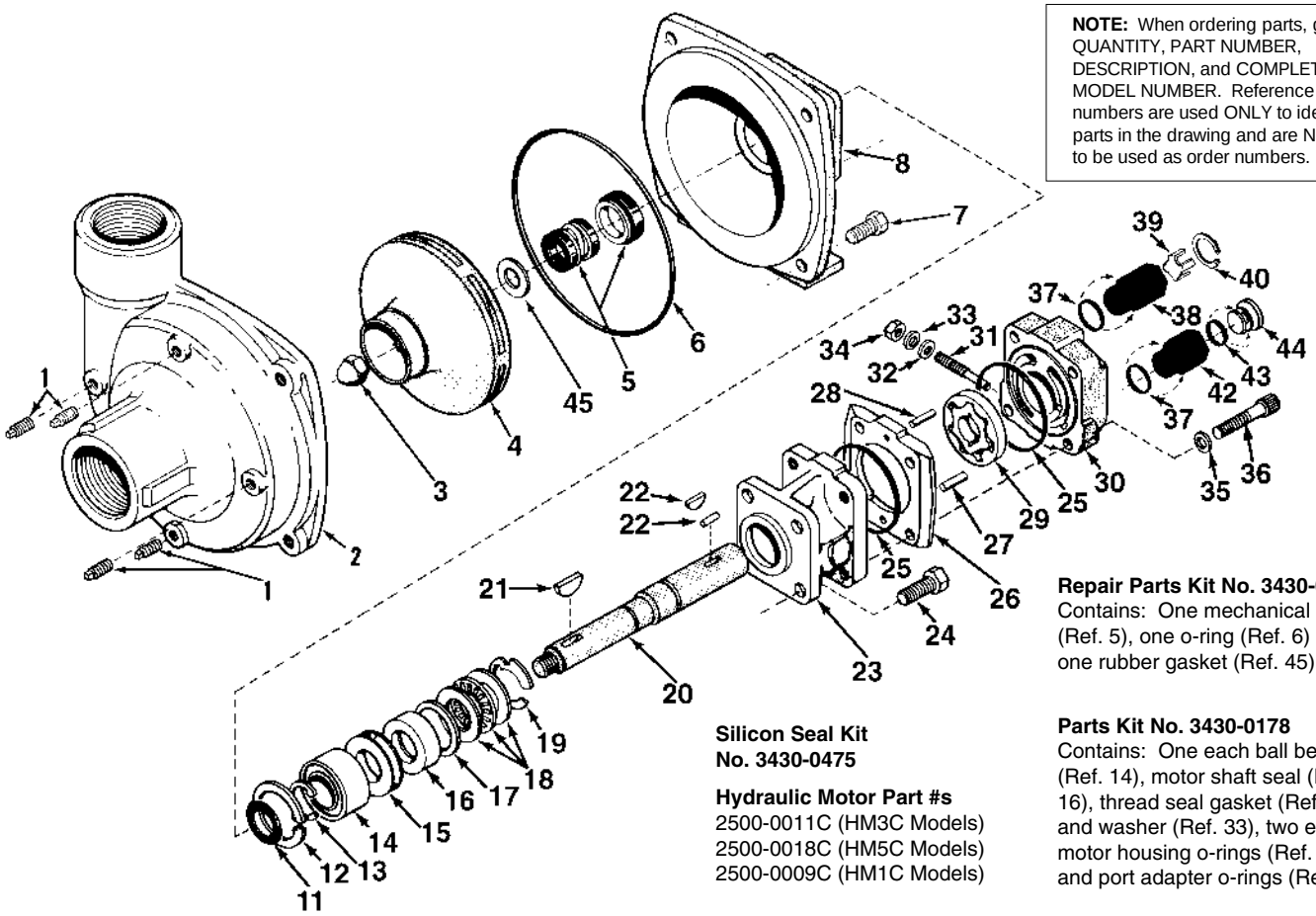
Hydraulic Motor Part #s
2500-0022C (HM2C Models)
2500-0013C (HM3C Models)
2500-0014C (HM4C Models)
2500-0019C (HM1C Models)

Adapter Kit No. 3430-0187 (HM4 Models Only):
Includes one each Ref. 37, Ref. 42, and Ref. 44, three Ref. 43, three metering orifices one No. 3373-0020 (Size #1), one No. 3373-0021 (Size #2) and one No. 3373-0022 (Size #3).

Ref. No.	Qnty. Req'd.	Part No.	Description
1	1	1410-0082	Spacer
2	1	2120-0009	Mechanical Seal
3	1	1721-0083	O-Ring
4	4	2406-0020	Pipe Plug
5	1	2250-0051	Jam Nut
6	1	2250-0052	Impeller Nut
7	1	0700-9000P	Pump Casing
8	1	2210-0088	Screw
9	1	0402-9100P	Impeller
10	4	2210-0087	Hex Head Cap Screw
11	1	1410-0056	Slinger Ring
12	1	1820-0013	Retaining Ring
13	1	1810-0014	Snap Ring
14	1	2000-0010	Ball Bearing
15	1	1410-0073	Spacer
16	1	2104-0005	Shaft Seal
17	1	1410-0074	Seal Spacer
18	1	2029-0014	Thrust Bearing Assembly: Includes (1) Thrust Bearing (2) Thrust Bearing Races
19	1	1810-0026	Snap Ring
20	1	0507-2500	Shaft HM4C, 7 1/16″ Long
20	1	0514-2500	Shaft HM3C, 7 13/16″ Long
20	1	0506-2500	Shaft HM1C, 7 5/16″ Long
21	1	1610-0012	Woodruff Key
22	1	1610-0032	Roll Pin (HM4C Model)
22	1	1610-0030	Woodruff Key (HM3C Model)
22	1	1610-0031	Roll Pin (HM1C Model)
23	1	0151-2500C	Motor Body: Includes (1) Main Bearing
24	4	2210-0021	Hex Head Cap Screw
25	2	1720-0110	O-Ring
26	1	0700-2500C	Gerotor Housing (HM1C Model) ½" Wide
26	1	0703-2500C	Gerotor Housing (HM4C Model) 5/16" Wide
26	1	0702-2500C	Gerotor Housing (HM3C Model) 1" Wide
27	1	1600-0045	Dowel Pin (HM4C Model)
27	1	1600-0052	Dowel Pin (HM3C Model)
27	1	1600-0044	Dowel Pin (HM1C Model)
28	1	1600-0042	Dowel Pin (HM4C Model)
28	1	1600-0068	Dowel Pin (HM3C Model)

Ref. No.	Qnty. Req'd.	Part No.	Description
28	1	1600-0037	Dowel Pin (HM1C Model)
29	1	3900-0025	Gerotor (HM4C Model)
29	1	3900-0024	Gerotor (HM3C Model)
29	1	3900-0022	Gerotor (HM1C Model)
30	1	0251-2500C	Motor End Plate: Includes (1) Main Bearing
31	1	3220-0029	Valve Stem
32	1	1700-0047	Gasket
33	1	2270-0027	Washer
34	1	2250-0038	Lock Nut
35	4	2270-0039	Washer
36	4	2220-0045	Socket Head Cap Screw (HM4C Model)
36	4	2220-0044	Socket Head Cap Screw (HM3C Model)
36	4	2220-0021	Socket Head Cap Screw (HM1C Model)
37	2	1720-0108	O-ring
38	1	3320-0016	Check Valve Body
39	1	3260-0039	Poppet
40	1	1820-0023	Retaining Ring
42	1	3360-0021	Pressure Port Adapter
43	1	1720-0105	Orifice O-ring (HM4C Models Only)
44	1	3373-0020 3373-0021 3373-0022	Metering Orifice (HM4C Models Only)
45	6	2270-0041	Washer
46	1	0750-9300P	Cover
47	1	0750-9006C	Intermediate Flange
48	4	2250-0060	Hex Nut
50	4	2210-0021	Hex Head Cap Screw
52	2	2210-0016	Screw
53	2	2250-0008	Hex Nut
54	1	1510-0063	Mounting Foot
55	1	2270-0057	Washer
56	1	1700-0097	Gasket
57	1	1700-0100	Rubber Gasket
58	4	2250-0060	Nut (Not Shown)

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.



Repair Parts Kit No. 3430-0332
Contains: One mechanical seal (Ref. 5), one o-ring (Ref. 6) and one rubber gasket (Ref. 45).

Silicon Seal Kit No. 3430-0475

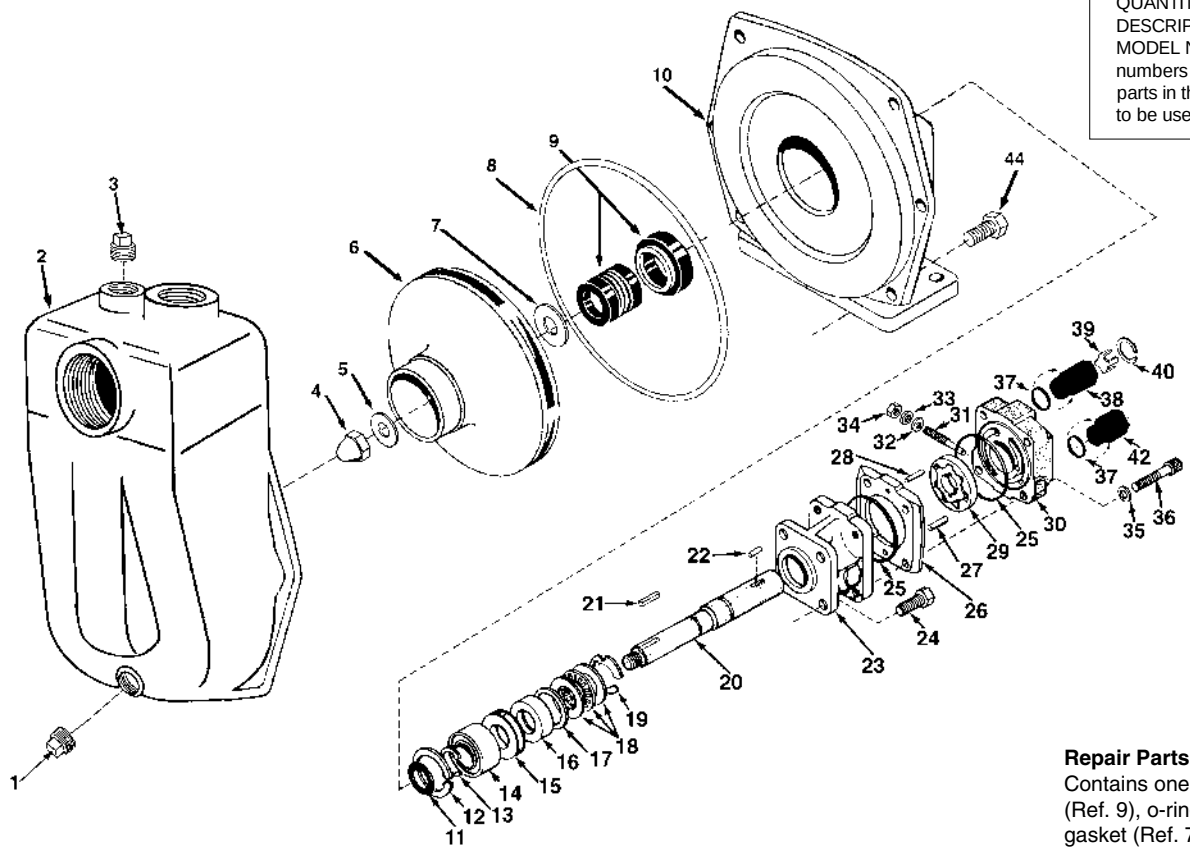
Hydraulic Motor Part #s
2500-0011C (HM3C Models)
2500-0018C (HM5C Models)
2500-0009C (HM1C Models)

Parts Kit No. 3430-0178
Contains: One each ball bearing (Ref. 14), motor shaft seal (Ref. 16), thread seal gasket (Ref. 32), and washer (Ref. 33), two each motor housing o-rings (Ref. 25), and port adapter o-rings (Ref. 37).

Ref. No.	Qnty. Req'd.	Part No.	Description
1	4	2406-0007	Drain/Vent Plug
2	1	0151-9200C	Pump Casing (Volute) (Includes a stainless steel wear ring)
3	1	2253-0002	Impeller Nut
4	1	0401-9200P	Impeller
5	1	2120-0009	Mechanical Seal (Viton)
6	1	1720-0083	O-ring
7	4	2210-0020	Hex Head Cap Screw
8	1	0750-9300C	Mounting Flange
11	1	1410-0056	Slinger Ring
12	1	1820-0013	Retaining Ring
13	1	1810-0014	Snap Ring
14	1	2000-0010	Ball Bearing
15	1	1410-0073	Spacer
16	1	2104-0005	Shaft Seal
17	1	1410-0074	Seal Spacer
18	1	2029-0014	Thrust Bearing Assembly—Consists of: (1) Thrust Bearing & (2) Thrust Brg. Races
19	1	1810-0026	Snap Ring
20	1	0510-2500	Shaft (HM3C Model) 7 ½″ long
20	1	0511-2501	Shaft (HM1C & HM5C Models) 7″ long
21	1	1610-0012	Woodruff Key
22	1	1610-0030	Woodruff Key (HM3C Models)
22	1	1610-0031	Roll Pin (HM1C and HM5C Models)
23	1	0151-2500C	Motor Body (Includes Main Bearing)
24	4	2210-0005	Hex Head Cap Screw
25	2	1720-0110	O-ring
26	1	0700-2500C	Gerotor Housing (HM1C Model) ½″ wide
26	1	0702-2500C	Gerotor Housing (HM3C Model) 1″ wide
26	1	0704-2500C	Gerotor Housing (HM5C Model) ⅝″ wide

Ref. No.	Qnty. Req'd.	Part No.	Description
27	1	1600-0052	Dowel Pin (HM3C Models)
27	1	1600-0044	Dowel Pin (HM1C and HM5C Models)
28	1	1600-0068	Dowel Pin (HM3C Model)
28	1	1600-0037	Dowel Pin (HM1C and HM5C Models)
29	1	3900-0022	Gerotor (HM1C Model)
29	1	3900-0024	Gerotor (HM3C Model)
29	1	3900-0048	Gerotor (HM5C Model)
30	1	0251-2500C	Motor End Plate (Includes Main Bearing)
31	1	3220-0029	Bypass Adjusting Screw
32	1	1700-0047	Gasket
33	1	2270-0027	Washer
34	1	2250-0038	Lock Nut
35	4	2270-0039	Washer
36	4	2220-0044	Cap Screw (HM3C Models)
36	4	2220-0021	Cap Screw (HM1C)
36	4	2220-0032	Cap Screw (HM5C Models)
37	2	1720-0108	O-ring
38	1	3320-0016	Tank Port Adapter
39	1	3260-0039	Poppet
40	1	1820-0023	Retaining Ring
42	1	3360-0021	Pressure Port Adapter
45	1	1700-0100	Rubber Gasket
46	1	2270-0071	Washer (Not Shown)

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.



Repair Parts Kit No. 3430-0500
Contains one each: mechanical seal (Ref. 9), o-ring (Ref. 8), and rubber gasket (Ref. 7).

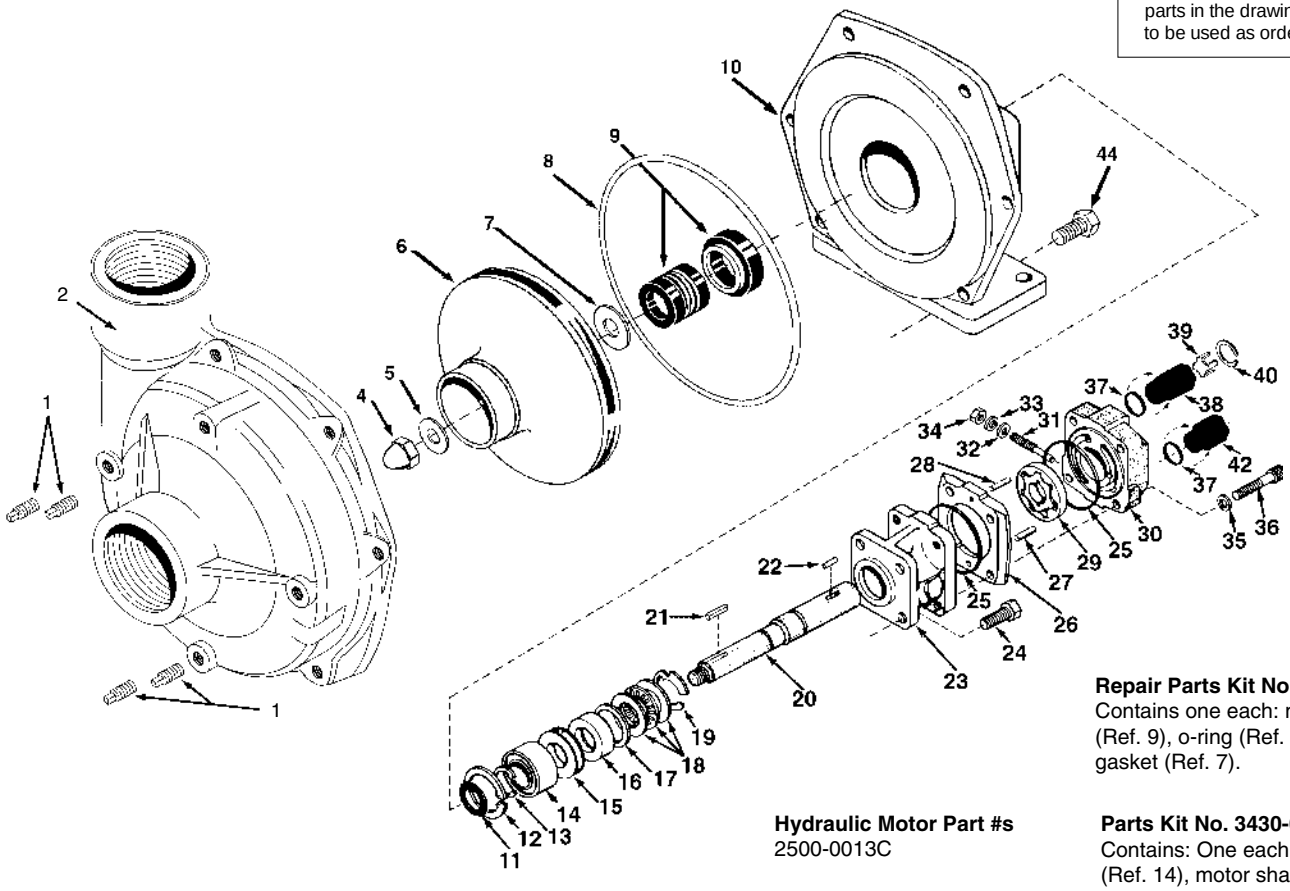
Hydraulic Motor Part #s
2500-0013C

Parts Kit No. 3430-0178
Contains: One each: ball bearing (Ref. 14), motor shaft seal (Ref. 16), thread seal gasket (Ref. 32), and washer (Ref. 33); two each: motor housing o-rings (Ref. 25), and port adapter o-rings (Ref. 37).

Ref. No.	Qnty. Req'd.	Part No.	Description
1	1	2406-0002	1/2" NPT Drain Plug (SP model only)
1	1	2406-0035	1/2" BSP Drain Plug (BSP model only)
2	1	3430-0481SP	Self-Priming Chamber (SP model only)—(Includes a stainless steel wear ring, plug and o-ring)
2	1	3430-0481BSP	Self-Priming Chamber (BSP model only)—(Includes a stainless steel wear ring, plug and o-ring)
3	1	2406-0034	1" NPT Prime Port Plug (SP model only)
3	1	2406-0036	1" BSP Prime Port Plug (BSP model only)
4	1	2253-0002	Impeller Nut
5	1	2270-0071	Washer
6	1	0403-9200P1	Impeller
7	1	1700-0100	Rubber Gasket
8	1	1720-0180	O-ring
9	1	2120-0009	Mechanical Seal (standard Viton)
10	1	0752-9200C	Mounting Flange
11	1	1410-0056	Slinger Ring
12	1	1820-0013	Retaining Ring
13	1	1810-0014	Snap Ring
14	1	2000-0010	Ball Bearing
15	1	1410-0073	Spacer
16	1	2104-0005	Shaft Seal
17	1	1410-0074	Seal Spacer
18	1	2029-0014	Thrust Bearing Assembly—Consists of: (1) Thrust Bearing & (2) Thrust Brg. Races
19	1	1810-0026	Snap Ring
20	1	0514-2500	Shaft

Ref. No.	Qnty. Req'd.	Part No.	Description
21	1	1610-0053	Key
22	1	1610-0055	Key
23	1	0151-2500C	Motor Body (Includes Main Bearing)
24	4	2210-0005	Hex Head Cap Screw
25	2	1720-0110	O-ring
26	1	0702-2500C	Gerotor Housing 1" wide
27	1	1600-0052	Dowel Pin
28	1	1600-0068	Dowel Pin
29	1	3900-0024	Gerotor
30	1	0251-2500C	Motor End Plate (Includes Main Bearing)
31	1	3220-0029	Bypass Adjusting Screw
32	1	1700-0047	Gasket
33	1	2270-0027	Washer
34	1	2250-0038	Lock Nut
35	4	2270-0039	Washer
36	4	2220-0044	Cap Screw
37	2	1720-0108	O-ring
38	1	3320-0016	Tank Port Adapter
39	1	3260-0039	Poppet
40	1	1820-0023	Retaining Ring
42	1	3360-0021	Pressure Port Adapter
44	6	2210-0086	Hex Head Cap Screw

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.



Repair Parts Kit No. 3430-0500
Contains one each: mechanical seal (Ref. 9), o-ring (Ref. 8), and rubber gasket (Ref. 7).

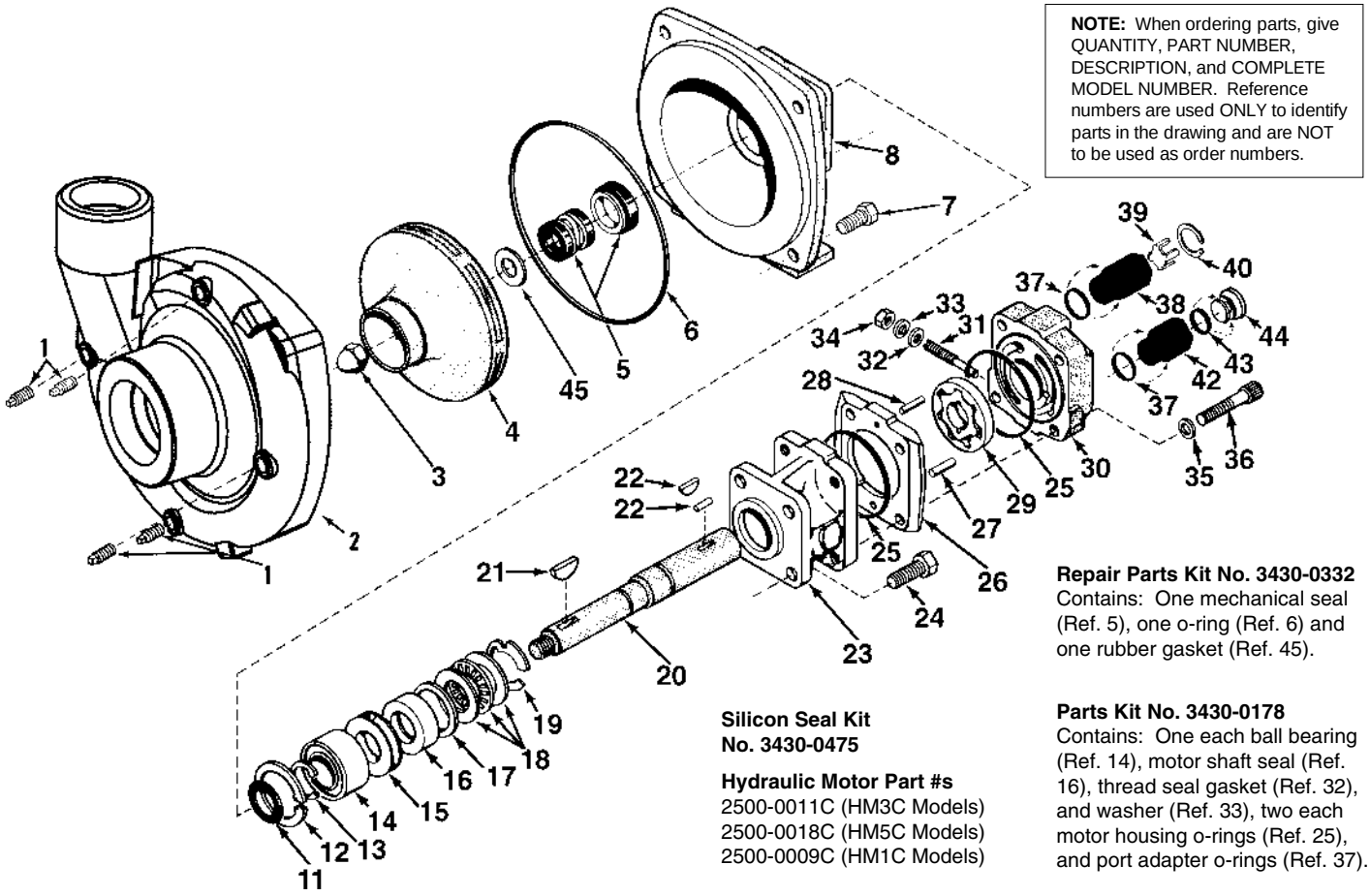
Hydraulic Motor Part #s
2500-0013C

Parts Kit No. 3430-0178
Contains: One each: ball bearing (Ref. 14), motor shaft seal (Ref. 16), thread seal gasket (Ref. 32), and washer (Ref. 33); two each: motor housing o-rings (Ref. 25), and port adapter o-rings (Ref. 37).

Ref. No.	Qnty. Req'd.	Part No.	Description
1	4	2406-0007	Drain/Vent Plug
2	1	0152-9200CM	Pump Casing (Includes a stainless steel wear ring)
4	1	2253-0002	Impeller Nut
5	1	2270-0071	Washer
6	1	0403-9200P1	Impeller
7	1	1700-0100	Rubber Gasket
8	1	1720-0180	O-ring
9	1	2120-0009	Mechanical Seal (standard Viton)
10	1	0752-9200C	Mounting Flange
11	1	1410-0056	Slinger Ring
12	1	1820-0013	Retaining Ring
13	1	1810-0014	Snap Ring
14	1	2000-0010	Ball Bearing
15	1	1410-0073	Spacer
16	1	2104-0005	Shaft Seal
17	1	1410-0074	Seal Spacer
18	1	2029-0014	Thrust Bearing Assembly—Consists of: (1) Thrust Bearing & (2) Thrust Brg. Races
19	1	1810-0026	Snap Ring
20	1	0514-2500	Shaft

Ref. No.	Qnty. Req'd.	Part No.	Description
21	1	1610-0053	Key
22	1	1610-0055	Key
23	1	0151-2500C	Motor Body (Includes Main Bearing)
24	4	2210-0005	Hex Head Cap Screw
25	2	1720-0110	O-ring
26	1	0702-2500C	Gerotor Housing 1" wide
27	1	1600-0052	Dowel Pin
28	1	1600-0068	Dowel Pin
29	1	3900-0024	Gerotor
30	1	0251-2500C	Motor End Plate (Includes Main Bearing)
31	1	3220-0029	Bypass Adjusting Screw
32	1	1700-0047	Gasket
33	1	2270-0027	Washer
34	1	2250-0038	Lock Nut
35	4	2270-0039	Washer
36	4	2220-0044	Cap Screw
37	2	1720-0108	O-ring
38	1	3320-0016	Tank Port Adapter
39	1	3260-0039	Poppet
40	1	1820-0023	Retaining Ring
42	1	3360-0021	Pressure Port Adapter
44	6	2210-0086	Hex Head Cap Screw

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.



Repair Parts Kit No. 3430-0332
Contains: One mechanical seal (Ref. 5), one o-ring (Ref. 6) and one rubber gasket (Ref. 45).

Silicon Seal Kit No. 3430-0475

Hydraulic Motor Part #s
2500-0011C (HM3C Models)
2500-0018C (HM5C Models)
2500-0009C (HM1C Models)

Parts Kit No. 3430-0178
Contains: One each ball bearing (Ref. 14), motor shaft seal (Ref. 16), thread seal gasket (Ref. 32), and washer (Ref. 33), two each motor housing o-rings (Ref. 25), and port adapter o-rings (Ref. 37).

Ref. No.	Qnty. Req'd.	Part No.	Description
1	4	2406-0007	Drain/Vent Plug
2	1	0151-9200C	Pump Casing (Volute) (Includes a stainless steel wear ring)
3	1	2253-0006	Impeller Nut
4	1	0401-9200P	Impeller
5	1	2120-0009	Mechanical Seal (Viton)
6	1	1720-0083	O-ring
7	4	2210-0020	Hex Head Cap Screw
8	1	0750-9300C	Mounting Flange
11	1	1410-0056	Slinger Ring
12	1	1820-0013	Retaining Ring
13	1	1810-0014	Snap Ring
14	1	2000-0010	Ball Bearing
15	1	1410-0073	Spacer
16	1	2104-0005	Shaft Seal
17	1	1410-0074	Seal Spacer
18	1	2029-0014	Thrust Bearing Assembly—Consists of: (1) Thrust Bearing & (2) Thrust Brg. Races
19	1	1810-0026	Snap Ring
20	1	0510-2500	Shaft (HM3C Model) 7 ½″ long
20	1	0511-2501	Shaft (HM1C & HM5C Models) 7″ long
21	1	1610-0012	Woodruff Key
22	1	1610-0030	Woodruff Key (HM3C Models)
22	1	1610-0031	Roll Pin (HM1C and HM5C Models)
23	1	0151-2500C	Motor Body (Includes Main Bearing)
24	4	2210-0005	Hex Head Cap Screw
25	2	1720-0110	O-ring
26	1	0700-2500C	Gerotor Housing (HM1C Model) ½″ wide
26	1	0702-2500C	Gerotor Housing (HM3C Model) 1″ wide
26	1	0704-2500C	Gerotor Housing (HM5C Model) ⅝″ wide

Ref. No.	Qnty. Req'd.	Part No.	Description
27	1	1600-0052	Dowel Pin (HM3C Models)
27	1	1600-0044	Dowel Pin (HM1C and HM5C Models)
28	1	1600-0068	Dowel Pin (HM3C Model)
28	1	1600-0037	Dowel Pin (HM1C and HM5C Models)
29	1	3900-0022	Gerotor (HM1C Model)
29	1	3900-0024	Gerotor (HM3C Model)
29	1	3900-0048	Gerotor (HM5C Model)
30	1	0251-2500C	Motor End Plate (Includes Main Bearing)
31	1	3220-0029	Bypass Adjusting Screw
32	1	1700-0047	Gasket
33	1	2270-0027	Washer
34	1	2250-0038	Lock Nut
35	4	2270-0039	Washer
36	4	2220-0044	Cap Screw (HM3C Models)
36	4	2220-0021	Cap Screw (HM1C)
36	4	2220-0032	Cap Screw (HM5C Models)
37	2	1720-0108	O-ring
38	1	3320-0016	Tank Port Adapter
39	1	3260-0039	Poppet
40	1	1820-0023	Retaining Ring
42	1	3360-0021	Pressure Port Adapter
45	1	1700-0100	Rubber Gasket
46	1	2270-0071	Washer (Not Shown)

Limited Warranty on Hypro Pumps and Other Hypro Products

Hypro Corporation ("Hypro") warrants to the original purchaser of its products (the "Purchaser") that such products will be free from defects in material and workmanship under normal use for the period of one (1) year for all products except: oil crankcase plunger pumps will be free from defects in material and workmanship under normal use for the period of five (5) years, and accessories will be free from defects in material and workmanship under normal use for the period of ninety (90) days. In addition, Hypro warrants to the purchaser all forged brass pump manifolds will be free from defects in material and workmanship under normal use and from damage resulting from environmental conditions for the life of the pump.

"Normal use" does not include use in excess of recommended maximum speeds, pressures, vacuums and temperatures, or use requiring handling of fluids not compatible with component materials, as noted in Hypro product catalogs, technical literature, and instructions. This warranty does not cover freight damage, freezing damage, normal wear and tear, or damage caused by misapplication, fault, negligence, alterations, or repair that affects the performance or reliability of the product.

THIS WARRANTY IS EXCLUSIVE. HYPRO MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Hypro's obligation under this warranty is, at Hypro's option, to either repair or replace the product upon return of the entire product to the Hypro factory in accordance with the return procedures set forth below. **THIS IS THE EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY.**

IN NO EVENT SHALL HYPRO BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND, WHETHER FOR BREACH OF ANY WARRANTY, FOR NEGLIGENCE, ON THE BASIS OF STRICT LIABILITY, OR OTHERWISE.

Return Procedures

All pumps or products *must* be flushed of *any* chemical (ref. OSHA Section 0910.1200 (d)(e)(f)(g)(h)) and hazardous chemicals *must* be labeled before being shipped* to Hypro for service or warranty consideration. Hypro reserves the right to request a Material Safety Data sheet from the Purchaser for any pump or product Hypro deems necessary. Hypro reserves the right to "disposition as scrap" pumps or products returned which contain unknown substances, or to charge for any and all costs incurred for chemical testing and proper disposal of components containing unknown substances. Hypro requests this in order to protect the environment and personnel from the hazards of handling unknown substances.

For technical or application assistance, call the **Hypro Technical/Application number: 1-800-445-8360.**
To obtain service or warranty assistance, call the Hypro Service and Warranty number: 1-800-468-3428;
or call the Hypro Service and Warranty FAX: (651) 766-6618.
Be prepared to give Hypro full details of the problem, including the following information:
1. Model number and the date and from whom you purchased your pump.
2. A brief description of the pump problem, including the following:
   - Liquid pumped. State the pH and any non-soluble materials, and give the generic or trade name.
   - Temperature of the liquid and ambient environment.
   - Suction lift or vacuum (measured at the pump).
   - Discharge pressure.
   - Size, type, and mesh of the inlet strainer.
   - Drive type (gas engine/electric motor; direct/belt drive; tractor PTO) and rpm of pump.
   - Viscosity (of oil, or other than water weight liquid).
   - Elevation from the pump to the discharge point.
   - Size and material of inlet and outlet line.
   - Type of spray gun, orifice size, unloader/relief valve.

Hypro may request additional information, and may require a sketch to illustrate the problem.
Contact the factory to receive a return material authorization before sending the product. All pumps returned for warranty work should be sent shipping charges prepaid to:

HYPRO CORPORATION
Attention: Service Department
375 Fifth Avenue NW
New Brighton, Minnesota 55112-3288

*Carriers, including U.S.P.S., airlines, UPS, ground freight, etc., require specific identification of any hazardous materials 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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Printed in the USA

CE Conformance to 89/392/EEC (machine directive), as well as, 73/23/EEC (low voltage) and 89/336/ECC (electromagnetic compatibility) as declared in standard EN809.

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