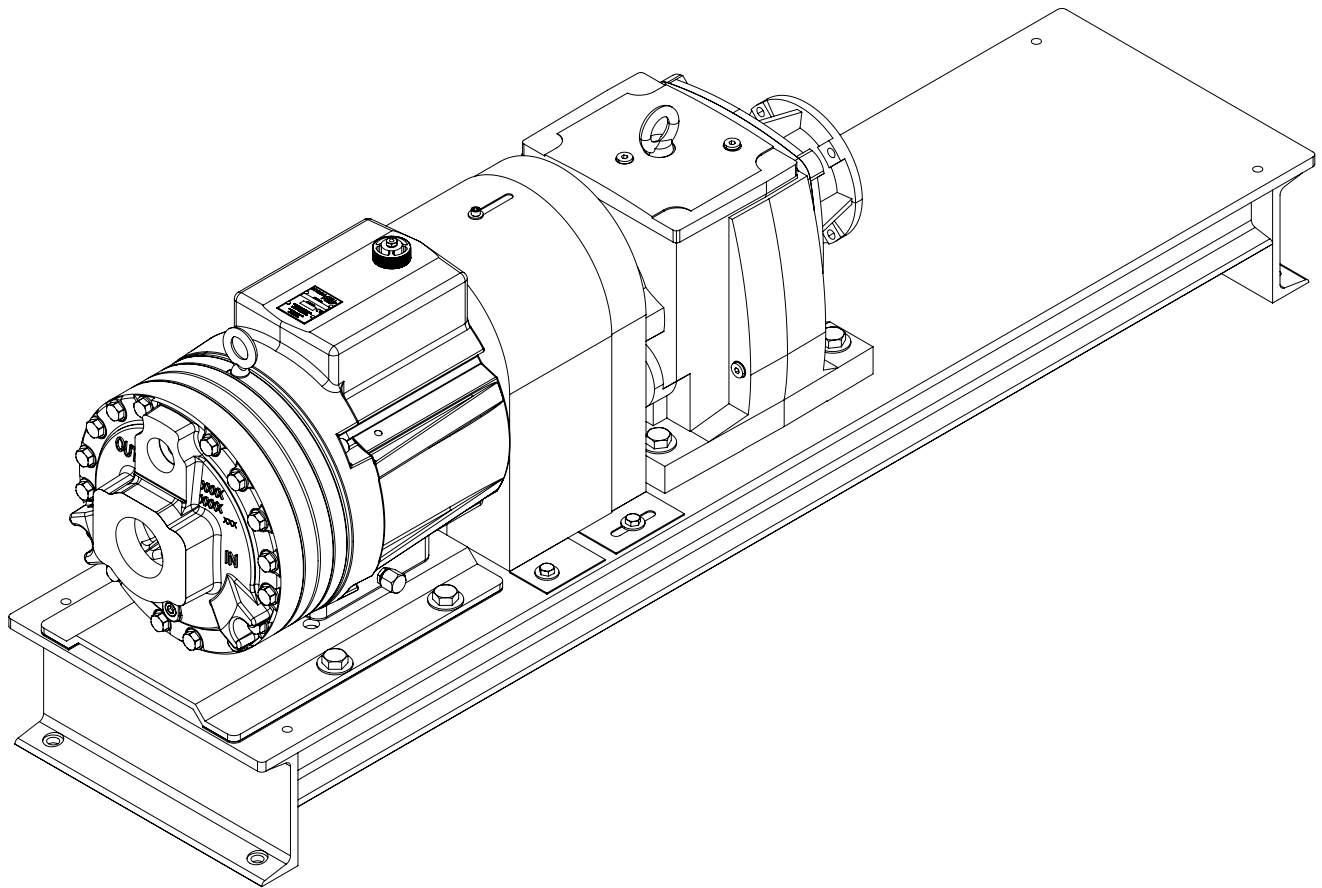


**Hydra·Cell**<sup>®</sup>  
METERING SOLUTIONS™

# P700 Metering Pump

**Installation, Operation & Maintenance**  
P700-991-2400 Rev A



 **Wanner Engineering, Inc.**

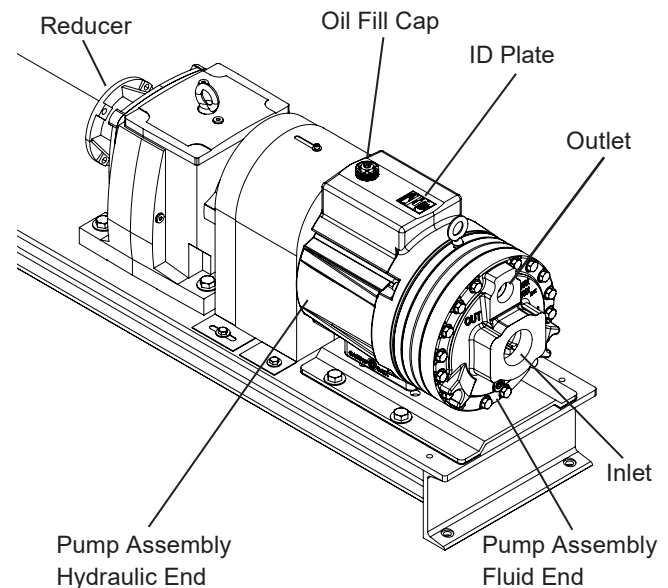
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## Component Identification



## P700 Operation

**Hydra-Cell Metering Solutions Pumps** are hydraulically-actuated, hydraulically-balanced diaphragm metering pumps that exceed API 675 performance standards of  $\pm 1\%$  steady state accuracy,  $\pm 3\%$  linearity and  $\pm 3\%$  repeatability.

**Due to their multiple diaphragm design**, the P Series metering pumps, with the exception of the P100, provide virtually “pulse-free” linear flow. Unlike conventional single diaphragm metering pumps, this linear flow reduces the need for pulsation dampeners and increases the reliability, performance, and safety of the metering pump system.

**Pump operation and plunger activation** are accomplished through a crankshaft (P100, P200 and P300) or wobble plate (P400, P500, P600 and P700). Horizontal disk check valves allow for the pumping of particulates that ordinarily collect on vertical ball check valves common to conventional metering pumps.

**P Series pumps** utilize speed to adjust flow rate through a motor and variable-frequency drive (VFD), eliminating the need for mechanical adjustment.

## P700 Specifications

<b>Diaphragms per Liquid End</b>	5 with diaphragm position control (DPC)
<b>Flow Control</b>	Electronic variable speed drive
<b>Steady State Accuracy</b>	$\pm 1\%$
<b>Linearity</b>	$\pm 3\%$
<b>Repeatability</b>	$\pm 3\%$
<b>Maximum Pressure</b>	
Metallic Head:	1200 psi (83 bar)
<b>Maximum Inlet Pressure</b>	250 psi (17 bar)
<b>Fluid Operating Temperatures*</b>	
Metallic Head:	250°F (121°C)
* Consult factory for correct component selection for temperatures from 160°F (71°C) to 250°F (121°C).	
<b>Inlet Port</b>	2-1/2 inch NPT, BSPT or 3 inch SAE J518 flange
<b>Discharge Port</b>	1-1/4 inch NPT, BSPT or 1-1/4 inch SAE J518 flange
<b>Maximum Solids</b>	800 microns
<b>Shaft Rotation</b>	Bi-directional
<b>Materials Used</b>	See Replacement Parts Kits Section for individual pump materials.
<b>Oil Capacity</b>	7.75 US quart (7.4 liters)
<b>Weight</b>	
Metallic Head:	638 lbs - 685 lbs (289 kg - 311 kg)

# P700 Specifications (Cont'd)

## Performance

### Maximum Flow at Designated Pressure - Imperial\*

gph							
100 psi	500 psi	1000 psi	1200 psi	Pump rpm	Gear Ratio	Motor rpm	
706 (3)	676 (7.5)	648 (10)	636 (15)	318	5.66:1	1800	
370 (3)	356 (5)	336 (7.5)	324 (7.5)	172	10.44:1		
254 (2)	242 (5)	222 (5)	214 (5)	119	15.18:1		
208 (2)	195 (3)	183 (5)	173 (5)	96	18.67:1	3600	
1394 (5)	1366 (15)	1332 (20)	1314 (20)	636	5.66:1		
754 (3)	732 (7.5)	708 (15)	700 (15)	345	10.44:1		
514 (3)	500 (5)	478 (7.5)	472 (10)	237	15.18:1		
416 (3)	402 (5)	386 (7.5)	378 (7.5)	193	18.67:1		

\* Flows are approximate. Calibrate pump to system per IOM instructions.

( ) Required Motor hp

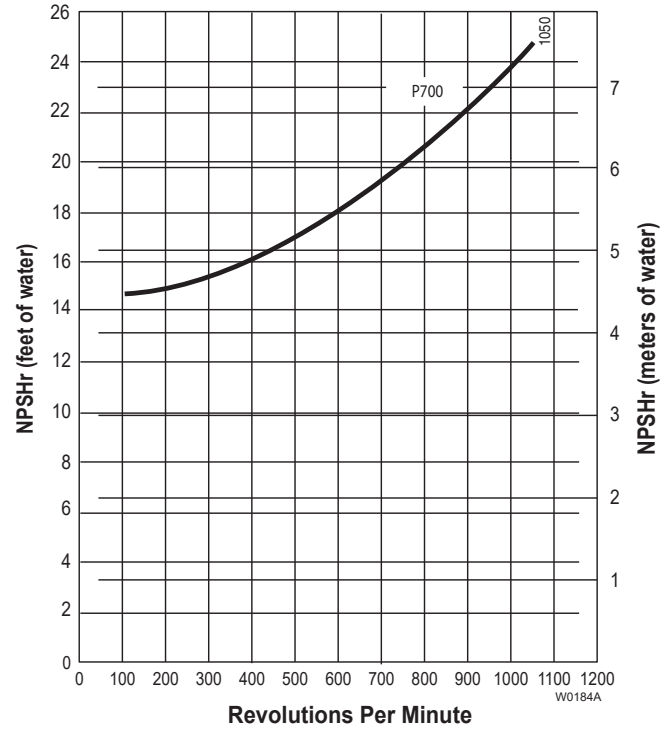
### Maximum Flow at Designated Pressure - Metric\*

lph							
7 bar	34 bar	69 bar	83 bar	Pump rpm	Gear Ratio	Motor rpm	
2227 (3)	2132 (6)	2043 (8)	2006 (12)	265	5.66:1	1500	
1167 (3)	1123 (4)	1060 (6)	1021 (6)	143	10.44:1		
801 (3)	763 (4)	700 (4)	675 (4)	99	15.18:1		
656 (3)	615 (3)	577 (4)	546 (4)	80	18.67:1	3000	
4396 (3)	4307 (12)	4200 (15)	4143 (15)	530	5.66:1		
2377 (3)	2308 (6)	2241 (12)	2207 (12)	287	10.44:1		
1621 (3)	1576 (4)	1507 (6)	1489 (8)	197	15.18:1		
1312 (3)	1268 (4)	1217 (6)	1192 (6)	161	18.67:1		

\* Flows are approximate. Calibrate pump to system per IOM instructions.

( ) Required Motor kW

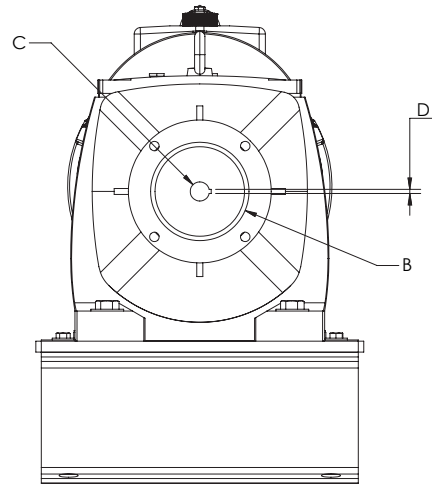
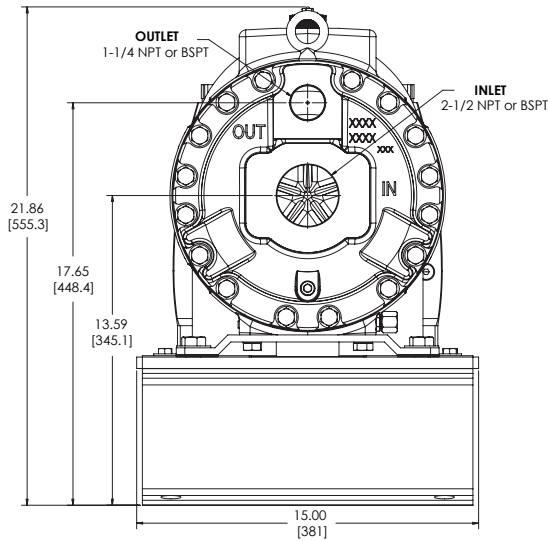
## Net Positive Suction Head – NPSHr



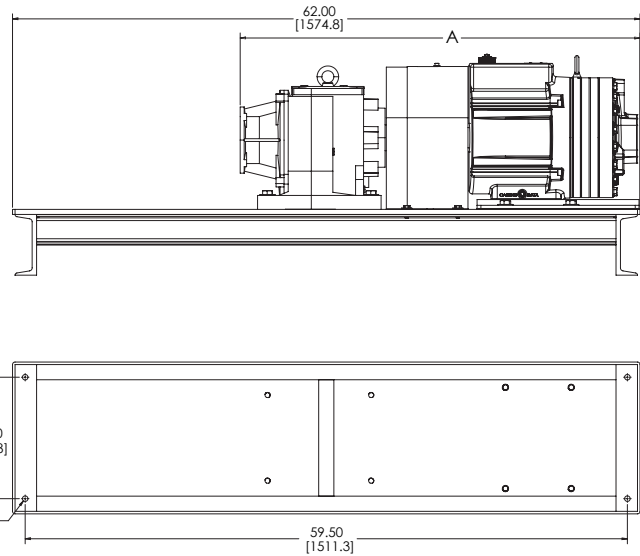
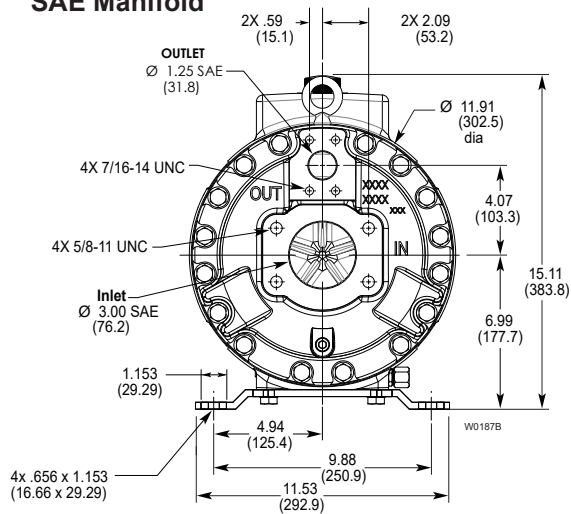
# P700 Dimensions

## P700 Models

### NPT/BSPT Manifold



### SAE Manifold



## Dimensions in Inches (Millimeters)

Input Frame Size	A	B	C	D
143/145 TC	39.51 (1003.4)	4.50 (114.3)	0.88 (22.2)	0.19 (4.8)
182/184 TC	40.82 (1036.7)	8.50 (215.9)	1.13 (28.6)	0.25 (6.4)
213/215 TC	43.10 (1094.7)	8.50 (215.9)	1.38 (34.9)	0.31 (7.9)
254/256 TC	43.10 (1094.7)	8.50 (215.9)	1.63 (41.3)	0.38 (9.5)
IEC 90 B5	39.46 (1002.2)	5.12 (130)	0.94 (24)	.31 (8)
IEC 100/112 B5	40.42 (1026.7)	7.09 (180)	1.10 (28)	.31 (8)
IEC 132 B5	42.65 (1083.4)	9.06 (230)	1.50 (38)	.39 (10)
IEC 160 B5	42.81 (1087.4)	9.84 (250)	1.65 (42)	.47 (12)

# P700 Installation

## Location

Locate the pump as close to the supply source as possible.

Install the pump system in a lighted clean space where it will be easy to inspect and maintain.

## Motor and Controller

The P Series pump shaft can rotate in either direction, therefore direction of motor shaft rotation is not critical.

Flow rate is determined by motor speed, which is controlled using an inverter duty constant torque motor and VFD. Flow rate functions can also be easily controlled using the Hydra-Cell Control Freak and appropriate motor.

## Accessories

Consult installation drawing below for typical metering fluid system components. Contact Wanner Engineering or the distributor in your area for more details.

## Important Precautions

**Adequate Fluid Supply.** To avoid cavitation and premature pump failure, be sure that the pump will have an adequate fluid supply and that the inlet line will not be obstructed. See **Inlet Piping** on page 6.

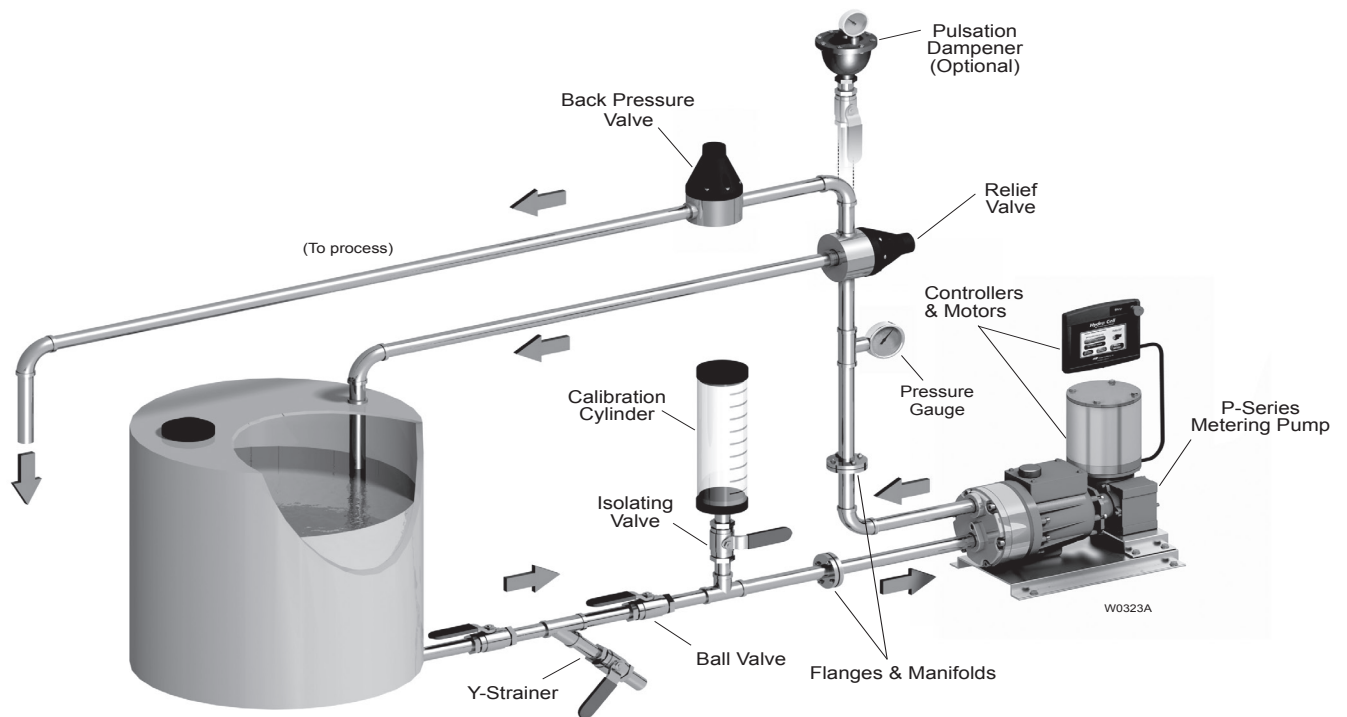
**Positive Displacement.** This is a positive-displacement pump. To avoid severe system damage if the discharge line ever becomes blocked, install a relief valve downstream from the pump. See **Discharge Piping** on page 6.

**Safety Guards.** Follow all codes and regulations regarding installation and operation of the pumping system.

**Shut-Off Valves.** Never install shut-off valves between the pump and discharge pressure regulator, or in the regulator bypass line.

Consult the Factory for the following situations:

- Extreme temperature applications (above 160° F or below 40° F)
- Pressure feeding of pumps
- Viscous or abrasive fluid applications
- Chemical compatibility problems
- Hot ambient temperatures (above 110° F)



Typical Metering Installation

# P700 Installation (Cont'd)

## Safety Precautions

### General remarks

These safety / installation instructions contain fundamental information and precautionary notes and must be kept available to all associated with the operation of the pump. Please read them thoroughly prior to installation, electrical connection and commissioning of the unit. It is imperative that all other operating instructions relating to the components of individual units are followed.

These safety / installation instructions do not take local regulations into account. The operator must ensure that such regulations are observed by all, including the personnel carrying out the installation.

Each pump must be labeled by the end user to warn of any hazards that the system process may produce; e.g. corrosive chemicals or hot process etc.

All personnel involved in the operation, maintenance, inspection and installation of the pump must be fully qualified to carry out the work. The personnel's responsibilities, competence and supervision must be clearly defined by the operator. To the extent that if the personnel in question is not already in possession of the requisite know how, appropriate training and instruction must be provided. In addition, the operator is responsible for ensuring that the contents of the operating instructions are fully understood by all the responsible personnel.

When installing a Hydra-Cell pump in conjunction with a motor or motor and frequency controller the relevant manuals must be referred to for electromagnetic compatibility. The installation should conform to EN 61800 and EN 60204 as applicable.

All safety instructions in this manual and all relevant local health and safety regulations must be followed.

Attention must be paid to the weight of the pump before attempting to lift either manually or selecting appropriate lifting equipment.

## Inlet Piping

Provide for permanent or temporary installation of a compound pressure gauge to monitor the inlet pressure. To maintain maximum flow, the pump inlet should be under flooded suction conditions at all times. **Do not supply more than one pump from the same inlet line.**

### Supply Tank

Use a supply tank that is large enough to provide time for any trapped air in the fluid to escape. The tank size should be at least twice the maximum pump flow rate.

Install a separate inlet line from the supply tank to each pump.

Place a cover over the supply tank, to prevent foreign objects from falling into it.

### Hose Sizing and Routing

To minimize acceleration head and frictional losses, size the suction line at least one size larger than the pump inlet, and keep the suction line as short and direct as possible.

Recommendations:

- Keep inlet lines less than 3 ft. (1 m) long
- Use at least 2-1/2" (63 mm) I.D. inlet hose
- Minimize fittings (elbows, valves, tees, etc.)

## Inlet Piping (Pressure Feed)

Provide for permanent or temporary installation of a pressure gauge to monitor the inlet pressure. Pressure at the pump inlet should not exceed 250 psi (17 bar); if it could get higher, install a pressure reducing valve. **Do not supply more than one pump from the same inlet line.**

**Note: System back pressure must exceed the pump inlet pressure by at least 15 psi (1 bar) in order to prevent flow thru.**

## Discharge Piping

### Hose and Routing

Use the shortest, most-direct route for the discharge line.

Select pipe or hose with a **working pressure** rating of at least 1.5 times the maximum system pressure. EXAMPLE: Select a 1500 psi (103 bar) W.P.-rated hose for systems to be operated at 1000 psi (69 bar) gauge pressure.

Support the pump and piping independently.

### Pressure Regulation

**Install a pressure relief valve in the discharge line.** Bypass pressure must not exceed the pressure limit of the pump.

Size the valve so that, when fully open, it will be large enough to relieve the full capacity of the pump without over-pressurizing the system.

Locate the valve as close to the pump as possible and ahead of any other valves.

Adjust the pressure relief valve to no more than 10% over the maximum working pressure of the system. Do not exceed the manufacturer's pressure rating for the pump or valve.

Route the bypass line to the supply tank.

**CAUTION: Never install shutoff valves in the bypass line or between the pump and pressure regulator or relief valve.**

Provide for permanent or temporary installation of a pressure gauge to monitor the discharge pressure at the pump.

### Minimum Discharge Pressure

To ensure proper capacity control, a minimum discharge pressure of 50 psi (3.5 bar) is required.

# P700 Installation (Cont'd)

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## Initial Start-Up Procedure

Before you start pump, be sure that:

- All shut-off valves are open, and the pump has an adequate supply of fluid.
  - All connections are tight.
  - The oil level is visible in the upper oil reservoir.
1. Open priming valve on system back pressure valve so pump starts under minimum pressure.
  2. Turn on power to pump motor.
  3. Check inlet pressure or vacuum. To maintain maximum flow, pump inlet should be under flooded suction conditions at all times. Inlet pressure must not exceed 250 psi (17 bar).
  4. Listen for any erratic noise and look for unsteady flow.
    - Jog pump on and off until fluid coming from priming valve is air-free.
    - Close priming valve.

## Calibration

**Note: Each metering pump or pump system must be calibrated to determine the pump speed required for the desired flow rate.**

Accurate calibration depends on pump discharge pressure and system conditions. When calibrating the pump or system, it is useful to plot capacity curves for future reference. Observe on the curve, that pump capacity decreases slightly as discharge pressure increases.

In order to achieve the best possible results, perform calibration under actual process conditions. Follow these steps:

1. Run pump for 20 minutes at actual process conditions. If process system cannot be used, circulate back to supply tank through pressure relief valve (see Typical Metering Installation drawing). If required system pressure is less than 50 psi (3.5 bar) back pressure valve must be installed and set to produce minimum of 50 psi (3.5 bar) pressure at pump head.
2. Determine maximum pump speed required for all system conditions that need to be satisfied. Measure pump delivery at this maximum speed using system calibration cylinder, flow meter, or similar container. This is the "rated capacity" for pump.
3. Measure pump delivery at 100%, 75%, 50%, 25%, and 10% of maximum speed just determined. Let pump run for 5 minutes at each speed setting before taking capacity measurement.

# P700 Maintenance

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**Note:** The numbers in parentheses are Reference Numbers located in the Parts List exploded views of this manual.

## Periodically

**CAUTION:** Do not turn the drive shaft while the oil reservoir is empty.

**CAUTION:** Do not leave contaminated oil in the pump housing or leave the housing empty. Remove contaminated oil as soon as discovered and replace with clean oil.

1. Check inlet pressure periodically with gauge.
2. Change oil according to hours guidelines in table.
3. Change oil as follows:
  - a. Remove brass cap (34), and allow oil and contaminants to drain completely. Catch oil and dispose of properly.
  - b. Use suitable Hydra-Oil for the application and pump components.

## Pump Operation Hours Between Oil Changes at Various Process Fluid Temperatures

Pressure	<90°F (32°C)	<139°F (60°C)	<180°F (82°C)
<b>Metallic Pump Head</b>			
<650 psi (45 bar)	6,000	4,500	3,000
<1000 psi (70 bar)	4,000	3,000	2,000

**Note:** Minimum oil viscosity for proper hydraulic end lubrication is 16-20 cST (80-100 SSU). P-Series replacement parts kits (complete kits and diaphragm kits) include suitable oil for each P Series pump configuration.

**CAUTION:** If you are losing oil but don't see any external leakage, or if the oil becomes discolored and contaminated, the diaphragm (21) may be damaged. Refer to the Fluid End Service and Troubleshooting Sections. Do not operate the pump with a damaged diaphragm.



# P700 Service (Fluid End)

**Note:** The reference numbers in parentheses are shown in the Fluid End Parts List.

This section explains how to disassemble and inspect all easily-serviceable parts of the pump fluid end.

**CAUTION:** Disassembly of the hydraulic end of the pump should be performed only by a qualified technician. For assistance, contact Wanner Engineering (612-332-5681) or the distributor in your area.

**CAUTION:** Do not remove the four socket head cap screws (31) that go through the back of the pump housing (37) and thread into the cylinder housing (23), unless you are repairing the hydraulic end of the pump.

## Tools and Supplies

The following tools and supplies are recommended for servicing the fluid end of the pump:

- Wanner P700 Tool Kit, P/N A03-200-1100
- 18-mm hex socket
- 18-mm box-end wrench
- Two 19-mm open-end wrenches
- Large Phillips-head screwdriver
- Mallet
- Torque wrench to 70 ft-lbs (100 N-m)
- New oil
- Lubricating gel
- Fine emery cloth

The following additional supplies are recommended for servicing the hydraulic end of the pump:

- 17-mm hex socket or box-end wrench
- Grease
- Anaerobic seal sealant

## 1. Remove Manifold and Valve Plate (4, 17)

- a. **Manifold.** Using 18-mm hex socket and 18-mm box-end wrench, remove 16 cap screws (2). **Do not remove** four socket head cap screws (31). Remove manifold.

**Note:** When you remove the valve plate in the following step, some oil will leak out from behind the diaphragms. Provide something to catch this oil leakage.

- b. **Valve Plate.** Re-insert two perimeter cap screws (2) through pump housing from shaft end at approximately 2 and 10 o'clock positions, to hold valve plate when five cap screws (15) are removed. Using 10-mm hex wrench, remove five socket head cap screws and valve plate.

**CAUTION:** Don't turn the pump drive shaft while the manifold and valve plate are off the pump, except when removing diaphragms or repriming the hydraulic cells.

- c. Inspect manifold for warping or wear around inlet and outlet ports. If wear is excessive, replace manifold. Inspect valve plate in same manner.

## 2. Inspect Valves (8-14)

**Note:** Wanner Valve Kits include items 8 - 14 and all O-rings for sealing the manifold to the valve plate.

The five inlet and five outlet valve assemblies are identical, but face in opposite directions. Inspect each valve as follows:

- a. Check spring retainer (14), and replace if worn or damaged.
- b. Check valve spring (12). If it is worn or shorter than new spring, replace it.
- c. Check valve (11) for wear or damage. If worn excessively, replace it.

**Note:** If your pump has plastic spring retainers, there is a tetra seal (flat O-ring) (13) between spring retainer (14) and valve seat (10). Pumps with metal spring retainers do not have tetra seal.

- d. Check dampening washer (8), and replace if damaged.
- e. Remove valve seat (10). Seat Puller Tool is included in Wanner Tool Kit. Inspect valve seat for wear and replace if worn. Install new O-ring (9).

**Note:** Whenever you replace any worn valve or valve seat, we recommend that you replace all valve assemblies to ensure reliable operation. All necessary parts are included in the Valve Kit.

- f. Reinstall valve assemblies:

- Clean valve ports and shoulders with emery cloth, and lubricate with lubricating gel or petroleum jelly.

**CAUTION:** If the elastomers are EPDM material, do not use a petroleum-based lubricant on them. Instead, use an EPDM-compatible lubricant. If the product is food-grade, use a compatible food-grade lubricant.

- Install O-ring (9) on valve seat (10), and lubricate. Do this on remaining valve seats.

• **Inlet Valves (five center valves).** Insert spring retainer (14) into valve plate (17), then insert spring (12) into spring retainer (14). If pump has plastic spring retainers (14), insert tetra seal (13) between retainer and valve seat (10). Insert valve (11) on top of valve spring (12), then insert valve seat (10). Side of valve seat that has deepest chamfer should face valve. Finally, insert dampening washer (8). A compatible grease or oil will help dampening washer stick to valve seat (10) for easier assembly.

• **Outlet Valves (five outer valves).** Insert dampening washer (8), valve seat (10), valve (11), and spring (12), then spring retainer (14). If pump has plastic retainers, install tetra seal (13) between valve seat (10) and spring retainer (12).

# P700 Service (Fluid End) (Cont'd)

## 3. Inspect and Replace Diaphragms (21)

- a. Lift diaphragm (21) by one edge, and turn pump shaft until diaphragm pulls up. This will expose machined cross-holes in valve plunger (69) behind diaphragm.
- b. Insert the Valve Plunger Holder (from Wanner Tool Kit) through one of cross-holes to hold diaphragm up.
- c. Grasp Valve Plunger Holder so valve plunger (69) won't rotate. Remove screw (18), O-ring (19), and follower (20) from center of diaphragm.
- d. Remove diaphragm and inspect carefully.

**Note: A damaged diaphragm generally indicates a pumping system problem, and replacing only the diaphragm will not solve the larger problem.**

Inspect diaphragm for the following:

- **Half-moon marks.** Usually caused by cavitation of the pump (see Troubleshooting).
  - **Concentric circular marks.** Usually caused by cavitation of the pump (see Troubleshooting).
  - **Small puncture.** Usually caused by a sharp object in the fluid, or by an ice particle.
  - **Diaphragm pulled away** from the center screw or from the cylinder sides. Usually caused by fluid being frozen in the pump, or by over pressurization of the pump.
  - **Slice in ridge of diaphragm.** Usually occurs when a diaphragm is operated at temperatures below its rated capability.
  - **Diaphragm edge chewed away.** Usually caused by over pressurizing the system. Could also be caused by the center and exterior cap screws not being torqued to their correct values.
- e. Inspect plunger (22) for rough surfaces or edges. **Do not remove** plunger from valve plunger (69).  
**CAUTION: If a diaphragm was damaged and foreign material or water has entered the oil reservoir, do not operate the pump. Check all diaphragms, then flush the reservoir completely (as outlined below) and refill it with fresh oil. Never let the pump stand with foreign material or water in the reservoir, or with the reservoir empty.**
  - f. Install new diaphragm (21) ridge-side out.  
**Note: It is recommended to not reuse old diaphragms, because the material may have taken a compression set and thus will not seal properly.**
  - g. Clean screw (18), follower (20), and threads in valve plunger (69). Remove any oil from valve plunger. Apply medium-strength threadlocker to screw (18). Re-install screw, O-ring (19), and follower. Tighten screw to 43 in-lbs (485 N-cm).
  - h. Repeat above inspection and replacement procedure with remaining four diaphragms.

## 4. Flush Contaminate from Hydraulic End

**(only if a diaphragm has ruptured)**

- a. With valve plate and manifold still removed (see above), remove oil drain cap (36). Allow all oil and contaminate to drain out.
- b. Fill reservoir with compatible solvent. Manually turn pump shaft to circulate compatible solvent and drain. Dispose of contaminated fluid properly.  
**CAUTION: If you have an EPDM diaphragm, or if food grade oil is in the reservoir, do not use kerosene or solvents. Instead, flush with the same lubricant that is in the reservoir.**
- c. Repeat step b. flushing procedure.
- d. Fill reservoir with fresh oil and manually turn pump shaft to circulate oil. Drain oil.
- e. Refill reservoir with fresh oil. If oil appears milky, there is still contaminant in reservoir. Repeat steps c and d until oil appears clean.

## 5. Priming Hydraulic Cells

**Note: Providing oil prime to fitted pumps requires pressure be applied to the diaphragms. This can be done manually, with the system head pressure, or with pressurized air if available. Review all methods below to determine the procedure most suitable.**

### Method 1 (system head pressure *less than 2 psi*)

- a. Install valve plate (17) with outlet valves not installed (or else remove outlet valves and leave seats installed) on cylinder housing (23). Tighten two socket head screws (31).
- b. Fill reservoir with correct Hydra-oil to fill port.
- c. With blunt pointer (eraser end of pencil), reach in through each outlet valve port and push diaphragm (21) backwards. Note air bubbles coming out at oil fill port. Now turn shaft about 1/2 turn.
- d. Repeat depressing diaphragms (21) and rotating shaft (approximately 4 to 6 times) until no more air bubbles escape and oil has dropped about 1 inch (25 mm) from top of fill port. Hydraulic cells are now primed. Replace oil fill cap with O-ring (28).
- e. Install outlet valve assemblies in each outlet valve port. See Parts List for correct assembly order. If necessary, tip pump (head upward) to keep valve (11) centered on valve seat (10) and allow valve retainer (14) to fit into port flush.
- f. Install manifold (4) and complete installation.

# P700 Service (Fluid End) (Cont'd)

## Alternative Method 1: (system head pressure less than 2 psi)

- a. With pump horizontal, and the fluid-end head removed, fill reservoir with correct Hydra-oil to fill port.
- b. Have catch basin for oil that leaks from behind diaphragms when priming. Catch oil and dispose of properly. **Do not reuse oil.**
- c. All air in oil within hydraulic piston behind diaphragms (21) must be forced out by turning shaft (and pumping piston). A shaft rotator is included in the Hydra-Cell Tool Kit. Keep pressure on diaphragms while turning shaft until bubble-free flow of oil comes from behind all diaphragms. Maintain oil level in reservoir. Do not allow oil level to be lower than reservoir.
- d. Before oil runs out past diaphragms (21), quickly attach loaded valve plate (17) with socket head screws (31). Do not tighten screws completely. Leave gap between valve plate and the cylinder housing (23). Turn shaft 2-3 turns to finish forcing out air behind diaphragms. Hydraulic cells are now primed. Finish tightening valve plate with two socket head screws (31) and add pump manifold (4).
- e. Wipe excess oil from around pump head.
- f. Check that oil level is 1 inch (25 mm) from top of fill port.
- g. Replace oil fill cap with O-ring (28) and complete installation.

## Method 2 (head pressure greater than 2 psi)

This simple and clean method of priming Hydra-cells requires an inlet head pressure of at least 5 feet (1.5 m) or 2 psi (0.14 bar). The pressure holds the diaphragms back while the piston forces the air out.

- a. Completely assemble pump and fill reservoir with correct Hydra-oil to fill port.
- b. **When tank head pressure is being used to prime**, install pump back into system and connect tank supply line to pump inlet.  
**Note: The pump discharge line may be connected at this time. However, make sure the end of the discharge line is open to let air pass out.**
- c. Slowly turn pump shaft by hand and watch for bubbles exiting oil reservoir fill opening. This will take several rotations; when no more bubbles come out and reservoir level has dropped about 1" (25 mm), hydraulic cells are primed.
- d. Replace oil fill cap with O-ring (28) and complete installation.
- e. **When compressed air is being used to prime**, insert clean air hose to pump inlet and restrict pump outlet. Turn shaft quarter turn and then apply air pressure into manifold to put pressure on diaphragms (21). This will force air out from inside pistons. Observe for bubbles at reservoir opening. Repeat for several rotations until no more air bubbles come out and reservoir level has dropped about 1" (25 mm). Hydraulic cells are now primed.
- f. Replace oil fill cap with O-ring (28) and complete installation.

## 6. Reinstall Valve Plate and Manifold (4, 17)

- a. Reinstall valve plate (17), with valve assemblies installed as outlined above, onto cylinder housing (23).
- b. Insert two perimeter cap screws (2) at 10 and 2 o'clock positions, through pump housing (37) from shaft end, and then through cylinder housing and valve plate. The cap screws are used to hold the valve plate and manifold during reassembly.
- c. Place high collar washer (16) on each socket head cap screw (15), and install through valve plate. Then thread into cylinder housing. Before tightening cap screws, install at least ten of perimeter cap screws (2) through valve plate and cylinder housing holes to ensure good alignment. Using 10-mm hex socket and torque wrench, torque five cap screws (15) to 65 ft-lbs (88 N-m). Remove ten perimeter cap screws.
- d. Reinstall O-rings (5,6,7) on rear side grooves of manifold (4). Use compatible petroleum jelly or lubricating gel to hold in place.  
**Note: If this is a food-grade application or using EPDM elastomers, be sure the lubricating gel is compatible with the application.**
- e. Reinstall the manifold (4) onto valve plate (17). Be sure drain plug (1) is installed in manifold.
- f. Insert 16 cap screws (2) and 16 washers (3) around edge of manifold. Use 18-mm hex socket and to alternately tighten opposite cap screws until secure. Torque to 65 ft-lbs (88 N-m).

# P700 Service (Hydraulic End)

**Note:** The numbers in parentheses are the Reference Numbers on the exploded view illustrations found in the Parts Section.

**CAUTION:** Do not disassemble the hydraulic end of the pump unless you are a skilled mechanic. For assistance, contact Wanner Engineering (TEL 612-332-5681 or FAX 612-332-6937) or the distributor in your area.

**CAUTION:** The four socket head cap screws (31) that screw through the back of the pump housing (37) into the cylinder housing (23) hold these parts together. *Do not remove* these four screws except when repairing the hydraulic end.

**Note:** The following service procedures refer several times to the Wanner P700 Tool Kit. We strongly urge you not to try to repair the hydraulic end of the pump without using the tools in this kit (available from Wanner or your local distributor). Refer also to the list of tools and supplies in the Fluid-End Service Section.

## 1. Remove Pump Housing

- Remove manifold (4), valve plate (17), and diaphragms (21), from pump housing (37). Refer to Fluid-End Service Section
- Drain oil from pump housing by removing drain plug (36). Dispose of oil properly.
- Check shaft assembly (61) for sharp burrs. Smooth any burrs, to prevent scarring seals (62) when removing shaft assembly.
- Reinsert two cap screws (2) through pump housing (37) and cylinder housing (23) from shaft assembly end (at 10 and 2 o'clock positions) to support parts as pump is being disassembled. Install shaft rotator (from P700 Tool Kit) over shaft assembly. Push shaft rotator on all the way, so front of shaft rotator touches pump housing. Tighten shaft rotator set screw into keyway. This keeps shaft assembly (61) attached to pump housing (37) when cylinder housing (23) is removed.
- Using three assembly studs from the (from P700 Tool Kit), insert them (equally spaced) through pump housing flange (37) and cylinder housing (23). Tighten nuts to within 3/4 in. (17 mm) from cylinder housing.

**Note:** The assembly studs will catch the cylinder housing as it is unbolted and allow the cylinder housing to be removed slowly under spring tension.

- Remove four cap screws (31) from cylinder housing (23). Slide cylinder housing out on two cap screws (2) that were inserted for support in Step d above.

**Note:** The preload on the piston return springs will push the cylinder housing out of the pump housing. Remove the cylinder housing assembly.

- Remove shaft assembly (61) by loosening set screw in the shaft rotator and sliding the shaft assembly out of seals (59).

**CAUTION:** These parts are heavy and may need a second person or a lifting device to remove them.

- Remove bearing adjustment plate (57) and inspect the bearing cup (61B) from the cylinder housing (23). Inspect all parts for wear, and replace if necessary.

- Inspect cam, bearings, and bearing cup (61B) in the pump housing (37).

**Note:** If the bearings are pitted or binding, or if the bearing cup in the housing is worn, contact Wanner Engineering.

**CAUTION:** If a bearing cup or bearing cone is replaced, they must be replaced as a pair or premature failure will result.

## 2. Disassemble Pistons

- Place cylinder housing assembly (23) on clean flat surface, with piston-feet side down.
- With diaphragms (21) removed (see the Fluid-End Service Section), thread screw (18) approximately three turns into one of valve plungers (69). Tap screw lightly with hammer, and plunger (22) should slip off the valve plunger. Remove screw (18). Piston assembly (74) can then be removed. Repeat for remaining cylinders.
- Inspect and clean all parts of piston assembly (74). Replace O-rings and any other parts that are worn or damaged. Repeat on remaining piston assemblies.

## 3. Reassemble Pistons

**Note:** When reassembling the hydraulic pistons, use new plungers (22). They are press-fit onto the valve plungers (69) and are not reusable.

- Drop steel ball (72) into bottom of piston assembly (73).  
**Note:** Using grease on the O-rings, and lubricating the parts, will aid in assembly.
- Insert retaining washer (71) and O-ring (66) to hold steel ball in place.
- Insert valve plunger (69) into valve cylinder (70). Slide spring (68) over valve plunger (69) inside valve cylinder (70).
- Insert O-ring (67) into spring retainer (65).
- Install two O-rings (67) onto valve cylinder (70).
- Install O-ring (66) onto spring retainer (65).
- Slide assembled valve cylinder (70), valve plunger (69), and spring (68) into spring retainer (65).
- Slide complete cylinder-and-retainer assembly into piston assembly (73).
- Insert piston return spring (64) into piston assembly (73).
- Repeat steps a. through i. for remaining four piston assemblies.

## 4. Remove Shaft Seals (62)

Inspect shaft seals (62). Replace if they look damaged in any way. Remove shaft seals by pounding out from inside pump housing (37). Replace both shaft seals. Clean bore of pump housing with emery cloth.

# P700 Service (Hydraulic End) (Cont'd)

## 5. Reassemble Pump Housing, Shaft Assembly, and Cylinder Housing

- a. With pump housing (37) horizontal and mounted on baseplate (38), insert cam assembly (61) into pump housing. If shaft seals (62) are still in pump housing, cover shaft keyway with masking tape and slide it through seals. Remove tape. Place shaft rotator (from the Tool Kit) over end of cam assembly shaft and slide it up tight against pump housing. Keep cam assembly (61) horizontal and tight against pump housing bearing. Tighten shaft rotator set screw to shaft keyway. This will hold the cam assembly horizontal and aid in assembly.
- b. Install O-ring (63) into pump housing (37) O-ring groove. Use grease to hold O-ring in groove.
- c. Place cylinder housing (23) face-down on clean surface.
- d. Insert bearing adjustment plate (57), with bearing cup (61A), dowel pin (58), and key (59), into cylinder housing (23).
- e. Insert five piston assemblies into cylinder housing (23).
- f. To aid in assembly, insert two cap screws (2) through pump housing from shaft side (at 10 and 2 o'clock positions).
- g. Pick up cylinder housing assembly (23) and slide onto two cap screws (2) that are in pump housing (37). It will slide on until piston feet contact cam assembly (61). Insert up to eight more cap screws (2) through pump housing and cylinder housing to aid in alignment.
- h. Using 17-mm hex socket or box-end wrench, install four 10-mm x 100-mm fully-threaded cap screws (from P700 Tool Kit) through pump housing (37) where four socket head cap screws (31) were fastened. Tighten four cap screws evenly. Cylinder housing assembly (23) will pull tight against pump housing (37).  
One at a time, remove fully-threaded cap screws and replace with cap screws (31). Tighten four cap screws to 25 ft-lbs (34 N-m).
- i. Remove shaft rotator.

## 6. Install Shaft Seals

- a. Cover cam assembly shaft keyway (61) with masking tape to protect inside diameter of seals. Grease shaft and slide on one shaft seal (62) up to pump housing (37).  
Pack inside (spring side) of second shaft seal (62) half-full with grease. Slide shaft seal on and flush against first shaft seal. Make sure outside diameters of two shaft seals are clean and free of grease. Remove protective tape from cam assembly shaft.
- b. Apply an anaerobic seal sealant or bearing retaining compound to outside diameter of shaft seals (62).  
Install shaft rotator/seal inserter (from the P700 Tool Kit) over the cam assembly shaft. Using mallet, tap shaft rotator/seal inserter to push two seals into the pump housing (37). Wipe off excess sealant.

## 7. Reinstall Plungers

**Note: If the plungers (22) have been removed from the valve plungers (69), do not reuse them. Install new ones.**

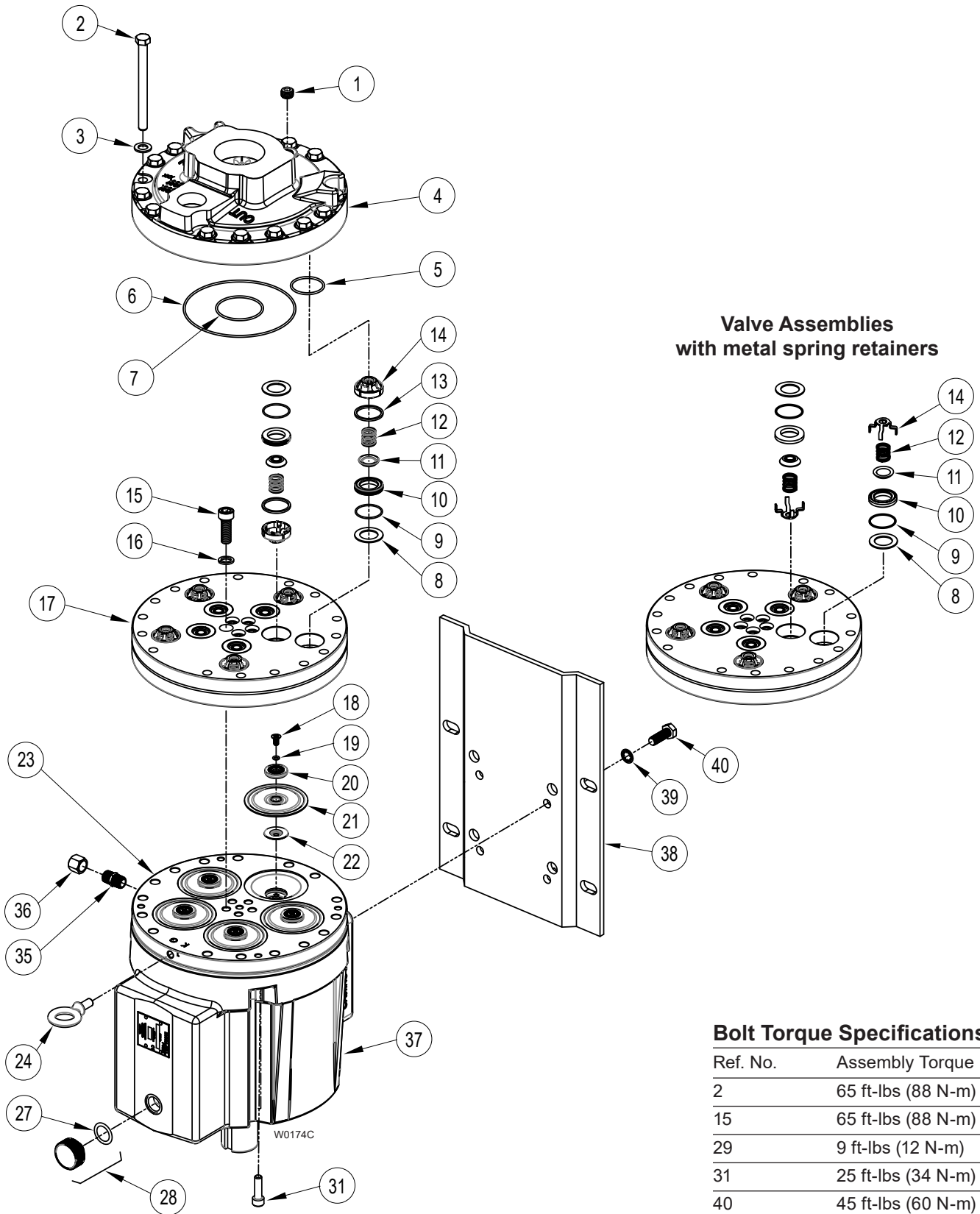
- a. Place plunger (22) onto exposed screw end of plunger guide lifter tool (from P700 Tool Kit). The flat side of plunger should face plunger guide lifter tool.
- b. Screw plunger guide lifter tool (with plunger) into valve plunger (69) until tight.
- c. Pull valve plunger (69) up until its cross holes are exposed. Insert valve plunger holder (from P700 Tool Kit) through top cross hole.
- d. Hold hex bolt with wrench. At the same time, tighten the hex nut against the plunger (22) with another wrench.
- e. Remove the plunger guide tool.  
**Note: Before removing the valve plunger holder tool, install new diaphragm. See Reinstall Diaphragms below.**
- g. Repeat procedure for remaining cylinders.

## 8. Reinstall Diaphragms

**Note: Keep the valve plunger holder tool installed in valve plunger (69) (as explained in Reinstall Plungers above).**

- a. Place diaphragm (21) onto plunger (22), ridge side out.
- b. Center follower (20) on diaphragm.
- c. Place O-ring (19) onto screw (18).
- d. Apply small amount of thread locker to threads of screw (18).
- e. Insert follower (18), with O-ring (19), through follower (20) and diaphragm (21). Screw into valve plunger (69).
- f. Hold valve plunger holder tool and tighten screw (18) to 43 in-lbs (485 N-m).
- g. Repeat above procedure for remaining cylinders.
- h. Fill reservoir with fresh oil and prime pump (See Fluid End Service Section).

# P700 Fluid End Parts



## Bolt Torque Specifications

Ref. No.	Assembly Torque
2	65 ft-lbs (88 N-m)
15	65 ft-lbs (88 N-m)
29	9 ft-lbs (12 N-m)
31	25 ft-lbs (34 N-m)
40	45 ft-lbs (60 N-m)

# P700 Fluid End Parts

Ref. No.	Part Number	Description	Quantity/ Pump	Ref. No.	Part Number	Description	Quantity/ Pump	
1	D25-038-2017	Plug, Hastelloy C.....	1	12	D25-022-3110	Valve Spring, 17-7 HT SST .....	10	
	D25-038-2210	Plug, Brass.....	1		D25-022-3114	Valve Spring, Elgiloy .....	10	
	D25-038-2211	Plug, 316 SST .....	1		D25-022-3115	Valve Spring, Hastelloy C.....	10	
2	G35-024-2010	Screw, M12, HHCS .....	16	13	D25-092-2110	Tetra Seal, Buna.....	10	
3	D40-048-2010	Washer, Flat .....	16		D25-092-2111	Tetra Seal, FKM .....	10	
4	D35-004-1002	Manifold, 316L SST, NPT.....	1		D25-092-2112	Tetra Seal, Neoprene .....	10	
	D35-004-1007	Manifold, Ductile iron, NPT .....	1		D25-092-2113	Tetra Seal, EPDM.....	10	
	D35-004-1010	Manifold, Magn/bronze, NPT .....	1		D25-092-2118	O-ring, PTFE.....	10	
	D35-004-1018	Manifold, Hastelloy, NPT.....	1	14	D25-023-1017	Retainer, Valve spring, Hastelloy C...10		
	D35-004-1028	Manifold, 2205, NPT .....	1		D25-023-2318	Retainer, Valve spring, PVDF .....	10	
	D35-004-1030	Manifold, Magn/bronze, SAE flange ..1		15	G35-081-2010	Screw, M12, SHCS.....	5	
	D35-004-1032	Manifold, 316L SST, SAE flange.....1			G35-084-2010	Washer, High collar .....	5	
	D35-004-1037	Manifold, Ductile iron SAE flange .....	1	17	D35-003-1002	Valve Plate, 316 SST.....	1	
	D35-004-1038	Manifold, Hastelloy, SAE flange.....1			D35-003-1003	Valve Plate, Brass .....	1	
	G35-004-1022	Manifold, 316L SST, BSPT.....	1		D35-003-1007	Valve Plate, Ductile iron .....	1	
	G35-004-1027	Manifold, Ductile iron, BSPT.....	1		D35-003-1018	Valve Plate, Hastelloy.....	1	
G35-004-1020	Manifold, Magn/bronze, BSPT.....	1	D35-003-1029		Valve Plate, 2205 .....	1		
G35-004-1028	Manifold, Hastelloy, BSPT .....	1	18		D25-030-2010	Screw, Flat-hd, 316 SST .....	5	
G35-004-1029	Manifold, 2205, BSPT .....	1			D25-030-2011	Screw, Flat-hd, Hastelloy C.....	5	
5	D25-074-2110	O-ring, Buna.....	5		19	D25-047-2110	O-ring, Buna.....	5
	D25-074-2111	O-ring, FKM .....	5			D25-047-2111	O-ring, FKM .....	5
	D25-074-2112	O-ring, Neoprene .....	5	D25-047-2112		O-ring, Neoprene .....	5	
	D25-074-2113	O-ring, EPDM.....	5	D25-047-2113		O-ring, EPDM.....	5	
	D25-074-2118	O-ring, PTFE.....	5	D25-047-2118		O-ring, PTFE.....	5	
6	D35-073-2110	O-ring, Buna.....	1	20	D25-017-1010	Follower, 316 SST .....	5	
	D35-073-2111	O-ring, FKM .....	1		D25-017-1011	Follower, Hastelloy C.....	5	
	D35-073-2112	O-ring, Neoprene .....	1	21	D25-018-2312	Diaphragm, Neoprene.....	5	
	D35-073-2113	O-ring, EPDM.....	1		D25-018-2313	Diaphragm, EPDM .....	5	
	D35-073-2118	O-ring, PTFE.....	1		D25-018-2315	Diaphragm, FKM.....	5	
7	D35-080-2110	O-ring, Buna.....	1		D25-018-2318	Diaphragm, PTFE .....	5	
	D35-080-2111	O-ring, FKM .....	1		D25-018-2320	Diaphragm, Buna-N-XS .....	5	
	D35-080-2112	O-ring, Neoprene .....	1	D25-018-2325	Diaphragm, AFLAS .....	5		
	D35-080-2113	O-ring, EPDM.....	1	22	D25-016-1010	Plunger.....	5	
	D35-080-2118	O-ring, PTFE.....	1					
8	D25-125-1011	Washer, Dampening, 316 SST .....	10					
	D25-125-1017	Washer, Dampening, Hastelloy C .....	10					
	D25-125-2310	Washer, Dampening, Celcon .....	10					
	D25-125-2316	Washer, Dampening, Nylon .....	10					
	D25-125-2317	Washer, Dampening, polypropylene ..10						
	D25-125-2318	Washer, Dampening, Kynar .....	10					
9	D25-035-2110	O-ring, Buna.....	10					
	D25-035-2111	O-ring, FKM .....	10					
	D25-035-2112	O-ring, Neoprene .....	10					
	D25-035-2113	O-ring, EPDM.....	10					
	D25-035-2118	O-ring, PTFE.....	10					
10	D25-020-1012	Valve Seat, Nitronic 50.....	10					
	D25-020-1016	Valve Seat, Tungsten carbide .....	10					
	D25-020-1017	Valve Seat, Hastelloy C.....	10					
	D25-020-3300	Valve Seat, Ceramic.....	10					
11	D25-021-1011	Valve, Nitronic 50 .....	10					
	D25-021-1016	Valve, Tungsten carbide.....	10					
	D25-021-1017	Valve, Hastelloy C .....	10					
	D25-021-3300	Valve, Ceramic.....	10					

# P700 Fluid End Parts

Ref. No.	Part Number	Description	Quantity/ Pump
23	K35-002-1010	Cylinder Housing, DPC .....	1
	K35-002-1210	Cylinder Housing Assembly, DPC <sup>1</sup> .....	1
	K35-002-1242	Loaded Cylinder Housing Assembly, DPC, Neoprene <sup>2</sup> .....	1
	K35-002-1243	Loaded Cylinder Housing Assembly, DPC, EPDM <sup>2</sup> .....	1
	K35-002-1244	Loaded Cylinder Housing Assembly, DPC, Buna N-XS <sup>2</sup> .....	1
	K35-002-1245	Loaded Cylinder Housing Assembly, DPC, FKM <sup>2</sup> .....	1
	K35-002-1246	Loaded Cylinder Housing Assembly, DPC, PTFE <sup>2</sup> .....	1
	K35-002-1247	Loaded Cylinder Housing Assembly, DPC, AFLAS <sup>2</sup> .....	1
24	D40-102-2020	Eyebolt.....	1
27	D10-080-2110	O-ring, Buna.....	1
28	D03-039-1210	Cap with O-ring, Oil fill .....	1
31	G35-029-2010	Screw, M10, SHCS.....	4
35	D35-155-0001	Pipe, Brass .....	1
36	D25-078-2210	Pipe Cap, Brass .....	1
37	G35-001-1033	Pump Housing Assembly, Aluminum <sup>3</sup> ...	1
38	D40-025-1010	Baseplate .....	1
39	G35-054-2010	Washer, Internal tooth .....	4
40	G35-087-2010	Screw, M12, HHCS .....	4

<sup>1</sup> Cylinder Housing Assembly includes housing (23) and bearing tension assembly (50-56).

<sup>2</sup> Loaded Cylinder Housing Assembly includes screw (18), O-ring (19), follower (20), diaphragm (21), plunger (22), housing (23), bearing tension assembly (50-56), and piston assembly (64-73).

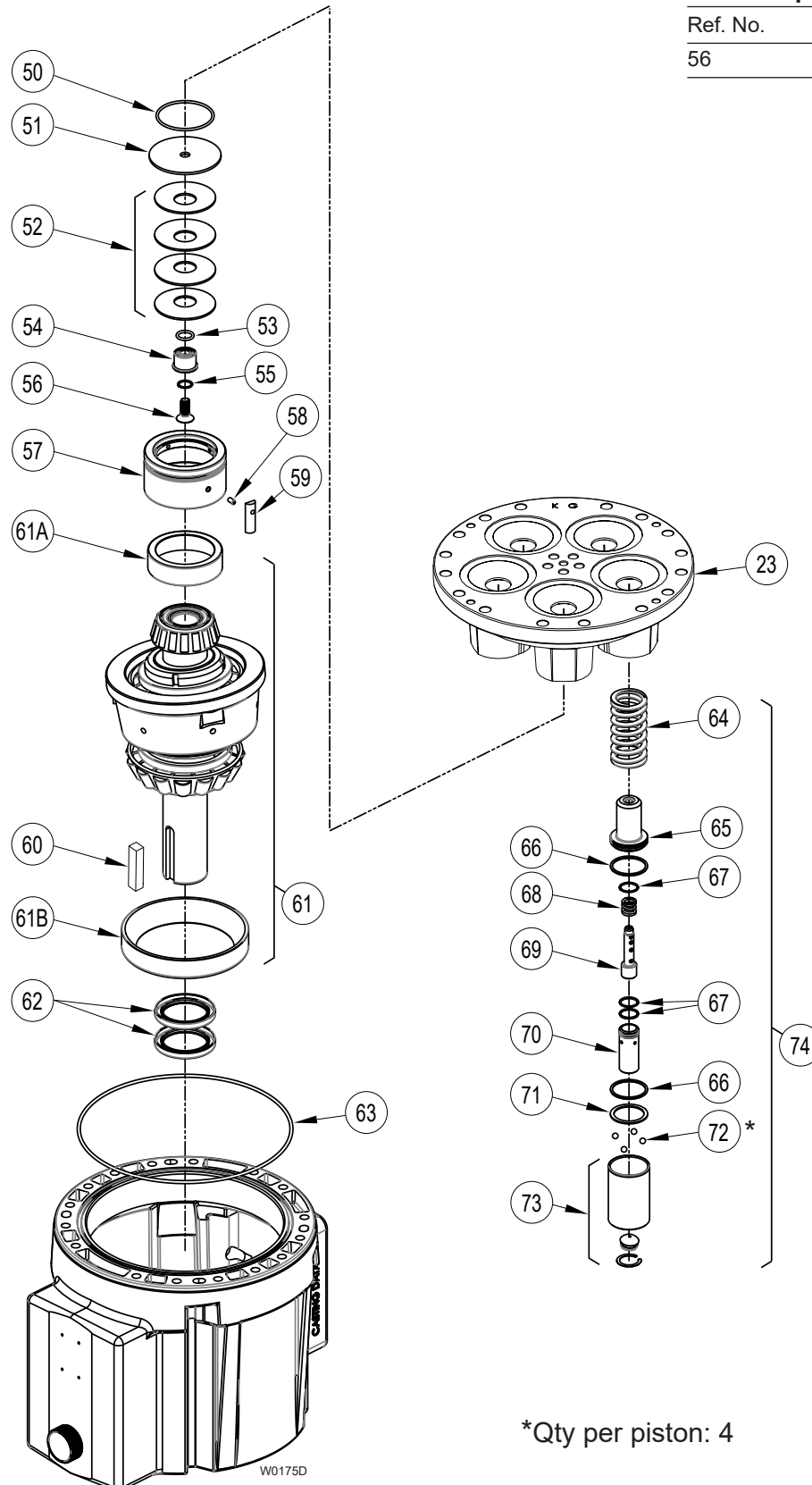
<sup>3</sup> Pump Housing Assembly includes housing (37), oil drain (35, 36), and bearing cup (61B).



# P700 Hydraulic End Parts

## Bolt Torque Specifications

Ref. No.	Assembly Torque
56	25 ft-lbs (34 N-m)



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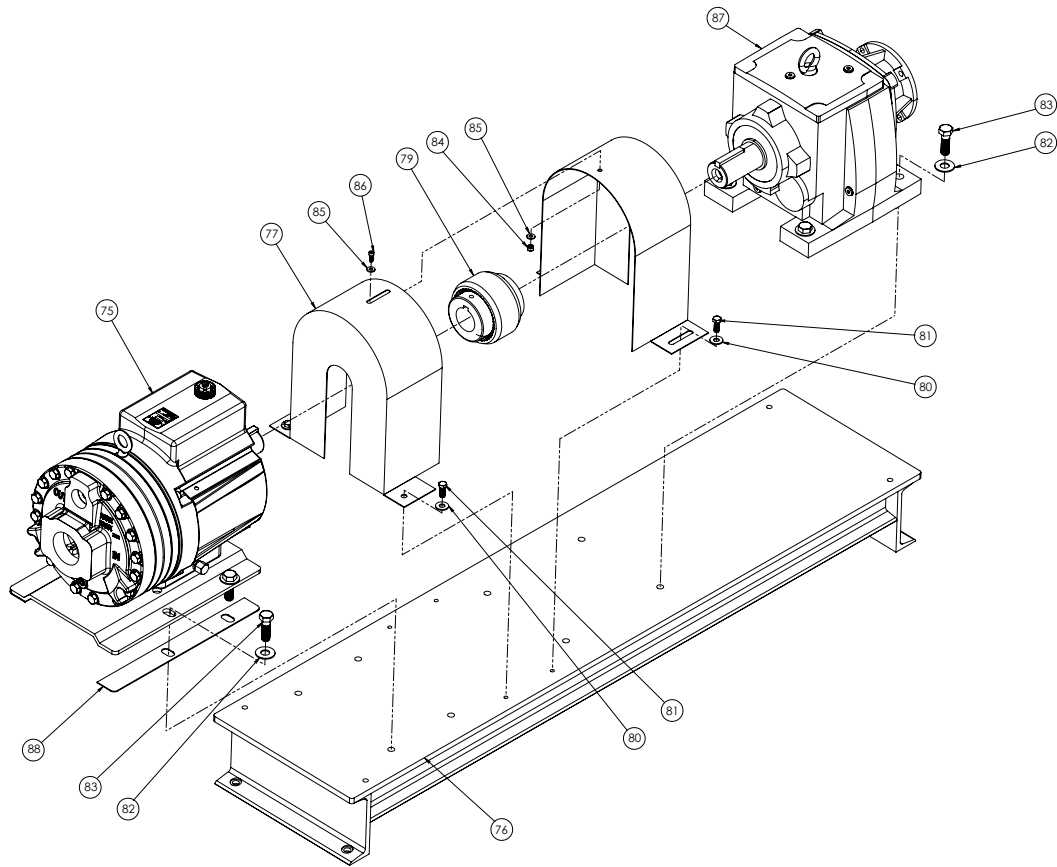
# P700 Hydraulic End Parts

Ref. No.	Part Number	Description	Quantity/ Pump
50	D35-080-2110	O-ring, Buna.....	1
51	D35-116-1010	Washer, Backup .....	1
52	D40-075-3110	Spring, Disc.....	4
53	D10-083-2110	O-ring, Buna.....	1
54	D35-112-1011	Guide, Disc spring.....	1
55	D40-047-2110	O-ring, Buna.....	1
56	G35-115-2011	Screw, Flat-hd .....	1
57	D35-012-1011	Plate, Bearing adjustment.....	1
58	D35-110-2011	Pin, Dowel .....	1
59	D35-113-1010	Key .....	1
60	D40-085-1010	Key, Shaft.....	1
61	D35-007-1210	(X) Cam Assembly, 37 GPM @ 1050 RPM <sup>1</sup> .....	1
	D35-007-1212	(E) Cam Assembly, 35 GPM @1160 RPM <sup>1</sup> .....	1
61A	D35-011-2911	Cup, Bearing .....	1
61B	D40-010-2911	Cup, Bearing .....	1
62	D40-031-2110	Seal, Shaft.....	2
63	D35-037-2110	O-ring, Buna.....	1
64	D25-019-3111	Spring, Piston return .....	5
65	D25-042-1010	Retainer, Spring .....	5
66	D25-034-2110	O-ring, Buna.....	10
67	D25-046-2110	O-ring, Buna.....	15
68	H25-045-3111	Spring, Sleeve valve for PTFE diaphragm .....	5
	K25-045-3110	Spring, Sleeve valve, DPC.....	5
69	K25-044-1010	Plunger, Valve, DPC.....	5
70	K25-043-1010	Cylinder, Valve, DPC.....	5
71	D25-041-1010	Washer, Retaining .....	5
72	D25-015-3010	Ball, Steel .....	20
73	D25-014-1209	Piston, with foot and retainer.....	5
74	K25-014-1210	Piston Assembly, DPC <sup>2</sup> .....	5

<sup>1</sup> Cam Assembly includes cam, shaft, wobble plate, bearings, cups and bearing carrier (57-59). It is only available as an assembly.

<sup>2</sup> Piston Assembly includes cylinder, foot, valve plunger, O-rings, spring retainer, and springs (64-73).

# P700 Reducer Parts List



Ref. No.	Part Number	Description	Quantity/ Pump
75	P7-N-Pump	P700 Pump Assembly	
76	112-720	Base Plate .....	1
77	104-615	Guard Weldment, 104-630 .....	1
78	104-630	Guard Weldment, Inner, 104-615.....	1
79	A04-065-1204	Assembly, M65 Coupling 2" x 2-1/8" ...	1
80	112-031	Washer, Flat, Wide, Type A, 3/8.....	4
81	D10-029-2112	Screw, 3/8-16 UNC x 1.00, HHCS, SST .....	4
82	112-036	Washer, Flat, 5/8, SST .....	8
83	S1259-032	Screw, .625-11 UNC x 2.00 LG HHCS SST.....	8
84	100-063	Locknut, 1/4-20, SST .....	1
85	100-663	Washer, Flat, 1/4, SST.....	2
86	217-105	Screw, SHCS, 1/4-20 UNC x .625" .....	1
87	112-950-01	5.66:1 Inline Reducer, NEMA 140TC ..	1
	112-950-02	10.44:1 Inline Reducer, NEMA 140TC	1
	112-950-03	15.18:1 Inline Reducer, NEMA 140TC.	1
	112-950-04	18.67:1 Inline Reducer, NEMA 140TC	1
	112-951-01	5.66:1 Inline Reducer, NEMA 180TC ..	1
	112-951-02	10.44:1 Inline Reducer, NEMA 180TC	1
	112-951-03	15.18:1 Inline Reducer, NEMA 180TC.	1
	112-951-04	18.67:1 Inline Reducer, NEMA 180TC	1

Ref. No.	Part Number	Description	Quantity/ Pump
	112-952-01	5.66:1 Inline Reducer, NEMA 210TC ..	1
	112-952-02	10.44:1 Inline Reducer, NEMA 210TC	1
	112-952-03	15.18:1 Inline Reducer, NEMA 210TC.	1
	112-952-04	18.67:1 Inline Reducer, NEMA 210TC	1
	112-953-01	5.66:1 Inline Reducer, NEMA 250TC ..	1
	112-953-02	10.44:1 Inline Reducer, NEMA 250TC	1
	112-953-03	15.18:1 Inline Reducer, NEMA 250TC.	1
	112-953-04	18.67:1 Inline Reducer, NEMA 250TC	1
	112-954-01	5.66:1 Inline Reducer, IEC 90 .....	1
	112-954-02	10.44:1 Inline Reducer, IEC 90 .....	1
	112-954-03	15.18:1 Inline Reducer, IEC 90.....	1
	112-954-04	18.67:1 Inline Reducer, IEC 90.....	1
	112-955-01	5.66:1 Inline Reducer, IEC 100/112.....	1
	112-955-02	10.44:1 Inline Reducer, IEC 100/112 ...	1
	112-955-03	15.18:1 Inline Reducer, IEC 100/112 ...	1
	112-955-04	18.67:1 Inline Reducer, IEC 100/112 ...	1
	112-956-01	5.66:1 Inline Reducer, IEC 132 .....	1
	112-956-02	10.44:1 Inline Reducer, IEC 132.....	1
	112-956-03	15.18:1 Inline Reducer, IEC 132.....	1
	112-956-04	18.67:1 Inline Reducer, IEC 132.....	1
	112-957-01	5.66:1 Inline Reducer, IEC 160 .....	1
	112-957-02	10.44:1 Inline Reducer, IEC 160 .....	1
	112-957-03	15.18:1 Inline Reducer, IEC 160.....	1
	112-957-04	18.67:1 Inline Reducer, IEC 160.....	1
88	104-758	Shim, .030, SST .....	2

# P700 Troubleshooting

Problem	Probable Cause	Solution
<b>Motor/Pump Does Not Operate</b>	No power.	Supply correct power according to motor requirements.
	Blown fuse/tripped circuit breaker.	Replace/reset, eliminate circuit overload.
	Shaft coupling to pump not in place.	Install proper coupling hardware (see parts list).
	Current overload - motor.	Motor not rated for pump operating conditions - install proper motor.
	Thermal overload - motor.	Motor not rated for pump and/or ambient operating conditions - supply cooling or install proper motor.
	Faulty motor drive/controller.	Repair/replace.
	Faulty motor.	Repair/replace.
	Low liquid level in supply tank (if low-level shut-off is used).	Fill tank.
<b>No Delivery</b>	Supply tank empty.	Fill tank.
	Loss of prime	Re-prime using Initial Start-Up Procedure.
	Inlet line or strainer clogged.	Clear debris and flush, or replace.
	Inadequate supply pressure at pump inlet.	Increase supply pressure by raising fluid level in tank, raising tank, or pressurizing suction tank.
	Inlet line too restrictive.	Increase inlet line diameter and/or decrease inlet line length.
	Fluid viscosity too high.	Reduce viscosity if possible (by heat or some other means). Increase inlet line diameter and/or decrease inlet line length. Increase supply pressure.
	Vapor lock/cavitation.	Increase inlet pressure. Decrease fluid temperature.
	Pump valves held open or worn out.	Clear debris and flush, or replace (see Fluid End Service)
	System relief valve actuating.	Adjust relief valve, or repair, clean, or replace with new relief valve.
<b>Delivery Too Low and/or Erratic</b>	Review all Probable Causes and Solutions in Problem 2 No Delivery above.	
	Air leak(s) in inlet line.	Locate all leaks and repair.
	System back pressure too low.	Adjust back pressure valve to higher setting. Install back pressure valve if none in system.
	Pumped fluid characteristics changed.	Monitor supply tank temperature to determine if fluid is too hot (leading to cavitation) or too cold (increasing fluid viscosity). Stabilize temperature at suitable level to resolve problem. Check for entrapped air in the fluid supply system.
	Inlet supply pressure changed.	Monitor inlet supply pressure (at the pump) to determine if it is too low, causing a starved condition/cavitation. Stabilize pressure at suitable level to resolve problem.
	Pump OK - Calibration system or flow meter error.	Evaluate components and repair/correct problem(s).
	Oil condition in pump hydraulic end changed.	Check oil level - if low evaluate for source of leakage. Consult factory for hydraulic end service. Change oil per recommended guidelines in maintenance section.
<b>Delivery Too High and/or Erratic</b>	System back pressure too low.	Adjust back pressure valve to higher setting. Install back pressure valve if none in system.
	Inlet supply pressure changed.	Monitor inlet supply pressure (at the pump) to determine if it is too high, causing a "flow-through" condition. Stabilize pressure at suitable level to resolve problem.
	Pump OK - Calibration system or flow meter error.	Evaluate components and repair/correct problem(s).

# P700 Replacement Parts Kits

TO ORDER REPLACEMENT PARTS KIT: A Replacement Parts Kit contains 9 digits corresponding to customer-specified design options.

1	2	3	4	5	6	7	8	9
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Digit	Order Code	Description
1-2	<b>P7</b>	<b>Pump Configuration</b> For all P700 Pumps
3	<b>K</b> <b>D</b> <b>V</b>	<b>Kit Designator</b> Complete Fluid End Kit* Diaphragm Kit* Valve Kit (diaphragm not included)
4-5	<b>52</b>	<b>Pump Head Version</b> Metallic Pump Head
6	<b>B</b> <b>C</b> <b>S</b> <b>T</b> <b>X</b>	<b>Spring Retainers (Dampening Washers)</b> For Brass pump head (Hastelloy C) For Cast iron pump head (Hastelloy C) For 316L Stainless Steel pump head (Hastelloy C) For Hastelloy C pump head (Hastelloy C) Not included in Diaphragm Kit
7	<b>A</b> <b>E</b> <b>X</b> <b>J</b> <b>W</b> <b>Z</b> <b>Y</b>	<b>Diaphragm &amp; O-ring Material</b> Aflas (with PTFE O-rings) EPDM (EPDM-compatible oil) FKM (Synthetic oil) PTFE (Food-contact oil) PTFE (Synthetic oil) Neoprene (Synthetic oil) Buna-N (Synthetic oil)
8-9	<b>SS</b> <b>TT</b> <b>SC</b> <b>TC</b> <b>TD</b> <b>XX</b>	<b>Check Valve Material (Spring/ Valve Seat / Valve)</b> Elgiloy/ Nitronic / Nitronic 50 Hastelloy C / Hastelloy C/ Hastelloy C Elgiloy / Ceramic / Ceramic Hastelloy C / Ceramic / Ceramic Hastelloy C /Tungsten Carbide / Tungsten Carbide Not included in Diaphragm Kit

\* K&D Kits include hydraulic end oil. Oil not included in V Kit.

## P700 Tool Kit

The P700 Tool Kit (Part No. A03-200-1100) contains the tools listed below. These tools are used to assist in the repair and maintenance of the P700. See the maintenance sections of this manual for specific application.

Ref. P700 No.	Tool Part No.	Tool Description	Quantity/ Kit
1	A03-185-1200	Rotater / Inserter .....	1
2	A03-162-1201	Plunger Lifter .....	1
3	A03-156-1200	Assembly Studs.....	4
4	A03-119-1000	D25 Seat Puller .....	1
5	A03-124-1200	Lever Assembly .....	1
6	A03-125-1000	Plunger Holder .....	1
7	A03-126-1500	Tool Box.....	1

## Kit Contents

Part Number*	Description	Qty	Kit Designator		
			K	D	V
<b>D25-018-___</b>	Diaphragm	5	•	•	
<b>D25-047-___</b>	O-ring, Follower	5	•	•	
<b>D25-074-___</b>	O-ring, Outlet valve	5	•	•	•
<b>D35-073-___</b>	O-ring, Outer manifold	1	•	•	•
<b>D35-080-___</b>	O-ring, Center manifold	1	•	•	•
<b>D25-035-___</b>	O-ring, Valve seat	10	•		•
<b>D25-020-___</b>	Valve seat	10	•		•
<b>D25-021-___</b>	Valve	10	•		•
<b>D25-022-___</b>	Valve spring	10	•		•
<b>D25-092-___</b>	Tetra Seal <sup>1</sup>	10	•		•
<b>D25-023-___</b>	Retainer, Valve spring	10	•		•
<b>D25-125-___</b>	Washer, Dampening	10	•		•
<b>A01-113-3400</b>	Threadlocker	1	•	•	

\* Last four digits of part numbers with \_\_\_ refer to specific material of construction.

<sup>1</sup> Tetra seal is provided with non-metallic spring retainers only.

# P700 Warranty

## Limited Warranty

Wanner Engineering, Inc. ("Wanner") extends to the original purchaser of equipment supplied or manufactured by Wanner and bearing its name, a limited one-year warranty from the date of purchase against defects in material or workmanship, under normal use and service, and provided the equipment is installed, operated and maintained in accordance with instructions supplied by Wanner. Wanner will repair or replace, at its option, defective parts without charge if: (a) you provide written notice of any defect within thirty (30) days from the discovery of the defect; (b) the claim is received by Wanner before the expiration of the warranty period; and (c) such parts are returned with transportation charges prepaid to Wanner Engineering, Inc., 1204 Chestnut Avenue, Minneapolis, Minnesota 55403. A return goods authorization must be received prior to the return of the defective part. No allowance will be made for repairs undertaken without Wanner written consent or approval.

Notwithstanding anything to the contrary, this warranty does not cover:

1. Electric motors (if applicable) not manufactured by Wanner. The warranties, if any, on such equipment are assigned to you by Wanner (without recourse) at the time of purchase.
2. Normal wear and/or damage caused by or related to abrasion, corrosion, abuse, negligence, accident, faulty installation or tampering which impairs normal operation.
3. Transportation costs.

This limited warranty is exclusive, and is in lieu of any other warranties (oral, express, implied or statutory) including, but not limited to, implied warranties of merchantability and fitness for a particular purpose; warranties of non-infringement; warranties arising from course of dealing or usage of trade or any other matter. Any descriptions of the equipment, drawings, specifications, and any samples, models, bulletins, or similar material used in connection with the sale of equipment are for the sole purpose of identifying the equipment and are not to be construed as an express warranty that the equipment will conform to such description. Any field advisory or installation support is advisory only. Every form of liability for direct, special, incidental or consequential damages or loss is expressly excluded and denied. All liability of Wanner shall terminate one (1) year from the date of purchase of the equipment.



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