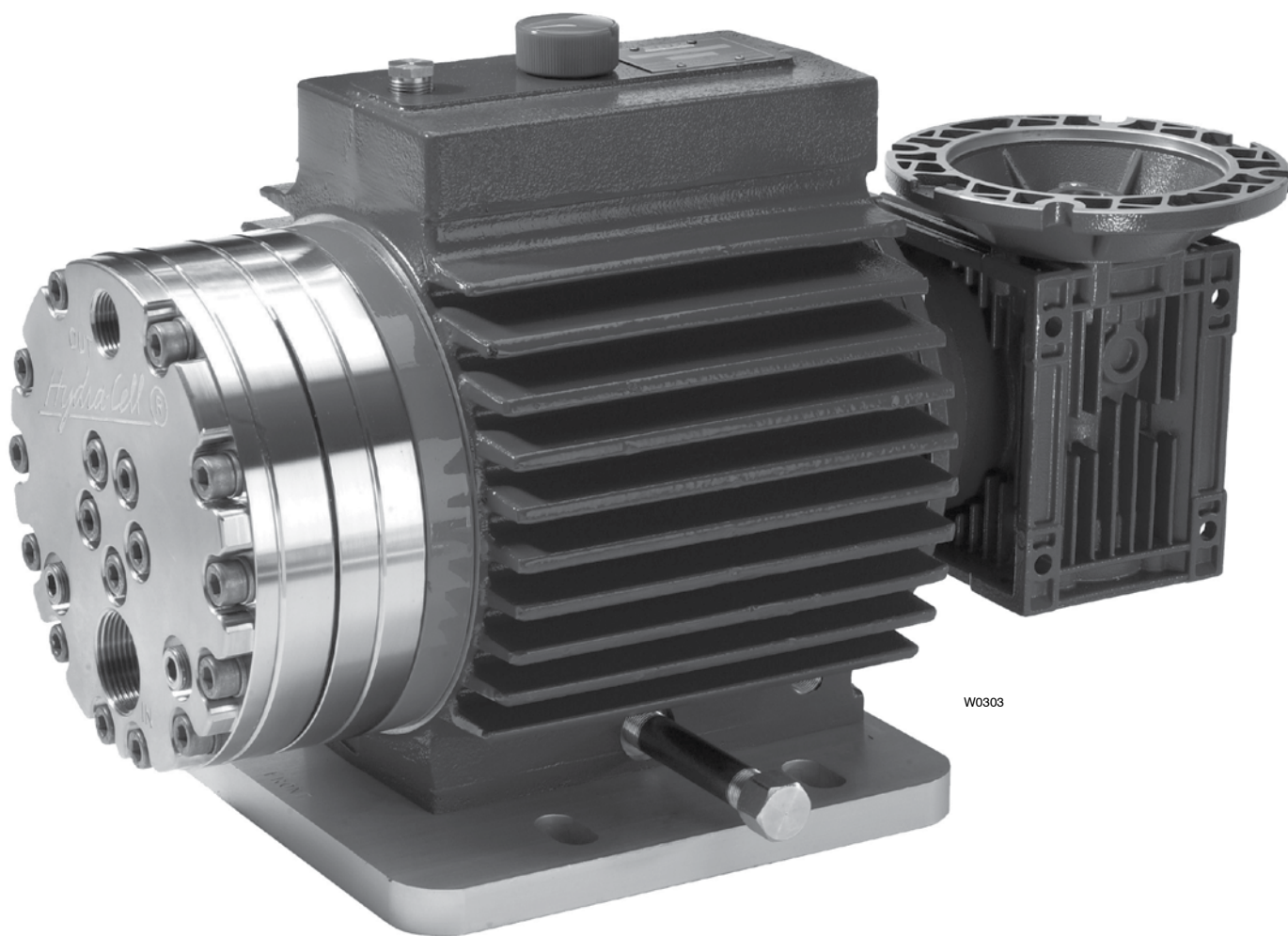


**Hydra·Cell<sup>®</sup>**  
METERING SOLUTIONS™

# ***P500 Metering Pump***

***Installation & Service***

***P500-991-2400***



W0303

***Wanner Engineering, Inc.***

1204 Chestnut Avenue, Minneapolis, MN 55403

TEL: (612) 332-5681 FAX: (612) 332-6937

TOLL-FREE FAX [US only]: (800) 332-6812

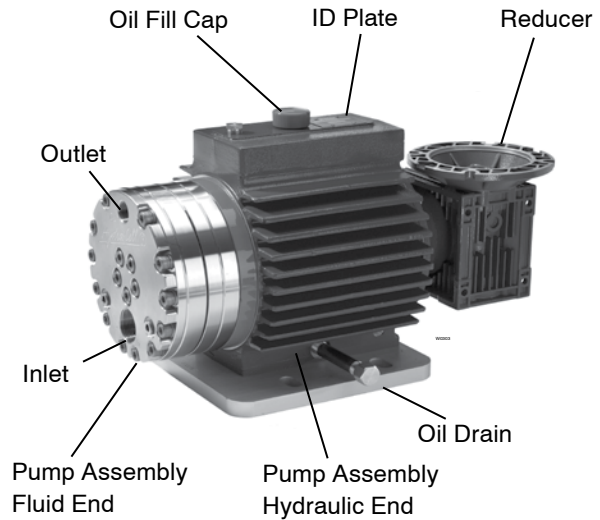
[www.hydra-cell.com/metering](http://www.hydra-cell.com/metering)

email: [sales@wannereng.com](mailto:sales@wannereng.com)

# P500 Contents

	Page
Specifications.....	2
Dimensions .....	3
Installation.....	6
Maintenance.....	8
Fluid End Service .....	9
Troubleshooting.....	11
Fluid End Parts List .....	12
Hydraulic End Parts List .....	14
Hydraulic End Service .....	15
Reducer Parts List .....	16
Replacement Parts Kits .....	19
Warranty.....	20

## Component Identification



## P500 Specifications

<b>Steady State Accuracy</b>	±1%
<b>Linearity</b>	±3%
<b>Repeatability</b>	±3%
<b>Maximum Pressure</b>	
Metallic Head:	2500 psi (173 bar)
<b>Maximum Inlet Pressure</b> 500 psi (35 bar)	
<b>Maximum Temperature</b>	
Metallic Head:	250°F (121°C) – consult factory for temperatures above 160°F (71°C)

<b>Inlet Port</b>	1 1/4 inch NPT or BSPT
<b>Discharge Port</b>	3/4 inch NPT or BSPT
<b>Shaft Rotation</b>	Bi-directional
<b>Oil Capacity</b>	2.2 US quart (2.1 liters)
<b>Weight</b>	
Metallic Head:	160 lbs (72.6 kg)

## Gallons Per Hour (GPH) Maximum Flow at Designated Pressure

GPH Metallic Pump Heads Only				Pump RPM	Gear Ratio	Motor RPM
100 PSI (*)	500 PSI (*)	1500 PSI (*)	2500 PSI (*)			
11.74 (1/4)	11.26 (1/4)	10.25 (1/4)	9.47 (1/2)	18	100:1	1800
14.39 (1/4)	13.89 (1/4)	12.79 (1/2)	11.89 (1/2)	22.5	80:1	
18.82 (1/4)	18.27 (1/4)	17.02 (1/2)	15.92 (3/4)	30	60:1	
22.36 (1/4)	21.78 (1/4)	20.41 (1/2)	19.15 (3/4)	36	50:1	
27.67 (1/4)	27.03 (1/4)	25.49 (3/4)	23.99 (1)	45	40:1	
36.52 (1/4)	35.80 (1/2)	33.95 (3/4)	32.06 (1 1/2)	60	30:1	
43.60 (1/4)	42.81 (1/2)	40.73 (1)	38.52 (1 1/2)	72	25:1	
54.22 (1/4)	53.32 (1/2)	50.89 (1)	48.20 (2)	90	20:1	
71.93 (1/4)	70.84 (1/2)	67.82 (1 1/2)	64.34 (3)	120	15:1	
107.3 (1/4)	105.9 (3/4)	101.7 (2)	96.62 (5)	180	10:1	
142.7 (1/4)	140.9 (1)	135.5 (3)	128.9 (5)	240	7.5:1	3600
213.6 (1/2)	211.0 (1 1/2)	203.3 (5)	193.5 (7 1/2)	360	5:1	
284.4 (1/2)	281.1 (2)	271.0 (7 1/2)	258.0 (10)	480	7.5:1	
426.0 (3/4)	421.3 (5)	406.5 (10)	387.1 (15)	720	5:1	

\*Required Motor HP

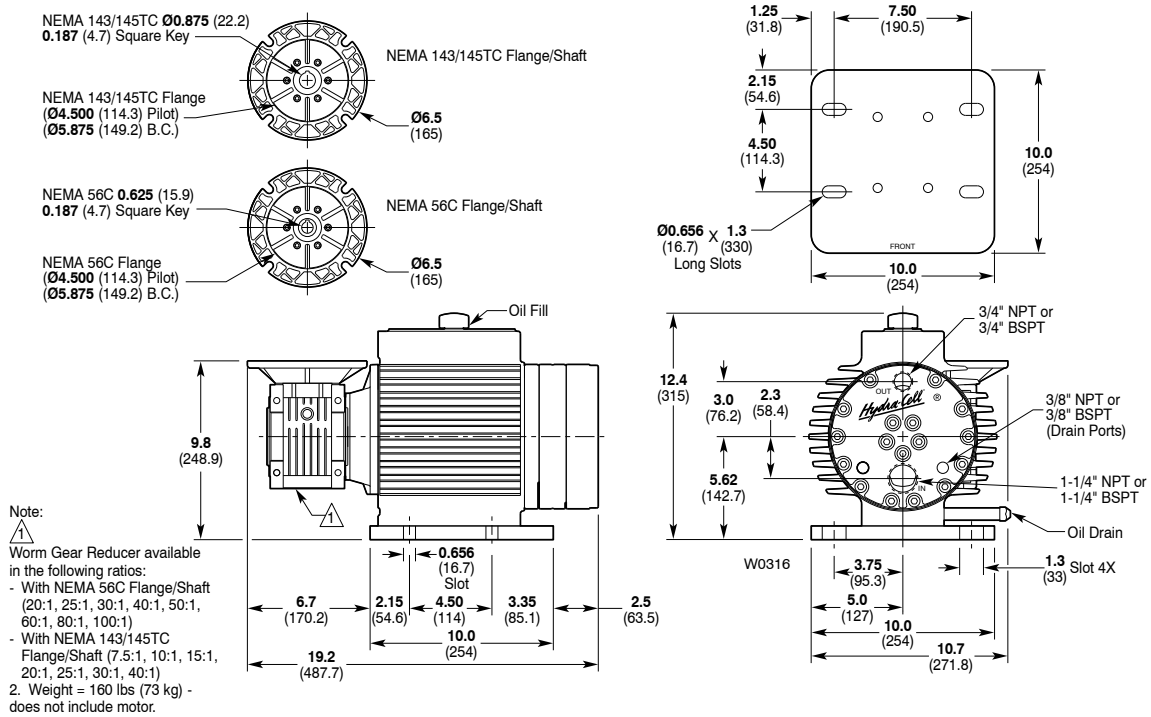
# P500 Dimensions

## P500 Models with Metallic Pumping Head

Inches (mm)

316 Stainless Steel  
Cast Iron  
Hastelloy® C

### P500 Model



# P500 Dimensions

## P500 Models with Metallic Pumping Head

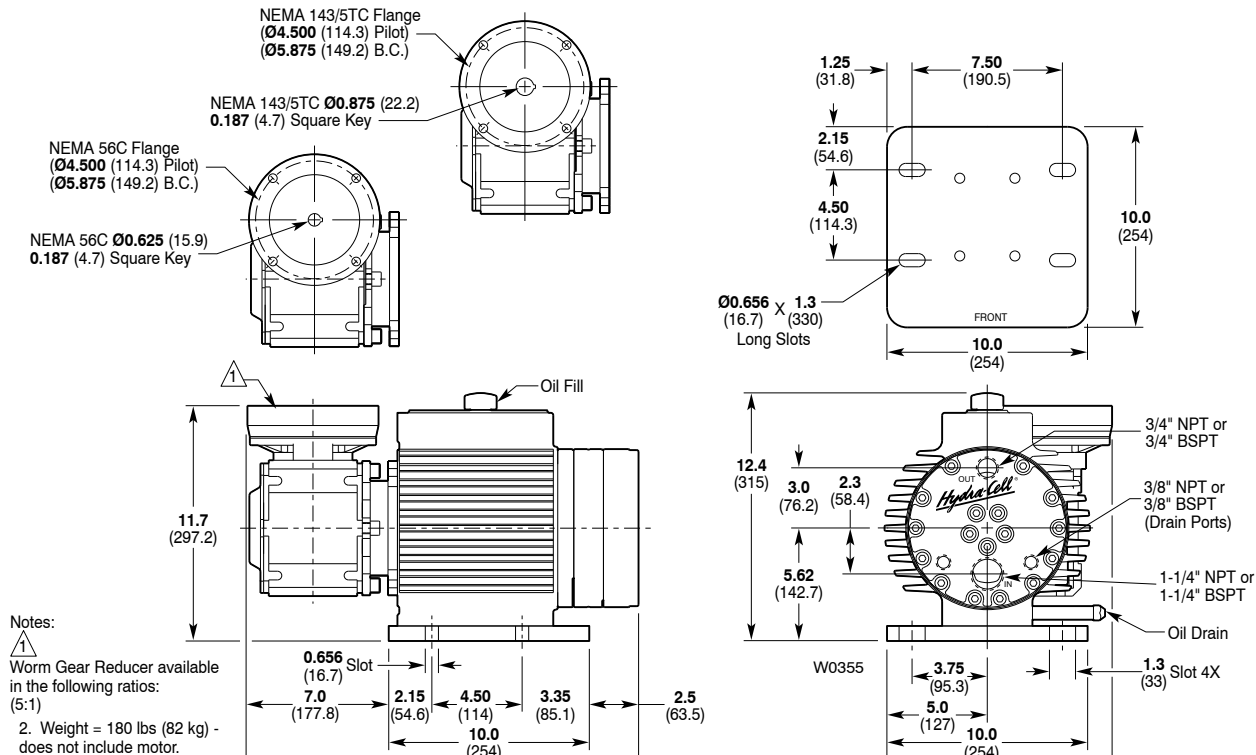
Inches (mm)

316 Stainless Steel

Cast Iron

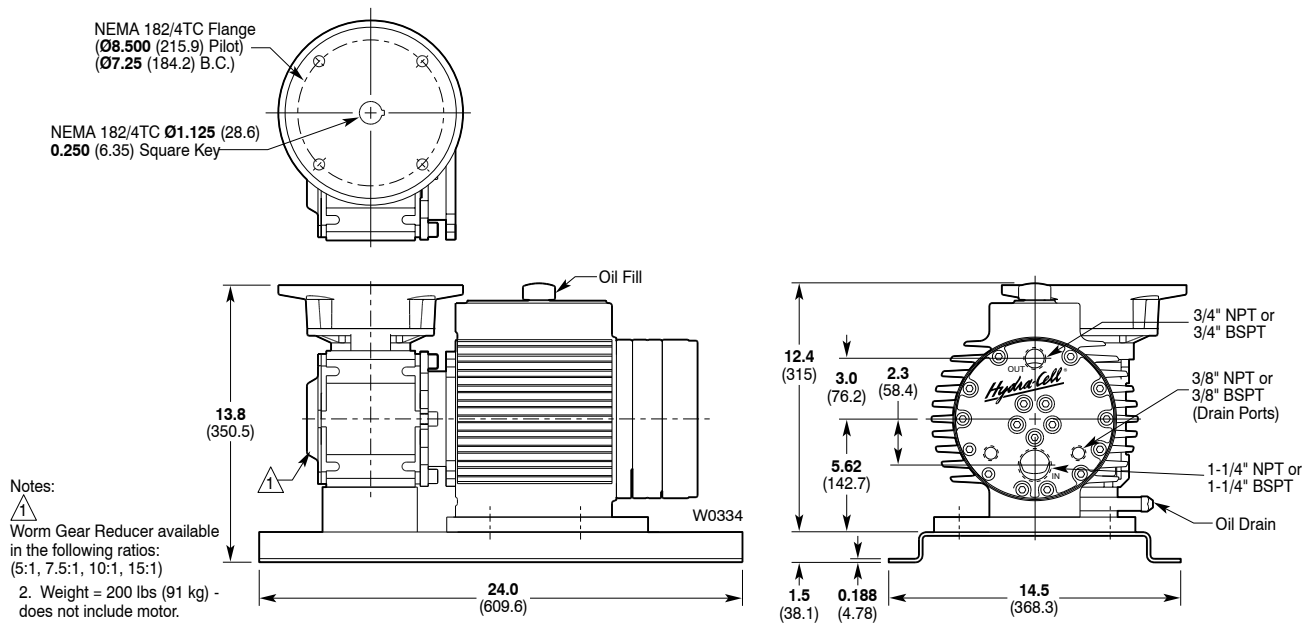
Hastelloy® C

### P500 Model FB75 with 56C or 140TC Flange Adapter



Notes:  
 ⚠️ Worm Gear Reducer available in the following ratios: (5:1)  
 2. Weight = 180 lbs (82 kg) - does not include motor.

### P500 Model FB75 with 180TC Flange Adapter and Base



Notes:  
 ⚠️ Worm Gear Reducer available in the following ratios: (5:1, 7.5:1, 10:1, 15:1)  
 2. Weight = 200 lbs (91 kg) - does not include motor.

# P500 Dimensions

## P500 Models with Metallic Pumping Head

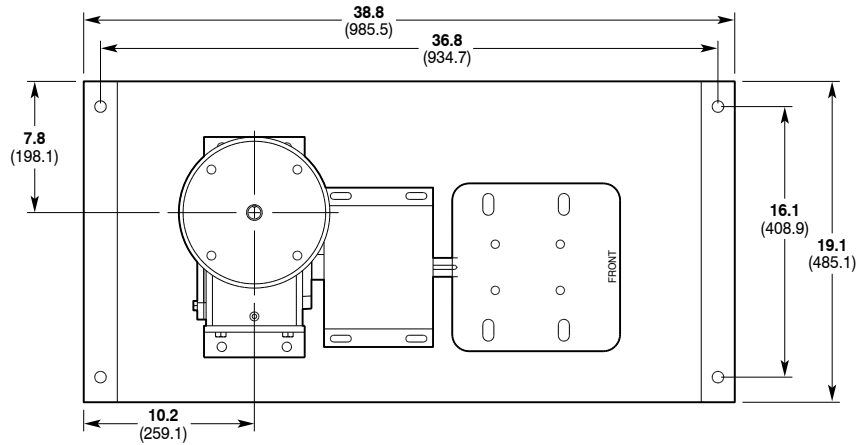
Inches (mm)

316 Stainless Steel

Cast Iron

Hastelloy® C

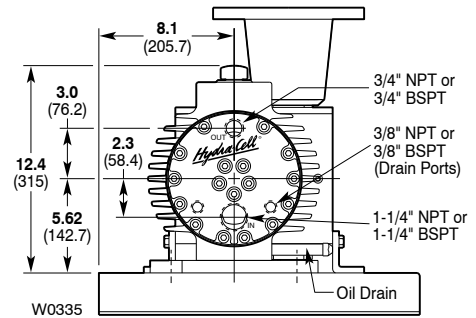
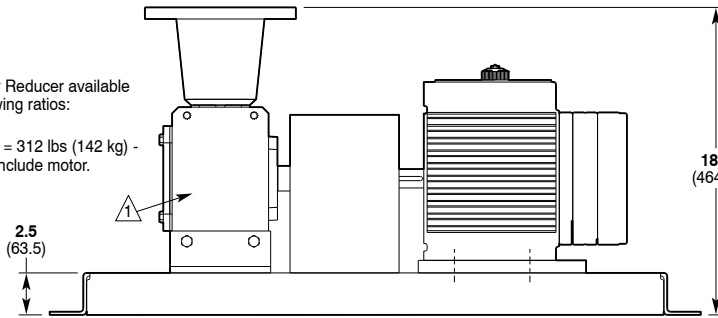
### P500 Model FL232 with 210TC Flange Adapter and Base



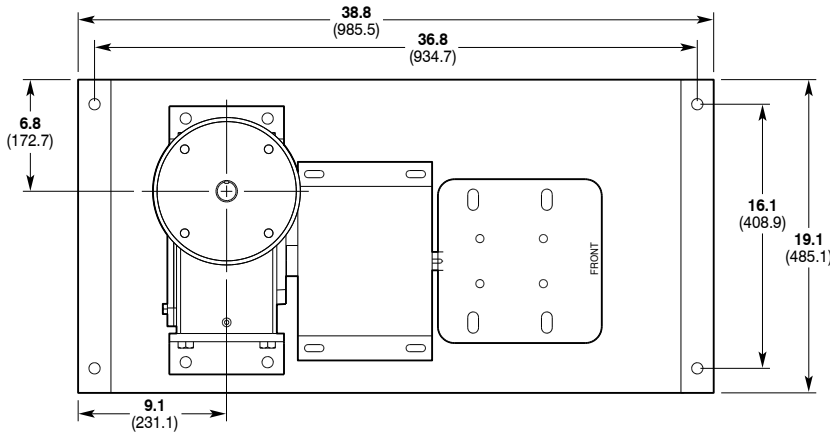
Notes:

1. Worm Gear Reducer available in the following ratios:  
(5:1, 7.5:1)

2. Weight = 312 lbs (142 kg) - does not include motor.



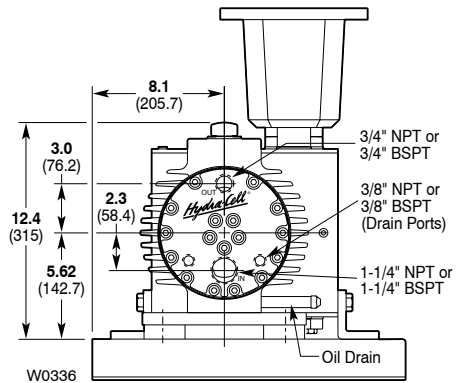
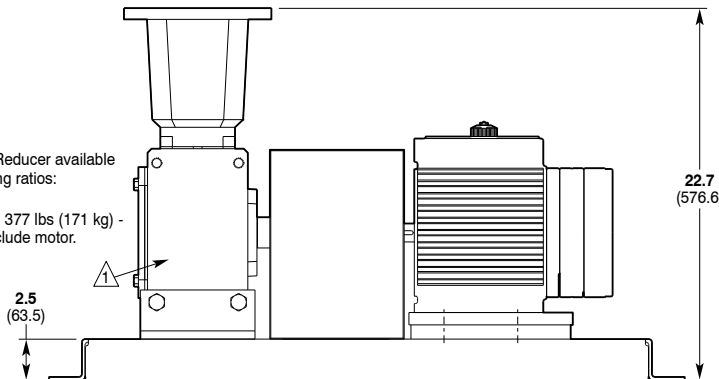
### P500 Model FL242 with 250TC Flange Adapter and Base



Notes:

1. Worm Gear Reducer available in the following ratios:  
(5:1)

2. Weight = 377 lbs (171 kg) - does not include motor.



# P500 Installation

## Location

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

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

Install it 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.

## Accessories

Consult installation drawing below for typical precision 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.

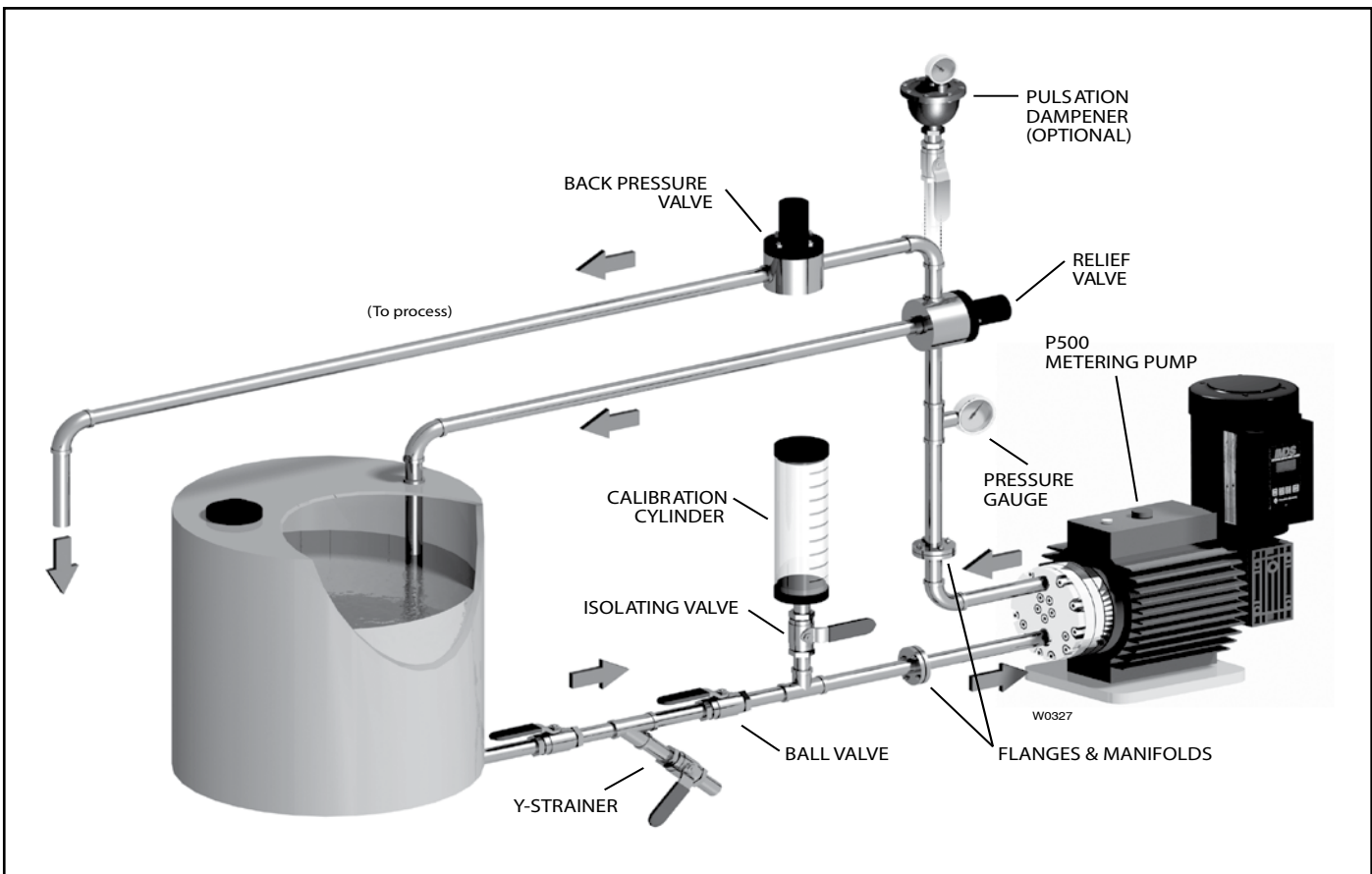
**Positive Displacement.** This is a positive-displacement pump. To avoid severe system damage if the discharge line ever becomes blocked, install a relief valve downstream from the pump. See **Discharge Piping** on page 6.

**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)



# P500 Installation

---

## 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 1-1/2" (38 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 500 psi (35 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.

# P500 Installation

## 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 1/4 inch (6 mm) above the cast surface 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 500 psi (35 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 Procedure

Each individual metering pump put into service must be calibrated in order to accurately determine required pump speed to achieve the desired flow. The capacity curves shown on page 3 represent a typical pump; individual pumps may vary slightly from these curves. 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 Installation drawing on page 5). 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 your system calibration cylinder, flow meter, or some other means. This is considered to be "rated capacity" for your particular metering pump.
3. Measure pump delivery at 75%, 50%, 25%, and 10% of maximum speed just determined. Let pump run for 5 minutes at each speed setting before taking capacity measurement.
4. Plot these values on linear graph paper using horizontal axis for RPM and vertical axis for GPH, or any other unit of measure you may be using for capacity.
5. Draw best-fit straight line through points just plotted. For stable conditions, this line predicts pump speed required to achieve desired flow over 10:1 turndown ratio.

**Note: as pump discharge pressure increases, capacity decreases slightly. For any metering pump there are a series of valid capacity curves that may apply. Use the curve that depends on actual pump discharge pressure and other system conditions. It is critically important to develop a custom capacity curve for each pump and each system.**

# P500 Maintenance

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

## Periodically

Change the oil according to the guidelines below. When changing, remove the drain plug (34). Allow all oil and contaminant to drain out. Catch the oil and dispose of it properly.

### Hours Between Oil Changes @ Various Process Fluid Temperatures

Pressure	<90°F (32°C)	<139°F (60°C)	<180°F (82°C)
<b>Metallic Pump Head</b>			
<1500 psi (104 bar)	4,000	3,000	2,000
<2500 psi (173 bar)	1,500	1,250	1,000

**NOTE: Minimum oil viscosity for proper hydraulic end lubrication is 16-20 cST (80-100 SSU).**

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

Use the appropriate Hydra-Oil for the application.

**Note: P Series replacement parts kits (complete kits and diaphragm kits) include the appropriate oil for each specific 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 (20) may be damaged. Refer to the Fluid-End Service Section. Do not operate the pump with a damaged diaphragm.**

**CAUTION: Do not leave contaminated oil in the pump housing or leave the housing empty. Remove contaminated oil. Dispose of properly. Replace with clean oil.**

Check the inlet pressure periodically with a gauge.



# P500 Fluid End Service

**NOTE:** The number in parentheses are the Reference numbers on the illustration on the preceding page and in the Parts Manual.

This section explains how to disassemble and inspect all easily serviceable parts of the pump. Repair procedures for the hydraulic end (oil reservoir) of the pump are included in a later section of the manual.

**CAUTION:** Do not disassemble the hydraulic end 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:** Do not remove the four socket-head capscrews (29) that go through 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 pump:

- Straightedge (at least 8 in. long)
- Grease or petroleum jelly
- 1/2" drive torque wrench, rated to at least 50 ft-lbs (70 N-m)
- Emery cloth and Scotch-Brite™ pad
- 11/16" socket (3/8" or 1/2" drive)
- 19 mm socket (1/2" drive)
- 3/8" drive socket wrench with extensions
- 1/2" drive socket wrench with extensions
- 5/16" (8 mm) open-end wrench
- Wanner Hydra-Oil (appropriate Grade, as determined by digit 12 of your pump model number).
- Anaerobic seal sealant (for shaft seals if servicing Hydraulic End)
- Wanner D-15 Tool Kit, which includes the following:
  - Valve seat puller
  - Plunger guide lifter
  - 3/32 x 6 in. T-handle hex wrench
  - 8 mm hex bit socket (1/2" drive)
  - Shaft rotator
  - Seal protector
  - Seal inserter
  - 5/16" hex Allen wrench
  - 7/16" 8-point socket (3/8" drive)
  - 6 mm hex Allen wrench

## 1. Remove Manifold (4), Valve Plate (24)

- a. **Manifold (4.)** Use 8 mm hex bit socket included in Wanner D-15 Tool Kit to remove 12 capscrews (2) and five capscrews (1) at front of manifold. Remove and inspect manifold for warping or wear around inlet and outlet ports and flow channels. If wear is excessive replace manifold. To check if manifold is warped, place straightedge across it; check both sides. A warped manifold should be replaced.

- b. **Valve Plate (24.)** Using 8 mm hex bit socket remove capscrew (22). Remove and inspect valve plate (in like manner as manifold) for excessive wear or warping. Replace if necessary.

**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.

## 2. Remove and Inspect Valves (9-20)

**NOTE:** Wanner Valve Kits include items and all O-rings for sealing the manifold to the valve plate. The five inlet and five outlet valve assemblies are different in size and face in opposite directions.

- a. Remove inlet valve seat (10) using seat puller tool included in Wanner D-15 Tool Kit. Inspect valve seat for wear, and replace if necessary.

**NOTE:** Whenever any valve or seat is replaced it is recommended to replace all valve assemblies to ensure the most reliable operation. All necessary parts are included in a replacement Valve Kit.
- b. Remove remaining inlet valve components (11-14) and outlet valve components (17-20) by hand or with small needle nose pliers.
- c. Check spring retainers (14, 20) and replace if worn, cracked, or damaged.
- d. Check valve springs (12, 19) and replace if worn, broken, or shorter than new spring. Never attempt to stretch old spring.
- e. Check valves (11, 18) for wear or damage and replace if necessary. Polishing of valves during operation is normal. If you can feel a ridge in valve surface, valve should be replaced.

**NOTE:** Pumps with plastic spring retainers (14, 20) include Tetra Seal (13, 17 - square section O-ring) between spring retainer and valve seat. Pumps with metal spring retainers do not include Tetra Seal.
- f. Reinstall valve assemblies:
  - Clean valve ports and shoulders in valve plate (24) with Scotch-Brite pad or fine emery cloth. Wash valve plate after cleaning, and lubricate valve ports with compatible grease, oil, or petroleum jelly.
  - Install new O-rings (9, 15) on seats (10, 16) and lubricate all O-rings.
  - Inlet Valves (five center, larger valves). Insert spring retainer (14) into valve plate (24), followed by Tetra seal (13) if spring retainer is plastic. Insert spring (12) into retainer, followed by valve (11) on spring. Finally, insert seat (10) with new O-ring into valve bore with larger I.D. chamfer (seating surface) facing down, towards valve.
  - Outlet Valves (five outer, smaller valves). Insert outlet seat (16) with new O-ring into valve bore with larger I.D. chamfer (seating surface) facing up. Insert Tetra Seal (17) if valve spring retainers are plastic. Insert valve (18) and spring (19) on seat. Finally, insert spring retainer

# P500 Fluid End Service

(20) into valve bore.

- Make sure springs are all properly nested into spring retainers to ensure proper valve performance.

## 3. Inspect and Replace Diaphragms (21)

- Lift diaphragm by one edge, and turn pump shaft until the diaphragm moves up to “top dead center”. This will expose machined cross-holes in valve plunger (51) behind diaphragm.
- Insert a 3/32 x 6 in. hex wrench through one of machined cross-holes, to hold diaphragm up and to keep valve plunger from rotating. Proper size tool is included in Wanner Tool Kit. (Don’t remove tool until new diaphragm is installed in step “f” below.)
- Unscrew diaphragm. Use a 5/16-in. (8-mm) open-end wrench, and turn counterclockwise.
- Remove diaphragm and inspect diaphragm carefully. A damaged diaphragm generally indicates pumping system problems and replacing diaphragm will not solve overall problem. Inspect diaphragm for the following:
  - **Small puncture.** Usually caused by a sharp foreign object in the fluid, or by an ice particle.
  - **Diaphragm pulled away** from the metal insert. Usually caused by excessive inlet vacuum, or by over pressurization of the pump inlet.
  - **Outer diaphragm bead extruded.** Usually caused by over pressurization of the pump or by extremely high temperatures.
  - **Diaphragm becoming stiff** and losing flexibility. Usually caused by pumping a fluid that is incompatible with the diaphragm material.
  - **Cut diaphragm convolute.** Usually caused by excessive inlet vacuum.

**CAUTION: If a diaphragm has ruptured 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.**
- Clean away any spilled oil.
- Install good or new diaphragm and tighten to 10 in.-lbs (110 N-cm).
- Repeat above inspection procedure (and replacement, if necessary) with other four diaphragms.

## 4. Flush Contaminant from Hydraulic End (only if diaphragm has ruptured)

- With valve plate and manifold still removed (see above), remove oil drain cap (26) allow all oil and contaminant to drain out.

- Fill reservoir with kerosene or solvent, manually turn pump shaft to circulate kerosene, and drain. Dispose of this contaminated fluid properly.
- Repeat flushing procedure (step “b” above).
- Fill reservoir with fresh oil, manually turn pump shaft to circulate oil, and drain again.
- Refill reservoir. If oil appears milky, there is still contaminant in reservoir. Repeat flushing procedure until oil appears clean.

## 5. Prime Hydraulic Cells

- With pump **horizontal and the fluid end head removed**, fill reservoir with appropriate Hydra oil for application. Have catch basin for oil that leaks from behind diaphragms when priming. Catch oil and dispose of properly; **do not reuse**.
- All air in oil within hydraulic cell (behind diaphragm) must be forced out by turning shaft (thus pumping piston). Shaft Rotator is included in Wanner D-15 Tool Kit. Rotate shaft two revolutions and refill reservoir. Rotate it two more revolutions and refill again. Continue to do this until oil that is being pumped from back of all five diaphragms is free of air.
- Wipe excess oil from cylinder housing (23) and diaphragms (21).
- Ensure that oil level is 1/4 in (6 mm) above cast surface in upper oil reservoir.
- Replace oil fill cap (28).

## 6. Reinstall Valve Plate (24), Manifold (4)

- Reinstall valve plate (24), with valve assemblies installed as outlined above, on cylinder housing center spud and alignment pin (8).
- Install capscrew (22) with flat washer (3) through center hole in valve plate and torque to 45 ft-lbs (60 N-m).
- Install new O-rings (5, 6, 7) into grooves in front side of valve plate. Use grease or petroleum jelly to hold in place.
- Reinstall manifold (4) over alignment pin (8), engaging center spud of manifold into center of valve plate.
- Install capscrews (1) with flat washers (3) through five center holes in manifold. Thread each capscrew in several turns, but do not torque.
- Install capscrews (2) with flat washers (3) through twelve outer holes at perimeter of manifold. Thread each capscrew in several turns, but do not torque.
- Return to five capscrews at center of manifold and alternately tighten opposite bolts until all are secure. Torque to 45 ft-lbs (60 N-m).
- Return to twelve capscrews at perimeter of manifold and alternately tighten opposite bolts until all are secure. Torque to 45 ft-lbs (60 N-m).
- Recheck all capscrews for tightness and proper torque, starting with five at center of manifold, then twelve at perimeter.

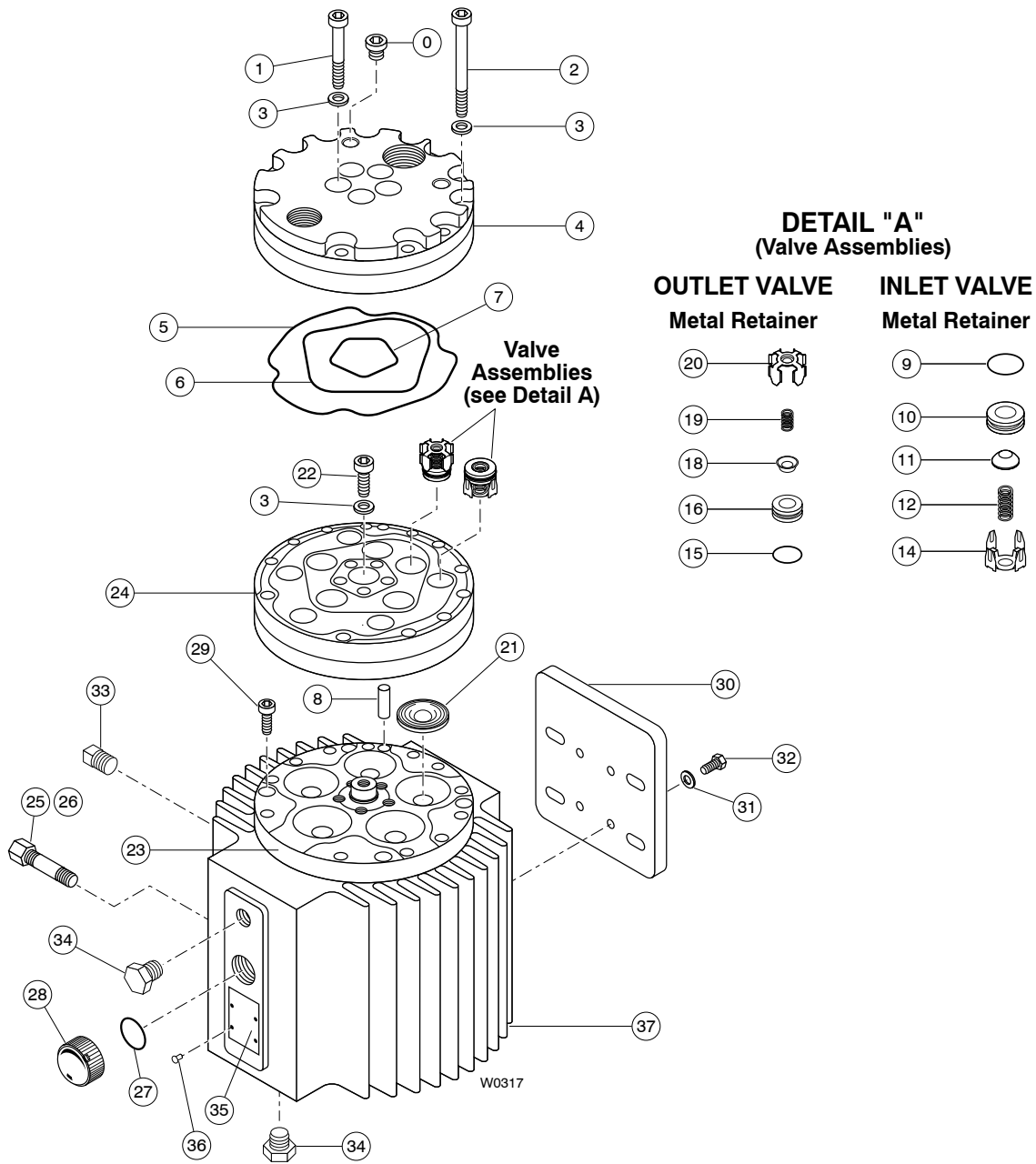
# P500 Troubleshooting

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.
	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 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.
	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.

# P500 Fluid End Parts List

## Bolt Torque Specifications

Ref. No.	Assembly Torque
1	45 ft-lbs (60 N-m)
2	45 ft-lbs (60 N-m)
22	45 ft-lbs (60 N-m)
29	15 ft-lbs (20 N-m)
32	45 ft-lbs (60 N-m)



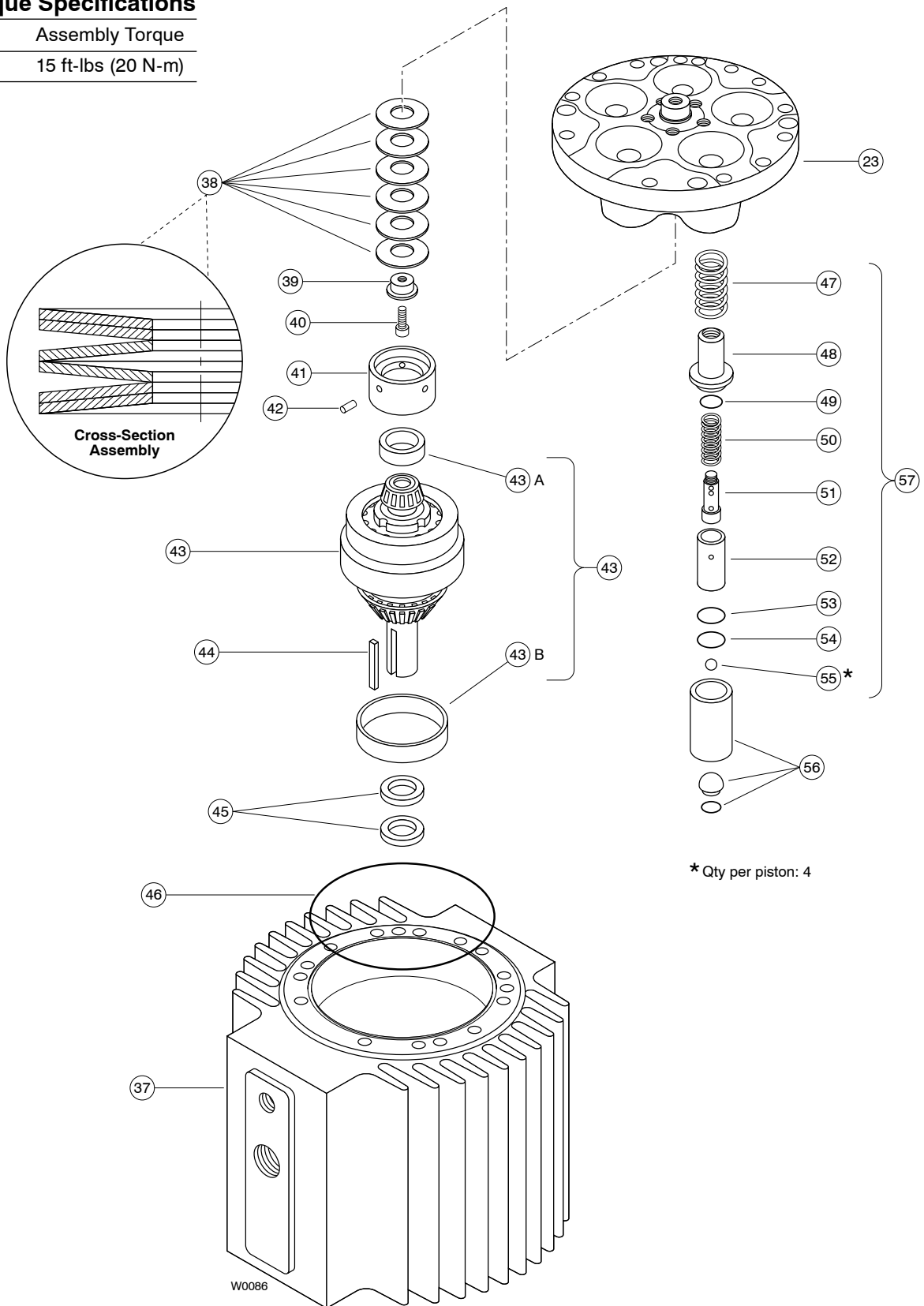
# P500 Fluid End Parts List

Ref. No.	Part Number	Description	Quantity/ Pump	Ref. No.	Part Number	Description	Quantity/ Pump
0	D25-038-2017	Plug, Hastelloy C, NPT .....	2	16	D15-020-2011	Valve Seat, outlet, Nitronic 50 .....	5
	D25-038-2211	Plug, 316 SST, NPT .....	2		D15-020-2017	Valve Seat, outlet, Hastelloy C .....	5
	G25-038-2017	Plug, Hastelloy C, BSPT .....	2	17	D03-092-2110	Tetra Seal, outlet, Buna .....	5
	G25-038-2211	Plug, 316 SST, BSPT .....	2		D03-092-2111	Tetra Seal, outlet, Viton .....	5
1	G15-081-2012	Screw, cap, socket head, sst .....	5	18	D03-021-1011	Valve, outlet, Nitronic 50 .....	5
2	G10-024-2012	Screw, cap, socket head, sst .....	12		D03-021-1017	Valve, outlet, Hastelloy C .....	5
3	100-037	Washer, flat, sst .....	17	19	D15-022-3113	Valve Spring, outlet, Hastelloy C .....	5
4	D15-004-1012	Manifold, 316L SST, NPT .....	1		D15-022-3114	Valve Spring, outlet, Elgiloy .....	5
	D15-004-1018	Manifold, Hastelloy C, NPT .....	1	20	D03-023-1017	Retainer, outlet valve spring, Hastelloy C .....	5
	G15-004-1012	Manifold, 316L SST, BSPT .....	1	21	D15-018-1220	Diaphragm, Buna-N-XS .....	5
	G15-004-1018	Manifold, Hastelloy C, BSPT .....	1		D15-018-1215	Diaphragm, Viton-XT .....	5
5	D40-073-2110	O-ring, outer manifold, Buna .....	1	22	G10-087-2010	Screw, cap soc hd .....	1
	D40-073-2111	O-ring, outer manifold, Viton .....	1	23	G15-002-1010	Cylinder Housing .....	1
6	D15-073-2110	O-ring, middle manifold, Buna .....	1	24	D15-003-1012	Valve Plate, 316L SST .....	1
	D15-073-2111	O-ring, middle manifold, Viton .....	1		D15-003-1018	Valve Plate, Hastelloy C .....	1
7	D35-080-2120	O-ring, inner manifold, Buna .....	1	25	D25-077-2210	Pipe, Brass .....	1
	D35-080-2121	O-ring, inner manifold, Viton .....	1	26	D25-078-2210	Pipe Cap, Brass .....	1
8	D15-026-2210	Pin, dowel .....	1	27	D10-080-2110	O-ring, Buna .....	1
9	D10-035-2110	O-ring, inlet valve seat, Buna .....	5	28	D03-039-1030	Cap with O-ring, oil fill .....	1
	D10-035-2111	O-ring, inlet valve seat, Viton .....	5	29	C22-015-2014	Screw, cap soc hd .....	4
10	D15-020-1011	Valve Seat, inlet, Nitronic 50 .....	5	30	D15-025-1033	Base Plate .....	1
	D15-020-1017	Valve Seat, inlet, Hastelloy C .....	5	31	G35-084-2010	Lockwasher .....	4
11	D10-021-1011	Valve, inlet, Nitronic 50 .....	5	32	G35-087-2010	Screw, cap hex hd .....	4
	D10-021-1017	Valve, inlet, Hastelloy C .....	5	33	D35-111-2010	Plug, magnetic .....	1
12	D10-022-3117	Valve Spring, inlet, Elgiloy .....	5	34	D25-038-2210	Plug, Brass .....	2
	D10-022-3123	Valve Spring, inlet, Hastelloy C .....	5	35	D10-040-2420	Nameplate .....	1
13	D10-092-2110	Tetra Seal, inlet, Buna .....	5	36	D10-112-2200	Rivet .....	4
	D10-092-2111	Tetra Seal, inlet, Viton .....	5	37	G15-001-1033	Pump Housing .....	1
14	D10-023-1017	Retainer, inlet valve spring, .....	5				
		Hastelloy C .....					
15	D25-046-2110	O-ring, outlet valve seat, Buna .....	5				
	D25-046-2111	O-ring, outlet valve seat, Viton .....	5				

# P500 Hydraulic End Parts List

## Bolt Torque Specifications

Ref. No.	Assembly Torque
40	15 ft-lbs (20 N-m)



\* Qty per piston: 4

# P500 Hydraulic End Parts List

Ref. No.	Part Number	Description	Quantity/ Pump
38	D15-075-3110	Spring, disk .....	6
39	D15-112-1010	Guide, disk spring .....	1
40	G15-115-2010	Screw, cap, soc hd.....	1
41	D15-012-1010	Plate, bearing adjustment.....	1
42	D15-110-2210	Pin, dowel.....	1
43	D15-007-1210	(X) Cam Assembly <sup>1</sup> .....	1
44	D25-085-2211	Key, shaft .....	1
45	H25-031-2112	Seal shaft .....	2
46	D15-037-2110	O-ring, Buna.....	1
47	D10-019-3110	Spring, piston return.....	5
48	D10-042-1010	Retainer, spring .....	5
49	D10-046-2110	O-ring, Buna.....	5
50	D10-045-3110	Spring, sleeve valve.....	5
51	D15-044-1010	Plunger, valve.....	5
52	D10-043-1010	Cylinder, valve.....	5
53	D10-034-2110	O-ring, Buna.....	5
54	D10-041-1010	Washer, retaining .....	5
55	D10-015-3010	Ball, steel.....	20
56	D15-014-1209	Piston (with foot, retainer and balls) ...	5
57	D15-014-1210	Piston Assembly, Buna <sup>2</sup> .....	5

- <sup>1</sup> Cam Assembly includes cam, shaft, wobble plate, bearings, and cups. It is only available as an assembly.
- <sup>2</sup> Piston Assembly includes items 47 through 55.

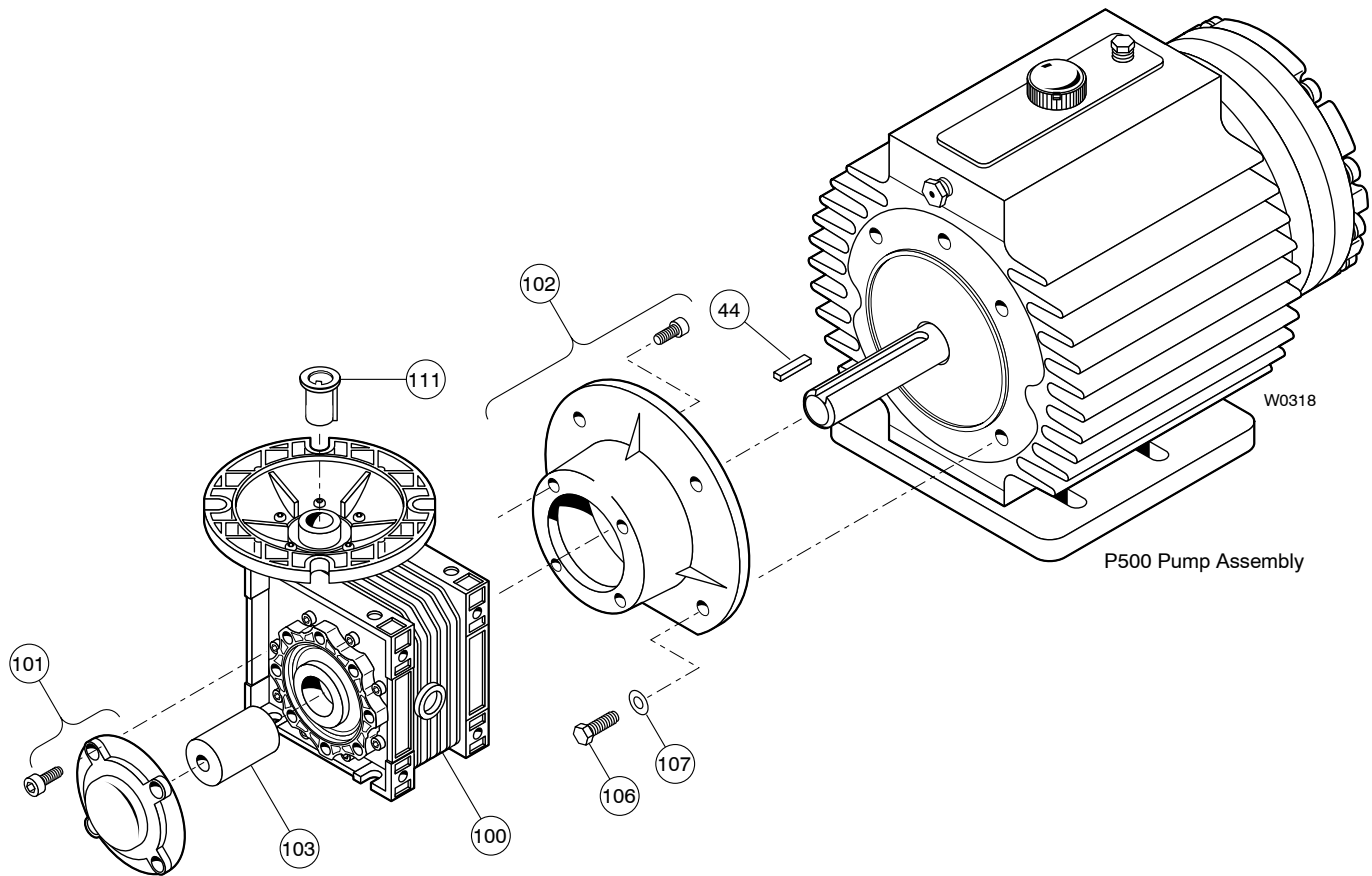
## Hydraulic End Service

**CAUTION: Do not disassemble or service the hydraulic end.**

**For assistance, contact Wanner Engineering at (612)332-5681 for the distributor in your area.**

# P500 Reducer Parts List (1 of 3)

Ref No. Part Number	Description	Quantity/ Pump	Ref No. Part Number	Description	Quantity/ Pump
100 112-331	Reducer, 7.5:1 ratio, 56C (requires item 111) .....	1	101 112-312	Kit, Protective Cover .....	1
112-332	Reducer, 10:1 ratio, 56C (requires item 111) .....	1	102 112-313	Kit, Output Flange, FC .....	1
	Reducer, 10:1 ratio, 143/145TC .....	1	103 112-320	Shaft Key Retainer .....	1
112-333	Reducer, 15:1 ratio, 56C (requires item 111) .....	1	106 A04-046-2012	Screw, hex hd .....	4
	Reducer, 15:1 ratio, 143/145TC .....	1	107 D40-048-2010	Washer, flat .....	4
112-304	Reducer, 20:1 ratio, 56C .....	1	111 112-350	Motor Adapter .....	1
112-334	Reducer, 20:1 ratio, 143/145TC .....	1	44 D25-085-2211	Key, shaft .....	Ref
112-305	Reducer, 25:1 ratio, 56C .....	1			
112-335	Reducer, 25:1 ratio, 143/145TC .....	1			
112-306	Reducer, 30:1 ratio, 56C .....	1			
112-336	Reducer, 30:1 ratio, 143/145TC .....	1			
112-307	Reducer, 40:1 ratio, 56C .....	1			
112-337	Reducer, 40:1 ratio, 143/145TC .....	1			
112-308	Reducer, 50:1 ratio, 56C .....	1			
112-309	Reducer, 60:1 ratio, 56C .....	1			
112-310	Reducer, 80:1 ratio, 56C .....	1			
112-311	Reducer, 100:1 ratio, 56C .....	1			

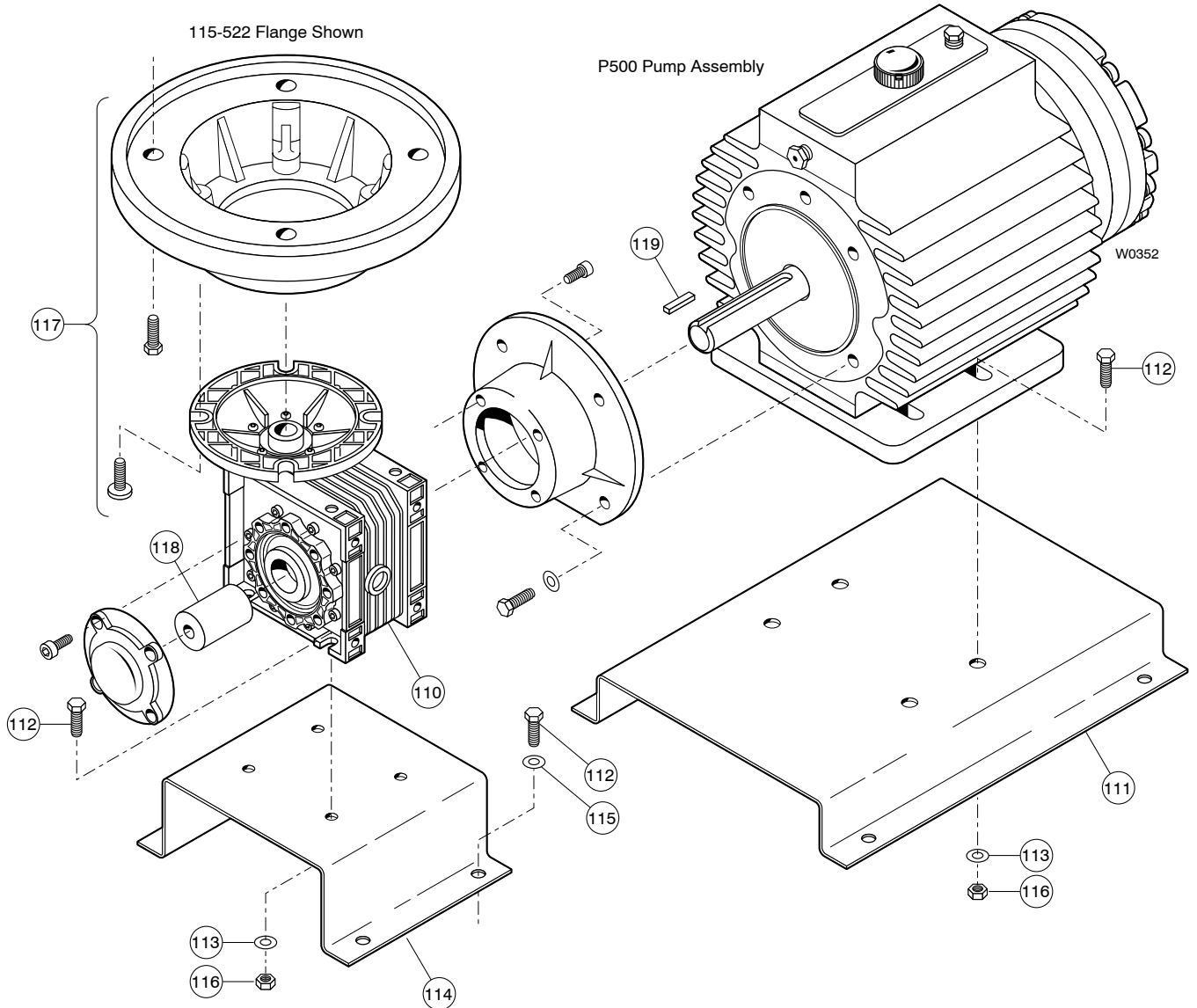




# P500 Reducer Parts List (2 of 3)

Ref No.	Part Number	Description	Quantity/ Pump	Ref No.	Part Number	Description	Quantity/ Pump
110	112-500	Reducer, 5:1 ratio, 56C .....	1	117	112-520	Flange, input, 56C.....	1
		Reducer, 5:1 ratio, 143/145TC .....	1		112-521	Flange, input, 143/145TC.....	1
		Reducer, 5:1 ratio, 182/184TC .....	1		112-522	Flange, input, 182/184TC.....	1
	112-501	Reducer, 7.5:1 ratio, 143/145TC .....	1			Screw, cap, 1/2 in. (part of 117) .....	4
		Reducer, 7.5:1 ratio, 182/184TC .....	1			Screw, cap, M8 (part of 117) .....	4
	112-502	Reducer, 10:1 ratio, 182/184TC .....	1	118	112-525	Shaft.....	1
	112-503	Reducer, 15:1 ratio, 182/184TC .....	1	119	D25-085-2211	Key, 2 inch.....	1
111*	112-517	Base, 182/184TC .....	1				
112*	S1256-014	Screw, SST, 182/184TC.....	12				
113*	100-657	Washer, flat, SST, 182/184TC.....	12				
114*	112-519	Support, SST, 182/184TC.....	2				
115*	D10-048-2012	Washer, lock, SST, 182/184TC .....	4				
116*	100-036	Nut, lock, SST, 182/184TC.....	4				

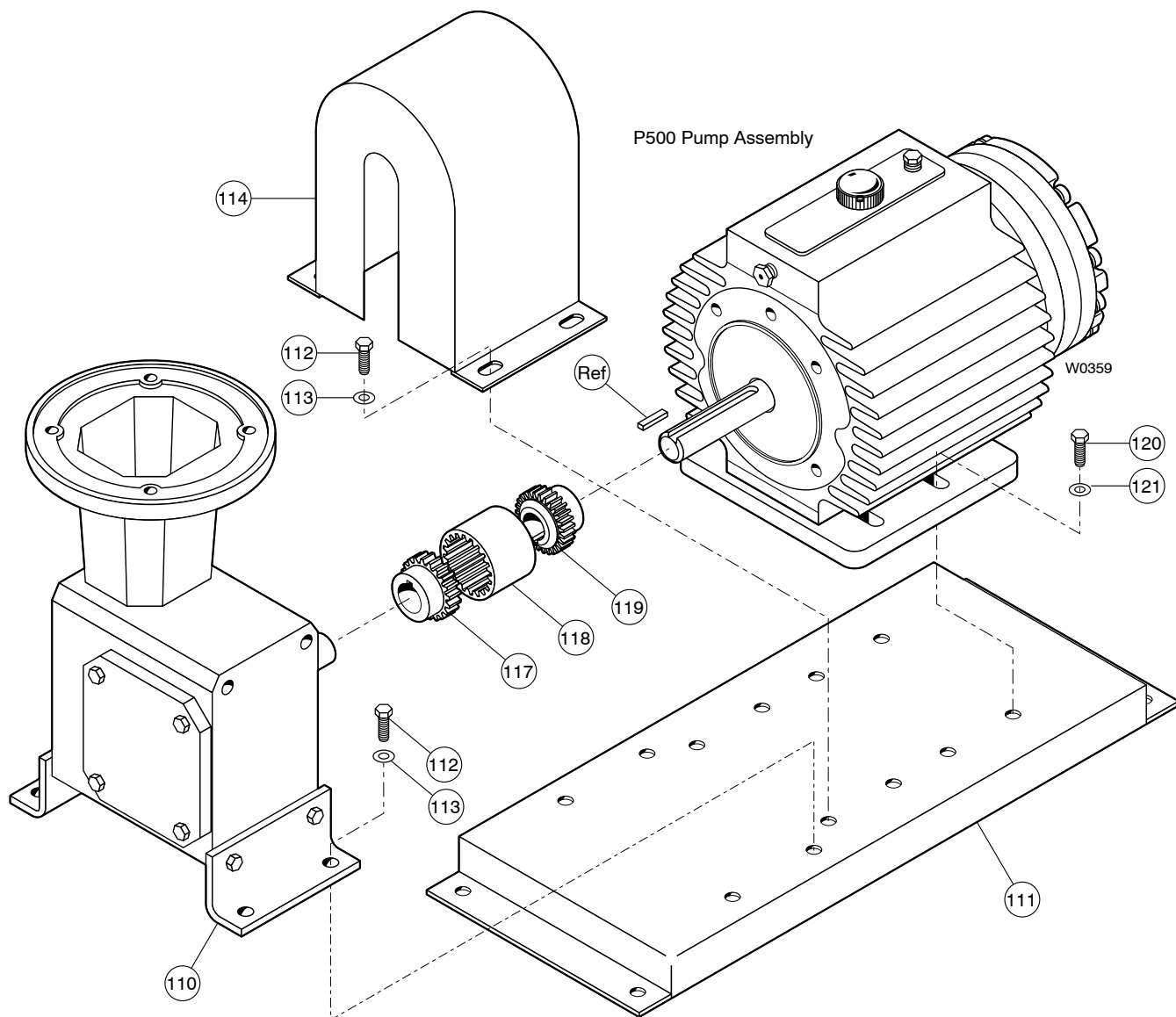
\* Used with 182/184TC reducers only.



# P500 Reducer Parts List (3 of 3)

Ref No.	Part Number	Description	Quantity/ Pump
110	112-700	Reducer, 5:1 ratio, 213/215TC .....	1
	112-701	Reducer, 7.5:1 ratio, 213/215TC .....	1
	112-800	Reducer, 5:1 ratio, 254/256TC .....	1
111	112-717	Base .....	1
112	100-913	Screw, SST.....	8
113	D10-048-2012	Washer, flat, SST.....	8
114	112-821	Guard, 213/215TC.....	1
	112-822	Guard, 254/256TC.....	1
117	A04-116-2205	Hub, coupling, 213/215TC.....	1
	A04-118-2203	Hub, coupling, 254/256TC.....	1
118	A04-115-2200	Sleeve, coupling, 213/215TC. ....	1
	A04-117-2200	Sleeve, coupling, 254/256TC. ....	1

Ref No.	Part Number	Description	Quantity/ Pump
119	A04-116-2201	Hub, coupling, 213/215TC.....	1
	A04-118-2201	Hub, coupling, 254/256TC.....	1
120	100-989	Screw, SST.....	4
121	C22-018-3102	Washer, flat, SST.....	4



# P500 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
---	---	---	---	---	---	---	---	---

Digit	Order Code	Description
1-2	<b>P5</b>	<b>Pump Configuration</b> For all P500 Pumps
3		<b>Kit Designator</b>
	<b>K</b>	Complete Fluid End Kit*
	<b>D</b>	Diaphragm Kit*
	<b>V</b>	Valve Kit
4-5		<b>Pump Head Version</b>
	<b>51</b>	Standard
6		<b>Spring Retainers/Dampening Washers</b>
	<b>S</b>	For 316 Stainless Steel pump head
	<b>T</b>	For Hastelloy® C pump head
	<b>X</b>	Not included in Diaphragm Kit
7		<b>Diaphragm &amp; O-ring Material</b>
	<b>G</b>	Viton®-XT
	<b>S</b>	Viton®-XT (Food Contact Oil)
	<b>X</b>	Viton®-XT (Synthetic Oil)
	<b>T</b>	Buna-N-XS
	<b>F</b>	Buna-N-XS (Food Contact Oil)
	<b>Y</b>	Buna-N-XS (Synthetic Oil)
8-9		<b>Check Valve Material</b> <b>(Valve Spring / Valve &amp; Seat)</b>
	<b>SS</b>	316 SST / 316 SST
	<b>TT</b>	Hastelloy® C / Hastelloy® C
	<b>XX</b>	Not included in Diaphragm Kit

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

## Kit Contents

Part Number*	Description	Qty	Kit Designator		
			K	D	V
<b>D15-018-___</b>	Diaphragm	5	•	•	
<b>D40-073-___</b>	O-ring, outer manifold	1	•	•	•
<b>D15-073-___</b>	O-ring, middle manifold	1	•	•	•
<b>D35-080-___</b>	O-ring, inner manifold	1	•	•	•
<b>D10-035-___</b>	O-ring, valve seat, inlet	5	•		•
<b>D15-020-___</b>	Valve seat, inlet	5	•		•
<b>D10-021-___</b>	Valve, inlet	5	•		•
<b>D10-022-___</b>	Valve spring, inlet	5	•		•
<b>D10-023-___</b>	Retainer, valve spring, inlet	5	•		•
<b>D25-046-___</b>	O-ring, valve seat, outlet	5	•		•
<b>D15-020-___</b>	Valve seat, outlet	5	•		•
<b>D03-021-___</b>	Valve, outlet	5	•		•
<b>D03-022-___</b>	Valve spring, outlet	5	•		•
<b>D10-023-___</b>	Retainer, valve spring, outlet	5	•		•
<b>A01-113-3400</b>	Threadlocker	1	•		•
	Hydraulic End Oil	(2.5 qt)			

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

---

### **Limited Warranty**

Wanner Engineering, Inc. extends to the original purchaser of equipment manufactured by it and bearing its name, a limited one-year warranty from the date of purchase against defects in material or workmanship, provided that the equipment is installed and operated in accordance with the recommendations and instructions of Wanner Engineering, Inc. Wanner Engineering, Inc. will repair or replace, at its option, defective parts without charge if such parts are returned with transportation charges prepaid to Wanner Engineering, Inc., 1204 Chestnut Avenue, Minneapolis, Minnesota 55403.

This warranty does not cover:

1. The electric motors (if any), which are covered by the separate warranties of the manufacturers of these components.
2. Normal wear and/or damage caused by or related to abrasion, corrosion, abuse, negligence, accident, faulty installation or tampering in a manner which impairs normal operation.
3. Transportation costs.

This limited warranty is exclusive, and is in lieu of any other warranties (express or implied) including warranty of merchantability or warranty of fitness for a particular purpose and of any non-contractual liabilities including product liabilities based on negligence or strict liability. Every form of liability for direct, special, incidental or consequential damages or loss is expressly excluded and denied.



**1204 Chestnut Avenue, Minneapolis, MN 55403**  
**TEL: (612) 332-5681 FAX: (612) 332-6937**  
**TOLL-FREE FAX [US only]: (800) 332-6812**

**[www.hydra-cell.com/metering](http://www.hydra-cell.com/metering)**  
**email: [sales@wannereng.com](mailto:sales@wannereng.com)**