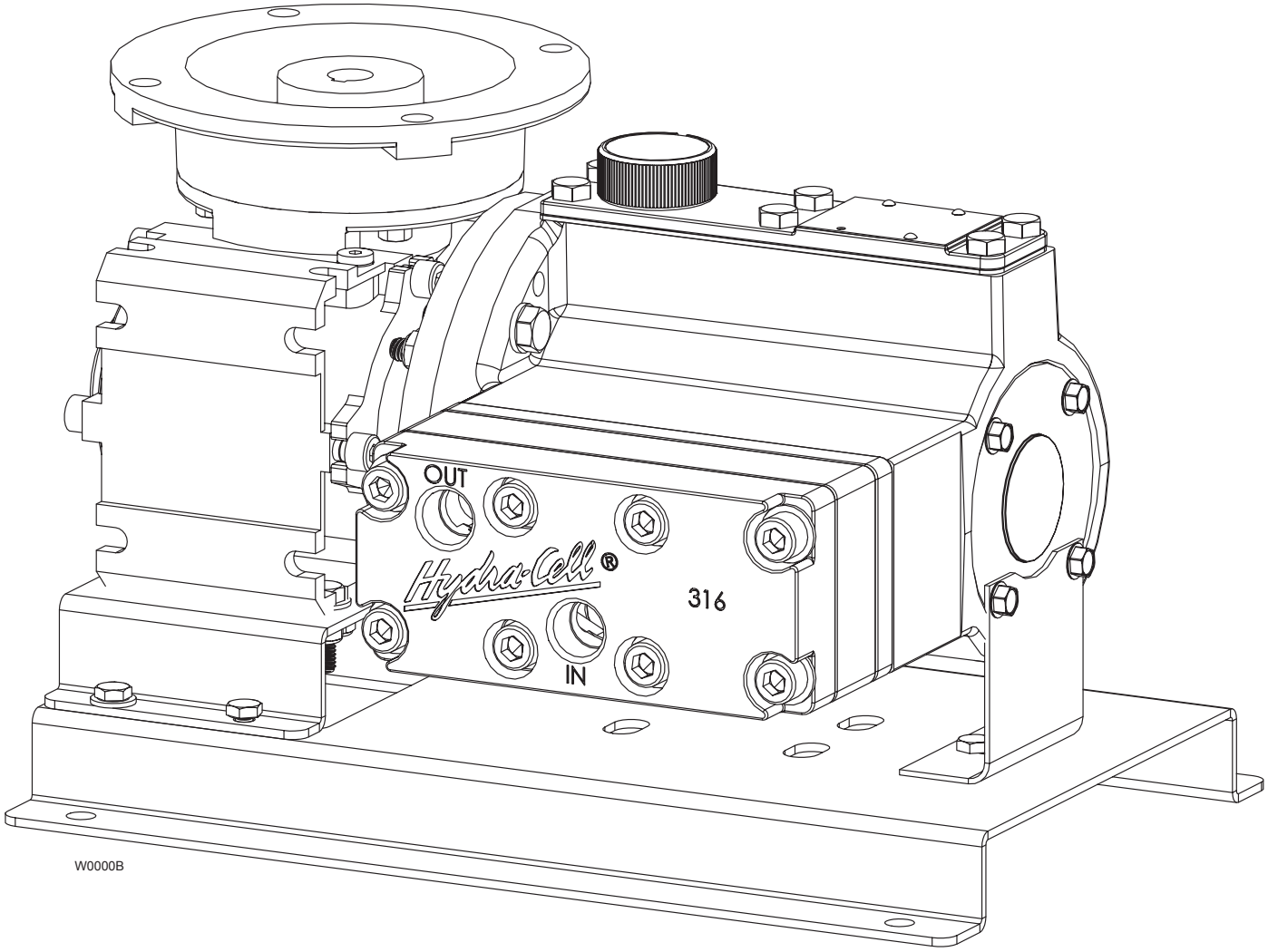
Hydra-Cell®
METERING SOLUTIONS™

P300 Metering Pump

Installation, Operation & Maintenance

P300-991-2400C



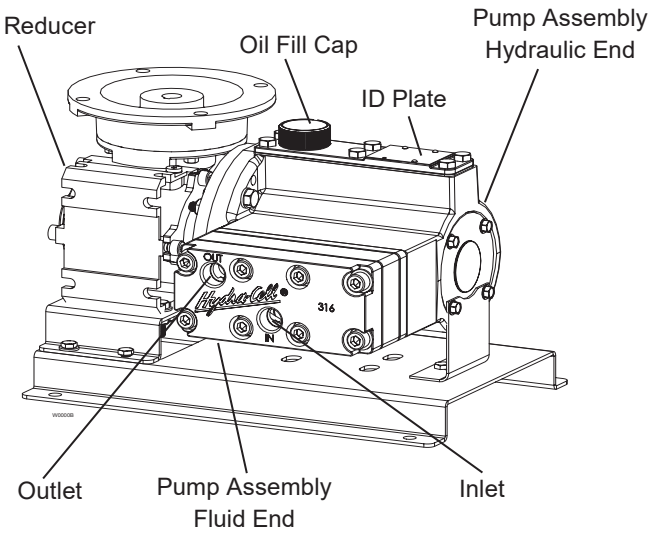
W0000B

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
email: sales@wannereng.com

CE

P300 Contents

Component Identification



P300 Operation

Hydra-Cell Metering Solutions Pumps are hydraulically-actuated, hydraulically-balanced diaphragm metering pumps that exceed API 675 performance standards of ±1% steady state accuracy, ±3% linearity and ±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 and P600). 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.

P300 Specifications

Diaphragms per Liquid End	3 (non Kel-Cell pistons)
Flow Control	Electronic variable speed drive
Steady State Accuracy	±1%
Linearity	±3%
Repeatability	±3%
Maximum Pressure	
Metallic Head:	2500 psi (173 bar)
Maximum Inlet Pressure	500 psi (35 bar)
Fluid Operating Temperatures*	
Metallic Head:	250°F (121°C)
* Consult factory for correct component selection for temperatures from 160˚F (71˚C) to 250˚F (121˚C).	
Inlet Port	1/2 inch NPT or BSPT
Discharge Port	1/2 inch NPT or BSPT
Maximum Solids	500 microns
Shaft Rotation	Bi-directional
Materials Used	See Replacement Parts Kits Section for individual pump materials.
Oil Capacity	1.1 US quart (1.05 liters)
Weight	Metallic Head: 54.5 lbs (24.7 kg)

P300 Specifications (Cont'd)

Performance Maximum Flow at Designated Pressure - Imperial

Metallic Pump Heads (gph)				Pump	Gear	Motor
100 psi	500 psi	1500 psi	2500 psi	rpm	Ratio	rpm
3.221 (¼)	3.183 (¼)	3.014 (½)	2.741 (½)	30	60:1	1800
3.895 (¼)	3.849 (¼)	3.655 (½)	3.350 (½)	36	50:1	
4.939 (¼)	4.882 (¼)	4.607 (½)	4.272 (½)	45	40:1	
6.639 (¼)	6.548 (¼)	6.194 (½)	5.786 (½)	60	30:1	
7.999 (¼)	7.881 (¼)	7.463 (½)	6.998 (½)	72	25:1	
10.04 (¼)	9.880 (¼)	9.368 (½)	8.815 (¾)	90	20:1	
13.44 (¼)	13.21 (¼)	12.54 (½)	11.84 (¾)	120	15:1	
20.24 (¼)	19.88 (¼)	18.89 (¾)	17.90 (1)	180	10:1	
27.03 (¼)	26.54 (½)	25.24 (¾)	23.96 (1½)	240	7.5:1	
40.63 (¼)	39.87 (½)	37.93 (1)	36.08 (1½)	360	5:1	
54.23 (¼)	53.20 (¾)	50.63 (1½)	48.19 (1½)	480	7.5:1	3600
81.42 (½)	79.85 (1)	76.02 (2)	72.43 (3)	720	5:1	

( ) Required Motor hp

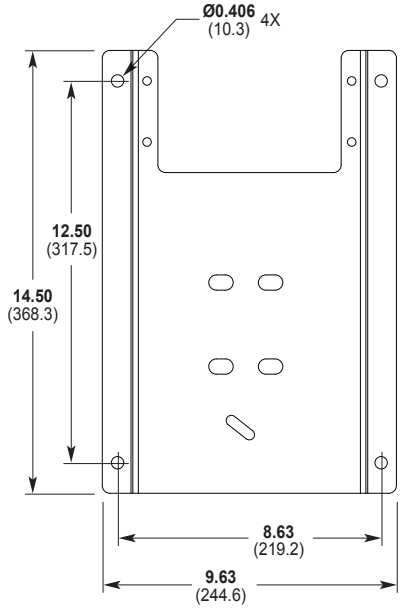
Performance Maximum Flow at Designated Pressure - Metric

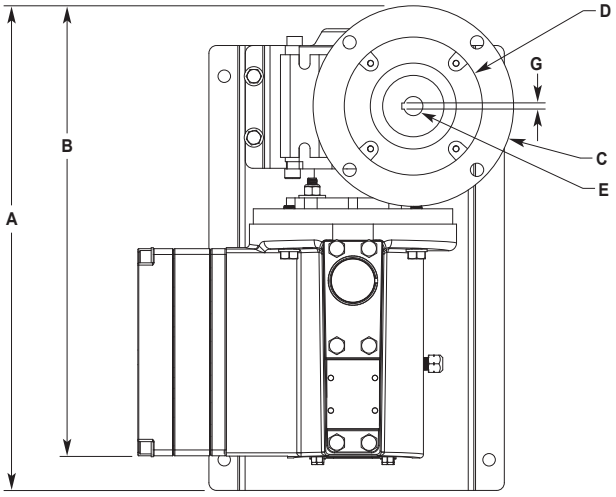
Metallic Pump Heads (lph)				Pump	Gear	Motor
7 bar	34 bar	103 bar	172 bar	rpm	Ratio	rpm
10.16 (0.18)	10.04 (0.18)	9.51 (0.25)	8.648 (0.55)	25	60:1	1500
12.29 (0.18)	12.14 (0.18)	11.53 (0.25)	10.57 (0.55)	30	50:1	
15.58 (0.18)	15.40 (0.18)	14.53 (0.37)	13.47 (0.55)	37.5	40:1	
20.94 (0.18)	20.66 (0.18)	19.54 (0.37)	18.25 (0.55)	50	30:1	
25.23 (0.18)	24.86 (0.18)	23.54 (0.37)	22.07 (0.75)	60	25:1	
31.66 (0.18)	31.17 (0.18)	29.55 (0.37)	27.81 (0.75)	75	20:1	
42.39 (0.18)	41.68 (0.25)	39.56 (0.55)	37.36 (0.75)	100	15:1	
63.83 (0.18)	62.70 (0.25)	59.59 (0.55)	56.47 (0.75)	150	10:1	
85.28 (0.18)	83.72 (0.25)	79.61 (0.55)	75.58 (1.1)	200	7.5:1	
128.2 (0.18)	125.8 (0.37)	119.7 (0.75)	113.8 (1.5)	300	5:1	
171.1 (0.55)	167.8 (0.75)	159.7 (1.1)	152.0 (1.5)	400	7.5:1	3000
256.8 (0.55)	251.9 (0.75)	239.8 (1.5)	228.5 (1.5)	600	5:1	

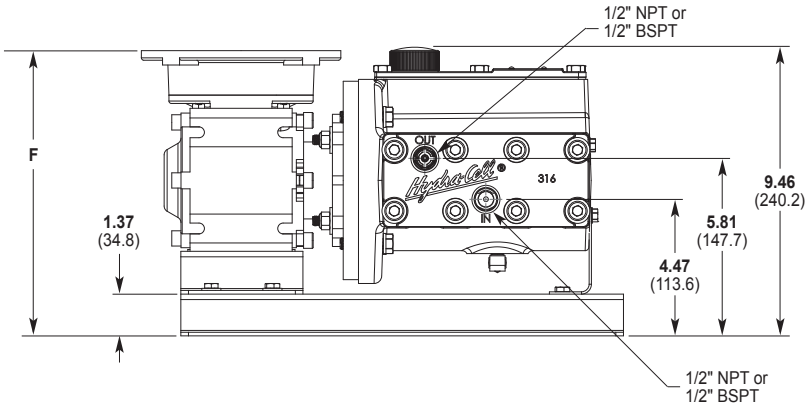
( ) Required Motor kW

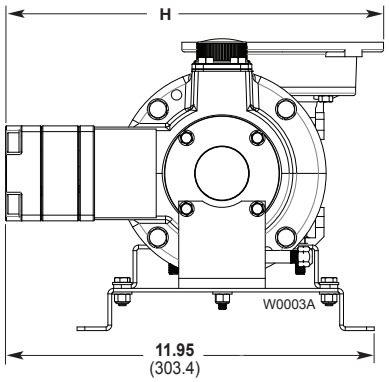
P300 Dimensions

P300 Models with Metallic Pumping Head









Dimensions in Inches (Millimeters)

Input Frame Size	A	B	C	D	E	F	G (Square Key)	H
NEMA 56C	15.79 (401.2)	14.70 (373.3)	Ø 6.54 (Ø 166)	Ø 4.50 (Ø 114.3)	Ø 0.62 (Ø 15.7)	9.35 (237.4)	0.187 (4.75)	12.25 (311)
NEMA 143/145TC	15.79 (401.2)	14.70 (373.3)	Ø 6.54 (Ø 166)	Ø 4.50 (Ø 114.3)	Ø 0.62 (Ø 15.7)	9.82 (249.4)	0.187 (4.75)	12.25 (311)
IEC 63 B5	15.28 (388.1)	14.19 (360.4)	Ø 5.51 (Ø 140)	Ø 3.74 (Ø 95)	Ø 0.43 (Ø 11)	9.17 (232.9)	0.157 (4)	11.73 (298.1)
IEC 71 B5	15.67 (398)	14.58 (370.3)	Ø 6.30 (Ø 160)	Ø 4.33 (Ø 110)	Ø 0.55 (Ø 14)	9.17 (232.9)	0.196 (5)	12.13 (308.1)
IEC 80 B5	16.46 (418.1)	15.37 (390.4)	Ø 7.87 (Ø 200)	Ø 5.12 (Ø 130)	Ø 0.75 (Ø 19)	9.17 (232.9)	0.236 (6)	12.91 (327.9)

P300 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**.

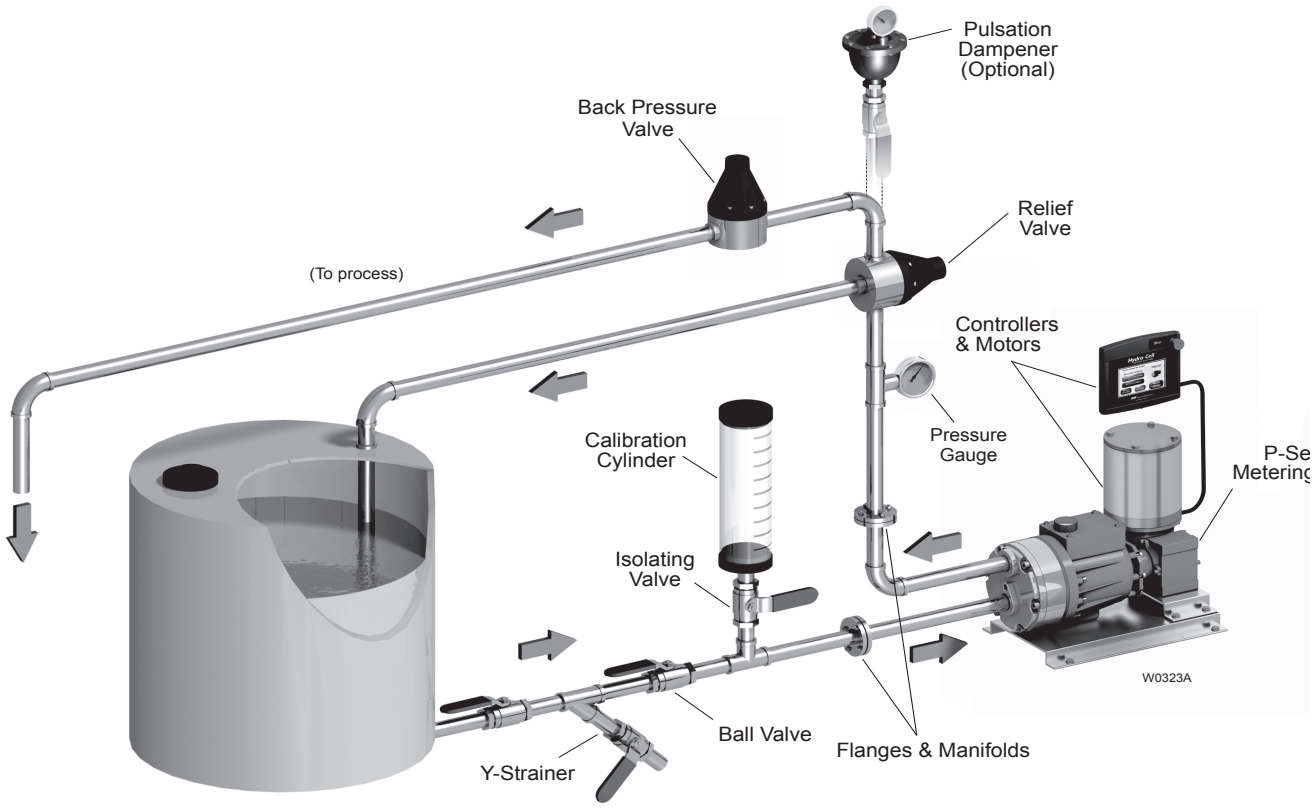
Positive Displacement. This is a positive-displacement pump. To avoid severe system damage if the discharge line ever becomes blocked, install a relief valve downstream from the pump. See **Discharge Piping**.

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 relief valve, 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

P300 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 5/8" (16 mm) I.D. inlet hose
- Minimize fittings (elbows, valves, tees, etc.)

Support the pump and piping independently.

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 (17.3 bar). For higher pressures 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 a system 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 overpressurizing 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 recommended.

P300 Installation (Cont'd)

Initial Start-Up Procedure

Before you start the pump, be sure that:

1. All shut-off valves are open, and pump has adequate supply of fluid.
2. All connections are tight.
3. The oil level is 1/4 inch (6 mm) above the cast surface in the upper oil reservoir.
4. Open priming valve on system back pressure valve so pump starts under minimum pressure. See Typical Metering Installation drawing.

Turn on power to pump motor and:

1. 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 (17.3 bar).
2. Observe any erratic noise or flow.
3. Jog pump on and off until fluid coming from priming valve is air-free.
4. Close priming valve.
5. Perform pump calibration. See Calibration Procedure.

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.

P300 Maintenance

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 (60), 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)
<1500 psi (104 bar)	6,000	4,000	2,000
<2500 psi (173 bar)	3,000	2,000	1,500

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 (17) may be damaged. Refer to the Fluid End Service and Troubleshooting Sections. Do not operate the pump with a damaged diaphragm.

P300 Fluid End Service (Cont'd)

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.

1. Remove Manifold (3) and Valve Plate (12)

a. Remove eight capscrews (1) around manifold (3). Use 8-mm hex Allen wrench.

b. Remove manifold (3).

c. Inspect manifold (3 for warping or wear around inlet and outlet ports. If wear is excessive, replace manifold.

To check if manifold is warped, remove O-rings (4) and place a straightedge across it. If warped replace.

d. Remove two socket-head capscrews (14) that hold valve plate (12) to pump housing (78). Use a 5-mm hex Allen wrench.

e. Inspect the valve plate as in step c. Replace if necessary.

2. Inspect Valves (5-11)

The three inlet and three outlet valve assemblies are identical and face opposite directions. Inspect each valve as follows:

a. Check spring retainer (10), and replace if worn.

b. Check valve spring (8). If shorter than new spring, replace (do not stretch old spring).

c. Check valve (7). If worn excessively, replace.

d. Remove valve seat (6) and O-ring (5). A seat puller is included in the Wanner Tool Kit.

Inspect valve seat for wear, and replace if necessary. A new O-ring (5) should be installed.

e. Reinstall inlet and outlet valve assemblies:

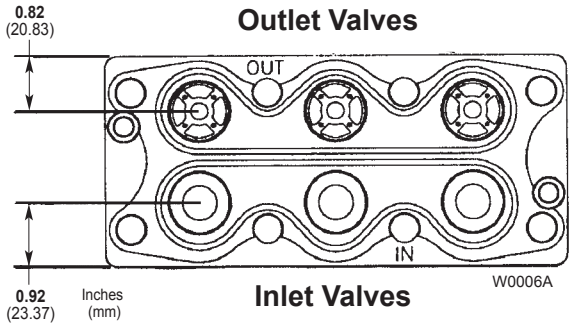
• Clean valve ports and shoulders with emery cloth, and lubricate with lubricating gel or petroleum jelly.

• Install O-ring (5) on the valve seat (6).

• **Inlet Valves** (3 lower valves in the illustration below). Insert spring retainer (10) into valve plate (12), insert spring (8), valve (7), and valve seat (6).

• **Outlet Valves** (3 upper valves in the illustration). Insert valve seat (6), valve (7), spring (8), and spring retainer (10).

Installing Inlet and Outlet Valves



P300 Fluid End Service (Cont'd)

3. Inspect and Replace Diaphragms (17)

a. Lift diaphragm (17) by one edge, and turn pump shaft (**use the shaft rotator from the Wanner Tool Kit)** until diaphragm moves up to "top dead center". This will expose machined cross-holes in plunger shaft behind diaphragm.

b. Insert the plunger holder tool through one of the machined cross-holes, to hold the diaphragm (17) up. (Don't remove tool until new diaphragm is installed in step f below.)

c. Unscrew the diaphragm. Use a 5/16-in. (8-mm) open-end wrench, and turn counterclockwise.

d. Inspect diaphragm carefully. A damaged diaphragm generally indicates a pumping system problem. Replacing diaphragm only, will not solve the larger problem. Inspect diaphragm for the following:

• **Small puncture**. Usually caused by sharp foreign object in fluid.

• **Diaphragm pulled away** from metal insert. Usually caused by excessive inlet vacuum, or by overpressurization of pump inlet.

• **Outer diaphragm bead extruded**. Usually caused by overpressurization of pump.

• **Diaphragm becoming stiff** and losing flexibility. Usually caused by pumping fluid that is incompatible with 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.

e. Clean away any spilled oil.

f. Install diaphragm (17) and tighten to 10 in-lbs (113 N-cm).

g. Repeat above inspection procedure with other two diaphragms (17). Replace if necessary.

4. Flush Contaminant from Hydraulic End

(only if a diaphragm has ruptured)

a. Remove the brass cap (60) and allow all oil and contaminate to drain out.

b. Fill reservoir with compatible solvent. Manually turn pump shaft to circulate compatible solvent and drain. Use the shaft rotator provided in Wanner Tool Kit (Part No. A03-175-1106). 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.

Note: P Series replacement parts kits (complete kits and diaphragm kits) include the correct oil for each specific P Series pump configuration.

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. Prime Hydraulic Cells

a. If necessary, with pump **horizontal**, fill reservoir with the correct Hydra oil for application.

Note: P Series replacement parts kits (complete kits and diaphragm kits) include the correct oil for each specific P Series pump configuration.

b. Air behind the diaphragm must be forced out by turning shaft and pumping piston. Any air in the hydraulic end will cause the pump to have loss in flow and re-priming will be necessary.

c. Turn shaft until bubble-free flow of oil comes from behind diaphragm. Use the shaft rotator provided in Wanner Tool Kit (Part No. A03-175-1106). Make sure oil level in reservoir doesn't get to low. Add oil as necessary. If oil gets too low, air will be drawn into hydraulic side of piston.

d. When oil is bubble-free, refresh oil reservoir.

c. Wipe excess oil from the diaphragm plate (18) and diaphragms (17).

6. Reinstall Valve Plate (12) and Manifold (3)

a. Reinstall valve plate (12), with valve assemblies installed as outlined above, onto diaphragm plate (18) and alignment pins (29).

Tighten two socket-head capscrews (14) evenly and snugly to compress outer diaphragm beads and hold valve plate (12) in place.

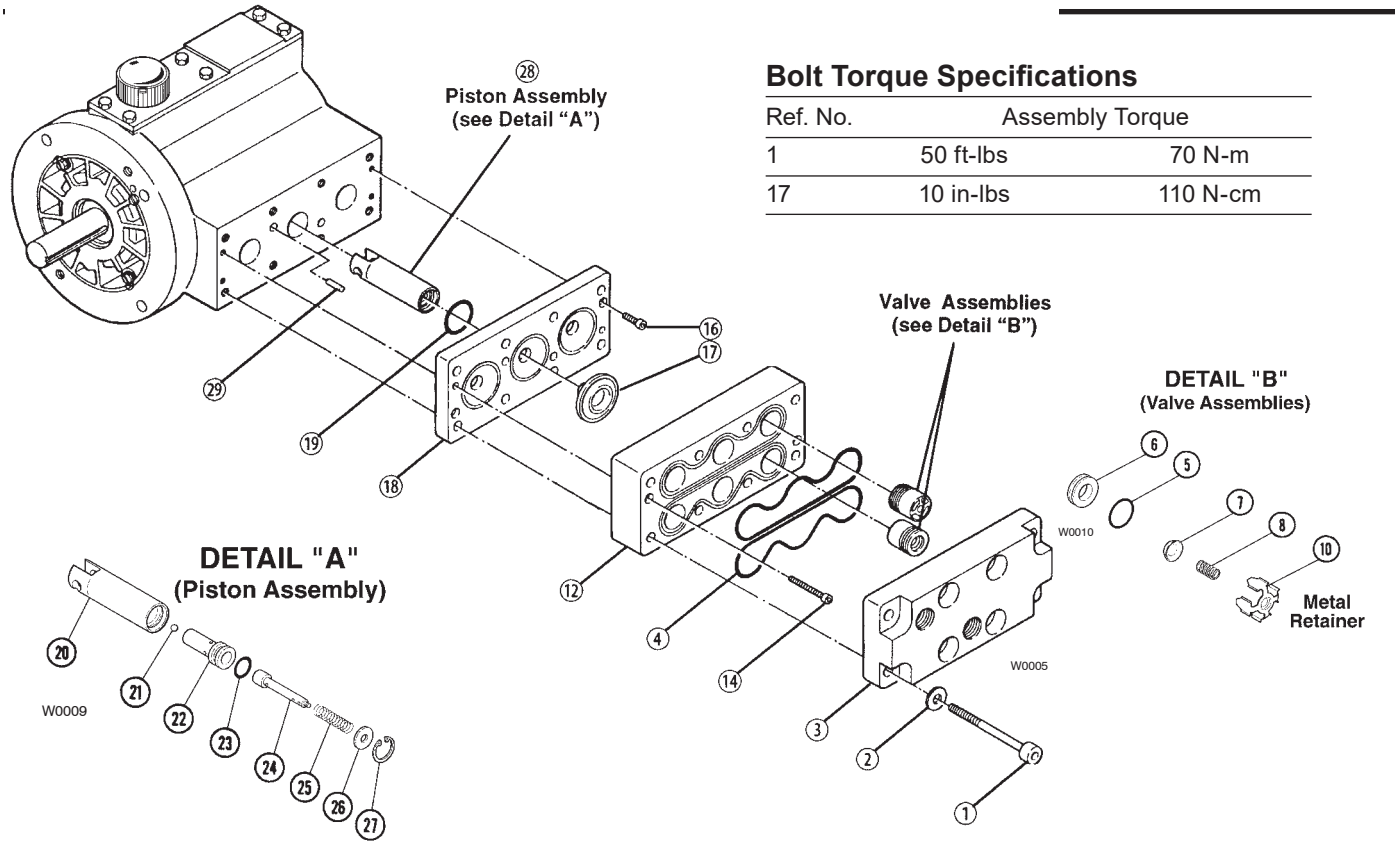
b. Reinstall O-rings (4) on front side of the valve plate (12). Use petroleum jelly or lubricating gel to hold them in place.

c. Reinstall manifold (3) onto valve plate (12).

d. Insert all capscrews (1), with washers (2), around edge of the manifold, and alternately tighten opposite bolts until all are secure. Torque to 50 ft-lbs (70 N-m).

e. Recheck all bolts for tightness and proper torque.

P300 Fluid End Parts List



Bolt Torque Specifications

Ref. No.	Assembly Torque	
1	50 ft-lbs	70 N-m
17	10 in-lbs	110 N-cm

Ref No.	Part Number	Description	Quantity/ Pump
1	G10-024-2012	Screw, Cap, soc-hd, SST	8
2	100-037	Washer, Flat, hardened, SST	8
3	D03-004-1010	Manifold, Brass, NPT	1
	D03-004-1034	Manifold, 304 SST, NPT	1
	D03-004-1036	Manifold, 316 SST, NPT	1
	D03-004-1047	Manifold, Hastelloy C, NPT	1
	G03-004-1040	Manifold, Brass, BSPT	1
	G03-004-1034	Manifold, 304 SST, BSPT	1
	G03-004-1036	Manifold, 316 SST, BSPT	1
	G03-004-1047	Manifold, Hastelloy C, BSPT	1
4	D03-073-2140	O-ring, Manifold, Buna-N	2
	D03-073-2141	O-ring, Manifold, FKM	2
	D03-073-2143	O-ring, Manifold, EPDM	2
	D03-073-2148	O-ring, Manifold, PTFE	2
5	D25-046-2110	O-ring, Valve seat, Buna-N	6
	D25-046-2111	O-ring, Valve seat, FKM	6
	D03-035-2113	O-ring, Valve seat, EPDM	6
	D03-035-2118	O-ring, Valve seat, PTFE	6
6	D15-020-2011	Valve Seat, Nitronic 50	6
	D15-020-1016	Valve, Tungsten Carbide	6
	D15-020-2017	Valve Seat, Hastelloy C	6
7	D03-021-1011	Valve, Nitronic 50	6
	D03-021-1016	Valve, Tungsten Carbide	6
	D03-021-1017	Valve, Hastelloy C	6
8	D03-022-3113	Valve Spring, Hastelloy C	6
	D03-022-3114	Valve Spring, Elgiloy	6

Ref No.	Part Number	Description	Quantity/ Pump
10	D03-023-1017	Retainer, Valve spring, Hastelloy C	6
12	D03-003-1030	Valve Plate, Brass	1
	D03-003-1034	Valve Plate, 304 SST	1
	D03-003-1036	Valve Plate, 316 SST	1
	D03-003-1047	Valve Plate, Hastelloy C	1
14	G10-088-2010	Screw, Cap, soc-hd	2
16	G03-088-2010	Screw, Cap, soc-hd	2
17	D03-018-1240	Diaphragm, Buna-N	3
	D03-018-1245	Diaphragm, FKM	3
	K03-018-1243	Diaphragm, EPDM	3
	K03-018-1248	Diaphragm, PTFE	3
18	D03-002-1012	Diaphragm Plate, Steel	1
19	D03-075-2110	O-ring, Diaphragm plate, Buna-N	3
20	D03-014-1004	Piston	3
21	D10-015-3010	Ball	3
22	D03-043-1000	Valve Cylinder	3
23	D03-034-2110	O-ring, Valve cylinder, Buna-N	3
24	D03-044-1000	Valve Plunger	3
25	D03-045-3110	Spring, Sleeve valve	3
26	D03-049-1000	Washer	3
27	D03-048-2210	Snap Ring	3
28	D03-014-1210	Piston Assembly (1)	3
29	D03-026-2210	Pin	2

(1) Piston Assembly includes: items 20 through 27.

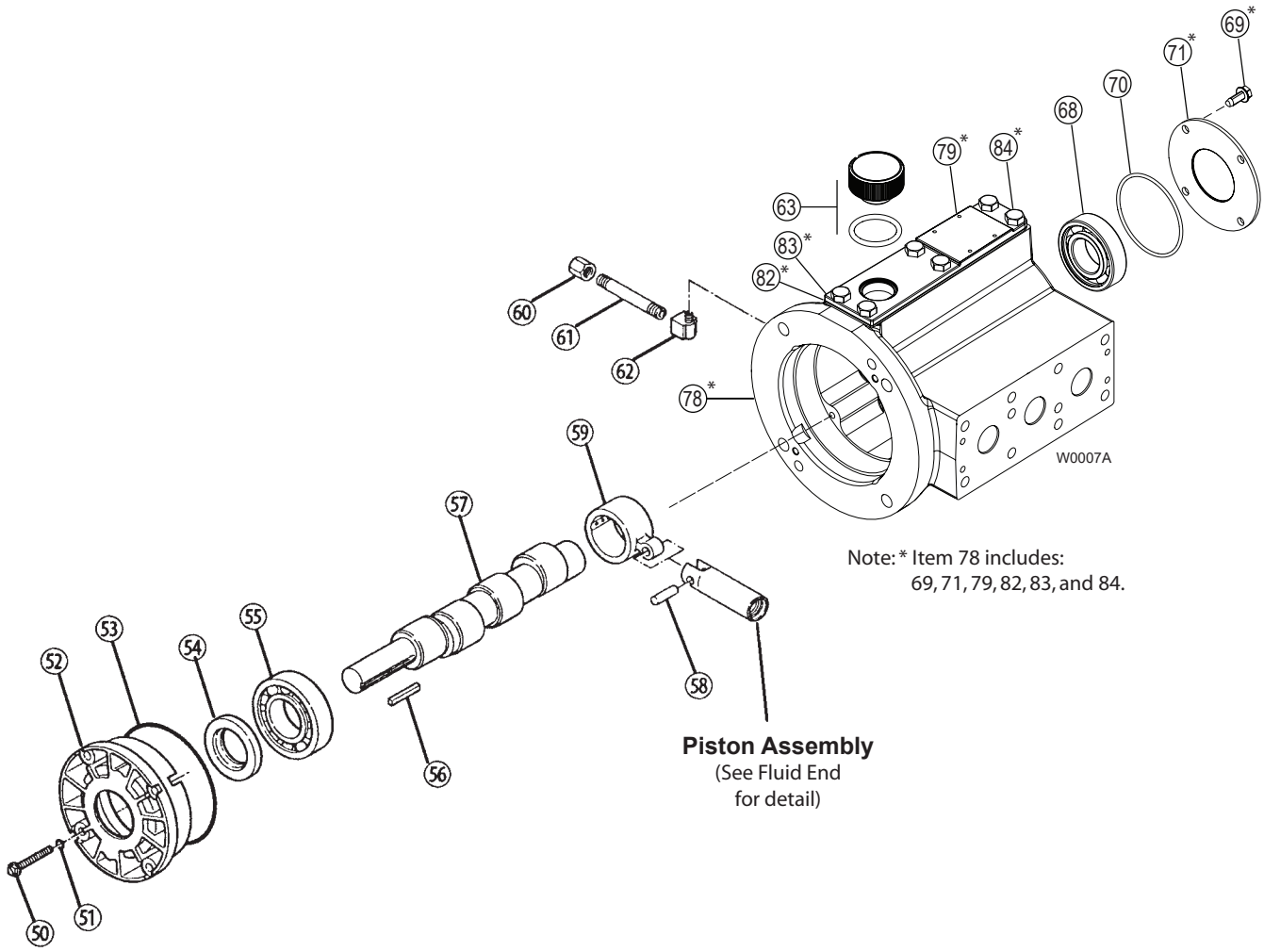
P300 Hydraulic End Parts Lists

Ref No.	Part Number	Description	Quantity/ Pump
50	G03-086-2010	Bolt, Hex flange	4
51	D25-047-2110	O-ring, Back cover screws, Buna-N	4
52	D03-131-1000	Back Cover	1
53	D03-037-2110	O-ring, Back cover, Buna-N	1
54	D03-031-2110	Seal, Buna-N	1
55	D03-011-2910	Back Bearing	1
56	D10-085-2210	Key, Shaft	1
57	D03-009-1040	(X) Crank Shaft, Shaft-driven, 7/8" O.D.	1
58	D03-133-1000	Pin	3
59	D03-132-1004	Connecting Rod, Aluminum-bronze	3
60	D10-078-2210	Cap, Brass, 1/8" NPT	1
61	D10-077-2210	Pipe, Brass, 1/8" NPT	1
62	D10-076-2210	Elbow, Brass, 1/8" NPT	1
63	D03-039-1030	Cap with O-ring, Oil fill	1

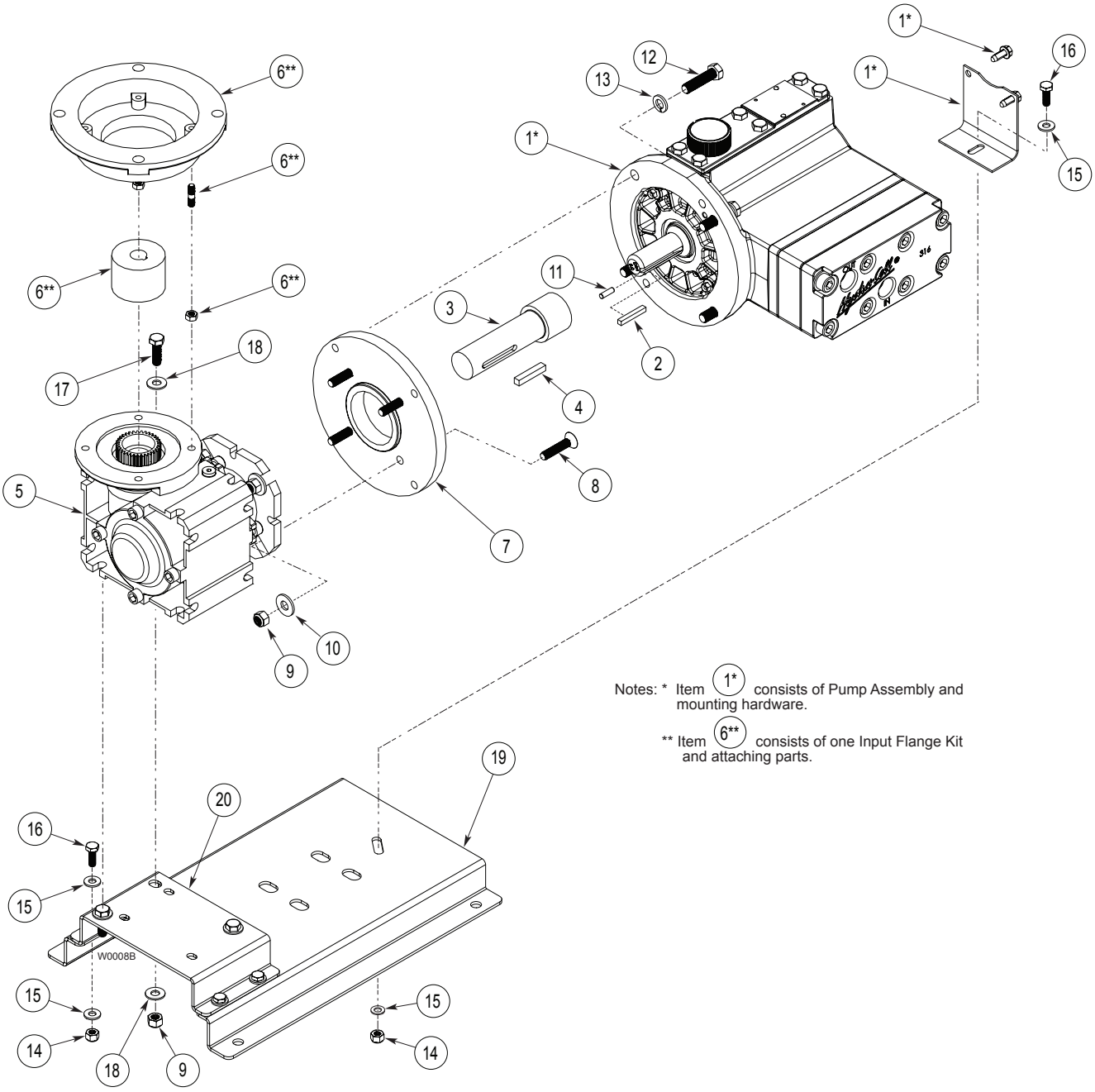
Ref No.	Part Number	Description	Quantity/ Pump
68	D03-010-2910	Front Bearing	1
69	D03-087-2010	Screw, Cap, hex-hd (part of 78)	4
70	D40-074-2110	O-ring, Front cover, Buna-N	1
71	D03-130-1000	Front Cover (part of 78)	1
78	G03-001-1033	Pump Housing Assy	1
79	D10-040-2420	Nameplate (part of 78)	1
82	G25-106-2318	Gasket, Cover (part of 78)	1
83	H25-105-1018	Cover, Housing (part of 78)	1
84	G25-090-2010	Screw, Cap, hex-hd (part of 78)	6

Hydraulic End Service

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.



P300 Reducer Parts List (Cont'd)



P300 Reducer Parts List

Ref No.	Part Number	Description	Quantity/ Pump
1	P3-M-PUMP	P300 Pump Assembly, BSPT	
	P3-N-PUMP	P300 Pump Assembly, NPT	
2	D10-085-2210	Key, 0.187 square x 1.0	1
3	112-581	Shaft, P300/P400	1
4	D25-085-2210	Key, 1/4” square x 1.40	1
5	112-414	Reducer, 60:1 ratio	1
	112-415	Reducer, 50:1 ratio	1
	112-416	Reducer, 40:1 ratio	1
	112-417	Reducer, 30:1 ratio	1
	112-418	Reducer, 25:1 ratio	1
	112-419	Reducer, 20:1 ratio	1
	112-420	Reducer, 15:1 ratio	1
	112-421	Reducer, 10:1 ratio	1
	112-422	Reducer, 7.5:1 ratio	1
	112-423	Reducer, 5:1 ratio	1
6	112-555	Input Flange Kit, NEMA 56C	1
	112-556	Input Flange Kit, NEMA 143/145 TC	1
	112-558	Input Flange Kit, IEC 63 B5	1
	112-559	Input Flange Kit, IEC 71 B5	1
	112-560	Input Flange Kit, IEC 80 B5	1
	112-563	Input Flange Kit, IEC 90 B5	1
7	D03-100-1012	Adapter, P300	1
8	D03-101-2017	Screw, 5/16-18 x 1.5, HHCS, SST	4
9	100-938	Locknut	7
10	112-030	Washer, Flat, wide, type A , 5/16”	4
11	D03-026-2211	Dowel Pin	2
12	101-749	Screw, 3/8-16 x 1.5, FHSCS	4
13	D25-048-2012	Lockwasher, .375, 316 SS	4
14	100-063	Locknut, 1/4-20, SST	5
15	100-663	Washer, Flat, 1/4”, SST	10
16	100-062	Screw, 1/4-20 UNC-2A x .75, HHCS, SST	5
17	100-948	Screw, HHCS	3
18	100-915	Washer, Flat, special, 5/16	5
19	112-016	Metering Pump Base, Carbon Steel, epoxy painted (1 of 2 piece base plate assembly)	1
	112-012	Metering Pump Base, Stainless Steel (1 of 2 piece base plate assembly)	1
20	112-017	Gear Box Base, Carbon Steel, epoxy painted (1 of 2 piece base plate assembly)	1
	112-013	Gear Box Base, Stainless Steel (1 of 2 piece base plate assembly)	1

P300 Troubleshooting

Problem	Probable Cause	Solution
Motor/Pump Does Not Operate:	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.
No Delivery	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.
Delivery Too Low and/or Erratic	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.
Delivery Too High and/or Erratic.	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).

P300 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		**Pump Configuration**
	P3	For all P300 Pumps
3		**Kit Designator**
	K	Complete Fluid End Kit*
	D	Diaphragm Kit*
	V	Valve Kit (diaphragm not included)
4-5		**Pump Head Version**
	51	Standard
6		**Spring Retainers (Dampening Washers)**
	B	For brass pump head (Hastelloy C)
	R	For 304 Stainless Steel pump head (Hastelloy C)
	S	For 316L Stainless Steel pump head (Hastelloy C)
	T	For Hastelloy C pump head (Hastelloy C)
	X	Not included in Diaphragm Kit
7		**Diaphragm & O-ring Material**
	E	EPDM (EPDM Compatible oil)
	G	FKM (Standard oil)
	S	FKM (Food-contact oil)
	X	FKM (Synthetic oil)
	J	PTFE (Food-contact oil)
	W	PTFE (Synthetic oil)
	T	Buna-N (Standard oil)
	F	Buna-N (Food-contact oil)
	Y	Buna-N (Synthetic oil)
8-9		**Check Valve Material (Spring/ Valve Seat / Valve)**
	SS	Elgiloy/ Nitronic 50 / Nitronic 50
	TT	Hastelloy C / Hastelloy C/ Hastelloy C
	SD	Elgiloy / Tungsten Carbide / Tungsten Carbide
	TD	Hastelloy C / Tungsten Carbide / Tungsten Carbide
	XX	Not included in Diaphragm Kit

** Includes hydraulic end oil*

Kit Contents

Part Number†	Description	Qty	Kit Designator K	D	V
D03-018-___	Diaphragm	3	●	●	
D25-073-___	O-ring, manifold	2	●	●	●
D25-046-___	O-ring, valve seat	6	●		●
D03-020-___	Valve seat	6	●		●
D03-021-___	Valve	6	●		●
D03-022-___	Valve spring	6	●		●
D03-023-___	Retainer, valve spring	6	●		●
A01-113-3400	Thread locker	1	●	●	
	Hydraulic end oil	(1.5 qt)	●	●	

† *Last four digits of part numbers with –___ refer to specific material of construction.*

P300 Tool Kit

The P300 Tool Kit (Part No. A03-175-1106) contains the tools listed below. These tools are used to assist in the repair and maintenance of the P300. See the maintenance sections of this manual for specific application.

1	A03-125-1020	Holder, Plunger	1
2	A03-195-1200	Rotator, Shaft	1
3	A03-124-1200	Lever Assembly	1
4	A03-117-1000	Seat Puller	1
5	A03-126-1500	Tool Box	1

P300 Warranty

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.

Wanner Engineering, Inc.

World Headquarters & Manufacturing
Wanner Engineering, Inc
1204 Chestnut Avenue,
Minneapolis, MN 55403 USA
Phone: 612-332-5681 ● Fax: 612-332-6937
Toll-Free Fax (USA): 800-332-6812
Email: sales@wannereng.com
www.Hydra-Cell.com

207 US Highway 281
Wichita Falls, TX 76310 USA
Phone: 940-322-7111
Toll-Free Fax: 800-234-1384
Email: sales@wannereng.com
www.Hydra-Cell.com

Latin American Office
São Paulo, Brazil
Phone: +55 (11) 4081-7098
Email: sales@wannereng.com
www.Hydra-Cell.com

Wanner International Ltd.

Wanner International Ltd
Hampshire - United Kingdom
Phone: +44 (0) 1252 816847
Email: sales@wannerint.co***m***
www.Hydra-Cell.eu

Wanner Pumps Ltd.

Wanner Pumps Ltd.
Kowloon - Hong Kong
Phone: +852 3428 6534
Email: sales@wannerpumps.com
www.WannerPumps.com

Shanghai - China
Phone: +86-21-6876 3700
Email: sales@wannerpumps.com
www.WannerPumps.com

P300-991-2400B 8/2005, Revised3/2016