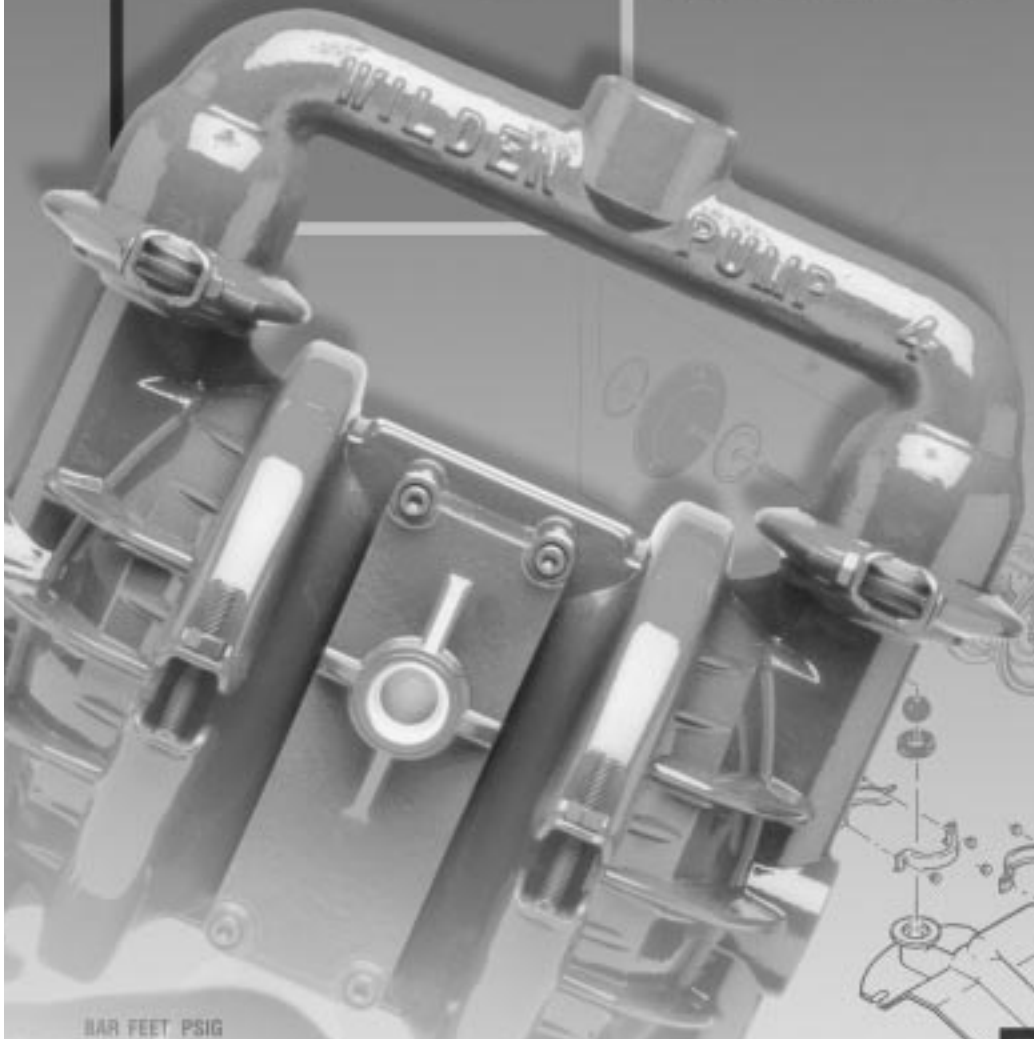
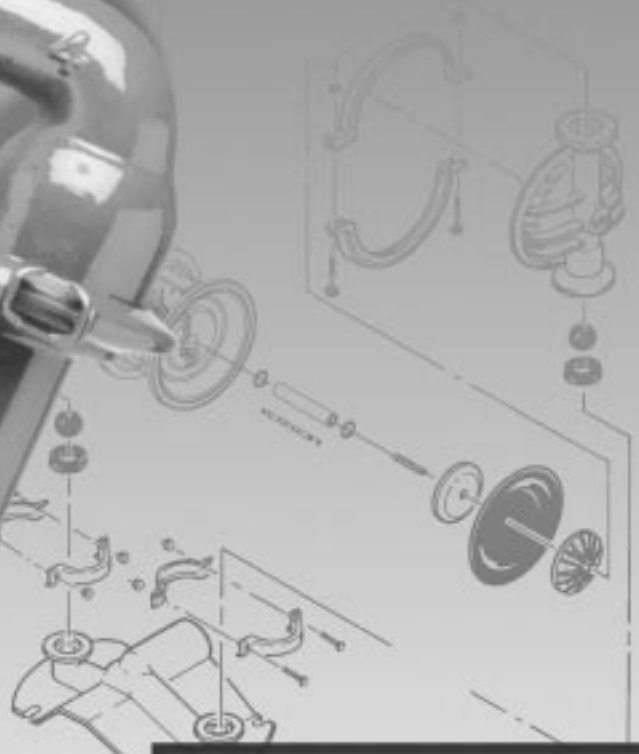
P4 Engineering Operation & Maintenance





PRO-FLO™
PROGRESSIVE PUMP TECHNOLOGY

Metal Pumps

ISO 9001 Est. 1955 QUALITY SYSTEM

WILDEN®
AIR OPERATED DOUBLE DIAPHRAGM PUMPS

A DOVER RESOURCES COMPANY

File Name: Wilden Metal Pumps Series P4

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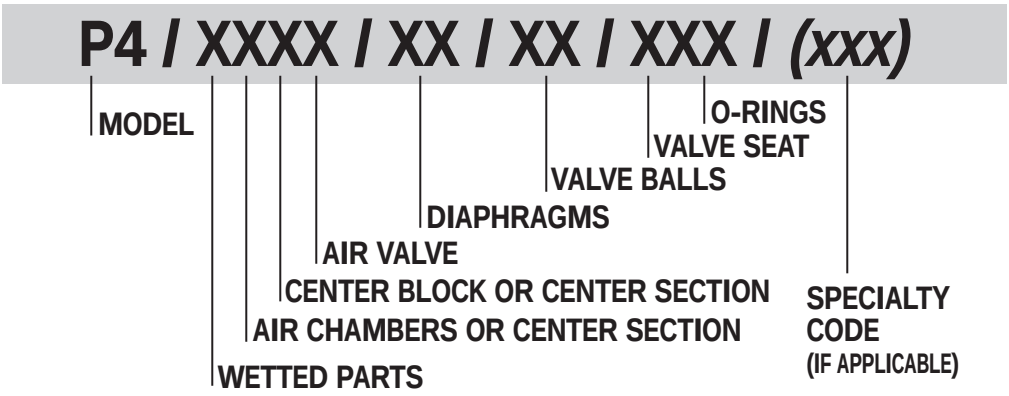
SECTION 1

WILDEN PUMP DESIGNATION SYSTEM



In the case where a center section is used instead of a center block and air chambers, the designation will be as follows: Acetal = LL

MODEL P4 METAL MATERIAL CODES

WETTED PARTS
A = ALUMINUM
H = HASTELLOY C
S = STAINLESS STEEL
W = CAST IRON

AIR CHAMBERS
A = ALUMINUM
L = ACETAL

CENTER SECTION/BLOCK
L = ACETAL
P = POLYPROPYLENE

AIR VALVE
L = ACETAL
P = POLYPROPYLENE

DIAPHRAGMS
BN = BUNA-N® (Red Dot)
FG = SANIFLEX™ (Cream)
ND = NORDEL® (Blue Dot)
NE = NEOPRENE (Green Dot)
PU = POLYURETHANE (Clear)
TF = TEFLON® PTFE (White)
VT = VITON® (Silver or White Dot)
WF = WIL-FLEX™ (Orange)

ULTRA-FLEX™ DIAPHRAGMS
UB = BUNA-N® (Red Dot)
UE = NORDEL® (Blue Dot)
UN = NEOPRENE (Green Dot)
UV = VITON® (Silver or White Dot)

VALVE BALL
BN = BUNA-N® (Red Dot)
FG = SANIFLEX™ (Cream)
ND = NORDEL® (Blue Dot)
NE = NEOPRENE (Green Dot)
PU = POLYURETHANE (Clear)
TF = TEFLON® PTFE (White)
VT = VITON® (Silver or White Dot)
WF = WIL-FLEX™ (Orange)

VALVE SEAT
A = ALUMINUM
BN = BUNA-N® (Red Dot)
FG = SANIFLEX™ (Cream)
H = HASTELLOY C
M = MILD STEEL
ND = NORDEL® (Blue Dot)
NE = NEOPRENE (Green Dot)
PU = POLYURETHANE (Clear)
S = STAINLESS STEEL
VT = VITON® (Silver or White Dot)
WF = WIL-FLEX™ (Orange)

VALVE SEAT O-RING
FS = FLUORO-SEAL™
TF = TEFLON® PTFE

NOTE: ELASTOMERIC MATERIALS USE COLORED DOTS FOR IDENTIFICATION.

SECTION 2

THE WILDEN PUMP — HOW IT WORKS

The Wilden diaphragm pump is an air-operated, positive displacement, self-priming pump. These drawings show flow pattern through the pump upon its initial stroke. It is assumed the pump has no fluid in it prior to its initial stroke.

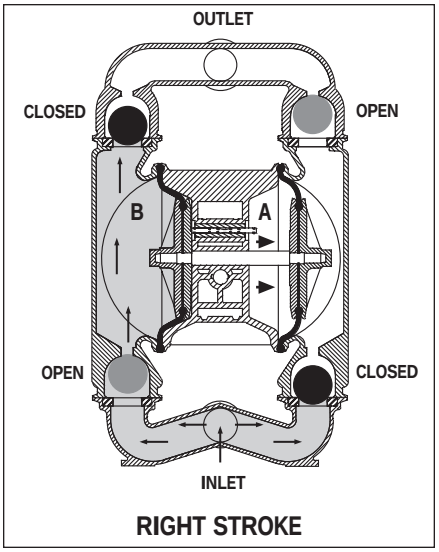


FIGURE 1 The air valve directs pressurized air to the back side of diaphragm A. The compressed air is applied directly to the liquid column separated by elastomeric diaphragms. The diaphragm acts as a separation membrane between the compressed air and liquid, balancing the load and removing mechanical stress from the diaphragm. The compressed air moves the diaphragm away from the center block of the pump. The opposite diaphragm is pulled in by the shaft connected to the pressurized diaphragm. Diaphragm B is on its suction stroke; air behind the diaphragm has been forced out to the atmosphere through the exhaust port of the pump. The movement of diaphragm B toward the center block of the pump creates a vacuum within chamber B. Atmospheric pressure forces fluid into the inlet manifold forcing the inlet valve ball off its seat. Liquid is free to move past the inlet valve ball and fill the liquid chamber (see shaded area).

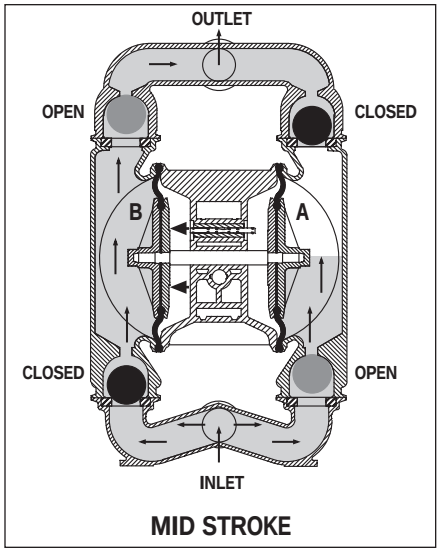


FIGURE 2 When the pressurized diaphragm, diaphragm A, reaches the limit of its discharge stroke, the air valve redirects pressurized air to the back side of diaphragm B. The pressurized air forces diaphragm B away from the center block while pulling diaphragm A to the center block. Diaphragm B is now on its discharge stroke. Diaphragm B forces the inlet valve ball onto its seat due to the hydraulic forces developed in the liquid chamber and manifold of the pump. These same hydraulic forces lift the discharge valve ball off its seat, while the opposite discharge valve ball is forced onto its seat, forcing fluid to flow through the pump discharge. The movement of diaphragm A toward the center block of the pump creates a vacuum within liquid chamber A. Atmospheric pressure forces fluid into the inlet manifold of the pump. The inlet valve ball is forced off its seat allowing the fluid being pumped to fill the liquid chamber.

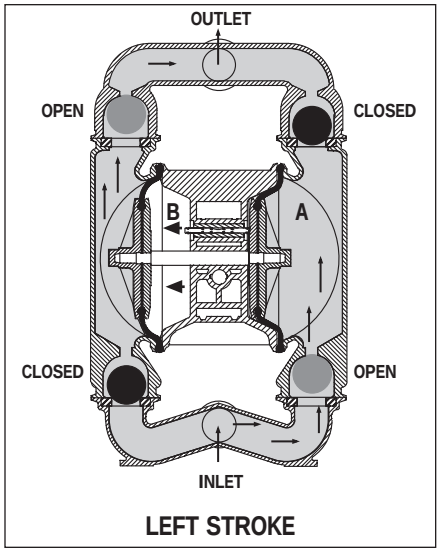
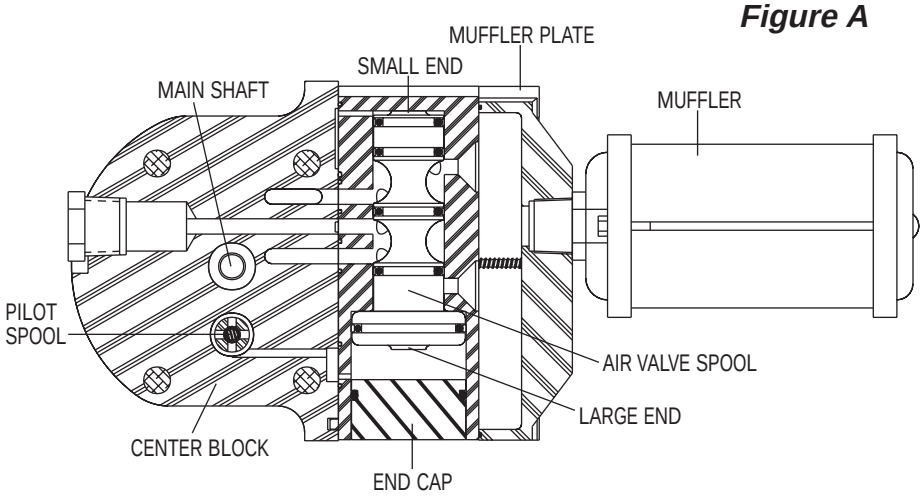


FIGURE 3 At completion of the stroke, the air valve again redirects air to the back side of diaphragm A, which starts diaphragm B on its exhaust stroke. As the pump reaches its original starting point, each diaphragm has gone through one exhaust and one discharge stroke. This constitutes one complete pumping cycle. The pump may take several cycles to completely prime depending on the conditions of the application.

PRO-FLO™ AIR DISTRIBUTION SYSTEM OPERATION — HOW IT WORKS

Figure A



The Pro-Flo™ patented air distribution system incorporates three moving parts: the air valve spool, the pilot spool, and the main shaft/diaphragm assembly. The heart of the system is the air valve spool and air valve. As shown in Figure A, this valve design incorporates an unbalanced spool. The smaller end of the spool is pressurized continuously, while the large end is alternately pressurized then exhausted to move the spool. The spool directs pressurized air to one air chamber while exhausting the other. The air causes the main shaft/diaphragm assembly to shift to one side — discharging liquid on that side and pulling liquid in on the other side. When the shaft reaches the end of its stroke, the inner piston actuates the pilot spool, which pressurizes and exhausts the large end of the air valve spool. The repositioning of the air valve spool routes the air to the other air chamber.

SECTION 3

WILDEN MODEL P4 METAL CAUTIONS – READ FIRST!

CAUTION: Do not apply compressed air to the exhaust port — pump will not function.

CAUTION: Do not over-lubricate air supply — excess lubrication will reduce pump performance. Pump is pre-lubed.

ELASTOMER TEMPERATURE LIMITS:

Acetal	–20°F to 180°F	–28.9°C to 82.2°C
Neoprene	0°F to 200°F	–17.7°C to 93.3°C
Buna-N®	10°F to 180°F	–12.2°C to 82.2°C
Nordel®	–60°F to 280°F	–51.1°C to 137.8°C
Viton®	–40°F to 350°F	–40°C to 176.7°C
Wil-Flex™	–40°F to 225°F	–40°C to 107.2°C
Saniflex™	–20°F to 220°F	–28.9°C to 104.4°C
Polyurethane	10°F to 150°F	–12.2°C to 65.6°C
Teflon® PTFE	40°F to 220°F	4.4°C to 104.4°C

CAUTION: When choosing pump materials, be sure to check the temperature limits for all wetted components. Example: Viton® has a maximum limit of 350°F (176.7°C) but polypropylene has a maximum limit of only 175°F (79°C).

CAUTION: Maximum temperature limits are based upon mechanical stress only. Certain chemicals will significantly reduce maximum safe operating temperatures. Consult chemical resistance guide (RBG E-4) for chemical compatibility and temperature limits.

WARNING: Prevention of static sparking — If static sparking occurs, fire or explosion could result. Pump, valves, and containers must be grounded to a proper grounding point when handling flammable fluids and whenever discharge of static electricity is a hazard.

CAUTION: Do not exceed 125 psig (8.6 Bar) air supply pressure.

CAUTION: The process fluid and cleaning fluids must be chemically compatible with all wetted pump components (see RBG E-4).

CAUTION: Pumps should be thoroughly flushed with water before installing into process lines. FDA and USDA approved pumps should be cleaned and/or sanitized before being used.

CAUTION: Always wear safety glasses when operating pump. If diaphragm rupture occurs, material being pumped may be forced out air exhaust.

CAUTION: Before any maintenance or repair is attempted, the compressed air line to the pump should be disconnected and all air pressure allowed to bleed from pump. Disconnect all intake, discharge and air lines. Drain the pump by turning it upside down and allowing any fluid to flow into a suitable container.

CAUTION: Blow out air line for 10 to 20 seconds before attaching to pump to make sure all pipeline debris is clear. Use an in-line air filter. **A 5μ (micron) air filter is recommended.**

NOTE: When installing Teflon® diaphragms, it is important to tighten outer pistons simultaneously (turning in opposite directions) to ensure tight fit. (See torque specifications in Section 8C.)

NOTE: P4 Cast Iron Teflon®-fitted pumps come standard from the factory with expanded Teflon® gaskets installed in the diaphragm bead of the liquid chamber. Teflon® gaskets cannot be re-used. Consult RBG PS-TG for installation instructions during reassembly.

NOTE: Before starting disassembly, mark a line from each liquid chamber to its corresponding air chamber. This line will assist in proper alignment during reassembly.

CAUTION: The P4 Pro-Flo™ is not submersible. If your application requires the pump to be submersed, the M4 model can be used.

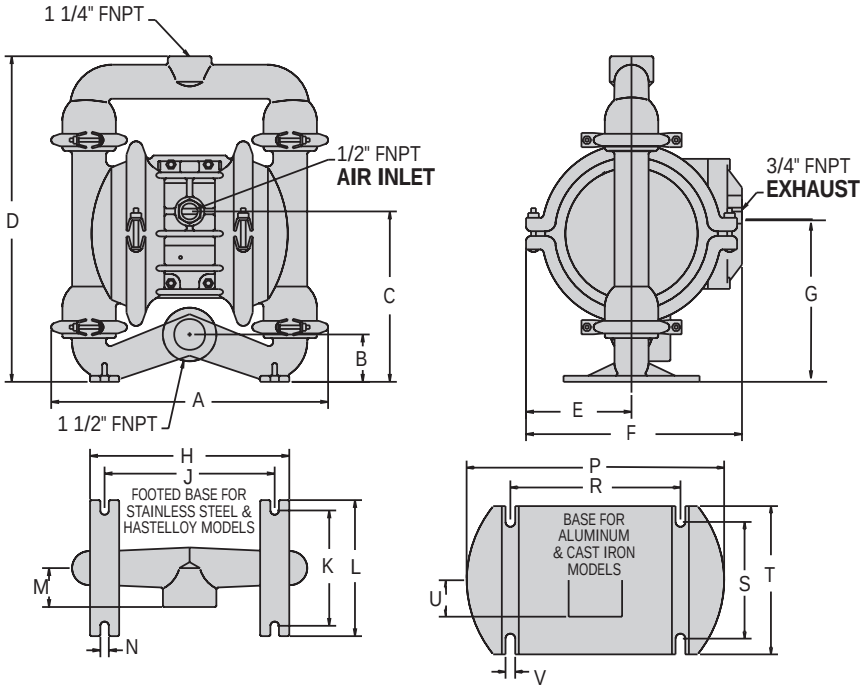
CAUTION: Tighten all hardware prior to installation.

WARNING: You must remove the plug that covers the pilot spool exhaust (located under the air inlet bushing) or pump **will not operate.**

SECTION 4A

DIMENSIONAL DRAWING

MODEL P4 METAL PUMP

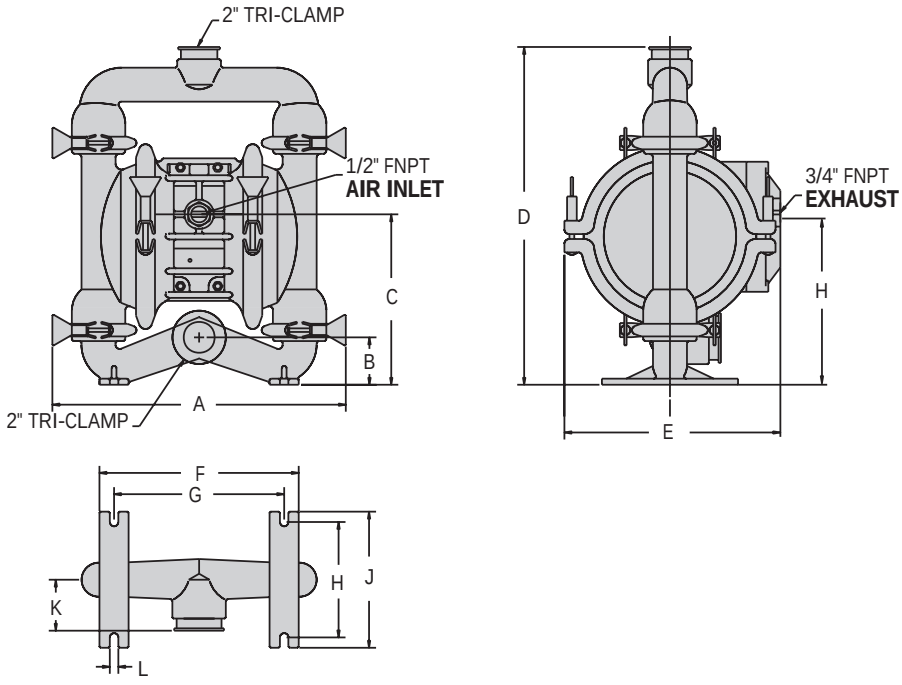


DIMENSIONS – P4 METAL		
ITEM	STANDARD (inch)	METRIC (mm)
A	14 17/32	369.1
B	2 15/32	62.7
C	8 3/32	205.6
D	16 7/8	428.6
E	5 13/16	147.6
F	12 19/32	319.9
G	8 5/16	211.1
H	10 5/16	261.9
J	8 13/16	223.8
K	6	152.4
L	7	177.8
M	2	50.8
N	7/16	11.1
P	13 7/32	335.7
R	8 3/4	222.3
S	5 15/16	150.8
T	7 21/32	194.5
U	1 29/32	48.4
V	1/2	12.7

SECTION 4B

DIMENSIONAL DRAWING

MODEL P4 METAL SANIFLO^{FDA} PUMP



DIMENSIONS – P4 SANIFLO^{FDA}		
ITEM	STANDARD (inch)	METRIC (mm)
A	15 3/8	390.5
B	2 15/32	62.7
C	8 3/32	205.6
D	17 13/32	442.1
E	12 19/32	319.9
F	10 5/16	261.2
G	8 13/16	223.8
H	8 5/16	211.1
J	5 31/32	151.6
K	7	177.8
L	2 5/8	66.7
M	7/16	11.1

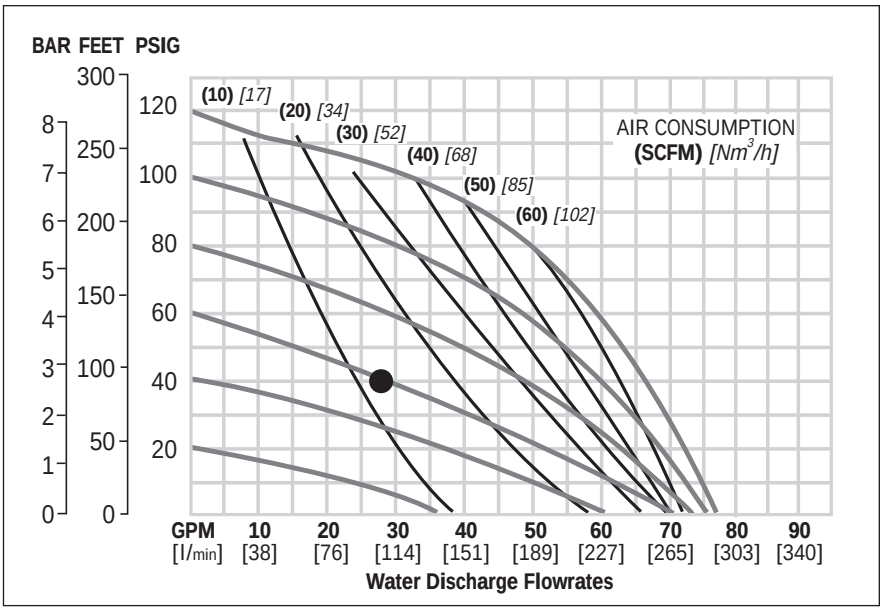
SECTION 5A
PERFORMANCE CURVES
MODEL P4 METAL RUBBER-FITTED

Height.....17⅞" (45.4 cm)
Width.....14³²⁄₃₂" (36.9 cm)
Depth.....12³⁹⁄₃₂" (32.0 cm)
Ship Weight.....Aluminum 28.6 lbs. (13 kg)
316 Stainless Steel 44.6 lbs. (20.2 kg)
Cast Iron 48.6 lbs. (22 kg)
Hastelloy 50.6 lbs. (23 kg)
Air Inlet.....½" (1.27 cm)
Inlet .....1½" (3.81 cm)
Outlet.....1¼" (3.18 cm)
Suction Lift .....19' Dry (5.79 m)
26' Wet (8.23 m)
Displacement per
Stroke ..... .26 gal. (.98 l)[1]
Max. Flow Rate.....76 gpm (287.7 l/m)
Max. Size Solids.....³⁄₁₆" (.48 mm)

[1]Displacement per stroke was calculated at 70 psig (4.8 Bar) air inlet pressure against a 30 psig (2 Bar) head pressure.

Example: To pump 27 gpm (102.2 lpm) against a discharge pressure head of 40 psig (2.7 Bar) requires 60 psig (4.1 Bar) and 13 scfm (22.1 Nm³/h) air consumption.

Caution: Do not exceed 125 psig (8.6 Bar) air supply pressure.



Flow rates indicated on chart were determined by pumping water.

For optimum life and performance, pumps should be specified so that daily operation parameters will fall in the center of the pump performance curve.

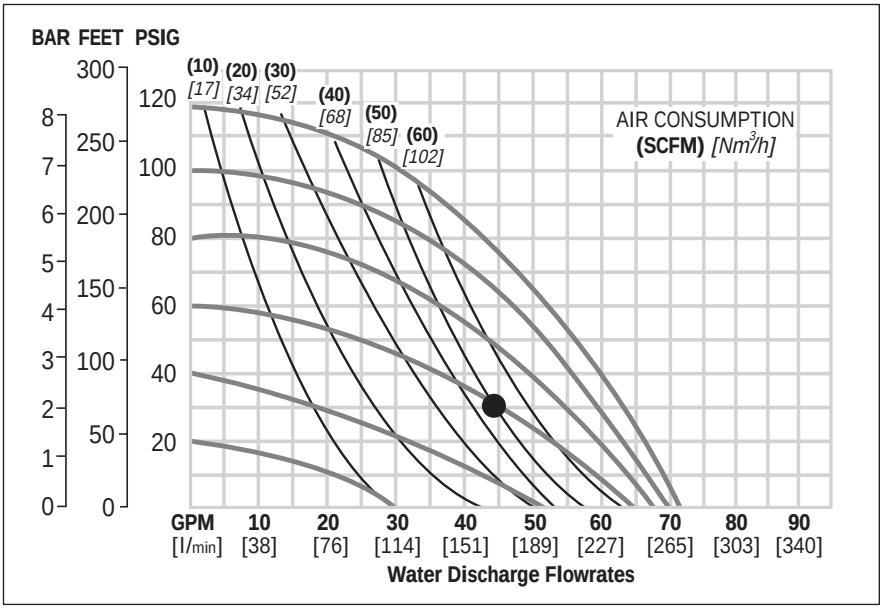
SECTION 5B
PERFORMANCE CURVES
MODEL P4 METAL ULTRA-FLEX™-FITTED

Height.....17⅞" (45.4 cm)
Width.....14³²⁄₃₂" (36.9 cm)
Depth.....12³⁹⁄₃₂" (32.0 cm)
Ship Weight.....Aluminum 28.6 lbs. (13 kg)
316 Stainless Steel 44.6 lbs. (20.2 kg)
Cast Iron 48.6 lbs. (22 kg)
Hastelloy 50.6 lbs. (23 kg)
Air Inlet.....½" (1.27 cm)
Inlet .....1½" (3.81 cm)
Outlet.....1¼" (3.18 cm)
Suction Lift .....17' Dry (5.18 m)
28' Wet (8.53 m)
Displacement per
Stroke ..... .20 gal. (.76 l)[1]
Max. Flow Rate.....71 gpm (268.8 l/m)
Max. Size Solids.....³⁄₁₆" (.48 mm)

[1]Displacement per stroke was calculated at 70 psig (4.8 Bar) air inlet pressure against a 30 psig (2 Bar) head pressure.

Example: To pump 45 gpm (170.3 lpm) against a discharge pressure head of 30 psig (2.0 Bar) requires 60 psig (4.1 Bar) and 50 scfm (84.6 Nm³/h) air consumption.

Caution: Do not exceed 125 psig (8.6 Bar) air supply pressure.



Flow rates indicated on chart were determined by pumping water.

For optimum life and performance, pumps should be specified so that daily operation parameters will fall in the center of the pump performance curve.

SECTION 5C

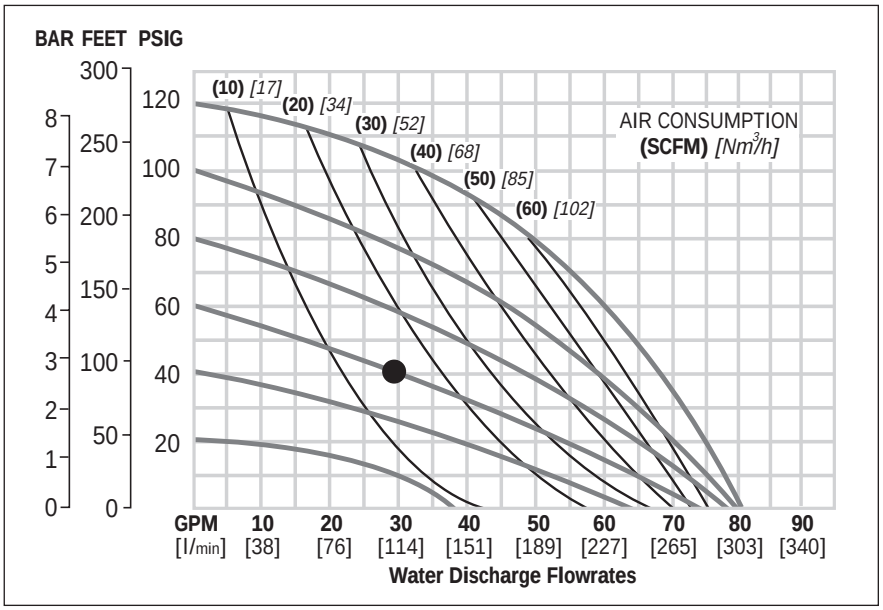
PERFORMANCE CURVES
MODEL P4 METAL TPE-FITTED

Height.....17⅞" (45.4 cm)
Width.....14$^{17}/_{32}$" (36.9 cm)
Depth.....12$^{19}/_{32}$" (32.0 cm)
Ship Weight.....Aluminum 28.6 lbs. (13 kg)
316 Stainless Steel 44.6 lbs. (20.2 kg)
Cast Iron 48.6 lbs. (22 kg)
Hastelloy 50.6 lbs. (23 kg)
Air Inlet.....½" (1.27 cm)
Inlet .....1½" (3.81 cm)
Outlet.....1¼" (3.18 cm)
Suction Lift .....17' Dry (5.18 m)
29' Wet (8.84 m)
Displacement per
Stroke ..... .29 gal. (1.1 l)[1]
Max. Flow Rate.....81 gpm (306.61 l/m)
Max. Size Solids.....$^{3}/_{16}$" (.48 mm)

[1]Displacement per stroke was calculated at 70 psig (4.8 Bar) air inlet pressure against a 30 psig (2 Bar) head pressure.

Example: To pump 30 gpm (113.6 lpm) against a discharge pressure head of 40 psig (2.72 Bar) requires 60 psig (4.1 Bar) and 15 scfm (25.5 Nm³/h) air consumption.

Caution: Do not exceed 125 psig (8.6 Bar) air supply pressure.



Flow rates indicated on chart were determined by pumping water.

For optimum life and performance, pumps should be specified so that daily operation parameters will fall in the center of the pump performance curve.

SECTION 5D

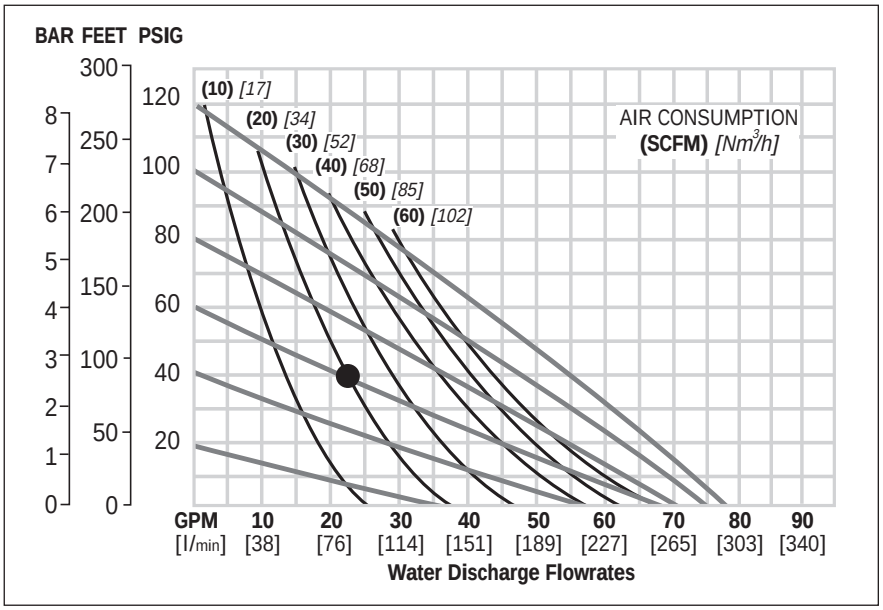
PERFORMANCE CURVES
MODEL P4 METAL TEFLON®-FITTED

Height.....17⅞" (45.4 cm)
Width.....14$^{17}/_{32}$" (36.9 cm)
Depth.....12$^{19}/_{32}$" (32.0 cm)
Ship Weight.....Aluminum 28.6 lbs. (13 kg)
316 Stainless Steel 44.6 lbs. (20.2 kg)
Cast Iron 48.6 lbs. (22 kg)
Hastelloy 50.6 lbs. (23 kg)
Air Inlet.....½" (1.27 cm)
Inlet .....1½" (3.81 cm)
Outlet.....1¼" (3.18 cm)
Suction Lift .....12' Dry (3.66 m)
28' Wet (8.53 m)
Displacement per
Stroke ..... .14 gal. (.53 l)[1]
Max. Flow Rate.....78 gpm (295.2 l/m)
Max. Size Solids .....$^{3}/_{16}$" (.48 mm

[1]Displacement per stroke was calculated at 70 psig (4.8 Bar) air inlet pressure against a 30 psig (2 Bar) head pressure.

Example: To pump 22 gpm (83.3 lpm) against a discharge pressure head of 40 psig (2.7 Bar) requires 60 psig (4.1 Bar) and 20 scfm (34 Nm³/h) air consumption.

Caution: Do not exceed 125 psig (8.6 Bar) air supply pressure.

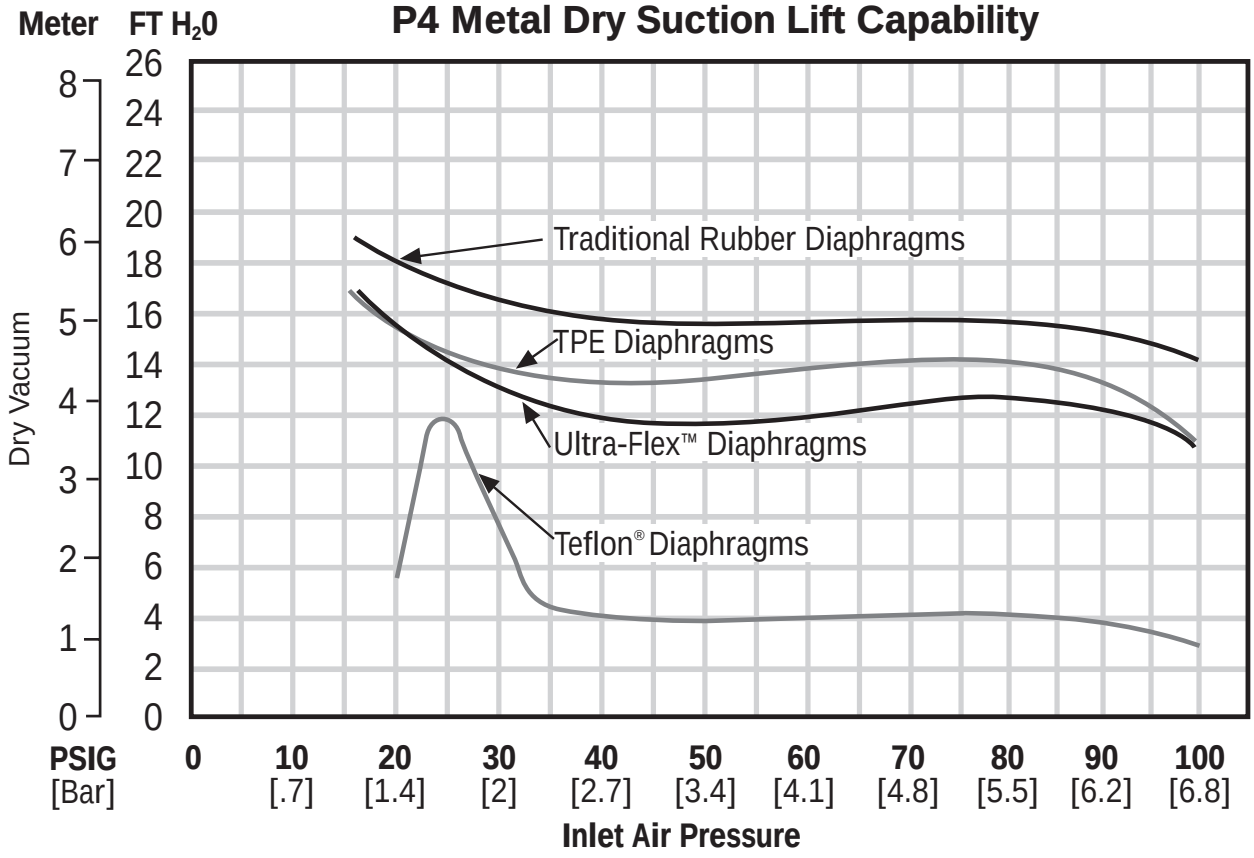


Flow rates indicated on chart were determined by pumping water.

For optimum life and performance, pumps should be specified so that daily operation parameters will fall in the center of the pump performance curve.

SECTION 6

SUCTION LIFT CURVES & DATA



Suction lift curves are calibrated for pumps operating at 1,000' (305 m) above sea level. This chart is meant to be a guide only. There are many variables which can affect your pump's operating characteristics. The number of intake and discharge elbows, viscosity of pumping fluid, elevation (atmospheric pressure) and pipe friction loss all affect the amount of suction lift your pump will attain.

SECTION 7 – AIR OPERATION
A – INSTALLATION

The P4 Pro-Flo™ model has a 1½" (3.81 cm) inlet and 1¼" (3.18 cm) outlet and is designed for flows to 81 gpm (306 lpm). Refer to Section 5 for performance characteristics. The **P4 Metal** pump is manufactured with wetted parts of Aluminum, 316 Stainless Steel, Cast Iron, and Hastelloy. The **P4** is available with a polypropylene air valve and center block with aluminum air chambers or a center section and air valve constructed of glass-filled Acetal. A variety of diaphragms, valve balls, valve seats and O-rings are available to satisfy temperature, chemical compatibility, abrasion and flex concerns.

The suction pipe size should be at least 1½" (3.81 cm) diameter or larger if highly viscous material is being pumped. The suction hose must be non-collapsible, reinforced type as the P4 is capable of pulling a high vacuum. Discharge piping should be at least 1¼" (3.18 cm); larger diameter can be used to reduce friction losses. It is critical that all fittings and connections are airtight or a reduction or loss of pump suction capability will result.

INSTALLATION: Months of careful planning, study, and selection efforts can result in unsatisfactory pump performance if installation details are left to chance.

Premature failure and long term dissatisfaction can be avoided if reasonable care is exercised throughout the installation process.

LOCATION: Noise, safety, and other logistical factors usually dictate where equipment will be situated on the production floor. Multiple installations with conflicting requirements can result in congestion of utility areas, leaving few choices for additional pumps.

Within the framework of these and other existing conditions, every pump should be located in such a way that five key factors are balanced against each other to maximum advantage.

ACCESS: First of all, the location should be accessible. If it's easy to reach the pump, maintenance personnel will have an easier time carrying out routine inspections and adjustments. Should major repairs become necessary, ease of access can play a key role in speeding the repair process and reducing total downtime.

AIR SUPPLY: Every pump location should have an air line large enough to supply the volume of air necessary to achieve the desired pumping rate (see Section 5). Use air pressure up to a maximum of 125 psi (8.6 Bar) depending on pumping requirements.

For best results, the pumps should use a 5 micron air filter, needle valve and regulator. The use of an air filter before the pump will ensure that the majority of any pipeline contaminants will be eliminated.

When operation is controlled by a solenoid valve in the air line, three-way valves should be used. This valve allows trapped air between the valve and the pump to bleed off which improves pump performance. Pumping volume can be determined by counting the number of strokes per minute and then multiplying the figure by the displacement per stroke.

MUFFLER: Sound levels are reduced below OSHA specifications using the standard Wilden muffler. Other mufflers can be used to further reduce sound levels, but they usually reduce pump performance.

ELEVATION: Selecting a site that is well within the pump's dynamic lift capability will assure that loss-of-prime troubles will be eliminated. In addition, pump efficiency can be adversely affected if proper attention is not given to site location.

PIPING: Final determination of the pump site should not be made until the piping problems of each possible location have been evaluated. The impact of current and future installations should be considered ahead of time to make sure that inadvertent restrictions are not created for any remaining sites.

The best choice possible will be a site involving the shortest and straightest hook-up of suction and discharge piping. Unnecessary elbows, bends, and fittings should be avoided. Pipe sizes should be selected so as to keep friction losses within practical limits. All piping should be supported independently of the pump. In addition, the piping should be aligned so as to avoid placing stress on the pump fittings.

Flexible hose can be installed to aid in absorbing the forces created by the natural reciprocating action of the pump. If the pump is to be bolted down to a solid location, a mounting pad placed between the pump and the foundation will assist in minimizing pump vibration. Flexible connections between the pump and rigid piping will also assist in minimizing pump vibration. If quick-closing valves are installed at any point in the discharge system, or if pulsation within a system becomes a problem, a surge suppressor should be installed to protect the pump, piping and gauges from surges and water hammer.

If the pump is to be used in a self-priming application, be sure that all connections are airtight and that the suction lift is within the model's ability. Note: Materials of construction and elastomer material have an effect on suction lift parameters. Please refer to Section 6 for specifics.

When pumps are installed in applications involving flooded suction or suction head pressures, a gate valve should be installed in the suction line to permit closing of the line for pump service.

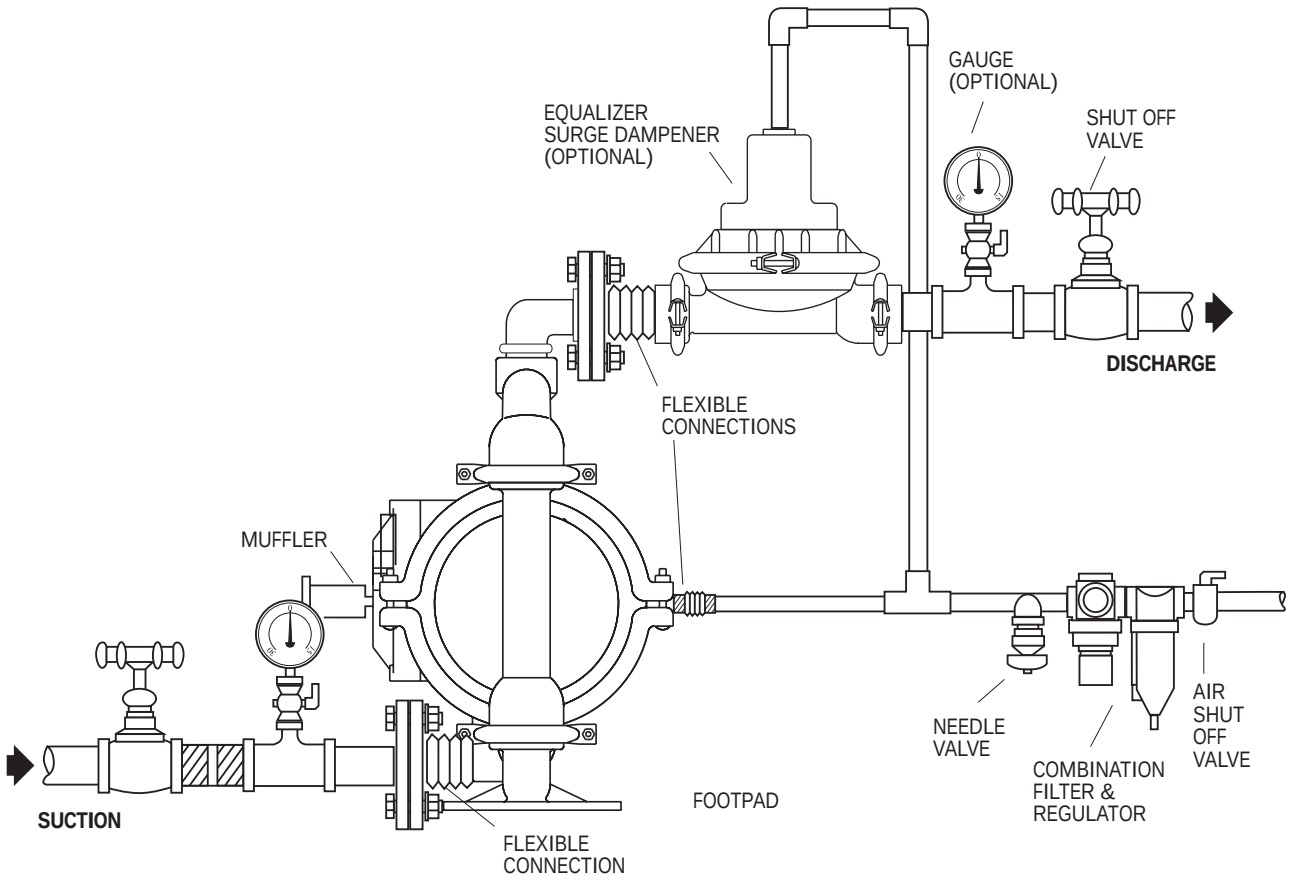
Pumps in service with a positive suction head are most efficient when inlet pressure is limited to 7–10 psig (.48–.68 Bar). Premature diaphragm failure may occur if positive suction is 10 psig (.68 Bar) and higher.

THE MODEL P4 WILL PASS 3/16" (4.79 MM) SOLIDS. WHENEVER THE POSSIBILITY EXISTS THAT LARGER SOLID OBJECTS MAY BE SUCKED INTO THE PUMP, A STRAINER SHOULD BE USED ON THE SUCTION LINE.

CAUTION: DO NOT EXCEED 125 PSIG (8.6 BAR) AIR SUPPLY PRESSURE.

P4 PUMPS CANNOT BE SUBMERGED. FOR SUBMERGED APPLICATIONS, USE A WILDEN M4 PUMP.

SUGGESTED INSTALLATION



SECTION 7 – AIR OPERATION

B – SUGGESTED OPERATION AND MAINTENANCE INSTRUCTIONS

OPERATION: The P4 is pre-lubricated, and does not require in-line lubrication. Additional lubrication will not damage the pump, however if the pump is heavily lubricated by an external source, the pump's internal lubrication may be washed away. If the pump is then moved to a non-lubricated location, it may need to be disassembled and re-lubricated as described in the ASSEMBLY/DISASSEMBLY INSTRUCTIONS.

Pump discharge rate can be controlled by limiting the volume and/or pressure of the air supply to the pump (preferred method). A regulator is used to control air pressure while a needle valve is used to control volume. Pump discharge rate can also be controlled by throttling the pump discharge by partially closing a valve in the discharge line of the pump. This action increases friction loss which reduces flow rate. (See Section 5.) This is useful when the need exists to control the pump from a remote location. When the pump discharge pressure equals or exceeds the air supply pressure, the pump will stop; no bypass or pressure relief valve is needed, and pump damage will not occur. The pump has reached a "deadhead" situation and can be restarted by reducing the fluid discharge pressure or increasing the air inlet pressure. The Wilden P4 pump runs solely on compressed air and does not generate heat, therefore your process fluid temperature will not be affected.

MAINTENANCE AND INSPECTIONS: Since each application is unique, maintenance schedules may be different for every pump. Frequency of use, line pressure, viscosity and abrasiveness of process fluid all affect the parts life of a Wilden pump. Periodic inspections have been found to offer the best means for preventing unscheduled pump downtime. Personnel familiar with the pump's construction and service should be informed of any abnormalities that are detected during operation.

RECORDS: When service is required, a record should be made of all necessary repairs and replacements. Over a period of time, such records can become a valuable tool for predicting and preventing future maintenance problems and unscheduled downtime. In addition, accurate records make it possible to identify pumps that are poorly suited to their applications.

C – TROUBLESHOOTING

Pump will not run or runs slowly.

1. Ensure that the air inlet pressure is at least 5 psig (.35 Bar) above startup pressure and that the differential pressure (the difference between air inlet and liquid discharge pressures) is not less than 10 psig (.7 Bar).
2. Check air inlet filter for debris (see recommended installation).
3. Check for extreme air leakage (blow by) which would indicate worn seals/bores in the air valve, pilot spool, main shaft.
4. Disassemble pump and check for obstructions in the air passageways or objects which would obstruct the movement of internal parts.
5. Check for sticking ball check valves. If material being pumped is not compatible with pump elastomers, swelling may occur. Replace ball check valves and seals with proper elastomers. Also, as the check valve balls wear out, they become smaller and can become stuck in the seats. In this case, replace balls and seats.
6. Check for broken inner piston which will cause the air valve spool to be unable to shift.
7. Remove plug from pilot spool exhaust.

Pump runs but little or no product flows.

1. Check for pump cavitation; slow pump speed down to allow thick material to flow into liquid chambers.
2. Verify that vacuum required to lift liquid is not greater than the vapor pressure of the material being pumped (cavitation).
3. Check for sticking ball check valves. If material being pumped is not compatible with pump elastomers, swelling may occur. Replace ball check valves and seals with proper elastomers. Also, as the check valve balls wear out, they become smaller and can become stuck in the seats. In this case, replace balls and seats.

Pump air valve freezes.

1. Check for excessive moisture in compressed air. Either install a dryer or hot air generator for compressed air. Alternatively, a coalescing filter may be used to remove the water from the compressed air in some applications.

Air bubbles in pump discharge.

1. Check for ruptured diaphragm.
2. Check tightness of outer pistons (refer to Section 8C).
3. Check tightness of clamp bands and integrity of O-rings and seals, especially at intake manifold.
4. Ensure pipe connections are airtight.

Product comes out air exhaust.

1. Check for diaphragm rupture.
2. Check tightness of outer pistons to shaft.

SECTION 8A
MODEL P4 METAL
DIRECTIONS FOR DISASSEMBLY/REASSEMBLY

CAUTION: Before any maintenance or repair is attempted, the compressed air line to the pump should be disconnected and all air pressure allowed to bleed from the pump. Disconnect all intake, discharge, and air lines. Drain the pump by turning it upside down and allowing any fluid to flow into a suitable container. Be aware of any hazardous effects of contact with your process fluid.

The Wilden P4 metal pump has a 1½" (3.81 cm) inlet and 1¼" (3.18 cm) outlet and is designed for flows up to 81 GPM (306.6 LPM). Its air distribution system is based on a revolutionary design which increases reliability and performance. The model P4 is available in Aluminum, Cast Iron, 316 Stainless Steel, or Hastelloy wetted parts. For highly corrosive applications, polypropylene and PVDF models are available.

TOOLS REQUIRED:

7/16" Wrench

½" Wrench

Adjustable Wrench

Vise equipped w/soft jaws
(such as plywood, plastic or other suitable material)

NOTE: The model photographed for these instructions incorporates rubber diaphragms, balls, and seats. Models with Teflon® diaphragms, balls and seats are the same except where noted.

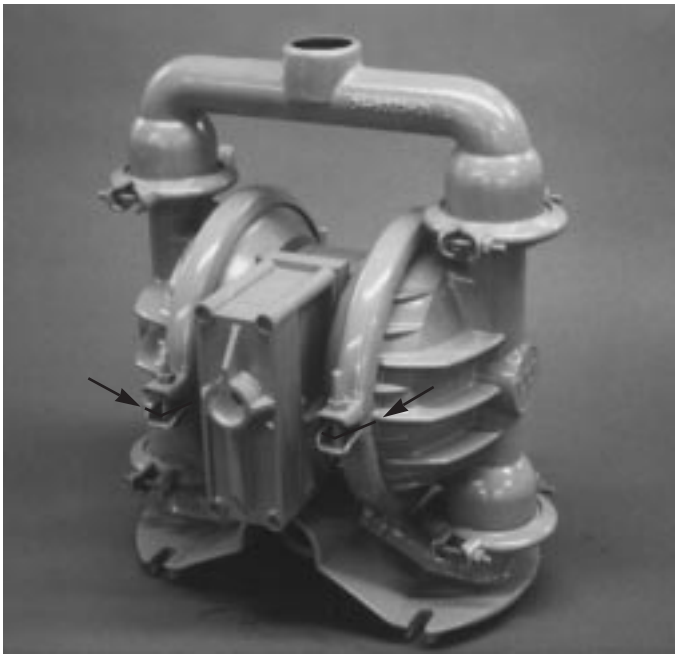
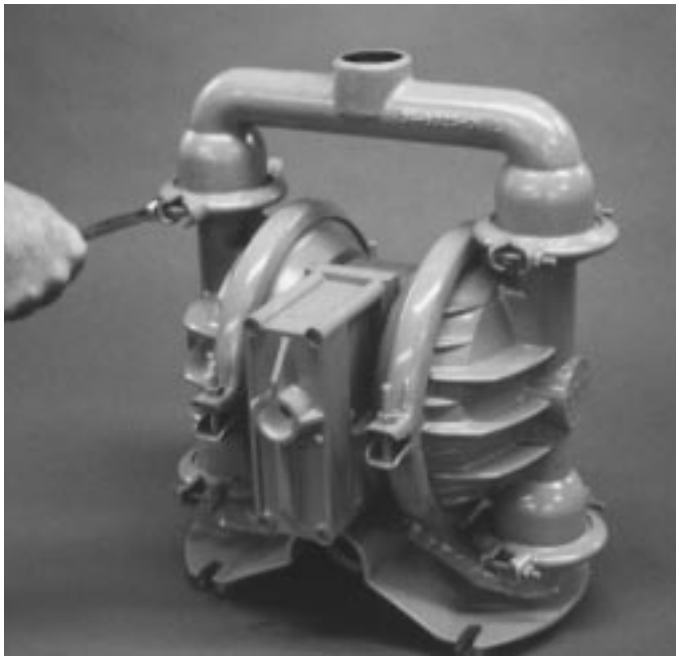


Figure 1

DISASSEMBLY:

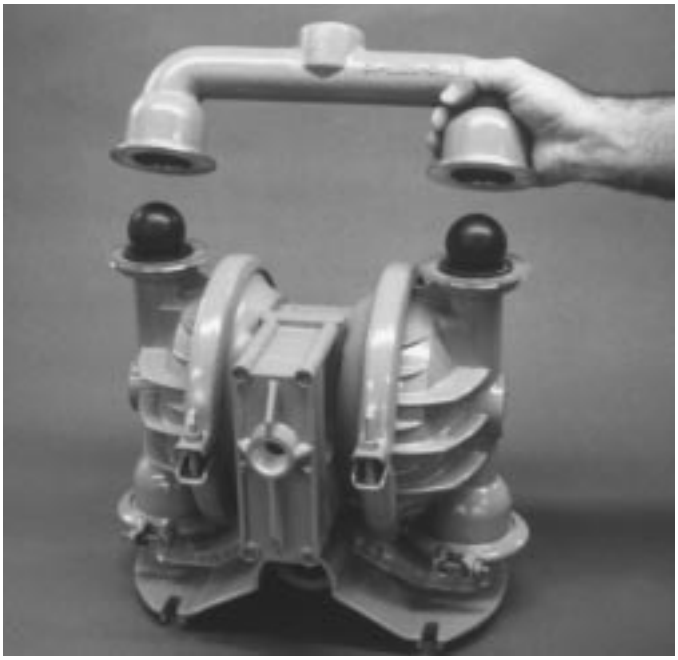
Step 1.

Before starting disassembly, mark a line from each liquid chamber to its corresponding air chamber. This line will assist in proper alignment during reassembly. *(Figure 1)*



Step 2. *Figure 2*

Utilizing a 7/16" wrench, remove the two small clamp bands that fasten the discharge manifold to the liquid chambers. *(Figure 2)*

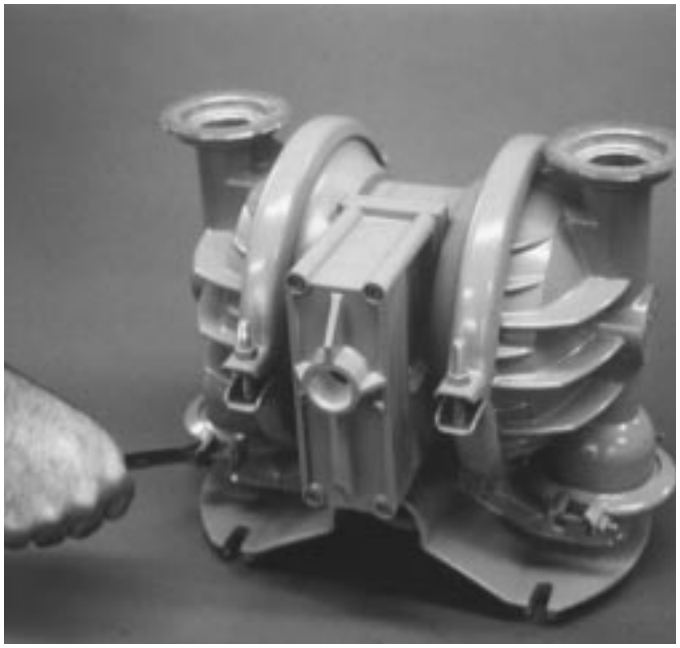


Step 3. *Figure 3*

Remove the discharge manifold to expose the valve balls and seats. Inspect ball cage area of manifold for excessive wear or damage. *(Figure 3)*

Step 4. *Figure 4*

Remove the discharge valve balls and seats *(Figure 4)* from the liquid chambers and inspect for nicks, chemical attack or abrasive wear. Replace worn parts with genuine Wilden parts for reliable performance.



Step 5. *Figure 5*

Remove the two small clamp bands which fasten the intake manifold to the liquid chambers. *(Figure 5)*

Step 6. *Figure 6*

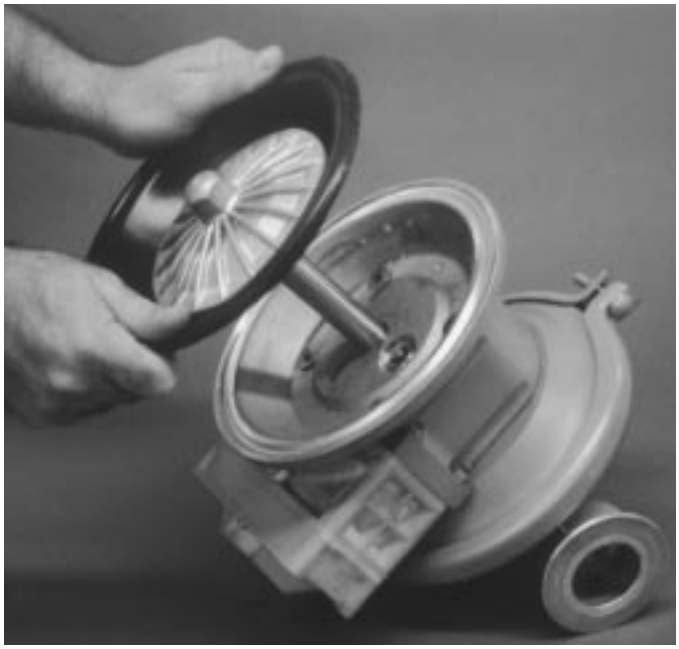
Lift liquid chambers and center section from intake manifold to expose intake valve balls and seats. Inspect ball cage area of liquid chamber for excessive wear or damage. *(Figure 6)*

Step 7. *Figure 7*

Remove one set of large clamp bands which secure one liquid chamber to the center section. *(Figure 7)*

Step 8. *Figure 8*

Lift liquid chamber away from center section to expose diaphragm and outer piston. *(Figure 8)*



Step 9A *Figure 9A*

Using an adjustable wrench, or by rotating the diaphragm by hand, remove the diaphragm assembly.

NOTE: Due to varying torque values, one of the following two situations may occur: 1) The outer piston, diaphragm and inner piston remain attached to the shaft and the entire assembly can be removed from the center section *(Figure 9A).*

Step 9B *Figure 9B*

2) The outer piston, diaphragm and inner piston separate from the shaft which remains connected to the opposite side diaphragm assembly *(Figure 9B).* Repeat disassembly instructions for the opposite liquid chamber. Inspect diaphragm assembly and shaft for signs of wear or chemical attack. Replace all worn parts with genuine Wilden parts for reliable performance.

Step 10 *Figure 10*

To remove diaphragm assembly from shaft, secure shaft with soft jaws (a vise fitted with plywood, plastic or other suitable material) to ensure shaft is not nicked, scratched or gouged. Using an adjustable wrench, remove diaphragm assembly from shaft**.** *(Figure 10)*

PRO-FLO™ AIR VALVE/CENTER SECTION
DISASSEMBLY, CLEANING, INSPECTION

AIR VALVE DISASSEMBLY:

CAUTION: Before any maintenance or repair is attempted, the compressed air line to the pump should be disconnected and all air pressure allowed to bleed from the pump. Disconnect all intake, discharge, and air lines. Drain the pump by turning it upside down and allowing any fluid to flow into a suitable container. Be aware of hazardous effects of contact with your process fluid.

The Wilden Metal P4 utilizes a revolutionary Pro-Flo™ air distribution system. A ½" (1.27 cm) air inlet connects the air supply to the center section. Proprietary composite seals reduce the coefficient of friction and allow the P4 to run lube-free. Constructed of Acetal or Polypropylene, the Pro-Flo™ air distribution system is designed to perform in on/off, non-freezing, non-stalling, tough duty applications.

TOOLS REQUIRED:

3/16" Hex Head Wrench
7/32" Hex Head Wrench
Snap Ring Pliers
O-Ring Pick

Step 1. *Figure 1*

Loosen the air valve bolts utilizing a 3/16" hex head wrench and then remove muffler plate screws. *(Figure 1)*

Step 2. *Figure 2*

Remove muffler plate and air valve bolts from air valve assembly *(Figure 2)* exposing muffler gasket for inspection. Replace if necessary.

Step 3. *Figure 3*

Lift away air valve assembly and remove air valve gasket for inspection *(Figure 3).* Replace if necessary.

Step 4. *Figure 4*

Remove air valve end cap to expose air valve spool by simply lifting up on end cap once air valve bolts are removed. *(Figure 4).*

Step 5. *Figure 5*

Remove air valve spool from air valve body by threading one air valve bolt into the end of the spool and gently sliding the spool out of the air valve body *(Figure 5).* Inspect seals for signs of wear and replace entire assembly if necessary. Use caution when handling air valve spool to prevent damaging seals.

NOTE: Seals should not be removed from assembly.
Seals are not sold separately.

Step 6. *Figure 6*

Remove pilot spool retaining snap ring on both sides of center section with snap ring pliers *(Figure 6).*

Step 7. *Figure 7*

Remove air chamber bolts with 7/32" hex head wrench *(Figure 7).*

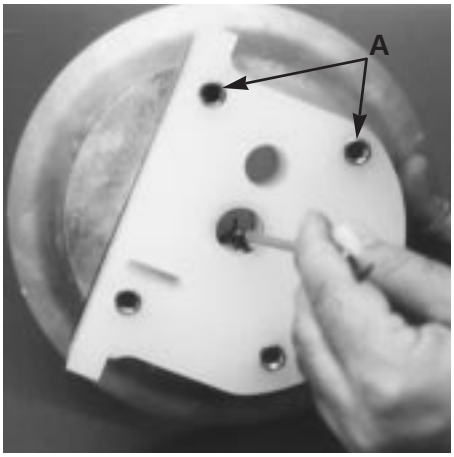
Step 8. *Figure 8*

Remove pilot spool bushing from center block *(Figure 8).*

Step 9. *Figure 9*

With O-ring pick, gently remove pilot spool retaining O-ring *(Figure 9).* Replace if necessary. Gently remove pilot spool from bushing and inspect spool and seals for nicks, gouges or other signs of wear. Replace pilot sleeve assembly or outer bushing O-rings if necessary.

NOTE: Seals should not be removed from pilot spool.
Seals are not sold separately.



Step 10. *Figure 10*

Check center block Glyd™ rings for signs of wear. If necessary, remove Glyd™ rings with O-ring pick and replace. *(Figure 10)*

NOTE: Threaded sleeves (see A — *Figure 10)* are removable and can be replaced if necessary. Sleeves can be press fit by hand.

SECTION 8C
REASSEMBLY HINTS & TIPS

ASSEMBLY:

Upon performing applicable maintenance to the air distribution system, the pump can now be reassembled. Please refer to the disassembly instructions for photos and parts placement. To reassemble the pump, follow the disassembly instructions in reverse order. The air distribution system needs to be assembled first, then the diaphragms and finally the wetted path. Please find the applicable torque specifications on this page. The following tips will assist in the assembly process.

- Lubricate air valve bore, center section shaft and pilot spool bore with NLGI grade 2 molybdenum disulfide based grease or equivalent.
- Clean the inside of the center section shaft bushing to ensure no damage is done to new Glyd™ ring seals.
- A small amount NLGI grade 2 molybdenum disulfide based grease can be applied to the muffler and air valve gaskets to locate gaskets during assembly.
- Make sure that the exhaust port on the muffler plate is centered between the two exhaust ports on the center section.
- Stainless bolts should be lubed to reduce the possibility of seizing during tightening.
- Use a mallet to tamp lightly on the large clamp bands to seat the diaphragm before tightening.

MAXIMUM TORQUE SPECIFICATIONS

Description of Part	Metal Pumps
Air Valve	45 in.-lbs. [5 m-N]
Outer Piston	33 ft.-lbs. [44.7 m-N]
Small Clamp Band	30 in.-lbs. [3.4 m-N]
Large Clamp Band (Rubber-Fitted)	95 in.-lbs. [10.7 m-N]
Large Clamp Band (Teflon®-Fitted)	120 in.-lbs. [13.5 m-N]
Air Chamber Screws (HSFHS ⅜"-16)	20 ft.-lbs. [27.1 m-N]

GLYD™ RING INSTALLATION:

PRE-INSTALLATION

- Once all of the old seals have been removed, the inside of the bushing should be cleaned to ensure no debris is left that may cause premature damage to the new seals.

INSTALLATION

The following tools can be used to aid in the installation of the new seals:
Needle Nose Pliers
Phillips Screwdriver
Electrical Tape

- Wrap electrical tape around each leg of the needle nose pliers (heat shrink tubing may also be used). This is done to prevent damaging the inside surface of the new seal.
- With a new seal in hand, place the two legs of the needle nose pliers inside the seal ring. (See *Figure A.)*
- Open the pliers as wide as the seal diameter will allow, then with two fingers pull down on the top portion of the seal to form kidney bean shape. (See *Figure B.)*
- Lightly clamp the pliers together to hold the seal into the kidney shape. Be sure to pull the seal into as tight of a kidney shape as possible, this will allow the seal to travel down the bushing bore easier.
- With the seal clamped in the pliers, insert the seal into the bushing bore and position the bottom of the seal into the correct groove. Once the bottom of the seal is seated in the groove, release the clamp pressure on the pliers. This will allow the seal to partially snap back to its original shape.
- After the pliers are removed, you will notice a slight bump in the seal shape. Before the seal can be properly resized, the bump in the seal should be removed as much as possible. This can be done with either the Phillips screwdriver or your finger. With either the side of the screwdriver or your finger, apply light pressure to the peak of the bump. This pressure will cause the bump to be almost completely eliminated.
- Lubricate the edge of the shaft with NLGI grade 2 molybdenum disulfide based grease.
- Slowly insert the center shaft with a rotating motion. This will complete the resizing of the seal.
- Perform these steps for the remaining seal.

Figure A

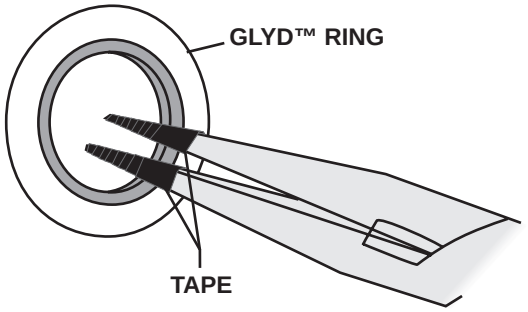
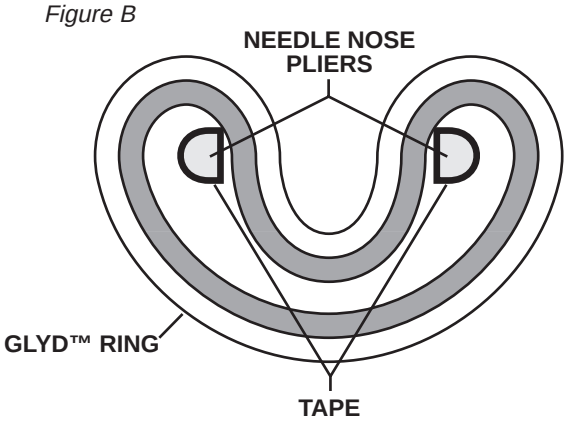


Figure B



GASKET KIT INSTALLATION

Only P4 Cast Iron pumps come standard with expanded Teflon® Gasket Kits (P/N 04-9500-99). Carefully prepare sealing surfaces by removing all debris and foreign matter from diaphragm bead and all mating surfaces. If necessary, smooth or deburr all sealing surfaces. Mating surfaces must be properly aligned in order to ensure positive sealing characteristics.

Step 1 *Figure 1*

Gently remove the adhesive covering from the back of the Teflon® tape. Ensure that the adhesive strip remains attached to the Teflon® tape. *(Figure 1)*

Step 2 *Figure 2*

Starting at any point, place the Teflon® tape in the center of the diaphragm bead groove on the liquid chamber and press lightly on the tape to ensure that the adhesive holds it in place during assembly. Do not stretch the tape during placement in center of diaphragm bead groove. *(Figure 2)*

Step 3 *Figure 3*

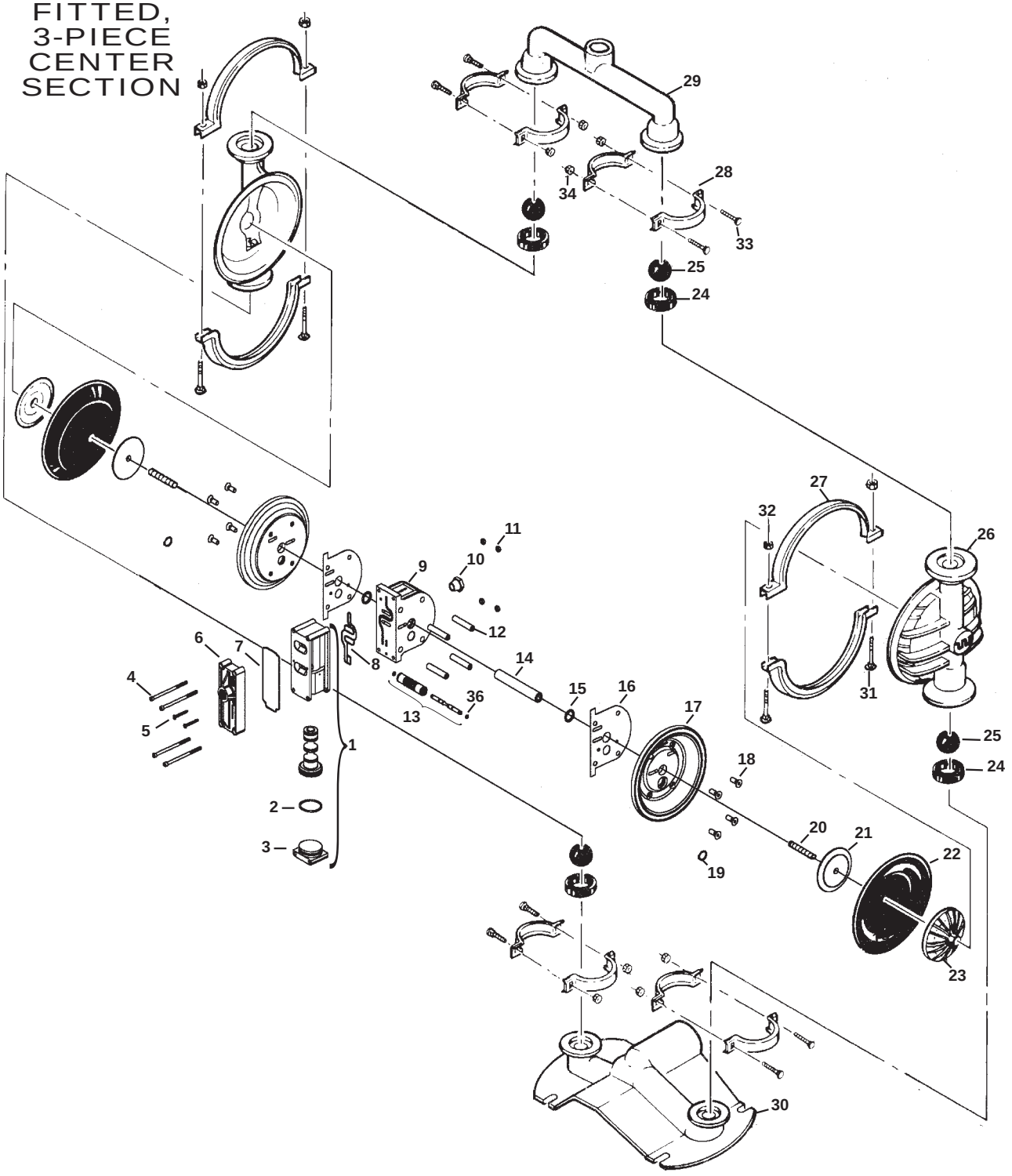
The ends of the tape should overlap approximately ½" (1.27 cm). *(Figure 3)* Proceed to install the Teflon® tape on the remaining liquid chamber.

EXPLODED VIEW/PARTS LISTING

P4

METAL

RUBBER/TPE/
ULTRA-FLEX™-
FITTED,
3-PIECE
CENTER
SECTION



P4 Metal, Rubber/TPE-Fitted or Ultra-Flex™-Fitted

Item #	Part Description	Qty. per Pump	P4/AAPP P/N	P4/WAPP P/N	P4/SAPP P/N	P4/HAPP P/N	P4/SAPP-070 P/N
1	**Pro-Flo™ Air Valve Assembly[1]**	**1**	**04-2000-20-700**	**04-2000-20-700**	**04-2000-20-700**	**04-2000-20-700**	**04-2000-20-700**
2	O-Ring (-225), End Cap (1.859 x .139)	1	04-2390-52-700	04-2390-52-700	04-2390-52-700	04-2390-52-700	04-2390-52-700
3	End Cap, Pro-Flo™	1	04-2330-20-700	04-2330-20-700	04-2330-20-700	04-2330-20-700	04-2330-20-700
4	Screw, HHC, Air Valve (1/4" x 4.5")	4	01-6000-03	01-6000-03	01-6000-03	01-6000-03	01-6000-03
5	Screw, SHCS, 10-16 x 1 3/4"	2	04-6351-03	04-6351-03	04-6351-03	04-6351-03	04-6351-03
6	Muffler Plate, Pro-Flo™	1	04-3180-20-700	04-3180-20-700	04-3180-20-700	04-3180-20-700	04-3180-20-700
7	Gasket, Muffler Plate	1	04-3500-52-700	04-3500-52-700	04-3500-52-700	04-3500-52-700	04-3500-52-700
8	Gasket, Air Valve	1	04-2600-52-700	04-2600-52-700	04-2600-52-700	04-2600-52-700	04-2600-52-700
9	Center Section Assembly	1	04-3110-20	04-3110-20	04-3110-20	04-3110-20	04-3110-20
10	Bushing, Reducer, NPT/BSP Combo	1	04-6950-20-700	04-6950-20-700	04-6950-20-700	04-6950-20-700	04-6950-20-700
11	Nut, Hex, 1/4"-20	4	04-6400-03	04-6400-03	04-6400-03	04-6400-03	04-6400-03
12	Sleeve, Threaded, Pro-Flo™ Center Block	4	04-7710-03	04-7710-03	04-7710-03	04-7710-03	04-7710-03
13	**Removable Pilot Sleeve Assembly**	**1**	**04-3880-99**	**04-3880-99**	**04-3880-99**	**04-3880-99**	**04-3880-99**
14	Shaft, Pro-Flo™	1	04-3800-09-700	04-3800-09-700	04-3800-09-700	04-3800-09-700	04-3800-09-700
	Shaft, Pro-Flo™, Ultra-Flex™	1	04-3830-09-700	04-3830-09-700	04-3830-09-700	04-3830-09-700	N/A
15	**Glyd™ Ring**	**2**	**08-3210-55-225**	**08-3210-55-225**	**08-3210-55-225**	**08-3210-55-225**	**08-3210-55-225**
16	**Gasket, Center Block, Pro-Flo™**	**2**	**04-3525-52**	**04-3525-52**	**04-3525-52**	**04-3525-52**	**04-3525-52**
17	Air Chamber, Pro-Flo™	2	04-3651-01	04-3651-01	04-3651-01	04-3651-01	04-3651-01
18	Screw, HSFHS, 3/8"-16 x 1"	8	71-6250-03	71-6250-03	71-6250-03	71-6250-03	71-6250-03
19	Retaining Ring	2	04-3890-03	04-3890-03	04-3890-03	04-3890-03	04-3890-03
20	Shaft Stud (P4/WAPP: Bolt)[2]	2	08-6150-08	04-6091-08	08-6150-08	08-6150-08	08-6150-08
	Shaft Stud, Ultra-Flex™	2	N/R	04-6152-08	04-6152-08	04-6152-08	N/A
21	Inner Piston	2	04-3700-01-700	04-3700-01-700	04-3700-01-700	04-3700-01-700	04-3700-01-700
	Inner Piston, Ultra-Flex™	2	04-3760-01-700	04-3760-01-700	04-3760-01-700	04-3760-01-700	N/A
22	**Diaphragm**	**2**	*	*	*	*	**04-1010-56**
23	Outer Piston	2	04-4551-01	04-4550-08	04-4550-03	04-4550-04	04-4550-03
	Outer Piston, Ultra-Flex™	2	04-4560-01	04-4560-02	02-4550-03	02-4550-04	N/A
24	**Valve Seat**	**4**	*	*	*	*	**04-1120-56**
25	**Valve Ball**	**4**	*	*	*	*	**04-1080-56**
26	Liquid Chamber	2	04-5000-01	04-5000-02	04-5000-03	04-5000-04	04-5000-03
27	Large Clamp Band	2	04-7330-08	04-7330-08	04-7330-03	04-7330-03	04-7330-03-70
28	Small Clamp Band	4	04-7100-08	04-7100-08	04-7100-03	04-7100-03	04-7100-03-70
29	Manifold, Discharge	1	04-5020-01	04-5020-02	04-5020-03	04-5020-04	04-5020-03-70
30	Manifold, Footed Inlet	1	04-5080-01	04-5080-02	04-5080-03	04-5080-04	04-5080-03-70
31	Carriage Bolt, Large Clamp Band (5/16"-18 RHSN)	4	04-6070-08	04-6070-08	04-6070-03	04-6070-03	04-6070-03
32	Hex Nut, Large Clamp Band (5/16"-18)	4	04-6420-08	04-6420-08	04-6420-03	04-6420-03	08-6660-03-72
33	Carriage Bolt, Small Clamp Band (1/4"-20 RHSN)	8	04-6050-08	04-6050-08	04-6050-03	04-6050-03	01-6070-03
34	Hex Nut, Small Clamp Band (1/4"-20)	8	04-6400-08	04-6400-08	04-6400-03	04-6400-03	04-6650-03-70
35	Muffler (Not Shown)	1	04-3510-99	04-3510-99	04-3510-99	04-3510-99	04-3510-99
36	Pilot Spool Retaining O-Ring	2	04-2650-49-700	04-2650-49-700	04-2650-49-700	04-2650-49-700	04-2650-49-700

[1]Air Valve Assembly includes item numbers 2 and 3.
[2]NOTE: Rubber/TPE-fitted cast iron pumps use ½-20 x 1½" Hex Bolt (P/N 04-6091-08) with washer (P/N 04-6800-08).
BSP-fitted pumps are available. Contact your distributor for part numbers.
BSP to NPT Air Line Reducer Bushing (P/N 04-6950-23-702) is available upon request.
For optional P4 Metal Pump elastomers, see Section 10.
NOTE: Muffler (P/N 04-3510-99) (not shown) is standard on all P4 pumps. (Comes equipped with P/N 08-3250-08 3/4" 45 degree street elbow.)
NOTE: Aluminum pumps are available with a screen base. Requires (1) 04-5620-01 (Screen), (4) 04-6140-08 (Bolt) and (4) 15-6720-08 (Washer).

-070 Specialty Code = Saniflo[FDA]

*See Section 10 — Elastomer Chart

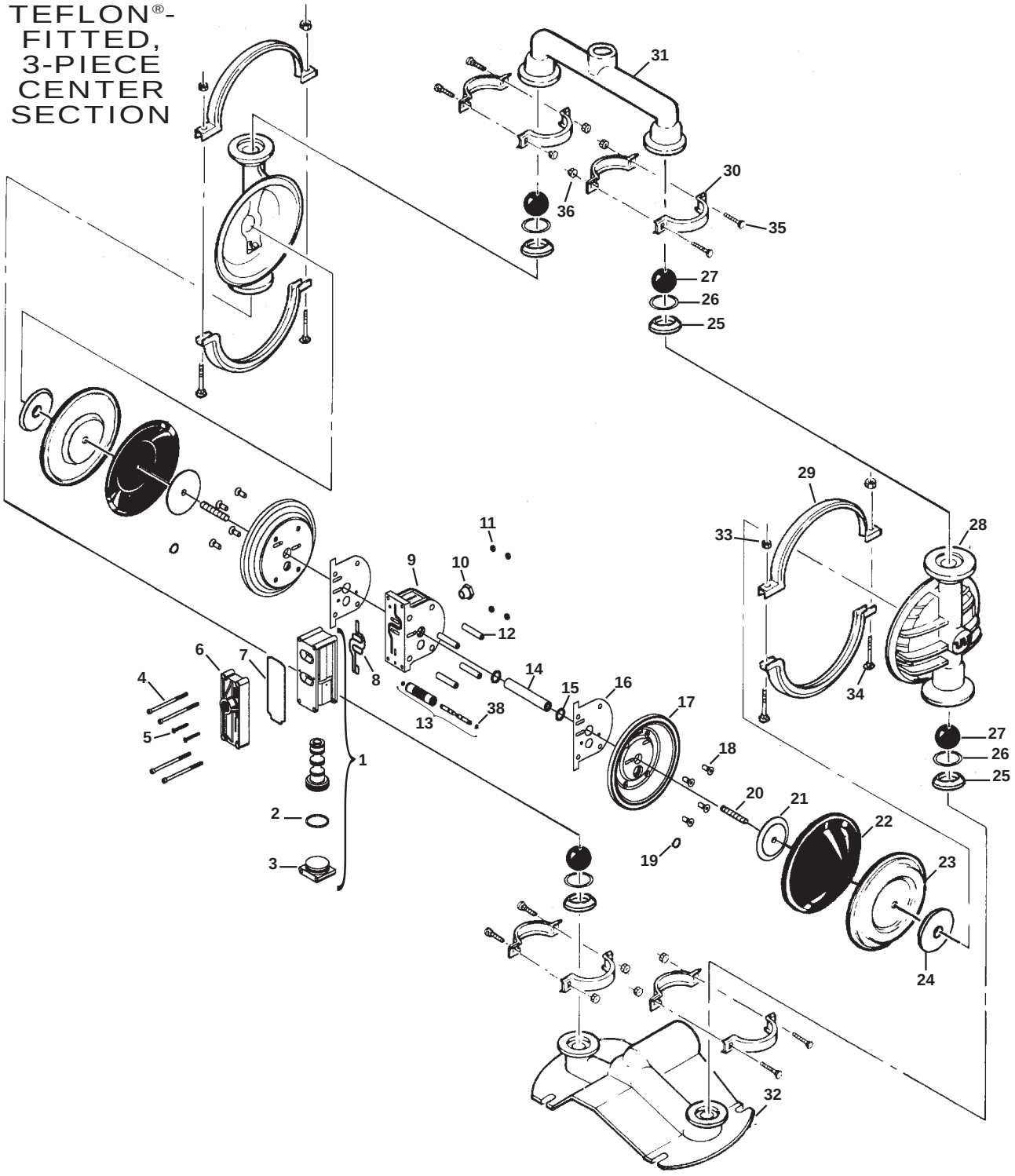
All boldface items are primary wear parts.

For Teflon®-fitted models, see next page.

EXPLODED VIEW/PARTS LISTING

P4 METAL

TEFLON®-FITTED, 3-PIECE CENTER SECTION



P4 Metal, Teflon®-Fitted

Item #	Part Description	Qty. per Pump	P4/AAPP P/N	P4/WAPP P/N	P4/SAPP P/N	P4/HAPP P/N	P4/SAPP-070 P/N
1	**Pro-Flo™ Air Valve Assembly[1]**	**1**	**04-2000-20-700**	**04-2000-20-700**	**04-2000-20-700**	**04-2000-20-700**	**04-2000-20-700**
2	O-Ring (-225), End Cap (1.859 x .139)	1	04-2390-52-700	04-2390-52-700	04-2390-52-700	04-2390-52-700	04-2390-52-700
3	End Cap, Pro-Flo™	1	04-2330-20-700	04-2330-20-700	04-2330-20-700	04-2330-20-700	04-2330-20-700
4	Screw, HHC, Air Valve (1/4" x 4.5")	4	01-6000-03	01-6000-03	01-6000-03	01-6000-03	01-6000-03
5	Screw, SHCS, 10-16 x 1 3/4"	2	04-6351-03	04-6351-03	04-6351-03	04-6351-03	04-6351-03
6	Muffler Plate, Pro-Flo™	1	04-3180-20-700	04-3180-20-700	04-3180-20-700	04-3180-20-700	04-3180-20-700
7	Gasket, Muffler Plate	1	04-3500-52-700	04-3500-52-700	04-3500-52-700	04-3500-52-700	04-3500-52-700
8	Gasket, Air Valve	1	04-2600-52-700	04-2600-52-700	04-2600-52-700	04-2600-52-700	04-2600-52-700
9	Center Section Assembly	1	04-3110-20	04-3110-20	04-3110-20	04-3110-20	04-3110-20
10	Bushing, Reducer, NPT/BSP Combo	1	04-6950-23-700	04-6950-23-700	04-6950-23-700	04-6950-23-700	04-6950-23-700
11	Nut, Hex, 1/4"-20	4	04-6400-03	04-6400-03	04-6400-03	04-6400-03	04-6400-03
12	Sleeve, Threaded, Pro-Flo™ Center Block	4	04-7710-03	04-7710-03	04-7710-03	04-7710-03	04-7710-03
13	**Removable Pilot Sleeve Assembly**	**1**	**04-3880-99**	**04-3880-99**	**04-3880-99**	**04-3880-99**	**04-3880-99**
14	Shaft, Pro-Flo™	1	04-3820-09-700	04-3820-09-700	04-3820-09-700	04-3820-09-700	04-3820-09-700
15	**Glyd™ Ring**	**2**	**08-3210-55-225**	**08-3210-55-225**	**08-3210-55-225**	**08-3210-55-225**	**08-3210-55-225**
16	**Gasket, Center Block, Pro-Flo™**	**2**	**04-3525-52**	**04-3525-52**	**04-3525-52**	**04-3525-52**	**04-3525-52**
17	Air Chamber, Pro-Flo™	2	04-3651-01	04-3651-01	04-3651-01	04-3651-01	04-3651-01
18	Screw, HSFHS, 3/8"-16 x 1"	8	71-6250-03	71-6250-03	71-6250-03	71-6250-03	71-6250-03
19	Retaining Ring	2	04-3890-03	04-3890-03	04-3890-03	04-3890-03	04-3890-03
20	Stud, Shaft	2	08-6150-08	08-6150-08	08-6150-08	08-6150-08	08-6150-08
21	Inner Piston	2	04-3750-01-700	04-3750-01-700	04-3750-01-700	04-3750-01-700	04-3750-01-700
22	**Back-up Diaphragm**	**2**	**04-1060-51**	**04-1060-51**	**04-1060-51**	**04-1060-51**	**04-1060-51**
23	**Diaphragm**	**2**	**04-1010-55**	**04-1010-55**	**04-1010-55**	**04-1010-55**	**04-1010-55**
24	Outer Piston	2	04-4600-01	04-4600-03	04-4600-03	04-4600-04	04-4600-03
25	**Valve Seat**	**4**	**04-1121-01**	**04-1121-08**	**04-1121-03**	**04-1121-04**	**04-1121-03**
26	**Valve Seat, O-Ring (2.609" x .139")**	**4**	**04-1200-55**	**04-1200-55**	**04-1200-55**	**04-1200-55**	**04-1200-55**
27	**Valve Ball**	**4**	**04-1080-55**	**04-1080-55**	**04-1080-55**	**04-1080-55**	**04-1080-55**
28	Liquid Chamber	2	04-5000-01	04-5000-02	04-5000-03	04-5000-04	04-5000-03
29	Large Clamp Band	2	04-7330-03	04-7330-03	04-7330-03	04-7330-03	04-7330-03-70
30	Small Clamp Band	4	04-7100-03	04-7100-03	04-7100-03	04-7100-03	04-7100-03-70
31	Manifold, Discharge	1	04-5020-01	04-5020-02	04-5020-03	04-5020-04	04-5020-03-70
32	Manifold, Footed Inlet	1	04-5080-01	04-5080-02	04-5080-03	04-5080-04	04-5080-03-70
33	Carriage Bolt, Large Clamp Band (5/16"-18 RHSN)	4	04-6070-03	04-6070-03	04-6070-03	04-6070-03	04-6070-03
34	Hex Nut, Large Clamp Band (5/16"-18)	4	08-6400-03	08-6400-03	08-6400-03	08-6400-03	08-6400-03
35	Carriage Bolt, Small Clamp Band (1/4"-20 RHSN)	8	01-6070-03	01-6070-03	01-6070-03	01-6070-03	01-6070-03
36	Hex Nut, Small Clamp Band (1/4"-20)	8	04-6400-03	04-6400-03	04-6400-03	04-6400-03	04-6650-03-70
37	Muffler (Not Shown)	1	04-3510-99	04-3510-99	04-3510-99	04-3510-99	04-3510-99
38	Pilot Spool Retaining O-Ring	2	04-2650-49-700	04-2650-49-700	04-2650-49-700	04-2650-49-700	04-2650-49-700

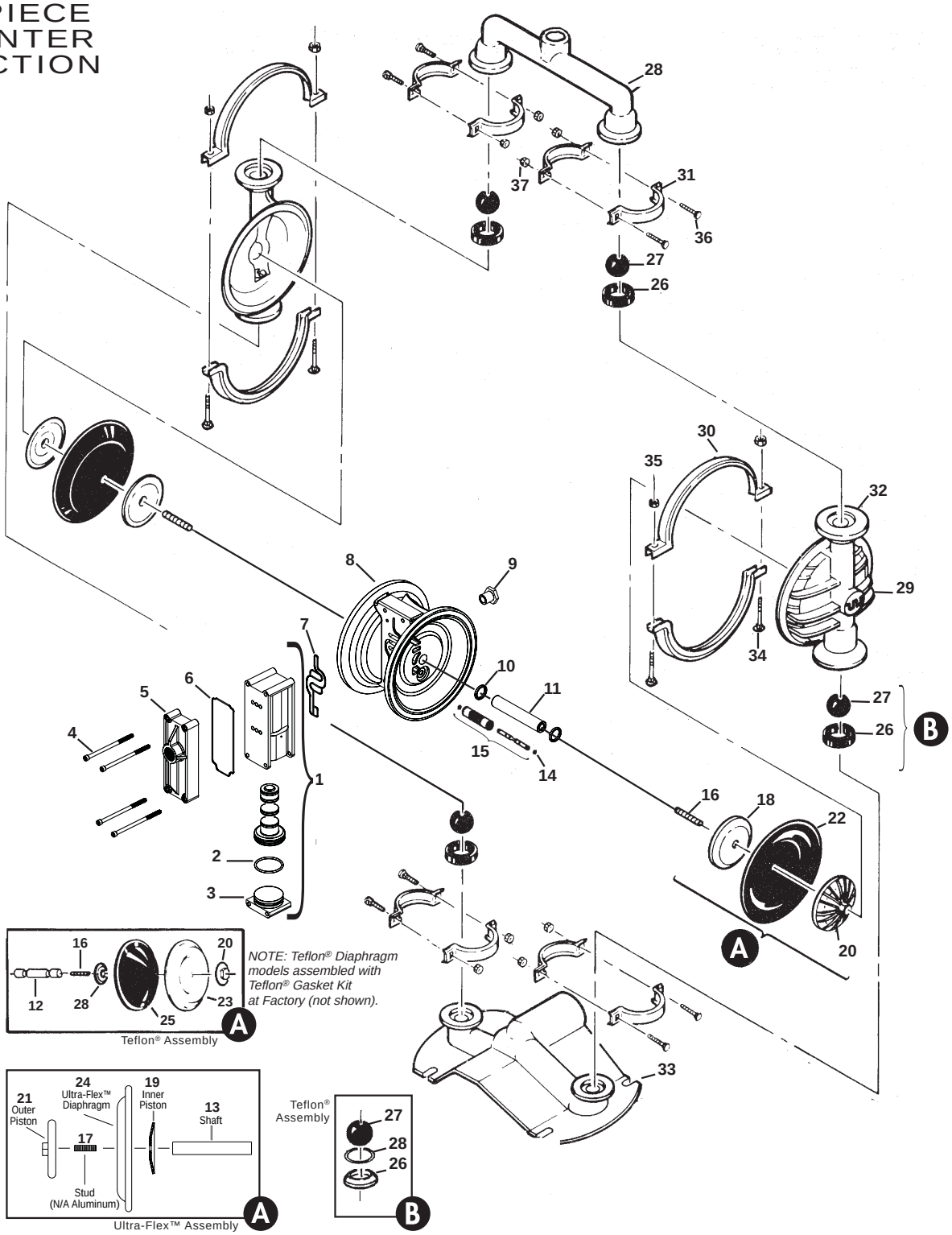
*Air Valve Assembly includes item numbers 2 and 3.
BSP-fitted pumps are available. Contact your distributor for part numbers.
BSP to NPT Air Line Reducer Bushing (P/N 04-6950-23-702) is available upon request.
Fluoro-Seal™ O-rings available upon request.
NOTE: Muffler (P/N 04-3510-99) (not shown) is standard on all pumps. (Comes equipped with P/N 08-3250-08 3/4" 45 degree street elbow for metal center section only.)
Back-up Diaphragm for Teflon®-fitted pump: P/N 04-1060-56. Neoprene Back-up Diaphragm, P/N 04-1060-51, is available upon request for Teflon®-fitted pumps. Please consult your local distributor.

-070 Specialty Code = Saniflo[FDA]

All boldface items are primary wear parts.

EXPLODED VIEW/PARTS LISTING

P4 METAL 1-PIECE CENTER SECTION



P4 Metal, One-Piece Center Section

			Rubber/TPE or Ultra-Flex™-Fitted				Teflon®-Fitted		
Item #	**Part Description**	**Qty. per Pump**	**P4/ALLL P/N**	**P4/ALLL/003 P/N**	**P4/WLLL P/N**	**P4/WLLL/022 P/N**	**P4/ALLL P/N**	**P4/ALLL/003 P/N**	**P4/WLLL P/N**
1	**Pro-Flo™ Air Valve Assembly[1]**	**1**	**04-2000-13-700**	**04-2000-13-700**	**04-2000-13-700**	**04-2000-13-700**	**04-2000-13-700**	**04-2000-13-700**	**04-2000-13-700**
2	O-Ring (-225), End Cap	1	04-2390-52-700	04-2390-52-700	04-2390-52-700	04-2390-52-700	04-2390-52-700	04-2390-52-700	04-2390-52-700
3	End Cap, Pro-Flo™	1	04-2330-13-700	04-2330-13-700	04-2330-13-700	04-2330-13-700	04-2330-13-700	04-2330-13-700	04-2330-13-700
4	1/4"-20 Hex HCS, Bolt	4	01-6000-03	01-6000-03	01-6000-03	01-6000-03	01-6000-03	01-6000-03	01-6000-03
5	Plate, Muffler	1	04-3180-13-700	04-3180-13-700	04-3180-13-700	04-3180-13-700	04-3180-13-700	04-3180-13-700	04-3180-13-700
6	O-Ring Gasket, Muffler Plate	1	04-3500-52-700	04-3500-52-700	04-3500-52-700	04-3500-52-700	04-3500-52-700	04-3500-52-700	04-3500-52-700
7	O-Ring Gasket, Air Valve	1	04-2600-52-700	04-2600-52-700	04-2600-52-700	04-2600-52-700	04-2600-52-700	04-2600-52-700	04-2600-52-700
8	Center Section Assembly	1	04-3150-13-700	04-3150-13-700	04-3150-13-700	04-3150-13-700	04-3150-13-700	04-3150-13-700	04-3150-13-700
9	Bushing, Reducer, NPT/BSP Combo	1	04-6950-20-700	04-6950-20-700	04-6950-20-700	04-6950-20-700	04-6950-20-700	04-6950-20-700	04-6950-20-700
10	**Glyd™ Ring II Seal, Shaft**	**2**	**08-3210-55-225**	**08-3210-55-225**	**08-3210-55-225**	**08-3210-55-225**	**08-3210-55-225**	**08-3210-55-225**	**08-3210-55-225**
11	Shaft, Traditional	1	04-3800-09-700	04-3800-09-700	04-3800-09-700	04-3800-09-700	N/A	N/A	N/A
12	Shaft, Teflon®	1	N/A	N/A	N/A	N/A	04-3820-01-700	04-3820-01-700	04-3820-01-700
13	Shaft, Ultra-Flex™	1	04-3830-09-07	04-3830-09-07	04-3830-09-07	04-3830-09-07	N/A	N/A	N/A
14	Pilot Spool Retaining O-Ring	2	04-2650-49-700	04-2650-49-700	04-2650-49-700	04-2650-49-700	04-2650-49-700	04-2650-49-700	04-2650-49-700
15	Pilot Spool, Pro-Flo™	1	04-3880-99	04-3880-99	04-3880-99	04-3880-99	04-3880-99	04-3880-99	04-3880-99
16	Stud	2	08-6150-08	08-6150-08	04-6090-08	04-6090-08	08-6150-08	08-6150-08	08-6150-08
17	Stud, Ultra-Flex™	2	N/R	N/R	04-6152-08	04-6152-08	N/A	N/A	N/A
18	Piston, Inner	2	04-3700-01-700	04-3700-01-700	04-3700-01-700	04-3700-01-700	04-3750-01-700	04-3750-01-700	04-3750-01-700
19	Piston, Inner, Ultra-Flex™	2	04-3760-01-700	04-3760-01-700	04-3760-01-700	04-3760-01-700	N/A	N/A	N/A
20	Piston, Outer	2	04-4551-01	04-4551-01	04-4550-08	04-4550-08	04-4600-01	04-4600-01	04-4600-03
21	Piston, Outer, Ultra-Flex™	2	04-4560-01	04-4560-01	04-4560-02	04-4560-02	N/A	N/A	N/A
22	**Diaphragm, Traditional**	**2**	*	*	*	*	**N/A**	**N/A**	**N/A**
23	**Diaphragm, Teflon®**	**2**	**N/A**	**N/A**	**N/A**	**N/A**	**04-1010-55**	**04-1010-55**	**04-1010-55**
24	**Diaphragm, Ultra-Flex™**	**2**	*	*	*	*	**N/A**	**N/A**	**N/A**
25	**Diaphragm, Back-up**	**2**	**N/A**	**N/A**	**N/A**	**N/A**	**04-1060-56**	**04-1060-56**	**04-1060-56**
26	**Valve Seat**	**4**	*	*	*	*	**04-1121-01**	**04-1121-01**	**04-1121-08**
27	**Valve Ball**	**4**	*	*	*	*	**04-1080-55**	**04-1080-55**	**04-1080-55**
28	**Valve Seat O-Ring**	**4**	**N/R**	**N/R**	**N/R**	**N/R**	**04-1200-55**	**04-1200-55**	**04-1200-55**
29	Chamber, Liquid	2	04-5000-01	04-5000-01	04-5000-02	04-5000-02	04-5000-01	04-5000-01	04-5000-02
30	Large Clamp Band	2	04-7300-08	04-7300-03	04-7300-08	04-7300-03	04-7300-03	04-7300-03	04-7300-03
31	Small Clamp Band	4	04-7100-08	04-7100-03	04-7100-08	04-7100-03	04-7100-03	04-7100-03	04-7100-03
32	Manifold, Discharge	1	04-5020-01	04-5020-01-03	04-5020-02	04-5020-02	04-5020-01	04-5020-01-03	04-5020-02
33	Manifold, Inlet	1	04-5080-01	04-5080-01-03	04-5080-02	04-5080-02	04-5080-01	04-5080-01-03	04-5080-02
34	Carriage Bolt, Large Clamp Band (5/16"-18 RHSN)	4	04-6070-08	04-6070-03	04-6070-08	04-6070-03	04-6070-03	04-6070-03	04-6070-03
35	Hex Nut, Large Clamp Band (5/16"-18)	4	04-6420-08	08-6400-03	04-6420-08	08-6400-03	08-6660-03-72	08-6400-03	08-6660-03-72
36	Carriage Bolt, Small Clamp Band (1/4"-20 RHSN)	8	04-6050-08	01-6070-03	04-6050-08	01-6070-03	01-6070-03	01-6070-03	01-6070-03
37	Hex Nut, Small Clamp Band (1/4"-20)	8	04-6400-08	04-6400-03	04-6400-08	04-6400-03	04-6650-03-70	04-6400-03	04-6650-03-70
38	Muffler (Not shown)	1	04-3150-99	04-3150-99	04-3150-99	04-3150-99	04-3150-99	04-3150-99	04-3150-99

[1]Air Valve Assembly includes item numbers 2 and 3.
BSP-fitted pumps are available. Contact your distributor for part numbers.
BSP to NPT Air Line Reducer Bushing (P/N 04-6950-23-702) is available upon request.
For optional P4 Metal Pump elastomers, see Section 10.
NOTE: Muffler (P/N 04-3510-99) (not shown) is standard on all P4 pumps. (Comes equipped with P/N 08-3250-08 3/4" 45 degree street elbow for metal center section only.)
NOTE: Aluminum pumps are available with a screen base. Requires (1) 04-5620-01 (Screen), (4) 04-6140-08 (Bolt) and (4) 15-6720-08 (Washer).

-003 Specialty Code = Alloy-Fitted
-022 Specialty Code = Stainless Steel Clamp Bands

*See Section 10 — Elastomer Chart

All boldface items are primary wear parts.

SECTION 10
ELASTOMER OPTIONS

P4 Metal

Material	Diaphragms (2)	Ultra-Flex™ Diaphragms (2)	Valve Balls (4)	Valve Seats (4)	Valve Seat O-Rings (4)
Neoprene	04-1010-51	04-1020-51	04-1080-51	04-1120-51*	N/A
Buna-N®	04-1010-52	04-1020-52	04-1080-52	04-1120-52*	N/A
Viton®	04-1010-53	04-1020-53	04-1080-53	04-1120-53*	N/A
Nordel® (EPDM)	04-1010-54	04-1020-54	04-1080-54	04-1120-54*	N/A
Teflon® PTFE	04-1010-55	N/A	04-1080-55	N/A	04-1200-55
Neoprene Back-up[1]	04-1060-51	N/A	N/A	N/A	N/A
Sani-Flex™	04-1010-56	N/A	04-1080-56	04-1120-56*	N/A
Polyurethane	04-1010-50	N/A	04-1080-50	04-1120-50*	N/A
Wil-Flex™	04-1010-58	N/A	04-1080-58	04-1120-58*	N/A
Fluoro-Seal™	N/A	N/A	N/A	N/A	04-1200-34
Aluminum	N/A	N/A	N/A	04-1121-01	N/A
316 Stainless Steel	N/A	N/A	N/A	04-1121-03	N/A
Hastelloy	N/A	N/A	N/A	04-1121-04	N/A
Mild Steel	N/A	N/A	N/A	04-1121-08	N/A

*NOTE: Rubber/TPE valve seats do not require O-rings.
[1]Use Neoprene back-up diaphragms with Teflon® diaphragms only.
NOTE: Sani-Flex™ back-up diaphragms, P/N 04-1060-56, are available upon request. Please consult your local distributor.
Consult RBG P/S UF for Ultra-Flex™ information.

MAINTENANCE RECORD

DATE	SERVICE RENDERED	SERVICED BY

ENGINEERED REVOLUTION

"Revolutionizing the way you solve your toughest pumping problems"

Plastic

- Polypropylene
- Carbon-Filled Acetal
- PVDF
- Teflon® PTFE
- Teflon® PFA

Metal

- Aluminum
- 316 S.S.
- Cast Iron
- Hastelloy

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SANITARY PUMP TECHNOLOGY

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