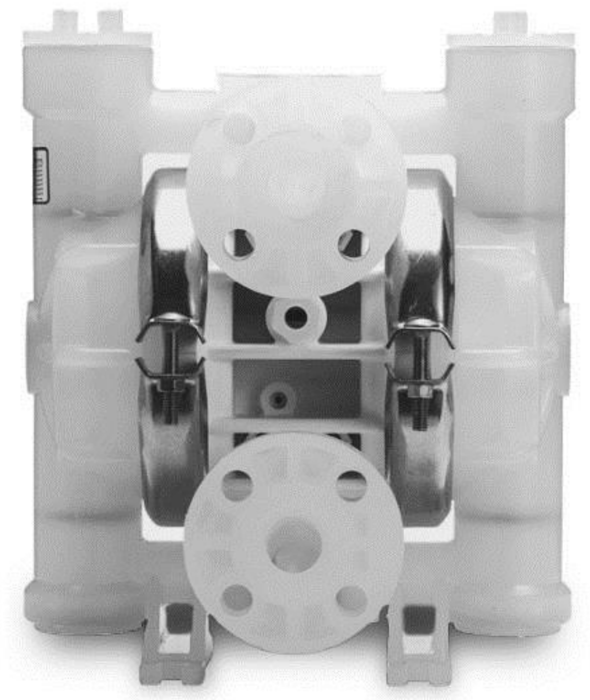
EOM
ENGINEERING OPERATION & MAINTENANCE

P2 Clamped Plastic Pump



Where Innovation Flows

WILDEN

WIL-10150-E-10

Contents

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Trademarks

Warranty

Each and every product manufactured by Wilden is built to meet the highest standards of quality. Every pump is functionally tested to insure integrity of operation. Wilden warrants that pumps, accessories and parts manufactured or supplied by it to be free from defects in material and workmanship for a period of five (5) years from date of installation or six (6) years from date of manufacture, whichever comes first.

For more information, and to register your Wilden pump for warranty, please visit https://www.psgdover.com/wilden/support/warranty-registration.

Certifications

CE

Precautions - Read First!

TEMPERATURE LIMITS:

Acetal	–29°C to 82°C	–20°F to 180°F
Buna-N	–12°C to 82°C	10°F to 180°F
Geolast®	–40°C to 82°C	–40°F to 180°F
Neoprene	–18°C to 93°C	0°F to 200°F
Nordel® EPDM	–51°C to 138°C	–60°F to 280°F
Nylon	–18°C to 93°C	0°F to 200°F
PFA	–7°C to 107°C	45°F to 225°F
Polypropylene	0°C to 79°C	32°F to 175°F
Polyurethane	–12°C to 66°C	10°F to 150°F
PVDF	–12°C to 107°C	10°F to 225°F
Saniflex™	–29°C to 104°C	–20°F to 220°F
SIPD PTFE with EPDM-backed	4°C to 137°C	40°F to 280°F
SIPD PTFE with Neoprene-backed	4°C to 93°C	40°F to 200°F
PTFE[1]	4°C to 104°C	40°F to 220°F
FKM	–40°C to 177°C	–40°F to 350°F
Wil-Flex™	–40°C to 107°C	–40°F to 225°F

[1] 4°C to 149°C (40°F to 300°F) - 13 mm (1/2") and 25 mm (1") models only.

NOTE: Not all materials are available for all models. Refer to Section 2 for material options for your pump.

CAUTION: When choosing pump materials, be sure to check the temperature limits for all wetted components. Example: FKM has a maximum limit of 177°C (350°F) but polypropylene has a maximum limit of only 79°C (175°F).

CAUTION: Maximum temperature limits are based upon mechanical stress only. Certain chemicals will significantly reduce maximum safe operating temperatures. Consult engineering guide for chemical compatibility and temperature limits.

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

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

CAUTION: Do not exceed 8 .6 bar (125 psig) air supply pressure.

CAUTION: P2 pumps are made of virgin plastic and are not UV-stabilized. Direct sunlight for prolonged periods can cause deterioration of plastics.

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 pipe line debris is clear . Use an in-line air filter.
A 5µ (micron) air filter is recommended.

NOTE: Tighten clamp bands and retainers prior to installation. Fittings may loosen during transportation.

NOTE: When installing PTFE diaphragms, it is important to tighten outer pistons simultaneously (turning in opposite directions) to ensure tight fit.

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: Verify the chemical compatibility of the process and cleaning fluid to the pump's component materials in the Chemical Resistance Guide.

CAUTION: When removing the end cap using compressed air, the air valve end cap may come out with considerable force. Hand protection such as a padded glove or rag should be used to capture the end cap.

CAUTION: P2 PTFE-fitted pumps come standard from the factory with expanded PTFE gaskets. (See Gasket Kit Installation.)

CAUTION: Do not over-tighten the air inlet reducer bushing. Too much torque on the reducer bushing may damage the air valve muffler plate. Do not exceed 0.9 Nm (8.0 in-lb).

NOTE: When reinstalling the outer pistons, apply two (2) drops of Loctite® 246 to the shaft internal threads before the diaphragm assembly.

Section 2

WILDEN PUMP DESIGNATION SYSTEM

P2 PLASTIC

25 mm (1") Pump
Maximum Flow Rate:
140 lpm (37 gpm)

LEGEND P2 / X X X X X / XXX / XX / X XX / XXXX

- P2 — MODEL
- X — WETTED PATH
- X — OUTER PISTON
- X — CENTER SECTION
- X — AIR VALVE
- XXX — DIAPHRAGMS
- XX — VALVE BALLS
- X — VALVE SEAT
- XX — O-RINGS
- XXXX — SPECIALTY CODE (if applicable)

MATERIAL CODES

MODEL
P2 = PRO-FLO®

WETTED PATH
K = PVDF
P = POLYPROPLYENE

OUTER PISTON
K = PVDF
P = POLYPROPLYENE

CENTER SECTION
LL = ACETAL
PP = POLYPROPYLENE

AIR VALVE
P = POLYPROPYLENE
L = ACETAL

DIAPHRAGMS
BNS = BUNA-N (Red Dot)
EPS = EPDM (Blue Dot)
FSS = SANIFLEX™ [Hytrel® (Cream)]
NES = NEOPRENE (Green Dot)
PUS = POLYURETHANE (Clear)
TEU = PTFE W/EPDM BACK-UP (White)
TNU = PTFE W/NEOPRENE BACK-UP (White)
TSU = PTFE W/SANIFLEX™ BACKUP (White)
VTS = FKM (White Dot)
WFS = WIL-FLEX™ [Santoprene® (Three Black Dots)]
TSS = FULL-STROKE PTFE W/SANIFLEX™ BACKUP
TWS = FULL-STROKE PTFE W/WIL-FLEX™ BACKUP

VALVE BALLS
BN = BUNA-N (Red Dot)
EP = EPDM (Blue Dot)
FS = SANIFLEX™ [Hytrel® (Cream)]
NE = NEOPRENE (Green Dot)
PU = POLYURETHANE (Brown)
TF = PTFE (White)
VT = FKM (White Dot)
WF = WIL-FLEX™ [Santoprene® (Three Black Dots)]

VALVE SEATS
K = PVDF
P = POLYPROPYLENE

VALVE SEAT O-RING
BN = BUNA-N
PU = POLYURETHANE (Brown)
TV = PTFE ENCAP. FKM
WF = WIL-FLEX™ [Santoprene®]

SPECIALTY CODES

0100	Wil-Gard II™ 110V
0102	Wil-Gard II™ sensor wires ONLY
0103	Wil-Gard II™ 220V
0206	PFA coated hardware, Wil-Gard II™ sensor wires ONLY
0400	P2 plastic
0402	P2 plastic, PFA coated hardware
0404	P2 plastic, DIN flange
0406	P2 plastic, PFA coated hardware, DIN flange
0415	P2 plastic, Wil-Gard II™ sensor wires ONLY
0416	P2, PFA coated hardware, Wil-Gard II™ sensor wires ONLY
0420	P2 plastic, Wil-Gard II™ 110V
0423	P2 plastic, PFA coated hardware, Wil-Gard II™ 110V
0424	P2 plastic, Wil-Gard II™ 220V, DIN flange
0426	P2 plastic, PFA coated hardware, Wil-Gard II™ 220V, DIN flange
0428	P2 plastic, Wil-Gard II™ 220V
0430	P2 plastic, SS outer pistons
0502	PFA coated hardware
0560	Split manifold
0561	Split manifold, PFA coated hardware
0563	Split manifold, discharge ONLY
0564	Split manifold, inlet ONLY
0603	PFA coated hardware, Wil-Gard II™ 110V
0608	PFA coated hardware, Wil-Gard II™ 220V
0660	Split manifold, Wil-Gard II™ 110V
0661	Split manifold, PFA coated hardware, Wil-Gard II™ 110V

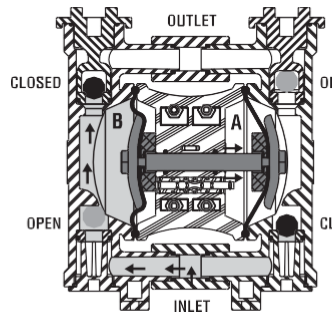
NOTE: Most Elastomeric materials use colored dots for identification.
NOTE: Not all models are available with all material options.

Hytrel® is a registered trademark of DuPont Dow Elastomers.

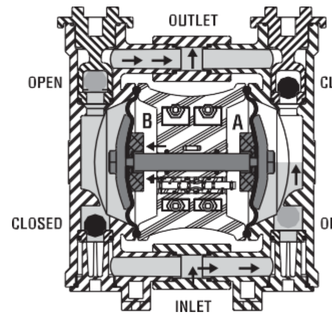
Section 3

HOW IT WORKS — PUMP

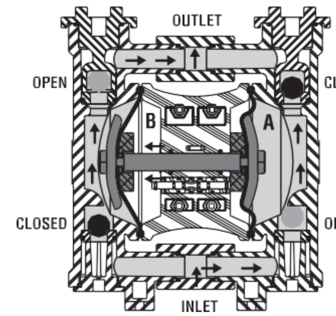
The Wilden diaphragm pump is an air-operated, placement, self-priming pump. These drawings show the flow pattern through the pump upon its initial stroke. It is assumed the pump has no fluid in it prior to its initial stroke.



RIGHT STROKE



MID STROKE



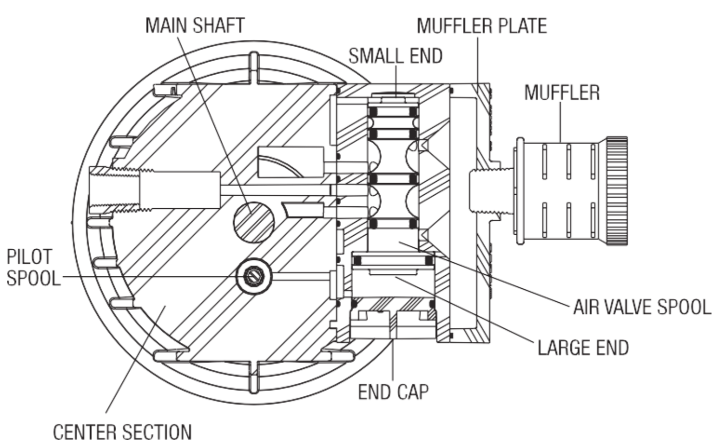
LEFT STROKE

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.

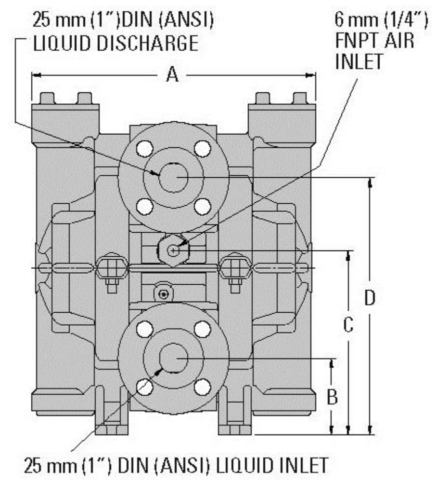
HOW IT WORKS — AIR DISTRIBUTION SYSTEM

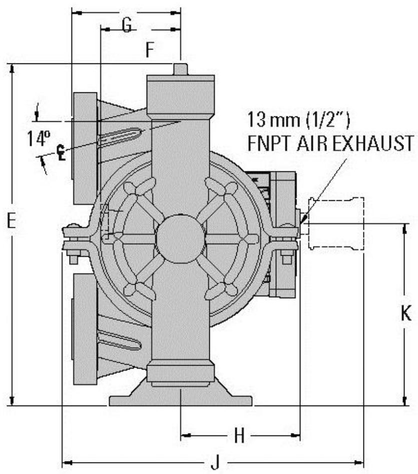


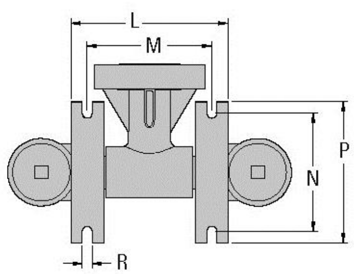
The Pro-Flo® patented air distribution system incorporates two moving parts: the air valve spool and the pilot spool. The heart of the system is the air valve spool and air valve. This valve design incorporates an unbalanced spool. The smaller end of the spool is pressurized continuously, while the large 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.

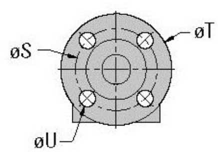
DIMENSIONAL DRAWING

P2 Plastic









DIMENSIONS

ITEM	METRIC (mm)	STANDARD (inch)
A	277	10.9
B	76	3.0
C	180	7.1
D	249	9.8
E	333	13.1
F	81	3.2
G	107	4.2
H	124	4.9
J	292	11.5
K	180	7.1
L	152	6.0
M	122	4.8
N	114	4.5
P	137	5.4
R	10	0.4
DIN		
S	84 DIA.	3.3 DIA.
T	114 DIA.	4.5 DIA.
U	15 DIA.	0.6 DIA.
ANSI		
S	79 DIA.	3.1 DIA.
T	109 DIA.	4.3 DIA.
U	15 DIA.	0.6 DIA.

Section 5

PERFORMANCE

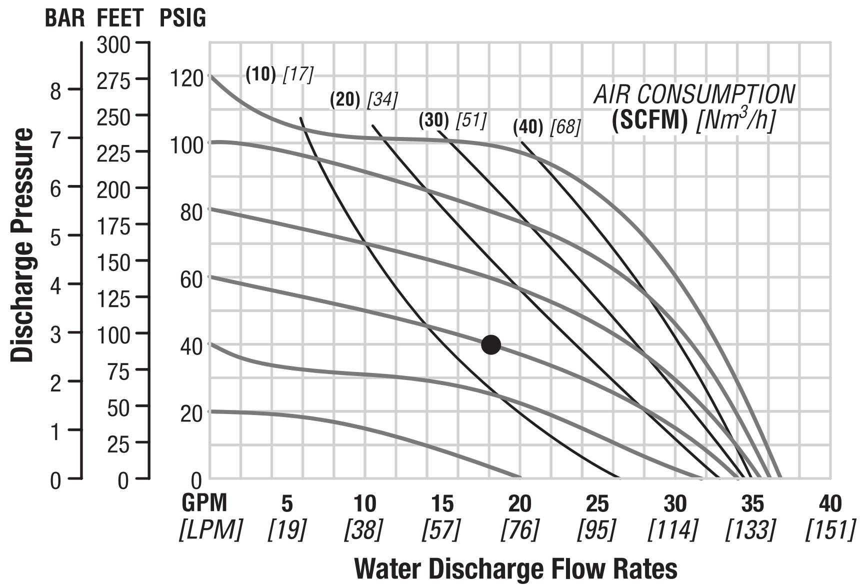
P2 PLASTIC RUBBER-FITTED

Ship Weight......... Polypropylene 8 kg (18 lb)
PVDF 10 kg (23 lb)
Air Inlet...................................... 6 mm (1/4")
Inlet..25 mm (1")
Outlet .... 25 mm (1")
Suction Lift .... 5.5 m Dry (18.0')
8.8 m Wet (29.0')
Disp. Per Stroke[1] ....0.31 L (0.082 gal)
Max. Flow Rate...............140 lpm (37 gpm)
Max. Size Solids..................... 3.2 mm (1/8")

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

Example: To pump 68 lpm (18 gpm) against a discharge pressure head of 2.7 bar (40 psig) requires 4.1 bar (60 psig) and 21.9 Nm^3/h (13 scfm) air consumption. (See dot on chart.)

Caution: Do not exceed 8.6 bar (125 psig) 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's performance curve.

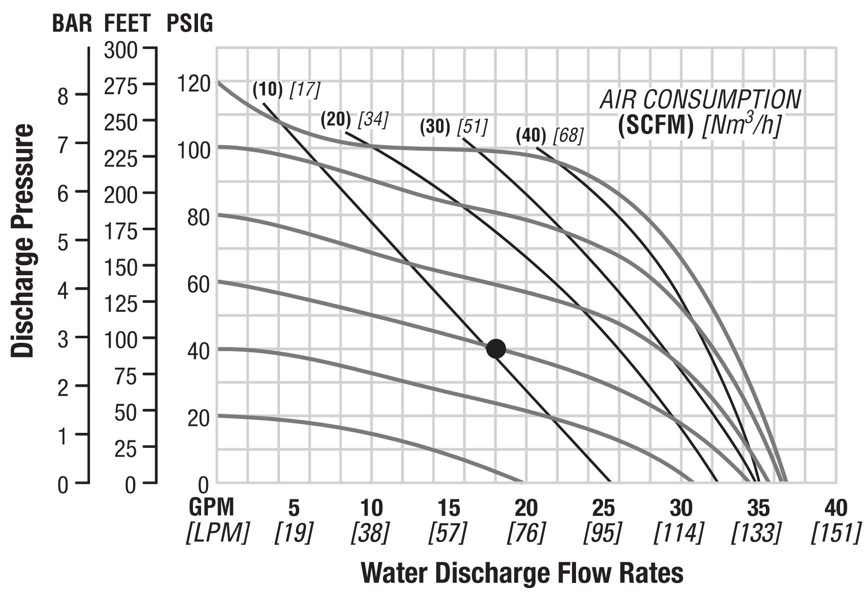
P2 PLASTIC TPE-FITTED

Ship Weight......... Polypropylene 8 kg (18 lb)
PVDF 10 kg (23 lb)
Air Inlet...................................... 6 mm (1/4")
Inlet..25 mm (1")
Outlet .... 25 mm (1")
Suction Lift .... 5.5 m Dry (18.0')
8.8 m Wet (29.0')
Disp. Per Stroke[1] ....0.39 L (0.104 gal)
Max. Flow Rate...............140 lpm (37 gpm)
Max. Size Solids..................... 3.2 mm (1/8")

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

Example: To pump 68 lpm (18 gpm) against a discharge pressure head of 2.7 bar (40 psig) requires 4.1 bar (60 psig) and 18.6 Nm^3/h (11 scfm) air consumption. (See dot on chart.)

Caution: Do not exceed 8.6 bar (125 psig) 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's performance curve.

PERFORMANCE

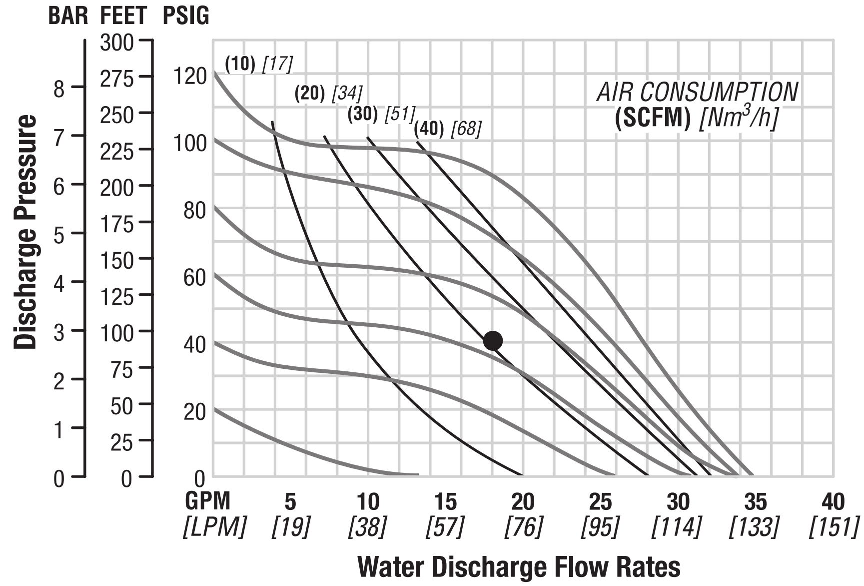
P2 PLASTIC REDUCED-STROKE PTFE-FITTED

Ship Weight......... Polypropylene 8 kg (18 lb)
PVDF 10 kg (23 lb)
Air Inlet...................................... 6 mm (1/4")
Inlet..25 mm (1")
Outlet .... 25 mm (1")
Suction Lift .... 3.4 m Dry (11')
8.8 m Wet (29.0')
Disp. Per Stroke[1] ....0.23 L (0.061 gal)
Max. Flow Rate...............132 lpm (35 gpm)
Max. Size Solids...................... 3.2 mm (1/8")

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

Example: To pump 68 lpm (18 gpm) against a discharge pressure head of 2.7 bar (40 psig) requires 4.1 bar (60 psig) and 37.2 Nm^3/h (22 scfm) air consumption. (See dot on chart.)

Caution: Do not exceed 8.6 bar (125 psig) 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's performance curve.

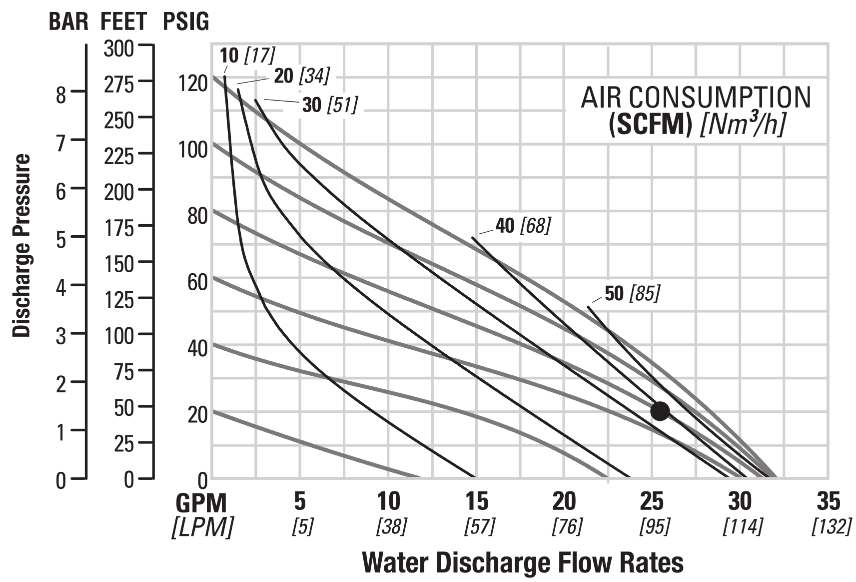
P2 PLASTIC FULL-STROKE PTFE-FITTED

Ship Weight......... Polypropylene 8 kg (18 lb)
PVDF 10 kg (23 lb)
Air Inlet...................................... 6 mm (1/4")
Inlet..25 mm (1")
Outlet .... 25 mm (1")
Suction Lift .... 4.1m Dry (13.6')
8.6 m Wet (28.4')
Disp. Per Stroke[1] ....0.6 L (0.15 gal)
Max. Flow Rate............139 lpm (36.8 gpm)
Max. Size Solids...................... 6.4 mm (1/4")

[1]Displacement per stroke was calculated at 4.8 bar (70 psig) air inlet pressure against a 2.1 bar (30 psig) head pressure.

Example: To pump 98.4 lpm (26 gpm) against a discharge head of 1.4 bar (20 psig) requires 5.5 bar (80 psig) and 61 Nm^3/h (38 scfm) air consumption.

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



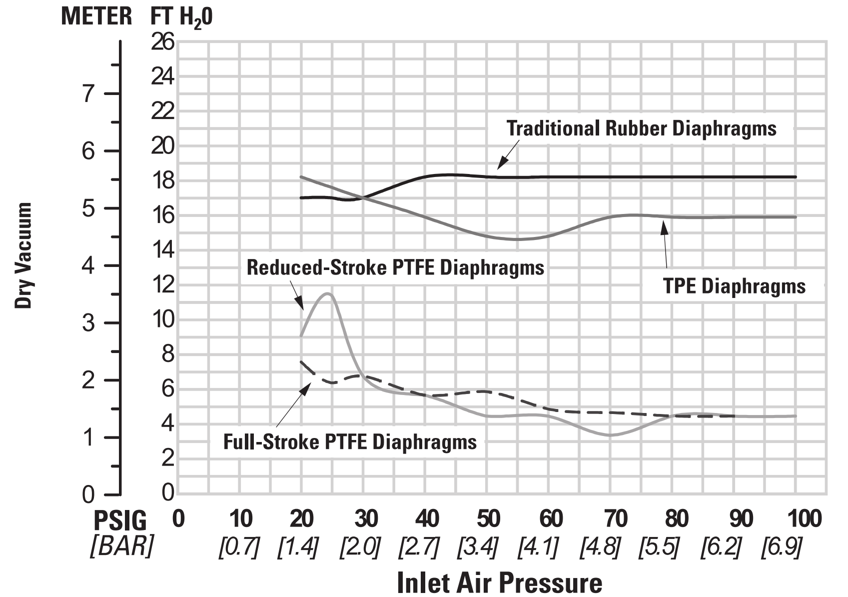
Flow rates indicated on chart were determined by pumping water.

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

SUCTION LIFT CURVES

P2 PLASTIC SUCTION - LIFT CAPABILITY

Suction-lift curves are calibrated for pumps operating at 305 m (1,000') 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.



Suggested Installation, Operation, Maintenance and Troubleshooting

The P2 has a 25 mm (1") inlet and 25 mm (1") outlet and is designed for flows to 140 lpm (37 gpm). The P2 Plastic pump is manufactured with wetted parts of pure, unpigmented PVDF or polypropylene. The P2 Plastic is constructed with a polypropylene or acetal center section. A variety of diaphragms and o-rings are available to satisfy temperature, chemical compatibility, abrasion and flex concerns.

The suction pipe size should be at least 25 mm (1") diameter or larger if highly viscous material is being pumped. The suction hose must be non-collapsible, reinforced type as the P2 is capable of pulling a high vacuum. Discharge piping should be at least 25 mm (1"); 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.

⚠ **CAUTION:** All fittings and connections must be airtight. Otherwise, pump suction capability will be reduced or lost.

Months of careful planning, study and selection efforts can result in unsatisfactory pump performance if installation details are left to chance. You can avoid premature failure and long-term dissatisfaction by exercising reasonable care 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 several 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. Use air pressure up to a maximum of 8.6 bar (125 psig) depending on pumping requirements.

  For best results, the pumps should use a 5µ (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.
- **Solenoid Operation:** 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 estimated 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 issues 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 challenges 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 to keep friction losses within practical limits. All piping should be supported independently of the pump. In addition, the piping should be aligned 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 (SD Equalizer®) should be installed to protect the pump, piping and gauges from surges and water hammer.

⚠ **NOTE:** Materials of construction and elastomer material have an effect on suction-lift parameters. Please refer to the performance section 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.

The P2 can be installed in submersible applications only when both the wetted and non-wetted portions are compatible with the material being pumped. If the pump is to be used in a submersible application, a hose should be attached to the pump's air and pilot spool exhaust ports and piped above the liquid level. The exhaust area for the pilot spool is designed to be tapped for a 1/8" NPT fitting.

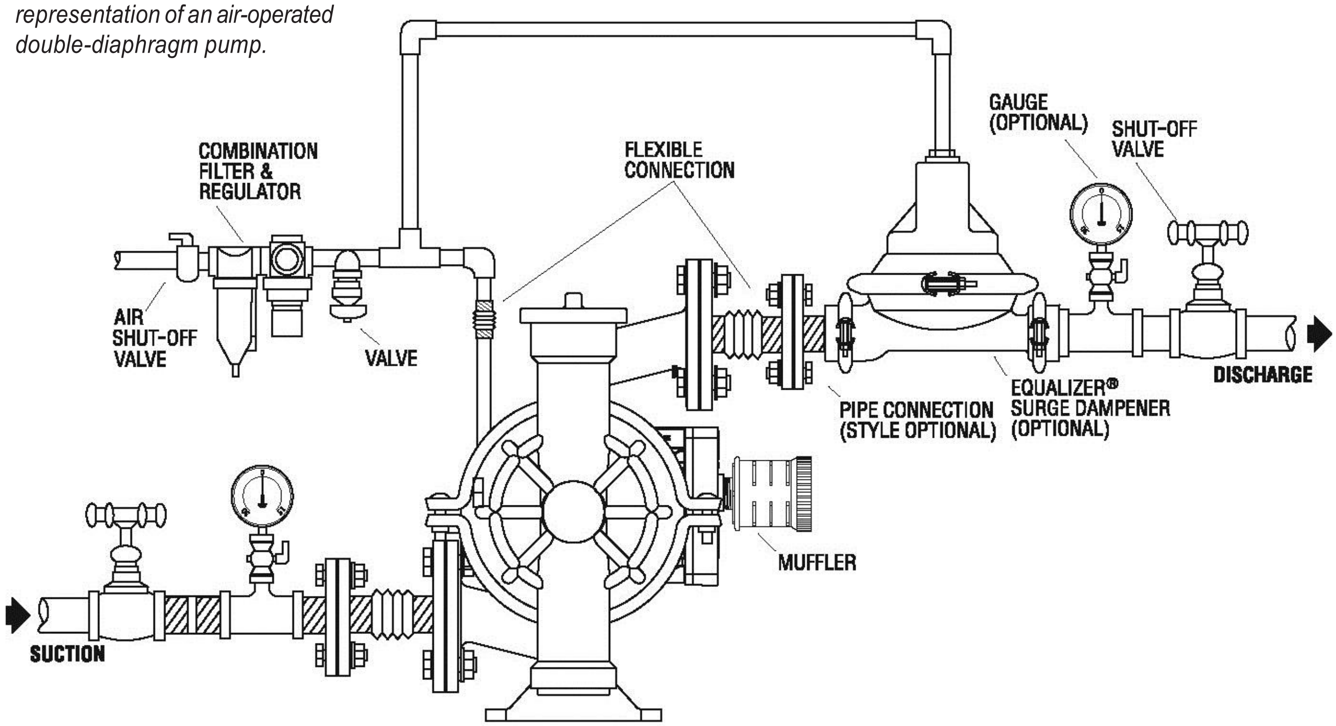
If the pump is to be used in a self-priming application, be sure that all connections are airtight and that the suction lift is within the model's ability. Note: Materials of construction and elastomer material have an effect on suction lift parameters. Please consult Wilden distributors for specifics.

The model **P2** will pass 3.2 mm (1/8") 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 8.6 bar (125 psig) air supply pressure.

Suggested Installation, Operation, Maintenance and Troubleshooting

This illustration is a generic representation of an air-operated double-diaphragm pump.



⚠ **NOTE:** In the event of a power failure, the shut-off valve should be closed, if the restarting of the pump is not desirable once power is regained.

Air-Operated Pumps: To stop the pump from operating in an emergency situation, simply close the shut-off valve (user-supplied) installed in the air supply line. A properly functioning valve will stop the air supply to the pump, therefore stopping output. This shut-off valve should be located far enough away from the pumping equipment such that it can be reached safely in an emergency situation

Operation

Pump discharge rate can be controlled by limiting the volume and/or pressure of the air supply to the pump. An air regulator is used to regulate air pressure. A needle valve is used to regulate 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. Wilden Pro-Flo® SHIFT pumps run solely on compressed air and do 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.

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Suggested Installation, Operation, Maintenance and Troubleshooting

Troubleshooting

Pump will not run or runs slowly.

1. Ensure that the air inlet pressure is at least 0.3 bar (5 psig) above startup pressure and that the differential pressure (the difference between air inlet and liquid discharge pressures) is not less than 0.7 bar (10 psig).
2. Check air inlet filter for debris (see SUGGESTED INSTALLATION).
3. Check for extreme air leakage (blow by) that would indicate worn seals/bores in the air valve, pilot spool and main shaft.
4. Disassemble pump and check for obstructions in the air passageways or objects that 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 that 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 seats 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 7).
3. Check tightness of fasteners 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 7

Disassembly / Reassembly

Pump Disassembly

Tools Required:

- 8 mm (5/16") Wrench
- 1/2" Box Wrench 1/2" Socket
- 1/2" Socket Drive
- 2 – 1" Sockets or Adjustable Wrench Adjustable Wrench
- Vise equipped with soft jaws (such as plywood, plastic or other suitable material)

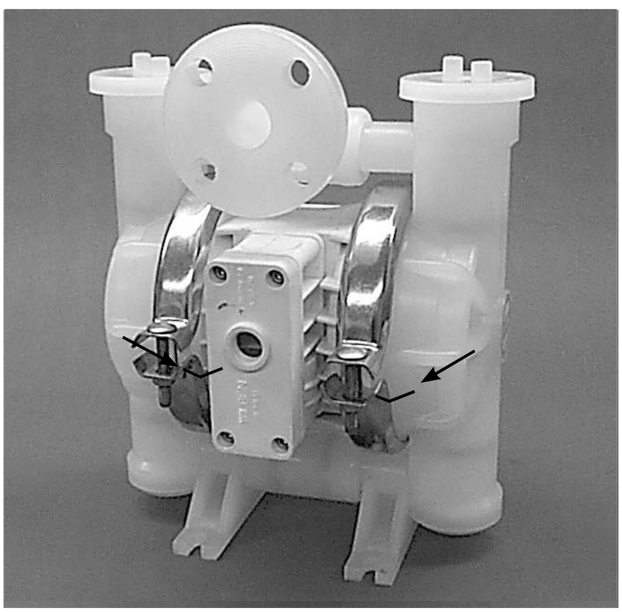
CAUTION: Before any maintenance or repair is attempt- ed, the compressed air line to the pump should be disconnected and all air pressure allowed to bleed from the pump. Disconnect all intake, discharge, and air lines. Drain the pump by turning it upside down and allowing any fluid to flow into a suitable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

The Wilden model P2 has a 25 mm (1”) inlet and 25 mm (1”) outlet and is designed for flows up to 140 lpm (37 gpm). The wetted path comes in both PVDF and polypropylene. The single-piece center section, consisting of center block and air chambers, is molded of polypropylene or acetal. The air valve body is manufactured of acetal or polypropylene. All o-rings used in the pump are of a special material and shore hardness that should only be replaced with factory-supplied parts.

PLEASE read all directions before starting disassembly.

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

NOTE: Replace worn parts with genuine Wilden parts for reliable performance.



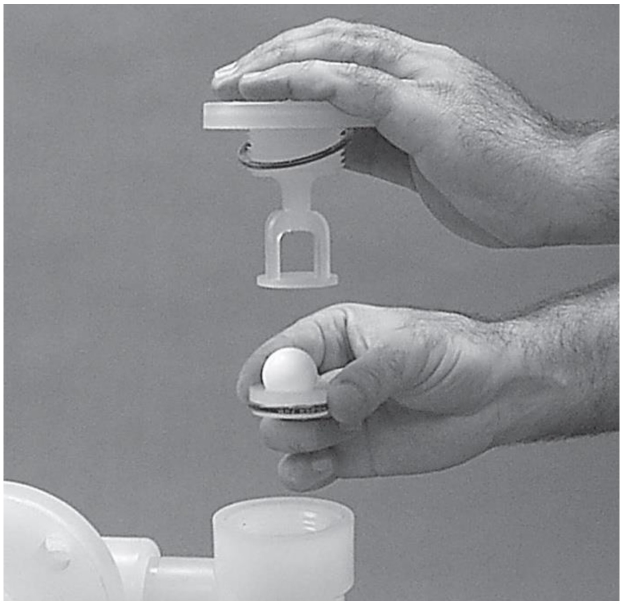
Step 1

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

Step 2

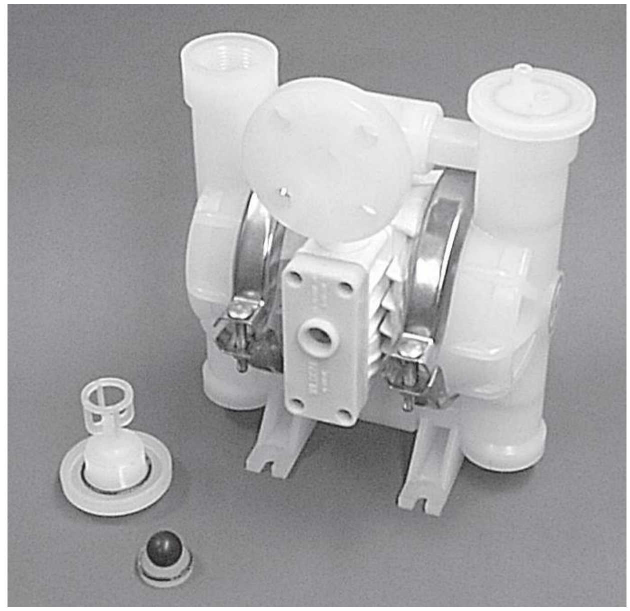
Using a screwdriver or other long, slim object, loosen the top liquid retainers from the liquid chambers.

Disassembly / Reassembly



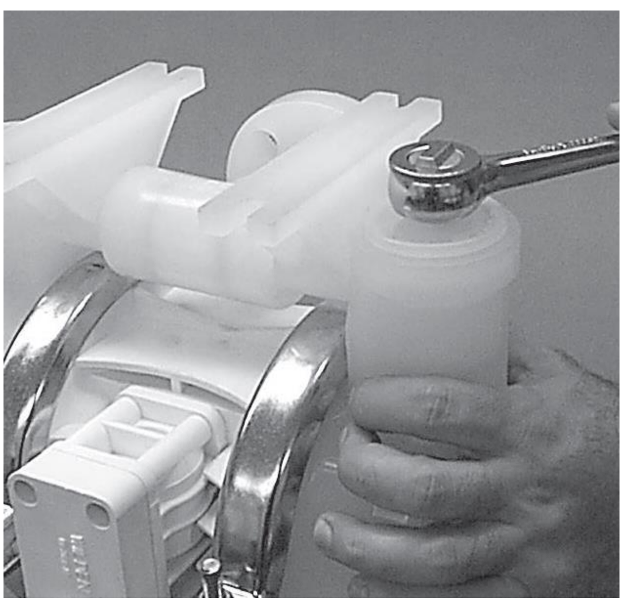
Step 3

Remove the top liquid retainer to expose the valve balls, valve seats and valve seat O-rings.



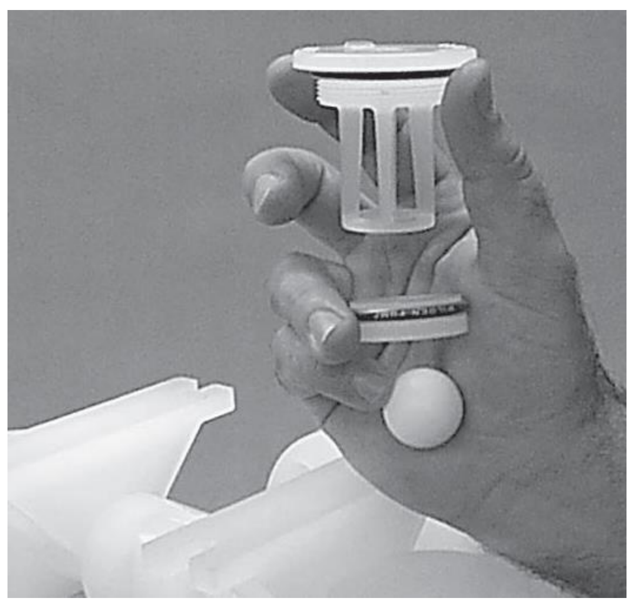
Step 4

Remove the top liquid retainer and retainer O-rings, discharge valve balls, seats and valve seat O-rings from the liquid chamber and inspect for nicks, gouges, chemical attack or abrasive wear. Replace worn parts with genuine Wilden parts for reliable performance.



Step 5

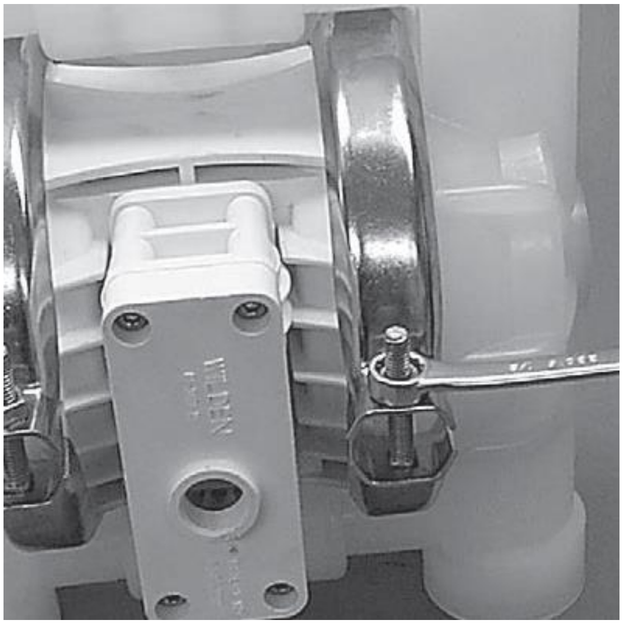
Using a 1/2" socket driver, loosen the bottom retainers.



Step 6

Remove the bottom liquid retainer and retainer O-rings, discharge valve balls, seats and valve seat O-rings from the liquid chamber and inspect for nicks, gouges, chemical attack or abrasive wear. Replace worn parts with genuine Wilden parts for reliable performance.

Disassembly / Reassembly

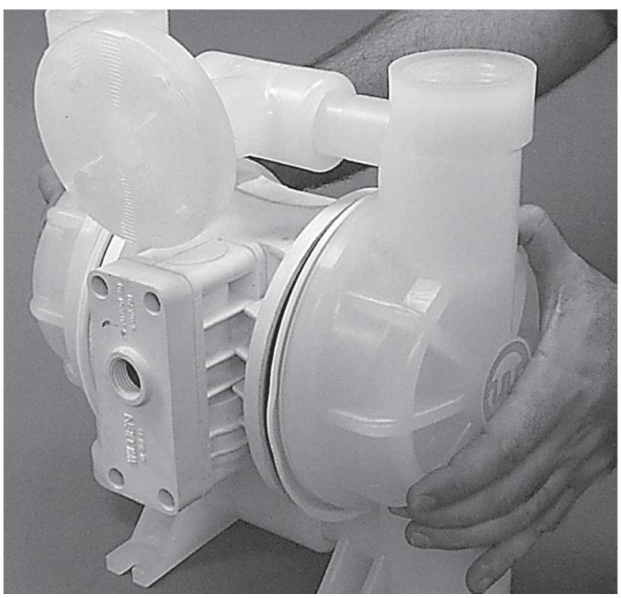


Step 7

With a 1/2" box wrench, loosen the large clamp bands that secure the liquid chambers to the center section.

Step 8

Rotate the clamp bands so that they can be removed.



Step 9

After clamp bands are removed, pull liquid chambers apart.

Step 10

Remove tee section from liquid chamber and inspect O-rings for signs of wear. Replace worn parts with genuine Wilden parts for reliable performance.

Disassembly / Reassembly

Step 11

Using two 1" sockets, remove diaphragm assembly from center section assembly.

Step 12

To remove the remaining diaphragm assembly from the shaft, secure shaft with soft jaws (a vise fitted with plywood or other suitable material) to ensure shaft is not nicked, scratched, or gouged. Using an adjustable wrench, remove diaphragm assembly from shaft. Inspect all parts for wear and replace with genuine Wilden parts if necessary.

Step 13

Inspect diaphragms, outer and inner pistons and disc spring (not shown) for signs of wear. Replace with genuine Wilden parts if necessary.

Disassembly / Reassembly

Air Valve / Center Section Disassembly

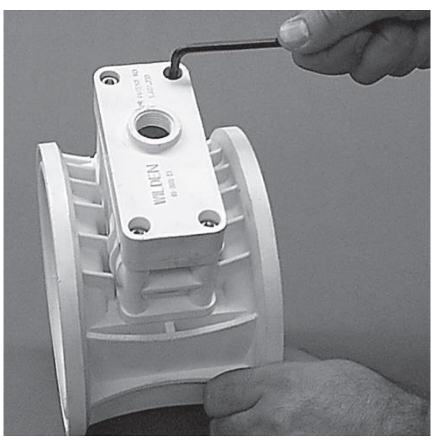
Tools Required:

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

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 P2 plastic utilizes a revolutionary Pro-Flo® air distribution system. A 6 mm (1/4") air inlet connects the air supply to the center section. Proprietary composite seals reduce the coefficient of friction and allow the P2 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.

NOTE: Replace worn parts with genuine Wilden parts for reliable performance.



Step 1

Loosen the air valve bolts utilizing a 3/16" hex-head wrench.

Step 2

Remove muffler plate and air valve bolts from air valve assembly exposing muffler gasket for inspection. Replace if necessary.

Step 3

Lift away air valve assembly and remove air valve gasket for inspection. Replace if necessary.

Disassembly / Reassembly

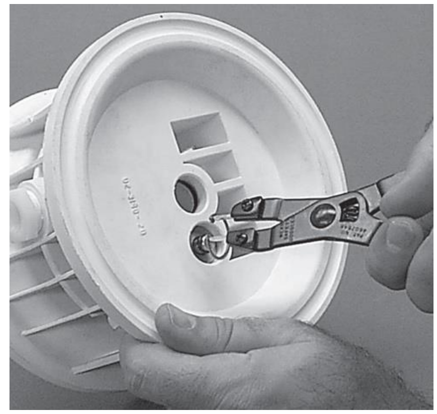
Step 4

Remove air valve end cap to expose air valve spool by simply lifting up on end cap once air valve bolts are removed.

Step 5

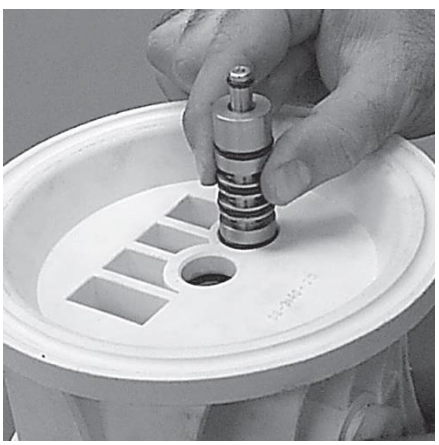
Remove air valve spool from air valve body by threading one air valve bolt into the end of the spool and gently slid- ing the spool out of the air valve body. Inspect seals for signs of wear and replace entire assembly if necessary. Use caution when handling air valve spool to prevent damaging seals.

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



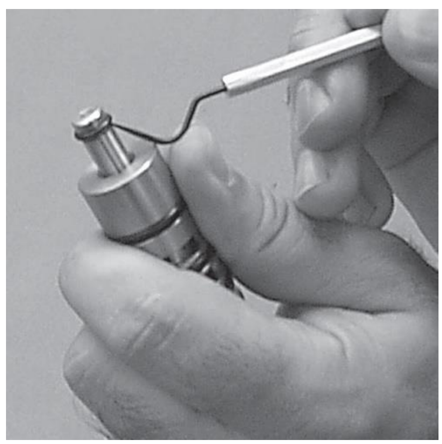
Step 6

Remove pilot spool sleeve retaining snap-ring on both sides of center section with snap ring pliers.



Step 7

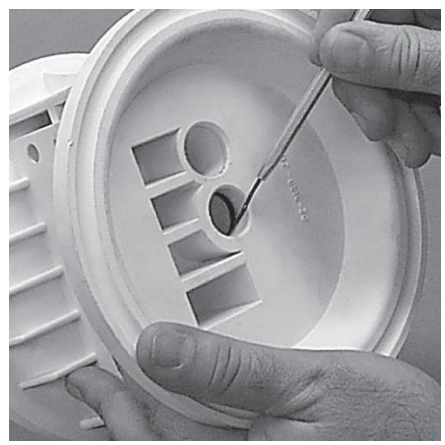
Remove pilot spool sleeve from center section.



Step 8

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

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



Step 9

Check center section Glyd™ rings for signs of wear. If necessary, remove Glyd™ rings with O-ring pick and replace.

Disassembly / Reassembly

Reassembly Hints & Tips

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.

- Clean the inside of the center section shaft bore to ensure no damage is done to new seals.
- Stainless bolts should be lubed to reduce the possibility of seizing during tightening.
- Be sure to tighten outer pistons simultaneously on PTFE-fitted pumps to ensure proper torque values.
- Apply two (2) drops of Loctite® 246 to the shaft internal threads before the diaphragm assembly.
- Concave side of disc spring in diaphragm assembly faces **toward** inner piston.

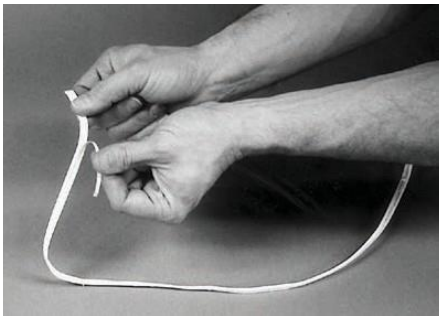
PRO-FLO MAXIMUM TORQUE SPECIFICATIONS

Description of Part	Torque
Air Valve, Pro-Flo®	3.1 N•m (27 in-lb)
Air Inlet, Reducer Bushing	0.9 N•m (8 in-lb)
Outer Piston — Rubber- and PTFE-fitted	27.1 N•m (20 ft-lb)
Top and Bottom Retainers	14.1 N•m (125 in-lb)
Large Clamp Band — Rubber-fitted	10.7 N•m (95 in-lb)
Large Clamp Band — PTFE-fitted	14.1 N•m (125 in-lb)

Gasket Kit / Installation

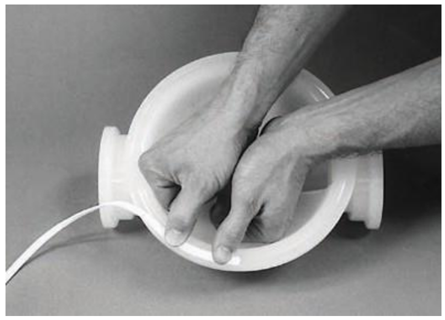
PTFE-fitted P2 pumps require expanded PTFE material around the diaphragm bead (P/N 02-9502-99). Carefully prepare sealing surfaces by removing all debris and foreign matter from diaphragm bead and all mating surfaces.

If necessary, smooth or deburr all sealing surfaces. Mating surfaces must be properly aligned in order to ensure positive sealing characteristics.



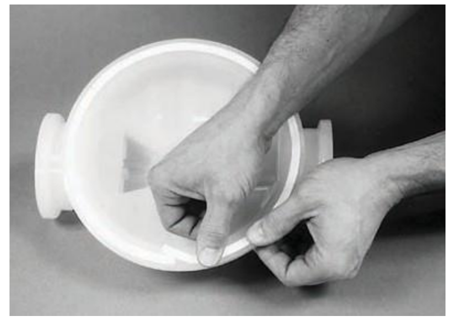
Step 1

Gently remove the adhesive covering from the back of the PTFE tape. Ensure that the adhesive strip remains attached to the PTFE tape.



Step 2

Starting at any point, place the PTFE 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.



Step 3

The ends of the tape should overlap approximately 13 mm (1/2"). Proceed to install the PTFE tape on the remaining liquid chamber.

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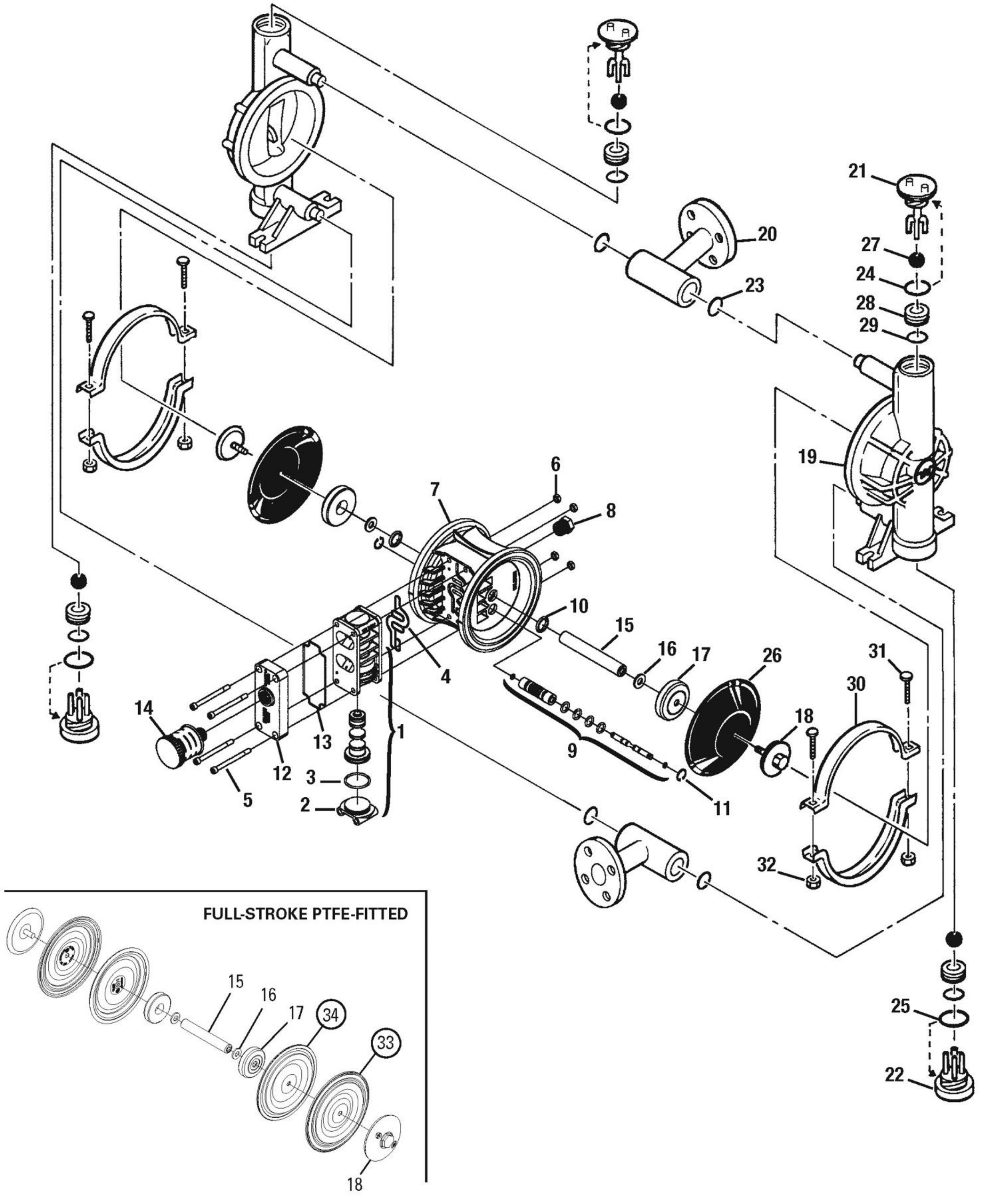
Exploded View and Parts Listing

P2 PLASTIC

FULL STROKE DIAPHRAGM FITTED

EXPLODED VIEW



Exploded View and Parts List

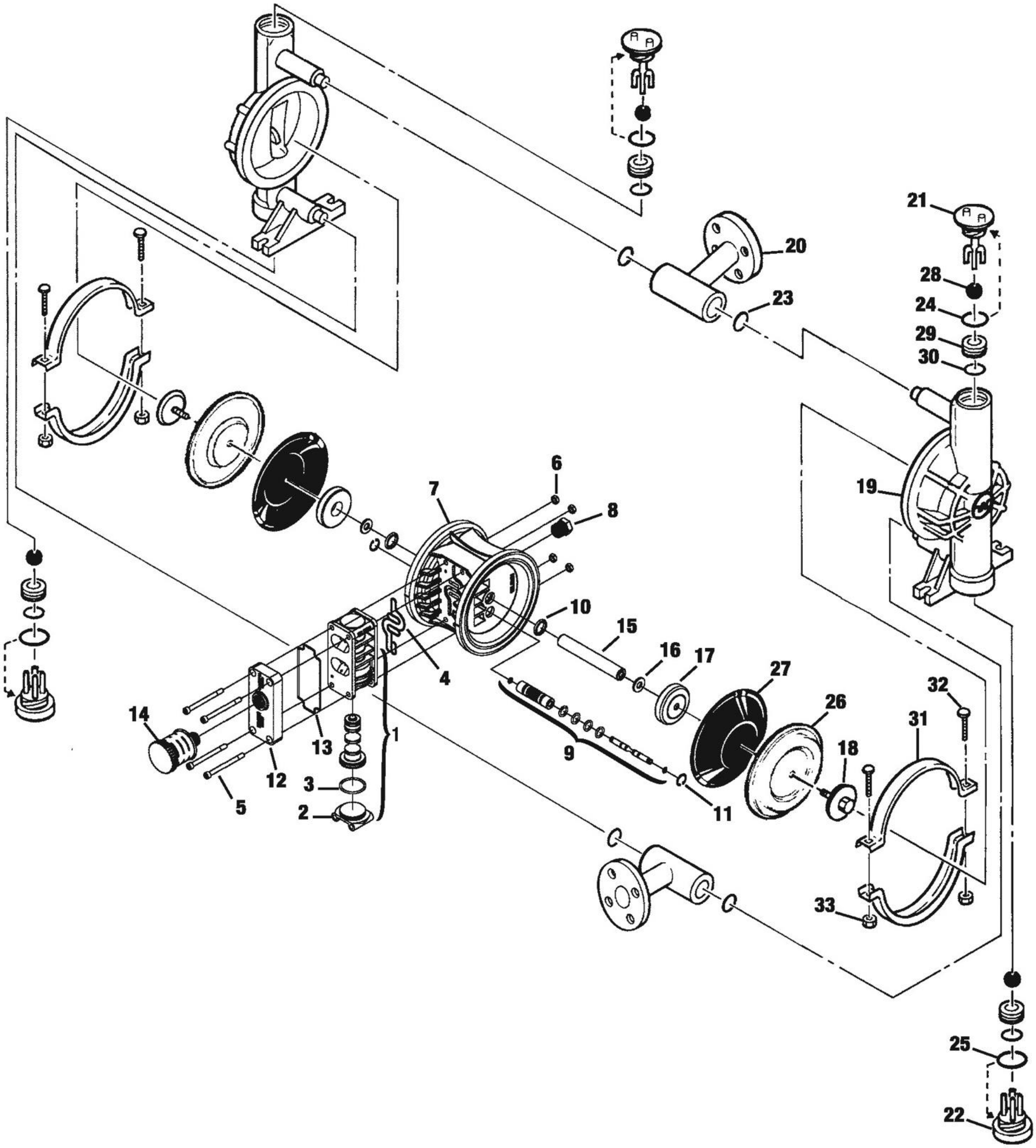
Item	Part Description	Qty. Per Pump	P2/ PKPPP/0400 P/N	P2/ PKPPP/0402 P/N	P2/ KKPPP/0400 P/N	P2/ KKPPP/0402 P/N
1	**Pro-Flo® Air Valve Assembly[1]**	**1**	**01-2010-20**	**01-2010-20**	**01-2010-20**	**01-2010-20**
2	End Cap	1	01-2332-20	01-2332-20	01-2332-20	01-2332-20
3	O-Ring, End Cap	1	01-2395-52	01-2395-52	01-2395-52	01-2395-52
4	Gasket, Air Valve	1	01-2615-52	01-2615-52	01-2615-52	01-2615-52
5	Screw, HSHC, Air Valve 1/4-20	4	01-6001-03	01-6001-05	01-6001-03	01-6001-05
6	Nut, Hex, 1/4"-20	4	04-6400-03	04-6400-05	04-6400-03	04-6400-05
7	Center Section	1	02-3140-20	02-3140-20	02-3140-20	02-3140-20
8	Bushing, Reducer	1	01-6950-20	01-6950-20	01-6950-20	01-6950-20
9	Removable Pilot Sleeve Assembly	1	02-3880-99	02-3880-99	02-3880-99	02-3880-99
10	**Glyd™ Ring II**	**2**	**02-3210-55-225**	**02-3210-55-225**	**02-3210-55-225**	**02-3210-55-225**
11	Retaining Ring	2	00-2650-03	00-2650-03	00-2650-03	00-2650-03
12	Muffler Plate	1	01-3181-20	01-3181-20	01-3181-20	01-3181-20
13	Gasket, Muffler Plate	1	01-3505-52	01-3505-52	01-3505-52	01-3505-52
14	Muffler	1	02-3510-99	02-3510-99	02-3510-99	02-3510-99
15	Shaft, Pro-Flo®	1	02-3810-03	02-3810-03	02-3810-03	02-3810-03
16	Disc Spring (Belleville Washer)	2	02-6802-08	02-6802-08	02-6802-08	02-6802-08
17	Inner Piston	2	02-3701-01	02-3701-01	02-3701-01	02-3701-01
18	Outer Piston	2	02-4550-21-500	02-4550-21-500	02-4550-21-500	02-4550-21-500
19	Liquid Chamber	2	02-5001-20-400	02-5001-20-400	02-5001-21-400	02-5001-21-400
20	Manifold Tee Section	2	02-5160-20-400	02-5160-20-400	02-5160-21-400	02-5160-21-400
21	Top Retainer	2	02-5411-20-400	02-5411-20-400	02-5411-21-400	02-5411-21-400
22	Bottom Retainer	2	02-5420-20-400	02-5420-20-400	02-5420-21-400	02-5420-21-400
23	T-Section O-Ring	4	*	*	*	*
24	Top Retainer O-Ring	2	*	*	*	*
25	Bottom Retainer O-Ring	2	*	*	*	*
26	**Diaphragm**	**2**	*	*	*	*
27	**Valve Ball**	**4**	*	*	*	*
28	**Valve Seat**	**4**	**02-1120-20-400**	**02-1120-20-400**	**02-1120-21-400**	**02-1120-21-400**
29	**Valve Seat O-Ring**	**4**	*	*	*	*
30	Clamp Band Assembly	4	02-7300-03-400	02-7300-05-402	02-7300-03-400	02-7300-05-402
31	Clamp Band Bolt 5/16" 18 x 1-3/4"	4	08-6050-03-500	08-6050-05-500	08-6050-03-500	08-6050-05-500
32	Clamp Band Nut 5/16"-18	4	08-6400-03	08-6400-05	08-6400-03	08-6400-05
33	**Diaphragm, Primary Full Stroke PTFE**	**2**	**02-1040-55**	**02-1040-55**	**02-1040-55**	**02-1040-55**
34	**Diaphragm, Backup Full Stroke PTFE**	**2**	*	*	*	*

[1]Air Valve Assembly includes items 2 and 3.
*Refer to corresponding elastomer chart in Section 10.
0400 Specialty Code = P2R
0402 Specialty Code = P2R with PFA coating
All boldface items are primary wear parts.

Exploded View and Parts Listing

P2 PLASTIC

REDUCED STROKE DIAPHRAGM FITTED | **EXPLODED VIEW**



Exploded View and Parts List

Item	Part Description	Qty. Per Pump	P2/ PKPPP/0400 P/N	P2/ PKPPP/0402 P/N	P2/ KKPPP/0400 P/N	P2/ KKPPP/0402 P/N
1	**Pro-Flo® Air Valve Assembly[1]**	**1**	**01-2010-20**	**01-2010-20**	**01-2010-20**	**01-2010-20**
2	End Cap	1	01-2332-20	01-2332-20	01-2332-20	01-2332-20
3	O-Ring, End Cap	1	01-2395-52	01-2395-52	01-2395-52	01-2395-52
4	Gasket, Air Valve	1	01-2615-52	01-2615-52	01-2615-52	01-2615-52
5	Screw, HSHC, Air Valve 1/4-20	4	01-6001-03	01-6001-05	01-6001-03	01-6001-05
6	Nut, Hex, 1/4"-20	4	04-64 00-03	04-6400-05	04-6400-03	04-6400-05
7	Center Section	1	02-3140-20	02-3140-20	02-3140-20	02-3140-20
8	Bushing, Reducer	1	01-6950-20	01-6950-20	01-6950-20	01-6950-20
9	Removable Pilot Sleeve Assembly	1	02-3880-99	02-3880-99	02-3880-99	02-3880-99
10	**Glyd™ Ring II**	**2**	**02-3210-55-225**	**02-3210-55-225**	**02-3210-55-225**	**02-3210-55-225**
11	Retaining Ring	2	00-2650-03	00-2650-03	00-2650-03	00-2650-03
12	Muffler Plate	1	01-3181-20	01-3181-20	01-3181-20	01-3181-20
13	Gasket, Muffler Plate	1	01-3505-52	01-3505-52	01-3505-52	01-3505-52
14	Muffler	1	02-3510-99	02-3510-99	02-3510-99	02-3510-99
15	Shaft, Pro-Flo®	1	02-3840-03	02-3840-03	02-3840-03	02-3840-03
16	Disc Spring (Belleville Washer)	2	02-6802-08	02-6802-08	02-6802-08	02-6802-08
17	Inner Piston	2	02-3751-01	02-3751-01	02-3751-01	02-3751-01
18	Outer Piston	2	02-4600-21-500	02-4600-21-500	02-4600-21-500	02-4600-21-500
19	Liquid Chamber	2	02-5001-20-400	02-5001-20-400	02-5001-21-400	02-5001-21-400
20	Manifold Tee Section	2	02-5160-20-400	02-5160-20-400	02-5160-21-400	02-5160-21-400
21	Top Retainer	2	02-5411-20-400	02-5411-20-400	02-5411-21-400	02-5411-21-400
22	Bottom Retainer	2	02-5420-20-400	02-5420-20-400	02-5420-21-400	02-5420-21-400
23	T-Section O-Ring	4	02-1300-60-400	02-1300-60-400	02-1300-60-400	02-1300-60-400
24	Top Retainer O-Ring	2	02-1220-60	02-1220-60	02-1220-60	02-1220-60
25	Bottom Retainer O-Ring	2	02-1230-60	02-1230-60	02-1230-60	02-1230-60
26	**Diaphragm**	**2**	**02-1010-55**	**02-1010-55**	**02-1010-55**	**02-1010-55**
27	**Backup Diaphragm**	**2**	*	*	*	*
28	**Valve Ball**	**4**	**02-1080-55**	**02-1080-55**	**02-1080-55**	**02-1080-55**
29	**Valve Seat**	**4**	**02-1120-20-400**	**02-1120-20-400**	**02-1120-21-400**	**02-1120-21-400**
30	**Valve Seat O-Ring**	**4**	**02-1200-60-400**	**02-1200-60-400**	**02-1200-60-400**	**02-1200-60-400**
31	Clamp Band Assembly	4	02-7300-03-400	02-7300-05-402	02-7300-03-400	02-7300-05-402
32	Clamp Band Bolt 5/16" 18 x 1-3/4"	4	08-6050-03-500	08-6050-05-500	08-6050-03-500	08-6050-05-500
33	Clamp Band Nut 5/16"-18	4	08-6400-03	08-6400-05	08-6400-03	08-6400-05

[1]Air Valve Assembly includes items 2 and 3.
*Refer to corresponding elastomer chart in Section 10.
0400 Specialty Code = P2R
0402 Specialty Code = P2R with PFA coating
All boldface items are primary wear parts.

Elastomer Options

P2 Plastic

Material	Diaphragms (2)	Reduced - Stroke Backup Diaphragms (2)	Full-Stroke Backup Diaphragms (2)	Valve Balls (4)	Valve Seat O-Rings (4)	Tee Section O-Rings (4)	Top Retainer O-Rings (2)	Bottom Retainer O-Rings (2)
Polyurethane	02-1010-50			02-1080-50	02-1200-50-400	02-1300-50-400	02-1220-50	02-1230-50
Buna-N	02-1010-52			02-1080-52	08-2390-52	04-2390-52	04-2390-52-700	02-1230-52
PTFE Encapsulated FKM					02-1200-60-400	02-1300-60-400	02-1220-60	02-1230-60
Neoprene	02-1010-51	02-1060-51		02-1080-51				
FKM	02-1010-53			02-1080-53				
EPDM	02-1010-54			02-1080-54				
PTFE	02-1010-55			02-1080-55				
Full-Stroke PTFE	02-1040-55			02-1080-55				02-1045-57
Tetra-Flex™ PTFE, Neoprene Backed	02-1010-64							
Tetra-Flex™ PTFE, EPDM Backed	02-1010-81							
Saniflex™	02-1010-56	02-1060-56	02-1065-56	02-1080-56				
Wil-Flex™	02-1010-58		02-1065-57	02-1080-58	02-1200-58-400	02-1300-58-400	02-1220-58	02-1230-58

[1]Backup diaphragms for use with PTFE diaphragms only.

Notes

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