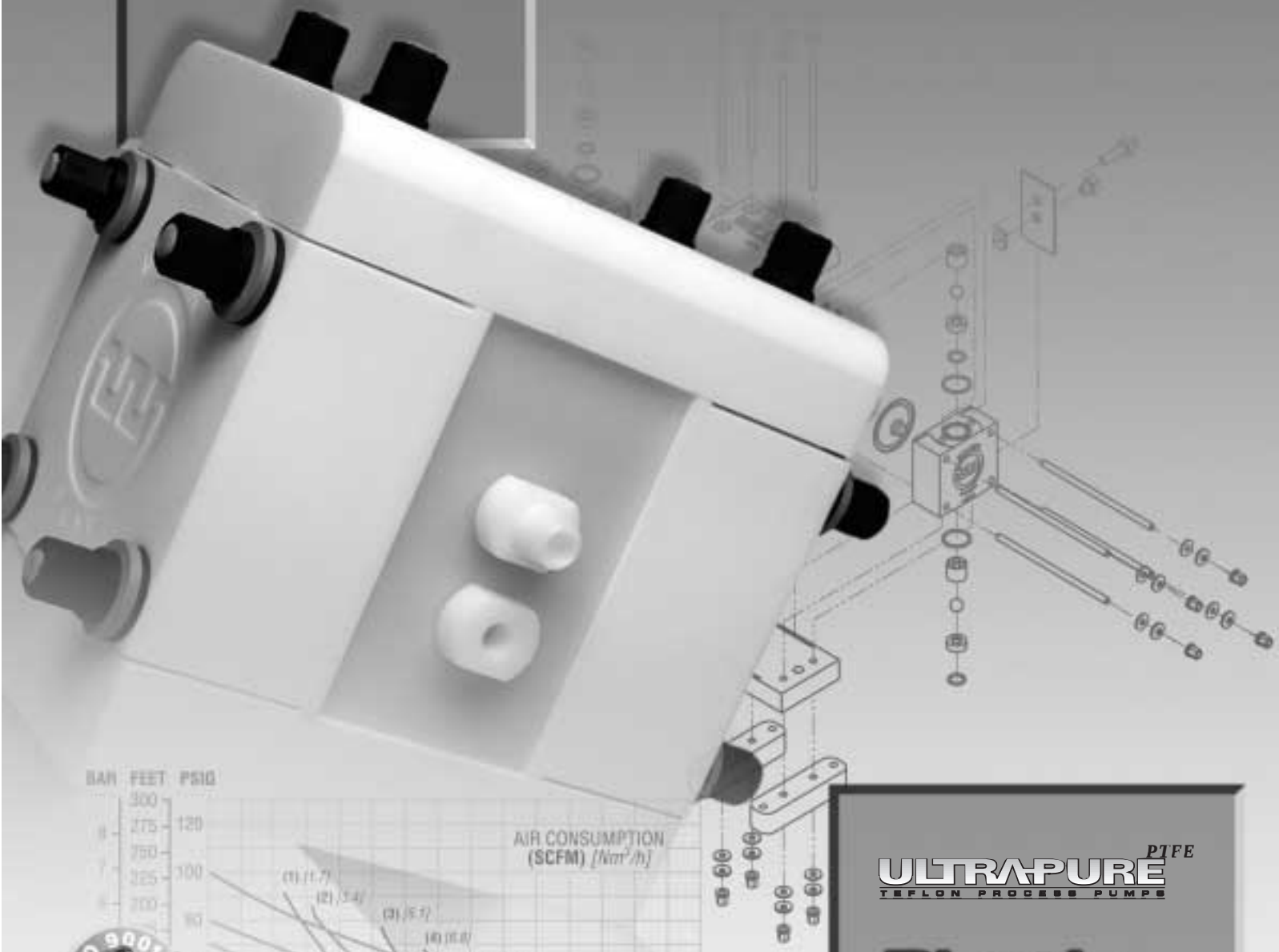
P.050 Engineering Operation & Maintenance



ISO 9001 Est. 1955 QUALITY SYSTEM

WILDEN®

AIR OPERATED DOUBLE DIAPHRAGM PUMPS

A DOVER RESOURCES COMPANY

ULTRA-PURE PTFE
TEFLON PROCESS PUMPS

Plastic Pumps

RBG EOM-P.050P 3/99
REPLACES RBG EOM-P.050P 8/98

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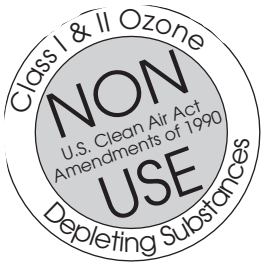
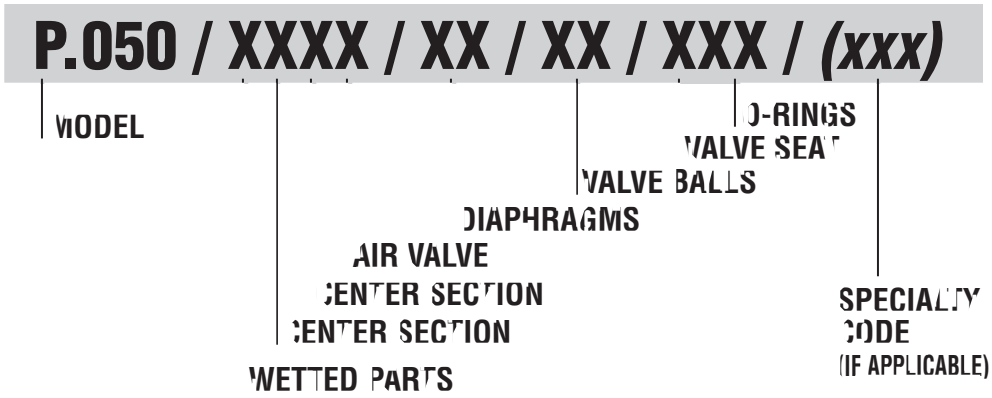


SECTION 1

WILDEN PUMP DESIGNATION SYSTEM



MODEL P.050 ULTRA-PURE^{PTFE} MATERIAL CODES

WETTED PARTS
T = TEFLON® PTFE

AIR CHAMBERS
K = PVDF (KYNAR®)

CENTER SECTION
K = PVDF (KYNAR®)

AIR VALVE
K = PVDF (KYNAR®)

DIAPHRAGMS
TX = IPD (INTEGRAL PISTON DIAPHRAGM) TEFLON® PTFE (White)

VALVE BALL
TF = TEFLON® PTFE (White)

VALVE SEAT
T = TEFLON®

VALVE SEAT O-RING*
TV = TEFLON® PFA ENCAP. VITON®

UNPACKING AND INSPECTION

Upon receiving your Wilden P.050 pump at your facility, inspect for damage due to mishandling in shipping. Wilden P.050 pumps are assembled and packaged in a class 10,000 cleanroom. Confirm that the pump has not been tampered with or exposed to external elements during the shipping process. Verify that the model number on the shipping box and the pump's discharge manifold is the same as the model number on your purchase order. Check the pump for loose bolts and/or connection damage that may have occurred in transport. Remove the shipping plugs (red plugs) from the liquid inlet and discharge ports. Please contact Wilden Pump & Engineering Company at (909) 422-1730 with concerns, comments, or questions.

Teflon is a registered trademark of DuPont.

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.

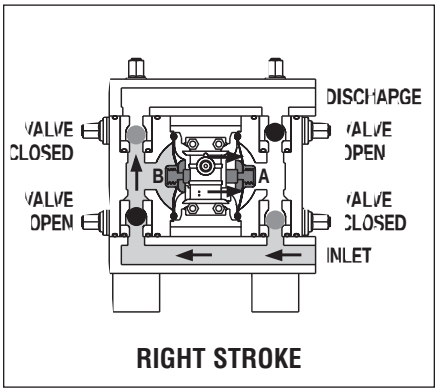


FIGURE 1 The air valve directs pressurized air to the back side of diaphragm A. The compressed air is applied directly to the liquid column separated by elastomeric diaphragms. The diaphragm acts as a separation membrane between the compressed air and liquid, balancing the load and removing mechanical 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).

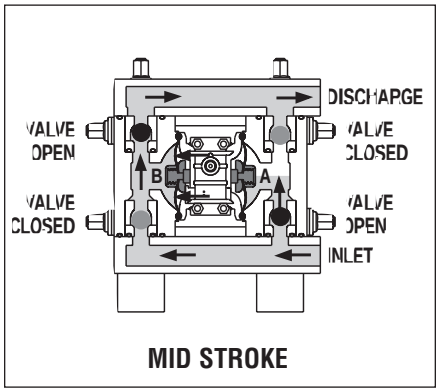


FIGURE 2 When the pressurized diaphragm, diaphragm A, reaches the limit of its discharge stroke, the air valve redirects pressurized air to the back side of diaphragm B. The pressurized air forces diaphragm B away from the center block while pulling diaphragm A to the center block. Diaphragm B is now 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.

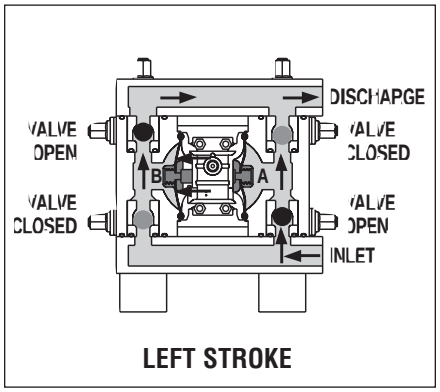
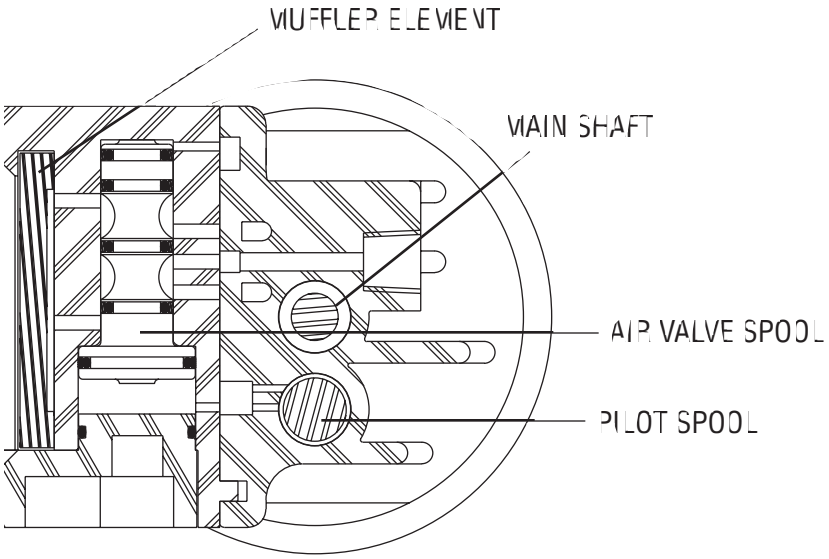


FIGURE 3 At completion of the stroke, the air valve again redirects air to the back side of diaphragm A, which starts diaphragm B on its exhaust stroke. As the pump reaches its original starting point, each diaphragm has gone through one exhaust and one discharge stroke. This constitutes one complete 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 1



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 1, this valve design incorporates an unbalanced spool. The smaller end of the spool is pressurized continuously, while the large end is alternately pressurized and exhausted to move the spool. The spool directs pressurized air to one chamber while exhausting the other. The air causes the main shaft/diaphragm assembly to shift to one side — discharging liquid on one side and pulling liquid in on the other side. When the shaft reaches the end of its stroke, it actuates the pilot spool, which pressurizes and exhausts the large end of the air valve spool. The pump then changes direction and the same process occurs in the opposite direction, thus reciprocating the pump.

SECTION 3

WILDEN MODEL P.050 ULTRA-PURE^{PTFE} CAUTIONS – READ FIRST!

TEMPERATURE/PRESSURE LIMITS: See temperature/pressure derate curve below *(Figure 1).*

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.

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 tie rods and retainers prior to installation. Fittings may loosen during transportation. See torque requirements on page 16.

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. (see RBG E4).

CAUTION: Due to the presence of glass in the composite fasteners, the P.050 pump is not recommended for use in hydrofluoric acid applications.

NOTE: For optimum purity, we suggest rinsing the P.050 with ultra-pure H_2O for 1 to 2 hours before installation.

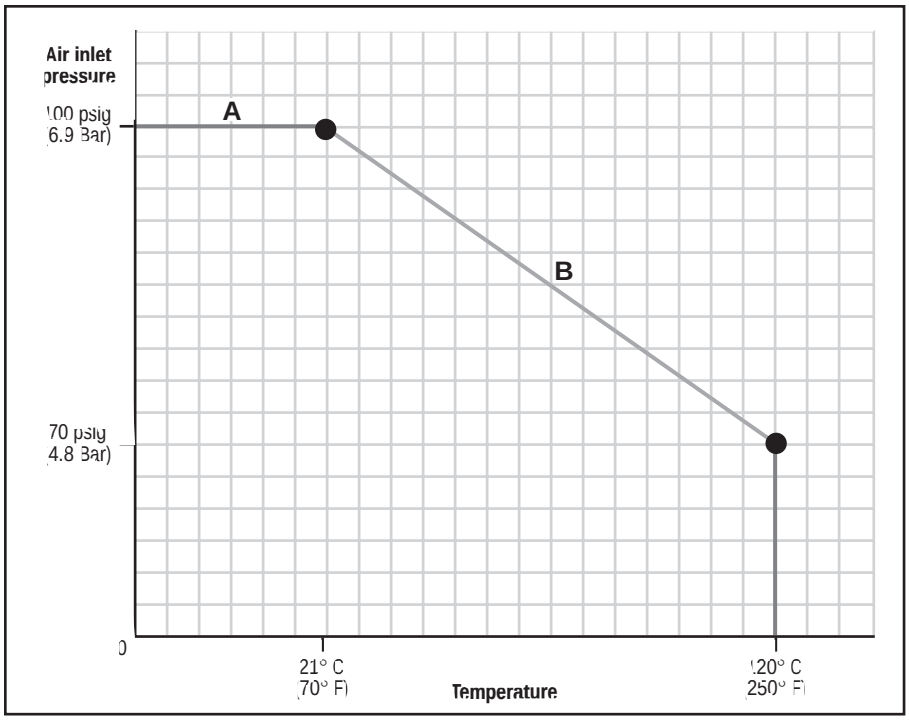
CAUTION: The P.050 pump is not submersible. If your application requires your pump to be submersed, Wilden offers other solutions.

CAUTION: Piping must be supported independently of pump. Pump must be isolated.

NOTE: The P.050 air inlet is a male threaded connection and the exhaust is a female threaded connection.

NOTE: Do not exceed 10 psi (0.68 Bar) positive inlet pressure.

Figure 1 **Temperature/Pressure Derate Curve**



For section A of the curve (temperatures below 21°C [70°F]) the maximum recommended air inlet pressure is 100 psig (6.9 Bar).

For section B of the curve (temperatures between 21°C [70°F] and 120°C [250°F]) use one of the following equations to determine the maximum recommended air inlet pressure:

Pressure (psig) = 100 – .1685 (temperature in °F – 70)

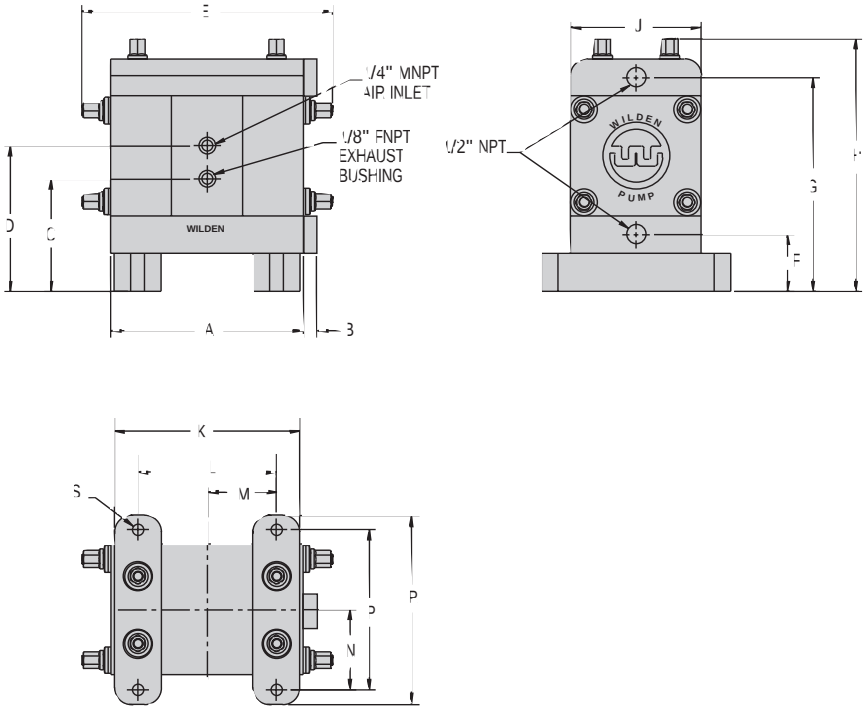
Pressure (psig) = 100 – .3030 (temperature in °C – 21)

NOTE: The P.050 is not recommended for temperatures over 120°C (250°F) or pressures above 100 psig (6.9 Bar).

SECTION 4

DIMENSIONAL DRAWING

WILDEN MODEL P.050 ULTRA-PURE^{PTFE}



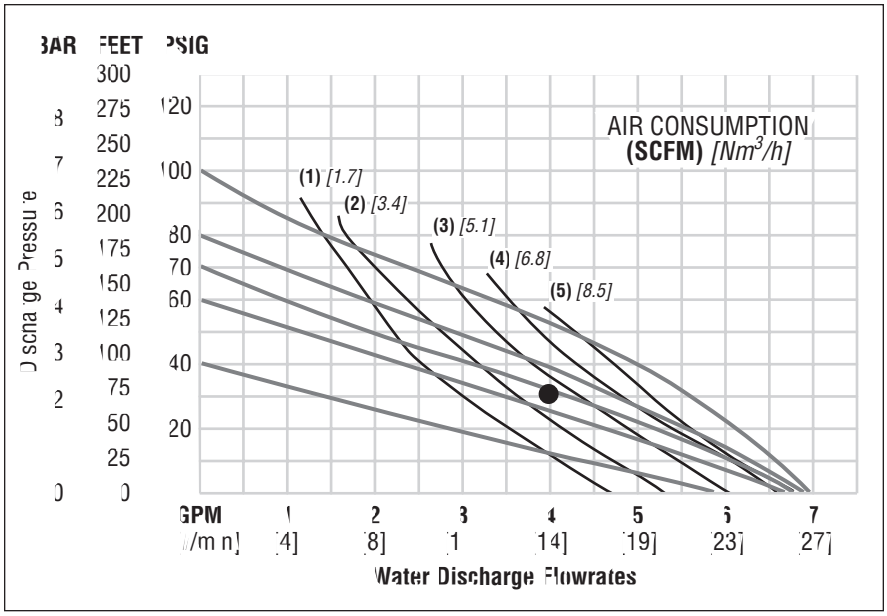
DIMENSIONS – P.050 Ultra-Pure^{PTFE}		
ITEM	STANDARD (inch)	METRIC (mm)
A	7.20	182.9
B	.50	12.7
C	4.13	104.9
D	5.38	136.7
E	9.3	236.2
F	2.13	54.1
G	8.00	203.2
H	9.43	239.5
J	4.88	123.9
K	6.94	176.3
L	5.19	131.8
M	2.59	65.8
N	2.99	75.9
P	5.98	151.8
R	7.08	179.8
S	Ø.42	Ø10.7

SECTION 5
PERFORMANCE CURVES
MODEL P.050 ULTRA-PURE^{PTFE} TEFLON®-FITTED

Height.....9.43" (239.5 mm)
Width.....9.3" (236.2 mm)
Depth.....7.08" (179.8 mm)
Ship Weight..... 15 lbs. (6.8 kg)
Air Inlet .....¼" (6.35 mm)
Inlet.....½" (12.7 mm)
Outlet.....½" (12.7 mm)
Suction Lift .....9' Dry (2.74 m)
25' Wet (7.6 m)
Displacement per
Stroke..... .022 gal.(.083 l)[1]
Max. Flow Rate.....7 gpm (26.5 lpm)
Max. Size Solids.....1/64" (.4 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 4 gpm (15.2 lpm) against a discharge pressure head of 30 psig (2 Bar) requires 70 psig (4.8 Bar) and 2.6 scfm (4.4 Nm³/h) air consumption. (See dot on chart.)

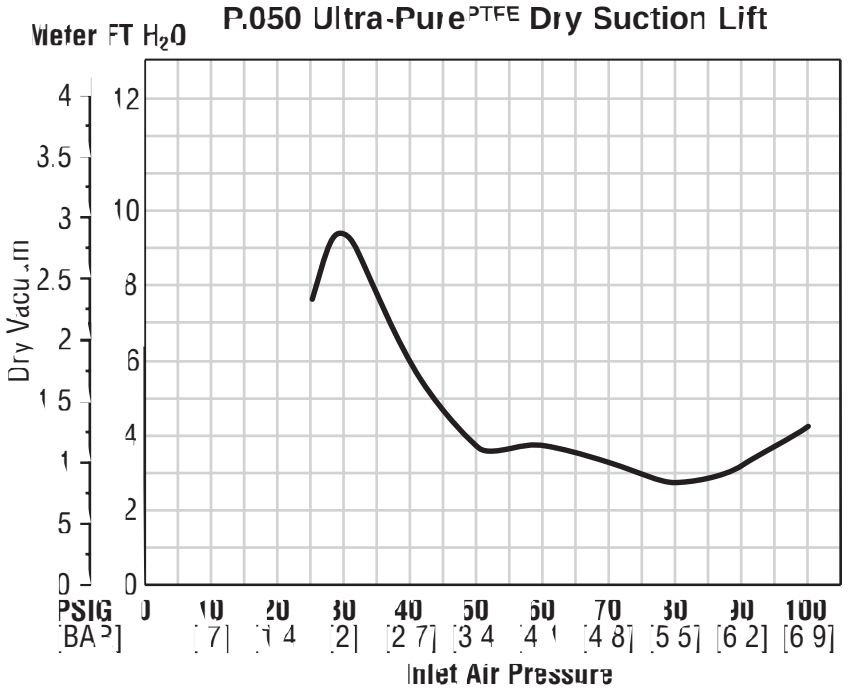


Flow rates indicated on chart were determined by pumping water.

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

CAUTION: Refer to Section 3, page 3, temperature/pressure derate curve *(Figure 1)* for maximum recommended temperature/pressure.

SECTION 6
SUCTION LIFT CURVE & 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 7A
INSTALLATION

The P.050 Ultra-Pure[PTFE] pump has a ½" (12.7 mm) inlet and discharge and is designed for flows to 7 gpm (26.5 l/m). The P.050 is an air-operated, double-diaphragm pump constructed of machined Teflon® PTFE with PVDF center section and air valve. This pump is designed specifically to recirculate pure chemicals such as piranha baths, etching solutions, photoresist removers, etc. in the semiconductor and electronic industries.

The suction pipe size should be at least ½" (12.7 mm) diameter or larger if highly viscous material is being pumped. The suction hose must be a non-collapsible, reinforced type as the P.050 is capable of pulling a vacuum. Discharge piping should be at least ½" (12.7 mm); 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 that "utility" equipment be situated away from the production floor. Multiple installations with conflicting requirements can result in congestion of utility areas, leaving few choices for siting of additional pumps.

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

1. 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.

2. 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 pump performance chart). Use air pressure up to a maximum of 100 psi (6.9 Bar) depending on pumping requirements.

NOTE: The P.050 exhaust air can be plumbed into the clean-room's exhaust system using the ⅛" FNPT exhaust bushing.

Sound levels are reduced below OSHA specifications using the standard Wilden muffler element.

3. 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.

4. 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 stresses 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 Wilden SD½ Equalizer surge dampener should be installed to protect the pump, piping and gauges from surges and water hammer.

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.

The P.050 cannot be used in submersible applications.

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.

Pumps in service with a positive suction head are most efficient when inlet pressure is limited to 7–10 psig (.4–.7 Bar). Premature diaphragm failure may occur if positive suction is 10 psi (.7 Bar) and higher.

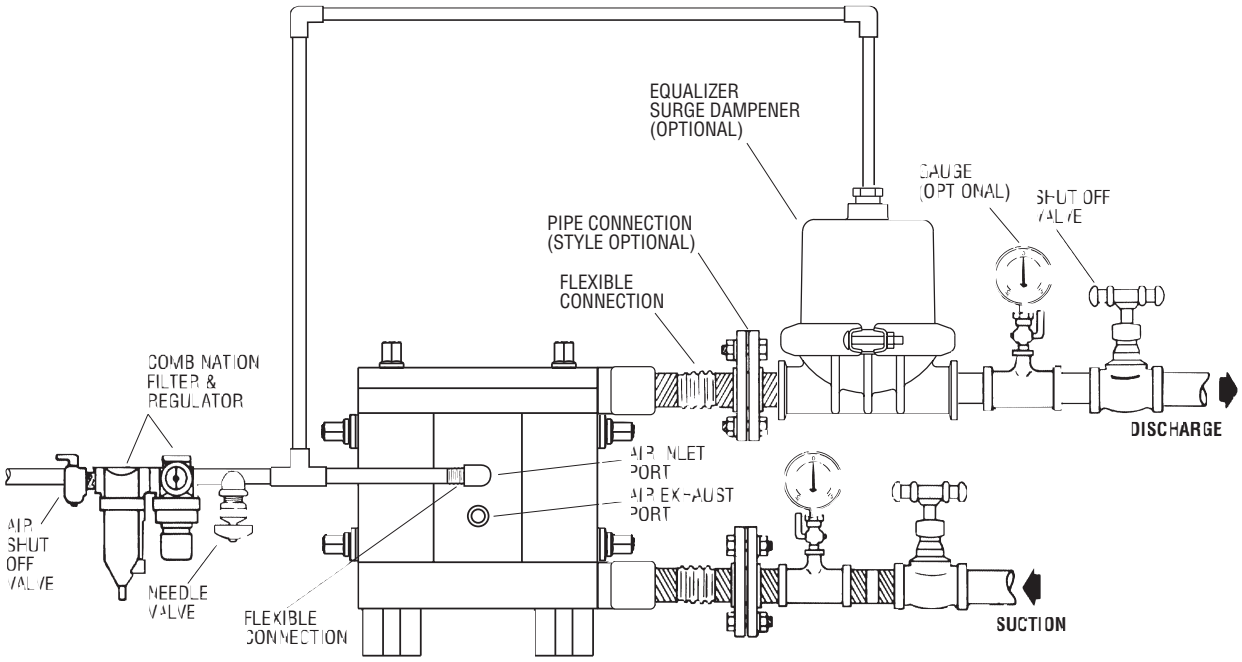
THE MODEL P.050 WILL PASS 1/64" (.4 MM) SOLIDS. WHENEVER THE POSSIBILITY EXISTS THAT LARGER SOLID OBJECTS MAY BE SUCKED INTO THE PUMP, A STRAINER SHOULD BE USED ON THE SUCTION LINE.

CAUTION: DO NOT EXCEED 100 PSIG (6.9 BAR) AIR SUPPLY PRESSURE AT AMBIENT TEMPERATURE.

BLOW OUT AIR LINE FOR 10 TO 20 SECONDS BEFORE ATTACHING TO PUMP TO MAKE SURE ALL PIPE LINE DEBRIS IS CLEAR.

The P.050 pump is not submersible. If your application requires the pump to be submersed, Wilden offers other solutions.

SECTION 7B
SUGGESTED INSTALLATION



NOTE: A variety of installations options are available to fit your customized application needs. Inlet and discharge ports can both be facing to the right or to the left of the pump. Inlet and discharge manifolds can also be mounted to allow inlet and discharge ports to face in different directions.

NOTE: The P.050 exhaust air can be plumbed into the clean-room's exhaust system using the ⅛" FNPT exhaust bushing.

SECTION 7C
SUGGESTED OPERATION AND MAINTENANCE INSTRUCTIONS

For best results, the pumps should use an air filter and regulator. The use of an air filter before the pump will insure that the majority of any pipeline contaminants will be eliminated. The P.050 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 regulate air pressure. A needle valve is used to regulate volume. Pump discharge rate can also be controlled by throttling the pump discharge by installing a valve in the discharge line of the pump. 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. When operation is controlled by a solenoid valve in the air line, a three-way valve should be used. Pumping volume can be set by counting the number of strokes per minute.

INSPECTIONS: 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.

SECTION 7D
TROUBLESHOOTING

Pump will not run or runs slowly.

1. Ensure that the air inlet pressure is at least 5 psig above startup pressure and that the differential pressure (the difference between inlet and discharge pressures) is not less than 10 psig.
2. Check air inlet filter for debris (see recommended installation).
3. Check for extreme air leakage which would indicate worn out seals/bores.
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. 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 runs but little or no product flows.

1. Check for pump cavitation; slow pump speed down to match thickness of material being pumped.
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. As the check valve balls wear out, they become smaller and can become stuck in the seats. In this case, replace balls and seats.
4. Ensure that all suction connections are tight, especially lower valve ball retainers.

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.
3. Check tightness of screws 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.

Pump rattles.

1. See RBG E9 Troubleshooting Guide.
2. Create false discharge head or suction lift.

SECTION 7E

AIR/GAS ENTRAPMENT ACTION STEPS FOR REMOVAL

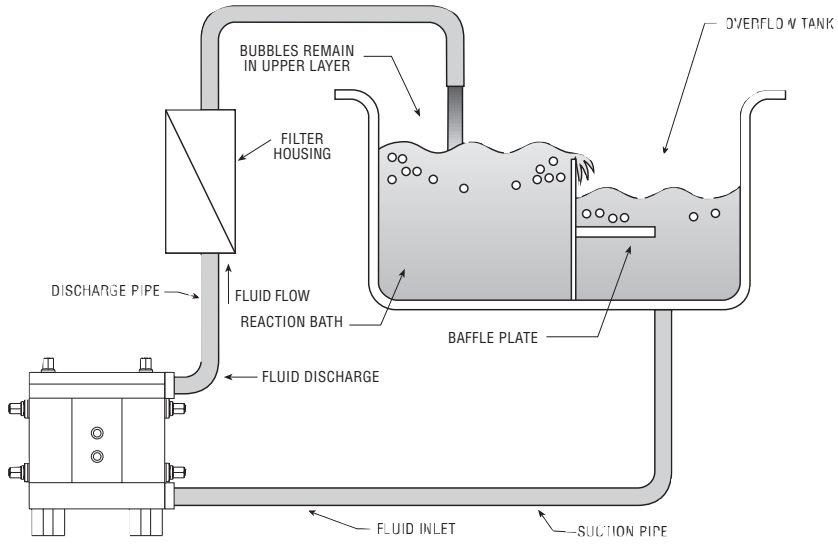
Many applications, particularly in the semiconductor industry, require the mixing of chemical (reaction baths, etching, etc.) Air or gas bubbles may be generated during this mixing process, especially if water or Hydrogen Peroxide is added to acid baths (Sulfuric, Chromic, etc.) This phenomenon must be considered when designing and/or specifying all fluid transfer equipment. Pumps are susceptible to "airlock" conditions (i.e., the presence of air or gas bubbles).

As the pump absorbs a number of bubbles through the suction port, "airlock" can occur and the pump speed will increase abnormally, while liquid flow will decrease due to cavitation. This condition leads to decreased diaphragm life and erratic diaphragm stroke patterns. "Airlock" is also more prevalent in high temperature applications. Proper air purging is essential to prevent such an occurrence. The following details outline measures to be followed for safe and efficient pump operation.

AIR/GAS VENT PLANS TO COUNTERACT "AIRLOCK"

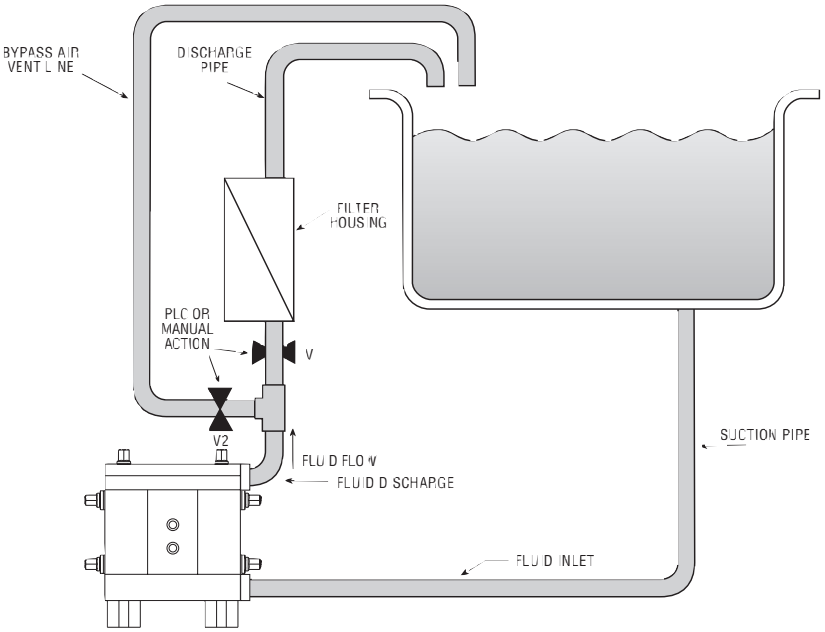
PLAN A

Plan A presumes the draw of liquid from a reaction bath or overflow tank. This plan depicts the use of a weir or baffle plate to "capture" air and/or gas bubbles in a "waterfall-line" fashion.



PLAN B

This plan suggests the use of a bypass air vent line to circumvent the filtration device, and ensure proper process operation (lessens filtration damage, pump inefficiencies, etc.)



If possible, the most successful "airlock" purging system would allow for the mixing of chemicals *after* the pump, thus allowing less agitation of the liquid through the pump. Sufficient suction piping is required to install a valve system to purge air and gas bubbles.

Note 1 The circulation capacity is largely determined by the filter selected when applicable. Filters with very small air purge diameters will be ineffective. Select the correct filtration device necessary to handle air/gas purging requirements.

SECTION 8A

MODEL P.050 ULTRA-PURE^{PTFE} 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. Wetted flushing of parts may be required prior to handling.

The Wilden model P.050 *(Figure 1)* is an air-operated, double-diaphragm pump with all wetted parts of Teflon® PTFE. The single-piece center section, consisting of the center block and air chambers, is molded from PVDF. All fasteners and hardware are constructed of engineered plastics. The air valve is manufactured of PVDF. All O-rings used in the pump are of special materials and should only be replaced with factory-supplied parts.

To expedite parts ordering, please find an exploded view of the P.050 model at the back of this manual.

PLEASE read all directions before starting disassembly.

TOOLS REQUIRED:

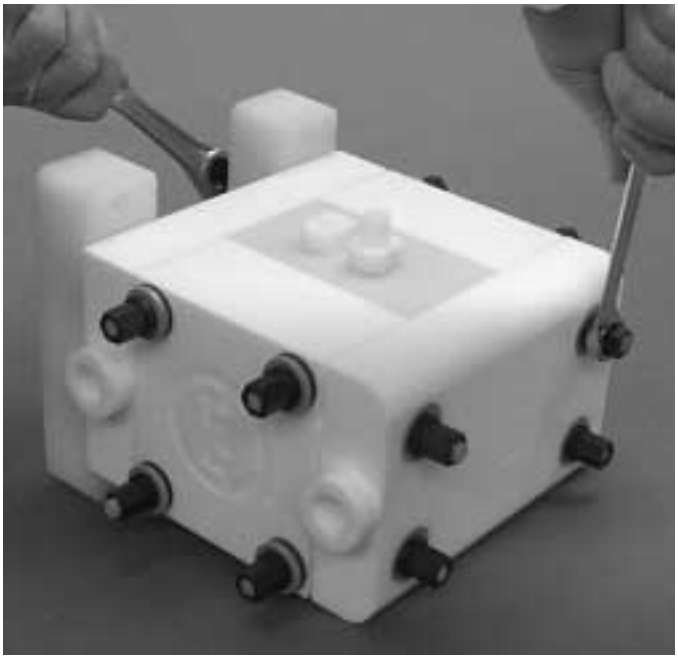
9/16" Wrench
9/16" Socket Wrench
5/32" Hex Key (Allen Wrench)
O-Ring Pick

Figure 1

DISASSEMBLY:

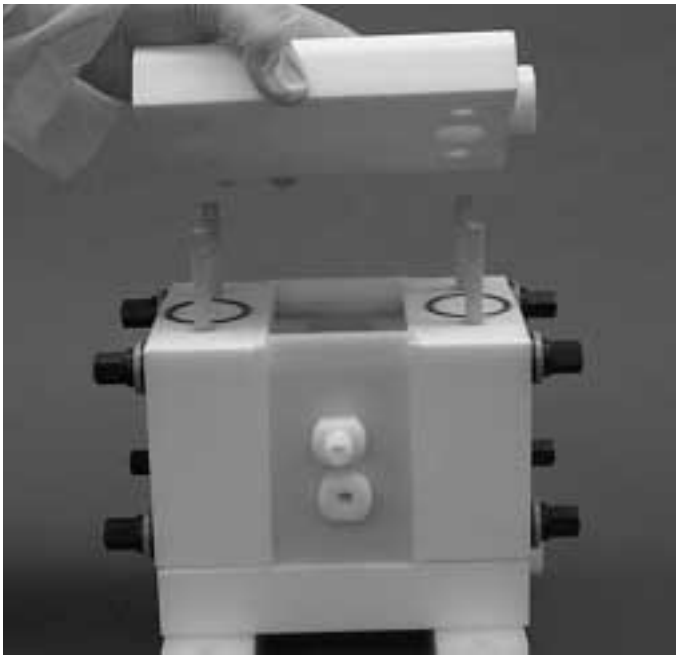
Step 1.

Before disassembly is started, turn the pump upside down and drain all liquid trapped in the pump into a suitable container. Be sure to use proper caution if liquid is corrosive or toxic.



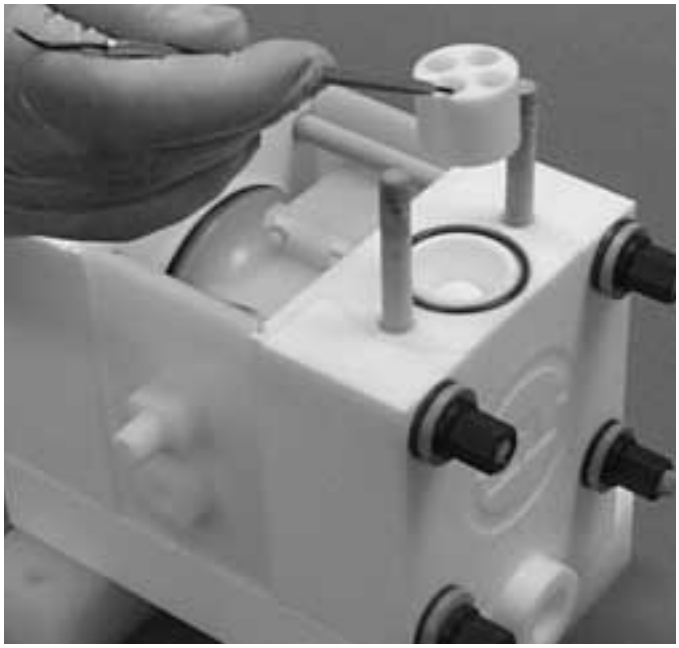
Step 2. *Figure 2*

Remove all four vertical top bolts using the 9/16" socket wrench and a 9/16" wrench or crescent wrench.



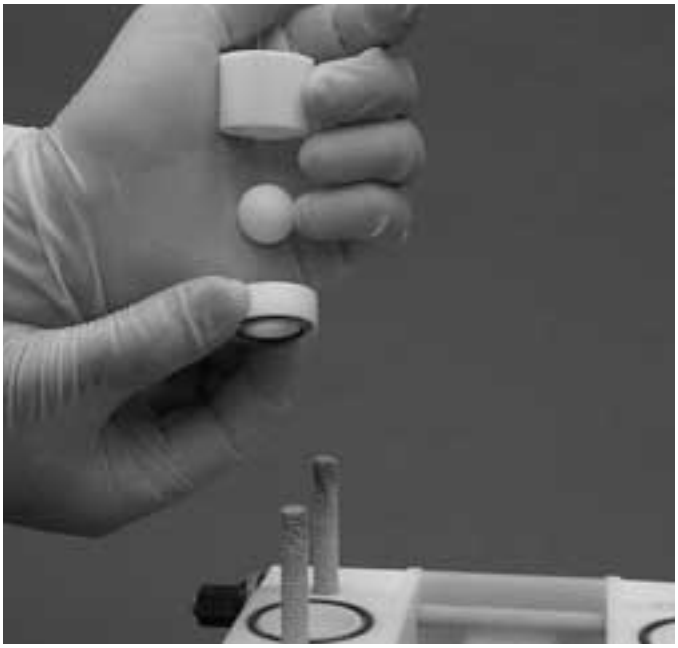
Step 3. *Figure 3*

Remove the top manifold.



Step 4. *Figure 4*

Use an O-ring pick or equivalent to lift the ball cages.

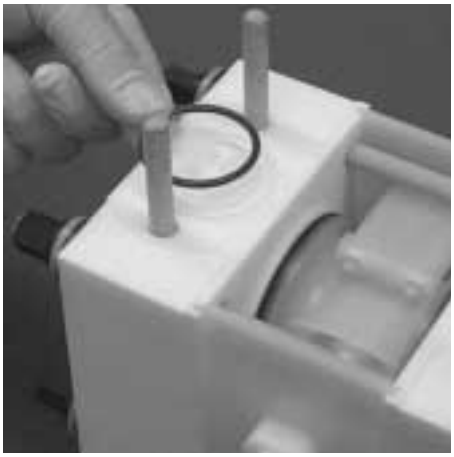


Step 5. *Figure 5*

Remove the Teflon® PTFE ball, seat, and seat O-ring.

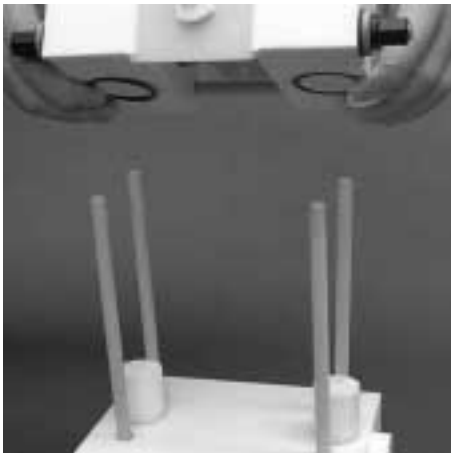
Step 6. *Figure 6*

Inspect the top ball cage, ball, and seat for abrasion. Inspect seat O-ring for swelling, cracking, or other damage. These parts should be replaced if damage is observed.



Step 7. *Figure 7*

Remove the liquid chamber O-ring and inspect for swelling, cracking, or other damage. Replace if damage is observed.



Step 8. *Figure 8*

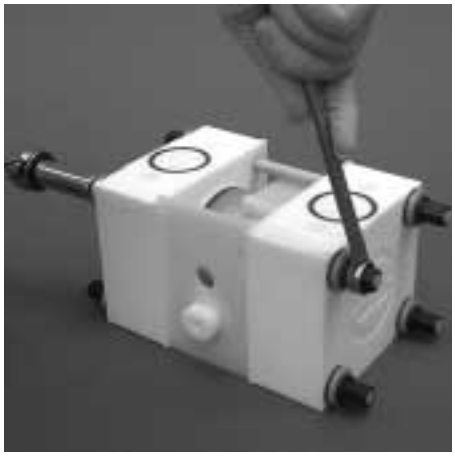
Remove the liquid chamber assembly of the pump by lifting it off the intake manifold.

Step 9. *Figure 9*

Inspect bottom ball cage, ball, and seat for abrasion. Inspect seat O-ring for swelling, cracking, or other damage. These parts should be replaced if damage is observed.

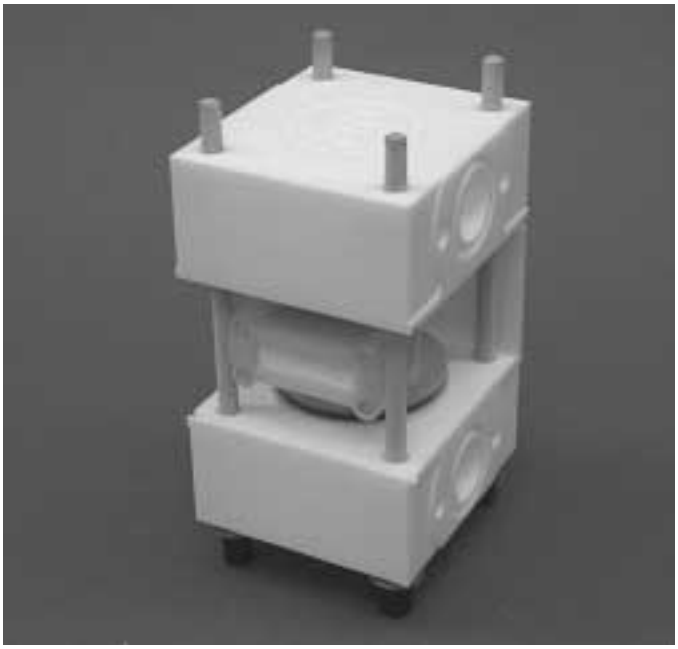
Step 10. *Figure 10*

Remove the air inlet nipple by unscrewing it. NOTE: Do not use any tools to remove the air inlet nipple. The air inlet nipple is hand tight.



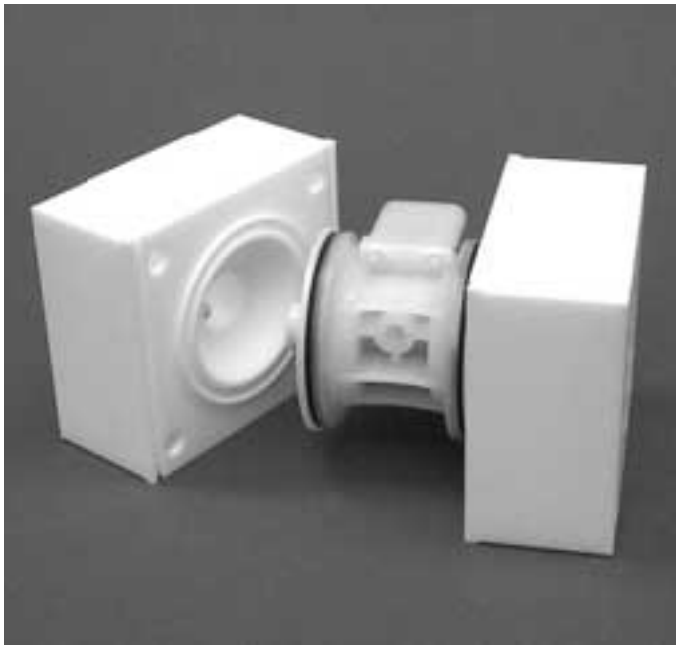
Step 11. *Figure 11*

Remove all four horizontal fasteners using the 9/16" socket wrench and a 9/16" wrench or crescent wrench.



Step 12. *Figure 12*

Place the liquid chamber assembly of the pump on one side and remove the liquid chambers and the center section.



Step 13. *Figure 13*

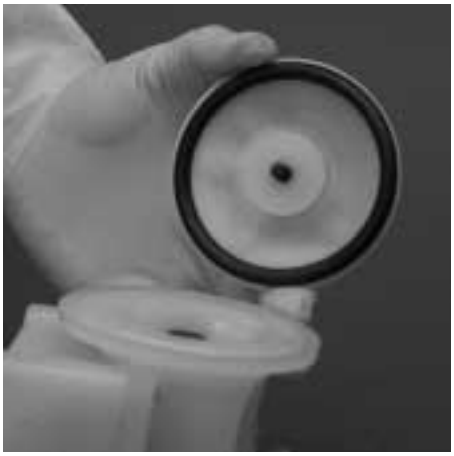
Visually inspect the liquid chambers for deformation and/or abrasion. If damaged, replace the liquid chambers.

Step 14. *Figure 14*

The retaining rod assembly is shown above. NOTE: The Belleville washer (tan) is sandwiched between the retaining nut and the flat washer (black).

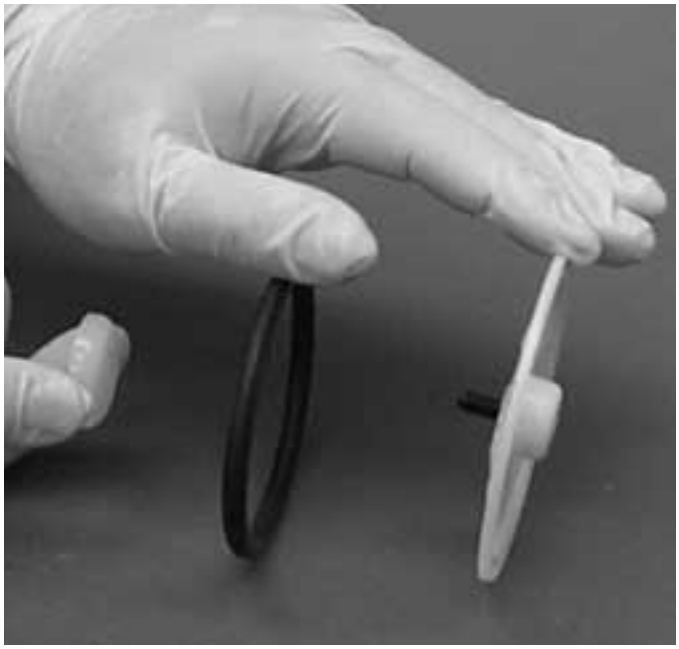
Step 15. *Figure 15*

To remove the Integral Piston Diaphragm (IPD), turn top diaphragm counterclockwise. NOTE: Do not use any tools while removing the IPD diaphragm. The diaphragm is hand tight.



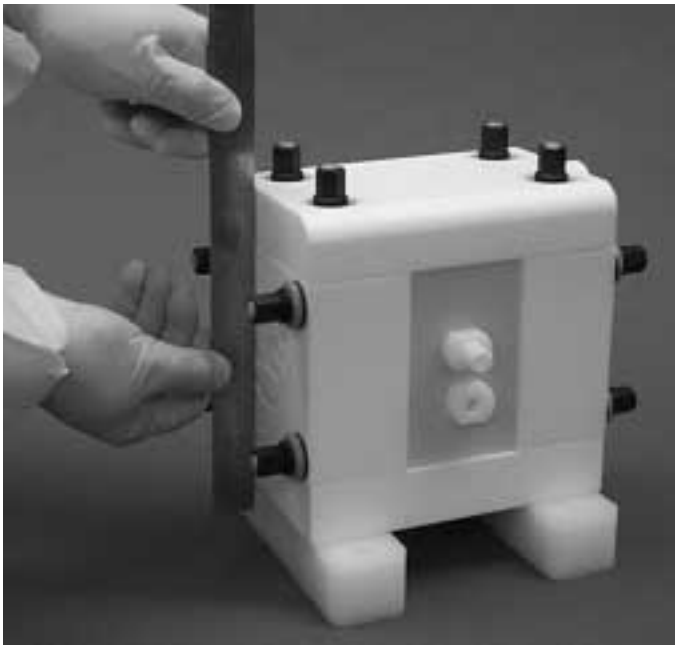
Step 16. *Figure 16*

Inspect shaft seals and threads for damage. Inspect O-ring for swelling, cracking or other damage. Replace if necessary.



Step 17. *Figure 17*

Inspect O-ring for swelling, cracking, or other damage. Replace if necessary. Inspect Integral Piston Diaphragm for evidence of stud pull-out or abrasion.



Step 18. *Figure 18*

When reassembling the pump, make sure the liquid intake and discharge manifolds are aligned with the liquid chambers. Use a straight edge to verify alignment. Tighten horizontal cross bolts as needed in order to achieve proper alignment.

NOTE: For torque specifications see page 16.

SECTION 8B

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

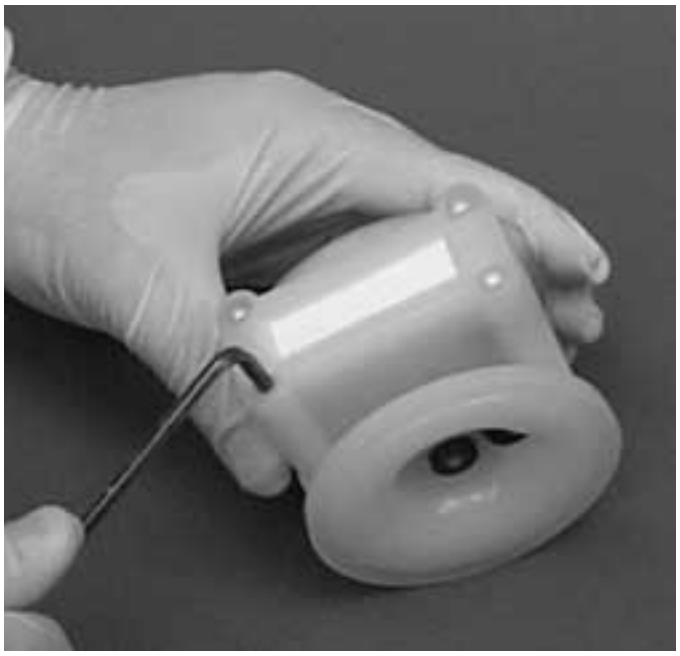
AIR VALVE DISASSEMBLY:

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 P.050 Ultra-Pure^{PTFE} pump utilizes a revolutionary Pro-Flo™ air distribution system. A ¼" (6.35 mm) air inlet connects the air supply to the center section air inlet port. Proprietary composite seals reduce the coefficient of friction and allow the P.050 to run lube-free. Constructed of PVDF, the Pro-Flo™ air distribution system is designed to perform in on/off, non-freezing, non-stalling, tough duty applications.

TOOLS REQUIRED:

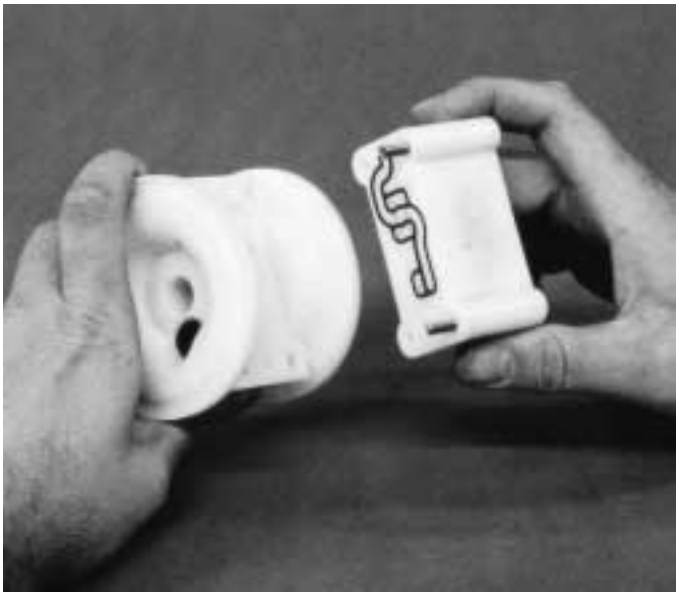
5/32" Hex Head Wrench
O-Ring Pick



Step 1. *Figure 1*

Remove air valve screws from center section with a 5/32" hex key (Allen wrench) *(Figure 1).*

NOTE: Screws are nonmetal composite. Carefully hand-tighten until air valve is snug against center section.



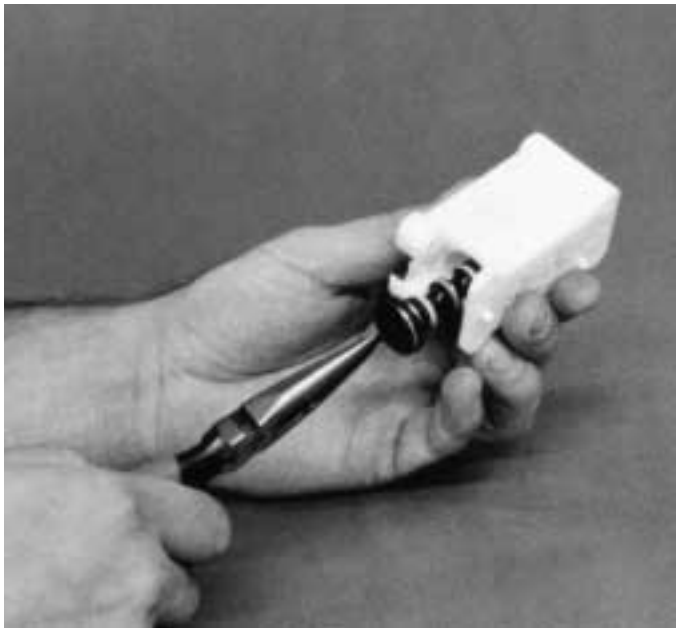
Step 2. *Figure 2*

Take care while removing air valve not to damage gasket *(Figure 2).*

NOTE: Air valve has molded-in alignment pins for proper positioning during assembly.

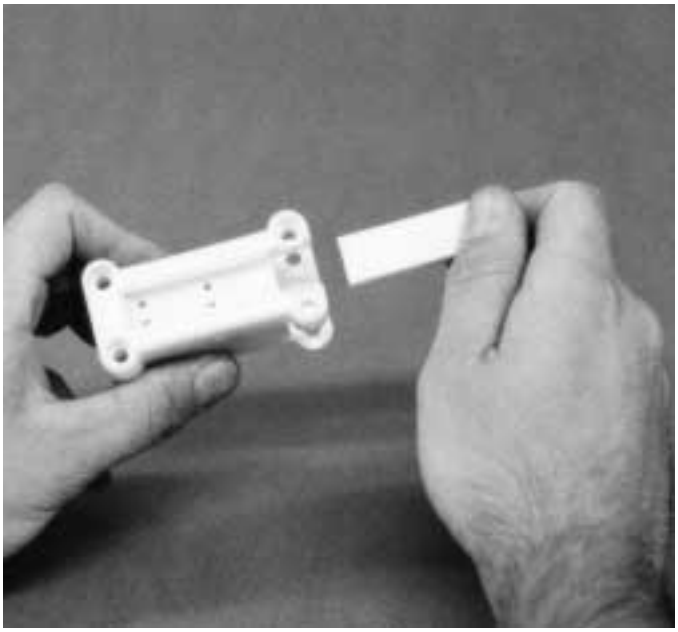
Step 3. *Figure 3*

Remove air valve end cap by simply pulling it away from air valve body (no tools required) *(Figure 3).* Inspect O-ring and replace as needed with genuine Wilden parts.



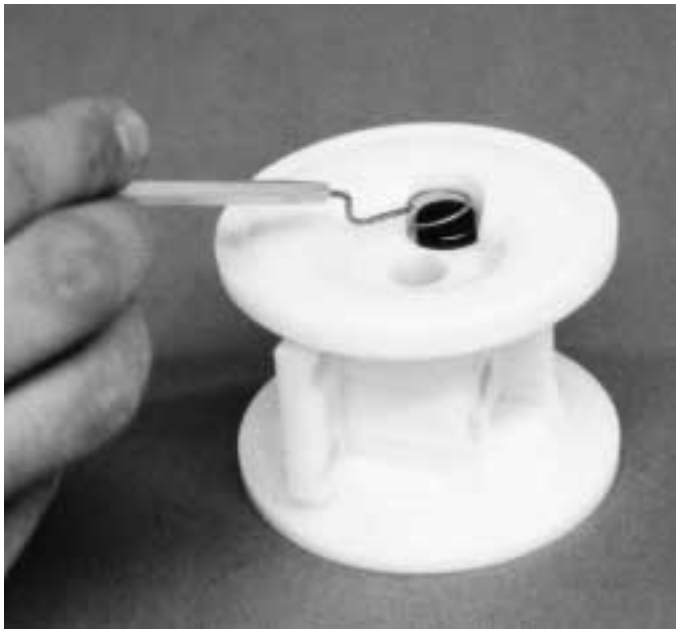
Step 4. *Figure 4*

The air valve spool can now be removed. A 4-40 UNC (Unified National Coarse thread) screw can be screwed into the threaded hole located in the center of the spool. Grip the screw with pliers and remove. If a 4-40 UNC screw is not available, the spool can be tapped out against a wood block or blown out with compressed air. Upon reassembly, lubricate air valve with NLGI grade 2 molybdenum disulfide based grease or equivalent *(Figure 4).*



Step 5. *Figure 5*

Remove the porous polyethylene muffler element by sliding it toward the end cap opening *(Figure 5).* The element can be cleaned by soaking it in a cleaning solution (no solvents). If the muffler restricts the air exhaust, replace muffler element.



Step 6. *Figure 6*

Remove pilot spool retaining ring with an O-ring pick *(Figure 6).*

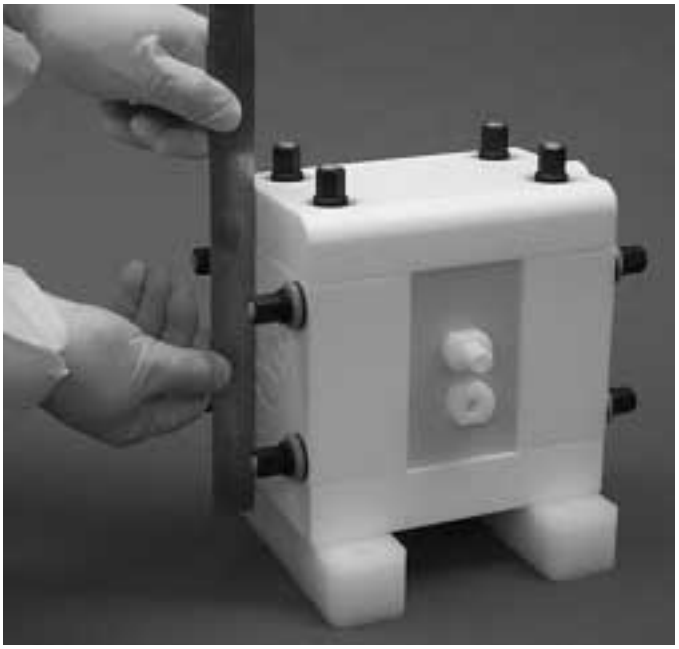
Step 7. *Figure 7*

Push pilot spool through center section and remove. Inspect seals for integrity and spool for damage. Replace pilot spool assembly if necessary. Upon reassembly of spool, apply a film of NLGI grade 2 molybdenum disulfide based grease or equivalent *(Figure 7)*.

SECTION 8C
REASSEMBLY

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 P.050 pump, follow the disassembly instructions in reverse order. The air distribution system needs to be assembled first, then the diaphragms, and finally the wetted parts. Please find applicable torque specifications in this section.

When center section O-rings have been replaced, the P.050 pump requires a break-in period of 2–3 minutes at air pressure above 60 psi.



NOTE: When reassembling the P.050 pump, tighten the horizontal cross bolts first, making sure the liquid intake and discharge manifolds are aligned with the liquid chambers. Use a straight edge to verify alignment *(Figure 1).* Tighten vertical cross bolts per the torque specifications below.

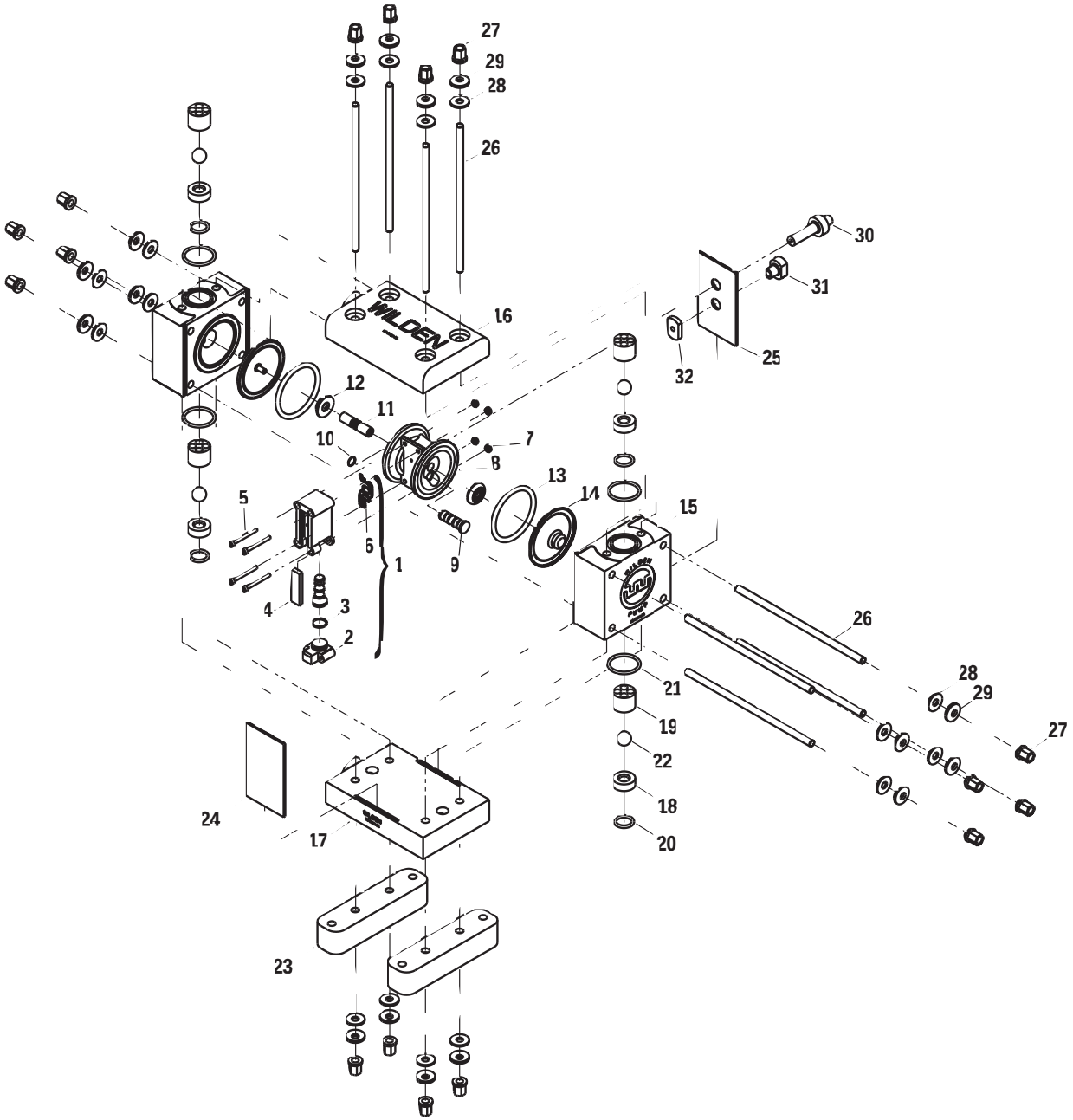
TORQUE SPECIFICATIONS FOR MODEL P.050 PUMPS

Description of Part	Maximum Torque
Air Valve Center Section Screws	12 in.-lbs. [1.4 m-N]
Horizontal Fasteners	Torque until liquid chambers are flush with top and bottom manifolds.
Vertical Fasteners	32 in.-lbs. [3.7 m-N]
Air Inlet	Hand tight.
Exhaust Porting	Hand tight.

NOTES

SECTION 9A
EXPLODED VIEW/PARTS LISTING

P.050
ULTRA-PURE® PTFE
TEFLON®-FITTED



Wilden Model P.050 Pumps

Item #	Description	Qty. per Pump	P.050/TKKK/TX/TF/TTV P/N
1	Assembly, Air Valve[1]	1	00-2000-21-700
2	End Cap, Air Valve	1	00-2300-21-700
3	O-Ring (ns), Air Valve End Cap	1	00-2390-52-700
4	Element, Muffler	1	00-3240-26-700
5	HSHCS, 10-24UNC-2A X	4	05-6000-79
6	Gasket, Air Valve O-Ring	1	00-2600-52-700
7	Nut, 10-24UNC-2B Hex	4	05-6400-65
8	Center Section	1	00-3150-21-700
9	**Spool, Pilot**	**1**	**00-3850-99-700**
10	Retaining Ring, Pilot Spool	1	00-2650-03-700
11	Shaft, Diaphragm	1	00-3800-99-700
12	Piston, Inner	2	05-3750-21-700
13	**O-Ring (Custom Size), Diaphragm**	**2**	**00-1070-53**
14	**Diaphragm, Primary**	**2**	**00-1030-55**
15	Chamber, Liquid	2	05-5000-55
16	Manifold, Disharge	1	05-5020-55
17	Manifold, Inlet	1	05-5080-55
18	**Seat, Ball**	**4**	**05-1120-55**
19	**Cage, Ball**	**4**	**05-5350-55**
20	**O-Ring (-211), Seat**	**4**	**05-1200-60**
21	**O-Ring (-222), Manifold**	**4**	**05-1370-60**
22	**Ball, Valve**	**4**	**01-1080-55**
23	Foot, Mounting	2	05-5540-32
24	Cover, Air Inlet	1	05-5491-32
25	Cover, Exhaust	1	05-5492-32
26	Rod, 3/8-16UNC-2A x 9.3 Tie	8	05-6170-78
27	Hex Nut, 3/8-16UNC-2B Flanged	16	05-6431-77
28	Washer, Flat	16	05-6730-77
29	Washer, Belleville Machined	16	05-6802-75
30	Fitting, Air Inlet	1	05-2175-20
31	Bushing, Exhaust	1	05-7025-20
32	Hex Nut, 1/4 NPT Straight	1	05-6475-20

[1]Air valve assembly includes items 2–4.

NOTE: The above bold-faced items are primary wear parts on the P.050 pump.

MAINTENANCE RECORD

DATE	SERVICE RENDERED	SERVICED BY