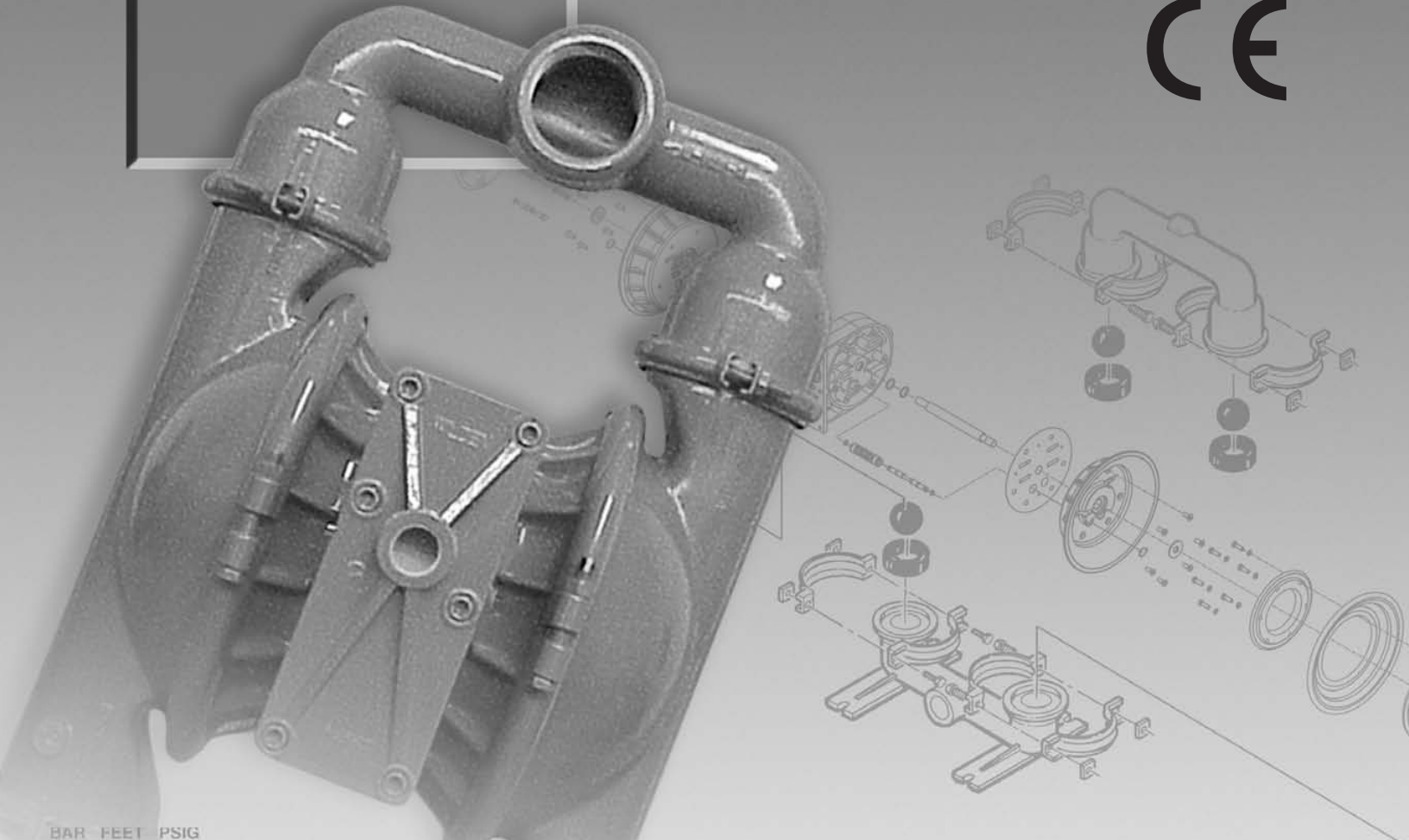


**BIOPHARM™**

**P15**

# Engineering Operation & Maintenance



**WILDEN®**

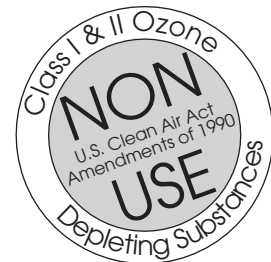
A DOVER COMPANY

**PROFLO®**  
PROGRESSIVE PUMP TECHNOLOGY

**Metal  
Pumps**

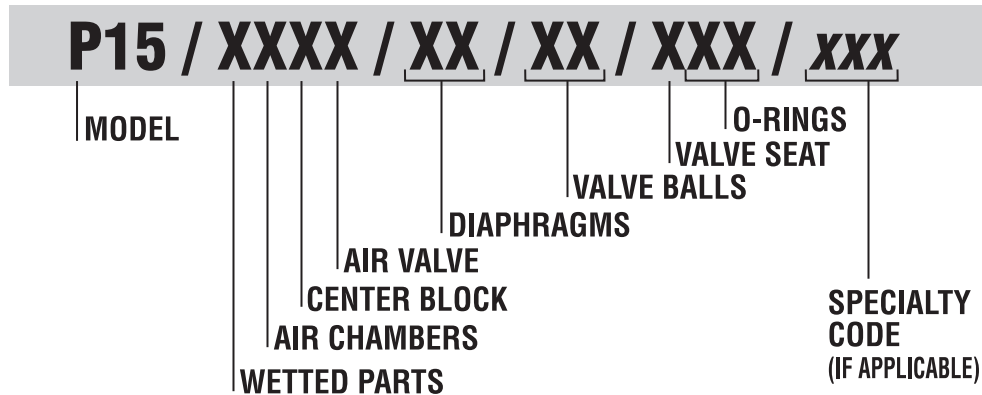
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## SECTION 1

# WILDEN PUMP DESIGNATION SYSTEM



## MODEL P15 METAL MATERIAL CODES

### WETTED PARTS

- H = HASTELLOY®
- S = STAINLESS STEEL

### AIR CHAMBERS

- A = ALUMINUM
- C = TEFLON® COATED
- S = STAINLESS STEEL

### CENTER BLOCK

- A = ALUMINUM
- C = TEFLON® COATED

### AIR VALVE

- P = POLYPROPYLENE

### DIAPHRAGMS

- TS = TEFLON® PTFE W/  
SANIFLEX™ BACK-UP

### VALVE BALL

- TF = TEFLON® PTFE  
(White)

### VALVE SEAT

- H = HASTELLOY®
- S = STAINLESS STEEL

### VALVE SEAT O-RING

- TF = TEFLON® PTFE

### SPECIALTY CODE

(AVAILABILITY VARIES BY MODEL.)

- 900 BioPharm
- 901 BioPharm, BSP
- 902 BioPharm, DIN
- 903 BioPharm, FDA (Tri-Clover® flanges & wing nuts)
- 904 BioPharm, USDA (Food Master)
- 905 BioPharm, 3A (CIP), Wil-Gard 110V
- 906 BioPharm, 3A (CIP), Wil-Gard 220V
- 907 BioPharm, LSH, side ported
- 908 BioPharm, FDA, Accu-Flo, 24V DC coil
- 909 BioPharm, FDA, Accu-Flo, 24V DC x-proof coil
- 910 BioPharm, FDA, Accu-Flo, 24V AC / 12V DC coil
- 911 BioPharm, FDA, Accu-Flo, 24V AC / 12V DC  
x-proof coil
- 912 BioPharm, FDA, Accu-Flo, 110V AC coil
- 913 BioPharm, FDA, Accu-Flo, 110V AC x-proof coil
- 914 BioPharm, Accu-Flo, 24V DC coil
- 915 BioPharm, Accu-Flo, 24V DC x-proof coil
- 916 BioPharm, Accu-Flo, 24V AC / 12V DC coil
- 917 BioPharm, Accu-Flo, 24V AC / 12V DC x-proof coil
- 918 BioPharm, Accu-Flo, 110V AC coil
- 919 BioPharm, Accu-Flo, 110V AC x-proof coil

**NOTE: MOST 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.

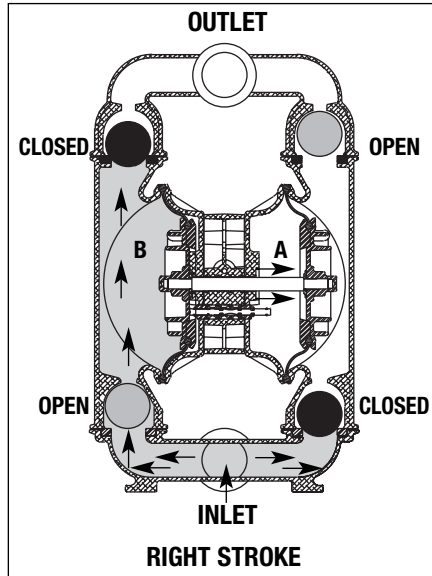


FIGURE 1 The air valve directs pressurized air to the back side of diaphragm A. The compressed air is applied directly to the liquid column separated by elastomeric diaphragms. The diaphragm acts as a separation membrane between the compressed air and liquid, balancing the load and removing mechanical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

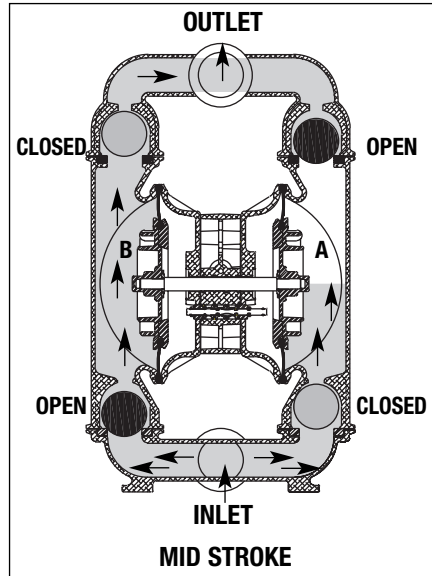


FIGURE 2 When the pressurized diaphragm, diaphragm A, reaches the limit of its discharge stroke, the air valve redirects pressurized air to the back side of diaphragm B. The pressurized air forces diaphragm B away from the center block while pulling diaphragm A to the center block. Diaphragm B is now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

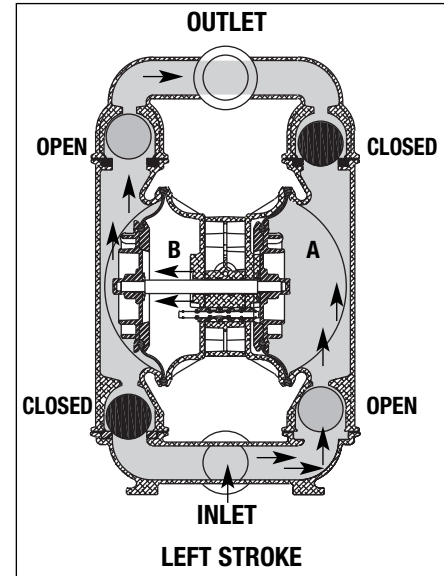
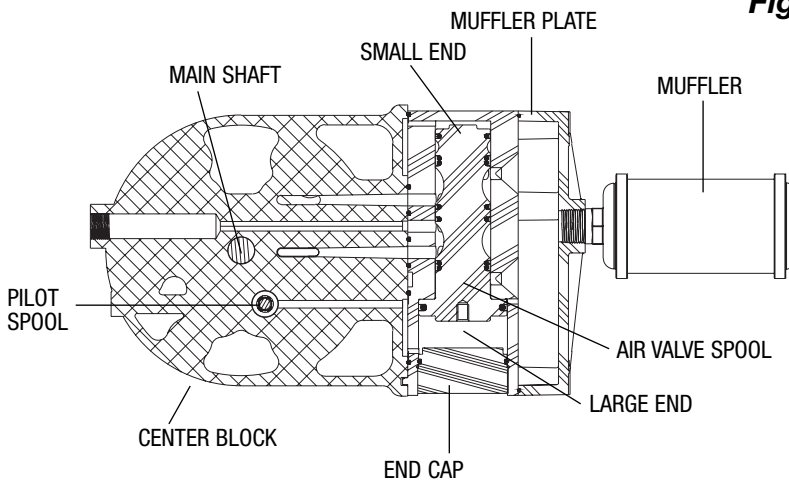


FIGURE 3 At completion of the stroke, the air valve again redirects air to the back side of diaphragm A, which starts diaphragm B on its exhaust stroke. As the pump reaches its original starting point, each diaphragm has gone through one exhaust and one discharge stroke. This constitutes one complete 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 P15 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:

Saniflex™    -28.9°C to 104.4°C    -20°F to 220°F

Teflon® PTFE    4.4°C to 104.4°C    40°F to 220°F



**CAUTION:** When choosing pump materials, be sure to check the temperature limits for all wetted components. Example: Viton® has a maximum limit of 176.7°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 Chemical Resistance Guide (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 8.6 bar (125 psig) air supply pressure.



**CAUTION:** The process fluid and cleaning fluids must be chemically compatible with all wetted pump components (see 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 suggested.



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



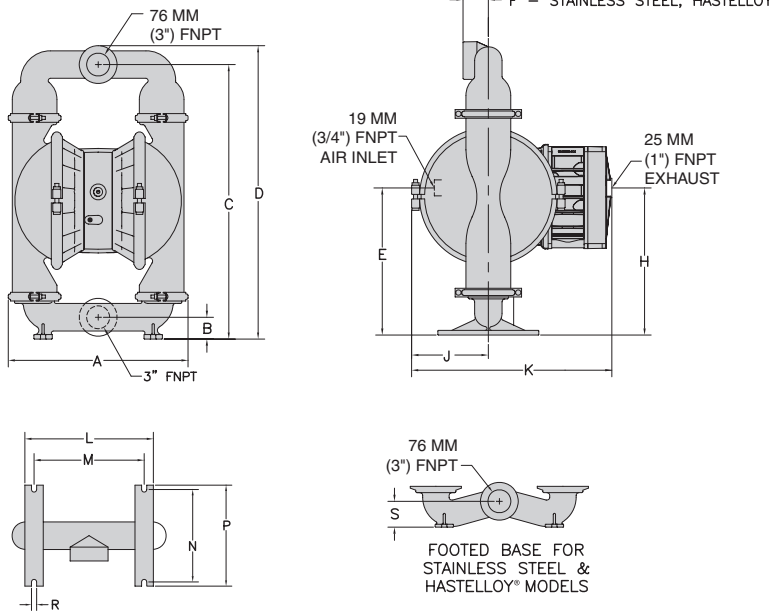
**CAUTION:** The P15 Pro-Flo™ is not submersible. If your application requires the pump to be submersed, the T15 model can be used.



**CAUTION:** Tighten all hardware prior to installation.

## SECTION 4A

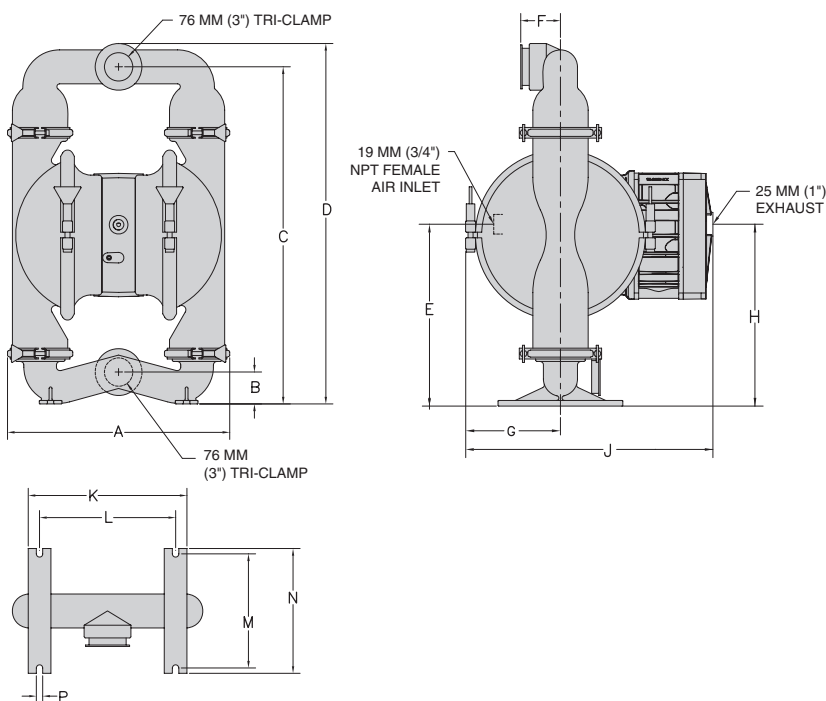
# DIMENSIONAL DRAWING MODEL P15 METAL



DIMENSIONS – P15 METAL		
ITEM	METRIC (mm)	STANDARD (inch)
A	506	19.9
B	59	2.3
C	761	30.0
D	823	32.4
E	391	15.4
F	71	2.8
H	406	16.0
J	216	6.5
K	522	20.6
L	360	14.2
M	305	12.0
N	258	10.2
P	282	11.1
R	16	0.6
S	71	2.8

## SECTION 4B

# DIMENSIONAL DRAWING MODEL P15 METAL BIOPHARM



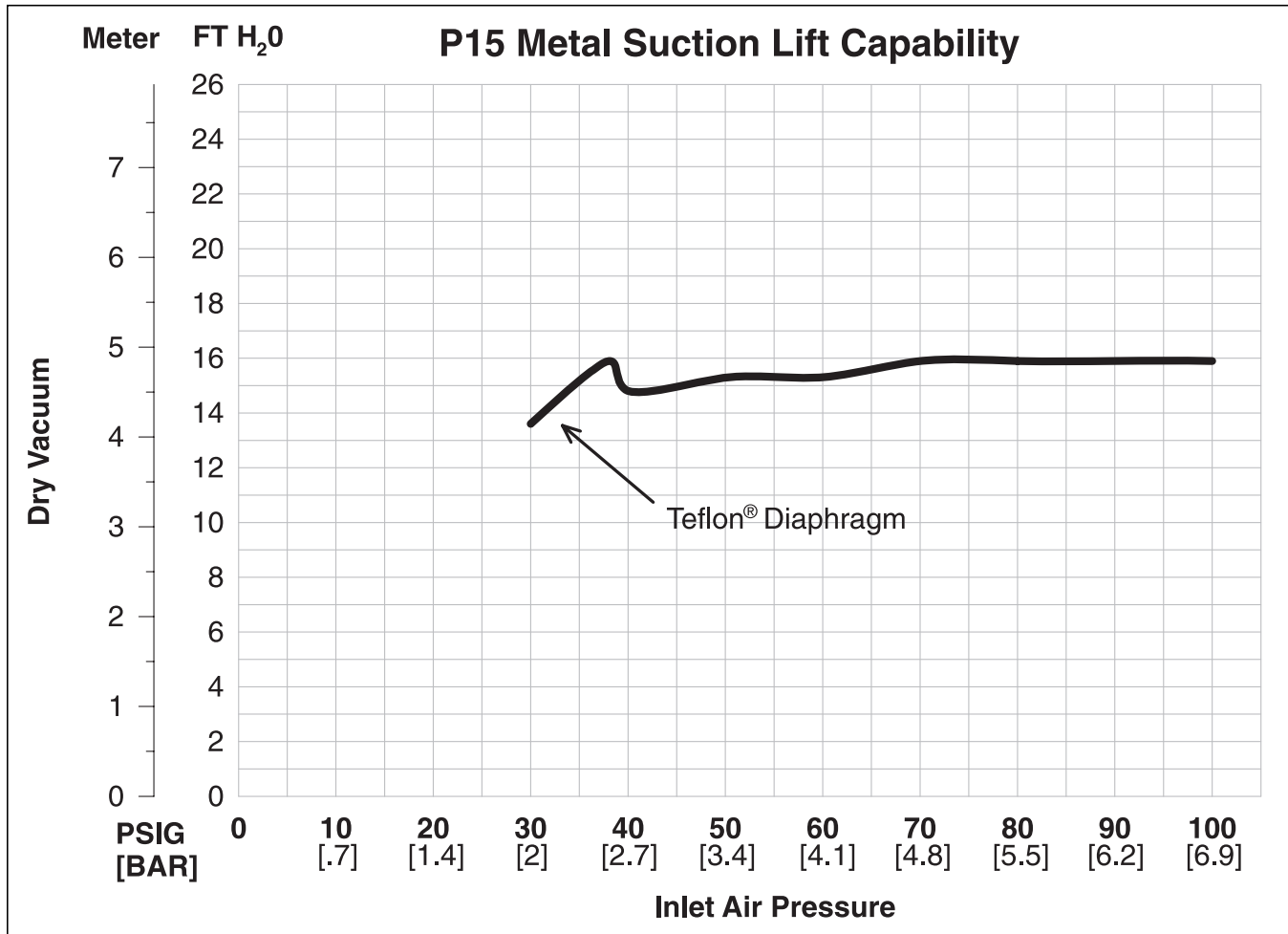
DIMENSIONS – P15 BIOPHARM		
ITEM	METRIC (mm)	STANDARD (inch)
A	521	20.5
B	71	2.8
C	766	30.2
D	811	31.9
E	392	15.4
F	89	3.5
G	216	8.5
H	406	16.0
J	522	20.6
K	356	14.0
L	305	12.0
M	256	10.1
N	279	11.0
P	14	0.6





# SECTION 6

## SUCTION LIFT CURVE



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.



# **SECTION 7A – AIR OPERATION**

## **INSTALLATION**

---

The P15 Pro-Flo™ model has a 76 mm (3") inlet and outlet and is designed for flows to 706 lpm (187 gpm). Refer to Section 5 for performance characteristics. The **P15 Metal** pump is manufactured with wetted parts of 316 Stainless Steel and Hastelloy. The center block of the **P15 Metal** is constructed of aluminum. 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 76 mm (3") diameter or larger if highly viscous material is being pumped. The suction hose must be non-collapsible, reinforced type as the P15 is capable of pulling a high vacuum. Discharge piping should be at least 76 mm (3"); 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 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 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 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 .5–.7 bar (7–10 psig). Premature diaphragm failure may occur if positive suction is .7 bar (10 psig) and higher.

**THE MODEL P15 WILL PASS 10 mm (3/8") SOLIDS. WHENEVER THE POSSIBILITY EXISTS THAT LARGER SOLID OBJECTS MAY BE SUCKED INTO THE PUMP, A STRAINER SHOULD BE USED ON THE SUCTION LINE.**

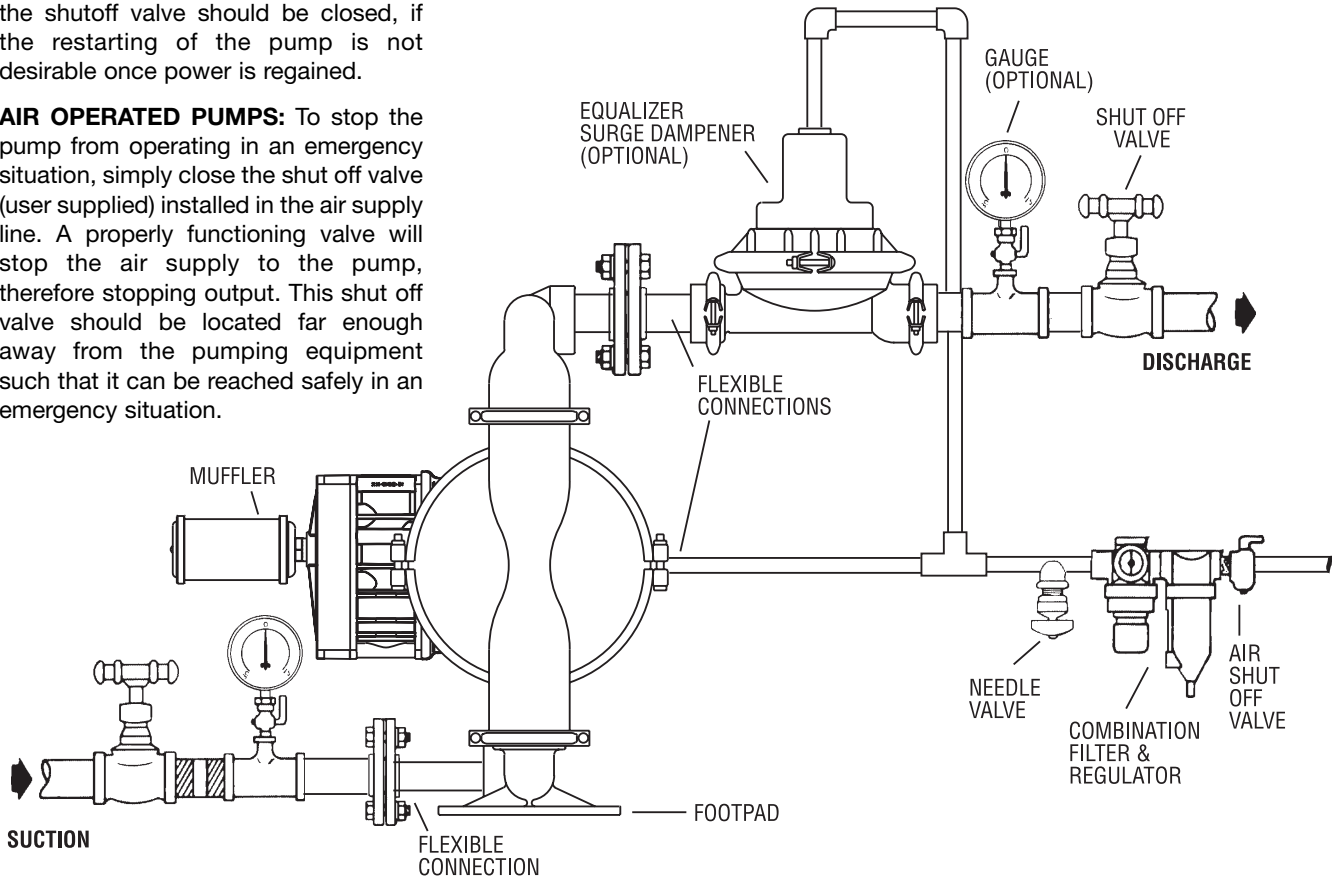
**CAUTION: DO NOT EXCEED 8.6 BAR (125 PSIG) AIR SUPPLY PRESSURE.**

**P15 PUMPS CANNOT BE SUBMERGED. FOR SUBMERGED APPLICATIONS, USE A WILDEN T15 OR W15 PUMP.**

# SUGGESTED INSTALLATION

**NOTE:** In the event of a power failure, the shutoff 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.



## SECTION 7B – AIR OPERATION

# SUGGESTED OPERATION AND MAINTENANCE INSTRUCTIONS

**OPERATION:** The P15 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). 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. The Wilden P15 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.

# **SECTION 7C – AIR OPERATION**

## **TROUBLESHOOTING**

---

### ***Pump will not run or runs slowly.***

1. Ensure that the air inlet pressure is at least .35 bar (5 psig) above startup pressure and that the differential pressure (the difference between air inlet and liquid discharge pressures) is not less than .7 bar (10 psig).
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 P15 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 P15 metal pump has a 76mm (3") inlet and outlet and is designed for flows up to 708 LPM (187 GPM). Its air distribution system is based on a revolutionary design which increases reliability and performance. The model P15 is available in 316 Stainless Steel or Hastelloy® wetted parts. For highly corrosive applications, polypropylene and PVDF models are available.

### TOOLS REQUIRED:

1<sup>1</sup>/<sub>6</sub>" Wrench Socket

5/8" Socket Wrench

3/8" Allen Wrench

3/4" Socket Wrench

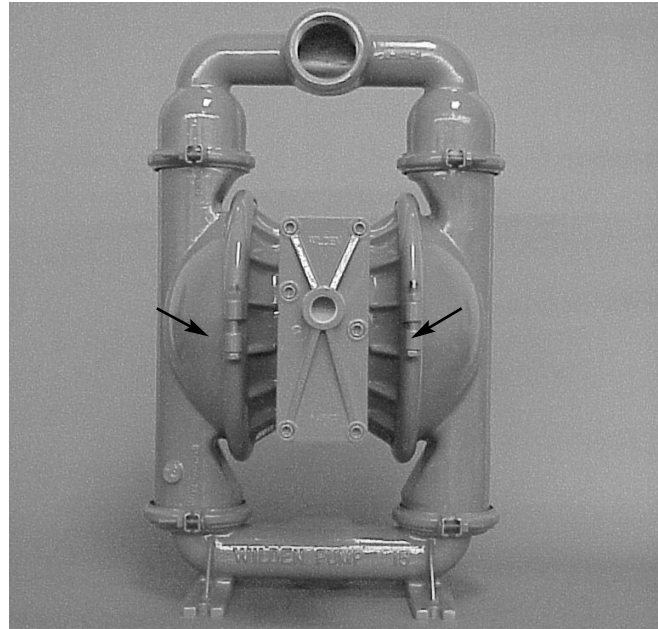
3/4" Box Wrench

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.

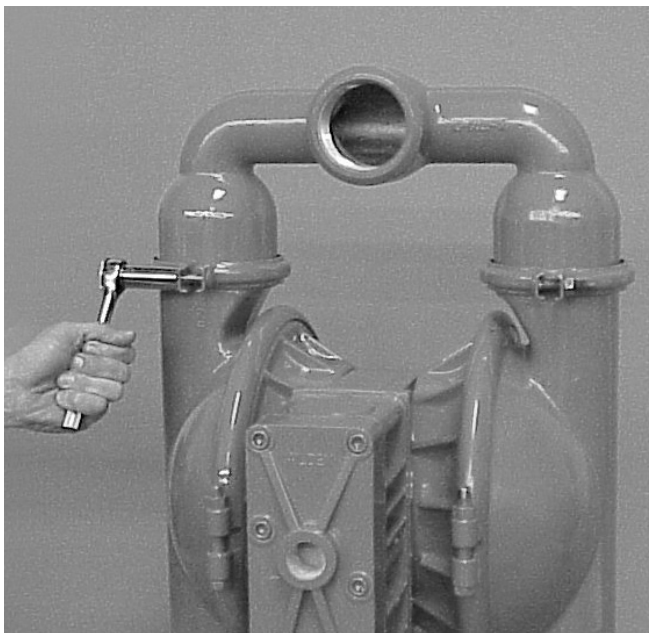


### DISASSEMBLY:

Figure 1

#### Step 1.

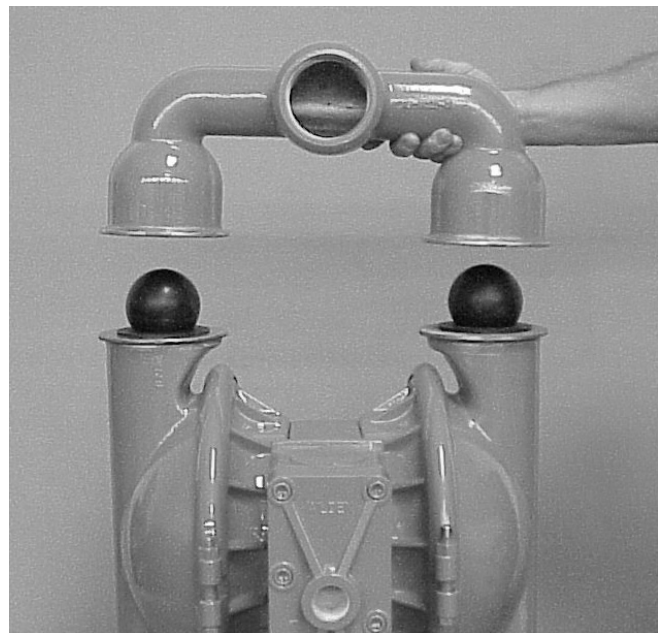
Before starting disassembly, mark a line from each liquid chamber to its corresponding air chamber. This line will assist in proper alignment during reassembly. (Figure 1)



#### Step 2.

Figure 2

Utilizing a 1<sup>1</sup>/<sub>6</sub>" wrench, remove the two small clamp bands that fasten the discharge manifold to the liquid chambers. (Figure 2)

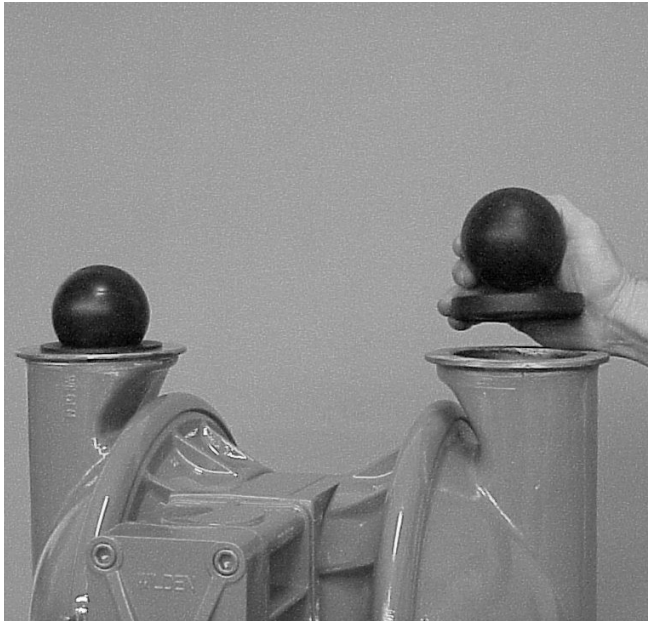


#### Step 3.

Figure 3

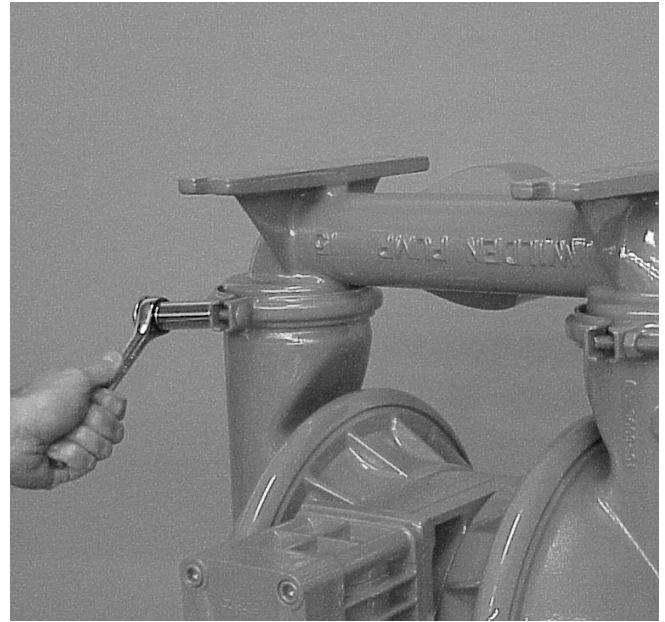
Remove the discharge manifold to expose the valve balls and seats. Inspect ball cage area of manifold for excessive wear or damage. (Figure 3)





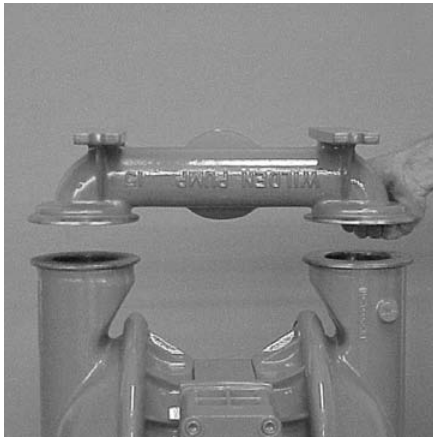
**Step 4.** *Figure 4*

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.



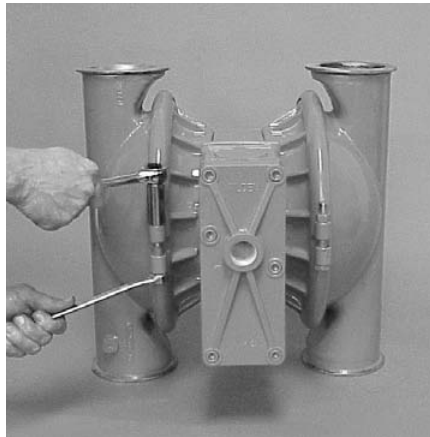
**Step 5.** *Figure 5*

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)



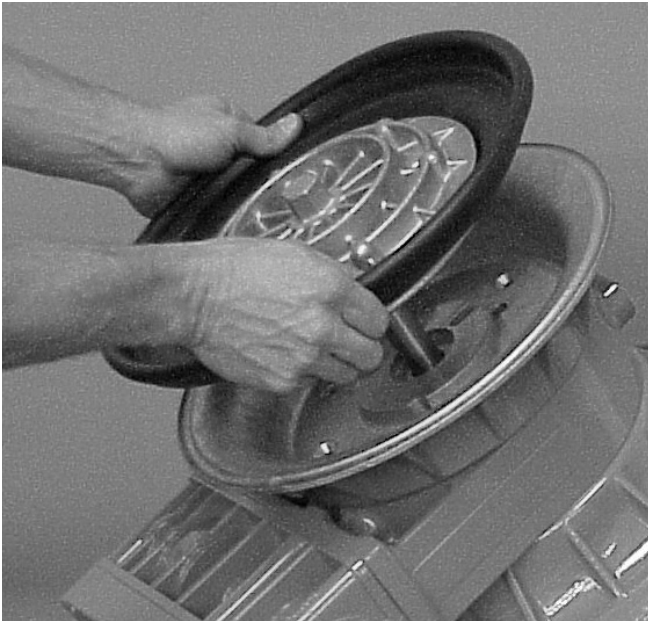
**Step 7.** *Figure 7*

Remove one set of large clamp bands which secure one liquid chamber to the center section. Use the  $\frac{3}{4}$ " socket wrench and the  $\frac{3}{4}$ " box socket wrench. (Figure 7)



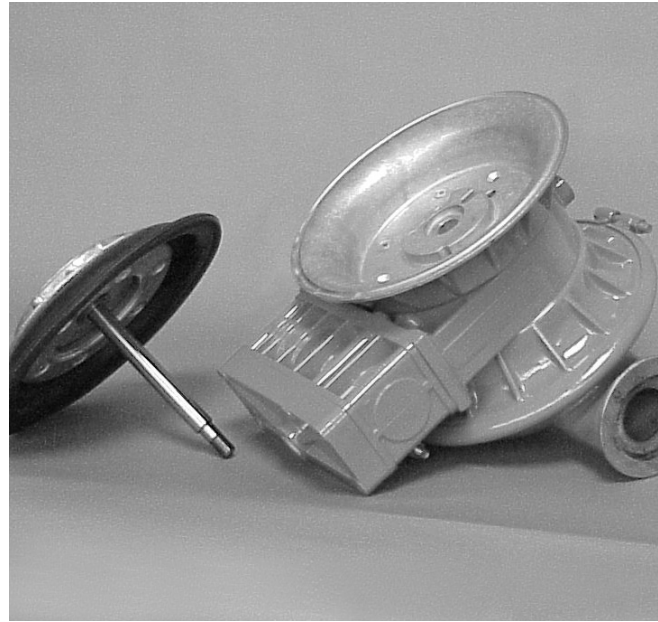
**Step 8.** *Figure 8*

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



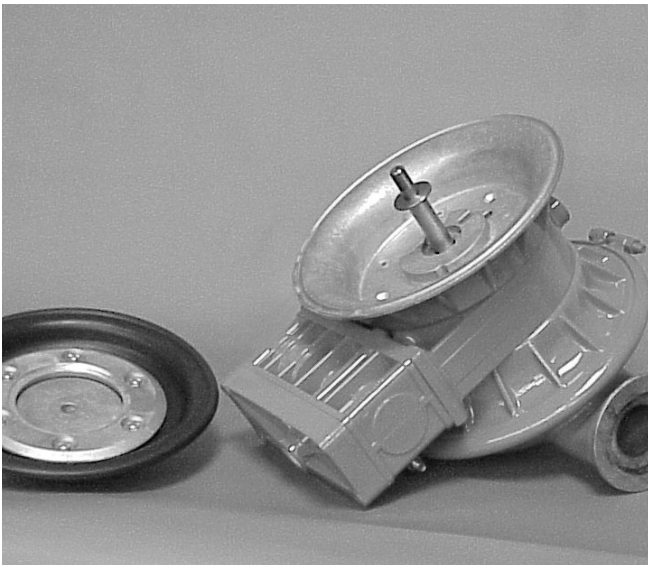
**Step 9** *Figure 9A*

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



**Step 9A** *Figure 9A*

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*)

## 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 Metal P15 utilizes a revolutionary Pro-Flo™ air distribution system. A 19 mm (¾") air inlet connects the air supply to the center section. Proprietary composite seals reduce the coefficient of friction and allow the P15 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:

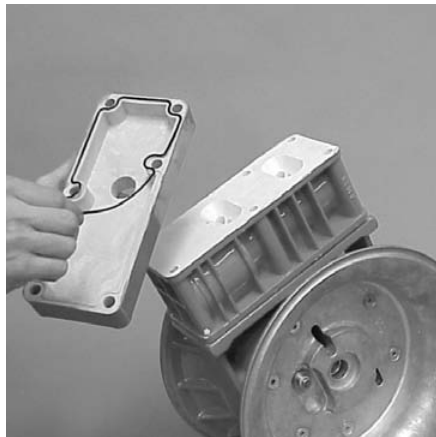
⅝" Hex Head Wrench  
¼" Hex Head Wrench  
Phillips Head Screwdriver  
Snap Ring Pliers  
O-Ring Pick



**Step 1.**

*Figure 1*

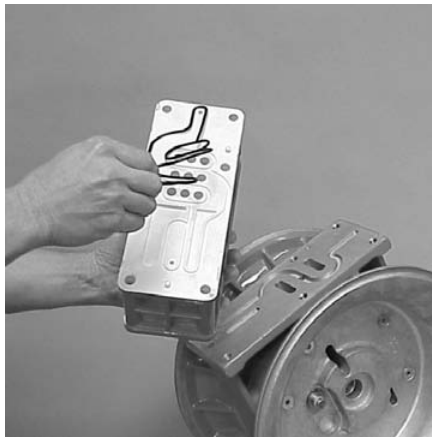
Loosen the air valve bolts utilizing a ⅝" hex head wrench and then remove muffler plate screws with a Phillips head screwdriver. (Figure 1)



**Step 2.**

*Figure 2*

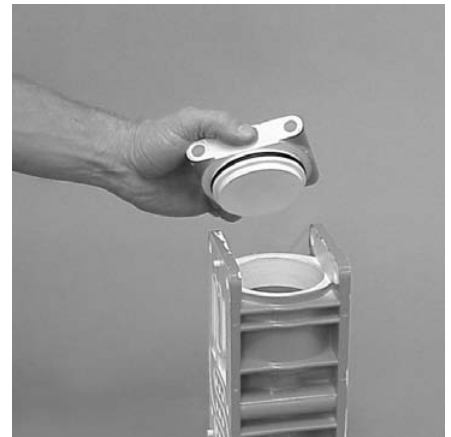
Remove muffler plate and air valve bolts from air valve assembly (Figure 2) exposing muffler gasket for inspection. Replace if necessary.



**Step 3.**

*Figure 3*

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

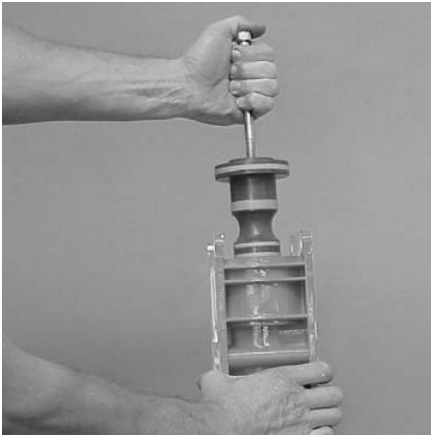


**Step 4.**

*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*).



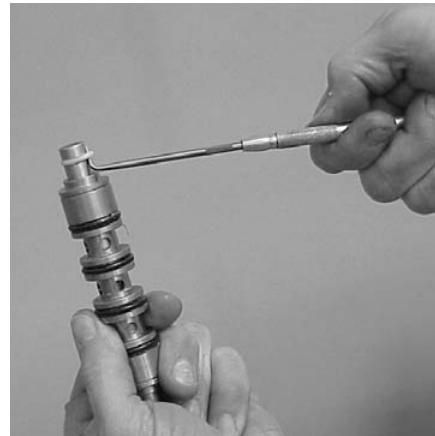
**Step 7.** *Figure 7*

Remove air chamber bolts with 1/4" 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*)

## 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	8.4 N•m [75 in.-lbs.]
Outer Piston	105.8 N•m [78 ft.-lbs.]
Inner Piston	19.0 N•m [14 ft.-lbs.]
Small Clamp Band (Teflon®-Fitted)	15.5 N•m [137 in.-lbs.]
Large Clamp Band (All)	47.4 N•m [35 ft.-lbs.]
Air Chamber Bolts	47.5 N•m [35 in.-lbs.]

### 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

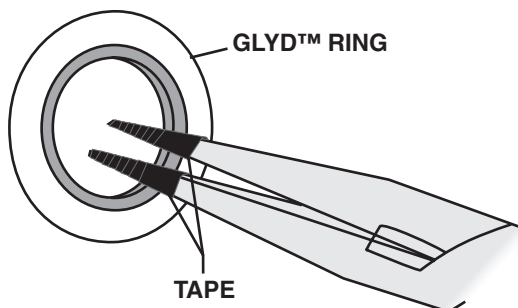
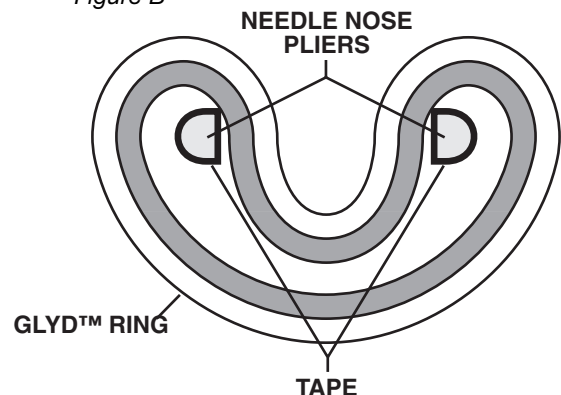


Figure B

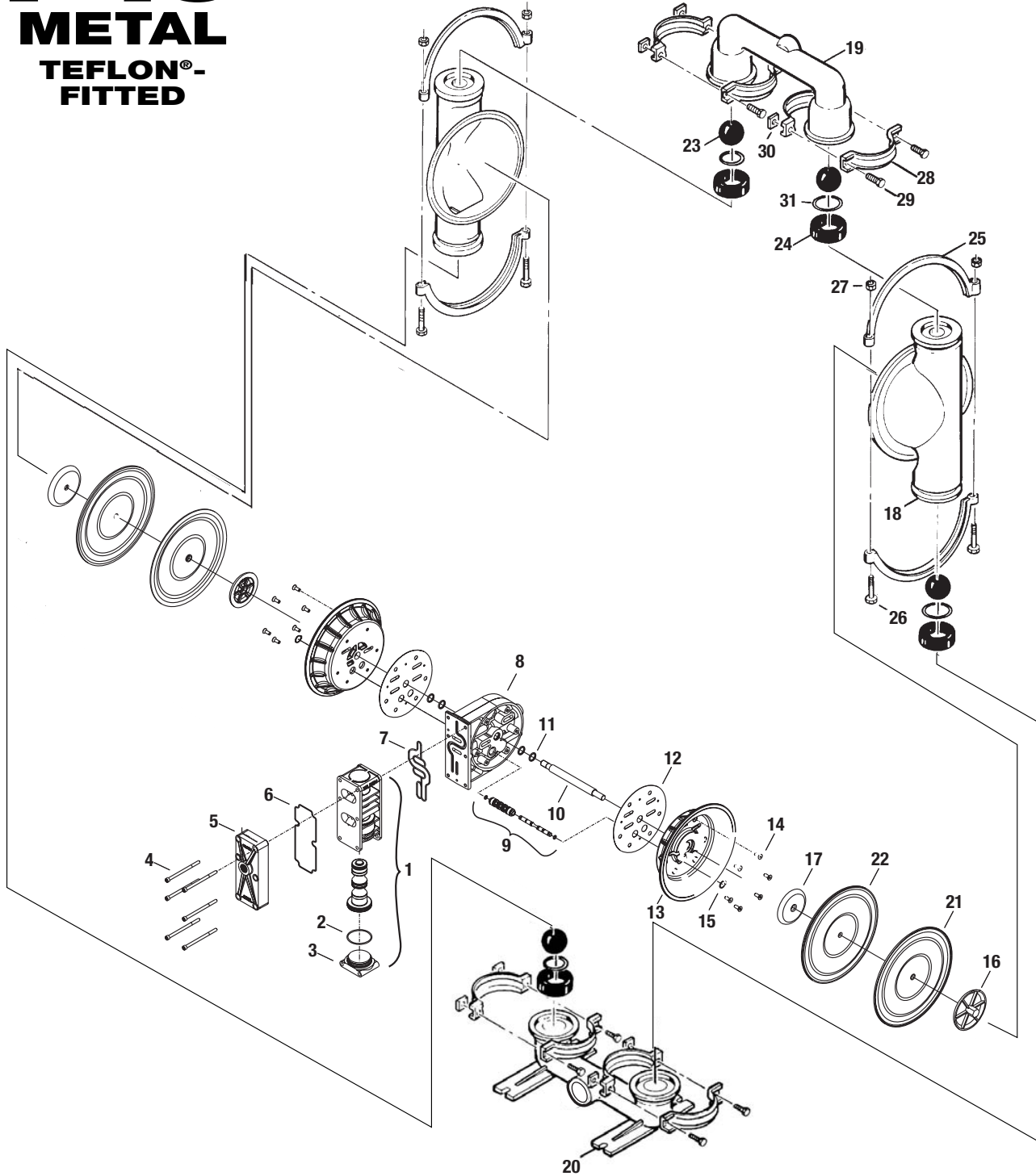


# SECTION 9A

# EXPLODED VIEW/PARTS LISTING

# P15

**METAL**  
TEFLON®-  
FITTED



## MODEL P15 METAL TEFLON®-FITTED

Item	Description	Qty.	P15/ HAAP/900	P15/ HSAP/900	P15/ SAAP/900	P15/ SSAP/900	P15/ SSAP/903
			P/N	P/N	P/N	P/N	P/N
<b>1</b>	<b>Pro-Flo™ Air Valve Assembly<sup>1</sup></b>	<b>1</b>	<b>15-2010-20</b>	<b>15-2010-20</b>	<b>15-2010-20</b>	<b>15-2010-20</b>	<b>15-2010-20</b>
2	O-Ring (-235), End Cap	1	71-1280-52	71-1280-52	71-1280-52	71-1280-52	71-1280-52
3	End Cap, Pro-Flo™	1	15-2332-20	15-2332-20	15-2332-20	15-2332-20	15-2332-20
4	Screw, HHC, Air Valve (7/16"-14 x 5 7/8")	6	15-6001-03	15-6001-03	15-6001-03	15-6001-03	15-6001-03
5	Muffler Plate, Pro-Flo™	1	15-3181-20	15-3181-20	15-3181-20	15-3181-20	15-3181-20
6	Gasket, Muffler Plate	1	15-3505-52	15-3505-52	15-3505-52	15-3505-52	15-3505-52
7	Gasket, Air Valve	1	15-2615-52	15-2615-52	15-2615-52	15-2615-52	15-2615-52
<b>8</b>	<b>Center Block Assembly<sup>2</sup></b>	<b>1</b>	<b>15-3110-01</b>	<b>15-3110-01</b>	<b>15-3110-01</b>	<b>15-3110-01</b>	<b>15-3110-01</b>
9	Removable Pilot Sleeve Assembly	1	15-3880-99	15-3880-99	15-3880-99	15-3880-99	15-3880-99
10	Shaft	1	15-3805-09	15-3805-09	15-3805-09	15-3805-09	15-3805-09
11	Center Block Glyd™ Ring	4	15-3210-55-225	15-3210-55-225	15-3210-55-225	15-3210-55-225	15-3210-55-225
12	Gasket, Center Block, Pro-Flo™	2	15-3525-52	15-3525-52	15-3525-52	15-3525-52	15-3525-52
13	Air Chamber, Pro-Flo™	2	15-3651-01	15-3651-01	15-3651-01	15-3651-01	15-3651-01
14	Air Chamber Screw 3/8" - 16 x 1"	12	71-6250-08	71-6250-08	71-6250-08	71-6250-08	71-6250-08
15	Retaining Ring	2	15-2651-03	15-2651-03	15-2651-03	15-2651-03	15-2651-03
16	Piston, Outer	2	15-4600-04	15-4600-04	15-4600-03	15-4600-03	15-4600-03
17	Piston, Inner	2	15-3750-03	15-3750-03	15-3750-03	15-3750-03	15-3750-03
18	Liquid Chamber	2	15-5000-04	15-5000-04	15-5000-03	15-5000-03	15-5000-03
19	Discharge Manifold	1	15-5020-04	15-5020-04	15-5020-03	15-5020-03	15-5020-03-70
20	Inlet Manifold	1	15-5080-04	15-5080-04	15-5080-03	15-5080-03	15-5080-03-70
21	Diaphragm	2	15-1010-55	15-1010-55	15-1010-55	15-1010-55	15-1010-55
<b>22</b>	<b>Back-up Diaphragm</b>	<b>2</b>	<b>15-1060-56</b>	<b>15-1060-56</b>	<b>15-1060-56</b>	<b>15-1060-56</b>	<b>15-1060-56</b>
<b>23</b>	<b>Valve Ball</b>	<b>4</b>	<b>15-1080-55</b>	<b>15-1080-55</b>	<b>15-1080-55</b>	<b>15-1080-55</b>	<b>15-1080-55</b>
<b>24</b>	<b>Valve Seat</b>	<b>4</b>	<b>15-1121-04</b>	<b>15-1121-04</b>	<b>15-1121-03</b>	<b>15-1121-03</b>	<b>15-1121-03</b>
25	Large Clamp Band	2	15-7300-03	15-7300-03	15-7300-03	15-7300-03	15-7300-03-70
26	Large Carriage Bolt 1/2" - 13 x 3 1/2"	4	15-6120-03	15-6120-03	15-6120-03	15-6120-03	15-6120-03
27	Large Hex Nut <sup>3</sup> 1/2" - 13"	4	15-6420-03	15-6420-03	15-6420-03	15-6420-03	15-6670-03-70
28	Small Clamp Band	4	15-7100-03	15-7100-03	15-7100-03	15-7100-03	15-7100-03-70
29	Small Carriage Bolt <sup>4</sup> 3/8" - 16 x 2"	8	15-6050-03	15-6050-03	15-6050-03	15-6050-03	15-6050-03
<b>30</b>	<b>Small Hex Nut<sup>3</sup> 3/8" - 16"</b>	<b>8</b>	<b>08-6450-03</b>	<b>08-6450-03</b>	<b>08-6450-03</b>	<b>08-6450-03</b>	<b>08-6670-03-72</b>
31	Teflon® Valve Seat O-Ring	4	15-1200-55	15-2100-55	15-1200-55	15-1200-55	15-1200-55
32	Muffler (not shown)	1	15-3510-99	15-3510-99	15-3510-99	15-3510-99	15-3510-99

<sup>1</sup>Air Valve Assembly includes items 2 and 3.

<sup>2</sup>Center Block Assembly includes item 11.

<sup>3</sup>P15-070 pump large clamp band comes with 15-6670-03-07 wing nut and 15-6720-07-70 washer.

<sup>4</sup>P15-070 pump small clamp band comes with 08-6670-03-72 wing nut and 08-6720-07-70 washer.

**All boldface items are primary wear parts.**

## SECTION 9B

# MATERIAL CODE DESIGNATIONS

Material Code	Material Description	Material Code	Material Description
01	Aluminum	51	Neoprene
02	Cast Iron	52	Buna-N / Nitrile
03	Stainless Steel	53	Viton® / FKM
04	Hastelloy®	54	Nordel® / EPDM
05	Teflon® coated	55	Teflon® / PTFE
06	Electroless, nickel plated	56	Saniflex™ / Hytrel
07	Brass	57	FDA Wil-Flex™
08	Alloy Steel	58	Wil-Flex™
09	Mild steel, chrome plated	59	Teflon® encapsulated silicone
10	Stainless steel, polished	60	Teflon® encapsulated Viton®
11	Aluminum, anodized	61	Buna-N high temp.
12	Cardboard	62	Polyurethane - ether
13	Acetal	63	50/50 Wil-Flex™
14	Plexiglass®	64	PTFE/Neoprene laminate
16	Acetal, carbon filled	65	Isoplast®
17	Polyvinyl Chloride (PVC)	66	Delrin® AF
20	Polypropylene	67	R.T.P.
21	Kynar®/PVDF	68	FDA Viton®
22	Teflon®/PFA	69	FDA Buna-N
23	Nylon	70	Isoplast®, SS filled
24	Phenolic	71	Verton®
26	Polyethylene	72	PTFE/EPDM laminate
28	Nylon, graphite filled	73	HALAR® coated aluminum
29	Nylon, clear	74	FDA EPDM
30	Cellulose fiber	75	Polyetheretherketone (PEEK), carbon filled
31	Armstrong N8090	76	Polyetherimide (PEI)
32	UHMW Polyethylene	77	Polyphenylene sulfide (PPS), glass filled
33	Chemraz®	78	Vinyl ester, glass filled
34	Fluoro-Seal™	79	G-10 fiberglass
37	Turcite®	81	EPDM/PTFE laminate
48	Expanded PTFE	82	Viton/PTFE laminate
49	Polyurethane	99	Multiple materials/Assemblies
50	Polyurethane - ester		







## WARRANTY

Each and every product manufactured by Wilden Pump and Engineering, LLC is built to meet the highest standards of quality. Every pump is functionally tested to insure integrity of operation.

Wilden Pump and Engineering, LLC 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. Failure due to normal wear, misapplication, or abuse is, of course, excluded from this warranty.

Since the use of Wilden pumps and parts is beyond our control, we cannot guarantee the suitability of any pump or part for a particular application and Wilden Pump and Engineering, LLC shall not be liable for any consequential damage or expense arising from the use or misuse of its products on any application. Responsibility is limited solely to replacement or repair of defective Wilden pumps and parts.

All decisions as to the cause of failure are the sole determination of Wilden Pump and Engineering, LLC.

Prior approval must be obtained from Wilden for return of any items for warranty consideration and must be accompanied by the appropriate MSDS for the product(s) involved. A Return Goods Tag, obtained from an authorized Wilden distributor, must be included with the items which must be shipped freight prepaid.

The foregoing warranty is exclusive and in lieu of all other warranties expressed or implied (whether written or oral) including all implied warranties of merchantability and fitness for any particular purpose. No distributor or other person is authorized to assume any liability or obligation for Wilden Pump and Engineering, LLC other than expressly provided herein.

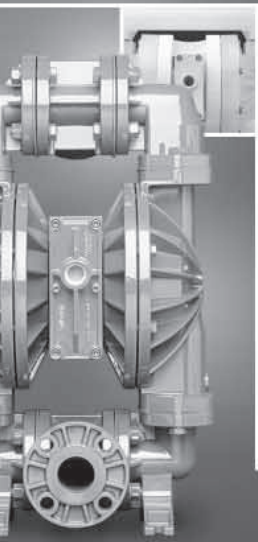
### PLEASE PRINT OR TYPE AND FAX TO WILDEN

PUMP INFORMATION			
Item # _____		Serial # _____	
Company Where Purchased _____			
YOUR INFORMATION			
Company Name _____			
Industry _____			
Name _____		Title _____	
Street Address _____			
City _____	State _____	Postal Code _____	Country _____
Telephone _____	Fax _____	E-mail _____	Web Address _____
Number of pumps in facility? _____		Number of Wilden pumps? _____	
Types of pumps in facility (check all that apply): <input type="checkbox"/> Diaphragm <input type="checkbox"/> Centrifugal <input type="checkbox"/> Gear <input type="checkbox"/> Submersible <input type="checkbox"/> Lobe			
<input type="checkbox"/> Other _____			
Media being pumped? _____			
How did you hear of Wilden Pump? <input type="checkbox"/> Trade Journal <input type="checkbox"/> Trade Show <input type="checkbox"/> Internet/E-mail <input type="checkbox"/> Distributor			
<input type="checkbox"/> Other _____			

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## ADVANCED S E R I E S

### Advance Your Process

Advanced wetted path designs  
 Lower the cost of operation  
 Maximize product containment  
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 Enhanced internal clearance  
 The result of advanced thought

## UNITEC™ S E R I E S

### Enrich Your Process

Simplicity of design  
 Unique Technology  
 Reliable, leak-free & quiet  
 Validated & certified  
 Intrinsically safe  
 The result of unique thought



## SANIFLO™ SANITARY PUMP TECHNOLOGY

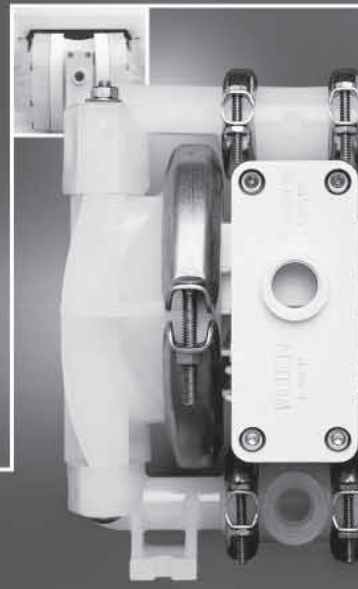
### Refine Your Process

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 Minimize product degradation  
 Improved production yields  
 Easy to inspect, clean & assemble  
 Minimized water requirements  
 The result of progressive thought

## ULTRAPURE™ TEFLON PROCESS PUMPS

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Validated & certified  
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 Compact, efficient & quiet  
 Runs on clean-dry air  
 The result of pure thought



## ORIGINAL S E R I E S

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Long standing design simplicity  
 Portable & submersible  
 Variable connection options  
 Fewest parts in industry  
 Solutions since 1955  
 The result of original thought

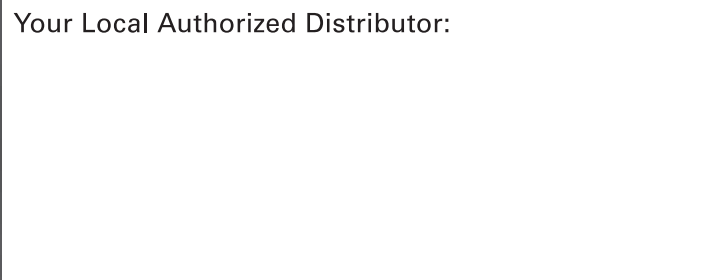
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