

H400S

Advanced™ Series **METAL** Pumps

EOM

Engineering
Operation &
Maintenance



Advance your process



PROFLO V™
PROGRESSIVE PUMP TECHNOLOGY

WILDEN®

A **DOVER** COMPANY























WIL-11110-E-04
REPLACES WIL-11110-E-03

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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.
-  **TEMPERATURE LIMITS:**
- | | | |
|------------------------------------|--------------------|----------------|
| Neoprene | -17.7°C to 93.3°C | 0°F to 200°F |
| Buna-N | -12.2°C to 82.2°C | 10°F to 180°F |
| EPDM | -51.1°C to 137.8°C | -60°F to 280°F |
| Viton® | -40°C to 176.7°C | -40°F to 350°F |
| Saniflex™ | -28.9°C to 104.4°C | -20°F to 220°F |
| Wil-Flex™ | -40°C to 107.2°C | -40°F to 225°F |
| Polytetrafluoroethylene (PTFE) | | |
| | 4.4°C to 104.4°C | 40°F to 220°F |
| Polyurethane | -12.2°C to 65.6°C | 10°F to 150°F |
| Tetra-Flex™ PTFE w/Neoprene Backed | | |
| | 4.4°C to 107.2°C | 40°F to 225°F |
| Tetra-Flex™ PTFE w/EPDM Backed | | |
| | -10°C to 137°C | 14°F to 280°F |
- 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: 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 (E4) 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:** All piping, valves, gauges and other components installed on the liquid discharge must have a minimum pressure rating of 20.7 bar (300 psig).
-  **CAUTION:** The discharge pressure generated by this pump is 2X the inlet pressure supplied.
-  **CAUTION:** The process fluid and cleaning fluids must be chemically compatible with all wetted pump components. Consult Chemical Resistance Guide (E4).
-  **CAUTION:** Do not exceed 82°C (180°F) air inlet temperature for Pro-Flo V™ models.
-  **CAUTION:** Pumps should be thoroughly flushed before installing into process lines. FDA and USDA approved pumps should be cleaned and/or sanitized before being used.
-  **CAUTION:** Always wear safety glasses when operating pump. If diaphragm rupture occurs, material being pumped may be forced out air exhaust.
-  **CAUTION:** Before any maintenance or repair is attempted, the compressed air line to the pump should be disconnected and all air pressure allowed to bleed from pump. Disconnect all intake, discharge and air lines. Drain the pump by turning it upside down and allowing any fluid to flow into a suitable container.
-  **CAUTION:** Blow out air line for 10 to 20 seconds before attaching to pump to make sure all pipeline debris is clear. Use an in-line air filter. A 5µ (micron) air filter is recommended.
-  **NOTE:** When installing PTFE diaphragms, it is important to tighten outer pistons simultaneously (turning in opposite directions) to ensure tight fit. (See torque specifications in Section 7.)
-  **NOTE:** Cast Iron PTFE-fitted pumps come standard from the factory with expanded PTFE gaskets installed in the diaphragm bead of the liquid chamber. PTFE gaskets cannot be re-used. Consult PS-TG for installation instructions during reassembly.
-  **NOTE:** Before starting disassembly, mark a line from each liquid chamber to its corresponding air chamber. This line will assist in proper alignment during reassembly.
-  **CAUTION:** Pro-Flo® pumps cannot be used in submersible applications. Pro-Flo V™ is available in both submersible and non-submersible options. Do not use non-submersible Pro-Flo V™ models in submersible applications. Turbo-Flo® pumps can also be used in submersible applications.
-  **CAUTION:** Tighten all hardware prior to installation.

WILDEN PUMP DESIGNATION SYSTEM

H400S METAL

38 mm (1-1/2") Pump
Maximum Flow Rate:
242 lpm (64 gpm)

LEGEND

H400S / XXXXX / XX / XX / XXX / XXX

MODEL

WETTED PARTS & OUTER PISTON

AIR CHAMBERS

CENTER BLOCK

AIR VALVE

DIAPHRAGMS

VALVE BALLS

O-RINGS

VALVE SEAT

SPECIALTY

CODE
(if applicable)

MATERIAL CODES

MODEL

H400S = HIGH PRESSURE
SIMPLEX

**WETTED PARTS & OUTER
PISTONS**

AA = ALUMINUM/ ALUMINUM
SS = STAINLESS STEEL/
STAINLESS STEEL

AIR CHAMBERS

A = ALUMINUM

CENTER BLOCK

A = ALUMINUM

AIR VALVE

A = ALUMINUM

DIAPHRAGMS

WFS = WIL-FLEX™
[Santoprene® (Orange
Dot)]

VALVE BALL

WF= WIL-FLEX™
[Santoprene® (Orange Dot)]

VALVE SEAT

A = ALUMINUM
S = STAINLESS STEEL

VALVE SEAT O-RING

TF = PTFE (White)

SPECIALTY CODES

- 0245 Reverse manifolds
- 0247 Discharge & inlet manifold facing exhaust
- 0250 Discharge manifold facing air inlet
- 0320 Submersible center block
- 0504 DIN flange

NOTE: MOST ELASTOMERIC MATERIALS USE COLORED DOTS FOR IDENTIFICATION.

NOTE: Not all models are available with all material options.

Nordel® and Viton® are registered trademarks of DuPont Dow Elastomers.
Teflon® is a registered trademark of DuPont.
Halar® is a registered trademark of Solvay.

HOW IT WORKS—PUMP

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.

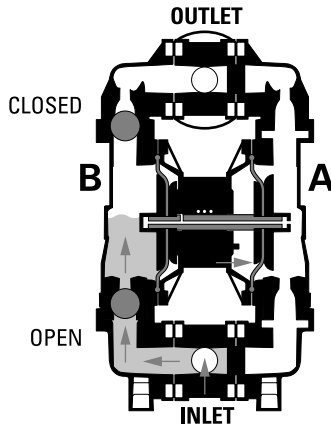


FIGURE 1 When air pressure is supplied to the pump, the air valve directs pressure to the back side of diaphragm A. The compressed air moves the diaphragm away from the center section of the pump. The opposite diaphragm is pulled in by the shaft connected to the pressurized diaphragm. Diaphragm B is on its suction stroke; air behind the diaphragm has been forced out to the atmosphere through the exhaust port. The movement of diaphragm B towards the center section of the pump creates a vacuum within chamber B. Atmospheric pressure forces fluid into the inlet manifold forcing the inlet valve ball off of its seat. Liquid is free to move past the inlet valve ball and fill the liquid chamber (see shaded area).

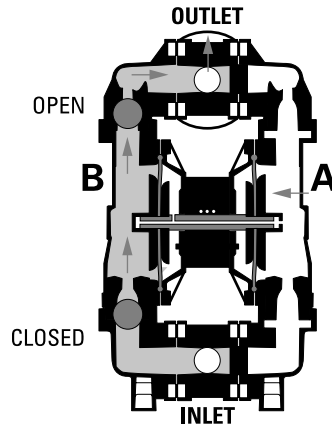


FIGURE 2 Once the shaft has reached the end of its stroke, the air valve redirects pressurized air to the back side of diaphragm B. This pressurized air is also directed to the opposite side of diaphragm A through a passageway that is routed through the common shaft and outer piston. The pressurized air forces diaphragm B away from the center section while also pushing diaphragm A to the center section. 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 of its seat, forcing fluid to flow through the pump discharge. The pressure on diaphragm A creates a force on the shaft that is combined with the pressure from diaphragm B. This total load is transferred to the liquid creating a liquid pressure that is 2X greater than the supplied air pressure.

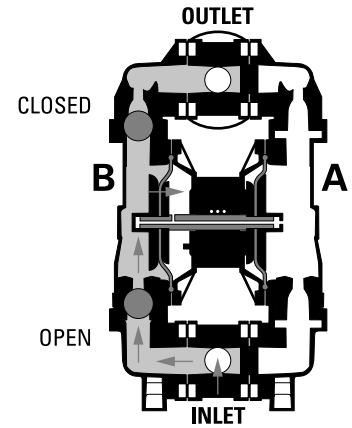
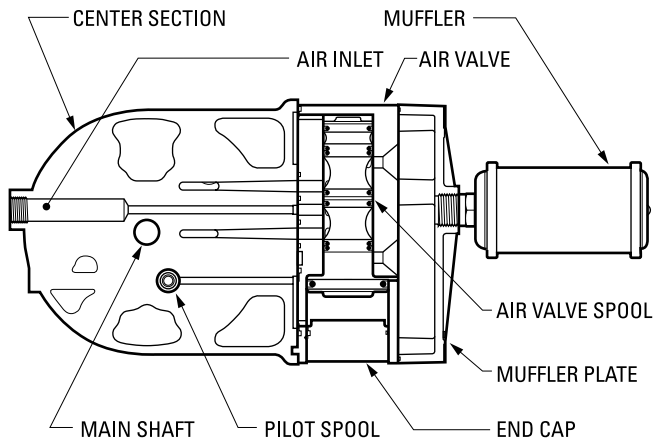


FIGURE 3 At completion of the stroke, the air valve again redirects air to the back side of diaphragm A, which starts diaphragm B on its exhaust stroke. As the pump reaches its original starting point, each diaphragm has gone through one exhaust and one discharge stroke. This constitutes one complete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

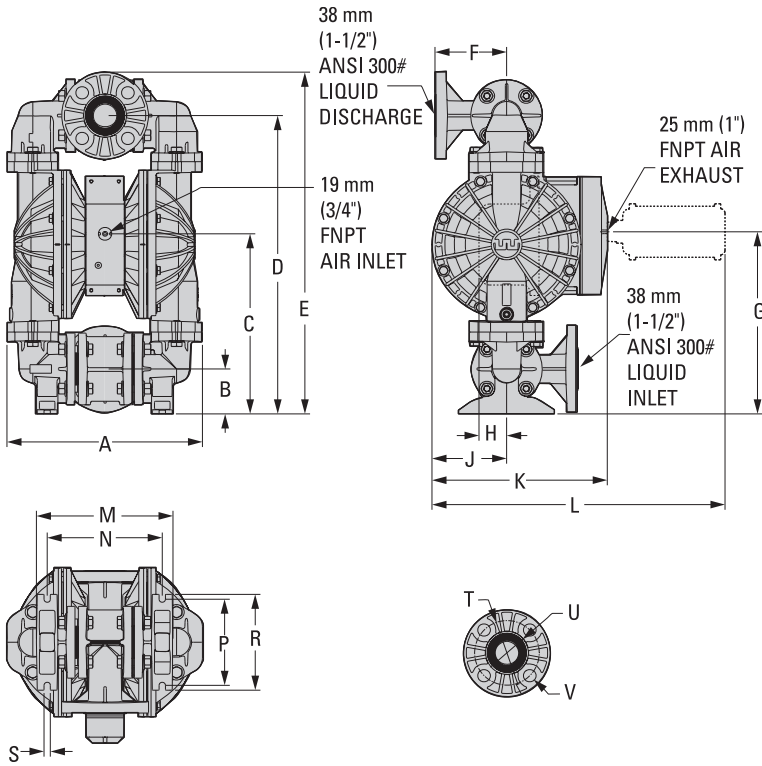
HOW IT WORKS—AIR DISTRIBUTION SYSTEM



The Pro-Flo V™ 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. 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 air valve 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 DRAWINGS

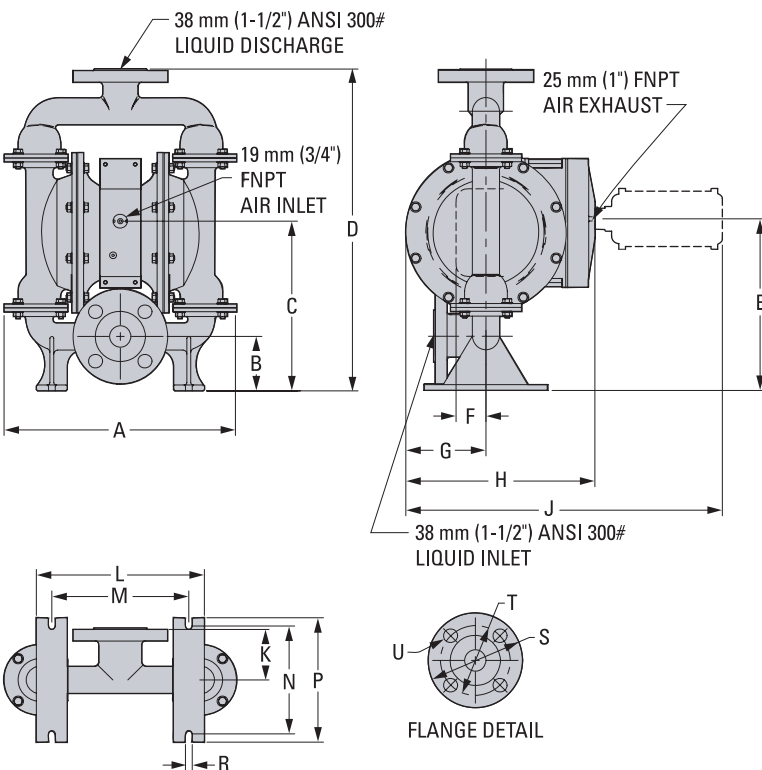
H400S Aluminum



DIMENSIONS

ITEM	METRIC (mm)	STANDARD (inch)
A	345	13.6
B	79	3.1
C	318	12.5
D	528	20.8
E	605	23.8
F	127	5.0
G	323	12.7
H	48	1.9
J	132	5.2
K	310	12.2
L	518	20.4
M	241	9.5
N	203	8.0
P	152	6.0
R	170	6.7
S	10	0.4
	DIN (mm)	ANSI (inch)
T	150 dia.	6.1 dia.
U	110 dia.	4.5 dia.
V	18 dia.	0.9 dia.

H400S Stainless Steel



DIMENSIONS

ITEM	METRIC (mm)	STANDARD (inch)
A	384	15.1
B	89	3.5
C	277	10.9
D	528	20.8
E	279	11.0
F	48	1.9
G	132	5.2
H	310	12.2
J	508	20.0
K	84	3.3
L	274	10.8
M	224	8.8
N	178	7.0
P	203	8.0
R	10	0.4
	DIN (mm)	ANSI (inch)
S	150 dia.	6.1 dia.
T	110 dia.	4.5 dia.
U	18 dia.	0.9 dia.

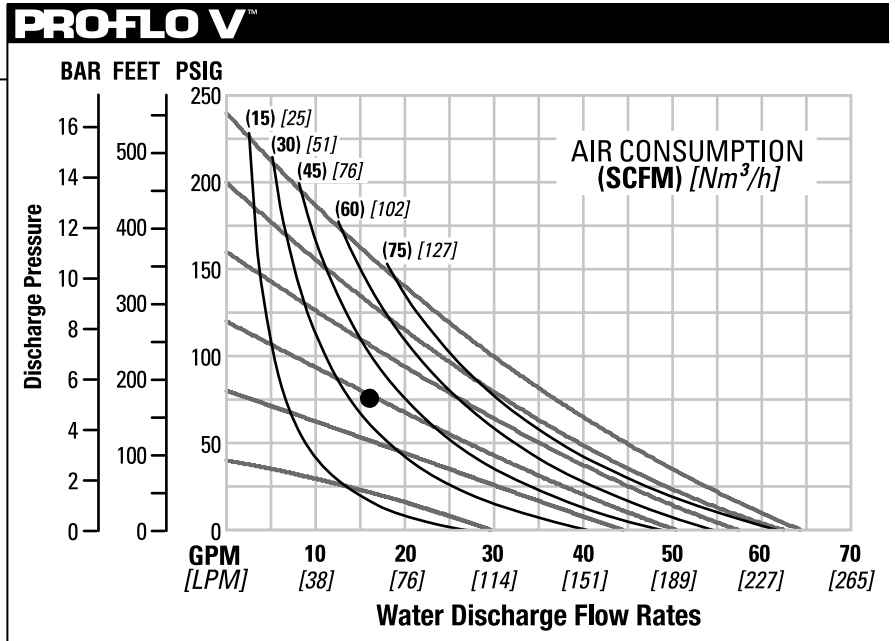
PERFORMANCE

**H400S ALUMINUM
TPE-FITTED**

Height605 mm (23.8")
 Width345 mm (13.6")
 Depth310 mm (12.2")
 Est. Ship Weight..Aluminum 27 kg (60 lbs)
 Air Inlet19 mm (3/4")
 Inlet38 mm (1-1/2")
 Outlet38 mm (1-1/2")
 Suction Lift3.1 m Dry (10.1')
 9.3 m Wet (30.6')
 Max. Flow Rate242 lpm (64 gpm)
 Max. Size Solids.....8.0 mm (5/16")

Example: To pump 61 lpm (16 gpm) against a discharge pressure head of 5.2 bar (75 psig) requires 4.1 bar (60 psig) and 60 Nm³/h (35 scfm) air consumption. (See dot on chart.)

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



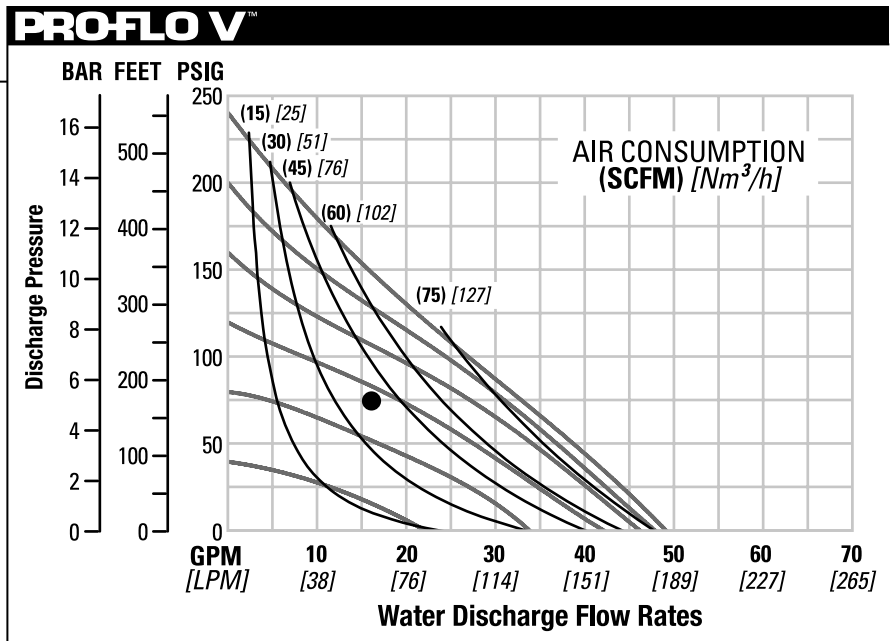
Flow rates indicated on chart were determined by pumping water.
 For optimum life and performance, pumps should be specified so that daily operation parameters will fall in the center of the pump performance curve.
 Air inlet pressure values are 50% of discharge pressure values shown on Y axis.

**H400S STAINLESS STEEL
TPE-FITTED**

Height528 mm (20.8")
 Width384 mm (15.1")
 Depth310 mm (12.2")
 Est. Ship WeightStainless Steel 37 kg (82 lbs)
 Air Inlet19 mm (3/4")
 Inlet38 mm (1-1/2")
 Outlet38 mm (1-1/2")
 Suction Lift3.1 m Dry (10.2')
 9.0 m Wet (29.5')
 Max. Flow Rate186 lpm (49 gpm)
 Max. Size Solids.....4.8 mm (3/16")

Example: To pump 61 lpm (16 gpm) against a discharge pressure head of 5.2 bar (75 psig) requires 3.8 bar (55 psig) and 81.5 Nm³/h (48 scfm) air consumption. (See dot on chart.)

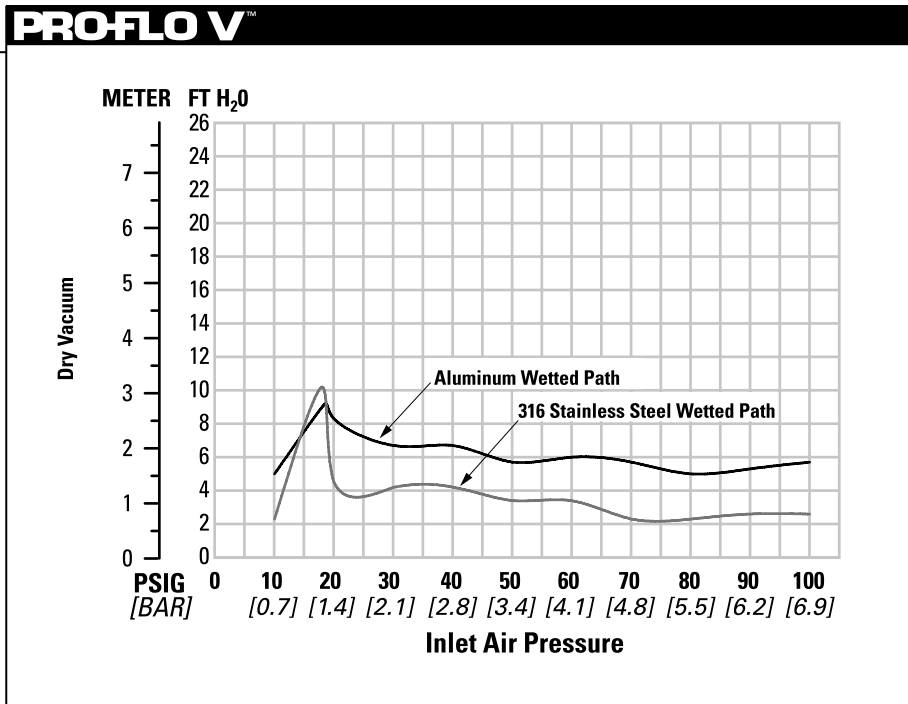
Caution: Do not exceed 8.6 bar (125 psig) air supply pressure.



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 performance curve.
 Air inlet pressure values are 50% of discharge pressure values shown on Y axis.

Section 5B SUCTION LIFT CURVE

H400S METAL



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

Wilden pumps are designed to meet the performance requirements of even the most demanding pumping applications. They have been designed and manufactured to the highest standards and are available in a variety of liquid path materials to meet your chemical resistance needs. Refer to the performance section of this manual for an in-depth analysis of the performance characteristics of your pump. Wilden offers the widest variety of elastomer options in the industry to satisfy temperature, chemical compatibility, abrasion resistance and flex concerns.

The suction pipe size should be at least the equivalent or larger than the diameter size of the suction inlet on your Wilden pump. The suction hose must be non-collapsible, reinforced type as these pumps are capable of pulling a high vacuum. Discharge piping should also be the equivalent or larger than the diameter of the pump discharge which will help 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 six 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.

If the pump is to be used in a self-priming application, make 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 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 for pump service.

Pumps in service with a positive suction head are most efficient when inlet pressure is limited to 0.5–0.7 bar (7–10 psig). Premature diaphragm failure may occur if positive suction is 0.7 bar (10 psig) and higher.

SUBMERSIBLE APPLICATIONS: Pro-Flo V™ pumps can be used for submersible applications, when using the Pro-Flo V™ submersible option. Turbo-Flo™ pumps can also be used for submersible applications.

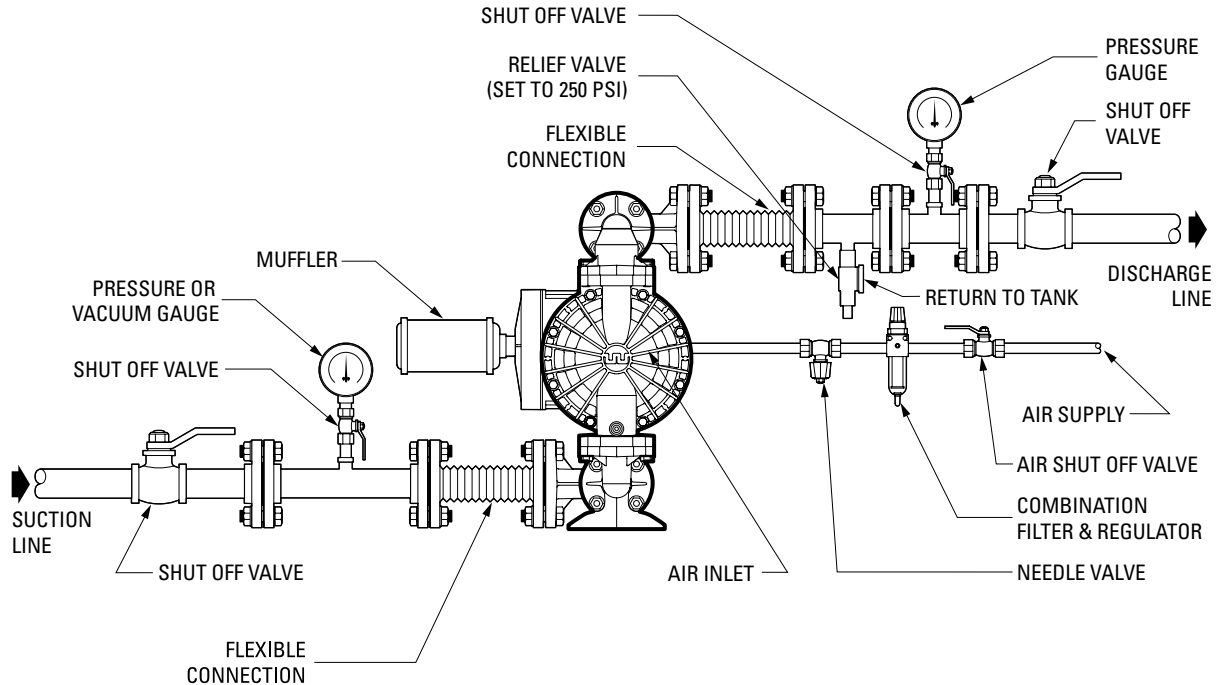
NOTE: Pro-Flo® and Accu-Flo™ pumps are not submersible.

ALL WILDEN PUMPS ARE CAPABLE OF PASSING SOLIDS. A STRAINER SHOULD BE USED ON THE PUMP INTAKE TO ENSURE THAT THE PUMP'S RATED SOLIDS CAPACITY IS NOT EXCEEDED.

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

SUGGESTED INSTALLATION

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.

SUGGESTED OPERATION & MAINTENANCE

OPERATION: The H400S 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. 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 H400S 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.

TROUBLESHOOTING

Pump will not run or runs slowly.

1. Ensure that the air inlet pressure is at least 0.4 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 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 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.
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 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.

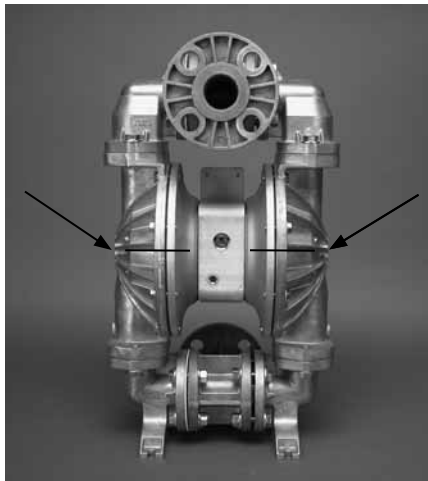
1. Check for diaphragm rupture.
2. Check tightness of outer pistons to shaft.

PUMP DISASSEMBLY

Tools Required:

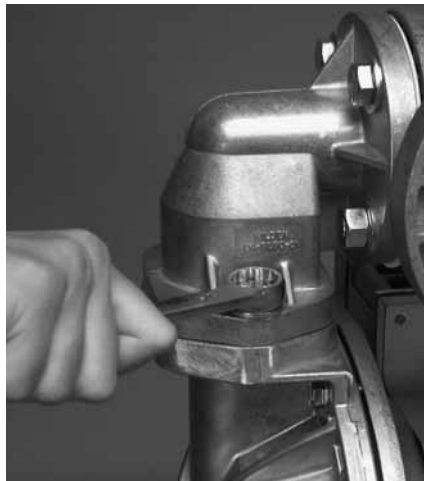
- 9/16" Wrench
- 3/4" Wrench
- Adjustable Wrench
- Vise equipped w/ soft jaws (such as plywood, plastic or other suitable material)

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.



Step 1

Please note alignment marks on liquid chambers. Use to properly align center section with liquid chambers.



Step 2

Using a 3/4" wrench, loosen the discharge manifold from the liquid chambers.



Step 3

Remove the discharge manifold to expose the top left valve ball. Note: the H400S pump does not use valve balls in the amplification chamber.



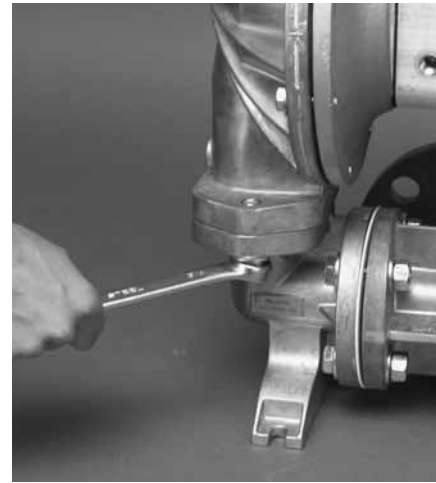
Step 4

Remove the discharge valve ball, valve seat and valve seat o-ring from the left liquid chamber and inspect for nicks, gouges, chemical attack or abrasive wear. Replace worn parts with genuine Wilden parts.



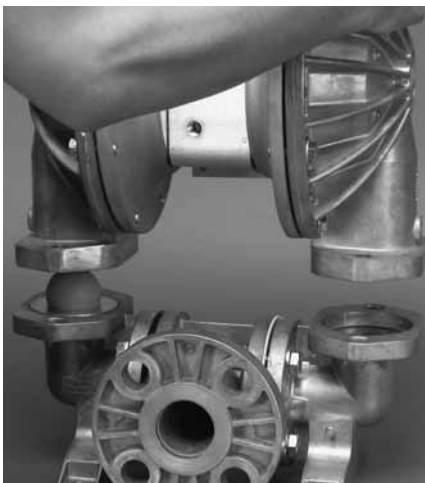
Step 5

To ensure no excessive wear or damage has occurred to the amplification chamber plug o-rings, remove plugs located between top and bottom tee sections and elbows, right side of pump only. Inspect and replace seat plug o-rings if necessary. Install buna o-ring on air side of plug and the encapsulated Viton® o-ring on liquid side of plug.



Step 6

Using a 3/4" wrench, loosen the inlet manifold from the liquid chambers.



Step 7

Lift liquid chambers and center section from inlet manifold to expose left inlet valve ball, valve seat and valve seat o-ring. Inspect for nicks, gouges, chemical attack or abrasive wear.



Step 8

Using a 9/16" wrench, remove the liquid chamber from the center section.



Step 9

The liquid chamber should be removed to expose the diaphragm and outer piston.



Step 10

Using an adjustable wrench, remove the diaphragm assembly from diaphragm shaft by turning counterclockwise.



Step 11

After loosening and removing the diaphragm assembly, remove opposite liquid chamber.



Step 12

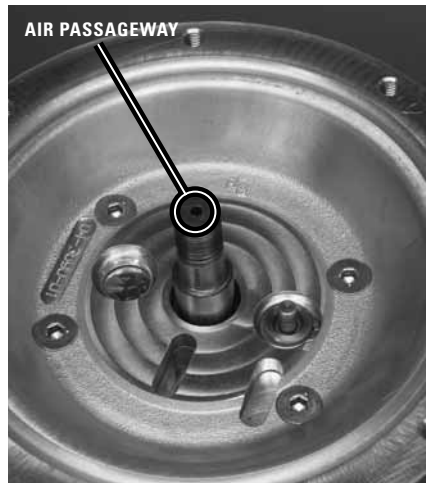
After removing the opposite liquid chamber, the remaining diaphragm assembly and diaphragm shaft can be easily removed.



Step 13

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.

H400S PISTON & SHAFT ORIENTATION



The outer piston on the side of the amplification chamber has an air passageway at the center of the outer piston lug. This air passageway allows air to flow from the opposite air chamber to the amplification chamber. This principle is how the H400S high pressure pump achieves a 2:1 ratio of inlet air pressure to discharge pressure. When reassembling the H400S pump, the outer piston with the air passageway has to be positioned on the same side as the amplification chamber. If it is not reassembled correctly, the pump will not operate and process fluid will enter the air distribution system through the air passageway located at the shaft lug.

This same air passageway continues through the diaphragm shaft, exits out of the diaphragm shaft via a 90° turn and into the air chamber located on the wetted side of the pump. The air passageway has to be positioned in the air chamber on the wetted side of the pump, opposite the amplification chamber.

AIR VALVE / CENTER SECTION DISASSEMBLY

Tools Required:

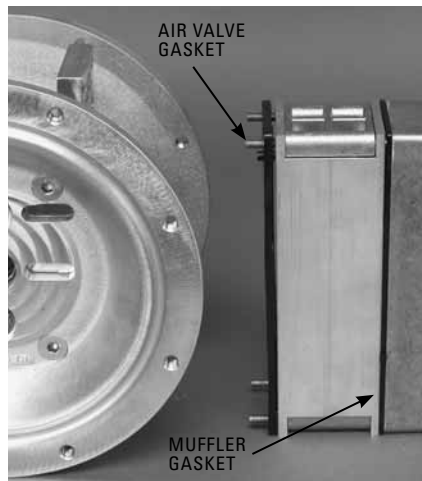
- 3/16" Hex Head Wrench
- 1/4" Hex Head Wrench
- Snap Ring Pliers
- O-Ring Pick

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.



Step 1

Using a 3/16" hex head wrench, loosen air valve bolts.



Step 2

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



Step 3

Remove air valve end cap to expose air valve spool by simply lifting up on end cap once air valve bolts are removed. Note: Pro-Flo V™ air valve incorporates an end cap at both ends of the air valve.

AIR VALVE / CENTER SECTION DISASSEMBLY



Step 4

Remove the air valve spool from the air valve body by threading one air valve bolt into the end of the air valve spool and gently sliding 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 5

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



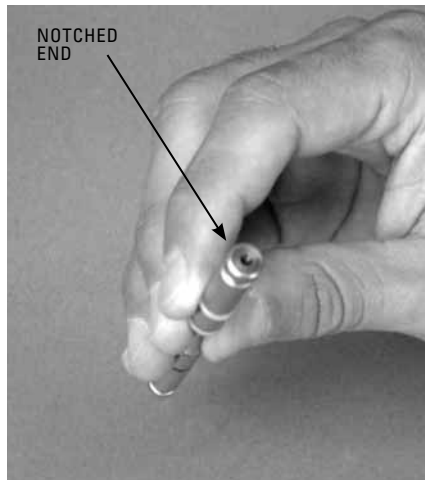
Step 6

Remove pilot spool sleeve from center section.



Step 7

Using an o-ring pick, gently remove the o-ring from the opposite side of the "notched end" on one side of the pilot spool. Gently remove the pilot spool from pilot spool sleeve and inspect for nicks, gouges and wear. Replace pilot sleeve or outer sleeve o-rings if necessary. During re-assembly, never insert the pilot spool into the sleeve with the "notched end" first, this end incorporates the urethane o-ring and will be damaged as it slides over the ports cut in the sleeve. Note: seals should not be removed from pilot spool. Seals are not sold separately.



Step 8

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

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 white EP bearing grease or equivalent.
- Clean the inside of the center section shaft bore to ensure no damage is done to new seals.
- A small amount NLGI grade 2 white EP bearing 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.

PRO-FLOV™ MAXIMUM TORQUE SPECIFICATIONS

Description of Part	Torque
Air Valve	13.6 N•m (120 in-lbs)
Air Chamber/Center Block	27.1 N•m (20 ft-lbs)
Outer Pistons, Rubber & PTFE	105.8 N•m (78 ft-lbs)

SHAFT SEAL 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 white EP bearing 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

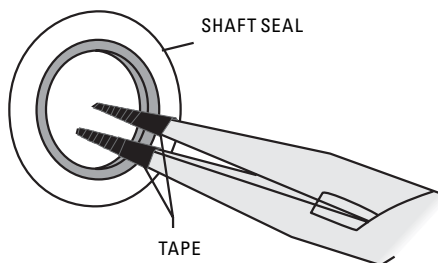
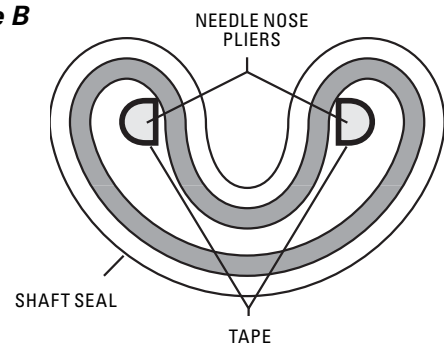


Figure B

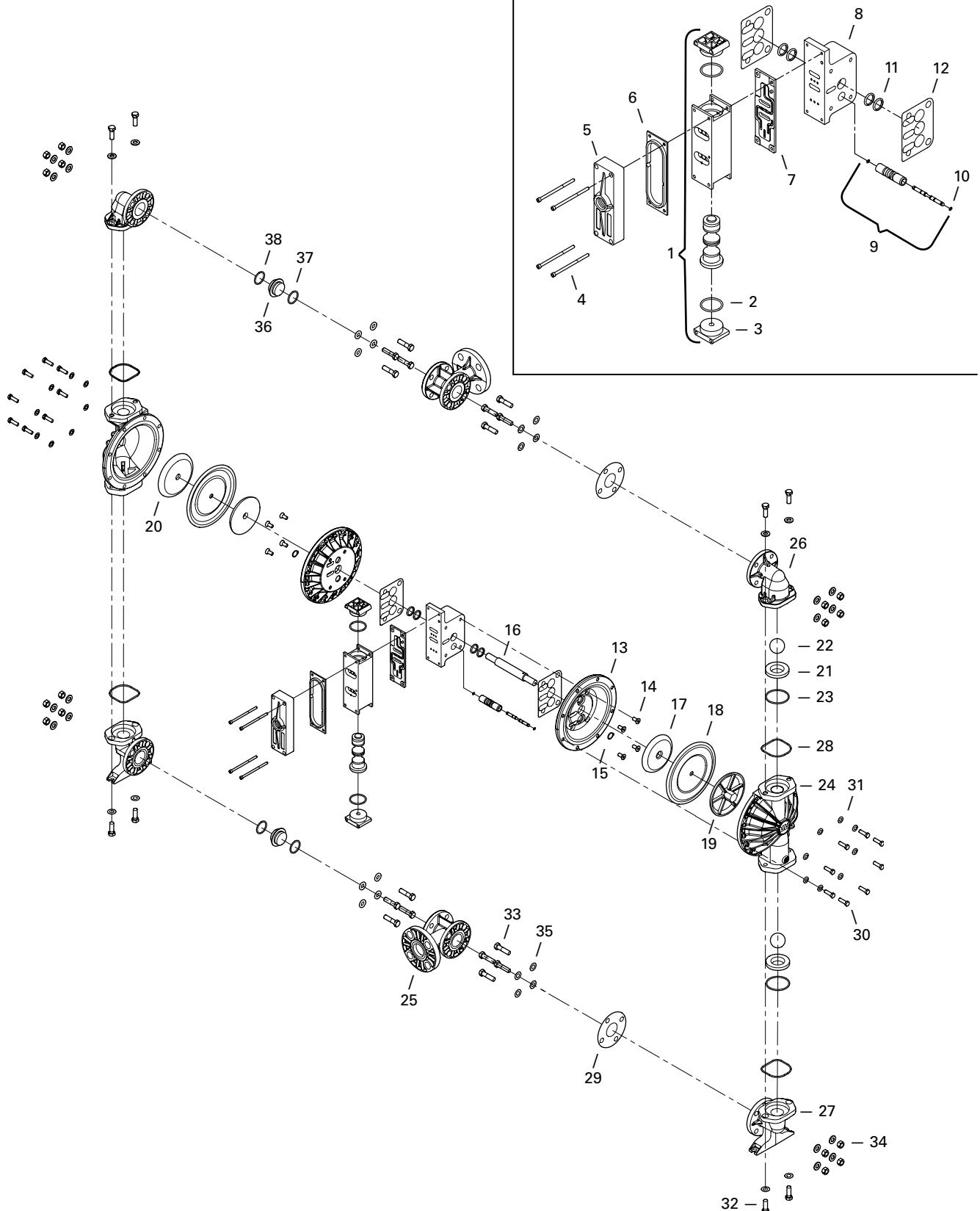


EXPLODED VIEW & PARTS LISTING

H400S ALUMINUM

TPE-Fitted

EXPLODED VIEW



EXPLODED VIEW & PARTS LISTING

H400S ALUMINUM

TPE-Fitted

PARTS LISTING

No.	Part Description	Qty.	H400S/AAAAA P/N
1	Pro-Flo V™ Air Valve Assembly ¹	1	04-2030-01
2	O-Ring (-225), End Cap (1.859 x .139)	2	04-2390-52-700
3	End Cap	2	04-2340-01
4	Screw, SHC, Air Valve (1/4"-20 x 4-1/2")	4	01-6000-03
5	Muffler Plate, Pro-Flo V™	1	04-3185-01
6	Gasket, Muffler Plate, Pro-Flo V™	1	04-3502-52
7	Gasket, Air Valve, Pro-Flo V™	1	04-2620-52
8	Center Block Assembly, Pro-Flo V™	1	04-3125-01
9	Pilot Sleeve Assembly	1	04-3880-99
10	Pilot Spool Retaining O-Ring	2	04-2650-49-700
11	Shaft Seal	4	15-3210-55-225
12	Gasket, Center Block, Pro-Flo V™	2	04-3529-52
13	Air Chamber, Pro-Flo V™	2	04-3694-01
14	Screw, HSFHS (3/8"-16 x 1")	8	71-6250-08
15	Retaining Ring	2	04-3890-03
16	Shaft	1	04-3845-08
17	Inner Piston	2	15-3750-01
18	Diaphragm	2	04-1011-58
19	Outer Piston	1	15-4600-03
20	Outer Piston	1	04-4565-03
21	Seat, Valve	2	04-1125-01
22	Ball, Valve	2	04-1080-58
23	Valve Seat O-Ring	4	04-1205-55
24	Liquid Chamber	2	04-4980-01
25	Tee, ANSI, H400S	2	04-5181-01
25	Tee, DIN, H400S	2	04-5186-01
26	Discharge Elbow	2	04-5250-01
27	Inlet Elbow	2	04-5210-01
28	Manifold O-Ring	4	04-1370-55
29	Tee Section Manifold Gasket	2	04-1325-55
30	Screw, HHC (3/8"-16 x 1-1/4")	16	04-6140-08
31	Washer (3/8")	16	15-6740-08-50
32	Screw, HHC (1/2"-13 x 1-1/2")	8	04-6180-08
33	Screw, HHC (1/2"-13 x 2")	16	04-6210-08
34	Hex Nut (1/2"-13)	16	15-6420-08
35	Washer (1/2")	40	04-6730-08
36	Seat, Plug, H400S	2	04-1135-01
37	O-Ring (1.484 x .139) Encapsulated Viton®	2	05-1370-60
38	O-Ring (1.484 x .139) Buna	2	02-1230-52
39	Muffler (Not Shown)	1	15-3510-99R

¹Air valve assembly includes item numbers 2 and 3.

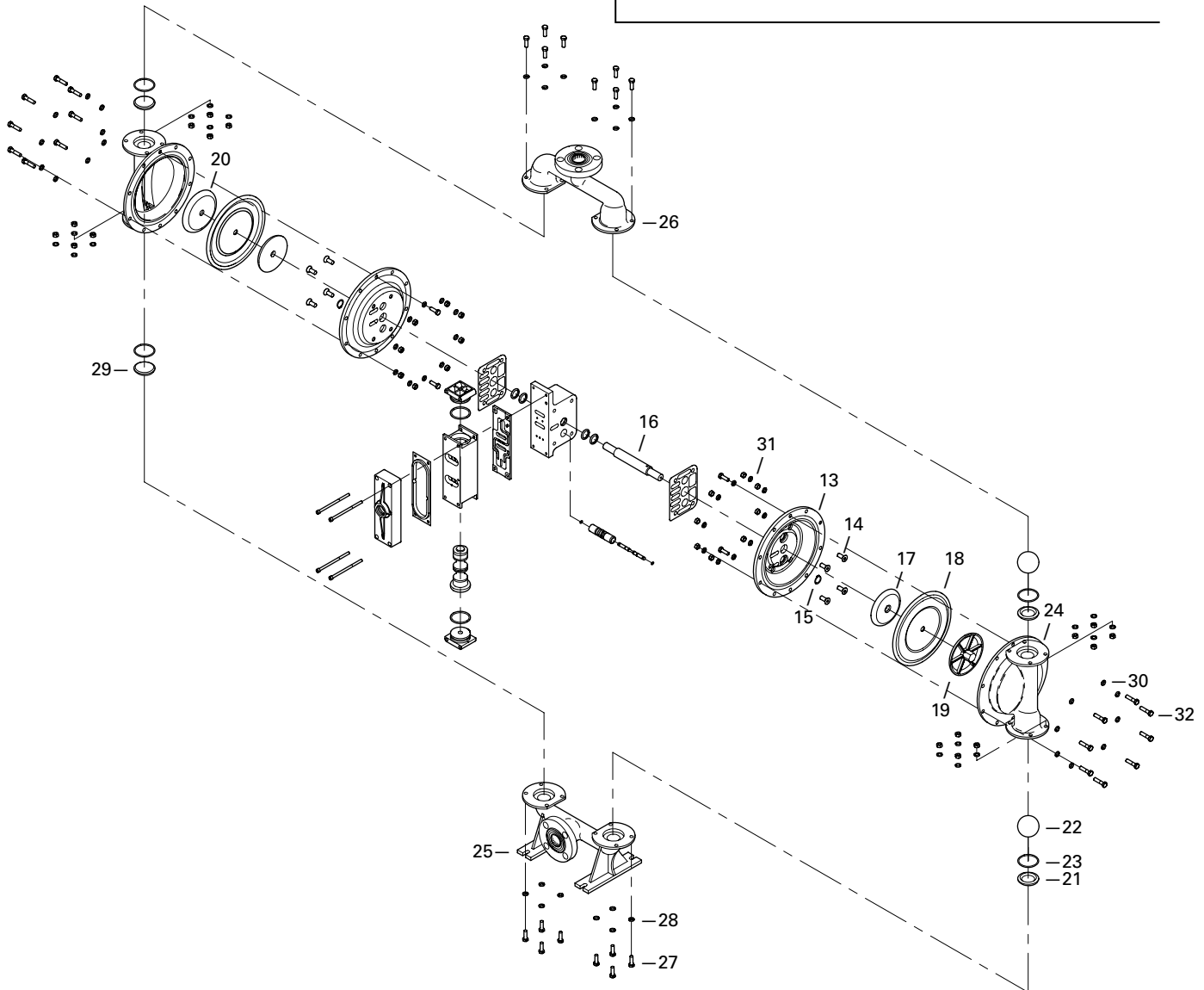
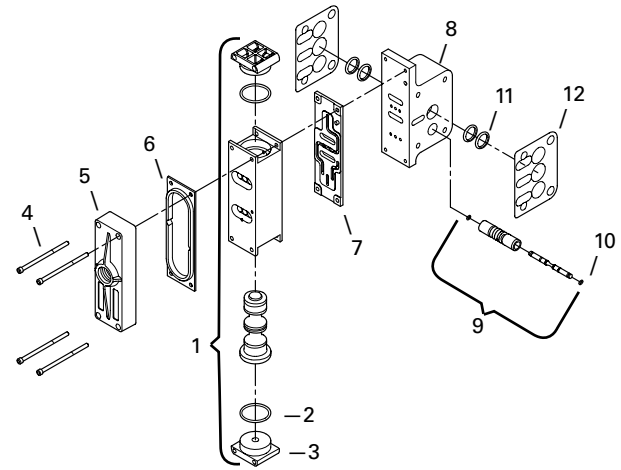
All boldface items are primary wear parts.

EXPLODED VIEW & PARTS LISTING

H400S STAINLESS STEEL

TPE-Fitted

EXPLODED VIEW



EXPLODED VIEW & PARTS LISTING

H400S STAINLESS STEEL

TPE-Fitted

PARTS LISTING

No.	Part Description	Qty.	H400S/SSAAA P/N
1	Pro-Flo V™ Air Valve Assembly ¹	1	04-2030-01
2	O-ring (-225), End Cap (1.859x.139)	2	04-2390-52-700
3	End Cap	2	04-2340-01
4	Screw, SCH, Air Valve (1/4-20x4-1/2")	4	01-6000-03
5	Muffler Plate, ProFlo V™	1	04-3185-01
6	Gasket, Muffler Plate, Pro-Flo V™	1	04-3502-52
7	Gasket, Air Valve, Pro-Flo V™	2	04-2620-52
8	Center Block, Pro-Flo V™	1	04-3125-01
9	Pilot Sleeve Assembly	1	04-3880-99
10	Pilot Spool Retaining O-ring	2	04-2650-49-700
11	Shaft Seal	4	15-3210-55-225
12	Gasket, Center Block, Pro-Flo V™	2	04-3529-52
13	Air Chamber, H400S	2	04-3697-01
14	Screw, HSFHS (3/8-16 x 1")	8	71-6250-08
15	Retaining Ring	2	04-3890-03
16	Shaft	1	04-3846-08
17	Inner Piston	2	15-3750-01
18	Diaphragm	2	04-1011-58
19	Outer Piston	1	15-4600-03
20	Outer Piston, H400S	1	04-4565-03
21	Seat, Valve	2	04-1121-03
22	Ball, Valve	2	04-1080-58
23	Valve Seat O-ring	4	04-1200-55
24	Liquid Chamber, H400S	2	04-4981-03
25	Inlet Manifold, ANSI	1	04-5092-03
	Inlet Manifold, DIN	1	04-5080-03-43
26	Discharge Manifold, ANSI	1	04-5032-03
	Discharge Manifold, DIN	1	04-5020-03-43
27	Screw, HHC (5/16-18 x 1")	20	08-6180-03-42
28	Flat Washer (5/16)	36	08-6730-03-42
29	Seat, Plug, H400S	2	04-1135-03
30	Disc Spring Washer, 5/16"	32	08-6810-03-42
31	Hex Nut (5/16-18)	32	08-6400-03
32	Screw, HHC (5/16-18 x 1-3/8")	16	08-6100-03
	Muffler (Not Shown)	1	15-3510-99R

¹Air valve assembly includes item numbers 2 and 3.

All boldface items are primary wear parts.

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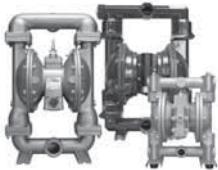
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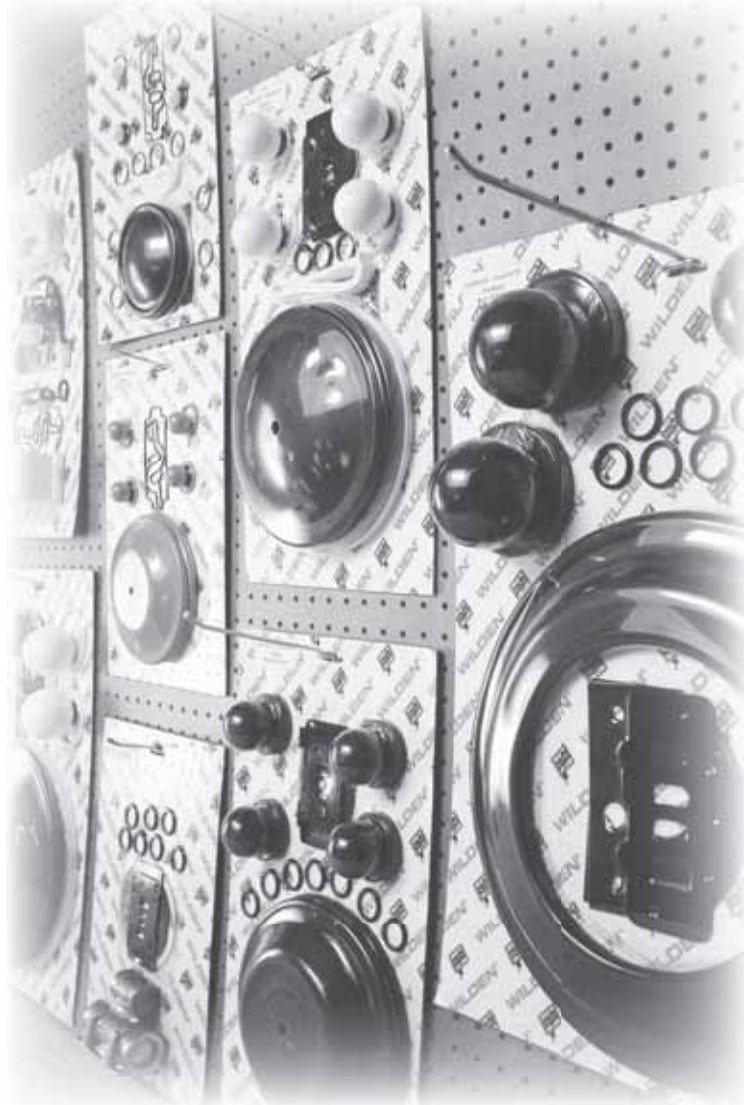
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