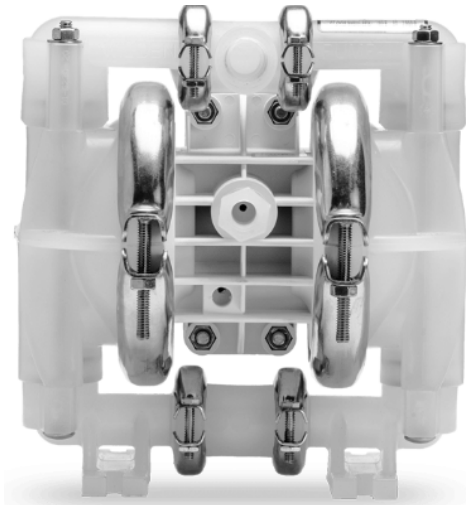


EOM

ENGINEERING OPERATION
& MAINTENANCE MANUAL

A1 Accu-Flo Clamped Plastic Pump



Where Innovation Flows

WILDEN[®]



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Warranty

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

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

Certifications



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SECTION 1

PRECAUTIONS – READ FIRST!



WARNING: Always wear safety glasses when operating a pump to avoid eye injury. If diaphragm rupture occurs, material being pumped may be forced out of the air exhaust.



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:

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

¹4°C to 149°C (40°F to 300°F) - 13 mm (1/2") and 25 mm (1") models only.

NOTE: Not all materials are available for all models. See "Wilden Pump Designation System" material options for your pump.



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



CAUTION: Maximum temperature limits are based on mechanical stress only. Certain chemicals will reduce maximum safe operating temperatures significantly. Consult the Chemical Resistance Guide for chemical compatibility and temperature limits.



CAUTION: All Wilden pumps are capable of passing solids. Use a strainer 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.



CAUTION: The process fluid and cleaning fluids must be chemically compatible with all wetted pump components. Consult Chemical Resistance Guide.



CAUTION: Thoroughly flush pumps before installing them into process lines. Clean and/or sanitize FDA- and USDA- approved pumps before using them.



CAUTION: Before attempting any maintenance or repair, disconnect the compressed air line to the pump and allow all air pressure 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.



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



CAUTION: Accu-Flo pumps cannot be used in submersible applications.



CAUTION: Before installation, tighten all hardware.



CAUTION: Only explosion proof (NEMA 7) solenoid valves should be used in areas where explosion proof equipment is required.



NOTE: A1 Plastic PTFE-fitted pumps come standard from the factory with expanded PTFE gaskets. (See "Gasket Kit Installation")



NOTE: Materials of construction and elastomer material may influence suction lift parameters. Please refer to "Performance" for specifics.



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



NOTE: Some 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.



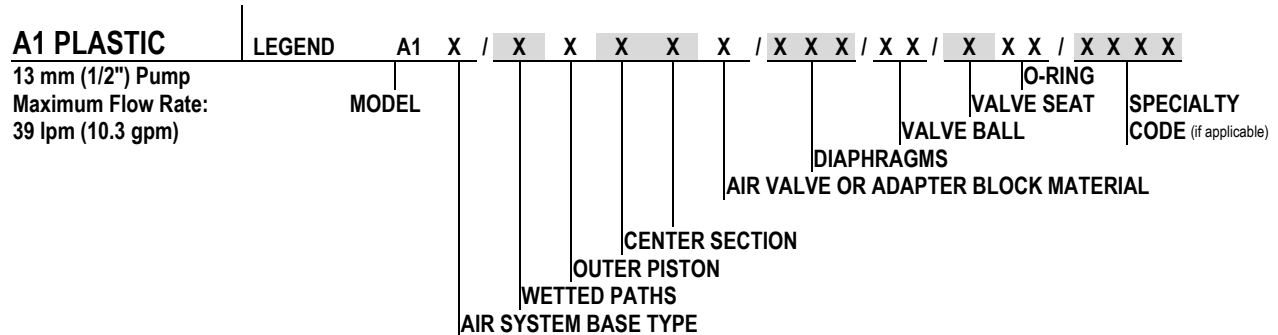
NOTE: In the event of a power failure, close the shut-off valve if you do not want the pump to restart when the power returns.



WARNING: This product can expose you to chemicals including Nickel, Chromium, Cadmium, or Cobalt, which are known to the State of California to cause cancer and/or birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.

SECTION 2

WILDEN PUMP DESIGNATION SYSTEM



MATERIAL CODES

MODEL

A1 = PLASTIC ACCU-FLO™

AIR SYSTEM BASE TYPE

T = TURBO-FLO™

P = PRO-FLO®

B = ADAPTER BLOCK

WETTED PATH

K = PVDF

P = POLYPROPYLENE

OUTER PISTON

K = PVDF

P = POLYPROPYLENE

Z = NO OUTER PISTON

CENTER SECTION

PP = POLYPROPYLENE

AIR VALVE

A = ALUMINUM (available for A1T only)

P = POLYPROPYLENE

U = UHMW (available for A1B only)

L = ACETAL (Available for A1B and A1P only)

DIAPHRAGMS

BNS = BUNA-N (RED DOT)

FSS = SANIFLEX™ [HYTREL® (CREAM)]

PUS = POLYURETHANE (CLEAR)

TNU = PTFE W/NEOPRENE BACK-UP (WHITE)

VTS = FKM (WHITE DOT)

WFS = WIL-FLEX™ [SANTOPRENE® (THREE BLACK DOTS)]

VALVE BALLS

BN = BUNA-N (RED DOT)

FG = SANIFLEX™

PU = POLYURETHANE (BROWN)

TF = PTFE (WHITE)

VT = FKM (SILVER OR WHITE DOT)

WF = WIL-FLEX™ (ORANGE)

VALVE SEATS

K = PVDF

VT = FKM

O-RINGS

BN = BUNA-N (RED DOT)

FG = SANIFLEX™ (CREAM)

PU = POLYURETHANE (BROWN)

TV = PTFE ENCAP. FKM®

WF = WIL-FLEX™ (ORANGE)

SPECIALTY CODES

- 0150 - Accu-Flo, 24V DC Coil
- 0151 - Accu-Flo, 24V AC / 12V DC coil
- 0154 - Accu-Flo, 24V DC x-proof coil
- 0155 - Accu-Flo, 110V AC coil
- 0167 - Accu-Flo, 24V AC / 12V DC coil, Wil-Gard 110V
- 0184 - Accu-Flo, 24V DC coil, PFA coated
- 0512 - Adapter block, no muffler, Pro-Flo, center section
- 0554 - Adapter block, no muffler, Pro-Flo center section, BSP

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

SECTION 3

HOW IT WORKS – AIR-OPERATED DOUBLE-DIAPHRAGM 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.

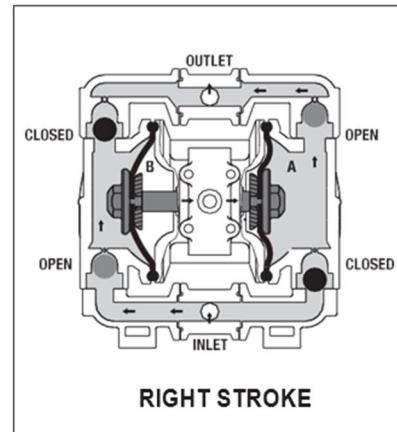
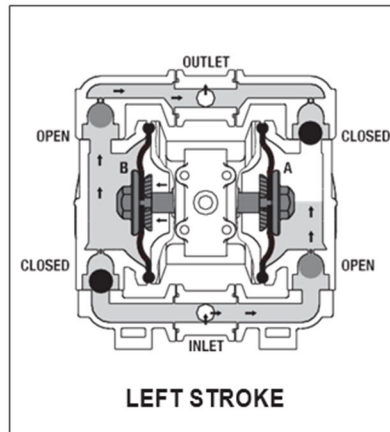
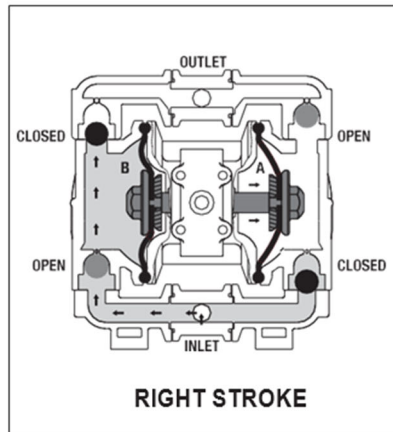


FIGURE 1 When the solenoid is energized, the air valve directs pressure to the back side of diaphragm A. The compressed air is applied directly to the liquid column separated by elastomeric diaphragms. The diaphragm acts as a membrane between the compressed air and the liquid, balancing the load and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

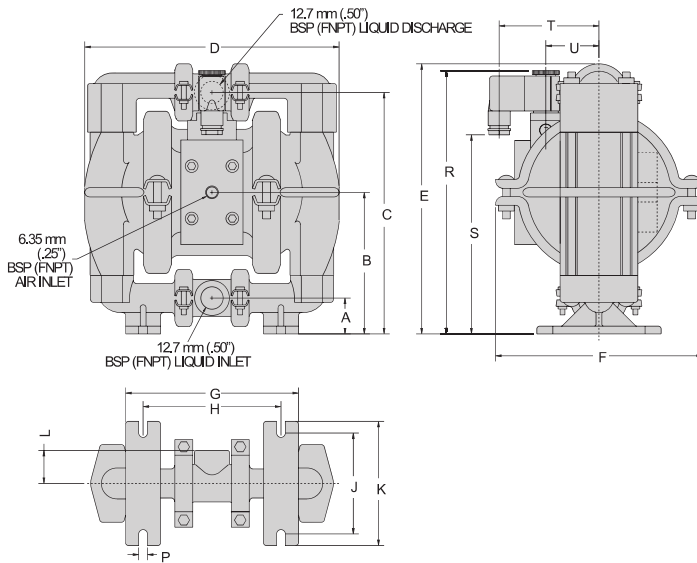
FIGURE 2 When the solenoid valve is deenergized, the air valve redirects pressurized air to the back side of diaphragm B. The pressurized air forces diaphragm B away from the center section while pulling diaphragm A to the center section. Diaphragm B is now on its discharge stroke. Diaphragm B forces 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 movement of diaphragm A toward the center section 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 of its seat allowing the fluid being pumped to fill the liquid chamber.

FIGURE 3 Once the solenoid valve is reenergized, the air is redirected 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 intake 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.

SECTION 4

DIMENSIONAL DRAWING

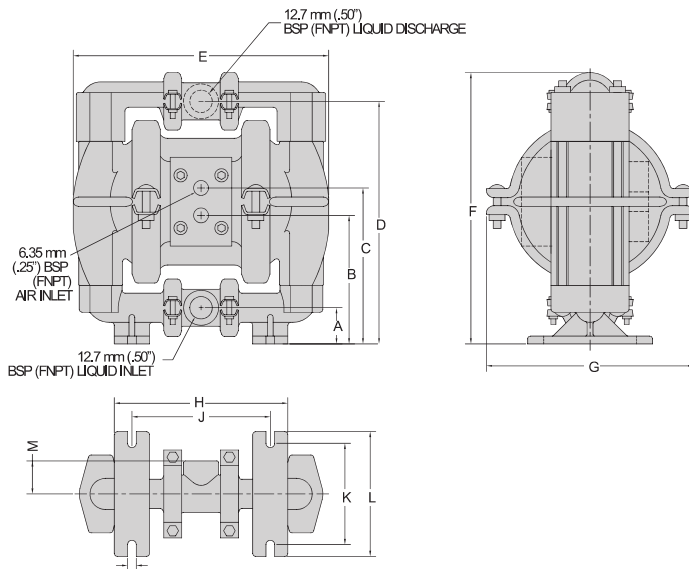
A1T Plastic Clamp Accu-Flo™



DIMENSIONS

ITEM	METRIC (mm)	STANDARD (inch)
A	30	1.16
B	114	4.50
C	196	7.69
D	208	8.19
E	218	8.63
F	118	7.00
G	145	5.66
H	114	4.50
J	84	3.25
K	102	4.00
L	28	1.09
N	84	3.31
P	8	.28
R	213	8.38
S	160	6.31
T	81	3.22
U	46	1.75

A1B Plastic Clamp (T-Series Center Section)

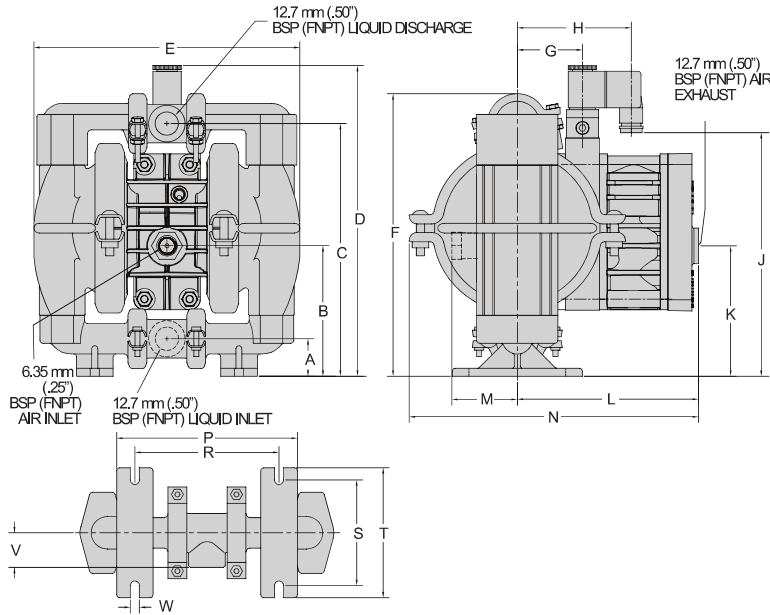


DIMENSIONS

ITEM	METRIC (mm)	STANDARD (inch)
A	30	1.16
B	114	4.50
C	196	7.69
D	208	8.19
E	218	8.63
F	118	7.00
G	145	5.66
H	114	4.50
J	84	3.25
K	102	4.00
L	28	1.09
N	84	3.31
P	8	.28

DIMENSIONAL DRAWING

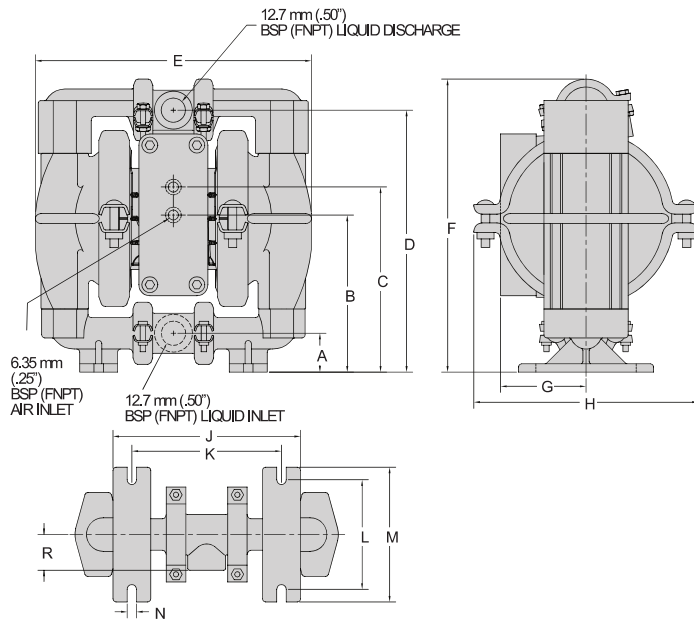
A1P Plastic Clamp Accu-Flo™



DIMENSIONS

ITEM	METRIC (mm)	STANDARD (inch)
A	30	1.16
B	117	4.59
C	196	7.69
D	244	9.56
E	208	8.19
F	218	8.63
G	51	2.00
H	89	3.50
J	191	7.50
K	117	4.56
L	142	5.56
M	56	2.16
N	231	9.06
P	145	5.66
R	114	4.50
S	84	3.25
T	102	4.00
V	28	1.09
W	8	.28

A1B Plastic Clamp (P-Series Center Section)



DIMENSIONS

ITEM	METRIC (mm)	STANDARD (inch)
A	30	1.16
B	117	4.59
C	140	5.50
D	196	7.69
E	208	8.19
F	218	8.63
G	64	2.53
H	118	6.88
J	145	5.66
K	114	4.50
L	884	3.25
M	102	4.00
N	8	.28
R	28	1.09

SECTION 5

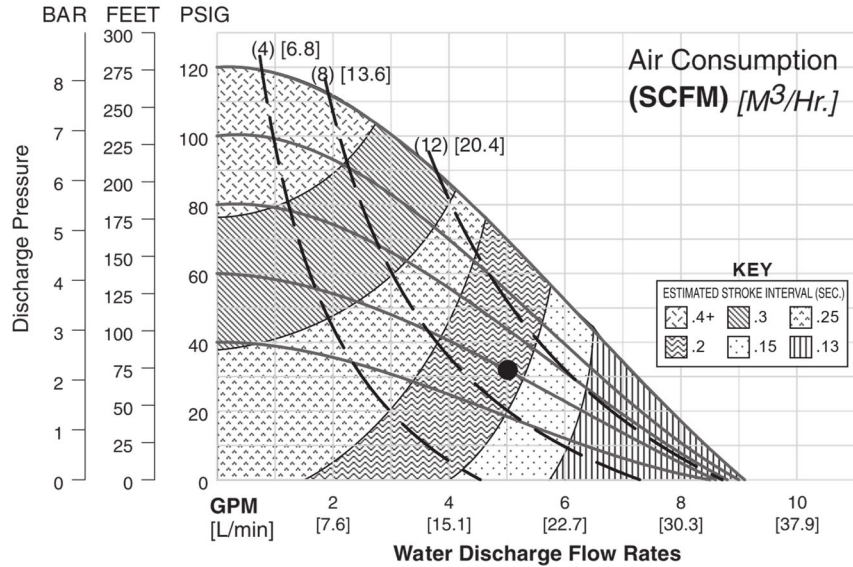
PERFORMANCE

**A1T PLASTIC
 RUBBER-FITTED**

Ship Weights.....Polypropylene 4.1 kg (9 lb)
 PVDF 5.1 kg (11 lb)
 Air Inlet......6 mm (1/4")
 Inlet......13 mm (1/2")
 Outlet......13 mm (1/2")
 Suction Lift......4.5 m Dry (15')
 9.3 m Wet (31')
 Disp. per Stroke¹.....0.6 L (0.015 gal)
 Max. Flow Rate.....33.4 lpm (9.1 gpm)
 Max. Size Solids.....1.6 mm (1/16")

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

Example: To pump 18.9 lpm (5 gpm) against a discharge head pressure of 2.2 Bar (32 psig) requires 4.1 Bar (60 psig) and 16.2 Nm³/h (9.5 scfm) air consumption.



Flow rates indicated on chart were determined by pumping water. For optimum life and performance, pumps should be specified so that daily operation parameters will fall in the center of the pump's performance curve.

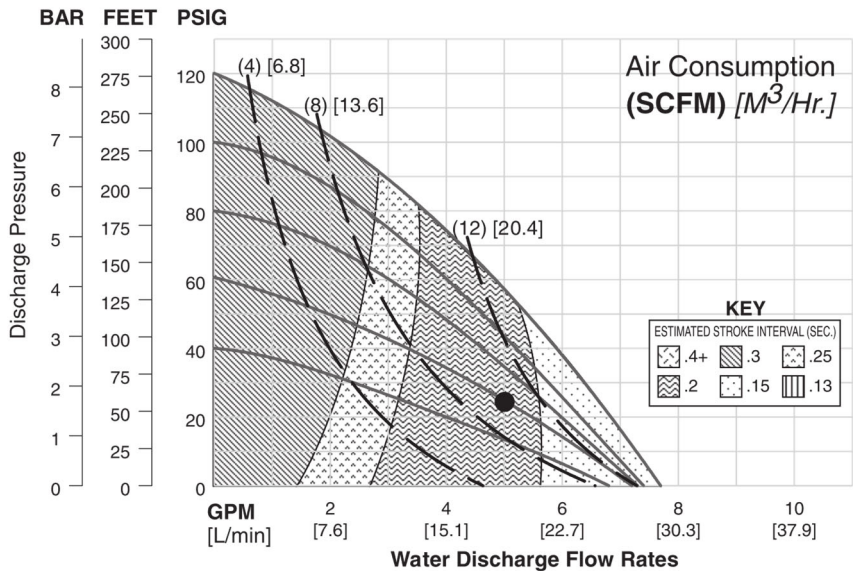
Caution: Do not exceed 8.6 bar (125 psig) air supply pressure.

**A1T PLASTIC
 PTFE-FITTED**

Ship Weights.....Polypropylene 4.1 kg (9 lb)
 PVDF 5.1 kg (11 lb)
 Air Inlet......6 mm (1/4")
 Inlet......13 mm (1/2")
 Outlet......13 mm (1/2")
 Suction Lift......3.5 m Dry (11')
 9.3 m Wet (31')
 Disp. per Stroke¹.....0.6 L (0.015 gal)
 Max. Flow Rate.....29.1 lpm (7.7 gpm)
 Max. Size Solids.....1.6 mm (1/16")

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

Example: To pump 18.9 lpm (5 gpm) against a discharge head pressure of 1.7 Bar (25 psig) requires 4.1 Bar (60 psig) and 17 Nm³/h (10 scfm) air consumption.



Flow rates indicated on chart were determined by pumping water. For optimum life and performance, pumps should be specified so that daily operation parameters will fall in the center of the pump's performance curve.

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

PERFORMANCE

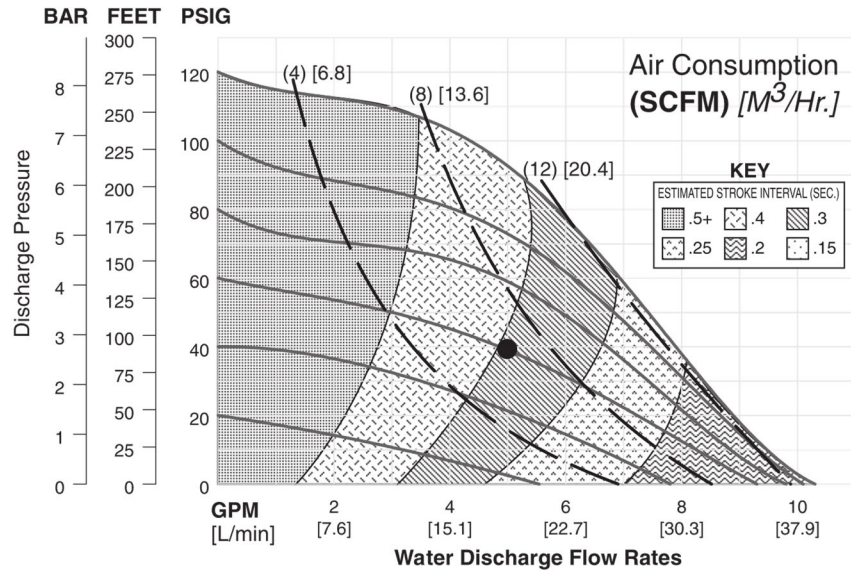
A1P PLASTIC RUBBER-FITTED

Ship Weights.....Polypropylene 4.1 kg (9 lb)
 PVDF 5.1 kg (11 lb)
 Air Inlet.....6 mm (1/4")
 Inlet.....13 mm (1/2")
 Outlet.....13 mm (1/2")
 Suction Lift.....6 m Dry (20')
 9 m Wet (29')

Disp. per Stroke¹.....0.12 L (0.032 gal)
 Max. Flow Rate.....39 lpm (10.3 gpm)
 Max. Size Solids.....1.6 mm (1/16")

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

Example: To pump 18.9 lpm (5 gpm) against a discharge head pressure of 2.7 Bar (39 psig) requires 4.1 Bar (60 psig) and 11.1 Nm³/h (6.5 scfm) air consumption.



Flow rates indicated on chart were determined by pumping water. For optimum life and performance, pumps should be specified so that daily operation parameters will fall in the center of the pump's performance curve.

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

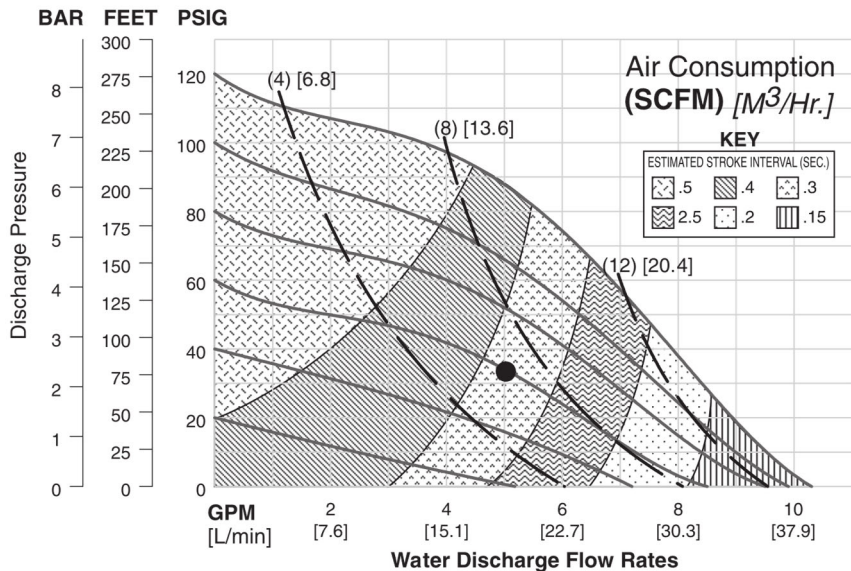
A1P PLASTIC PTFE-FITTED

Ship Weights.....Polypropylene 4.1 kg (9 lb)
 PVDF 5.1 kg (11 lb)
 Air Inlet.....6 mm (1/4")
 Inlet.....13 mm (1/2")
 Outlet.....13 mm (1/2")
 Suction Lift.....5.18 m Dry (17')
 9 m Wet (29')

Disp. per Stroke¹.....0.11 L (0.028 gal)
 Max. Flow Rate.....39 lpm (10.3 gpm)
 Max. Size Solids.....1.6 mm (1/16")

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

Example: To pump 18.9 lpm (5 gpm) against a discharge head pressure of 2.3 Bar (34 psig) requires 4 Bar (60 psig) and 11.1 Nm³/h (6.5 scfm) air consumption



Flow rates indicated on chart were determined by pumping water. For optimum life and performance, pumps should be specified so that daily operation parameters will fall in the center of the pump's performance curve.

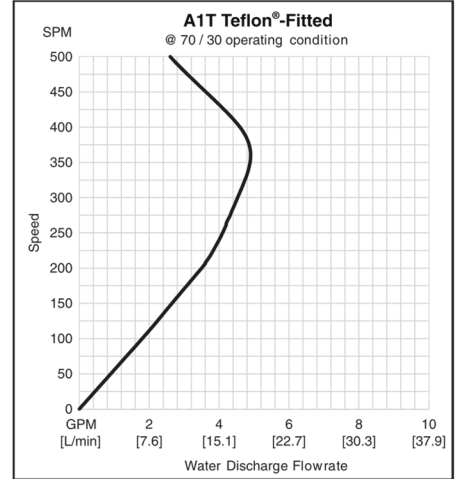
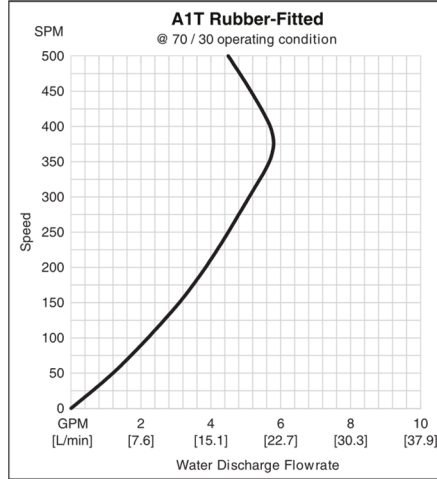
Caution: Do not exceed 8.6 bar (125 psig) air supply pressure.

SECTION 5

SUCTION LIFT CAPABILITY

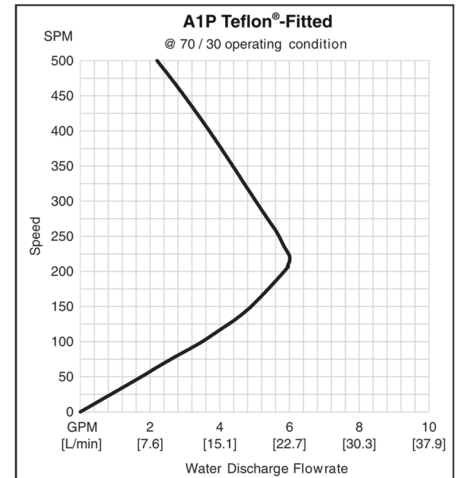
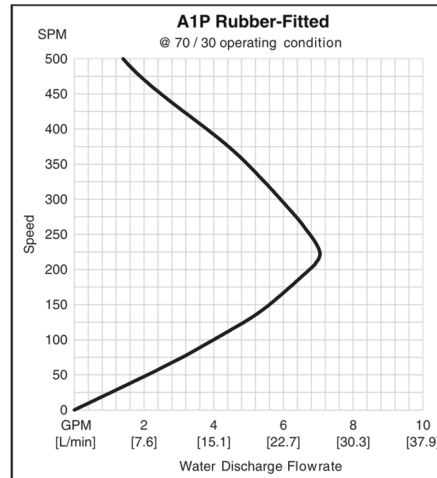
**A1T PLASTIC
ACCU-FLO**

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 that 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.



**A1P PLASTIC
ACCU-FLO™**

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 that 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 6

**SUGGESTED INSTALLATION, OPERATION, MAINTENANCE
AND TROUBLESHOOTING**

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 "Performance" 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 equal to or larger than the diameter size of the suction inlet on your Wilden pump. The suction hose must be a non-collapsible, reinforced type because these pumps are capable of pulling a high vacuum. Discharge piping should also be equal to or larger than the diameter of the pump discharge, which will help reduce friction losses.

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

Months of careful planning, study and selection efforts can result in unsatisfactory pump performance if installation details are left to chance. You can avoid premature failure and long-term dissatisfaction by exercising reasonable care throughout the installation process.

Location

Noise, safety and other logistical factors usually dictate where equipment will be situated on the production floor. Multiple installations with conflicting requirements can result in congestion of utility areas, leaving few choices for additional pumps. Within the framework of these and other existing conditions, locate every pump in such a way that the following six key factors are balanced against each other to maximum advantage:

- **Access:** First, the location should be accessible. If it's easy to reach the pump, maintenance personnel will be able to perform routine inspections and adjustments more easily. If 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. 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. You can estimate pumping volume by counting the number of strokes per minute, and then multiplying that figure by the displacement per stroke.
- **Muffler:** Using the standard Wilden muffler, sound levels are reduced below OSHA specifications. You can use other mufflers to reduce sound levels farther, 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 "Performance" 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.

CAUTION: All Wilden pumps are capable of passing solids. Use a strainer 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.

CAUTION: Pro-Flo® and Accu-Flo™ pumps do not have single-point exhaust option and are not submersible.

SUGGESTED INSTALLATION, OPERATION, MAINTENANCE AND TROUBLESHOOTING

Operating Principles Behind Accu-Flo™ Pumps

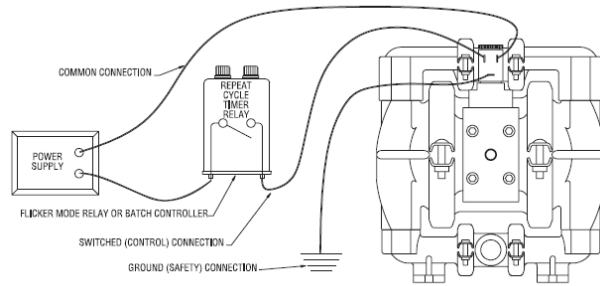
When the solenoid is unpowered, one air chamber is pressurized with air, while the opposite chamber is exhausted. When electric power is applied, the solenoid shifts, and the pressurized air chamber is exhausted while the opposite chamber is pressurized. By alternately applying and removing power, the solenoid-operated pump runs like a standard Wilden pump.

The speed of the pump is controlled electrically. Since each stroke is controlled by an electrical signal, the pump is ideal for batching and other electrically controlled dispensing applications.

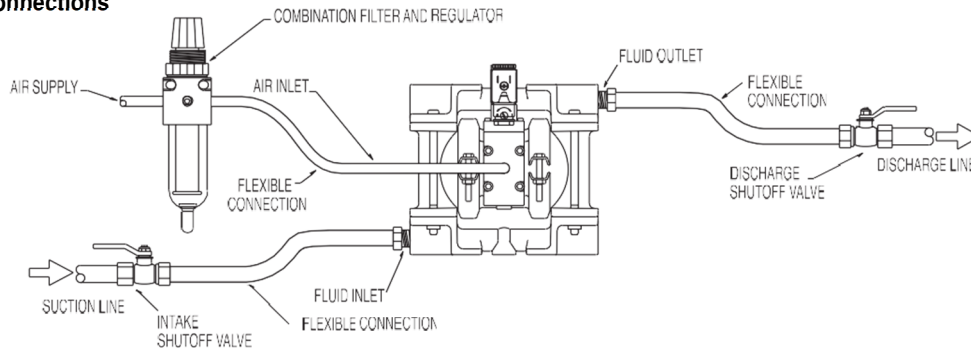
Although the speed of the pump is controlled electrically, the air pressure is important. Air pressure displaces the fluid, and if the pressure is insufficient to complete the physical stroke before an electronic impulse signals the pump to shift, the stroke will not be completed, and the displacement per stroke will be reduced. This does not harm the unit in any way, but it may cause inaccuracy when attempting to batch specific quantities with high precision if this effect is not taken into account.

There are three coil voltage options available. One coil allows for 24V DC operation. The second coil option allows for operation with either 12V DC or 24V AC at 60 Hz and the third coil option allows for 110V AC operation.

Electrical Connections



Plumbing Connections



Operation

A red button on the side of the air valve is a manual override; when actuated it will shift the valve as if an electric current had actuated the solenoid.

A muffler can be installed to reduce the amount of noise generated by the pump. Use of the specified Wilden muffler will reduce noise levels below OSHA specifications.

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.

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 effect 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. Internal maintenance is not recommended for Accu-Flo™ solenoid air valves. When worn or damaged, a new air valve body, coil or terminal connector must be purchased. Please consult section 9 for part numbers.

SUGGESTED INSTALLATION, OPERATION, MAINTENANCE AND TROUBLESHOOTING

Troubleshooting

Pump will not run or runs slowly.

1. Remove plug from pilot spool exhaust.
2. 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).
3. Check air inlet filter for debris (see "Suggested Installation, Operation, Maintenance and Troubleshooting").
4. Check for extreme air leakage (blow by) that would indicate worn seals/bores in the air valve, pilot spool and main shaft.
5. Disassemble the pump and check for obstructions in the air passageways or objects that would obstruct the movement of internal parts.
6. Check for sticking ball check valves.
 - a. If material being pumped is not compatible with pump elastomers, swelling may occur. Replace ball check valves and seals with proper elastomers.
 - b. 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.
7. Check for any broken inner piston that would cause the air valve spool to be unable to shift.

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.
 - a. If material being pumped is not compatible with pump elastomers, swelling may occur. Replace ball check valves and seals with proper elastomers.
 - b. 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 the compressed air.
 - a. Either install a dryer or a hot air generator for compressed air.
 - b. Alternatively, you may use coalescing filter to remove the water from the compressed air in some applications.

Air bubbles in pump discharge.

1. Check for a ruptured diaphragm.
2. Check tightness of outer pistons (see "Disassembly/Reassembly").
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 a diaphragm rupture.
2. Check the tightness of the outer pistons to the shaft.

Solenoid Troubleshooting

- ***Solenoid buzzes or solenoid burnout.***
Incorrect voltage, faulty or dirty solenoid.
- ***Solenoid valve fails to shift electrically but shifts with manual override.***
Incorrect voltage, defective coil or wiring.
- ***Valve shifts but fails to return.***
Broken spring, mechanical binding.
- ***Excessive leaking from air valve vent.***
Worn seals in air valve.

SECTION 7

DISASSEMBLY / REASSEMBLY

PUMP DISASSEMBLY

Tools Required:

- 5/16" Wrench
- 3/16" Allen Wrench
- 3/8" Wrench
- 7/16" Wrench
- Adjustable Wrench
- Vise equipped with soft jaws (such as plywood, plastic or other suitable material)



CAUTION: Before attempting any maintenance or repair, disconnect the compressed air line to the pump and allow all air pressure 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.



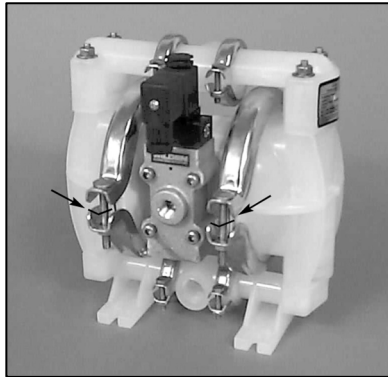
NOTE: Your specific pump model may vary from the configuration shown; however, pump disassembly procedure will be the same.



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

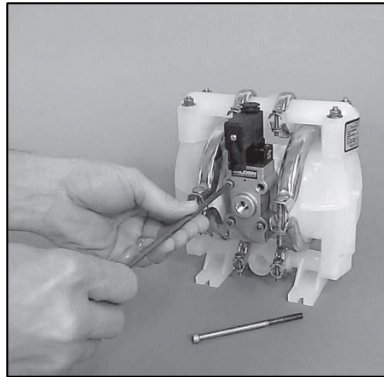


NOTE: Replace worn parts with genuine Wilden parts for reliable performance.



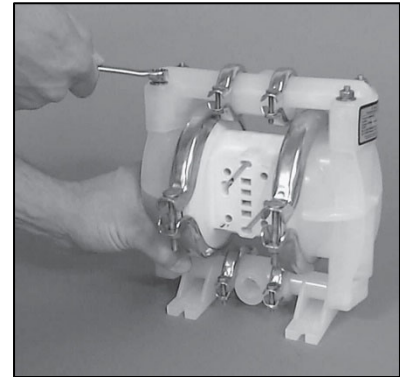
Step 1

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



Step 2

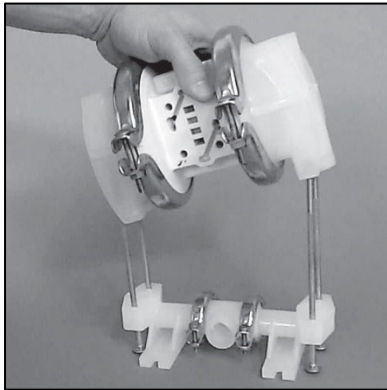
Using the 3/16" Allen Wrench, remove air valve bolts. Inspect air valve assembly for wear or damage.



Step 3

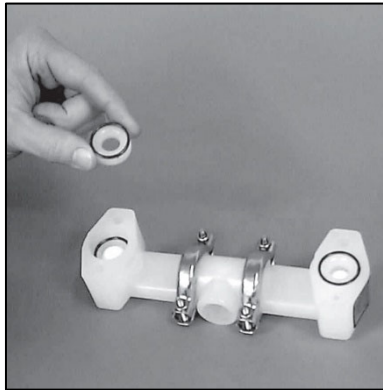
Utilizing the 7/16" box wrench, start by removing the four long carriage bolts that hold the top and bottom manifolds to the center section.

DISASSEMBLY / REASSEMBLY



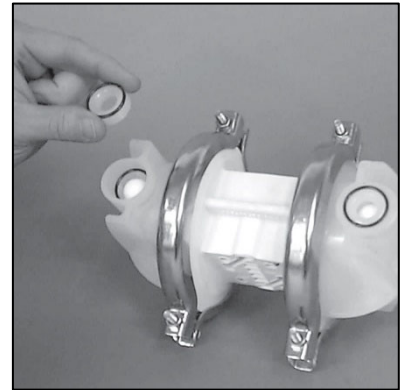
Step 4

Remove the top manifold and lift the center section off the inlet manifold.



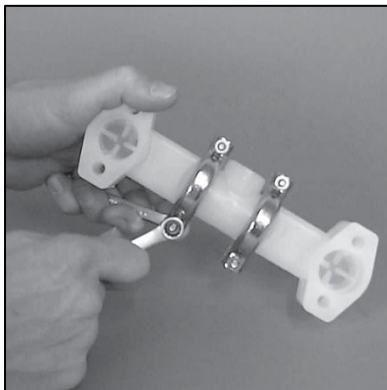
Step 5

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



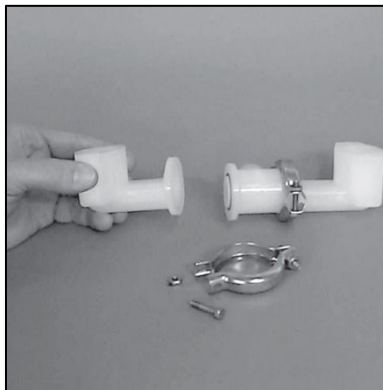
Step 6

Remove and inspect the seat, seat O-ring, and valve ball. Check for nicks, gouges, chemical attack or abrasive wear. Replace worn parts with genuine Wilden parts for reliable performance.



Step 7

Normally the inlet and discharge manifold should not be disassembled during regular pump maintenance. Should this be necessary completely remove and disassemble manifold clamp bands.



Step 8

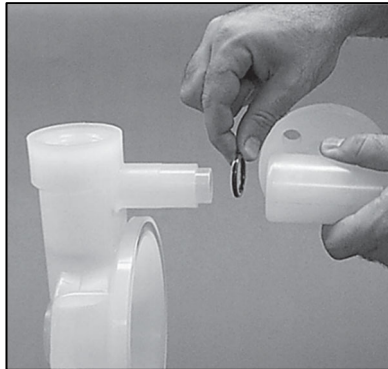
Inspect O-rings for wear or damage and replace if necessary.



Step 9

Use a 7/16" wrench to remove one set of clamp bands that secure one liquid chamber to the one-piece center section.

DISASSEMBLY / REASSEMBLY



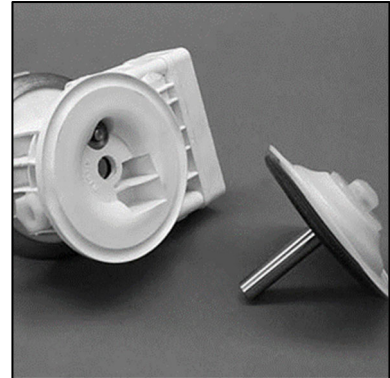
Step 10

Lift the liquid chamber away from the center section to expose the diaphragm and outer piston.



Step 11

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



Step 12A

NOTE: Due to varying torque values, one of the following two situations may occur:

1) The outer piston, diaphragm and inner piston remain attached to the shaft and the entire assembly can be removed from the center section.



Step 12B

2) The outer piston, diaphragm, inner piston, and disc spring separate from the shaft which remains connected to the opposite side diaphragm assembly (Figure 12B). PTFE-fitted pumps come standard with back-up diaphragms.

NOTE: Disc spring not shown on Figure 12B.



Step 13

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

DISASSEMBLY / REASSEMBLY

REASSEMBLY HINTS AND TIPS

Upon performing applicable maintenance to the air distribution system, the pump can now be reassembled. Please refer to the disassembly instructions for photos and parts placement.

To reassemble the pump, follow the disassembly instructions in reverse order. The air distribution system needs to be assembled first, then the diaphragms and finally the wetted path. The applicable torque specifications are on this page.

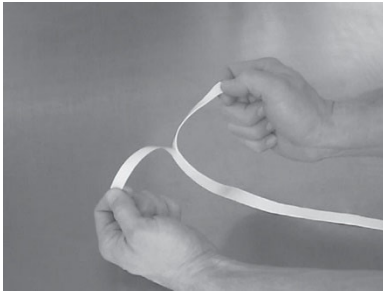
The following tips will assist in the assembly process:

- Clean the inside of the center section shaft bore to ensure no damage is done to new shaft seals.
- Stainless bolts should be lubed to reduce the possibility of seizing during tightening.
- Level the water chamber side of the intake/discharge manifold to ensure a proper sealing surface. This is most easily accomplished by placing them on a flat surface prior to tightening their clamp bands to the desired torque (see this page for torque specs).
- Be sure to tighten outer pistons simultaneously on PTFE-fitted pumps to ensure proper torque values.
- Ensure proper mating of liquid chambers to manifolds prior to tightening vertical bolts. Overhang should be equal on both sides.
- Apply a small amount of removable threadlocker to the threads of the shaft prior to assembling the diaphragms and outer pistons.

Maximum Torque Specifications	
Description	Torque
Air Valve & Solenoid	2.8 N•m [25 in.·lbs.]
Outer Piston	14.1 N•m [125 in.·lbs.]
Small Clamp Band	1.7 N•m [15 in.·lbs.]
Large Clamp Band (Rubber-fitted)	7.4 N•m [65 in.·lbs.]
Large Clamp Band (PTFE-fitted)	9.6 N•m [85 in.·lbs.]
Vertical Bolts (FKM [Rubber only])	5.6 N•m [50 in.·lbs.]
Vertical Bolts (FKM PTFE-fitted)	2.8 N•m [25 in.·lbs.]
Vertical Bolts, all Polypropylene	9 N•m [80 in.·lbs.]

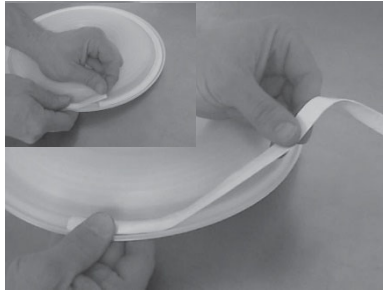
GASKET KIT INSTALLATION

A1 PVDF pumps come standard with expanded PTFE Gasket Kits (P/N 01-9501-99) for all sealing surfaces. A1 Poly pumps come standard with expanded PTFE Gasket Kits (P/N 01-9500-99) for diaphragm bead only. Carefully prepare sealing surfaces by removing all debris and foreign matter from diaphragm bead and all mating surfaces. If necessary, smooth or deburr all sealing surfaces. Mating surfaces must be properly aligned in order to ensure positive sealing characteristics.



Step 1

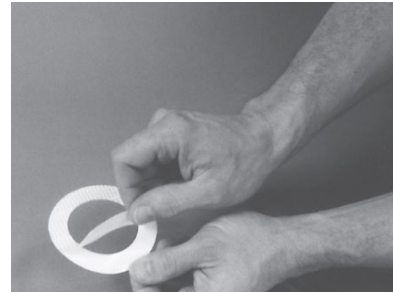
Gently remove the adhesive covering from the back of the PTFE tape. Ensure that the adhesive strip remains attached to the PTFE tape.



Step 2

Starting at any point, place the PTFE tape in the center of the diaphragm bead and press lightly on the tape to ensure that the adhesive holds it in place during assembly. Do not stretch the tape during placement.

The ends of the tape should overlap approximately 12.7 mm (1/2"). Proceed to install the PTFE tape on the remaining diaphragm.



Step 3

Carefully remove the protective covering from the back of the PTFE gasket attached to tape.



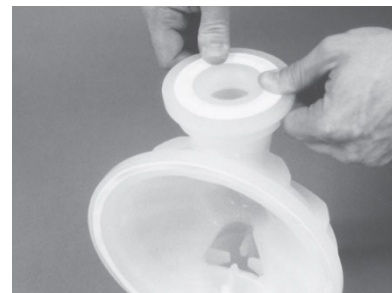
Step 4

Install the valve ball, valve seat and O-ring.



Step 5

Center the gasket so that it evenly covers the O-ring and seat areas.



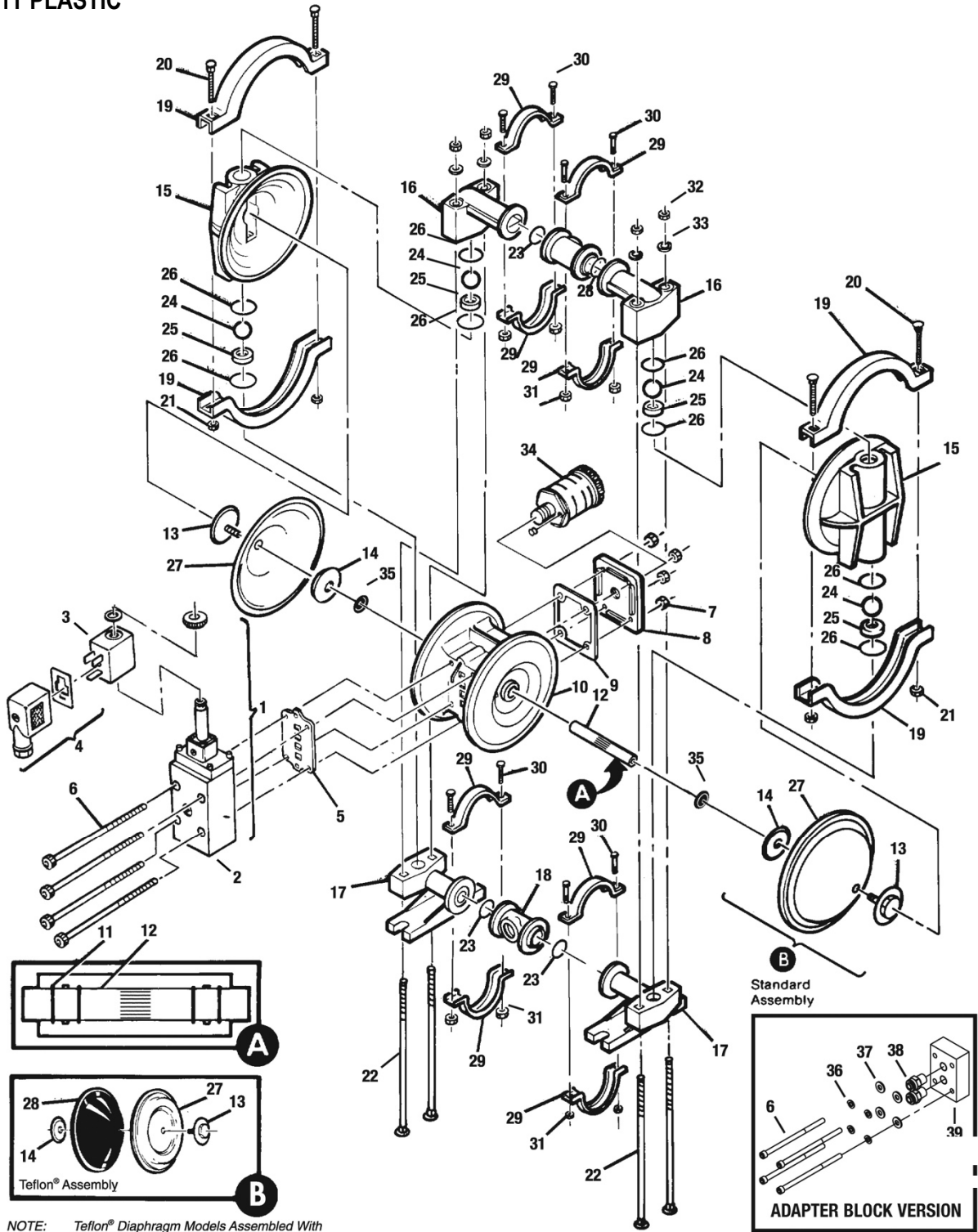
Step 6

Gently apply pressure to gasket to ensure the adhesive maintains a positive seal to stay in place during pump assembly.

SECTION 8

EXPLODED VIEW AND PARTS LIST

A1T PLASTIC



NOTE: Teflon® Diaphragm Models Assembled With Teflon® Gasket Kit At Factory (Not Shown)

EXPLODED VIEW AND PARTS LIST

Item	Part Description	Qty.	Rubber-Fitted		PTFE-Fitted	
			A1T/PPPA-150 P/N	A1T/KPPA-150 P/N	A1T/PPPA-150 P/N	A1T/KPPA-150 P/N
1	24 Volt DC Valve Assembly ¹	1	01-2000-99-150	01-2000-99-150	01-2000-99-150	01-2000-99-150
2	Main Valve Body	1	01-2000-01-150	01-2000-01-150	01-2000-01-150	01-2000-01-150
3	24 Volt DC Coil	1	00-2110-99-150	00-2110-99-150	00-2110-99-150	00-2110-99-150
4	Terminal Connector	1	00-2130-99	00-2130-99	00-2130-99	00-2130-99
5	Air Valve Gasket	1	01-2600-52	01-2600-52	01-2600-52	01-2600-52
6	Air Valve Screw	4	01-6000-03	01-6000-03	01-6000-03	01-6000-03
7	Air Valve Screw Nut	4	04-6400-03	04-6400-03	04-6400-03	04-6400-03
8	Muffler Plate	1	01-3180-20	01-3180-20	01-3180-20	01-3180-20
9	Muffler Plate Gasket	1	01-3500-52	01-3500-52	01-3500-52	01-3500-52
10	Center Section	1	01-3153-20	01-3153-20	01-3153-20	01-3153-20
11	Center Block Glyd™ Ring	4	01-3220-55	01-3220-55	01-3220-55	01-3220-55
12	Shaft	1	01-3800-03-09	01-3800-03-09	01-3800-03-09	01-3800-03-09
13	Piston, Outer	2	01-4570-20-500	01-4570-21-500	01-4570-20-500	01-4570-21-500
14	Piston, Inner	2	01-3710-01-150	01-3710-01-150	01-3710-01-150	01-3710-01-150
15	Liquid Chamber	2	01-5000-20	01-5000-21	01-5000-20	01-5000-21
16	Discharge Manifold Elbow	2	01-5230-20	01-5230-21	01-5230-20	01-5230-21
17	Inlet Manifold Elbow	2	01-5220-20	01-5220-21	01-5220-20	01-5220-21
18	Manifold Tee Section (Female, Threaded)	2	01-5160-20	01-5160-21	01-5160-20	01-5160-21
19	Large Clamp Band Assembly	2	01-7300-03	01-7300-03	01-7300-03	01-7300-03
20	Large Clamp Band Bolt	4	01-6070-03	01-6070-03	01-6070-03	01-6070-03
21	Large Clamp Band Nut	4	04-6400-03	04-6400-03	04-6400-03	04-6400-03
22	Vertical Bolt	4	01-6080-03	01-6080-03	01-6080-03	01-6080-03
23	Manifold O-Ring	4	*	*	01-1300-60-500	01-1300-60-500
24	Valve Ball	4	*	*	01-1080-55	01-1080-55
25	Valve Seats	4	01-1120-21-500	01-1120-21-500	01-1120-21-500	01-1120-21-500
26	Valve Seat O-Ring	8	*	*	00-1205-60	00-1205-60
27	Diaphragm	2	*	*	01-1010-55	01-1010-55
28	Back-up Diaphragm	2			01-1060-51	01-1060-51
29	Small Clamp Band Assembly	4	01-7100-03	01-7100-03	01-7100-03	01-7100-03
30	Small Clamp Band Bolt	8	01-6101-03	01-6101-03	01-6101-05	01-6101-05
31	Small Clamp Band Nut	8	01-6400-03	01-6400-03	01-6400-03	01-6400-03
32	Vertical Bolt Nut	4	04-6400-03	04-6400-03	04-6400-03	04-6400-03
33	Vertical Bolt Washer	4	01-6730-03	01-6730-03	01-6730-03	01-6730-03
34	Muffler	1	01-3510-99	01-3510-99	01-3510-99	01-3510-99
35	Disc Spring	2	01-6802-08	01-6802-08	01-6802-08	01-6802-08
36	Lock Washer ²	4	50-6760-03	50-6760-03	50-6760-03	50-6760-03
37	Flat Washer ²	4	01-6730-03	01-6730-03	01-6730-03	01-6730-03
38	Fitting, Air Inlet ²	2	00-2170-20	00-2170-20	00-2170-20	00-2170-20
39	Adapter Block ²	1	01-2150-XX*	01-2150-XX*	01-2150-XX*	01-2150-XX*
	Vent Plug (not shown)	1	01-7020-17	01-7020-17	01-7020-17	01-7020-17
	Gasket Tape & Donuts (not shown)				01-9500-99	01-9501-99

¹Air valve assembly includes items 2, 3 and 4.

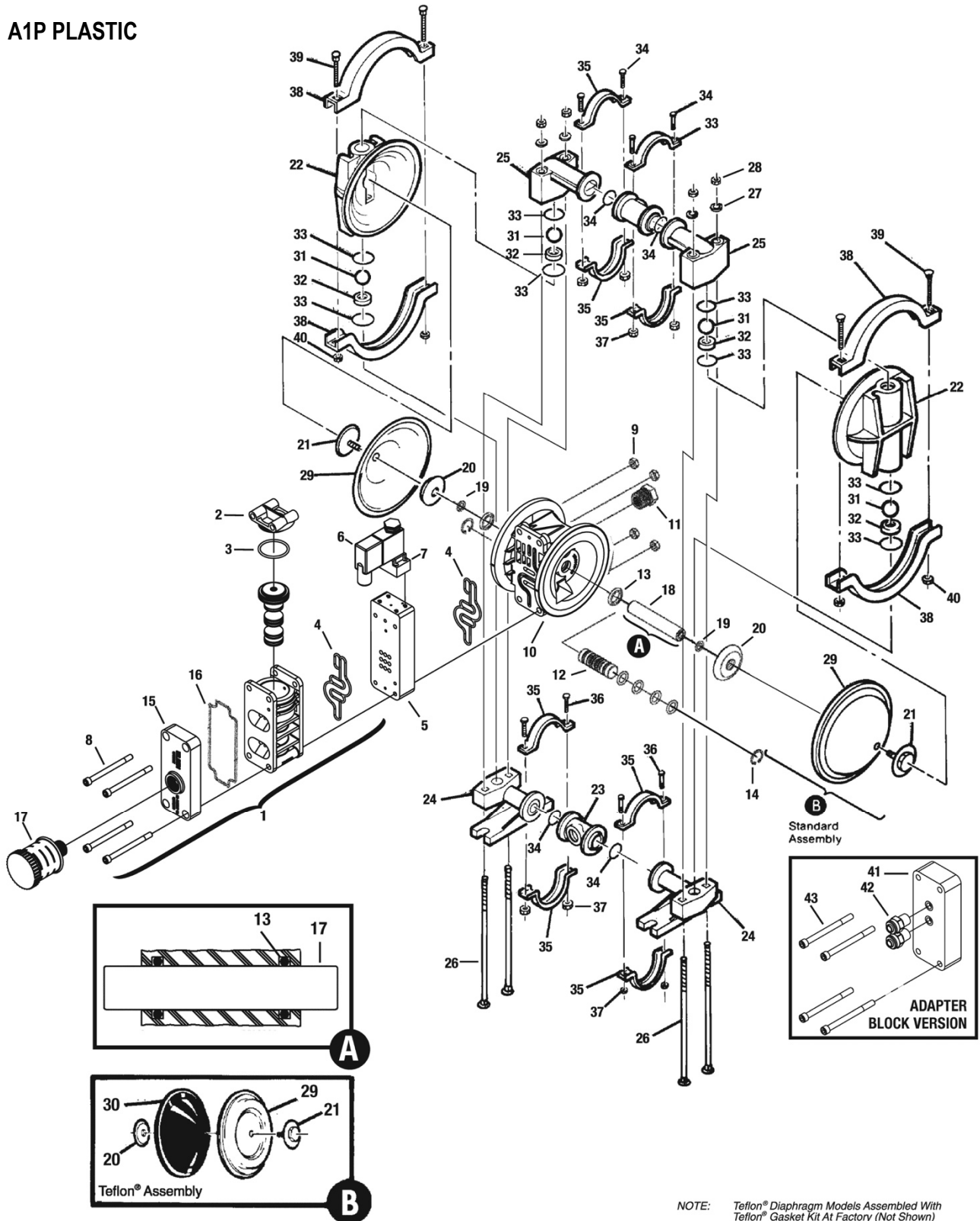
²Adapter block version ONLY.

*Refer to Section 9 for options.

All boldface items are primary wear parts.

EXPLODED VIEW AND PARTS LIST

A1P PLASTIC



NOTE: Teflon® Diaphragm Models Assembled With Teflon® Gasket Kit At Factory (Not Shown)

EXPLODED VIEW AND PARTS LIST

Item	Part Description	Qty.	Rubber-Fitted		PTFE-Fitted	
			A1P/PPPA-150 P/N	A1P/KPPA-150 P/N	A1P/PPPA-150 P/N	A1P/KPPA-150 P/N
1	Pro-Flo™ Air Valve Assembly ¹	1	01-2010-20	01-2010-20	01-2010-20	01-2010-20
2	End Cap	1	01-2332-20	01-2332-20	01-2332-20	01-2332-20
3	O-Ring, End Cap	1	01-2395-52	01-2395-52	01-2395-52	01-2395-52
4	Gasket, Air Valve	2	01-2615-52	01-2615-52	01-2615-52	01-2615-52
5	Pro-Flo™ Solenoid Spacer	1	01-2160-20	01-2160-20	01-2160-20	01-2160-20
6	Terminal Connector	1	00-2130-99	00-2130-99	00-2130-99	00-2130-99
7	24 Volt DC Coil	1	00-2110-99-150	00-2110-99-150	00-2110-99-150	00-2110-99-150
8	Screw, HSHC, Air Valve 1/4-20	4	01-6000-03	01-6000-03	01-6000-03	01-6000-03
9	Nut, Hex, 1/4"-20	4	04-6400-03	04-6400-03	04-6400-03	04-6400-03
10	Center Section Assembly	1	01-3140-20	01-3140-20	01-3140-20	01-3140-20
11	Bushing, Reducer	1	01-6950-20	01-6950-20	01-6950-20	01-6950-20
12	Pilot Sleeve Plug Assy	1	01-2285-99	01-2285-99	01-2285-99	01-2285-99
13	Glyd™ Ring II	2	01-3220-55	01-3220-55	01-3220-55	01-3220-55
14	Retaining Ring	2	00-2650-03	00-2650-03	00-2650-03	00-2650-03
15	Muffler Plate	1	01-3181-20	01-3181-20	01-3181-20	01-3181-20
16	Gasket, Muffler Plate	1	01-3505-52	01-3505-52	01-3505-52	01-3505-52
17	Muffler	1	02-3510-99	02-3510-99	02-3510-99	02-3510-99
18	Shaft, Pro-Flo™	1	01-3810-03	01-3810-03	01-3810-03	01-3810-03
19	Disc Spring	2	01-6802-08	01-6802-08	01-6802-08	01-6802-08
20	Inner Piston	2	01-3711-08	01-3711-08	01-3711-08	01-3711-08
21	Outer Piston	2	01-4570-20-500	01-4570-21-500	01-4570-20-500	01-4570-21-500
22	Liquid Chamber	2	01-5000-20	01-5000-21	01-5000-20	01-5000-21
23	Manifold Tee Section	2	01-5160-20	01-5160-21	01-5160-20	01-5160-21
24	Inlet Manifold Elbow	2	01-5220-20	01-5220-21	01-5220-20	01-5220-21
25	Discharge Manifold Elbow	2	01-5230-20	01-5230-21	01-5230-20	01-5230-21
26	Screw, SHCS (Chamber Bolt)	4	01-6080-03	01-6080-03	01-6080-03	01-6080-03
27	Vertical Bolt Washer	4	01-6730-03	01-6730-03	01-6730-03	01-6730-03
28	Vertical Bolt Nut	4	04-6400-03	04-6400-03	04-6400-03	04-6400-03
29	Diaphragm	2	*	*	01-1010-55	01-1010-55
30	Back-up Diaphragm	2			01-1060-51	01-1060-51
31	Valve Ball	4	*	*	01-1080-55	01-1080-55
32	Valve Seat	4	01-1120-21-500	01-1120-21-500	01-1120-21-500	01-1120-21-500
33	Valve Seat O-Ring	4	*	*	00-1205-60	00-1205-60
34	Manifold O-Ring	4	*	*	01-1300-500	01-1300-500
35	Small Clamp Band	8	01-7100-03	01-7100-03	01-7100-03	01-7100-03
36	Small Clamp Band Bolt	8	01-6101-03	01-6101-03	01-6101-03	01-6101-03
37	Small Clamp Band Nut	8	01-6400-03	01-6400-03	01-6400-03	01-6400-03
38	Large Clamp Band	4	01-7300-03	01-7300-03	01-7300-03	01-7300-03
39	Large Clamp Band Bolt	4	01-6070-03	01-6070-03	01-6070-03	01-6070-03
40	Large Clamp Band Nut	4	04-6400-03	04-6400-03	04-6400-03	04-6400-03
41	Adapter Block ²	1	01-2155-20	01-2155-20	01-2155-20	01-2155-20
42	Adapter Block Air Fittings ²	2	00-2170-20	00-2170-20	00-2170-20	00-2170-20
43	Air Valve Bolts ²	4	04-6000-03	04-6000-03	04-6000-03	04-6000-03
	Gasket Tape & Donuts (not shown)	1			01-9500-99	01-9501-99

¹Air valve assembly includes items 1, 2, 3 and 4.

²Adapter block version ONLY.

*Refer to Section 9 for options.

All boldface items are primary wear parts.

SECTION 9

ELASTOMER OPTIONS

A1 PLASTIC

Material	Diaphragm P/N	Valve Ball P/N	Valve Seat* P/N	Valve Seat O-Ring P/N	Manifold O-Ring P/N
Polyurethane	01-1010-50	01-1080-50		01-1200-50	01-1300-50
Buna-N	01-1010-52	01-1080-52		00-1260-52	01-1300-52
FKM®	01-1010-53	01-1080-53	01-1120-53 ¹		
Wil-Flex™	01-1010-58	01-1080-58		00-1260-58	01-1300-58
Saniflex™	01-1010-56	01-1080-56		01-1200-56	01-1300-56
PTFE PTFE ²	01-1010-55	01-1080-55			
PVDF			01-1120-21-500		
PTFE Encapsulated/ FKM®				01-1205-60	01-1300-60-500

¹Must be used with part number 01-5010-21-500.

²PTFE PTFE diaphragms require Neoprene back-up diaphragms (P/N 01-1060-51).

*FKM valve seats do not require O-rings. Must use KYNAR ball ring P/N 01-5010-21-500.

Solenoid-Operated Valve Assembly Options (Consists of Valve Body, Coil and Connector)

Pump Models Designating Specialty Code #	Part Number	Description
151	01-2000-99-151	24V AC / 12V DC Valve Assembly
153	01-2000-99-153	24V AC / 12V DC Valve Assembly (NEMA 7)
150	01-2000-99-150	24V DC Valve Assembly
154	01-2000-99-154	24V DC Valve Assembly (NEMA 7)
157	01-2000-99-157	International 24V DC Valve Assembly*
155	01-2000-99-155	110V AC Valve Assembly
156	01-2000-99-156	110V AC Valve Assembly (NEMA 7)

Item 1 Main Valve Body Options

Part Number	Description
01-2000-01-150	Main Valve Body
01-2000-01-154	Main Valve Body (Nema 7)

Item 2 Coil Options

Pump Models Designating Specialty Code #	Part Number	Description
150	00-2110-99-150	24V DC Coil
151	00-2110-99-151	24V AC Coil
153	00-2110-99-153	24V AC, NEMA 7 Coil
154	00-2110-99-154	24V DC, NEMA 7 Coil
155	00-2110-99-155	110V AC Coil
156	00-2110-99-156	110V AC NEMA 7 Coil
157	00-2110-99-157	International 24V DC*Coil

*International 24V DC coil is explosion proof per PTB file #EX-91.C.2027.

Adapter Block Options (A1T)

Part Number	Description
01-2150-32	UHMW PE
01-2150-13	Acetal
01-2150-20	Polypropylene

SECTION 10

ELECTRICAL INFORMATION

NEMA 4 / UL / CSA

Part Number	Voltage ±10%			Power (W) ±10%	Current (A)			Resistivity (Ω)
	DC	AC			DC	AC		
		60 Hz	50 Hz			Inrush	Holding	
00-2110-99-150	24	48	44	4.8	.20	.20	.20	121
00-2110-99-151	12	24	22	4.8	.40	.40	.40	32
00-2110-99-155	60	120	110	4.8	.08	.08	.06	840

NEMA 7 / UL / CSA

Part Number	Voltage ±10%			Power (W) ±10%	Current (A)			Resistivity (Ω)
	DC	AC			DC	AC		
		60 Hz	50 Hz			Inrush	Holding	
00-2110-99-153	12	24	22	7	.60	.55	.32	19
00-2110-99-154	24	48	44	7	.30	.30	.18	75
00-2110-99-156	60	120	110	7	.12	.13	.06	475

¹NEMA 4 and IEC 144/855420 I.P. 66 for "Dust-tight, watertight corrosion resistant."

²Meets European standards and regulations, Cenelec/PTB file # EX-91.C.2027.

NOTES

NOTES

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