

# SAFETY MANUAL— READ FIRST!

**IMPORTANT:** READ THESE WARNINGS AND SAFETY PRECAUTIONS PRIOR TO INSTALLATION OR OPERATION. FAILURE TO COMPLY WITH THESE INSTRUCTIONS COULD RESULT IN PERSONAL INJURY AND OR PROPERTY DAMAGE. RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE.

**⚠ WARNING** Pump, valves and all containers must be properly grounded prior to handling flammable fluids and/or whenever static electricity is a hazard.

**⚠ WARNING** Prior to servicing the pump, ensure that the air and fluid lines are closed and disconnected. While wearing personal protective equipment, flush, drain and process liquid from the pump in a safe manner.

**⚠ CAUTION** Do not connect a compressed air source to the exhaust port of the pump.

**⚠ CAUTION** Ensure that the muffler is properly installed prior to pump operation.

**⚠ CAUTION** Do not lubricate air supply.

**⚠ CAUTION** When selecting pump materials, be aware of the following temperature limitations:

Buna-N (Nitrile):	10°F to 180°F (-12C to 82C)
Geolast®:	10°F to 180°F (-12C to 82C)
EPDM:	-40°F to 280°F (-40C to 138C)
Santoprene®:	-40°F to 225°F (-40C to 107C)
Viton® (FKM):	-40°F to 350°F (-40C to 177C)
PTFE:	40°F to 220°F (4C to 104C)
Polyethylene:	32°F to 158°F (0C to 70C)
Polypropylene:	32°F to 180°F (0C to 82C)
PVDF:	0°F to 250°F (-18C to 181C)
Nylon:	0°F to 200°F (-18C to 93C)

Temperature limits are solely based upon mechanical stress and certain chemicals will reduce the maximum operating temperature. Consult a chemical resistance guide for chemical compatibility and a more precise safe temperature limit. Always use minimum air pressure when pumping at elevated temperatures.

**⚠ WARNING** = Hazards or unsafe practices which could result in severe personal injury, death or substantial property damage

**⚠ CAUTION** = Hazards or unsafe practices which could result in minor personal injury, product or property damage.

**⚠ CAUTION** Do not exceed 120 psig (8.3 bar) air-inlet pressure.

**⚠ CAUTION** Ensure all wetted components are chemically compatible with the process fluid and the cleaning fluid.

**⚠ CAUTION** Ensure pump is thoroughly cleaned and flushed prior to installation into a process line.

**⚠ CAUTION** Always wear Personal Protective Equipment (PPE) when operating pump.

**⚠ CAUTION** Close and disconnect all compressed air and bleed all air from the pump prior to service. Remove all process fluid in a safe manner prior to service.

**⚠ CAUTION** Blow out all compressed air lines in order to remove any debris, prior to pump installation.

**⚠ CAUTION** Ensure air exhaust is piped to atmosphere prior to a submerged installation.

**⚠ CAUTION** Ensure all hardware is set to correct torque values prior to operation.

**⚠ CAUTION** Ensure that the selected pump model number is made from the correct material and matches that which was ordered.

## INSTALLATION

**Notice:** Re-torque fasteners prior to use. Refer to torque requirements listed in maintenance manual and attached to pump.

1. A lube-free, clean, dry compressed air source (or any nonflammable, compressed gas) is recommended. Use a filter that is capable of filtering out particles larger than 50 microns.
2. All pumps should be mounted in an upright position with the exception of the 1/4" models which may be rotated 360° to suit the application.
3. When particles exceed the maximum particle specification of the pump or are sharp enough to cut elastomers install a particle fluid filter on the fluid suction line.
4. Fluid suction lines and air exhaust lines should never be smaller than specified pipe size of the pump.
5. Apply PTFE (Teflon®) tape to threads upon assembly to prevent leakage.
6. Never use pipe dope on air line connections.
7. Never use collapsible tube on fluid inlet.
8. Do not exceed 10 ft-lbs of torque on plastic pipe threads.
9. If changing to a different application reconfirm compatibility of fluid.

### SUBMERGED APPLICATIONS

1. Fluid must be compatible with fasteners and intermediate material.
2. Pipe exhaust above the level of the fluid.

### HIGH VISCOSITY APPLICATIONS

1. Position the pump close to or below the level of the fluid source
2. Suction lines should be increased in size - up to three times the size of the inlet manifold. Dual manifolds may be used when available.
3. Start the pump slowly using a valve on the air line.

### LOW TEMPERATURE AND UV EXPOSURE

1. Polypropylene tends to embrittle at freezing temperatures. Pump must be insulated or heated, otherwise use pumps with different materials of construction.
2. If excessive icing occurs at the pump exhaust, air source must be dried using mechanical means or through the introduction of ethyl alcohol in the air line.
3. UV rays will damage polypropylene pumps, either shroud the pumps from UV rays or use pumps with UV stabilized materials.

### GENERAL MAINTENANCE

1. Check periodically for product or air leakage. Tighten any joint where leakage is occurring.
2. When pumping hazardous or toxic materials, diaphragms should be replaced at regularly scheduled intervals based upon pump usage.
3. In freezing temperatures, the pump must be completely drained when idle.
4. When pumping highly abrasive fluids reduce discharge flow rate or reduce air pressure to prolong diaphragm life.
5. If you are pumping a material that will settle or compact, the pump must be flushed before shut down.

## TROUBLE SHOOTING

### AIR IS APPLIED TO PUMP BUT PUMP IS NOT STARTING

1. Clean filters and debris from all fluid lines.
2. Make sure all valves on fluid lines are open.
3. Inspect diaphragms for rupture.
4. Air pressure must not be below 20 psi (1,3 bar).

### PUMP IS PUMPING BUT NOT PRIMING

1. Check all suction line connections for leakage.
2. Inspect check valves for wear or debris.
3. Suction lift specifications may be exceeded.
4. If fluid is viscous use larger suction lines.

### LEAKAGE

1. Retorque all fasteners to specified torque requirements.
2. Replace o-rings.
3. Inspect diaphragms for rupture.

### LOW FLOW RATE

1. Confirm air pressure and air capacity at the air valve as required.
2. Check for leaks in suction line or obstructions in lines.
3. If fluid is viscous use larger lines.
4. Viscosity of fluids may have increased if temperature is lower.

### AIR IN DISCHARGE LINES

1. Check for leaks in suction lines.
2. Inspect diaphragms for rupture.

### ERRATIC CYCLING

1. Inspect check valve seats for debris.
2. Inspect fluid lines for debris.
3. Automatic valves must be properly functioning.
4. Viscosity of product may be changing.

### PREMATURE DESTRUCTION OF WETTED COMPONENTS

1. If fluid is abrasive, slow down pump or increase size of pump.
2. Filter fluid for sharp objects.
3. Make sure fluid is compatible with wetted materials.

# 3" CLASSIC PERFORMANCE MAINTENANCE MANUAL

## CHECK VALVE AND O-RING MAINTENANCE

1. Flush and neutralize the pump to be certain all corrosives or hazardous materials are removed prior to any maintenance. This procedure should always be followed when returning pumps for factory service also.
2. Remove the suction and discharge manifolds fasteners (16, 17, 18). The check valve seats (26) and check balls (27) are located inside the bottom of the Outer Chamber (28) or inside the Discharge Manifold (22). Remove the seat and balls and inspect for excessive wear, pitting, or other signs of degradation. On models using check valve seats (25) and o-rings (24), check the seats, balls, for excessive wear, pitting, or other signs of degradation.

**NOTE: When using pumps built with PTFE o-rings, always replace with new PTFE o-rings since the original o-rings will not reseal the pump.**

## DIAPHRAGM AND PILOT SLEEVE ASSEMBLY MAINTENANCE

3. To inspect the diaphragms, remove the eight fasteners (16, 17, 18, 33) from the outer chamber. If replacement is necessary due to abrasion or rupture, remove the outer diaphragm plates (52) by turning counter-clockwise. Models built with PTFE elastomers will have PTFE overlays (30) that face the outer chamber (28) and back-up diaphragms (31) on the air side of the pump. Pumps without PTFE will contain only the back-up diaphragms (31).
4. If diaphragm replacement is required, remove the inner diaphragm plate by removing fasteners (55, 56).
5. If a diaphragm has been ruptured and corrosive or viscous fluid has entered the air side of the pump, the complete air system should be cleaned and inspected.
6. After removing the diaphragm-plate assemblies, bumpers (3), & flat washers (47) the pilot sleeve assembly (13, 14, 15, 42, 45, & 48) and diaphragm rod assembly (34, 49) may be removed after removing the retaining plate (46) fasteners (38) and pushing the entire unit out through the bore in the intermediate (41). The diaphragm rod assembly must be unscrewed to remove the pilot sleeve (13).

**NOTE: To aid in reassembly apply a non-synthetic, petroleum based lubricating grease without EP additives. Carleton-Stuart MagnaLube G is recommended.**

7. Clean or replace any components that have excessive wear, dirt build-up, or chemical attack. Lube all components prior to reassembling. Reassemble pilot sleeve spacers, o-rings (42) and lip seals (14) within bore of intermediate. Make sure that the open side of the lip seals is facing outward toward the diaphragms. Also make sure that the end pilot spacers (45) are at the end on either side of the pilot sleeve assembly and all inner spacers (48) are separated by o-rings (15). Next carefully insert the diaphragm rod assembly with pilot sleeve inside the assembly in the bore. Reattach retaining plates. Do not over tighten self-tapping screws (38).

**NOTE: To aid in reassembly of the diaphragms apply a non-synthetic, petroleum based lubricating grease without EP additives to the diaphragm's outside diameter sealing bead. Carleton-Stuart MagnaLube G is recommended.**

8. Inspect stud (35) for damage to threads. Replace if necessary by threading into outer plate (52) leaving 7/8" sticking out. Note! Use red (permanent) "Loctite #262" on the threads. Reassemble the diaphragms (31) by placing the "liquid side" on the outer diaphragm plate (52), place the inner diaphragm plate (51) on the opposite side of the diaphragm, insert fasteners (56) with washers (55) and **tighten fasteners to 12.5 ft-lbs (17,0 NM) of torque.**

- NOTE: For models with PTFE overlays (30), position the overlay between the outer diaphragm plate (52) and the diaphragm (31) before attaching the inner diaphragm plate (51).**
9. Invert one diaphragm assembly. Place bumper (3) onto diaphragm rod. Place washer (47) onto stud (35). Attach inverted diaphragm assembly to rod and hand tighten the outer plate. Repeat this process with the second diaphragm assembly. **Note!** It is not necessary to invert the second diaphragm assembly. **Torque the outer plates to a minimum of 10 ft-lbs (13,56 NM).** Position outer chamber (28, dish side up) and secure to workbench. Place the intermediate assembly (center section) onto the chamber with the inverted diaphragm to the top. Note the orientation of the intermediate to the chamber and to the top and bottom of pump. Install all fasteners (16, 17, 18, 33) to inner and outer chambers. **Tighten fasteners to 20 ft-lbs (27,12 NM).** Insert a pry bar into the suction opening of the secured chamber until it contacts the hex boss of the outer diaphragm plate (52). Pry upward until the top diaphragm is as high as it will go. While supporting the pry bar in this up position, slip a second pry bar under the top diaphragm plate and pry upward until it stops. Flip (invert) the top diaphragm down so it is resting on the groove of the inner chamber. Note! When using the pry bar, exercise care not to damage the diaphragms or machined surfaces. Properly orient the second chamber (28) to the intermediate (center section) and repeat installation and torque procedures.
  10. Place the check balls (27) and check valve seats (26) in the discharge manifold (22), position on the outer chamber and reassemble using fasteners (16, 17, 18). Place the check balls (27) and check valve seats (26) in the outer chambers (28), position the suction manifold (23) and reassemble using fasteners (16, 17, 18). **Torque all manifold fasteners to 37 ft-lbs (50,17NM)**  
**Note! For models using check valve seats (25), and o-rings (24), make sure that the o-rings (24) are facing the machined flanges of the suction manifold (23) and/or discharge manifold (22). Also make sure that the o-rings do not shift from their grooves during reassembly.**

## AIR VALVE MAINTENANCE

11. To evaluate the air valve components, remove the eight cap screws (11), washers (8, 10) from the air body (7). Inspect the gasket (4), valve plate (5) and shuttle (6) for scratches, surface irregularities, and excessive wear. Replace if necessary. Using needle nose pliers, pull out both of the end plugs. Push the air valve spool (2) out of the valve. Carefully reach in and pull the lip seals (43) and o-rings (44) out of the air valve body. Check the air valve spool, lip seals and o-rings for cracks, splitting, scratches, and wear. Replace and/or clean items as necessary.
12. Lubricate lip seals (43) and o-rings (44). Reinstall the o-rings and lip seals making sure that the lips of the seals are facing each other. Lubricate and insert the air valve spool (2) with the chamfered end entering the air valve body (7) through the end that has the spool image pictured. Press the end plugs into position. Lubricate and reinsert the shuttle valve (6) and valve plate (5). Place the gasket (4) with the words "THIS SIDE UP" facing the valve plate. Reassemble to the intermediate using cap screws (11) and washers (8, 10). Flat washers (8) should be touching the plastic air valve body. **Tighten cap screws to 40 in-lbs (4,52 NM).**

## EXTERNAL FASTENER TORQUE REQUIREMENTS

**NOTE: When reassembling loosely tighten all external fasteners, adjusting and aligning and gradually, in an alternating fashion, tighten to torque requirements listed below.**

Diaphragm Plates	12.5 ft-lbs	(17,0 NM)
Diaphragm/Rod	10.0 ft-lbs	(13,56 NM)
Chambers	20.0 ft-lbs	(27,12 NM)
Manifolds/Chamber	37.0 ft-lbs	(50,17 NM)
Air Valve Body	40.0 in-lbs	(4,52 NM)

## SPECIFICATIONS

### CAPACITY:

Adjustable 0-255 GPM (965 LPM)

### MAXIMUM TEMP:

3" Metallic - 200°F (93°C)

### MAXIMUM AIR PRESSURE:

120 psi (8,2 bar)

### MINIMUM AIR PRESSURE:

20 psi (1,3 bar)

### DRY LIFT:

Models with PTFE balls - 10 feet (3 meters)

Other Models - 15 feet (4,5 meters)

### WEIGHT:

130 pounds (29 kg)

### MAXIMUM SOLIDS:

7/16" (11,1 mm)

### AIR SUPPLY:

Inlet - 3/4" NPT Female (BSP compatible)

Outlet - 3/4" NPT Female

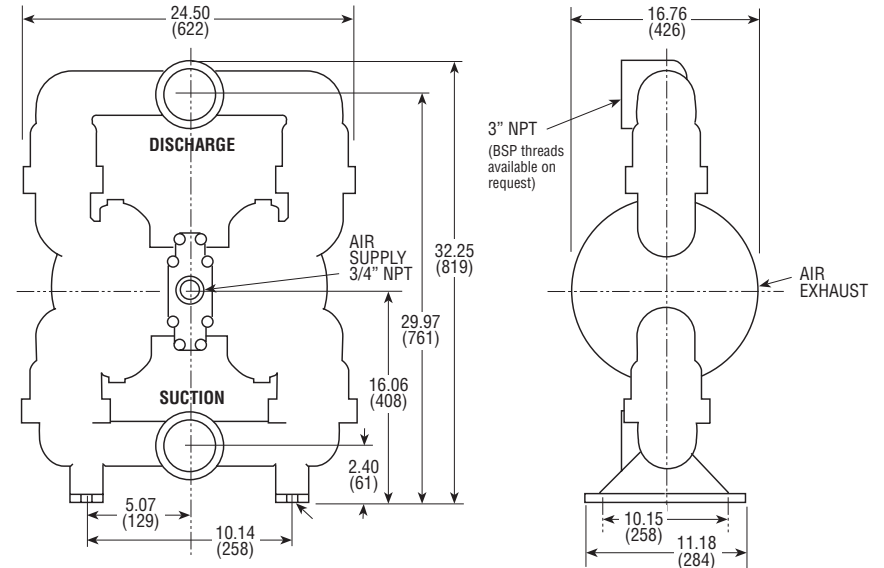
### FLUID INLET/DISCHARGE:

3" NPT Female

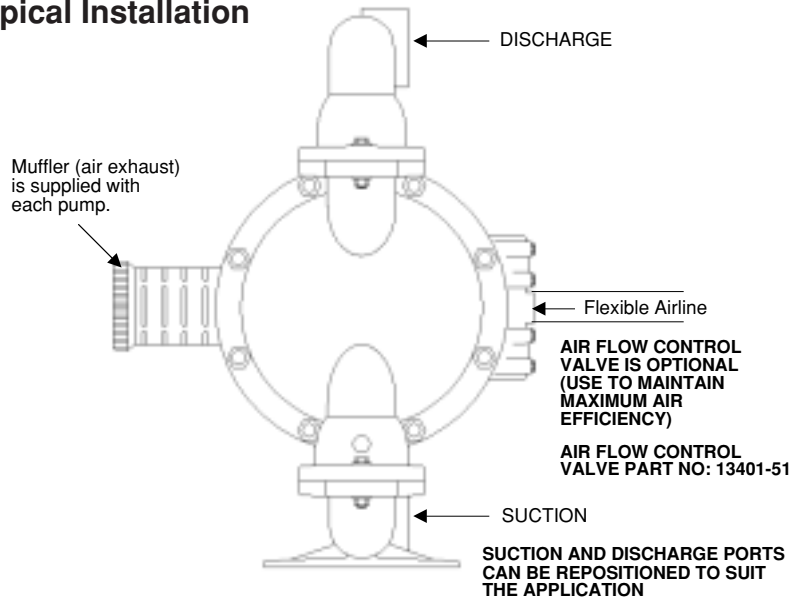
BSP Available

## DIMENSIONS

Dimensions in inches and (mm)



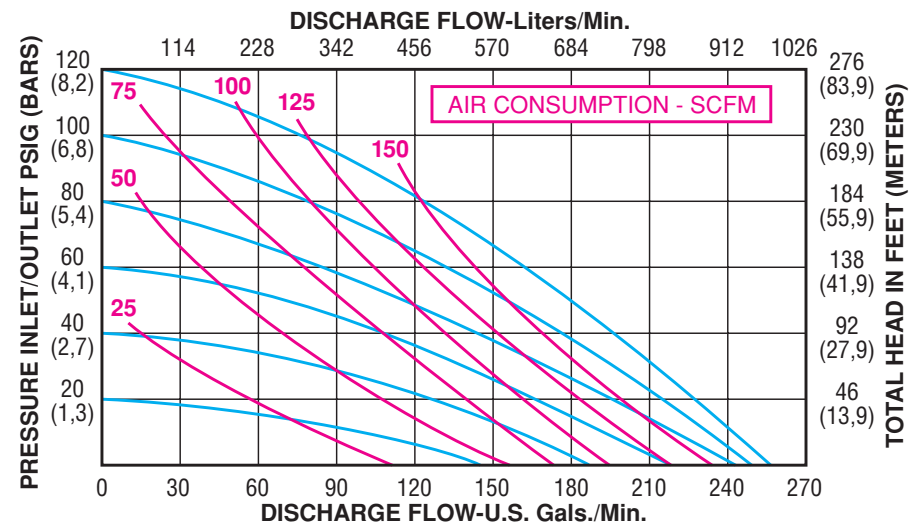
## Typical Installation



**DO NOT USE AIR LINE LUBRICATION**

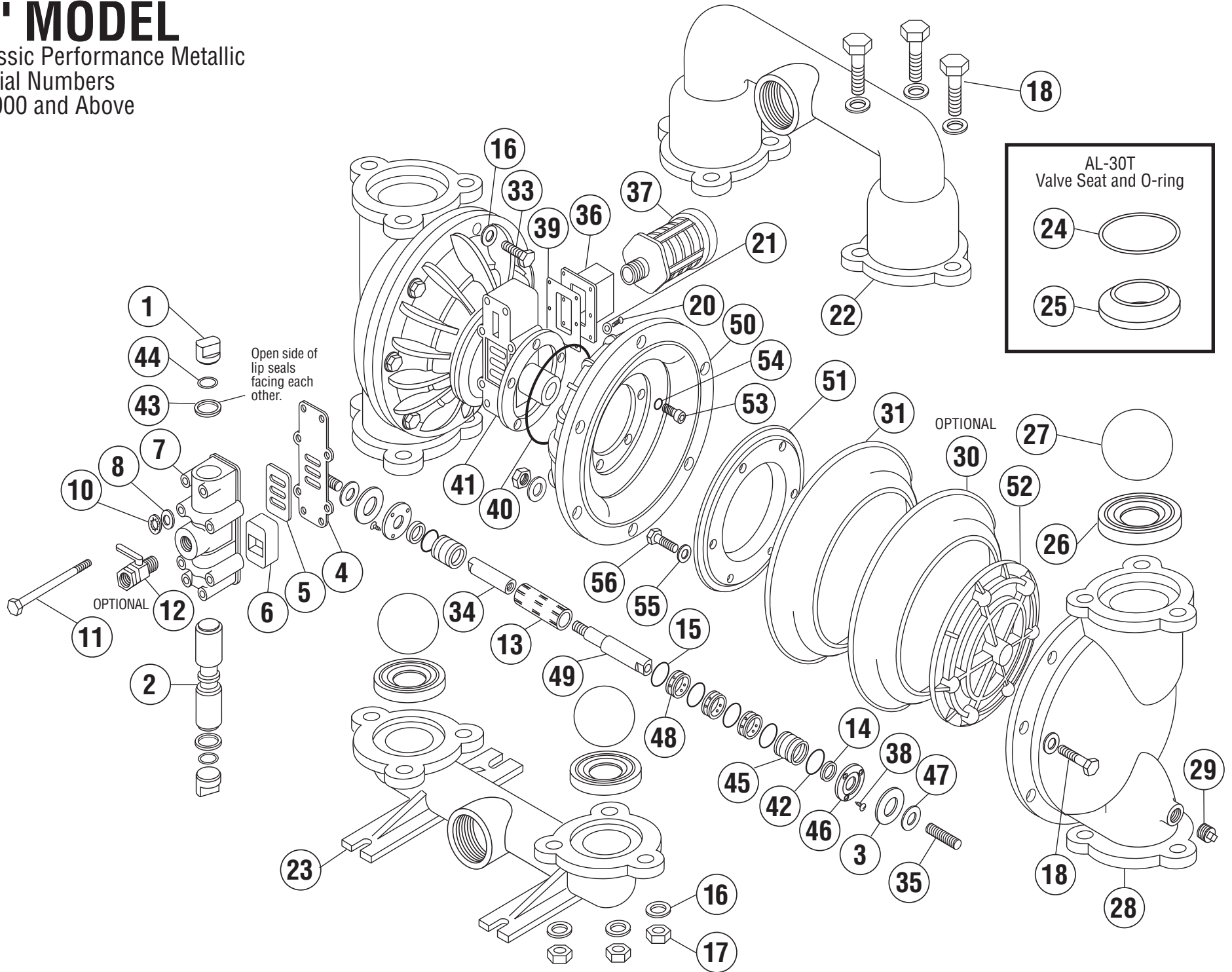
## PERFORMANCE CURVE

(Based on water-flooded suction)



# 3" MODEL

Classic Performance Metallic  
Serial Numbers  
96000 and Above



**3" CLASSIC PERFORMANCE METALLIC MODELS**

**APRIL 2015**

ITEM	DESCRIPTION	Qty per pump	MODEL	PART NO.	MATERIAL
1	AIR VALVE END PLUG	2	ALL 3"	11703-60	POLYPRO
2	AIR VALVE SPOOL	1	ALL 3"	10412-31	ACETAL
3	BUMPER	2	ALL3"	12309-16	URETHANE
4	GASKET	1	ALL 3"	12115-19	NITRILE
5	SHUTTLE PLATE	1	ALL 3"	10414-26	SS
6	SHUTTLE	1	ALL 3"	10413-32	SPECIAL
7	AIR VALVE BODY	1	ALL 3"	11613-60	POLYPRO
8	FLAT WASHER	8	ALL 3"	12300-26	SS
10	LOCK WASHER (1/4")	8	ALL 3"	12350-26	SS
11	CAP SCREW	8	ALL 3"	12516-26	SS
12	AIR FLOW CONTROL VALVE (Optional)	1	ALL 3"	13401-51	PVC
13	PILOT SLEEVE	1	ALL 3"	10106-31	ACETAL
14	LIP SEAL (DIAPHRAGM ROD)	2	ALL 3"	12002-76	NITRILE
15	O-RING (PILOT SLEEVE SPACER)	4	ALL 3"	11919-16	URETHANE
16	FLAT WASHER	52	ALL 3"	12306-26	SS
17	HEX NUT (1/2" - 13)	24	ALL 3"	12604-26	SS
18	HEX BOLT (1/2" X 2-1/2")	24	ALL 3"	12522-26	SS
20	TAPPING SCREW (#8 X 1")	6	ALL 3"	12531-26	SS
21	WASHER #8	6	ALL 3"	12311-26	SS
22	DISCHARGE MANIFOLD (NPT)	1	ALL 3"	10551-20	AL
	DISCHARGE MANIFOLD (BSP)	1	ALL 3"	10552-20	AL
23	SUCTION MANIFOLD (NPT)	1	ALL 3"	10548-20	AL
	SUCTION MANIFOLD (BSP)	1	ALL 3"	10549-20	AL
24	O-RING, VALVE SEAT	4	AL-T	11934-17	PTFE
		OPT	AL	11934-11	NITRILE
		OPT	AL-V	11934-13	VITON
		OPT	AL-E	11934-15	EPDM
25	VALVE SEAT	4	AL-T	10905-42	NYLON
		OPT	ALL 3"	10905-20	AL
26	VALVE SEAT	4	AL-E	10905-15	EPDM
			AL	10905-19	NITRILE
			AL-V	10905-13	VITON
27	BALL	4	AL	11007-19	GEOLAST
			AL-E	11007-23	SANTOPRENE
			AL-T	11007-45	PTFE
			AL-V	11007-13	VITON
			AN	11007-21	NITRILE
28	OUTER CHAMBER	2	ALL 3"	10719-20	AL
29	PIPE PLUG (1/4" NPT)	2	ALL 3"	12205-42	NYLON
30	OVERLAY	2	AL-T	11407-59	PTFE
31	DIAPHRAGM	2	AL, AL-T	10608-16	URETHANE
			AL-E	10608-23	SANTOPRENE
			AL-V	10608-13	VITON
			AN	10608-11	BUNA
			AB	10608-19	GEOLAST
33	HEX BOLT (1/2" X 1-1/2")	4	ALL 3"	12538-26	SS

ITEM	DESCRIPTION	Qty per pump	MODEL	PART NO.	MATERIAL
34	DIAPHRAGM ROD (Short)	1	ALL 3"	*	SS
35	STUD (5/8 X 2-1/4")	2	ALL 3"	12533-25	PS
36	MUFFLER PLATE	1	ALL 3"	13107-60	POLYPRO
37	EXTERNAL MUFFLER	1	ALL 3"	13001-00	SPECIAL
38	SCREW (#6 x 3/4")	6	ALL 3"	12550-26	SS
39	GASKET (MUFFLER PLATE)	1	ALL 3"	12108-11	NITRILE
40	O-RING	2	ALL 3"	11941-11	NITRILE
41	INTERMEDIATE	1	ALL 3"	11520-20	AL
42	O-RING (END SPACER)	2	ALL 3"	11919-11	NITRILE
43	LIP SEAL (AIR VALVE)	2	ALL 3"	12003-76	NITRILE
44	O-RING (VALVE END PLUG)	2	ALL 3"	11913-11	NITRILE
45	END SPACER (Pilot Sleeve)	2	ALL 3"	10206-40	POLYPRO
46	RETAINING PLATE	2	ALL 3"	12712-20	AL
47	WASHER	2	ALL 3"	12312-25	PS
48	INNER SPACER (Pilot Sleeve)	3	ALL 3"	10205-40	POLYPRO
49	DIAPHRAGM ROD (Long)	1	ALL 3"	*	SS
50	INNER CHAMBER	2	ALL 3"	11802-20	AL
51	INNER PLATE	2	ALL 3"	11107-20	AL
52	OUTER PLATE	2	ALL 3"	11213-20	AL
53	SOCKET BOLT	10	ALL 3"	12535-26	SS
54	O-RING	10	ALL 3"	11932-11	NITRILE
55	FLAT WASHER	12	ALL 3"	12303-25	PS
56	HEX BOLT	12	ALL 3"	12534-25	PS

**\* DIAPHRAGM ROD AVAILABLE ONLY AS AN ASSEMBLY**

DIAPHRAGM ROD ASSEMBLY Items 34 and 49	1	ALL 3"	35000-00	SS
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**OPTIONAL ASSEMBLIES**

AIR VALVE ASSEMBLY Items 1,2,4,5,6,7,43,44	1	ALL 3"	50000-60	POLYPRO
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PILOT SLEEVE ASSEMBLY Items 13,14,15,42,45,48	1	ALL 3"	46000-00	VARIOUS
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<b>REPAIR KITS - WET END</b>				
Includes items 26, 27, 31 & (30 optional)				
Model AL-T Repair Kit includes items 24, 25, 27, 31 & (30 - Used in pumps built w/ PTFE)				
To order a wet end repair kit, add "KIT" to the pump model. e.g. AL-30T KIT				

**NOTE:**

1. PS = Plated Steel, SS = Stainless Steel, AL = ALUMINUM
2. Pumps with special finish should reorder same parts with special finish:  
EXAMPLE: OUTER CHAMBER: 10719-20 F16 (Hard Coat Anodized Finish)