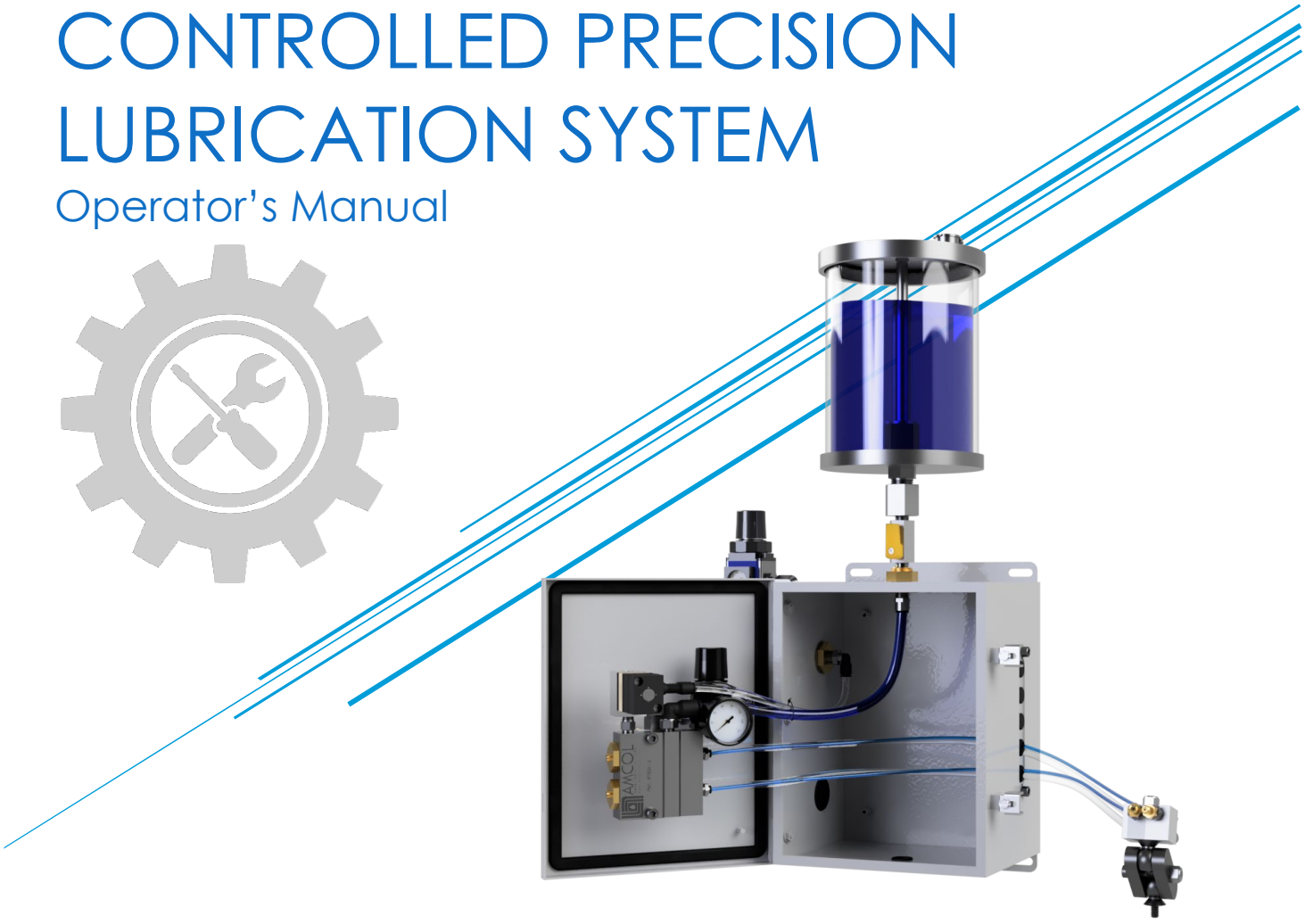
AMCOL CORPORATION

6000P PNEUMATICALLY CONTROLLED PRECISION LUBRICATION SYSTEM

Operator's Manual



Contents

AMCOL Corporation

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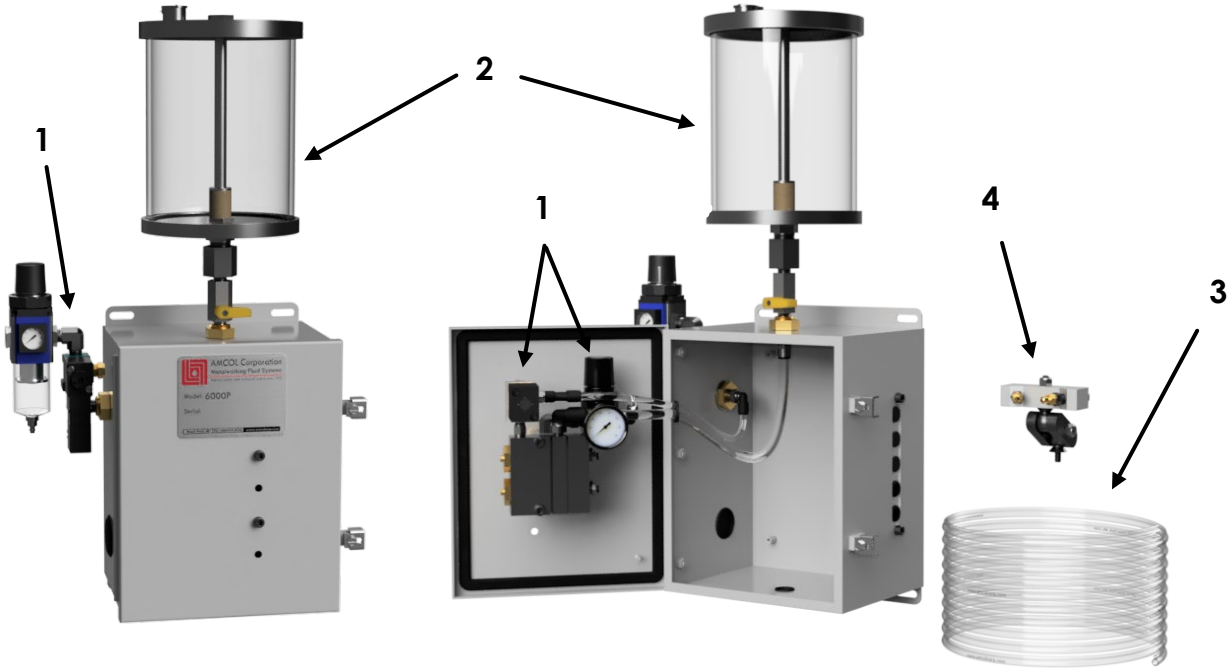
1 Introduction

The AMCOL 6000P Pneumatically Controlled Precision Lubrication Applicator is an air operated spray system used to accurately dispense minute quantities of liquid lubricants and coatings used in the production and fabrication of metal. With this system, fluids are injection metered from a gravity reservoir using patented positive displacement piston pumps and then mixed with air at the spray point. Multi-point lubrication is accomplished with multiple injectors or by splitting outputs at the spray point.

This operator's manual describes the installation, operation, and maintenance of your new AMCOL 6000P Precision Applicator. For more information on the system and the individual components, please refer to the preceding document: "AMCOL 6000P PNEUMATICALLY CONTROLLED PRECISION LUBRICATION SYSTEM - Technical Description."

2 Included Components

1. System Controls
2. Gravity Feed Reservoir
3. Air/Liquid Hose to Spray Point
4. Air/Liquid Spray Assembly



Shown is a 6000P Precision Applicator System with a two injector T60A Posi-pump, ½ Gallon Reservoir, urethane bonded biaxial hose, and B2 Manifold with Air Propelled Wet Tips on a Multifunctional Mounting Bracket.

For additional information about spray manifolds, nozzle extensions, spray tips, and mounting brackets, please see the AMCOL 6000 Series Spray Assemblies- Technical Description and Operator's Manual.

3 Assembly and Installation

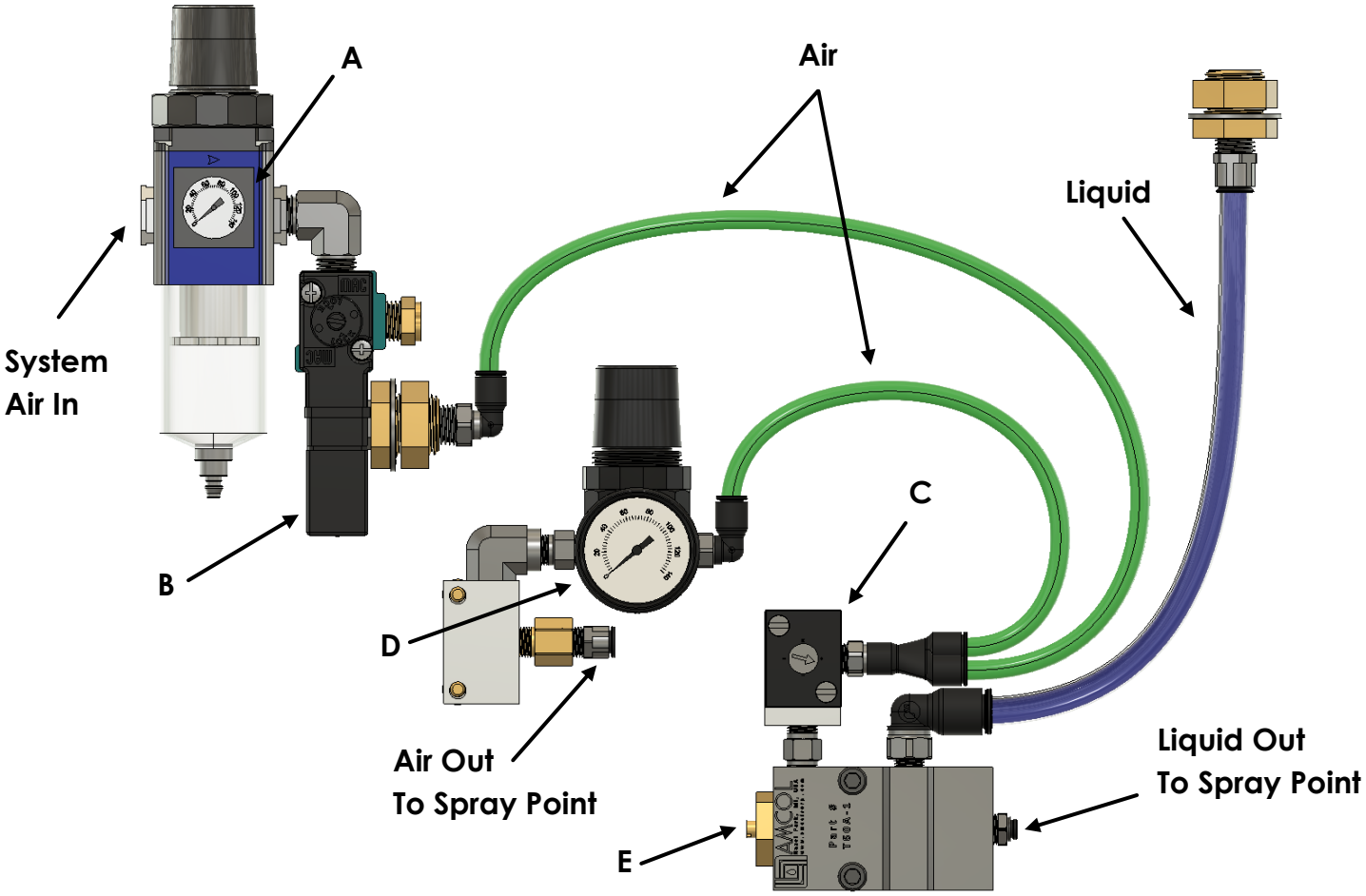
PRIOR TO GETTING STARTED

- ***WARNING! The AMCOL 6000P series applicator is serviced by a high-pressure air source. Pressurized air is inherently dangerous and only qualified individuals should be allowed to work on these systems.***
- ***WARNING! Wear safety glasses at all times.***
- ***WARNING! Lock out service air during assembly, disassembly, and related repairs.***
- ***WARNING! Tighten all hose and fittings prior to operation.***
- ***WARNING! Only use fluids that are compatible with aluminum, brass, steel, urethane, nylon, and acrylic.***

Installation

1. Review your applicator to see that no damage has occurred in shipment.
2. See that all your components and the related mounting are appropriate for your piece of equipment.
3. Ensure that your plant air source has the required capacity and is available, clean, and dry.
4. Mount the system controls in a protected area, which can be easily accessed by operations and maintenance personnel. Some components may require minor assembly as they have been shipped independently to avoid damage in transit.
5. Attach liquid reservoir to the system controls.
6. Mount transition blocks/manifold to the machine, while carefully observing that these items will not interfere with the activities associated with the use, maintenance, and adjustment of your machine.
7. Spray tips should be mounted at the maximum distance from and directly at the spray target. This may require additional adjustments once the system is fully operational.
8. Connect system actuation to your machine controls.
9. Connect plant air source and set the filter-regulator to 60 psi.
10. Fill the liquid reservoir and then open the shut-off valve on the bottom of the reservoir.
11. Manually actuate system, observing that system is leak free and all adjustments are operational. The manual actuator is a push button over-ride recessed toward the top of the solenoid.
12. Under careful observation, operate system in production environment.

4 Recommended Settings



Item ID	Description	Recommended Setting
A	System Air Pressure	60 PSI
B	System Actuation Solenoid	According to machine cycle rate and volume
C	Pulse Frequency Generator	According to injection rate and volume
D	Dispersing Air Pressure	20 PSI as a starting point. Adjustment of the flow control at the transition block is highly dependent on spray tip. Adjust as needed, **DO NOT** mist or fog!
E	Injection Volume	Start at 1.5 turns open from off

5 Operation

Before Getting Started

- Ensure all hoses are connected to the appropriate fittings and are tightly secured.
- Ensure all wiring connections to the solenoids are secure.
- Refill reservoir if low or empty.
- Securely connect an air source to the system air regulator. Check system pressure (60 psi recommended).
- Re-prime the system if liquid is not at the spray point.

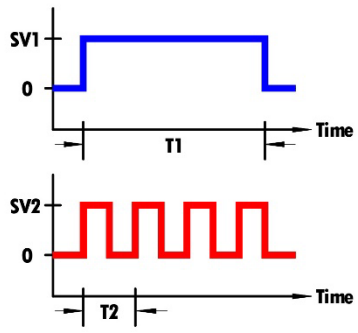
Operating the System Actuation Solenoid

- Observe 0 psi on the Dispersing Air Regulator when closed.
- Observe no fluid output when the Pulse Rate Solenoid is closed.
- Manually open the solenoid and set the Dispersing Air Pressure.
- Manually actuate the solenoid and observe the fluid output. Modify injection volume settings accordingly (clockwise to decrease, counterclockwise to increase).

Setting Injection Pulse Rate

- The Pulse Frequency Generator can be modified through the dial on the face of the PFG.
- Pulse Frequency Generators should not be set less than ¼ of a turn, which is equivalent to approximately 2 cycles per second.

Proper Operation



System Timing

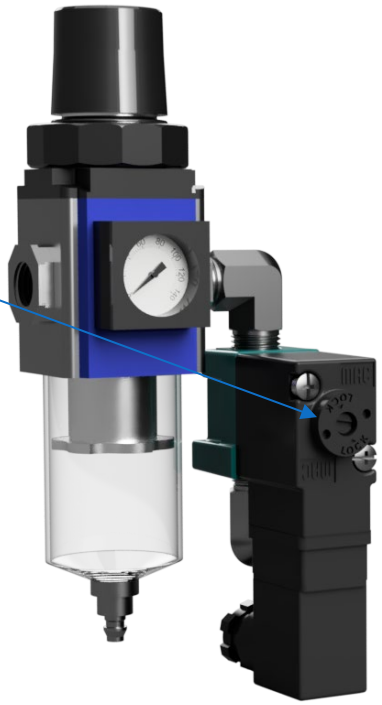
System timing can be seen to the left. This is the normal operation when the system actuation solenoid is opened. SV1 represents the Dispersing Air and is kept on during for the full duration of the spray cycle (T1). SV2 represents the Injection Pulse Rate set by the PFG, which should be actuated according to the desired cycle rate (T2), up to 2 times per second.

Manual Actuation

To manually test the system to observe spray output, perform the following:

- Activate System Actuation Solenoid. This solenoid should remain open while testing spray volume and pattern. Modify Dispersing Air and Injection Rate and Volume settings as necessary.

To manually activate the solenoid, press the manual override button



Manual operation should be used to verify current settings, test spray coating, and troubleshoot.

Automatic Actuation

To automatically use the 6000P system, it should be interfaced with the control PLC, which should contain the following sequence:

- Activate the System Actuation Solenoid whenever the system is operating.

While running automatically, the spray volume and pattern should be consistent. No misting or fogging should be present. See Section 7 for troubleshooting.

6 Priming/Re-priming the System

1. Fill the reservoir.
2. Open the ball valve on the bottom of the reservoir.
3. Open pumps by turning the T60A liquid adjustment screw counterclockwise.
4. Repeatedly cycle the injectors.
5. Once liquid reaches the spray point, readjust the T60A Posi-pump to the desired setting.
6. Adjust spray air pressure if necessary.

7 System Troubleshooting

Check in order as listed

Fluid Volume Inappropriate

- Injectors misadjusted: adjust individual injectors.
- Incorrect cycle timing: readjust Injection Pulse Rate.

Inconsistent Spray Volume to One Spray Point

- Spray tip is clogged: simply remove, clean, and replace spray tip.
- Spray tip is not properly attached: be sure spray tip is tightly threaded and secured, and that the 1/8" liquid line is properly installed onto barbed connectors.
- Spray tip is damaged: remove and replace.
- Liquid or air hose is severed or incorrectly attached: reconnect or replace.
- T60A Posi-pump needs to be rebuilt: see instructions on page 12.

Inconsistent Spray Volume to All Spray Points

- Be sure the fluid reservoir ball valve is open.
- Fluid level is low: refill reservoir.
- Strainer on reservoir is clogged: clean or replace.

Mist or Fog

- Manifolded dispensing air pressure set too high: adjust.
- Individual spray point flow set too high: adjust.

Liquid from Back of Injector

- Injector contact seals leaking: clean injector and replace O-ring.

No or Low Dispersing Air

- Manifolded dispersing air pressure set too low: adjust.
- Air hose is kinked or cut: repair or replace.
- Spray tip is clogged: clean or replace.
- Spray tip is damaged: replace.

Air in Liquid Line

- Fluid line is not properly attached to pump: replace hose or fitting.
- Injector seal is failing: rebuild or replace.

Liquid Drains from Spray Tip

- Injector check valve is failing: rebuild or replace.
- Liquid line in single point nozzle assembly is damaged or disconnected: replace

8 T60A Posi-pump Troubleshooting

No Liquid

- Pump is turned off: turn liquid adjustment screw counterclockwise.
- Pump is seized: remove, clean, and rebuild.
- Reservoir is empty: fill.
- Air pressure is too low: adjust to over 60 PSI.

Bubbles from Injectors

- Air seals are leaking: replace.
- Exit fitting is leaking: replace.

Liquid Drains from Injector Outlet

- Exit fitting is leaking: replace.
- Evacuation valve is ineffective: clean or replace.
- Biaxial hose is trimmed incorrectly: be sure hose is cut straight with no burrs or deformities.

Too Much Liquid

- T60A adjustment screw is too far open: adjust clockwise.

Not Enough Liquid

- Too far closed: adjust counterclockwise
- Liquid outlet (or hose) is kinked: replace.

Liquid Volume is Inconsistent

- Injector is contaminated: clean.
- O-ring seal is faulty: replace or rebuild.

Liquid Volume is Increasing with Time

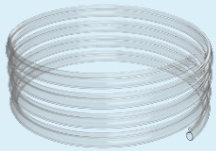
- O-ring on adjustment stem is deteriorated: replace.

Liquid Leaking from Pump Body

- O-ring seals are worn: replace.
- Piston sleeve is not tight: tighten.
- Piston sleeve is worn: rebuild complete injector

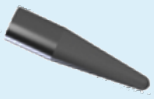
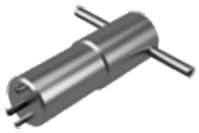
9 Maintenance

Recommended Spares

	Description	Part Number	Quantity
	Biaxial hose	6000-B-BH1	10' per injector
	Rebuild Kit (for T60A)	T60A-RK	1 per injector
	Pneumatic Pulse Frequency Generator	6000-60-A101	1
	T60A Assembly with Pulse Frequency Generator	T60A-1-BA-P *	1
Spray assemblies are unique to each 6000 and should be replaced accordingly when damaged. See the 6000 Series Spray Assemblies Technical Description for information about the various parts and options.			

* Number of injectors on replacement pump must match current system

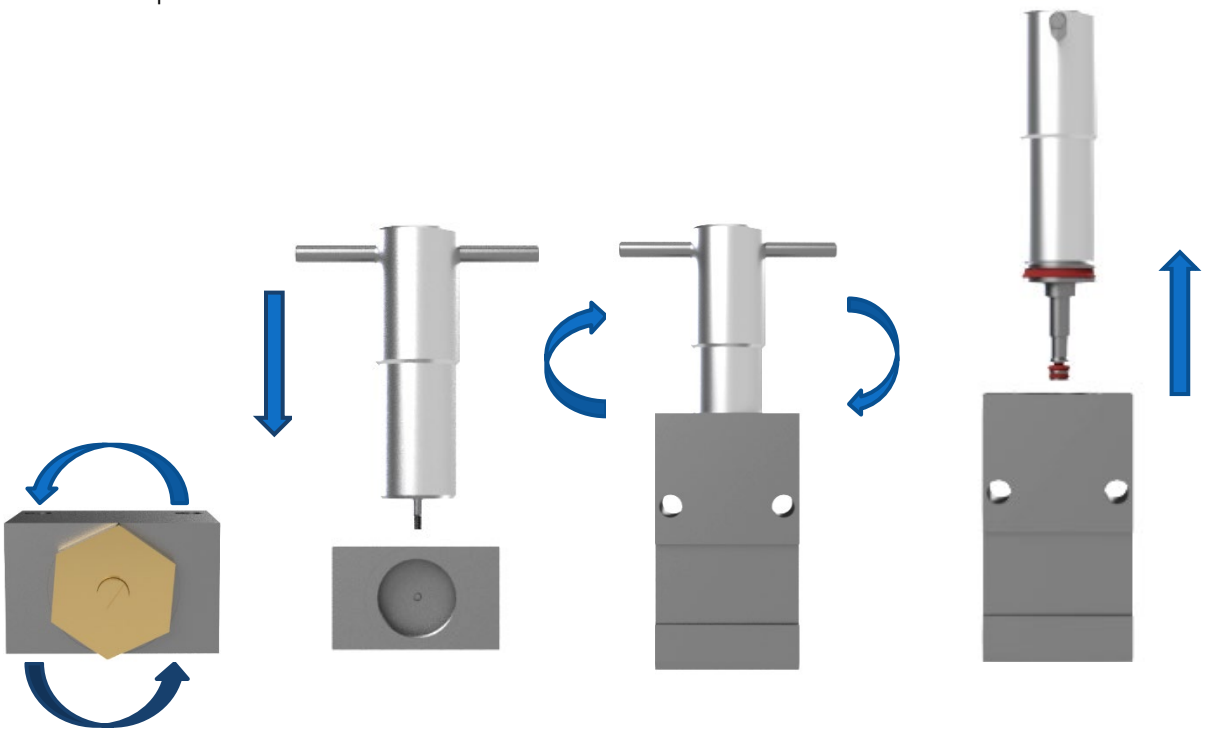
Recommended Tools

	Description	Part Number	Quantity
	O-ring repair tool	ORT-T60	1
	T-60A repair tool	RT-T60	1

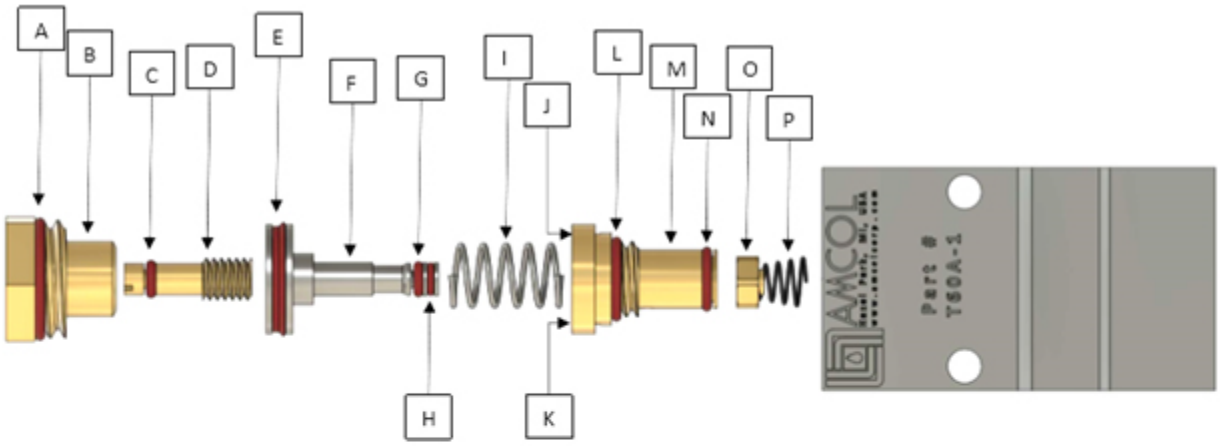
Repair of the T60A Posi-Pump

https://amcolcorp.com/slug/t60a-rebuild-instructions/

1. Remove brass hex cap from the body using a 7/8" wrench.
2. Unscrew adjustment stem from brass hex cap using standard screwdriver.
3. Thread RT-T60A Repair Tool into threaded hole on top of piston subassembly. Slowly pull piston assembly straight out of piston sleeve.
4. Remove Helical Spring from Piston Sleeve.
5. Unscrew Piston Sleeve from pump body using the ears on the RT-T60A Repair Tool and remove.
6. Clean and observe all components, both internally and externally.
7. Using the liquid to be pumped as a lubricant, replace and install all associated components in reverse order.



T60A Posi-pump Bill of Materials



Ref #	Description	Part Number
A	Viton-A O-Ring for Brass Cap	A-3395-13
B	Brass hex cap	B-2799-6
C	Viton-A O-Ring	A-3395-1
D	Liquid Adjustment stem	B-2799-7
E	Viton U-Cup Seal	A-5074-17
F	Piston Sub-assembly	YA-7167-1
G	Slip O-ring	A-4213-39
H	Bottom Piston O-ring	A-4213-37
I	Helical spring	A-7130-1
J	Inner O-ring	A-3395-5
K	O-ring Retaining Ring	YA-7168-1
L	Viton-A O-Ring For Piston Sleeve (top)	A-3395-9
M	Piston sleeve	YB-3543-1
N	Viton-A O-Ring For Piston Sleeve (bottom)	A-3395-6
O	Viton Evacuation valve	A-5087-2
P	Conical spring	A-4957-17

Preventative and Predictive Maintenance

Daily

- Observe fluid level and fill as necessary
- Observe system settings
- Observe system for damage

Quarterly

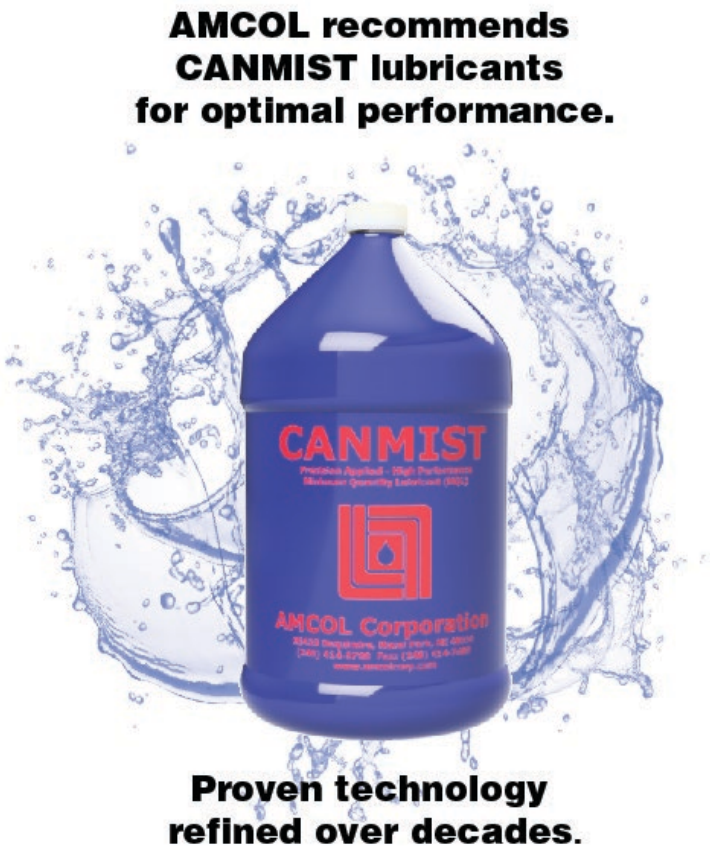
- Empty, clean, and refill reservoir
- Replace liquid and air hose

Yearly

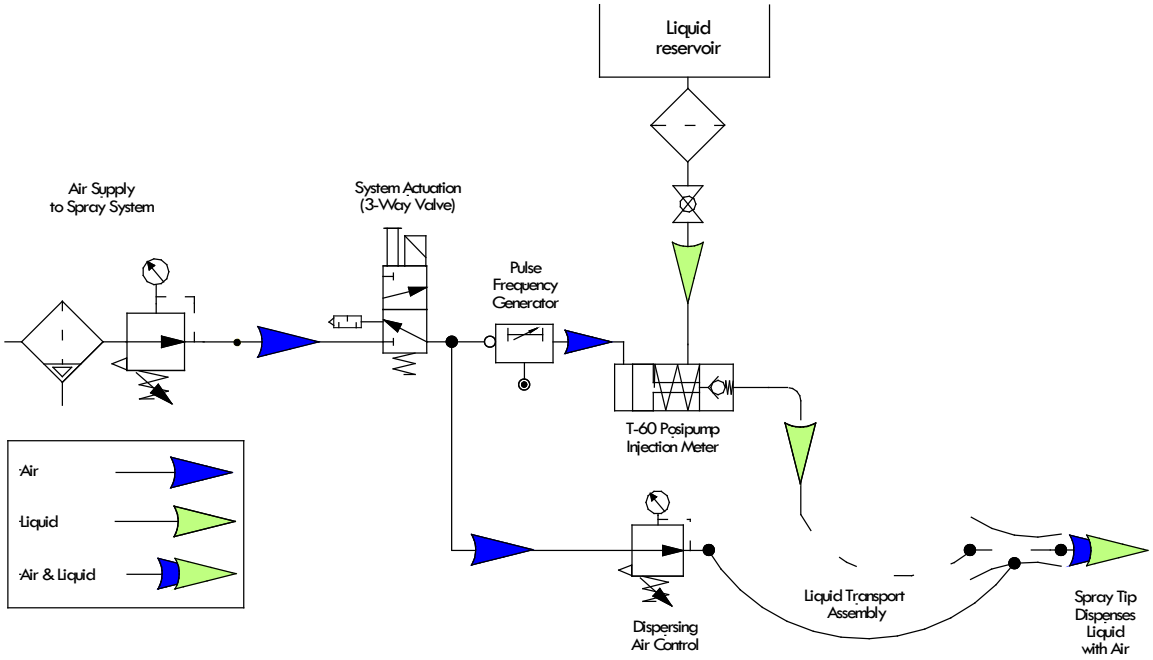
- Rebuild or replace T60A Posi-pumps

10 Recommended Fluids

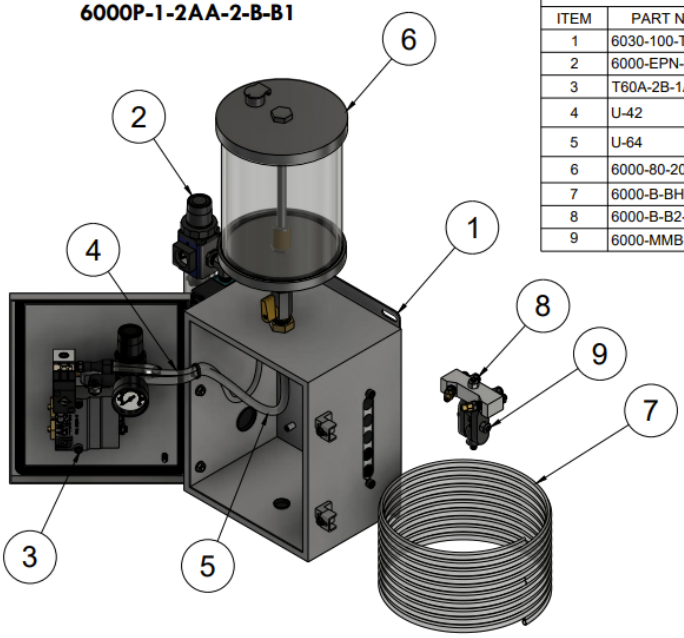
AMCOL offers a variety of CANMIST High Performance Lubricants to meet your specific needs. With your new 6000P Pneumatically Controlled Precision Lubrication System, the properly matched fluid is of critical importance. Only CANMIST fluids are recommended and fully compatible with 6000 Spray Systems. Contact an AMCOL representative to select the right CANMIST fluid for your operation.



11 Schematics and Drawings

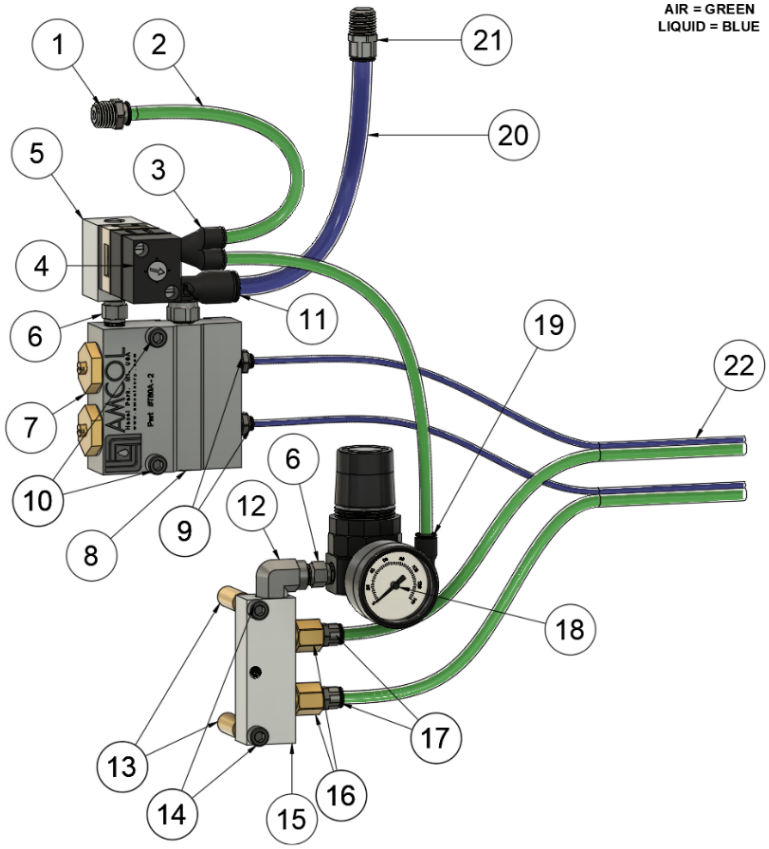


General schematic for single air source



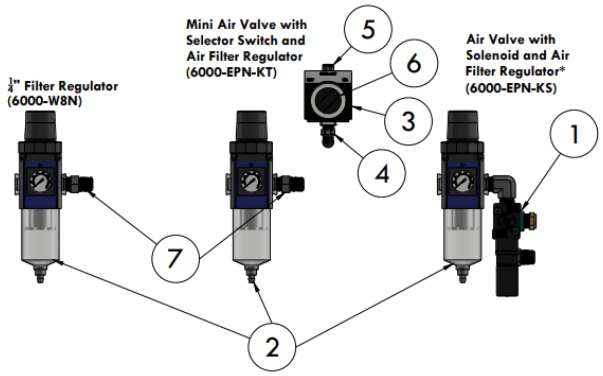
PARTS LIST		
ITEM	PART NUMBER	DESCRIPTION
1	6030-100-T60A-AC2	Enclosure for 6000 Series
2	6000-EPN-KS	Air Valve with Solenoid and Air Filter Regulator (110V AC)
3	T60A-2B-1A	Biaxial T60A-2, Adjustable Hex Caps, Adjustable Regulator
4	U-42	¼ Urethane Tubing
5	U-64	⅜ Urethane Tubing
6	6000-80-20	½ Gallon Reservoir
7	6000-B-BH1	Biaxial Hose
8	6000-B-B2-1022WT1	B2 Manifold with Air Propelled Wet Tips
9	6000-MMB-C2	Compact Mounting Bracket for B2 Manifold

Sample System with Components (6000P-1-2AA-2-B-B1)



PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	3175 56 14	1/4" TUBE X 1/4" MALE THREAD CONNECTOR
2	1	U-42	P/H URETHANE TUBING @ 1/4" OD
3	1	3148 56 11	1/8" NPT X (2) 1/4" HOSE PUSHLOCK FITTING
4	1	6000-60-A101	PULSE (FREQUENCY) GENERATOR
5	1	A10S	TIMER BLOCK - REMOTE
6	2	2-PC-11	1/8" STEEL HEX PIPE
7	1	T60A-2	T60 POSI-PUMP, 2 INJECTOR
8	2	12004	1/8-27 PTF FLUSH PLUG - BLACK
9	2	3175 53 11	1/8" TUBE 1/8" NPT CONNECTOR
10	2	25C125SHC	1/4"-20 X 1 1/4" SCS
11	1	3109 60 11	PUSHLOCK ELBOW 3/8" TUBE X 1/8" MALE THREAD
12	1	2-PC-18	1/8" MALE X 1/8" FEMALE DEG. STEEL ELBOW
13	2	6000-60-020	STACKING NUT
14	2	25C37SHC	1/4"-20 X 3/8" SCS
15	1	2-AM-2	2 HOSE BIAXIAL BLOCK MANIFOLD
16	2	222P-2-2	1/8" - 1/8" PIPE ADAPTER
17	2	3175 56 11	1/4" TUBE X 1/8" MALE THREAD CONNECTOR
18	1	R07-100-RGEA	1/8" REGULATOR
19	1	3109 56 11	PUSHLOCK ELBOW 1/4" TUBE X 1/8" MALE THREAD
20	1	U-64	P/H URETHANE TUBING @ 3/8" OD
21	1	3175 60 14	3/8" TUBE X 1/4" MALE THREAD CONNECTOR
22	1	6000-B-BH1	BIAXIAL HOSE

T60A-2B-1A Complete Assembly

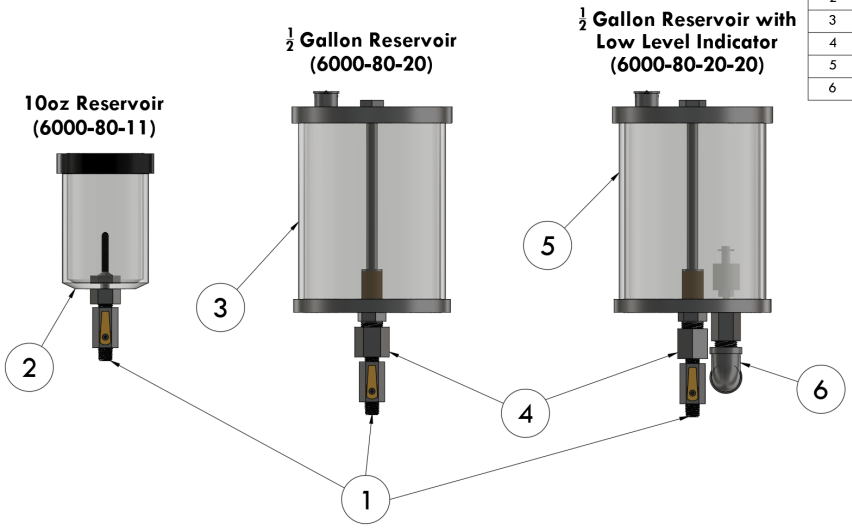


PARTS LIST		
ITEM	PART NUMBER	DESCRIPTION
1	6000-90-11	SOLENOID FOR 6000 (110V)*
2	B07-202-M1KA	1/4" FILTER-REGULATOR
3	800T-X528	ON/OFF PLATE FOR 6030 TOGGLE SWITCH
4	3109 56 11	PUSHLOCK ELBOW 1/4" TUBE X 1/8" MALE THREAD
5	3175 56 11	1/4" TUBE X 1/8" MALE THREAD CONNECTOR
6	6030-90-12	ON/OFF SELECTOR SWITCH
7	4-PC-11	1/4" MALE NPT HEX NIPPLE

* Other Voltages available, contact your sales representative for information

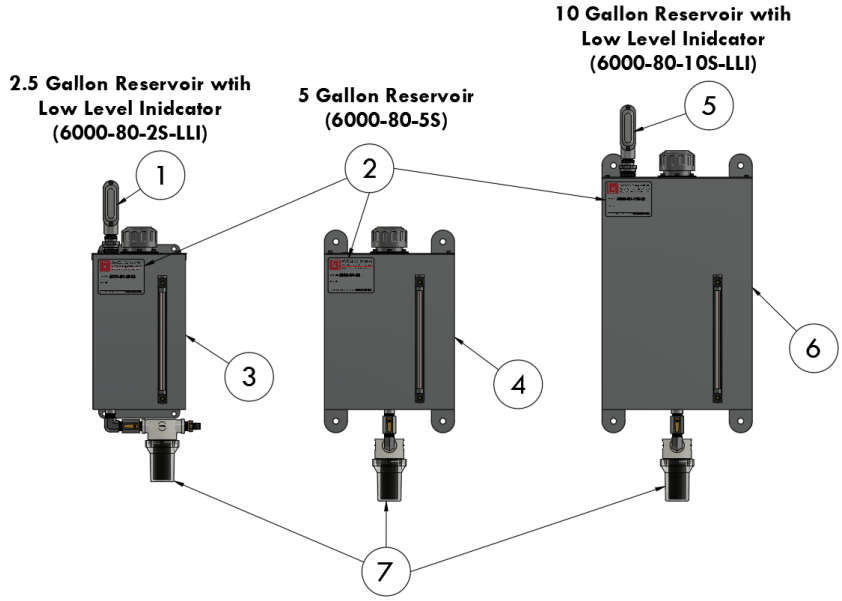
System Actuation Assemblies

PARTS LIST		
ITEM	PART NUMBER	DESCRIPTION
1	MV608-4	1/4" M X 1/4" F BALL VALVE
2	A-5409-1	10 Ounce Reservoir with Filter
3	B-966-16-S01	½ Gallon Reservoir
4	0201-8-4	1/2 F x 1/4 M P/H Hose Adapter
5	YB-5167-7	½ Gallon Reservoir with LLI
6	ELM90-50	½" Male Iron 90 Deg Elbow

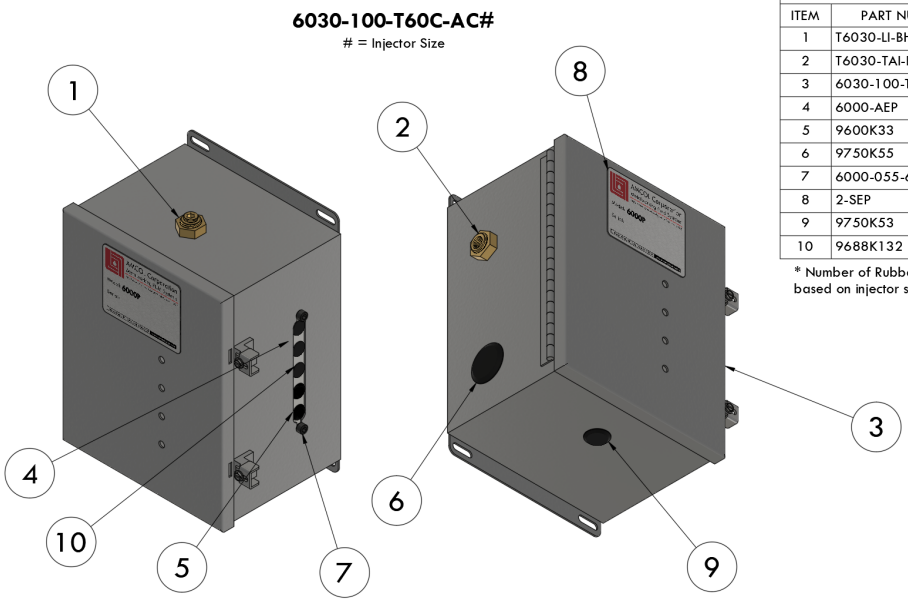


Top Mounted Reservoir Assemblies

PARTS LIST		
ITEM	PART NUMBER	DESCRIPTION
1	LLI-622-5W	Low Level Indicator for 2.5 and 5 Gallon Reservoir
2	2-SEP	SERIALIZED EQUIPMENT PLATE
3	80-2.5-20-SA	2.5 Gallon Gravity Feed Reservoir Stock Assembly
4	80-5-20-SA	5 Gallon Gravity Feed Reservoir Stock Assembly
5	LLI-622-10W	Low Level Indicator for 10 Gallon Reservoir
6	80-10-20-SA	10 Gallon Gravity Feed Reservoir Stock Assembly
7	6000-LFA	Liquid Feed Assembly



Wall Mounted Reservoir Assemblies



PARTS LIST		
ITEM	PART NUMBER	DESCRIPTION
1	T6030-LI-BH	Liquid-In Bulkhead
2	T6030-TAI-BH	Air-In Bulkhead for Toggle
3	6030-100-T60C	Enclosure for 6030
4	6000-AEP	Aluminum Plate
5	9600K33	Rubber Grommet*
6	9750K55	Black Polyethylene Plug- 1 $\frac{1}{4}$
7	6000-055-60	$\frac{1}{4}$-20 x $\frac{1}{4}$ Socket Cap SCS
8	2-SEP	Serialized Equipment Plate
9	9750K53	Polyethylene Snap-in Finishing Plug
10	9688K132	Black Nylon Finishing Plug $\frac{7}{8}$ *

* Number of Rubber Grommets and Black Nylon Plugs are different based on injector size

6000P Enclosure Assembly (2 Injector Shown)

AMCOL Corporation

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