Serv-O-Spray™

Operation Manual

UNIST
Environmentally Friendly Lubrication

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1-800-253-5462 (US & Canada)
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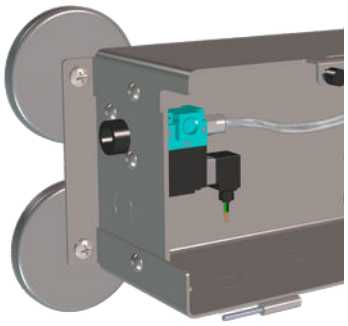
Serv-O-Spray™ Operation Manual

02/11/2019 V2.4

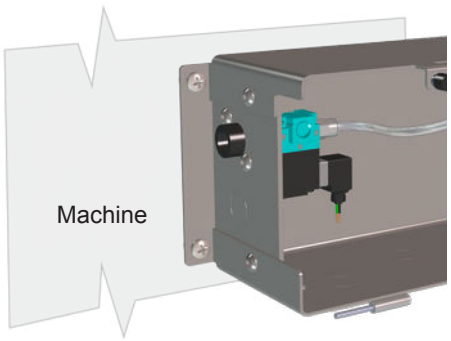
Serv-O-Spray™ Quick Start Guide

1. Mount (Pg. 10)



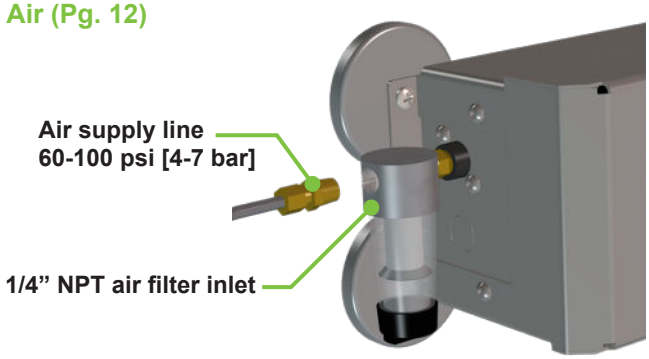
Magnet mount

or



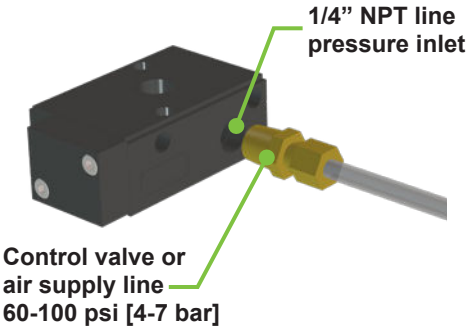
Direct mount

2. Air (Pg. 12)



Air supply to filter

or

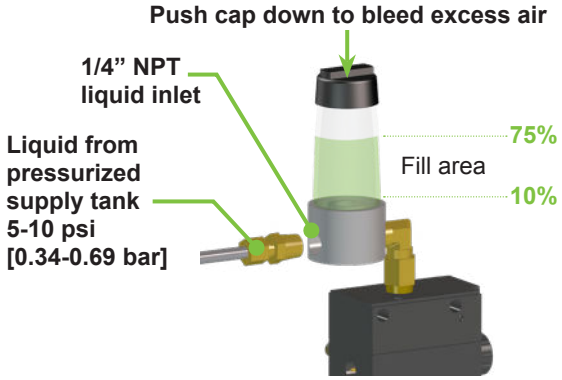


Air supply to manifold

3. Fluid (Pg. 12)

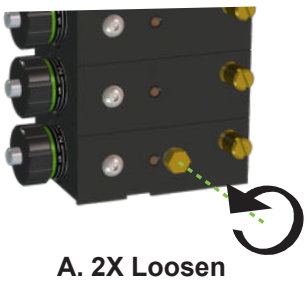
Fill reservoir

or



Bleed trapped air

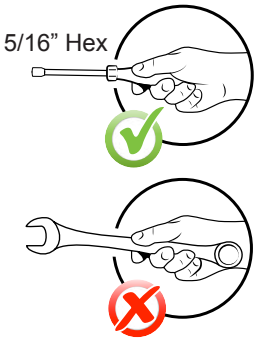
4. Prime (Pg. 14)



A. 2X Loosen

B. Drip

C. 2X Tighten



Do Not
Overtighten

Important Operator Information

Consult this documentation in all cases where this caution symbol appears. This symbol is used to inform you of any potential HAZARD or actions that require your attention.

Use of this equipment in a manner other than that specified by Unist, Incorporated may compromise design integrity and become unsafe.

WARNING: This equipment is not intended for use in explosive environments.

ADVERTENCIA: Este equipo no está diseñado para uso en atmósferas explosivas.

AVVERTIMENTO: Questa apparecchiatura non è inteso per l'uso in ambienti esplosivi.

WARNUNG: Das Ausrüstung darf in einer explosiven Umgebung NICHT verwendet werden.

AVERTISSEMENT: Cet équipement n'est pas prévu pour une utilisation dans des environnements explosifs.

WARNING: This product can expose you to chemicals, including lead, which is known to the State of California to cause cancer, birth defects, or other reproductive harm. For more information go to www.p65warnings.ca.gov.

ADVERTENCIA: Este producto puede exponerlo a productos químicos, incluido el plomo, que el estado de California sabe que causan cáncer, defectos de nacimiento u otros daños reproductivos. Para obtener más información, vaya a www.p65warnings.ca.gov.

AVVERTIMENTO: Questo prodotto può esporre a sostanze chimiche, incluso il piombo, che è noto allo Stato della California come causa di cancro, difetti alla nascita o altri danni riproduttivi. Per ulteriori informazioni, visitare www.p65warnings.ca.gov.

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AVERTISSEMENT: Ce produit peut vous exposer à des produits chimiques, y compris le plomb, qui est connu par l'État de Californie pour causer le cancer, des malformations congénitales ou d'autres problèmes de reproduction. Pour plus d'informations, visitez www.p65warnings.ca.gov.

Identifying Symbols

Caution - ISO 7000-0434B

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Introduction

Thank You

Thank you for your purchase of the Unist Serv-O-Spray™. Please take the time to read this operation manual to take full advantage of your new Serv-O-Spray™.

The Unist Serv-O-Spray™ uses a positive-displacement pump to deliver precise and repeatable shots of lubricant. The system offers flexibility while maintaining simplicity and can be operated using only compressed air.

Figure 1: Serv-O-Spray™ system

System Introduction

The Serv-O-Spray™ gives simple, precise lubrication. Two types of pumps are available: atomizing pumps that provide an air and oil mix, and oil-only pumps. These adjustable positive-displacement pumps are proven with a track record of consistency and reliability. Their modular design allows multiple pumps to be stacked together when more than one output is required, so each system can be tailored specifically for the application. Each pump in the stack includes a stroke adjustment for the pump output.

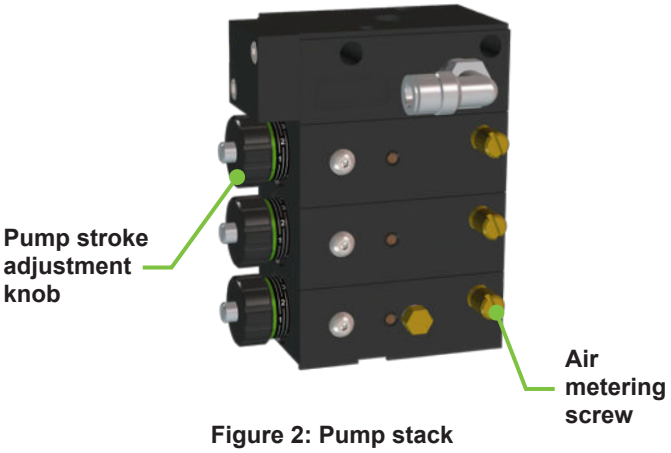


Figure 2: Pump stack

Atomizing pumps also have an air metering screw to regulate the output air flow. The combination of these adjustments gives complete control of the spray output.

It is not only the adjustability and precision of the Unist Serv-O-Spray™ that keeps our customers satisfied, but also our unrivaled quality. Unist products are built to provide years of service in tough, industrial environments. We take pride in the quality of our equipment and each Unist system is thoroughly tested in our shop before making its way to yours.

Common Configurations

The Serv-O-Spray's™ modularity gives each customer the flexibility to configure a unit exactly as needed. Because of this, there are thousands of Serv-O-Spray™ configurations. They may look different because of the presence or absence of an enclosure or the size of the reservoir, but regardless of the look, all Serv-O-Sprays™ have the same key components which use the same simple adjustments. The examples provided below illustrate some of these different looks.

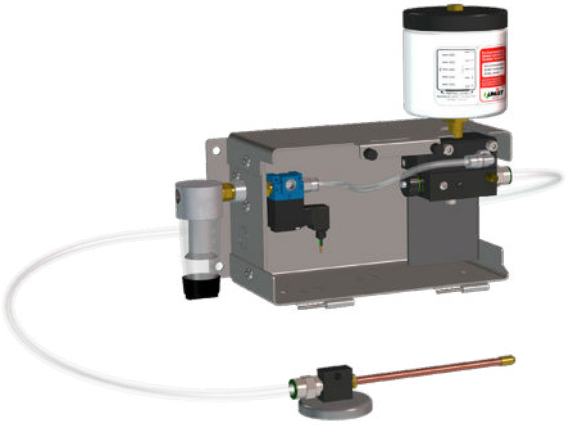


Figure 3: Single pump output system with an enclosure

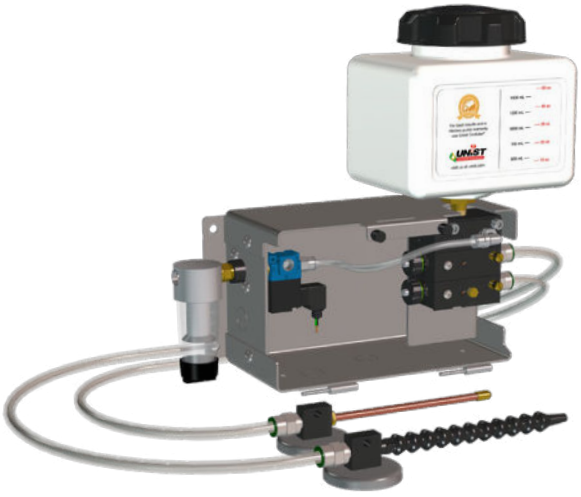


Figure 4: Multiple pump output system with an enclosure

Figure 5: Single pump output system without an enclosure

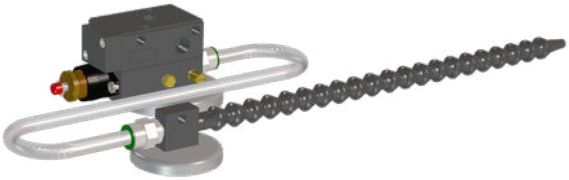


Figure 6: Single pump output system without an enclosure & reservoir

Unist systems perform best with our Coolube® line of lubricants. Coolube's® 100% natural, non-toxic, renewable plant oil-based composition makes it an ideal choice for manufacturers who care about their environmental impact. Coolube® contains no petroleum products, is 100% chlorine and silicone free, and produces no harmful VOC's. Coolube® is completely biodegradable, yet still has a long shelf life. An added benefit is your system's pump is guaranteed for life when used exclusively with Unist Coolube® lubricant.

Figure 7: Coolube® lubricant

Key Components

The Pump

In most cases, the Serv-O-Spray™ provides an atomized oil and air mixture that is delivered to the work interface. For some applications, it can be configured with an oil-only pump, so only fluid is delivered. The oil is metered using a pneumatically actuated positive-displacement pump and the output per stroke is adjusted with the pump stroke adjustment knob.

There are many variations of pumps used in the Serv-O-Spray™ system based on the viscosity of the fluid being used, the output rate required, if it is an air atomizing or an oil-only pump, and where the pump is located in the pump stack. The charts on pages 4 and 5 will help identify which style of pumps is/are in your system.

On an atomizing pump, the air flow is controlled with an air-metering screw. The volume of oil supplied with each pump stroke is controlled by the pump stroke adjustment knob. The density and distance of the spray is determined by these two adjustments.

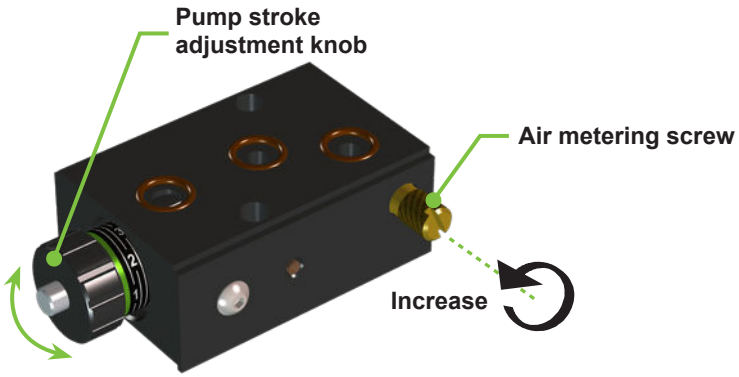


Figure 8: Air metering screw & pump stroke adjustment

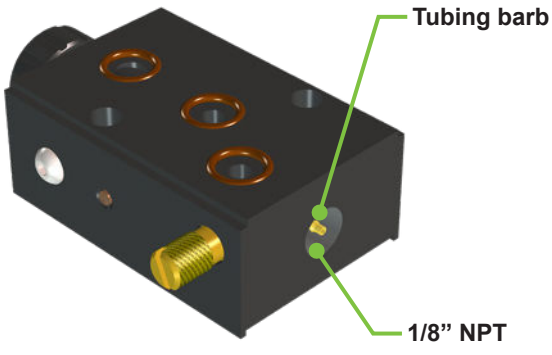


Figure 9: Outlet port

Intermittent Fluid Output

Every time a compressed air signal is supplied from an actuation valve, the pump will deliver one quick shot of fluid out the nozzle tip along with a controlled amount of air. Air continues to flow from the nozzle tip until the air actuation valve is closed. The pump will not deliver another shot until the actuation valve is closed and then reopened. The pumps can be cycled as often as needed, up to 150 times per minute (not recommended for continuous operation). The actuation valve should be on for at least 100 milliseconds and off for at least 100 milliseconds.

Figure 10: Intermittent fluid output

Output

If the Serv-O-Spray™ is designed to deliver an air and oil spray, keeping the fluid and air separate until the point of application is the key to delivering consistent spray output. Unist's coaxial outputs excel at this by combining the fluid and air directly at the nozzle tip. The "jacket of air" surrounding the fluid outlet evenly atomizes the fluid and delivers it to the target in a balanced spray pattern. In the oil-only case, the output from the Serv-O-Spray™ can be connected directly to the point(s) of application.

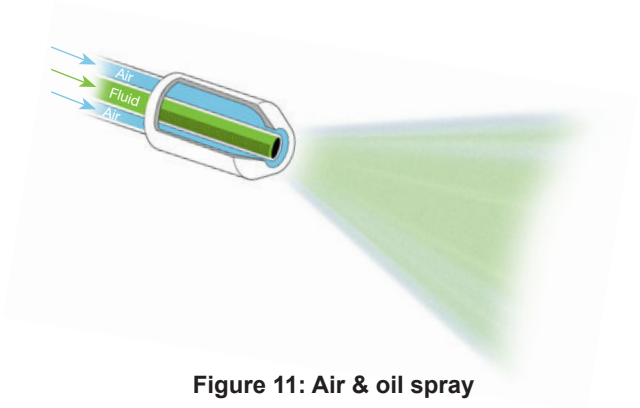
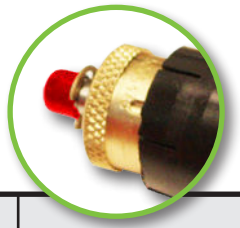


Figure 11: Air & oil spray

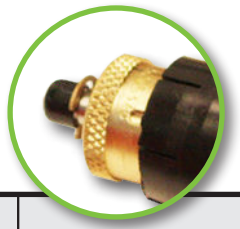
Standard Pump Identification Charts



1-Drop Standard Pump (Red Cap)

(Knurled brass adjustment knob with black body)

Features	Air metering screw	Air metering screw & drain plug	None	Drain plug
Pump				
Part #	94-6811	94-6821	94-6811-1	94-6821-1
Location	intermediate	bottom	intermediate oil-only	bottom oil-only



3-Drop Standard Pump (Black Cap)

(Knurled brass adjustment knob with black body)

Features	Air metering screw	Air metering screw & drain plug	None	Drain plug
Pump				
Part #	94-6813	94-6823	94-6813-1	94-6823-1
Location	intermediate	bottom	intermediate oil-only	bottom oil-only

Figure 12: Standard pump identification charts

1-Drop MV Pump (Green Band)

(Anodized aluminum adjustment knob with black body)

Features	Air metering screw	Air metering screw & drain plug	None	Drain plug
Pump				
Part #	302098	302099	302416	302417
Location	intermediate	bottom	intermediate oil-only	bottom oil-only

2-Drop MV Pump (Red Band)

(Anodized aluminum adjustment knob with black body)

Features	Air metering screw	Air metering screw & drain plug	None	Drain plug
Pump				
Part #	302100	302101	302418	302419
Location	intermediate	bottom	intermediate oil-only	bottom oil-only

Figure 13: MV pump identification charts

System Layout

A. Air filter

Standard on every system with enclosure

B. Control valve

Options include solenoid valve (shown), air pilot valve, manual valve, or foot valve

C. Positive-displacement metering pump

Precise and reliable with full stroke outputs of 0.033 mL, 0.100 mL, or 0.045 mL

D. Air metering screw

Controls nozzle air flow (not present on oil-only pumps)

E. Pump stroke adjustment knob

Controls volume of fluid delivered per stroke

F. 16 oz [473 mL] fluid reservoir

Additional sizes and styles available

G. Rugged steel enclosure

Removable cover for easy adjustment or maintenance (optional keyed lock)

H. Drain plug

Use to empty fluid from pump stack, reservoir, and to bleed trapped air

I. Outlet port

Connection port for coaxial or oil-only outputs

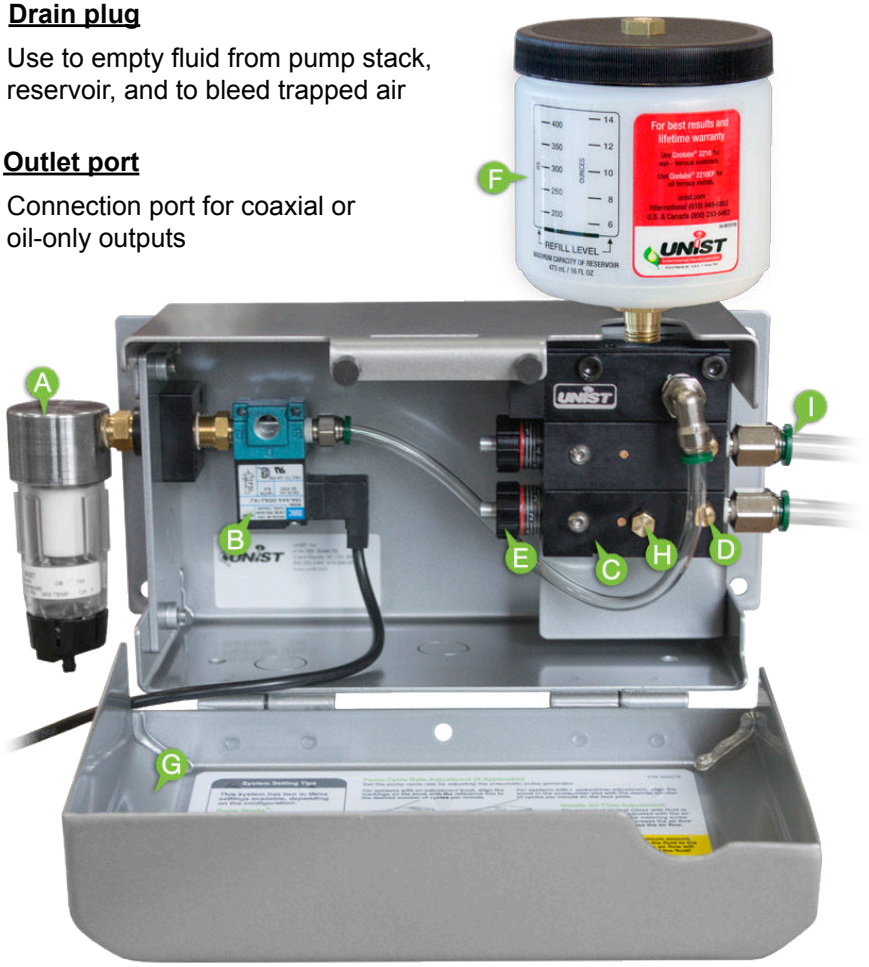


Figure 14: Typical system layout

System Specifications

Supply air pressure	clean, dry compressed air, 60-100 psi [4-7 bar], 25 SCFM [708 LPM] minimum				
Pumps		**1-drop standard**	**3-drop standard**	**1-drop MV**	**2-drop MV**
	Viscosity	50-1000 SUS	50-1000 SUS	30-1300 SUS	30-500 SUS
	Output at full stroke	0.033 mL	0.100 mL	0.045 mL	0.100 mL
	Output rate	0-396 mL/hr	0-1200 mL/hr	0-540 mL/hr	0-1200 mL/hr
Air flow rate	0-4 SCFM [0-113 LPM] for each air and oil output. 1-2 SCFM [28-56 LPM] typical				
Operating temperature range	32˚-122˚F [0˚-50˚C]				
Storage temperature range	4˚-158˚F [-16˚–70˚C]				
Fluid reservoir capacity	reservoir dependent, 16-64 oz [473-1893 mL] fluid supplied through air trap: clean, filtered fluid, 10 psi [0.69 bar] max				
Cycles per minute	recommended: 5-50 pulses/min maximum: 150 pulses/min (not recommended for continuous operation)				

Figure 15: System specifications

Mounting Dimensions

Systems With Enclosures

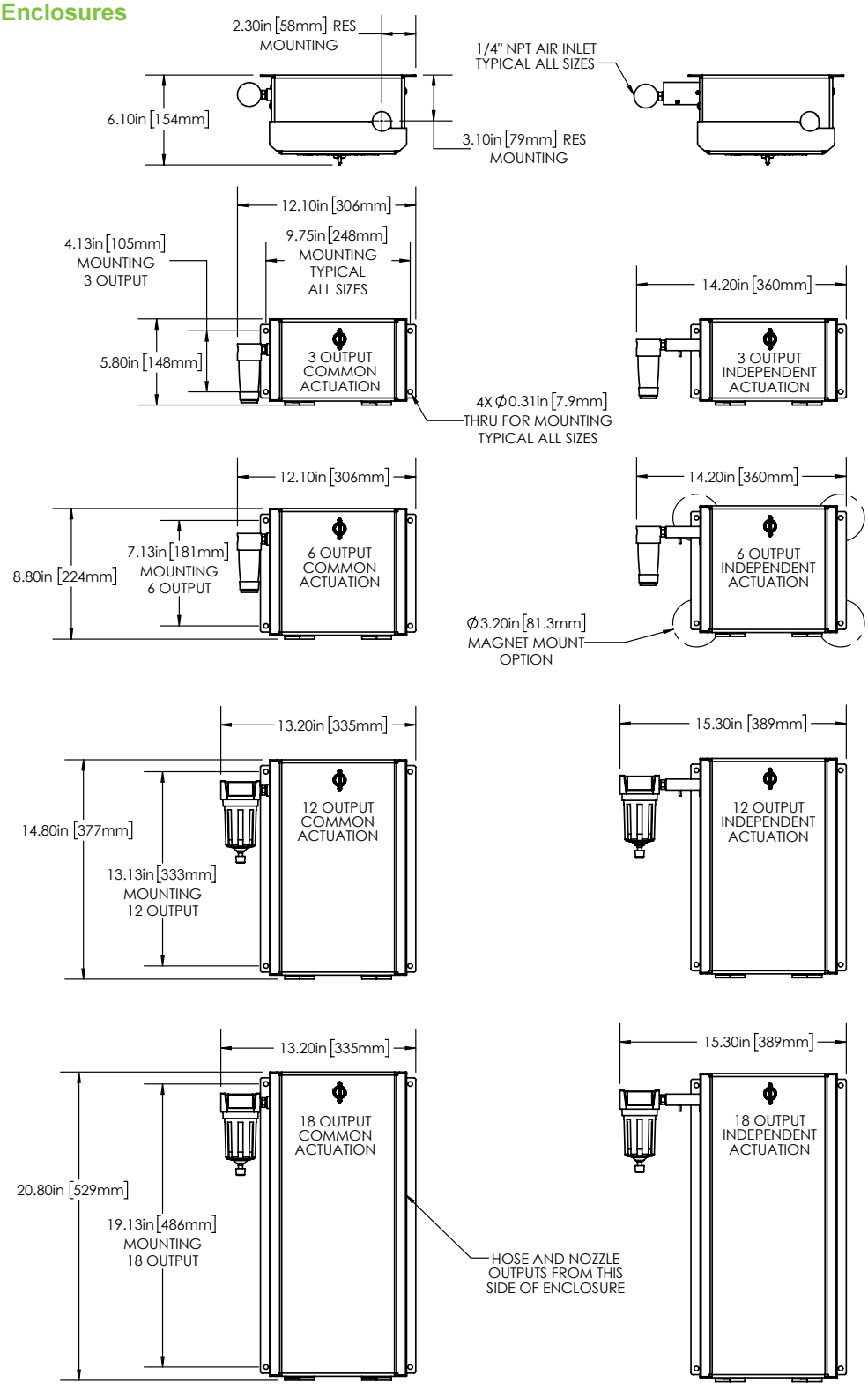


Figure 16: Systems with enclosures

Systems Without Enclosures

Each pump is 1” [25.4 mm] tall, so you can determine the height of a system’s pump stack (in inches) using this formula:

Height = (number of pumps) + 1.05

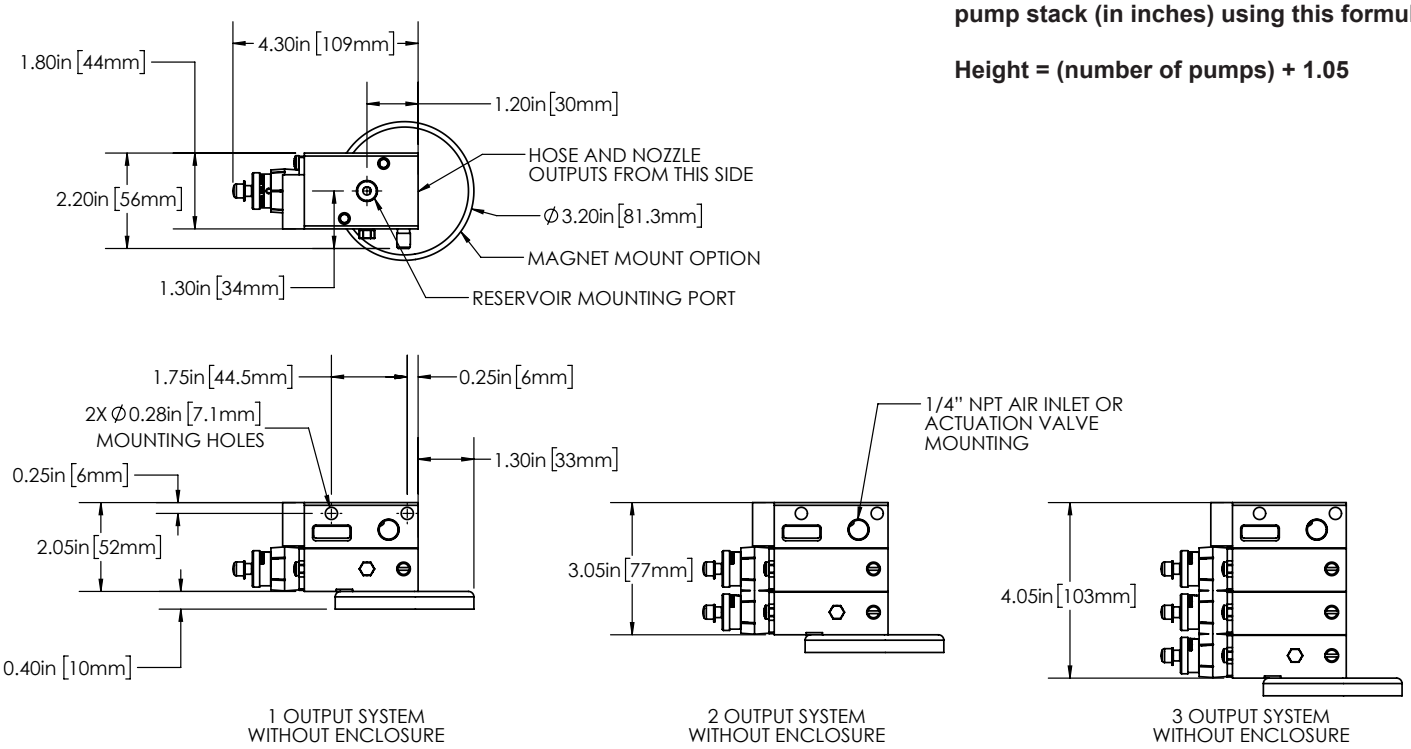


Figure 17: Systems without enclosures

Reservoirs

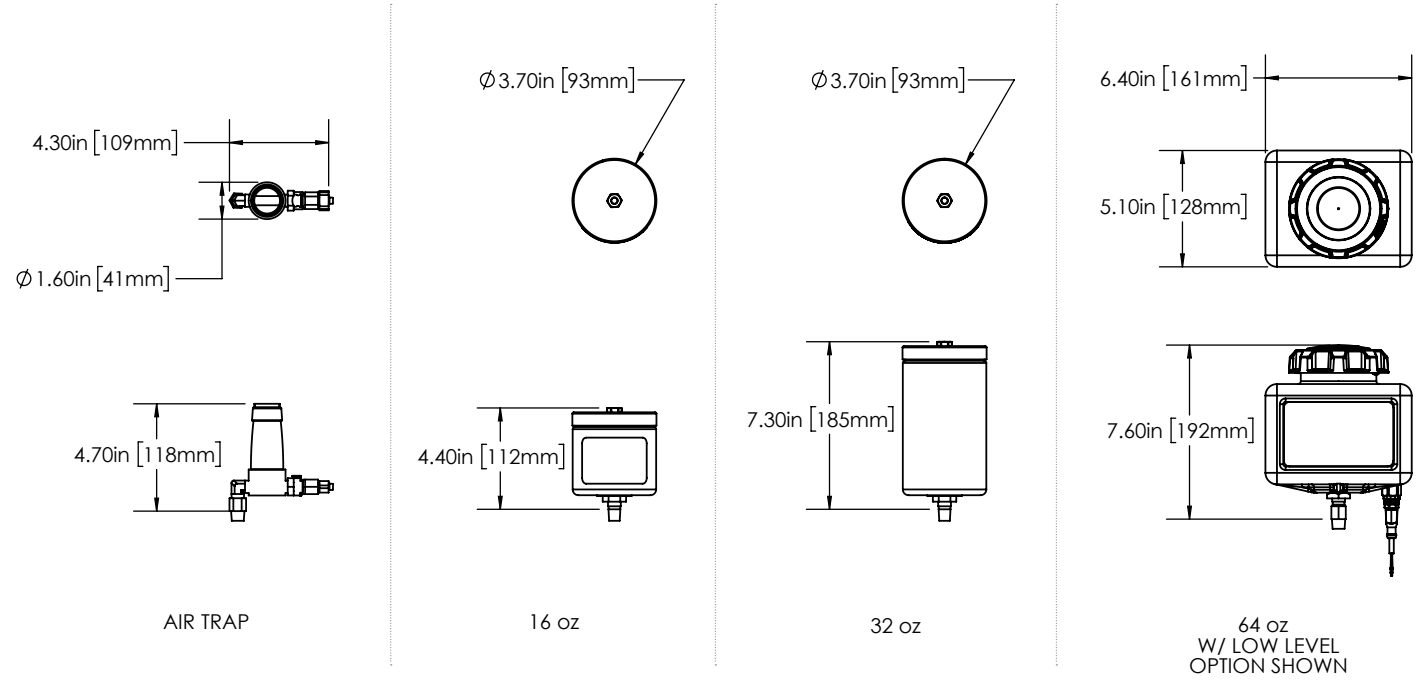


Figure 18: Reservoirs

Installation

Position & Mount System

Mount the system in close proximity to the machine, where it is convenient to access and where there are no obstructions that may pinch or kink output or air feed lines. The unit may be mounted directly to the machine, or with optional magnets, and must be mounted so the reservoir is up and the unit is level.

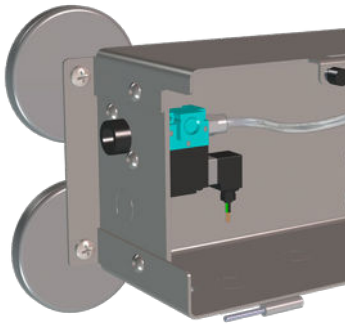


Figure 19: Magnet mount

Attention: *The Serv-O-Spray™ must be securely mounted to a suitable mounting surface for safe operation. Use appropriate fasteners in all four mounting positions. Failure to do so could lead to unsafe operation and personal injury.*

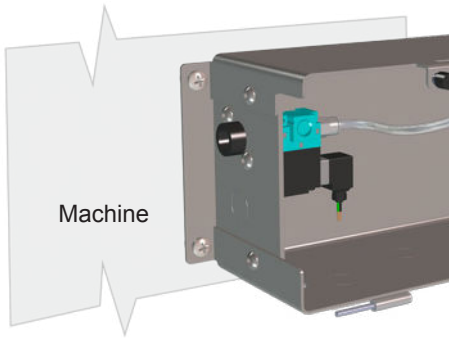


Figure 20: Direct mount

Attention: *Always use two people while securing the Serv-O-Spray™ to its mounting surface. Failure to do so could cause personal injury.*

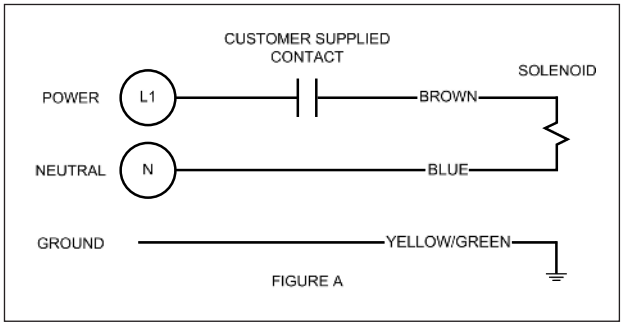
Connect Control Valve

The pneumatic circuit on the Serv-O-Spray™ can be controlled with a solenoid valve or an air pilot valve. If the Serv-O-Spray™ is to be turned on whenever the machine is operated, the solenoid valve is wired to the operation circuit on the machine. If independent operation is needed, the solenoid is wired to a separate switch. The voltage, current, and wiring diagrams for the Unist supplied solenoid valves are shown below.

Serv-O-Spray™ Control Valves

Unist part #	Pipe size	Voltage	Power	Figure	DIN connector size
68-1040-18-12VD	1/8" NPT	12VDC	1.8 W	B	9.4 mm
68-1040-18-24VD	1/8" NPT	24VDC	5.4 W	B	9.4 mm
68-1040-18-24	1/8" NPT	24V 60/50Hz	5.7/7.4 W	A	9.4 mm
68-1040-18-110	1/8" NPT	110V/50Hz 120V/60Hz	5.4 W	A	9.4 mm
68-1040-18-220	1/8" NPT	220V/50Hz 240V/60Hz	5.9 W	A	9.4 mm
68-1040-110	1/4" NPT	110V/50Hz 120V/60Hz 24VDC	15 W 14 W 6 W	A A B	18 mm
68-1040-24VAC	1/4" NPT	24V/60Hz	14 W	B	18 mm
68-1041-18-110	1/8" NPT	110V/50Hz 120V/60Hz	5.4 W	A	9.4 mm
68-1041-1824VAC	1/8" NPT	24V 60/50Hz	5.7/7.4 W	A	9.4 mm
68-1041-1824VDC	1/8" NPT	24VDC	5.4 W	B	9.4 mm

Note: Systems come supplied with 2 meter long DIN connector



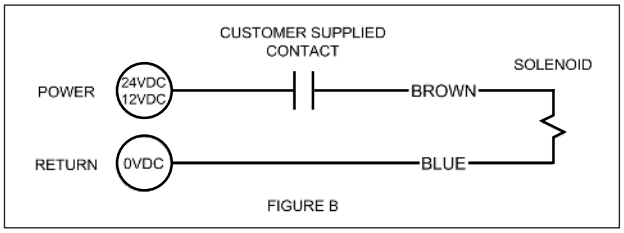


Figure 21: Serv-O-Spray™ control valves

Attention: *Use caution when making electrical connections. Only qualified individuals should attempt to connect input power and control signals to the Serv-O-Spray™. Failure to do so safely could cause damage to property and personal injury.*

Attention: *Ensure that power is not applied to the Serv-O-Spray™ while connecting solenoid inputs as this could cause personal injury or property damage.*

If the system is controlled with a pneumatic air pilot valve, the air pilot signal is connected as shown below.

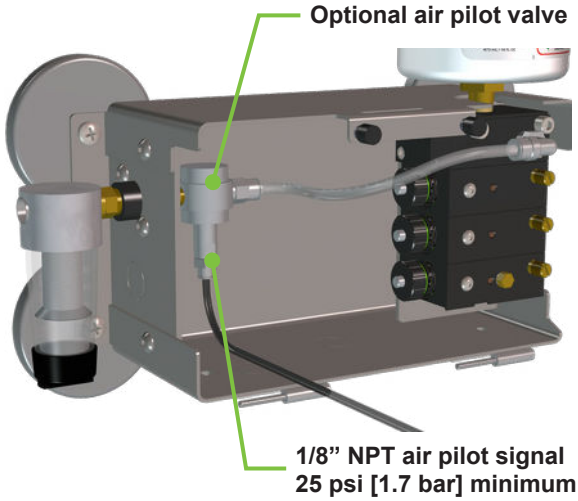


Figure 22: Pneumatic air pilot valve

Attention: *Ensure air pressure is not present when connecting the air pilot signal to the Serv-O-Spray™ air pilot valve as this could cause personal injury or property damage.*

Connect Low Level Switch (If Applicable)

A low level switch indicates that fluid needs to be added to the system. There are two different styles of switches. One is used in a reservoir and the other in a remote tank. The low level switch can be connected to an input on the machine, an external annunciator, or other device that indicates the fluid level is low. The wiring for each type of switch is shown in Figure 23.

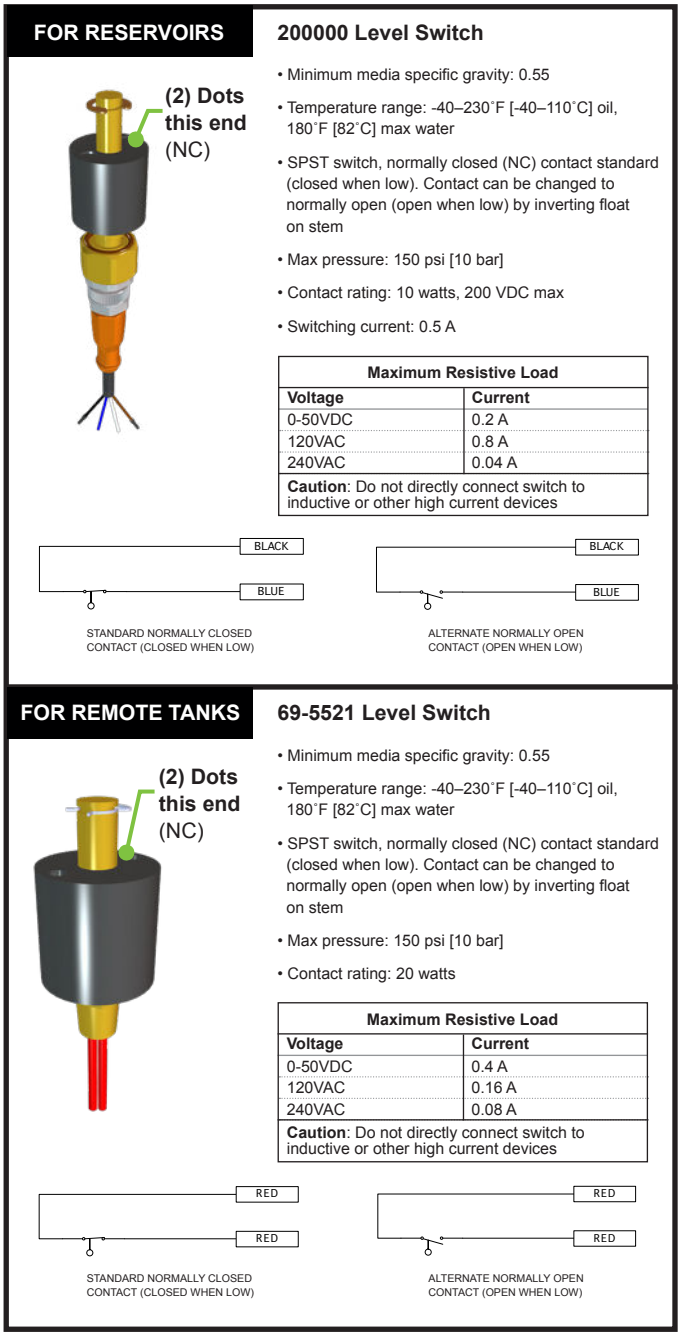


Figure 23: Low level switch

The float is installed at the factory so that the switch is open when the reservoir is full, and closes when it the fluid level is low. This works well for turning on alarms and lights. However, if broken wire detection is desired in the circuit logic, this can be changed by inverting the float on the stem so the switch is closed when the reservoir is full and open when it is low.

Attach Air Supply

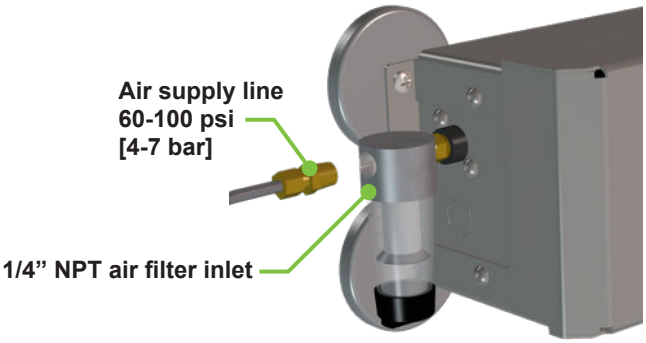


Figure 24: Air supply to filter

Attach air supply line to 1/4” NPT inlet. On units with a steel enclosure the inlet is located on the supplied air filter.

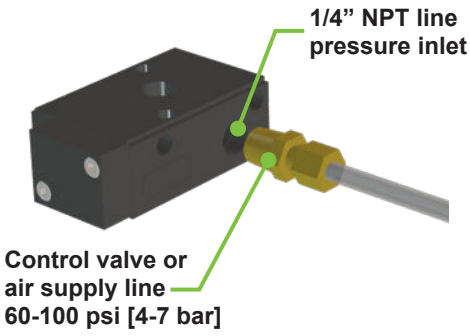


Figure 25: Air supply to manifold

For units without an enclosure, the air supply attaches directly to the control valve, or the top manifold block if no control valve is present. Filtered air should be used for the air supply.

Attention: *Use caution when connecting the Serv-O-Spray™ to a compressed air source. Only qualified individuals should make this connection. Failure to do so safely could cause damage to property and personal injury.*

Fill Reservoir Or Air Trap

For a system with a gravity feed reservoir, remove the cap, fill the system with the fluid, and replace the cap.

Figure 26: Filling reservoir

If the system is fed pressurized fluid from an external source and is equipped with an air trap, attach the fluid source, set the supply pressure to 5-10 psi [0.34-0.69 bar], and depress the air vent cap until the trap is 75% full. Do this periodically so the air trap does not fill with air.

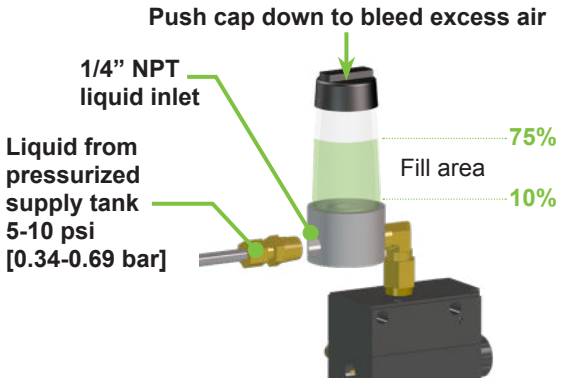


Figure 27: Bleeding air trap

Attention: *Use caution while connecting to a pressurized fluid source. Fluid leaks could cause hazardous slippery conditions. Only qualified individuals should attempt to make this connection.*

Position & Install Nozzles

Keep the nozzle as close as possible to the cutting edge, ideally within 2” [50.8 mm]. The longer the distance that the nozzle needs to spray, the more airflow is needed to carry aerosol and the higher the likelihood of an unwanted mist being generated.

Turning The System On & Off

The Serv-O-Spray™ is turned on or off using a solenoid valve or an air pilot valve. Solenoid control will turn on the unit when the correct electrical voltage is applied. Air pilot valve control turns on the unit when the air signal is received.

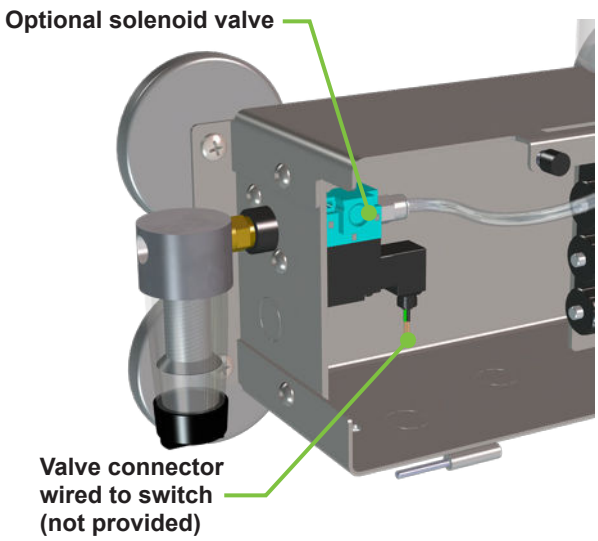


Figure 28: Remote operation

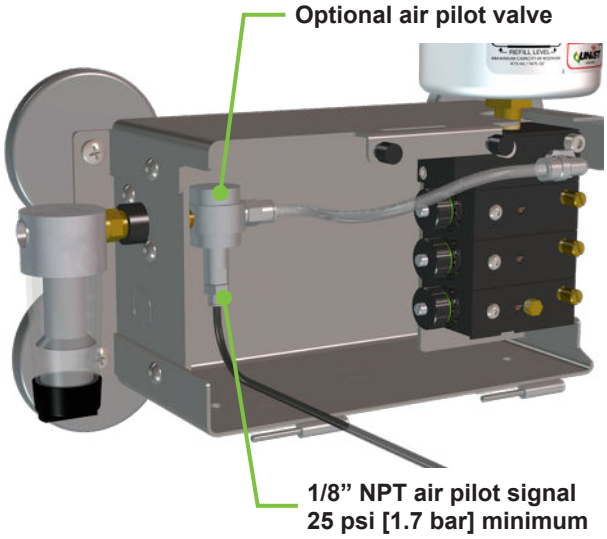


Figure 29: Pneumatic air pilot valve

Helpful hint: You can manually stroke a pump by pressing the end of the piston to move the pump’s piston. This can be useful in diagnosing system problems.

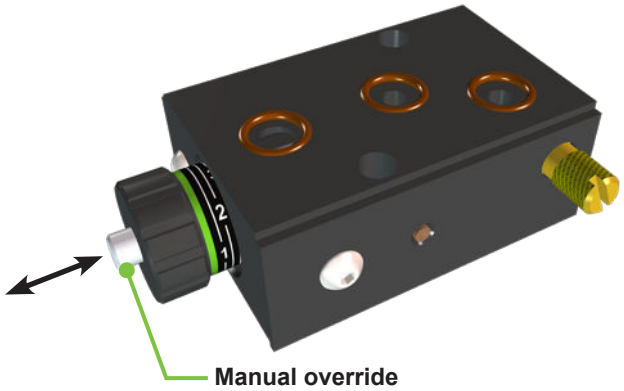
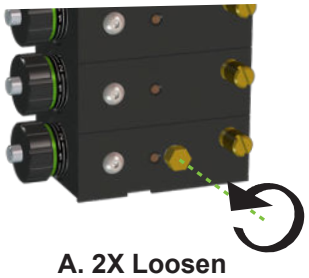


Figure 30: Manual override

Prime The Pumps

To prime the system, use a 5/16” nut driver to turn the drain plug on the bottom pump two turns counterclockwise to bleed trapped air. Once fluid is present, close the plug; **do not overtighten or you will break the drain plug**. It is recommended a nut driver be used, and not a wrench, to reduce the chance of over tightening. The screw should be snug, tightened just enough so the fluid does not leak from the drain. A rag can be placed below the drain plug to catch the fluid.



A. 2X Loosen

B. Drip

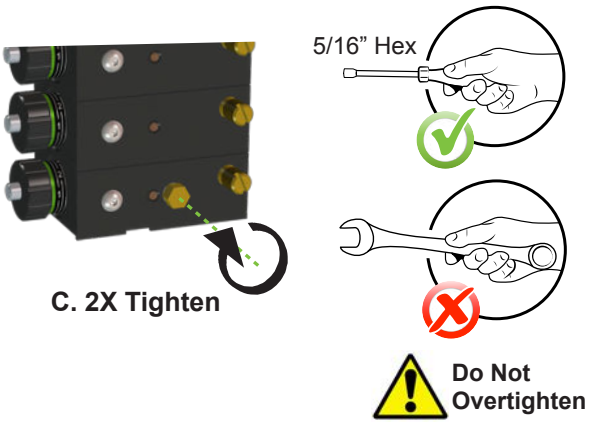


Figure 31: Priming the pumps

The priming procedure may need to be performed again if there is a lot of air trapped in the fluid path between the reservoir and the bottom pump.

Attention: *Be careful to not spill any oil during the pump stack bleeding process. Clean up any spilled oil immediately as spilled oil can cause hazardous slippery conditions.*

To complete pump priming, adjust the pump(s) to full stroke and then cycle repeatedly until fluid is pumping consistently. When priming is complete, adjust the pump stroke back to the previous setting.

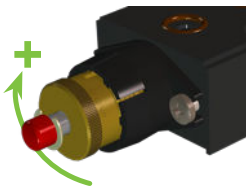
Attention: *Ensure all people are clear from the area of the system output nozzles when operating the outputs manually. Failure to do so could result in personal injury.*

Set Pump Stroke

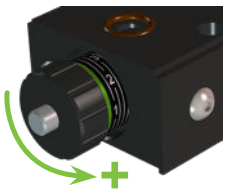
Set the pump output to be what is needed for the operation.

NOTE: Adjustment procedure depends on the pump style

Standard pumps (pumps with a knurled brass adjustment knob): The pump stroke is decreased by turning the knob counterclockwise. Full stroke is when the knob is turned fully clockwise.



MV pumps (pumps that have a black anodized aluminum adjustment knob): The pump stroke is decreased by turning the knob clockwise. Full stroke is when the knob is turned fully counterclockwise.



3-Drop Standard Pump (Black Cap)

1-Drop Standard Pump (Red Cap)

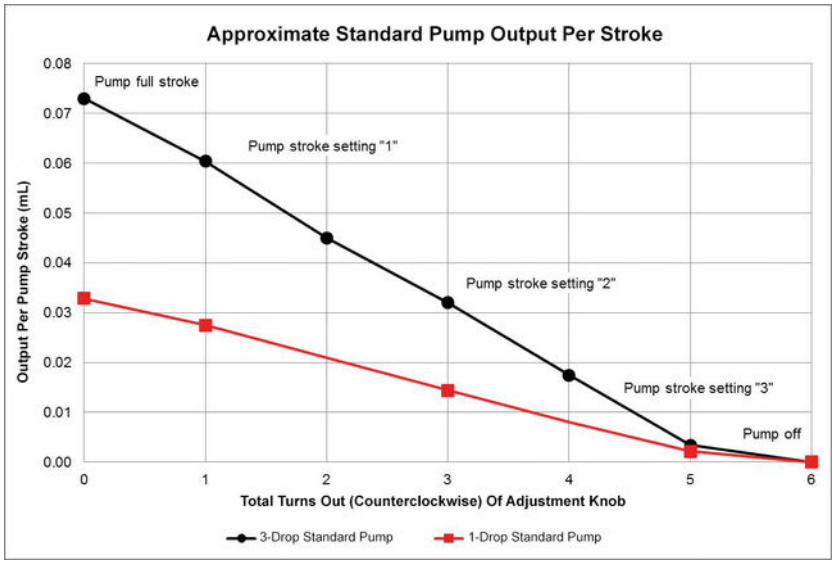


Figure 32: Approximate standard pump output per stroke

2-Drop MV Pump (Red Band)

1-Drop MV Pump (Green Band)

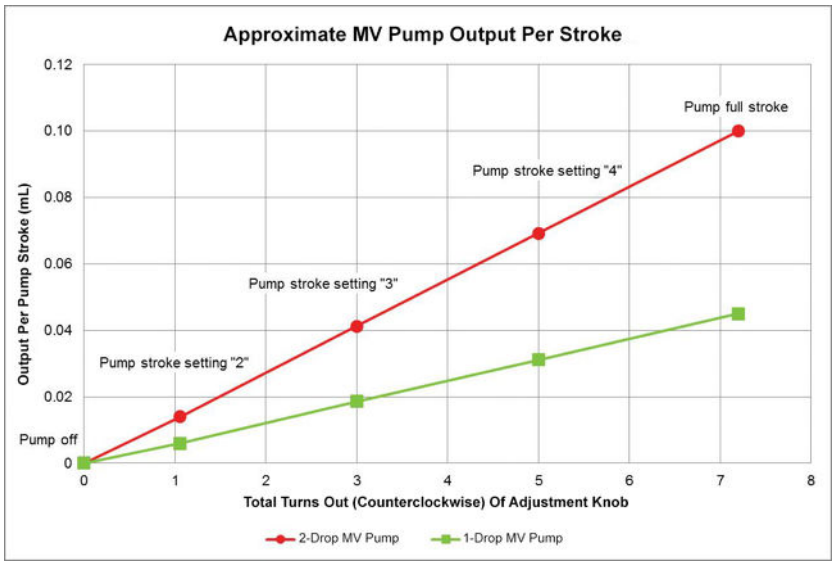


Figure 33: Approximate MV pump output per stroke

Adjust Airflow

On atomizing pumps, the air metering screw will adjust how fine a spray is generated. Too little air will result in a pulsating and spitting spray. Too much air will create a fog of very fine mist. Adjust the air metering screw to the desired degree of atomization for the application.

The recommended initial setting for the air metering screw is found by rotating the air metering screw clockwise until it is fully seated, then backing it off 3/4 of a turn (270 degrees).

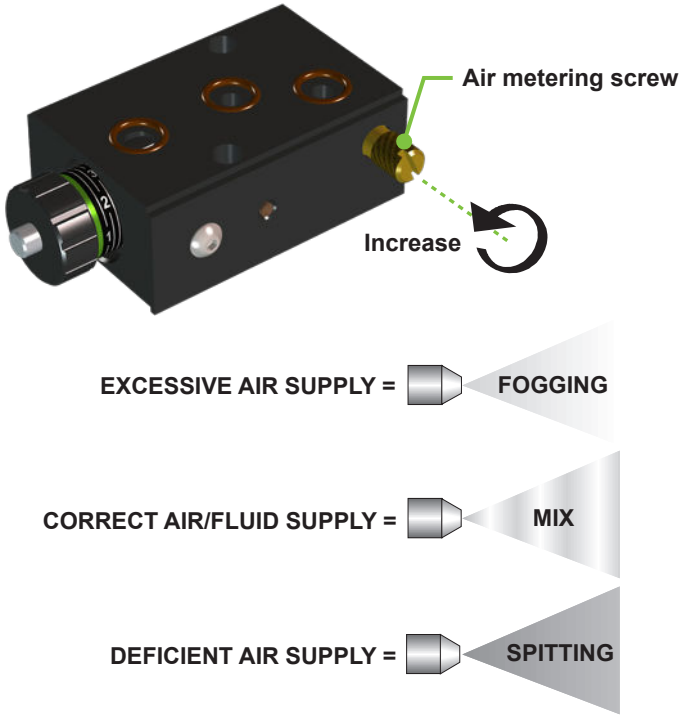


Figure 34: Adjusting airflow

NOTE: Use the minimum amount of air necessary to deliver the fluid to the point of application. Excess air flow will cause undesirable fogging!

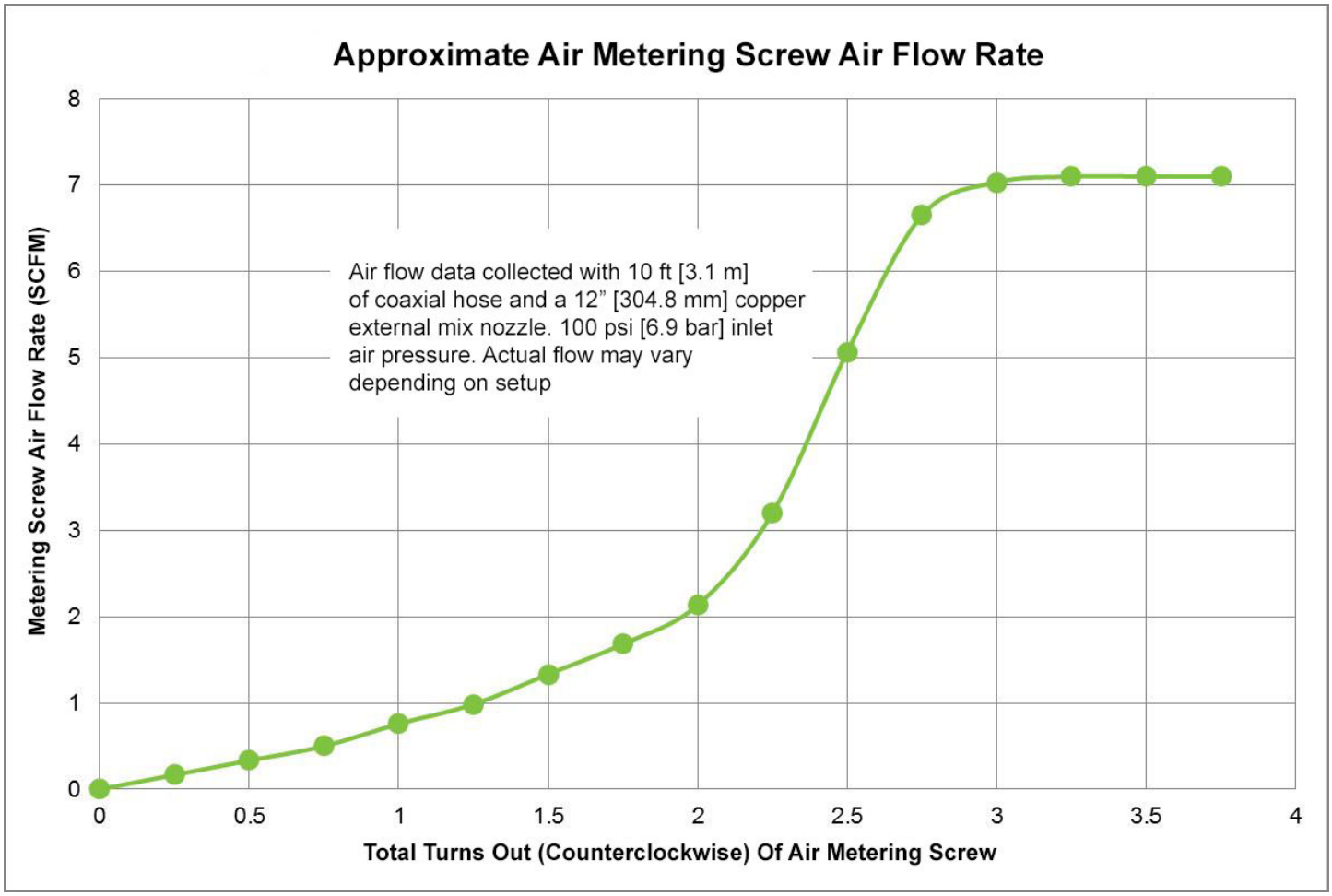


Figure 35: Approximate air metering screw air flow rate

Nozzle Styles

Flexible Plastic

Plastic nozzles are easy to aim to where the spray is needed, and there is no work-hardening on the nozzle if it is repeatedly bent into different shapes. The downside of this style nozzle is if there are things that can hit the nozzle, such as metal chips in cutting operations or an operator cleaning the machine, the nozzle is easily moved out of position. The spray output will have a conical shape with an included angle of approximately 15-20 degrees, depending on the amount of air introduced.

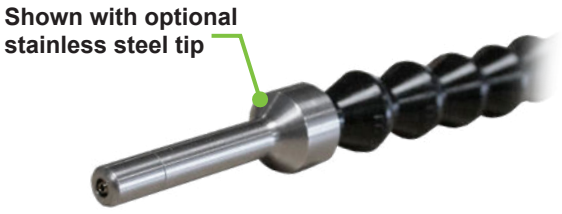


Figure 36: Flexible plastic nozzle

Semi-Rigid Copper

Semi-rigid copper nozzles are our most popular nozzle. They offer a nice balance of flexibility and rigidity. They are easily bent and molded to shape, and they hold that shape well when hit or impacted with moderate force. Repeated bending can cause work-hardening, and eventually the nozzle body will crack. The spray output will have a conical shape with an included angle of approximately 15-20 degrees, depending on the amount of air introduced.

Figure 37: Semi-rigid copper nozzle

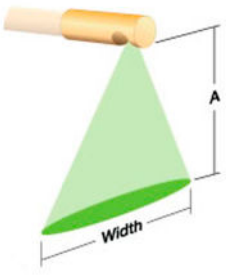
Stainless Steel

Stainless steel nozzles offer very good rigidity; they are not easily bent into, or out of shape. This makes them the preferred choice when the nozzle will be put in one position, and the force expected to be exerted on the nozzle is more than a copper nozzle can withstand without deforming. The spray output will have a conical shape with an included angle of approximately 15-20 degrees, depending on the amount of air introduced.

Figure 38: Stainless steel nozzle

Fan Spray

Fan spray nozzles are useful when an elliptical spray pattern fits the application better than a conical pattern. An example of this would be coating an item coming down a conveyer line. The chart below gives approximations of the spray area coverage.



Spray Dimensions

A	Min	Width	Max	+ / –
1.00" [25.4 mm]	1.60" [40.6 mm]	2.40" [60.9 mm]	3.20" [81.3 mm]	0.80" [20.3 mm]
2.00" [50.8 mm]	2.90" [73.7 mm]	3.80" [96.5 mm]	4.70" [119.4 mm]	0.90" [22.9 mm]
3.00" [76.2 mm]	4.10" [104.1 mm]	5.20" [132.1 mm]	6.30" [160.0 mm]	1.10" [27.9 mm]
4.00" [101.6 mm]	5.30" [134.6 mm]	6.60" [167.6 mm]	7.90" [200.7 mm]	1.30" [33.0 mm]
5.00" [127 mm]	6.50" [165.1 mm]	8.00" [203.2 mm]	9.50" [241.3 mm]	1.50" [38.1 mm]
6.00" [152.4 mm]	7.70" [195.6 mm]	9.40" [238.8 mm]	11.10" [281.9 mm]	1.70" [43.2 mm]

Figure 39: Fan spray nozzle

Connecting & Disconnecting Tubing & Nozzles

When ordered as a system, the nozzles, and associated tubing, will come attached to the applicator. To ease the routing of the tubing or make a cleaner installation, the tubing can be disconnected from the nozzle, trimmed to length, and reattached. Knowing the proper technique to attach the coaxial tubing to the unit or the nozzle can make this task much easier. Watching the tutorial video "**Working With The Redesigned Capillary Splicer**" found at unist.com/splice is recommended before disconnecting the tubing.

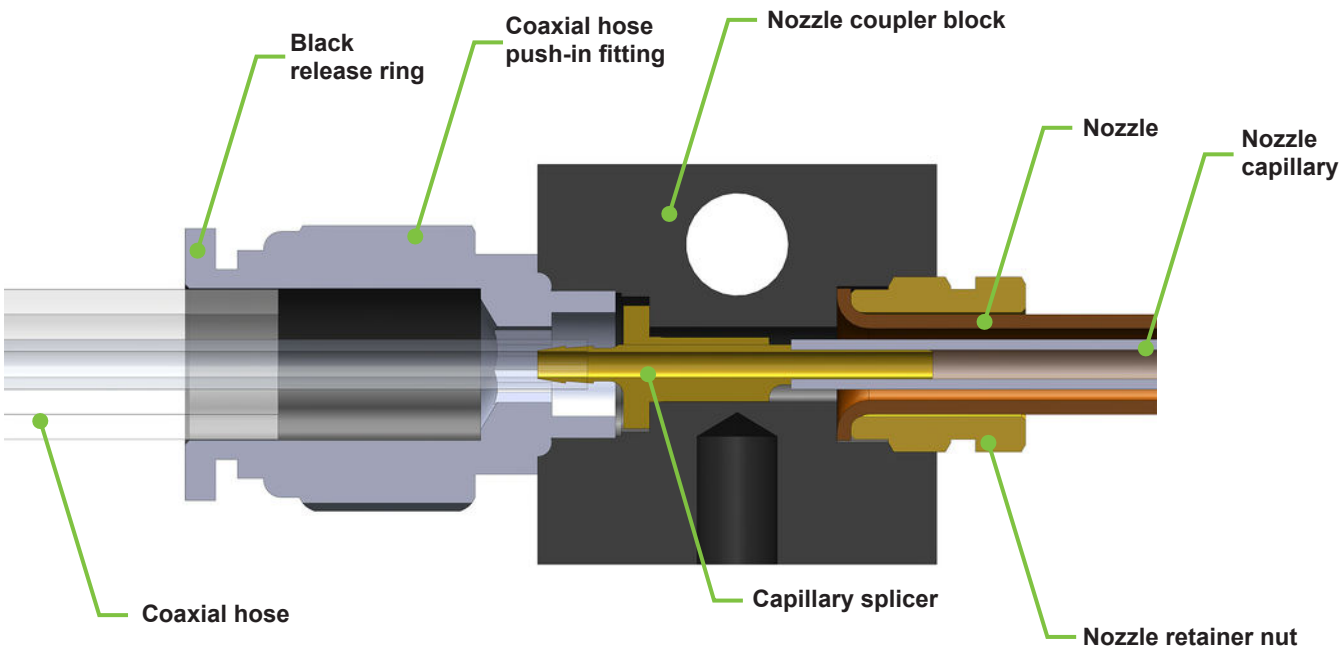


Figure 40: Capillary splicer cross section

Attention: *While troubleshooting it may be necessary to access the electrical solenoid on the Serv-O-Spray™. Only qualified individuals should perform such work and control power to the Serv-O-Spray™. Should be turned off when accessing this enclosure.*

Pump is not cycling

- Confirm inlet air pressure is between 60-100 psi [4-7 bar].
- Confirm that actuation of the controlling solenoid valve or air pilot valve allows air to flow into the system.

No fluid output from cycling pump

- Confirm that the fluid reservoir is not empty.
- Confirm that the inlet air pressure is between 60-100 psi [4-7 bar].
- Perform the pump priming procedure, previously described in the section titled **"Prime The Pumps"** on page 14.
- Perform a pump rebuild. (Watch the video: unist.com/rebuild).

Reduced fluid output

- Confirm that the fluid reservoir is not empty.
- Confirm that the inlet air pressure is between 60-100 psi [4-7 bar].
- Confirm that the pump stroke adjustment knob is set appropriately.
- Perform the pump priming procedure, previously described in the section titled **"Prime The Pumps"** on page 14.
- Perform a pump rebuild. (Watch the video: unist.com/rebuild).

Fluid flows continuously out of a nozzle without pumps cycling

- Perform a pump rebuild to replace outlet check valve seal and spring.

Air bubbling upward into fluid reservoir when system operating

- Perform a pump rebuild to replace outlet check valve seal and spring.

Fluid accumulation in outer tubing

- Increase atomizing air flow.
- Position nozzles as shown in the section titled **"Keeping fluid out of the outer tube"** on page 20.

Keeping fluid out of the outer tube

In some instances the fluid can accumulate in the outer tubing. This is usually caused when too little atomizing air flow is used and/or the fluid line is lower than the nozzle coupling block. The problem can be alleviated by:

1. Increasing the atomizing air flow
2. Raising the fluid line so the fluid flows down into, and eventually out of, the nozzle.
3. Mounting the nozzle coupler block at an angle so fluid flows down into, and eventually out of, the nozzle. See the illustrations below for an example of how to mount the nozzle coupler block.

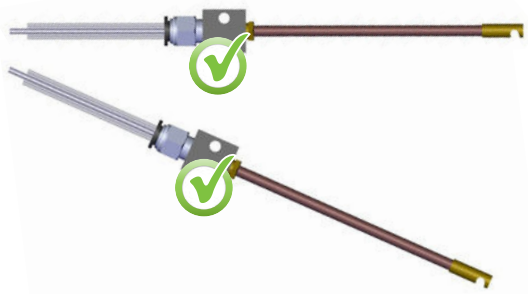


Figure 41: Correct way to mount the coupler block

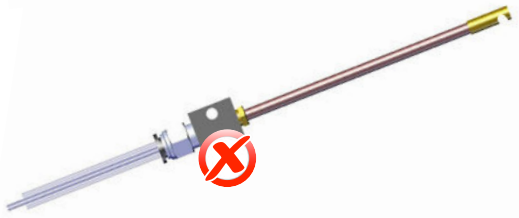
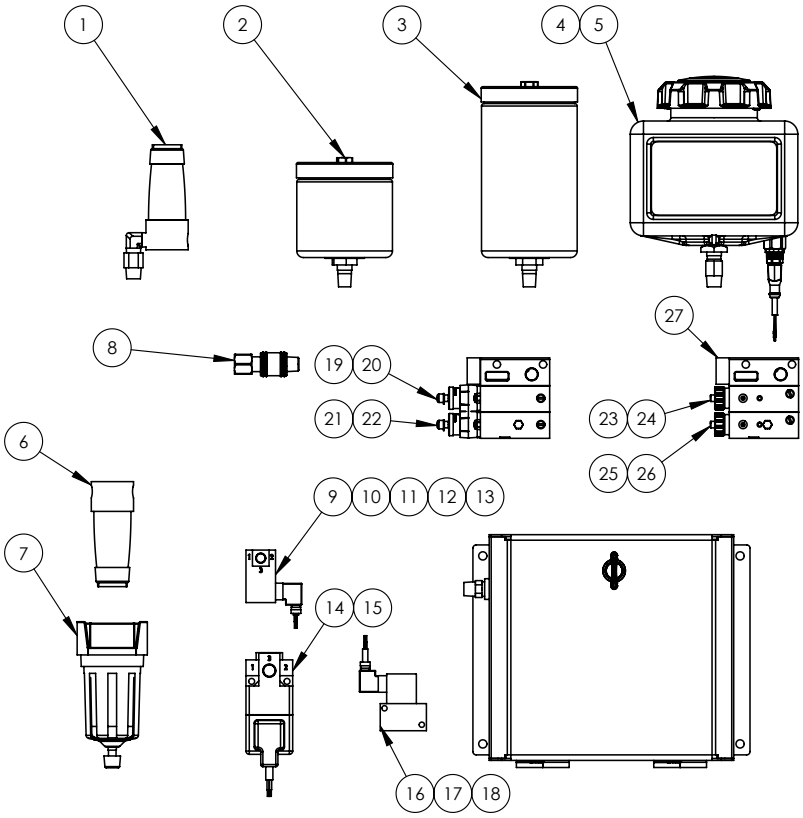


Figure 42: Incorrect way to mount the coupler block

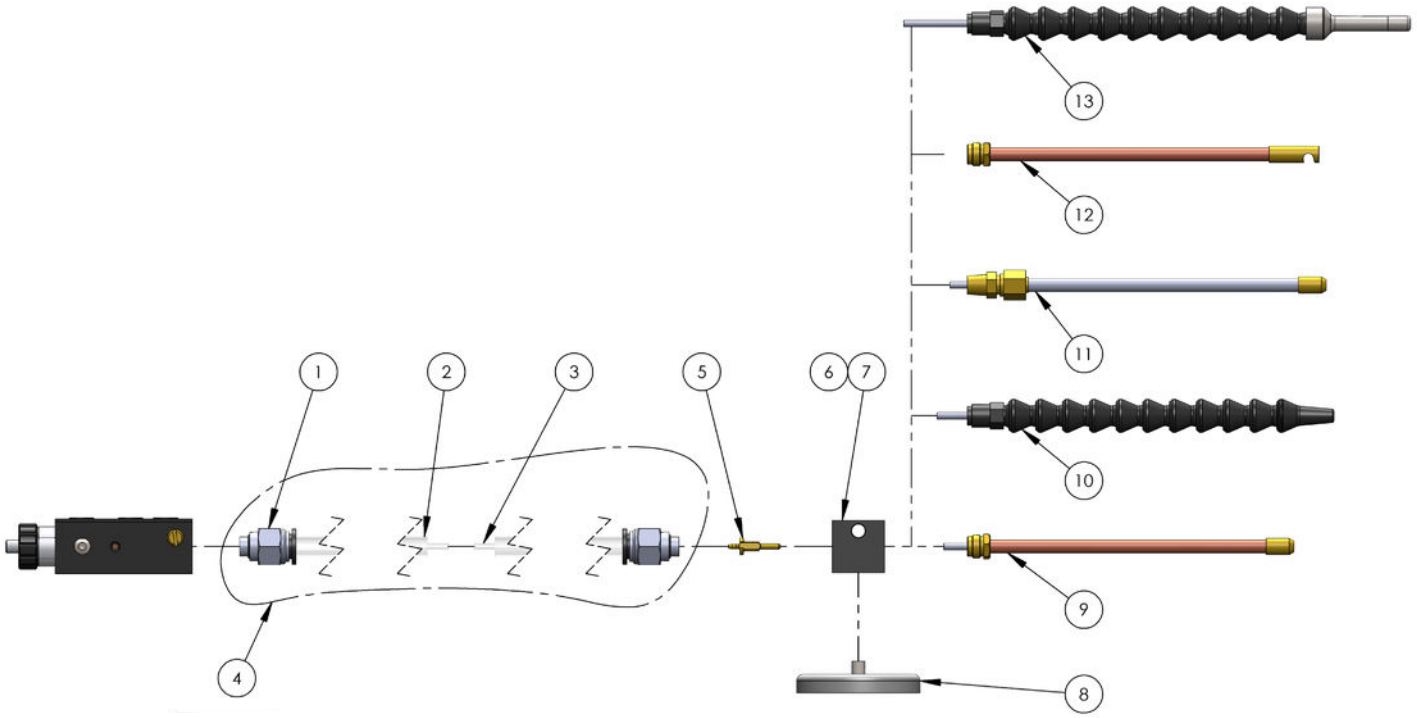
Appendix A: System Spare Parts



ITEM NO.	DESCRIPTION	PART NUMBER
27	ASSEMBLY, OR ELEMENT BLOCK	60-6395
26	PUMP ASSEMBLY, BOTTOM, 1-DROP	302099
25	PUMP ASSEMBLY, BOTTOM, 2-DROP	302101
24	PUMP ASSEMBLY, INTERMEDIATE, 1-DROP	302098
23	PUMP ASSEMBLY, INTERMEDIATE, 2-DROP	302100
22	METERING PUMP, 1-DROP, BOTTOM BLOCK	94-6821
21	METERING PUMP, 3-DROP, BOTTOM BLOCK	94-6823
20	METERING PUMP, 1-DROP, INTERMEDIATE BLOCK	94-6811
19	METERING PUMP, 3-DROP, INTERMEDIATE BLOCK	94-6813
18	SOLENOID VALVE, STACKABLE, 24 VAC, W/2M DIN	68-1041-1824VAD
17	SOLENOID VALVE, STACKABLE, 110 VAC, W/2M DIN	68-1041-18-110D
16	SOLENOID VALVE, STACKABLE, 24 VDC, W/2M DIN	68-1041-1824VDD
15	Solenoid Valve, 1/4", 24 VAC, w/ 2m DIN	68-1040-24VACD
14	Solenoid Valve, 1/4", 110 VAC/24 VDC, w/ 2m DIN	68-1040-110D
13	Solenoid Valve, 1/8", 24 VAC, w/ 2m DIN	68-1040-18-24D
12	Solenoid Valve, 1/8", 12 VDC, w/ 2m DIN	68-1040-1812VDD
11	Solenoid Valve, 1/8", 220 VAC, w/ 2m DIN	68-1040-18-220D
10	Solenoid Valve, 1/8", 110 VAC, w/ 2m DIN	68-1040-18-110D
9	Solenoid Valve, 1/8", 24 VDC, w/ 2m DIN	68-1040-1824VDD
8	MANUAL SLEEVE VALVE, 1/4 NPT	69-5506
7	AIR FILTER, 1/4 NPT	F60-2
6	AIR FILTER, 1/4 NPT	69-459
5	RESERVOIR ASSEMBLY, 64 OZ., UNI-MAX W/LOW LEVEL SENSOR	301313
4	RESERVOIR ASSEMBLY, 64 oz.	301311
3	RESERVOIR, 32 oz, POLYETHYLENE	69-460
2	RESERVOIR, 16 oz, POLYETHYLENE	69-459-PE
1	AIR TRAP, 1/4 NPT	6139

Figure 43: System spare parts

Appendix B: Nozzle Spare Parts

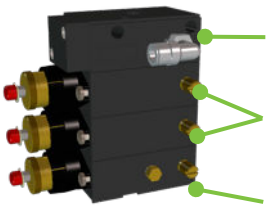


ITEM NO.	DESCRIPTION	PART NUMBER
13	X" PLASTIC NOZZLE, EXTERNAL MIX, W/STAINLESS STEEL TIP	6121-P-XP-SS
12	X" COPPER NOZZLE, FAN SPRAY	60-6100-XSR-FS
11	X" STAINLESS STEEL NOZZLE, EXTERNAL MIX, 1/8 NPT	6121PT-P-XSS
10	X" PLASTIC NOZZLE, EXTERNAL MIX	6121-P-XP
9	X" COPPER NOZZLE, EXTERNAL MIX	6121-P-XSR
8	MAGNET, NOZZLE BLOCK	60-6340-22
7	NOZZLE COUPLER BLOCK, 1/8 NPT, 7/16-20	6110
6	NOZZLE COUPLER BLOCK, 1/8 NPT, 1/8 NPT	6110-3
5	SPLICER, CAPILLARY TUBING, W/O HOLE	302116
4	COAX HOSE, W/ FITTINGS, TBD' LG.	6123PT-TBD
3	TUBING, 1/8 OD NYLON CAPILLARY, TBD' LG.	71-2050
2	3/8" OD TUBING, POLYURETHANE, TBD' LG.	6100-TBD
1	PUSH IN FITTING, 3/8" X 1/8" UNIVERSAL PIPE THREAD	301875

Figure 44: Nozzle spare parts

Appendix C: Standard Pump Components

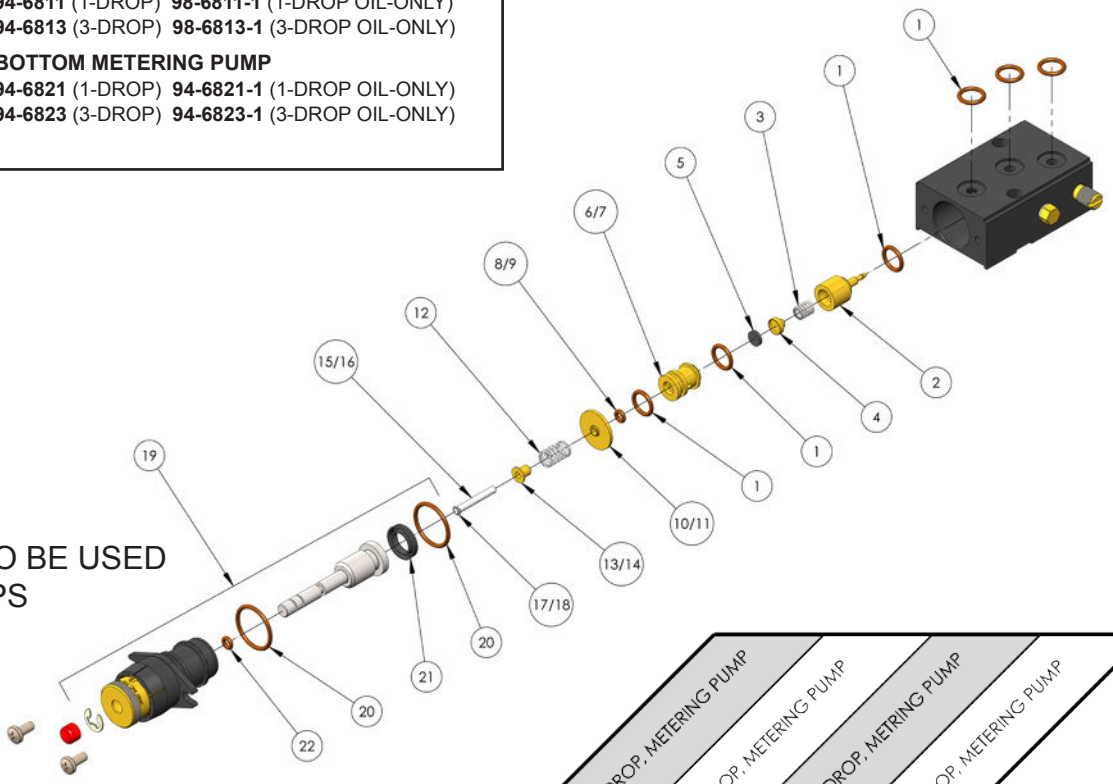
STANDARD COMPONENTS



MANIFOLD
94-6900-1

INTERMEDIATE METERING PUMP(S)
94-6811 (1-DROP) **98-6811-1** (1-DROP OIL-ONLY)
94-6813 (3-DROP) **98-6813-1** (3-DROP OIL-ONLY)

BOTTOM METERING PUMP
94-6821 (1-DROP) **94-6821-1** (1-DROP OIL-ONLY)
94-6823 (3-DROP) **94-6823-1** (3-DROP OIL-ONLY)



NOTE: KITS CAN ALSO BE USED WITH OIL-ONLY PUMPS

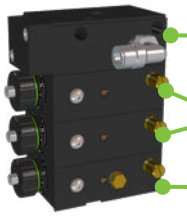
EXPLODED VIEW OF INTERNAL KIT PARTS -ORDER BY KIT NUMBER ONLY-

ITEM NO.	DESCRIPTION	PART NUMBER	94-6831-1 QTY. (REBUILD KIT, 1-DROP, METERING PUMP)	94-6831-2 QTY. (SEAL KIT, 1-DROP, METERING PUMP)	94-6833-1 QTY. (REBUILD KIT, 3-DROP, METRING PUMP)	94-6833-2 QTY. (SEAL KIT, 3-DROP, METERING PUMP)
1	O-RING, ID .364, CS .070, VITON	2-012-V884-75	6	6	6	6
2	HOUSING, CHECK VALVE, METERING PUMP	89-6900-10	1	-	1	-
3	SPRING, CHECK VALVE, INJECTOR PUMP	9303-108	1	-	1	-
4	BODY, CHECK VALVE, INJECTOR PUMP	9303-107	1	-	1	-
5	CHECK SEAL, CHECK VALVE, VITON, INJECTOR PUMP	9303-112	1	1	1	1
6	INSERT, 1-DROP	94-6808-12	1	-	-	-
7	INSERT, 3-DROP	94-6808-18	-	-	1	-
8	O-RING, ID .114, CS .070, VITON	2-006-V884-75	1	1	-	-
9	O-RING, ID .176, CS .070, VITON	2-008-V358-75	-	-	1	1
10	WASHER, 1-DROP, INJECTOR PUMP	9303-110	1	-	-	-
11	WASHER, 3-DROP, INJECTOR PUMP	95-1001	-	-	1	-
12	SPRING, RETURN, INJECTOR	94-6100-8	1	-	1	-
13	SLEEVE, SPRING RETAINING	94-6812	1	-	-	-
14	WASHER, BRASS, METERING PIN, 3-DROP PUMP	94-6803-2	-	-	1	-
15	METERING PIN, 1-DROP, METERING PUMP	94-6806-12	1	-	-	-
16	METERING PIN, 3-DROP, INJECTOR PUMP	94-6806-18	-	-	1	-
17	RETAINING CLIP, 1-DROP, METERING PIN, INJECTOR PUMP	5103-0012SPPR	1	-	-	-
18	RETAINING CLIP, 3-DROP, METERING PIN, INJECTOR PUMP	5103-0018SPPR	-	-	1	-
19	ASSEMBLY, END CAP, INJECTOR PUMP	94-6801-A	1	-	1	-
20	O-RING, ID .739, CS .070, BUNA	2-018	-	2	-	2
21	U-CUP, BUNA, 1/8" CROSS SEC. x 3/8 ID, 5/8 OD	9303-111	-	1	-	1
22	O-RING, ID .114, CS .070, BUNA	2-006	-	1	-	1

Figure 45: Standard pump components

Appendix D: MV Pump Components

STANDARD COMPONENTS

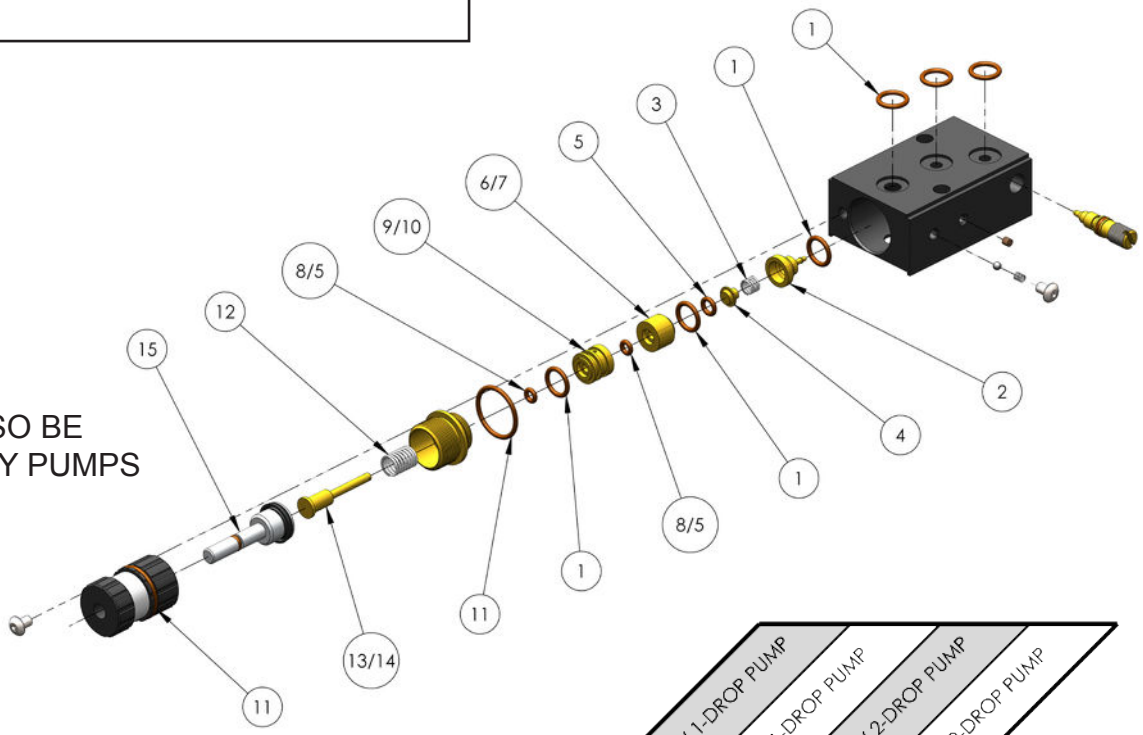


MANIFOLD
94-6900-1

INTERMEDIATE METERING PUMP(S)
302098 (1-DROP) **302410** (1-DROP OIL-ONLY)
302100 (2-DROP) **302418** (2-DROP OIL-ONLY)

BOTTOM METERING PUMP
302099 (1-DROP) **302417** (1-DROP OIL-ONLY)
302101 (2-DROP) **302419** (2-DROP OIL-ONLY)

NOTE: KITS CAN ALSO BE USED WITH OIL-ONLY PUMPS

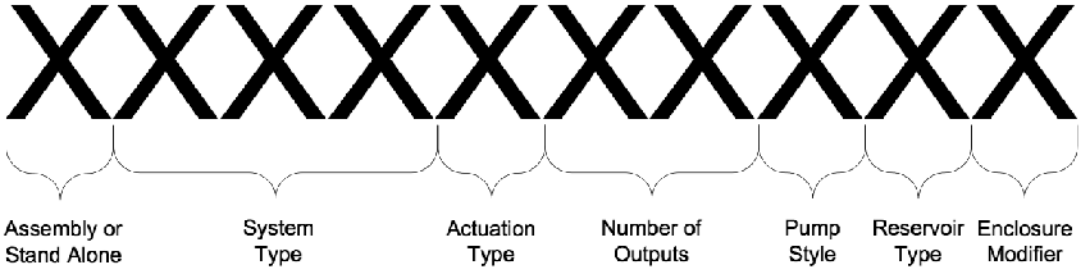


EXPLODED VIEW OF INTERNAL KIT PARTS -ORDER BY KIT NUMBER ONLY-

ITEM NO.	DESCRIPTION	PART NUMBER	REBUILD KIT, MV 1-DROP PUMP 301877 QTY.	SEAL KIT, MV 1-DROP PUMP 302291 QTY.	REBUILD KIT, MV 2-DROP PUMP 301878 QTY.	SEAL KIT, MV 2-DROP PUMP 302292 QTY.
1	O-RING, ID .364, CS .070, VITON	2-012-V884-75	6	6	6	6
2	HOUSING, CHECK VALVE, OUTLET	301848	1	-	1	-
3	SPRING, OUTLET CHECK VALVE	301850	1	-	1	-
4	BODY, OUTLET CHECK SEAL	301849	1	-	1	-
5	O-RING, ID .176, CS .070, VITON	2-008-V358-75	1	1	3	3
6	INSERT, METERING PIN, LOWER, 1-DROP	301851	1	-	-	-
7	INSERT, METERING PIN, LOWER, 2-DROP	301852	-	-	1	-
8	O-RING, ID .114, CS .070, VITON	2-006-V884-75	2	2	-	-
9	INSERT, METERING PIN, UPPER, 1-DROP	301853	1	-	-	-
10	INSERT, METERING PIN, UPPER, 2-DROP	301854	-	-	1	-
11	O-RING, ID .739, CS .070, BUNA	2-018	2	2	2	2
12	SPRING, PISTON RETURN	301859	1	-	1	-
13	METERING PIN, BALL CHECK VALVE, 1-DROP ASSEMBLY	301870	1	-	-	-
14	METERING PIN, BALL CHECK VALVE, 2-DROP ASSEMBLY	301871	-	-	1	-
15	PISTON ASSEMBLY, INJECTOR PUMP	301872	1	1	1	1

Figure 46: MV pump components

Appendix E: System Part Numbering Scheme



1st Character: Assembly or Stand Alone

Designator	Description
A	Assembly-Mated w/ outputs
S	Stand Alone-No output/System only

2nd, 3rd & 4th Character: System Type

Designator	Description
200	Serv-O-Spray

5th Character: Actuation Type

Designator	Description
A	110VAC Solenoid-Common Actuation
B	24VAC Solenoid-Common Actuation
C	220VAC Solenoid-Common Actuation
M	440VAC Solenoid-Common Actuation
D	24VDC Solenoid-Common Actuation
N	12VDC Solenoid-Common Actuation
Q	24VDC/110VAC Solenoid-Common
F	24VAC Solenoid-Independant Actuation
G	24VDC Solenoid-Independent Actuation
E	110VAC Solenoid-Independent Actuation
P	220VAC Solenoid-Independent Actuation
H	Air Pilot Valve
J	Air Pilot Valve with Foot Pedal
K	Manual Valve
X	No Valve

6th & 7th Character: Number of Outputs

Designator	Description
01-16	1-16 outputs

8th Character: Pump Style

Designator	Description
A	Standard 1-drop
B	Standard 3-drop
C	MV 1-drop
D	MV 2-drop

9th Character: Reservoir Type

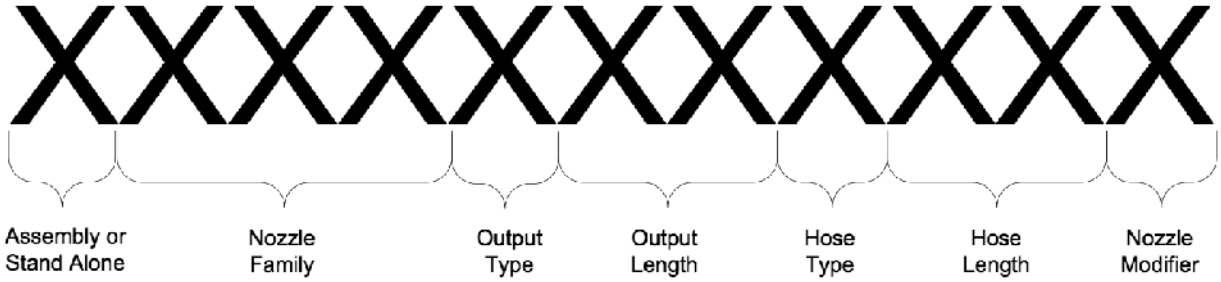
Designator	Description
B	16 oz
C	32 oz
D	64 oz
E	64 oz w/ Low Level Option
F	Air Trap Kit
X	No Reservoir

10th Character: Enclosure Modifier

Designator	Description
A	Standard Enclosure
B	Standard Enclosure w/ Magnet Mount
C	Standard Enclosure w/ Key Lock
D	Standard Enclosure w/ Magnet Mount & Key Lock
E	No Enclosure & Bottom Magnet Mount
X	No Enclosure

Figure 47: System part numbering scheme

Appendix F: Nozzle Part Numbering Scheme



1st Character: Assembly or Stand Alone

Designator	Description
A	Assembly-Mated w/ system
S	Stand Alone-No system. Outputs only.

2nd, 3rd & 4th Character: Nozzle Family

Designator	Description
201	Serv-O-Spray Nozzle

5th Character: Output Type

Designator	Description	Use with system type
A	1/4"-Flexible Plastic	100, 200
B	1/4"-Semi-Rigid Copper	100, 200
C	1/4"-Stainless Steel	100, 200
D	1/4"-Flexible Steel	100, 200
P	1/4"-Copper Fan Spray	100, 200
T	1/4"-Plastic w/ Stainless Tip	100, 200

6th & 7th Character: Output Length (6" increments)

Designator	Description
06-36	Length (in inches)
XX	Predefined Length Nozzle

Special lengths additional cost

8th Character: Hose Type

Designator	Description	Use with system type
A	Polyurethane Coaxial Hose	100, 200
B	Braided Stainless Steel Coaxial Hose	100, 200

9th and 10th Characters: Hose Length (5ft increments)

Designator	Description
05-50	Length (in feet)

Special lengths additional cost

11th Character: Nozzle Modifier

Designator	Description
A	Standard (Magnet Only)
B	Articulated Arm Only
C	Magnet & Articulated Arm
X	No Magnet, No Articulated Arm

Figure 48: Nozzle part numbering scheme

Notes

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