Single Line & Saw Blade Lube Systems

Operation Manual

UNIST
Environmentally Friendly Lubrication

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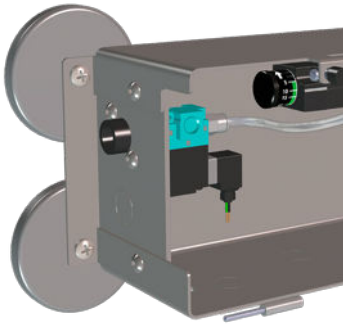
Single Line & Saw Blade Lube Systems Operation Manual

02/11/2019 V2.2

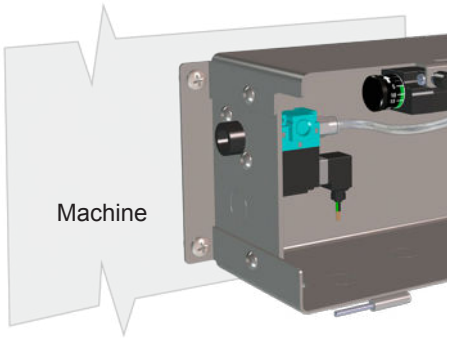
Single Line System Quick Start Guide

1. Mount (Pg. 10)



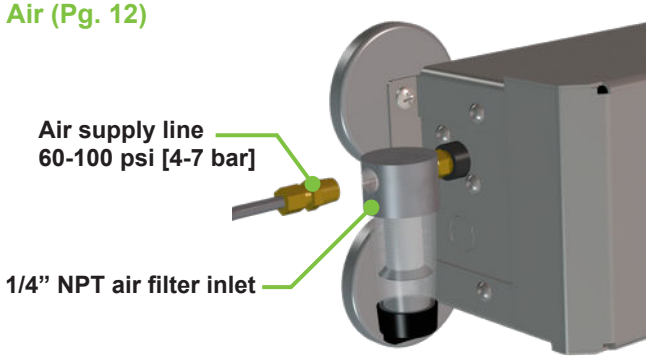
Magnet mount

or



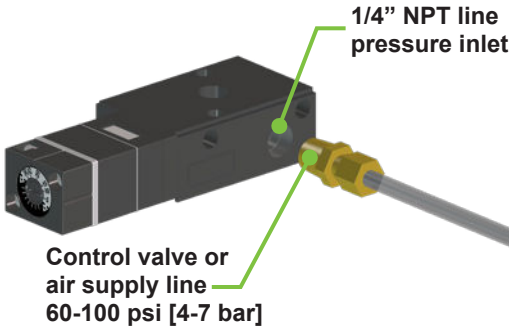
Direct mount

2. Air (Pg. 12)



Air supply to filter

or

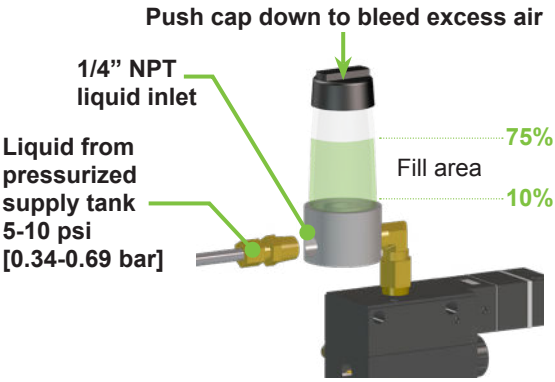


Air supply to manifold

3. Fluid (Pg. 12)

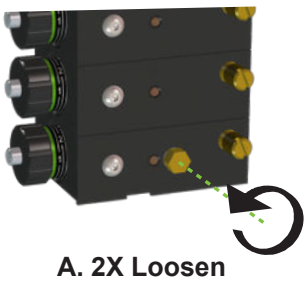
Fill reservoir

or



Bleed trapped air

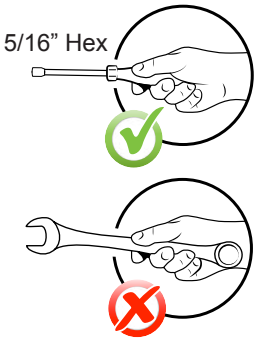
4. Prime (Pg. 16)



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.

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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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Identifying Symbols

Caution - ISO 7000-0434B

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Introduction

Thank You

Thank you for your purchase of the Unist Single Line lubricator. Please take the time to read this operation manual to take full advantage of your new unit.

The Unist Single Line lubricator uses a positive-displacement pump to give a continuous spray of fluid at a precise rate. The system offers flexibility while maintaining simplicity and can be operated using only compressed air.

Figure 1: Saw Blade Lube system

Figure 2: Single Line system

Figure 3: OEM system

System Introduction

The Single Line lubricator gives simple, precise lubrication. The adjustable positive-displacement pumps are proven with a track record of consistency and reliability. The modular design allows multiple pumps to be stacked together when more than one output is required, so each unit can be tailored specifically for the application. Each pump stack includes a stroke adjustment for the pump output and a pulse generator to control the cycle rate of the pump.

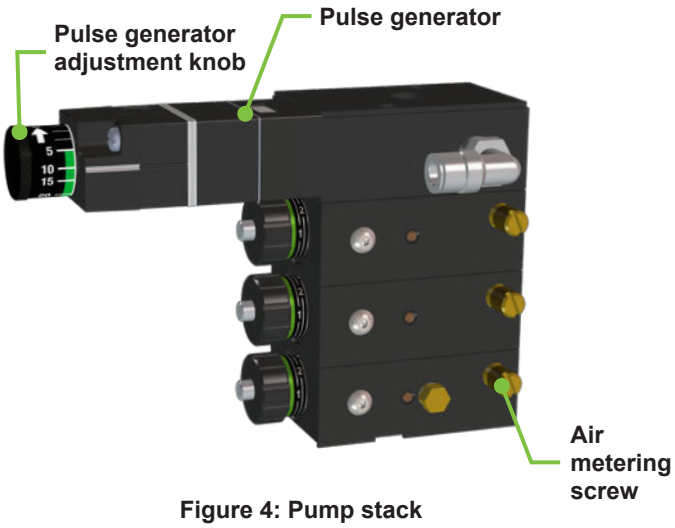


Figure 4: Pump stack

The pump also has 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 Single Line system 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

Because of its modular design, there are thousands of possible configurations for a Single Line lubricator. Units may look different because of the presence or absence of an enclosure, the size of the reservoir, or the type of nozzle attached. However, regardless of the look or nozzle, all Single Line lubricators have the same key components which use the same simple adjustments.

There are three main styles of Single Line systems: The standard Single Line system, the Saw Blade Lube system, and the OEM system.

The Standard Single Line System

The standard Single Line system is a Single Line lubricator with one or more single line copper nozzles.

Figure 5: Standard Single Line system with single line copper nozzle

The Saw Blade Lube System

The Saw Blade Lube system is a Single Line lubricator with one or more saw specific nozzles.

Figure 6: Saw Blade Lube system with band saw nozzles

The OEM System

The OEM system is a single output Single Line lubricator with a small enclosure and a 16 oz [473 mL] or 32 oz [946 mL] enclosure.

Figure 7: OEM system with Bat Nozzle

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 8: Coolube® lubricant

Key Components

The Pump

In most cases, the Single Line system 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 Single Line 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 pump(s) 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.

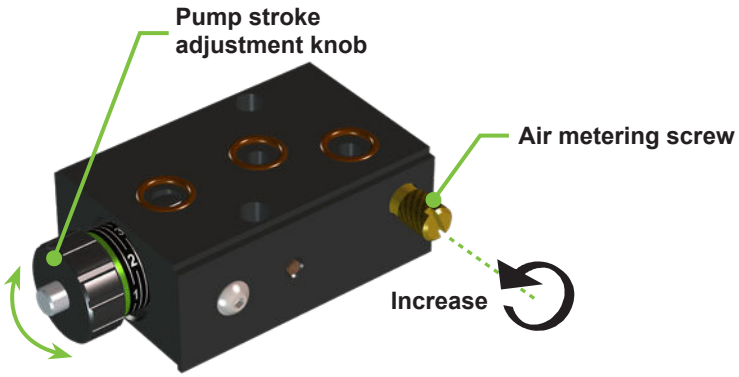


Figure 9: Air metering screw & pump stroke adjustment

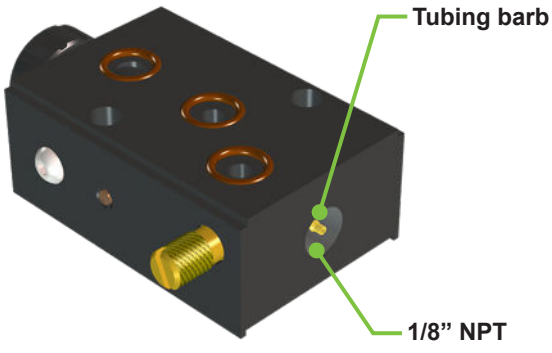


Figure 10: Outlet port

The Pulse Generator

The pulse generator is a variable pneumatic timer specially designed and manufactured by Unist to give consistent control of the pump cycle rate. Because this is a pneumatic and not an electronic circuit, the exact rate of the pulses are subject to changes in air pressure and other mechanical variations. The numbers on the dial should be used as rough approximations of the pulses per minute at 80 psi [5.52 bar]. If an exact value is needed, regulated air is recommended and the frequency should be set by adjusting the knob so that the pump strokes at the desired rate as measured with a timer.

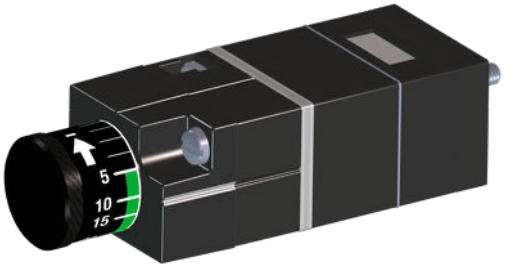


Figure 11: Pulse generator

Output

The Single Line system is named from tubing that carries the air and oil mixture from the end of the pump to the tip of the nozzle. On Single Line systems, the air and oil are mixed at the pump and a single line carries this mixture to the nozzle. This is in contrast to the Unist Coolubricator™ line, where coaxial tubing carries the air and oil separately. Oil-only pumps deliver striaght oil.

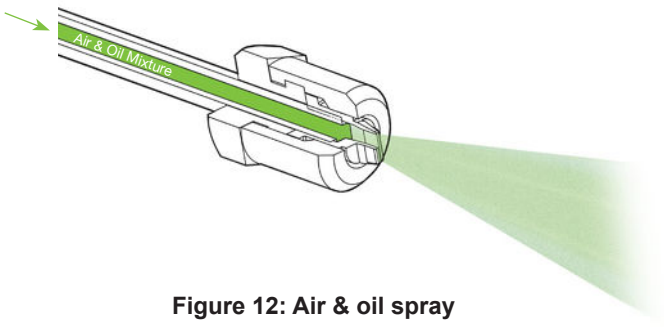
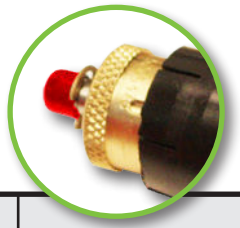


Figure 12: Air & oil spray

1-Drop Standard Pump (Red Cap)

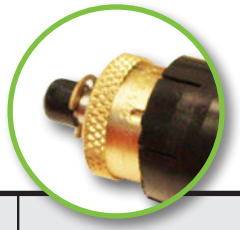
(Knurled brass adjustment knob with black body)



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 13: 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 14: 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. Pneumatic pulse generator

Controls pump cycle rate

E. Air metering screw

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

F. Pump stroke adjustment knob

Controls volume of fluid delivered per stroke

G. 16 oz [473 mL] fluid reservoir

Additional sizes and styles available

H. Rugged steel enclosure

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

I. Drain plug

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

J. Outlet port

Connection port for single line output

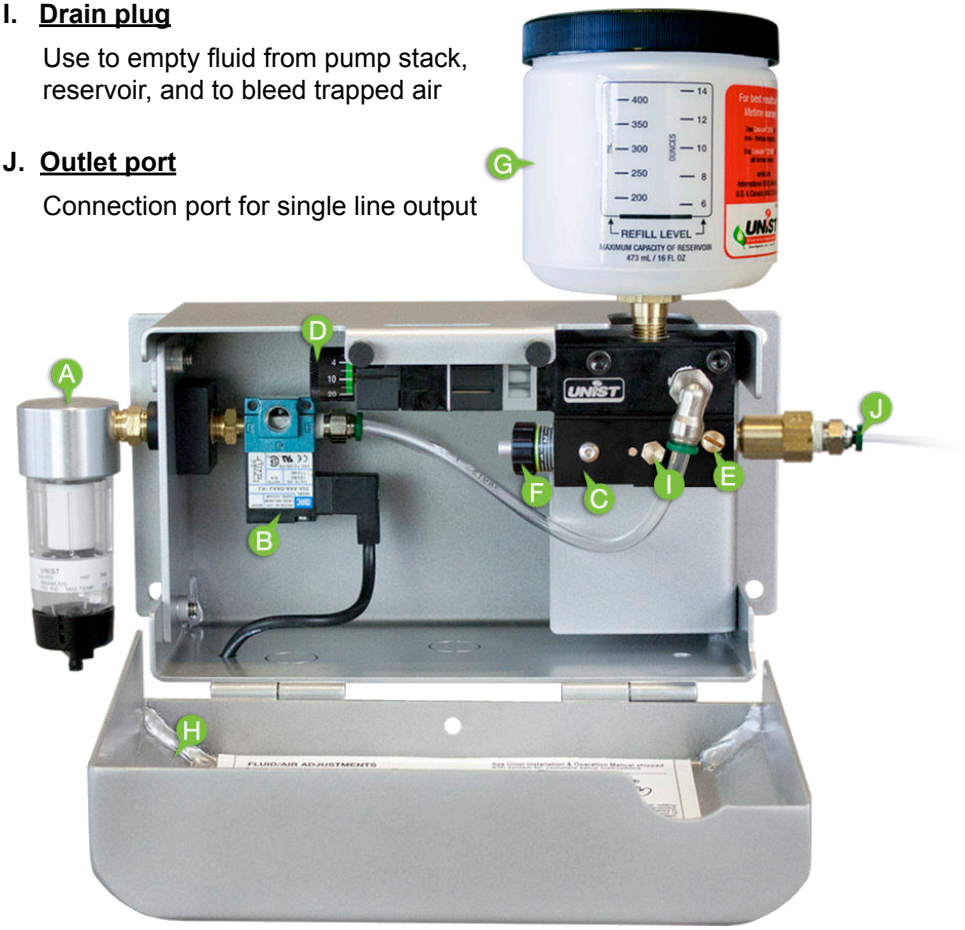


Figure 15: Typical system layout

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				
Pulse generator frequency	recommended: 5-50 pulses/minute maximum: 200 pulses/minute (not recommended for continuous operation)				
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				

Figure 16: System specifications

Mounting Dimensions

Systems With Standard Enclosures

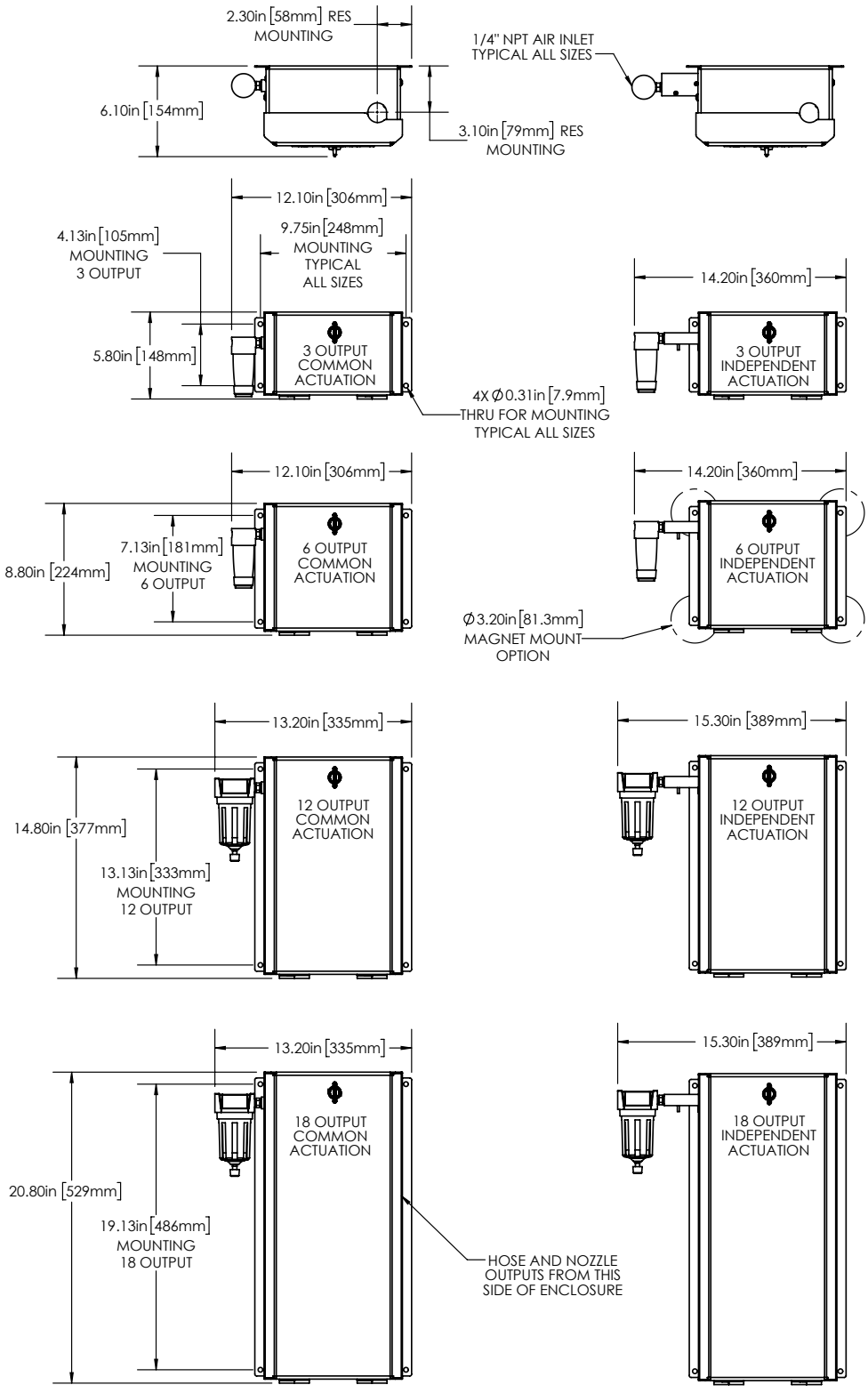


Figure 17: Systems with standard enclosures

Systems Without Standard 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

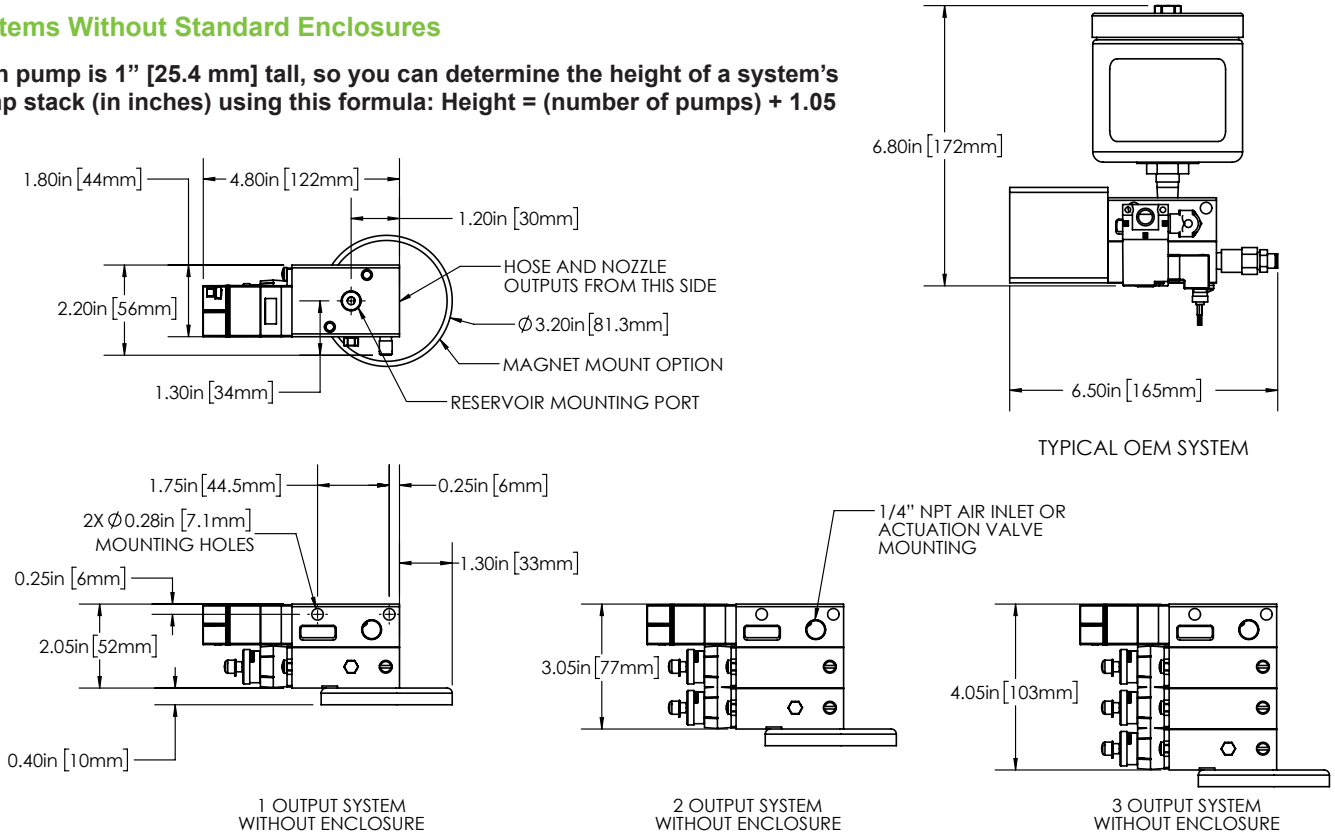


Figure 18: Systems without standard enclosures

Reservoirs

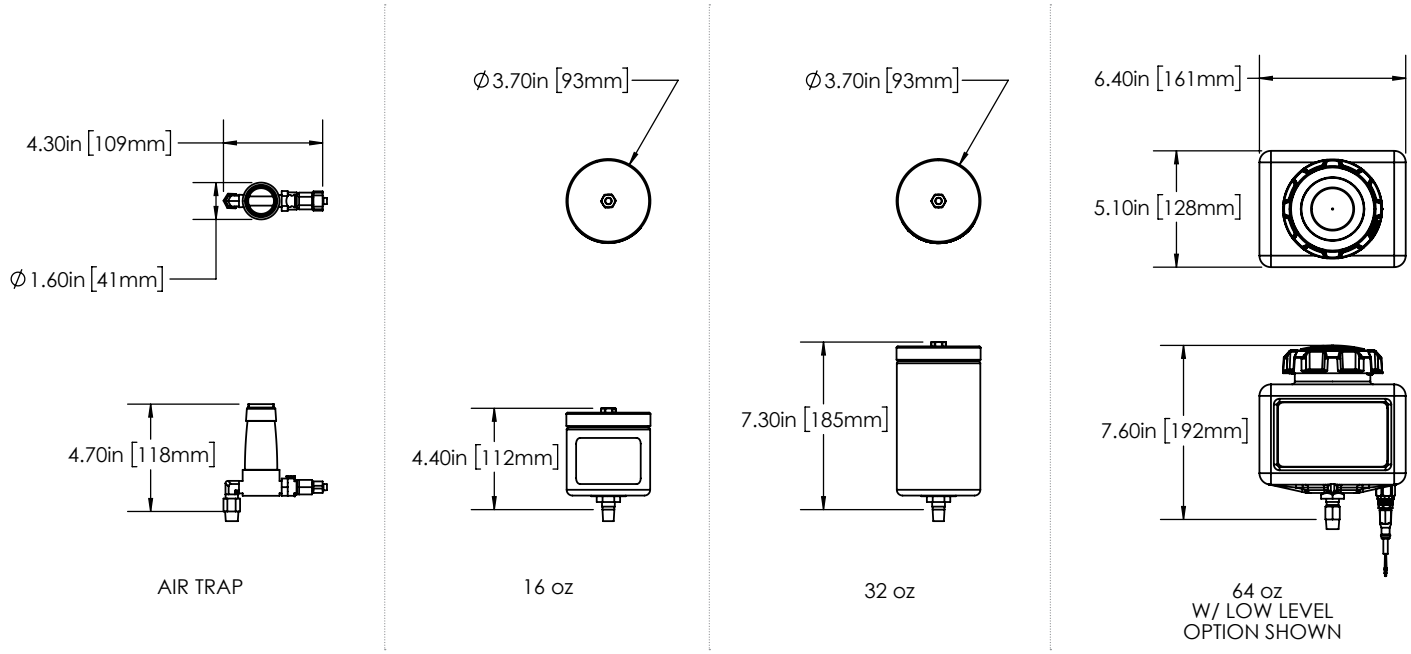


Figure 19: Reservoirs

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.

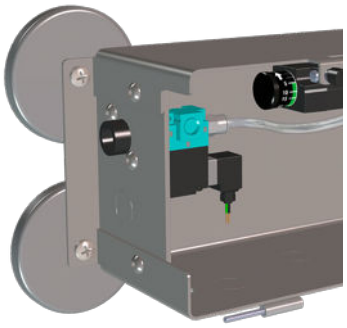


Figure 20: Magnet mount

Attention: *The Single Line lubricator 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.*

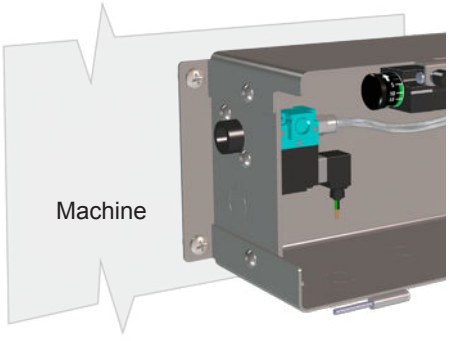


Figure 21: Direct mount

Attention: *Always use two people while securing the Single Line lubricator to its mounting surface. Failure to do so could cause personal injury.*

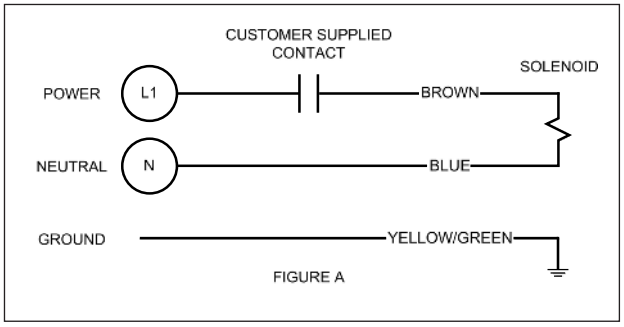
Connect Control Valve

The pneumatic circuit on the Single Line lubricator can be controlled with a solenoid valve, a manual slide valve, or an air pilot valve. If the Single Line lubricator 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.

Single Line Control Valves

Unist part #	Pipe size	Voltage	Power	Figure	DIN connector size
68-1040-18-12VD	1/8" NPT	12 VDC	1.8 W	B	9.4 mm
68-1040-18-24VD	1/8" NPT	24 VDC	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



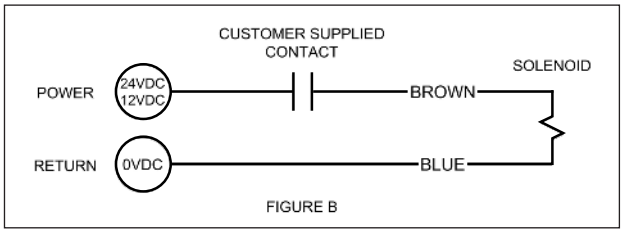


Figure 22: Single Line control valves

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

Attention: *Ensure that power is not applied to the Single Line lubricator 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.

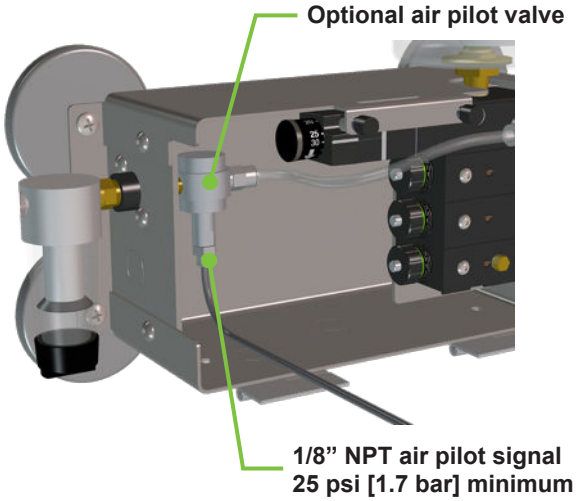


Figure 23: Pneumatic air pilot valve

Attention: *Ensure air pressure is not present when connecting the air pilot signal to the Single Line 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 24.

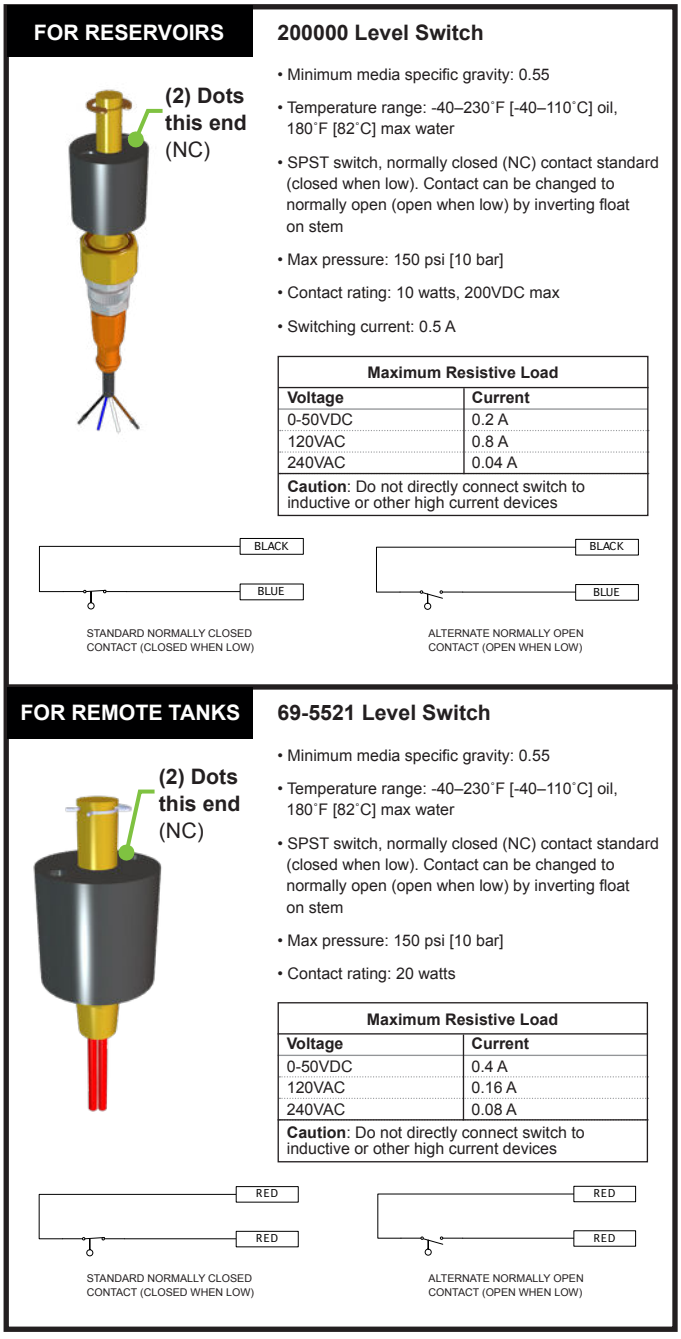


Figure 24: Low level switch

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

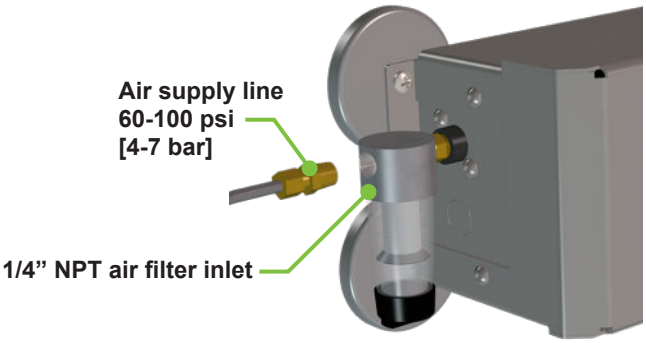


Figure 25: Air supply to filter

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

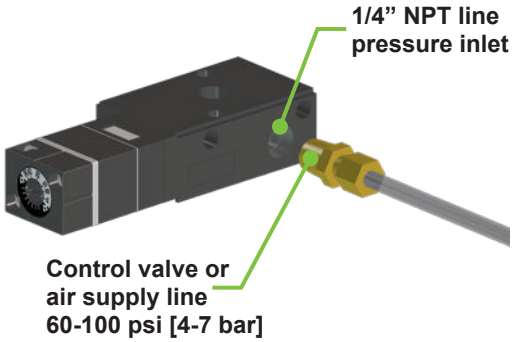


Figure 26: Air supply to manifold

For units without a standard 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 Single Line lubricator 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 27: 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.

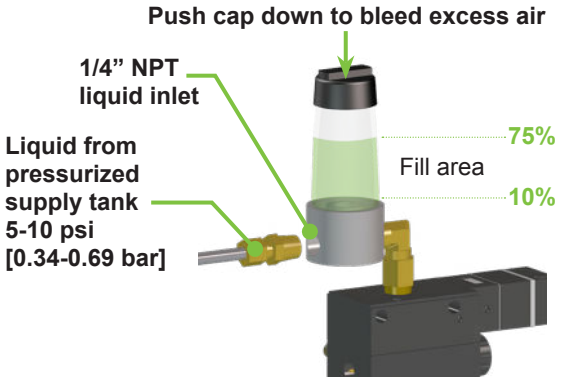


Figure 28: Bleeding air trap

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

Single Line Copper Nozzle

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.

Figure 29: Single line copper nozzle

On the vertical plane, the nozzle should be placed so all the tools to be used are adequately covered by the output spray. For longer tools this means the angle from vertical is less than the 60-70 degrees shown.

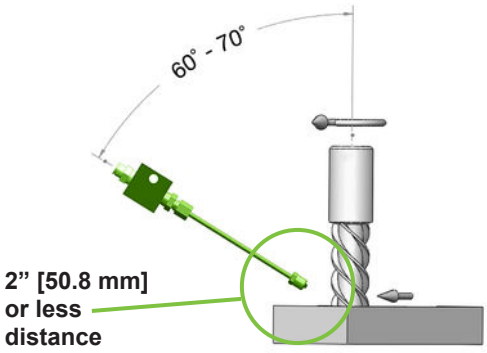


Figure 30: Vertical position of single line copper nozzle

Splitter Nozzle

For sawing applications where a Bat Nozzle or a Band Saw Blade Nozzle will not fit, a splitter nozzle could be the best solution. The nozzles should be aimed to spray the sides of the blade and into the gullet of the teeth.

Figure 31: Splitter nozzle

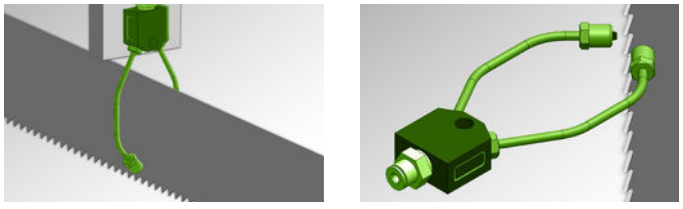


Figure 32: Splitter nozzle on a horizontal or vertical band saw

Bat Nozzle

The Bat Nozzle was designed to easily fit on a wide variety of circular saws, vertical band saws, and horizontal band saws. The nozzle includes a 1.75” [44.5 mm] square mounting flange that can be attached to the blade guard. A 1” [25.4 mm] diameter hole drilled through the guard allows the nozzle to be centered over the blade. The nozzle position can then be adjusted as close to the blade as required with a thumb screw. Two outlets on the sides of the blade and a third outlet spraying directly into the gullet of the teeth assure proper application of lubricant to the saw blade. The Bat Nozzle is available in various lengths to accommodate a broad range of saws.

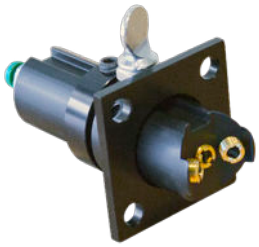


Figure 33: Bat Nozzle

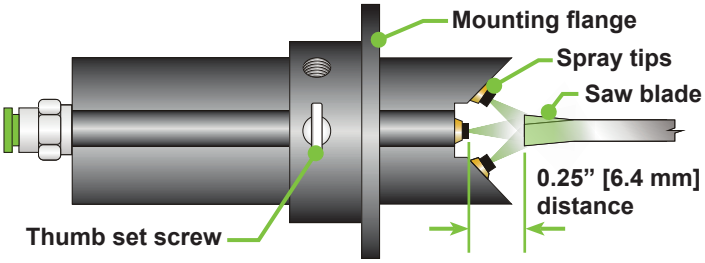


Figure 34: Bat Nozzle components

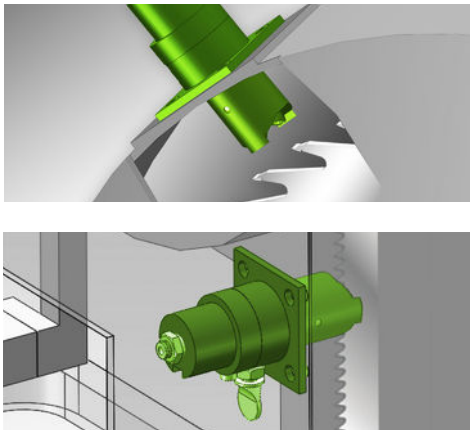


Figure 35: Bat Nozzle on a circular or band saw

Band Saw Blade Nozzle

The Band Saw Blade (BSB) Nozzle provides users with alternative mounting options and delivers an ideal spray pattern for horizontal band saw blade lubrication. Its smaller footprint makes for easier mounting and less intrusive installation. When mounted to the blade guide, proper positioning is easy when using the built-in ruler guide. Simply align the top of the blade with the appropriate blade size marking and secure the nozzle in place. The available mounting kit provides additional mounting flexibility. The BSB Nozzle is available in 1” [25.4 mm], 2” [50.8 mm], and 3” [76.2 mm] sizes to accommodate most common band saw blade widths.

Figure 36: Band Saw Blade Nozzle

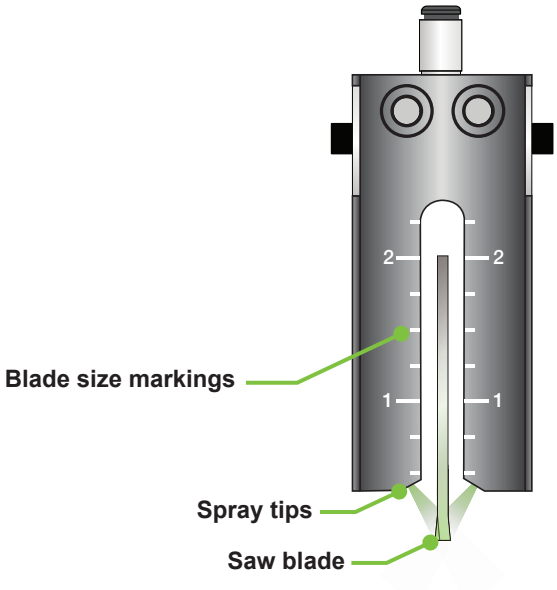


Figure 37: Band Saw Blade Nozzle Components

Band Saw Guide Nozzle

When blade guide lubrication is required, the Band Saw Guide (BSG) Nozzle will lubricate the sides of the blade to help minimize friction. The BSG Nozzle can be mounted directly to a guide block, to the BSB Nozzle, or installed with the Mounting Kit. When paired with a BSB Nozzle, this will provide lubrication for both the cutting edge and the sides of the blade.

Figure 38: Band Saw Guide Nozzle paired with a Band Saw Blade Nozzle

BSB & BSG Mounting Kit

For maximum flexibility, every band saw mounting kit includes two mounting brackets. The block mount allows either a blade or the guide nozzle to be held 90 degrees from the mounting surface. The rail mount allows the vertical height of the BSB or BSG Nozzles to be easily adjusted by sliding the nozzle up or down and tightening the clamps at the sides.

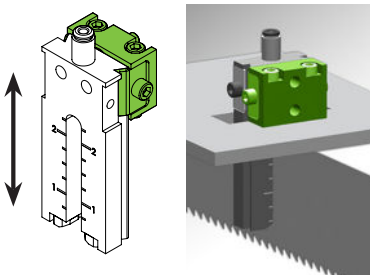


Figure 39: Block mount

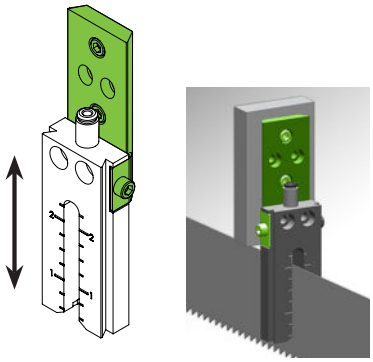


Figure 40: Rail mount

Turning The System On & Off

The Single Line system is turned on or off using a manual slide valve, a solenoid valve, or an air pilot valve. If the unit is equipped with a manual slide valve, it is turned on and off by sliding the valve to the desired position. Moving the slide valve barrel toward the air filter will turn air flow to the system on. Moving the slide valve barrel away from the air filter will turn air flow to the system off.

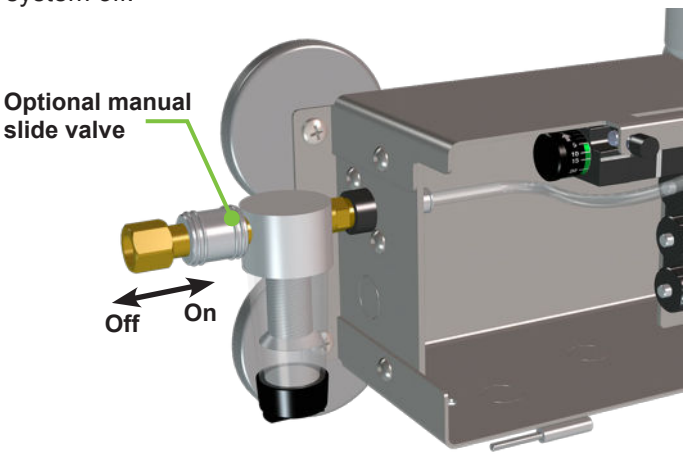


Figure 41: Manual slide valve

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.

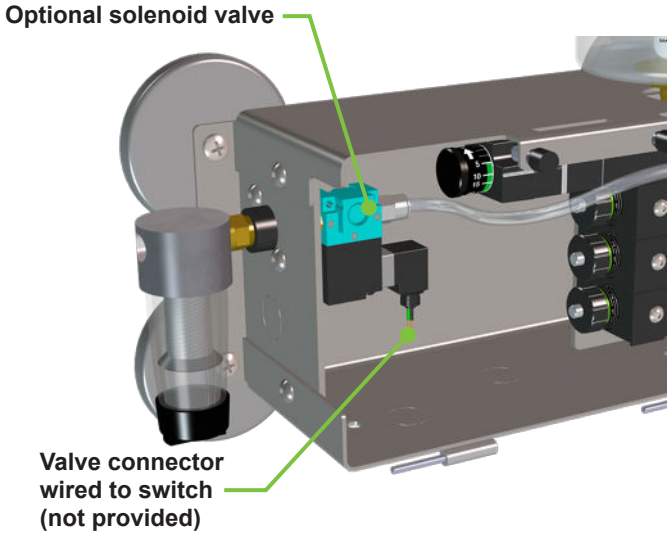


Figure 42: Remote operation

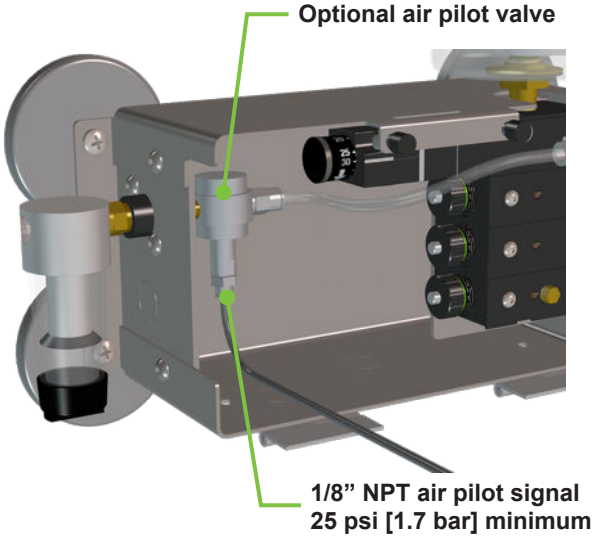


Figure 43: Pneumatic air pilot valve

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.

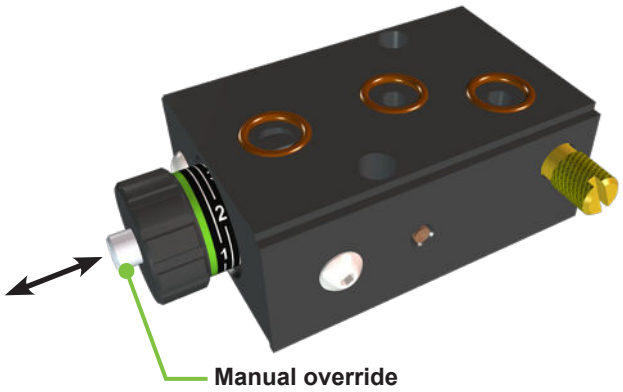
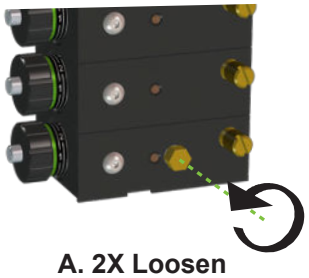


Figure 44: Manual override

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 the so 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

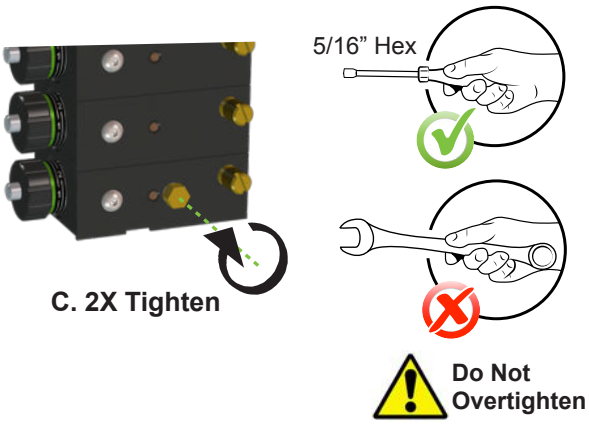


Figure 45: Priming the pumps

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.

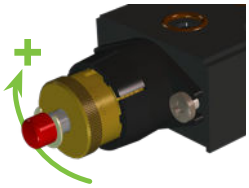
Attention: *Ensure all people are clear from the area of the system output nozzles when operating the outputs manually. Failure to do so could result in personal injury.*

Setting Pump Stroke

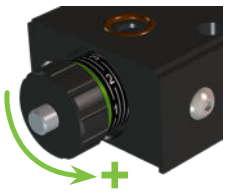
It is suggested that the pump be left at full stroke and spray pattern adjustments are made with the pulse generator. However in cases where very low output is needed and a stable spray pattern cannot be maintained when adjusting the pulse generator alone, the pump stroke length can be decreased and the pump cycle rate increased.

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)

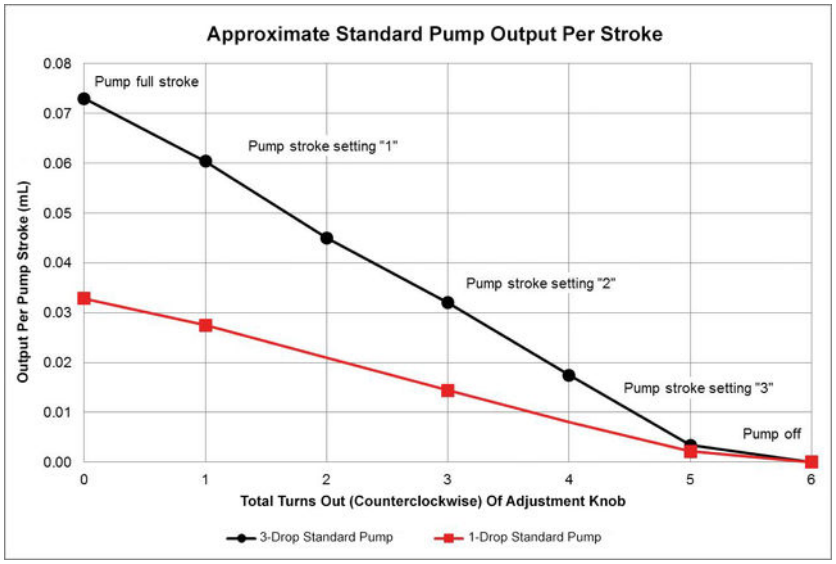


Figure 46: Approximate standard pump output per stroke

2-Drop MV Pump (Red Band)

1-Drop MV Pump (Green Band)

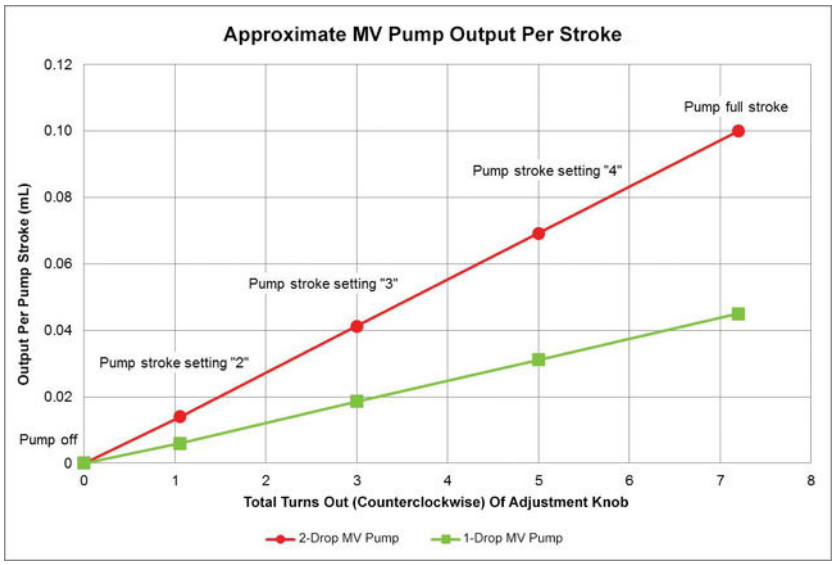


Figure 47: Approximate MV pump output per stroke

Adjust Pulse Generator

The pulse generator is recommended as the primary fluid rate adjustment. The entire range of rates is contained in a single 360 degree rotation, so turning the knob a full turn will return the pulse generator to its initial rate.

System With Knob

Adjust the pulse generator to 10 pulses per minute by aligning the 10 on the decal with the alignment notch on the mounting block. This should result in a pulse approximately once every 6 seconds. Turning the knob clockwise decreases the frequency, counterclockwise increases it. The numbers on the dial can be used as rough approximations of the pulses per minute.

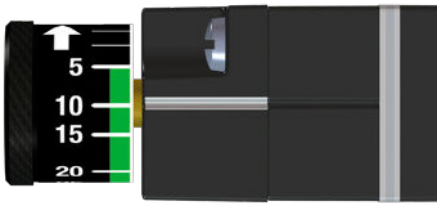


Figure 48: Pulse generator adjustment knob

System Without Knob

Adjust the pulse generator to 10 pulses per minute using a screwdriver and a stopwatch. The pump should pulse once every 6 seconds. Turning the screw clockwise decreases the frequency, counterclockwise increases it.

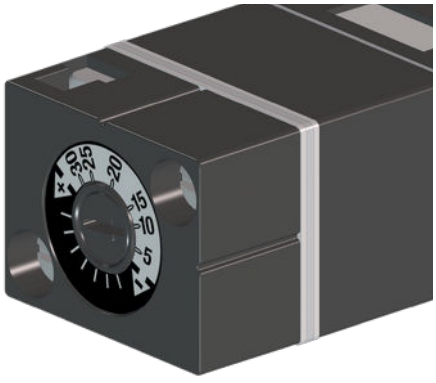


Figure 49: Pulse generator

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).

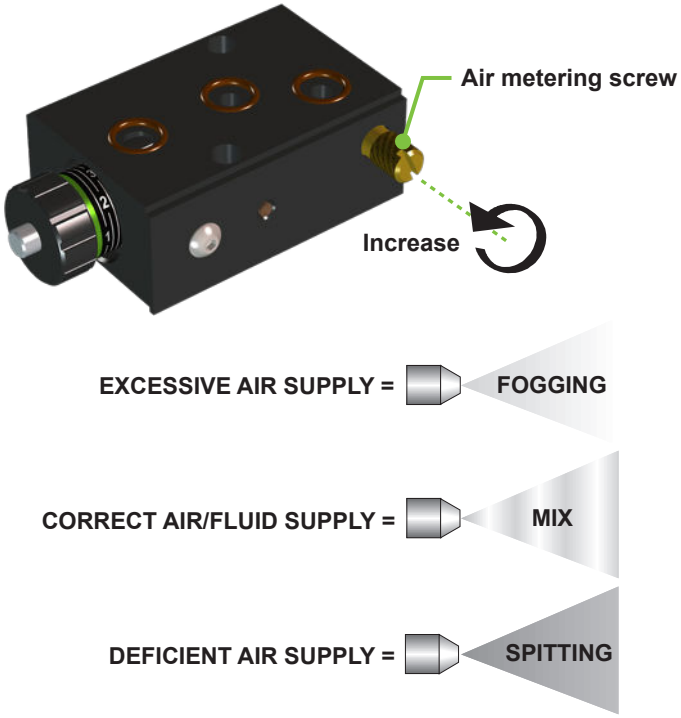


Figure 50: Adjusting airflow

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

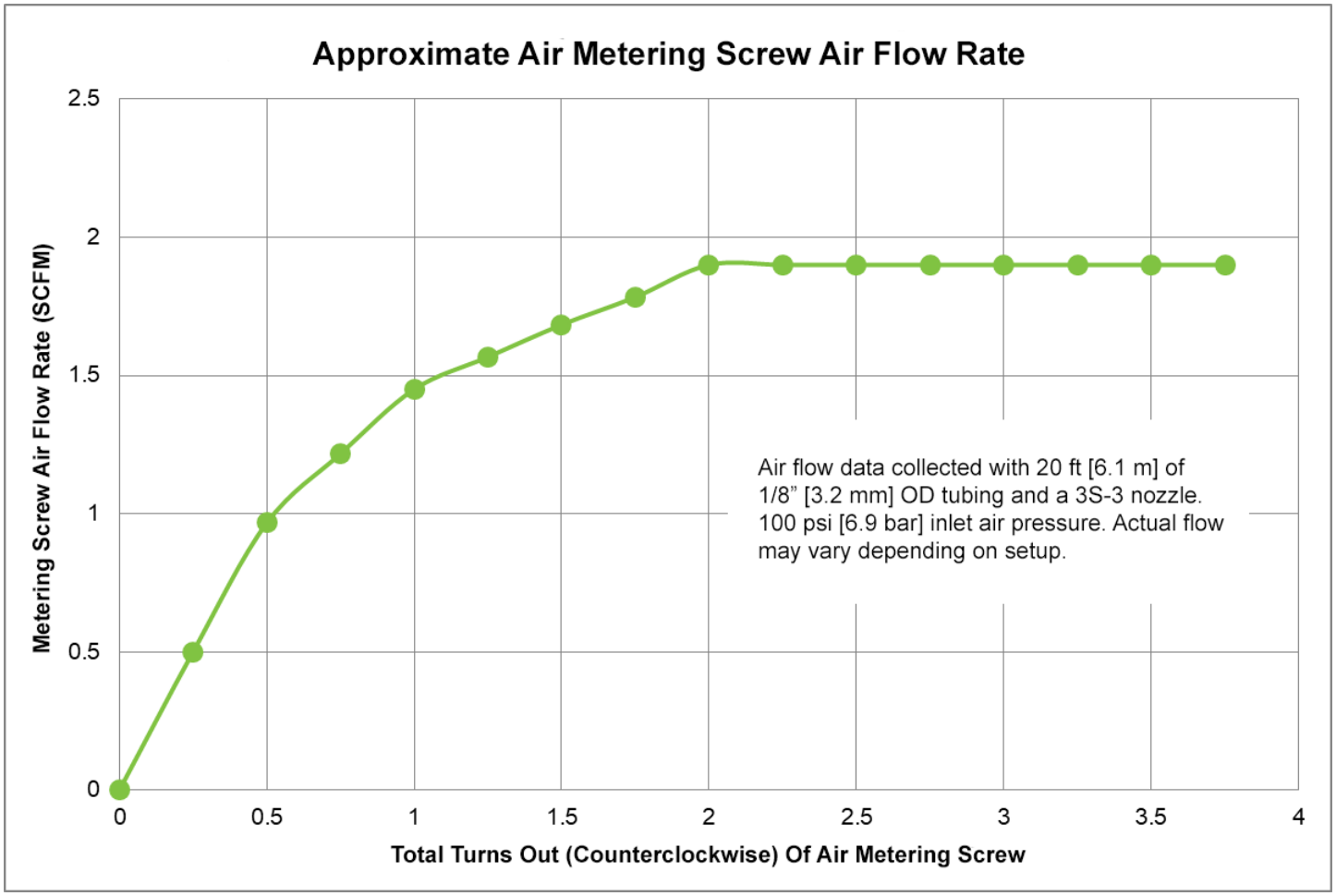


Figure 51: Approximate air metering screw air flow rate

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

Pump is not cycling

- Confirm pulse generator is not set to 0.
- Confirm inlet air pressure is between 60-100 psi [4-7 bar].
- Confirm that actuation of the controlling manual valve, solenoid valve, or air pilot valve allows air to flow into the system.
- Inspect the pulse generator inlet screen for debris. (See Figure 52).

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 16.
- 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.
- Confirm the pulse generator is set appropriately.
- Perform the pump priming procedure, previously described in the section titled **"Prime The Pumps"** on page 16.
- 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.

Inspecting the pulse generator

Remove pulse generator and check air inlet screen for particulate matter. If none found, replace pulse generator. See illustration below for details on the position of the air inlet screen.

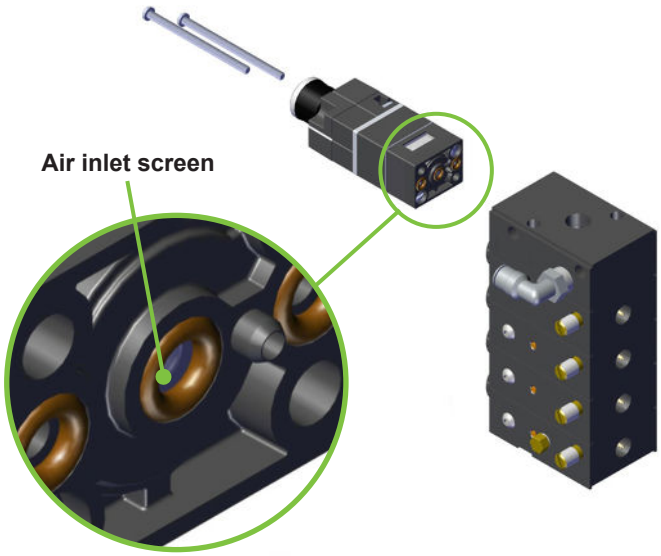
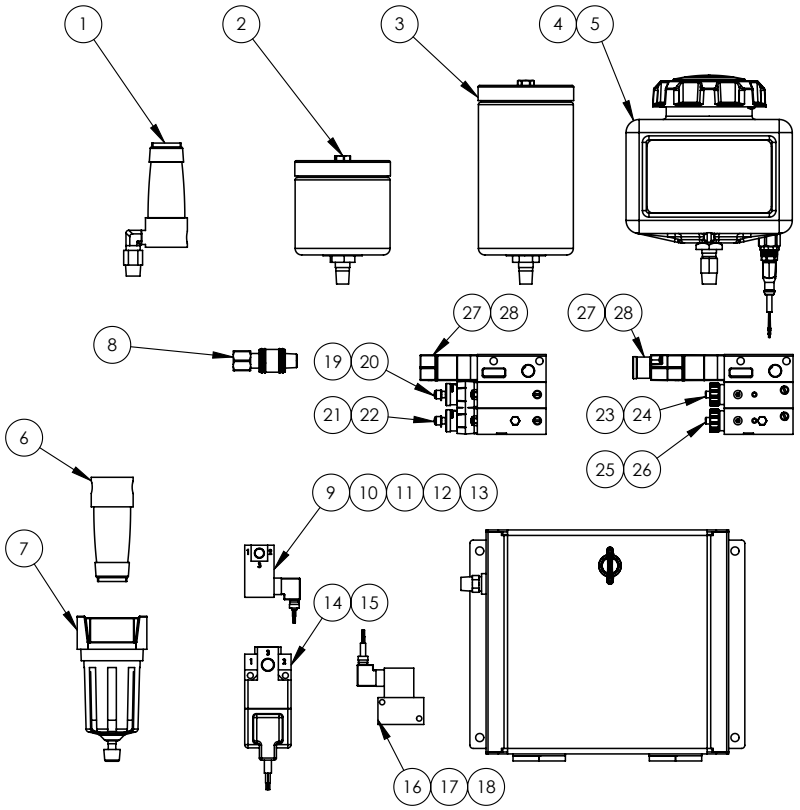


Figure 52: Air inlet screen

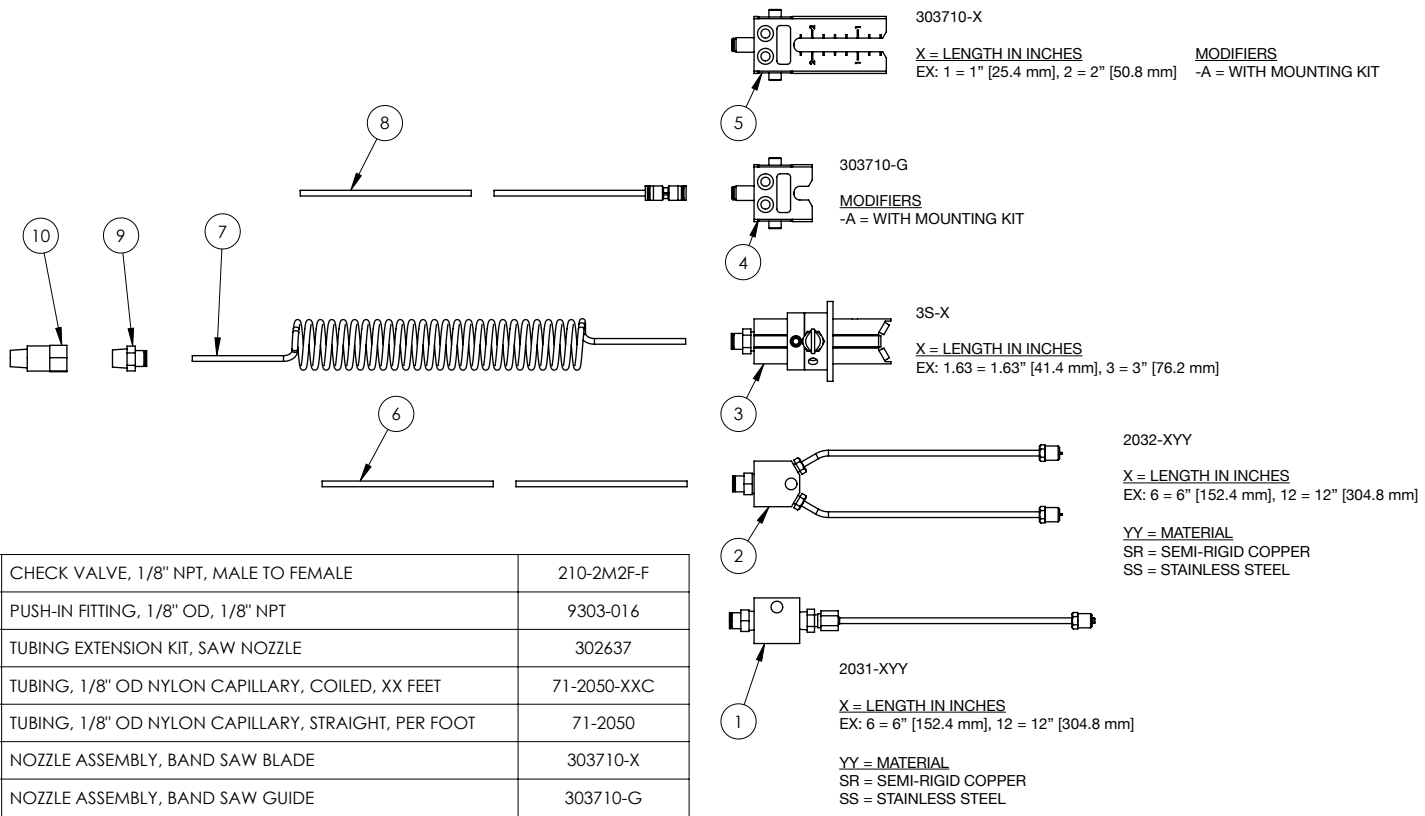
Appendix A: System Spare Parts



28	ASSEMBLY, PULSE GENERATOR, WITH ADJUSTMENT KNOB	301930
27	ASSEMBLY, PULSE GENERATOR	60-6393
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, 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
ITEM NO.	DESCRIPTION	PART NUMBER

Figure 53: System spare parts

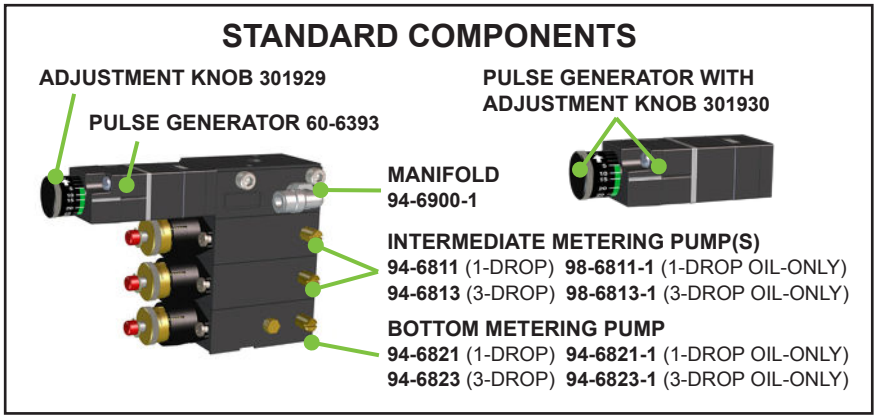
Appendix B: Nozzle Spare Parts

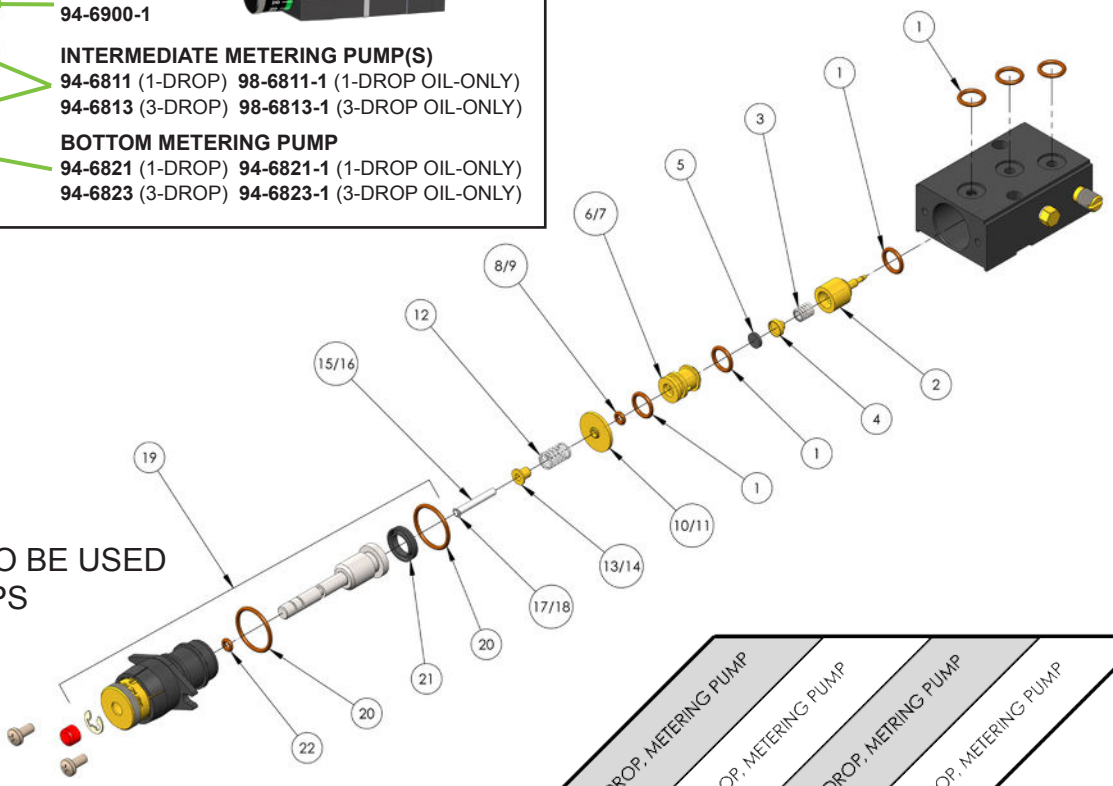


ITEM NO.	DESCRIPTION	PART NUMBER
10	CHECK VALVE, 1/8" NPT, MALE TO FEMALE	210-2M2F-F
9	PUSH-IN FITTING, 1/8" OD, 1/8" NPT	9303-016
8	TUBING EXTENSION KIT, SAW NOZZLE	302637
7	TUBING, 1/8" OD NYLON CAPILLARY, COILED, XX FEET	71-2050-XXC
6	TUBING, 1/8" OD NYLON CAPILLARY, STRAIGHT, PER FOOT	71-2050
5	NOZZLE ASSEMBLY, BAND SAW BLADE	303710-X
4	NOZZLE ASSEMBLY, BAND SAW GUIDE	303710-G
3	BAT NOZZLE ASSEMBLY	3S-X
2	SPLITTER NOZZLE, 1/8" OD TUBING	2032-XYY
1	NOZZLE KIT, 1/8" OD TUBING	2031-XYY

Figure 54: Nozzle spare parts

Appendix C: Standard Pump Components





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

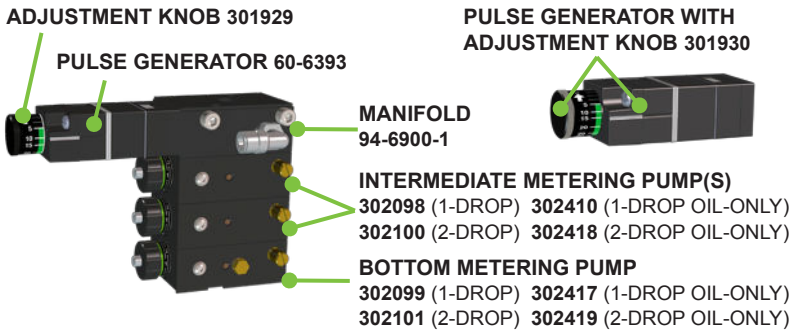
EXPLODED VIEW OF INTERNAL KIT PARTS -ORDER BY KIT NUMBER ONLY-

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

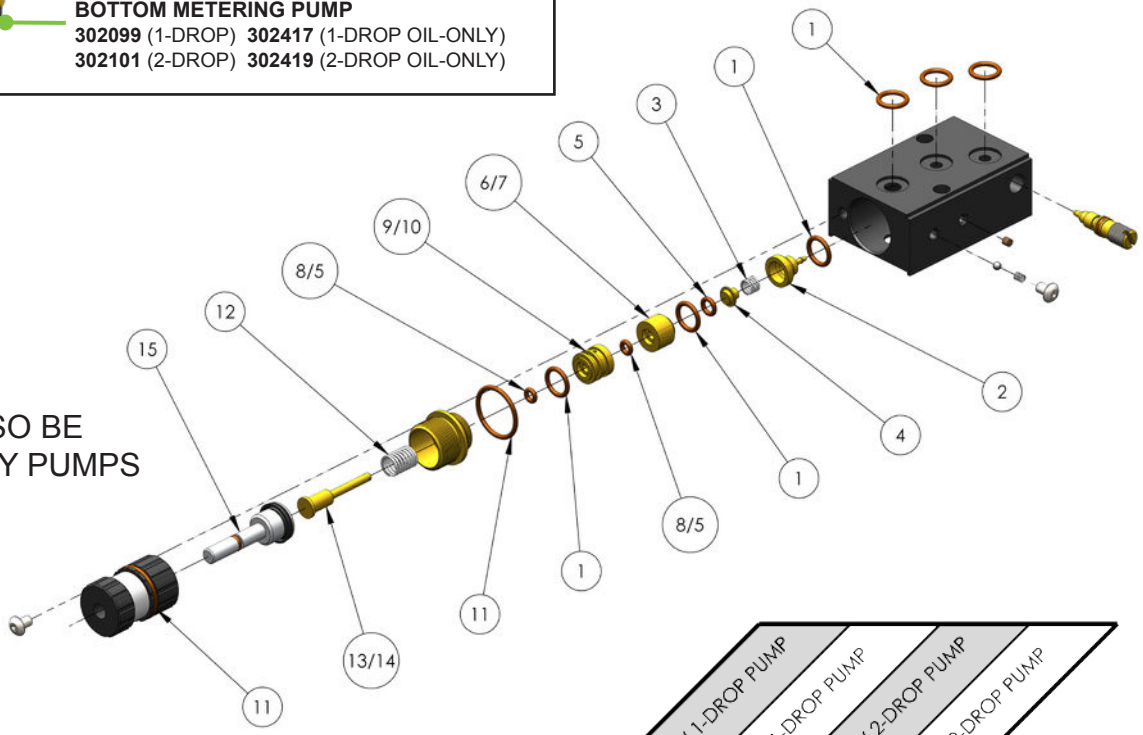
Figure 55: Standard pump components

Appendix D: MV Pump Components

STANDARD COMPONENTS



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

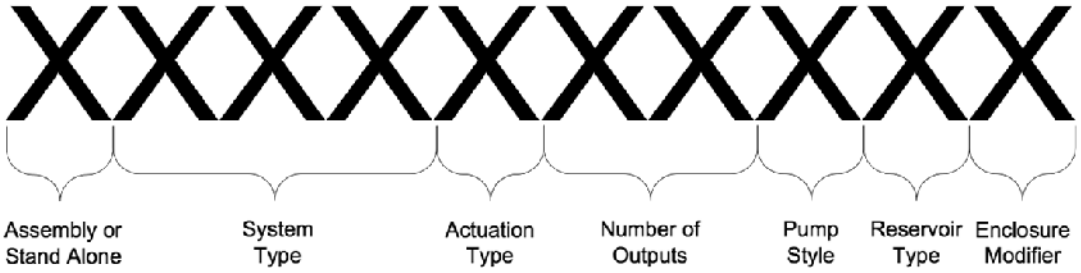


EXPLODED VIEW OF INTERNAL KIT PARTS -ORDER BY KIT NUMBER ONLY-

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 56: 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
100	Coolubricator

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-Independent 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

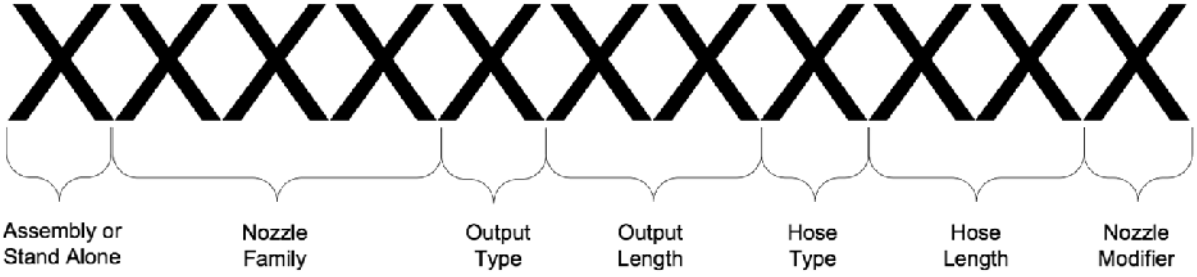
Designator	Description
B	16 oz
C	32 oz
D	64 oz
E	64 oz w/ Low Level Option
F	Air Trap Kit
X	No Reservoir

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 57: 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
101	Coolubricator 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
E	3-outlet BAT[1]	100
K	Guide Lube Point 1/8" NPT - Ftg[1]	100
L	Guide Lube Point 1/4" NPT - Ftg[1]	100
M	1/8" OD Copper Nozzle	100
N	Splitter[2]	100
P	1/4"-Copper Fan Spray	100, 200
R	Band Saw Blade Nozzle[1]	100
S	Band Saw Guide Nozzle[1]	100

[1]Nozzle Modifier does not apply
[2]Articulated Arm does not apply

6th & 7th Character: Output Length (6" increments standard. Special lengths additional cost)

Designator	Description
06-36	Length (in inches)[1]
XX	Predefined Length Nozzle

[1]on 1.63" BAT use 01. BAT limited to 01, 03 & 07
Splitters limited to 06,12,18
Use 00 for guide lube
Band Saw Blade use 01, 02 or 03

8th Character: Hose Type

Designator	Description	Use with system type
A	Polyurethane Coaxial Hose	100, 200
B	Braided Stainless Steel Coaxial Hose	100, 200
C	1/8" Coiled Tubing (10' long minimum)	100
D	1/8" Straight Tubing	100

9th & 10th Characters: Hose Length (5ft increments standard. Special lengths additional cost)

Designator	Description
05-50	Length (in feet)

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 58: Nozzle part numbering scheme

Notes

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