

# SERIES 170 LUBRICATION SYSTEM



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### Preventive Maintenance

The danger in using automatic lubrication systems is **Complacency!** Pumps and injectors require priming at the time of commissioning. If the lubricant is depleted, then the pump/injector loses its' prime. When the reservoir is later re-filled without being re-primed, it will appear as if the system is working ... until someone notices that the fluid level has not changed!

This could result in serious damage to the equipment.

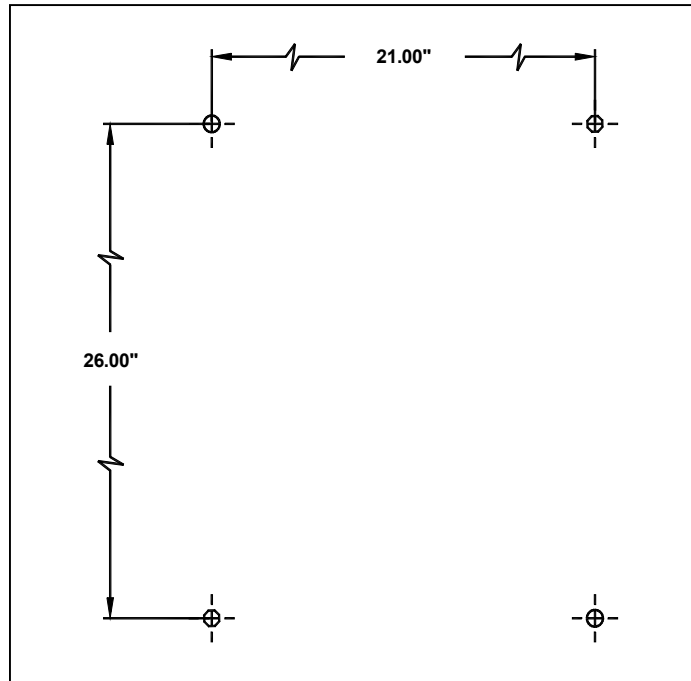
### Installation

- System must be mounted with the reservoir upright.
- Install a protective and lockout device for isolating and disconnecting the Series 170 System. Before beginning the installation work, disconnect the electrical supply.
- The 24 VDC systems will require that the customer provide a remote disconnect switch within line of sight and within 20 feet of the Series 170 electrical enclosure.
- The 120 VAC systems will require that the customer provide a remote disconnect switch within line of sight and within 20 feet of the Series 170 electrical enclosure.

Failure to observe the safety instructions, e.g. touching electrically charged parts when the system is opened, may be life threatening!

### Installation Instructions

- Mount Series 170 with 3/8-24 bolts according to template shown in Fig.1.
- Allow adequate space for reservoir filling and routine maintenance.



**Fig. 1: Series 170 Mounting pattern**

The Series 170 lubrication system can be divided into 4 major components:

1. Filter-Regulator/Pressure switch assembly
2. Reservoir assembly
3. VS assembly
4. Controls (refer to attached Controls Manual and system prints).

1. Filter-Regulator/Pressure switch assembly (Ref. Fig. 2): For supply air filtration, regulation and protection, the Series 170 provides as a standard a filter-regulator/pressure switch assembly.

a. Filter: (1), (5-micron element, auto-drain, and polycarbonate bowl).

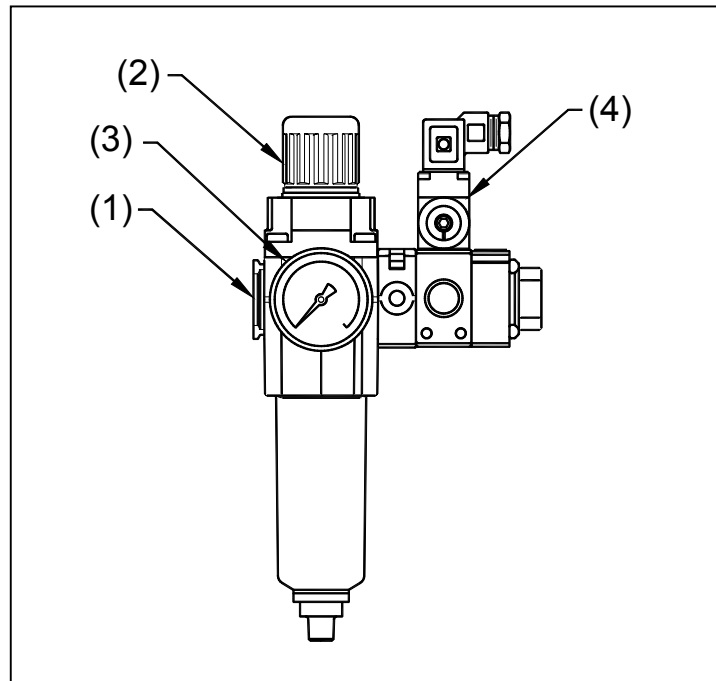
- Size supply source based on 1 SCFM per nozzle.

- Connect supply source to 1/4" NPT filter inlet port.

\*\* Quick disconnects are not recommended for this connection. \*\*

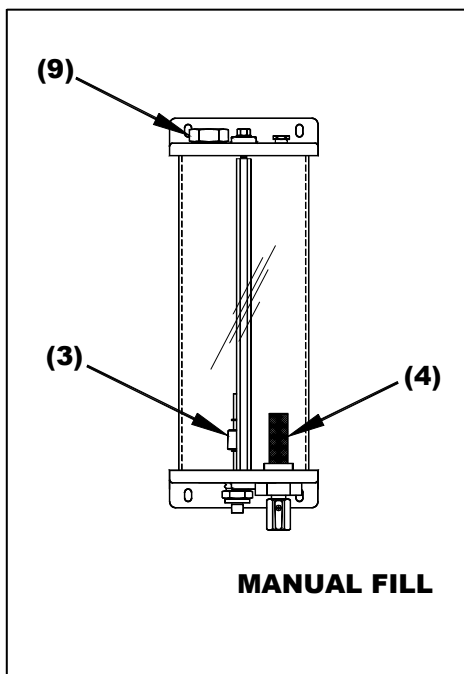
b. Regulator (2): Relieving, 0-160 psig gauge (3) (Factory preset at 65 psig.)

c. Pressure switch: (4), Provides verification of air supply. (Switch is preset from factory at 50 PSIG).

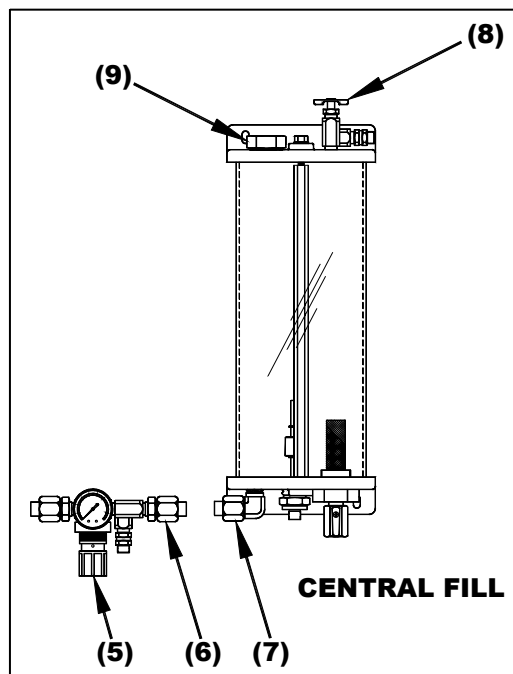


**Fig. 2: Filter-Regulator/Pressure switch assembly**

2. Reservoir assembly: There are two reservoir assemblies available for the system. All reservoirs have a low level switch (3) and 100-mesh strainer (4) as standard.
- a. **Manual fill** (Ref. Fig. 3):
    - Remove fill plug (9) from reservoir top plate.
    - Fill reservoir and replace fill plug.
  
  - b. **Central fill** (Ref. Fig. 4): for remote filling of reservoir from a centralized tank.
    1. **Pressure feed**
      - Adjust regulator on pressurized central fill assembly (Ref. Fig. 4), to the closed position. Pull down on adjustment handle (5), to unlock, rotate handle counter-clockwise until closed.
      - Connect ½” steel tubing from outlet side (6), of pressurized central fill assembly to the ½” steel tube fitting (7) supplied on the bottom plate of reservoir.
      - Connect feed line to inlet side of pressurized central fill assembly.
      - Open drain cock (8) on reservoir top plate for initial filling.
      - Adjust regulator to 3 PSIG maximum.
      - Monitor fill process and close drain cock when reservoir is ¾ full.
  
    2. **Manual fill** (Ref. Fig. 4)
      - Open drain cock (8) and adjust regulator to 0 PSIG.
      - Remove fill plug (9) from reservoir top plate.
      - Fill reservoir, close drain cock and replace fill plug.



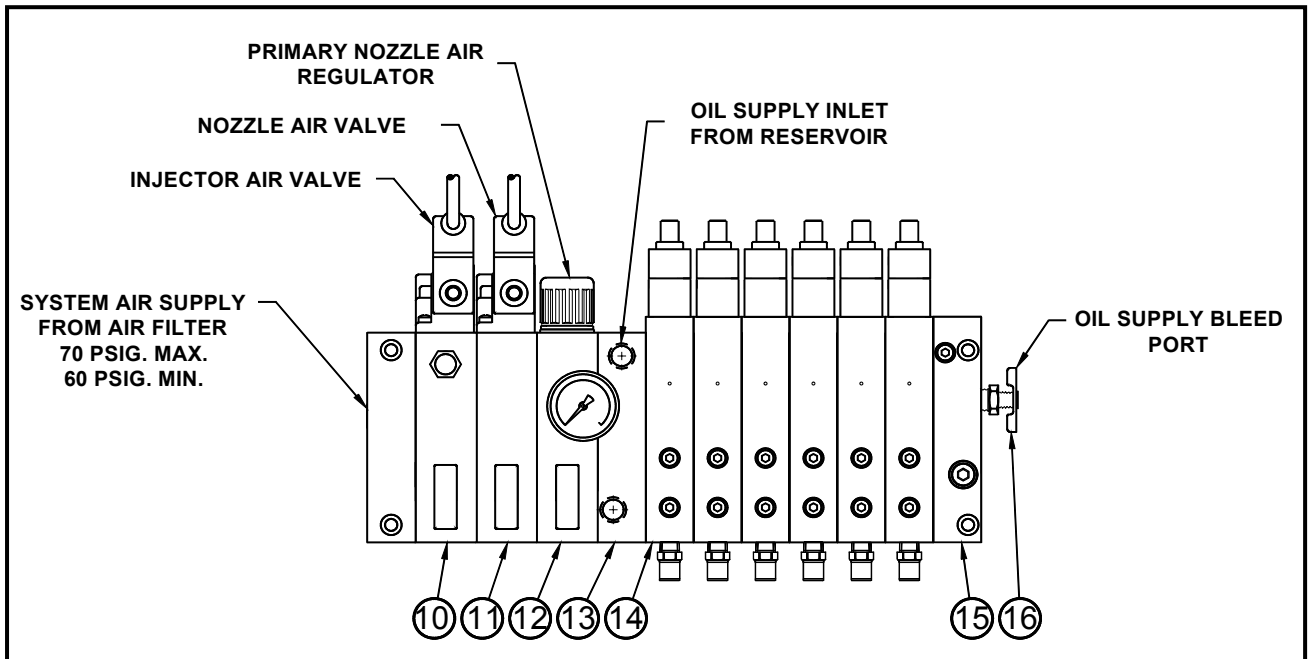
**Fig. 3: Reservoir – Manual Fill**



**Fig. 4: Reservoir – Pressurized Central Fill**

3. **VS Assembly (Ref. Fig. 5):** This is the core of the Series 170 lubrication system. The manifolded VS Assembly is a self-contained modular unit that incorporates valves to control the injector air supply as well as regulated air supply for the nozzle. The VS assembly can accommodate a maximum of 8 injectors per assembly.

- a. **Injector solenoid valve: (10)** This is the first valve in the stack and its' sole purpose is to supply a pulsed air signal to the injector.
- b. **Nozzle air solenoid valve: (11)** This is the next valve in the stack and it is responsible for supplying main air pressure to the neighboring component, the regulator.
- c. **Regulator block: (12)**, This accepts main air pressure from the nozzle air solenoid valve and regulates the pressure down to an acceptable level for the nozzle assemblies. The outlet of the Regulator block is ported through all following components.
- d. **Oil Feed block: (13)**, This receives oil from the reservoir and feeds all following injectors.
- e. **Injector block: (14)**, This consists of a positive displacement injector. The pulsed air signal (from the Injector solenoid valve) drives a piston pin assembly forward into a metering chamber. The piston pin assembly pressurizes the oil, overcoming an integral outlet check valve assembly and oil is dispensed (Ref. Injector Operation section for more information). The Injector block is also ported for the regulated nozzle air supply.
- f. **Manifold end plate: (15)**, This contains the bleed petcock (16), and auxiliary ports to run both the injector air signal and nozzle air supply to another injector manifold assembly.



**Fig. 5: VS Assembly with Six Injectors**



**Tube Connections: Reference system part number for type of tubing.**

**Nylon tubing**

- Lubricant line: 3/16" O.D.
- Nozzle air supply: 1/4" O.D. (3/8" O.D. for spindle applications).
- Ensure that the tube end is cut square and is free of burrs.
- Push the tube end through the collet into the fitting.
- Continue pushing the tube (firmly) through the o-ring until it bottoms out on the tube stop, and then pull back.
- To disconnect, push the tube into the fitting until it bottoms out on the tube stop. Then, while holding down the collet, withdraw the tube.
- Run feed lines from system to nozzle in such a manner to avoid damage due to friction or vibration.
- Do not connect the feed lines from the system to the nozzle at this time.

**Steel tubing**

- Cut tubing square with a tube cutter or fine-tooth hacksaw.
- Lightly deburr the I.D. and O.D. of the tube end to remove burrs and sharp edges.
- Slip nut and ferrule over deburred tube end. Be sure the long, straight end of the ferrule points toward the tube end.
- Hold tube steady against internal shoulder of fitting body and tighten nut.
- Loosen nut and check proper set (i.e. make sure ferrule is secured to tube). Avoid rotating the ferrule.

**Bleeding/Priming system:**

- Set air regulator to 0 PSIG.
- Open the ball valve (located on the reservoir bottom plate) to allow lubricant to fill the system.  
Note: handle on ball valve should be inline with the tubing.
- Open the bleed petcock, located on the VS manifold end cap.
- Allow oil to drain until no air is present, then close pet-cock.
- Manually cycle the injectors – Push in on the Injector adjustment rod, beginning with the injector closest to the oil feed block – Repeat until lubricant is observed in the nozzle feed line.
- Repeat process to each injector.

**Fill Lubricant Lines:**

- Cycle system until lubricant reaches nozzle position.
- Continue to cycle to purge tubing of all contaminants.
- Monitor progress – If injectors are not delivering repeat bleed process.
- With the system cycling, set the air regulator for 5 PSIG.
- Continue to cycle system until lubricant is dispensed out of nozzle tip.
- Adjust lubricant volume to desired output.
- Adjust air regulator for desired spray pattern.



**Series 170 Model Code**

	170	S	A	2	T	D	16	0808	H	M	NY	C	C
<b>Type of Enclosure</b>													
30" x 24" Stainless-steel enclosure with window and padlock kit ...S													
(Nema 4X Rating)													
30" x 24" Steel enclosure with window and padlock kit .....N													
<b>Omit for system without enclosure</b>													
<b>Voltage Requirements</b>													
110/120 VAC 50/60 HZ .....A													
220/240 VAC 50/60 HZ .....B													
230 VAC ~ 24-VDC European – CE .....C													
24 VDC .....D													
<b>1 or 2 Zones (Fluid Networks)</b>													
One Zone .....1													
Two Zones .....2													
<b>Type of control:</b>													
Customer Controlled (no controls included with system)													
Timer Controlled (injector timer included .....T													
(requires external signal for system "ON")													
System "ON" and Injector Timers (both included) .....R													
<b>Regulators</b>													
One Zone, all feed lines equal length, needs 1 regulator .....S													
One Zone, 2 different feed line lengths, needs 2 regulators .....D													
All feed lines served by each regulator should be equal lengths													
"Loop" the lines to compensate for minor differences in length													
Two Zones require two regulators													
<b>Number of Injectors</b> .....01-16													
<b>Nozzle/Zone (Fluid Network) Assignment</b>													
One Zone .....0000													
Two Zones/dual regulator systems, combination examples													
Zone 1, 1 nozzle; Zone 2, 1 nozzle .....0101													
Zone 1, 8 nozzles; Zone 2, 4 nozzles .....0804													
Zone 1, 8 nozzles; Zone 2, 8 nozzles .....0808													
Combinations cannot exceed 16 nozzles.													
<b>Injector Size (Maximum Output)</b>													
Half-drop per stroke Injector .....H													
Two-Drop per stroke injector .....T													
<b>Reservoir Filling Method</b>													
Central fill .....P													
Manual Fill .....M													
<b>Tube Fittings</b>													
Nylon Push In Tube Fittings .....NY													
Nylon Compression Tube Fittings .....NC													
Carbon Steel Steel Tube Fittings .....CS													
Stainless Steel Steel Tube Fittings .....SS													
No Fittings .....XX													
<b>Application Zone 1</b>													
Continuous Spray .....C													
Pulsed Spray .....P													
<b>Application Zone 2</b>													
Continuous Spray .....C													
Pulsed Spray .....P													
No Second Zone .....X													

**Standard on all Models**

- Low Reservoir Level switch
- Low air pressure switch
- Pilot Lights

**Special Request Options**

- (Add code to model number)
- Spindle (0-60 psi gauge,
- 0.015 ml fixed injector.....S1

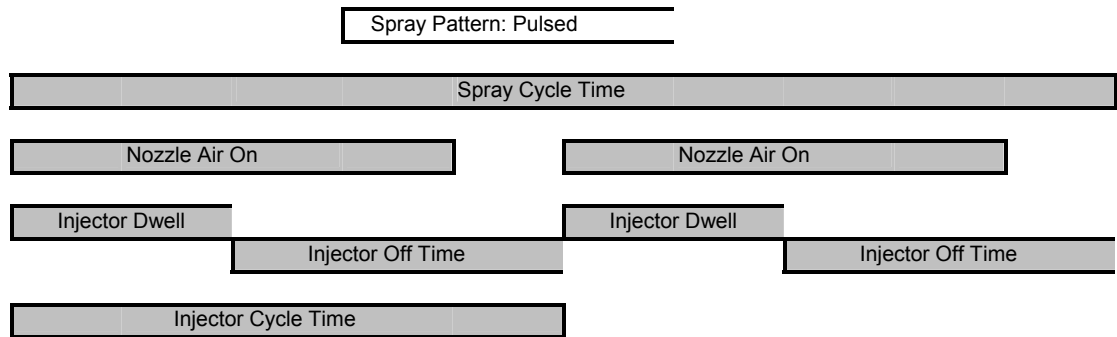
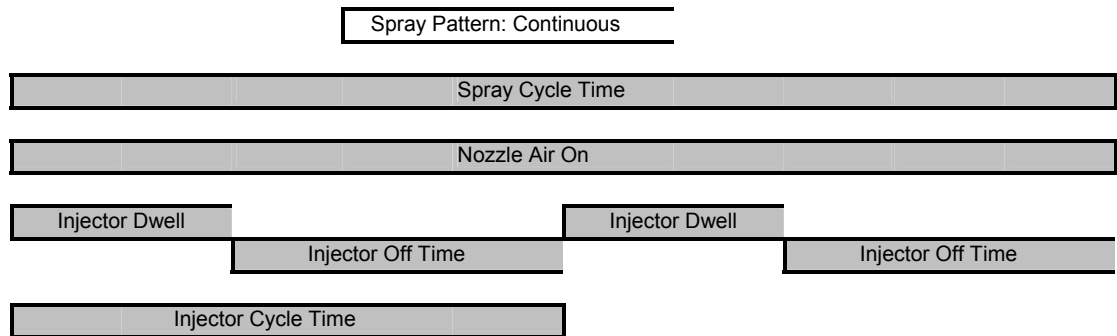
**Each Order Requires the Following**

- Series 170 model number
- Spray nozzle item number
- (see separate form)

- Red light (low level/low pressure)
- Green system operation light for each zone.
- Extra volume nozzles, i.e. Metalworking applications.....S2
- Spray nozzle bracket model number (optional)

**Description**

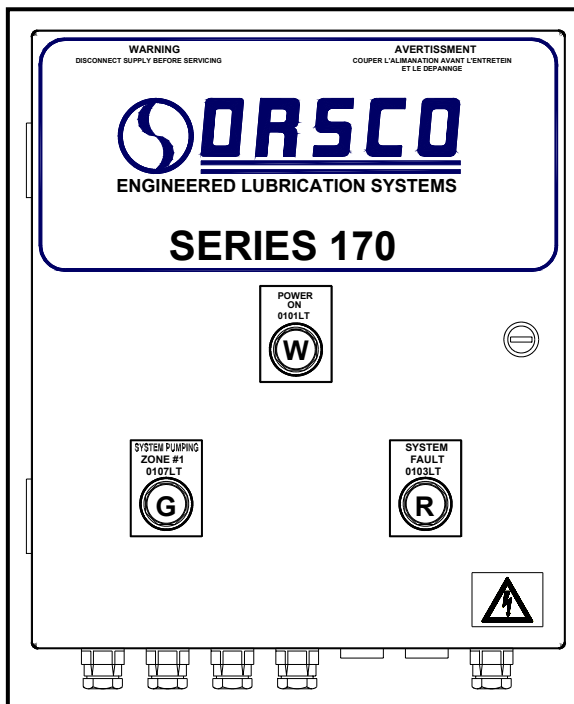
- The Series 170 Lubrication system is a complete, versatile lubrication system for a maximum of 16 lubrication points.
- Lubricant is delivered to the nozzle assembly by a manually adjustable, positive displacement injector, available in two sizes: ½ drop (.015ml), and 2 drops (.060ml).
- The lubrication system can operate in either a “continuous” or a “pulsed” mode according to the following diagrams.



- Control of cycle. Nozzle air and injector solenoid timing constitutes one zone (network). The Series 170 lubrication system can accommodate maximum of two zones.
- Operation of the injector solenoid is indicated by a green pilot light. One pilot light per zone. Each system has a main air pressure switch and reservoir level switch. A red light is activated when either the air supply is removed or the reservoir level is low.
- Nozzle air supply regulated through a pressure regulator. Single zone system can be divided into a dual regulator zone (network). For a dual zone system, each zone has independent regulator.



## Troubleshooting



<b>Fault: Red Fault Indicator Light is "On"</b>	
<b>Cause</b>	<b>Remedy</b>
Low Reservoir Level	Fill reservoir with clean filtered lubricant.
Low Air Pressure	Check inlet air supply. Check air filter element, replace if necessary.
Switch Malfunction	Disconnect cable from air pressure switch, if Fault Indicator changes state, replace pressure switch. Fault Indicator remains "On", replace level switch.

<b>Fault: System Pump Indicator Not Cycling/Injectors Cycling</b>	
<b>Cause</b>	<b>Remedy</b>
Blown Fuse	Inspect fuse (0106FU, 0111FU), replace if necessary.
Blown Bulb	Inspect bulb (0107LT, 0112LT), replace if necessary.
Faulty Connections	Inspect wire connections between fuse and indicator light.

<b>Fault: System Pump Indicator Cycling/Injectors Not Cycling</b>	
<b>Cause</b>	<b>Remedy</b>
No power to injector solenoid	Inspect wire connections to injector solenoid (0106SOL, 0111SOL).
Injector air supply low	Verify air supply from injector solenoid (Manual override on solenoid).
Injector internal air pocket	Repeat bleed procedure.
Injector mechanical failure	Replace injector.



### Troubleshooting (con't)

<b>Fault: System Pump Indicator Not Cycling/Injectors Not Cycling</b>	
<b>Cause</b>	<b>Remedy</b>
Power to system	Inspect incoming power connections, repair or replace as necessary.
	Inspect main fuse (0100FU), replace if necessary.
Start/Stop Relay	Inspect control relay wire connections, including all contacts. Verify power to relay coil, replace coil if necessary.
Injector Timer	Verify output of Injector Cycle Timer (0105TR, 0110TR). Verify injector Cycle Timer settings (Repeat cycle or single-shot mode). Replace timer if necessary.

<b>Fault: Nozzle Air Line -Low pressure</b>	
<b>Cause</b>	<b>Remedy</b>
Open Air Line	Reconnect or replace air line
Leak at fitting	Inspect all fittings, re-seat tubing, or replace fitting if necessary.
Regulator pressure low	Re-adjust regulator to proper setting.
Clogged Air filter	Replace filter element
Solenoid valve failure	Verify power to solenoid (0108SOL, 0113SOL), replace if necessary.

<b>Fault: Nozzle Air Line - High pressure</b>	
<b>Cause</b>	<b>Remedy</b>
Blocked air line	Inspect tubing for damage, replace if necessary.
Regulator pressure high	Re-adjust regulator to proper setting.
Blocked nozzle tip orifice	Inspect nozzle, replace tip if necessary.

<b>Fault: Nozzle Oil Line -Low pressure</b>	
<b>Cause</b>	<b>Remedy</b>
Open Oil Line	Reconnect or replace oil line
Leak at fitting	Inspect all fittings, re-seat tubing, or replace fitting if necessary.
Nozzle check valve	Inspect check ball in nozzle assembly. Clean and re-install.
Injector check valve	Inspect injector check seal for contamination, clean and re-install.

<b>Fault: Nozzle Oil Line -High pressure</b>	
<b>Cause</b>	<b>Remedy</b>
Blocked nozzle tip orifice	Inspect nozzle, replace tip if necessary.

<b>Fault: Nozzle Air Line - Line filled with Oil</b>	
<b>Cause</b>	<b>Remedy</b>
Nozzle check valve	Inspect nozzle assembly for proper installation of check assembly.

## Series 170 Technical Data

<b><u>Operating Voltage</u></b>	24 VDC 120 VAC ~ 60 Hz. 230 VAC ~ 50/60 Hz.	<b><u>Injector Cycle Timer (IC)</u></b>	DIP switch selectable Factory pre-set @ 0.5 seconds Non-adjustable
		<b>ON-Time Range</b>	"X1S" 1 to 255 seconds "X10S" 10 to 2550 seconds
		<b>OFF-Time Range</b>	Solid-state normally open 0.7A steady-state, 10 Amp In-rush
<b><u>Operating Current:</u></b>	24 VDC .... 0.65 - 1.37 FLA 120 VAC - 60 Hz .... 0.18 - 0.35 FLA 230 VAC - 50/60 Hz .... 0.12 - 0.21 FLA	<b>Output Type</b>	Solid-state normally open 0.7A steady-state, 10 Amp In-rush
		<b>Output Rating</b>	0.7A steady-state, 10 Amp In-rush
<b><u>Temperature Range:</u></b>	-20° F to 120° F (7° C to 50° C)	<b><u>System Cycle Timer (SC)</u></b>	DIP switch selectable
<b><u>Number of Injectors:</u></b>	16	<b>ON-Time Range</b>	"X1M" 1 to 15 minutes "X10M" 10 to 150 minutes "X10M" 10 to 150 minutes "X1H" 1 to 15 hours
<b><u>Reservoir</u></b>	Capacity 4000 ml (244 in <sup>3</sup> ) Tube Material: Acrylic Seal Material: Buna N Filter: 100 mesh	<b>OFF-Time Range</b>	Solid-state normally open 0.7A steady-state, 10 Amp In-rush
		<b>Output Type</b>	Solid-state normally open 0.7A steady-state, 10 Amp In-rush
		<b>Output Rating</b>	0.7A steady-state, 10 Amp In-rush
<b><u>Level Switch</u></b>	Material: Buna N Max. switching power: 20 VA Max. switching current: 0.7 Amp Switch contact (dry state) SPST - N.C.	<b><u>Lines</u></b>	
		<b>Nozzle Air Supply</b>	1/4" O.D. Nylon
		<b>Min. bend radius</b>	22 mm (0.88")
		<b>Working pressure</b>	17.2 bar(250 psi) @ 23.9° C (75° F)
		<b>Burst pressure</b>	68.9 bar (1000 psi) @ 23.9° C (75° F)
<b><u>Lubricant Range:</u></b>	100-2000 SUS	<b>Nozzle Oil Supply</b>	3/16" O.D. Nylon
		<b>Min. bend radius</b>	19 mm (0.75")
		<b>Working pressure</b>	13.8 bar(200 psi) @ 23.9° C (75° F)
		<b>Burst pressure</b>	55.1 bar (800 psi) @ 23.9° C (75° F)
<b><u>Injector Output</u></b>	#570-89468 0-0.015 ml (.001 in <sup>3</sup> ) #570-89490 0-0.060 ml (.004 in <sup>3</sup> )		
<b><u>Inlet Air pressure</u></b>	4 - 5 bar (60-70 psi)		
<b><u>Main Air filter micron rating:</u></b>	5 micron		
<b><u>Main Air Regulator</u></b>	160 psig (Factory preset @ 65 psig)		
<b><u>(Relieving:</u></b>			
<b><u>Air Inlet port</u></b>	1/4" NPT		

**Product Certification:**

**CSA C22.2 No. 14-95 – Industrial Control Equipment  
 UL 508 – Industrial Control Equipment**





### Series 170 System Spare Parts List

<b>Pneumatic Spare Parts</b>	<b>Orsco Item No.</b>
110/120 AC Injector Air Valve Block	549-20000
240/220 AC Injector Air Valve Block	549-20001
24 VDC Injector Air Valve Block	549-20002
110/120 AC Nozzle Air Valve Block	549-20004
240/220 AC Nozzle Air Valve Block	549-20005
24 VDC Nozzle Air Valve Block	549-20006
110/120 AC Valve Coil	549-20009
240/220 AC Valve Coil	549-20011
24 VDC Valve Coil	549-20010
Solenoid Kit	549-20012
Spool Assembly Kit	549-20013
Valve/Regulator Seal Kit	549-20014
Regulator Block Assembly	549-20008
Gauge: 30 PSI	495-09185
Gauge: 15 PSI	291-09237
Gauge: 60 PSI	495-91310
Gauge: 160 PSI	105-09190-0624
Valve/Regulator Tie Rod	785-43300
Regulator Tie Rod (Dual Regulator Option only)	785-43200
Filter/Regulator, 5 micron	549-99313
5 Micron Filter Element	549-90013
Pressure switch (preset @ 50 psig)	549-11013
Reservoir Base Assembly (w/ Float sw.)	570-89472
Reservoir Float Switch	090-07145

<b>Fittings</b>	
Nylon Tube Push In Fittings	
3/16" Tube x 1/8" NPT Straight	549-11055
1/4" Tube x 1/8" NPT Straight	549-11047
Nylon Tube Compression Fitting	
3/16" Tube x 1/8" NPT Straight	575-12602
1/4" Tube x 1/8" NPT Straight	575-12670-0982
Steel Tube Fittings (Mat'l: Carbon Steel)	
1/8" Steel Tube x 1/8" NPT Straight	344-96554
1/4" Steel Tube x 1/8" NPT Straight	035-98588
Steel Tube Fittings (Mat'l: Stainless Steel)	
1/8" Steel Tube x 1/8" NPT SS Ftg.	344-96552
1/4" Steel Tube x 1/8" NPT SS Ftg.	344-96553

<b>Electrical Spare Parts</b>	<b>Orsco Item No.</b>
120 VAC Green Pilot Light	642-91027
120 VAC Red Pilot Light	642-91028
120 VAC White Pilot Light	642-99182
24 VDC Green Pilot Light	642-91029
24 VDC Red Pilot Light	642-91030
24 VDC White Pilot Light	642-99183
220 VAC Green Pilot Light	642-91032
220 VAC Red Pilot Light	642-91031
220 VAC White Pilot Light	642-99292
ICAC Injector Timer Module	702-10006
ICDC Injector Timer Module	702-10007
SCAC System Timer Module	702-10004
SCDC System Timer Module	702-10005
1/4 Amp Fuse	108-07111
1 Amp Fuse	108-07117
2.5 Amp Fuse	108-91093
4 Amp Fuse	108-07110
30 Amp Disconnect Switch	349-07300

<b>Valve Stack Parts</b>	
Injector Manifold End Cap	116-43500
Valve Manifold End Cap	116-43501
Oil Feed Block	116-43600

<b>Injector Spare Parts</b>	
Injector (Complete Assembly)	570-89468
Injector Tie Rod	785-43100

<b>Tubing</b>	
3/16" O.D. Nylon (per foot)	565-19185
1/4" O.D. Nylon (per foot)	565-19040-2950

<b>Recommended Spare Parts</b>	<b>Quantity</b>
Valve Coils	2
Injector (Complete Assembly)	2
Air Filter Element: 5 micron	1
Reservoir Assembly (#570-89472)	1
Red Pilot Light	1
Green Pilot Light	1
White Pilot Light	1
Timer Module	1
1/4 Amp Fuse	2
1 Amp Fuse	2



4 Amp Fuse	2
Spare Fittings	2 each

We recommend these items relevant to your system.

## Model 570-89468 Half-Drop Injector Model 570-89490 Double-Drop Injector

### SPECIFICATIONS

Lubricant viscosity range: 100-2000 SUS  
 Operating pressure (air): 60-70 psi (4-5 bar)  
 Operating pressure (oil): 200 psi max. (8 bar)  
 Pumping ratio 40:1 (theoretical)  
 Output volume (oil): 0-.060 ml/cycle (0-.004 in<sup>3</sup>)  
     570-89468: 0 - 0.015ml/cycle (0 - .001 in<sup>3</sup>)  
     570-89490: 0 - 0.060ml/cycle (0 - .004 in<sup>3</sup>)  
 Maximum speed: 300 cpm  
 Outlet port size oil & air: 1/8 NPTF  
 Monitor port size oil & air: 1/8 NPTF  
 Seals: Viton

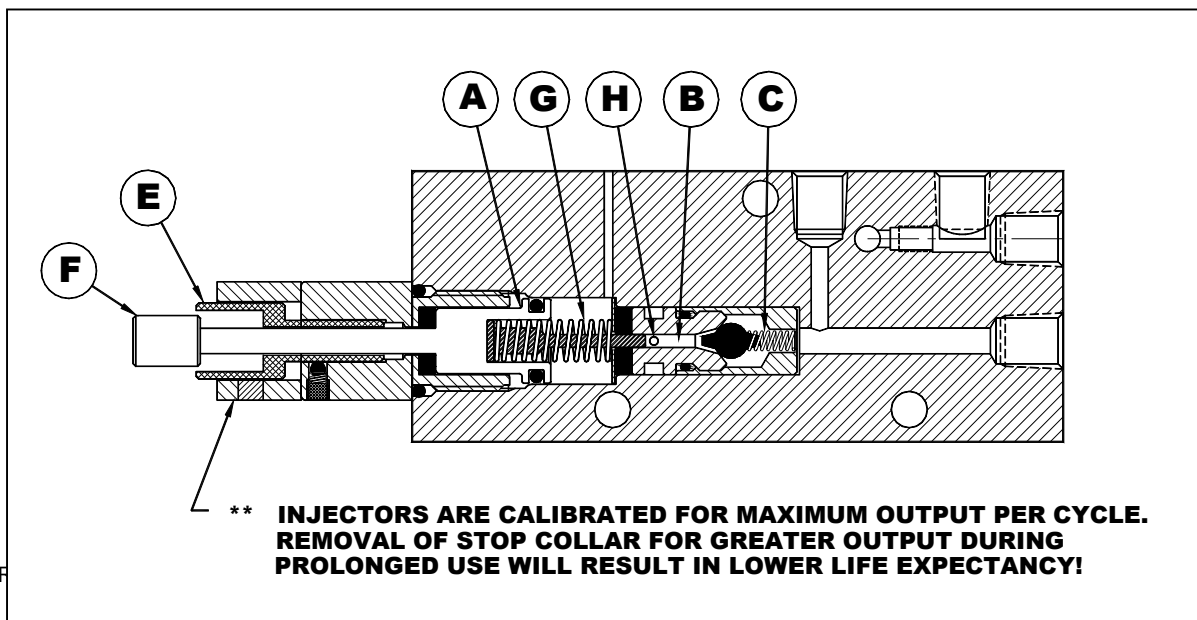
### OPERATION

As air enters the upper piston area "A" it pushes the piston/plunger downward due to the ambient pressure below the piston. When the piston/pin assembly moves downward the oil in the pumping chamber "B" is pressurized to overcome the outlet check spring "C" and oil is dispensed. During this process the volume of oil dispensed is determined by the stroke length, which is controlled by the adjustment screw "E". When the Adjustment Rod "F" contacts the adjustment screw "E" the injector completes the dispense cycle.

### DESCRIPTION

The Orsco Injector serves a multi-function purpose of dispensing and monitoring both air and oil to the spray nozzle. Due to the stackable modular design there has been a significant reduction in the amount of tubing and connectors necessary to assemble the unit.

When the pressure is vented from the top of the air piston "A" the spring pushes the piston/pin assembly back to the return position. As the piston assembly returns the outlet check closes creating a vacuum in the pumping chamber "B". When the plunger opens the oil inlet hole "H" the lubricant flows into the pumping chamber to fill the void thus completing the cycle.





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**Notes**