

# Intelligrated Series 170 Lubrication System #170-0115-4-AC/DC



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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.

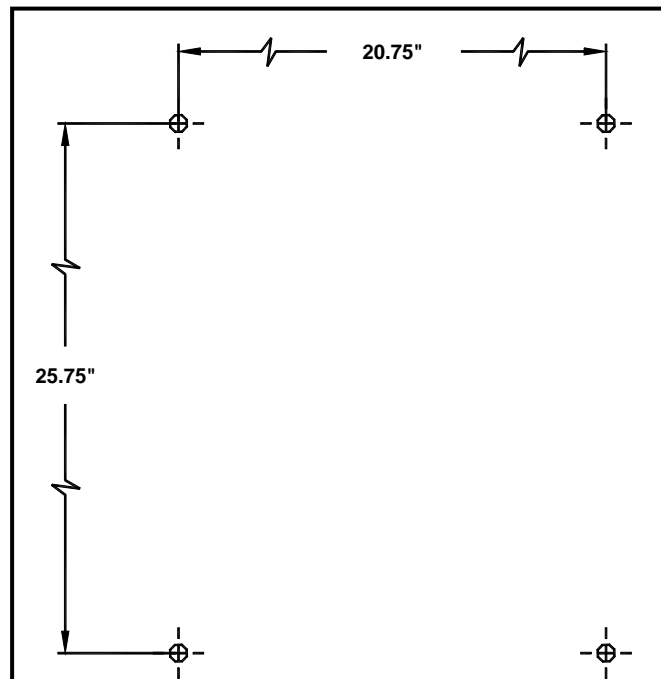
#### Installation

- 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.



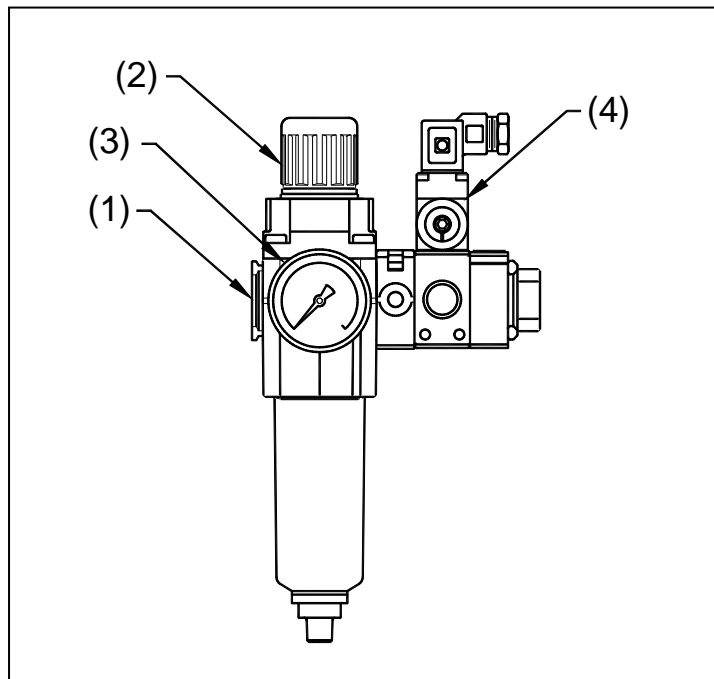
**Fig. 1: Series 170 Mounting pattern**

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).

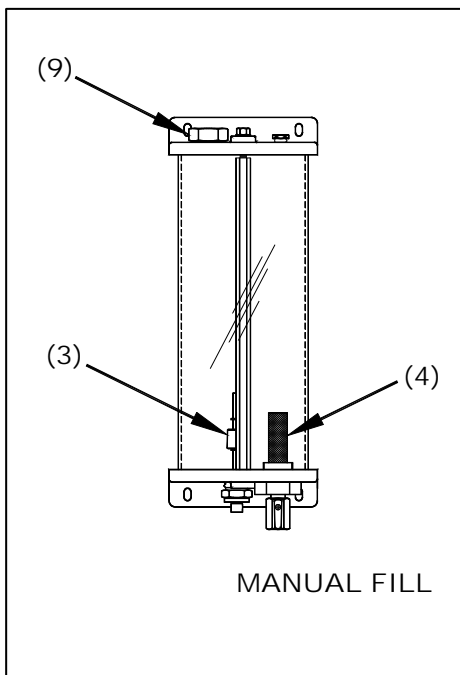
1. Filter-Regulator/Pressure switch assembly (Ref. Fig. 2): For supply air filtration, regulation and protection, the Series 170 provides as a standard a filter-regulator/pressure switch assembly.
  - a. Filter (1): (5-micron element, auto-drain, and polycarbonate bowl).
    - Size supply source based 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 70 psig.)
  - c. Pressure switch: (4), Provides verification of air supply. (Switch is preset from factory at 50 PSIG).

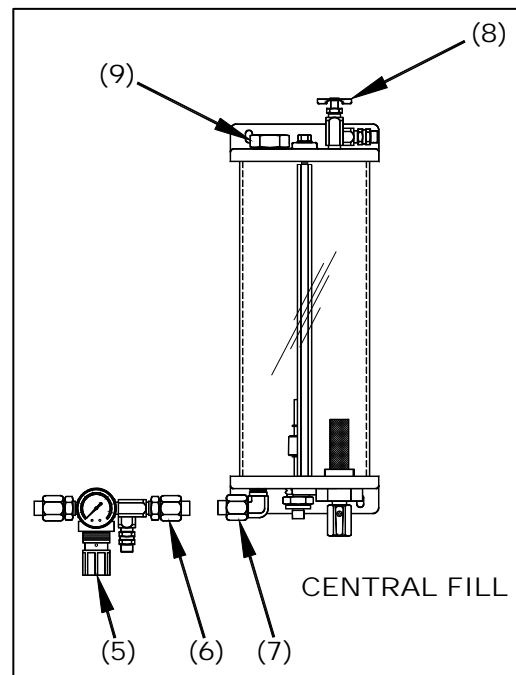


**Fig. 2: Filter-Regulator/Pressure switch assembly**

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.



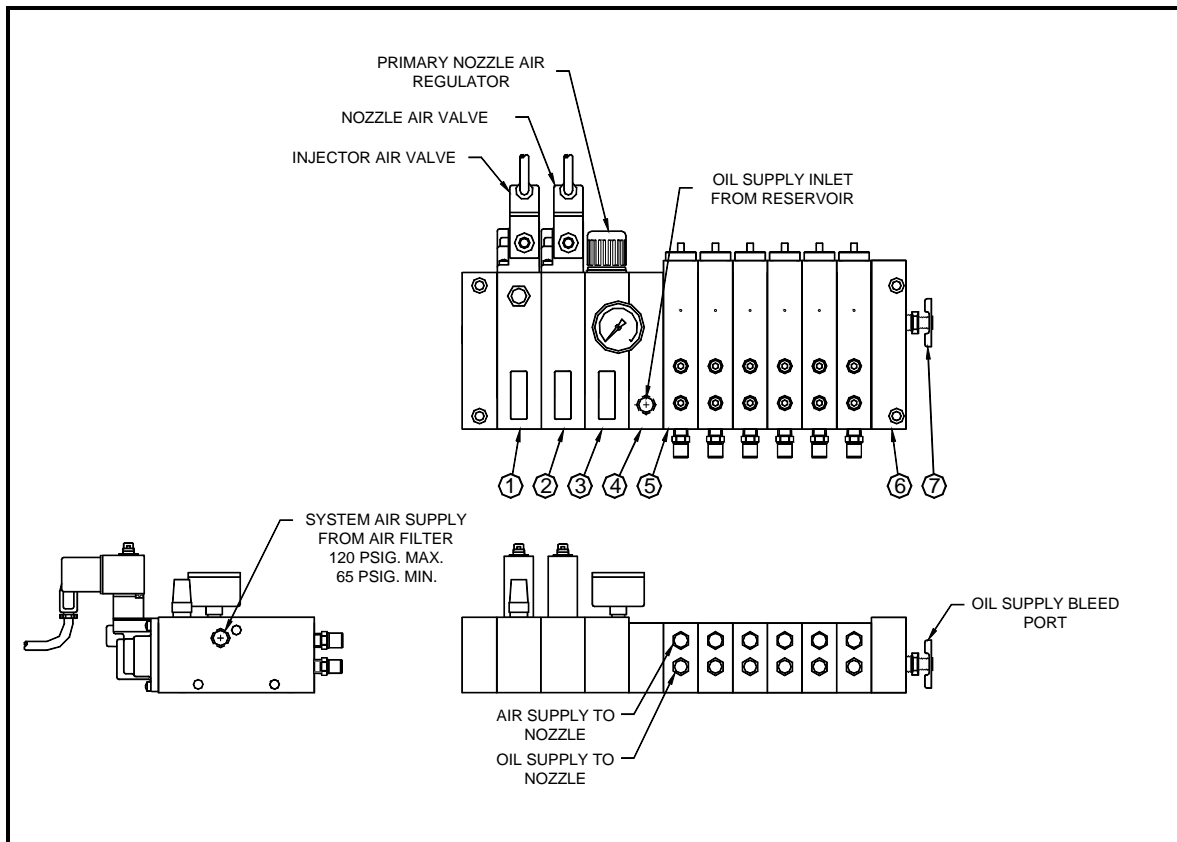
**Fig. 3: Reservoir – Manual Fill**



**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:** (1) 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:** (2) 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:** (3), 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:** (4), This receives oil from the reservoir and feeds all following injectors.
- e. **Injector block:** (5), 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:** (6), This contains the bleed petcock (7), 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:**

- 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.

**Manual fill systems.**

- To manually prime:
  - Open the bleed petcock, located on the VS manifold end cap.
  - Allow oil to drain until no air is present, then close petcock.
  - 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 NYC C

#### Type of Enclosure (Door opening to right to left standard) (Omit for no enclosure)

- 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**

#### Voltage Requirements

- 110/120 VAC 50/60 HZ ..... **A**  
 220/240 VAC 50/60 HZ ..... **B**  
 24 VDC ..... **D**

#### Control Networks

- One Control Network ..... **1**  
 Two Control Networks ("D" option in regulator field below) ..... **2**

#### Type of control:

- Customer Controlled (no controls included with system) ..... **C**  
 Timer Controlled (injector timer included) ..... **T**  
 (requires external signal for system "ON")  
 System "ON" and Injector Timers (both included) ..... **R**

#### Regulators

- Single Network/Single Zone (1 regulator) ..... **S**  
 Single Network/Dual Regulator (2 regulators) ..... **D**  
 Dual Network/Dual Regulator (2 regulators) ..... **D**  
 All feed lines served by each regulator should be similar lengths (+/- 20 ft.)

#### Number of Injectors ..... 01-16

#### Spray Nozzle Assignment

- 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.

#### Injector Size (Fixed Output)

- Half-drop per stroke Injector (0.015cc) ..... **H**  
 Two-drop per stroke Injector (0.060cc) ..... **T**

#### Reservoir Filling Method

- Central fill (low level switch and pressurized reservoir) ..... **P**  
 Central fill with high and low level switch ..... **PH**  
 Manual Fill (low level switch only) ..... **M**

#### Tube Fittings

- 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**  
 (Oil Lines-Nylon: 3/16" O.D. Tubing; Steel: 1/8" O.D. Tubing)  
 (Air Lines-Nylon: 1/4" O.D. Tubing; Steel 1/4" O.D. Tubing)

#### Application Control Network #1

- Continuous Spray ..... **C**  
 Pulsed Spray ..... **P**

#### Application Control Network #2

- Continuous Spray ..... **C**  
 Pulsed Spray ..... **P**  
 No Second Zone ..... **X**

#### Standard on all Models:

- Low reservoir level switch
- Low air pressure switch
- Pilot Lights  
 Red light (low level/low pressure)  
 Green System operation light for each control network

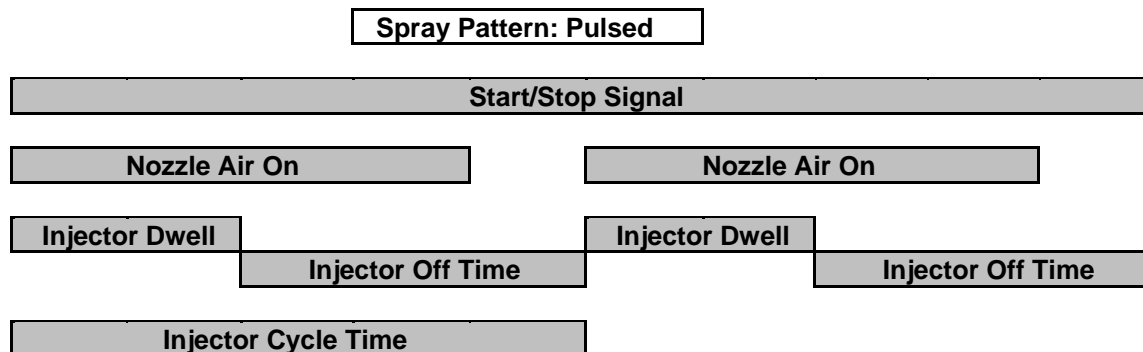
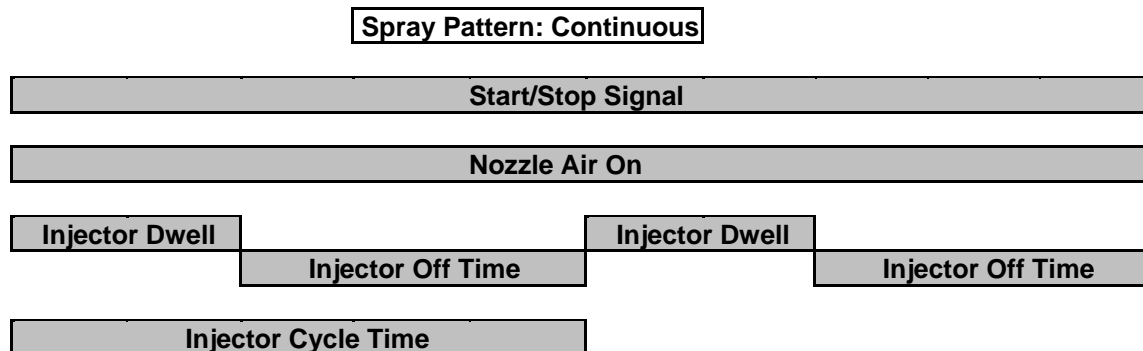
#### Special Request Options:

(Add code to model number)

- Spindle (0-60 psi gauge, 3/8" nozzle air line) ..... **S1**
- Extra volume nozzles, i.e. metalworking applications ..... **S2**
- Wide spray nozzle option ..... **S3**  
 (every two injector outputs combined)
- **Door opening to left to right**  
 ("S" or "N" enclosure option only) ..... **S4**

### Description

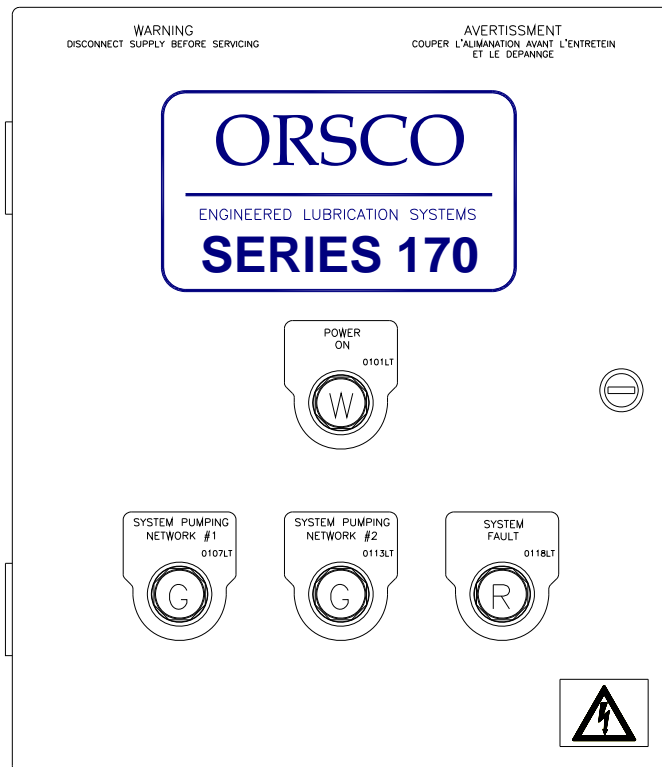
- The Series 170 Lubrication system is a complete, versatile lubrication system for a maximum of 16 lubrication points.
- Lubricant is delivered to the nozzle assembly by a non-adjustable, positive displacement injector, available in two sizes: 1/2 drop (.015ml), and 2 drops (.060ml).
- The lubrication 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 network. The Series 170 lubrication system can accommodate maximum of two networks.
- Operation of the injector solenoid is indicated by a green pilot light. One pilot light per network. 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 network system can be divided into dual regulator zones. For a dual network system, each network has an 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 (Q:1 FU, Q:2 FU), replace if necessary.
Blown Bulb	Inspect bulb (0107LT, 0113LT), 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 (Q:1 SOL, Q:3SOL).
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 (Q1, Q3) 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 (Q:2 SOL, Q:4 SOL), 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>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>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>Nozzle Oil Supply</b>	3/16" O.D. Nylon
		<b>Min. bend radius</b>	19 mm (0.75")
<b><u>Temperature Range:</u></b>	-20° F to 120° F (7° C to 50° C)	<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>Number of Injectors:</u></b>	16		
<b><u>Reservoir</u></b>		<b><u>Thread Sealant</u></b>	
<b>Capacity</b>	4000 ml (244 in <sup>3</sup> )	<b>Standard</b>	Loctite 565 (Teflon-based)
<b>Tube Material:</b>	Acrylic		(Non-Teflon based sealant available upon request)
<b>Seal Material:</b>	Buna N		
<b>Filter:</b>	100 mesh (150 micron)		
<b><u>Level Switch</u></b>			
<b>Material:</b>	Buna N		
<b>Max. switching power:</b>	20 VA		
<b>Max. switching current:</b>	0.16 Amp		
<b>Switch contact (dry state)</b>	SPST - N.C.		
<b><u>Lubricant Range:</u></b>	100-2000 SUS		
<b><u>Injector Output</u></b>			
<b>Half-Drop: #570-10000</b>	0.015 ml (.001 in <sup>3</sup> )		
<b>Double-Drop: #570-10002</b>	0.060 ml (.004 in <sup>3</sup> )		
<b><u>Inlet Air pressure</u></b>	4.5 – 8.3 bar (65-120 psi)		
<b><u>Main Air filter micron rating:</u></b>	5 micron		
<b><u>Main Air Regulator</u></b>	160 psig (Factory preset @ 75 psig)		
<b><u>(Relieving:</u></b>			
<b><u>Air Inlet port</u></b>	1/4" NPT		

## Series 170 System Spare Parts List

<b>VS Assembly Spare Parts</b>	<b>Orsco Item No.</b>
110/120 AC Injector Valve Block	549-20000
240/220 AC Injector Valve Block	549-20001
24 VDC Injector 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
170/VS/VSR Seal Kit (See below)	570-10084

Valve/Regulator Tie Rod	785-43300
Regulator Tie Rod (Dual Regulator Option only)	785-43200

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

Injector Manifold End Cap	116-43500
Valve Manifold End Cap	116-43501
Oil Feed Block	116-43600

<b>Injector Components</b>	
Injector (Half-Drop)	570-10000
Injector (Double-Drop)	570-10002
Injector Tie Rod	785-43100

<b>Filter/Reservoir Components</b>	
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.)	570-10188
Reservoir Float Switch	570-10187
Reservoir Seals (Buna)	567-99244
(Viton, EPDM Seals available upon request)	

<b>Recommended Spare Parts</b>	<b>Quantity</b>
Valve Coils	2
Injector (Complete Assembly)	2
Air Filter Element: 5 micron	1
Reservoir Assembly (#570-10188)	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

<b>Fittings</b>	<b>Orsco Item No.</b>
Nylon Tube Push In Fittings	
3/16" Tube x 1/8" NPT Straight	549-11055
1/4" Tube x 1/8" NPT Straight	030-10402-01

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

170/VS/VSR Seal Kit includes:

- (2) Reservoir Seals
- Valve Interface Seals
- Injector Interface Seals (for 8 injectors)

## OPERATION

**Model 570-10000 Half-Drop Injector (0.015 ml)**

**Model 570-10002 Two-Drop Injector (0.060 ml)**

## SPECIFICATIONS

Lubricant viscosity range: 100-2000 SUS

Operating pressure (air): 65-120 psi (4.5-8.3 bar).

Operating pressure (oil): 200 psi max. (8 bar)

Pumping ratio 40:1 (theoretical) for 570-10000, 10:1 (theoretical) for 570-10002

Output volume (oil):

570-10000: 0.015ml/cycle (0.001 in<sup>3</sup>)

570-10002: 0.060ml/cycle (0.004 in<sup>3</sup>)

Maximum speed: 120 cpm (2 Hz)

Outlet port size oil & air: 1/8 NPTF

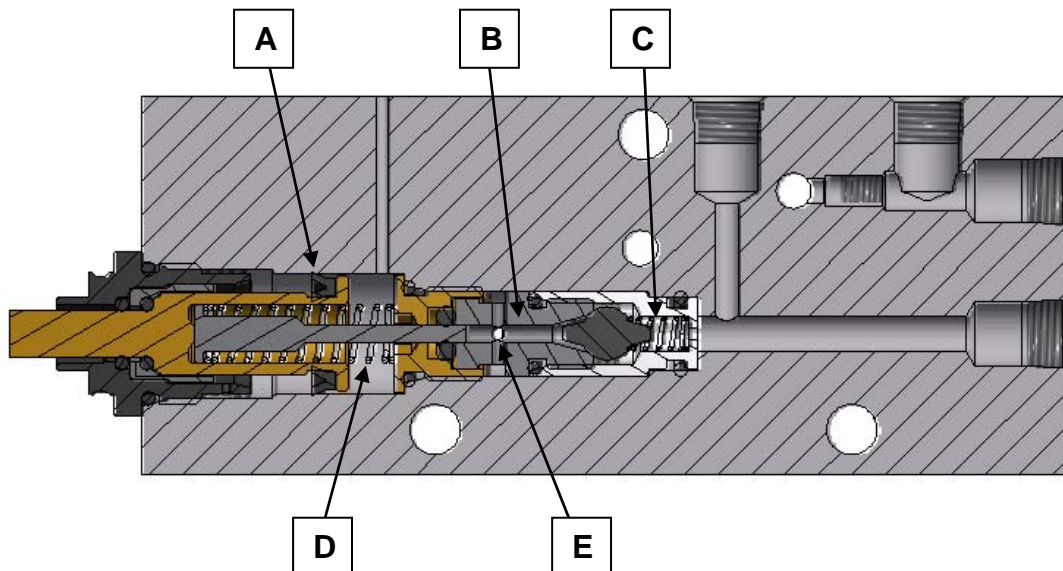
Monitor port size oil & air: 1/8 NPTF

## 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.

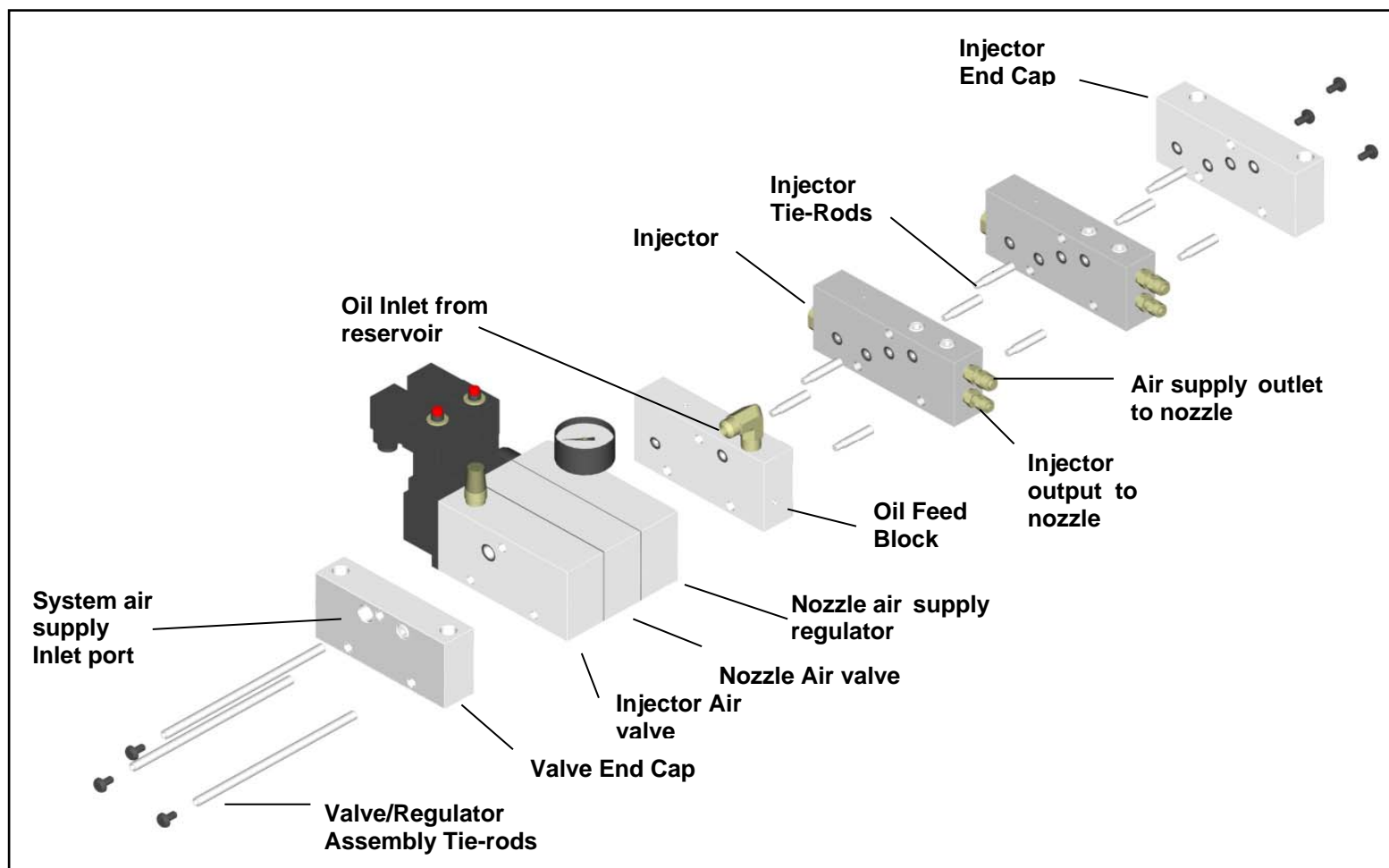
## OPERATION

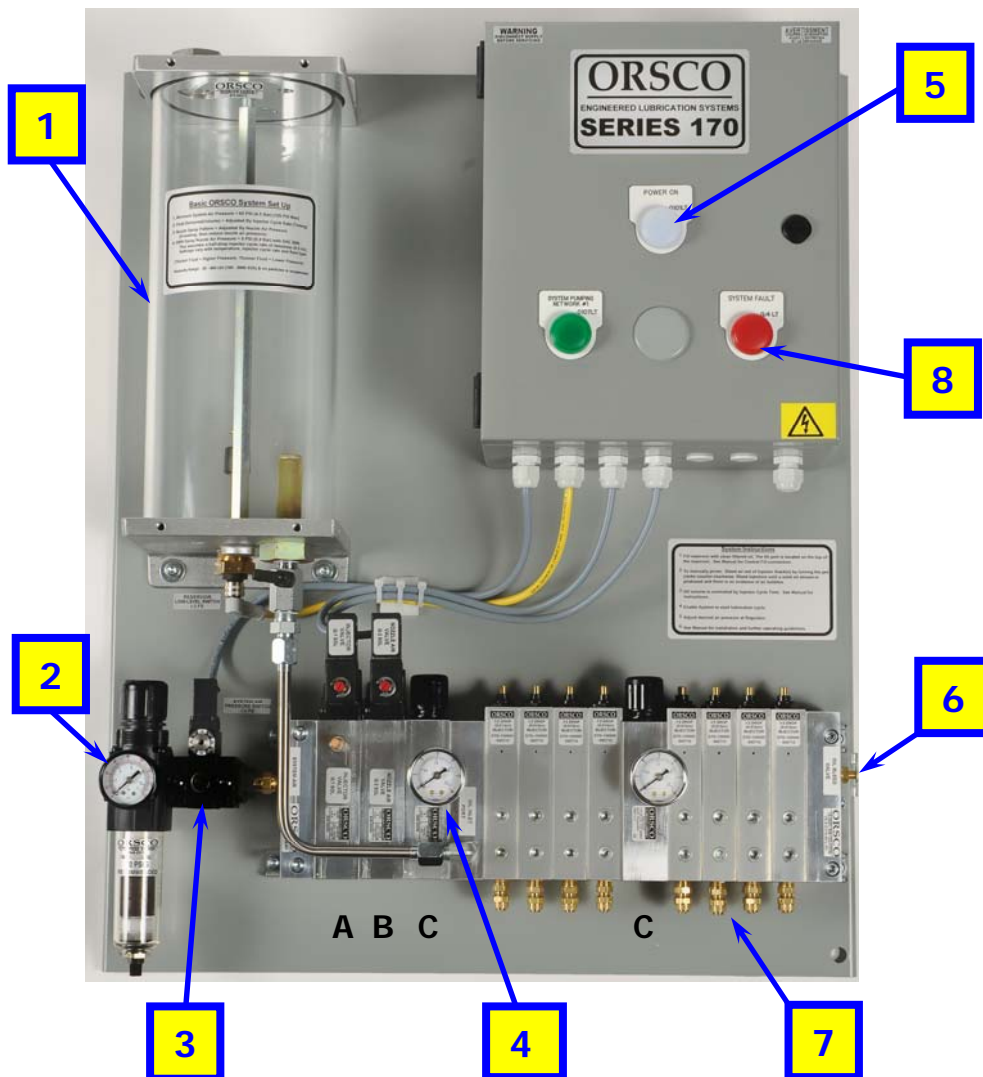
As air enters the upper piston area "A" it pushes the piston/plunger downward due to the ambient pressure below the piston. When the piston/pin assembly moves downward the oil in the pumping chamber "B" is pressurized to overcome the outlet check spring "C" and oil is dispensed. When the pressure is vented from the top of the air piston "A", the piston return spring "D" 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 pin returns beyond the oil inlet hole "E", lubricant flows into the volume chamber completing the cycle.



## VS Assembly: Adding or replacing an injector

- 1). Remove #10-32 B.H.C.S. from Injector End Cap.
- 2). Remove Injector End Cap.
- 3). To replace injector, simply remove existing injector and replace with new (ensure seals are seated properly).  
To add an injector, thread one injector tie-rod (three req'd per injector) onto each existing tie-rod assembly.  
Install additional injector (ensure seals are seated properly).
- 4). Install Injector End Cap. Install #10-32 B.H.C.S..
- 5). Re-bleed VS assembly.





- A. Injector Control Solenoid**  
**B. Air Control Solenoid** (air to spray nozzles)  
**C. Air Pressure Regulator for Spray Nozzles** (nominal setting of 5 PSI)

1. Reservoir is Filled with Oil  
Shut off valve below the reservoir is in the open position—shown below in the closed position.
2. System Pressure is between 65 PSI & 120 PSI  
This is the normal operating range for the system. A nominal setting of 80 PSI is standard.
3. Low System Pressure Switch is Set at 55 PSI  
Factory set at 55 PSI. If set above system air pressure you will induce a low air fault signal—adjusted with an allen wrench.
4. Air Pressure to Nozzles is Set  
Approximately 5 PSI for most applications, but varies with viscosity.
5. System "Power-On" light(white) is illuminated  
This indicates you have power to the system.
6. Bleed Air Out of System  
Open the butterfly valve and release any air in system, close when oil is produced without air in it. Air in the system can cause vapor lock and injector malfunction.
7. Oil Line from Injector to Nozzle is Filled  
From each injector you should have one air line and one oil line. If you do not see fluid in the oil line, then no fluid is being delivered. If the lines are full, you can disconnect the oil line fitting at the injector to see if oil is being delivered. This will be a very small amount of fluid—usually 0.015 cc/cycle.
8. Fault Light(red) Should Not Be Lit  
This fault indicates low system air pressure or low oil in the reservoir.

**Notes**