

Table of Contents

| | Page |
|-----------------------------|------|
| Safety | 2 |
| General Description..... | 2 |
| Product Specifications..... | 3 |
| Operation..... | 3 |
| Maintenance and Repair..... | 5 |

WARNING

The measuring valve assembly is precharged to 2000 PSI. Do not attempt to disassemble or remove any components from measuring valve assembly unless the discharge procedure, as printed in this manual, is strictly followed. Simply disconnecting the measuring valve assembly from the lubricant supply source will not discharge this assembly. Failure to heed this warning may result in serious injury and will make the spray unit inoperable.

SAFETY

Read and carefully observe these operating instructions before unpacking and operating this Airless Spray System. The Airless Spray System must be operated, maintained and repaired exclusively by persons familiar with the operating instructions. Local safety regulations regarding installation, operation and maintenance must be followed.

Operate this Airless Spray System only after safety instructions and this service manual are fully understood.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Safety Instructions

This equipment generates very high grease pressure. Extreme caution should be used when operating this equipment as material leaks from loose or ruptured components can inject fluid through the skin and into the body causing serious bodily injury. Stay clear of the spray nozzle as material discharged from the nozzle tip can also inject fluid through the skin and into the body causing serious bodily injury. Adequate protection is recommended to prevent splashing of material onto the skin or into the eyes.

DESCRIPTION

General Description

This Airless Lubrication Spray System consists of three major components: 1) A pump, used to charge the system with lubricant, Model 85416, Not included with 85415) A measuring valve (252815), which the pump charges with lubricant, and which measures and provides the hydraulic force necessary to spray the lubricant through the 3) Spray Head Assembly (252825). The Spray Head is equipped with an electrically operated Solenoid Valve which controls the flow of lubricant through the Spray Nozzle. See Service Manual C8, Page 282 for pump description and specifications. The spray tip must be ordered separately.

Appropriate Use

- This Airless Spray device is exclusively designed to dispense grease onto a Horizontal Drill Stem to aid in disassembly of the Drill Sticks after use.
- It should only be operated with approved grease lubricants.
- It should only be charged with appropriate pumping equipment, not to exceed the maximum pressure rating per Product Specifications.
- It should be operated by an appropriate Control System which will disable the pump when the preset pressure is reached, as signaled by the Pressure Switch on the Measuring Valve. The Control System must keep the Solenoid Valve of the Spray Head closed while the pump is operating and disable the Pump while the Solenoid Spray Head is open in order for a measured volume of lubricant to be discharged. The Control System must also provide a timing device to control the time which the Solenoid Valve of the Spray Head is open, dispensing lubricant. Limit the Spray Valve "On" time to a time period where the pressure is optimal to develop a full spray pattern, turn "Off" to eliminate dribbling from the Spray Nozzle as the pressure decays to a point where there is insufficient pressure to develop a good spray pattern.

- The controller may also be used to synchronize timing of the spray with the movement of a machine part.
- The measuring valve and spray head assemblies are supplied with ports for conducting heated fluid. These heat ports may be connected into an existing source of heat, such as hydraulic return lines or engine coolant lines to provide heat for predictable spray patterns. A relatively constant temperature fluid (while in operation) between 80° F min. and 160° F. max. should be used. Spray tips should be selected based on the lubricant to be sprayed and the temperature of the lubricant as it passes through the spray system.

Product Specifications

| | |
|---|--|
| Output per Cycle | - .500 in ³ max. (8.2 cc) (dependant on spray "ON" time) |
| Pressure Switch Preset | |
| Pressure | - 4500 psi (310 bar) max. |
| Output Pressure | - 4500 psi (310 bar) max. |
| Operating Temperature* | - 20° to 160° F (-28° C to 71° C) |
| Operating Voltage | - 12 VDC |
| Initial Current | - 1.2 amps |
| Material Inlet (measuring valve) | - 3/8 SAE J-1926 (9/16 - 18 UNF) |
| Material Outlet (spray head) | - 1/2 SAE J-1926 (3/4 - 16 UNF) |
| Interconnecting Ports | - 3/8 SAE J-1926 (9/16 - 18 UNF) |
| Pressure Switch Contacts | - 5 Amps @ 125/250 VAC |
| Initial Hydraulic Charge (measuring valve) | - 2000 PSIG (138 bar) |
| Initial Pneumatic Charge (measuring valve) | - 1500 PSIG (103.5 bar) |

* To achieve consistent spray material temperature, pump to be maintained at +80° F to 120° F.

Spray tip must be ordered separately and selected based on lubricant and pattern desired.

OPERATION

When the Pressure Switch, mounted on the Measuring Valve senses low pressure on the Measuring Valve Chamber, it signals the control unit to turn on the pump and begin filling the Measuring Chamber with lubricant. Due to the hydraulic and gas pre-charge on the Measuring Valve and Accumulator respectively, initial charging of the lubricant will begin at 2000 psi. The Pump will continue to charge the Measuring Chamber, moving the Measuring Piston in its bore against the precharged hydraulic circuit and accumulator pressure. The Check Valve will prevent any lubricant from escaping the Measuring Chamber, and the Solenoid Valve will prevent lubricant from flowing out of the Spray Nozzle. When the pressure inside the Measuring Chamber reaches the pressure switch set point, the Pump is turned off, the Spray Valve is enabled and a ready light is turned on, indicating the system is ready to spray. A push button or other device is used to initiate the spray cycle at the Control Unit. When the spray cycle is initiated, a timer will begin to time, the Solenoid Valve will open, the Pump

will be disabled and the stored Accumulator pressure will force the Measuring Piston to move, forcing the lubricant out of the Measuring Valve outlet, through a hose or tube into the Spray Head, through the Solenoid Valve and out the nozzle onto the work surface. When the Timer times out, the Spray Solenoid will close and the Pressure Switch, sensing low pressure, will turn on the Pump to refill the measuring chamber for another cycle.

Heating the Airless Spray System

To maintain an optimal and predictable spray pattern, the measuring valve, spray head and interconnecting supply line should be kept warm. The temperature of the lubricant should be kept as constant as possible for a consistent spray pattern. The amount of heat used is dependant upon the characteristics of the lubricant and the ambient temperatures to be encountered.

Heating ports are provided in the spray head and measuring valve to facilitate the application of heat to the system. These ports may be used to circulate a warming fluid in a series loop through the spray head and measuring valve. A heat trace line may also be part of this loop to keep the interconnecting supply line warm as well.

The heating loop may consist of the return or supply line of a hydraulic circuit which has enough fluid circulating through it to keep the components warm. The engine cooling system may also be used. Temperatures should be as consistent as possible once the machine has warmed up and is in operation.

Spray tips should be selected on the basis of the lubricant temperature once the machine is warmed up and in operation. Generally, as the lubricant gets hotter, the spray pattern will get wider and become more atomized, for a given spray tip. If the lubricant is too cold, the lubricant spray pattern will be very narrow, become a solid stream, or will not spray at all.

Lubricants


This system was designed and tested with grease lubricants. Lubricants with high viscosities, large particles and with very tacky properties should be avoided. Any lubricant should be tested in the system before the lubricant is committed to long term use.

Lubricants with large particulates may cause blockages in the spray tips and valves used in the spray system. Any particulates will act as an abrasive and cause premature wear on these components.

A lubricant change may require a change in spray tips. A change in lubricant properties will change the spray characteristics.

Mounting the Spray Head

The spray head may be mounted in any position. It should be situated so that the spray head is directed to the work surface.

 **WARNING**

Never mount the Spray Head in a position where the material spray can be directed at any person in the area of operation. Mounting above the work surface will keep any residual spray material on the work surface, after the spray cycle is completed. Mount the Spray Head as close to the Measuring Valve as possible. Long hose or tubing connections between Spray Head and measuring valve will degrade spray patterns considerably. Use a 1/2" I.D. hose or larger and keep the length under 7', between Spray Head and Measuring Valve.

1. Mount securely to an even, stable and solid surface with two 1/4" bolts through the two mounting holes provided.
2. For best results, the spray head should be heated. Heating ports are provided in the spray head body for this purpose. A possible source of heat would be a hydraulic return line from a device which is in operation while the machine is in operation. Engine coolant could also be used.
3. Connect a 1/2" min. material supply line with suitable adapters, between spray head and measuring valve. For best results, this line should be heated and insulated. The heat supply lines for the spray head may be used as a heat trace line along the material supply line. Insulate all lines together for best heat transfer.
4. Install the spray tip into the roto-clean spray head. See instructions packaged with the tip for installation.
5. Connect the Solenoid Valve to the Control Unit using a Deutsch connector at the Solenoid Valve. The control unit must be capable of supplying 12 VDC at 1.2 amps to the Solenoid Valve.

Mounting the Measuring Valve

The Measuring Valve may be mounted in any position. It should be located in an area which is warm (70° to 100° F) for optimum performance. It should be mounted as close to the Spray Head as possible (see above). It should be placed in an area where it will not interfere with any moving parts of the machine.

1. Mount the Measuring Valve on an even, stable, solid surface with (2) 5/16 mounting bolts through the holes provided.
2. Connect the Material Supply Line from the Spray Head to the Material Outlet of the Pump (see above).
3. Connect the Material Supply Line from Pump to the Material Inlet of the Measuring Valve using suitable adapters (see pump owners manual).
4. For best results, heat should be applied to the measuring valve. Use the heating ports provided, as recommended above.
5. Connect the Pressure Switch to the Control Unit, using a Deutsch Connector. Switch contacts: normally open.

Installing the Pump

Install the pump per the Pump Owners Manual instruction. The pump should be mounted in a warm environment (70° to 100° F) for optimal performance. If using Lincoln Pump Model 85416, the control unit will have to cycle the pump on and off to supply enough material to fill the spray system with each cycle. See Pump Owners Manual.

Purge the System of Air

See the Pump Owners Manual for Purging and Priming the pump with lubricant.

Air may be purged from the Pump Supply Line by operating the Pump (after it is primed) and opening the Material Dump Valve on the front face of the Measuring Valve, until grease, free of air, flows out the Material Dump Valve Discharge Port on the side of the Measuring Valve. Stop pump and close the Material Dump Valve by tightening the Set Screw securely on the ball.

Continue to prime the system by loosening the hose/tube connection to the Spray Valve at the Spray Valve Material Inlet. Operate the Pump again until lubricant, free of air, flows out the fitting. Turn off the Pump and tighten the fitting securely. Restart the Pump and allow it to build pressure in the system until the Ready Light turns on. Check for leaks in all interconnecting hoses/fittings.

 **WARNING**

Make sure the area around the Spray Head and work surface is clear, keep hands or any other body parts out of the Spray Nozzle path. Ensure that Spray Head is securely mounted and cannot come loose and spray in the direction of any personnel.

⚠ WARNING

Dirt or debris in spray nozzle can cause spray pattern to discharge in an unpredictable pattern, even outside of the projected spray area. Keep clear of Spray Head and keep distance between anyone and spray when operating.

Make several trial spray shots by initiating a spray cycle. Adjust the Spray Nozzle as necessary to obtain the desired spray pattern.

⚠ WARNING

Disable and lockout the Spray System while any adjustments are made. Discharge the Spray System using the Material Dump Valve to relieve any pressure on the Spray System. When using the Material Dump Valve, keep fingers, hands and other body parts away from the Material Dump Valve Discharge Port. Keep any personnel out of the line of fire of the Dump Valve Discharge Port. Lubricant will travel out the hole at a high velocity and could be injected into the skin or eyes. Open the Material Dump Valve very slowly with an Allen Wrench and close after adjustments/repairs are complete.

Adjust the Control Unit Timer for spray time to suit the system requirements.

MAINTENANCE AND REPAIR

Clearing a clogged spray tip

This unit is supplied with a roto-clean spray head which allows the operator to clear a clogged spray tip without tools or disassembly. To clear a clogged tip:

1. Turn off electrical power to the spray system
2. Rotate the roto-clean spray tip handle so that arrow on handle points away from spray head outlet.
3. Reapply power to the spray system.
4. Place a container under spray head outlet to catch lubricant.
5. Initiate a spray sequence. This will force lubricant backwards through the spray tip flushing dirt and debris out of the tip.

6. Rotate the roto-clean spray tip handle so that arrow points in direction of spray head outlet. Resume normal operation.

Frequent tip clogging may indicate that dirt or other foreign matter has entered the spray system necessitating the flushing or disassembly and cleaning of the entire system.

Spray Tip Replacement

As the spray system is in normal use, the spray tips will wear causing degraded spray patterns. Tip wear will depend on the lubricant in use. Lubricants with high particulate content will wear the tips more rapidly than lubricants with lower particulate content.

1. Turn off electrical power to spray system.
2. Grasp Roto-Clean spray tip handle and pull out of spray head.
3. Insert new Roto-Clean Spray tip and point arrow on handle in direction of spray head outlet.
4. Reapply power to system and resume normal operation.

Under some conditions, the spray tip seals may need to be replaced. This requires the removal of the Roto-Clean spray head. When removing the spray head, turn electrical power to the spray system and discharge the spray system by opening the material dump valve on the measuring valve, bleeding all pressure off the system. Follow the instructions packaged with the Roto-Clean tip for seal and tip replacement.

System Discharge

Any maintenance or repair of the airless spray system, other than simple clog clearing or tip replacement, requires that pressure is discharged from the system. This discharge is done in two steps.

1. Discharging lubricant pressure from the system. (For maintenance or repair of the spray valve and interconnecting hose.)

Open the material dump valve on the face of the measuring valve to bleed all the pressure from the spray valve and interconnecting hose/line. Lubricant will be expelled from the dump valve port. Keep fingers, hands, eyes, etc. away from direction of discharge path. Leave the dump valve open until all maintenance is completed. Close the valve and tighten when work is finished.
2. Discharge hydraulic pressure from measuring valve. For any maintenance or repair or measuring valve which requires removal of any component or disassembly of the measuring valve. Follow the above procedure before starting to discharge the hydraulic circuit.

⚠ WARNING

Measuring valve is always under pressure. Disconnecting all hoses from the measuring valve does not relieve the internal pressure in it. Follow this discharge procedure exactly prior to any disassembly of the measuring valve assembly. Failure to heed this warning can result in severe personal injury or death and may result in permanent damage to the measuring valve assembly.

To Discharge The Hydraulic Circuit

- A) Keep eyes, fingers, hands, etc. out of discharge path. Oil will be expelled from the hydraulic dump valve discharge port. Place a rag or some other suitable object over discharge port to deflect the oil flow and prevent oil spray.
- B) Slowly open the hydraulic Discharge Valve with an Allen wrench by turning counterclockwise. Open valve a little at a time until oil flows from the discharge port. If oil fails to flow from the discharge port, consult Lincoln Technical Services for assistance. Do not attempt disassembly until it is certain that there is no hydraulic pressure in the measuring valve.

Disassembly and Repair of Spray Valve Assembly 252825

1. Disconnect power to spray system.
2. Discharge the lubricant pressure from the measuring valve per system discharge procedure step 1.
3. Disconnect interconnecting hose from spray valve inlet. Disconnect heater lines from valve body (4). Disconnect electrical connections to solenoid coil.
4. Remove spray valve from mounting position.
5. Remove Roto-Clean Spray Tip by pulling from Roto-Clean nozzle body.
6. Remove Roto-Clean Nozzle Body (8) from tip adapter (6), with two 1" wrenches. Save nylon gasket (7) for reassembly.
7. Remove tip adapter (6) from valve body (4) with a 1" wrench.
8. Remove solenoid coil (1) from solenoid valve (3) by removing nut on top of coil with a 3/4" wrench. Slide coil from solenoid valve.
9. Remove solenoid valve (3) from valve body (4) with a 1 1/4" wrench.
10. Thoroughly clean and inspect all components for wear and damage. Lincoln recommends replacement of all seals and packings prior to reassembly.

11. Reassemble in reverse order of Disassembly Procedure. All O-Rings and packings should be properly lubricated as they are installed.

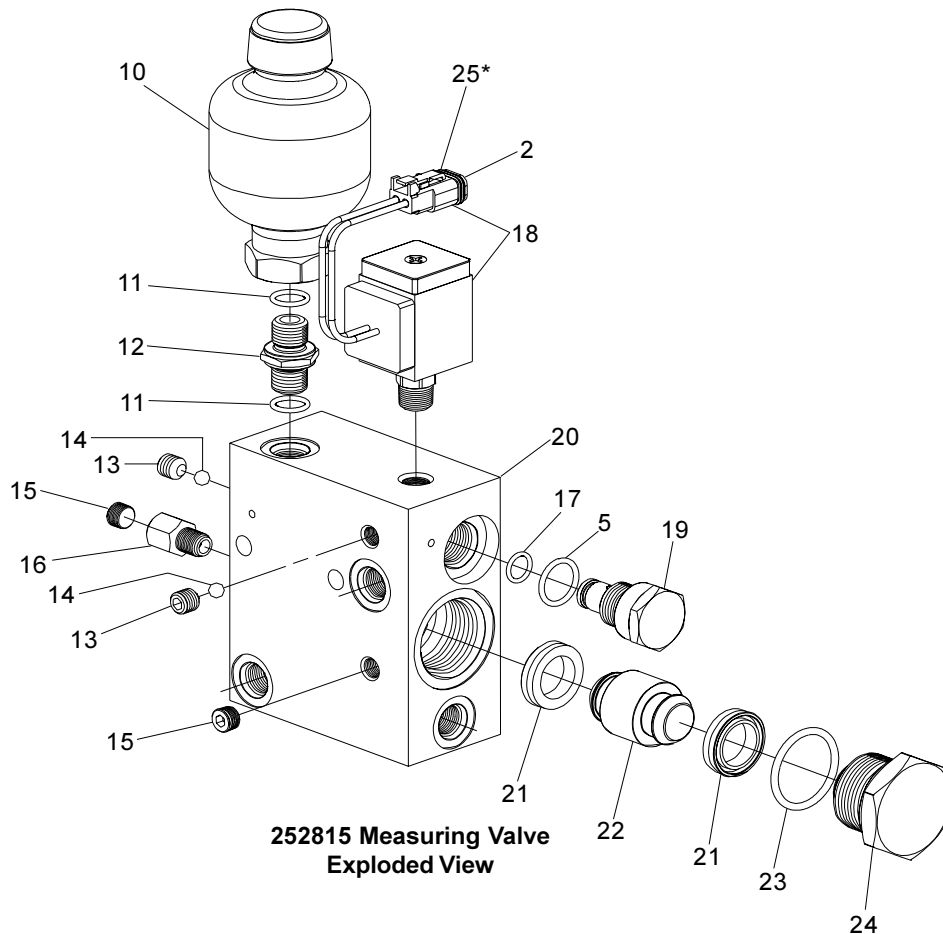
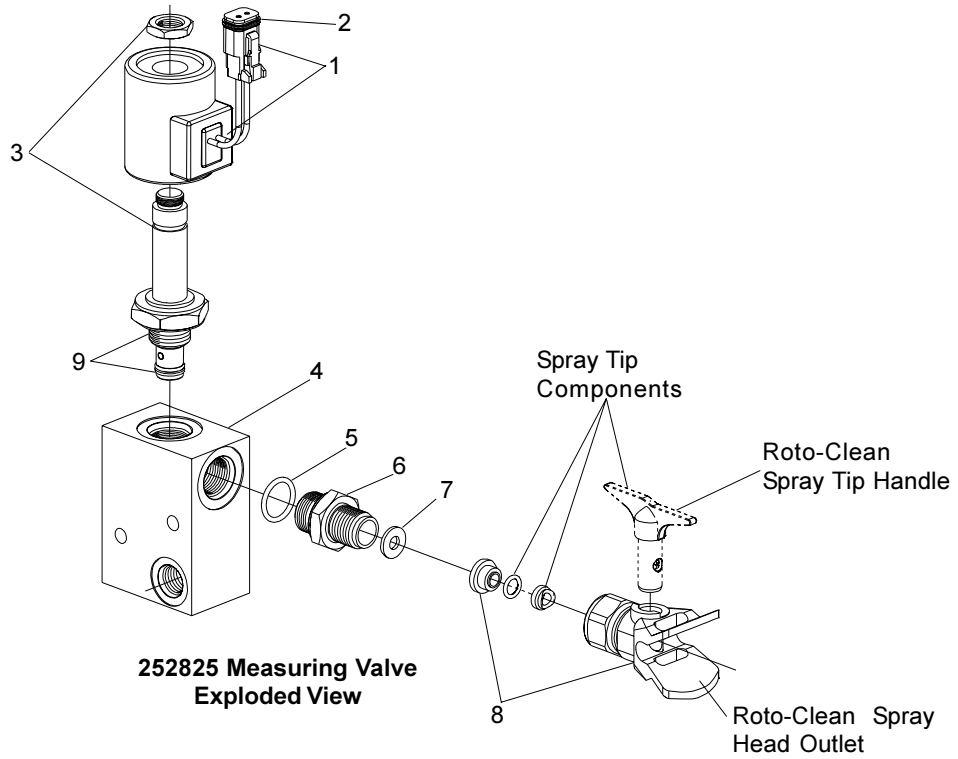
Disassembly and Repair of Measuring Relief Valve Assembly 252815

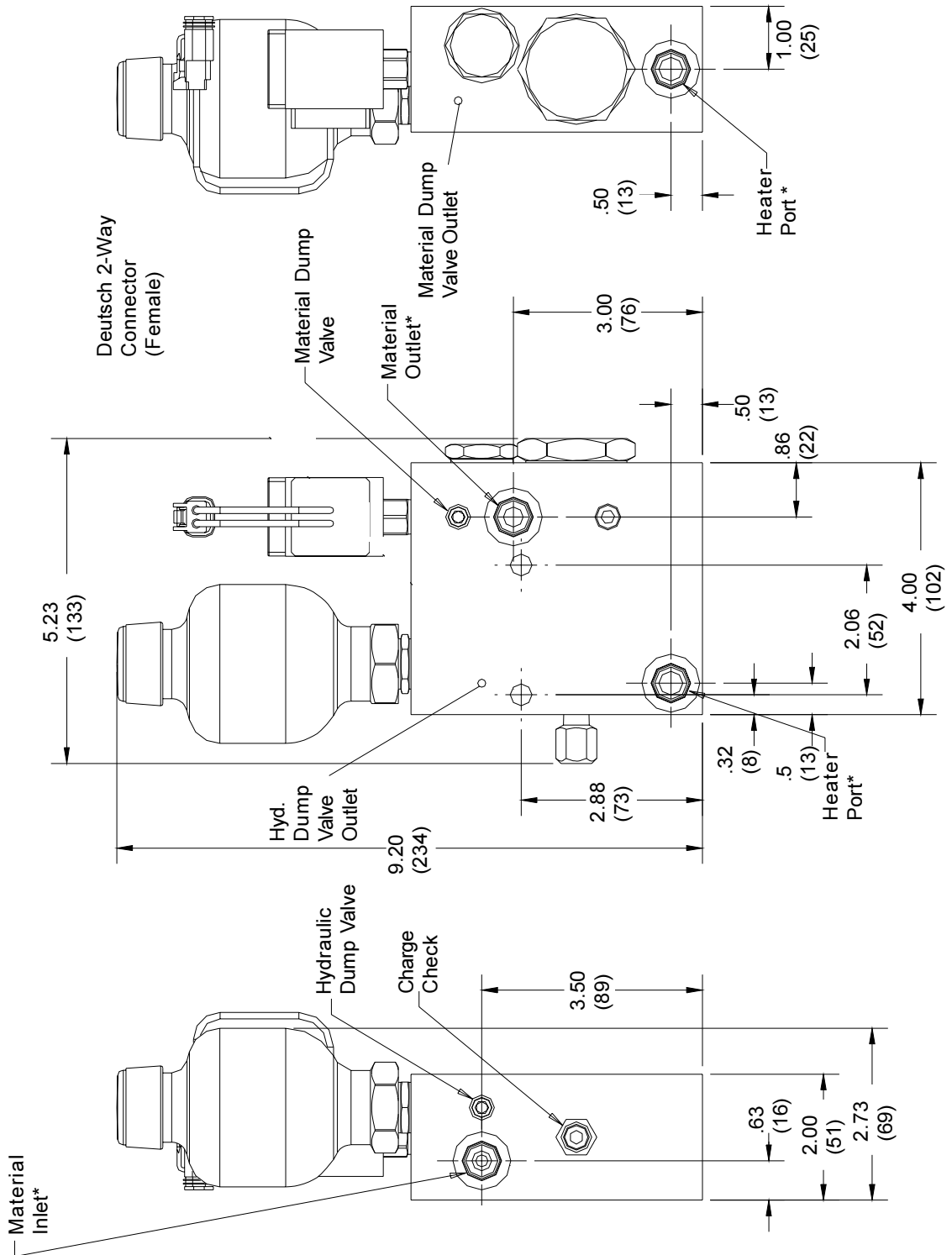
1. Disconnect power from Spray System.
2. Discharge system following discharge procedures 1 and 2.
3. Disconnect electrical connections from pressure switch (18) at connector (2).
4. Remove inlet line from pump and interconnecting hose to spray valve from valve body (20). Disconnect heater lines from valve body (20).
5. Remove valve from mounting surface.
6. Remove dump valve set screws (13) and balls (14) from valve body (20) with a 3/16" Allen wrench.
7. Remove check valve assembly (19) from valve body (20) with a 1" wrench.
8. Remove pipe plug (15) from charging check (16) with a 3/16" Allen wrench.
9. Remove charging check (16) from valve body (20) with a 9/16" wrench.
10. Remove plug (24) from valve body (20) with a 1-5/8" wrench.
11. Remove measuring piston (22) from Valve Body (20) by tapping from bore using a suitable brass rod inserted in hole left by charging check (16).
12. Remove Accumulator (10) from valve body (20) with a suitable wrench.
13. Remove Pressure Switch (16) from Valve Body with a 9/16" wrench.
14. Thoroughly clean and inspect all components for wear or damage. Lincoln recommends the replacement of all seals and packings upon reassembly.
15. Do not attempt any disassembly of accumulator (10). This unit is precharged at the factory to 1500 psi with nitrogen gas. Further disassembly of the accumulator is hazardous and can cause severe personal injury or death. There are no serviceable components in the accumulator. Damaged or non functioning accumulators should be replaced and old one should be disposed of properly.
16. Reassemble in the reverse order of disassembly. All seals and packings should be properly lubricated at the time of assembly. The use of Loctite #242 or equivalent is recommended on all pipe threads when installing to insure good seal.
17. Charge hydraulic circuit per procedure below.

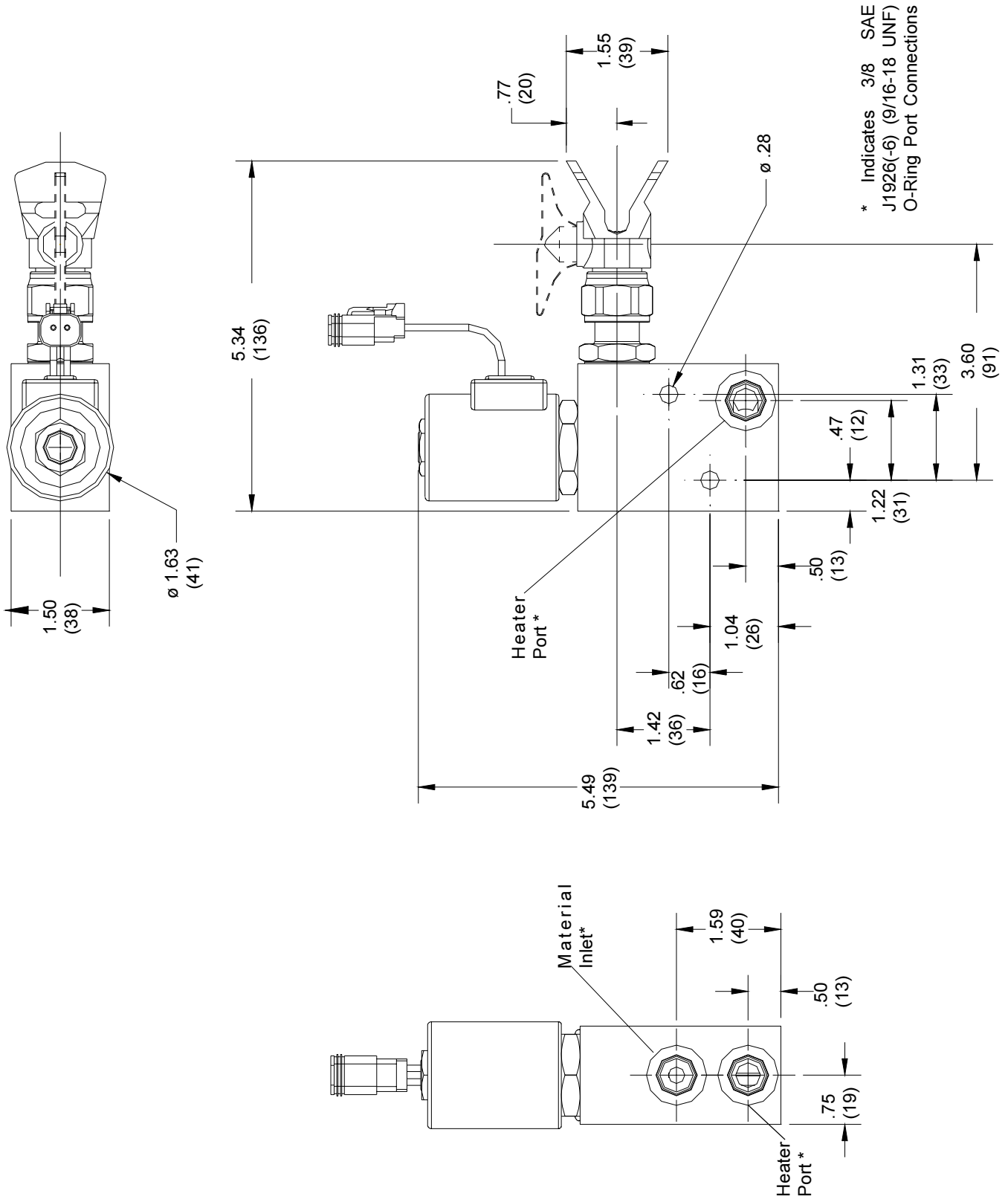
Charging the Hydraulic Circuit

A suitable hand operated pump capable of building 2000 PSI, with a pressure gage to monitor charging pressure is required to properly charge the hydraulic circuit. The Airless Spray System will not operate properly without being correctly charged prior to installation.

-
1. Connect pump outlet with gage to inlet of charging check (1/8 NPT).
 2. Fill pump reservoir with Dexron II Automatic Transmission Fluid.
 3. Open Hydraulic Dump Valve on side of measuring valve body.
 4. Operate hand pump until oil, free of air, flows from Hydraulic Dump Valve Discharge port on side of measuring valve.
 5. Close valve by turning clockwise and tighten securely with a 3/16" Allen wrench.
 6. Continue pumping, slowly until a steady pressure of 2000 PSI is indicated on the gage.
 7. Check for leaks around hydraulic dump valve and its discharge port, as well as around charging check. Look for the presence of transmission fluid from measuring valve outlet which would indicate damaged seals on measuring piston (22).
 8. Disconnect pump from Charging Check (16). Check for any leakage of oil from the Charging Check inlet, indicating a bad check valve.
 9. Install Pipe Plug (15) into Charging Check (16). Apply Loctite #242 or equivalent to plug prior to installing. Tighten securely.
 10. Place measuring valve back in operation.







Parts List

| Item | Qty. | Description | Part No. |
|------|------|--|----------|
| 1 | 1 | Solenoid Coil Assembly (includes Item 2) | 270925 |
| 2 | 1 | Deutsch Connector | 270926 |
| 3 | 1 | Solenoid Valve (includes Item 9) | 252822 |
| 4 | 1 | Spray Head Body | 252824 |
| 5 | 2 | O-Ring (Nitrile) | Note 1 |
| 6 | 1 | Tip Adapter | 252821 |
| 7 | 1 | Tip Gasket (Nylon) | Note 1 |
| 8 | 1 | Rotoclean Nozzle | 252831 |
| 9 | 1 | Solenoid Valve Seal Kit | 270899 |
| 10 | 1 | Accumulator | 252817 |
| 11 | 2 | O-Ring (Nitrile) | Note 1 |
| 12 | 1 | Union | 252775 |
| 13 | 2 | Set Screw (3/8-16) | 50506 |
| 14 | 2 | Ball | 66003 |
| 15 | 2 | Pipe Plug (1/8 NPT) | 68645 |
| 16 | 1 | Check Valve | 130021-3 |
| 17 | 1 | O-Ring (Nitrile) | Note 1 |
| 18 | 1 | Pressure Switch (includes Items 2 & 25) | 270927 |
| 19 | 1 | Check Valve (includes Items 17 & 18) | 252810 |
| 20 | 1 | Measuring Valve Body | 252816 |
| 21 | 2 | U-Cup Seal (Polyurethane) | Note 1 |
| 22 | 1 | Piston | 252764 |
| 23 | 1 | O-Ring (Nitrile) | Note 1 |
| 24 | 1 | End Plug | 252818 |
| 25 | 4 | Contact Pins (Not Shown) | 252833 |
| | 1 | Seal Kit (See Note 1) | 270924 |

Note 1: Seal Kit 270924 contains all seals necessary for rebuilding both the measuring valve and the spray head assembly except for the solenoid valve and RotoClean nozzle.

Troubleshooting

| Symptom | Possible Cause | Remedy |
|--|--|---|
| Airless spray system will not dispense lubricant | No electrical power. | Turn on power. |
| | Clogged spray tip. | Clear clogged tip. |
| | Pump out of lubricant. | Fill reservoir. |
| | Pump failure. | Repair pump. |
| | Defective solenoid spray valve. | Repair or replace solenoid valve. |
| Continuous lubricant flow out of spray head. | Defective pressure switch. | Replace pressure switch. |
| | Damaged seals on solenoid spray valve. | Replace seals on solenoid valve. |
| | Worn or defective spray solenoid valve. | Repair or replace solenoid valve. |
| | Electrical Defect | Repair electrical problem. |
| Spray pattern too narrow or solids stream. | Tip turned for cleaning. | Turn tip so arrow points in direction of spray. |
| | Wrong spray tip for lubricant in use. | Select spray tip better suited for lubricant in use. |
| | Worn or damaged spray tip. | Replace spray tip. |
| | Tip partially clogged. | Clear clogged tip. |
| | Low pressure. | Adjust pressure switch for 4500 P.S.I. |
| | Lubricant is too cold. | Check heater system or system was not allowed to warm up. |
| | Wrong lubricant in system. | Replace lubricant in reservoir and purge. |
| | Distance between spray head and work surface too short. | Reposition spray head. |
| Spray pattern too wide. | Wrong spray tip for lubricant in use. | Select spray tip better suited for lubricant in use. |
| | Clogged spray tip. | Clear clogged tip. |
| | Damaged spray tip. | Replace spray tip. |
| | Wrong lubricant in system. | Replace lubricant in reservoir and purge. |
| | High pressure. | Adjust pressure switch for 4500 P.S.I. |
| | Lubricant is too hot. | Check heater system. |
| | Distance between spray head and work surface too short. | Reposition spray head. |
| Poor spray pattern; lubricant dispenses in solids stream or balls up around spray tip. | Wrong lubricant in system. | Replace lubricant in reservoir and purge. |
| | Low pressure. | Adjust pressure switch for 4500 P.S.I. |
| | Lubricant is too cold. | Check heater system or system was not allowed to warm up. |
| | Lubricant too tacky to spray. | Replace lubricant in reservoir and purge. |
| | Measuring valve has lost hydraulic charge or is damaged. | Repair measuring valve as assembly. |
| Spray does not deliver full output. | Defective accumulator. | Repair measuring valve as assembly. |
| | Spray valve "On" time set too short. | Correctly set spray valve "On" time. |
| Spray delivers full output then drips lubricant before topping. | Spray valve "On" time set too long. | Correctly set spray valve "On" time. |
| | Worn or damaged spray solenoid valve. | Repair or replace solenoid valve. |
| Spray valve sputters or starts to spray lubricant before lube cycle is initiated. | Worn or damaged spray solenoid valve. | Repair or replace solenoid valve. |

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