JP Pump

Customer Product Manual
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– English –
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For parts and technical support, call the Industrial Coating Solutions Customer Support Center at (800) 433-9319 or contact your local Nordson representative.

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– Original document –

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Change Record

Revision	Date	Change
01	1/93	Initial Release
02	12/15	Added O-ring part number 942206.
03	4/17	Updated elbow part number 971605.
04	5/17	Added regulator cover part number 1611468.
05	2/18	Added elbow 1611659.
06	7/18	Update cover part number for regulator. Updated Hydraulic Packing Replacement.
07	1/19	Added screw and washer kit 1614780.
08	2/24	Added unpacking procedure.
09	01/25	Incorrect gauge PN listed in parts section, replaced with correct gauge PN 901254
10	01/25	Updated Manufacturer Address

Section 1
Safety

Introduction

Read and follow these safety instructions. Task- and equipment-specific warnings, cautions, and instructions are included in equipment documentation where appropriate.

Make sure all equipment documentation, including these instructions, is accessible to persons operating or servicing equipment.

Qualified Personnel

Equipment owners are responsible for making sure that Nordson equipment is installed, operated, and serviced by qualified personnel. Qualified personnel are those employees or contractors who are trained to safely perform their assigned tasks. They are familiar with all relevant safety rules and regulations and are physically capable of performing their assigned tasks.

Intended Use

Use of Nordson equipment in ways other than those described in the documentation supplied with the equipment may result in injury to persons or damage to property.

Some examples of unintended use of equipment include:

- using incompatible materials
- making unauthorized modifications
- removing or bypassing safety guards or interlocks
- using incompatible or damaged parts
- using unapproved auxiliary equipment
- operating equipment in excess of maximum ratings

Regulations and Approvals

Make sure all equipment is rated and approved for the environment in which it is used. Any approvals obtained for Nordson equipment will be voided if instructions for installation, operation, and service are not followed.

Personal Safety

To prevent injury follow these instructions.

- Do not operate or service equipment unless you are qualified.
- Do not operate equipment unless safety guards, doors, or covers are intact and automatic interlocks are operating properly. Do not bypass or disarm any safety devices.
- Keep clear of moving equipment. Before adjusting or servicing moving equipment, shut off the power supply and wait until the equipment comes to a complete stop. Lock out power and secure the equipment to prevent unexpected movement.
- Relieve (bleed off) hydraulic and pneumatic pressure before adjusting or servicing pressurized systems or components. Disconnect, lock out, and tag switches before servicing electrical equipment.
- While operating manual spray guns, make sure you are grounded. Wear electrically conductive gloves or a grounding strap connected to the gun handle or other true earth ground. Do not wear or carry metallic objects such as jewelry or tools.
- If you receive even a slight electrical shock, shut down all electrical or electrostatic equipment immediately. Do not restart the equipment until the problem has been identified and corrected.
- Obtain and read Safety Data Sheets (SDS) for all materials used. Follow the manufacturer's instructions for safe handling and use of materials, and use recommended personal protection devices.
- Make sure the spray area is adequately ventilated. To prevent injury, be aware of less-obvious dangers in the workplace that often cannot be completely eliminated, such as hot surfaces, sharp edges, energized electrical circuits, and moving parts that cannot be enclosed or otherwise guarded for practical reasons.

High-Pressure Fluids

High-pressure fluids, unless they are safely contained, are extremely hazardous. Always relieve fluid pressure before adjusting or servicing high pressure equipment. A jet of high-pressure fluid can cut like a knife and cause serious bodily injury, amputation, or death. Fluids penetrating the skin can also cause toxic poisoning.

If you suffer a fluid injection injury, seek medical care immediately. If possible, provide a copy of the SDS for the injected fluid to the health care provider.

The National Spray Equipment Manufacturers Association has created a wallet card that you should carry when you are operating high-pressure spray equipment. These cards are supplied with your equipment. The following is the text of this card:

WARNING: Any injury caused by high pressure liquid can be serious. If you are injured or even suspect an injury:

- Go to an emergency room immediately.
- Tell the doctor that you suspect an injection injury.
- Show them this card
- Tell them what kind of material you were spraying

MEDICAL ALERT — AIRLESS SPRAY WOUNDS: NOTE TO PHYSICIAN

Injection in the skin is a serious traumatic injury. It is important to treat the injury surgically as soon as possible. Do not delay treatment to research toxicity. Toxicity is a concern with some exotic coatings injected directly into the bloodstream.

Consultation with a plastic surgeon or a reconstructive hand surgeon may be advisable.

The seriousness of the wound depends on where the injury is on the body, whether the substance hit something on its way in and deflected causing more damage, and many other variables including skin microflora residing in the paint or gun which are blasted into the wound. If the injected paint contains acrylic latex and titanium dioxide that damage the tissue's resistance to infection, bacterial growth will flourish. The treatment that doctors recommend for an injection injury to the hand includes immediate decompression of the closed vascular compartments of the hand to release the underlying tissue distended by the injected paint, judicious wound debridement, and immediate antibiotic treatment.

Fire Safety

To avoid a fire or explosion, follow these instructions.

- Ground all conductive equipment. Use only grounded air and fluid hoses. Check equipment and workpiece grounding devices regularly. Resistance to ground must not exceed one megohm.
- Shut down all equipment immediately if you notice static sparking or arcing. Do not restart the equipment until the cause has been identified and corrected.
- Do not smoke, weld, grind, or use open flames where flammable materials are being used or stored. Do not heat materials to temperatures above those recommended by the manufacturer. Make sure heat monitoring and limiting devices are working properly.
- Provide adequate ventilation to prevent dangerous concentrations of volatile particles or vapors. Refer to local codes or your material SDS for guidance.
- Do not disconnect live electrical circuits when working with flammable materials. Shut off power at a disconnect switch first to prevent sparking.
- Know where emergency stop buttons, shutoff valves, and fire extinguishers are located. If a fire starts in a spray booth, immediately shut off the spray system and exhaust fans.
- Shut off electrostatic power and ground the charging system before adjusting, cleaning, or repairing electrostatic equipment.
- Clean, maintain, test, and repair equipment according to the instructions in your equipment documentation.
- Use only replacement parts that are designed for use with original equipment. Contact your Nordson representative for parts information and advice.

Halogenated Hydrocarbon Solvent Hazards

Do not use halogenated hydrocarbon solvents in a pressurized system that contains aluminum components. Under pressure, these solvents can react with aluminum and explode, causing injury, death, or property damage. Halogenated hydrocarbon solvents contain one or more of the following elements:

Element	Symbol	Prefix
Fluorine	F	“Fluoro-”
Chlorine	Cl	“Chloro-”
Bromine	Br	“Bromo-”
Iodine	I	“Iodo-”

Check your material SDS or contact your material supplier for more information. If you must use halogenated hydrocarbon solvents, contact your Nordson representative for information about compatible Nordson components.

Action in the Event of a Malfunction

If a system or any equipment in a system malfunctions, shut off the system immediately and perform the following steps:

- Disconnect and lock out system electrical power. Close hydraulic and pneumatic shutoff valves and relieve pressures.
- Identify the reason for the malfunction and correct it before restarting the system.

Disposal

Dispose of equipment and materials used in operation and servicing according to local codes.

Section 2

Description

Introduction

See Figure 2-1. The JP pump is an air-powered, positive displacement, demand-type, dual piston pump designed for waterborne coating applications. The pump is designed to be mounted horizontally.

A redesign in 2006 changed the filter/regulator/lubricator module (FRL) and relocated it to a bracket mounted to the solvent chamber. The accumulator bracket has also been redesigned.

This manual has been changed to reflect the redesign. If you need a previous version of the manual covering the old design, please contact your Nordson representative.

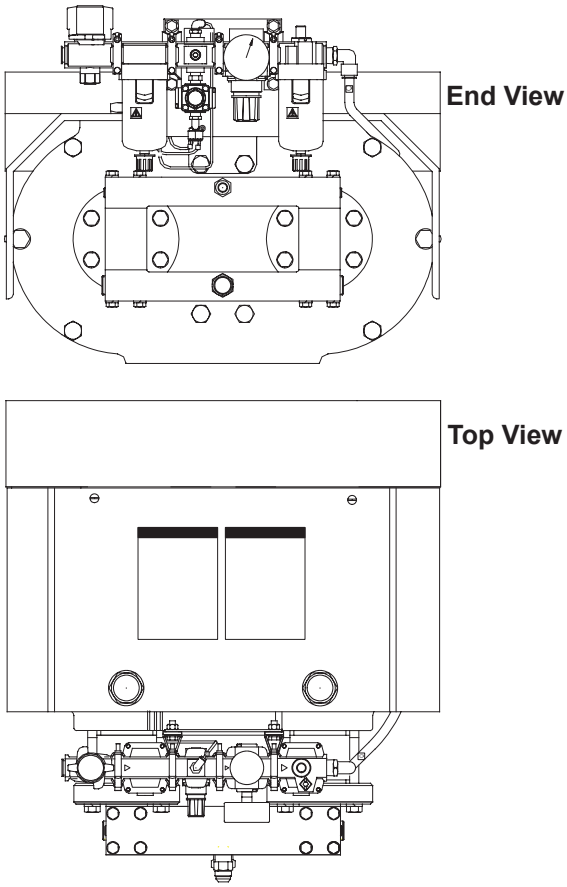


Figure 2-1 JP Pump (Redesign)

Pump Components

See Figure 2-2. The pump consists of an air motor section (2), and a hydraulic section (3), and air control components.

Air Control Components

Filter/regulator/lubricator module (1): Prepares the working air for use by the JP pump. This module filters the incoming shop air, regulates pilot air to the factory set pressure and routes it to the roller valves, routes unregulated air to the double pilot valve to shift the air valve spool, regulates working air pressure for pump operation, and lubricates the air with vitalizer oil.

Accumulator (12): Stores working air and adds to the flow of air to the cylinders. This helps to eliminate pressure fluctuations (winking).

Air valve (10): Directs working air to the cylinders. This is an open-center type valve. If the valve spool should stop in the center position when the pump is turned off, you will not be able to restart the pump because working air will be directed into both cylinders. To restart the pump, press the manual override button on the double pilot valve (11). This directs supply air to one side of the air valve and shifts the valve spool out of the center position.

Double pilot valve (11): Directs unregulated air to either end of the air valve spool in response to pilot air signals from the roller valves.

Roller valves (not shown): Direct pilot air to either end of the double pilot valve spool. The roller valves are actuated by lands on the piston shafts.

Air Motor

The air motor (2) consists of two cylinders, spring-returned pistons, and a solvent chamber (7). Solvent in the solvent chamber lubricates the hydraulic plungers to minimize wear on the packings located in the hydraulic section (3).

Hydraulic Section

The hydraulic section (3) consists of high-pressure cylinders (7), plunger assemblies (8), a siphon manifold (5), and a pressure manifold (4). Four ball check valves direct the flow of coating material in and out of the pump.

Two ports (6) at either end of the siphon manifold are provided for installing the optional circulation valve kit. Refer to the Parts section for kit ordering information.

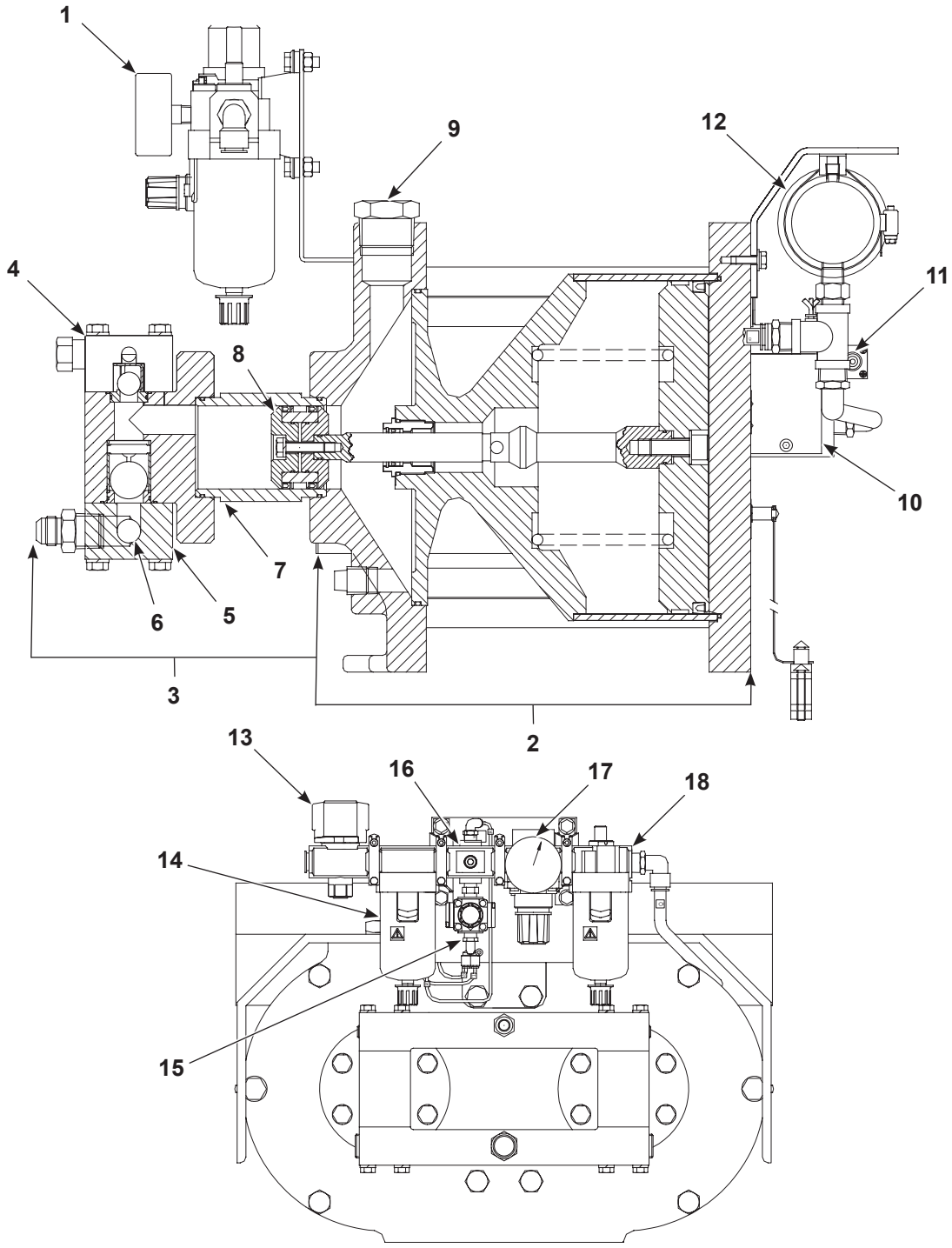


Figure 2-2 JP Pump Components

1. Filter/regulator/lubricator
2. Air motor section
3. Hydraulic section
4. Pressure manifold
5. Siphon manifold
6. Circulation valve connection
7. High-pressure cylinders
8. Plunger assemblies
9. Solvent chamber
10. Air valve
11. Double pilot valve
12. Accumulator
13. Shutoff valve
14. Air filter
15. Pilot air regulator
16. Manifold
17. Working air regulator
18. Lubricator

Theory of Operation

See Figure 2-2 and 2-3. Supply air enters the pump at the shut-off valve. The air is filtered and passes into a manifold where unregulated air is delivered through line 3 to the double pilot valve. The unregulated air is used by the double pilot valve to overcome the working air pressure and shift the air valve spool. Regulated pilot air is routed through lines 4 and 5 to the roller valves and then to the double pilot valve to shift its spool.

Working air is regulated and lubricated before flowing into the accumulator, air valve, and air motor cylinders.

NOTE: The pilot air regulator is set at the factory. Do not change the regulator setting. Use the working air regulator to run the pump and adjust the output pressure.

The position of the double pilot valve spool determines which piston/plunger begins its downward (pressure) stroke first when the pump is started. While the left air motor piston is forced down into the cylinder by working air from the air valve, the right air motor piston is being forced upwards by the return spring.

The left hydraulic plunger pressurizes the coating material in the hydraulic section and forces it out of the pump through a ball check valve, through the pressure manifold, and into the fluid lines to the spray guns.

Just before the left plunger reaches the bottom of its stroke, the roller valve lever on that side of the pump is depressed by the chamfered land on the air piston shaft. Pilot air is directed to the double pilot valve, which then shifts the air valve spool to direct working air to the right air motor cylinder while exhausting the air in the left cylinder.

The left hydraulic plunger is drawn out of the hydraulic section, siphoning coating material into the pump, where it is retained by a ball check until the next pressure stroke.

The strokes of the pistons overlap and keep the fluid pressure in the delivery lines to the guns constant.

Specifications

Technical Data	
Fluid Output to Air Input Pressure Ratio	16:1
Input Air Pressure	5 bar (75 psi)
Air Consumption (cfm)	Refer to Table 2-1
Hydraulic Fluid Pressure	83 bar (1200 psi)
Hydraulic Fluid Delivery	7.6 lpm (2 gpm)
Pressure Feed	1.3 bar (20 psi)
Plumbing	
Air Supply Hose	12.7-mm (1/2-in.) ID
Hydraulic Fluid Hose	6.35-mm (1/4-in.) ID

Table 2-1 AIr Consumption

Air Pressure Setting bar (psi	**Strokes/Minute m^3/min (ft^3/min)**		
	@ 25 strokes/minute	**@ 35 strokes/minute**	**@ 35 strokes/minute**
5.2 (75)	0.4 (13.9)	0.6 (19.4)	0.7 (25.0)
3.5 (50)	0.3 (10)	0.4 (14)	0.5 (18)
1.7 (25)	0.2 (6.4)	0.2 (8.6)	0.3 (11)

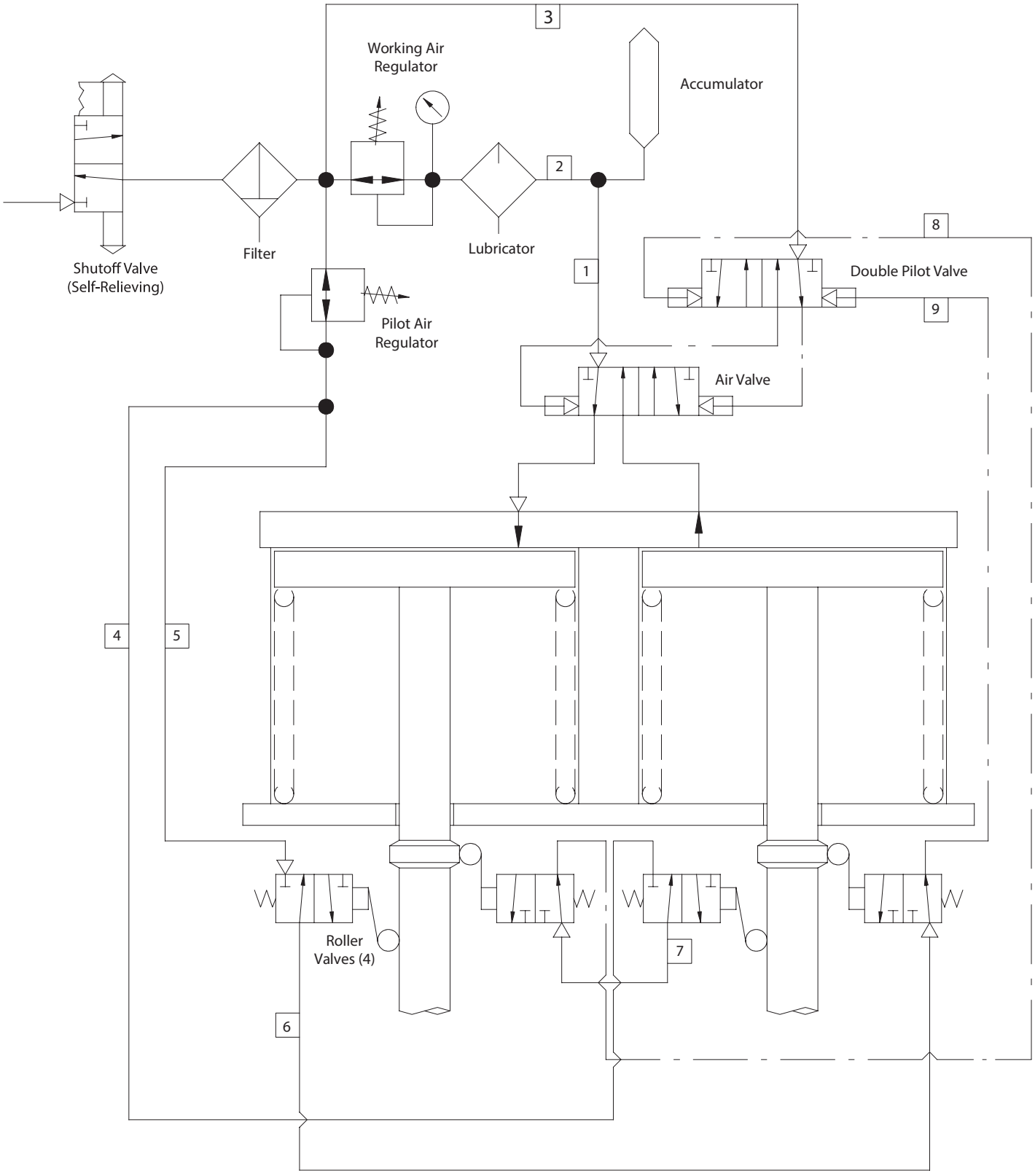
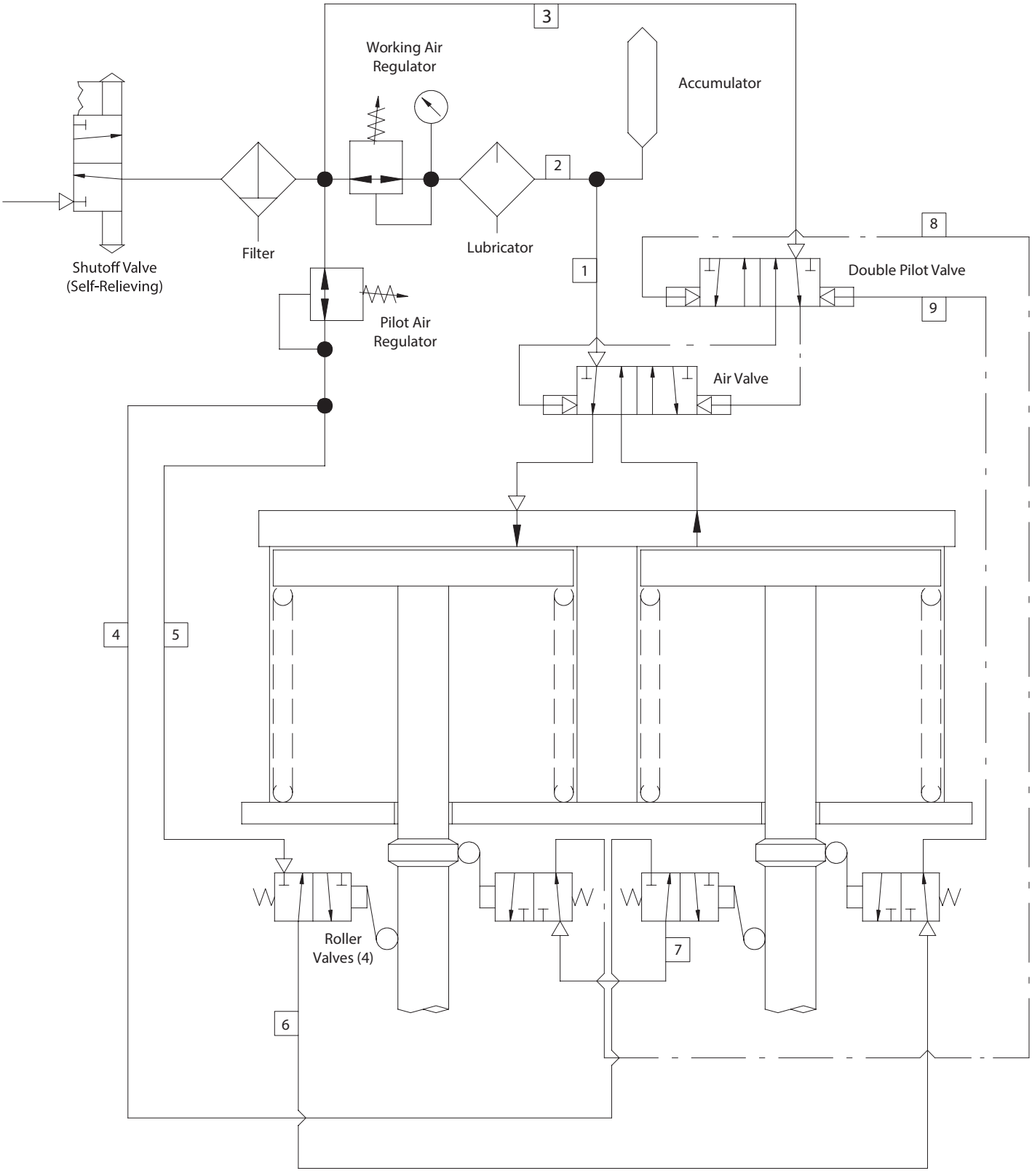


Figure 2-3 JP Pump Pneumatic Schematic



Section 3

Installation

WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

Unpacking

1. See Figure 3-1. Remove the siphon rod (1) from the tube on the pallet.
2. Remove the nuts (9), lock washers (8), and washers (7) securing the pump (2) to the pallet.
3. Remove the shipping bracket screws (6), lock washers (5), and washers (4) securing the shipping bracket (3) to the pump (2).

NOTE: The shipping bracket is only used to secure the pump to the pallet for shipment. Do not use the shipping bracket to secure the pump to a mounting surface.

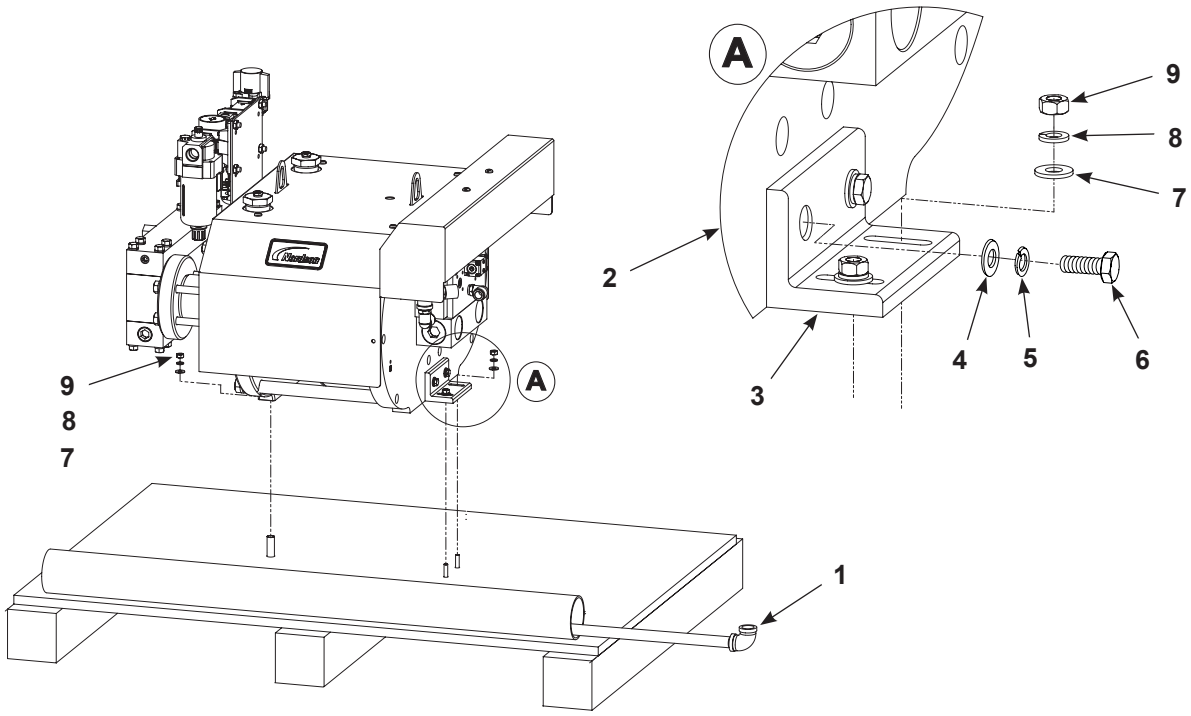


Figure 3-1 Removing the Pump from the Shipping Pallet

1. Siphon rod
2. Pump
3. Shipping bracket
4. Shipping bracket washer
5. Shipping bracket lock washer
6. Shipping bracket screw
7. Washer
8. Lock washer
9. Nut

Mounting

See. Figure 3-2. Install the pump on a horizontal surface and in an area accessible for operation and maintenance. Use three hex head 1/2- 13 bolts to mount the pump, one bolt for the mounting slot (2) located on the solvent chamber (1), and two bolts into the threaded mounting holes located on the bottom surface of the upper head (3).

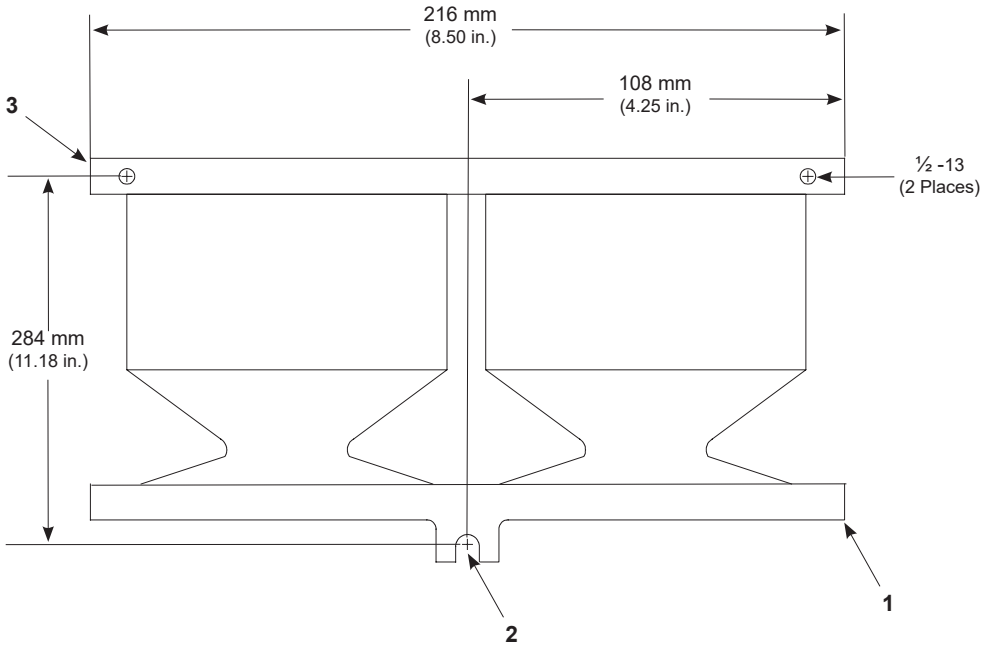


Figure 3-2 Mounting Dimensions

1. Solvent chamber
2. Mounting slot
3. Upper head

Air Supply Connection

See Figure 3-3. The pump requires 5.5 bar (80 psi) maximum input air at 0.5 m3/min (17.16 cfm) to operate at 45 strokes per minute. The air supply hose should be 12.7 mm (0.50 in.) minimum ID.

Use at least 305 mm (12 in.) of flexible air hose to connect the pump to rigid air pipe. The hose serves as a vibration damper during pump operation.

Purge the air supply piping and hose of contaminants. Connect the hose to the air shutoff valve (1). Make sure that the shut-off valve is turned off and the regulator (2) is backed all the way out.

Fluid Hose Connection

See Figure 3-3. All tubing and fittings installed on the pump must be stainless steel. Coat all fitting threads liberally with pipe joint adhesive and tighten securely to eliminate siphoning of air.

If the fluid system is to be hard-plumbed, use only 9.5-mm (3/8-in.) ID wall seamless stainless steel tubing for the high pressure circuit. Hoses at least 305 mm (12 in.) long must be installed between the pressure and siphon fittings and rigid tubing to serve as a vibration damper.

High-Pressure Hose Connection

Connect a high pressure, reinforced PTFE, 6.4 mm (0.250 in.) fluid hose (6) between the pressure fitting (4) and the fluid heater inlet (if used).

Siphon Hose Connection

1. Connect the male connector (8) provided with the pump to the siphon rod elbow (9).
2. Connect the siphon strainer (10) to the siphon rod (9). Tighten the strainer thumbscrew securely.
3. Connect the siphon rod assembly to the siphon hose (7).
4. Connect the siphon hose to the siphon fitting (5).

Solvent Chamber Fluid and Vitalizer Oil Fill

1. See Figure 3-3. Use Nordson Type-Q or -T solvent chamber fluid for waterborne coatings. Remove the air filter caps (2) and fill the solvent chambers to 102 mm (4 in.) from the top.
2. Remove the lubricator cup (3) and fill it with the vitalizer oil (provided).

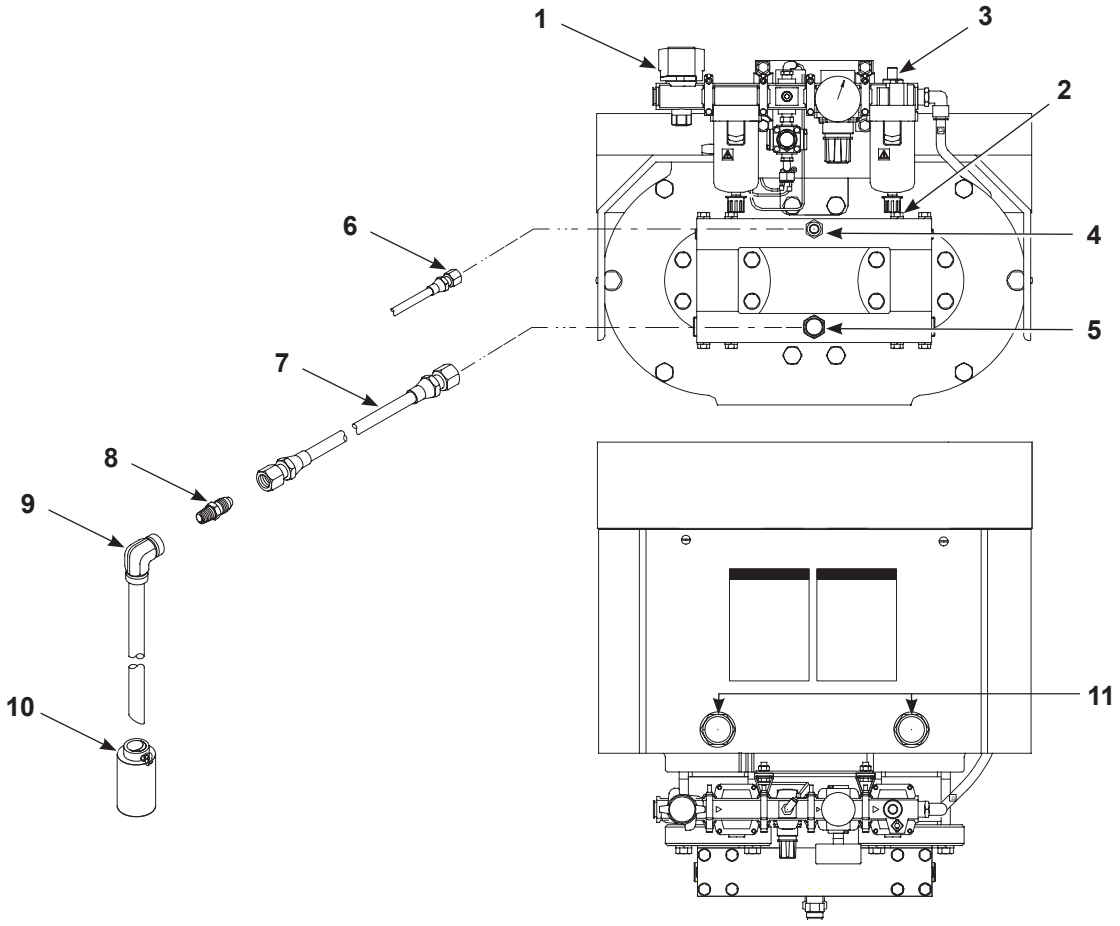


Figure 3-3 Air and Fluid Connections

1. Air shutoff valve
2. Working air regulator
3. Lubricator
4. Pressure fitting
5. Siphon fitting
6. High-pressure hose
7. Siphon hose
8. Male connector
9. Siphon rod
10. Strainer
11. Air filter caps

Optional Pressure Feed Siphon Installation

CAUTION: A pressure feed over 0.07 bar (1 psi) will result in circulation of coating material through the hydraulic section. When installing or repairing the pump, shut off the pressure feed and the air supply shutoff valve to relieve the hydraulic pressure inside the pump. Failure to follow these procedures could result in personal injury.

The coating material may be supplied to the pump by gravity pressure or pressure fed from a pressure reservoir. Nordson Corporation recommends a maximum feed pressure of 1.4 bar (20 psi). At no time should a check valve or fluid regulator be used on the pressure supply line. A shut-off valve must be installed on the line to the pump.

1. See Figure 3-4. Install the male connector (2) provided with the pump to the pressure feed line (3).
2. To dampen vibration, install the siphon hose (1) between the siphon fitting (4) and the pressure feed line (3).

Optional Circulation Valve Kit Installation

See Figure 3-4. Use the procedures below to install the optional circulation valve kit on the JP pump:

1. Remove a pipe plug (5) from one end of the siphon manifold (4).
2. Connect the circulation valve (8) to the open port, using a 3/4 x 1/2-in. bushing (12).
3. Connect the drain-off valve (7) to the circulation valve (8).
4. Connect the return hose (6) from the spray gun(s) to the elbow (9) on the circulation valve (8).
5. To install a dual circulation valve, repeat steps 1- 4.

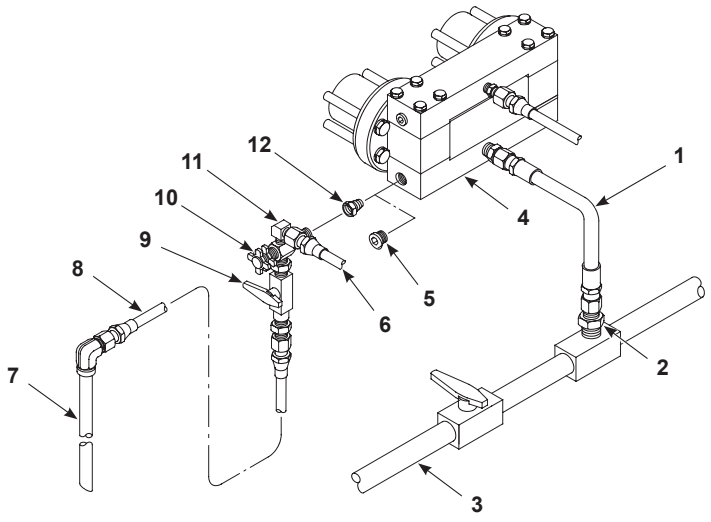


Figure 3-4 Pressure Feed and Circulation Valve Connections

1. Siphon hose	5. Pipe plug	9. Drain-off valve
2. Male connector	6. Return hose	10. Circulation valve
3. Pressure feed line.	7. Drain rod	11. Elbow
4. Siphon manifold	8. Drain hose	12. 3/4 x 1/2-in. bushing

Note: The bushing (12) is not included with the circulation kit. Refer to Optional Circulation Valve Kit on page 7-14 for ordering information

Section 4

Operation

WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

Before Startup

WARNING: To prevent static electricity build-up, ground the pump and all system components, including the waste container. Ungrounded components can cause a fire or explosion.

Before starting up the system, make sure that:

- all fittings and connections are tightened securely;
- the shut-off valve, circulation valve(s), and drain-off valve(s) (if used) are closed and that the working air regulator is backed all the way out;
- the system components (heater, filter, etc.) have been installed in accordance with the instructions in their respective manuals;
- the proper fluid filter screen is installed and that the filter housing is secure;
- the solvent chamber is filled with the proper fluid;
- the lubricator is filled with vitalizer oil;
- the coating material is at the ambient temperature; and
- all safety measures have been observed.

Flushing the Pump

See Figure 4-1 when making adjustments to the pump. The first-time startup of the pump requires a flush to clean out any residual dirt, grease, and machining chips left from manufacturing and installation.

NOTE: The flush material can be a solvent used in the coating material; or, if using water-based coatings, butyl cellusolve or soapy water.

1. Remove the gun nozzle. If using a circulation valve kit, insert a drain-off rod into a waste container.
2. If the system uses a circulation valve, close the circulation valve and open the drain-off valve.
3. Insert a siphon rod into a container of a suitable flush material. If a pressure feed is used, pressurize the siphon line with solvent flush material.

NOTE: Make sure that you back the air regulator out completely. The pump will run erratically if started without coating material in the lines.

4. Pressurize the air supply line.
5. Open the air shutoff valve (1).
6. Adjust the working air regulator (5) until the pump strokes 20 strokes per minute. If using a non-circulating system, trigger the gun(s) to allow the pump to operate.

NOTE: If the pump does not stroke, push the manual override button (3) located on the double pilot air valve (2).

7. Observe the material being pumped out of the gun or drain valve. Run the pump until the flush material being pumped into the waste container flows without bubbles.
8. Using a small screwdriver, adjust the lubricator (4) to a rate of 1 drop per 5- 10 strokes of the pump. Make sure that the lubricator is filled with vitalizer oil.
9. If a circulation valve kit is installed, close the drain-off valve and slowly open the circulation valve. Adjust the circulation valve until the pump strokes 20 strokes per minute. Allow solvent flush material to circulate through the system for 15- 30 minutes.
10. Using the working air regulator (5), reduce the air pressure to zero.
11. If your system uses a circulation valve, close the circulation valve and open the drain-off valve.
12. Remove the siphon rod. If the pump is pressure-fed, shut off the pressure feed.
13. Adjust the air regulator (5) to allow the pump to discharge the flush material into a waste container. If using a non-circulating system, trigger the gun(s) until all solvent flush material has been pumped out of the system.
14. Using the air regulator (5), reduce the air pressure to zero.
15. Close the shut-off valve.
16. Open the fluid filter drain and clean the filter screen.

Normal Operation

1. See Figure 4-1. Place a siphon rod into the coating material. If a pressurized system is used, pressurize the feed line.
2. Open the air shut-off valve (1) and adjust the air regulator (5) until the pump begins to stroke slowly.
3. Let coating material flow out of the filter drain. Close the drain.
4. Let the pump discharge coating material from the drain-off valve. Close the drain-off valve.
5. Adjust the air regulator to the required pressure and adjust the circulation valve to a rate of 8- 10 strokes per minute.

WARNING: Fluid must be circulated through the heater when the heater is operating. Operating the heater without proper circulation can result in an extreme pressure increase caused by expansion of solvents used in many coating materials. Failure to circulate material through an operating heater can result in heater plugging, heat limiter failure, property damage, or personal injury.

6. If a heater is used, turn it on. Allow 10- 15 minutes for the system to reach operating temperature. When the thermometer reads within 2 _C (5 _F) of the operating temperature, adjust the circulation valve. The maximum desired flow rate is 7.6 lpm (or 2.0 gpm) maximum.
7. Start spraying.

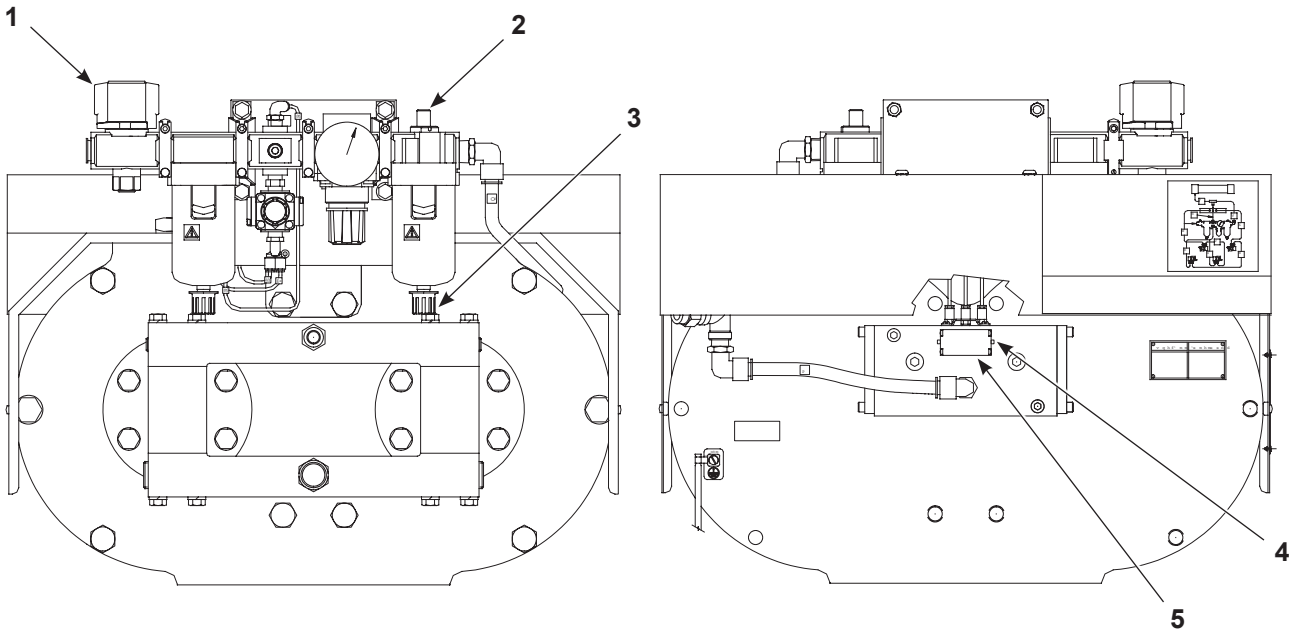


Figure 4-1 Pump Adjustments - End View

1. Air Shut-off valve
2. Lubricator adjustment
3. Working air regulator
4. Manual override button
5. Double-pilot air valve

Daily Maintenance

Refer to Table 4-1.

WARNING: Make sure that all system components are grounded. Ungrounded components can cause electrical sparking, fire, or explosion.

WARNING: Do not soak system components in solvent. Some solvents can damage hose coverings and seals.

Table 4-1 Daily Maintenance

Item	Task
High pressure fluid filter	Clean the high pressure fluid filter daily unless experience indicates that less-frequent cleaning would be adequate. To prevent production downtime, use a dual filter assembly. Consult your Nordson Corporation representative to see if a dual filter is appropriate for your application and material. 1. Place a clean spare screen in the fluid filter and soak the dirty screen in a solvent that is compatible with your coating material. 2. Inspect the filter screen and discard it if ruptured or distorted.
Solvent chamber fluid	Check the solvent chamber fluid condition. 1. If the solvent fluid appears to be contaminated with coating material, drain the fluid and replace with new fluid. 2. Fill the solvent chamber to 102 mm (4 in.) from the top of the casting. Use only Nordson type “Q” or “T” solvent chamber fluid for water-based coatings.
Air lubricator	Check the air lubricator oil level and rate of delivery. 1. If necessary, adjust the rate to approximately 1 drop of oil per every 5- 10 strokes of the pump. 2. Refill the air lubricator with vitalizer oil or an approved substitute only. Refer to the Adjusting Air Line Lubricators instruction sheet for a list of approved replacement oils.
Air filter	1. Drain the air filter, remove the air filter bowl, dump out the remaining water (if necessary) and remove the air filter element daily. This may be done less frequently if experience indicates that less-frequent cleaning would be adequate. 2. Do not soak the parts in solvent. Wash the parts in soapy water, rinse, dry, and reuse.
System components	Wipe system components clean with a cloth soaked in a solvent compatible with your coating material. This should remove any dirt and coating material splashes.

Section 5
Troubleshooting

WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

This section contains troubleshooting procedures. These procedures cover only the most common problems that you may encounter. If you cannot solve the problem with the information given here, contact your local Nordson representative for help.

No.	Problem	Go to
1.	Pump fails to start	5-2
2.	Pump stops during operation	5-3
3.	Pump strokes irregularly or hydraulic fluid pressure fluctuates	5-4
4.	Gradual loss of hydraulic fluid pressure while air supply pressure remains constant	5-4
5.	Coating material mixing with solvent chamber fluid	5-5
6.	Pump strokes when circulation and drain-off valves are closed	5-5
7.	Hydraulic pressure drops when the guns are triggered	5-5
8.	Fading or narrowing of the spray pattern after the gun is triggered	5-5
9.	Gun nozzle plugging	5-5
10.	Tails appearing in a spray pattern that was normal	5-5
11.	Temperature drop after the spray guns are triggered	5-5

Problem	Possible Cause	Corrective Action
1. Pump fails to start	Air supply input not present or inadequate	Check for adequate air volume and pressure in the supply line. Make sure that the air supply and pump shut-off valves are turned on. **NOTE:** Refer to the *Description* section for the relationship between air input pressure and hydraulic output pressure.
	Improperly adjusted air regulator, blocked air filter element, or faulty air regulator **NOTE:** When both the circulation and drain-off valves are closed, the pump will not start. If both are closed while the pump is operating, the pump will stop stroking.	Check the air regulator gauge for at least 1.4 bar (20 psi) of compressed air supplied to the air motor. 1. If the gauge reads below 1.4 bar (20 psi), adjust the air regulator to the desired setting. 2. If the pump cannot achieve pressure after you adjust the air regulator, remove and clean the air filter element. 3. If the problem continues, disconnect the 12.7-mm (1/2-in.) OD tubing at the air valve and check for air flow. If no air flows out of the tubing, replace the air regulator.
	Blocked hydraulic system	1. If sufficient air pressure is available to operate the pump, check for hydraulic fluid pressure. If hydraulic fluid pressure is maintained, the condition is outside the pump. 2. Check for a faulty circulation valve. Refer to Problem 6. 3. Check for either a clogged gun nozzle, fluid filter screen, or siphon strainer.
	Air valve spool centered, not allowing working air to exhaust	If sufficient air pressure is available to operate the pump, push the manual override button located on the double pilot valve. After a smooth quick shift of the air valve spool, the pump should start.
	Lubricator not properly adjusted, air valve spool binding	1. If the air valve spool does not shift, movement may be restricted due to poor lubrication. Remove both end caps and push the spool back and forth. a. If it does not move or is extremely tight, disassemble the valve to lubricate or rebuild. b. If the spool slides back and forth easily, reinstall the end caps. 2. After reassembling, adjust the lubricator to one drop per every 5-10 strokes.
	Improper air line routing	See Figure 5-2. Check the air tube connections against the pneumatic schematic. If everything appears correct and the pump still will not start, then the double pilot valve or the roller valves are faulty.
	Faulty lower roller valves	Perform the following procedures to check the two lower roller valves: 1. Disconnect tube 6 from the roller valve on the lower left side of the pump. Air should flow when the valve is actuated and stop when released. 2. Disconnect tube 7 from the roller valve on the lower right side of the pump. Air should flow when the valve is actuated and stop when released.

Continued...

Problem	Possible Cause	Corrective Action
1. Pump fails to start *(contd)*	Faulty upper roller valves or pilot valve	Check the two upper roller valves by releasing the actuator (which is normally depressed when installed) while both air pistons are in their full returned position. Perform the following procedure: 1. Remove the two retaining screws that secure the roller valve assembly to the lower head casting. 2. Disconnect tube 3 on the upper left valve assembly. 3. Activate the upper left roller valve. Air should not flow. 4. Activate the upper right roller valve. Air should not flow. 5. Activate the lower right and upper left roller valves together. Air should flow 6. Repeat the test by removing tube 2 and activating the lower left and upper right valves. Air should flow only when both valves are activated together and should stop when released.
	Faulty pilot valve	If the lower and upper roller valves are functioning properly, replace the pilot valve.
2. Pump stops during operation	Blocked hydraulic section	Perform the *Blocked hydraulic section* Corrective Action in Problem 1. If the problem still exists, perform the following before continuing: 1. Purge the hydraulic system of air. If using a circulation valve, close the circulation valve finger-tight. 2. Open the drain-off valve. Operate the pump with the drain-off rod submerged in coating material. Bubbles indicate that air or solvent vapor is present in the hydraulic system. If bubbles do not stop, or if irregular stroking disappears after purging only to reappear a short time later, there may be an air leak in the siphon circuit. If the operating temperature is too high for the coating material being pumped, solvent may be vaporizing inside the pump, creating gas bubbles.

Problem	Possible Cause	Corrective Action
3. Pump strokes irregularly or hydraulic fluid pressure fluctuates	Air leak in the siphon circuit	Leaks in the siphon system may be checked by placing both the siphon rod or pressure feed supply and drain-off rod in water. Close the circulation valve, open the drain-off valve, and operate the pump while watching for bubbles in the water. If bubbles occur, air is entering the pump through the siphon system. Possible leak locations and their solutions: • Any pipe and fitting locations throughout the pressure feed supply or siphon hose/rod assembly. Tighten all fittings including the connections at the siphon manifold. • A small hole or crack in the siphon hose. Replace the hose. • The two O-rings between the siphon manifold and the hydraulic housings. Replace the O-rings.
	Solvent vapor in the hydraulic system	During a siphon stroke, pressure in the hydraulic chamber falls below atmospheric pressure, lowering the boiling point of the solvents in the coating material. If the fluid temperature is close to the boiling point, the drop in pressure may permit a solvent to begin boiling off, creating gas bubbles inside the hydraulic chamber. The fluid temperature should be at least 12 °C (20 °F) below the boiling point of the most volatile solvent used in the coating material. Lower the temperature of the coating material or pressure feed the coating material into the pump. **NOTE:** Viscous coating materials, long siphon systems, and blocked siphon strainers may cause pressure inside the hydraulic chamber to drop to unusually low levels during the siphon stroke, thereby aggravating this condition.
	Leaks in the pneumatic system	See Figure 5-2. Check the pneumatic system schematic. Observe and listen for continuous air leaks from partially opened valves, tube connections, or pinched hoses. Check the air filter screen for clogging. Replace any faulty parts and clean the air filter element, if necessary.
	Faulty air valve	If the pump continuously double strokes, the air valve is faulty. Rebuild or replace the air valve.
	Leaky siphon or high pressure back check valves	If the pump continuously double strokes, close both the circulation and drain-off valves, if used, or shut off the gun. Both plungers should stop. Quickly open and close the drain-off valve (open for one half second or less), or trigger the gun. If one plunger does not stop each time the valve is closed, or trigger released, but runs its full stroke and returns, the fault lies in the siphon ball check valve on that side of the pump or the high pressure ball check valve on the opposite side. Rebuild or replace the faulty component.
	Out of coating material	Refill the coating material supply.
4. Gradual loss of hydraulic fluid pressure while air supply pressure remains constant	Worn hydraulic packings	Replace any worn hydraulic packings.

Problem	Possible Cause	Corrective Action
5. Coating material mixing with solvent chamber fluid	Worn hydraulic packings	Replace any worn hydraulic packings.
6. Pump strokes when circulation and drain-off valves are closed	Leaks in high pressure hydraulic fluid system	Look for fluid leaks throughout the high pressure system and repair them.
	Faulty drain-off valve	If fluid leaks out of drain-off hose when the drain-off valve is closed, repair or replace the drain-off valve.
	Faulty circulation valve	Disconnect the circulating system return hose at the valve and blow compressed air into the circulation valve through the open fitting. If air escapes from the siphon rod when both the circulation and drain-off valves are closed, the circulation valve is faulty. Rebuild or replace the circulation valve.
	Faulty siphon and high pressure ball check valves	Refer to Possible Cause, *Leaky siphon or high pressure ball check valves* in Problem 3.
7. Hydraulic pressure drops when the guns are triggered	Insufficient air supply	Refer to the Description section for air supply specifications.
	Heavy viscous material causing inadequate flow rate	Correct the flow rate by pressure feeding (not siphoning) the coating material. The pressure should not exceed 1.4 bar (20 psi).
	Partially blocked fluid lines	Check and clean the filter screen. Flush all of the fluid lines.
	Nozzle nut not installed or leaking	Install or tighten the nozzle.
8. Fading or narrowing of the spray pattern after the gun is triggered	Inadequate air supply	Refer to the *Description* section for air supply specifications.
9. Gun nozzle plugging	Inadequate filter screen size or ruptured filter screen	Check the filter screen for proper size and for rupture or damage. Refer to the manuals provided with your filter and gun(s).
10. Tails appearing in a spray pattern that was normal **NOTE:** Tails are streams of un-atomized coating material at the outer edges of the spray pattern.	Partially blocked filter screen	Check fluid filter screen and clean, if necessary. Refer to the filter manual.
	Change in coating viscosity	Check coating material viscosity and thin with a compatible solvent, as necessary.
	Inadequate air supply	Check the main air supply for the proper operating pressure. Refer to the *Description* section for air supply specifications.
11. Temperature drop after the spray guns are triggered	Inadequate heater capacity	Make sure that the heater capacity is adequate and that all heaters are functioning properly. Refer to the heater manual.
	Changes to system	Check for a change to larger low-rate and the addition of more spray guns to the system.

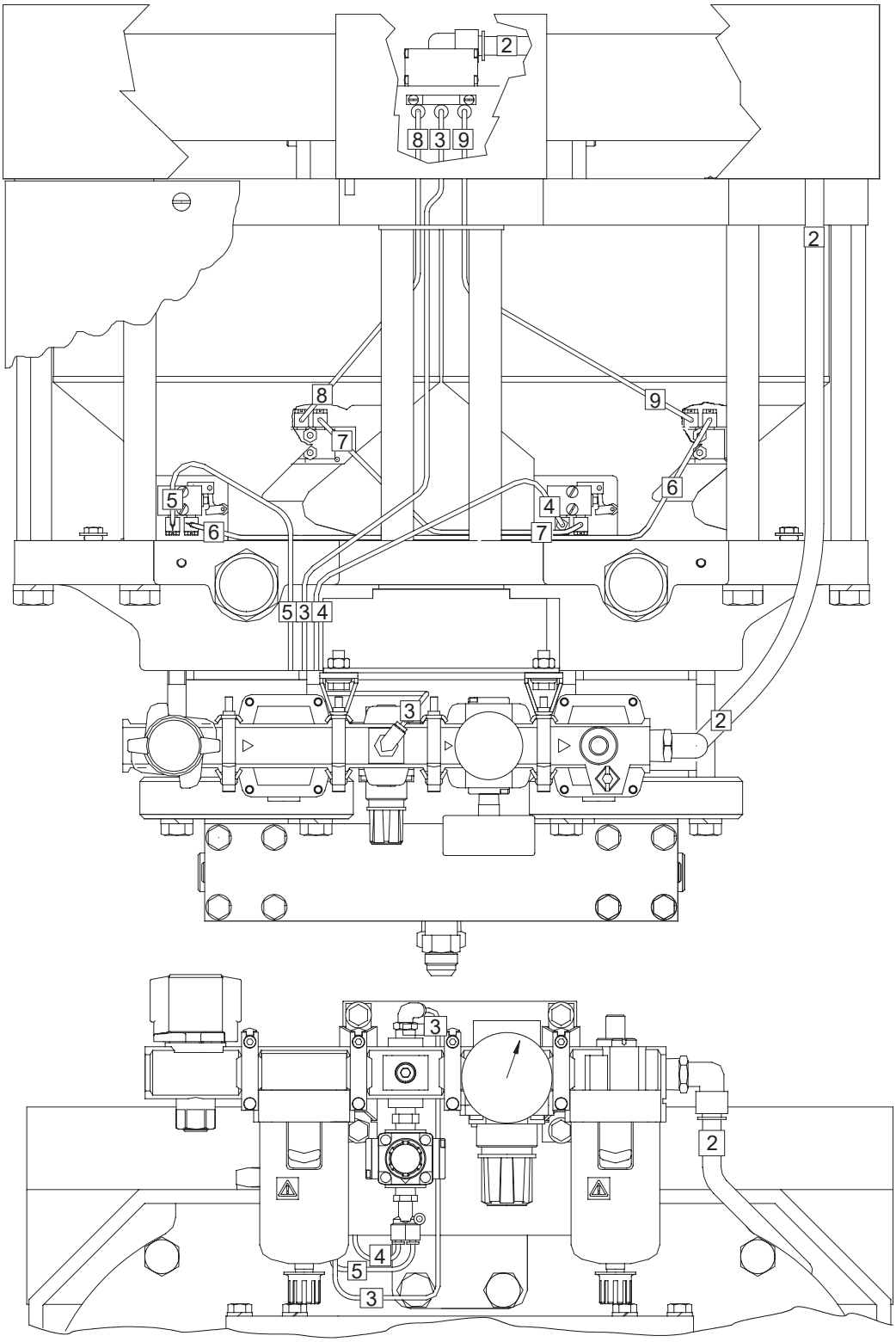


Figure 5-1 Tubing Diagram

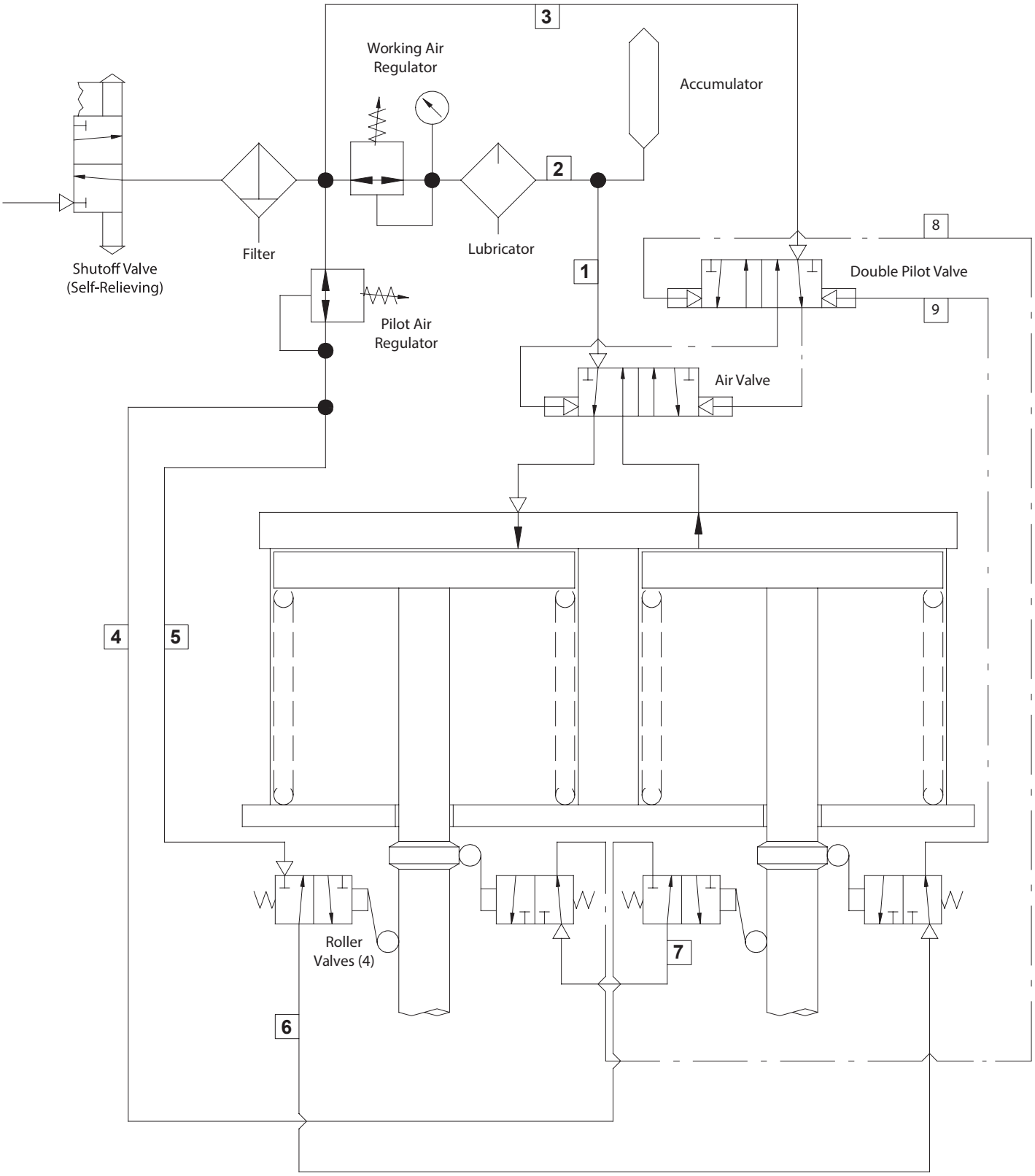


Figure 5-2 Pneumatic Schematic

Section 6
Repair

WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

WARNING: To prevent personal injury or equipment damage, shut off air supply to relieve hydraulic pressure. Shut off pressure feed system. Drain off system pressure.

NOTE: It may be necessary to remove the air tubing from the pump to perform certain repairs. When removing or installing tubing, see Tubing Diagram and Pneumatic Schematic in the *Troubleshooting* section.

Hydraulic Section Repair

Make sure you have the parts you need on hand before you start. Use the following items to repair the hydraulic section:

- Hydraulic section repair kit
- Hydraulic packing service kit
- High-pressure ball check kit
- Siphon ball check kit
- VC-3 threadlocking compound
- O-ring lubricant - Parker O-Lube or equivalent

Refer to the *Parts* section for kit parts lists and illustrations.

Hydraulic Section Removal

1. See Figure 6-1. Remove the screws (2) and lock washers (3) that secure the hydraulic section (1) to the pump.
2. Remove the high pressure cylinder (5) and O-rings (4). Discard the O-rings.

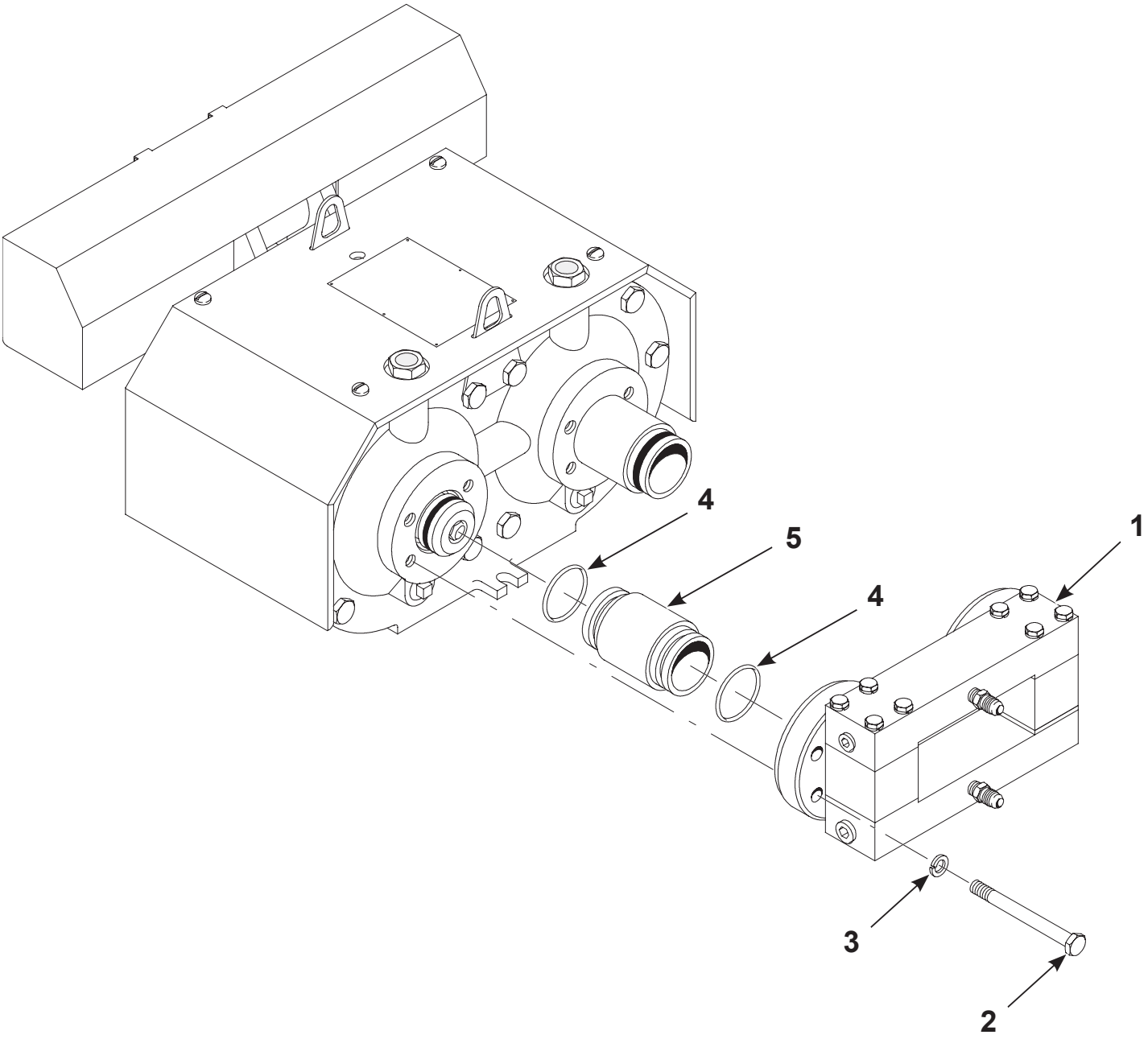


Figure 6-1 Hydraulic Section Removal

1. Hydraulic Section
2. Screw (8)
3. Lock washer (8)
4. O-ring (4)
5. High-pressure cylinder (2)

Hydraulic Packing Replacement

1. See Figure 6-2. Remove the screws (1) and lock washers (2) that secure the plunger assembly to the piston shafts (9).
2. Remove and discard the O-rings (4) from the hydraulic retainer seals (3).
3. Remove and discard the U-cups (5) from the hydraulic seal holders (6).
4. Remove the O-rings (7) and back-up rings (8) from the piston shafts. Discard the O-rings.
5. Lightly lubricate all O-rings (4, 7) and U-cups (5) with O-ring lubricant.
6. Install the back-up rings (8) and O-rings (7) to the piston shafts.
7. Install the O-rings (4) to the hydraulic retainer seals (3).
8. Install the U-cups (5) on the hydraulic seal holders (6) as illustrated.
9. Install the plunger assemblies onto the piston shafts.

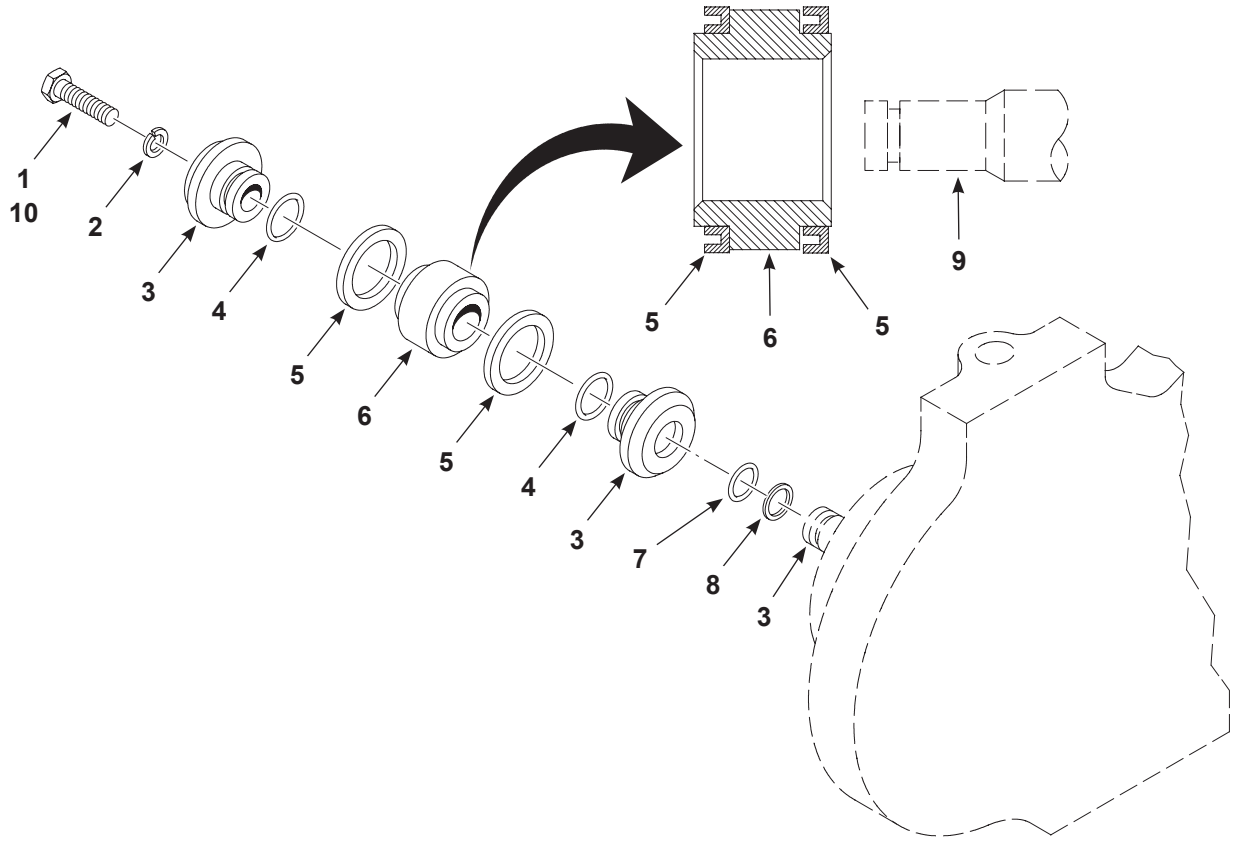


Figure 6-2 Hydraulic Packing Replacement

1. Screw (2)
2. Lock washer (2)
3. Hydraulic retainer seal
4. O-ring (4)
5. U-cup (2)
6. Hydraulic seal holder (2)
7. O-ring (2)
8. Backup ring (2)
9. Piston shaft (2)
10. Threadlock adhesive

High-Pressure Check Rebuild

1. See Figure 6-3. Remove the screws (1) and lock washers (2) that secure the pressure manifold (3) to the check housings (9).
2. Remove the ball cages (4) and balls (5) from the check housings.
3. Remove and discard the O-rings (8) from the check housings.
4. Remove the ball seats (7) from the check housings. Remove and discard the O-rings (6) from the ball seats.
5. Lightly lubricate all O-rings (6, 8) with O-ring lubricant.
6. Install the O-rings (6) onto the ball seats (7).
7. Install the ball seats (7), balls (5), and ball cages (4) into the check housings.
8. Install the O-rings (8) into the check housings.

NOTE: When installing the hydraulic section to the solvent chamber, keep the pressure manifold screws loose to allow for proper alignment of the hydraulic section to the solvent chamber.

9. Install the pressure manifold (3) to the check housings (9) using the lock washers (2) and screws (1). Do not tighten the screws at this time.
10. Install the hydraulic section to the pump. Refer to Hydraulic Section Installation on page 6-6.

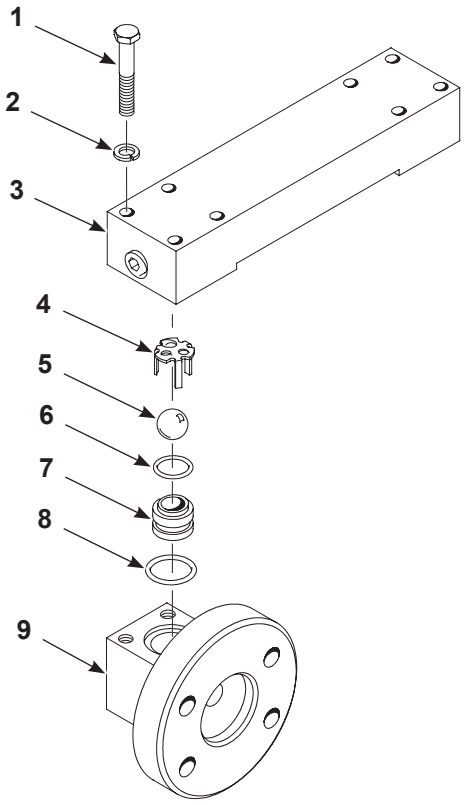


Figure 6-3 High-Pressure Check Rebuild

1. Screws (8)
2. Lock washer (8)
3. Pressure manifold
4. Ball cage (2)
5. Ball (2)
6. Ball seat O-ring (2)
7. Ball seat (2)
8. Check housing O-ring (2)
9. Check housing (2)

Siphon Check Rebuild

1. See Figure 6-4. Remove the screws (9) and lock washers (8) that secure the siphon manifold (7) to the check housings (1).
2. Remove and discard the O-rings (2) from the check housings (1).
3. Remove the ball seats (6) from the check housings (1). Remove and discard the O-rings (5) from the ball seats.
4. Remove the ball guides (3) and balls (4) from the check housings (1).
5. Lightly lubricate all O-rings (2, 5) with O-ring lubricant.
6. Install the O-rings (5) onto the ball seats (6).
7. Install the ball guides (3), balls (4), and ball seats (6) into the check housing (1).
8. Install the O-rings (2) into the check housings (1).

NOTE: When installing the hydraulic section to the solvent chamber, keep the siphon manifold screws loose to allow the hydraulic section to be properly aligned to the solvent chamber.

9. Install the siphon manifold (7) to the check housings (1) using the lock washers (8) and screws (9). Do not tighten the screws at this time.
10. Install the hydraulic section to the pump. Refer to Hydraulic Section Installation on page 6-6.

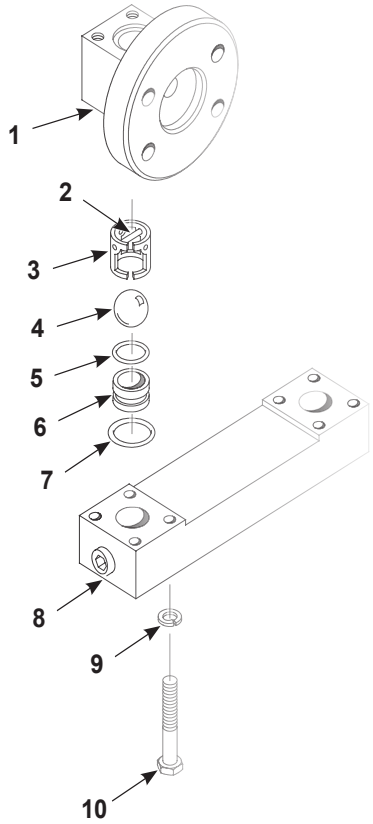


Figure 6-4 Siphon Check Rebuild

1. Check housing (2)
2. Check housing O-ring (2)
3. Ball guide (2)
4. Ball (2)
5. Ball seat O-ring (2)
6. Ball seat (2)
7. Siphon manifold
8. Lock washer (8)
9. Screw (8)
10. Screw (8)

Hydraulic Section Installation

1. See Figure 6-5. Lubricate the O-rings (4) with O-ring lubricant and install them onto the high pressure cylinders (5).
2. Install the high pressure cylinders (5) into the solvent chamber.
3. Install the hydraulic section (1) to the pump using the lock washers (3) and screws (2). Tighten the screws to 41- 47 N•m (30- 35 ft-lb).
4. Tighten the pressure manifold screws (See Figure 6-3, (1)) and siphon manifold screws (See Figure 6-4, (9)) to 27- 34 N•m (20- 25 ft-lb).

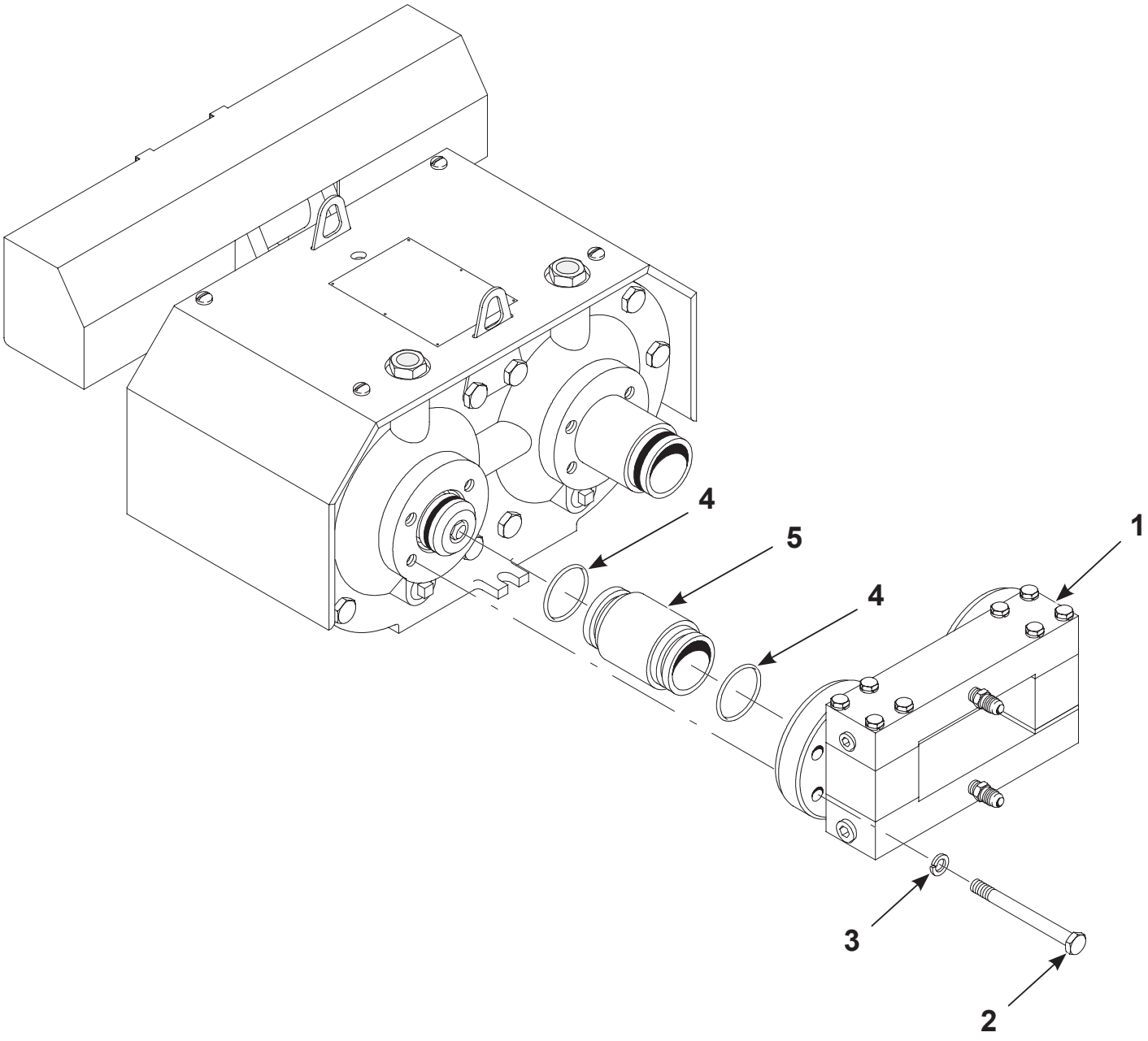


Figure 6-5 Hydraulic Section Installation

1. Hydraulic section
2. Screws (8)
3. Lock washers (8)
4. O-rings (4)
5. High-pressure cylinder

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Air Motor Repair

NOTE: Disconnect the air supply line and air tubing from the FRL module and remove the module before working on the air motor.

Use the following items to repair the air motor:

- Air motor repair kit
- Solvent seal service kit
- Low-temperature lithium grease

NOTE: It will be necessary to disconnect the air tubing from the valves to repair the air motor and air valve. Tubing Diagram and Pneumatic Schematic in the *Troubleshooting* section when reconnecting the tubing.

Air Motor Disassembly

1. See Figure 6-6. Remove the screws (2, 3) securing the cover plate (4) and accumulator cover (1).
2. Remove the hydraulic section and plunger assembly. Refer to *Hydraulic Section Removal* on page 6-2 for the procedure.

WARNING: To prevent personal injury and equipment damage, do not remove more than two screws from the solvent chamber.

3. Remove two screws (8), lock washers (7), and spacers (12) from the solvent chamber (6), as illustrated. Do not remove the remaining screws at this time.
4. Thread the spring removal studs (10) and flat washers (11) through the solvent chamber and into the upper head (5). Tighten the nuts (9) until snug.
5. Remove the remaining screws (8), lock washers (7), and spacers (12) that secure the solvent chamber to the upper head.

WARNING: The air motor springs are under tension. To prevent personal injury or equipment damage, back off the spring removal studs evenly by alternating turns.

6. Carefully back off the spring removal studs, in alternating turns, until the tension in the air motor springs is released.
1. See Figure 6-7. Remove the solvent chamber (1) and upper head (8).
2. Remove the air motor springs (3), air cylinder (9), and piston assembly (2).
3. Using a deep-well socket, remove the solvent seal packing gland (11).
4. Remove the screws (13), flat washers (14), and nylon washers (15) that secure the lower head (10) to the solvent chamber.

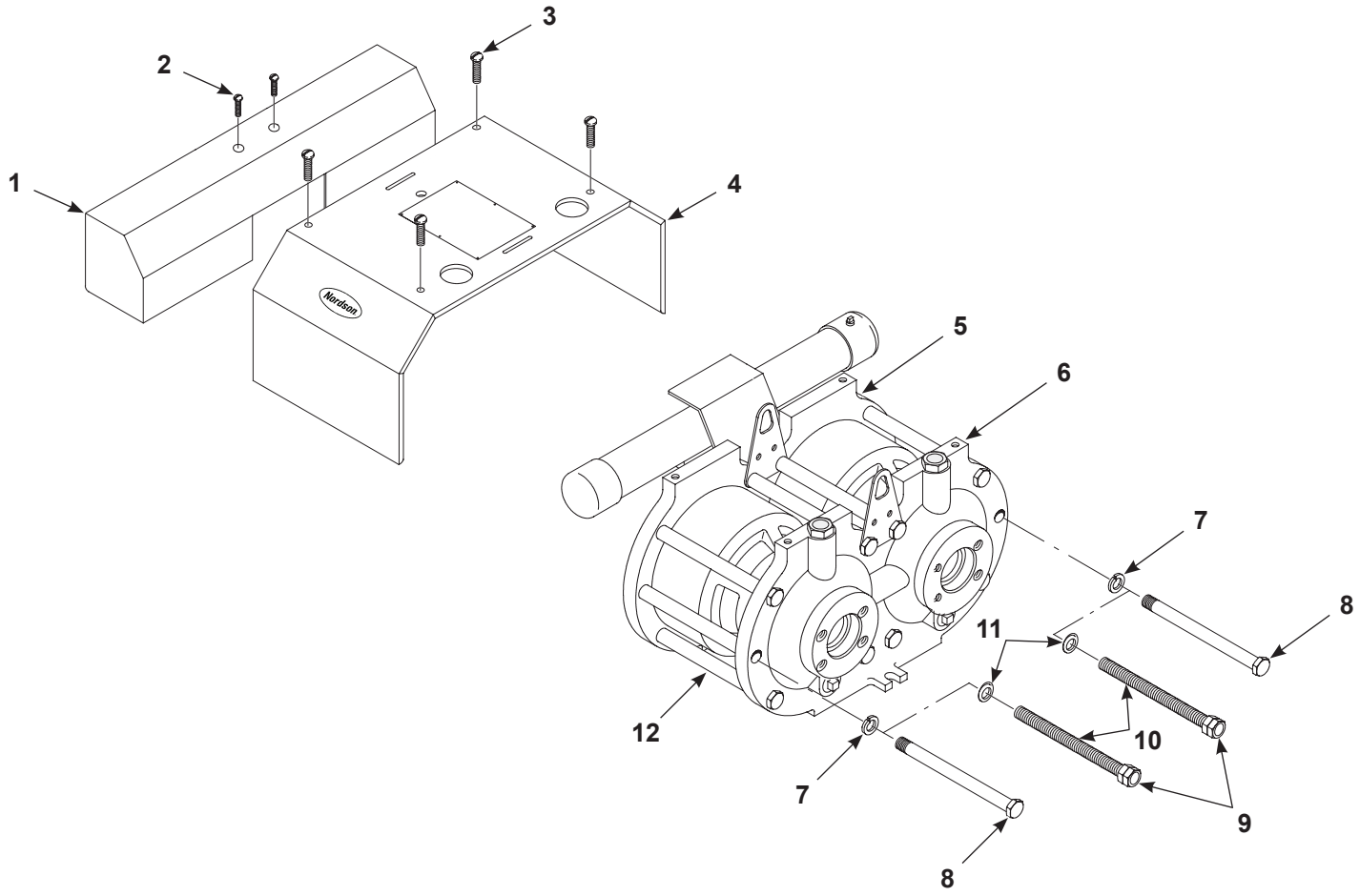

Figure 6-6 Air Motor Disassembly

1. Accumulator cover
2. Accumulator cover screws
3. Cover plate screws (4)
4. Cover plate
5. Upper head
6. Solvent chamber
7. Lock washers (8)
8. Screws (10)
9. Nuts (4)
10. Spring removal studs (2)
11. Flat washers (2)
12. Spacers (10)

Air Motor Assembly

See Figure 6-7. Before assembling the air motor, take note of the flat surfaces of the upper head (8) and solvent chamber (1). These surfaces are noted as (A) and (B). Lay the pump on its side, with these surfaces (A and B) flat against a horizontal plane, during assembly. This will help you to properly align the upper head and lower head (10) with the solvent chamber.

1. Before assembling the air motor, inspect the following parts for damage and replace as necessary:
   - the U-cups (6) and glide rings (4) on the pistons (5) and air cylinders (9)
   - the lower head O-rings (12) and upper head O-rings (7)
   - the solvent seal packing glands (11)
   - the air cylinders (9) to ensure there are no scratches on the inside surfaces.
2. Install the lower heads (10) to the solvent chamber (1) using the screws (13), flat washers (14), and nylon washers (15). Tighten the screws securely.
3. Using a deep-well socket, install the solvent seal packing glands (11) into the lower heads.
4. Lubricate the air cylinders and U-cups (6) thoroughly with low temperature grease. Install the air cylinders onto the upper head (8).
5. Lubricate the pistons (5) thoroughly with low temperature grease. Install the pistons into the air cylinders.
6. Install the air motor springs (3) onto the pistons (5).
7. Install the solvent chambers (1) onto the air cylinders.

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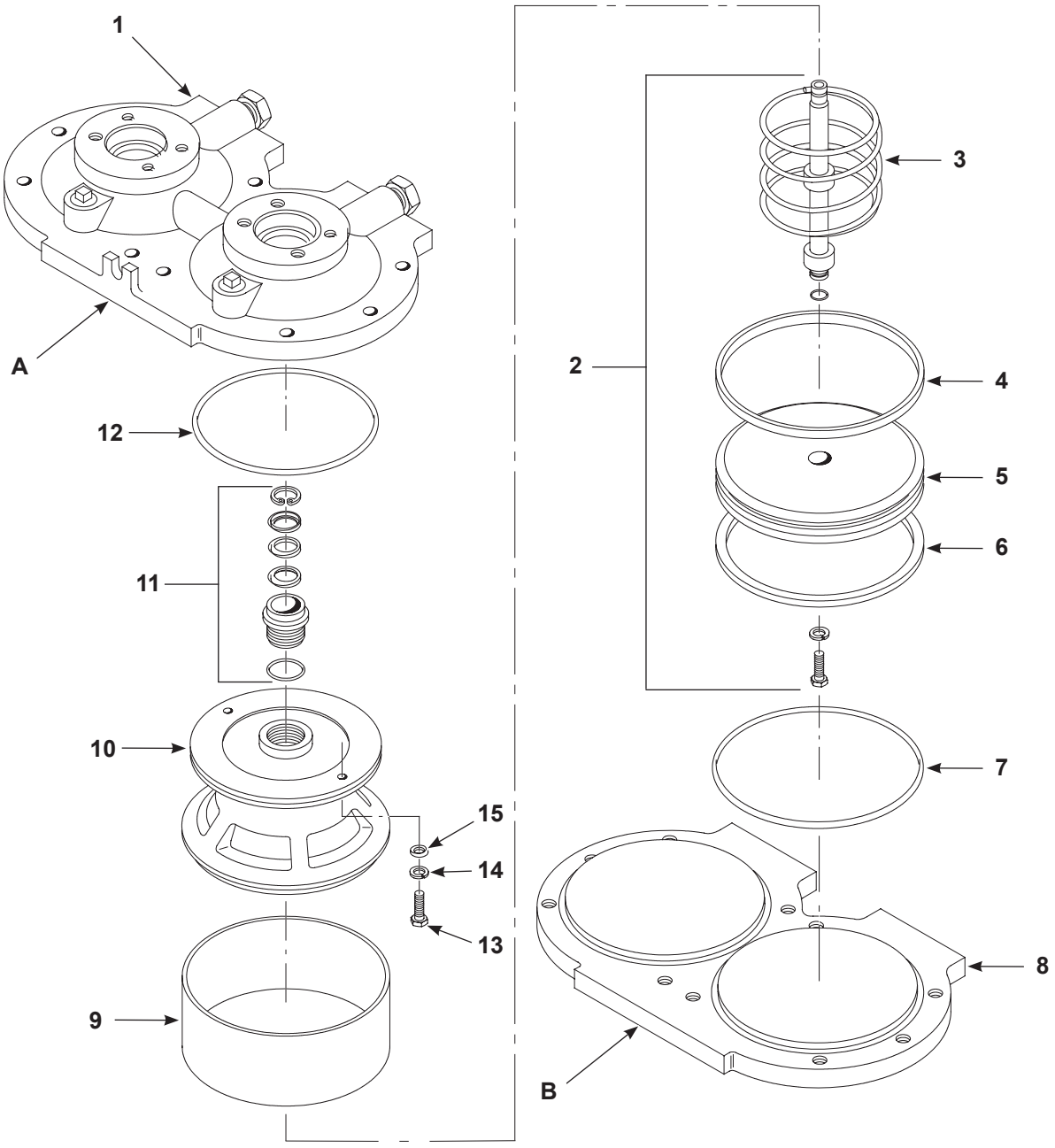

Figure 6-7 Air Motor Exploded View

1. Solvent chamber
2. Piston assembly (2)
3. Air motor spring (2)
4. Glide ring (2)
5. Piston (2)
6. U-cup (2)
7. Upper head O-ring (2)
8. Upper head
9. Air cylinder (2)
10. Lower head (2)
11. Solvent seal packing gland (2)
12. Lower head O-ring (2)
13. Screws (4)
14. Flat washers (4)
15. Nylon washers (4)

Air Motor Assembly *(contd)*

1. See Figure 6-8. Thread the spring removal studs (10) and washers (11) through the solvent chamber (6), spacers (12), and into the upper head (5) as illustrated. Tighten the nuts (9) until snug.
2. Install the remaining nuts and tighten evenly by alternating turns.

NOTE: Two screws (Figure 6-8, positions 2 and 6) do not use lock washers.

3. Install the remaining spacers, lock washers, and screws. Do not tighten the screws at this time.
4. Remove the spring removal studs (10) and install the lock washers (7) and screws (8). Tighten all screws to 41- 47 N•m (30- 35 ft-lb). See Figure 6-8 for the proper tightening and torquing pattern.
5. Install the cover plate (4) onto the pump. Tighten the cover plate screws (3) securely. Install the accumulator cover (2) onto the pump. Tighten the accumulator cover screws (1) securely.
6. Install the plunger assembly and hydraulic section. Refer to Hydraulic Section on page 6-1 for the procedures.

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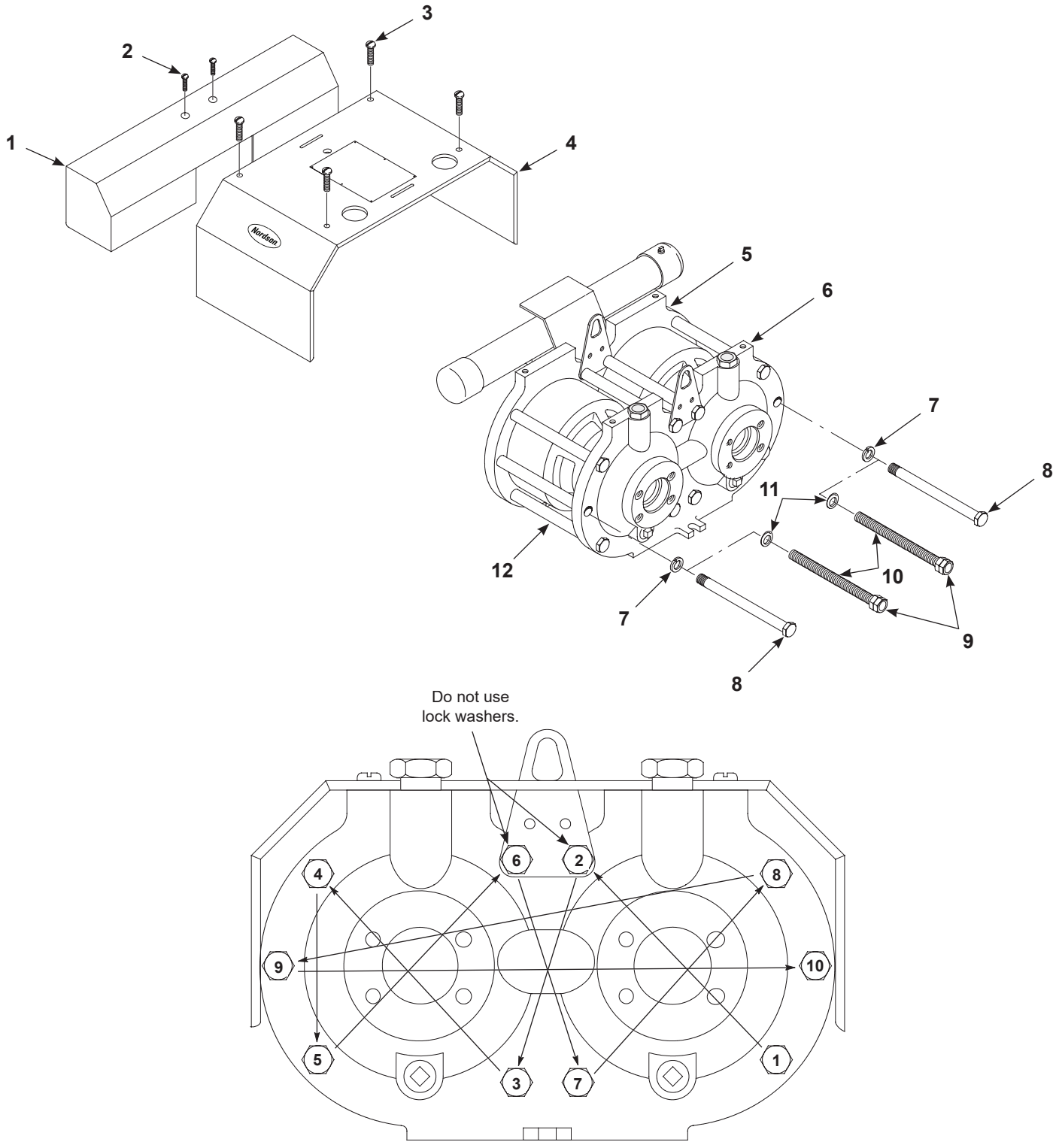

Figure 6-8 AIr Motor Assembly

1. Accumulator cover
2. Accumulator cover screws
3. Cover plate screws (4)
4. Cover plate
5. Upper head
6. Solvent chamber
7. Lock washers (8)
8. Screws (10)
9. Nuts (4)
10. Spring removal studs (2)
11. Flat washers (2)
12. Spacers (10)

Air Valve Repair

Air Valve Disassembly

1. See Figure 6-9. Disconnect the tubing from the connectors (2).
2. Remove the screws (1) that secure the air valve to the pump.
3. Remove and discard the valve mounting O-rings (12) that are between the valve body and the upper head.
4. Remove the screws (3) that secure the end plates (4).
5. Remove and discard the end plate O-rings (5).
6. Carefully push out the spool (11) from the valve bore.
7. Remove the spacers (6, 7, 8, 9) and O-rings (10) from the valve bore. Discard the O-rings.
8. Inspect the spool and valve spacers for any wear and damage. Replace, if necessary.

Air Valve Assembly

1. See Figure 6-9. Thoroughly coat the new O-rings (5, 10, 12) and valve bore with low temperature grease.
2. Insert spacers (7, 8, 9) and O-rings (10) into the greased valve bore as illustrated. Note the position of the ID holes in the exhaust spacers (7).
3. Thoroughly grease the spool (11) with low temperature grease and insert it into the valve bore.
4. Insert an end spacer (6) into each end of the valve bore with the chamfer pointing out, as illustrated.
5. Install the end plate O-rings (5) into each end of the valve bore, against the end spacers' chamfers (6).
6. Apply VC-3 threadlocking compound onto the screw threads. Secure the end plates (4) with the screws (3). Tighten the screws securely.
7. Install the valve mounting O-rings (12) to the upper head.
8. Install the air valve onto the pump using its screws (1). Tighten the screws securely.
9. Connect the tubing to its connectors (2). See the Tubing Diagram on page 5-8 in the Troubleshooting section.

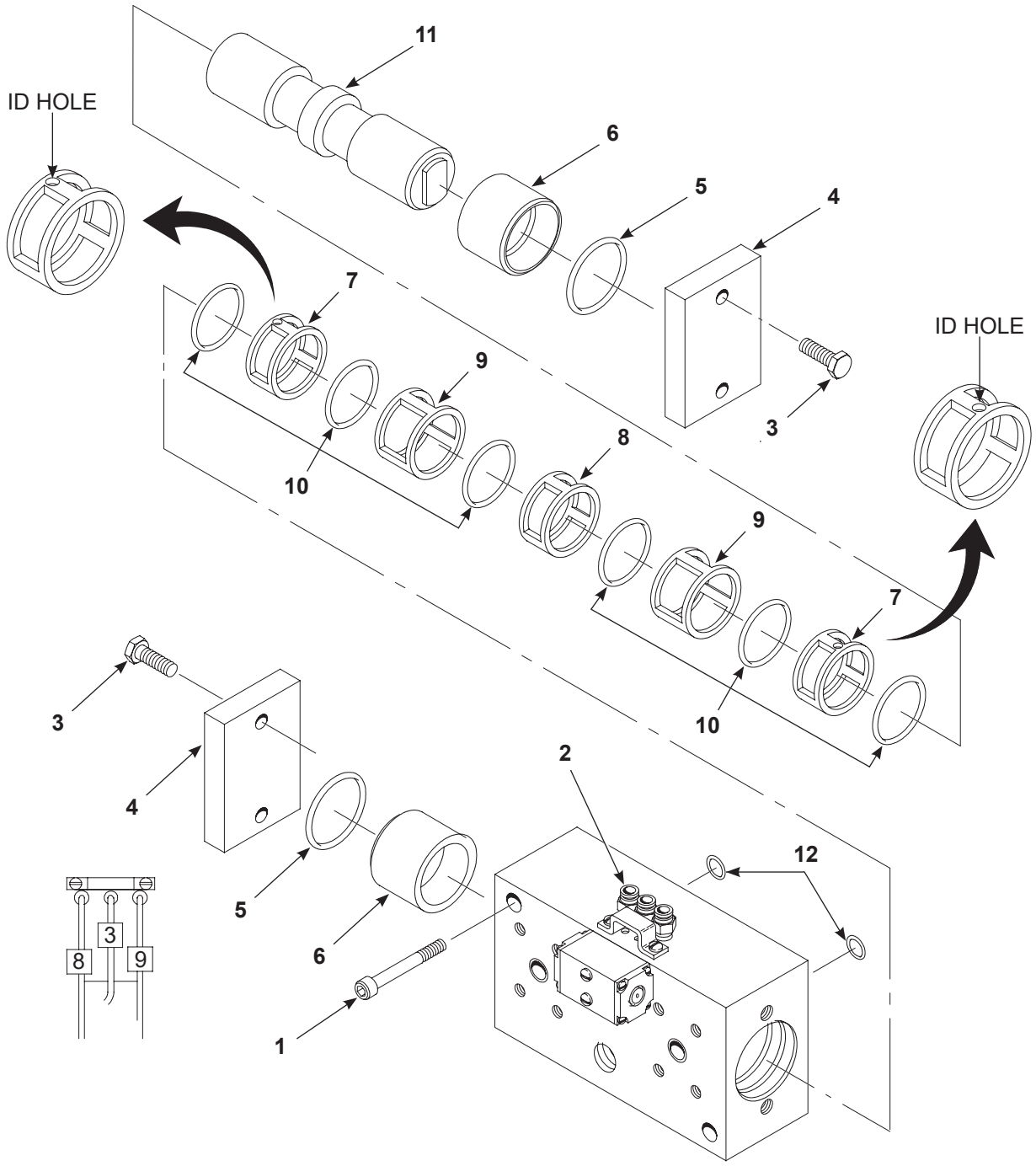

Figure 6-9 Air Valve Repair

1. Screws (2)
2. Tubing connector (3)
3. End plate screws (4)
4. End plate (2)
5. End plate O-ring (2)
6. End spacer (2)
7. Exhaust spacer (2)
8. Middle spacer (1)
9. Spacer (2)
10. Spool O-ring (6)
11. Spool
12. Valve mounting O-ring (2)

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Section 7
Parts

Introduction

To order parts, call the Nordson Customer Service Center or your local Nordson representative. Use this five-column parts list, and the accompanying illustration, to describe and locate parts correctly.

Using the Illustrated Parts List

Numbers in the Item column correspond to numbers that identify parts in illustrations following each parts list. The code NS (not shown) indicates that a listed part is not illustrated. A dash (—) is used when the part number applies to all parts in the illustration.

The number in the Part column is the Nordson Corporation part number. A series of dashes in this column ( ) means the part cannot be ordered separately.

The Description column gives the part name, as well as its dimensions and other characteristics when appropriate. Indentions show the relationships between assemblies, subassemblies, and parts.

- If you order the assembly, items 1 and 2 will be included.
- If you order item 1, item 2 will be included.
- If you order item 2, you will receive item 2 only.

The number in the Quantity column is the quantity required per unit, assembly, or subassembly. The code AR (As Required) is used if the part number is a bulk item ordered in quantities or if the quantity per assembly depends on the product version or model.

Letters in the Note column refer to notes at the end of each parts list. Notes contain important information about usage and ordering. Special attention should be given to notes.

Item	Part	Description	Quantity	Note
—	0000000	Assembly	1	
1	000000	• Subassembly	2	A
2	000000	• • Part	1	
NOTE: A. B. NS: Not Shown AR: As Required				

Parts Lists in This Section

JP Pump Assembly

See Figure 7-1.

Item	Part	Description	Quantity	Note
—	139457	Pump, JP	1	
1	1069275	• COVER, accumulator	1	
2	981565	• SCREW, pan head, 1/4- 20 x 0.50 in., zinc	6	
3	- - - - - -	• COVER, pump	1	
4	- - - - - -	• HYDRAULIC SECTION	1	A
5	- - - - - -	• AIR MOTOR	1	B
6	167480	• • RING, lift, JP	2	
NOTE: A. Refer to Hydraulic Section Parts on page 7-4 for parts in this assembly. B. Refer to Air Motor Parts on page 7-6 for parts in this assembly.				

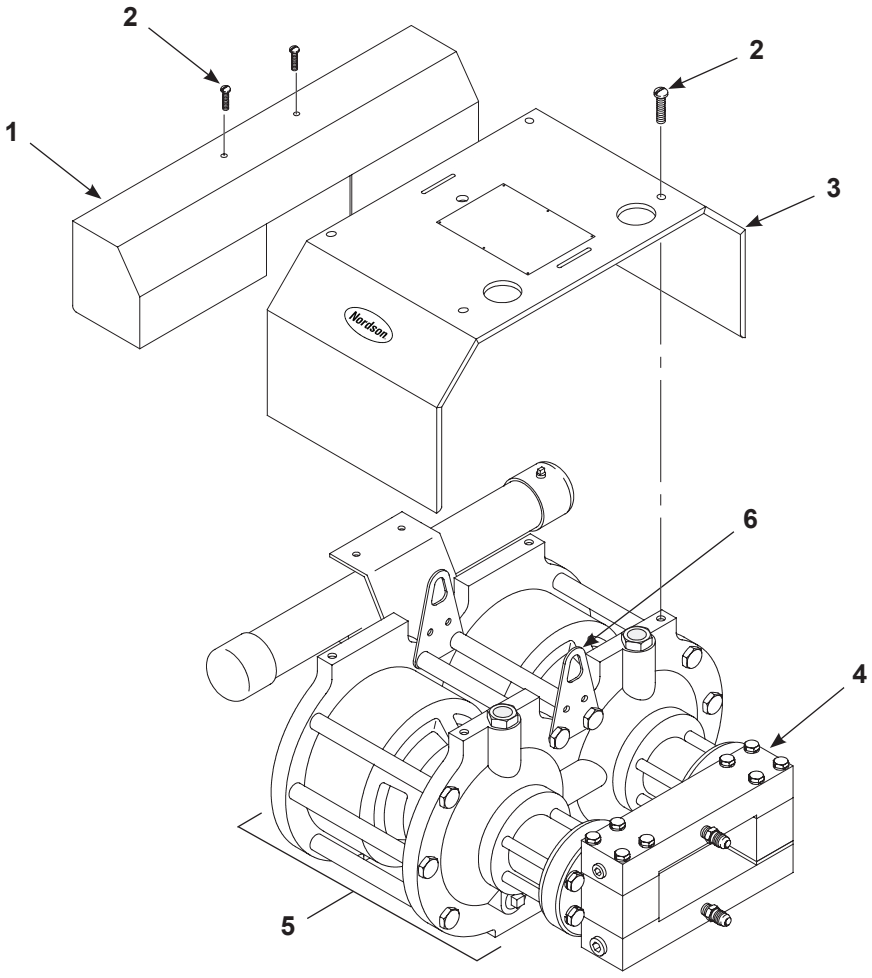

Figure 7-1 JP Pump Assembly

Hydraulic Section Parts

See Figure 7-2.

Item	Part	Description	Quantity	Note
1	139490	MANIFOLD, pressure	1	
2	249356	FITTING, 3/8-in. NPT, with O-ring	1	
3	945017	S O-RING, hot paint, 3/8 in. tube	1	A, B
4	981624	SCREW, hex, 3/8- 16 x 2.500 in., cap, zinc	16	
5	983160	WASHER, lock, e, split, 3/8 in., nickel-plated steel	16	
6	973415	PLUG, pipe, socket, standard, 1/4 in., stainless steel	2	
7	503574	CAGE, ball	2	A
8	900021	BALL, 440 stainless steel, 0.688 in., 100 grade	2	A
9	940222	O-RING, hot paint, 1.00 x 1.125 x 0.063 in.	2	A, B
10	139483	SEAT, ball, 0.688 in. diameter	2	A
11	940260	O-RING, hot paint, 1.25 x 1.375 x 0.063 in.	2	A, B
12	139485	HOUSING, check	2	
13	941490	O-RING, hot paint, 2.81 x 3.00 x 0.094 in.	4	B, C, D, E
14	139458	CYLINDER, high-pressure	2	
15	981549	SCREW, hex, 5/16 x 1.50 in., stainless steel, G8	2	G
16	983441	WASHER, lock, e, split, 5/16 in., stainless steel	2	G
17	139488	RETAINER, hydraulic seal	4	
18	940280	O-RING, hot paint, 1.375 x 1.50 x 0.063 in.	4	B, C, D, E
19	119868	SEAL, spring, 2 3/16 x 2 1/2 x 3/16 in., UHM	4	C
20	139487	HOLDER, hydraulic seal	2	
21	940160	O-RING, hot paint, 0.625 x 0.75 x 0.063 in.	2	B, C, D, E
22	954045	BACK-UP RING, single, 5/8 x 3/4 in.	2	B, C, D, E
23	139491	MANIFOLD, siphon	1	
24	972112	S CONNECTOR, straight, 7/8- 14 x 3/4 in. NPT	1	
25	711974	PLUG, pipe, socket, 3/4 in. NPT, stainless steel	2	
26	139484	SEAT, ball, 1.125 in. diameter	2	F
27	940250	O-RING, hot paint, 1.188 x 1.312 x 0.063 in.	2	B, F
28	900002	BALL, 440 stainless steel, 1.125 in., 100 grade	2	F
29	- - - - - -	GUIDE, ball	2	
30	344802	PIN, ball guide, pump	2	
31	940292	O-RING, hot paint, 1.50 x 1.625 x 0.063 in.	2	B, F
32	983180	WASHER, lock, e, split, 1/2 in., nickel-plated steel	8	
33	981614	SCREW, hex, 1/2- 13 x 5.00 in., cap, zinc	8	

NOTE: A. These parts are included in the High-Pressure Check Service Kit, part 141439. Refer to page 7-16.

B. These parts are included in the Hydraulic Section Repair Kit, part 141441. Refer to page 7-16.

C. These parts are included in the Hydraulic Packing Service Kit, part 141438. Refer to page 7-15.

D. These parts are included in the Air Motor Repair Kit, part 141436. Refer to page 7-15.

E. These parts are included in the Solvent Seal Service Kit, part 141437. Refer to page 7-15.

F. These parts are included in the Siphon Check Service Kit, part 141440. Refer to page 7-16.

G. These parts are included in the Hydraulic Section Screw and Washer Kit, part 1614780. Refer to page 7-16.

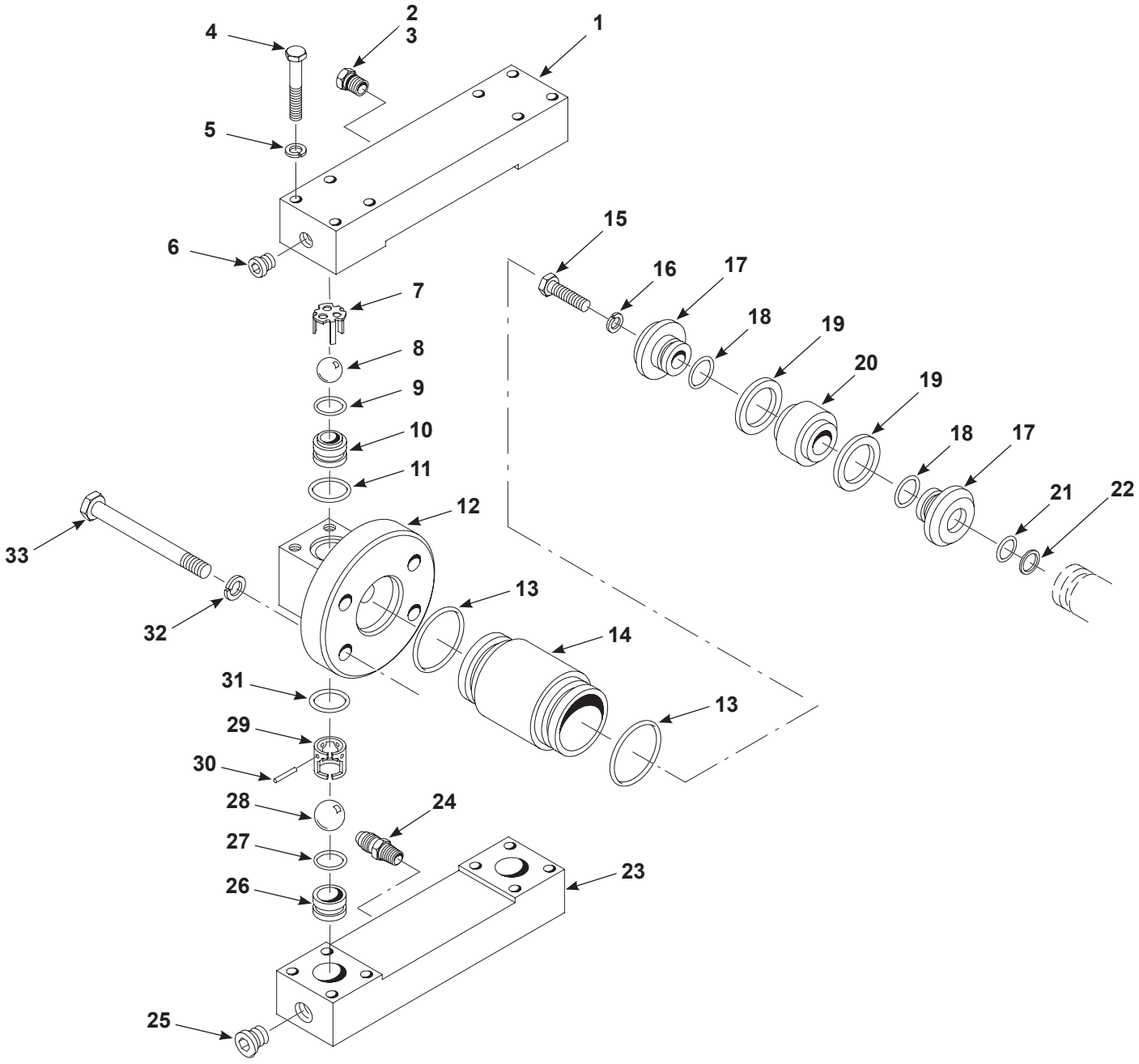

Figure 7-2 Hydraulic Section Parts

Air Motor Parts

See Figure 7-3

Item	Part	Description	Quantity	Note
—	- - - - - -	AIR MOTOR	1	
1	119876	• CYLINDER, air, glass	2	
2	139492	• HEAD, lower	2	
3	139477	• GLAND, packing, solvent seal	2	
4	986917	• • RETAINING RING, internal, #112, invert	2	A
5	139480	• • SPACER, solvent seal	2	A
6	139493	• • U-CUP, polyurethane, 7/8 x 1 1/8 x 1/4 in.	2	A
7	139481	• • BEARING, shaft, solvent seal	2	A
8	139478	• • HOUSING, packing gland	2	
9	945081	• • O-RING, hot paint, 1 1/4-in. OD tube	2	A, B, C
10	942711	• O-RING, hot paint, 9.25 x 9.50 x 0.125 in.	2	B
11	139479	• SPACER	10	
12	983440	• WASHER, lock, split, 5/8, nickel-plated steel	8	
13	981473	• SCREW, hex, 5/8- 18 x 11.00 in., zinc, g8	10	
14	973434	• PLUG, pipe, square, 1/2 in., stainless steel	2	
15	139489	• CHAMBER, solvent	1	
16	119872	• FILTER, air	2	
17	139459	• SHAFT, piston	2	
18	139486	• SPRING, compression, 10.25 x 5.938 OD x0.33 in.	2	
19	940205	• O-RING, Buna-N, 0.875 x 1.00 x 0.063 in.	2	B
20	119858	• RING, glide	2	B
21	139460	• PISTON	2	
22	119857	• U-CUP, 9 5/16 x 10 x 11/32 in.	2	B
23	983007	• WASHER, flat, e, 0.531 x 1.00 x 0.063 in., zinc	2	
24	981470	• SCREW, socket, 1/2- 13 x 1.25 in., zinc, Nylok	2	B
25	942742	• O-RING, Buna-N, 10.00 x 10.25 in.	2	
26	139470	• HEAD, upper	1	
27	139497	• WASHER, nylon, self-sealing	4	B
28	983504	• WASHER, flat, 0.281 x 0.734 x 0.063 in., zinc	4	
29	981472	• SCREW, hex, 1/4- 20 x 1.00 in., stainless steel, g8	4	
30	981770	• SCREW, with lock washer, #8- 32 x 0.50 in., zinc	2	D
31	165745	• ADAPTER, roller valve	2	D
32	164419	• VALVE, roller operated	4	D
33	981469	• SCREW, flat head, #8- 32 x 1.00 in., zinc-plated steel	4	D
34	984112	• NUT, hex, lock, thin, #8- 32 UNC-3b	4	D
35	972853	• ELBOW, banjo, 1/8 tube x 10-32, brass	8	D
36	981063	• SCREW, fillister head, with lock washer, #8- 32 x 0.875 in., zinc	4	D

NOTE: A. These parts are included in the Solvent Seal Service Kit, part 141437. Refer to page 7-15.
B. These parts are included in the Air Motor Repair Kit, part 141436. Refer to page 7-15.
C. These parts are included in the Hydraulic Section Repair Kit, part 141441. Refer to page 7-17.
D. These parts are included in the Roller Valve Conversion Kit, part 167538. Refer to page 7-17.

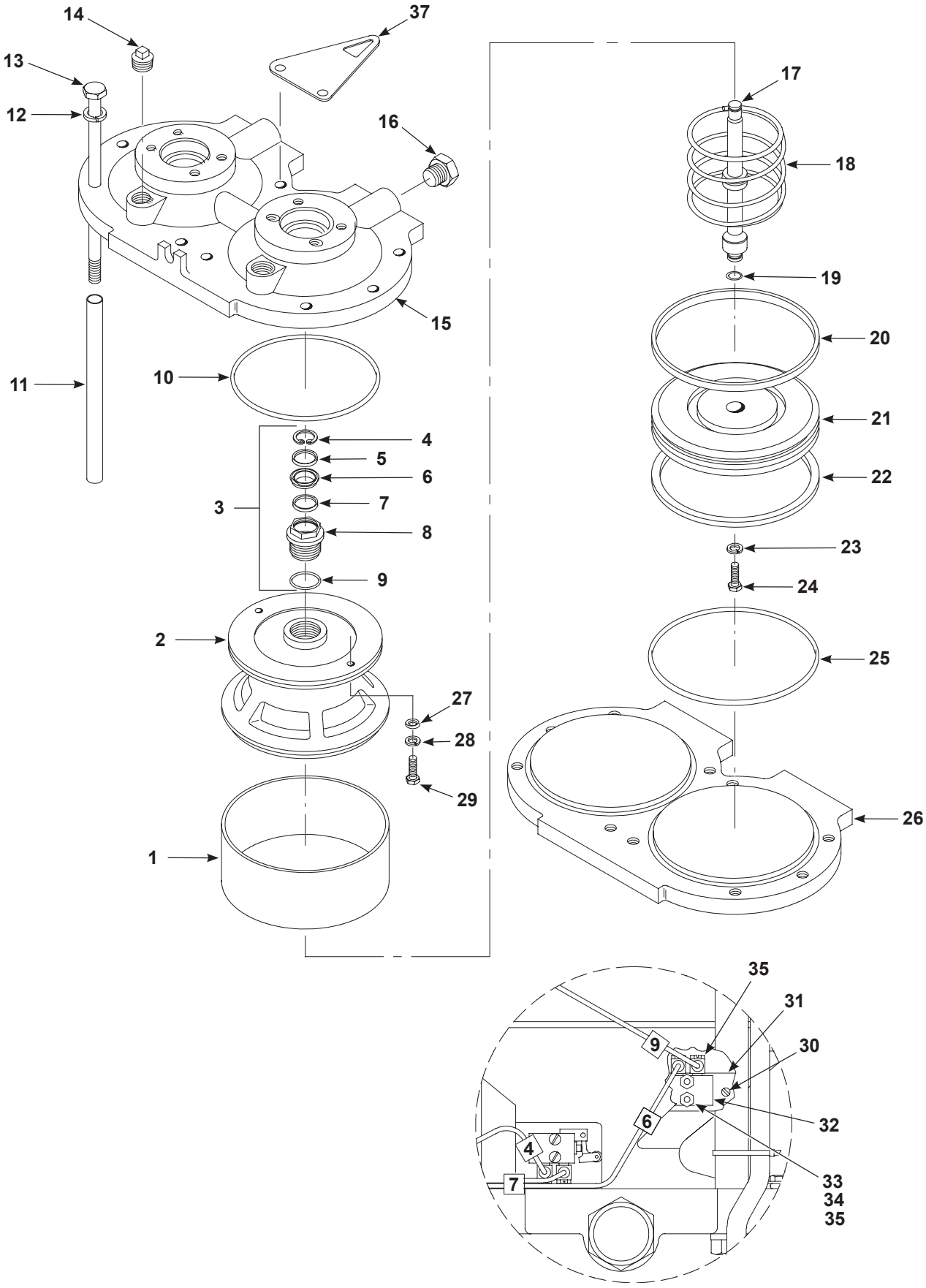

Figure 7-3 Air Motor Parts

Air Motor Miscellaneous Parts

See Figure 7-4

Item	Part	Description	Quantity	Note
1	139461	VALVE, air	1	A
2	981475	SCREW, socket head, 5/16- 18 x 2.75, zinc	2	A, B
3	972122	ELBOW, male, 1/2 in. tube x 3/8 in. NPT	2	
4	971659	CONNECTOR, male, 1/2 in. tube x 3/8 in. NPT	1	
5	973272	TEE, pipe, class 150, 3/8 in., zinc	1	
6	973073	NIPPLE, 3/8 x 3/8 x 1.45 in., zinc	1	
7	139474	ACCUMULATOR, JP	1	
8	970970	CLAMP, hose, No. 52	2	
9	1069272	BRACKET, accumulator, DR pump	1	
10	981211	SCREW, hex, 1/4- 20 x 0.75 in. zinc	2	
11	983140	WASHER, lock, split, 1/4 in. nickel	2	
12	345913	WASHER, flat, regular, 1/4 in., zinc	2	
13	940164	O-RING, Buna-N, 0.625 x 0.75 x 0.063 in.	2	A, B
14	240976	CLAMP, ground with wire	1	
15	132154	STUD, ground	1	

NOTE: A. These parts are included in the Air Valve Assembly, part 139496. Refer to page 7-14.

B. These parts are included in the Air Valve Repair Kit, part 141435. Refer to page 7-14.

C. Refer to *Air Valve Parts* on page 7-10 for parts breakdown.

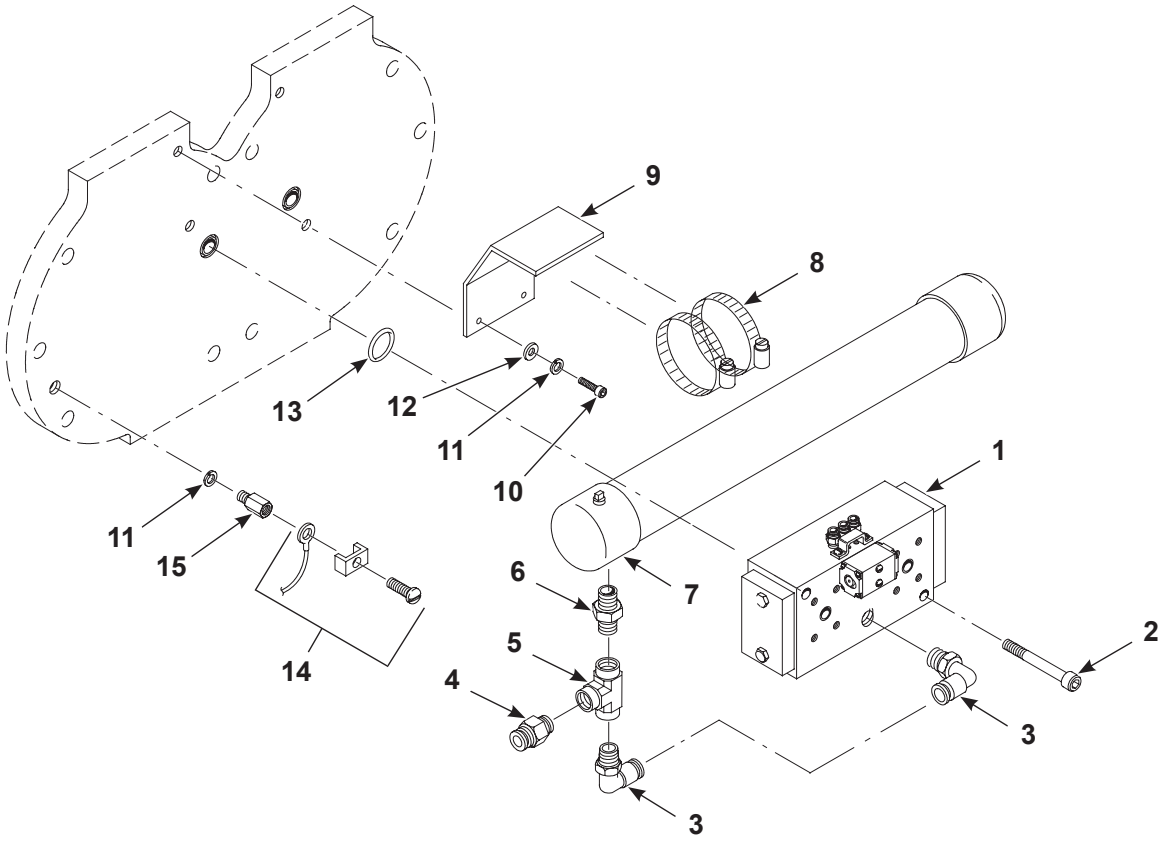

Figure 7-4 Air Motor Miscellaneous Parts

Air Tubing

See Figure 7-5

Tube No.	Part	Size OD (in.)	Length (+/- 1/16 in.)
1	900610	1/2	8.75
2	900610	1/2	22.50
3	900609	1/8	25.50
4	900609	1/8	18.625
5	900609	1/8	15.25
6	900609	1/8	19
7	900609	1/8	10
8	900609	1/8	15
9	900609	1/8	20

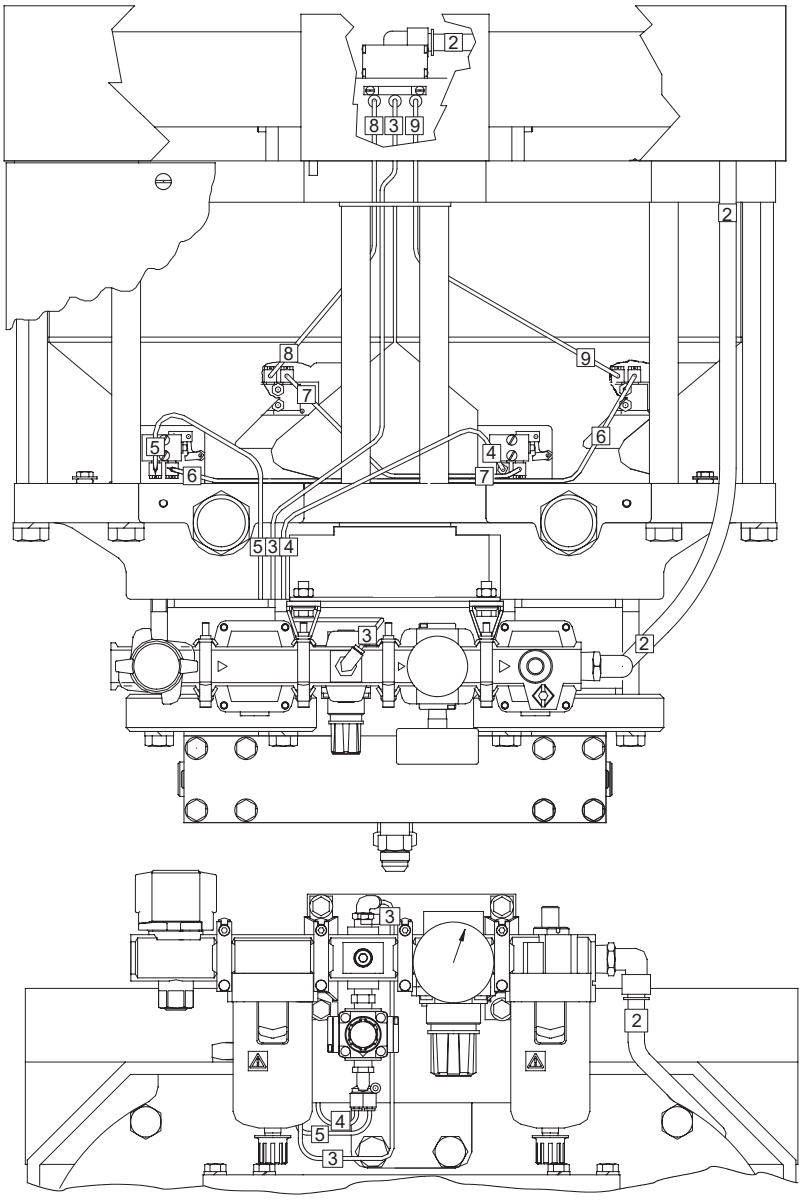

Figure 7-5 Air Tubing

Air Valve Parts

See Figure 7-6

Item	Part	Description	Quantity	Note
—	139461	VALVE, air	1	
1	139462	• BODY, air valve	1	
2	973422	• PLUG, pipe, socket, flush, 3/8 in., zinc	4	
3	901166	• VALVE, 2 position, 4-way, air pilot	1	
4	981233	• SCREW, socket, 1/4- 20 x 1.00 in., zinc	4	
5	139469	• PLATE, end	2	
6	940311	• O-RING, Buna-N, 1.75 x 1.875 x 0.063 in.	2	
7	139465	• SPACER, end	2	
8	981039	• SCREW, pan, #6- 32 x 0.312 in., zinc-plated steel	2	
9	249317	• DEFLECTOR	1	
10	972185	• CONNECTOR, male, 1/8 tube x #10- 32 NPT	3	
11	942206	• O-RING	6	
12	139466	• SPACER, exhaust	2	
13	139467	• SPACER	2	
14	139468	• SPACER, middle	1	
15	165731	• SPOOL, air valve	1	
16	139464	• BUMPER, spool	2	
17	940164	• O-RING, buna-N, 0.625 x 0.75 x 0.063 in.	2	
18	981475	• SCREW, socket, 5/16- 18 x 2.75 in., zinc	2	
NS	- - - - - -	• GREASE, lithium, low temperature	AR	
NS	900424	• COMPOUND, threadlock, VC-3	AR	
NS	900481	• ADHESIVE, pipe/thread/hydraulic sealant	AR	

AR: As Required

NS: Not Shown

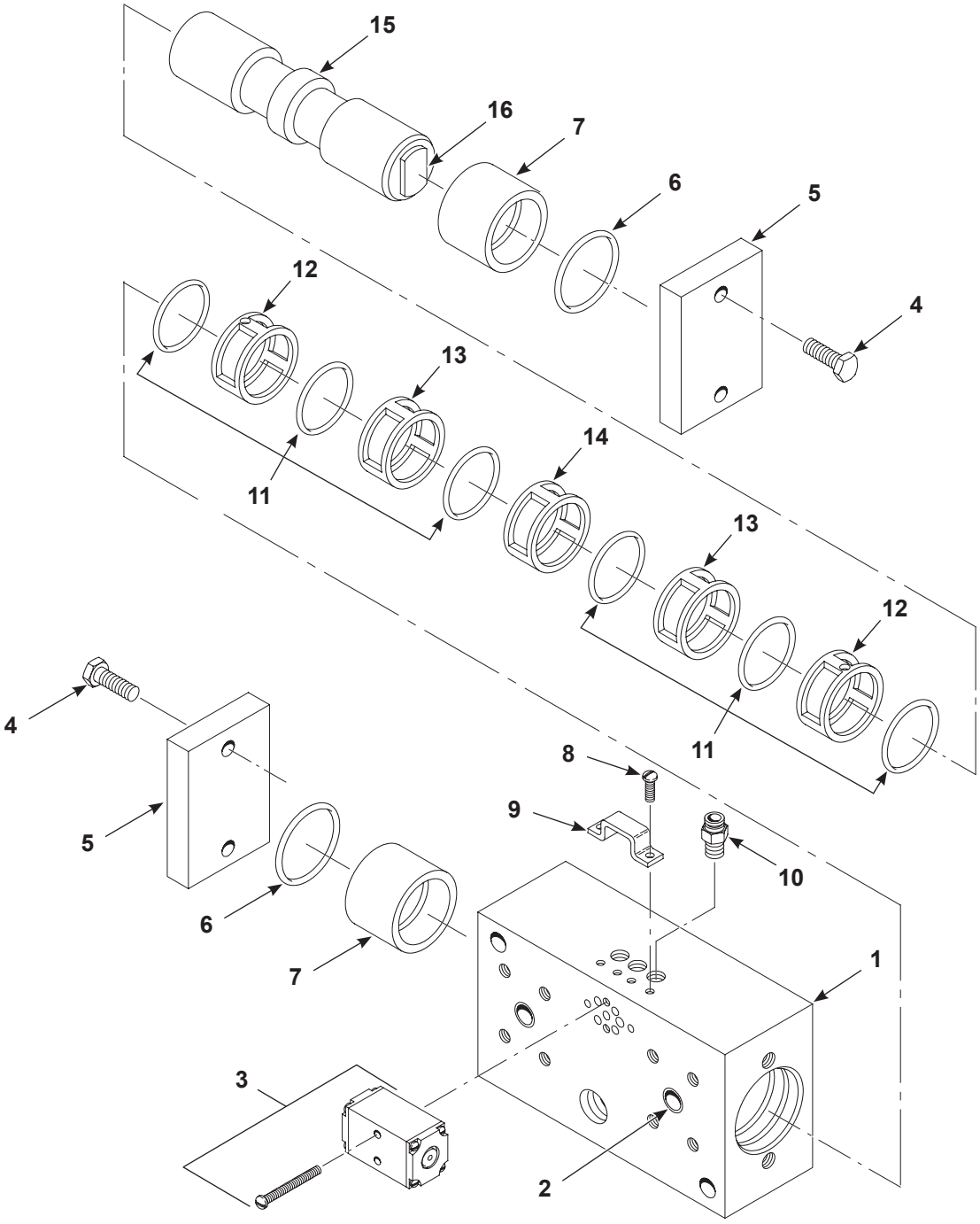

Figure 7-6 Air Valve Parts

FRL Module and Fittings

See Figure 7-7. This module can only be ordered through Nordson as a complete assembly. Individual modules and service parts can be ordered from SMC or its distributors.

Item	Part	Description	Quantity	Note
—	1068742	MODULE, filter/regulator/lubricator, 1/2 in. NPT	1	A
1	VHS40-N04-Z	• Shutoff valve	1	B
2	Y400	• Coupler	2	B
3	AF40-N04-2Z	• Air filter	1	B
NS	AF40P- 060S	• Filter element	1	B
4	Y400T	• Coupler, w/mounting bracket	2	B
5	Y44-N02	• Cross spacer	1	B
6	AR40K-N04-Z	• Regulator	1	B
7	AL40-N04-23Z	• Lubricator	1	B
8	AR20K-N02-Z	• Regulator	1	B
9	KV-113-B2	• Nipple, long	1	
10	249962	BRACKET, FRL	1	A, C
11	972184	ELBOW, male, 1/2 in. tube x 1/2 in. NPT	1	A, C
12	971519	ELBOW, male, 1/8 tube x 1/4-in. NPT	1	A, C
13	901254	GAUGE, air, ⅛ NPT, PSI-KPA-KG/CM	1	A, C
14	1611659	ELBOW, universal branch, ⅛ T x ⅛ NPT, with seal	1	A, C
15	1613132	COVER, regulator, lockout, AR20 series	1	A

NOTE: A. Nordson part number.

B. SMC part number.

C. These parts are not included in the FRL module and must be ordered separately.

NS: Not Shown

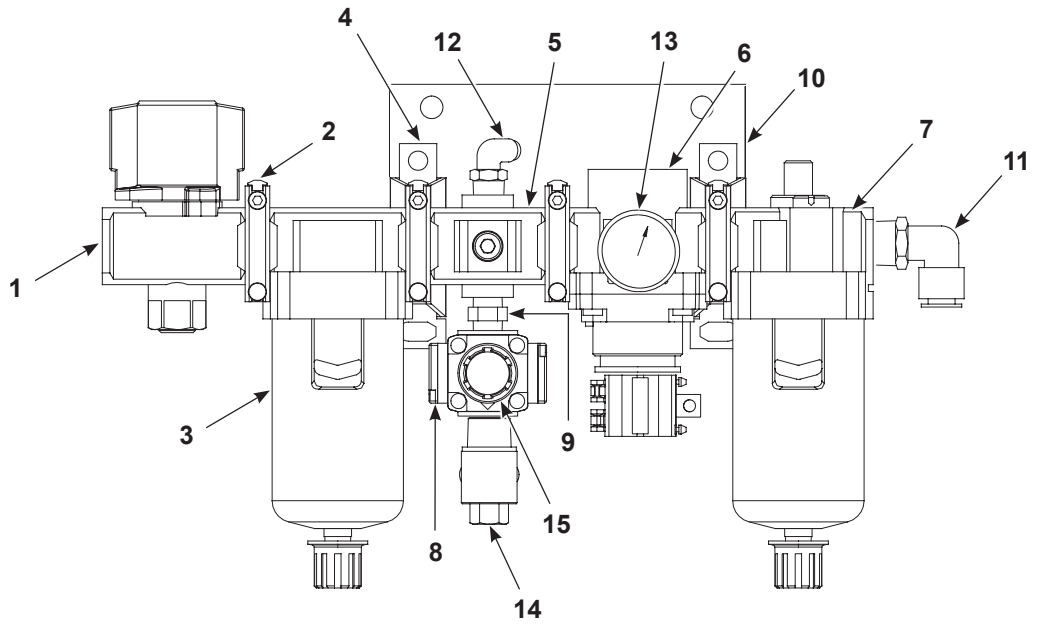

Figure 7-7 FRL Module and Fittings

Accessories

See Figure 7-8.

Item	Part	Description	Quantity	Note
—	141428	ACCESSORY GROUP, JP	1	
1	141443	• TOOL KIT, repair, JP	1	
2	- - - - - -	• • STUD, 5/8-8 x 16 in., steel	2	
3	983090	• • WASHER, flat, 0.656 x 1.312 x 0.095 in., zinc	2	
4	984194	• • NUT, hex, reg, 5/8-18, zinc-plated steel	4	
5	972102	• CONNECTOR, male, 37, 7/8-14 x 1/2 in., stainless steel	1	
6	713186	• STRAINER, siphon, stainless steel, with 0.006 screen	1	
7	713198	• • STRAINER, siphon, stainless steel	1	
8	941160	• • O-RING, hot paint, 0.75 x 0.938 x 0.094 in.	1	
9	981279	• • SCREW, thumb, 1/4- 20 x 1.00 in., stainless steel	1	
NS	244854	• FLUID, Type-Q concentrate	1	
NS	900214	• OIL, vitalizer, 1 pint	1	
NS	900431	• ADHESIVE, pipe/thread/hydraulic sealant	1	
10	750256	ROD, siphon, 55 gallon	1	A
11	827060	HOSE, siphon, 1/2 in. ID, stainless steel, 5 ft	1	A

NOTE: A. These parts are not included with the accessory group and must be ordered separately.

NS: Not Shown

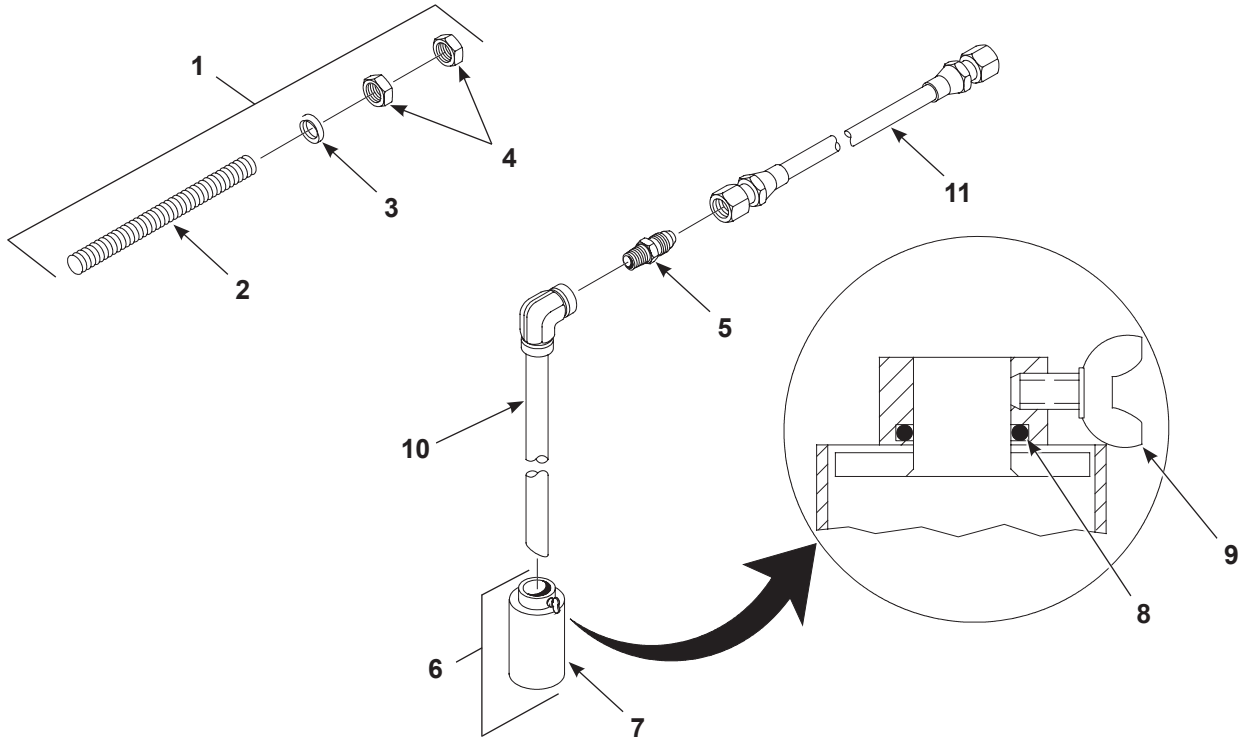

Figure 7-8 JP Pump Accessories

Optional Circulation Valve Kit

Refer to the Circulation Valve Kit instruction sheet, included with this manual, for complete information concerning the optional circulation valve and its accessories.

Part	Description	Note
105071	SERVICE KIT, circulation, stainless steel	A
750222	VALVE, circulation, stainless steel	
973389	BUSHING, pipe, hydraulic, 3/4 x 1/2 in., stainless steel	B
106251	SERVICE KIT, packing, valve	

NOTE: A. This kit also includes stainless steel hex nipple, part 973971.

B. This bushing is not included with the circulation kit, part 105071. You must order the bushing separately.

Service Kits

The following kits are available for the JP Pump.

Air Valve Repair Kit

See Figure 7-4 and 7-5, as indicated in the Note column.

Item	Part	Description	Quantity	Note
—	141435	SERVICE KIT, repair, air valve	1	
6	940311	• O-RING, Buna-N, 1.75 x 1.875 x 0.063 in.	2	A
11	942206	• O-RING	6	A
2	981475	• SCREW, socket, 5/16- 18 x 2.75 in., zinc	2	B
13	940164	• O-RING, Buna-N, 0.625 x 0.75 x 0.063 in.	2	B
NS	900337	• GREASE, lithium, low temperature, 1.75 oz	1	

NOTE: A. See Figure 7-5 for component location.

B. See Figure 7-4 for component location.

NS: Not Shown

Air Valve Assembly

See Figure 7-4

Item	Part	Description	Quantity	Note
—	139496	VALVE ASSEMBLY, JP air	1	
—	972122	• ELBOW, male, 1/2 in. tube x 3/8 in. NPT	1	
2	981475	• SCREW, socket, 5/16- 18 x 2.75 in., zinc	2	
1	139461	• VALVE, air	1	A
13	940164	• O-RING, Buna-N, 0.625 x 0.75 x 0.063 in.	2	

NOTE: A. Refer to the *Air Valve,* and see Figure 7-5 for a detailed parts breakdown.

Air Motor Repair Kit

See Figures 7-3 and 7-2, as indicated in the Note column.

Item	Part	Description	Quantity	Note
—	141436	SERVICE KIT, repair, air motor	1	
9	945081	• O-RING, hot paint, 11/4 in. OD tube	2	A
10	942711	• O-RING, hot paint, 9.25 x 9.50 x 0.125 in.	2	A
19	940205	• O-RING, Buna-N, 0.875 x 1.00 x 0.063 in.	2	A
20	119858	• RING, glide	2	A
22	119857	• U-CUP, 9 5/16 x 10 x 11/32 in.	2	A
25	942742	• O-RING, Buna-N, 10.00 x 10.25 in.	2	A
27	139497	• WASHER, nylon self-sealing	4	A
13	941490	• O-RING, hot paint, 2.81 x 3.00 x 0.094 in.	4	B
18	940280	• O-RING, hot paint, 1.375 x 1.50 x 0.063 in.	4	B
21	940160	• O-RING, hot paint, 0.625 x 0.75 x 0.063 in.	2	B
22	954045	• • BACK-UP RING, single, 5/8 x 3/4 in.	2	B
NS	900337	• GREASE, lithium, low temperature, 1.75 oz	1	

NOTE: A. See Figure 7-3 for component location.

B. See Figure 7-2 for component location.

NS: Not Shown

Solvent Seal Service Kit

See Figures 7-3 and 7-2, as indicated in the Note column.

Item	Part	Description	Quantity	Note
—	141437	SERVICE KIT, solvent seal	1	
4	986917	• RETAINING RING, internal, #112, invert	2	A
5	139480	• SPACER, solvent seal	2	A
6	139493	• U-CUP, polyurethane, 7/8 x 1 1/8 x 1/4 in.	2	A
7	139481	• BEARING, shaft, solvent seal	2	A
9	945081	• O-RING, hot paint, 1 1/4-in. OD tube	2	A
13	941490	• O-RING, hot paint, 2.81 x 3.00 x 0.094 in.	4	B
18	940280	• O-RING, hot paint, 1.375 x 1.50 x 0.063 in.	4	B
21	940160	• O-RING, hot paint, 0.625 x 0.75 x 0.063 in.	2	B
22	954045	• BACK-UP RING, single, 5/8 x 3/4 in.	2	B

NOTE: A. See Figure 7-3 for component location.

B. See Figure 7-2 for component location.

Hydraulic Packing Service Kit

See Figure 7-2

Item	Part	Description	Quantity	Note
—	141438	SERVICE KIT, hydraulic packing	1	
13	941490	• O-RING, hot paint, 2.81 x 3.00 x 0.094 in.	4	
18	940280	• O-RING, hot paint, 1.375 x 1.50 x 0.063 in.	4	
19	119868	• SEAL, spring, $2\frac{3}{16}$ x $2\frac{1}{2}$ x $\frac{3}{16}$ in., UHM	4	
21	940160	• O-RING, hot paint, 0.625 x 0.75 x 0.063 in.	2	
22	954045	• BACK-UP RING, single, $\frac{5}{8}$ x $\frac{3}{4}$ in.	2	

High-Pressure Check Service Kit

See Figure 7-2

Item	Part	Description	Quantity	Note
—	141439	SERVICE KIT, high pressure check	1	
6	945017	• O-RING, hot paint, $\frac{3}{8}$ in. tube	1	
7	503574	• CAGE, ball	2	
8	900021	• BALL, 440 stainless steel, 0.688 in., 100 grade	2	
9	940222	• O-RING, hot paint, 1.00 x 1.125 x 0.063 in.	2	
10	139483	• SEAT, ball, 0.688 in. diameter	2	
11	940260	• O-RING, hot paint, 1.25 x 1.375 x 0.063 in.	2	

Siphon Check Service Kit

See Figure 7-2

Item	Part	Description	Quantity	Note
—	141440	SERVICE KIT, siphon check	1	
26	139484	• SEAT, ball, 1.125 in. diameter	2	
27	940250	• O-RING, hot paint, 1.188 x 1.312 x 0.063 in.	2	
28	900002	• BALL, 440 stainless steel, 1.125 in. diameter, 100 grade	2	
31	940292	• O-RING, hot paint, 1.50 x 1.625 x 0.063 in.	2	

Hydraulic Section Screw and Washer Kit

See Figure 7-2

Item	Part	Description	Quantity	Note
—	1614780	SERVICE KIT, screw and washer, hydraulic section	1	
15	981549	• SCREW, hex, $\frac{5}{16}$ x 1.50 in., stainless steel, G8	2	
16	983441	• WASHER, lock, e, split, $\frac{5}{16}$ in., stainless steel	2	
NS	900200	• ADHESIVE, Loctite 242, blue, removable, 0.5 ml	AR	

AR: As Required

NS: Not Shown

Hydraulic Section Repair Kit

See Figures 7-3 and 7-2, as indicated in the Note column.

Item	Part	Description	Quantity	Note
—	141441	SERVICE KIT, repair, hydraulic section	1	
9	945081	• O-RING, hot paint, 1 1/4 in. OD tube	2	A
6	945017	• O-RING, hot paint, 3/8 in. tube	1	B
9	940222	• O-RING, hot paint, 1.00 x 1.125 x 0.063 in.	2	B
11	940260	• O-RING, hot paint, 1.25 x 1.375 x 0.063 in.	2	B
13	941490	• O-RING, hot paint, 2.81 x 3.00 x 0.094 in.	4	B
18	940280	• O-RING, hot paint, 1.375 x 1.50 x 0.063 in.	4	B
21	940160	• O-RING, hot paint, 0.625 x 0.75 x 0.063 in.	2	B
22	954045	• BACK-UP RING, single, 5/8 x 3/4 in.	2	B
27	940250	• O-RING, hot paint, 1.188 x 1.312 x 0.063 in.	2	B
31	940292	• O-RING, hot paint, 1.50 x 1.625 x 0.063 in.	2	B

NOTE: A. See Figure 7-3 for component location.

B. See Figure 7-2 for component location.

Roller Valve Conversion Kit

See Figure

Item	Part	Description	Quantity	Note
—	167538	CONVERSION KIT, roller valve, JP	1	
30	981770	• SCREW, fillister head, with lock washer, #8- 32 x 0.50 in., zinc	2	
31	165745	• ADAPTER, roller valve	2	
32	164419	• VALVE, roller-operated	4	
33	981469	• SCREW, flat head, #8- 32 x 1.00 in., zinc-plated steel	4	
34	984112	• NUT, hex, lock, thin, #8- 32 UNC-3b	4	
35	972853	• ELBOW, banjo, 1/8 tube x 10-32, brass	8	
36	981063	• SCREW, fillister head, with lock washer, #8- 32 x 0.875 in., zinc	4	
NS	900424	• COMPOUND, threadlock, VC-3	AR	

AR: As Required

NS: Not Shown

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Pump Packing and Solvent Chamber Fluid Guide

This guide covers the following:

- Packing and Solvent Chamber Fluid Compatibility
- Packing Material and Application
- Solvent Chamber Fluid Composition and Application
- Solvent Chamber Fluid Parts List
- Type Q Concentrate Mixing Instructions

Packing and Solvent Chamber Fluid Compatibility

MATERIAL TYPE	SOLVENT FAMILY	ABRASIVE QUALITY	PACKING TYPE	SOLVENT FLUID
Waterborne	Water	Mild	D	T, Q
		Medium	G	T, Q
		High	U	T, Q
	Alcohols	Mild	D	T, Q
		Medium	G	T, Q
		High	U	T, Q
Solventborne	Ketones (e.g., acetone, MEK, MAK, etc.)	Mild	F	K, S
		Medium	F	K, S
		High	U	K, S
	Aromatic Hydrocarbons (e.g., xylene, toluene, etc.)	Mild	F	K, S
		Medium	F	K, S
		High	F, U(1)	K, S
	Alcohols	Mild	D	K, Q
		Medium	G	T, Q
		High	U	K, Q
	Aliphatic Petroleum Naphthas	Mild	D	K, S
		Medium	D	K, S
		High	G	T, Q
	Chlorinated Solvents	Mild	F	K, S
		Medium	F	K, S
		High	F	K, S

Note 1: Type U packings may swell slightly when exposed to aromatic hydrocarbon solvents.

Packing Material and Application

Packing Type	Material	Application
A	Cotton duck saturated with buna-nitrile and coated with graphite	Good for less abrasive applications where strong solvents are not used. Contains graphite coating to reduce friction.
D	Cotton duck and synthetic fabric saturated with buna-nitrile and PTFE	Good for less abrasive applications where strong solvents are not used. Contains PTFE to reduce friction.
F	PTFE V-rings stacked with leather V-rings	Most commonly used packing in the finishing industry. Use for strong solvents and abrasive materials.
G(1)	Polyurethane U-cups	Frequently used with waterborne materials. Not compatible with some solvents.(1)
U(2)	Ultra-high molecular weight polyethylene (UHMWPE)	Good for highly abrasive materials. Compatible with waterborne and most solventbornes.(2)
NOTE 1: Do not use Type G packing glands with aromatic hydrocarbon solvents or with Type K or S solvent chamber fluids. **NOTE 2:** Type U packings may swell slightly when exposed to aromatic hydrocarbon solvents.		

Solvent Chamber Fluid Composition and Application

Solvent Type	Material	Application
T	Mixed propylene glycol	Use for waterborne systems. (Thinner than Type-Q and best used on smaller pump models.)
Q	Liquid anionic flocculant mixed with distilled water.	Use for waterborne systems. (Thicker than Type-T and best used on larger pump models.)
K	Epoxidized soybean oil	Use for solventborne applications. Do not use for waterborne and catalyzed alkyd urea applications.
S	Mixed aliphatic dimethyl esters	Use for solventborne applications.
NOTE: Type K solvent is highly viscous. At room temperature, it is not appropriate for use in Model 25B or 64B pumps where the solvent must flow through a filler cup and small ID passage into the solvent chamber.		

Solvent Chamber Fluid Parts List

Part	Description
248831	FLUID, type-S, pump chamber, one quart
900255	FLUID, type-K, pump chamber, one quart
140029	FLUID, type-T, pump chamber, one quart
244854	FLUID, type-Q concentrate (2.6 fluid ounce, makes one gallon)

Type Q Concentrate Mixing Instructions

WARNING: Do not take internally. For industrial use only. Avoid direct contact. Eye and skin irritant. Refer to the MSDS shipped with the solvent chamber fluid for more information.

Mix one gallon of distilled water with 2.6 fluid ounces of Type Q concentrate as follows:

1. Fill a 1-gallon-(3.8-liter) round container $^3/_4$ full of distilled water at 70–100 °F.
2. Use a rotating agitator to mix the water until it forms a whirlpool at the container's center.
3. Slowly pour one full bottle (2.6 oz.) of Type Q concentrate into the whirlpool.
4. Add the remaining distilled water to make one gallon, and mix for an additional 15 minutes.

NOTE: The mixture may separate after prolonged shelf time. If it does, mix again before using.

Issued 10/03

Air Lubricator Adjustments and Oils

Adjustments

Air lubricators are shipped with Nordson pumps or are optional equipment. Refer to your pump manual for lubricator installation instructions.

Lubricators are not pre-adjusted at the factory. To properly adjust the lubricator, follow the instructions below:

1. Fill the lubricator bowl with Nordson Vitalizer oil.

   NOTE: Use only Nordson Vitalizer oil or an oil recommended by your Nordson representative. Disregard any oil recommendations in the OEM instruction sheet shipped with the air lubricator.

2. Start the pump and run it at the desired operating speed.
3. Adjust the lubricator to deliver oil at the rate given for your pump in the following table.

Pump Model	Strokes per drop of oil
180D	10–15
360D	10–15
25B	17–25
64B	15–20
32/64	17–25
CP	15–20
JP	5–10

Ordering Nordson Vitalizer Oil

To order parts, call the Nordson Finishing Customer Support Center at (800) 433–9319 or your local Nordson representative.

Quantity	Part Number
1 Pint (0.47 liters)	900214
1 Quart (0.95 liters)	900215
1 Gallon (3.79 liters)	900216
5 Gallons (18.93 liters)	900217

Vitalizer Oil Specifications

API Gravity:	31.7
Pour Point:	25 °F (-3.9 °C)
Flash Point 1:	430 °F (221 °C) (See Note 1)
Viscosity @ 100 °F (38 °C):	153
Viscosity @ 210 °F (99 °C):	43
Viscosity Index:	95
Neutralization No.	0.12
Toxicity (Refer to Notes 2 and 3)	

Specification Notes

1. As oil is heated various fractions will boil off in succession, starting at 430 °F (221 °C).
2. The toxicity of this oil is not classified as a hazardous material by the U.S. Department of Labor Health and Safety Regulations. There is a possibility of dermatitis. Effects of overexposure are presently unknown.
3. Antidote: If eyes are exposed to this oil, flush with plain water. Skin that has been exposed to this oil should be washed with soap and water, as with any lubricating oil.

Issued 1/04

Circulation Kits for CP Pumps

Description

This instruction sheet covers two circulation kits for CP Pumps:

- Stainless steel circulation kit, with Viton O-rings
- Stainless steel circulation kit, with EPR O-rings

The circulation kits consist of these parts:

- stainless steel circulation valve
- two-way ball valve (drain-off valve)
- drain-off hose and rod
- NPT and JIC fittings

Installation

WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

The circulation valve kits are shipped partially assembled.

NOTE: All NPT fittings on the siphon side of the hydraulic system must be coated liberally with pipe thread adhesive/sealant and tightened securely to eliminate the siphoning of air into the pump.

See Figure 1.

1. Remove the plastic shipping caps covering the valve ports and threaded fittings before assembling the kit and installing it on the pump.
2. Install the circulation valve (2) on the pump siphon manifold. Threads on the valve outlet port are $^1/_2$ in. NPT. Orient the valve so that the elbow is on top.
3. Connect the ball valve (3) to the circulation valve.
4. Connect the drain-off hose (4) to the ball valve.
5. Connect the drain-off rod to the drain-off hose.

NOTE: Use the recommended high-pressure hose for your pump.

6. Connect a high-pressure fluid hose with a $^1/_2$–20 JIC fitting from the return side of the fluid circuit to the elbow (1) on the circulation valve.

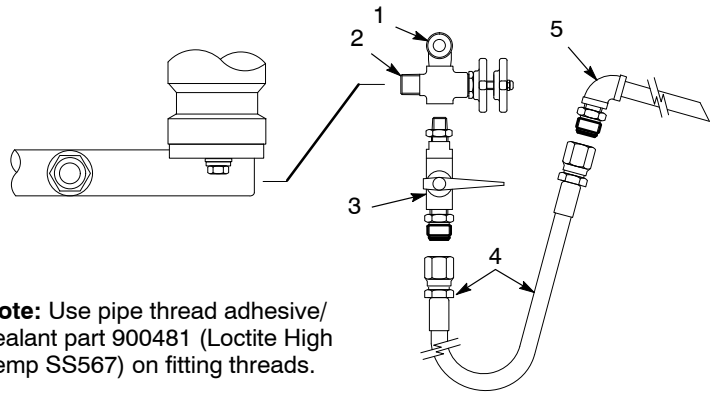

Figure 1 Circulation Kit Installation

1. Elbow (return)
2. Circulation valve
3. Ball valve
4. Drain-off hose
5. Drain-off rod

Circulation Kit Operation

See Figure 2.

Rotate the circulation valve outer knob clockwise to close the valve, counter-clockwise to open it. To lock the valve setting, rotate the inner knob until it contacts the valve body and tighten it securely.

- Opening the circulation valve increases the return flow through the valve, causes the pump to run faster, and increases the volume of fluid flowing through system.
- Closing the circulation valve decreases the return flow, causes the pump to run slower, and decreases the volume of fluid flowing through the system.

CAUTION: Never close the circulation valve more than finger tight. Over-tightening may damage the carbide point and seat.

Keep the ball valve closed while circulating fluid through the system. Open the ball valve to bleed air or drain waste fluid from the system.

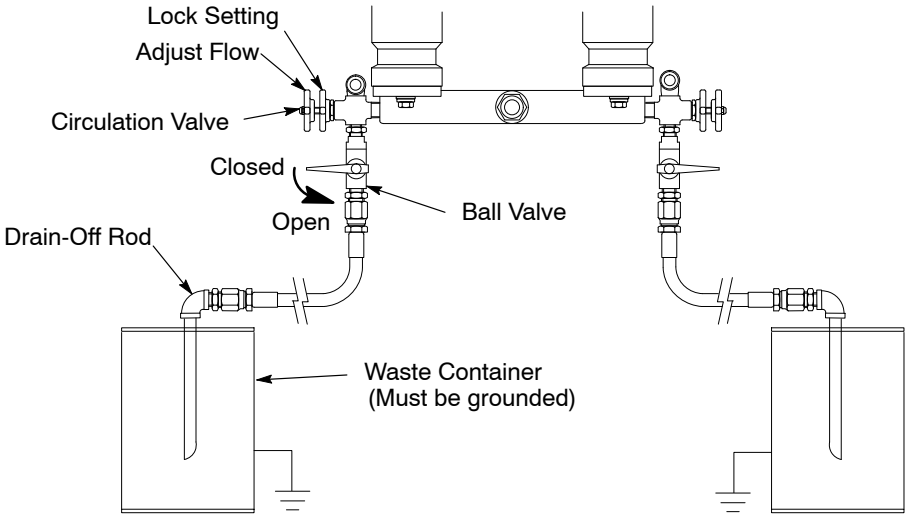

Figure 2 Circulation Kit Operation

Circulation Kit Parts

To order parts, call the Nordson Finishing Customer Support Center at (800) 433-9319 or your local Nordson representative.

Stainless Steel Circulation Kit, Viton O-rings

See Figure 3.

Item	Part	Description	Quantity	Note
—	105071	KIT, circulation, stainless steel	1	
1	972177	• ELBOW, male, $^1/_2$–20 x $^1/_4$ in. NPT, stainless steel	1	
2	973971	• NIPPLE, hex, $^3/_8$ x $^1/_4$ x 1.406 in., stainless steel	1	
3	972103	• CONNECTOR, male, 37, 3/4–16 x 3/8 in., stainless steel	2	
4	823060	• HOSE, drain-off, 3/8 in. ID, 5 ft.	1	
5	750250	• ROD, drain-off	1	
6	750222	• VALVE, circulation, stainless steel	1	A
7	750130	• VALVE, ball, stainless steel	1	B

NOTE A: Refer to *Circulation Valve Repair and Parts* in this instruction sheet.
B: Refer to *Ball Valve Repair and Parts* in this instruction sheet.

Stainless Steel Circulation Kit, EPR O-rings

See Figure 3.

Item	Part	Description	Quantity	Note
—	179440	KIT, circulation, stainless steel, EPR	1	
1	972177	• ELBOW, male, $^1/_2$–20 x $^1/_4$ in. NPT, stainless steel	1	
2	973971	• NIPPLE, hex, $^3/_8$ x $^1/_4$ x 1.406 in., stainless steel	1	
3	972103	• CONNECTOR, male, 37, 3/4–16 x 3/8 in., stainless steel	2	
4	823060	• HOSE, drain-off, 3/8 in. ID, 5 ft.	1	
5	750250	• ROD, drain-off	1	
6	- - - - - -	• VALVE, circulation, stainless steel, EPR	1	A
7	750130	• VALVE, ball, stainless steel	1	B

NOTE A: Refer to *Circulation Valve Repair and Parts* in this instruction sheet.
B: Refer to *Ball Valve Repair and Parts* in this instruction sheet.

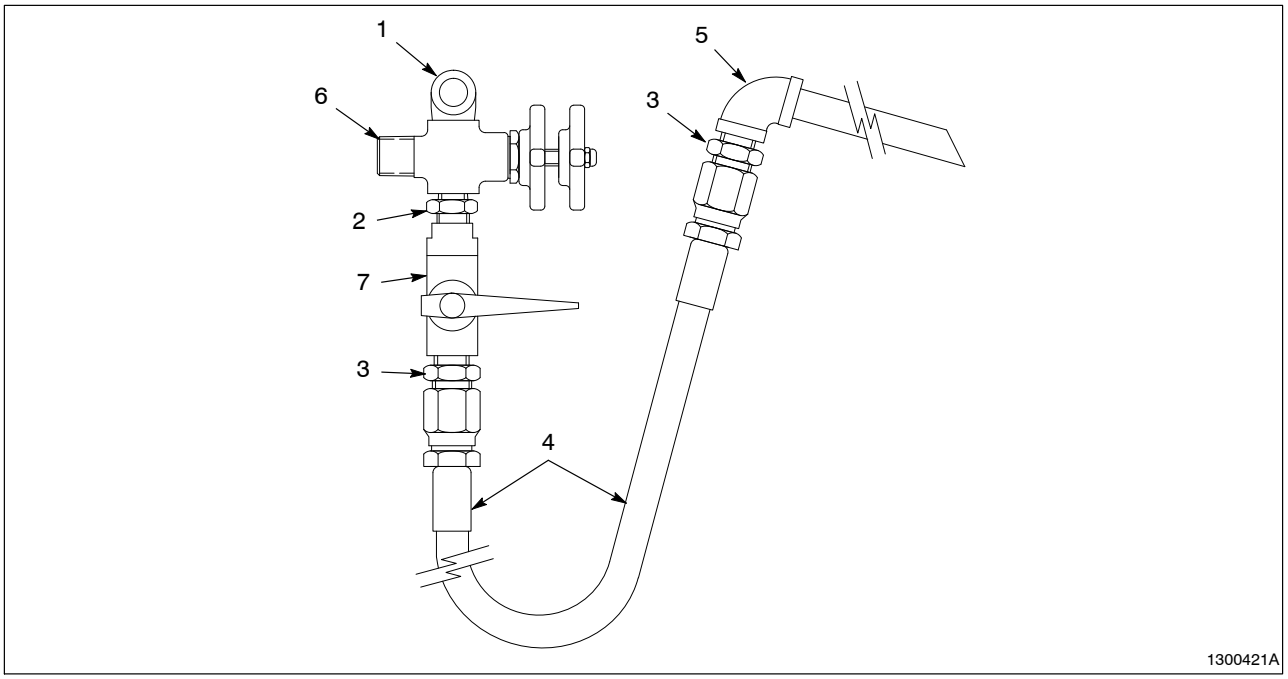

Figure 3 Circulation Kit Parts

Circulation Valve Repair and Parts

Disassembly

See Figure 4.

1. Loosen the lock nut knob (10) and rotate the adjusting knob (11) counterclockwise until the valve is fully opened.
2. Unscrew the cap (9) from the body (4).
3. Remove the lock nut knob, adjusting knob, cap, stem (7), and point (2) from the circulation valve as an assembly. Use care to prevent damaging the point.
4. Remove the point from the keyed slot in the stem. Remove the lock nut (12) from the stem, and unscrew the lock nut knob and adjusting knob from the stem.
5. Unscrew the stem from the cap. Remove the O-rings and backup ring (5, 6, and 8) from the stem and cap.
6. Use a hex wrench to remove the hollow lock screw (1) from the body.
7. Carefully remove the seat (2) and seal washer (3) from the body.

Clean and inspect the valve parts. Replace any damaged or worn parts. A damaged seat or point makes circulation control difficult and can prevent the circulation valve from closing completely.

Assembly

1. Lubricate new O-rings (6, 8) with O-ring lubricant. Install the back-up rings and O-rings on the stem (7) and cap (9).
2. Thread the stem into the cap (9) and install the lock nut knob (10), adjusting knob (11) and lock nut (12) on the stem.
3. Lubricate the seat (2) and seal washer (3) with O-ring lubricant and install them into the body (4).
4. Install the side of the hollow lock screw (1) into the body (4) with the greatest face area against the seat. To avoid damaging the seat, tighten the hollow lock screw carefully.
5. Install the point (2) into the keyed slot in the stem.
6. Insert the cap and stem assembly into the body, carefully sliding the point into the seat. Do not force the point into the seat.
7. To prevent damaging the point or seat, rotate the adjusting knob counterclockwise until the stem hits the stop in the cap. Screw the cap into the body and tighten it snugly.

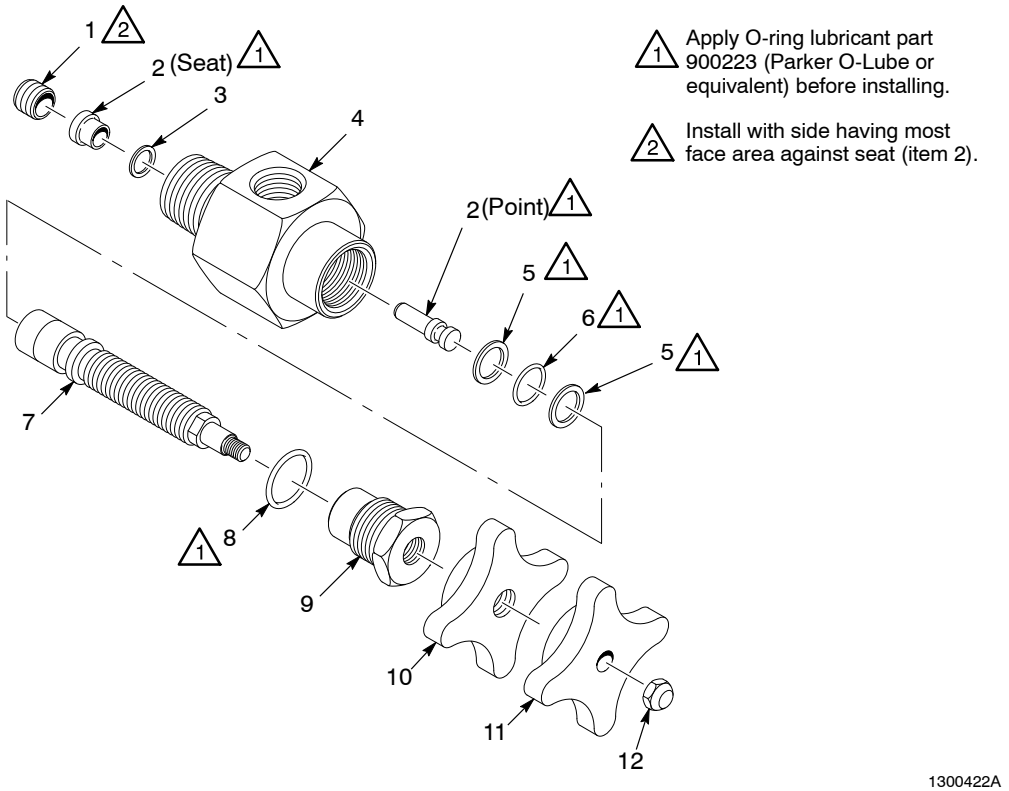

Figure 4 Circulation Valve Repair and Parts

Circulation Valve with Viton O-Rings

See Figure 4.

Item	Part	Description	Quantity	Note
—	750222	VALVE, circulation, stainless steel	1	
1	981701	• SCREW, lock, hollow, $^{5}/_{8}$–18	1	
2	750030	• POINT and seat assembly	1	A
3	750227	• WASHER, seal	1	A
4	750223	• BODY, circulation valve, stainless steel	1	
5	954012	• BACK-UP RING, single, $^{3}/_{8}$ x $^{1}/_{2}$ in.	2	
6	940128	• O-RING, Viton, black, 0.375 x 0.500 in.	1	
7	750224	• STEM	1	
8	940166	• O-RING, Viton, black, 0.625 x 0.750 in.	1	
9	750225	• CAP, 316 stainless steel	1	
10	750028	• NUT, lock, $^{7}/_{16}$–20	1	
11	750029	• KNOB	1	
12	984122	• NUT, lock, #10-32	1	
NOTE A: Included in Carbide Seat service kit, part 106244.				

Circulation Valve with EPR O-Rings

See Figure 4.

Item	Part	Description	Quantity	Note
–	- - - - - -	VALVE, circulation, stainless steel, EPR	1	
1	981701	• SCREW, lock, hollow, $^5/_8$–18	1	
2	750030	• POINT and seat assembly	1	A
3	750227	• WASHER, seal	1	A
4	750223	• BODY, circulation valve, stainless steel	1	
5	954012	• BACK-UP RING, single, $^3/_8$ x $^1/_2$ in.	2	
6	945067	• O-RING, EPR, 0.375 x 0.500 x 0.063 in.	1	
7	750224	• STEM	1	
8	941163	• O-RING, EPR, 0.625 x 0.750 x 0.063 in.	1	
9	750225	• CAP, 316 stainless steel	1	
10	750028	• NUT, lock, $^7/_{16}$–20	1	
11	750029	• KNOB	1	
12	984122	• NUT, lock, #10-32	1	
NOTE A: Included in Carbide Seat service kit, part 106244.				

Carbide Seat Service Kit

See Figure 4.

Item	Part	Description	Quantity	Note
–	106244	SERVICE kit, carbide seat, circulation valve	1	
2	750030	• POINT and seat assembly	1	
3	750027	• WASHER, seal	1	A
3	750227	• WASHER, seal	1	B
NOTE A: Used with standard steel circulation valves. B: Used with stainless steel circulation valves.				

Ball Valve Repair and Parts

Disassembly

See Figure 5.

1. Remove the fillet-head screw (5) from the handle (4). Remove the handle from the ball valve.
2. Remove the flat spring (3) from the stem (1).
3. Unscrew the stem gland nut (6) from the housing (10). Pull the stem (1) out of the valve body.
4. Remove the thrust washer (7) and the stem packing (2).
5. Unscrew the body cap (9) from the housing.
6. Remove the ball (12) and ball seats (11). Remove and discard the body seal (8).

Clean and inspect the valve parts. Replace any worn or damaged parts.

Assembly

1. Install new ball seats (10) in the housing (10) and body cap (9). Install the new ball (12) into the housing, then screw the body cap into the housing hand-tight.

NOTE: Do not tighten the body cap while the valve is cold. This forces the body seats out of the housing and cap seats.

2. Install a new thrust washer (7) in the housing.
3. Install a new stem packing (3) on the stem (1). Insert the stem (1) into the valve body, aligning the end of stem (1) with the slot in ball (8).
4. Install the stem gland nut (2) over the stem (1). Screw the gland nut into the housing and tighten it hand-tight.
5. Heat the ball valve for one hour at 350 °F (177 °C) to form the ball seats, then tighten the body cap (9) and stem gland nut (2) securely while the valve is still hot.
6. When the valve has cooled, insert the flat spring (5) into the groove in the stem (1).
7. Install the handle (6) over the stem (1). Align the holes in the handle (6) and stem (1). Install the fillet-head screw (7) into the handle and tighten it securely.

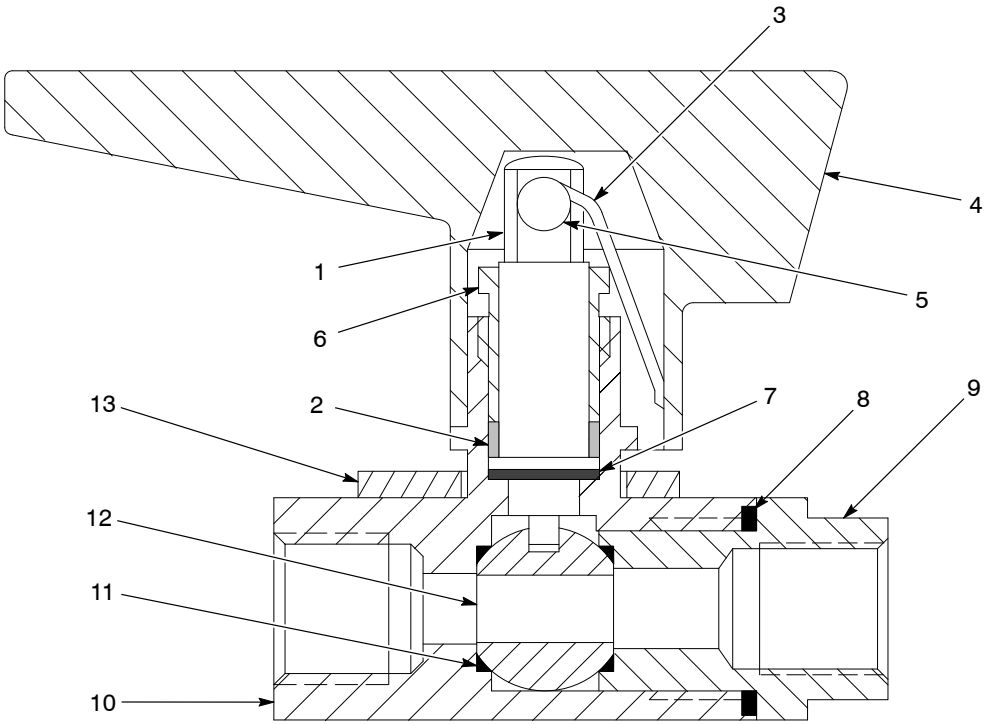

Figure 5 Ball Valve Repair and Parts

Ball Valve Parts

See Figure 5.

Item	Part	Description	Quantity	Note
–	750130	Valve, ball, stainless steel	1	
1	750134	• Stem	1	
2	750046	• Packing, stem	1	
3	750048	• Spring, flat, 1.125 x 0.218 OD x 0.026 in.	1	
4	750049	• Handle	1	
5	750050	• Screw, fillet head, #8-32 x 0.875 in., steel, zinc, grade 5	1	
6	750045	• Nut, gland, stem	1	
7	750047	• Washer, thrust, 0.343 x 0.500 x 0.020 in.	1	
8	750060	• Seal, body	1	
9	750136	• Cap, body	1	
10	750131	• Housing, valve	1	
11	750059	• Seat, ball	2	
12	750135	• Ball	1	
13	750055	Optional bracket	1	

Ball Valve Repair Kit

See Figure 5.

Item	Part	Description	Quantity	Note
—	106251	Kit, repair	1	
2	750046	• Packing, stem	1	
3	750048	• Spring, flat	1	
7	750047	• Washer, thrust, 0.343 x 0.500 x 0.020 in.	1	
8	750060	• Seal, body	1	
11	750059	• Seat, ball	2	

Issued 11/02

Nordson Corporation

OPERATOR CARD

187729–01

JP Pump

Startup

WARNING: Allow only qualified personnel to perform the following tasks. Follow the safety instructions in this document and all other related documentation.

WARNING: Relieve air and fluid pressure before servicing this equipment.

WARNING: Make sure that all system components are grounded to a true earth ground. Ungrounded components can cause electrical sparking, fire, or explosion.

Introduction

This operator's card contains only the information necessary for daily operation and maintenance. For other information refer to the product manual. See Figure 1 for the following procedures.

Before you start the JP pump, make sure that the

- solvent chamber is filled with the proper fluid.
- lubricator is filled with vitalizer oil.

Initial Startup

Before putting the JP pump into service, flush it to remove any contaminates left in the pump from the manufacturing and installation process.

1. Remove the gun nozzle (4).
2. If using a circulation valve kit, insert the drain-off rod (8) into a waste container (9). Close the circulation valve (6) and open the drain-off valve (7).

NOTE: The solvent flush material can be a solvent used in the coating material or, if using water-based coatings, butyl cellosolve or soapy water.

3. Insert the siphon rod (11) into a container of suitable solvent flush material (10). If a pressure feed is used, pressurize the siphon line.

NOTE: Make sure that the air regulator is completely backed out. The pump will run erratically if you start it without material in the lines.

4. Pressurize the air supply line (1).
5. Open the air shut-off valve (16).
6. Adjust the air regulator (15) until the pump strokes at a rate of 20 times per minute. If using a non-circulating system, trigger the spray gun (3) to allow the pump to operate.

NOTE: If the pump does not stroke, push the manual override button (12) located on the double-pilot air valve (13).

Initial Startup *(contd)*

7. Observe the material being pumped out of the spray gun (3) or drain-off rod (8). Run the pump until the material flows without bubbles.
8. Using a small screwdriver, set the lubricator (14) to a rate of 1 drop per 5–10 strokes of the pump. Make sure that the lubricator is filled with vitalizer oil.
9. If using a circulation valve kit, close the drain-off valve (7) and slowly open the circulation valve (6). Adjust the circulation valve until the pump strokes 20 times per minute. Allow solvent flush material to circulate through the system for 15–30 minutes.
10. Using the air regulator (15), set the air pressure to zero.
11. If using a circulation valve kit, close the circulation valve and open the drain-off valve.
12. Remove the siphon rod (11) from the solvent flush material container (10). If the pump is pressure-fed, shut off the pressure feed.
13. Adjust the air regulator until the pump discharges the solvent flush material into a waste container (9). If using a non-circulating system, trigger the spray gun (3) until all solvent flush material has been pumped out of the system.
14. Using the air regulator, set the air pressure to zero.
15. Close the air shut-off valve (16).
16. Open the fluid filter drain (5) and clean the filter screen.

Normal Startup

1. Place the siphon rod (11) into the coating material container (10). If using a pressurized system, pressurize the feed line.
2. Pressurize the air supply line (1).
3. Open the air shut-off valve (16).
4. Adjust the air regulator (15) until the pump begins to stroke slowly.
5. Allow coating material to flow out of the filter drain (5). Close the drain.
6. Allow the pump to discharge coating material from the drain-off valve (7). Close the valve.
7. Adjust the air regulator to the pressure required to pump your material.
8. Adjust the circulation valve (6) until the pump strokes 8–10 times per minute.

WARNING: Always circulate material through the heater while it is on. Failure to circulate material through an operating heater can cause heater plugging, heat limiter failure, property damage, or personal injury.

9. If using a heater (2), turn it on. Allow 10–15 minutes for the system to reach operating temperature. When the thermometer reads within 2 °C or 5 °F of the operating temperature, adjust the circulation valve. The maximum desired flow rate is 7.6 lpm (2.0 gpm) maximum.
10. Start spraying.

Changing Materials

NOTE: If the new material is incompatible with the old material, flush the system twice. First, use a solvent flush material compatible with the old material, then use a solvent flush material compatible with the new material.

1. Using the air regulator (15), set the air pressure to zero.
2. Place the siphon rod (11) in a container of compatible solvent flush material. Increase the air pressure.
3. For non-circulating systems, observe the material being pumped out of the spray gun (3) or filter drain (5). Run the pump until the material being pumped flows without bubbles.

Changing Materials *(contd)*

4. For circulating systems,
   a. Close the drain-off valve (7) and slowly open the circulation valve (6). Open the circulation valve until the pump strokes 20 times per minute.
   b. Allow solvent flush material to circulate through the system for 15–30 minutes.
   c. Open the drain-off valve and close the circulation valve.
5. Using the air regulator, set the air pressure to zero.
6. Place the siphon rod in a container of new coating material (10).

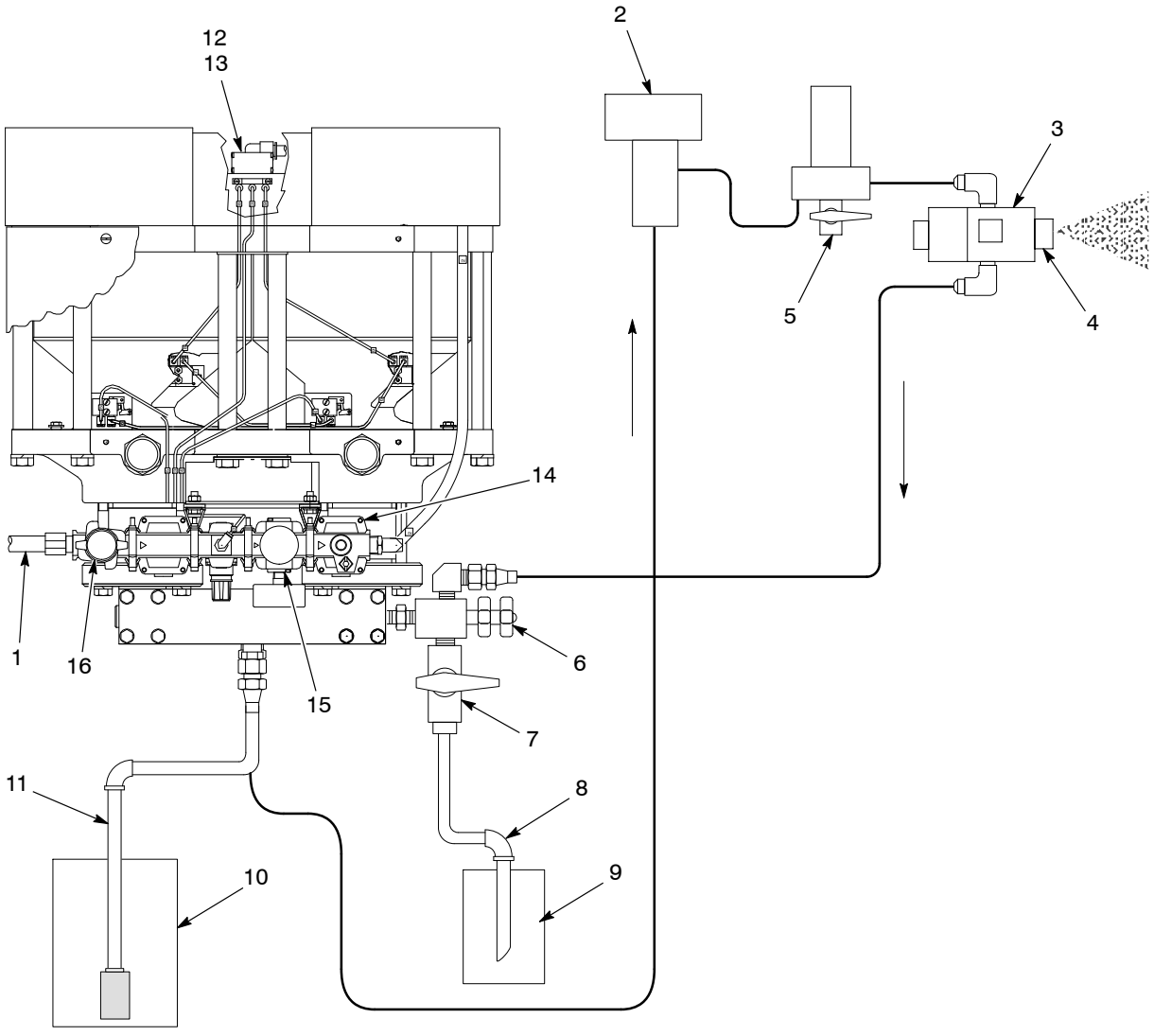

Figure 1 Typical JP Pump System

1. Air supply line
2. Heater
3. Spray gun
4. Gun nozzle
5. Filter drain
6. Circulation valve
7. Drain-off valve
8. Drain-off rod
9. Waste container
10. Coating or solvent flush material
11. Siphon rod
12. Manual override button
13. Double-pilot air valve
14. Lubricator
15. Air regulator
16. Air shut-off valve

Shutdown

1. If using a heater (2), turn it off 10–15 minutes before shutting down the pump.
2. Using the air regulator (15), set the air pressure to zero.
3. Close the valve to the main air supply line (1).
4. If using a pressurized system, close the main pressure feed supply valve.
5. Open the drain-off valve (7) to relieve system pressure. Close the drain-off valve.

Daily Maintenance

Clean the High-Pressure Fluid Filter

NOTE: To prevent production downtime, use a dual-filter assembly. Consult your Nordson representative to see if a dual filter is appropriate for your application and material.

Clean the high-pressure fluid filter daily unless experience indicates that less-frequent cleaning would be adequate:

1. Place a clean spare screen in the fluid filter and soak the dirty screen in a solvent that is compatible with your coating material.
2. Inspect the filter screen and discard it if ruptured or distorted.

Check the Solvent Chamber Fluid

1. If the solvent chamber fluid appears to be contaminated with coating material, drain the fluid and fill the solvent chamber with new fluid.
2. Fill the solvent chamber to 10.2 cm (4 in.) from the top of the casting. Use only Nordson type-Q or -T solvent chamber fluid for water-based coatings.

Check the Air Lubricator Oil

1. If necessary, adjust the rate to approximately one drop of oil per every 5–10 strokes of the pump.
2. Refill the air lubricator with vitalizer oil or an approved substitute only. Refer to the *Adjusting Air Line Lubricators* instruction sheet for a list of approved replacement oils.

Clean the Air Filter Components

1. Drain the air filter.
2. Remove the air filter bowl. Dump out any remaining water.
3. Remove the air filter element daily. This may be done less frequently if experience indicates that less-frequent cleaning would be adequate.
4. Wash the parts in soapy water, rinse, dry. Inspect the parts for any wear damage. Replace defective parts.

Clean the System Components

CAUTION: Do not soak system components in solvent. Some solvents can damage hose coverings and seals.

Wipe system components with a cloth soaked in a solvent compatible with your coating material.

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