

# **Rhino<sup>®</sup> Screw Together 24:1/48:1 & 32:1/65:1 Pumps**

Customer Product Manual  
Part 334606C



NORDSON CORPORATION • AMHERST, OHIO • USA



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# Rhino Screw Together 24:1/48:1 & 32:1/65:1 Pumps

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## **1. Safety**

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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 Material Safety Data Sheets (MSDS) 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 MSDS 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 him this card.
- Tell him 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 in the spray area. 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 MSDS for guidance.
- Do not disconnect live electrical circuits while 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:

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

Check your material MSDS 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.

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## **2. Description**

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This manual provides basic information about the Rhino bulk unloader screw together pumps. Refer to your unloader controls manual for specific information about operating your pump as part of an unloader assembly.

### ***Theory of Operation***

See [Figure 1](#), which shows a cutaway view of both the 24:1/48:1 and 32:1/65:1 ratio pumps. The pumps operate in the same manner but have slightly different designs. Refer to the *Parts* section for specific illustrations and information about both ratios of the pump.

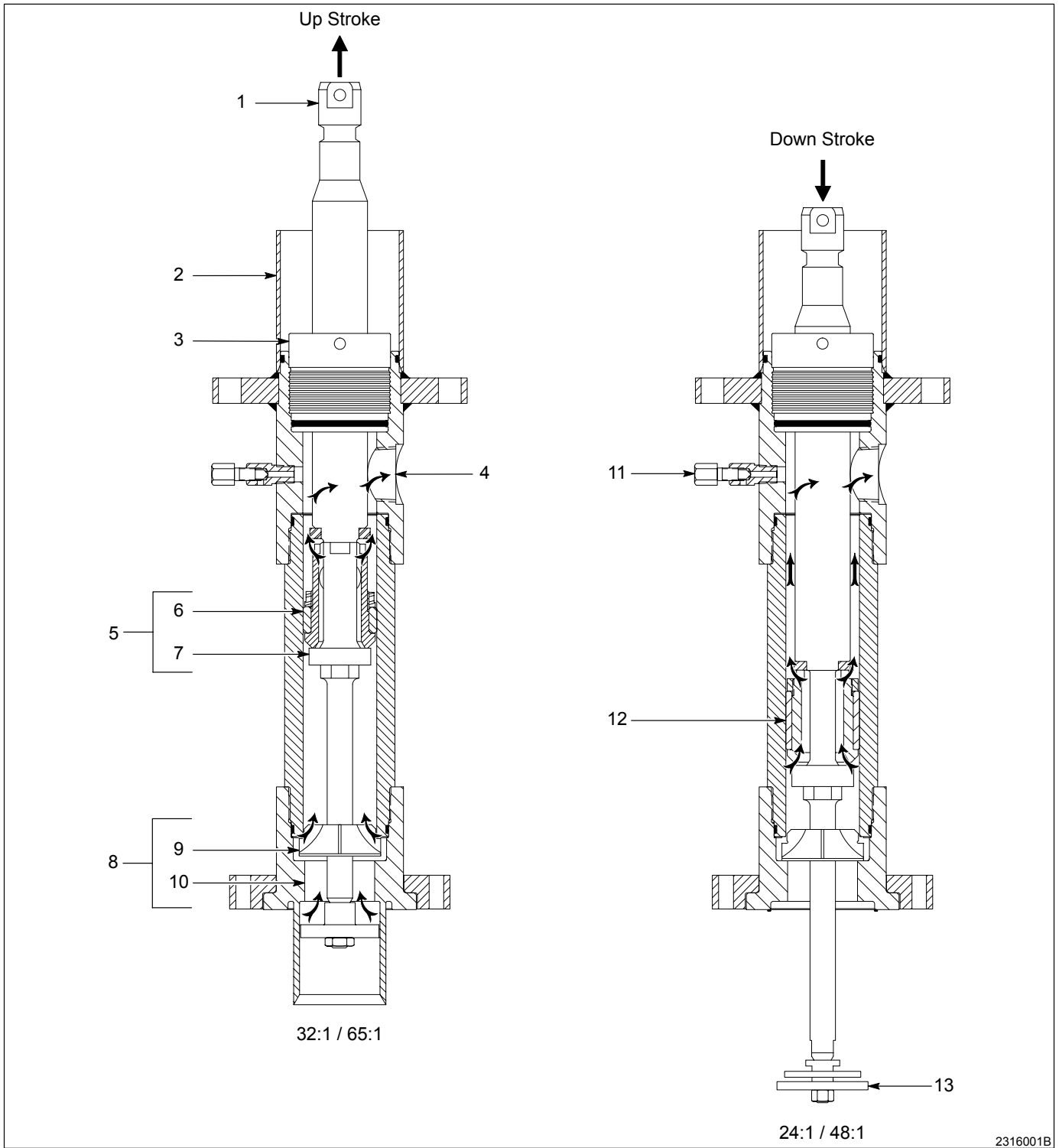
An air motor, located directly above the pump, drives the hydraulic section. A four-way air valve mounted to the air motor controls the direction of the air motor shaft movement. As the air motor piston moves up and down, it shifts the air valve spool, which exhausts air on one side of the piston and directs air pressure to the opposite side of the piston.

The shovel (13) moves up and down with the plunger (1) and forces material into the hydraulic section. The hydraulic section pressurizes the material and forces it out of the pump.

During the upward pump stroke, the plunger and shovel are pulled upward and the upper check valve (5) closes. The lower check (9) raises off the lower check seat (10). The lower check valve (8) opens and allows material to pass into the lower pump chamber, below the upper check. As the plunger and piston (6 or 12) move upward, material from the upper pump chamber is forced out of the pump outlet port (4).

When the plunger strokes downward, the upper check valve opens, and the lower check valve closes. Material between the upper check seat (7) and lower check is forced upward through the piston, which pressurizes the material above the upper check and forces it out of the pump.

The solvent chamber (2) at the top of the pump contains fluid that lubricates the plunger and packing gland (3) seals and prevents material from hardening on the shaft. A bleed valve (11) on the side of the pump body allows the operator to bleed air from the material being pumped.



2316001B

Fig. 1 Pump Operation

- |                      |                      |                      |
|----------------------|----------------------|----------------------|
| 1. Plunger           | 6. 32:1/65:1 piston  | 11. Bleed valve      |
| 2. Solvent chamber   | 7. Upper check seat  | 12. 24:1/48:1 piston |
| 3. Packing gland     | 8. Lower check valve | 13. Shovel           |
| 4. Outlet port       | 9. Lower check       |                      |
| 5. Upper check valve | 10. Lower check seat |                      |

**Specifications**

Following are the specifications for the Rhino bulk unloader screw together pump.

**Maximum Output**

Refer to Table 1 for pump output information. Maximum pump output is expressed in volume per stroke and can depend on material viscosity, temperature, filters, and system configuration.

Table 1 Pump Output Values

<b>Pump Ratios</b>	<b>US (cubic inches/stroke)</b>	<b>Metric (cubic cm/stroke)</b>
24:1/48:1 Pumps	8	131
32:1/65:1 Pump	5.8	95

**Maximum Stroke Rate**

1 stroke per 2 seconds (30 strokes per minute) — intermittent

1 stroke per 4 seconds (15 strokes per minute) — continuous

**Viscosity Range**

30,000–3 million centipoise

**3. Installation**

The installation of the Rhino bulk unloader screw together pump is dependent upon the bulk unloader and application. Refer to the system documentation provided or contact your Nordson representative for further information.

**4. Operation**

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

The operation of the pump is primarily determined by the system in which it is installed. Refer to your Rhino unloader controls manual for more information. Refer to the following procedures to bleed the pump.

## Bleeding the Pump

At low pressure, bleed the pump until all air has been removed from the pump.

See Figure 1.

Follow these procedures to bleed the pump:

1. Reduce pressure to 0 bar/psi.



**WARNING:** Do not open the bleed valve more than three turns. The bleed valve and material may be forced from the valve body if loosened more than three turns. Personal injury could result.

2. Place a small waste container beneath the bleed valve (11). Make sure that the small bleed port (or ball valve) is pointed down. Carefully loosen the bleed valve only two or three turns. Or, open the ball valve (See Figure 10 (20)).
3. Initiate a purge from the unloader controller or push the purge button on your unloader. Gradually increase the pressure to an acceptable stroke rate for the pump or acceptable material bleed volume.
4. Leave the bleed valve open until the material flows continuously, without spitting.
5. Tighten the bleed valve or close the ball valve. Remove the waste container. Further bleeding should not be necessary unless the hydraulic section is completely empty or after changing material containers.

## 5. Maintenance

Refer to Table 2 for recommended maintenance procedures.

Table 2 Pump Maintenance Procedures

Frequency	Component	Maintenance Task
Daily	Solvent chamber	Check the level of fluid in the solvent chamber. Make sure that the fluid level is 4 cm (1.5 in.) from the top of the chamber. Refer to the <i>Parts</i> section for solvent chamber fluid ordering information.
Weekly	Follower plate seals	Inspect the follower plate seals for damage or signs of excessive material leakage. If you must replace the seals, refer to the <i>Parts</i> section for ordering information.

**6. 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.

Problem	Possible Cause	Corrective Action
<p><b>1. Pump not delivering material</b></p>	<p>Insufficient air pressure to pump air motor</p> <p>Follower plate not in contact with material</p> <p>Air pocket in pump</p> <p>Blocked hydraulic system or follower plate</p>	<p>Increase air pressure to the pump air motor.</p> <p>Make sure that the follower plate is lowered and in contact with the material.</p> <p>Carefully bleed the pump as described in the <i>Operation</i> section of this manual.</p> <p>Perform the following steps:</p> <ol style="list-style-type: none"> <li>1. Cycle the pump. Slowly open the bleed valve only two or three turns.                     <p>If material exits the valve, close the valve and go to step 2.</p> <p>If no material exits the valve, close the valve, shut down the system, and relieve system pressure. Remove and rebuild the pump.</p> </li> <li>2. Shut down the pump. Relieve system pressure. Disconnect the hose from the pump. Check the hose for blockage.                     <p>If the hose is not blocked, go to step 3.</p> <p>If the hose is blocked, clean or replace the hose.</p> </li> <li>3. Remove the gun from the hose. Check the gun for blockage.                     <p>If the gun is blocked, clean it.</p> <p>If the gun is damaged, rebuild or replace the gun as necessary.</p> </li> </ol>

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## 7. Repair

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**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 serious injury, relieve air and material (fluid) pressures before disconnecting any hydraulic connections or servicing equipment. Follow the specific instructions in this manual.

**NOTE:** To relieve system pressure, shut off the pump, trigger all guns, and open the pump bleed valve (as described in the *Operation* section of this manual). Make sure that the valve is not plugged with material.

This section contains detailed instructions for repairing or replacing unloader and pump components. Faulty hoses are not field-repairable. You must replace them if they are damaged or plugged with cured material. Dispensing guns are covered in a separate manual.

Refer to your system controls manual for specific information concerning the safe operation of your unloader. The controls manual includes detailed operating instructions, illustrations that show the location of all operating controls, and preliminary procedures to prepare your unloader for pump repair. Contact your Nordson representative if you require a copy of your controls manual.

**NOTE:** Unless otherwise noted, the illustrations in this section show drum unloader follower plates and seals. You may have a pail unloader, which has different follower plates and seals.

### ***Packing Gland Replacement***

Packing glands can be replaced without removing the pump from the unloader frame. If you need to remove the hydraulic section (pump) from the unloader frame, refer to *Hydraulic Section Removal* in this manual.

Replace the pump packing glands whenever you notice any material leaking from around the glands.

**NOTE:** Some O-ring lubricants may react with your dispensing material. Contact your Nordson representative for assistance in ordering the appropriate O-ring lubricant for your application.

### **Packing Gland Removal**

Follow these procedures to remove your packing glands from the pump.

**NOTE:** When you replace the packing glands, clean and inspect the plunger.

1. Place several blocks of wood on the frame base, to prevent the follower plate from contacting the drum hold down assembly. Lower the follower plate to the wood blocks.



**WARNING:** To avoid injury, place the unloader in neutral until noted otherwise in this procedure. To avoid injury, you must leave the unloader in this position until otherwise directed.

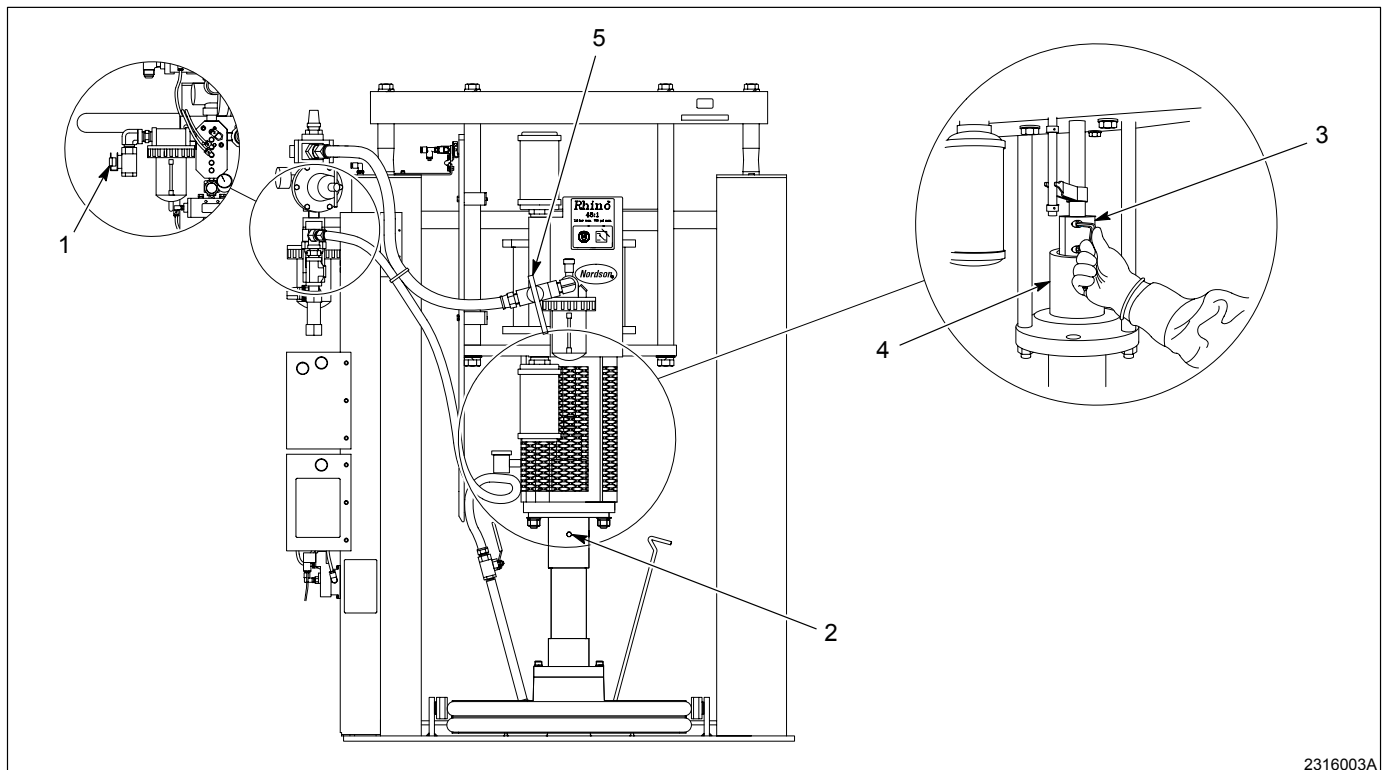
2. [See Figure 2](#). Shut off the compressed air supply at the air motor lockout valve (5).



**WARNING:** Do not open the bleed valve more than three turns. The bleed valve and material may be forced from the valve body if loosened more than three turns. Personal injury could result.

3. Bleed the hydraulic pressure through the bleed valve (2) and guns. Leave the bleed valve open.
4. Remove the coupling (3) from the plunger. Drain the solvent chamber (4).
5. Push the pump rod down with the air motor shaft, then raise the air motor shaft. Shut off the compressed air supply at the air motor lockout valve.
6. Remove the solvent chamber.





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Fig. 2 Replacing the Packing Gland

- |  |                    |                            |
|--|--------------------|----------------------------|
| 1. Air supply valve (main air on A-Unit) | 3. Coupling        | 5. Air motor lockout valve |
| 2. Bleed valve                           | 4. Solvent chamber |                            |

*Note:* Refer to your controls manual to determine your air motor lockout valve location, which may differ from the figure shown.

### **Packing Gland Removal** (contd)

7. See Figure 3. Fit a pin spanner wrench (1) or the optional gland removal tool (used with your  $\frac{3}{4}$ -in. drive wrench) into one of the four holes (2) in the circumference of the packing gland . Unscrew the packing gland (5) counterclockwise out of the pump body.



**WARNING:** It is important to inspect the plunger for scoring or damage before re-assembly. Personal injury or equipment damage could result from using a scored plunger.

8. Clean and inspect the visible portions of the plunger (6) for scoring. A scored plunger will cause premature seal wear and leakage of the new packing gland. Replace the plunger, if necessary.

**NOTE:** It is recommended to replace the plunger at the same time as the packing gland due to plunger wear, which could cause premature seal wear. A drive train kit, consisting of a packing gland, plunger, piston, spacer, upper rod check, lower check plate, shovel, and O-rings, is available. To replace the plunger, remove the hydraulic section from the unloader.

9. Before installing the new packing gland, clean the mating surfaces of the mounting flange, packing gland, and plunger. Lubricate all seals and O-rings (3 and 4) with a compatible lubricant.

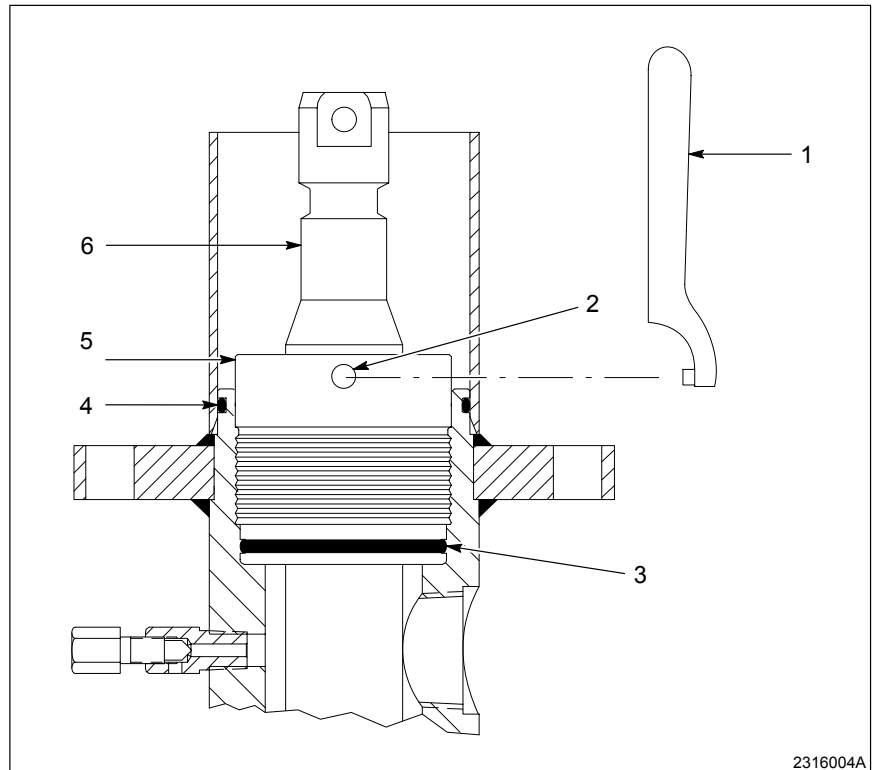


Fig. 3 Replacing the Packing Gland

- |                                       |                  |
|---------------------------------------|------------------|
| 1. Pin spanner wrench                 | 4. O-ring        |
| 2. Gland retainer circumference holes | 5. Packing gland |
| 3. O-ring                             | 6. Plunger       |

### **Packing Gland Installation**

Follow these procedures to install a new packing gland:

1. See Figure 3. Coat the threads of the packing gland (5) with Never-Seez lubricant. Taking care not to pinch the O-ring (3) when inserting the packing gland, screw the packing gland into the pump body clockwise.
2. Reinstall the coupling over the air motor shaft and plunger. You may have to pull the plunger up through the packing gland. If the plunger (6) has stalled in the bottom of the hydraulic section, retrieve it using the procedure in [Table 3](#).

**Packing Gland Installation** (contd)

Table 3 Raising the Plunger and Installing the Coupling

Air Motor Lockout Valve Position	Procedure
ON	<ol style="list-style-type: none"> <li>1. Adjust the air motor regulator to 0 bar/psi and turn the air motor lockout valve on.</li> <li>2. Increase air pressure at the air motor regulator until the air motor just starts to cycle. When the air motor shaft just begins its UP stroke, turn the air motor regulator to 0 bar/psi.</li> </ol>
OFF	<ol style="list-style-type: none"> <li>3. Turn the air motor lockout valve off.</li> <li>4. <a href="#">See Figure 4</a>. Position both halves of the coupling (3) over the plunger (2) and air motor shaft (1). Align the holes on the side of the coupling with the hole running through the plunger.</li> <li>5. Secure the coupling halves together with the four coupling screws (4) and insert a screwdriver (5) through the coupling and plunger.</li> </ol> <p><b>NOTE:</b> Make sure that the bleed valve on the pump is open and not plugged.</p>
ON	<ol style="list-style-type: none"> <li>6. Turn the air motor lockout valve on.</li> <li>7. Increase air pressure at the air motor regulator until the air motor draws the plunger up from within the pump body. Apply air pressure until the plunger has been raised high enough to install the coupling properly. Turn the air motor regulator to 0 bar/psi.</li> </ol>
OFF	<ol style="list-style-type: none"> <li>8. Turn the air motor lockout valve off and remove the screwdriver and coupling.</li> <li>9. <a href="#">See Figure 3</a>. Install the solvent chamber taking care not to pinch the O-ring (4).</li> </ol>
ON	<ol style="list-style-type: none"> <li>10. Turn the air motor lockout valve on. Using minimal air pressure at the air motor regulator, cycle the air motor just until the air motor shaft touches the plunger rod.</li> </ol>
OFF	<ol style="list-style-type: none"> <li>11. Turn the air motor lockout valve off and reinstall the coupling using appropriate threadlocking compound on the coupling screws. Tighten the screws evenly.</li> <li>12. <a href="#">See Figure 2</a>. Fill the solvent chamber (4) with appropriate solvent to approximately 4 cm (1.5 in.) from the top and close the pump bleed valve.</li> </ol>

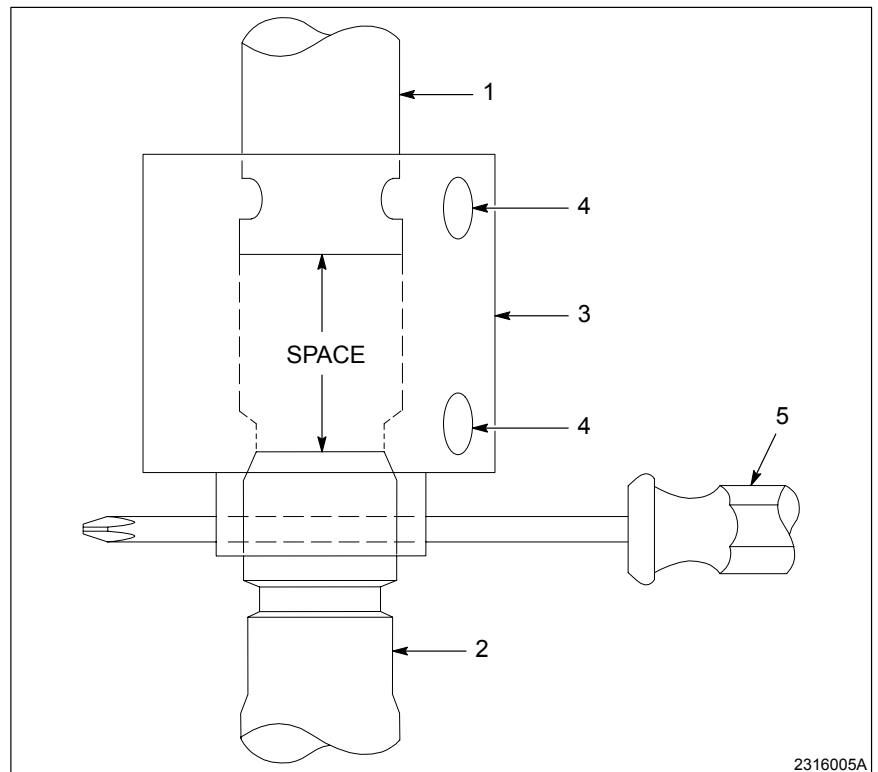


Fig. 4 Raising the Plunger

- |             |                    |
|-------------|--------------------|
| 1. Shaft    | 4. Coupling screws |
| 2. Plunger  | 5. Screwdriver     |
| 3. Coupling |                    |

## Hydraulic Section Removal

If the pump is operable, flush the system before disassembly. Refer to the *System Cleaning* procedure in the *Rhino Bulk Unloader Controls* manual. For air valve and air motor repair, refer to the *Air Valve and Air Motor* manual.

See Figure 5.

1. Place several blocks of wood on the frame base, to prevent the follower plate from contacting the drum hold down assembly. Lower the follower plate (9) to the wood blocks.



**WARNING:** To avoid injury, place the unloader in neutral until noted otherwise in this procedure. To avoid injury, you must leave the unloader in this position until otherwise directed.

2. Operate the pump until the coupling (12) is accessible. Shut off the pump.
3. See Figure 2.

Shut off the compressed air supply at the air motor lockout valve (5).



**WARNING:** Do not open the bleed valve more than three turns. The bleed valve and material may be forced from the valve body if loosened more than three turns. Personal injury could result.

4. Relieve the hydraulic pressure through the bleed valve and gun(s). Leave the bleed valve open. Bleed the air pressure to the air motor.
5. Disconnect and remove the coupling (3) from the plunger. Drain the solvent chamber (4).
6. Open the air motor lockout valve. Gradually increase the air pressure to the air motor. Close the air motor lockout valve after the plunger has been pushed to its lowest point and the air motor shaft is at the top of its range.
7. Remove the solvent chamber.
8. Disconnect the material supply hose from the pump.

9. See Figure 5.

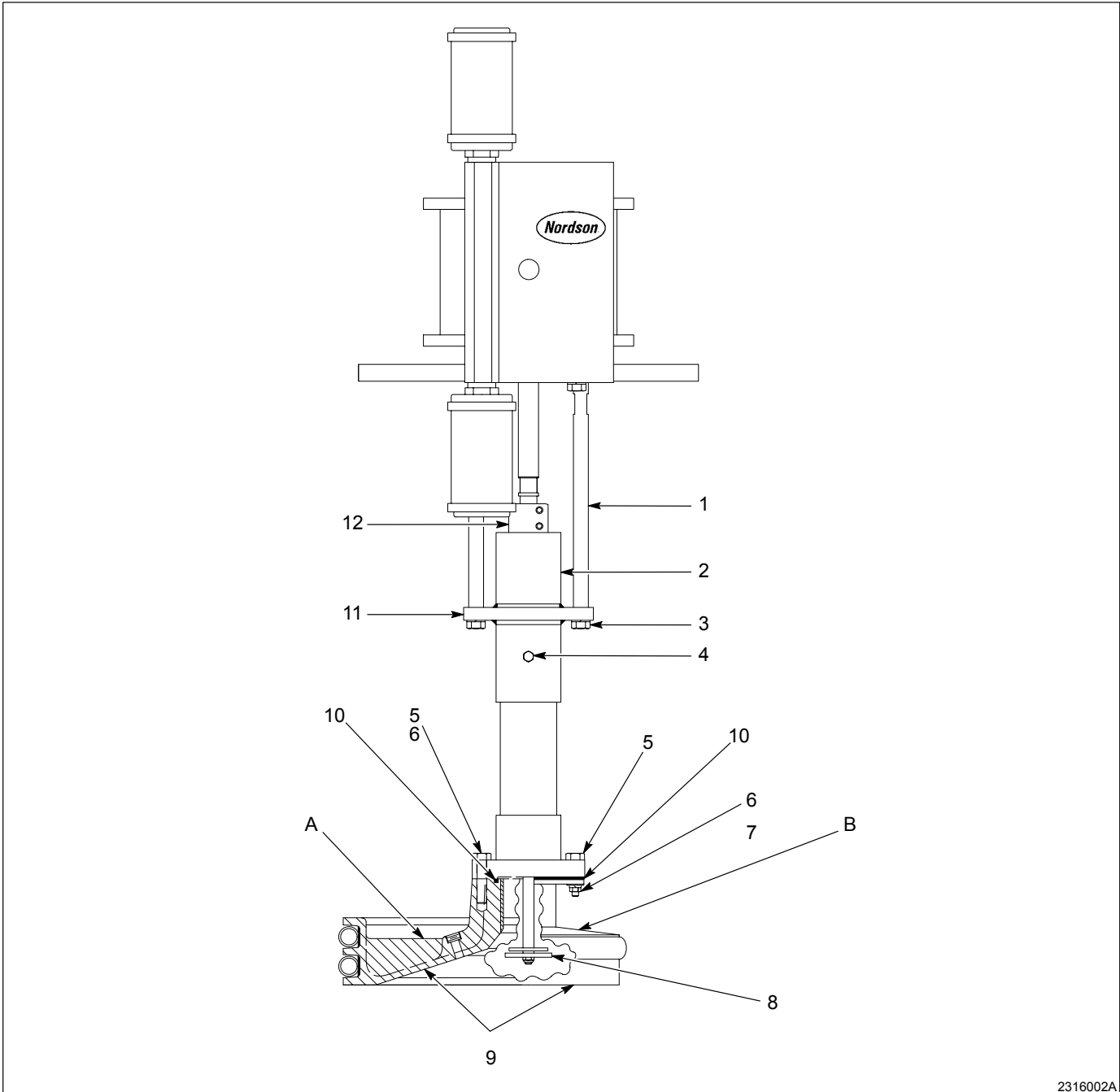
Remove the hex head screws (5), lock washers (6), and nuts (7) (pail units) that secure the hydraulic section to the follower plate.



**WARNING:** You must replace self-locking nuts every time you remove them or personal injury and equipment damage could result.

10. Remove the self-locking nuts (3) from the support rods (1). Raise the elevator until the ends of the support rods clear the mounting flange (11) and the elevator is in the full UP position.
11. Place the elevator in the NEUTRAL position.
12. Place a prop beneath the elevator so it does not drift down.
13. Lift the hydraulic section until the shovel (8) is exposed.
14. Remove the hydraulic section from the unloader and the follower plate.
15. Remove the follower plate gasket (10) (pail units) or O-ring (10) (drum units).

**Hydraulic Section Removal**  
(contd)



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Fig. 5 Hydraulic Section Removal and Installation

- |                        |                        |                                  |
|------------------------|------------------------|----------------------------------|
| A. Drum follower plate | B. Pail follower plate |                                  |
| 1. Support rods        | 5. Hex head screws     | 9. Follower plate                |
| 2. Solvent chamber     | 6. Lock washers        | 10. Gasket (pail); O-ring (drum) |
| 3. Self-locking nuts   | 7. Nuts                | 11. Mounting flange              |
| 4. Bleed valve         | 8. Shovel              | 12. Coupling                     |



## Plunger and Piston Replacement

You must remove the pump from the unloader frame in order to replace the plunger and piston. Refer to *Hydraulic Section Removal* in this section.

If the pump is operable, flush the system before disassembly. Refer to your system controls manual for more information.



**CAUTION:** To prevent damage to equipment, replace the packing gland when you remove the plunger and piston from the pump.



**CAUTION:** Always inspect all parts and wear surfaces for signs of damage before assembly. Replace all damaged or worn parts.

**NOTE:** A complete drive train kit can be ordered for pump rebuild. Refer to the *Parts* section.

## Plunger and Piston Removal

Follow these procedures to remove the plunger and piston from the hydraulic section.

See Figure 6.

1. After removing the hydraulic section from the unloader, secure it to a device so that you can unscrew the bottom pump cover (3) from the pump body (2).
2. **24:1/48:1 Pumps:** Remove the self-locking nut (7) from the bottom of the shovel assembly. Unscrew the shovel (8) then remove the plate washer (6) and washer retainer (9) from the upper check rod (10).

**32:1/65:1 Pumps:** Unscrew the shovel (8) from the upper check rod (10).

3. Install a strap wrench on the bottom pump cover and unscrew it counter-clockwise from the body.
4. Remove the O-ring (5) from the pump body. Slide the lower check (13) off the upper check rod.

**NOTE:** You have to push from the top of the plunger to remove the following assembly from the pump body.

5. Using either an arbor press or a hydraulic press, push the plunger (1), piston (15) and upper check rod assembly out of the pump body.
6. Secure the flats (14) of the upper check rod in a vise. Use a wrench to grip the flats on the plunger and unscrew it from the upper check rod.

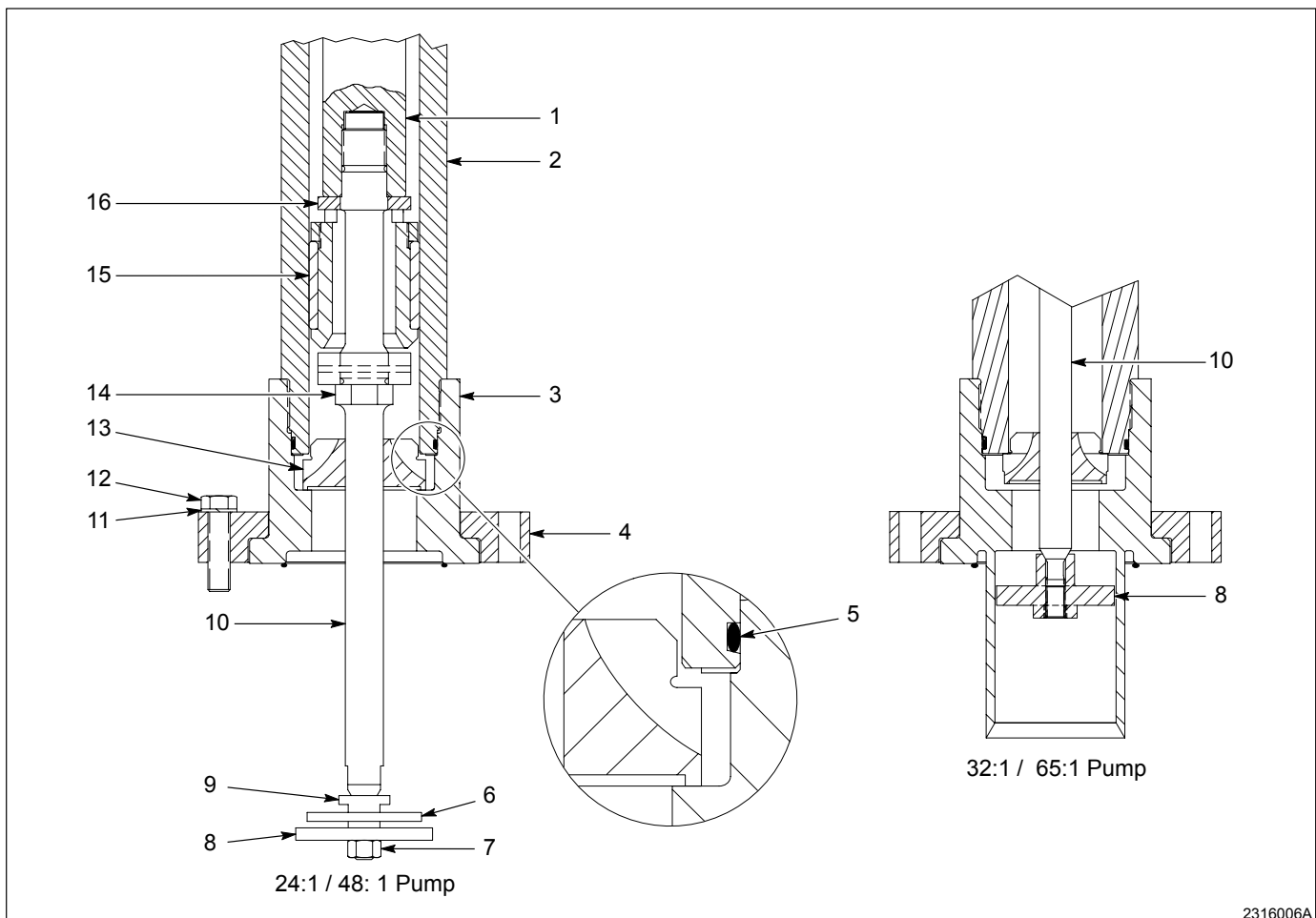
**Plunger and Piston Removal**(contd)

7. Remove the piston and spacer (16).
8. Thoroughly clean and inspect all components. Replace any of them if they are worn, scored, or distorted. You must replace the piston when you remove it from the pump.



**CAUTION:** Replace the packing gland whenever you remove the plunger and piston from the pump body for cleaning and inspection. Otherwise, the equipment can be damaged.

9. Replace the packing gland as described in the *Packing Gland Replacement* procedure earlier in this section.



2316006A

Fig. 6 Plunger and Piston Replacement

- |                         |                     |                     |
|-------------------------|---------------------|---------------------|
| 1. Plunger              | 7. Self-locking nut | 12. Hex head screws |
| 2. Pump body            | 8. Shovel           | 13. Lower check     |
| 3. Bottom pump cover    | 9. Washer retainer  | 14. Flats           |
| 4. Follower plate cover | 10. Upper check rod | 15. Piston          |
| 5. O-ring               | 11. Lock washers    | 16. Spacer          |
| 6. Plate washer         |                     |                     |

### **Plunger and Piston Installation**

1. See Figure 6. Install the piston (15) and spacer (16) on the upper check rod (10). Place removable threadlocking compound on the threads of the upper check rod and install it on the plunger (1). Tighten the check rod to approximately 108 N•m (80 ft-lb).
2. Install a new O-ring (5) on the pump body (2).
3. Lubricate the pump body bore and the outer diameter of the piston with an O-ring grease that is compatible with the material being dispensed.
4. Using either an arbor press or a hydraulic press, carefully press the plunger, piston, and upper check rod, as an assembly, into the pump body.
5. Install the lower check (13) on the upper check rod.
6. Slide the follower plate cover (4) over the bottom pump cover (3) and screw the bottom pump cover onto the pump body. Torque the bottom pump cover to 240–291 N•m (177–215 ft-lb).
7. Install the packing gland as described in the *Packing Gland Replacement* procedure earlier in this section.
8. Verify that the elevator prop is still securely in place and the elevator control valve is in the NEUTRAL position.
9. **24:1/48:1 Pumps:** Install the washer retainer (9), plate washer (6), shovel (8), and a new self-locking nut (7) onto the upper check rod.  
**32:1/65:1 Pumps:** Thread the shovel (8) onto the upper check rod and tighten to 54 N•m (40 ft-lb).
10. Using the lock washers (11) and hex head screws (12), secure the follower plate to the pump. Reinstall the pump to the unloader frame. Refer to *Hydraulic Section Installation* for procedures.

**Hydraulic Section Installation**

See Figure 5.

Verify that the elevator prop is still securely in place and the elevator control is in the NEUTRAL position before installing the hydraulic section on the unloader frame.

1. Check the follower plate gasket (10) (pail units) or O-ring (10) (drum units) and replace if damaged. Carefully insert the shovel (8) through follower plate (9) and install the hydraulic section onto the follower plate.
2. Secure the hydraulic section to the follower plate with the hex head screws (5), lock washers (6), and nuts (7) (pail units). Tighten two hex head screws and lock washers opposite each other, then two others, until all are tightened securely to 34–41 N•m (25–30 ft-lb).



**WARNING:** The elevator must be in the UP position when you remove the prop from beneath the elevator. Air could have escaped (from a leaky valve or seal on the frame) while the unloader was out of operation, causing the elevator to fall quickly. Failure to observe this warning could result in personal injury.

3. Place the elevator in the UP position and raise the elevator. Remove the prop from beneath the elevator.
4. Lower the elevator until the threaded ends of the support rods (1) project through the mounting flange (11).



**WARNING:** You must replace self-locking nuts every time you remove them or personal injury and equipment damage could result.



**CAUTION:** If the self-locking nuts are tightened at this time, the motor and pump may be mis-aligned; this may cause binding and excessive wear to moving parts and contact surfaces.

5. Loosely install new self-locking nuts (3) on the support rods.
6. Reinstall the coupling. If the plunger has stalled in the bottom of the hydraulic section, retrieve it using the procedure in Table 3, in the *Packing Gland Installation* section.
7. Tighten the self-locking nuts to a torque of 204–210 N•m (150–155 ft-lb).
8. Fill the solvent chamber (2) to 4 cm (1.5 in.) from the top with either vitalizer oil (certain high viscosity materials only) or solvent chamber fluid. Close the bleed valve (4).
9. Before starting the system, bleed the pump as described in the *Operation* section.

## ***Follower Plate Seal(s) Replacement***

You must use an approved Nordson seal or you may experience leaking from around the follower plate.



**CAUTION:** Do not damage the follower plate seal groove with sharp tools. Leakage at the seals may result if either follower plate seal groove is damaged. Replace the follower plate if either groove is damaged.

### ***Roll-On Seals***

If your unloader has replaceable roll-on follower plate seals, perform the following to replace the seals:

1. Remove the container of material from the unloader as noted in your unloader manual.
2. Turn the air motor lockout valve off.
3. Place the elevator control valve in the NEUTRAL position.
4. Turn the elevator control regulator to 0 bar/psi.
5. Remove the old seals from the grooves in the follower plate. Clean all foreign material from the follower plate grooves.
6. Coat the new seals with an O-ring grease that is compatible both with the material you wish to dispense and with the seals used. Install the new seals.

### **Heat Shrink, Adjustable Clamp-Type Seals**

This procedure details the follower plate seal replacement procedure for heat shrink, adjustable clamp-type (non-TES) seals.

#### **Removal**

1. If a container is installed on the unit, remove the follower plate from the container. Refer to your system controls manual for all specific operating procedures for your particular unloader.
  2. Turn off the air motor supply valve.
  3. Remove the container of material from the unloader.
  4. Place several blocks of wood on the frame base to prevent the follower plate from contacting the drum hold down assembly. Lower the follower plate to the wood blocks.
  5. Place the unloader in the NEUTRAL position and turn the elevator control regulator to 0 bar/psi.
  6. Place the elevator in the UP position to relieve pressure in the upper portion of the cylinder.
  7. Place the elevator in the DOWN position. The follower plate should rest on the blocks.
  8. Place the elevator in the NEUTRAL position.
  9. [See Figure 7](#). Follow these procedures to remove the seal:
    - a. Carefully cut the heat shrink tubing (1) at both seal joints.
    - b. Loosen the worm clamp (2) at each seal.
    - c. Remove the seals (3).
- NOTE:** To adjust the positioning of the worm clamp, flex the end of the seal, then insert a screwdriver into the seal to loosen or tighten the clamp.
10. Clean the follower plate seal groove.

## Installation

1. Follow these procedures to install replacement seals:
  - a. Place the new seal in its groove on the follower plate.
  - b. Tighten the worm clamps.
  - c. Center the heat shrink tubing over the seal seams.



**CAUTION:** To prevent leakage, make sure that the seal seams are at the opposite sides of the follower plate (180 degrees apart) and that the seal gap is no more than 3 mm (0.12 in.).

**NOTE:** Use a rubber mallet, if necessary, to eliminate the gap at the seal seam. Start tapping the seal 180 degrees from the seam. Tap in such a direction as to close the gap at the seal seam.

2. Use a flameless electric heat gun to heat the shrink tubing at the seal seams.
3. Coat the new seal(s) with an O-ring grease that is compatible both with the material you wish to dispense and with the seal(s) used. Install the new seal(s).
4. Replace the material container. Refer to the container changing procedures in your unloader control manual for more information.
5. Lower the follower plate into the container of material and check for material leakage.

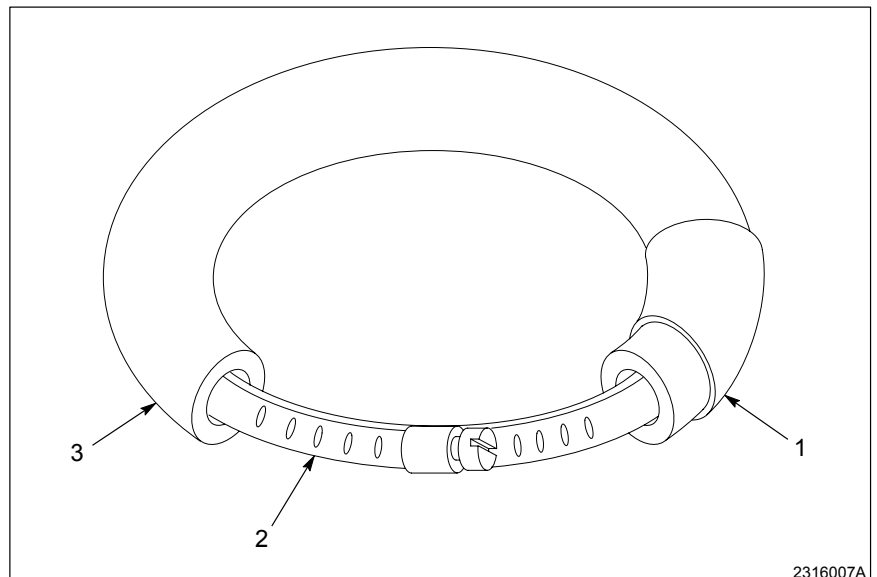


Fig. 7 Follower Plate Seal

1. Heat shrink tubing
2. Worm clamp
3. Seal





**8. Parts**

To order parts, call the Nordson Customer Service Center or your local Nordson representative. Use the 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.

Item	Part	Description	Quantity	Note
—	0000000	Assembly	1	
1	000000	• Subassembly	2	A
2	000000	• • Part	1	

- 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.

**Pump Assembly**

See Figure 8.

Item	Part	Description	Quantity	Note
—	-----	Pump assembly, 24:1/48:1 ratio	1	
—	-----	Pump assembly, 32:1/65:1 ratio	1	
—	-----	Pump assembly, 32:1/65:1 ratio, with ball valve for bleed	1	
1	249144	• Muffler, 1 <sup>1</sup> / <sub>4</sub> NPT	2	
2	-----	• Motor, air	1	A
3	230668	• Plate, mounting, motor	1	
4	227586	• Rod, connecting, pump/motor	3	
5	984260	• Nut, hex, lock, torque	3	
6	-----	• Pump, hydraulic	1	A
7	126896	• Coupling, kit	1	
NS	126895	• • Coupling, rod plunger/air motor	1	
NS	982160	• • Screw, socket, M8 x 25, zinc	4	
NS	900424	• • Compound, threadlocking, VC-3	1	
NS	295796	Muffler, reclassifier, 1 NPT	2	B
NS	329916	Kit, muffler, reclassifier	AR	C
NS	900256	Fluid, solvent chamber, 1-gal, standard	AR	D
NS	900216	Fluid, solvent chamber, 1-gal, vitalizer oil	AR	D
NS	900302	Grease, high temperature	AR	

NOTE A: Air motor and air valve parts list are located in the *7- and 10-Inch Air Motors with Air Valve* manual. Pump parts are listed later in this section.

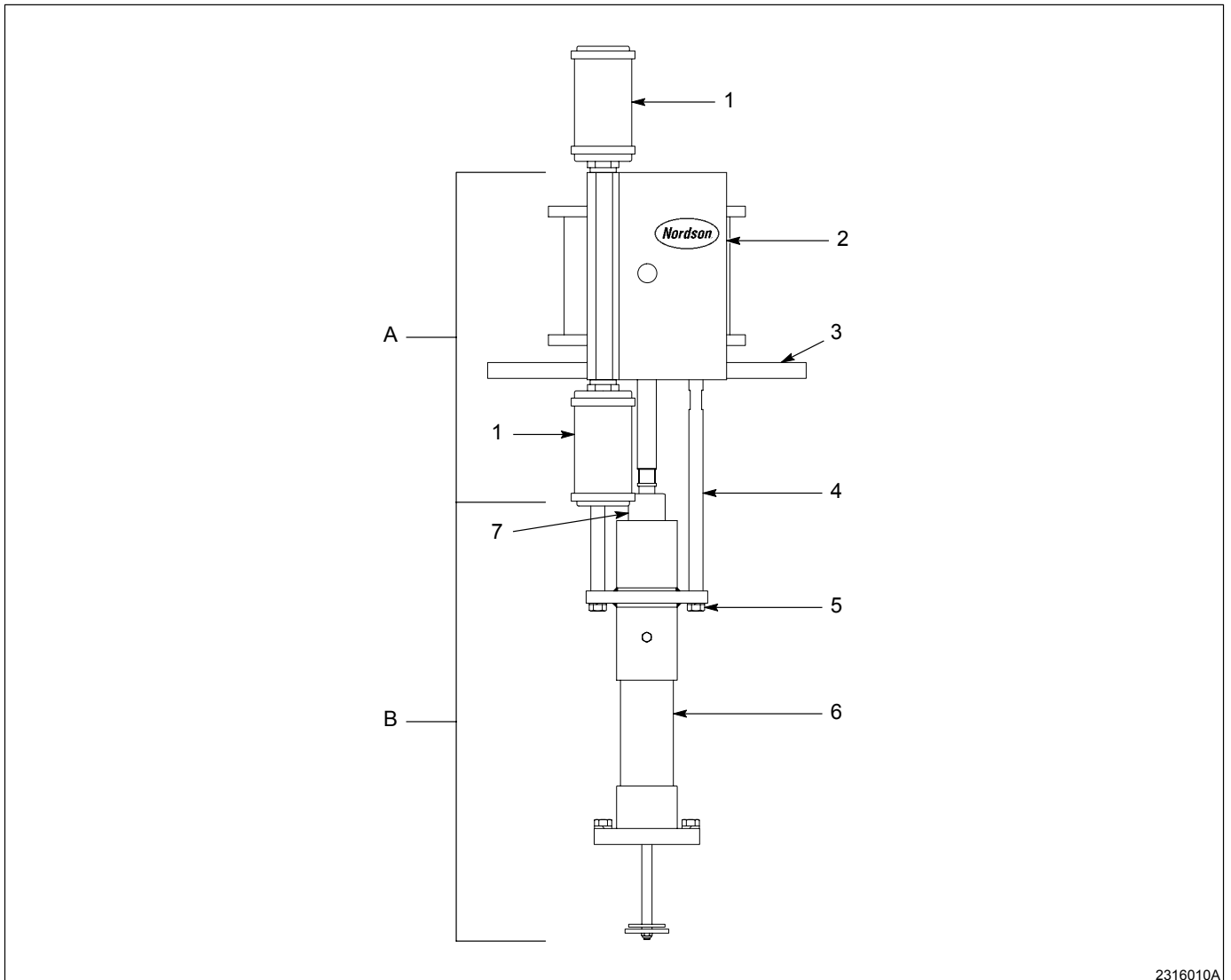
B: Reclassifiers are an option that may be installed on your unit. If you need assistance in determining which part to order for your unit, contact your Nordson representative.

C: This kit includes two reclassifiers and the fittings needed to mount the reclassifiers to the air motor.

D: Contact your Nordson representative to determine the proper solvent chamber fluid for your application.

AR: As Required

NS: Not Shown



2316010A

Fig. 8 Pump Assembly

A. Air Motor

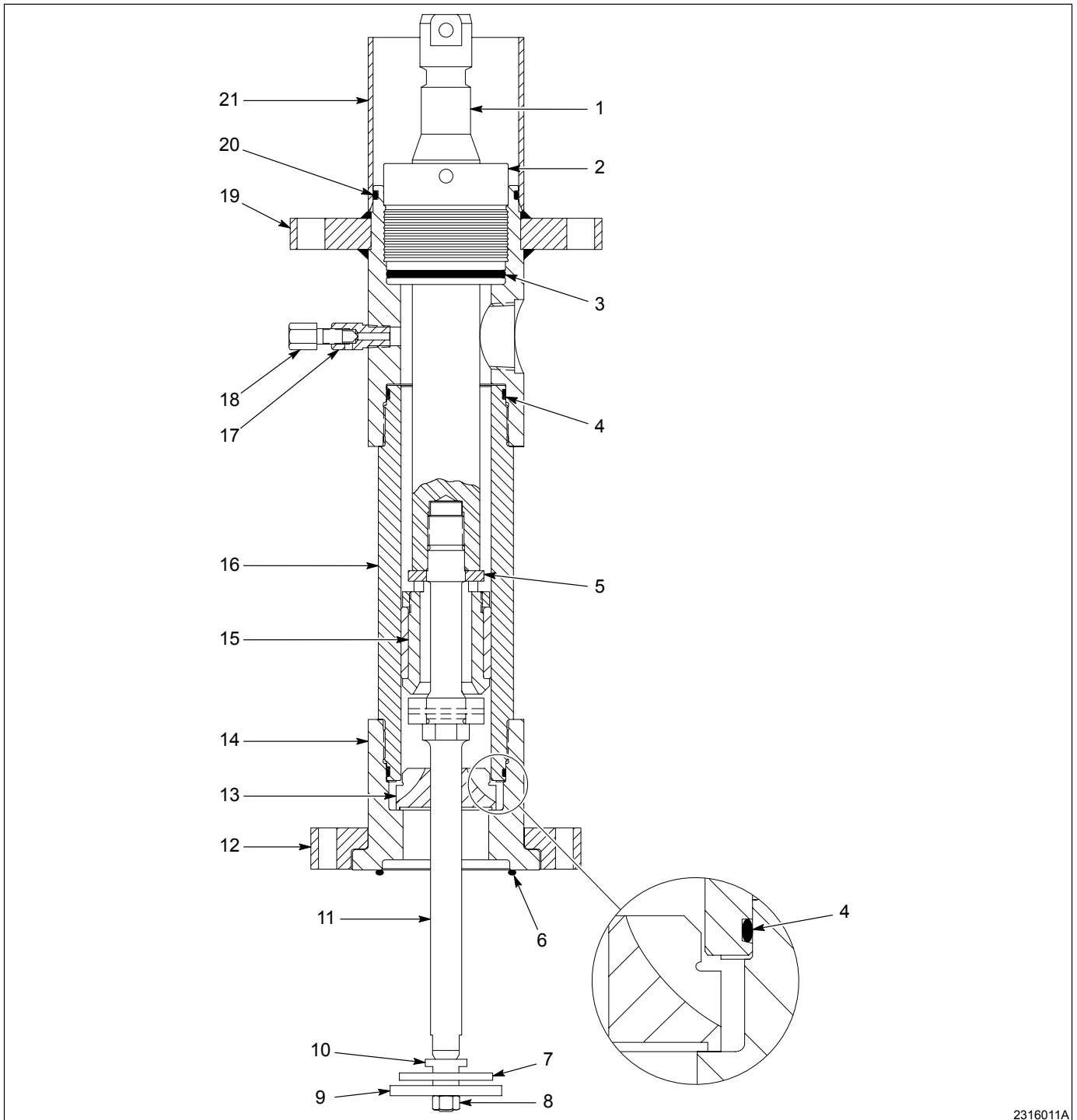
B. Hydraulic section

**24:1/48:1 Pump Parts List**

See Figure 9.

Item	Part	Description	Quantity	Note
—	225793	Pump, hydraulic section, 48:1	1	
1	225804	• Rod, plunger 48:1	1	
2	239818	• Kit, gland assembly, 48:1, screw together	1	A,B
NS	-----	• • Gland, 48:1, screw together	1	
3	942310	• • O-ring, -231, Buna-N, 70 Duro 2.609 x 2.887 x 0.13 in.	1	
4	941470	• O-ring, Viton, 2 11/16 x 2 7/8 x 3/32 in.	2	C
5	126856	• Spacer, 1.81 OD x 0.93 ID	1	
6	940410	• O-ring, Viton, 3.000 x 3.125 x 0.063 in.	1	
7	803740	• Washer, 0.656 ID x 2.250 OD	1	
8	984159	• Nut, hex, lock, 3/8-24 UNJF 3B	1	
9	126829	• Disc shovel	1	
10	803743	• Retainer, washer	1	
11	126857	• Rod, upper check, assembly, 48:1	1	D
12	225800	• Plate, cover, follower	1	
13	126908	• Plate, lower check, 48:1	1	
14	225794	• Cover, bottom pump, 48:1	1	
15	126853	• Piston, assembly 48:1	1	A
16	225797	• Body, pump mach 48:1	1	A
17	124698	• Body, bleeder, valve	1	E
18	124697	• Poppet, screw, adj	1	
19	225795	• Cover, upper, pump, 48:1/65:1	1	
20	942361	• O-ring, -236, Buna-N, 3.25 x 3.50 x 0.13 in.	1	
21	124734	• Chamber, solvent	1	

NOTE A: Coat the threads of this part with Never-Seez lubricant, part 900344, when assembling.  
 B: The packing gland is not field repairable. Replace the gland as an assembly using the 48:1 gland kit, part 239818.  
 C: Coat this part with PTFE grease lubricant, part 900349, when assembling.  
 D: Coat the threads of this part with threadlocking adhesive, part 900464, when assembling.  
 E: Coat the threads of this part with pipe/thread sealant, part 900481, when assembling.  
 NS: Not Shown



2316011A

Fig. 9 24:1/48:1 Pump

**24:1/48:1 Pump  
Recommended Spare Parts**

See Figure 9.

Nordson Corporation recommends that you stock the following spare parts in the noted quantities.

Item	Part	Description	Quantity	Note
2	239818	Kit, gland assembly, 48:1, screw together	1	A
4	941470	O-ring, Viton, 2 <sup>11</sup> / <sub>16</sub> x 2 <sup>7</sup> / <sub>8</sub> x <sup>3</sup> / <sub>32</sub> in.	2	
15	126853	Piston	1	
NS	233554	Wrench, spanner	1	
NS	1001689	Kit, gland removal tool, for <sup>3</sup> / <sub>4</sub> -in. drive wrench	1	

NOTE A: The packing gland is not field repairable. Replace the gland as an assembly.  
NS: Not Shown

**24:1/48:1 Pump Check and  
Seat Kit**

See Figure 9.

Item	Part	Description	Quantity	Note
—	306243	Kit, check and seat, 48:1 pump	1	
4	941470	• O-ring, Viton, 2 <sup>11</sup> / <sub>16</sub> x 2 <sup>7</sup> / <sub>8</sub> x <sup>3</sup> / <sub>32</sub> in.	1	A
6	940410	• O-ring, Viton, 3.000 x 3.125 x 0.063 in.	1	
13	126908	• Plate, lower check, 48:1	1	
14	225794	• Cover, bottom pump, 48:1	1	

NOTE A: Coat this part with PTFE grease lubricant, part 900349, when assembling.

**24:1/48:1 Pump Shovel Kit**

See Figure 9.

Item	Part	Description	Quantity	Note
—	306262	Kit, shovel, 48:1 pump	1	
7	803740	• Washer, 0.656 ID x 2.250 OD	1	
8	984159	• Nut, hex, lock, $\frac{3}{8}$ -24 UNJF 3B	1	
9	126829	• Disc shovel	1	
10	803743	• Retainer, washer	1	

**24:1/48:1 Pump Drive Train Kit**

See Figure 9.

Item	Part	Description	Quantity	Note
—	306239	Drive train kit, 48:1, screw together pump	1	
1	225804	• Rod, plunger 48:1	1	
2	239818	• Kit, gland assembly, 48:1, screw together	1	A
4	941470	• O-ring, Viton, 2 $\frac{11}{16}$ x 2 $\frac{7}{8}$ x $\frac{3}{32}$ in.	2	B
5	126856	• Spacer, 1.81 OD x 0.93 ID	1	
6	940410	• O-ring, Viton, 3.000 x 3.125 x 0.063 in.	1	
7	803740	• Washer, 0.656 ID x 2.250 OD	1	
8	984159	• Nut, hex, lock, $\frac{3}{8}$ -24 UNJF 3B	1	
9	126829	• Disc shovel	1	
10	803743	• Retainer, washer	1	
11	126857	• Rod, upper check, assembly, 48:1	1	C
13	126908	• Plate, lower check, 48:1	1	
15	126853	• Piston, assembly 48:1	1	A

NOTE A: Coat the threads of this part with Never-Seez lubricant, part 900344, when assembling.  
 B: Coat this part with PTFE grease lubricant, part 900349, when assembling.  
 C: Coat the threads of this part with threadlocking adhesive, part 900464, when assembling.

**32:1/65:1 Pump Parts List**

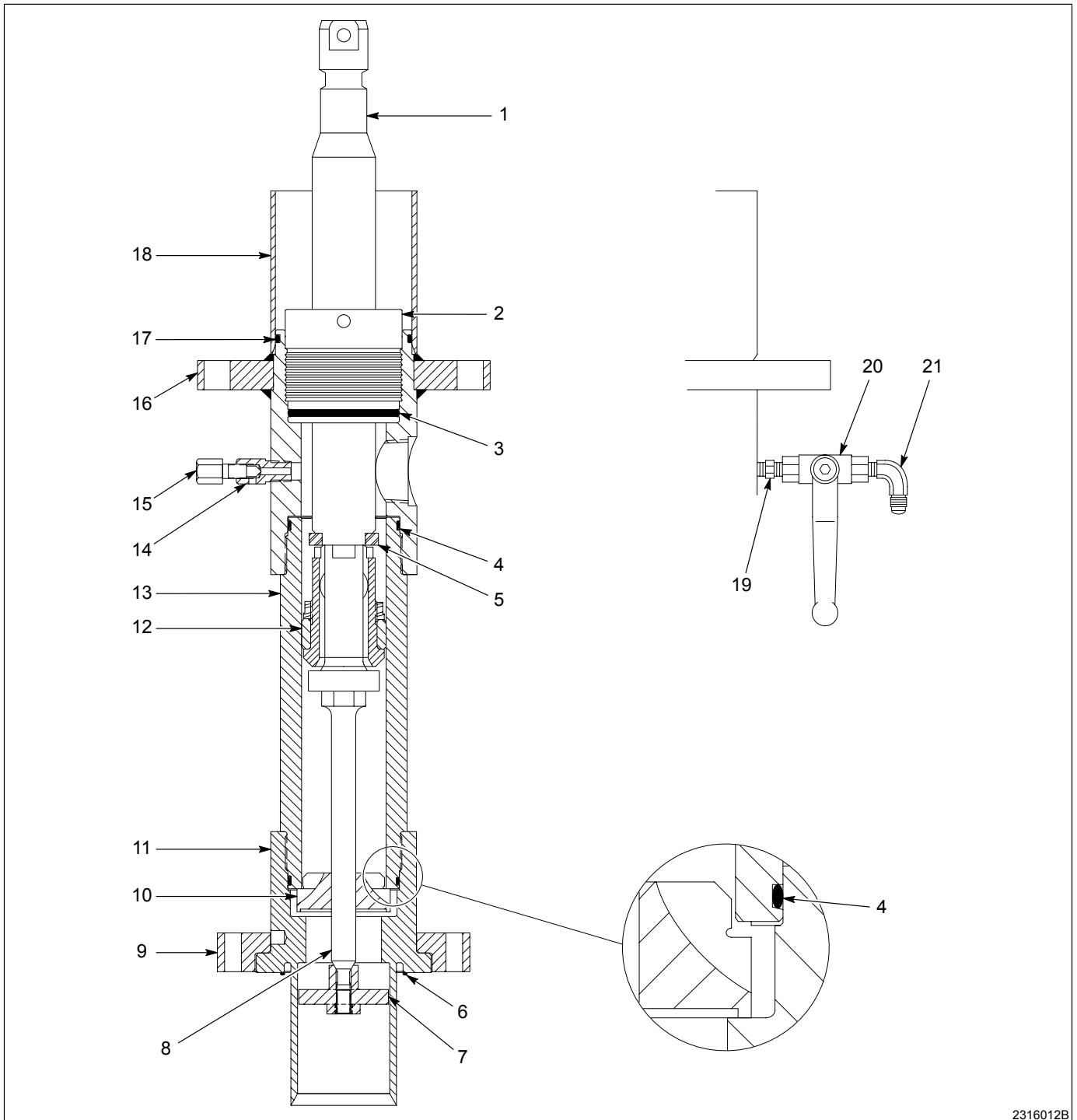
See Figure 10.

Item	Part	Part	Description	Quantity	Note
—	225791		Pump, hydraulic section, 65:1	1	
—		320843	Pump, hydraulic section, 65:1, ball valve		
1	126878	126878	• Rod, plunger, 65:1	1	
2	239819	239819	• Gland assembly, 65:1 screw together	1	A, B
NS	-----	-----	• Gland, 65:1, screw together	1	
3	942310	942310	• • O-ring, -231, Buna-N, 70 Duro, 2.609 x 2.887 x 13 in.	1	
4	941470	941470	• O-ring, Viton, 2 <sup>11</sup> / <sub>16</sub> x 2 <sup>7</sup> / <sub>8</sub> x 3 <sup>3</sup> / <sub>32</sub> in.	2	C
5	126877	126877	• Spacer, 1.50 OD x 0.93 ID x 0.25	1	
6	940410	940410	• O-ring, Viton, 3.000 x 3.125 x 0.063 in.	1	
7	295971	295971	• Plate, shovel, 2.38-in. follower	1	
8	126893	126893	• Rod, upper check, assembly	1	D
9	225800	225800	• Plate, cover, follower	1	
10	126874	126874	• Plate, lower check, 65:1	1	
11	225792	225792	• Housing, bottom, pump, 65:1	1	
12	126876	126876	• Piston, assembly 65:1 piston	1	
13	225796	225796	• Body, pump 65:1	1	A
14	124698		• Body, bleeder, valve	1	E
15	124697		• Poppet, screw, adj	1	
16	225795	225795	• Housing, upper, pump, 65:1	1	
17	942361	942361	• O-ring, Buna-N, 3.234 x 3.500 x 0.139 in.	1	
18	124734	124734	• Chamber, solvent	1	
19		973037	• Nipple, hex, 1/4 x 1/4 x 1.45, steel, zinc	1	
20		146496	• Valve, directional, manual, 2750 psi, 2-way	1	
21		972200	• Elbow, male, 37, 9/16-18 x 1/4, steel	1	

NOTE A: Coat the threads of this part with Never-Seez lubricant, part 900344, when assembling.  
 B: The packing gland is not field repairable. Replace the gland as an assembly using the 65:1 screw together type gland assembly kit, part 239819.  
 C: Coat this part with PTFE grease lubricant, part 900349, when assembling.  
 D: Coat the threads of this part with threadlocking adhesive, part 900464, when assembling.  
 E: Coat the threads of this part with pipe/thread sealant, part 900481, when assembling.

NS: Not Shown





2316012B

Fig. 10 32:1/65:1 Pump

**32:1/65:1 Pump  
Recommended Spare Parts**

See Figure 10.

Nordson Corporation recommends that you stock the following spare parts in the noted quantities.

Item	Part	Description	Quantity	Note
2	239819	Kit, gland assembly, 32:1/65:1 screw together	1	A
4	941470	O-ring, Viton, 2 <sup>11</sup> / <sub>16</sub> x 2 <sup>7</sup> / <sub>8</sub> x 3 <sup>3</sup> / <sub>32</sub> in.	2	
12	126876	Piston, assembly 65:1 piston	1	
NS	233554	Wrench, spanner	1	
NS	1001689	Kit, gland removal tool, for 3/4-in. drive wrench	1	

NOTE A: The packing gland is not field repairable. Replace the gland as an assembly.  
NS: Not Shown

**32:1/65:1 Pump Check and  
Seat Kit**

See Figure 10.

Item	Part	Description	Quantity	Note
—	306242	Kit, check and seat, 32:1/65:1 pump	1	
4	941470	• O-ring, Viton, 2 <sup>11</sup> / <sub>16</sub> x 2 <sup>7</sup> / <sub>8</sub> x 3 <sup>3</sup> / <sub>32</sub> in.	1	A
6	940410	• O-ring, Viton, 3.000 x 3.125 x 0.063 in.	1	
10	126874	• Plate, lower check, 65:1	1	
11	225792	• Housing, bottom, pump, 65:1	1	

NOTE A: Coat this part with PTFE grease lubricant, part 900349, when assembling.

**32:1/65:1 Pump Drive Train Kit**

See Figure 10.

Item	Part	Description	Quantity	Note
—	306237	Drive train kit, 32:1/65:1, screw together pump	1	
1	126878	• Rod, plunger, 32:1/65:1	1	
2	239819	• Gland assembly, 32:1/65:1 screw together	1	A
4	941470	• O-ring, Viton, 2 <sup>11</sup> / <sub>16</sub> x 2 <sup>7</sup> / <sub>8</sub> x 3 <sup>3</sup> / <sub>32</sub> in.	2	B
5	126877	• Spacer, 1.50 OD x 0.93 ID x 0.25	1	
6	940410	• O-ring, Viton, 3.000 x 3.125 x 0.063 in.	1	
8	126893	• Rod, upper check, assembly	1	C
7	295971	• Plate, shovel, 2.38-in. follower	1	
10	126874	• Plate, lower check, 65:1	1	
12	126876	• Piston, assembly 65:1 piston	1	

NOTE A: Coat the threads of this part with Never-Seez lubricant, part 900341, when assembling.  
 B: Coat this part with PTFE grease lubricant, part 900349, when assembling.  
 C: Coat this part with threadlocking adhesive, part 900464, when assembling.

**Standard Cast Drum Follower Plate Assembly**      [See Figure 11.](#)

Item	Part	Description	Quantity	Note
1	940410	O-ring, 3.00 x 3.125 x 0.063 in.	1	
2	982452	Screw, hex head, M10 x 50 mm long	4	
3	983423	Washer, flat, M10	4	
4	-----	Seal, follower plate	2	A
5	-----	Ring, Neoprene	2	A
6	-----	Plate, follower, drum	1	A

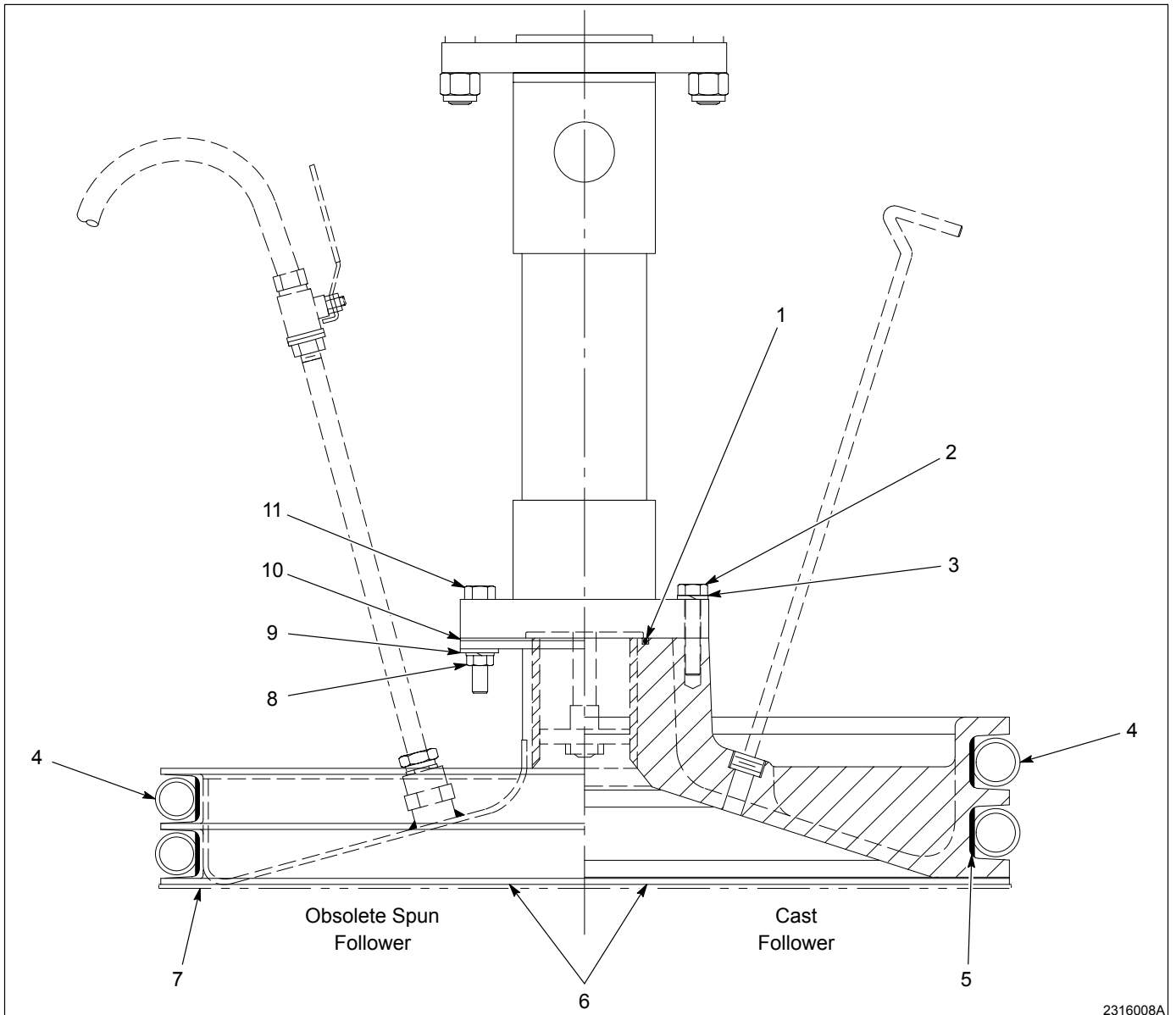
NOTE A: Refer to the following parts lists for a listing of available drum follower plates, seals, and rings.

**Spun Drum Follower Plate Assembly**      [See Figure 11.](#)

The spun follower plate is an obsolete part. Order these parts only if you have a spun follower in the field and need service parts.

Item	Part	Description	Quantity	Note
4	-----	Seal, follower plate	2	A
6	-----	Plate, follower, drum	1	A
8	984152	Nut, <sup>3</sup> / <sub>8</sub> -16	4	
9	983061	Washer, lock, <sup>3</sup> / <sub>8</sub>	4	
10	124690	Gasket	1	
11	981407	Screw, <sup>3</sup> / <sub>8</sub> -16 x 2 in. long	4	

NOTE A: Refer to the following parts lists for a listing of available drum follower plates, seals, and rings.



2316008A

Fig. 11 Drum Follower Plate Assembly

**Drum Follower Plates**

[See Figure 11.](#)

Item	Part	Description	Quantity	Note
6	281770	Plate, follower, 457 mm drum, 30-gal	1	
6	186126	Plate, follower, 571 mm drum, 55-gal	1	

**Drum Follower Plate Seals**

[See Figure 11.](#)

Item	Part	Description	Quantity	Note
4	183553	Kit, seal, 571 mm drum	1	A
4	124706	Seal, follower plate, 571 mm drum	2	B
4	165215	Seal, follower plate, 457 mm drum	2	
5	308796	Ring, Neoprene, 571 mm drum	2	B
7	282846	Ring, follower plate, 571 mm drum	1	C

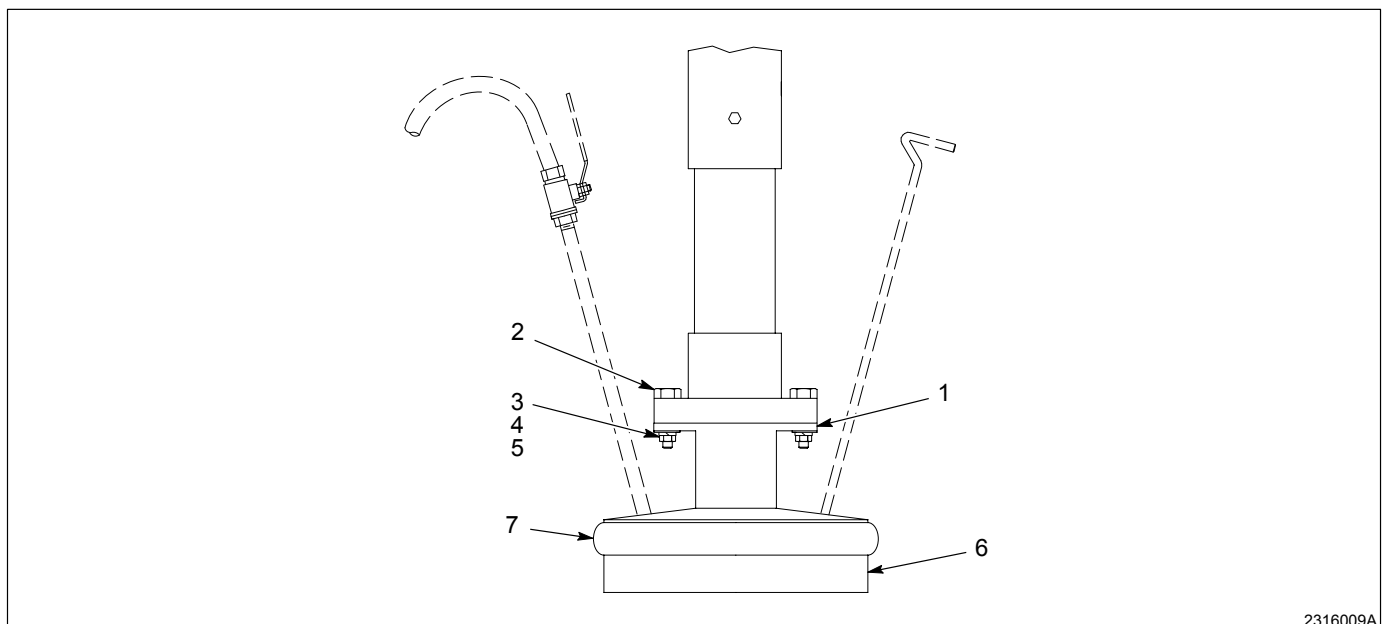
NOTE A: This kit includes two seals, two Neoprene rings, and lubricant for the seals.  
 B: The follower seal and Neoprene ring are used together on the 571 mm drum cast followers only.  
 C: Follower plate rings are used with urethane material pre-packaged in aluminum or plastic bags.

**Pail Follower Plate Assembly**

See Figure 12.

Item	Part	Description	Quantity	Note
1	124690	Gasket, follower	1	
2	981624	Screw, hex head, $\frac{3}{8}$ -16 x 2.5 long	4	
3	983061	Washer, flat	4	
4	983160	Washer, lock, split, $\frac{3}{8}$ , nickel-plated	4	
5	984152	Nut, $\frac{3}{8}$ -16	4	
6	-----	Plate, follower, pail	1	A
7	-----	Seal, follower plate	1	A

NOTE A: Refer to the following parts lists for a listing of available follower plates and seals.



2316009A

Fig. 12 Pail Follower Plate Assembly

**Pail Follower Plates**

See Figure 12.

Item	Part	Description	Quantity	Note
6	124807	Plate, follower, 280 mm	1	
6	124778	Plate, follower, 286 mm	1	
6	124860	Plate, follower, 305 mm	1	

**Pail Follower Plate Seals**

See Figure 12.

Item	Part	Description	Quantity	Note
7	274379	Seal, follower, pail, 280 mm, molded silicone, 1 piece	1	
7	274378	Seal, follower, pail, 286 mm, molded silicone, 1 piece	1	
7	124863	Seal, follower, pail, 305 mm, hydraulic hose, 3 pieces	1	A

NOTE A: Figure 7 portrays this type of follower plate seal.