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## Change Record

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>6/18</td>
<td>Released.</td>
</tr>
<tr>
<td>02</td>
<td>6/18</td>
<td>Internal record change.</td>
</tr>
</tbody>
</table>
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 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. 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.
Fire Safety (contd)

- 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:

<table>
<thead>
<tr>
<th>Element</th>
<th>Symbol</th>
<th>Prefix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluorine</td>
<td>F</td>
<td>“Fluoro-”</td>
</tr>
<tr>
<td>Chlorine</td>
<td>Cl</td>
<td>“Chloro-”</td>
</tr>
<tr>
<td>Bromine</td>
<td>Br</td>
<td>“Bromo-”</td>
</tr>
<tr>
<td>Iodine</td>
<td>I</td>
<td>“Iodo-”</td>
</tr>
</tbody>
</table>

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.
Safety Labels

Refer to Table 1-1 for the text of the safety labels and see Figure 1-1 for the location of the safety labels.

The safety label is provided to help operate and maintain equipment safely.

Table 1-1  Safety Labels

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><strong>WARNING:</strong> The following information is important to the health and safety of employees. Failure to follow the messages in this safety notice can result in personal injury, including death, or damage to the equipment or property.</td>
</tr>
<tr>
<td></td>
<td>- Allow only personnel with appropriate training and experience to operate or service the equipment. The use of untrained or inexperienced personnel to operate or service the equipment can result in injury, including death, to themselves or others, and damage to the equipment.</td>
</tr>
<tr>
<td></td>
<td>- <strong>DO NOT</strong> place any body part or portion of the body between the drum and the air manifold, or between the crossbar and the platen/follower plate.</td>
</tr>
<tr>
<td></td>
<td>- To safely operate and maintain this equipment, refer to the <em>Safety, Operation,</em> and <em>Maintenance</em> sections in the applicable product manual. Manuals are available at <a href="http://www.emanuals.nordson.com">www.emanuals.nordson.com</a>.</td>
</tr>
<tr>
<td></td>
<td>- It is very important to remember that when the ram is in the <em>Neutral</em> position, it is not mechanically locked. <em>Air pressure</em> remains in the ram cylinders. Small air leaks in the circuit could cause the ram to move. Use support blocks to prevent the ram from moving when necessary.</td>
</tr>
<tr>
<td></td>
<td>- Avoid servicing this equipment from the rear. If service from the rear is unavoidable, lock out all electric and pneumatic power sources.</td>
</tr>
<tr>
<td>2.</td>
<td><strong>WARNING:</strong> Lock out all electrical and pneumatic power sources. <strong>DO NOT</strong> place hands or body between the platen/drum and crossbar.</td>
</tr>
</tbody>
</table>
Figure 1-1  Safety Label Location
Section 2
Overview

Introduction

This document covers all components of the Rhino® SD3/XD3 Single-Post Unloader. Refer to the following sections for detailed information.

Unloader Components

Refer to Table 2-1 and see Figure 2-1.

Table 2-1  Unloader Components

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Container Level Light Tower: Indicates when the container is low or empty. The low indicator is customer adjustable.</td>
</tr>
<tr>
<td>2</td>
<td>Pneumatic Control Module: Contains the air pressure regulators and gauges for the pump air motor and the elevator control valve for the operation of the unloader. The module also contains all of the pneumatic valves for the operation of the unloader and the 5-micron filter for the control signal air supply.</td>
</tr>
<tr>
<td>3</td>
<td>Material Outlet Port: The material outlet port of the pump. See the Specifications section for port connection size.</td>
</tr>
<tr>
<td>4</td>
<td>Pail Locators: Designed for positioning the material container below the follower plate.</td>
</tr>
<tr>
<td>5</td>
<td>Blow-Off Check Valve: Opened with line pressure air to remove the follower from the material container during material changes. Air is supplied to the check valve from the control module when the blow-off valve is actuated, and only when the elevator control is in the Ram Up position.</td>
</tr>
<tr>
<td>6</td>
<td>Pump: Air-powered, dual-acting, positive-displacement pump consisting of an air motor and a hydraulic section.</td>
</tr>
<tr>
<td>7</td>
<td>Solvent Chamber: Surrounds the pump plunger and contains fluid that lubricates the plunger and packing gland seals. The fluid keeps the material from hardening on the plunger and minimizes wear on the packing gland seals.</td>
</tr>
<tr>
<td>8</td>
<td>Bleed Valve: Designed for use as a bleed port at the highest point of the pump hydraulic section. The port is used to bleed air from the pump section during initial startup and container changes.</td>
</tr>
<tr>
<td>9</td>
<td>Bleed Port: Relieves the air pressure between the follower plate and the material container during container changes. When the bleeder stem is removed, air and material exits through the bleed port on the follower plate.</td>
</tr>
<tr>
<td>10</td>
<td>Follower Plate Module: Contains an elastomer seal(s) that creates a sealed compartment when lowered into a material container. The downward movement of the follower plate forces material into the hydraulic section of the pump.</td>
</tr>
<tr>
<td>11</td>
<td>Base Plate: The base of the unloader; must be secured to the floor.</td>
</tr>
</tbody>
</table>
Unloader Components (contd)

Figure 2-1  Single-Post Unloader

1. Light tower  
2. Pneumatic control module  
3. Material outlet port  
4. Pail locator  
5. Blow-off check valve  
6. Pump  
7. Solvent cup  
8. Bleed valve  
9. Bleed port  
10. Follower plate  
11. Base plate
Pneumatic Control Module

See Figures 2-2 and 2-3.

The control module provides the pneumatic operating functions for Rhino SD3/XD3 single-post unloaders and mounts to the side of the unloaders.

The control module is configured for automatic shutdown (ASD) or automatic crossover (ACO) of the air motor. For the ACO configuration, the module will shut off the air motor of the A-unit when it reaches the empty position, and start up the air motor of the B-unit. The control module will shut off the air motor when the piston of the cylinder assembly (6) actuates the magnetic sensor (5) on the frame assembly. The magnetic sensor is mounted to a bracket (8) that is secured to the cylinder assembly tie rod (4) by a set screw (7). This position of the sensor bracket can be adjusted to correspond to the position of the follower in the material container at the empty condition. This will allow the control to shut down the pump when the material container is empty, preventing a pump runaway condition.

![Diagram of Pneumatic Control Module]
Figure 2-3  Frame Piston Sensor Assembly

1. Elbow  4. Cylinder tie rod  7. Set screw
## Control Module Symbols and Icons

See Figure 2-4.

<table>
<thead>
<tr>
<th>Symbol Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Measurement Symbol</td>
<td></td>
</tr>
<tr>
<td>Pressure Control Symbol</td>
<td></td>
</tr>
<tr>
<td>Pneumatic Reset Symbol</td>
<td></td>
</tr>
<tr>
<td>Push Button On Icon</td>
<td></td>
</tr>
<tr>
<td>Push Button Off Icon</td>
<td></td>
</tr>
<tr>
<td>Air Motor Icon</td>
<td></td>
</tr>
<tr>
<td>Up Icon</td>
<td></td>
</tr>
<tr>
<td>Down Icon</td>
<td></td>
</tr>
<tr>
<td>Elevator Icon</td>
<td></td>
</tr>
<tr>
<td>Material Container Blow-Off Icon</td>
<td></td>
</tr>
</tbody>
</table>

![Figure 2-4 Control Module Symbols and Icons](image-url)
Control Module Components

Refer to Table 2-2 and see Figure 2-5 for a description of the control module components.

Table 2-2  Control Module Components

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Air Motor Regulator:</strong> Controls the air to the pump.</td>
</tr>
<tr>
<td>2</td>
<td><strong>Control Module Lockout Valve:</strong> Allows the control module to be locked out of receiving input air pressure for service of the unloader.</td>
</tr>
<tr>
<td>3</td>
<td><strong>Elevator Air Regulator:</strong> Controls the air to the elevator cylinder.</td>
</tr>
<tr>
<td>4</td>
<td><strong>Material Container Blow-Off Valve:</strong> Activates the flow of the air to the blow-off check valve located on the follower plate, forcing air beneath the bottom of the follower plate and into the container. The pressure forces the follower out of the container.</td>
</tr>
<tr>
<td>5</td>
<td><strong>Air Motor Lockout Valve:</strong> Allows the air motor to be locked out of receiving air pressure from the control module for service.</td>
</tr>
<tr>
<td>6</td>
<td><strong>Air Motor Pressure Gauge:</strong> Displays the pressure to the air motor.</td>
</tr>
<tr>
<td>7</td>
<td><strong>Pneumatic Reset Valve:</strong> Resets the control module’s signal valves when pressed.</td>
</tr>
<tr>
<td>8</td>
<td><strong>Elevator Air Pressure Gauge:</strong> Displays the pressure to the elevator cylinder.</td>
</tr>
</tbody>
</table>
| 9    | **Elevator Control Valve:** Initiates ram movement.  
* **Ram Up** position raises the elevator and the follower plate.  
* **Ram Down** position lowers the elevator and follower plate assembly into the material container.  
* **Neutral** position stops elevator movement. **Neutral** is not a locked and secured position. The follower plate may drift downward over time. |
Figure 2-5  Control Module

2. Control module lockout valve  5. Air motor lockout valve  8. Elevator air pressure gauge
Pump

See Figure 2-6 and refer to Table 2-3 for a description of the pump components.

**NOTE:** Installation and operation are dependent upon the bulk unloader and application. Refer to the *Rhino SD3/XD3 Hydraulic Section* manual and *Rhino SD3/XD3 Air Motor* manual for detailed information.

![Diagram of Pump](image)

**Figure 2-6** Pump

1. Air motor  
2. Split coupling  
3. Solvent chamber  
4. Shovel  
5. Air motor valves  
6. Hydraulic section

**Table 2-3** Pump Components

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Air Motor:</strong> Drives the hydraulic section.</td>
</tr>
<tr>
<td>2</td>
<td><strong>Split Coupling:</strong> Connects the air motor coupling shaft to the hydraulic section plunger rod.</td>
</tr>
<tr>
<td>3</td>
<td><strong>Solvent Chamber:</strong> Contains fluid to lubricate the plunger and packing gland seal and prevents material from hardening on the plunger rod.</td>
</tr>
<tr>
<td>4</td>
<td><strong>Shovel:</strong> Forces material into the hydraulic section.</td>
</tr>
<tr>
<td>5</td>
<td><strong>Air Motor Valves:</strong> Control the direction of the air motor shaft.</td>
</tr>
<tr>
<td>6</td>
<td><strong>Hydraulic Section:</strong> Pressurizes the material and forces it out of the pump.</td>
</tr>
</tbody>
</table>
**Theory of Operation**

The following paragraphs provide theory of operation for a typical pump air motor and hydraulic section.

**Air Motor**

See Figure 2-7.

The air motor drives the hydraulic section. A five-port, three-position (5/3) main air control valve controls the direction of the air motor shaft movement.

When the air motor piston moves up and down, the proximity sensor detects a magnet on the piston. The proximity sensor sends momentary signals to a pilot valve. The pilot valve sends a positive continuous signal to the main air motor control valve for each direction of travel.

![Figure 2-7 100-mm Air Motor](image-url)
Theory of Operation (contd)

Hydraulic Section

See Figure 2-8.

The hydraulic section has a shovel attached to the end of the hydraulic plunger that projects into the center of the follower plate. The shovel moves up and down with the plunger, helping to force material into the hydraulic section. The hydraulic section pressurizes the material and forces it out of the pump.

When the plunger strokes downward, the piston/upper check opens and the lower check closes. Material between the upper and lower checks is forced upward through the piston. The material above the upper check pressurizes and flows out of the material output port.

During the upward pump stroke, the plunger and shovel are pulled upward and the piston/upper check closes. The lower check opens and allows material to pass into the lower pump chamber below the upper check. As the plunger and piston move upward, material from the upper pump chamber is forced out of the material outlet port.

The solvent chamber surrounds the plunger. The chamber contains solvent chamber fluid that lubricates the plunger and packing gland seal. This fluid keeps material from hardening on the plunger and minimizes wear on the packing gland seal.
Figure 2-8  Hydraulic Section
Bleed Valve

See Figure 2-9. The bleed valve is used to relieve material pressure and purge air from the system during pump priming. The bleed valve is located on the hydraulic section near the material outlet.

**NOTE:** Do not open the bleed valve more than three turns. The bleed valve and material may be forced from the valve body.

**NOTE:** The bleed valve can be used with the included handle for tool-free operation, or the handle can be removed, therefore requiring a wrench for operation.

**NOTE:** For clarity, some parts are not shown or are enlarged.
Follower Module

See Figure 2-10.

The follower module attaches onto the hydraulic section of the pump. It is designed to force material out of straight-sided containers. Follower plate modules are available to fit the following container inside diameters:

<table>
<thead>
<tr>
<th>O-ring</th>
<th>Wiper</th>
</tr>
</thead>
<tbody>
<tr>
<td>280 mm</td>
<td></td>
</tr>
<tr>
<td>286 mm</td>
<td></td>
</tr>
<tr>
<td>305 mm</td>
<td>280–286 mm</td>
</tr>
<tr>
<td>310 mm</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2-10 Follower Modules

1. Pump
2. Follower plate
3. Bleeder stem
4. Bleeder stem adapter
Follower Module (contd)

The follower plate (2) has one elastomer seal. When the follower plate is lowered into a container, the elastomer seal causes the material to pressurize by creating a tight seal around the inside diameter of the container. When the pump cycles, the follower plate forces the material out of the container and into the pump hydraulic section. The elastomer seal also protects the material from moisture and contamination from the surrounding environment.

Lowering the follower plate module into a container will cause air buildup between the bottom of the follower plate (2) and the material. Loosen the bleeder stem (3) from the adapter (4) before lowering the follower plate to provide a path for the air to vent.

The blow-off check valve allows air to enter the area below the follower plate. The blow-off check valve connects to the Rhino® unloader control module with tubing. When the elevator is in the Up position and the blow-off valve is triggered, air flows under the follower plate (2). This pressure forces the container off of the follower plate.
Options

**Container Level Light Tower**

See Figure 2-11.

The container level light tower indicates when the container is low or empty. The *low* indicator has a customizable location.
**Container Hold-Down**

See Figure 2-12.

The container hold-down is used to secure the material container in place during a container change.
**Material Output Gauge**

See Figure 2-13.

The material output gauge connects to the hydraulic section pump outlet manifold and measures the material output pressure.

![Material Output Gauge Diagram](image-url)

Figure 2-13  Material Output Gauge
Specifications

WARNING: Use Nordson or equivalent nylon or PTFE fluid hoses with electrical continuity between fittings. Hoses must be capable of withstanding the maximum output pressure of the pump. Use flexible hoses between the pump and the fluid system to dampen vibrations.

Dimensions and Weight

<table>
<thead>
<tr>
<th>Description</th>
<th>Dimension</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (ram down)</td>
<td>54.1 in.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>82.7 in.</td>
<td>A</td>
</tr>
<tr>
<td>Depth (front to back)</td>
<td>19 in.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19.9 in.</td>
<td>A</td>
</tr>
<tr>
<td>Width</td>
<td>24.5 in.</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>230–260 lb</td>
<td>B</td>
</tr>
</tbody>
</table>

NOTE A: Dimension includes container level light tower.

B: Weight depends on options, such as container level light tower and container hold-down.

Connections

<table>
<thead>
<tr>
<th>Description</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air inlet</td>
<td>½-in. NPT</td>
</tr>
<tr>
<td>Material outlet size</td>
<td>–12 SAE</td>
</tr>
</tbody>
</table>
Consumable Items

Keep the following on hand when repairing the pump.

Adhesives, Sealants, and Lubricants

Use these adhesives, sealants, and lubricants for maintenance and repairs.

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>900439</td>
<td>ADHESIVE, Loctite® Threadlocker Red 271™</td>
</tr>
<tr>
<td>900464</td>
<td>ADHESIVE, Loctite Threadlocker Blue 242®</td>
</tr>
<tr>
<td>900481</td>
<td>ADHESIVE, Loctite High Temp SS567™</td>
</tr>
<tr>
<td>156289</td>
<td>LUBRICANT, Mobil SHC™ 634</td>
</tr>
<tr>
<td>900344</td>
<td>LUBRICANT, Never-Seez®</td>
</tr>
</tbody>
</table>

Solvent Chamber Fluid

Solvent chamber fluid lubricates the plunger and reduces upper packing wear. Solvent chamber fluid is not shipped with the pump.

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>900255</td>
<td>FLUID, type-K, pump chamber, 1 qt</td>
</tr>
<tr>
<td>156289</td>
<td>LUBRICANT, Mobil SHC 634</td>
</tr>
</tbody>
</table>
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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.

Installation Procedure

CAUTION: Read and understand this entire section before performing any installation procedures. Contact a local Nordson representative with questions regarding the installation of this equipment.

WARNING: Personnel performing these procedures must know how to safely operate the unloader elevator controls.

Review the following before installing the unloader into a system:

- Install a customer-supplied shutoff valve in the air supply line to isolate the unloader for maintenance or other procedures.
- The maximum main air supply pressure is 100 psi (7 bar).
- Install a customer-supplied air filter to supply clean, dry shop air filtered to 5 microns.
- The main air supply to the unloader must be at least 60 psi (4.83 bar) and filtered to 5 microns.
- The material outlet port is -12 SAE.
- Use hose supports in applications where the material hose is suspended by an overhead tool balancer or similar device to prevent hose damage. Route the hose in a manner that prevents kinking and abrasion.

WARNING: When operating the elevator control valve, it is important to remember that Neutral is not a locked and secured position. The follower module may drift downward over time.
Unpack the Unloader

1. Remove the unloader from the packing crate and pallet. Perform the following:
   - Examine all surfaces for evidence of dents, scratches, corrosion, and other physical damage.
   - Report any damage to a Nordson representative.

Install the Unloader

1. Position the unloader at a location that allows access to the front of the unloader. Secure the unloader to the floor in the desired location using the holes provided in the frame base plate.
2. Set the elevator regulator and air motor regulator to 0 psi/bar. Make sure the elevator control valve is in the Neutral position and the air motor ball valve is closed.
3. Connect the main air supply line to the pneumatic supply port.
4. Connect the material hose to the material outlet port.
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.

CAUTION: To prevent damage to the follower plate and seals, never use a damaged material container.

WARNING: When operating the elevator controls, it is important to remember that Neutral is not a locked and secured position. The follower plate may drift downward over time.

First-Time Startup

This procedure applies only to starting up a new system for the first time.

Refer to Table 4-1 and see Figure 4-1.

1. Make sure the solvent chamber is properly filled with solvent chamber fluid.
   • Pour the solvent chamber fluid into the solvent chamber until it is within 1.5 in. (38 mm) from the top of the solvent chamber.
2. Place the elevator control valve (9) in the Neutral position.
3. Set the air motor regulator (1) to 0 psi/bar.
4. Set the elevator air regulator (3) to 30 psi (2 bar).
5. Close the air motor lockout valve (5).
6. Make sure the air hoses and material delivery hose are not kinked or pinched.
7. Place the elevator control valve (9) in the Ram Up position to raise the follower plate.
8. Inspect the material container for dents or other damage. Do not use a damaged container.
CAUTION: To prevent damage to the follower plate seal, do not use petroleum-based products; use grease.

9. Coat the follower plate seal with grease.

10. Place the container of material between the pail locators and center it under the follower plate.

11. Remove the bleeder stem from the bleeder stem port to relieve any air trapped under the follower plate.

WARNING: Wear protective clothing, gloves, and safety glasses when lowering the follower plate into the container. The expelled air from under the follower plate may contain material.

NOTE: It may be necessary to increase the elevator cylinder pressure when using high-viscosity material to ensure proper operation of the cylinder assembly and to prevent the pump from losing contact with the material. Use the minimum air pressure necessary to operate the elevator.

12. Place the elevator control valve (9) in the Ram Down position and slowly lower the follower plate into the open container of material. To stop the follower plate, place the elevator control valve in the Neutral position.

13. Perform the following:
   a. When material begins to flow from the fitting on the bleeder stem port, place the elevator control valve (9) in the Neutral position.
   b. Install the bleeder stem into the bleeder stem port and tighten securely. Use a rag to remove excess material around the bleeder stem/blow-off port.

14. Place the elevator control valve (9) in the Ram Down position to force material into the pump.

15. Set the air motor pressure to 0 psi, then open the air motor lockout valve (5).
WARNING: To prevent personal injury, do not open the bleed valve more than two or three turns.

16. Bleed the pump.
   a. Carefully open the bleed valve. The bleed valve achieves full flow by turning the valve handle a 1/4 turn.
   
   NOTE: Do not open the bleed valve more than three turns.
   
   b. Slowly increase the air motor pressure until material begins to flow from the bleed valve.
   c. Leave the valve open until the material flow is continuous and any trapped air in the hydraulic section vents.
   d. Close the bleed valve.

17. Make sure the hose and applicator are secured and the applicator is not pointing at any personnel in the area.

18. Trigger the applicator(s) to bleed off air in the lines.

19. Adjust the air motor regulator (1) to increase pressure until the applicator dispenses material that flows smoothly, continuously, and without air bubbles.

Table 4-1 Control Module Components

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Air Motor Regulator:</strong> Controls the air to the pump.</td>
</tr>
<tr>
<td>2</td>
<td><strong>Control Module Lockout Valve:</strong> Allows the control module to be locked out of receiving input air pressure for service of the unloader.</td>
</tr>
<tr>
<td>3</td>
<td><strong>Elevator Air Regulator:</strong> Controls the air to the elevator cylinder.</td>
</tr>
<tr>
<td>4</td>
<td><strong>Material Container Blow-Off Valve:</strong> Activates the flow of the air to the blow-off check valve located on the follower plate, forcing air beneath the bottom of the follower plate and into the container. The pressure forces the follower out of the container.</td>
</tr>
<tr>
<td>5</td>
<td><strong>Air Motor Lockout Valve:</strong> Allows the air motor to be locked out of receiving air pressure from the control module for service.</td>
</tr>
<tr>
<td>6</td>
<td><strong>Air Motor Pressure Gauge:</strong> Displays the pressure to the air motor.</td>
</tr>
<tr>
<td>7</td>
<td><strong>Pneumatic Reset Valve:</strong> Resets the control module’s signal valves when pressed.</td>
</tr>
<tr>
<td>8</td>
<td><strong>Elevator Air Pressure Gauge:</strong> Displays the pressure to the elevator cylinder.</td>
</tr>
</tbody>
</table>
| 9    | **Elevator Control Valve:** Initiates ram movement.  
   - *Ram Up* position raises the elevator and the follower plate.  
   - *Ram Down* position lowers the elevator and follower plate assembly into the material container.  
   - *Neutral* position stops elevator movement. *Neutral* is not a locked and secured position. The follower plate may drift downward over time. |
Figure 4-1  Control Module

1. Air motor regulator
2. Control module lockout valve
3. Elevator air regulator
4. Material container blow-off valve
5. Air motor lockout valve
6. Air motor pressure gauge
7. Pneumatic reset valve
8. Elevator air pressure gauge
9. Elevator control valve
Container Change Procedure

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

Severe personal injury could result if hands or fingers are caught between the follower plate and container. Keep hands clear of this area.

Do not open the bleed valve more than three turns. The bleed valve and material may be forced from the valve body.

See Figure 4-2.

1. Set the air motor lockout valve (1) to Off.
2. Place the elevator control valve (4) in Neutral.
3. Press and hold the material container blow-off valve (3).
4. Place the elevator control valve (4) in Ram Up. If the container (6) begins to rise off the unloader base plate (11), place the elevator control valve in Neutral to allow the container to return to the unloader frame. Then, place the elevator control valve in Ram Up.
5. Raise the elevator until it reaches its maximum height, clear of the container (6).
6. Release the material container blow-off valve (3).
7. Unlatch the hold-down (if used) and remove the old container. Center a new, undamaged container (6) under the follower plate (10). If used, latch the hold-down.
8. Coat the follower plate seal (5) with a compatible lubricant if required.
9. Remove the bleeder stem (9).
10. Press the pneumatic reset valve (7). Then, place the elevator control valve (4) in Ram Down to apply downward force to the elevator.
11. Allow air to bleed from the bleeder stem fitting as the follower (10) moves downward. When material starts to continuously flow from the bleeder stem fitting, place the elevator control valve (4) in Neutral.
12. Install the bleeder stem (9) and wipe excess material.
13. Place the elevator control valve (4) in Ram Down to apply downward force to the elevator.
14. Decrease the air motor regulator (2) to 0 psi, then set the air motor lockout valve (1) to On.
Container Change Procedure (contd)

15. Open the bleed valve (8) no more than three turns. Bleed the remaining air through the bleed valve and dispense guns into an appropriate disposable container.

16. Slowly increase the air motor pressure until the pump starts to cycle. Continue cycling the pump at this slow cycle rate to bleed the air from the system.

17. After all the air is bled, close the bleed valve (8).

18. Adjust the air motor regulator (2) to the desired operating pressure set point.

Figure 4-2  Container Change Procedure

1. Air motor lockout valve
2. Air motor regulator
3. Material container blow-off valve
4. Elevator control valve
5. Follower plate seal
6. Container
7. Pneumatic reset valve
8. Bleed valve
9. Bleeder stem
10. Follower plate
11. Unloader base plate
Pump Operation

Refer to Table 4-1 and see Figure 4-1.

Basic Operation

A container of adhesive or sealant material is centered between the pail locators and under the follower plate. The elevator consists of an air-driven piston that lowers the follower plate into the container of material. The elastomer seal around the outer edge of the follower plate creates an airtight compartment below the follower plate. Downward movement of the follower plate forces material into the hydraulic section of the pump.

When the piston of the elevator cylinder activates the magnetic sensor at the bottom of the ram cylinder, the control will shut off air supply to the air motor, signaling that the material container is empty. Follow the Container Change Procedure on page 4-5 to complete the container change procedure.

Pneumatic Controls

The operating controls for the unloader are completely pneumatic. Clean, dry shop air filtered to 5 microns (filter is supplied by the customer) is supplied to two pressure regulators: one for the pump air motor and one for the elevator cylinder. The blow-off air supply is taken from input line pressure.

Air Motor Supply

The regulated air supply flows through a shut-off valve before it enters the pump air motor.

Unregulated air at full shop pressure is supplied to the pilot valve. This valve supplies pilot air to the main motor control valve. This higher-pressure signal air enables the air motor to make rapid directional changes regardless of the regulated supply air setting.
Elevator and Blow-Off Air Supply

The control module is fully pneumatic. Shop air pressure is supplied to the control when the control module lockout valve is opened. Opening this lockout valve allows for operation of the elevator control valve and the material container blow-off valve. Air pressure to the air motor regulator, as well as the signal valves in the control and air motor, are also activated. Air pressure is only supplied to the air motor when the air motor lockout valve is opened. The air supply to the pilot, intermediate, and material container blow-off valves is at full shop pressure.

The regulated air supply for the elevator cylinder flows to a three-position elevator control valve. The valve controls the flow of air to the elevator cylinder. The elevator control valve has three positions: *Ram Up*, *Ram Down*, and *Neutral*.

- **Ram Up** position: Air enters the bottom of the cylinder. Air above the elevator cylinder piston is vented. The air pressure forces the cylinder piston upward, which raises the follower plate and pump.
- **Ram Down** position: Air enters the top of the cylinder. Air below the elevator cylinder piston is vented. The air pressure forces the cylinder piston downward, which lowers the follower plate and pump.
- **Neutral** position: There is no pressure to the elevator cylinder. The follower plate should remain stationary, since the air pressure to both sides of the piston is sealed.

**WARNING:** The *Neutral* position is not a locked and secured position. The follower plate may drift downward over time.

Unregulated air at full shop pressure is supplied to the material container blow-off valve when the following conditions are achieved:

1. The elevator control valve is in the *Ram Up* position.
2. The air pressure on the elevator cylinder *Ram Up* piston is greater than the elevator cylinder *Ram Down* piston by more than 2 psi.
3. The button of the material container blow-off valve is pressed and held.

**NOTE:** Air supply to the material container blow-off valve can be achieved with the elevator control valve in the *Neutral* position if condition #2 is satisfied.

The blow-off feature routes air under the follower plate during the removal of an empty container. The blow-off check valve connects to the follower blow-off port. Pressing and holding the push button on the blow-off valve forces air under the follower plate. The air pressure forces the container off of the follower plate. The elevator control valve must be in the *Ram Up* position for the blow-off valve push button to activate air pressure to the bottom of the follower.

Following the drum change procedure and loading of the new material container, the pneumatic reset valve must be pressed to reset the air motor’s control valves to begin operation of the air motor.
Maintenance

This section details the preventative maintenance procedures for the unloader. The frequencies listed are only guidelines. Always perform preventative maintenance procedures according to your facility maintenance schedule.

It may be necessary to adjust frequencies due to the facility environment, process parameters, material being applied, or experience.

**WARNING:** Never use halogenated hydrocarbon solvents to clean aluminum parts or to flush any system. Cleaning agents, coatings and paints, or adhesives may contain halogenated hydrocarbon solvents. Obtain and read the SDS for each material and solvent being used.

**WARNING:** Always relieve system pressure before servicing equipment. Trigger all dispensing devices and bleed off system pressure.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Item</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>Customer-Supplied Air Filter/Separator</td>
<td>Drain the accumulated water if necessary.</td>
</tr>
<tr>
<td></td>
<td>Lines and Hoses</td>
<td>Check all hydraulic and pneumatic connections and tighten them if required. Inspect all pneumatic tubing for bends or kinks.</td>
</tr>
<tr>
<td></td>
<td>Material Supply</td>
<td>Make sure the material supply is free of dust and other contaminates. Contaminates may affect pump performance or clog the applicator.</td>
</tr>
<tr>
<td></td>
<td>Regulator Settings</td>
<td>Check the air motor regulator and elevator regulator settings and adjust if necessary.</td>
</tr>
<tr>
<td></td>
<td>Solvent Chamber</td>
<td>Check the level of fluid in the solvent chamber. Refill the solvent chamber with fluid if necessary. Refer to the <em>Pump</em> section in this manual for the solvent chamber fluid type and part number if necessary.</td>
</tr>
<tr>
<td>Weekly</td>
<td>Unloader</td>
<td>Clean the top of the unloader cylinders. Clean any material from the top of the follower plate and around the follower plate seal.</td>
</tr>
<tr>
<td></td>
<td>Follower Plate Seal</td>
<td>Inspect the follower plate seal for damage or signs of excessive material leakage and replace if necessary. Refer to the <em>Follower</em> section in this manual for replacement procedures.</td>
</tr>
<tr>
<td></td>
<td>Solvent Chamber</td>
<td>Replace the solvent chamber fluid. If necessary, use a pick to remove any material blocking the outlet port.</td>
</tr>
<tr>
<td></td>
<td>Pump</td>
<td>Refer to the <em>Rhino SD3/XD3 Hydraulic Section Manual</em> and <em>Rhino SD3/XD3 Air Motor Manual</em> for maintenance procedures.</td>
</tr>
</tbody>
</table>
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## 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.

These troubleshooting procedures cover only the most common problems. If the problem cannot be solved with the information given here, contact a local Nordson representative for assistance.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>Air motor does not work.</strong>&lt;br&gt;Note: Refer to the Pumps section in this manual for location of the components referenced in these procedures.</td>
<td>No air supply, inadequate air supply.&lt;br&gt;Blocked hydraulic system.&lt;br&gt;Air motor regulator malfunction.&lt;br&gt;Magnetic proximity sensor not functioning.</td>
<td>Check the air supply and operating pressure.&lt;br&gt;Check hoses, applicators, and other components in the hydraulic system.&lt;br&gt;Check the air motor regulator and replace if necessary. &lt;br&gt;Perform the following:&lt;br&gt;1. Disconnect the signal and output air lines from the magnetic proximity sensor.&lt;br&gt;2. Actuate the sensor with a magnet to verify the pneumatic signal is present. Replace the magnetic proximity sensor if the pneumatic signal is not present.</td>
</tr>
<tr>
<td>Problem</td>
<td>Possible Cause</td>
<td>Corrective Action</td>
</tr>
<tr>
<td>---------</td>
<td>---------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Pilot valve not functioning.</td>
<td>Perform the following: 1. Lock out the air to the unloader. 2. Disconnect the signal and output air lines from the pilot valve. 3. Connect an air gauge at the end of each output air port. 4. Turn on the air supply to the unloader. Manually actuate each magnetic proximity sensor. 5. Verify the pneumatic signal is alternating between the air gauges. Replace the pilot valve if the pneumatic signal does not alternate between the air gauges.</td>
<td></td>
</tr>
<tr>
<td>Air motor main control valve not functioning.</td>
<td>Check the magnetic proximity sensors and the pilot valve. If the magnetic proximity sensors and the pilot valve are functioning, replace the air motor main control valve.</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** Refer to the *Pumps* section in this manual for location of the components referenced in these procedures.

2. **Air motor is leaking excessively or constantly.**

   **NOTE:** Refer to the *Pumps* section in this manual for location of the components referenced in these procedures.

   | Worn cylinder seal. | Listen for air leaking from the seal where the piston rod exits the cylinder head. Replace the cylinder if air leaks are heard. Replace the air motor main control valve or the cylinder. These valves cannot be repaired and must be replaced. Order new valves. Refer to the *Rhino SD3/XD3 Air Motor* manual for ordering information. |
   | Air leaks from the air valve exhaust ports. Worn magnetic proximity sensors or pilot valve. | |

*Continued...*
<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
</table>
| 3. Elevator does not work. | Malfunctioning elevator regulator, or damaged elevator control valve. | 1. Set the elevator air regulator to 0 psi/bar.  
2. Disconnect the air supply.  
3. Disconnect the tubing at the top and bottom of the control valve.  
4. Connect the air supply. Set the elevator regulator to 10 psi (0.7 bar).  
5. Operate the elevator control valve. Listen for air flowing from the tubing connections. If air flow is not heard, replace the elevator control valve.  
6. If there is not an air pressure reading at the gauge, perform the following:  
   a. Shut off the air supply and remove the gauge.  
   b. Turn on the air supply and check for air flowing from the regulator. If there is no air flow, replace the regulator.  
7. Connect all components.  
   Elevator air cylinder seals worn or damaged; piston is binding in the cylinder.  
   If the problem was not solved using the above procedure, replace the air cylinder. Refer to the Rhino SD3/XD3 Frames manual for rebuild procedures. |
| 4. Blow-off assembly is not working. | No air supply pressure. | Check the air supply. Make sure that the elevator control valve is in the Ram Up position when attempting to operate the blow-off feature.  
Refer to Problem 3, Elevator does not work for the corrective action.  
1. Set the elevator air regulator to 0 psi/bar.  
2. Remove the blow-off tube.  
3. Adjust the air pressure to 10 psi (0.7 bar). Listen for air pressure.  
   • If no air is present, replace the blow-off valve.  
   • If air is present, make sure that it is flowing out of the bottom of the follower plate when tubing is reconnected. |

Continued...
<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blow-off check valve or hose clogged with material.</td>
<td>Check the blow-off check valve and tube for clogged material and clean if necessary.</td>
<td></td>
</tr>
</tbody>
</table>

5. **Pump is not delivering material.**

<table>
<thead>
<tr>
<th>Possible Cause</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insufficient air pressure to the pump air motor.</td>
<td>Use the air motor regulator to increase air pressure.</td>
</tr>
<tr>
<td>Follower plate is not in contact with the material.</td>
<td>Make sure that the elevator is in the Ram Down position. Increase ram down pressure if necessary.</td>
</tr>
<tr>
<td>Pump hydraulic section has an air pocket.</td>
<td>Bleed the pump. Refer to the First-Time Startup procedure in the Operation section of this manual.</td>
</tr>
<tr>
<td>Blockage in the hydraulic system.</td>
<td>1. Shut down the pump and relieve the system pressure.</td>
</tr>
<tr>
<td>2. Remove the applicator from the system. Check the applicator for blockages. Replace or rebuild the applicator if necessary.</td>
<td></td>
</tr>
<tr>
<td>3. Disconnect the material hose from the pump. Check the hose for blockages. Clean or replace the hose if necessary.</td>
<td></td>
</tr>
<tr>
<td>4. If steps 1, 2, and 3 do not solve the problem, remove and rebuild the pump. Refer to the Rhino SD3/XD3 Hydraulic Section manual and Rhino SD3/XD3 Air Motor manual for the procedures.</td>
<td></td>
</tr>
</tbody>
</table>
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.

Reference Documentation

Refer to the applicable document for repair procedures.

<table>
<thead>
<tr>
<th>Document Title</th>
<th>Doc. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhino Bleed Valve</td>
<td>1612230</td>
</tr>
<tr>
<td>Rhino SD3/XD3 190 cc ARW Packing Gland Replacement</td>
<td>1613686</td>
</tr>
<tr>
<td>Rhino SD3/XD3 Packing Gland Replacement</td>
<td>1611640</td>
</tr>
<tr>
<td>Rhino SD3/XD3 5-Gallon Follower Modules</td>
<td>1610313</td>
</tr>
<tr>
<td>Rhino SD3/XD3 Air Motor</td>
<td>1610312</td>
</tr>
<tr>
<td>Rhino SD3/XD3 Container Level Light Tower</td>
<td>1610316</td>
</tr>
<tr>
<td>Rhino SD3/XD3 Hydraulic Section</td>
<td>1611632</td>
</tr>
<tr>
<td>Rhino SD3/XD3 Hydraulic Section Pump Outlet Manifold</td>
<td>1611641</td>
</tr>
<tr>
<td>Rhino SD3/XD3 Material Container Blow-Off Check Valve</td>
<td>1610317</td>
</tr>
<tr>
<td>Rhino SD3/XD3 Pneumatic Container Level Detector</td>
<td>1613339</td>
</tr>
<tr>
<td>Rhino SD3/XD3 Pneumatic Controls</td>
<td>1611639</td>
</tr>
<tr>
<td>Rhino SD3/XD3 Single-Post Frame</td>
<td>1610311</td>
</tr>
</tbody>
</table>
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Introduction

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

Reference Documentation

Refer to the applicable document for repair procedures.

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