Electric Changeover Rhino[®] Unloaders

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Part A, Section 1

Safety

Section A 1 Safety

Introduction

This section contains general safety instructions for using your Nordson equipment. Task- and equipment-specific warnings are included in other sections of this manual where appropriate. Note all warnings and follow all instructions carefully. Failure to do so may result in personal injury, death, or property damage.

To use this equipment safely,

- read and become familiar with the general safety instructions provided in this section of the manual before installing, operating, maintaining, or repairing this equipment.
- read and carefully follow the instructions given throughout this manual for performing specific tasks and working with specific equipment.
- store this manual within easy reach of personnel installing, operating, maintaining, or repairing this equipment.
- follow all applicable safety procedures required by your company, industry standards, and government or other regulatory agencies.
- obtain and read Material Safety Data Sheets (MSDS) for all materials used. Contact your material supplier for this information.

Safety Symbols

Become familiar with the safety symbols presented in this section. These symbols will alert you to safety hazards and conditions that may result in personal injury, death, or property and equipment damage.



WARNING: Failure to observe this warning may result in personal injury, death, or equipment damage.

Safety Symbols (contd)



WARNING: Risk of electrical shock. Failure to observe this warning may result in personal injury, death, or equipment damage.



WARNING: Disconnect equipment from line voltage. Failure to observe this warning may result in personal injury, death, or equipment damage.



WARNING: Risk of explosion or fire. Fire, open flames, and smoking prohibited.



WARNING: Wear protective clothing, safety goggles, and approved respiratory protection. Failure to observe may result in serious injury.



WARNING: Hot! Risk of burns. Wear heat-protective clothing, safety goggles with side shields and/or heat-protective gloves depending on the symbol shown.



WARNING: System or material pressurized. Relieve pressure. Failure to observe this warning may result in serious injury or death.



WARNING: Injection hazard. Do not point this device at yourself or other personnel. Failure to observe this warning may result in serious injury or death.



CAUTION: Failure to observe may result in equipment damage.



CAUTION: Hot surface. Failure to observe may result in burns.

Qualified Personnel

"Qualified personnel" is defined here as individuals who thoroughly understand the equipment and its safe operation, maintenance, and repair. Qualified personnel are physically capable of performing the required tasks, familiar with all relevant safety rules and regulations, and have been trained to safely install, operate, maintain, and repair the equipment. It is the responsibility of the company operating the equipment to see that its personnel meet these requirements.

Intended Use



WARNING: Use of this equipment in ways other than described in this manual may result in personal injury, death, or property and equipment damage. Use this equipment only as described in this manual.

Nordson Corporation cannot be responsible for injuries or damages resulting from nonstandard, unintended applications of its equipment. This equipment is designed and intended only for the purpose described in this manual. Uses not described in this manual are considered unintended uses and may result in serious personal injury, death, or property damage. Unintended uses may result from taking the following actions:

- making changes to equipment that have not been recommended or described in this manual or using parts that are not genuine Nordson replacement parts
- failing to make sure that auxiliary equipment complies with approval agency requirements, local codes, and all applicable safety standards
- using materials or auxiliary equipment that are inappropriate or incompatible with your Nordson equipment
- allowing unqualified personnel to perform any task

Installation

Read the installation section of all system component manuals before installing your equipment. A thorough understanding of system components and their requirements will help you to install the system safely and efficiently.

- Allow only qualified personnel to install Nordson and auxiliary equipment.
- Use only approved equipment. Using unapproved equipment in an approved system may void agency approvals.

Installation (contd)

- Make sure all equipment is rated and approved for the environment in which you are using it.
- Follow all instructions for installing components and accessories.
- Install all electrical, pneumatic, gas, and hydraulic connections to local code.
- Install locking, manual shutoff valves in the air supply lines to the system. This allows you to relieve air pressure and lock out the pneumatic system before undertaking maintenance and repairs.
- Install a locking disconnect switch or breaker in the service line ahead of any electrical equipment.
- Use only electrical wire of sufficient gauge and insulation to handle the rated current demand. All wiring must meet all applicable codes.
- Ground (and fuse, if necessary) all electrically conductive equipment within 10 feet (3 meters) of the spray area or according to its rated current consumption. (See the ID plate on your equipment.) Ungrounded conductive equipment can store a static charge which could ignite a fire or cause an explosion if a hot spark is discharged.
- Route electrical wiring, cables, hoses, and air supply tubing along a protected path. Make sure they will not be damaged. Do not bend cables or hoses around a radius of less than 6 in. (152 mm).
- Use only designated lifting points or lugs to lift and move heavy equipment. Always balance and block loads when lifting to prevent shifting. Lifting devices must be inspected, certified, and rated for a greater weight than the equipment being lifted.
- Do not use unapproved fluid hoses. Solvents may cause them to deteriorate rapidly and allow flammable liquids or pressurized material to escape.
- Protect components from damage, wear, and harsh environmental conditions.
- Allow ample room for maintenance, material supply container drop-off and loading, panel accessibility, and cover removal.
- Protect equipment with safety devices as specified by applicable safety regulations.
- If safety devices must be removed for installation, install them immediately after the work is completed and check them for proper functioning.

Operation

Only qualified personnel, physically capable of operating the equipment and with no impairments to their judgement or reaction times, are permitted to operate this equipment.

Read all component manuals before operating your Nordson equipment. A thorough understanding of components and their operation will help you operate the system safely and efficiently.

- Before starting this equipment, check all safety interlocks, fire-detection systems, and protective devices such as panels and covers. Make sure all devices are fully functional. Do not operate the system if these devices are not working properly. Do not deactivate or bypass automatic safety interlocks, locked-out electrical disconnects, or pneumatic valves.
- Never operate equipment with a known malfunction or leak.
- Do not attempt to operate electrical equipment if standing water is present.
- Know where EMERGENCY STOP buttons, safety shutoff components, and fire extinguisher are located. Make sure they work. If a component malfunctions, shut down and lock out the equipment immediately.
- Know the pinch points, temperatures, pressures, and dispense material composition for all equipment that you are working with. Recognize potential hazards associated with these and exercise appropriate caution.
- Use this equipment only in the environments for which it is rated. Do not operate this equipment in humid, flammable, or explosive environments unless it has been rated for safe operation in these environments.
- Before operating, make sure all equipment, objects being sprayed, and fluid containers are connected to a true earth ground.
- Do not remove guards while unit is in operation. Failure to observe may cause personal injury from moving mechanical parts under the guards.

Operation (contd)

- Never touch exposed electrical connections or equipment while the power is ON.
- If you notice electrical arcing in a spray area, shut down the system immediately. An arc can cause a fire or explosion.
- Do not operate the equipment at pressures higher than the rated maximum working pressure of any component in the system.
- Keep parts of the body or loose clothing away from moving equipment or parts. Remove jewelry and cover or tie back long hair.
- Shut off moving equipment before taking measurements or inspecting workpieces.
- Wear National Institute of Occupational Safety and Health (NIOSH) approved respirators while operating spray equipment and when performing maintenance and cleaning tasks.
- Wear gloves, eye protection, and protective clothing to protect your skin when operating equipment.
- If your skin has been exposed to dispense materials or solvents wash frequently with soap and water, especially before eating or drinking. Do not use solvents to remove coating materials from your skin.
- Do not use high-pressure compressed air to blow dust or powder off your skin or clothes. High-pressure compressed air can be injected under the skin and cause serious injury or death. Treat all high-pressure fittings and hoses as if they could leak and cause injury.
- Never point handguns or applicator nozzles at yourself or other persons.
- Do not smoke in the spray area. A lit cigarette could ignite a fire or cause an explosion.
- Keep paint pumps, pressure pots, and containers of flammable materials far enough away from spray booths to prevent their inclusion in a booth fire.
- Make sure the liquid in the heater is circulated to the external circuit when the heater is operating.
- Do not use fluids that will corrode the equipment.

Less-Obvious Dangers

Operators should also be aware of less-obvious dangers in the workplace that often cannot be completely eliminated:

- exposed surfaces on the equipment which may be hot or have sharp edges and cannot be practically safeguarded
- ungrounded conductive equipment which may continue to store an electrostatic charge after the equipment has been shut off
- vapors and materials which may cause allergic reactions or other health problems
- automatic hydraulic, pneumatic, or mechanical equipment or parts that may move without warning
- unguarded, moving mechanical assemblies

Action in the Event of a System or Component Malfunction

Do not operate a system that contains malfunctioning components. If a component malfunctions, turn the system OFF immediately.

- Disconnect and lock out electrical power. Close and lock out hydraulic and pneumatic shutoff valves and relieve pressures.
- Allow only qualified personnel to make repairs.

Maintenance and Repair

Allow only qualified personnel to perform maintenance, troubleshooting, and repair tasks.

- Always wear appropriate protective clothing and use safety devices when working on this equipment.
- Follow the recommended maintenance procedures in your equipment manuals.
- Do not service or adjust any equipment unless another person trained in first aid and CPR is present.
- Use only genuine Nordson replacement parts. Using unapproved parts or making unapproved modifications to equipment may void agency approvals and create safety hazards.

Maintenance and Repair (contd)

• Refer to MSDS before using solvents to clean this equipment. The MSDS will provide use, storage, and disposal information about the solvent. Read this information carefully and follow all instructions.



WARNING: Note the flash point of the cleaning solvent used. Only use controlled methods and equipment, such as temperature-controlled or explosion-protected heaters, to heat cleaning solvent. Observe explosion-prevention regulations and follow applicable safety instructions.

- Never use an open flame to clean the unit or components of the unit.
- Do not store flammable materials in the spray area or room. Keep paint pumps, pressure pots, and containers of flammable materials far enough away from spray booths to prevent their inclusion in a booth fire. If a fire or explosion occurs, flammable materials in the area will increase the chances and the extent of personal injuries and property damage.
- Make sure that the room where you are working is sufficiently ventilated. Avoid breathing vapors over prolonged periods of time.
- Check interlock systems periodically to ensure their effectiveness.
- Check all ground connections periodically with a megohm meter. Resistance to ground must not exceed one megohm. If sparks or arcing occur, shut down the system immediately.
- Make sure the spray area floor is conductive to ground and that the operator's platform is grounded.
- Connect all disconnected equipment ground cables and wires after servicing the equipment. Ground conductive equipment.
- Disconnect, lock out, and tag electrical power at a disconnect or breaker in the service line ahead of electrical equipment before servicing.



WARNING: Service lines connected to panel disconnect switches may still be energized unless they are disconnected. Make sure the power is off before servicing. Wait five minutes for the capacitors to discharge after shutting off the electrical power.

• If a "power on" test is required, perform the test carefully and then shut off and lock out power as soon as the test is over.

Maintenance and Repair (contd)

- Never troubleshoot a power supply without first disconnecting all external power supplies and discharging the high-voltage capacitors with an insulated screwdriver.
- Do not attempt to service electrical equipment if there is standing water present. Do not service electrical equipment in a high-humidity environment.
- Use tools with insulated handles when working with electrical equipment.
- Keep high-voltage connection points clean and protected with dielectric grease or oil.
- Relieve air and fluid pressures before servicing equipment. Follow the specific instructions in this manual.
- Do not attempt to service a moving piece of equipment. Shut off the equipment and lock out power. Secure the equipment to prevent uncontrolled movement.
- If you must disassemble a spring-loaded component, carefully preload the spring first if it is possible to do so.

Material and Solvent Precautions



WARNING: Hot! Risk of burns. Wear heat-protective clothing, safety goggles with side shields and/or heat-protective gloves.

Heated materials may cause severe burns on contact. Remember that some materials, even solid materials, may retain heat for some time. If you are burned by a heated material, immediately cool the affected skin with lots of cool, clean water. Do not try to remove hot, melted material from the skin. Seek immediate medical attention.

High-pressure fluids, unless they are safely contained, are extremely hazardous. A jet of high-pressure fluid can act like a knife or needle, penetrate skin and muscle, and inject itself into your body. Injected fluids can cause toxic poisoning.

Material and Solvent Precautions (contd)

Do not treat an injection injury as minor. Seek medical care immediately. Inform the medical staff at the hospital that you have an injection injury and identify the fluid that was injected. If possible, give the doctor copies of the MSDS for the injected fluid and for any additives, such as solvents, that are in the injected fluid.

Nordson recommends that you carry a National Safety Equipment Manufacturers Association (NSEMA) wallet card to give to emergency medical staff in the event of an injection injury. These cards are supplied with the equipment. Additional cards are available free from Nordson Corporation.



WARNING: Injection hazard. Do not go near a known leak in a hose or fitting, and stay clear of all dispensing device nozzles or orifices. Do not point a dispensing device at yourself or other personnel. The high-pressure fluid stream can penetrate skin and inject fluid into the body causing serious injury or death.

- Always handle fluid dispensing devices carefully. Do not point the nozzle of a pressurized device at yourself or other personnel.
- Never place hands, fingers, or other parts of your body directly over a nozzle or near a leak in a high-pressure system.
- Never "back-flush" the nozzles. Blocking a nozzle causes the high-pressure fluid to change direction. An injection injury may result.
- Always relieve system pressure before servicing equipment. Trigger all dispensing devices and bleed off system pressure.

Halogenated hydrocarbon solvents can cause an explosion when used with aluminum components in a pressurized fluid pumping system (pumps, heaters, filters, valves, spray guns, and tanks). The explosion could cause serious bodily injury, death, or substantial property damage. No available stabilizers will prevent this violent reaction from happening.



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 MSDS for each material and solvent being used.

Use nonhalogenated solvents.

Material and Solvent Precautions (contd)

- Contact your solvent supplier to determine whether your existing materials and solvents contain halogenated hydrocarbons or to obtain a suitable, nonhalogenated hydrocarbon solvent for cleaning and flushing your system.
- See Table A 121. Check the labels on your solvent containers. Halogenated hydrocarbon solvents can be recognized if any of the following elements are listed in the name of the product or as an ingredient:

<u>Element</u>	<u>Symbol</u>	<u>Prefix</u>
Flourine	F	"Flouro-"
Chlorine	CI	"Chloro-"
Bromine	Br	"Bromo-"
lodine	I	"lodo-"

- Pump the system empty, shut off the pumps, and relieve the system pressure.
- Disassemble and inspect the system components. Replace any damaged or corroded parts.
- Thoroughly clean all noncorroded parts with nonhalogenated hydrocarbon solvents before reassembling the system.
- Contact your coatings, solvent, or adhesive supplier for a nonhalogenated solvent to thoroughly flush the entire system before operating it.
- If you must use halogenated hydrocarbon solvents, consult your Nordson representative about compatible Nordson components.

Material and Solvent Precautions (contd)

Table A 121	Solvents Containing Halogenated	Fluids
-------------	---------------------------------	--------

Chlorinated Solvents	Iodinated Solvents	Brominated Solvents	Fluorocarbon Solvents
Carbon Tetrachloride	Ethyl Iodide	Ethylene Dibromide	Dichlorofluoromethane
Chloroform	Methyl Iodide	Methyl Bromide	Trichlorofluoromethane
Ethylene Dichloride	N-butyl lodide	Methylene Chlorobromide	Freon
Methylene Chloride	Propyl Iodide		
1-1-1 Trichloroethane			
Monochlorobenzene			
Orthodichlorobenzene			
Perchloroethylene			
Trichloroethylene			

Disposal

Dispose of equipment and materials used in operation and cleaning according to your local regulations.

Part A, Section 2

Description

Section A 2 Description

About This Manual

All general user information for your Rhino unloader can be found in Part A of this manual. Refer to Part B for specific repair and parts list information.

The illustrations in this manual may not precisely match your bulk unloader due to product modifications or improvements. Contact your Nordson representative with questions about any differences between the unloaders shown and your model.

General

See Figure A 2-1. Figure A 2-1 shows both primary (A-Unit) and secondary (B-Unit) electric changeover unloaders as they are shipped. Your installation may differ. Rhino bulk unloaders are available in a variety of configurations. Electric changeover unloaders are currently only available with a rotary elevator control for elevator operation. Contact your Nordson representative if you require more information about the other configurations available for Rhino unloaders.

Rhino drum unloaders pump Nordson-approved adhesives and sealant materials at room temperature from 200-liter (55-gallon) containers.



CAUTION: If the material is too abrasive or generally not compatible, equipment may wear out prematurely and components may be damaged.

Contact your Nordson Corporation representative to verify that the material you wish to pump is compatible with your equipment and setup.

General (contd)





An unloader normally pumps a constant supply of material to dispensing guns or process applicators. The hydraulic section of the unloader is a dual-acting, positive-displacement, demand-type operation pump. This pump can handle high-viscosity materials, some of which may be abrasive. It is often used in applications that require rapid delivery of material to dispensing guns.

The unloaders are available with either a 24:1, 48:1, or 65:1 ratio pump. The 24:1 ratio pumps use 7-inch air motors; the 48:1 and 65:1 ratio pumps both use 10-inch air motors. The electric changeover drum unloaders are also available with a pail (5-gallon) follower plate installed on a drum (55-gallon unit) frame.

Basic Operation

See Figure A 2-2. To operate the unloader, the operator centers an open, non-tapered, undamaged container of adhesive or sealant material on the unloader frame. When DOWN movement is initiated, a pair of air-driven pistons lowers the follower plate (9), and air-operated piston pump into the container of material. Continuous down pressure is exerted by the elevator (1).

For most applications, the rubber seals around the outer edge of the follower plate create a sealed compartment below the follower plate. The downward movement of the follower plate forces material into the hydraulic section (8). Once air pressure to the pump air motor (2) is turned on, the pump strokes and pumps material from the container.

When the container is empty, the empty drum switch (3) is tripped and operation switches to the other unloader. While the other unloader is in operation, the operator raises the follower plate, replaces the empty container with a full one, and lowers the follower plate into the new container. For most applications, a blow-off assembly (10) is used to introduce air pressure under the follower plate. Then the operator can remove the follower plate from the container of material.

Basic Operation (contd)



Fig. A 2-2 Electric changeover unloader, primary unit

- 1. Elevator
- 2. Air motor
- 3. Empty drum switch
- 4. Empty/low drum light tower
- 5. Electrical junction box
- 6. Purge button

- 7. Bleeder stem
- 8. Hydraulic section
- 9. Follower plate
- 10. Blow-off assembly
- 11. Elevator control valve—DOWN position
- 12. Elevator control valve—NEUTRAL position
- 13. Elevator control valve-UP position
- 14. Filter
- 15. Electric solenoid (air motor control)

Theory of Operation

See Figure A 2-2. The following information details the operation of your bulk unloader.

Pneumatic Controls

The elevator movement controls that operate the electric changeover unloaders are pneumatic. Because of the latent (potential) power in a pressurized unloader, an unloader under pressure from the air supply is considered active even if it is not pumping. Only a non-pressurized pump is considered inactive. The unloader frame can stay under pressure even when the unloader is disconnected. Be cautious and aware that air remains in the cylinders.

The air supply to the unloader(s) passes through a filter (14) that removes most contaminants and moisture. Then the air enters three pressure regulators:

- a. an adjustable regulator for the pump air motor
- b. an adjustable regulator to control elevator force
- c. a non-adjustable regulator for the blow-off (if applicable)

Unloaders with rotary elevator control have an elevator control valve that initiates elevator movement. Placing the elevator control valve in the UP position (13) raises the elevator and placing it in the DOWN position (11) lowers the elevator and follower plate assembly into the container of coating material. Placing the elevator control valve in the NEUTRAL position (12) halts elevator movement. The electric changeover unloaders have purge buttons that will activate the pump at any time, even if the container of material is empty.

Electric Controls

Unloaders installed in pairs feature the automatic changeover (auto-over) option. This feature allows the operator to change the empty container of one unloader while the other unloader is in operation. The changeover operation is electrically-controlled. The electric controls require 120 Vac, supplied from a customer-supplied external power source.

The electrical junction box (5) is pre-wired to provide the following output signals:

- dirty filter
- drum A empty
- drum B empty
- drum A low
- drum B low
- runaway A
- runaway B

Electric Controls (contd)

When the light tower (4) receives signals, the light will illuminate. Depending on how you configure your the PLC logic, the light may illuminate when it receives a low drum signal and/or an empty drum signal from the PLC.

Electric Solenoid

The electric solenoid valve (15) controls air motor operation. When the primary unit is in operation, the electric solenoid on the primary unit allows air to flow from the air supply valve to the air motor. The electric solenoid on the secondary unit stops air from flowing to that unit. When a changeover occurs, the air supply switches from the pump on the primary unit to the pump on the secondary unit. The electric solenoid at the secondary unit opens and allows air to flow to the secondary air motor and the primary unit's solenoid shuts off the air flow to the air motor.

Air Motor Air Supply

The air supply for the air motor passes through the filter (14), a regulator, solenoid valve, lockout valve, and a lubricator. As air passes through the lubricator, it mixes with a small amount of vitalizer oil. This minimizes wear on the air motor piston and cylinder.

Blow-Off Air Supply

See Figure A 2-2. Electric changeover unloaders are available with a blow-off assembly (10) with a maximum pressure rating of 1 bar (15 psi), or are available with no blow-off.

If an unloader is equipped with the optional blow-off air supply, the blow-off assembly (10) is used to relieve vacuum and as an aid to push the follower plate (9) out of the container. The blow-off assembly provides air flow into the container beneath the follower plate. The blow-off air supply passes through a filter/separator, a pre-set non-adjustable regulator, a ball valve, and the follower plate. Refer to the *Operation* section for specific operating instructions.

Elevator Air Supply

Air from the regulator flows to the elevator control valve. The unloader elevator has three types of movement: down, up, and neutral.

Down

DOWN elevator movement is initiated by placing the elevator control valve in the DOWN position (11). Air enters the top of the left cylinder and flows through the upper crossover tube to the top of the right cylinder. Air below the pistons is vented. The air pressure forces the cylinder pistons downward, which lowers the follower plate and pump.

Up

UP elevator movement is initiated by placing the elevator control valve in the UP position (13). Air enters the bottom of the left cylinder and flows through the lower crossover tube to the right cylinder. Air above the pistons is vented. The air pressure forces the cylinder pistons upward, which raises the follower plate and pump.

Neutral



WARNING: Do not treat the neutral position as a secure or locked position. Personal injury or equipment damage could result.

An unloader is placed in the NEUTRAL position by placing the elevator control valve in the NEUTRAL position (12). The NEUTRAL position holds the elevator in place. In the NEUTRAL position, the frame cylinders do not release pressure. The follower plate should remain stationary, since the air pressure to both sides of the piston is sealed.

Pump Operation

See Figure A 2-3. 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 (14) 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.

When the plunger (1) strokes downward (12), the upper check valve (5) opens, and the lower check valve (8) closes. Material between the upper check (7) and lower check (9) is forced upward through the piston (6), which pressurizes the material above the upper check and forces it out of the pump.

During the upward pump stroke (11), the plunger (1) and shovel (14) 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 (7). As the plunger and piston (6) move upward, material from the upper pump chamber is forced out of the pump outlet port (4).

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 (13) on the side of the pump body allows the operator to bleed air from the pump.

Pump Operation (contd)



Fig. A 2-3 Pump operation

- 1. Plunger
- 2. Solvent chamber
- 3. Packing gland
- 4. Outlet port
- 5. Upper check valve

- 6. Piston
- 7. Upper check
- 8. Lower check valve
- 9. Lower check
- 10. Lower check seat

- 11. Up stroke
- 12. Down stroke
- 13. Bleed valve
- 14. Shovel

Specifications

NOTE: Because of technological or quality improvements, equipment specifications are subject to change without notice.

Electrical Supply

120 Vac

3.3 amps (normal operation, with purge); 5.5 amps (worst case)

Air Supply

The customer must supply a single source of 4.8–6.9 bar (70–100 psi) air pressure to power the unloader(s). Options may depend on customer requirements. Contact your Nordson Corporation representative for additional details.

Overall Dimensions

Drum, per unloader			
Weight/Mass US (lb) Metric (kg)			
Weight (approximate)	790	359	

Drum, per unloader			
Physical Dimensions	US (in.)	Metric (cm)	
Height (elevator down)	62	157	
Height (elevator up)	105	268	
Depth	31	79	
Width	56	142	

Baseplate Mounting Holes

Drum			
Dimensions, on center	US (in.)	Metric (cm)	
Width	39	99	
Depth	20.5	52	

Maximum Output

Maximum pump output is expressed in volume per stroke and can depend on material viscosity, temperature, filters, and system configuration.

Pump Ratios	US (cubic inches/stroke)	Metric (cublic cm/stroke)
24:1/48:1 Pumps	5	81.9
65:1 Pump	8	131.1

Maximum Stroke Rate

1 stroke per second (60 strokes per minute)-intermittent

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

Viscosity Range

30,000 centipoise-3 million centipoise

Air Consumption

See Figures A 2-4 and A 2-5 for air consumption data charts according to pump ratio. Actual consumption depends on system specifications, material composition, flow rate, and other factors.



Fig. A 2-4 Air consumption of the 24:1 pump
Air Consumption (contd)



Fig. A 2-5 Air consumption of the 48:1 and 65:1 pumps

Part A, Section 3

Installation

Section A 3 Installation



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

General

Perform the following steps to install the unloader:

NOTE: If your floor is not level, be sure to level your unloaders before anchoring them to the floor. Operating your unloaders on a surface that is not level can affect elevator operation.

- Position the unloaders to allow access to the controls and follower plate area. Make sure that the air hoses are protected and can reach between Primary Unit (Unit A) and Secondary Unit (Unit B).
- 2. Anchor the unloaders to the floor.
- 3. Set the pneumatic control regulators and the air motor regulators to 0 bar/0 psi. Make sure that the main air supply ball valves are closed.
- Connect the air supply line to the ³/₄-in. NPT inlet valve at the Primary Unit. Maximum supply air pressure is 7 bar (100 psi). A ³/₄-in. air line with a minimum flow of 200 scfm is required.



CAUTION: Use a hose support to prevent hose damage in applications where the hose is suspended by an overhead tool balancer or similar device. Route the hose in a manner that prevents kinking and abrasion. Do not bend the hoses less than the minimum bend radius of the hoses.

5. The pump outlet fitting on the hydraulic section is a female 1^{1}_{4} NPTF pipe threads. Attach your material hoses to the pump outlets of both unloaders.

Automatic Changeover Installation

When two unloaders are used together with an electric automatic changeover (auto-changeover) feature, they must be connected together by several air lines and electrical cables. The primary unit is unit A, and the secondary unit is unit B. The main air supply is connected to unit A.

Air Line Connections

Refer to Table A 3-1 and see Figure A 3-1 for air line connection locations. Make the Primary Unit (A) connections; Secondary Unit (B) connections are pre-assembled at the factory and supplied bundled in a canvas cover.

Item	To Primary Unit - Unit A		Connector Description	Fron	n Secondary Unit - Unit B
	Location and Designator			De	esignator and Location
1	Pump air— Upper left solenoid	BB	³ / ₄ -in. hose 37° JIC fittings	BB	90° elbow at electric solenoid
2	Elevator supply air— Elbow at manifold	S	¹ / ₂ -in. hose	S	Air supply connection at tee
3	Blow-off air— Tee of blow-off air supply (pipe thread)	Y	³ / ₄ -in. hose—special fitting at Unit A with gasket	Y	Blow-off valve at follower
4	Air supply ball valve	³ / ₄ NPTF	Shop Air— ³ / ₄ NPTF fitting at valve	None	None

Air Line Connections (contd)



Fig. A 3-1 Air line connections

Electrical Connections

Refer to Table A 3-2 for electrical connection locations. Make the Secondary Unit (B) connections; Primary Unit (A) connections are pre-assembled at the factory and supplied bundled in the wire harness

From Primary Unit - Unit A	Description	To Secondary Unit - Unit B
B-Unit Low/Empty	5-pin cable	Low/Empty Switch
B-Unit Pump Control Valve	3-pin cable	Pump Control Valve
B-Unit Purge Switch	3-pin cable	Purge
Optional Filter Stand	5-pin cable	Filter

Table A 3-2	Electrical	Connections
Table A 3-2	Electrical	Connections

New Equipment Installation

NOTE: This procedure applies only to the first-time startup of a new system.



Fig. A 3-2 Electric changeover unloader components

- 1. Elevator
- 2. Empty drum bracket
- 3. Empty drum switch
- 4. Solvent chamber
- 5. Follower plate
- 6. Follower plate seals

- 7. Blow-off ball valve
- 8. Elevator control valve—DOWN position
- 9. Elevator control valve—UP position
- 10. Air motor lubricator
- 11. Air motor regulator

- 12. Air motor pressure gauge
- 13. Air supply ball valve
- 14. Elevator controls gauge
- 15. Elevator controls regulator
- 16. Air motor lockout valve
- 17. CELL PLC junction box

New Equipment Installation (contd)

- 1. Verify that all pneumatic connections have been made at the appropriate locations. Refer to Table A 3-1 and see Figure A 3-1.
- 2. Verify that all electrical connections have been made at the appropriate locations. Refer to Table A 3-2.
- See Figure A 3-2. Make sure that the fluid level in the pump solvent chamber (4) is 38 mm (1.5 in.) from the top of the chamber. Add fluid as necessary. Refer to the *Unloader* section in Part B for ordering solvent chamber fluid.
- 4. Make sure that the air motor lubricator (10) is filled with vitalizer oil. The lubricator capacity is 500 ml (16 fluid ounces). Refer to Part B for ordering vitalizer oil.
- 5. Lubricate the follower plate seals (6) with a lubricant that is compatible both with the seals and with the material dispensed.
- 6. Verify that the air motor lockout valve (16) is closed.
- 7. Open the air supply ball valve (13) to power the unloader.
- 8. Adjust the air motor regulator (11) setting until the air motor pressure gauge (12) reads 0 bar/psi.
- Adjust the elevator controls regulator (15) setting until the elevator controls gauge (14) reads 1.5–4.0 bar (20–60 psi). Adjust the elevator controls regulator for the minimum air pressure necessary to raise the elevator (1).

NOTE: You may need to increase this setting when using high-viscosity material. Apply sufficient down pressure to force material into the pump.

NOTE: Your unloaders may have been shipped with the secondary unit activated for start-up. You may have to toggle the empty drum switch on the secondary unit to begin operation at the primary unit.

- 10. Place the elevator control valve in the UP position (9) to raise the elevator to the top of its travel range.
- 11. If your unloader is equipped with a blow-off, open the blow-off ball valve (7). Listen for air flow to make sure that the adapter tube is not clogged. Close the ball valve.
- 12. Make sure that the air hoses and material delivery hose are not kinked or pinched.
- 13. Connect your Programmable Logic Controller (PLC) cable from your system PLC to the junction box on the Primary Unit (A) port labeled CELL PLC (17).

Verifying the Empty Drum Setting

Electric changeover unloaders are shipped with the empty drum setting already set. As a safety precaution, verify the empty drum setting before beginning normal operation of your unloader. For most applications, you should not have to adjust this setting. However, you can adjust the setting to stop the follower plate closer or farther from the bottom of the drum. Use extreme caution if you adjust the setting.

The empty drum bracket (2) is fastened to the pump support rod approximately 5.1 centimeters (2.0 inches) below the elevator crossover. The bracket engages the empty drum switch (3) and stops the follower plate (5) approximately $1^{1}/_{2}$ inches from the bottom of the drum.

During initial startup, verify the empty drum setting of your unloader:

- 1. Lower the follower plate (5) by initiating and maintaining down elevator movement.
- 2. When the follower plate (5) reaches the bottom of the drum and shuts down the unloader, carefully check the distance between the base rail and the bottom of the follower plate.
- 3. If you need to adjust the shutdown point, find the proper stop height for your container and raise or lower the empty drum bracket (2). To adjust the empty drum setting for your unloader:
 - a. Loosen the bolts that secure the empty drum bracket to the pump support rod.
 - b. Raise the bracket to make the follower plate stop lower in the container. Lower the bracket to make the follower plate stop higher in the container.
 - c. Tighten the bolts.
- 4. Raise and lower the unloader several times to make sure the empty-container bracket (2) is in the proper location, and trips the empty drum switch (3). Test the unloader operation and repeat step 3 as required.

Verifying the Empty Drum Setting (contd)

- 5. If the empty drum bracket (2) adjustment is not adequate, adjust the empty drum switch (3). To adjust the empty drum switch and its arm radius, use the following procedures:
 - a. At the empty drum switch, loosen the set screw that holds the limit switch in place.
 - b. Slide the arm off and rotate it a few degrees. Rotate the arm clockwise to engage the bracket later. Rotate the arm counterclockwise to engage the bracket sooner.
 - c. Fasten the arm in place with the set screw.
 - d. Test the unloader operation and repeat steps a-c as required.

Part A, Section 4

Operation

Section A 4 Operation



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

Introduction

This section describes new equipment startup, routine operating procedures, and procedures for changing to a different material.



WARNING: Wear protective clothing, goggles, and gloves when operating this equipment.

Elevator Movement

See Figure A 4-1. To operate your Rhino bulk unloader, you will initiate UP and DOWN elevator movement and place the elevator in the NEUTRAL position. This section provides specific directions for initiating these movements.

UP Elevator Movement

See Figure A 4-1. For rotary elevator control unloaders, initiate UP elevator movement of the elevator by placing the elevator control value in the UP position (12).

DOWN Elevator Movement

See Figure A 4-1. For rotary elevator control unloaders, initiate DOWN movement of the elevator by placing the elevator control valve in the DOWN position (10).

NEUTRAL Position

See Figure A 4-1. For rotary elevator control unloaders, place the elevator in the NEUTRAL position by placing the elevator control valve in the NEUTRAL position (11).

Elevator Movement (contd)



Fig. A 4-1 Electric changeover unloader daily operation controls

- 1. Elevator
- 2. Purge button
- 3. Solvent chamber
- 4. Bleed valve
- 5. Bleeder stem
- 6. Follower plate
- 7. Container hold down

- 8. Follower plate seals
- 9. Blow-off ball valve
- 10. Elevator control valve—DOWN position
- 11. Elevator control valve—NEUTRAL position
- 12. Elevator control valve-UP position
- 13. Air motor lubricator

- 14. Air motor regulator
- 15. Air motor pressure gauge
- 16. Air supply ball valve
- 17. Elevator controls regulator
- 18. Elevator controls gauge
- 19. Lockout valve to air motor

New Equipment Startup



CAUTION: Do not use a damaged container. It may damage the follower plate, follower plate seals, or sealing device when the follower plate is lowered into the container.

- 1. Carefully inspect the new material container for dents or other damage. Do not use a damaged container.
- 2. Perform the following to prepare the follower plate (6) for operation:
 - a. If your follower plate has seals (8), coat the seals with an O-ring grease that is compatible both with the seals and with the dispensing material.
 - b. If your unloader uses a seal ring or similar device, place it in the open container.
 - c. If your unloader does not use a seal ring, use only materials that are shipped in bags within the container.
- 3. Place the container of material on the base of the unloader, and center it under the follower plate (6).
- 4. Adjust the elevator controls regulator (17) until the elevator controls gauge (18) reads at least 2.1 bar (30 psi).
- 5. If your unloader is equipped with a blow-off assembly, make sure the blow-off ball valve (9) is closed. Unscrew the bleeder stem (5) from the follower plate (6) to allow any air trapped under the follower plate to escape.



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



WARNING: Do not lower the follower plate into the container without wearing goggles, gloves, and long sleeved protective clothing. The air expelled when you bleed air from under the follower plate may contain material that could cause injury.

6. Place the elevator control valve in the DOWN position (10) and slowly lower the follower plate (6) into the open container of material. To stop the follower plate, place the elevator control valve in the NEUTRAL position (11).

New Equipment Startup (contd)

- Continue lowering the follower plate (6) until material begins to flow from the bleeder stem (5) fitting. Place the elevator control valve in the NEUTRAL position (11). Tighten the bleeder stem securely.
- 8. Initiate DOWN elevator movement to force material into the pump section.
- 9. Before continuing, make sure the hose and gun are secured firmly and that the gun is not pointing at any personnel in the area.
- 10. Open the lockout valve to the air motor (19).
- 11. Adjust the air motor regulator (14) until the pump begins to operate. Do not increase the pressure beyond the minimum required to cycle the pump. Check the air motor pressure gauge (15) and note the minimum required pressure.
- 12. At low pressure, bleed the pump until all air has been removed from the pump. It will begin spitting. Follow these procedures to bleed the pump:
 - a. 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.

- b. Place a waste container beneath the bleed valve (4). Make sure that the small bleed port is pointed down. Carefully loosen the bleed valve only two or three turns.
- c. See Figure A 4-2. Push the purge button (1). The purge button for the primary units is located on the right hand side of the unit, at the electrical junction box, as shown. The purge button for the secondary units is located on the left side of the unit, adjacent to the rotary control valve, as shown.
- d. Gradually increase the pressure to an acceptable stroke rate for the pump or acceptable material bleed volume.
- e. Leave the bleed valve open until the material flows continuously.
- f. Tighten the bleed valve. Remove the waste container. Further bleeding should not be necessary unless the hydraulic section is completely empty or after every time you change containers of material.
- 13. Bleed all air from the system. Trigger the gun(s) to allow air in the lines to bleed off.

NOTE: If air is not bled from the gun, the gun may pop and spit when dispensing material.

- 14. Raise pressure to operating levels. When you reach normal operating pressure, the gun dispenses material smoothly, continuously, and without air bubbles.
- 15. See Figure A 4-1. Adjust the drip rate of the air motor lubricator (13) to one drip for every fifteen pump strokes.

New Equipment Startup (contd)



Fig. A 4-2 Purge button locations

1. Purge push button

Routine Operating Procedures

The following paragraphs provide information about the various routine operating procedures for Rhino bulk unloaders. Routine operating procedures include

- daily startup
- forced changeover
- temporary shutdown
- restart after temporary shutdown
- container changing
- extended shutdown
- restart after extended shutdown

Daily Startup

See Figure A 4-1.

- 1. Make sure that air pressure to the system is off. Make sure that the unloader is in the NEUTRAL position.
- 2. Perform the following steps:
 - a. For most applications, check for material leaking past the follower plate seals (8). If you need to replace the seals, refer to Part B of this manual for instructions.
 - b. If the container is empty, refer to the *Container Changing* procedure in this section.
- 3. Check the solvent chamber (3) fluid level. Refer to the *Installation* section for filling instructions.
- 4. Check the air motor lubricator (13) fluid levels. Turn on the air supply ball valve (16) to the unloader.
- 5. Verify that the air motor lockout valve (19) is open.
- 6. Initiate DOWN elevator movement at the designated unit.

NOTE: If the pump does not pump or the wrong pump is pumping, perform the *Forced Changeover* procedures in this section until the right pump is pumping.

- Check the air motor lubricator (13) for the desired flow rate (one drop of lubricant for every fifteen strokes of the pump). Adjust the air motor lubricator, if necessary.
- 8. Check the unloader for proper pump operation. Adjust the air motor regulator (14) as necessary for the material you are pumping.
- 9. Refer to the *Container Changing* procedures in this section to replace an empty container with a full one.

Forced Changeover

To switch operation from the active unloader when the material container is not empty, perform a forced changeover to start the inactive unloader.

Once *New Equipment Startup* has been performed, the inactive unloader must be ready for operation and the following conditions must be met at the inactive unloader. The follower plate must be

- in place,
- under downward pressure, and
- in any position other than the empty drum position.

NOTE: The inactive unloader will start if in any position other than empty drum.

To perform a forced changeover, press the empty container switch down on the unloader that is pumping. Operation will transfer to the inactive unloader. The *Installation* section details the location of the empty-container switch.

Temporary Shutdown

See Figure A 4-1. Any shutdown intended to last one hour or less is termed a "temporary" shutdown. Follow the steps below to perform a temporary shutdown.

1. Place the elevator control valve in the NEUTRAL position (11).



WARNING: When you shut off the air supply ball valve, the elevator is not in a locked state. The elevator and follower plate could drift downward and cause personal injury.

2. Turn off the air supply ball valve (16).

NOTE: When you shut off the air supply to the unloader, air pressure to the controls is vented to atmosphere. The unloader remains in a neutral state until you turn on the air supply ball valve (16) and initiate UP or DOWN elevator movement.

Restart after Temporary Shutdown

See Figure A 4-1.

- 1. Open the air supply ball valve (16).
- 2. Initiate DOWN elevator movement until the unloader begins pumping.
- 3. Refer to the *Container Changing* procedures in this section to replace an empty container with a full one.

Container Changing

See Figure A 4-1. Follow these procedures to change the container of material for your Rhino bulk unloader.

NOTE: You must bleed the pump every time that you change containers. This section contains procedures that detail how to bleed the pump.

- 1. Place the unloader in the NEUTRAL position.
- 2. For unloaders that have a blow-off assembly, open the blow-off ball valve (9).
- 3. Place the air motor lockout valve (19) in the OFF position.
- 4. Initiate elevator UP elevator movement. Air enters below the follower plate (6) and helps you to remove the follower plate from the container.

NOTE: For unloaders with a blow-off assembly, if the container begins to rise off the unloader frame, place the elevator in the NEUTRAL position for a moment to allow the container to return to the frame. Then, resume UP elevator movement.



CAUTION: Be careful to watch for material spitting from the container when the follower plate is removed from the container. Failure to observe this precaution can result in personal injury.

- 5. Continue UP elevator movement until the follower plate (6) is clear of the container and the elevator (1) is raised to its maximum height.
- 6. For unloaders with a blow-off assembly, close the blow-off ball valve (9).
- 7. For unloaders with a container hold down (7), disengage or unlatch the hold down.

Container Changing (contd)

- 8. Remove the empty container from the unloader. For unloaders that use a special seal ring, remove the ring from the container (or from the base of the follower). Clean the ring if necessary.
- 9. Inspect the blow-off port and clean as necessary. This is especially important if you use your unloader for urethane applications.



CAUTION: Do not use a damaged container. A damaged container can damage the follower plate, follower plate seals, or sealing device when the follower plate is lowered.

- 10. Carefully inspect the new container for dents or other damage. Do not use a damaged container.
- 11. For unloaders that use follower plate seals (8), coat the seals with O-ring lubricant. Make sure that the lubricant is compatible both with the dispensing material and with the seals.



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

- 12. Center the container under the follower plate (6).
- 13. For unloaders with a container hold down (7), engage or latch the hold down.
- 14. Remove the bleeder stem (5).
- Initiate DOWN elevator movement and slowly lower the follower plate (6) into the container. To stop the elevator (1), place the elevator control valve in the NEUTRAL position (11).
- 16. For unloaders with a blow-off assembly, perform the following steps:
 - a. When you see a continuous flow of material flowing from the bleeder stem
 (5) fitting, stop DOWN movement of the elevator by placing the elevator in the NEUTRAL position.
 - b. Tighten the bleeder stem.
- 17. Initiate DOWN elevator movement at the designated unit.
- 18. Open the air motor lockout valve (19).
- 19. Perform these steps to bleed the pump:
 - a. Reduce pressure to 0 bar/psi.

Container Changing (contd)



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.

- b. Place a waste container beneath the bleed valve (4). Make sure that the small bleed port is pointed down. Carefully loosen the bleed valve only two or three turns.
- c. Push the purge button (2). Gradually increase the pressure to an acceptable stroke rate for the pump or acceptable material bleed volume.
- d. Leave the bleed valve open until the material flows continuously.
- e. Tighten the bleed valve. Remove the waste container. Further bleeding should not be necessary unless the hydraulic section is completely empty or until the next container change.

Extended Shutdown

See Figure A 4-1. Any shutdown intended to last longer than one hour is termed an "extended" shutdown. Follow the steps below to perform an extended shutdown.



WARNING: When you shut off the air supply ball valve the elevator is not in a locked state. The elevator and follower plate could drift downward and cause personal injury.

NOTE: When you shut off the air supply to the unloader, air pressure to the controls is vented to the atmosphere. The unloader remains in a neutral state until you turn on the air supply ball valve and initiate UP or DOWN elevator movement.

- 1. Place the unloader in the NEUTRAL position.
- 2. Shut off the air supply ball valve (16).
- 3. Trigger the gun(s) to relieve material pressure.

Restart after Extended Shutdown

To restart operation after an extended shutdown, perform the *Daily Startup* procedures in this section.

Changing to a Different Material

Not all adhesives and sealants are compatible with each other. Consult the manufacturer of both the old and new materials to determine compatibility. If you are switching materials, make sure that the lubricant for the follower plate seals is compatible with the new material to be dispensed.

If the old and new materials are not compatible, clean the entire system before using the new material. Refer to the *System Cleaning* procedure in the *Maintenance* section of this manual.

If the old and new materials are compatible, refer to the *Container Changing* procedure in this section.

Part A, Section 5

Maintenance

Section A 5 Maintenance



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

Introduction



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 MSDS for each material and solvent being used.

This section details the recommended preventive maintenance procedures for the unloader. The frequency of periodic system cleaning depends on your facility's operating conditions and shop environment.

Daily Maintenance

Perform these steps daily:

- 1. Check the electrical junction box light tower for proper bulb operation. The bulb should light when the empty drum switch is tripped and, depending on your PLC logic, could be set to light for low drum.
- 2. Visually inspect the unit. Check all hydraulic and pneumatic connections and tighten them if required. Inspect all pneumatic tubing for bends or kinks.
- Check the vitalizer oil supply in the air motor lubricator and add oil as necessary. Adjust the lubricator to add one drop of oil for every fifteen pump strokes.
- 4. Check the level of fluid in the solvent chamber. Make sure that the fluid level is 38 mm (1.5 in.) from the top of the chamber. Add fluid to the chamber as necessary. Refer to the *Unloader* section in Part B of this manual for ordering solvent chamber fluid.
- 5. Drain accumulated water from the filter/separator (near the air supply inlet) as required.
- 6. If you have a material filter installed in your system (filter stand), check and change the filter element, as needed. Refer to the following procedures for changing the filter element.

Filter Element Change Procedure

Many electric changeover unloaders are installed with a material filter mounted on a separate filter stand. The filter contains an element that must be changed periodically, as needed. Follow the procedures below to change your filter element.

- 1. Place the unloader you are servicing in the NEUTRAL position. Refer to the *Operation* section if you require further instructions for unloader operation.
- 2. Locate and close the main lockout valve on your unit.
- 3. If your unit is equipped with material supply ball valve(s), close the material supply ball valve(s).



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. Place a one-gallon bucket beneath the pump bleed valve(s). Use an adjustable wrench to slowly open and bleed off pressure. Close the valve(s).
- 5. Place a five-gallon bucket beneath the check valve on the outlet side of the filter. Open the bleed valve to bleed off pressure. Close the valve.
- 6. See Figure A 5-1. Place a five-gallon bucket under the filter bowl (5). Remove the plug (4) using a 1/4-in. hex wrench.
- Ask an assistant to support the filter bowl (5). Using a ¹/₂-in. hex wrench, remove the four cap screws (1). Remove the filter bowl and filter bowl O-ring (2).
- 8. Remove the filter element (3) and filter O-ring (7).

Filter Element Change Procedure (contd)



Fig. A 5-1 Filter assembly

- 1. Cap screws
- 2. Filter bowl O-ring
- 3. Filter element
- 4. Plug
- 5. Filter bowl
- 6. Filter head
- 7. Filter O-ring
- 8. Dial
- 9. Restriction indicator cover
- 9. Clean the filter bowl (5) and filter head (6) components.
- Install a new filter O-ring (7) and filter element (3) on the bottom of the filter head (6). Refer to the *Options* section in Part B of this manual for filter kit ordering information.
- Support the filter bowl (5) and filter bowl O-ring (2) in place at the bottom of the filter head (6) and install the four socket head cap screws (1). Using a torque wrench, hex driver socket, and bit, tighten the screws to 81 N•m (60 lb-ft).
- 12. Using a $1/_4$ -in. hex wrench, install the plug (4) at the bottom of the filter bowl (5).
- 13. Remove the restriction indicator cover (9). Turn the dial (8) clockwise to the CLEAN position. Install the cover.
- 14. If your unit is equipped with material supply ball valve(s), open the material supply ball valve(s).
- 15. Open the lockout valve on your unit.

Weekly Maintenance

Perform these steps on a weekly basis:

- 1. Inspect the follower plate seals for damage or signs of excessive material leakage. If you must replace the seals, refer to Part B, *Unloader, Repair,* of this manual.
- 2. Inspect the unloader. Clean any material from the top of the follower plate and around the follower plate seals. Clean the top of each unloader cylinder.

Periodic Maintenance

Clean the system when you need to

- remove contaminants
- switch materials and the materials are incompatible with each other
- flush material build-up from the system

System Cleaning

NOTE: If your system is installed without follower plate seals, you will need to add them when flushing solvent through your system.

Follow these procedures to clean your unloader system.

- 1. Remove the follower plate from the material container. Refer to the *Container Changing* procedures in the *Operation* section.
- Note the air motor regulator setting. Reduce the pressure so the air motor will operate more slowly with the thinner solvent.
- Note the elevator controls regulator setting. Reduce the elevator controls regulator pressure to 1–2 bar (15–30 psi) for this procedure.



CAUTION: Do not use a damaged container. A damaged container can damage the follower plate, follower plate seals, or sealing device when the follower plate is lowered.

4. Carefully inspect the solvent container for dents or other damage. Do not use a damaged container.



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

- 5. Center the solvent container beneath the follower plate. Lower the follower plate into the container. Refer to the *Container Changing* procedures in the *Operation* section.
- 6. For unloaders with a container hold down, engage or latch the hold down.
- 7. Remove the gun(s) from the hose(s).



WARNING: Point the hose(s) downward into an empty waste container to help contain the solvent spray in the area.

- 8. Secure the hose(s) to an empty waste container.
- 9. Gradually increase air pressure to the elevator.

System Cleaning (contd)

- 10. Place the elevator control valve in the DOWN position to lower the follower plate into the solvent container. Leave the elevator control valve in the DOWN position.
- 11. Slowly increase air pressure to the air motor until the desired flow rate is obtained.
- 12. Pump solvent through the system until no traces of material are visible in the discharge from the hose(s) into the waste container.
- 13. Remove the solvent container from the unloader and replace it with a new container of material. Refer to the *Container Changing* procedures in the *Operation* section.
- 14. Bleed the pump. Follow the bleeding the pump directions found in the *Operation* section of this manual.
- 15. Raise the air motor regulator pressure to the pressure that you noted in step 2.
- 16. Increase the pressure of the elevator controls regulator to the pressure that you noted in step 3.
- 17. Install any dispensing guns or devices removed for this procedure.

Part A, Section 6

General Troubleshooting

Section A 6 General Troubleshooting



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

Introduction

This section contains troubleshooting procedures for only the most common problems you may encounter. If you cannot solve the problem, contact your local Nordson representative for assistance.

Problem		
1.	Air motor not working	A 6-1
2.	Air motor leaking excessively or constantly	A 6-1
3.	Elevator not working	A 6-2
4.	Blow-off assembly not working	A 6-2
5.	Pump not delivering material	A 6-3
6.	Light on tower not lighting when supposed to—at Low and/or Empty Drum	A 6-3

Troubleshooting Procedures

Problem		Possible Cause	Corrective Action
1.	Air motor not working	Air supply inadequate or missing	Check air supply and operating pressures.
		Hydraulic system blocked	Check hoses, guns, and other hydraulic components for blockages.
		Air motor regulator malfunctioning or lubricator blocked	Check air motor lubricator and replace, if necessary. Clean lubricator.
			NOTE : If more detailed information is required for troubleshooting the air motor, contact your Nordson Corporation representative.
		Air control valve solenoid activated, not working	Press the manual override button to allow air to enter the air motor.
2.	Air motor leaking	Worn U-cup in air motor	Perform these steps:
	excessively or constantly		1. Remove air motor guards
	·····,		2. Listen for air leaking from bottom of air motor.
			3. If U-cup is leaking, replace it.
		Worn end bushings or O-rings on the air valve crankshaft	Replace air valve O-rings, if leaking. Or, repair air valve, as necessary.
		Ice forming in air valve	Install an air line heater near air valve or contact your Nordson Corporation representative for assistance.
		Worn or damaged air motor piston, air valve poppet seal washers, or manifold O-rings	Repair air valve or air motor, or replace manifold O-rings.

Troubleshooting Procedures (contd)

Problem		Possible Cause	Corrective Action	
3.	Elevator not working	Malfunctioning elevator controls regulator, or damaged push buttons or valves	Contact your Nordson Corporation representative for assistance.	
		Elevator air cylinder seals worn or damaged, or piston binding in cylinder	If problem was not solved in pneumatic troubleshooting, rebuild air cylinders.	
4.	Blow-off assembly not working	Failed relief valve (air leaking from valve)	Replace relief valve.	
		No supply air pressure present	Check air supply. Make sure that blow-off ball valve is open. Place elevator control valve in UP position. When the container rises from the base, place the elevator control valve in NEUTRAL position so that air can gather under follower plate.	
			If there is still no air flow, proceed to the next Possible Cause and Corrective Action.	
		Clogged adapter tube of follower plate	To check for and clean a clogged adapter tube, shut off air to the system. Remove the blow-off hose and clean the adapter tube and follower hole.	
Troubleshooting Procedures (contd)

	Problem	Possible Cause	Corrective Action	
5.	Pump not delivering material	Insufficient air pressure to pump	Increase air pressure to pump air motor.	
		Follower plate not in contact with material	Make sure you have placed elevator control valve in the DOWN position. The unloader should begin to pump material.	
		Air pocket in pump	Carefully bleed pump as noted in <i>Operation</i> section of this manual.	
		Blocked hydraulic system or follower	Perform following steps:	
		plate	 Cycle pump. Slowly open bleed valve only two or three turns. If material exits valve, close valve and go to step 2. If no material exits valve, close valve; shut down system; relieve system pressure. Remove and rebuild pump. 	
			 Shut down pump. Relieve system pressure. Disconnect hose from pump. Check hose for blockage. If hose is not blocked, go to step 3. If hose is blocked, clean or replace hose. 	
			 Remove gun from hose. Check gun for blockage. If gun is blocked, clean it. If gun is damaged, rebuild or replace gun as necessary. 	
6.	Light on tower not lighting when supposed to—at Low and/or Empty Drum	Light burned out	Disconnect the leads and apply 120 V to the light. If the light is burned out, replace the light.	
		All other problems	Check to see if the empty drum switch is not bent, broken, or out of alignment. If the light is still not lighting, contact your Nordson Corporation representative.	

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Part B, Section 1

Unloader

Section B 1 Unloader



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

Repair



WARNING: Read and follow the information in the *Safety* section in Part A of this manual before repairing your equipment. Otherwise, personal injury or equipment damage could result.



WARNING: Relieve air and fluid pressures before servicing equipment. Follow the specific instructions in this manual.



WARNING: Wear protective clothing, goggles, and gloves when working with this equipment.

This section contains detailed instructions for repairing or replacing unloader and pump components. Refer to the *Safety* section in Part A of this manual for information on the location of warning tags and guarding for this equipment. Any guards noted in Part B of this manual are for general reference only.

Faulty hoses are not field-repairable. You must replace them if they are damaged. Dispensing guns are covered in a separate manual.

NOTE: Unless otherwise noted, the illustrations in this section portray drum unloader follower plates and seals as a general reference.

Replacing the Follower Plate Seal(s)

If your unloader has replaceable follower seal(s), perform the following steps to replace the seal(s):

- 1. Remove the container of material from the unloader as noted in the *Operation* section in Part A of this manual.
- 2. Remove the old seal(s) from the groove(s) in the follower plate. Clean the follower plate groove(s) until free of all foreign material.
- 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).

Removing the Hydraulic Section

See Figure B 1-1. If the pump is operable, flush the system before disassembly. Refer to the *System Cleaning* procedure in the *Maintenance* section in Part A of this manual. For air valve and air motor repair, refer to the *Air Valve and Air Motor* section in Part B of this manual.



WARNING: System or material pressurized. Relieve pressure. Failure to observe this warning may result in serious injury or death.

- 1. Lower the follower plate (8) to the base. Relieve all hydraulic pressure. Drain the solvent chamber fluid and remove the solvent chamber (2) from the unloader.
- 2. Operate the pump until the coupling (11) is accessible. Shut off the pump.



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. Shut off air pressure to the air motor. Relieve the hydraulic pressure at the guns. Open the bleed valve (4) only two or three turns.
- 4. Disconnect the coupling (11). Gradually increase the air pressure to the air motor. Close the ball valve after the plunger has been pushed to its lowest point and the shaft and coupling are clear of the plunger.

Removing the Hydraulic Section (contd)

- 5. When the air motor shaft is at the top of its range, turn off air pressure to the unit.
- 6. Disconnect the material supply hose from the pump.
- 7. 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 (10).
- 8. Remove the hex head screws (5) and lock washers (6) that secure the hydraulic section to the follower plate (8) and the follower plate gasket (9).
- 9. Raise the hydraulic section until the shovel (7) is exposed.
- 10. Remove the hydraulic section from the unloader.

Removing the Hydraulic Section (contd)





- A. Drum follower plate
- B. Pail follower plate
- 1. Support rods
- 2. Solvent chamber
- 3. Self-locking nuts
- 4. Bleed valve
- 5. Hex head screws

- 6. Lock washers
- 7. Shovel
- 8. Follower plate
- 9. Follower plate gasket (pail units); O-ring (drum units)
- 10. Mounting flange
- 11. Coupling

Packing Gland Replacement



WARNING: To prevent serious injury from material under pressure, always relieve system pressure before disconnecting any hydraulic connections.

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

Relieve system pressure, shut off the pump, trigger all guns, and open the pump bleed valve (as described in this section). Make sure that the pump bleed valve is not plugged with material.

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

Packing Gland Removal



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

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

Follow these procedures to remove your packing glands from the pump. Packing glands can be replaced without removing the pump from the unloader frame. If you have already removed the hydraulic section (pump) from the unloader as directed in *Removing the Hydraulic Section*, you may have already completed some of the following steps.



WARNING: To avoid injury, place the unloader in neutral until noted otherwise in this procedure.

- 1. See Figure B 1-2. Lock out the compressed air supply at the air supply valve (1).
- 2. Bleed the hydraulic pressure through the bleed valve (2) and guns.

Packing Gland Removal(contd)

- 3. Remove the coupling (3) from the plunger. Drain and remove the solvent chamber (4).
- 4. Remove the lockout. Push the pump rod down with the air motor shaft, then raise the air motor shaft. Lock out the compressed air supply at the air supply valve (1).
- 5. See Figure B 1-3. Fit a pin spanner wrench (1) into one of the four holes in the circumference of the gland retainer (2). Unscrew the gland retainer (3) counterclockwise out of the pump body.



WARNING: It is important to inspect the plunger for wear or damage before re-assembly. Severe injury or equipment damage could result from using a worn plunger.

- 6. Clean and inspect the plunger (4) for wear. A worn plunger will cause premature seal wear and leakage of the new gland. Replace the plunger, if necessary.
- 7. Before installing new packing glands, clean the mating surfaces of the mounting flange, packing gland, and plunger. Lubricate all seals and O-rings with compatible lubricant.



Packing Gland Removal(contd)

Fig. B1-2 Replacing the packing gland

- 1. Air supply valve
- 2. Bleed valve

- 3. Coupling
- 4. Solvent chamber

Packing Gland Removal(contd)



Fig. B1-3 Replacing the packing gland

- 1. Pin spanner wrench
- 4. Plunger
- Gland retainer circumference (with holes) 2.
- 5. O-ring

3. Gland retainer

Packing Gland Installation

Follow these procedures to install a new packing gland into your pump body.

- 1. See Figure B 1-3. Coat the threads of the gland retainer (3) with Never-Seez. Screw the gland retainer into the pump body clockwise, taking care not to pinch the O-ring.
- 2. See Figure B 1-4. If the plunger has stalled in the bottom of the hydraulic section, follow these procedures to raise the plunger:
 - a. With air supply to the unloader turned on, position both halves of the coupling (3) on the shaft (1) and align the coupling hole with the plunger hole. Loosely install the four coupling cap screws (4).
 - b. With air supply to the unloader turned off, insert a screwdriver (5) into the coupling (3) and hole in plunger as shown. Tighten the coupling cap screws (4).



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

- c. Open the bleed valve on the side of the pump by turning it clockwise two turns.
- d. With the air supply to the unloader turned on, operate the air motor at low pressure and slow stroke and raise the shaft (1) until the pump nearly reaches the top of its stroke. Shut off the air supply to the air motor.
- e. Use the lockout valve to the air motor to bleed the air in the air motor.
- f. Remove the coupling (3) and install the solvent chamber (See Figure B 1-2, (2)).

Packing Gland Installation(contd)

- 3. See Figure B 1-2. Remove the lockout from the air supply valve (1) and operate the air motor slowly to bring the shaft and plunger together. Stop the air motor when the shaft is close enough to install the top portion of the coupling on the shaft.
- 4. Lock out air pressure to the air motor. Install the coupling using removable threadlocking compound on the screws.
- 5. Fill the solvent chamber with an appropriate solvent to approximately 4 cm (1.5 in.) from the top.
- 6. Close the pump bleed valve.





- 1. Shaft
- 2. Plunger
- 3. Coupling

- 4. Cap screws
- 5. Screwdriver

Plunger and Piston Replacement

You can replace the plunger and piston without removing the pump from the unit. If the pump is operable, flush the system before disassembly. Refer to the *System Cleaning* procedure in *Maintenance* section in Part A of this manual.



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



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

Piston and Plunger Removal

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

- 2. See Figure B 1-5. Operate the pump until the coupling joining the air motor shaft and the plunger (1) is accessible. Shut off the pump air supply. Bleed hydraulic pressure at the guns and pump bleed valve.
- 3. Drain the solvent from the solvent chamber.
- 4. Remove the coupling. Operate the air motor and shut off the ball valve after the plunger has been pushed to its lowest point. Make sure the shaft is clear of the plunger (1).
- 5. Loosen but do not remove the hex head screws (13) and lock washers (12) that secure the follower plate cover (4) to the follower plate.
- 6. Support the follower plate. Remove the hex head screws (13) and lock washers (12) that secure the pump body (2) to the follower plate. Remove the follower plate and gasket (pail units) or O-ring (drum units) from the bottom of the follower plate cover (4).

- 7. Raise the pump assembly until the shovel (9) is exposed. Place a prop beneath the elevator so it does not drift.
- 8. Remove the self-locking nut (8) from the bottom of the shovel assembly. Remove the shovel (9), plate washer (7), and washer retainer (10) from the upper check rod (11).
- Using an Armstrong #34-234 pin spanner wrench (not shipped with your unloader), unscrew the bottom pump cover (3) with the follower plate cover (4) from the pump body (2). The bottom pump cover has a hole in the circumference that will accommodate the spanner wrench.

NOTE: If the pump body spins during removal, use a strap wrench to hold the pump body in place.

NOTE: Early versions of this pump do not have spanner holes. Use a strap wrench to remove the bottom pump cover from the pump body.

- 10. Remove the O-ring (6) and back-up ring (5) from the pump body (2), between the bottom pump cover (3) and the lower check (14). Slide the lower check off the upper check rod (11).
- 11. Grasp the upper check rod (11) and carefully pull the plunger (1) and piston (16) assembly from the pump body (2).

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

- 12. Secure the flats (15) of the upper check rod (11) in a vice. Use a wrench to grip the flats on the plunger (1) and unscrew it from the upper check rod.
- 13. Remove the piston (16) and spacer (17).
- 14. Thoroughly clean and inspect all components. Replace any of them if they are worn, scored, or distorted. You must replace the piston if you have removed it from the pump.
- 15. Remove the packing gland as described in the *Packing Gland Replacement* procedure earlier in this section.



Fig. B1-5 Plunger and piston replacement

- 1. Plunger
- 2. Pump body
- 3. Bottom pump cover
- 4. Follower plate cover
- 5. Back-up ring
- 6. O-ring

- 7. Washer
- 8. Self-locking nut
- 9. Shovel
- 10. Washer retainer
- 11. Upper check rod
- 12. Lock washers

- 13. Hex head screws
- 14. Lower check
- 15. Flats
- 16. Piston
- 17. Spacer



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.

- See Figure B 1-5. Install the piston (16) and spacer (17) on the upper check rod (11). Place removable threadlocking compound on the threads of the upper check rod and install it on the plunger (1). Tighten securely.
- 2. Install a new back-up ring (5) and O-ring (6) on the pump body (2).
- 3. Carefully install the plunger (1), piston (16), spacer (17), and upper check rod (11) as an assembly in the pump body (2).
- 4. Install the lower check (14) on the upper check rod (11).
- 5. Slide the follower plate cover (4) over the bottom pump cover (3) and screw both parts into the pump body (2).
- 6. Loosely install the lock washers (12) and hex head screws (13), but do not tighten the screws at this time.
- 7. Tighten two hex head screws (13) and lock washers (12) opposite each other, then two others, until all are tightened securely.
- 8. Install the packing gland as described in the *Packing Gland Replacement* procedure earlier in this section.



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

- 9. Install the washer retainer (10), plate washer (7), shovel (9), and a new self-locking nut (8) onto the upper check rod (11).
- See Figure B 1-1. Replace the follower plate gasket (9) or O-ring (9) located between the follower plate cover and the follower plate (8). Install the pump body on the follower plate carefully so that you do not damage the shovel (7).

11. Secure the pump body to the follower plate (8) with the hex head screws (5) and lock washers (6).

NOTE: To retrieve a plunger that is stalled in the hydraulic section, refer to the raising the plunger procedure in *Packing Gland Replacement* in this section.

- 12. See Figure B 1-4. Operate the air motor until the air motor shaft (1) and the end of the plunger rod (2) can be brought together. Place removable threadlocking compound on the screw (4) threads and install the coupling (3).
- 13. See Figure B 1-2. Fill the solvent chamber (4) to within 4 cm (1.5 in.) of the top with the appropriate solvent.
- 14. Close the bleed valve on the side of the pump. Remove the wood blocks from under the elevator.

Installing the Hydraulic Section

See Figure B 1-1.

- 1. Check the follower plate gasket (9) or O-ring (9) and replace it if it is damaged. Carefully insert the shovel (7) through follower plate (8) and install the hydraulic section onto the follower plate.
- 2. Lower the elevator until the threaded ends of the support rods (1) project through the mounting flange (10).

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.

- 3. Loosely install new self-locking nuts (3) on the support rods (1).
- See Figure B 1-4. Operate the air motor at low pressure until the air motor shaft

 (1) and the end of the plunger rod (2) can be brought together. Place removable threadlocking compound on the screw (4) threads and install the coupling (3).
- 5. See Figure B 1-1. Tighten the self-locking nuts (3).
- 6. Secure the hydraulic section to the follower plate with the hex head screws (5) and lock washers (6).
- 7. 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).

NOTE: Contact your Nordson Corporation representative for help in choosing the correct solvent chamber fluid for your application.

8. Before starting the system, bleed the pump as described in the *Operation* section in Part A of this manual.

Parts

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

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.

ltem	Part	Description	Quantity	Note
—	000000	Assembly	1	
1	000000	Subassembly	2	А
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.

NOTE: In a dual unloader system, Unit A is the primary unloader and Unit B is the secondary unloader. The main air supply is connected to Unit A, and Unit A contains most of the control devices for dual unloader operation.

Follower Plate and Seal Assembly

See Figure B 1-6.

ltem	Part	Description	Quantity	Note		
_		Module, follower, cast drum	1			
1	186126	Follower plate, 55 gal, Rhino	1			
2	982452	Screw, socket, M10 x 50, bl	4			
3	983405	Washer, lock, M, split, M10, steel, zinc	4			
—		Module, seal, 55 gal	1			
4	183553	Hose, seal, 55 gal kit	1			
5	124786	Stem, bleeder, follower	1			
6		Neoprene ring	2			
7		Follower seal	2			
8		O-ring	1	А		
9	124778	Follower plate, cast, 286 mm pail	1	А		
10	124690	Gasket	1	А		
11	981624	Screw, hex head, ³ / ₈ -16 x 2.50 long	4	А		
12	983160	Lockwasher, ³ / ₈	4	А		
13	983061	Flat washer, ³ / ₈	4	А		
14	984152	Nut, ³ / ₈ -16	4	А		
15		Seal, 286 mm	1	А		
NOTE A: These parts are used to attached a pail (5-gallon) follower plate to a drum (55-gallon) unloader.						



Follower Plate and Seal Assembly (contd)

Fig. B1-6 Follower plate and seal assembly

Blow-Off Assembly Components

See Figures B 1-7 or B 1-8.

Primary Unit (A-Unit)

See Figures B 1-7 and B 1-8.

ltem	Part	Description	Quantity	Note	
		Module, blow-off, primary, 15 psi	1		
1	1043271	 Nipple, ¹/₂ NPT x 24 in. Ig 	1		
2	901151	 Valve, ¹/₂ NPT ball 	1		
3	972708	 Fitting, ¹/₂ NPT ¹/₂ hose 	1		
4	281858	 Hose, ¹/₂ ID pushlok 	AR		
5	973181	 Nipple, ¹/₂ close 	1		
6	223326	 Regulator, preset, ¹/₂ NPT, 15 psi 	1		
7	973547	 Tee, male run, ¹/₂ NPT 	1		
8	972146	 Fitting, 37 degree, ¹/₂ tube 	1		
9	972024	 Connector, ¹/₂ tube, ¹/₂ hose 	1		
10	972366	 Expander, ¹/₂ to ³/₄ NPT 	1		
11	939694	Strap, cable	1		
12	281861	• Tee, ³ / ₄ NPT	1		
13		 Valve, relief, ³/₄ NPT, 25 psi 	1		
13	236980	 Cap, ³/₄ pipe, steel 	1	А	
14	124786	Stem, bleed, follower	1		
NS	900481	Sealant, pipe thread	AR		
15		• Decal, 15 psi	1		
NOTE A: Pipe caps replace relief valves on most units. Relief valves are portrayed in the illustration. If you need assistance in verifying what is installed on your unit, contact your Nordson Corporation representative.					

AR: As Required

NS: Not Shown

Blow-Off Assembly Components (contd)



Fig. B1-7 Blow-off assembly components





Fig. B1-8 Blow-off assembly components, primary unit only

Blow-Off Assembly Components (contd)

Secondary Unit (B-Unit)

See Figure B 1-7.

ltem	Part	Description	Quantity	Note		
—		Module, blow-off, secondary unit	1			
1	1043271	 Nipple, ¹/₂ NPT x 24 in. Ig 	1			
2	901151	 Valve, ¹/₂ NPT ball 	1			
4	124792	 Hose, ³/₄ push lock 	AR			
14	124786	Stem, bleed, follower	1			
NS	221926	 Coupling, ³/₄ NPS, barbed, with gasket 	1	А		
3	972852	 Coupling, barbed, ³/₄ 	1	В		
5	972366	 Adapter, female ³/₄ x male ¹/₂ 	1	С		
NS	186494	Clamp, 1 OD, hose	1	D		
NS	900481	Sealant, pipe thread	AR			
NOTE A: Th	is hose couplin	g connects at the primary unit.				
B: Th	B: This hose coupling connects at the secondary unit.					
C: This adapter connects the hose to the ball valve in secondary units only.						
D: This clamp holds down the hose on the side of the secondary unit.						
AR: As Requi	AR: As Required					
NS: Not Show	NS: Not Shown					

Pneumatic Components

See Figures B 1-9 and B 1-10, as indicated.

Primary Unit (A-Unit)

See Figure B 1-9.

ltem	Part	Description	Quantity	Note	
—		Module, rotary pneumatic, primary, electric	1		
1	973103	• Nipple, steel, sched 40, ³ / ₄ , 1.37	1		
2	973411	 Plug, pipe, socket, flush, ¹/₄, zinc 	7		
3	124792	• Hose, 0.75 ID, 200 psi	AR		
	Continued on next page				

Pneumatic Components (contd)

Item	Part	Description	Quantity	Note
4	124795	• Fitting, hose, $\frac{3}{4}$ barb x $\frac{11}{16}$	2	
NS	972583	• Elbow, male, 37, $1 \cdot \frac{1}{16} \cdot 12 \times \frac{3}{4}$, steel	1	
6	973109	• Nipple, steel, sched 40, ³ / ₄ , 2.00	1	
7	1054491	 Lubricator, ³/₄ NPT 	1	
8	971266	• Elbow, male, 0.25 tube x 0.25 NPT	4	
9	973252	• Nipple, hex, ${}^{3}/_{4} \times {}^{3}/_{4} \times 1.96$, steel, zinc	1	
10	1044045	• Filter, ³ / ₄ NPT	1	
11	973109	• Nipple, steel, sched 40, ³ / ₄ , 2.00	1	
12	282777	Manifold, air supply	1	
13	1054494	 Regulator, ³/₄ NPT 	1	
14	124791	 Gage, 0–160 psig, ¹/₄ NPT 	1	
15	900730	• Tubing, polyurethane, 0.250 x 0.040	AR	
16	972105	 Connector, male, 37, 1-¹/₁₆-12 x ³/₄, steel 	1	
17	973181	• Nipple, ¹ / ₂ close	1	
18	972255	• Elbow, male, 37, ³ / ₄ -16 x ³ / ₈ , steel	1	
NS	982039	• Screw, socket, m8 x 55, bl	2	
20	973085	• Nipple, steel, sched 40, ¹ / ₄ , 0.87	1	
21	901245	 Gage, press, 0–100 psi, 0–7 bar 	1	
22	973187	• Elbow, pipe, hydraulic, 45, ¹ / ₈ , zinc	1	
23	126767	 Regulator, air, 0–60, ¹/₄ NPT 	1	
24	973265	• Tee, pipe, hydraulic, ³ / ₄ , steel, zinc	1	
NS	982049	• Screw, hex, cap, m8 x 25, bl	2	А
NS	983013	• Washer, flat, m, reg, 8, steel, zinc	2	А
NS	282779	Spacer, manifold	1	А
NS	900464	Adhesive, threadlocking, removable	AR	
NS	900481	Adhesive, pipe/thread/hydraulic sealant	AR	
NOTE A: These parts are located beneath the air supply manifold, item 12 in the illustration. AR: As Required NS: Not Shown				

Primary Unit (A-Unit)(contd)



Primary Unit (A-Unit)(contd)

Fig. B1-9 Pneumatic components, primary unit

Pneumatic Components (contd)

Secondary Unit (B-Unit)

See Figure B 1-10.

ltem	Part	Description	Quantity	Note		
_		Module, rotary pneumatic secondary electric	1			
1	124792	• Hose, 0.75 ID, 200 psi	AR			
2	124795	 Fitting, hose, ³/₄ barb x 1¹/₁₆ 	2			
3	972583	• Elbow, male, 37, $1^{1}/_{16}$ -12 x $^{3}/_{4}$, steel	1			
4	973109	• Nipple, steel, sched 40, ³ / ₄ , 2.00	1			
5	1054491	 Lubricator, ³/₄ NPT 	1			
6	971266	• Elbow, male, 0.25 tube x .25 NPT	3			
7	973085	• Nipple, steel, sched 40, ¹ / ₄ , 0.87	1			
8	901245	 Gage, press, 0–100 psi, 0–7 bar 	1			
9	973187	• Elbow, pipe, hydraulic, 45, ¹ / ₈ , zinc	1			
10	126767	 Regulator, air, 0–60, ¹/₄ NPT 	1			
11	281858	 Hose, ¹/₂ ID pushlok 	AR			
12	972024	 Connector, barbed, ¹/₂ hose, ³/₄-16 	2			
13	186494	Clamp, hose 1 ID	1			
14	981160	• Screw, pan, 10-32 x 0.500, steel, zinc	2			
15	983123	• Washer, flat, E, 0.219 x 0.500 x 0.049, zinc	2			
16	983120	• Washer, lock, E, split, #10, steel, nickel	2			
17	984120	• Nut, hex, mach, #10-32, steel, zinc	1			
18	709765	 Elbow, male, 37 d, ³/₄-16 x ¹/₄, steel 	1			
19	939694	Strap, cable, 0.06-4.00, natural	10			
20	900730	• Tubing, polyurethane, 0.250 x 0.040	AR			
NS	900464	Adhesive, threadlocking, removable	AR			
NS	973411	 Plug, pipe, socket, flush, ¹/₄, zinc 	1	А		
NS	900481	Adhesive, pipe/thread/hydraulic sealant	AR			
NS	186507	Cover, hose, 8 wide x 9 ft LG	1			
NOTE A: This item is located on the top of the right air cylinder.						
NS: Not Shown						



Secondary Unit (B-Unit)(contd)

Fig. B1-10 Pneumatic components, secondary unit

Pump Control Components

See Figures B 1-11 through B 1-14, as indicated.

Primary Unit (A-Unit)

See Figures B 1-11 and B 1-12.

ltem	Part	Description	Quantity	Note			
		Module, pump control, A, electric changeover	1				
1	939694	Strap, cable, 0.06-4.00, natural	4				
2	124795	 Fitting, hose, ³/₄ barbed x 1¹/₁₆ 	2				
3	124792	• Hose, 0.75 ID, 200 psi	AR				
4	972583	 Elbow, male, 37, 1¹/₁₆-12 x ³/₄, steel 	1				
5	233577	 Valve, ³/₄ NPT, 3-way, solenoid, 120 V 	1				
6	982293	• Screw, socket, M6 x 65, bl	2				
7	973439	 Elbow, male, pipe, hydraulic, ³/₄, steel, zinc 	1				
8	282776	 Valve, ball, vented, ³/₄ NPT 	1				
9	972105	 Connector, male, 37, 1¹/₁₆-12 x ³/₄, steel 	1				
10	271487	Cap, end, vinyl	1				
11	233589	Actuator, 13 LG, limit switch	1				
12	233571	Switch, limit, sequential	1				
13	981134	• Screw, fillister, 10-32 x 1.750, steel, zinc	2				
14	983124	• Washer, lock, E, int, #10, steel, zinc	8				
15	233567	Switch, push button	1				
16	981160	• Screw, pan, 10-32 x 0.500, steel, zinc	4				
17	233552	 Box, junction, low/empty, 120 V, changeover 	1				
18	981239	 Screw, hex, ¹/₄-20 x 0.500, cap, zinc 	4				
19	983141	• Washer, lock, E, int, ¹ / ₄ , steel, zinc	4				
20	984703	Nut, hex, M6, steel, zinc	2				
21	984120	Nut, hex, machined, #10-32, steel, zinc	6				
22	984130	 Nut, hex, heavy, ¹/₄-20, steel, zinc 	4				
23	124791	 Gage, 0–160 psig, ¹/₄ NPT 	1				
24	973265	• Tee, pipe, hydraulic, ³ / ₄ , steel, zinc	1				
25	973262	 Bushing, pipe, hydraulic, ³/₄ x ¹/₄, steel, zinc 	1				
26	973627	• Nipple, steel, sched 40, ³ / ₄ , 4.00	1				
NS	900464	Adhesive, threadlocking, removable	AR				
AR: As Required							
NS: Not Shown							





Fig. B1-11 Pump control components, primary unit

Pump Control Components (contd)





Fig. B1-12 Pump control components, primary unit
Pump Control Components (contd)

Secondary Unit (B-Unit)

See Figures B 1-13 and B 1-14.

ltem	Part	Description	Quantity	Note
		Module, pump control, B, electric changeover	1	
1	939694	Strap, cable, 0.06–4.00, natural	1	
2	124795	 Fitting, hose, ³/₄ barbed x 1¹/₁₆ 	2	
3	124792	• Hose, 0.75 ID, 200 psi	AR	
4	972583	 Elbow, male, 37, 1¹/₁₆-12 x ³/₄, steel 	2	
5	233577	 Valve, ³/₄ NPT, 3-way, solenoid, 120 V 	1	
6	982293	• Screw, socket, M6 x 65, bl	2	
7	282776	 Valve, ball, vented, ³/₄ NPT 	1	
8	271487	Cap, end, vinyl	1	
9	233589	Actuator, 13 LG, limit switch	1	
10	233571	Switch, limit, sequential	1	
11	981134	• Screw, fillister, 10-32 x 1.750, steel, zinc	2	
12	983124	• Washer, lock, E, int, #10, steel, zinc	8	
13	233567	Switch, push button	1	
14	981160	• Screw, pan, 10-32 x 0.500, steel, zinc	4	
15	984703	Nut, hex, M6, steel, zinc	2	
16	984120	 Nut, hex, machined, #10-32, steel, zinc 	6	
17	124791	 Gage, 0–160 psig, ¹/₄ NPT 	1	
18	228628	 Tee, street, steel, ³/₄ NPTF 	1	
19	973262	 Bushing, pipe, hydraulic, ³/₄ x ¹/₄, steel, zinc 	1	
20	973151	• Elbow, pipe, hydraulic, 90, ¹ / ₄ , steel, zinc	1	
21	973439	• Elbow, male, pipe, hydraulic, ³ / ₄ , steel, zinc	1	
NS	900464	Adhesive, threadlocking, removable	AR	
AR: As Requi	red		1	
NS: Not Show	/n			

Pump Control Components (contd)



Secondary Unit (B-Unit)(contd)

Fig. B1-13 Pump control components, secondary unit



Secondary Unit (B-Unit)(contd)

Fig. B1-14 Pump control components, secondary unit

Elevator Control Components

Primary Unit (A-Unit)

See Figure B 1-15.

ltem	Part	Description	Quantity	Note
—		Module, ram, control, A-Unit, Elec	1	
1	324896	Grommet, rubber, 0.812 ID x 0.25 OD	1	
2	971265	 Connector, male, ¹/₄ tube x ¹/₄ NPT 	2	
3	981176	• Screw, pan, 10-32 x 1.500, steel, zinc	4	
4	983120	 Washer, lock, E, split, #10, steel, nickel 	4	
5	983123	• Washer, flat, E, 0.219 x 0.500 x 0.049, zinc	4	
6	124797	 Valve, rotary, 3-position, ¹/₄ port 	1	
7	939694	Strap, cable, 0.06-4.00, natural	2	
8	972556	 Muffler, low profile, ¹/₄ NPT 	1	
9	984120	Nut, hex, mach, #10-32, steel, zinc	4	
NS	900481	 Adhesive, pipe/thread/hydraulic sealant 	AR	
AR: As Required				
NS: Not Show	NS: Not Shown			

Elevator Control Components (contd)



Primary Unit (A-Unit)(contd)

Fig. B1-15 Elevator control components, primary unit

Elevator Control Components (contd)

Secondary Unit (B-Unit)

See Figure B 1-16.

ltem	Part	Description	Quantity	Note
—		Module, ram, control, B-Unit, Elec	1	
1	324896	Grommet, rubber, 0.812 ID x 0.25 OD	1	
2	981167	• Screw, fillister, 10-24 x 1.000, steel, zinc	4	
3	983120	 Washer, lock, E, split, #10, steel, nickel 	4	
4	983123	• Washer, flat, E, 0.219 x 0.500 x 0.049, zinc	4	
5	971265	 Connector, male, ¹/₄ tube x ¹/₄ NPT 	2	
6	124797	 Valve, rotary, 3-position, ¹/₄ port 	1	
7	984120	Nut, hex, mach, #10-32, steel, zinc	4	
8	272556	 Muffler, low profile, ¹/₄ NPT 	1	
NS	900481	Adhesive, pipe/thread/hydraulic sealant	AR	
AR: As Requi	red			
NS: Not Shown				

Elevator Control Components (contd)



Secondary Unit (B-Unit)(contd)

Fig. B1-16 Elevator control components, secondary unit

Limit Brackets

See Figures B 1-17 and B 1-18, as indicated.

Primary Unit (A-Unit)

See Figure B 1-17.

ltem	Part	Description	Quantity	Note
—		Module, bracket, limit, A, electric changeover	1	
1	233582	Bracket, limit, J-box, A, changeover	1	
2	982035	Screw, socket, M8 x 16, bl	2	
3	983013	• Washer, flat, M, reg, 8, steel, zinc	2	
4	282785	 Clamps, 1¹/₂ ID 	1	
5	233572	Bracket, trip, limit switch	1	
6	981478	U-bolt, 6 inch pipe, with nuts	1	
7	983440	• Washer, lock, E, split, ⁵ / ₈ , steel, nickel	4	
NS	900439	Adhesive, threadlocking	AR	
AR: As Required				
NS: Not Shown				

Limit Brackets (contd)



Primary Unit (A-Unit)(contd)

Fig. B1-17 Limit brackets, primary unit

Limit Brackets (contd)

Secondary Unit (B-Unit)

See Figure B 1-18.

ltem	Part	Description	Quantity	Note
—		Module, bracket, limit, B, electric changeover	1	
1	282785	 Clamps, 1¹/₂ ID 	1	
2	233572	Bracket, trip, limit switch	1	
NS	900439	Adhesive, threadlocking	AR	
AR: As Requi	red			
NS: Not Shown				

Limit Brackets (contd)



Secondary Unit (B-Unit)(contd)

Fig. B1-18 Limit brackets, secondary unit

Manual Shut-Off Components

See Figure B 1-19. Manual shut-off components are installed on primary units only.

ltem	Part	Description	Quantity	Note
—		Module, pneumatic manual shut off	1	
1	282776	 Valve, ball, vented, ³/₄ NPT 	1	
2	973226	• Elbow, pipe, hydraulic, 90, ³ / ₄ , steel, zinc	1	
NS	900481	Adhesive, pipe/thread/hydraulic sealant	AR	
AR: As Requi NS: Not Show	red /n		· · ·	



Manual Shut-Off Components (contd)

Fig. B1-19 Manual shut-off components

Support Assemblies

Primary Unit (A-Unit)

See Figure B 1-20.

ltem	Part	Description	Quantity	Note
—		Module, support, pneumatic, A, electric	1	
1	233615	Bracket, support, pneumatic, A, electric	1	
2	981402	 Screw, hex head, ³/₈-16 x 0.75, large 	4	А
3	983061	• Washer, ³ / ₈	4	А
4	983160	• Washer, lock, ³ / ₈	4	
NS	900464	Adhesive, threadlocking, removable	AR	
NOTE A: Coat this part with removable threadlocking adhesive, part 900 464, when assembling.				
AR: As Required				
NS: Not Show	NS: Not Shown			

Support Assemblies (contd)



Primary Unit (A-Unit)(contd)

Fig. B1-20 Support assembly, primary unit

Support Assemblies (contd)

Secondary Unit (B-Unit)

See Figure B 1-21.

ltem	Part	Description	Quantity	Note
—		Module, support, rotary drum-B, electric	1	
1	233584	Bracket, support, B-Unit, electric	1	
2	981402	 Screw, hex head, ³/₈-16 x 0.75, large 	4	А
3	983061	• Washer, ³ / ₈	4	А
NS	900464	Adhesive, threadlocking, removable	AR	
NOTE A: Coat this part with removable threadlocking adhesive, part 900 464, when assembling.				
AR: As Requi	red			
NS: Not Shown				

Support Assemblies (contd)



Secondary Unit (B-Unit)(contd)

Fig. B1-21 Support assembly, secondary unit

Accessory Kit

This kit is shipped with the unloaders.

ltem	Part	Description	Quantity	Note
_	186663	Module, accessory, kit, K-solvent	1	
NS	900216	Oil, vitalizer, 1 gallon	1	
NS	900256	 Fluid, type K, pump chamber, 1 gallon 	1	
NS	900302	Grease, high temperature	1	
AR: As Required NS: Not Shown				

Pump Assembly

See Figu	ire B	1-22.
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ltem	Part	Description	Quantity	Note
—	230715	Pump assembly, 48:1 ratio	1	
—	230716	Pump assembly, 65:1 ratio	1	
1	249144	• Muffler, 1 ¹ / ₄ NPT	2	
1	295796	Muffler, reclassifier, 1 NPT	2	D
2		Motor, air	1	А
3	230668	Plate, mounting, motor	1	
4	227586	Rod, connecting, pump/motor	3	
5	984260	Nut, hex, lock, torque	3	
6	225793	Pump, hydraulic, 48:1	1	Е
6	225791	Pump, hydraulic, 65:1	1	Е
7	126896	Coupling, kit	1	
NS		Coupling, rod, plunger/air motor	1	
NS	982160	• • Screw, socket, M8 x 25, zinc	4	
NS	900424	Compound, threadlocking, VC-3	AR	
NS	900256	Fluid, solvent chamber, 1-gal (type K)	AR	B, C
NS	900216	Fluid, solvent chamber, 1-gal (vitalizer oil)	AR	B, C
NS	900302	Grease, high temperature	AR	С
NOTE A: Air motor and air valve parts list are located in the Air Valve and Air Motor section of this manual.				

B: Contact your Nordson Service representative for the proper solvent chamber fluid for your application.

C: These items shipped in the accessory group for the unloader.

D: 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 Corporation representative.

E: Pump parts are listed later in this section. Order the appropriate pump ratio based on the pump already installed on your unit.

AR: As Required

NS: Not Shown

Pump Assembly (contd)



Fig. B1-22 Pump assembly

A. Air motor

B. Hydraulic section

48:1 Pump Parts List

See Figur	e B 1-23.
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ltem	Part	Description	Quantity	Note
	225793	Pump, hydraulic, section 48:1	1	
1	225804	Rod, plunger 48:1	1	
2	239818	Gland, packing 48:1	1	A, E
3	954055	Back-up ring, single	3	
4	941470	• O-ring, Viton, 2- ¹¹ / ₁₆ x 2- ⁷ / ₈ x ³ / ₃₂	3	В
5	126856	• Spacer, 1.81 OD x 0.93 ID	1	F
6	940410	• O-ring, Viton, 3.000 x 3.125 x 0.063	1	
7	803740	• Washer, 0.656 ID x 2.250 OD	1	
8	984159	 Nut, hex, lock, ³/₈-24 UNJF 3B 	1	
9	803736	Disc shovel	1	
10	803743	Retainer, washer	1	
11	126857	Rod, upper check, assembly, 48:1	1	C, F
12	225800	Plate, cover, follower	1	
13	235950	Plate, lower check, 48:1	1	
14	225794	Cover, bottom pump, 48:1	1	
15	126853	Piston, assembly 48:1	1	F
16	225797	Body, pump mach 48:1	1	А
17	124698	Body, bleeder, valve	1	D
18	124697	Poppet, screw, adj	1	
19	225795	Cover, upper, pump, 48:1/65:1	1	
20	942361	• O-ring, Buna-N, 3.25 x 3.50 x 0.13	1	
21	124734	Chamber, solvent	1	
NS	900341	Lubricant, Never-Seez, 16-oz can	AR	
NS	900349	Lubricant, PTFE grease, 0.75-oz tube	AR	
NS	900464	Adhesive, threadlocking, removable	AR	
NS	900481	Adhesive, pipe/thread sealant	AR	
NOTE A: Coat this part's threads with Never-Seez lubricant, part 900 341, when assembling.				
B: Coat this part with PTFE grease lubricant, part 900 349, when assembling.				

D: Coat this part with pipe/thread sealant, part 900 481, when assembling.

E: The packing gland is not field repairable. Replace the gland as an assembly.

F: Included in optional piston replacement kit, part 126 831.

AR: As Required

NS: Not Shown

48:1 Pump Parts List (contd)



Fig. B1-23 48:1 pump

48:1 Pump Recommended Spare Parts

See Figure B 1-23. Nordson Corporation recommends that you maintain one (1) of each recommended spare part in stock.

ltem	Part	Description	Quantity	Note	
15	126853	Piston	1	А	
2	239818	Gland, packing 48:1	1	В	
3	954055	Back-up ring, single	1		
4	941470	 O-ring, Viton, 2-¹¹/₁₆ x 2-⁷/₈ x ³/₃₂ 	1		
NOTE A: Included in optional piston replacement kit, part 126 831. B: The packing gland is not field repairable. Replace the gland as an assembly.					

48:1 Optional Piston Replacement Kit

See Figure B 1-23.

ltem	Part	Description	Quantity	Note
—	126831	Kit, replacement, piston	1	
15	126853	Piston	1	
11	126857	Rod, upper check	1	
5	126856	• Spacer, 1.81 x 0.930 x 0.250	1	

65:1 Pump Parts List

See Figure B 1-24. The figure on the right is the adapted version. Check your configuration and order accordingly.

ltem	Part	Description	Quantity	Note
	225791	Pump, hydraulic, section 65:1	1	
1	126878	Rod, plunger (65:1)	1	
2	239819	Gland, packing 65:1	1	A, E
3	954055	 Back-up ring, single, 2-¹¹/₁₆ 	3	
4	941470	 O-ring, Viton, 2-¹¹/₁₆ x 2-⁷/₈ x ³/₃₂ 	3	В
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	1	
7	803740	• Washer, 0.656 ID x 2.250 OD	1	G
8	984159	 Nut, hex, lock, thin, ³/₈-24 UNJF 3B 	1	G
9	126829	Disc shovel	1	н
10	803743	Retainer, washer	1	G
11	126893	Rod, upper check, assembly	1	С
12	225800	Plate, cover, follower	1	
13	235952	Plate, check, lower	1	
14	225792	Cover, bottom pump, 65:1	1	
15	126876	Piston, assembly 65:1 piston	1	
16	225796	Body, pump 65:1	1	А
17	124698	Body, bleeder, valve	1	D
NOTE A: Co	at this part's th	reads with Never-Seez lubricant, part 900 341, when assembling	g.	
B: Coat this part with PTFE grease lubricant, part 900 349, when assembling.				
C: Coat this part with removable threadlocking adhesive, part 900 464, when assembling.				
D: Coat this part with pipe/thread sealant, part 900 481, when assembling.				
E: The packing gland is not field repairable. Replace the gland as an assembly.				
G: This part is not available for the adapted configuration.				
H: It this part is for the adapted configuration, part 295971 must be ordered for a correct fitting.				
Continued on next page				

ltem	Part	Description	Quantity	Note
18	124697	Poppet, screw, adj.	1	
19	225795	Cover, upper pump, 48:1/65:1	1	
20	942361	• O-ring, Buna-N, 3.234 x 3.500 x 0.139	1	
21	124734	Chamber, solvent	1	
22	124690	Gasket, follower	2	F
23	295970	Adapter, follower, 2.38 ID	1	F
24	295971	Plate, shovel 2.38, follower	1	F
NS	900341	Lubricant, Never-Seez, 16-oz can	AR	
NS	900349	Lubricant, PTFE grease, 0.75-oz tube	AR	
NS	900464	Adhesive, threadlocking, removable	AR	
NS	900481	Adhesive, pipe/thread, sealant	AR	
NOTE F: This part available only for the adapted configuration (service shovel/adapter).				
AR: As Required				
NS: Not Shown				

65:1 Pump Parts List (contd)

65:1 Pump Parts List (contd)



Fig. B1-24 65:1 pumps

65:1 Pump Recommended Spare Parts

See FigureB 1-24. Nordson Corporation recommends that you maintain one (1) of each recommended spare part in stock.

ltem	Part	Description	Quantity	Note
15	126876	Piston	1	
2	239819	Gland, packing 65:1	1	А
3	954055	Back-up ring, single	1	
4	941470	• O-ring, Viton, 2- ¹¹ / ₁₆ x 2- ⁷ / ₈ x ³ / ₃₂	1	
NOTE A: The packing gland is not field repairable. Replace the gland as an assembly.				

Part B, Section 2

Air Valve and Air Motor

Section B2 Air Valve and Air Motor

Repair

This section contains detailed instructions for repairing or replacing air valve and air motor components. Refer to the *Safety* section in Part A of this manual for information on the location of warning tags, operation tags, and guarding for this equipment. Any guards noted in this section are for general reference only.

Safety Precautions



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



WARNING: To prevent serious personnel injury from material under pressure, always relieve system pressure before breaking any hydraulic connections.

NOTE: To relieve system pressure, shut off the pump and trigger all of the guns. Shut-off air pressure to the air motor regulator.



WARNING: Wear protective clothing, safety glasses, and gloves when working with this equipment.

Air Valve

The following procedures provide information on air valve repair. See Figures B 2-1 through B 2-5 as specified.

Air Valve Removal and Disassembly

- 1. Reduce air supply regulator to 0 bar/0psi and disconnect the air line from the motor.
- 2. See Figure B 2-1. Remove the two pan head screws (1) and lock washers (2) from the side of the cover (3). Remove the cover (3).
- 3. Unscrew the mufflers from the muffler block (4).
- 4. Remove the four socket head screws (10) that attach the air valve (6) to the cylinder heads (7 and 8). Be careful not to lose the O-rings (9) from the air valve as you separate the air valve and muffler block (4) from the cylinder heads.
- 5. Remove the four socket head screws (5) that secure the muffler block (4) and cover (11) to the air valve (6). Separate the muffler block from the air valve .



Fig. B 2-1 Removing cover and muffler block

- 1. Pan head screws
- 2. Lock washers
- 3. Cover
- 4. Muffler block

- 5. Socket head screws
- 6. Air valve
- 7. Cylinder head (upper)
- 8. Cylinder head (lower)
- 9. O-rings
- 10. Socket head screws
- 11. Cover

Air Valve Removal and Disassembly(contd)

- 6. See Figure B2-2. Remove the four socket head screws (1) from each poppet cap (2 and 3). Remove the poppet caps from the valve body (4). Remove the poppet seal washers (5) from the poppet caps.
- 7. Remove the socket head screws (6), poppets (7 and 8), and O-rings (9 and 10) from the valve body (4).
- 8. Remove the four socket head screws (11), snapper bracket (12), and gasket (13) from the valve body (4).
- 9. Disengage the ball stem (14), spring (15), and fork (16) from the snapper (17). Remove the socket head screw (18), snapper bearing (19), nut (20), lockwasher (21), washer (22), and snapper from the valve body (4).



Air Valve Removal and Disassembly(contd)

Fig. B 2-2 Removing poppet caps, poppets, and snapper assembly

- 1. Socket head screws
- 2. Poppet cap
- 3. Poppet cap
- 4. Valve body
- 5. Poppet seal washers
- 6. Socket head screws
- 7. Poppet
- 8. Poppet

- 9. O-ring
- 10. O-ring
- 11. Socket head screws
- 12. Snapper bracket
- 13. Gasket
- 14. Ball stem
- 15. Spring
- 16. Fork

- 17. Snapper
- 18. Socket head screw
- 19. Snapper bearing
- 20. Nut
- 21. Lockwasher
- 22. Washer

Air Valve Removal and Disassembly(contd)

- 10. See Figure B2-3. Remove the socket head screw (1), seal washer (2), bushing (3), and O-ring (4) from the valve body (5).
- 11. Remove the crankshaft (6), O-ring (7), and arm (8) from the valve body (5).
- 12. Push the poppet spool (9) from the valve body (5). Remove the O-rings (10 and 11) from inside the valve body.
- 13. Inspect all moving parts before re-assembly and replace any that appear worn or damaged. Replace the O-rings and seals using the air valve seal kit. Refer to the parts list in this section for ordering information.



Fig. B 2-3 Removing the crankshaft and poppet spool

- 1. Socket head screw
- 2. Seal washer
- 3. Bushing
- 4. O-ring

- 5. Valve body
 6. Crankshaft
- 7. O-ring
- 8. Arm

- 9. Poppet spool
- 10. O-ring
- 11. O-ring

Air Valve Assembly

NOTE: Lubricate all O-rings with a compatible O-ring lubricant before installation.

- 1. See Figure B2-4. Install the new O-ring (7) in the valve body (8).
- 2. Perform the following steps to install one poppet:
 - a. Install the new O-ring (6) on the spool side of one poppet (5).
 - b. Push the socket head screw (4) through the center of the poppet. Make sure the O-ring is still seated in the poppet.
 - c. Install the poppet on one end of the poppet spool (24). Tighten the socket head screw.
- Note the position of the poppet spool (24) cutout with respect to the valve body (8). Install the poppet spool with poppet (5) in the valve body so that the cutout is centered in the NPT port.
- 4. Install the new O-ring (13) on the crankshaft (12).
- 5. Align and install the crankshaft (12) and arm (28) so that they are perpendicular to the valve body (8). It may be necessary to move the arm or crankshaft slightly to align the teeth of the arm with the splines of the crankshaft.

NOTE: If you do not properly align the crankshaft (12) with the arm (23) as described in step 5, the valve will not work properly.

6. Assemble the new seal washer (15), O-ring (13), bushing (14), and socket head screw (16). Hold the contact arm of the crankshaft (12) and install this assembly on the opposite side of the valve body (8). Tighten the socket head screw.

Air Valve Assembly(contd)

- 7. To install the snapper assembly, perform the following steps:
 - a. Install the socket head screw (9), snapper bearing (10), and snapper (15), in the valve body (8). Install the washer (25), lockwasher (26), and nut (27).
 - b. Coat the ball stem (17) with moly disulfide lubricant before assembling. Refer to the parts list in this section for ordering information on the lubricant.
 - c. Place the spring (18) over the ball stem (17), and place the end of the fork (19) in the ball stem.
 - d. Position the gasket (22) on the valve body (8).
 - e. Place end of the fork (19) over the snapper and hold this assembly in place.
 - f. Place the snapper bracket (21) on top of gasket (22), place the ball stem (17) in the socket of the snapper bracket, and install the four socket head screws (20). Tighten the socket head screws evenly.
- 8. Perform the following steps to install the remaining poppet (5):
 - a. Install the new O-ring (6) in the remaining poppet.
 - b. Push the socket head screw (4) through the center of the poppet (5). Make sure the O-ring is still seated in the poppet.
 - c. Install the poppet in the valve body (8) and tighten the socket head screw.
- 9. Install new poppet seal washers (3) in the poppet caps (2). Use the eight socket head screws (1) to attach the two poppet caps to the valve body (8).




Fig. B 2-4 Assembling the air valve

- 1. Socket head screws
- 2. Poppet caps
- 3. Poppet seal washers
- 4. Socket head screw
- 5. Poppet
- 6. O-ring
- 7. O-ring
- 8. Valve body
- 9. Socket head screw

- 10. Snapper bearing
- 11. Snapper
- 12. Crankshaft
- 13. O-ring
- 14. Bushing
- 15. Seal washer
- 16. Socket head screw
- 17. Ball stem
- 18. Spring

- 19. Fork
- 20. Socket head screws
- 21. Snapper bracelet
- 22. Gasket
- 23. Arm
- 24. Poppet spool
- 25. Washer
- 26. Lock washer
- 27. Nut

Air Valve Assembly(contd)

- 10. See Figure B2-5. Secure the muffler block (1) and cover (10) to the four-way air valve (2) with four socket head screws (3).
- Install two new O-rings (4) between the valve body (2) and the cylinder heads (5). Use four socket head screws (6) to attach the valve body to the cylinder heads.
- 12. Coat the threads of each muffler with an anti-seize thread sealing compound. Screw the mufflers into the muffler block (1). Install the cover (7) with two pan head screws (8) and lock washers (9).



Fig. B 2-5 Installing the muffler block and cover

- 1. Muffler block
- 2. Air valve
- 3. Socket head screws
- 4. O-rings

- - 5. Cylinder heads
 - 6. Socket head screws
 - 7. Cover

- 8. Pan head screws
- 9. Lock washers
- 10. Cover

Air Motor

The following procedures provide information on air motor repair. See Figures B2-6 through B2-8 specified.

Air Motor Removal



WARNING: Be sure to relieve all hydraulic pressure from the hoses at the outlet of the pump, and make sure to bleed off the pressure from the pump before repairing this unit. Otherwise, serious injury, death, or equipment damage could result.

1. Turn the air pressure to the pump air motor down until it barely operates the air motor. Operate the air motor until the coupling rises above the solvent chamber. Shut-off the air supply to the air motor.



Fig. B 2-6 Bleeding the pump

NOTE: The 7-inch air motor features a nut and split collar that couples the air motor shaft to the pump plunger. The 10-inch air motor uses a split coupling to connect the air motor shaft to the pump plunger. For this procedure, both types are referred to as "the coupling."

2. Relieve all hydraulic pressure from the hoses. Bleed the pump as shown in Figure B2-6. Remove the follower plate from the container, remove the container unloader, and lower the follower plate to the frame.

Air Motor Removal(contd)

- 3. Remove the coupling and note how it is attached to the air motor shaft.
- 4. Start the pump and observe the movement of the shaft. When it is fully retracted (the piston will be at the top of the stroke), shut off the pump. Close the air motor ball valve and adjust the regulator to 0 bar/0 psi. Disconnect the air supply line from the air motor.
- 5. See Figure B2-8. Remove the two hex head screws (13), lock washers (14), hex nuts (15), and two-piece shifter arm (10).
- Remove the three hex head screws (4) and lock washers (5) securing the motor (1) to the mounting plate (2). As you lift the air motor from the plate, take care not to lose the spacers (3) beneath the lower cylinder head (6). Move the air motor to a clean work area.

Air Motor Disassembly

- 1. Remove the air valve as described in this section.
- 2. See Figure B2-7. Use two wrenches to grasp the flats on the ends of the push rods (1 and 2). Prevent the lower push rod (2) from moving and turn the upper push rod (1) counterclockwise. Remove the push rods, spool (3), and O-ring (4).
- 3. Remove the four hex nuts (5) and lock washers (6) at the bottom of the air motor. Pull the long hex head screws (7) out of the assembly.
- 4. Remove the upper cylinder head (8) and O-ring (9) from the air motor.
- Turn the remaining assembly upside down. Remove four socket head screws (10), lock washers (11), and the back-up plate (12) from the lower cylinder head (13).
- 6. Remove the lower cylinder head (13) from the air cylinder (14). Remove the O-ring (15) from the lower cylinder head.
- Pull the piston/shaft assembly from the air cylinder (14). Place a wrench on the flats (16) of the shaft (17). Use another wrench to remove the nut (18). Remove the piston (19) and O-ring (20) from the shaft.
- 8. Remove the U-cup seal (21) from the lower cylinder head (13).
- 9. Inspect all air motor components and replace any that are damaged or worn. Replace all O-rings and seals.



Air Motor Disassembly(contd)

Fig. B 2-7 Removing push rods, cylinder heads, and piston assembly

- 1. Upper push rod
- 2. Lower push rod
- 3. Spool
- 4. O-ring
- 5. Hex nuts
- 6. Lock washers
- 7. Hex head screws

- 8. Cylinder head (upper)
- 9. O-ring
- 10. Socket head screws
- 11. Lock washers
- 12. Back-up plate
- 13. Cylinder head (lower)
- 14. Air cylinder

- 15. O-ring
- 16. Flats
- 17. Shaft
 - 18. Nut
 - 19. Piston
- 20. O-ring
- 21. U-cup seal

Air Motor Assembly

NOTE: Lubricate all O-rings with O-ring grease before installing.

- See Figure B2-7. Install the new O-ring (20) on the shaft (17). Install the piston (19) on the shaft. Apply a few drops of thread locking compound to the shaft threads. Install and tighten the nut (18) on the shaft.
- 2. Lubricate the piston (19) seal and ID of the air cylinder (14) with O-ring grease. Slide the piston into the air cylinder at an angle. Center the piston when it is well within the air cylinder.
- 3. Install the O-ring (9) in the upper cylinder head (8). Place the air cylinder (14) and piston (19) assembly on a flat surface with the shaft (17) pointing upward.
- 4. Lubricate and place a new U-cup seal (21) in the lower cylinder head (13) so that the open part of the "U" is facing toward the cylinder head. Carefully press the U-cup seal into place.
- 5. Install the back-up plate (12), four socket head screws (10), and lock washers (11) on the lower cylinder head (13).

CAUTION: In the following step, you must install the lower cylinder head (13) carefully so you do not damage the U-cup seal (21).

6. Install the O-ring (15) in the lower cylinder head (13). Install the lower cylinder head and O-ring on the air cylinder (14).

NOTE: You may have to rock the lower cylinder head (13) gently to get the U-cup seal (21) over the shaft.

- 7. Carefully align and install the upper cylinder head (8) on the air cylinder (14). Lay the assembly flat with the shaft (17) horizontal on a work table. Install, but do not tighten, the long hex screws (7), lock washers (6), and hex nuts (5).
- 8. Install the O-ring (4) on the upper push rod (1) and slide this rod through the bushing in the upper cylinder head (8). Slide the spool (3) onto the upper push rod and place a couple of drops of thread-locking compound on the rod threads. Perform the next step immediately.

NOTE: You may have to rotate the lower cylinder head (13) slightly, with respect to the upper cylinder head (8), so that the push rod assembly moves freely.

- 9. Slide the lower push rod (2) through the bushing in the lower cylinder head (13). Use wrenches on the flats of the upper and lower push rods (1 and 2) to tighten them securely.
- 10. Tighten the long hex head screws (7), hex nuts (5) and lock washers (6) evenly. Check that the push rods move freely.
- 11. Install the air valve as described in this section.

Air Motor Installation

- 1. See Figure B2-8 air motor (1). Lift the air motor onto the mounting plate (2) and slide the shaft through the center hole. Install the spacers (3) between the air motor and the mounting plate.
- 2. Place a couple of drops of thread locking compound on the threads of the hex head screws (4). Install (but do not tighten) the hex head screws and lock washers (5) in the bottom of the mounting plate (2) so that they thread into the lower cylinder head (6).
- 3. Move the air motor shaft (7) toward the hydraulic (pump) plunger (8). Install and tighten the coupling (9).

NOTE: As you perform the next step, make sure you install the two-piece shifter arm (10) on the air motor shaft (7) so that the arm rides between the collars (11) of the lower push rod (12).

- 4. Install the two-piece shifter arm, two hex head screws (13), lock washers (14), and nuts (15) on the air motor shaft (7).
- 5. Connect the supply air hose to the air valve fitting, using PTFE tape to seal the threads.
- 6. Turn on the air supply and start the pump. Check the pump for proper operation.

Air Motor Installation(contd)





- 1. Air motor
- 2. Mounting plate
- 3. Spacers
- 4. Hex head screws
- 5. Lock washers
- 6. Lower cylinder head
- 7. Air motor shaft
- 8. Hydraulic pump plunger

- 9. Coupling
- 10. Shifter arm
- 11. Collars
- 12. Lower push rod
- 13. Hex head screws
- 14. Lock washers
- 15. Hex nuts

Parts

This section contains part numbers and ordering information for the air valve and air motor assemblies only. The other parts lists in Part B contain ordering information for the main unloader components and frame assemblies. If you need assistance with interpreting a parts list, refer to the *Unloader* section in this manual for basic parts lists instructions.

Air Valve Assembly

ltem	Part	Description	Quantity	Note
	248 843	Valve, Air		
1	982 158	Screw, socket head, M6 x 40	8	
2	248 841	Cap, poppet	2	
3	248 839	Washer, seal, poppet	2	А
4	982 030	Screw, socket head, M6 x 20	2	
5	248 842	Poppet	2	
6	940 101	• O-ring, Viton, 0.250 x 0.375 x 0.063	2	А
7	941 282	• O-ring, Viton-encapsulated, Buna-N, 1.5 x 1.68 x 0.09	2	А
8	248 844	Body, valve	1	
9	134 811	Screw, socket head, cap, M8 x 25	1	
10	139 911	Bearing, snapper	1	
11	249 142	Snapper	1	
12	247 232	Crankshaft	1	
13	940 154	 O-Ring, Buna-N, 0.563 x 0.688 x 0.063 	2	А
14	323 575	Bushing, end, crankshaft	1	
15	323 043	Washer, seal	1	А
16	981 255	• Screw, socket head, ¹ / ₄ -28 x 0.75, Nylok	1	
17	323 477	Stem, ball	1	
18	323 478	• Spring, compression, 3.625 x 0.385 x 0.080	1	
19	323 476	• Fork	1	
20	982 006	Screw, socket head, M8 x 20	4	
21	323 472	Bracket, snapper	1	
22	323 470	Gasket, air valve	1	А
23	247 233	• Arm	1	
24	248 840	Spool, poppet	1	
25	983 051	• Washer, flat, 0.344 x 0.688 x 0.065	1	
26	983 150	 Washer, Lock, E, split, ⁵/₁₆, stl, ni 	1	
27	984 211	 Nut, hex, lock, thin, ⁵/₁₆–18, UNC 2B 	1	
NS	900 278	Lubricant, moly disulfide, 1 gallon	1	
NOTE A: Th	ese parts are ir	cluded in the air valve seal kit (part 106 448).		
NS: Not Show	'n			

See Figure B2-9.



Air Valve for 7- and 10-inch Air Motors

Fig. B2-9 Air valve for 7- and 10-inch air motors

Air Valve Seal Kit

See Figure B2-9. Nordson Corporation recommends that you purchase one kit as a spare part.

ltem	Part	Description	Quantity	Note	
	106 448	Kit, air valve seal	—		
3	248 839	Washer, seal, poppet	2		
6	940 101	 O-ring, Viton, 0.250 x 0.375 x 0.063 	2		
7	941 282	O-ring, encapsulated Viton, 1.500 x 1.688	2		
14	940 154	 O-ring, Buna-N, 0.563 x 0.688 x 0.063 	2		
16	323 043	Washer, seal	1		
23	323 470	Gasket, air valve	1		
NS	941 201	 O-ring, Viton, 1.0 x 1.188 x 0.094 	2	А	
NOTE A: Th	NOTE A: This is an item in both the 7- or 10-inch air motor part lists. See item 31 of Figure B2-10.				

7- and 10- inch Air Motor Parts Lists

See Figure B2-10.

NOTE: The 10-inch air motor illustration is used as a reference for both parts lists. Be careful to note part numbers and quantities of items based on which size air motor you use.

7-inch Air Motor

Item	Part	Description	Quantity	Note
	124 702	Motor, air, 180D	—	
1	323 420	• Collar	3	
2	985 407	• Pin, Spirol, medium, 0.188 x 0.750	3	
3	323 421	Rod, push	1	
4	945 004	• O-ring, 0.531 x 0.187	1	
5	248 845	• Bolt, eye, ³ / ₈ -16 x 1.25	1	
6	132 154	Stud, ground	1	
7	984 716	• Nut, hex, M16, stl, zn	4	
8	983 419	Washer, lock, M, split, M16, stl, zn	4	
9	249 093	Head, cylinder, upper, 180D	1	
10	942 611	• O-ring, Buna-N, 6.75 x 7.0 x 0.125	2	
11	323 418	• Spool	1	
12	984 176	 Nut, hex, h.s., stl, zn, 1¹/₂ 	1	
13	249 091	Piston, air motor, 180D	1	
14	941 250	• O-ring, hotpaint, 1.313 x 1.5 x 0.094	1	
15	124 677	Rod, connecting, piston	1	
16	982 185	• Screw, hex, cap, M16 x 240, bk	4	
17	124 700	Rod, push	1	
18	249 089	Cylinder, air, 180D	1	
19	249 095	Head, cylinder, lower, 180D	1	
20	952 101	 Cup, U, polyurethane, 1-³/₁₆ x 1-¹¹/₁₆ 	1	А
21	249 076	Plate, back-up	1	
22	983 409	• Washer, lock, M, split, M6, stl, zn	4	
23	982 176	Screw, socket head, M6 x 16, bl	4	
24	982 049	• Screw, hex, cap, M8 x 25, bl	2	
25	249 088	Arm, shifter, 180D (half)	2	
26	983 404	Washer, lock, M, split, M8, stl, zn	2	
27	984 707	Nut, hex, M8, steel, zinc	2	
28	982 292	Screw, socket head, M6 x 55, bl	4	
29	249 078	Block, muffler	1	
NOTE A: No	ordson Corporat	tion recommends purchasing this item as a spare part.		

ltem	Part	Description	Quantity	Note
30	248 843	Valve, air	1	В
31	941 201	• O-ring, Viton, 1.0 x 1.18 x 0.094	2	С
32	982 293	Screw, socket, M6 x 65, bl	4	
33	982 000	• Screw, pan, slot, M5 x 10, zn	2	
34	983 401	• Washer, lock, M, split, M5, steel, zn	2	
35		Cover, air valve	1	
36	249 115	Collar, rod, connecting	2	
37	249 126	Nut, coupling (180D only)	1	
38		Cover, air valve side guard	1	
NS	900 223	Lubricant, O-ring, Parker, 4 oz.	1	
NS	900 439	Adhesive, threadlocking	1	
NOTE B: Se	e Figure B2-9	for the breakdown of this subassembly.		
C: Th	is part is inclu	ded in the air valve seal kit (part 106 448).		
NS: Not Show	vn			

7-inch Air Motor(contd)





Fig. B2-10 7-inch air motor (10-inch air motor reference)

10-inch Air Motor

See Figure B2-10.

NOTE: The cylinder heads for the 10-inch air motor differ slightly from the illustration. 10-inch air motor cylinder heads use 6 nuts and washers instead of the 4 used in a 7-inch air motor.

ltem	Part	Description	Quantity	Note
	124 701	Motor, air, 360D	—	
1	323 420	• Collar	3	
2	985 407	• Pin, Spirol, medium, 0.188 x 0.750	3	
3	323 421	Rod, push	1	
4	945 004	• O-ring, 0.531 x 0.187	1	
5	248 845	• Bolt, eye, ³ / ₈ -16 x 1.25	1	
6	132 154	Stud, ground	1	
7	984 716	Nut, hex, M16	6	
8	983 419	Washer, lock, split, M16	6	
9	249 084	Head, cylinder, upper, 360 D	1	
10	942 730	 O-ring, hotpaint, 9.75 x 10.0 x 125 	2	
11	323 418	• Spool	1	
12	984 176	 Nut, hex 1¹/₂-12 	1	
13	249 081	Piston, air motor, 360D	1	
14	941 250	 O-ring, hotpaint, 1.313 x 1.5 x 0.094 	1	
15	124 677	Rod, connecting, piston	1	
16	982 185	Screw, hex head, cap, M16 x 240	6	
17	124 700	Rod, push	1	
18	249 082	Cylinder, air, 360D	1	
19	249 086	 Head, cylinder, lower, 360D 	1	
20	952 101	• Cup, U, polyurethane, 1.8125 x 1.6875	1	А
21	249 076	Plate, back-up	1	
22	983 409	Washer, lock, split, M6	4	
23	982 176	Screw, socket head, M6 x 16	4	
24	982 049	Screw, hex head, cap, M8 x 25	2	
25	249 077	Arm, shifter, 360D	2	
26	983 404	Washer, lock, split, M8	2	
27	984 707	Nut, hex, M8	2	
28	982 292	Screw, socket head, M6 x 55	4	
29	249 078	Block, muffler	1	
NOTE A: No	ordson Corpora	tion recommends purchasing this item as a spare part.	•	

ltem	Part	Description	Quantity	Note
30	248 843	Valve, air	1	В
31	941 201	 O-ring, Viton, 1.0 x 1.188 x 0.094 	2	С
32	982 293	Screw, socket head, M6 x 65	4	
33	982 000	• Screw, pan head, M5 x 10	2	
34	983 401	Washer, lock, split, M5	2	
35		Cover, air valve	1	
38		Cover, air valve side guard	1	
NS	900 223	Lubricant, O-ring, Parker, 4oz.	1	
NS	900 439	Adhesive, threadlocking	1	
NOTE B: Se	e Figure B2-9	for a breakdown of this subassembly.	·	
C: Th	nis part is inclu	ded in the air valve seal kit (part 106 448).		
NS: Not Sho	wn			

10-inch Air Motor(contd)

Part B, Section 3

Frame

Section B 3 Frame



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

Repair



WARNING: System or material pressurized. Relieve pressure. Failure to observe this warning may result in serious injury or death.



WARNING: Wear protective clothing, goggles, and gloves when working with this equipment.

This section contains detailed instructions for repairing or replacing drum unloader frame components. Refer to the *Unloader* section in Part B of this manual for additional unloader component repairs.

Rebuilding Air Cylinders

NOTE: Nordson Corporation recommends that the technician rebuild both air cylinders at the same time.

Air Cylinder Disassembly

See Figure B 3-1.

- 1. Remove the container of material from the unit as noted in the *Operation* section in Part A of this manual.
- 2. Place wood blocks beneath the follower plate. Lower the elevator until the follower plate makes contact with the wood blocks.

Air Cylinder Disassembly(contd)

- 3. Use the directional valve to bleed all air from both the top and bottom of the elevator pistons. To do this,
 - a. Turn both the pneumatic controls regulator and the air motor regulator to 0 bar/psi and disconnect the input air supply.

NOTE: For future reference, note the settings of both the pneumatic controls regulator and the air motor regulator.

- b. Place the unloader in the DOWN position until all air bleeds from above the air cylinder piston.
- c. Place the unloader in the UP position until any remaining air bleeds from below the air cylinder piston.

NOTE: The elevator should not rise at this point when in the UP position.

- d. Place the unloader in the DOWN position.
- 4. Disconnect the push-lock air tube at the bottom of the left cylinder. Bleed separately and wait for the pressure to escape.
- 5. Remove each shaft separately. To remove the shaft:
 - a. Remove the hex head screws (2), lock washers (3), and flat washers (4) that secure the crossover (1) to each cylinder shaft (6) and frame tube (23).
 - b. Remove the crossover.
 - c. Remove the cap screws (5) from the top of the cylinder shafts.
 - d. Install ⁷/₈-14 eye bolts in the tops of the shafts and lift each shaft out of the cylinder separately.
- 6. Remove the following from each cylinder shaft (6):
 - shaft screw (22)
 - bottom piston spacer (21)
 - piston guide disk (20)
 - piston backup plates (17)
 - gaskets (18)
 - piston seal (19)
 - other piston stop (7).
- 7. Slide the cylinder head (11) off each shaft (6).

Air Cylinder Disassembly(contd)

8. Remove the following from each cylinder head (11):

- internal retaining ring (16)
- wiper scraper (15)
- bearing (14)
- shaft seal (13)
- external O-ring (12)

Cleaning Air Cylinders

Clean the inside walls of the cylinders. Immediately apply a coating of O-ring lubricant to prevent corrosion. Clean the piston seals, cylinder heads, and shafts. Whenever you disassemble the cylinders, you should replace the seals, wiper scrapers, bearings, and O-rings.

Air Cylinder Assembly

See Figure B 3-1.

- Lubricate the following items with petroleum jelly and install them into of each cylinder head (11): new shaft seal (13), new bearing (14), new wiper scraper (15), and retaining ring (16).
- 2. Lubricate two new O-rings (12) with O-ring lubricant. Install an O-ring onto each cylinder head (11).
- 3. Place a light coating of petroleum jelly on the cylinder shafts (6). Slide the cylinder heads (11) onto the shafts.
- 4. Slide the piston stop (7) onto each cylinder shaft (6). Apply non-removable threadlocking adhesive to the shaft screws (22). Immediately install the following components (in order) on each cylinder shaft:
 - piston backup plate (17)
 - gasket (18)
 - piston seal (19)
 - gasket (18)
 - piston backup plate (17)
 - piston guide disk (20)
 - bottom piston spacer (21)
 - shaft screw (22)
- 5. Tighten each screw securely with an impact wrench to 85 N•m (250 ft-lb).

Air Cylinder Assembly(contd)

- 6. Lubricate the piston seal (19) with O-ring lubricant.
- 7. Install the shaft and piston assembly on the crossover.
- 8. To install each cylinder head (11), perform the following steps:
 - a. Apply removable threadlocking adhesive to the cap screws (5).
 - b. Install the cap screws into each cylinder (8). Tighten each screw to 7–11 N•m (10–15 ft-lb).
 - c. Install any device or bracket that was removed from the top of the cylinder head). Install the air fitting on the left cylinder head and connect the air supply.
- Align the mounting plate (for the pump—air motor—follower assembly) with the mounting rods (10). Apply removable threadlocking adhesive to the hex head screws (9). From the underside of the mounting plate, install the flat washers (4), lock washers (3), and hex head screws (9) to secure the plate to the mounting rods. Tighten the screws securely.
- 10. Place the unloader in the NEUTRAL position. Connect the input air supply to the fitting.
- 11. Turn the pneumatic controls regulator and the air motor regulator to the settings you noted in step 3 of the *Air Cylinder Disassembly* procedure.
- 12. Remove the wood blocks from beneath the follower plate.

Parts

This section contains part numbers and ordering information for the drum frame assembly only. The other parts lists in Part B contain ordering information for the main unloader components, air valve, and air motor assemblies. Refer to the *Unloader* Parts section in this manual for basic parts list instructions.

Drum Frame Components

ltem	Part	Description	Quantity	Note
	230 593	Frame, bulk unloader, 55 gallon	1	
1		Crossover, frame, drum	1	
2	981 664	 Screw, hex, ⁷/₈-14 x 4.500, zinc, g8 	4	
3	983 501	• Washer, lock, E, spt, ⁷ / ₈ , steel, zinc	8	
4	983 254	• Washer, flat, E, 0.938 x 1.750 x 0.134, z	8	
5	981 663	 Screw, socket, ³/₈-24 UNF x ³/₄ large, zinc 	16	
6	230 592	Shaft, air cylinder, frame, drum	2	
7	126 752	Stop, piston	2	
8	126 746	Frame drum, bulk unloader	1	
9	981 552	• Screw, hex, ⁷ / ₈ -14 x 2.250, cap, zinc	2	
10	126 751	Rod, mounting pump drum	2	
11	126 749	Head, cylinder, frame drum	2	
12	944 330	• O-ring, Buna-N, 5.500 x 6.000 x 0.250	2	
13	124 789	Seal, rod, 1.50 diameter	2	
14	126 748	Bushing, Durlon, 1.504/1.503 ID	2	
15	272 443	Scraper, wiper, 1.5 ID	2	
16	986 807	Retaining ring, internal, 200, basic	2	
17	126 758	Plate, backup, piston	4	
18	126 755	Gasket, piston	4	
19	126 753	Seal, piston, double acting	2	
20	230 563	Disk, guide, piston, 55-ex	2	
21	230 562	Spacer, bottom, piston, 55-ex	2	
22	982 731	• Screw, socket, ⁷ / ₈ -14 x 3.50, bl	2	
			Continue	ed on next page

See Figure B 3-1.

Drum Frame Components (contd)

ltem	Part	Description	Quantity	Note	
23	230 652	Tube, frame	2		
NS	900 464	Adhesive, threadlocking 50 ml—removable	AR		
NS	900 439	Adhesive, threadlocking 50 ml—non-removable	AR		
NS		Jelly, petroleum	AR		
NS	900 223	Lubricant, O-ring, Parker 4 oz	AR		
NS	900 302	Grease, high temperature,O-ring, (14.5-oz cartridge)	AR		
NS	900 216	Oil, vitalizer, 1 gallon	AR		
AR: As Requi	red				
NS: Not Show	NS: Not Shown				



Drum Frame Components (contd)

Fig. B3-1 Drum frame components

Part B, Section 4

Options

Section B 4 Options

Introduction

This section contains ordering information for the various options available for the electric changeover unloaders. Use the parts lists to order parts only if you already have them installed on your unloader. If you wish to add an option that was not originally part of your unloader, contact your Nordson representative for assistance.

The other parts lists in Part B contain ordering information for the main unloader components, air valve and air motor, and frame assemblies. If you need assistance with interpreting a parts list, refer to the *Unloader* parts section in this manual for basic part list instructions.

Drum Hold Down Kit

See Figure B 4-1. Drum hold down brackets hold the material container in place during elevator UP movement.

ltem	Part	Description	Quantity	Note
_	282 774	Kit, drum hold down	1	А
1	230 607	Screw, socket head, shoulder	4	
2	807 230	Spring	4	
3	807 231	Holder, drum	2	
4	807 232	Cover	2	
5	981 014	• Screw, pan head, #4-40 x 0.250, sl, zn	4	
NS	900 464	Adhesive, threadlocking	AR	
6		Flange, frame assembly	2	В
NOTE A: If y	our old drum h	old down kit used washers, discard them before installing the ne	w hold down kit.	
B: The flanges are part of the frame assembly. Only one flange is shown in Figure B 4-1.				
AR: As Required				
NS: Not Show	/n			

Drum Hold Down Kit (contd)





Part	Description	Quantity	
124 935	Valve, check $1^{1}/_{4}$ (male input, female output)	1	
973 092	Nipple, hex, $1^{1}/_{4} \times 1^{1}/_{4} \times 2$, steel, zinc	1	
973 184	Coupling, pipe, hydraulic, $1^{1}/_{4}$, steel, zinc	1	
900 481	Adhesive, pipe/thread/hydraulic sealant	AR	
AR: As Required			

Filter Kits

Certain Rhino unloaders are installed with a material filter mounted on a separate stand. This filter contains an element that must be changed periodically, as needed. Select the proper gauge mesh from the parts list below when ordering filter replacement kits.

Part	Description	Note
169 015	Kit, element, with O-rings, 20 mesh	
149 160	Kit, element, with O-rings, 30 mesh	
178 491	Kit, element, with O-rings, 60 mesh	
1607906	Kit, element, with O-rings, 0.40 stab point	



Pump Packing and Solvent Chamber Fluid Guide

This guide covers the following:

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

Packing and Solvent Chamber Fluid Compatibility

MATERIAL TYPE	SOLVENT FAMILY	ABRASIVE QUALITY	PACKING TYPE	SOLVENT FLUID
	Water	Mild	D	T, Q
		Medium	G	T, Q
Watarbaraa		High	U	T, Q
vvalerborrie		Mild	D	T, Q
	Alcohols	Medium	G	T, Q
		High	U	T, Q
	Ketones	Mild	F	K, S
	(e.g., acetone, MEK, MAK, etc.)	Medium	F	K, S
		High	U	K, S
	Aromatic Hydrocarbons (e.g., xylene, toluene, etc.)	Mild	F	K, S
		Medium	F	K, S
		High	F, U ⁽¹⁾	K, S
	Alcohols	Mild	D	K, Q
Solventborne		Medium	G	T, Q
		High	U	K, Q
		Mild	D	K, S
	Aliphatic Petroleum Naphthas	Medium	D	K, S
		High	G	T, Q
		Mild	F	K, S
	Chlorinated Solvents	Medium	F	K, S
		High	F	K, S
Note 1: Type U packings	s may swell slightly when exposed	d to aromatic hydro	carbon solvents.	

Packing Material and Application

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

Solvent Chamber Fluid Composition and Application

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

Solvent Chamber Fluid Parts List

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

Type Q Concentrate Mixing Instructions



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

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

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

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

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Air Lubricator Adjustments and Oils

Adjustments

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

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

1. Fill the lubricator bowl with Nordson Vitalizer oil.

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

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

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

Ordering Nordson Vitalizer Oil

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

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

Vitalizer Oil Specifications

 API Gravity:
 31.7

 Pour Point:
 25 °F (-3.9 °C)

 Flash Point 1:
 430 °F (221 °C) (See Note 1)

 Viscosity @ 100 °F (38 °C):
 153

 Viscosity @ 210 °F (99 °C):
 43

 Viscosity Index:
 95

 Neutralization No.
 0.12

 Toxicity (Refer to Notes 2 and 3)

Specification Notes

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

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