Ford Glass Group
Rhino® Bulk Unloader Controls

Customer Product Manual
Part 1010550B
Issued 1/02

NORDSON CORPORATION • AMHERST, OHIO • USA

Nordson Corporation welcomes requests for information, comments, and inquiries about its products. General information about Nordson can be found on the Internet using the following address: http://www.nordson.com.

Address all correspondence to:

Nordson Corporation
Attn: Customer Service
555 Jackson Street
Amherst, OH 44001

Notice

Trademarks

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Ford Glass Group Rhino Bulk Unloader Controls

Safety

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

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

Qualified Personnel

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

Intended Use

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

Some examples of unintended use of equipment include

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

Regulations and Approvals

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

Personal Safety

To prevent injury follow these instructions.

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

High-Pressure Fluids

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

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

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

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

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

MEDICAL ALERT—AIRLESS SPRAY WOUNDS: NOTE TO PHYSICIAN

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

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

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

Fire Safety

To avoid a fire or explosion, follow these instructions.

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

Halogenated Hydrocarbon Solvent Hazards

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

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

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

Action in the Event of a Malfunction

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

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

Disposal

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

Description

NOTE: This manual is written to reflect the controls and components of the Ford Glass Group unloader configuration only. The procedures included are specific to the product configuration. Use this manual to familiarize yourself with the safe and proper operation of Ford Glass Group unloaders.

Rhino bulk unloaders are available in a variety of configurations, with various hydraulic sections and controls. Rhino drum unloaders pump Nordson-approved adhesives and sealant materials at room and elevated temperature from various sized containers.

WARNING: Do not use this manual when operating unloaders not built to Ford Glass Group specifications. Using this manual when operating unloaders not built to Ford Glass Group specifications could result in serious personal injury.

Contact your Nordson representative

- if you have questions about your unloader configuration.
- if you require more information about the other Rhino bulk unloader configurations available.
- to verify that the material you wish to pump is compatible with your equipment and setup.

General Description

See Figure 1.

Ford Glass Group unloaders are typically installed in a dual-unloader auto-changeover application, with two identical unloaders connected to each other and system controls that connect to an electrical junction box (J-box). The J-box is either mounted to the primary A-Unit or to a separate stand, per customer specifications. Ford Glass Group unloaders consist of the following major components:

- rotary elevator control
- 65:1 dual-acting, positive-displacement, demand-type pump with 10-inch air motor
- drum (55-gallon) follower plate

Pumping operation can be automatically switched between the two unloaders when the controller receives an empty-drum signal.

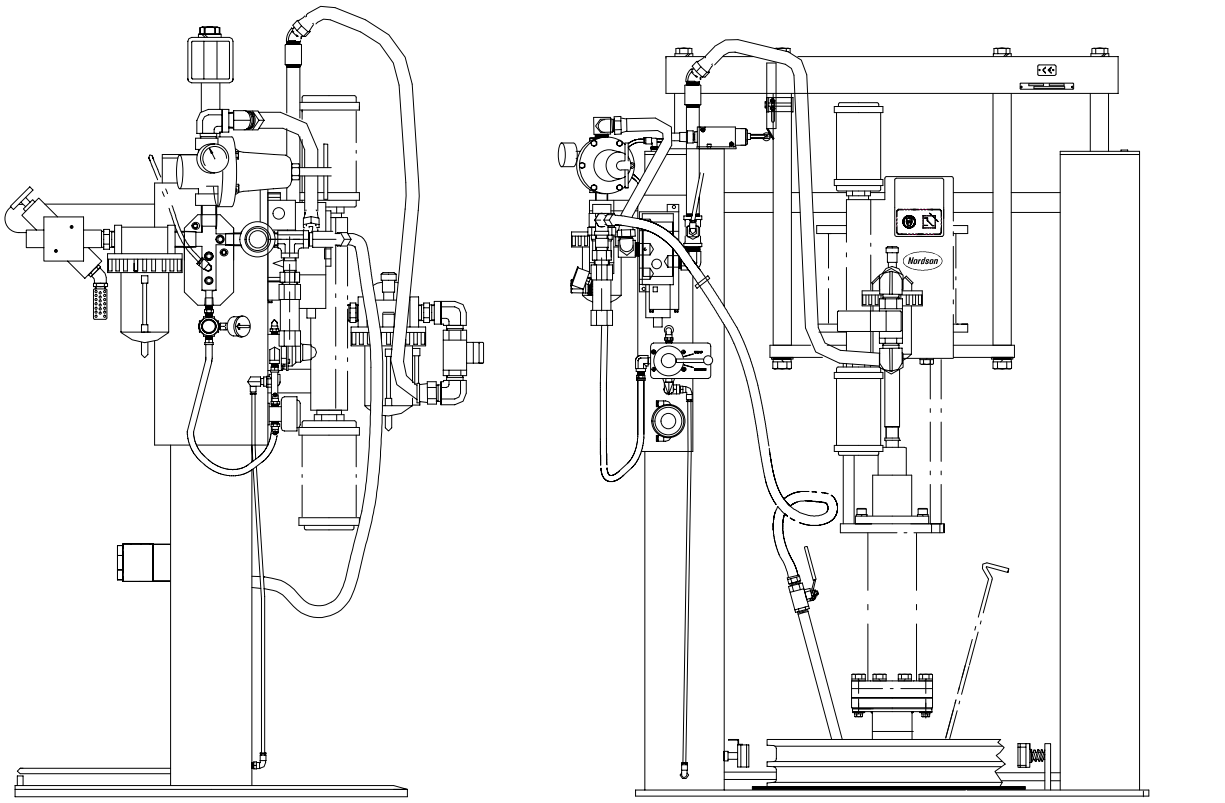

Figure 1 Ford Glass Group Rhino Bulk Unloader

Basic Operation

See Figure 2.

To operate the unloader, the operator centers an open, non-tapered, undamaged 55-gallon drum of adhesive or sealant material on the unloader frame. The operator then moves the elevator control valve (11) to the DOWN position. A pair of air-driven pistons lowers the follower plate (7) and air-operated piston pump into the container of material. Continuous down pressure is exerted by the elevator (1).

A follower plate ring (8) sits under the follower plate, on top of the bagged material inside the material drum. The downward movement of the follower plate and pressure from the follower plate ring compresses the bag of material and forces material into the hydraulic section (6). Once air pressure to the pump air motor (2) is turned on, the pump strokes and pumps material from the container. Fluid in the solvent chamber (5) keeps the packing glands lubricated and helps prevent material from curing on the pump plunger rod.

When the container is empty, the operator uses the blow-off valve (9) to introduce air pressure under the follower plate. The operator then raises the follower plate from the container of material, replaces the empty container with a full one, and lowers the follower plate into the new container. Refer to the *Container Change* procedures in this manual for more information.

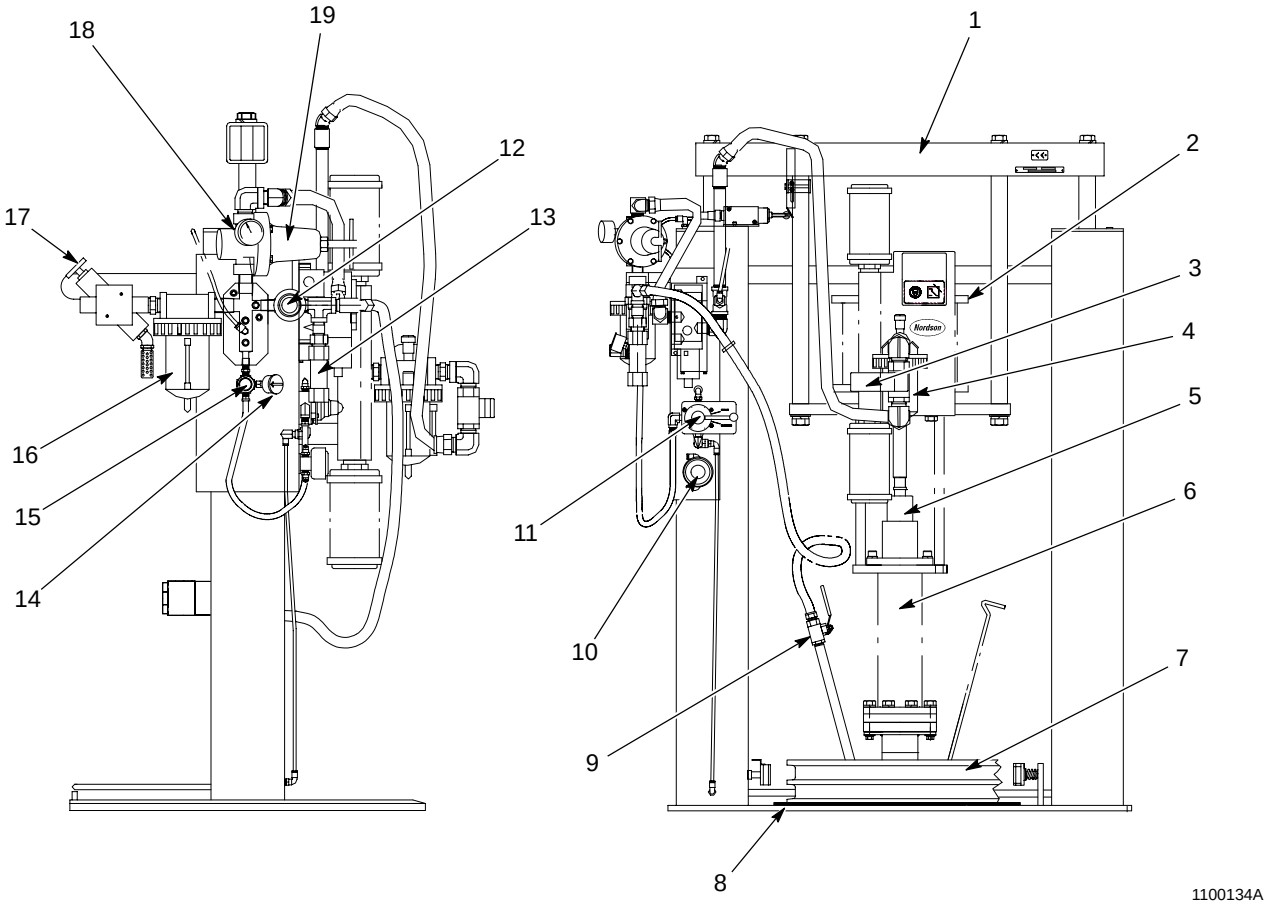

Figure 2 Basic Components

1. Elevator
2. Air motor
3. Air motor lockout valve
4. Air motor lubricator
5. Solvent chamber
6. Hydraulic section (pump)
7. Follower plate
8. Follower plate ring
9. Blow-off valve
10. Purge button
11. Elevator control valve
12. Pre-set regulator (blow-off)
13. Relief valve (blow-off)
14. Elevator control gauge
15. Elevator control regulator
16. Filter/separator
17. Main air supply valve
18. Air motor gauge
19. Air motor regulator

Theory of Operation

The following information details the operation of your bulk unloader.

Pneumatic Controls

See Figure 2.

The operating controls for the Rhino unloader 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 air supply to the unloader(s) enters at the main air supply valve (17), which also serves as the emergency stop. Air then passes through a filter/separator (16) that removes most contaminants and moisture. Then the air enters two adjustable pressure regulators:

- the air motor regulator (19) with gauge (18)
- the elevator control regulator (15) with gauge (14)

Each unloader has a manual purge button (10) that, when pushed, supplies air to the air motor at a reduced volume and allows the pump to run and purge material or bleed air from the system.

J-Box

The J-box, not shown, controls two operations at the unloader. The J-box

- receives an empty-drum signal when the empty-drum limit switch is activated and the follower plate has reached the specified depth of the material container. Operation then switches automatically to the other unloader.
- sends signals from the controller to a solenoid that activates the air motor.

Rotary Elevator Control

See Figure 2.

The rotary elevator control valve (11) initiates elevator movement. Placing the elevator control valve in the UP position raises the elevator and follower plate. Placing the elevator control valve in the DOWN position lowers the elevator and follower plate assembly into the material container. Placing the elevator control valve in the NEUTRAL position halts elevator movement.

Air Motor Air Supply

See Figure 2.

The air supply for the air motor passes through the filter/separator (16), air motor regulator (19) and gauge (18), air motor lockout valve (3), and air motor lubricator (4). The lockout valve is used to lock out air pressure to the air motor. As air passes through the lubricator, it mixes with a small amount of vitalizer oil. The oil minimizes wear on the air motor components.

The air motor is also controlled by a signal from the J-box. If the air motor is active from the J-box signal, the air motor lockout valve will stop air motor operation. If the air motor is not receiving an active signal from the J-box, the air motor lockout valve will not activate a stopped air motor.

Blow-Off Air Supply

See Figure 2.

The blow-off assembly receives air from the main air supply. The blow-off assembly consists of a pre-set regulator (12), relief valve (13), and blow-off valve (9).

- The pre-set regulator reduces the main air supply to under 1.03 bar (15 psi).
- The relief valve opens if the blow-off pre-set regulator fails and the blow-off air supply reaches 1.72 bar (25 psi).
- When the operator opens the blow-off valve, regulated air is forced into the container beneath the follower plate (7). This relieves any vacuum and helps push the follower plate out of the container. Refer to the *Operation* section for specific operating instructions.

Elevator Air Supply

See Figure 2.

Air from the elevator control regulator (15) flows to the elevator control valve (11). Pressure settings can be monitored at the elevator control gauge (14). The unloader elevator has three types of movement: down, up, and neutral.

Down

Down elevator movement is initiated by setting the elevator control valve to the DOWN position. 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. Once the follower plate is inside the container, the elevator will continue downward and exert force onto the material in the container.

Up

Upward elevator movement is initiated by setting the elevator control valve to the UP position. 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. The follower plate may not remain stationary. Always block the elevator if the unoader is in this position for long time periods. Personal injury or equipment damage could result.

Setting the elevator control valve to the NEUTRAL position holds the elevator in place. 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.

Specifications

Following are the specifications for the Ford Glass Group unloaders.

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

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). Contact your Nordson Corporation representative for additional details.

Overall Dimensions

Weight/Mass	US (lb)	Metric (kg)
Weight (approximate)	790	359

Physical Dimensions	US (in.)	Metric (cm)
Height (elevator down)	62	157
Height (elevator up)	105	268
Width	49	124
Depth	30	76

Baseplate Mounting Holes (on Center)

Dimensions	US (in.)	Metric (cm)
Width	39	99
Depth	20.5	52

Installation

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

See Figure 3.

Perform the following steps to install the unloader:

1. Position the unloader(s) to allow access to the controls and follower plate area.

NOTE: Operating an unloader on a surface that is not level can affect elevator operation.

2. Level the unloader and anchor it to the floor.
3. Close the elevator control regulator (15) and the air motor regulator (19). Their gauges (14, 18) should read 0 bar/0 psi. Make sure that the main air supply valve (17) is closed.
4. Connect the air supply line to the $^{3}/_{4}$-in. NPT inlet valve (main air supply valve). 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: If the material is too abrasive or generally not compatible, equipment may wear out prematurely and components may be damaged.

5. The pump outlet fitting on the hydraulic section is shipped with an output check valve installed. Connect the material supply hose to the check valve output fitting (female $1^{1}/_{4}$ NPTF pipe threads). It may be necessary to use an adapter.

CAUTION: Use a hose support to prevent hose damage when the hose is suspended by an overhead tool balancer or similar device. Route the hose in a manner that prevents kinking and abrasion. To prevent kinking, do not bend the hoses more than their minimum bend radius.

6. Make sure that the fluid level in the pump solvent chamber (5) is 38 mm (1.5 in.) from the top of the chamber. Add K-solvent to the chamber as necessary. Refer to the *Parts* section for K-solvent ordering information.
7. Fill the air motor lubricator (4) with vitalizer oil. The lubricator capacity is 500 ml (16 fl oz). Refer to the *Parts* section for vitalizer oil ordering information.

New Unloader Functional Check

NOTE: Before putting a new unloader into service, perform this procedure to ensure that it is operating properly.

1. Make sure that the air hoses and material delivery hose are not kinked or pinched.
2. Verify that all electrical connections between the unloader and the J-box and the J-box and the controller have been made. Refer to the schematics shipped in your system documentation for more information.
3. Verify that the empty-drum setting will stop the follower plate at the desired depth in the material container. Refer to *Adjusting the Empty-Drum Setting* for more information.

See Figure 3.

4. Verify that all pneumatic connections have been made.
5. Make sure that the air motor lubricator (4) and solvent chamber (5) are filled with the proper fluids.
6. Open the main air supply valve (17).
7. Adjust the elevator control regulator (15) to the minimum pressure necessary to raise and lower the elevator (1):
   a. As a starting point, adjust the elevator control regulator until the elevator control gauge (14) reads 1.5–4.0 bar (20–60 psi).
   b. Set the elevator control valve (11) to the UP position.
   c. Adjust the elevator control regulator until the follower plate (7) starts moving up.

   NOTE: When using high-viscosity material, you may need to increase this setting to apply sufficient down pressure to force material into the pump.
8. Allow the the elevator move to the top of its travel range.
9. Open the blow-off valve (9). Listen for air flow to make sure that the adapter tube is not clogged. Close the valve.

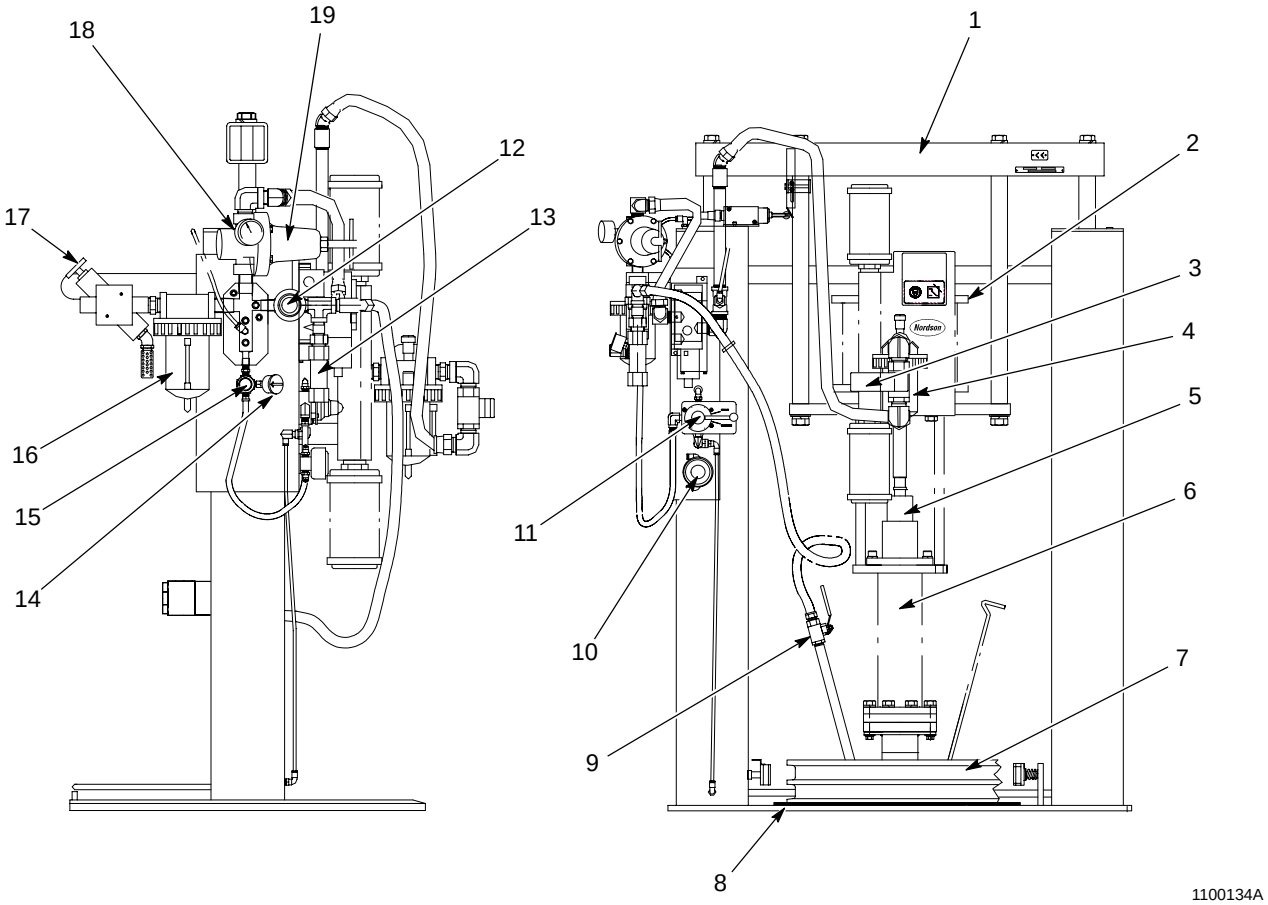

Figure 3 Basic Components

1. Elevator
2. Air motor
3. Air motor lockout valve
4. Air motor lubricator
5. Solvent chamber
6. Hydraulic section (pump)
7. Follower plate
8. Follower plate ring
9. Blow-off valve
10. Purge button
11. Elevator control valve
12. Pre-set regulator (blow-off)
13. Relief valve (blow-off)
14. Elevator control gauge
15. Elevator control regulator
16. Filter/separator
17. Main air supply valve
18. Air motor gauge
19. Air motor regulator

Adjusting the Empty-Drum Setting

WARNING: When verifying the empty-drum setting, follow these procedures and observe the safety precautions in this document. Failure to do so could result in serious personal injury or equipment damage.

The empty-drum setting is factory-set to stop the follower plate approximately 3.8 cm (1.5 in.) from the bottom of the container. This setting is entirely based on customer preference. Verify this setting during equipment preparation, before starting normal operation of your unloader.

See Figure 4.

You will need to adjust the empty-drum setting if

- the factory-set distance between the elevator crossover (1) and the top of the empty-drum bracket (3) shifted during shipping,
- or the level of material left in a container after production is unacceptable because the follower plate either stopped too high or stopped too close to the bottom of the container.

To move the empty-drum bracket and adjust the shutdown point:

1. Find the proper stop height for your container.
2. Lower the follower plate to the desired position. This is best done by using gauge blocks between the base and the bottom of the follower plate.
3. Once the follower plate is resting on the gauge blocks at the required height/position, adjust the empty-drum bracket so that it activates the empty-drum limit switch (5) at this position.
   a. Loosen the clamp (2) that secures the empty-drum bracket to the pump support rod (4).
   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. Center the empty-drum limit switch in the middle of the width of the bracket for your desired position.
   d. Tighten the clamp.
4. With wood blocks still in place, raise and lower the unloader several times to make sure that the empty-drum bracket is in the proper location, and makes contact with the empty-drum valve (6). Retest the unloader operation and repeat step 3 as required.

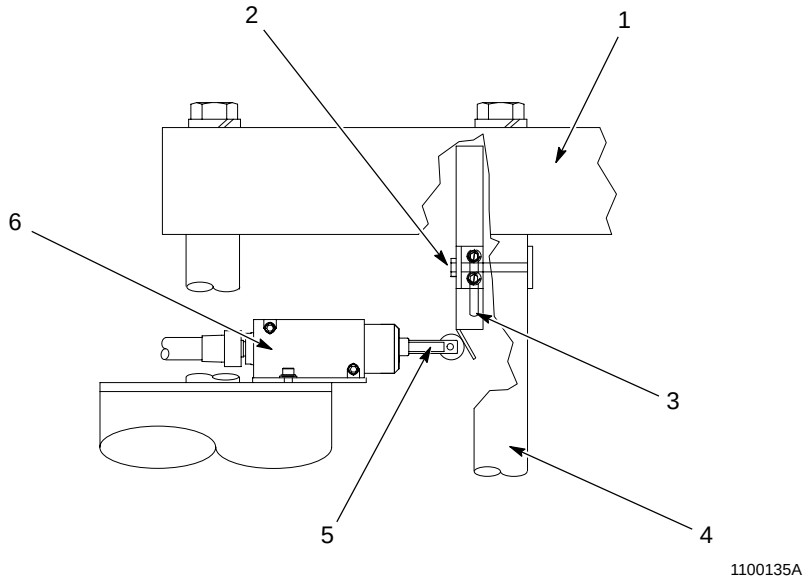

Figure 4 Adjusting the Empty-Drum Setting

1. Elevator crossover
2. Clamp
3. Empty-drum bracket
4. Pump support rod
5. Empty-drum limit switch
6. Empty-drum valve

Operation

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

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

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

New Equipment Startup

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

See Figure 5.

1. Load a new container of material. Refer to the *Container Change* procedure in this section or to the operator's card attached to your unit.
2. Make sure that the air motor lockout valve (2) is open.
3. Make sure that the unloader you are loading with material is active.
   a. At the unloader you want to operate, adjust the air motor regulator (18) until the pump begins to operate. Do not increase the pressure beyond the minimum required to cycle the pump. Check the air motor gauge (17) and note the minimum required pressure.
   b. If the unloader does not begin to operate: At the other unloader, activate the empty-drum limit switch (13) to transfer operation back to the inactive unloader.
4. Adjust the drip rate of the air motor lubricator (3) to one drop of oil for every other pump stroke. Most of the oil that drops in the sight glass returns to the reservoir.
5. Before continuing, make sure that the hose and gun are secured firmly and that the gun is not pointing at any personnel in the area.
6. Bleed any air from the pump. Follow the procedures in *Bleeding the Pump*, in this section.
7. 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.
8. Raise pressure to operating levels. When you reach normal operating pressure, the gun should dispense material smoothly, continuously, and without air bubbles.

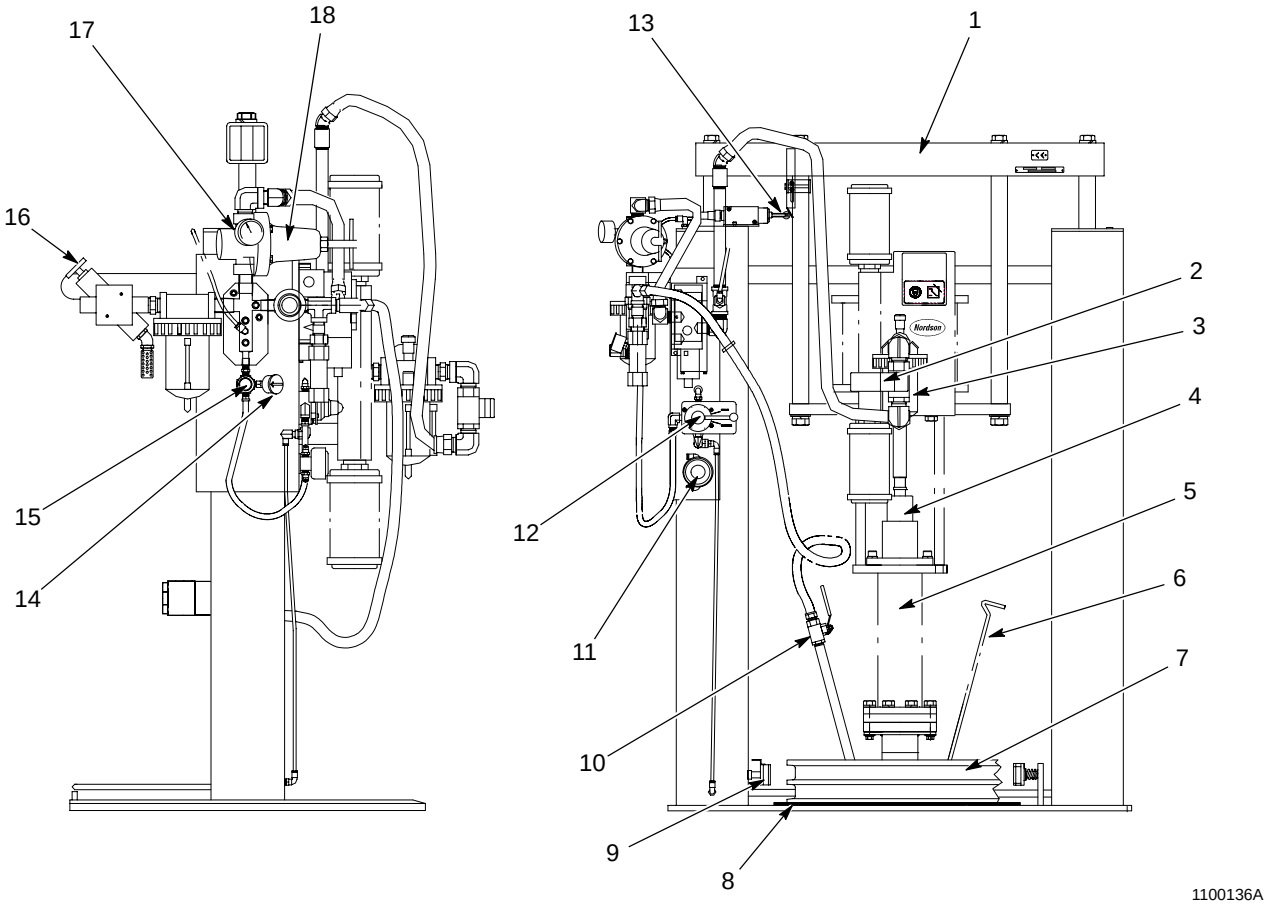

Figure 5 Daily Operation Controls

1. Elevator
2. Air motor lockout valve
3. Air motor lubricator
4. Solvent chamber
5. Bleed valve
6. Bleeder stem
7. Follower plate
8. Follower plate ring
9. Container hold down
10. Blow-off valve
11. Purge button
12. Elevator control valve
13. Empty-drum limit switch
14. Elevator control gauge
15. Elevator control regulator
16. Main air supply valve
17. Air motor gauge
18. Air motor regulator

Routine Operating Procedures

Routine operating procedures include

- elevator movement
- daily startup
- forced changeover
- container change
- bleeding the pump
- purging the pump
- shutdown
- restart after shutdown

Elevator Movement

See Figure 5. Elevator movement is controlled by the elevator control valve (12).

- To move the elevator up, put the elevator control valve in the UP position.
- To move the elevator down, put the elevator control valve in the DOWN position.
- To place the elevator in neutral, put the elevator control valve in the NEUTRAL position.

Daily Startup

See Figure 5.

1. Make sure that air pressure to the system is off and that the elevator control valve (12) is in the NEUTRAL position.
2. Perform the following steps:
   a. Check for material leaking past the follower plate ring (8). If you see material leaking past the follower plate ring, the bag of material is most likely punctured. Load a new bag or container of material. Refer to the *Container Change* procedure in this section.
   b. If the container is empty, refer to the *Container Change* procedure in this section.
3. Check the fluid levels in the following and fill if necessary:
   - Solvent chamber (4): K-solvent must be 38 mm (1.5 in.) from the top of the chamber.
   - Air motor lubricator (3): Fill with vitalizer oil. The capacity is 500 ml (16 oz).
4. Verify that the air motor lockout valve (2) is open.
5. Turn on the main air supply valve (16) to the unloader.
6. Place the elevator control valve in the DOWN position 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 correct pump is pumping.
7. Check the air motor lubricator for the desired flow rate (one drop of oil for every other pump stroke). Adjust the drip rate, if necessary.
8. Check the pump operation. Adjust the air motor regulator (18) as necessary for the material you are pumping.
9. Refer to the *Container Change* procedure in this section to replace an empty container with a full one.

Forced Changeover

See Figure 5. A forced changeover switches operation from the active unloader when the material container is not empty.

NOTE: Make sure that the secondary unloader is ready for operation.

Press down on the empty-drum limit switch (13) on the active unloader.

Container Change

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 from dispensing one material to another, contact your Nordson representative for direction and/or assistance.

Follow these procedures to change a container of material.

Removing the Empty Container

See Figure 5.

1. Close the air motor lockout valve (2).
2. Place the elevator control valve (12) in the NEUTRAL position.
3. Open the blow-off valve (10).
4. Place the elevator control valve in the UP position. Blow-off air enters below the follower plate (7) and helps you to remove the follower plate from the container.
5. Continue UP elevator movement until the follower plate is clear of the container and the elevator (1) is raised to its maximum height.

WARNING: 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.

6. Close the blow-off valve.
7. Remove the empty container from the unloader.
8. Remove the follower plate ring (8) from the container or from the base of the follower plate. Clean the ring if necessary.
9. Inspect the blow-off port in the bottom of the follower plate and clean as necessary. This is especially important if you use your unloader for urethane applications.

Installing a Full Container of Material

See Figure 5.

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.

1. Carefully inspect the new container for dents or other damage. Do not use a damaged container.
2. Place the follower plate ring (8) in the open 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.

3. Place the container of material on the base of the unloader and center it under the follower plate (7).
4. Adjust the elevator control regulator (15) until the elevator control gauge (14) reads at least 2.1 bar (30 psi).
5. Make sure the blow-off valve (10) is closed.
6. Unscrew the bleeder stem (6) from the follower plate to allow any air trapped under the follower plate to escape.

WARNING: Make sure that you are wearing goggles, gloves, and long sleeved protective clothing before lowering the follower plate into the container. The air expelled when you bleed air from under the follower plate may contain material that could cause injury.

7. Place the elevator control valve in the DOWN position and slowly lower the follower plate into the container to force material into the pump section.
8. When you see a continuous flow of material flowing from the bleeder stem fitting, stop DOWN elevator movement by placing the elevator control valve in the NEUTRAL position.
9. Tighten the bleeder stem securely.
10. Open the air motor lockout valve (2).
11. Bleed the pump according to the procedures in *Bleeding the Pump*, in this section.

    NOTE: You must bleed the pump every time you change containers.

Bleeding the Pump

See Figure 5.

At low pressure, bleed the pump through the bleed valve (5) until all air has been removed from the pump.

Perform these steps to bleed 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.

1. Place a waste container beneath the bleed valve. Make sure that the small bleed port is pointed down. Carefully open the bleed valve.

   NOTE: The bleed stem must be in place when depressurizing the pump.

2. Press the purge button to stroke the pump.
3. Gradually increase the pressure to an acceptable stroke rate for the pump or acceptable material bleed volume.
4. Leave the bleed valve open until the material flows continuously.
5. 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.

Purging the Pump

See Figure 5.

Press the purge button (11).

The purge button will activate the pump at any time, as long as the main air supply is turned on. The purge button will initiate a purge at the A-Unit even if the B-Unit is active. It also will activate the air motor even if the J-box is not sending an activate air motor signal. It will not initiate a purge if the air motor lockout valve (2) is closed.

Shutdown

See Figure 5.

1. Place the elevator control valve (12) in the NEUTRAL position.

WARNING: When you shut off the air supply 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 main air supply valve (16).
3. Relieve material pressure through the bleed valve (5) or by triggering the dispense gun(s).

NOTE: When you shut off the air supply to the unloader, air pressure to the controls is vented to atmosphere. Because of trapped air in the air cylinders and air motor, the unloader remains neutral and unlocked state and could drift until you turn on the main air supply valve and deliberately initiate an up or down elevator movement.

Restart after Shutdown

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

Maintenance

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

Table 1 details the recommended preventive maintenance procedures for the unloader. Additional maintenance procedures are found in the individual component manuals for the pump, air motor, frame, and additional components.

Table 1 Recommended Maintenance Procedures

Frequency	Component	Maintenance Task
Daily	Unloader	Visually inspect the unit. Check all hydraulic and pneumatic connections and tighten them if required. Inspect all pneumatic tubing for bends or kinks.
	Solvent chamber	Check solvent chamber fluid level. Fill if necessary.
	Air motor lubricator	Check air motor lubricator fluid level. Fill if necessary.
Weekly	Unloader	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.

Troubleshooting

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

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

Problem	Possible Cause	Corrective Action
1. Elevator not working	Malfunctioning elevator control regulator, or damaged elevator control valve	Refer to the pneumatic schematics provided in your system documentation.
	Elevator air cylinder seals worn or damaged, or piston binding in cylinder	If problem was not solved by your pneumatic troubleshooting with the schematics, rebuild the air cylinders.
2. Blow-off assembly not working	No supply air pressure present	Check air supply. Make sure that the blow-off valve is open. Place the elevator control valve in the UP position. When the container rises from the unloader frame, place the elevator control valve in the NEUTRAL position so that air can gather under the follower plate.
		If no air flow, proceed to the next step.
	Clogged blow-off adapter tube	Shut off air to the system. Remove blow-off hose and clean adapter tube.

Continued...

Troubleshooting *(contd)*

Problem	Possible Cause	Corrective Action
3. Pump not delivering material	Insufficient air pressure to pump	Increase the air pressure to the pump air motor.
	Follower plate not in contact with material	Make sure that the elevator control valve is in the DOWN position. The unloader should begin to pump material.
	Air pocket in pump	Carefully bleed the pump. Refer to *Bleeding the Pump* in the *Operation* section.
	Blocked hydraulic system or follower plate	Perform following steps: **WARNING**: Do not open the bleed valve more than three turns. The bleed valve and material may be forced from the valve body and personal injury can result. 1. Cycle pump. Slowly open the bleed valve only two or three turns. If material exits the valve, close the valve and go to step 2. If no material exits the valve, close the valve; shut down the system; relieve system pressure. Remove and rebuild the pump. 2. Shut down the pump. Relieve system pressure. Disconnect the hose from the pump. Check the hose for blockage. If the hose is not blocked, go to step 3. If the hose is blocked, clean or replace the hose. 3. Remove the gun from the hose. Check the gun for blockage. If the gun is blocked, clean it. If the gun is damaged, rebuild or replace the gun as necessary.

Repair

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

This section covers basic procedures for preparing Rhino unloaders for repair. Refer to the *Operation* section for unloader operating instructions. For dispensing gun, air valve and air motor, pump, and frame repair information, refer to the specific component manuals.

NOTE: Faulty hoses are not field-repairable. You must replace them if they are damaged.

Preparing to Remove the Hydraulic Section

To perform the pump repair procedures in the pump manual, you must remove the pump hydraulic section from the unloader frame.

Follow these procedures to prepare the system for pump removal:

NOTE: Follow the procedures in the pump manual to remove the follower plate and the hydraulic section from the air motor.

See Figure 6.

1. Remove the container of material. Refer to the *Container Change* procedure in the *Operation* section.
2. Purge the pump (2) to remove material pressure. Refer to the *Purging the Pump* procedure in the *Operation* section.
3. Place wood blocks on the base of the frame beneath the follower plate (3). Blocks should be high enough to keep the follower plate from contacting the drum hold down shoes.
4. Lower the elevator until the follower plate makes contact with the wood blocks.
5. Turn on low pressure at the air motor regulator (12) to stroke the pump. Turn off the valve when you can access the coupling.
6. Close the air motor lockout valve (1).
7. Turn off the main air supply valve (10).
8. Place the elevator control valve (6) in the NEUTRAL position.
9. Remove the hydraulic section from the unloader by following the procedures in your pump manual.

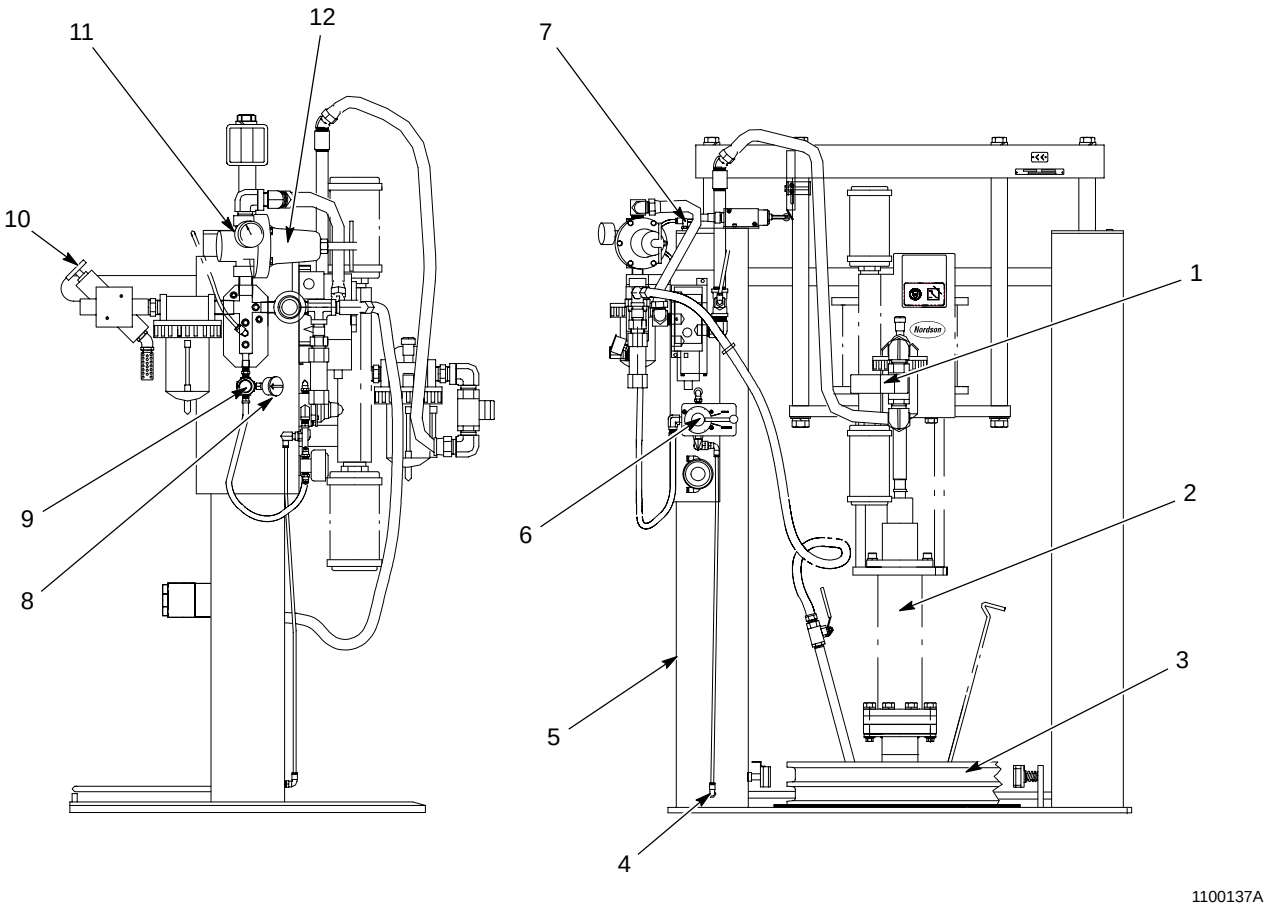

Figure 6 Preparing to Remove the Hydraulic Section

1. Air motor lockout valve
2. Pump (hydraulic section)
3. Follower plate
4. Bottom push-lock fitting
5. Left air cylinder
6. Elevator control valve
7. Top push-lock fitting
8. Elevator control gauge
9. Elevator control regulator
10. Main air supply valve
11. Air motor gauge
12. Air motor regulator

Bleeding Air Pressure from the Elevator Air Cylinders

To prepare the air cylinders for the rebuild procedures located in the frame manual, you must relieve all of the air pressure in the cylinders.

WARNING: The frame air cylinders can stay under pressure even when the unloader is disconnected from the air supply. Be cautious and aware that air remains in the cylinders. Otherwise, serious personal injury can result.

Follow these procedures to isolate the air cylinders from all air pressure.

See Figure 6.

1. Remove the container of material. Refer to the *Container Change* procedures in the *Operation* section.
2. Place wood blocks on the base of the frame. Refer to steps 3 and 4 of *Preparing to Remove the Hydraulic Section* for more information.

   NOTE: For future reference, note the settings of the elevator control regulator and the air motor regulator and the orientation of the cylinder heads.
3. Use the elevator control valve (6) to bleed all air from both the top and bottom of the elevator pistons. To do this,
   a. Set the elevator control regulator (9) and the air motor regulator (12) until the gauges (8, 11) read 0 bar/psi.
   b. Lock out the input air supply from the main air supply valve (10).
   c. Place the elevator control valve in the UP position to bleed air from below the air cylinder piston.
   d. Place the elevator control valve in the DOWN position to bleed air from above the air cylinder piston.

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

WARNING: Secure the air tubing when bleeding air. Failure to observe this warning may result in personal injury.

4. Disconnect the air tubing from the top and bottom push-lock fittings (4, 7) of the left cylinder (5). Wait for the air pressure escape.
5. Rebuild the unloader frame by following the procedures located in your frame manual.

Reinstating Air Pressure to the Elevator Air Cylinders

Follow these procedures to reinstate air pressure to the air cylinders and return your unloader to operation.

See Figure 6.

1. Place the elevator control valve (6) in the NEUTRAL position.
2. Connect the air tubing to the top and bottom push-lock fittings (4, 7).

Returning the Unloader to Operation

Follow these procedures to return your unloader to operation.

See Figure 6.

1. Adjust the elevator control regulator (9) and the air motor regulator (12) to the settings you noted in step 3 of the *Bleeding Air Pressure from the Elevator Air Cylinders* procedure.
2. Reconnect the air supply to the main air supply valve (10).
3. Remove the wood blocks from beneath the follower plate.
4. Replace the container of material. Refer to the *Container Change* procedures in the *Operation* section.
5. Make sure that the air motor lockout valve (1) is open.

Parts

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

Using the Illustrated Parts List

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

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

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

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

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

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

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

Ram Control Components

See Figure 7.

Item	Part	Description	Quantity	Note
—	- - - - - -	Module, ram control		
1	973037	• Nipple, hex, $^1/_4$ x $^1/_4$ x 1.45, steel, zinc	1	
2	901245	• Gage, pressure, 0–100 psi, 0–7 bar	1	
3	973187	• Elbow, pipe, hydraulic, 45, $^1/_8$, zinc	1	
4	324058	• Hose, air line, $^1/_4$ ID, blue	AR	A
5	- - - - - -	• Connector, male, sw, $^1/_4$ hose, $^1/_4$ NPT, ba	2	
6	126767	• Regulator, air, 0–60, $^1/_4$ NPT	1	
7	124797	• Valve, rotary, 3-position, $^1/_4$ por	1	
8	981176	• Screw, pan, 10-32 x 1.500, steel, zinc	4	
9	983120	• Washer, lock, split, #10, steel, zinc	4	
10	983123	• Washer, flat, e, 0.219 x 0.500 x 0.049, zinc	4	
11	984120	• Nut, hex, mach, #10-32, steel, zinc	4	
12	272556	• Muffler, low profile, $^1/_4$ NPT	1	
13	973151	• Elbow, pipe, hydraulic, 90, $^1/_4$, steel, zinc	3	
14	971266	• Elbow, male, $^1/_4$ tube x $^1/_4$ NPT	4	
15	900730	• Tubing, polyurethane, 0.250 x 0.040	AR	A

NOTE A: Order the length required for your application.

AR: As Required

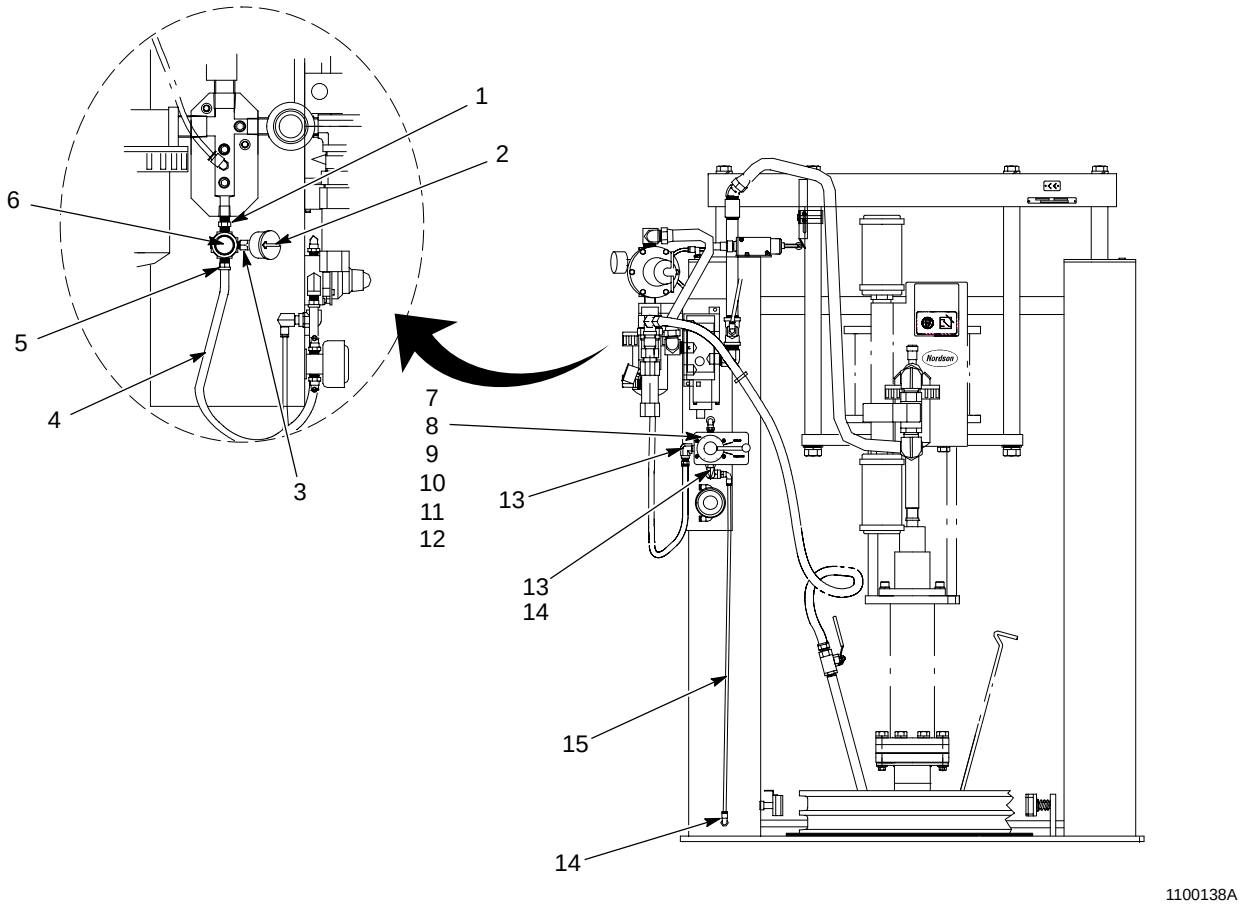

Figure 7 Ram Control Components

Rotary Pneumatics and Pneumatic Shut-Off Components

See Figure 8.

Item	Part	Description	Quantity	Note
—	- - - - - -	Module, rotary pneumatic	1	
1	124795	• Fitting, hose, $^3/_4$ barb x $1^1/_{16}$	2	
2	145240	• Hose, 0.75 ID, 200 psi, blue	AR	A
3	282779	• Spacer, manifold	1	
4	982240	• Screw, hex, cap, M8 x 20, black	2	
5	983013	• Washer, flat, m, reg, 8, steel, zinc	2	
6	983404	• Washer, lock, m, split, M8, steel, zinc	2	
7	282777	• Manifold, air supply	1	
8	973422	• Plug, pipe, socket, flush, $^3/_8$, zinc	1	
9	982039	• Screw, socket, M8 x 55, black	2	
10	973109	• Nipple, steel, schedule 40, $^3/_4$, 2.00	4	
11	973226	• Elbow, pipe, hydraulic, 90, $^3/_4$, steel, zinc	2	
12	282776	• Valve, ball, vented, $^3/_4$ NPT	1	
13	972583	• Elbow, male, 37, $1^1/_{16}$-12 x $^3/_4$, steel	1	
14	303956	• Lubricator, micro mist, $^3/_4$ NPT	1	
15	973410	• Plug, pipe, socket, standard, $^1/_4$, zinc	2	
16	124798	• Filter, $^3/_4$ NPT, 16 oz, 250 psi	1	
17	124800	• Regulator, $^3/_4$ NPT, 0–125 psi	1	
18	124791	• Gage, 0–160 psig, $^1/_4$ NPT	1	
19	973140	• Elbow, male, 45 d, $^3/_4$ NPT x $1^1/_{16}$-12 JIC	1	
—	- - - - - -	Module, pneumatic shut-off, emergency stop	1	
20	- - - - - -	• Muffler, exhaust, $^3/_4$ NPT	1	
21	973163	• Elbow, pipe, hydraulic, 45, $^3/_4$, zinc		
22	973407	• Bushing, pipe, hydraulic, $1^1/_4$ x $^3/_4$, steel	1	
23	146223	• Valve, manual lockout	1	
NS	900481	• Adhesive, pipe/thread/sealant	AR	

NOTE A: Order the length required for your application.
B: Apply pipe/thread/sealant adhesive to this part.
AR: As Required
NS: Not Shown

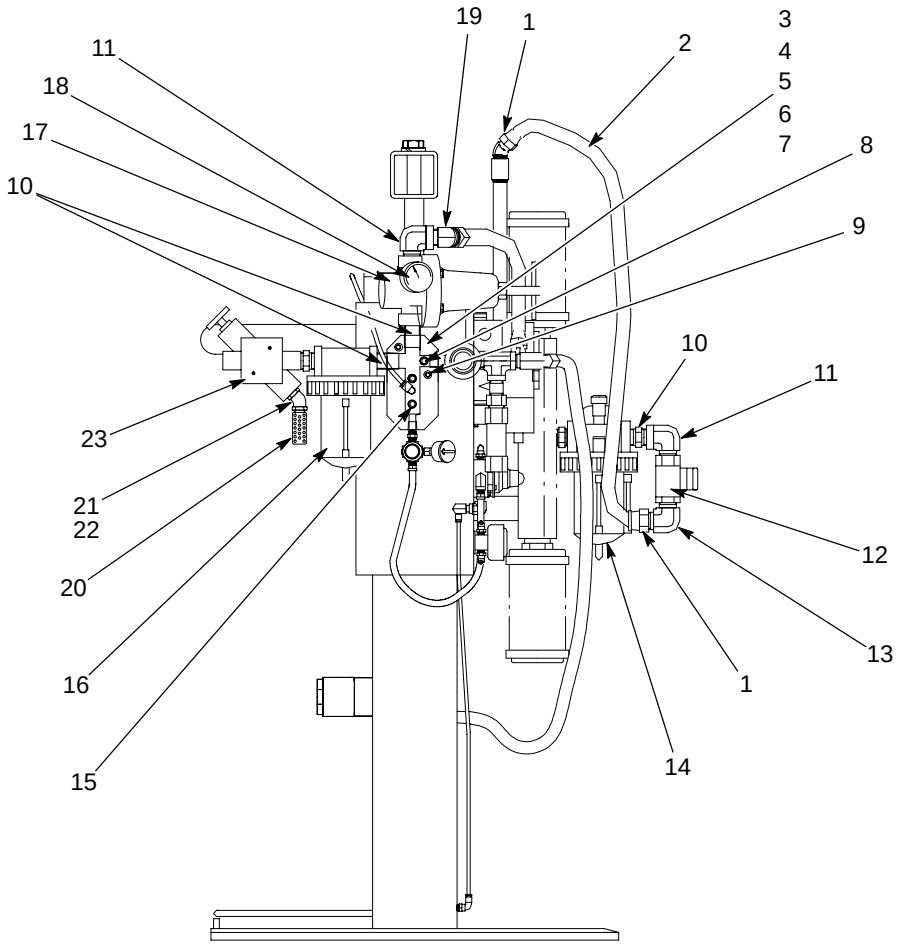

Figure 8 Rotary Pneumatics and Pneumatic Shut-Off Components

Pump Control Components

See Figures 9 and 10.

Item	Part	Description	Quantity	Note
—	- - - - - -	Module, pump control, 24 V	1	
1	223481	• Switch, limit	1	
2	972583	• Elbow, male, 37, $1^{1}/_{16}$-12 x $^{3}/_{4}$, steel	1	
3	973103	• Nipple, steel, schedule 40, $^{3}/_{4}$, 1.37	1	
4	973226	• Elbow, pipe, hydraulic, 90, $^{3}/_{4}$, steel, zinc	1	
5	1018347	• Valve, solenoid, 24 Vdc, $^{3}/_{4}$ NPTF, auto standard	1	
6	973442	• Plug, pipe, socket, flush, $^{3}/_{4}$, zinc	3	
7	981556	• Screw, socket, $^{1}/_{4}$-20 x 1.500, zinc	2	
8	983141	• Washer, lock, e, int, $^{1}/_{4}$, steel, zinc	4	
9	983504	• Washer, flat, e, 0.281 x 0.734 x 0.063, zinc	4	
10	984130	• Nut, hex, heavy, $^{1}/_{4}$-20, steel, zinc	2	
11	972119	• Elbow, male, $^{1}/_{4}$ tube x $^{1}/_{8}$ NPT	2	
12	145240	• Hose, 0.75 ID, 200 psi, blue	AR	A
13	124795	• Fitting, hose, $^{3}/_{4}$ barb x $1^{1}/_{16}$	2	
14	164639	• Valve, manual, pushbutton, with cup	1	
15	973402	• Plug, pipe, socket, flush, $^{1}/_{8}$, zinc	1	
16	981893	• Screw, socket, 10-32 x 0.500, zinc	4	
17	983120	• Washer, lock, e, split, #10, steel, nickel	4	
18	983123	• Washer, flat, e, 0.219 x 0.500 x 0.049, zinc	4	
19	984120	• Nut, hex, mach, #10-32, steel, zinc	4	
20	971266	• Elbow, 0.25 tube x 0.25 NPT	2	
21	900730	• Tubing, polyurethane, 0.250 x 0.040	AR	A

NOTE A: Order the length required for your application

AR: As Required

NS: Not Shown

Continued...

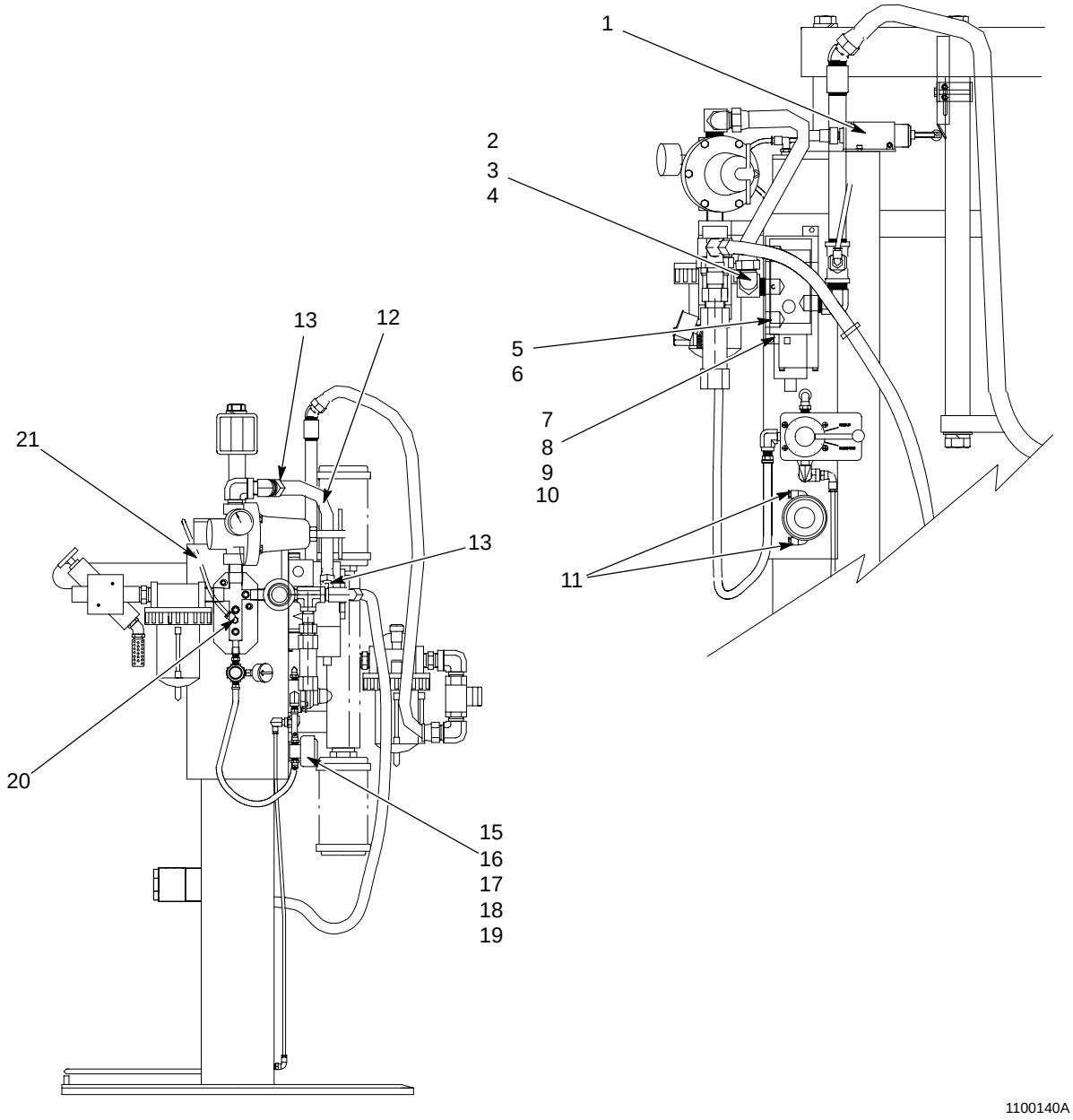

Figure 9 Pump Control Components

Pump Control Components *(contd)*

Item	Part	Description	Quantity	Note
22	973140	• Elbow, male, 45-deg, $^3/_4$ NPT x $1^1/_{16}$-12	1	
23	973510	• Coupling, pipe, class 150, $^3/_4$, ga	1	
24	- - - - - -	• Nipple, pipe, $^3/_4$ NPT, 12.00 long	1	
25	973262	• Bushing, pipe, hydraulic, $^3/_4$ x $^1/_4$, steel, zinc	1	
26	973037	• Nipple, hex, $^1/_4$ x $^1/_4$ x 1.45, steel, zinc	1	
27	247820	• Valve, check, $^1/_4$ NPT	1	
28	973265	• Tee, pipe, hydraulic, $^3/_4$, steel, zinc	1	
29	973439	• Elbow, male, pipe, hydraulic, $^3/_4$, steel, zinc	1	
30	981771	• Screw, socket, 10-32 x 1.375, zinc	2	
31	296506	• Bracket, limit switch	1	
32	186549	• Stop, empty drum, CE pail	1	
33	982372	• Screw, socket, M5 x 12, black	2	
34	983401	• Washer, lock, M, split, M5, steel, zinc	2	
35	983035	• Washer, flat, M, reg, 5, steel, zinc	2	
36	230566	• Bracket, rotary drum light switch	1	
37	982035	• Screw, socket, M8 x 16, black	2	
38	983013	• Washer, flat, M, reg, 8 , steel, zinc	2	
39	983404	• Washer, lock, M, split, M8, steel, zinc	2	
40	282785	• Clamps, $1^1/_2$ ID	1	

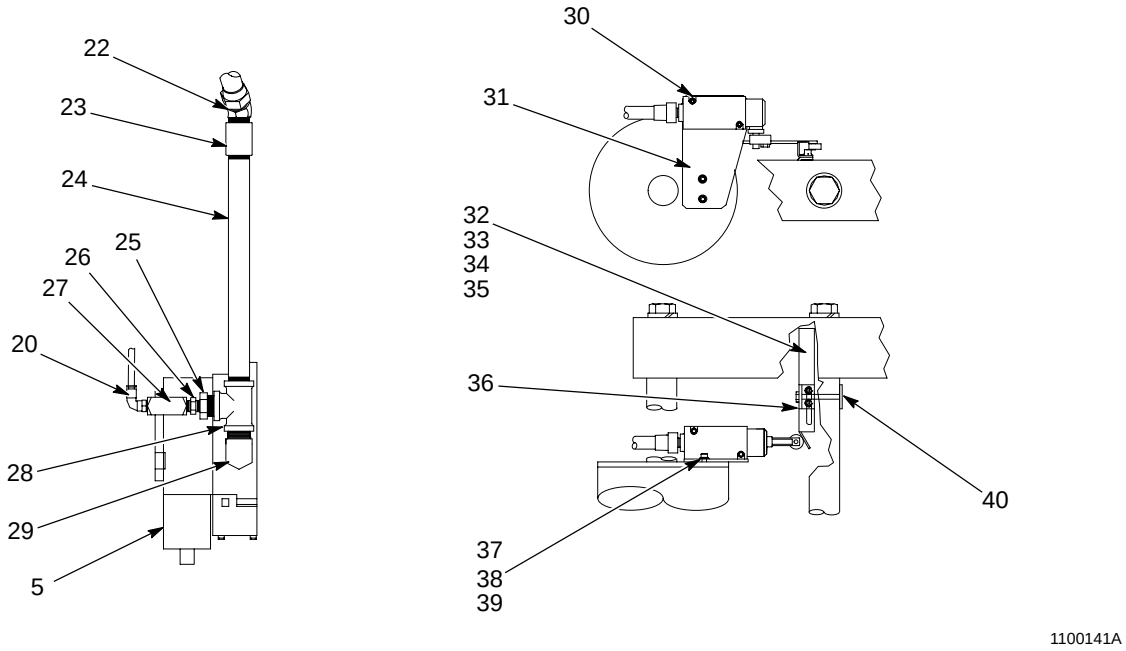

Figure 10 Additional Pump Control Components

Blow-Off Components

See Figure 11.

Item	Part	Description	Quantity	Note
—	- - - - - -	Module, blow-off, 15 psi	1	
1	973973	• Nipple, hex, $^1/_2$ x $^3/_8$ x 1.625, brass	1	
2	- - - - - -	• Regulator, 15 psi, $^3/_8$ NPT	1	
3	973276	• Tee, pipe, straight, $^3/_8$ x $^3/_8$, brass	1	
4	972255	• Elbow, male, 37, $^3/_4$-16 x $^3/_8$, steel	1	
5	972024	• Connector, female, $^1/_2$ hose, $^3/_4$-16, barbed	1	
6	973553	• Nipple, steel, schedule 40, $^3/_8$, 1.00	1	
7	973391	• Bushing, red, $^3/_4$ x $^3/_8$, steel, zinc	1	
8	164643	• Valve, relief, 25 psi, $^3/_4$ NPT	1	
9	973453	• Nipple, steel, schedule 40, $^1/_2$ x 12 long	1	
10	901151	• Valve, ball, $^1/_2$ NPT	1	
11	972708	• Connector, male, $^1/_2$ hose, $^1/_2$ NPT, barbed	1	
12	281858	• Hose, $^1/_2$ ID, push-lock	AR	A
NS	900481	• Adhesive, pipe/thread/sealant	1	

NOTE A: Order the length required for your application.

B: Apply pipe/thread/sealant adhesive to this part.

AR: As Required

NS: Not Shown

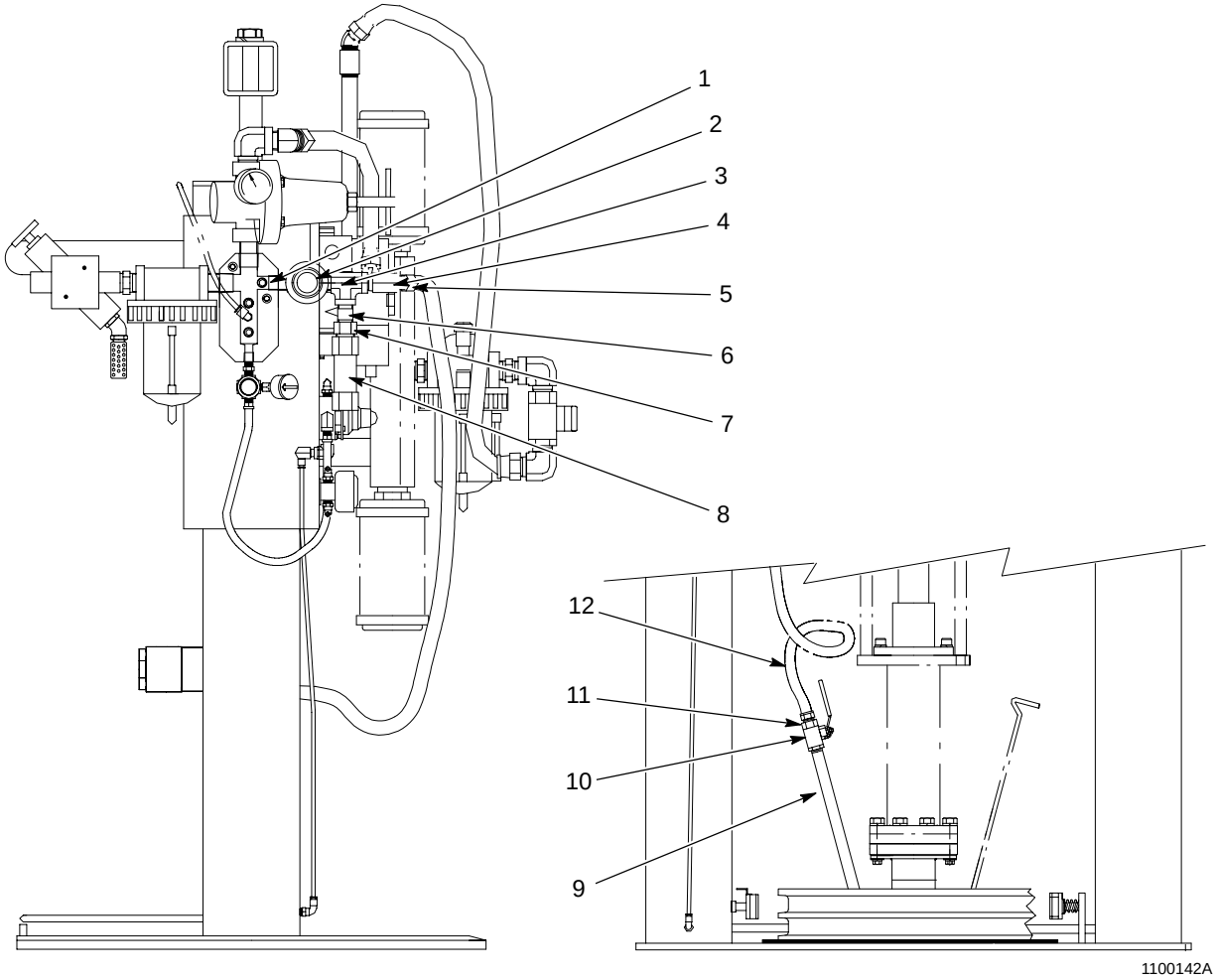

Figure 11 Blow-Off Components

Pneumatic Support Module

See Figure 12. The pneumatic support module consists of the brackets and hardware that attach to the unloader frame and hold the pneumatic components.

Item	Part	Description	Quantity	Note
—	1005620	Module, support, pneumatic, A-Unit, electric	1	
1	1003187	• Bracket, pneumatic controls, A-unit	1	
2	981402	• Screw, hex, cap, $^3/_8$-16 x 1.00, zinc	4	A
3	983061	• Washer, flat, e, 0.4060 x 0.812 x 0.065, zinc	4	A
4	983160	• Washer, lock, e, split, $^3/_8$, steel, nickel	4	
NS	900464	• Adhesive, threadlocking	AR	
NOTE A: Coat the screws and the upper washers with threadlocking adhesive, part 900464. AR: As Required NS: Not Shown				

Check Valve

See Figure 12.

Item	Part	Description	Quantity	Note
—	221941	Module, check valve, $1^1/_4$ NPT	1	
5	322822	• Pipe fitting, $1^1/_4$ m x $1^1/_4$ f, steel, zinc	1	
6	124935	• Valve, check, ball, $1^1/_4$ NPTF	1	
NS	900481	• Adhesive, pipe/thread/sealant	AR	
NOTE A: AR: As Required NS: Not Shown				

Accessory Kit

This kit is shipped with the unloaders.

Part	Description	Quantity
124747	Accessory group, ship with kit	1
900216	• Oil, vitalizer, 1-gal	1
900256	• Fluid, type K, pump chamber, 1-gal	1
900302	• Grease, high temperature	1

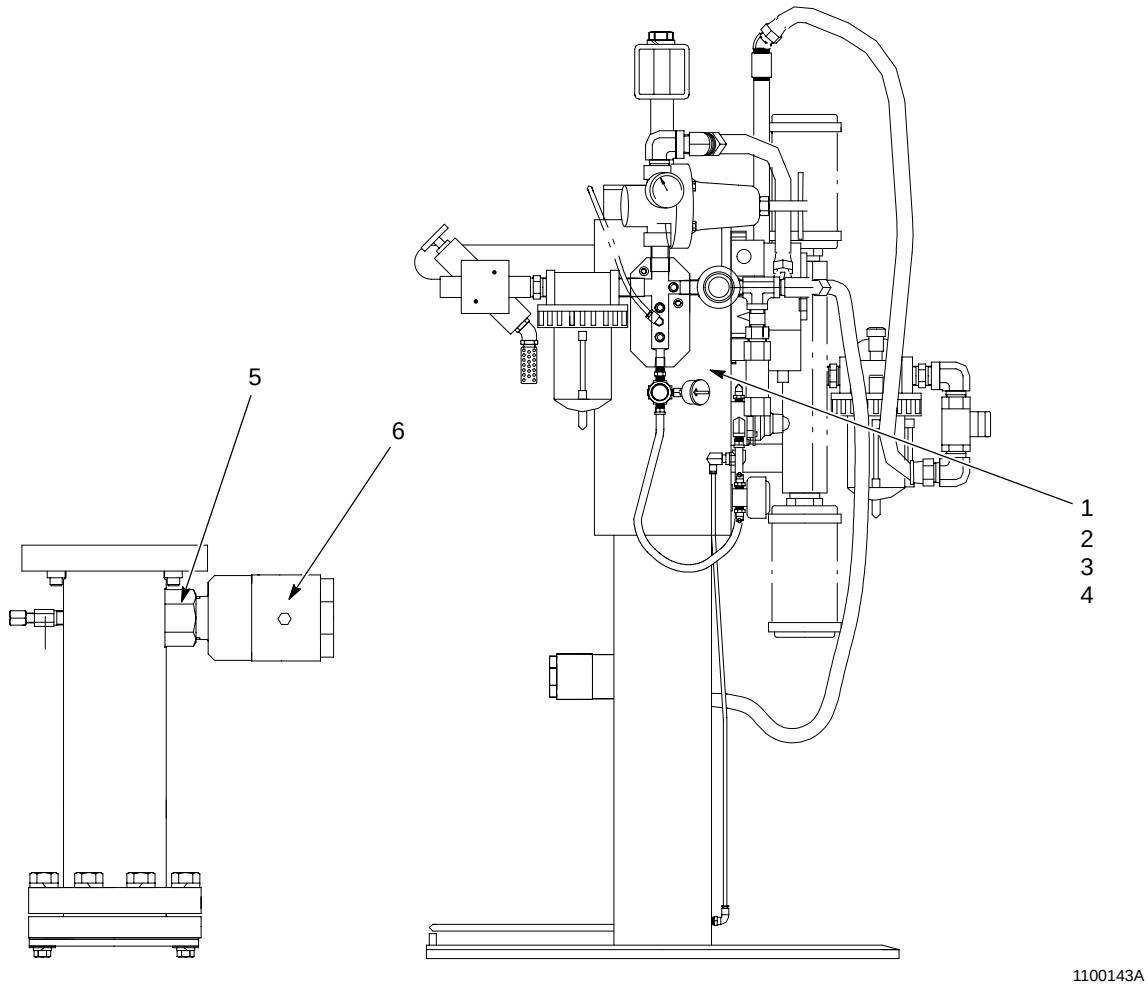

Figure 12 Pneumatic Support Module and Check Valve

Drum Hold Down Kit

See Figure 13. Drum hold down brackets hold the material container in place during elevator UP movement.

Item	Part	Description	Quantity	Note
—	282774	Kit, drum hold down	1	A
1	230607	• Screw, socket head, shoulder	4	B
2	807230	• Spring	4	
3	807231	• Holder, drum	2	
4	807232	• Cover	2	
5	981014	• Screw, pan head, #4-40 x 0.250, steel, zinc	4	
NS	900464	• Adhesive, threadlocking	AR	
6	- - - - - -	Flange, frame assembly	2	C

NOTE A: If your old drum hold down kit used washers, discard them before installing this kit.

B: Apply threadlocking adhesive to this part during reassembly.

C: The flanges are part of the frame assembly and are shown for reference purposes only. Only one flange is shown in the figure.

AR: As Required

NS: Not Shown

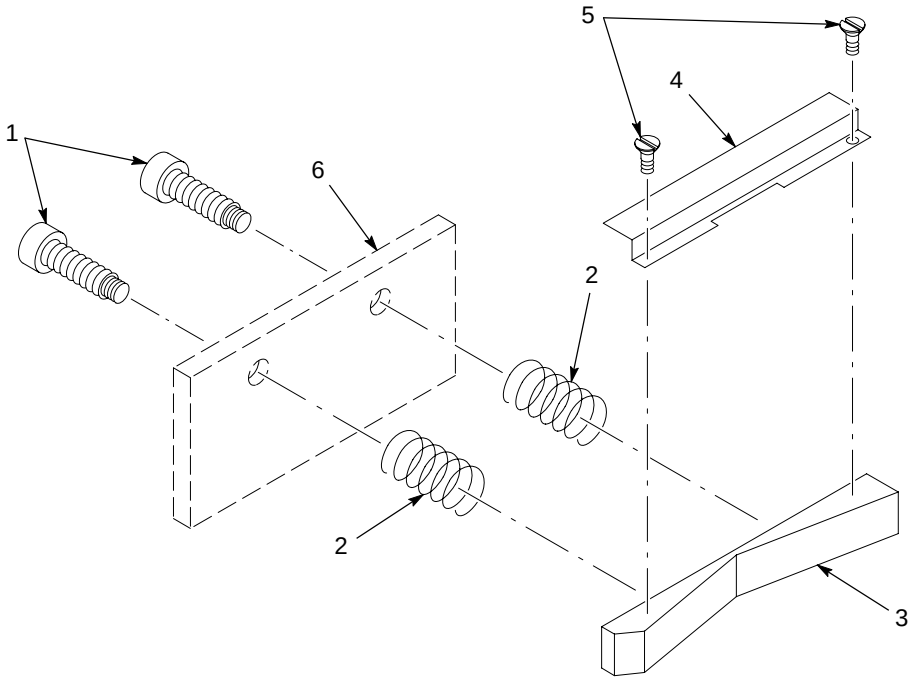

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Figure 13 Drum Hold Down Kit