GM Glass Group
Rhino® Bulk Unloaders

Customer Product Manual
Part 1006911A

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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GM Glass Group Rhino Bulk Unloaders

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

Halogenated Hydrocarbon Solvent Hazards

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

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.

2. Description

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.

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

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

Contact your Nordson representative if

- you have questions about your unloader configuration
- you require more information about the other Rhino bulk unloader configurations available

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

- to verify that the material you wish to pump is compatible with your equipment and setup

General Description

See Figure 1.

Figure 1 shows both primary (A-Unit) and secondary (B-Unit) bulk unloaders as they are built for GM Glass Group applications. GM Glass Group unloaders are available with two different A-Units (120 V or 24 V) and a B-Unit unloader that can be used with either A-Unit.

GM Glass Group unloaders are shipped with:

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

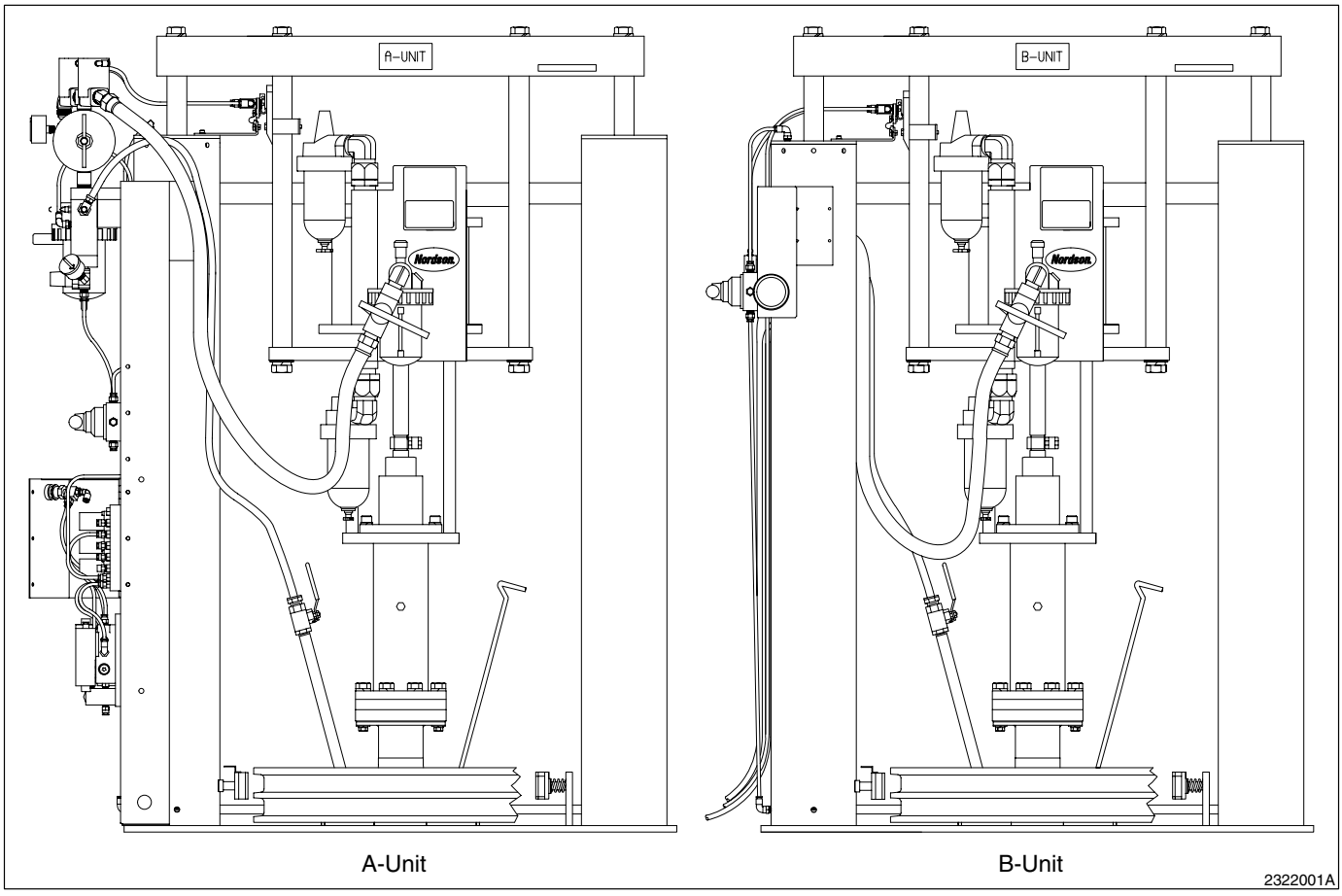

Fig. 1 GM Glass Group Rhino Bulk Unloaders

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 (9) to the DOWN position (15). A pair of air-driven pistons lowers the follower plate (6) and air-operated piston pump into the container of material. Continuous down pressure is exerted by the elevator (1).

GM Glass Group Rhino unloaders have a follower plate ring that 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 (5). 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 operator uses the blow-off push button (21) and blow-off valve (7) 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.

GM Glass Group Rhino unloaders are shipped with the auto-changeover function. With auto-changeover, when two unloaders (an A- and B-Unit) are coupled together, pumping switches automatically from one unit to the other as the material containers are emptied.

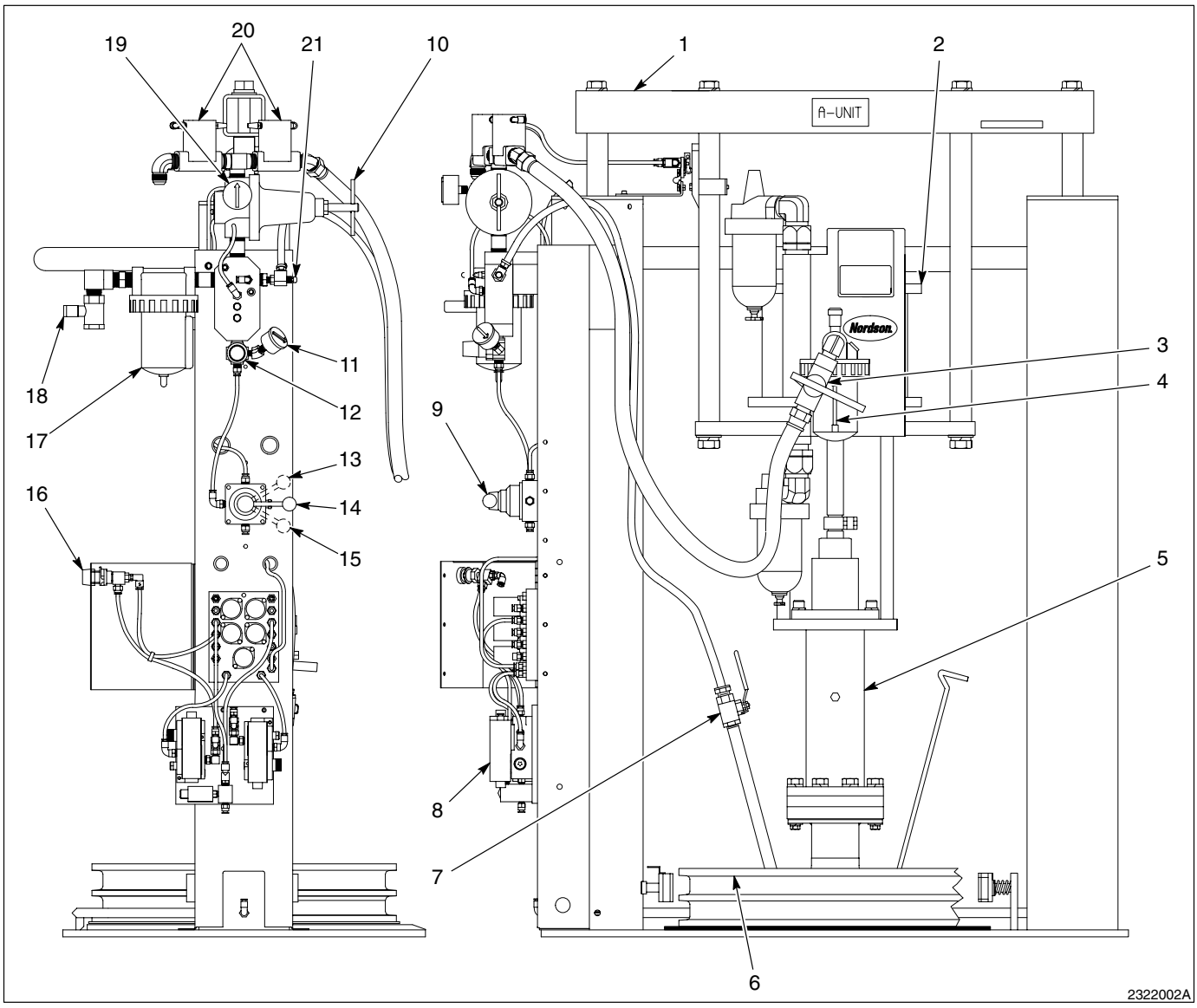

Fig. 2 Basic Components

1. Elevator
2. Air motor
3. Air motor lockout valve
4. Air motor lubricator
5. Hydraulic section (pump)
6. Follower plate
7. Blow-off valve
8. Air motor On/Off control valve
9. Elevator control valve
10. Air motor regulator
11. Elevator control gauge
12. Elevator control regulator
13. UP position
14. NEUTRAL position
15. DOWN position
16. Purge push button
17. Filter/separator
18. Main air supply valve
19. Air motor gauge
20. AIr motor On/Off valve
21. Blow-off push button

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 unloader frame can stay under pressure even when the unloader is disconnected from the air supply. Be cautious and aware that air remains in the cylinders.

The air supply to the unloader(s) enters at the main air supply valve (18) and then passes through a filter/separator (17) that removes most contaminants and moisture. Then the air enters two adjustable pressure regulators:

- the air motor regulator (10) with gauge (19)
- the elevator control regulator (12) with gauge (11)

Air enters the air motor On/Off control valve (8), which is electrically operated from the control panel. This valve activates the air-piloted air motor On/Off valves (20), which turn on or off the air motor of the unit that is pumping.

GM Glass Group unloaders are installed in pairs with the auto-changeover option. This feature provides uninterrupted operation, allowing the operator to change the empty container of one unloader while the other unloader is in operation.

Rotary Elevator Control

See Figure 2.

The rotary elevator control valve (9) initiates elevator movement. Placing the elevator control valve in the UP position (13) raises the elevator and follower plate. Placing the elevator control valve in the DOWN position (15) lowers the elevator and follower plate assembly into the material container. Placing the elevator control valve in the NEUTRAL position (14) halts elevator movement. Each unloader has a manual purge push button (16) 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.

Air Motor Air Supply

See Figure 2.

The air supply for the air motor passes through the filter/separator, a regulator, the air motor lockout valve (3), and the 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.

Blow-Off Air Supply

See Figure 2.

GM Glass Group unloaders are shipped with a blow-off assembly attached to standard shop air, with a pressure rating of 4.8–8.3 bar (70–120 psi).

The blow-off assembly consists of the blow-off push button (21) and the blow-off valve (7). When the operator pushes the push button and opens the valve, air is forced into the container beneath the follower plate (6). 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 (12) flows to the elevator control valve (9). 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 (15). 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

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 (14). 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.

Specifications

Following are the specifications for the GM Glass Group Rhino 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

3. 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:

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

1. Position the unloader(s) to allow access to the controls and follower plate area. For automatic changeover unloaders, make sure that the air hoses are protected and can reach between the A-Unit and the B-Unit.

2. Anchor the unloader to the floor.

3. Close the elevator control regulator (15) and the air motor regulator (17). Their gauges (10, 9) should read 0 bar/0 psi. Make sure that the main air supply valve (16) 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.

5. The pump outlet fitting on the hydraulic section is a female $1^{1}/_{4}$ NPTF pipe threads. Connect your material supply hose, using an adapter if necessary, to mate your diameter hose with the pump outlet fitting.

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.

Auto-Changeover Connections

When two unloaders (an A-Unit and a B-Unit) are used together with an automatic changeover (auto-changeover) feature, they must be connected together by several air lines. The primary unit is the A-Unit and the secondary unit is the B-Unit. The main air supply is connected to the A-Unit. Refer to the pneumatic schematic provided with your Nordson system documentation for air line connections. If you require additional information, contact your Nordson Corporation representative.

New Equipment Preparation

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

See Figure 3.

1. Verify that all pneumatic connections have been made.
2. Make sure that the air motor lubricator (4) and solvent chamber (5) are filled with the proper fluids.
3. Open the main air supply valve (16).
4. Adjust the air motor regulator (17) setting until the air motor gauge (9) reads 0 bar/psi.
5. Adjust the elevator control regulator (15) setting until the elevator control gauge (10) reads 1.5–4.0 bar (20–60 psi). You want to adjust the elevator control regulator to the minimum air pressure necessary to raise the elevator (1). This is achieved by placing the elevator control valve (14) in the UP position (11) and turning the elevator control valve until the follower plate (6) starts moving up.

   NOTE: You may need to increase this setting when using high-viscosity material, to apply sufficient down pressure to force material into the pump.
6. Place the elevator control valve in the UP position and raise the elevator to the top of its travel range.
7. Push the blow-off push button (18). Open the blow-off valve (7). Listen for air flow to make sure that the adapter tube is not clogged. Close the valve.
8. Make sure that the air hoses and material delivery hose are not kinked or pinched.
9. Connect your bulk pump air motor control cable from your system controller to the Primary Unit (A-Unit) air motor On/Off control valve (8) as shown on your system schematic.

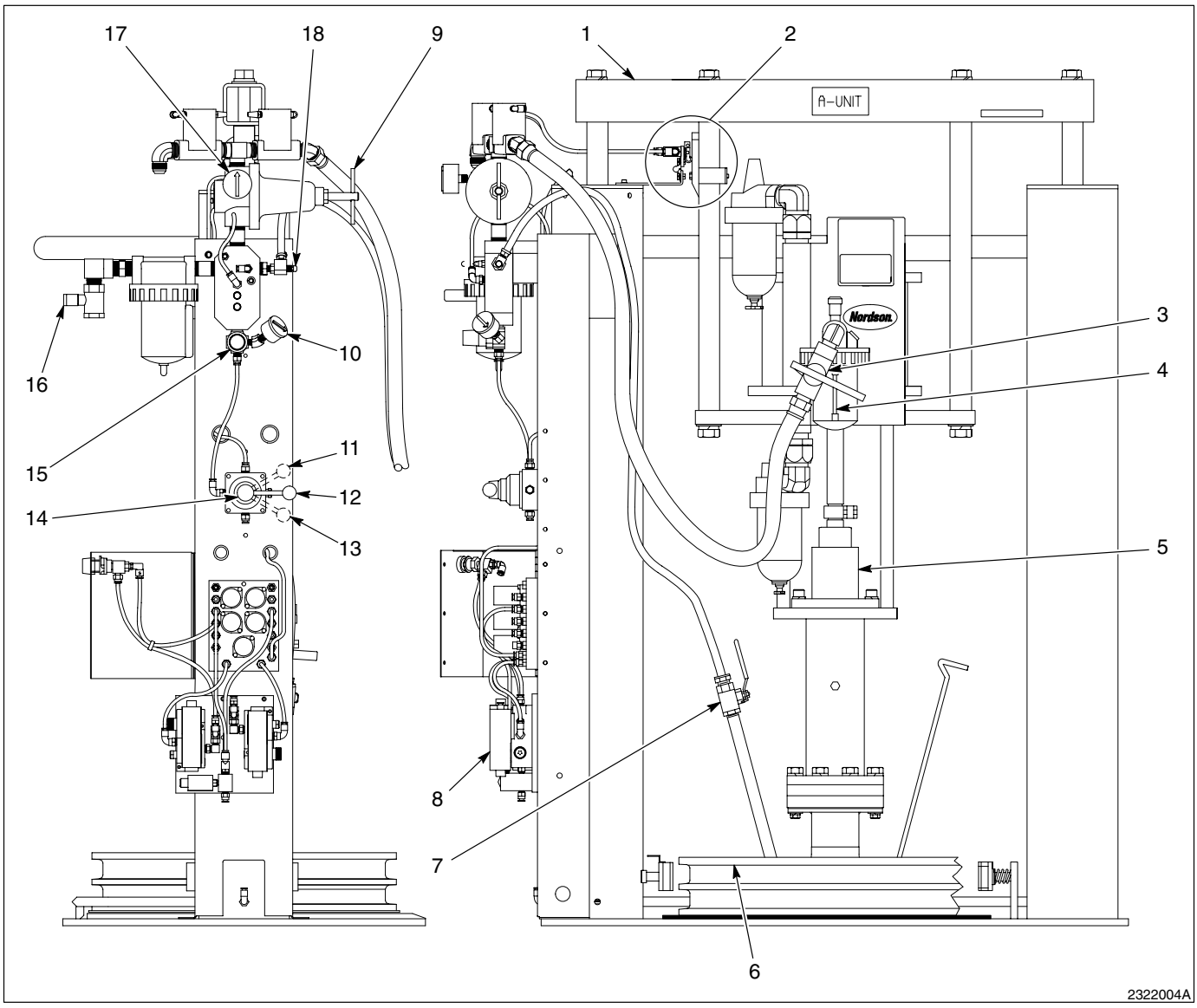

Fig. 3 GM Glass Group Rhino Unloader Components

1. Elevator
2. Empty-container valve and bracket
3. Air motor lockout valve
4. Air motor lubricator
5. Solvent chamber
6. Follower plate
7. Blow-off valve
8. Air motor On/Off control valve
9. Air motor gauge
10. Elevator control gauge
11. UP position
12. NEUTRAL position
13. DOWN position
14. Elevator control valve
15. Elevator control regulator
16. Main air supply valve
17. Air motor regulator
18. Blow-off push button

Checking and Adjusting the Empty-Container Setting

WARNING: Verify the empty-container setting. Failure to verify this setting can result in serious personal injury or equipment damage. Use extreme caution if you adjust the empty-container setting. Follow the procedures and observe the safety precautions in this document. Failure to do so could result in serious personal injury or equipment damage.

See Figure 3.

The empty-container setting is factory-set to stop the follower plate (6) approximately 3.8 cm (1.5 in.) from the bottom of the container. This setting is entirely based on customer preference. Based on your application needs, you can adjust this setting to stop the follower plate closer or farther from the bottom of the container.

As a safety precaution, it is important to verify this setting during initial startup, before beginning normal operation of your unloader. You should not have to adjust the empty-container setting on your GM Glass Group Rhino unloader.

Locate the empty-container valve and bracket (2) to help you locate the areas shown in detail in Figure 4. These areas show the brackets and hardware that are adjusted to make the empty-container setting.

Checking the Empty-Container Setting

It is possible for the factory setting of the empty-container bracket to shift during shipping. To check the pre-set empty-container setting of your unloader, perform the following procedure:

See Figure 3.

1. With the wood blocks shipped under the follower plate (6) still in place, measure the distance between the elevator (1) crossover bar and the empty-container bracket (2).

2. The factory-set distance between the elevator crossover and the top of the empty-container bracket is 1.3 cm (0.50 in.).

   - If the distance still measures 1.3 cm (0.50 in.), then no adjustments are needed.

   - If the distances does not measure 1.3 cm (0.50 in.), you need to adjust the empty-container setting. Refer to *Adjusting the Empty-Container Setting* in this section.

Adjusting the Empty-Container Setting

See Figure 4.

You will need to adjust the empty-container setting if:

- the factory-set distance between the elevator crossover (1) and the top of the empty-container bracket (2) shifted during shipping,
- or the level of material left in an empty container after production is unacceptable (follower stopped too high in the container or stopped too close to the bottom of the container).

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

1. Find the proper stop height for your container.
2. Loosen the bolts (3) that secure the empty-container bracket (2) to the pump support rod (4).
3. 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.
4. Tighten the bolts.
5. With wood blocks still in place to protect the container hold down shoes, raise and lower the unloader several times to make sure that the empty-container bracket (2) is in the proper location, and makes contact with the empty-container valve (5). Retest the unloader operation and repeat step 3 as required.

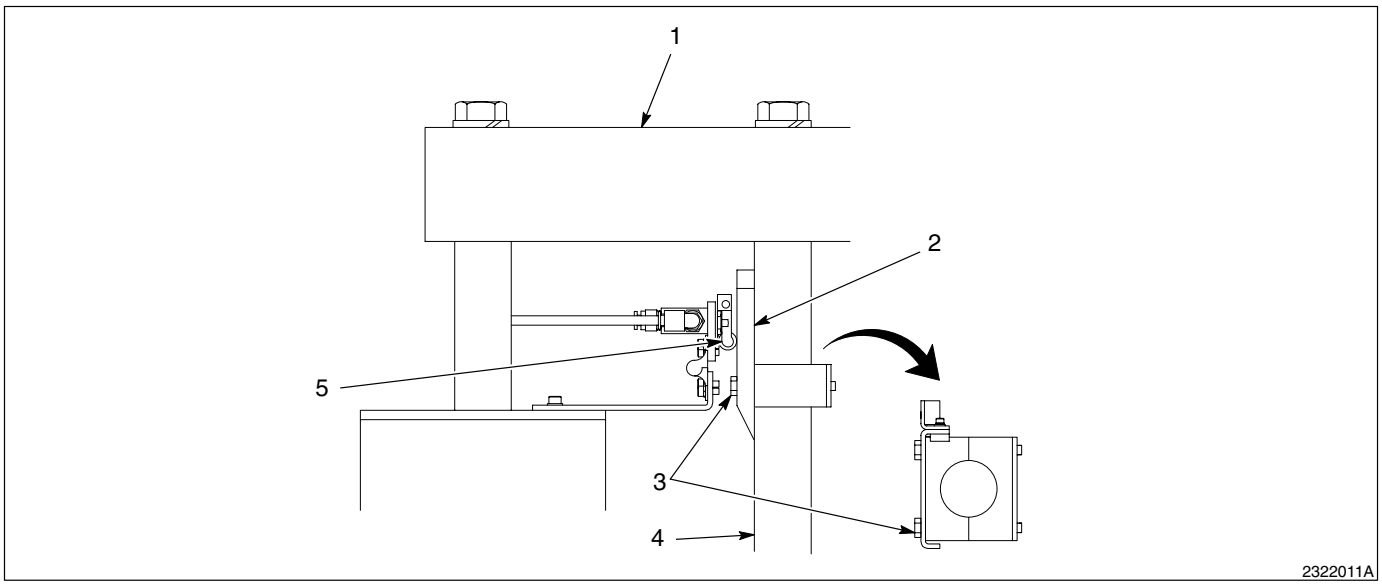

Fig. 4 Drum Unloader Settings

1. Elevator crossover
2. Empty-container bracket
3. Bolts
4. Pump support rod
5. Empty-container valve

4. Operation

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

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.

New Equipment Startup

This procedure applies only to the first-time startup of operation 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 (13) until the pump begins to operate. Do not increase the pressure beyond the minimum required to cycle the pump. Check the air motor gauge (21) and note the minimum required pressure. The gun must be on and the air motor On/Off control valve (10) energized with a GUN ON signal.

   b. If the unloader does not begin to operate: At the other unloader, push the empty-container valve switch 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.

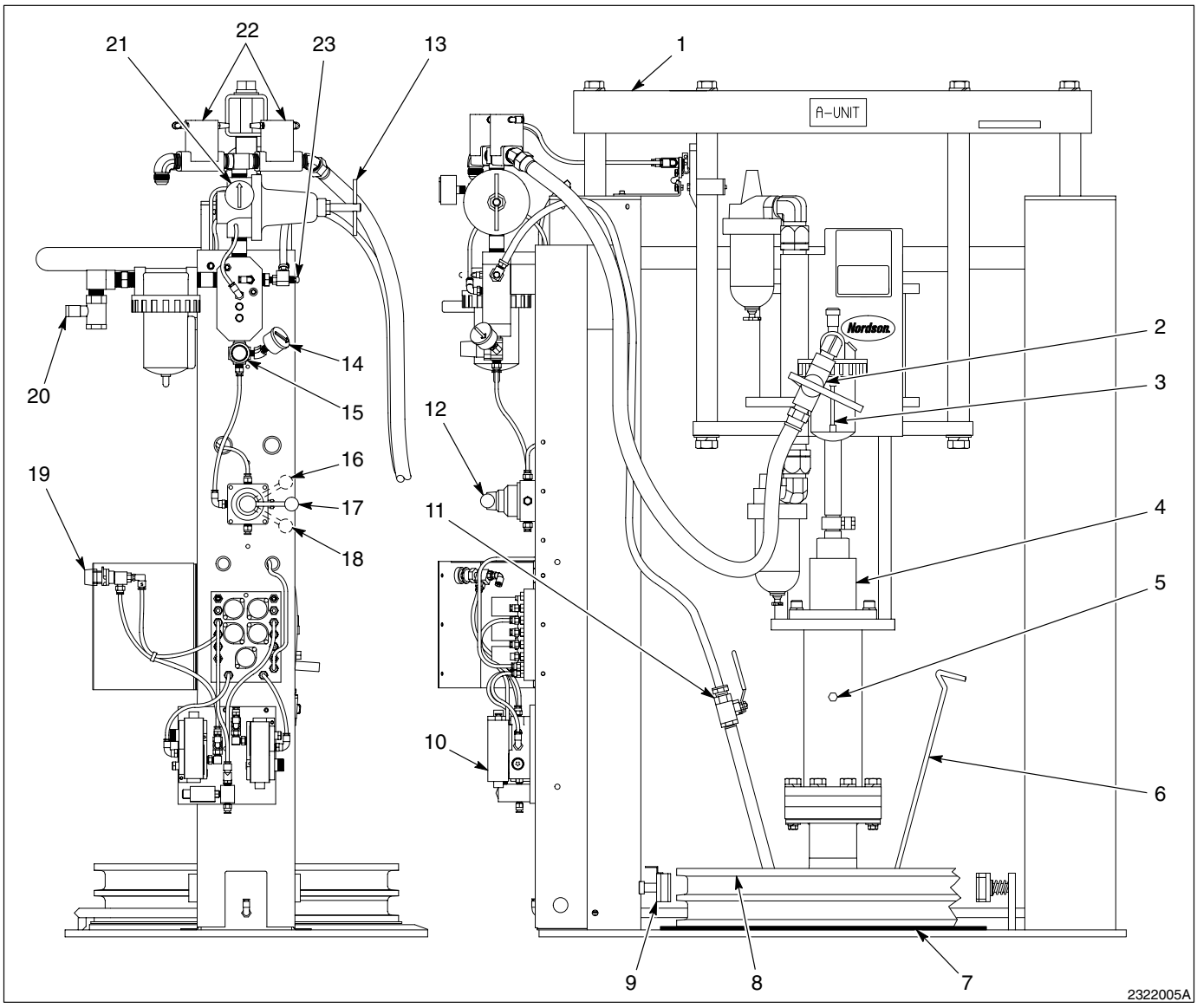

Fig. 5 Daily Operation Controls

1. Elevator
2. Air motor lockout valve
3. Air motor lubricator
4. Solvent chamber
5. Bleed valve
6. Bleeder stem
7. Follower plate ring
8. Follower plate
9. Container hold down
10. Air motor On/Off control valve
11. Blow-off valve
12. Elevator control valve
13. Air motor regulator
14. Elevator control gauge
15. Elevator control regulator
16. UP position
17. NEUTRAL position
18. DOWN position
19. Purge button
20. Main air supply valve
21. Air motor gauge
22. Air motor On/Off valve
23. Blow-off push button

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 and refer to Table 1.

Table 1 Elevator Movement

To move the elevator . . .	Move the elevator control valve (12) to the . . .
UP	UP position (16)
DOWN	DOWN position (18)
NEUTRAL	NEUTRAL position (17)

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 (17).

2. Perform the following steps:

   a. Check for material leaking past the follower plate ring (7). 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 levels of fluid in the solvent chamber (4) and air motor lubricator (3). Fill if necessary. Refer to step 6 in the *Installation* section for filling instructions.

4. Verify that the air motor lockout valve (2) is open.

5. Turn on the main air supply valve (20) to the unloader.

6. Place the elevator control valve in the DOWN position (18) 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.

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 (13) 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

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

NOTE: The inactive unloader will not start if in the empty-container position.

To perform a forced changeover, press down the empty-container valve (See Figure 4, (5)) on the unloader that is pumping. Operation will transfer to the inactive 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 (17).
3. Push the blow-off push button (23) and open the blow-off valve (11).
4. Place the elevator control valve in the UP position (16). Blow-off air enters below the follower plate (8) 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. Unlatch or disengage the container hold down (9).
8. Remove the empty container from the unloader.
9. Remove the follower plate ring (7) from the container (or from the base of the follower plate). Clean the ring if necessary.
10. 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 (7) 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 (8).
4. Adjust the elevator control regulator (15) until the elevator control gauge (14) reads at least 2.1 bar (30 psi).
5. Latch or engage the container hold down (9).
6. Make sure the blow-off valve (11) is closed.
7. Unscrew the bleeder stem (6) from the follower plate to allow any air trapped under the follower plate to escape.

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.

8. Place the elevator control valve in the DOWN position (18) and slowly lower the follower plate into the container to force material into the pump section.
9. 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 (17).
10. Tighten the bleeder stem securely.
11. Open the air motor lockout valve (2).

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

12. Bleed the pump according to the procedures in *Bleeding the Pump*, in this section.

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. It will begin spitting.

Perform these steps to bleed the pump:

1. Reduce pressure to 0 bar/psi.

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

2. Place a waste container beneath the bleed valve (5). Make sure that the small bleed port is pointed down. Carefully open the bleed valve.

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.

Perform these steps to purge the pump and remove residual material pressure:

NOTE: The purge button on the A-Unit will activate the pump at any time. The purge button will initiate a purge at the A-Unit even if the B-Unit is active.

1. Push the purge button on your unloader. The purge button (19) on the A-Unit is located on the pump control box. The purge button on the B-Unit is located on the front of the unloader, on the bracket holding the elevator controls (See Figure 7, (9)).

Shutdown

See Figure 5.

1. Place the elevator control valve (12) in the NEUTRAL position (17).

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 (20).

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, the unloader remains in a neutral and unlocked state and could drift until you turn on the main air supply valve and deliberately initiate UP (16) or DOWN (18) elevator movement.

Restart after Shutdown

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

5. Maintenance

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

Table 2 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 2 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.

6. Troubleshooting

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

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

Problem	Possible Cause	Corrective Action
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.
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 you have placed the elevator control valve in the DOWN position. The unloader should begin to pump material.

Continued on next page

Problem	Possible Cause	Corrective Action
3. Pump not delivering material *(contd.)*	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 if loosened more than three turns. Personal injury could 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.

7. 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 further 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.

WARNING: Standard A- and B-Unit Rhino unloaders operate in a dual unloader configuration. You must be aware of the air/hydraulic pressures in both unloaders when servicing. Shut off and lock out various components as directed. Failure to heed this warning may result in serious personal injury or death.

Removing the Hydraulic Section

To perform pump repair procedures (located 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 from the pump. Refer to the *Purging the Pump* procedure in the *Operation* section.

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

3. Place wood blocks on the base of the frame beneath the follower plate (4).
4. Lower the elevator until the follower plate makes contact with the wood blocks. Blocks should be high enough to keep the follower plate from contacting the drum hold down shoes.
5. Turn on low pressure at the air motor regulator (8) 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 (14).
8. Place and leave the elevator control valve (12) in the NEUTRAL position (10).

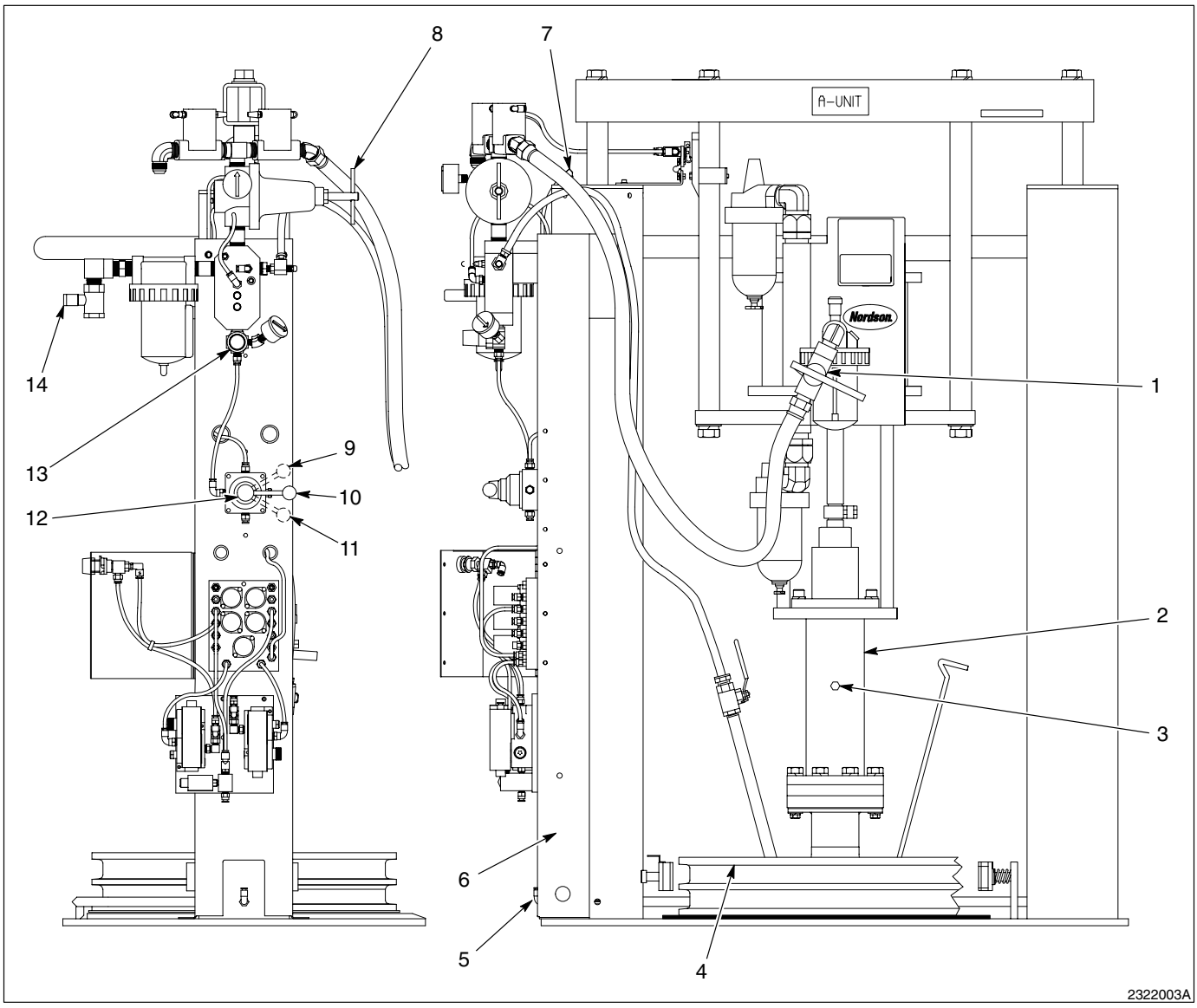

Fig. 6 Removing the Hydraulic Section

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

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. 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 *Removing the Hydraulic Section* for more information.
3. Use the elevator control valve (12) to bleed all air from both the top and bottom of the elevator pistons. To do this,
   a. Set the elevator control regulator (13) and the air motor regulator (8) to 0 bar/psi and disconnect the input air supply from the main air supply valve (14).

      NOTE: For future reference, note the settings of the elevator control regulator and the air motor regulator and the orientation of the cylinder heads.

   b. Place the elevator control valve in the UP position (9) until any remaining air bleeds from below the air cylinder piston.

   c. Place the elevator control valve in the DOWN position (11) until all air bleeds 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 push-lock fittings at the bottom (5) and top (7) of the left cylinder (6) separately. Wait for the air pressure escape.

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 (12) in the NEUTRAL position (10).
2. Connect the air tubing to the top and bottom push-lock fittings (5, 7).

Returning the Unloader to Operation

Follow these procedures to return your unloader to operation.

See Figure 6.

1. Adjust the elevator control regulator (13) and the air motor regulator (8) 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 (14).
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.

8. Parts

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

Using the Illustrated Parts List

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

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

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

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

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

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

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

Rotary Control Components

See Figure 7 unless otherwise noted.

Note that one column lists the A-Unit components and the other column lists the B-Unit components. Quantities of items are the same for both the A- and B-Units unless otherwise noted.

Item	Part	Part	Description	Quantity	Note
—	- - - - - -		Module, rotary control, A-Unit	1	
—		- - - - - -	Module, rotary control, B-Unit	1	
1	981771	981771	• Screw, socket, 10-32 x 1.375, zinc	4	
2	983120	983120	• Washer, lock, e, split, #10, steel, nickel	4	
3	983123	983123	• Washer, flat, e, 0.219 x 0.500 x 0.049, zinc	4	
4	272556	272556	• Muffler, low profile, $^1/_4$ NPT	1	
5	971265	971265	• Connector, male, $^1/_4$ tube x $^1/_4$ NPT	3/2	
6	324896		• Grommet, rubber, 0.812 ID x 1.25 OD	1	
7	124797	124797	• Valve, rotary, 3-position, $^1/_4$ por	1	
8	971266		• Elbow, male, $^1/_4$ tube x $^1/_4$ NPT	1	
9		164639	• Valve, manual, push button, with cup	1	
10		972119	• Elbow, male, $^1/_4$ tube x $^1/_8$ NPT	2	
NS	972716	972716	• Connector, male, $^1/_4$ tube x $^1/_8$ NPT	1	A
NS	901379	901379	• Actuator, cam follower 11925	1	A
NS	900481	900481	• Adhesive, pipe/thread/hydraulic sealant	AR	

NOTE A: This part is illustrated in the limit brackets illustration, Figure 11.
AR: As Required
NS: Not Shown

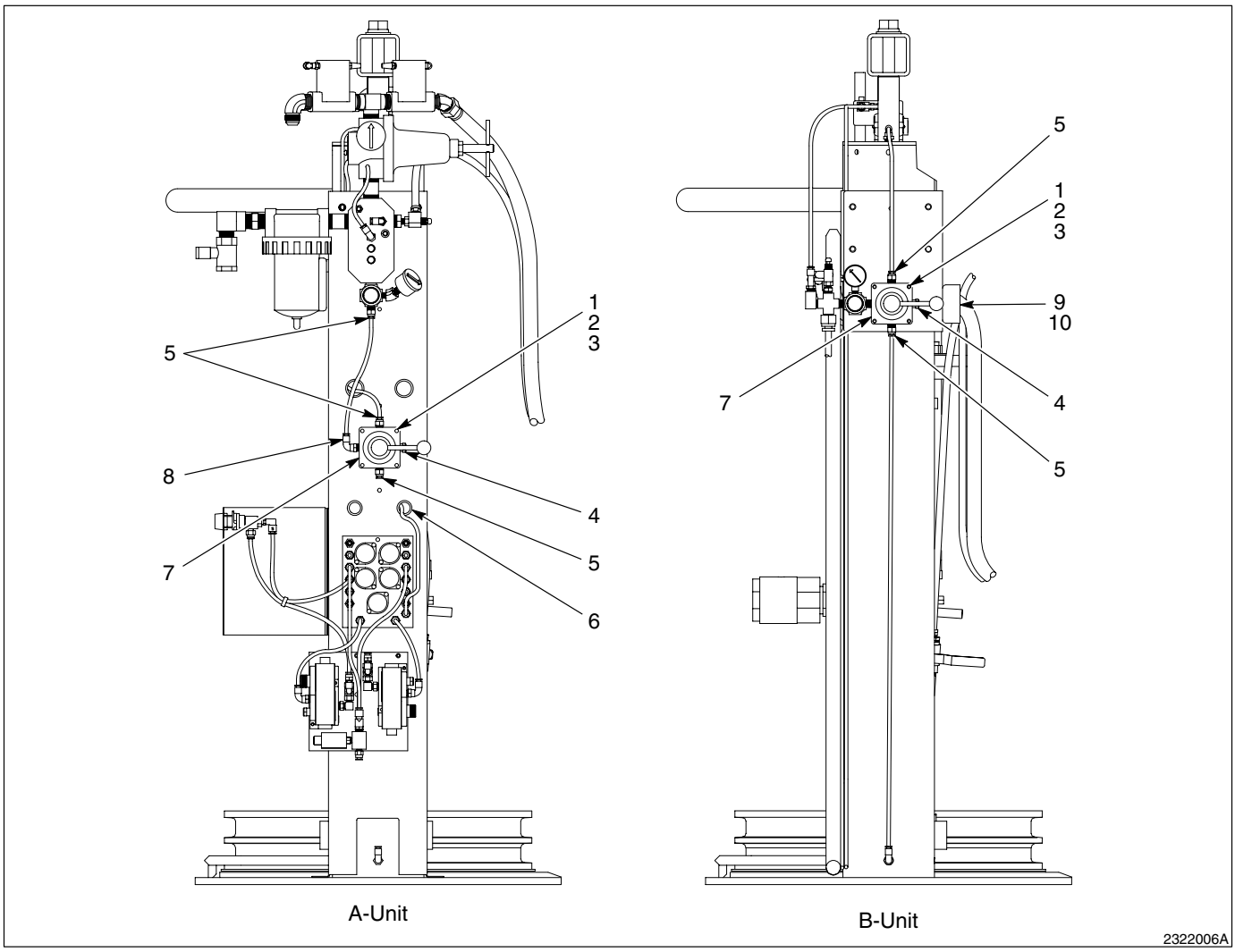

Fig. 7 Rotary Control Components

CE Rotary Pneumatics

See Figure 8.

Note that one column lists the A-Unit components and the other column lists the B-Unit components. Quantities of items are the same for both the A- and B-Units unless otherwise noted.

Item	Part	Part	Description	Quantity	Note
—	- - - - - -		Module, CE pneumatics, A-Unit	1	
—		- - - - - -	Module, CE pneumatics, B-Unit	1	
1	973411	973411	• Plug, pipe, socket, flush, $^1/_4$, zinc	4/2	
2	972583	972583	• Elbow, male, 37, $1^1/_{16}$-12 x $^3/_4$, steel	2/1	
3	973109	973109	• Nipple, steel, schedule 40, $^3/_4$, 2.00	3/1	
4	282776		• Valve, ball, vented, $^3/_4$ NPT	1	
5	973226		• Elbow, pipe, hydraulic, 90, $^3/_4$, steel, zinc	1	
6	303956	303956	• Lubricator, micro mist, $^3/_4$ NPT	1	
7	124795	124795	• Fitting, hose, $^3/_4$ barb x $1^1/_{16}$	2	A
8	124792	124792	• Hose, 0.75 ID, 200 psi	AR	
9	282779		• Spacer, manifold	1	
10	982240		• Screw, hex, cap, M8 x 20, black	2	
11	983013		• Washer, flat, m, reg, 8, steel, zinc	2	
NS	164636	164636	• Switch, limit, $^1/_8$ NPT	1	B, F
NS	900517	900517	• Tubing, poly, spiral cut, 0.62 ID	AR	C
NS	900730	900730	• Tubing, polyurethane, 0.250 x 0.040	AR	D
NS		186507	• Cover, hose, 8 wide x 9-ft long	1	
NS	900481	900481	• Adhesive, pipe/thread/hydraulic sealant	AR	E
NS	900464	900464	• Adhesive, threadlocking	AR	F

NOTE A: The second fitting on the B-Unit is located at the end of the hose, at the A-unit connection.
B: This part is illustrated in the limit brackets illustration, Figure 11.
C: Spiral wrap is used to bundle the $^1/_4$-in. tubing.
D: Unless otherwise noted, order this part for all of the tubing on the unloader.
E: Apply pipe/thread/hydraulic sealant to all pipe threads.
F: Apply threadlocking adhesive to the limit switch.

AR: As Required

NS: Not Shown

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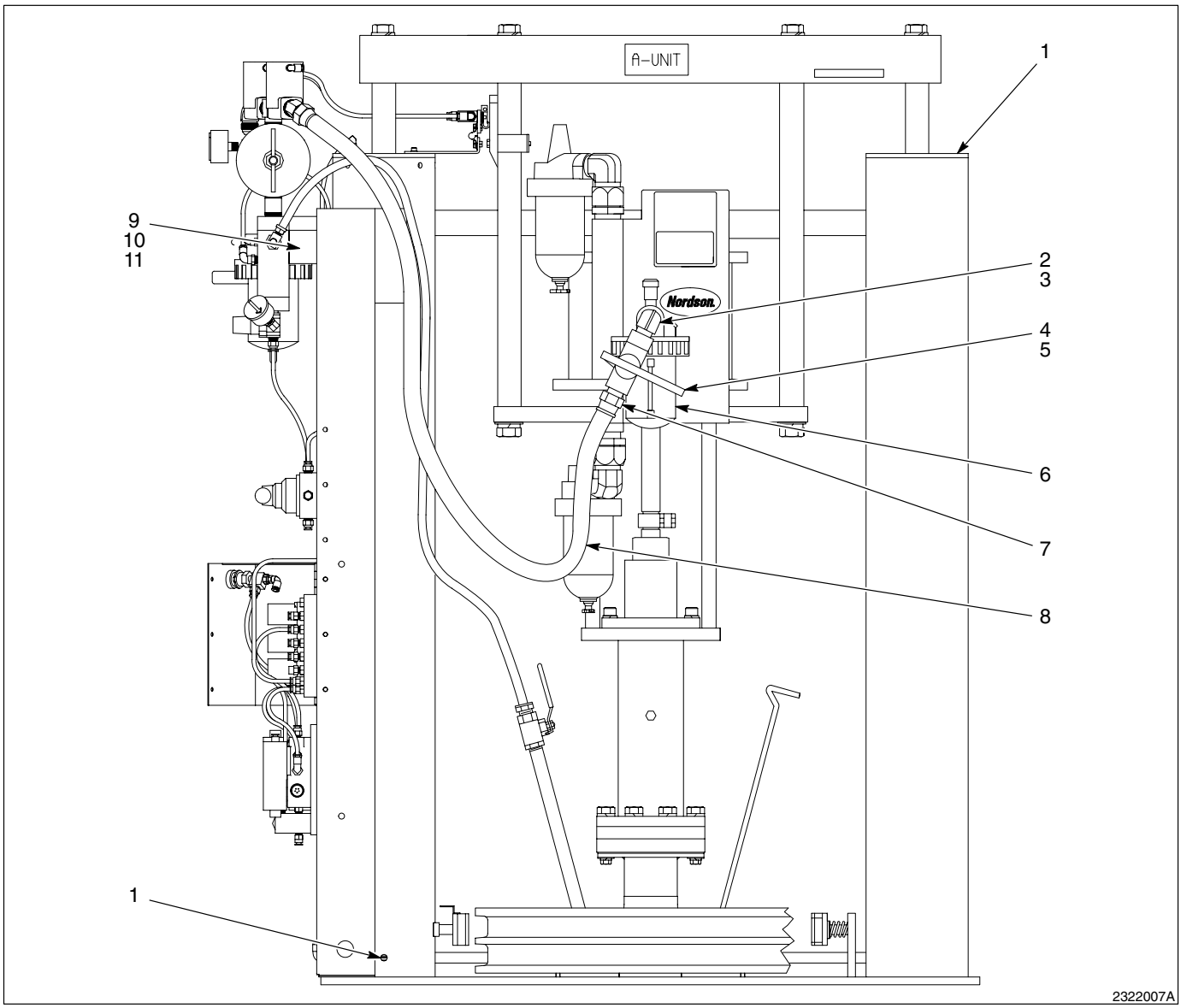

Fig. 8 CE Rotary Pneumatics (1 of 2)

Additional CE Rotary Pneumatics

See Figures 8 and 9.

Note that one column lists the A-Unit components and the other column lists the B-Unit components. Quantities of items are the same for both the A- and B-Units unless otherwise noted.

Item	Part	Part	Description	Quantity	Note
10	186466		• Valve, 3-way, $^3/_4$ NPT, air pilot	2	
11/NS	972119	972119	• Elbow, male, $^1/_4$ tube x $^1/_8$ NPT	3/1	
12	281861		• Tee, pipe, male, $^3/_4$ NPT, steel	1	
13	973140		• Elbow, male, 45 d, $^3/_4$ NPT x $1^1/_{16}$-12 JIC	1	
14	124800		• Regulator, $^3/_4$ NPT, 0–125 psi	1	
15	982039		• Screw, socket, M8 x 55, black	2	
16	972122		• Elbow, male, $^1/_2$ tube x $^3/_8$ NPT	1	
17	901245		• Gage, pressure, 0–100 psi, 0–7 bar	1	
17		124790	• Gage, 0–160 psig, $^1/_8$ NPT	1	
18	973187	973187	• Elbow, pipe, hydraulic, 45, $^1/_8$, zinc	1	
19	126767	126767	• Regulator, air, 0–60, $^1/_4$ NPT	1	
20	973085	973085	• Nipple, steel, schedule 40, $^1/_4$, 0.87	1/2	
21	282777		• Manifold, air supply	1	
22	971266	971266	• Elbow, male, $^1/_4$ tube x $^1/_4$ NPT	3/2	
23	124798		• Filter, $^3/_4$ NPT, 16 oz, 250 psi	1	
26	973252		• Nipple, hex, $^3/_4$ x $^3/_4$ x 1.96, steel, zinc	1	
27	124791		• Gage, 0–160 psig, $^1/_4$ NPT	1	
28	170269		• Muffler, exhaust, $^1/_8$-in. NPT	2	
29		900513	• Tubing, polyethylene, 0.505 x 0.064	AR	
30		971299	• Connector, male, $^1/_2$ tube x $^1/_4$ NPT	1	
31		973561	• Tee, male, branch, auto, $^1/_4$, steel, zinc	1	
32		971267	• Tee, male run, $^1/_4$ tube x $^1/_4$ NPT	1	

AR: As Required
NS: Not Shown

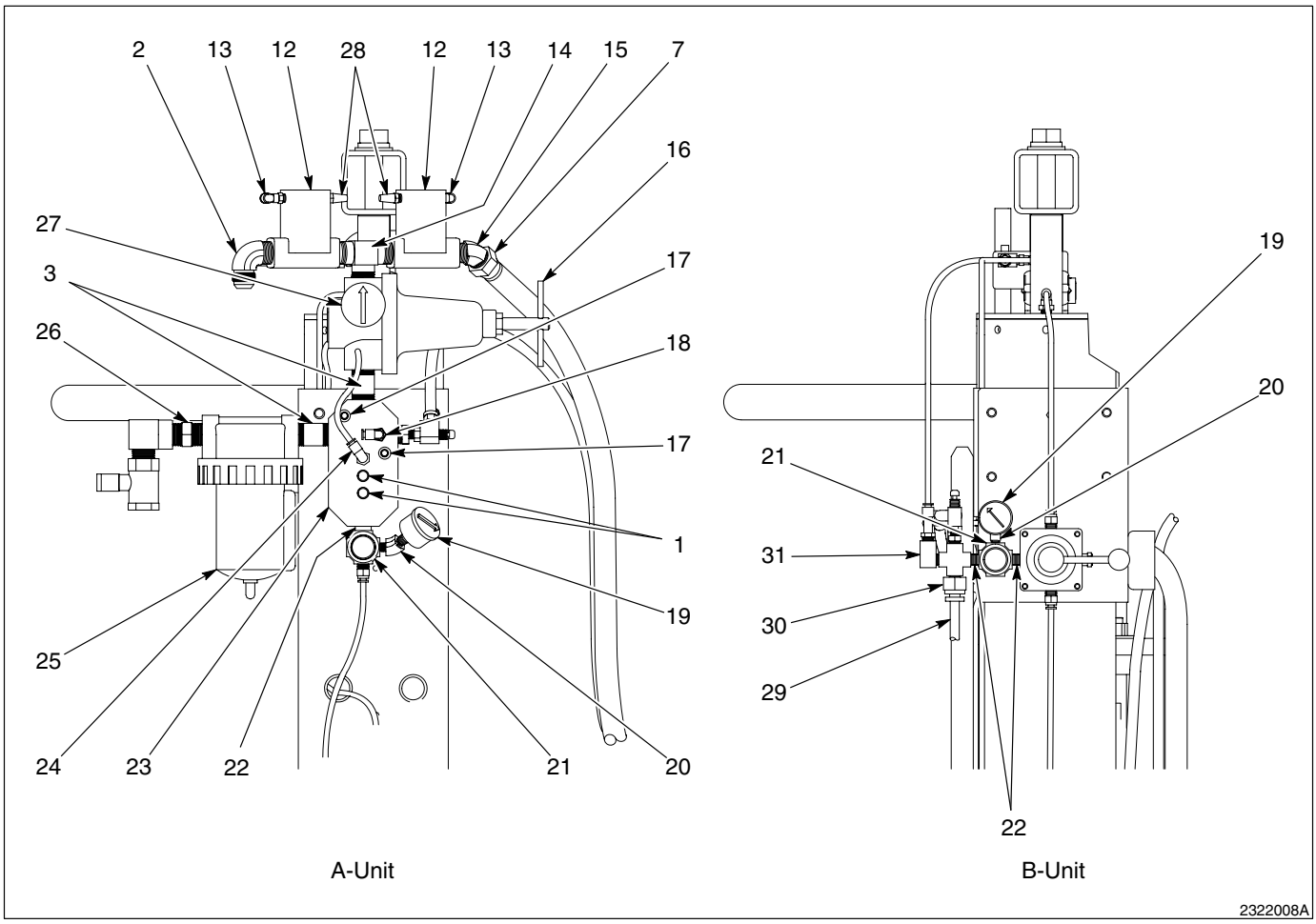

Fig. 9 CE Rotary Pneumatics (2 of 2)

Blow-Off Components

See Figure 10.

Note that one column lists the A-Unit components and the other column lists the B-Unit components. Quantities of items are the same for both the A- and B-Units unless otherwise noted.

Item	Part	Part	Description	Quantity	Note
—	327105		Module, blow-off, shop air, A-Unit	1	
—		327106	Module, blow-off, shop air, B-Unit	1	
1	124786	124786	• Stem, bleeder, follower	1	
2	973453	973453	• Nipple, steel, schedule 40, $^1/_2$ x 12 long	1	
3	973382	973382	• Bushing, red, $^1/_2$ x $^1/_4$, steel, zinc	1	
4	- - - - - -	- - - - - -	• Connector, male, sw, $^1/_4$ hose, $^1/_4$ NPT, barb	1	
5	901151	901151	• Valve, ball, $^1/_2$ NPT	1	
6	805652	805652	• Hose, air, $^1/_4$ ID	AR	A
7	973000		• Nipple, steel, schedule 40, $^1/_8$, 0.75	1	
7		973564	• Nipple, hex, $^1/_4$ x $^1/_8$ x 1.188, steel, zinc	1	
8	327127	327127	• Coupling, barbed, $^1/_4$ hose, $^1/_8$ NPT	1	
9	124787	124787	• Button, push, manual	1	
10	164636	164636	• Switch, limit, $^1/_8$ NPT	1	
11	973441		• Bushing, pipe, hydraulic, $^1/_2$ x $^1/_8$, steel	1	
12		973223	• Cross, pipe, $^1/_4$, brass	1	
NS	900481	900481	• Adhesive, pipe/thread/hydraulic sealant	AR	

NOTE A: Order the length of hose that you require.
AR: As Required
NS: Not Shown

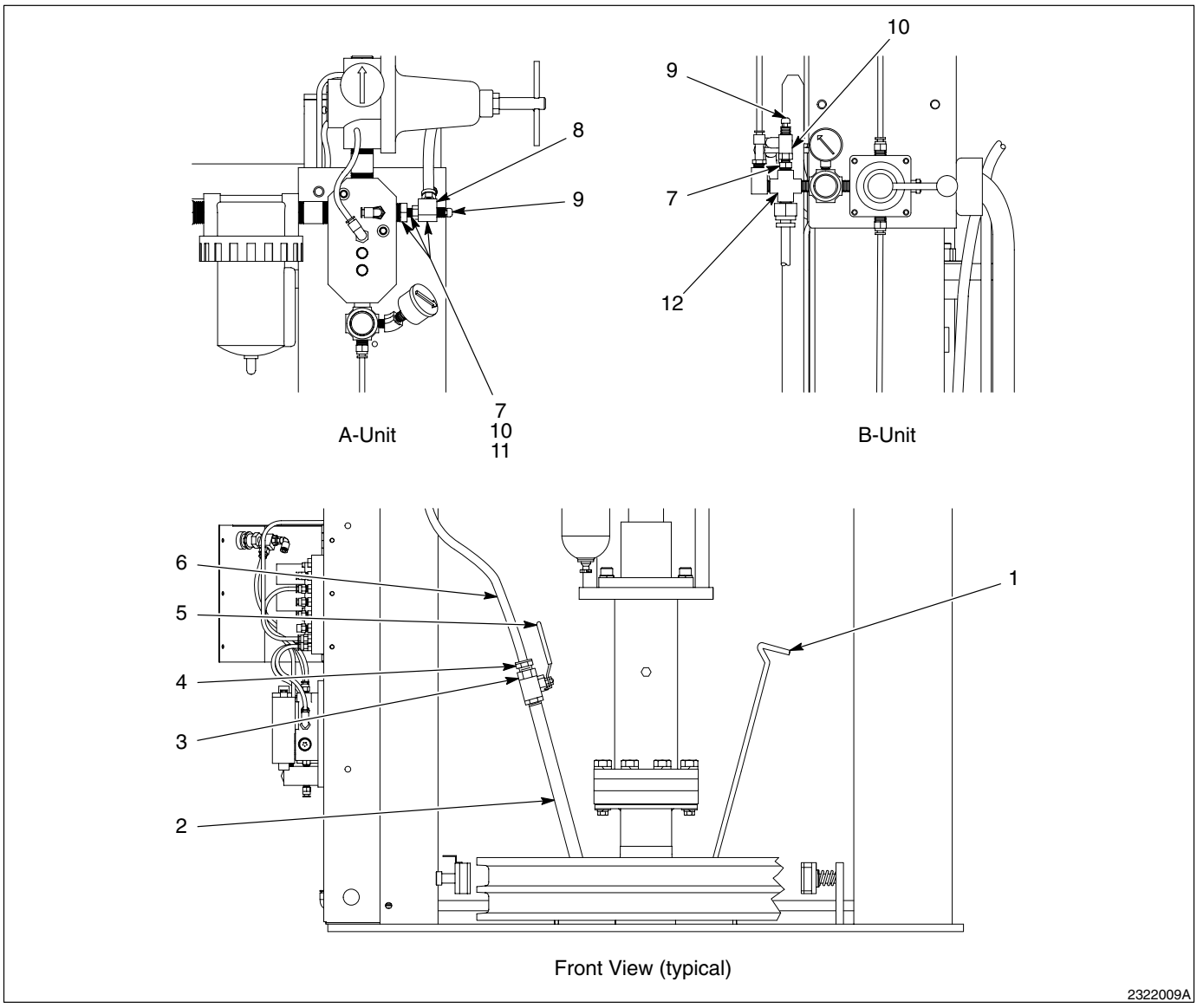

Fig. 10 Blow-Off Components

Empty-Container Limit Brackets

See Figure 11.

Item	Part	Description	Quantity	Note
—	- - - - - -	Module, bracket, drum limit, rotary	1	
1	186549	• Stop, empty drum, CE pail	1	
2	982372	• Screw, socket, M5 x 12, black	2	
3	983401	• Washer, lock, M, split, M5, steel, zinc	2	
4	983035	• Washer, flat, M, reg, 5, steel, zinc	2	
5	282785	• Clamps, $1^1/_2$ ID	1	
6	230566	• Bracket, rotary drum limit switch	1	
7	982059	• Screw, socket, M4 x 8, black	6	A
8	282783	• Bracket, limit switch	1	
9	982035	• Screw, socket, M8 x 16, black	2	A
10	983013	• Washer, flat, M, reg, 8, steel, zinc	2	
11	282782	• Hinge, spring	1	
12	221940	• Bracket, CE, drum limit switch	1	
NS	900439	• Adhesive, threadlocking	AR	
13	972119	Elbow, male, $^1/_4$ tube x $^1/_8$ NPT	1	
14	972716	Connector, male, $^1/_4$ tube x $^1/_8$ NPT	1	
15	164636	Switch, limit, $^1/_8$ NPT	1	B
16	901379	Actuator, cam follower 11925	1	
NS	900464	Adhesive, threadlocking	AR	

NOTE A: Coat the threads of these parts with threadlocking adhesive, part 900439.
B: Coat the threads of this part with threadlocking adhesive, part 900464.
AR: As Required
NS: Not Shown

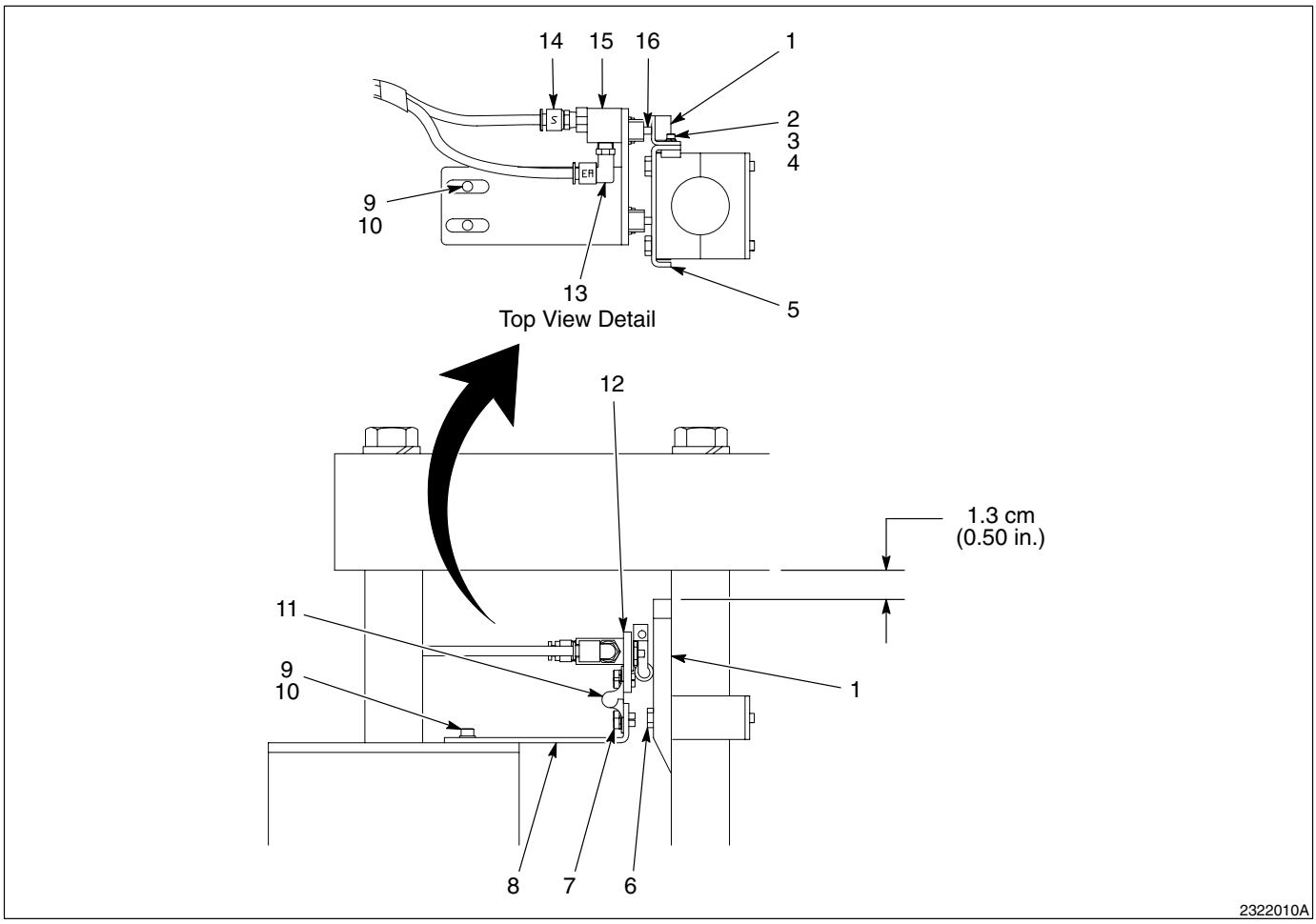

Fig. 11 Limit Brackets

Pneumatic Support Modules

See Figure 12.

Note that one column lists the A-Unit components and the other column lists the B-Unit components. Quantities of items are the same for both the A- and B-Units unless otherwise noted.

Item	Part	Part	Description	Quantity	Note
—	- - - - - -		Module, support, pneumatic, rotary drum, A-Unit	1	
—		- - - - - -	Module, support, pneumatic, rotary drum, B-Unit	1	
1	981402	981402	• Screw, hex, cap, $^{3}/_{8}$-16 x 1.00, zinc	6/4	A
2	983061	983061	• Washer, flat, e, 0.4060 x 0.812 x 0.065, zinc	6/4	A
3	282775		• Support, Rhino, air logic	1	
3		221697	• Bracket, pneumatic, drum, B-Unit, rotary	1	
4	983160		• Washer, lock, e, split, $^{3}/_{8}$, steel, nickel	4	
NS	900464	900464	• Adhesive, threadlocking	AR	

NOTE A: Coat the screws and the upper washers with threadlocking adhesive, part 900464.
AR: As Required
NS: Not Shown

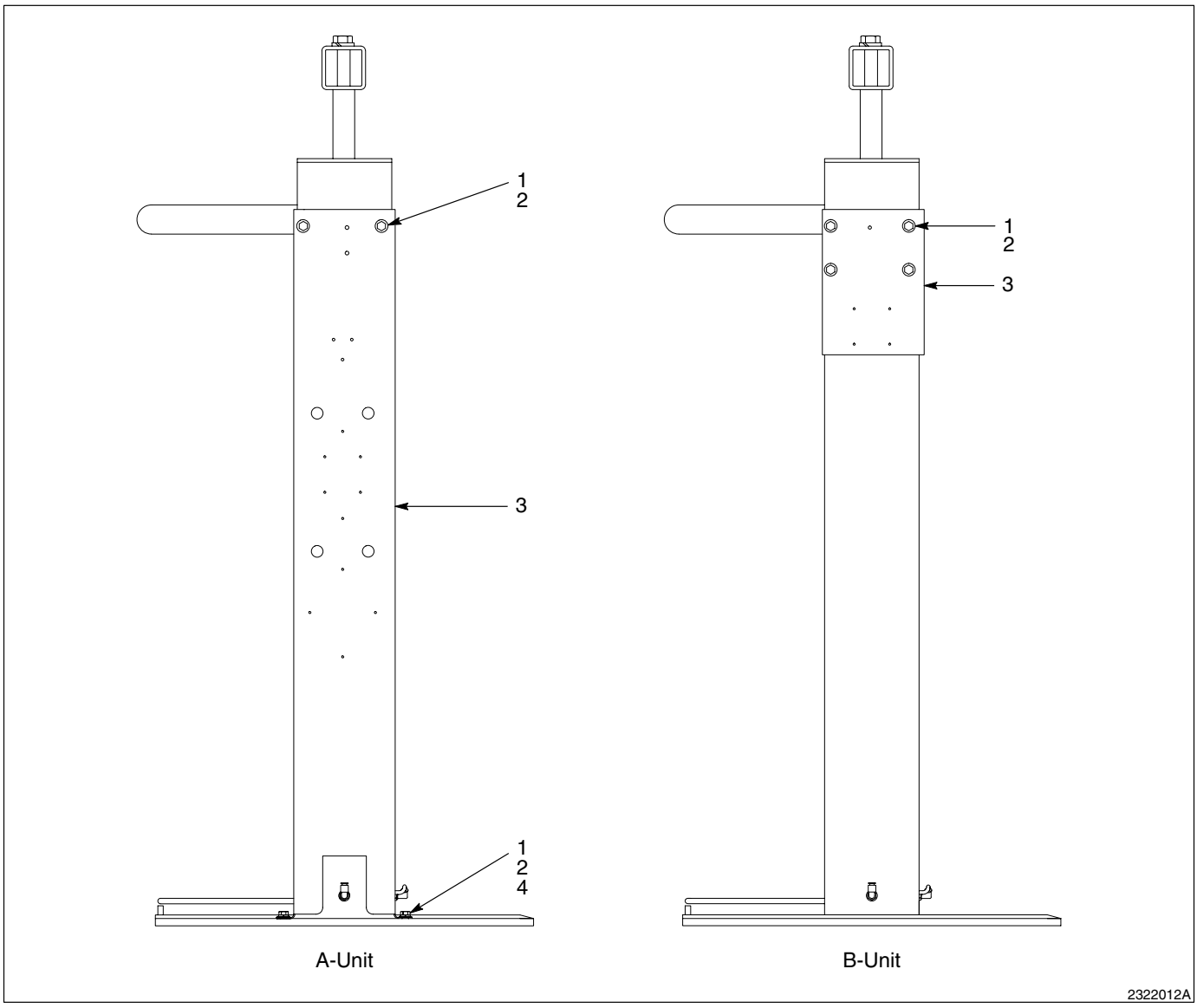

Fig. 12 Pneumatic Support Modules

Pump Controller Parts

See Figure 13.

The pump controller is found on A-Units, only.

Item	Part	Description	Quantity	Note
—	- - - - - -	Module, pump control, bulk unloader	1	
1	982244	• Screw, pan, slotted, M5 x 35, zinc	2	A
2	983408	• Washer, flat, m, narrow, M5, steel, zinc	8	
3	- - - - - -	• Module, pump control	1	
4	186495	• Cover, 1 hole, Rhino, air logic	1	
5	900730	• Tubing, polyurethane, 0.250 x 0.040	AR	
6	973402	• Plug, pipe, socket, flush, $^1/_8$, zinc	4	
7	972716	• Connector, male, $^1/_4$ tube x $^1/_8$ NPT	11	
8	282790	• Button, push, for 0.875 dia hole	1	
9	282789	• Adapter, button/valve	1	
10	164636	• Switch, limit, $^1/_8$ NPT	1	
11	972119	• Elbow, male, $^1/_4$ tube x $^1/_8$ NPT	1	
12	982193	• Screw, pan, slotted, M5 x 16, zinc	6	A
NS	900464	• Adhesive, threadlocking	AR	

NOTE A: Coat the threads of these parts with threadlocking adhesive, part 900464.
AR: As Required
NS: Not Shown

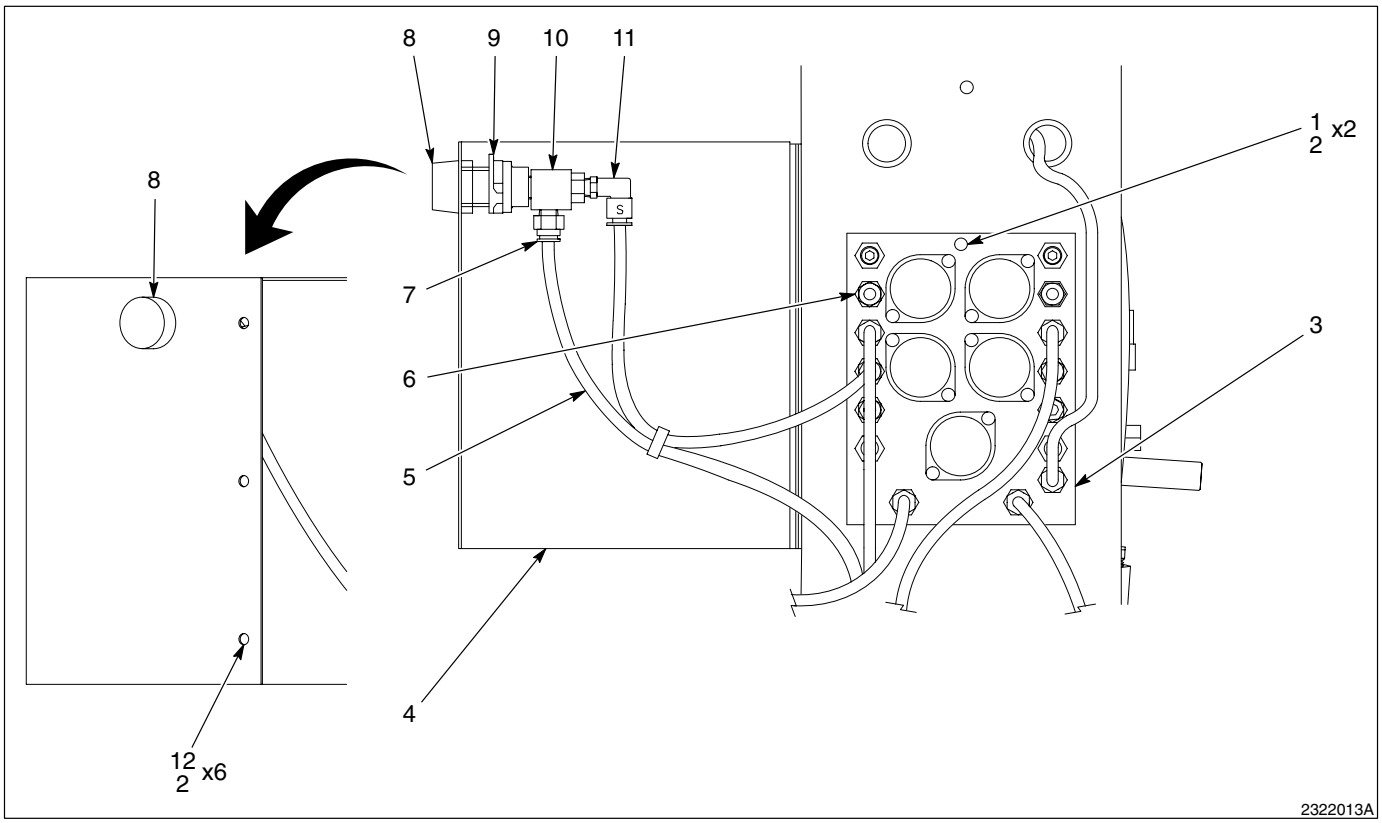

Fig. 13 Pump Controller Parts

Electric Shut-Off Modules

See Figure 14.

Note that one column lists the 120 V shut-off components and the other column lists the 24 V shut-off components. Quantities of items are the same for both units unless otherwise noted.

Item	Part	Part	Description	Quantity	Note
—	327611		Module, electric shut-off, 120 V	1	
—		306683	Module, electric shut-off, 24 V	1	
1	170269	170269	• Muffler, exhaust, $^1/_8$-in. NPT	2	
2	282852	282852	• Shuttle, valve, $^1/_8$ NPT	2	
3	982271	982271	• Screw, socket, M4 x 20, black	4	A
4	306681	306681	• Plate, mounting, 281 161 valves	1	
5	972119	972119	• Elbow, male, $^1/_4$ tube x $^1/_8$ NPT	2	
6	272556	272556	• Muffler, low profile, $^1/_4$ NPT	2	
7	971266	971266	• Elbow, male, $^1/_4$ tube x $^1/_4$ NPT	2	
8	973238	973238	• Bushing, red, $^1/_4$ x $^1/_8$, brass	2	
9	973121	973121	• Elbow, male, pipe, hydraulic, $^1/_8$, brass	2	
10	973411	973411	• Plug, pipe, socket, flush, $^1/_4$, zinc	4	
11	281161		• Valve assembly, 120 Vac	2	
11		172336	• Valve assembly, 24 V	2	
12	972189	972189	• Connector, Y, branch, $^1/_4$ tube x $^1/_4$ NPT	1	
13	972716	972716	• Connector, male, $^1/_4$ tube x $^1/_8$ NPT	4	
14	306682	306682	• Manifold, mounting, pressure switch	1	
15	982364	982364	• Screw, socket, M6 x M12	2	A
16	325307	325307	• Switch, pressure, $^1/_8$ NPT p117g	2	
17	981164	981164	• Screw, socket, 10-32 x 0.750, zinc	4	A
18	900730	900730	• Tubing, polyurethane, 0.250 x 0.040	AR	
NS	900464	900464	• Adhesive, threadlocking	AR	

NOTE A: Coat the threads of these parts with threadlocking adhesive, part 900464.
AR: As Required
NS: Not Shown

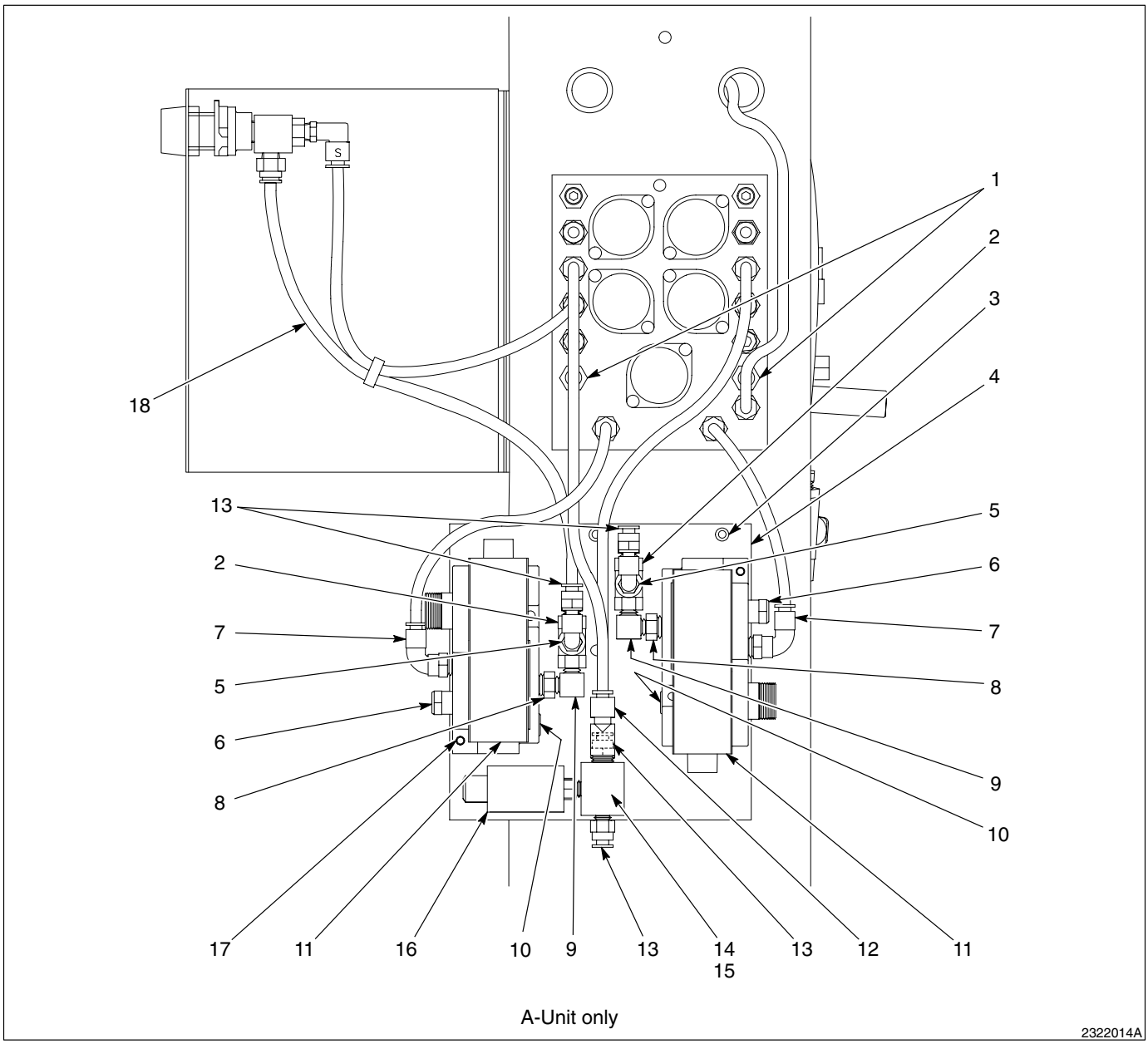

Fig. 14 Electric Shut-Off Modules

Exhaust Components

See Figure 15.

Item	Part	Description	Quantity	Note
—	295788	Module, exhaust, reclassifier	1	
1	295796	• Muffler, reclassifier, 1 NPT	1	
2	295797	• Connector, swivel, $1^1/_4$ F JIC x $1^1/_4$ m	1	
3	295798	• Elbow, male, 37, $1^5/_8$-12 x 1 NPTF-16	1	

Pneumatic Manual Shut-Off Module

See Figure 15.

This module controls main air supply into the unloaders and is installed on the A-Unit only.

Item	Part	Description	Quantity	Note
—	- - - - - -	Module, pneumatic, manual shut-off	1	
4	973226	• Elbow, pipe, hydraulic, 90, $^3/_4$, steel, zinc	1	A
5	282776	• Valve, ball, vented, $^3/_4$ NPT	1	A
NS	900481	• Adhesive, pipe/thread/sealant	AR	

NOTE A: Coat these parts with pipe/thread/sealant adhesive, part 900481.
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

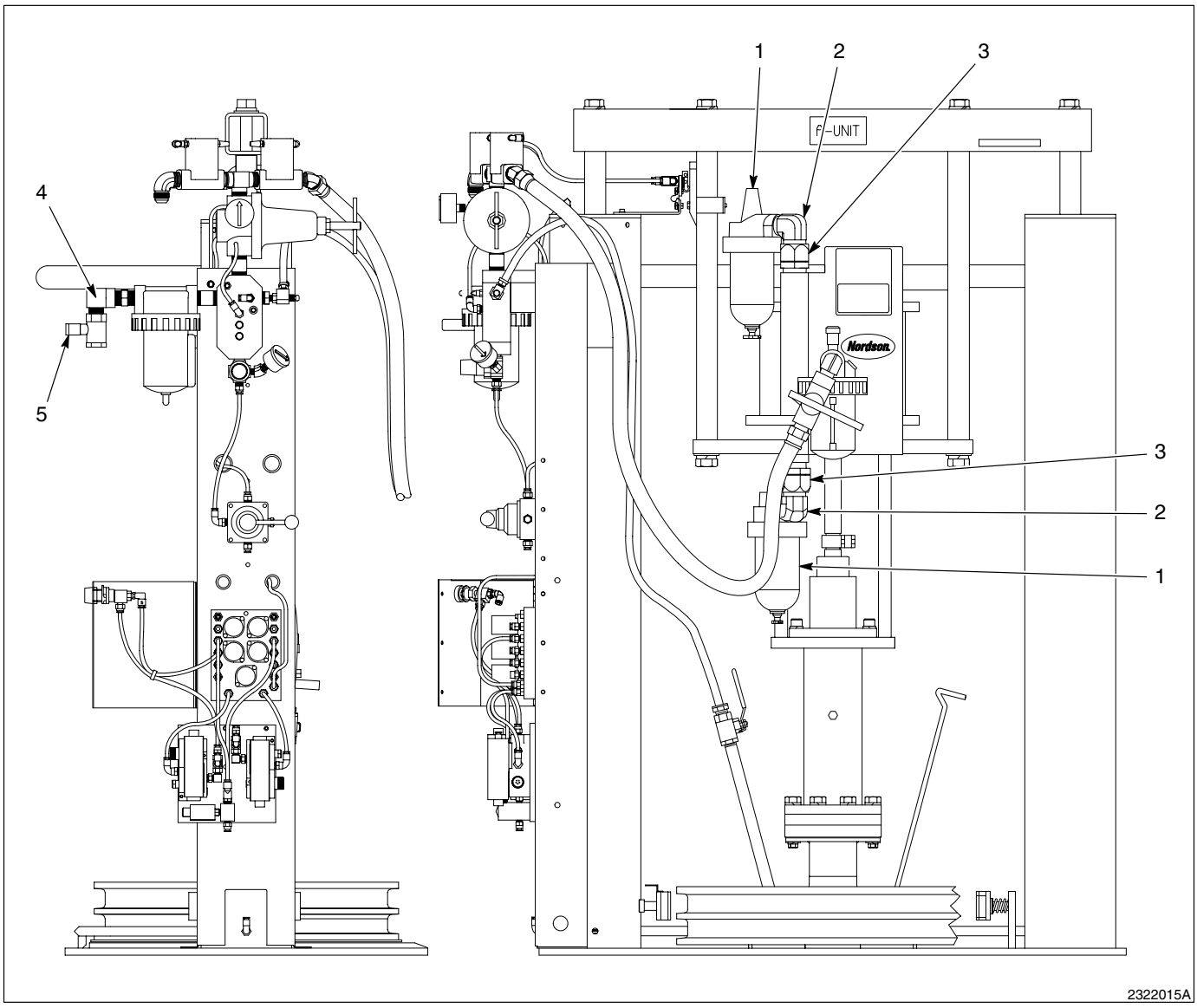

Fig. 15 Exhaust Components and Pneumatic Manual Shut-Off Module

Drum Hold Down Kit

See Figure 16.

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 the new hold down 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

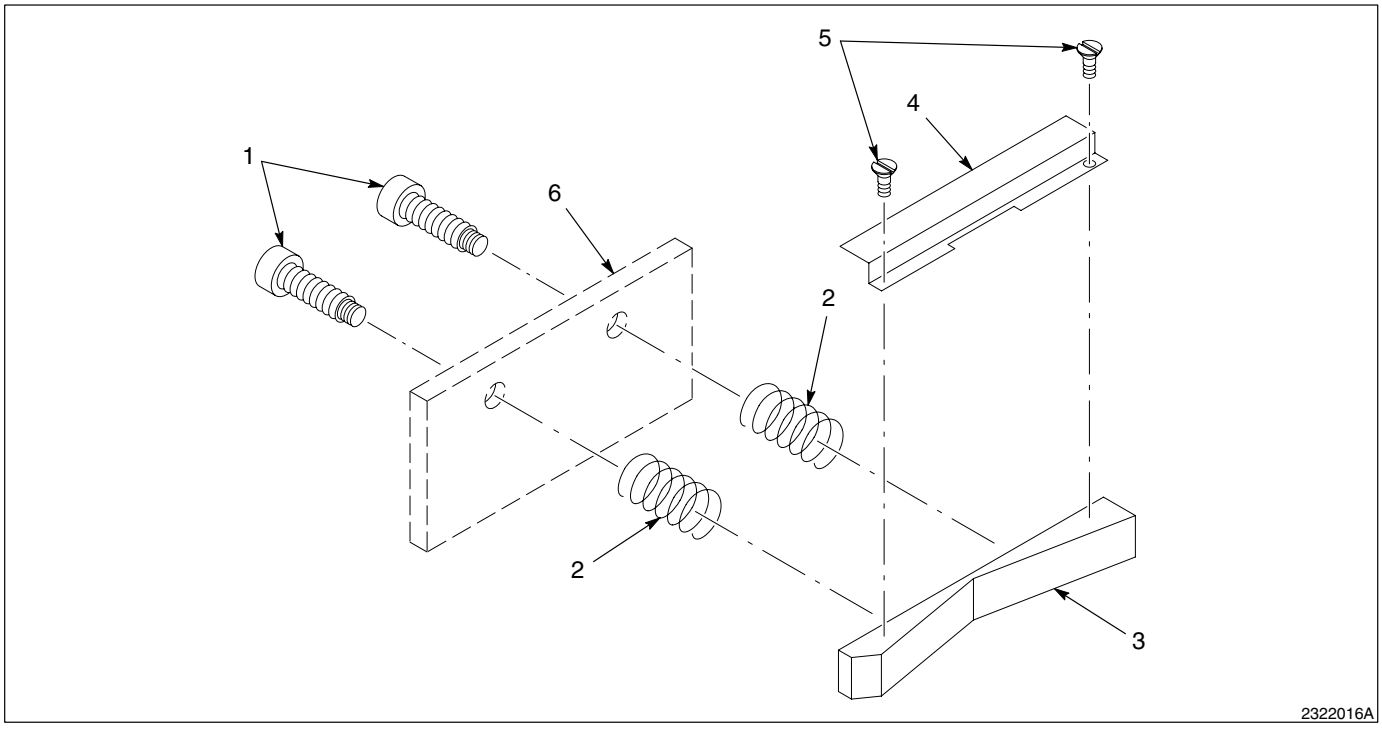

Fig. 16 Drum Hold Down Kit