Instructions

Uni-Drum™ Supply System

332372M

EN

Bulk Supply System for 1000 Liter (264 Gallon) Magnadrums. For professional use only.

Not for use in explosive atmospheres.

See page 3 for maximum outlet pressure and maximum fluid flow.

The Uni-Drum supply system evacuates 1000 liter (264 gallon) magnadrums and other tote drums of the same size and capacity. The Uni-Drum pumps and transfers flowable and highly viscous materials such as sealant, adhesives, and sound deadeners from bulk drums with maximum efficiency.

The Uni-Drum is built to work with other high pressure equipment to optimize material use.

Important Safety Instructions
Read all warnings and instructions in this manual and related manuals.
Save these instructions.

See page 3 for list of models.

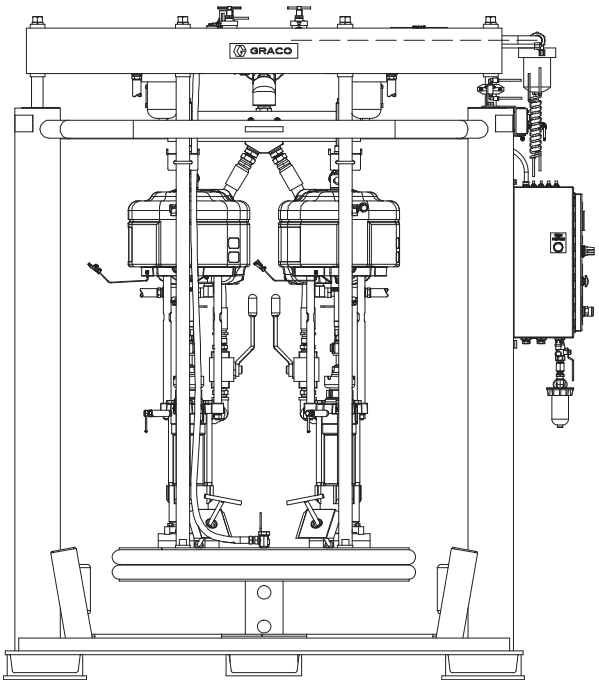


Table of Contents

Models

Supply Unit Part No.	Pump	Ratio	Maximum Outlet Pressure	Maximum Fluid Flow	Pump Manual	Tandem System Part No.	Depressurization / 7 Day Timer	Control Box Part No.
U81883 (LH) ★	6500 NXT Check-Mate® 500 Carbon Steel (Dual Pump)	26:1	2600 psi (18.2 MPa, 182 bar)	7.8 gpm (30.0 lpm) @ 60 cpm	312376	U81885	No / No	24R637
U81884 (RH) ★								
U81807 (RH) ★						N/A	Yes / No	
U82084 (RH)†						N/A	No / No	Not Included
U82267 (RH)†						N/A	No / No	
U82277 (LH)†						N/A	No / No	
U82090 (RH)†	6500 NXT Check-Mate 1000 Stainless Steel (Dual Pump)	10:1	660 psi (4.55 Mpa, 45.5 bar)	17.4 gpm (65.8lpm) @ 60 cpm	311716	N/A	No / No	
U82151 (RH)	Premier, Dura-Flo™ 580 Carbon Steel (Dual Pump)	34:1	3400 psi (24.0 Mpa, 235 bar)	9.2 gpm (34.8 lpm) @60 cpm	308151	N/A	No / No	24R637
U82283 (RH) ★	XL Dura-Flo 1000 cc Max-Life® Carbon Steel (Single Pump)	47:1	4500 psi (31.0 MPa 310 bar)	7.9 gpm (29.2 lpm) @ 30 cpm	3A4100	N/A	No / No	24Z181
U82293 (LH) ★								
U82987 (LH) ★	XL Dura-Flo 1000 cc Severe Duty® Carbon Steel (Single Pump)	47:1	4500 psi (31.0 MPa 310 bar)	7.9 gpm (29.2 lpm) @ 30 cpm	3A4100	N/A	No / No	24Z181
U82988 (RH) ★								
U82375 (RH) ★	XL Dura-Flo 1000 cc Max-Life Stainless Steel (Single Pump)	47:1	4500 psi (31.0 MPa 310 bar)	7.9 gpm (29.2 lpm) @ 30 cpm	3A4100	N/A	No / No	24Z181
U82379 (LH) ★								
U82577 (LH) ★	XL Dura-Flo 430 cc Severe Duty Carbon Steel (Dual Pump)	47:1	4500 psi (31.0 MPa 310 bar)	6.9 gpm (26.1 lpm) @ 60 cpm	311826	U82576	No / No	24R637
U82578 (RH) ★								
U82917 (LH) ★	6500 NXT Dura-Flo 1000 cc Severe Duty Carbon Steel (Single Pump)	10:1	1180 psi (8.14 MPa 81.4 bar)	17.4 gpm (65.8 lpm) @ 60 cpm	311833	U82916	No / No	24Z181
U82918 (RH) ★								
U83110 (RH) ★	XL Dura-Flo 1000 cc Max-Life Stainless Steel (Dual Pump)	47:1	4500 psi (31.0 MPa 310 bar)	7.9 gpm (29.2 lpm) @ 30 cpm	3A4100	U83107	Yes/No	24R637
U83109 (LH) ★								

U83132 (RH) ★ U83130 (LH) ★	XL Dura-Flo 1000 cc Severe Duty “R” Carbon Steel (Dual Pump)	47:1	4500 psi (31.0 MPa 310 bar)	7.9 gpm (29.2 lpm) @ 30 cpm	3A4100	N/A	No/No	Not Included
U83136 (RH) ★ U83134 (LH) ★	XL Dura-Flo 1000 cc Max-Life Stainless Steel (Dual Pump)	47:1	4500 psi (31.0 MPa 310 bar)	7.9 gpm (29.2 lpm) @ 30 cpm	3A4100	N/A	No/No	Not Included

★ CE *approved.*

†*These systems do not include the pneumatic control box and a Declaration of Incorporation is provided. Refer to the Pneumatic Diagram on page 41 for required circuit and components.*

Related Manuals

Manual No.	Relates to Part	Description
311238	N65LN2	NXT Air Motor, Instructions-Parts
312375	L500CS	Check-Mate Lower, Instructions
312376	P26LCS	Check-Mate Pump Packages, Instructions-Parts
308169	214849	Air Filters, Lubricators, and Kits, Instructions-Parts
308201	224040	Airgard Pump Runaway Valve, Instructions-Parts
307375	N/A	Noise Reference Guide, Instructions
311716	253596	Stainless Steel 1000cc Lower, Instructions-Parts
308213	222800	Premier Air Motor, Instructions-Parts
311825	222801	Dura-Flo Lowers, Instructions-Parts
308151	222801	Dura-Flo Pumps, Instructions-Parts
3A4100	25A455 / 25A448	1000 cc Dura-Flo Long Stroke

Symbols

Warning Symbol

⚠ WARNING

This symbol alerts you to the possibility of serious injury or death if you do not follow the instructions.

Caution Symbol

⚠ CAUTION

This symbol alerts you to the possibility of damage to or destruction of equipment if you do not follow the instructions.

⚠ WARNING

EQUIPMENT MISUSE HAZARD

Equipment misuse can cause the equipment to rupture or malfunction and result in serious injury.

- This equipment is for professional use only.
- Read all instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are uncertain about usage, call your Graco distributor.
- Do not alter or modify this equipment. Use only genuine Graco parts and accessories.
- Check equipment daily. Repair or replace worn or damaged parts immediately.
- Do not exceed the maximum working pressure stated on the equipment or in the **Technical Data** for your equipment. Do not exceed the maximum working pressure of the lowest rated component in your system.
- Use fluids and solvents which are compatible with the equipment wetted parts. Refer to the **Technical Data** section of all equipment manuals. Read the fluid and solvent manufacturer's warnings.
- Do not kink or overbend hoses or use hoses to pull equipment.
- Route hoses away from traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 180°F (82°C) or below -40°F (-40°C).
- Wear hearing protection when operating this equipment.
- Do not lift pressurized equipment.
- Do not lift the equipment by the air motor lift ring if the total weight of the equipment exceeds 550 lb (250 kg).
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.

⚠ WARNING

SKIN INJECTION HAZARD

Spray from the gun, hose leaks, or ruptured components can inject fluid into your body and cause extremely serious injury, including the need for amputation. Fluid splashed in the eyes or on the skin can also cause serious injury.

- Fluid injected into the skin might look like just a cut, but it is a serious injury. **Get immediate surgical treatment.**
- Do not point the gun at anyone or at any part of the body.
- Do not put your hand or fingers over the spray tip.
- Do not stop or deflect leaks with your hand, body, glove or rag.
- Do not “blow back” fluid; this is not an air spray system.
- Always have the tip guard and the trigger guard on the gun when spraying.
- Check the gun diffuser operation weekly. Refer to the gun manual.
- Be sure the gun trigger safety operates before spraying.
- Lock the gun trigger safety when you stop spraying.
- Follow the **Pressure Relief Procedures** on page 25 whenever you: are instructed to relieve pressure; stop spraying; clean, check, or service the equipment; and install or clean the spray tip.
- Tighten all fluid connections before operating the equipment.
- Check the hoses, tubes, and couplings daily. Replace worn, damaged, or loose parts immediately. Permanently coupled hoses cannot be repaired; replace the entire hose.
- Use only Graco approved hoses. Do not remove any spring guard that is used to help protect the hose from rupture caused by kinks or bends near the couplings.

MOVING PARTS HAZARD

Moving parts, such as the pump rod, follower plate and ram assembly, can pinch or amputate your fingers.

- Keep clear of all moving parts when starting or operating the pump.
- Keep your hands away from the follower plate and the lip of the drum while the ram is operating.
- Keep your hands away from the ram frame while the ram is operating.
- Before servicing the equipment, follow the **Pressure Relief Procedures** on page 25 to prevent the equipment from starting unexpectedly.

⚠ WARNING

FIRE AND EXPLOSION HAZARD

Improper grounding, poor ventilation, open flames or sparks can cause a hazardous condition and result in a fire or explosion and serious injury.

- Ground the equipment and the container where the material is deposited. Refer to **Grounding the System** on page 13.
- If there is any static sparking or you feel an electric shock while using this equipment, **stop the pumps immediately**. Do not use the equipment until you identify and correct the problem.
- Provide fresh air ventilation to avoid the buildup of flammable fumes from solvents or the fluid being sprayed.
- Keep the spray area free of debris, including solvent, rags, and gasoline.
- Electrically disconnect all equipment in the spray area.
- Extinguish all open flames or pilot lights in the spray area.
- Do not smoke in the spray area.
- Do not turn on or off any light switch in the spray area while operating or if fumes are present.
- Do not operate a gasoline engine in the spray area.
- Keep a fire extinguisher in the work area.

TOXIC FLUID HAZARD

Hazardous fluid or toxic fumes can cause serious injury or death if splashed in the eyes or on the skin, inhaled, or swallowed.

- Know the specific hazards of the fluid you are using.
- Store hazardous fluid in an approved container. Dispose of hazardous fluid according to all local, state and national guidelines.
- Always wear protective eye wear, gloves, clothing and respirator as recommended by the fluid and solvent manufacturer.

Unpacking the System

The Uni-Drum supply system was carefully packaged for shipment by Graco. When the system arrives, perform the following procedure to uncrate the system.

⚠ WARNING

EQUIPMENT MOVING HAZARD
Removing the unit off the pallet without following the unpacking procedure will damage the equipment.

To unpack the system, do the following:

1. Inspect carefully for shipping damage. Contact the carrier promptly if damage is discovered.
2. Carefully unwrap and remove the plastic packaging material.
3. Inspect the contents carefully. There should not be any loose or damaged parts.
4. Compare the packing slip against all items included in the crate. Report any shortages or other inspection problems immediately.
5. Remove the band straps that hold the Uni-Drum to the pallet.

NOTE: The Uni-Drum is ready for installation. Before installing the system, read the **General Description** on page 9 to become familiar with the system components.

Overview

Installation Overview

The location of the Uni-Drum should allow for easy loading and unloading of the 1000 liter (264 gallon) magnadrum or other tote drums with a forklift.

The Uni-Drum supply system must be leveled and mounted on a horizontal floor. An unleveled condition can keep the Uni-Drum from operating properly.

Anchor the frame's four foot pads securely to the floor. The anchor bolts should be sized with sufficient safety factor to withstand the downward force of the follower plate and other objects that can push the frame off the floor.

Operation Overview

The Uni-Drum is a supply system that evacuates fluids from a 1000 liter (264 gallon) magnadrum or other tote drums.

Depending on the configuration, this Uni-Drum supply system includes either a single Graco air motor and displacement pump or dual air motors and displacement pumps in a ram assembly with a single follower plate. Some models have a pneumatic layout panel that controls the air components. See page page 3 for a complete list of models and features.

In short, the operator places the magnadrum inside the frame with the follower plate placed directly on top of the material. Locally, the system can be operated using the pneumatic layout panel if equipped.

The displacement pump(s) evacuate material out of each magnadrum. After removing the empty drum from the system, the operator repeats the evacuation process when another drum is ready for evacuation.

NOTE: Dual air motor/displacement pump systems are referred to in most figures and descriptions in this manual. Single air motor/pump systems function the same way unless noted otherwise.

General Description

System Components

A general description of the Uni-Drum supply system helps the installers and operators become familiar with the system components. Contact your Graco distributor for help in choosing accessories to suit your particular needs.

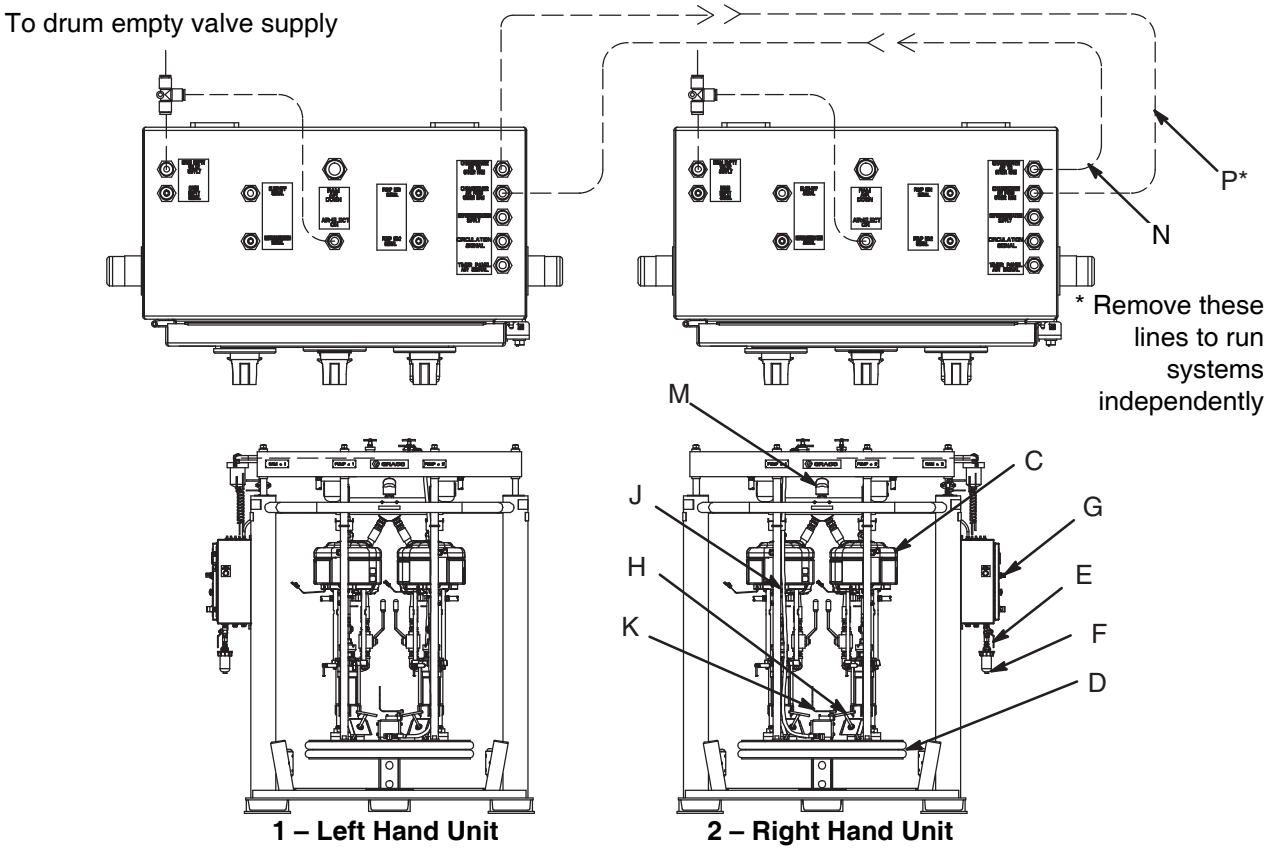
Before you install the system you should be familiar with the parts described in the following paragraphs.

The figure below shows the typical Uni-Drum supply system equipped with dual pumps. The following list identifies the Uni-Drum system components:

- **Uni-Drum System** (A) is usually setup to alternate the material supply operation between the left hand (LH) and right hand (RH) supply units, which is accomplished using a combination of pneumatic logic and manual operators. Drum changeovers occur after the follower plate has reached its preset low limit level in the drum. Alternating between supply units eliminates the downtime that is usually expended unloading an empty drum and reloading a full drum.
  - LH pump supply unit (A) accommodates one 1000 liter (264 gallon) drum. The LH supply unit has a local pneumatic layout panel.
  - RH pump supply unit (B) accommodates one 1000 liter (264 gallon) drum. The RH supply unit has a local pneumatic layout panel.

Ref.	Description
C	Pump and air motor.
D	Ram assembly and follower plate
E	Main air inlet valve
F	3/8 npt air filter
G	Pneumatic layout panel (Not included in models indicated on **page 3**)

Ref.	Description
H	Bleed stick
J	Air inlet valve
K	Blow-off valves
M	Pump outlet
N	Changeover air to supply unit 1 (LH)
P	Changeover air to supply unit 2 (RH)



1 – Left Hand Unit **2 – Right Hand Unit**

General Description

System Components *(continued)*

NOTE: The paragraphs that follow describe the components for the RH pump supply unit only. The descriptions are the same for the LH pump supply unit.

- The pump(s) evacuate material from the drum.
- The **follower plate** (D) is connected to the ram assembly and is designed to apply an even amount of pressure to the material in the drum. With the follower plate in its raised position, the operator moves a drum inside the frame. The follower plate is lowered directly on top of the material in the drum. When pressure is applied to the follower plate, the material is pumped out of the drum through hoses, which are attached to the pump outlet ports. When the drum is empty, the operator raises the follower plate, removes the empty drum. The process is repeated when another drum is ready to be unloaded.
- **3/8" npt air filter** (F) filters air to the pneumatic layout panel. The 5 micron filter removes particles, such as dust, moisture, foreign matter and other contaminants from the compressed air.
- **Bleed stick(s)** (H) are removed to allow air trapped between the top of the material and ram plate to be evacuated. Typically, they are removed and the ram plate is lowered until the material is evident in the port. They are replaced before pumping begins.
- **Follower plate blow-off valves** (K) open and close the flow of air to assist raising the follower plate (D) out of an empty drum.

Pneumatic Layout Panel (G)

The pneumatic layout panel includes the following system components. For more information, refer to the **Pneumatic Diagram** on page 41.

- Main Air Inlet Valve (at E) is used to open or shutoff the air supply to the entire supply unit.
- Pump No. 1 Air Regulator controls pump speed and outlet pressure for pump no. 1 by adjusting the air pressure to the pump.
- Pump No. 1 Pressure Gauge displays the amount of air pressure supplied to pump no. 1.
- Pump No. 1 Start.
- Pump No. 2 Start (if equipped).
- Pump No. 2 Air Regulator controls pump speed and outlet pressure for pump no. 2 by adjusting the air pressure to the pump (if equipped).
- Pump No. 2 Pressure Gauge displays the amount of air pressure supplied to pump no. 2 (if equipped).
- Ram Up pushbutton turns on air pressure to raise the follower plate.
- The Ram Position Switch performs the following three functions:
  - Place the switch in the RAISE position to enable the Ram Up Position Switch.
  - Place the switch in the HOLD position to hold the follower plate in the current position.
  - Place the switch in the LOWER position to lower the follower plate.
- Blow-off pushbutton turns on air pressure to assist raising the follower plate.
- Blow-off regulator adjusts air pressure to blow-off valves.
- Blow-off pressure gauge displays the amount of air pressure supplied to the blow-off valve.

Installation

The installation procedures in this section are intended to serve as a guide for installing the Uni-Drum system with Graco supplied pneumatic control panel. If you need more information, contact your Graco distributor.

NOTE: When raising and lowering the follower plate, be sure that the unit is unobstructed overhead to avoid interference with other objects.

The installation procedure includes:

- Preparing the site
- Selecting a location for the Uni-Drum
- Preparing to install the Uni-Drum
- Installing the Uni-Drum
- Connecting power to the control panel
- Grounding the system
- Checking resistance between the control panel and the true earth ground
- Connecting air supply lines to Uni-Drum

Preparing the Site

Ensure that you have an adequate compressed air supply. Approximately 450 cfm at 80 psi is required to operate the pumps at the maximum rate.

Keep the site clear of any obstacles or debris that could interfere with the installer's and operator's movement.

Selecting a Location for the Uni-Drum

Refer to **Technical Data (Uni-Drum Ram)** on page 42 for ram mounting and clearance dimensions.

When selecting a location for the Uni-Drum, keep the following in mind:

1. There should be sufficient space for installing, servicing, and using the equipment.
    - Select an accessible location for the system. There must be sufficient space around the system for maintenance.
    - Select a convenient location for the equipment. Check that there is sufficient overhead clearance for the pump and ram when the ram is in the fully raised position. Make sure the air regulators for the pumps and follower plate are fully accessible.
    - Make sure the air source for the panel and shutoff valves are fully accessible.
    - Make sure there is easy and safe access to an appropriate pneumatic source. Graco recommends a minimum of 3 feet (0.91 m) of open space in front of the control panel.
2. Make sure that you will be able to level the base of the ram using metal shims.

Preparing to Install the System

Before installing the system:

- See component manuals for specific data on component requirements. Data presented here pertains to the system only.
- Have all system and subassembly documentation available during installation.
- Be sure that all non-Graco supplied hoses and fittings are adequately sized and pressure-rated to meet the system requirements.

NOTE: For units without a Graco pneumatic layout panel, refer to the **Pneumatic Diagram on page 41** for required circuit and components. For further installation specifics, contact your Graco distributor.

Installation

Installing the Uni-Drum

To install the Uni-Drum, follow the procedure below. Refer to **Technical Data (Uni-Drum Ram)** on page 42 for ram mounting and clearance dimensions.

1. Using equipment such as a forklift or handtruck, move the Uni-Drum into place on the floor. Remove the shipping pallet.
2. Level the Uni-Drum, using metal shims.
3. Using the holes in the base as a guide, drill holes for 13 mm (1/2”) anchors.
4. Bolt the Uni-Drum to the floor using anchors that are long enough to prevent the unit from tipping. Refer to page 42 for more information.

⚠ WARNING

EQUIPMENT MISUSE HAZARD

The Uni-Drum system is shipped with every major component already attached and weighs approx. 3950 lb (1792 kg). The Uni-Drum system should never be moved or lifted by one person. To prevent equipment damage or personal injury, engage an adequate number of personnel and use a forklift, hand truck, and support devices, such as a hoist when moving and installing the Uni-Drum system.

⚠ CAUTION

Be sure to use as many people as needed when the frame is being lifted or moved. Exercise care to avoid jarring, dropping, or tilting the frame while it is being moved to its installed location to prevent injury or property damage.

Installation

Grounding the System

⚠ WARNING

FIRE AND EXPLOSION HAZARD
Before operating the pump, ground the system as explained below. Also read the section **FIRE AND EXPLOSION HAZARD** on page 6.

1. *Pump:* use a ground wire and clamp. See Fig. 1. Loosen the grounding lug locknut (W) and washer (X). Insert one end of a 12 ga (1.5 mm²) minimum ground wire (Y) into the slot in lug (Z) and tighten the locknut securely. Connect the other end of the wire to a true earth ground. For a ground wire and clamp, order Part No. 237569.

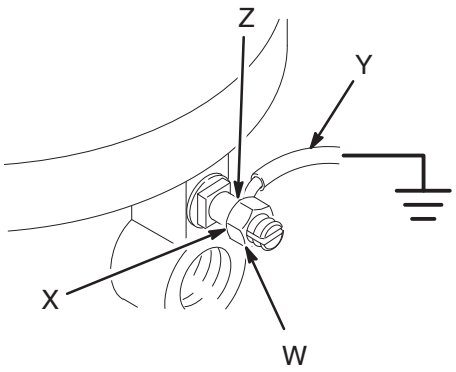


Fig. 1

2. *Air and fluid hoses:* Use only electrically conductive hoses.
3. *Air compressor:* follow manufacturer's recommendations.
4. *Spray gun or dispensing valve:* ground through connection to a properly grounded fluid hose and pump.
5. *Object being sprayed:* follow your local code.
6. *Fluid supply drum:* follow your local code.
7. *Solvent pails used when flushing:* follow your local code. Use only metal pails, which are conductive, placed on a grounded surface. Do not place the pail on a non-conductive surface, such as paper or cardboard, which interrupts the grounding continuity.
8. *To maintain grounding continuity when flushing or relieving pressure*, hold a metal part of the spray gun firmly to the side of a grounded metal pail, then trigger the gun.

Checking the Resistance Between the Pumps and the True Earth Ground

Have a qualified electrician check the resistance between each pump and the true earth ground. If the resistance is greater than 1.0 ohm, a different ground site may be required. Do not operate the system until the problem is corrected.

NOTE: Use a meter that is capable of measuring resistance at this level.

⚠ WARNING

FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD
To reduce the risk of fire, explosion, or electric shock the resistance between the supply unit components and true earth ground must be less than 1.0 ohm.

Installation

Connecting the Air Supply Lines to the Uni-Drum

Perform the following procedure to connect the input air supply lines to the Uni-Drum system.

Connecting Air Supply Lines to the Supply Units

To connect the main air supply line to the LH and RH supply units, do the following:

⚠ WARNING

To reduce the risk of over pressurizing your system, which could result in component rupture and cause serious injury, never exceed the specified maximum incoming air pressure to the pumps (see **Technical Data (Uni-Drum Ram)** on page 42).

NOTE: Have a qualified technician connect both supply units to an air supply source that has the following required ratings:

Description	Requirements
Inlet Port Size:	1” npt(f)
Air Volume:	450 cfm
Input Air:	80 psi (5.5 bar, 0.55 MPa)

1. Check the air supply to ensure that it is properly sized and pressure-rated for this system.
2. Connect the air supply line to the 1” npt main air inlet.

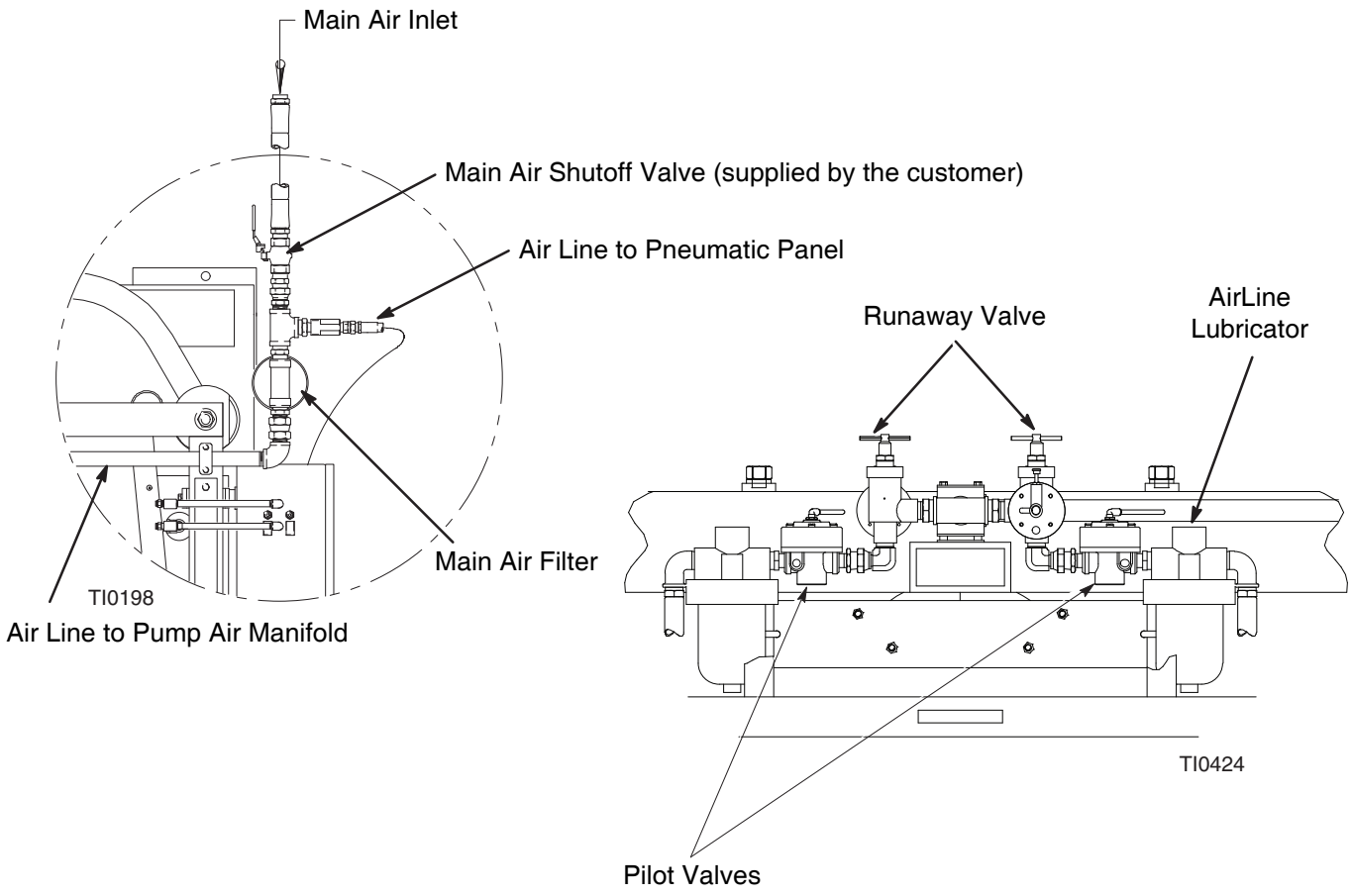


Fig. 2

NOTE: Dual pump configuration shown.

Installation

Connecting Output Hose to the Pumps

This procedure describes how to connect the fluid output hoses to the pump(s). It is the customer's responsibility to have the fluid supply hose already installed and ready for connection to the pump(s).

⚠ CAUTION

There must be a minimum of 10 feet (3 m) of fluid supply hose on the outlet to prevent damage to the unit.

NOTE: The fluid supply hose must move freely without kinking when the pump(s) move up and down.

Check the fluid supply hose to ensure it is properly sized and pressure-rated for this system to avoid excessive weight/crossloading on the carriage. Use only electrically conductive hoses. The fluid supply hose should have spring guards on both ends. Connect the fluid supply hose to the fluid manifold outlet.

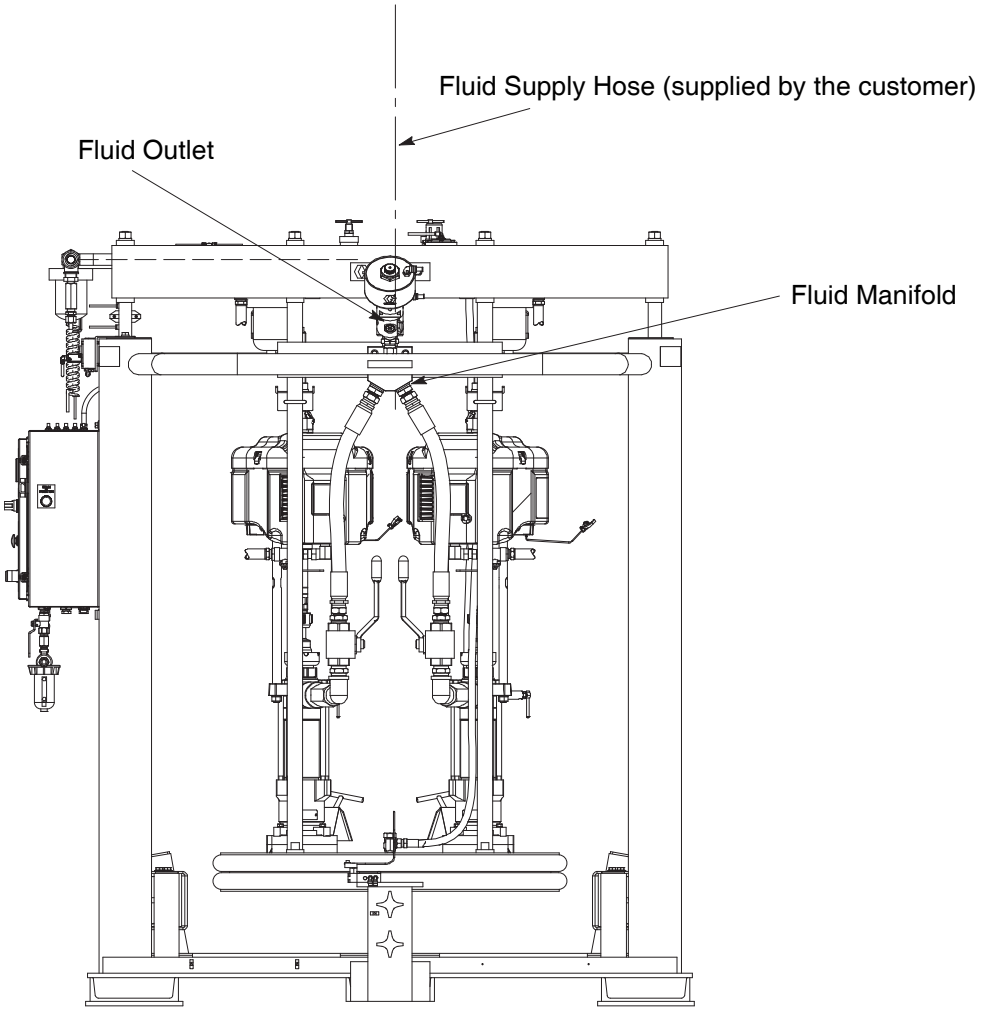


Fig. 3

NOTE: Dual pump configuration shown.

Operation

The operation procedures include:

- Prepare the operator
- Overview
- Pneumatic layout panel switches and indicators
- Initial system startup procedure
- Daily system startup
- System shutdown
- Operation modes for the pump(s)
- Pressure relief procedure
- Air motor icing
- Preventive maintenance schedule
- System operation procedures

Prepare the Operator

All persons who operate the equipment must be trained in the safe, efficient operation of all system components as well as the proper handling of all fluids. All operators must thoroughly read all instruction manuals, tags, and labels before operating the equipment.

Overview

The Uni-Drum supply system uses a single or dual air driven reciprocating pump(s) depending on the configuration. Each supply unit pumps material from a 1000 liter (264 gallon) drum.

General Functional Description

The LH and RH supply units can operate at the same time or as independent units. Generally, the Uni-Drum system is setup to operate as redundant units. This means that the RH unit is held in reserve on standby until the drum underneath the LH unit has been emptied, and vice versa.

Operating a redundant system allows the operator to maintain a continuous supply of material without interruption. The operator is afforded sufficient time to replace an empty drum at one supply unit while the drum at the other supply unit is being emptied.

System Startup

There are a series of steps that must be followed in sequential order to startup the system.

System Operation

Depending upon the system setup, at any time during operation, the operator can:

- Stop the pumps and relieve ram pressure at the LH supply unit.
- Stop the pumps and relieve ram pressure at the RH supply unit.
- Shutdown the system.

To load the drum into the supply unit, the follower plate must be raised and the bleed stick removed at the supply unit. The follower plate is lowered by the operator directly into the drum, the bleed stick(s) are replaced. The follower plate is pressurized, the pump(s) are turned on and material is pumped from the drum through the outlet ports on the pumps via a supply hose to one or more targeted applications.

Supply Unit Operation

The Uni-Drum supply system can be setup to alternate between the LH and RH supply units. This dual supply system setup virtually eliminates material replenishment downtime.

The Uni-Drum supply system allows the operator to load the material drum into the RH supply unit while the LH supply unit drum is being emptied. When the supply unit changeover occurs, the operator unloads the empty drum at the LH supply unit while the RH supply unit drum is being emptied. The cycle is repeated as many times as needed.

System Shutdown

For system shutdown, the operator turns off the pump(s) and de-pressurizes the system. Depending upon the type of material, the operator may choose to raise the follower plate from the drum or keep the follower plate lowered in the drum to prevent the material from being contaminated. Some materials will harden or congeal when exposed to air or used past their shelf life. Material should be kept covered when it is not being used and uncovered when it is ready to use.

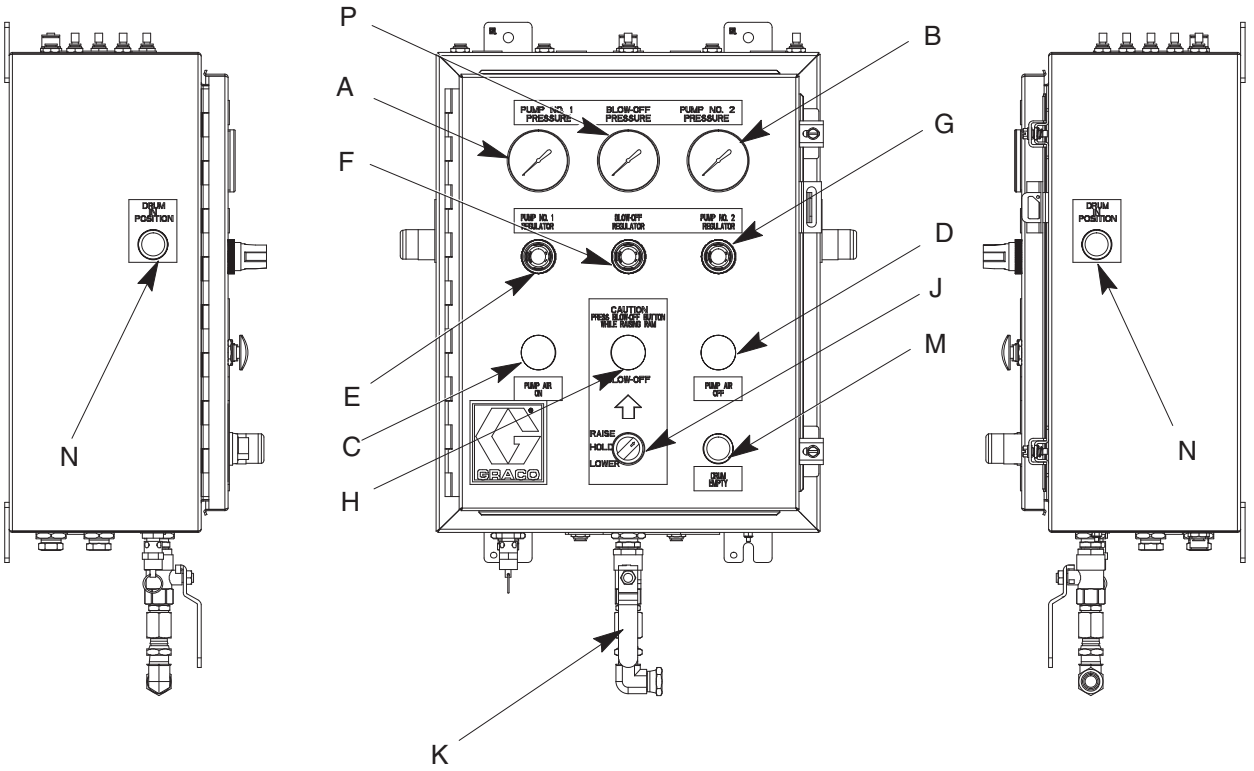
Operation

Pneumatic Layout Panel Switches and Indicators

NOTE: Pneumatic Layout panel not included with all models. See page 3 for a complete list of models and features. For units without a Graco pneumatic layout panel, refer to the **Pneumatic Diagram** on page 41 for required circuit and components.

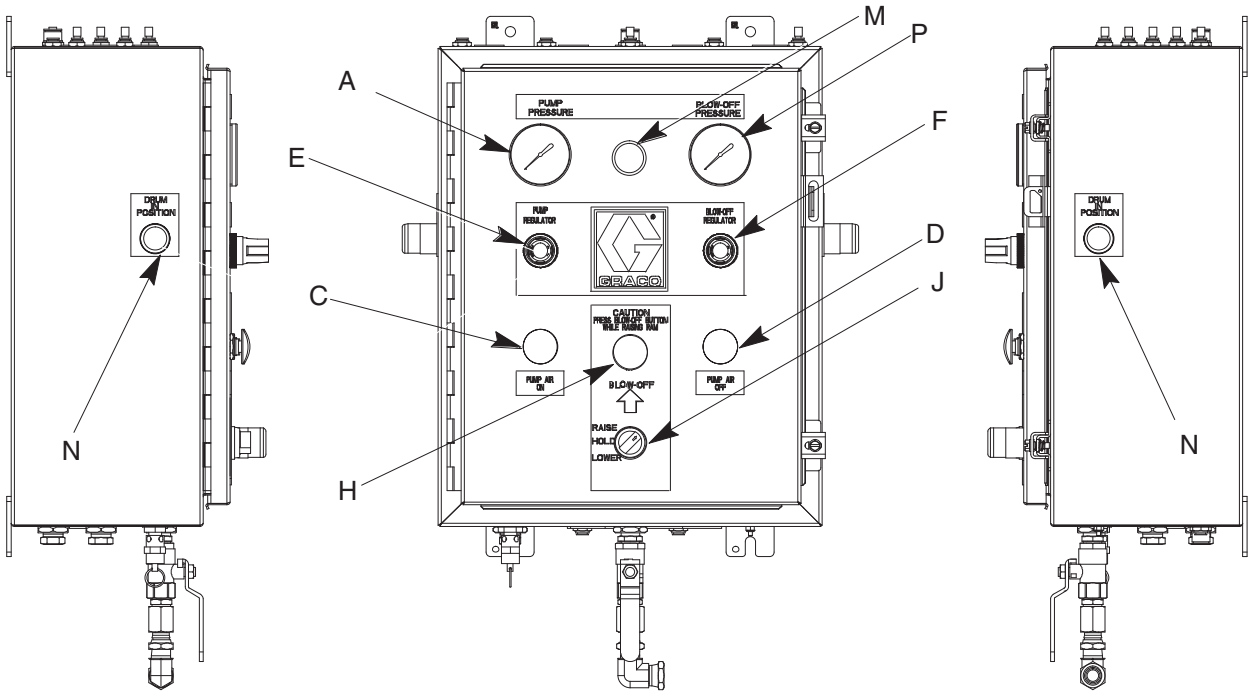
Use the table and Fig. 4 when operating the switches and reading the indicators on the pneumatic layout panel.

Ref	Button/Switch/Gauge		What it Does
A	PUMP NO. 1 PRESSURE Air Gauge		Indicates the air inlet pressure setting for pump no. 1.
B	PUMP NO. 2 PRESSURE Air Gauge		Indicates the air inlet pressure setting for pump no. 2.
C	Pump Air On		Starts pumps
D	Pump Air Off		Shut off pumps
E	PUMP NO. 1 REGULATOR Control Knob		Controls pump speed and outlet pressure by adjusting the air pressure to pump no. 1.
F	BLOW-OFF Control Knob		Adjust air pressure to blow-off valves.
G	PUMP NO. 2 REGULATOR Control Knob		Controls pump speed and outlet pressure by adjusting the air pressure to pump no. 2.
H	BLOW-OFF Push Button		Turns on air pressure to assist raising the follower plate.
J	RAM POSITION Switch	RAISE	Enables Ram Up push button.
		HOLD	Holds the follower plate in the current position.
		LOWER	Lowers the follower plate.
K	Panel Air Inlet Valve		Opens air supply line to the pneumatic layout panel.
M	DRUM EMPTY Indicator		Indicates low fluid level in drum. Signals change to other ram in tandem systems.
N	DRUM IN POSITION Indicator		Indicates presence of Magnadrum under follower plate.
P	BLOW-OFF Pressure Gauge		Indicates the air blow-off pressure setting.



24R637 Panel Shown (Used on Supply Units U81883, U81884, U82151, U82577, U82578, U83109, and U83110 Only)

Fig. 4



24Z181 Panel Shown (Used on Supply Units U82283, U82293, U82375, U82379, U82917, and U82918 Only)

Fig. 5

Operation

Flushing the System Before Initial Use

Flushing the system before its initial use can prevent material contamination, which may cause the material to fail or perform poorly.

⚠ CAUTION

Flush the system before performing the initial material loading procedure. The system was factory-tested using a light soluble oil, a soybean oil, or some other oil as tagged. Flush the system to avoid contaminating the material that has been designated for initial material loading.

To flush the system, perform the following procedure:

1. Select the material for the initial material load.
2. Verify whether the factory-test oil and the initial material load are compatible:
   a. If the two substances are compatible, omit the remaining steps in this procedure and perform the **Initial System Startup Procedure** on page 19.
   b. If the two substances are incompatible, perform the remaining steps in this procedure to flush the system.

⚠ WARNING

Use fluids and solvents that are chemically compatible with the equipment wetted parts. See the **Technical Data** sections of all the equipment manuals. Always read the material manufacturer's literature before using fluid or solvent in this pump.

3. Select a drum containing a compatible material that can dissolve, clean, and eliminate the factory-test oil from the system. If necessary, check with the material supplier for a recommended flush material.
4. Before flushing, be sure the entire system and flushing drums are properly grounded. Refer to **Ground the System**, on page 12.
5. Perform steps 1 through 11 of the **Initial System Startup Procedure** on page 19 to load the drum containing the solvent.
6. Run the flush material through the system for approximately 1 to 2 minutes.
7. Remove the drum containing the flush material.

Operation

Initial System Startup Procedure

⚠ WARNING

PRESSURIZED FLUID HAZARD
To reduce the risk of serious bodily injury, such as fluid injection or splashing fluid in the eyes or on the skin, **always** wear eye protection and protective clothing when installing, operating, or servicing this dispensing system.

MOVING PARTS HAZARD
Moving equipment parts can cause personal injury, including severing of hands or fingers. Make sure all personnel are clear of moving parts before operating the equipment.

⚠ CAUTION

The use of a non-compatible lubricant can cause material contamination or inadequate performance. Use only a lubricant compatible with the material to be pumped. Check with the material supplier for a recommended lubricant.

To help avoid damage to equipment, *do not* use a drum of material that has been dented or otherwise damaged; damage to the follower plate wiper may result.

⚠ WARNING

PRESSURIZED EQUIPMENT HAZARD
To reduce risk of injury or equipment damage:

- Make sure all material hose connections are secure.
- Do not pressurize the system until you have verified the system is ready and it is safe to do so.

Settings for Initial System Startup

The initial system startup procedure contains the checklist of settings, adjustments, and procedural steps that must be completed before the system is ready for daily operation.

NOTE: Complete the startup procedure for the RH supply unit first. Then, repeat the startup procedure for the LH supply unit.

Perform the initial system startup procedure as follows:

1. Check all material hoses and fittings to ensure tightness and to prevent any material leakage.
2. Check all system air lines. Make sure that all routing of air lines will not interfere with any moving components within the system.
3. Fill the packing nut/wet cup on the pump(s) 1/3 full with Graco throat seal liquid (p/n 206995). Refer to your specific pump manual for details.
4. Open the main air shut off valve, making air pressure available to the unit. See Fig. 2.
5. At the pneumatic layout panel, open the panel air inlet valve at the RH supply unit, making air pressure available to the unit. See Fig. 4.
6. Adjust the pump main air regulators to 0 psi.
7. Set the RAM POSITION switch to RAISE and immediately press and hold the blow-off button until the follower is completely out of the drum. Use minimum amount of air pressure necessary to push the follower out of the drum.
8. Set the RAM POSITION switch to HOLD.
9. Roll a drum into the supply unit under the elevated follower plate.

NOTE: Whenever a drum change is required, remove the cover from the drum of new material by holding it level and lifting it straight up. Tipping the cover may allow accumulated dirt to spill into the drum, which may result in damage to the material and equipment.

Operation

Initial System Startup Procedure *(continued)*

10. ***IMPORTANT:*** Lubricate the follower plate wiper with a lubricant that is compatible with the material to be pumped. Check with your material supplier for compatibility.

NOTE: Before lowering the follower plate assembly into the drum, make sure that nothing is between the follower plate and the drum, or between the ram tie bar and the top of the ram posts.

11. Remove the bleed stick(s) at the base of each pump.
12. Lower the follower plate as follows:
    a. Set the Ram Position selector to LOWER.
    b. Lower the follower plate until the material is evident in the bleed stick port(s).
    c. Set the Ram Position selector to HOLD.
    d. Replace the bleed stick(s).
    e. Set the Ram Position selector to LOWER.
13. Close the pump air inlet valve(s) (located on air motor).
14. Prime the pump(s) as follows:
    a. Set the pump regulator(s) to 30 psi.
    b. Push the pump Air On button to open the air supply to the pump(s). Note: Pump(s) should not start if inlet valve(s) were closed in step 13.
    c. Place a waste container under pump #1 bleed valve.
    d. Open pump #1 bleeder valve.
    e. Open pump #1 inlet valve to start pump.
    f. dispense material until all the air is purged from the system.
    g. Shut off pump #1 inlet air valve and close bleed valve.
    h. Repeat steps c-g for pump #2 if equipped.
15. Push pump air off button on control panel.
16. Open the pump inlet valve(s).

Adjusting the Pump Regulators

NOTE: Both pumps must operate at the same cycles per minute rate to prevent the occurrence of uneven drum evacuation.

NOTE: For the maximum air input pressure for each pump see the appropriate manual.

17. Run the system under normal conditions. Adjust the PUMP NO. 1 REGULATOR to the desired setting as follows:
    a. Turn the knob clockwise to increase air pressure or counterclockwise to decrease air pressure (see Fig. 4).
    b. Check the air gauge to verify the air pressure setting.
18. Repeat step 17 to adjust the air regulator for the PUMP NO. 2 REGULATOR if equipped.

Adjusting the Ram-Up and Ram-Down Regulators

19. At the pneumatic layout panel (see page 21), open the hinged cover.
20. Set the RAM POSITION switch to RAISE and push the BLOW-OFF pushbutton. Verify that the follower plate (5) elevates at the desired speed. If not, do the following:
    a. Adjust the RAM-UP REGULATOR. Turn the knob clockwise to increase the amount of air pressure. Check the air gauge to verify that air pressure was increased. (See Fig. 5).
    b. Verify that regulator R3 is set to 5 to 10 psi (.035 to .07 MPa, 0.35 to 0.7 bar).

⚠ CAUTION

Improper setting of the Regulator R3 while the selector is in the HOLD position, can cause the plate to drop and operator injury. Failure to adjust regulator R3 properly can cause the platen to exit the drum at a high rate of speed, risking damage to the machine.

    c. Repeat step 20.a until the ram raises at the desired speed.

NOTE: The Blow-off pressure may need adjusted to ensure the drum remains seated on the frame.

21. Set the RAM POSITION switch to DOWN while observing the air gauge inside the panel.
22. Adjust the RAM-DOWN REGULATOR to 50 psi (0.34 MPa, 3.4 bar) as follows (see Fig. 5):
    a. Turn the knob clockwise to increase air pressure or counterclockwise to decrease air pressure.
    b. Check the air gauge to verify the air pressure setting.
23. Close and secure the hinged cover.

Operation

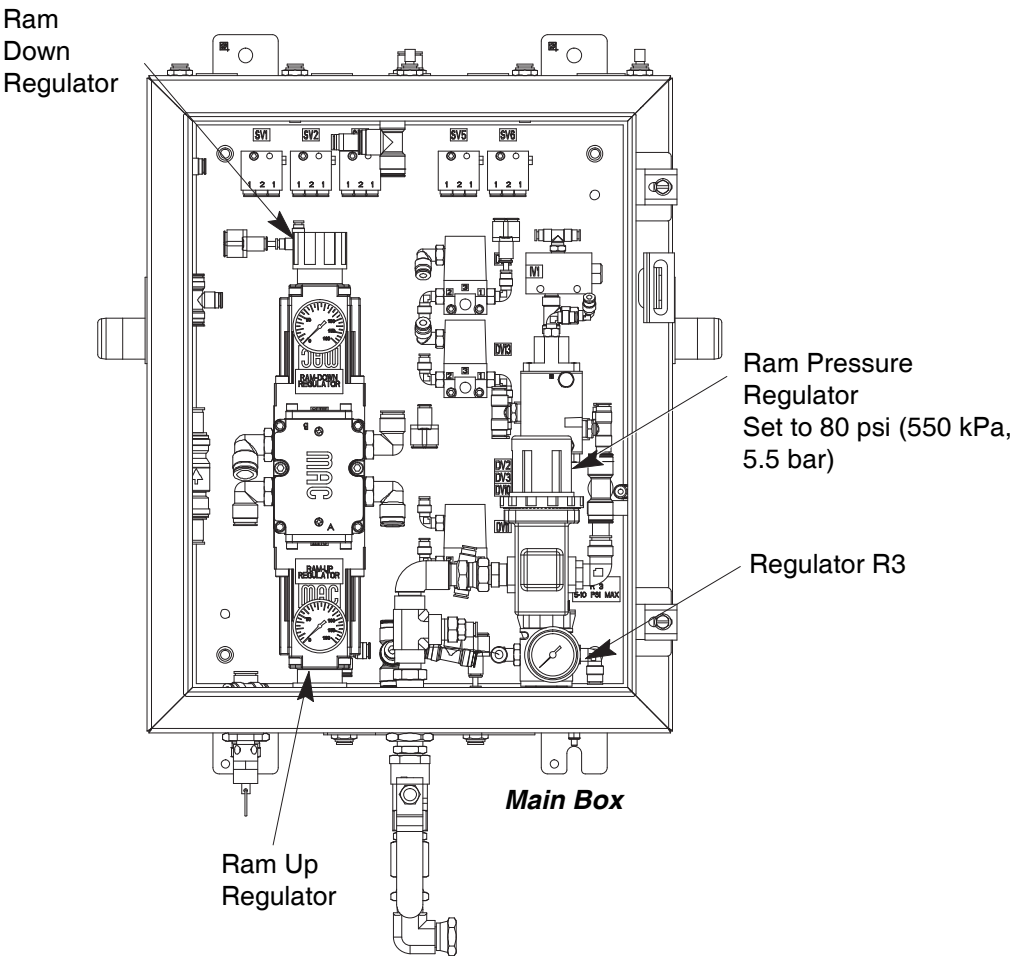


Fig. 6

Initial System Startup Procedure *(continued)*

Preventing Pump Cavitation

NOTE: Cavitation occurs when the pump cylinder did not fully load with material on the upstroke, and a cavity forms in the material after the pump changes to the downstroke. Perform step 24 when there is pump cavitation. If cavitation is not occurring, omit step 24 and proceed to step 25.

24. To prevent cavitation from occurring, perform the following steps:
    a. Lower the air motor air pressure until cavitation stops.
    b. Increase the ram down pressure.

Adjusting the Low Limit Switch

NOTE: When the low limit switch is activated, the pumps are normally turned off automatically by the pneumatic control, and a second set of pumps begin pumping.

25. Adjust the low limit switch as follows:
    a. At the control panel (see page 16), set the RAM POSITION switch to LOWER, allowing the follower plate to activate the lower limit switch.
    b. Verify that the follower plate lowers to the limit set point: a level between 1 to 4 inches (25.4 to 101.6 mm) from the bottom of the drum.
    c. Adjust the actuator to activate the switch at the level defined in step 25.b.

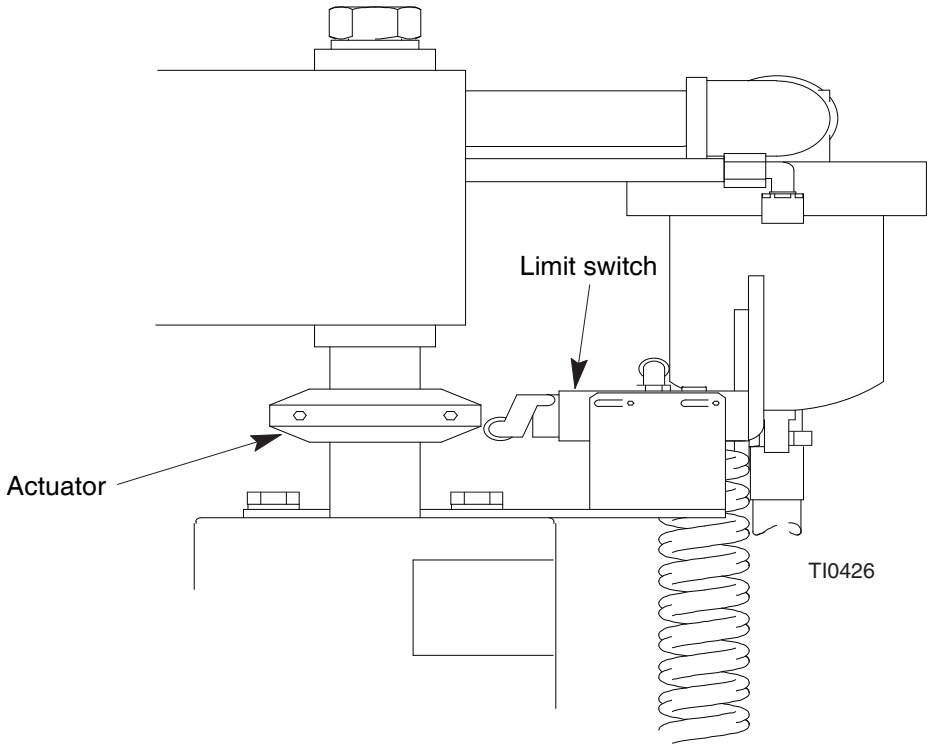


Fig. 7

Operation

Emergency Stop

When an emergency stop is required, do the following:

Stopping the System

1. To stop the system, close the main air shut off valve (see Fig. 7) to the supply unit.

Restarting the System

2. To restart the system, do the following:
   a. Open the main air valve to the supply unit (see Fig. 7).

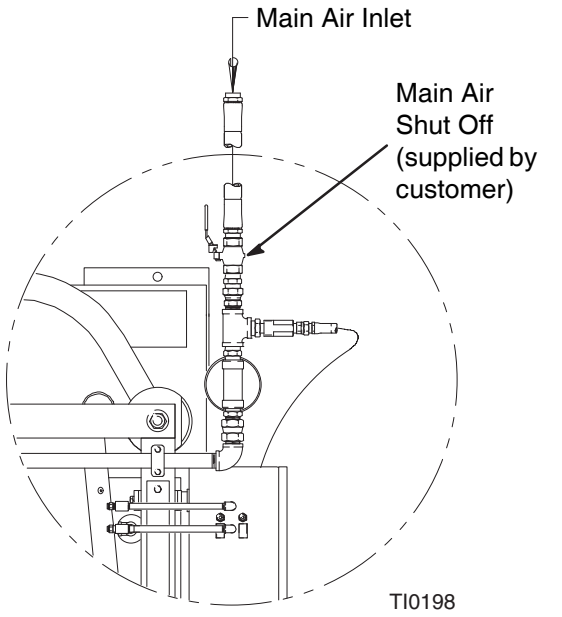


Fig. 8

Operation

Pressure Relief Procedures

These procedures describe how to relieve pressure from the system.

Fluid Pressure Relief Procedure

This procedure describes how to relieve pressure on the follower plate an in the pumps. Use this procedure whenever you shutoff the pumps and before checking or adjusting any part of the system.

⚠ WARNING

MOVING PARTS HAZARD

Follow the **Pressure Relief Procedure** below before checking or repairing the follower plate or any other part of the system and when shutting down the system. Keep hands and fingers away from the follower plate, pump inlets, and the drum when raising or lowering the follower plate to reduce the risk of pinching or amputating hands or fingers.

During operation, also keep hands and fingers away from limit switches to reduce the risk of pinching or amputating hands or fingers.

⚠ WARNING

SKIN INJECTION HAZARD

The system pressure must be manually relieved to prevent the system from starting or spraying accidentally. Material under high pressure can be injected through the skin and cause serious injury. To reduce the risk of an injury from injection, splashing fluid, moving parts, follow the **Pressure Relief Procedure** whenever you:

- are instructed to relieve the pressure
- stop dispensing material
- check or service any of the system equipment
- install or clean the follower plate wipers.

At the pneumatic layout panel, do the following:

1. Close the main air inlet valve (B).
2. Open any downstream fluid valves.

NOTE: Depressurization kit not included with all models. See page 3 for a complete list of models and features.

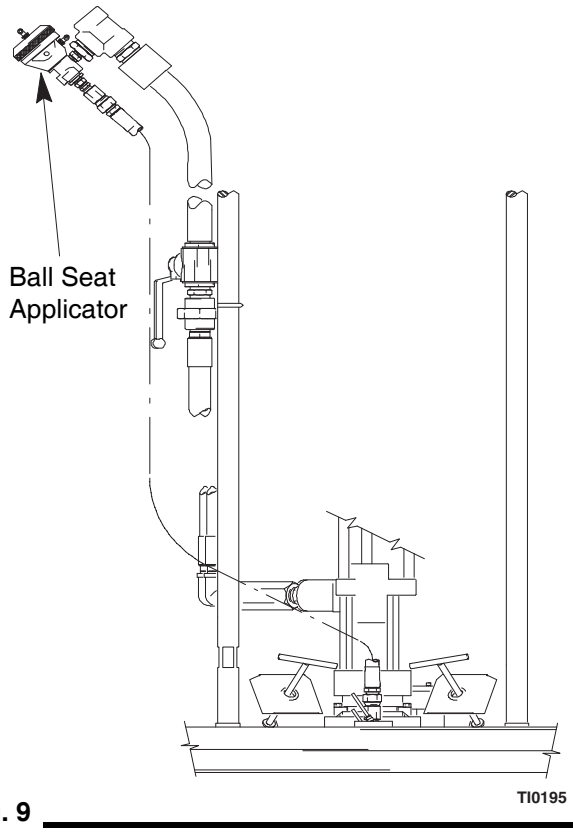


Fig. 9

NOTE: In order to fully relieve system pressure, including ram cylinders, the steps in the pneumatic pressure relief procedure must be performed.

Operation

Pneumatic Pressure Relief Procedure

⚠ WARNING

MOVING PARTS HAZARD
Follow the **Pressure Relief Procedure** below before checking or repairing the follower plate or any other part of the system and when shutting down the system. Keep hands and fingers away from the follower plate, pump inlets, and the drum when raising or lowering the follower plate to reduce the risk of pinching or amputating hands or fingers.

During operation, also keep hands and fingers away from limit switches to reduce the risk of pinching or amputating hands or fingers.

⚠ WARNING

SKIN INJECTION HAZARD
The system pressure must be manually relieved to prevent the system from starting or spraying accidentally. Material under high pressure can be injected through the skin and cause serious injury. To reduce the risk of an injury from injection, splashing fluid, moving parts, follow the **Pressure Relief Procedure** whenever you:

- are instructed to relieve the pressure
- stop dispensing material
- check or service any of the system equipment
- install or clean the follower plate wipers.

This procedure describes how to relieve pressure on the pneumatic panel and cylinders. Use this procedure whenever you perform ram assembly service on the piston rod seal or the ram piston.

1. Follow the **Fluid Pressure Relief Procedure** on page 25.
2. Fully lower the ram by setting the RAM POSITION switch (A) to LOWER. Leave switch in LOWER position
3. Open the door on the pneumatic control box (E).
4. Adjust the air pressure to 0 PSI for the RAM DOWN regulator. Refer to the gauge on the Ram Down Regulator (Fig. 5) and R3 Regulator to verify the ram has been depressurized.
5. Slowly open the drain cock located on the bottom of the air cylinders (D).
6. After the air pressure has been relieved, remove the RAM DOWN air line running from the top of the pneumatic control box to the ram cross bar (G).
7. Close the main air inlet on header (B).
8. Leave the drain cock open and the RAM DOWN airline removed until service is complete.
9. After service is complete, close drain cocks and make all pneumatic connections. Perform the procedure for **Adjusting the Ram-Up and Ram-Down Regulators** on page 21.

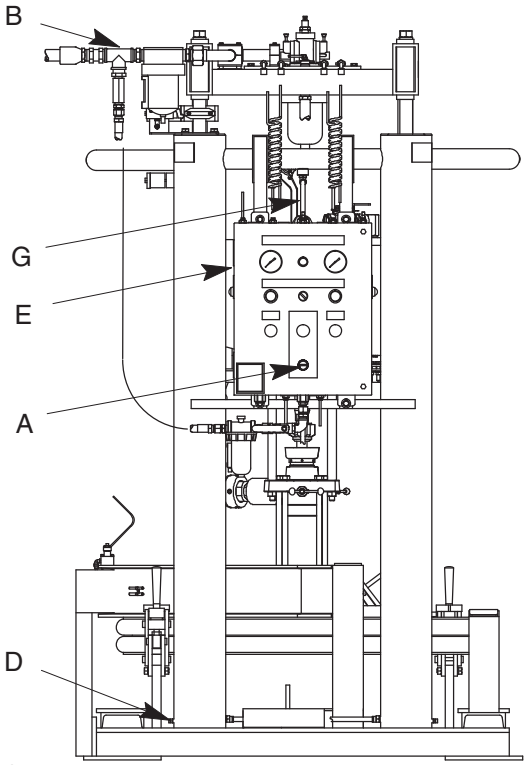


Fig. 10

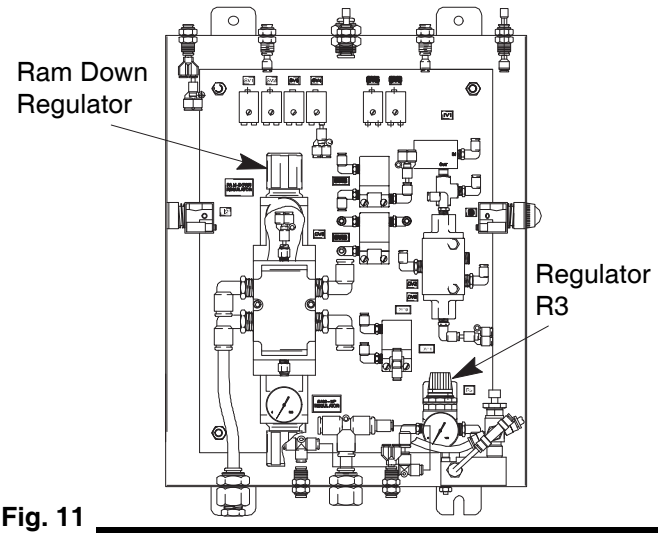


Fig. 11

Operation

Preventive Maintenance Schedule

The operating conditions of your particular system determine how often maintenance is required. Establish a preventive maintenance schedule by recording when and what kind of maintenance is needed, and then determine a regular schedule for checking your system.

Changing Empty Drums

NOTE: After the automatic pump crossover has taken place, immediately replace the empty drum with a new, full drum. If both Uni-Drums become empty at the same time:

- Material will stop being delivered to the dispenser
- Air may enter the supply hose or pipe header
- Pump runaway could occur, resulting in damage to the pumps.

Drum Changing Procedure

To remove an empty drum and load a new, full drum:

1. Check that the pump air is turned off.
2. Check that the RAM UP air regulator is set to 60 psi (maximum).
3. Close the two ball valves at the outlet manifold at the rear of the Uni-Drums.
4. To raise the follower plate:
   a. Set the RAM POSITION control to RAISE and immediately press and hold the blow-off air button until the follower plate is completely out of the drum. Use minimum amount of air pressure necessary to push the follower out of the drum.

Note: If the drum begins to lift from the frame, increase the blow-off pressure.

5. With the ram raised and the RAM POSITION control set to RAISE, remove the empty drum, using a suitable lifting device.

⚠ WARNING

MOVING PARTS HAZARD
Use a long-handled flat-bladed ice scraper if it is necessary to scrape the bottom of the follower plate. Do not put your hands between the plate and the drum.

6. ***IMPORTANT:*** Being careful not to damage the follower plate wipers, wipe or scrape any material buildup from the follower plate and wipers, and properly dispose of the waste material.

NOTE: When you open a new drum, take care to remove the cover by holding it level. Tipping the cover may allow accumulated dirt to spill into the material, which can damage the equipment. Also check that the drum is not damaged or dented.

7. Remove the cover from the new drum and remove any other packing from the drum, exposing the material. Make sure there are no foreign objects on the surface of the material.
8. Position the new drum, using a suitable lifting device, under the raised follower plate. Check that the DRUM IN PLACE indicator is lighted.
9. ***IMPORTANT:*** Lubricate the follower plate wipers with a lubricant approved by the material manufacturer.

Operation

⚠ WARNING

PRESSURIZED FLUID HAZARD
To reduce the risk of serious bodily injury, such as fluid injection or splashing fluid in the eyes or on the skin, **always** wear eye protection and protective clothing when installing, operating, or servicing this dispensing system.

MOVING PARTS HAZARD
Moving equipment parts can cause personal injury, including severing of hands or fingers. Make sure all personnel are clear of moving parts before operating the equipment.

⚠ CAUTION

The use of a non-compatible lubricant can cause material contamination or inadequate performance. Use only a lubricant compatible with the material to be pumped. Check with the material supplier for a recommended lubricant.

To help avoid damage to equipment, *do not* use a drum of material that has been dented or otherwise damaged; damage to the follower plate wiper may result.

⚠ WARNING

PRESSURIZED EQUIPMENT HAZARD
To reduce risk of injury or equipment damage:

- Make sure all material hose connections are secure.
- Do not pressurize the system until you have verified the system is ready and it is safe to do so.

NOTE: Complete the entire procedure described below for the RH supply unit first. Then, repeat the procedure for the LH supply unit, if applicable.

NOTE: Before lowering the follower plate assembly into the drum, make sure that nothing is between the follower plate and the drum, or between the ram tie bar and the top of the ram posts.

10. Remove the bleed stick(s) at the base of each pump.
11. Lower the follower plate as follows:
    a. Set the Ram Position selector to LOWER.
    b. Lower the follower plate until the material is evident in the bleed stick port(s).
    c. Set the Ram Position selector to HOLD.
    d. Replace the bleed stick(s).
    e. Set the Ram Position selector to LOWER.
12. Close the pump air inlet valve(s) (located on the air motor).
13. Prime the pump(s) as follows:
    a. Set the pump regulator(s) to 30 psi.
    b. Push the pump Air On button to open the air supply to the pump(s). Note: Pump(s) should not start if the inlet valve(s) were closed in step 13.
    c. Place a waste container under pump #1 bleed valve.
    d. Open pump #1 bleeder valve.
    e. Open pump #1 inlet valve to start pump
    f. Dispense material until all the air is purged from the system.
    g. Shut off pump #1 inlet air valve and close bleed valve.
    h. Repeat steps c-g for pump #2 if equipped.
14. Push pump air off button on control panel.
15. Open the pump inlet valve(s).

NOTE:

- If the pump does not prime properly, which may occur with heavier, high viscosity fluids, increase the Ram Down air pressure.
- If fluid is forced out around the top wiper, ram pressure is too high; decrease the air pressure to the ram.
- Ram pressure adjustments may be carried out using the dual regulator ***inside*** the pneumatic panel, where the upper regulator knob controls the downward pressure of the ram, and the lower regulator knob controls the upward pressure of the ram.

Ram Assembly Troubleshooting

Problem	Cause(s)	Solution(s)
Ram won't raise or lower	Closed main air valve or clogged air line	Open air valve, clear air line
	Not enough air pressure	Increase ram pressure
	Worn or damaged piston	Replace piston. See procedure on page 35.
Ram raises or lowers too fast	Ram air pressure too high	Decrease ram air pressure
Ram drops when in "Raise" or "Hold" position	Regulator R3 pressure set too high	Reset R3 pressure to between 5-7 psi.
Fluid squeezes past follower plate wipers	Ram air pressure too high	Decrease ram air pressure
	Worn or damaged wipers	Replace wipers. See procedure on page 38.
Pump won't prime properly, or pumps air	Not enough ram air pressure	Increase ram down pressure
	Worn or damaged ram piston	Replace ram piston. See procedure on page 35.
	Bent drum has stopped follower plate	Replace drum
Drum lifts off of frame when raising ram	Blow-off pressure too low	Increase blow-off pressure

Pump Troubleshooting

For additional information about the displacement pump, refer to the applicable instruction manual.

Problem	Cause(s)	Solution(s)
Rapid downstroke or upstroke (pump cavitation)	Air is trapped in pump.	Bleed air from the pumps and prime using the procedure described in steps 13a-15h on page 28.
	Downstroke: Lower check in pump is worn. Upstroke: Upper check in pump is worn.	Rebuild and replace pump, as necessary.
Material leaks around pump outlet	Outlet fitting is loose.	Tighten outlet fitting.
Material leaks around bleed port	Bleed port fitting is loose.	Tighten bleed port fitting.
Pump won't move up or down	Problem with air motor.	See **Air Motor Troubleshooting** chart on page 31.
	Foreign object lodged in pump.	Remove object and rebuild pump assembly. **⚠ WARNING** To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedures** on page 25. Before attempting to dislodge a foreign object: 1. Relieve system pressure. 2. Remove the pump from the air motor.
Wet-cup leaks	Worn throat packings.	Tighten wet-cup. Replace throat packings.

Air Motor Troubleshooting

For additional information about the air motor, refer to the applicable instruction manual.

Problem	Cause(s)	Solution(s)
Air motor will not shift directions, stalled in DOWN position	Main air valve spool is dirty or damaged	Clean/rebuild main air valve.
Air motor will not shift directions, stalled in UP position		
Air motor stalled halfway between the top and bottom		
Air continually exhausting around air motor shaft.	Air motor shaft seal is damaged	Replace air motor shaft seal.
Air continually exhausting around the air valve/slide valve	Air valve/slide valve gasket is damaged	Replace the valve gasket.
Air continually exhausting from muffler while the motor is idle	Internal seal damage	Rebuild air motor.
Oil leaking from exhaust port	Too much lubricant mixed in with the air supply	Reduce lubricant supply.
Frost build-up on muffler	Air motor operating at high pressure, or high cycle rate	Reduce pressure, cycle rate, or duty cycle of the air motor.

Routine Maintenance

Flushing the System

Flush the pump:

- Before the first use
- When changing material or fluid part number or brand
- Before fluid can dry or settle out in a dormant pump (check the shelf life or pot life of catalyzed fluids)
- Before storing the pump.

Flush with a fluid that is compatible with the fluid you are pumping and with the wetted parts in your system. Check with your fluid manufacturer or supplier for recommended flushing fluids and flushing frequency.

⚠ WARNING

FIRE AND EXPLOSION HAZARD
Before flushing, read the section **FIRE AND EXPLOSION HAZARD** on page 7. Be sure the entire system and flushing pails are properly grounded. Refer to **Grounding the System** on page 13.

To flush the system, perform the following procedure:

1. Place a drum of compatible flush material under the follower plate.
2. Run the pumps and circulate the flush material through the system for approximately 1 to 2 minutes or until the solution is clean.
3. Remove the drum containing the flush material from under the follower plate.
4. Return the system to current readiness condition.

Cleaning the System

⚠ CAUTION

Cleaning the system after using it can prevent material contamination, which may cause the material to fail or perform poorly. Do not load new material into a contaminated system.

Clean the system to avoid untimely equipment malfunctions and to ensure that system components operate efficiently.

To clean the system, perform the following procedure:

⚠ WARNING

MOVING PARTS HAZARD
Use a long-handled flat-bladed ice scraper if it is necessary to scrape the bottom of the follower plate. Do not put your hands between the plate and the drum.

1. ***IMPORTANT:*** Being careful not to damage the follower plate wipers, wipe or scrape any material buildup from the follower plate and wipers, and properly dispose of the waste material.
2. Apply a generous amount of lubricant to the follower plate wipers.
3. Return the system to current readiness condition.

Wiper Lubrication

It is extremely important that the follower plate wipers be thoroughly lubricated between drum changes. The follower plate may stick without lubrication.

Pneumatic Layout Panel Service

The pneumatic layout panel service procedures include:

- Filter/element replacement

Filter/Element Replacement

The air filter is located between the air supply source and the pneumatic layout panel. See Fig. 12.

To replace an air filter/element, do the following:

1. At the pneumatic layout panel, do the following:
   a. Press the PUMP AIR OFF to shutoff the air supply at both pumps.
   b. Close the main air shut off valve.
   c. Turn the shutoff valve under the panel to the off position.

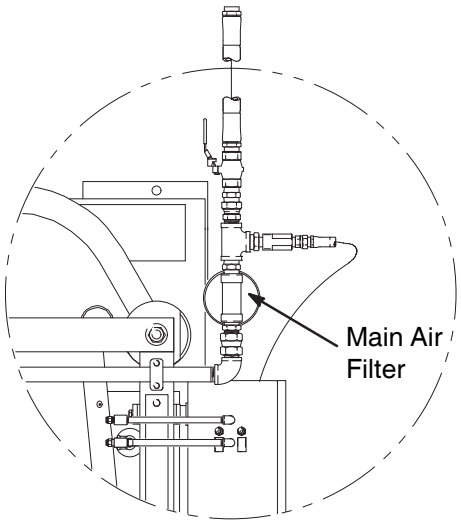


Fig. 12

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedures** on page 25.

2. Relieve the pressure.

Filter Removal

3. Turn the air filter counterclockwise to unscrew the filter from its mounting.

Filter/Element Replacement

4. Replace the old air filter element with a new filter element.
5. Clean the sight glass, if necessary. Reinstall the sight glass back on its threaded mounting. Tighten the sight glass.
6. Check for air leakage around the filter.
7. Return the system to current readiness condition.

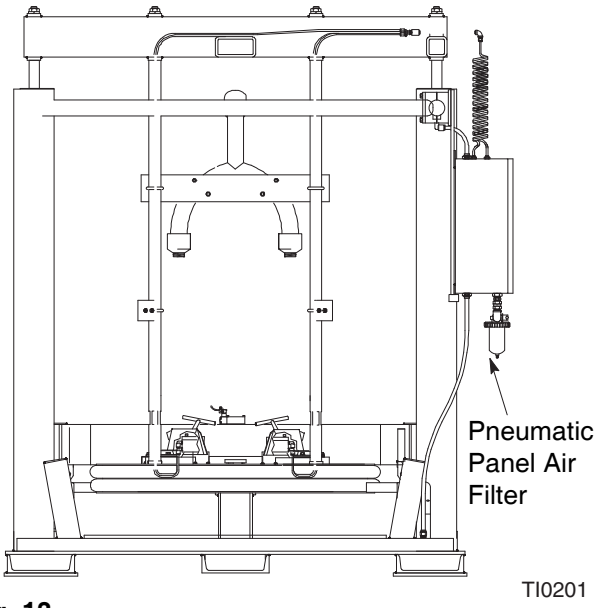


Fig. 13

Ram Assembly Service

Piston Rod Seal Service (Fig. 13)

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedures** on page 25.

1. **Relieve the air pressure.** Follow the **Pneumatic Pressure Relief Procedure** on page 26.
2. Remove the four nuts and lockwashers holding the tie bar to the rods. Remove the tie bar.
3. Remove the guide sleeve retaining ring by gripping the ring tab with a pair of pliers and rotating the ring out of its groove.
4. Remove the guide sleeve by sliding it off of the rod. Four 1/4”-20 holes are provided to ease removal of the guide sleeve.

⚠ WARNING

Do not use pressurized air to remove the guide sleeve or piston. Failure to follow this instruction may result in personal injury.

5. Inspect the parts for wear or damage. Replace as necessary.
6. Install new O-rings and seal guard. Lubricate the packings with O-ring lubricant.
7. Slide the guide sleeve onto the rod and push it into the cylinder. Replace the retaining ring by feeding it around the guide sleeve groove.
8. Reinstall the tie bar using the nuts and lockwashers. Torque to 40 ft-lb (54 N•m).

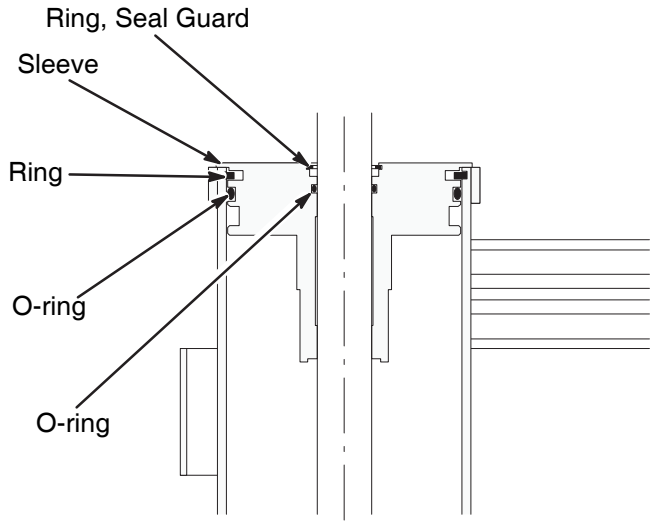


Fig. 14

Ram Assembly Service

Ram Piston Service (Fig. 14)

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedures** on page 25.

1. **Relieve the air pressure.** Follow the **Pneumatic Pressure Relief Procedure** on page 26.
2. Remove the tie bar as explained under **Piston Rod Seal Service** on page 34.
3. Remove the guide sleeve and slide it off of the piston rod.

⚠ WARNING

Do not use pressurized air to remove the guide sleeve or piston. Failure to follow this instruction may result in personal injury.

4. Carefully pull the piston rod **straight** up out of the cylinder. If the rod is cocked to one side, the piston or inside surfaces of the cylinder could be damaged.
5. Carefully lay the piston and rod down so the rod will not be damaged or bent. Remove the lower piston retaining ring. Slide the piston off the piston rod.
6. Install new O-ring seals on the piston rod and the piston. Lubricate the piston and seals. Reinstall the piston and retaining ring.
7. Carefully insert the piston into the cylinder and push the rod **straight** down into the cylinder. Add 3 ounces of lubricant to each cylinder after inserting the piston.
8. Slide the guide sleeve onto the piston rod. Reinstall the retaining ring and tie bar, as explained under **Piston Rod Seal Service** on page 34.

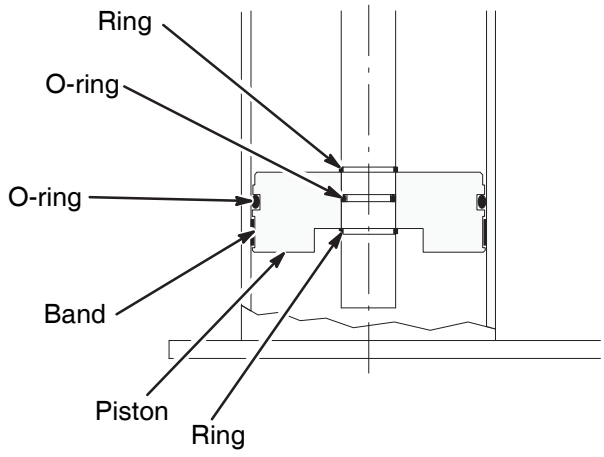


Fig. 15

Ram Assembly Service

The ram assembly service procedures include:

- Low/Empty limit switch replacement
- Ball seat applicator repair procedure
- Servicing the pumps

Low/Empty Limit Switch Replacement

To replace the lower limit switch, do the following:

1. Perform the **System Shutdown** procedure provided by the integrator at the applicable supply unit (LH or RH).

⚠ WARNING

ELECTROCUTION HAZARD
Installing and servicing this equipment requires access to parts which could cause an electric shock or other serious injury. Have only qualified electricians access the control assembly.

2. Shut off main air control panel.

NOTE: When raising and lowering the follower plate, be sure that the unit is unobstructed overhead to avoid interference with other objects.

Switch Removal

3. Disconnect the air tubing from the switch. Note the tube and fitting relationship to insure they are reconnected correctly.
4. Mark the surface on the ram limit bracket using a felt-tipped pen to ensure that the new lower limit switch is installed in the same spot.
5. Measure the distance from the mounting bracket (306) to the outer diameter of the limit switch roller to ensure that the new roller is installed in the same position.
6. Remove the fasteners holding the switch to the limit bracket (306).

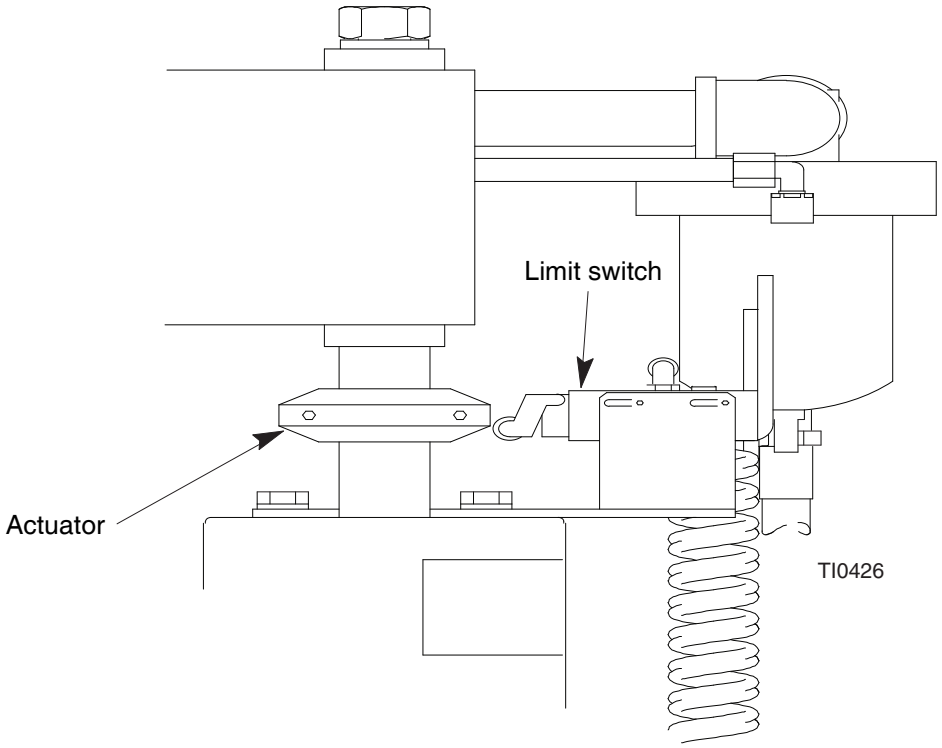


Fig. 16

Low/Empty Limit Switch Replacement *(continued)*

Switch Replacement

7. Install the new limit switch (305) on the limit bracket (306) using the fasteners.
8. Reconnect the tubing for the limit switch.
9. Make sure that the limit switch roller is positioned in the same location per the measurement in step 5. See Fig 15.
10. Reinstall the cover on the control panel.
11. Resupply air to the control panel.
12. Perform the **Daily System Startup** procedure provided by the integrator at the applicable supply unit (LH or RH).
13. Verify that the limit switch operates correctly.
14. Return the system to current readiness condition.

Servicing the Pumps

When the pumps and air motors require service, refer to the applicable instruction manual.

Ram Assembly Service

Replacing Wipers (Fig. 16)

1. Perform the **System Shutdown** procedure provided by the integrator.
2. To replace worn or damaged wipers (412), raise the follower plate up out of the drum. Remove the drum from the base. Wipe the fluid off the follower plate. Refer to the **Drum Changing** procedure on page 27.
3. Separate the wiper joint (A) and bend back the strapping (413) covering the clamp setscrew (415). See Detail A of Fig. 16. Loosen the setscrew, pull the end of the strapping through the clamp (414) and remove the wiper.
4. Slide the strapping (413) through the new wiper (412). Slide the clamp (414) onto the new strapping and bend the strapping back approximately 3 in. (76 mm). Insert the strapping through the clamp a second time. See Detail B of Fig. 16.
5. Install the wipers on the follower plate. Position the wipers so that their joints (A) are 180° apart.

NOTE: You will need the special banding tool (C) shown in Detail C of Fig. 16 to tighten the strapping. Order Part No. 168092 Banding Tool.

6. Grip the strapping (413) with the tool (C) as shown. With your thumb on the gripper lever (E), turn the tool handle (F) clockwise to apply tension.

NOTE: Be careful not to pull the cutting handle (D) until you are ready to cut the strapping in step 8.

7. Continue turning the tool handle until you see the strapping stop moving through the clamp (414). Stop turning the handle.
8. Tighten the setscrew (B) with a wrench (G). Pull the cutting handle (D) to cut. Remove the tool (C). Bend the strapping back over the clamp (414).
9. Pound the wiper all the way around with a rubber mallet until the joints (A) are butted tightly together. Check the overall circumference of both wipers. They should measure less than 135 in. (343 cm). Adjust as necessary.
10. Return the system to current readiness condition. Refer to the **Drum Changing** procedure on page 27.

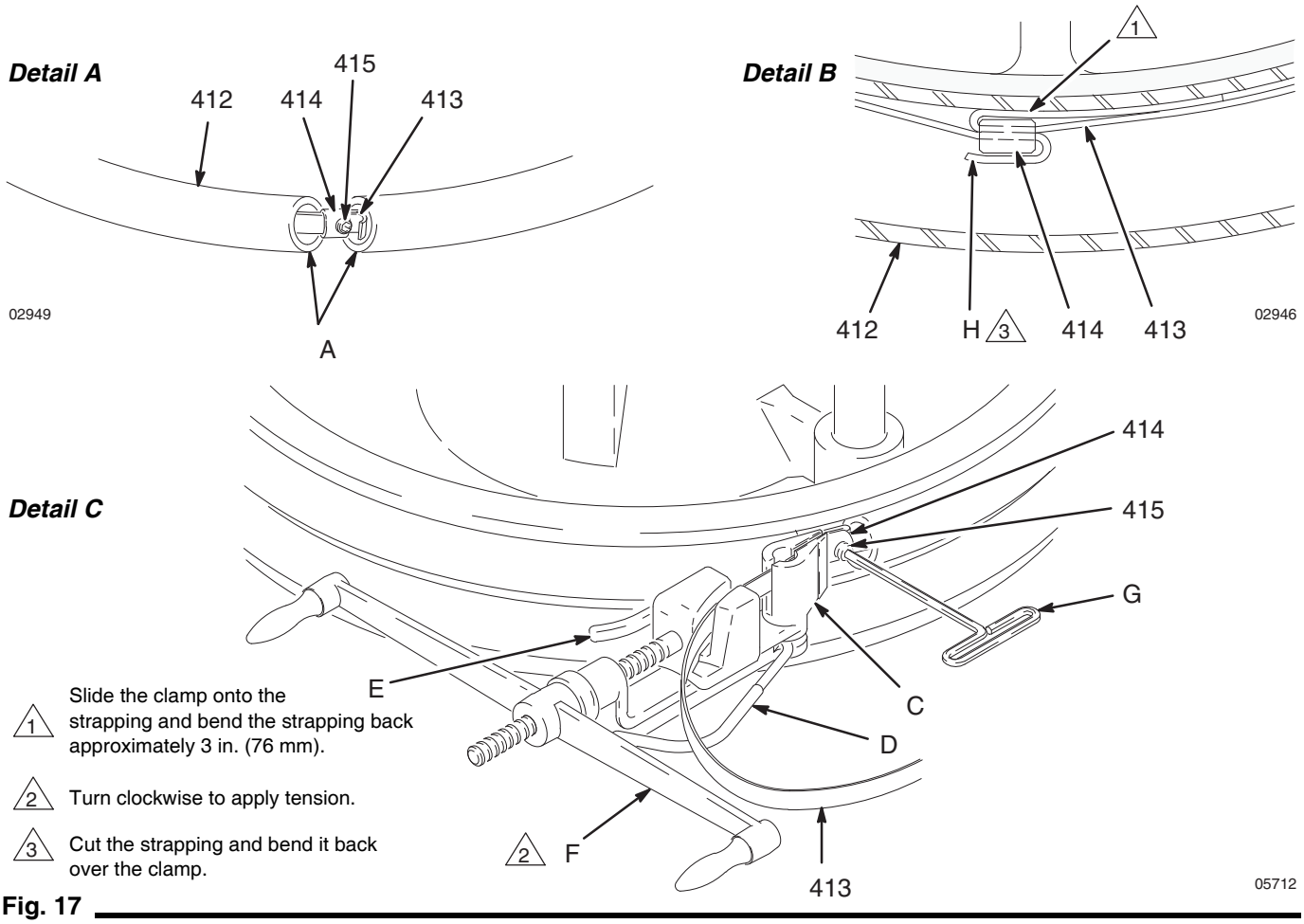


Fig. 17

Pump Assembly Service

Pump Removal

(Refer to System Drawing Package.)

⚠ WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedures** on page 25.

1. Relieve the air pressure from the air motors and ram assembly to be serviced.
2. Move the RAM POSITION switch to HOLD.
3. Close the pump outlet ball valves and relieve the fluid pressure from the pumps at the pump bleed valve on the ram assembly to be serviced.
4. Using an overhead lifting device, attach and secure a chain capable of lifting the weight of the pump assembly to the eye at the top of the air motor.

NOTE: For effective pump removal, the lifting point must be directly above the pump and capable of moving sideways. The lifting action should be the “chain fall” type that allows a slow upward and downward movement.

NOTE: Check the Technical Data page in the separate pump manual to find the weight of the pump being serviced. For example, Graco Premier 45:1 SST Pump (222939) weighs 240 lb (109 kg) per Form 308148.

5. Detach the air hose from the air motor.
6. Detach the fluid supply hose at the pump outlet.

NOTE: When loosening the pump and the air motor fasteners in steps and below, ensure the chain slack is taken up to prevent the pump assembly from falling.

7. On the follower plate adapter, loosen and rotate or remove four lugs and hex bolts holding the flange of the pump lower.
8. On the underside of the air motor, remove the bolts securing the air motor to the motor support brackets. It may be necessary to move or remove some brackets for efftive pump removal.
9. Detach any other connections to the pump assembly to ensure the pump is free of attachments before removal. Possible connections include:
    - Air motor exhaust kit
    - Pump proximity switch kit
    - Pump grounding wire

NOTE: When lifting the pump in step 10 below, ensure the lifting chain does not damage the air controls mounted at the top of the ram cross-members.

10. Using a “chain fall” style lifting device, slowly pull the pump upward a few inches until the base of the pump clears the pump mounting adapter and the air motor clears the support brackets.
11. Pull the pump assembly out of the ram assembly and guide the pump assembly downward to the floor, placing the base of the pump on a wood surface and taking care not to damage the seal area of the pump inlet housing.
12. Remove the gasket and o-ring (items 32 and 33) from the pump adapter. They should be discarded and replaced when the pump is reinstalled.
13. Clean excess and hardened material from the pump adapter on the follower plate.
14. Ensure that material is not rising through the pump adapter in the follower plate. If material is flowing upward, move the RAM POSITION switch to RAISE until the flow stops, then move the switch back to HOLD.
15. Move the pump assembly to a suitable work area and repair the pump using the appropriate Graco Instruction Manual.

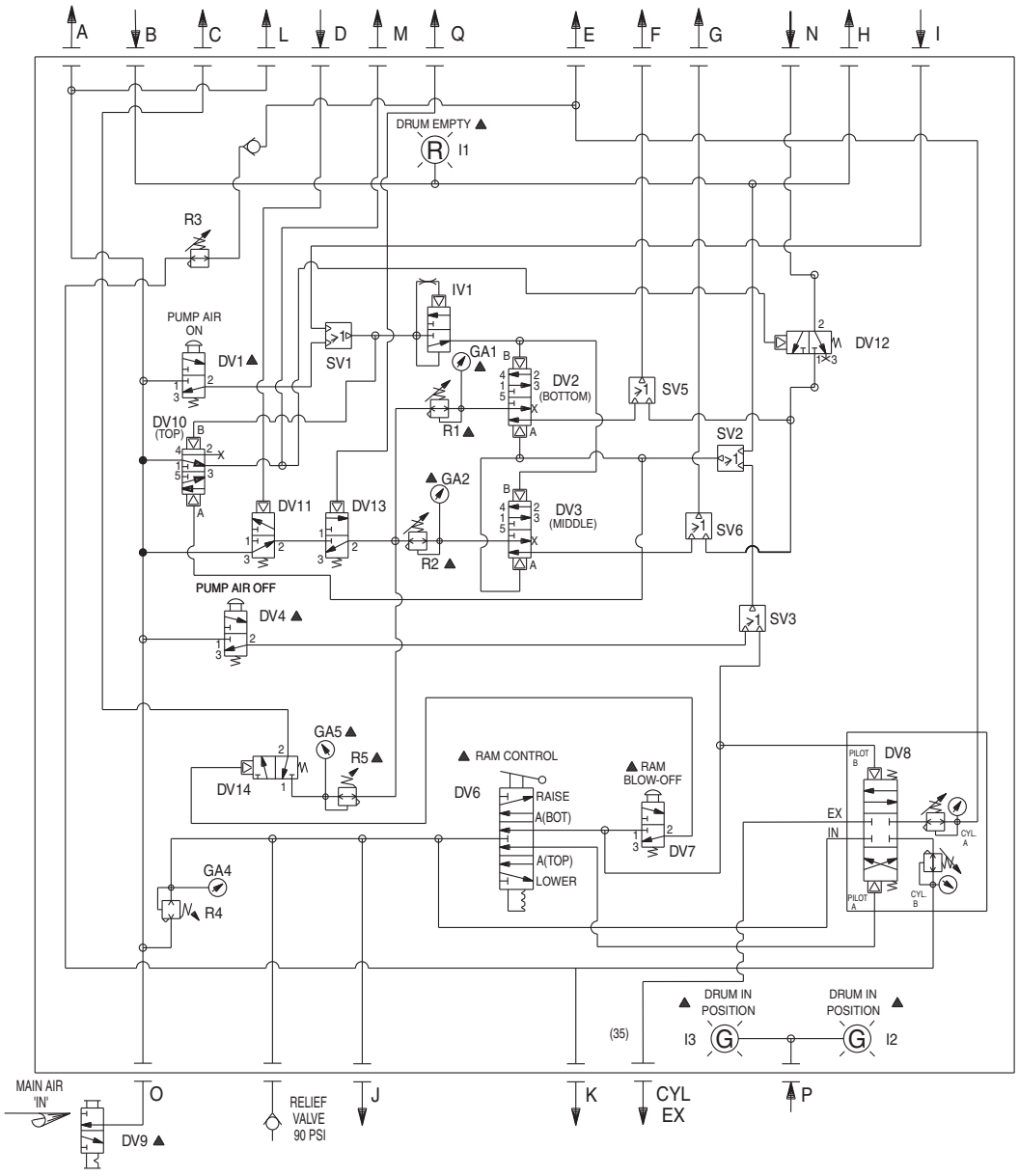
Pump Installation

(Refer to System Drawing Package.)

1. When the pump is serviced and tested and ready to be replaced in the Uni-Drum Ram, perform the steps of the Pump Removal procedure in reverse order.
2. It is recommended that the pump be tagged with the type and date of repair and the name of the technician who performed the repair.
3. Before returning the reassembled pump to production use, it must be primed with material and air removed from the material. Follow the Pump Instruction Form and the pump material bleeding procedure from the **Drum Changing Procedure** on page 27.

Pneumatic Diagram

Pneumatic Layout Panel (24R637)



NOTES:
1. MINIMUM REQUIRED PNEUMATIC CIRCUIT TO BE PROVIDED BY OTHERS.
2. ITEMS DENOTED WITH▲ARE OPERATOR CONTROLS AND INDICATORS. REFER TO PAGES 16 AND 17 OF MANUAL.

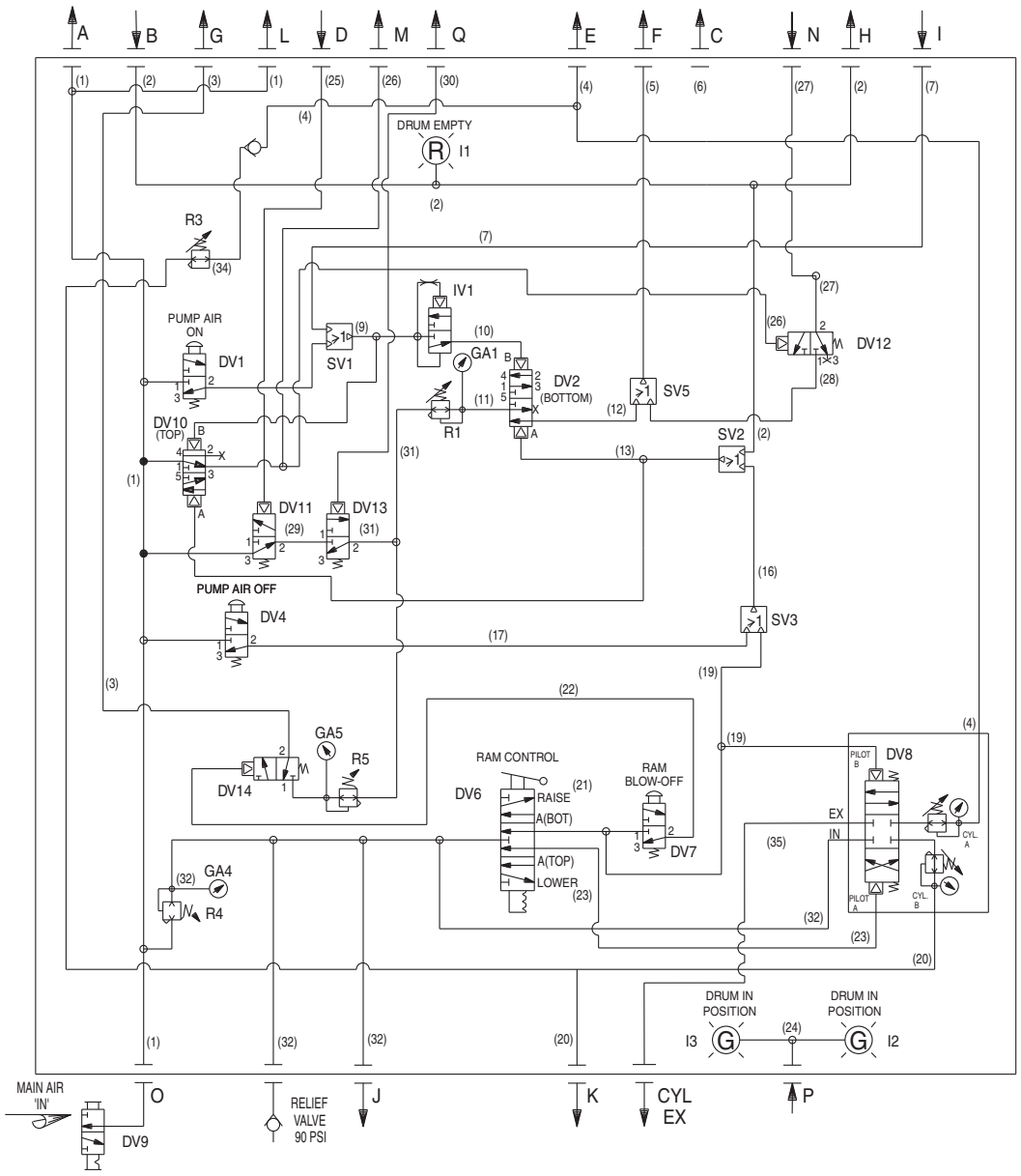
	DESCRIPTION	RANGE	SETTING
R1	PUMP NO.1 REGULATOR AND GAUGE	0-100 PSI (0-6.9 BAR)	DEPENDANT UPON DESIRED FLOWRATE
GA1			
R2	PUMP NO.2 REGULATOR	0-100 PSI (0-6.9 BAR)	DEPENDANT UPON DESIRED FLOWRATE
GA2			
R3	RAM CUSHION AIR	0-25 PSI (0-1.7 BAR)	5-10PSI (0.3-0.7 BAR)
R4	RAM AIR SUPPLY	0-120 PSI (0-8.3 BAR)	SET TO 80 PSI MAX (5.5 BAR)
GA4			
R5	DRUM BLOW-OFF AIR	0-25 PSI (0-1.7 BAR)	SET TO MINIMUM TO REMOVE DRUM
GA5			
DV9	VENTED BALL VALVE	125 PSI (8.6 BAR)	N/A
DV	DIRECTIONAL VALVE	N/A	N/A
SV	SHUTTLE VALVE	N/A	N/A
R	REGULATOR	N/A	N/A
I	INDICATOR	N/A	N/A
GA	GAUGE	N/A	N/A

CONNECTION	DESCRIPTION
A	AIR SUPPLY FOR DRUM EMPTY
B	DRUM EMPTY SIGNAL
C	BLOW-OFF AIR REGULATOR
L	DEPRESSURIZATION SUPPLY
D	DEPRESSURIZATION
M	SIR TO TIMER PANEL
Q	AIR/ELECTRICAL ON
E	RAM DOWN
F	PUMP #1 REMOTE REGULATOR
G	PUMP #2 REMOTE REGULATOR
N	CIRCULATION
H	TO RAM
I	FROM OTHER RAM
O	LOCK-OUT VALVE
J	AIR SUPPLY FOR DRUM IN POSITION
K	RAM UP
R	CYLINDER EXHAUST
P	DRUM IN POSITION SIGNAL

CHANGEOVER

Pneumatic Diagram

Pneumatic Layout Panel (24Z181)



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R4	RAM AIR SUPPLY	0-120 PSI (0-8.3 BAR)	SET TO 80 PSI MAX (5.5 BAR)
GA4			
R5	DRUM BLOW-OFF AIR	0-25 PSI (0-1.7 BAR)	SET TO MINIMUM TO REMOVE DRUM
GA5			
DV9	VENTED BALL VALVE	125 PSI (8.6 BAR)	N/A
DV	DIRECTIONAL VALVE	N/A	N/A
SV	SHUTTLE VALVE	N/A	N/A
R	REGULATOR	N/A	N/A
I	INDICATOR	N/A	N/A
GA	GAUGE	N/A	N/A

CONNECTION	DESCRIPTION
A	AIR SUPPLY FOR DRUM EMPTY
B	DRUM EMPTY SIGNAL
C	OPEN
L	DEPRESSURIZATION SUPPLY
D	DEPRESSURIZATION
M	SIR TO TIMER PANEL
Q	AIR/ELECTRICAL ON
E	RAM DOWN
F	PUMP #1 REMOTE REGULATOR
G	BLOW-OFF AIR REGULATOR
N	CIRCULATION
H	TO RAM
I	FROM OTHER RAM
O	LOCK-OUT VALVE
J	AIR SUPPLY FOR DRUM IN POSITION
K	RAM UP
R	CYLINDER EXHAUST
P	DRUM IN POSITION SIGNAL

CHANGEOVER

Technical Data (Uni-Drum Ram)

Supply Unit	Description	Specification
U81883 **U81884** **U81807**	Overall dimensions:	Width: 69 in. (1753 mm) Depth: 51 in. (1295 mm) Height (lowered): 85.2 in. (2164 mm) Height (raised): 141 in. (3581 mm)
	Compressed air requirement:	80 psi maximum (5.5 bar, 0.55 MPa) 450 cfm
	Main air inlet size:	1 in. npt(f)
	Overall Weight:	Approximately 3950 lb (1792 kg)
U82084 **U82090** **U82151** **U82267**	Overall dimensions:	Width: 69 in. (1753 mm) Depth: 51 in. (1295 mm) Height (lowered): 98.8 in. (2510 mm) Height (raised): 167.5 in. (4255 mm)
U82277 **U82283** **U82293**	Compressed air requirement:	80 psi maximum (5.5 bar, 0.55 MPa) 450 cfm
U82375	Main air inlet size:	1 in. npt(f)
U82379 **U82577** **U82578** **U82917** **U82918** **U82987** **U82988** **U83110** **U83109** **U83132** **U83130** **U83136** **U83134**	Overall Weight:	Approximately 3950 lb (1792 kg)

Technical Data (Pumps)

Supply Unit	Description	Specification
U81883	Ratio:	26:1 Fluid to Air Power Ratio
U81884	Maximum Fluid Working Pressure:	2600 psi (182 bar, 18.2 MPa)
U81807	Maximum Air Input Pressure:	100 psi (7.0 bar, 0.7 MPa)
U82084	Maximum Pump Cycle Rate:	60 cycles per min
U82267	Maximum Flow Rate:	7.8 gpm (30.0 liters/min) at 60 cycles/min
U82277	Air Motor Piston Effective Area:	Refer to motor manual
	Stroke Length:	Refer to motor manual
	Displacement Pump Effective Area:	Refer to pump lower manual
	Pump Operating Temperature:	150.0° F (65.5° C) Maximum Temperature
	Air Inlet Size:	1 in. npt(f)
	Fluid Outlet Size:	1-1/4 in. npt(f)
	Wetted Components:	Carbon Steel; Chrome, Zinc, and Electroless Nickel Plating; 304, 440, and 17-4 PH Grades of Stainless Steel; Ductile Iron; Tungsten Carbide; Acetal; PTFE; Leather; UHMW Polyethylene
	Weight:	Approx. 240 lbs. (109 kg) per pump
U82090	Ratio:	10:1 Fluid to Air Power Ratio
	Maximum Fluid Working Pressure:	660 psi (4.55 Mpa, 45.5 bar)
	Maximum Air Input Pressure:	65 psi (4.5 bar, 0.45 Mpa)
	Maximum Pump Cycle Rate:	60 cycles per min
	Maximum Flow Rate:	17.4 gpm (65.8 lpm) @60 cycles/min
	Air Motor Piston Effective Area:	Refer to motor manual
	Stroke Length:	Refer to motor manual
	Displacement Pump Effective Area:	Refer to pump lower manual
	Air Inlet Size:	1 in. npt (f)
	Fluid Outlet Size:	1-1/4 in. npt (f)
	Wetted Components:	303 and 304 Grades of Stainless Steel; PTFE; Carbon-Filled PTFE
	Weight:	Approx. 240 lbs. (109 kg) per pump

U82283	Ratio:	47:1 Fluid to Air Power Ratio
U82293	Maximum Fluid Working Pressure:	4500 psi (31 Mpa, 310 bar)
U82987	Maximum Air Input Pressure:	100 psi (0.7 Mpa, 7.0 bar)
U82988	Maximum Pump Cycle Rate:	30 cycles per min
U83132	Maximum Flow Rate:	7.9 gpm (29.2 lpm) @30 cycles per min
U83130	Air Motor Piston Effective Area:	Refer to pump manual
	Stroke Length:	Refer to pump manual
	Displacement Pump Effective Area:	Refer to pump manual
	Air Inlet Size:	1 in. npt (f)
	Fluid Outlet Size:	1-1/4 in. npt (f)
	Wetted Components:	Carbon Steel; Chrome, Zinc, and Electroless Nickel Plating; 304, 440, and 17-4 PH Grades of Stainless Steel; Ductile Iron; Tungsten Carbide; Acetal; PTFE; Leather; UHMW Polyethylene
	Weight:	Approx. 240 lbs. (109 kg) per pump

U82375	Ratio:	47:1 Fluid to Air Power Ratio
U82379	Maximum Fluid Working Pressure:	4500 psi (31 Mpa, 310 bar)
U83110	Maximum Air Input Pressure:	100 psi (0.7 Mpa, 7.0 bar)
U83109	Maximum Pump Cycle Rate:	30 cycles per min
U83136	Maximum Flow Rate:	7.9 gpm (29.2 lpm) @30 cycles per min
U83134	Air Motor Piston Effective Area:	Refer to pump manual
	Stroke Length:	Refer to pump manual
	Displacement Pump Effective Area:	Refer to pump manual
	Air Inlet Size:	1 in. npt (f)
	Fluid Outlet Size:	1-1/4 in. npt (f)
	Wetted Components:	304, 329, 17-4 grades of Stainless Steel; Chrome Plate; Tungsten Carbide; Acetal; PTFE; Leather; UHMW Polyethylene; Carbon-Filled PTFE
	Weight:	Approx. 240 lbs. (109 kg) per pump

U82577	Ratio:	47:1 Fluid to Air Power Ratio
U82578	Maximum Fluid Working Pressure:	4500 psi (31 Mpa, 310 bar)
	Maximum Air Input Pressure:	100 psi (0.7 Mpa, 7.0 bar)
	Maximum Pump Cycle Rate:	60 cycles per min
	Maximum Flow Rate:	6.9 gpm (26.1 lpm) @60 cycles per min
	Air Motor Piston Effective Area:	Refer to pump manual
	Stroke Length:	Refer to pump manual
	Displacement Pump Effective Area:	Refer to pump manual
	Air Inlet Size:	1 in. npt (f)
	Fluid Outlet Size:	1-1/4 in. npt (f)
	Wetted Components:	Carbon Steel; Chrome, Zinc, and Electroless Nickel Plating; 304, 440, and 17-4 PH Grades of Stainless Steel; Ductile Iron; Tungsten Carbide; Acetal; PTFE; UHMW Polyethylene
	Weight:	Approx. 240 lbs. (109 kg) per pump

U82917	Ratio:	10:1 Fluid to Air Power Ratio
U82918	Maximum Fluid Working Pressure:	1180 psi (8.14 Mpa, 81.4 bar)
	Maximum Air Input Pressure:	100 psi (0.7 Mpa, 7.0 bar)
	Maximum Pump Cycle Rate:	60 cycles per min
	Maximum Flow Rate:	17.4 gpm (65.8 lpm) @60 cycles per min
	Air Motor Piston Effective Area:	Refer to motor manual
	Stroke Length:	Refer to motor manual
	Displacement Pump Effective Area:	Refer to pump lower manual
	Air Inlet Size:	1 in. npt (f)
	Fluid Outlet Size:	1-1/4 in. npt (f)
	Wetted Components:	303 Grade Stainless Steel; Carbon Steel; Chrome Steel; Chrome Zinc, and Electroless Nickel Plating; Buna-N; Tungsten Carbide; Nylon; Ultra-High Molecular Weight Polyethylene; Leather; PTFE
	Weight:	Approx. 132 lbs. (60 kg) per pump

Graco Standard Warranty

Graco warrants all equipment referenced in this document which is manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

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For patent information, see www.graco.com/patents.

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Original instructions. This manual contains English. MM 332372

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International Offices: Belgium, China, Japan, Korea

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