

# Instructions-Parts List



## Important Safety Instructions

Read all warnings and instructions in this manual.  
Save these instructions.

# BES 300 Pneumatic Control<sub>310925 rev.A</sub>

## Bin Evacuation System

For use with 300 gallon (1135 liter) bags in bin containers.

BES Part No.	Maximum Working Fluid Pressure <i>psi (MPa, bar)</i>	Pump Part No.	Quantity	Pump
<b>248654</b>	120 (.84, 8.4)	248273	2	3150 Sanitary Husky <sup>®</sup> Pump, Ball Check
<b>248740</b>	1000 (7, 70)	949444	4	10:1 Sanitary Bulldog <sup>®</sup>
<b>248739</b>	430 (3, 30)	949704	2	FT14 Sanitary Pump
<b>248741</b>	1000 (7, 70)	949444	2	10:1 Sanitary Bulldog <sup>®</sup>
<b>248745</b>	120 (.84, 8.4)	248274	2	3150 Sanitary Husky <sup>®</sup> Pump, Flapper Check

## Related Publications

- 306916** Bulldog<sup>®</sup> and King<sup>®</sup> Pumps
- 307592** Senator<sup>®</sup> and Quiet Senator<sup>®</sup> Air Motors
- 308076** FT14 Sanitary and Senator<sup>®</sup> Pumps
- 308149** Bulldog<sup>®</sup> and King<sup>®</sup> Pumps
- 310622** 3150 Sanitary Husky<sup>®</sup> Pumps

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## Manual Conventions

### Warning

 <b>WARNING</b>

<p><b>WARNING:</b> a potentially hazardous situation which, if not avoided, could result in death or serious injury.</p> <p>Warnings in the instructions usually include a symbol indicating the hazard. Read the general <b>Warnings</b> section for additional safety information.</p>

### Caution

<b>CAUTION</b>
<p><b>CAUTION:</b> a potentially hazardous situation which, if not avoided, may result in property damage or destruction of equipment.</p>

### Note

 Additional helpful information.

The following general warnings are related to the safe setup, use, grounding, maintenance and repair of this equipment. Additional more specific warnings may be found throughout the text of this manual where applicable.

 <b>Warning</b>	
	<p><b>FIRE AND EXPLOSION HAZARD</b></p> <p>Flammable fumes, such as solvent and paint fumes, in <b>work area</b> can ignite or explode. To help prevent fire and explosion:</p> <ul style="list-style-type: none"> <li>• Use equipment only in well ventilated area.</li> <li>• When flammable liquid is sprayed or used for flushing or cleaning, keep sprayer at least 20 feet (6 m) away from explosive vapors.</li> <li>• Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static arc).</li> <li>• Keep work area free of debris, including solvent, rags and gasoline.</li> <li>• Do not plug or unplug power cords, or turn power or light switches on or off when flammable fumes are present.</li> <li>• Ground equipment and conductive objects in work area. See <b>Grounding</b> instructions.</li> <li>• Use only grounded hoses.</li> <li>• Hold gun firmly to side of grounded pail when triggering into pail.</li> <li>• If there is static sparking or you feel a shock, <b>stop operation immediately</b>. Do not use equipment until you identify and correct the problem.</li> <li>• Keep a fire extinguisher in the work area.</li> </ul>
	<p><b>PRESSURIZED EQUIPMENT HAZARD</b></p> <p>Fluid from the gun/dispense valve, leaks, or ruptured components can splash in the eyes or on skin and cause serious injury.</p> <ul style="list-style-type: none"> <li>• Follow <b>Pressure Relief Procedure</b> in this manual, when you stop spraying and before cleaning, checking, or servicing equipment.</li> <li>• Tighten all fluid connections before operating the equipment.</li> <li>• Check hoses, tubes, and couplings daily. Replace worn or damaged parts immediately.</li> </ul>
	<p><b>EQUIPMENT MISUSE HAZARD</b></p> <p>Misuse can cause death or serious injury.</p> <ul style="list-style-type: none"> <li>• Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See <b>Technical Data</b> in all equipment manuals.</li> <li>• Use fluids and solvents that are compatible with equipment wetted parts. See <b>Technical Data</b> in all equipment manuals. Read fluid and solvent manufacturer's warnings.</li> <li>• Check equipment daily. Repair or replace worn or damaged parts immediately.</li> <li>• Do not alter or modify equipment.</li> <li>• For professional use only.</li> <li>• Use equipment only for its intended purpose. Call your Graco distributor for information.</li> <li>• Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.</li> <li>• Do not kink or over bend hoses or use hoses to pull equipment.</li> <li>• Comply with all applicable safety regulations.</li> </ul>

 **Warning**
**MOVING PARTS HAZARD**

Moving parts can pinch or amputate fingers and other body parts.

- Keep clear of moving parts.
- Do not operate equipment with protective guards or covers removed.
- Pressurized equipment can start without warning. Before checking, moving, or servicing equipment, follow the **Pressure Relief Procedure** in this manual. Disconnect power or air supply.
- The frame is shipped with several major components attached and weighs about 2500 lb. (1134 kg). To avoid injury and equipment damage never have one person move or lift the frame.

**TOXIC FLUID OR FUMES HAZARD**

Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed.

- Read MSDS's to know the specific hazards of the fluids you are using.
- Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.

**PERSONAL PROTECTIVE EQUIPMENT**

You must wear appropriate protective equipment when operating, servicing, or when in the operating area of the equipment to help protect you from serious injury, including eye injury, inhalation of toxic fumes, burns, and hearing loss. This equipment includes but is not limited to:

- Protective eyewear
- Clothing and respirator as recommended by the fluid and solvent manufacturer
- Gloves
- Hearing protection

# Overview

## Operation Overview

The BES 300 evacuates fluids from a 300 gallon (1135 liter) bag in a plywood box or collapsible bin.

The BES 300 consists of a frame, two or four Graco displacement pumps, ram plate with an inflatable seal, ram air cylinder, and a pneumatic control panel.

### Basic Operation of BES 300

1. The operator places the bin inside the frame.
2. Using the control panel, the operator lowers the ram plate on top of the material.
3. The operator inflates the ram plate seal, applies down pressure to the ram plate, and turns on the pumps.
4. The displacement pumps evacuate the material out of the bin.
5. The operator stops the pumps, deflates the seal, and raises the ram plate out of the bin.
6. The empty bin is removed, another bin is put in place, and the BES 300 is ready to repeat the process.

# System Components

See FIG. 1.

**A Stainless Steel Frame:** supports the cardboard or collapsible bin.

**B Pneumatic Control Panel:** contains pneumatic controls to regulate the air pressure to pump air motors, ram, and ram plate seal in order to control:

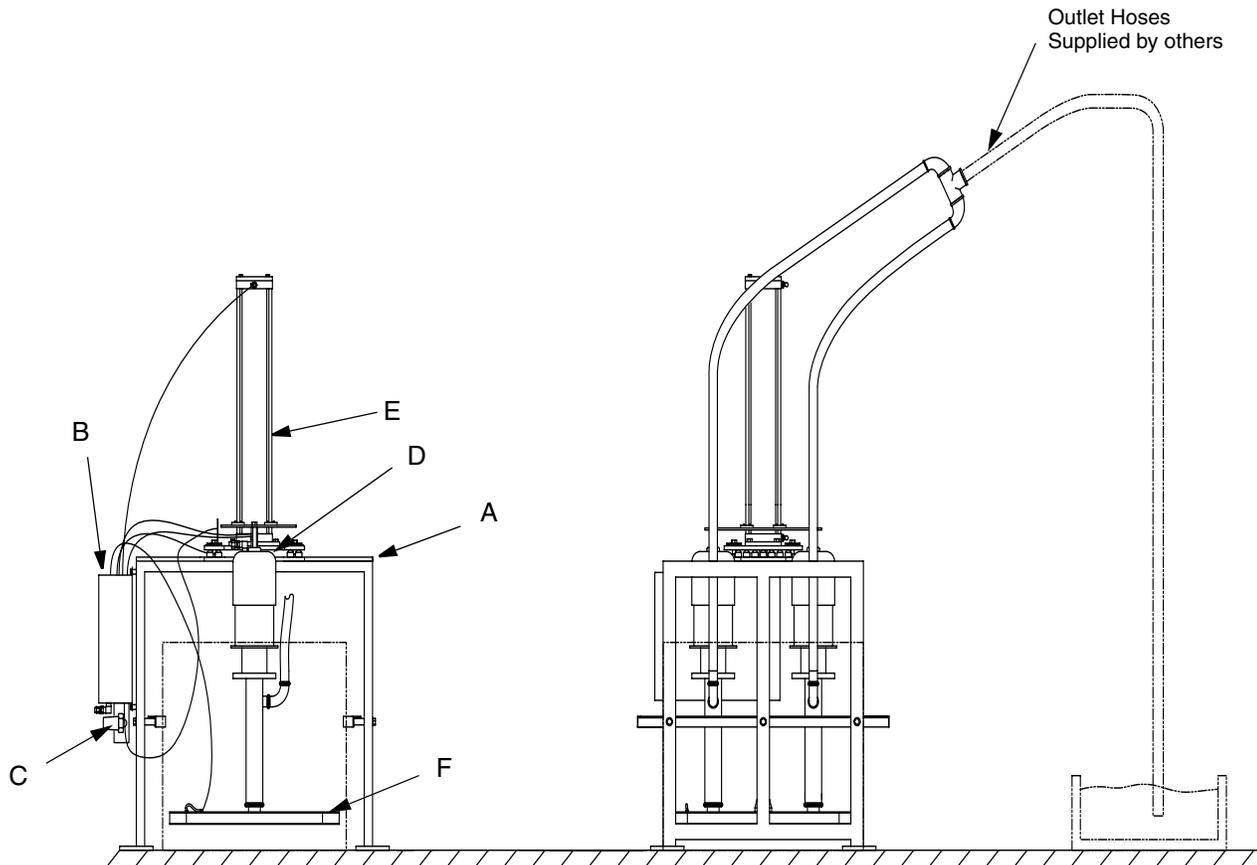
- pump air motor pressure
- pump speed control
- ram up and down pressure
- seal pressure
- turn the pumps on or off
- inflate or deflate the ram plate seal
- raise or lower the ram plate

**C Air Shutoff Valve:** shuts off air to the pneumatic control panel (B).

**D Sanitary Pumps:** pump material from the bin to the target application.

**E Air Cylinder:** raises and lowers the pumps and the ram plate in and out of the material container.

**F Ram Plate:** applies an even amount of pressure to the material in the bin. When the ram plate seal is inflated, it creates a seal. The ram plate presses down on the material in the bin to assist the pumps in delivering the material.



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**FIG. 1: Typical Installation**

# Before Installing

## Uncrating Equipment

### CAUTION

Moving the BES 300 off the pallet without following this uncrating procedure will damage equipment.

Uncrate the BES 300 as follows:

1. Inspect the crate for shipping damage. Contact the carrier if damaged.
2. Remove plywood sides and top of crate.
3. Check the contents for loose or damaged parts.
4. Compare the packing slip against items inside the crate. Immediately call your Graco distributor about any shortages or damage.
5. Remove the band strap holding the cylinder bin to the frame.
6. Remove and unpack the air cylinder bin and pumps.



See **Overview**, page 5, to become familiar with system components and general operation.

## Location

When selecting a location, make sure the location:

- Is close to where the fluid is being delivered to minimize back pressure and maximize flow rate.
- Provides enough room around the equipment for maintenance.
- Does not interfere with opening the pneumatic control panel door or frame door (on one or both sides). If the frame is rotated 180°, the frame door will open from left to right or from right to left. There are extra holes in the frame to mount the control panel on either side.
- Provides enough room on the right and/or left side of the BES 300 to easily load and unload fluid bins with a forklift or pallet-jack hand truck.

- Provides easy and safe access to the air supply shutoff valves and the pneumatic control panel. Graco recommends a minimum of 3 ft. (0.91 m) of open space in front of the panel.
- Provides enough overhead clearance (11 ft., 3.4 m recommended) for installing and servicing the air cylinder and connecting air supply lines to the pneumatic control panel.
- Has a flat, level floor.

## Moving Frame to Location

### WARNING



The frame is shipped with several major components attached and weighs about 2500 lb. (1134 kg). To avoid injury and equipment damage, follow instructions below. Never have one person move or lift the frame. Read warnings page 4.

- Do not remove the frame from the pallet at this time.
  - Use a forklift or hand truck and support devices, such as a hoist, and have an adequate number of personnel to move the frame to the installation site.
  - Avoid jarring or tilting the frame while moving it.
-  • Ensure there is an adequate compressed air supply. Refer to air motor/pump manual for your pump air consumption. About 250-300 scfm at 100 psi (0.7 MPa, 7 bar) is required to operate the pumps at the maximum rate.
- Have all component manuals available for specific component requirements. See page 34.
  - Ensure that all hoses are properly sized and pressure rated for the system.

# Installation

## Anchoring Frame

The frame must be level in order for the BES 300 to operate properly. If necessary, level the BES 300 using metal shims. Make sure the frame does not wobble.

Anchor the four foot pads to the floor. To prevent the frame from being pushed off the floor, the anchor bolts must be long enough to withstand the 5027 lb. (22.36 kN) of downward force that the air cylinder can exert.

Use the holes in the four base footings as a guide and drill holes for 1/2" (13 mm) bolts. Bolt the frame to the floor with anchors.

## Installing Air Cylinder

**WARNING**

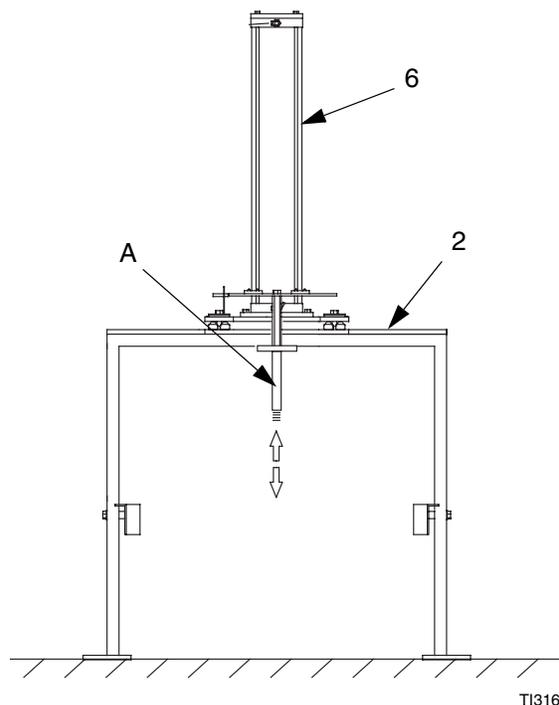


The air cylinder weighs about 130 lb. (59 kg). To avoid injury and equipment damage, follow instructions below. Never have one person move or lift the frame. Read warnings page 4.

 All models do not use the same parts. Refer to parts drawing for your model.

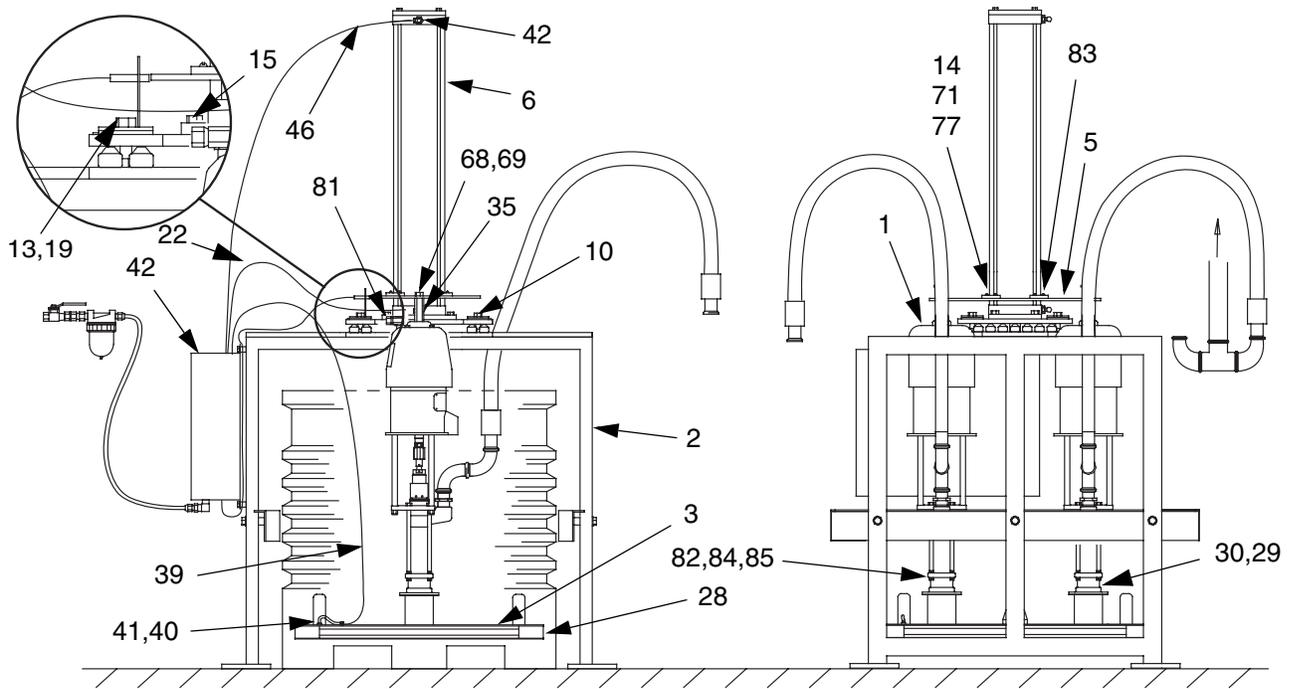
1. Remove the nuts (13) and washers (19) attached to the pump mounting rods (35), and remove the air motor mounting plate (5). See FIG. 3.
2. Using a hoist, lift the air cylinder (6) into position on top of the frame (2). See FIG. 2.
3. Lower the air cylinder shaft (A) through the center hole in the frame.

4. Secure the air cylinder (6) to the frame (2) with the screws (15). See FIG. 3.



**FIG. 2: Air Cylinder Shaft**

5. Remove the screws (10) from the frame (2).
6. Remove the two band straps that hold the ram plate (3) to the shipping pallet. Do not remove the pallet.
7. Apply a compatible grease to the cylinder shaft threads to avoid damaging them. Align and screw the air cylinder shaft (A) into the ram plate (3). See FIG. 2. If the shaft does not thread properly, do not force it. Re-check alignment of plate (3).



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FIG. 3

8. Uncrate and mount pumps to the ram plate (3), with outlets facing away from pneumatic control panel. Secure pumps to plate using the following gaskets and hardware:
  - **Part No. 248740 and 248741:** gasket (82), screws (85), and washers (84)
  - **Part No. 248739:** gasket (30), tri-clamp (29)
  - **Part No. 248654 and 248745:** gasket, tri-clamp
9. For part numbers 248654 and 248745 install the two connecting rods to the ram plates.
10. Reinstall the air motor mounting plate (5), slipping plate over the top and down the length of air cylinder (6).
11. Install cylinder guide bearings (14) on top of the air motor mounting plate (5):
  - **Part No. 248740 and 248739:** use screws (83) and washers (71).
  - **Part No. 248781:** use screws (77) and washers (71).
  - **Part No. 248654 and 248745:** use screws and washers.
12. Connect the cylinder upper air supply line (46) to the upper 1/2" elbow (42).
13. Connect the cylinder lower air supply line (46) to the 1/2" lower elbow (42).
14. Connect air lines to pumps (1) air motors.
  - **Part No. 248740 and 248739, 248654, and 248745:** install 1/2" tubing from pneumatic control panel to air motor air inlet.
  - **Part No. 248741:** install union adapter (81) and connect hose (22) to air motor air inlet and pneumatic control panel.
15. Remove bolts holding the frame (2) to the shipping pallet.

**WARNING**



The overall system weighs about 2400-3400 lb. (1089-1542 kg). To avoid injury and equipment damage, follow instructions below. Never have one person move or lift the frame. Read warnings page 4.

 The open arch in the cylinder guide bearings (14) fits around tie rods on the air cylinder (6).

## Connecting Pump Output Hoses

- See **Graco Standard Warranty**, page 34, for air motor/pump instruction manual numbers.
- The output hose(s) (K - supplied by others) should already be installed, with riggings and supports, and ready for connection to the 10 ft. (3.05 m) hoses (20) supplied. See FIG. 4.
- Make sure the output hose(s) (K) are sized and pressure-rated for the system. Use only electrically conductive hoses with spring guards on both ends.

The fluid hoses must move freely, without kinking, when the pumps move up and down.

### Two Pump System Includes:

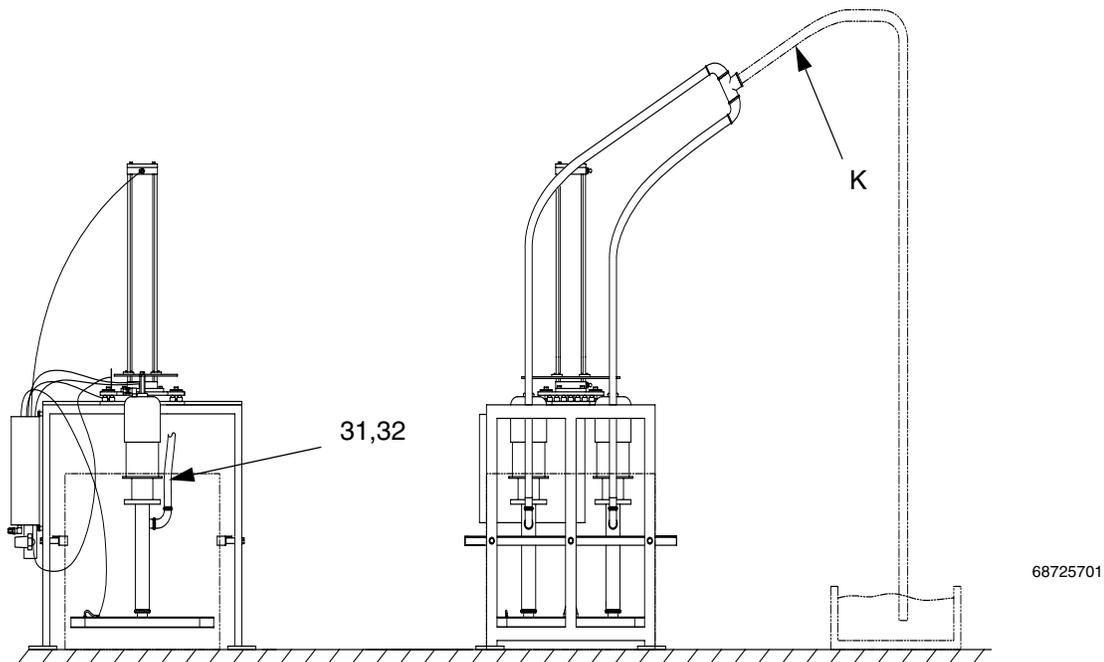
Description	Quantity
2" (51mm) tri-clamp sanitary clamps (31)	4
2" (51mm) tri-clamp sanitary gaskets (32)	4

### Four Pump System Includes:

Description	Quantity
2" (51mm) tri-clamp sanitary clamps (31)	8
2" (51mm) tri-clamp sanitary gaskets (32)	8

### Two Pump AODD System Includes:

Description	Quantity
3" (76 mm) tri-clamp sanitary clamps	2
3" (76 mm) tri-clamp sanitary gaskets	2



**FIG. 4: Connect pump outlet hoses**

## Grounding

**⚠ WARNING**



The system must be properly grounded. Read warnings, page 4. Follow the instructions below.

**Pump:** use the ground wire and clamp (supplied). There are two styles of grounding connections on pump air motors.

**If you have ground screw shown in FIG. 5,** you need to order part no. 222011 ground wire, ring terminal, and clamp assembly (Y). To install 222011, remove the ground screw (Z) and insert it through the eye of ring terminal (X), then tighten ground screw back into air motor as shown in FIG. 5. Connect the other end of the wire to a true earth ground.

**If you have ground screw shown in FIG. 6,** loosen the grounding lug locknut (W) and washer (X). Insert one end of the 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. Order 237569 ground wire and clamp assembly.

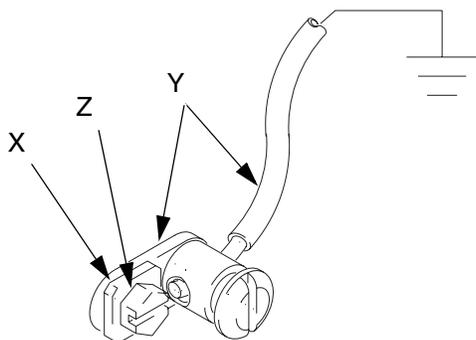


FIG. 5: Ground Screw

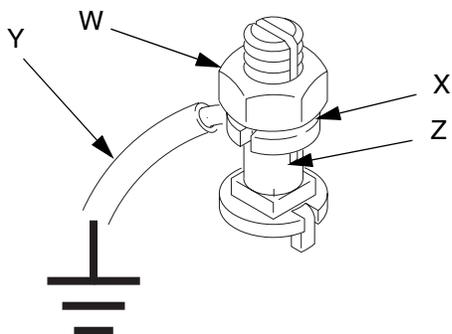


FIG. 6: Ground Screw

**Air and fluid hoses:** use only electrically conductive hoses with a maximum of 500 ft. (150 m) combined hose length to ensure grounding continuity. Check the electrical resistance of your air and fluid hoses. If the total resistance to ground exceeds 29 megohms, replace the hose immediately.

**Air compressor:** follow manufacturer's recommendations.

**Dispense valve:** ground through connection to a properly grounded fluid hose and pump.

**Fluid supply container:** follow your local code.

**Solvent pails used when flushing:** follow your local code. Use only conductive, metal pails, placed on a grounded surface. Do not place the pail on a nonconductive surface, such as paper or cardboard, which interrupts grounding continuity.

**To maintain grounding continuity when flushing or relieving pressure:** hold a metal part of the dispense valve firmly to the side of a grounded metal pail, then trigger the gun/valve.

## Checking Resistance

Have a qualified electrician check the resistance between each pump and true earth ground. Resistance must be less than 0.25 ohms. If the resistance is greater, a different ground site may be required. Do not operate the system until you correct the problem.

## System Overview

### Prepare the Operator

Anyone operating the equipment must be trained to safely operate all system components and properly handle fluids used. Operators must read all instruction manuals, tags, and labels before operating equipment.

# Pneumatic Control Panel

## Part No. 15E523

See FIG. 7.

Ref. No.	Switch/Button Name	Operation
1	Seal Inflate On/Off	Switch to ON to inflate ram plate seal. Switch to OFF to deflate ram plate seal.
2	Ram Plate Seal Pressure Gage	Displays Ram plate seal pressure.
3	Ram Plate Seal Regulator	Adjust to raise or lower ram plate seal pressure.
4	Pump On/Off	Switch to ON to run the pumps. Switch to OFF to stop the pumps.
5	Pump Pressure Gage	Displays current pump pressure.
6	Pump Pressure Regulator	Adjust to raise or lower pump inlet air pressure.
7	Ram Directional Switch	Switch to UP to raise the ram plate. Switch to DOWN to apply ram pressure to the material. Switch to NEUTRAL to hold the position of the ram plate.
8	Ram Up Pressure Gage	Displays Ram Up operation pressure.
9	Ram Up Regulator	Adjust to raise or lower ram up pressure.
10	Ram Down Pressure Gage	Displays Ram Down operation pressure.
11	Ram Down Regulator	Adjust to raise or lower ram down pressure.

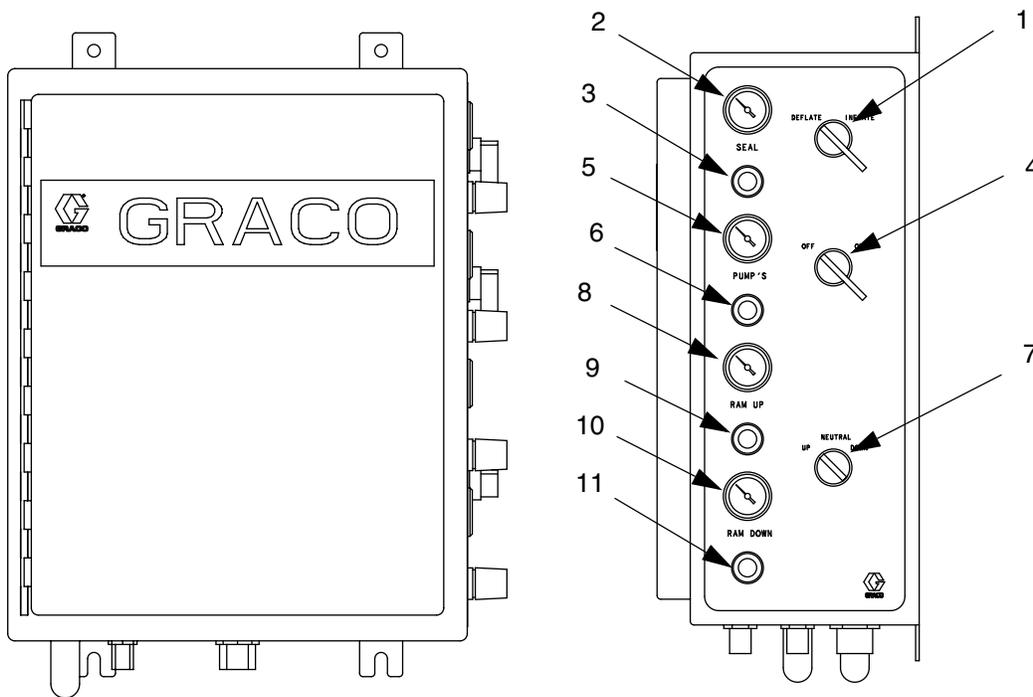


FIG. 7: Part No. 15E523

## Setting Air Pressures

Each system function has an associated air pressure. Air pressure regulators are located on the pneumatic control panel. Set initial air pressures as shown in the table below. Make adjustments as needed during operation. See FIG. 8.

Ref.	Function	Regulator Setting psi (kPa, bar)
2	SEAL INFLATE	15 (103, 1.0)
8	RAM UP	30 (207, 2.1)
10	RAM DOWN	30 (207, 2.1)
5	PUMP	50 (345, 3.4)

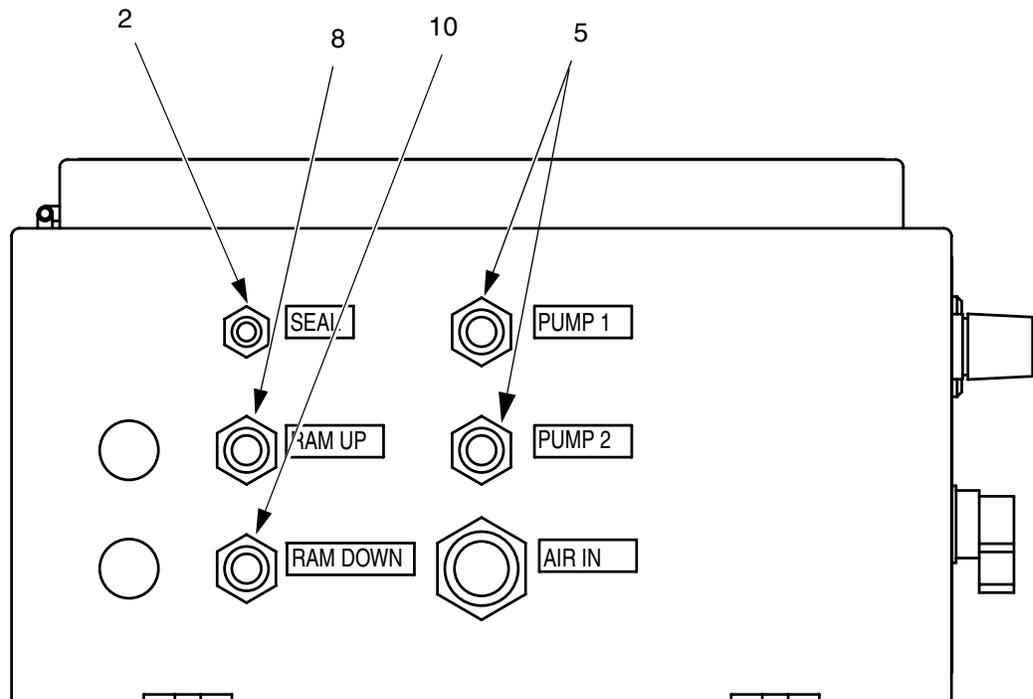


FIG. 8: Part No 15E523, 4 pump shown

## Pressure Relief Procedure

 **WARNING**

Read warnings, page 3, and follow the **Pressure Relief Procedure** whenever you:

- are instructed to relieve pressure
- stop operation
- check, clean, or service any of the equipment

1. To turn off the pumps move pump switch to stop.
2. Open all system fluid drain valves that are downstream of the pumps.

## Initial Startup

 **WARNING**



When raising or lowering the ram plate, keep hands and body away from ram plate and bin lip. Read warnings, page 4.

This procedure takes you through the settings, adjustments, and other steps that must be completed before the system is ready for daily operation.

1. Fill all the pumps packing nut/wet cups 1/3 full with a compatible lubricant if applicable. Refer to your pump manual for details. Do not use Graco Throat Seal Lubricant with a sanitary application.
2. Turn on the air to the pneumatic control panel.
3. Turn **SEAL INFLATE** to OFF.
4. Open the air shutoff valves for the pneumatic controls and pumps.

5. Open the pneumatic control panel door. Check for air leaks.
6. The equipment was tested with water. Flush the system before loading material. See page 16.
7. Follow **Loading the Bin** procedure, page 15.
8. Adjust the ram down air regulator to 50 psi (0.34 MPa, 3.4 bar).
9. Adjust the pump regulator as needed.



All pumps must operate at the same cycles per minute rate to prevent the bin from evacuating unevenly.



### Pump Cavitation

Pump cavitation occurs when the pump cylinder does not fully load with material on the up stroke and an air pocket forms in the material after the pump changeover. If pump cavitation occurs, increase the ram down air pressure.

10. Adjust the seal vacuum pump air regulator to 20 psi (138 kPa, 1.4 bar).
11. Deflate the seal.
12. Press the RAM UP button. If the ram does not raise, increase the ram up air regulator pressure.
13. Verify the seal is completely deflated after the ram plate exits the bin. If it is not, deflate the seal.
14. When adjustments are complete, close the pneumatic control panel door.
15. Follow **Unloading the Bin** procedure, page 15.
16. The system is now ready for standard operation. See page 15.

# Standard Operation

 When raising and lowering the ram plate, make sure there are no objects obstructing the unit.

## Loading the Bin

 **WARNING**

When raising or lowering the ram plate, keep hands and body away from ram plate and bin lip. Read warnings, page 4.

1. Open the air shutoff valves for the air controls and pumps.
2. On the control panel, switch to the RAM UP position. If the ram does not elevate, increase the ram up air regulator pressure on the pneumatic control panel.
3. Move the bin in front of the frame.
4. Remove the lid from the fluid bin to expose the fluid bag. If present, open the outer plastic bag and pull it up over the sides of the bin, exposing the aseptic inner bag.
5. Make sure the bag is taut and secure it in place.
6. Load the bin of material into the center of the frame.
7. **Initial Startup Only:** The frame has spring-loaded guides to stabilize the bin. Adjust the guides equally with the screws on all four sides of the bin. Leave

enough space between guides and bin to allow for removal of the bin.

8. Make sure the corner seals are in place.
9. Switch to the Ram Down position.

 **WARNING**



When raising or lowering the ram plate, keep hands and body away from ram plate and bin lip. Read warnings, page 4.

10. Use the ram plate handles to center the ram plate inside the bin. Be careful not to pinch the inflatable seal when it enters the bin.

## Unloading the Bin

1. Follow the **Pressure Relief Procedure**, page 14.
2. Ensure seal is deflated and ram is raised.
3. Unload the bin from the frame.

## System Shutdown

Follow the **Pressure Relief Procedure**, page 14.

Depending on the type of material, it may be best to deflate the seal and raise the ram plate out of the material or keep the ram plate lowered in the bin. Some materials dry and harden when exposed to air. Cover materials when they are not being used.

# Maintenance

## Air Motor Icing

Air motor icing occurs when moisture in the compressed air collects in the air motor and freezes, causing the motor to stall. If icing occurs with any of the pumps, shut off the air supply to all pumps and allow the ice to thaw.

### CAUTION

Operating the system without all the pumps functioning can damage the system.

To minimize icing:

- Reduce the moisture in your compressed air by using an air dryer or filter, which traps water.
- Main air line should slope slightly downward so water collects and can be drained at the end of the line.
- Plumb a drop line from the top of each main air line. Install an automatic drain or drain valve at the bottom of each drop.
- Ensure air motor exhaust tube is outside of a refrigerated area.

## Preventive Maintenance

Your system operating conditions determine how often maintenance is required. Record when and what kind of maintenance is needed to create a maintenance schedule.

## Flushing the System

### WARNING



Read warnings, page 2. Follow **Grounding** instructions, page 11.

- The equipment was tested with water. Flush the system before loading material.
- Flush regularly to avoid having material dry and build up and possibly contaminate new material or cause blockages.
- Flush at the lowest pressure possible. Check connectors for leaks and tighten them if necessary.

To flush the system:

1. Load a bin containing water, compatible solvent, or cleaning solution that can dissolve the material and clean the system. Follow the procedure for **Loading the Bin**, page 15.



Use solvent that is compatible with the equipment wetted parts and the material you will dispense. See Technical Data in your pump manual for wetted parts and consult your material supplier.

2. Operate the pumps and circulate the cleaning fluid through the system for about 1-2 minutes or until the equipment is clean.
3. Remove the bin of cleaning fluid from the frame. Follow the procedure for **Unloading the Bin**, page 15.
4. Operate the pumps at low pressure to remove excess solvent.
5. Follow the **Pressure Relief Procedure**, page 14.

## Cleaning Pumps

1. Follow the **Pressure Relief Procedure**, page 14.
2. Remove pumps from plate and frame.
3. See the pump manual for maintenance and service procedures.

## Cleaning Ram Plate and Seal

1. Follow the **Pressure Relief Procedure**, page 14.  
Keep the air supply to the ram open.

2. Raise the ram plate.
3. Remove the inflatable seal and corner seals from the ram plate.
4. Clean the seals and ram plate with a compatible cleaning fluid.
5. Apply a generous amount of lubricant to the ram plate channel and seals.
6. Install the inflatable seal and corner seals on the ram plate. Position the inflatable seal so that the seal bottom is angled into the ram plate channel.

## Troubleshooting

Problem	Cause	Solution
Ram plate will not raise or lower.	Air pressure to the ram is too low.	Increase RAM UP air pressure.
	Ram plate is stuck in bin.	<ol style="list-style-type: none"> <li>1. Deflate seal. Turn SEAL INFLATE to OFF.</li> <li>2. Switch to RAM UP position. When it is raised, check for obstructions in bin or quality of seal.</li> </ol>
Pump(s) will not operate.	Air pressure to the pump(s) is too low.	Increase PUMP air pressure to a minimum of 30 psi (207 kPa, 2.1 bar). Refer to pump manual.
Pumps will not prime or are cavitating.	Ram plate is not in contact with material.	<ul style="list-style-type: none"> <li>• Check SEAL and RAM DOWN pressures and adjust until you have a quality seal.</li> <li>• Refer to troubleshooting in pump manual.</li> </ul>
	Material bag was sucked into pump.	Shut off air to pumps, deflate seal, and raise ram to clear pump intake.
Premature seal wear.	SEAL and RAM DOWN air pressures are too high.	Adjust SEAL and RAM DOWN air pressures until you have proper seal and pump operation.
Material leaking past seal.	RAM DOWN air pressure is too high.	Reduce RAM DOWN pressure while ensuring pumps are operating properly.
	Container bag is not pulled taut or clamped for smooth bin walls.	Pull bag tight and secure in place.
	Corner seals are not in place.	Install corner seals.
Too much material left in bottom of bin.	Container bag is bunched up at bottom of bin	Reduce seal pressure while ensuring there is still a good seal.

# Service

 See FIG. 9. All models do not use the same parts.  
Refer to parts drawing for your model.

## Before Servicing

### WARNING



Never stand or work under the ram plate. See warnings, page 4.

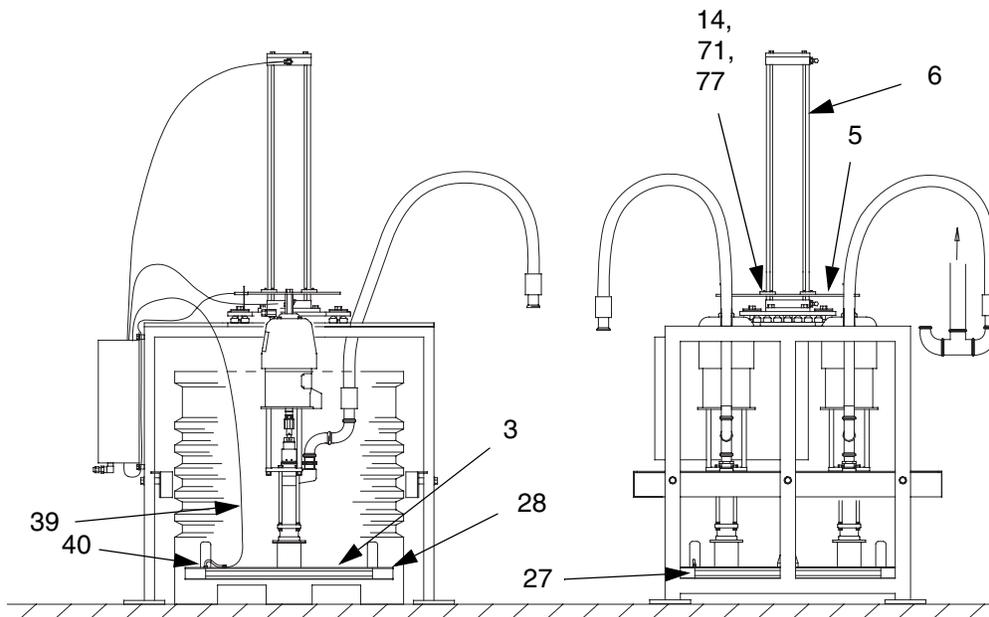
### WARNING



Read warnings, page 3, and follow the **Pressure Relief Procedure** whenever you:

- are instructed to relieve pressure
- stop operation
- check, clean, or service any of the equipment

1. Remove the bin from the frame.
2. Follow the **Pressure Relief Procedure**, page 14.
3. Lower the ram plate and deflate the seal
4. Shut off the air supply to the system.



TI13115A

FIG. 9

## Replacing Cylinder Bearing

CAUTION
To avoid damaging equipment, replace each bearing individually. Do not remove all four bearings at the same time.

1. Follow the **Before Servicing** procedure, page 18.
2. Remove cylinder guide bearings (14) on top of the air motor mounting plate (5):
  - **Part No. 248740 and 248739:** remove screws (83) and washers (71).
  - **Part No. 248741:** remove screws (77) and washers (71).
  - **Part No. 248654 and 248745:** remove screws (11) and washers (12).
3. Install cylinder guide bearings (14) on top of the air motor mounting plate (5):
  - **Part No. 248740 and 248739:** use screws (83) and washers (71).
  - **Part No. 248741:** use screws (77) and washers (71).
  - **Part No. 248654 and 248745:** use screws (11) and washers (12).



The open arch in the cylinder guide bearings (14) fits around tie rods on the air cylinder (6).

4. Repeat steps 2-3 as needed to replace additional cylinder bearings.
5. Raise and lower the ram plate to check the bearings.

## Replacing Ram Plate Seal or Corner Seals

1. Follow the **Before Servicing** procedure, page 18.

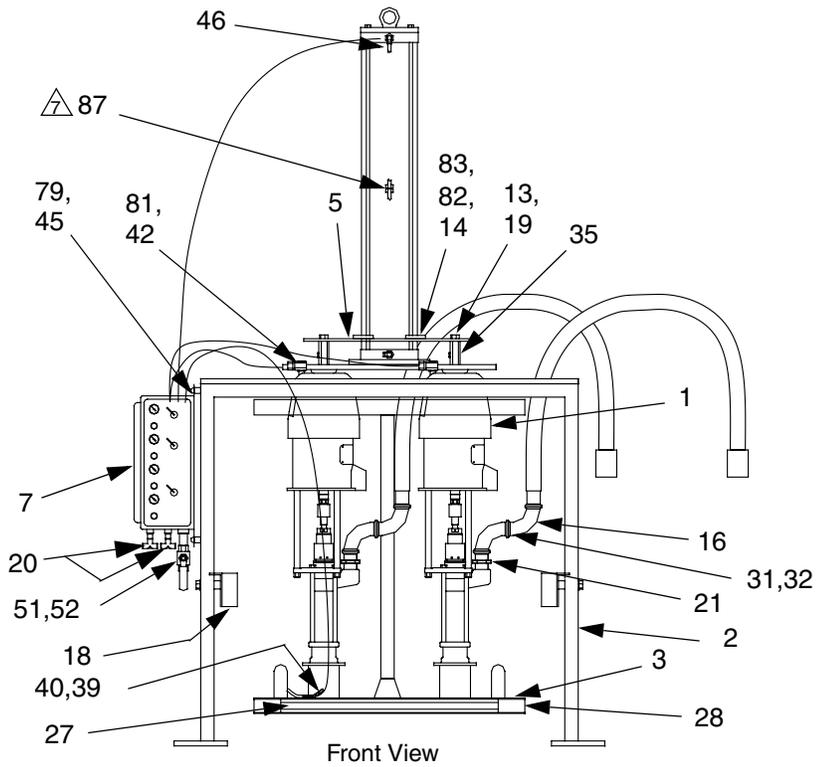
2. **If you are only replacing the corner seals (28) and not the ram plate seal (27),** remove the rivet and replace each corner seal individually. Do not remove all 4 corner seals at the same time or the ram plate seal may move out of place. Be careful not to puncture the ram plate seal. Skip to step 8.

**If you are replacing the ram plate seal (27),** remove the rivets, then remove all 4 corner seals (28). Check the corner seals for damage and replace if necessary.

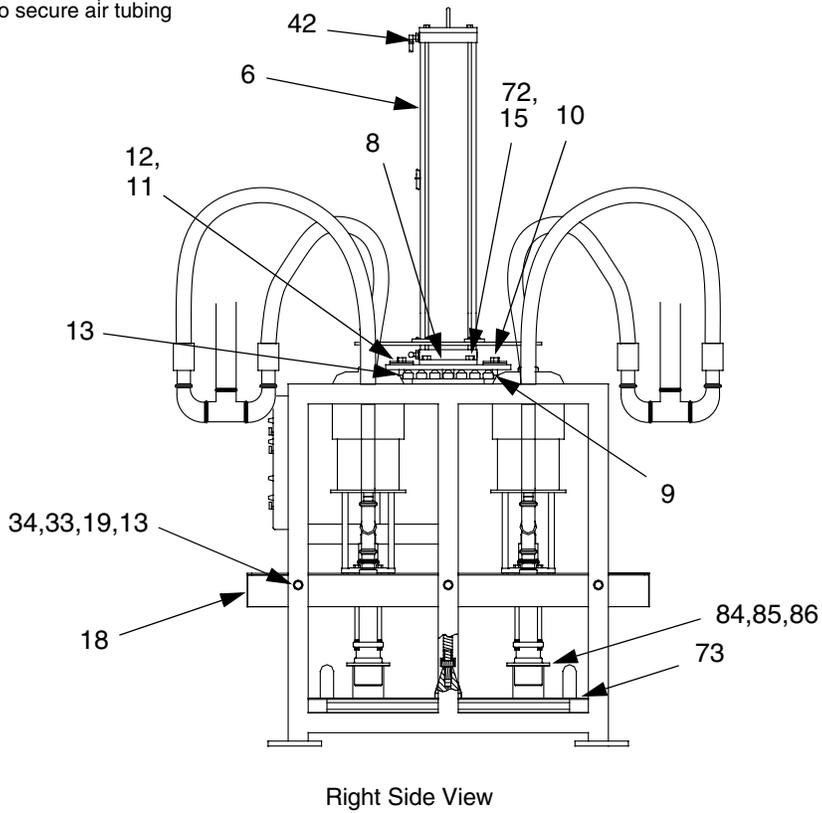
3. Disconnect the tube fitting (40) from the seal air supply tube (39).
4. Remove the ram plate seal (27), using a blunt-end tool to avoid damaging the seal. Carefully disengaging the air stem from the hole in the ram plate (3).
5. Insert the air stem of the new seal (27) into the ram plate (3) hole. To avoid puncturing the new seal, carefully slide the seal in place around the ram plate.
6. Install the four corner seals (28) with rivets.
7. Connect the air supply tube (39) to the tube fitting (40).
8. Check operation by inflating and deflating the seal. Check for air leaks. After loading a bin of material into the frame, check whether material leaks around the ram plate and seals.

# Part No. 248740

4 Pump BES System



⚠ Use tie straps 88, 89 to secure air tubing



**Part No. 248740**

4 Pump BES 300 System

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	949444	PUMP, 10:1 Sanitary Bulldog; see manual 306916	4	39	590385	TUBE, poly-flo (15')	*
2	15E339	FRAME	1	40	115743	FITTING	1
3	570191	PLATE, ram	1	42	512684	FITTING, elbow, tube	6
5	626656	PLATE, mounting, motor	1	45	112944	SCREW, cap BTN HD	7
6**	15D492	CYLINDER, air, SST	1	46	590570	TUBE, polyethylene; 1/2" OD (30')	*
7	15E523	CONTROL PANEL, pneumatic; see page 30	1	51	510073	FITTING, nipple, hex	1
8	626655	PLATE, mounting, air cylinder	1	52	512485	VALVE, Ball, SST	1
9	551274	CASTER, SST 125# 1.75"	18	69▲	290331	TAG, warning (not shown)	1
10	514331	SCREW, cap hex head	4	72	551363	WASHER, lock 5/8" SST	4
11	625596	WASHER, thrust SST	4	73	551691	RIVET, 3/8" x 2-1/2" SST	4
12	625595	BEARING, thrust; PTFE	4	76	626046	BIN, corner (not shown)	4
13	514334	NUT, 3/4-10 Nylock	8	79	104034	WASHER, plain	4
14	625752	BEARING, cylinder guide	4	81	502033	FITTING, bushing pipe	4
15	513386	SCREW, cap hex head	4	82	170772	Washer, plain	8
16	513490	ELBOW	8	83	104119	SCREW, cap hex head	8
18	626520	GUIDE, box side	2	84	103975	WASHER, lock	16
19	514332	WASHER, 3/4" SST 1.875"	10	85	102471	SCREW, cap hex head	16
20	119485	TEE, Union, Tube, 1/2 in.	2	86	601809	GASKET, sanitary, ram	4
21	514887	ADAPTER, tri-clamp	4	87	C78216	CLAMP, TY-RAP	1
27	116464	SEAL	1	88	103473	STRAP, tie, wire (not shown)	12
28	551065	SEAL, corner	4	89	103546	STRAP, tie, wire (not shown)	3
31	500984	CLAMP, 2" tri-clamp	8				
32	512332	GASKET, S-clamp; buna-N	8				
33	514594	ROD, threaded stud	6				
34	514819	SPRING	6				
35	625903	ROD, mounting, motor	4				

\* Bulk Tubing

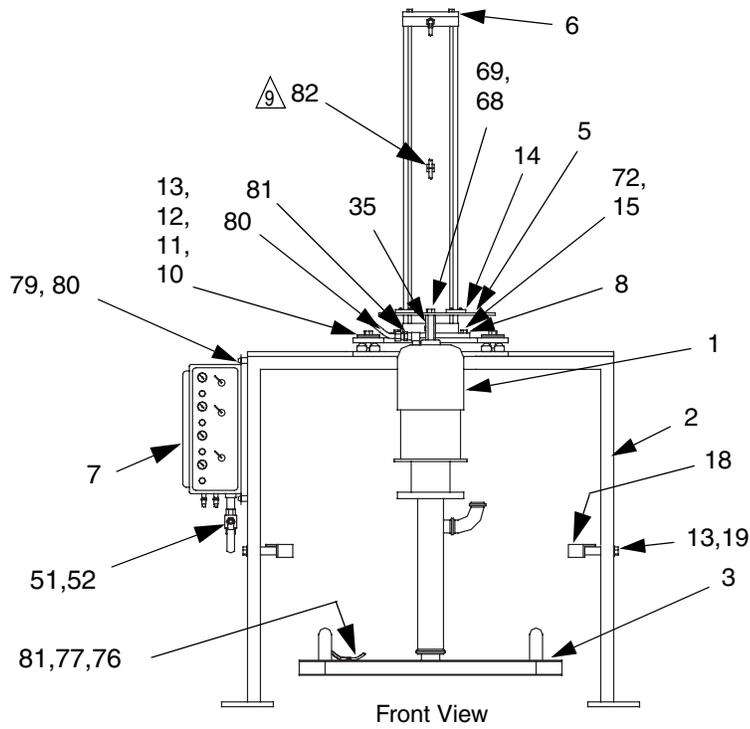
† Recommended spare parts

\*\* Air Cylinder repair kit is 15D519

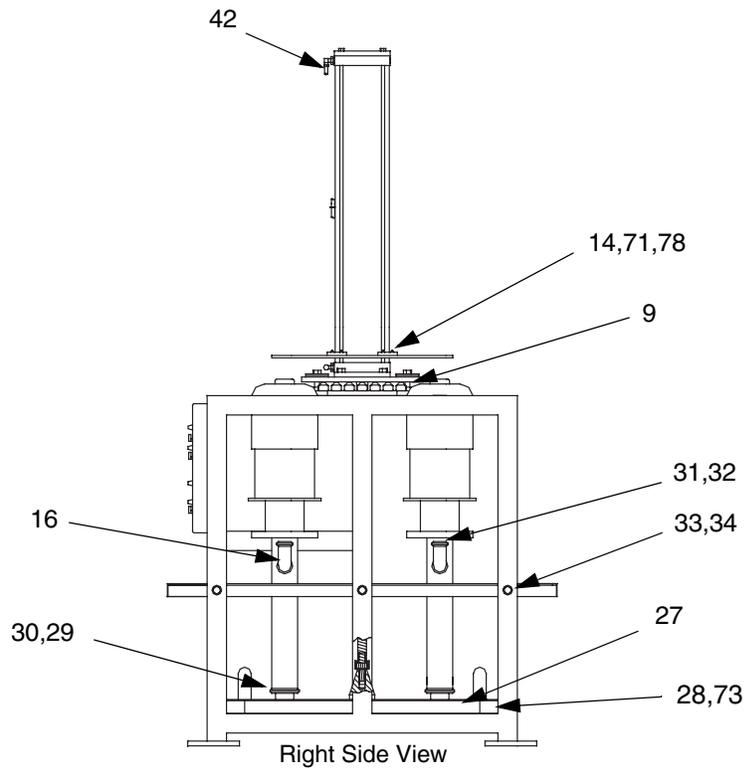
▲ Replacement Danger and Warning labels, tags and cards are available at no cost.

# Part No. 248739

2 Pump BES 300 System



 Use tie straps 83, 84 to secure air tubing.



## Part No. 248739

## 2 Pump BES 300 System

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	949704	PUMP, Sanitary FT14; see manual 308076 for pump and 307592 for air motor	2	46	590570	TUBE, polyethylene, 1/2" OD; 25' (7.62 m) (not shown)	*
2	15E339	FRAME	1	47	949412	CLAMP, bag (not shown)	4
3	949417	PLATE, ram	1	48	625988	TUBE, wand (not shown)	4
5	626136	PLATE, mounting, motor	1	50	070313	LUBRICANT, grease (not shown)	
6**	15D492	CYLINDER, SST	1	51	510073	FITTING, nipple hex	1
7	15E523	CONTROL PANEL, pneumatic; see page 30	1	52	512485	VALVE, ball SST	1
8	625747	PLATE, mounting, air cylinder	1	57	626046	CORNER, bin (not shown)	4
9	551274	CASTER, SST	22	63▲	290331	LABEL, warning (not shown)	1
10	514331	SCREW, cap hex head	4	68	551365	SCREW, 3/4-10 x 2" hex HD	2
11	625596	WASHER, thrust SST	4	69	551364	WASHER, lock 3/4" SST	2
12	625595	BEARING, thrust; PTFE	4	71	170772	WASHER, plain	8
13	514334	NUT, 3/4-10 Nylock SST	12	72	551363	WASHER, lock 5/8" SST	4
14	625752	BEARING, cylinder guide	4	73	551691	RIVET, 3/8" x 1/2" SST	4
15	513386	SCREW, cap hex head	4	76	598449	BULKHEAD, union	1
16	513490	FITTING, elbow	2	77	590385	TUBE, poly-flo (10')	*
18	626520	GUIDE, box	2	78	104119	SCREW, cap, hex HD	8
19	514332	WASHER, 3/4" SST 1.875" OD	12	79	112944	SCREW, cap, btn HD	7
27	514984	SEAL, inflatable	1	80	104034	WASHER, plain	4
28	551065	SEAL, corner	4	81	502033	FITTING, bushing pipe	3
29	510490	TRI-CLAMP, 4"	2	82	C78216	CLAMP, ty-rap	1
30	513548	GASKET, tri-clamp	2	83	103473	STRAP, tie wire	12
31	500984	TRI-CLAMP; 2"	4	84	103546	STRAP, tie wire	3
32	512332	GASKET, S-clamp	4				
33	514594	ROD, threaded stud	6				
34	514819	SPRING, coil SST	6				
35	626051	ROD, mounting, motor	2				
42	512684	FITTING, elbow tube	8				
45	501630	SCREW, cap, SST hex (not shown)	4				

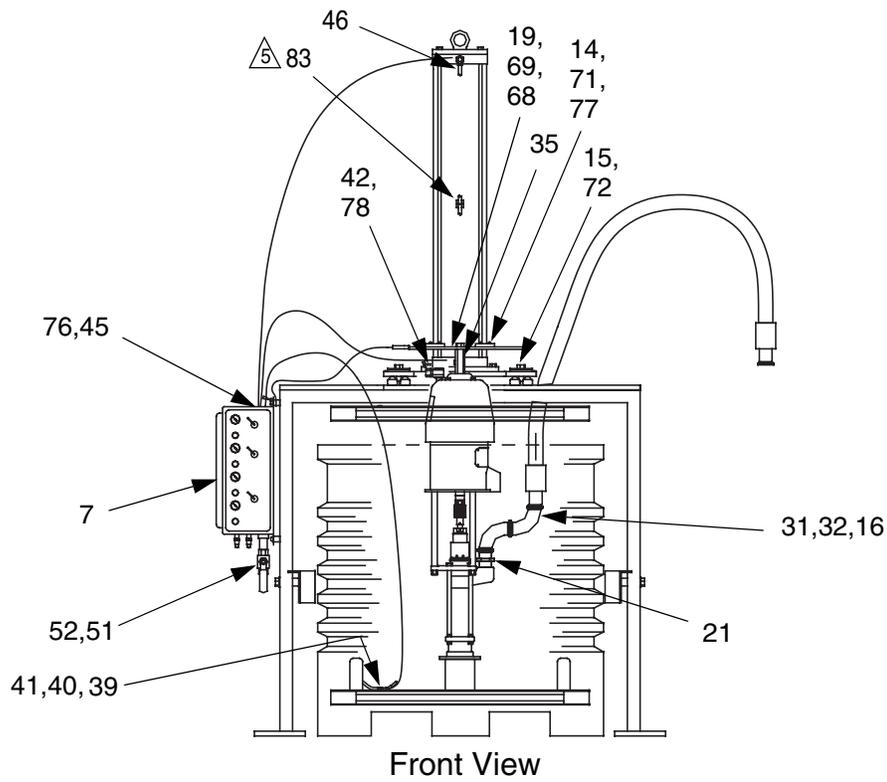
\* Bulk Tubing

\*\* Air Cylinder repair kit is 15D519

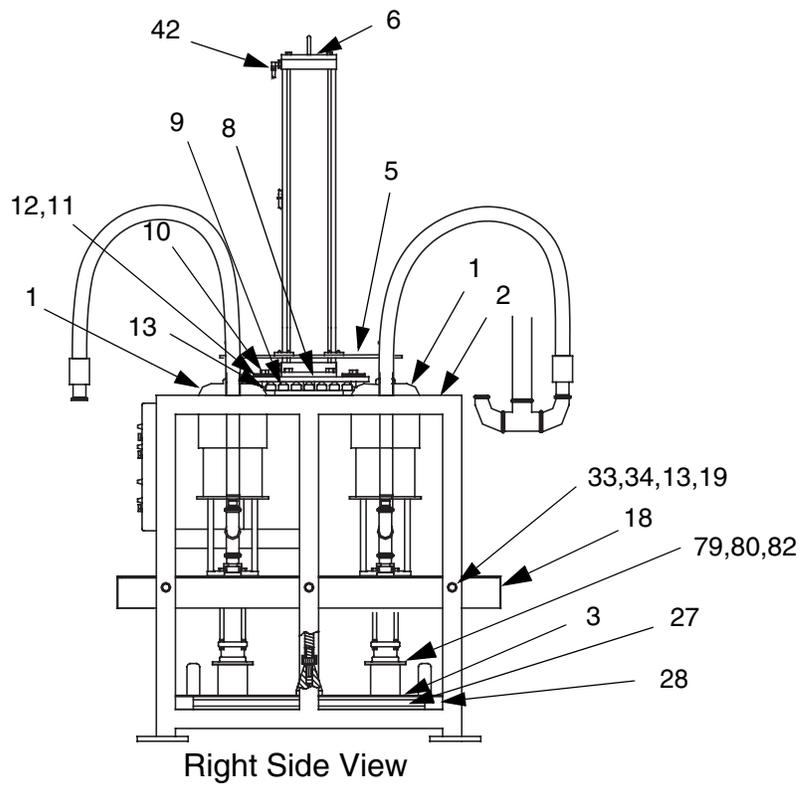
† Recommended spare parts

▲ Replacement Danger and Warning labels, tags and cards are available at no cost.

# Part No. 248741



⚠ Use tie straps 84, 85 to secure air



## Part No. 248741

2 Pump BES 300 System, with flow meter option

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	949444	PUMP, 10:1 Sanitary Bulldog; see manual 306916	2	45	112944	SCREW; cap, btn, HD	7
2	15E339	FRAME	1	46	590570	TUBE, polyethylene; 1/2" OD; 25' (7.62 m)	*
3	949884	PLATE, ram	1	51	510073	FITTING, nipple hex	1
5	626136	PLATE, mounting, motor, SST	1	52	512485	VALVE, ball SST	1
6**	15D492	CYLINDER, air, SST	1	68	551365	SCREW; 3/4-10 x 2"	2
7	15E523	BOX, pneumatic	1	69	551364	WASHER, lock 3/4" SST	2
8	625747	PLATE, mounting, air cylinder	1	71	170772	WASHER, plain	8
9	551274	CASTER, SST 125#, 1.75D	22	72	551363	WASHER, lock SST	4
10	514331	SCREW; cap, Hex Head	4	73	551691	RIVET, 3/8" x 2-1/2" SST	4
11	625596	WASHER, thrust SST	4	76	104034	WASHER, plain	4
12	625595	BEARING, thrust	4	77	104119	SCREW, cap hex head	8
13	514334	NUT; 3/4-10, nylock SST	12	78	502033	FITTING, bushing pipe	2
14	625752	BEARING, cylinder guide	4	79	103975	WASHER, lock	8
15	513386	SCREW, cap hex head	4	80	102471	SCREW, cap hex HD	8
16	513490	FITTING, elbow	4	82	601809	GASKET, sanitary ram	2
18	626520	GUIDE, box side	2	83	C78216	CLAMP, ty-rap	1
19	514332	WASHER, 3/4" SST 1.875 OD	12	84	103473	STRAP, tie, wire (not shown)	12
21	514887	ADAPTER; tri-clamp	2	85	103546	STRAP, tie, wire (not shown)	3
27	551413	SEAL, inflatable	1	169▲	290331	LABEL, warning (not shown)	1
28	551065	SEAL, corner	4				
31	500984	TRI-CLAMP; 2"	4				
32	512332	GASKET; S-clamp; buna-N	4				
33	514594	ROD, threaded stud	6				
34	514819	SPRING, coil SST	4				
35	625903	ROD, mounting, motor	2				
39	590385	TUBE, poly-flo (15')	*				
40	608789	FITTING; connector male	1				
41	608786	CONNECTOR; 3/8" tube x 1/4" npt(f); nylon	1				
42	512684	FITTING, elbow tube	4				

\* Bulk Tubing

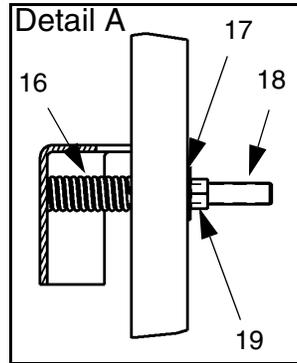
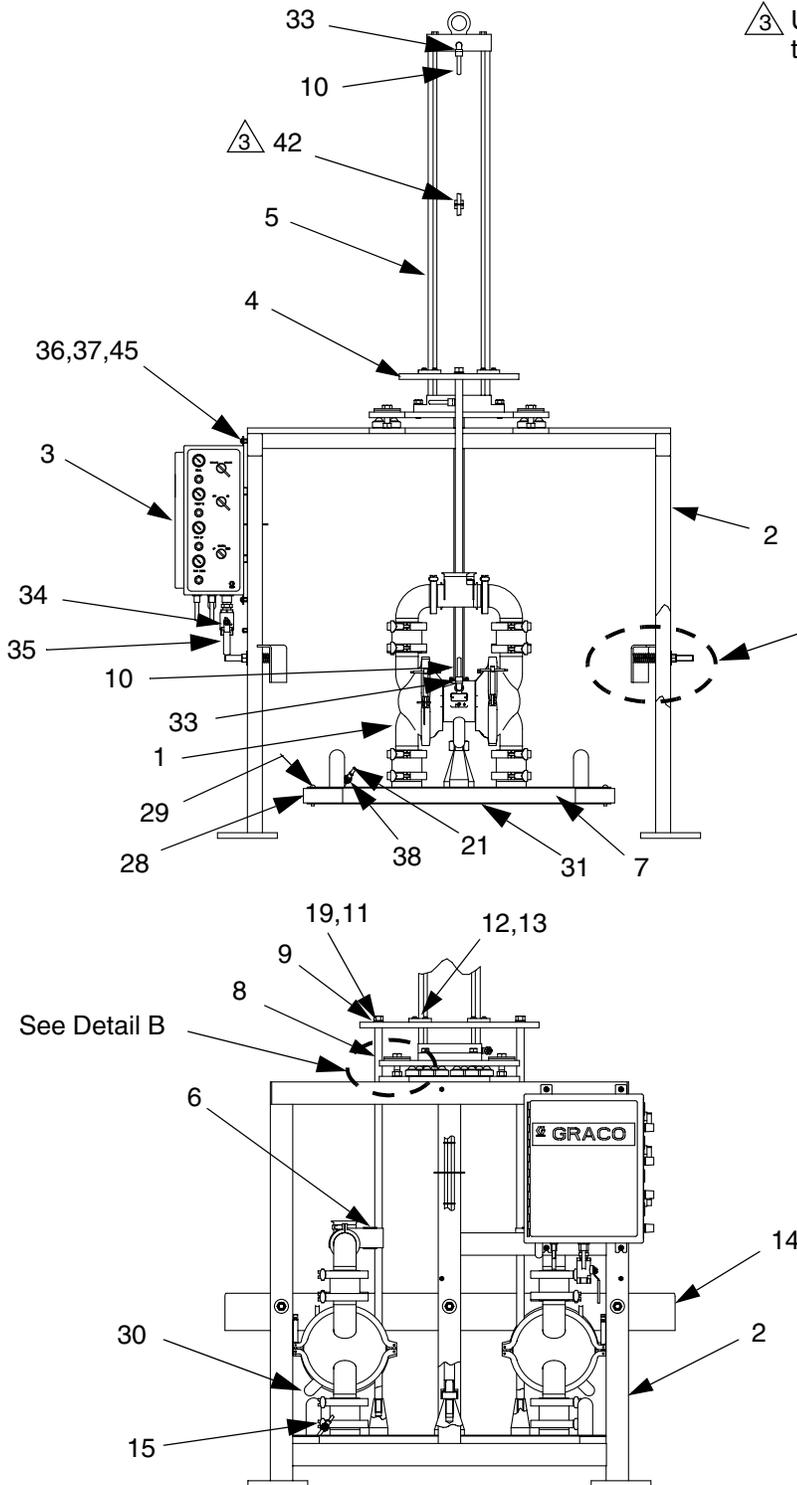
\*\* Air Cylinder repair kit is 15D519

† Recommended spare parts

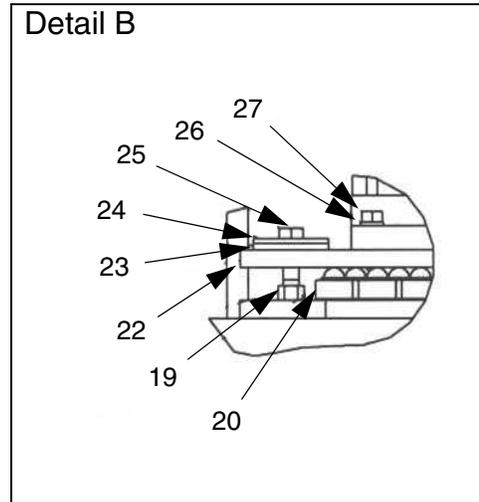
▲ Replacement Danger and Warning labels, tags and cards are available at no cost.

# Part No. 248654

⚠ Use tie straps 43, 44 to secure air tubing.



See Detail A



**Part No. 248654**

2 Pump BES 300 System, without flow meter option

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	248273	PUMP, ram, sanitary, see manual 308149	2	26	551363	WASHER, lock 5/8" SST	4
2	15E339	FRAME	1	27	513386	SCREW, cap hex head	4
3	15E523	BOX, pneumatic	1	28	551065	SEAL, corner	4
4	15E473	PLATE, guide, AODD	1	29	551691	RIVET, 3/8" x 2 -1/2" SST	4
5**	15D492	CYLINDER, air, SST	1	30	512913	MUFFLER, poethylene 3/4" NPT	2
6	15E477	SUPPORT, pump, AODD	2	31	15E348	PLATE, ram, AODD	1
7	514984	SEAL, inflatable	1	33	512684	FITTING, elbow tube	4
8	15E472	ROD, tie AODD	2	34	510073	FITTING, nipple hex	1
9	551364	WASHER, lock 3/4" SST	2	35	512485	VALVE, ball SST	1
10	590570	TUBE, polyethelene, 1/2" OD (35')	*	36	112944	SCREW, cap btn hd	7
11	625752	BEARING, cylinder guide	4	37	107542	WASHER, lock, spring	4
12	104119	SCREW, cap, hex Head	8	38	598449	BULKHEAD, union	1
13	170772	WASHER, plain	8	39	949412	CLAMP, bag, (not shown)	4
14	626520	GUIDE, box side	2	40	625988	TUBE, wand (not shown)	4
15	510490	CLAMP, 4" tri-clamp	4	41	626046	BIN, corner (not shown)	4
16	514819	SPRING, coil SST	6	42	C78216	CLAMP, ty-rap	1
17	514332	WASHER, 3/4" SST 1.875	11	43	103473	STRAP, tie, wire (not shown)	12
18	514594	ROD, threaded stud	6	44	103546	STRAP, tie, wire (not shown)	3
19	514334	NUT, 3/4-10 Nylock SST	17	45	104034	WASHER, plain	4
20	551274	CASTER, SST 125# 1.75D	20	53▲	188621	LABEL, warning (not shown)	1
21	590385	TUBE, poly-flo (10')	*				
22	625747	PLATE, cyl mount	1				
23	625595	BEARING, thrust	4				
24	625596	WASHER, thrust	4				
25	514331	SCREW, cap, hex head	4				

\* Bulk tubing

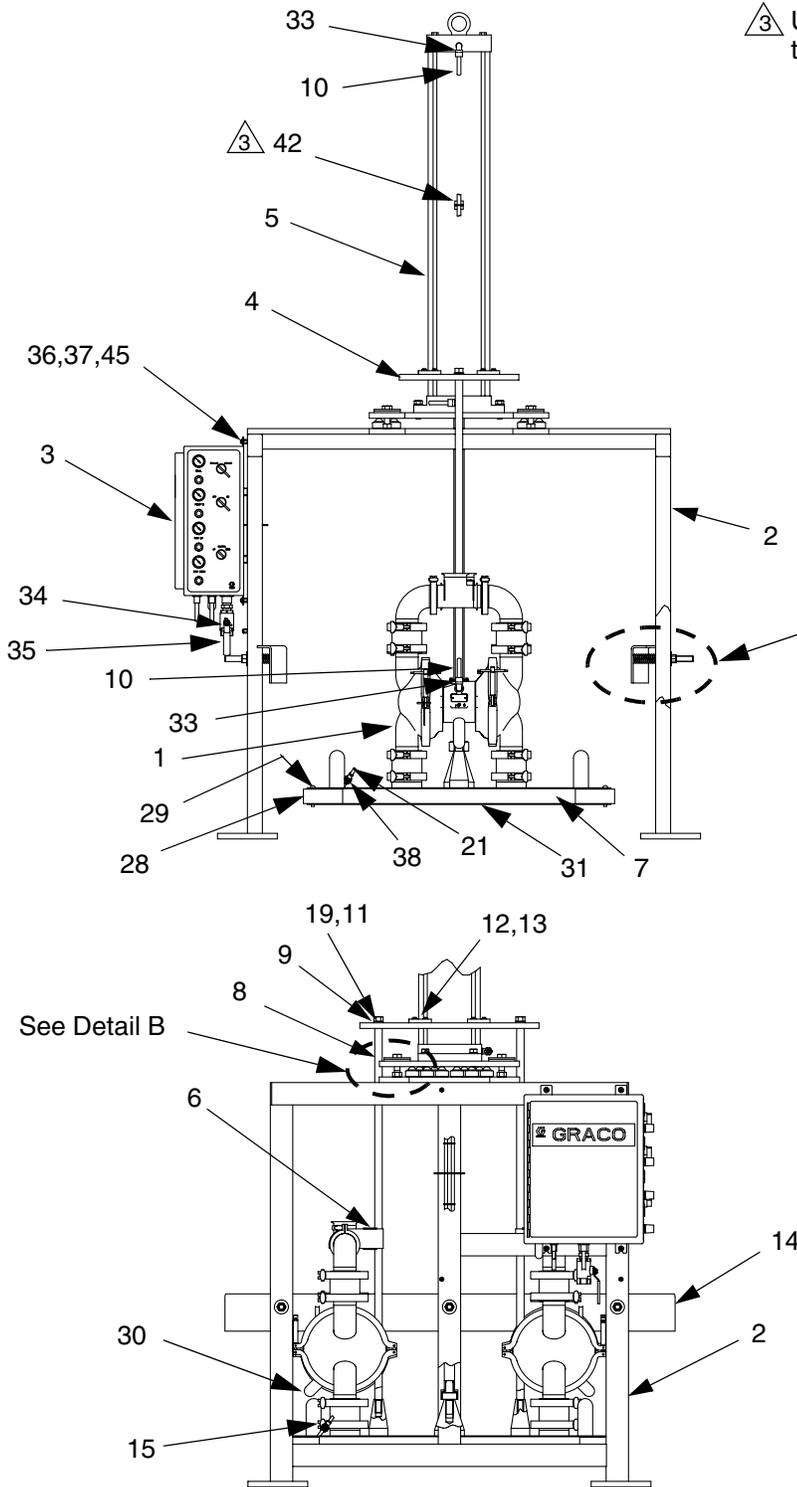
† Recommended spare parts

\*\* Air Cylinder repair kit is 15D519

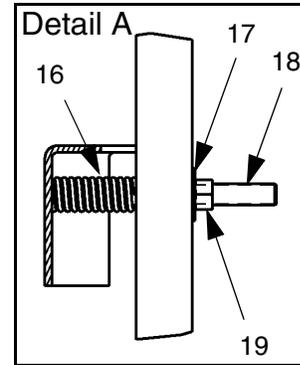
▲ Replacement Danger and Warning labels, tags and cards are available at no cost.

# Part No. 248745

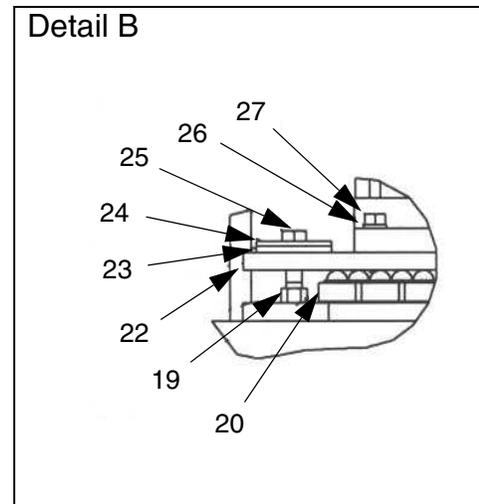
2 Pump BES 300 System



③ Use tie straps 43, 44 to secure air tubing.



See Detail A



See Detail B

## Part No. 248745

2 Pump BES 300 System, without flow meter option

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	248274	PUMP, ram sanitary	2	27	513386	SCREW, cap hex head	4
2	15E339	FRAME	1	28	551065	SEAL, corner	4
3	15E523	BOX, pneumatic	1	29	551691	RIVET, 3/8" x 2-1/2"	4
4	15E473	PLATE, guide, AODD	1	30	512913	MUFFLER, polyethylene 3/4" NPT	2
5**	15D492	CYLINDER, SST	1	31	15E348	PLATE, ram AODD	1
6	15E477	SUPPORT, pump, AODD	2	33	512684	FITTING, elbow, tube	4
7	514984	SEAL, inflatable	1	34	510073	FITTING, nipple hex	1
8	15E472	ROD, tie, AODD	2	35	512485	VALVE, ball, SST	1
9	551364	WASHER, lock 3/4" SST	2	36	112944	SCREW, cap, BTN HD	7
10	590570	TUBE, polyethylene, 1/2" OD (35')	*	37	107542	WASHER, lock, spring	4
11	625752	BEARING, cylinder guide	4	38	598449	BULKHEAD, union	1
12	104119	SCREW, cap hex head	8	39	949412	CLAMP, bag, BES300 weldment	4
13	170772	WASHER, plain	8	40	625988	TUBE, wand	4
14	626520	GUIDE, box side	2	41	626046	BIN, corner	4
15	510490	CLAMP, 4" tri-clamp	4	42	C78216	CLAMP, ty-rap	1
16	514819	SPRING, coil, SST	6	43	103473	STREP, tie, wire	12
17	514332	WASHER, 3/4" SST 1.875 OD	11	44	103546	STRAP, tie, wire	3
18	514594	ROD, threaded stud	6	45	104034	WASHER, plain	4
19	514334	NUT, 3/4-10 nylock SST	17	53▲	188621	LABEL, warning (not shown)	1
20	551274	CASTER, SST 125#, 1.75	20				
21	590385	TUBE, poly-flo (10')	*				
22	625747	PLATE, cyl mount SS	1				
23	625595	BEARING, thrust	4				
24	625596	WASHER, thrust SST	4				
25	514331	SCREW, cap, hex head	4				
26	551363	WASHER, lock 5/8" SST	4				

\* Bulk tubing

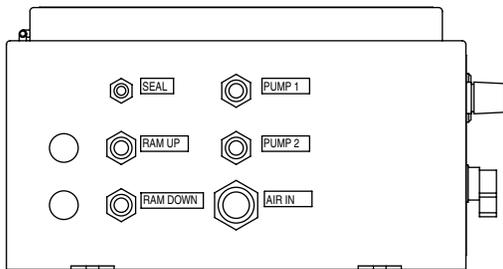
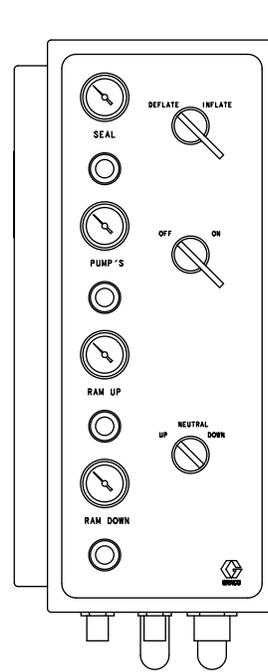
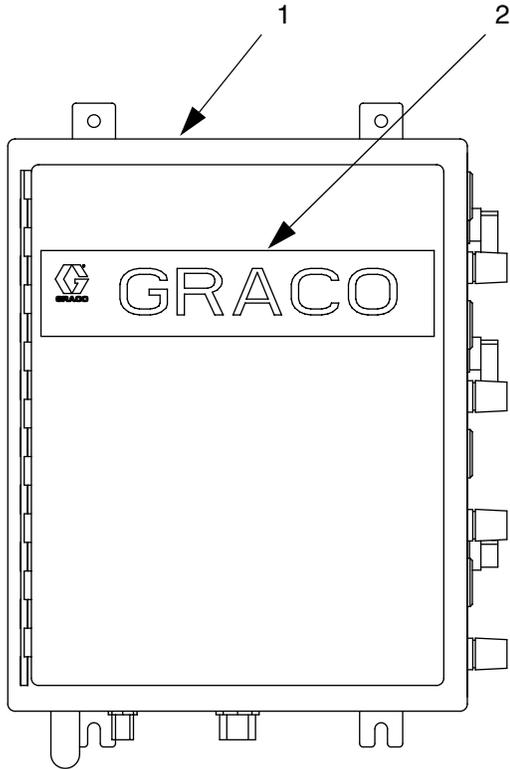
† Recommended spare parts

\*\* Air Cylinder repair kit is 15D519

▲ Replacement Danger and Warning labels, tags and cards are available at no cost.

# Pneumatic Control Box

Part No. 15E523



**Part No. 15E523**

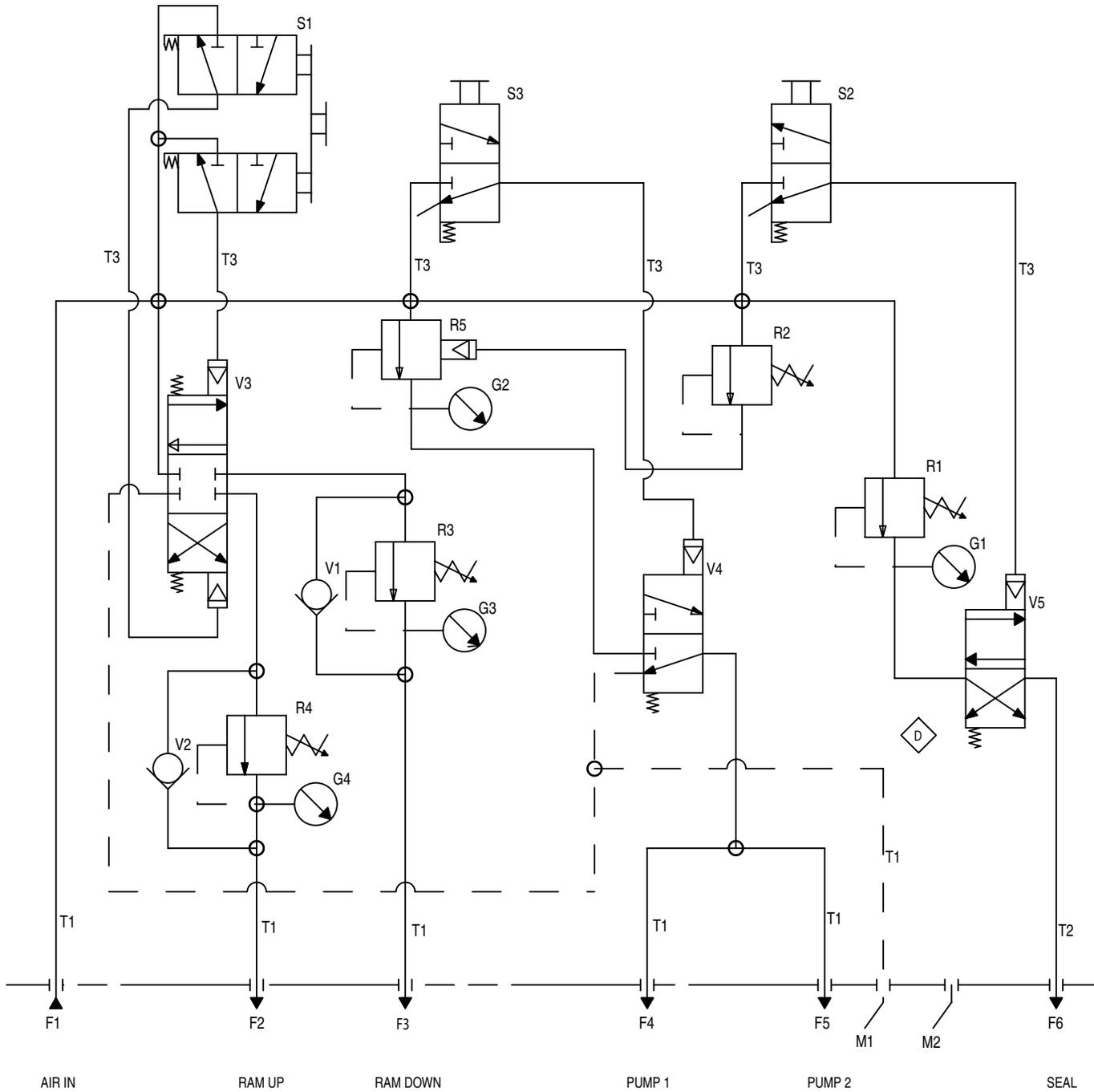
2 Pump BES 300 System, without flow meter option

<b>Ref. No.</b>	<b>Part No.</b>	<b>Description</b>	<b>Qty.</b>	<b>Ref. No.</b>	<b>Part No.</b>	<b>Description</b>	<b>Qty.</b>
1		ENCLOSURE, with back panel	1	11		VALVE, air pilot operated (not shown)	1
2	15E562	LABEL	1			SWITCH, pneumatic, 2 position (not shown)	2
3	15E563	LABEL, instructions (not shown)	1	12		FITTING, bulkhead, 3/4" NPT (not shown)	1
4	512896	REGULATOR (not shown)	4	13		FITTING, bulkhead, 3/8" tube (not shown)	1
5		GAUGE, 160 PSI (not shown)	4	14		FITTING, bulkhead, 1/2" tube (not shown)	2
6		VALVE, check 3/8" (not shown)	2	15		MUFFLER, 1/2" NPT (not shown)	2
7		VALVE, air pilot, 3 position (not shown)	1	16		TUBE, 1/2" O.D. (not shown)	AR
8		VALVE, air pilot operated (not shown)	1	17		TIUBE, 3/8" O.D. (not shown)	AR
9		SWITCH, 3 position (not shown)	1	18		TUBE, 5/32" O.D. (not shown)	AR
10		REGULATOR (not shown)	1	19			

# Pneumatic Diagram

Part No. 15E523

## SCHEMATIC



# Technical Data

BES 300 Part No.	248654	248740	248739	248741	248745
Maximum Working Fluid Pressure	120 psi (.84 MPa, 8.4 bar)	1000 psi (7 MPa, 70 bar)	430 psi (3 MPa, 30 bar)	1000 psi (7 MPa, 70 bar)	120 psi (.84 MPa, 8.4 bar)
Compressed air requirement	80-120 psi (0.55-0.84 MPa, 5.5-8.4 bar)	80-100 psi (0.55-0.7 MPa, 5.5-7 bar)	80-100 psi (0.55-0.7 MPa, 5.5-7 bar)	80-100 psi (0.55-0.7 MPa, 5.5-7 bar)	80-120 psi (0.55-0.84 MPa, 5.5-8.4 bar)
Pneumatic control panel					
Maximum input air	120 psi (0.84 MPa, 8.4 bar)	100 psi (0.7 MPa, 7 bar)	100 psi (0.7 MPa, 7 bar)	100 psi (0.7 MPa, 7 bar)	120 psi (0.84 MPa, 8.4 bar)
Air inlet - air controls	3/4 npt(f)	3/4" npt(f)	3/4" npt(f)	3/4" npt(f)	3/4" npt(f)
Air inlet - pump	1/2" npt(f)	1" npt(f)	1" npt(f)	1" npt(f)	1/2" npt(f)
Fluid displacement	1.03 gal./cycle (ea. pump)	.14 gal./cycle (ea. pump)	.23 gal./cycle (ea. pump)	.14 gal./cycle (ea. pump)	1.03 gal./cycle (ea. pump)
Flow rate	120 GPM @ 60 CPM	17 GPM @ 60 CPM	27.6 GPM @ 60 CPM	34 GPM @ 60 CPM	120 GPM @ 60 CPM
Pressure ratio	1:1	10:1	4.3:1	10:1	1:1
Air consumption	~0.8 SCFM per GPM @ 70 psi (.48 MPa, 4.8 bar) (ea. pump)	~3.5 SCFM per GPM @ 70 psi (.48 MPa, 4.8 bar) (ea. pump)	~1.8 SCFM per GPM @ 70 psi (.48 MPa, 4.8 bar) (ea. pump)	~3.5 SCFM per GPM @ 70 psi (.48 MPa, 4.8 bar) (ea. pump)	~0.8 SCFM per GPM @ 70 psi (.48 MPa, 4.8 bar) (ea. pump)
Pump Outlet	3" tri-clamp	2" tri-clamp	2" tri-clamp	2" tri-clamp	3" tri-clamp

 See your component manuals for a list of wetted parts and other technical data.

# 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.

**THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.**

Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

**GRACO MAKES NO WARRANTY, AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IN CONNECTION WITH ACCESSORIES, EQUIPMENT, MATERIALS OR COMPONENTS SOLD BUT NOT MANUFACTURED BY GRACO.** These items sold, but not manufactured by Graco (such as electric motors, switches, hose, etc.), are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Graco, or otherwise.

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## Graco Information

*TO PLACE AN ORDER*, contact your Graco distributor or call to identify the nearest distributor.

**Phone:** 612-623-6921 or **Toll Free:** 1-800-328-0211, **Fax:** 612-378-3505

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