## Instructions



## Ram Supply Unit

310526 rev.N

# Air Powered, 20 liter (5 gallon pail size)/30 liter 76 mm (3 in.) Dual Post, Unheated

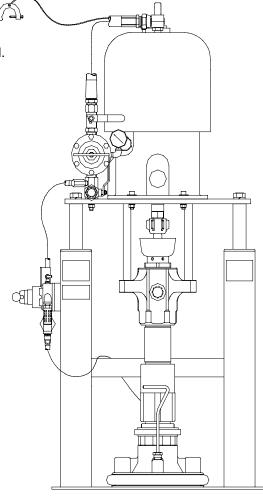
0.9 MPa, 9 bar (125 psi) Maximum Ram Inbound Air Pressure



### **Important Safety Instructions**

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

See page 2 for Table of Contents and page 7 for List of Models and Maximum Working Pressures.



Model 918372 Shown

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## **Symbols**

### Warning Symbol

### **WARNING**

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

### Caution Symbol

### **A** CAUTION

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

## **WARNING**



### **EQUIPMENT MISUSE HAZARD**

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



- This equipment is for professional use only.
- Read all instruction manuals, warnings, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are uncertain about usage, call your distributor.
- Do not alter or modify this equipment. Use only genuine Graco parts and accessories.
- Check the equipment daily. Repair or replace worn or damaged parts immediately.
- Do not exceed 9 MPa, 9 bar (125 psi) maximum inbound air pressure to the ram.
- Never exceed the recommended working pressure or the maximum air inlet pressure stated on your pump or in the **Pump Chart** on page 7.
- Be sure that all spray/dispensing equipment and accessories are rated to withstand the maximum working pressure of the pump. Do not exceed the maximum working pressure of any component or accessory used in the system.
- Route the hoses away from the traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 82° C (180° F) or below -40° C (-40° F).
- Do not kink or overbend hoses or use hoses to pull the equipment.
- Do not touch the metal heat sink when the surface is hot.
- Use fluids that are compatible with the equipment wetted parts. See the **Technical Data** sections of all the equipment manuals. Read the fluid manufacturer's warnings before using fluid or solvent in this pump.
- Always wear protective eyewear, gloves, clothing, and respirator as recommended by the fluid and solvent manufacturers.
- Wear hearing protection when operating this equipment.
- Comply with all applicable local, state and national fire, electrical and other safety regulations.

## **A** WARNING





#### SKIN INJECTION HAZARD

Spray from the spray gun, hose leaks, or ruptured components can inject fluid into your body and cause extremely serious injury, including the need for amputation. Splashing fluid 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/valve at anyone or at any part of the body.
- Do not put your hand or fingers over the spray tip/nozzle.
- Do not stop or deflect fluid leaks with your hand, body, glove, or rag.
- Always have the trigger guard on the gun when dispensing.
- Check the gun diffuser operation weekly. Refer to the gun manual.
- Be sure the gun/valve trigger safety operates before dispensing.
- Lock the gun/valve trigger safety when you stop dispensing.
- Follow the **Pressure Relief Procedure** on page 13 if the nozzle clogs, and before cleaning, checking or servicing the equipment.
- Tighten all fluid connections before operating the equipment.
- Check the hoses, tubes, and couplings daily. Replace worn, damaged, or loose parts immediately. Do not repair high pressure couplings; you must replace the entire hose.
- Fluid hoses must have spring guards on both ends, to help protect them from rupture caused by kinks or bends near the couplings.



#### FIRE AND EXPLOSION HAZARD

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

- Ground the equipment and the object being sprayed. Refer to Ground the System on page 11.
- If there is any static sparking while using the equipment, stop dispensing immediately. Identify and correct the problem.
- Provide fresh air ventilation to avoid the buildup of flammable fumes from solvent or material.
- Do not smoke in the dispense area.
- Extinguish all open flames or pilot lights in the dispense area.
- Do not turn on or off any light switch in the dispense area.
- Keep the dispense area free of debris, including solvent, rags, and gasoline.
- Keep a fire extinguisher in the work area.

## **WARNING**



#### **MOVING PARTS HAZARD**

Moving parts, such as the ram follower plate/pump inlet can pinch fingers.

- Keep clear of all moving parts when starting or operating the equipment.
- Keep hands and fingers away from the priming piston during operation and whenever the pump is charged with air.
- Keep clear of the follower plate, pump fluid inlet, and lip of the fluid container when raising or lowering the ram.
- Before checking or servicing the ram or pump, follow the Pressure Relief Procedure on page 13.



### **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 eyewear, gloves, clothing and respirator as recommended by the fluid and solvent manufacturer.

## **List of Models**

Ram Supply Unit Part No.	Pail	Size		3 in.) Ram er Wiper	Pump Part No.	Parts Page
	30 liter	5 gallon	PVC	Buna–N		
241082**	1			~	240945	18
241083**	1			~	222813	20
241084**	~			~	222833	22
241630**	~			~	245173	24
570153**	~		~		*	26
918371		~	~		237261	28
918372	~		~		240945	30
253293		~		~	240945	30
253375†		~		~	253376	32
918378		~		~	237707	34
918379		~	~		237707	35
918380		~		~	237708	36
918386	~			~	222813	38
970018	~		~		240945	40
234977	~		~		240945	40
970031	<b>/</b>		~		240945	42
970247	<b>V</b>			~	240945	44
970248	~			~	240945	46
970249	~			~	222813	48
970250	~			~	222833	50
C59774**	<b>V</b>			~	222832	52
C59777**	~			~	245173	54

<sup>\*</sup> Pump and air motor not available as an assembly. Refer to parts page.

<sup>\*\*</sup> These units are not CE certified.

<sup>†</sup> This unit includes heated plate with silicone wiper.

## **Pump Chart**

Pump Part No.	Ratio	Pump Model	Displacement Pump		Maximum Fluid Pressure			Maximum Pump Air Input			Pump Manual No.*	
			Model	CS	SST	МРа	bar	psi	МРа	bar	psi	
222813	55:1	Bulldog®Quiet	CM450	~		34	341	4950	0.6	6	90	308017
222832	20:1	King® Quiet	DF2400	~		14	138	2000	0.7	7	100	308151
222833	20:1	King®	DF2400	1		12	124	1800	0.6	6	90	308151
237261	31:1	Bulldog®	CM800	1		21	214	3100	0.7	7	100	308351
237707	50:1	King®	CM1000	~		31	310	4500	0.6	6	90	308355
237708	50:1	King®	CM1000		~	31	310	4500	0.6	6	90	308356
240945	65:1	King® Quiet	CM800	~		34	345	5000	0.6	6	90	308351
245173	56:1	King® Quiet	DF900		~	39	386	5600	0.7	7	100	308354

CS = carbon steel

SST = stainless steel

<sup>\*</sup>See the pump manual for additional specifications and parts information.

## **Typical Installation**

Α	Air Line Filter	L	Applicator Gun or Valve
В	Accessory Bleed-Type Master Air Valve	М	Gun Swivel
	(required)	N	Mounting Plate
С	Pump Bleed-Type Master Air Valve (required)	1	Wiper Seal
D	Pump Air Regulator	2	Pump Assembly
E	Main Air Line Supply	3	Ram Hand Valve
F	Air Manifold	4	Ram Module
G	Follower Plate Blowoff Button	5	Follower Gasket
Н	Ram Air Supply Hose	6	Follower Assembly
l	Air Line Lubricator	7	Grounding Wire (required; see page 11 for
J	Fluid Drain Valve (required)		installation instructions)
K	Fluid Regulator	8	Bleed Handle

### 918372 shown with 241086 and Follower Kit 918408

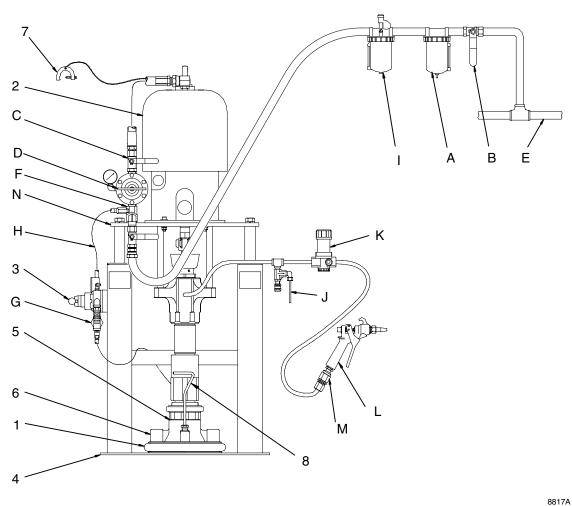


Fig. 1

## **Typical Installation**

The typical installation discussed below is only a guide for selecting and installing system components and accessories. Contact your Graco representative or Graco Technical Assistance for help in designing a system to suit your particular needs.

This air-powered ram extruder forces high viscosity fluids into the intake valve of the fluid pump. Some system accessories are discussed below. Accessories for use with this ram are listed in the **Accessories** section on page 63.

### Selecting a Location for the Ram

Refer to the Ram Mounting and Clearance Dimensions drawing (Fig. 7 on page 64) for ram mounting and clearance dimensions.

When selecting a location for the ram, keep the following in mind:

- 1. There should be sufficient space for installing and using the equipment. Make sure:
  - there is sufficient overhead clearance for the pump and ram when the ram is in the fully raised position.
  - the air regulators for the pump and ram are fully accessible.
- 2. You need to decide whether you will be bolting the ram to the floor, or bolting it to a mobile platform.
- 3. If you bolt the ram to the floor, make sure:
  - you will be able to level the base of the ram using metal shims.
  - you have anchors long enough to prevent the unit from tipping. Refer to the Dimensional Drawing on page 64 for more information.
- If you bolt the ram to a mobile platform, make sure:
  - you locate the platform on a surface where it won't roll around.
  - the ram and platform are stable in all operating positions, so the ram won't tip over.

### System Accessories

Before you install the system you should be familiar with the parts discussed below. For more information, refer to Fig. 1, A Typical Installation, on page 8.

#### Air and Fluid Hoses

When installing a system, make sure:

- all air and fluid hoses are properly sized for your system.
- you use only electrically conductive air and fluid hoses.
- you ground your equipment.
- the fluid hoses have spring guards on both ends.

To allow the gun freer movement, use a short whip hose between the main fluid hose and the gun.

#### **Air Line Modules**

### **A** WARNING



## PRESSURIZED FLUID HAZARD AND MOVING PARTS HAZARD

The pump bleed-type master air valve (C) is required in your system to relieve air trapped between this valve and the pump after the pump air regulator is closed. Trapped air can cause the pump to cycle unexpectedly, which could result

in serious bodily injury, including splashing in the eyes or on the skin and injury from moving parts.

2-Regulator Air Control Modules (918407) (Fig.1 on page 8)

The following components are included with the module:

- Pump Bleed-type Master Air Valve (C) is required in your system to relieve air trapped between it and the air motor when the valve is closed (see the WARNING above). Be sure the bleed valve is easily accessible from the pump, and is located downstream from the air regulator.
- Pump Air Regulator (D) controls pump speed and outlet pressure by adjusting the air pressure to the pump. Locate the regulator close to the pump, but upstream from the bleed-type master air valve.
- Ram Air Regulator (not shown) controls the air pressure to the ram.
- Ram Air Supply Hose (H) connects the ram air regulator to the air manifold.
- Air Manifold (F) divides the main air supply into separate lines for the pump and ram.

## **Typical Installation**

The following components are included with the module:

- Pump Bleed-type Master Air Valve is required in your system to relieve air trapped between it and the air motor when the valve is closed (see the WARNING above). This bleed valve should be easily accessible and located downstream from the air regulator. It can be used for a safety lockout.
- Pump Air Regulator controls pump speed and outlet pressure by adjusting the air pressure to the pump.
   It is located on the air control panel upstream from the bleed-type master air valve.
- Ram Air Regulator controls the air pressure to the ram. There are separate air regulators to control the ram pressure in the up and down directions.
- Ram Air Supply Hose connects the ram air regulator to the air manifold.
- FRL (filter, regulator, lubricator) conditions the air to the ram and the pump. The pump air regulator is located in this assembly. The ram air is taken from this assembly; an air line tube connects the FRL and the ram air control module.

#### **Air Line Accessories**

Install the following accessories in the order shown in the Typical Installation, using adapters as necessary:

 Pump runaway valve (not shown) senses when the pump is running too fast and automatically shuts off the air to the motor. A pump that runs too fast can be seriously damaged.

- Air line lubricator (I) provides automatic air motor lubrication (standard on the 4-Regulator Air Control Module).
- Air line filter (A) removes harmful dirt and moisture from the compressed air supply (standard on the 4-Regulator Air Control Module).
- Accessory bleed-type air valve (B) isolates the air line accessories for servicing. Locate upstream from all other air line accessories. This isolates the accessories for servicing.

#### Fluid Line Accessories

Install the following accessories in the positions shown in the Typical Installation drawing, using adapters as necessary:

- A fluid drain valve (J) is required in your system to relieve fluid pressure in the hose and gun (see the WARNING on page 9). When you install the fluid drain valve:
  - Screw the drain valve into the open branch of a tee mounted in the fluid line.
  - Install the drain valve pointing down, and so the handle points down when the valve is opened.
- A fluid regulator (K) controls fluid pressure to the gun/valve, and dampens pressure surges.
- A gun or valve (L) dispenses the fluid. The gun shown in the Typical Installation is a dispensing gun for highly viscous fluids.
- A gun swivel (M) allows freer gun movement.

### Installation

The installation procedure includes:

- grounding the system
- locating and installing the ram
- installing the pump in the ram (if pump and ram are not already assembled)

### **Ground the System**

### **WARNING**



### FIRE AND EXPLOSION HAZARD

When installing the pump, ground the system as explained below. Also read the section **FIRE AND EXPLOSION HAZARD** on page 4.

To reduce the risk of static sparking, ground the pump, object being sprayed, and all other spraying/dispensing equipment used or located in the spraying/dispensing area. Check your local electrical code for detailed grounding instructions for your area and type of equipment.

- 1. *Pump:* connect the ground wire and clamp to a true earth ground as shown in Fig. 2.
  - a. Loosen the grounding lug locknut (W) and washer (X).
  - b. Insert one end of the 1.5 mm<sup>2</sup> (12 ga) minimum ground wire (Y) into the slot in lug (Z) and tighten the locknut securely.
  - c. Connect the other end of the wire to a true earth ground.

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

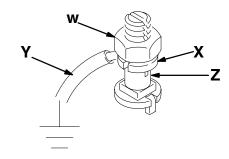


Fig. 2

- 2. Fluid and air hoses: use only electrically conductive materials and air hoses, and fluid hoses.
- 3. *Air compressor:* follow the manufacturer's recommendations.
- 4. *Spray gun or dispensing valve:* connect to a properly grounded fluid hose and pump.
- 5. Fluid supply container: according to local code.
- 6. Object being sprayed: according to local code.
- 7. *Dispense gun:* obtain grounding through the connection of the hose, or cable.
- All solvent pails used when flushing: according to your local code. Use only metal pails, which are conductive, placed on a grounded surface. Do not place the pail on a nonconductive surface, such as paper or cardboard, which interrupts the grounding continuity.

### Locating the Ram

To locate the ram, follow one of the procedures below. Refer to the Ram Mounting and Clearance Dimensions drawing (Fig. 7 on page 64) for ram mounting and clearance dimensions.

#### **Bolting the Ram to the Floor**

To install the ram in a permanent location:

- 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 pump and ram are fully accessible.
- 2. Level the base of the ram, using metal shims.
- 3. Using the holes in the base as a guide, drill holes for 1/2 in. (13 mm) anchors.
- 4. Bolt the ram to the floor anchors, which must be long enough to prevent the unit from tipping. Refer to the Dimensional Drawing on page 64.
- 5. Now you are ready to install the pump. Go to the **Installing the Pump** section on page 12.

#### Securing the Ram to a Mobile Platform

When performing the following procedure, use the Mobile Platform Kit (918414) to secure the ram to a mobile platform.

### Installation

To install the ram on a mobile platform:

- 1. Brace the platform so it remains stationary while you attach the ram to the platform.
- 2. Place the ram on the platform and line up the holes in its base with the holes in the platform.
- Secure the ram to the platform with the provided nuts and bolts.
- 4. Now you are ready to install the pump. Go to the **Installing the Pump** section on page 12.

### Installing the Pump

To install the pump, follow the procedure below. Refer to Fig. 1, A Typical Installation, on page 8, for more information.

- 1. Attach the pump assembly to the ram:
  - a. Place the pump assembly onto the pump mounting plate.
  - b. Secure the pump assembly to the pump mounting plate with the four 5/16 in.—18 socket head capscrews.
- 2. Install the pump air control module:
  - a. Insert the air manifold stud in the hole on the pump mounting plate (N) and secure with the lockwasher and nut provided.
  - b. Connect the air regulator kit's hose to the pump's air inlet.
- 3. Attach the ram air control module to the ram:
  - Insert the four supplied 1/4 in.-20 socket head capscrews, with lockwashers, through the hand lever valve.
  - b. Attach the screws to the mounting bracket.
  - c. Connect the air hose from the air control module to the air manifold.
  - d. Connect the ram air lines to the air control module:
    - Connect the airlines from the top side of the cylinders to the top fitting on the hand valve.

- ii. Connect air lines from the bottom side of the cylinders to the bottom fitting on the hand valve.
- 4. Attach the follower to the pump assembly:
  - Use the hand valve (3) on the pump air control to raise the pump assembly to the UP position (Fig. 3).

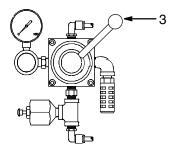


Fig. 3

- b. Make sure the o-ring is already in the follower plate. If it is not already there, place it in the follower now.
- c. Lubricate the o-ring.
- d. Push the follower up onto the end of the pump assembly until the follower bottoms out. The locking bolt should be facing front.
- e. Tighten the locking bolts to 13.6–20.3 N.m (10–15 ft-lb).
- f. Connect the air hose from the follower plate blowoff to the air control module on the follower blowoff valve assembly.
- g. Use the hand valve (3) on the pump air control to lower the pump to the OFF (neutral) position (Fig. 4).

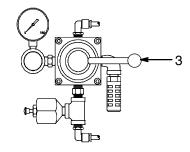


Fig. 4

## **Operation**

### WARNING



#### **MOVING PARTS HAZARD**

Follow the **Pressure Relief Procedure** below before checking or repairing the ram or any other part of the system and

when shutting down the system. Keep hands and fingers away from the follower plate, fluid pump inlet, and lip of the fluid container when raising or lowering the ram 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.

#### **Pressure Relief Procedure**

### **A** WARNING



#### **SKIN INJECTION HAZARD**

The system pressure must be manually relieved to prevent the system from starting or spraying accidentally. Fluid

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 spraying/dispensing
- check or service any of the system equipment
- install or clean the spray tip/nozzle

Use this procedure whenever you shut off the sprayer and before checking or adjusting any part of the system, to reduce the risk of serious injury.

- Lock the gun/valve trigger safety.
- 2. Shut off the main air supply to the pump.
- 3. Close all air bleed valves.

- 4. Unlock the gun/valve trigger safety.
- Hold a metal part of the gun/valve firmly to the side of a grounded metal pail, and trigger the gun/valve to relieve pressure.
- 6. Lock the gun/valve trigger safety.
- 7. Have a container ready to catch the drainage, then open the drain valve or pump bleed valve.
- 8. Leave the drain valve open until you are ready to spray/dispense again.

If you suspect that the spray tip/nozzle or hose is completely clogged, or that pressure has not been fully relieved after following the steps above, *very slowly* loosen the tip guard retaining nut or hose end coupling to relieve pressure gradually, then loosen completely. Now clear the tip/nozzle or hose.

 If you want to relieve pressure in the ram, see the Ram Pressure Relief Procedure in Form #310525.

### Raising and Lowering the Ram

The ram hand valve on the pump air control has 3 positions (Fig. 5):

- Ram UP raises the ram. When removing ram plate from drum, it is necessary to use follower blowoff to avoid creating a vacuum in drum.
- Ram DOWN lowers the ram.
- Ram OFF puts the ram in "neutral." Moving the hand valve to OFF does not change the position of the ram, but it stops the air pressure from attempting to move the ram either up or down.

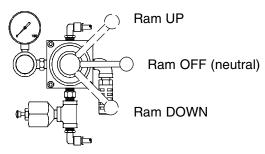


Fig. 5

## **Operation**

### **Preparing to Pump Fluid**

Follow the steps below to prepare the system for pumping fluid. Refer to the Typical Installation Drawing, (Fig. 1 on page 8) for more information.

- Move the hand valve lever to the OFF position (Fig. 5). Close the ram air regulator and main air control valve.
- 2. Move the hand valve lever to the UP position (Fig. 5). Open the main air control valve and ram air regulator until the ram starts to move upward. Let the ram rise to its full height.
- 3. Set a full pail of fluid on the ram base and center it under the follower plate.

**NOTE:** Do not use pails that have side bungs or large dents with this ram. Rough bung openings or large dents will damage the wiper or stop the follower plate, resulting in a runaway pump.

- 4. Move the hand valve lever to the DOWN position (Fig. 5) and lower the ram until the follower plate is just ready to enter the pail, then move the hand valve lever to OFF. If necessary, reposition the pail so the wiper will not hit the pail lip.
- 5. Unscrew the follower plate's bleed handle (see Fig. 1, item (8) on page 8).
- Move the hand valve lever to the DOWN position (Fig. 5), to lower the follower plate into the pail, until all air is forced out and fluid comes out of the vent opening.
- 7. Move the hand valve lever to OFF and screw in the bleed handle (see Fig. 1, item (8) on page 8).
- 8. Set the air pressure to the ram at 345 kPa, 3.4 bar (50 psi). Move the hand valve lever to the DOWN position (Fig. 5).
- Slowly start the pump by opening both the bleedtype master air valve and the fluid dispensing valve. Do not allow the pump to cycle too quickly. Let the pump run until the system is primed and all air is forced out.
- 10. Stop the pump by closing either the bleed-type master air valve or the fluid dispensing valve.

**NOTE:** Increase air pressure to the ram if the pump does not prime properly with heavier fluids. If fluid is forced out around the top wiper, ram pressure is too high and the air pressure should be decreased.

### **Pumping Fluid**

To pump fluid from the pail:

- 1. Move the hand valve lever to the DOWN position (Fig. 5).
- 2. Open the bleed-type master air valve.
- 3. Start the pump by opening the pump air regulator. Then adjust the pump for normal operation.

Always use the lowest possible air pressure to both the pump and ram.

### **A** WARNING

Do not overpressurize the system, as this could result in serious injury or damage to the equipment.

**NOTE:** It is normal for the pump to stall if the dispense gun or other fluid valve is closed.

### **Changing Pails**

To change pails:

- Stop the pump by closing either the bleed-type master air valve or the fluid dispensing valve, and then moving the hand valve lever to UP (Fig. 5). Carefully equalize pressure in the drum by using the follower blowoff button.
- 2. Raise the wiper plate until it is completely out of the drum.
- 3. When the ram reaches its maximum height, move the hand valve to OFF (Fig. 5).
- 4. Remove the empty pail and put a full pail in its place.
- 5. Perform the procedure, **Preparing to Pump Fluid**, above.

## **Operation**

#### **Shutdown**

1. Move the hand valve lever to the OFF position (Fig. 5). Shut off the air supply to the ram and pump.

### **▲** WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** (page 13).

2. Relieve the pressure.

### **Emergency Stop**

- 1. To stop the ram from moving, move the hand valve (Fig. 5) the OFF position.
- 2. To stop the pump, close the Bleed-type Master Air Valve closest to the motor's air inlet [see Fig. 1, item (C) on page 8].

### Flushing Safety

 Before flushing, be sure the entire system and flushing pails are properly grounded. Refer to Ground the System, on page 11.

### **▲** WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** (page 13).

2. Relieve the pressure.

### **A WARNING**



#### PRESSURIZED FLUID HAZARD

Always use the lowest possible fluid pressure, and maintain firm metal-to-metal contact between the gun/valve

and the pail during flushing to reduce the risk of fluid injection injury, static sparking and splashing.

3. Remove the spray tip/nozzle from the spray gun/ dispensing valve.

### **Inspection Frequency**

Periodically (once a month), inspect the ram guide sleeves, rods and cylinders for wear or damage, replace all worn parts. See the **Service** section of Form# 310525 for instructions on replacing worn parts.

See the pump instruction manual for its inspection frequency.

## **Troubleshooting Chart**

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 in <b>Service</b> section of Form #310525.	
	Hand valve closed or clogged.	Open, clear hand valve or exhaust.	
Ram raises or lowers too fast.	Ram air pressure too high.	Decrease ram air pressure.	
Air leaks around cylinder rod.	Worn rod seal.	Replace o-rings in guide sleeve. See procedure in <b>Service</b> section of Form #310525.	
Fluid squeezes past follower plate	Ram air pressure too high.	Decrease ram air pressure.	
wiper.	Worn or damaged wiper.	Replace wiper. See procedure on page 17.	
Pump won't prime properly, or pumps air.	Closed main air valve or clogged air line.	Open air valve, clear air line.	
	Not enough pump air pressure.	Increase pump pressure.	
	Worn or damaged piston.	Replace piston. See procedure in <b>Service</b> section of Form #310525.	
	Hand valve closed or clogged.	Open, clear hand valve or exhaust.	
	Hand valve dirty, worn or damaged.	Clean, service hand valve.	
	Bent pail has stopped follower.	Replace pail.	
Air pressure won't hold pail down or push plate up.	Closed main air valve or clogged air line.	Open air valve, clear air line.	
	Not enough ram air pressure.	Increase ram air pressure.	
	Valve passage clogged.	Clean valve passage.	
	Worn piston seal.	Replace seal.	

### **Service**

This section describes how to service the wiper. For information about servicing the ram, see Form# 310525, **76 mm (3 in.) Air-Powered Ram Module**.

### **Wiper Service**

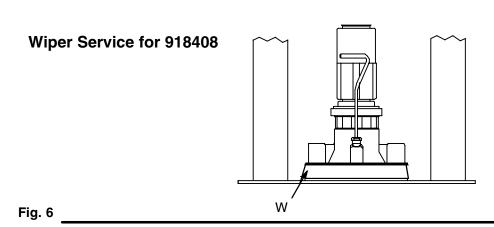
You have one of 3 kinds of follower plates with your ram. If you have follower plate kit 918408, follow the procedure below to change the follower wiper. If you have a stamped-metal follower plate kit 918409, 237702, or 241081, refer to Form# 308049 for service information.

To replace a worn or damaged wiper [(W) in Fig. 6] follow this procedure:

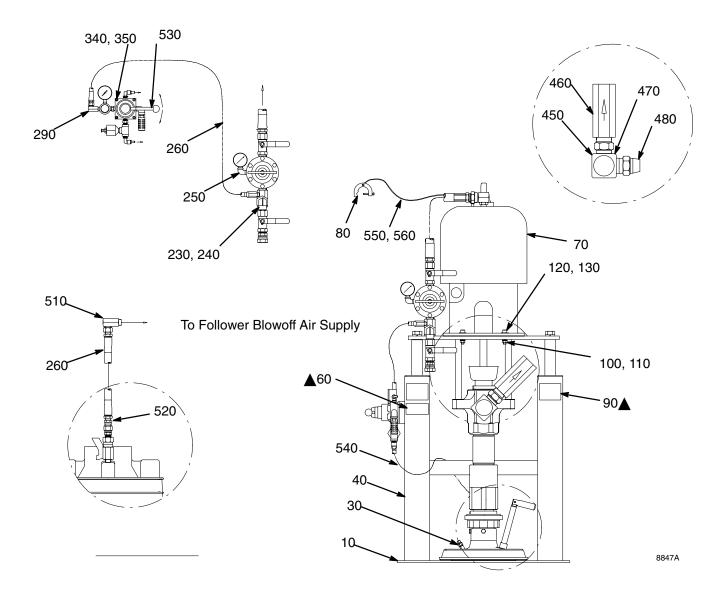
- Raise the follower plate up out of the pail. Remove the pail from the base. Wipe the fluid off the follower plate.
- 2. Pry off the old wiper with a smooth pry bar.
- 3. Coat the wiper with a lubricant.

The lubricant should be compatible with the material to be pumped. (Check with the material supplier for a compatible lubricant.)

- 4. Fit a portion of the wiper into the groove on the wiper plate, then stretch the wiper around the rest of the plate.
- 5. Use a rubber mallet to pound the wiper all the way around the follower plate until the wiper's ends are butted tightly together.



Model 241082, 76 mm (3 in.) Ram, 65:1 King/CM800 with Buna-N follower wiper Includes items 10–560

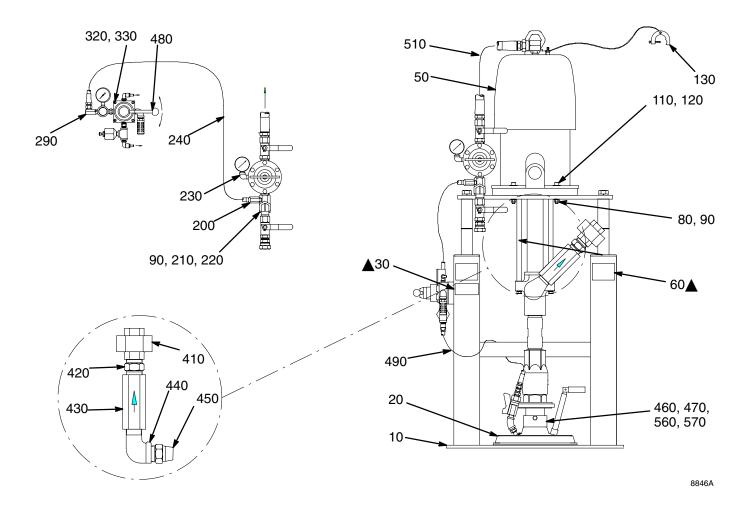


### Model 241082, 76 mm (3 in.) Ram, 65:1 King/CM800 with Buna-N follower wiper Includes items 10-560

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
10	241086	MODULE, ram; 76 mm (3 in.);	1	250	241132	KIT, regulator	1
		30 liter		260	238753	HOSE, coupled	1
30	241081	PLATE, wiper	1	290	100840	ELBOW, street	2
40	109482	O-RING	1	340	107445	SCREW, cap	4
60▲	C14023	LABEL, ram up/down	1	350	100016	WASHER, lock	4
70	240945	PUMP, 65:1 King	1	450	158491	NIPPLE	1
80	237569	WIRE & CLAMP, grounding (re-	1	460	115032	VALVE, check	1
		quired); 7.62 m (25 ft)		470	158683	ELBOW	1
90▲	C14043	LABEL, pinch point	4	480	100380	BUSHING, pipe	1
100	100340	NUT, hex; 3/8–16	4	510	155541	UNION, swivel; 90°	1
110	100133	WASHER, lock; 3/8	4	530	918406	RAM AIR CONTROL ASSY.	1
120	100023	WASHER, flat; 3/8	4	540	204561	HOSE, coupled	1
130	102886	SCREW, cap; 3/8-16 x 1.5	4	550	214954	HOSE, coupled	1
230	100131	NUT, hex; 3/8	1	560	160327	UNION, adapter; 90°	1
240	100322	WASHER, lock	2	▲ Re	placement	Danger and Warning labels, tags	and cards

<sup>▲</sup> Replacement Danger and Warning labels, tags and cards are available at no cost.

Model 241083, 76 mm (3 in.) Ram, 55:1 Bulldog/CM450 with Buna-N follower wiper Includes items 10–570

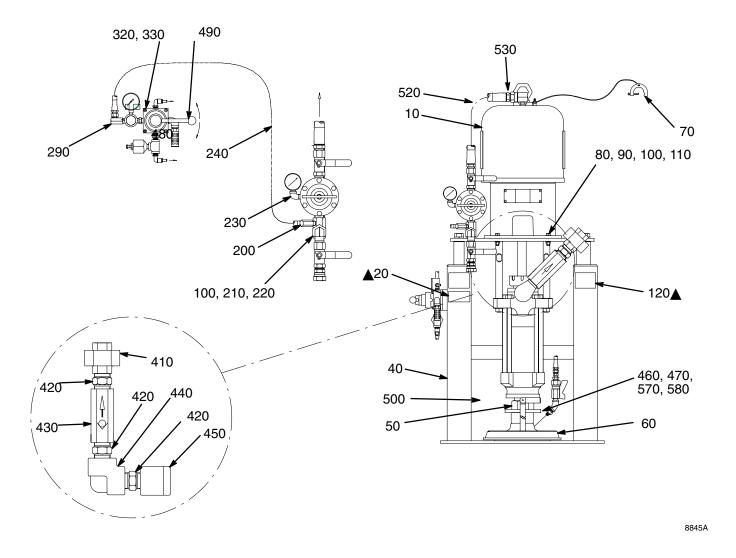


### Model 241083, 76 mm (3 in.) Ram, 55:1 Bulldog/CM450 with Buna-N follower wiper Includes items 10-570

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
10	241086	MODULE, ram; 76 mm (3 in.);	1	240	238753	HOSE, coupled	1
		30 liter		290	100840	ELBOW, street	2
20	241081	PLATE, wiper	1	320	107445	SCREW, cap	4
30▲	C14023	LABEL, ram up/down	1	330	100016	WASHER, lock	4
50	222813	PUMP, 55:1 Bulldog, Quiet	1	410	521975	UNION, pipe	1
60▲	C14043	LABEL, warning, pinch point	4	420	C20490	NIPPLE	1
80	100340	NUT, hex; 3/8–16	4	430	521850	VALVE, check	1
90	100133	WASHER, lock; 3/8	4	440	C38324	ELBOW	1
110	100023	WASHER, flat; 3/8	4	450	C19661	NIPPLE, reducing	1
120	C19845	SCREW, cap	4	460	194152	ADAPTER	1
130	237569	WIRE & CLAMP, grounding (re-	1	470	109458	O-RING	1
		quired); 7.62 m (25 ft)		480	918406	RAM AIR CONTROL ASSY.	1
190	100307	NUT, hex	2	490	204561	HOSE, coupled	1
200	155541	UNION	1	510	214952	HOSE, coupled	1
210	100131	NUT, hex; 3/8	1	560	109482	O-RING	1
220	100322	WASHER, lock	2	570	100421	SCREW, set	2
230	241132	KIT, regulator	1	▲ Rei	placement	Danger and Warning labels, tags	and cards

<sup>▲</sup> Replacement Danger and Warning labels, tags and cards are available at no cost.

Model 241084, 76 mm (3 in.) Ram, 20:1 King/DF2400 with Buna-N follower wiper Includes items 10–580

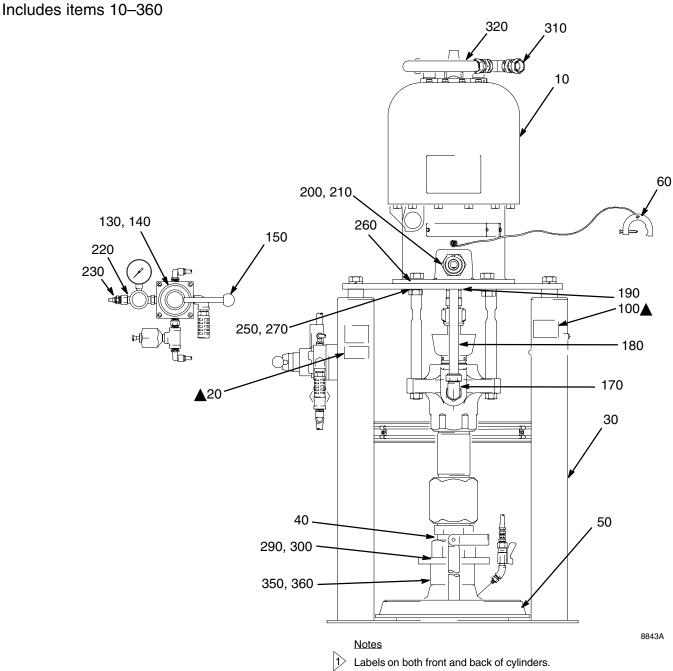


### Model 241084, 76 mm (3 in.) Ram, 20:1 King/DF2400 with Buna-N follower wiper Includes items 10-580

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.	
10	222833	PUMP, 20:1 King, Quiet	1	290	100840	ELBOW, street	2	
20▲	C14023	LABEL, ram up/down	1	320	107445	SCREW, cap	4	
40	241086	MODULE, ram; 76 mm (3 in.); 30	1	330	100016	WASHER, lock	4	
		liter		410	521975	UNION, pipe	1	
50	190166	CYLINDER, intake	1	420	C20490	NIPPLE	2	
60	241081	PLATE, wiper	1	430	521850	VALVE, check	1	
70	237569	WIRE & CLAMP, grounding (re-	1	440	C38324	ELBOW	1	
		quired); 7.62 m (25 ft)		450	C38457	NIPPLE, reducing	1	
80	102637	SCREW, cap	4	460	194152	ADAPTER	1	
90	100023	WASHER, flat; 3/8	4	470	109458	O-RING	1	
100	100133	WASHER, lock; 3/8	4	490	918406	RAM AIR CONTROL ASSY.	1	
110	100340	NUT, hex; 3/8–16	4	500	204561	HOSE, coupled	1	
120▲	C14043	LABEL, pinch point	4	520	214954	HOSE, coupled	1	
200	155541	UNION	1	530	160327	UNION, adapter; 90°	1	
210	100131	NUT, hex; 3/8	1	570	109482	O-RING	1	
220	100322	WASHER, lock	2	580	100421	SCREW, set	2	
230	241132	KIT, regulator	1	▲ Rei	placement	Danger and Warning labels, tags a	and cards	
240	238753	HOSE	1	are available at no cost.				

ds are available at no cost.

Model 241630, 76 mm (3 in.) Ram, 56:1 King/DF900 with Buna-N follower wiper

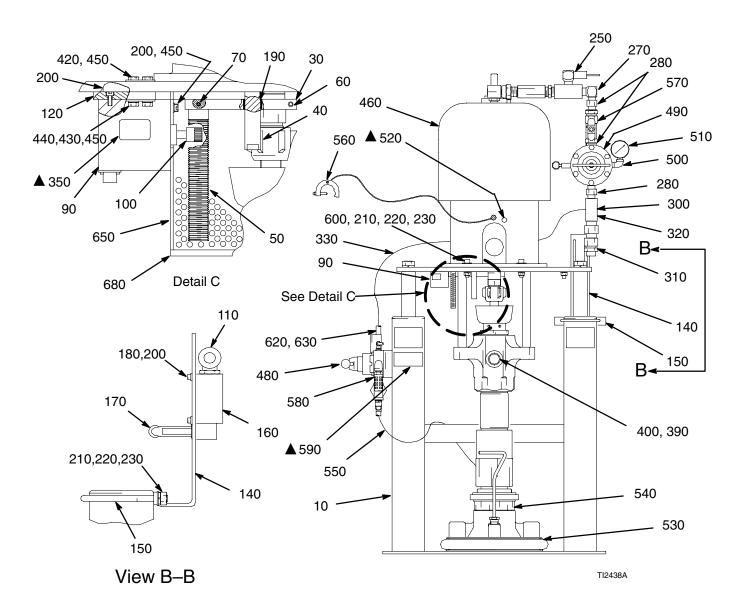


### Model 241630, 76 mm (3 in.) Ram, 56:1 King/DF900 with Buna-N follower wiper Includes items 10-360

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
10	245173	PUMP, 56:1 King	1	230	194257	Fitting, tube	1
20▲	C14023	LABEL, ram up/down	1	250	100023	WASHER, flat; 3/8	4
30	241086	MODULE, ram; 76 mm (3 in.); 30	1	260	102886	Screw, cap	4
		liter		270	100340	NUT, hex; 3/8-16	4
40	190166	Cylinder, intake	1	280	100133	Washer, lock	4
50	241081	Plate, wiper, 5 gal.	1	290	109482	O–ring	1
60	237569	Grounding wire & clamp (required)	1	300	194152	Adapter	1
		7.62 m (25 ft)		310	160327	UNION, adapter; 90°	1
100▲	C14043	Label, warning	4	320	204561	HOSE, coupled	1
120	100840	Street elbow	1	350	109458	O-RING	1
130	107445	Screw, cap	4	360	100421	SCREW, cap	2
140	100016	Washer, lock	4			· ·	
150	918406	Ram air control assembly	1	▲ Rei	olacement	Danger and Warning labels, tag	gs and cards
220	194256	Adapter	1		available a		,

ds

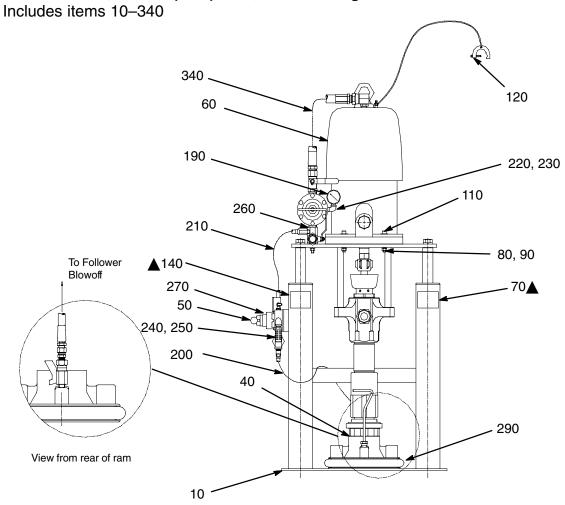
## Model 570153, 76 mm (3 in.) Ram, 65:1 King/CM800 with PVC follower wiper Includes items 10–680



## Model 570153, 76 mm (3 in.) Ram, 65:1 King/CM800 with PVC follower wiper Includes items 10–680

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
10	241086	MODULE, ram; 76 mm (3 in.)	1	350▲	180233	LABEL, warning	2
		30 liter		370	111881	MUFFLER	1
20	115792	VALVE, solenoid; 24V	1	390	235497	VALVE, check	1
30	626636	BRACKET, encoder	1	400	158555	NIPPLE, reducing	1
40	626629	ROD, guide	1	420	100014	SCREW, cap	2
50	626637	ROD, connecting	1	430	100016	WASHER, lock	2
60	101885	SCREW, cap	1	440	100015	NUT, hex mscr	2
70	105210	SCREW, cap	1	450	100086	WASHER, plain	6
90	514221	ENCODER, optical; 250 ppr;	1	460	240945	PUMP, 65:1 King	1
		8-30VDC		470	C14043	LABEL, pinch point	4
100	504851	GEAR, spur	1	480	918406	CONTROL ASSY.	1
110	513650	GRIP, cord	1	490	206197	REGULATOR, air	1
120	626647	BRACKET, encoder mounting	1	500	187357	ELBOW, street	1
130	157191	ADAPTER	1	510	101180	GAUGE, press	1
140	918412	BRACKET, limit switch assy.;	1	520▲	186620	LABEL, grounding	1
		20 liter (5 gal.)		530	C58391	PLATE, follower; 20 liter (5 gal.)	1
150	C24332	BOLT, "U"	1	540	109482	O-RING	1
160	C04000	SWITCH, limit	1	550	204561	HOSE, coupled	1
170	C07566		1	560	237569	WIRE ASSY.; 7.62 m (25 ft)	1
180	104116	WASHER, plain	2	570	110225	VALVE, vented; 2-way	1
190	513527	BEARING, sleeve; 3/4 x 7/8 x 1	1	580	107445	SCREW, cap	4
200	102598	SCREW, cap	8	590▲	C14023	LABEL, ram up/down	1
210	100023	WASHER, flat	6	600	102886	SCREW, cap	4
220	100133	WASHER, lock	6	610	C19028	UNION, swivel; 45°	1
230	100131	NUT, full hex	6	620	100840	ELBOW, street	1
250	166590	ELBOW, street	1	630	156823	UNION, swivel	1
260	100505	BUSHING, pipe	1	640	116306	VALVE, safety	1
270	158683	ELBOW; 90°	1	650	626657	GUARD, gear	1
280	158491	NIPPLE	3	660	106145	BRACKET, mounting	2
300	101846	TEE, pipe	1	680	114225	TRIM, edge protection	2.5 ft
310	156684	UNION, adapter	1				
320	158256	UNION, swivel	1	▲ Rep	lacement l	Danger and Warning labels, tags ai	nd cards
330	208048	HOSE, coupled	1		available a		

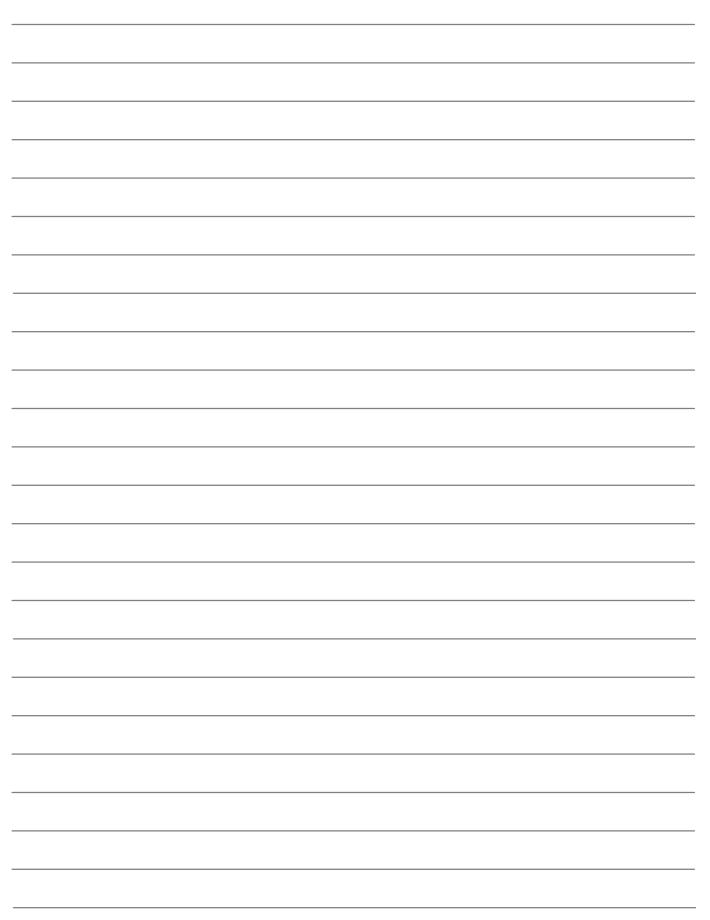
### Model 918371, 76 mm (3 in.) Ram, 31:1 Bulldog/CM800 with PVC follower wiper



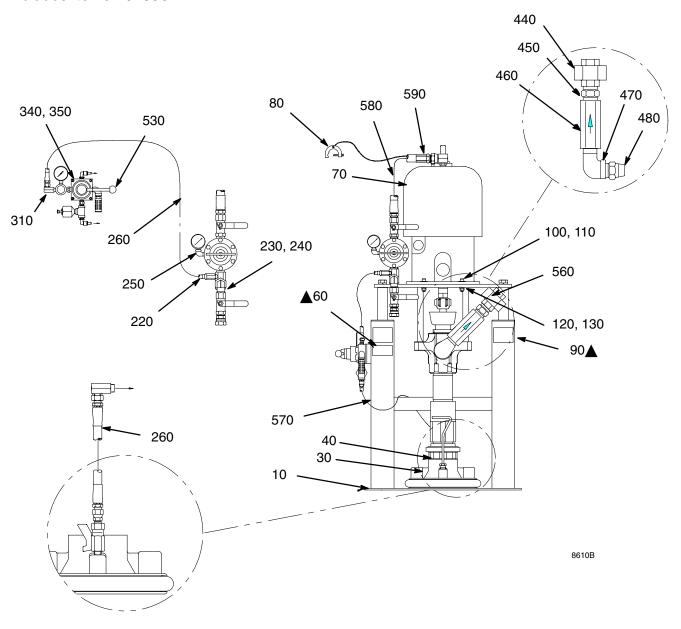
Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
10	918405	MODULE, ram; 76 mm (3 in.);	1	190	241132	REGULATOR ASSY.	1
		20 liter (5 gal.)		200	204561	HOSE, coupled	1
40	518786	O-RING	1	210	238753	HOSE, coupled	1
50	918406	CONTROLS, 2 reg.; 20 liter	1	220	100322	WASHER, lock	2
		(5 gal.) assy.		230	100131	NUT, full hex	1
60	237261	PUMP, 31:1 Bulldog	1	240	107445	SCREW, cap	4
70▲	C14043	LABEL, pinch point	4	250	100016	WASHER, lock	4
80	100307	NUT, hex; 3/8–16	4	260	155541	UNION, swivel; 90°	1
90	100133	WASHER, lock; 3/8	4	270	100840	ELBOW, street	2
110	102637	SCREW, cap; 3/8-16 x 2.5	4	290	C58391	PLATE, follower; 20 liter (5 gal.)	1
120	237569	WIRE & CLAMP, grounding (re-	1	340	214952	HOSE, coupled	1
140▲	C14023	quired); 7.62 m (25 ft) LABEL, ram up/down	1		placement available	Danger and Warning labels, tags ar	nd cards

are available at no cost.

## **Notes**



Model 918372, 76 mm (3 in.) Ram, 65:1 King/CM800 with PVC follower wiper Model 253293, 76 mm (3 in.) Ram, 65:1 King/CM800 with NBR follower wiper Includes items 10–590



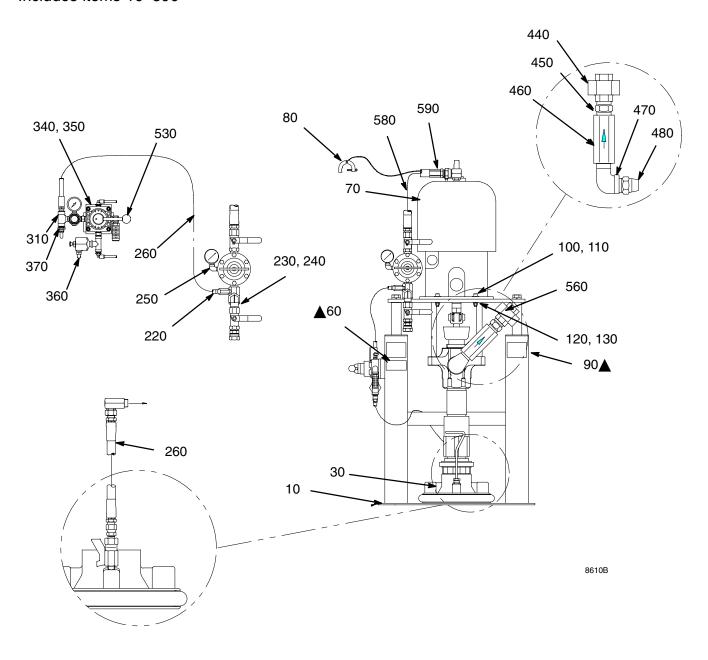
Model 918372, 76 mm (3 in.) Ram, 65:1 King/CM800 with PVC follower wiper Model 253293, 76 mm (3 in.) Ram, 65:1 King/CM800 with NBR follower wiper Includes items 10-590

Ref No.	Part No.	Description	Qty.
10	241086	MODULE, ram; 76 mm (3 in.); 30 liter	1
30	C58391	FOLLOWER ASSY. (918372 only)	1
		FOLLOWER ASSY. (253293 only) 253293 follower assy. components:	1
	237702	· PLATE, inductor	1
	156971	· NIPPLE, short	1
	100083	· COUPLING, 3/8-1/4 npt	1
	208391	· VALVE, ball	1
	155665	· UNION, adapter	1
	100081	· BUSHING, 1/2 x 3/8	1
	177542	· HANDLE	1
	101831	· PIN, spring	1
	166560	· STEM, probe	1
40	109482	O-RING	1
60▲	C14023	LABEL, ram up/down	1
70	240945	PUMP, 65:1 King	1
80	237569	WIRE & CLAMP, grounding (required); 7.62 m (25 ft)	1
90▲	C14043	LABEL, pinch point	4
100	100340	NUT, hex; 3/8-16	4
110	100133	WASHER, lock; 3/8	4
120	100023	WASHER, lock; 3/8	4
130	102886	SCREW, cap; 3/8-16 x 1.5	4
220	155541	UNION	1
230	100131	NUT, hex; 3/8	1
240	100322	WASHER, lock	2

Ref No.	Part No.	Description	Qty.
250	241132	KIT, regulator	1
260	238753	HOSE, coupled	1
310	100840	ELBOW, street	2
340	107445	SCREW, cap	4
350	100016	WASHER, lock	4
440	521975	UNION, pipe	1
450	C20490	NIPPLE	1
460	521850	VALVE, check	1
470	C38324	ELBOW	1
480	C38306	NIPPLE	1
530	918406	CONTROL ASSY.	1
570	204561	HOSE, coupled	1
580	214954	HOSE, coupled	1
590	160327	UNION, adapter; 90°	1

<sup>▲</sup> Replacement Danger and Warning labels, tags and cards are available at no cost.

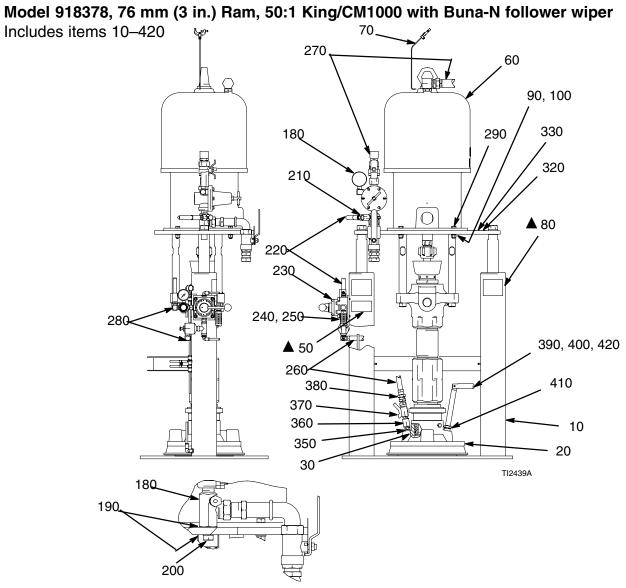
Model 253375, 76 mm (3 in.) Ram, 65:1 King with silicone follower wiper Includes items 10–590



### Model 253375, 76 mm (3 in.) Ram, 65:1 King with silicone follower wiper Includes items 10-590

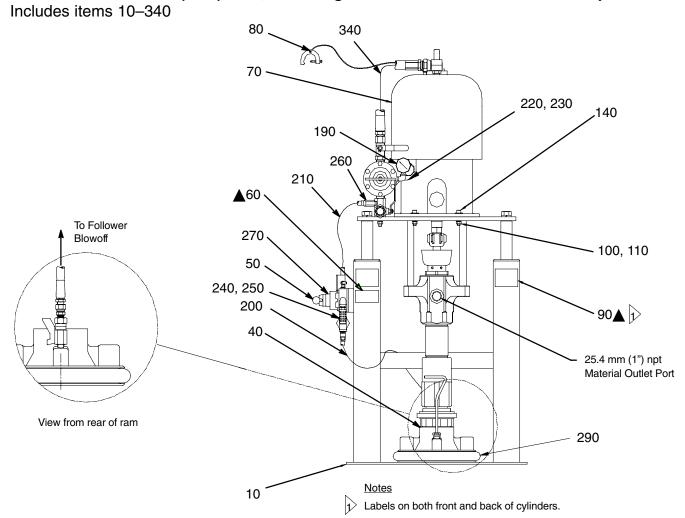
Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
10	241086	MODULE, ram; 76 mm (3 in.);	1	250	241132	KIT, regulator	1
		30 liter		260	238753	HOSE, coupled	1
30	244757	FOLLOWER ASSY.	1	310	108638	TEE	1
60▲	C14023	LABEL, ram up/down	1	340	107445	SCREW, cap	4
70	253376	PUMP, 65:1 King	1	350	100016	WASHER, lock	4
80	237569	WIRE & CLAMP, grounding (re-	1	360	115949	ELBOW	1
		quired); 7.62 m (25 ft)		370	115950	BUSHING	1
90▲	C14043	LABEL, pinch point	4	440	521975	UNION, pipe	1
100	100340	NUT, hex; 3/8–16	4	450	C20490	NIPPLE	1
110	100133	WASHER, lock; 3/8	4	460	521850	VALVE, check	1
120	100023	WASHER, lock; 3/8	4	470	C38324	ELBOW	1
130	102886	SCREW, cap; 3/8-16 x 1.5	4	480	C38306	NIPPLE	1
220	155541	UNION	1	530	918406	CONTROL ASSY.	1
230	100131	NUT, hex; 3/8	1	580	214954	HOSE, coupled	1
240	100322	WASHER, lock	2	590	160327	UNION, adapter; 90°	1

<sup>▲</sup> Replacement Danger and Warning labels, tags and cards are available at no cost.



Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
10	918405	MODULE, ram; 76 mm (3 in.);	1	240	107445	SCREW, cap	4
		20 liter (5 gal.)		250	100016	WASHER, lock	4
20	237702	PLATE, inductor; 20 liter (5 gal.)	1	260	204561	HOSE, coupled	1
30	109482	O-RING	1	270	214952	HOSE, coupled	1
50▲	C14023	LABEL, ram up/down	1	280	100840	ELBOW, street	2
60	237707	PUMP, 50:1 King	1	290	102637	SCREW, cap	4
70	237569	WIRE ASSY.; 7.62 m (25 ft)	1	350	156971	NIPPLE, short	1
80▲	C14043	LABEL, pinch point	4	360	100083	COUPLING; 3/8-1/4 npt	1
90	100307	NUT, hex	4	370	208391	VALVE, ball	1
100	100133	WASHER, lock	4	380	155665	UNION, adapter	1
180	241132	REGULATOR ASSY.	1	390	177542	HANDLE	1
190	100322	WASHER, lock	2	400	101831	PIN, spring	1
200	100131	NUT, full hex	1	410	100081	BUSHING; 1/2 x 3/8	1
210	155541	UNION, swivel; 90°	1	420	166560	STEM, probe	1
220	238753	HOSE, coupled	1	▲ Replacement Danger and Warning labels, tags and cards			
230	918406	CONTROL ASSY.	1	are available at no cost.			

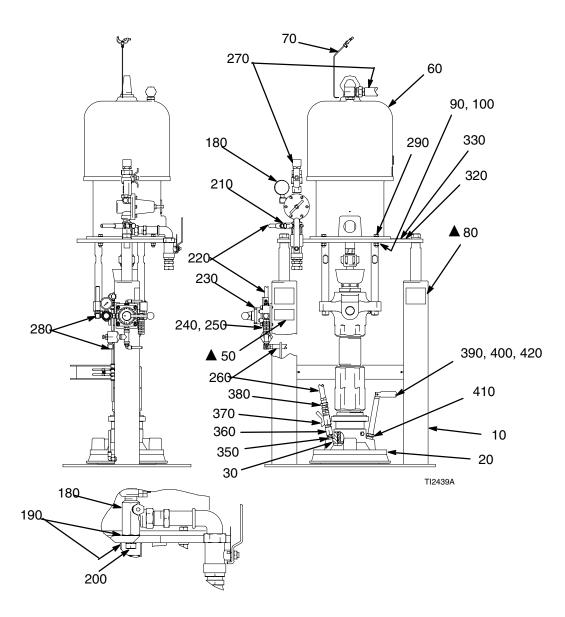
### Model 918379, 76 mm (3 in.) Ram, 50:1 King/CM1000 with Buna-N follower wiper



Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
10	918405	MODULE, ram; 76 mm (3 in.);	1	190	241132	REGULATOR ASSY.	1
		20 liter (5 gal.)		200	204561	HOSE, coupled	1
40	518786	O-RING	1	210	238753	HOSE, coupled	1
50	918406	REGULATOR CONTROL ASSY.	1	220	100322	WASHER, lock	2
60▲	C14023	LABEL, ram up/down	1	230	100131	NUT, full hex	1
70	237707	PUMP, 50:1 King	1	240	107445	SCREW, cap	4
80	237569	WIRE & CLAMP, grounding (re-	1	250	100016	WASHER, lock	4
		quired); 7.62 m (25 ft)		260	155541	UNION, swivel; 90°	1
90▲	C14043	LABEL, pinch point	4	270	100840	ELBOW, street	2
100	100307	NUT, hex; 3/8–16	4	290	C58391	PLATE, follower; 20 liter (5 gal.)	1
110	100133	WASHER, lock; 3/8	4	340	214952	HOSE, coupled	1
140	102637	SCREW, cap; 3/8-16 x 1.5	4	▲ Re	placement	Danger and Warning labels, tags ar	nd cards

are available at no cost.

Model 918380, SST, 76 mm (3 in.) Ram, 50:1 King/CM450 with Buna-N follower wiper Includes items 10-420

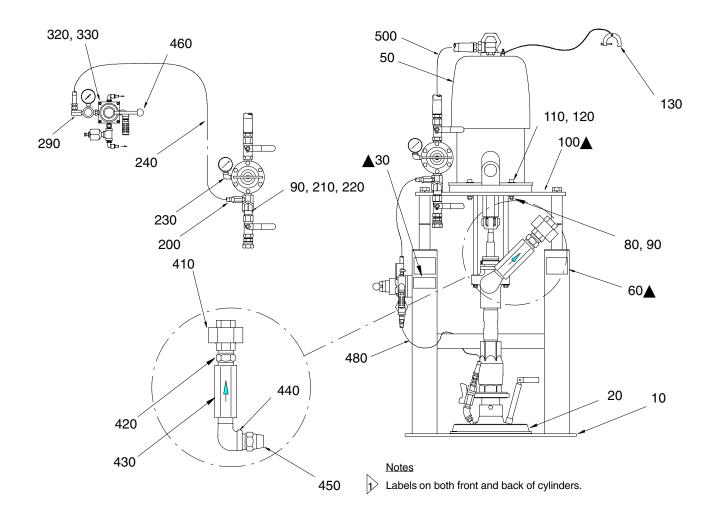


Notes
Labels on both front and back of cylinders.

#### Model 918380, SST, 76 mm (3 in.) Ram, 50:1 King/CM450 with Buna-N follower wiper Includes items 10–420

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
10	918405	MODULE, ram; 76 mm (3 in.);	1	240	107445	SCREW, cap	4
		20 liter (5 gal.)		250	100016	WASHER, lock	4
20	237702	PLATE, inductor; 20 liter (5 gal.)	1	260	204561	HOSE, coupled	1
30	109482	O-RING	1	270	214952	HOSE, coupled	1
50▲	C14023	LABEL, ram up/down	1	280	100840	ELBOW, street	2
60	237708	PUMP, 50:1 King	1	290	102637	SCREW, cap	4
70	237569	WIRE ASSY.; 7.62 m (25 ft)	1	350	156971	NIPPLE, short	1
80▲	C14043	LABEL, pinch point	4	360	100083	COUPLING; 3/8-1/4 npt	1
90	100307	NUT, hex	4	370	208391	VALVE, ball	1
100	100133	WASHER, lock	4	380	155665	UNION, adapter	1
180	241132	REGULATOR ASSY.	1	390	177542	HANDLE	1
190	100322	WASHER, lock	2	400	101831	PIN, spring	1
200	100131	NUT, full hex	1	410	100081	BUSHING; 1/2 x 3/8	1
210	155541	UNION, swivel; 90°	1	420	166560	STEM, probe	1
220	238753	HOSE, coupled	1	▲ Re	placement	Danger and Warning labels, tag	s and cards
230	918406	CONTROL ASSY.	1	are	available	at no cost.	

Model 918386, 76 mm (3 in.) Ram, 55:1 Bulldog/CM450 with Buna-N follower wiper Includes items 10–500

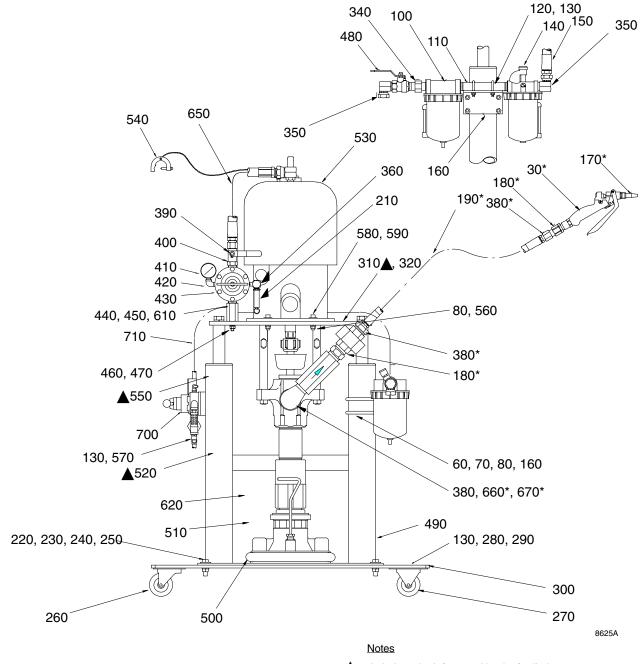


#### Model 918386, 76 mm (3 in.) Ram, 55:1 Bulldog/CM450 with Buna-N follower wiper Includes items 10-500

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
10	241086	MODULE, ram; 76 mm (3 in.);	1	220	100322	WASHER, lock	2
		30 liter		230	241132	REGULATOR ASSY.	1
20	918409	FOLLOWER ASSY.; 20 liter	1	240	238753	HOSE, coupled	1
		(5 gal.);Buna-N		290	100840	ELBOW	2
30▲	C14023	LABEL, ram up/down	1	320	107445	SCREW, cap	4
50	222813	PUMP, 55:1 Bulldog	1	330	100016	WASHER, lock	4
60▲	C14043	LABEL, pinch point	4	410	521975	UNION, pipe	1
80	100340	NUT, hex; 3/8–16	4	420	C20490	NIPPLE	1
90	100133	WASHER, lock; 3/8	5	430	521850	VALVE, check	1
100▲	290128	LABEL, CE	1	440	C38324	ELBOW	1
110	100023	WASHER, flat; 3/8	4	450	C19661	NIPPLE	1
120	C19485	SCREW, cap; 3/8–16 x 2.5	4	460	918406	KIT, air, see page 56 for parts	1
130	237569	WIRE & CLAMP, grounding (re-	1	480	204561	HOSE, coupled	1
		quired); 7.62 m (25 ft)		500	214952	HOSE, coupled	1
200	155541	UNION	1	▲ Rei	olacement	Danger and Warning labels, tags a	nd cards
210	100131	NUT, full hex	1		available a		

<sup>310526 39</sup> 

Model 970018, 76 mm (3 in.) Ram, 65:1 Portable King/CM800 with PVC follower wiper Model 234977, 76 mm (3 in.) Ram, 65:1 Portable King/CM800 with PVC follower wiper



Labels on both front and back of cylinders.

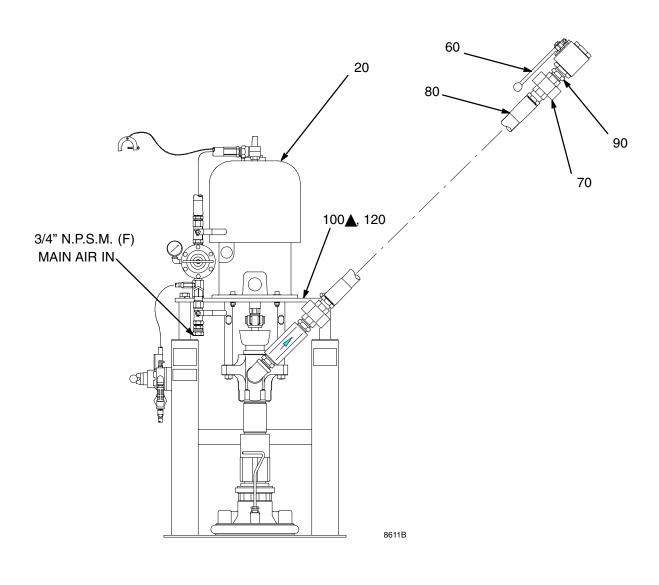
**Parts** 

Model 970018, 76 mm (3 in.) Ram, 65:1 Portable King/CM800 with PVC follower wiper Model 234977, 76 mm (3 in.) Ram, 65:1 Portable King/CM800 with PVC follower wiper

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
30*	235628	GUN, flow, Ultra-Lite	1	400	110332	ADAPTER	1
60	100307	NUT, hex; 3/8	4	410	101180	GAUGE, press	1
70	515998	U-BOLT	2	420	187357	ELBOW, street	1
80	100133	WASHER, lock; 3/8	8	430	206197	REGULATOR, air	1
100	106150	FILTER	1	440	100403	PLUG, pipe	1
110	C19606	NIPPLE; 3/4	1	450	206205	MANIFOLD, air	1
120	C20456	U-BOLT; 1/4	2	460	100322	WASHER, lock	2
130	100214	WASHER, lock; 1/4	22	470	100131	NUT, full hex	1
140	214849	LUBRICATOR	1	480	113332	VALVE, ball, vented	1
150	110048	HOSE	1	490	241086	MODULE, ram; 76 mm (3 in.);	1
160	C59451	BRACKET	1			30 liter	
170*	C08088	NOZZLE	1	500	C58391	PLATE, follower; 20 liter (5 gal.)	1
180*	207947	SWIVEL	2	510	109482	O-RING	1
190*	H55025	HOSE	1	520▲	C14023	LABEL, ram up/down	1
210	103347	VALVE, relief	1	530	240945	PUMP, 65:1 King	1
220	100060	SCREW	4	540	237569	WIRE ASSY.; 7.62 m (25 ft)	1
230	101044	WASHER	4	550▲	C14043	LABEL, pinch point	4
240	100018	WASHER, lock	4	560	100340	NUT	4
250	100338	NUT	4	570	107445	SCREW, cap	4
260	113063	CASTER	2	580	100023	WASHER, flat	4
270	113210	CASTER	2	590	102886	SCREW, cap	4
280	100450	SCREW	16	610	155541	UNION, swivel; 90°	1
290	100188	NUT; 1/4	16	620	204561	HOSE, coupled	1
300	194162	PLATE	1	650	214954	HOSE, coupled	1
310▲	290128	LABEL, CE	1	660*	115032	VALVE, check	1
320	100055	SCREW	2	670*	158683	ELBOW; 90°	1
340	160032	NIPPLE	3	680	100380	BUSHING, pipe	1
350	160327	UNION	2	700	918406	CONTROL ASSY.	1
360	100840	ELBOW, street	3	710	238753	HOSE, coupled	1
380*	158491	NIPPLE	3	▲ Rep	lacement	Danger and Warning labels, tags an	d cards
390	107142	VALVE, ball, vented	1		available a		

<sup>\*</sup> Not included with 234977.

Model 970031, 76 mm (3 in.) Ram, 65:1 King/CM800 with PVC follower wiper Includes items 20–120



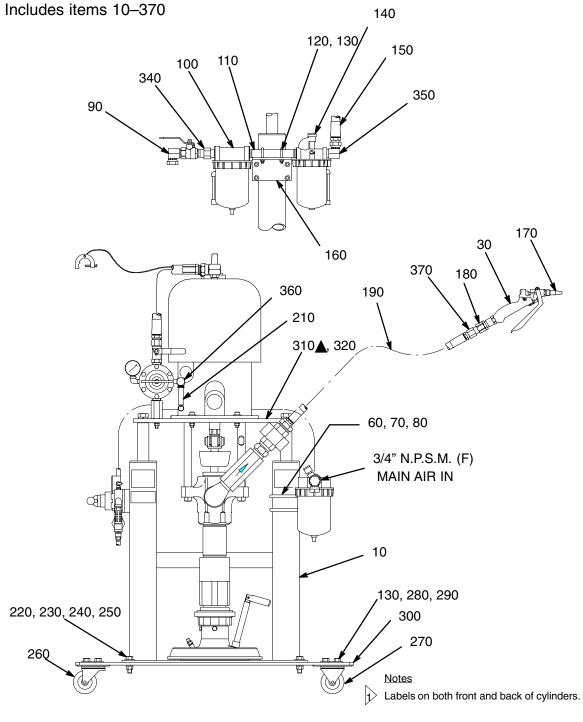
<u>Notes</u>

Labels on both front and back of cylinders.

#### Model 970031, 76 mm (3 in.) Ram, 65:1 King/CM800 with PVC follower wiper Includes items 20–120

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
20	918372	SUPPLY UNIT, 65:1 King;	1	90	C20490	NIPPLE	1
		30 liter		100▲	290128	LABEL, CE	1
60	118854	VALVE	1	120	100055	SCREW	2
70	521975	UNION	1	▲ Ren	lacement	Danger and Warning labels,	tags and cards
80	521973	HOSE	1		available a		age arra carae

#### Model 970247, 76 mm (3 in.) Ram, 65:1 Portable King/CM800 with Buna-N follower wiper



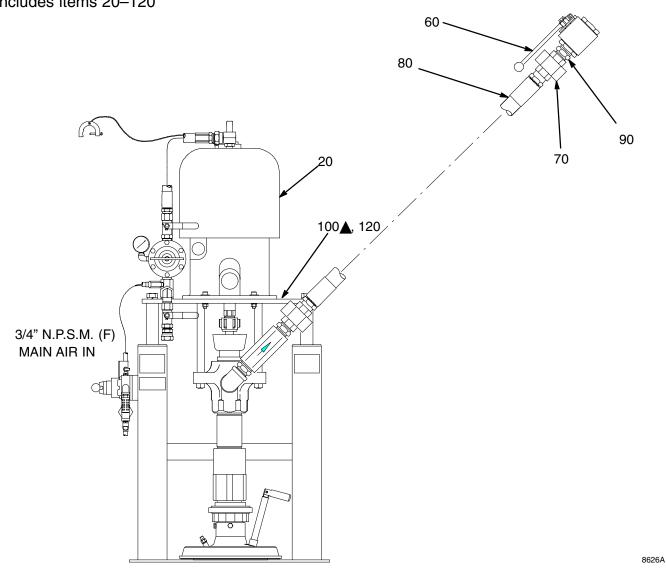
8625A

#### Model 970247, 76 mm (3 in.) Ram, 65:1 Portable King/CM800 with Buna-N follower wiper Includes items 10-370

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
10	241082	SUPPLY UNIT, 65:1 King;	1	210	108124	VALVE, relief	1
		30 Liter (8 gal.)		220	100060	SCREW	3
30	235628	GUN, flow, Ultra-Lite	1	230	101044	WASHER	4
60	100307	NUT, hex; 3/8	2	240	100018	WASHER, lock	4
70	515998	U-BOLT	2	250	100338	NUT	4
80	100133	WASHER, lock; 3/8	2	260	113063	CASTER	2
90	C19029	FITTING	1	270	113210	CASTER	2
100	106150	FILTER	1	280	102313	SCREW	16
110	C19606	NIPPLE; 3/4	1	290	100015	NUT; 1/4	16
120	C20456	U-BOLT; 1/4	2	300	194162	PLATE	1
130	100016	WASHER, lock; 1/4	18	310▲	290128	LABEL, CE	1
140	214849	LUBRICATOR	1	320	100055	SCREW	2
150	110048	HOSE	1	340	160032	NIPPLE	1
160	C59451	BRACKET	1	350	160327	UNION	1
170	C08088	NOZZLE	1	360	100840	ELBOW, street	1
180	207947	SWIVEL	2	370	158491	NIPPLE	2
190	H55025	HOSE	1	▲ Ron	lacament	Danger and Warning Jahole	tage and carde

<sup>▲</sup> Replacement Danger and Warning labels, tags and cards are available at no cost.

# Model 970248, 76 mm (3 in.) Ram, 65:1 King/CM800 with Buna-N follower wiper Includes items 20–120



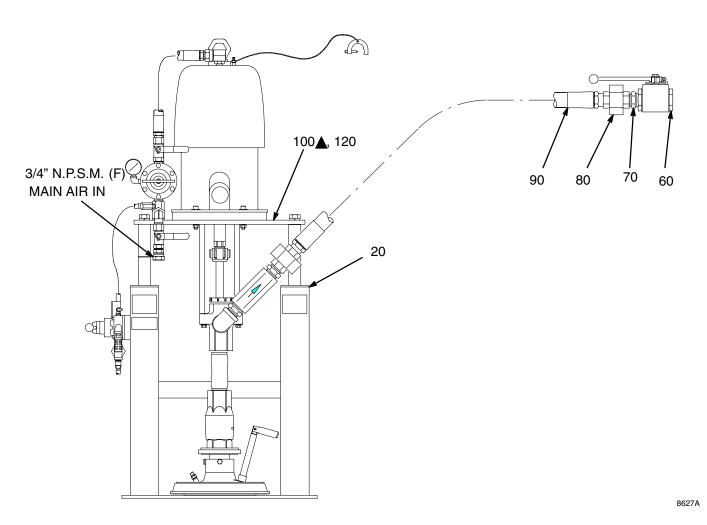
Notes

Labels on both front and back of cylinders.

#### Model 970248, 76 mm (3 in.) Ram, 65:1 King/CM800 with Buna-N follower wiper Includes items 20–120

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
20	241082	SUPPLY UNIT, 65:1 King;	1	90	C20490	NIPPLE	1
		30 liter		100▲	290128	LABEL, CE	1
60	118854	VALVE	1	120	100055	SCREW	2
70	521975	UNION	1	▲ Ren	olacement	Danger and Warning labels,	tags and cards
80	521973	HOSE	1		available a		rage arra carac

Model 970249, 76 mm (3 in.) Ram, 55:1 Bulldog/CM450 with Buna-N follower wiper Includes items 20–120



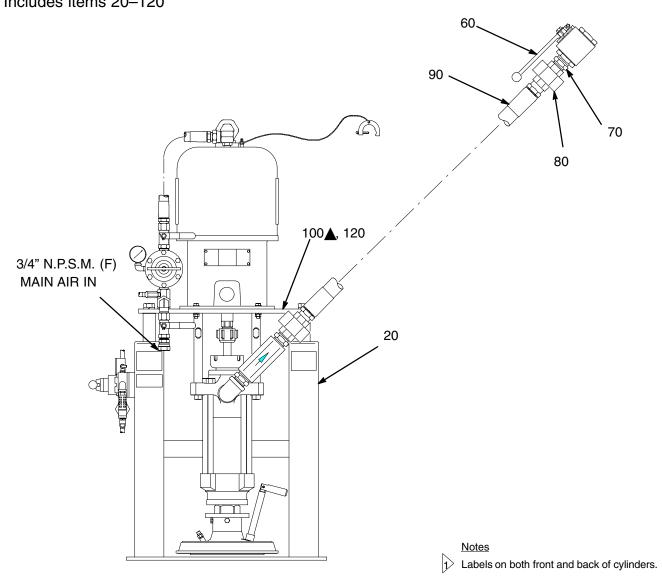
Notes

Labels on both front and back of cylinders.

#### Model 970249, 76 mm (3 in.) Ram, 55:1 Bulldog/CM450 with Buna-N follower wiper Includes items 20–120

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
20	241083	SUPPLY UNIT, 55:1 Bulldog;	1	90	521973	HOSE	1
		30 liter		100▲	290128	LABEL, CE	1
60	118854	VALVE	1	120	100055	SCREW	2
70	C20490	NIPPLE	1	▲ Ren	olacement	Danger and Warning labels, ta	ags and cards
80	521975	UNION	1		available a		.go arra carao

# Model 970250, 76 mm (3 in.) Ram, 20:1 King with Buna-N follower wiper Includes items 20–120

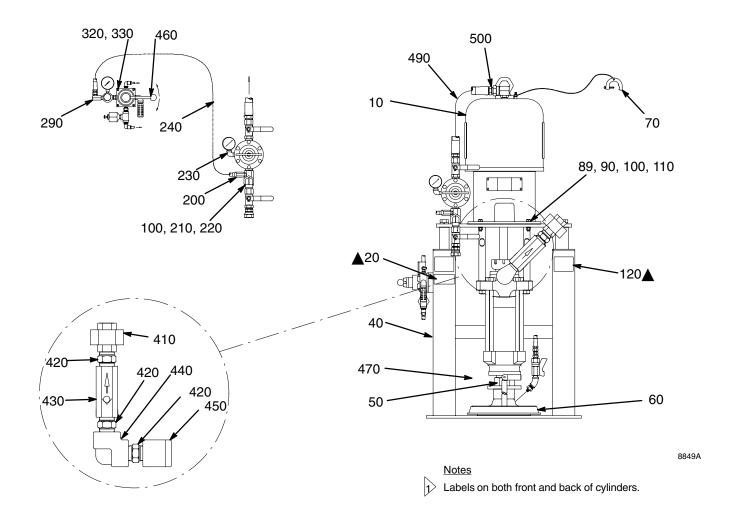


8628A

#### Model 970250, 76 mm (3 in.) Ram, 20:1 King with Buna-N follower wiper Includes items 20–120

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
20	241084	SUPPLY UNIT, 20:1 King;	1	90	521973	HOSE	1
		30 liter (8 gal.)		100▲	290128	LABEL, CE	1
60	118854	VALVE	1	120	100055	SCREW	2
70	C20490	NIPPLE	1	▲ Ren	lacement	Danger and Warning labels,	tags and cards
80	521975	UNION	1			at no cost.	lage and cards

# Model C59774, 76 mm (3 in.) Ram, 20:1 King with Buna-N follower wiper Includes items 10–500

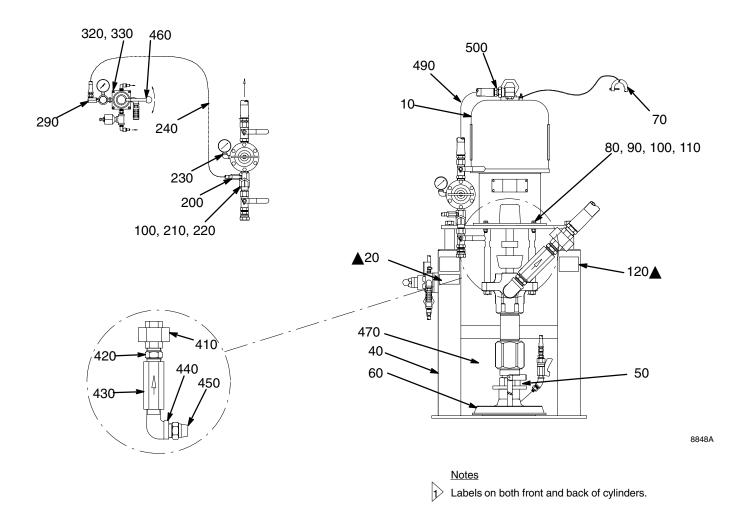


#### Model C59774, 76 mm (3 in.) Ram, 20:1 King with Buna-N follower wiper Includes items 10-500

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
10	222832	PUMP, 20:1 King	1	230	241132	REGULATOR ASSY.	1
20▲	C14023	LABEL, ram up/down	1	240	238753	HOSE, coupled	1
40	241086	MODULE, ram; 76 mm (3 in.);	1	290	100840	ELBOW, street	2
		30 liter		320	107445	SCREW, cap	4
50	190166	CYLINDER, intake	1	330	100016	WASHER, lock	4
60	918409	PLATE, wiper; 20 liter (5 gal.)	1	410	521975	UNION, pipe	1
70	237569	WIRE & CLAMP, grounding (re-	1	420	C20490	NIPPLE, hex	2
		quired); 7.62 m (25 ft)		430	521850	VALVE, check	1
80	102637	SCREW, cap	4	440	C38324	ELBOW, street	1
90	100023	WASHER, flat	4	450	C38457	FITTING, coupled, reducing	1
100	100133	WASHER, lock	4	460	918406	RAM AIR CONTROL ASSY.	1
110	100340	NUT	4	470	204561	HOSE, coupled	1
120▲	C14043	LABEL, pinch point	4	490	214954	HOSE, coupled	1
200	155541	UNION, swivel; 90°	1	500	160327	UNION, adapter; 90°	1
210	100131	NUT, full hex	1	▲ Re	placement	Danger and Warning labels, tags a	and cards
220	100322	WASHER, lock	2		available a		cardo

ls are available at no cost.

# Model C59777, 76 mm (3 in.) Ram, 56:1 King with Buna-N follower wiper Includes items 10–500



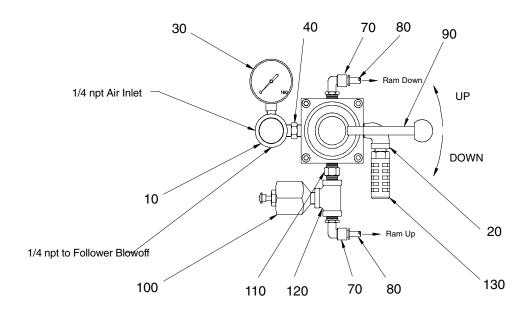
#### Model C59777, 76 mm (3 in.) Ram, 56:1 King with Buna-N follower wiper Includes items 10-500

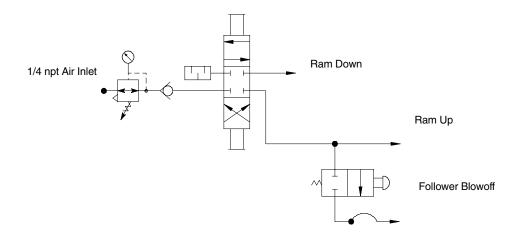
Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
10	245173	PUMP, 56:1 King	1	230	241132	REGULATOR ASSY.	1
20▲	C14023	LABEL, ram up/down	1	240	238753	HOSE, coupled	1
40	241086	MODULE, ram; 76 mm (3 in.);	1	290	100840	ELBOW, street	2
		30 liter		320	107445	SCREW, cap	4
50	190166	CYLINDER, intake	1	330	100016	WASHER, lock	4
60	918409	PLATE, wiper; 20 liter (5 gal.)	1	410	521975	UNION, pipe	1
70	237569	WIRE & CLAMP, grounding (re-	1	420	C20490	NIPPLE, hex	1
		quired); 7.62 m (25 ft)		430	521850	VALVE, check	1
80	102637	SCREW, cap	4	440	C38324	ELBOW, street	1
90	100023	WASHER, flat	4	450	C38306	COUPLING, reducing	1
100	100133	WASHER, lock	4	460	918406	RAM AIR CONTROL ASSY.	1
110	100340	NUT	4	470	204561	HOSE, coupled	1
120▲	C14043	LABEL, pinch point	4	490	214954	HOSE, coupled	1
200	155541	UNION, swivel, 90°	1	500	160327	UNION, adapter; 90°	
210	100131	NUT, full hex	1	▲ Rei	placement	Danger and Warning labels, tags a	and cards
220	100322	WASHER, lock	2		available a		aria sarao

ds are available at no cost.

#### Model 918406, Air Control Assembly

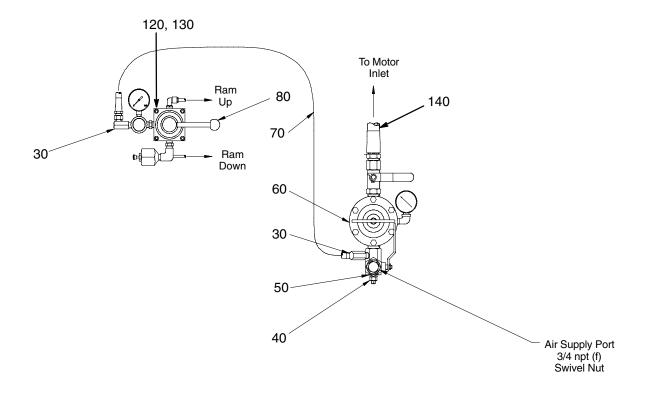
Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
10	C11023	REGULATOR, pressure; 130 psi	1	80	054172	TUBING; nylon; 1/4	10 in.
		(0.9 MPa, 9.1 bar); 1/4 npt		90	C06015	VALVE, hand	1
20	100840	ELBOW, street; 1/4 npt	1	100	918108	VALVE, relief	1
30	111598	GAUGE, pressure; 0-160 psi	1	110	C20479	NIPPLE, hex; 1/4 npt	1
		(0-1.1 MPa, 0-11 bar); 1/4 npt		120	104984	TEE, plain; 1/4 npt	1
40	106495	VALVE, check; 1/4 npt	1	130	C36183	MUFFLER; 1/4 npt	1
70	C19391	ELBOW CONNECTOR; 1/4T x 1/4P	2				





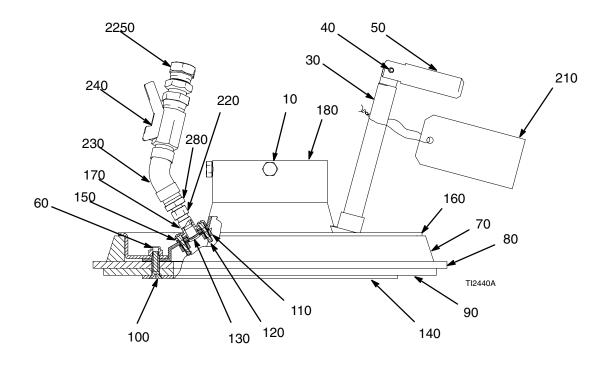
#### Model 918407, Ram Air Control Module for King, Bulldog, Monark, & Senator

	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
20	100307	NUT, hex; 3/8–16	2	70	238753	HOSE ASSY.; 1/4 x 203 mm (8 ft.)	1
30	155541	UNION, swivel; 90°; 1/4 npt	2	80	918406	RAM AIR CONTROL ASSY.	1
40	100131	NUT, hex jam; 3/8-16 unc	1	120	107445	SCREW, cap	4
50	100322	WASHER, lock int. tooth; 3/8	2	130	100016	WASHER, lock	4
60	241132	KIT, regulator	1	140	214952	HOSE, coupled	1



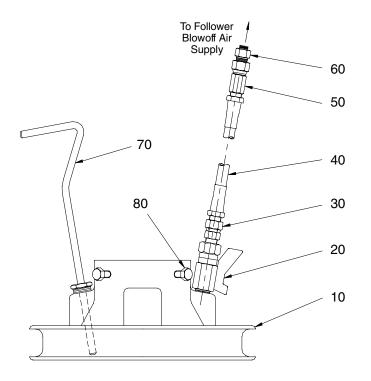
#### Model 241081, Follower Plate Kit Buna-N

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
10	109468	SCREW, cap	2	130	184149	CLAMP, seal, retaining	1
30	166560	STEM, probe	1	140	194149	CLAMP, retaining	1
40	101831	PIN, spring	1	150	184168	GASKET	1
50	177542	HANDLE	1	160	194151	CLAMP, retaining	1
60	102040	NUT, lock, hex	8	170	184288	MANIFOLD	1
70	194148	SPACER	1	180	241080	PLATE, inductor	1
80	194146	WIPER	1	220	114317	VALVE, check	1
90	194147	WIPER, follower plate	1	230	111842	ELBOW, pipe; 45°	1
100	109469	SCREW, mach., flat	8	240	208391	VALVE, ball	1
110	109466	NUT, lock, hex	2	250	155665	UNION, adapter	1
120	110883	SCREW, mach., pan	2	280	100730	BUSHING	1



#### Model 918408, Follower Plate Kit for use with PVC Hose (\*Wiper not included)

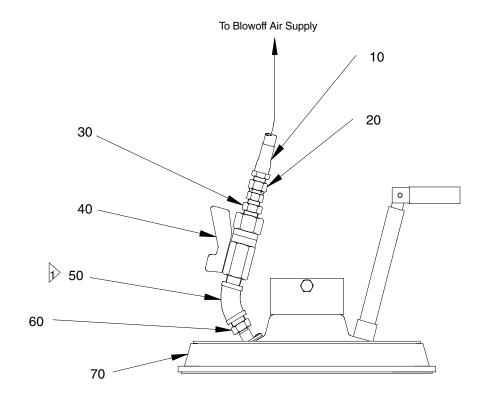
Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
10	617376	PLATE, follower; 20 liter (5 gal.)	1	70	155541	UNION, swivel; 90°	1
20	C20479	NIPPLE, hex	1	80	100081	BUSHING, pipe	1
30	C19704	COUPLING, reducer	1	90	100057	SCREW, cap	2
40	208391	VALVE, ball	1	100	177542	HANDLE	1
50	C20927	UNION, swivel	1	110	101831	PIN, spring	1
60	C12007	HOSE, air; 1/4 npt	1	120	166560	STEM, probe	1



<sup>\*</sup>See **Accessories** on page 63 for ordering information.

#### Model 918409, Follower Plate Kit Buna-N

Ref	Part	Description	Qty.	Ref	Part	Description	Qty.
No.	No.			No.	No.		
10	109468	SCREW, cap	2	120	110883	SCREW	2
20	109458	O-RING	1	130	184149	CLAMP, seal retaining	1
30	166560	STEM, probe	1	140	184419	CLAMP, retaining	1
40	101831	PIN, spring	1	150	184168	GASKET	1
50	177542	HANDLE	1	160	184418	CLAMP, retaining	1
60	102040	NUT, lock, hex	8	170	184288	MANIFOLD	1
70	276049	SPACER	1	180	222764	PLATE, inductor	1
80	184420	WIPER	1	220	C20467	NIPPLE, reducing	1
90	184421	PLATE, follower	1	230	111842	ELBOW, pipe; 45°	1
100	109469	SCREW, mach., flat	8	240	208391	VALVE, ball	1
110	109466	NUT, lock, hex	2	250	155665	UNION, adapter	1

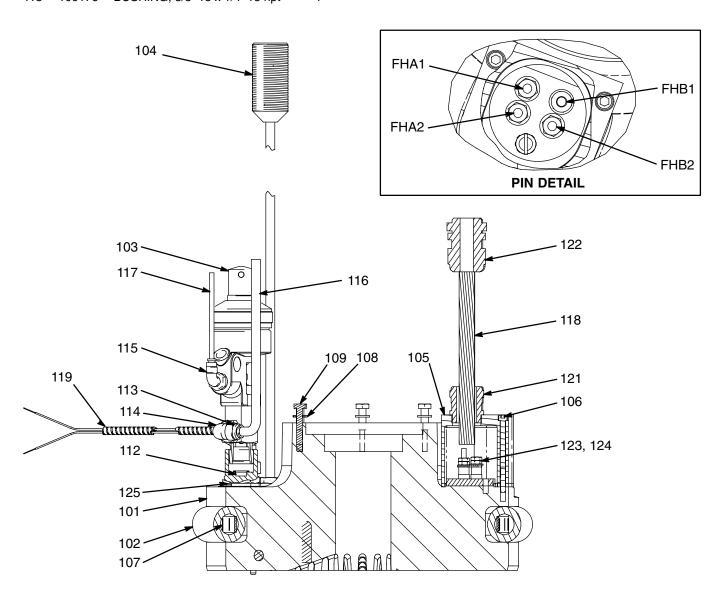


<u>Notes</u>

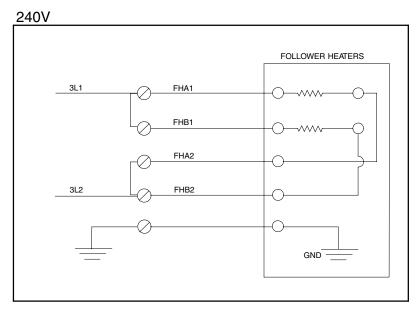
Rotate to allow valve and air line to clear pump.

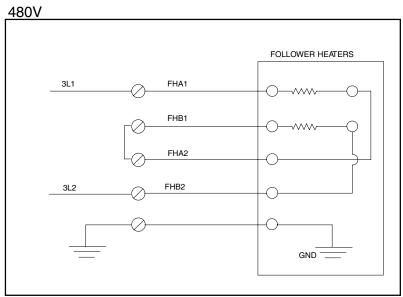
#### Model 244757, Heated Follower Plate Kit with Smooth Bottom

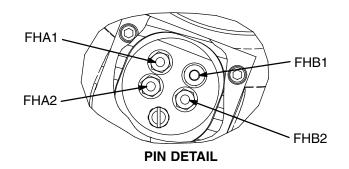
Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
101	244710	PLATE, heated; smooth bottom	1	114	115948	ELBOW, 90°; 5/16 tube x 1/4 npt	1
102	C31052	WIPER	1	115	115949	ELBOW, 90°; 5/32 tube x 1/4 npt	1
103	207440	VALVE, automatic dispense;	1	116		TUBE, PTFE; 5/16 in. OD	
		see manual 306715		117		TUBE, PTFE; 5/32 in. OD	
104	198030	HANDLE, bleed	1	118	233594	CABLE ASSY.	1
105	198027	COVER, connector	1	119	517428	SENSOR, temperature	1
106	514930	SCREW	3	121	116536	CONNECTOR, strain relief	1
107	C31154	CLAMP, 4-1/8 in. to 7 in.	2	122	115845	CONNECTOR, strain relief	1
108	100016	WASHER, lock; 1/4 in.	6	123	115159	WASHER	4
109	114238	SCREW, 1/4-20 UNC x 1-1/2 in.	6	124	102931	NUT; 8-32 UNC	4
112	167730	GASKET; copper	1	125	15C171	GASKET; silicone sponge	1
113	100176	BUSHING; 3/8-18 x 1/4-18 npt	1				



#### 240/480 Volt Ram Plate Assembly Wiring







# **Accessories**

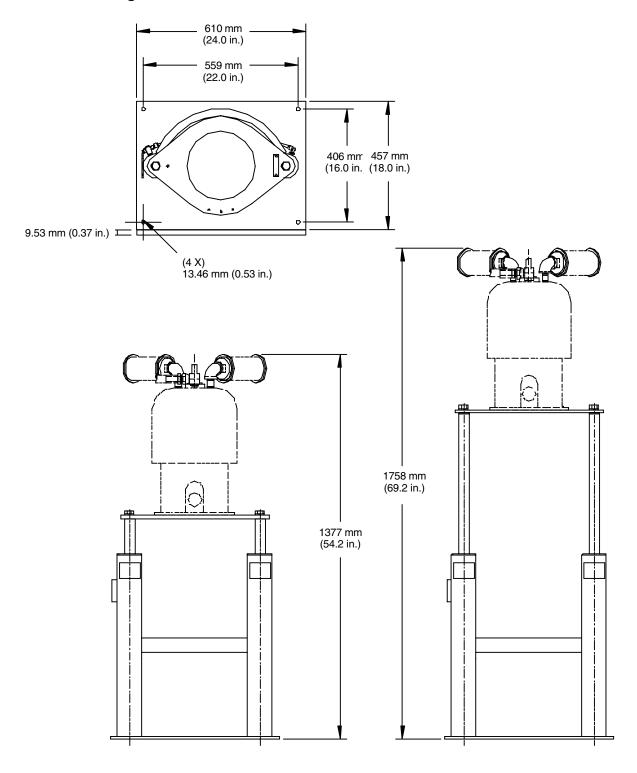
#### Use Only Genuine Graco Parts and Accessories

Description  HEATED 5-gal. FOLLOWER PLATE ASSEMBLY Used for 240, 380, 480, 575 VAC. 305 mm (12 in.) O.D. Silicone Wiper hose	Part No.
CM800 Heated Module 15:1 President	617335 617325
UNHEATED 5-gal. FOLLOWER ASSEMBLY 305 mm (12 in.) O.D.	
Follower, wiper type for XX Follower, hose type for high viscosity (no wiper hose) Follower, wiper type for low viscosity (Buna-N) Follower, wiper type for low viscosity (Buna-N) for use with CM800 & CM1000 pumps	241081 918408 918409 237702
UNHEATED 5-gal. WIPER RING KITS 305 mm (12 in.) O.D. Kit contains hose and clamp to be used with 918408	
PVC, Unheated applications	C03064
AIR CONTROL MODULES FOR RAM AND AIR CONTROL  2 Regulator module contains controls for ram and motor  4 Regulator module contains controls for ram up, ram down, blow-off and motor  0.9 MPa, 9 bar (125 psi) MAXIMUM WORKING PRESSURE for Ram	
2-Regulator air control module for King/Bulldog/Senator air motors	918407
LOW LEVEL PAIL KIT Lights a red beacon signal when the pail is empty	918430
MOUNTING KIT Required for mounting Checkmate pumps to follower plate.	222-776
CASTER BASEPLATE Used for heated applications.	918414
HOSE SUPPORT KIT Supports hose to ram to prevent hose kinks. Used only in 20 I (5 gal.) applications.	C31197
RAM REPAIR KIT	918439

Kit contains o-rings, retaining rings, piston, and bumper.

# **Dimensions**

#### **Ram Mounting and Clearance Dimensions**



# Ram Supply Unit Technical Data

#### **▲** WARNING

Be sure that all fluids and solvents used are chemically compatible with the Wetted Parts listed below. Always read the manufacturer's literature before using fluid or solvent in this pump.

Maximum ram inbound air pressure 0.9 MPa, 9 bar (125 psi)

Weight approx. 177 kg (390 lbs)

Ram wetted parts (materials of construction)

Carbon steel, nitrile, nylon

Floor space dimensions 610 mm x 457 mm (24 in. x 18 in.)

Overall height (lowered, with pump) 1377 mm (54.2 in.)

Overall height (extended, with pump) 1758 mm (69.2 in.)

Sound See pump and ram manuals for their respective sound pressure levels.

# **Graco Standard Warranty**

Graco warrants all equipment 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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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.

#### FOR GRACO CANADA CUSTOMERS

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#### **Graco Information**

**TO PLACE AN ORDER**, contact your Graco distributor, or call one of the following numbers to identify the distributor closest to you:

1-800-328-0211 Toll Free 612-623-6921 612-378-3505 Fax

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