



GRACO

First choice when
quality counts.™

Rev. D

Supersedes Rev. C
and PCN D



INSTRUCTIONS

This manual contains important
warnings and information.
READ AND KEEP FOR REFERENCE.

Pneumatic Cart-Mount Pumps

CHECK-MATE™ 450 DISPLACEMENT PUMPS (UHMWPE and PTFE packings)

Model 231-144, 10:1 Ratio Monark®

Model 231-301, 10:1 Ratio Monark® (All PTFE Packings)

12.5 MPa, 125 bar (1800 psi) Maximum Fluid Working Pressure

1.25 MPa, 12.5 bar (180 psi) Maximum Air Input Pressure

Model 231-145, 10:1 Ratio Monark®, with Hose and Gun

12.5 MPa, 125 bar (1800 psi) Maximum Fluid Working Pressure

1.25 MPa, 12.5 bar (180 psi) Maximum Air Input Pressure

Model 231-146, 20:1 Ratio President®

25.0 MPa, 250 bar (3600 psi) Maximum Fluid Working Pressure

1.25 MPa, 12.5 bar (180 psi) Maximum Air Input Pressure

Model 231-147, 20:1 Ratio President®, with Hose and Gun

25.0 MPa, 250 bar (3600 psi) Maximum Fluid Working Pressure

1.25 MPa, 12.5 bar (180 psi) Maximum Air Input Pressure

CHECK-MATE™ 200 DISPLACEMENT PUMPS (UHMWPE and PTFE packings)

Model 231-134, 23:1 Ratio Monark®

28.5 MPa, 285 bar (4140 psi) Maximum Fluid Working Pressure

1.25 MPa, 12.5 bar (180 psi) Maximum Air Input Pressure

Model 231-135, 23:1 Ratio Monark®, with Hose and Gun

28.5 MPa, 285 bar (4140 psi) Maximum Fluid Working Pressure

1.25 MPa, 12.5 bar (180 psi) Maximum Air Input Pressure

Model 231-136, 46:1 Ratio President®

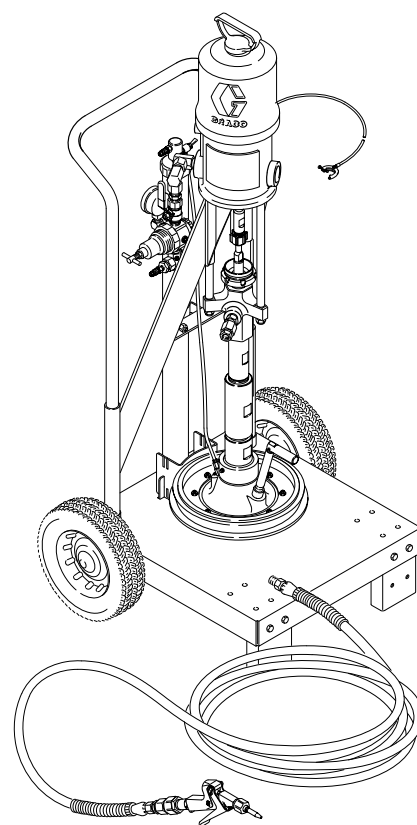
32.0 MPa, 320 bar (4600 psi) Maximum Fluid Working Pressure

0.7 MPa, 7 bar (100 psi) Maximum Air Input Pressure

Model 231-137, 46:1 Ratio President® with Hose and Gun

32.0 MPa, 320 bar (4600 psi) Maximum Fluid Working Pressure

0.7 MPa, 7 bar (100 psi) Maximum Air Input Pressure



Model 231-137 Shown

0257B

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Symbols

Warning Symbol



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

Caution Symbol



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

! WARNING



INJECTION HAZARD

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

- Fluid injected into the skin might look like just a cut, but it is a serious injury. **Get immediate medical attention.**
- Do not point the spray gun/dispensing valve at anyone or at any part of the body.
- Do not put hand or fingers over the spray tip/nozzle.
- Do not stop or deflect fluid leaks with your hand, body, glove, or rag.
- Do not “blow back” fluid; this is not an air spray system.
- Always have the tip guard and the trigger guard on the spray gun/dispensing valve when spraying/dispensing.
- Be sure the gun trigger safety operates before spraying.
- Lock the gun/valve trigger safety when you stop spraying.
- Follow the **Pressure Relief Procedure** on page 10 whenever you: are instructed to relieve pressure; stop spraying; clean, check, or service the equipment; and install or clean the spray tip.
- Tighten all the fluid connections before operating the equipment.
- Check the hoses, tubes, and couplings daily. Replace worn, damaged, or loose parts immediately. Permanently coupled hoses cannot be repaired; replace the entire hose.



TOXIC FLUID HAZARD

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

- Know the specific hazards of the fluid you are using. Read the fluid manufacturer’s warnings.
- Store hazardous fluid in an approved container. Dispose of the hazardous fluid according to all local, state, and national guidelines.
- Wear appropriate protective clothing, gloves, eyewear, and respirator.

Warnings are continued on the next page.

⚠ WARNING



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/dispensed. See **Grounding** on page 5.
- Provide fresh air ventilation to avoid the buildup of flammable fumes from solvent or the fluid being sprayed.
- Extinguish all the open flames or pilot lights in the spray/dispensing area.
- Electrically disconnect all the equipment in the spray/dispensing area.
- Keep the spray/dispensing area free of debris, including solvent, rags, and gasoline.
- Do not turn on or off any light switch in the spray/dispensing area while operating or if fumes are present.
- Do not smoke in the spray/dispensing area.
- Do not operate a gasoline engine in the spray/dispensing area.
- If there is any static sparking while using the equipment, **stop spraying/dispensing immediately**. Identify and correct the problem.



INSTRUCTIONS



EQUIPMENT MISUSE HAZARD

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

- This equipment is for professional use only.
- Read all the instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are uncertain about usage, call your Graco distributor.
- Do not alter or modify this equipment. Use only genuine Graco parts and accessories.
- Check the equipment daily. Repair or replace worn or damaged parts immediately.
- Do not exceed the maximum working pressure of the lowest rated system component. See the **Technical Data** on page 23 for your equipment's Maximum Working Pressure.
- Use fluids that are compatible with the equipment wetted parts. See the **Technical Data** section of all the equipment manuals. Read the fluid manufacturer's warnings.
- Route the hoses away from traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 180°F (82°C) or below -40°F (-40°C).
- Do not use the hoses to pull equipment.
- Wear hearing protection when operating this equipment.
- Comply with all applicable local, state, and national fire, electrical, and other safety regulations.



MOVING PARTS HAZARD


Moving parts, such as the air motor piston, can pinch or amputate fingers.


- Do not operate the equipment with the air motor plates removed.
- Keep clear of the elevator tube, frame slides, and the frame of the cart when operating the equipment.
- Keep clear of the wiper plate and the lip of the fluid container when operating the equipment.
- Before servicing the equipment, follow the **Pressure Relief Procedure** on page 10 to prevent the equipment from starting unexpectedly.

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Installation

Grounding

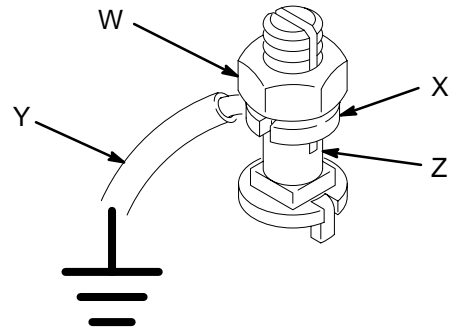
**WARNING**

**FIRE AND EXPLOSION HAZARD**
Before operating, ground the system as explained below. Also read the section **FIRE AND EXPLOSION HAZARD** on page 3.

To reduce the risk of static sparking, ground the pump and all other components used or located in the spray/dispensing area. Check your local electrical code for detailed instructions for your area and type of equipment and be sure to ground all of these components.

- **Pump:** loosen the grounding lug locknut (W) and washer (X). Insert one end of a 12 ga (1.5 mm²) minimum ground wire (Y) into the slot in lug (Z) and tighten the locknut securely. See Fig. 1. Connect the other end of the wire to a true earth ground.
- **Air and Fluid Hoses:** Use only electrically conductive hoses with a maximum of 500 feet (150 m) combined hose length to ensure grounding continuity.
- **Air Compressor:** follow the air compressor manufacturer's recommendations
- **Spray gun/dispensing valve:** obtain grounding through connection to a properly grounded fluid hose and pump.
- **Fluid supply container:** according to local code.
- **Object being sprayed:** according to local code.

- All solvent pails used when flushing, according to local code. Use only metal pails, which are conductive. Do not place the pail on a non-conductive surface, such as paper or cardboard, which interrupts grounding continuity.
- To maintain grounding continuity when flushing or relieving pressure, always hold a metal part of the gun firmly to the side of a grounded metal pail, then trigger the gun.



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Fig. 1

Flushing Safety

**WARNING**

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 10.

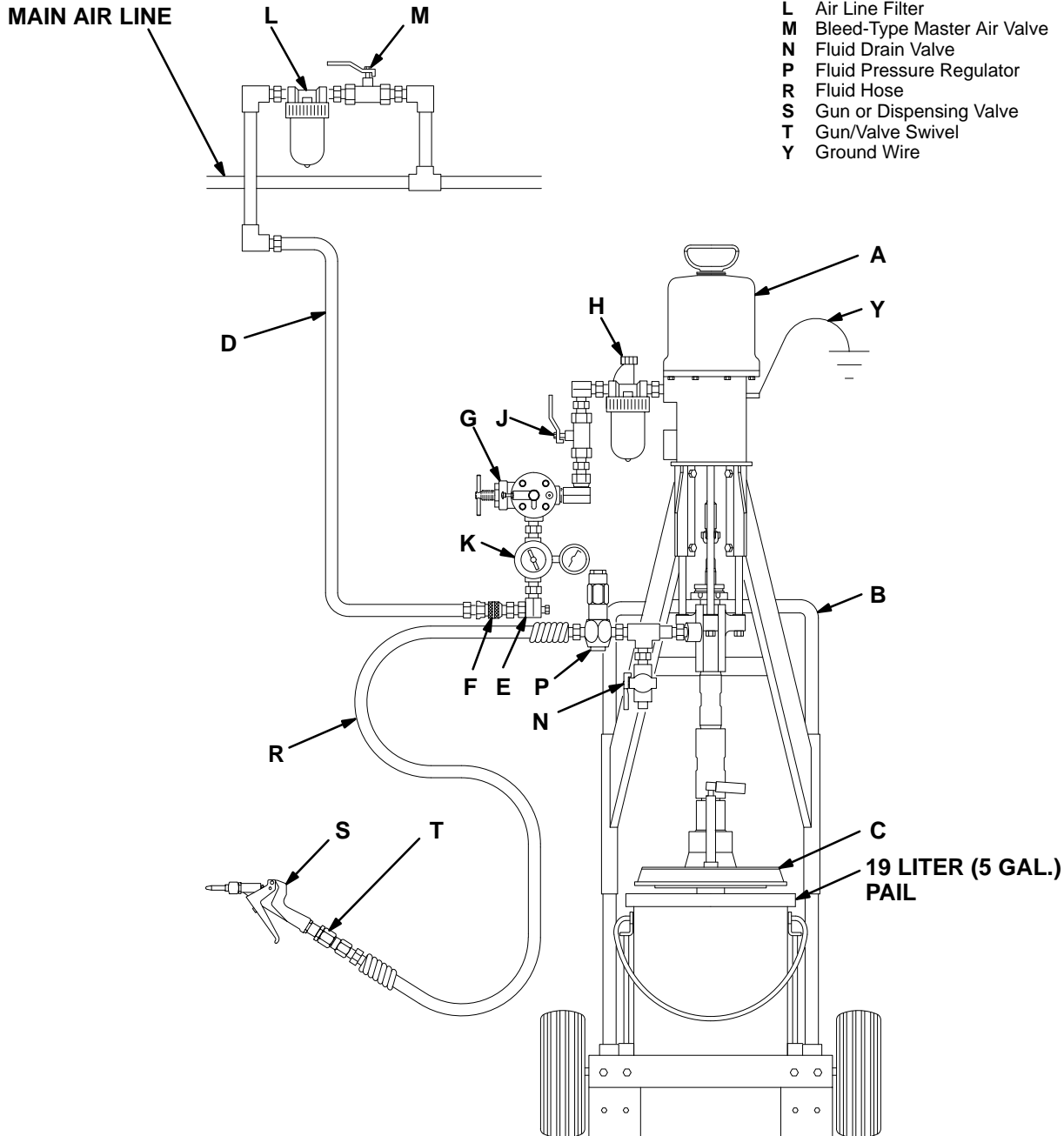
Before flushing, be sure the entire system and flushing pails are properly grounded. Refer to **Grounding** at left. Follow the **Pressure Relief Procedure** on page 10, and remove the spray tip/nozzle from the gun/dispensing valve. Always use the lowest possible fluid pressure, and maintain firm metal-to-metal contact between the gun/dispensing valve and the pail during flushing to reduce the risk of fluid injection injury, static sparking, and splashing.

Installation

Typical Installation

Key

- A Pump
- B Pneumatic Elevator Cart
- C Wiper Plate
- D Air Hose
- E Air Manifold
- F Air Line Quick Disconnect Coupler
- G Pump Runaway Valve
- H Air Line Lubricator
- J Red-Handled Bleed-Type Master Air Valve
- K Air Regulator
- L Air Line Filter
- M Bleed-Type Master Air Valve
- N Fluid Drain Valve
- P Fluid Pressure Regulator
- R Fluid Hose
- S Gun or Dispensing Valve
- T Gun/Valve Swivel
- Y Ground Wire



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Installation

NOTE: Reference numbers and letters in parentheses in the text refer to the callouts in the figures and the parts drawing.

The Typical Installation shown on page 6 is only a guide for selecting and installing system components and accessories. Contact your Graco distributor for assistance in designing a system to suit your particular needs.

Assembling the Pump

The major components of this pump are packed in separate containers. They are:

- Check-Mate Pump (Part No. varies by Model)
- Air Regulation Kit 223–815
- Pneumatic Elevator Cart 224–137
- Cart Accessory Kit 224–376
- Wiper Plate 222–812 (or 235–539, Model 231–301 only)
- Hose 215–244, Flo-Gun 207–945, and Gun Swivel 207–947 (*Models 231–135, 231–137, 231–145, and 231–147 only*)

Assemble the components as explained on page 8.

System Accessories

Refer to the **Typical Installation** drawing on page 6.

WARNING

Two accessories are required in your system: a red-handled bleed-type master air valve (J) and a fluid drain valve (N). These accessories help reduce the risk of serious injury including fluid injection, splashing in the eyes or on the skin, and injury from moving parts if you are adjusting or repairing the pump.

The bleed-type master air valve relieves air trapped between this valve and the pump after the air is shut off. Trapped air can cause the pump to cycle unexpectedly. Locate the valve close to the pump.

The fluid drain valve assists in relieving fluid pressure in the displacement pump, hose, and gun. Triggering the gun to relieve pressure may not be sufficient.

Air and Fluid Hoses

Be sure all air and fluid hoses are properly sized and pressure rated for your system. Use only grounded air and fluid hoses. Fluid hoses must have spring guards on both ends.

Supplied Air Line Components

The following components are supplied with your pump:

- **The red-handled bleed-type master air valve (J)** is required in your system to relieve air trapped between it and the air motor when the valve is closed (see the **WARNING** at left). Be sure the bleed valve is easily accessible from the pump, and is located downstream from the air regulator.
- **The air regulator (K)** 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.
- **The air manifold (E)** is the air inlet for the pump.
- **The air line quick disconnect coupler (F)** consists of a female coupler and a male pin fitting. The female coupler screws onto the end of the air hose (D). The male fitting is installed at the inlet of the air manifold (E). A second male fitting is included with the pneumatic elevator cart, installed at the cart air inlet.

Air Line Accessories

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

- **A pump runaway valve (G)** senses when the pump is running too fast and automatically shuts off the air to the motor. A pump which runs too fast can be seriously damaged.
- **An air line lubricator (H)** provides automatic air motor lubrication.
- **An air line filter (L)** removes harmful dirt and moisture from the compressed air supply.
- **A second bleed-type air valve (M)** isolates the air line accessories for servicing. Locate upstream from all other air line accessories.

Fluid Line Accessories

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

- **A fluid drain valve (N)** is required in your system to relieve fluid pressure in the hose and gun (see the **WARNING** at left). Screw the drain valve into the open branch of a tee mounted in the fluid line. Install the drain valve pointing down, but so the handle points up when opened.
- **A fluid regulator (P)** controls fluid pressure to the gun/valve, and dampens pressure surges.
- **A gun or valve (S)** dispenses fluid. The gun shown in the **Typical Installation** is a dispensing gun for highly viscous fluids.
- **A gun swivel (T)** allows freer gun movement.

Installation

Mounting the Pump on the Cart

Install the pump on the cart as explained in the separate cart manual 308–092.

Assembling the Wiper Plate to the Pump

Install the wiper plate on the pump as explained in the separate wiper plate manual 308–049.

NOTE: The wiper plate is shipped for use with straight-sided pails on a 19 liter (5 gallon) ram. The plate must be modified for use with the pneumatic elevator cart, or for use with tapered pails. Refer to the separate wiper plate manual 308–049 for details.

Installing Cart Accessory Kit 224–376

1. Screw the air inlet adapter into the pump's air inlet. *For Monark pumps*, use the straight swivel adapter (17), which will be oriented as shown in the parts drawings on pages 14 and 18. *For president pumps*, use the 90° swivel adapter (19) with the swivel angled forward (see Fig. 2).
 2. The air regulation kit (4) requires some reconfiguration before it is assembled to the pump. Proceed as follows:
 - a. Remove the 90° swivel adapter (10) from the air regulation kit (4). Attach this adapter to the swivel adapter (17 or 19) installed in Step 1. The swivel end of the adapter (10) must face down. See Fig. 2 for President pumps and the parts drawings on pages 14 and 18 for Monark pumps.
 - b. Remove the air manifold (5) so its swivel inlet faces the same direction as the T-handle of the air regulator (11). See Fig. 2.
 - c. Reorient the pressure gauge (6) and the elbow which attaches it to the air regulator so the gauge is upright and faces backward, toward the handle of the cart. See Fig. 2.
 - d. Screw the bushing (16) into the swivel inlet of the air manifold (5), and screw the male quick disconnect fitting (15) into the bushing. Screw the female quick disconnect coupler (26) onto the air hose (D, see page 6).
 - e. Install the air regulation kit onto the pump by connecting the nipple (9) to the swivel end of the adapter (10). Tighten securely. When properly installed, the pump air inlet fitting (15) will face the same direction and be parallel to the air inlet fitting (CC) on the pneumatic elevator.
 3. Screw the fluid fitting onto the pump's fluid outlet. Use the 1/2 npt(f) adapter (18) for Check-Mate 200 Pumps, and the 3/4 npt(f) coupling (20) for Check-Mate 450 Pumps.
 4. Remove the plug from the air valve housing (U) on the top of the cart's cylinder. Screw the plug into the open port of the air manifold (5), as shown in Fig. 2.
 5. Screw the air release toggle valve (21) into the open port of the air valve housing (U). Be sure that the hole on the release valve is facing down.
 6. Place the gasket (25) on the threaded end of the barbed stud (24). Screw the stud into the air release toggle valve (21). push one end of the tube (22) onto the barbed stud (24).
 7. Screw the tube fitting (23) into the port on the wiper plate (3).
 8. Route the tube (22) over the crosspiece (V) of the cart frame and bring it to the tube fitting (23). If the tube is longer than necessary, it can be shortened by cutting. Do not shorten the tube by more than 152 mm (6 in.).
 9. Push the tube into the tube fitting (23) until it snaps securely in place. Pull on the tube to ensure it is locked.
- NOTE:** To release the tube (22) from the fitting (23), press in and hold the button on the fitting, and pull the tube out.
10. If your model is equipped with a hose and gun, connect one end of the fluid hose (30) to the fitting (18 or 20) at the pump's fluid outlet.
 11. Screw the bushing (27) onto the other end of the hose (30).
 12. Screw the gun swivel (29) into the fluid inlet of the gun (28).
 13. Connect the gun swivel (29) to the bushing (27) on the free end of the hose (30).

Installation

MODEL 231-137 SHOWN

CART ACCESSORY KIT 224-376
INCLUDES ITEMS 15-27

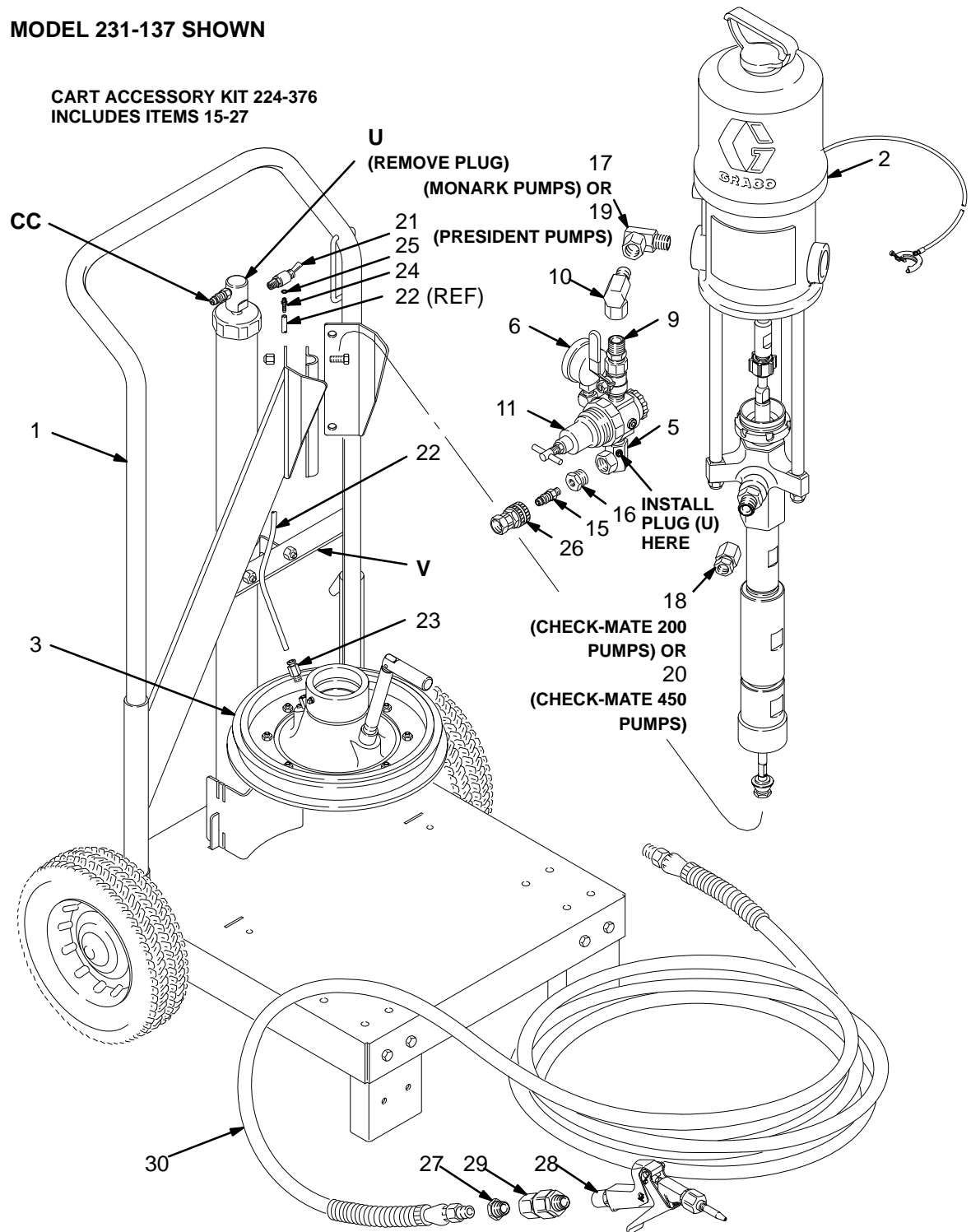


Fig. 2

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Operation

Pressure Relief Procedure

WARNING



INJECTION HAZARD

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, or moving parts, follow the **Pressure Relief Procedure** whenever you:

- are instructed to relieve the pressure,
- stop spraying,
- check or service any of the system equipment,
- or install or clean any part of the system.

1. Lock the spray gun/dispensing valve trigger safety.
2. Shut off the air to the pump.
3. Close the bleed-type master air valve (required in your system).
4. Unlock the trigger safety.
5. 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 trigger safety.
7. Open the drain valve (required in your system), having a container ready to catch the drainage.
8. Leave the drain valve open until you are ready to spray again.

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

General

CAUTION

To avoid tip-over, the cart must be on a flat and level surface. Failure to follow this caution could result in injury or equipment damage.

WARNING

Moving parts can pinch or amputate your fingers or other body parts. When the pump is operating, the priming piston (located at the pump intake) and the air motor piston (located behind the air motor plates) move. Therefore, never operate the pump with the air motor plates removed, and keep your fingers and hands away from the priming piston.

Before attempting to clear an obstruction from the priming piston or service the pump, follow the **pressure relief procedure** at left to prevent the pump from starting accidentally.

The elevator tube (AA) and from slides (BB) move up and down when the elevator is in operation, and can pinch fingers or hands caught between them and the cart frame. Keep your hands away from the elevator tube, from slides, and the frame of the cart when the elevator is in operation. See Fig. 3.

The wiper plate (3) moves downward as the elevator is lowered, and can pinch or amputate fingers or hands caught between it and the lip of the fluid container. Keep your hands away from the wiper plate and the lip of the fluid container when the elevator is in operation.

Operation

Raising the Elevator and Positioning the Pail

1. Disconnect the female quick coupler from the pump air inlet fitting (15) and connect it to the air inlet fitting (CC) on the elevator. Turn on the main air. See Fig. 3.
2. Raise the elevator to its maximum height, so the hanger (DD) on the cart handle is below the hook (EE) on the elevator frame.
3. Place a 19 liter (5 gallon) pail of fluid on the base of the cart. Slide the pail back against the pail stop (FF). The pail stop is adjustable to four positions, to properly align the pail with the wiper plate (3).
4. Make the fluid surface concave by scooping from the center of the pail to the sides.

Lowering the Elevator

1. Pull the hanger (DD) upward and hold it firmly against the handle of the cart. Disconnect the female quick coupler from the elevator air inlet fitting (CC) and connect it to the pump air inlet fitting (15). After a short delay, the weight of the pump will cause the elevator to move downward. Continue to hold the hanger (DD) against the cart handle until the hook (EE) on the frame is low enough to prevent it from engaging the hanger. See Fig. 3.
2. If necessary, push down on the top of the pump to help the wiper plate (3) enter the pail. When the wiper plate enters the pail, open the wiper plate vent (GG) and leave it open until fluid appears at the vent hole. Close the vent.
3. Start the pump as explained in the separate pump manual.
4. When the pail is empty, change pails as follows.

Changing Pails

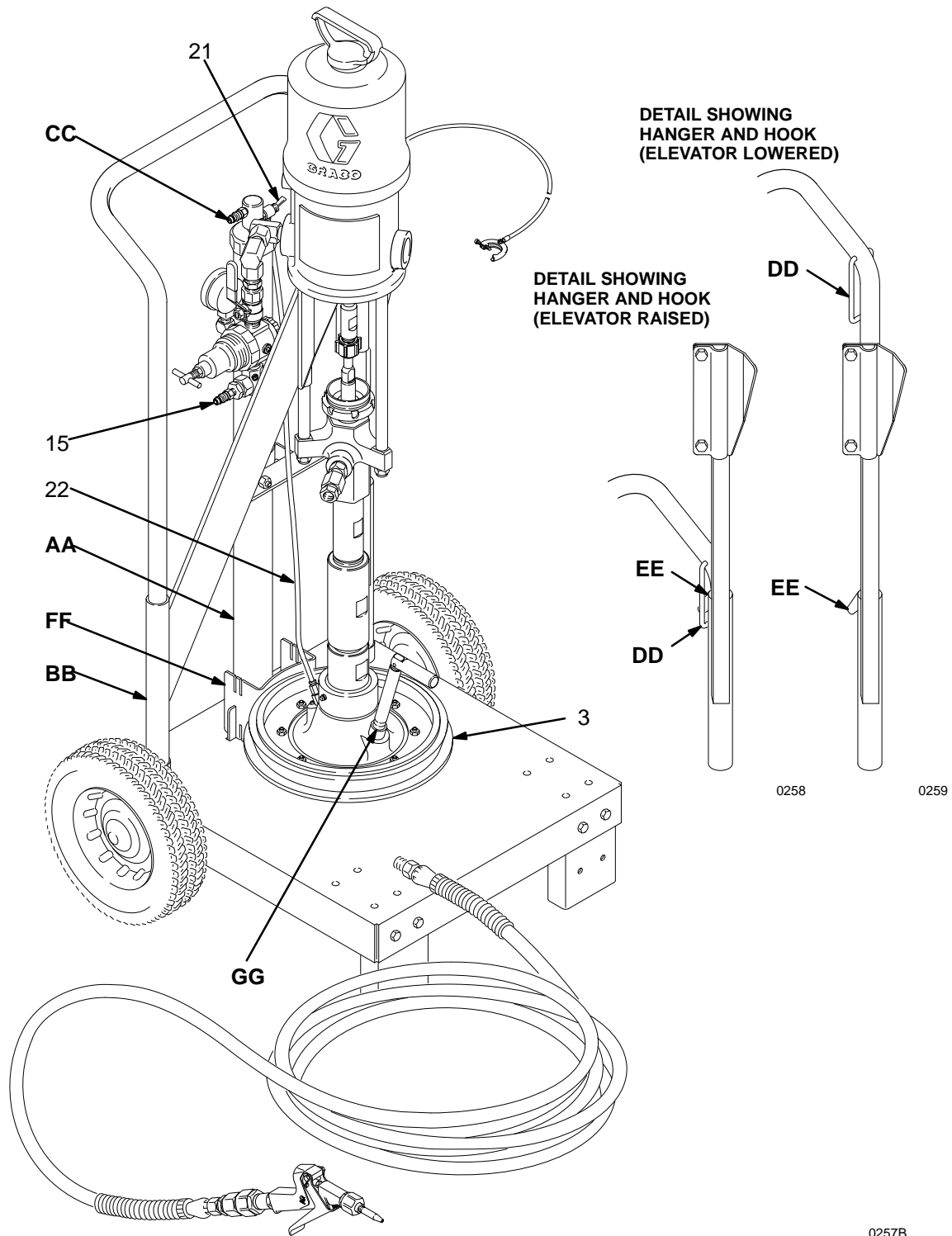
WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 10.

To raise the pump out of an empty pail:

1. Stop the pump and **relieve the pressure**.
 2. Set the air release toggle valve (21) to the down (open) position. The toggle valve directs air under the wiper plate, making it easier to pull the plate out of the pail. See Fig. 3.
 3. Disconnect the female quick coupler from the pump air inlet fitting (15), and connect it to the elevator air inlet fitting (CC). After a short delay, the elevator will begin to raise the pump from the pail.
 4. As the wiper plate (3) nears the top of the pail, the seal between the wiper and pail will decrease and the plate may not come completely out of the pail. The elevator will lift the pump and pail together. Allow the elevator to rise to its maximum height, so the hanger (DD) on the cart handle is below the hook (EE) on the elevator frame, then just pull the pail off the plate.
- NOTE:** If the plate is stuck at the bottom of the pail and does not come out at all, the elevator will pull the pail up along with the plate. If this happens, allow the elevator to rise to its full height, then open the wiper plate vent (GG). This will make it possible to pull the pail off the plate. Check for a blockage in the tube (22) near the wiper plate (3). Fluid may have dried in and around the wiper plate's air assist check valve. Refer to the separate wiper plate manual 308–049 for details and clean as necessary.
5. Place the full pail on the cart base and position as explained above.

Operation



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Fig. 3

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Parts

Model 231-133, Series A

10:1 Ratio Monark Pump with Check-Mate 450 Displacement Pump

Includes items 1–27, 31

Model 231-145, Series A

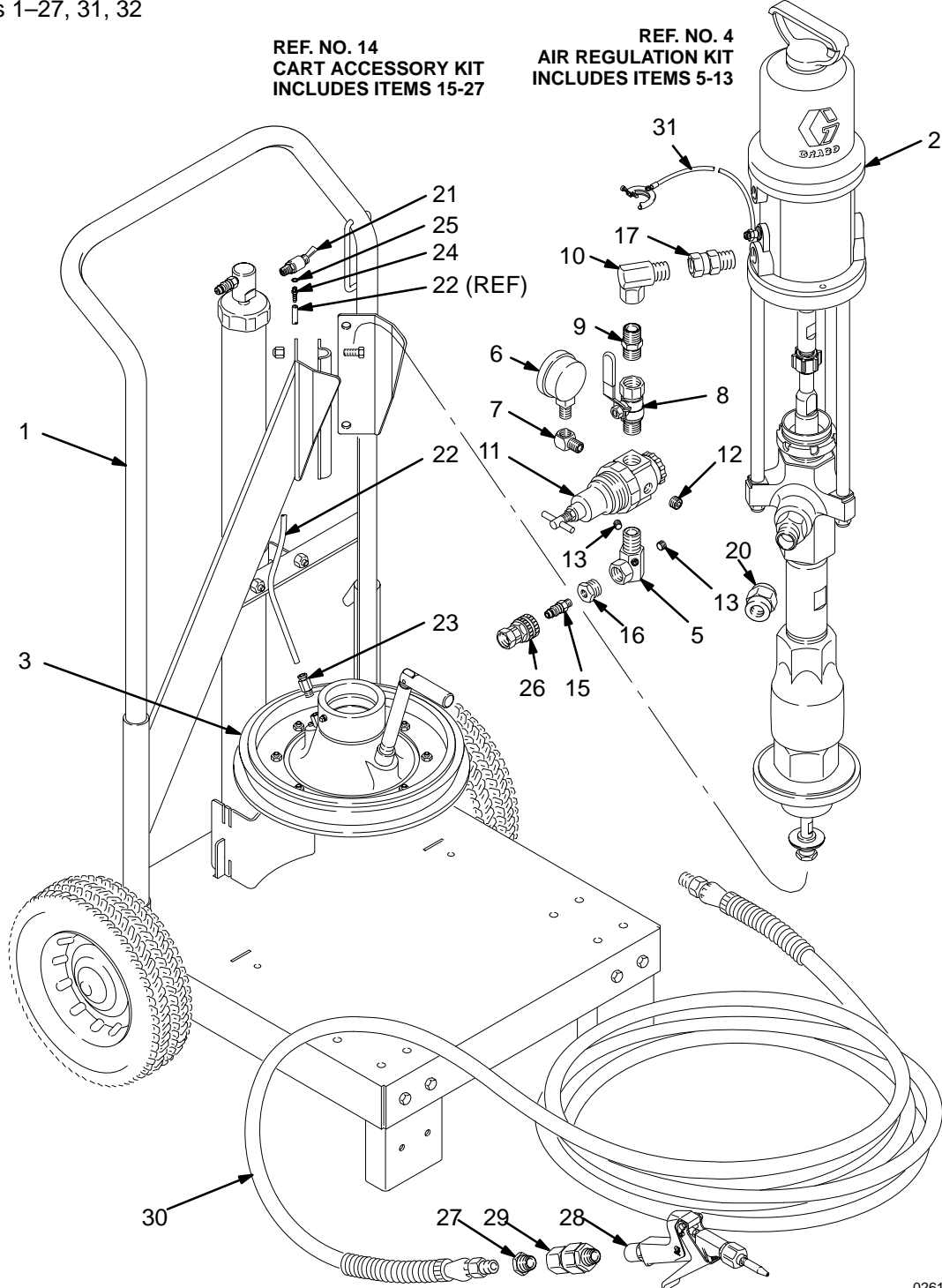
10:1 Ratio Monark Pump with Check-Mate 450 Displacement Pump

Includes items 1–32

Model 231-301, Series A

10:1 Ratio Monark Pump with Check-Mate 450 Displacement Pump (All PTFE Packed)

Includes items 1–27, 31, 32



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Parts

Model 231–133, Series A
10:1 Ratio Monark Pump
with Check-Mate 450 Displacement Pump
Includes items 1–27, 31

Model 231–145, Series A
10:1 Ratio Monark Pump
with Check-Mate 450 Displacement Pump
Includes items 1–32

Model 231–301, Series A
10:1 Ratio Monark Pump
with Check-Mate 450 Displacement Pump
(All PTFE Packed)
Includes items 1–27, 31, 32

| Ref. No. | Part No. | Description | Qty. |
|----------|----------|--|------|
| 11 | 104–266 | . AIR REGULATOR See 308–167 for parts | 1 |
| 12 | 100–721 | . PLUG, pipe, headless; 1/4 npt | 1 |
| 13 | 104–765 | . PLUG, pipe, headless; 1/8 npt | 1 |
| 14 | 224–376 | KIT, accessory, cart Includes items 15–27 | 1 |
| 15 | 169–971 | . FITTING, quick disconnect, air 3/8 npt(m) | 1 |
| 16 | 158–212 | . BUSHING, reducer; 1/2 npt(m) x 3/8 npt(f) | 1 |
| 17 | 162–505 | . UNION, adapter, straight; 3/8 npt(m) x 1/2 npt(f) swivel | 1 |
| 18 | 161–077 | . UNION, adapter, straight; 1/2 npt(f) x 3/8 npsm (f) swivel; <i>not used on these pumps</i> | 1 |
| 19 | 155–470 | . UNION, adapter, 90°; 1/2 npt(m) x 12 npsm(f) swivel; <i>not used on these pumps</i> | 1 |
| 20 | 161–490 | . COUPLING, reducing; 3/8 npt(f) x 3/8 npt(f) | 1 |
| 21 | 111–305 | . VALVE, release; toggle; 1/8 npt(m) x 10–32 unf-2b(f) | 1 |
| 22 | 181–137 | . TUBE; nylon; 4.6 mm (0.180") ID; 0.965 m (38" long) | 1 |
| 23 | 104–172 | . FITTING, tube; 1/8 npt(m) x 6 mm (1/4") OD tube | 1 |
| 24 | 104–164 | . STUD, tube, barbed; 10–32 unf-2a | 1 |
| 25 | 104–640 | . GASKET, buna-N | 1 |
| 26 | 208–536 | . COUPLER, quick disconnect | 1 |
| 27 | 100–081 | . BUSHING, reducer; 1/2 npt(m) x 3/8 npt(f) <i>used with Model 231–145 only</i> | 1 |
| 28 | 207–945 | FLO-GUN See 307–004 for parts | 1 |
| 29 | 207–947 | SWIVEL, straight, gun; 1/2 npt(m) x 1/2 npt(f) | 1 |
| 30 | 215–244 | HOSE, fluid; nylon; 10 mm (3/8") ID; 3/8 npt(mbe); 7/6 m (25 ft) long | 1 |
| 31 | 222–011 | GROUND WIRE and CLAMP | 1 |
| 32 | 238–275 | DESIGNATION PLATE <i>Used on Model 231–145 (not shown)</i> | 1 |
| | 238–277 | DESIGNATION PLATE <i>Used on Model 231–301 (not shown)</i> | 1 |

| Ref. No. | Part No. | Description | Qty. |
|----------|----------|--|------|
| 1 | 224–137 | CART, elevator, pneumatic See 308–092 for parts | 1 |
| 2 | 222–770 | 10:1 RATIO MONARK PUMP <i>Used on Models 231–144 & 231–145</i> See 308–017 for parts | 1 |
| | 235–626 | 10:1 RATIO MONARK PUMP <i>Used on Model 231–301</i> See 308–017 for parts | 1 |
| 3 | 222–812 | PLATE, wiper, 19 liter (5 gallon) <i>Used on Model 231–144 & 231–145</i> See 308–049 for parts | 1 |
| | 235–539 | PLATE, wiper, 19 liter (5 gallon) <i>Used on Model 231–301</i> See 308–049 for parts | 1 |
| 4 | 238–272 | AIR REGULATION KIT Includes items 5–13 | 1 |
| 5 | 162–376 | . MANIFOLD, air, swivel; 1/2 npt(m) x 1/2 npt(f) swivel; three 1/8 npt(f) ports | 1 |
| 6 | 100–960 | . GAUGE, air pressure; 0–1.4 MPa, 0–14 bar (0–200 psi) range | 1 |
| 7 | 100–840 | . ELBOW, street, 90°; 1/2 npt(m x f) | 1 |
| 8 | 113–269 | . VALVE, bleed-type, red-handled; 1/2 npt(m x f) | 1 |
| 9 | 158–491 | . NIPPLE; 1/2 npt | 1 |
| 10 | 155–470 | . UNION, adapter; 1/2 npt(m) x 1/2 npsm(f) swivel | 1 |

Parts

Model 231-146, Series A

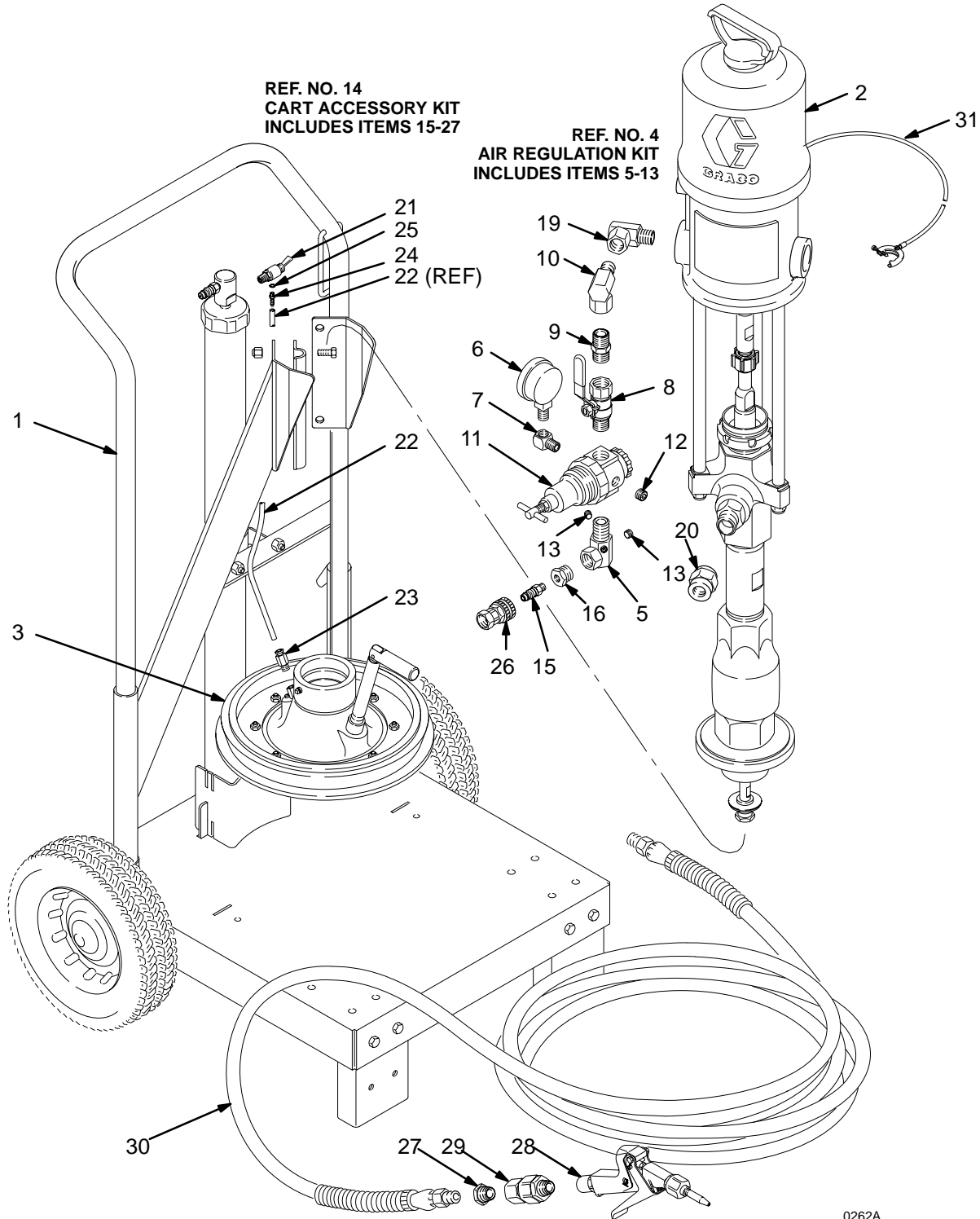
20:1 Ratio President Pump with Check-Mate 450 Displacement Pump

Includes items 1-27, 31, 32

Model 231-147, Series A

20:1 Ratio President Pump with Check-Mate 450 Displacement Pump

Includes items 1-32



0262A

Parts

Model 231–146, Series A
20:1 Ratio President Pump
with Check-Mate 450 Displacement Pump
Includes items 1–27, 31, 32

Model 231–147, Series A
20:1 Ratio President Pump
with Check-Mate 450 Displacement Pump
Includes items 1–32

| Ref. No. | Part No. | Description | Qty. |
|----------|----------|--|------|
| 15 | 169–971 | . FITTING, quick disconnect, air 3/8 npt(m) | 1 |
| 16 | 158–212 | . BUSHING, reducer; 1/2 npt(m) x 3/8 npt(f) | 1 |
| 17 | 162–505 | . UNION, adapter, straight; 3/8 npt(m) x 1/2 npt(f) swivel; <i>not used on these pumps</i> | 1 |
| 18 | 161–077 | . UNION, adapter, straight; 1/2 npt(f) x 3/8 npsm (f) swivel; <i>not used on these pumps</i> | 1 |
| 19 | 155–470 | . UNION, adapter, 90°; 1/2 npt(m) x 12 npsm(f) swivel | 1 |
| 20 | 161–490 | . COUPLING, reducing; 3/8 npt(f) x 3/8 npt(f) | 1 |
| 21 | 111–305 | . VALVE, release; toggle; 1/8 npt(m) x 10–32 unf-2b(f) | 1 |
| 22 | 181–137 | . TUBE; nylon; 4.6 mm (0.180") ID; 0.965 m (38" long) | 1 |
| 23 | 104–172 | . FITTING, tube; 1/8 npt(m) x 6 mm (1/4") OD tube | 1 |
| 24 | 104–164 | . STUD, tube, barbed; 10–32 unf-2a | 1 |
| 25 | 104–640 | . GASKET, buna-N | 1 |
| 26 | 208–536 | . COUPLER, quick disconnect | 1 |
| 27 | 100–081 | . BUSHING, reducer; 1/2 npt(m) x 3/8 npt(f) <i>used with Model 231–147 only</i> | 1 |
| 28 | 207–945 | FLO-GUN See 307–004 for parts | 1 |
| 29 | 207–947 | SWIVEL, straight, gun; 1/2 npt(m) x 1/2 npt(f) | 1 |
| 30 | 215–244 | HOSE, fluid; nylon; 10 mm (3/8") ID; 3/8 npt(mbe); 7/6 m (25 ft) long | 1 |
| 31 | 222–011 | GROUND WIRE and CLAMP | 1 |
| 32 | 238–276 | DESIGNATION PLATE (<i>not shown</i>) | 1 |

| Ref. No. | Part No. | Description | Qty. |
|----------|----------|---|------|
| 1 | 224–137 | CART, elevator, pneumatic See 308–092 for parts | 1 |
| 2 | 222–768 | 20:1 RATIO PRESIDENT PUMP See 308–017 for parts | 1 |
| 3 | 222–812 | PLATE, wiper, 19 liter (5 gallon) See 308–049 for parts | 1 |
| 4 | 238–272 | AIR REGULATION KIT Includes items 5–13 | 1 |
| 5 | 162–376 | . MANIFOLD, air, swivel; 1/2 npt(m) x 1/2 npt(f) swivel; three 1/8 npt(f) ports | 1 |
| 6 | 100–960 | . GAUGE, air pressure; 0–1.4 MPa, 0–14 bar (0–200 psi) range | 1 |
| 7 | 100–840 | . ELBOW, street, 90°; 1/2 npt(m x f) | 1 |
| 8 | 113–269 | . VALVE, bleed-type, red-handled; 1/2 npt(m x f) | 1 |
| 9 | 158–491 | . NIPPLE; 1/2 npt | 1 |
| 10 | 155–470 | . UNION, adapter; 1/2 npt(m) x 1/2 npsm(f) swivel | 1 |
| 11 | 104–266 | . AIR REGULATOR See 308–167 for parts | 1 |
| 12 | 100–721 | . PLUG, pipe, headless; 1/4 npt | 1 |
| 13 | 104–765 | . PLUG, pipe, headless; 1/8 npt | 1 |
| 14 | 224–376 | KIT, accessory, cart Includes items 15–27 | 1 |

Parts

Model 231-134, Series A

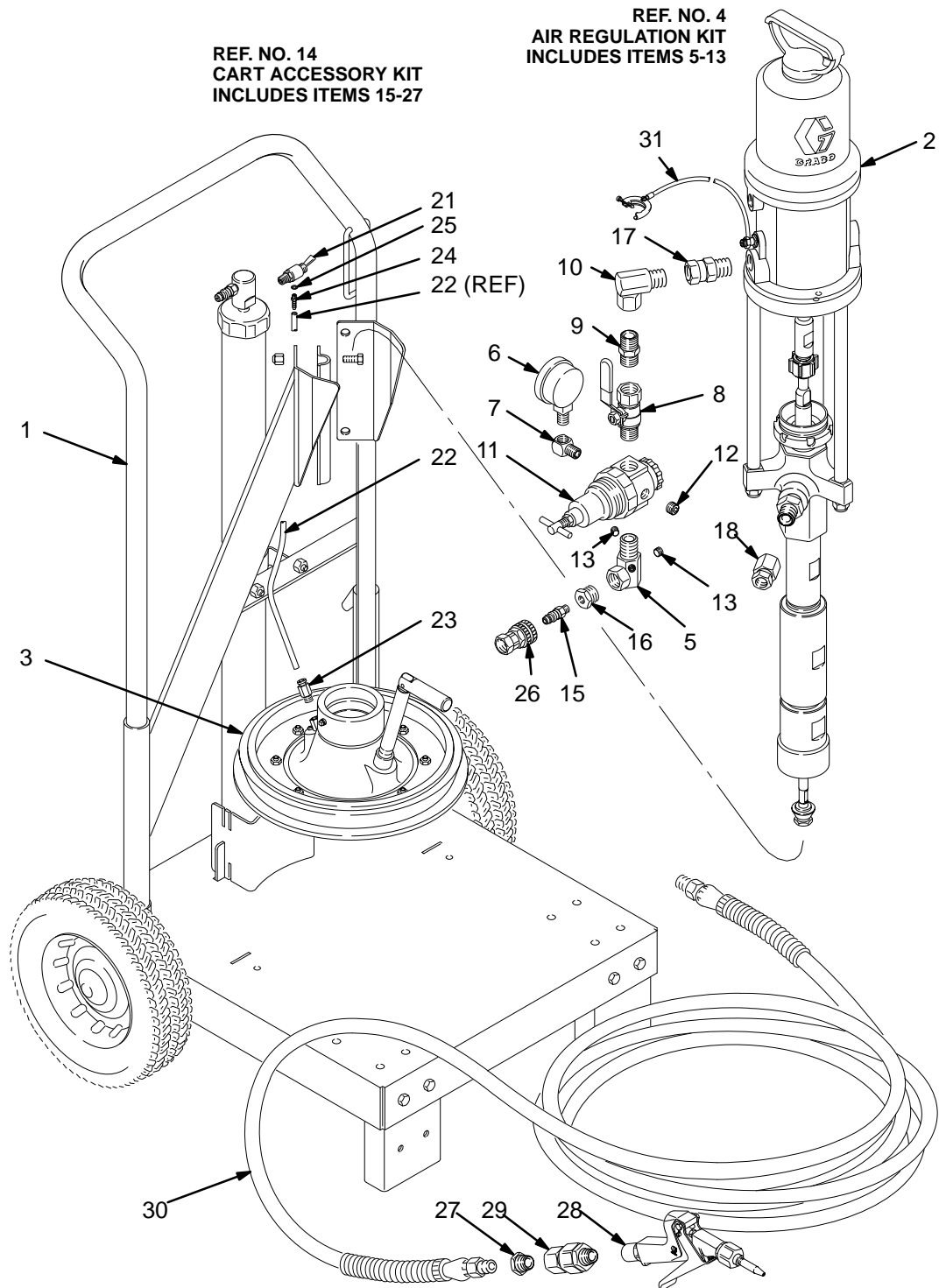
23:1 Ratio Monark Pump with Check-Mate 200 Displacement Pump

Includes items 1-27, 31, 32

Model 231-135, Series A

23:1 Ratio Monark Pump with Check-Mate 200 Displacement Pump

Includes items 1-32



0263A

Parts

Model 231–134, Series A
23:1 Ratio Monark Pump
with Check-Mate 200 Displacement Pump
Includes items 1–27, 31, 32

Model 231–135, Series A
23:1 Ratio Monark Pump
with Check-Mate 200 Displacement Pump
Includes items 1–32

| Ref. No. | Part No. | Description | Qty. |
|----------|----------|---|------|
| 15 | 169–971 | . FITTING, quick disconnect, air 3/8 npt(m) | 1 |
| 16 | 158–212 | . BUSHING, reducer; 1/2 npt(m) x 3/8 npt(f) | 1 |
| 17 | 162–505 | . UNION, adapter, straight; 3/8 npt(m) x 1/2 npt(f) swivel | 1 |
| 18 | 161–077 | . UNION, adapter, straight; 1/2 npt(f) x 3/8 npsm (f) swivel | 1 |
| 19 | 155–470 | . UNION, adapter, 90°; 1/2 npt(m) x 12 npsm(f) swivel; <i>not used on these pumps</i> | 1 |
| 20 | 161–490 | . COUPLING, reducing; 3/8 npt(f) x 3/8 npt(f); <i>not used on these pumps</i> | 1 |
| 21 | 111–305 | . VALVE, release; toggle; 1/8 npt(m) x 10–32 unf-2b(f) | 1 |
| 22 | 181–137 | . TUBE; nylon; 4.6 mm (0.180") ID; 0.965 m (38" long) | 1 |
| 23 | 104–172 | . FITTING, tube; 1/8 npt(m) x 6 mm (1/4") OD tube | 1 |
| 24 | 104–164 | . STUD, tube, barbed; 10–32 unf-2a | 1 |
| 25 | 104–640 | . GASKET, buna-N | 1 |
| 26 | 208–536 | . COUPLER, quick disconnect | 1 |
| 27 | 100–081 | . BUSHING, reducer; 1/2 npt(m) x 3/8 npt(f) <i>used with Model 231–135 only</i> | 1 |
| 28 | 207–945 | FLO-GUN See 307–004 for parts | 1 |
| 29 | 207–947 | SWIVEL, straight, gun; 1/2 npt(m) x 1/2 npt(f) | 1 |
| 30 | 215–244 | HOSE, fluid; nylon; 10 mm (3/8") ID; 3/8 npt(mbe); 7/6 m (25 ft) long | 1 |
| 31 | 222–011 | GROUND WIRE and CLAMP | 1 |
| 32 | 238–273 | DESIGNATION PLATE (<i>not shown</i>) | 1 |
| 1 | 224–137 | CART, elevator, pneumatic See 308–092 for parts | 1 |
| 2 | 222–782 | 23:1 RATIO MONARK PUMP See 308–080 for parts | 1 |
| 3 | 222–812 | PLATE, wiper, 19 liter (5 gallon) See 308–049 for parts | 1 |
| 4 | 238–272 | AIR REGULATION KIT Includes items 5–13 | 1 |
| 5 | 162–376 | . MANIFOLD, air, swivel; 1/2 npt(m) x 1/2 npt(f) swivel; three 1/8 npt(f) ports | 1 |
| 6 | 100–960 | . GAUGE, air pressure; 0–1.4 MPa, 0–14 bar (0–200 psi) range | 1 |
| 7 | 100–840 | . ELBOW, street, 90°; 1/2 npt(m x f) | 1 |
| 8 | 113–269 | . VALVE, bleed-type, red-handled; 1/2 npt(m x f) | 1 |
| 9 | 158–491 | . NIPPLE; 1/2 npt | 1 |
| 10 | 155–470 | . UNION, adapter; 1/2 npt(m) x 1/2 npsm(f) swivel | 1 |
| 11 | 104–266 | . AIR REGULATOR See 308–167 for parts | 1 |
| 12 | 100–721 | . PLUG, pipe, headless; 1/4 npt | 1 |
| 13 | 104–765 | . PLUG, pipe, headless; 1/8 npt | 1 |
| 14 | 224–376 | KIT, accessory, cart Includes items 15–27 | 1 |

Parts

Model 231-136, Series A

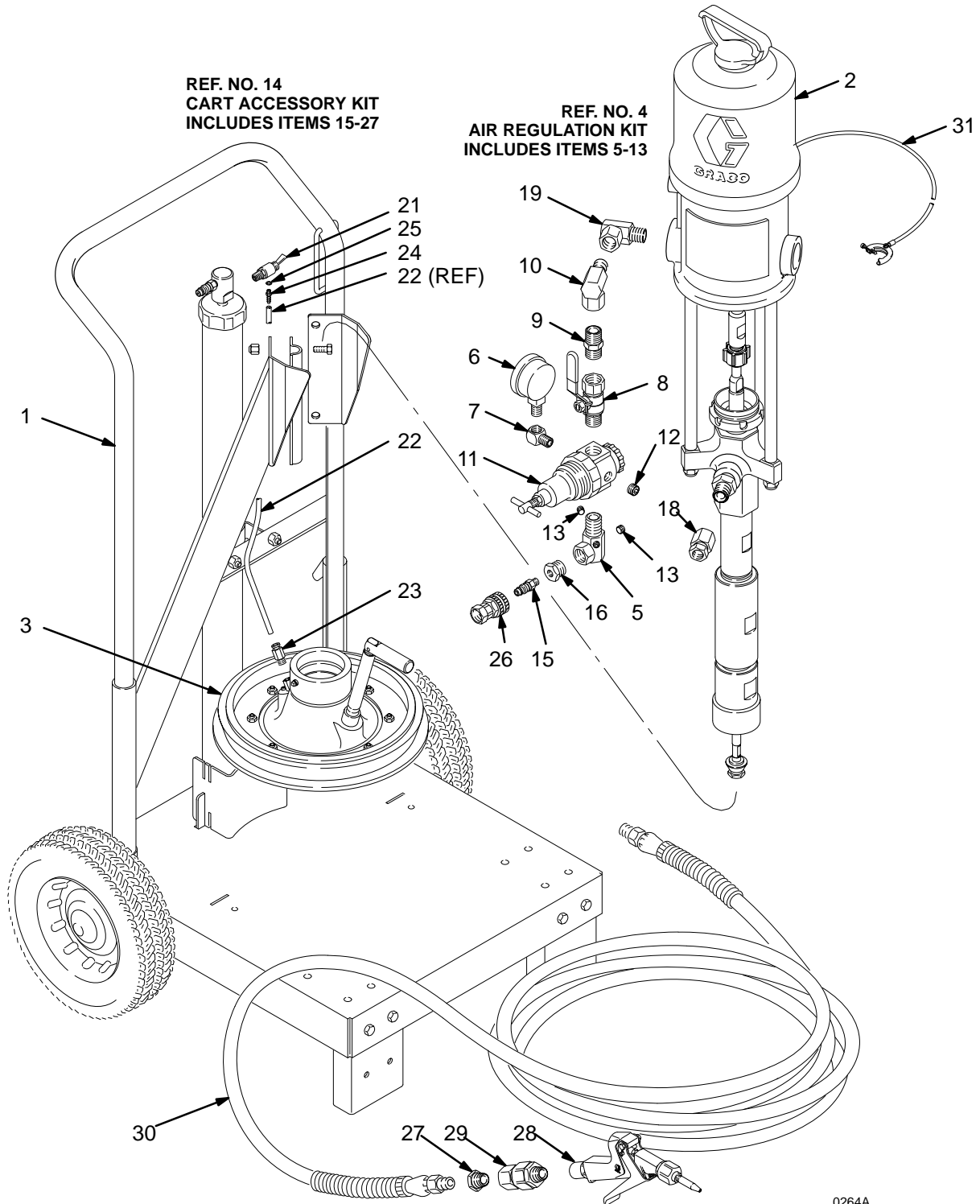
46:1 Ratio President Pump with Check-Mate 200 Displacement Pump

Includes items 1-27, 31, 32

Model 231-137, Series A

46:1 Ratio President Pump with Check-Mate 200 Displacement Pump

Includes items 1-32



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Parts

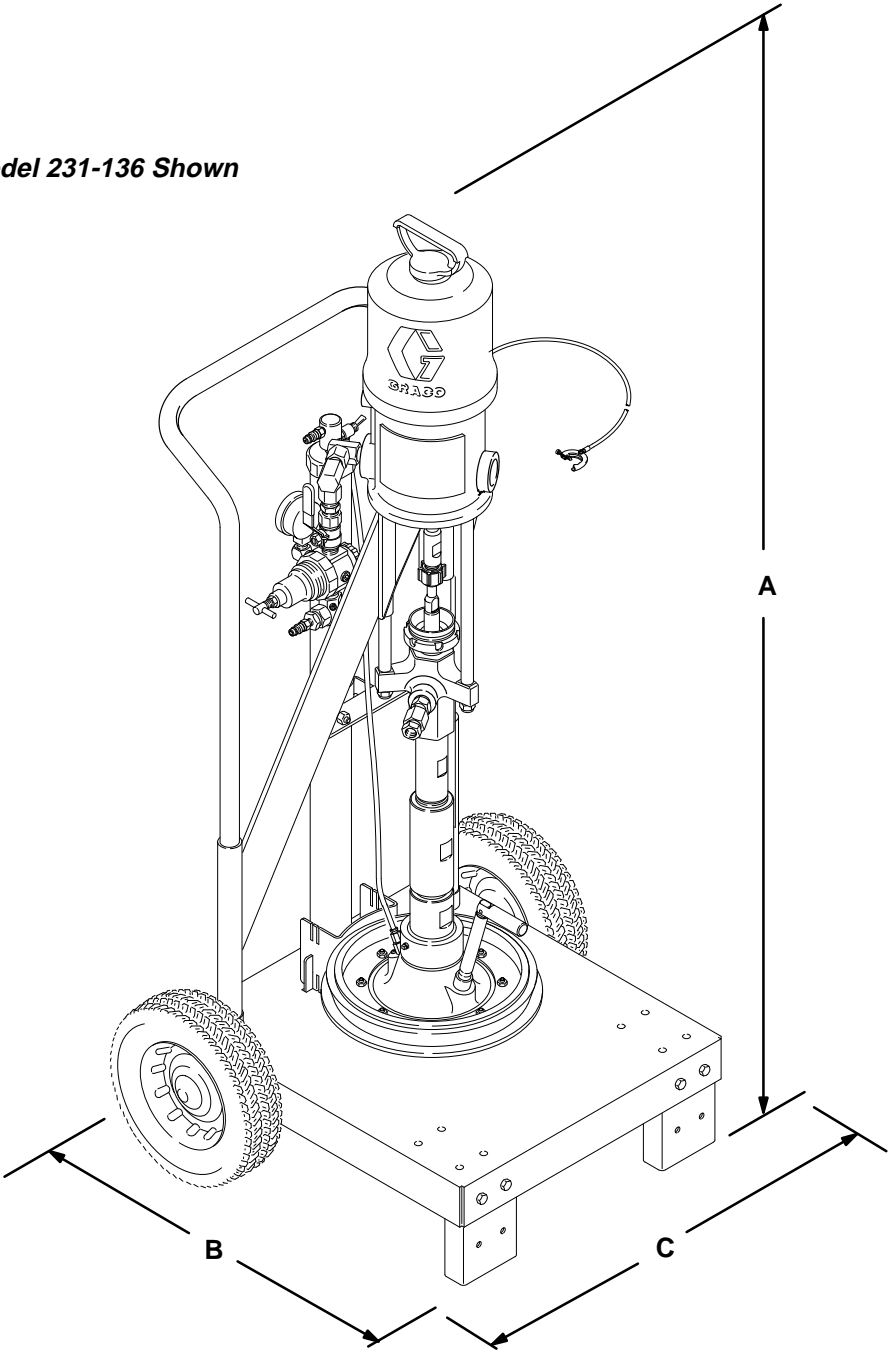
Model 231–136, Series A
46:1 Ratio President Pump
with Check-Mate 200 Displacement Pump
Includes items 1–27, 31, 32

Model 231–137, Series A
46:1 Ratio President Pump
with Check-Mate 200 Displacement Pump
Includes items 1–32

| Ref. No. | Part No. | Description | Qty. | Ref. No. | Part No. | Description | Qty. |
|----------|----------|---|------|----------|----------|--|------|
| 1 | 224–137 | CART, elevator, pneumatic See 308–092 for parts | 1 | 15 | 169–971 | . FITTING, quick disconnect, air 3/8 npt(m) | 1 |
| 2 | 222–783 | 46:1 RATIO PRESIDENT PUMP See 308–080 for parts | 1 | 16 | 158–212 | . BUSHING, reducer; 1/2 npt(m) x 3/8 npt(f) | 1 |
| 3 | 222–812 | PLATE, wiper, 19 liter (5 gallon) See 308–049 for parts | 1 | 17 | 162–505 | . UNION, adapter, straight; 3/8 npt(m) x 1/2 npt(f) swivel; <i>not used on these pumps</i> | 1 |
| 4 | 238–272 | AIR REGULATION KIT Includes items 5–13 | 1 | 18 | 161–077 | . UNION, adapter, straight; 1/2 npt(f) x 3/8 npsm (f) swivel | 1 |
| 5 | 162–376 | . MANIFOLD, air, swivel; 1/2 npt(m) x 1/2 npt(f) swivel; three 1/8 npt(f) ports | 1 | 19 | 155–470 | . UNION, adapter, 90°; 1/2 npt(m) x 12 npsm(f) swivel | 1 |
| 6 | 100–960 | . GAUGE, air pressure; 0–1.4 MPa, 0–14 bar (0–200 psi) range | 1 | 20 | 161–490 | . COUPLING, reducing; 3/8 npt(f) x 3/8 npt(f); <i>not used on these pumps</i> | 1 |
| 7 | 100–840 | . ELBOW, street, 90°; 1/2 npt(m x f) | 1 | 21 | 111–305 | . VALVE, release; toggle; 1/8 npt(m) x 10–32 unf-2b(f) | 1 |
| 8 | 113–269 | . VALVE, bleed-type, red-handled; 1/2 npt(m x f) | 1 | 22 | 181–137 | . TUBE; nylon; 4.6 mm (0.180") ID; 0.965 m (38" long) | 1 |
| 9 | 158–491 | . NIPPLE; 1/2 npt | 1 | 23 | 104–172 | . FITTING, tube; 1/8 npt(m) x 6 mm (1/4") OD tube | 1 |
| 10 | 155–470 | . UNION, adapter; 1/2 npt(m) x 1/2 npsm(f) swivel | 1 | 24 | 104–164 | . STUD, tube, barbed; 10–32 unf-2a | 1 |
| 11 | 104–266 | . AIR REGULATOR See 308–167 for parts | 1 | 25 | 104–640 | . GASKET, buna-N | 1 |
| 12 | 100–721 | . PLUG, pipe, headless; 1/4 npt | 1 | 26 | 208–536 | . COUPLER, quick disconnect | 1 |
| 13 | 104–765 | . PLUG, pipe, headless; 1/8 npt | 1 | 27 | 100–081 | . BUSHING, reducer; 1/2 npt(m) x 3/8 npt(f) <i>used with Model 231–137 only</i> | 1 |
| 14 | 224–376 | KIT, accessory, cart Includes items 15–27 | 1 | 28 | 207–945 | FLO-GUN See 307–004 for parts | 1 |
| | | | | 29 | 207–947 | SWIVEL, straight, gun; 1/2 npt(m) x 1/2 npt(f) | 1 |
| | | | | 30 | 215–244 | HOSE, fluid; nylon; 10 mm (3/8") ID; 3/8 npt(mbe); 7/6 m (25 ft) long | 1 |
| | | | | 31 | 222–011 | GROUND WIRE and CLAMP | 1 |
| | | | | 32 | 238–274 | DESIGNATION PLATE (<i>not shown</i>) | 1 |

Dimensions

Model 231-136 Shown



0252B

| Pump Model | A (Raised) | A (Lowered) | B | C (Wheelbase) | Weight (Less Hose & Gun) |
|---------------------------|---------------------|---------------------|----------------------|--------------------|--------------------------|
| 231-134, 231-135 | 1791 mm (70.51 in.) | 1352 mm (53.23 in.) | 575.5 mm (22.66 in.) | 670 mm (26.34 in.) | 61.2 kg (135 lb) |
| 231-136, 231-137 | 1844 mm (72.60 in.) | 1405 mm (55.31 in.) | 575.5 mm (22.66 in.) | 670 mm (26.34 in.) | 63.5 kg (140 lb) |
| 231-144, 231-145, 231-301 | 1791 mm (70.51 in.) | 1391 mm (54.76 in.) | 575.5 mm (22.66 in.) | 670 mm (26.34 in.) | 63.5 kg (140 lb) |
| 231-146, 231-147 | 1844 mm (72.60 in.) | 1444 mm (56.85 in.) | 575.5 mm (22.66 in.) | 670 mm (26.34 in.) | 65.8 kg (145 lb) |

Technical Data

| Category | Data |
|--|--|
| Maximum fluid working pressure (pump) <i>Models 231-144, 231-145 & 231-301</i> <i>Models 231-146 & 231-147</i> <i>Models 231-134 & 231-135</i> <i>Models 231-136 & 231-136</i> | 12.5 MPa, 125 bar (1800 psi) 25.0 MPa, 250 bar (3600 psi) 28.5 MPa, 285 bar (4140 psi) 32.0 MPa, 320 bar (4600 psi) |
| Maximum air input pressure (pump) <i>Models 231-144, 231-145 & 231-301</i> <i>Models 231-146 & 231-147</i> <i>Models 231-134 & 231-135</i> <i>Models 231-136 & 231-136</i> | 1.25 MPa, 12.5 bar (180 psi) 1.25 MPa, 12.5 bar (180 psi) 1.25 MPa, 12.5 bar (180 psi) 0.7 MPa, 7 bar (100 psi) |
| Maximum air input pressure (cart) | 1.4 MPa, 14 bar (200 psi) |
| Wetted parts | See separate component manuals |

Manual Change Summary

This manual was revised to include the changes from PCN D.

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 by an authorized Graco distributor 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.

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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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