



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

INSTRUCTIONS

Rev. S
Supersedes Rev. P
and PCN R

Portable Hydra-Spray® Sprayers

35:1 Ratio Senator® Sprayer

242 bar, 24.2 MPa (3500 psi) Maximum Fluid Working Pressure

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

* Model 224-617, Series B

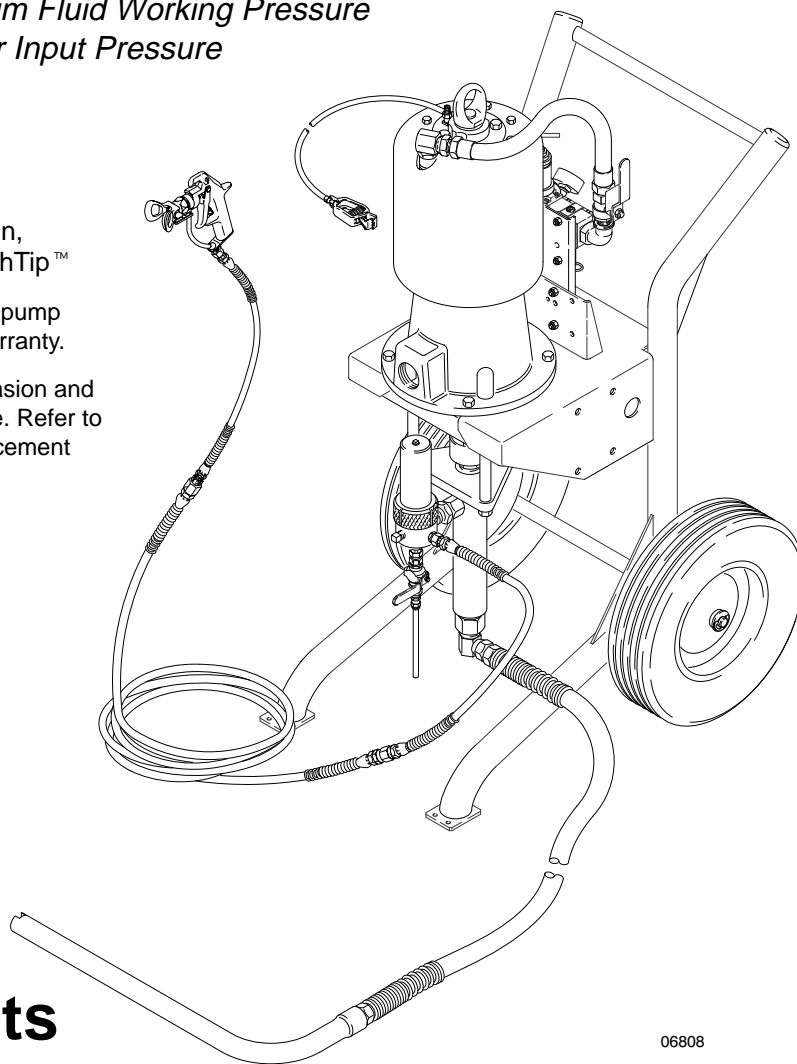
With Severe-Duty Displacement Pump**

* Model 231-157

Same as 224-617 except includes hose, gun, RAC™ IV DripLess™ Tip Guard and SwitchTip™

* These models have a two year warranty on the pump only. All other components have a one year warranty.

** Severe-Duty Displacement Pumps have an abrasion and corrosion resistant displacement rod and sleeve. Refer to **Technical Data** in the separate pump or displacement pump manual for "Wetted Parts" information.



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Model 231-157 Shown

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 instructions.

! WARNING



INSTRUCTIONS

EQUIPMENT MISUSE HAZARD

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

- This equipment is for professional use only.
- Read all instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are not sure, call your Graco distributor.
- Do not alter or modify this equipment.
- Check equipment daily. Repair or replace worn or damaged parts immediately.
- Do not exceed the maximum working pressure of the lowest rated system component. Refer to the **Technical Data** on page 15 for the maximum working pressure of this equipment.
- Use fluids and solvents which are compatible with the equipment wetted parts. Refer to the **Technical Data** section of all equipment manuals. Read the fluid and solvent manufacturer's warnings.
- Do not use hoses to pull equipment.
- Route hoses away from traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 180°F (82°C) or below -40°F (-40°C).
- Wear hearing protection when operating this equipment.
- Do not lift pressurized equipment.
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.

! WARNING



INJECTION HAZARD

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



- Fluid injected into the skin might look like just a cut, but it is a serious injury. **Get immediate medical attention.**
- Do not point the gun at anyone or at any part of the body.
- Do not put your hand or fingers over the spray tip.
- Do not stop or deflect leaks with your hand, body, glove or rag.
- Do not “blow back” fluid; this is not an air spray system.
- Always have the tip guard and the trigger guard on the gun when spraying.
- Check the gun diffuser operation weekly. Refer to the gun manual.
- Be sure the gun trigger safety operates before spraying.
- Lock the gun trigger safety when you stop spraying.
- Follow the **Pressure Relief Procedure** on page 9 if the spray tip 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 or damaged parts immediately. Do not repair high pressure couplings; you must replace the entire hose.
- Use only Graco approved hoses. Do not remove the spring guard that is used to help protect the hose from rupture caused by kinks or bends near the couplings.



MOVING PARTS HAZARD

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

- Keep clear of all moving parts when starting or operating the pump.
- Before servicing the equipment, follow the **Pressure Relief Procedure** on page 9 to prevent the equipment from starting unexpectedly.

WARNING



FIRE AND EXPLOSION HAZARD

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



- Ground the equipment and the object being sprayed. Refer to **Grounding** on page 5.
- If there is any static sparking or you feel an electric shock while using this equipment, **stop spraying immediately**. Do not use the equipment until you identify and correct the problem.
- Provide fresh air ventilation to avoid the buildup of flammable fumes from solvents or the fluid being sprayed.
- Keep the spray area free of debris, including solvent, rags, and gasoline.
- Electrically disconnect all equipment in the spray area.
- Extinguish all open flames or pilot lights in the spray area.
- Do not smoke in the spray area.
- Do not turn on or off any light switch in the spray area while operating or if fumes are present.
- Do not operate a gasoline engine in the spray area.



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.

Setup

Grounding

⚠ WARNING

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



1. *Pump*: check ground wire and clamp for proper installation. To install ground wire and clamp. See Fig. 1. Loosen grounding lug locknut (W) and washer (X). Insert one end of a 1.5 mm² (12 ga) minimum ground wire (Y) into the slot in lug (Z) and tighten the locknut securely. Connect the other end of the wire to a true earth ground. To obtain ground wire and clamp, order Graco Part No. 238-909 Ground Wire Assembly.

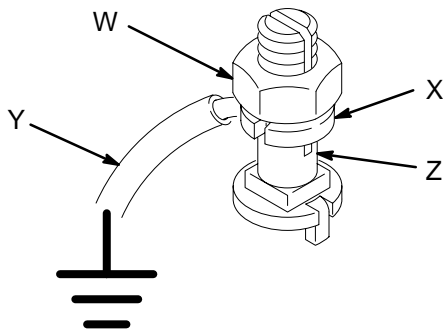


Fig. 1

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

Setup

General Information

Reference letters shown in parentheses used in text refer to callouts in figure 2. Figure 2 is only a guide for selecting and installing system components and accessories. Contact your Graco distributor for help in designing a system to suit your particular needs. Refer to the **Accessories** section for accessories available from Graco.

System Accessories

WARNING

A main air bleed valve (L), pump air bleed valve (J), and fluid drain valve (B) are required. These accessories help reduce the risk of serious injury, including fluid injection and splashing of fluid in the eyes or on the skin, and injury from moving parts if you are adjusting or repairing the pump.

The main air bleed valve (L) shuts off and relieves the air to the pump. The pump air bleed valve (J) relieves air trapped between it 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.

- **The 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** above). Be sure the bleed valve is easily accessible from the pump, and is located **downstream** from the air regulator.
- **The pump air filter/regulator (E)** controls pump speed and outlet pressure by adjusting the air pressure to the pump. It also removes harmful dirt and moisture from the compressed air supply. Locate the regulator close to the pump, but **upstream** from the bleed-type master air valve.
- **The fluid drain valve (B)** is required in your system to relieve fluid pressure in the pump, hose and gun (see the **WARNING** at left).

Air Line Accessories

Install the following accessories in the order shown in Figure 2, using adapters as necessary:

- **A pump runaway valve (P)** 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 (G)** provides automatic air motor lubrication.
- **A second bleed-type air valve (L)** isolates the air line accessories for servicing. Locate upstream from all other air line accessories.

Air and Fluid Hoses

Connect an electrically conductive fluid hose (N) to the 3/8 npsm(f) outlet union (D) of the fluid filter (C).

Connect an electrically conductive air supply hose (M) to the air inlet union (F).

Connect a spray gun (R) to the fluid hose.

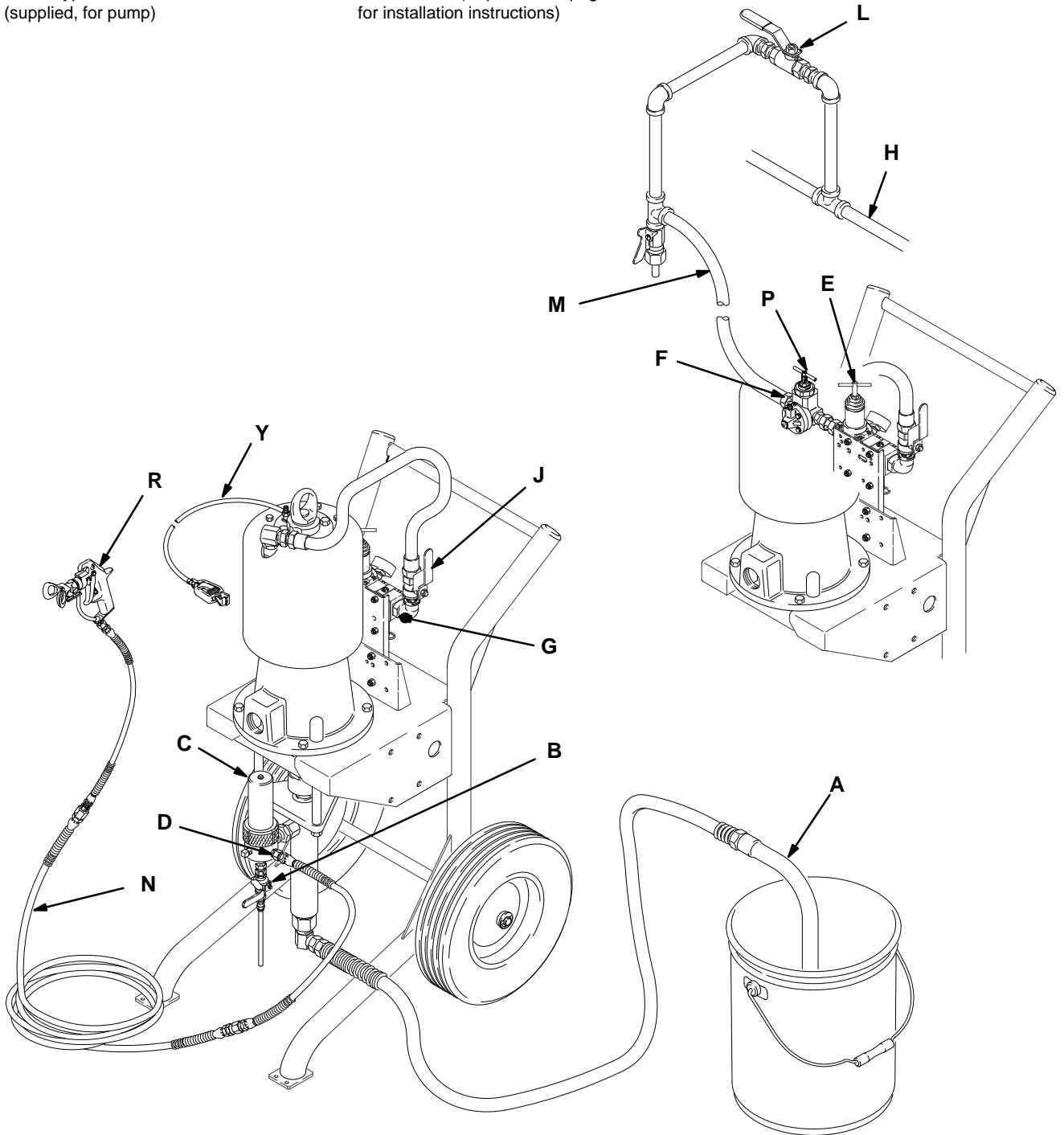
Supplied Components

The following components are supplied with your pump:

Setup

KEY

- | | |
|---|---|
| A Fluid Suction Tube (supplied) | L Bleed-Type Master Air Valve (for accessories) |
| B Fluid Drain Valve (supplied) | M Electrically Conductive Air Supply Hose |
| C Fluid Filter (supplied) | N Electrically Conductive Fluid Supply Hose |
| D 3/8 npsm(f) Fluid Outlet Union | P Pump Runaway Valve |
| E Air Filter/Regulator (supplied) | R Airless Spray Gun |
| F 3/4 npsm(f) Air Inlet Union | Y Ground Wire (required; see page 5 for installation instructions) |
| G Air Line Lubricator (location) | |
| H Main Air Supply Line | |
| J Bleed-Type Master Air Valve (supplied, for pump) | |



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Fig. 2

Operation

Instructions

The operating instructions and additional safety warnings are given in the separate pump instruction manual supplied. Service instructions are given in the manuals for each of the separate components of this sprayer. Extra copies of these manuals are available at no charge from Graco.


Component Service Information

For component parts and service information, refer to the following manuals. The manuals supplied with your sprayer depend on the model ordered.

35:1 Senator Pump	307-648
Air Regulator Kit	308-648
Fluid Filter	307-296
Airless Spray Gun	308-236

Pressure Relief Procedure

⚠ WARNING

 **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, or 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,
- or install or clean the spray tip/nozzle.

1. Lock the spray gun trigger safety.
2. Close the pump air bleed valve (J, required in your system).
3. Shut off the main air bleed valve (L, required in your system).
4. Unlock the spray gun trigger safety.
5. Hold a metal part of the spray gun firmly to the side of a grounded metal pail, and trigger the spray gun to relieve pressure.
6. Lock the spray gun trigger safety.
7. Open the drain valve (B, required in your system), to relieve pressure in the fluid hose and gun. Triggering the gun to relieve pressure may not be sufficient. Have 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 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 and relieve pressure gradually, then loosen completely. Now clear the tip or hose.

Operation

Flush the Pump Before Using

Pumps are tested with lightweight oil which is left in to protect pump parts. To prevent contamination of fluid, flush the pump with a compatible solvent before using it. Before flushing, always follow the **Pressure Relief Procedure Warning** on page 9, and remove the spray tip from the gun. Use the lowest possible pressure, and maintain firm metal-to-metal contact between the gun and a grounded metal pail during flushing.

Sprayer Startup

1. Engage the spray gun safety latch, but do not install a spray tip yet.
2. Be sure the fluid drain valve (B), air regulator (E), and pump bleed-type master air valve (J) are closed. See Figure 2 on page 7.
3. Place the suction tube (A) in the fluid container.
4. Open the bleed-type master air valve (J).

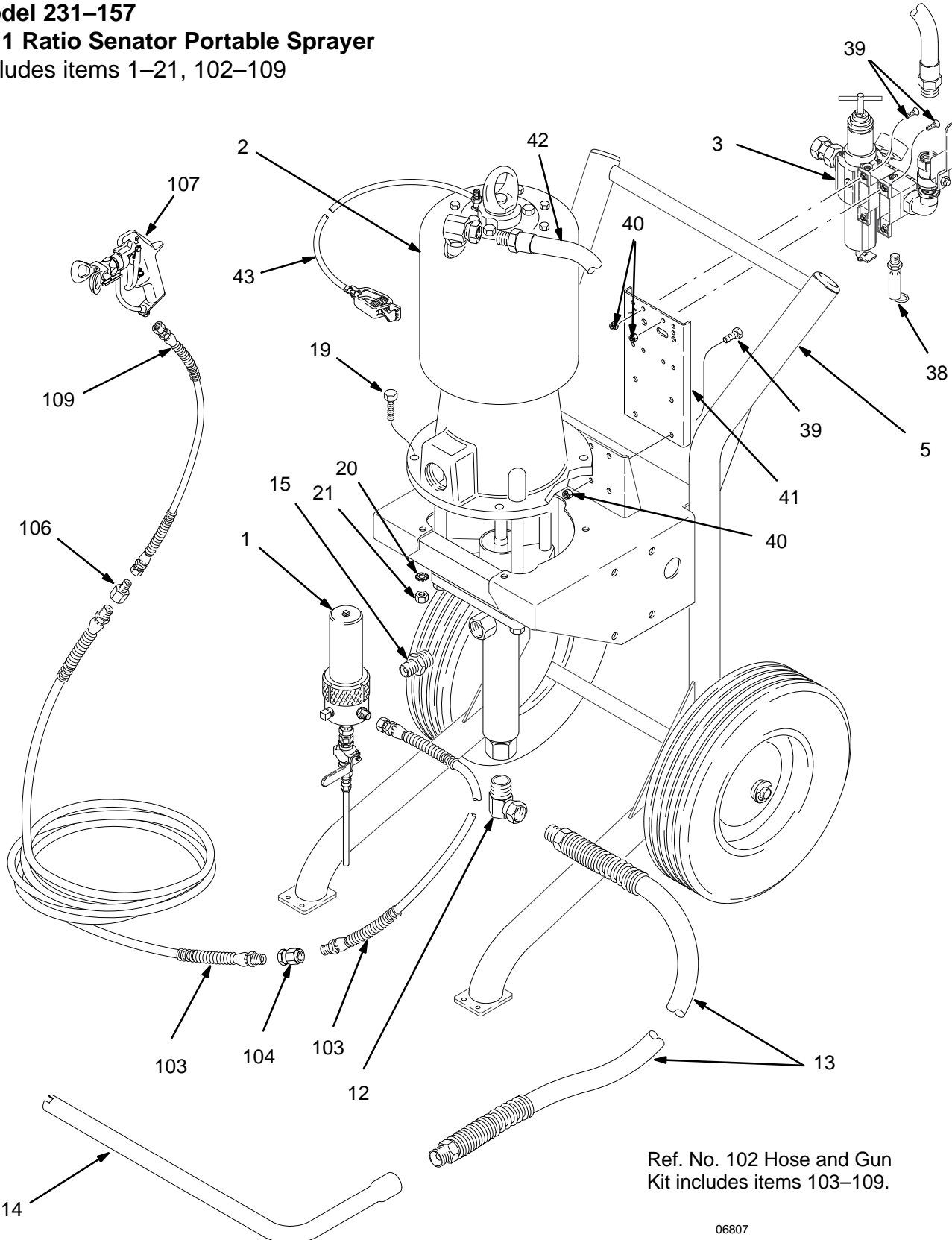
5. Release the spray gun safety latch and hold a metal part of the gun firmly to the side of a grounded metal waste container. Trigger the gun while slowly opening the air regulator (E).
6. Allow the pump to run **slowly** until all air is purged from the pump and hose and a steady stream of fluid is flowing from the gun. Then release the trigger and engage the safety latch. The pump should stall against pressure when the trigger is released.
7. Follow the **Pressure Relief Procedure** on page 9.
8. Install the spray tip. If you are using the RAC IV DripLess™ Tip Guard, refer to manual 307–848 for installation instructions.

NOTE: If the pump is hard to prime, follow steps 1 to 4, place a waste container under the fluid drain valve tube, open the drain valve, slowly open the air regulator, and run the pump **slowly**. As soon as fluid comes from the drain tube, close the drain valve quickly. Now trigger the gun to prime the hose.

Parts

Model 224-617, Series A
35:1 Ratio Senator Portable Sprayer
Includes items 1-21

Model 231-157
35:1 Ratio Senator Portable Sprayer
Includes items 1-21, 102-109



Ref. No. 102 Hose and Gun
Kit includes items 103-109.

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Parts

Model 224–617, Series B 35:1 Ratio Senator Portable Sprayer Includes items 1–43

Model 231–157 35:1 Ratio Senator Portable Sprayer Includes items 1–43, 102–109

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
1	238–620	FILTER, fluid; with 60 mesh (250 micron) element and drain valve see 307–296 for parts	1	39	113–428	SCREW, hex; 1/4–20unc	4
2	218–048	35:1 SENATOR PUMP see 307–648 for parts	1	40	102–040	NUT, lock; 1/4–20 unc–3b	4
3	238–881	AIR CONTROL SYSTEM see 308–168 for parts	1	41	191–605	BRACKET	1
4	206–994	THROAT SEAL LIQUID 8 oz (0.27 liter); not shown	1	42	238–374	HOSE, coupled	1
5	238–163	CART, portable	1	43	238–909	GROUND WIRE ASSY	1
12	107–409	UNION, adapter, 90°; 1" npt(m) x 3/4 npsm(f) swivel	1	102	218–657	HOSE AND GUN KIT Includes items 103–109	1
13	214–961	HOSE, suction; 3/4 npt(mbe); 3/4" ID; 6 ft (1.8 m) long	1	103	215–245	. HOSE, fluid; nylon; 3/8" (9.5 mm) ID; 3/8 npt (mbe); 50' (15.2 m) long	2
14	165–767	TUBE, suction; 3/4 npt(f); 18" (457 mm) long	1	104	156–173	. UNION, adapter, straight; 3/8 npt(f) x 3/8 npsm(f) swivel	1
15	157–191	ADAPTER; 3/4 npt(m) x 1/2 npt(m)	1	105	155–665	. UNION, adapter, straight; 3/8 npt(m) x 3/8 npsm(f) swivel (not shown – same as item 11)	1
19	100–004	CAPSCREW, hex hd; 3/8–16 unc–2a; 1.25" (31 mm) long	4	106	150–287	. COUPLING; 1/4 npt(m) x 3/8 npt(f)	1
20	100–133	LOCKWASHER; 3/8"	4	107	235–463	. AIRLESS SPRAY GUN see manual 308–236 for parts	1
21	100–131	NUT, hex; 3/8–16 unc–2b	4	109	214–912	. HOSE, fluid; nylon; 1/4" (6.3 mm) ID; 1/4 npsm (fbe); 3' (0.95 m) long	1
38	113–498	VALVE, safety; 1/4–18npt; 7.6 bar, 0.76 MPa (110 psi)	1	<i>307 and 308 numbers in the descriptions refer to separate instruction manuals.</i>			

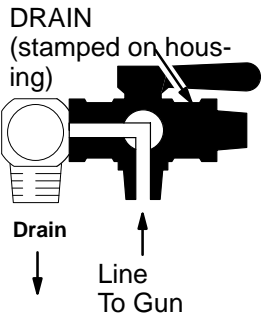
Accessories

For Two Gun Systems

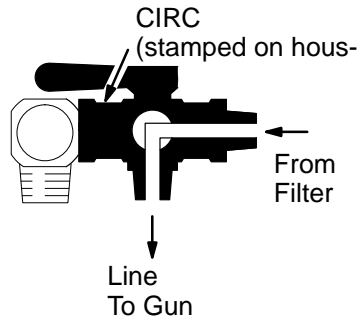
Each line in a two gun system must have a shutoff valve to relieve fluid pressure if the fluid line becomes clogged, and to isolate one gun for servicing while the other is in operation. Director valve 214-711 is recommended for both purposes. Use elbow 100-840 to direct the outlet flow from the drain valve in a safe direction to a waste container. Use reducer bushings 100-176 and 100-206 to connect the valve to the outlets of fluid filter 214-625.

In the draining mode, the valve handle is turned away from the elbow (marked DRAIN on the valve housing); in the operating mode, the handle is turned toward the elbow (marked CIRC on the housing).

Draining Mode



Operating Mode

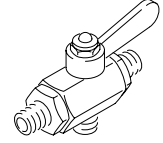


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Director Valve 214-711

5000 psi (350 bar) Maximum Working Pressure

1/4 npt(m) x 1/4 npt(m) x 1/4 npt(m)



Elbow 100-840

To direct flow from drain valve in a safe direction.

1/4 npt(f) x 1/4 npt(m)

Reducer Bushings

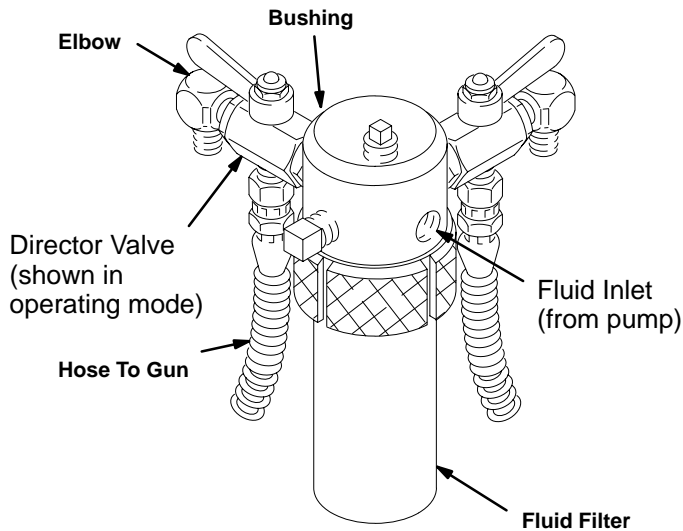
To connect director valve 214-711 to the outlets of the fluid filter.

100-176 3/8 npt(m) x 1/4 npt(f)

100-206 1/2 npt(m) x 1/4 npt(f)

Manual Change Summary

Models 224-619, 237-007, and 231-164 are obsolete and have been deleted from the manual. Additionally a new cart replacement and pump safety relief valve have been incorporated.



Two Gun Hookup

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Technical Data

Models 224–617 and 231–157 35:1 Ratio Senator Sprayers

Maximum air input pressure	7 bar, 0.7 MPa (100psi)
Maximum fluid working pressure	242 bar, 24.2 MPa (3500 psi)
Fluid filter element	60 mesh (250 micron) screen
Air inlet	3/4 npsm(f)
Fluid outlet (pump)	1/2 npt(f)
Height	59.75" (1517 mm)
Width	29.25" (743 mm)
Weight	234 lb (106 kg)
Wetted parts	<i>Pump</i> : see separate pump manual supplied <i>Spray Gun</i> : see 308–236 <i>Fluid Filter</i> : see 307–296 <i>Fluid Hoses/Suction Tube</i> : Nylon, Aluminum

The Graco Warranty and Disclaimers

WARRANTY

Graco warrants all equipment listed in this manual 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. Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

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

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

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

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

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In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or for 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.

Graco Phone Number

TO PLACE AN ORDER, contact your Graco distributor, or call this number to identify the distributor closest to you:
1-800-367-4023

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