

# Displacement Pump

308190M

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*Use only genuine Graco Replacement Parts. Use of non-Graco replacement parts may void warranty.*

## Models:

**236787, Series A**

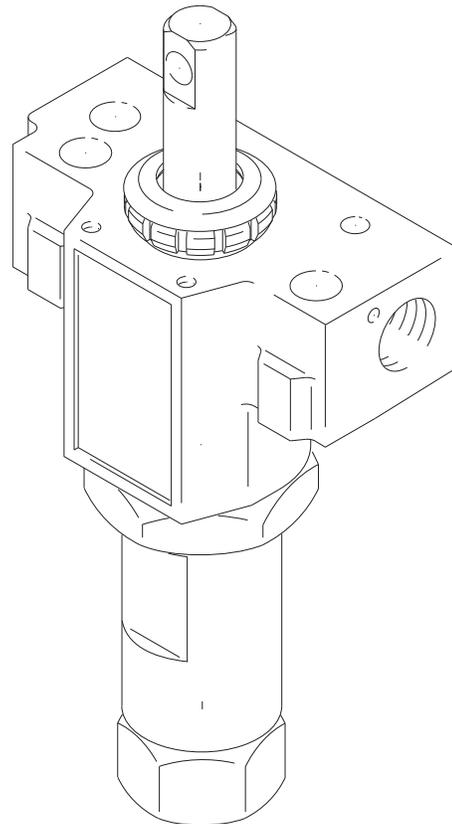
**235699, Series B**

**241320, Series A**



### **Important Safety Instructions**

Read all warnings and instructions in this manual. Be familiar with the controls and the proper usage of the equipment. Save these instructions.

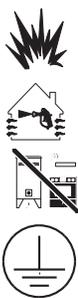


**Models 236787 and 235699 Shown**

# Warnings

The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbols refer to procedure-specific risks. When these symbols appear in the body of this manual or on warning labels, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

## WARNING



### FIRE AND EXPLOSION HAZARD

Flammable fumes, such as solvent and paint fumes, in **work area** can ignite or explode. To help prevent fire and explosion:

- Use equipment only in well ventilated area.
- Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static arc).
- Ground all equipment in the work area. See **Grounding** instructions.
- Never spray or flush solvent at high pressure.
- Keep work area free of debris, including solvent, rags and gasoline.
- Do not plug or unplug power cords, or turn power or light switches on or off when flammable fumes are present.
- Use only grounded hoses.
- Hold gun firmly to side of grounded pail when triggering into pail. Do not use pail liners unless they are anti-static or conductive.
- **Stop operation immediately** if static sparking occurs or you feel a shock. Do not use equipment until you identify and correct the problem.
- Keep a working fire extinguisher in the work area.



### SKIN INJECTION HAZARD

High-pressure spray is able to inject toxins into the body and cause serious bodily injury. In the event that injection occurs, **get immediate surgical treatment**.

- Do not aim the gun at, or spray any person or animal.
- Keep hands and other body parts away from the discharge. For example, do not try to stop leaks with any part of the body.
- Always use the nozzle tip guard. Do not spray without nozzle tip guard in place.
- Use Graco nozzle tips.
- Use caution when cleaning and changing nozzle tips. In the case where the nozzle tip clogs while spraying, follow the **Pressure Relief Procedure** for turning off the unit and relieving the pressure before removing the nozzle tip to clean.
- Equipment maintains pressure after power is shut off. Do not leave the equipment energized or under pressure while unattended. Follow the **Pressure Relief Procedure** when the equipment is unattended or not in use, and before servicing, cleaning, or removing parts.
- Check hoses and parts for signs of damage. Replace any damaged hoses or parts.
- This system is capable of producing 3000 psi (210 bar/21 MPa). Use Graco replacement parts or accessories that are rated a minimum of 3000 psi (210 bar/21 MPa).
- Always engage the trigger lock when not spraying. Verify the trigger lock is functioning properly.
- Verify that all connections are secure before operating the unit.
- Know how to stop the unit and bleed pressure quickly. Be thoroughly familiar with the controls.

# WARNING



## EQUIPMENT MISUSE HAZARD

Misuse can cause death or serious injury.

- Do not operate the unit when fatigued or under the influence of drugs or alcohol.
- Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See **Technical Data** in all equipment manuals.
- Use fluids and solvents that are compatible with equipment wetted parts. See Technical Data in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request MSDS from distributor or retailer.
- Do not leave the work area while equipment is energized or under pressure
- Turn off all equipment and follow the **Pressure Relief Procedure** when equipment is not in use.
- Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.
- Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards.
- Make sure all equipment is rated and approved for the environment in which you are using it.
- Use equipment only for its intended purpose. Call your distributor for information.
- Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Do not kink or over bend hoses or use hoses to pull equipment.
- Keep children and animals away from work area.
- Comply with all applicable safety regulations.



## MOVING PARTS HAZARD

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

- Keep clear of moving parts.
- Do not operate equipment with protective guards or covers removed.
- Pressurized equipment can start without warning. Before checking, moving, or servicing equipment, follow the **Pressure Relief Procedure** and disconnect all power sources.



## TOXIC FLUID OR FUMES HAZARD

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

- Read Safety Data Sheet (SDS) to know the specific hazards of the fluids you are using.
- Route exhaust away from work area. If diaphragm ruptures, fluid may be exhausted into the air.
- Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.



## PERSONAL PROTECTIVE EQUIPMENT

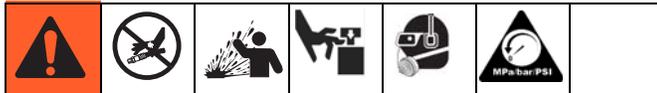
Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. This protective equipment includes but is not limited to:

- Protective eyewear, and hearing protection.
- Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer

# Displacement Pump

## Pressure Relief Procedure

 Follow the Pressure Relief Procedure whenever you see this symbol.



This equipment stays pressurized until pressure is manually relieved.

To help prevent serious injury from pressurized fluid, such as skin injection, splashing fluid and moving parts, follow the Pressure Relief Procedure when you stop spraying and before cleaning, checking, or servicing the equipment.

1. Engage the gun safety latch.
2. Turn ON/OFF switch to OFF.
3. Unplug power supply cord.
4. Disengage the gun safety latch. Hold a metal part of the gun firmly to a grounded metal pail. Trigger the gun to relieve pressure.
5. Engage the gun safety latch.
6. Open the pressure drain valve. Leave the pressure drain valve open until you are ready to spray again.
7. If you suspect the spray tip or hose is clogged or that pressure has not been fully relieved after following the steps above, **VERY SLOWLY** loosen tip guard retaining nut or hose end coupling to relieve pressure gradually, then loosen completely. Clear hose or tip obstruction.

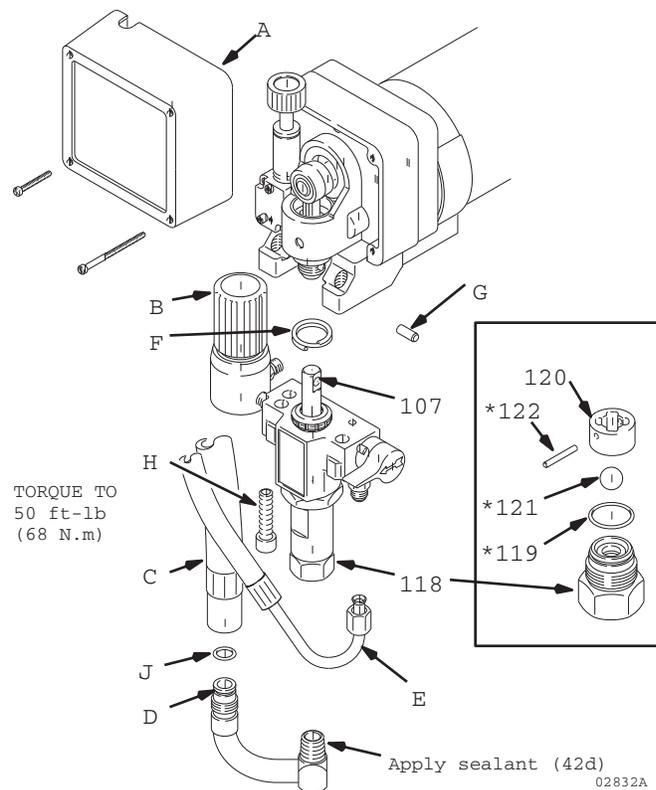
**NOTE 1:** Packing Repair Kit 235703 is available. Parts included in the kit are marked with a \*. Use all the new parts in the kit; use items 125 and 126 only in Displacement Pumps 235699 and 241320.

**NOTE 2:** Check the motor brushes and clean the transducer whenever you repack the pump. Replace these parts as needed. See the sprayer manual for instructions.

## Intake Valve Repair

1. Unscrew the intake valve (118). Remove the o-ring (119\*), ball guide (120), stop pin (122\*) and ball (121\*) from the valve.
2. Clean and inspect the parts for wear or damage. Replace parts as needed. Use a new o-ring (119\*). If no further service is needed, reassemble the pump.

## Removing the Pump (FIG. 1)



**FIG. 1**

1. Flush the pump, if possible. Relieve pressure. Stop the pump with the piston rod (107) in its lowest position, if possible. To lower the piston rod manually, rotate the motor fan blades.
2. Remove the filter (B), if your sprayer has one.
3. While pulling upward on the suction hose (C), unscrew the hose from the inlet tube (D). Unscrew the drain hose (E) from the displacement.

4. Use a screwdriver to push the retaining spring (F) up and push out the pin (G).
5. Loosen the screws (H) and remove the pump.

## Installing Pump

(FIG. 1 and FIG. 2)

1. Mount the pump on the drive housing. Tap it into the alignment pins with a soft hammer. Tighten the screws (H) to 50 ft-lb (68 N.m).
2. Align the hole in the rod (107) with the connecting rod assembly (J). Use a screwdriver to push the retaining spring (F) up, and push in the pin (G). Push the retaining spring into place around the connecting rod.

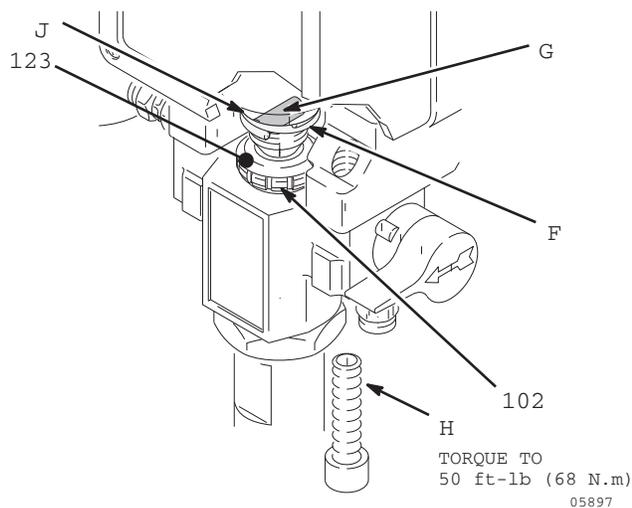


FIG. 2



Be sure the retaining spring (F) is firmly in the groove all the way around, to prevent the pin (G) from working loose due to vibration. See Fig 2. If the pin works loose, it or other parts could break off due to the force of the pump action. These parts could be projected into the air and result in serious injury or property damage, including the pump connecting rod or bearing housing.

3. Replace the o-ring (J) if worn or damaged. Reconnect the suction and drain hoses.

4. Tighten the packing nut (102) just enough to stop leakage, but no tighter. Fill the packing nut/wet-cup 1/3 full with Graco TSL. Push the plug (123) into the wet-cup.

## Disassembling the Pump (FIG. 3)

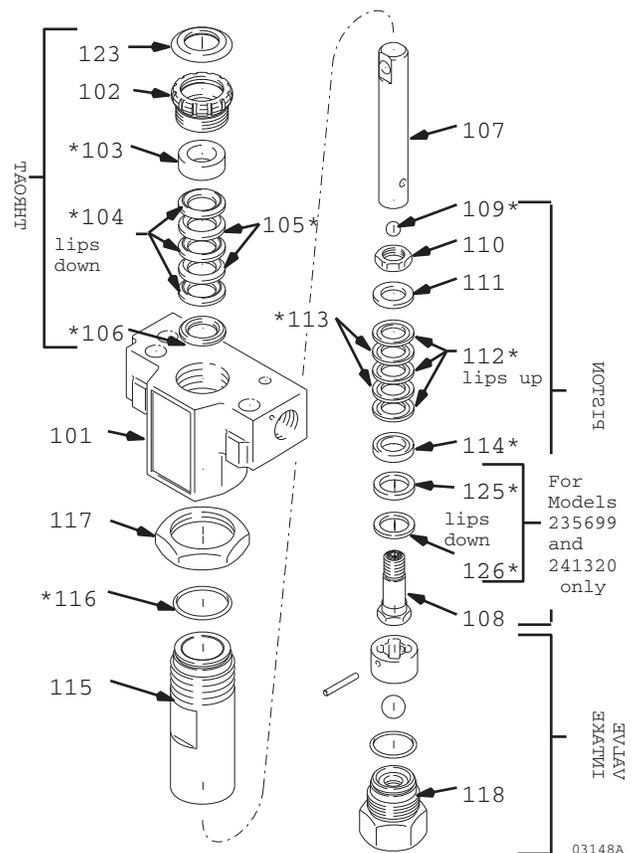


FIG. 3

1. Remove the intake valve (118). See page 4.
2. Unscrew the packing nut (102) and plug (123).
3. Use a plastic mallet to tap the piston rod (107) down, and then pull the rod out through the bottom of the cylinder.
4. Remove the throat packings.
5. Loosen the jam nut (117). Remove the cylinder (115) and the o-ring (116\*).
6. Clamp the flats of the piston rod in a vise. Use an open-end wrench to loosen the nut (110) and then unscrew the piston valve (108).
7. Remove all parts from the piston valve (108).

## Reassembling the Pump

**NOTE 1:** Alternate plastic and leather packings. See Fig 3. The lips of the throat V-packings face down. The lips of the piston V-packings face up. Incorrect installation damages the packings and causes pump leaking.

**NOTE 2:** Soak the leather packings in oil before reassembling the pump.

1. Check the outside of the piston rod (107) and the inside of the cylinder (115) for wear. Replace worn parts to ensure a good seal with the new packings.
2. Stack these parts onto the piston valve (108) one at a time: **Models 235699 and 241320 only:** the backup washer (126\*) and u-cup (125\*), then **All Models:** the female gland (114\*), alternately three plastic (112\*) with two leather packings (113\*), and the male gland (111\*). See Fig 4.
3. Tighten the nut (110) onto the piston valve (108) to 2 in-lb (0.23 N.m). See Fig 4.

**NOTE 3:** Note the alignment of the piston (108) to the nut (110). Maintain this alignment through Step 8.

4. Clean all residue from the piston valve threads. Apply a strip of adhesive, supplied, to the threads.
5. Place the ball (109\*) on piston valve (108) (Fig 4).

### NOTICE

Tightening the piston valve into the rod, is critical. Follow the procedure carefully to avoid damaging the packings by over-tightening.

6. Hand tighten the valve into the piston rod just until the nut (110) contacts the rod. See Fig 5.

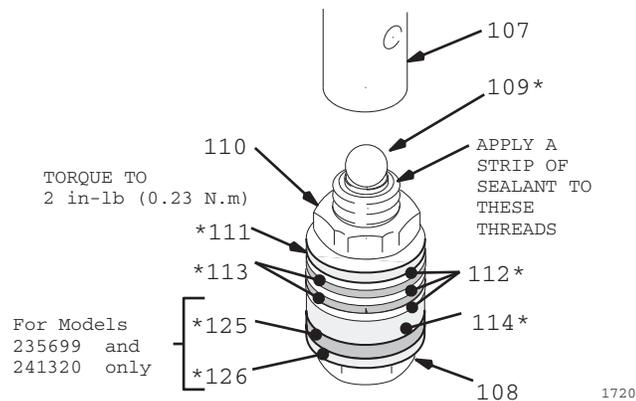


FIG. 4

DO NOT ALLOW NUT (110) TO MOVE RELATIVE TO PISTON (108) WHEN TIGHTENING PISTON AGAINST ROD

110  
TORQUE NUT AGAINST ROD TO 30 ft-lb (40 N.m)

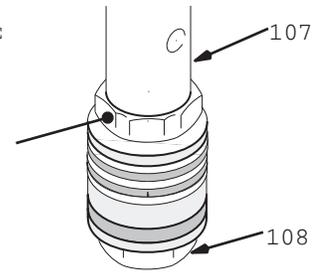


FIG. 5

7. Place the flats of the rod (107) in a vise.
8. CAREFULLY tighten the nut (110) against the piston rod to 30 ft-lb (40 N.m). See Fig 5. Use two wrenches to maintain the alignment mentioned in NOTE 3, to the left.
9. Stack parts one at a time into the top of the manifold (101): the male gland (106\*), alternately three plastic packings (104\*) with two leather packings (105\*), and then the female gland (103\*). See Fig 6.

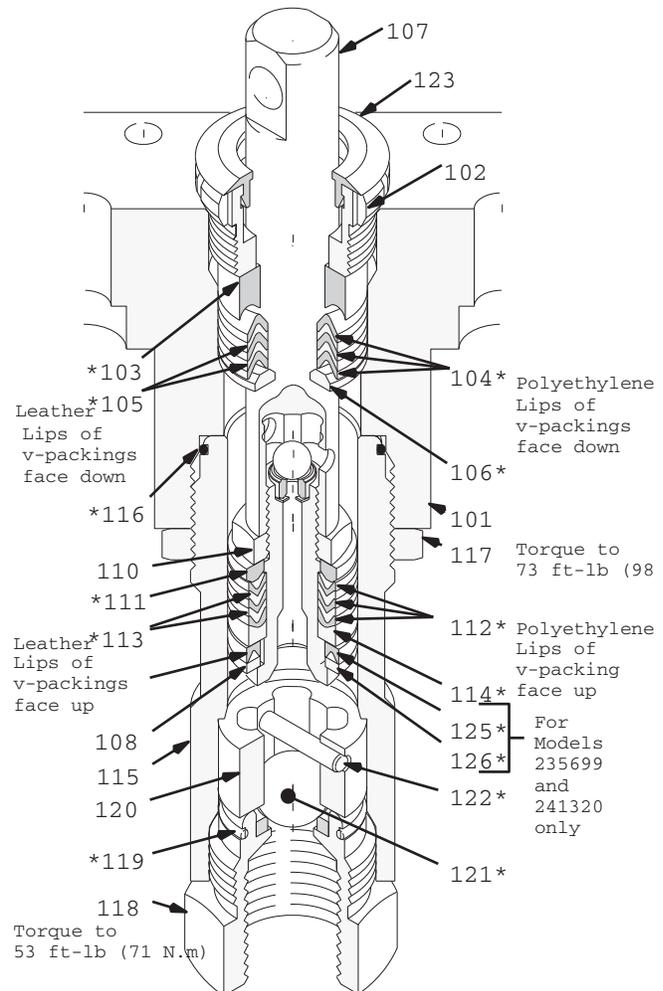
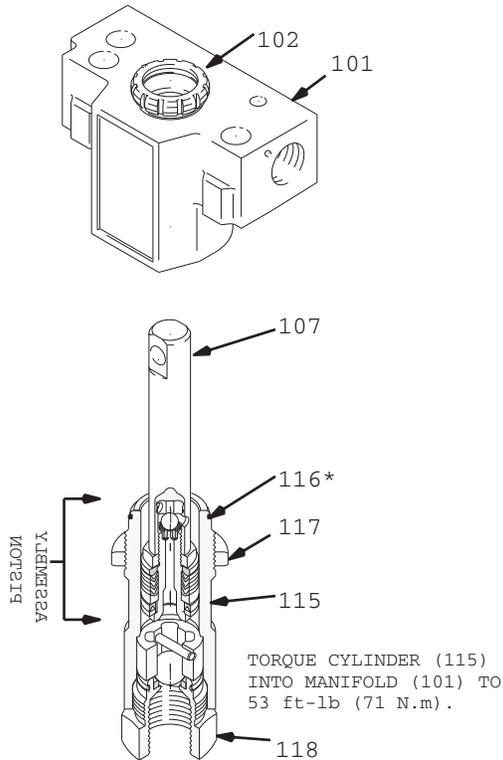


FIG. 6

10. Install the packing nut (102) and plug (124), but leave loose for now. See Fig 7.



11. Place a new o-ring (116\*) firmly in the cylinder (115) groove. See Fig 7.
12. Coat the piston rod and packings with oil. Carefully slide the assembly INTO THE TOP OF THE CYLINDER (115). See Fig 7.
13. Place the intake valve (118) in a vise and assemble its parts. See page 4. Screw the cylinder (115) onto the valve (118). Turn the jam nut (117) all the way down. See Fig 7.
14. Put the manifold in a vise. Guide the rod/cylinder assembly up through the manifold (101). Screw the cylinder (115) into the manifold and tighten to 53 ft-lb (71 N.m). See Fig 7.
15. Tighten intake valve (118) to 53 ft-lb (71 N.m). See Fig 7.
16. Tighten the cylinder jam nut (117) to 73 ft-lb (98 N.m). See Fig 7.
17. Install the pump. See page 4.

FIG. 7

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# Parts

**Model 236787, Series A: Includes 101 to 124**

**Model 235699, Series B: Includes 101 to 126**

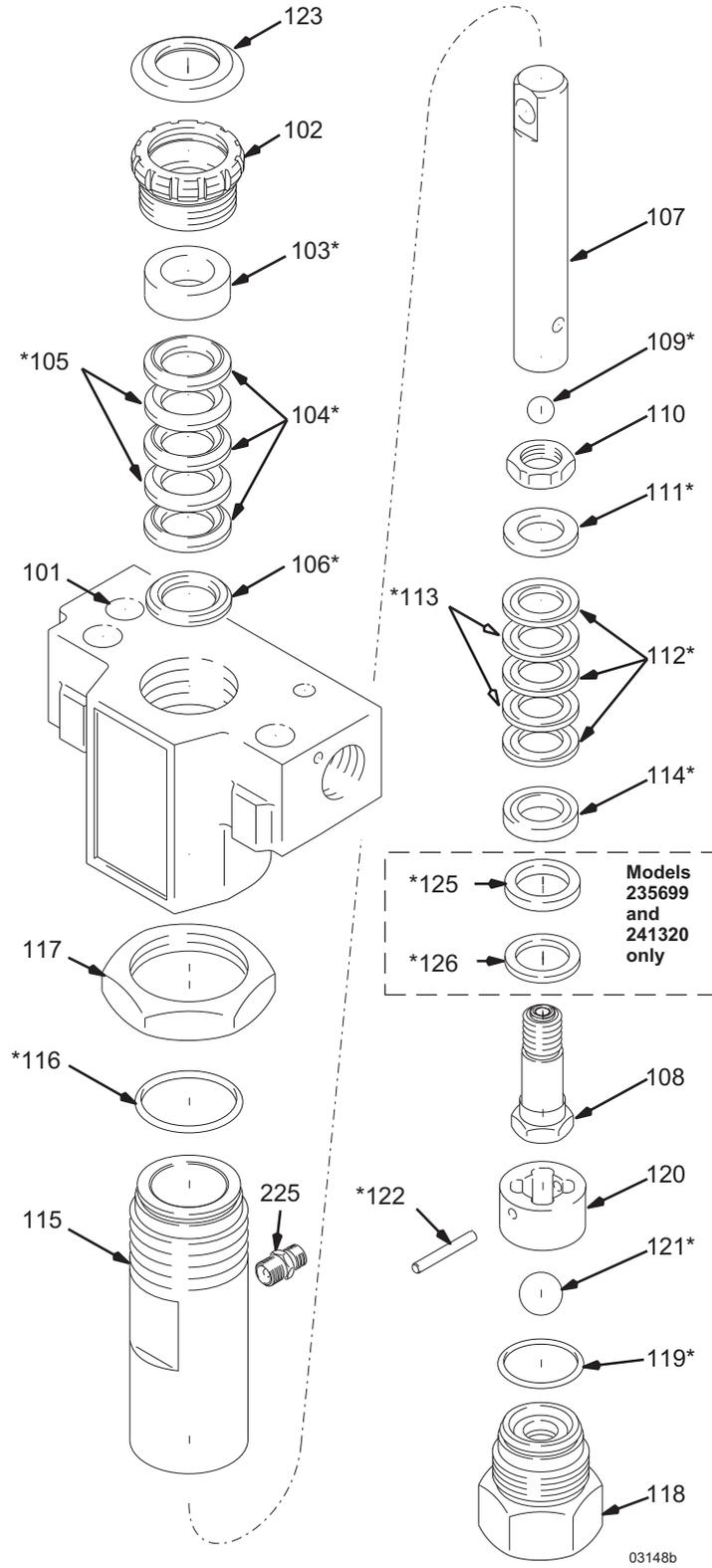
**Model 241320, Series A: Includes 101 to 126**

REF	Part No.	Description	Qty
101		PUMP MANIFOLD	1
	187611	<i>Models 236787 and 235699</i>	
	193724	<i>Model 241320</i>	
102	193047	PACKING NUT	1
103*	176757	GLAND, female, throat	1
104*	176997	V-PACKING,UHMW polyethylene, throat	3
105*	176755	V-PACKING, leather, throat	2
106*	176754	GLAND, male, throat	1
107		DISPLACEMENT ROD	1
	187613	<i>Model 236787</i>	
	235709	<i>Models 235699 and 241320</i>	
108		PISTON VALVE	1
	224808	<i>Model 236787</i>	
	218197	<i>Models 235699 and 241320</i>	
109*	105444	BALL, 5/16 in., piston	1
110	176751	NUT, hex, 1/2-20 unf-2b	1
111*	176750	GLAND, male, piston	1
112*	176882	V-PACKING	3
113*	176749	V-PACKING, leather, piston	2

REF	Part No.	Description	Qty
114*	180073	GLAND, female, piston	1
115		CYLINDER, pump	1
	236786	<i>Model 236787</i>	
	235708	<i>Models 235699 and 241320</i>	
116*	108526	PACKING, o-ring, PTFE	1
117	187614	JAM NUT, 1-3/8-18 unef-2b	1
118	224966	INLET VALVE	1
119*	111603	PACKING, o-ring, PTFE	1
120	176760	BALL GUIDE	1
121*	105445	INLET BALL, 1/2 in.	1
122*	176759	BALL STOP PIN	1
123	180656	PLUG	1
124*	102969	SEALANT (not shown)	1
125*†	105522	PACKING, u-cup, polyurethane	1
126*†	186652	WASHER, backup, steel	1
225	157350	ADAPTER, 3/8 npt x 1/4 npt	1

\* **Supplied in Repair Kit 235703.** Keep a repair kit on hand to reduce down time.

† Used in Displacement Pumps 235699 and 241320 ONLY.



# Technical Data

DISPLACEMENT PUMP	US	Metric
Working pressure range	0-3000 psi	0-210 bar / 0-21 MPa
Cycles per gallon/liter	620	164
Pump inlet size		1/2 npt (f)
Pump outlet size		1/4 npt
Wetted Parts		
Models 236787 and 235699	Stainless steel, carbon steel, aluminum, polyethylene, Delrin, leather	
Model 241320	Stainless steel, carbon steel, polyethylene, Delrin, leather	

## Graco Information

For the latest information about Graco products, visit [www.graco.com](http://www.graco.com).

For patent information, see [www.graco.com/patents](http://www.graco.com/patents).

**TO PLACE AN ORDER**, contact your Graco distributor or call 1-800-690-2894 to identify the nearest distributor.

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*For patent information, see [www.graco.com/patents](http://www.graco.com/patents).*

Original instructions. This manual contains English. MM 308190

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