

Displacement Pump

309577E

Rev. A

FOR USE WITH REACTOR™ ELECTRIC PROPORTIONERS

3500 psi (24.5 MPa, 245 bar) Maximum Working Pressure

Part No. 245970, Series A

21 cc, used on Model E-20 and E-XP1

Part No. 245971, Series A

41 cc, used on Model E-XP2

Part No. 245972, Series A

55 cc, used on Model E-30



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PROVEN QUALITY. LEADING TECHNOLOGY.

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Manual Conventions

Warning

 **WARNING**




A warning alerts you to possible serious injury or death if you do not follow instructions.

Symbols, such as fluid injection (shown), alert you to a specific hazard and direct you to read the indicated hazard warnings on pages 3-4.

Caution

 **CAUTION**

A caution alerts you to possible equipment damage or destruction if you do not follow instructions.

Note

 A note indicates additional helpful information.

Related Manuals

The following manuals are shipped with the Reactor™. Refer to these manuals for detailed equipment information.

Reactor Electric Proportioner	
Part No.	Description
309551	Reactor Electric Proportioner, Operation Manual (English)
309574	Reactor Electric Proportioner, Repair-Parts Manual (English)


WARNING
**INJECTION HAZARD**

High-pressure fluid from gun, hose leaks, or ruptured components will pierce skin. This may look like just a cut, but it is a serious injury that can result in amputation. **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 gun fluid nozzle.
- 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.
- Follow **Pressure Relief Procedure**, page 5, when you stop spraying and before cleaning, checking, or servicing equipment.
- Use lowest possible pressure when flushing, priming, or troubleshooting.
- Engage spray gun piston safety lock when not spraying.
- Tighten all fluid connections before operating the equipment.
- Check hoses, tubes, and couplings daily. Replace worn or damaged parts immediately. High pressure hose cannot be recoupled; replace the entire hose.

**FIRE AND EXPLOSION HAZARD**

Solvent and 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 and plastic drop cloths (potential static arc).
- Do not plug or unplug power cords or turn lights on or off when flammable fumes are present.
- Keep the work area free of debris, including solvent, rags, and gasoline.
- Ground equipment and conductive objects. See **Grounding** in your Reactor manual.
- Hold gun firmly to side of grounded pail when triggering into pail.
- Use only grounded hoses.
- If there is static sparking or you feel a shock, **stop operation immediately**. Do not use equipment until you identify and correct the problem.

**EQUIPMENT MISUSE HAZARD**

Misuse can cause serious injury or death.

- For professional use only.
- Use equipment only for its intended purpose. Call your Graco distributor for information.
- Read manuals, warnings, tags, and labels before operating equipment. Follow instructions.
- Check equipment daily. Repair or replace worn or damaged parts immediately.
- Do not alter or modify equipment. Use only Graco parts and accessories.
- 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.
- Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Do not use hoses to pull equipment.
- Comply with all applicable safety regulations.

 WARNING	
	<p>BURN HAZARD</p> <p>This equipment is used with heated fluid, which can cause equipment surfaces to become very hot. To avoid severe burns:</p> <ul style="list-style-type: none"> • Do not touch hot fluid or equipment. • Allow equipment to cool completely before touching it. • Wear gloves if fluid temperature exceeds 110°F (43°C).
	<p>TOXIC FLUID OR FUMES HAZARD</p> <p>Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed.</p> <ul style="list-style-type: none"> • Read Material Safety Data Sheet (MSDS) to know the specific hazards of the fluids you are using. • Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.
	<p>PERSONAL PROTECTIVE EQUIPMENT</p> <p>You must wear proper protective equipment when operating, servicing, or when in the operating area of the equipment to help protect you from serious injury, including eye injury; inhalation of toxic fumes; and hearing loss. This equipment includes but is not limited to:</p> <ul style="list-style-type: none"> • Protective eyewear • Gloves, clothing, and respirator as recommended by the fluid and solvent manufacturer • Hearing protection.

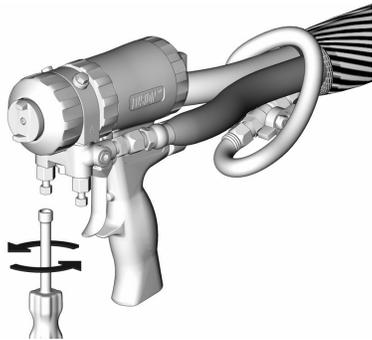
Pressure Relief Procedure

⚠ WARNING



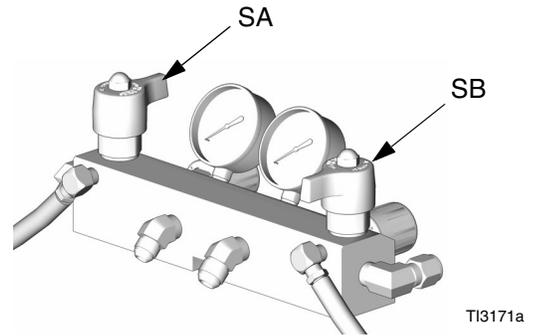
Read warnings, page 3.

- 1.** Relieve pressure in gun and perform gun shut-down procedure. See gun manual.
- 2.** Close gun fluid manifold valves A and B.



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- 3.** Shut off feed pumps and agitator, if used.
- 4.** Turn PRESSURE RELIEF/SPRAY valves (SA, SB) to PRESSURE RELIEF. Route fluid to waste containers or supply tanks. Ensure that gauges drop to 0.



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Tools Needed

- Vise with flat jaws
- 12 in. adjustable, open end wrench (2)
- Non-sparking hammer, 20 oz maximum
- Small screwdriver
- ISO pump oil
- Pick or long small screwdriver
- Snap-ring pliers
- 1/2 in. (13 mm) diameter plastic rod
- 7/8 in. deep-well socket (245970 only)

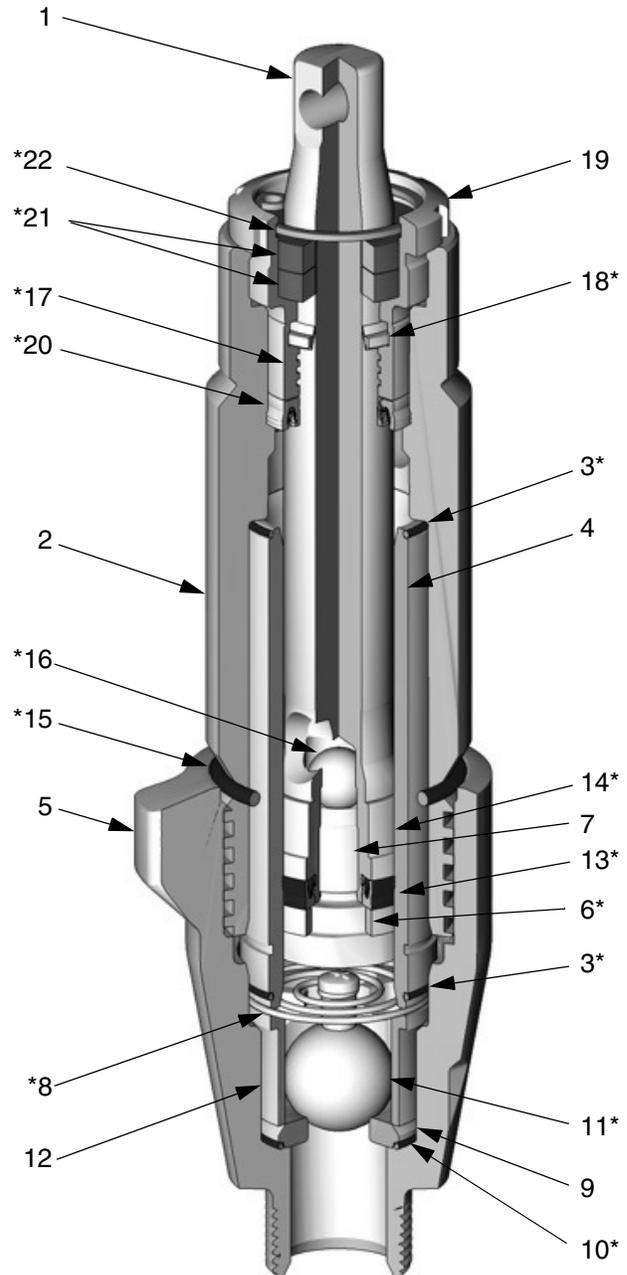
Repair Kits

A repair kit is available for your pump. Kit parts are marked with an asterisk, for example (3*). See page 17. Kit must be purchased separately. For best results, use all parts in the kit.

Clean and Inspect Parts

- 1.** Clean and inspect all parts. Intake and piston ball seats, sleeve, and displacement rod must not be worn, scratched, or damaged.
- 2.** Remove and clean sleeve when repacking pump.

Cutaway View



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Disassembly

⚠ WARNING



Pump rod and connecting rod move during operation. Moving parts can cause serious injury such as pinching or amputation. Keep hands and fingers away from connecting rod during operation.

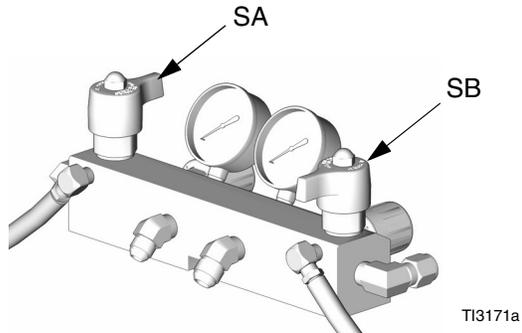
1. Shut off **A**, **B**, and **Q** heat zones.

2. Flush pumps. See Reactor manual.

3. Relieve pressure, page 5.

4. To disconnect pump A:

a. Turn PRESSURE RELIEF/SPRAY valves (SA, SB) to PRESSURE RELIEF.



b. Press . Motor will run until component A pump is at bottom of its stroke, then shut off.

c. Shut main power OFF .

d. Disconnect fluid inlet (C) and outlet (D). See FIG. 1.

e. Push retaining spring (E) up. Push pin (F) out. Loosen locknut (G) by hitting firmly with a non-sparking hammer. Unscrew pump. See FIG. 1.



To disconnect pump B, see page 8. To continue repairing pump A, see page 9.

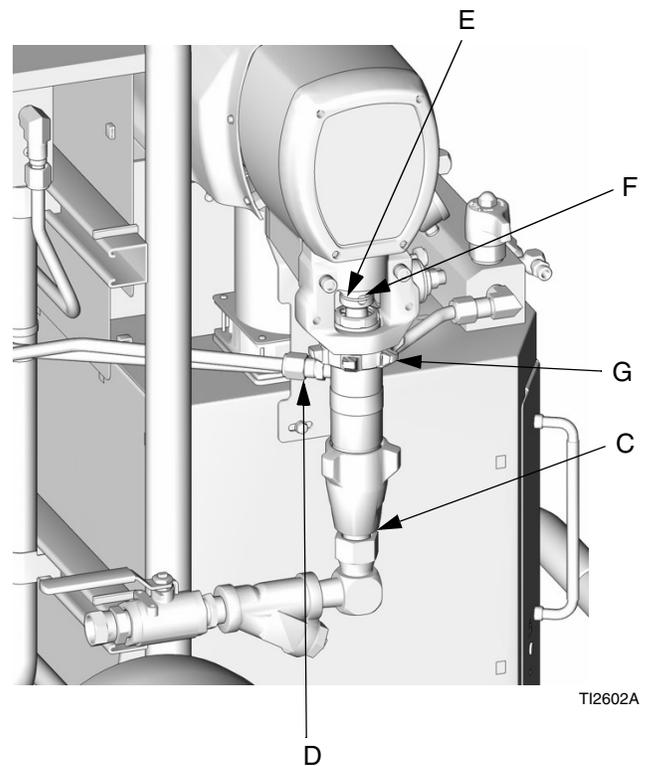
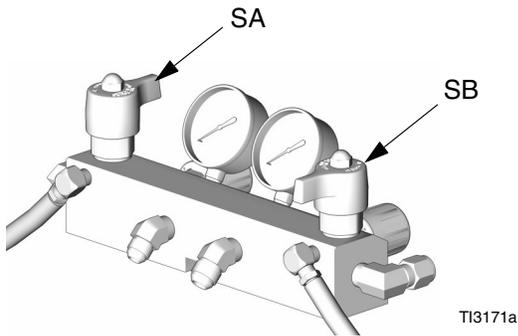


FIG. 1. Disconnect Pump (Pump A Shown)

5. To disconnect pump B:

- a.** Turn PRESSURE RELIEF/SPRAY valves (SA, SB) to PRESSURE RELIEF.



- b.** Turn main power ON .

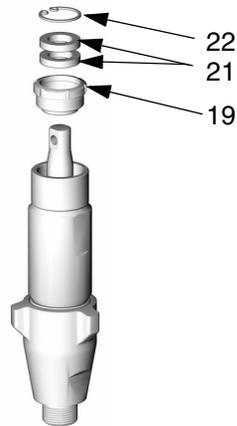
- c.** Enter jog mode (see operation manual). Run motor until component B pump is at bottom of its stroke. Press pump  to stop.

- d.** Shut main power OFF .

- e.** Disconnect fluid inlet (C) and outlet (D). See FIG. 1.

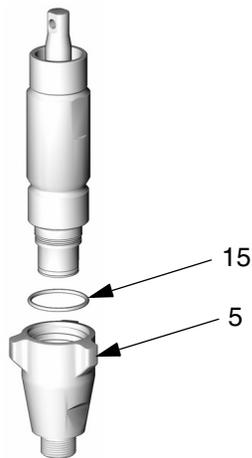
- f.** Push retaining spring (E) up. Push pin (F) out. Loosen locknut (G) by hitting firmly with a non-sparking hammer. Unscrew pump. See FIG. 1.

- 6.** Unscrew packing nut (19). Remove retaining ring (22) and felt washers (21).



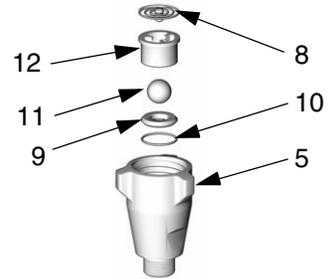
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- 7.** Loosen intake valve housing (5) with non-sparking hammer, then unscrew. Remove o-ring (15).



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- 8.** Disassemble intake valve. Be sure to remove o-ring (10).

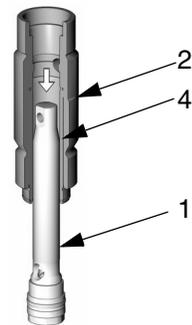


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Spring (8) is on Model 245972 only.

- 9.** Tap rod (1) with non-sparking hammer to drive it out of cylinder (2).

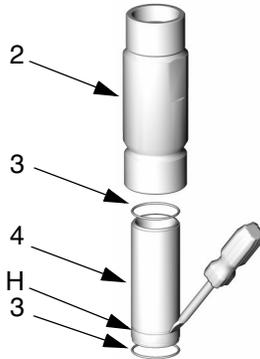


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Sleeve (4) may come out with rod.

- 10.** Using screwdriver in groove (H), remove sleeve (4) from cylinder (2), or pull it off rod. Remove o-rings (3).

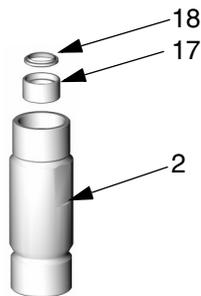


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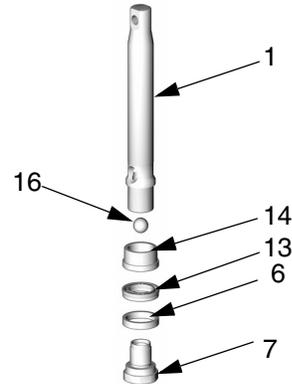
Be sure top o-ring (3) comes out.

- 11.** Remove scraper assembly (18, 245971 and 245972 only) and bushing (17).



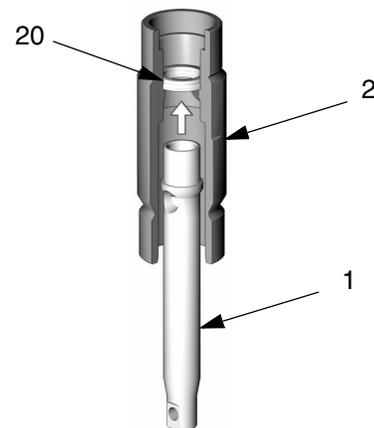
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- 12.** Unscrew piston (7) from rod (1). Remove piston guide (6) and ball (16). Remove u-cup (13) and bushing (14).



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- 13.** Insert piston end of rod (1) into cylinder (2) and push u-cup (20) out.

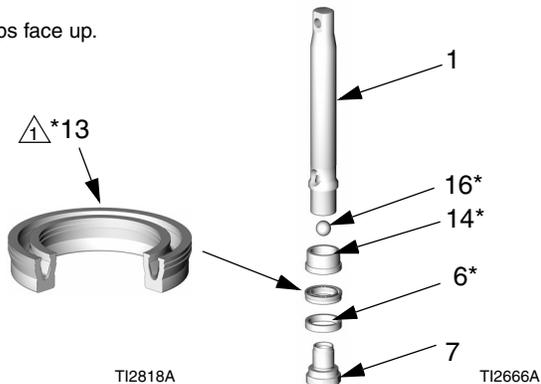


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Reassembly

1. Install ball (16*) in rod (1). Slide bushing (14*) onto rod (1). Install piston guide (6) and u-cup (13*) on piston (7). Lips of u-cup must face up. On Models 245970 and 245971, be sure lips of piston guide (6) face down.

 Lips face up.



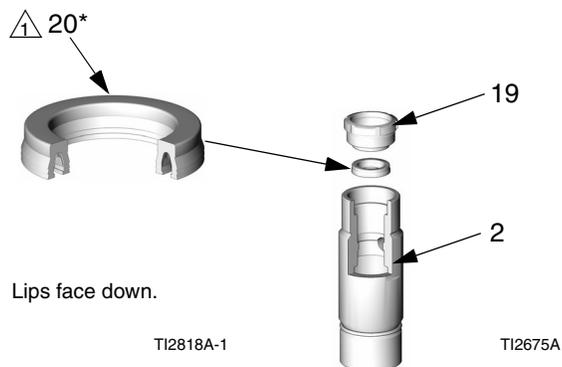
Sealing patch on piston threads is good for four repackings. Use Loctite® on piston threads after four repackings; be sure none gets on ball.

2. Hold u-cup centered and tighten piston valve (7) to rod (1) slowly, to seat u-cup. Be careful not to damage sealing edges of u-cup. Torque as specified below.

Model	Torque ft-lb (N•m)
245970	24-30 (32-40)
245971	47-53 (63-71)
245972	47-53 (63-71)

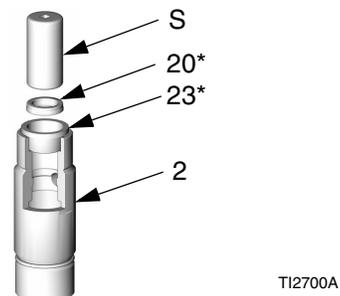
3. Install throat u-cup as follows:

- a. Models 245971 and 245972: Grease u-cup (20*) and cylinder (2). Place u-cup in cylinder with lips facing down. Be careful not to damage sealing edges of u-cup. Install packing nut (19) to properly insert and align u-cup, then remove packing nut.

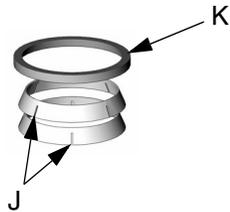


 Lips face down.

- b. Model 245970: Grease u-cup (20*) and cylinder (2). Place seal installation tool (23*) in cylinder. Place u-cup in tool with lips facing down. Be careful not to damage sealing edges of u-cup. Press u-cup in place with 7/8 in. deep-well socket (S). Remove socket and tool.

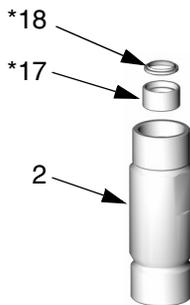


- 4.** Install scraper kit (18*, 245971 and 245972 only) in bushing. Ensure that slots (J) in scrapers do not align and seal (K) fits under lip of bushing.



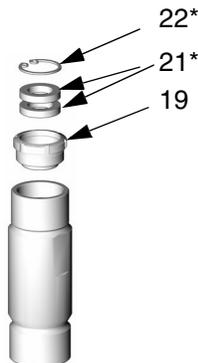
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- 5.** Insert bushing (17*), flat side down. Press bushing in place to seat u-cup.



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- 6.** Install felt washers (21) into packing nut (19). Install retaining ring (22). Soak assembly in ISO pump oil for 10 minutes (minimum), then install packing nut handtight.

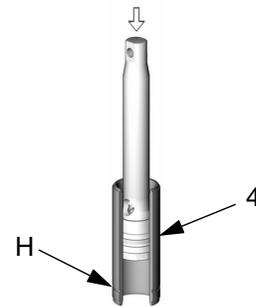


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Groove (H) in sleeve outer surface must be toward bottom.

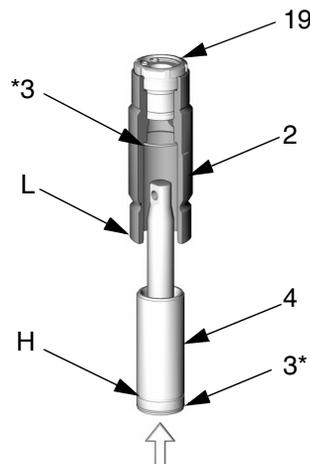
- 7.** Grease piston u-cup and sleeve top edge. Push piston assembly into top of sleeve (4). Drive in with non-sparking hammer.



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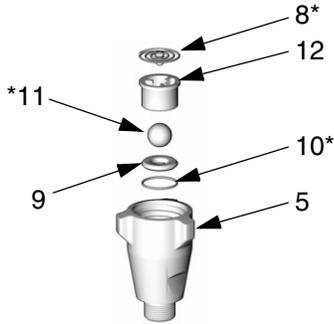
- 8.** Grease top 1-2 in. (25-50 mm) of displacement rod (1) and outside of sleeve (4). Grease o-rings (3*) and place one in cylinder and other on bottom of sleeve.

- 9.** Slide sleeve/ rod assembly into bottom of cylinder (2). Drive in with hammer until top of groove (H) aligns with bottom of cylinder (L). Use plastic rod to drive displacement rod until 1/4-3/8 in. (6-10 mm) of its greatest diameter is visible above packing nut (19).



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- 10.** Reassemble intake valve with o-ring (10*), seat (9), and ball (11*). Install ball guide (12) and spring (8*, Model 245972 only; screw must be at top).

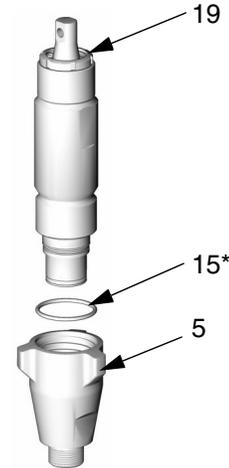


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Seat may be flipped over and used on other side. Clean seat thoroughly. No scratches permitted on sealing edge.

- 11.** Replace o-ring (15*). Install intake valve. Torque housing (5) as follows, or be sure intake valve is snug against cylinder.



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Model	Torque ft-lb (N•m)
245970	65-75 (88-101)
245971	75-85 (101-114)
245972	145-155 (195-209)

- 12.** Torque packing nut (19) to 90-110 in-lb (10-12 N•m).

13. To reconnect pump B:

- a.** Turn main power ON  .
- b.** Enter jog mode. Run motor until component B connecting rod is at bottom of its stroke.

- c.** Shut main power OFF  .
- d.** Ensure locknut (G) is screwed on pump with flat side up. Screw pump into bearing housing (M) until pin holes align. Push pin (F) in. Pull retaining spring (E) down. See FIG. 2.

- e.** Continue screwing pump into housing until fluid outlet (D) is aligned with steel tube and top threads are +/- 1/16 in. (2 mm) of bearing face (N). See FIG. 2.
- f.** Tighten locknut (G) by hitting firmly with a non-sparking hammer. See FIG. 2.
- g.** Reconnect fluid inlet (C) and outlet (D).

 To reconnect pump A, see page 15.

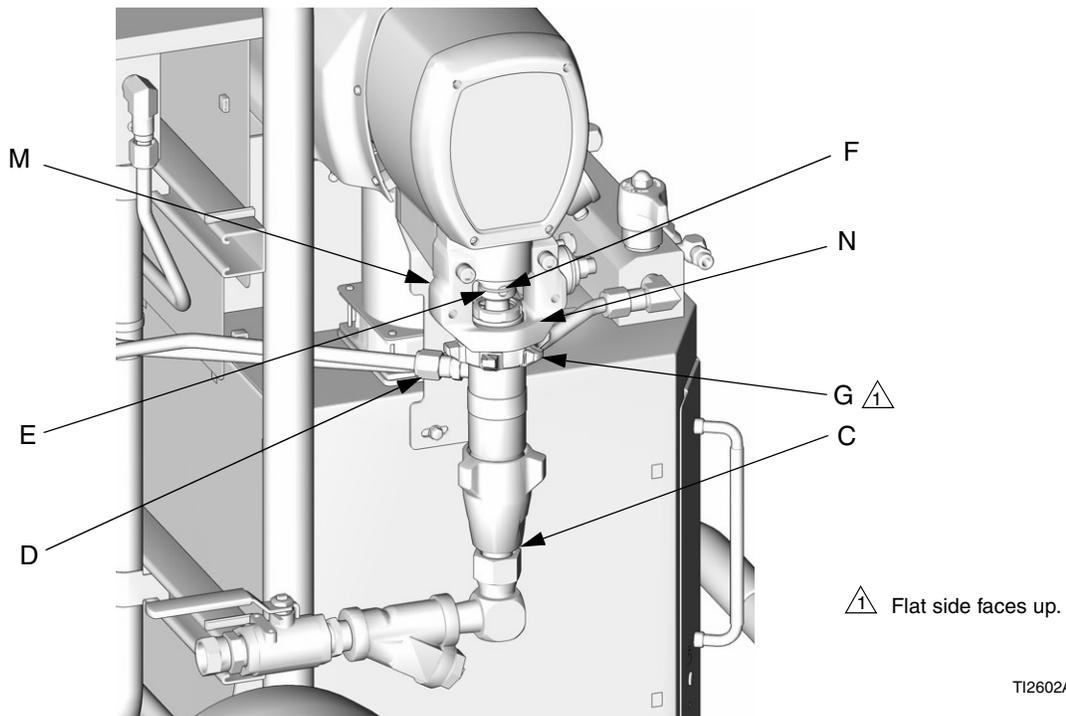


FIG. 2. Reconnect Pump (Pump A Shown)

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14. To reconnect pump A:

- a.** Turn main power ON



- b.** Press . Motor will run until component A connecting rod is at bottom of its stroke, then shut off. Pump B moves to top of stroke; pumps must be opposed (1 up, 1 down) for Reactor to run.

- c.** Shut main power OFF



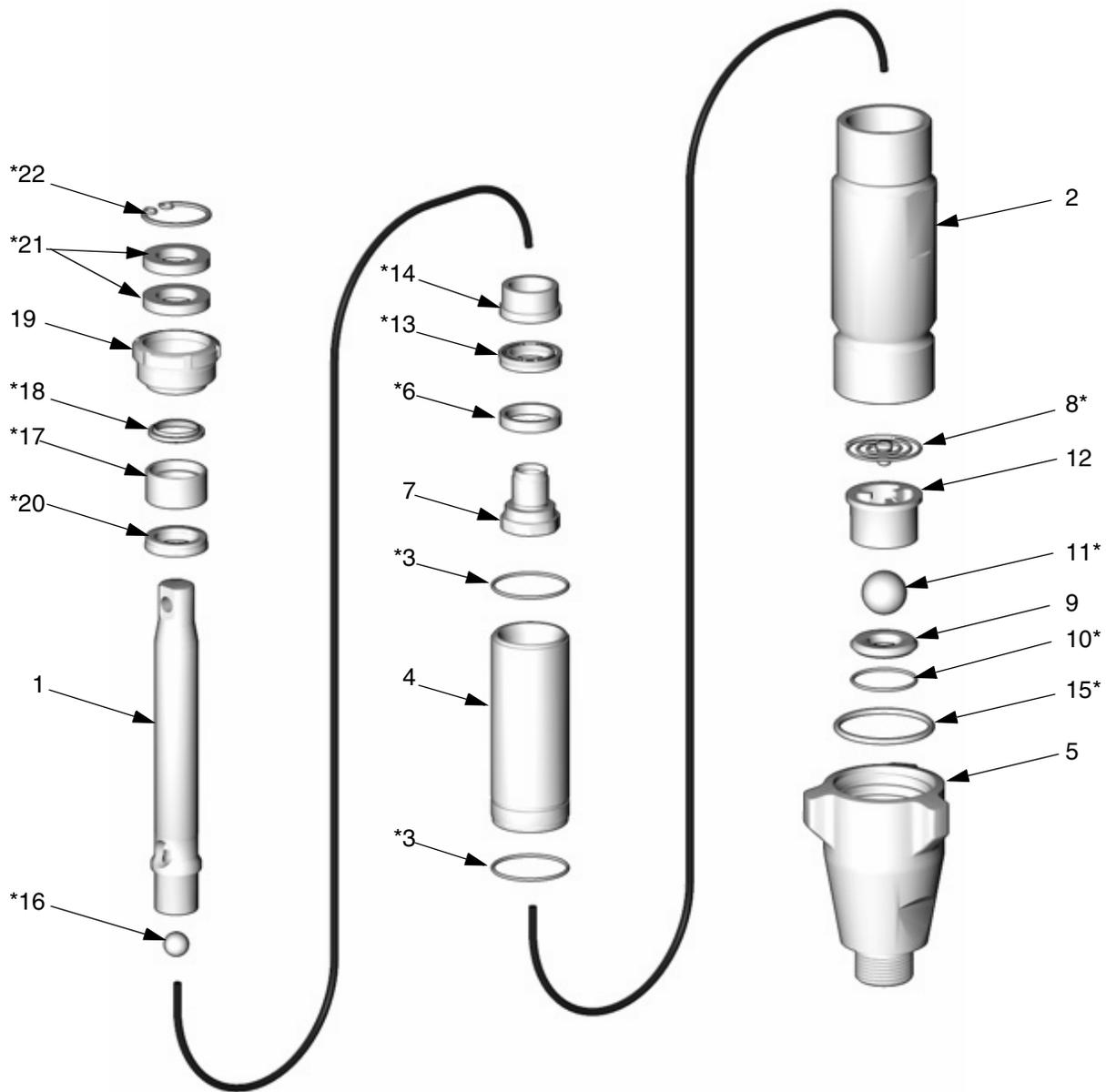
- d.** Ensure locknut (G) is screwed on pump with flat side up. Screw pump into bearing housing (M) until pin holes align. Push pin (F) in. Pull retaining spring (E) down. See FIG. 2.
- e.** Continue screwing pump into housing until fluid outlet (D) is aligned with steel tube and top threads are +/- 1/16 in. (2 mm) of bearing face (N). See FIG. 2.
- f.** Tighten locknut (G) by hitting firmly with a non-sparking hammer. See FIG. 2.
- g.** Reconnect fluid inlet (C) and outlet (D).

Parts

Part No. 245970, Series A; includes items 1-7, 9-17, 19-22

Part No. 245971, Series A; includes items 1-7, 9-22

Part No. 245972, Series A; includes items 1-22 (shown)



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Part No. 245970, Series A; includes items 1-7, 9-17, 19-22

Part No. 245971, Series A; includes items 1-7, 9-22

Part No. 245972, Series A; includes items 1-22 (shown)

Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description	Qty
1	240518	ROD, displacement; sst (245970)	1	15*	114054	O-RING; Viton® (245970)	1
	240517	ROD, displacement; sst (245971)	1		106556	O-RING; Viton (245971)	1
	246689	ROD, displacement; sst (245972)	1		107306	O-RING; Viton (245972)	1
2	243346	CYLINDER, pump (245970)	1	16*	105444	BALL, piston; sst; 0.3125 in. (8 mm) (245970)	1
	240520	CYLINDER, pump (245971)	1		101947	BALL, piston; sst; 0.375 in. (10 mm) (245971)	1
	245413	CYLINDER, pump (245972)	1		107203	BALL, piston; sst; 0.5625 in. (14 mm) (245972)	1
3*	108526	O-RING; Teflon® (245970)	2	17*	15B075	BUSHING, rod (245970)	1
	107098	O-RING; Teflon (245971)	2		15B074	BUSHING, rod (245971)	1
	108822	O-RING; Teflon (245972)	2		15B076	BUSHING, rod (245972)	1
4	240521	SLEEVE, cylinder; sst (245970)	1	18*	113938	KIT, scraper (245971)	1
	240525	SLEEVE, cylinder; sst (245971)	1		117452	KIT, scraper (245972)	1
	240921	SLEEVE, cylinder; sst (245972)	1	19	193046	NUT, packing (245970)	1
5	195892	HOUSING, valve, intake (245970)	1		193032	NUT, packing (245971)	1
	193030	HOUSING, valve, intake (245971)	1		189589	NUT, packing (245972)	1
	198219	HOUSING, valve, intake (245972)	1	20*	117447	SEAL, u-cup, throat; UHMWPE (245970)	1
6*	196758	GUIDE, piston (245970)	1		117446	SEAL, u-cup, throat; UHMWPE (245971)	1
	196757	GUIDE, piston (245971)	1		117448	SEAL, u-cup, throat; UHMWPE (245972)	1
	198303	GUIDE, piston (245972)	1	21*	117597	WASHER, felt (245970)	2
7	239932	VALVE, piston (245970)	1		117599	WASHER, felt (245971)	2
	240150	VALVE, piston (245971)	1		117600	WASHER, felt (245972)	2
	240580	VALVE, piston (245972)	1	22*	551528	RING, retaining (245970)	1
8*	245256	SPRING, intake ball (245972 only)	1		117718	RING, retaining (245971)	1
9	239922	SEAT, intake; carbide (245970); includes items 10 and 11	1		117719	RING, retaining (245972)	1
	244199	SEAT, intake; carbide (245971); includes items 10 and 11	1	23*	15B661	TOOL, installation, seal (245970); not shown; part of Repair Kit 246420	1
	240918	SEAT, intake; carbide (245972); includes items 10 and 11	1				
10*	107079	O-RING; Teflon (245970)	1				
	108526	O-RING; Teflon (245971)	1				
	107098	O-RING; Teflon (245972)	1				
11*	105445	BALL, intake; sst; 0.5 in. (13 mm) (245970)	1				
	102972	BALL, intake; sst; 0.875 in. (22 mm) (245971)	1				
	107167	BALL, intake; sst; 1 in. (25 mm) (245972)	1				
12	192624	GUIDE, ball (245970)	1				
	193027	GUIDE, ball (245971)	1				
	193391	GUIDE, ball (245972)	1				
13*	117450	SEAL, u-cup, piston; UHMWPE (245970)	1				
	117449	SEAL, u-cup, piston; UHMWPE (245971)	1				
	117448	SEAL, u-cup, piston; UHMWPE (245972)	1				
14*	15B078	BUSHING, piston (245970)	1				
	15B077	BUSHING, piston (245971)	1				
	15B079	BUSHING, piston (245972)	1				

* These parts are also included in the Pump Repair Kits, which may be purchased separately. Order the correct kit for your pump from the table below.

Pump Part No.	Repair Kit
245970	246420
245971	246421
245972	246422

Technical Data

Category	Data
Maximum working pressure	3500 psi (24.5 MPa, 245 bar)
Effective area of displacement	245970: 0.394 in. ² (2.54 cm ²) 245971: 0.554 in. ² (3.57 cm ²) 245972: 0.743 in. ² (4.79 cm ²)
Fluid inlet size	245970 and 245971: 3/4 npt(m) 245972: 1 npsm(m)
Fluid outlet size	245970: 1/4 npt(f) 245971 and 245972: 3/8 npt(f)
Wetted parts	stainless steel, Teflon, zinc-plated carbon steel, brass, tungsten carbide, chrome plating, ultra-high molecular weight polyethylene

Viton® and Teflon® are registered trademarks of the Du Pont Company.

Loctite® is a registered trademark of the Loctite Company.

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.

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.

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