INSTRUCTIONS-PARTS LIST 308854

Rev. F

KEEP FOR REFERENCE.
Read this and all related manuals for important warnings and instructions.

INSTRUCTIONS

GRACO

First choice when quality counts.™

Airless Paint Sprayers

3000 psi (210 bar, 21 MPa) Maximum Working Pressure

ULTRA®*MAX* 1595

230 VAC CE

Model	Series	Description
232164	A	Hi-boy with RAC IV™ tip, gun and hose

120 VAC

Model	Series	Description
232160	A	Hi-Boy
232161	A	Hi-Boy with RAC IV tip, gun and hose
232162	A	CSA/UL Hi-Boy
232163	A	CSA/UL Hi-Boy with RAC IV tip, gun and hose

MARK V™

100 VAC

Model	Series	Description
232166	A	Hi-Boy

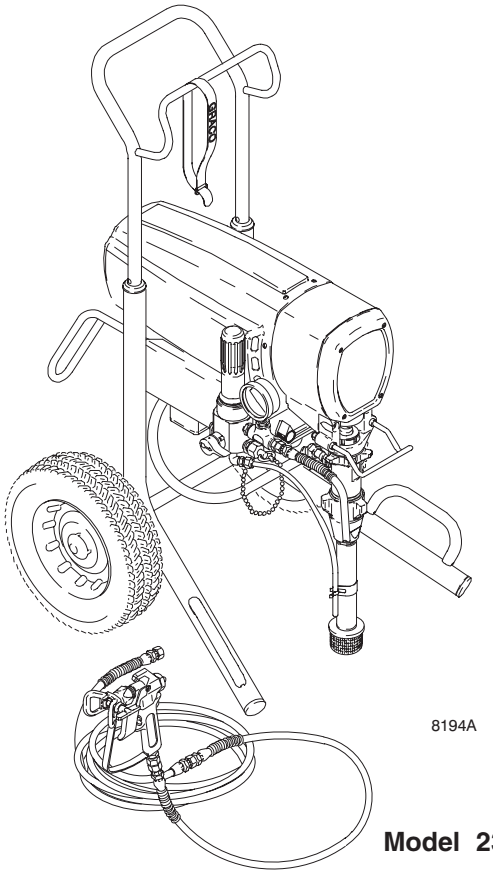
230 VAC CE

Model	Series	Description
232173	A	Hi-boy with RAC IV™ tip, gun and hose

120 VAC

Model	Series	Description
232171	A	Hi-Boy with RAC IV tip, gun and hose

All models are not available in all countries



Model 232164

Related Manuals

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GRACO INC. P.O. BOX 1441 MINNEAPOLIS, MN 55440–1441

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Warnings and Cautions

Warning Symbol

⚠ WARNING

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

Caution Symbol

⚠ CAUTION

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

⚠ WARNING

Fire and explosion can occur when spraying or flushing flammable fluid in an area where air circulation is poor and flammable vapors can be ignited by an open flame or sparks.

To help prevent a fire and explosion:

- **Use outdoors or in an extremely well ventilated area.**
- Do not use 1,1,1–trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids containing such solvents in pressurized aluminum equipment. Such use could result in a chemical reaction, with the possibility of explosion.
- Remove, extinguish or unplug all ignition sources; tape wall switches. Do not smoke in spray area.
- Ground Sprayer, object being sprayed, paint and solvent pails.
- Hold gun firmly to side of a grounded pail when triggering into pail.
- Use a properly grounded outlet.
- Use only conductive airless paint hose.
- Do not modify this equipment.

Fluid injection is a serious injury! If high pressure fluid pierces your skin, the injury might look like “just a cut”. But it is a serious wound! Get immediate medical attention.

To help prevent injection, always:

- Engage trigger safety latch when not spraying.
- Point gun away from yourself or anyone else.

- Relieve pressure before checking or repairing any leak.
- Relieve pressure when you turn off the sprayer or stop spraying
- Keep drain hose outlet under fluid when opening drain valve.
- Relieve pressure through the gun when you turn off the sprayer or stop spraying.
- Do not use components rated less than system *Maximum Working Pressure*

Never allow children to use this unit. If you are injured using this equipment, get immediate medical treatment.

Component Identification and Function

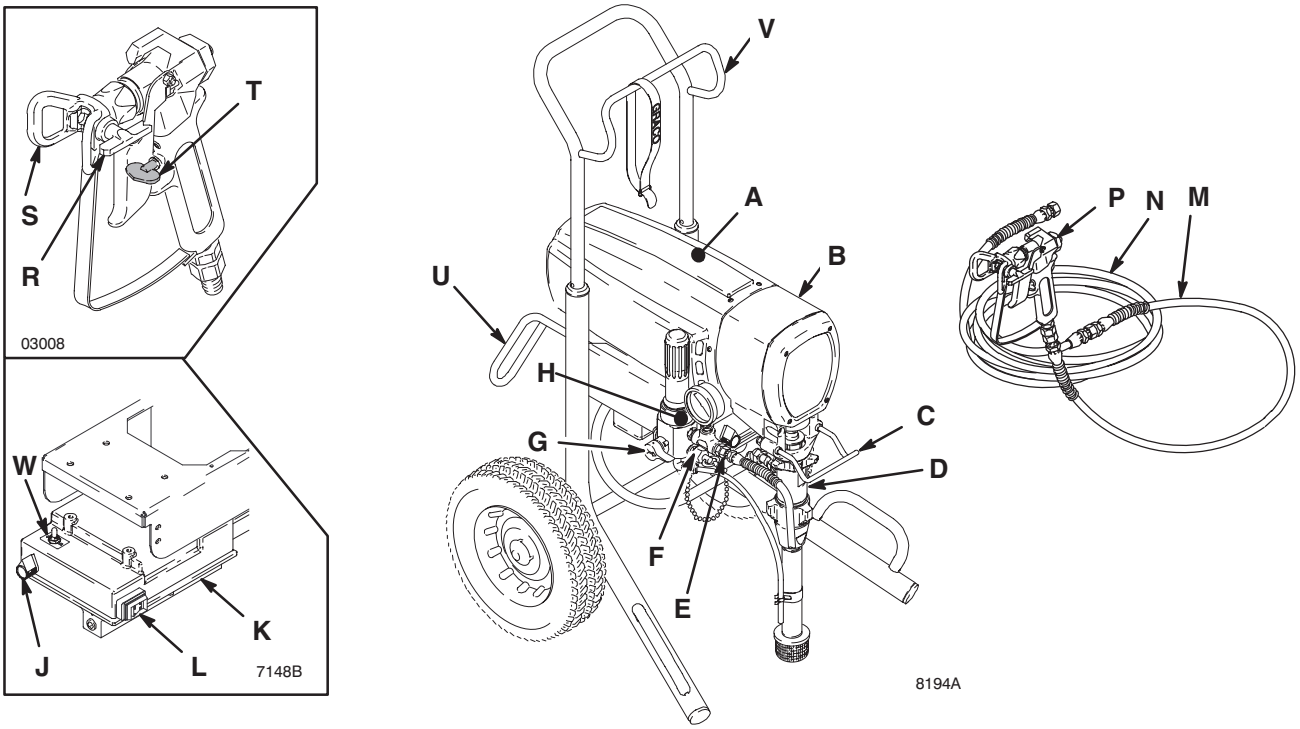


Fig. 1

A	Motor	DC motor, permanent magnet, totally enclosed, fan cooled
B	Drive Assembly	Transfers power from DC motor to the displacement pump
C	Pail Hanger	Container for fluid to be sprayed may be hung here
D	Displacement Pump	Transfers fluid to be sprayed from source through spray gun
E	Primary Fluid Outlet	Single spray gun operation is connected here
F	Secondary Fluid Outlet	Second spray gun operation is connected here
G	Pressure Drain Valve	Relieves fluid outlet pressure when open
H	Fluid Filter	Final filter of fluid between source and spray gun
J	Pressure Adjust Knob	Controls fluid outlet pressure
K	Pressure Control	Controls motor speed to maintain fluid outlet pressure at displacement pump outlet. Works with pressure adjusting knob.
L	ON/OFF Switch	Power switch that controls VAC main power to sprayer
M	3 ft (0.9 m) Hose	3/16 in. ID, grounded, nylon hose used between 50 ft hose and spray gun to allow more flexibility when spraying
N	50 ft (15 m) Main Hose	1/4 in. ID, (3/8 in. ID, MARK V) grounded, nylon hose, spring guards both ends
P	Spray Gun	High pressure spray gun with gun safety latch
R	RAC IV Switch Tip	Uses high pressure fluid to clear tip clogs without removing tip from spray gun
S	RAC IV Tip Guard	Reverse-A-Clean (RAC) tip guard reduces the risk of injection injury
T	Spray Gun Safety Latch	Gun safety latch inhibits accidental triggering of spray gun
U	Power Cord Rack	Holds wrapped power cord for storage
V	Spray Hose Rack	Holds wrapped spray hose for storage
W	10/12 Amp Switch	Allows Models 232164, 232173 to operate on 10A service with reduced performance
	15/20 Amp Switch	Allows Models 232160 through 232163, 232166, 232171 to operate on 15A service with reduced performance

General Repair Information

⚠ CAUTION

To reduce risk of pressure control malfunction:

- Use needle nose pliers to disconnect a wire. Never pull on wire, pull on connector.
- Mate wire connectors properly. Center flat blade of insulated male connector in female connector.
- Route wires carefully to avoid interference with other connections of pressure control. Do not pinch wires between cover and control box.

Tool List

Phillips screwdriver
Small flat blade screwdriver
Needle nose pliers
Plastic mallet or 20 oz (max) hammer
12 in. adjustable wrench
Adjustable, open-end wrench
Torque wrench
1/4 in. hex key wrench
3/16 in. hex key wrench
5/8 in. socket wrench
3/8 in. open end wrench
1/2 in. open end wrench
3/4 in. open end wrench
7/8 in. open end wrench
High quality motor oil
Bearing grease

1. **Keep all screws, nuts, washers, gaskets, and electrical fittings** removed during repair procedures. These parts are not normally provided with replacement assemblies.

⚠ WARNING

ELECTRIC SHOCK HAZARD
To reduce risk of serious injury, including electric shock, do not touch moving or electrical parts with fingers or tools while testing repair. Shut off and unplug sprayer when inspection is complete. Install all covers, gaskets, screws and washers before operating sprayer.

2. **Test repair** after problem is corrected.

3. **If sprayer does not operate properly**, review repair procedure to verify procedure was done correctly. If necessary, see Troubleshooting, page 5, for other possible solutions.

⚠ WARNING

EXPLOSION HAZARD
Motor and drive housing are very hot during operation and could burn skin if touched. Flammable materials spilled on hot, bare motor could cause fire or explosion. Have motor shield in place during operation to reduce risk of burns, fire or explosion.

⚠ CAUTION

Do not run sprayer dry for more than 30 seconds to avoid damaging pump packings.

4. **Install motor shield before operation** of sprayer and replace if damaged. Motor shield directs cooling air around motor to prevent overheating. It can also reduce risk of burns, fire or explosion; see preceding **WARNING**.

Pressure Relief Procedure

⚠ WARNING

INJECTION HAZARD
System pressure must be manually relieved to prevent system from starting or spraying accidentally. Fluid under high pressure can be injected through skin and cause serious injury. To reduce risk of injury from injection, splashing fluid, or moving parts, follow **Pressure Relief Procedure** whenever you:

- are instructed to relieve pressure,
- stop spraying,
- check or service any system equipment,
- or install or clean spray tip.

1. Lock gun safety latch.
2. Turn ON/OFF switch to OFF.
3. Unplug power supply cord.
4. Unlock gun safety latch. Hold metal part of gun firmly to grounded metal pail. Trigger gun to relieve pressure.
5. Lock gun safety latch.
6. Open pressure drain valve. Leave pressure drain valve open until ready to spray again.

If suspected that spray tip or hose is completely clogged, or that pressure has not been fully relieved after following steps above, VERY SLOWLY loosen tip guard retaining nut or hose end coupling to relieve pressure gradually, then loosen completely. Now clear tip or hose obstruction.

Troubleshooting

TYPE OF PROBLEM	WHAT TO CHECK *If check is OK, go to next check*	WHAT TO DO *When check is not OK refer to this column*
Motor runs and pump strokes, but output is low or there is no output.	Extension cord size and length.	Replace cord with a larger size, grounding type extension cord.
	Paint supply.	Refill and reprime pump.
	Clogged intake strainer.	Remove and clean strainer and reinstall. Mark V models 232171 and 232173 strainer is for use in paint only.
	Loose suction tube or loose fittings.	Tighten; use thread sealant or sealing tape on threads, if necessary.
	Worn spray tip.	Follow **Pressure Relief Procedure Warning**, then replace tip. See your separate gun or tip manual.
	Motor brushes, loose leads and terminals, minimum 13 mm brush length, broken or misaligned springs, or brushes binding in holders. See page 7.	Replace parts as needed. See page 7.
	Motor armature for shorts. Use an armature tester (growler).	Replace motor. See page 13.
	If pump continues to stroke when gun trigger is released. With pump on and primed, trigger gun momentarily, then release and engage safety latch. Relieve pressure, turn off and unplug sprayer.	Service pump. See manual 308798.
	If intake valve ball and piston ball are seating properly.	Remove intake valve and clean. Check balls and seats for nicks; replace if necessary. See manual 308798. Strain paint before using to remove particles that could clog the pump.
	Intake valve ball is packed with material.	Remove and clean intake valve. Do not leave Mark V models 232171 and 232173 sprayers under pressure for more than 5 minutes when pumping texture material and not actively spraying.
	Leaking around throat packing nut which may indicated worn or damaged packings.	Replace packings. See manual 308798. Also check piston valve seat for hardened paint or nicks and replace if necessary. Tighten the packing nut/wetcup.
	Defective pressure control transducer.	Replace pressure control transducer. See page 10.

(Continued on page 6)

Troubleshooting

Motor runs but pump does not stroke.	Displacement pump connecting rod pin (20). See page 16.	Replace pin, if missing. Be sure retainer spring (35) is fully in groove all around connecting rod. See page 16.
	Frozen or hardened paint in the pump (39).	Thaw. See NOTE 1. Plug in sprayer and turn on. Slowly increase pressure setting to see if motor starts.
	Be sure crank in drive housing rotates; plug in sprayer and turn on briefly to check. Turn off and unplug sprayer.	Check drive housing assembly for damage and replace if necessary. See page 17.
Motor is hot and runs intermittently.	Determine if sprayer was operated at high pressure with small tips, which causes low motor RPM and excessive heat build up.	Decrease pressure setting or increase tip size.
	Be sure ambient temperature where sprayer is located is no more than 90°F and sprayer is not located in direct sun.	Move sprayer to shaded, cooler area, if possible.
	Determine if sprayer was turned on, pressurized, but not operating for long periods of time.	Turn off sprayer whenever you stop spraying for a while and relieve fluid pressure.

NOTE 1: Thaw sprayer in a warm area if water or water-based paint has frozen in it. Do not start sprayer until it has thawed completely. If paint hardened (dried) in sprayer, replace pump packings. See manual 308798.

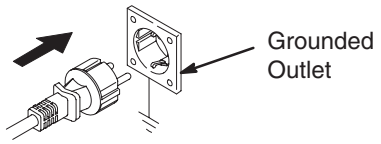
Grounding

Grounding

⚠ WARNING

Improper installation or alteration of the grounding plug will result in a risk of electric shock, fire or explosion that could cause serious injury or death.

1. Models 232160 through 233163, 232171 require a 120 Vac, 60 Hz, 10A circuit with a grounding receptacle. Models 232164, 232173 requires a 230 Vac, 50 Hz, 10A circuit with a grounding receptacle. Model 232166 requires a 100 Vac, 50 Hz, 15A circuit with a grounding receptacle. See Fig. 2.



Model 232164

Fig. 2 9286A

2. Do not alter ground prong or use adapter.

3. A 1.5 mm^2 by 90 m extension cord may be used with this equipment.

Motor Brush Replacement

NOTE: Replace brushes worn to less than 1/2 in. Brushes wear differently on each side of motor, check both sides. Brush Repair Kit 222157 is available for Models 232164, 232173 and Brush Repair Kit 220853 is available for Models 232160 through 232163, 232166, 232171. Spring clip, 110816, may be purchased separately.

Motor Brush Removal

1. Read **General Repair Information**; page 4.

2.  Relieve pressure**;** page 4.

3. Fig. 3. Remove motor shield (14). Remove inspection covers (B) and gaskets on each side of motor.

(Continued on page 8)

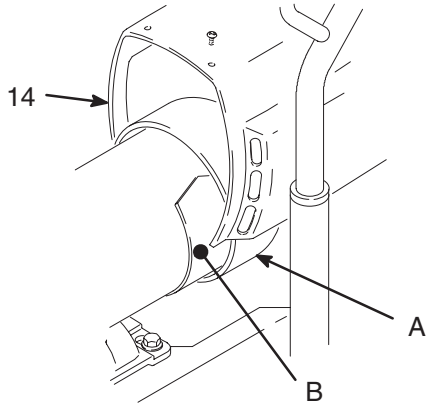


Fig. 3 7703B

4. Fig. 4. Push in 110816 spring clip (A) to release hooks (B) from brush holder (C). Pull out spring clip.

5. Fig. 4. Loosen terminal screw (D). Pull brush lead (E) away, leaving motor lead (F) in place. Remove brush (G) and spring (H).

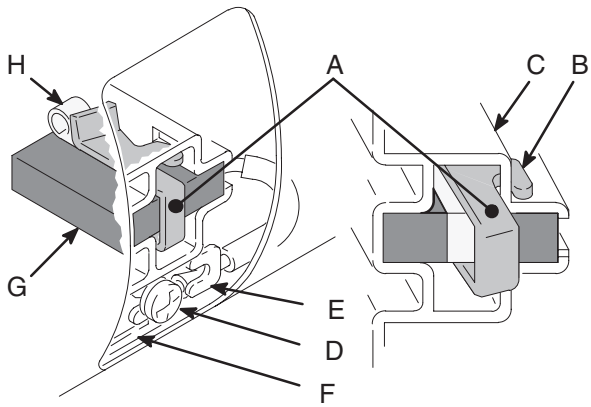


Fig. 4 01227

6. Inspect commutator for excessive pitting, burning or gouging. A black color on commutator is normal. Have commutator resurfaced by a qualified motor repair shop if brushes wear too fast.

Motor Brush Replacement

Motor Brush Installation

⚠ CAUTION

When installing brushes, follow all steps carefully to avoid damaging parts.

7. Fig. 5. Install new brush (G) with lead in long slot (J) of brush holder (C).

8. Fig. 4. Slide brush lead (E) under washer of terminal screw (D) and tighten screw. Be sure motor lead (F) is connected at terminal screw.

9. Fig. 5.Place spring (H) on brush (G).

10. Fig. 5. Install spring clip (A). Push down to hook short slots (K) in brush holder (C).

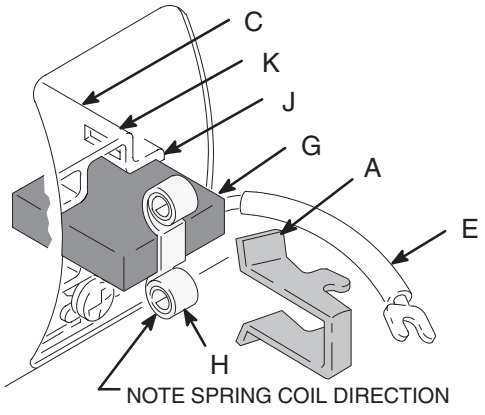


Fig. 5

11. Repeat for other side.

12. Test brushes.

    a. Remove pump connecting rod pin.

    b. With sprayer OFF, turn pressure control knob fully counterclockwise to minimum pressure. Plug in sprayer.

    c. Turn sprayer ON. Slowly increase pressure until motor is at full speed.

⚠ CAUTION

Do not run sprayer dry for more than 30 seconds while checking brushes to avoid damaging displacement pump packings.

13. Install brush inspection covers and gaskets.

14. Break in brushes.

    a. Operate sprayer 1 hour with no load.

    b. Install connecting rod pin.

Pressure Control

⚠ CAUTION

Do not install the pressure control until motor is checked. A defective motor may damage the pressure control. Make sure to test the motor prior to pressure control installation.

⚠ WARNING

ELECTRIC SHOCK HAZARD
To reduce the risk of Electric Shock: wait 5 minutes after turning sprayer off before servicing to allow stored current to discharge.

Motor Test

With motor shield off and four motor leads disconnected:

1. Check continuity with multimeter from each black motor lead to ground (one at a time). Any reading less than infinite resistance – even very high resistance – means motor is shorted to ground. Replace motor.

⚠ CAUTION

A motor that is shorted to ground will damage the pressure control.

2. Remove fan cover from motor.
3. Remove pump pin (See page 16 for instructions to remove pin).
4. With black motor leads not connected, use motor fan to spin motor quickly. Motor should spin freely in both directions. If not, replace motor.
5. Connect black motor leads together.
6. Use motor fan to turn motor. It should be much harder to turn than in step 4. If there is uneven or no resistance to turning, check brushes and replace if necessary.
7. If there is still uneven or no resistance to turning, replace motor.
8. Install pump pin and fan cover.

Pressure Control Replacement

1.  Relieve pressure; page 4.
2. Remove two screws (19) holding filter assembly (A). See Fig. 7 and parts list, except as noted.
3. Remove filter assembly by unthreading swivel union (15) from hex nipple (102). Unthread nipple from pressure control (5)
4. Remove 8 screws (64) and motor shield (14).
5. Remove outlet cover (221) on pressure control wiring box. Disconnect motor leads. See Fig 6.
6. Loosen electrical tubing (22) from pressure control fitting and pull out wires
7. Remove hose (28) from rear of pressure control swivel union (15).
8. Support pressure control (5) and carefully remove motor mount screws (37). Remove pressure control.
9. Install new pressure control (5) with screws (37).
10. Continue to assemble sprayer.

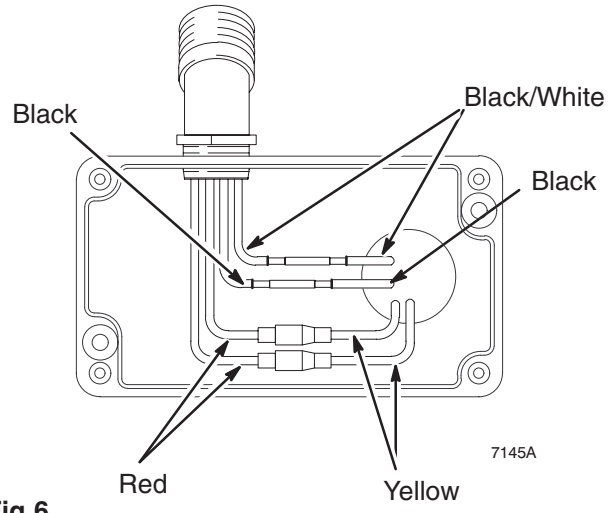


Fig 6

Pressure Control

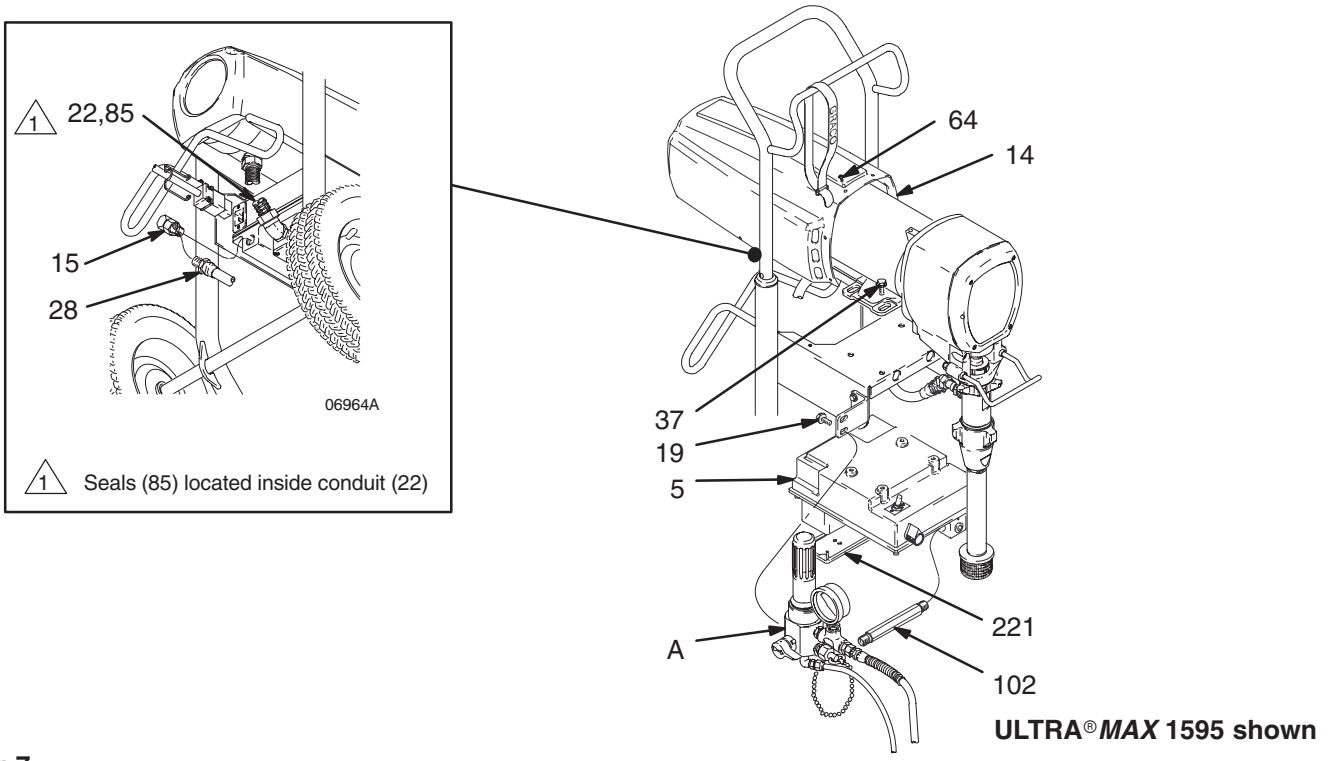


Fig 7

Pressure Control Repair

General Repair and Replacement

1.  Relieve pressure; page 4.

2. Remove power cord (90) and plug retainer (89) by removing screws (230) and washers (229).

3. Remove screws (213) and lockwashers (214). Carefully remove control housing (202) from control motor board (201) so internal wiring is not damaged. Lay housing on side next to control motor board. See Fig. 8 and parts list.

4. Remove and replace only those components and wires necessary for repair. Make a diagram showing wire hook–ups for items removed to insure correct wiring when reinstalling. See Fig 9 for wiring information.

5. Install control housing (202) to motor control board (201) using screws (213) and lockwashers (214).

Pressure Control Transducer and O–Ring Replacement

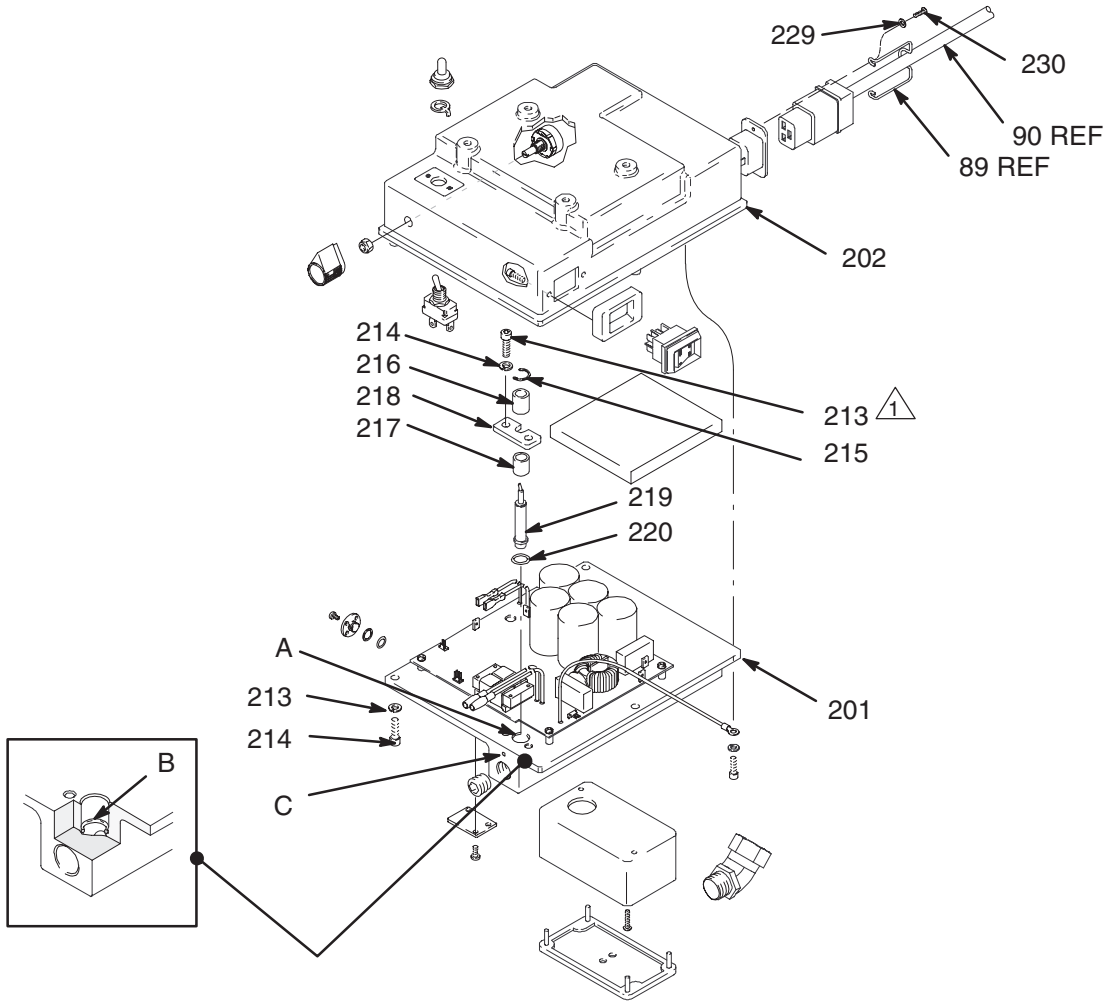
⚠ WARNING

FIRE AND EXPLOSION HAZARD
Proper o–ring replacement is essential to reduce the risk of fire or explosion which can result in serious injury and property damage.

NOTE: Do not replace o–ring unless damaged or if leakage is seen around weep hole, o–ring or transducer.

1. See Fig. 8 and pressure control part list. Disassemble pressure control as in steps 1 through 4 on page 10 and remove old transducer (219) and, if necessary, old o–ring (220).

Pressure Control Repair



1 Torque to 150 in–lb (17 N.m)

8185A

Fig 8

2. Carefully slide new o–ring (220) down bore (A) of motor control (201) into o–ring groove (B). Make sure o–ring is in groove around its entire circumference.

NOTE: PTFE o–ring (220) is stiffer than a rubber o–ring and may be difficult to place in groove.

3. Carefully slide new transducer and plastic spacer (217) down bore. Loosely attach bracket (218), screws (213), and washers (214).

4. Seat transducer into o–ring by drawing down screws and washers until bracket is flush with motor control surface.

5. Carefully remove transducer and verify that o–ring is seated correctly and not pushed out of groove. If not seated correctly use new o–ring and repeat steps 2 through 5.

6. When o–ring is correctly installed, reinstall transducer and tighten screws to 150 in-lb (17 N·m). Install spacer (216) and C-clip (215). Connect electrical lead and assemble sprayer.

7. Perform Flush and Prime procedures in STARTUP of Operation Manual 308855 with compatible fluid.

8. Inspect weep hole (C) for any leakage.

9. If any leakage is present, replace o–ring repeating steps 1 through 9.

Pressure Control Wiring

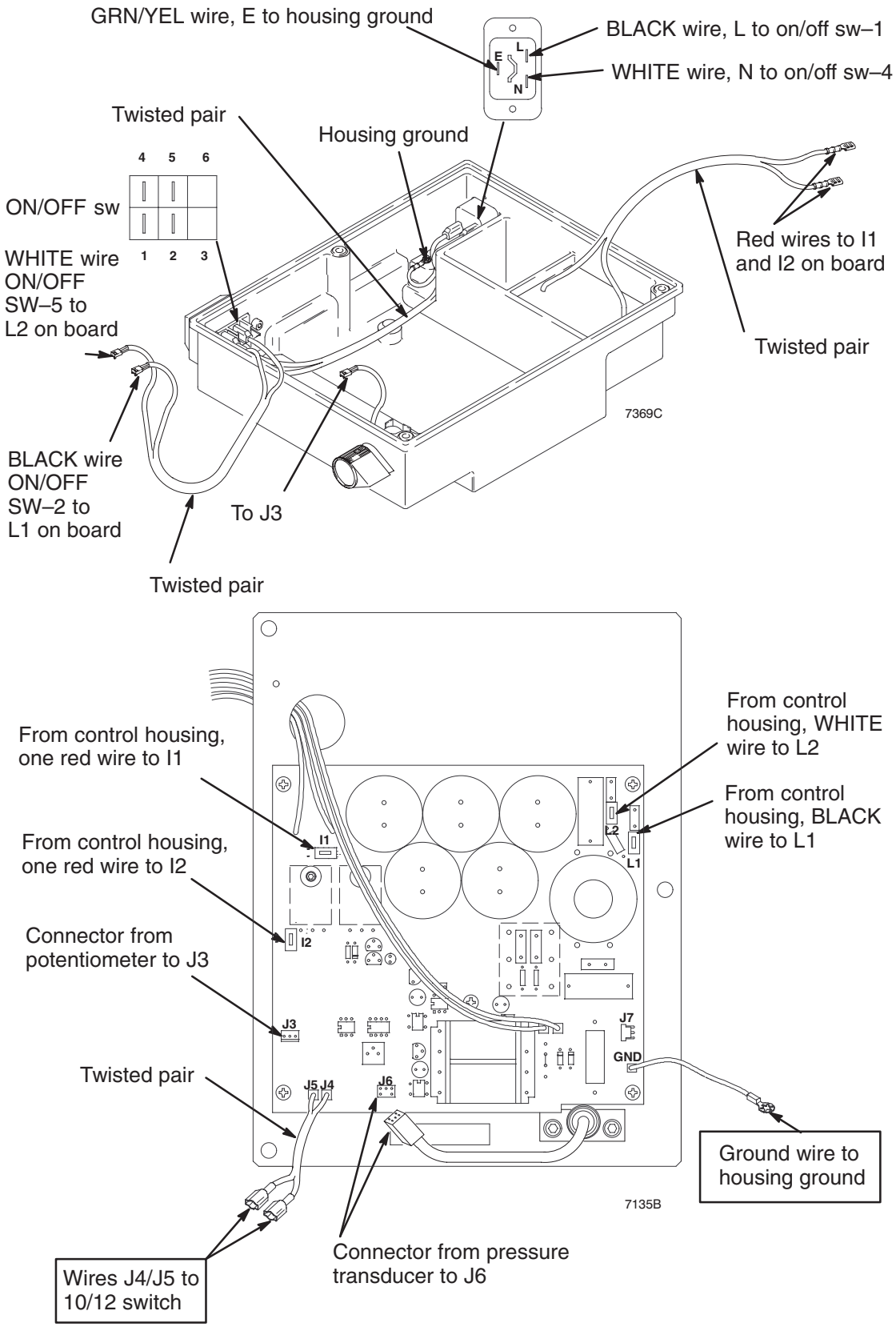


Fig 9

Motor Replacement

⚠ WARNING

ELECTRIC SHOCK HAZARD
To reduce the risk of Electric Shock: wait 5 minutes after turning sprayer off before servicing to allow stored current to discharge.

NOTE: Refer to Fig. 10 and parts list, except as noted.

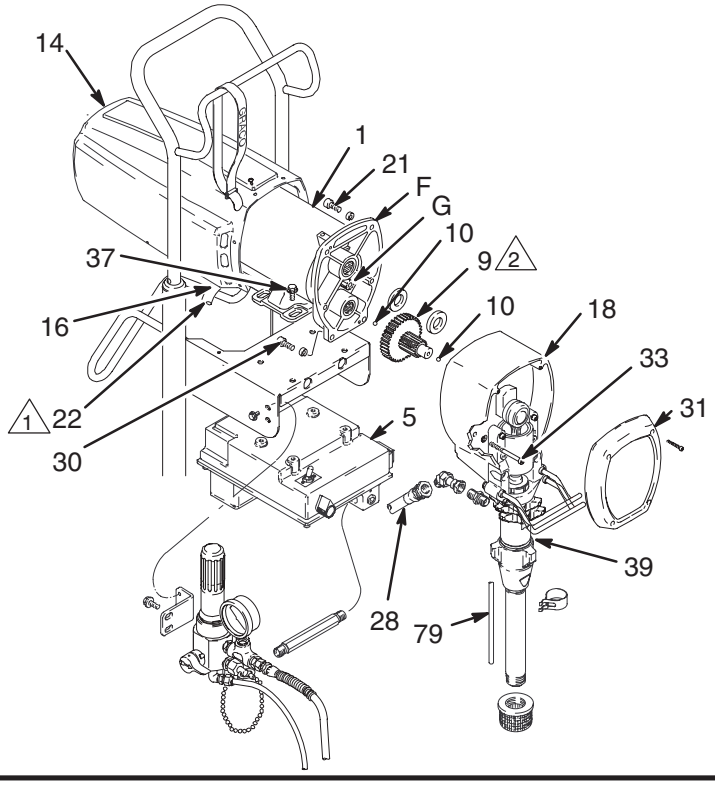
1.  Relieve pressure**;** page 4.
2. Remove motor shield (14). Remove front cover (31). Disconnect hose (28) at pump. Disconnect drain hose (79) from pump (39).
3. Remove outlet cover on pressure control wiring box. Disconnect four motor leads. See Fig 6.
4. Unscrew conduit connector (16) from motor and pull motor leads from tubing (22).
5. Remove screws (33) from recess of drive housing.
6. Remove screws (21 and 30) from motor bell (F).
7. Use a plastic mallet to tap displacement pump (39) from rear to loosen drive housing (18) from motor bell (F). Pull off drive housing.

⚠ CAUTION

DO NOT drop gear cluster (9) when removing drive housing (18). The gear cluster may stay engaged in the motor front end bell or the drive housing.

DO NOT lose thrust balls (10) located at each end of gear cluster (9) or drop them between gears. The balls, which are heavily covered with grease, usually stay in the shaft recesses, but could be dislodged. If caught between gears and not removed, the balls will seriously damage the drive housing. If the balls are not in place, the bearings will wear prematurely.

8. Lower pressure control (5) by unscrewing motor mounting screws (37).
9. Lift off motor (1).
10. Mount and center new motor on frame and attach pressure control (5) with motor mounting screws (37).
11. Insert motor leads through connector (16) and tubing (22) to pressure control. Screw connector (125) two or three threads into motor. Tighten locknut up to motor. Connect four motor leads. See Fig. 6.
12. Liberally grease gear cluster (9) and pinion gear (G) and pack all bearings in motor bell. Be sure thrust balls (10) are in place. (One ball is included with a replacement drive housing.)
13. Align gears and push drive housing (18) straight onto motor bell (F) and locating pins.
14. Continue to reassemble sprayer.



ULTRA®*MAX* 1595 shown

1 Seals (93) located inside conduit (22)

2 Apply 6 ounces bearing grease

7957A

Fig. 10

Bearing Housing and Connecting Rod Replacement

NOTE: Read **General Repair Information** on page 4 before doing this procedure. See Fig. 11.

NOTE: Stop sprayer at bottom of its stroke to get crank (E) in its lowest position.To lower crank manually, carefully rotate blades of fan with a screwdriver.

1.  Relieve pressure**;** page 4.

2. Remove front cover (31). Unclip drain hose (79) from pump. Hold a wrench on pump intake valve (H) and unscrew pump suction tube (42). Disconnect pump hose (28).

3. Push up retaining spring (35). Push pin (20) out rear.

4. Loosen locknut (38). Unscrew displacement pump (39).

5. Remove four screws (33) and lockwashers (49).

6. Lightly tap lower rear of bearing housing (27) with a plastic mallet to loosen it from drive housing (18). Pull bearing housing and connecting rod assembly (29) straight off drive housing.

7. Remove pail bracket assembly (F) and install with locknuts (13) on new bearing housing.

8. Inspect crank (E) for excessive wear and replace parts as needed. Evenly lubricate inside of bronze bearing (B) with high quality motor oil. Liberally pack roller bearing (C) with bearing grease.

9. Assemble connecting rod (29) and bearing housing (27).

10. Clean mating surfaces of bearing (27) and drive (18) housings.

11. Align connecting rod (29) with crank (E) and drive housing locating pins (G) with bearing housing (27) holes. Push bearing housing onto drive housing or tap it into place with a plastic mallet.

⚠ CAUTION

DO NOT use the bearing housing screws (33) to try to align or seat the bearing housing; the bearing and drive housing will not align properly and will result in premature bearing wear.

12. Install screws (33) and lockwashers (49). Tighten screws evenly to 300 in-lb (34 N.m).

13. Install pump. See page 17.

14. Install remaining parts. See Fig. 11.

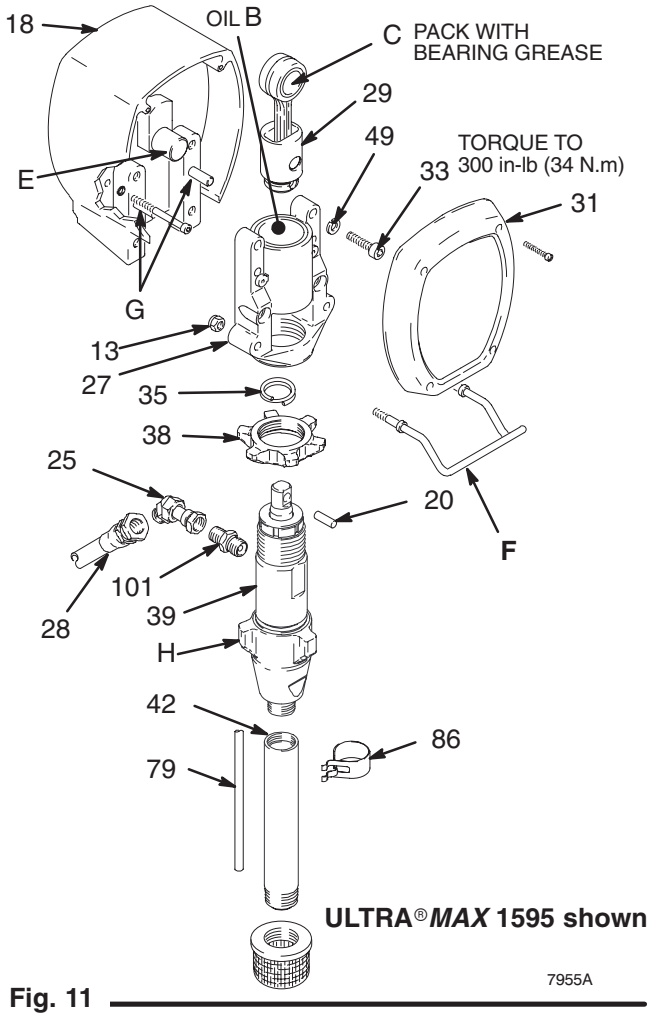


Fig. 11

Drive Housing Replacement

⚠ CAUTION

DO NOT drop gear cluster (9) when removing drive housing (18). Gear cluster may stay engaged in the motor front end bell or the drive housing.

DO NOT lose thrust balls (10) located at each end of gear cluster (9) or drop them between gears. The balls, which are heavily covered with grease, usually stay in the shaft recesses, but could be dislodged. If caught between gears and not removed, the balls will seriously damage drive housing. If the balls are not in place, the bearings will wear prematurely.

NOTE: Read **General Repair Information** on page 4 before doing this procedure. See Fig. 12.

1.  Relieve pressure**;** page 4.

2. Remove front cover (31) and motor shield (14). Unclip drain hose (79) from pump.

3. Remove four bearing housing screws (33) and lockwashers (49).

4. Lightly tap lower rear of bearing housing (27) with a plastic mallet to loosen it from drive housing (18). Pull assembled bearing housing and connecting rod straight off drive housing.

5. Remove two drive housing screws (51) and lockwashers (63).

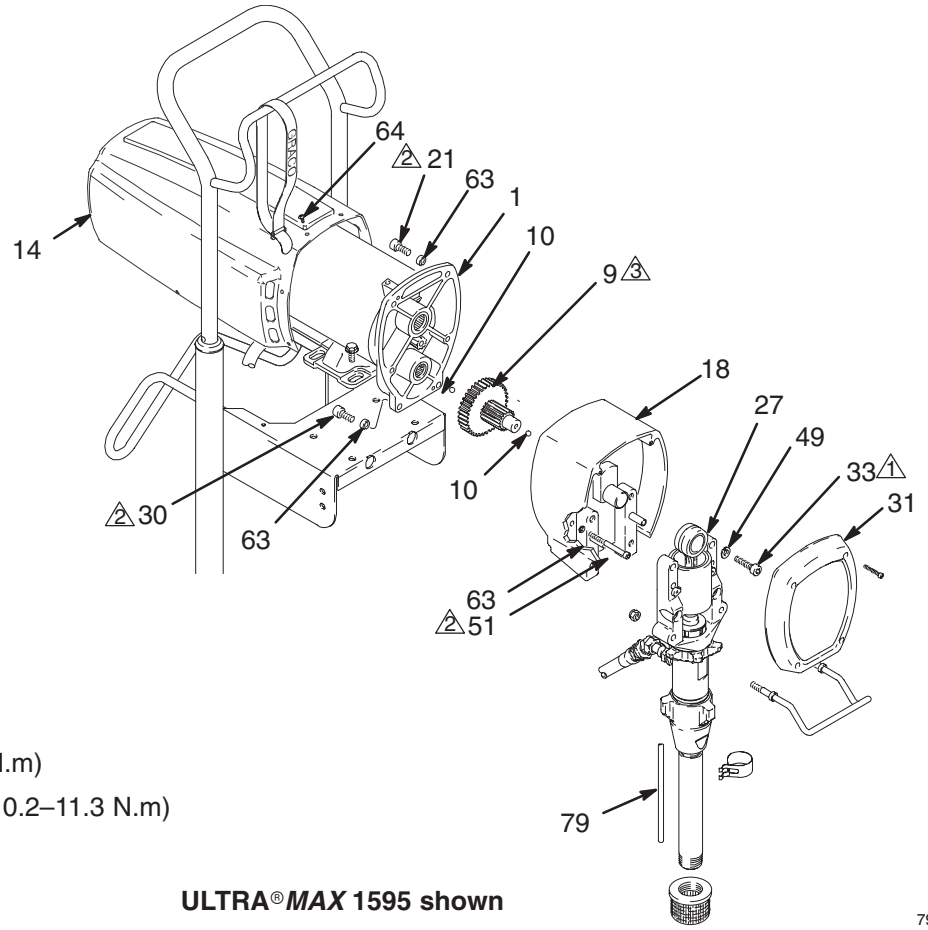
6. Remove two lower screws (30) and lockwashers (63) and then two upper screws (21) and lockwashers (63) from front of motor (1).

7. Tap drive housing (18) with a plastic mallet to loosen it from front of motor (1), and then pull drive housing straight off.

8. Liberally apply approximately 4 ounces of bearing grease to gear cluster (9). Grease is supplied with drive housing replacement kit. Be sure thrust balls (10) are in place.

9. Align gears and push new drive housing straight onto front of motor and locating pins.

10. Continue reassembling sprayer.



1 Torque to 300 in-lb (34 N.m)
2 Torque to 90–100 in-lb (10.2–11.3 N.m)
3 Liberally apply grease

ULTRA®*MAX* 1595 shown

7956A

Fig. 12

Displacement Pump Repair

Removing pump

1. Flush pump. Relieve pressure. Fig. 13. Cycle pump with piston rod (A) in its lowest position.
2. Fig. 13. Unscrew suction tube and hose from pump.

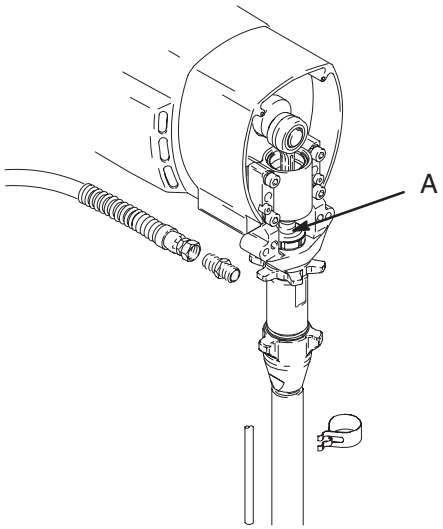


Fig. 13

3. Fig. 14. Use screwdriver to push retaining spring (35) up and pin (20) out.

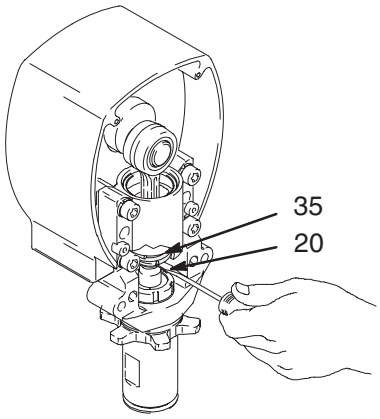


Fig. 14

4. Fig. 15. Loosen locknut by hitting firmly with a 20 oz (maximum) hammer. Unscrew pump.

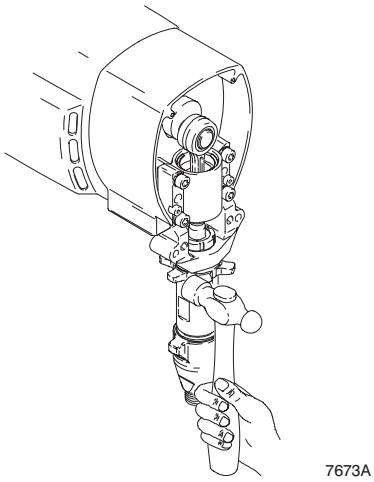


Fig. 15

Repairing Pump

See manual 308798 for pump repair instructions.

Displacement Pump Repair

Installing pump

⚠ WARNING

If the pin works loose, it or other parts could break off due to the force of the pumping action. These parts could be projected through the air and result in serious bodily injury or property damage, including damage to the pump, connecting rod or bearing housing.

⚠ CAUTION

If the pump locknut loosens during operation, the threads of the bearing housing will be damaged.

1. Fig. 16. Pull piston rod out 1.5 in. Screw in pump until holes in bearing cross link and piston rod align.

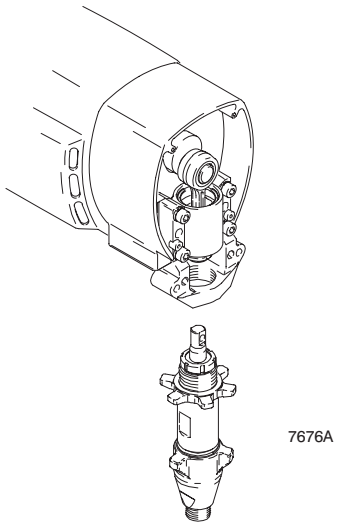


Fig. 16

2. Fig. 17. Push pin (20) into holes.

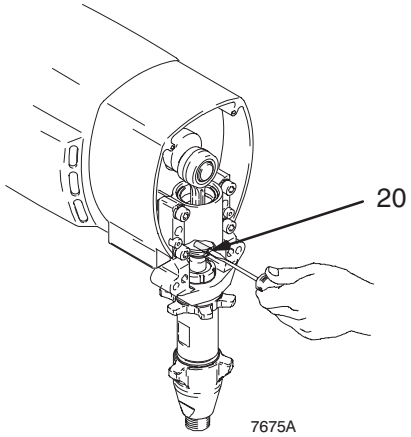


Fig. 17

3. Fig. 18. Push retaining spring (35) into groove all the way around connecting rod.

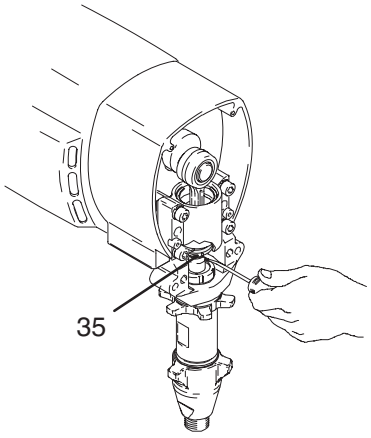


Fig. 18

Fig. 19. Screw jam nut down onto pump until stops. Screw pump up into bearing housing until it is stopped by jam nut. Back off pump and jam nut to align pump outlet to back. Tighten jam nut by hand, then tap 1/8 to 1/4 turn with a 20 oz (maximum) hammer to approximately 75 ± 5 ft–lb (102 N·m).

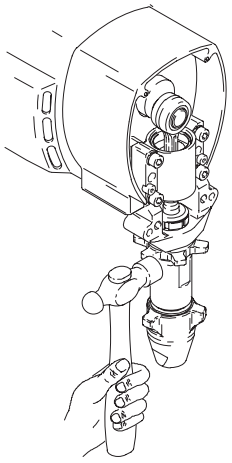


Fig. 19

Fig. 20. Fill packing nut with Graco TSL, through one of the slits, until fluid flows onto the top of seal.

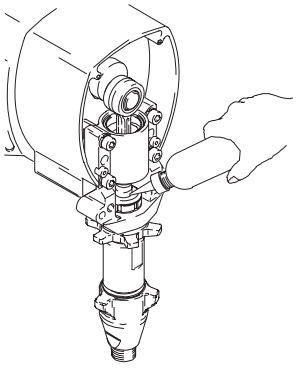
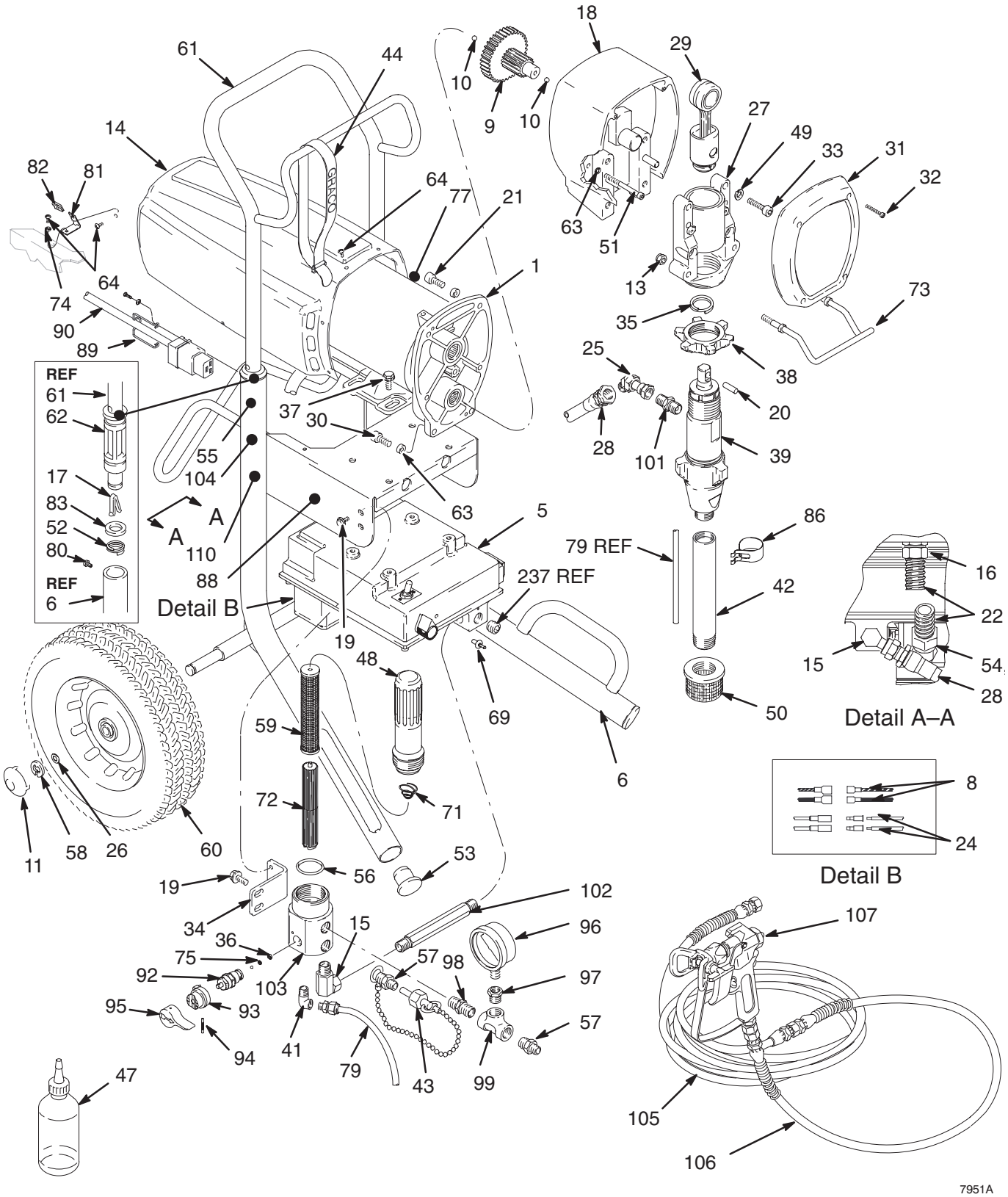


Fig. 20

Parts Drawing – Sprayer

Models 232160 through 232164, 232166, Series A



Parts List – Sprayer

Models 232160 through 232164, 232166, Series A

REF NO.	PART NO.	DESCRIPTION	QTY
1		**MOTOR, ELECTRIC**	**1**
		includes 41 and 73a	
	235726*	**Model 232164**	**1**
	220854*	**Models 232160 thru 232163**	**1**
5		**PRESSURE CONTROL**	**1**
		see parts list on page 23	
	239429	**Model 232164**	**1**
	239750	**Models 232160 thru 232163**	**1**
6	240143	FRAME, cart	1
8	107266	TERMINAL	2
9	**220637**	**GEAR REDUCER**	**1**
10	100069	BALL	2
11	104811	CAP, hub	2
13	112746	LOCKNUT, 5/16 –18	2
14	**240483**	**SHIELD, motor** (includes label 77)	**1**
15	155494	UNION, swivel, 90°	2
16	110138	CONNECTOR, conduct	1
17	112827	BUTTON, snap	2
18	**220879**	**DRIVE HOUSING**	**1**
19	114402	SCREW, hex hd, flanged	4
20	183210	PIN, straight, hdls	1
21	100644	SCREW, cap	2
22	065312	TUBING, electrical, flexible, 5.5 in.	1
24	107264	TERMINAL	2
25	161889	UNION, swivel	1
26	154636	WASHER	2
27	**240701**	**BEARING HOUSING**	**1**
28	240246	HOSE, coupled, 1/4in. by 20 in.	1
29	**220640**	**ROD CONNECTING KIT**	**1**
30	100643	SCREW, cap	2
31	188423	COVER, housing	1
32	108850	SCREW, mach, filh	4
33	110141	SCREW, cap, sch	4
34	193081	BRACKET, manifold, filter	1
35	183169	SPRING, retaining	1
36	111699	GASKET, seat, valve	1
37	110963	SCREW, flange, hex hd	4
38	193031	NUT, retaining	1
39	**240291**	**KIT, pump, displacement**	**1**
		manual 308798	
41	112538	ELBOW, 90°, street, reducing	1
42	193097	TUBE, suction	1
43		PLUG, packless	
	240131	Models 232160 thru 232164, 1/4 in.	1
	240987	Model 232166, 3/8 in.	1
44	114271	STRAP, retaining	1
47	206994	THROAT SEAL LIQUID, 8 OZ	1
48	240315	BOWL, filter	1
49	106115	WASHER, lock, spring	4
50	**181072**	**STRAINER, inlet**	**1**
51	108849	SCREW, cap, sch	2
52	110243	RING, retaining	2
53	108691	PLUG, tubing	2
54	108460	CONNECTOR, conduit, 45°	1
55▲		LABEL, caution	1
	192839	English	1
	193521	Japanese	1
56	104361	PACKING, o–ring	1
57		ADAPTER	
	164672	Models 232160 thru 232164, 3/8 npt x 1/4 npsm	2
	162485	Model 232166, 3/8 npt x 3/8 npsm	2
58	101242	RING, retaining, ext.	2
59	167025	STRAINER, 60 mesh	1
60	179811	WHEEL, semi–pneumatic	2
61	240136	HANDLE, cart	1
62	192027	SLEEVE, cart	2
63	105510	WASHER, lock, spring	6
64	108865	SCREW, machine, pan hd	10
69	111482	RIVET, snap	1
71	171941	SPRING, compression	1
72	186075	SUPPORT, filter	1
73	192719	HANGER, pail	1
74	100020	CONNECTOR, tube, female	2
75	187615	VALVE, seat	1
77▲		LABEL, DANGER	1
	187791	English	1
	189702	Japanese	1
79	240144	HOSE, drain	1
80	109032	SCREW, machine, pan hd	4
81	185384	BRACKET	2
82	110240	NUT, self–retaining	2
83	183350	WASHER	2
85	107447	SEAL, conduit	2
86	192691	CLIP, spring	1
87▲	290447	LABEL, warning	3
		(on brush covers–not shown)	
88▲†	187784	LABEL, danger, French	1
89	192149	RETAINER, plug	1
90		CORD SET	1
	240539	European	1
	240540	Italy	1
	240541	Denmark	1
	240542	Switzerland	1
	240543	Bare end, European	1
	240247	Japan	1
92	235014	DRAIN VALVE ASSEMBLY	1
93	224807	CAM, drain valve	1
94	111600	PIN, grooved	1
95	187625	HANDLE, valve, drain	1
96	102814	GAUGE, pressure, fluid	1
97	100176	BUSHING, hex	1
98	156849	NIPPLE, pipe	1
99	100483	TEE, pipe	1
101	162485	NIPPLE, adapter	1
102	193024	NIPPLE, hex	1
103	240700	HOUSING KIT, filter (includes item 56)	1
104†	192839	LABEL, warning, French	1
105†	238361	HOSE, grounded, nylon, 1/4" ID, cpld 1/4 npsm(f), 50 ft (15m) spring guards both ends	1
106†	238358	HOSE, grounded, nylon, 3/16" ID, cpld 1/4 npsm(f), 3 ft (.9 m) spring guards both ends	1
107†	**222667**	**GUN, contractor, basic**	**1**
		manual 307614	
108	221621	TIP, spray, cylinder (not shown)	1
		manual 308644	
109	237859	GUARD, rac (not shown)	1
110		LABEL, WARNING	1
	187975	English	1
	193520	Japanese	1

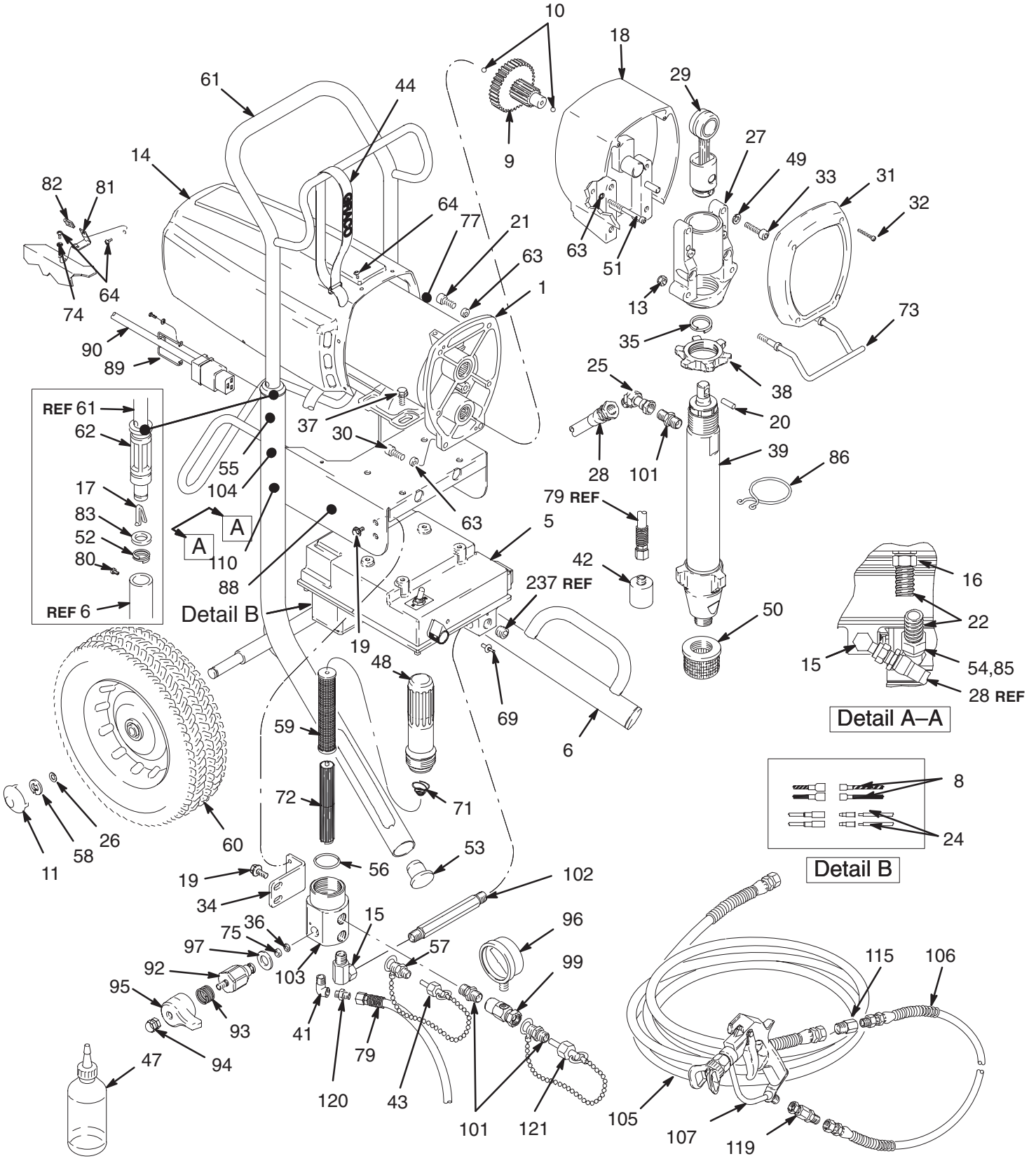
▲*Extra Danger and Warning tags and labels available free.*

**Motor Brush Repair Kit is available:*
Model 232164; order 222157
Models 232160 thru 232163, 232166; order 220853

†Models 232160 and 232162 have items 88 & 104, but not 105 thru 107. Model 232166 does not nave any of these items.

Parts Drawing – Sprayer

Models 232171, 232173; Series A



Parts List – Sprayer

Models 232171, 232173; Series A

REF NO.	PART NO.	DESCRIPTION	QTY
1		**MOTOR, ELECTRIC**	**1**
		includes 41 and 73a	
	235726*	**Model 232173**	**1**
	220854*	**Model 232171**	**1**
5		**PRESSURE CONTROL**	**1**
		see parts list on page 23	
	239429	**Model 232173**	**1**
	239750	**Model 232171**	**1**
6	240143	FRAME, cart	1
8	107266	TERMINAL	2
9	**220637**	**GEAR REDUCER**	**1**
10	100069	BALL	2
11	104811	CAP, hub	2
13	112746	LOCKNUT, 5/16 –18	2
14	**240483**	**SHIELD, motor** (includes label 77)	**1**
15	155494	UNION, swivel, 90°	2
16	110138	CONNECTOR, conduct	1
17	112827	BUTTON, snap	2
18	**220879**	**DRIVE HOUSING**	**1**
19	114402	SCREW, hex hd, flanged	4
20	183210	PIN, straight, hdls	1
21	100644	SCREW, cap	2
22	065312	TUBING, electrical, flexible, 5.5 in.	1
24	107264	TERMINAL	2
25	161889	UNION, swivel	1
26	154636	WASHER	2
27	**240701**	**BEARING HOUSING**	**1**
28	240246	HOSE, coupled, 1/4in. by 20 in.	1
29	**220640**	**ROD CONNECTING KIT**	**1**
30	100643	SCREW, cap	2
31	188423	COVER, housing	1
32	108850	SCREW, mach, filh	4
33	110141	SCREW, cap, sch	4
34	193081	BRACKET, manifold, filter	1
35	183169	SPRING, retaining	1
36	193710	SEAL, valve	1
37	110963	SCREW, flange, hex hd	4
38	193031	NUT, retaining	1
39	**240800**	**KIT, pump, displacement manual 308798**	**1**
41	100840	ELBOW, 90°	1
42	241717	DEFLECTOR	1
43	240131	PLUG, packless	1
44	114271	STRAP, retaining	1
47	206994	THROAT SEAL LIQUID, 8 OZ	1
48	240315	BOWL, filter, includes 71	1
49	106115	WASHER, lock, spring	4
50	**189920**	**STRAINER, inlet**	**1**
51	108849	SCREW, cap, sch	2
52	110243	RING, retaining	2
53	108691	PLUG, tubing	2
54	108460	CONNECTOR, conduit, 45°	1
55▲		LABEL, caution	1
	192839	English	1
	193521	Japanese	1
56	104361	PACKING, o–ring	1
57	164672	ADAPTER	1
58	101242	RING, retaining, ext.	2
59	167025	STRAINER, 60 mesh	1
60	179811	WHEEL, semi–pneumatic	2
61	240136	HANDLE, cart	1
62	192027	SLEEVE, cart	2
63	105510	WASHER, lock, spring	6
64	108865	SCREW, machine, pan hd	10
69	111482	RIVET, snap	1
71	171941	SPRING, compression	1
72	186075	SUPPORT, filter	1
73	192719	HANGER, pail	1
74	100020	WASHER, lock	2
75	193709	VALVE, seat	1
77▲		LABEL, DANGER	1
	187791	English	1
	189702	Japanese	1
79	194178	HOSE, drain	1
80	109032	SCREW, machine, pan hd	4
81	185384	BRACKET	2
82	110240	NUT, self–retaining	2
83	183350	WASHER	2
85	107447	SEAL, conduit	2
86	194525	CLIP, spring	1
87▲	290447	LABEL, warning	3
		(on brush covers–not shown)	
88▲†	187784	LABEL, danger, French	1
89	114426	RETAINER, plug	1
90		CORD SET	1
	114514	USA Models 232160, 232161, 232171	1
	114515	CSA Models 232162, 232163	1
	240539	European	1
	240540	Italy	1
	240541	Denmark	1
	240542	Switzerland	1
	240543	Bare end, European	1
92††	240914	DRAIN VALVE ASSEMBLY	1
93	114708	SPRING	1
94	114688	NUT, capped	1
95	194102	HANDLE, valve, drain	1
96	102814	GAUGE, pressure, fluid	1
97	114797	GASKET	1
98	156849	NIPPLE, pipe	1
99	237475	SWIVEL, union	1
101	162485	NIPPLE, adapter	3
102	193024	NIPPLE, hex	1
103	194497	HOUSING, filter	1
104†	192839	LABEL, warning, French	1
105†	240797	HOSE, grounded, 3/8 in. x 50 ft (15m) spring guards both ends	1
106†	241735	HOSE, grounded, 1/4 x 3 ft (.9 m) spring guards both ends	1
107†	**241338**	**GUN, texture; includes 105 and 106 manual 308491**	**1**
110		LABEL, WARNING	1
	187975	English	1
	193520	Japanese	1
111▲	195119	LABEL, warning	1
		(on drain hose–not shown)	
115	159841	ADAPTER, 1/4 npt(f) x 3/8 npt(m)	1
119	224457	SWIVEL, straight	1
120	156971	NIPPLE	1
121	240987	PLUG, packless, 3/8	1

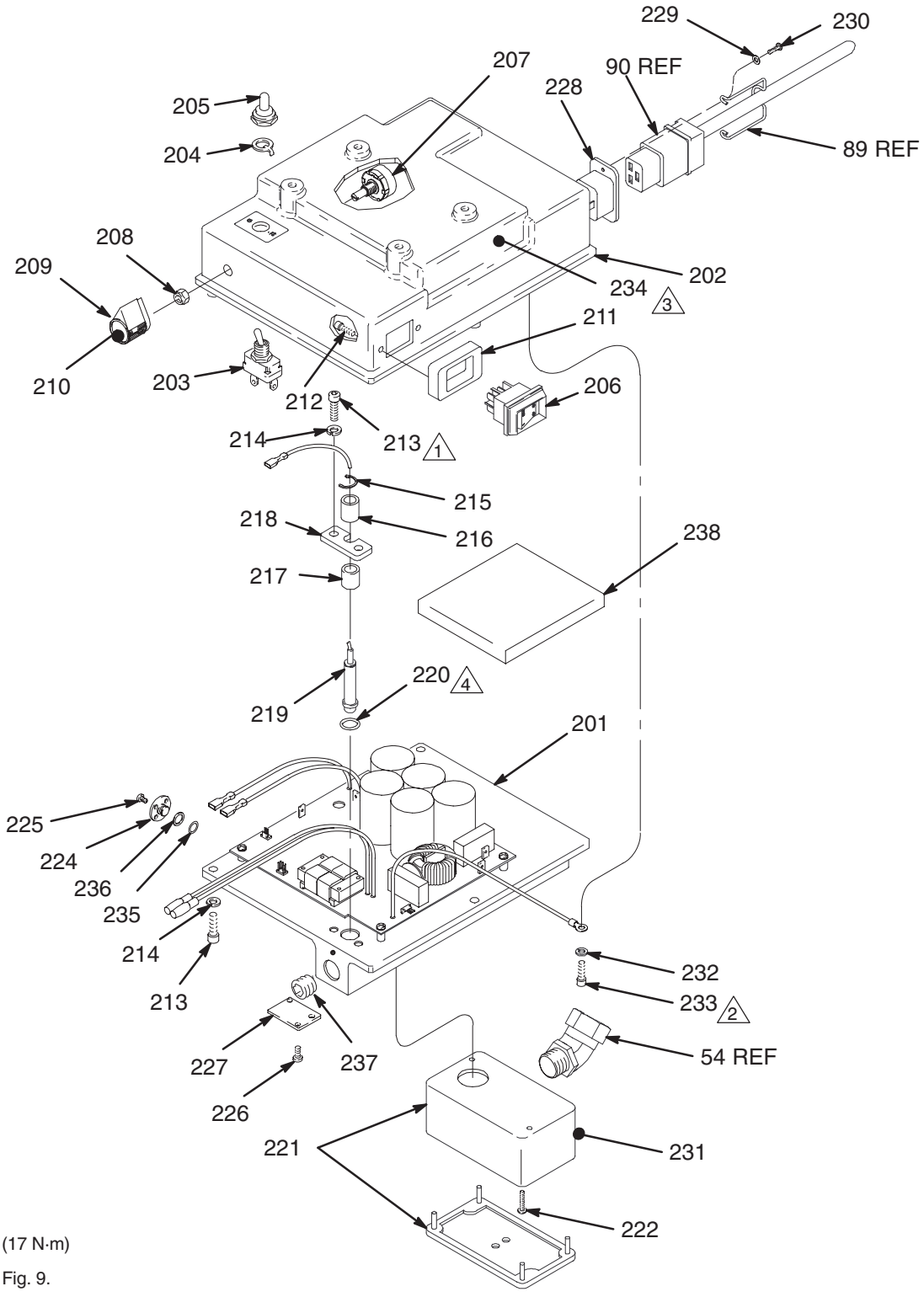
▲ *Extra Danger and Warning tags and labels available free.*

** Motor Brush Repair Kit is available:*
Model, 232173; order 222157
Model 232171; order 220853

† Models 232171, 232173 have items, 105 thru 107.

†† Drain valve replacement kit 241276 is available

Pressure Control Drawing



1 Torque to 150 in–lb (17 N·m)

2 To housing ground, Fig. 9.

3 Located this point, inside housing

4 WARNING! See Pressure Control Transducer and O–Ring Replacement on page 10 for correct replacement procedure.

7202D

Fig 21

Pressure Control Parts List

Part Number 239750 or 239429

Ref No.	Part No.	Description	Qty
		PRESSURE CONTROL	1
		See Ref. No. 5 on page 21 for location	
	239750	Models 232160 through 232163, 232166	1
	239429	Model 232164	1
201		**MOTOR CONTROL BOARD**	**1**
	239283	**Model 232164**	**1**
	239751	**Models 232160 thru 232163, 166**	**1**
202		**CONTROL HOUSING**	**1**
	238976	**Model 232164**	**1**
	239442	**Models 232160 thru 232163, 166**	**1**
203	111930	. SWITCH, toggle (10/12 or 15/20)	1
204	105658	. RING, locking	1
205	105659	. BOOT, toggle	1
206	111961	. SWITCH, rocker (on/off)	1
207	236352	. POTENTIOMETER (pressure adjust)	1
208	112382	. NUT, shaft sealing	1
209	114273	. KNOB, control	1
210	193072	. LABEL, control knob	1
211	192226	. SPACER, switch	1
212	112788	. SCREW, cap hd	2
213	100644	SCREW, cap	5
214	100016	WASHER, lock	5
215	114031	CLIP, cee	1
216	192223	SPACER, transducer	1
217	192144	SPACER, transducer	1
218	192145	BRACKET, transducer	1
219	236364	TRANSDUCER, pressure control	1
220	104319	O-RING *See O-Ring Replacement page 10*	1
221	192050	ELECTRICAL ENCLOSURE KIT	1
222	M71503	SCREW	2
224†	192142	PLUG	1
225†	104836	SCREW	4
226†	110637	SCREW	2
227†	192155	COVER	1
228	113799	INLET, ac power	1
229	114027	WASHER, flat	2
230	111714	SCREW, machine, phillips, pan hd	2
231▲	189930	LABEL, caution	1
232	157021	WASHER, lock, internal	1
233	111593	SCREW, grounding	1
234	186620	LABEL, ground	1
235†	111710	O-RING	1
236†	111711	RING, backup	1
237	101754	PLUG, pipe	1
238	192212	PAD, foam	1
323*	235009	SWITCH TRANSDUCER (not shown)	1
324*	192150	BLOCK, transducer (not shown)	1
325*	108850	SCREW, machine, fil hd (not shown)	4
326*	111704	SCREW, machine, fil hd (not shown)	2
327*	239530	SWITCH (not shown)	1

▲ *Replacement Danger and Warning labels, tags and cards are available at no cost.*

† *These parts are included on all sprayers as shipped, but not on replacement pressure control 239576.*

** These parts are included with replacement pressure control 239576, but are not on all sprayers as shipped.*

Technical Data

Power Requirements
- Models 232164 and 232173 . . . . . 230 VAC, 50 Hz, 1 phase, 12A min or 5000W generator
- Models 232160 thru 163, 232171 . . . . . 120 VAC, 60 Hz, 1 phase, 15A min or 5000W generator
- Model 232166 . . . . . 100 VAC, 50/60 Hz, 1 phase, 15A min or 5000W generator

Motor . . . . . 1.6 HP with latex at 138 bar (13.8 MPa, 2000 psi)
Working Pressure Range 0–210 bar (0–21 MPa, 0–3000 psi)
Cycles/Gallon (liter) 118 (31)
Maximum Delivery Rating . . . . . 1.25 gpm (4.75 lpm)
Tip Size: one gun – 0.035; two guns – 0.025; three guns – 0.019 with latex at 138 bar (13.8 MPa, 2000 psi)
Power Cord
- Model 232164. 232173 . . . . . 1.5 mm^2 by 4.5 m, 3 wire
- Models 232160 – 163, 166, 171 . 2.0 mm^2 by 4.5 m, 3 wire

Inlet Paint Strainer . . . . . 16 mesh (975 micron) stainless steel screen, reusable
Outlet Paint Filter . . . . . 60 mesh (238 micron) stainless steel screen, reusable
Pump Inlet Size . . . . . 3/4 npt(m)
Fluid Outlet Size
- Filter . . . . . 3/8 npt(f)
- Filter with standard 3/8 npt(f) to 1/4 npsm adapter 1/4 npsm

Sound Data
- Sound pressure level at one meter . . . . . 85.3 db(A)
- Sound power level . . . . . 95.2 db(A)
- Measured under maximum operating conditions per ISO–3744

Basic Sprayer Wetted Parts: . . . . . zinc-plated carbon steel, polyurethane, polyethylene, stainless steel, PTFE, Delrin®, chrome plating, leather, V-Max™ UHMWPE, aluminum, stainless steel, tungsten carbide

NOTE: Delrin®

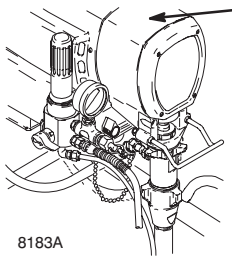
Dimensions

Weight (dry w/o packaging) . . . . . 140 lb (63.5 kg)
Height . . . . . 30.5 in. (775 mm)
Length . . . . . 25.5 in. (648 mm)
Width . . . . . 22.5 in. (572 mm)

Accessories

DANGER LABELS

An English language DANGER label is on your sprayer. If you have painters who do not read English, order one of the following labels to apply to your sprayer. Order labels from your Graco distributor.



French	187784
Spanish	185962
German	186042
Greek	186046
Korean	186050

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.

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.

GRACO MAKES NO WARRANTY, AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, IN CONNECTION WITH ACCESSORIES, EQUIPMENT, MATERIALS OR COMPONENTS SOLD BUT NOT MANUFACTURED BY GRACO. These items sold, but not manufactured by Graco (such as electric motors, switches, hose, etc.), are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

In no event will Graco be liable for indirect, incidental, special or consequential damages resulting from Graco supplying equipment hereunder, or the furnishing, performance, or use of any products or other goods sold hereto, whether due to a breach of contract, breach of warranty, the negligence of Graco, or otherwise.

FOR GRACO CANADA CUSTOMERS

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ADDITIONAL WARRANTY COVERAGE

Graco does provide extended warranty and wear warranty for products described in the "Graco Contractor Equipment Warranty Program".

Graco Phone Number

TO PLACE AN ORDER, contact your Graco distributor, or call this number to identify the distributor closest to you: **1–800–690–2894 Toll Free.**

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Foreign Offices: Belgium, Korea, Hong Kong, Japan

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