Instructions–Parts List

8.5:1 RATIO STAINLESS STEEL

Dyna-Mite™ 190 Pump

308302K
ENG

Used for precision dispense of viscous materials from small containers. For professional use only.

Not approved for use in European explosive atmosphere locations.

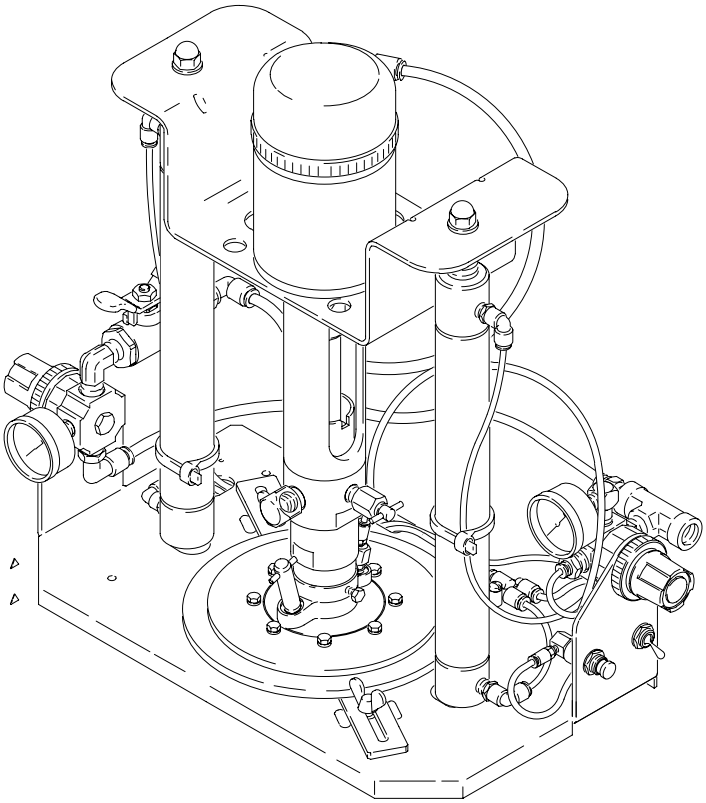
6.0 MPa, 60 bar (850 psi) Maximum Fluid Working Pressure
0.7 MPa, 7 bar (100 psi) Maximum Air Inlet Pressure

Part No. 235870, Series C
Does not include Pump and Ram

Part No. 235871, Series C CE
Includes Pump and Ram

Wiper Plates (order separately)
Model 224908, Series A
3 kilogram (1 gallon) size

Model 224923, Series B
1 kilogram (1 quart) size



Important Safety Instructions
Read all warnings and instructions in this manual.
Save these instructions.

HO03

PROVEN QUALITY. LEADING TECHNOLOGY.

Table of Contents

⚠ WARNING

INSTRUCTIONS

EQUIPMENT MISUSE HAZARD

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

- This equipment is for professional use only.
- Read all instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are uncertain about usage, call your Graco distributor.
- Do not alter or modify this equipment. Use only genuine Graco parts and accessories.
- Check equipment daily. Repair or replace worn or damaged parts immediately.
- Do not exceed the maximum working pressure of the lowest rated system component. Refer to the **Technical Data** on page 26 for the maximum working pressure of this equipment.
- Use fluids and solvents which are compatible with the equipment wetted parts. Refer to the **Technical Data** section of all equipment manuals. Read the fluid and solvent manufacturer's warnings.
- Do not exceed the maximum working pressure of the lowest rated system component. This equipment has a **6.0 MPa, 60 bar (850 psi) maximum working pressure.**
- Do not use hoses to pull equipment.
- Route hoses away from traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 82°C (180°F) or below –40°C (–40°F).
- Wear hearing protection when operating this equipment.
- Do not lift pressurized equipment.
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.

⚠ WARNING

PRESSURIZED EQUIPMENT HAZARD

Spray from the gun/valve, hose leaks, or ruptured components can splash fluid in the eyes or on the skin can also cause serious injury.

- Do not point the gun/valve at anyone or at any part of the body.
- Do not stop or deflect leaks with your hand, body, glove or rag.
- Follow the **Pressure Relief Procedure** on page 10 whenever you: are instructed to relieve pressure; stop dispensing; clean, check, or service the equipment; and install or clean the nozzle.
- Tighten all fluid connections before operating the equipment.
- Check the hoses, tubes, and couplings daily. Replace worn, damaged, or loose parts immediately. Permanently coupled hoses cannot be repaired; replace the entire hose.

MOVING PARTS HAZARD

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

- Keep clear of all moving parts when starting or operating the pump.
- Before servicing the equipment, follow the **Pressure Relief Procedure** on page 10 to prevent the equipment from starting unexpectedly.
- Keep hands and fingers away from the priming piston during operation and whenever the pump is charged with air.
- Keep your hands away from the wiper plate and the lip of the fluid container while the ram is operating.
- Do not place your fingers into the air motor coupling cavity while the pump is operating.
- Do not shut off the air supply to the ram while it is being raised. Doing so will cause the pump to fall uncontrolled to the bottom.

⚠ WARNING

FIRE AND EXPLOSION HAZARD

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

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

TOXIC FLUID HAZARD

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

- Know the specific hazards of the fluid you are using.
- Store hazardous fluid in an approved container. Dispose of hazardous fluid according to all local, state and national guidelines.
- Always wear protective eyewear, gloves, clothing and respirator as recommended by the fluid and solvent manufacturer.

Installation

Grounding

⚠ WARNING

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

To reduce the risk of static sparking, ground the pump. Check your local electrical code for detailed grounding instructions for your area and type of equipment. Be sure to ground all of this dispensing equipment.

1. *Pump*: unscrew the green grounding screw (W) and washer (X), located on the ram base (Z). Install a 1.5 mm^2 (12 ga) minimum ground wire (Y) and secure with the screw and washer. Connect the other end of the ground wire to a true earth ground. See Fig. 1.

2. *Fluid hoses:* use only grounded fluid hoses.

3. *Dispensing valve:* obtain grounding through connection to a properly grounded fluid hose and pump.

4. *Fluid supply container:* obtain grounding by securing the container to the ram base with the clamps.

5. *Air compressor:* according to local code.

6. *To maintain grounding continuity when flushing or relieving pressure,* always hold a metal part of the dispense valve firmly to the side of a grounded metal pail, ten trigger the valve.

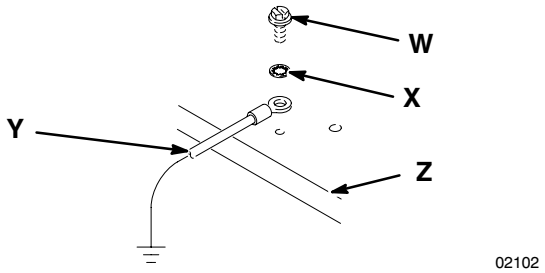


Fig. 1

Installation

NOTE: Reference numbers and letters in parentheses in the text refer to the callouts in the figures and the Parts Drawing.

If you supply your own accessories, be sure they are adequately sized and pressure-rated to meet the system's requirements.

Contact your Graco distributor for assistance in designing a system to suit your particular needs.

Pump Location and Set-Up

1. Place the unit on a hard, level surface. Check that the unit is level in all directions. Refer to **Dimensions** on page 28 to ensure that there is sufficient overhead clearance for the pump when the ram is fully raised. Leave room on both sides so the air regulators will be easily accessible.

2. Read the section **System Components and Accessories** on page 9. Connect an air supply hose to the 1/4 npt(f) main air inlet fitting (57). See Fig. 2.

3. Unpack the wiper plate (P). Back out the screws (302) so they will clear the pump intake housing (11). Raise the ram by setting the ram director valve switch (36) to the UP position and increasing the setting of the ram air regulator (27b).

4. Place the wiper plate (P) on a 2 in. thick x 4 in. wide block of wood. Center the wiper plate and the wood block on the base, under the pump intake housing (11).

5. Set the ram air regulator (27b) to zero. Set the ram director valve switch (36) to the DOWN position. As the ram unit slowly falls, guide the pump intake housing (11) into the wiper plate (P).

6. Set the ram air regulator (27b) to 0.07 MPa, 0.7 bar (10 psi). Push down on the pump to install the wiper plate (P) onto the intake housing (11). Secure the wiper plate to the pump with the two screws (302).

7. Connect the 660 mm (26 in.) air line tube (76) from the connector (37) at the air assist valve (18) to the connector (310) at the wiper plate (P). Refer to **Connecting and Disconnecting Tubes**.

Connecting and Disconnecting Tubes

Connection

1. Grasp the tube, then slowly push it straight into the fitting until it stops.

2. Be sure that the tube is securely connected, and will not pull out when air pressure is applied. To check, pull back gently on the tube to ensure that it will not pull out.

Disconnection

⚠ WARNING

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

1. **Relieve the pressure.**

2. Push evenly on the fitting's red release button.

3. While holding the release button in, pull the tube out of the fitting.

4. To reuse the tubing, cut off the previously connection portion at 90°, being careful not to damage the outer diameter of the tube. Use of a tube cutter is recommended. The fitting will leak if the tubing is not cut at 90°.

Installation

KEY

P	Wiper Plate Assembly
1	Pump
8	Bleed-Type Master Air Valve
11	Pump Fluid Intake Housing
18	Air Assist Valve (Push button)
25	Pump Bleeder Valve
27a	Pump Air Regulator
27b	Ram Air Regulator
28	Fluid Outlet Fitting
37	Air Assist Valve Connector
57	Air Inlet
76	Air Line to Wiper Plate
302	Capscrews
310	Wiper Plate Connector

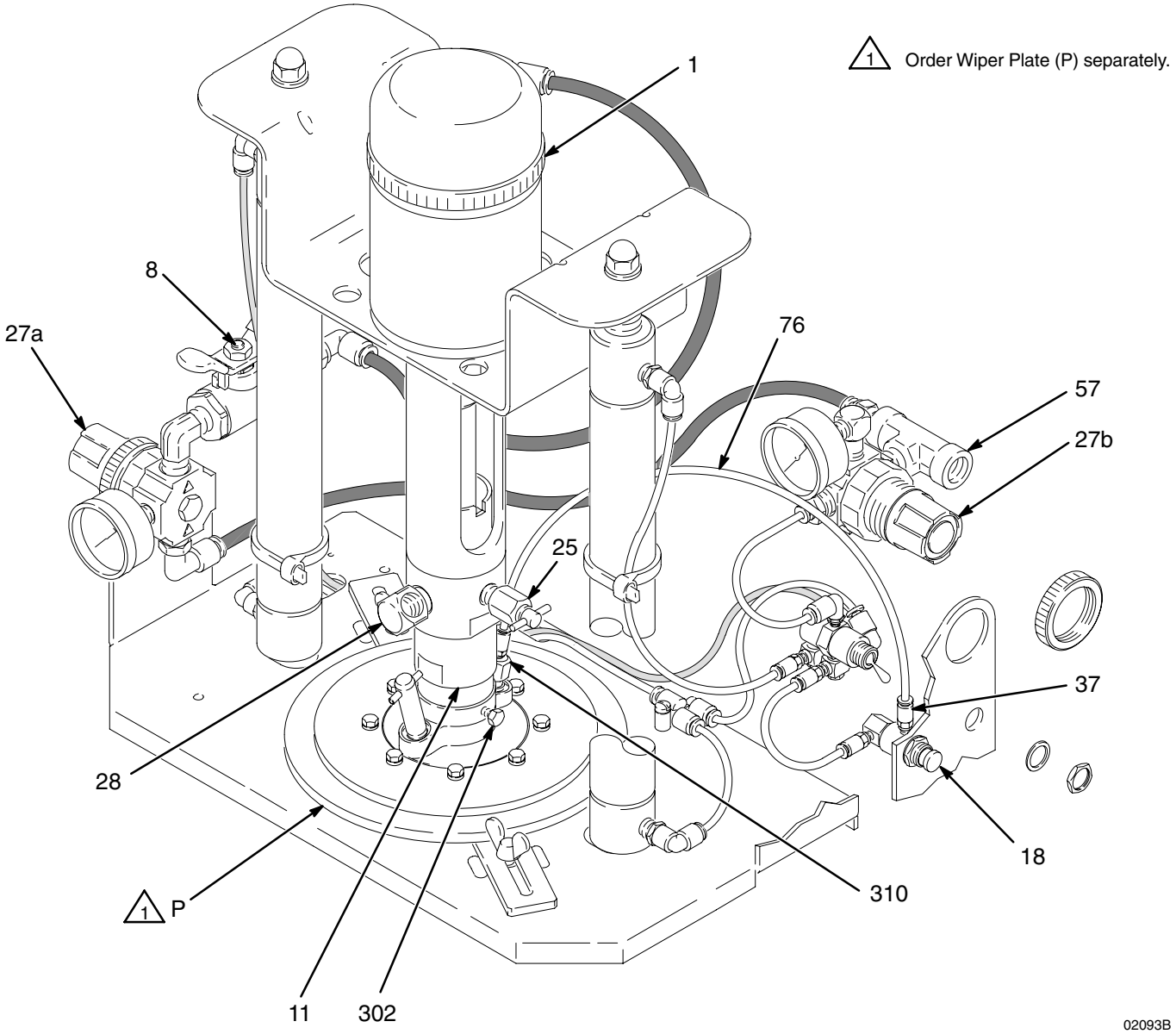


Fig. 2

Notes

Installation

System Accessories (See Fig. 2)

⚠ WARNING

Two required safety devices are supplied with your pump: a bleed-type master air valve (8) and a pump bleeder valve (25). These devices help reduce the risk of serious injury, including splashing in the eyes or on the skin, and injury from moving parts if you are adjusting or repairing the pump.

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

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

Supplied Components

The following components are supplied with your pump.

- **The bleed-type master air valve (8)** is supplied with your system to relieve air trapped between it and the air motor when the valve is closed (see the **WARNING** above).
- **The pump air regulator (27a)** controls pump speed and outlet pressure by adjusting the air pressure to the pump. The regulator is located upstream from the bleed-type master air valve.
- **The ram air regulator (27b)** controls ram speed by adjusting the air pressure to the ram, and also controls the pressure exerted by the wiper plate on the fluid.
- **The pump bleeder valve (25)** is supplied in your system to relieve fluid pressure in the displacement pump, hose, and dispensing valve (see the **WARNING** at left). Be sure the drain hole in the valve is pointing down. This valve is also used to bleed air from the pump when priming.

Air Line

Connect an air supply hose to the 1/4 npt(f) main air inlet fitting (57). Install an air line filter and lubricator in the main air line. In the main air line, upstream from all other air line accessories, install a second bleed-type master air valve to shut off all air to the system and to isolate the accessories for servicing.

Fluid Line

Connect a fluid hose to the fluid outlet fitting (28). Connect a suitable dispensing valve to the free end of the hose.

Operation

Pressure Relief Procedure

⚠ WARNING

PRESSURIZED EQUIPMENT HAZARD
The system pressure must be manually relieved to prevent the system from starting or spraying accidentally. To reduce the risk of an injury from accidental spray from the gun, splashing fluid, or moving parts, follow the **Pressure Relief Procedure** whenever you:

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

1. Shut off the dispensing valve.
2. Shut off the bleed-type master air valve (required in your system), on the main air line.
3. Close the bleed-type master air valve (supplied with your pump).
4. Trigger the dispensing valve to relieve pressure.

If you suspect that the dispensing valve, nozzle, or hose is completely clogged, or that pressure has not been fully relieved after following the steps above, very slowly open the pump bleeder valve, having a container ready to catch the drainage. Leave the pump bleeder valve open until you are ready to dispense again. Very slowly loosen the hose end coupling and relieve pressure gradually, then loosen completely. Now clear the nozzle or hose.

⚠ WARNING

Keep hands and fingers away from the priming piston and pump intake during operation and whenever the pump is charged with air. During operation, the priming piston extends beyond the intake housing to pull material into the pump, and can severely injure or amputate a hand or finger caught between it and the intake housing. Always follow the **Pressure Relief Procedure** at left before clearing, cleaning, flushing, or servicing any part of the pump.

The air motor piston and fluid piston (located inside the air motor cylinder and coupling) also move when air is supplied to the motor. Do not place your hand or fingers into the air motor coupling cavity while the pump is operating.

As the ram is raised and lowered, the wiper plate, ram tubes, and pump mounting bracket move. To reduce the risk of pinching or amputation of fingers, keep you hands away from the wiper plate, lip of the fluid can, pump bracket, and ram tubes while the pump is operating.

To reduce the risk of serious injury and damage to equipment, do not shut off the air supply to the ram when the ram is raised. Doing so will cause the pump to fall uncontrolled to the bottom.

Operation

Starting and Adjusting the Ram

1. Refer to Fig. 3. Be sure all air regulators and bleed-type air valves are closed.

2. Open the air valve in the main air line and set the ram air regulator (27b) to 200 kPa, 2 bar (28 psi). Set the ram director valve switch (36) to the UP position and let the ram rise to its full height. To change the speed at which the ram raises and lowers, adjust the air regulator to increase or decrease the air volume.

3. Check that the fluid can is not dented or out of shape, which will damage the wiper plate and cause leakage around the wiper. Cut off the top of the fluid can with the can opener, or remove the bottom of the can. Be sure that the edge is free of burrs, which will damage the wiper plate. If necessary, bend the edge back with a pliers so the wiper plate will enter the can easily. Lubricate the wiper ring (305) to help the plate enter the can easily.

4. Set a can of fluid on the ram base, centering it under the wiper plate (P). If the can has a welded seam, position it with the seam facing the rear of the pump.

5. Loosen the wiper plate bleed valve (303) enough to allow air trapped under the wiper plate to escape. With your hands away from the lip of the can and the wiper plate, set the director valve switch (36) to the DOWN position and lower the ram until the wiper plate enter the can. Reduce the air pressure when the plate enters the can.

NOTE: If the wiper plate does not enter the can easily, increase the ram pressure; once it enters the can, immediately reduce the pressure.

6. Continue to lower the ram until fluid appears at the wiper plate vent hole. Tighten the wiper plate bleed valve (303) securely. See Fig. 3.

7. Clamp the can in place with the clamps (24) and wing screws (39), being sure the clamp catches the lip of the can.

Priming the Pump and Pumping Fluid

1. Be sure the pump air regulator (27a) is closed. Then set the ram air regulator (27b) to be about 150 kPa, 1.5 bar (22 psi). Set the director valve switch (36) to DOWN.

2. Open the bleed-type master air valve (8). Set the pump air regulator (27a) to 200 kPa, 2 bar (28 psi).

3. Open the pump bleeder valve (25) to allow air to bleed from the pump. When the pump is fully primed, close the valve.

4. Keep the director valve switch (36) in the DOWN position while the pump is operating.

NOTE: Adjust the air pressure to the ram as needed, but do not increase it to a level where fluid is forced past the wiper plate.

Operation

KEY

P	Wiper Plate Assembly
1	Pump
8	Bleed-Type Master Air Valve
18	Air Assist Valve (Push button)
24	Clamps
25	Pump Bleeder Valve
27a	Pump Air Regulator
27b	Ram Air Regulator
28	Fluid Outlet Fitting
36	Ram Director Valve
76	Air Tube
39	Clamp Wing Screws
302	Wiper Plate Screws
303	Wiper Bleed Valve
305	Wiper Plate Ring

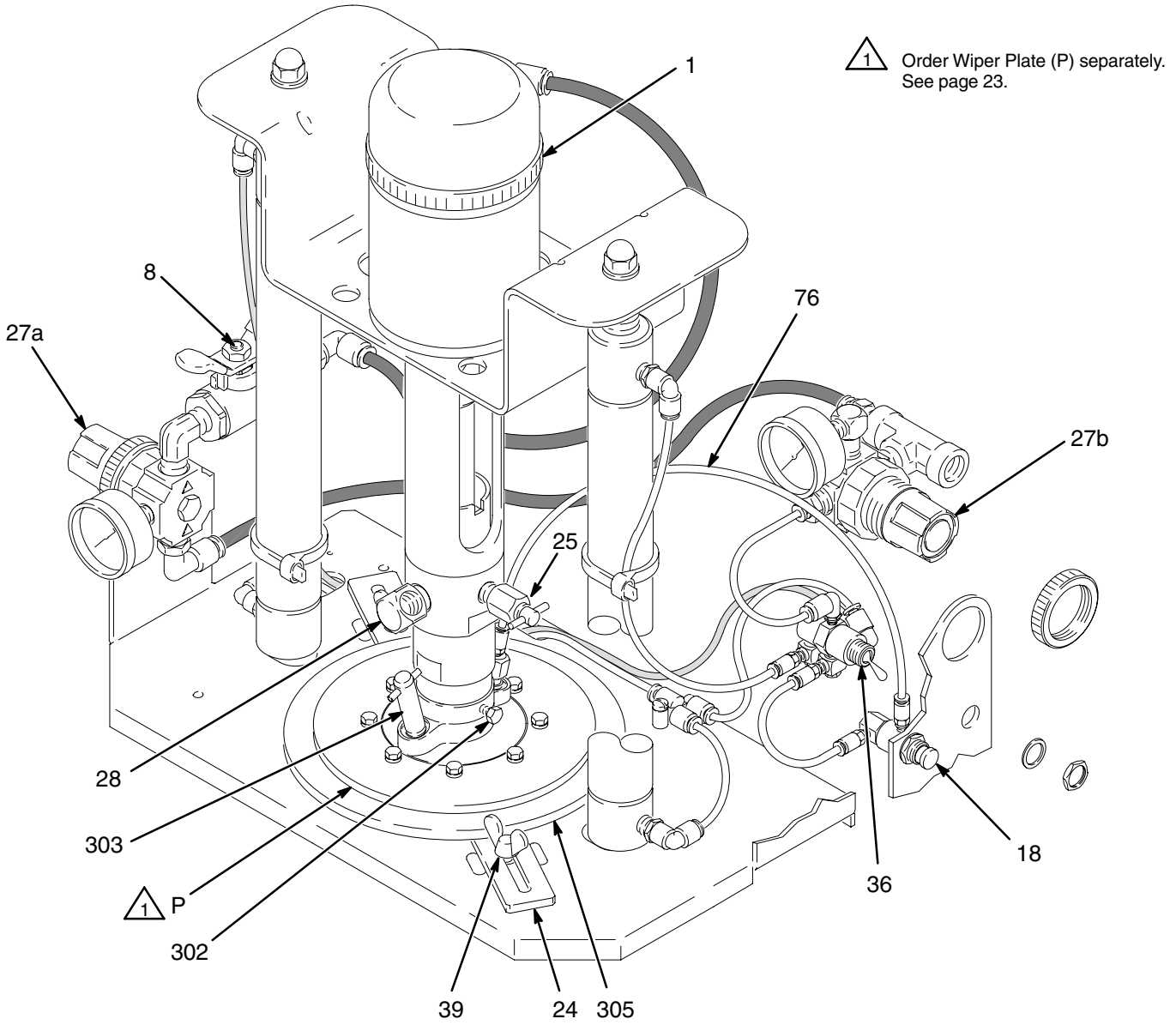


Fig. 3

Operation

Changing Fluid Cans

1. Stop the pump. Close the bleed-type master air valve (8), but leave air pressure on to the ram. Set the ram air regulator (27b) to below 210 kPa, 2.1 bar (30 psi). Open the dispensing valve and relieve all fluid pressure in the system.

2. Set the director valve switch (36) to UP.

3. Push in the air assist valve (18) and hold it in until the wiper plate clears the top of the can.

⚠ CAUTION

If the fluid has set up and the wiper plate (P) is stuck in the can, do not increase the setting of the ram air regulator (27b) to remove the plate. Excessive pressure in the can may cause the can to rupture. If you cannot pull the can off the plate by hand, loosen the two screws (302) holding the plate to the pump (1), disconnect the air tube (76) from the plate, and remove the can and plate. It may be necessary to cut the can to remove the plate.

4. Loosen the clamps (24) and remove the empty can. Set the full can on the ram base and position it under the wiper plate. If the can has a welded seam, position it with the seam facing the rear of the pump.

5. Lower the ram and adjust the position of the can relative to the wiper plate, as explained under **Starting and Adjusting the Ram** on page 11. Clamp the can in place.

Shutdown and Care of the Pump

⚠ WARNING

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

1. Always flush the pump with a compatible solvent before fluid dries in the pump.

2. Set the director valve switch (36) to DOWN. Allow the ram to go to the lowest position.

3. Shut off the air supply to the ram and pump and **relieve the pressure**.

Troubleshooting

⚠ WARNING

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

Before servicing this equipment always make sure to **Relieve the Pressure**.

Check all possible problems and solutions before disassembling the pump.

Problem	Cause	Solution
Pump does not operate	Restricted air line, clogged air passages, or inadequate air supply	Clear; see **Technical Data** on page 26.
	Main air valve is closed	Open valve.
	Air regulator malfunction	Repair or replace.
	Dirty or worn air motor parts; air motor leak.	Clean and overhaul air motor. See page 16.
	Obstructed fluid hose or dispensing valve; fluid hose ID is too small.	Increase pump air regulator pressure.
	Fluid is too heavy; pump is laboring	Clean. See page 16.
	Fluid has dried on the fluid piston	Clean and overhaul air motor. See page 16.
Pump operates, but in small strokes	Dirty or worn air motor parts; air motor leak.	Clean and overhaul air motor. See page 16.
Pump operates, but output is low	Restricted air line, clogged air passages, or inadequate air supply	Clear; see **Technical Data** on page 26.
	Dirty or worn air motor parts; air motor leak.	Clean and overhaul air motor. See page 16.
	Obstructed fluid hose or dispensing valve; fluid hose ID is too small	Clear*; use hose with larger ID.
	Fluid is too heavy; pump is laboring	Increase pump air regulator pressure.
	Worn intake valve	Service. See page 16.
Pump running too fast	Exhausted fluid supply	Replace or refill can.
	Worn intake valve	Service. See page 16.
	Dirty or worn air motor parts; air motor leak	Clean and overhaul air motor. See page 16.
Ram does not move up or down	Restricted air line, clogged air passages, or inadequate air supply	Clear; see **Technical Data** on page 26.
	Main air valve is closed	Open valve.
	Air regulator malfunction	Repair or replace.
	Wiper plate is lodged in container	Use air assist valve. See page 13.
Pump does not prime	Fluid is too heavy	Open pump bleeder valve.
Wiper plate leaks	Ram pressure is too high	Reduce air pressure to ram.
	Wiper plate ring is worn	Replace.
Leakage past throat packing	Worn u-cup packing	Replace (wet-cup is not adjustable).

* To determine if the fluid hose or gun is obstructed, **relieve the pressure**. Disconnect the fluid hose and place a container at the pump fluid outlet to catch any fluid. Turn on the air just enough to start the pump (about 140–280 kPa, 1.4–2.8 bar [20–40 psi]). If the pump starts when the air is turned on, the obstruction is in the fluid hose or gun.

Notes

Service

Disassembly (See Fig. 4)

⚠ WARNING

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

NOTE: Repair Kit 223895 is available to repair the air motor. Parts included in the kit are marked with an asterisk, for example (103a*). For the best results, use all the new parts in the kit.

NOTE: Repair Kit 223894 is available to repair the fluid pump. Parts included in the kit are marked with a dagger, for example (114†). For the best results, use all the new parts in the kit.

1. **Relieve the pressure**. Disconnect all hoses. Remove the wiper plate. Remove the fluid outlet elbow (28), noting its position relative to the air inlet. Remove only the three screws (138) and lockwashers (141) holding the pump to the mounting bracket (33).

2. Rotate the pump so the bleeder valve (25) is aligned with the slot in the mounting bracket (33), and lift the pump straight up through the bracket.

NOTE: Preform step 3 only if the air valve (165) needs replacement. Otherwise, proceed to step 4.

3. ***If it is necessary to replace the air valve (165)*** unscrew the cylinder cap (101) from the air motor cylinder (102). Unscrew the two socket screws holding the air valve (212). Remove the air valve.

⚠ CAUTION

Do not immerse the air valve (165) in solvent. To clean the valve, use a brush and compressed air.

4. Remove the three remaining screws (138) and washers (141) holding the air motor coupling (105) to the cylinder (102). Pull the cylinder straight up off the coupling until the air valve housing (103a) clears the air motor piston (104).

5. Unscrew the air valve housing (103a) from the cylinder (102).

6. Remove the pin (144) from the air motor piston (104) and the fluid piston (106). Unscrew the air motor piston from the fluid piston, and pull it straight up out of the air motor coupling (105). Remove the large o-ring (103d) from the outer diameter of the air motor piston, and the two small o-rings (103b) from the inner diameter.

7. Unscrew the air motor coupling (105) from the cylinder coupling (196). Pull the air motor coupling straight up until it clears the fluid piston (106). Remove the o-ring (103c, 103e) from the coupling.

8. Hold the fluid piston (106) steady by inserting a small screwdriver or punch into the 4 mm diameter hole (A). Remove the screw (145) and lockwasher (135) holding the priming piston (115) to the priming piston rod (110).

9. Pull the priming piston rod (110) and fluid piston (106) straight up out of the fluid housing (109). Remove the pin (123), and unscrew the priming piston rod from the fluid piston.

10. Unscrew the intake valve housing (111) from the fluid housing (109). Remove the o-ring (161) from the intake valve housing.

11. Remove the intake valve (114) and valve stop (112) from the intake valve housing (111).

12. Unscrew the wet-cup/packing nut (107). Remove the u-cup packing (163) from the throat. Remove the o-ring (162) from the wet-cup/packing nut.

13. Clean all parts with a solvent compatible with the fluid you are pumping, and inspect for wear or damage. Reassemble as explained on page 18.

Service

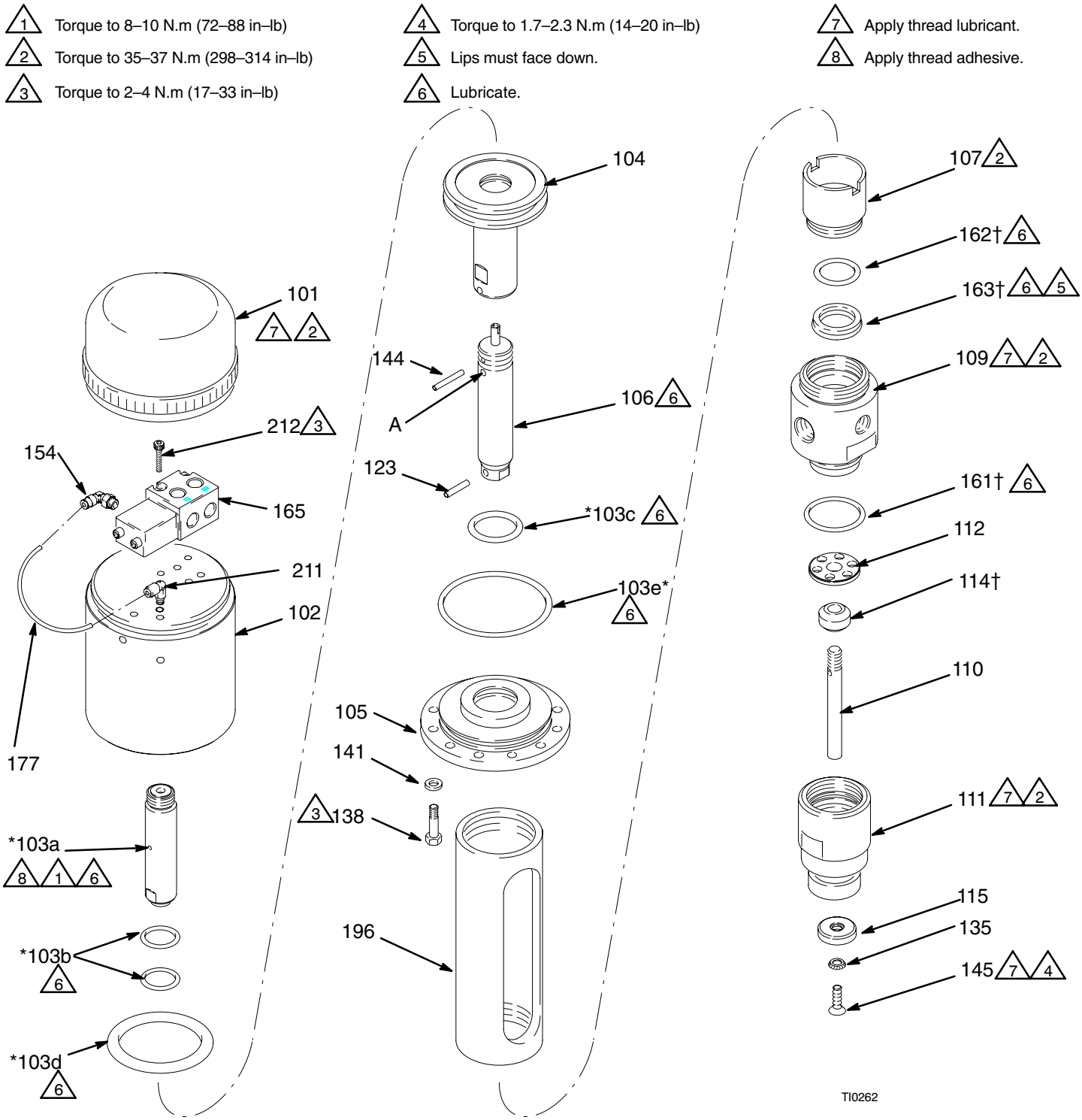


Fig. 4

Reassembly (See Fig. 5)

NOTE: Lubricate all packings and o-rings with a compatible grease before reassembling.

1. Install the u-cup packing (163†) in the throat of the fluid housing (109), with the lips facing down. install the o-ring (162†) into the groove above the bearing of the wet-cup/packing nut (107). Apply thread lubricant and install the wet-cup/packing nut in the fluid housing (109). Torque to 35–37 N•m (298–314 in-lb).

2. Screw the priming piston rod (110) into the fluid piston (106) until the holes align. Install the pin (123) in the holes. Carefully slide the assembled piston and rod down through the wet-cup and fluid housing.

3. Place the intake valve (114†) onto the seat of the intake valve housing (111). Insert the valve stop (112) into the intake valve housing, with the flat side facing up. Be sure the valve stop (112) seats on the lip of the intake housing. Lubricate the o-ring (161†). Bend it into a kidney shape, then carefully pish it into the inner groove of the intake valve housing (111), to avoid damaging it.

4. Apply thread lubricant to the lower threads of the fluid housing (109). Bring the fluid housing and intake valve housing (111) together, making sure the priming piston rod (110) passes straight through the valve stop (112) and intake valve (114) installed in the housing (111) onto the fluid housing (109), then torque to 35–37 N•m (298–314 in-lb).

5. Apply lubricant to the threads of the screw (145). Hold the fluid piston (106) steady by inserting a small screwdriver or punch into the 4mm diameter hole (A). Install the priming piston (115) onto the end of the priming piston rod (110), using the screw (145) and lockwasher (135). Torque to 1.7–2.3 N•m (14–20 in-lb).

6. Apply lubricant to the top threads of the fluid housing (109). Screw the air motor coupling (105) onto the fluid housing, and torque to 35–37 N•m (298–314 in-lb).

7. Install the large o-ring (103e*) on the outer diameter of the air motor coupling (105), and the small o-ring (103c*) in the groove on the inner diameter of the coupling.

8. Install the two small o-rings (103b*) in the grooves of the inner diameter of the air motor piston (104). lower the piston through the air motor coupling (105) so it engages the threads of the fluid piston (106). Screw the air motor piston onto the fluid piston, aligning the holes to obtain maximum threads engagement. Insert the pin (144) in the holes.

9. Install the large o-ring (103d*) on the outer diameter of the air motor piston (104).

10. Apply adhesive to the threads of the housing assembly (103a*) and screw the assembly into the air motor cylinder (102). Torque to 8–10 N•m (72–88 in-lb). Apply lubricant to the outer diameter of the air valve housing assembly (103a) and the inner diameter of the air motor cylinder (102).

11. Lower the air motor cylinder (102) onto the air motor coupling (105). Align the air inlet with the fluid outlet, as was noted in step 1 under **Disassembly**. The air valve housing assembly (103a) will slide down into the air motor piston (104). Secure the cylinder to the coupling with three screws (138) and washers (141). Torque the screws to 2–4 N•m (17–33 in-lb).

12. ***If it was necessary to replace the air valve (165)*** align and install the new air valve on the top of the air motor cylinder (102), as shown in Fig. 4. Install the two mounting screws and washers and torque to 2–4 N•m (17–33 in-lb). Lubricate the upper threads of the air motor cylinder (102). Screw the cylinder cap (101) onto the cylinder.

13. Lower the pump through the mounting bracket (33). Orient it in the correct direction and secure to the bracket using the three screws (138) and washers (141). Torque the screws to 2–4 N•m (17–33 in-lb). Reinstall the fluid outlet fitting (28).

14. Reinstall the wiper plate assembly on the fluid intake housing (111). Secure with the two capscrews (302). Reconnect all hoses and return the pump to service.

Service

1 Torque to 8–10 N.m (72–88 in–lb)
2 Torque to 35–37 N.m (298–314 in–lb)
3 Torque to 2–4 N.m (17–33 in–lb)
4 Torque to 1.7–2.3 N.m (14–20 in–lb)
5 Lips must face down.
6 Lubricate.
7 Apply thread lubricant.
8 Apply thread adhesive.

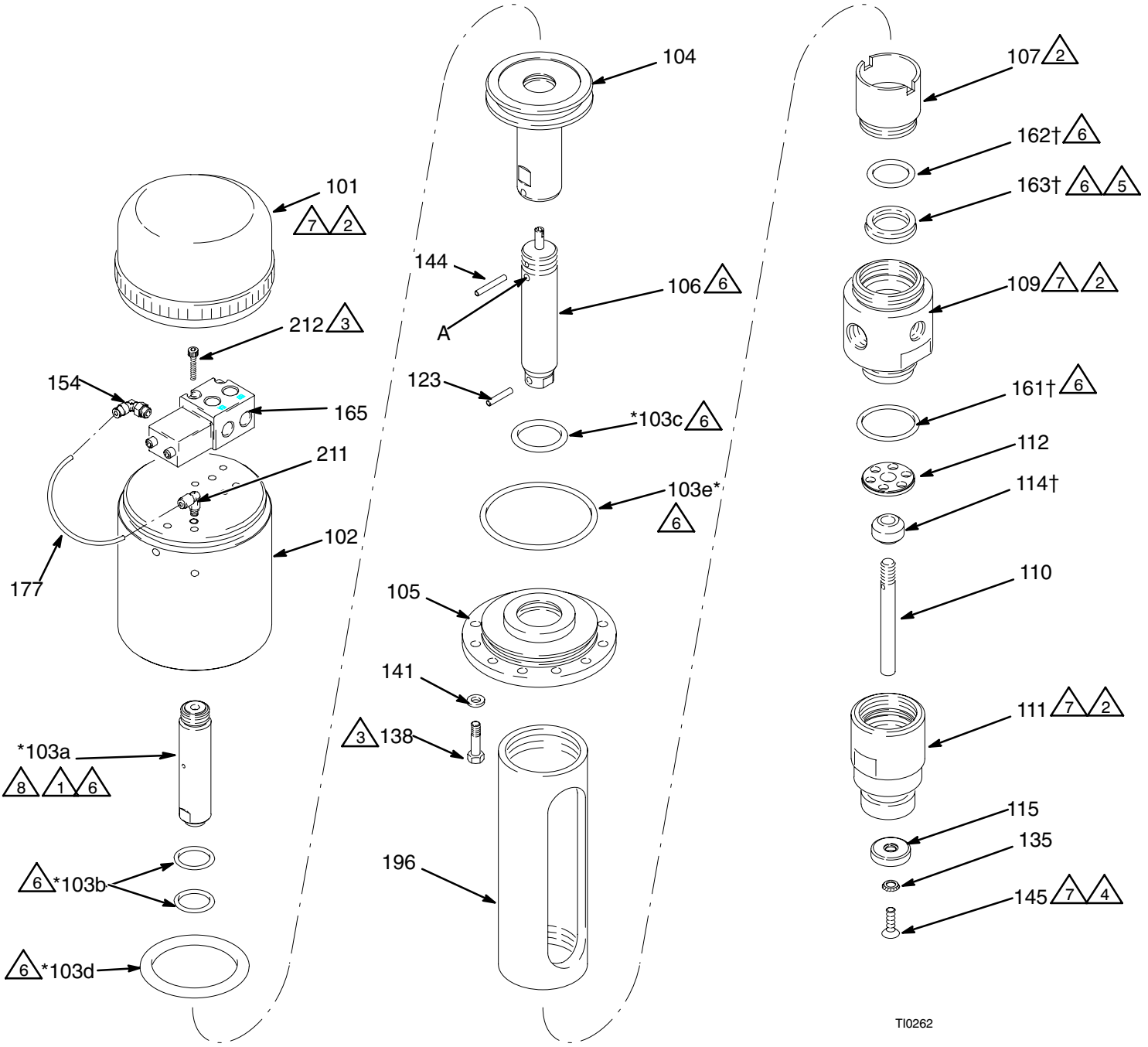
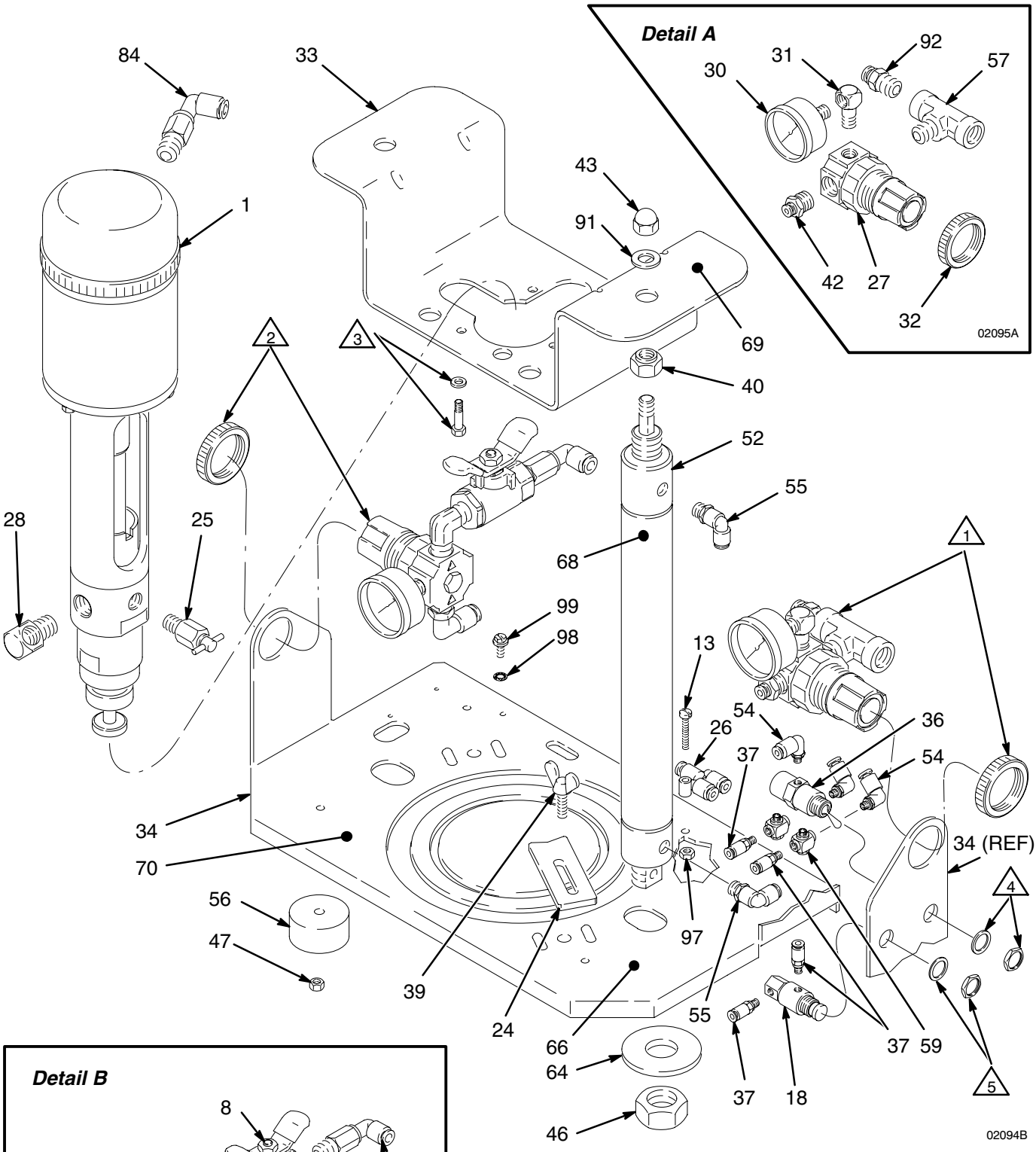
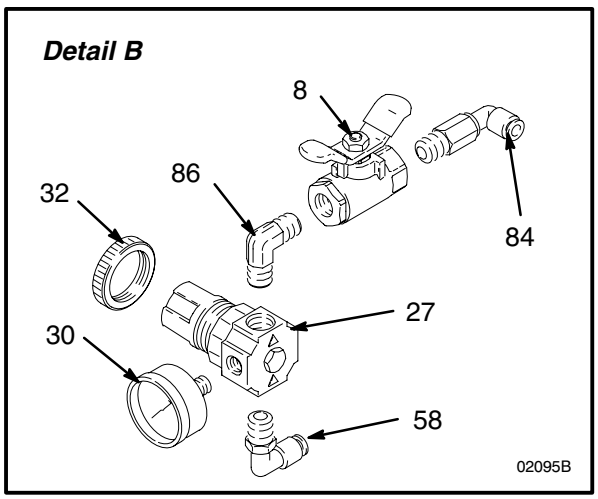


Fig. 5

Parts





1 See Detail A above.

2 See Detail B at left.

3 Part of item 1.

4 Part of item 36.

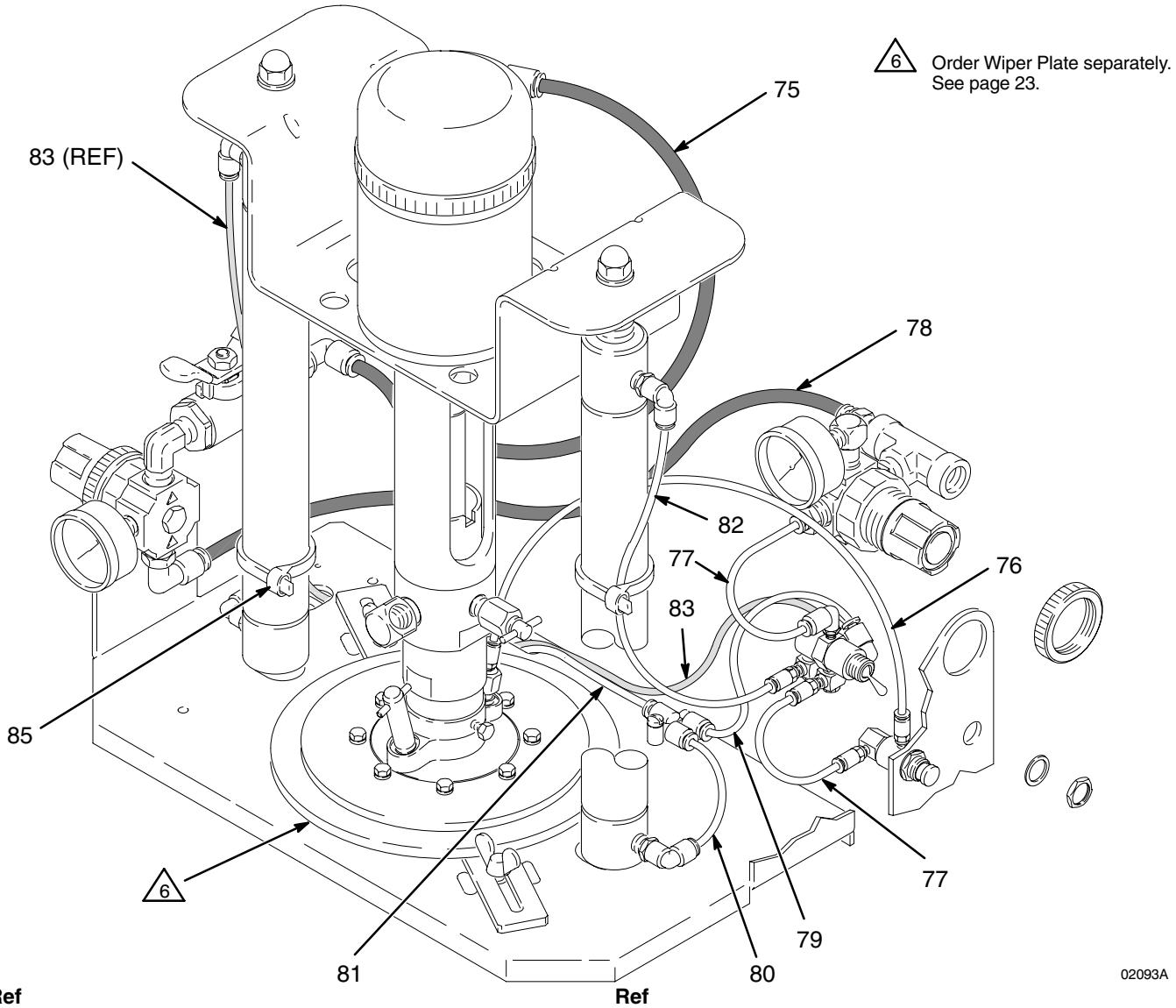
5 Part of item 18.

Parts

Ref No.	Part No.	Description	Qty.
1	235870	PUMP, bare See pages 24–25 for parts	1
8	110223	VALVE, ball; 1/4 npt(f) inlet x 1/4 npt(f) outlet	1
13	104301	SCREW, cap, socket; 5–40 unc-3a; 16 mm (0.625”) lg	1
18	110914	VALVE, air assist, pushbutton; normally closed	1
24	186291	CLAMP, pail	2
25	223730	VALVE, bleeder, pump	1
26	112189	“Y” union; 4 mm (0.156”) OD tube	1
27	110318	REGULATOR, air 0–1.25 MPa, 0–12.5 bar (0–180 psi) regulated pressure range; 1/4 npt(f) inlet and outlet	2
28	166866	ELBOW, street; 1/4 npt(m x f)	1
30	108190	GAUGE, air pressure 0–0.7 MPa, 0–7 bar (0–100 psi)	2
31	100839	ELBOW, street; 1/8 npt(m x f)	1
32	110209	NUT, panel	2
33	188852	BRACKET, pump	1
34	236062	BASE ASSEMBLY, elevator; carbon steel	1
36	110859	SWITCH, valve, air director	1
37	110932	CONNECTOR, male; 4 mm (0.156”) OD tube x 10–32 unf(m)	4
39	110888	SCREW, wing, M6 x 1.0; 16 mm (0.63”) long	2
40	186361	RETAINER, nut; 3/8–24 unf-2b	2
42	110933	CONNECTOR, male; 4 mm (0.156”) OD tube x 1/4–18 npt(m)	1
43	110889	NUT, crown; 3/8–24 unf-2b	2
46	100071	NUT; 3/4–16 nfs	2
47	110911	NUT, hex; M5 x 0.8	4
52	110910	CYLINDER, air	2
54	109193	ELBOW; 4 mm (0.156”) OD tube x 10–32 unf(m)	3
55	198171	ELBOW; 4 MM (0.156”) OD tube x 1/8–27 npt(m)	4
56	110930	BUMPER	4
57	110936	TEE, pipe; 1/ npt(m) branch x 1/4 npt(f) run	1
58	110937	ELBOW; 6.3 mm (0.250”) OD tube x 1/4 npt(m)	1
59	110940	TEE, adjustable; 10–32 unf-2b(f) run x 10–32 unf-2a(m) branch	2
64	110947	WASHER, plain; 19 mm (3/4”)	2
66▲	186503	LABEL, caution	1
68▲	186502	LABEL, caution	2
69▲	186505	LABEL, warning	1
70▲	186531	LABEL, warning	1
84	112188	ELBOW; 6.3 mm (0.250”) OD tube x 1/4 npt(m)	2
86	110249	ELBOW; 1/4 npt(m)	1
91	158019	WASHER, plain; 11 mm (0.442”) size	2
92	112186	CONNECTOR, male; 6.3 mm (0.250”) OD tube x 1/4–18 npt(m)	1
93	111002	OPENER, can; plated carbon steel (not shown)	1
97	100975	NUT; 5–40	1
98	157021	WASHER, grounding	1
99	111593	SCREW, ground	1

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

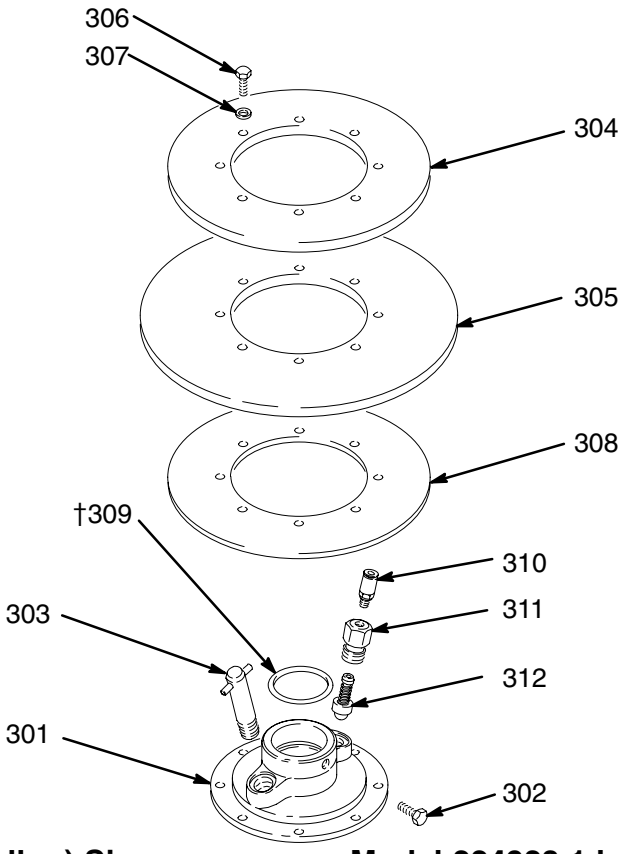
Parts



Ref No.	Part No.	Description	Qty.
75	186532	TUBE, air; nylon; 6.3 mm (0.250”) OD; 4/6 mm (0.180”) ID; 570 mm (22.44”) long	1
76	186533	TUBE, air; nylon; 4 mm (0.156”) OD; 2.7 mm (0.106”) ID; 660 mm (26”) long	1
77	186534	TUBE, air; nylon’ 4 mm (0.156”) OD; 2.7 mm (0.106”) ID; 125 mm (4.92”) long	2
78	188963	TUBE, air; nylon; 6.3 mm (0.250”) OD; 4.6 mm (0.180”) ID; 410 mm (16.14”) long	1
79	188964	TUBE, air; nylon; 4 mm (0.156”) OD; 2.7 mm (0.106”) ID; 106 mm (4.18”) long	1
80	188965	TUBE, air; nylon; 4 mm (0.156”) OD; 2.7 mm (0.106”) ID; 150 mm (5.91”) long	1
81	188966	TUBE, air; nylon’ 4 mm (0.156”) OD; 2.7 mm (0.106”) ID; 290 mm (11.42”) long	1
82	188967	TUBE, air; nylon; 4 mm (0.156”) OD; 2.7 mm (0.106”) ID; 330 mm (13”) long	1
83	188968	TUBE, air; nylon; 4 mm (0.156”) OD; 2.7 mm (0.106”) ID; 635 mm (25”) long	1
85	103473	STRAP, tie	2

Parts

NOTE: The Wiper Plate is not supplied with the pump, and must be ordered separately.



02096

Model 224908 3 kg (1 Gallon) Size

Includes items 301–312

Ref No.	Part No.	Description	Qty.
301	187596	wiper; stainless steel	1
302	111639	SCREW, cap, hex hd; M5 x 0.8; 10 mm (0.39”) long; stainless steel	2
303	223746	VALVE, bleed, wiper plate	1
304	187597	RING, backup; stainless steel	1
305	187599	RING, wiper; rubber	1
306	111638	SCREW, cap, hex hd’ M4 x 0.7; 12 mm (0.47”) long; stainless steel	8
307	111637	LOCKWASHER, plain; no. 4; stainless steel	8
308	187600	RING, backup; polyurethane	1
309†	110954	O-RING, PTFE	1
310	110932	CONNECTOR, male; 4 mm (0.156”) OD tube x 10–32 unf-2a(m)	1
311	187683	HOUSING, check valve	1
312	224918	VALVE, check	1

† *These parts are included in Pump Repair Kit 223894, which may be purchased separately. Kit includes additional parts; see pages 24 and 25.*

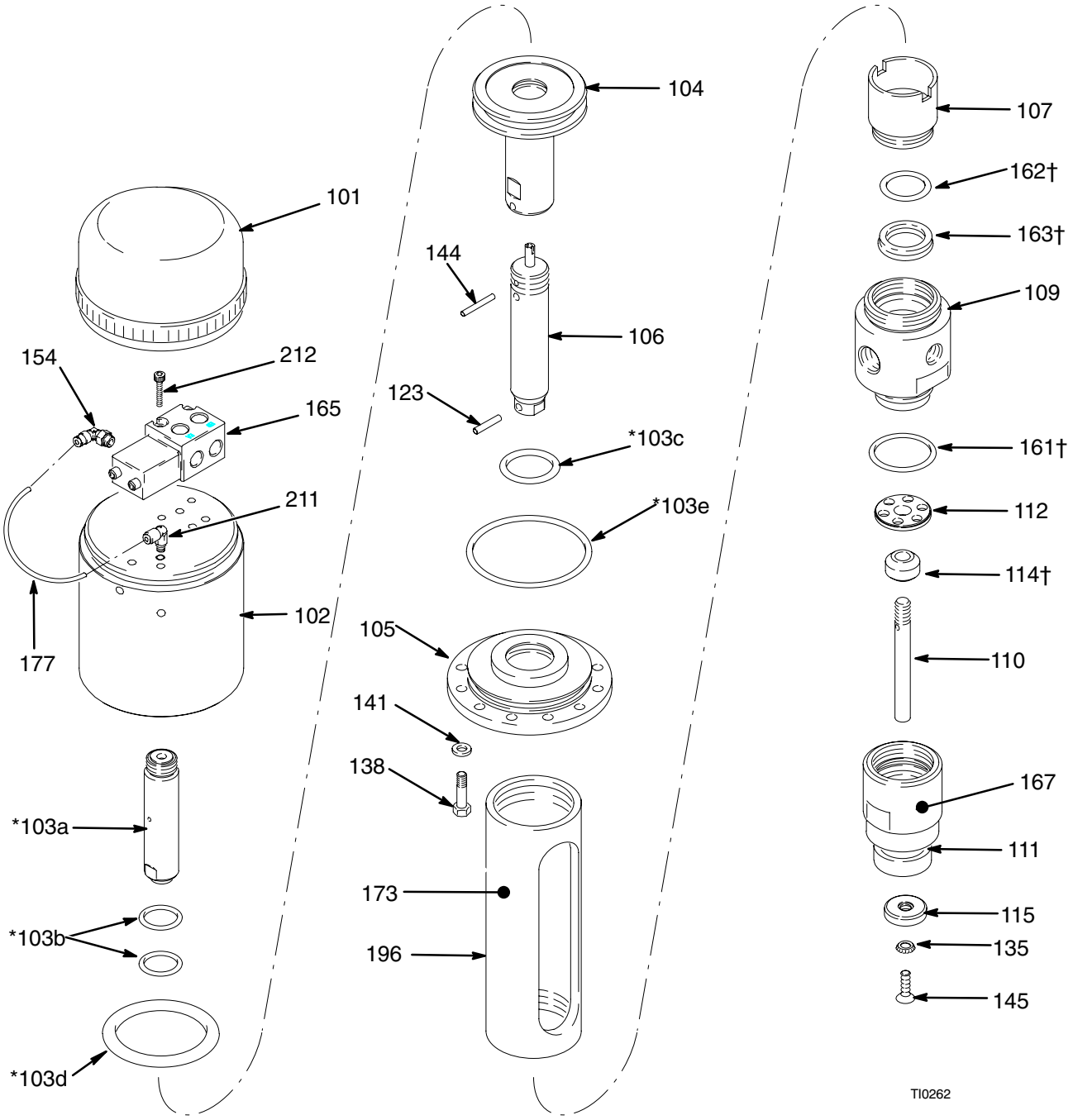
Model 224923 1 kg (1 Quart) Size

Includes items 301–312

Ref No.	Part No.	Description	Qty.
301	187596	wiper; stainless steel	1
302	111639	SCREW, cap, hex hd; M5 x 0.8; 10 mm (0.39”) long; stainless steel	2
303	223746	VALVE, bleed, wiper plate	1
304	187738	RING, backup; stainless steel	1
305	187740	RING, wiper; rubber	1
306	111638	SCREW, cap, hex hd’ M4 x 0.7; 12 mm (0.47”) long; stainless steel	8
307	111637	LOCKWASHER, plain; no. 4; stainless steel	8
308	187741	RING, backup; polyurethane	1
309†	110954	O-RING, PTFE	1
310	110932	CONNECTOR, male; 4 mm (0.156”) OD tube x 10–32 unf-2a(m)	1
311	187683	HOUSING, check valve	1
312	224918	VALVE, check	1

† *These parts are included in Pump Repair Kit 223894, which may be purchased separately. Kit includes additional parts; see pages 24 and 25.*

Parts


101
154
212
165
211
102
177
*103a
*103b
*103d
104
144
106
123
*103c
*103e
105
141
138
173
196
107
162†
163†
109
161†
112
114†
110
167
111
115
135
145
TI0262

Parts

Ref No.	Part No.	Description	Qty.
101	186273	CAP, cylinder, aluminum	1
102	15D742	KIT, cylinder repair	1
103	223895	AIR MOTOR REPAIR KIT Includes items 103a–103e, 166	1
103a*		. HOUSING ASSEMBLY, air valve (not sold separately)	1
103b*	110852	. O-RING; polyurethane	2
103c*	110853	. O-RING; buna-N	1
103d*	110854	. O-RING; buna-N	1
103e*	110855	. O-RING; buna-N	1
104	186276	PISTON, air motor; aluminum	1
105	187581	COUPLING, air motor; aluminum	1
106	187579	PISTON, fluid; stainless steel	1
107	235838	WET-CUP/PACKING NUT; stainless steel, PTFE	1
109	187578	HOUSING, fluid; stainless steel	1
110	187586	ROD, priming piston; stainless steel	1
111	186283	HOUSING, valve, intake; stainless steel	1
112	186285	STOP; stainless steel	1
114†	186296	VALVE, intake; PEEK	1
115	187759	PISTON, priming; stainless steel	1
123	110893	PIN, spring; 3.3 mm (0.13”) dia. x 16 mm (0.63”) long	1
135	111640	WASHER, lock, int. tooth’ 5.3 mm (0.21”) ID	1
138	110873	SCREW, cap, hex hd; M5 x 0.8; 20 mm (0.79”) long	6
141	110874	WASHER, flat; no. 5	6
144	112120	PIN, spring	6
145	111639	SCREW, cap, hex head; M5 x 0.8; 10 mm (0.39”) long	1
154	109193	ELBOW, 4 mm (0.156”) OD tube x 10–32 unf(m)	1
161†	110966	O-RING: PTFE	1
162†	110955	O-RING; fluoroelastomer	1
163†	110946	PACKING, u-cup; glass-filled PTFE and 304 stainless steel	1
165	115796	VALVE, air; poppet, 4 way, 5 port	1
167▲	186501	LABEL, warning	1
173▲	186500	LABEL, caution	1
177	186534	TUBE, air; nylon 4 mm (0.156”) OD; 2.7 mm (0.106”) ID	
196	187582	COUPLING, cylinder; aluminum	1
211	114151	ELBOW, 1/8 npt(f)	1
212	106246	SCREW, cap sc hd, 8–32 UNRC x 1.00; 1.00 mm (0.04”) long	2

** These parts are included in Air Motor Repair Kit 223895, which may be purchased separately.*

† *These parts are included in Pump Repair Kit 223894, which may be purchased separately. Kit also includes two Part No. 110954 PTFE O-Rings, for use with wiper plate.*

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

Technical Data

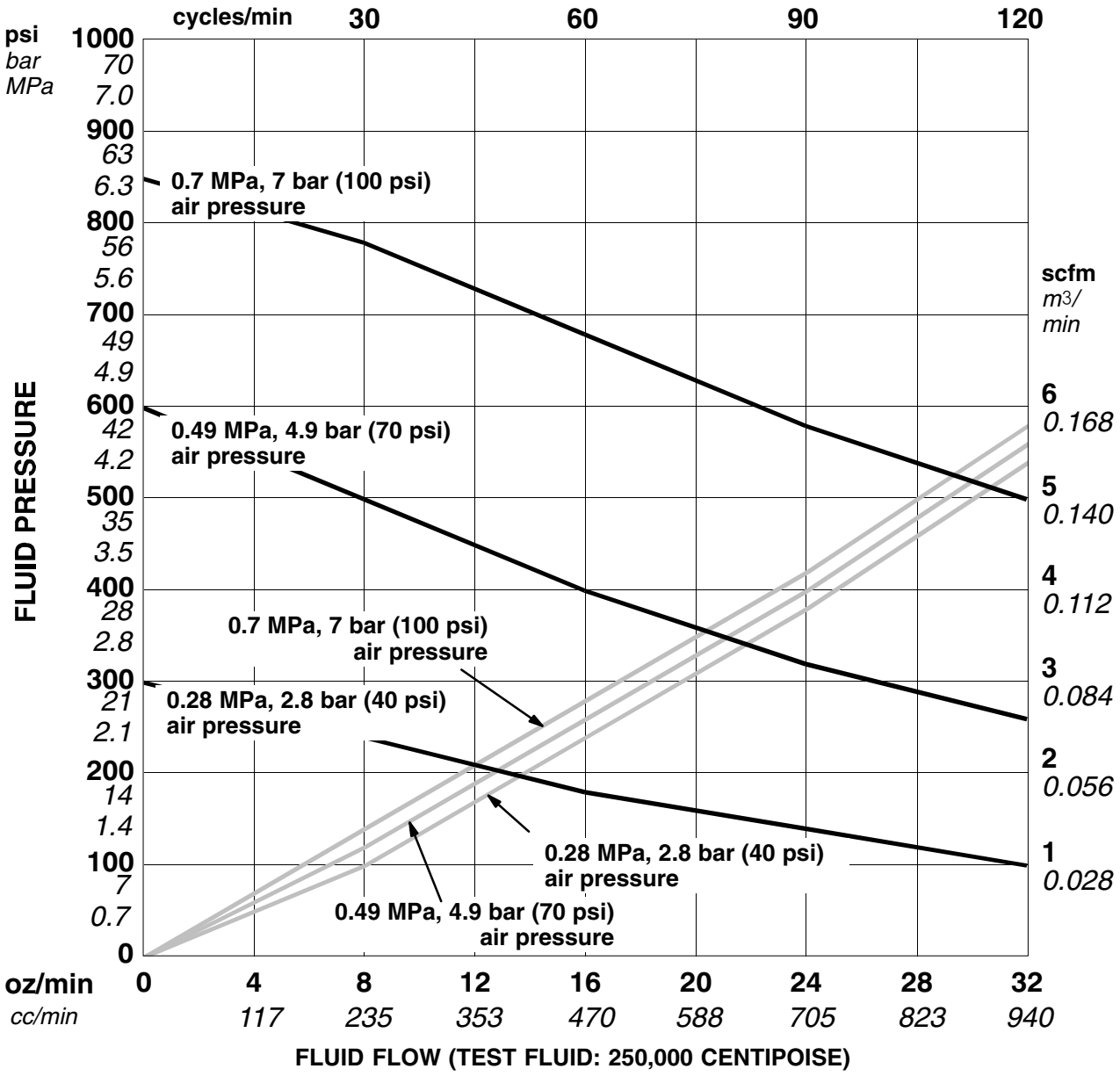
Category	Data
Maximum fluid output pressure	6.0 MPa, 60 bar (850 psi)
Air input pressure range	243–700 kPa, 2.4–7.0 bar (35–100 psi)
Maximum fluid viscosity	600,000 cps
volume per stroke (dispenses on down-stroke only)	5.0 cc (0.17 oz.)
Recommended pump speed for continuous operation	40 cpm
Maximum recommended pump speed	60 cpm
Maximum flow (250,000 cps fluid)	940 cc/min (32 oz/min); 0.162 m^3/min (5.8 scfm) air consumption at 0.7 MPa, 7 bar (100 psi)
Stroke length	19 mm (3/4 in.)
Maximum pump operating temperature	60° C (140° F)
Air inlet size	1/4 npt(f)
Fluid outlet size	1/4 npt(f)
Weight	approx. 8.4 kg (18.5 lb)
Wetted parts	304 and 17–4 pH Stainless steel; PTFE, fluoroelastomer, PEEK
* Sound pressure level at 0.7 MPa, 7 bar (100 psi), 40 cpm	64.12 dB(A)
* Sound power level at 0.7 MPa, 7 bar (100 psi), 40 cpm	70.84 dB(A)

** Sound pressure measured 1 meter from the pump resting on the floor. Sound power level measured per ISO standard 9614–2*

Technical Data

KEY: Fluid Outlet Pressure – Black Curves
Air Consumption – Gray Curves

NOTE: Recommended pump speed for continuous operation: 40 cpm
Maximum recommended pump speed
(to shaded area): 60 cpm



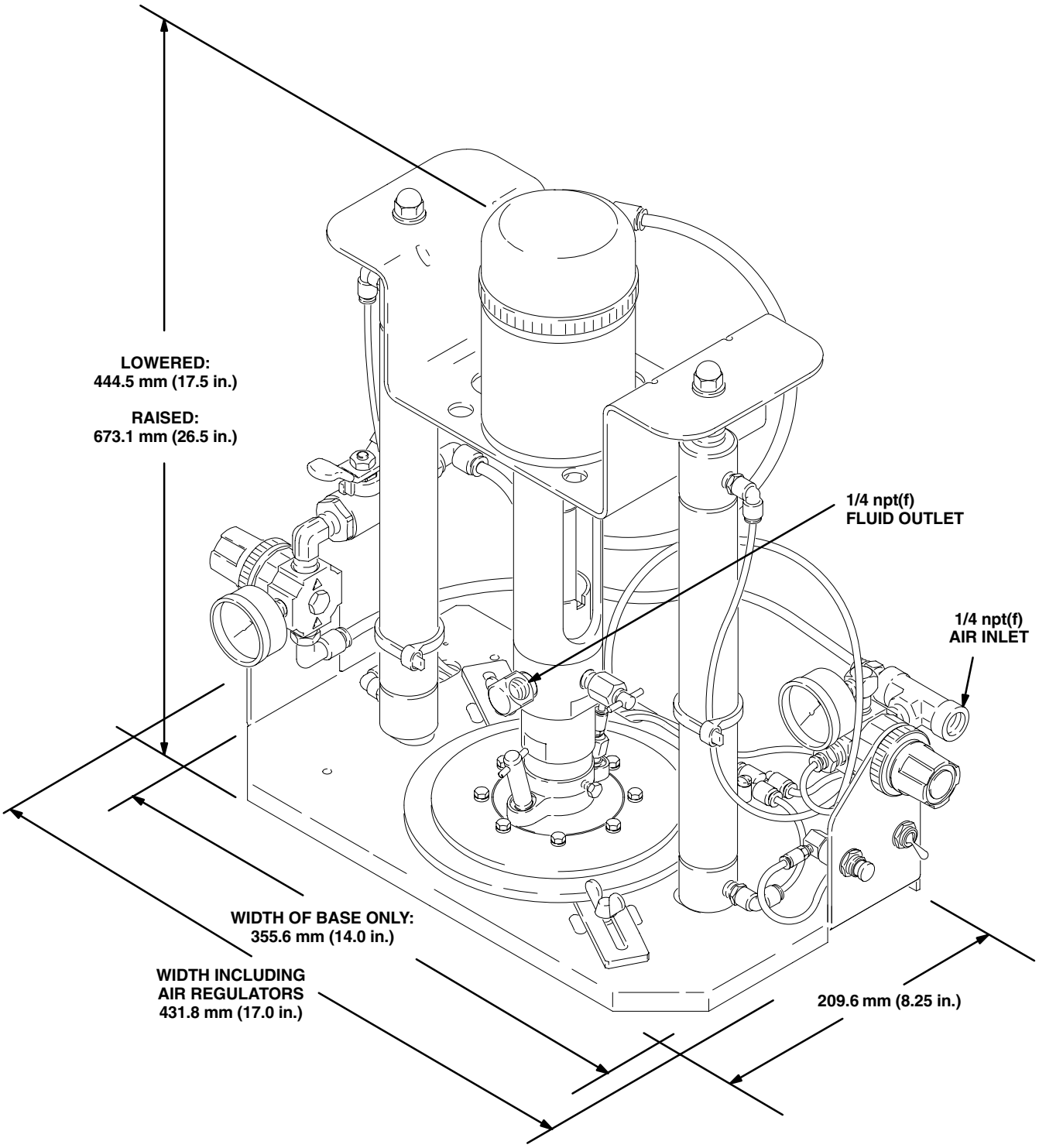
To find Fluid Outlet Pressure (MPa/bar/psi) at a specific fluid flow (ccm or oz/min) and operating air pressure (MPa/bar/psi):

1. Locate desired flow along bottom of chart.
2. Follow vertical line up to intersection with selected fluid outlet pressure curve (black). Follow left to scale to read fluid outlet pressure.

To find Pump Air Consumption (m^3/min or scfm) at a specific fluid flow (ccm or oz/min) and air pressure (MPa/bar/psi):

1. Locate desired flow along bottom of chart.
2. Read vertical line up to intersection with selected air consumption curve (gray). Follow right to scale to read air consumption.

Dimensions



02091A

Notes

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 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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Original instructions. This manual contains English. MM 308302

Graco Headquarters: Minneapolis
International Offices: Belgium, China, Japan, Korea

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

www.graco.com
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