
INSTRUCTIONS

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

5:1 Ratio Fire-Ball® Pumps

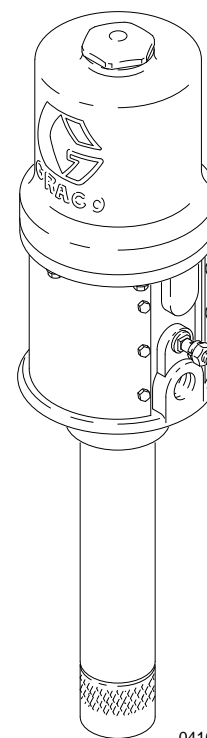
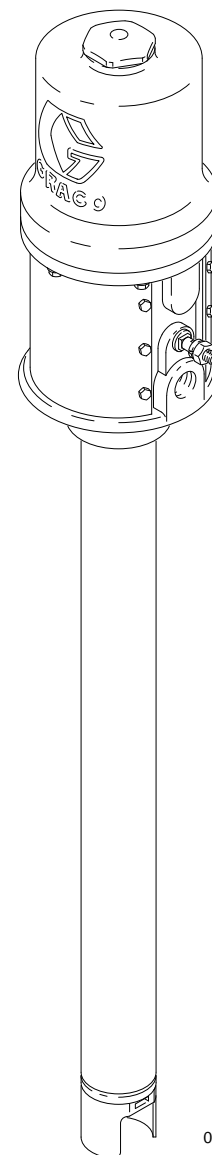
900 psi (62 bar) Maximum Working Pressure

180 psi (12 bar) Maximum Air Input Pressure

Gear Lube and Motor Oil Pumps
(See page 5 for pump models and descriptions)

MODEL 203—872

MODEL 203—876



04109

04110

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Symbols

Warning Symbol



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

Caution Symbol



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

WARNING



INSTRUCTIONS

EQUIPMENT MISUSE HAZARD

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

- This equipment is for professional use only.
- Read all instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are not sure, call Graco Technical Assistance at 1-800-543-0339.
- Do not alter or modify this equipment.
- Check equipment daily. Repair or replace worn or damaged parts immediately.
- Do not exceed the maximum working pressure of the lowest rated component in your system. This equipment has a **900 psi (62 bar) maximum working pressure at 180 psi (12 bar) maximum incoming air pressure.**
- 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.
- Handle hoses carefully. Do not pull on hoses to move 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).
- Do not lift pressurized equipment.
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.

⚠ WARNING



FLUID INJECTION HAZARD

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

- If a fluid injection injury occurs, get **emergency medical care at once**. Do not treat as a simple cut. Tell the doctor exactly what fluid was injected.

NOTE TO PHYSICIAN: Injection into the skin is a traumatic injury. **It is important to treat the injury surgically as soon as possible.** Do not delay treatment to research toxicity. Toxicity is a concern with some exotic coatings injected directly into the blood stream. Consultation with a plastic surgeon or reconstructive hand surgeon may be advisable.

- Do not point the dispensing valve at anyone or at any part of the body.
- Do not put your hand or fingers over the end of the dispensing valve.
- Do not stop or deflect leaks with your hand, body, glove or rag.
- Use only extensions and no-drip tips which are designed for use with your dispensing valve.
- Do not use a low pressure flexible nozzle with this equipment.
- Follow the **Pressure Relief Procedure** on page 9 if the grease fitting coupler clogs and before cleaning, checking or servicing the equipment.
- Tighten all fluid connections before operating the equipment.
- Check the hoses, tubes, and couplings daily. Replace worn or damaged parts immediately. Do not repair high pressure couplings; you must replace the entire hose.
- Fluid hoses must have spring guards on both ends, to help protect them from rupture caused by kinks or bends near the couplings.



TOXIC FLUID HAZARD

Hazardous fluids 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.

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 8.
- If there is any static sparking or you feel an electric shock while using this equipment, **stop spraying immediately**. Do not use the equipment until you identify and correct the problem.
- Provide fresh air ventilation to avoid the buildup of flammable fumes from solvents or the fluid being sprayed.
- Keep the spray area free of debris, including solvent, rags, and gasoline.
- Before operating this equipment, electrically disconnect all equipment in the spray area.
- Before operating this equipment, extinguish all open flames or pilot lights in the spray area.
- Do not smoke in the spray area.
- Do not turn on or off any light switch in the spray area while spraying or while there are any fumes in the air.
- Do not operate a gasoline engine in the spray area.



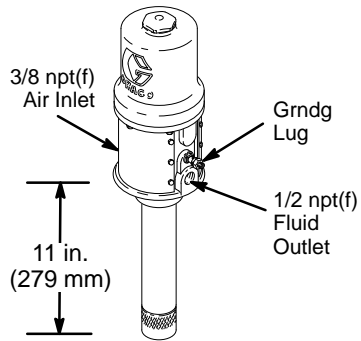
MOVING PARTS HAZARD

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

- Do not operate the pump with the air motor plates removed.
- Keep clear of all moving parts when starting or operating the pump.
- Before servicing the equipment, follow the **Pressure Relief Procedure** on page 9 to prevent the equipment from starting unexpectedly.

Pump Models and Dimensional Drawings

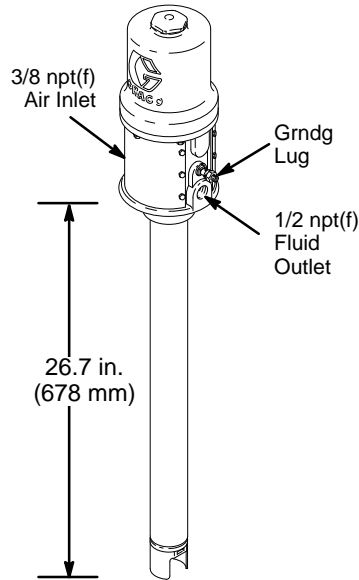
MODEL 203-876, Series K
Stubby size, wall mount



Overall length:
22.8 in. (579 mm)

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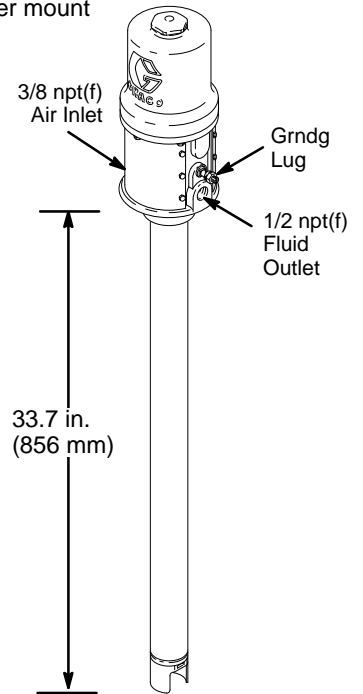
MODEL 203-872, Series K
16 gal. (120 lb) drum size,
cover mount



Overall length:
38.5 in. (978 mm)

04110

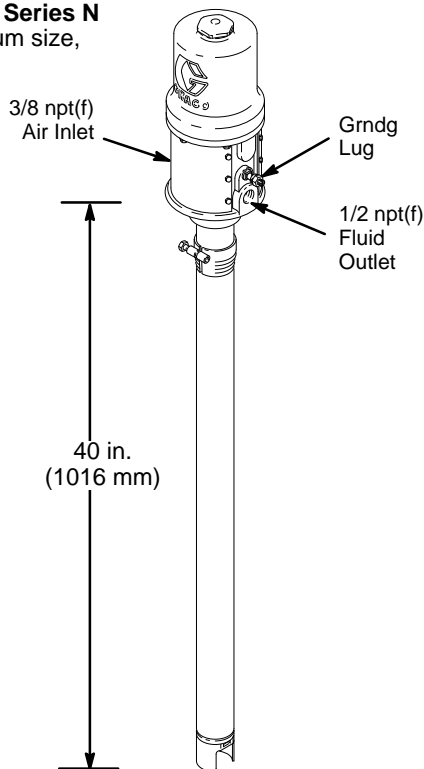
MODEL 203-857, Series K
55 gal. (400 lb) drum size,
cover mount



Overall length:
45.5 in. (1156 mm)

04112

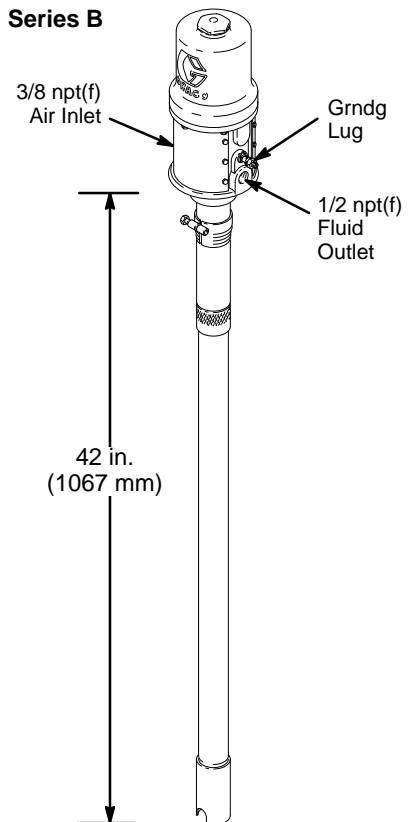
MODEL 204-254, Series N
55 gal. (400 lb) drum size,
bung mount



Overall length:
51.8 in. (1316 mm)

04113

MODEL 222-087, Series B
275 gal. tank size,
bung mount

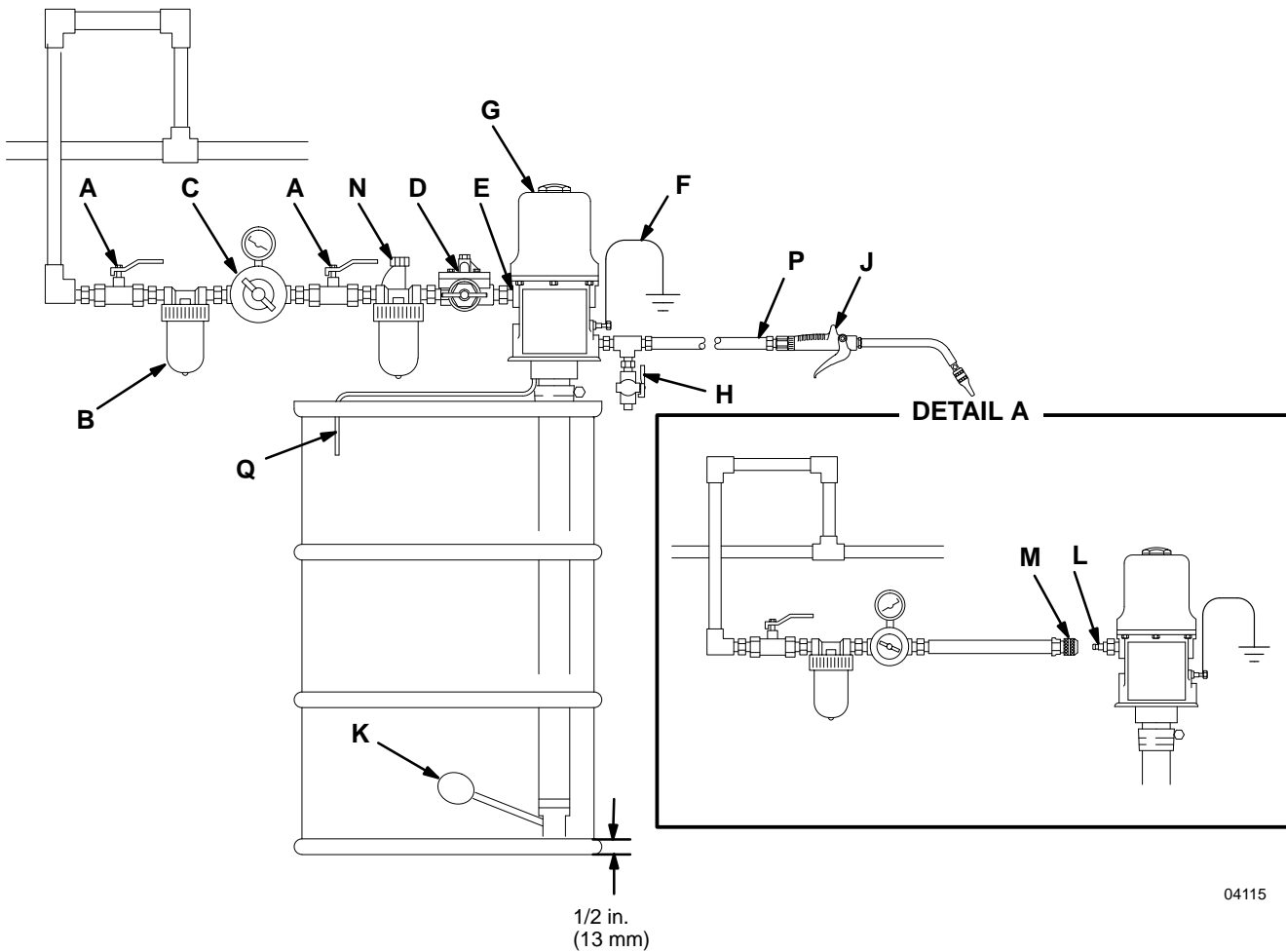


Overall length:
53.9 in. (1369 mm)

04114

NOTE: Technical Data and Mounting Hole Layout on page 25.

Installation



KEY

- | | | | |
|---|---|---|---------------------------------|
| A | Bleed-Type Master Air Valve | H | Drain Valve |
| B | Air Line Filter | J | Dispensing Valve |
| C | Air Regulator and Gauge | K | Low Level Cut-Off Valve |
| D | Pump Runaway Valve (shown for position – not needed if you use a low level cut-off valve [K]) | L | Male Quick Disconnect Fitting |
| E | Air Inlet | M | Female Quick Disconnect Coupler |
| F | Ground Wire | N | Air Line Lubricator |
| G | Pump (Model 204–254 shown) | P | Fluid Hose |
| | | Q | Weep Hole Drain Tube |

Fig. 1

Installation

The installation shown in Fig.1 is only a guide to selecting and installing optional and required accessories. For assistance in designing a system to suit your needs, contact your Graco representative or Graco Technical Assistance at 1-800-543-0339.

Install the pump on the drum cover so the pump's fluid intake is 1/2 in. (13 mm) off the bottom of the drum. On Models 204-254 and 222-087, screw the bung adapter tightly into the drum cover's bung hole, adjust the position of the pump in the drum, and tighten the bung adapter screw to hold the pump.

Pump Weep Hole Drain Kit

There is a fluid weep hole (S) in the pump base. See Fig. 2. The fluid weepage is a necessary function on all reciprocating type pumps and should not be considered as pump leakage. A Weep Hole Drain Kit, Part No. 224-907, is available to prevent the fluid from accumulating on the exterior of the pump and surrounding surfaces.

Drive the fitting (R) into the pump base weep hole (S). Press the tube firmly onto the fitting. Route the tube (Q) into the drum through the small hole in the cover, as shown in Fig.1, or route the tube into a separate container that you have installed for that purpose.

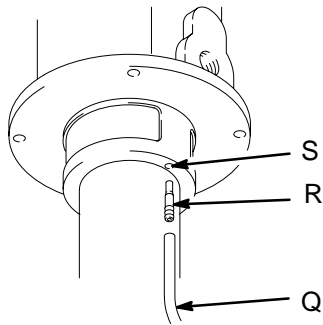


Fig. 2

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System Accessories

CAUTION

Do not hang the air accessories directly on the air inlet (E). The fittings are not strong enough to support the accessories and may cause one or more to break. Provide a bracket on which to mount the accessories.

NOTE: Install the accessories in the order shown in Fig.1 .

1. If you are **not** using a low level cut-off valve (K) at the pump fluid intake, install a pump runaway valve (D) to shut off the air to the pump if the pump accelerates beyond the pre-adjusted setting. A pump which runs too fast can be seriously damaged.
2. Install an air line lubricator (N) for automatic air motor lubrication.
3. Next, install a bleed-type master air valve (A) to relieve air trapped between it and the motor when the valve is closed. Order Part No. 107-142. As an alternative, you can install an air line quick disconnect coupler (M) and fitting (L) to serve as an air-bleed device. See Detail A in Fig.1.

WARNING

Two accessories are **required** in your system: an air bleed device and a fluid drain valve. These accessories help reduce the risk of serious injury including fluid injection, splashing in the eyes or on the skin, and injury from moving parts if you are adjusting or repairing the pump.

The air bleed device relieves air trapped between it and the air motor after the air supply is shut off. Trapped air can cause the air motor to cycle unexpectedly, causing serious injury if you are adjusting or repairing the pump. Use either a bleed-type master air valve (A) or a quick disconnect coupler (M) and fitting (L). Install near the pump air inlet, within easy reach of the pump.

The fluid drain valve (H) assists in relieving fluid pressure in the displacement pump, hoses and dispensing valve. Triggering the valve to relieve pressure may not be sufficient.

4. Install the air regulator (C) to control pump speed and pressure.
5. Install an air line filter (B) to remove harmful dirt and contaminants from your compressed air supply. Install another bleed-type master air valve (A) to isolate the accessories for servicing.
6. Install a drain valve (H) near the pump fluid outlet. Order Part No. 210-658.
7. Install a suitable fluid hose (P) and dispensing valve (J).

Installation

Grounding

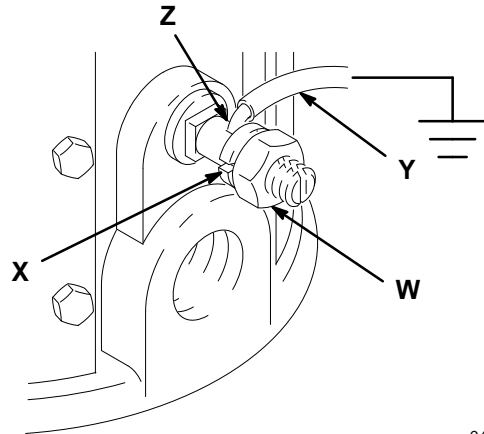
Proper grounding is an essential part of maintaining a safe system.

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 equipment:

1. *Pump:* use a ground wire and clamp as shown to the right.
2. *Air and Fluid hoses:* use only grounded hoses.
3. *Air compressor:* follow manufacturer's recommendations.
4. *Fluid supply container:* according to local code.
5. *To maintain grounding continuity when flushing or relieving pressure,* always hold a metal part of the valve firmly to the side of a grounded metal pail, then trigger the valve.

To ground the pump:

To ground the pump, loosen the grounding lug locknut (W) and washer (X). Insert one end of a 12 ga (1.5 mm²) minimum ground wire (Y) into the slot in lug (Z) and tighten the locknut securely. Connect the other end of the wire to a true earth ground. Order Part No. 222-011, Ground Wire and Clamp.




04111

. Fig. 3

Operation

Pressure Relief Procedure

⚠ WARNING



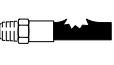
PRESSURIZED FLUID HAZARD

The equipment stays pressurized until pressure is manually relieved. To reduce the risk of serious injury from pressurized fluid, accidental spray from the valve or splashing fluid, follow this procedure whenever you:

- Are instructed to relieve pressure
- Stop dispensing
- Check, clean or service any system equipment
- Install or clean dispensing devices

1. Close the pump air regulator and the bleed-type master air valve (required in your system).
2. Hold a metal part of the dispensing valve firmly to a grounded metal waste container and trigger the valve to relieve the fluid pressure.

⚠ WARNING



COMPONENT RUPTURE HAZARD

The maximum working pressure of each component in the system may not be the same. To reduce the risk of overpressurizing any component in the system, be sure you know the maximum working pressure of each component. **Never** exceed the maximum working pressure of the lowest rated component in the system. Overpressurizing any component can result in rupture, fire, explosion, property damage, and serious injury.


To determine the fluid output pressure using the air regulator reading, multiply the ratio of the pump by the air pressure shown on the regulator gauge. For example:

$$5 (:1) \text{ ratio} \times 100 \text{ psi air} = 500 \text{ psi fluid output}$$

$$[5 (:1) \text{ ratio} \times 7 \text{ bar air} = 35 \text{ bar fluid output}]$$

Limit the air to the pump so that no air line or fluid line component or accessory is overpressurized.

⚠ WARNING



MOVING PARTS HAZARD

Never operate the pump with the warning plate (17) or the identification plate (41) removed. These plates protect your fingers from pinching or amputation by moving parts in the air motor.

Starting and Adjusting the Pump

1. With the air regulator (C) closed, open the bleed-type master air valves (A) or, if so equipped, join the quick disconnect coupler (M) to the male fitting (L).
2. Open the dispensing valve (J) into a grounded metal waste container, making firm metal-to-metal contact between the container and valve.
3. Open the pump air regulator (C) slowly, just until the pump is running. When the pump is primed and all air has been pushed out of the lines, close the dispensing valve.

NOTE: When the pump is primed, and with sufficient air supplied, the pump starts when the dispensing valve is opened and shuts off when it is closed.

4. Adjust the air regulator until you get sufficient flow from the dispensing valve. Always run the pump at the lowest speed necessary to get the desired results. Do not exceed the maximum working pressure of any component in the system.
5. Never allow the pump to run dry of the fluid being pumped. A dry pump will quickly accelerate to a high speed, possibly damaging itself. If your pump accelerates quickly, or is running too fast, stop it immediately and check the fluid supply. If the supply container is empty and air has been pumped into the lines, prime the pump and lines with fluid, or flush it and leave it filled with a compatible solvent. Be sure to eliminate all air from the fluid lines.

Continued on page 10.

Operation

NOTE: The low level cut-off valve accessory (K) closes the pump fluid intake when the fluid level is low, causing the pump to stall, to avoid running dry.

A pump runaway valve (D) can be installed on the air line of pumps not equipped with a low level cut-off valve, to automatically shut off the pump if it starts to run too fast.

6. Read and follow the instructions supplied with each component in your system.

7. If the pump will be unattended for any period of time, or to shut off the system at the end of the work shift, always follow the **Pressure Relief Procedure** on page 9.

Troubleshooting

NOTE: Check all other possible problems and solutions before disassembling the pump.

Problem	Cause	Solution
Pump fails to operate	Inadequate air supply pressure or restricted air lines	Increase air supply; clear
	Closed or clogged dispensing valve	Open; clear
	Clogged fluid lines, hoses, valves, etc.	Clear*
	Damaged air motor	Service air motor
	Exhausted fluid supply	Refill and reprime or flush
Continuous air exhaust	Worn or damaged air motor gasket, packing, seal, etc.	Service air motor
Erratic pump operation	Exhausted fluid supply	Refill and reprime or flush
	Held open or worn intake valve or piston packings	Clear; service
Pump operates, but output low on up stroke	Held open or worn piston packings	Clear; service
Pump operates, but output low on down stroke	Held open or worn intake valve	Clear; service
Pump operates, but output low on both strokes	Inadequate air supply pressure or restricted air lines	Increase air supply; clear
	Closed or clogged valves	Open; clean
	Exhausted fluid supply	Refill and reprime or flush
	Clogged fluid lines, hoses, valves, etc.	Clear*

*Follow the **Pressure Relief Procedure** on page 9 and disconnect the fluid line. If the pump starts when the air is turned on again, the line, etc., is clogged.

Air Motor and Throat Service

Before you start:

1. Be sure you have all necessary parts on hand. **Air Motor Repair Kit 206–728** includes repair parts for the motor. Use all the parts in the kit for the best results. Parts included in the kit are marked with one asterisk, for example (28*), in the text and drawings. See the **Parts List** for your pump model number.
2. **Displacement Pump Repair Kit 237–498** includes repair parts for the pump throat and piston. Use all the parts in the kit for the best results. Parts included in the kit are marked with a symbol, for example (6†), in the text and drawings. See the **Parts List** for your pump model number.
3. Three accessory tools should be used. **Padded Pliers, 207–579**, are used to grip the trip rod without damaging its surface. **Gauge, 171–818**, is used to ensure the proper clearance between the poppets and seat of the transfer valve. **Guide Collar Tool, 168–085**, is used to install the piston in the displacement pump cylinder during pump servicing.

Disassembly

1. Flush the pump. Follow the **Pressure Relief Procedure** on page 9 before proceeding.
2. Disconnect the hoses, remove the pump from its mounting, and clamp the air motor base in a vise.
3. Use a strap wrench on the displacement cylinder (16) to screw it out of the air motor base (52).
4. Pull the connecting rod (15) down as far as it will go.
5. Use a hammer and punch to remove the roll pin (4) from the piston rod (44), and then screw the connecting rod (15) out of the piston rod. See Fig. 4.

⚠ CAUTION

Do not damage the plated surface of the trip rod (51). Damaging the surface of the trip rod can result in erratic air motor operation. Use the special padded pliers, 207–579, to grasp the rod.

6. Manually push up on the piston rod (44) to move the piston assembly (53) up as far as it will go. Unscrew the cylinder cap nut (45). Pull the nut up. Grip the trip rod (51) with padded pliers 207–579 and screw the nut off the rod. See Fig. 4.

7. Remove the six screws (22) holding the cylinder (31) to the base (52). Carefully pull the cylinder straight up off the piston (53).

⚠ CAUTION

To avoid damaging the cylinder wall, lift the cylinder straight up off of the piston. Never tilt the cylinder as it is being removed.

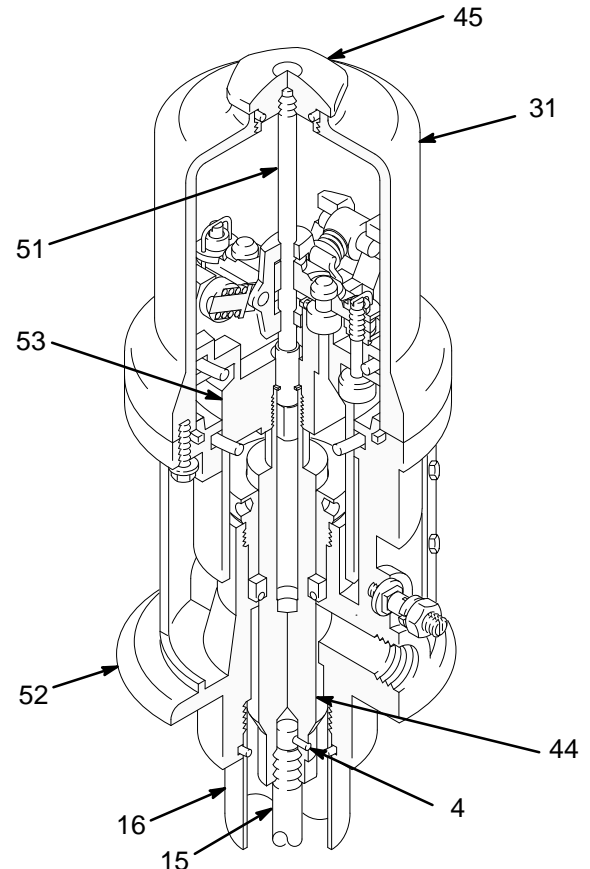


Fig. 4

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Air Motor and Throat Service

WARNING



MOVING PARTS HAZARD

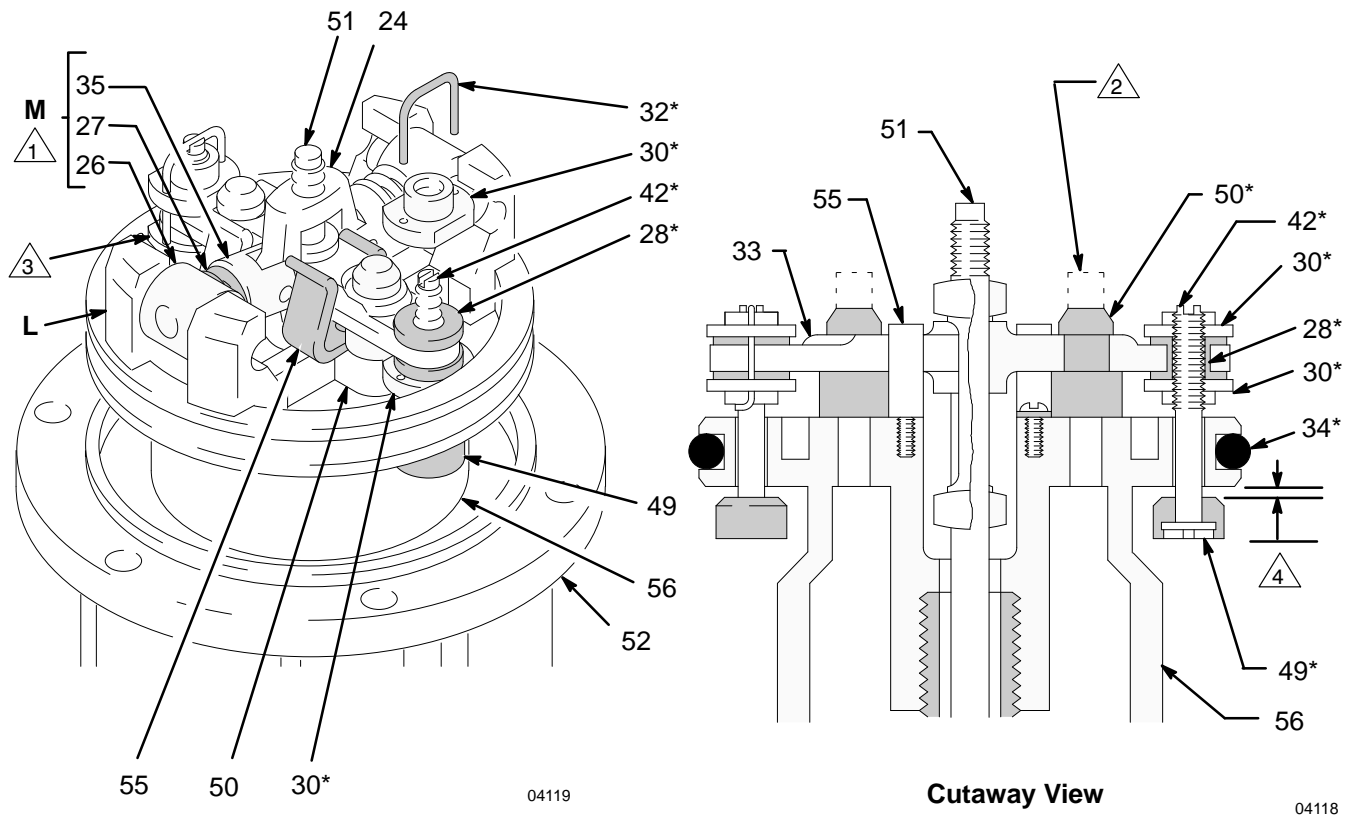
To reduce the risk of pinching or amputating your fingers, **always** keep fingers clear of the toggle assemblies (M).

8. Use a screwdriver to push down on the trip rod yoke (24) and snap the toggles down. See Fig. 5. Remove the lockwires (32) from the adjusting nuts (30) of the transfer valves. Screw the top nuts off. Screw the stems (42) out of the grommets (28) and bottom nuts (30). Take the valve poppets (49) off the stems and squeeze them firmly to check for cracks.
 9. Grip the toggle rockers (26) with a pliers. Compress the springs (27) and swing the toggle assembly (M) up and away from the piston lugs (L), and remove the parts. Check that the valve actuator (33) is supported by the spring clips (55), but slides easily into them. See Fig. 5.
 10. Remove the trip rod yoke (24), actuator (33) and trip rod (51). Check the exhaust valve poppets (50) for cracks.
- NOTE:** To remove the exhaust valve poppets (50), stretch them out and cut them with a sharp knife.
11. Remove one of the air motor muffler plates (17 or 41). Pull the piston up out of the base. Remove the throat packing nut (38) and packing (46).

Reassembly

1. Clean all the parts carefully in a compatible solvent and inspect for wear or damage. Use all the repair kit parts during reassembly and replace other parts as necessary.
2. Check the polished surfaces of the piston, piston rod and cylinder wall for scratches or wear. A scored rod will cause premature packing wear and leaking.
3. Lubricate all parts with a light, waterproof grease.
4. Install the packing (46†), with the lips facing down. Screw the packing nut (38) into the base (52) loosely. See Fig. 6.
5. Slide the piston rod (44) down through the packings and lower the piston (56) into the base (52). Be sure the o-rings (34*, 36, 37*) are in place.
6. Pull the exhaust valve poppets (50*) into the valve actuator (33) and clip off the top part shown with dotted lines. See Fig. 5.
7. Install the transfer valve grommets (28*), then reassemble the valve mechanism. Before installing the lockwires (32*) in the adjusting nuts (30*), use the special gauge 171–818 to adjust the transfer valve so there is 0.145 in. (3.7 mm) clearance between the poppets (49*) and the seat when it is open. See Fig. 5. Snap the toggles (35) to the up position.
8. Reassemble the air motor and assemble to the displacement pump. Before installing the air motor plate, tighten the throat packing nut (38) just snug — do not overtighten.
9. Before remounting the pump, connect an air hose and run the pump slowly [at about 40 psi (3 bar)] to see that it operates smoothly.
10. Reconnect the ground wire before regular operation of the pump.

Air Motor and Throat Service



- △ 1 Push toggles (M) in and then up.
- △ 2 Cut off tops of poppets as indicated by dotted lines.
- △ 3 Turn wires up.
- △ 4 0.145 in. (3.7 mm) clearance between poppets (49*) and seat when it is open.

Fig. 5

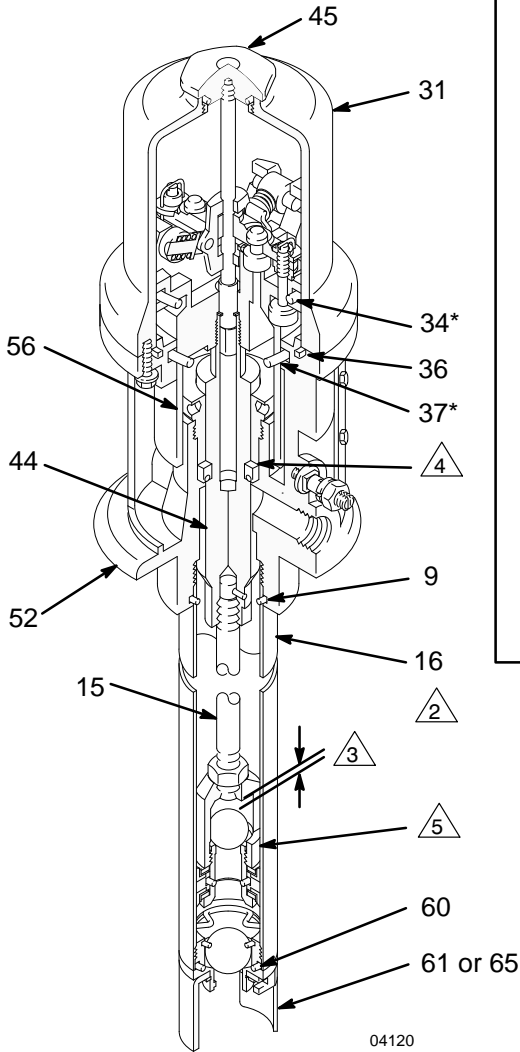
Displacement Pump Service

Disassembly

NOTE: Displacement Pump Repair Kit 237–498 includes repair parts for the pump piston and throat. Parts included in the kit are marked with two asterisks, for example, (6†), in the text and drawings.

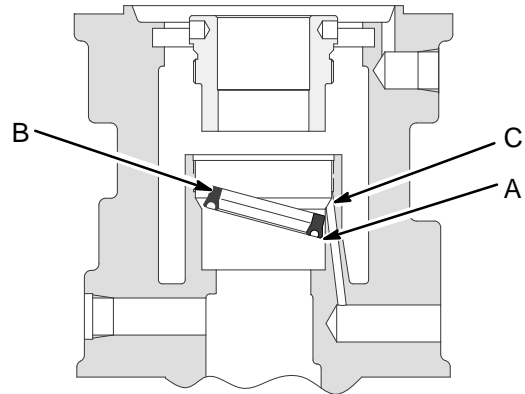
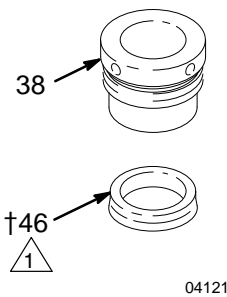
1. Flush the pump. Follow the **Pressure Relief Procedure** on page 9, before proceeding.
2. Disconnect the hoses, remove the pump from its mounting, and clamp the air motor base in a vise.

3. Unscrew the intake valve body (61 or 65) from the displacement cylinder (16). Disassemble the intake valve (see the parts drawing for your model for parts). Clean and inspect the parts for wear or damage, and replace parts as needed. Be sure to check the o-ring (60). Unless further service is needed, reassemble and reinstall the intake valve, using liquid sealant on the male threads. See Fig. 6.



- △1 Lips must face down.
- △2 Torque to 95–105 ft-lb (129–142 N.m).
- △3 0.2 in. (5 mm) of ball travel.
- △4 See Detail A.
- △5 See Detail B.
- △6 Lips must face up.

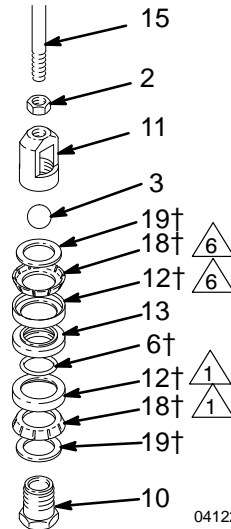
DETAIL A Throat Packings



Shows seal being installed. 04173

CAUTION: To avoid seal damage during installation, insert seal at an angle as shown above, so that side A is below hole C. Then press side B down until seal bottoms out.

DETAIL B Piston Packings



04122

Fig. 6

Displacement Pump Service

NOTE: To replace the throat packing, which is included in Repair Kit 237–498, refer to the Air Motor and Throat Packing Repair section on page 13.

4. Use a strap wrench on the displacement cylinder (16) to screw it out of the air motor base (52). Carefully inspect the smooth inner surface of the cylinder for scoring or irregular surfaces. Such damage causes premature packing wear and leaking, so replace the part if damaged.
5. Loosen the locknut (2), unscrew the piston (11) from the connecting rod (15), and disassemble the piston. See Fig. 6.
6. Clean and inspect the parts and replace any that are worn or damaged. Be sure to check the o-ring (9) in the motor base (52).
7. Grease the new piston packings and reassemble the piston as shown in Fig. 6.
8. Reinstall the piston (11) on the connecting rod (15), allowing 0.2 in. (5 mm) of free travel between the steel ball (3) and the end of the connecting rod before tightening the locknut (2). See Fig. 6.
9. Grease the inside top of the displacement cylinder (16). Compress the leather cup packings with the guide collar tool (R) and work the displacement cylinder onto the lower packing with a turning motion. See Fig. 7. Remove the guide collar tool, push the displacement cylinder up, and screw it firmly into the air motor base.
10. If the ground wire was disconnected before servicing, be sure to reconnect it before regular operation of the pump.

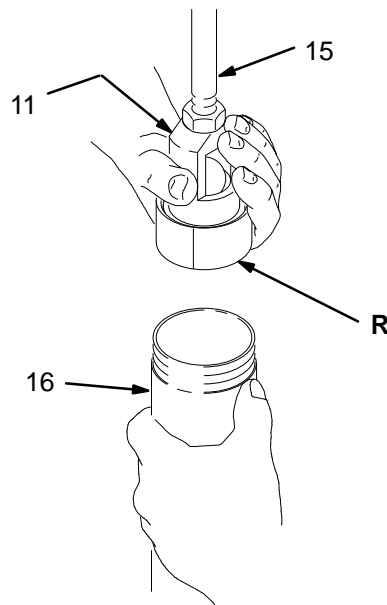


Fig. 7

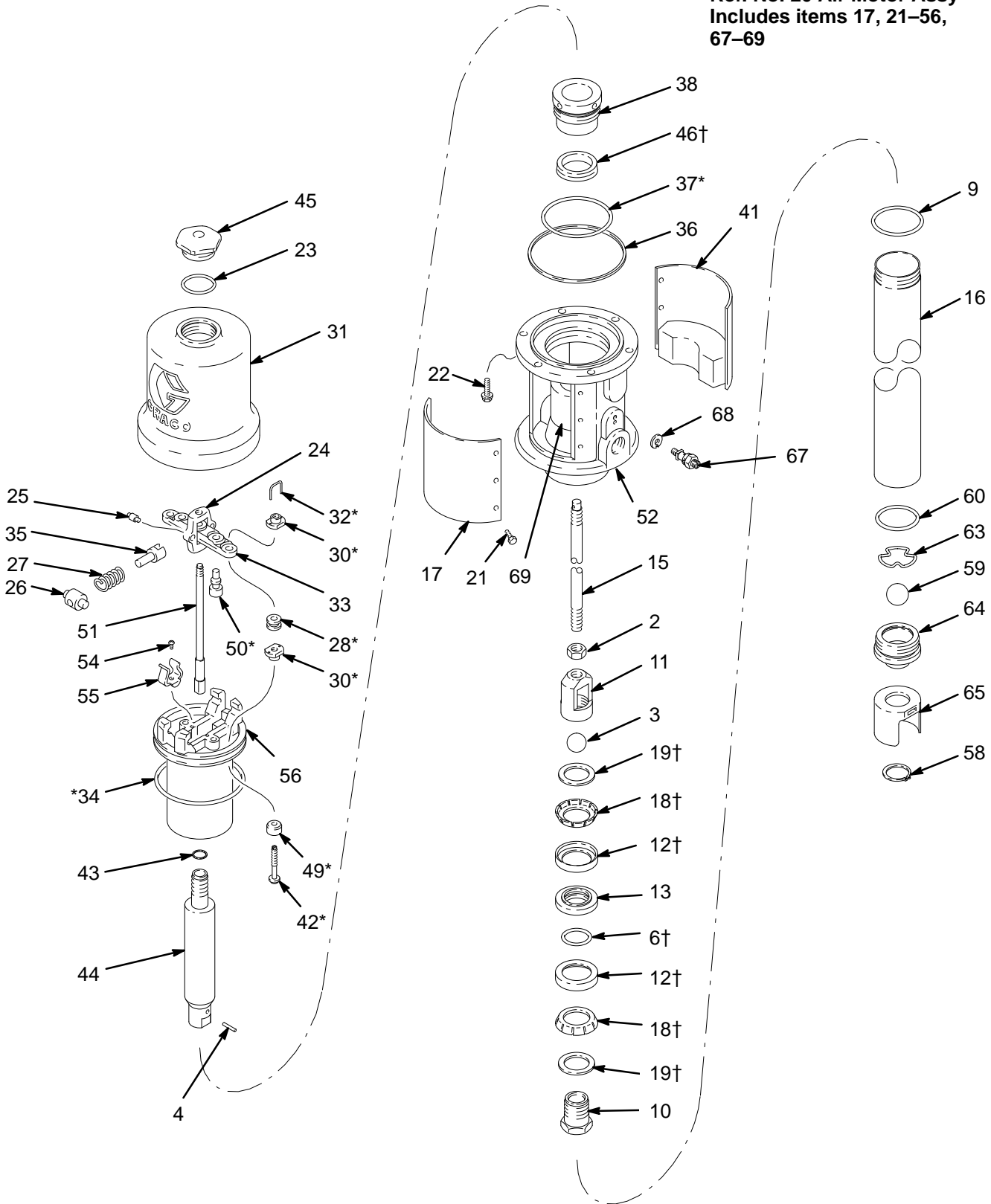
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NOTE: A guide collar is required for installing the piston in the displacement cylinder. Guide Collar Tool, 168–085, is available, or make a collar using shim stock having a 0.016 in. (0.41 mm) maximum thickness.

Parts

Model 203-857, Series K

Ref. No. 20 Air Motor Assy
Includes items 17, 21-56,
67-69



Parts

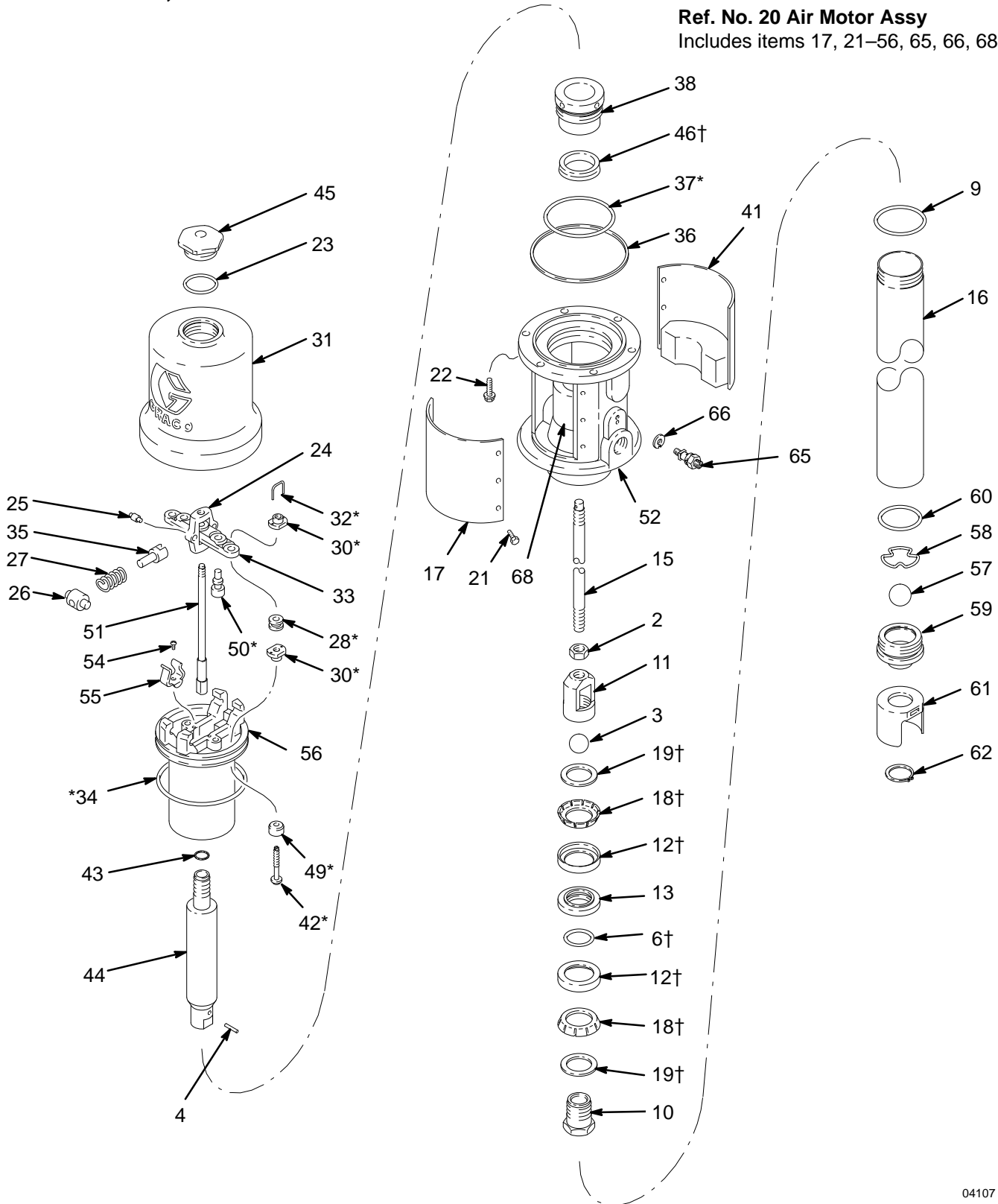
Model 203–857, Series K

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
2	100–111	NUT, hex jam; 1/2–20	1	36	160–624	. O-RING; buna-N	1
3	100–279	BALL, steel; 0.88" (22.2 mm) dia	1	37*	160–625	. O-RING; buna-N	1
4	101–579	PIN, roll; 0.12" (3.2 mm) dia; 0.75" (19 mm) long	1	38	190–024	. NUT, packing	1
6†	154–662	O-RING; buna-N	1	41	222–499	. PLATE, identification (with muffler)	1
9	156–641	O-RING; buna-N	1	42*	160–896	. STEM, valve	2
10	156–989	SEAT, piston	1	43	160–932	. GASKET; copper	1
11	157–184	HOUSING, piston	1	44	161–059	. ROD, piston	1
12†	158–402	PACKING, cup; leather	2	45	161–435	. NUT, cylinder cap	1
13	158–857	SPACER, piston	1	46†	112–843	. PACKING, block; polyurethane	1
15	160–649	ROD, connecting	1	49*	170–708	. POPPET, valve; urethane	2
16	160–917	CYLINDER, displacement	1	50*	170–709	. POPPET, valve; urethane	2
17	222–501	PLATE, warning (with muffler)	1	51	203–965	. ROD, trip	1
18†	171–590	SPREADER, packing	2	52	204–895	. BASE (white color)	1
19†	171–594	WASHER, back-up	2	53	214–036	. PISTON Assy	
20	203–963	AIR MOTOR Assy, Series S Includes items 17, 21–56, 67, 68, 69	1			includes items 54–56 (also includes repair kit 206–728 when ordered as a replacement part)	1
21	100–078	. SCREW, hex washer hd mach; no. 8–32 x 0.38"	12	54	102–975	. . SCREW, rd hd mach; no. 6–32 x 0.25"	2
22	101–578	. CAPSCREW, hex hd Nylock; 5/16–18 x 0.88"	6	55	172–866	. . CLIP, spring	2
23	156–698	. O-RING; buna-N	1	56		. . PISTON, bare; not sold separately	1
24	158–360	. YOKE, rod, trip	1	58	100–989	RING, retaining	1
25	158–362	. PIN, toggle	2	59	101–190	BALL, steel; 1" (25 mm) dia	1
26	158–364	. ROCKER, toggle	2	60	156–633	O-RING; nitrile rubber	1
27	167–585	. SPRING, helical compression	2	63	157–182	RETAINER, bail	1
28*	158–367	. GROMMET; rubber	2	64	160–914	HOUSING, valve	1
30*	160–261	. NUT, adjusting	4	65	156–893	BASE, valve	1
31	160–613	. CYLINDER (white color)	1	67	104–029	LUG, grounding	1
32*	160–618	. LOCKWIRE, transfer valve	2	68	104–582	WASHER, tab	1
33	172–867	. ACTUATOR, valve	1	69	180–233	LABEL, warning	2
34*	160–621	. O-RING; nitrile rubber	1			* Included in repair kit 206–728.	
35	160–623	. ARM, toggle	2			† Included in repair kit 237–498.	

Parts

Model 203-872, Series K

Ref. No. 20 Air Motor Assy
Includes items 17, 21-56, 65, 66, 68



04107

Parts

Model 203–872, Series K

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
2	100–111	NUT, hex jam; 1/2–20	1	36	160–624	. O-RING; buna-N	1
3	100–279	BALL, steel; 0.88" (22.2 mm) dia	1	37*	160–625	. O-RING; buna-N	1
4	101–579	PIN, roll; 0.12" (3.2 mm) dia; 0.75" (19 mm) long	1	38	190–024	. NUT, packing	1
6†	154–662	O-RING; buna-N	1	41	222–499	. PLATE, identification (with muffler)	1
9	156–641	O-RING; buna-N	1	42*	160–896	. STEM, valve	2
10	156–989	SEAT, piston	1	43	160–932	. GASKET; copper	1
11	157–184	HOUSING, piston	1	44	161–059	. ROD, piston	1
12†	158–402	PACKING, cup; leather	2	45	161–435	. NUT, cylinder cap	1
13	158–857	SPACER, piston	1	46†	112–84	. PACKING, block; polyurethane	1
15	160–647	ROD, connecting	1	49*	170–708	. POPPET, valve; urethane	2
16	160–915	CYLINDER, displacement	1	50*	170–709	. POPPET, valve; urethane	2
17	222–501	PLATE, warning (with muffler)	1	51	203–965	. ROD, trip	1
18†	171–590	SPREADER, packing	2	52	204–895	. BASE (white color)	1
19†	171–594	WASHER, back-up	2	53	214–036	. PISTON Assy includes items 54–56 (also includes repair kit 206–728 when ordered as a replacement part)	1
20	203–963	AIR MOTOR Assy, Series S Includes items 17, 21–56, 65, 66, 68	1	54	102–975	. . SCREW, rd hd mach; no. 6–32 x 0.25"	2
21	100–078	. SCREW, hex washer hd mach; no. 8–32 x 0.38"	12	55	172–866	. . CLIP, spring	2
22	101–578	. CAPSCREW, hex hd Nylock; 5/16–18 x 0.88"	6	56		. . PISTON, bare; not sold separately	1
23	156–698	. O-RING; buna-N	1	57	101–190	BALL, steel; 1" (25 mm) dia	1
24	158–360	. YOKE, rod, trip	1	58	157–182	RETAINER, ball	1
25	158–362	. PIN, toggle	2	59	160–914	HOUSING, valve	1
26	158–364	. ROCKER, toggle	2	60	156–633	O-RING; nitrile rubber	1
27	167–585	. SPRING, helical compression	2	61	156–893	BASE, valve	1
28*	158–367	. GROMMET; rubber	2	62	100–989	RING, retaining	1
30*	160–261	. NUT, adjusting	4	65	104–029	LUG, grounding	1
31	160–613	. CYLINDER (white color)	1	66	104–582	WASHER, tab	1
32*	160–618	. LOCKWIRE, transfer valve	2	68	180–233	LABEL, warning	2
33	172–867	. ACTUATOR, valve	1				
34*	160–621	. O-RING; nitrile rubber	1				
35	160–623	. ARM, toggle	2				

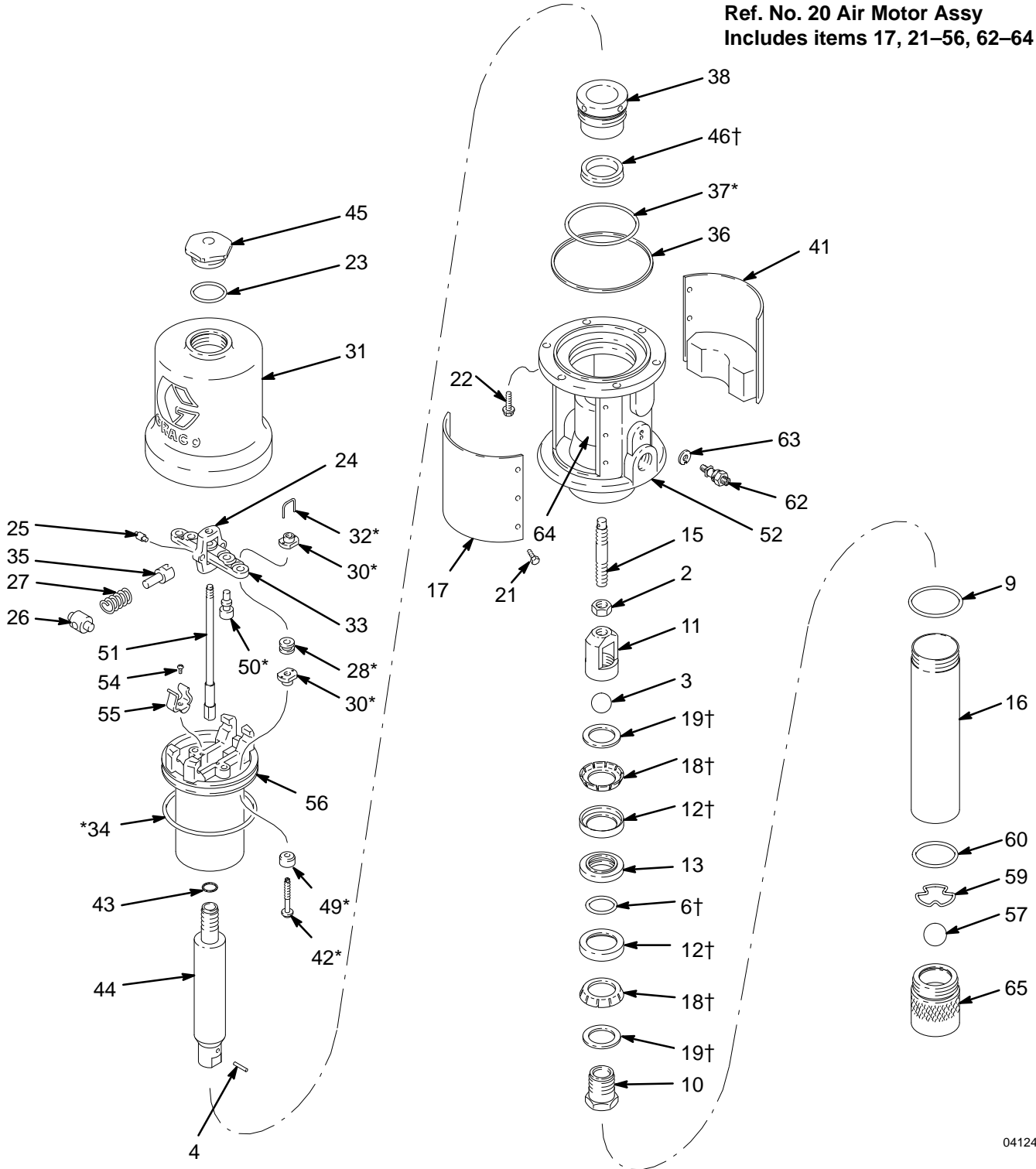
* Included in repair kit 206–728.

† Included in repair kit 237–498.

Parts

Model 203-876, Series K

Ref. No. 20 Air Motor Assy
Includes items 17, 21-56, 62-64



04124

Parts

Model 203–876, Series K

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
2	100–111	NUT, hex jam; 1/2–20	1	36	160–624	. O-RING; buna-N	1
3	100–279	BALL, steel; 0.88" (22.2 mm) dia	1	37*	160–625	. O-RING; buna-N	1
4	101–579	PIN, roll; 0.12" (3.2 mm) dia; 0.75" (19 mm) long	1	38	190–024	. NUT, packing	1
6†	154–662	O-RING; buna-N	1	41	222–499	. PLATE, identification (with muffler)	1
9	156–641	O-RING; buna-N	1	42*	160–896	. STEM, valve	2
10	156–989	SEAT, piston	1	43	160–932	. GASKET; copper	1
11	157–184	HOUSING, piston	1	44	161–059	. ROD, piston	1
12†	158–402	PACKING, cup; leather	2	45	161–435	. NUT, cylinder cap	1
13	158–857	SPACER, piston	1	46†	112–843	. PACKING, block; polyurethane	1
15	160–697	ROD, connecting	1	49*	170–708	. POPPET, valve; urethane	2
16	183–010	CYLINDER, displacement	1	50*	170–709	. POPPET, valve; urethane	2
17	222–501	PLATE, warning (with muffler)	1	51	203–965	. ROD, trip	1
18†	171–590	SPREADER, packing	2	52	204–895	. BASE (white color)	1
19†	171–594	WASHER, back-up	2	53	214–036	. PISTON Assy	
20	203–963	AIR MOTOR Assy, Series S Includes items 17, 21–56, 62–64	1			includes items 54–56 (also includes repair kit 206–728 when ordered as a replacement part)	1
21	100–078	. SCREW, hex washer hd mach; no. 8–32 x 0.38"	12	54	102–975	. . SCREW, rd hd mach; no. 6–32 x 0.25"	2
22	101–578	. CAPSCREW, hex hd Nylock; 5/16–18 x 0.88"	6	55	172–866	. . CLIP, spring	2
23	156–698	. O-RING; buna-N	1	56		. . PISTON, bare; not sold separately	1
24	158–360	. YOKE, rod, trip	1	57	101–190	BALL, steel; 1" (25 mm) dia	1
25	158–362	. PIN, toggle	2	59	157–182	RETAINER, ball	1
26	158–364	. ROCKER, toggle	2	60	156–633	O-RING; buna-N	1
27	167–585	. SPRING, helical compression	2	62	104–029	LUG, grounding	1
28*	158–367	. GROMMET; rubber	2	63	104–582	WASHER, tab	1
30*	160–261	. NUT, adjusting	4	64	180–233	LABEL, warning	2
31	160–613	. CYLINDER (white color)	1	65	183–009	BODY, intake valve	1
32*	160–618	. LOCKWIRE, transfer valve	2				
33	172–867	. ACTUATOR, valve	1				
34*	160–621	. O-RING; nitrile rubber	1				
35	160–623	. ARM, toggle	2				

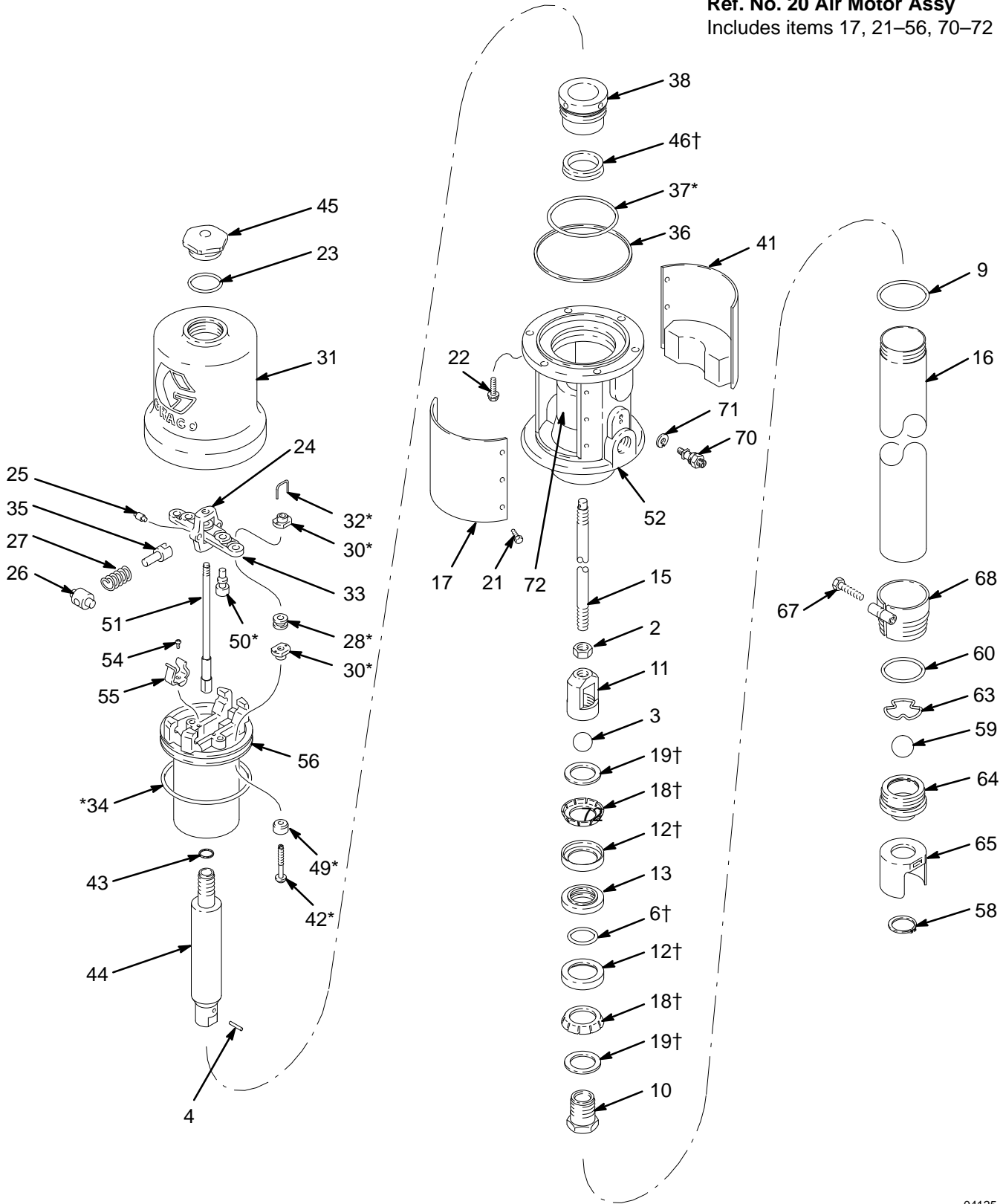
* Included in repair kit 206–728.

† Included in repair kit 237–498.

Parts

Model 204-254, Series N

Ref. No. 20 Air Motor Assy
Includes items 17, 21-56, 70-72



04125

Parts

Model 204–254, Series N

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
2	100–111	NUT, hex jam; 1/2–20	1	41	222–499	. PLATE, identification (with muffler)	1
3	100–279	BALL, steel; 0.88" (22.2 mm) dia	1	42*	160–896	. STEM, valve	2
4	101–579	PIN, roll; 0.12" (3.2 mm) dia; 0.75" (19 mm) long	1	43	160–932	. GASKET; copper	1
6†	154–662	O-RING; buna-N	1	44	161–059	. ROD, piston	1
9	156–641	O-RING; buna-N	1	45	161–435	. NUT, cylinder cap	1
10	156–989	SEAT, piston	1	46†	112–843	. PACKING, block; polyurethane	1
11	157–184	HOUSING, piston	1	49*	170–708	. POPPET, valve; urethane	2
12†	158–402	PACKING, cup; leather	2	50*	170–709	. POPPET, valve; urethane	2
13	158–857	SPACER, piston	1	51	203–965	. ROD, trip	1
15	161–815	ROD, connecting	1	52	204–895	. BASE (white color)	1
16	161–816	CYLINDER, displacement	1	53	214–036	. PISTON Assy includes items 54–56 (also includes repair kit 206–728 when ordered as a replacement part)	1
17	222–501	PLATE, warning (with muffler)	1	54	102–975	. . SCREW, rd hd mach; no. 6–32 x 0.25"	2
18†	171–590	SPREADER, packing	2	55	172–866	. . CLIP, spring	2
19†	171–594	WASHER, back-up	2	56		. . PISTON, bare; not sold separately	1
20	203–963	AIR MOTOR Assy, Series S Includes items 17, 21–56, 70–72	1	58	100–989	RING, retaining	1
21	100–078	. SCREW, hex washer hd mach; no. 8–32 x 0.38"	12	59	101–190	BALL, steel; 1" (25 mm) dia	1
22	101–578	. CAPSCREW, hex hd Nylock; 5/16–18 x 0.88"	6	60	156–633	O-RING; nitrile rubber	1
23	156–698	. O-RING; buna-N	1	63	157–182	RETAINER, ball	1
24	158–360	. YOKE, rod, trip	1	64	160–914	HOUSING, valve	1
25	158–362	. PIN, toggle	2	65	156–893	BASE, valve	1
26	158–364	. ROCKER, toggle	2	66	222–308	BUNG ADAPTER Assy includes items 67 and 68	1
27	167–585	. SPRING, helical compression	2	67	104–542	. SCREW, cap, hex hd; M8 x 1.25"	1
28*	158–367	. GROMMET; rubber	2	68	210–834	. ADAPTER, bung, bare	1
30*	160–261	. NUT, adjusting	4	70	104–029	LUG, grounding	1
31	160–613	. CYLINDER (white color)	1	71	104–582	WASHER, tab	1
32*	160–618	. LOCKWIRE, transfer valve	2	72	180–233	LABEL, warning	2
33	172–867	. ACTUATOR, valve	1				
34*	160–621	. O-RING; nitrile rubber	1				
35	160–623	. ARM, toggle	2				
36	160–624	. O-RING; buna-N	1				
37*	160–625	. O-RING; buna-N	1				
38	190–024	. NUT, packing	1				

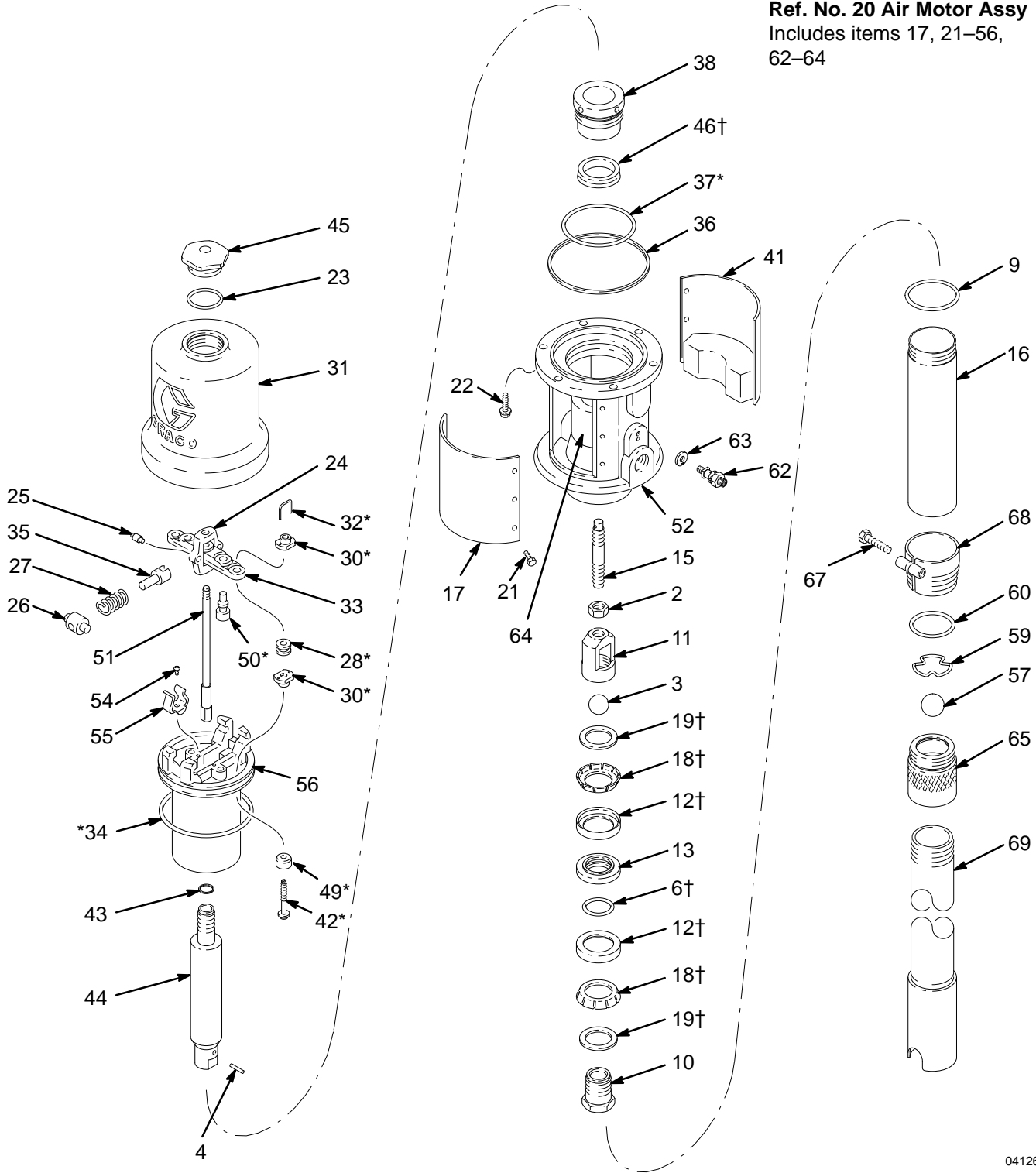
* Included in repair kit 206–728.

† Included in repair kit 237–498.

Parts

Model 222-087, Series B

Ref. No. 20 Air Motor Assy
Includes items 17, 21-56,
62-64



04126

Parts

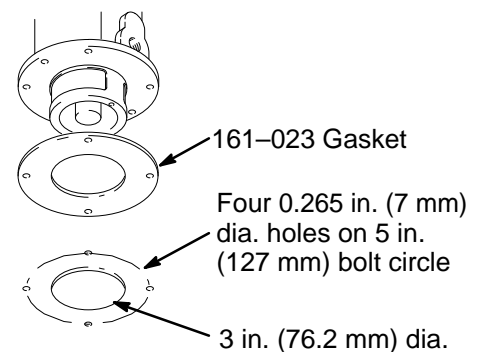
Model 222-087, Series B

Ref. No.	Part No.	Description	Qty.	Ref. No.	Part No.	Description	Qty.
2	100-111	NUT, hex jam; 1/2-20	1	41	222-499	. PLATE, identification (with muffler)	1
3	100-279	BALL, steel; 0.88" (22.2 mm) dia	1	42*	160-896	. STEM, valve	2
4	101-579	PIN, roll; 0.12" (3.2 mm) dia; 0.75" (19 mm) long	1	43	160-932	. GASKET; copper	1
6†	154-662	O-RING; buna-N	1	44	161-059	. ROD, piston	1
9	156-641	O-RING; buna-N	1	45	161-435	. NUT, cylinder cap	1
10	156-989	SEAT, piston	1	46†	112-843	. PACKING, block; polyurethane	1
11	157-184	HOUSING, piston	1	49*	170-708	. POPPET, valve; urethane	2
12†	158-402	PACKING, cup; leather	2	50*	170-709	. POPPET, valve; urethane	2
13	158-857	SPACER, piston	1	51	203-965	. ROD, trip	1
15	160-697	ROD, connecting	1	52	204-895	. BASE (white color)	1
16	183-010	CYLINDER, displacement	1	53	214-036	. PISTON Assy includes items 54-56 (also includes repair kit 206-728 when ordered as a replacement part)	1
17	222-501	PLATE, warning (with muffler)	1	54	102-975	. . SCREW, rd hd mach; no. 6-32 x 0.25"	2
18†	171-590	SPREADER, packing	2	55	172-866	. . CLIP, spring	2
19†	171-594	WASHER, back-up	2	56		. . PISTON, bare; not sold separately	1
20	203-963	AIR MOTOR Assy, Series S Includes items 17, 21-56, 62-64	1	57	101-190	BALL, steel; 1" (25 mm) dia	1
21	100-078	. SCREW, hex washer hd mach; no. 8-32 x 0.38"	12	59	157-182	RETAINER, ball	1
22	101-578	. CAPSCREW, hex hd Nylock; 5/16-18 x 0.88"	6	60	156-633	O-RING; nitrile rubber	1
23	156-698	. O-RING; buna-N	1	62	104-029	LUG, grounding	1
24	158-360	. YOKE, rod, trip	1	63	104-582	WASHER, tab	1
25	158-362	. PIN, toggle	2	64	180-233	LABEL, warning	2
26	158-364	. ROCKER, toggle	2	65	183-009	BODY, intake valve	1
27	167-585	. SPRING, helical compression	2	66	222-308	BUNG ADAPTER Assy includes items 67 and 68	1
28*	158-367	. GROMMET; rubber	2	67	104-542	. SCREW, cap, hex hd; M8 x 1.25"	1
30*	160-261	. NUT, adjusting	4	68	210-834	. ADAPTER, bung, bare	1
31	160-613	. CYLINDER (white color)	1	69	220-691	SUCTION TUBE Assy	1
32*	160-618	. LOCKWIRE, transfer valve	2				
33	172-867	. ACTUATOR, valve	1				
34*	160-621	. O-RING; nitrile rubber	1				
35	160-623	. ARM, toggle	2				
36	160-624	. O-RING; buna-N	1				
37*	160-625	. O-RING; buna-N	1				
38	190-024	. NUT, packing	1				

* Included in repair kit 206-728.

† Included in repair kit 237-498.

Mounting Hole Layout



04127

Technical Data

Maximum working pressure 900 psi (62 bar)
Fluid pressure ratio 5:1
Air operating range 40 to 180 psi (3 to 12 bar)
Air consumption 3 cfm per gallon pumped
(1.35 m³/liter) at 100 psi (7 bar);
up to 8 cfm with pump operated
within recommended range

Pump cycles per gallon 28
Pump cycles per liter 7.4
Maximum recommended pump speed . 66 cycles/min;
2.5 gpm (9.56 liter/min)
Recommended speed for
optimum pump life 15 to 25 cycles per min
Wetted parts Steel, Copper, Leather, Buna-N
Approximate weight 22 lb (10 kg)

Manual Change Summary

This manual was revised to update the drawings and include the following changes:

Page 27: Under **Mounting Hole Layout**, Part Number 161–023, Gasket, was changed to have four holes. This will allow either a two hole or four hole mounting configuration.

Series Change: Model 203–857 to Series K; Model 203–872 to Series K; Model 203–876 to Series K; Model 204–254 to Series N; and Model 222–087 to Series B. Air Motor 203–963 to Series S.

Assembly Changed	Part Status	Ref No.	Part No.	Name
203–857, 203–872, 203–876, 204–254 & 222–087	Deleted	29	159–312	Male Gland
	Deleted	39	160–632	Washer
	Deleted	40	160–634	Flat Packing
	Deleted	47	169–133	Female Gland
	Old	38	160–631	Packing Nut
	New	38	190–024	Packing Nut
Old	46	159–314	V-Packing	
New	46	112–843	Block Packing	

The Graco Warranty and Disclaimers

WARRANTY

Graco warrants all equipment manufactured by it 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. As purchaser's sole remedy for breach of this warranty, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment proven 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, 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 with Graco equipment of 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 claim. 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.

DISCLAIMERS AND LIMITATIONS

The terms of this warranty constitute purchaser's sole and exclusive remedy and are in lieu of any other warranties (express or implied), **including warranty of merchantability or warranty of fitness for a particular purpose**, and of any non-contractual liabilities, including product liabilities, based on negligence or strict liability. Every form of liability for direct, special or consequential damages or loss is expressly excluded and denied. In no case shall Graco's liability exceed the amount of the purchase price. Any action for breach of warranty must be brought within two (2) years of the date of sale.

EQUIPMENT NOT COVERED BY GRACO WARRANTY

Graco makes no warranty, and disclaims all implied **warranties of merchantability and fitness for a particular purpose**, with respect to accessories, equipment, materials, or components sold but not manufactured by Graco. These items sold, but not manufactured by Graco (such as electric motor, 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.

Graco Phone Numbers

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

FOR TECHNICAL ASSISTANCE, service repair information or assistance regarding the application of Graco equipment: **1-800-543-0339 Toll Free**

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