

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

INSTRUCTIONS

HEAVY-DUTY STAINLESS STEEL Drum Agitator

100 psi (7 bar) Maximum Air Input Pressure

Model 238-157, Series A
Back-Geared, Air-Powered Agitator

Model 238-250, Series A
Siphon Tube Kit

CE Model 231-414, Series A
Siphon Agitator Package

CE Model 231-413, Series A
Non-Siphon Agitator Package

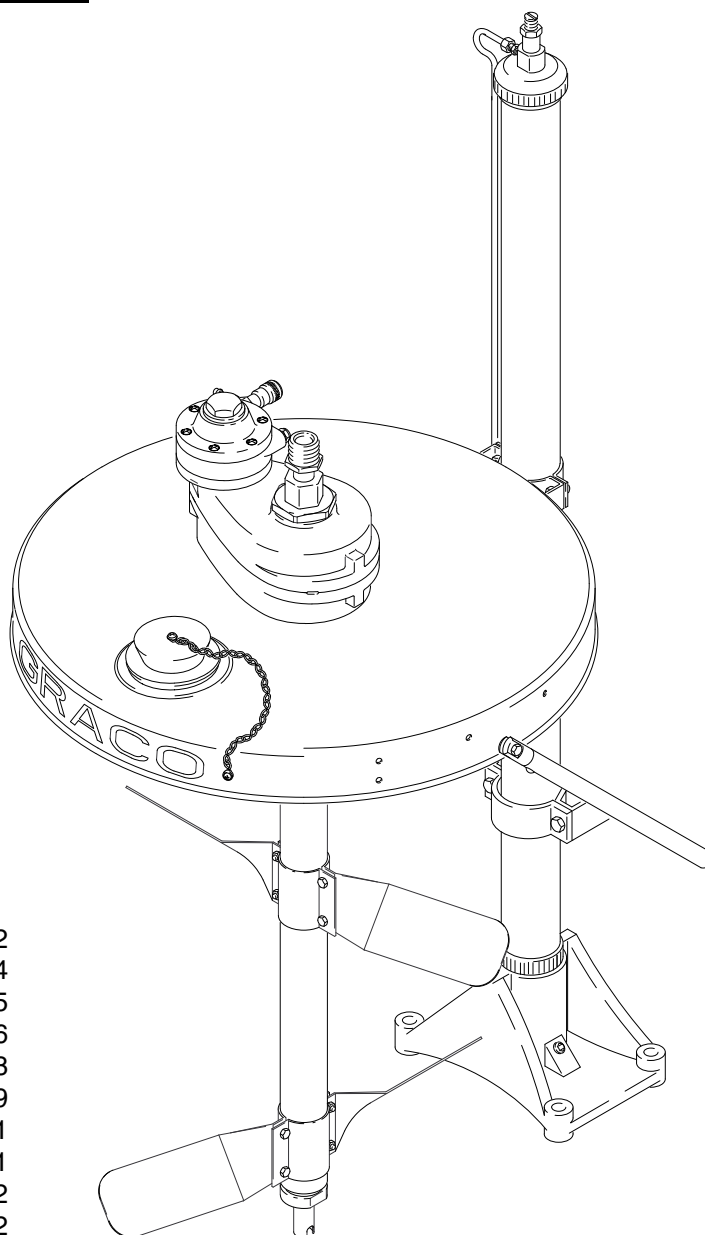


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Model 231-414 shown

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 your Graco distributor.
- 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 **100 psi (7 bar) maximum working pressure**.
- Use fluids and solvents that 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.
- Always wear protective eyewear, gloves, clothing, and respirator as recommended by the fluid and solvent manufacturer.
- Comply with all applicable local, state, and national fire, electrical, and safety regulations.

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 all equipment. Refer to **Grounding** on page 6.
- If there is any static sparking or you feel an electric shock while using this equipment, **shut off the agitator immediately**. Do not use the equipment until you identify and correct the problem.
- Do not use 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents, or fluids containing such solvents in aluminum pumps. Such use could result in a serious chemical reaction, with the possibility of explosion.
- Do not use kerosene or other flammable solvents or combustible gases to flush the unit.
- Provide fresh air ventilation to avoid the buildup of flammable fumes from solvents or the fluid being dispensed.
- Keep the dispensing area free of debris, including solvent, rags, and gasoline.
- Do not smoke in the dispensing area.



MOVING PARTS HAZARD

Moving parts, such as the rotating blades of the agitator, can pinch or amputate your fingers or other body parts and can cause splashing in the eyes or on the skin.

- Keep clear of all moving parts when starting or operating the agitator.
- Always shut off the agitator and disconnect the air line before you remove the agitator from the drum or check or repair any part of the agitator.



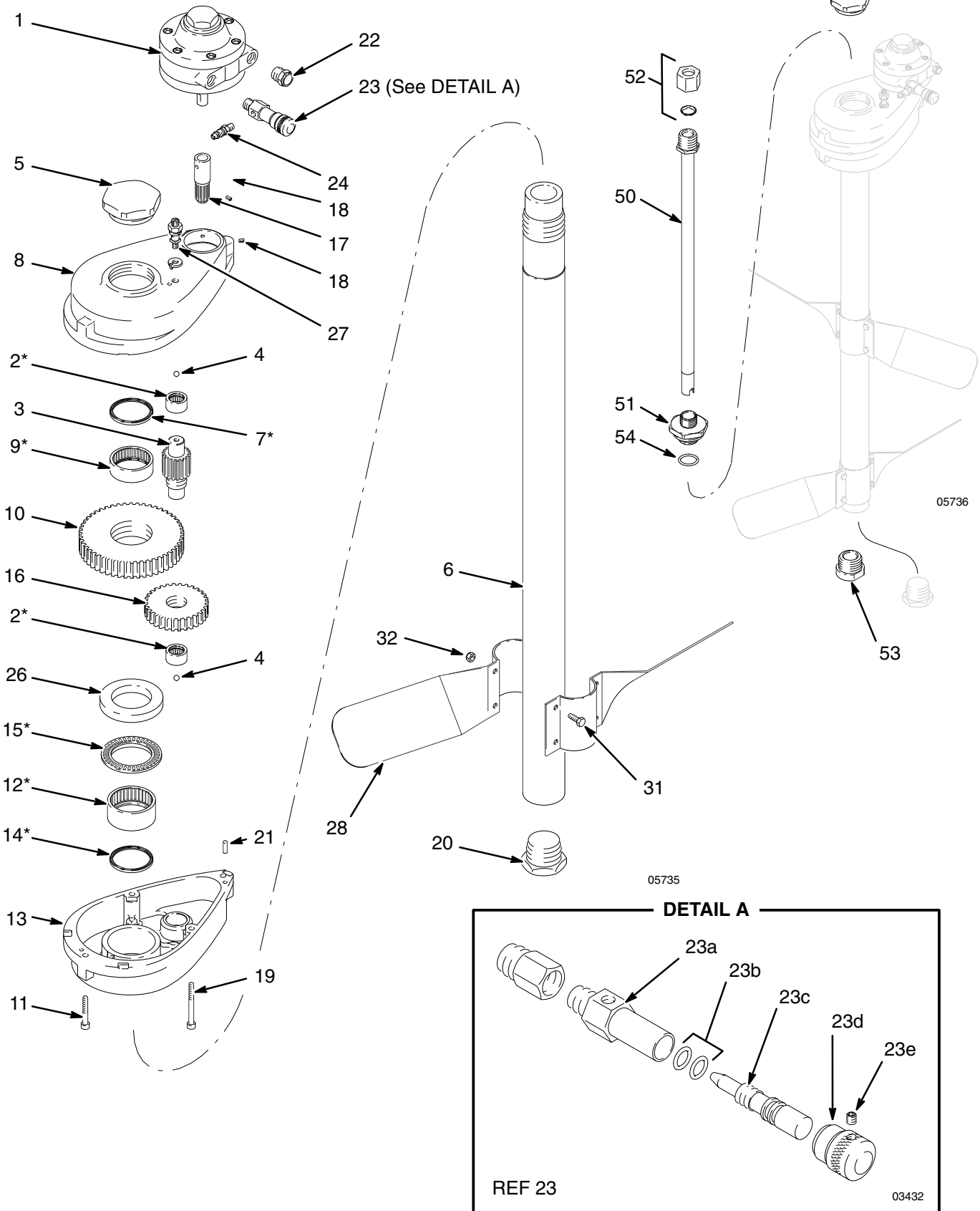
HAZARDOUS VAPORS

Hazardous fluids or toxic fumes can cause serious injury or death if splashed in the eyes or on the skin, swallowed, or inhaled. When flushing the air motor, keep your face away from the exhaust port.

Parts Drawings

**Heavy-Duty Stainless Steel Agitator,
Model 238-157**

Siphon Kit, Model 238-250



Parts Lists

Heavy-Duty Stainless Steel Agitator, Model 238–157

Ref No.	Part No.	Description	Qty.	Ref No.	Part No.	Description	Qty.
1†	101–140	AIR MOTOR	1	23	202–233	VALVE, needle <i>Includes items 23a to 23e</i>	1
2*	191–004	BEARING, needle; 3/4"	2	23a	159–448	.HOUSING, needle valve	1
3	190–988	GEAR, pinion #2	1	23b	159–589	.PACKING, o-ring	2
4	100–069	BALL, thrust	2	23c	159–449	.VALVE, needle	1
5	191–003	PLUG, top	1	23d	101–326	.SCREW, set	1
6	190–977	SHAFT, agitator	1	23e	156–930	.BARREL, needle valve	1
7*	113–363	SEAL, bearing	1	24	169–969	FITTING, air line, male	1
8	190–983	HOUSING, upper	1	25	113–358	SCREW, hex head <i>(not shown)</i>	3
9*	190–980	BEARING, needle; 45mm	1	26	190–976	NUT; 50 mm	1
10	190–989	GEAR #2	1	27	104–029	LUG, grounding	1
11	113–357	SCREW, cap, socket head	2	28	190–985	BLADE, agitator	4
12*	190–978	BEARING, needle; 50mm	1	30▲	290–152	LABEL, warning	1
13	190–984	HOUSING, lower	1	31	113–413	SCREW, cap	8
14*	113–359	SEAL, bearing	1	32	113–414	NUT, lock	8
15*	190–979	BEARING, needle, thrust; 50mm	1				
16	190–987	GEAR #1	1				
17	190–986	GEAR, pinion #1	1				
18	108–161	SET SCREW, cup pt; SST	3				
19	113–356	SCREW, cap, socket head	2				
20	191–002	PLUG, bottom	1				
21	105–489	PIN, dowel	2				
22	112–173	MUFFLER	1				

† *Air Motor Repair Kit, Part No. 207–335, is available.*

* *Included in Bearing Replacement Kit 238–251*

▲ *Extra warning labels are available for free.*

Siphon Kit, Model 238–250

Ref No.	Part No.	Description	Qty.
50	238–161	TUBE, siphon	1
51	190–998	RETAINER, siphon tube	1
52	190–999	NUT, retaining	1
53	191–000	BEARING; plain	1
54	109–176	O-ring; PTFE®	1

Drum Cover Assembly, Model 238–283

See manual 308–466.

Installation

NOTE: Reference numbers and letters in parentheses refer to the callouts in the figures and in the **Parts Drawings**.

Grounding

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

To reduce the risk of static sparking, the mounting cover and all electrically conductive objects or devices in the dispensing area **must** be properly grounded. Check your local electrical code for detailed grounding instructions for your area and type of equipment.

To ground the agitator, connect one end of the ground wire (A) to the ground connector (B) on the agitator. See Fig. 1. Connect the other end of the ground wire to a true earth ground.

For an additional ground wire and clamp, order Part No. 237-569.

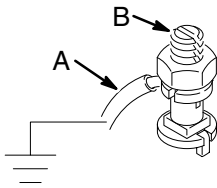


Fig. 1

Assembling and Positioning the Agitator

With an Elevator

Mount the drum cover as described in manual 306-287. The elevator must be in the down position when you do any work on the elevator, agitator, or drum cover assembly. **Do not** go under the elevator when it is raised. Proceed to step 1 in **With or Without an Elevator**.

Without an Elevator

If your system does not have an elevator, you should install the Handles Kit to facilitate handling the drum cover and agitator. Two people are needed to safely lift and move the drum cover and agitator. *To order the Handles Kit, order Part No. 237-524.*

Place two standard 55 U.S. gallon (45 Imperial gallon) barrels 14 in. (approximately 36 cm) apart, and center the drum cover on the barrels with the Graco logo centered and facing you, as shown in Fig. 2. Proceed to step 1 in **With or Without an Elevator**.

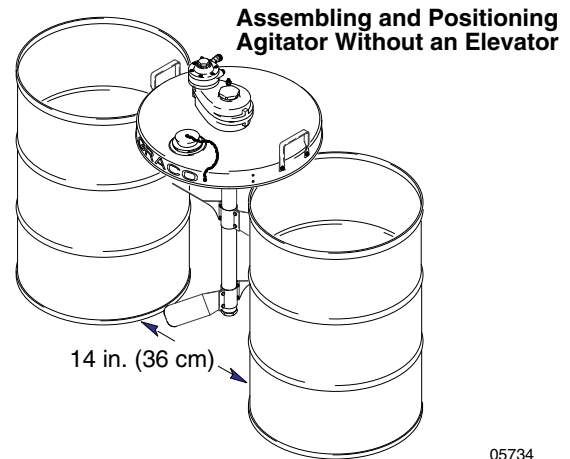


Fig. 2

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With or Without an Elevator

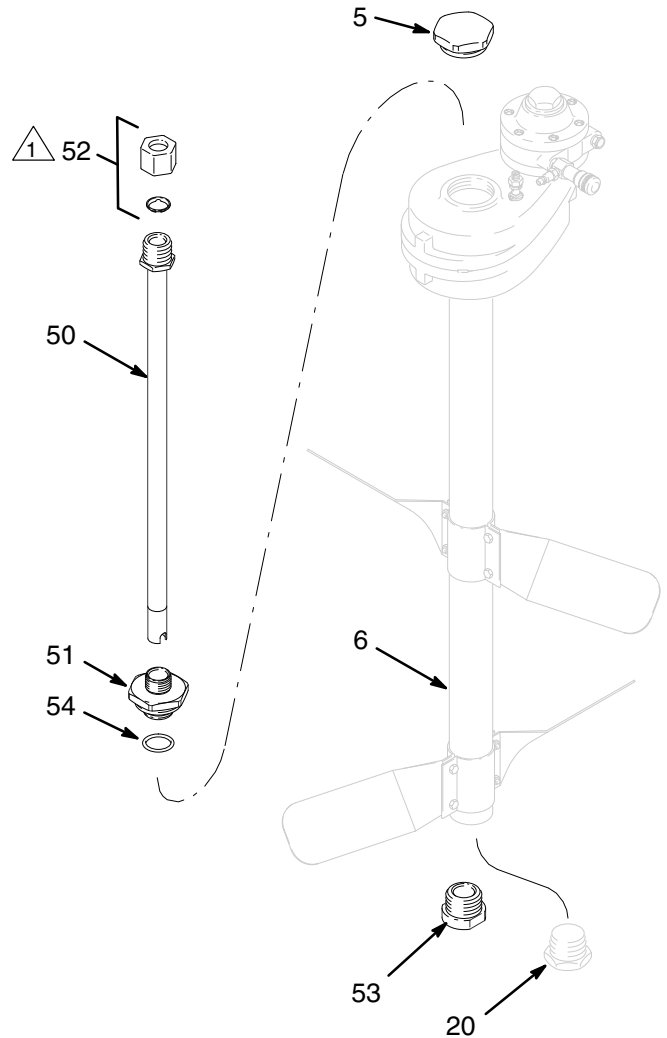
1. Slide the agitator shaft through the large hole in the center of the drum cover (29).
2. Rotate the agitator so that the air motor is to the left of the shaft, as shown in Fig. 2, which will align the three tapped holes in the bottom of the agitator with the three through holes in the drum cover.
3. Thread the three hex head screws (25) up through the drum cover and into the agitator, and torque them to 75 in-lb (8.4 N-m).
4. Assemble one pair of agitator blades (28) so that the four through holes in the blade halves are lined up (see **Parts Drawing** for blade orientation).
5. Push four cap screws (31) through the four holes in the blades, and start the lock nuts (32) onto the cap screws.
6. Slide the loose blade assembly up the shaft, and position it approximately 13 in. (33 cm) from the bottom of the shaft.
7. Tighten the four lock nuts (32) evenly to draw the blades together until they are tight on the shaft. Torque the locknuts to 50 to 55 in-lb (5.6 to 6.2 N-m). A gap will remain between the blade halves.
8. Repeat steps 4 and 5 with the second pair of agitator blades.
9. Position the second blade assembly near the bottom end of the shaft, but not on the bottom plug (20).
10. Rotate the lower blade assembly so that it is oriented 90 degrees relative to the upper blade assembly, and torque the lock nuts (32) to 50 to 55 in-lb (5.6 to 6.2 N-m). A gap will remain between the blade halves.

Installation

Installing the Siphon Kit

See the Siphon Kit, Model 238–250, **Parts List** on page 5.

1. Remove the top plug (5) and the bottom plug (20).
2. Replace the bottom plug (20) with the plain bearing (53), and tighten the bearing with a wrench.
3. Work the PTFE® o-ring (54) onto the siphon tube retainer (51), and press it into the o-ring groove.
4. Replace the top plug (5) with the siphon tube retainer (51). Leave the retaining nut (52) on the siphon tube retainer, but make sure it is not tightened. Tighten the siphon tube retainer into the top of the agitator housing with a wrench.
5. Slide the siphon tube (50) down through the retaining nut (52), siphon tube retainer (51), and agitator shaft (6) until the siphon tube touches the bottom of the drum. Raise the siphon tube approximately 1/4 in. (approximately 6 mm) so that it does not touch the bottom of the drum. Hold the siphon tube at this height with one hand, and tighten the retaining nut with the other hand (hand-tight is enough to hold the siphon tube in place).



CAUTION

Barrel Heights Vary.

Loosen the retaining nut on the siphon tube retainer before you raise the drum cover. If you do not loosen the retaining nut, the siphon tube may make contact with the bottom of the barrel when you lower the drum cover onto a new barrel, which could damage the siphon tube or the barrel.

1 Make sure the center tabs on the retaining nut ferrule point down.

Fig. 3

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Operation

WARNING



MOVING PARTS HAZARD

To reduce the risk of serious injury, including cuts, amputation of fingers by the agitator blades, and splashing in the eyes or on the skin, always shut off the agitator (disconnect the air line from the agitator) before you raise, check, or repair the agitator.

Startup

1. Make sure the needle valve (23) is closed.
2. Turn on the air supply, and connect the air line coupler.
3. Using the needle valve (23) to adjust the agitator speed, gradually increase the speed until you can see through the inspection port movement in the surface of the liquid, but do not increase the agitator speed enough to create a vortex in the surface of the liquid. If the surface begins to vortex, decrease the agitator speed to prevent air entrainment.

NOTE: Always maintain moderate agitator speed, which is approximately 50 rpm of the agitator blades. Excessive agitator speed may cause vibration, foaming of fluid, and increased wear on parts. Always agitate fluid thoroughly before supplying it to the dispensing equipment. Continue agitating fluid while the dispensing equipment is being supplied.

Shutdown


To stop the agitator, close off the air supply with the needle valve (23), or disconnect the air line coupler.


CAUTION


Keep the agitator upright. Do not lay it on its side or upside down, or liquid may flow down the shaft and into the gear reducer area.


Service

Flushing the Air Motor

 **WARNING**

 **FIRE AND EXPLOSION HAZARD**
Do not use kerosene or other flammable solvents to flush the air motor. Flushing with flammable solvents could cause fire or explosion and result in serious injury or property damage.

 **WARNING**

 **HAZARDOUS VAPORS**
Hazardous fluids or toxic fumes can cause serious injury or death if splashed in the eyes or on the skin, swallowed, or inhaled. When flushing the air motor, keep your face away from the exhaust port, and wear the appropriate protective clothing, gloves, eyewear, and respirator.

If the air motor (1) is sluggish or inefficient, follow this procedure in a well ventilated area.

1. Disconnect the air line and muffler (22). See the **Parts Drawing** on page 4.
2. Add several teaspoons of non-flammable solvent, or spray the solvent directly into the male quick-disconnect coupler (24).
NOTE: The recommended solvent for air motors and lubricated pumps is Gast® Flushing Solvent (Part No. AH255 or AH255A) or Penetone Inhibisol® Safety Solvent.
3. Reconnect the air line, and slowly increase the air pressure until there is no trace of solvent in the exhaust air.
4. Reconnect the muffler (22).
5. Re-lubricate the motor with a squirt of lightweight oil into the male quick-disconnect coupler (24).

Lubricating the Air Motor

If an air line lubricator is not installed, the agitator air motor must be manually lubricated after every 8 hours of use. Lubricate the air motor by placing 2 or 3 drops of SAE #10 light oil in the motor's air inlet.


Additional Air Motor Service

If the air motor vanes need to be replaced, or if foreign material is present in the motor chamber, an experienced mechanic may remove the end plate opposite the drive shaft end of the air motor. *Do not pry with a screwdriver*, it will dent the surface of the plate and body and cause leaks. Use a puller tool, which will remove the end plate while maintaining the position of the shaft.

New vanes should have the edges with cut corners pointing toward the bottom of the vane slot.

To order an Air Motor Repair Kit, order Part No. 207-335.

Cleaning the Agitator Shaft and Seal

 **CAUTION**

Keep the agitator upright. Do not lay it on its side or upside down, or liquid may flow down the shaft and into the gear reducer area.

If any material is on the shaft (6) within 1/2 in. (13 mm) of the housing (13), it must be removed to prevent damage to the bearing seal (14*). If the flexible lips on the bearing seal are torn or worn such that they do not make contact all the way around the shaft, the seal must be replaced. A worn seal may allow foreign material into the bearing and cause premature failure. See **Servicing the Gear Reducer** on page 10 for instructions on getting access to the seal and for the Bearing Replacement Kit Part No.

Cleaning an Agitator with a Siphon Kit

The procedure for flushing and cleaning the siphon tube (50) and agitator shaft (6) is as follows:

1. Raise the agitator out of the drum.
2. Remove the plain bearing (53) from the agitator shaft (6), and clean it.
3. Detach any attachments from the siphon tube, and flush the siphon tube.
4. Loosen the retaining nut (52), and slowly lift the siphon tube (50) out of the agitator.
5. Clean the inside and outside of the siphon tube (50), flush the inside of the agitator shaft (6), and clean the agitator blades (28) and the outside of the shaft.
6. Reassemble the siphon tube by doing the reverse of steps 2 through 4.

Service

Servicing the Gear Reducer

You may want to have the Bearing Replacement Kit on hand before you begin this procedure. *To order a Bearing Replacement Kit, order Part No. 238–251.*

Disassembling

The following procedure does not require that you remove the agitator from the drum of material:

1. If your agitator has a siphon kit, do steps 2 through 4 in **Cleaning an Agitator with a Siphon Kit** on page 9. If your agitator does not have a siphon kit, proceed to step 2 below.
2. Raise/support the drum cover above the drum high enough so that you can reach the underside of it.
3. Remove the three hex head screws (25) that hold the agitator to the drum cover.
4. Raise the agitator housing 4 to 6 in. (100 to 150 mm) above the drum cover, and support it at that height with blocks.
5. Tightly grip the agitator shaft with a clamp to prevent the shaft from falling into the drum.
6. Remove the two short bolts (11) and the two long bolts (19) that hold the upper housing (8) and the lower housing (13) together. Carefully lifting straight up, lift the upper housing off of the lower housing.
7. Turn the large gear (10) counter-clockwise to remove it from the agitator shaft, and lift the pinion/gear assembly (3, 16) out of the lower housing.

NOTE: Before you do step 8, check to be sure the agitator shaft is well secured. See step 5.

8. Turn the 50 mm nut (26) counter-clockwise to remove it from the agitator shaft.
9. Carefully lift the lower housing (13) off of the agitator shaft.

Cleaning and Servicing

1. Clean any foreign material off of the outside of the upper and lower housings (8 and 13).

NOTE: Do not lose the two small thrust balls (4). One is in the upper housing (8), and one is in the lower housing (13).

2. Inspect the parts for any wear. If any of the parts are worn or damaged, replace them. The Bearing Replacement Kit contains replacement bearings and seals (items 2, 7, 9, 12, 14, and 15).

Reassembling

NOTE: See the **Parts Drawing** on page 4 for proper bearing and seal placement and orientation.

1. Reposition the lower housing (13) on the agitator shaft.

CAUTION

To prevent damage to the bearings and seals, avoid scraping them against the threaded agitator shaft while you are lowering the lower housing in place.

2. Thread the 50-mm nut (26) onto the agitator shaft by turning it clockwise, and tighten it hand tight.
3. Reposition the pinion/gear assembly (3, 16) in the lower housing, thread the large gear (10) onto the agitator shaft, and tighten the large gear hand tight.
4. Make sure the small thrust balls (4) are in place.
5. Carefully lowering it straight down, reposition the upper housing (8) on the lower housing (13).
6. Replace the two short bolts (11) and the two long bolts (19) that hold the upper housing (8) and the lower housing (13) together, and torque the bolts to 75 in-lb (8.5 N-m).
7. Remove the blocks that you have supporting the agitator housing, and reposition the agitator on the drum cover.
8. Thread the three hex head screws (25) up through the drum cover and into the agitator, and torque them to 75 in-lb (8.4 N-m).
9. If your agitator has a siphon kit, re-install it by doing the reverse of steps 2 through 4 in **Cleaning an Agitator with a Siphon Kit** on page 9.

Additional Agitator Service

If the unit requires more than installation of a bearing replacement kit or gear replacement, it may be advisable to send the unit to a Graco distributor for repair or replacement.

Technical Data

Maximum air input pressure 100 psi (7 bar)
 Motor power rating at 1200 rpm (shaft at 50 rpm),
 using 12 cfm (0.34 m³/min) 0.25 hp (186 W)
 Maximum recommended shaft rpm 100
 Gear reducer ratio 24:1
 Weight 33.5 lb (15.2 kg)
 Height
 From top of air motor to end of agitator
 shaft (no nut) 38 in. (965 mm)
 From top of air motor to end of siphon
 tube (no fittings) 43 in. (1092 mm)
 Span of agitator blades 20 in. (508 mm)
 Width of agitator blades 3 in. (76 mm)
 Air inlet Mates with 1/4-in. npt(f) quick-disconnect,
 Part No. 208–536
 Wetted parts 304 SST, 304/304L SST,
 Delrin[®] A/F, nylon, PTFE[®]
 Siphon tube I.D. 3/4 in. (19 mm)

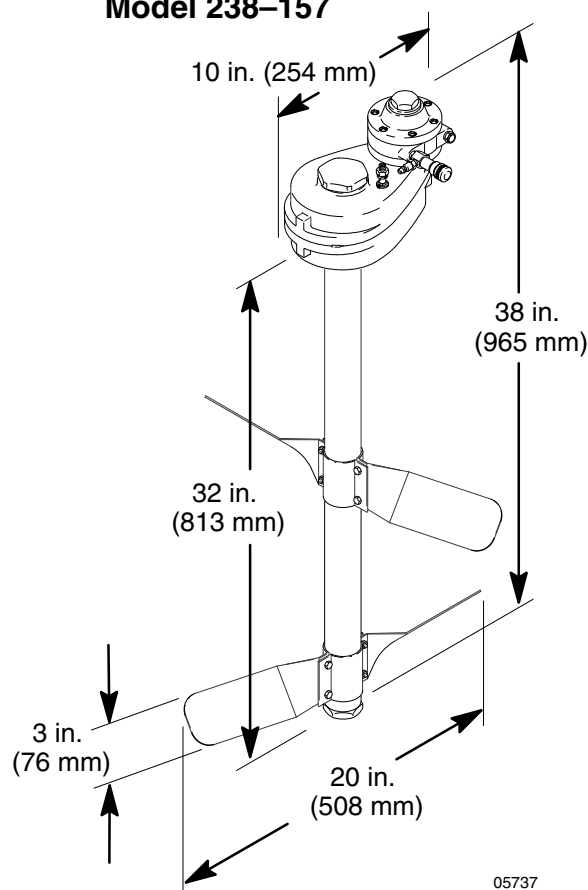
Maximum flow at 100 cps 12 gpm (45.5 lpm)
 Maximum flow at 1000 cps 1.2 gpm (4.5 lpm)
 Air consumption 3 to 30 scfm (0.08 to 0.85 m³/min)

* Sound data
 † Typical operating conditions
 Sound power 77.3 dB(A)
 Sound pressure 63.8 dB(A)
 ‡ Maximum noise conditions
 Sound power 86.4 dB(A)
 Sound pressure 72.9 dB(A)

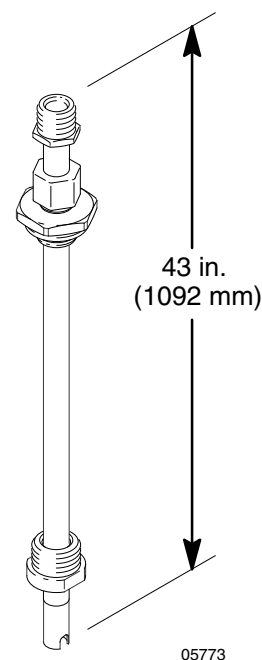
* Sound data was measured per ISO 3744-1981.
 † 50 rpm (shaft) agitating 300 cps water-base material
 ‡ 100 rpm (shaft) agitating an empty container
 Gast[®] is a registered trademark of Gast Manufacturing.
 Inhibisol[®] is a registered trademark of Penetone Corp.
 Delrin[®] and PTFE

Dimensional Drawings

**Heavy-Duty Stainless Steel Agitator,
Model 238–157**



Siphon Kit, Model 238–250



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 Number

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

Sales Offices: Atlanta, Chicago, Detroit, Los Angeles

Foreign Offices: Belgium, Canada, England, Korea, Switzerland, France, Germany, Hong Kong, Japan

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

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