Instructions

Check-Mate® 800 Pumps

308352F

EN

Stainless Steel

Stainless Steel pumps with Priming Piston and Severe-Duty® Rod Cylinder for transferring common industrial coatings and adhesives. For professional use only.

Model 236462, Series B, 65:1 Ratio

with King® Air Motor and 236612 Displacement Pump

5850 psi (40 MPa, 403 bar) Maximum Working Pressure
90 psi (0.6 MPa, 6.2 bar) Maximum Air Input Pressure

Model 241519, Series B, 65:1 Ratio

with Quiet King® Air Motor and 236612 Displacement Pump

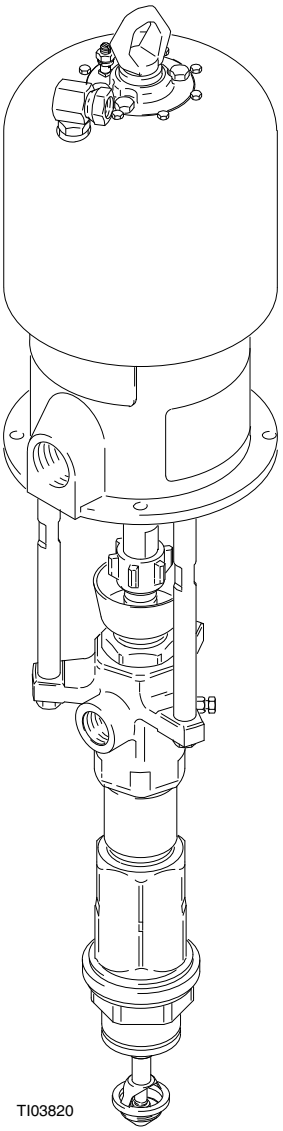
5850 psi (40 MPa, 403 bar) Maximum Working Pressure
90 psi (0.6 MPa, 6.2 bar) Maximum Air Input Pressure

Model 234978, Series A, 31:1 Ratio

with Bulldog® Air Motor and 236612 Displacement Pump

3100 psi (21 MPa, 214 bar) Maximum Working Pressure
100 psi (0.7 MPa, 7 bar) Maximum Air Input Pressure

See page 28 for technical specifications.



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Important Safety Instructions

Read all warnings and instructions in this manual before using the equipment.
Save these instructions.

Contents

Related Manuals

Manuals are available at www.graco.com

Manual in English	Description
309347	King Air Motor Repair-Instructions
309348	King Quiet Air Motor Repair-Instructions
307049	Bulldog Air Motor Parts-Instructions

Warnings

The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbols refer to procedure-specific risks. When these symbols appear in the body of this manual or on warning labels, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

⚠ WARNING

SKIN INJECTION HAZARD

High-pressure fluid from dispensing device, hose leaks, or ruptured components will pierce skin. This may look like just a cut, but it is a serious injury that can result in amputation. **Get immediate surgical treatment.**

- Engage trigger lock when not dispensing.
- Do not point dispensing device at anyone or at any part of the body.
- Do not put your hand over the fluid outlet.
- Do not stop or deflect leaks with your hand, body, glove, or rag.
- Follow the **Pressure Relief Procedure** when you stop dispensing and before cleaning, checking, or servicing equipment.
- Tighten all fluid connections before operating the equipment.
- Check hoses and couplings daily. Replace worn or damaged parts immediately.

FIRE AND EXPLOSION HAZARD

Flammable fumes, such as solvent and paint fumes, in **work area** can ignite or explode. Paint or solvent flowing through the equipment can cause static sparking. To help prevent fire and explosion:

- Use equipment only in well-ventilated area.
- Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static sparking).
- Ground all equipment in the work area. See **Grounding** instructions.
- Never spray or flush solvent at high pressure.
- Keep work area free of debris, including solvent, rags and gasoline.
- Do not plug or unplug power cords, or turn power or light switches on or off when flammable fumes are present.
- Use only grounded hoses.
- Hold dispense valve firmly to side of grounded pail when triggering into pail. Do not use pail liners unless they are anti-static or conductive.
- **Stop operation immediately** if static sparking occurs or you feel a shock**.** Do not use equipment until you identify and correct the problem.
- Keep a working fire extinguisher in the work area.

⚠ WARNING


EQUIPMENT MISUSE HAZARD

Misuse can cause death or serious injury.

- Do not operate the unit when fatigued or under the influence of drugs or alcohol.
- Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See **Technical Specifications** in all equipment manuals.
- Use fluids and solvents that are compatible with equipment wetted parts. See **Technical Specifications** in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request Safety Data Sheets (SDSs) from distributor or retailer.
- Do not leave the work area while equipment is energized or under pressure.
- Turn off all equipment and follow the **Pressure Relief Procedure** when equipment is not in use.
- Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.
- Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards.
- Make sure all equipment is rated and approved for the environment in which you are using it.
- Use equipment only for its intended purpose. Call your distributor for information.
- Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Do not kink or over bend hoses or use hoses to pull equipment.
- Keep children and animals away from work area.
- Comply with all applicable safety regulations.



MOVING PARTS HAZARD

Moving parts can pinch, cut or amputate fingers and other body parts.

- Keep clear of moving parts.
- Do not operate equipment with protective guards or covers removed.
- Equipment can start without warning. Before checking, moving, or servicing equipment, follow the **Pressure Relief Procedure** and disconnect all power sources.

TOXIC FLUID OR FUMES HAZARD

Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled, or swallowed.

- Read Safety Data Sheets (SDSs) to know the specific hazards of the fluids you are using.
- Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.

PERSONAL PROTECTIVE EQUIPMENT

Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. Protective equipment includes but is not limited to:

- Protective eyewear, and hearing protection.
- Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer.

Installation

Grounding

The equipment must be grounded to reduce the risk of static sparking. Static sparking can cause fumes to ignite or explode. Grounding provides an escape wire for the electric current.

Pump: use ground wire and clamp (supplied). Remove the ground screw (Z) and insert through eye of ring terminal at the end of ground wire (Y). Fasten ground screw back onto pump and tighten securely. Connect the other end of the wire to a true earth ground. Order Part 222011 Ground Wire and Clamp.

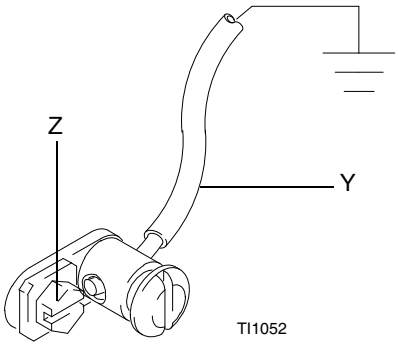


FIG. 1

Air and fluid hoses: use only electrically conductive hoses.

Air compressor: follow manufacturer's recommendations.

Dispense valve: ground through connection to a properly grounded fluid hose and pump.

Fluid supply container: follow local code.

Solvent pails used when flushing: follow local code. Use only conductive metal pails, placed on a grounded surface. Do not place the pail on a nonconductive surface, such as paper or cardboard, which interrupts grounding continuity.

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

Accessories

A main air bleed valve (C), pump air bleed valve (E), and fluid drain valve (M) are required. These accessories help reduce the risk of serious injury, including fluid injection and splashing of fluid in the eyes or on the skin, and injury from moving parts if you are adjusting or repairing the pump.

The main air bleed valve (C) shuts off the air to the pump and ram. The pump air bleed valve (E) relieves air trapped between this valve and the pump after the air is shut off. Trapped air can cause the pump to cycle unexpectedly. Locate the valve close to the pump. Order Part 107141.

The fluid drain valve assists in relieving fluid pressure in the displacement pump, hose, and dispense valve. Triggering the dispense valve to relieve pressure may not be sufficient. Order Part 235992.

Install the following accessories in the order shown in FIG. 2, page 7, using adapters as necessary.

Air and Fluid Hoses

Be sure all air hoses (H) and fluid hoses (N) are properly sized and pressure-rated for your system. Use only electrically conductive hoses.

Mounting

Mount the pump (A) to suit the type of installation planned. FIG. 2 on page 7 illustrates a ram-mounted pump in a multi-valve header system. Pump dimensions and the mounting hole layout are shown in **Dimensions**, page 27.

If you are mounting the pump on a ram, refer to your separate ram manual for installation and operation instructions. Mounting Kit 222776 is available to mount the pump on a 55 gallon (200 liter) ram.

Air Line

- **Main air bleed valve (C):** is required in your system to shut off the air supply to the pump and ram. When closed, the valve will bleed off all air in the ram and pump, and the ram will slowly lower. Be sure the valve is easily accessible from the pump, located upstream from the air manifold (G), and downstream from the air regulator.

Trapped air can cause the pump to cycle unexpectedly, which could result in serious injury from splashing or moving parts.

- **Air line lubricator (D):** provides automatic air
- motor lubrication. Locate in the position shown.
- **Pump air bleed valve (E):** required in your system, to relieve air trapped between it and the air motor when the valve is closed. Be sure the bleed valve is easily accessible from the pump, and is located downstream from the air regulator.
- **Air Regulator (F):** controls pump speed and outlet pressure by adjusting the air pressure to the pump. Locate the regulator close to the pump, but upstream from the pump air bleed valve.
- **Air manifold (G):** has a swivel air inlet. It mounts to a ram, and has ports for connecting lines to air accessories, such as the ram air regulator (T) and ram director valve (U).
- **Air line filter (J):** removes harmful dirt and moisture from the compressed air supply. Also, install a drain valve (W) at the bottom of each air line drop, to drain off moisture.
- **Air shutoff valve (K):** isolates the air line accessories for servicing. Locate upstream from all other air line accessories.
- **Pump runaway valve (V):** senses when the pump is running too fast and automatically shuts off the air to the motor. A pump which runs too fast can be seriously damaged. Locate in the position shown.

Fluid Line

- **Fluid drain valve (M):** required in your system, to relieve fluid pressure in the hose and dispense valve
- **Fluid shutoff valve (P):** shuts off fluid flow.
- **Fluid pressure regulator (L):** for more precise adjustment of the fluid pressure.
- **Dispense valve (S):** to dispense fluid.
- **Fluid line swivel (R):** for easier dispense valve movement.

Flush Before Using Equipment

The equipment was tested with lightweight oil, which is left in the fluid passages to protect parts. To avoid contaminating your fluid with oil, flush the equipment with a compatible solvent before using the equipment. See **Flush the Equipment**, page 9.

Typical Installation

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

The Typical Installation shown in FIG. 2 is only a guide for selecting and installing system components and accessories. Contact your Graco distributor for assistance in designing a system to suit your particular needs.

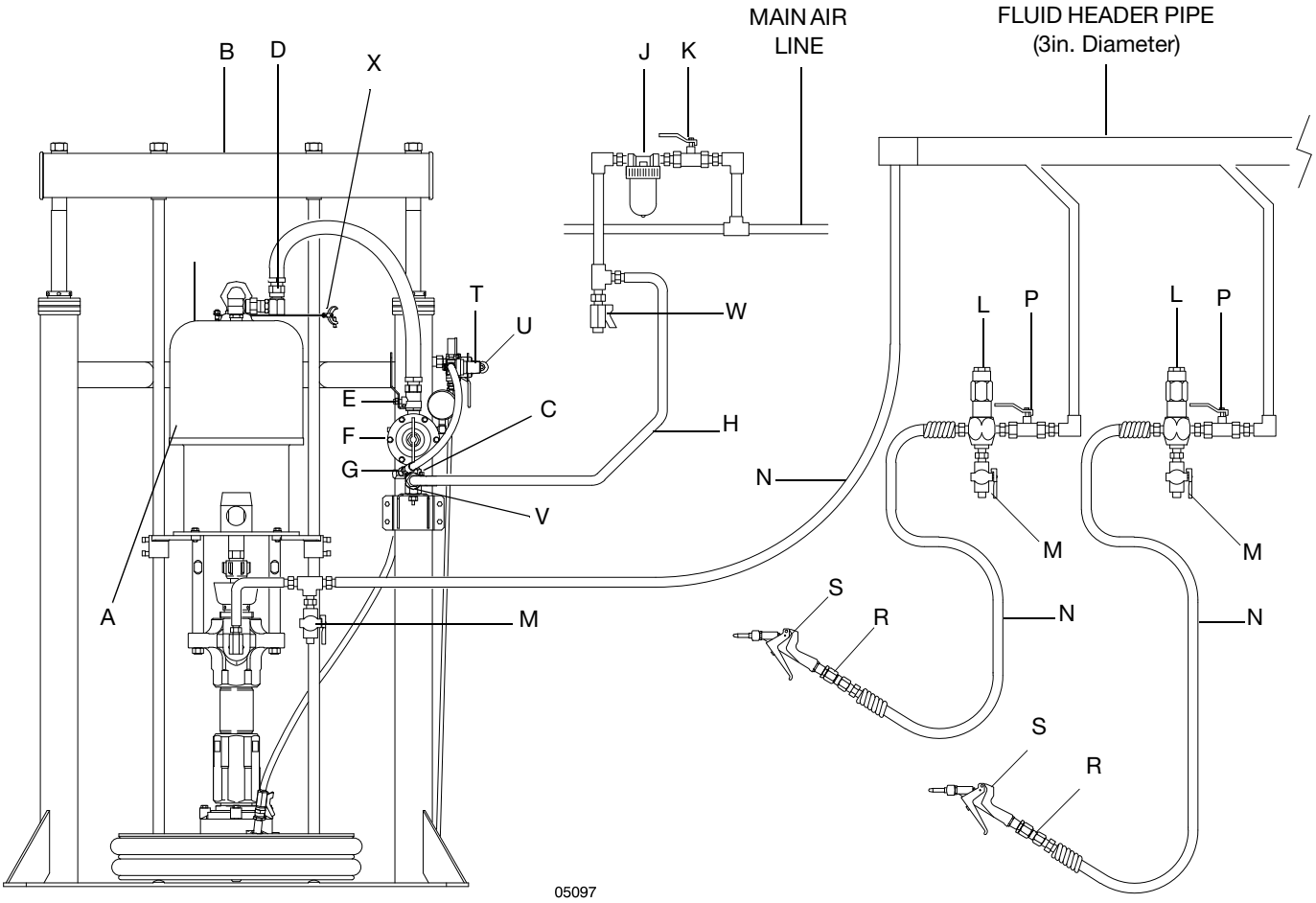


FIG. 2: Typical Installation

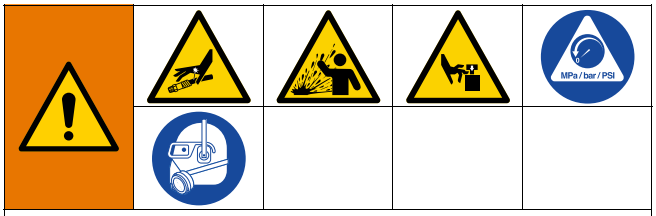
Key:

A Pump
B 200 L (55 gal) Air-Powered Ram
C Main Air Bleed Valve (required, for pump and ram)
D Air Line Lubricator
E Pump Air Bleed Valve (required, for pump)
F Pump Air Regulator
G Air Manifold
H Electrically Conductive Air Supply Hose
J Air Line Filter
K Air Shutoff Valve (for accessories)
L Fluid Regulator
M Fluid Drain Valve (required)
N Electrically Conductive Fluid Hose
P Fluid Shutoff Valve
R Valve Swivel
S Dispense Valve
T Ram Air Regulator
U Ram Director Valve
V Pump Runaway Valve (position only)
W Air Line Drain Valve
Y Ground Wire (required, see **Grounding**, page 5, for installation)

Operation

Pressure Relief Procedure

Follow the Pressure Relief Procedure whenever you see this symbol.



This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as skin injection, splashing fluid and moving parts, follow the Pressure Relief Procedure when you stop dispensing and before cleaning, checking, or servicing the equipment.

1. Engage trigger lock.
2. Close all air bleed valves.
3. Disengage the trigger lock.
4. Hold a metal part of the dispense valve firmly to a grounded metal pail. Trigger the dispense valve to relieve pressure.
5. Engage the trigger lock.
6. Open all fluid drain valves in the system, having a waste container ready to catch drainage. Leave drain valve(s) open until you are ready to dispense again.
7. If you suspect the nozzle or hose is clogged or that pressure has not been fully relieved:
   a. VERY SLOWLY loosen the tip guard retaining nut or the hose end coupling to relieve pressure gradually.
   b. Loosen the nut or the coupling completely.
   c. Clear the obstruction in the hose or nozzle.

Packing Nut/Wet Cup

Before starting, fill the packing nut (2) 1/3 full with Graco Throat Seal Liquid (TSL) or compatible solvent.

The packing nut is torqued at the factory and is ready for operation. If it becomes loose and there is leaking from the throat packings, relieve pressure, then torque the nut to 136–149 N•m (100–110 ft-lb) using the wrench (109) (order separately). Do this whenever necessary. Do not overtighten the packing nut.

NOTE: The bleed hole must face down.

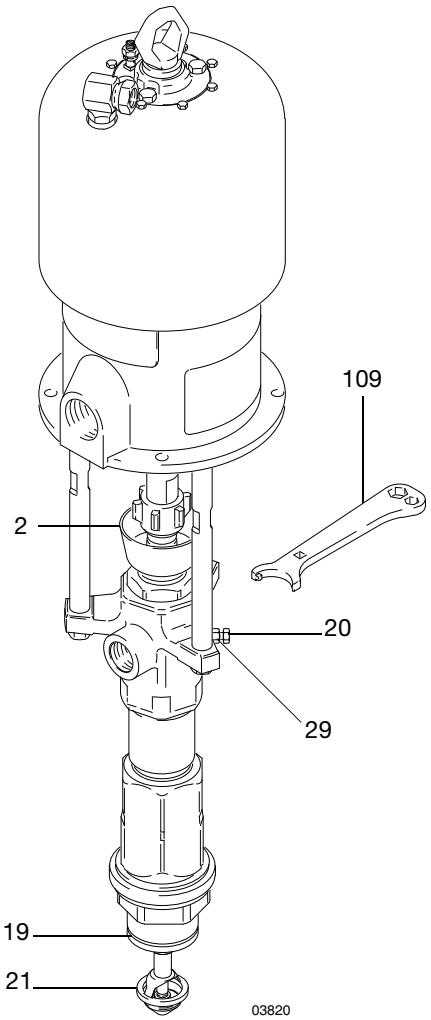
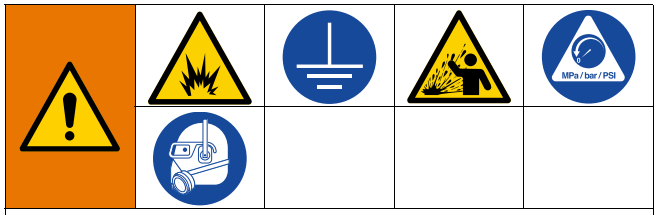


FIG. 3

Flush the Equipment



To avoid fire and explosion, always ground equipment and waste container. To avoid static sparking and injury from splashing, always flush at the lowest possible pressure.

- Flush before fluid can dry in the equipment, at the end of the day, before storing, and before repairing equipment.
- Flush at the lowest pressure possible. Check connectors for leaks and tighten as necessary.
- Flush with a fluid that is compatible with the fluid being dispensed and the equipment wetted parts.

1. Perform **Pressure Relief Procedure**, page 8.
2. Remove nozzle and soak in solvent.
3. Set pump to lowest possible fluid pressure, and start pump.
4. Hold a metal part of the dispense valve (S) firmly to a grounded metal pail. Trigger the dispense valve until clean solvent dispenses.
5. Perform **Pressure Relief Procedure**, page 8.

Start and Adjust the Pump

Keep hands and fingers away from the priming piston (21) during operation and whenever the pump is charged with air. The priming piston extends beyond the intake housing (19) to pull material into the pump and can amputate a hand or finger caught between it and the intake housing. Follow the **Pressure Relief Procedure** on page 8, before checking, clearing, or cleaning the priming piston.

1. Supply fluid to the pump, per the requirements of your system.
2. Close the air regulator (F).
3. Open all air bleed valves (C, E).
4. Hold a metal part of the valve (S) firmly to the side of a grounded metal pail and hold the trigger open.
5. Slowly open the air regulator until the pump starts.
6. Cycle the pump slowly until all air is pushed out and the pump and hoses are fully primed.
7. Release the valve trigger and lock the trigger safety. The pump should stall against pressure.


To reduce the risk of fluid injection, do not use your hand or fingers to cover the bleed hole on the underside of the bleeder valve body (29) when priming the pump. Use a crescent wrench to open and close the bleeder plug

8. If the pump fails to prime properly, open the bleeder valve plug (20) slightly. Use the bleed hole, on the underside of the valve body (29), as a priming valve until the fluid appears at the hole. See FIG. 3, page 8. Close the plug.

NOTE: When changing fluid containers with the hose and dispense valve already primed, open the bleeder valve plug (20), to help prime the pump and vent air before it enters the hose. Close the plug when all air is eliminated.

NOTICE

Do not allow the pump to run dry. It will quickly accelerate to a high speed, causing damage. If your pump is running too fast, stop it immediately and check the fluid supply. If the container is empty and air has been pumped into the lines, refill the container and prime the pump and the lines, or flush and leave it filled with a compatible solvent. Eliminate all air from the fluid system.

NOTE: With the pump and lines primed, and with adequate air pressure and volume supplied, the pump will start and stop as you open and close the dispense valve. In a circulating system, the pump will speed up or slow down on demand, until the air supply is shut off.

To reduce the risk of overpressurizing your system, which could cause component rupture and serious injury, never exceed the Maximum Incoming Air Pressure to the pump (see the **Technical Specifications** on page 28).

9. Use the air regulator (F) to control the pump speed and the fluid pressure.

NOTICE

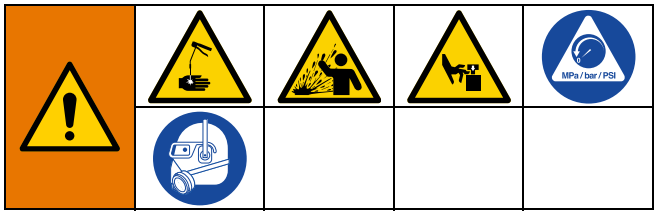
Always use the lowest air pressure necessary to get the desired results. Higher pressures cause premature nozzle and pump wear.

Shutdown and Care of the Pump

For overnight shutdown, stop the pump at the bottom of the stroke to prevent fluid from drying on the exposed displacement rod and damaging the throat packings. Relieve the pressure according to the **Pressure Relief Procedure**, page 8.

Always flush the pump before the fluid dries on the displacement rod. Refer to **Flush the Equipment**, page 9.

Troubleshooting



1. Follow **Pressure Relief Procedure**, page 8, before checking or repairing the pump.
2. Check all possible problems and causes before disassembling pump.

Problem	Cause	Solution
Pump fails to operate	The air supply is inadequate or air lines are restricted.	Increase the air supply; clear the air line.
	The valves are closed or clogged.	Check that all valves are open and clear clogs.
	The fluid hose or dispense valve is obstructed.*	Open and clear the hose or dispense valve.
	The fluid hose ID is too small.	Use a hose with a larger ID.
	Fluid has dried on the displacement rod.	Clean the displacement rod. Always stop the pump at the bottom or its stroke. Keep the wet-cup 1/3 filled with a compatible solvent.
	Motor parts are dirty, worn, or damaged.	Clean or repair motor parts; see your motor manual.
Pump operates, but output is low on both strokes.	The air supply is inadequate or air lines are restricted.	Increase the air supply; clear the air line.
	The valves are closed or clogged.	Check that all valves are open and clear clogs.
	The fluid hose or dispense valve is obstructed.*	Open and clear the hose or dispense valve.
	The fluid hose inner diameter (ID) is too small.	Use a hose with a larger ID.
	The bleeder valve is open.	Close the bleeder valve.
	Air is leaking into the supply container.	Check the ram plate seal.
	The fluid is too heavy for pump priming.	Use the bleeder valve or a ram. Follow the **Start and Adjust the Pump** procedure, page 9.
	The intake valve or seals are held open or worn.	Clear the valve and replace seals.
	Packings in the displacement pump are worn.	Replace the packings.

Problem	Cause	Solution
Pump operates, but output is low on downstroke.	The fluid is too heavy for pump priming.	Use the bleeder valve or a ram. Follow the **Start and Adjust the Pump** procedure, page 9.
	The intake valve or seals are held open or worn.	Clear the valve and replace seals.
Pump operates, but output is low on upstroke	The piston valve or seals are held open or worn.	Clear the valve and replace seals.
Erratic or accelerated pump speed	The fluid supply is exhausted.	Refill and prime.
	The fluid is too heavy for pump priming.	Use the bleeder valve or a ram. Follow the **Start and Adjust the Pump** procedure, page 9.
	The piston valve or seals are held open or worn.	Clear the valve and replace seals.
	The priming piston is held open or worn.	Clear and service the piston.
	Packing in the displacement pump are worn.	Replace the packings.

*** To determine if the fluid hose or dispense valve is obstructed**:

1. Follow the **Pressure Relief Procedure**, page 8.
2. Disconnect the fluid hose and place a container at the pump fluid outlet to catch any fluid.
3. Turn on the air just enough to start the pump. If the pump starts when the air is turned on, the obstruction is in the fluid hose or dispense valve.

NOTE: If you experience air motor icing, call your Graco distributor.

Repair

Required Tools

- Torque wrench
- Bench vise, with soft jaws
- Rubber mallet
- Hammer
- O-ring pick
- 13 mm (1/2 in.) diameter brass rod
- Set of socket wrenches
- Set of adjustable wrenches
- Pipe wrench
- Packing nut wrench (109, order separately)
- Thread lubricant

Disconnect the Displacement Pump

Be sure to use at least two people when lifting, moving, or disconnecting the pump. This pump is too heavy for one person. If you are disconnecting the displacement pump from a motor which is still mounted (for example, on a ram), be sure to support the displacement pump while it is being disconnected, to prevent it from falling and causing injury or property damage. Do this by securely bracing the pump, or by having at least two people hold it while another disconnects it.

1. Perform the **Flush the Equipment** procedure, page 9. Stop the pump at the bottom of its stroke.
2. Follow the **Pressure Relief Procedure**, page 8.
3. Disconnect the air and fluid hoses.
4. Disconnect the displacement pump (106) from the motor (101). Note the relative position of the pump fluid outlet (ZA) to the motor air inlet (ZB).

NOTE: If the motor does not require servicing, leave it attached to its mounting.

   a. Use an adjustable wrench (or a hammer and rod) to unscrew the coupling nut (104) from the motor shaft (ZC). Do not lose or drop the coupling collars (105). See FIG. 4, page 14.

   b. Hold the tie rod flats with a wrench to keep the rods from turning. Unscrew the nuts (103) from the tie rods (102). Carefully remove the displacement pump (106) from the motor (101).

NOTE: To service the displacement pump, refer to **Disassemble the Displacement Pump**, page 15, and **Assemble the Displacement Pump**, 18. To service the air motor, refer to the separate motor manual, supplied.

Connect the Displacement Pump

Be sure to use at least two people when lifting, moving, or connecting the pump. This pump is too heavy for one person. If you are connecting the displacement pump to a motor which is still mounted (for example, on a ram), be sure to support the displacement pump while it is being connected, to prevent it from falling and causing injury or property damage. Do this by securely bracing the pump, or by having at least two people hold it while another connects it.

1. Ensure the coupling nut (104) and the coupling collars (105) are in place on the displacement rod (1).
2. Align the pump fluid outlet (ZA) with the motor air inlet (ZB) as noted in **Disconnect the Displacement Pump**, page 13. Position the displacement pump (106) on the tie rods (102).
3. Screw the nuts (103) onto the tie rods (102). Torque the nuts to 81–89 N•m (60–66 ft-lb).
4. Screw the coupling nut onto the motor shaft loosely. Hold the motor shaft (ZC) flat with a wrench to keep it from turning. Use an adjustable wrench to torque the coupling nut to 196–210 N•m (145–155 ft-lb).
5. Torque the packing nut (2) to 136–149 N•m (100–110 ft-lb).
6. Reconnect all hoses. Reconnect the ground wire if it was disconnected.
7. Fill the wet-cup (2) 1/3 full of TSL or compatible solvent. See **Packing Nut/Wet Cup**, page 8.
8. Turn on the air supply. Run the pump slowly to ensure proper operation.
9. Follow the **Pressure Relief Procedure**, page 8.
10. Torque the packing nut (2) to 136–149 N•m (100–110 ft-lb).

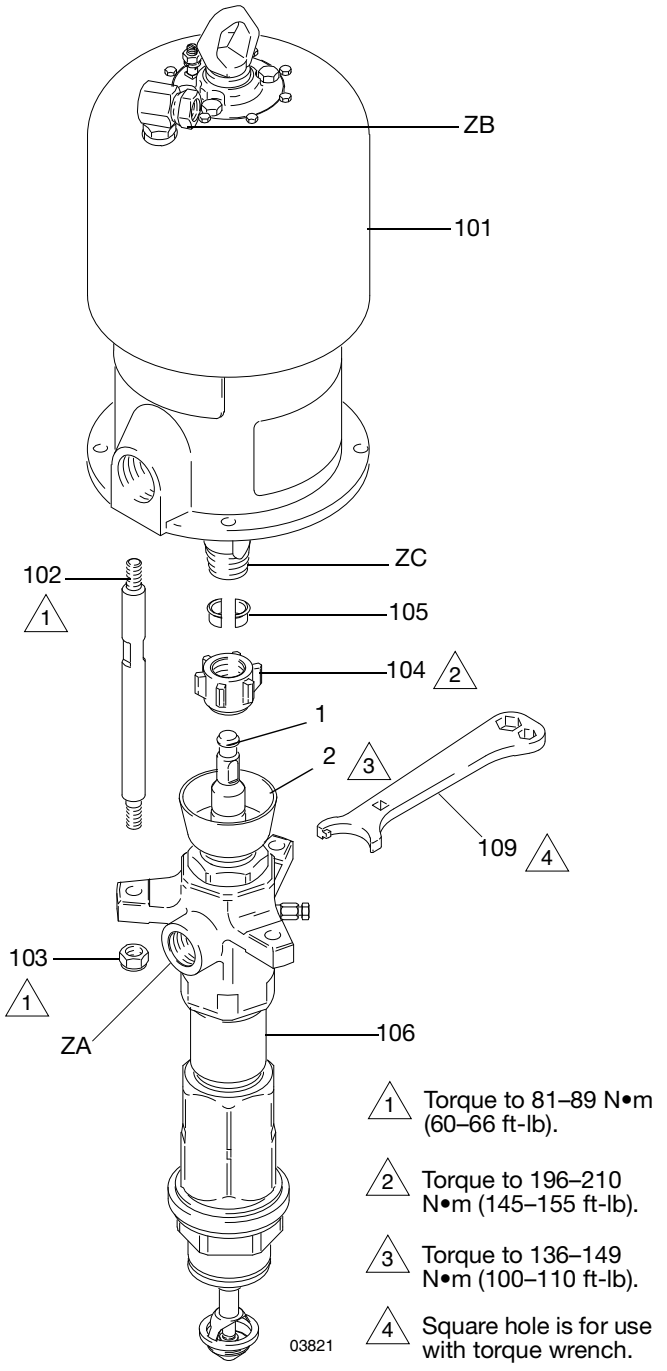


FIG. 4

Disassemble the Displacement Pump

When disassembling the pump, lay out removed parts in sequence to ease reassembly. Clean all parts with a compatible solvent and inspect them for wear or damage. Refer to FIG. 7, page 16, for a cutaway view of the pump.

NOTE: Repair Kit 222866 is available to replace the packings and seals. Parts included are denoted with an asterisk (*). For the best results, use all the new parts in the kit. See **Parts**, page 22.

1. Follow the **Disconnect the Displacement Pump** procedure, page 13.
2. Place the pump in a vise, with the outlet housing (9) positioned as shown in FIG. 6.
3. Hold the flats of the priming piston rod (18) with an adjustable wrench. Use a second wrench to unscrew the priming piston seat (22) from the rod. Slide the priming piston (21) off the rod. Inspect the inner and outer surfaces of the piston (21) for scoring, wear, or other damage.
4. Loosen the packing nut (2) using the wrench (109) (order separately).
5. Use a pipe wrench to unscrew the hex (19)of the intake cylinder from the intake valve housing (17).

NOTE: The pump may separate at joints A, B, or C. See FIG. 6.

NOTE: These instructions are written with the pump separating at joint A. If it separates at joints B or C, disassemble it at that joint, place the intake housing (17) in a vise, and continue with step 7.

6. Unscrew the intake valve housing (17) from the cylinder (10). Pull the housing off the pump.

NOTE: The intake check valve assembly (ZE) should slide down the priming piston rod (18) as you remove the housing. If it does not slide easily, firmly tap on the top of the housing (17) with a rubber mallet to loosen.

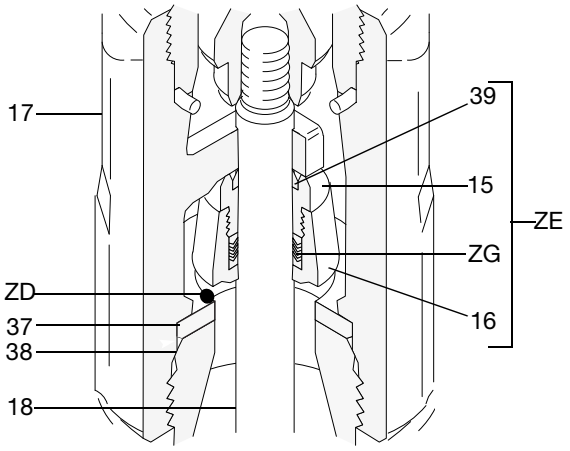


FIG. 5 Intake Valve Detail

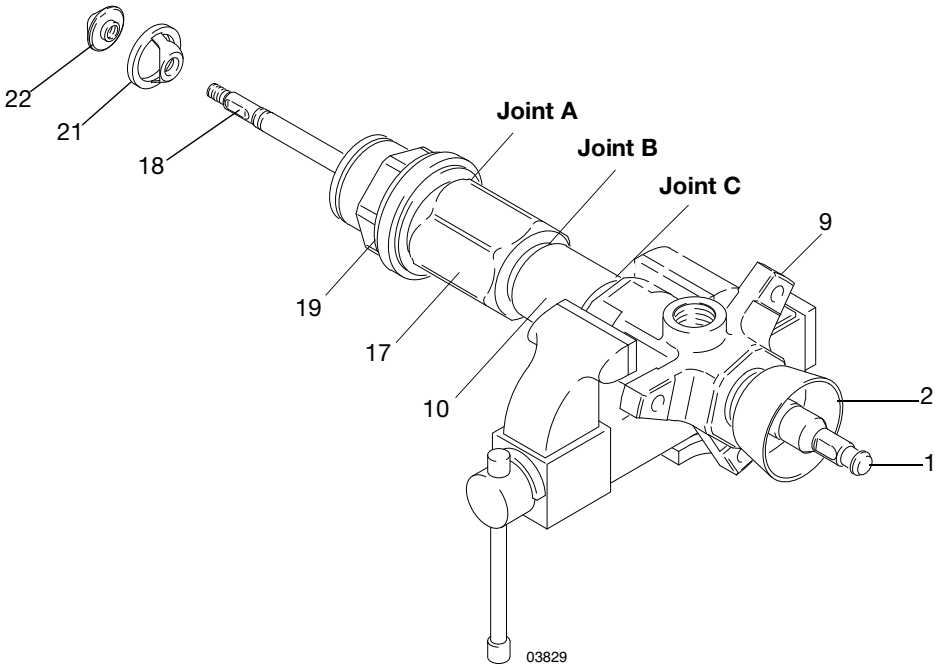


FIG. 6

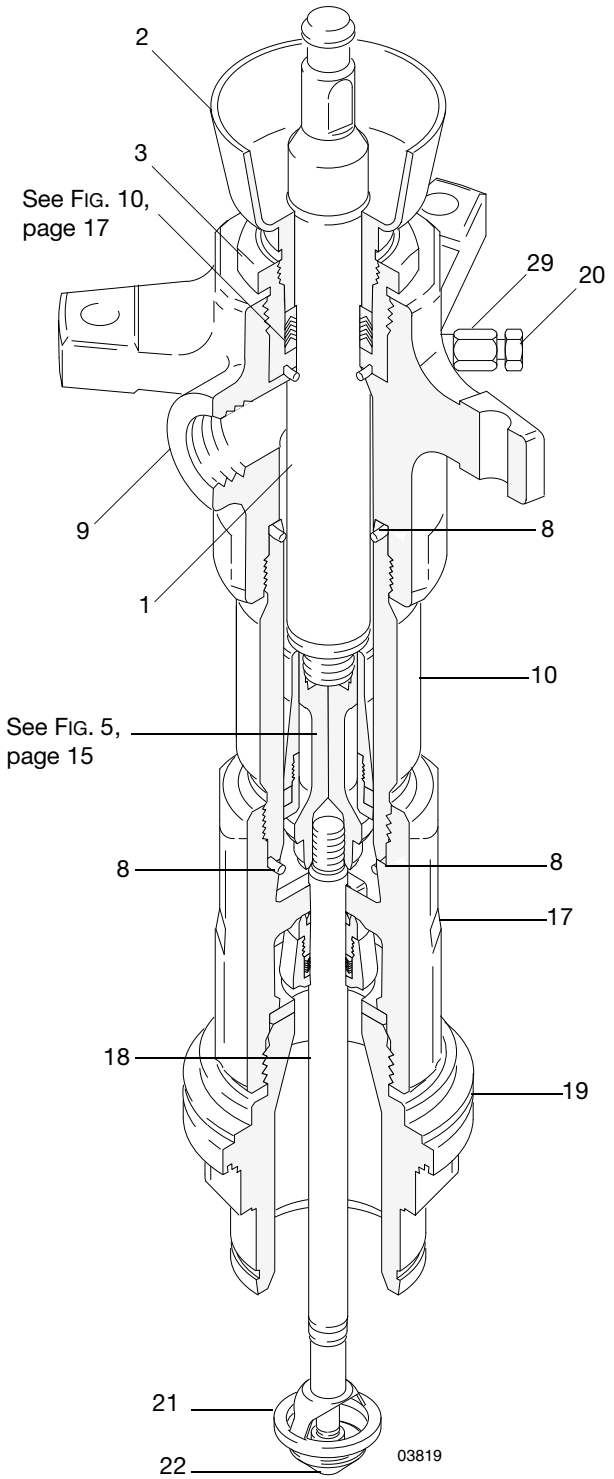


FIG. 7

7. Pull the intake seat (37) and seal (38) out the bottom of the intake valve housing (17). Refer to FIG. 5, page 15.

NOTE: Do not drop the check valve assembly (ZE) as it comes free. Set the check valve aside for later.

NOTE: If the seat (37) is difficult to remove, insert a hammer and brass rod through the top of the housing (17) and drive the seat out.

8. Use a rubber mallet to drive the displacement rod (1) and the priming piston rod (18) out of the outlet housing (9) and cylinder (10). Inspect the outer surfaces of the rods for damage by running a finger over the surface.

9. Unscrew the packing nut (2). Unscrew the packing housing (3) and remove the seal (42). Remove the throat glands and packings (ZF).

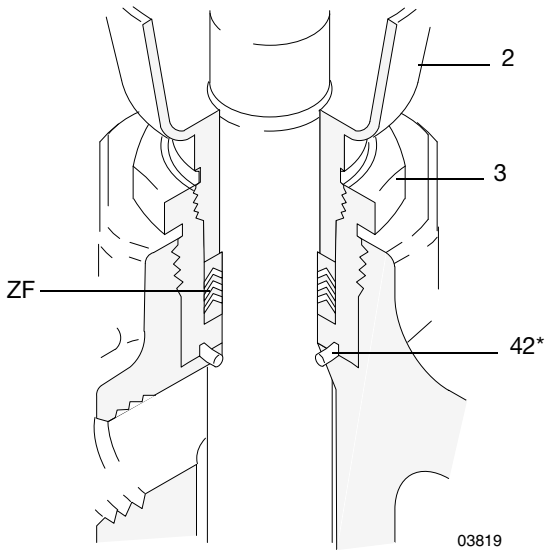


FIG. 8 Throat Packing Detail

10. Remove the seal (8) from the bottom of the cylinder (10). Shine a light into the cylinder to examine the inside surface for scoring or damage. Refer to FIG. 10, page 17.

11. **If the cylinder is damaged, or there is evidence of leaking around the top cylinder seal (8):** unscrew the cylinder from the outlet housing with a pipe wrench. Remove the top cylinder seal.

12. Place the flats of the displacement rod (1) in a vise. Unscrew the piston (12) from the displacement rod. The priming piston rod (18) will release as well. Slide the piston guide (11) and seat (14) off the piston (12). Refer to FIG. 10, page 17.

NOTE: It is not necessary to remove the priming piston rod (18) from the piston (12) unless your inspection reveals damage to either part.

13. **If the priming piston rod (18) or piston (12) are damaged:** Place the piston flats in a vise. Unscrew the priming piston rod (18).

14. Place the piston guide (11) in a vise, as shown in FIG. 9. Use an adjustable wrench to unscrew the piston seat (14) from the guide. Remove the seal (13).

NOTE: Always replace the seal with a new one.

15. Inspect the mating surfaces (ZH) of the piston (12) and piston seat (14) for damage or wear.

16. Disassemble the intake check valve assembly (ZE).

    a. Place the intake valve body (16) in a vise. Unscrew the packing nut (15).

    b. Remove the seal (39) from the packing nut. Remove the glands and packings (ZG) from the valve body.

17. Inspect the mating surfaces (ZD) of the intake valve body (16) and seat (37) for damage or wear. See FIG. 5, page 15, and FIG. 11, page 18.

NOTE: The seal (39) is press-fit in the nut (15) and may require cutting to ease removal.

18. Unscrew the bleeder valve plug (20) completely from the valve body (29). Clean the valve threads and the bleed hole.

NOTE: It is not necessary to remove the valve body from the pump outlet housing (9).

19. Inspect all parts for damage. Clean all parts and threads with a compatible solvent.

20. Follow the **Assemble the Displacement Pump** procedure, page 18.

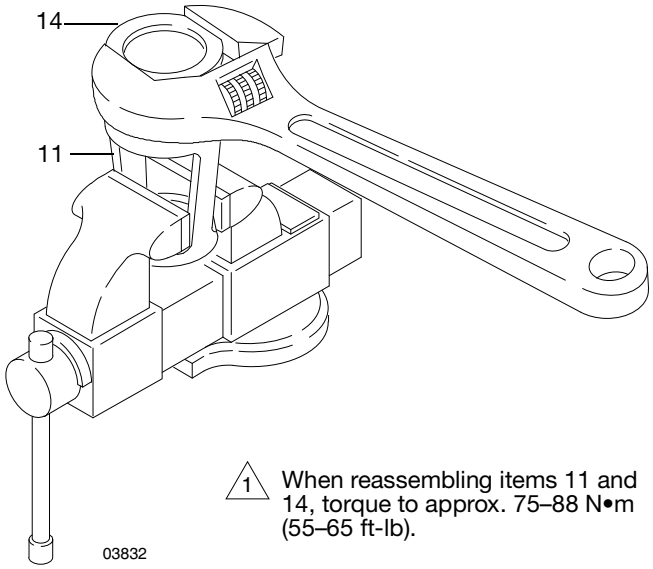
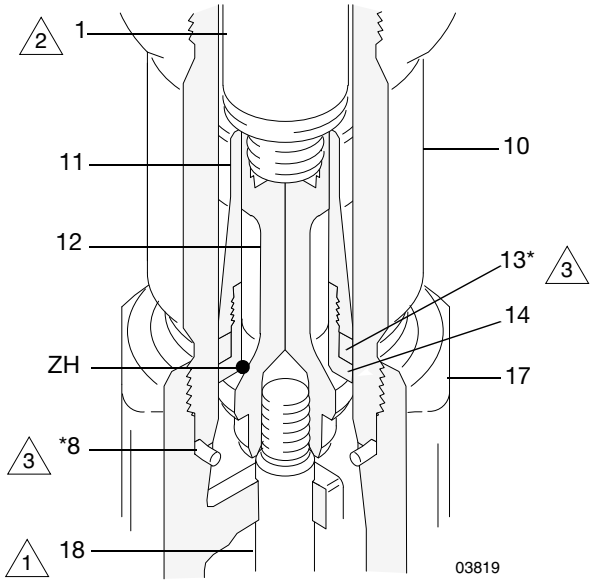


FIG. 9



1 Piston check valve (see Fig. 10).

2 Intake check valve (see Fig. 11).

3 Lubricate.

FIG. 10 Piston Check Valve Detail

Assemble the Displacement Pump

1. Lubricate the intake packings and install them in the valve body (16), with the lips of the v-packings facing up, in the following order (see FIG. 11):

   - the female gland (25*)
   - one PTFE packing (24*)
   - one UHMWPE packing (26*)
   - one PTFE (24*)
   - one UHMWPE (26*)
   - the male gland (23*)

2. With the beveled side facing up, press the intake valve seal (39*) into the recess of the intake valve packing nut (15) until it snaps into place.

NOTE: The nose of the seal should be flush with or slightly recessed into the face of the packing nut.

3. Place the flats of the valve body (16) in a vise. Screw the packing nut into the valve body handtight. Set the intake housing assembly aside.

4. Lubricate the piston seal (13*) and install it on the piston seat (14). Screw the piston guide (11) onto the seat (14).

5. Place the guide in a vise as shown in FIG. 9, page 17, and torque the seat to 75–88 N•m (55–65 ft-lb).

6. **If the priming piston rod (18) was removed from the piston (12)**:

   a. Place the flats of the piston in a vise.

   b. Use an adjustable wrench on the flats of the rod to screw the rod into the piston. Torque the rod to 125–137 N•m (92–101 ft-lb).

NOTE: Be careful not to create burrs on the flats of the rod.

7. Place the piston seat/guide assembly onto the piston (12) so the 45° beveled seating surfaces match.

8. Screw the displacement rod (1) into the piston (12) hand tight.

9. Torque the displacement rod (1) to 339–359 N•m (250–265 ft-lb).

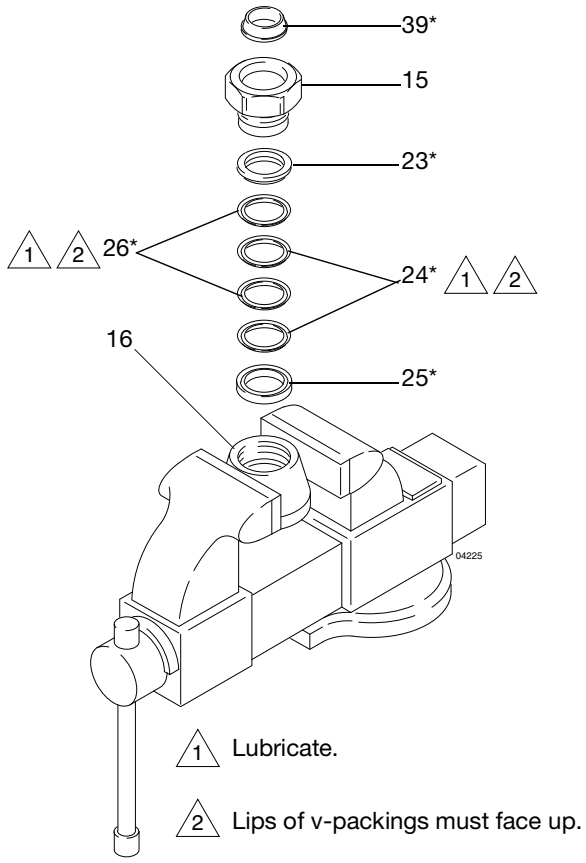


FIG. 11

10. **If the cylinder (10) was removed from the outlet housing (9):**

    a. Lubricate the seal (8*) and place it on the top of the cylinder.

NOTE: The cylinder is symmetrical, so either end can be the top.

    b. Screw the cylinder into the outlet housing. See FIG. 13, page 20.

11. Lubricate the seal (42*) and install it in the groove on the bottom of the packing housing (3).

12. Screw the packing housing (3) into the outlet housing (9). Torque the packing housing to 203–237 N•m (150–175 ft-lb). See the Detail in FIG. 13, page 20.

13. Lubricate and install the throat packings and glands in the packing housing (3) one at a time, with the lips of the v-packings facing down, in the following order. Refer to FIG. 13, page 20:

    - the male gland (7*)
    - one UHMWPE v-packing (6*)
    - one PTFE v-packing (4*)
    - UHMWPE (6*)
    - PTFE (4*)
    - UHMWPE (6*)
    - the female gland (5*)

14. Loosely install the packing nut (2).

15. Lubricate the displacement rod (1). Slide the rod, piston assembly, and priming piston rod (18) into the cylinder (10) from the bottom, until the top of the rod (1) protrudes from the packing nut (2).

16. Lubricate the seal (8*) and install on the bottom of the cylinder (10). Slide the intake valve housing (17) onto the priming piston rod (18). Ensure that the smooth surface of the valve stop (VS) is facing down toward the pump intake.

17. Screw the housing onto the cylinder. See FIG. 13, page 20.

18. Lubricate the priming piston rod (18), then slide the assembled intake valve (ZE) onto the rod, making certain that the packing nut (15) goes on the rod first.

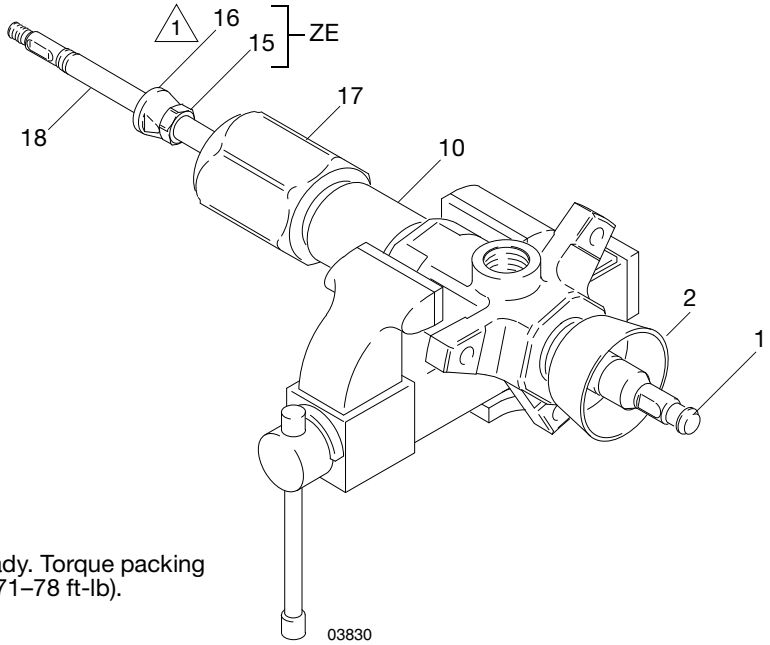
19. Push the valve assembly up the rod, stopping before it reaches the intake valve housing (17). See FIG. 12 page 19.

20. Hold the valve body (16) steady with a wrench. Use an adjustable wrench to torque the packing nut (15) to 97–106 N•m (71–78 ft-lb).

21. Use a rubber mallet on the priming piston rod (18), to drive the valve assembly up to the stop (VS).

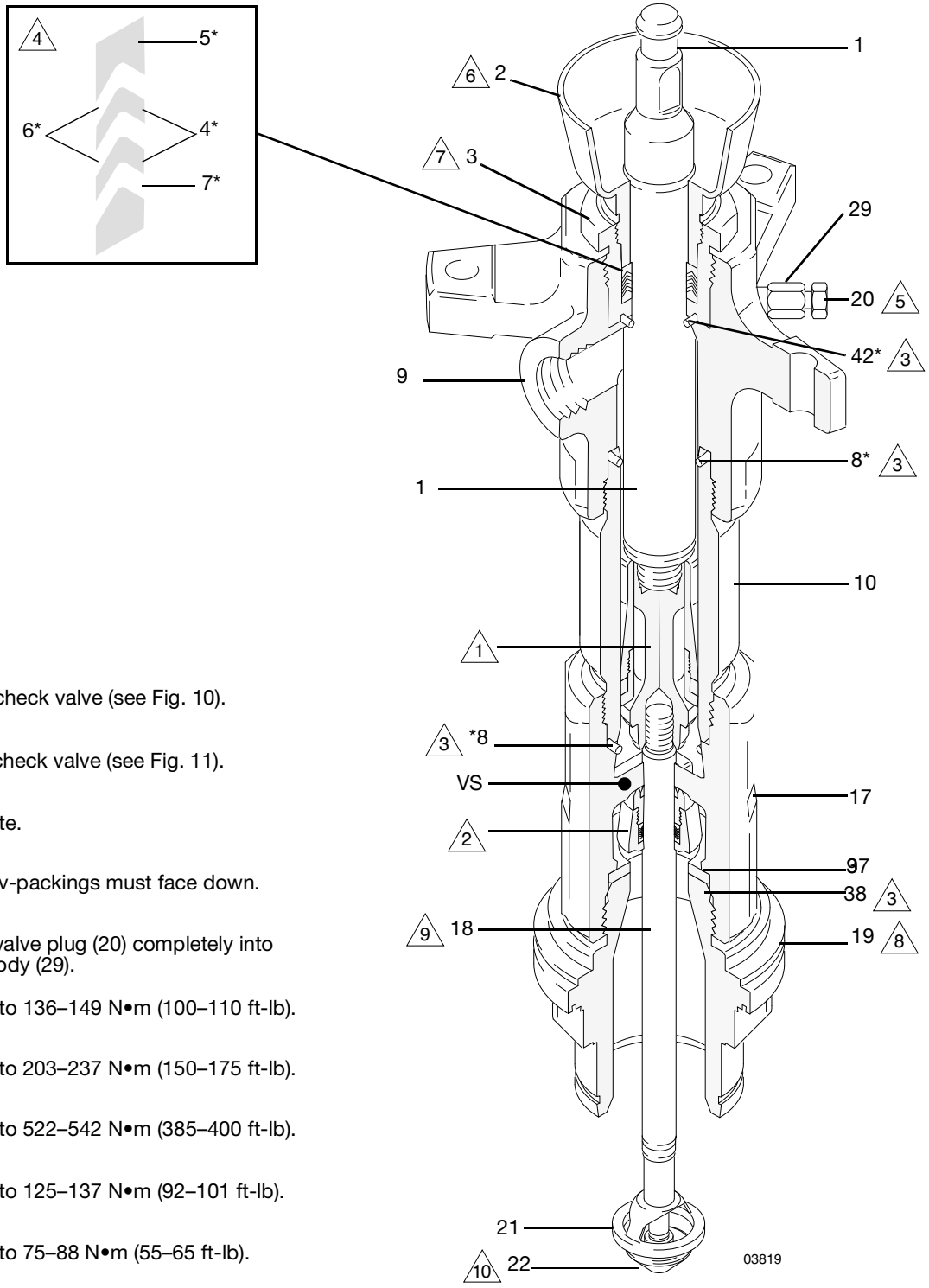
22. The intake seat (37) is reversible. Inspect both sides of the seat and install it with the best side facing into the housing (17). Push it into the housing until it seats securely.

23. Lubricate the seal (38*) and install in the bevel around the bottom of the seat. Refer to FIG. 13, page 20.



1 Hold valve body (16) steady. Torque packing nut (15) to 97–106 N•m (71–78 ft-lb).

FIG. 12



1 Piston check valve (see Fig. 10).

2 Intake check valve (see Fig. 11).

3 Lubricate.

4 Lips of v-packings must face down.

5 Screw valve plug (20) completely into valve body (29).

6 Torque to 136–149 N•m (100–110 ft-lb).

7 Torque to 203–237 N•m (150–175 ft-lb).

8 Torque to 522–542 N•m (385–400 ft-lb).

9 Torque to 125–137 N•m (92–101 ft-lb).

10 Torque to 75–88 N•m (55–65 ft-lb).

FIG. 13

24. Screw the intake cylinder (19) into the intake housing (17). Use a pipe wrench to tighten the hex of the intake cylinder (19). Torque the hex to 522–542 N•m (385–400 ft-lb).

NOTE: This will also torque the intake valve housing (17) and pump cylinder (10) into the outlet housing (9).

25. Screw the bleeder valve plug (20) into the valve body (29). See FIG. 13, page 20.

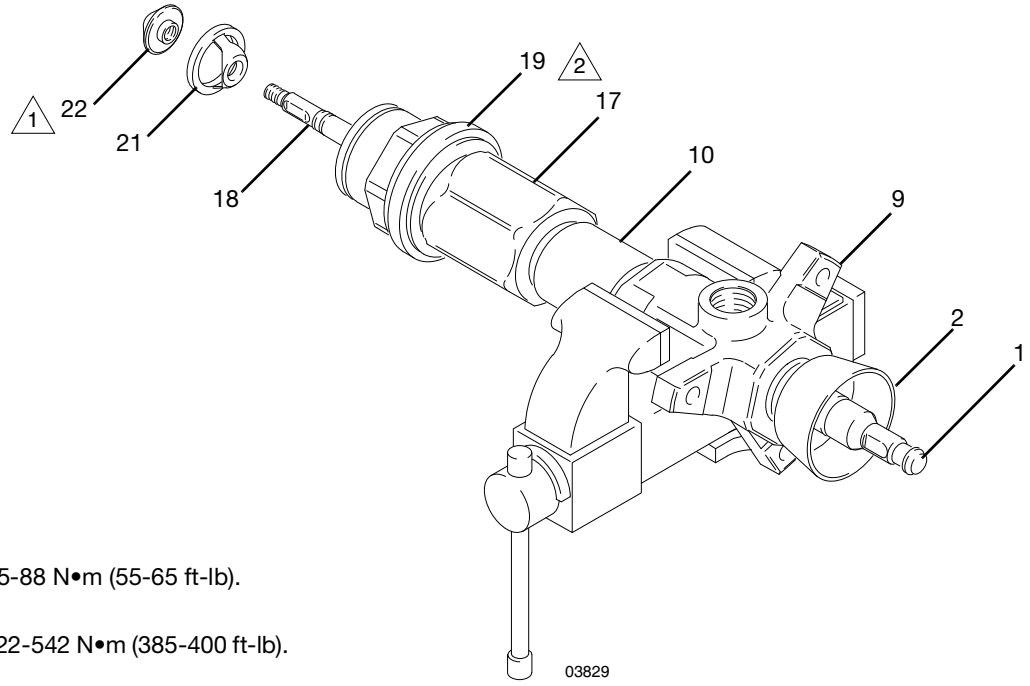
NOTE: The plug has two sets of threads. When reassembling, be sure to screw the plug completely into the valve body.

26. Check that the flats of the priming piston rod (18) are accessible below the intake cylinder (19). If not, tap on the top of the displacement rod (1) with a rubber mallet until the flats are exposed.

27. Slide the priming piston (21) onto the rod (18) until it stops.

28. Hold the rod (18) steady with an adjustable wrench on the flats, and screw the seat (22) onto the rod with another wrench. Torque the seat to 75–88 N•m (55–65 ft-lb).

29. Reconnect the displacement pump to the air motor. Follow the **Connect the Displacement Pump** procedure, page 14.



1 Torque to 75-88 N•m (55-65 ft-lb).

2 Torque to 522-542 N•m (385-400 ft-lb).

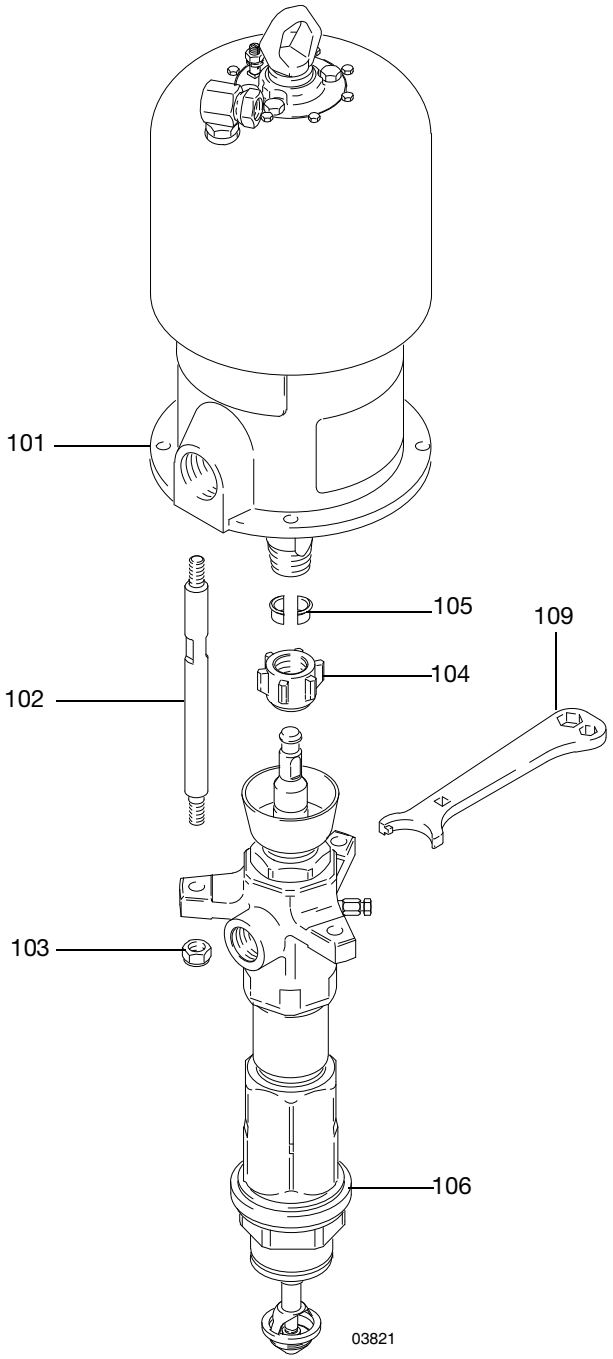
FIG. 14

Parts

Model 236462 Pump, Series B, 65:1 Ratio, with King Air Motor (shown)

Model 241519 Pump, Series B, 65:1 Ratio, with Quiet King Air Motor

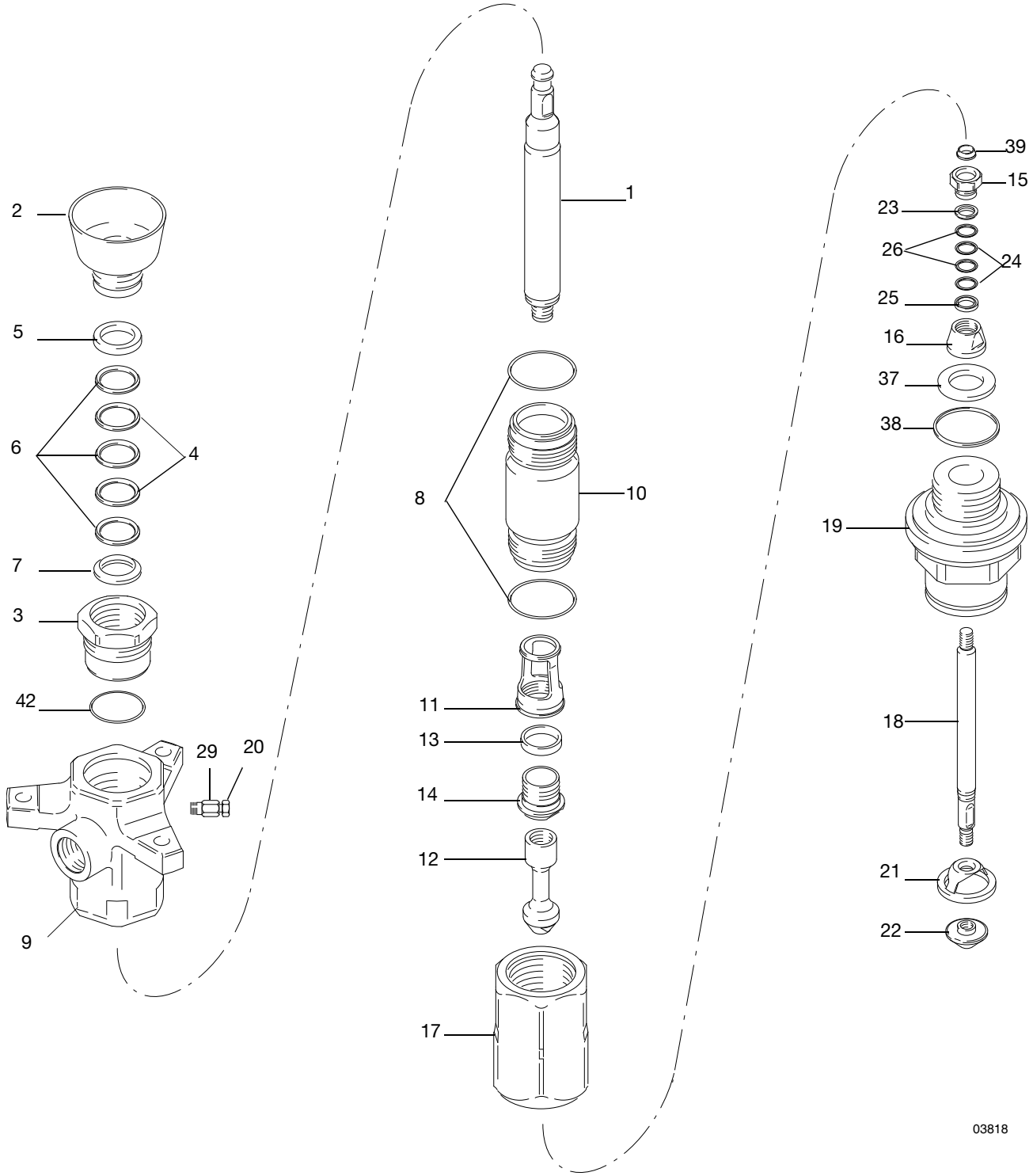
Model 234978 Pump, Series A, 31:1 Ratio, with Bulldog Air Motor



Ref.	Part	Description	Qty.
30s	172479	TAG, warning (not shown)	1
31s	290331	LABEL, warning (not shown)	1
32s	189991	LABEL, safety, warning, crush (not shown)	1
101	245111	AIR MOTOR, King used on Part 236462 only; See your King Air Motor Repair-Instruction manual for parts (see **Related Manuals**, page 2)	1
	220106	AIR MOTOR, Quiet King used on Part 241519 only; Refer to your Quiet King Air Motor Repair-Instruction manual for parts (see **Related Manuals**, page 2)	1
	208356	AIR MOTOR, Bulldog used on Part 234978 only; Refer to your Bulldog Air Motor Parts-Instructions manual for parts (see **Related Manuals**, page 2)	1
102	190000	ROD, tie; 224 mm (8.82 in.) shoulder to shoulder	3
103	106166	NUT, hex; M16 x 2.0	3
104	186925	NUT, hex; M16 x 2.0	1
105	184129	COLLAR, coupling	2
106	236612	PUMP, displacement; See page 22 for parts	1
109	112887	WRENCH, spanner (order separately)	1

s*Replacement safety labels, tags, and cards are available at no cost.*

Part 236612, Series A, Displacement Pump



Model 236612, Series A, Displacement Pump Parts List

Ref.	Part	Description	Qty.
1	189317	ROD, displacement; stainless steel	1
2	236582	PACKING NUT/WET-CUP; stainless steel	1
3	189645	HOUSING, throat packing; stainless steel	1
4*	109306	V-PACKING, throat; PTFE	2
5*	184176	GLAND, throat, female; stainless steel	1
6*	109256	V-PACKING, throat; UHMWPE	3
7*	184226	GLAND, throat, male; stainless steel	1
8*	109499	SEAL, cylinder; PTFE	2
9	237568	HOUSING, outlet; stainless steel	1
10	189437	CYLINDER, pump; stainless steel	1
11	189511	GUIDE, piston; stainless steel	1
12	189439	PISTON; stainless steel	1
13*	190015	SEAL, piston; PTFE	1
14	189441	SEAT, piston; stainless steel	1
15	189728	NUT, packing, intake valve; stainless steel	1
16	189514	VALVE BODY, intake; chrome-plated stainless steel	1
17	237574	HOUSING, intake; stainless steel	1
18	184400	ROD, priming piston; stainless steel	1
19	189516	CYLINDER, intake; stainless steel	1
20	190293	PLUG, bleeder valve; stainless steel	1
21	276378	PISTON, priming; stainless steel	1
22	190241	SEAT, priming piston; stainless steel	1
23*	184221	GLAND, intake valve, female; stainless steel	1
24*	109301	V-PACKING, intake valve; PTFE	1
25*	184171	GLAND, intake valve, female; stainless steel	2
26*	109251	V-PACKING, intake valve; UHMWPE	1
29	184392	BODY, bleeder valve; stainless steel	2
30s	172479	TAG, warning (not shown)	1
37	189446	SEAT, intake valve; chrome-plated stainless steel	1
38*	189492	SEAL, intake; PTFE	1
39*	189725	SEAL, intake valve; PTFE	1
42*	166073	SEAL; PTFE	1

** These parts are included in Repair Kit 222866, which may be purchased separately.*

s*Replacement safety labels, tags, and cards are available at no cost.*

Performance Charts

To find Fluid Outlet Pressure (psi/MPa/bar) at a specific fluid flow (lpm/gpm) and operating air pressure (psi/MPa/bar):

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.

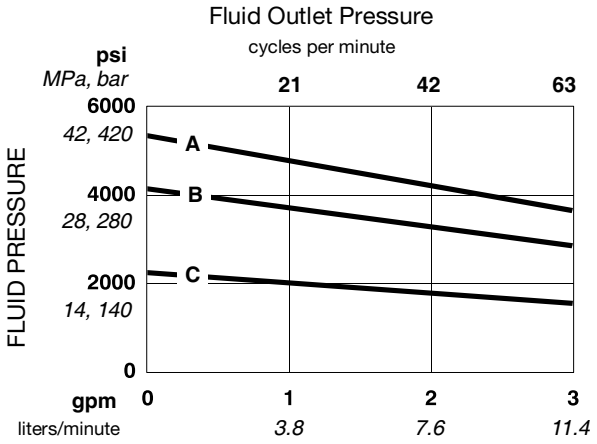
To find Pump Air Consumption (m3/min or scfm) at a specific fluid flow (lpm/gpm) and air pressure (psi/MPa/bar):

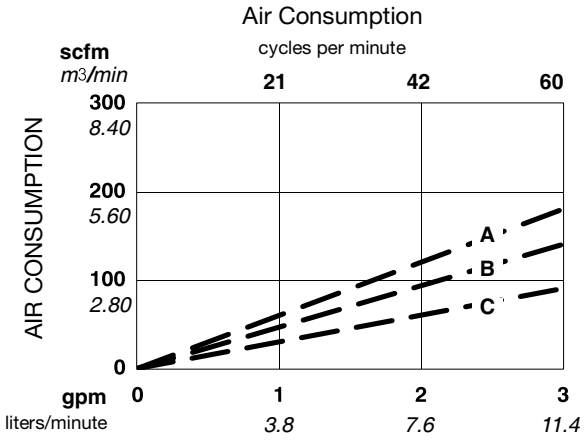
1. Locate desired flow along bottom of chart.
2. Read vertical line up to intersection with selected air consumption curve (dashes). Follow left to scale to read air consumption.

Model 23462 and 241519

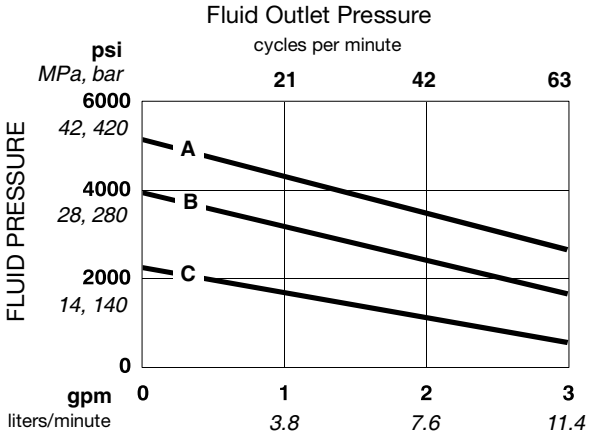
A: 0.6 MPa, 6.2 bar (90 psi) air pressure
B: 0.5 MPa, 6.2 bar (70 psi) air pressure
C: 0.3 MPa, 2.8 bar (40 psi) air pressure

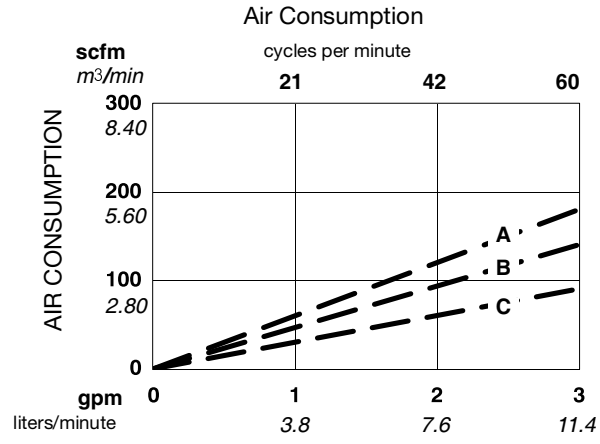
Test Fluid: Number 10 Weight Oil





Test Fluid: 4 Million CPS Weldable Rubber Base Sealer

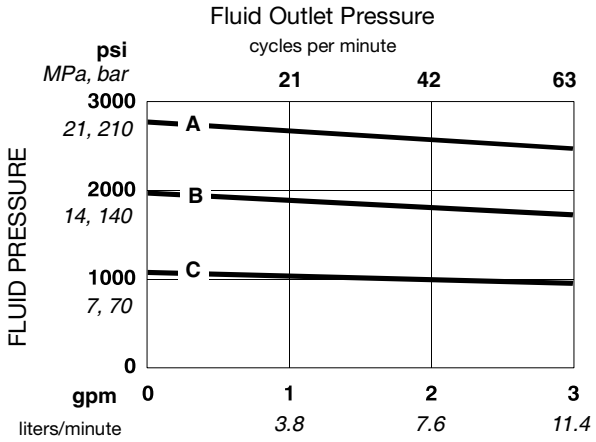


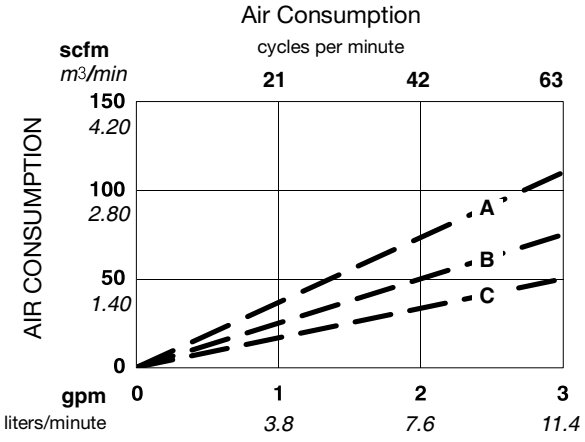


Model 234978

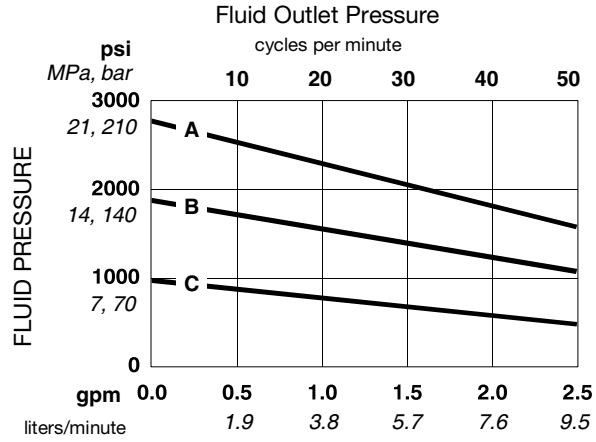
A: 0.6 MPa, 6.2 bar (90 psi) air pressure
B: 0.5 MPa, 4.9 bar (70 psi) air pressure
C: 0.3 MPa, 2.8 bar (40 psi) air pressure

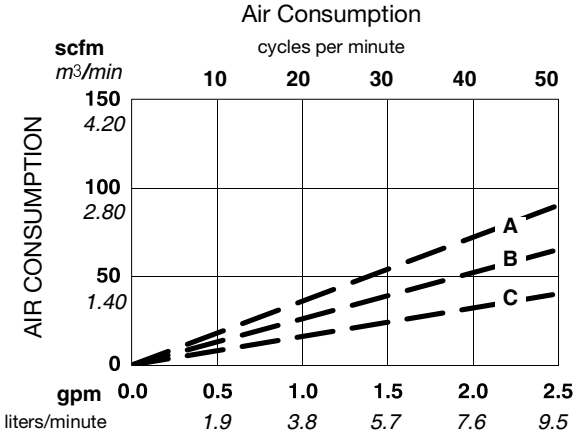
Test Fluid: Number 10 Weight Oil



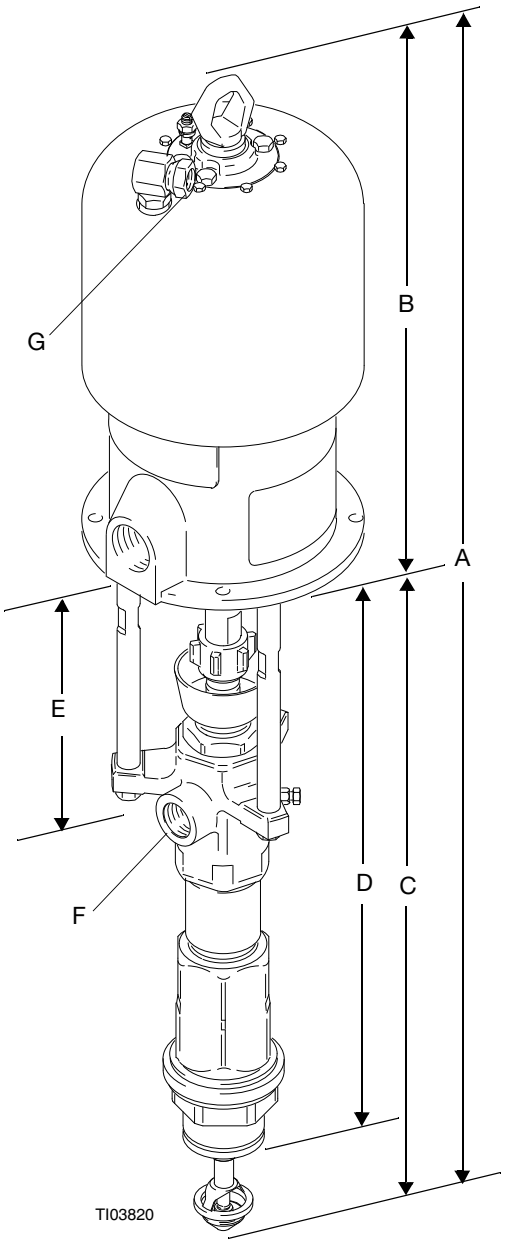


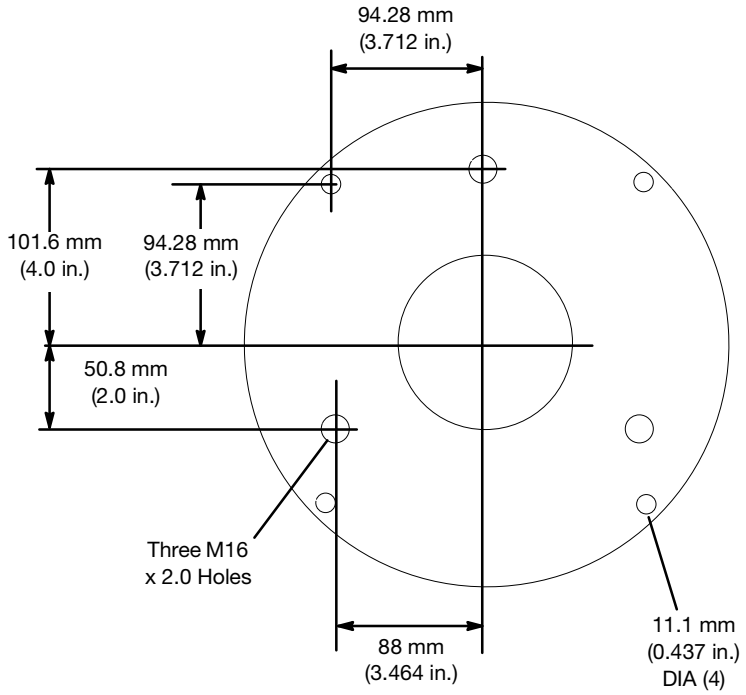
Test Fluid: 4 Million CPS Weldable Rubber Base Sealer





Dimensions





Pump Model	A	B	C	D	E	F	G
236462	1376.7 mm (54.20 in.)	583.0 mm (22.95 in.)	793.7 mm (31.25 in.)	728.5 mm (28.68 in.)	257.0 mm (10.12 in.)	1 in. npt(f)	3/4 npsm(f)
241519	1344 mm (52.91 in.)	583.0 mm (22.95 in.)	793.7 mm (31.25 in.)	728.5 mm (28.68 in.)	257.0 mm (10.12 in.)	1 in. npt(f)	3/4 npsm(f)
234978	1494 mm (58.82 in.)	544.0 mm (21.42 in.)	949.0 mm (37.39 in.)	884.0 mm (34.82 in.)	413.0 mm (16.26 in.)	1 in. npt(f)	3/4 npsm(f)

Technical Specifications

Models 236462 and 241519

Check-Mate 800 Pumps		
	US	**Metric**
Ratio	65:1	
Maximum fluid working pressure	5850 psi	40 MPa, 403 bar
Maximum air input pressure	90 psi	0.6 MPa, 6.2 bar
Pump cycles per 3.8 liters (1 gal)	21 cycles	
Fluid flow at 60 cycles/min	2.8 gpm	10.6 liters/min
Air motor piston effective area	78.5 $in.^2$	506 cm^2
Stroke length	4.75 in.	120 mm
Displacement pump effective area	1.24 $in.^2$	8 cm^2
Maximum pump operating temperature	180 °F	82 °C
Air inlet size	3/4 npsm(f)	
Fluid outlet size	1 in. npt(f)	
Weight	160 lb	73 kg
Displacement pump weight	81 lb	37 kg
Wetted parts	304, 316, 440, 440C, and 17–4 PH Grades of Stainless Steel; Chrome, Zinc, and Nickel Plating; PTFE; Glass-Filled PTFE; Ultra-High Molecular Weight Polyethylene	
King Noise (dBa)		
Sound pressure	78.8 dBa at 40 psi (0.3 MPa, 2.8 bar)	
Sound power	86.5 dB(A) at 40 psi (0.3 MPa, 2.8 bar)	
Sound pressure	82.7 dBa at 70 psi (0.5 MPa, 4.8 bar)	
Sound power	88.8 dBa at 70 psi (0.5 MPa, 4.8 bar)	
Sound pressure	90.5 dBa at 90 psi (0.6 MPa, 6.2 bar)	
Sound power	97.7 dBa at 90 psi (0.6 MPa, 6.2 bar)	
Sound pressure measured 3.3 feet (1 meter) from equipment. *Sound power measured per ISO-9614–2.* *Input air pressures at 15 cycles per minute.*		
Quiet King Noise (dBa)		
Sound pressure	77.9 dBa at 40 psi (0.3 MPa, 2.8 bar)	
Sound power	85.2 dB(A) at 40 psi (0.3 MPa, 2.8 bar)	
Sound pressure	79.2 dBa at 70 psi (0.5 MPa, 4.8 bar)	
Sound power	86.6 dBa at 70 psi (0.5 MPa, 4.8 bar)	
Sound pressure	87.5 dBa at 90 psi (0.6 MPa, 6.2 bar)	
Sound power	95.2 dBa at 90 psi (0.6 MPa, 6.2 bar)	
Sound pressure measured 3.3 feet (1 meter) from equipment. *Sound power measured per ISO-ISO-9614–2.* *Input air pressures at 15 cycles per minute.*		
Notes		
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Model 234978

Check-Mate 800 Pumps		
	US	**Metric**
Ratio	31:1	
Maximum fluid working pressure	3100 psi	21 MPa, 214 bar
Maximum air input pressure	100 psi	0.7 MPa, 7 bar
Pump cycles per 3.8 liters (1 gal)	21 cycles	
Fluid flow at 60 cycles/min	2.8 gpm	10.6 liters/min
Air motor piston effective area	38 $in.^2$	248 cm^2
Stroke length	4.75 in.	120 mm
Displacement pump effective area	1.24 $in.^2$	8 cm^2
Maximum pump operating temperature	180 °F	82 °C
Air inlet size	3/4 npsm(f)	
Fluid outlet size	1 in. npt(f)	
Weight	160 lb	73 kg
Displacement pump weight	81 lb	37 kg
Wetted parts	Carbon Steel; Chrome, Zinc, and Nickel Plating; 304, 316, 440, and 17–4 PH Grades of Stainless Steel; Alloy Steel; Ductile Iron; PTFE; Glass-Filled PTFE; Ultra-High Molecular Weight Polyethylene	
Bulldog Noise (dBa)		
Sound pressure	82.4 dBa at 40 psi (0.3 MPa, 2.8 bar)	
Sound power	91.6 dBa at 40 psi (0.3 MPa, 2.8 bar)	
Sound pressure	87.3 dBa at 70 psi (0.5 MPa, 4.8 bar)	
Sound power	95.9 dBa at 70 psi (0.5 MPa, 4.8 bar)	
Sound pressure	88.5 dBa at 90 psi (0.6 MPa, 6.2 bar)	
Sound power	97.4dBa at 90 psi (0.6 MPa, 6.2 bar)	
Sound pressure	90.0 dBa at 100 psi (0.7 MPa, 7 bar)	
Sound power	98.1 dBa at 100 psi (0.7 MPa, 7 bar)	
Sound pressure measured 3.3 feet (1 meter) from equipment. *Sound power measured per ISO-9614–2.* *Input air pressures at 15 cycles per minute.*		
Notes		
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California Proposition 65

CALIFORNIA RESIDENTS

⚠ **WARNING:** Cancer and reproductive harm – www.P65warnings.ca.gov.

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.

THIS WARRANTY IS EXCLUSIVE, AND IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.

Graco's sole obligation and buyer's sole remedy for any breach of warranty shall be as set forth above. The buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available. Any action for breach of warranty must be brought within two (2) years of the date of sale.

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

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

FOR GRACO CANADA CUSTOMERS
The Parties acknowledge that they have required that the present document, as well as all documents, notices and legal proceedings entered into, given or instituted pursuant hereto or relating directly or indirectly hereto, be drawn up in English. Les parties reconnaissent avoir convenu que la rédaction du présente document sera en Anglais, ainsi que tous documents, avis et procédures judiciaires exécutés, donnés ou intentés, à la suite de ou en rapport, directement ou indirectement, avec les procédures concernées.

Graco Information

For the latest information about Graco products, visit www.graco.com.
For patent information, see www.graco.com/patents.
TO PLACE AN ORDER, contact your Graco distributor or call to identify the nearest distributor.
Phone: 612-623-6921 **or Toll Free:** 1-800-328-0211, **Fax:** 612-378-3505

All written and visual data contained in this document reflects the latest product information available at the time of publication.
Graco reserves the right to make changes at any time without notice.

Original instructions. This manual contains English. MM 308352
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Revision F, May 2024