

## T1

312766S

### 2:1 Ratio Transfer Pump

EN

***For use with polyurethane foam, polyurea, and solvent-borne and water-borne materials.  
For professional use only.***

#### **Model 256200**

55 Gallon (200 Liter) Drum Size

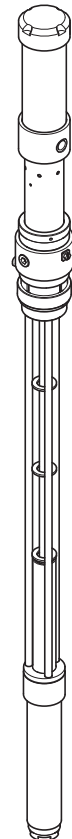
*180 psi (1.2 MPa, 12 bar) Maximum Air Working Pressure*

*360 psi (2.5 MPa, 25 bar) Maximum Fluid Working Pressure*



#### **Important Safety Instructions**

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



T117170a










II 1/2 G T6  
ITS03ATEX11227










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# 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 symbol refers to procedure-specific risk. Refer back to these warnings. Additional, product-specific warnings may be found throughout the body of this manual where applicable.

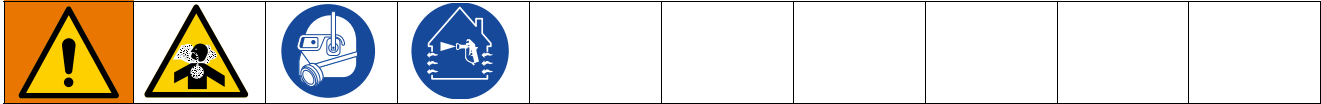
 <h2 style="margin: 0;">WARNING</h2>	
	<p><b>TOXIC FLUID OR FUMES HAZARD</b></p> <p>Toxic fluids or fumes can cause serious injury or death if splashed in the eyes or on skin, inhaled or swallowed.</p> <ul style="list-style-type: none"> <li>• Read Safety Data Sheets (SDSs) for handling instructions and to know the specific hazards of the fluids you are using, including the effects of long-term exposure.</li> <li>• When spraying, servicing equipment, or when in the work area, always keep work area well-ventilated and always wear appropriate personal protective equipment. See <b>Pressure Relief Procedure</b> warnings in this manual.</li> <li>• Store hazardous fluid in approved containers, and dispose of it according to applicable guidelines.</li> </ul>
	<p><b>PERSONAL PROTECTIVE EQUIPMENT</b></p> <p>Always wear appropriate personal protective equipment and cover all skin when spraying, servicing equipment, or when in the work area. Protective equipment helps prevent serious injury, including long-term exposure; inhalation of toxic fumes, mists or vapors; allergic reaction; burns; eye injury and hearing loss. This protective equipment includes but is not limited to:</p> <ul style="list-style-type: none"> <li>• A properly fitting respirator, which may include a supplied-air respirator, chemically impermeable gloves, protective clothing and foot coverings as recommended by the fluid manufacturer and local regulatory authority.</li> <li>• Protective eyewear and hearing protection.</li> </ul>
   	<p><b>FIRE AND EXPLOSION HAZARD</b></p> <p>Flammable fumes, such as solvent and paint fumes, in <b>work area</b> can ignite or explode. Paint or solvent flowing through the equipment can cause static sparking. To help prevent fire and explosion:</p> <ul style="list-style-type: none"> <li>• Use equipment only in well-ventilated area.</li> <li>• Eliminate all ignition sources; such as pilot lights, cigarettes, portable electric lamps, and plastic drop cloths (potential static sparking).</li> <li>• Ground all equipment in the work area. See <b>Grounding</b> instructions.</li> <li>• Never spray or flush solvent at high pressure.</li> <li>• Keep work area free of debris, including solvent, rags and gasoline.</li> <li>• Do not plug or unplug power cords, or turn power or light switches on or off when flammable fumes are present.</li> <li>• Use only grounded hoses.</li> <li>• Hold gun firmly to side of grounded pail when triggering into pail. Do not use pail liners unless they are anti-static or conductive.</li> <li>• <b>Stop operation immediately</b> if static sparking occurs or you feel a shock. Do not use equipment until you identify and correct the problem.</li> <li>• Keep a working fire extinguisher in the work area.</li> </ul>

 <h1 style="margin: 0;">WARNING</h1>	
 	<p><b>EQUIPMENT MISUSE HAZARD</b></p> <p>Misuse can cause death or serious injury.</p> <ul style="list-style-type: none"> <li>• Do not operate the unit when fatigued or under the influence of drugs or alcohol.</li> <li>• Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See in all equipment manuals.</li> <li>• Use fluids and solvents that are compatible with equipment wetted parts. See 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.</li> <li>• Turn off all equipment and follow the <b>Pressure Relief Procedure</b> when equipment is not in use.</li> <li>• Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer’s replacement parts only.</li> <li>• Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards.</li> <li>• Make sure all equipment is rated and approved for the environment in which you are using it.</li> <li>• Use equipment only for its intended purpose. Call your distributor for information.</li> <li>• Route hoses and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.</li> <li>• Do not kink or over bend hoses or use hoses to pull equipment.</li> <li>• Keep children and animals away from work area.</li> <li>• Comply with all applicable safety regulations.</li> </ul>
  	<p><b>PRESSURIZED EQUIPMENT HAZARD</b></p> <p>Fluid from the equipment, leaks, or ruptured components can splash in the eyes or on skin and cause serious injury.</p> <ul style="list-style-type: none"> <li>• Follow the <b>Pressure Relief Procedure</b> when you stop spraying/dispersing and before cleaning, checking, or servicing equipment.</li> <li>• Tighten all fluid connections before operating the equipment.</li> <li>• Check hoses, tubes, and couplings daily. Replace worn or damaged parts immediately.</li> </ul>
	<p><b>BURN HAZARD</b></p> <p>Equipment surfaces and fluid that is heated can become very hot during operation. To avoid severe burns:</p> <ul style="list-style-type: none"> <li>• Do not touch hot fluid or equipment.</li> </ul>
 	<p><b>MOVING PARTS HAZARD</b></p> <p>Moving parts can pinch, cut or amputate fingers and other body parts.</p> <ul style="list-style-type: none"> <li>• Keep clear of moving parts.</li> <li>• Do not operate equipment with protective guards or covers removed.</li> <li>• Equipment can start without warning. Before checking, moving, or servicing equipment, follow the <b>Pressure Relief Procedure</b> and disconnect all power sources.</li> </ul>

# Important Isocyanate (ISO) Information

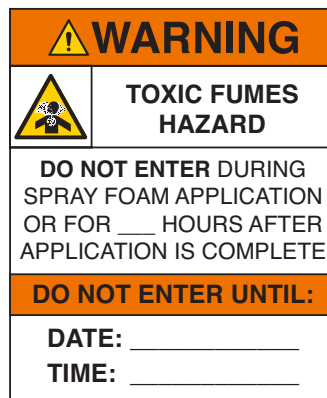
Isocyanates (ISO) are catalysts used in two component materials.

## Isocyanate Conditions



Spraying or dispensing fluids that contain isocyanates creates potentially harmful mists, vapors, and atomized particulates.

- Read and understand the fluid manufacturer’s warnings and Safety Data Sheets (SDSs) to know specific hazards and precautions related to isocyanates.
- Use of isocyanates involves potentially hazardous procedures. Do not spray with this equipment unless you are trained, qualified, and have read and understood the information in this manual and in the fluid manufacturer’s application instructions and SDSs.
- Use of incorrectly maintained or mis-adjusted equipment may result in improperly cured material, which could cause off gassing and offensive odors. Equipment must be carefully maintained and adjusted according to instructions in the manual.
- To prevent inhalation of isocyanate mists, vapors and atomized particulates, everyone in the work area must wear appropriate respiratory protection. Always wear a properly fitting respirator, which may include a supplied-air respirator. Ventilate the work area according to instructions in the fluid manufacturer’s SDSs.
- Avoid all skin contact with isocyanates. Everyone in the work area must wear chemically impermeable gloves, protective clothing and foot coverings as recommended by the fluid manufacturer and local regulatory authority. Follow all fluid manufacturer recommendations, including those regarding handling of contaminated clothing. After spraying, wash hands and face before eating or drinking.
- Hazard from exposure to isocyanates continues after spraying. Anyone without appropriate personal protective equipment must stay out of the work area during application and after application for the time period specified by the fluid manufacturer. Generally this time period is at least 24 hours.
- Warn others who may enter work area of hazard from exposure to isocyanates. Follow the recommendations of the fluid manufacturer and local regulatory authority. Posting a placard such as the following outside the work area is recommended:





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- Use of isocyanates involves potentially hazardous procedures. Do not spray with this equipment unless you are trained, qualified, and have read and understood the information in this manual and in the fluid manufacturer’s application instructions and SDSs.
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Avoid all skin contact with isocyanates. Everyone in the work area must wear chemically impermeable gloves, protective clothing and foot coverings as recommended by the fluid manufacturer and local regulatory authority. Follow all fluid manufacturer recommendations, including those regarding handling of contaminated clothing. After spraying, wash hands and face before eating or drinking.

## Material Self-Ignition



Some materials may become self-igniting if applied too thick. Read material manufacturer’s warnings and Safety Data Sheets (SDSs).

## Keep Components A and B Separate



Cross-contamination can result in cured material in fluid lines which could cause serious injury or damage equipment. To prevent cross-contamination:

- **Never** interchange component A and component B wetted parts.
- Never use solvent on one side if it has been contaminated from the other side.

## Moisture Sensitivity of Isocyanates

Exposure to moisture (such as humidity) will cause ISO to partially cure, forming small, hard, abrasive crystal that become suspended in the fluid. Eventually a film will form on the surface and the ISO will begin to gel, increasing in viscosity.

### NOTICE

Partially cured ISO will reduce performance and the life of all wetted parts.

- Always use a sealed container with a desiccant dryer in the vent, or a nitrogen atmosphere. **Never** store ISO in an open container.
- Keep the ISO pump wet cup or reservoir (if installed) filled with appropriate lubricant. The lubricant creates a barrier between the ISO and the atmosphere.
- Use only moisture-proof hoses compatible with ISO.
- Never use reclaimed solvents, which may contain moisture. Always keep solvent containers closed when not in use.
- Always lubricate threaded parts with an appropriate lubricant when reassembling.

**NOTE:** The amount of film formation and rate of crystallization varies depending on the blend of ISO, the humidity, and the temperature.

## Foam Resins with 245 fa Blowing Agents

Some foam blowing agents will froth at temperatures above 90°F (33°C) when not under pressure, especially if agitated. To reduce frothing, minimize preheating in a circulation system.

## Changing Materials

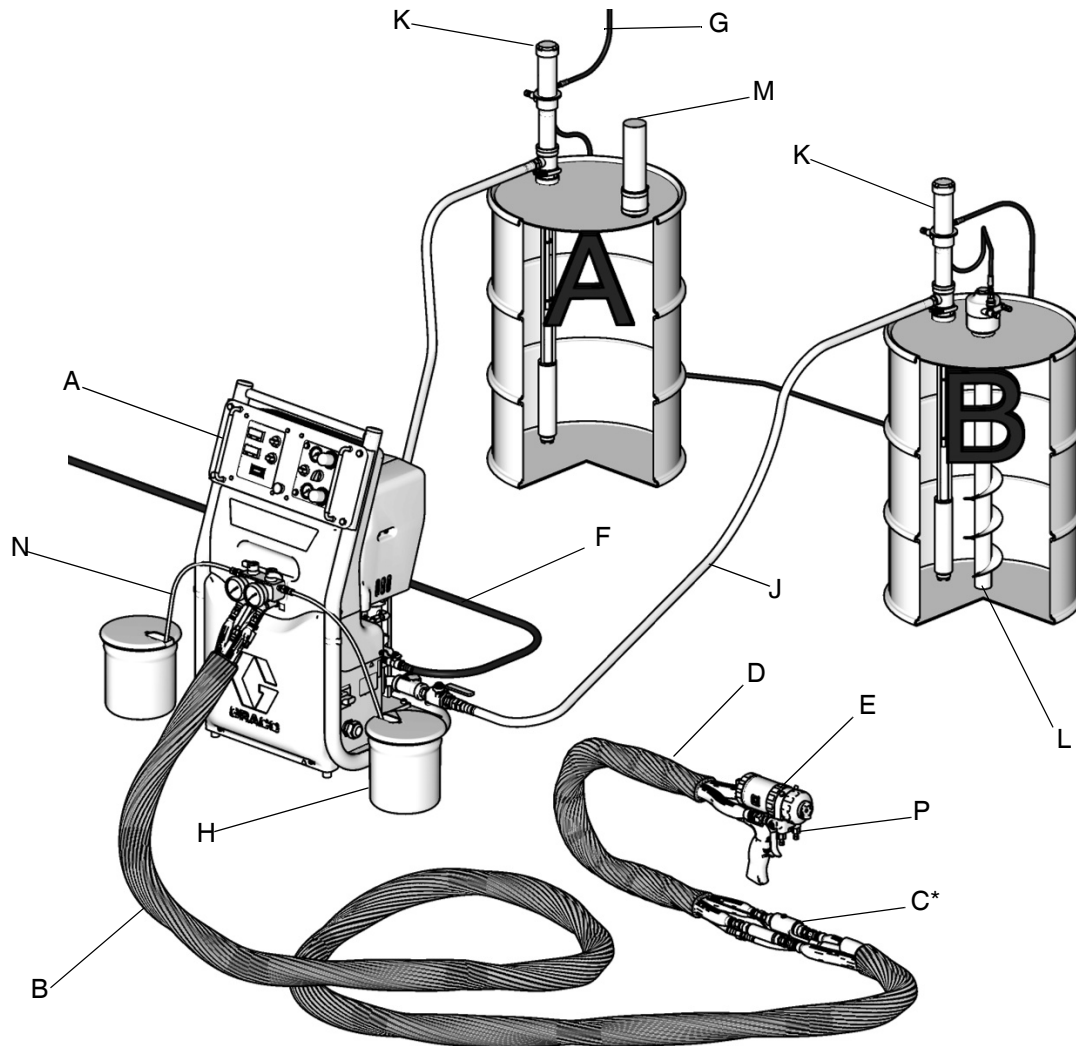
### **NOTICE**

Changing the material types used in your equipment requires special attention to avoid equipment damage and downtime.

- When changing materials, flush the equipment multiple times to ensure it is thoroughly clean.
- Always clean the fluid inlet strainers after flushing.
- Check with your material manufacturer for chemical compatibility.
- When changing between epoxies and urethanes or polyureas, disassemble and clean all fluid components and change hoses. Epoxies often have amines on the B (hardener) side. Polyureas often have amines on the B (resin) side.

# Typical Installation

## Typical Installation without Circulation



\* Shown exposed for clarity. Wrap with tape during operation.

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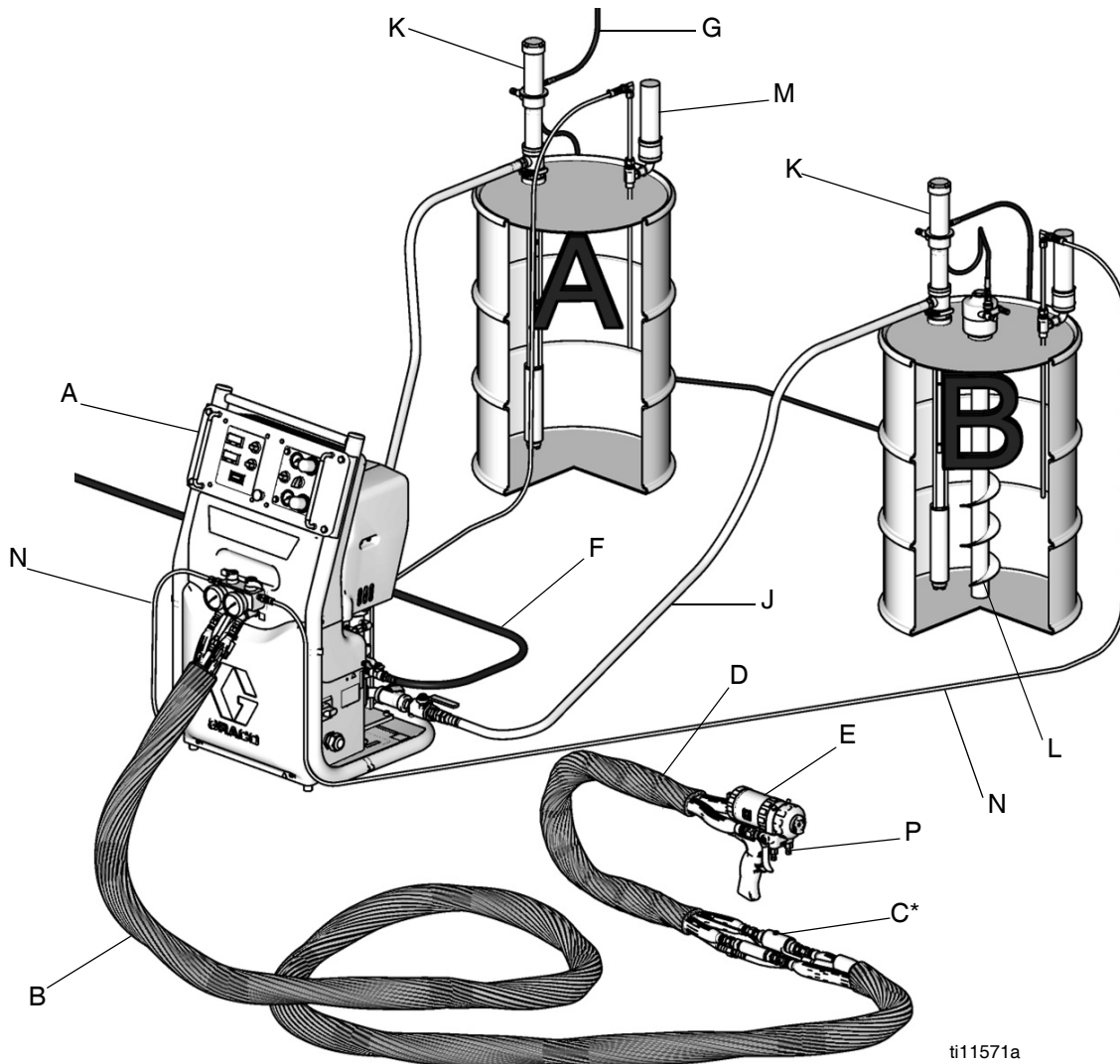
**FIG. 1: Typical Installation without Circulation**

**Key:**

- |   |                                      |   |   |
|---|--------------------------------------|---|---|
| A | Reactor Proportioner                 | G | Feed Pump Air Supply Lines 3/8 in. (76 mm) ID minimum |
| B | Heated Hose                          | H | Waste Containers                                      |
| C | Fluid Temperature Sensor (FTS)       | J | Fluid Supply Lines (217382)                           |
| D | Heated Whip Hose                     | K | Feed Pumps  |
| E | Fusion® Spray Gun                    | L | Agitator  |
| F | Proportioner and Gun Air Supply Hose | M | Desiccant Dryer                                       |
|   |                                      | N | Bleed Lines/Over Pressure Relief                      |
|   |                                      | P | Gun Fluid Manifold                                    |



# Typical Installation with Circulation



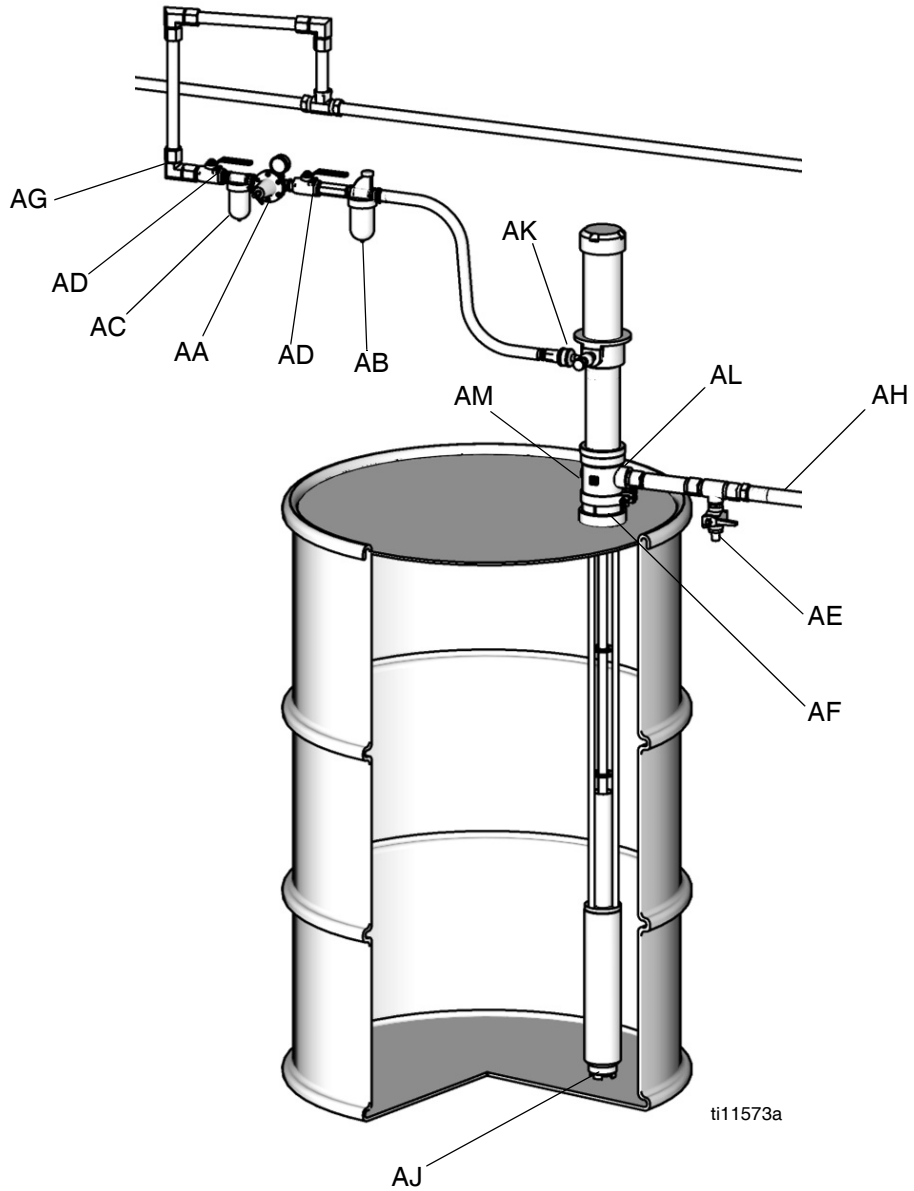
\* Shown exposed for clarity. Wrap with tape during operation.

**FIG. 2: Typical Installation with Circulation**

**Key:**

- |   |   |   |                                  |
|---|---|---|----------------------------------|
| A | Reactor Proportioner                                  | J | Fluid Supply Lines (217382)      |
| B | Heated Hose   | K | Feed Pumps                       |
| C | Fluid Temperature Sensor (FTS)                        | L | Agitator                         |
| D | Heated Whip Hose                                      | M | Desiccant Dryer                  |
| E | Fusion Spray Gun                                      | N | Bleed Lines/Over Pressure Relief |
| F | Proportioner and Gun Air Supply Hose                  | P | Gun Fluid Manifold               |
| G | Feed Pump Air Supply Lines 3/8 in. (76 mm) ID minimum |   |                                  |

## Typical Installation for Lubrication Applications



**FIG. 3: Typical Installation for Lubrication Applications**

**Key:**

AA	Pump Air Regulator	AF	Bung Adapter
AB	Air Line Lubricator	AG	Grounded Air Hose
AC	Air Line Filter	AH	Grounded Fluid Hose
AD	Bleed-Type Master Air Valve (required, for pump)	AJ	Pump Fluid Inlet
AE	Fluid Drain Valve (required)	AK	1/4 npt(f) Pump Air Inlet
		AL	1/2 npt(f) Pump Fluid Outlet
		AM	Return Port

# Installation



A bleed-type master air valve (AD) and a fluid drain valve (AE) are required in your system, to help reduce the risk of serious injury, including splashing fluid in the eyes or on the skin, and injury from moving parts when you are adjusting or repairing the pump.

- The bleed-type master air valve (AD) relieves air trapped between this valve and the pump after the pump is shut off. Trapped air can cause the pump to cycle unexpectedly and result in serious injury, including amputation. Install the valve close to the pump.
- The fluid drain valve (AE) helps relieve pressure in the displacement pump, hose, and dispensing valve when shutting off the pump. Actuating the dispensing valve to relieve pressure may not be sufficient, especially if there is a clog in the hose or the dispensing valve.

## System Accessories

Refer to FIG. 3 and the **Accessories** on page 24.

**NOTE:** To ensure maximum pump performance, be sure that all accessories used are properly sized to meet your system's requirements.

## Air Line Accessories

Install the following accessories in the order shown in the **Typical Installation for Lubrication Applications**, page 10, using adapters as necessary:

**An air line lubricator (AB)** provides automatic air motor lubrication.

**A bleed-type master air valve (AD)** is required in your system to relieve air trapped between it and the air motor when the valve is closed (see the **WARNING** on left). Be sure the bleed valve is easily accessible from the pump, and is located downstream from the air regulator.

**An air line filter (AC)** to remove harmful dirt and moisture from the compressed air supply.


**A second bleed-type air valve (AD)** isolates the air line accessories for servicing. Locate upstream from all other air line accessories.

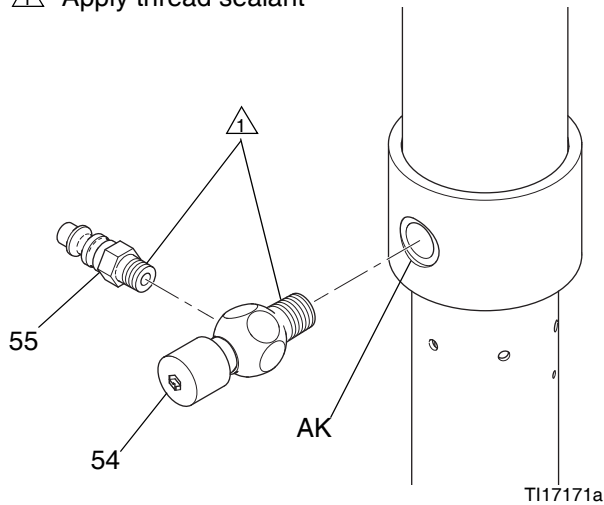
## Fluid Line Accessories

**A fluid drain valve (AE)** is required in your system to relieve fluid pressure in the hose and gun (see the **WARNING** on left). Install the drain valve so that it points down and the handle points up when the valve is opened.

# Setup


1. Apply thread sealant to the male threads of the air needle valve (54) and the quick disconnect fitting (55). Install into inlet port (AK).

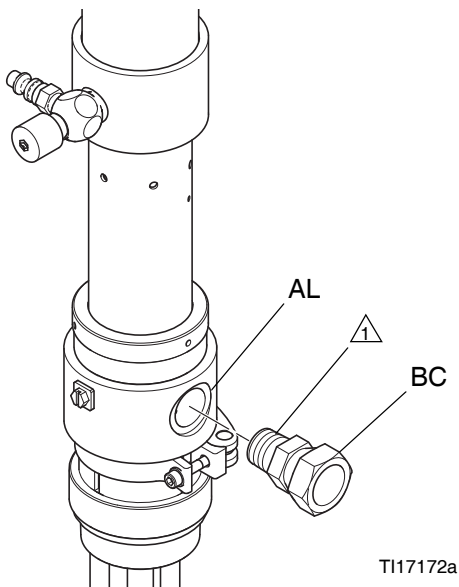
 Apply thread sealant



**FIG. 4**

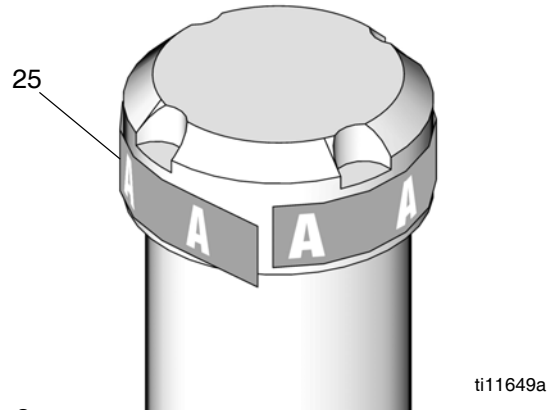
2. Apply thread sealant to the male outlet fitting (BC) (not supplied) and insert into the outlet port (AL).

 Apply thread sealant



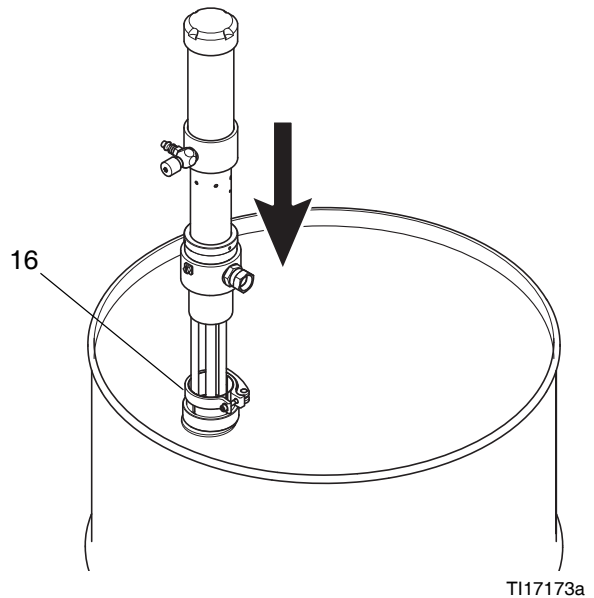
**FIG. 5**

3. Use labels (25) provided to identify the appropriate pump for your material.



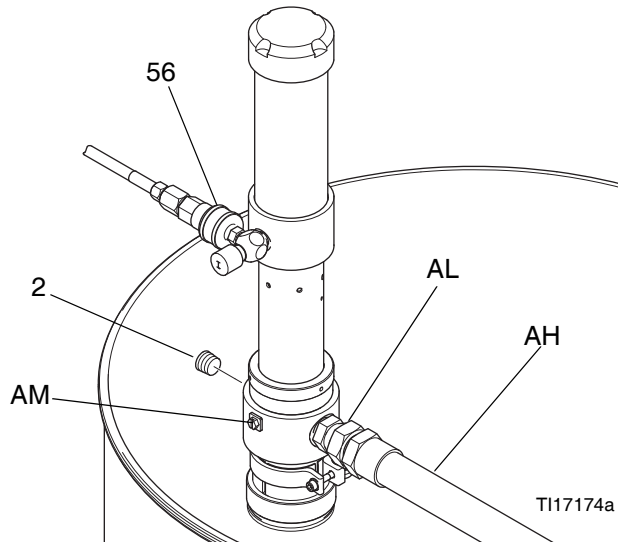
**FIG. 6**

4. Lubricate the bung adapter (16) inside diameter and mounting threads. Ensure the gasket is in place and screw the bung adapter (16) securely into the bunghole of the drum. Insert the pump through the adapter (16) and lock it in place.



**FIG. 7**

- Install air line (3/8 in. (76 mm) ID minimum) with quick disconnect air coupler (56).



**FIG. 8**

- Connect a grounded fluid hose (AH) to the 1/2 npt(f) fluid outlet (AL). In a circulating system, remove the pipe plug (2) and connect a fluid return line to the 3/8 npt(f) return port (AM).

**Air compressor:** Follow manufacturer's recommendations.

**Fluid hoses:** Use only grounded hoses with a maximum of 300 ft (91 m) combined hose length to ensure grounding continuity. Refer to Hose Grounding Continuity.

**Dispensing valve:** Ground through connection to a properly grounded fluid hose and pump.

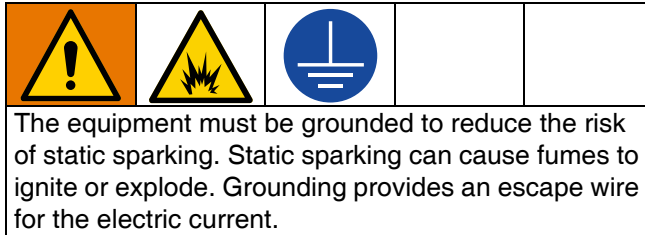
**Object being sprayed:** Follow local code.

**Fluid supply container:** Follow local code.

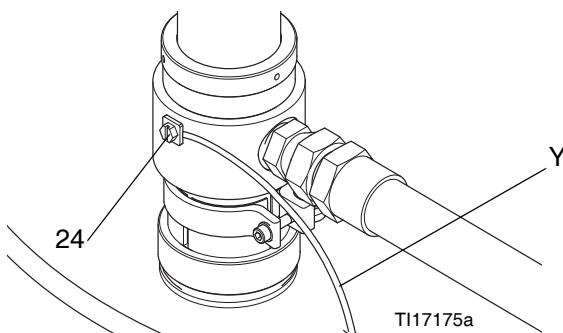
**Solvent pails used when flushing:** Follow local code. Use only conductive metal pails, placed on a grounded surface. Do not place the pail on a nonconductive surface, such as paper or cardboard, which interrupts grounding continuity.

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

## Grounding



**Pump:** Connect Ground Wire (Y) to grounding screw (24) and tighten the screw securely. See FIG. 9. Connect the other end of the wire to a true earth ground. Make certain to comply with all National, State, and Local Electrical Codes.



**FIG. 9**

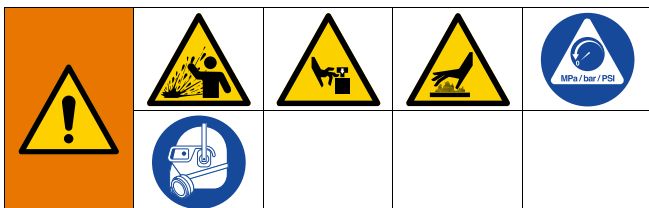
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# Operation

## Pressure Relief Procedure



Follow the Pressure Relief Procedure whenever you see this symbol.



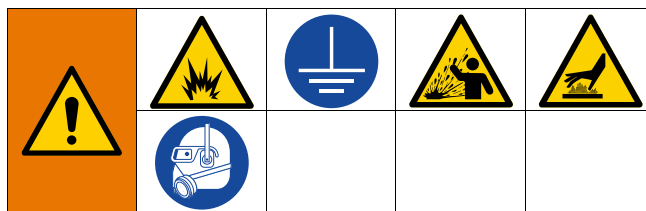
This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as, splashing fluid and moving parts, follow the Pressure Relief Procedure when you stop spraying and before cleaning, checking, or servicing the equipment..

1. Shut off the air to the pump.
2. Close the bleed-type master air valve (AD).
3. Hold a metal part of the dispense valve firmly to a grounded metal pail. Trigger the valve to relieve pressure.
4. 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.
5. If you suspect the nozzle or hose is clogged or that pressure has not been fully relieved after following the steps above, VERY SLOWLY loosen the hose end coupling to relieve pressure gradually, then loosen completely. Clear hose or nozzle obstruction.

## Flush Pump Before Use

The pump is tested with lightweight oil, which is left in to protect the pump parts. To prevent contamination of the fluid you are pumping, flush the pump with a compatible solvent before using it. See **Flush the Equipment**, page 14.

## 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.

Hot solvent may ignite. To avoid fire and explosion:

- Flush equipment only in a well-ventilated area
- 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. Follow **Pressure Relief Procedure**, page 14.
2. Allow the fluid in the system to cool.
3. Remove spray tip and soak in solvent.
4. Place siphon tube in grounded metal pail containing cleaning fluid.
5. Set pump to lowest possible fluid pressure, and start pump.
6. Hold a metal part of the gun firmly to a grounded metal pail. Trigger the gun until clean solvent dispenses.
7. Remove gun from hose. See gun manual to further clean gun.
8. Follow **Pressure Relief Procedure**, page 14, and Remove fluid filter and soak in solvent. Replace filter cap.

## Daily Startup

1. Verify that the air needle valve (54) is closed.
2. Connect the air line quick disconnect coupler (55) to the transfer pump.
3. Turn on the main air supply.
4. Slowly open the air needle valve until the transfer pump runs slowly.
5. Use the air needle valve to control the pump speed.

### NOTICE

Never allow the pump to run dry. A dry pump will quickly accelerate to a high speed and can damage the pump. If the pump accelerates quickly or starts running too fast, stop it immediately and check the fluid supply. If the supply container is empty or air has been pumped into the lines, refill the container; prime the pump and the lines with fluid, or flush and leave it filled with a compatible solvent. Be sure to eliminate all air from the fluid system.

Do not attempt to operate pump unless it is securely mounted in a drum.

## Daily Shutdown

1. Disconnect the air line quick disconnect coupler (55).
2. When air pressure is bled off, close the air needle valve (54).

## Corrosion Protection for Pump

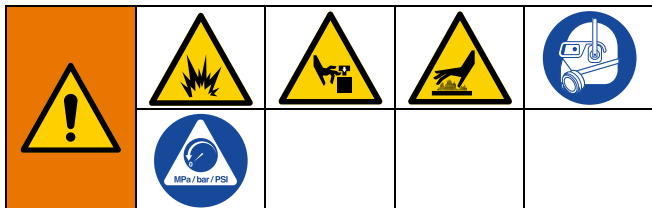
### NOTICE

Water or moist air can cause your pump to corrode. To help prevent corrosion, NEVER leave the pump filled with water or air. After normal flushing, flush the pump again with mineral spirits solvent (also called white spirit) or oil-based solvent, relieve pressure, and leave the mineral spirits solvent (also called white spirit) in the pump. Be sure to follow to the **Pressure Relief Procedure** on page 14.

## Lubrication

If you are not using an accessory air line lubricator, manually lubricate the motor daily. Disconnect the air regulator, place about 15 drops of light machine oil in the pump air inlet, reconnect the regulator and turn on the air supply to dispense oil into the motor.

# Repair



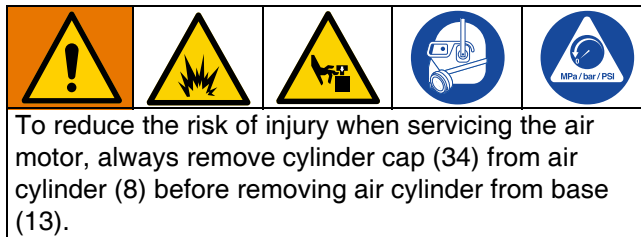
## Before you start

- Have all the necessary repair parts on hand.
- Allow the fluid in the system to cool.
- Clean all parts with a compatible solvent. Inspect parts for wear or damage and replace as needed.
- Flush the pump, if possible. Stop the pump at the bottom of its stroke. Follow **Pressure Relief Procedure**, page 14, before repairing any part of the system.
- Disconnect the air and the fluid hoses and the grounding wire. Remove the pump from its mounting and clamp it in a vise.

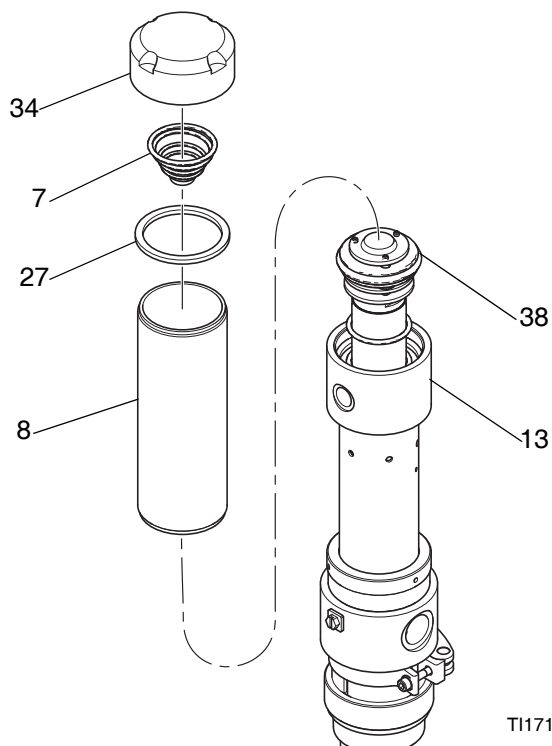
## Required Tools

- Pliers
- Set of socket wrenches
- Set of adjustable wrenches
- Insert Tool 24B917

## Disassemble the Air Motor



1. Unscrew the cylinder cap (34) from the cylinder (8). To remove the spring (7), pry gently under the coils in the direction of the helix. Inspect the spring (7) and gasket (27) for wear or damage; replace if necessary. See FIG. 10.



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**FIG. 10**

2. Unscrew the cylinder (8) from the air motor base (13) and lift the cylinder straight off the air piston (38). Unscrew by hand or use a chain wrench to prevent distortion of the cylinder's shape. See FIG. 10.



- Use a pliers on the top plate of the air valve piston (38) and a wrench on the piston rod (35) to unscrew the air valve piston from the piston rod. See FIG. 11.

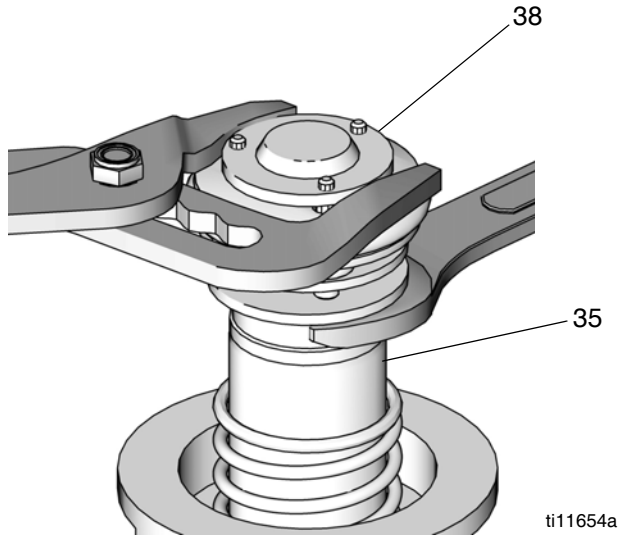




FIG. 11

- Remove washer (10), lower spring (9), and gasket (27). Inspect for wear or damage and replace as necessary. See FIG. 13.
- If any valve plate spacers (38d) are damaged, replace all three to maintain the correct clearance between the valve plates (18a,18f) and the seats. See FIG. 12.

 Apply locking compound to threads.

 Torque to 10-14 in-lb (1.1-1.6 N•m)

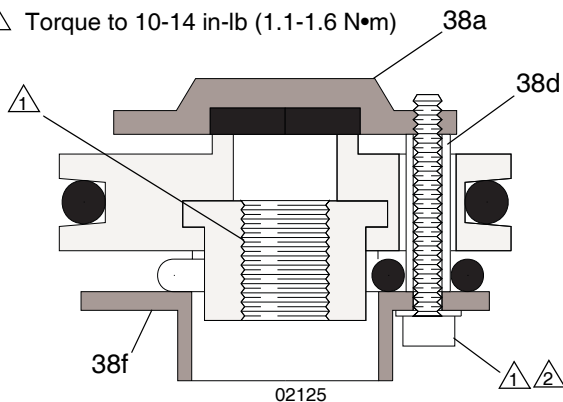


FIG. 12

- Disconnect the piston rod (35) from the pump connecting rod (37) and pull the piston rod out of the air motor base (13). Remove o-ring (6). Inspect o-ring (6) and replace if necessary.

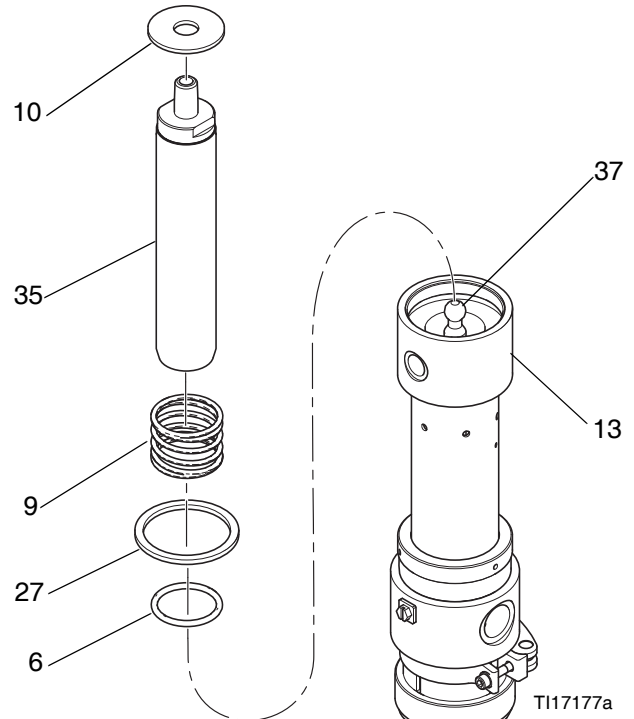


FIG. 13

## Reassemble the Air Motor

- Reinstall o-ring (6). Reconnect the piston rod (35) and the pump connecting rod (37). See FIG. 13.
- Reinstall the gasket (11), spring (9), and washer (10). Reassemble the piston (38). Apply thread sealant to the threads of the piston rod (35) and carefully screw the piston (38) onto the rod. See FIG. 11 and FIG. 13.

**NOTE:** When installed, there should be 0.032 in. (0.8 mm) minimum clearance between the washer (10) and the shoulder of the piston rod (35).

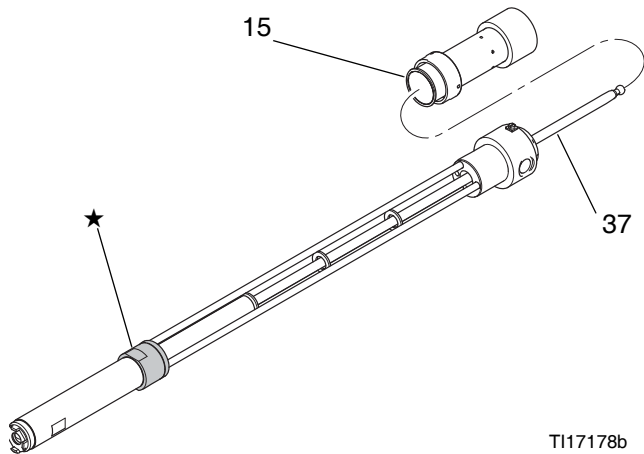
- Reinstall the spring (7) and gasket (27) on the cylinder cap (34) and screw the cap onto the cylinder (8). Screw the cylinder into the air motor base (13). See FIG. 10.

# Disassemble the Pump Lower

**NOTE:** In Series C the fluid section was upgraded to prevent threaded joints from loosening due to vibrations. Wrench flats were also added to improve serviceability.

Series A and B pumps can be upgraded with repair kit 24R989.

1. Unscrew the air motor connecting ring (15). Lay the pump on its side and rotate until the ball on the pump connecting rod (37) releases from the socket in the motorpiston rod (35). Separate the motor from the displacement pump.

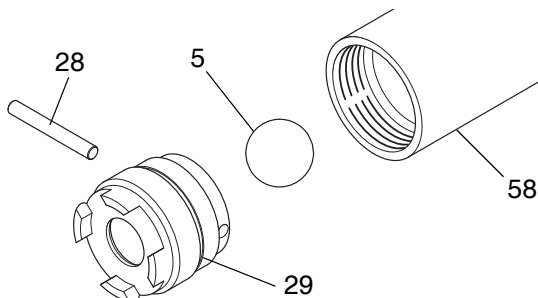


★ Support the Series A, B, and D pump frame with a strap wrench. Series C pumps have wrench flats.

**FIG. 14**

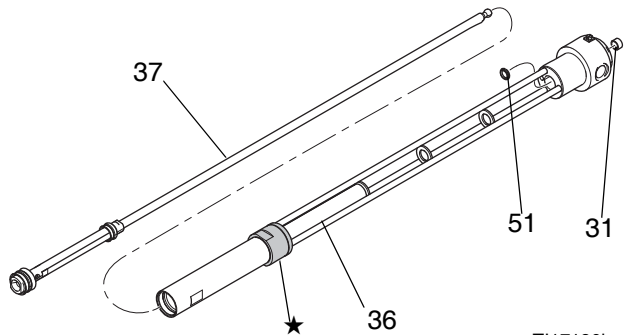
**NOTE:** To repair the air motor, see **Disassemble the Air Motor**, page 16.

2. Unscrew the intake valve housing (29) from the piston cylinder (58). Disassemble intake valve.



**FIG. 15**

3. Unscrew the piston cylinder (58) from the pump frame (36).
4. Push down on the pump connecting rod (37) until fluid piston assembly is clear of displacement pump frame (36). Pull the piston assembly and connecting rod out of the frame. Remove the bearing (31) and seal (51) from the frame.

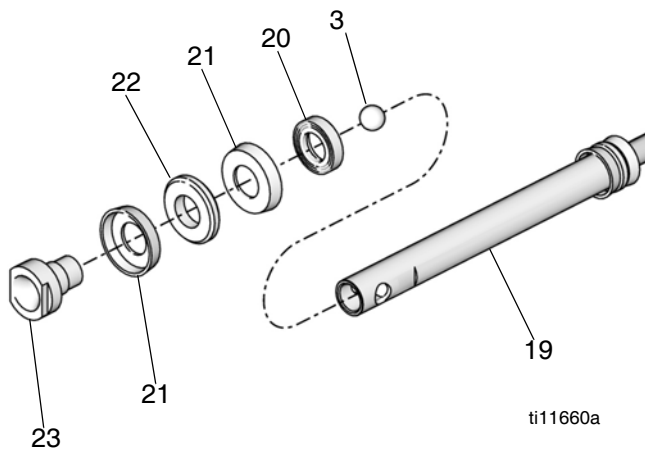


★ Support the Series A, B, and D pump frame with a strap wrench. Series C pumps have wrench flats.

**FIG. 16**

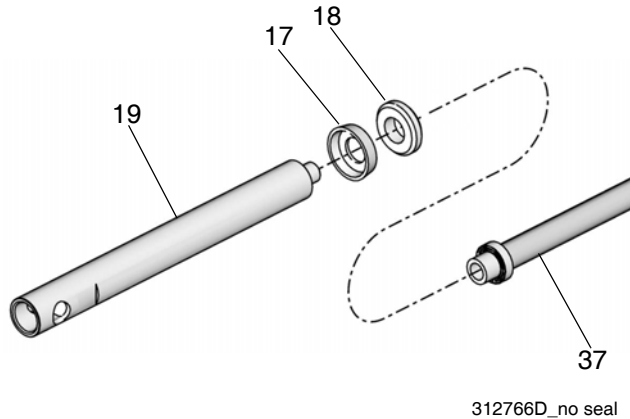
**NOTE:** Scoring or irregular surfaces on the connecting rods (37, 19) or polished inner wall of the pump frame (36) and piston cylinder (58) can cause premature packing wear and leaking. To check these parts, rub a finger over the surface or hold the part up to the light at an angle. Replace if necessary.

5. Unscrew the piston body (23) from the piston valve housing on the fluid piston rod (19).



**FIG. 17**

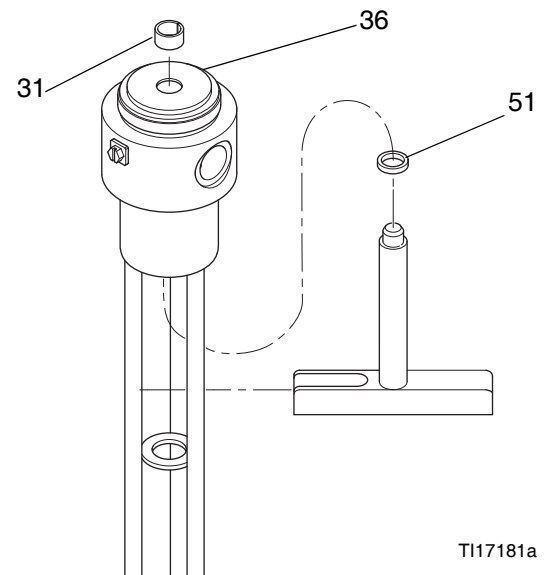
- Unscrew the fluid piston rod (19) from the pump connecting rod (37). Remove the cup packing (17) and bearing (18).



**FIG. 18**

## Reassemble the Pump Lower

- Lubricate packing (17) and bearing (18) with no. 2 lithium-based grease.
- Install the bearing (18), and cup packing (17) with the lips facing down on the pump connecting rod (37). See FIG. 18.
- Lubricate the piston seals (21) and bearing (22) with no. 2 lithium-based grease. Install one piston seal (21) with the lips facing down, bearing (22), and second piston seal (21) with lips facing up on the piston (23). Install the backup washer (20) with the grooves facing down. See FIG. 17 on page 18.
- Place the ball (3) on top of the piston body (23) and screw the piston body and the fluid piston rod (19) together. Torque to 30-35 ft-lb (41-48 N•m). Screw the piston valve housing (29) onto the lower connecting rod (19). See FIG. 17 on page 18.
- Install the seal (51), with the lips facing down, in the displacement pump frame (36), then install bearing (31).



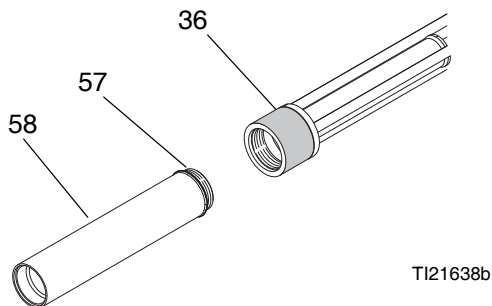
**FIG. 19**

**NOTE:** Install seal (51) from the bottom of the pump frame (36) with insert tool 24B917.

- Use a turning motion to maneuver and install the pump connecting rod (37) and piston back into the pump frame (36). See FIG. 14 on page 18.

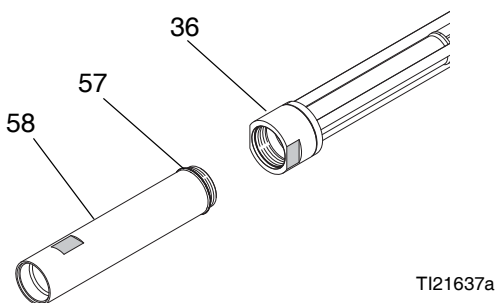
7. Install piston cylinder (58).

- a. **For Series A and B Pumps:** Support the pump frame (36) with a strap wrench. Lubricate o-ring (57) lightly with grease and apply thread sealant to threads of pump cylinder (58). Torque to 10-15 ft-lb (13.5-20 N•m).



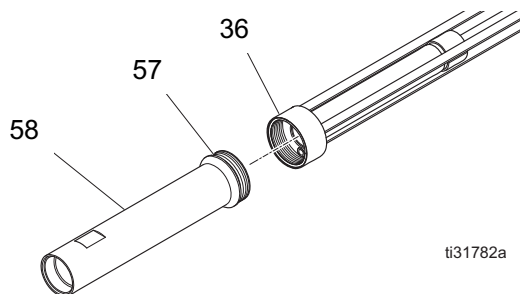
**FIG. 20: Series A and B**

- b. **For Series C Pumps:** Support the pump frame (36) with wrench flats. Lubricate o-ring (57) lightly with grease and apply th to threads of pump cylinder (58). Torque to 30-35 ft-lb (41-48 N•m).



**FIG. 21: Series C**

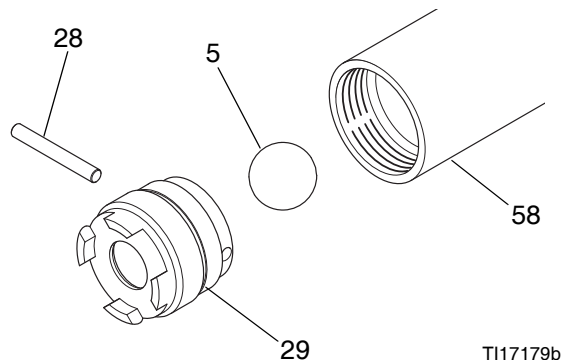
- c. **For Series D Pumps:** Support the pump frame (36) with a strap wrench. Lubricate o-ring (57) lightly with grease and apply thread sealant to threads of pump cylinder (58). Torque to 30-35 ft-lb (41-48 N•m).



**FIG. 22: Series D**

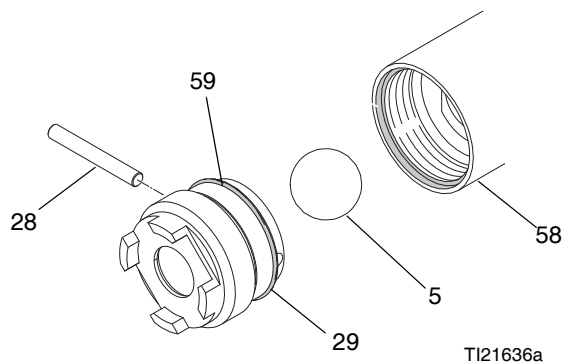
8. Install intake valve (29).

- a. **For Series A and B Pumps:** Apply thread locker to threads of intake valve (29). Torque to 10-15 ft-lb (13.5-20 N•m).



**FIG. 23: Series A and B**

- b. **For Series C and D Pumps:** Lubricate o-ring (59) and install thread locking compound to threads of intake valve (29). Torque to 30-35 ft-lb (41-48 N•m).



**FIG. 24 Series C**

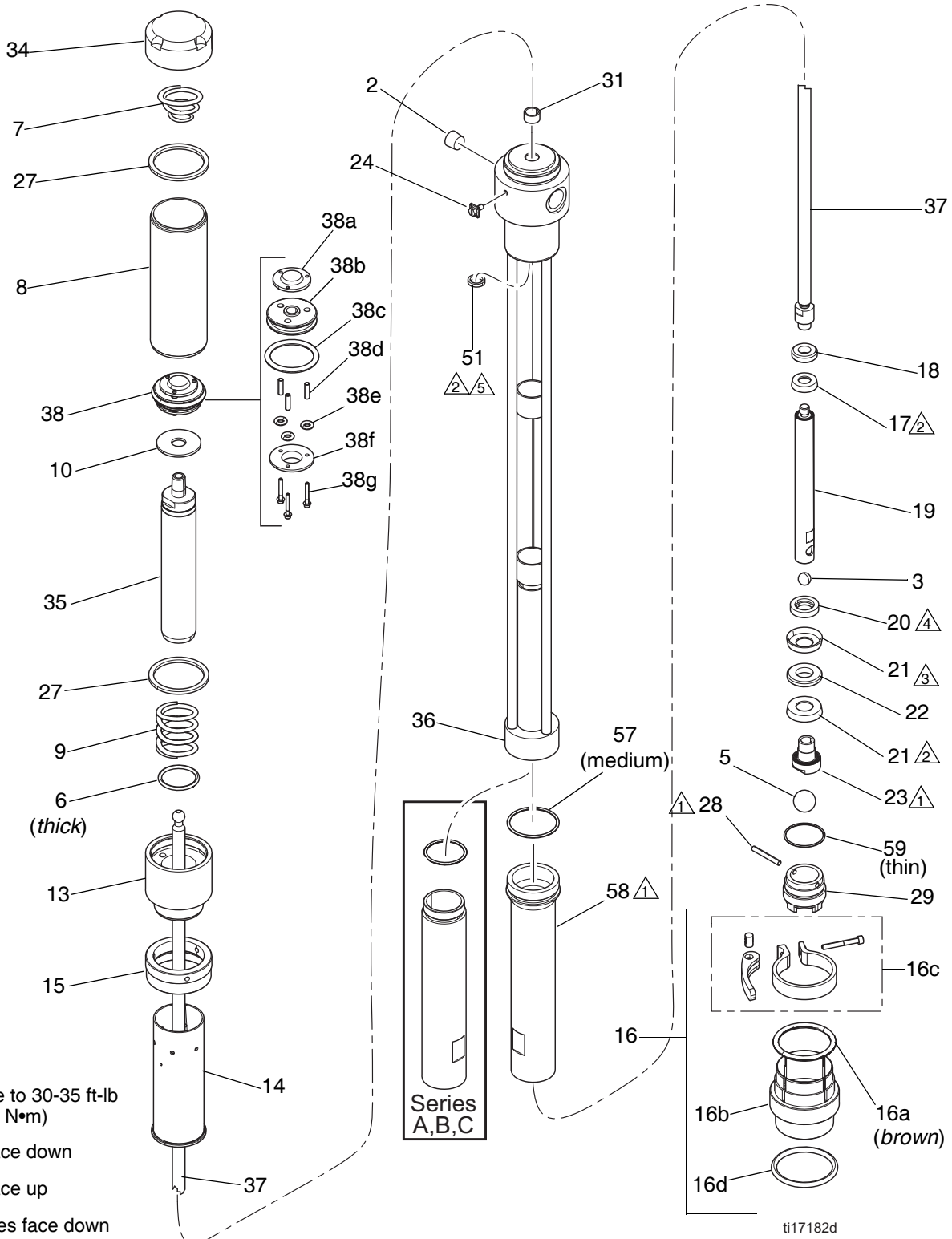
# Troubleshooting



1. Follow **Pressure Relief Procedure**, page 14, before checking or repairing gun.
2. Check all possible problems and causes before disassembling pump.

Problem	Cause	Solution
The pump fails to operate.	Dirty or worn air motor.	Clean, service.
	Inadequate air supply or restricted lines.	Clean lines or increase the air supply (see , page 27).
	Closed or clogged air valves.	Open or clear the valves.
	Clogged fluid hose or valve.	Clear the hose or valves.
	Worn or damaged valves or seals.	Service the valves or seals.
The pump operates, but the output is low on both strokes.	Clogged fluid hose or valve.	Clear the hose or valves.
	Low or empty fluid supply.	Refill the fluid supply and reprime the pump.
	Worn or damaged valves or seals.	Service the valves or seals.
The pump operates, but the output is low on the downstroke.	Held open or worn intake valve.	Clear or service the valve.
	Worn or damaged valves or seals.	Service the valves or seals.
The pump operates, but the output is low on the upstroke.	Held open or worn piston valve.	Clear or service the valve.
	Worn or damaged valves or seals.	Service the valves or seals.
Erratic or accelerated operation.	Low or empty fluid supply.	Refill the fluid supply and reprime the pump.
	Broken air motor compression spring.	Replace the spring.
Pump slowly moves after fluid shutoff in downstroke.	Clogged or dirty intake valve check ball.	Clean ball and seat.
	Worn or damaged valves or seats.	Install repair kit.
Pump slowly moves after fluid shutoff in upstroke.	Clogged or dirty lower piston ball or seat.	Clean ball and seat.
	Worn or damaged valves or seats.	Install repair kit.

# Parts



△1 Torque to 30-35 ft-lb (41-48 N•m)

△2 Lips face down

△3 Lips face up

△4 Grooves face down

△5 Use assembly tool 24B917

**NOTE:** Thin, medium, and thick refers to the relative cross section thickness of the o-rings.

Ref.	Part	Description	Qty.	Ref.	Part	Description	Qty.
2	101748	PLUG, pipe; SST	1	37	256431	ROD, pump, connector	1
3◆	101750	BALL, bearing, upper	1	38	24J679	PISTON, valve, air	1
5◆	101917	BALL, bearing, lower	1	38a†	162729	PLATE, exhaust	1
6†	156698	O-RING	1	38b	189210	PISTON	1
7†	157630	SPRING, compression, tapered	1	38c†	108357	O-RING	1
8	24J673	CYLINDER, air	1	38d	181485	SPACER	3
9†	157633	SPRING, compression	1	38e†	108358	O-RING	3
10	157872	WASHER, valve	1	38f	181487	PLATE, intake	1
13	24J674	BASE, motor, air	1	38g	220884	SCREW, #6-32	3
14	24J675	HOUSING, connecting rod	1	39	172479	TAG, instruction	1
15	24J676	RING, connecting	1	51◆	111791	SEAL	1
16	253146	ADAPTER, bung; SST (includes 16a-16g)	1	54✘	206264	VALVE, needle	1
16a◆	120207	O-RING; inner	1	55✘	169969	FITTING, line, air	1
16b	24J526	ADAPTER	1	56✘	114558	COUPLER, line, air	1
16c	234188	CLAMP, hopper	1	57★	131227	O-RING (Series D)	1
16d◆	120998	O-RING; O.D.	1		118403	O-RING (Series A, B, and C)	1
17◆	161788	PACKING, cup; upper piston	1	58★	26C049	CYLINDER, piston (Series D)	1
18◆	16C799	BEARING, piston, upper	1		24R988	CYLINDER, piston (Series A, B, and C)	1
19	256432	ROD, piston, fluid	1	59★	103414	O-RING	1
20	161792	RING, back-up	1				
21◆	161793	SEAL, piston, lower	2				
22◆	186648	BEARING, piston, lower	1				
23	161795	PISTON	1				
24	116343	SCREW, ground	1				
25✘	15K008	LABEL, ID	1				
27†	162989	GASKET	2				
28	164250	PIN, ball stop	1				
29★	24T262	HOUSING, valve, intake	1				
31◆	166564	BEARING, connecting rod	1				
34	256429	CAP, cylinder, air	1				
35	24J678	ROD, piston	1				
36✘	24K361	FRAME, pump (Series D)	1				

**NOTE:** Complete T1 pump repair kit 24X055 contains repair kits 247958 and 24K363.

† Parts included in repair kit 247958.

◆ Parts included in repair kit 24K363.

✘ Indicates parts not shown (shipped loose).

★ Parts included in repair kit 24R989. See **Disassemble the Pump Lower**, page 18, for instructions.

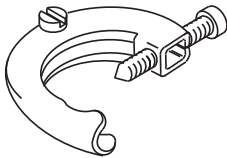
✘ Replacement pump frames for Series A, B, or C pumps also require the intake valve kit 24R989.

# Accessories

## Grounding Clamp

Part	Description
103538	CLAMP, ground

Qty.  
1

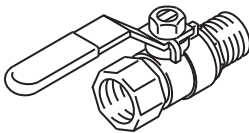


## Bleed-Type Master Air Valve

300 psi (2.1 MPa, 21 bar) Maximum Working Pressure

Part	Description
107142	VALVE, ball, vented; 1/2 npt(m) inlet x 1/2 npt(f) outlet

Qty.  
1

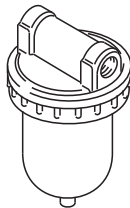


## Air Line Filter

250 psi (1.7 MPa, 17.5 bar) Maximum Working Pressure.

Part	Description
106149	FILTER, air line; 1/2 npt(f) inlet and outlet

Qty.  
1

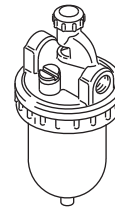


## Air Line Lubricator

250 psi (1.7 MPa, 17.5 bar) Maximum Working Pressure.

Part	Description
214848	LUBRICATOR, air line; 8 oz (0.24 liter) bowl capacity; 1/2 npt(f) inlet and outlet

Qty.  
1

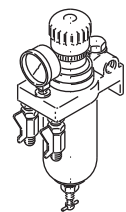


## Air Line Filter and Regulator

180 psi (1.3 MPa, 13 bar) Maximum Working Pressure.

Part	Description
202660	FILTER, air; includes gauge and two 1/4 npt(m) outlet valves, 50 micron filter element with 100 mesh inlet strainer; 1/2 npt(f) inlet; flow rate is over 50 scfm (1.4 m <sup>3</sup> /min).

Qty.  
1



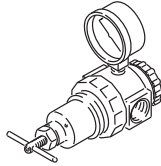
01355



## Air Regulator and Gauge

300 psi (2.1 MPa, 21 bar) Maximum Working Pressure.

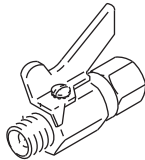
Part	Description	Qty.
202156	REGULATOR, air; 0-200 psi (0-14 bar) regulated pressure range; 3/8 npt(f) inlet and outlet	1



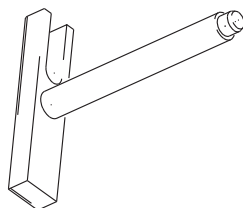
## Fluid Drain Valve

500 psi (3.5 MPa, 35 bar) Maximum Working Pressure

Part	Description	Qty.
208630	VALVE, ball; 1/2 npt(m) x 3/8 npt(f); for non-corrosive fluids; carbon steel and PTFE	1
237534	VALVE, ball; 3/8 npt(m) x 3/8 npt(f); for corrosive fluids; SST and PTFE	1



## Insert Tool 24B917 (4 in. long)

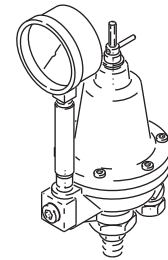


01357

## Fluid Pressure Regulator

250 psi (1.7 MPa, 17.5 bar) Maximum Working Pressure.

Part	Description	Qty.
203831	REGULATOR, fluid; carbon steel; 0-60 psi (0-4 bar) regulated fluid pressure range; 2 gpm (7.6 liter/min) maximum flow rate	1
209030	REGULATOR, fluid; stainless steel; 5-100 psi (0.4-7 bar) regulated fluid pressure range; 3 gpm (11.3 liter/min) maximum flow rate	1

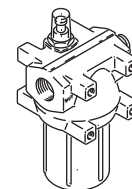


01356

## Fluid Filter

300 psi (2.1 MPa, 21 bar) Maximum Working Pressure

Part	Description	Qty.
213057	FILTER, 30 mesh	1
213058	FILTER, 60 mesh	1
213059	FILTER, 100 mesh	1

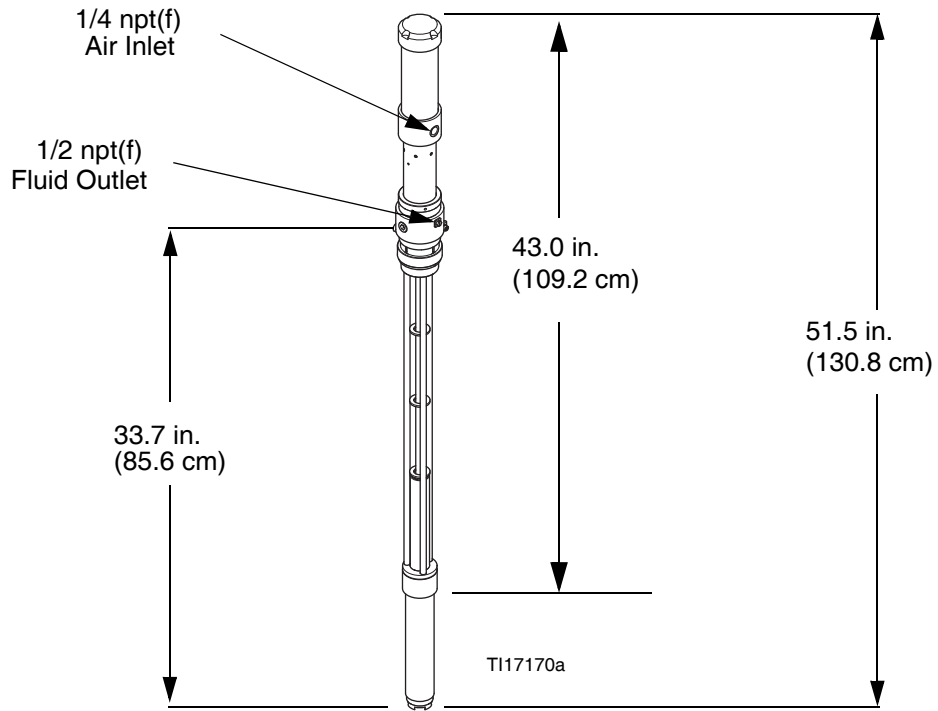


0779

## UHMWPE Packing Conversion Kit, 224017

Part	Description	Qty.
111004	PACKING, cup	2
111005	PACKING, cup	2
161789	BEARING, piston	1
161794	BEARING, piston	1
405977	MANUAL, instruction	1

# Dimensions



# Performance Chart

## Calculate Fluid Outlet Pressure (black curves)

To calculate fluid outlet pressure psi (MPa, bar) at a specific fluid flow (lpm/gpm) and operating air pressure psi (MPa, bar), use the following instructions and pump data chart.

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

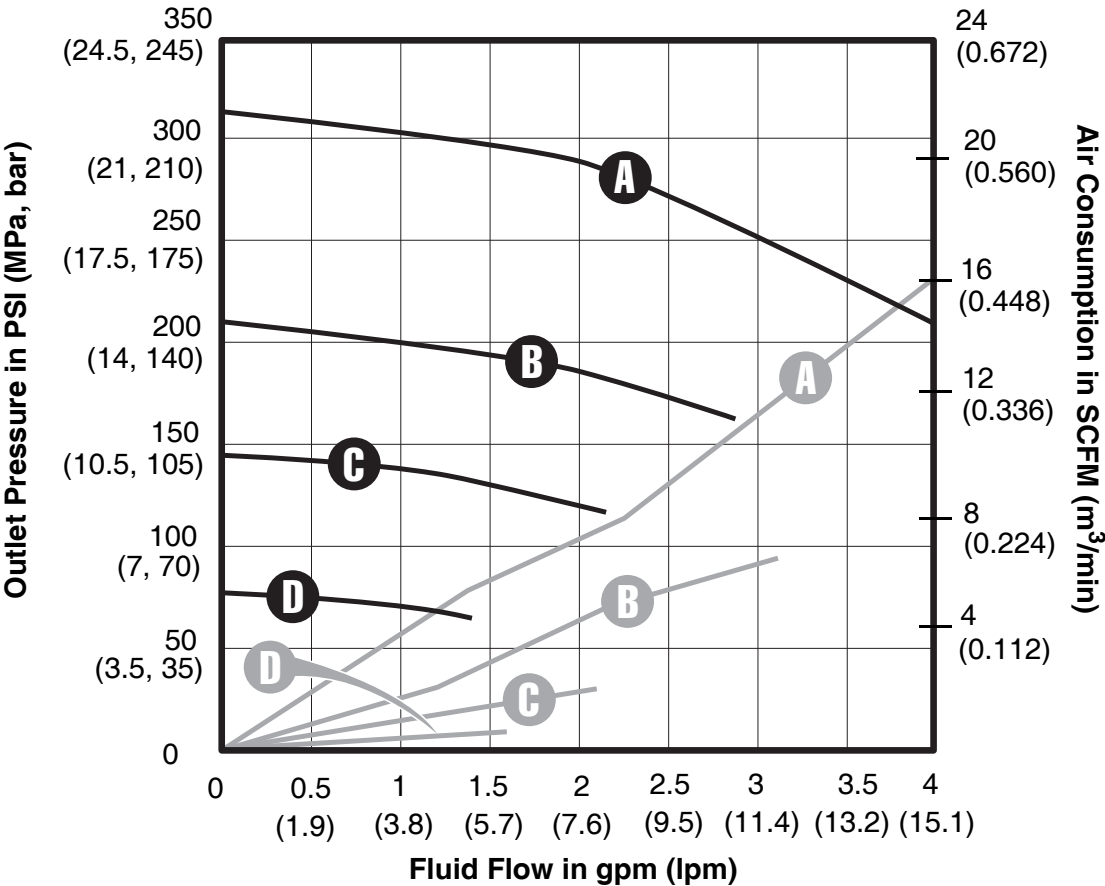
## Calculate Pump Air Consumption (grey curves)

To calculate pump air consumption (m<sup>3</sup>/min or scfm) at a specific fluid flow (lpm/gpm) and air pressure psi (MPa, bar), use the following instructions and pump data chart.

1. Locate desired fluid flow along bottom of chart.
2. Follow vertical line up to intersection with selected air pressure curve (grey). Follow horizontally right to read air consumption.

**Key**

- A 180 psi (1.2 MPA, 12.4 bar)
- B 100 psi (0.7 MPA, 7 bar)
- C 70 psi (0.5 MPA, 7.8 bar)
- D 40 psi (0.3 MPA, 2.8 bar)





# Technical Specifications

<b>T1 2:1 Ratio Transfer Pump</b>		
	<b>US</b>	<b>Metric</b>
Maximum fluid working pressure	360 psi	2.48 MPa, 24.8 bar
Maximum air inlet pressure	180 psi	1.2 MPa, 12 bar
Pressure ratio	2:1	
<b>Maximum fluid operating temperature</b> (Do not exceed the lowest maximum depending on the diaphragm, ball, and seat used in your pump.)		
Maximum ambient temperature	120 °F	50 °C
Maximum fluid temperature	180 °F	82 °C
<b>Maximum pump speed</b>		
Pump cycles per 1 gallon (3.8 liters)	40	Pump cycles per 1 gallon (3.8 liters)
Maximum recommended pump speed for continuous operation	100 cycles per min (150 cycles per min intermittent)	Maximum recommended pump speed for continuous operation
<b>Fluid flow per cycle*</b>		
Gallons (liters) per pump cycle	0.025 (0.095)	Gallons (liters) per pump cycle
<b>Noise (dBa)</b>		
Maximum sound pressure	88.7 dB(A) at 80 psi (0.55 MPa, 5.5 bar)	
Sound power	96.8 dB(A) at 80 psi (0.55 MPa, 5.5 bar)	
<i>Sound power measured per ISO-9614-2.</i>		
<b>Inlet/Outlet Sizes</b>		
Fluid recirculation port	3/8 npt(f)	
Air inlet port	1/4 npt(f)	
Fluid outlet port	1/2 npt(f)	
<b>Materials of Construction**</b>		
Wetted parts	Stainless Steel, PTFE, PEEK	
<b>Weight</b>		
All models	18.5 lb	8.4 kg
<b>Notes</b>		
* <i>Startup pressures and displacement per cycle may vary based on suction condition, discharge head, air pressure, and fluid type.</i>		
** <i>All fluid contact materials are FDA-compliant and meet the United States Code of Federal Regulations (CFR) Title 21 for repeated use in food-processing machinery. The pump user must verify that the construction materials meet their specific application requirements.</i>		
All trademarks or registered trademarks are the property of their respective owners.		

# 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.

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Original instructions. This manual contains English. MM 312766

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Revision S, June 2019