

2K Manual Dispense Valve

332198E

EN

For use with two component proportioners to mix and dispense beads of non-abrasive material. For professional use only.

Not approved for use in European explosive atmosphere locations.

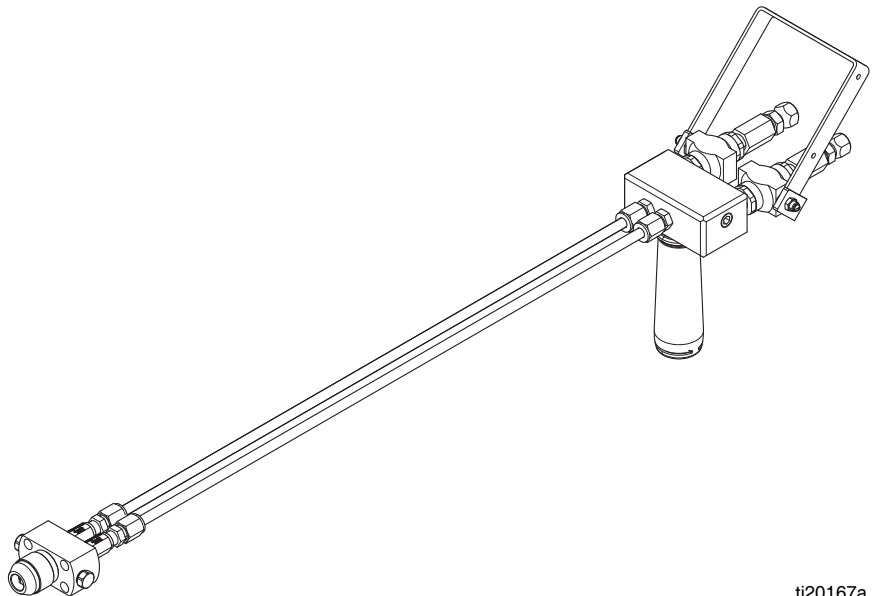
Model 24R021

2000 psi (14 MPa, 137 bar) Maximum Fluid Working Pressure



Important Safety Instructions

Read all warnings and instructions in this manual and the system manual. Save all instructions.



ti20167a



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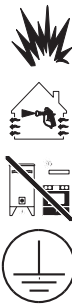
Related Manuals

The following manuals are available at www.graco.com.

Part	Description
3A1602	E-8p Proportioner Operation and Repair

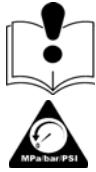
Warnings

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	
	<p>TOXIC FLUID OR FUMES HAZARD</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"> • Read MSDSs 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. • Always wear chemically impermeable gloves when spraying, dispensing, or cleaning equipment.
	<p>PERSONAL PROTECTIVE EQUIPMENT</p> <p>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. This protective equipment includes but is not limited to:</p> <ul style="list-style-type: none"> • Protective eyewear, and hearing protection. • Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer
	<p>SKIN INJECTION HAZARD</p> <p>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.</p> <ul style="list-style-type: none"> • 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.
	<p>FIRE AND EXPLOSION HAZARD</p> <p>Flammable fumes, such as solvent and paint fumes, in work area can ignite or explode. To help prevent fire and explosion:</p> <ul style="list-style-type: none"> • 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 arc). • 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. • Ground all equipment in the work area. See Grounding instructions. • Use only grounded hoses. • Hold gun firmly to side of grounded pail when triggering into pail. Do not use pail liners unless they are antistatic 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 Data** in all equipment manuals.
- Use fluids and solvents that are compatible with equipment wetted parts. See Technical Data in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request MSDS 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.



PRESSURIZED ALUMINUM PARTS HAZARD

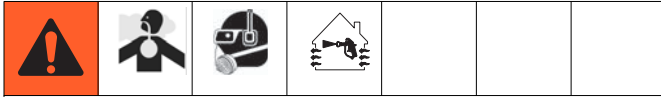
Use of fluids that are incompatible with aluminum in pressurized equipment can cause serious chemical reaction and equipment rupture. Failure to follow this warning can result in death, serious injury, or property damage.

- Do not use 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids containing such solvents.
- Many other fluids may contain chemicals that can react with aluminum. Contact your material supplier for compatibility.

Important Isocyanate (ISO) Information

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

Isocyanate Conditions



Spraying or dispensing materials containing isocyanates creates potentially harmful mists, vapors, and atomized particulates.

Read material manufacturer's warnings and material MSDS to know specific hazards and precautions related to isocyanates.

Prevent inhalation of isocyanate mists, vapors, and atomized particulates by providing sufficient ventilation in the work area. If sufficient ventilation is not available, a supplied-air respirator is required for everyone in the work area.

To prevent contact with isocyanates, appropriate personal protective equipment, including chemically impermeable gloves, boots, aprons, and goggles, is also required for everyone in the work area.

Material Self-ignition



Some materials may become self-igniting if applied too thick. Read material manufacturer's warnings and material MSDS.

Keep Components A (ISO) and B (RES) 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 (ISO) and component B (RES) 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 crystals, which 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

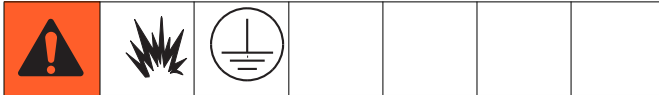
Changing the material types used in your equipment requires special attention to avoid equipment damage and downtime.

- 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

Installation



1. Relieve all system pressure before installing the dispense valve.



GROUNDING

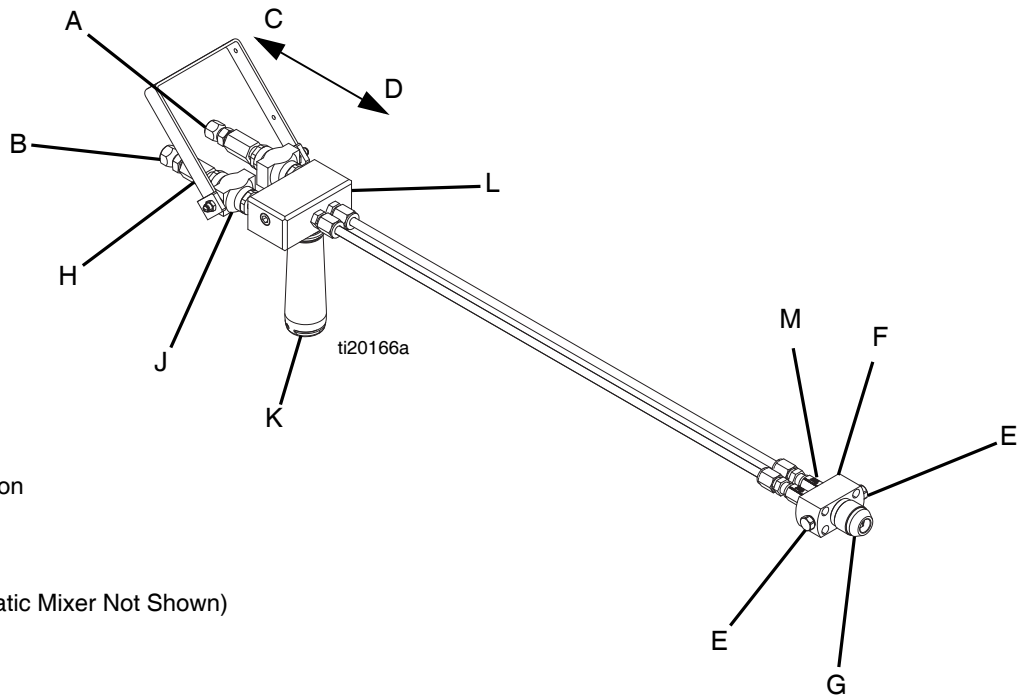
The equipment must be grounded to reduce the risk of static sparking. Static sparking can cause fumes to ignite or explode. Grounding provides an escape wire for the electric current.

2. Ground the gun through connection to a properly grounded fluid hose and pump. See your system manual for further information.

3. Thread the handle (K) onto the manifold (L).
4. Connect the gun fluid supply hoses to the A (ISO) and B (RES) fluid inlets of gun.

NOTE: Hoses are color coded: red for component A (ISO), blue for component B (RES). Red (ISO) usually is connected to the left side of the valve (as viewed from the back of the gun).

5. Perform **Prime** procedure, page 8.



Key:

- A A (Iso) Hose
- B B (Resin) Hose
- C OFF (Closed) Position
- D ON (Open) Position
- E Restrictor or Plug
- F Outlet Manifold
- G Static Mixer Nut (Static Mixer Not Shown)
- H Lever
- J Inlet Ball Valves
- K Handle
- L Manifold
- M Check Valves

FIG. 1

Operation

Prime



Perform this procedure whenever air is introduced into the material lines, such as after connecting the material supply lines to the dispense valve.

1. Perform **Pressure Relief Procedure** on page 10.
2. *If a static mixer is installed*, remove static mixer.
3. Use lever (H) to open the dispense valve inlet ball valves (J).

NOTICE

Always open and close lever (H) fully and quickly. Opening the valve partially or slowly will cause soft spots in the material and may shut down the proportioner because of a pressure imbalance.

4. *If necessary*, prime the proportioner. See proportioner manual for priming instructions.
5. Run the proportioner until clean, air-free material begins to exit the dispense valve.
6. If necessary, **Pressure Balance the Gun**.
7. **Install Disposable Static Mixer**.

Pressure Balance the Gun



Balancing the back pressure:

- controls ratio lead-lag when the gun opens
- holds pressure in the hose, providing a very smooth flow
- minimizes oozing from mixer
- minimizes material crossover.

1. Use lever (H) to close the dispense valve inlet ball valves (J).

NOTICE

Always open and close lever (H) fully and quickly. Opening the valve partially or slowly will cause soft spots in the material and may shut down the proportioner because of a pressure imbalance.

2. Remove static mixer.
3. With the static mixer removed, dispense into a waste container. Note pressure gauge readings. If pressures are more than 25% apart, continue to next step. If not, pressures are sufficiently balanced.
4. *If pressures are more than 25% apart*, replace one or both plugs or restrictors with a different restrictor size:

NOTE: An extra 0.032 in. restrictor is included with the gun. If necessary, use this restrictor to balance the pressures. Put the larger orifice on the side with the higher viscosity material.

- a. Perform **Pressure Relief Procedure** on page 10.
- b. Select the new restrictors required to achieve desired back pressure and balance. See pressure drop chart in FIG. 2 on page 15.

NOTE: The valve should be able to achieve the desired flow rate at a pressure of 200-1500 psi (1.4-10 MPa, 14-103 bar). A (ISO) and B (RES) pressures should balance within 25% of each other.

- c. **Install Restrictors or Plugs**, see page 11.
- d. Repeat this procedure to verify pressures are balanced.

Ratio Checking

NOTE: Use ratio check nozzle 255247 with retaining nut 512292. Purchase separately.

The output mix ratio of your proportioner can be checked by dispensing the two fluids separately out of the nosepiece into tared cups. The cups can then be weighed and the weights divided to get the mix ratio by weight.

Ratio checks provide information about the ratio of an overall sample. Transient problems (soft spots) caused by starting and stopping the flow (lead-lag) may not show up in this kind of ratio check. Physical tests of the mixed fluid are the best check of correct ratio and mix quality.

Install Disposable Static Mixer



1. Perform **Pressure Relief Procedure**, page 10.
2. Use lever (H) to close the dispense valve inlet ball valves (J).
3. Coat threads of outlet manifold (F) with grease to prevent material curing on threads.
4. Install static mixer and secure with nut (G).

Dispense



1. *If it is possible that air may be in the fluid lines, perform **Prime** procedure on page 8.*
2. *If the gun has not yet been pressure balanced, perform **Pressure Balance the Gun** procedure on page 8.*
3. *If the fluid in the static mixer is cured or there is no static mixer installed, **Install Disposable Static Mixer**, page 9.*
4. Start proportioner and adjust to desired pressure. See proportioner manual for instructions.

NOTE: Use the lowest proportioner pressure setting that produces the desired flow.

NOTICE

If the proportioner pressure setting is too high, any differences in viscosity will cause a pressure differential that will result in improper mixing.

5. Use lever (H) to open and close dispense valve inlet ball valves (J) as desired to dispense materials.

NOTICE

Always open and close lever (H) fully and quickly. Opening the valve partially or slowly will cause soft spots in the material and may shut down the proportioner because of a pressure imbalance.

6. If stopping dispensing for longer than the cure time of the materials:
 - a. Use lever (H) to close dispense valve inlet ball valves (J) as desired to dispense materials.
 - b. Keep static mixer installed.
 - c. When ready to dispense again, **Install Disposable Static Mixer**, page 9.
7. When done using the dispense valve for the day, perform **Daily Shutdown** on page 10.

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 spraying and before cleaning, checking, or servicing the equipment.

This procedure describes how to relieve pressure from the dispense valve. See the supply system manual for instructions on relieving pressure from the entire system.

1. Shut off material supply pumps.
2. With the valve pointed into a grounded metal pail, use the lever (H) to open the inlet ball valves (J) and relieve the fluid pressure.



3. If the valve nozzle or fluid hose is clogged or if pressure has not been fully relieved after following the steps above:
 - a. Use lever (H) to close dispense valve inlet ball valves (J).
 - b. VERY SLOWLY loosen the static mixer nut (G) from the outlet manifold (F) or the hose end coupling to relieve pressure gradually, then loosen completely. Clear hose or nozzle obstruction.
 - c. Use lever (H) to open dispense valve inlet ball valves (J).

Daily Shutdown

NOTE: For brief shutdowns, leave the cured mixer in place until it is time to use a fresh mixer.



When you finish using the 2K Manual Dispense Valve, clean the outlet manifold (F) and protect it from drying or crystallization as follows:

1. Perform **Pressure Relief Procedure**, page 10.
2. Remove and properly dispose of the static mixer.
3. Dispense one shot of material into a waste container to clear any crossover in the outlet manifold (F).
4. Wipe the nose with a clean rag, being careful not to let the materials contact each other.
5. Install PTFE night capt (19) and retaining nut (G).

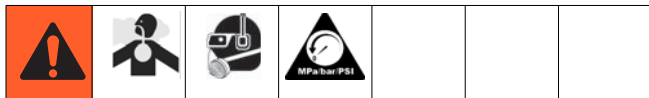
Flushing



Flush the valve regularly to remove material build up.

1. Perform **Pressure Relief Procedure**, page 10.
2. Remove static mixer.
3. To maintain ground continuity, press and hold a metal part of the dispense valve against the side of a grounded metal pail then pump solvent through the gun into the grounded metal pail until clean solvent is dispensed. Use the lowest pressure possible while dispensing solvent.

Install Restrictors or Plugs



Two 0.024 in. restrictors are installed with the gun. An extra 0.032 in. restrictor is included with the gun. If necessary, use this restrictor to balance the pressures. Optional restrictors in various sizes are also available. Restrictors create back pressure and make up for viscosity differences between A (ISO) and B (RES). See pressure drop chart in FIG. 2 on page 15 and see the **Volume Balancing** section. See **249765 Restrictor Kit** on page 14.

1. Perform **Pressure Relief Procedure**, page 10.
2. Remove restrictors (E).
3. *If using one or more restrictors*, assemble o-rings (CC) and screens (BB) onto restrictors (AA). See FIG. 2 on page 15.
4. *If using one or more plugs (see **Accessories** on page 14)*, assemble o-rings (CC) onto plugs.
5. Screw assembled restrictors or plugs into outlet manifold (F).

NOTICE

Restrictors and plugs can be damaged if they are overtightened. Torque to 40-50 in-lb (4.5-5.6 N•m).

Volume Balancing

Ratio errors can occur between the proportioner and the manifold, even if the proportioner output ratio is very accurate.

Different restrictor sizes are available to correct imbalances. See FIG. 2 on page 15 for available sizes.

Check Valve Imbalance

If resin and hardener are at or near 1:1 ratio, when one check valve opens, the resulting surge closes the other. This check valve oscillation causes ratio imbalance. Install restrictors on both sides to meter a smooth flow to the manifold.

Sizing Restrictors

If resin and hardener are at or near 1:1 ratio and viscosities are similar, add a few hundred psi pressure drop to each side to prevent check valve oscillation. Use the chart in FIG. 2 on page 15, or use a restrictor about twice the size of your spray tip, on both sides.

Maintenance

Routine Cleaning

Restrictor Screens

Soak the restrictor screens in solvent regularly to clean. If soaking is ineffective, replace restrictor screens.

Restrictors

Soak the restrictors in solvent and use the included vise (30) and drill bit (31) to clean the orifice.

Check Valves

Soak the check valves in solvent. Use a small screw driver to actuate the check valve ball and spring to remove any restriction. Ensure fluid flows freely through the check valve before re-installing.

Outlet Manifold

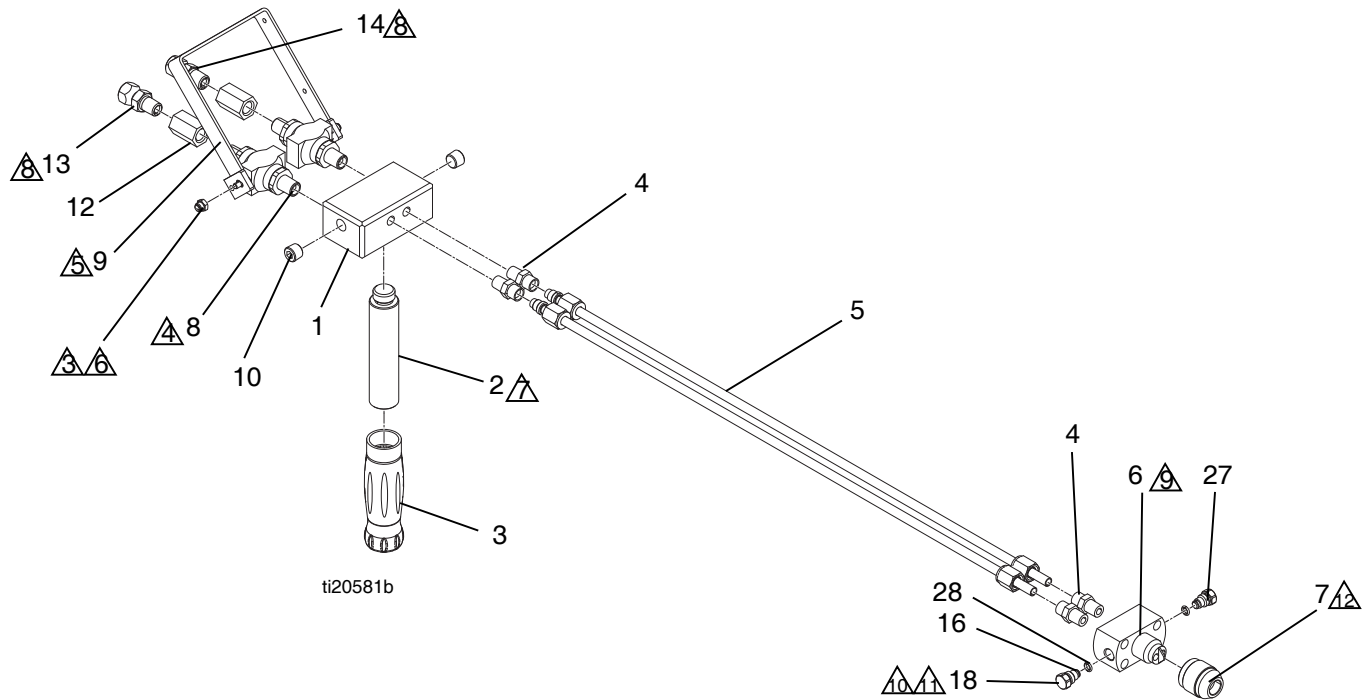
Use drill bits to clean the outlet manifold (F) regularly. See the following drill bit size table.

Item	Drill Bit Size
Outlet manifold fluid outlet	1/4 in. (6 mm)
Outlet manifold inner passage	1/8 in. (3 mm)
(Restrictor size) 0.018 in.	#77 (0.45 mm)
0.024 in.	#73 (0.61 mm); included
0.032 in.	#67 (0.81 mm)
0.040 in.	#60 (1.01 mm)
0.062 in.	1/16 in. (1.59 mm)
0.094 in.	3/32 in. (2.38 mm)
Drill bit pin vise	117661; included

Troubleshooting

Problem	Cause	Solution
Pressure is higher on one side when setting pressure with function knob.	Pump intake valve partially plugged.	Clean pump intake valve.
	Air in hose. Fluid is compressible.	Purge air from hose.
	Unequal size hoses.	Use matching hoses.
Pressures are not balanced when running but pressure is generated and holds on both strokes.	Feathering the valve lever to decrease the flow rate through the gun.	When opening or closing the valve, always move the lever all the way. Do not try to control the flow rate by partially opening the lever.
	Unequal viscosities.	Check that A (ISO) and B (RES) chemicals are within the chemical manufacturer's specified application temperature range.
		Change restrictor at mix point to balance back pressure.
	Restriction on one side.	Clean mix module, restrictors, or check valves at mix manifold.
A (ISO) side rich; lack of B (RES) side.	A (ISO) side gauge is low.	B (RES) side restriction downstream of gauge. Check gun check valve spring, mix module, or mix manifold restrictor screen.
	B (RES) side gauge is low.	B (RES) side material supply problem. Check B (RES) side inlet strainer and pump intake valve.
B (RES) side rich; lack of A (ISO) side.	A (ISO) side gauge is low.	A (ISO) side material supply problem. Check A (ISO) side inlet strainer and pump intake valve.
	B (RES) side gauge is low.	A (ISO) side restriction downstream of gauge. Check gun check valve spring, mix module, or mix manifold restrictor screen.
Flow will not shut off when ball valve lever is closed.	Worn ball valve seat of ball.	Replace ball valve. See assembly specifications in illustration on page 13.

Parts



NOTE: Apply thread sealant on all tapered thread fittings.

- ⚠ When installing a new ball valve (8), remove the acorn nuts and handle from the ball valves (8). Keep the acorn nuts, discard the handle.
- ⚠ Install and tighten ball valves (8) so that the studs are pointing away from each other. The flats line up squarely with the flat of the inlet manifold (1), and the pressure laser marking are on the handle (2) side of the inlet manifold (1).
- ⚠ Orient lever (9) and adjust balls in valves (8) so they are closed when lever is pulled back. Carefully install the lever onto the ball valve (8) studs, making sure the stud flats line up with the slots in the lever.
- ⚠ Install acorn nuts from ball valves (8) on top of the lever (9). Torque to 40-50 in-lb (4.5-5.6 N•m).

- ⚠ Apply red thread locking liquid to the threads of the handle (2).
- ⚠ Make sure that #6 JIC adapter (13) is on the right and #5 JIC adapter (14) is on the left of the inlet manifold (1), when viewed from the rear of the gun.
- ⚠ Squarely align outlet manifold (6) to inlet manifold (1).
- ⚠ Apply lithium grease.
- ⚠ Torque restrictors (18) to 40-50 in-lb (4.5-5.6 N•m).
- ⚠ Hand tighten mixer nut (7) onto outlet manifold (6).

Ref	Part	Description	Qty	Ref	Part	Description	Qty
1	24R986	MANIFOLD, inlet	1	16	111516	PACKING, o-ring	2
2	16U410	HANDLE, manual 2K gun	1	17◆	249036	PACKING, o-ring (not shown), includes qty 6 of item 16	1
3	16F422	GRIP, handle, 390st	1	18	15E373	RESTRICTOR, 0.024 in.	2
4	119984	FITTING, union, 1/8 npt x 5/16 tube	4	19	15K652	CAP, night	1
5	15G421	TUBE, 5/16 extension, assembly	2	27	25A689	VALVE, check, 1/8 npt, rev, 5000	2
6	24K994	MANIFOLD, outlet	1	28	15E378	FILTER, screen, 40 mesh	2
7	512292	NUT, mixer	1	29◆	118665	GREASE, Fusion®	1
8	214037	VALVE, ball, 1/4, 5000 psi, with lever	2	30◆	117661	VISE, drill pit pin	1
9	217562	LEVER, valve	1	31◆	---	BIT, 0.024 in. cleanout drill	1
10	100721	PLUG, pipe	2	32◆	15E374	RESTRICTOR, 0.032 in.	1
12	113093	CONNECTOR, pipe	2				
13	117506	FITTING, swivel, 1/4 npt x #6 JIC	1				
14	117595	FITTING, swivel, 1/4 npt x #5 JIC	1				
15◆	512289	MIXER, 1/2-30 spray	10				

--- Not for sale.

◆ Items are shipped loose.

Accessories

Restrictors

15E372	0.018 in. Orifice Restrictor
15E373	0.024 in. Orifice Restrictor
15E374	0.032 in. Orifice Restrictor
15E375	0.040 in. Orifice Restrictor
15E376	0.062 in. Orifice Restrictor
15E377	0.094 in. Orifice Restrictor

249765 Restrictor Kit

Includes one each of restrictor sizes 0.018, 0.024, 0.032, 0.040, 0.062, and 0.094 in., one plug with no restriction, package of 10 screens, and package of 6 o-rings.

15E370 Plug

Fits restrictor port, but with minimal restriction. Uses 249036 O-ring Kit.

249036 Restrictor O-ring Kit

Package of 6.

249037 Restrictor Screen Kit

40 mesh. Package of 10.

15K652 PTFE Night Cap

Partially fill with ISO pump oil or ISO pump grease to protect outlet manifold (6) from air and moisture.

217374 ISO Pump Oil

1 pint (0.5 liter) container.

106565 ISO Pump Grease

14.6 oz (0.4 kg) cartridge

255247 Ratio Check Nozzle

Use with retainer nut 512292.

246385 Pump Inlet Strainer

Use to strain material before it enters proportioner.

Gun Length Reduction

To reduce the overall length of the gun from 47 in. (1194 mm) to 24 in. (610 mm), purchase two of each of the following fittings: 503279 and 151243. Use these fittings to replace fittings (4) and tubes (5).

Standard Disposable Mixer

512289 † 1/2 in. (13 mm) ID x 5/8 in. (16 mm) OD x 30 element.

Alternate Disposable Mixers

120042 ◆ 1/4 in. (6 mm) ID x 3/8 in. (10 mm) OD x 24 element; package of 50.

512014 ◆ 1/4 in. (6 mm) ID x 3/8 in. (10 mm) OD x 32 element.

512016 ◆ 3/8 in. (10 mm) ID x 1/2 in. (13 mm) OD x 24 element.

512017 ◆ 3/8 in. (10 mm) ID x 1/2 in. (13 mm) OD x 30 element.

551979 † 1/2 in. (13 mm) ID x 5/8 in. (16 mm) OD x 36 element.

512291 ◆ Retainer Nut for 1/2 in. (13 mm) OD and smaller mixers.

512292 † Retainer Nut for 5/8 in. (16 mm) OD mixers.

u Use retainer nut 512291 for 1/2 in. (13 mm) OD and smaller mixers.

† Use retainer nut 512292 for 5/8 in. (16 mm) OD and smaller mixers.

Typical Restrictor Pressure Drop

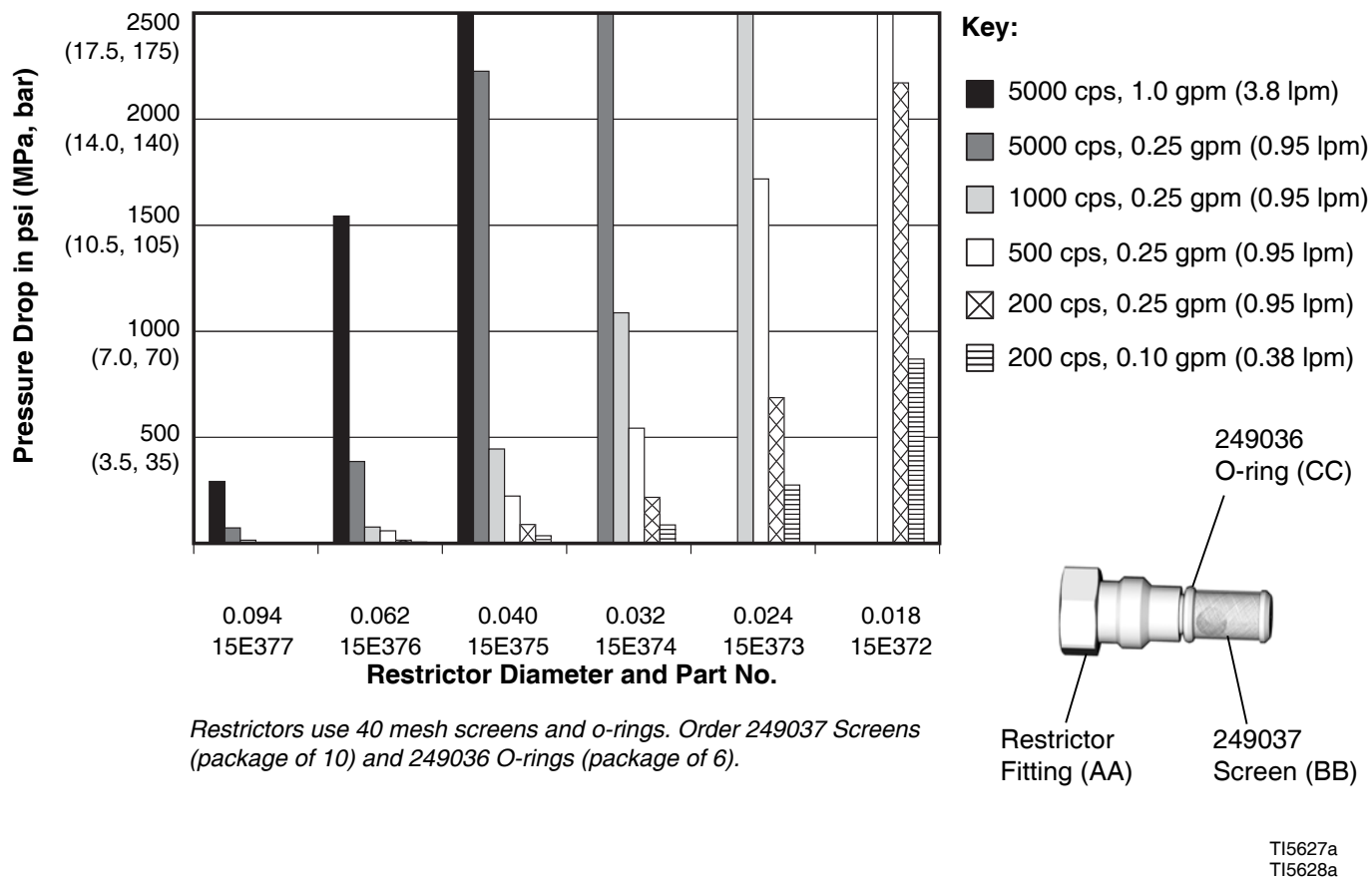


FIG. 2

Technical Data

Maximum Fluid Working Pressure	2000 psi (14 MPa, 137 bar)
Wetted Parts	Carbon steel, stainless steel, aluminum, chemically resistant o-rings, PTFE, PEEK

Graco Standard Warranty

Graco warrants all equipment referenced in this document which is manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

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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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For the latest information about Graco products, visit www.graco.com.

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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

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Original instructions. This manual contains English. MM 332198

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