

Instructions – Parts List



ValueMix™ Proportioning System

309367 Rev.E

For proportional mixing of plural component coatings

85 psi (0.6 MPa, 6 bar) Maximum Working Air Pressure

100 psi (0.7 MPa, 7 bar) Maximum Working Fluid Pressure

US Patent Pending

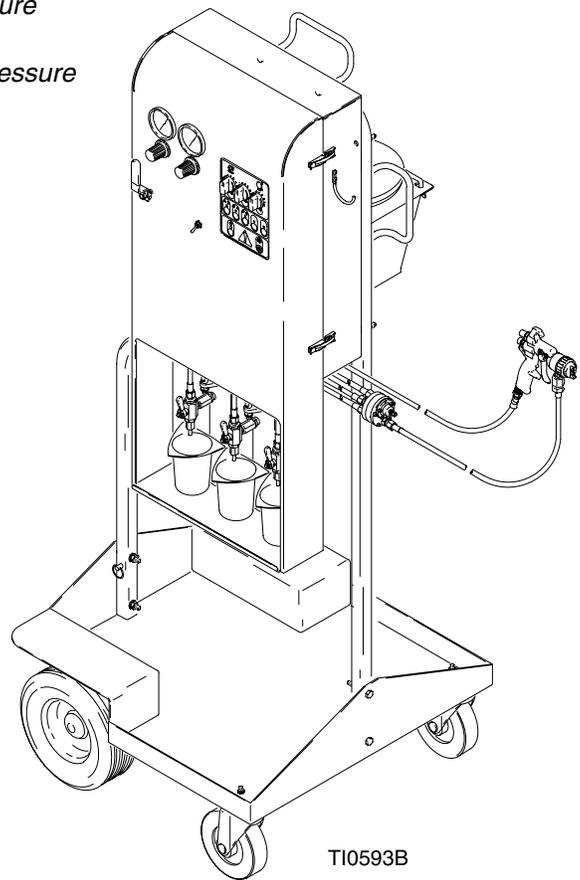
Intrinsically Safe for Hazardous Locations (Class I; Division 1; Group D) when used with an approved barrier only.



Conforms to
ANSI/UL
standard 2279
Class 1 Zone 0
AEx ia IIA T3



110474
Certified to
CAN/CSA
22.2 No. E 79-11



T10593B

Model 244705 Shown



Read warnings and instructions.
See page 2 for table of contents.

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List of Models

Part No.	Series	No. of Pumps	Type of Gun	Mounting Style	Solvent Hopper
244704	A	3	HVLP	Cart	—
244705	A	3	HVLP	Cart	245274

Symbols

Warning Symbol



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

Caution Symbol



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

WARNING



INSTRUCTIONS



EQUIPMENT MISUSE HAZARD

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

- This equipment is for professional use only.
- Read all instruction manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are uncertain about usage, call your Graco distributor.
- Do not alter or modify this equipment. Use only genuine Graco parts and accessories.
- Check the equipment daily. Repair or replace worn or damaged parts immediately.
- Do not operate the proportioner without the barrier; doing so could cause fire or explosion.
- Do not operate the barrier module with the cover removed.
- Disconnect the electric power before connecting or disconnecting any electrical component.
- Equipment that will come in contact with the intrinsically safe terminals of the safety barrier absolutely must be rated for Intrinsic Safety. This includes such things as a DC voltage meter or ohm-meter used in troubleshooting, cables, and connections. Alternately, remove the unit from the hazardous area while troubleshooting.
- Do not exceed the maximum working pressure of the system components. See the instruction manuals of the individual system components for their maximum working pressures. The maximum working fluid pressure of this equipment is 100 psi (0.7 MPa, 7 bar).
- Route the hoses away from the traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 180°F (82°C) or below -40°F (-40°C).
- Use only Graco approved hoses. Do not remove hose spring guards, which help protect the hose from rupture caused by kinks or bends near the couplings.
- Do not use the hoses to pull the equipment.
- Use fluids or solvents that are compatible with the equipment wetted parts. See the **Technical Data** section of all the equipment manuals. Read the fluid and solvent manufacturer's warnings.
- Do not use 1,1,1-trichloroethane, methylene chloride, other halogenated hydrocarbon solvents or fluids containing such solvents in aluminum equipment. Such use could result in a serious chemical reaction, with the possibility of explosion.
- Comply with all applicable local, state and national fire, electrical and other safety regulations.

WARNING



FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

Improper grounding, poor air ventilation, open flames, or sparks can cause a hazardous condition and result in fire or explosion and serious injury.

- Ground the equipment and the object being sprayed. See **Ground the System** on page 14.
- Ground the intrinsically safe power supply. A voltage limiting safety barrier must be properly grounded to be both effective and safe. For proper grounding, use the ground wire provided (or a 12 gauge minimum ground wire), and the barrier's ground must be within 1 ohm of true earth ground.
- The ValueMix control is intrinsically safe when used with the power supply/intrinsic safety barrier provided with the unit. If the power supply/intrinsic safety barrier is not used, the control is no longer intrinsically safe and must not be operated in hazardous locations, as defined in article 500 of the National Electrical Code (USA) or your local electrical code.
- Be sure your installation complies with national, state, and local codes for the installation of electrical apparatus in a Class I, Group D, Division 1 Hazardous Location, including all of the local safety fire codes, NFPA 33, NEC 504 and 516, and OSHA 1910.107.
- Do not exceed the +15 volts maximum applied voltage from the external power supply. Disconnect electrical power at the power outlet before servicing the equipment.
- Provide fresh air ventilation to avoid the buildup of flammable vapors from solvent or the fluid being sprayed.
- Eliminate all ignition sources such as pilot lights, cigarettes and plastic drop cloths (static arc hazard). Do not plug or unplug power cords or turn lights on or off in the spray area.
- Keep the spray area free of debris, including solvent, rags, and gasoline.
- Do not turn on or off any light switch in the spray area while operating or if fumes are present.
- Do not smoke in the spray area.
- Do not operate a gasoline engine in the spray area.
- If there is any static sparking while using the equipment, **stop spraying immediately**. Identify and correct the problem.
- Keep liquids away from the electrical components.

WARNING



PRESSURIZED EQUIPMENT HAZARD



Spray from the gun, hose leaks or ruptured components can splash fluid in the eyes or on the skin and cause serious injury.

- Do not stop or deflect fluid leaks with your hand, body, glove or rag.
- Follow the **Pressure Relief Procedure** on page 31 when: you are instructed to relieve pressure; stop spraying; clean, check or service the equipment; and install or clean fluid nozzles.
- Do not point the spray gun at anyone or at any part of the body.
- Tighten all fluid connections before operating the equipment.
- Check the hoses, tubes and couplings daily. Replace worn, damaged or loose parts immediately. Permanently coupled hoses cannot be repaired; replace the entire hose.



MOVING PARTS HAZARD

Moving parts, such as the air cylinder rod and coupling, can pinch or amputate your fingers.

- Keep clear of all moving parts when starting or operating the pump.
- Before servicing the equipment, follow the **Pressure Relief Procedure** on page 31 to prevent the equipment from starting unexpectedly.



TOXIC FLUID HAZARD

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

- Know the specific hazards of the fluid you are using. Read the fluid manufacturer's warnings.
- Store hazardous fluid in an approved container. Dispose of hazardous fluid according to all local, state and national guidelines.
- Wear the appropriate protective clothing, gloves, eyewear, and respirator.

ValueMix Proportioner Overview

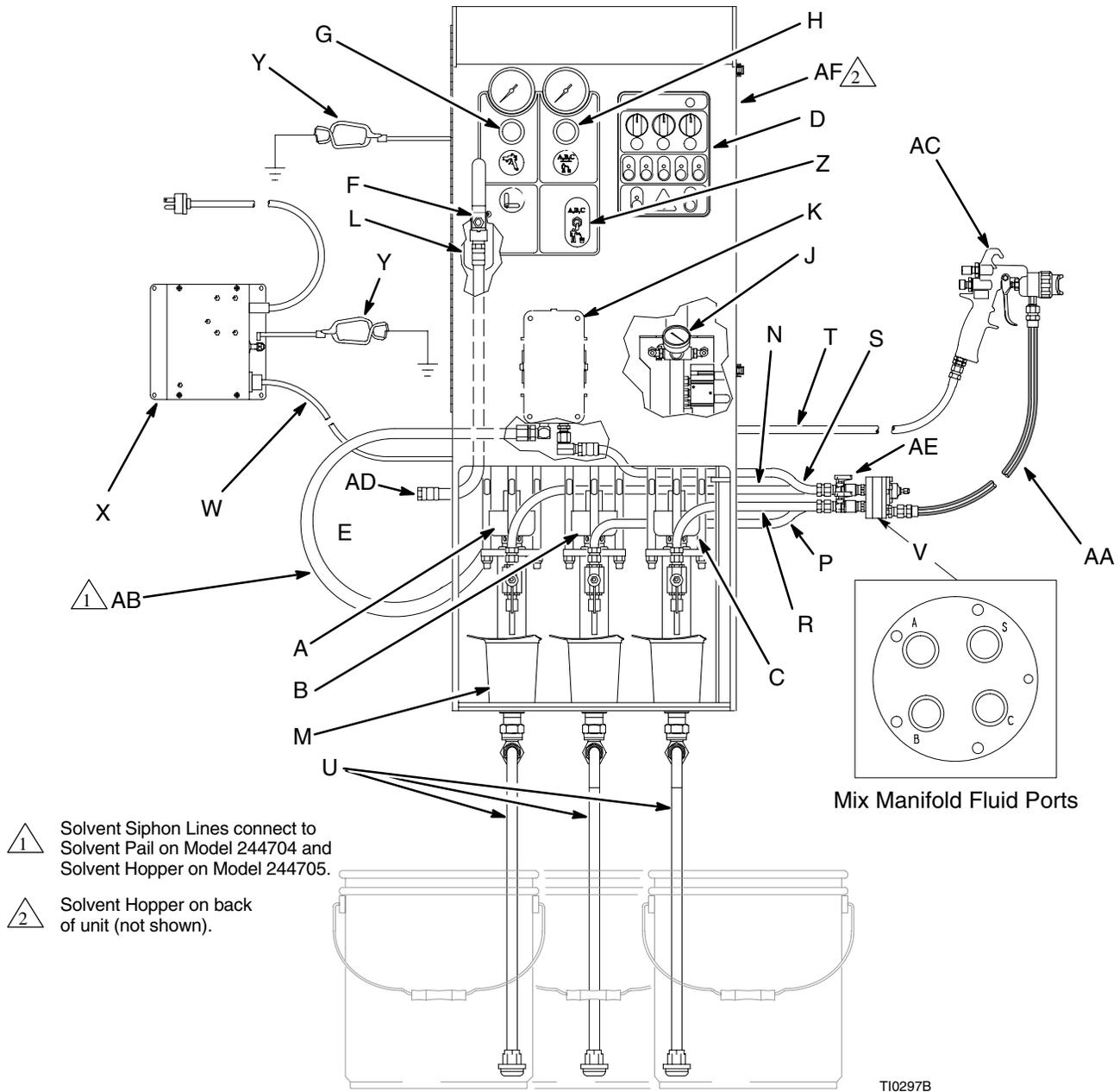


Fig. 1

KEY

A	Component A Pump	S	Solvent Flush Line
B	Component B Pump	T	Gun Air Supply Line
C	Component C Pump	U	Fluid Siphon Lines
D	ValueMix Control Panel (see page 7)	V	Mix Manifold/Fluid Regulator
E	Sample Valve	W	Power Cable
F	Bleed-Type Master Air Valve	X	Power Supply/Intrinsic Safety Barrier
G	Gun Air Regulator	Y	Ground Wires
H	Pump Air Regulator	Z	Spray/Flush Toggle Switch
J	Component B and C Pump Air Regulators	AA	Integrator Tube with static mixers
K	Solvent Pump (mounted inside the door)	AB	Solvent Siphon Line
L	Air Filter	AC	Spray Gun
M	500 ml Beakers	AD	Main Air Inlet
N	Component A Fluid Line	AE	Manifold Ball Valves (Model 244704)
P	Component B Fluid Line	AF	Solvent Hopper (Model 244705)
R	Component C Fluid Line		

ValueMix Proportioner Overview

KEY

- RA Component A Ratio Dial
- RB Component B Ratio Dial
- RC Component C Ratio Dial
- PA Pump A Independent Run Key
- PB Pump B Independent Run Key
- PC Pump C Independent Run Key
- PT Pump Test Key
- BD Batch Dispense Key
- RS Run/Spray Key
- ER Error Signal
- ST Stop Key
- RL Ratio Lockout

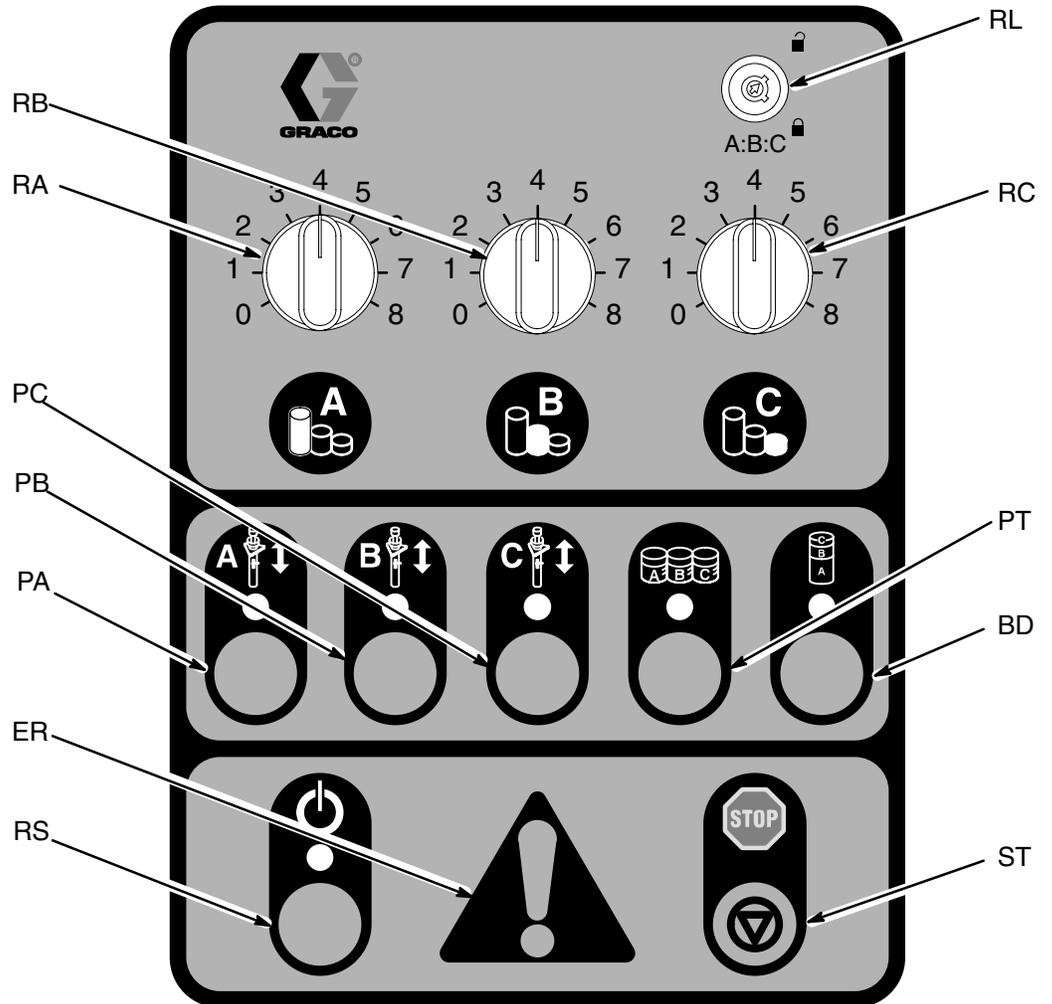


Fig. 2

TI0616a

Installation

NOTE:

- Reference numbers and letters in parentheses in this text refer to the numbers and letters in the illustrations.
- Icons in the text refer to the icons on the equipment and keypad.
- Be sure all accessories are adequately sized and pressure-rated to meet the system requirements.

List of Manuals

The following manuals are included with your ValueMix proportioner.

Manual	Description
309367	ValueMix Proportioner
308741	HVLP Air Spray Gun
308652	Husky Solvent Pump
309192	Moisture Sensitive Feed Kit

The following manuals are included with accessories, which may be purchased separately.

Manual	Description
309185	243928 Hopper Kits
309198	244018 Gun Air Interlock Kit

System Configuration

The standard ValueMix Proportioner mixes two or three component materials in ratios up to 8:1:1.

Fig. 1 on page 6 illustrates the three component configuration. There are three displacement pumps, and all three ratio dials and pump independent run keys are functional.

Ventilate the Spray Booth

WARNING



To prevent hazardous concentrations of toxic and/or flammable vapors, spray only in a properly ventilated spray booth. Do not operate the spray gun unless ventilation fans are operating.

Check and follow all of the National, State and Local codes regarding air exhaust velocity requirements.

Check and follow all local safety and fire codes.

Location

Keep the site clear of any obstacles or debris that could interfere with the operator's movement.

WARNING



FIRE AND EXPLOSION HAZARD

The ValueMix control is intrinsically safe when used with the power supply/intrinsic safety barrier (X) provided with the unit. If the power supply/intrinsic safety barrier is not used, the control is no longer intrinsically safe and the control, as well as the power supply, must not be operated in hazardous locations, as defined in article 500 of the National Electrical Code (USA) or your local electrical code.

Installation

Complying to Codes

Be sure your installation complies with national state and local codes for the installation of electrical apparatus in a Class I, Group D, Division 1 Hazardous Location, including all of the local safety fire codes, NFPA 33, NEC 504 and 516, and OSHA 1910.107.

Power Cord

The package is shipped with a power cord for North America (128) and a power cord for Europe (157). In other areas, purchase a cord locally which meets the IEC 320 standard.

Grounding the Intrinsically Safe Power Supply

The intrinsic safety barrier (X) must be properly grounded to be both effective and safe. For proper grounding, use the ground wire (Y) provided (or a 12 gauge minimum ground wire), and the barrier's ground must be within 1 ohm of true earth ground.

Non-Hazardous Location Wiring

1. Connections and wiring in the non-hazardous location must be prevented from contacting any other wires or terminations.
2. At least 2 in. (50 mm) of clearance distance must be maintained between the intrinsically safe and non-intrinsically safe wiring. Use tie wraps.
3. Intrinsically safe and non-intrinsically safe wiring must be kept separate with a raceway, wire lacing, wire ties or equal.
4. Non-hazardous location equipment must not have a potential that exceeds 250 volts DC or 250 volts AC RMS.

Hazardous Location Wiring (see Fig. 3)

1. Conductors on the hazardous side of the barrier (the barrier output), to the control module, must not be connected through plugs, cables, terminal blocks, or devices other than those supplied with the unit.
2. Conductors from barrier outputs must travel from the non-hazardous area to the hazardous area by the shortest, most direct route.
3. The maximum allowable cable length is 50 ft (15.2 m), as supplied with the package.

WARNING



FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

To reduce the risk of fire, explosion, or electric shock, all electrical equipment must be installed by a qualified electrician only.

For your safety, be sure to read and understand **Non-Hazardous Location Wiring** at left and follow the instructions there.

Hazardous (*classified*) Location Wiring of Intrinsically Safe Circuits

WARNING



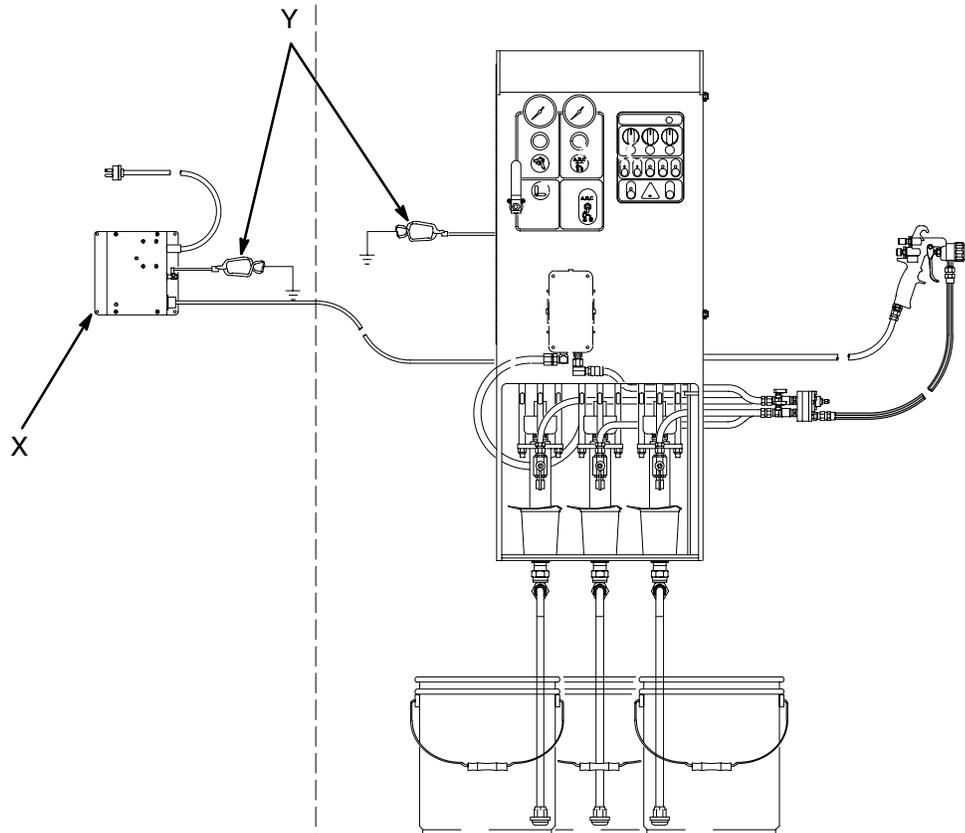
FIRE AND EXPLOSION HAZARD

The transmitting of flammable atmosphere from one area to another through an opening or conduit can cause fire or explosion and result in serious injury and property damage. Refer to NEC Article 504 and 4.3 of ANSI standards ISA-RP12.6-1987.

Installation

Non-Hazardous Area

Hazardous Area



T10379B

Fig. 3

Installation

Assemble the Cart

⚠ CAUTION

To avoid tip-over, the cart must be on a flat and level surface. When moving the cart, move slowly enough to react to any obstacle. Do not transport the cart on slopes greater than 10°. Failure to follow this caution could result in injury or equipment damage.

Standard Cart Mount

NOTE: The Standard Cart, Part No. 243826, is used on Model 244704. Refer to the **Parts List** on page 54 when assembling the cart.

1. Attach the casters (7a and 7b) to the base plate (6b) as shown in the illustrations on page 54.
2. Attach the frame (6a) to the base plate (6b).
3. Bolt the ValueMix to the frame stand.

Heavy Duty Cart Mount

NOTE: The Heavy Duty Cart, Part No. 243826, is used on Model 244705. Refer to the **Parts List** on page 55 when assembling the cart.

1. Assemble the wheels (6e) and casters (6k) to the base (6a) as shown in the illustration on page 55.
2. Assemble the frame uprights (6b and 6c) exactly as shown. Secure the frame uprights to the studs on the base with the pins (6m).

⚠ CAUTION

To avoid tip-over, the angled frame (6c) must be assembled over the large wheels (6e).

3. Install the support bar (6s) and screws (6t).
4. Assemble the top frame (6d) and secure with the pins (6m).
5. Bolt the ValueMix to the frame stand.

Assemble the Solvent Hopper Kit

The ValueMix Model 244705 comes standard with Solvent Hopper Kit 245274. Optional Component Hopper Kits are available.

- For three pump systems, order three of Part No. 243928.

Refer to the parts drawing on page 62.

1. Install the two flange bolts (709) partway into the ValueMix frame (4). Hang the solvent hopper support (706) on the bolts and tighten.
2. Place the hopper screen (702) in the bottom of the hopper (701).
3. Place the washer (703) on the male end of the adapter (705). Install an o-ring (704) on the adapter and screw the adapter into the base of the hopper.
4. Screw the reducing nipple (713) into the adapter (705) and screw the elbow (711) onto the reducing nipple.
5. Install the shoulder screws (717), washers (718), and nuts (719). Place the hopper in the support (706) so the washer (703) fits between the shoulder screws and the support. Install the retaining rod (707) in the holes of the support and secure with the wingnut (716) to hold the hopper in place.
6. Connect the length of tubing (710) to the elbow (711) and to the fluid inlet of the solvent pump (131).
7. Attach the warning label (715) to the center of the back panel, as shown in Fig. 4.

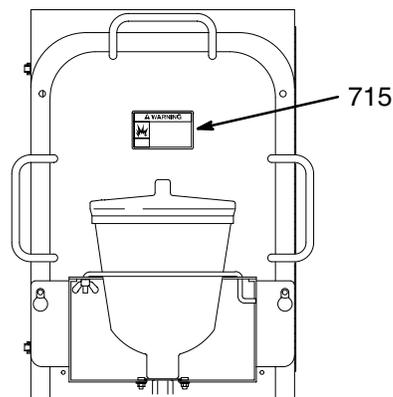


Fig. 4

8. Fill the top hopper with solvent.

NOTE: If you are using very moisture-sensitive materials, refer to the Product Data Sheet 320443 for alternative hoses and desiccant-dried feed containers.

Installation

WARNING



FIRE AND EXPLOSION HAZARD

Static charge may build up on plastic reservoir and could discharge, igniting flammable materials and gases.



To reduce the risk of fire and explosion:

- Do not spray into plastic reservoir
- Clean plastic reservoir in Non-Hazardous location.

Failure to follow this warning can result in serious injury.

Spray Guns

Refer to the separate gun instruction manuals (supplied) for gun setup, operation, and service instructions.

Gun/Hose Hook

Attach the gun/hose hook to either the back or right side of the cabinet, using the hardware provided.

Installation

Grounding

WARNING



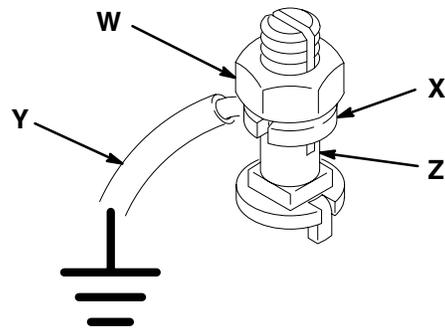
FIRE, EXPLOSION, AND ELECTRIC SHOCK HAZARD

To reduce the risk of fire, explosion, or electric shock, the system must be properly grounded. Follow the **Fire, Explosion, and Electric Shock Hazard** warnings on page 4 and follow the instructions below.

1. Connect the static ground wire (Y) supplied to the ground lug on the power supply/intrinsic safety barrier. See Fig. 5. Loosen the grounding lug locknut (W) and washer (X). Insert one end of the ground wire (Y) into the slot in lug (Z) and tighten the locknut securely. Connect the ground wire clamp to a true earth ground as defined in your local code.
2. Clamp the ground wire from the proportioner to a true earth ground.
3. Ground all fluid supply containers and waste containers according to your local code.
4. Ground the object being sprayed according to your local code.
5. Maintain grounding continuity when flushing or relieving pressure. Follow the instructions in your separate gun manual for safely grounding your gun while flushing.
6. Check grounding continuity.

Have a qualified electrician check the resistance between each ValueMix component and the true earth ground. The resistance must be less than 25 ohms. If the resistance is greater than 25 ohms, a different ground site may be required. Do not operate the system until the problem is corrected.

NOTE: Use a meter that is capable of measuring resistance at this level.



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Fig. 5

Electrical Connections

WARNING



FIRE AND EXPLOSION HAZARD

The ValueMix control is intrinsically safe when used with the power supply/intrinsic safety barrier provided with the unit. If the power supply/intrinsic safety barrier is not used, the control is no longer intrinsically safe and the control, as well as the power supply, must not be operated in hazardous locations, as defined in article 500 of the National Electrical Code (USA) or your local electrical code.

1. Route the 50 ft (15.2 m) electrical cable from the ValueMix control panel (D) into a non-hazardous area. The power supply/intrinsic safety barrier must be located in the non-hazardous area.

NOTE: The 15 Vdc power supply/intrinsic safety barrier will accept 85–264 Vac at 47–63 Hz.

2. Mount the power supply/intrinsic safety barrier to the wall, using the 1/4 in. (6 mm) holes in the flange. Be sure the power supply light is easily visible.
3. Connect the 50 ft (15.2 m) cable to the output on the power supply and to the input on the ValueMix control panel. Route the cable away from traffic areas and secure it to prevent damage.
4. Plug the power supply/intrinsic safety barrier into a wall outlet. Verify that the green power supply light is on.

Installation

Air Connections

There is a small filter inside the ValueMix cabinet. However, a large filter should be installed in an easily serviceable position where the ValueMix will be connected to the compressed air supply. This large filter should have an automatic bowl drain.

NOTE: Refer to the **Technical Data** section on page 72 to determine the maximum air consumption of your system. Verify that your air compressor and air supply lines are adequately sized to meet those requirements. For example, do not use more than 50 ft (15.2 m) of 1/2 in. (13 mm) ID supply hose from the compressor to the ValueMix.

Refer to Fig. 1 on page 6. Bring a compressed air supply line from the air compressor to the proportioner location. Be sure all air hoses are properly sized and pressure-rated for your system. The air hose should have a 3/8 npsm(m) or 3/8 npt(m) thread.

For initial setup, install an air pressure gauge at the ValueMix air inlet. Use this gauge to verify that the air supply is 85 psi (0.6 MPa, 6.0 bar) with the pumps running and the gun atomizing air at full flow. If the air pressure is less than 85 psi (0.6 MPa, 6.0 bar), the air supply to the package is inadequate. Verify that the air compressor can meet the supply demands of the facility. Use a larger diameter supply line, or shorten the supply line.

1. Connect the main air supply hose to the red air inlet hose (AD), using a 3/8 npsm(m) connector.
2. Connect the gun air hose (T) from the outlet of the gun air regulator (G) to the air inlet of the spray gun (AC).

CAUTION

Do not lubricate the air supply. The pump air valves and air cylinder are designed to operate with clean, dry air. Certain lubricants can damage these components.

Air Pressure Drop Chart

These air pressure drops are measured using the standard ValueMix with a 31 ft (9.4 m), 3/8 in. (10 mm) ID air hose.

Delta Spray™ HVLP Spray Gun

Air Regulator Pressure Setting psi (kPa, bar)	Gun Inlet Pressure psi (kPa, bar)
22 (154 kPa, 1.5 bar)	10 (70 kPa, 0.7 bar)
38 (265 kPa, 2.6 bar)	20 (140 kPa, 1.4 bar)
53 (366 kPa, 3.6 bar)	30 (210 kPa, 2.1 bar)
*69 (472 kPa, 4.7 bar)	*40 (280 kPa, 2.8 bar)
85 (584 kPa, 5.8 bar)	50 (345 kPa, 3.4 bar)

* Maximum compliant gun inlet air pressure.

Installation

Fluid Connections

NOTE: The pumps are siphon-fed from pails. Model 244705 comes standard with Solvent Hopper Kit 245274. See page 12.

1. Tighten the siphon feed connections for all pumps.
2. Connect the fluid line to the fluid inlet of the spray gun (AC).

CAUTION

Do not pressure feed this system. Even low pressure feeding of the pumps will cause off-ratio spraying.

3. Fill the displacement pump wet-cup 2/3 full with ISO pump oil (supplied).

Flushing the System Before First Use

The system was tested with lightweight oil, which should be flushed out to avoid contaminating the fluid you will spray.

Refer to **Flushing the Fluid Supply** on page 33.

WARNING

For your safety, read the **Fire, Explosion, and Electric Shock Hazard** warnings on page 4 before flushing, and follow all recommendations given there.

Operator Controls

Ratio Setting Dials

The ratio dials (RA, RB, RC) set the ratio for components A, B, and C.

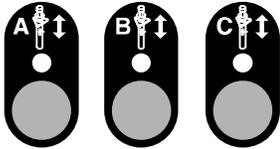
NOTE: A pump will not run if its ratio is set to 0 (zero).

Ratio Lockout

Ratio Lockout may be used to provide a keyed electronic switch which prevents changes to a set ratio. To change the ratio, turn the switch to the unlock position .

If the ratio is changed when the switch is in the locked position , it will cause a ratio change error and will shut down. Change the ratio back to the original value, press the STOP key to clear the error, and continue running.

Pump Independent Run Keys



The pump independent run keys (PA, PB, and PC) run each pump independently, for priming and flushing.

When a key is pressed, its LED will light. The activated pump will run for 12 cycles and then stop in the bottom position. Twelve cycles is enough to fill the standard 25 ft of 1/4 in. ID hose length to the mix manifold. Repeat procedure for hose lengths exceeding 25 ft to ensure it is fully primed. This function does not run continuously in order to prevent a painter from mistakenly spraying one component of a plural component material. To continuously run a single pump, turn the ratio dial for all other pumps to zero and press the Run/Spray key.

Only one of these keys can be active at a time.

Pump Test Key



The pump test key runs the pumps for 3 cycles in sequence (A, B, C). When dispensed through the sample valves (see page 20) into separate containers, this can be used to verify that the system mechanics and electronics are functioning properly. When the pump test key is pressed, its LED and the LED of the currently active pump will light.

Batch Dispense



Press the batch dispense key (BD) to dispense a total volume of 8 oz (237 ml) in the proper ratio, for small jobs or touch-up. The pumps will run in sequence (A, B, C), dispensing fluid in the proportion set on the ratio setting dials.

When the batch dispense key is pressed, its LED and the LED of the currently active pump will light.

To stop this function manually, press the key again.

NOTE: If this function is stopped manually, the correct ratio may not have been dispensed.

Run/Spray



Press the run/spray key (RS) for normal operation. When the run/spray key is pressed, its LED and the LED of the currently active pump will light.

The pumps will run in sequence (A, B, C), dispensing fluid in the proportion set on the ratio setting dials.

NOTE: A pump will not run if its ratio is set to 0 (zero).

To stop this function, press the key again.

Error Code Signal



The ValueMix Error Code Signal LED (ER) blinks in different sequences when the ValueMix senses any of six error conditions. Refer to **Error Code Troubleshooting** on page 34 for an explanation of the error codes and recommended corrective action.

Stop



Press the STOP key (ST) to stop any function and to clear an error code.

Operator Controls

KEY

- RA Component A Ratio Dial
- RB Component B Ratio Dial
- RC Component C Ratio Dial
- PA Pump A Independent Run Key
- PB Pump B Independent Run Key
- PC Pump C Independent Run Key
- PT Pump Test Key
- BD Batch Dispense Key
- RS Run/Spray Key
- ER Error Signal
- ST Stop Key
- RL Ratio Lockout

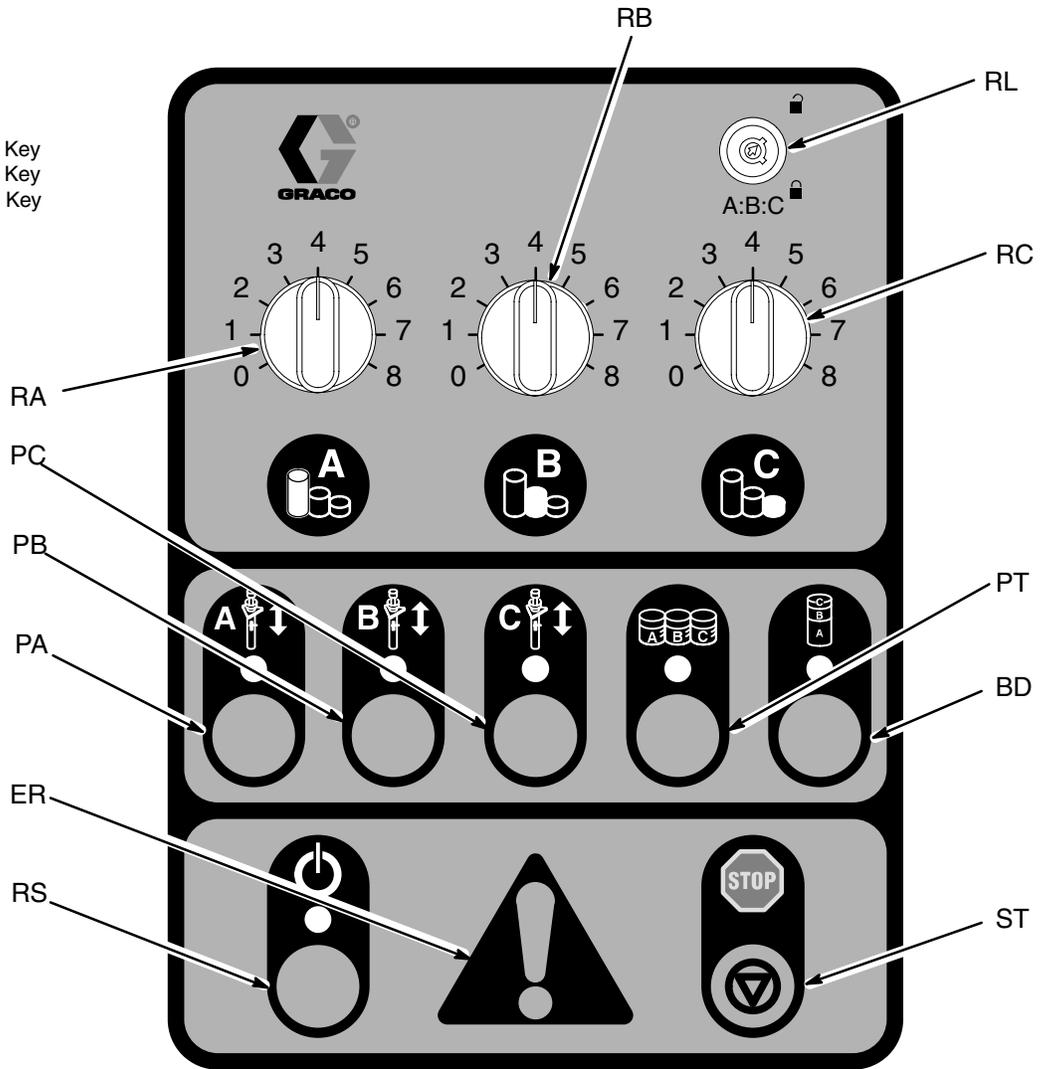


Fig. 6

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Operator Controls

Bleed-Type Master Air Valve (F)

Shuts off all air to the ValueMix.

Spray/Flush Toggle Switch (Z)

Directs the flow of air to the proportioner pumps when in the up position, and to the solvent pump when in the down position.

Pump Air Regulator (H)

Controls air pressure to the proportioner pumps or to the solvent pump, depending on the setting of the spray/flush toggle switch.

Gun Air Regulator (G)

Controls air pressure to the spray gun.

B and C Pump Air Regulators (J)

If the viscosity difference between any two components is greater than 10:1, always run the highest viscosity material through the A pump and use the B and C air regulators to reduce the air pressure to the B and C pumps. Refer to **Special Adjustments for Materials with Large Viscosity Differences**, on page 28.

Sample Valves

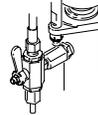
WARNING

The sample valves must be used only as ON/OFF valves. Never use them to “throttle” fluid flow, as this causes rapid wear of the valve. A worn valve may leak or fail to stay in the position (spray/sample) that you set it, unexpectedly allowing fluid into the closed off part of the system. This hazard can result in fluid splashing in the eyes or on the skin.

If the valve leaks fluid into the closed off part of the system, or if the valve handle is loose or does not hold its position firmly, replace the valve immediately.

The sample valve directs low pressure fluid in either of two directions.

- To spray (normal operation), turn the handle up.



- To sample, turn the handle down.



- To shut off fluid flow, turn the handle horizontal.



Operator Controls

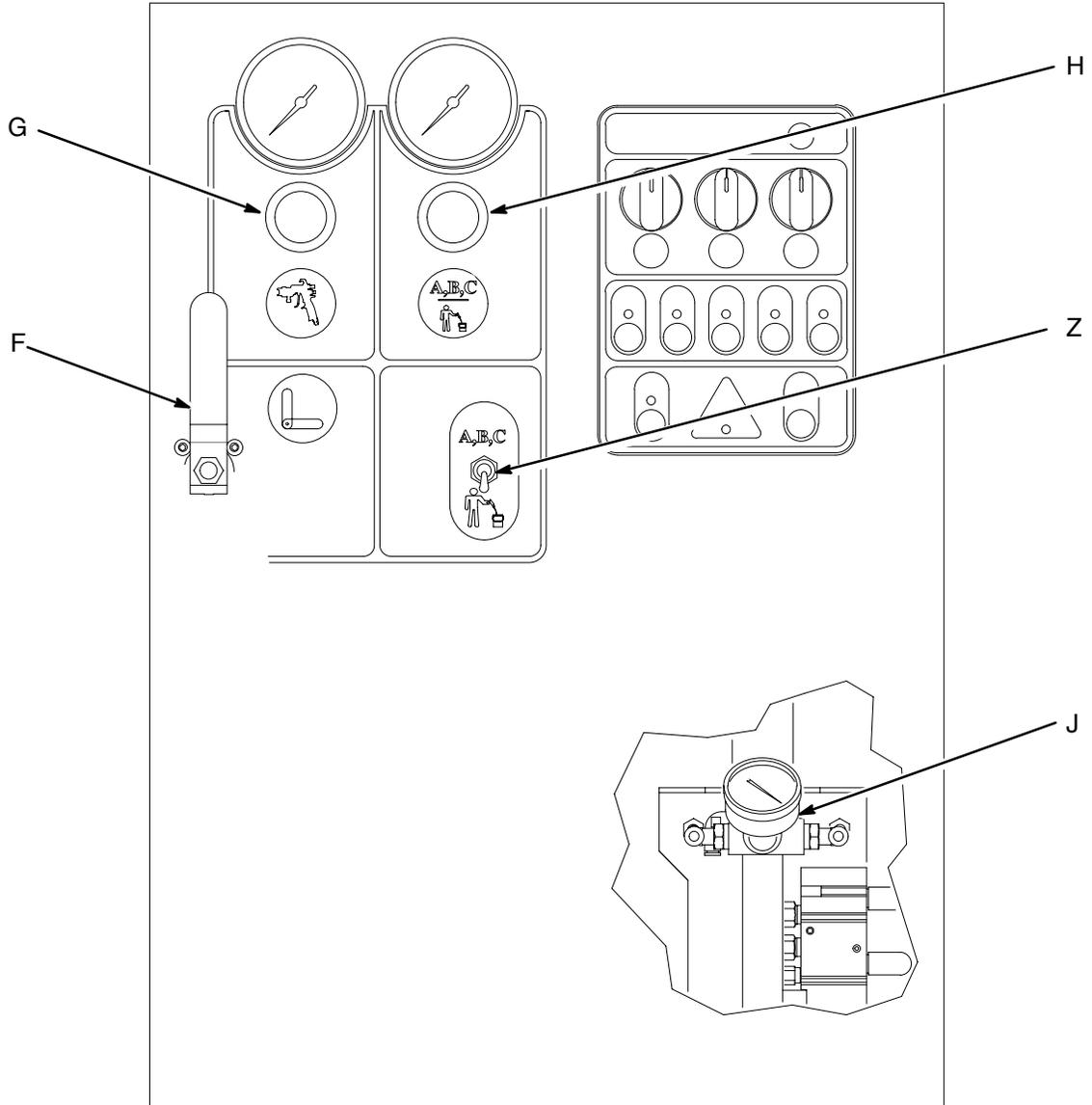


Fig. 7

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Polyurethane Coatings and Isocyanate

Isocyanate and Fluid Handling Equipment

Isocyanate is a catalyst that is often used in two component polyurethanes. It is sensitive to moisture, such as humidity in the air. Moisture will react with the isocyanate, which causes small, hard, and very abrasive crystals to form and become suspended in the material. Eventually a film will develop over the top of the isocyanate, and the isocyanate will begin to “gel” (increase in viscosity). If used, this partially cured isocyanate will dramatically hinder the performance and life of all wetted parts.

NOTE: The amount of film formation and rate of material crystallization will vary depending on the blend of isocyanate.

Some ways in which moisture can come into contact with isocyanate would be:

- **A dry wet-cup.** As a piston pump cycles it will draw a thin film of material up past the throat seal into the atmosphere. Always keep the wet-cup filled with Graco ISO Pump Oil (IPO). The ISO oil will create a barrier between the isocyanate and the atmosphere.
- **Moisture sensitive hoses.** The “ISO Hose” must always be constructed from Polyethylene (PE) PTFE or Polyolefin (Moisture Lok™). These hoses are less prone to absorb moisture.
- **Solvents exposed to atmosphere or reclaimed solvents.** These solvents can contain moisture. Although the reaction time will typically be at a slower rate, it is recommended that solvent containers are kept closed when not in use and that reclaimed solvents are never used when working with isocyanates.

Contact your Graco distributor for details on what product is recommended when spraying polyurethanes.

Setup

Setting the Ratio

1. Read your fluid manufacturer's recommendations for the proper mixing ratio.
2. Set the component A, B, and C ratio dials (RA, RB, RC) to the recommended settings.

NOTE: A pump will not run if its ratio is set to 0 (zero).

NOTE: Fractional ratios must be converted to their whole number equivalents. For example, a 1-1/2:1 ratio must be set to 3:2. Refer to the ratio conversion charts on pages 24 and 25.

Priming the Pumps and Fluid Lines

NOTE: If components have a large difference in viscosity, see page 28.

1. Verify that the ratio is set correctly. See **Setting the Ratio**, above.

NOTE: A pump will not run if its ratio is set to 0 (zero) or if the manifold ball valves are closed.

2. Fill the displacement pump wet-cup 2/3 full with ISO pump oil (supplied).
3. Place the pump siphon tubes into the corresponding fluid supply containers.
4. Place the siphon tube of the solvent flush pump into the solvent pail.
5. Set the sample valves (E) to the spray position (up).



6. Turn the gun and pump air regulators (G, H) off by turning them all the way counterclockwise.
7. Turn the fluid regulator on the mix manifold (V) clockwise to the fully open position.
8. Set the spray/flush toggle switch (Z) to the spray position (up).

9. Open the bleed-type master air valve (F).
10. Set the pump air regulator (H) to a maximum of 15 psi (0.1 MPa, 1 bar). Do not open the gun air regulator (G) yet.

NOTE: For thicker materials, set the pump air regulator to a higher setting to ensure a steady fluid supply to the gun.

11. See Fig. 6. Press the pump A independent run key (PA). Gradually open the pump air regulator (H) until the pump begins to cycle. Pump A will run independently. Trigger the gun into a grounded waste container until component A flows from the gun. If necessary, press the key again to dispense the required amount.

WARNING

Moving parts, such as the pump coupling, could pinch or amputate your fingers. Follow the **Pressure Relief Procedure** on page 31 before manually loosening a pump.

NOTE: If the pump does not move with up to 85 psi (0.6 MPa, 6.0 bar) air pressure applied, do not increase the air pressure any further. Relieve the pressure, make sure the bleed-type master air valve (F) is closed, and carefully rotate the pump coupling (311) by hand until it moves up and down freely.

12. After pump A stops cycling, reduce the pump air regulator (H) to 15 psi (0.1 MPa, 1.0 bar). Press the pump B independent run key (PB). Follow the instructions in step 11.
13. After pump B stops cycling, reduce the pump air regulator (H) to 15 psi (0.1 MPa, 1.0 bar). Press the pump C independent run key (PC). Follow the instructions in step 11.
14. When pump C stops cycling, set the spray/flush toggle switch (Z) to the flush position (down).
15. Trigger the gun until a steady stream of solvent flows from the nozzle.

NOTE: Priming of all fluid components and the solvent line is required to remove all air from the fluid system.

Ratio Conversion Chart

2K Ratio Combinations
(whole number to fractional ratio conversion)

A	B	equals	A	B	A	B	equals	A	B	A	B	equals	A	B
1	1	=	1	1	6	1	=	6	1	8	1	=	8	1
2	1	=	2	1	6	2	=	3	1	8	2	=	4	1
2	2	=	1	1	6	3	=	2	1	8	3	=	2.67	1
3	1	=	3	1	6	4	=	1.5	1	8	4	=	2	1
3	2	=	1.5	1	6	5	=	1.2	1	8	5	=	1.6	1
3	3	=	1	1	6	6	=	1	1	8	6	=	1.33	1
4	1	=	4	1	7	1	=	7	1	8	7	=	1.14	1
4	2	=	2	1	7	2	=	3.5	1	8	8	=	1	1
4	3	=	1.33	1	7	3	=	2.33	1					
4	4	=	1	1	7	4	=	1.75	1					
5	1	=	5	1	7	5	=	1.4	1					
5	2	=	2.5	1	7	6	=	1.17	1					
5	3	=	1.67	1	7	7	=	1	1					
5	4	=	1.25	1										
5	5	=	1	1										

Ratio Conversion Chart

3K Ratio Combinations (whole number to fractional ratio conversion)

A	B	C	equals	A	B	C	A	B	C	equals	A	B	C	A	B	C	equals	A	B	C
1	1	1	=	1	1	1	6	1	1	=	6	1	1	7	7	1	=	7	7	1
2	1	1	=	2	1	1	6	2	1	=	6	2	1	7	7	2	=	3.5	3.5	1
2	2	1	=	2	2	1	6	2	2	=	3	1	1	7	7	3	=	2.33	2.33	1
2	2	2	=	1	1	1	6	3	1	=	6	3	1	7	7	4	=	1.75	1.75	1
3	1	1	=	3	1	1	6	3	2	=	3	1.5	1	7	7	5	=	1.4	1.4	1
3	2	1	=	3	2	1	6	3	3	=	2	1	1	7	7	6	=	1.17	1.17	1
3	2	2	=	1.5	1	1	6	4	1	=	6	4	1	7	7	7	=	1	1	1
3	3	1	=	3	3	1	6	4	2	=	3	2	1	8	1	1	=	8	1	1
3	3	2	=	1.5	1.5	1	6	4	3	=	2	1.33	1	8	2	1	=	8	2	1
3	3	3	=	1	1	1	6	4	4	=	1.5	1	1	8	2	2	=	4	1	1
4	1	1	=	4	1	1	6	5	1	=	6	5	1	8	3	1	=	8	3	1
4	2	1	=	4	2	1	6	5	2	=	3	2.5	1	8	3	2	=	4	1.5	1
4	2	2	=	2	1	1	6	5	3	=	2	1.67	1	8	3	3	=	2.67	1	1
4	3	1	=	4	3	1	6	5	4	=	1.5	1.25	1	8	4	1	=	8	4	1
4	3	2	=	2	1.5	1	6	5	5	=	1.2	1	1	8	4	2	=	4	2	1
4	3	3	=	1.33	1.33	1	6	6	1	=	6	6	1	8	4	3	=	2.67	1.33	1
4	4	1	=	4	4	1	6	6	2	=	3	3	1	8	4	4	=	2	1	1
4	4	2	=	2	2	1	6	6	3	=	2	2	1	8	5	1	=	8	5	1
4	4	3	=	1.33	1.33	1	6	6	4	=	1.5	1.5	1	8	5	2	=	4	2.5	1
4	4	4	=	1	1	1	6	6	5	=	1.2	1.2	1	8	5	3	=	2.67	1.67	1
5	1	1	=	5	1	1	6	6	6	=	1	1	1	8	5	4	=	2	1.25	1
5	2	1	=	5	2	1	7	1	1	=	7	1	1	8	5	5	=	1.6	1	1
5	2	2	=	2.5	1	1	7	2	1	=	7	2	1	8	6	1	=	8	6	1
5	3	1	=	5	3	1	7	2	2	=	3.5	1	1	8	6	2	=	4	3	1
5	3	2	=	2.5	1.5	1	7	3	1	=	7	3	1	8	6	3	=	2.67	2	1
5	3	3	=	1.67	1	1	7	3	2	=	3.5	1.5	1	8	6	4	=	2	1.5	1
5	4	1	=	5	4	1	7	3	3	=	2.33	1	1	8	6	5	=	1.6	1.2	1
5	4	2	=	2.5	2	1	7	4	1	=	7	4	1	8	6	6	=	1.33	1	1
5	4	3	=	1.67	1.33	1	7	4	2	=	3.5	2	1	8	7	1	=	8	7	1
5	4	4	=	1.25	1	1	7	4	3	=	2.33	1.33	1	8	7	2	=	4	3.5	1
5	5	1	=	5	5	1	7	4	4	=	1.75	1	1	8	7	3	=	2.67	2.33	1
5	5	2	=	2.5	2.5	1	7	5	1	=	7	5	1	8	7	4	=	2	1.75	1
5	5	3	=	1.67	1.67	1	7	5	2	=	3.5	2.5	1	8	7	5	=	1.6	1.4	1
5	5	4	=	1.25	1.25	1	7	5	3	=	2.33	1.67	1	8	7	6	=	1.33	1.17	1
5	5	5	=	1	1	1	7	5	4	=	1.75	1.25	1	8	7	7	=	1.14	1	1
			=				7	5	5	=	1.4	1	1	8	8	1	=	8	8	1
			=				7	6	1	=	7	6	1	8	8	2	=	4	4	1
			=				7	6	2	=	3.5	3	1	8	8	3	=	2.67	2.67	1
			=				7	6	3	=	2.33	2	1	8	8	4	=	2	2	1
			=				7	6	4	=	1.75	1.5	1	8	8	5	=	1.6	1.6	1
			=				7	6	5	=	1.4	1.2	1	8	8	6	=	1.33	1.33	1
			=				7	6	6	=	1.17	1	1	8	8	7	=	1.14	1.14	1
			=							=				8	8	8	=	1	1	1

Setup

Pump Test (Replaces the Ratio Check)

NOTE: Run the pump test procedure daily. The pumps must be primed. The test dispenses equal amounts from each pump. The test confirms that the pumps and electronics are running properly, and replaces the traditional method of ratio check.

1. Place a minimum 200 ml beaker (M) or identical size containers under each sample valve (E).
2. Set the sample valves (E) to the sample position (down).



3. Press the pump test key (PT). The pumps will run three cycles in sequence (A, B, C), dispensing 108 ml (3.65 oz) of material each. This function will stop automatically after all pumps set to more than 0 (zero) have run.

NOTE: A pump will not run if its ratio is set to 0 (zero) or if the manifold ball valves are closed.

4. Check the fluid levels of the containers. If the volumes dispensed by the pumps are equal, the pumps are operating correctly. If the volumes are not equal, refer to **System Troubleshooting** on page 39.

Batch Dispense

The batch dispense function allows you to dispense a total volume of 8 oz (237 ml) of material at the selected ratio, for touch-up or small jobs using a cup gun.

This will not check the ratio of a pump. Depending on initial position of the pumps and ratio settings, all pump functions may not be exercised.

1. Place a minimum 500 ml container (M) under pump A sample valve (E).
2. Set the pump A sample valve to the sample position (down),



and the other pump sample valves to off (horizontal).



3. Set the pump air regulator (H) to a maximum of 15 psi (0.1 MPa, 1 bar).
4. Press the batch dispense key (BD). The independent run key for pump A will light. Gradually open the pump air regulator (H) until the pump begins to cycle.

After pump A has finished dispensing, the next pump in sequence will be activated, indicated by the independent run light. Reduce the air pressure, move the container under the appropriate sample valve, and turn the valve to sample (down).



The pumps will run in sequence (A, B, C), dispensing fluid in the ratio set on the ratio setting dials. Check the fluid levels in the containers (if separate containers are used). If the proportions are not correct, refer to **Troubleshooting** on page 34.

NOTE: A pump will not run if its ratio is set to 0 (zero).

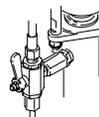
5. This function will stop automatically after all pumps set to more than 0 (zero) have run.

NOTE: If this function is stopped manually, the correct ratio may not have been dispensed.

6. Place the mixed material in a pressure cup or other application device and apply to the work-piece.

NOTE: To dispense additional batches, repeat steps 1 through 6.

7. Before resuming regular operation, set the sample valves (E) to the spray position (up).

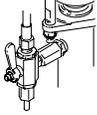


Setup

Run/Spray

Setting the Fluid Pressure

1. Have a grounded metal pail available when setting the fluid pressure.
2. Set the sample valves (E) to the spray position (up).



3. Open the bleed-type master air valve (F).
4. Set the pump air regulator (H) to a minimum of 40 psi (0.3 MPa, 2.8 bar). Do not open the gun air regulator (G) yet.
5. Open the cabinet and verify that the air regulators on pumps B and C are set and locked at the maximum setting. The gauges should read the same as the gauge on the front panel. Refer to **Special Adjustments for Materials with Large Viscosity Differences**, on page 28.

NOTE: For thicker materials, set the pump air regulator to a higher setting to ensure a steady fluid supply to the gun.

6. Press the run/spray key (RS). The pumps will run until the hoses are pressurized. If a pump over-travel error occurs (three blinks), clear the error and press the run/spray key (RS) again. It may take one or two attempts to fully pressurize the hoses. If the error occurs more than three times, refer to **Error Code Troubleshooting** on page 36.

7. Hold a metal part of the gun firmly to the side of the grounded metal pail and trigger the gun (AC).
8. Adjust the fluid regulator on the mix manifold (V) to provide a smooth, steady stream from the gun.

NOTE: The pressure adjustments of each component will vary with the viscosity. In general, start with the lowest regulated fluid pressure, then increase as needed to get a smooth, even flow.

To achieve optimum performance, set the pump air pressure 10–15 psi higher than the desired spray pressure. Adjust the mix manifold/fluid regulator (V) to lower the pressure so you get adequate flow at the gun. Dropping 10–15 psi through the mix manifold/fluid regulator will eliminate most pressure/flow pulsations.

Adjusting the Spray Pattern

1. Refer to the spray gun manual for instructions on adjusting the spray pattern.
2. Use a long piece of paper as a test piece while setting the pressure and spray pattern.
3. Open the gun air regulator (G) and adjust the air pressure to provide the desired spray pattern.
4. When you are satisfied with the spray pattern, release the gun trigger. You are now ready to spray finished parts.

CAUTION

Never leave mixed material in the mix manifold, integrator hose, or gun for a period longer than the pot life of the material. Refer to **Flushing the Value-Mix of Mixed Material** on page 32.

Setup

Run/Spray (continued)

Special Adjustments for Materials with Large Viscosity Differences

If the viscosity difference between any two components is greater than 10:1, this special adjustment is recommended to provide a smooth, steady stream of fluid from the gun. The high viscosity material will determine the required pump pressure to feed the system, which in turn causes the low viscosity material pump to take overly large steps when it is activated. This can result in pump over-travel errors (four blinks).

NOTE: To make the following adjustments you must run the highest viscosity material through the A pump. The A component determines the maximum air pressure required. The B and C component pressures are then adjusted to a lower pressure to achieve smooth flow.

The B hose is LDPE and is intended for use with isocyanates. If the isocyanate is the higher viscosity material, which would require it to be run on the A pump, the hoses must be switched at the pump outlets.

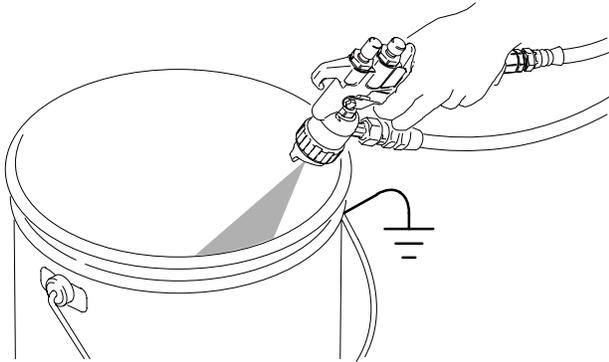
1. Adjust the pump air regulator (H) to provide adequate pressure and flow of the thickest material.
2. Open the cabinet and locate the air regulators (J) on the component B and C pumps.
3. Reduce the air pressure to the pump with the lowest viscosity material 10–20 psi (0.07–0.14 MPa, 0.7–1.4 bar) from its current setpoint.
4. Press the run/spray key (RS) and test for smooth fluid flow from the gun. If the flow has not improved, reduce the air pressure in increments of 10–20 psi (0.07–0.14 MPa, 0.7–1.4 bar) until smooth flow is achieved. If any of the pumps stall, look at the LEDs on the control panel to determine which pump is stalled and increase the air pressure of the appropriate air regulator.

NOTE: You may have to make additional minor adjustments to the air regulator (H) on the front of the cabinet and/or to the fluid regulator on the mix manifold (V) to achieve the smoothest possible fluid flow from the gun.

5. After the pressures are set, lock the air regulators (J) settings to prevent pressure creeping.

Daily Startup

1. Drain the filter bowl (111) in the cabinet. Drain the large filter installed at the air drop on the wall. Depending on the amount of contamination in your air line, it may be necessary to drain this filter periodically throughout the day.
2. Prime the system. Refer to page 23.
3. Hold a metal part of the spray gun firmly to the side of a grounded metal pail, and trigger the gun.
5. Open the gun air regulator (G).
6. Spray the material as instructed in your spray gun manual.
7. **If the fluid output is too low**, increase the pump air pressure and/or increase the regulated fluid pressure on the mix manifold.



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4. Press the run/spray key (RS). The pumps will begin to cycle. Trigger the gun until mixed material flows from the nozzle. Release the trigger.

If the fluid output is too high, reduce the pump air pressure or decrease the regulated fluid pressure on the mix manifold.

NOTE: The pressure adjustments of each component will vary with the viscosity. In general, start with the lowest regulated fluid pressure, then increase as needed to get a smooth, even flow.

To achieve optimum performance, set the pump air pressure 10–15 psi higher than the desired spray pressure. Adjust the mix manifold/fluid regulator (V) to lower the pressure so you get adequate flow at the gun. Dropping 10–15 psi through the mix manifold/fluid regulator will eliminate most pressure/flow pulsations.

⚠ CAUTION

Do not use the first 4–5 oz. (120–150 ml) of material from the standard system, as it may not be thoroughly mixed.

If a longer length of static mixers and integrator hose (mix material hose) is used, be sure to completely purge the hose of solvent and material to ensure that material at the gun is on-ratio and properly mixed.

⚠ CAUTION

Never allow the fluid supply tanks to empty completely while the ValueMix is operating. Fill them periodically, as needed. Failure to fill the tanks when they are low may allow air into the fluid lines, causing an error signal and stopping production.

Shutdown

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 31.

Press the STOP key to stop all functions.

- If your stop time will not exceed the pot life, no additional action is needed, except to relieve the system pressure.
- If your stop time will exceed the pot life, you must flush the mixed material from the system. See **Flushing the ValueMix of Mixed Material**, page 32.

CAUTION

Always stop the pumps on the down stroke, to prevent material from hardening on the pump displacement rods, which could damage the seals or cause erratic pump movement when the pumps are restarted.

Always hang the gun higher than the manifold.

Pressure Relief Procedure

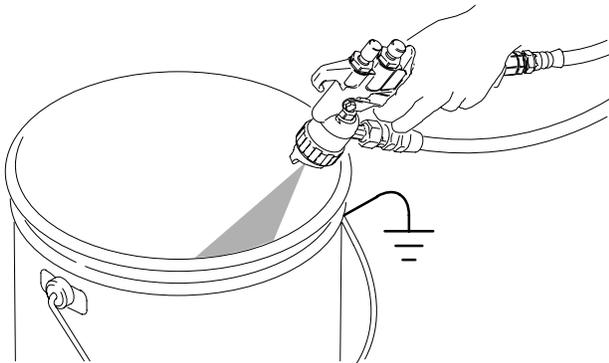
⚠ WARNING

PRESSURIZED EQUIPMENT HAZARD

The system pressure must be manually relieved to prevent the system from starting or spraying accidentally. To reduce the risk of an injury from accidental spray from the gun, splashing fluid, or moving parts, follow the **Pressure Relief Procedure** whenever you:

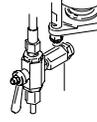
- are instructed to relieve the pressure,
- stop spraying,
- check or service any of the system equipment,
- or install or clean the spray nozzle.

1. Press the STOP key (ST).
2. Close the bleed-type master air valve (F).
3. Ensure mix manifold ball valves (AE) are open. See Fig. 1.
4. Hold a metal part of the spray gun firmly to the side of a grounded metal pail, and trigger the gun to relieve fluid pressure.



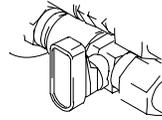
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5. Place waste containers under each of the sample valves (E) and open the valves to the sample position (down),



to relieve fluid pressure in the pumps, hose, and gun.

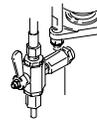
6. If you suspect that the spray tip or hose is completely clogged or that pressure has not been fully relieved after following the steps above, very slowly loosen the fluid hose end coupling and relieve pressure gradually, then loosen the coupling completely. Now clear the tip or hose obstruction.
7. Close mix manifold ball valves (AE).



⚠ CAUTION

Hoses which have been pressurized for some time stretch and may result in some residual pressure in the hoses as they relax. Failure to close the mix manifold valves when storing the unit may result in material leakage into the mix manifold and make it inoperable.

8. Turn each of the sample valves (E) to the spray position (up)



before you resume spraying.

Mixed Material Flushing

Flushing the ValueMix of Mixed Material

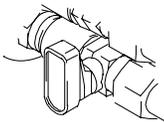
Follow the procedure below:

- Before any break or service procedure that exceeds the pot life of the fluid,
- Before servicing the control assembly.

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 31.

1. When shutting down overnight or for an extended period, run each pump independently to the full down position, to prevent material from hardening on the displacement rod.
2. Press the stop button (ST) to stop all functions.
3. **IMPORTANT:** Relieve the fluid pressure. Trigger the gun into a grounded waste container until all fluid pressure is relieved.
4. Close all manifold ball valves (AE).



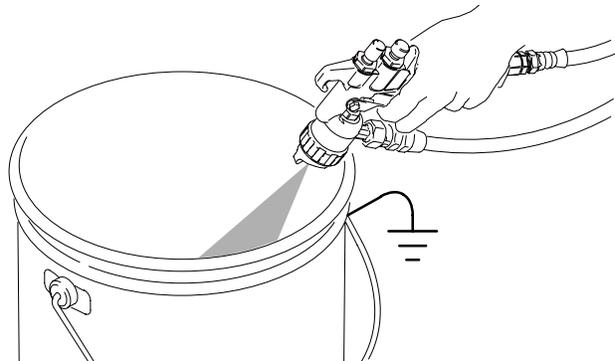
CAUTION

Be sure to close the manifold ball valves. If you do not, fluid pressure in the individual component lines (A, B, C) can push material through the check valves into the mix manifold (V) and lock up the manifold.

5. Make sure the solvent is compatible with the equipment wetted parts and with the fluid being sprayed.

NOTE: Some solvents or solvent blends flush mixed material well, but may react poorly with individual components. Contact the material manufacturer to determine the best solvent for flushing both the mixed material and the individual components.

6. Close the gun air regulator (G).
7. Set the spray/flush toggle switch (Z) to the flush position (down).
8. Adjust the pump air pressure regulator (H). Use the lowest pressure possible to avoid splashing.
9. Trigger the gun into a grounded waste container. Run the solvent pump until clear solvent flows from the gun. Trigger the gun on and off periodically to allow the solvent to dissolve the mixed material in the manifold and fluid lines.



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10. Close the master bleed-type air valve (F).
11. Relieve the pressure in the solvent line by triggering the gun into a grounded waste container.

Complete System Flushing

⚠ WARNING

For your safety, read the **Fire, Explosion, and Electric Shock Hazard** warnings on page 4 before flushing, and follow all recommendations given there.

Flushing the Fluid Supply

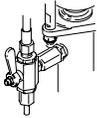
Follow the procedure below:

- During initial startup,
- Before changing colors,
- Before extended shut downs,
- Before servicing the system if possible or after servicing if production will not resume right away.

⚠ WARNING

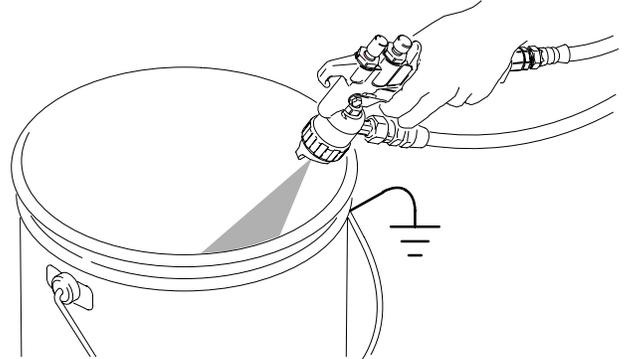
To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 31.

1. **IMPORTANT:** Relieve the pressure.
2. Make sure the solvent is compatible with the equipment wetted parts and with the fluid being sprayed.
3. Place the siphon tubes of component A, B, and C pumps into separate pails of solvent.
4. Set the sample valves (E) to the spray position (up).



5. Close the gun air regulator (G).

6. Trigger the gun into a grounded waste container and press the pump A independent run key (PA). If necessary press the key again until the component A fluid lines are clean and clear solvent flows from the gun. Trigger the gun on and off periodically to allow the solvent to dissolve the mixed material in the manifold and fluid lines.



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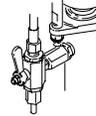
Alternatively, to run a single pump continuously until cleaned, set the ratios of the other pumps to 0 (zero).

NOTE: To stop the pump from dispensing the full amount of solvent, press the independent run key again before the pump stops cycling, or press the STOP key.

7. Set the sample valve (E) to the sample position (down)



and run the pump until the sample tube is flushed clean. Return the valve to the spray position (up) when complete.



8. Repeat for component B and C pumps.
9. Relieve the pressure as instructed on page 31.
10. See page 29 for startup procedure.

Error Code Troubleshooting

CAUTION

Do not use the fluid in the mixed material line that was dispensed off ratio as it may not cure properly.

ValueMix has six error code signals to alert you of a problem. If any of the six errors is detected, operation will stop and the error code signal will blink as follows.

NOTE: Determine the cause of the error, and then press the STOP key (ST) to clear the error.

- **One blink**, followed by a 1 sec delay, then repeated, signals a pump position sensor error. See below.
- **Two blinks**, followed by a 1 sec delay, then repeated, signals a runaway pump. See page 35.

- **Three blinks**, followed by a 1 sec delay, then repeated, signals that a pump traveled a greater distance than allowed, potentially causing an off ratio condition. See page 36.
- **Four blinks**, followed by a 1 sec delay, then repeated, signals that an attempt was made to change ratios while the system was running, or the ratio was changed when the ratio lockout switch was set to lock. See page 37.
- **Five blinks**, followed by a 1 sec delay, then repeated, signals an attempt to run a pump when its ratio is set to 0 (zero). See page 37.
- **Six blinks**, followed by a 1 sec delay, then repeated, signals that memory has failed or has not been initialized. See page 37.

Pump Position Sensor Error

The controller is not receiving a signal from a sensor or the reading is out of range.

An incorrect reading from a pump position sensor can result in off ratio dispensing.

To determine which pump position sensor is at fault:

1. Check which independent pump run light is blinking.
2. Press the STOP key to clear the error.

PROBLEM	CAUSE	SOLUTION
Pump position sensor error signal.	Pump is out of calibration.	Recalibrate the pump sensor. Refer to page 41.
	Loose wire connections.	Check wire connections on sensors and controller.
	Ratio selected for a non-existing pump.	Set ratio to zero if a pump is not present (e.g., set the C ratio knob to zero on a two pump system).
	A new pump sensor, electronic controller, air cylinder, or pump assembly was installed or the wire connections between the controller and a pump and sensor assembly were switched.	Recalibrate the pump sensor. Refer to page 41.
	Bad pump position sensor.	Refer to Troubleshooting the Position Sensor on page 40. Replace the position sensor for that pump.
	Pump position sensor magnet has come loose from the magnet support tube (302).	Inspect the magnet support tube and magnet. Refer to page 63. Repair as needed.

Error Code Troubleshooting

Runaway Pump Error

The pump runaway error signal is triggered when the position sensor detects a pump speed greater than 60 cycles per minute. A pump which runs too fast can seriously damage itself.

If your pump accelerates quickly, or is running too fast, stop it immediately and check the fluid supply.

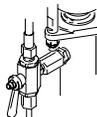
1. To determine which pump ran away, check which independent pump run light is blinking.

2. Press the STOP key to clear the error.
3. If the supply container is empty and air has been pumped into the lines, refill the container and 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.

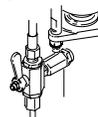
PROBLEM	CAUSE	SOLUTION
Pump runaway.	Air in the fluid system.	Purge all air from the fluid system. See Priming the Pumps and Fluid Lines on page 23.
	Leak in the fluid system.	Check for fluid leaks and repair.
	Exhausted fluid supply.	Refill fluid supply containers and prime pumps. See Priming and Removing Air from a Pump .

Priming and Removing Air from a Pump

1. Refill the supply container. Verify that the siphon hose is well below the fluid surface. Check that the siphon hose connections are tight.
2. Reduce the pump air regulator (H) to zero.
3. Place a container under the pump's sample valve.
4. Set the sample valve to the sample position (down).



5. Set the spray/flush toggle switch (Z) to the spray position (up).
6. Press the pump's independent run key (PA, PB, or PC). Gradually adjust the pump air regulator (H) until the pump begins to cycle.
7. Run the pump until the fluid is primed and all the air is out of the system.
8. Stop the pump. Turn the sample valve to the spray position (up).



Error Code Troubleshooting

Pump Over-Travel Error

Pump over-travel occurs when a pump travels farther than its maximum targeted dose.

2. Press the STOP key to clear the error.

1. To determine which pump over-travelled, check which independent pump run light is blinking.

3. Troubleshoot as explained in the following chart.

PROBLEM	CAUSE	SOLUTION
Pump travels further than its maximum targeted dose.	Air in the fluid system.	Purge all air from the fluid system. See Priming the Pumps and Fluid Lines on page 23.
	Pump air pressure is too high.	Reduce pump air regulator setting. Refer to Special Adjustments for Materials with Large Viscosity Differences on page 28.
	Pump's piston or throat seal is leaking.	Replace piston seal. Refer to Verify Pump Seal and Check Valve Operation on page 40.
	Pump's intake or piston valve is not closing.	Clean intake valve and replace worn or damaged parts. Refer to Verify Pump Seal and Check Valve Operation on page 40.
	There is a leak in the fluid system.	Check the siphon feed hoses and fittings for leakage. Replace as needed. Check all fluid hoses and fittings for leakage. Replace as needed.
Pump(s) B and C are diving through the material.	Air pressure is too high.	Adjust air regulators for pumps B and C to a point lower than the setting for pump A. Refer to Special Adjustments for Materials with Large Viscosity Differences on page 28.

Error Code Troubleshooting

Ratio Change Error

Ratio changes are not allowed while the system is in the run mode or when the ratio lockout switch is set to lock . The system will shut down.

1. Set the ratio dials to the original ratio setting, or turn the ratio lockout key switch to unlock .
2. Press the STOP key to clear the error.
3. Set the ratio dials to the desired settings.
4. Press the run/spray key to resume operation.

Zero Ratio Failure

A pump will not run if its ratio is set to 0 (zero).

1. Check which independent pump run light is blinking.
2. Press the STOP key to clear the error.
3. Set the pump's ratio dial to a value from 1–8, or select another pump to run.

PROBLEM	CAUSE	SOLUTION
Zero ratio failure.	Pump ratio dial is set to 0 (zero).	Set the dial to a value from 1–8. Select another pump to run.

Memory Error

Memory has failed or has not been initialized.

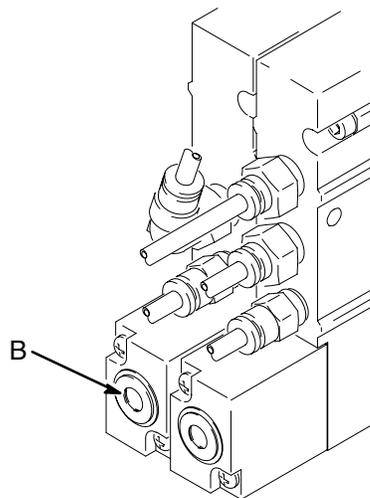
Press the STOP key to clear the error.

PROBLEM	CAUSE	SOLUTION
Memory error.	No information is stored in the memory.	Recalibrate the sensors. See page 41.
	Memory is corrupted.	Replace the control board. See page 49.

Solenoid Valve Troubleshooting

PROBLEM	CAUSE	SOLUTION
Controller turns on but pump stalls; run/spray key light is on steady.	Inadequate air pressure.	Increase air pressure.
	Solenoid valve is dirty and can't shift.	Follow procedure below.

1. Ensure that the master air valve and the pump air regulator are open.
2. Press the STOP key to shut off the pump.
3. Test the solenoid valve that is at the back of the cabinet (see Fig. 8). Using a pencil, toothpick, or similar tool, press the button (B) on the back of the solenoid valve. If this causes the valve to shift, it must be replaced. Refer to **Solenoid Valve Replacement** on page 43.



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Fig. 8

Power Supply Troubleshooting

PROBLEM	CAUSE	SOLUTION
No power to controller; LEDs are not lit.	Blown fuse in power supply.	Isolate cause of blown fuse by following procedure below.

1. Ensure that the power supply is plugged in.
2. Check if the green LED on the power supply is lit (visible through the opening at the power output connector).
 - a. If lit, the power supply is functioning properly.
 - b. If not lit, the intrinsic safety barrier fuse is probably blown. Determine and correct the cause of the blown fuse (check for shorted wires, bad connectors, etc.).

3. After correcting the problem, replace the intrinsic safety barrier board. Refer to **Intrinsic Safety Barrier (ISB) Board Replacement** on page 44.

NOTE: The fuse on the ISB board is a special fast blow fuse that cannot be replaced individually. Replace the entire board.

System Troubleshooting

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 31.

1. **Relieve the pressure.**
2. Check all possible causes and problems before disassembling the pump.

PROBLEM	CAUSE	SOLUTION
Pump fails to operate.	Restricted line or inadequate air supply; closed or clogged valves.	Clear; increase air supply. Check that valves are open. Check settings of component B and C air regulators inside the cabinet. Check that manifold ball valves (AE) are open.
	Obstructed fluid hose or gun/valve; fluid hose ID is too small.	Open, clear*; use hose with larger ID.
	Fluid dried on the displacement rod.	Clean; always stop pump at bottom of stroke before shutdown.
	Pump has set after shipment.	If the pump does not move with up to 85 psi (0.6 MPa, 6.0 bar) air pressure applied, do not increase the air pressure any further. Relieve the pressure, make sure the bleed-type master air valve (F) is closed, and carefully rotate the pump coupling (311) by hand until it moves up and down freely.
Pump operates, but output low.	Restricted line or inadequate air supply; closed or clogged valves.	Clear; increase air supply. Check that valves are open.
	Obstructed fluid hose, mix manifold, or gun/valve; fluid hose ID is too small.	Open, clear*; use hose with larger ID. To service mix manifold, see page 50.
	Held open or worn intake valve.	Clear valve; service.
	Held open or worn piston valve or u-cup seal.	Clear valve; replace u-cup seal.
Erratic or accelerated pump speed.	Exhausted fluid supply.	Refill and prime. See Priming and Removing Air from a Pump , on page 35.
	Held open or worn piston valve or u-cup seal.	Clear valve; replace u-cup seal.
	Held open or worn intake valve.	Clear valve; service.

* To determine if the fluid hose or gun is obstructed, **relieve the pressure**. Disconnect the fluid hose and place a container at the pump fluid outlet to catch any fluid. Turn on the air power just enough to start the pump. If the pump starts when the air power is turned on, the obstruction is in the fluid hose or gun.

System Troubleshooting

Verify Pump Seals and Check Valves Operation – Pump Stall Test

1. Verify that the pump is primed with fluid and that there is no air in the system.
2. Cycle the pump until it is at least 1 in. (25 mm) from its top or bottom position.
3. Stall the pump by turning the sample valve (E) to the horizontal position.



4. Push the independent run key for the appropriate pump. This will turn the pump on, in the downward direction.

5. Increase the pump air regulator (H) to more than 50 psi (0.35 MPa, 3.5 bar).
6. Observe the pump coupler/displacement rod for movement, for at least 30 sec.

If the pump moves downward, it is possible that the throat seal has failed, the inlet check is not sealing properly, or there is a leak at the pump outlet.

7. Push the independent run key once to deactivate the pump and a second time to activate the pump in the upward direction. Observe the pump coupler/displacement rod for movement, for at least 30 sec.

If the pump moves upward, it is possible that the piston seal has failed, the piston check is leaking, the throat seal has failed, or there is a leak at the pump outlet.

Troubleshooting the Position Sensor

1. Unplug the ValueMix power cord.
2. Remove the electrical connectors from the suspected bad sensor and from its solenoid valve and switch them to a known good pump.
3. Take the connectors from the known good pump and connect them to the suspected bad sensor.
4. Calibrate the suspected bad sensor (refer to page 41).

5. Once calibrated, do an independent run to check operation.

If the pump functions, the problem is with the electronic control. See page 49.

If the pump does not function, the sensor is bad. See page 42.

Sensor Calibration

Perform this calibration procedure after a sensor error has occurred.

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 31.

1. Relieve the pressure.
2. Place a container under the sample valve of the pump being calibrated.
3. Set the sample valve to the sample position (down).



4. Open the master air valve.
5. Set the pump air regulator to 30 psi (0.2 MPa, 2.1 bar).

6. Press and hold the STOP button.
7. Press the pump's independent run key. When the pump begins to move, release the STOP key and the independent run key.

The pump will move to the top of its stroke, pause, reverse direction and move to the bottom of its stroke, pause, then repeat. Each motion must happen in 5 sec or less. If either the upward motion or the downward motion takes more than 5 sec, increase the air pressure until the pump moves at the required speed. **The entire calibration procedure takes 20 seconds.** Do not press the STOP key.

When this is achieved, the pump sensor is calibrated.

NOTE: Visually check that the pump moves to the full top and bottom position both times during the calibration. If the pump does not reach the full top and bottom position both times, the calibration will fail and the system will give another sensor error (1 blink).

Component B and C Pump Adjustment

Separate air regulators are included with pumps B and C. Under most operating conditions, leave these air regulators all the way open, and use the pump air regulator on the front of the ValueMix to set the air pressure to all pumps. This allows the supply air to feed through the B and C regulators to power those two pumps at the same pressure set for pump A.

In applications using a highly viscous fluid as component A and much thinner fluids as components B and C, decrease the air pressure supplied to pumps B and C, to a point below the setting for pump A. This prevents pump over-travel errors caused by too much air pressure. Refer to **Special Adjustments for Materials with Large Viscosity Differences** on page 28.

Service

Sensor Service

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 31.

1. Relieve the pressure.
2. Disconnect the fluid hose and suction hose from the pump.
3. Unplug the electrical power cord.
4. See Fig. 9. Disconnect the wire connectors from the sensor (301) and from the air control (317).
5. Disconnect the ground wire.
6. Disconnect the air tubes (325A and 325B) from the air control (317). Label the lines so you do not reverse them when reassembling.

NOTE: To disconnect the air tubes from the fittings, push in on the button on the fitting and pull the tube out.

7. Loosen but do not remove the four nuts (123) holding the pump bracket (303) to the cabinet. Lift the pump bracket up and off the fasteners, and remove it from the cabinet.
8. Pull the sensor (301) straight off the assembly, to avoid damaging the sensor element.

CAUTION

Be very careful when using a wrench on the flats of the air cylinder rod (R). Burrs can be created which can cause the rod to stick and halt its travel. If burrs are present, carefully remove them and manually check that the rod travels freely over its entire range.

9. Unscrew the magnet support (302) from the air cylinder (305).
10. Reassemble in the reverse order, following all reassembly notes in Fig. 9.
11. Recalibrate the sensor. Refer to page 41.

Air Cylinder Service

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 31.

1. Relieve the pressure.
2. Perform steps 2 through 9 under **Sensor Service**.

CAUTION

When removing the coupler (311), use a wrench on the flats of the coupler and unscrew it from the air cylinder rod (R). Leave the coupler attached to the pump displacement rod (404). Applying a wrench to the air cylinder rod can create burrs on the rod, which can cause the rod to stick and halt its travel. Carefully remove any burrs and manually check that the rod travels freely over its entire range.

3. See Fig. 9. Unscrew the coupler (311) from the air cylinder rod (R).
4. Disconnect the air lines (325A and 325B) and remove the fittings (326) from the air cylinder (305). Label the lines so you do not reverse them when reassembling.
5. Unscrew the nut (307) from the air cylinder (305). Remove the three upper tie rod nuts (309) and take the displacement pump (310) and base plate (306) off the assembly.
6. Lower the air cylinder through the bracket (303) until the top of the cylinder is free, then pull it out the front of the bracket.
7. Remove the support (304) from the air cylinder (305).
8. Reassemble in the reverse order.
9. Recalibrate the sensor. Refer to page 41.

Service

Intrinsic Safety Barrier (ISB) Board Replacement

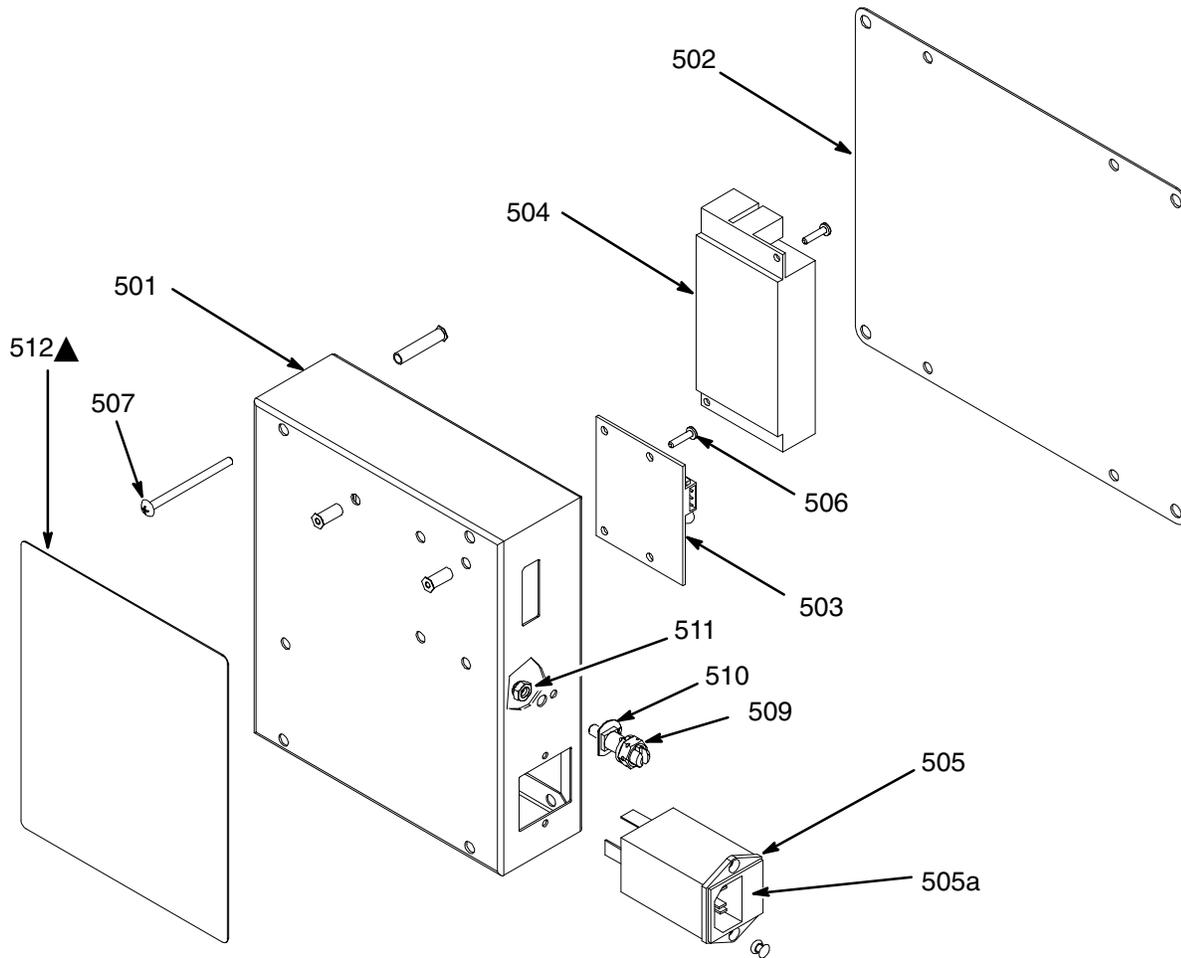
WARNING



ELECTRIC SHOCK HAZARD

To reduce the risk of electric shock, be sure to unplug the power supply from the wall outlet before servicing the power supply.

1. Unplug the power supply from the wall outlet.
2. Remove four screws (507) and pull the cover (502) off the enclosure (501). See Fig. 10.
3. Unplug the connector (508, not shown) from the intrinsic safety barrier (ISB) board (503).
4. Remove four screws (506) from the ISB board.
5. Install the new board and reassemble in the reverse order.



TI0620a

Fig. 10

Service

Displacement Pump Service

Disassembly

When disassembling the pump, lay out all removed parts in sequence to make reassembling easier.

Clean all the parts thoroughly when disassembling. Check them carefully for damage or wear, and replace parts as needed.

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 31.

1. Relieve the pressure.
2. Disconnect the fluid hose and suction hose from the pump.

CAUTION

When removing the coupler (311), use a wrench on the flats of the coupler and unscrew it from the displacement rod (404). Leave the coupler attached to the air cylinder rod (R). Applying a wrench to the air cylinder rod can create burrs on the rod, which can cause the rod to stick and halt its travel. Carefully remove any burrs and manually check that the rod travels freely over its entire range.

3. See Fig. 9. Pull out the cotter pin (320) and unscrew the coupler (311) from the displacement rod (404).

4. Remove the three nuts (309) from the bottom of the tie rods (308) and pull off the displacement pump (310). Take the pump to a workbench.
5. See Fig. 11. Unscrew the intake valve housing (406) from the outlet housing (402). If it is difficult to remove, squirt penetrating oil around the threads and gently tap around the valve housing with a plastic hammer to loosen it.
6. Remove the ball stop pin (415), o-ring retainer (419), o-ring (408), ball guide (418), and ball (407).
7. Loosen the throat seal nut (401). Push the displacement rod (404) down as far as possible, and pull it out of the outlet housing (402), being careful not to scratch the sleeve (403).
8. Secure the flats of the piston stud (405) in a vise. Screw the displacement rod (404) off the piston stud. Remove the ball (412), seal retainer (413), u-cup seal (414), and spacer (420).
9. Remove the throat seal nut (401), spacer (421), wave washer (423), u-cup seal (422), and seal support (416) from the outlet housing (402).
10. Inspect all parts for damage. Clean all parts and threads with a compatible solvent before reassembling. Inspect the polished surfaces of the displacement rod (404) and sleeve (403) for scratches, scoring, or other damage, which can cause premature seal wear and leaking. To check, run a finger over the surface or hold the part up to the light at an angle. Replace any worn or damaged parts.

NOTE: If the sleeve (403) needs replacement and is hard to remove, contact your Graco distributor.

Service

Displacement Pump Service (continued)

Reassembly

NOTE: Repair Kit 243828 is available. Refer to the parts list on page 64. For the best results, use all the new parts in the kit. Parts included in the kit are marked with one asterisk (for example, 414*).

1. If you removed the sleeve (403), reinstall it in the outlet housing (402), making sure to replace the gasket (411). To install the gasket, lay it flat in the outlet housing (402) and use the sleeve to seat the gasket against the shoulder of the outlet housing. *Be sure the tapered end of the sleeve faces down, toward the pump intake.*
2. Lubricate the piston u-cup seal (414*). Install the piston packing parts on the piston stud (405) one at a time, in the order shown in Fig. 11. *Be sure the lips of the u-cup face up, toward the threads of the piston stud.*
3. Clean the threads of the piston stud (405) and apply thread sealant. Place the flats of the piston stud in a vise. Install the piston ball (412*) on the piston and screw the displacement rod (404) onto the piston valve assembly. Torque to 35–40 ft-lb (47–54 N.m).
4. Insert the displacement rod (404) into the bottom of the outlet housing (402), being careful not to scratch the sleeve (403). Push the rod straight up until it protrudes from the top of the housing.

5. Install the ball (407*), guide (418), o-ring (408*), retainer (419), and ball stop pin (415) in the intake valve housing (406). Lubricate the intake valve housing threads, and screw the intake valve housing into the outlet housing (402). Torque to 55–65 ft-lb (75–88 N.m).

CAUTION

When removing or installing a throat u-cup seal (422), the ID of the seal can be damaged if there are any burrs on the wrench flats or the threads of the displacement rod (404). Carefully inspect and remove any burrs in these areas.

6. Lubricate the throat u-cup seal (422*). Install the throat packing parts over the displacement rod (103) and into the outlet housing (402) one at a time, in the order shown in Fig. 11. *Be sure the lips of the u-cup face down.* Lubricate the throat seal nut threads. Install the throat seal nut and torque to 18–20 ft-lb (24–27 N.m).
7. See Fig. 9. Align the outlet of the displacement pump (310) with the front of the ValueMix and raise the pump onto the tie rods (308). Secure with the three locknuts (309).
8. Screw the coupler (311) onto the displacement rod (404). Install the cotter pin (320*).
9. Reconnect the fluid hose and suction hose to the pump.

Service

Displacement Pump Service (continued)

 Lubricate.

 Lips of the u-cup seal face down.

 Tapered end of sleeve (403) must face down toward pump intake.

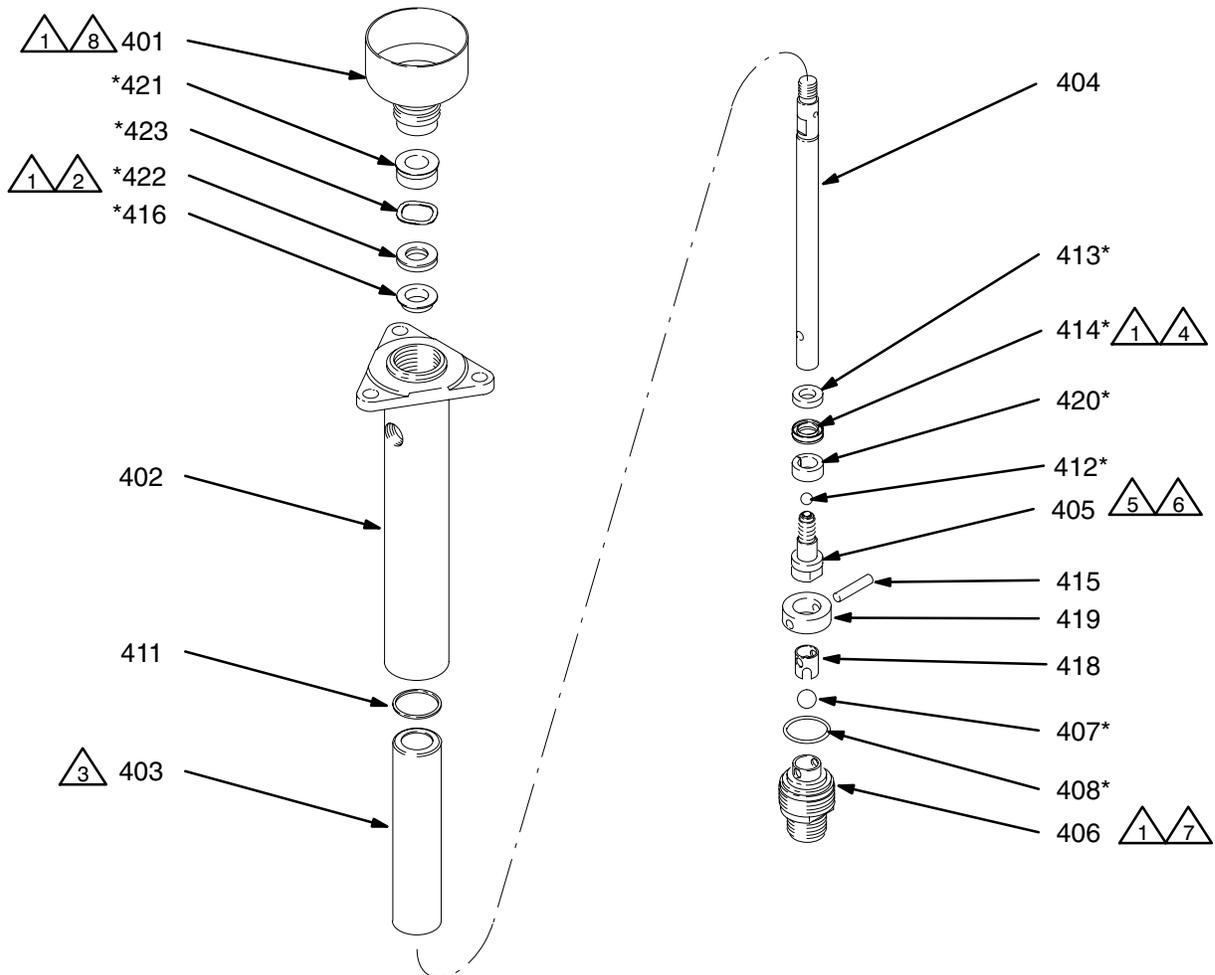
 Lips of the u-cup seal face up.

 Apply thread sealant.

 Torque to 35–40 ft-lb (47–54 N.m).

 Torque to 55–65 ft-lb (75–88 N.m).

 Torque to 18–20 ft-lb (24–27 N.m).



TI0298A

Fig. 11

Service

Sample Valve Service

Follow the **Pressure Relief Procedure** on page 31. Remove the valve from the pump and disassemble it. Clean the parts and inspect them for wear or damage. Replace them as necessary.

Lubricate the o-ring seals and threaded parts with lithium base lubricant. Assemble the valve in the reverse order of disassembly (see Fig. 12). When installing the lever on the valve, make sure the hole in the ball is aligned with the direction of the lever.

-  1 Apply lubricant.
-  2 Torque to 145–155 in-lb (16.4–17.5 N.m).
-  3 Torque to 45–50 ft-lb (61–68 N.m).

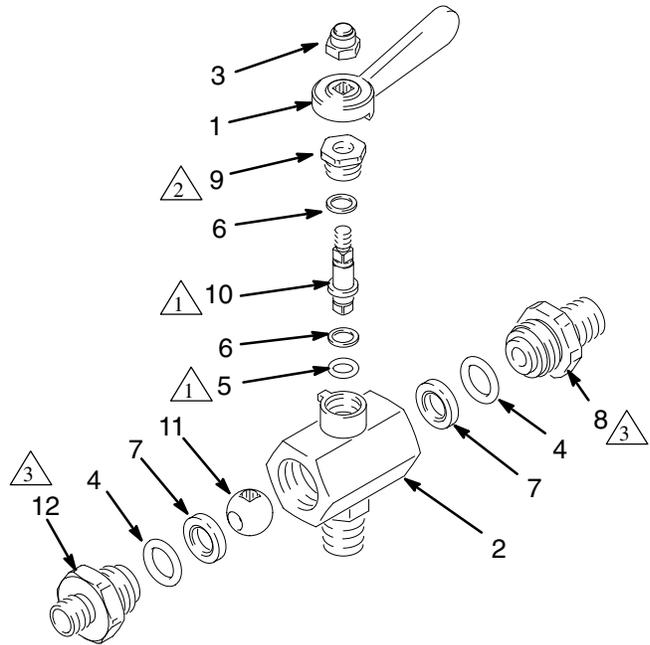


Fig. 12

TI0598a

Service

Electronic Control Replacement

Disassembly

1. Remove the nuts (123) and take off the circuit board cover (103). See Fig. 13.
2. Pull the knobs (204) off the shafts of the switches.
3. Remove the nuts (N) and star washers (W) from the switches. Do not remove the tab washers (T).
4. Remove the screws (206).
5. Unplug the membrane ribbon cable (R) from the connector (C) on the circuit board (202).

Reassembly

1. Plug the ribbon cable (R) into the connector (C) on the circuit board (202).
2. Check that the tab washers are in place on the switches. The tab on the washers must align with the 9 on the switches.
3. Assemble the circuit board (202) to the plate (201) with the screws (206), star washers (W) and nuts (N).
4. Install the knobs (204).
5. Reinstall the circuit board cover (103).
6. Recalibrate the sensors. Refer to page 41.

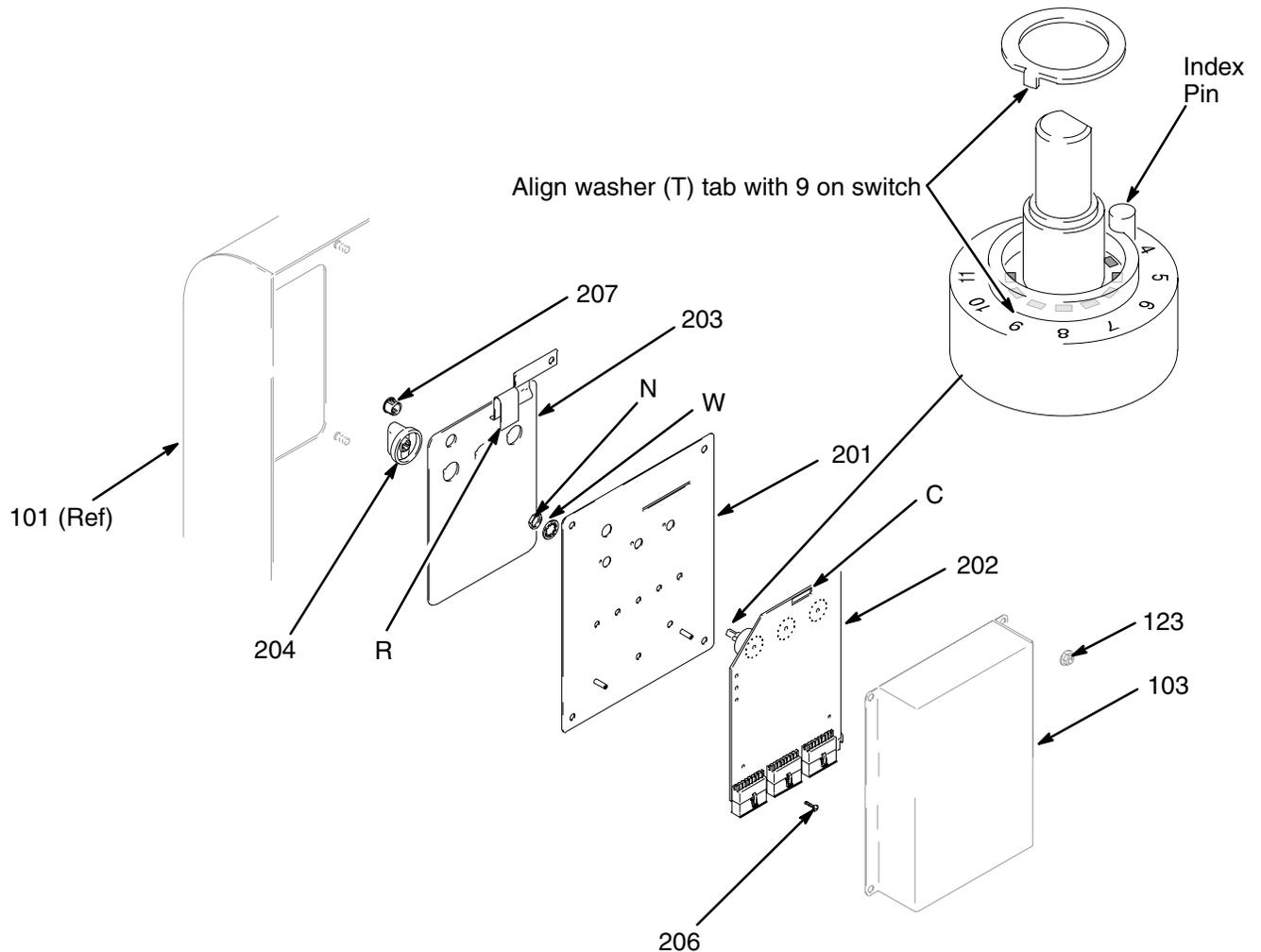


Fig. 13

TI0617a

Service

Mix Manifold/Fluid Regulator Service

WARNING

To reduce the risk of serious injury whenever you are instructed to relieve pressure, always follow the **Pressure Relief Procedure** on page 31.

1. Relieve the pressure.
2. Remove the four short screws (620) and one long screw (621) holding the fluid regulator housing (606) to the regulator mounting plate (601). Remove the fluid regulator housing, spring (611), and retainer (610). See Fig. 14.
3. Remove the remaining long screws (621) holding the regulator mounting plate (601), mix manifold housing (603), and base (605) together. Separate the three parts.
4. Remove the two gaskets (602, 604) from the mix manifold housing (603).
5. Hold the nut (619) with a wrench and unscrew the valve stem (612). Disassemble the acetal washer (618), diaphragm (617), large gasket (616), small gasket (615), and metal washer (614).
6. Clean all parts and replace any damaged parts.
7. Place the gaskets (602, 604) in the grooves of the mix manifold housing (603). Align the indexing pin on the base (605) with the small hole in the housing (603), and assemble the two parts.
8. Reassemble the diaphragm assembly in the reverse order, following the notes in Fig. 14. Be sure the AIR SIDE of the diaphragm (617) faces up toward the nut (619).
9. Reassemble the remaining parts in the reverse order, following the notes in Fig. 14.

Service

-  IMPORTANT: Apply thread adhesive.
-  IMPORTANT: Torque to 6–10 in-lb (0.7–1.1 N•m).
-  Lubricate.
-  Torque to 50–60 in-lb (5.7–6.8 N•m).
-  AIR SIDE must face up, toward nut (619).

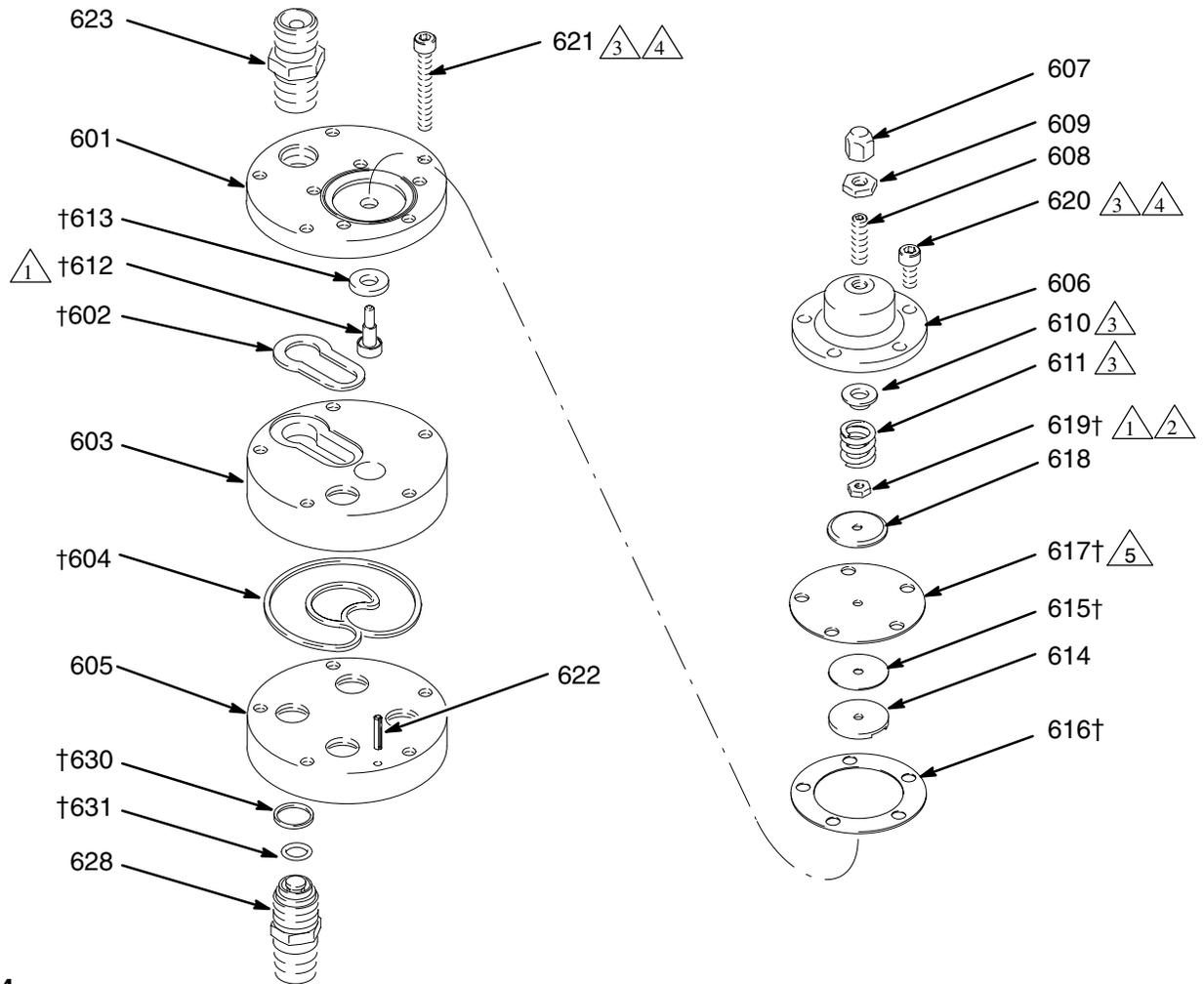
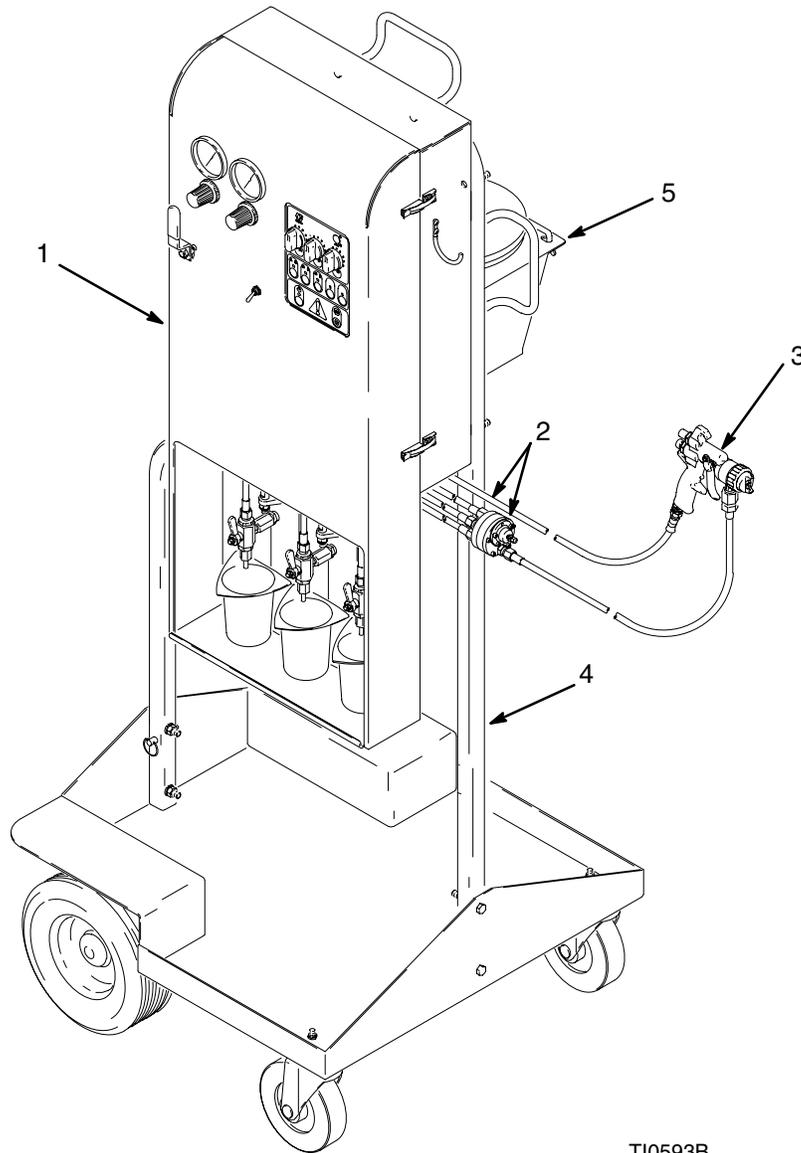


Fig. 14

Parts

244704 and 244705 ValueMix Proportioners

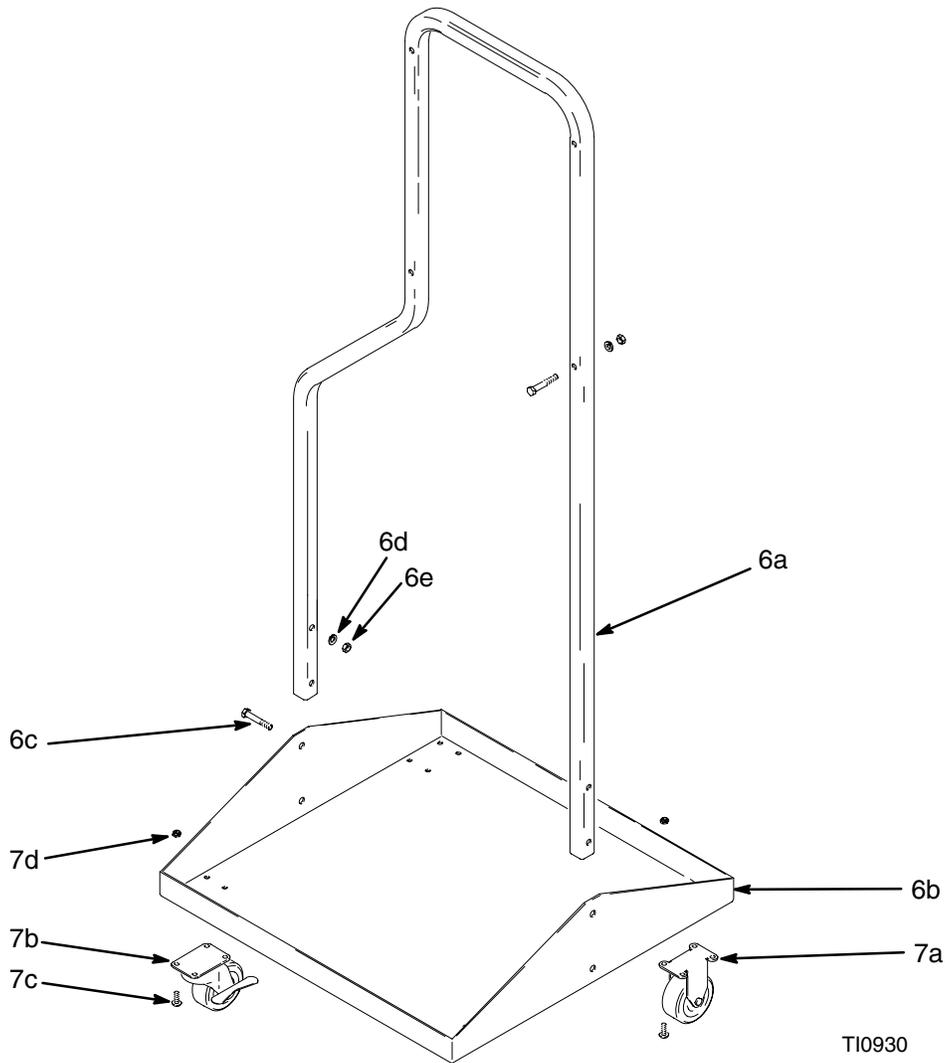


TI0593B

ValueMix Part No.	Series	Proportioner (1)	Hose Bundle (2)	Gun (3)	Cart (4)	Solvent Hopper (5)
244704	A	245089	245141	—	243826	—
244705	A	245089	245150	239560	243930	245274

Parts

243826 ValueMix Standard Cart

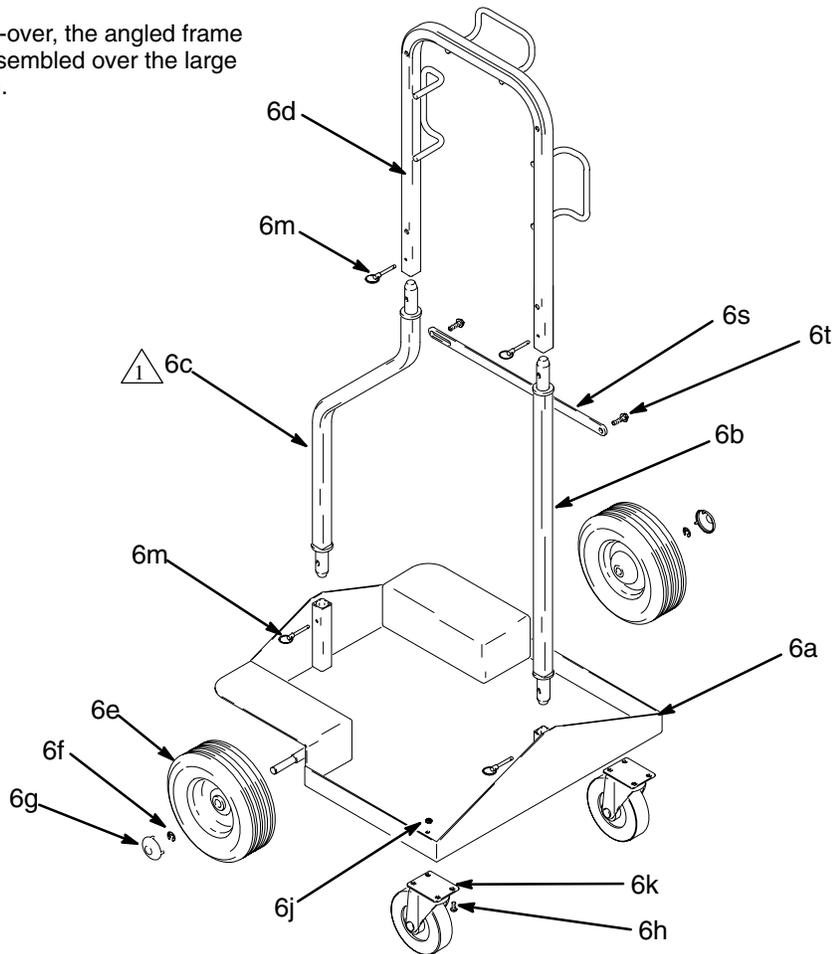


Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description	Qty
6	243826	KIT, stand mount, includes items 6a–6e	1	7	243827	KIT, cart mount, includes items 7a–7d	1
6a	196477	. FRAME, stand	1	7a	113210	. WHEEL, caster, rigid	2
6b	196355	. PLATE, base	1	7b	113063	. WHEEL, caster, swivel	2
6c	112912	. SCREW, cap, hex hd; 3/8–16 x 2.25 in. (57 mm) long	8	7c	112944	. SCREW, cap, button hd, socket; 5/16	16
6d	100133	. WASHER, lock	8	7d	112746	. NUT, lock; nylon insert	16
6e	100307	. NUT, hex; 3/8–16	8				

Parts

243930 ValueMix Heavy Duty Cart

 To avoid tip-over, the angled frame must be assembled over the large wheels (6e).

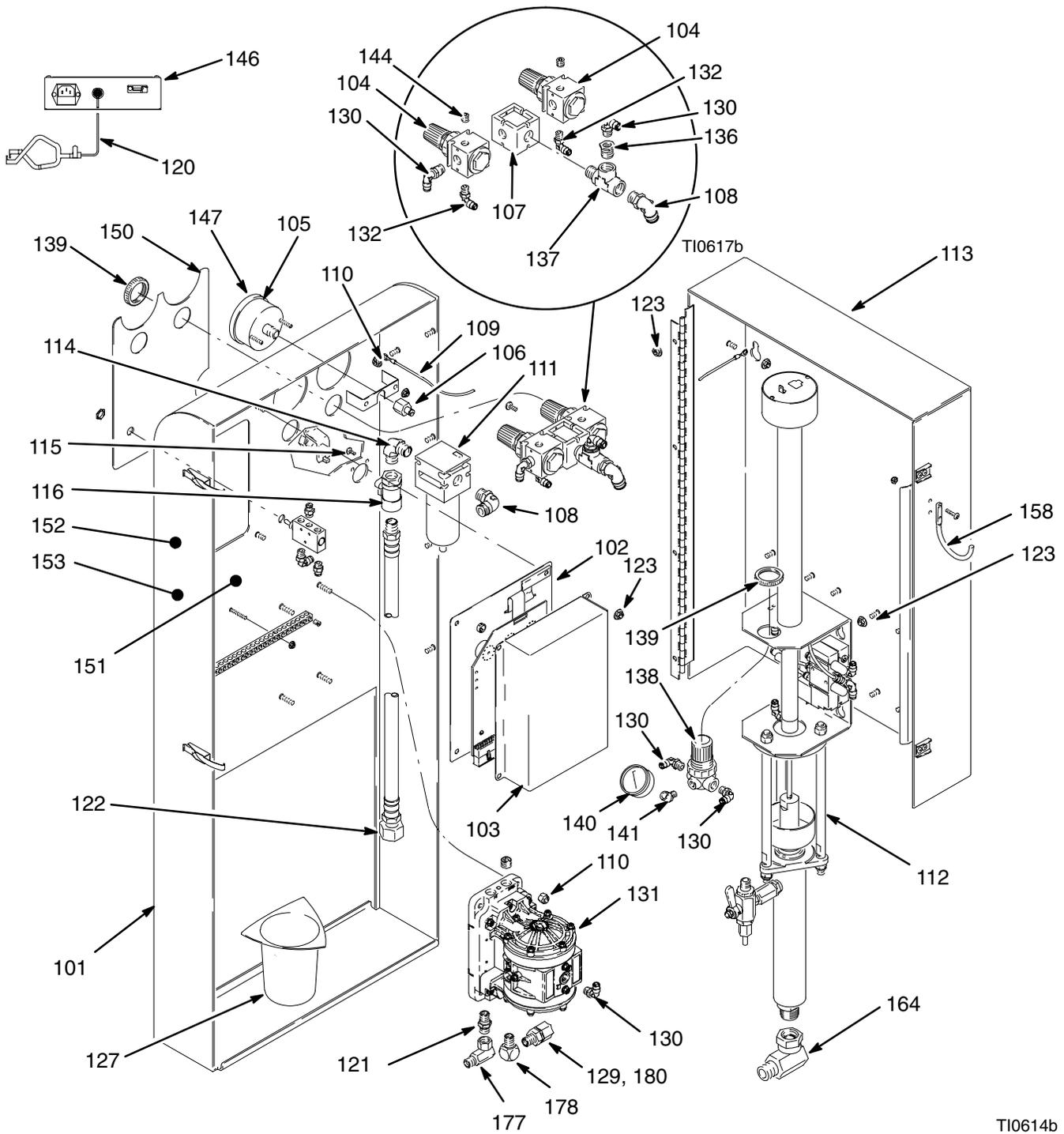


TI0595a

Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description	Qty
6a	243932	. BASE	1	6j	112746	. NUT, hex	8
6b	243934	. FRAME, straight	1	6k	116021	. CASTER, swivel	2
6c	243935	. FRAME, angled	1	6m	116022	. PIN, quick release	4
6d	243938	. FRAME, top	1	6n	112912	. SCREW, cap, hex hd	4
6e	106062	. WHEEL, semi-pneumatic	2	6p	111033	. WASHER, lock	4
6f	101242	. RING, retaining	2	6r	100307	. NUT, hex	4
6g	104811	. HUBCAP	2	6s	244011	. BAR, support	1
6h	112944	. SCREW, cap, button hd	8	6t	116023	. BOLT, flange	2

Parts

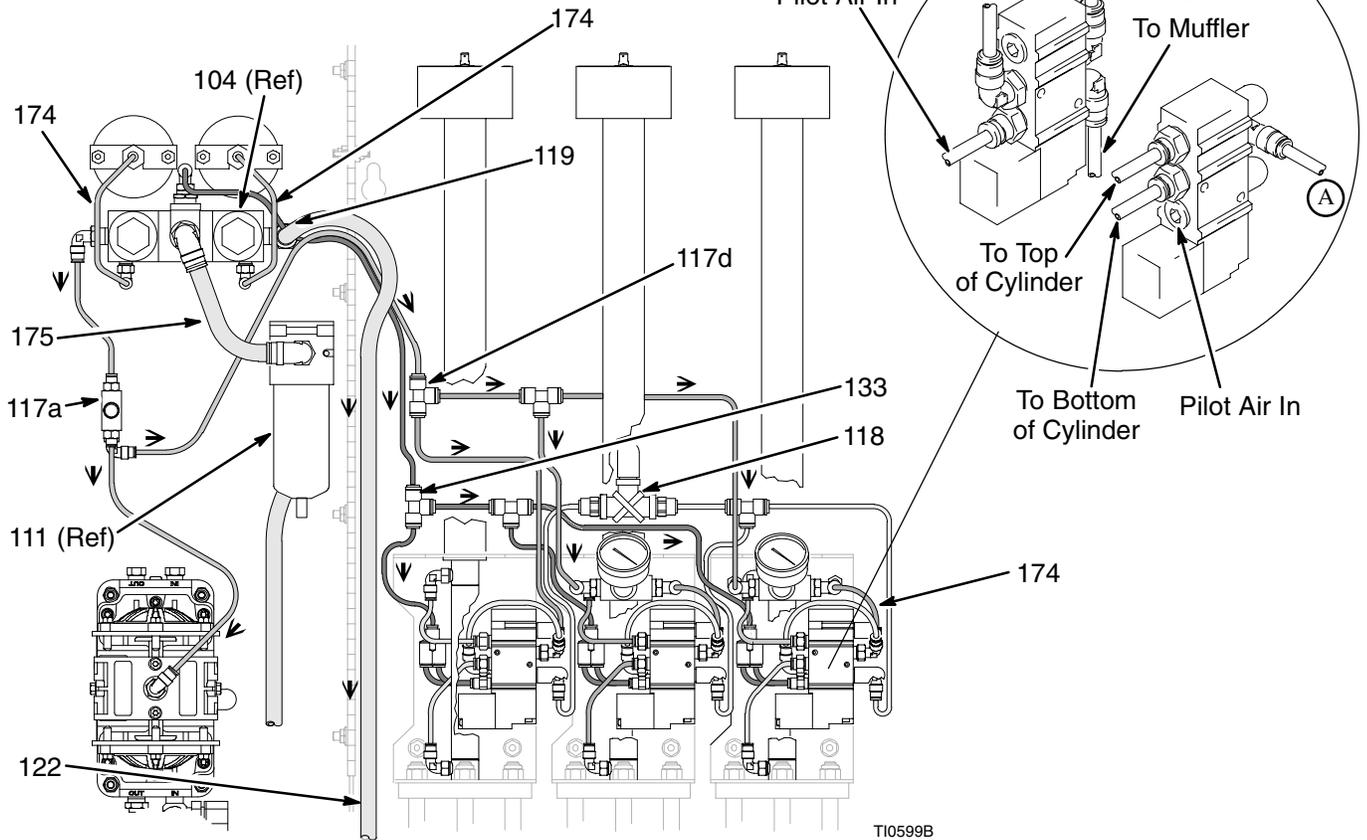
245089 Three Pump Proportioner, Series A (see parts listing on pages 59 and 60)



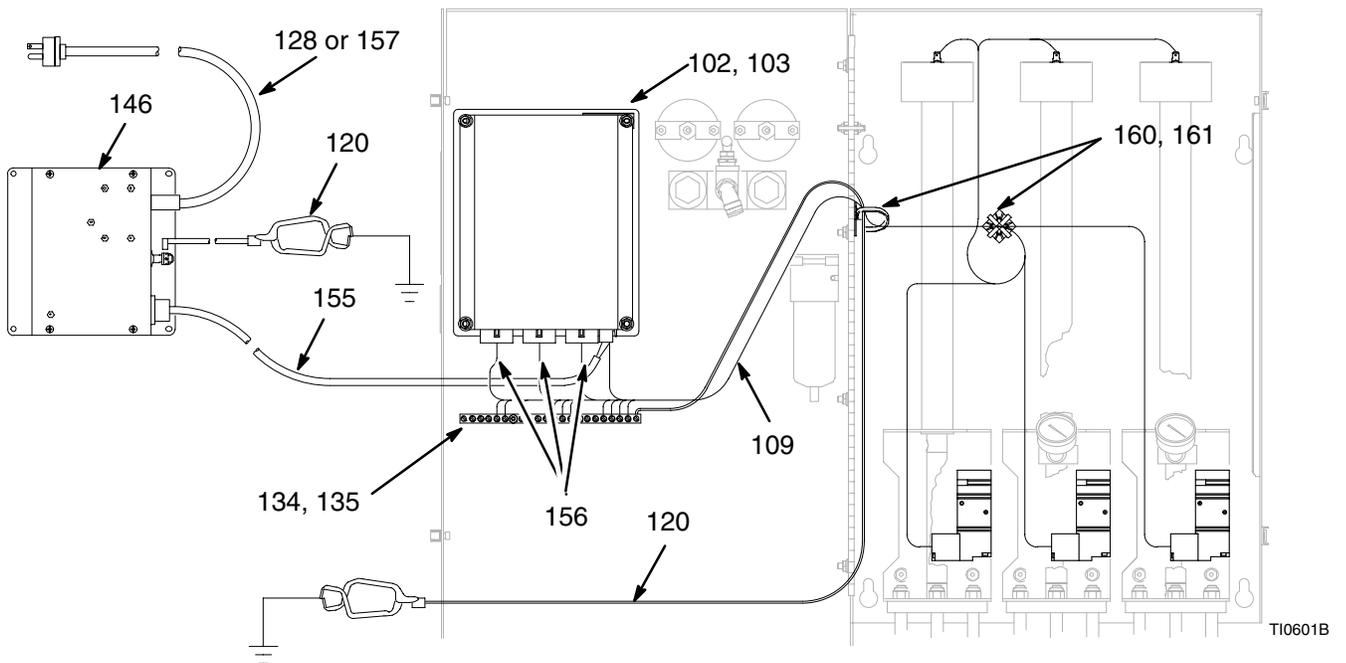
TI0614b

Parts

Air Tubing Schematic, 245089 Three Pump Proportioner, Series A
(see parts listing on pages 59 and 60)

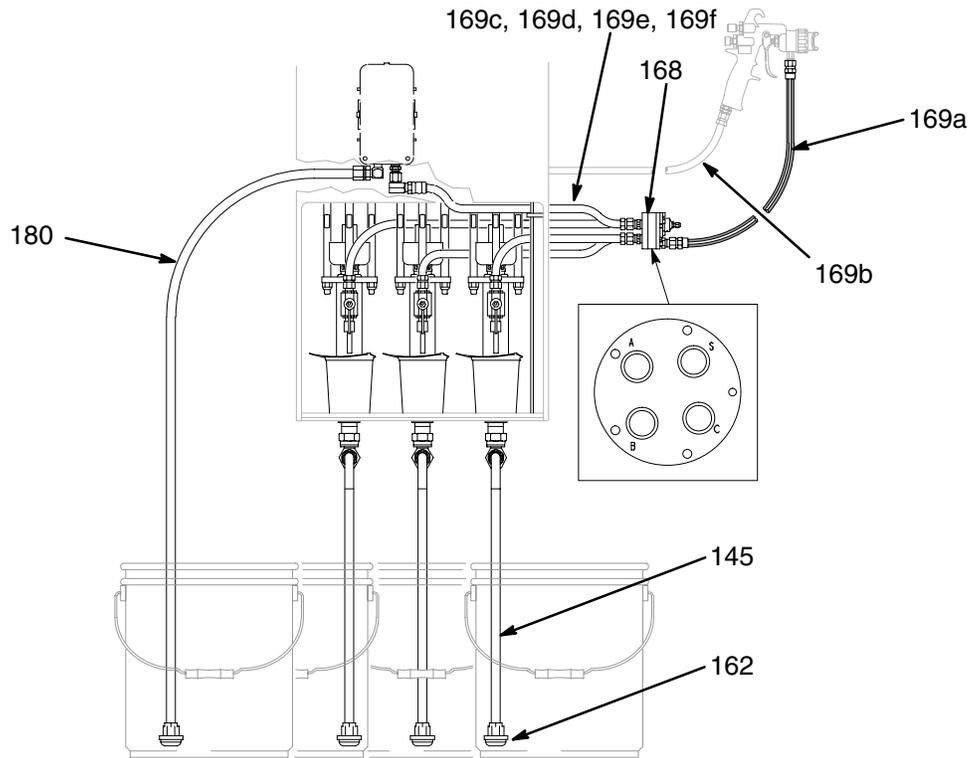


Electrical Schematic, 245089 Three Pump Proportioner, Series A
(see parts listing on pages 59 and 60)



Parts

Fluid Lines Schematic, 245089 Three Pump Proportioner, Series A
(see parts listing on pages 59 and 60)



TI0603a

Parts

245089 Three Pump Proportioner, Series A

Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description	Qty
101	196353	DOOR	1	118a	104984	•TEE, pipe, 1/4 npt(f)	1
102	243679	CONTROL, electronic see page 65 for parts	1	118b	113058	•CONNECTOR, tube, 1/4 npt(m) x 5/32 in. OD tube	2
103	196270	COVER, circuit board	1	118c	512910	•MUFFLER, polyethylene	1
104	111804	REGULATOR, air, 1/4 npt(f)	2	118d	buy locally	•TUBE, polyethylene, 5/32 in. OD	30.8 in.
105	114117	GAUGE, air	2	118e	111594	. HOLDER, tie	1
106	114471	CONNECTOR, 1/4 npt(f) x 5/32 in. OD tube	2	118f	113278	•TEE, 5/32 in. OD tube	1
107	111805	BLOCK, diverter	1	119	110249	ELBOW, 90°, 1/4 npt (mbe)	1
108	114316	ELBOW, 90°, 3/8 npt(m) x 3/8 in. OD tube	2	120	238909	GROUND WIRE AND CLAMP	2
109	115936	CORD SET, ground	1	121	162453	NIPPLE, 1/4 npt x 1/4 npsm	1
110	102040	NUT, lock, w/nylon insert, 1/4–20	6	122	233244	HOSE, air inlet, 3/8 npt(m) x 3/8 npsm(f), 36 in. (1 m) long	1
111	114124	FILTER, air, 5 micron, 3/8 npt	1	123	115942	NUT, hex, flange head, 1/4–20	20
112	243677	PUMP, proportioner see page 63 for parts	3	126▲	196303	LABEL, identification	1
113	196481	BRACKET	1	127	114169	CUP, beaker	3
114	109544	ELBOW, 90°, 3/8 npt (mbe)	1	128	241998	CORD SET, North American 10 ft (3 m) long	1
115	114381	SCREW, cap, button hd, 10–24 x 1/4 in. (6 mm) long	2	129	116013	CONNECTOR, tube	1
116	114362	VALVE, ball, air, 3/8 npt (fbe)	1	130	114469	ELBOW, tube, 1/4 npt(m) x 5/32 in. OD tube	5
117	243999	TUBE ASSEMBLY, air supply, includes items 117a–117e	1	131	D11021	PUMP, solvent, Husky® double diaphragm, see manual 308652	1
117a	115919	•SWITCH, toggle, spray/flush	1	132	111503	ELBOW, 90°, 1/8 npt(m) x 5/32 in. OD tube	2
117b	114263	•CONNECTOR, 1/8 npt(m) x 5/32 in. OD tube	2	133	244001	TUBE ASSEMBLY, pilot air includes items 133a–133b	1
117c	111503	•ELBOW, 90°, 1/8 npt(m) x 5/32 in. OD tube	1	133a	113278	•TEE, 5/32 in. OD tube	2
117d	113278	•TEE, 5/32 in. OD tube	2	133b	buy locally	•TUBE, polyethylene, 5/32 in. OD	48.3 in.
117e	buy locally	•TUBE, polyethylene, 5/32 in. OD	72.8 in.				
118	244003	TUBE ASSEMBLY, air exhaust, includes items 118a–118f	1				

Parts List is continued on page 60.

Parts

245089 Three Pump Proportioner, Series A

Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description	Qty
134	114556	BLOCK, grounding	1	156	115854	CORD SET, pump control	2
135	109466	NUT, lock, hex, w/nylon insert, 8-32	4	157	115984	CORD SET, European 2 m long	1
136	C19675	BUSHING, reducer, 3/8 npt(m) x 1/4 npt(f)	1	158	115986	HOOK, hose	1
137	803088	TEE, 3/8 npt (m x f) run, 3/8 npt(f) branch	1	159	114417	SCREW, self-tapping, pan hd, 8-32 x 5/8 in. long	2
138	115242	REGULATOR, air, 1/4 npt	2	160	111594	HOLDER, tie	6
139	115244	NUT, regulator	4	161	103546	STRAP, tie	6
140	108190	GAUGE, pressure, air	2	162	218798	STRAINER, suction hose	3
141	113630	ELBOW, street, 45°, 1/8 npt (m x f)144	2	164	116095	UNION, swivel, 90°, 1/2 npt(m) x 3/4 npsm(f)	3
144	101754	PLUG, pipe, 3/8 npt	1	171	217374	ISO PUMP OIL, 1/8 gal.	1
145	243832	KIT, siphon hose, 1/2 npt (m x f)	3	174	buy locally	TUBE, polyethylene, 5/32 in. OD	A/R
146	243610	POWER SUPPLY, 15V see page 66 for parts	1	175	buy locally	TUBE, polyethylene, 3/8 in. OD	A/R
147	193200	COVER, lens	1	177	155541	UNION, swivel, 90°, 1/4 npt(m) x 1/4 npsm(f)	1
150▲	196368	LABEL	1	178	100840	ELBOW, street, 1/4 npt(m) x 1/4 npsm(f)	1
151▲	196367	LABEL	1	180	buy locally	TUBE, nylon, 3/8 in. OD	4.5 ft
152▲	196564	LABEL	1				
153▲	190774	LABEL	1				
155	115853	CORD SET, power includes item 155a	1				
155a▲	195012	•LABEL	1				

▲ Replacement danger and warning labels, tags, and cards are available for free.

Parts

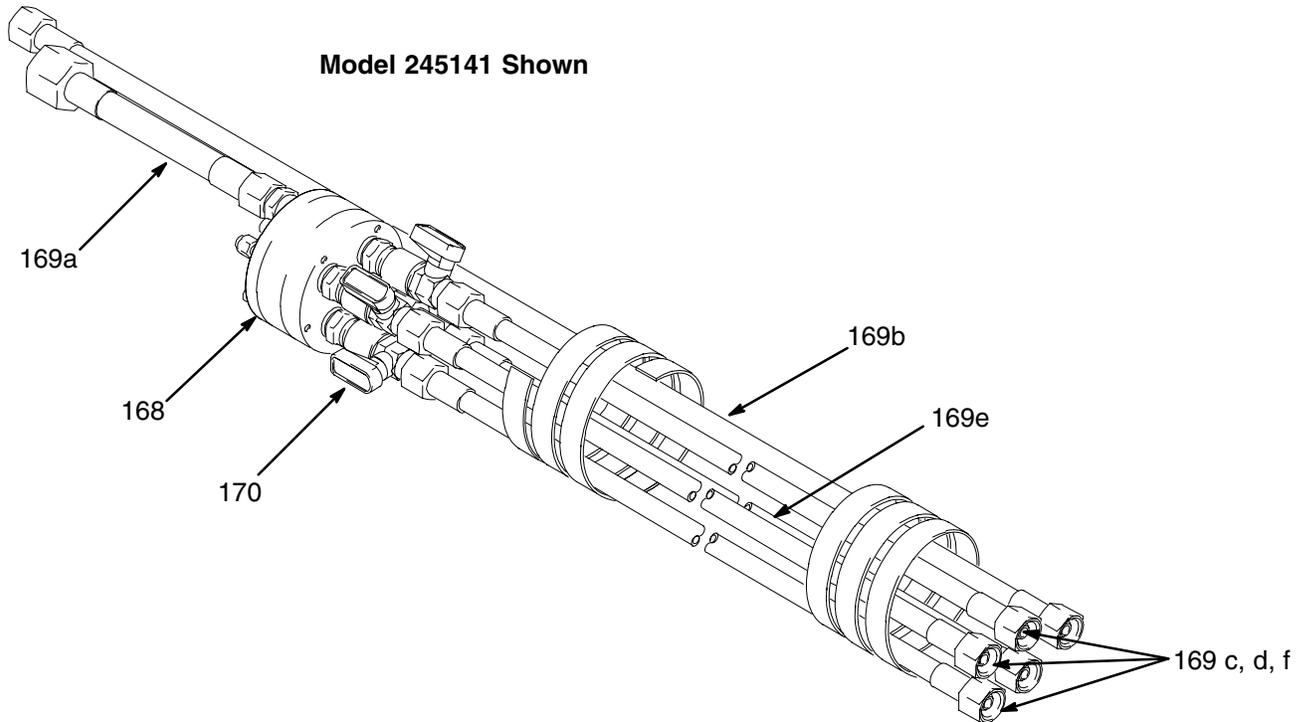
245150 Hose Assembly, Series A

Ref. No.	Part No.	Description	Qty.
168	244022	MIX MANIFOLD ASSEMBLY see page 67 for parts	1
169	245088	HOSE ASSEMBLY, 25 ft includes items 169a–169e	1
169a	245144	•TUBE, static mixer, nylon, 1/4 in. ID	1
169b	243810	•HOSE, air, gun, polyurethane, 3/8 in. ID	1
169	243802	•HOSE, components A, B, C (gray), LDPE, 25 ft	3
169e	243991	•HOSE, solvent (natural), nylon, 25 ft	1

245141 Hose Assembly, Series A

Ref. No.	Part No.	Description	Qty.
168	244022	MIX MANIFOLD ASSEMBLY see page 67 for parts	1
169	245105	HOSE ASSEMBLY, 35 ft* includes items 169a–169e	1
169a	245144	•TUBE, static mixer, nylon, 1/4 in. ID	1
169b	245155	•HOSE, air, gun, polyurethane, 3/8 in. ID	1
169	245154	•HOSE, components A, B, C (gray), LDPE, 35 ft	3
169e	245153	•HOSE, solvent (natural), nylon, 35 ft	1
170	116698	•VALVE, manifold	3

*35 ft hose lengths are intended for specific, low viscosity applications and are not suitable for all materials. Thorough testing of all new materials should be done before attempting to spray with 35 ft hoses.



TI1472A

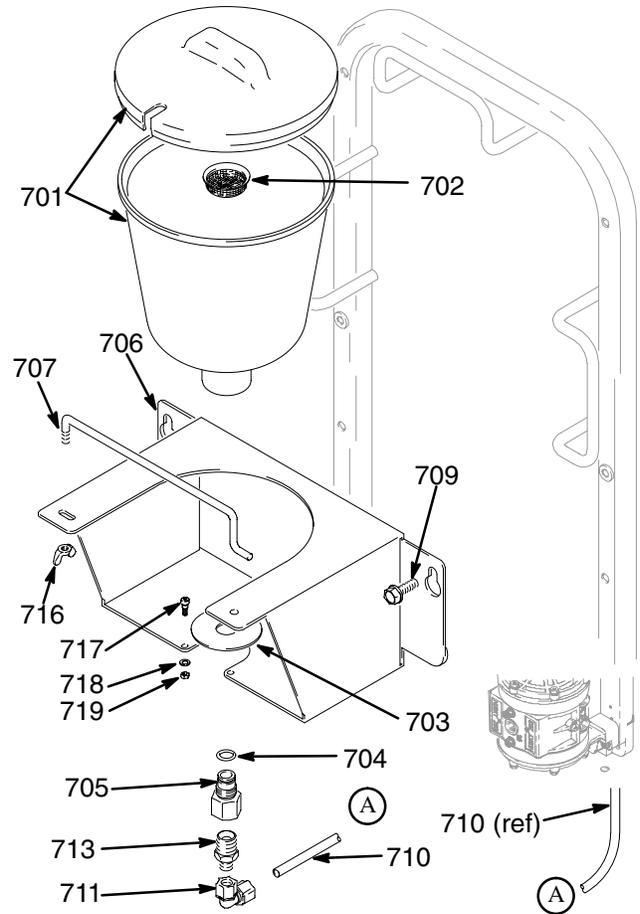
Parts

245274 Solvent Hopper Assembly

Ref. No.	Part No.	Description	Qty.
701	188787	HOPPER; 1.5 gal. (5.7 liter)	1
702	112133	SCREEN, hopper	1
703	196554	WASHER, retaining	1
704	104938	O-RING	1
705	196553	ADAPTER; 7/8-14 x 1/2 npt	1
706	243939	SUPPORT, hopper, solvent	1
707	196551	ROD, retaining	1
709	116023	BOLT, flange; 3/8-16	2
710	054134	TUBING, bulk; 3/8 in. (10 mm) OD	*
711	116018	ELBOW; 3/8 OD tube x 1/4 npt(f)	1
713	162449	NIPPLE, reducing; 1/2 x 1/4 npt	1
715	196705	LABEL, warning (see page 12)	1
▲ 716	100191	WINGNUT; 5/16-18	1
717	105270	SCREW, shoulder	2
718	104116	WASHER	2
719	100179	NUT	2

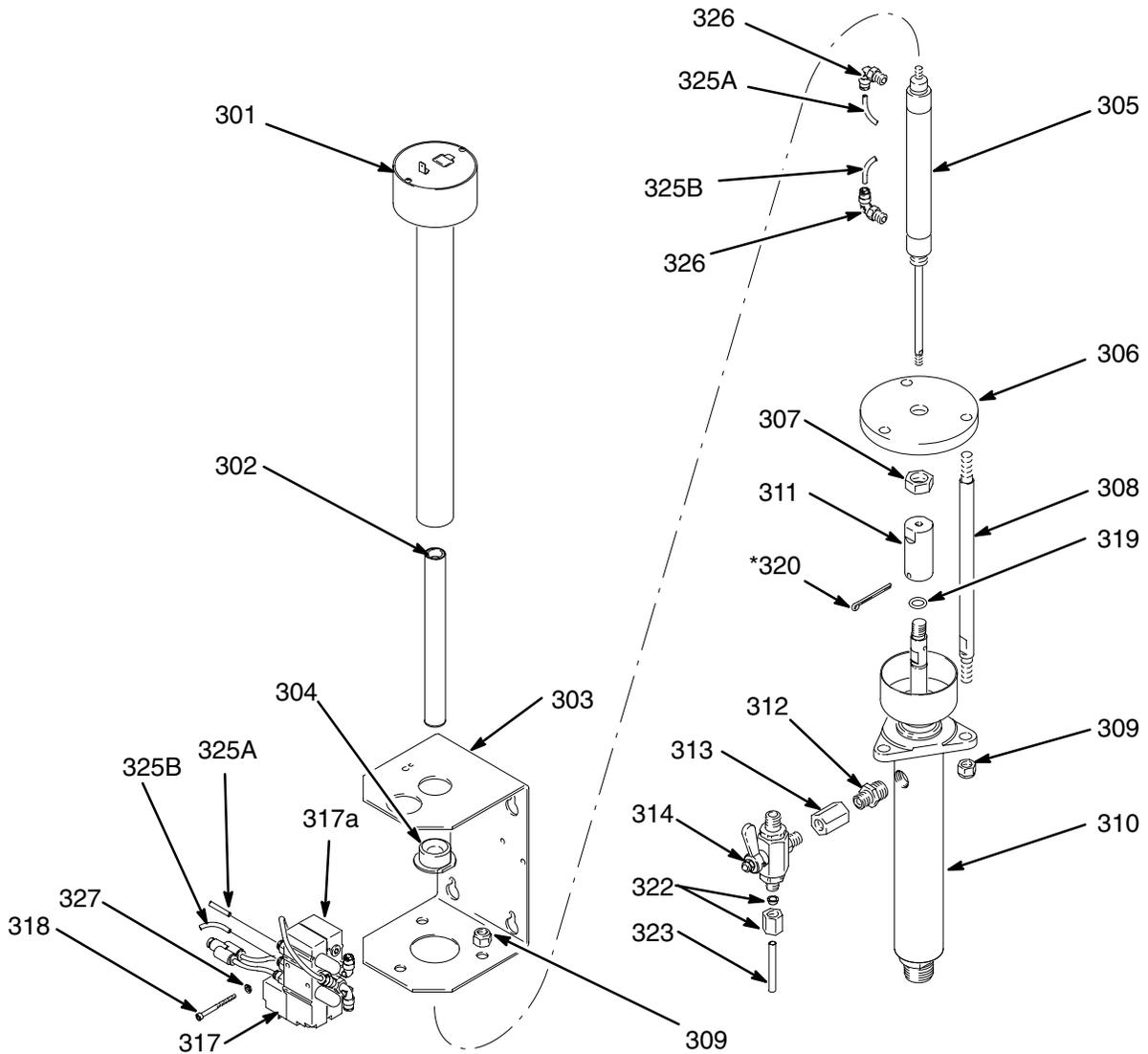
* Order 2.5 ft (0.76 m) of tubing.

▲ Replacement danger and warning labels, tags, and cards are available for free.



Parts

243677 Proportioner Pump, Series A



TI0618a

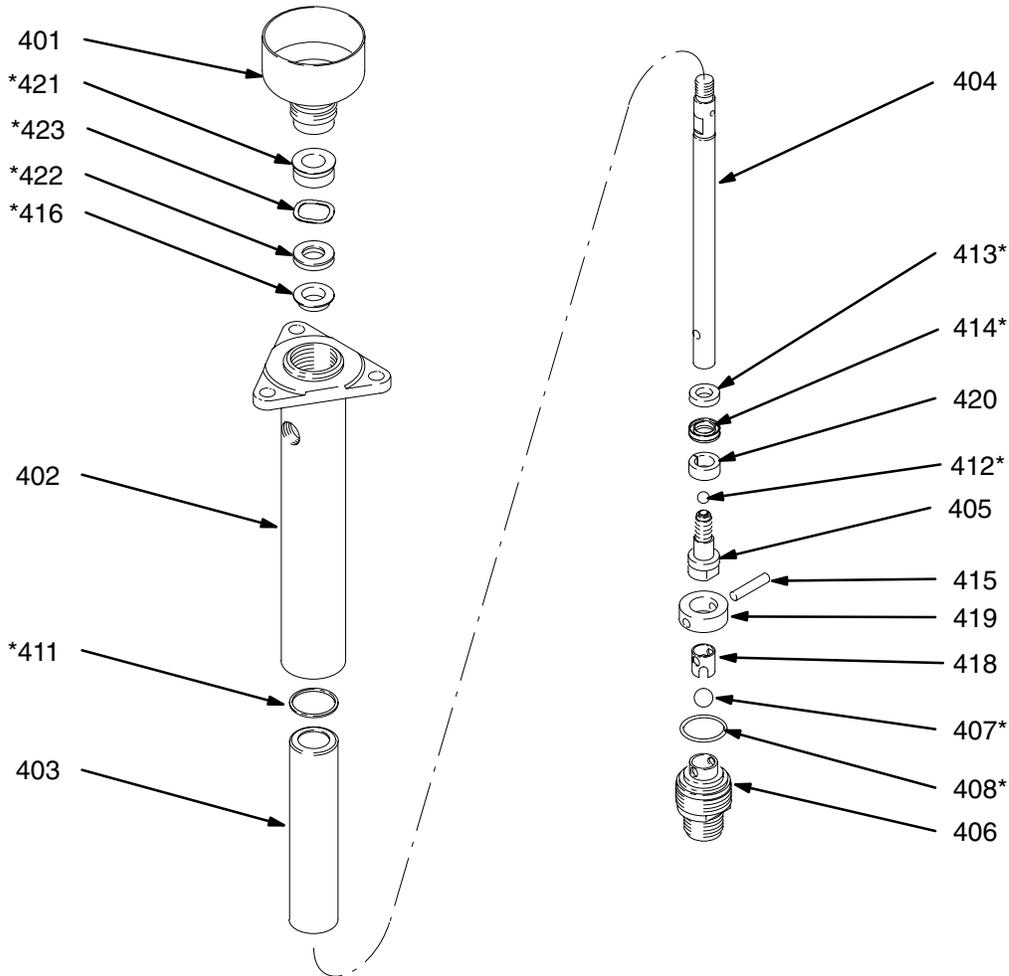
Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description	Qty
301	243678	SENSOR, displacement	1	317	243692	CONTROL, air includes item 317a	1
302	243680	SUPPORT, magnet, LVDT	1	317a	196334	• VALVE, solenoid	1
303	196272	BRACKET	1	318	115913	SCREW, socket hd	2
304	196283	RING, threaded, LVDT mount	1	319	154771	O-RING	1
305	115915	CYLINDER, air	1	320*	101946	PIN, cotter	1
306	196277	BASE, pump mount	1	322	116012	FITTING, tube, compression	1
307	100155	NUT	1	323	196499	TUBE, sample valve	1
308	196278	ROD, tie	3	325	buy locally	TUBE, polyethylene, 5/32 in. OD	A/R
309	101566	NUT, lock	6	326	111503	ELBOW, tube, 1/8 npt(m) x 5/32 in. OD tube	2
310	243676	PUMP, displacement	1	327	100068	WASHER	2
311	196286	COUPLING, pump	1				
312	157350	NIPPLE	1				
313	113093	CONNECTOR, pipe	1				
314	243800	VALVE, ball, sample see page 68 for parts	1				

* This parts is included in Displacement Pump Repair Kit 243828, which may be purchased separately. See page 64 for additional parts.

Parts

Model 243676 Displacement Pump, Series B

Carbon steel displacement pump with glass reinforced PTFE u-cup seals



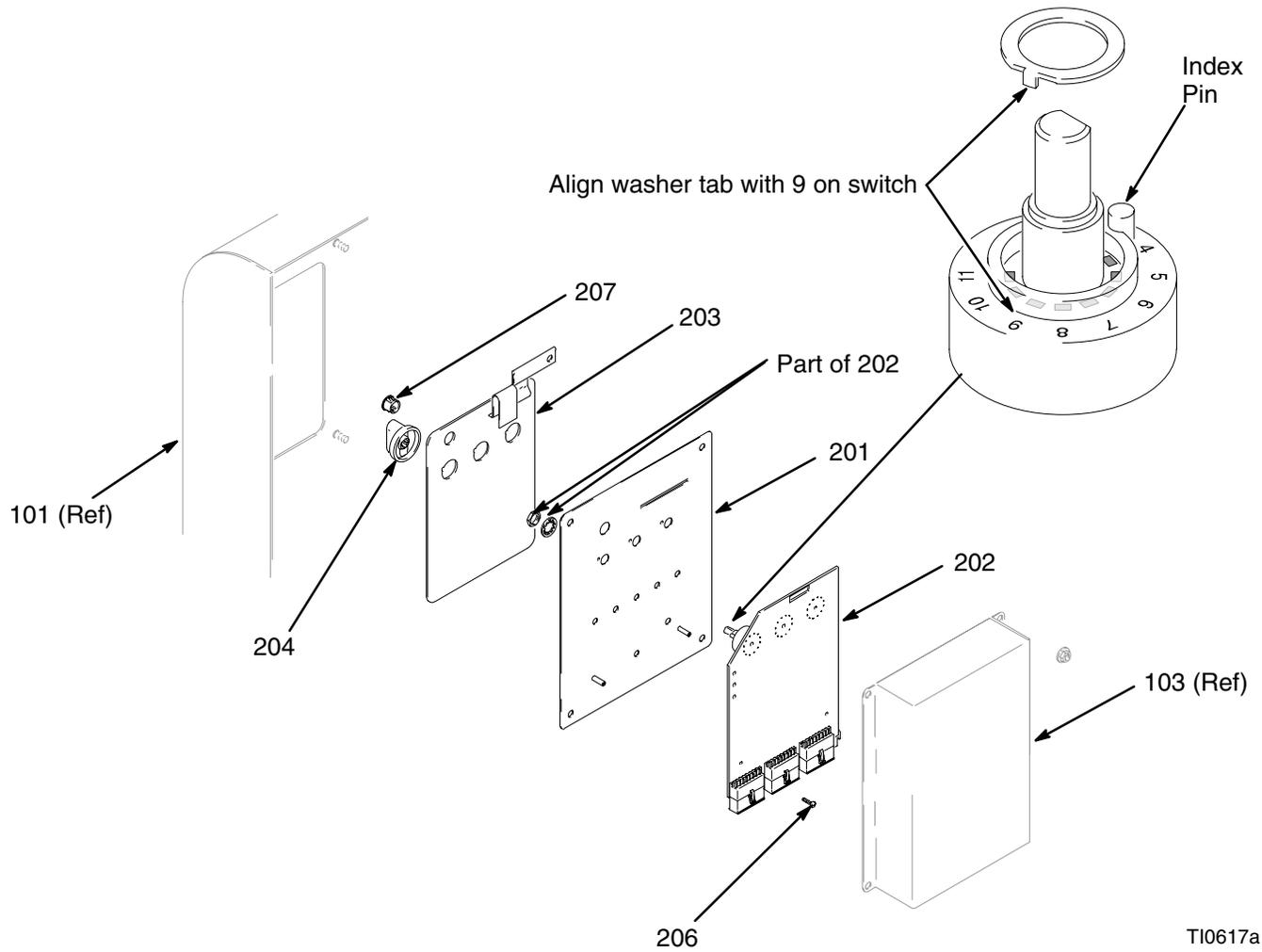
TI0298A

Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description	Qty
401	206269	THROAT SEAL NUT/WET-CUP, CST	1	413*	186199	RETAINER, seal, SST	1
402	207011	HOUSING, outlet, CST	1	414*	115923	SEAL, u-cup, piston, glass-filled PTFE	1
403	178898	SLEEVE, housing, SST	1	415	186179	PIN, ball stop, intake, SST	1
404	223603	ROD, displacement, SST	1	416*	196344	SUPPORT, seal, pump shaft	1
405	223591	STUD, piston, SST with tungsten carbide seat	1	418	186187	GUIDE, ball, intake, SST	1
406	223593	HOUSING, valve, intake, SST with tungsten carbide seat	1	419	186183	RETAINER, o-ring, SST	1
407*	105445	BALL, intake, 440C SST, 0.5 in. (13 mm) dia.	1	420	196287	SPACER, piston	1
408*	165052	O-RING, PTFE	1	421*	196288	SPACER, throat	1
411*	164480	GASKET, flat, PTFE	1	422*	115924	SEAL, u-cup, throat, glass-filled PTFE	1
412*	105444	BALL, piston, 440C SST, 0.31 in. (7.9 mm) dia.	1	423*	116038	WASHER, wave spring	1

* These parts are included in Repair Kit 243828, which may be purchased separately.

Parts

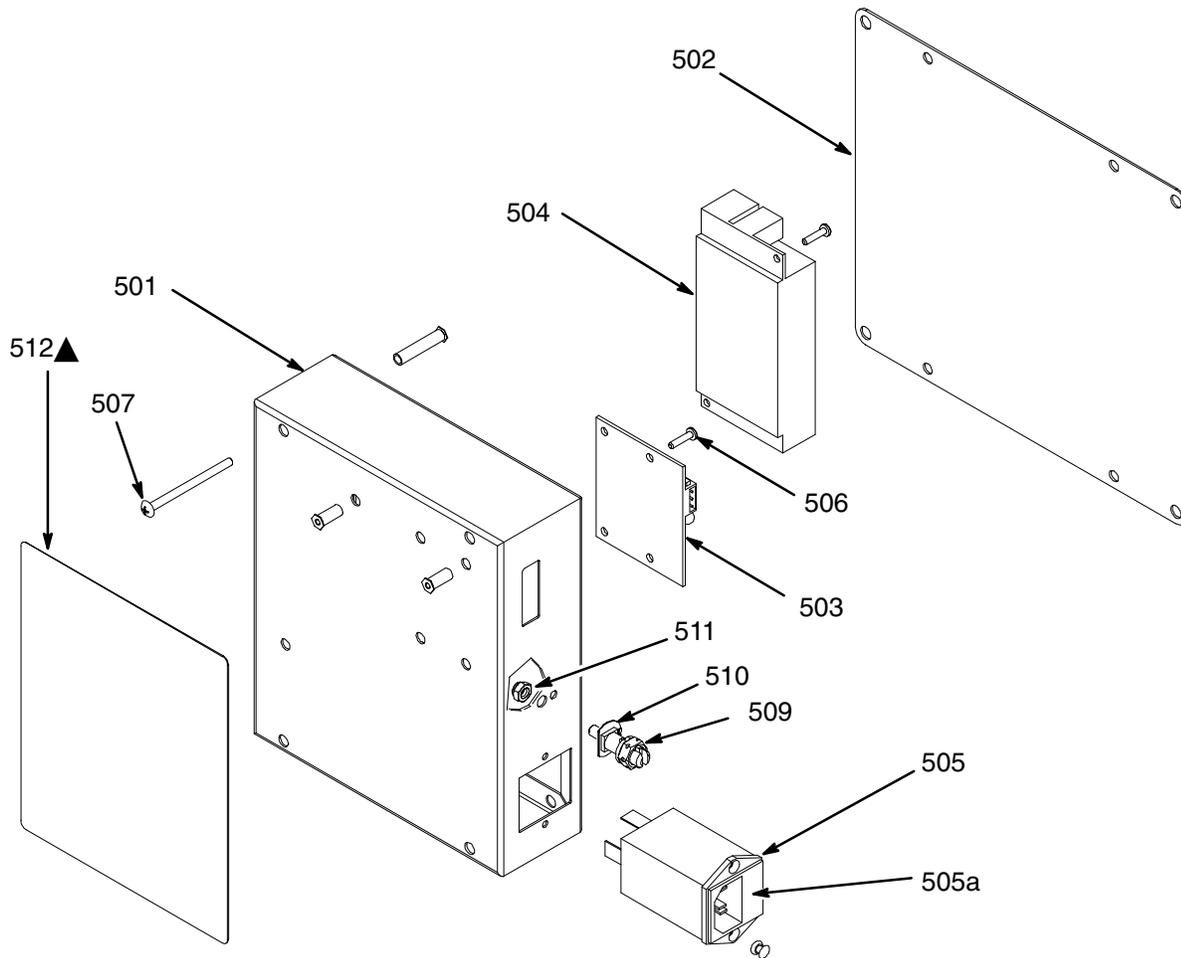
243679 Electronic Control, Series A



Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description	Qty
201	196348	PLATE, mounting bracket	1	204	116019	KNOB	3
202	243498	BOARD, control	1	206	100171	SCREW, machine, pan hd	2
203	115731	SWITCH, membrane	1	207	115857	LOCK, electrical	1

Parts

243610 Power Supply, 15V, Series A



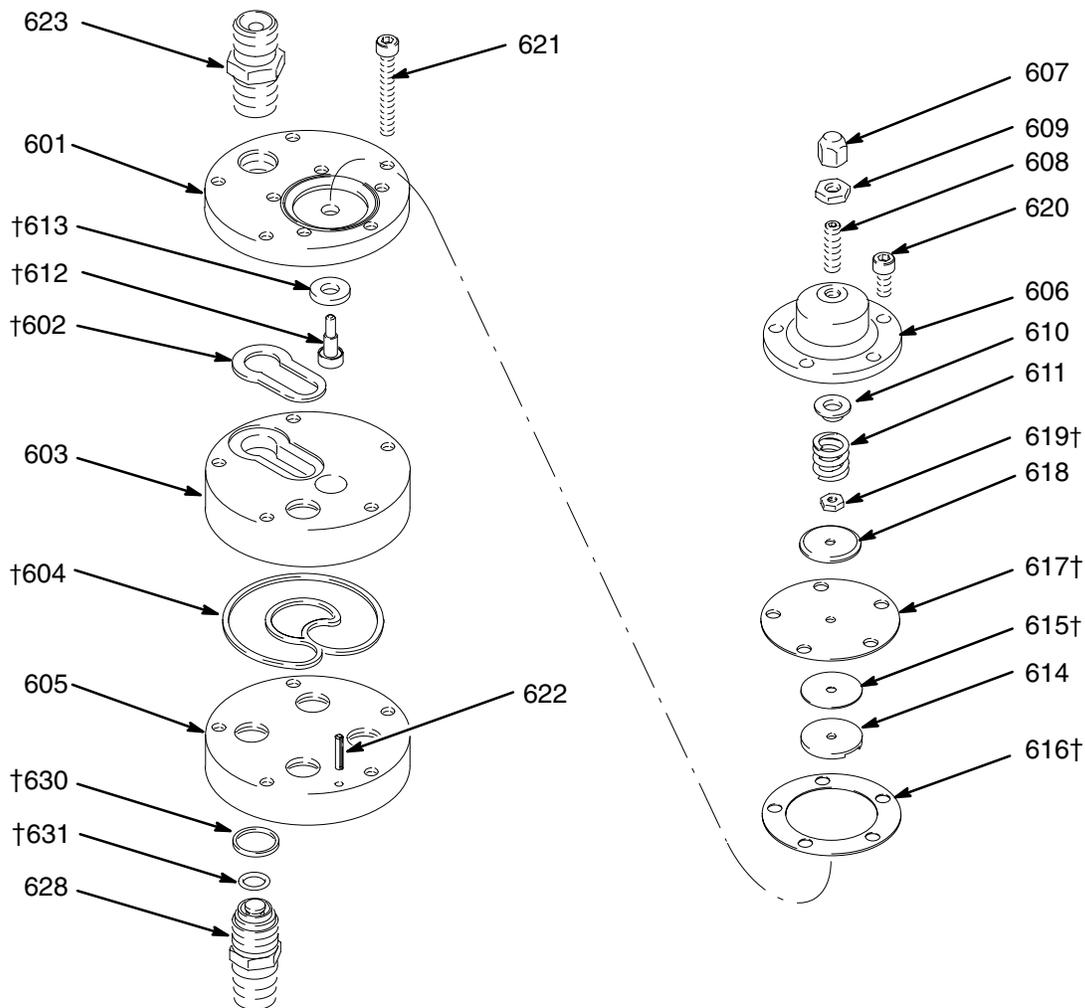
TI0620a

Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description	Qty
501	115858	ENCLOSURE, control box	1	507	buy locally	SCREW, machine, phillips truss hd no. 6-32 x 2 in. (51 mm) long	4
502	115859	COVER, control box	1	508	115856	CABLE, DC	1
503	243497	BOARD, intrinsic safety barrier	1	509	104029	CLAMP, ground	1
504		POWER SUPPLY, not available separately	1	510	104582	WASHER, tab	1
505	115855	CORD, AC includes item 505a	1	511	105332	NUT, lock	1
505a	115985	• FUSE, 4.0 Amp, 250V, time lag	1	512▲	196365	LABEL, warning	1
506	buy locally	SCREW, machine, phillips no. 4-40 x 1/2 in. (13 mm) long	6				

▲ Replacement danger and warning labels, tags, and cards are available for free.

Parts

244022 Mix Manifold with Fluid Regulator, Series A



Ref No.	Part No.	Description	Qty	Ref No.	Part No.	Description	Qty
601	196340	PLATE, mounting, regulator	1	614	168879	WASHER, backup	1
602†	196343	GASKET, mix manifold, outlet	1	615†	178322	GASKET	1
603	196341	HOUSING, mix manifold	1	616†	178320	GASKET, non-metallic	1
604†	196342	GASKET, mix manifold, inlet	1	617†	178321	DIAPHRAGM, regulator	1
605	196339	BASE, mix manifold	1	618	168881	WASHER, acetal	1
606	168877	HOUSING, regulator	1	619†	102980	NUT, hex	1
607	170303	NUT, cap	1	620	103229	SCREW, cap, socket hd	4
608	102433	SCREW, set, socket hd	1	621	115968	SCREW, cap, socket hd	5
609	100166	NUT, hex	1	622	102411	PIN, spring	1
610	167244	RETAINER, spring	1	623	162453	NIPPLE, 1/4 npt x 1/4 npsm	1
611	167245	SPRING, compression	1	628	115966	VALVE, check	4
612†	168872	STEM, valve	1	630†	196512	GASKET	4
613†	169597	SEAT, valve	1	631†	111504	PACKING, o-ring	4

† These parts are included in Repair Kit 244012, which may be purchased separately.

Parts

243800 Sample Valve

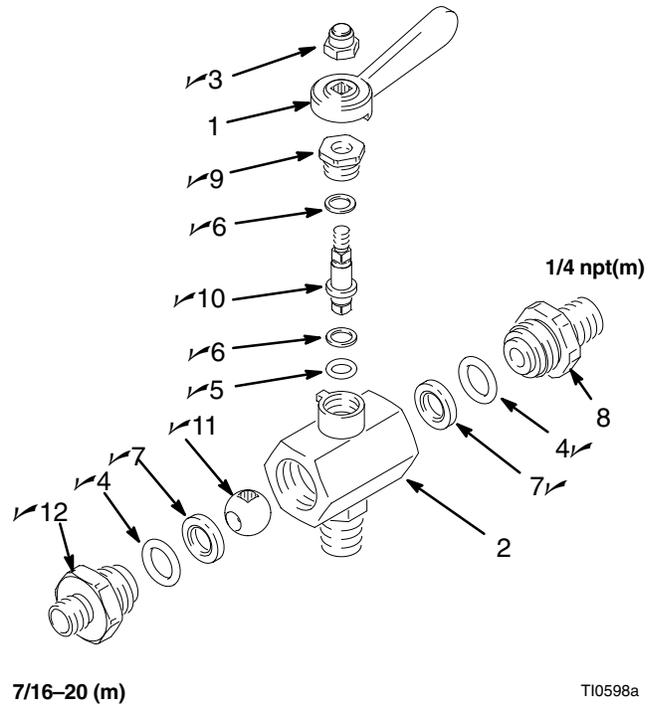
200 psi (1.4 MPa, 14 bar) Maximum Working Pressure

1/4 npt x 7/16-20 (mbe), PTFE seals, chemically resistant fluoroelastomer

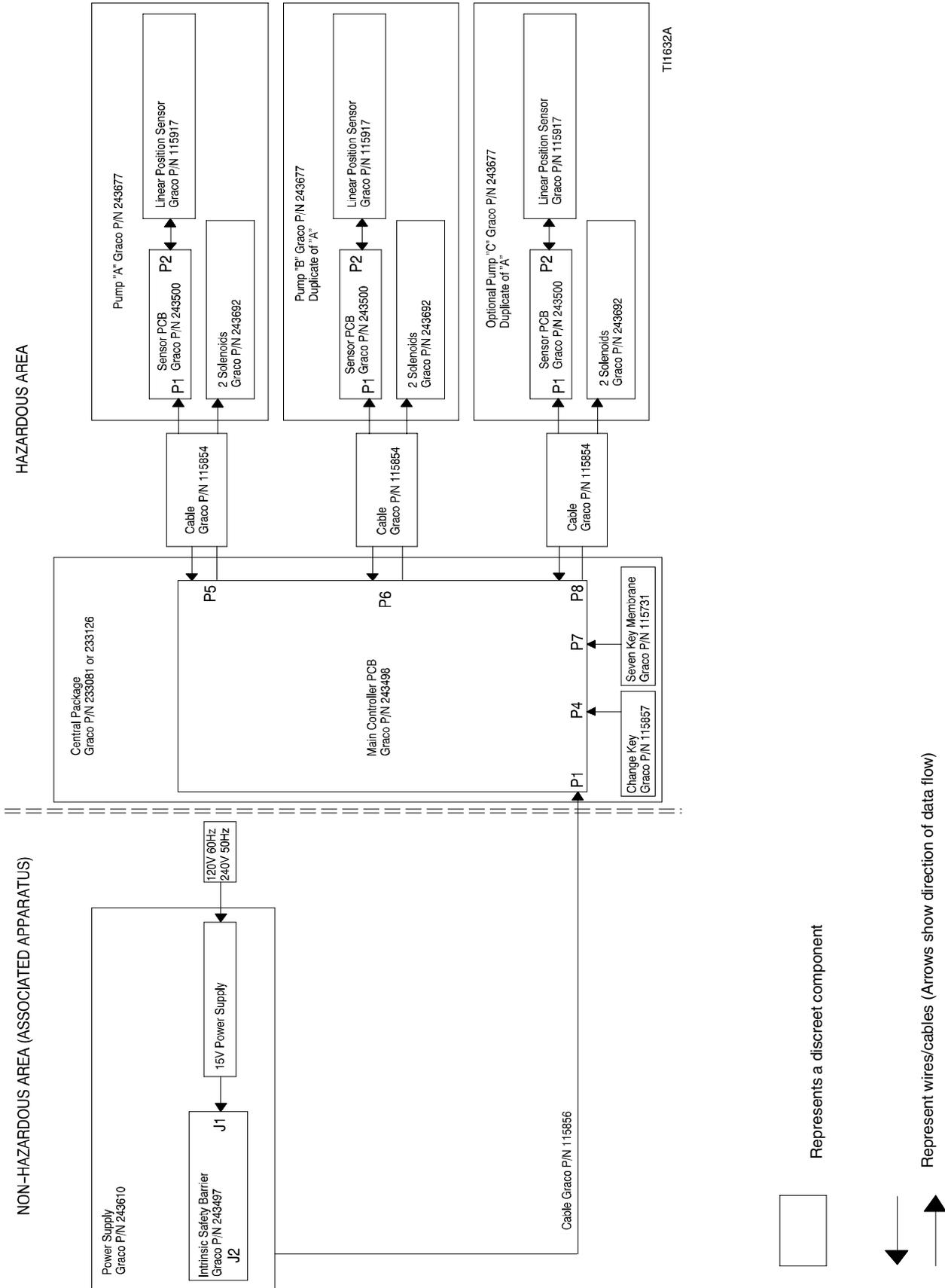
Ref

No.	Part No.	Description	Qty
1	206970	LEVER, valve	1
2	214710	HOUSING, valve	1
3	102310✓	NUT, hex; nylon cap; No. 10-32	1
4	104892✓	SEAL, o-ring; PTFE	2
5	111450✓	SEAL, o-ring; chemically resistant fluoroelastomer	1
6	164900✓	WASHER, flat, nylon	2
7	172094✓	SEAT, ball, nylon	2
8	165274	STUD, valve; 1/4 npt(m)	1
9	165964✓	NUT, packing	1
10	166696✓	STEM, valve	1
11	167008✓	BALL, valve	1
12	196500✓	ADAPTER, nipple; 7/16-20	1

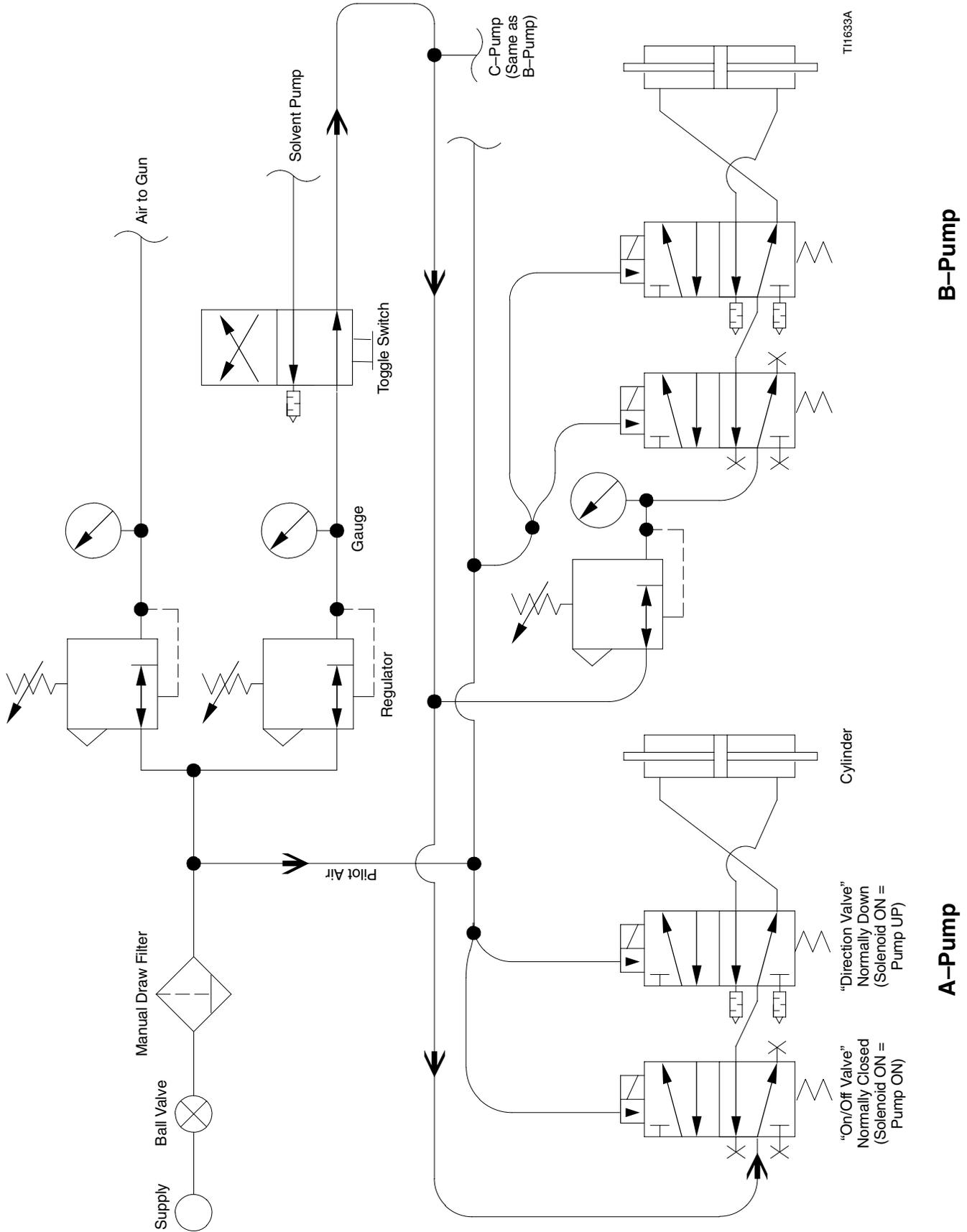
✓ Keep these spare parts on hand to reduce down time.



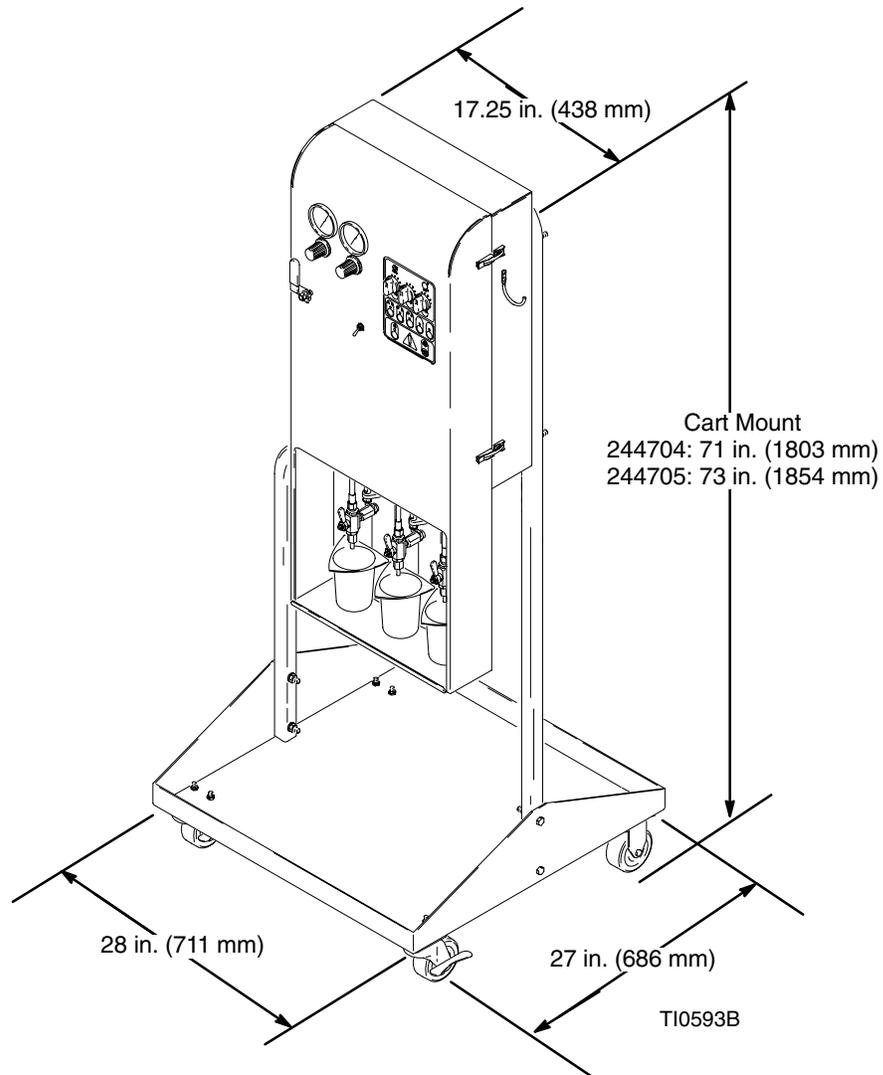
Electrical Schematic



Pneumatic Schematic



Dimensions



Technical Data

Maximum working fluid pressure	100 psi (0.7 MPa, 7 bar)
Maximum fluid inlet pressure	0 psi (gravity or siphon feed only)
Maximum solvent supply pressure	100 psi (0.7 MPa, 7 bar)
Maximum working air pressure	85 psi (0.6 MPa, 6.0 bar)
Maximum operating temperature	120° F (49° C)
Air supply	10 micron (maximum) filtration required.
Average air consumption	HVLP: 2.6 scfm (0.07 m ³ /min.) pumps <u>22 scfm (0.62 m³/min.) gun</u> 24.6 scfm (0.69 m ³ /min.) TOTAL
Maximum air consumption	HVLP: 10 scfm (0.28 m ³ /min.) pumps <u>22 scfm (0.62 m³/min.) gun</u> 32 scfm (0.90 m ³ /min.) TOTAL
Mixing ratio range	1:1–8:1*
On-ratio accuracy	±5%
Fluids handled	One, two, or three component epoxy or polyurethane paints
Viscosity range of fluid	10–500 cps* (up to 50 sec, Zahn #3) maximum for any individual component. See Performance Chart on page 73 for flow limitations with high viscosity fluids.
Maximum fluid flow	0.19 gpm, 24 oz/min (0.7 l/min)†
Operating temperature range	41–104° F (5–40° C)
Electrical Power Supply Requirements	85–264 Vac, at 47–63 Hz
Weight	128 lb (58.1 kg)
Wetted parts	Zinc-plated carbon steel, anodized aluminum, 303, 304 SST, 17–4 SST, tungsten carbide (with nickel binder), PTFE; CV75, acetal, nylon (component A, C, and solvent hoses), LDPE (component B and suction hoses)

* *Dependant on application. For more detailed information on viscosities, flow rates, or mixing ratios, consult your Graco distributor.*

† *0.19 gpm (0.946 l/min) is the maximum flow rate available. As viscosity and length of the hose increase, the achievable flow rate decreases.*

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Technical Data

Sound Pressure Levels (dBa) (measured at 1 meter from unit)‡

Output Flow Rate	Input Air Pressure	
	40 psi (0.28 MPa, 2.8 bar)	70 psi (0.48 MPa, 4.8 bar)
12 oz/min (0.35 l/min)	61.3 dB(A)	63.3 dB(A)
24 oz/min (0.71 l/min)	—	64.8 dB(A)

Sound Power Levels (dBa) (tested in accordance with ISO 9614-2)‡

Output Flow Rate	Input Air Pressure	
	40 psi (0.28 MPa, 2.8 bar)	70 psi (0.48 MPa, 4.8 bar)
12 oz/min (0.35 l/min)	73.3 dB(A)	75.3 dB(A)
24 oz/min (0.71 l/min)	—	76.8 dB(A)

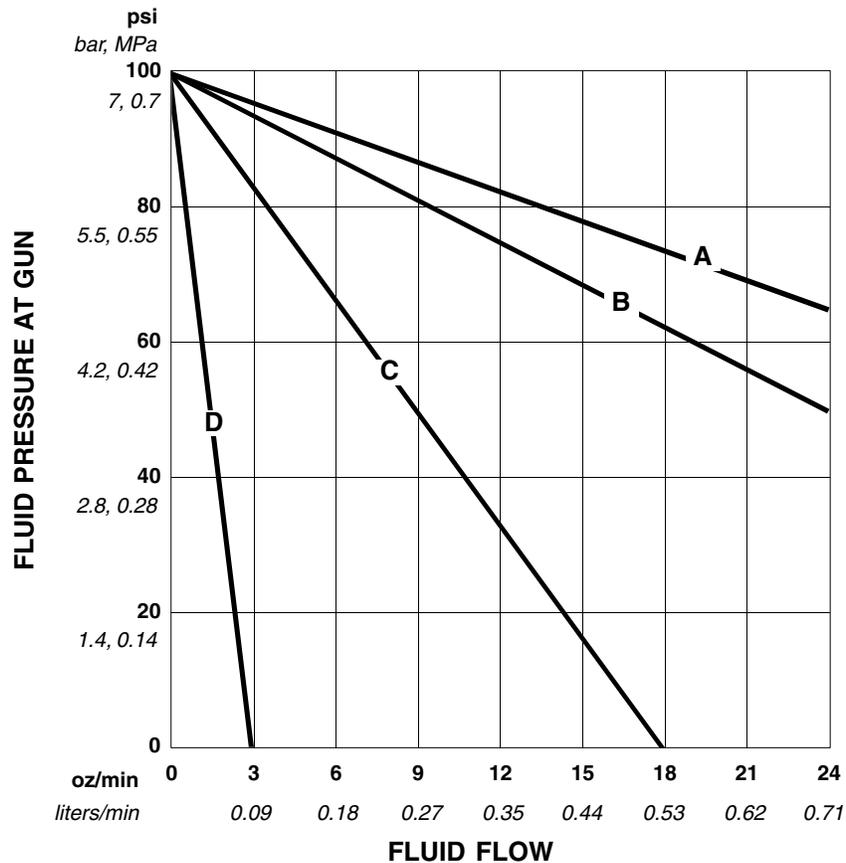
‡ Sound data is for the ValueMix proportioner only, without a spray gun. Refer to the spray gun instruction manual for gun sound data.

Performance Chart

Viscosity of Individual Components at 1:1:1 Ratio

NOTE: Lower viscosity combinations and ratio selection will improve flow rate.

- A 30 centipoise fluid
- B 100 centipoise fluid
- C 380 centipoise fluid
- D 500 centipoise fluid



Graco Standard Warranty

Graco warrants all equipment 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

TO PLACE AN ORDER, contact your Graco distributor, or call one of the following numbers to identify the distributor closest to you:

1-800-367-4023 Toll Free

612-623-6921

612-378-3505 Fax

*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.*

Sales Office: Minneapolis

International Offices: Belgium, Korea, Hong Kong, Japan

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