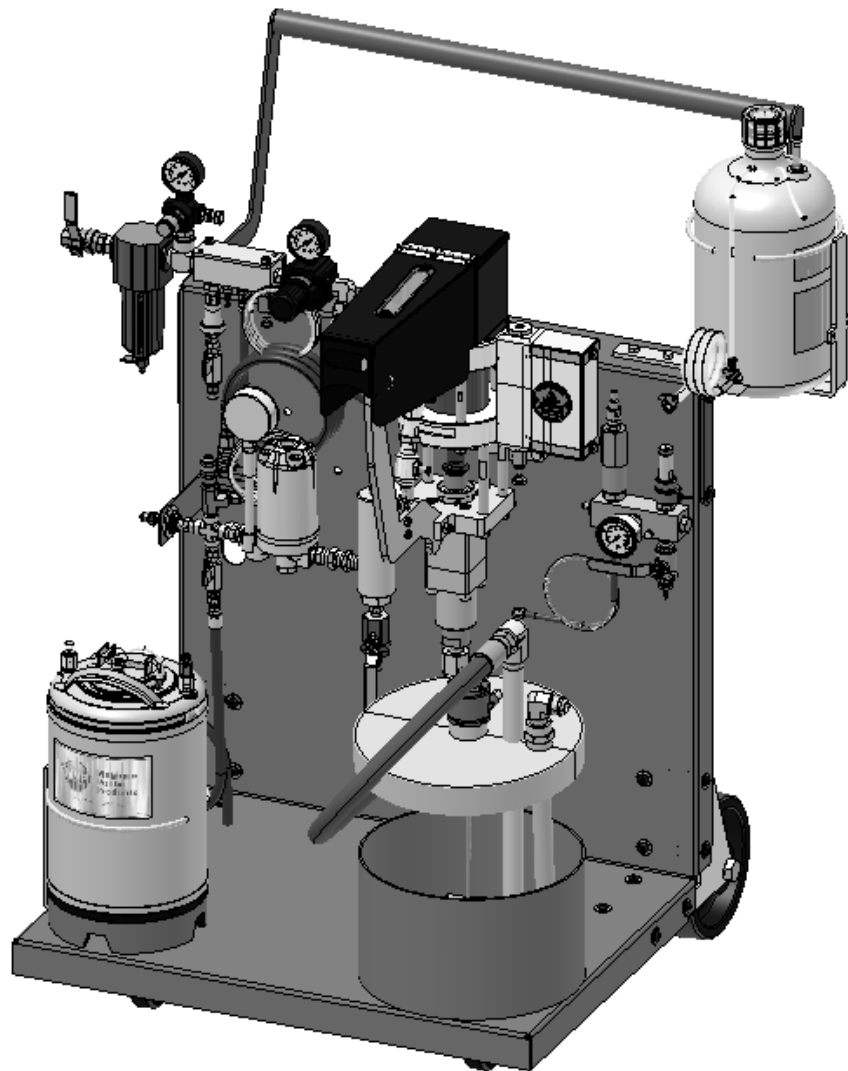


Precision Gelcoat System

Operations Manual

This manual is applicable to the following models:

- PGC-PRO2-A
 - PGC-PRO2-B
 - PGC-PRO2-C
 - PGC-PRO2-D
-





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Safety & Warning Information

Warnings

Due to the vast number of chemicals that could be used and their varying chemical reactions, the buyer and user of this equipment should determine all factors relating to the fluids used, including any of the potential hazards involved. Particular inquiry and investigation should be made into potential dangers relating to toxic fumes, fires, explosions, reaction times, and exposure of human beings to the individual components or their resultant mixtures. MVP assumes no responsibility for loss, damage, expense or claims for bodily injury or property damage, direct or consequential, arising from the use of such chemical components.

The end user is responsible for ensuring that the end product or system complies with all the relevant laws in the country where it is to be used and that all documentation is adhered to.

Recommended Occupational Safety & Health Act (OSHA) Documentation:

- 1910.94 Pertaining to ventilation
- 1910.106 Pertaining to flammable liquids
- 1910.107 Pertaining to spray finishing operations, particularly paragraph (m), Organic Peroxides and Dual Component Coatings

For Additional information, contact the Occupational Safety and Health Administration (OSHA) at <https://www.osha.gov/about.html>.

Recommended National Fire Protection Association (NFPA) Documentation:

- NFPA No.33 Chapter 14 Organic Peroxides and Dual Component Materials
- NFPA No. 63 Dust Explosion Prevention
- NFPA No. 70 National Electrical Code
- NFPA No. 77 Static Electricity
- NFPA No. 91 Blower and Exhaust System
- NFPA No. 654 Plastics Industry Dust Hazards

Fire Extinguisher – code ABC, rating number 4a60bc using Extinguishing Media –Foam, Carbon Dioxide, Dry Chemical, Water Fog, is recommended for this product and applications.

The following general warnings and guidelines are for the setup, use, grounding, maintenance, and repair of equipment. Additional product-specific warnings may be found throughout this manual as applicable. Please contact your nearest MVP Technical Service Representative if additional information is needed.

Safety Precautions

- Avoid skin contact and inhalation of all chemicals.
- Review Material Safety Data Sheet (MSDS) to promote the safe handling of chemicals in use.
- Restrict the use of all chemicals to designated areas with good ventilation.
- Chemicals are flammable and reactive.
- Noxious fumes released when combusted.
- Operate equipment in a ventilated environment only.
- Uncured liquid resins are highly flammable unless specifically labeled otherwise.
- Cured laminate, accumulations of overspray, and laminate sandings are highly combustible.
- Do not operate or move electrical equipment when flammable fumes are present.
- Ground all equipment.
- If a spark is seen or felt, immediately halt operation. Do not operate the equipment until the issue has been identified and repaired.
- Contaminated catalyst may cause fire or explosion.
- Containers may explode if exposed to fire / heat.
- Use and store chemicals away from heat, flames, and sparks.
- Do not smoke in work areas or near stored chemicals.
- Do not mix Methyl Ethyl Ketone Peroxide (MEKP) with materials other than polyethylene.
- Do not dilute MEKP.
- Keep food and drink away from work area.



Physical Hazards

- Never look directly into the spray gun fluid tip. Serious injury or death can result.
- Never aim the spray gun at or near another person. Serious injury or death can result.
- Chemical compounds can be severely irritating to the eyes and skin.
- Inhalation, ingestion, or injection may damage internal organs and lead to pulmonary disorders, cancers, lymphomas, and other diseases or health conditions.
- Other potential health effects include: irritation of the eyes and upper respiratory tract, headache, light-headedness, dizziness, confusion, drowsiness, nausea, vomiting, and occasionally abdominal pain.
- Eye contact: Immediately flush with water for at least 15 minutes and seek immediate medical attention.
- Skin Contact: Immediately wash with soap and water and seek immediate medical attention.
- Inhalation: Move the person to fresh air and seek immediate medical attention.
- Do not remove shields, covers, or safety features on equipment that is in use.
- Never place fingers, hands, or any body part near or directly in front of the spray gun fluid tip. The force of the liquid as it exits the spray tip can shoot liquid through the skin.
- Keep hands and body parts away from any moving equipment or components.
- Do not stand under plunger
- An improperly loaded drum may lead to an imbalance, causing a unit to tip over



Personal Protective Equipment (PPE)

- MVP recommends the use of personal safety equipment with all products in our catalog.
- Wear safety goggles, hearing protection, a respirator, and chemical resistant gloves.
- Wear long sleeve shirts or jackets and pants to minimize skin exposure.
- PPE should be worn by operators and service technicians to reduce the risk of injury.



For Additional information, contact the Occupational Safety and Health Administration (OSHA). <https://www.osha.gov/about.html>

Symbol Definitions



Indicates the risk of contact with chemicals that are hazardous, which may lead to injury or death.



Indicates the risk of contact with voltage / amperage that may lead to serious injury or death



Indicates that the materials being used are susceptible to combustion



Indicates the risk of contact with moving components that may lead to serious injury or death.



Indicates that the system or component should be grounded before proceeding with use or repair.



Indicates the use of lit cigarettes or cigars is prohibited, because the materials being used are susceptible to combustion.



Indicates that the materials and/or the process being performed can lead to ignition and explosion.



A recommendation for the use of Personal Protective Equipment (PPE) before using or repairing the product.

Polymer Matrix Materials: Advanced Composites

Potential health hazards associated with the use of advanced composites can be controlled through the implementation of an effective industrial hygiene and safety program.

https://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_1.html#t_iii:1_1

Resins		
Composite Component	Organ System Target (Possible Target)	Known (Possible) Health Effect
Epoxy resins	Skin, lungs, eyes	Contact and allergic dermatitis, conjunctivitis
Polyurethane resins	Lungs, skin, eyes	Respiratory sensitization, contact dermatitis, conjunctivitis
Phenol formaldehyde	Skin, lungs, eyes	As above (potential carcinogen)
Bismaleimides (BMI)	Skin, lungs, eyes	As above (potential carcinogen)
Polyamides	Skin, lungs, eyes	As above (potential carcinogen)
Reinforcing materials		
Composite Component	Organ System Target (Possible Target)	Known (Possible) Health Effect
Aramid fibers	Skin (lungs)	Skin and respiratory irritation, contact dermatitis (chronic interstitial lung disease)
Carbon/graphite fibers	Skin (lungs)	As noted for aramid fibers
Glass fibers (continuous filament)	Skin (lungs)	As noted for aramid fibers
Hardeners and curing agents		
Composite Component	Organ System Target (Possible Target)	Known (Possible) Health Effect
Diaminodiphenylsulfone	N/A	No known effects with workplace exposure
Methylenedianiline	Liver, skin	Hepatotoxicity, suspect human carcinogen
Other aromatic amines		
Composite Component	Organ System Target (Possible Target)	Known (Possible) Health Effect
Meta-phenylenediamine (MPDA)	Liver, skin (kidney, bladder)	Hepatitis, contact dermatitis (kidney and bladder cancer)
Aliphatic and cyclo-aliphatic amines	Eyes, skin	Severe irritation, contact dermatitis
Polyaminoamide	Eyes, skin	Irritation (sensitization)
Anhydride	Eyes, lungs, skin	Severe eye and skin irritation, respiratory sensitization, contact dermatitis

Catalyst - Methyl Ethyl Ketone Peroxide (MEKP)

MEKP is among the more hazardous materials found in commercial channels. The safe handling of the “unstable (reactive)” chemicals presents a definite challenge to the plastics industry. The highly reactive property which makes MEKP valuable to the plastics industry in producing the curing reaction of polyester resins also produces the hazards which require great care and caution in its storage, transportation, handling, processing and disposal. MEKP is a single chemical. Various polymeric forms may exist which are more or less hazardous with respect to each other. These differences may arise not only from different molecular structures (all are, nevertheless, called “MEKP”) and from possible trace impurities left from the manufacture of the chemicals, but may also arise by contamination of MEKP with other materials in its storage or use. Even a small amount of contamination with acetone, for instance, may produce an extremely shock-sensitive and explosive compound.



WARNING

Contamination with promoters, materials containing promoters (such as laminate sandings), or with any readily oxidizing material (such as brass or iron) will cause exothermic redox reactions which can be explosive in nature. Heat applied to MEKP or heat buildup from contamination reactions can cause the material to reach its Self-Accelerating Decomposition Temperature (SADT).

Researchers have reported measuring pressure rates-of-rise well over 100,000 psi per second when certain MEKP's reach their SADT. For comparison, the highest-pressure rate-of-rise listed in NFPA Bulletin NO.68, “Explosion Venting”, is 12,000 psi per second for an explosion of 12% acetylene and air. The maximum value listed for a hydrogen explosion is 10,000 psi per second. Some forms of MEKP, if allowed to reach their SADT, will burst even an open topped container. This suggests that it is not possible to design a relief valve to vent this order of magnitude of pressure rate-of-rise. The user should be aware that any closed container, be it a pressure vessel, surge chamber, or pressure accumulator, could explode under certain conditions. There is no engineering substitute for care by the user in handling organic peroxide catalysts. If, at any time, the pressure relieve valve on top of the catalyst tank should vent, the area should be evacuated at once and the fire department called. The venting could be the first indication of a heat, and therefore, pressure build-up that could eventually lead to an explosion. Moreover, if a catalyst tank is sufficiently full when the pressure relief valve vents, some catalyst may spray out, which could cause eye injury. For this reason, and many others, anyone whose job puts them in an area where this vented spray might go, should always wear full eye protection even when laminating operations are not taking place.

Safety in handling MEKP depends to a great extent on employee education, proper safety instructions, and safe use of the chemicals and equipment. Workers should be thoroughly informed of the hazards that may result from improper handling of MEKP, especially regarding contamination, heat, friction and impact. They should be thoroughly instructed regarding the proper action to be taken in the storage, use, and disposal of MEKP and other hazardous materials used in the laminating operation. In addition, users should make every effort to:

- Store MEKP in a cool, dry place in original containers away from direct sunlight and away from other chemicals.
- Keep MEKP away from heat, sparks, and open flames.
- Prevent contamination or MEKP with other materials, including polyester over spray and sandings, polymerization accelerators and promoters, brass, aluminum, and non-stainless steels.

- Never add MEKP to anything that is hot, since explosive decomposition may result.
- Avoid contact with skin, eyes, and clothing. Protective equipment should be worn at all times. During clean-up of spilled MEKP, personal safety equipment, gloves, and eye protection must be worn. Firefighting equipment should be at hand and ready.
- Avoid spillage, which can heat up to the point of self-ignition.
- Repair any leaks discovered in the catalyst system immediately, and clean-up the leaked catalyst at once in accordance with the catalyst manufacturer's instructions.
- Use only original equipment or equivalent parts from Magnum Venus Products in the catalyst system (i.e.: hoses, fitting, etc.) because a dangerous chemical reaction may result between substituted parts and MEKP.
- Catalyst accumulated from the purging of hoses or the measurement of fluid output deliveries should never be returned to the supply tank, such catalyst should be diluted with copious quantities of clean water and disposed of in accordance with the catalyst manufacturer's instructions.

The extent to which the user is successful in accomplishing these ends and any additional recommendations by the catalyst manufacturer determines largely the safety that will be present in his operation.

Clean-Up Solvents and Resin Diluents



WARNING

A hazardous situation may be present in your pressurized fluid system! Hydro carbon solvents can cause an explosion when used with aluminum or galvanized components in a closed (pressurized) fluid system (pump, heaters, filters, valves, spray guns, tanks, etc.). An explosion could cause serious injury, death, and/or substantial property damage. Cleaning agents, coatings, paints, etc. may contain Halogenated Hydrocarbon solvents. Some Magnum Venus Products spray equipment includes aluminum or galvanized components and will be affected by Halogenated Hydrocarbon solvents.

There are three key elements to the Halogenated Hydrocarbon (HHC) solvent hazard.

- | | |
|--|--|
| 1. The presence of HHC solvents. | 1,1,1 – Trichloroethane and Methylene Chloride are the most common of these solvents. However, other HHC solvents are suspect if used; either as part of paint or adhesives formulation, or for clean-up flushing. |
| 2. Aluminum or Galvanized Parts. | Most handling equipment contains these elements. In contact with these metals, HHC solvents could generate a corrosive reaction of a catalytic nature. |
| 3. Equipment capable of withstanding pressure. | When HHC solvent contact aluminum or galvanized parts inside a closed container such as a pump, spray gun, or fluid handling system, the chemical reaction can, over time, result in a build-up of heat and pressure, which can reach explosive proportions. When all three elements are present, the result can be an extremely violent explosion. The reaction can be sustained with very little aluminum or galvanized metal; any amount of aluminum is too much. |

- The reaction is unpredictable. Prior use of an HHC solvent without incident (corrosion or explosion) does NOT mean that such use is safe. These solvents can be dangerous alone (as a clean-up or flushing agent) or when used as a component or a coating material. There is no known inhibitor that is effective under all circumstances. Mixing HHC solvents with other materials or solvents such as MEKP, alcohol, or toluene may render the inhibitors ineffective.
- The use of reclaimed solvents is particularly hazardous. Reclaimers may not add any inhibitors. The possible presence of water in reclaimed solvents could also feed the reaction.
- Anodized or other oxide coatings cannot be relied upon to prevent the explosive reaction. Such coatings can be worn, cracked, scratched, or too thin to prevent contact. There is no known way to make oxide coatings or to employ aluminum alloys to safely prevent the chemical reaction under all circumstances.
- Several solvent suppliers have recently begun promoting HHC solvents for use in coating systems. The increasing use of HHC solvents is increasing the risk. Because of their exemption from many state implementation plans as Volatile Organic Compounds (VOCs), their low flammability hazard, and their not being classified as toxic or carcinogenic substances, HHC solvents are very desirable in many respects.



WARNING

Do not use Halogenated Hydrocarbon (HHC) solvents in pressurized fluid systems having aluminum or galvanized wetted parts.

Magnum Venus Products is aware of NO stabilizers available to prevent HHC solvents from reaction under all conditions with aluminum components in closed fluid systems. HHC solvents are dangerous when used with aluminum components in a closed fluid system.

- Consult your material supplier to determine whether your solvent or coating contains Halogenated Hydrocarbon solvents.
- Magnum Venus Products recommends that you contact your solvent supplier regarding the best non-flammable clean-up solvent with the heat toxicity for your application.
- If, however, you find it necessary to use flammable solvents, they must be kept in approved, electrically grounded containers.
- Bulk solvent should be stored in a well-ventilated, separate building, 50 feet away from your main plant.
- You should only allow enough solvent for one day's use in your laminating area.
- NO SMOKING signs must be posted and observed in all areas of storage or where solvents and other flammable materials are used.
- Adequate ventilation (as covered in OSHA Section 1910.94 and NFPA No.91) is important wherever solvents are stored or used, to minimize, confine and exhaust the solvent vapors.
- Solvents should be handled in accordance with OSHA Section 1910.106 and 1910.107.

Catalyst Diluents

Magnum Venus Products spray-up and gel-coat systems currently produced are designed so that catalyst diluents are not required. Magnum Venus Products therefore recommends that diluents not be used to avoid possible contamination which could lead to an explosion due to the handling and mixing of MEKP and diluents. In addition, it eliminates any problems from the diluent being contaminated through rust particles in drums, poor quality control on the part of the diluents suppliers, or any other reason. If diluents are absolutely required, contact your catalyst supplier and follow his instructions explicitly. Preferably the supplier should premix the catalyst to prevent possible “on the job” contamination while mixing.



WARNING

If diluents are not used, remember that catalyst spillage and gun, hose, and packing leaks are potentially more hazardous since each drop contains a higher concentration of catalyst and will therefore react more quickly with overspray and the leak.

Cured Laminate, Overspray and Laminate Sandings Accumulation

- Remove all accumulations of overspray, Fiberglass Reinforced Plastic (FRP) sandings, etc. from the building as they occur. If this waste is allowed to build up, spillage of catalyst is more likely to start a fire; in addition, the fire would burn hotter and longer.
- Floor coverings, if used, should be non-combustible.
- Spilled or leaked catalyst may cause a fire if it comes in contact with an FRP product, oversprayed chop or resin, FRP sandings or any other material with MEKP.

To prevent spillage and leakage, you should:

- | | |
|--|---|
| 1. Maintain your Magnum Venus Products System. | Check the gun several times daily for catalyst and resin packing or valve leaks. REPAIR ALL LEAKS IMMEDIATELY. |
| 2. Never leave the gun hanging over or lying inside the mold. | A catalyst leak in this situation would certainly damage the part, possibly the mold, and may cause a fire. |
| 3. Inspect resin and catalyst hoses daily for wear or stress at the entry and exits of the boom sections and at the hose and fittings. | Replace if wear or weakness is evident or suspected. |
| 4. Arrange the hoses and fiberglass roving guides so that the fiberglass strands DO NOT rub against any of the hoses at any point. | If allowed to rub, the hose will be cut through, causing a hazardous leakage of material which could increase the danger of fire. Also, the material may spew onto personnel in the area. |

Toxicity of Chemicals

- Magnum Venus Products recommends that you consult OSHA Sections 1910.94, 1910.106, 1910.107 and NFPA No.33, Chapter 14, and NFPA No.91.
- Contact your chemical supplier(s) and determine the toxicity of the various chemicals used as well as the best methods to prevent injury, irritation and danger to personnel.
- Also determine the best methods of first aid treatment for each chemical used in your plant.

Equipment Safety

Magnum Venus Products suggest that personal safety equipment such as EYE GOGGLES, GLOVES, EAR PROTECTION, and RESPIRATORS be worn when servicing or operating this equipment. Ear protection should be worn when operating a fiberglass chopper to protect against hearing loss since noise levels can be as high as 116 dB (decibels). This equipment should only be operated or serviced by technically trained personnel!



CAUTION

Never place fingers, hands, or any body part near or directly in front of the spray gun fluid tip. The force of the liquid as it exits the spray tip can cause serious injury by shooting liquid through the skin. NEVER LOOK DIRECTLY INTO THE GUN SPRAY TIP OR POINT THE GUN AT OR NEAR ANOTHER PERSON OR AN ANIMAL.



DANGER

Contaminated catalyst may cause fire or explosion. Before working on the catalyst pump or catalyst accumulator, wash hands and tools thoroughly. Be sure work area is free from dirt, grease, or resin. Clean catalyst system components with clean water daily.



DANGER

Eye, skin, and respiration hazard. The catalyst MEKP may cause blindness, skin irritation, or breathing difficulty. Keep hands away from face. Keep food and drink away from work area.

Treatment of Chemical Injuries



CAUTION

Refer to your catalyst manufacturer's safety information regarding the safe handling and storage of catalyst. Wear appropriate safety equipment as recommended.

Great care should be used in handling the chemicals (resins, catalyst and solvents) used in polyester systems. Such chemicals should be treated as if they hurt your skin and eyes and as if they are poison to your body. For this reason, Magnum Venus Products recommends the use of protective clothing and eye wear in using polyester systems. However, users should be prepared in the event of such an injury.

Precautions include:

1. Know precisely what chemicals you are using and obtain information from your chemical supplier on what to do in the event the chemical gets onto your skin or into the eyes, or if swallowed.
2. Keep this information together and easily available so that it may be used by those administering first aid or treating the injured person.
3. Be sure the information from your chemical supplier includes instructions on how to treat any toxic effects the chemicals have.

**WARNING**

Contact your doctor immediately in the event of an injury. If the product's MSDS includes first aid instructions, administer first aid immediately after contacting a doctor.

Fast treatment of the outer skin and eyes that contact chemicals generally includes immediate and thorough washing of the exposed skin and immediate and continuous flushing of the eyes with lots of clean water for at least 15 minutes or more. These general instructions of first aid treatment may be incorrect for some chemicals; you must know the chemicals and treatment before an accident occurs. Treatment for swallowing a chemical frequently depends upon the nature of the chemical.

Emergency Stop Procedure

In an emergency, follow these steps to stop a system:

1. The ball valve located where the air enters the power head of the resin pump, should be moved to the “OFF” or closed position.

Note ***The “open” or “on” position is when the ball valve handle is parallel (in line) with the ball valve body. The “closed” or “off” position is when the ball valve handle is perpendicular (across) the ball valve body.***

2. Turn all system regulators to the “OFF” position (counter-clockwise) position.
3. Verify / secure the catalyst relief line, located on the catalyst relief valve.
4. Verify / secure the resin return line, located on the resin filter.
5. Place a container under the resin pump ball valve to catch ejected resin.
6. Locate the ball valve on the resin pump.
7. Rotate the ball valve 90 degrees to the “On” or open position.

Grounding

Grounding an object means providing an adequate path for the flow of the electrical charge from the object to the ground. An adequate path is one that permits charge to flow from the object fast enough that it will not accumulate to the extent that a spark can be formed. It is not possible to define exactly what will be an adequate path under all conditions since it depends on many variables. In any event, the grounding means should have the lowest possible electrical resistance.

Grounding straps should be installed on all loose conductive objects in the spraying area. This includes material containers and equipment. Magnum Venus Products recommends grounding straps be made of AWG No.18 stranded wire as a minimum and the larger wire be used where possible. NFPA Bulletin No77 states that the electrical resistance of such a leakage path should be 1 meg ohm (10^6 ohms) or less.

**CAUTION**

Whenever flammable or combustible liquids are transferred from one container to another, or from one container to the equipment, both containers or container and equipment shall be effectively bonded and grounded to dissipate static electricity. For further information, see National Fire Protection Association (NFPA) 77, titled "Recommended Practice on Static Electrical". Refer especially to section 7-7 titled "Spray Application of Flammable and Combustible Materials".

Introduction

This manual provides information for the operation, maintenance, and simple repair of the MVP Precision Gelcoat System. This unit is designed to perform lower volume gelcoat jobs such as touch-up of existing coating or small surface area applications. The typical material flow rate under test conditions was 200 ml/min maximum. The following procedures are included:

- Step-by-step assembly and disassembly
- Installation, start-up, and shut-down instructions
- Step-by-step operation instructions



Please read this manual carefully and retain for future reference. Follow the steps in the order given, otherwise you may damage the equipment or injure yourself.

**WARNING**

This unit is not rated for explosive atmospheres.

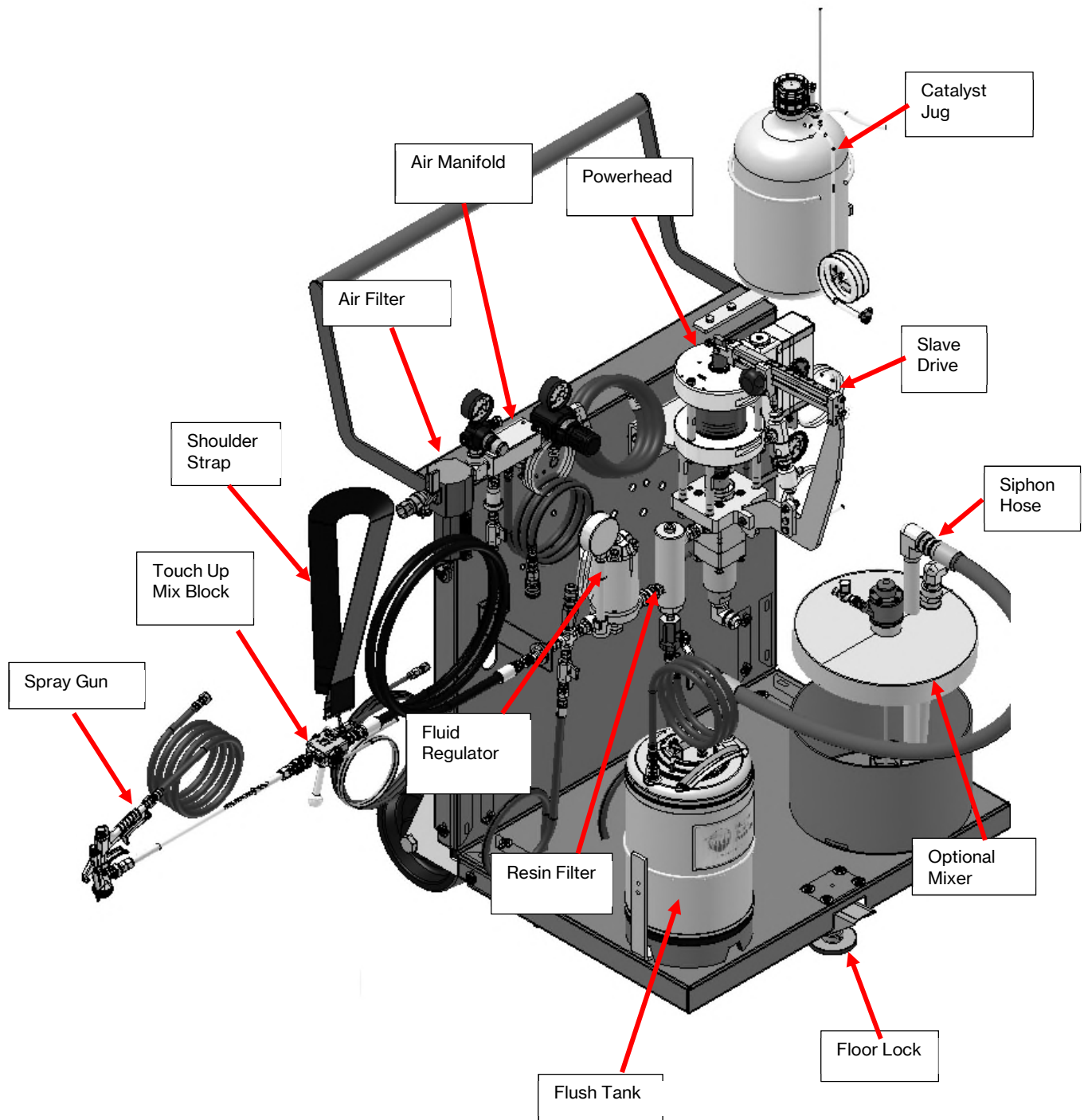
Note ***A list of all materials used in the construction of the unit will be provided upon request so you may confirm compatibility with the materials being used.***

Air Requirements

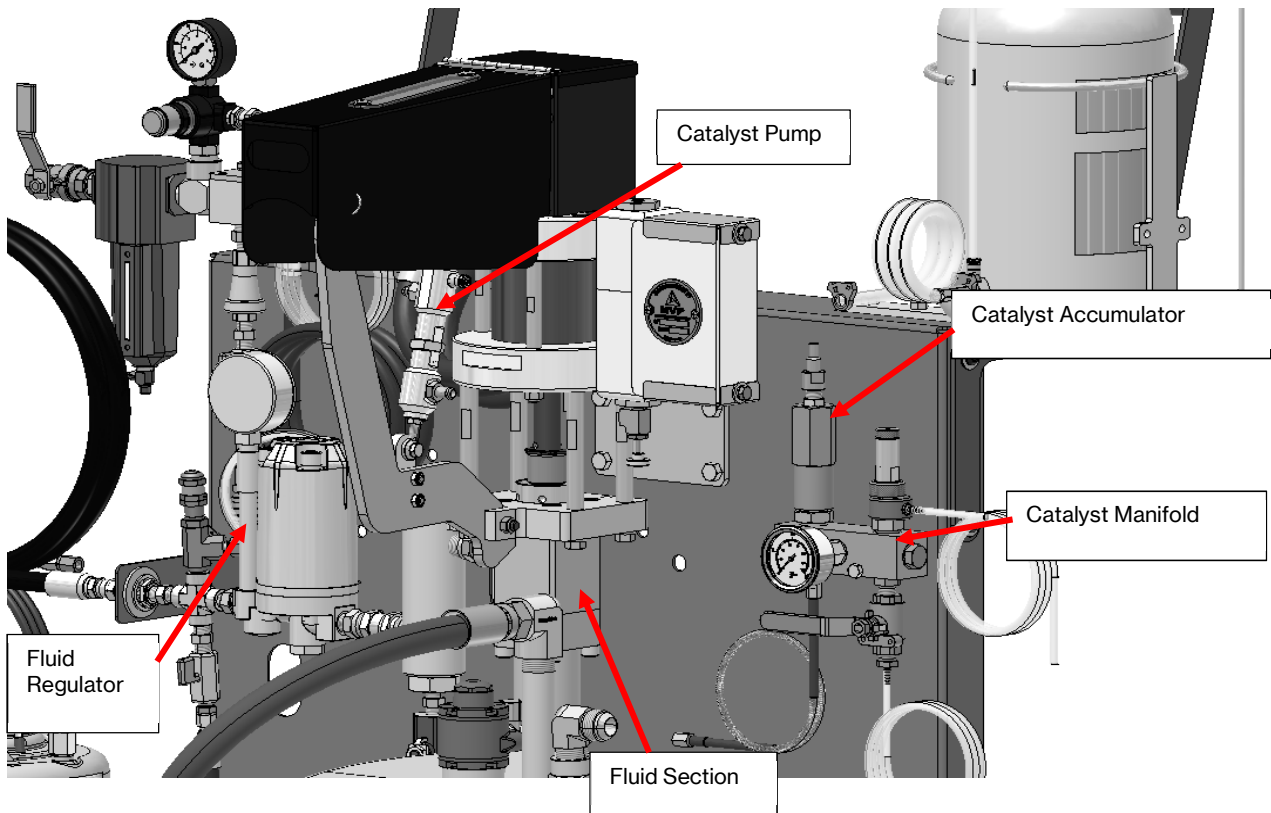
1. The system requires a supply of air (30 cfm) and not to exceed 100 psi (7 bar).
2. The unit requires a ½ inch (12 - 13 mm) inside diameter air hose minimum (use caution when using quick disconnects; they may restrict air flow).
3. Preferably the air will be clean, dry, and oil free.

Unit Overview

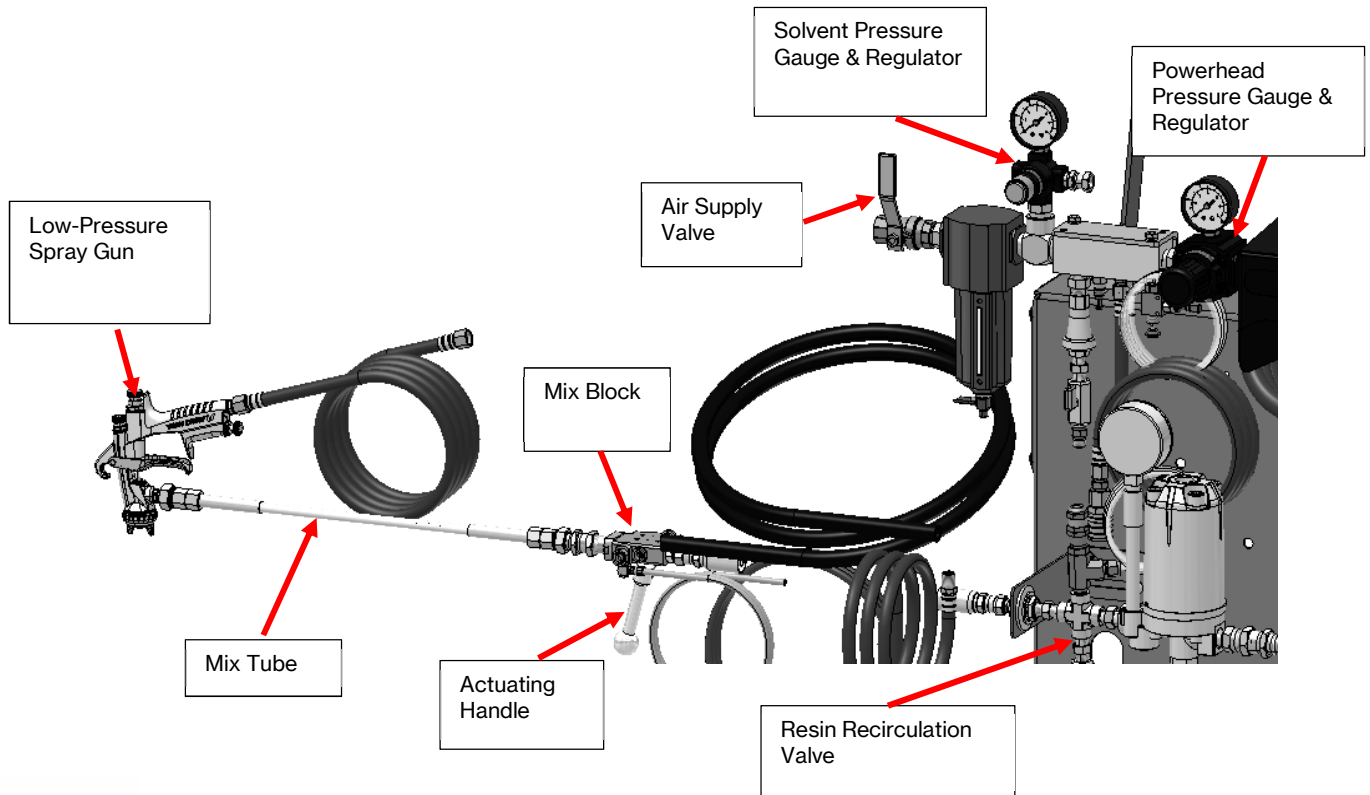
Below helps identify the main components and controls the operator needs to know for proper operation for the unit.



Unit Overview, continued



Overview of Controls



Specifications

Precision Gelcoater (PGC)	
Specification	Measurement
Width	44 inches (111.76 cm)
Depth	35 inches (88.9 cm)
Height	50 inches (127 cm)
Weight	220 lbs. (99.79 kg) *weight may vary by configuration
Gelcoat Capacity	5 Gal (18.93 liters)
MEKP Capacity	2 Gal (7.57 liters)

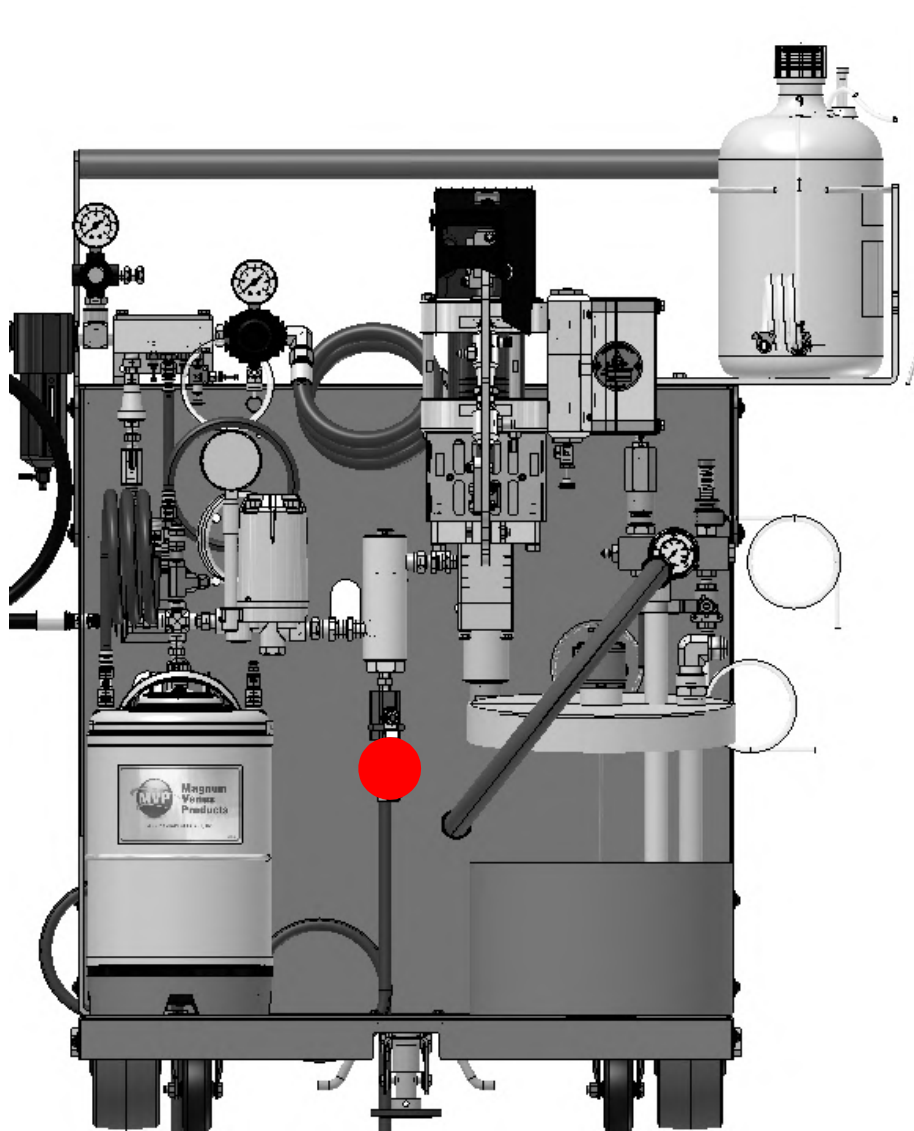


Figure 1. Center of Gravity (without fluid)

Assembling the Unit



WARNING

The unit should not be lifted/moved by personnel. If the unit needs to be lifted or moved, use a forklift and appropriate safety precautions to prevent tipping or falling.

Never pull hoses to move the system. This can cause damage to the equipment and personal injury from pressurized hoses.



WARNING

Do not exceed 100 psi (7 bar) pressure to the system. Do not assemble or operate the equipment in an environment that is outside the humidity and ambient temperature range provided by the manufacturer of your materials. Refer to the Material Safety Data Sheets (MSDS) supplied by our material manufacturer(s).



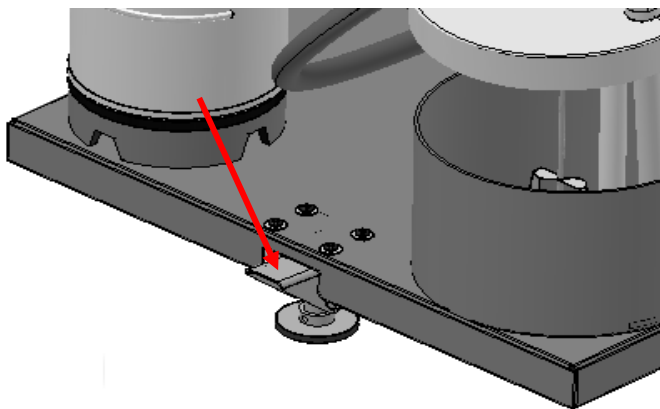
CAUTION

Always wear proper safety equipment (glasses, gloves, respirator, etc.) when working with dispensing equipment and before startup of the unit. Refer to and follow the requirements of the Material Safety Data Sheets (MSDS) supplied by your material manufacturer(s).

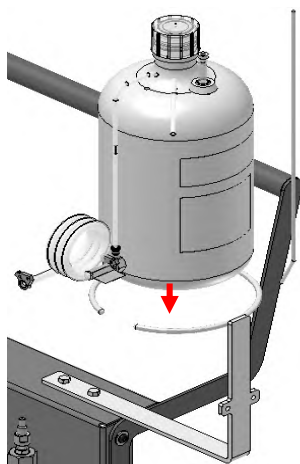
1. Unpack the unit and components on a flat even surface.

Note *Do not attempt to operate the unit on an inclined surface.*

2. Step on the foot pedal at the front of the cart to engage the floor lock.

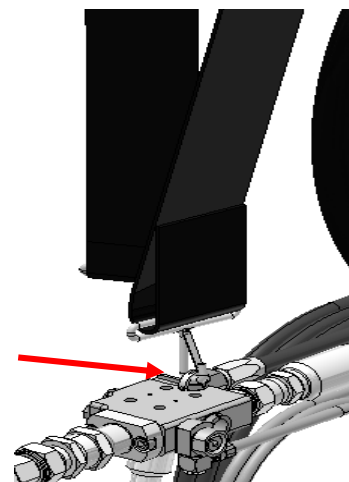


Note *If you need to move the unit, disengage the floor lock by pushing back on the bracket behind the plunger. Use the installed casters to wheel the unit, do not attempt to lift without a forklift.*



3. Insert catalyst jug into the jug bracket.
4. Check all hoses and fittings to make sure the system will hold pressure.
5. Attach hoses to gelcoat supply, catalyst manifold, mix block, and gun air.
6. Attach pickup hoses to the inlet of the pump.
7. Place flush tank in holder on base of unit and attach air hose from manifold.
8. Connect yellow flush tube from mix block to flush tank.
9. Double check all hose fittings and connections are tight.
10. Attach shoulder strap to mix block.

Note Do not connect gun to mix block at this time.



Optional Guarding

Guards may be included to shield moving parts around the slave arm and fluid section. Some local codes do not require guards, but they are available for the unit upon request when not included. See the Parts Drawing for your unit to determine the part numbers to order.

If your unit includes guards, review the information in this section for proper operation, installation, and maintenance of the guards.

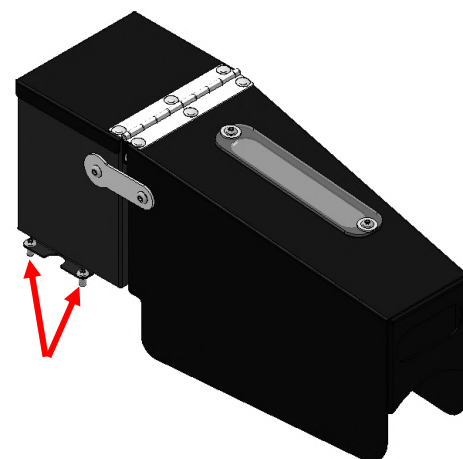
Install Guards

11. To attach the slave arm guard, insert the four hex cap screws through the brackets and into the top of the powerhead and tighten.

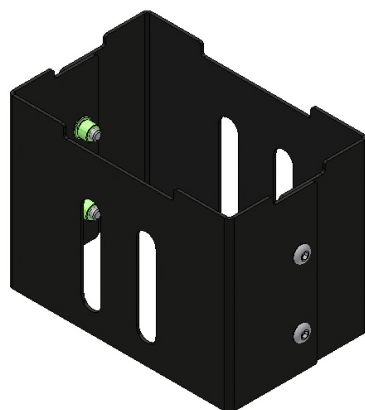


CAUTION

Slave arm cover has a hinged opening. Keep digits clear when opening the cover to access the equipment to avoid pinching.



12. Place the coupler guard around the fluid section beneath the powerhead and secure with cap screws.



Note You can access the packing nut oil cavity through the openings to refill with the guard in place if you are using the standard oil dispenser obtained from MVP. It should not be necessary to remove the guard after installation.

Maintain Guards

13. Inspect the guards monthly after installation to make sure they do not show signs damage or missing fasteners.
14. Replace parts as needed.



WARNING

Do not modify either guard. Doing so may change safety distances and can lead to personal injury. Refer to the parts drawing for the guard for part numbers. Use only the same rated fasteners and MVP parts to repair guards.

Remove Guards



CAUTION

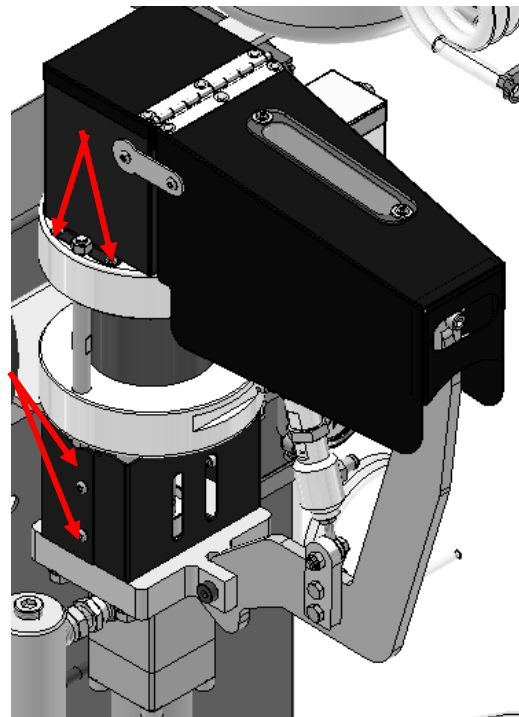
Do not operate unit without all proper guarding required by local safety standards in place. To avoid injury do not reach inside guards while system is in operation.

15. If you need to remove either guard to adjust settings or access equipment for maintenance, shut off main air supply to the unit and release fluid pressure.

16. Remove screws holding the guards in place.

Note ***Do not remove guards unless it is necessary for maintaining the unit. Be careful not to lose the screws that hold the guard in place.***

17. Replace both guards according to the instructions in the Install Guards section above.



Priming the Unit

Pre-Startup Instructions

1. Open the incoming air supply ball valve all the way.

Note ***The main air supply ball valve is a safety valve and must be fully closed or open. When the ball valve is closed, the air pressure remaining in the air manifold and air system will be released.***



WARNING

Avoid excessive force when operating valves to prevent damage to equipment.



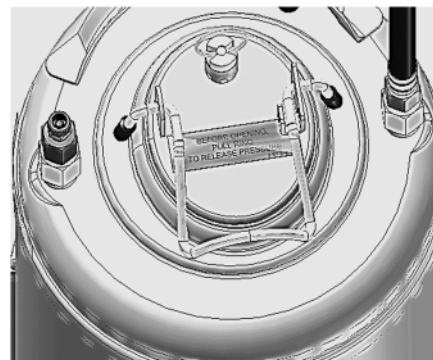
CAUTION

Noise levels can exceed 85 d B(A), depending on operating conditions and site. Wear earplugs as necessary when operating system.

Prime Solvent to Mix Block

2. Open the solvent tank lid and fill $\frac{3}{4}$ with appropriate solvent.
3. Replace the lid on the tank and close the relief valve located on top of the lid.

Note *Be sure the pressure relief valve is completely closed and the lever is in a horizontal position.*



4. Set the flush tank pressure at 60 psi (4 bar).



WARNING

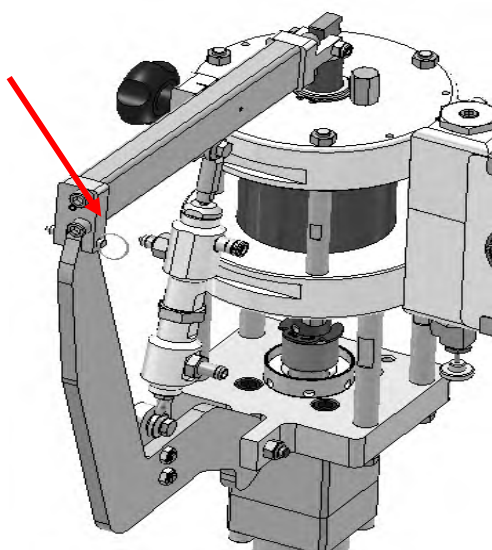
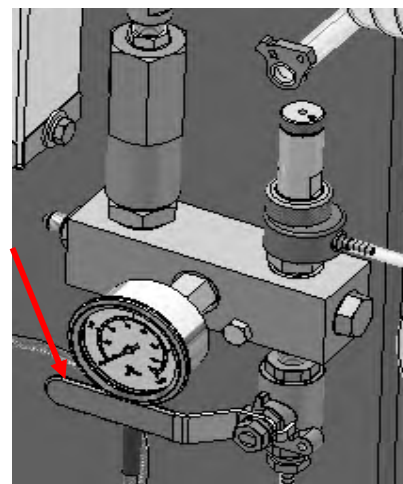
Do not exceed 70 psi (5 bar) pressure in the flush tank to avoid risk of injury or system damage.

5. Check for leaks and fix as necessary.
6. Hold an appropriate container under the mix block and press the flush button on the block for 5 to 7 seconds, making sure the flush tank pressure does not exceed 70 psi (5 bar).

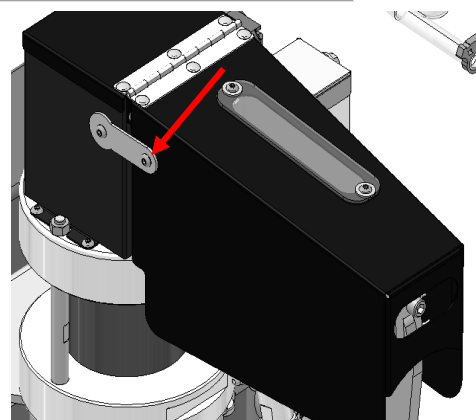
Prime Catalyst to Mix Block

Note *The flush system must be primed and operating as outlined above before you put any gelcoat resin or catalyst into the pumps to avoid the material setting up in the equipment.*

7. Fill the catalyst jug $\frac{3}{4}$ full.
8. Open the recirculation valve on the catalyst manifold.
9. Remove the pivot pin for the catalyst drive linkage.



Note *If your unit has a guard installed, you will need to lift the hinged cover to access the catalyst drive. To lift the cover, remove the front hex cap screw from the side bracket to allow movement. Use caution not to lose the screw.*



10. Using the catalyst drive, prime catalyst back to the jug through the recirculation valve until there is no air in the tube.



CAUTION

Keep hands/digits clear of moving parts to avoid risk of injury.

11. Close the recirculation valve.
12. With the mix block in the open position over an appropriate container, hand prime catalyst out of the mix chamber until a steady stream is achieved.

Note *Do not reinstall the pivot pin at this time or open the catalyst recirculation valve at the catalyst manifold to prevent over pressurizing the system.*

Prime Gelcoat to Mix Block

Note *The resin pump was tested using oil. It may require up to ½ gallon (1-2 liters) of gelcoat to purge any remaining oil from the system the first time used.*



WARNING

DO NOT change the fluid pressure relief valve pressure setting. The pressure setting should not deviate from the factory setting of 100 psi.

13. Fill the packing nut cavity $\frac{3}{4}$ full with throat seal oil (TSL).
14. Place a container of gelcoat onto the unit.
15. Insert the gelcoat suction wand into the container.
16. Clamp or tape the resin return hose to the pail.
17. With the mix block in the open position, slowly increase the pump pressure until the pump is running at a slow but steady rate.



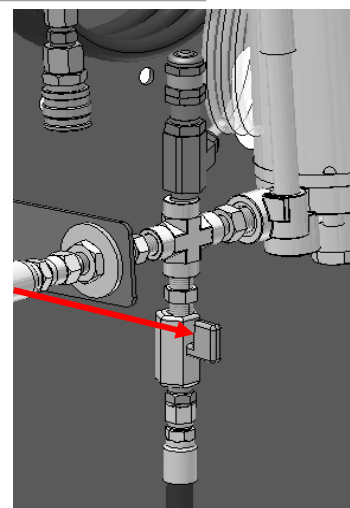
CAUTION

Keep hands clear of moving parts to avoid risk of injury.

18. Allow the pump to run until a steady stream of gelcoat is being dispensed.



19. Flush the mix chamber for 1 second and then for 7 – 10 short bursts.
20. Close the mix block and allow the system to pressurize.
21. Allow the unit to set under static load for 15 to 30 minutes to seat the resin packing.
22. Turn the pump regulator to zero (“0”).
23. Slowly open the resin recirculation valve at the bottom of the resin over-pressure valve to drain the fluid pressure.



Set Up the Gun



WARNING

To avoid contamination of the material, do not apply grease to any part that will contact wetted parts. Never use HHC solvents as noted in the safety information section. They can cause cracks or dissolution on the aluminum gun body by chemical reaction.

24. Install the turbulent mixer into the mix chamber.
25. Screw air-assist onto the gun.
26. Attach clear mix tube assembly onto mix chamber using adapter fitting.
27. Connect the other end to gun.

Note ***For longer turbulent mixer life, do not over tighten the air-assist nozzle housing.***

Charge Catalyst Air Pressure

28. Open the catalyst recirculation valve.
29. Use the charging hose to connect to the catalyst accumulator.
30. Push down on the female quick disconnect for 5 to 10 seconds and disengage.

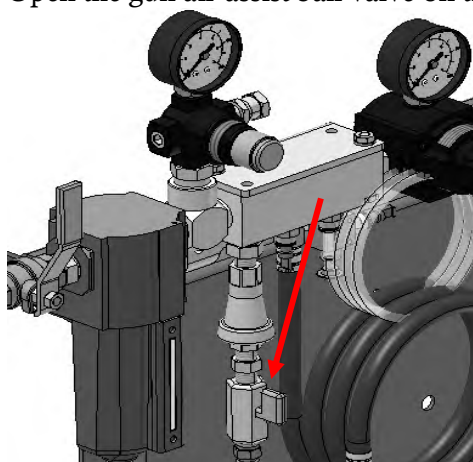
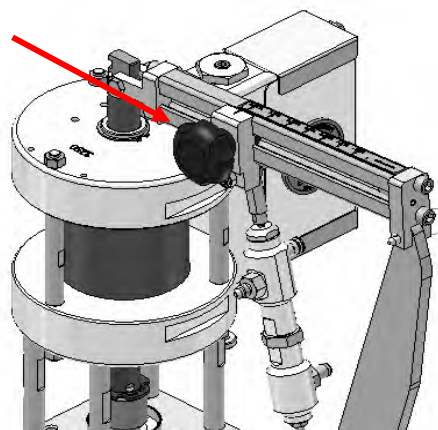
Pressurize Fluid

Note ***Remove catalyst pivot pin before pressurizing gelcoat to the pump. Do not reinstall pivot pin or open the catalyst recirculation valve at this time to prevent over pressurizing the catalyst system.***

31. Increase the gelcoat pump regulator to 40 psi (3 bar).
32. Using the catalyst drive arm, use slow up and down motion to pressurize the catalyst pump to about 100 psi (7 bar).

Note *There should be a gain in pressure on both the up and down strokes. The catalyst for touch-up jobs should be run at a slightly lower pressures (100 PSI) than for standard or larger jobs.*

33. Pin the catalyst drive into the pivot arm and set the desired catalyst percentage using the knob on the slave arm.
34. If your unit has a safety guard installed, close the cover after pinning the drive in place and reinsert the front hex cap screw.
35. Open the gun air-assist ball valve on the air manifold.



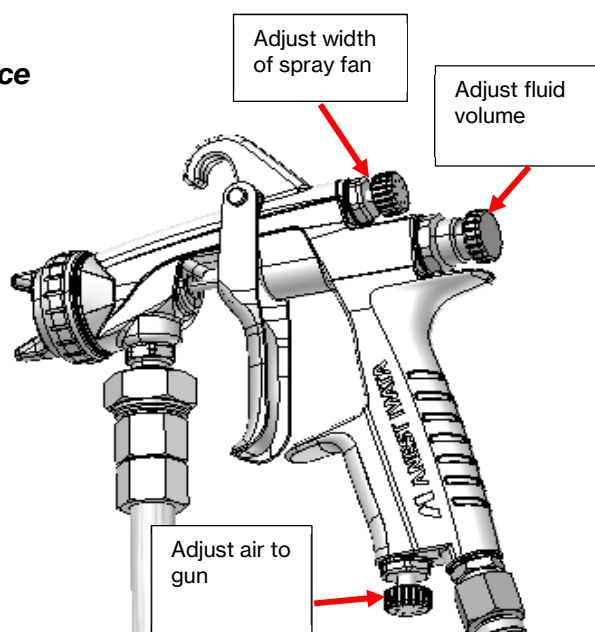
36. Pull the handle on the mix block to open it.
37. Hold the gun approximately 4 – 10 inches (100 – 250 mm) from the work surface and spray a test pattern.

Note *Since this gun is operated at low air pressure, high transfer efficiency will not be obtained if the spray distance is too far.*

Note *Hold the gun perpendicular to the work surface at all times and move in a straight horizontal line. Arcing the gun causes uneven coating.*

38. Adjust the gun resin flow knob and air-assist knob until the desired width and volume is achieved.

Note *Too much air-assist to the gun head will cause porosity in the gelcoat laminate. If you encounter uneven application or air bubbles, decrease air-assist supply with the knob on the handle of the spray gun until you achieve the desired results in your spray test.*



Starting Up

Daily Start Up

1. Check all hoses for damage.
2. Check all material supplies and fill or replace as needed.

Note ***Refill all materials before starting the unit. If the supply runs out, turn the powerhead pressure regulator to zero ("0") before replacing.***

3. Close the flush tank relief valve.
4. Ensure mix block is closed.
5. Open the recirculation valve on the catalyst manifold.
6. Open the main inlet valve on the air manifold.
7. Open the resin recirculation valve (valve below resin over-pressure valve) and run the pump at low pressure for 30 seconds.
8. Close the resin recirculation valve.
9. Check to make sure the powerhead pressure is 40 psi (3 bar).



CAUTION

Powerhead pressure should not exceed 60 psi (4 bar) for proper operation and to avoid risk of injury. The powerhead cycles at a rate of 1 - 20 cycles per minute, depending on operating settings.

10. Remove the quick pin from the catalyst drive.
11. Manually pump the catalyst pump with the catalyst drive, observe catalyst returning to the catalyst jug, and pump until the stream is air free.
12. Close the recirculation valve on the catalyst manifold.
13. Manually pump the catalyst pump with the slave arm drive, bringing catalyst to operating pressure of 200 psi (14 bar).
14. Check the fluid pressure regulator pressure and adjust to operating pressure (not to exceed 70 psi, or 5 bar).
15. Replace the pivot pin into the catalyst pump drive.

Start Up Following a Long-Term Shutdown

In addition to the daily start-up steps, perform the following steps when restarting a unit that has been idle for a long period or that has never been previously started:

16. Insert the distribution ring into the mix chamber locating rim.
17. Place mix housing seal into the mix chamber locating rim.
18. Insert the catalyst injector and injector seal into the aperture in the distribution ring.
19. Place mix chamber and catalyst injector onto the front of the gun and secure it with the 2 screws.

20. Apply a small amount of red grease to the threads of the mix chamber.
21. Install the mixer onto the mix chamber.
22. Attach the clear mix tube assembly onto the mix chamber using the adapter fitting.

Shutting Down

Daily Shut Down

Note ***Cleaning the gun head is necessary if you are stopping production or there will be long pauses in operation for any reason. Follow these steps whenever the gun will be idle for at least the standard gel time of your materials. If the gun will be idle for longer than one week, follow the steps in the Long-Term Shut-Down section.***

1. Release the trigger on the gun and then close the gun block.



CAUTION

If the pump continues to cycle when the gun trigger is released, contact MVP for service on the fluid pressure regulator immediately. Do not attempt to service the fluid pressure regulator yourself.

2. Close air assist valve on unit.
3. Flush the mix assembly and mix tube by pressing flush button and pulling gun trigger until tubing runs clean and gun is dispensing solvent, then press the flush button for 7-10 short bursts.
4. Wipe the face of the air-assist nozzle after flushing.
5. Turn the powerhead pressure to zero (0), then open the resin recirculation valve.
6. Run the pump slowly until the pump is at the bottom of the stroke.
7. Turn off the main air ball valve at the air manifold and turn the powerhead pressure regulator back to zero (0).
8. Open the ball valve on the catalyst manifold to dump catalyst pressure.
9. Open the relief valve on top of the flush tank to release the solvent flush tank pressure.
10. Disassemble the air-assist and clean it with solvent.

Long-Term Shut-Down

Follow long-term shut-down procedures when any of the following apply:

- When the gun will be idle for one week or longer
- When the gun will be idle for longer than the storage life of your materials
- When you are shipping the unit

If the gun will be idle for more than 20 minutes but less than any of the above, follow the steps in the Daily Shut Down section above.

11. Drain the moisture filler by holding a small empty container under the air filter and turning the filter valve until water drains out.
12. When the water is no longer draining, close the filter valve.
13. Place the resin wand into 2 gallons (9 liters) of solvent and clean the wand thoroughly.

Clean Mix Block

14. Remove clear mix tubing and thread adapter.
15. Remove the turbulent mixer from the mix chamber.
16. Push the flush button on the block and flush into an appropriate container.
17. Remove mix chamber by removing 2 screws.
18. Remove mix housing seal, distribution ring, catalyst injector, and injector seal.

Note ***When using solvent for cleaning or flushing, store the used solvent in a manufacturer approved container with a tight-fitting lid to avoid evaporation.***



WARNING

Solvents may be extremely flammable. Only operate and/or flush the system in a well-ventilated area away from any ignition sources.



CAUTION

Follow all warnings and suggestions regarding the use of respirator, clothing, and other appropriate safety procedures recommended by the manufacturers of your material.

19. Visually inspect the open ports of the mix block for signs of gelled material after flushing.
20. Wipe mix block face with solvent.

Remove Fluid Pressure

21. Turn the pump pressure regulator knob counterclockwise until it reads zero ("0").
22. Flush the gun block into an appropriate container.
23. Slowly open the resin recirculation valve.
- 24.

Clean Catalyst System

25. Pull out the quick pin in the upper slave arm, then pull up the piston rod priming knob and lean the top of the catalyst pump toward the resin pump as far as it will go to disconnect the catalyst pump from the upper slave arm.
26. Empty any remaining catalyst from the catalyst jug.
27. Fill the catalyst jug with clean distilled water.
28. Slowly and gently pump the distilled water through the system by moving the catalyst pump priming knob up and down by hand.

29. Hand pump until a stream of clean water flows from the system on both the upstroke and downstroke.
30. Empty the water from the catalyst jug and continue hand pumping until no more water exits the system.
31. Blow clean compressed air into the catalyst jug lines to remove moisture.
32. Disable the catalyst pump by trapping the upper bearing block of the catalyst pump between the vertical post and the quick pin.

Flush Resin System

33. Remove the resin wand from the resin supply and allow the wand to drain into an appropriate container.
34. Open the mix block.
35. Slowly increase pressure to the resin pump.
36. Slowly pump extra resin from the system.
37. Turn pump pressure to zero ("0").
38. Close the mix block.
39. Place an appropriate container under the mix block.
40. Open the mix block.
41. Place the wand into a container of flush solvent.
42. Turn the pump pressure regulator knob clockwise until the pump begins to stroke (slow, even strokes).
43. When clean solvent flows from the mix block, close the pump pressure regulator knob by turning it counterclockwise until the pump pressure gauge reads zero ("0").
44. Place a container under the resin filter and slowly unscrew the filter tank from the filter body.
45. Clean the filter tank, spring, screen, and filter core in solvent.
46. Reassemble accumulator and filter assembly.
47. Close mix block.
48. Push the flush button on the side of the mix block to flush the mix block.

Shutdown Flush System

49. Turn the flush regulator knob on the manifold until the gauge reads zero ("0").
50. Relieve the pressure in the solvent tank by gently pulling up on the pressure relief valve lever.
51. Cover the unit with clean plastic sheeting to protect while not in use.

Performing Maintenance

Note ***No components require lubrication on this system. Avoid using any material that may contaminate your gelcoat.***

**WARNING**

Disconnect air supply to the unit before attempting to perform service.

Daily Maintenance

1. Drain the water trap.
2. Remove the air-assist tip from the gun and clean.
3. Lightly dampen a rag with solvent and wipe down the gun head, handle, and mix block.

Note ***Do not soak the gun or mix block in solvent.***

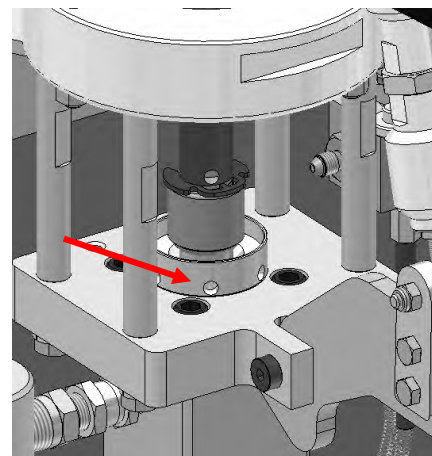
**CAUTION**

To avoid injury do not touch the tip of the fluid gun needle.

Weekly Maintenance

Gelcoat Pump Packing Set

4. Check gelcoat pump piston rod oil reservoir and inspect for gelcoat bypassing packing set.
5. Turn pump regulator to zero.
6. Open ball valve at gelcoat filter to release gelcoat pressure.
7. Insert a rod or Phillips screwdriver into one of the holes in the gelcoat packing nut.
8. Turn the packing nut $\frac{1}{8}$ to $\frac{1}{4}$ turn. Do not overtighten.



Mix Block

9. Turn the pump regulator pressure to zero ("0").
10. Open gel coat recirculation valve relieve gelcoat fluid pressure.
11. Open catalyst recirculation valve at the catalyst manifold to relieve catalyst fluid pressure.
12. Close the catalyst recirculation valve at the catalyst manifold.

Filter and Accumulator

13. Turn gelcoat pump regulator to zero.
14. Open ball valve at the gelcoat filter to relieve gelcoat fluid pressure.
15. Remove the return hose from the ball valve.
16. Unscrew the resin filter and clean the filter screen.
17. Use red grease on the filter housing threads.

Catalyst Pump

18. Inspect the catalyst pump packing nut on top of the catalyst pump for catalyst leaking through the packing set.
19. Wipe catalyst pump piston rod off with a clean dry towel.

Six Month Maintenance

Flush Tank

20. Turn pump pressure regulator knob counterclockwise until the gauge reads zero ("0").
21. Turn solvent pressure until gauge reads zero "0"
22. Flush the mix block into an appropriate container.
23. Open solvent tank relief valve
24. Use a clean towel to wipe the inside of the tank clean.
25. Wipe out any solid debris.
26. Inspect the flush tank O-ring for cracking or other damage; replace as needed.

Hose Set

27. Inspect the hose set for any kinks or wear and replace hoses as needed.

Note ***Replace the flush hose once a year.***

Catalyst Jug and Feed Hose

28. Drain catalyst from jug.
29. Wash the jug out with distilled water and drain.
30. Repeat rinsing with distilled water.
31. Replace the feed and return hose as needed.

The following components should be rebuilt after six months of full-time use (8 hours a day, 5 days a week).

For this component	Minimum rebuild should include:
Catalyst Pump	• All O-rings • All balls • Piston seal • Packing set
Gelcoat Pump	• Packing set • Piston cups • Cylinder O-rings
Mix Block	• All seals • All O-rings

Troubleshooting



CAUTION

Release all air and fluid pressure prior to attempting to service equipment. Do not touch the tip of the gun fluid needle; it has a sharp point and can cause injury.

Low Volume Gun Troubleshooting

Symptom	Possible Cause	Remedy
Spray Pattern Fluttering	Air entering between fluid nozzle and tapered seat of gun body	Remove fluid nozzle and clean seat. If damaged, replace nozzle.
	Air is drawn from fluid needle packing set	Tighten fluid needle packing
	Air entering at fluid container fitting nut or fluid hose joint	Fully tighten joint section
Spray Pattern in crescent shape	Buildup on air cap partially blocking holes, air pressure from both horns differs.	Remove obstructions from holes with brush. Note Do not use metal objects to clean horn holes.
Spray pattern in an inclined shape	Buildup or damage on fluid nozzle circumference and air cap center	Remove obstructions; replace parts as needed
	Fluid nozzle is not properly fitted	Remove fluid nozzle and clean seat section.
Spray pattern is split	Material viscosity too low	Add material to increase viscosity
	Fluid output too high	Tighten the fluid adjustment knob to reduce output or turn pattern adjustment valve set clockwise.
Spray pattern is heavy in center	Material viscosity is too high	Thin material
	Fluid output is too low	Turn fluid adjustment knob counter-clockwise to increase fluid output
Spray pattern is spitting	Fluid nozzle and fluid needle set are not seated properly	Clean or replace fluid nozzle and fluid needle set
	First-stage travel of trigger (when only air discharges) decreased	Replace fluid nozzle and fluid needle set
	Buildup inside air cap set	Clean air cap set.
Air leaks from air valve set	Dirt or damage on air valve seat	Clean and replace parts as needed
	O-ring in air valve seat damaged or deteriorated	Replace O-ring
Fluid leaks from fluid nozzle	Dirt, damage, or wear on fluid nozzle needle seat	Clean and replace parts as needed

Low Volume Gun Troubleshooting

Symptom	Possible Cause	Remedy
	Loose fluid needle adjustment knob	Tighten knob
	Wear on fluid needle spring	Replace needle spring
	Fluid nozzle insufficiently tightened to the gun body	Retighten nozzle
Fluid leaks from fluid needle	Needle not returning due to packing set too tight	Adjust fluid needle packing set
Fluid leaks from fluid needle	Needle not returning due to material buildup on fluid needle	Clean and adjust fluid needle
	Needle packing set worn	Retighten or replace parts as needed
	Packing seat loose	Clean and adjust needle packing seat
Material does not come out	Fluid adjustment knob insufficiently open	Adjust the fluid adjustment knob
	Tip hole of nozzle clogged	Clean nozzle
	Filter clogged	Clean and replace parts as needed

System Troubleshooting

Symptom	Possible Cause	Remedy
Slow cure during upstroke	S.S. ball in catalyst pump piston body not seating	Clean ball and inspect seat. Replace ball, piston seal, or piston body as applicable.
Slow cure during downstroke	S.S. ball in catalyst pump inlet body not seating	Clean ball and inspect seat. Replace ball or have seat repaired if questionable.
No cure or slow overall cure	Catalyst pump set at too low or too high a percentage	Move the catalyst pump to an appropriate setting. Verify the pump is in a vertical position.
	Catalyst supply is lower than the outlet fitting on the jug	Fill the catalyst jug 1/3 full.
	Quick pin not attached to pump or slave arm	Install the quick pin, making sure the catalyst pump is in a vertical position.
	Catalyst leaking	Check all fittings. The catalyst system must be fluid tight
	Catalyst relief valve on catalyst pump is leaking	Relieve pressure from the catalyst pump. Clean and repair the relief valve
	Catalyst suction screen in the catalyst jug is clogged	Clean the suction screen and verify catalyst supply is not contaminated
	Air lock in catalyst pump	Remove air lock
	Catalyst pump piston seal worn or damaged	Replace piston seal (spring in seal faces top of pump)
	Catalyst pump outlet body damaged	Replace catalyst pump outlet body and piston seal. During reassembly, verify spring in seal faces top of pump and the pump is reconnected vertically

System Troubleshooting		
Symptom	Possible Cause	Remedy
	Catalyst hose plugged	Relieve pressure from the system and then replace catalyst hose
	Material too cold	Consult your material supplier for proper temperature. Maintain a draft-free environment of about 70 degrees F. An auxiliary heat source may be required to reduce gel time.
	Piston cups, piston ball, or pump cylinder worn	Clean and inspect parts; replace any damaged components.
Low output on upstroke of fluid section	Clogged pump pick-up wand screen	Unscrew screen from hose and clean
No fan, constant low output, or fast cure	Resin filter clogged	Disassemble and clean filter body and screen with solvent Disassemble and clean the resin filter
	Resin hose plugged	Relieve pressure from system and then flush the hose with solvent. If material is hard, replace hose.
	Leaking pick-up wand assembly	Tighten assembly fittings
	Material cold or air pressure low	Heat material or increase pump pressure
Heavy pulsation	Resin accumulator plugged	Relieve pressure from the system then disassemble and clean the accumulator
Pump jumps on upstroke	Piston ball worn or not seating properly	Replace piston ball and piston cups. Be sure to lubricate ball and cups thoroughly.
Pump dives on downstroke	Foot valve, spring retainer, or foot valve ball damaged or dirty	Clean or replace parts as applicable. Be sure to lubricate ball thoroughly.
	Pick-up wand assembly not tight	Tighten or seal joints of pick-up wand
	Air in material	Agitate material to remove air pockets
Low output on upstroke	Piston cups, piston ball, or pump cylinder worn	Inspect and clean the parts; replace as applicable
Pump does not run	Silencers on valve block plugged	Turn off air to pump and unscrew silencers, then clean silencers and reinstall
	Actuator valve or socket cap screw at shift block broken	Replace the broken cartridge valve or socket cap screw
	fluid section or hose plugged	Relieve fluid pressure from the system, then disassemble and clean the pro pump. Replace any worn parts. Rep
	Air not connected	Check that air hose is connected to manifold and regulator is at 20 psi or more

System Troubleshooting		
Symptom	Possible Cause	Remedy
	Air restricted	Straighten any kinks in air hoses
Material in oil reservoir	Packing worn	Replace packing set in lower part of pump
	Piston rod worn or scored	Replace piston rod
No material delivery on downstroke	Foot valve, spring retainer, or foot valve ball damaged or dirty	Clean or replace parts as needed
Hose leaks at fittings	Fitting loose	Tighten fitting. Always check all fittings before operating
	Fitting or nipple damaged	Relieve fluid pressure from the system before attempting to inspect and replace damaged parts
	Crimped hose	Relieve fluid pressure from the system before attempting to inspect and replace damaged parts. If the hose has been sharply bent, the plastic liner may be ruptured and hose should be replaced
Slow cure on one side of fan	Turbulent mixer clogged or damaged	Clean or replace parts as needed
	Distribution ring partly clogged	Remove the mix chamber and clean the distribution ring
	Mix housing damaged	Inspect and replace as needed
Pump has short travel – stuttering near top or bottom of stroke	Valve block is not shifting all the way or is shifting before completing a full stroke	Check air supply to shift block; it should be 90 – 100 psi (6 – 7 bar)
		Replace actuator valve or VPRO-2003 valve as needed.
Pump continues to cycle when gun trigger is released	Fluid pressure regulator malfunction	Contact MVP for service