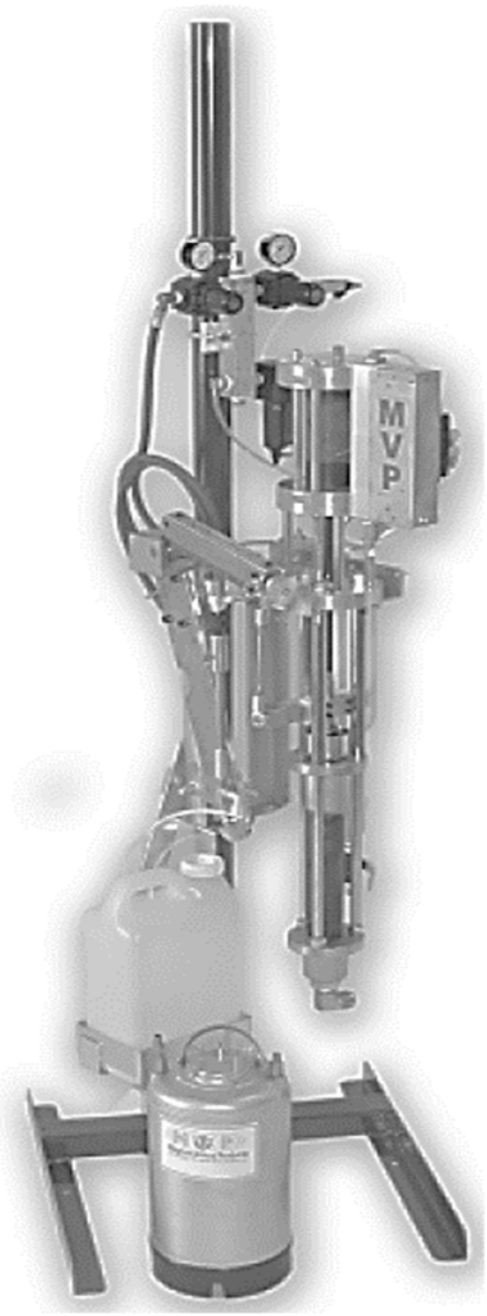
APS Gelcoat System

Operations Manual

This manual is applicable to the following models:

- IMG-APS-x-INT
- SF-FIT-G-APS-x
- MGS-APS-x



MVP
MAGNUM VENUS PRODUCTS

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CORPORATE HEADQUARTERS
2030 Falling Waters Rd, Suite 350, Knoxville, TN 37922 · USA · Tel: (865) 686-5670

DISTRIBUTION AND PURCHASING
642 Barbrow Ln, Knoxville, TN 37932 · USA · Tel: (865) 684-4416

TECHNOLOGY CENTER AND MANUFACTURING
1862 Ives Ave, Kent, WA 98032 · USA · Tel (253) 854-2660 · Fax (253) 854-1666

E-mail: info@mvpind.com

For a list of international distributors, visit our website at :

www.mvpind.com/mvp-international

Use of this product confirms that Magnum Venus Products, Inc.'s standard terms and conditions of sale apply.

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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 andcyclo-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 Hyrdrocarbon 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 Hyrdocarbon (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, over-sprayed 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.

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 UPS 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 may be as low as 1 meg ohm (10 ohms) but that resistance as high as 10,000 meg ohms will produce an adequate leakage path in some cases.

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 APS Gelcoat System. 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.

The information in this manual pertains to all APS Gelcoat Systems, including the following model numbers:

- IMG-APS-X-INT
- SF-FIT-G-APS-X
- MGS-APS-X

Note ***The X in each model number above is a place holder. Your model number will have a number as this digit that indicates the pump size for your unit. SF in a model number indicates a solvent-free system.***

Air Requirements

1. The system requires a supply of air (30 cfm) and at least 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.

Catalyst Atomizing Air

4. Atomizing air should be generally balanced between 15 and 25 psi. It should be low enough to reduce overspray and high enough to atomize catalyst efficiently.

Getting Started

1. Fill solvent cup $^1/_3$ full.
2. Check catalyst and material level.
3. Inspect material spray tip and catalyst tip assemblies and their O-rings for damage; replace as needed.
4. Inspect tip pin O-rings on front of gun head and replace as needed.
5. Attach catalyst and material tips to gun.
6. Lubricate retaining ring threads and assemble onto the gun.
7. Inspect hose assemblies and connections for leaks or damage; replace as needed.

Note ***Do not wait until hoses are so worn that they are at risk of bursting before replacing.***

8. Connect the hoses as shown in Figure 1.
9. Inspect and replace the following parts as needed:
   - Chopper blades
   - Anvil sleeve
   - Cutter head bearing
   - Idler bearing
10. Inspect and adjust the following as needed:
    - Cutter head to anvil sleeve tension

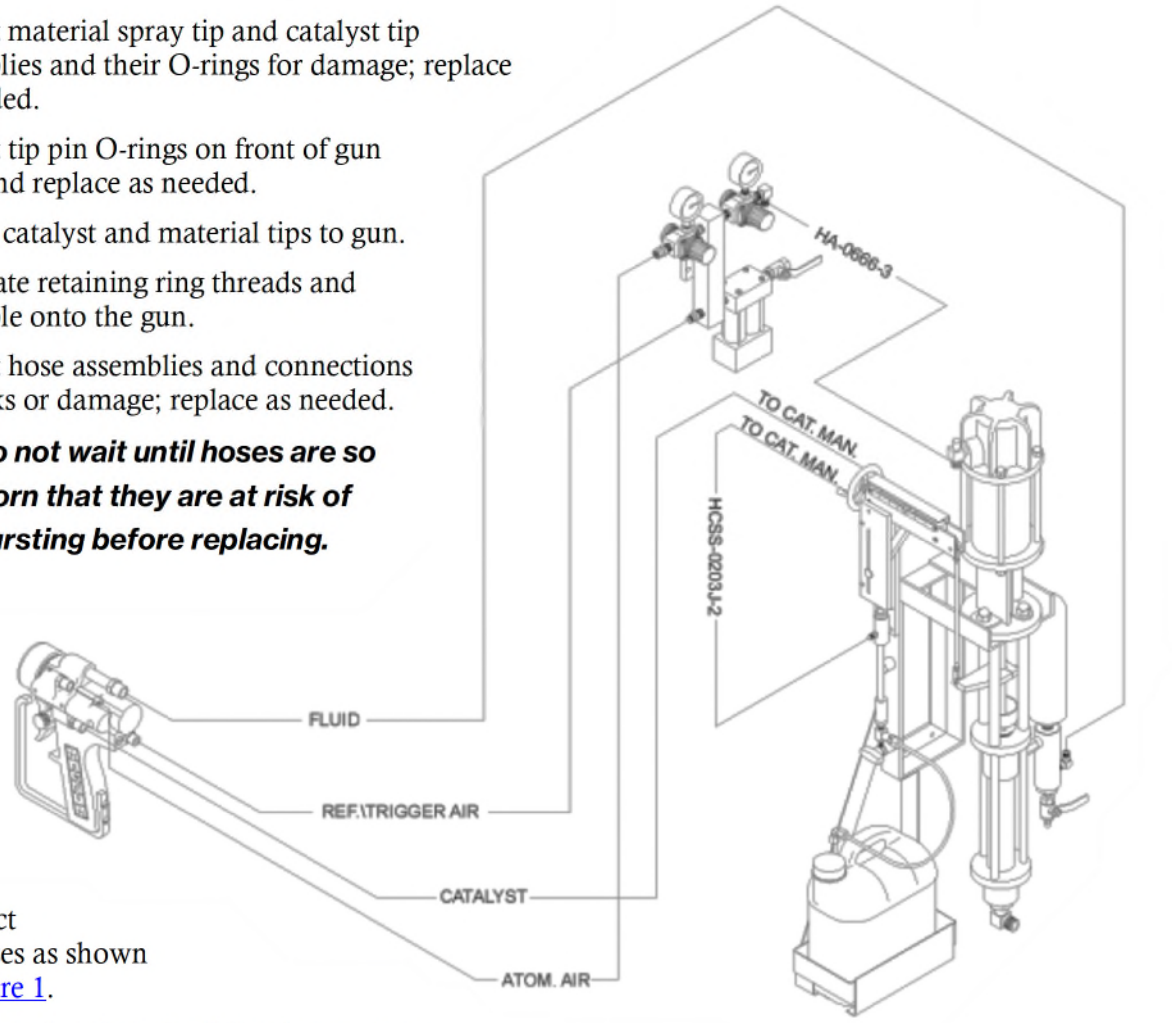


Figure 1. Hose Connections

- Idler bearing to anvil sleeve tension
- Chopper position for most efficient disbursement of chop into spray pattern

11. Oil the cutter assembly air motor as necessary (normally 2 – 3 drops daily depending on usage).

Priming the Unit

First Time Priming

1. Make sure all air regulators are turned completely to the left, shutting off air to the components.
2. Slowly open the main air valve.

Prime Catalyst

3. Remove the pin to disengage the catalyst pump.
4. Open the ball valve on the catalyst manifold, if applicable.
5. Eliminate air pockets by manually hand pumping the catalyst 5 to 10 short strokes.
6. Continue to hand pump and close the ball valve on the catalyst manifold.
7. Pull and hold the trigger on the gun while hand pumping until there is a solid, steady catalyst flow from the head of the gun, then release the trigger.
8. Continue to hand pump the catalyst until catalyst is fully primed and pressurized, generally within 5 additional strokes.

Note ***Do not engage slave pump until material pump is primed.***

Prime Material Pump

9. With the catalyst pump still disengaged, place an appropriate waste container under the pump valve to catch material.
10. Open the ball valve located on the bottom of the filter assembly.
11. Bring up the pressure on the material pump gauge just enough that the pump begins to stroke.
12. After a smooth flow of material is coming from the valve, close the valve.
13. Once pump is primed, it will stall (stop stroking). Increase the air to operating pressures (generally 30 – 50 psi, depending on output and transfer efficiency desired).
14. Engage the slave pump.

Priming Previously Used System

15. Slowly open the main air valve.
16. Disengage the slave pump.

Prime Material Pump

17. With the catalyst pump still disengaged, place an appropriate waste container under the pump valve to catch material.
18. Open the ball valve located on the bottom of the filter assembly.
19. Bring up the pressure on the material pump gauge just enough that the pump begins to stroke.
20. After a smooth flow of material is coming from the valve, close the valve.
21. Once pump is primed, it will stall (stop stroking). Increase the air to operating pressures (generally 30 – 50 psi, depending on output and transfer efficiency desired).

Prime Catalyst Pump

22. Open the ball valve on the catalyst manifold (if applicable).
23. Eliminate air pockets by manually hand pumping the catalyst 5 to 10 short strokes.
24. Continue to hand pump and close the ball valve on the catalyst manifold.
25. Continue to hand pump the catalyst until catalyst is fully primed and pressurized, generally within 5 additional strokes.

Note ***You should feel resistance in the pump stroke when the system if properly primed.***

26. Engage the catalyst pump.

Testing Spray Pattern

1. Lay out a strip of test material such as paper or cardboard.

Note ***Make sure you spray the test pattern away from the original part.***

2. Spray a fan on the test material and check the following:
    - Spray pattern width and output
    - Catalyzation
    - Spray pattern definition (fingers and tails)
3. Adjust the fan as necessary with the MVP Air-Assist adjustment screw.
4. Continue to spray test patterns until you have fine-tuned the fan to the best pattern possible by eliminated fingers and tails.

    The system is now ready for use.

Shutting Down

1. Trigger gun until the pump shaft is in the fully lowered position at the bottom of the stroke.
2. Engage the gun trigger lock.

Relieve Pressures

3. Close the main air valve to the system.
4. Purge excess air by relieving air from the bottom of the air filter/water trap.
5. Dump catalyst pressure at the catalyst manifold (if applicable) by opening the catalyst ball valve.
6. Close the ball valve as soon as pressure is relieved to avoid draining catalyst from the line.
7. Place a container under the material ball valve at the bottom of the fluid filter assembly to catch material flow when relieving pressure.
8. **Slowly** open the material ball valve.

CAUTION

Remember, the pump is under extreme pressure. Use the utmost caution when opening the valve to avoid injury or being sprayed with material.

9. Once material pressure is relieved, close the ball valve.
10. Remove catalyst and material tip assemblies from the head of the gun and clean thoroughly.

Note ***When cleaning gun with solvents, avoid getting solvent in exhaust port of air trigger gun by covering the port with thumb or finger and pointing the gun downward while cleaning.***

11. Thoroughly clean diffuser cavity in front of gun head.
12. Inspect entire gun and equipment for overspray and clean any noted.

System is now shut down and ready for next start up.

Using the ATC Gun

The air refinement adjustment is basically the only adjustment needed on the AT series of actuated guns. The AT series guns are air trigger guns. Air is moved into two chambers which contain two pistons. The air moves the pistons forward or backward depending on the position of the trigger (on or off). The air pistons are attached to the needle assemblies, and their actuation is what opens and closes the valves. There is no lead or lag of catalyst spraying without resin or vice versa, the response is instantaneous.

The seat, diffuser, and packing arrangement are built into a removable cartridge assembly that is attached to the front of the gun for service, adjustment, or replacement. The catalyst valve is also removable from the front of the gun.

The air valve for triggering the gun is a 4-way air valve that works the same as the catalyst valve. A rod spool design with three O-rings opens and closes the air passages to the pistons.

The AT series guns are the most advanced state of the art guns in the composites industry. The series features low maintenance, few adjustments, and superb quality. The gun will help give you a superior finished product along with a long life of service provided you **do not soak the gun in acetone**.

The needles are kept out of the spraying atmosphere and enclosed inside the gun. The air section and fluid section of the gun are separate, avoiding the possibility of fluid in the air section. The guns are lightweight, well balanced, and feature the patented air-assist airless design.

Troubleshooting

AT Gun

Gun Troubleshooting		
Problem	**Possible Cause**	**Remedy**
Air leaking from exhaust port on back handle while trigger is OFF	O-ring material worn or cut	Replace O-rings
	O-rings on catalyst piston worn or cut	
	O-rings on trigger valve worn or cut	
Air leaking from exhaust port on back of handle while trigger is ON or OFF	O-rings on trigger valve worn or cut	Replace O-rings
	O-rings on catalyst valve and/or material piston worn or nicked	
Catalyst leaking from catalyst tip while gun is idle, not being triggered	O-rings on catalyst valve worn or cut	Replace O-rings
Catalyst leaks from weep hole on catalyst side of gun	O-rings on catalyst valve worn or cut	Replace O-rings
No catalyst coming from gun	Catalyst air piston is not actuating	Check for clogged catalyst air passages (small holes underneath back cylinder). ***Note*** ***There is more than one passageway***
	Plugged catalyst restrictor (Allen screw in front of catalyst valve)	Clean and clear orifice in front of catalyst valve
	Plugged catalyst passage in head of gun or catalyst tips	Inspect, clean, and clear passageways
	No catalyst flow to gun	See Slave Pump troubleshooting
Material is leaking from tip on the front of the gun	Loose diffuser seat	Tighten diffuser seat ¼ to ½ turn at a time until snug, then one more ¼ turn. ***Note*** ***Overtightening diffuser seat may cause binding of material needle***
	Worn needle and/or seat	Replace worn items

Gun Troubleshooting		
Problem	**Possible Cause**	**Remedy**
	O-ring on diffuser nicked or cut	Replace O-rings
Material leaking from weep hole on material side of gun	Loose diffuser seat	Tighten diffuser seat ¼ to ½ turn at a time until snug, then one more ¼ turn. ***Note*** ***Overtightening diffuser seat may cause binding of material needle***
	Worn needle packing	Replace packing and adjust as indicated above

Slave Pump

Pump Troubleshooting		
Problem	**Possible Cause**	**Remedy**
No catalyst coming from gun	Ball valve open on catalyst manifold	Make sure ball valve is fully closed
Catalyst spitting from gun	Air is being drawn into the catalyst siphon assembly	Replace the inlet nipple
	Cracked or deteriorated (pin holes) inlet nipple at the bottom of the slave pump	
	Worn or cut O-ring in inlet nipple	Replace O-ring in inlet nipple
	Improper seal around siphon hose	Check seal and make sure hose is inserted all the way into the nipple
	Cracked or deteriorated (pin holes) catalyst siphon hose	Replace the catalyst siphon hose
	Cracked or deteriorated elbow assembly on catalyst jug assembly	Replace elbow assembly
Catalyst spitting from gun	Worn or cut O-ring on elbow assembly	Replace O-ring
	Inverted washer in elbow or inlet nipple	Inspect and be certain that flat side of washer is against the O-ring for proper sealing
No catalyst flow on down stroke of catalyst pump	Debris in lower ball and seat assembly	Remove and clean
	Chipped or worn ball and/or seat	Inspect and replace ball and/or seat as necessary
No catalyst flow on up stroke of catalyst pump	Debris in ball seat assembly located on bottom of pump shaft (upper ball seat assembly)	Remove and clean

Pump Troubleshooting		
Problem	**Possible Cause**	**Remedy**
	Chipped or worn ball and/or seat assembly	Inspect and replace ball and/or seat as necessary
Loss of catalyst pressure	Worn or cut O-ring on ball seat assembly located on bottom of pump shaft (upper ball seat assembly)	Replace O-ring
	Sticking catalyst pressure relief valve assembly on the catalyst manifold (if applicable)	Disassemble, inspect, and clean; replace seals as necessary
Catalyst leaking from top of catalyst slave pump	Worn or cut O-rings located in top of pump	Replace O-rings
	Worn guide bushing located in upper jam nut. A bent pump shaft may cause wearing of guide bushing	Replace guide bushing or whole jam nut assembly as necessary
	Bent catalyst pump shaft	Replace pump shaft

Fluid Sections

Pump Troubleshooting		
Problem	**Possible Cause**	**Remedy**
Fast downstroke (winking of pattern)	Debris on lower ball seat	Disassemble and clean
Fast upstroke (winking of pattern)	Debris on upper ball seat	Disassemble and clean
Partial dive on downstroke	Air siphoning	Check for loose fittings, kinks, or cuts from bottom of pump to the end of the siphon assembly and correct as necessary
Pump stroke chatter	Plugged material filter	Disassemble and clean filter
	Buildup of material around pump upper packings/seals	Disassemble and replace packings/seals
Material leakage into solvent cup	Loose packings	Clean solvent cup and tighten as applicable ½ turn at a time ***Note Pressure must be off at pump before adjusting***
	Worn packings	Disassemble and replace upper packings
	Worn shaft	Disassemble and replace shaft
Intermittent stopping of pump stroke (can cause resin to continue	Air lock in surge chamber. This can be caused by the pump running when the drum is empty or when moving a siphon hose assembly from	1. Reduce pump pressure to zero, disconnect slave and slowly open the ball valve on filter to allow resin and air to escape 2. Slowly increase pump pressure until pump begins stroking

Pump Troubleshooting		
Problem	**Possible Cause**	**Remedy**
spraying without catalyst)	one drum to another, allowing air into the system	3. After smooth flow of resin is achieved, close the valve and reconnect slave
Decrease in volume of resin delivery	Clogged material filter	Disassemble and clean
	Worn cylinder; fluid is bypassing the packings through the worn areas	Disassemble and inspect cylinder for wear when doing any repairs

Nozzle Information

Selecting a Tungsten Carbide Spray Nozzle

It is important to select the proper spray nozzle in order to get the optimum efficiency out of your MVP spray system.

Nozzle Selection Per Gun	
For this gun	**Choose a nozzle with this prefix**
MG-3000	M2
LW-2500	LW
ATG-3500	UCT
ATC-4000	UCT
MIX-1000	ALCEL
MIX-6000-C	MIX
MIX-5500-G	MIX

The remainder of the part number for the nozzle denotes the orifice size and pattern width.

Pattern Width

The type and size of the mold being sprayed will determine the appropriate pattern width. Too wide may produce waste.

Output

The orifice size and fluid pressure determine the material output of a spray nozzle. The following chart will help in selecting the appropriate spray nozzle for the desired output.

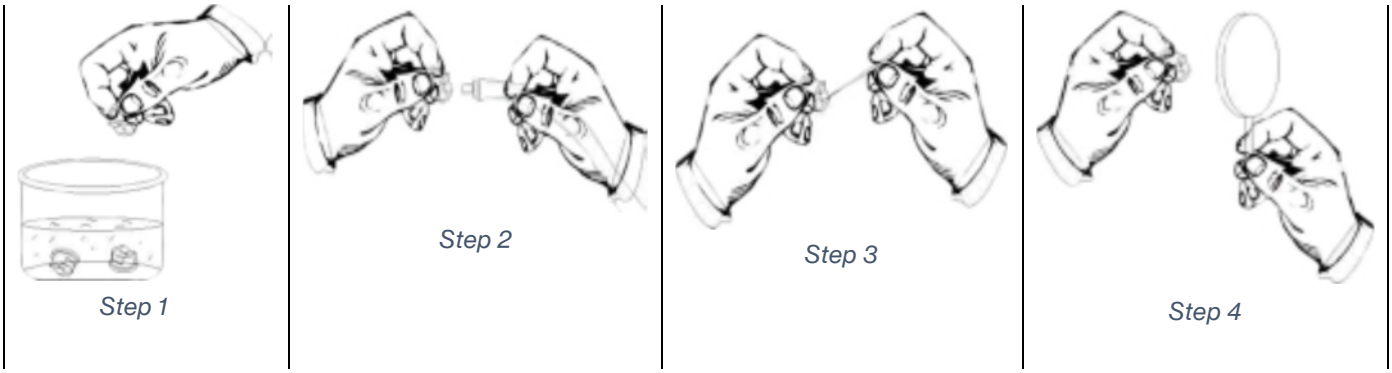
Orifice Size to Fluid Pressure		
Standard Orifice Size	**GPM – 500 psi**	**GPM – 1000 psi**
0.015	0.12	0.16
0.018	0.18	0.25
0.021	0.24	0.33
0.023	0.28	0.40
0.026	0.35	0.50
0.031	0.53	0.75
0.036	0.71	1.00

Orifice Size to Fluid Pressure		
Standard Orifice Size	**GPM – 500 psi**	**GPM – 1000 psi**
0.043	1.10	1.50
0.049	1.30	1.85
0.052	1.40	2.00
0.058	1.60	2.50
0.062	2.10	3.00
0.068	2.50	3.50
0.072	2.80	4.00
0.078	3.50	5.00
0.085	3.90	5.50

Maintenance for Flat Spray Tungsten Carbide Tips

Your carbide tip has a precisely machined orifice and with proper care will give a long and useful life. Remember, the orifice tip is brittle and should never be dropped or probed with a sharp metal object. Follow these steps to keep the tip clean and ready for use:

1. Immediately after spraying, submerge spray tip in solvent until film or coating dissolves completely.
2. Blow out tip with compressed air.
3. Use pointed wooden stick to remove any particles that are left.
4. Inspect the tip carefully using a magnifying glass or microscope.



5. Repeat steps 1 - 3 as necessary.

Note ***All tips have been paint-spray tested. Some orifices are extremely small and barely visible.***