High Volume/Output RTM Systems

Operations Manual

This manual is applicable to the following models:

- RTM-PAT-x
- RTM-HVUPS-x

MAGNUM VENUS PRODUCTS

Rev. December 2018

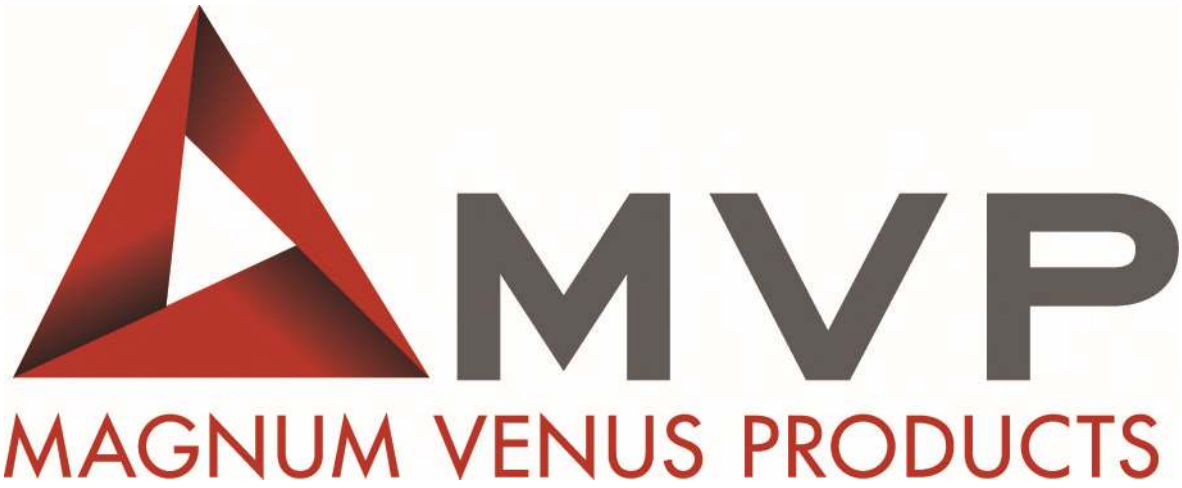

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Table of Contents

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 High Volume/Output RTM Systems. 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.

Component Assemblies

MVP's High Volume/Output RTM Systems consists of multiple components. Each component has its own detailed manual and drawings. For complete repair and maintenance instructions, refer to the appropriate manuals.

- ❑ HV PRO GUN MANUAL – CPHV-1000 (**INJECTION GUN**)
- ❑ 1:1 CLASSIC PRO GUN – PRTM-RG-1000-A (**RECIRCULATION GUN**)
- ❑ PATRIOT POWERHEAD MANUAL – PAT-PH-10000 (10" POWERHEAD)
- ❑ PATRIOT HV FLUID SECTION MANUAL – PAT-LS-49090 (HV PATRIOT FLUID SECTION)
- ❑ PATRIOT METERING PUMP MANUAL – PAT-CP-3000
- ❑ INNOVATOR II MANUAL (**CONTROL BOX)** – INV-CB-100

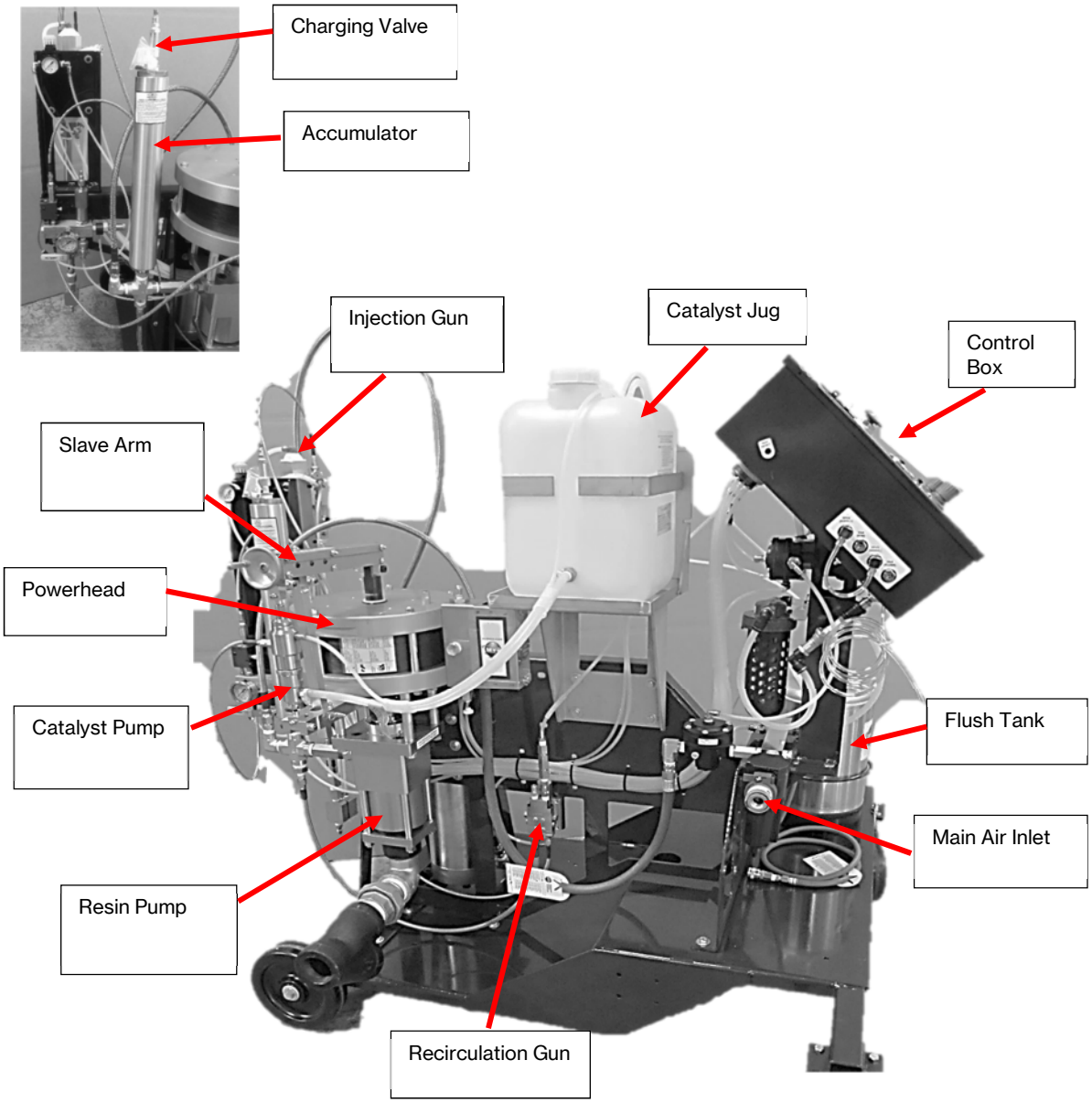
Note ***When using an innovator with the HV PAT-LS-49090 larger fluid section, the standard 10 mm feed tube assembly can be a little restrictive and cause the MPG to activate at higher flow rates. Consider alternative connect options to increase the flow to the IVx3 valve.***

Air Requirements

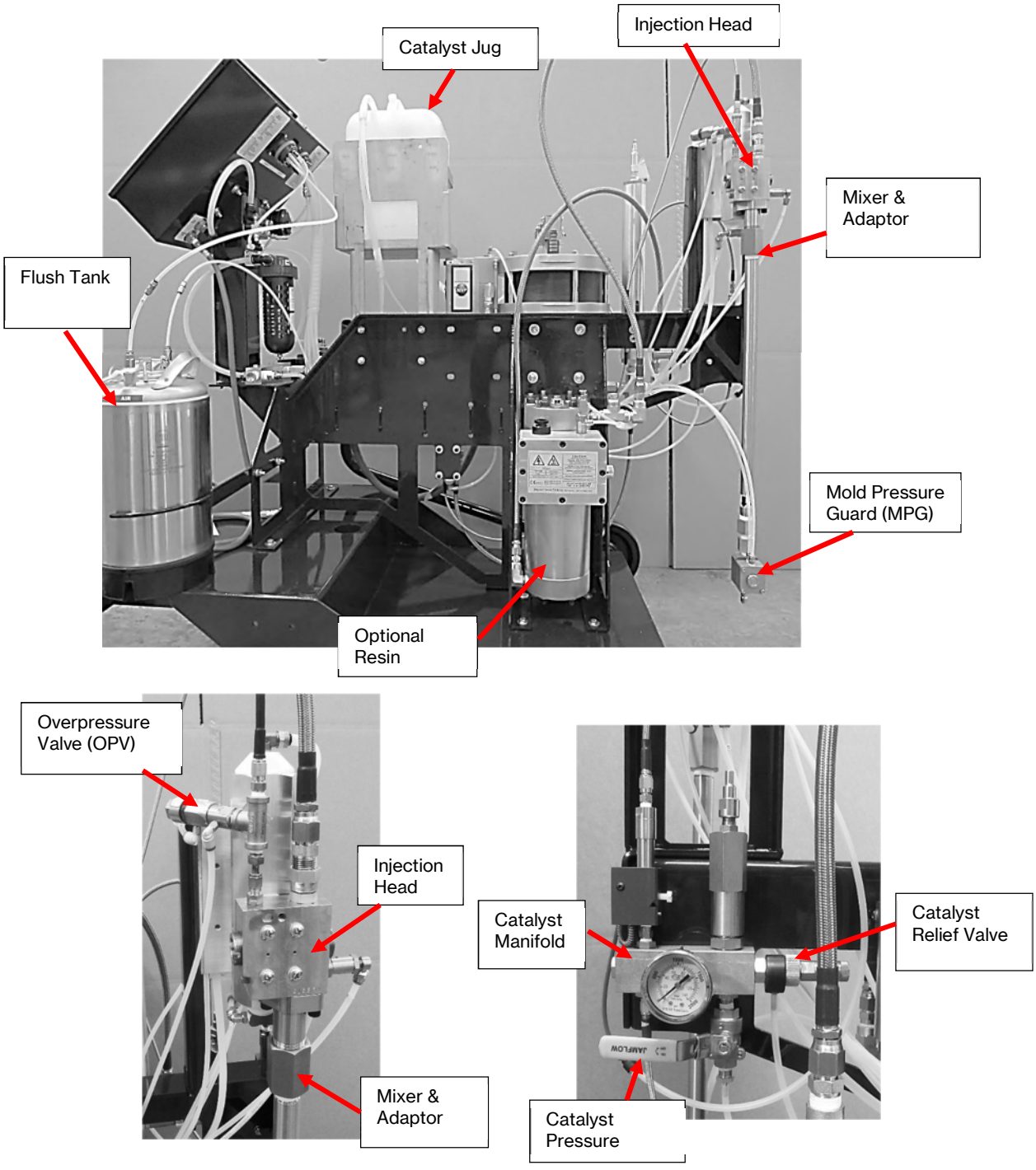
1. The system requires a supply of air (30 cfm) and at least 100 psi (7 bar).
2. The unit requires a ½ inch (12 - 13 mm) inside diameter air hose minimum (use caution when using quick disconnects; they may restrict air flow).
3. Preferably the air will be clean, dry, and oil free.

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

Following is a brief description of the main controls and their function. For complete details on operation and programming of the control box, reference the Innovator II Control Unit Component Manual.

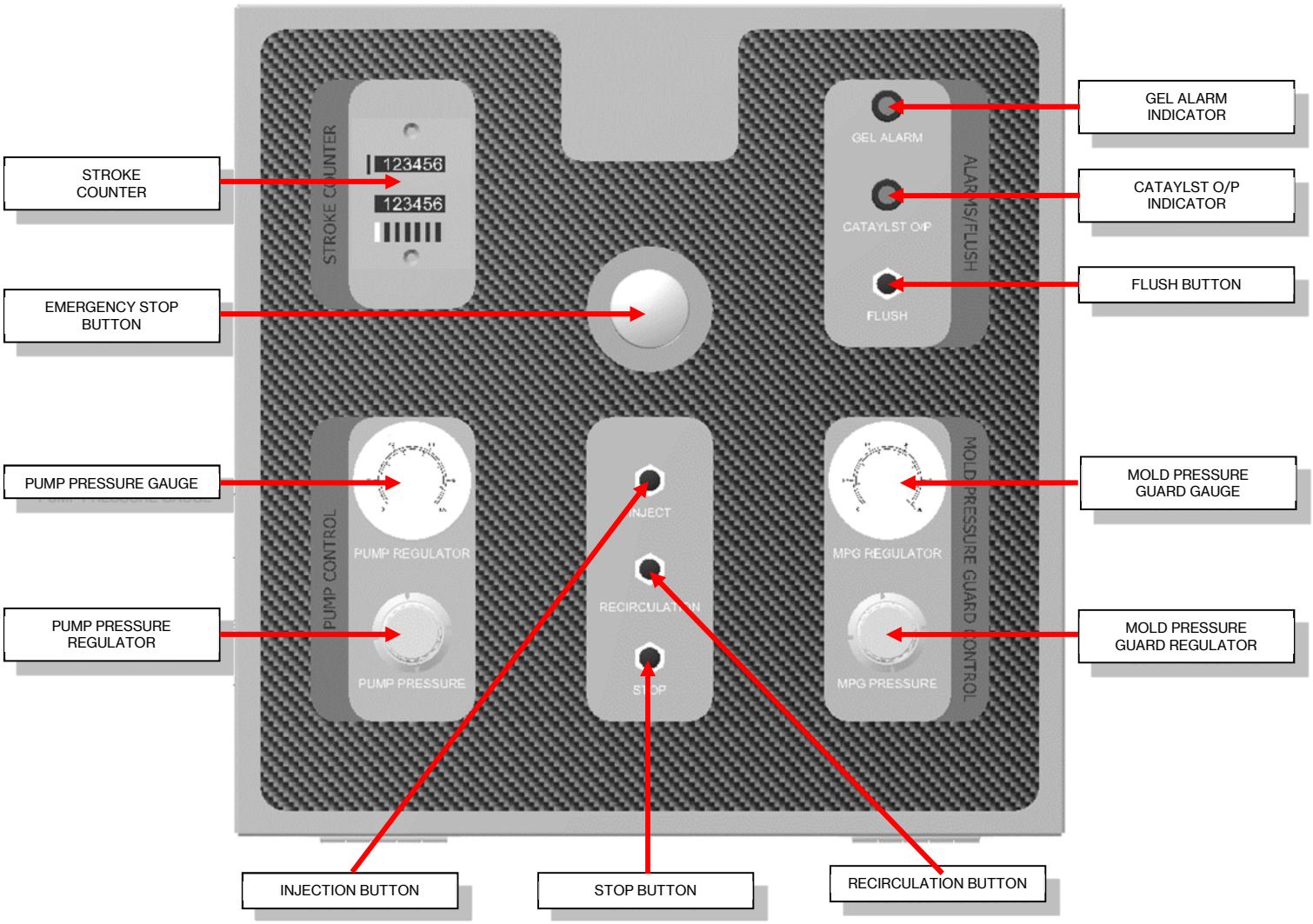


Figure 1. Control Panel Overview

Innovator II Control Panel		
Control Name	**Type of Control**	**Function**
Emergency Stop	Push Button	Press this button in the event of an emergency to place the system in a safe state. Twist and pull to release and allow machine operation.
Pump Pressure	Pressure Gauge	Displays the air pressure being supplied to the pump.
Pump Pressure	Regulator	Adjust this to control the air pressure being supplied to the pump and to set the pump speed.

Innovator II Control Panel		
Control Name	**Type of Control**	**Function**
CAT/OP	Indicator Light	Will turn red if overpressure state exists.
RGA Alarm	Indicator Light	Will turn red if gel alarm timer has expired.
Flush Button	Push Button	Press this button to operate the flush cycle
Mold Pressure Guard	Preset Level Gauge	Displays signal air pressure being supplied to the Mold Pressure Guard (MPG) control.
Mold Pressure Guard	Regulator	Use this to adjust the MPG control signal air pressure.
Inject Button	Push Button	Press this button to start the machine in inject mode.
Recirculate Button	Push Button	Press this button to start the machine in recirculation mode.
Stop Button	Push Button	Press this button to stop the machine in injection, recirculation, or flush mode.
Stroke Count	Counter	Displays the current number of strokes the pump has performed.
Stroke Count Preset Count	Counter	Displays the number of strokes at which the unit will shut down when reached.
Stroke Count Digit Modifiers	Spin Buttons	Click up or down to adjust the number in the Preset Count column to set the stroke count the machine should stop at.
Digit Lockout	Button	Press this button to keep the stroke count setting.
Reset Button	Push Button	Press this button to reset the current stroke count.

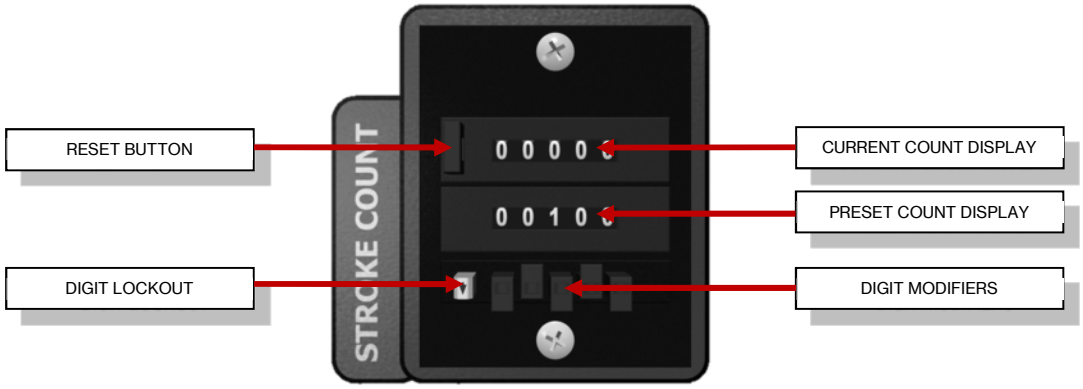


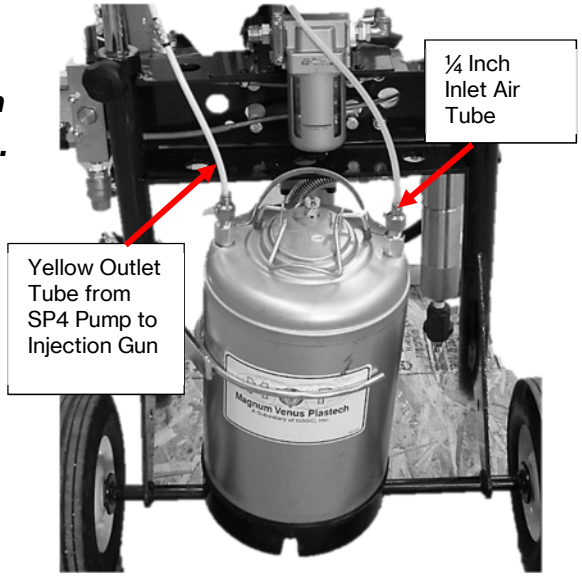
Figure 2. Stroke Counter

Getting Started

1. Unpack the unit and components.
2. Attach the resin supply hose to the inlet of the pump.

Note ***The Patriot HV pump requires a 2-inch connection from Tote, IBC, Day Tank, or a bulk supply system.***

3. Connect the resin return hose from the recirculation gun to the resin supply.
4. Connect the yellow outlet tube from the outlet side of the flush tank to the flush valve on the injection gun.
5. Connect the red 4 mm tube to the fitting on the inlet side of the quick exhaust of the pump in the flush tank.
6. Connect the ¼ inch pump inlet air tube to the inlet quick exhaust on the top of the flush tank.
7. Fill the flush tank ¾ full with solvent.



CAUTION

Be sure the flush tank connections are correct or the equipment can be damaged. It is important not to fill the flush tank more than ¾ full or solvent can get into the air system and cause damage.

8. Check to make sure all hose fittings and connections are tight.

Note ***The repair and maintenance of several components will require the use of removable Loctite® 243 or equivalent thread lock compound, lithium grease (Lubriplate 08465) or red grease (6706-2-1).***

9. Connect to an appropriate air source.

Note ***The machine is supplied with an inline filter and should be connected to an unlubricated air supply. Ensure you do not exceed the maximum inlet air pressure marked on the filter (1 Mpa; 10 bar; 145 psi).***

Note ***There is a sleeve valve on the rear of the enclosure so that air may be isolated from the control box. Air should be removed from the unit when it is not in use by sliding the isolation valve sleeve away from the control box.***

Note ***Following air supply loss, either by the sleeve valve or loss of main pressure, when the supply is re-energized all controls revert to an off state. This is a safety feature so that none of the valves or components will energize unexpectedly and create an unsafe situation.***

10. Slide the air valve on the back of the cabinet to the open position.

11. Twist and pump the emergency stop button to allow unit operation.
12. Fill the resin pump packing nut $^1/_3$ full with TSL oil.
13. Press the **Inject** button and check that the injection gun valve rotates open, then press the **Stop** button.
14. Tighten the packing nuts on the HV injection gun block.
15. Repeat steps 13 - 14 three to five times to properly seat the injection gun block packing.
16. Press the **Recirculate** button and check that the recirculation gun valve rotates open, then press the **Stop** button.
17. Tighten the packing nuts on the recirculation gun block.
18. Repeat steps 16 - 17 three to five times to properly seat the recirculation gun block packing.

CAUTION

Put on respirator as specified for spray painting and wear all required personal protective equipment, including eye protection and gloves as specified by your materials manufacturer(s).

19. Fill the catalyst jug at least ½ full of appropriate catalyst.
20. Secure the pump inlet to a proper resin supply.
21. Place the end of the resin return hose into the resin container.
22. Fill the flush tank at least ¾ full of appropriate solvent.
23. Place an appropriate container under the injection head and test the flush system by pressing the flush button.

First Time Start Up

24. Turn the pump regulator to zero.
25. Adjust the catalyst percentage on the slave arm as required.
26. With all material containers appropriately filled, press the **Recirculation** button.
27. Slowly increase the pump regulator pressure until the pump strokes slowly and evenly.
28. Allow the pump to recirculate until the flow of resin and catalyst back to their respective containers is free of bubbles.
29. Press the **Stop** button to take the unit out of recirculation mode.
30. Test the ratio of catalyst and resin to the injection head by following the steps in the Performing a Gel Test section prior to dispensing.

Performing a Gel Test

1. Check all material supplies and refill or replace as needed.
2. Open the main air supply slide valve on the back of the control panel.

3. Press the **Recirculation** button and allow the unit to recirculate for at least 20 strokes or until no bubbles are returning to the catalyst jug from the recirculation tube.
4. Check to make sure the catalyst percentage is set properly.
5. Check resin pump pressure and adjust as necessary.
6. Press the **Stop** button to take the unit out of recirculation mode.
7. Connect a short feed hose to the outlet of the injection head.
8. Place the end of the feed hose over an appropriate container to catch extra resin.
9. Press the **Inject** button.
10. After one or two strokes of the pump, quickly move a graduated container under the resin stream to catch about 100 grams of resin.
11. Repeat step 10 until you have two or three more samples.
12. Press the **Stop** button.
13. Flush the injection head as necessary.
14. Mark the sample containers with the pertinent test information, including the time, catalyst percentage, resin temperature, and operator name.
15. Press the **Reset** button on the counter to restart the stroke count.
16. Check that the material collected properly cures.
17. Properly dispose of the catalyst and resin.

Dispensing Material

Note ***Follow these steps daily when beginning injection.***

1. Check all hoses for wear or damage; replace as needed.
2. Check all material supplies and refill or replaces as needed.
3. Open the main air supply slide valve on the back of the control panel.
4. Press the recirculation button and allow the unit to recirculate for at least 20 strokes or until no bubbles are returning to the catalyst jug from the recirculation tube.
5. Check the catalyst percentage to make sure it is set properly.
6. Check resin pump pressure and adjust as needed.
7. Check the mold pressure guard (MPG) set pressure and adjust as needed.
8. Set the desired number of strokes on the counter display.
9. Press the **Stop** button to take the unit out of recirculation mode.
10. Perform a daily gel test by following the steps in the section above and balance the fluid pressures.
11. Connect the injection hose to the injection head and press the **Inject** button.
12. If you are using an IVx3, Turbo Autosprue (TAS), PPVS, or similar option, properly connect the feed hoses and control lines to the control box.

Note ***Refer to the Innovator II Control Panel component manual for additional information.***

13. The unit is ready to inject a part.

Shutting Down

1. If you need to end injection before the preset counter reaches zero, press the **Stop** button.

Note ***The counter will stop the injection when the preset count is reached and close the injection head.***

2. Press the reset button on the counter to return the stroke count to zero.
3. Flush the injection head, feed hose(s), and any optional resin valves used.
4. Disconnect the resin feed hose from the injection head.
5. At this point if you need to inject another mold, return to the Dispensing Material steps.
6. If you need to shut down for the day, place the unit in recirculation mode, press the **Recirculation** button, and allow the unit to recirculate for about a minute.
7. Press the **Stop** button.
8. Turn off the main air slide valve on the back of the control box.

Troubleshooting

System Troubleshooting		
Symptom	**Possible Cause**	**Remedy**
Will not start injection or has stopped during injection sequence	No air supply	Make sure pressurized air line is connected to the machine air inlet.
	Stop button pushed	Press **Inject** button
	Remote stop button pushed	Press **Inject** button
	PPVS signal not being received	Install jumper between PPVS supply and PPVS signal if no PPVS is being used
		Check signal coming from PPVS if installed
		Check internal PPVS circuits: Check line (67) for leaks Check V08 output (41) for signal (should be on)
	MPG circuit is engaged	Check for blockage on resin delivery lines
		Check FC 03 for proper adjustment
		Check for air leaks on MPG valve and connection 1B-11 (26)
		Check internal MPG circuits • Check (26) for leaks • Check (67) for leaks

System Troubleshooting		
Symptom	**Possible Cause**	**Remedy**
		• Check V14 output (62) for signal (should be on) • Check V15 output (05) for signal (should be on)

	Stop sequence has been imitated	Check internal stop sequence circuits
		• Check (16) for signal (should be off)
		  ○ Remote stop button has malfunctioned
		• Check (15) for signal (should be off)
		  ○ CE NORM guard valve has malfunctioned
		• Check (37) for signal (should be off)
		  ○ Pulse valve (S01) has malfunctioned. See below.
		• Check (39) for signal (should be off)
		  ○ Pulse valve (S01) has malfunctioned. See below.
		• Check (49) for signal (should be off)
		  ○ Catalyst overpressure circuit engaged. See below.
		• Check (48) for signal (should be off)
		  ○ Predetermined counter has not reset or has malfunctioned. See below.

	CE NORM guard has been opened	Close CE NORM guard and check valve for proper operation
Will not start injection or has stopped during injection sequence	Pulse valve has malfunctioned	Check internal pulse valve circuit • Check (36) for signal (should be off) ***Note*** ***This valve also resets all circuits to off when air pressure to the system is moved from an off state to on. If circuits are not resetting on startup this valve is faulty.***
	Catalyst overpressure circuit is engaged (indicated on control panel)	Check for blockage in catalyst system delivery lines
		Check FC 04 for proper adjustment
		Check for air leaks on catalyst overpressure valve and connection 1B-7(21)
		Check internal catalyst overpressure circuits • Check (21) for leaks • Check V03 output (49) for signal (should be off)
Predetermined counter not counting or skipping counts	Will not count in recirculation mode	Make sure unit is in injection mode
	FC 03 not adjusted properly	Adjust FC 03 for proper flow. See Innovator II Control Panel manual.
	Faulty signals from powerhead shift block	Repair or replace powerhead shift block
	Faulty RGA V03 valve or OR09 shuttle	Check (60) for signal. It should cycle on and off with pulses from powerhead.

System Troubleshooting		
Symptom	**Possible Cause**	**Remedy**
	Faulty counter	Check (60) for signal. It should cycle on and off with pulse from powerhead.
Catalyst overpressure circuit does not stop pump	FC 04 not adjusted properly	Adjust flow control • Remove (21) from catalyst overpressure valve, start pump, then slowly turn FC 04 until pump stops
MPG will not stop pump on overpressure	Excessive pressure	Reduce MPG pressure from panel
	FC 04 not adjusted properly	Adjust flow control • Remove (26) from MPG valve, slowly turn in FC 06 until pump stops
Gel Alarm time incorrect	FC 03 not adjusted properly	Adjust flow control until gel alarm set correctly
Gel Alarm not working	FC 03 not adjusted properly	Adjust flow control until gel alarm set correctly
		Check RGA V02 (51) for signal – should be off/pulsing when pumping and on when not pumping
		Check RGA V02 output (52) for signal – should be off/pulsing when pumping and on when not pumping
Flush dwell time incorrect	FC 05 not adjusted properly	Adjust flow control until flush dwell is set correctly
Flush not working	FC 05 not adjusted properly	Adjust flow control until flush dwell is set correctly

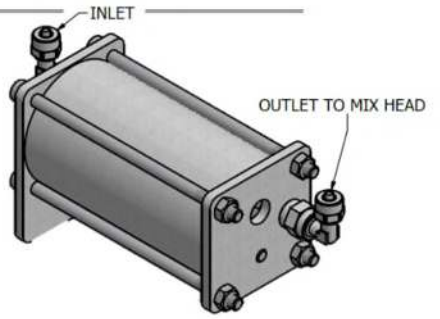
Specialty Components

Slave Drive Stickers

SP4 Solvent Pump

The SP4 Solvent Pump assembly performs a 200-cc solvent purge followed by an air purge to thoroughly clean and purge the injection head and mixer. It is contained within the flush tank. During the flush cycle, only the SP4 solvent pump will be pressurized to force out the solvent contained inside and then purges air for the remainder of the flush cycle.

There are two connection to the flush pump inside the flush tank:



- The pump inlet air tube connects to the inlet side of the SP4 solvent pump through the inlet fitting
- The yellow flush tube from the injection gun/mix head extends down through the outlet side fitting and connects to the outlet of the solvent pump

Note ***It is important that the solvent level in the tank remain no less than $^1/_3$ full so there is at least one inch of solvent above the pump. This will allow the pump to properly refill with solvent after each use.***

Activate the SP4 by pressing the flush button on the control panel. The pump will operate for 30 to 60 seconds. The duration of the flush/purge cycle can be adjusted. For more information, reference the Innovator II Control Unit component manual.

Maintenance

It is important to keep the inside of the flush tank clean and free of dirt, debris, or glass fiber. These can prevent the pump foot valve from sealing properly.

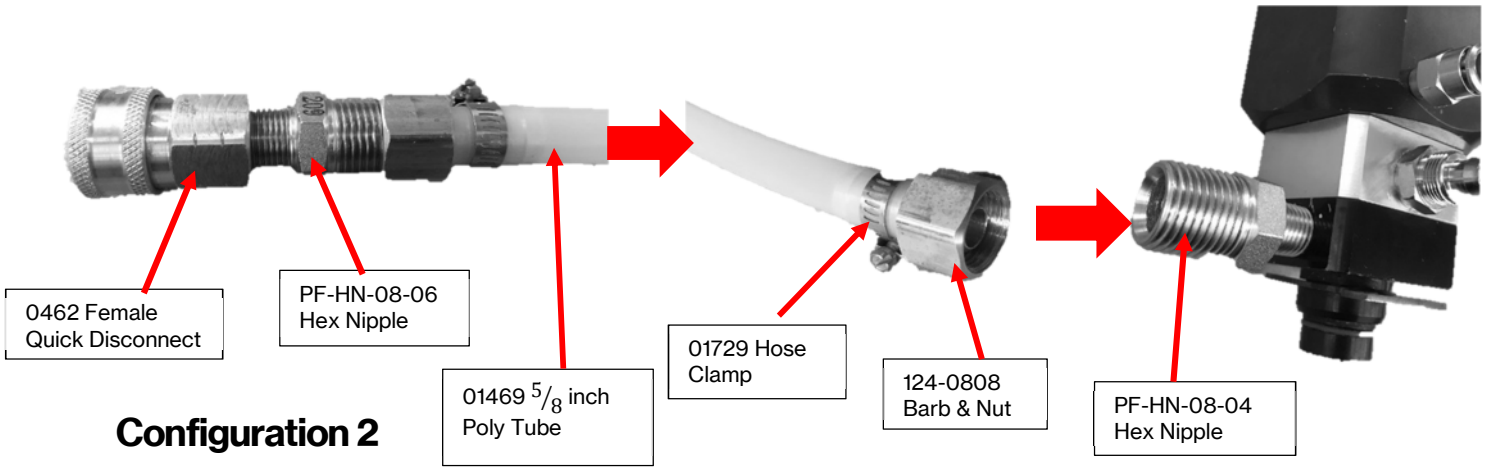
The SP4 solvent pump is essentially maintenance free except it will occasionally be necessary to replace the O-ring on the pump foot valve.

Optional Connections

When using an Innovator unit with one of the larger fluid sections (HO or HV), the standard 10 mm feed tube assembly can be a little restrictive and could cause the MPG to activate at higher flow rates. It may be necessary to use one of the following options to increase the flow.

Configuration 1

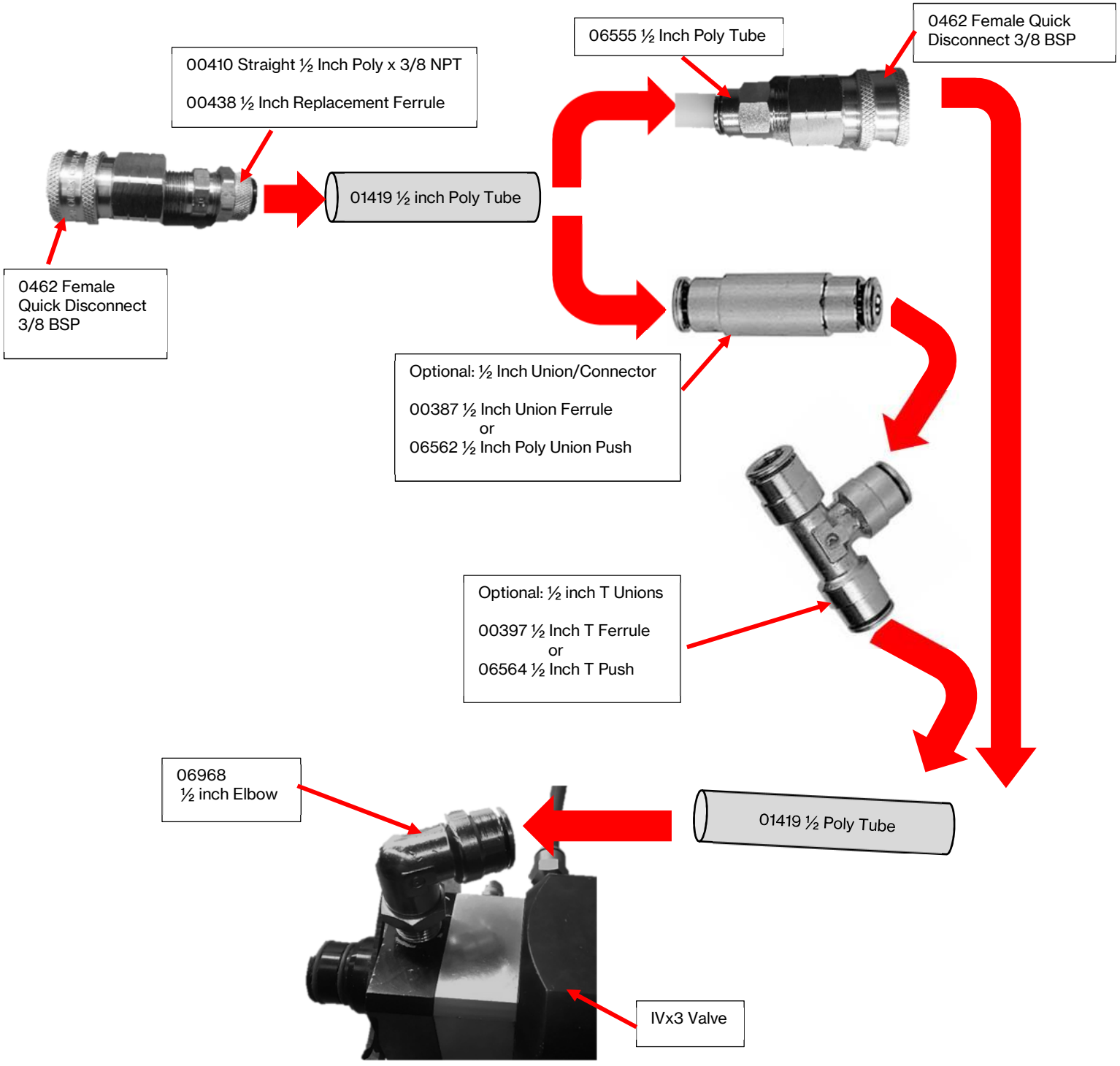
This configuration uses either a $^5/_8$ inch poly tube or a ½ inch resin hose as the feed hose. By changing the two hex nipples on the injection head and IVx3 valve, other resin hose assemblies can also be used. The $^5/_8$ inch poly tube has the advantage of being translucent so the operator can see the resin flow and check for air bubbles during an injection, as well as being less expensive than resin hose.



Configuration 2

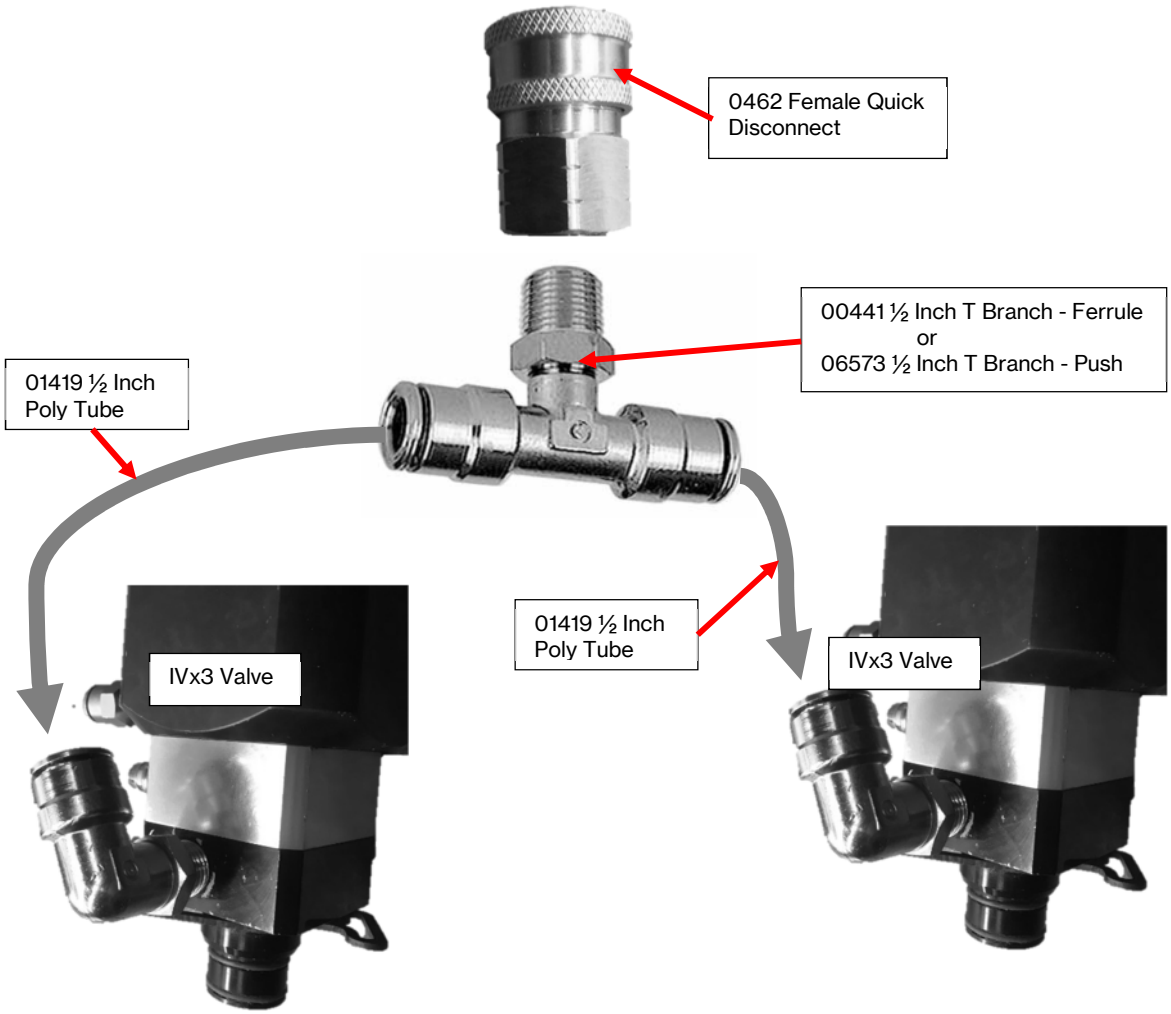
This is an alternative connection for the IVx3 valve using ½ inch poly tube. The nut and ferrule style of fittings are recommended, since they will have a more positive lock on the tubing, have a

secure vacuum connection, and will not have issues with O-ring compatibility that can occur with push fittings.



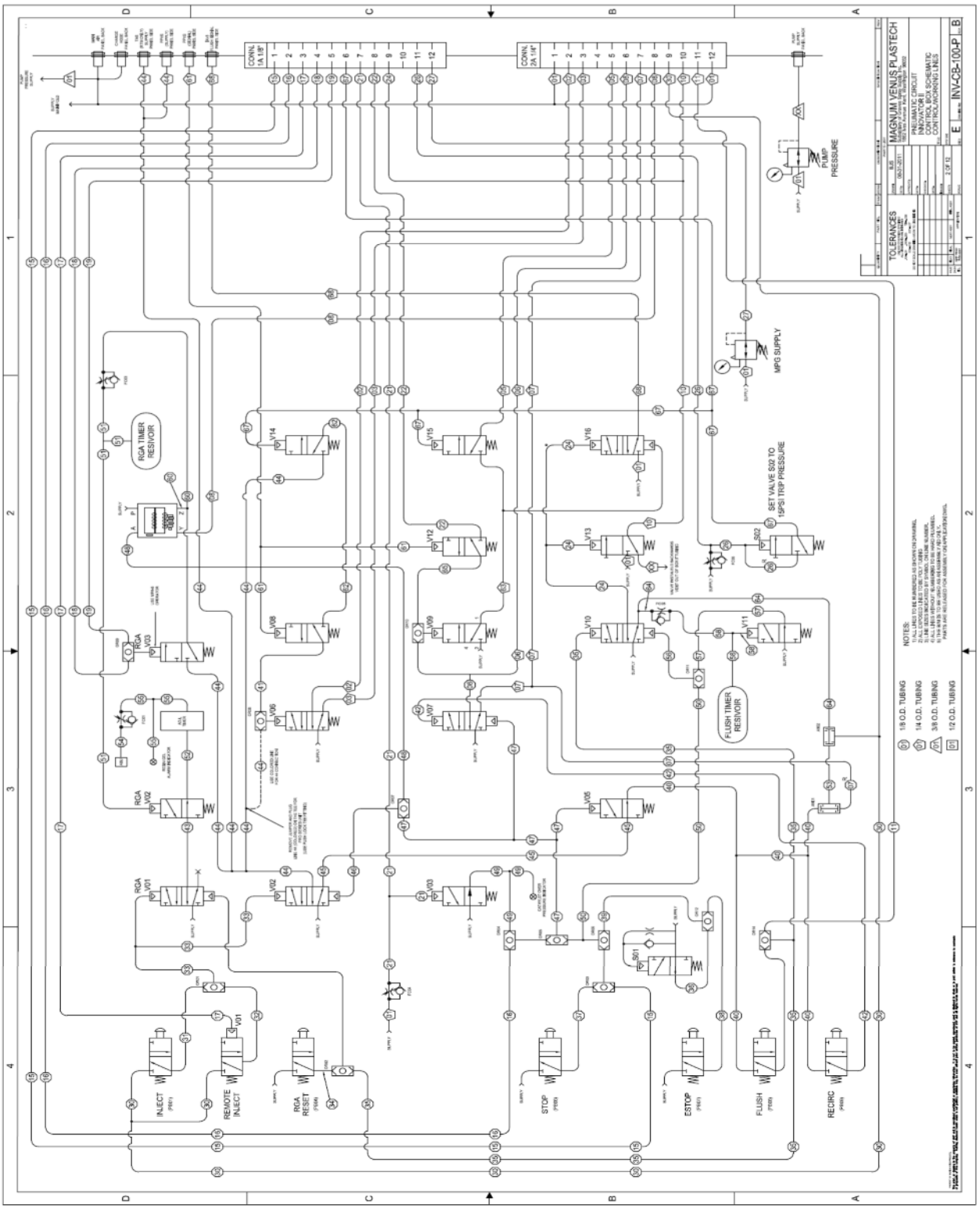
Configuration 3

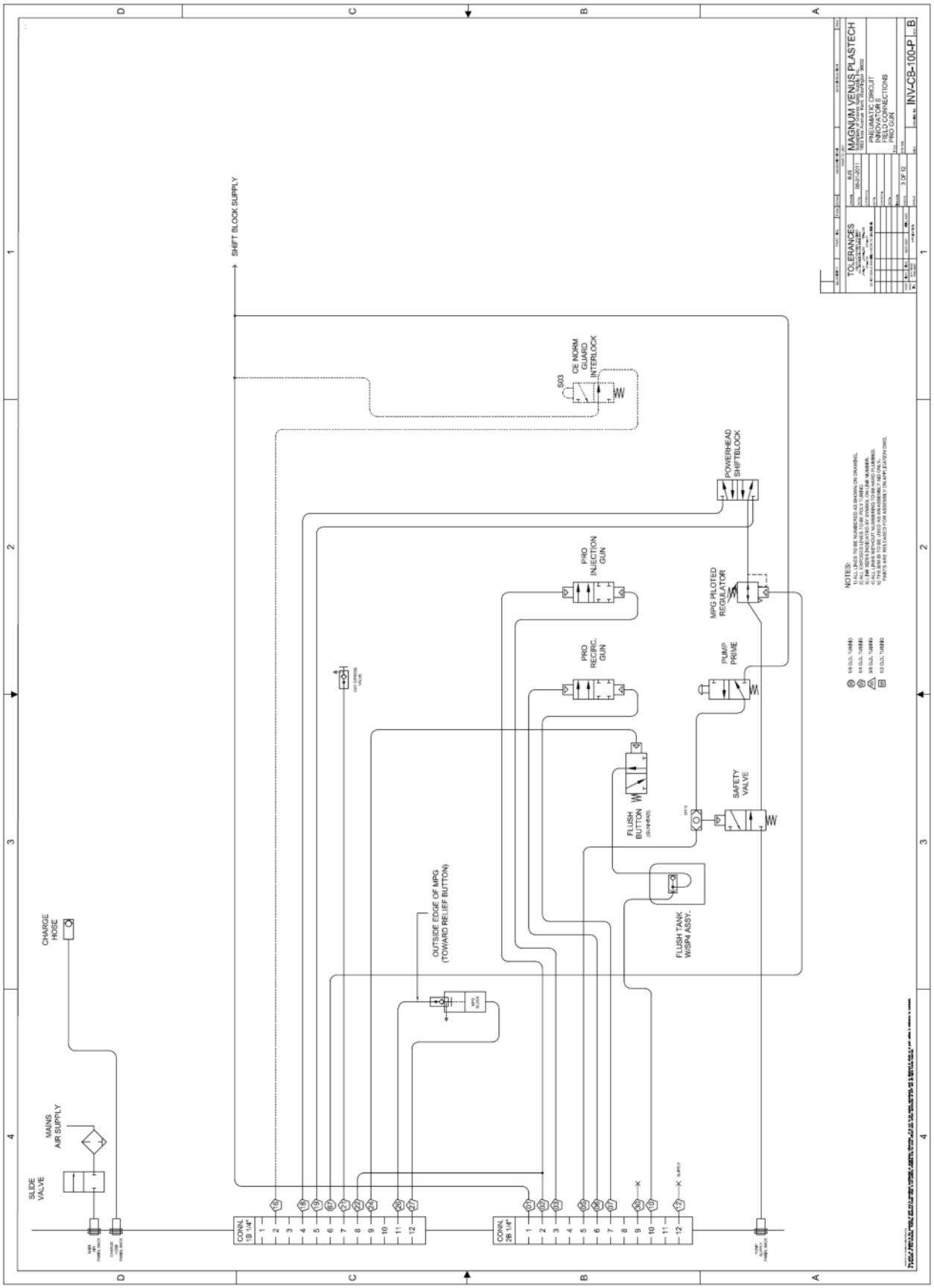
For two IVx3 valves (maximum flow), use two $^{5}/_{8}$ inch or ½ inch poly tubes to the valves.

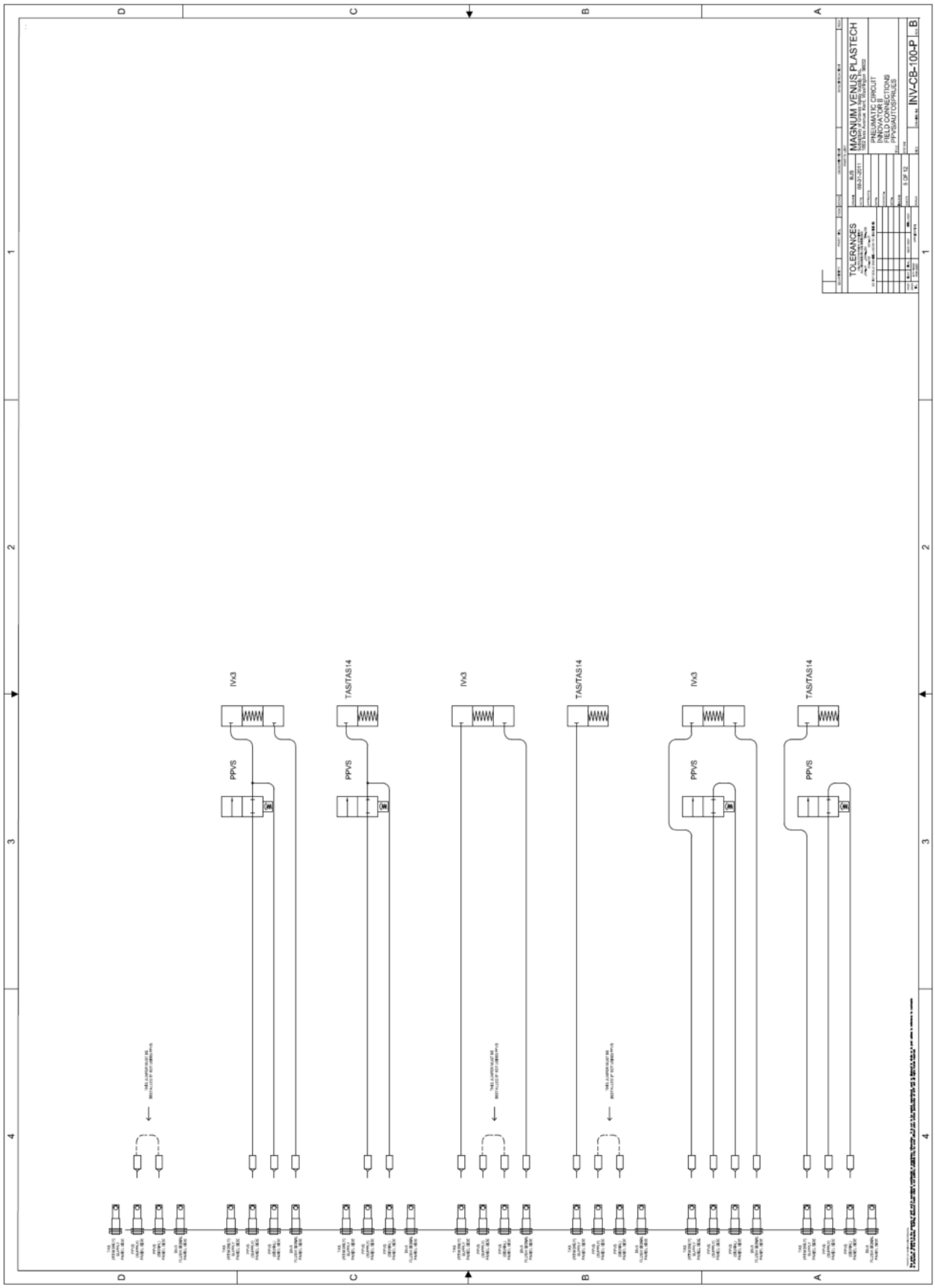


The optimum configuration is to use the TAS14 Autosprue (Assy-0437). The TAS has the best possible flow using 15 mm feed tube and large orifice nose port.

Pneumatic Drawings




SHIFT BLOCK SUPPLY
CE NORM GUARD INTERLOCK
S03
POWERHEAD SHIFTBLOCK
PRO INJECTION GUN
MPG PILOTED REGULATOR
PRO RECIRC. GUN
PUMP PRIME
SAFETY VALVE
FLUSH BUTTON
FLUSH TANK W/SP4 ASSY.
OUTSIDE EDGE OF MPG (TOWARD RELIEF BUTTON)
CHARGE HOSE
MAINS AIR SUPPLY
SLIDE VALVE
CONN. 1B 1/4F
CONN. 2B 1/4F
MAGNUM VENUS PLASTECH
INV-CB-100-P
NOTES:


MAGNUM VENUS PLASTECH
INV-CB-100-P
IV3
TAS/TAS14
PPVS