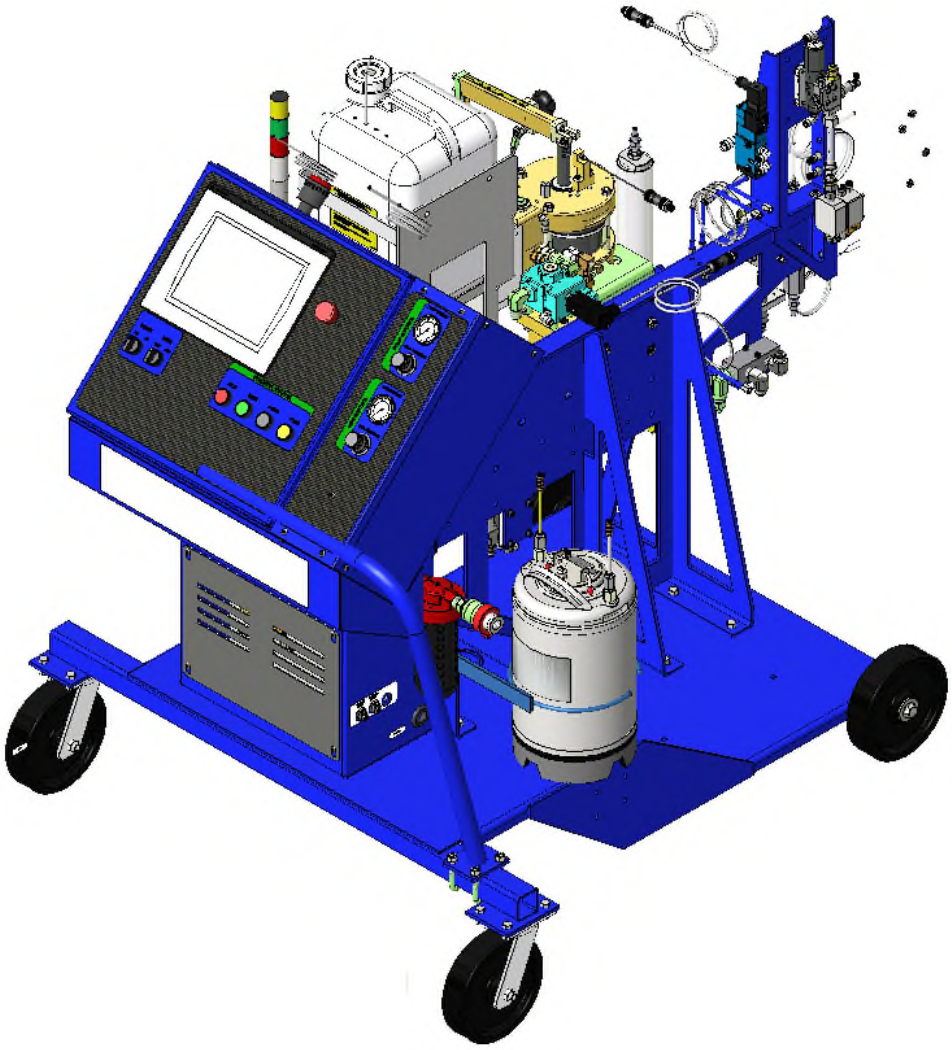
Innovator Plus System

Operations Manual

This manual is applicable to the following models:

- INV3-PAT
- INV3-UPS
- UPU-INV3
- INV3-DHV
- INV3-MP
- INV3-DUO



MAGNUM VENUS PRODUCTS

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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 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 Innovator Plus System. The following procedures are included:

- 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 Innovator Plus System consists of multiple components. Each component has its own detailed manual and drawings. For complete repair and maintenance instructions, refer to the appropriate manuals.

- ❑ RECIRCULATION GUN
- ❑ DISPENSE GUN
- ❑ POWERHEAD
- ❑ FLUID SECTION
- ❑ CATALYST ALARM SENSOR
- ❑ ULTRA PROPORTIONER
- ❑ INNOVATOR PLUS CONTROL BOX

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

The Innovator Plus System is designed to make your production more efficient and cost effective through a state-of-the-art programmable logic controller (PLC) controlled injection system. The unit's controls can process large shot of hundreds of pounds or as small as 5 ccs. The Innovator Plus System can be used for various applications, including:

- Polyester
- Vinyl ester
- Epoxy
- Urethane

The Innovator Plus System uses a touch screen and manual switches/push buttons for operation. The panel mounted push buttons are used for actual operation of the machine, while the human-machine interface (HMI), or touch screen, is most commonly used to monitor machine status and manage recipes. Although there are some controls on the touch screen, they are generally only used in the case of a mechanical push button failure.

Once the machine has been set up and calibrated, operation is very simple. Choose a recipe from the HMI or scan a tag or barcode using the optional RFID/Barcode reader system. When the corresponding recipe is loaded, the machine will go into a ready state; push the start button and the injection cycle begins.

For detailed information regarding the Innovator Plus controls, refer to the Innovator Plus Control Box component manual.

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

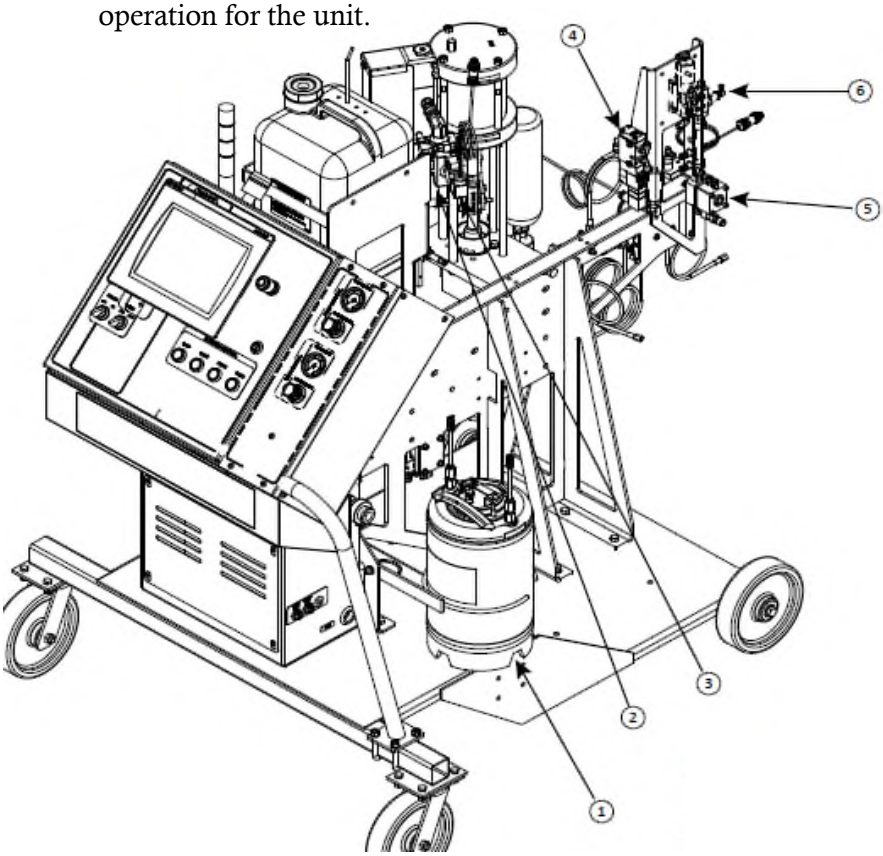


Figure 1. Unit Overview

Figure 1 Legend	
#	**Description**
1	Flush Tank Assembly
2	Safety Valve
3	24VDC 4/2 Valve
4	3-Way Valve
5	MPG Block Assembly
6	Dispense Gun

Figure 2 Legend	
#	**Description**
1	Piloted Regulator
2	Recirc Gun
3	Fluid Section
4	Filter Surge Chamber Assy
5	Cat Pump
6	Catalyst Alarm Sensor
7	Powerhead
8	Catalyst Jug

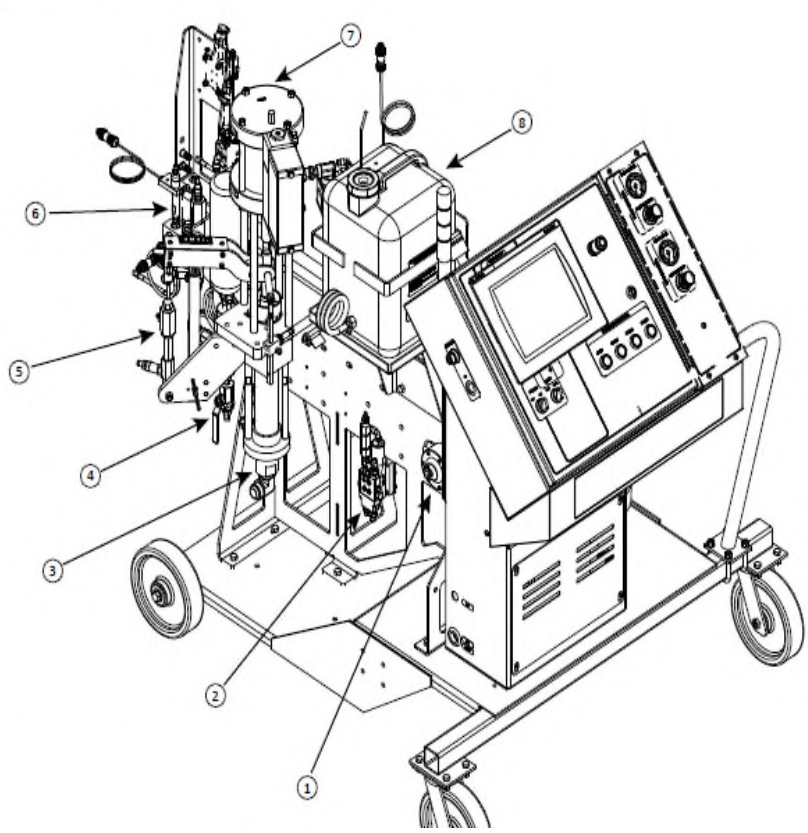


Figure 3. Unit Overview

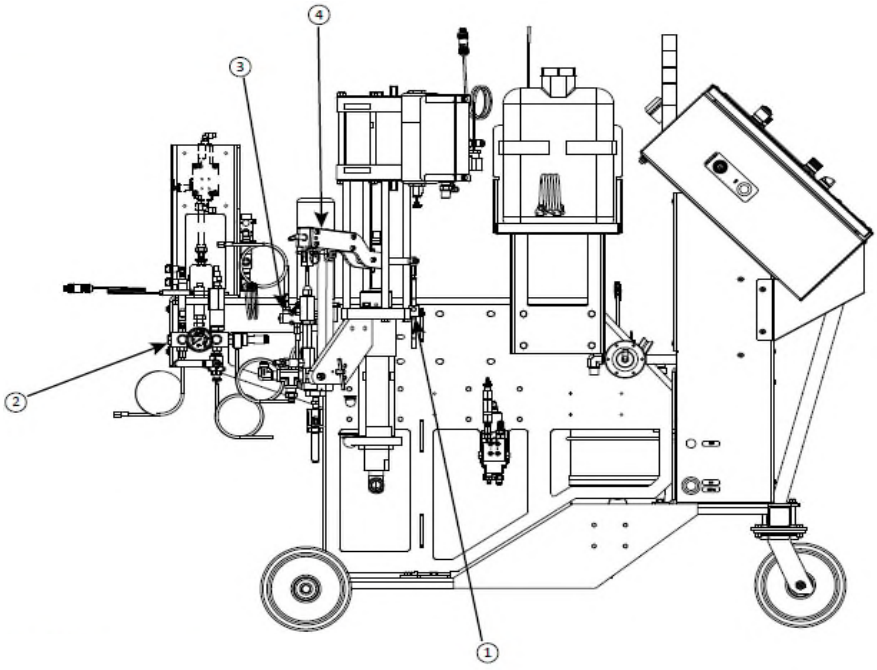


Figure 2. Unit Overview

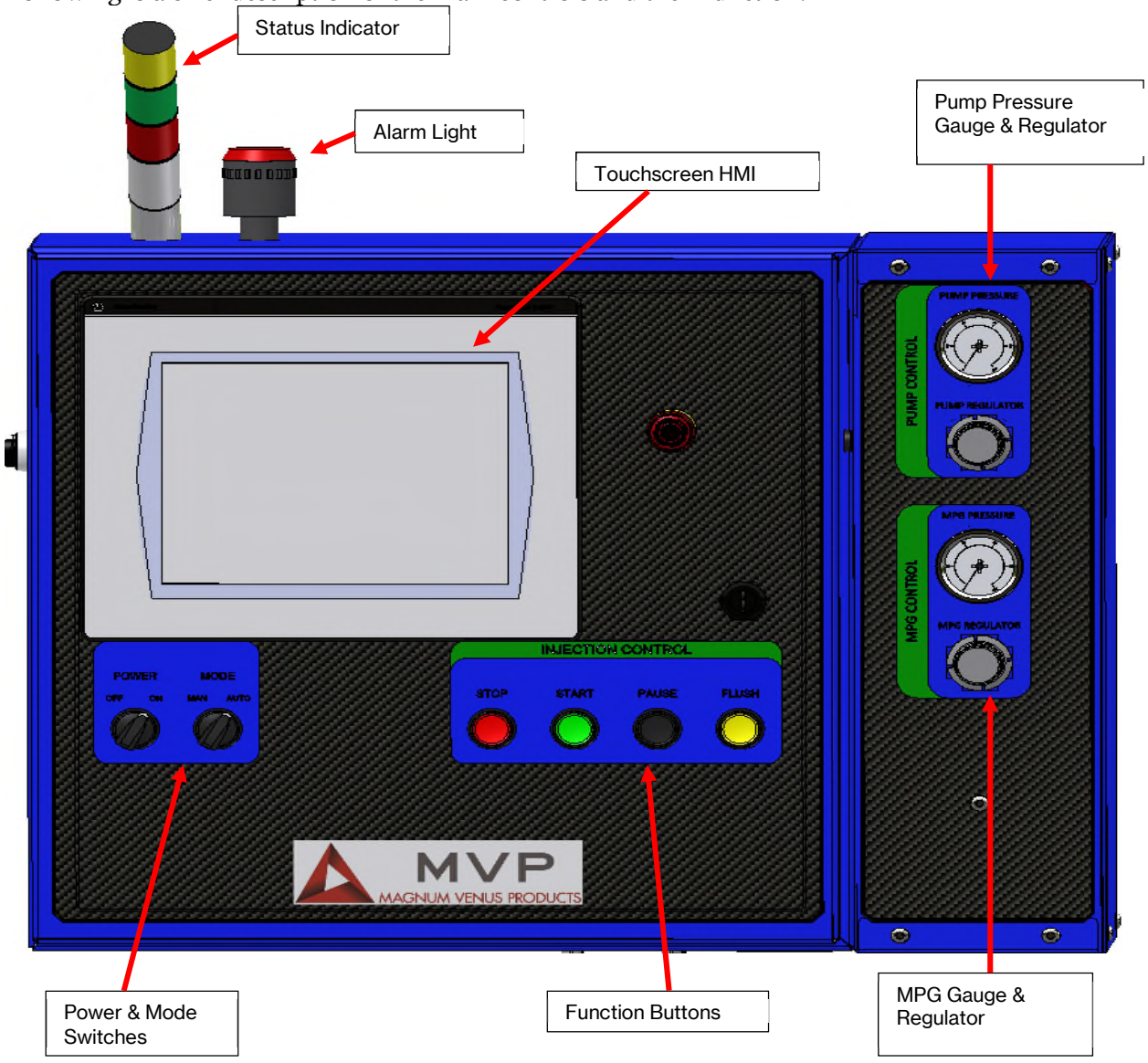
Figure 3 Legend	
#	**Description**
1	Counter Sensor Assembly
2	Catalyst Manifold
3	Catalyst Recirc Block
4	Ultra Proportioner

System Specifications

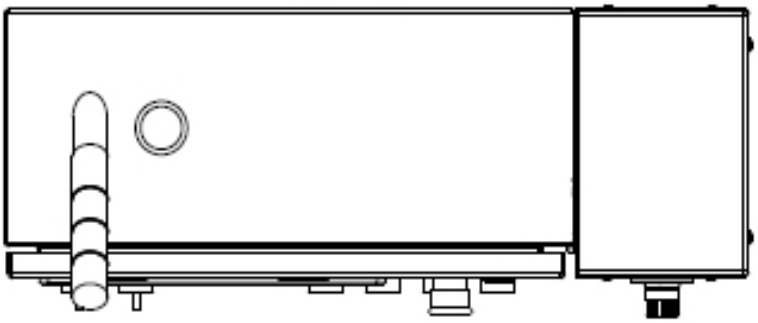
- Output Capabilities: Up to 7.5 lbs./min. (3.4 kg/min.) depending on materials & application
- Catalyst Pressure 0.75% to 2.5% by volume with PAT CP – 0980, 1% – 3% with PAT CP 1530
- Air Consumption 18 CFM/150 ltrs
- Maximum Air Input Pressure 100 psi (7 bar, 0.7 MPa)

Overview of Controls

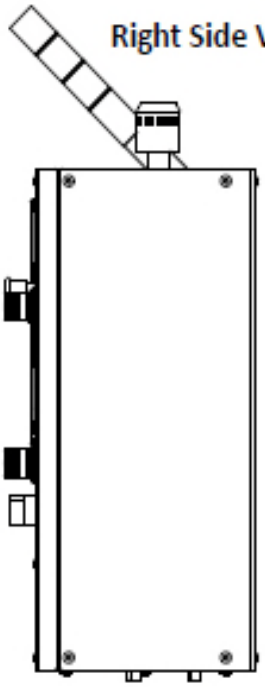
Following is a brief description of the main controls and their function.



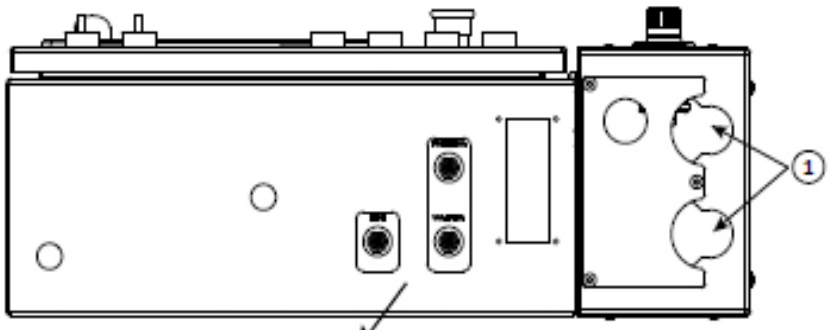
Top View

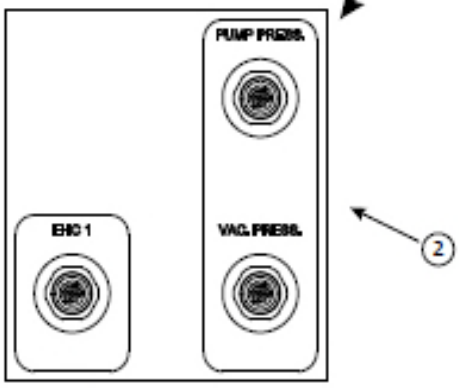


Right Side View

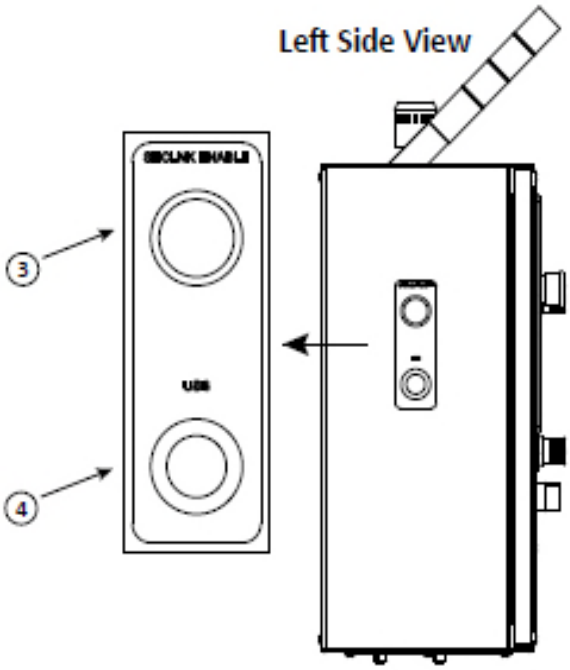


Bottom View





Left Side View



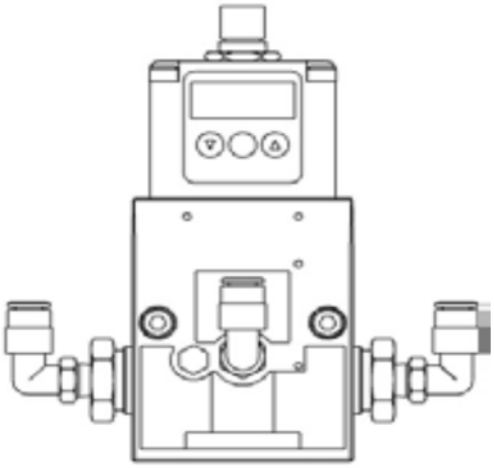
Legend:

1. Input Power
2. Accessory Connections (Optional)
3. SECURE Link enable/disable Switch
4. USB Expansion Port

Note: The bottom of the front panel is protected by a metal cover to protect these lines and connections.

Pneumatic Controls

Electronic Pump Pressure Control



The electronic pump pressure control (EPPC) allows the user to insert pump pressure settings into the recipe on the PLC. The EPPC is placed in line with the manual pump pressure control and sets the pressure automatically when a recipe is recalled via the touchscreen. This allows different injection pressures for different parts to be recalled with no input from the operator.

Note ***The EPPC is located in the control cabinet and is accessible via removable panel.***

Manual Pump Speed Control

If the EPPC regulator option is not ordered, then the pumping system pressure/speed must be controlled manually via the regulator on the front panel, and the gauge displays the input pressure to the pumping system powerhead.

Note ***If the EPPC option is ordered, then the manual regulator must be set to 100 psi at all times.***

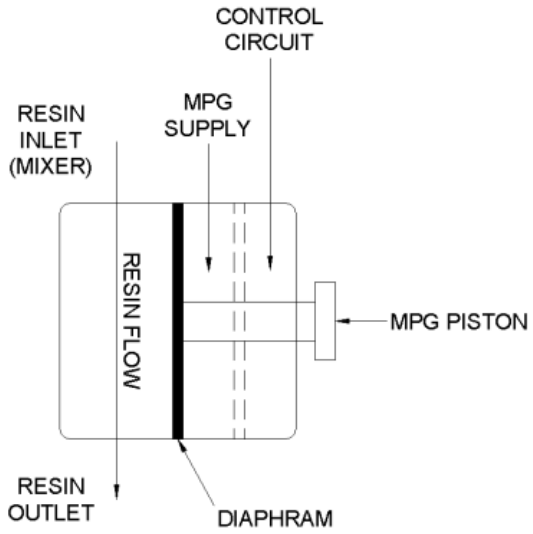
Manual Mold Pressure Guard Control

The unit features a mold pressure guard (MPG), which is used to control the maximum allowable pressure at the mixing head. The MPG can be used to provide line pressure control during an injection or as a safety mechanism to prevent the line pressure from exceeding the maximum working pressure of the injection line to the mold.

The MPG block is supplied with 2 air lines:

- Supply air from the MPG pressure regulator on the control panel
- Air line to an internal circuit on the control system

The fluid override pressure is set via the regulator and gauge on the panel. When fluid pressure at the injection head exceeds the MPG preset level, the internal diaphragm moves the MPG piston outward and leaks air from the line connected to the control circuit.



Note ***It is normal to hear air leaking from the MPG block when the MPG is operational.***

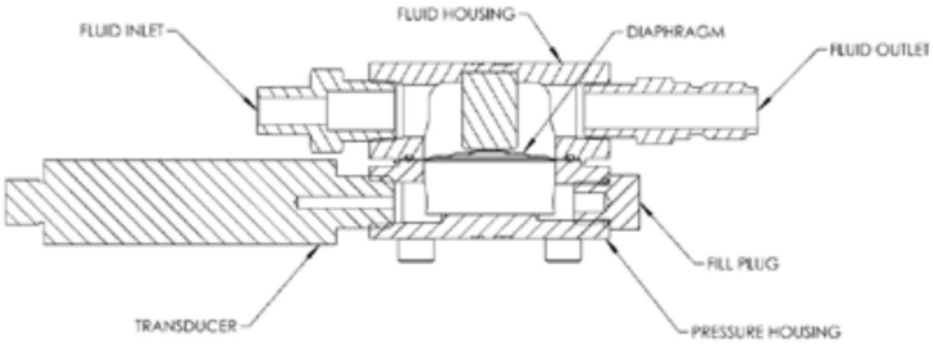
As the level/flow of air pressure is reduced by the MPG piloted regulator, the supply pressure to the pump is reduced, slowing or completely stopping the system. When the pressure is restored, either by fluid being drawn into the mode, recirculation engaged, or blockage being cleared from the output line, the system will start up again.

Note ***The MPG reaction time is factory set and should not be adjusted.***

Electronic Mold Pressure Guard Control

The electronic mold pressure guard (EMPG) is a device that measures back pressure on the outbound side to the injection port. As fluid passes through the fluid housing and pushes on the internal diaphragm, the diaphragm in turn pushes on a fluid filled chamber which translates the pressure to the PLC via transducer. When set up properly, the PLC will then start or stop the injection cycle at high and low pressures based on the reading from the EMPG. This allows the unit to inject maximum flow into the port for a faster feed.

Note ***The connection from the fluid outlet to the injection port must be kept as short as possible to ensure the unit is reading the port pressure and not back pressure from the hose.***

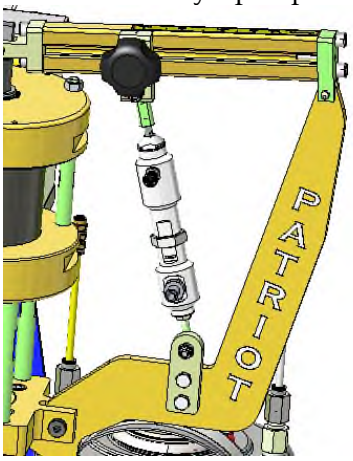


Setting Up the Unit

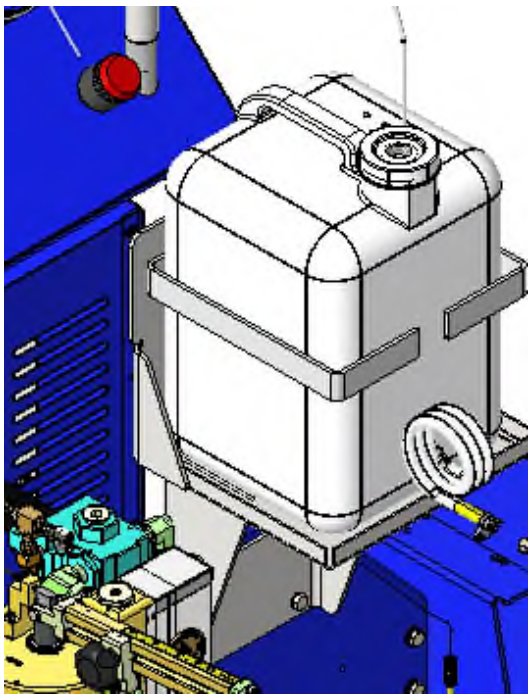
CAUTION

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.
2. Install the catalyst pump onto the slave drive assembly at the desired percentage.



3. Mount the catalyst jug bracket and install the catalyst jug.
4. Attach the catalyst feed tube between the catalyst jug outlet and catalyst pump inlet.



Note ***Trim the feed tube as necessary to keep it always flowing up to the catalyst jug outlet.***

5. Install the catalyst leak control tube from the top of the catalyst pump to the port in the catalyst jug.
6. Connect the catalyst hose from the catalyst pump outlet to the injection head.
7. Attach pick-up hoses to the inlet of the pump.
8. Place the flush tank in the holder and attach air hose.
9. Connect the yellow flush tube from the injection head to the flush tank.
10. Fill the flush tank ¾ full of solvent.

Note ***Do not fill the flush tank more than ¾ full or solvent can leak into the air system and cause damage.***

11. Double check that all hose fittings and connections are tight.
12. Torque the powerhead tie rod nuts as follows:
    - Torque nuts 1, 2, 3, and 4 (as shown in the diagram) to 5 - 7 ft lbs.
    - Torque nuts 5, 6, 7, and 8 to 15 ft lbs.
    - Torque nuts 9, 10, 11, and 12 to 23 ft lbs.

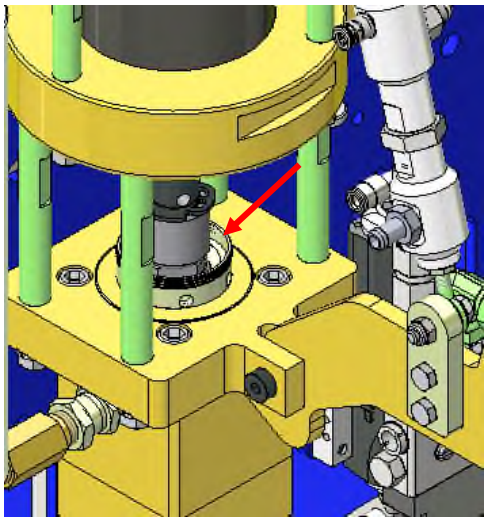
Figure 4. Powerhead & Fluid Section Torque Sequence

13. Apply removable thread locking compound to the fluid section tie rod bolts.
14. Torque the fluid section bolts as follows:
    - Torque bolts 1, 2, 3, and 4 to 5 – 7 ft lbs.
    - Torque bolts 5, 6, 7, and 8 to 20 ft lbs.
    - Torque bolts 9, 10, 11, and 12 to 30 – 32 ft lbs.

Connect Electrical

The Innovator Plus System comes standard with a 10-foot power cord for use with 110 VAC or 220 VAC. If the EHC-X option is installed, the unit must be power at 220 VAC. Refer to the reference label on the panel for electrical connections.

Due to the variety of electrical codes, MVP does not supply connections to any of the heaters available. The electrical connection must be made by a qualified electrician per the codes of the local jurisdiction.



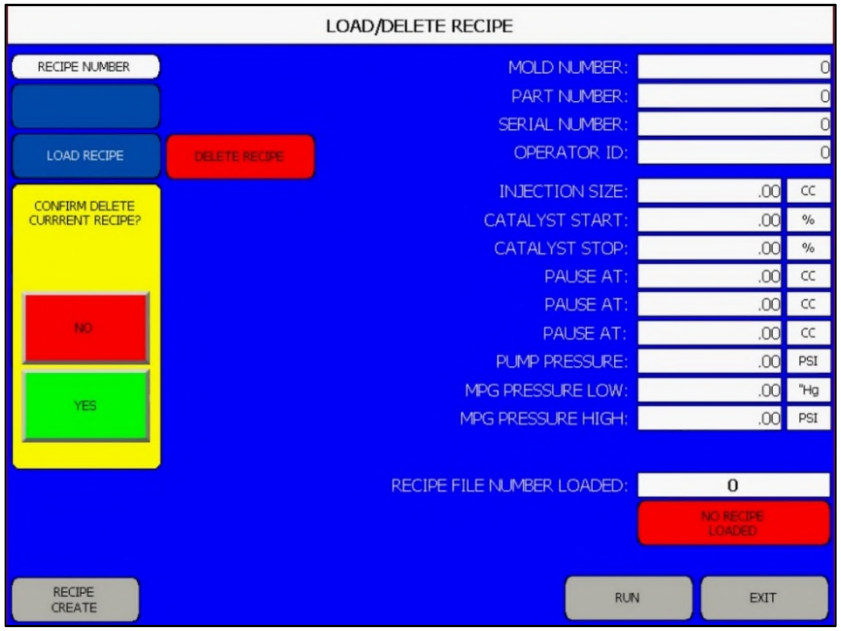
Perform Pre-Start Checks

15. Gather all tools and materials needed for the job.
16. Check all catalyst and resin fittings to be sure they are tight.
17. Fill the pump packing nut $^1/_3$ full with TSL oil or equivalent.
18. Fill the catalyst jug at least ½ full of appropriate catalyst.
19. Check the connection of the pick-up wand to the pump inlet to make sure it is tight.
20. Place the resin pick-up wand in the resin supply container.
21. Make sure the flush tank is ¾ full of solvent.
22. Place an appropriate waste container under the injection head.
23. Connect the 6 mm air line to the air supply.
24. Slide the air valve to the **open** position.
25. Release the E-stop to allow machine operation.
26. Press the flush button to test the flush system.

Load a Recipe

1. From the startup screen, select 

.
2. Select the desired recipe number.
3. Select Load Recipe.
4. When the recipe is ready for the injection cycle, the status indicator display changes to **RECIPE LOADED**.

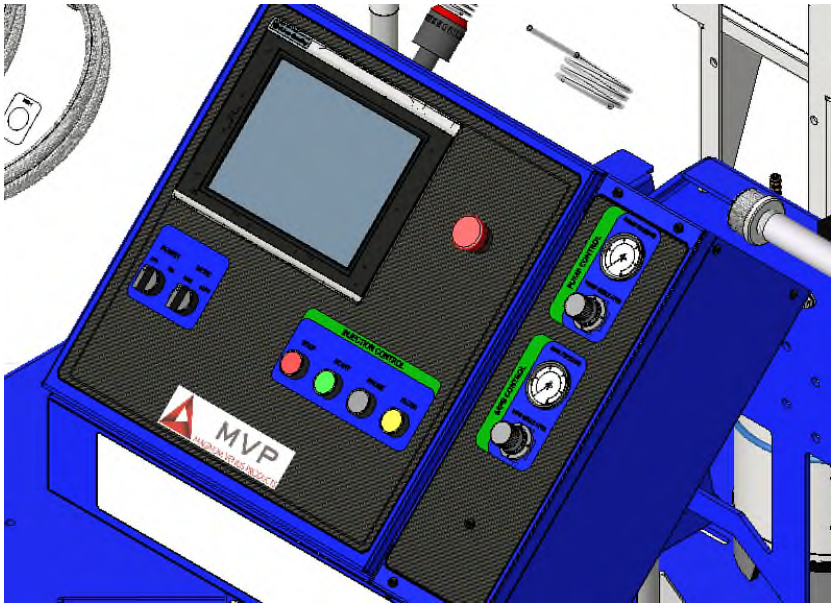


Recipe Load Screen Fields	
Field	**Description**
Mold Number	The injection tool tracking identifier (RFID only)
Part Number	Part tracking identifier (barcode only)
Serial Number	Serial tracking identifier (barcode only)
Operator ID	Operator tracking identifier (barcode only)
Injection Size	Material quantity to dispense
Catalyst Start	Hardener start percentage (PSD only)
Catalyst Stop	Hardener stop percentage (PSD only)
Pause At	Point at which the injection cycle pauses. There are 3 pauses available during the injection.
Pump Pressure	Pressure to supply the injection pump (EPPC only)
MPG Pressure Low	Low setting of the EMPG to restart injection process (EMPG only)
MPG Pressure High	High setting of the EMPG to stop the injection process (EMPG only)

First Time Start Up

If the system has been used previously, skip to Daily Start Up.

5. Turn the pump regulator to zero (0).
6. Adjust the catalyst percentage using the slave arm knob.
7. With all the material containers properly filled, press the recirculation button on the control panel.
8. Slowly increase the pump regulator until the pump begins to stroke slowly and evenly.
9. Allow the pump to recirculate until the flow of resin and catalyst back to their respective containers is free of air bubbles.
10. Press the **Stop** button to take the unit out of recirculation mode.
11. Place a suitable waste container under the injection head and press the **Inject** button.
12. After 4 or 5 strokes of the pump, press the **Stop** button.
13. Check to make sure the material properly cures.



14. Properly dispose of the dispensed material.
15. Flush the injection head as necessary.

WARNING

Do not load a recipe while injecting.

Performing Daily Tasks

Daily Start Up

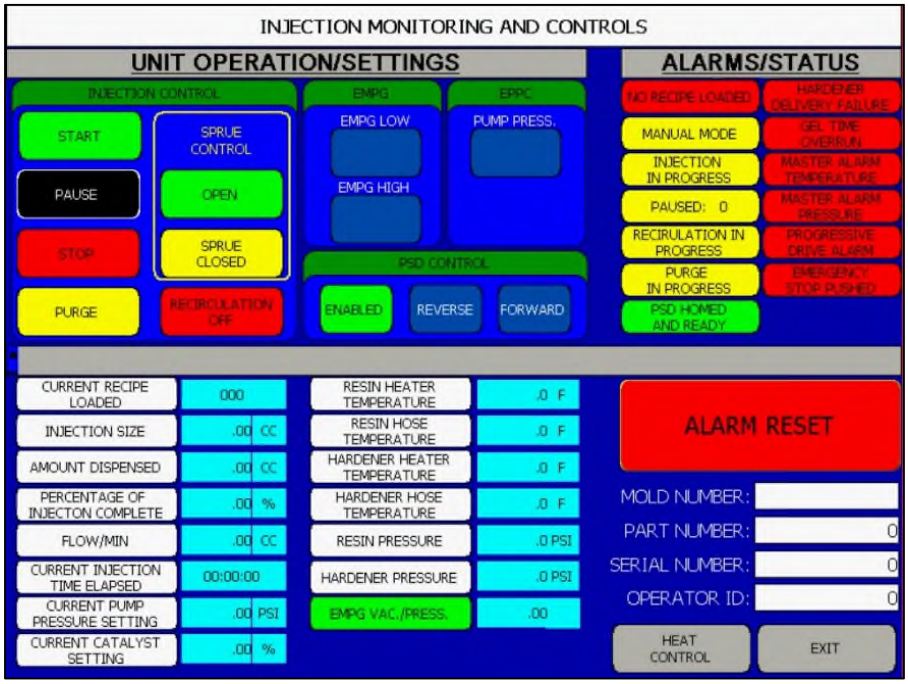
1. Check all hoses for wear or damage; replace as needed.
2. Check all material supplies and fill or replace as needed.
3. Open the main air supply slide valve on the back of the control box.
4. Verify pump pressure to ensure the pump is not damaged.
5. Check that the catalyst percentage is set properly.
6. Check the resin pump pressure and adjust as necessary.
7. Check the mold pressure guard (MPG) set pressure and adjust as necessary.
8. Set the desired number of strokes on the counter display.
9. Press the **Recirculation** button and allow the unit to recirculate for at least 20 strokes or until no bubbles are seen returning to the catalyst jug from the recirculation tube.
10. Press the **Stop** button to take the unit out of recirculation mode.
11. Place an appropriate waste container under the injection head and press the **Inject** button.
12. Pump for 2 to 3 strokes, then press the **Stop** button.
13. Perform a gel test and balance the fluid pressures.
14. Press the reset button on the counter to return to zero.
15. Flush the injection head as necessary.

Inject a Part

16. Connect the injection hose to the injection head.
17. If using a turbo autosprue (TAS), PPVS, or other option, connect the control line to the control box.
18. Press the **Start** button.

Note ***Both the EMPG and EPPC settings are loaded from a recipe. Once the unit has started injecting, the settings may be adjusted manually via the HMI Injection Control screen.***

19. Monitor the injection status via the HMI.



20. If any fields change to red and/or an alarm sounds, address the error and press **Alarm Reset**.

Note ***The Injection Monitor screen displays real-time data from the injection process. Red fields indicate an error separate from the master alarm indicators. Pressing the Alarm Reset will deactivate the alarm for a pre-configured amount of time. If the alarm was not addressed or remained active after the reset window passed, it will sound again.***

21. When injection is complete, press **Stop**, then the **Reset** button on the counter.
22. Connect the next part or flush the system.
23. Flush the injection head as necessary.

Daily Shut Down

24. Close the TAS or pinch the injection hose to close the mold.
25. Press the **Reset** button on the counter to reset the counter.
26. Flush the injection head and hose or TAS.
27. Disconnect the injection hose or TAS from the injection head.
28. Turn off the main air slide valve on the back of the unit.

Maintaining the HMI

Calibrate Touch Screen

Over time objects and images on the display screen may not display as well as they did originally. This is a normal maintenance issue with a touch screen and is easily fixed. Use a

plastic stylus device with a minimum tip radius of 1 mm (0.040 in.) to prevent damage to the screen.

1. Click **Display** on the menu list.
2. Click Calibrate Touchscreen.
3. Briefly press and hold the stylus on the center of the target and repeat as the target moves around the screen.
4. Click the **OK** message within 30 seconds to accept the changes.

Replace the Battery

The HMI terminal contains a lithium battery to provide backup for the real-time clock. It is not used for application backup or retention.

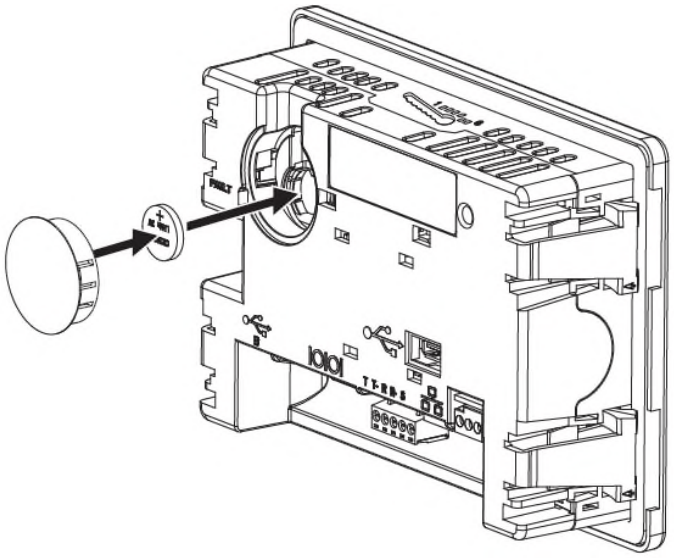
WARNING

Shut off power before beginning any service.

Work in a static-free area with a grounded electrostatic discharge (ESD) wristband. Avoid touching exposed electronic components to prevent damage from ESD.

The battery is located on the back of the terminal. No special tools are required.

5. Remove the terminal from the unit.
6. Remove the round battery cover on the back of the terminal.
7. Remove the used battery and replace with 2711P-RY2032 or a manufacturer's equivalent (Matsushita or Duracell DL2032).
8. Dispose of used batteries in accordance with local regulations.



Troubleshooting

HMI Panel

If the terminal does not start up correctly, check for:

- Adequate power
- State message or status codes
- Indicator states

- An application that is not running during power up
- Reverse any terminal changes since the last successful startup

Resetting Unit to Initial Settings

Returning a terminal to its initial settings does not affect the firmware version or the installed font image. On the subsequent boot after resetting, the file system is formatted, removing applications, logs, recipes, user-installed fonts, objects, and graphics. Most terminal configuration parameters are returned to their default values. To reset the terminal, follow these steps:

1. Connect an external USB keyboard to the terminal.
2. Hold the Ctrl and Shift keys simultaneously while starting up the terminal.
3. In the dialog box that appears, press Yes or F1 to return to out-of-box condition.

Unit Troubleshooting

The most common problems with equipment are diagnosed by analyzing the cured part. Follow the guidelines in the table below to troubleshoot issues with output.

System Troubleshooting		
Symptom	**Possible Cause**	**Remedy**
Slow cure during upstroke	SS ball in catalyst pump piston body not seating	Clean ball and inspect seat. Replace ball, piston seal, or piston body as needed.
Slow cure during downstroke	SS ball in catalyst pump inlet body not seating	Clean ball and inspect seat. Replace ball or have seat repaired as applicable.
	Catalyst check valve not working correctly	Inspect the catalyst check valve and repair or replace as needed.
No cure or slow over-all cure	Catalyst pump set at too low or too high a percentage	Move catalyst pump to a higher setting (closer to the gel coat pump). Verify the catalyst pump is vertical.
	Catalyst supply below outlet fitting on jug	Fill catalyst jug at least 1/3 full
	Quick pin not attached to pump or slave arm	Install quick pin. Install catalyst pump in vertical position.
	Catalyst leak	Check all fittings. The catalyst system must be fluid tight
	Catalyst relief valve on catalyst pump leaking	Relieve pressure from pro pump. Clean and repair the relief valve
	Catalyst suction screen in jug clogged	Clean screen and verify catalyst supply is not contaminated; replace as needed
	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)
No cure or slow over-all cure	Catalyst pump outlet body damaged	Replace catalyst pump outlet body and piston seal. During reassembly, verify spring in seal faces top of pump and reconnect catalyst pump vertically
	Catalyst pump check valve blocked or stuck	Disassemble check valve and remove blockage

System Troubleshooting		
Symptom	**Possible Cause**	**Remedy**
	Catalyst hose plugged	**Relieve pressure from system** and replace hose
	Gel coat too cold	Consult materials supplier for proper temperature. Maintain a draft-free environment of about 70°F. An auxiliary heat source may be required to reduce gel time.
	Piston cups, piston ball, or pump cylinder worn	Inspect the piston cups, piston ball, and pump cylinder. Clean and replace any damaged components.
No fan, constant low output, or fast cure	Resin filter clogged	Disassemble and clean filter body and screen with solvent
	Resin hose plugged	**Relive pressure from system** and then flush hose with solvent. If material is hardened, replace hose.
	Leaking pick-up wand assembly	Tighten assembly fittings
	Resin filter clogged	Disassemble and clean the resin filter
	Material cold or air pressure low	Heat material or increase pump pressure
Low output on upstroke of Pro Pump	Clogged pump pick-up wand screen	Unscrew screen from hose and clean
Narrow fan	Material cold, nozzle too large, or air pressure low	Heat material, use smaller nozzle, or as a last resort increase pump pressure
	Resin filter clogged	Disassemble and clean the resin filter
Wide fan	Air pressure too high	Lower pressure then increase pressure until you reach the desired fan
	Nozzle too small or too wide	Change nozzle
Round fan	Orifice in nozzle worn, clogged, or damaged	Insert a thin wire through the rear face of the nozzle orifice. Clean material from V shaped notch in front. If notch is worn or rough, replace nozzle. Soak off hardened material in solvent.
	Air-assist pressure too high	Decrease air-assist pressure
Excessive misting	Pump air pressure too high	Reduce air pressure to gel coat pump
Heavy pulsation	Resin accumulator plugged	**Relieve pressure from 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 is damaged or dirty	Clean or replace foot valve, spring retainer, and foot valve ball. 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

System Troubleshooting		
Symptom	**Possible Cause**	**Remedy**
Low output on upstroke	Piston cups, piston ball, or pump cylinder worn	Inspect the piston cups, piston ball, and pump cylinder. Clean and replace any damaged components
Pump does not run	Silencers on valve block plugged	Turn off air to pump and unscrew silencers. Clean silencers and reinstall
	Actuator valve or socket cap screw at shift block broken	Replace the broken cartridge valve or socket cap screw
	Pro pump or hose plugged	**Relieve fluid pressure from the system** and disassemble and clean the Pro pump. Replace any worn parts. Replace hoses as needed.
	Air not connected	Check that air hose is connected to manifold and regulator is at 20 psi or more
	Air restricted	Straighten any kinks in air hoses
Material in oil reservoir	Packing worn	Replace packing set in lower part of the pump
	Piston rod worn or scored	Replace piston rod
No gelcoat delivery on downstroke	Foot valve, spring retainer, or foot valve ball damaged or dirty	Clean or replace foot valve, spring retainer, and foot valve ball. Be sure to lubricate ball thoroughly
Hose leaks at fittings	Fitting loose	Tighten fitting. Check all fittings for leaks before operating
	Fitting or nipple damaged	**Relieve fluid pressure from the system** then inspect and replace damaged parts.
	Crimped hose	**Relieve fluid pressure from the system** then inspect and replace damaged parts. If the hose has been sharply bent, the plastic liner may be ruptured and should be replaced
Slow cure on one side of the fan	Turbulent mixer clogged or damaged	Clean or replace turbulent mixer
	Distribution ring partly clogged	Remove the mix chamber and clean the distribution ring
	Mix housing damaged	Inspect and replace as needed
Heavy lines in the spray fan (fingers)	Gelcoat too cold	Increase gelcoat temperature. Use in-line resin heater
	Pump air pressure too low	Slowly increase the pump pressure in 5 psi (0.5 bar) increments and recheck spray fan
	Air-assist pressure too low	Slowly increase air-assist pressure as needed
Pump has short travel, stuttering near top or bottom of stroke	Valve block not shifting all the way or 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 valve as needed

Clearing Catalyst Pump Air Lock

An air lock is a bubble in the catalyst pump that prevents catalyst flow. The piston body moves inside the bubble of air instead of pumping catalyst. If you determine that there is an air lock in

your catalyst pump, you will need to clear it to continue operation. If your unit has the Pro-Recirc option installed, you can open the recirculation valve and hand prime the catalyst back to the jug until the flow is bubble-free.

To clear the air lock without using the optional Pro-Recirc, follow these steps:

4. Relieve line pressure from the catalyst pump by locking the gun open over an appropriate empty waste container and leaving in this position.

WARNING

Fluids under high pressure. Before performing any service or repair on this equipment, be sure to relieve air and fluid pressure.

5. Relieve pressure from the catalyst pump.
6. Place a rag over the hose and fitting of the catalyst hose, then loosen and remove the hose from the nipple on the catalyst pump.
7. Remove the pin from the catalyst bearing block and upper slave arm.
8. Tilt the catalyst pump toward the resin pump to release the air bubble.

Note ***If the bubble does not appear in the inlet tube, remove the lower quick pin and turn the pump upside down.***

9. Slowly hand pump the catalyst into a suitable container until catalyst spurts from the nipple an equal amount on both the upstroke and downstroke.
10. Reconnect the catalyst hose to the nipple.
11. Hand pump the catalyst pump until catalyst comes out through the gun.
12. Reattach the pump to the slave arm and close the gun.