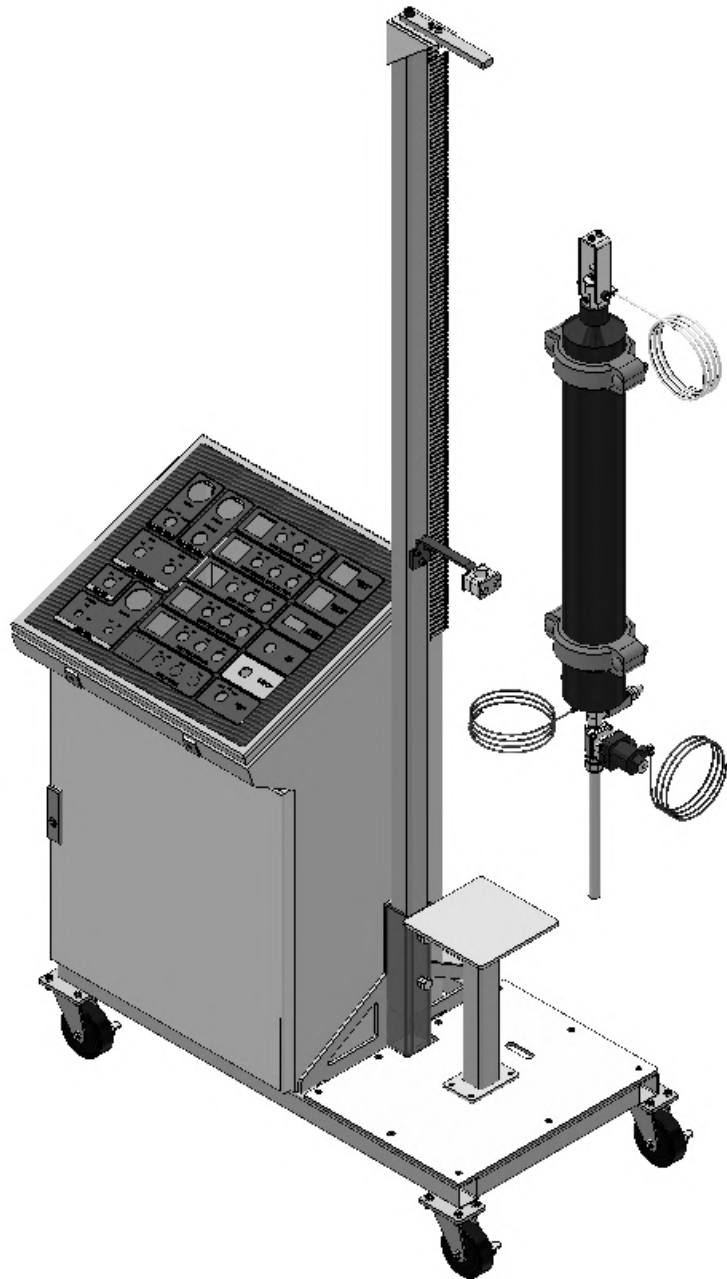


Hypaject MKIII Injection Unit

Operations Manual

This manual is applicable to the following models:

- 2064 Hypaject MKIII





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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.

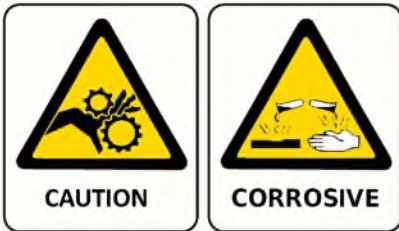
Safety Precautions

- 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 and cyclo-aliphatic amines	Eyes, skin	Severe irritation, contact dermatitis
Polyaminoamide	Eyes, skin	Irritation (sensitization)
Anhydride	Eyes, lungs, skin	Severe eye and skin irritation, respiratory sensitization, contact dermatitis

Catalyst - Methyl Ethyl Ketone Peroxide (MEKP)

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



WARNING

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

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

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

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

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

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

Clean-Up Solvents and Resin Diluents



WARNING

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

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

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

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

**WARNING**

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

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

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

Catalyst Diluents

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



WARNING

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

Cured Laminate, Overspray and Laminate Sandings Accumulation

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

To prevent spillage and leakage, you should:

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

Toxicity of Chemicals

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

Equipment Safety

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



CAUTION

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



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 Hypaject MKIII Injection Unit. The following procedures are included:

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



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

The machine is designed primarily for the injection of pre-mixed and single component resin systems. It may be used to inject a wide variety of thermoset resin systems, including polyesters, vinyl esters, phenolics, multi-component epoxies, and single component epoxies.

**WARNING**

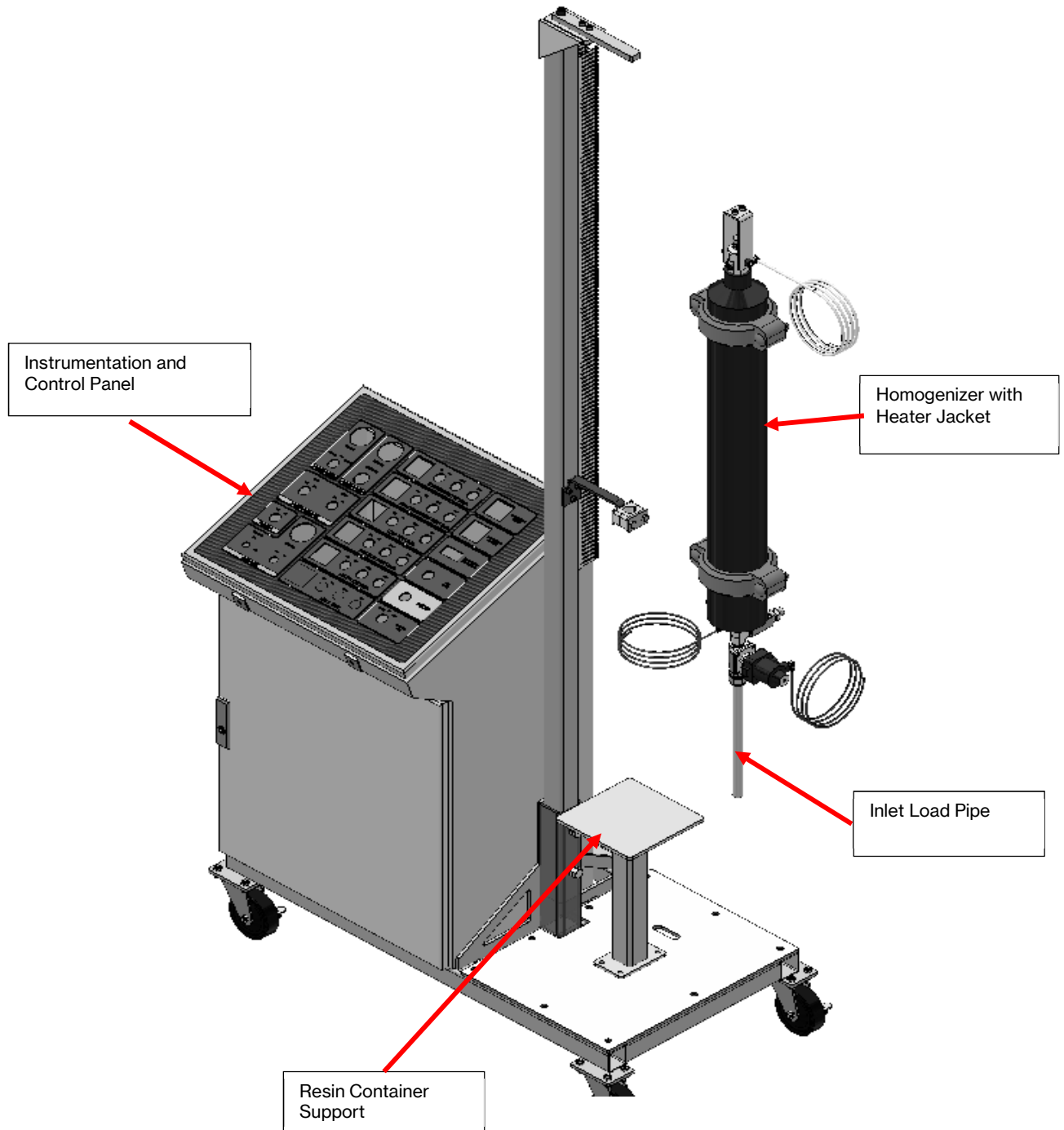
All fittings, components, seals, and hoses are selected and fitted specifically to this machine to ensure that they are compatible with fluid materials to be used. Never replace factory fitted parts with non-MVP components. Stainless steel or plastic fittings MUST NOT be replaced during service. Contact between an organic peroxide catalyst and fittings of a non-compatible material can cause a violent reaction or explosion.

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

Basic Operating Concept

The Hypaject is a non-mixing pressure dispensing Resin Transfer Molding (RTM) unit offering universal application for injecting mixtures of any liquid resins/catalysts into an RTM mold. The maximum volume that can be injected without interruption is 6 liters.

During operation, the unit's main holding tank (the homogenizer) is filled with the desired amount of resin matrix using an internally generated vacuum source. The resin is then actively degassed with the homogenizer vacuum. Once the resin has degassed, the homogenizer is pressurized and the resin is injected into the RTM mold using a diaphragm valve for control.

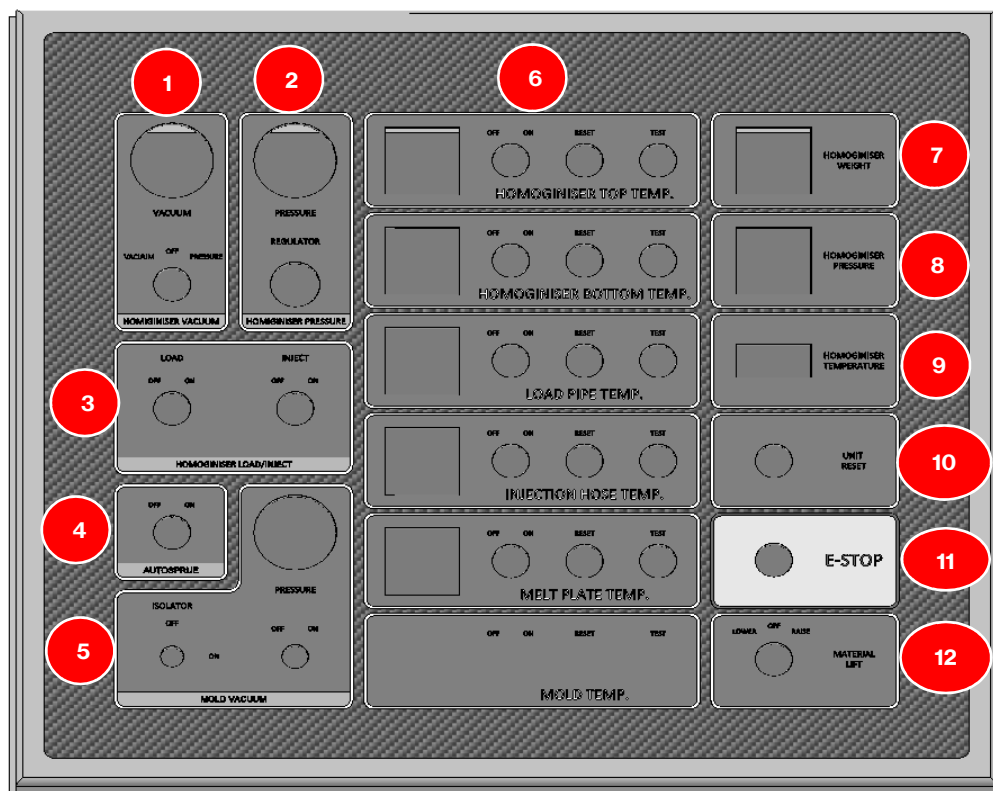
Optional Components

The following additional options are available to customize the Hypaject:

- ☐ 2 CHANNEL HEATER OPTION WITH P.I.D. CONTROL (2X BAND HEATERS ON HOMOGENIZER)
- ☐ 3 CHANNEL HEATER OPTION WITH P.I.D. CONTROL (2X BAND HEATERS ON HOMOGENIZER AND HEATED OUTLET HOSE)
- ☐ 5 CHANNEL HEATER OPTION WITH P.I.D. CONTROL (2X BAND HEATERS ON HOMOGENIZER, HEATED OUTLET HOSE, AND HEATED MELT PLATE WITH AUTO-HEIGHT CONTROL AND HEATED INLET TUBE)
- ☐ PNEUMATIC LOAD PLATE WITH RAISE/LOWER CONTROL
- ☐ DIGITAL PRESSURE/VACUUM READOUT UNIT PLUS PRESSURE SENSOR
- ☐ DIGITAL WEIGHT READOUT UNIT PLUS LOAD CELL
- ☐ INTERNAL HOMOGENIZER THERMOCOUPLE
- ☐ TEMPERATURE READOUT FOR THERMOCOUPLE
- ☐ MOLD VACUUM SERVICE
- ☐ EXTERNAL PRESSURE SOURCE
- ☐ EXTERNAL VACUUM SOURCE
- ☐ SPARES KIT
- ☐ DATA LOGGING CONNECTOR FOR MONITORING TEMPERATURE ZONES AND PRESSURE WEIGHT OPTIONS (IF FITTED)

Overview of Controls

Following is a brief description of the main controls, their location, and their function. All options are described. Your unit may have some controls blanked out depending on the options configured for your machine.



Hypaject Control Panel		
No.	Description	Function
1	Homogenizer Vacuum Gauge and Pressure Switch	Measures the vacuum level in the homogenizer when under vacuum; switches between operating under vacuum or operating under pressure. Releases vacuum or pressure when in off position
2	Homogenizer Pressure Gauge and Regulator	Adjusts and measures homogenizer pressure. Note <i>Control knob locks when pushed down. Release for adjustment by pulling upward and turning clockwise to increase pressure.</i>
3	Load and Injection Valves	Operates the load and injection valves, respectively.
4	TAS Open/Close	Operates the mold turbo TAS, allowing resin to flow into the mold or drain pipe
5	Mold Vacuum Generator Switch, Gauge, and Isolator	Controls and monitors mold vacuum option

Hypaject Control Panel		
No.	Description	Function
6	Heater Zone Controls	Each optional zone consists of: <ul style="list-style-type: none"> • Temperature PID Controller to adjust set-point and over temperature trip setting • Circuit Test Button to test the fault circuit • Fault/Reset button/lamp to indicate if fault is present or heater is over temperature
7	Homogenizer Pressure / Vacuum Digital Indicator	Readout indicates pressure in homogenizer
8	Homogenizer Weight Readout	Indicates weight of homogenizer assembly and weight resin mixture
9	Internal Thermocouple Readout	Indicates temperature sensed by thermocouple probe mounted in lower homogenizer block
10	Emergency Stop Reset Button	Must be pressed to provide power once the emergency stop button has been pulled up to reset.
11	Emergency Stop Button (E stop)	Cuts electrical power to heaters and pneumatic power to unit
12	Resin Load Platform Control	<p>Turn left to lower the resin platform, right to raise the platform and to the center to hold resin platform in place.</p> <p>Note <i>When the up command is given the platform will raise automatically until the melt plate sensor signals the resin level has reached the optimum loading height for the melt plate. At this point, the load platform will stop and lock. As the resin is drawn into the homogenizer and the level reduces, the automatic control will raise the platform to adjust accordingly.</i></p> <p>Note <i>The platform is raised by an air cylinder mounted to the base and set to the lowest pressure possible. If required, adjust the air pressure using the regulator on the left side of the control cabinet.</i></p>

Connections

All connections on the rear of the control cabinet are labelled and marked. The following table describes the fittings on the rear of the cabinet.

Hypaject Cabinet Connections	
Description	Function
Homogenizer Thermocouple Connector	Provides input from the homogenizer thermocouple to the homogenizer readout unit (option)
Mold Vacuum Connection	6 mm quick fit connector for mold vacuum output (option)
External Pressure Source	6 mm connection port for external machine pressure source (max 10 bar). Allows alternative gasses to be used (such as argon) (option)
External Vacuum Source	6 mm quick fit connector enables external vacuum sources to be connected. Allows greater homogenizer vacuum levels to be achieved (option)
External/Internal Pressure Source Selector	180-degree operation; enables selection of internal or external pressure source (option)
External/Internal Vacuum Source Selector	180-degree operation; enables selection of internal or external vacuum source (option)
Incoming Air	Connection for main air supply
Mains Isolator	Isolates all incoming electrical supply
Heated Zones Option	Power and thermocouple connector for each zone fitted

Getting Started



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. Place the unit in the desired working location, lock the wheels, and connect the resin output pipe to the mold.
2. Make sure the homogenizer pressure regulator is unlocked and turned fully counterclockwise to zero (0).
3. Check the load valve and injection valve are closed.
4. Connect an air supply to the unit.
5. Connect the heated resin outlet hose to the turbo TAS (TAS), if fitted.
6. Connect the TAS red signal line to TAS, if fitted.
7. Operate the TAS open switch to make sure TAS opens and closes, if fitted.
8. Choose one of these options:
 - *If your unit does not have any heating options installed, skip to step*

- *If your unit has any heating options installed;* Follow the steps in the Set Up Electrical section.

Set Up Electrical

9. Check that the heater output switches are turned off.
10. Plug the electrical supply in and switch the mains isolator on.
11. If activated, lift the E stop button and press reset.
12. Operate the TAS open switch and confirm the TAS opens and closes; leave closed after completing this check.
13. Set desired temperatures on all temperature controllers.
14. Place resin container on the platform under the loading pipe and melt plate (if fitted).
15. Allow temperatures to rise to the set point.

Operating the Unit

Set Up High Temp Glass Faced Tool

1. Select the mold cavity thickness required and place the corresponding shims on the mold clamps.

Note ***With no shims the mold has a cavity of 1 mm.***

2. Select the appropriate silicon frame seal for the desired cavity thickness:

Mold Seals	
For this cavity thickness	Use this size seal and matching shims
1 mm – 1.5 mm	Standard fitted seals
2 mm – 2.5 mm	1 mm
3 mm – 3.5 mm	2 mm
4 mm – 4.5 mm	3 mm
5 mm – 5.5 mm	1 mm combined with 3 mm
6 mm	1 mm, 2 mm, and 3 mm combined

3. Make sure the reinforcement you are using can be compressed to the mold cavity thickness selected.
4. Carefully load reinforcement material into the cavity, ensuring the fiber does not pass over the inner seal.
5. Place a 15 mm strip of compressible surface tissue on the two longer sides to prevent easy resin side flow paths from injection point to vents.
6. Close the mold and tighten the clamps (and shims, if required), until each dowel clamp point is solidly against the stops.
7. If using vacuum to assist injection, test to ensure the cavity is vacuum tight using the two corner vent points provided.

Note *If operating the mold at temperatures above 140° F (60° C), you must use 6 mm PTFE pipe to vent the mold cavity. 6 mm nylon pipe can be used if working at lower temperatures. The pipe is retained by the brass fitting and olive situated at each vent point. The vent pipes must be routed the vacuum supply via a suitable vacuum catch pot to prevent excess resin from entering the vacuum pump.*

8. Make sure the mold and machine are at the correct temperature.

Note *Injecting before the correct temperature can cause the mold cavity to expand and result in poor thickness control.*

Load Resin

9. Turn the homogenizer pressure regulator fully counterclockwise to zero (0).
10. Ensure the inject and load valves are closed.
11. Place a resin container onto the load platform in line with the melt plate (if fitted).
12. Operate the load plate switch to up.
13. Switch the homogenizer vacuum/pressure switch to vacuum.
14. Allow the vacuum to rise to maximum indicated on vacuum gauge.
15. Operate the load valve to open and load the required quantity of resin into the homogenizer.



CAUTION

Do not load more than 6000 cc homogenizer capacity. Ensure enough working time is available for the mixture of resin to be used and cleaned from the machine internals before the resin gels.

16. Close the load valve.
17. Allow up to 5 minutes to elapse to allow the loaded volume of resin to degas and reach the pre-set homogenizer zone temperature.
18. Turn the vacuum/pressure switch to pressure.

Inject the Mold



WARNING

Do not open the load valve when the homogenizer is under pressure.

19. Connect injection hose to mold or TAS (if fitted).
20. Use the homogenizer pressure regulator to set the homogenizer pressure to the desired value.
21. Open the TAS, if fitted.
22. Open the inject valve.

Note *Do not close the TAS during injection without first closing the injection valve.*

23. Observe the injection rate and adjust the injection pressure as required.
24. Wait for the mold to fill.
25. If you are using vacuum assisted injection, slowly remove vacuum.

Note ***It is very important to finish the injection with a slight positive pressure on the cavity. Do not close the inject valve until the vacuum has been switched off and allowed to decay.***

26. Close the injection valve to stop the flow of resin.
27. Close TAS, if applicable.
28. Allow the part to cure according to the resin manufacturer's recommendations.

Note ***Continue to monitor the temperature of the mold. It is very important that the mold temperature is constant and does not drop throughout injection and curing.***

Cleaning and Shutting Down



WARNING

Always ensure homogenizer pressure is at zero (0) before opening load valve!

For two component resin systems, skip to

Single Component Systems

1. With the TAS closed, turn homogenizer pressure to zero (0) and allow sufficient time for pressure to decay.
2. Switch the homogenizer to vacuum.
3. Open the inject valve and allow all resin in the injection hose and closed TAS to be drawn into the homogenizer.
4. Place a waste container under the load pipe.
5. Close the inject valve and switch the homogenizer to pressure; ensure pressure is set to zero (0).
6. Open the load valve and allow remaining resin to flow into the waste container.

Note ***If flow is too low, apply a small amount of pressure via the injection pressure regulator (up to 5 psi (0.3 bar)).***

7. Close the load valve and switch the homogenizer to vacuum.
8. Place a container of flushing epoxy (epoxy that has not been accelerated or catalyzed and is liquid at room temperature) onto the load plate and adjust the height to immerse the lower section of the melt plate.

9. Open the load valve and allow a sufficient quantity of flushing epoxy to be loaded.
10. Close the load valve.
11. Open the inject valve and allow a small amount of flushing epoxy to flow through the injection pipe to the waste container and then close the injection valve.
12. With the flushing epoxy inside the homogenizer, turn off all temperature outputs and allow the machine to cool to room temperature.
13. Once cooled, open the load valve and allow all flushing epoxy to drain into the waste container.
14. Close the load valve and remove the waste container.

**DANGER**

Before flushing machine with solvent, ensure that all heated zones are at ambient temperature!

15. Place a container of solvent onto the load plate and adjust the height to immerse the lower section of the melt plate.
16. Switch the homogenizer to vacuum and observe the vacuum level until at least minus 0.8 bar (-12 psi) is reached.
17. Open the load valve and allow a sufficient quantity of solvent to be loaded.
18. Allow solvent to bubble and circulate inside the homogenizer under vacuum for 2 to 3 minutes.
19. Close the load valve.
20. Ensure homogenizer pressure is set to zero (0).
21. Switch the homogenizer to pressure and open the injection valve to allow solvent to drain from the homogenizer into a waste container through the TAS drain pipe.
22. Repeat steps [16](#) through [21](#) as necessary to fully flush the homogenizer.
23. Skip to

Two Component Systems

24. With all valves closed, turn homogenizer pressure to low (5 – 10 psi (about 0.5 bar)).
25. With TAS closed, place the drain pipe into a waste container and secure.
26. Open the inject valve and eject remaining resin mixture into the waste container.
27. Close the inject valve and switch to vacuum.
28. Place a container of solvent onto the load plate and adjust the height to immerse the lower section of the melt plate.
29. Make sure the vacuum level in the homogenizer is at least minus 0.8 bar (-12 psi).
30. Open the load valve and allow a sufficient quantity of solvent to be loaded.
31. Allow solvent to bubble and circulate inside the homogenizer under vacuum for 2 to 3 minutes.
32. Close the load valve.

Maintaining the System



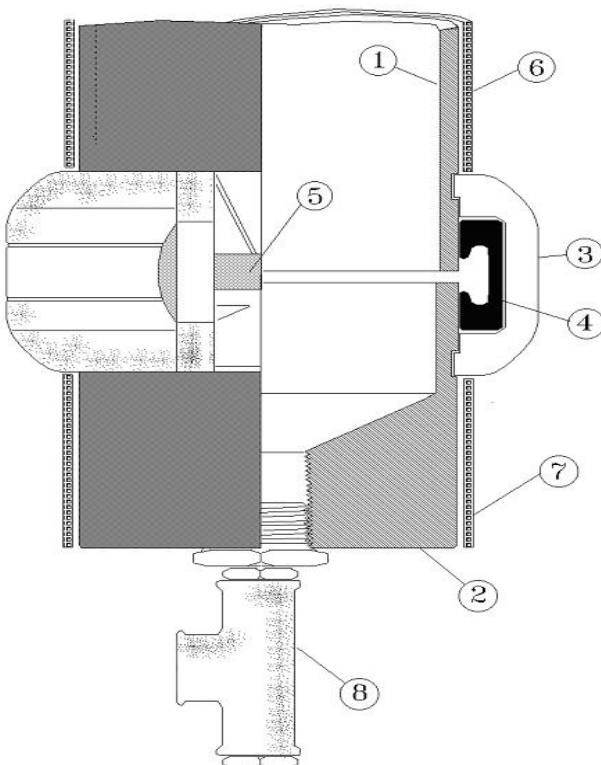
CAUTION

Wear suitable protective clothing, approved eye protection goggles, and chemically resistant gloves at all times when carrying out any maintenance on the system. Solvents and resin may still be present within the unit's internal parts.

1. Disconnect all electrical and pneumatic supplies before commencing any maintenance.
2. Perform the following steps every 12 weeks of constant use:

Resin Homogenizer

3. Carefully prize the two clamp split rings apart while ensuring the lower homogenizer body is supported.
4. Carefully lower the homogenizer lower body while removing the now visible seal.
5. Inspect the homogenizer internals and clean as needed.
6. Reassemble in reverse order.

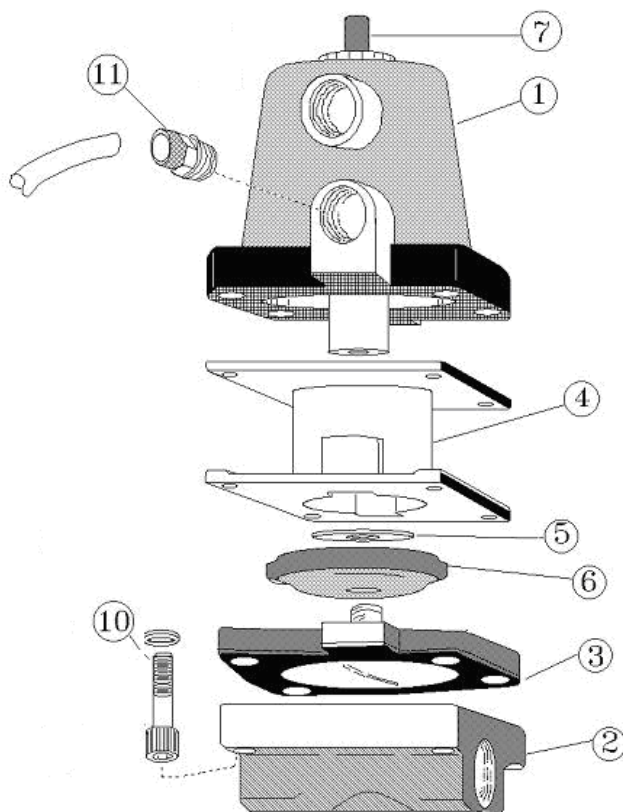


1. Homogenizer main body
2. Homogenizer lower body
3. Seal clamp (x2)
4. HT seal
5. Clamp bolt (x2)
6. Main body heater element (x2)
7. Lower body heater element
8. Resin inlet/outlet fittings

Load and Injection Valves

7. Remove the 4 seat fixing screws to access the valve main diaphragm seals.
8. Lift the actuator body assembly off the valve seat.

9. Remove the diaphragm seal by unscrewing from the actuator shaft.
10. Replace the seal, ensuring the support washer and diaphragm support are correctly assembled onto the seal prior to reinstallation.
11. When reassembling, tighten the screws evenly and firmly to squeeze the seal between the seat and spacer.



1. Valve actuator body
2. Valve seat
3. Valve diaphragm
4. Heat spacer
5. Support washer
6. Diaphragm support
7. Actuator position indicator
8. Not pictured
9. Not pictured
10. Seat fixing screws (x4)
11. 6 mm air fittings (x2)

Melt Plate Option

Note *The Hypaject melt plate has an electrical level sensor connected and must be maintained free of contamination by resin or cleaning solvents.*

12. Check the level at which the sensor stops the lift platform before each use to ensure the melt plate does not immerse in the fluids too far.
13. Set and adjust the two sensor plastic nuts to lower or raise the sensor tip to above the fluid level.
14. Adjust the sensor height so that the automatic lift stops when the fluid is halfway up the melt plate large diameter body and no further.

Note *If the melt plate is not needed when using two component resin systems, remove it from the pipe end and use a simple non-heated load pipe.*