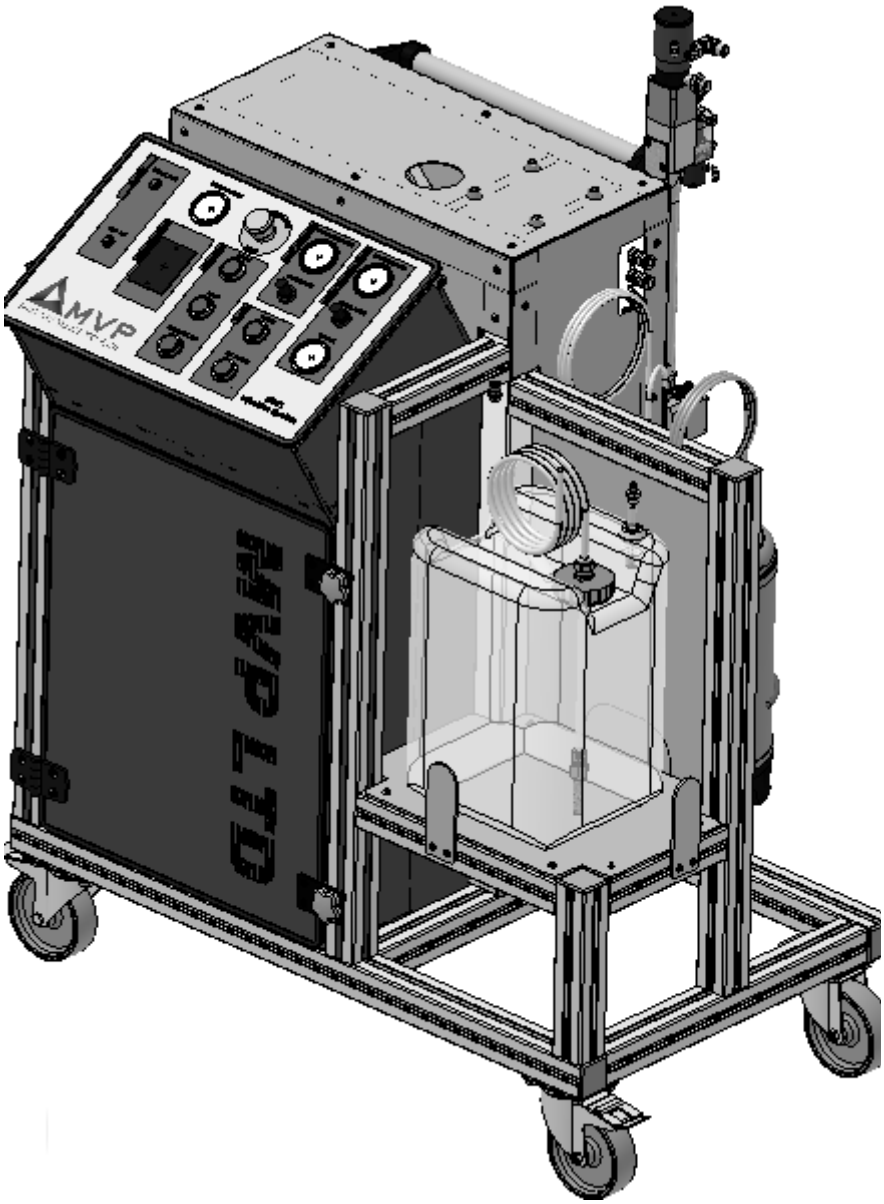
Megaject MKVI Unit

Operations Manual

This manual is applicable to the following models:

- 8071 - Polyester
- 8072 – Epoxy 2:1
- 8073 – Epoxy 1:1
- 8074 - Phenolic



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.

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 Megaject MKVI 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.

Component Assemblies

MVP's Megaject MKVI Unit consists of multiple components and optional items that may or may not be included with your system. It is important to familiarize yourself with your unit to be able to properly operate and maintain it. You may obtain part numbers and drawings at www.mvpind.com/application-support/technical-documnets/product-drawings/.

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.

Resin Heaters

Each CFH-5000 Clean Flow Resin Heater is 4000-watt, 1 PH, 220 Vac @ 18.18 amps.

Optimizing Output

Resin viscosity

High viscosity resins will reduce the potential output of any metering machine for a given power input. Viscosity of the resin can be decreased by:

- Increasing the temperature
- Reducing filler loadings
- Using viscosity modifiers

Pipe Work Restriction

Fitting larger bore output hoses or reducing the hose length can improve output of the machine. This is an important factor if long hoses (greater than 4 meters) or higher viscosity resins are used.

Fillers

When using fillers, it is essential the filler is well-mixed and not allowed to settle over time. You may use a tank agitator or regularly re-circulate the resin. Frequent re-circulation may reduce pump seal life. Filler particle sizes of 5 µm or less are recommended. If filter blockage is occurring, switch to a larger mesh size.

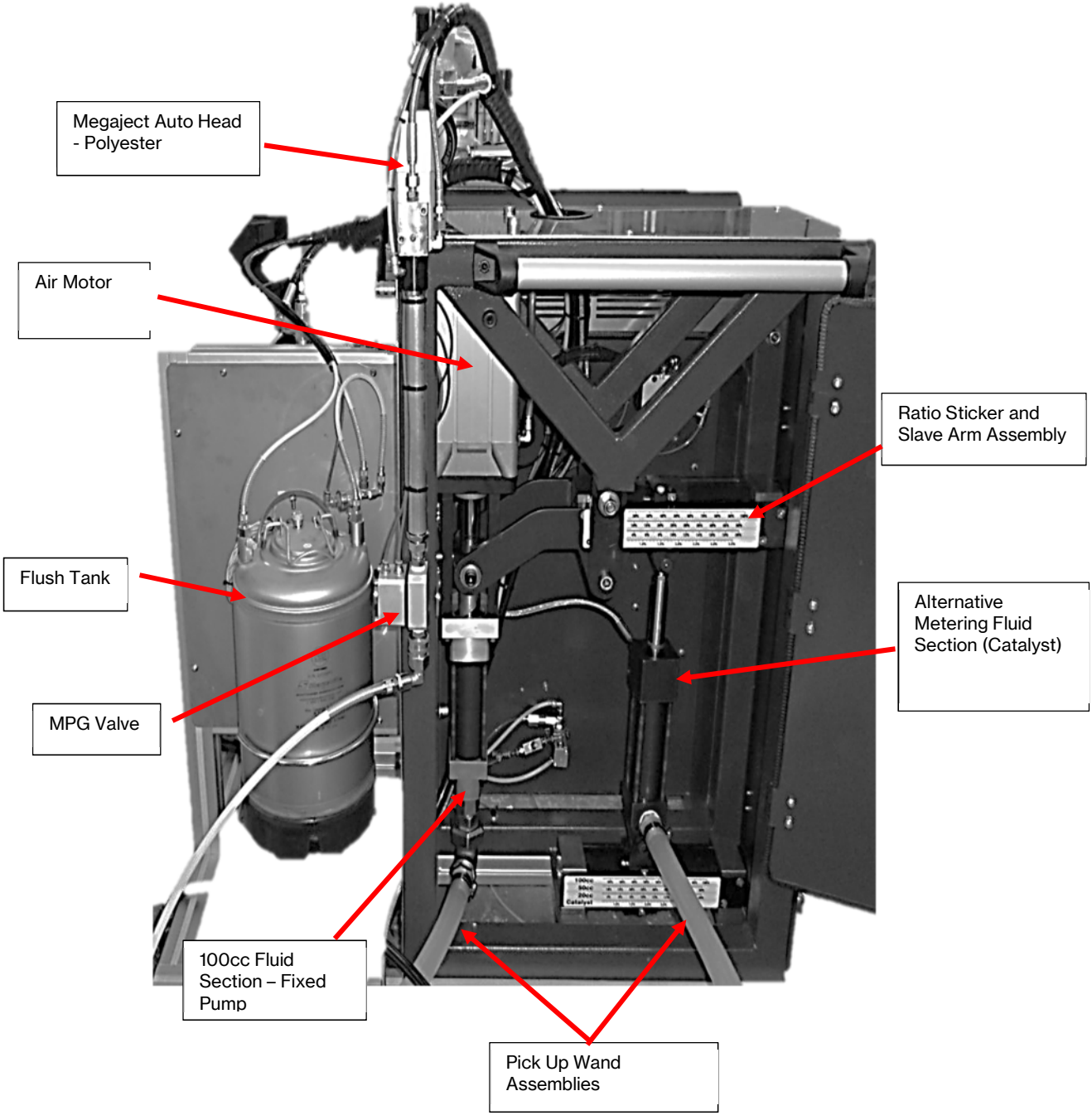
Output Information

MKVI Output Information									
Fluid Section		**Cat Pump**		**20cc Pump**		**50cc Pump**		**100cc Pump**	
		Low	*High*	*Low*	*High*	*Low*	*High*	*Low*	*High*
100cc	**Liters/min.**	8.002	8.29	8.05	9.60	8.29	12.00	9.12	16.00
	Ratio	188 : 1	26 : 1	34 : 1	5 : 1	14 : 1	2 : 1	7 : 1	1 : 1

Note ***Outputs are based on 40 cycles per minute and are theoretical. Actual output will depend on several factors.***

Unit Overview

The diagrams below identify the main components and controls the operator needs to know for proper operation for the unit.



Unit Overview - Continued

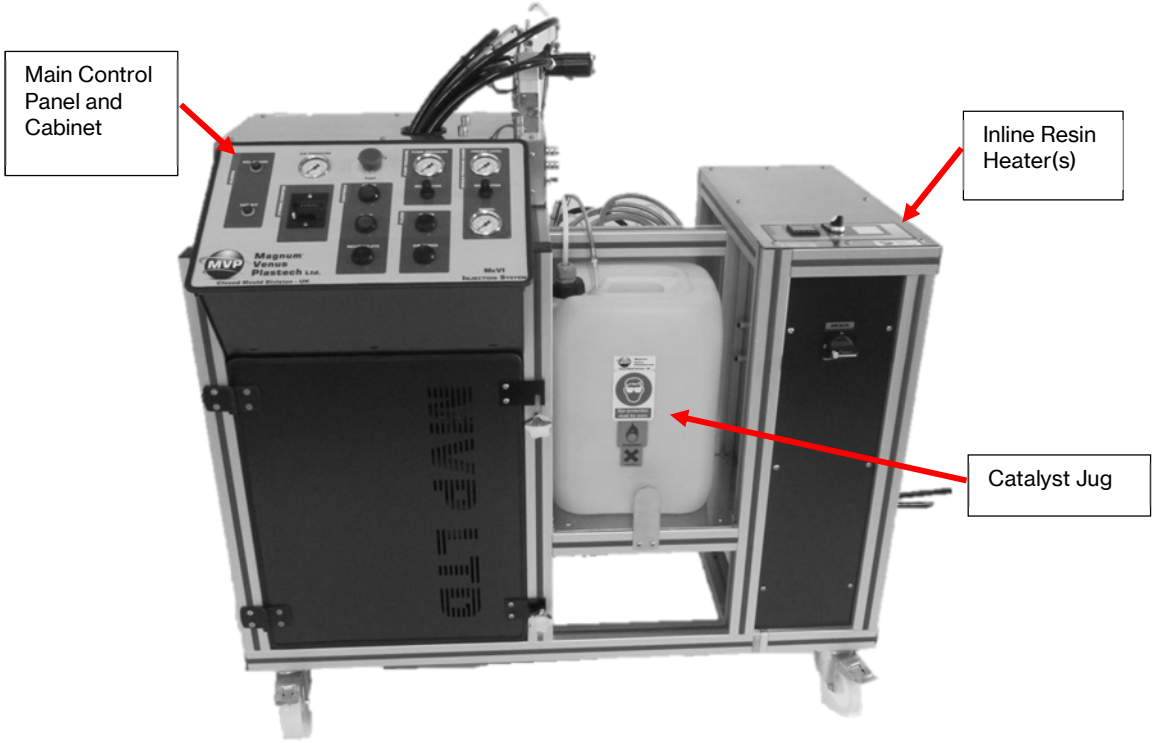


Figure 1. Front View

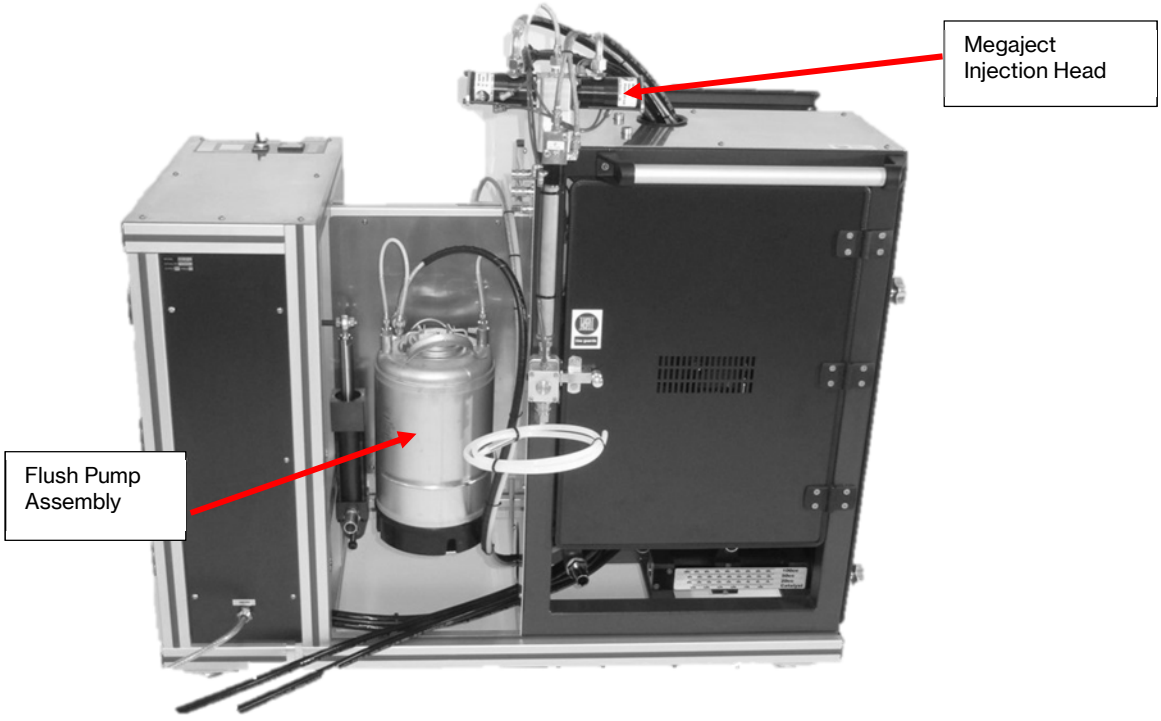


Figure 2. Rear View

Overview – Megaject Auto Head

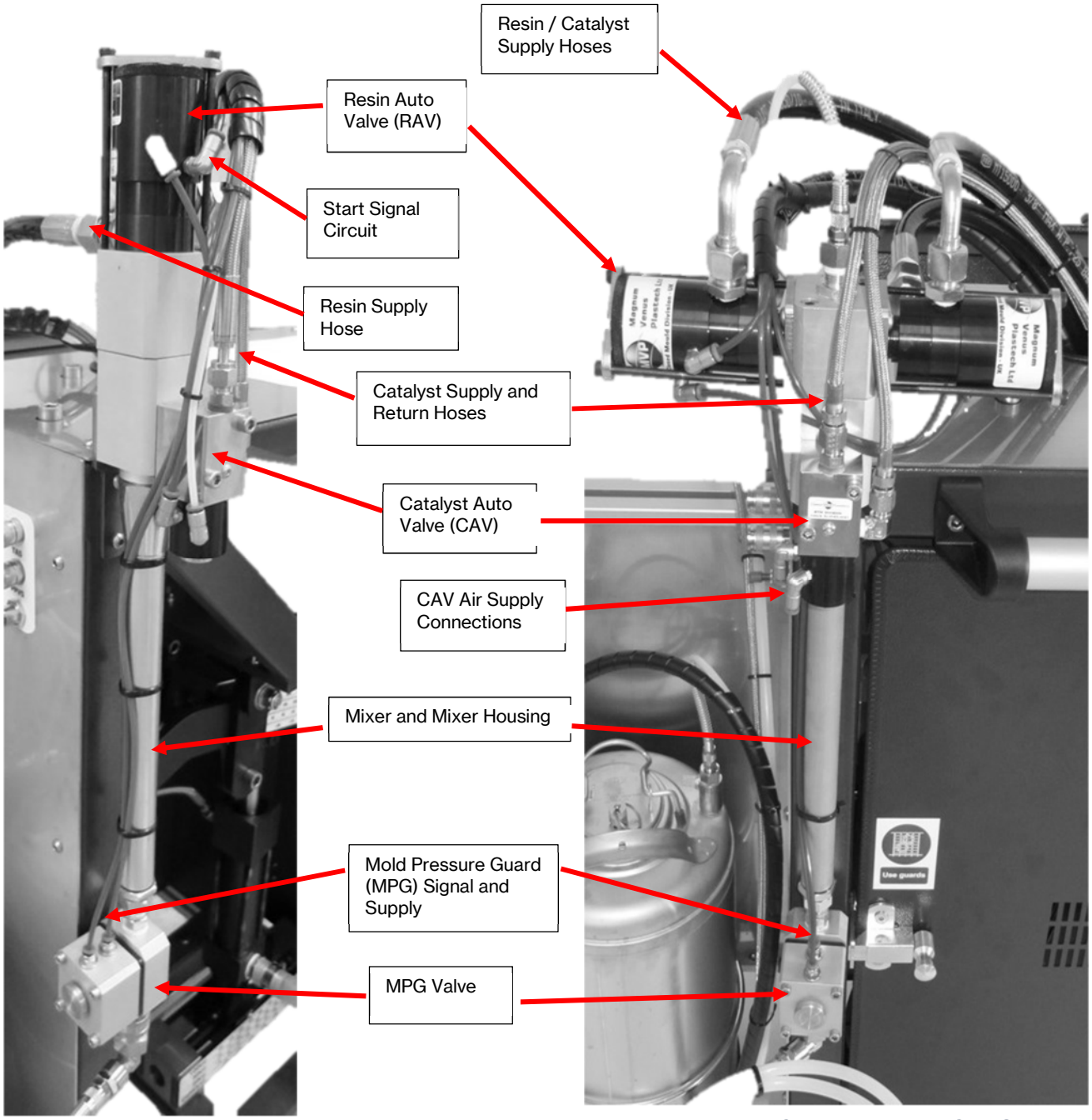
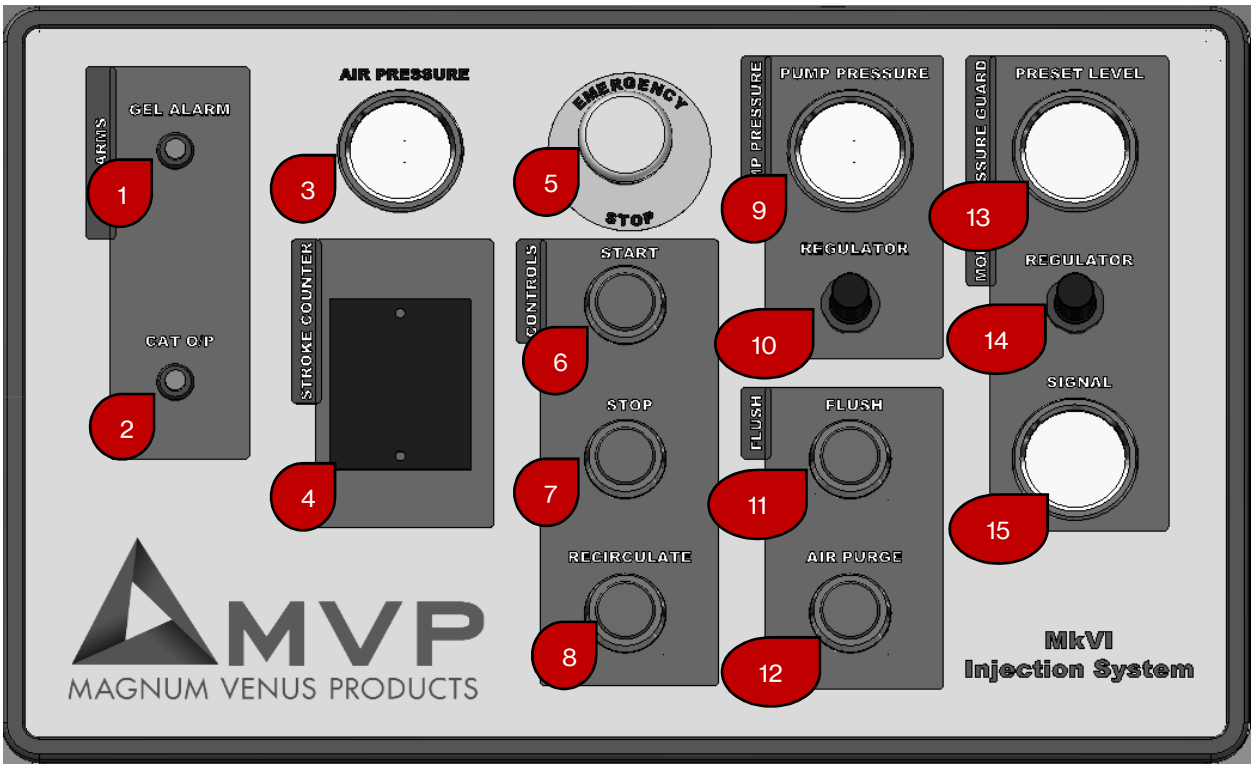


Figure 4. Polyester Head Configuration

Figure 4. 1:1 Head Configuration with CAV Option

Overview of Controls



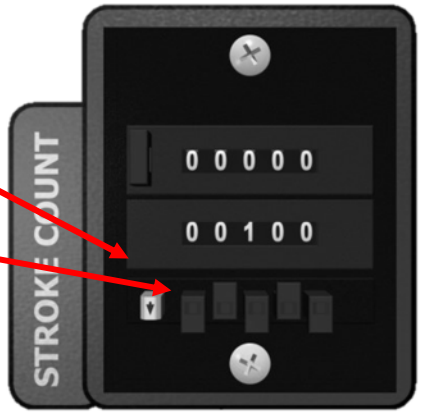
Control Panel		
Number	**Description**	**Function**
1	Resin Gel Alarm (RGA) and Indicator	The RGA unit alarms after a pre-determined period (set by the operator) to warn that the machine needs to be either flushed or restarted. If the RGA is in an alarm state the indicator turns red.
2	Catalyst Overpressure (O/P) Alarm and Indicator	The catalyst overpressure valve will shut the unit down if the catalyst pressure reaches 1000 psi and the indicator will turn red.
3	Main Air Pressure Gauge	Indicates the air pressure set at the main system regulator. This should not exceed 6 bar (90 psi) to prevent damage to some components in the system.
4	Stroke Counter (PDC)	The pre-determining 5-digit counter contains two readouts. • The upper readout displays the machine output count during injection. • The lower readout displays the preset count entered by the operator
5	Emergency Stop Button	Removes all air pressure from the machine and deactivates the **On** switch
6	Start Button	Begins machine operation/injection of material through the injection head
7	Stop Button	Stops machine operation

Control Panel		
Number	**Description**	**Function**
8	Recirculate Button	Puts the unit in recirculation mode. ***Note*** ***Press the Stop button to take the unit out of recirculation mode***
9	Pump Speed Pressure Gauge	Measures air pressure being sent to the resin pump air motor
10	Pump Speed Pressure Regulator	Adjusts the air pressure fed to the resin pump air motor
11	Solvent Flush Button	Activates the machine solvent flush cycle for approximately 30 seconds
12	Air Purge Button	Purges excess resin/solvent from the injection head
13	Mold Pressure Guard (MPG) Preset Level Gauge	Indicates the maximum injection pressure selected by the operator
14	MPG Preset Regulator	Adjusts maximum injection pressure
15	MPG Signal Gauge	Indicates the MPG signal pressure being sent to the resin pump auto-regulator. ***Note*** ***The lower the pressure, the slower the pump speed***

Stroke Counter (PDC)

To pre-set the stroke counter, follow these steps:

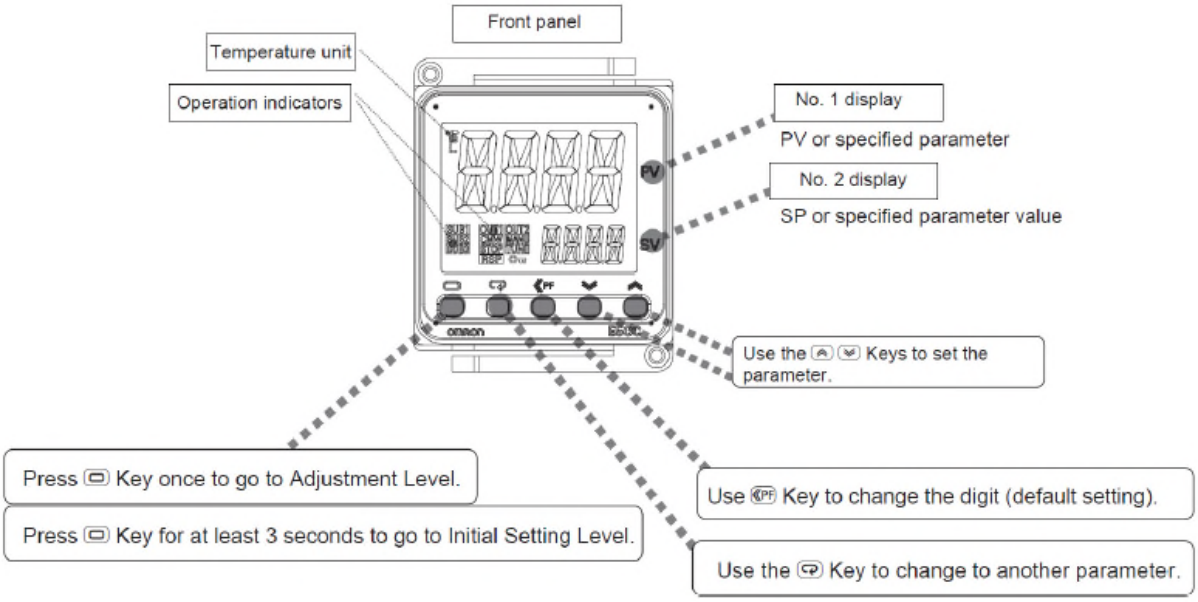
4. Press and hold the white arrow lever down.
5. Set the predetermined number of strokes required with the individual digit buttons.
6. Release the white arrow lever.



Note ***The available range is 0 – 999.9 liters.***

Note ***The machine cannot be started in inject mode. If a previous injection stopped automatically when the count was reached and the stroke count has not been reset, the unit will not start. Press the reset button on the predetermining counter to start.***

Optional Heater Controls



The main power switch for the heater(s) is located on the side of the main cabinet and activates the power to the inline resin heater controls. The power switch on the heater controls turns the power on/off to the inline resin heater(s).

- Press  once to adjust the temperature level.
- Press  to select the digit to change
- Use  or  to set the digit.

Assembling the Unit

1. Check all hoses for wear or damage; replace as necessary.
2. Connect the air supply to the push fitting on the side of the cabinet.

Note ***Ensure that air pressure of 85 -103 psi (6 -7 bar) is available.***

3. If applicable, connect the resin pick-up pipe to the bottom of the resin pump and tighten fully.
4. Place the wand, filter, and the resin recirculation return pipe into a suitable resin container.
5. Securely anchor wand and return pipe.

Note ***It is important to have the end of the return hose submerged into materials like epoxy to prevent air bubbles from being introduced.***

6. If applicable, fill the catalyst jug ¾ full with a suitable catalyst or catalyst.
7. Fill the solvent tank at least ¾ full with solvent.

Note ***It is important not to let the solvent level fall too low or the solvent pump will not work correctly. The solvent pump should always be covered by solvent. Ensure that any spills are cleaned up immediately.***

8. Ensure the recirculation button in in the **OFF** position.
9. Re-set the emergency stop button by turning it counterclockwise until the red button pops up.
10. Slide the main air supply switch to the **ON** position and monitor the incoming air pressure on the air pressure gauge.
11. Adjust the two hand wheels on the slave arm assembly simultaneously until the secondary pump is at its maximum stroke.

Note ***Ensure that the top and bottom readings are identical.***

Note ***If the catalyst pump fails to prime, you may need to hand-prime the pump. To do so, unscrew the top shoulder bolt that secures the catalyst pump shaft to the top ratio arm, then crack open the catalyst output connection and push or pull the pump shaft up and down until you see fluid at the pump inlet connection (bottom fitting). Re-tighten the catalyst output connection and re-fit the pump to the upper ratio arm, then re-circulate as normal until you observe catalyst at the catalyst sight glass.***

Setting the Mix Ratios

Catalyst levels can be adjusted by moving the secondary pump along the ratio arms connected to the main resin pump using the hand wheels. To adjust, follow these steps:

12. Open the side door.
13. Turn the two hand wheels simultaneously until the secondary pump is in the required position as indicated on the ratio arm.
14. Ensure top and bottom readings are identical.
15. Recirculate the machine to ensure that the pump is correctly primed.
16. Perform a ratio check by taking a sample of both the resin and the catalyst from the return lines as follows:

- Pull the two material return lines from their respective containers and hold them over catch containers, then put the unit into recirculation mode (see Recirculating the Machine section).
- After a second or two, place the sample container under the two return lines at the same time to collect a sample of both materials.
- Press stop to cancel the recirculation.
- Weigh the two samples and determine ratio.
- If necessary, adjust the ratio and repeat this step to retest.

17. If required, carry out a timed gel test by injecting approximately 200cc of resin into a cup.

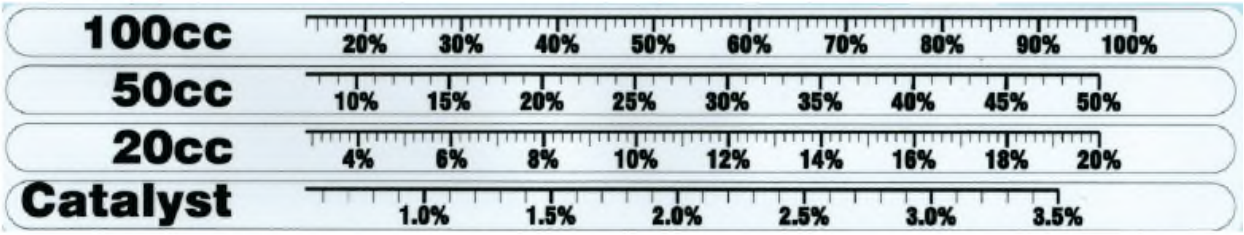


Figure 5. Ratio Configuration

Operating the Unit

Recirculating the Machine

Recirculation should be carried out on a regular basis to ensure resin and catalyst flows are even, free of air bubbles (observed through recirculation returns), and to prevent sedimentation of any fillers or additives in the resin system.

Recirculate the machine at the start of each shift or if new material has been added to either the resin or catalyst containers. To recirculate, follow these steps:

1. Adjust pump pressure regulator until the pump pressure gauge reads approximately 2 bar.
2. If a mold pressure guard (MPG) is fitted, adjust the MPG preset level to approximately 1 bar.
3. If the unit has inline heaters installed, turn the main electrical power on the side of the control cabinet to **On**.
4. Push the recirculation button and slowly adjust the pump pressure so that the pump is moving slowly and evenly.
5. If the unit has inline heaters installed, turn the heat control on and adjust the controller to the desired position.
6. Allow the machine to recirculate for the required period.
7. Ensure recirculating materials are free of air bubbles and there is even flow on both pump strokes.
8. Press the **Stop** button to turn off the recirculation.

Re-priming the Unit

When the operator changes the resin or catalyst in a machine that was previously commissioned, re-priming is required. To re-prime the unit, follow these steps:

9. Remove the pickup wand(s) and filter from the fluid and place in a clean empty container.
10. Recirculate the machine to empty the fluid lines.
11. To clean the lines and pump, place the pick-up pipe in a solvent container and recirculate until clean solvent appears at the recirculation pipe.
12. Place the recirculation pipe into a waste container.
13. Place the pickup wand in new fluid.

14. Recirculate the machine until all solvent is discharged and new fluid is observed at the recirculation pipe.
15. Place the recirculation pipe into the fluid container with the pickup wand.
16. Continue recirculating until pumped material is free of all air bubbles.

Note ***If the new material is of similar chemical type to the existing material, it may not be necessary to clean the system with solvent before loading new material. Follow all MSDS guidelines for the materials that you are using.***

Injecting

Follow these steps each time an injection or series of injections is carried out:

Before Injection

17. Check the incoming air pressure gauge to ensure it reads at least 90 psi (6 bar).
18. Ensure there is sufficient resin, catalyst, and solvent to complete the injection cycle.
19. If your unit has inline heaters, turn the electrical power on the side of the control cabinet to **On**.
20. Check to make sure the secondary pump is set to the required ratio.
21. Adjust the pump pressure regulator to the required setting (suggested initial setting of 15 psi or 1 bar).
22. Recirculate the material and adjust the MPG pre-set regulator until the required maximum injection pressure is indicated on the MPG preset level gauge (suggested initial setting of 30 psi or 2 bar).
23. If your unit has inline heaters, turn the heat control to the **On** position and adjust the controller to the desired temperature, then recirculate the material long enough to bring it to the desired temperature.
24. Push the **Stop** button to stop the recirculation.
25. If applicable, adjust the MPG pre-set regulator until the required maximum injection pressure is indicated on the MPG preset level gauge.
26. Set the pre-determined count to the required count number or press the counter reset button to set the output count to zero.

Injection

27. Place the injection nozzle into the mold injection port or connect to mold through an injection valve.
28. Press the green **Start** button.
29. Machine will inject until the set pre-determined count is reached.
30. Disconnect the injection pipe from the mold and place the Sprue plug into the mold injection plug or disconnect the injection pipe from the injection valve.

Note ***Pump pressure and MPG pre-set level can be adjusted during injection to optimize the injection speed. Do not exceed the maximum safe injection pressure for the selected mold.***

Flushing

31. Anchor injection nozzle securely in a suitable waste container.
32. Push air purge button until excess resin is expelled.
33. Push solvent flush button.
34. After approximately 30 seconds flush will automatically stop. The solvent flush button may be used a second time if necessary.

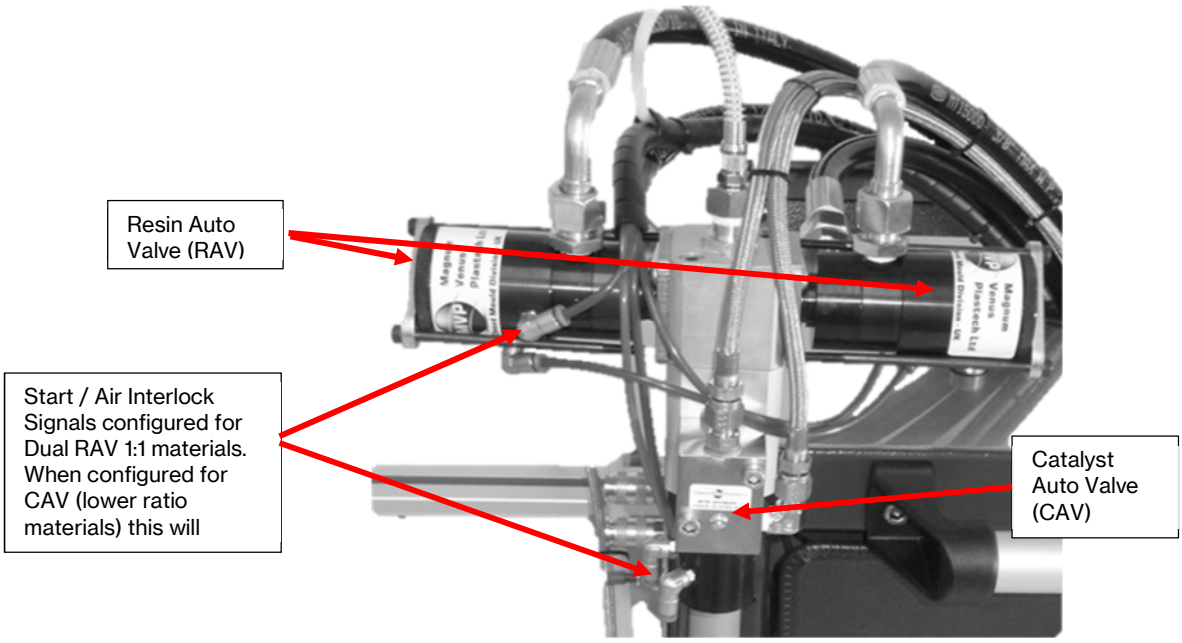
Note ***If two or more injections are to be carried out consecutively, it may not be necessary to flush the mixing head between shots. Approximately 1 minute after the end of an injection, the RGA will alarm indicating that the machine must be flushed. Operating the solvent flush or continuing with the injection will cancel the alarm.***

Changing Between Ratios & Materials

35. Properly flush and clean the fixed 100cc Fluid Section of the existing material.
36. Using solvent, purge the fixed 100cc fluid section and hoses of the material being removed.
37. Purge the Solvent from the system (pump and hoses) and clean or replace any items that will contaminate the new material.
38. If the system is using the 20cc, 50cc or another 100cc fluid section to meter the second material (catalyst, activator or B-component) also flush and clean this pump.
39. As with the main component material purge the secondary pump and hose with solvent or cleaning agent.

Note ***When using the Catalyst Pump (5cc pump) with MEKP catalyst it will not be necessary to purge out the catalyst unless the catalyst and pump will not be used for more than six months.***

40. If the catalyst system will sit idle for longer than the expiration date of the catalyst, drain and pump out the catalyst system.
41. Clean the catalyst jug and feed tube with warm water, then remove and clean any filters.
42. Disconnect and remove the secondary pump and replace with the new fluid section.
43. Set the new pump at the desired ratio on the ratio arms and connect to the injection head using the correct hoses.
44. If necessary, reconnect the interlock air signals from the catalyst resin auto valve (RAV) (1:1) to the catalyst auto valve (CAV) (188:1) or vice versa.



45. If applicable, connect the resin pick-up pipe to the bottom of the secondary pump and tighten fully.
46. Place the wand with filter and the recirculation return pipe into a suitable container.
47. Securely anchor wand and return pipe.

Note ***It is important to have the end of the return hose submerged for materials like epoxy to prevent air bubbles from being introduced.***

48. If applicable, connect the catalyst pump inlet to the catalyst jug outlet and fill the catalyst jug ¾ full with a suitable catalyst or catalyst.
49. Recirculate materials (resin and catalyst) following the steps in the Recirculating the Machine section, until both materials are thoroughly primed and free of air bubbles.
50. Conduct a ratio check and gel test before restarting the injection process.

Shutting Down

1. At the end of the shift, switch off the machine air and electrical power when the resin pump piston shaft is at the bottom of its stroke.

Note ***Leave the resin pump piston shaft parked at the bottom of its stroke to ensure that any resin on the pump shaft does not dry out and cause excess seal wear.***

2. For long shutdown periods, if any doubt exists about the stability of the resin system, re-prime with an unfilled, un-accelerated resin system.
3. Once the system is full of un-accelerated resin, pump approximately 300cc of resin through the injection head then flush.

Note ***Do not leave the Megaject either empty or with a cleaning solvent in the resin system. Under normal circumstances, catalyst may be left in the system for extended periods.***

4. If filled resin systems have been used, filler may settle at the bottom of the pump and pipework. Under these circumstances a higher pump pressure may be required to start the pump recirculating. If filler has formed sediment around the bottom inlet ball valve of the pump it may momentarily stick. In such circumstances continue to pump on recirculation for 3 minutes as this should 'unstick' the valve. The resulting flow will quickly wash away sediment, allowing the pump to operate correctly. If the problem continues, the bottom resin pump ball valve must be serviced.
5. After a shutdown period, ensure the resin and catalyst systems are fully primed before operating.

Maintaining System

100cc Pump Option

To maximize service life, it is important to keep the machine free from dirt and contamination and follow correct procedures for use and maintenance as instructed in this manual.

Fluid Section		100cc	
		Low	High
100cc	Liters/min	9.12	16.00
	Ratio	7:1	1:1
	Percentage	14%	100%

Machine			Head Type	Part No.
MKVI	Epoxy 1:1 (100cc)		Auto	8073
Conversion Kit				
MKVI	Epoxy1:1 (100cc)	Polyester	N/A	8073-PLY-CON KIT
	Epoxy1:1 (100cc)	Phenolic (20cc)	N/A	8073-PHE-CON KIT
	Epoxy1:1 (100cc)	Epoxy 2:1 (50cc)	N/A	8073-EPY2:1-CON KIT

Maintenance Schedule

After every 1 ton of resin pumped

1. Check general cleanliness of machine and ensure there are no leaks.
2. Check resin pump lubricant level.
3. Clean resin filters (remove, clean with acetone, dry, and replace).
4. Remove mixer shroud and check cleanliness of mixer tube, clean as necessary.

After every 5 tons of resin pumped

5. Split injection mixing head.
6. Examine internals for gelled resin or foreign objects and clean as necessary.

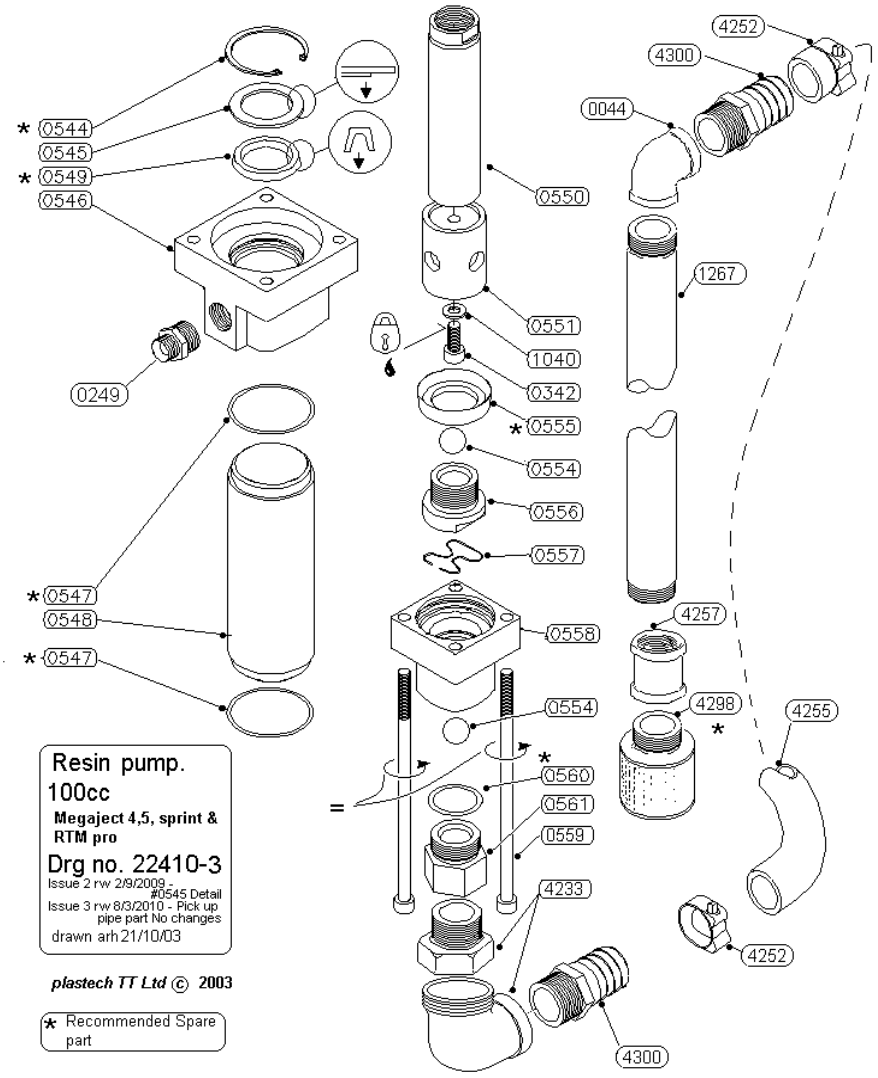
Note ***It is not necessary to dismantle the head Non-Return Valves (NRVs) if the head appears to be in good condition.***

7. Check MPG block by removing the four M5 cap screws and examining the parts (it is not necessary to remove MPG diaphragm).

After every 100 tons of resin pumped

8. Replace main resin pump seals.
9. Replace mixer tube and mixer tube O-ring.

Replacing 100cc Resin Pump Seals



Servicing the 100cc Resin Pump

To service internal resin pump seals, first pump out any resin from internals by placing system on recirculation. Clean pump internals using solvent before servicing by recirculating 5 liters of solvent through the resin pump and pumping the solvent out of system into a waste bucket.

10. Isolate machine from air supply.

To Access Piston Seal

11. Remove the four M8 securing bolts.
12. Slide pump cylinder and lower gold block assembly from piston.

13. The piston seal may now be removed by unscrewing seal retainer nut.
14. Replace seal, ensuring that the seal lip faces up and valve ball is placed back into cage.

To Replace Shaft Seal

15. Proceed further without reassembling the piston and seal.

Re-Assembling the 100cc Resin Pump

The piston is reassembled in reverse order. Use medium strength thread lock on the piston bolt.

16. To replace the shaft seal, remove the top block from the machine by first removing the four M8 retaining bolts from the underside of the top block.
17. Draw the top block down shaft away from the four square air motor pillars.
18. Using circlip pliers, remove the large circlip.
19. Remove washer.
20. Remove old seal and discard.
21. Install new seal and reassemble pump in reverse order.

Note ***O-ring top and bottom seals should be replaced during these service operations if found to be damaged.***

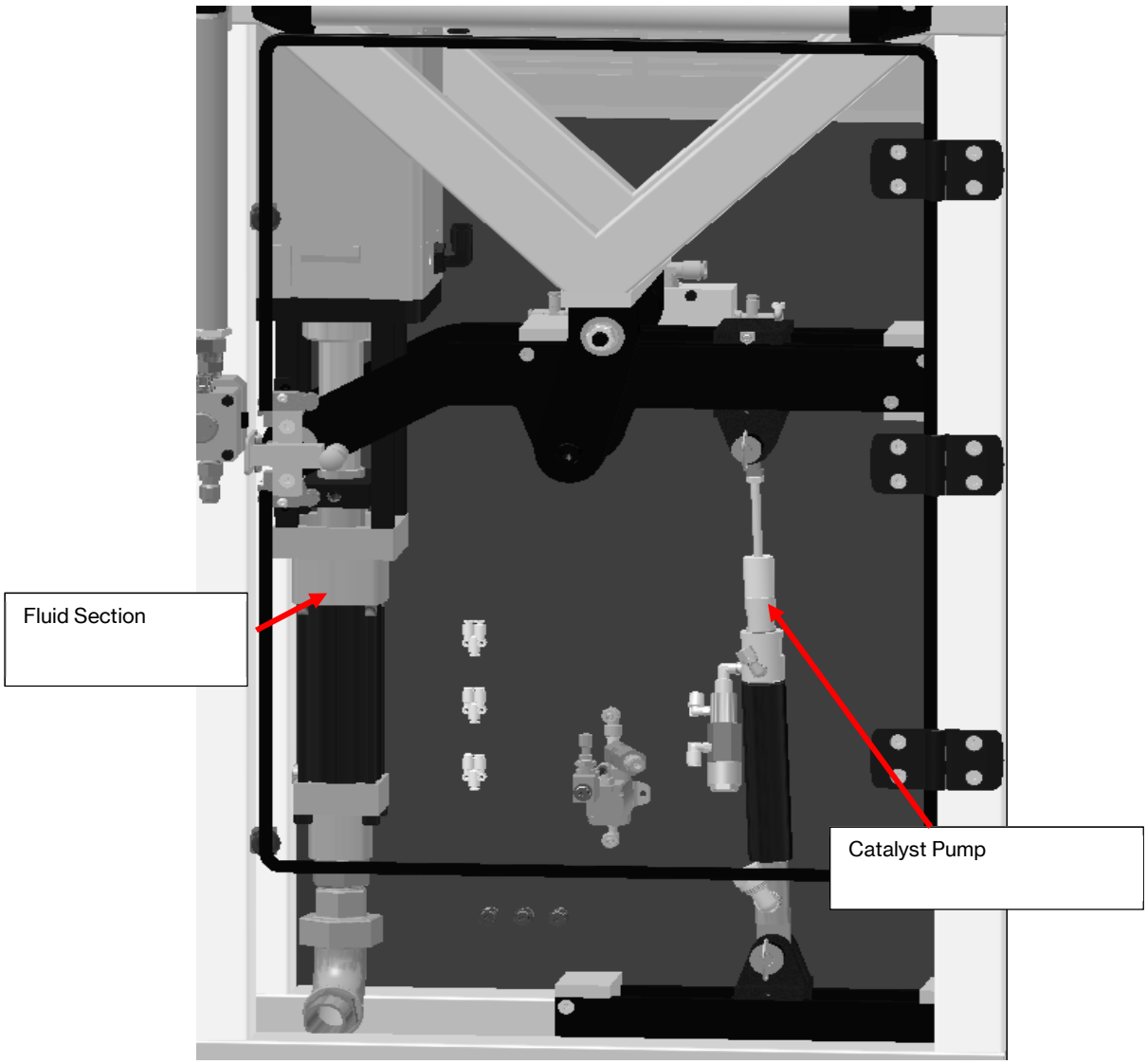
22. Ensure pump assembly is evenly re-tightened with the four M8 tie bolts.
23. When pump is re-installed in machine, renew pump seal lubricant in top seal block.

Optional Pumps

Catalyst Pump Option

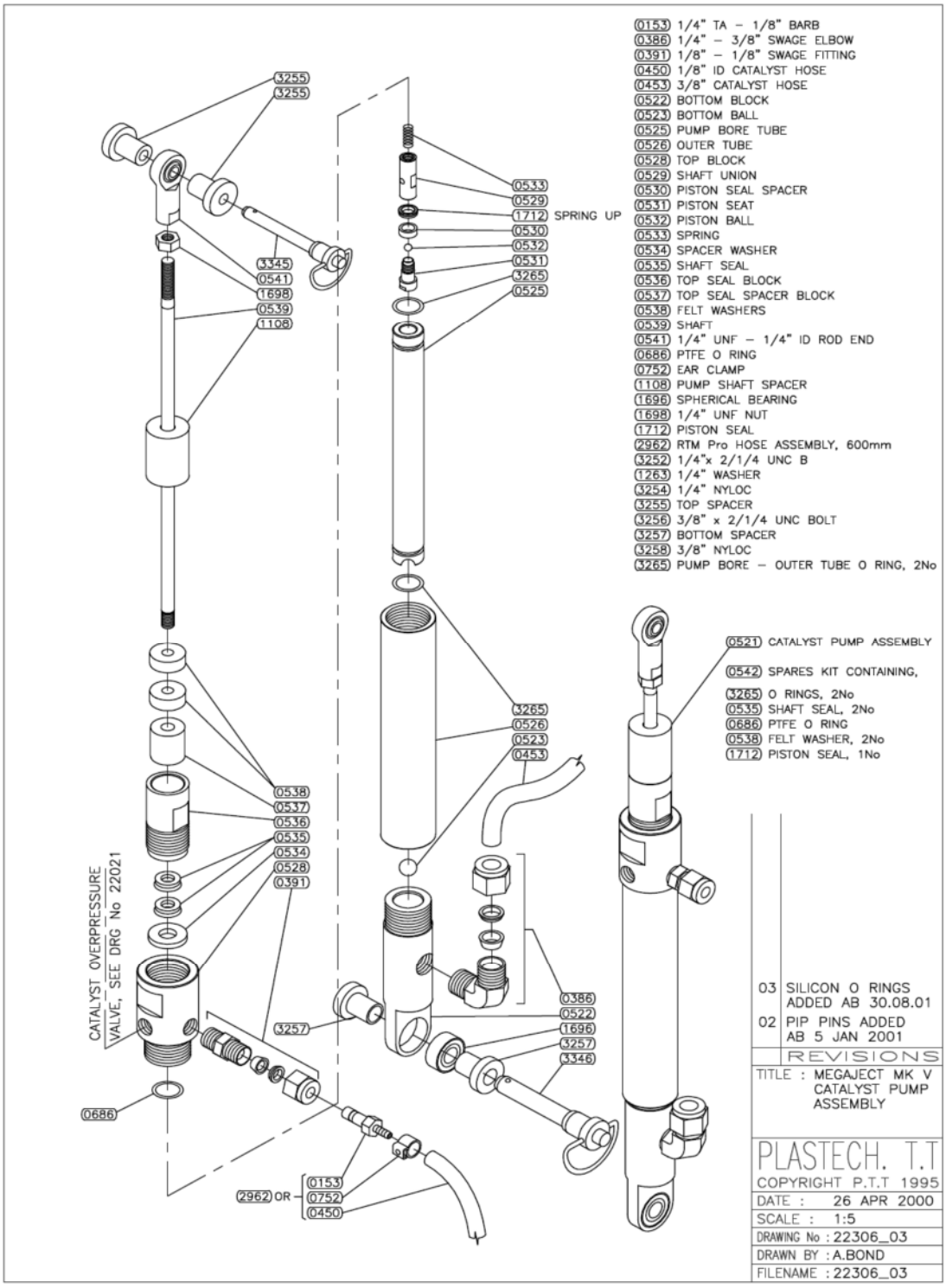
Fluid Section		Catalyst Pump	
		Low	High
100cc	Liters/min	8.002	8.29
	Ratio	188:1	26:1
	Percentage	0.5%	3.8%

Machine			Head Type	Part No.
MKVI	Polyester		Auto	8071
Conversion Kit				
MKVI	Polyester	Phenolic (20cc)	N/A	8071-PHE-CON KIT
	Polyester	Epoxy 2:1 (50cc)	N/A	8071-EPY2:1-CON KIT
	Polyester	Epoxy 1:1 (100cc)	N/A	8071-EPY1:1-CON KIT



Replacing 5cc Polyester Catalyst Pump Seals

24. Remove Catalyst pump from ratio arms.
25. Disconnect inlet and outlet hoses at swivel fittings.
26. Unscrew bottom block and top block from outer tube.
27. Examine bottom block ball bearing for pitting/damage and replace if necessary.
28. Replace bottom seat O-ring.
29. Slide pump bore tube out of top block and remove from piston shaft.
30. Replace pump bore outer tube O-rings with new O-rings lubricated using silicone grease.
31. Unscrew piston seal body from shaft.
32. Examine piston ball and spring and replace if necessary.
33. Unscrew piston seal retainer.
34. Remove and replace piston seal.



35. Remove top block from piston shaft.
36. Unscrew top seal block from top block.
37. Remove shaft seals from top seal block and replace.
38. Remove felt washers and replace.
39. Reassemble in reverse of the steps above.

40. When refitting the piston seal retainer clean threads thoroughly.
41. Place a small amount of Loctite 243 or similar thread lock compound on the threads and screw in finger tight only.

20cc Pump Option

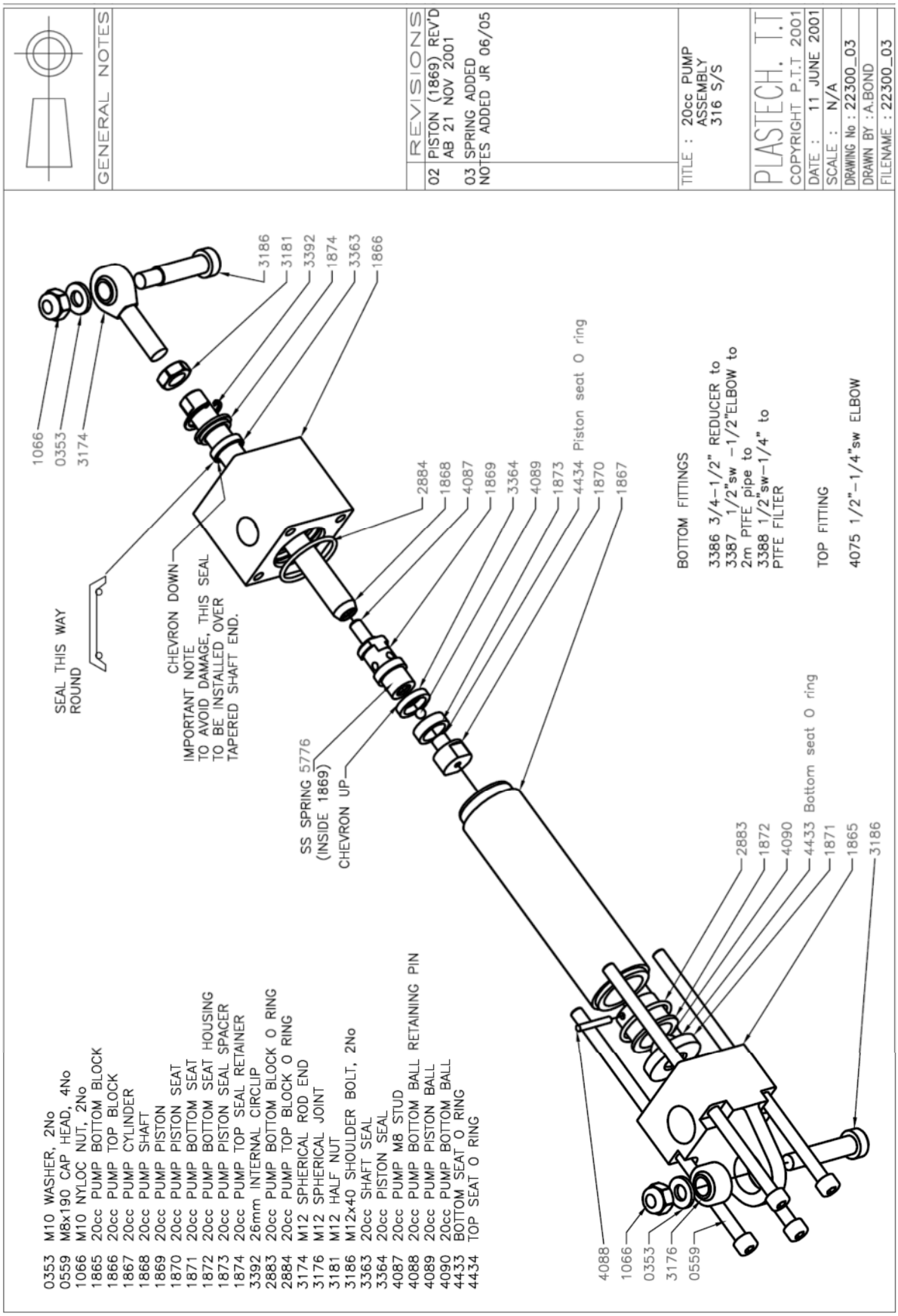
Fluid Section		20cc Pump	
		Low	High
100cc	Liters/min	8.05	9.60
	Ratio	34:1	5:1
	Percentage	2.90%	20.75%

Machine			Head Type	Part No.
MKVI	Phenolic (20cc)		Auto	8074
Conversion Kit				
MKVI	Phenolic (20cc)	Polyester	N/A	8074-PLY-CON KIT
	Phenolic (20cc)	Epoxy 2:1 (50cc)	N/A	8074-EPY2:1-CON KIT
	Phenolic (20cc)	Epoxy 1:1 (50cc)	N/A	8074-EPY1:1-CON KIT

To access the pump piston seal or any other internal parts, follow these steps:

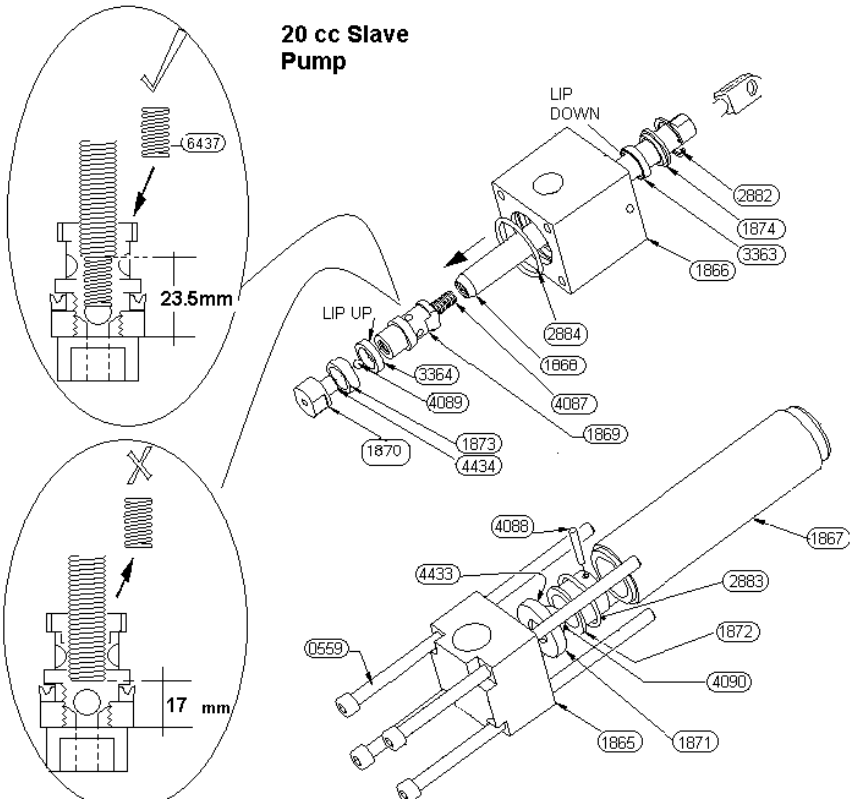
42. Pump out catalyst from system and then remove feed pipe and filter assembly from catalyst container.
43. Remove pump guard.
44. Remove the four M8 bolts from the lower block from pump body.
45. Remove the newly exposed pump cylinder by drawing down to expose the pump shaft and piston assembly.
46. Remove the piston retainer/lower seal retainer to allow removal of back bushing and the piston seal.
47. Replace with new seal, observing the correct lip up orientation of the seal as detailed on drawing.
48. Reassemble in reverse order.

49.


GENERAL NOTES
REVISIONS
02 PISTON (1869) REV'D AB 21 NOV 2001
03 SPRING ADDED NOTES ADDED JR 06/05
TITLE : 20cc PUMP ASSEMBLY 316 S/S
PLASTECH. T.T
COPYRIGHT P.T.T 2001
DATE : 11 JUNE 2001
SCALE : N/A
DRAWING No : 22300_03
DRAWN BY : A.BOND
FILENAME : 22300_03
0353 M10 WASHER, 2No
0559 M8x190 CAP HEAD, 4No
1066 M10 NYLOC NUT, 2No
1865 20cc PUMP BOTTOM BLOCK
1866 20cc PUMP TOP BLOCK
1867 20cc PUMP CYLINDER
1868 20cc PUMP SHAFT
1869 20cc PUMP PISTON
1870 20cc PUMP PISTON SEAT
1871 20cc PUMP BOTTOM SEAT
1872 20cc PUMP BOTTOM SEAT HOUSING
1873 20cc PUMP PISTON SEAL SPACER
1874 20cc PUMP TOP SEAL RETAINER
3392 26mm INTERNAL CIRCLIP
2883 20cc PUMP BOTTOM BLOCK O RING
2884 20cc PUMP TOP BLOCK O RING
3174 M12 SPHERICAL ROD END
3176 M12 SPHERICAL JOINT
3181 M12 HALF NUT
3186 M12x40 SHOULDER BOLT, 2No
3363 20cc SHAFT SEAL
3364 20cc PISTON SEAL
4087 20cc PUMP M8 STUD
4088 20cc PUMP BOTTOM BALL RETAINING PIN
4089 20cc PUMP PISTON BALL
4090 20cc PUMP BOTTOM BALL
4433 BOTTOM SEAT O RING
4434 TOP SEAT O RING
SEAL THIS WAY ROUND
IMPORTANT NOTE TO AVOID DAMAGE, THIS SEAL TO BE INSTALLED OVER TAPERED SHAFT END.
CHEVRON DOWN
SS SPRING 5776 (INSIDE 1869)
CHEVRON UP
Piston seat O ring
Bottom seat O ring
BOTTOM FITTINGS
3386 3/4-1/2" REDUCER to 3387 1/2"sw -1/2"ELBOW to 2m PTFE pipe to 3388 1/2"sw-1/4" to PTFE FILTER
TOP FITTING
4075 1/2"-1/4"sw ELBOW

Pump Piston Shaft Seal

Note ***Do not attempt to remove the top piston rod clevis from the shaft as this is permanently thread locked together.***



50. The piston assembly must be removed so that the piston rod can be withdrawn upwards through the top seal housing and removed to access piston rod seal.
51. Remove circlip, retainer washer, and old seal.
52. Ensure new seal is evenly pushed into the top housing with the seal lip entering first.
53. Reassemble in reverse order.

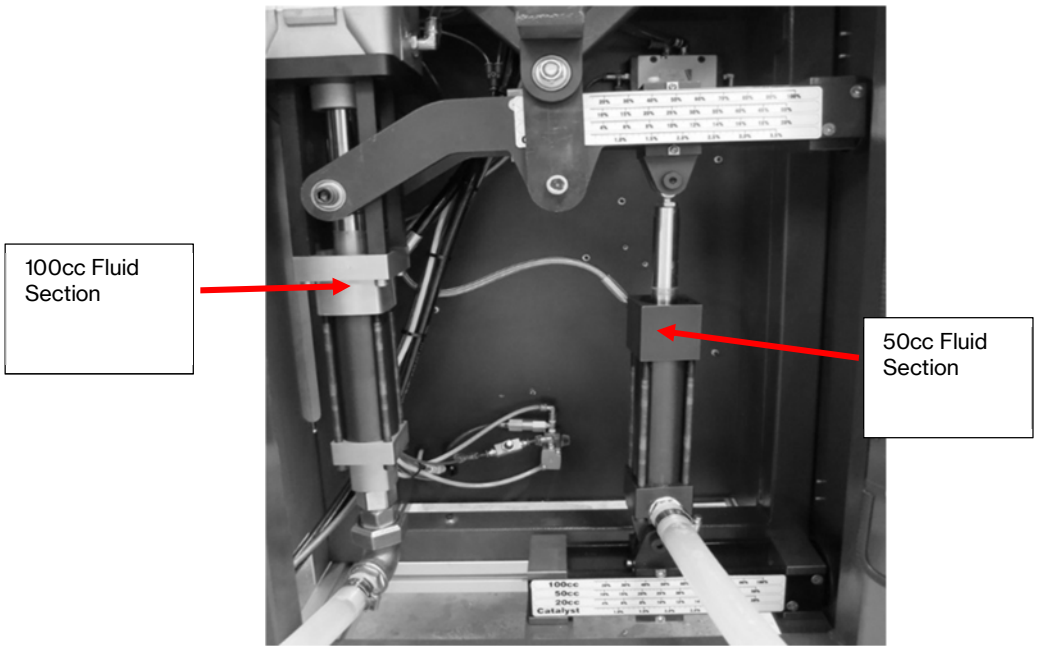
Note ***When replacing piston assembly ensure M8 stud remains as factory set in thread sealed position.***

Note ***When using ball spring the stud should be thread locked in position to dimension 23.5mm when spring used or dimension 17mm when no spring is used.***

50cc Pump Option

Fluid Section		50cc Pump	
		Low	High
100cc	Liters/min	8.29	12.00
	Ratio	14:1	2:1
	Percentage	7.27%	51.8%

Machine			Head Type	Part No.
MKVI	Epoxy 2:1 (50cc)		Auto	8072
Conversion Kit				
MKVI	Epoxy 2:1 (50cc)	Polyester	N/A	8072-PLY-CON KIT
	Epoxy 2:1 (50cc)	Phenolic (20cc)	N/A	8072-PHE-CON KIT
	Epoxy 2:1 (50cc)	Epoxy 1:1 (100cc)	N/A	8072-EPY1:1-CON KIT



To access the pump piston seal or any other internal parts, follow these steps:

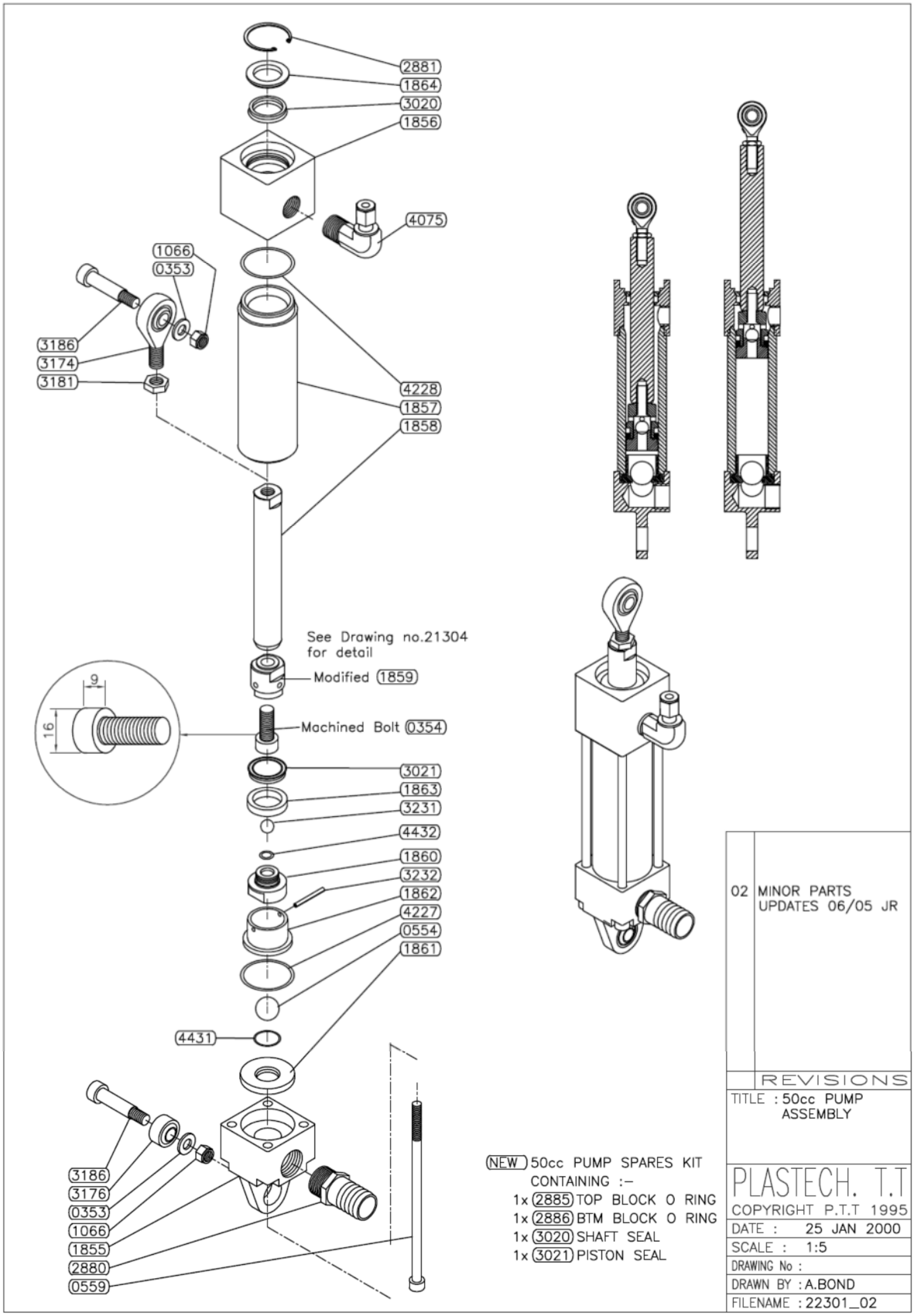
54. Pump out catalyst from system and then remove feed pipe and filter assembly from catalyst container.
55. Remove pump guard.
56. Remove the four M8 bolts from the lower block of the pump body.
57. Remove the newly exposed pump cylinder by drawing down to expose the pump shaft and piston assembly.
58. Remove the piston retainer/lower seal retainer to allow removal of back bushing and the piston seal.
59. Replace with new seal, observing the correct lip up orientation of the seal as detailed on drawing.
60. Reassemble in reverse order.
61.

Pump Piston shaft seal:

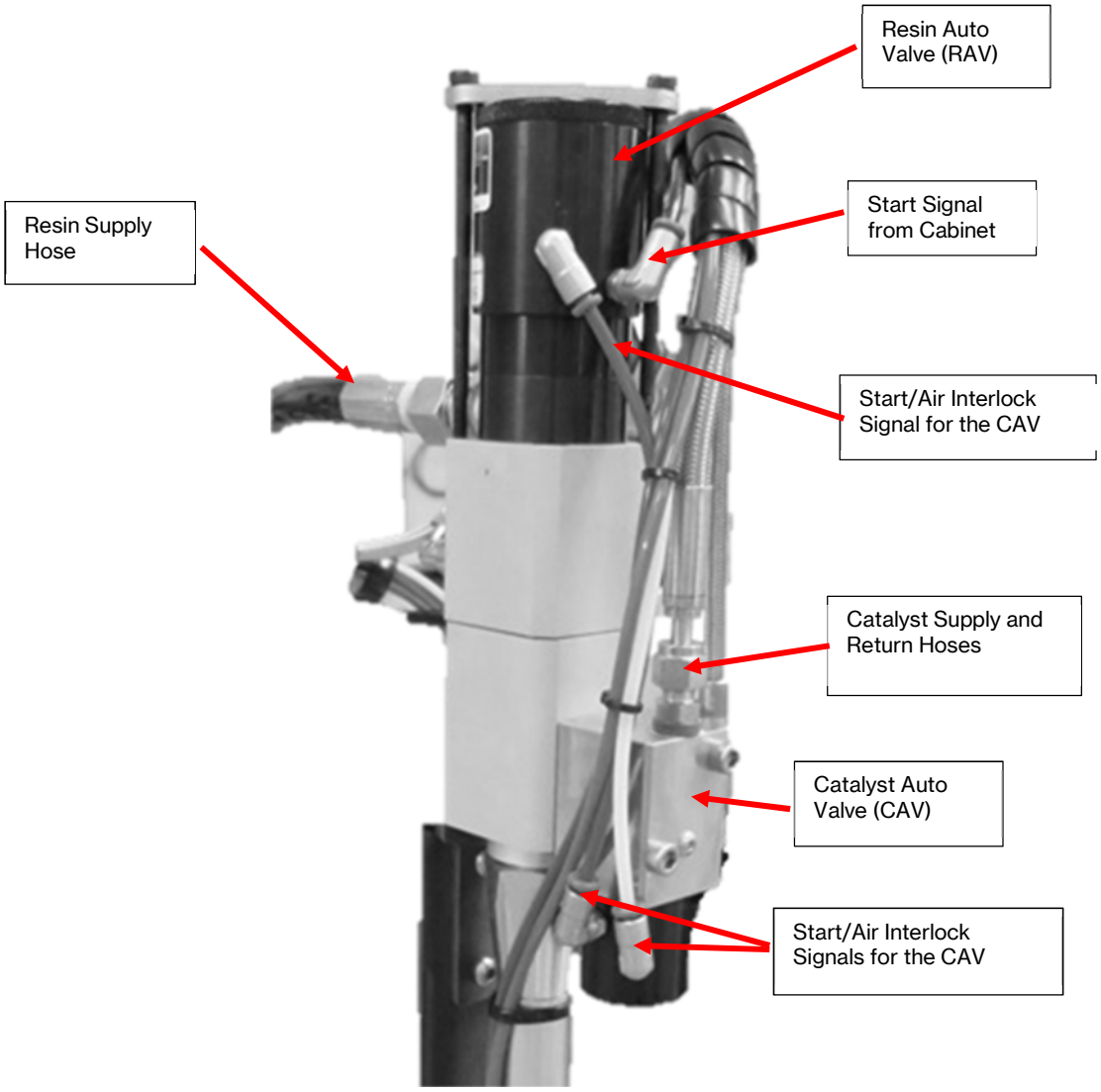
Note ***Do not attempt to remove the top piston rod clevis from the shaft as this is permanently thread locked together.***

The top seal can be removed and replaced by following the steps above to remove and disassemble the pump.

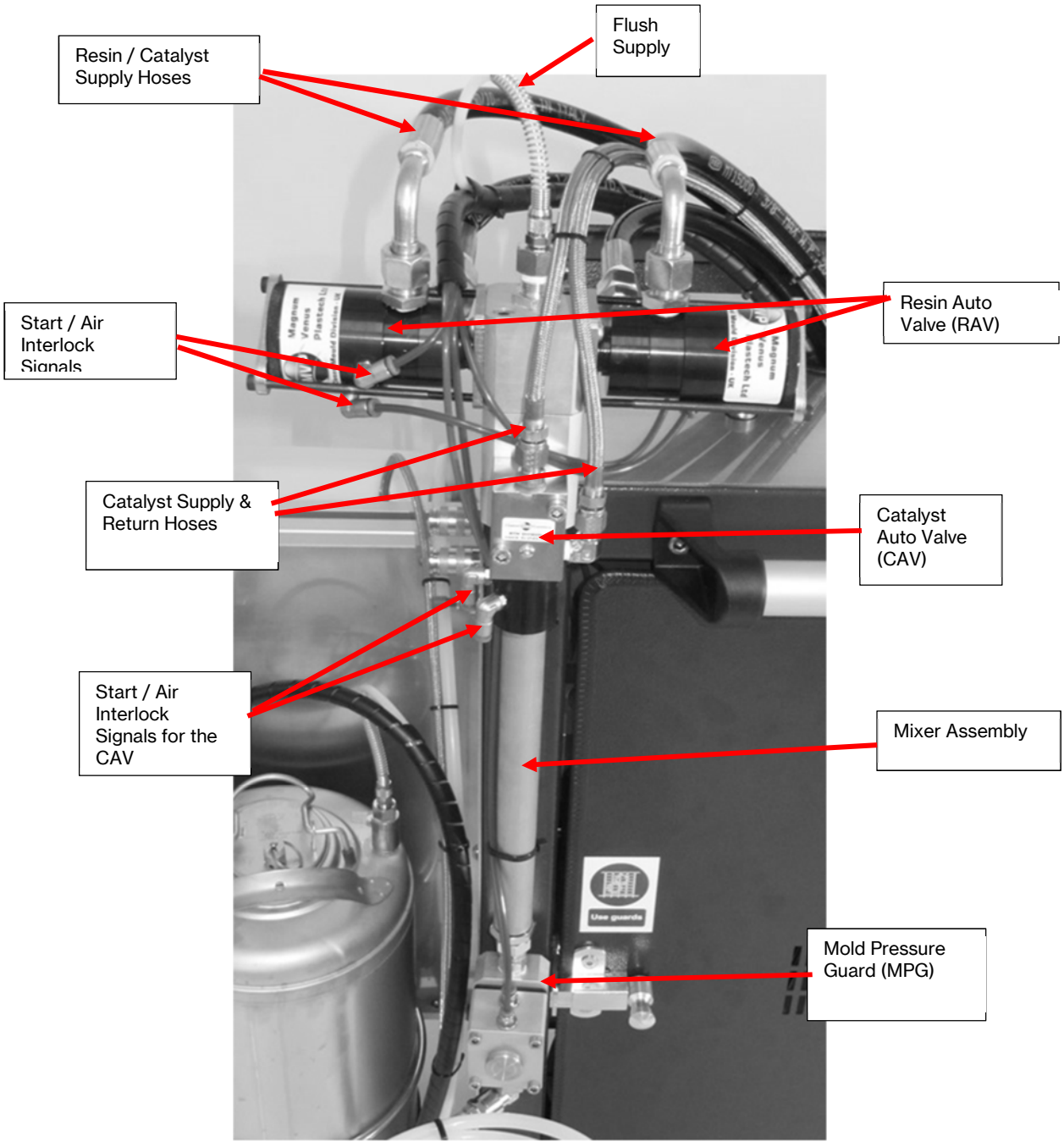
62. The piston assembly must be removed so that the piston rod can be withdrawn upwards through the top seal housing and removed to access piston rod seal.
63. Remove circlip, retainer washer, and old seal.
64. Ensure new seal is evenly pushed into the top housing with the seal lip entering first.
65. Reassemble in reverse order.


2881
1864
3020
1856
4075
1066
0353
3186
3174
3181
4228
1857
1858
See Drawing no.21304
for detail
Modified 1859
9
16
Machined Bolt 0354
3021
1863
3231
4432
1860
3232
1862
4227
0554
1861
4431
3186
3176
0353
1066
1855
2880
0559
NEW 50cc PUMP SPARES KIT
CONTAINING :-
1x 2885 TOP BLOCK O RING
1x 2886 BTM BLOCK O RING
1x 3020 SHAFT SEAL
1x 3021 PISTON SEAL
02 MINOR PARTS
UPDATES 06/05 JR
REVISIONS
TITLE : 50cc PUMP
ASSEMBLY
PLASTECH. T.T
COPYRIGHT P.T.T 1995
DATE : 25 JAN 2000
SCALE : 1:5
DRAWING No :
DRAWN BY : A.BOND
FILENAME : 22301_02

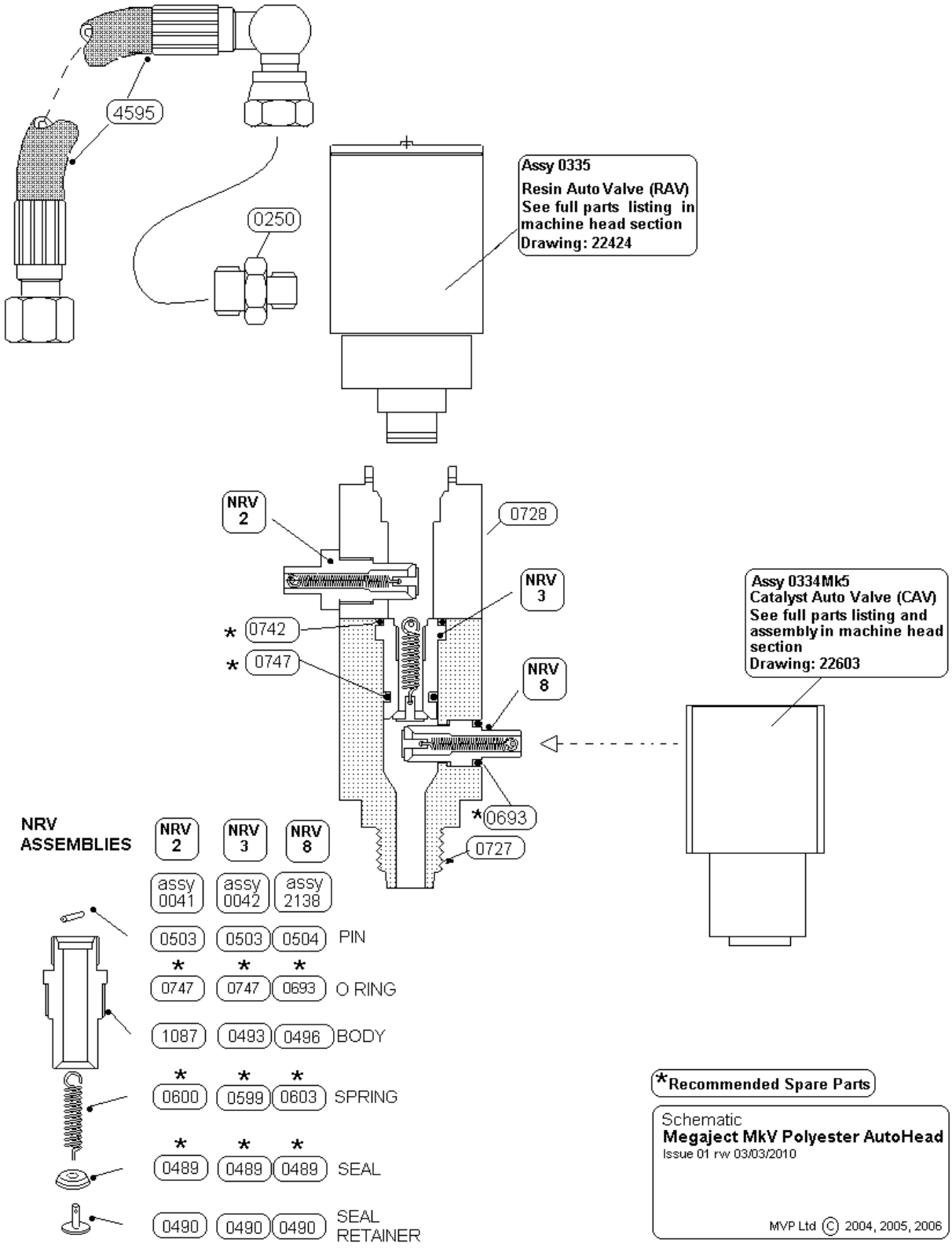
Megaject Auto Head



1:1 Configuration with CAV Attached



CAV Configuration Assembly



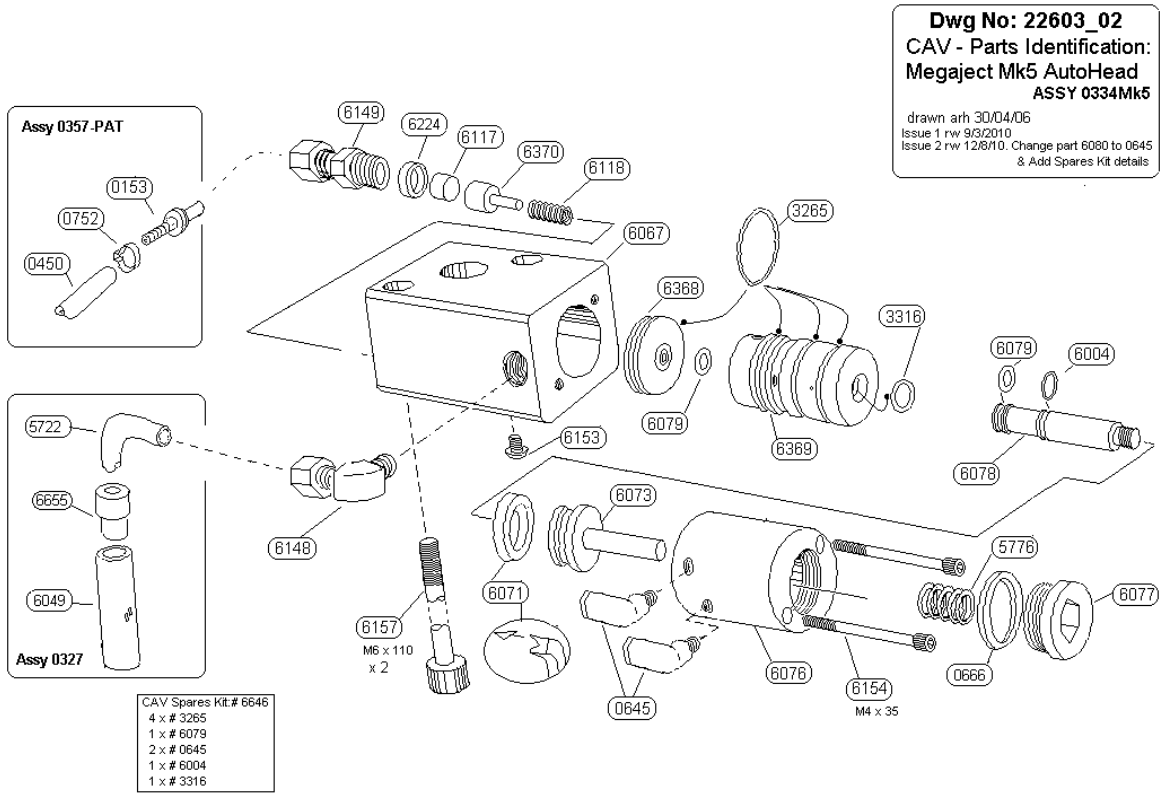
66. To remove the Resin Auto Valve (RAV), unscrew the two M5 x 110mm cap heads holding the clamp plate, then pull the RAV free from the head.
67. Use a wrench to remove the NRV2 from the top head block.

68. To remove NRV3, remove top head block bolts and split head into two sections.
69. Remove head block O-ring.
70. To service the NRV3, first remove spring retaining pin and screw M10 bolt partially into the NRV3 valve body, then pull body to remove it from head block.
71. Inspect all head block and NRV galleries; if catalyzed resin is evident, remove residue or replace parts as necessary.
72. To disassemble NRVs, remove spring retaining pin; seal can be replaced by removing spring from seat retainer.
73. When using a new PTFE cone seal, press and turn into NRV seat using thumb pressure only to ensure a good seal.

Note ***On reassembly a suitable hook must be used to stretch the spring sufficiently to enable the retaining pin to be replaced.***

74. Reassemble in reverse order.
75. Inspect the head block O-ring, NRV3 O-ring and NRV8 O-ring, and replace each after using a small amount of silicon grease to lubricate.
76. To access the NRV8, unscrew the two M5 x 50mm bolts that fix the CAV to the bottom head block, then pull the NRV8 out of the block for servicing.
77. After reassembly, the head must be flushed to check all seals are tight and head galleries are clean.

Catalyst Auto Valve (CAV) Assembly



The catalyst auto valve needs little servicing as all components are suitable for both MEKP and recommended acetyl acetone peroxide (AAP) catalysts.

The movement of the spool as indicated from the aluminum air cylinder end should be between 4 and 5 mm. Any less or greater can cause catalyst to flow incorrectly, so ensure this movement is correct by measuring using calipers after service and before using the machine is used in production.

The valve should only need servicing if air or catalyst is noted to weep from between the air cylinder and stainless-steel body. In this case the O-ring should be replaced. If catalyst appears to weep back to the catalyst bottle during injection mode, replace the internal spool O-rings. If catalyst is observed to weep from the injection nozzle during recirculation mode, replace the small front O-ring.

Take care not to damage or scratch the spool internal body when replacing the O-ring.

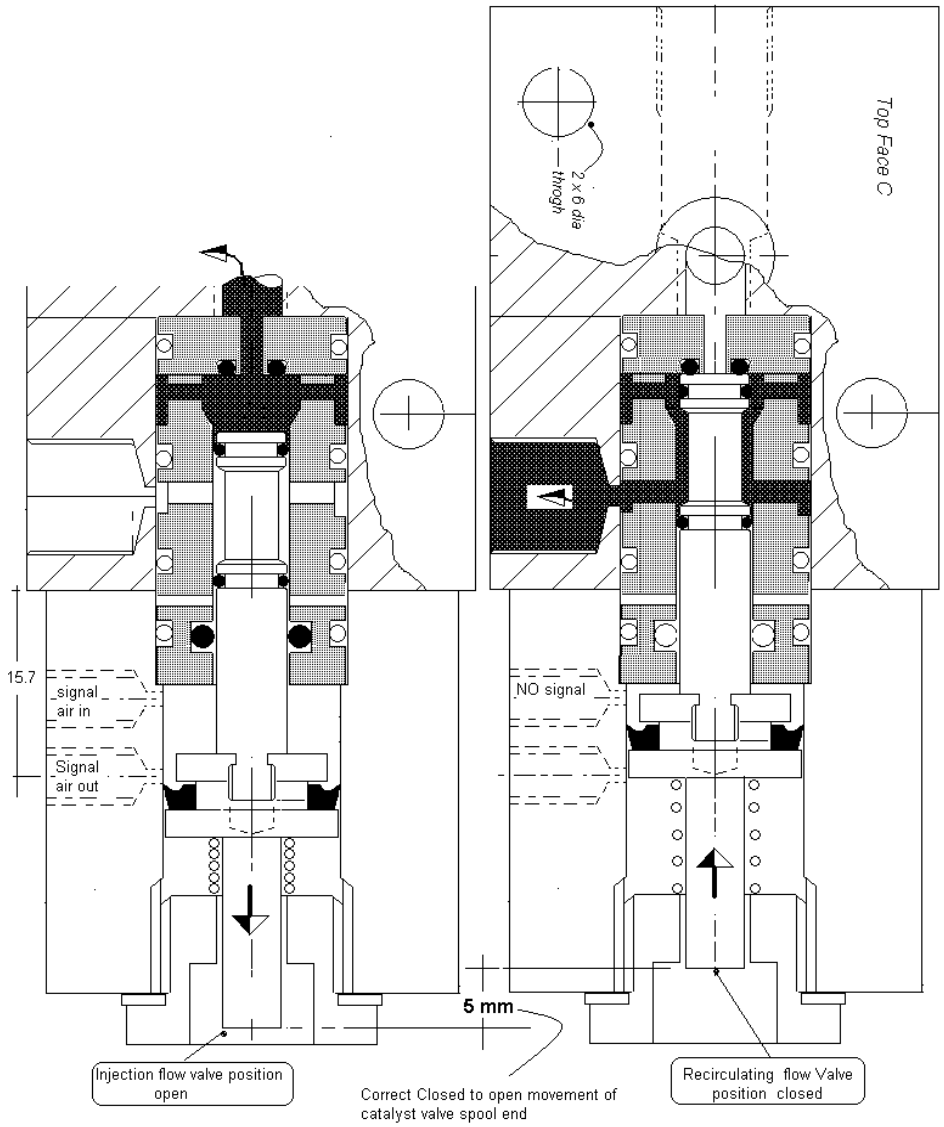


Figure 6. CAV Cross Section

Resin Auto Valve (RAV)

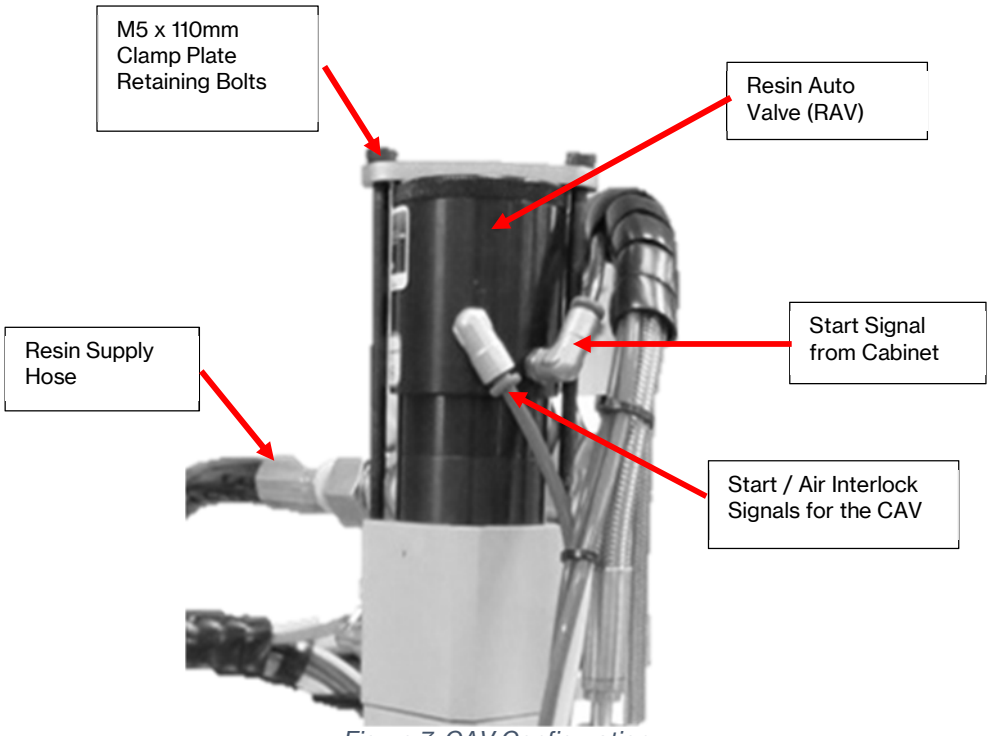
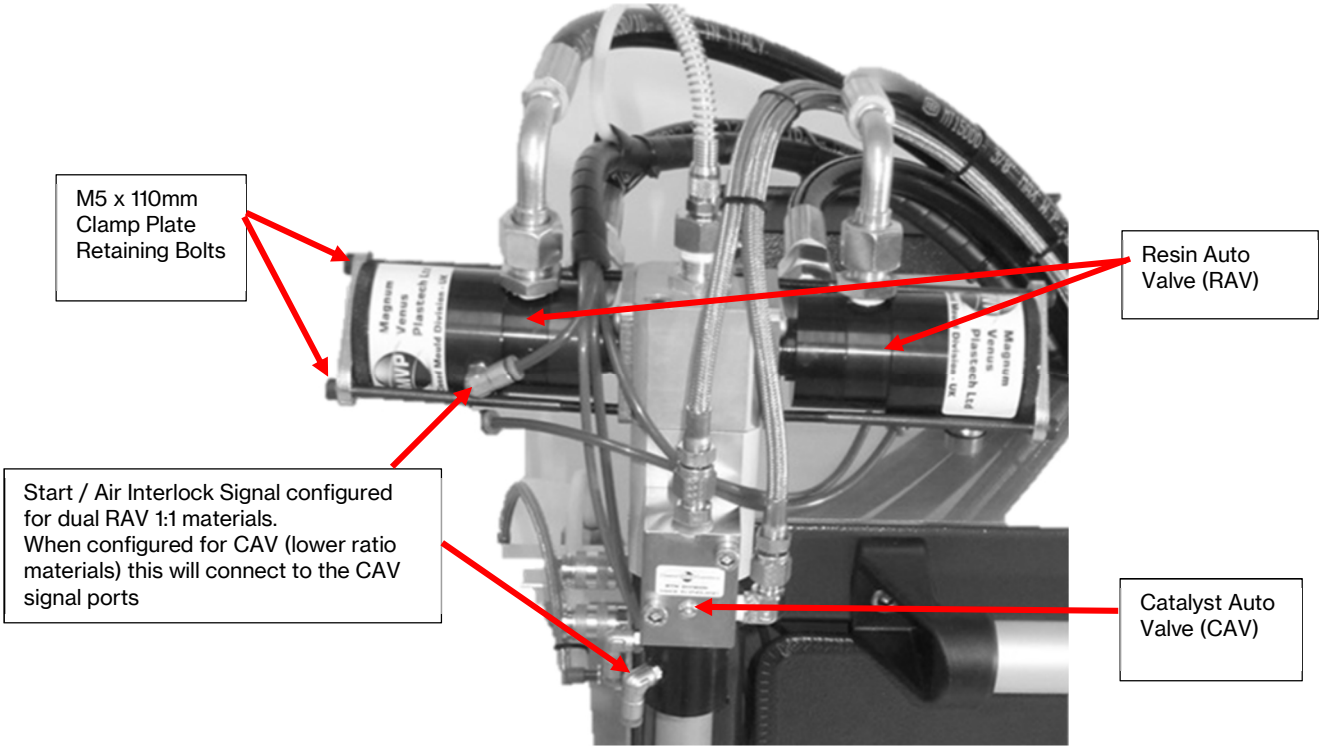
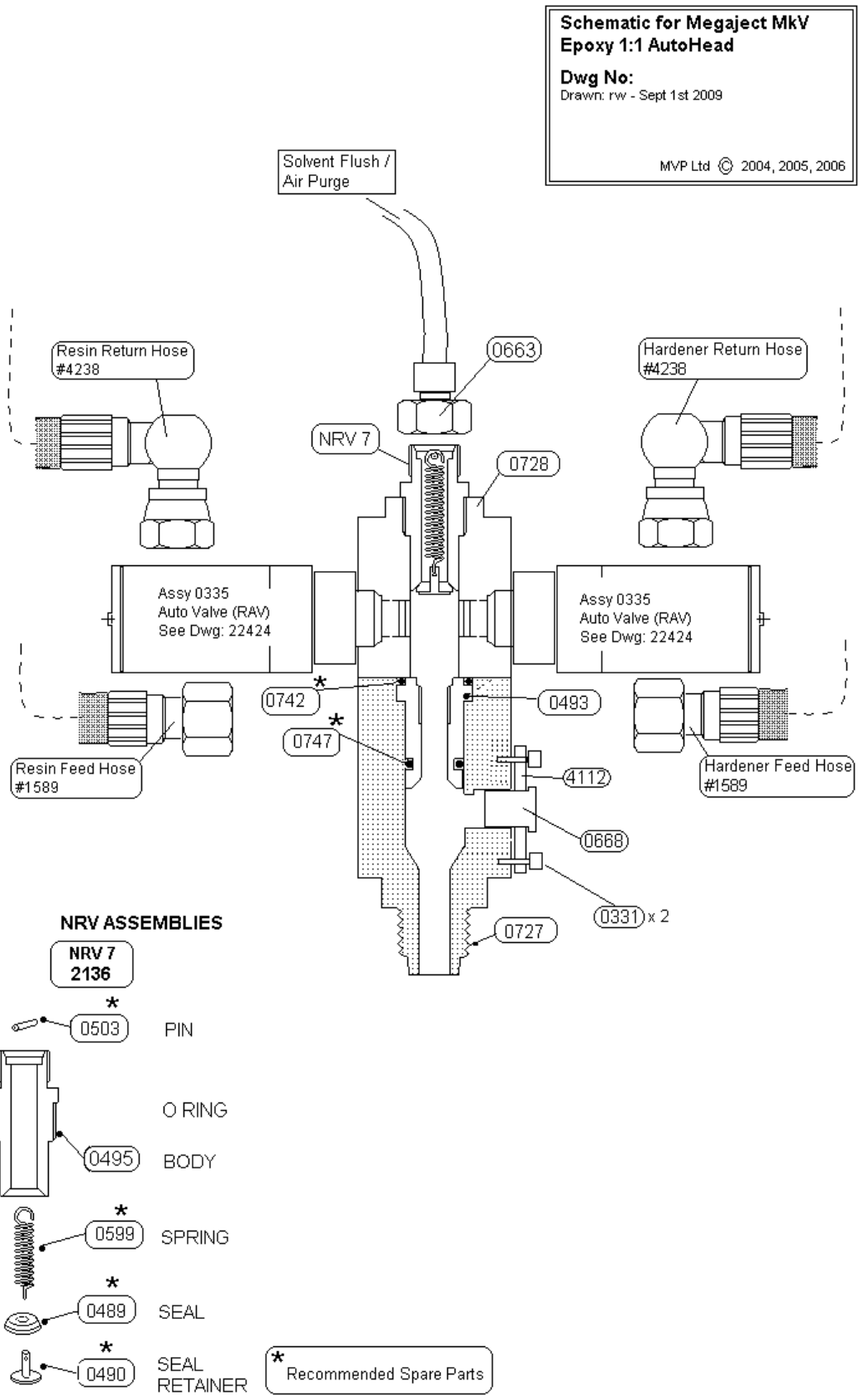
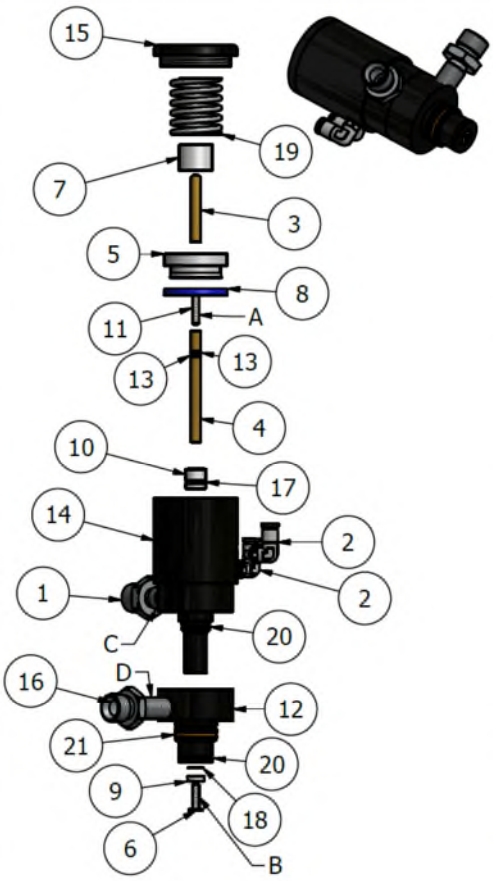


Figure 7. CAV Configuration




Schematic for Megaject MkV
Epoxy 1:1 AutoHead
Dwg No:
Drawn: rw - Sept 1st 2009
MVP Ltd © 2004, 2005, 2006
Solvent Flush / Air Purge
0663
Resin Return Hose #4238
Hardener Return Hose #4238
NRV 7
0728
Assy 0335 Auto Valve (RAV) See Dwg: 22424
Assy 0335 Auto Valve (RAV) See Dwg: 22424
0742
0747
0493
4112
0668
0331 x 2
0727
Resin Feed Hose #1589
Hardener Feed Hose #1589
NRV ASSEMBLIES
NRV 7 2136
0503 PIN
O RING
0495 BODY
0599 SPRING
0489 SEAL
0490 SEAL RETAINER
* Recommended Spare Parts



PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	0250	1/4 x 3/8 BSP UNION
2	2	0645	ELBOW MALE STUD SWIVEL 4MM-M5
3	1	5827	TAS TOP SHAFT
4	1	5828	TAS BOTTOM SHAFT
5	1	5830	TAS/RAV PISTON
6	1	5832	TAS NOSE SCREW
7	1	5835	TAS STROKE LIMITER
8	1	5836	TAS LIP SEAL
9	1	5837	TAS/RAV NOSE SEAL
10	1	5838	TAS BUSH
11	1	5850	M4 X 20 SET SCREW
12	1	5852	TAS/RAV NOSE
13	2	6004	RAV SHAFT O RING
14	1	6166	RAV, CYLINDER BODY
15	1	6167	RAV, CYLINDER LID
16	1	9007	1/4 x 3/8 BSP UNION
17	1	6905	O RING TAS BUSH
18	1	6059	TAS- M4 WASHER
19	1	5825	TAS/ RAV NOSE
20	2	3265	O RING CAT PUMP
21	1	4433	0 RING 20cc PUMP

A+B BLUE LOCTITE
C+D TAPE AND GOO GREASE ALL O RINGS AND SEALS
GREASE INTERNAL THREAD ON RAV BODY

TITLE: MKVI RAV		DRAWING NUM: 83022_01
DRAWN BY: DAINAN BOSHOFF	DATE: 22/04/2013	ASSY NUM: 8071 ASSY-0424

Note ***Always ensure the resin auto valve (RAV) is locked into the head top position using the two M5 securing lock screws.***

Using and Maintaining the RAV

78. Use air signal on 4mm fitting to open valve (valve closes when signal is removed).
79. To replace the main seal, remove the hex head screw, seal, and washer, then replace the seal with the recess against the screw head.
80. Use a small amount of removable thread lock compound on the 5mm exposed threads and nest to seal and washer only.

Note ***Do not overtighten hex head screw and use only a small amount of locking compound.***
The seal can be accessed and replaced without removing the nose block.
If the shaft turns while removing the screw, apply signal air pressure to open the connector, locking the shaft against rotation.

Note ***After renewing the seal ensure correct operation and sealing efficiency between open and closed positions before production use.***

81. Disconnect signal pressure.

82. Unscrew and remove cylinder top.

CAUTION

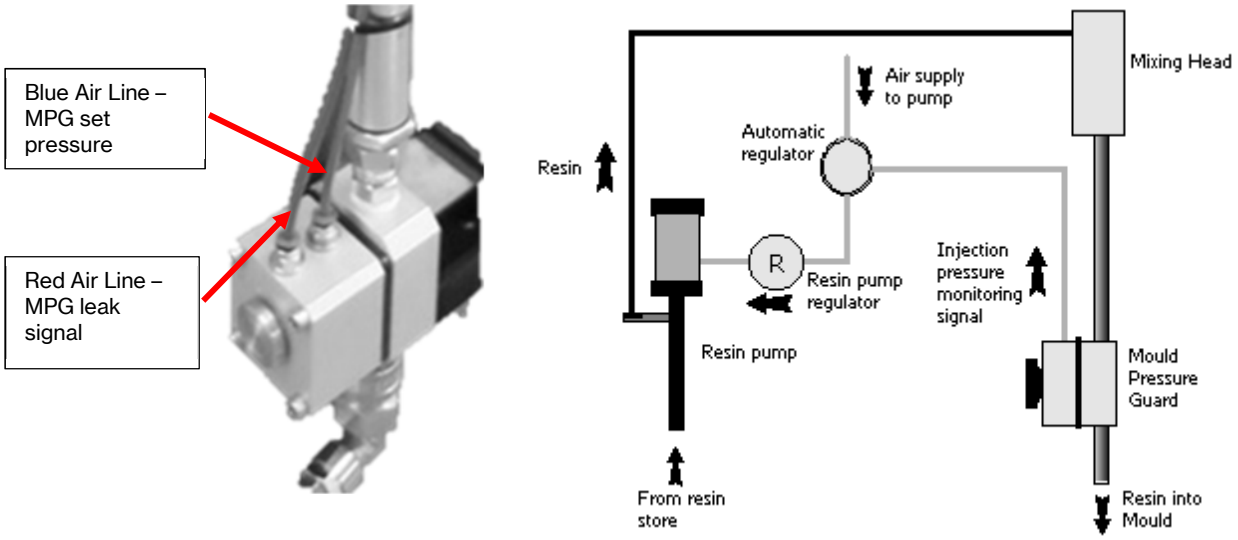
The top is under spring pressure.

83. Remove spring and limiter.
84. Pull piston shaft upward, then either cut seals off shaft (without scratching grooves in shaft) or replace shaft complete with seals fitted.
85. Reassemble, using a small amount of thread lock compound on threads and PTFE sealer paste on shaft end next to the piston base hole. Do not grip and turn shaft beneath the O-ring seal grooves.

Mold Pressure Guard (MPG)

The machine features a mold pressure guard (MPG), which is used to control the maximum allowable pressure at the mixing head. This provides line pressure control during an injection, or is 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 shown below. The blue air line supplies air from the MPG pressure regulator on the control panel. When fluid pressure at the injection head exceeds the MPG preset level on the MPG pressure gauge, the internal diaphragm moves and leaks air from the red air line connected to the control circuit, causing the machine to slow and stop.

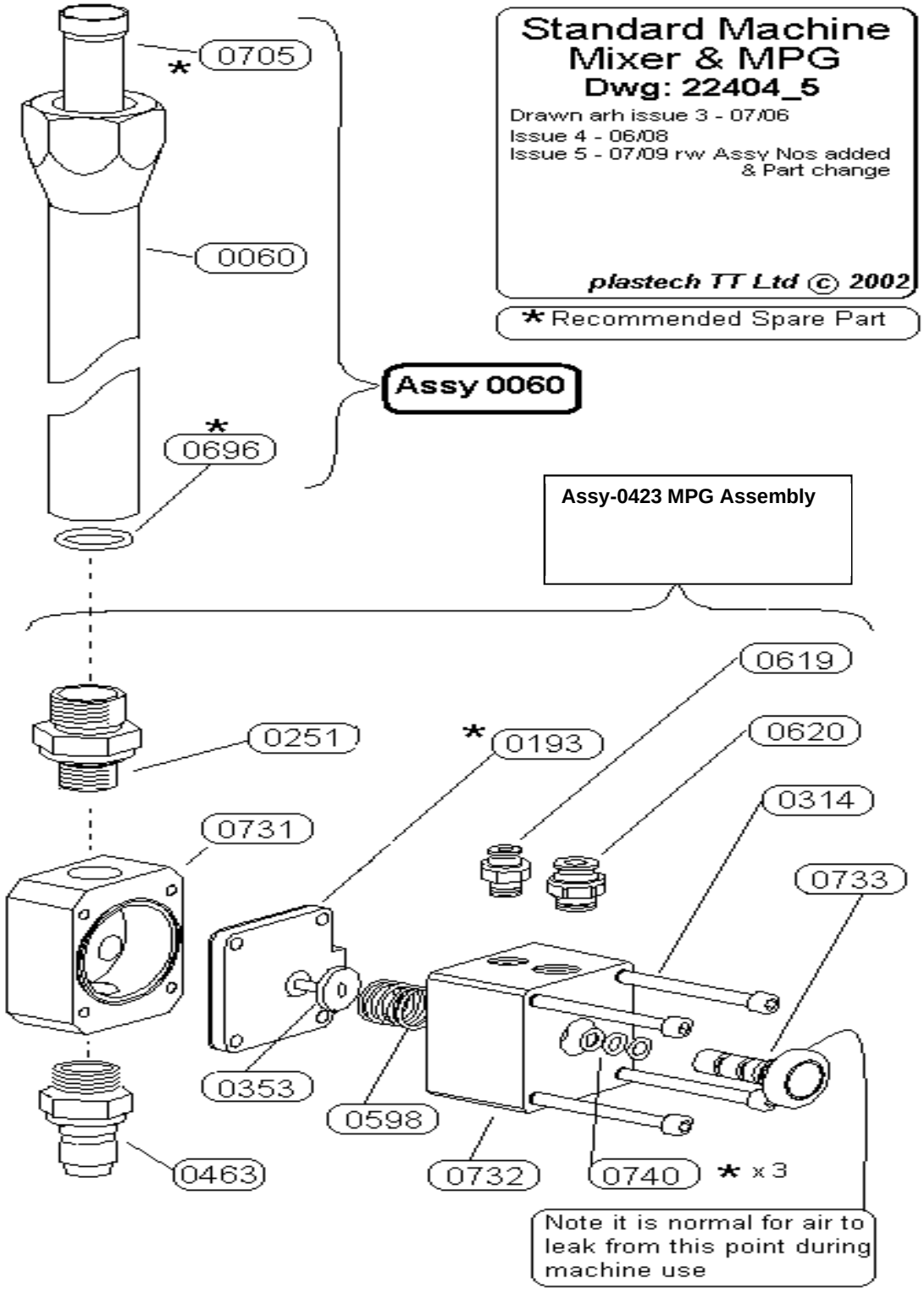


86. Set the maximum injection pressure on the MPG preset level gauge using the MPG regulator.
87. If the resin pressure is below the preset pressure, the automatic regulator will remain fully open, allowing full main pressure to the resin pump regulator.

If the resin pressure exceeds the preset level, the MPG signal pressure will reduce proportionally, closing the automatic regulator and limiting air pressure to the resin pump regulator. This slows or stops the resin pump, reducing resin pressure until it matches the preset level. During operation, a small leak of air will occur from the MPG sensor block. This is normal.

88. Adjust the MPG preset level during injection to achieve optimum pump output speed at the safest injection pressure.

Several factors will affect the optimum setting of the MPG regulator, such as fiber volume fraction, mold size and rigidity, resin viscosity, required resin delivery rate, etc.



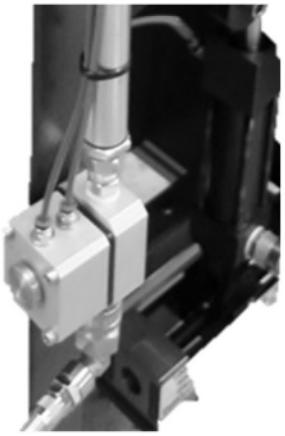
Mixer Tubes

Figure 8. RGA Mechanical Timer

Mixer tubes will only require replacement if partial or full gelation/sedimentation has occurred in the injection head. They cannot be repaired and must be replaced.

To replace mixer tubes, follow these steps:

89. Remove mold pressure guard (MPG) signal pipes.
90. Remove mixer shroud from head.
91. Remove mixer tube from inside shroud.
92. Lightly grease new mixer tube and shroud threads with silicon grease.
93. Ensure internal O-ring is in position, then replace mixer shroud.
94. Reattach to mixer head and reconnect MPG pipes, with the blue pipe nearest to the mixer tube.



Accessories

Resin Gel Alarm (RGA)

The machine features a resin gel alarm (RGA) system designed to alert the operator to the risk of catalyzed resin curing in the machine or mold during an injection or prior to the machine being flushed and cleaned.

When the inject button is pressed and the machine starts in injection mode, the RGA becomes active. It monitors the time between pump strokes during an injection, and if the preset time is exceeded an audible alarm will sound and the visual RGA indicator on the control panel will change from black to red.

The alarm is reset when the pump stroke changes direction in injection mode, but the RGA will continue to monitor the pump strokes and will alarm again if the preset time between pump strokes is once again exceeded. For example, if the machine stalled during injection due to a higher than normal back-pressure in the injection line. The operator may increase the injection pressure to make the pump stroke and therefore reset the alarm and complete the injection.

The RGA is deactivated so that it stops monitoring pump strokes and cancels any active visual/audible alarms by either flushing the machine or pressing the RGA reset button. The reset button is on the back of the control panel and can be pressed by inserting a small screwdriver or equivalent through the hole marked RGA reset. This is not intended to be used in normal operation and is provided as a means to silence the alarm if the pump cannot run and the machine cannot be flushed.

A user configurable pneumatic timer, which can be adjusted between 20-300 seconds, is located in the control box. A factory set timer of between 30-60 seconds is included in the RGA circuit to limit the switching rate of the circuit. These two timers need to time out in sequence in order for the alarm to trigger. In practice, if the mechanical timer is set to 5 minutes and the duration of a pump stroke were to exceed 5.5 to 6 minutes during an injection, the alarm would trigger.

Adjusting the RGA

The time between strokes before the RGA alarms and the volume of the alarm whistle can be adjusted. The pneumatic RGA is located in the control box. The mechanical timer is shown in

Figure 8. Turn the knob to adjust the timer to the required time, between 20 and 300 seconds. The dial shows seconds divided by 10, so to set the timer to 100 seconds, adjust the dial to 10.

The RGA alarm whistle volume can be changed by adjusting the flow controller that is in line with the whistle.

Catalyst Overpressure Valve (OPV)

The machine features catalyst overpressure protection. In addition to the industry standard inclusion of a pressure relief valve in the catalyst circuit, the control circuit will detect the overpressure condition and stop the pump from running. In injection or recirculation modes it is the equivalent of pressing the stop button.

For example, if during an injection the catalyst system is over pressurized, the injection will stop, the mixing head will return to the recirculation position, and the turbo auto sprue (TAS) signal will exhaust.

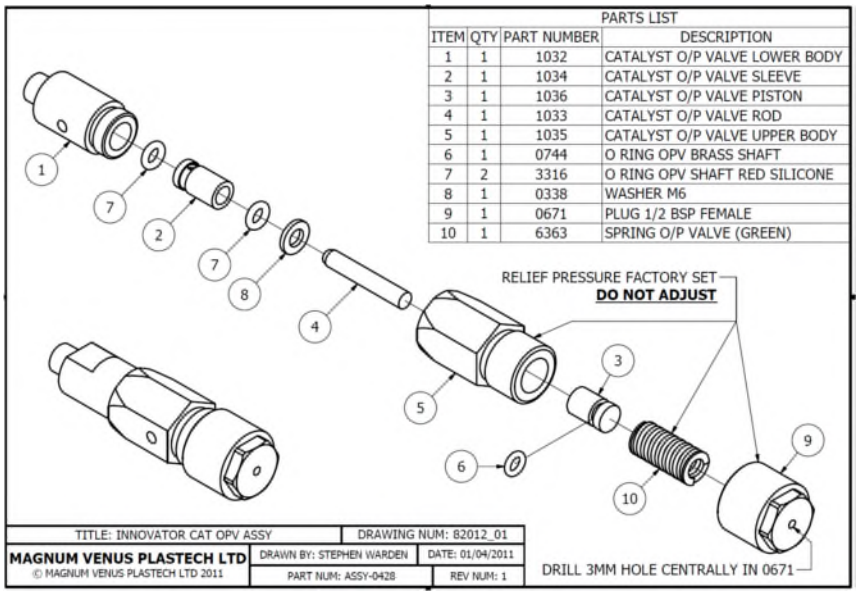
A visual indicator is provided on the side of the control box which will change from black to red in the event of catalyst overpressure. To reset the overpressure control circuit, the catalyst pressure must be relieved and the reason for the condition must be remedied before the machine can be operated in injection or recirculation modes.

Under normal circumstances the OPV is maintenance free. If catalyst leaks constantly from the 4mm hole in the stainless-steel bottom body, the O-rings must be replaced.

Note ***It is essential that the internal spring tension is not disturbed in the event of servicing this unit.***

To renew front O-rings, follow these steps:

95. Disconnect the red signal pipe.
96. Unscrew the whole assembly from the catalyst pump using a wrench on the forward stainless-steel body, taking care of any small residual pressurized catalyst as thread seal is broken. **Do not** disturb the spring tension end cap.
97. Hold the brass body and unscrew the stainless-steel body.
98. Pull shaft and collar from body, replace O-rings, and reassemble, ensuring shaft is re-inserted with rounded end into the body.



99. Ensure bodies are correctly screwed together using PTFE tape or similar thread sealant.

100. Reattach the valve to pump using thread sealant.

101. Re-prime catalyst system to remove any air from the system.

Flush System

Press the flush button to clean the injection head. The operator cannot initiate a flush when the machine is in injection mode, so accidental flushing of the system into a mold during an injection is not possible.

The flush system has a timer function that will stop the flush cycle automatically. The default duration of the flush is set between 30 – 60 seconds during manufacturing, however this can be adjusted by the user as required.

The flush cycle can be stopped at any time by pressing the **Stop** button.

Note ***Before pressing the flush button, ensure that they outlet from the mixing head is directed to a suitable waste container.***

Adjusting the Flush Timer

The flush timer duration can be increased or decreased by adjusting the flush timer restrictor. The restrictor controls the rate of airflow out of the timer circuit reservoir and the speed that the pressure falls in order to actuate the automatic flush stop valve. To set the timer, adjust the restrictor and then time the flush cycle. Continue this procedure until the desired flush time is obtained.

Note ***If the restrictor is fully wound in, air flow will be blocked and the timer will not operate.***

SP4 Solvent Pump Assembly

The SP4 performs a 200cc solvent purge followed by an air purge to thoroughly clean and purge the injection head and mixer. The pump is contained in a 3-gallon stainless-steel flush tank. During the flush cycle only the SP4 solvent pump will be pressurized to force out the solvent contained inside and then purges with air for the reminder of the flush cycle.

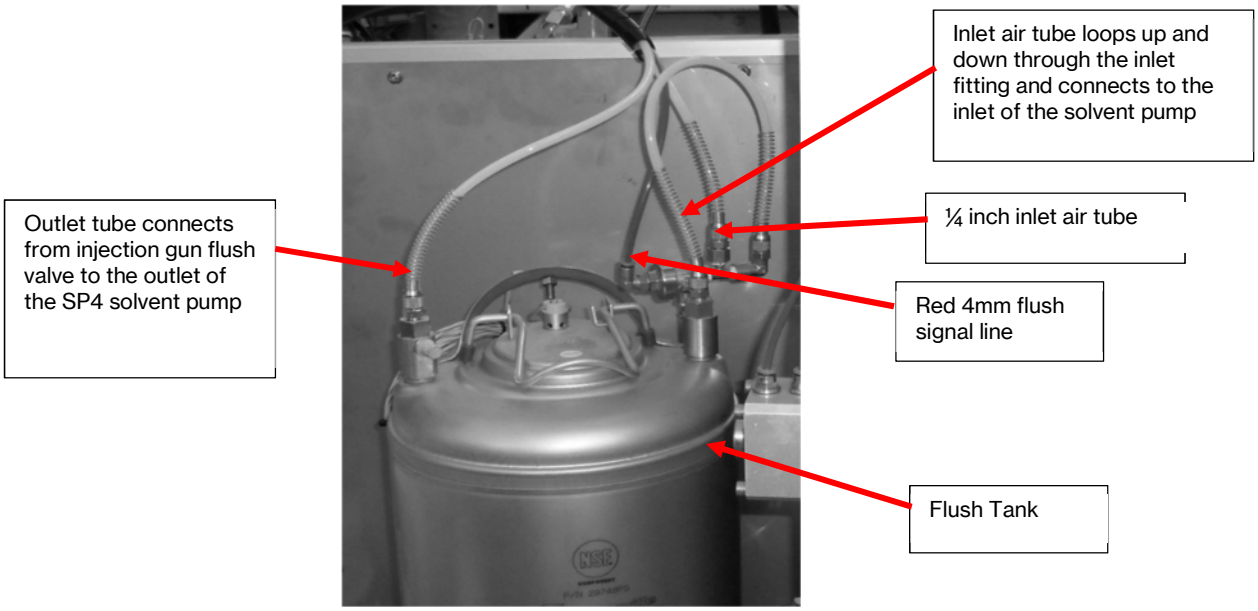
The SP4 is activated by pressing the **Flush** button on the control panel and will operate for 30 to 60 seconds. The duration of the flush / purge cycle can be changed by adjusting the flush timer.

Connecting the SP4 Pump

102. Connect the outlet tube from the outlet side of the solvent pump through the outlet fitting to the flush port of the injection gun.

103. Connect the red 4mm tube to the fitting on the inlet side of the quick exhaust.

104. Connect the ¼ inch pump inlet air tube to the other side of the inlet quick exhaust.



On the inside of the flush tank there are two connections to the flush pump:

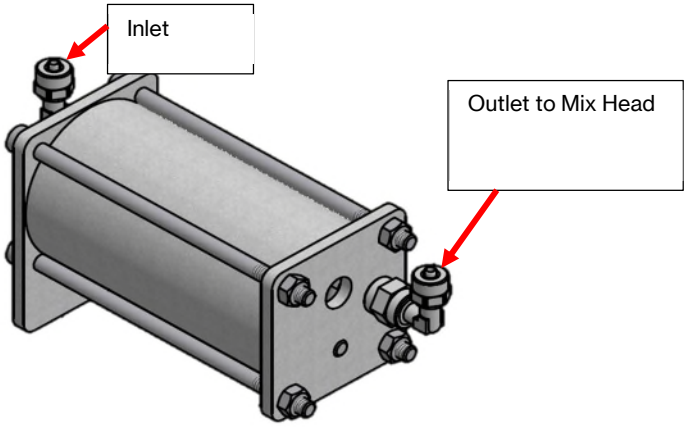
- The pump inlet air tube connects to the inlet side of the SP4 solvent pump through the inlet fitting
- The flush tube from the injection gun / mix head extends down through the outlet side fitting and connects to the outlet of the solvent pump

Note ***It is important that the solvent level in the tank be at no less than $^1/_3$ full, or at least 25mm (1 inch) of solvent above the SP4 pump. This will allow the solvent pump to properly refill with solvent after each use.***

Maintaining the SP4 Pump

The SP4 solvent pump is mostly maintenance free, but it may be necessary to replace the O-ring on the pump foot valve.

It is important to keep the inside of the flush tank clean and free of dirt, debris, and glass fibers that may prevent the pump foot valve from sealing properly.



Troubleshooting

MKVI Mix Meter System Troubleshooting		
Symptom	**Possible Cause**	**Remedy**
Pump does not operate on recirculation command	No air supply	Make sure pressurized air line is connected to the machine air inlet.
	Supply switch tripped off	Check that the 'pull on' switch is down – pull down for **ON**
	Air supply pressure is too low	Make sure air supply is at least 5 bar on incoming pressure gauge
	Pump regulator too low	Increase pump speed regulator output pressure
	Catalyst overpressure valve operated	Check catalyst recirculation valve is in recirculation position
	MPG signal reading low or zero	Check red signal pipe and fitting on MPG at head is secure and is not leaking. Check MPG brass spool is not leaking air – apply pressure to brass spool and observe signal pressure increase on panel, which may indicate MPG diaphragm requires renewal. Service and renew internal MPG O-rings
Pump does not operate on recirculation command	Pump changeover switch not being activated	Check changeover switches are being activated correctly by pump
	Resin pump seized with old resin	If resin is left in the machine fluid section for extended periods it may gel prematurely or harden completely. Check for signs of this in the tank, inlet pipe, or recirculation return pipe. If this condition arises, a complete clean out and service of the entire system is required
Pumps do not start on injection command	Head valves not in injection flow position	Check that both auto valves are opening correctly
	Pre-determining counter not reset to zero	Reset to zero using counter reset button
	Any of the same possible causes the pump does not operate in recirculation mode	See above
Pump tries to pump but stops or stalls immediately	Catalyst overpressure triggering	Check NRV8 and catalyst recirculation valve for blockage
	Head or mixer gelled up	Check mixer first and renew mixer element if partially blocked. If major blockage, renew element and service complete head internals.

MKVI Mix Meter System Troubleshooting		
Symptom	**Possible Cause**	**Remedy**
Pump tries to pump but stops or stalls immediately	Blocked resin fitting at head	Check RAV for blockage – this section can remain uncleared when resin is changed or machine has been idle for extended periods
	Resin gelled in pump or hoses	Dismantle and service all machine resin fluid section
Resin fails to pump on both pump strokes when recycled	Pick-up filter partially blocked / damaged / missing	Check pick-up filter and clean in acetone. ***Note*** ***When using fillers this filter can become clogged very rapidly, especially if filled resin is not agitated and recirculated regularly***
	Pump internal ball check valve(s) not seating	If the resin pick-up filter becomes damaged and/or filled resin is left idle in the machine for extended periods, the pump valves may intermittently fail to operate correctly. It may be possible to clear the fault by recycling quickly for several minutes; otherwise the pump must be serviced. When checking the valves, inspect the pump piston seal and renew if badly scored and/or worn.
	Pump piston seal worn	Inspect the pump piston seal and renew if badly scored and/or worn
	Resin viscosity too high	Reduce speed of pump and/or reduce resin viscosity
Catalyst fails to pump on both pump strokes when recycled	Pick-up filter partially blocked / damaged / missing	Check pick-up filter and clean in acetone. ***Note*** ***When using fillers this filter can become clogged very rapidly, especially if filled resin is not agitated and recirculated regularly***
Catalyst fails to pump on both pump strokes when recycled	Pump internal ball check valve(s) not seating	If the resin pick-up filter becomes damaged and/or filled resin is left idle in the machine for extended periods, the pump valves may intermittently fail to operate correctly. It may be possible to clear the fault by recycling quickly for several minutes; otherwise the pump must be serviced. When checking the valves, inspect the pump piston seal and renew if badly scored and/or worn.
	Pump piston seal worn	Inspect the pump piston seal and renew if badly scored and/or worn
	Catalyst pick-up filter clogged	It is imperative this submerged filter remains clean. Remove from pipe end, flush in water, and air purge to dry

MKVI Mix Meter System Troubleshooting		
Symptom	**Possible Cause**	**Remedy**
Air bubbles observed in catalyst recirculation flow	Catalyst level low	Refill catalyst bottle
	Catalyst lower pump inlet pipe connection lost	Check fitting for tightness. If metal olive seal is damaged, renew
	Catalyst lower body seal worn	Renew O-ring
	Catalyst contaminated	Safely discard contaminated catalyst. Clean entire catalyst fluid section and refill with fresh catalyst
Wet molding / uncatalyzed resin patches	Pump requires re-priming	Make sure there is sufficient catalyst level. Re-prime catalyst pump
	Worn seal or residue in external NRV at head	Service head external NRV
	NRV8 seal failure	Service NRV8. Ensure there is a good seal between PTFE cone and seat
	Air/gas bubbles in catalyst	See above.
	Solvent leaking into mold when injecting under vacuum	Service solvent isolation valve mounted on machine frame and replace seals if required