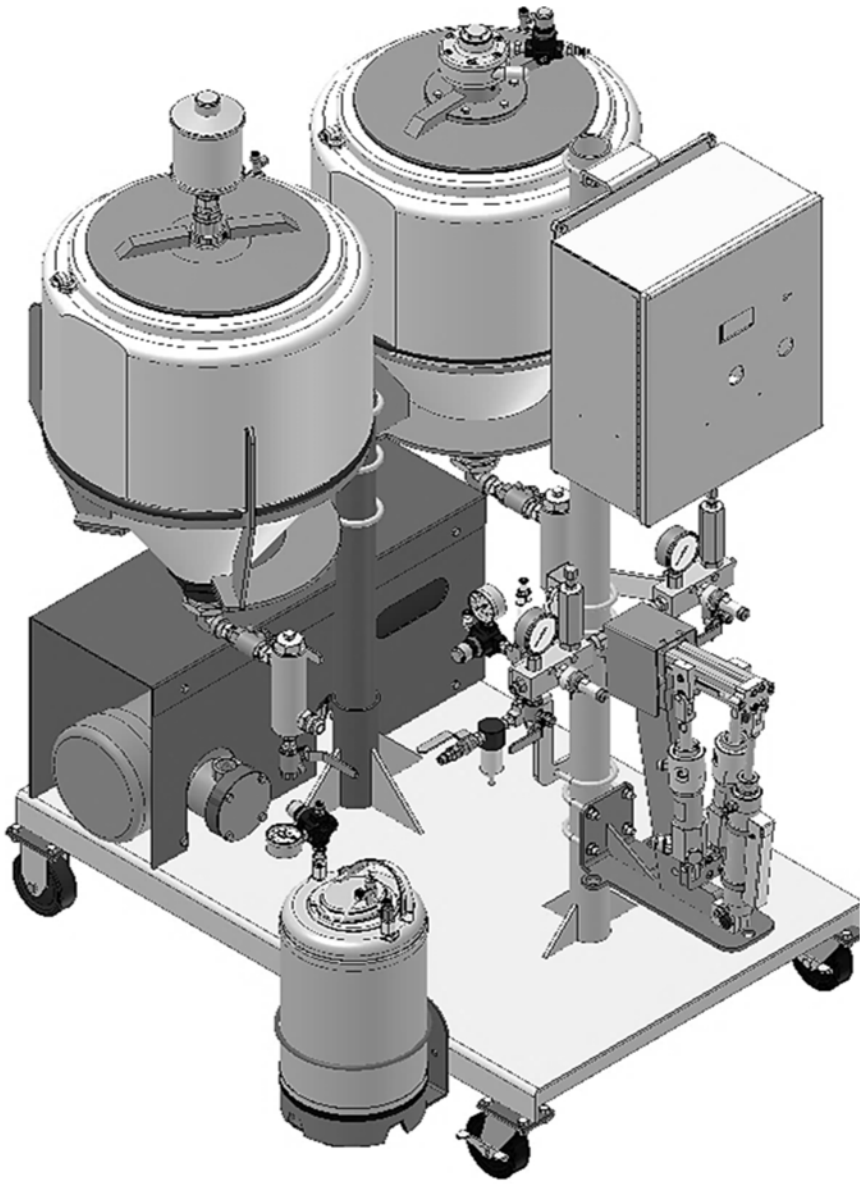
Mini Link Hydraulic System

Operations Manual

This manual is applicable to the following models:

- MLM-2000-PUL



MAGNUM VENUS PRODUCTS

Rev. December 2018

MAGNUM VENUS PRODUCTS

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

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

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

E-mail: info@mvpind.com

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

www.mvpind.com/mvp-international

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

Table of Contents

Safety & Warning Information

Warnings

Due to the vast number of chemicals that could be used and their varying chemical reactions, the buyer and user of this equipment should determine all factors relating to the fluids used, including any of the potential hazards involved. Particular inquiry and investigation should be made into potential dangers relating to toxic fumes, fires, explosions, reaction times, and exposure of human beings to the individual components or their resultant mixtures. MVP assumes no responsibility for loss, damage, expense or claims for bodily injury or property damage, direct or consequential, arising from the use of such chemical components.

The end user is responsible for ensuring that the end product or system complies with all the relevant laws in the country where it is to be used and that all documentation is adhered to.

Recommended Occupational Safety & Health Act (OSHA) Documentation:

- 1910.94 Pertaining to ventilation
- 1910.106 Pertaining to flammable liquids
- 1910.107 Pertaining to spray finishing operations, particularly paragraph (m), Organic Peroxides and Dual Component Coatings

For Additional information, contact the Occupational Safety and Health Administration (OSHA) at https://www.osha.gov/about.html.

Recommended National Fire Protection Association (NFPA) Documentation:

- NFPA No.33 Chapter 14 Organic Peroxides and Dual Component Materials
- NFPA No. 63 Dust Explosion Prevention
- NFPA No. 70 National Electrical Code
- NFPA No. 77 Static Electricity
- NFPA No. 91 Blower and Exhaust System
- NFPA No. 654 Plastics Industry Dust Hazards

Fire Extinguisher – code ABC, rating number 4a60bc using Extinguishing Media –Foam, Carbon Dioxide, Dry Chemical, Water Fog, is recommended for this product and applications.

The following general warnings and guidelines are for the setup, use, grounding, maintenance, and repair of equipment. Additional product-specific warnings may be found throughout this manual as applicable. Please contact your nearest MVP Technical Service Representative if additional information is needed.

Safety Precautions
• Avoid skin contact and inhalation of all chemicals.
• Review Material Safety Data Sheet (MSDS) to promote the safe handling of chemicals in use.
• Restrict the use of all chemicals to designated areas with good ventilation.
• Chemicals are flammable and reactive.
• Noxious fumes released when combusted.
• Operate equipment in a ventilated environment only.
• Uncured liquid resins are highly flammable unless specifically labeled otherwise.
• Cured laminate, accumulations of overspray, and laminate sandings are highly combustible.
• Do not operate or move electrical equipment when flammable fumes are present.
• Ground all equipment.
• If a spark is seen or felt, immediately halt operation. Do not operate the equipment until the issue has been identified and repaired.
• Contaminated catalyst may cause fire or explosion.
• Containers may explode if exposed to fire / heat.
• Use and store chemicals away from heat, flames, and sparks.
• Do not smoke in work areas or near stored chemicals.
• Do not mix Methyl Ethyl Ketone Peroxide (MEKP) with materials other than polyethylene.
• Do not dilute MEKP.
• Keep food and drink away from work area.


Physical Hazards

- Never look directly into the spray gun fluid tip. Serious injury or death can result.
- Never aim the spray gun at or near another person. Serious injury or death can result.
- Chemical compounds can be severely irritating to the eyes and skin.
- Inhalation, ingestion, or injection may damage internal organs and lead to pulmonary disorders, cancers, lymphomas, and other diseases or health conditions.
- Other potential health effects include: irritation of the eyes and upper respiratory tract, headache, light-headedness, dizziness, confusion, drowsiness, nausea, vomiting, and occasionally abdominal pain.
- Eye contact: Immediately flush with water for at least 15 minutes and seek immediate medical attention.
- Skin Contact: Immediately wash with soap and water and seek immediate medical attention.
- Inhalation: Move the person to fresh air and seek immediate medical attention.
- Do not remove shields, covers, or safety features on equipment that is in use.
- Never place fingers, hands, or any body part near or directly in front of the spray gun fluid tip. The force of the liquid as it exits the spray tip can shoot liquid through the skin.
- Keep hands and body parts away from any moving equipment or components.
- Do not stand under plunger
- An improperly loaded drum may lead to an imbalance, causing a unit to tip over

Personal Protective Equipment (PPE)

- MVP recommends the use of personal safety equipment with all products in our catalog.
- Wear safety goggles, hearing protection, a respirator, and chemical resistant gloves.
- Wear long sleeve shirts or jackets and pants to minimize skin exposure.
- PPE should be worn by operators and service technicians to reduce the risk of injury.

For Additional information, contact the Occupational Safety and Health Administration (OSHA). https://www.osha.gov/about.html

Symbol Definitions

Indicates the risk of contact with chemicals that are hazardous, which may lead to injury or death.

Indicates the risk of contact with voltage / amperage that may lead to serious injury or death

Indicates that the materials being used are susceptible to combustion

Indicates the risk of contact with moving components that may lead to serious injury or death.

Indicates that the system or component should be grounded before proceeding with use or repair.

Indicates the use of lit cigarettes or cigars is prohibited, because the materials being used are susceptible to combustion.

Indicates that the materials and/or the process being performed can lead to ignition and explosion.

A recommendation for the use of Personal Protective Equipment (PPE) before using or repairing the product.

Polymer Matrix Materials: Advanced Composites

Potential health hazards associated with the use of advanced composites can be controlled through the implementation of an effective industrial hygiene and safety program.

https://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_1.html#t iii:1_1

Resins		
Composite Component	**Organ System Target (Possible Target)**	**Known (Possible) Health Effect**
Epoxy resins	Skin, lungs, eyes	Contact and allergic dermatitis, conjunctivitis
Polyurethane resins	Lungs, skin, eyes	Respiratory sensitization, contact dermatitis, conjunctivitis
Phenol formaldehyde	Skin, lungs, eyes	As above (potential carcinogen)
Bismaleimides (BMI)	Skin, lungs, eyes	As above (potential carcinogen)
Polyamides	Skin, lungs, eyes	As above (potential carcinogen)
Reinforcing materials		
Composite Component	**Organ System Target (Possible Target)**	**Known (Possible) Health Effect**
Aramid fibers	Skin (lungs)	Skin and respiratory irritation, contact dermatitis (chronic interstitial lung disease)
Carbon/graphite fibers	Skin (lungs)	As noted for aramid fibers
Glass fibers (continuous filament)	Skin (lungs)	As noted for aramid fibers
Hardeners and curing agents		
Composite Component	**Organ System Target (Possible Target)**	**Known (Possible) Health Effect**
Diaminodiphenylsulfone	N/A	No known effects with workplace exposure
Methylenedianiline	Liver, skin	Hepatotoxicity, suspect human carcinogen
Other aromatic amines		
Composite Component	**Organ System Target (Possible Target)**	**Known (Possible) Health Effect**
Meta-phenylenediamine (MPDA)	Liver, skin (kidney, bladder)	Hepatitis, contact dermatitis (kidney and bladder cancer)
Aliphatic andcyclo-aliphatic amines	Eyes, skin	Severe irritation, contact dermatitis
Polyaminoamide	Eyes, skin	Irritation (sensitization)
Anhydride	Eyes, lungs, skin	Severe eye and skin irritation, respiratory sensitization, contact dermatitis

Catalyst - Methyl Ethyl Ketone Peroxide (MEKP)

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

WARNING

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

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

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

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

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

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

Clean-Up Solvents and Resin Diluents

WARNING

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

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

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

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

WARNING

Do not use Halogenated Hydrocarbon (HHC) solvents in pressurized fluid systems having aluminum or galvanized wetted parts.
Magnum Venus Products is aware of NO stabilizers available to prevent HHC solvents from reaction under all conditions with aluminum components in closed fluid systems. HHC solvents are dangerous when used with aluminum components in a closed fluid system.

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

Catalyst Diluents

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

WARNING

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

Cured Laminate, Overspray and Laminate Sandings Accumulation

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

To prevent spillage and leakage, you should:

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

Toxicity of Chemicals

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

Equipment Safety

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

CAUTION

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

DANGER

Contaminated catalyst may cause fire or explosion. Before working on the catalyst pump or catalyst accumulator, wash hands and tools thoroughly. Be sure work area is free from dirt, grease, or resin. Clean catalyst system components with clean water daily.

DANGER

Eye, skin, and respiration hazard. The catalyst MEKP may cause blindness, skin irritation, or breathing difficulty. Keep hands away from face. Keep food and drink away from work area.

Treatment of Chemical Injuries

CAUTION

Refer to your catalyst manufacturer's safety information regarding the safe handling and storage of catalyst. Wear appropriate safety equipment as recommended.

Great care should be used in handling the chemicals (resins, catalyst and solvents) used in polyester systems. Such chemicals should be treated as if they hurt your skin and eyes and as if they are poison to your body. For this reason, Magnum Venus Products recommends the use of protective clothing and eye wear in using polyester systems. However, users should be prepared in the event of such an injury.

Precautions include:

1. Know precisely what chemicals you are using and obtain information from your chemical supplier on what to do in the event the chemical gets onto your skin or into the eyes, or if swallowed.
2. Keep this information together and easily available so that it may be used by those administering first aid or treating the injured person.
3. Be sure the information from your chemical supplier includes instructions on how to treat any toxic effects the chemicals have.

WARNING

Contact your doctor immediately in the event of an injury. If the product's MSDS includes first aid instructions, administer first aid immediately after contacting a doctor.

Fast treatment of the outer skin and eyes that contact chemicals generally includes immediate and thorough washing of the exposed skin and immediate and continuous flushing of the eyes with lots of clean water for at least 15 minutes or more. These general instructions of first aid treatment may be incorrect for some chemicals; you must know the chemicals and treatment before an accident occurs. Treatment for swallowing a chemical frequently depends upon the nature of the chemical.

Emergency Stop Procedure

In an emergency, follow these steps to stop a UPS System:

1. The ball valve located where the air enters the power head of the resin pump, should be moved to the "OFF" or closed position.

Note ***The "open" or "on" position is when the ball valve handle is parallel (in line) with the ball valve body. The "closed" or "off" position is when the ball valve handle is perpendicular (across) the ball valve body.***

2. Turn all system regulators to the "OFF" position (counter-clockwise) position.
3. Verify / secure the catalyst relief line, located on the catalyst relief valve.
4. Verify / secure the resin return line, located on the resin filter.
5. Place a container under the resin pump ball valve to catch ejected resin.
6. Locate the ball valve on the resin pump.
7. Rotate the ball valve 90 degrees to the "On" or open position.

Grounding

Grounding an object means providing an adequate path for the flow of the electrical charge from the object to the ground. An adequate path is one that permits charge to flow from the object fast enough that it will not accumulate to the extent that a spark can be formed. It is not possible to define exactly what will be an adequate path under all conditions since it depends on many variables. In any event, the grounding means should have the lowest possible electrical resistance.

Grounding straps should be installed on all loose conductive objects in the spraying area. This includes material containers and equipment. Magnum Venus Products recommends grounding straps be made of AWG No.18 stranded wire as a minimum and the larger wire be used where possible. NFPA Bulletin No77 states that the electrical resistance of such a leakage path may be as low as 1 meg ohm (10 ohms) but that resistance as high as 10,000 meg ohms will produce an adequate leakage path in some cases.

CAUTION

Whenever flammable or combustible liquids are transferred from one container to another, or from one container to the equipment, both containers or container and equipment shall be effectively bonded and grounded to dissipate static electricity. For further information, see National Fire Protection Association (NFPA) 77, titled "Recommended Practice on Static Electrical". Refer especially to section 7-7 titled "Spray Application of Flammable and Combustible Materials".

Introduction

This manual provides information for the operation, maintenance, and simple repair of the MVP Mini Link Hydraulic System. The following procedures are included:

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

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

Component Assemblies

MVP's Mini Link Hydraulic System consists of a combination a dispense gun and two metering pumps (either one or a combination of the following:

- ❑ VHPC-1200 METERING PUMP
- ❑ VHPC-2200 METERING PUMP
- ❑ VHPC-3200 METERING PUMP
- ❑ VHPC-4200 METERING PUMP

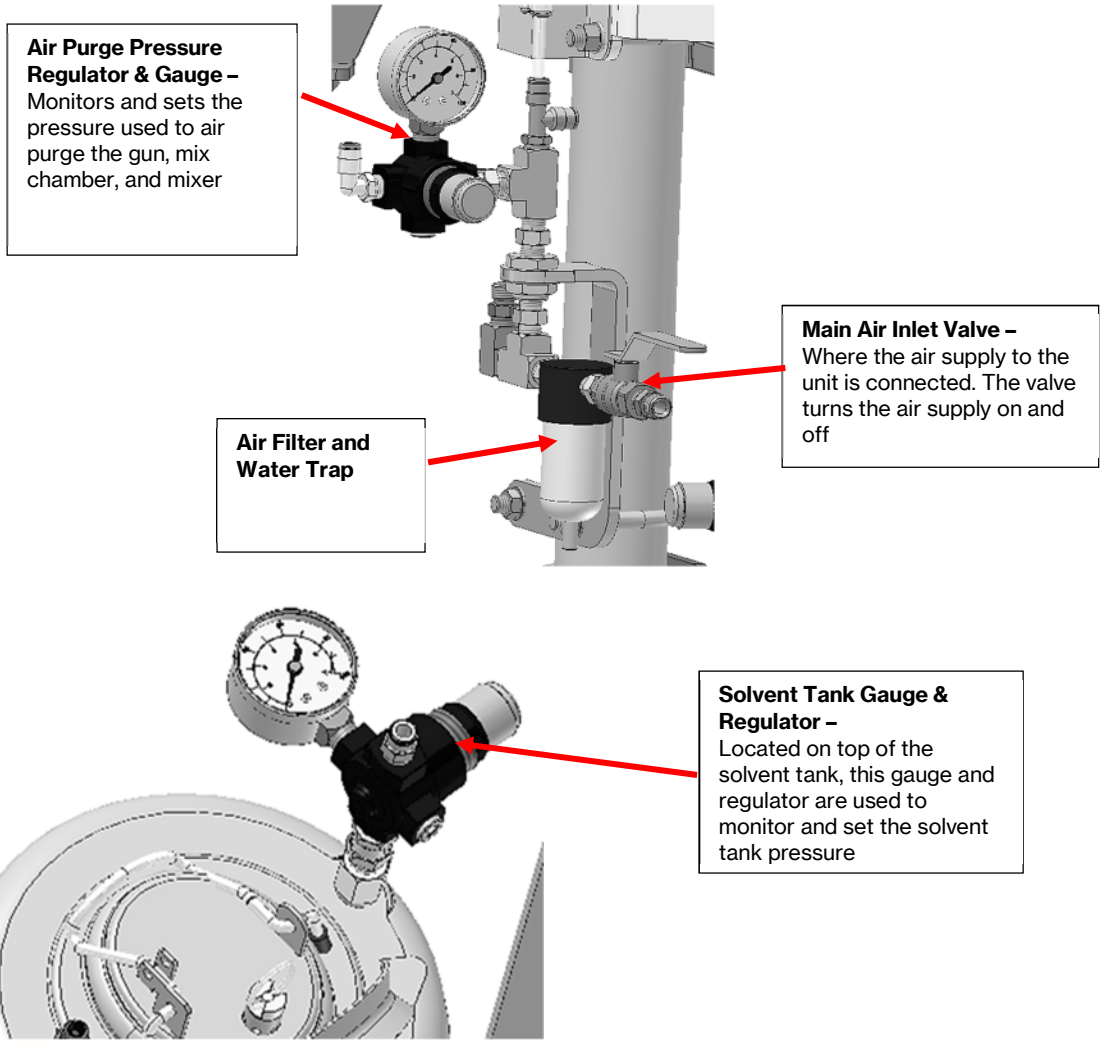
AND

- ❑ 1:1 CLASSIC PRO GUN

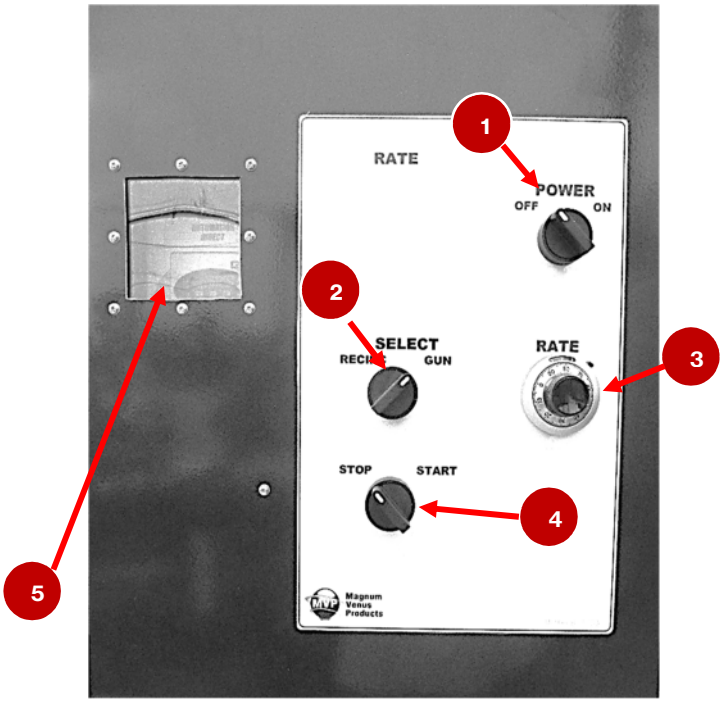
Ratio Ranges

Mini Link Ratio Chart				
Fixed Fluid Section	Variable Fluid Section	Material Ratio Range		Output
		High	Low	
VHPC-1200	VHPC-1200	1 : 1	4.6 : 1	0.53 – 0.87 GPM (2.0 -2.9 liter)
VHPC-1200	VHPC-2200	1.3 : 1	5.8 : 1	0.51 - 0.78 GPM (1.93 -2.38 liter)
VHPC-1200	VHPC-3200	2.2 : 1	10.4 : 1	0.48 – 0.63 GPM (1.81 – 2.38 liter)
VHPC-1200	VHPC-4200	5 : 1	21.5 : 1	0.46 -0.52 GPM (1.81 – 1.96 liter)
VHPC-2200	VHPC-2200	1 : 1	4.6 : 1	0.42 - 0.69 GPM (1.6 – 2.61 liter)
VHPC-2200	VHPC-3200	1.8 : 1	8.25 : 1	0.39 – 0.54 GPM (1.47 – 2.04 liter)
VHPC-2200	VHPC-4200	4 : 1	18.6 : 1	0.36 – 0.43 GPM (1.36 – 1.63 liter)
VHPC-3200	VHPC-3200	1 : 1	4.6 : 1	0.23 – 0.38 GPM (0.87 – 1.43 liter)
VHPC-3200	VHPC-4200	2.2 : 1	10.4 : 1	0.21 – 0.28 GPM (0.79 -1.06 liter)
VHPC-4200	VHPC-4200	1 : 1	4.6 : 1	0.10 – 0.17 GPM (0.37 – 0.64 liter)

Unit Overview – Air Manifold Controls

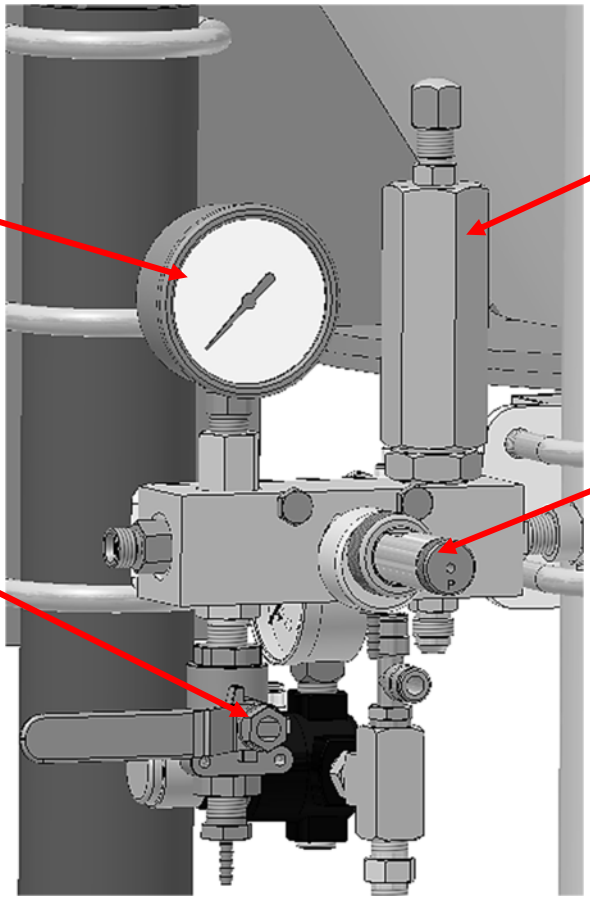


Unit Overview – Control Box



Control Box		
Number	**Description**	**Function**
1	Power On/Off Control	Control box main power switch; turns on and off power the control box and hydraulic pump/motor
2	Mode Selector	Selects between the recirculation and gun mode. In recirculation mode the material is returned to the containers and in gun mode the material is ready to be dispensed through the gun
3	Rate Control Dial	Pump speed control; this controls the rate at which the material is dispensed
4	Start/Stop Control	Starts or stops the pump movement by turning on or off the hydraulic motor/pump.
5	Drive Display Window	Shows the megahertz of the motor controller. The window allows the operator to see the megahertz as displayed on the motor controller.

Unit Overview – Material Manifold Controls



Setting Up the Unit

WARNING

Before performing maintenance of any kind, follow all warnings outlined in this manual, follow all pressure relief procedures outlined, turn off all electrical equipment associated with the system, and clean all tools of grease or other material that can react with the material being pumped.

DANGER

Use proper safety gear, including gloves and safety glasses as recommended by the manufacturer of your materials.

1. Connect air supply to system that is capable of providing 90 – 100 psi (6 – 7 bar) of clean, dry air.

Note ***When using the air driven mixer, a supply of 20 CFM is required.***

2. Open the air manifold ball valve.

3. Check the hydraulic oil level (pre-filled at the factory) and top off as needed.
4. Connect a power supply.

Note ***The unit is set to either 120 Volt 22 amps or 220 single phase 13.7 amps, according to customer preference.***

5. Check to make sure that all hose fittings are tight.
6. Inspect hoses to make sure none were damaged in shipping.
7. Fill the solvent container no more than $^{2}/_{3}$ full with desired solvent.

Note ***Non-flammable solvents are recommended.***

8. Using the air regulator located on the flush tank, pressurize the solvent to between 40 and 60 psi (3 and 4 bar).
9. Set the air purge regulator mounted at the top of the air manifold to between 40 and 60 psi (3 and 4 bar).
10. Locate the 3-way ball valve on the gun hose set.
11. Rotate the ball valve handle to the flush position (pointing at the yellow tubing).
12. Test solvent flush by pushing the flush buttons located on either side of the gun block.
13. Rotate the ball valve handle to the direction of the clear tubing.
14. Push the flush buttons again to air purge the mixer housing.
15. Rotate the ball valve handle to the neutral position in the center when both flush testing and air purge are complete.

Set Gun Packing

16. Turn the gun mode select switch from RECIRC to GUN and back again 3 to 5 times.

Note ***The recirculation and dispense guns should open and close as each is selected.***

Note ***If your system has a standard gun with trigger, you will need to pull the trigger on the gun 3 to 5 times.***

17. Using the T-bit tool, snug the packing nuts on each of the gun blocks.
18. Repeat steps and several times to properly seat the seals in the Pro Gun blocks.

Note ***The recirculation and dispense gun packing will need to be tightened regularly to prevent or stop leaks.***

Prime Metering Pumps

Note ***When pressure feeding the two components to the pump and gun, the outgoing fluid pressure should be 8 to 10 times higher than the inlet pressure from feed source for proper metering.***

19. Install the ratio block onto the gun head to keep the two materials separate for priming and avoid material waste.
20. Set both pumps for the longest pump stroke for priming.

Note ***If either tank or pump completely runs out of material, never re-prime fluid section with static mixer attached. This could result in material crossover inside the gun.***

21. Pour throat seal oil (TSL-ISO) into the packing nut reservoirs until they are ¾ full to protect the piston rods from material drying on them.
22. Fill both containers with materials, but do not exceed 12 gallons in either container.

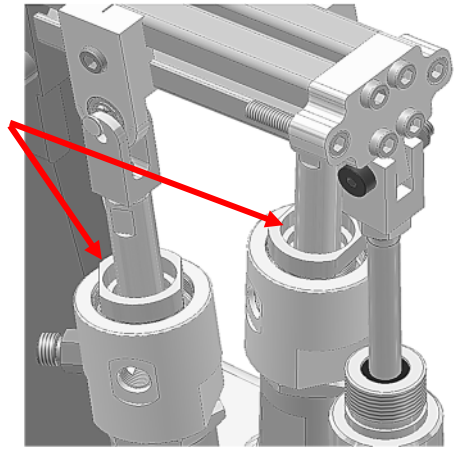


Figure 1. Packing Nut Oil Reservoirs

Note ***Any time the air driven mixer is to be used, no less than 3 gallons of resin should be in the container. Mixer speed should be run at the lowest speed possible to avoid whipping air into the resin.***

23. Connect the red air hose quick disconnect to the mixer air motor.
24. Slowly turn mixer air regulator knob until desired mixer speed is achieved.

Note ***Always keep the ISO tank lid on the tank and slightly snug to avoid moisture contamination or crystals forming. Crystallized ISO will plug the fluid filter and affect metering.***

25. Turn the rate control dial on the control panel to zero.
26. With air pressure to the system, turn the power switch on the control panel to the **ON** position.
27. Turn the Start/Stop Control to the **STOP** position.
28. Turn the Mode Selector switch to the GUN position.

Note ***The pump should not run, but the dispense gun valve rod should rotate to the ON position and the recirculation gun should close. There is a machined slot in one end of the valve rod which should be horizontal in the open position and vertical in the off position.***

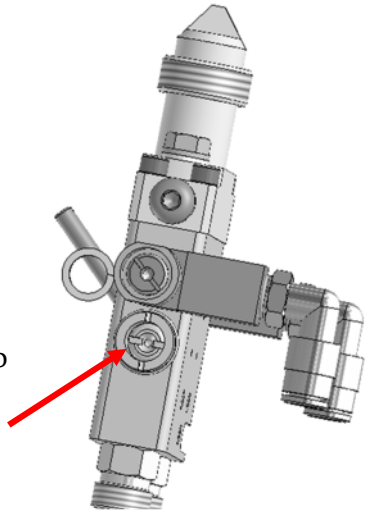


Figure 2. Valve Rod in Gun Block

29. Turn the Mode Selector switch to **RECIRC** (the valve should rotate to the vertical position).
30. After checking the dispense gun open/close positions, turn the Mode Selector switch to the **GUN** position (gun open).
31. Check that the ball valves between the material tanks and filters are open; the ball valves on the bottom of the filters should remain closed.

32. Set the Start/Stop Switch to the **START** position to start the hydraulic pump and motor.

Note ***By connecting a couple of fittings and some poly tubing via the ratio block to the front of the dispense gun, the two components can be returned to the tanks or source without the risk of contamination.***

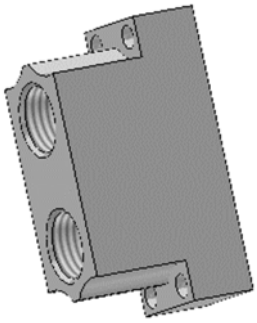


Figure 3. Ratio Block

33. With the ratio block attached to the gun head, turn the Rate Control Dial clockwise to begin cycling the pumping system.
34. Once a steady stream of both A & B materials is flowing, note if any fluid pressures are reading for both materials.
35. If no fluid pressure is reading, increase pump speed.

Note ***For gravity fed container systems, very little fluid pressure is required for ratio checks, but the fluid gauge needle should come off its stop even if an exact reading is not obtainable.***

36. Turn the Mode Selector switch to **RECIRC.**
37. The dispense gun valve rod closes and the recirculation gun valve rod opens, returning the materials to the source tanks. When using the ratio block, the two materials remain separate and no solvent flush is required at this time.
38. Turn the Start/Stop Switch to **STOP** or turn the Rate Control Dial to zero to stop recirculating.

Setting Pump Ratio

The resin pump (pump A) is normally fixed at the longest pump stroke length and is not used for adjusting ratio changes.

The hardener pump (pump B) is used to set the proper ratio by loosening the cap screw and sliding the upper and lower slide clevis at the top and bottom of the metering pump in the slotted track to the desired setting, then tightening the cap screw. The indicator stickers on the top and bottom of the slotted track are used for a reference when setting ratios.

1. If during priming a fluid section shows no pressure because of a very low viscosity material, add a smaller diameter hose onto the ratio block to restrict the flow and increase fluid pressure.

Note ***To set the ratio, an accurate scale or volumetric beakers are needed.***

2. Turn the Mode Selector switch to **GUN**, allowing both materials to begin flowing out of the ratio block.
3. Slide two pre-weighted containers under the resin streams.
4. Allow no less than 10 pump reversals before removing the containers.
5. Turn the Mode Selector switch to **RECIRC**.
6. Weigh the materials and subtract the container weights to find the ratio.

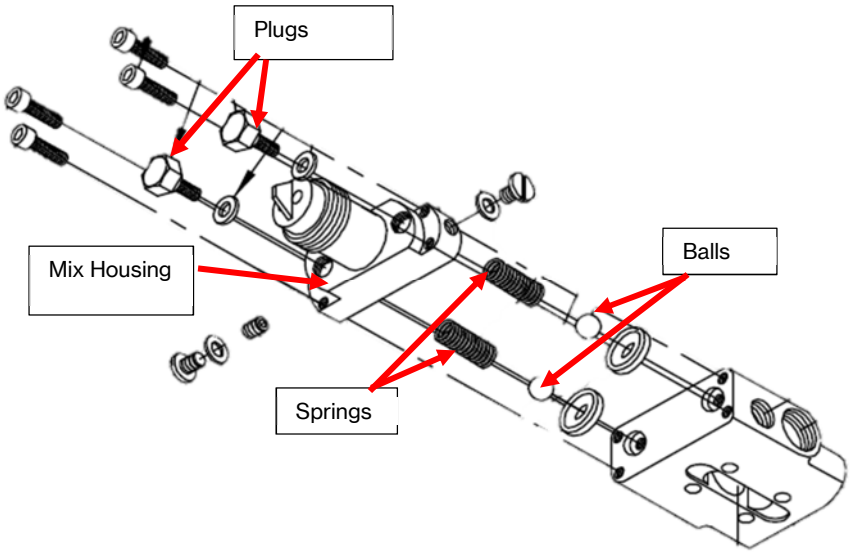
Note ***Some material manufacturers may only give a volumetric ratio rather than weight. In this case if setting the ratio by weight measurement is preferred, you will need the specific gravity of each material to convert the weight to volume in cubic centimeters (cc's).***

Example ***The poly resin (material A) weight is 500 grams and has a specific gravity of 1.09. Divide the sample weight by the specific gravity to obtain the volume (500/1.09 = 458.71 cc's).***

7. To adjust the ratio, loosen the cap screw to adjust the pump stroke length on the hardener fluid section shorter, lower slave arm.
8. Tighten the cap screw and check the ratio again.
9. Make notes of each setting until the desired ratio is set.

Note ***It is best practice to make notes of all settings during ratio checks including pump speed settings, pressures, and temperatures. At the start of each work week, perform another ratio check. This is especially important when using fillers mixed into the resin to assure filler settling has not occurred in the resin filter or pump.***

10. Flush the ratio block by pushing the flush valves and selecting between solvent and purge on the 3-way valve on the gun hose.
11. Install the mix housing, springs, and ball checks on the gun block.



Note ***Sometimes it is easier to install the mix housing first, then remove the plugs on the front of the mix block to install the ball and springs.***

12. Attach the static mixer to the mix chamber.
13. Turn the Mode Selector switch to **GUN** and dispense material into a waste bucket.
14. Make note of the fluid pressures for both materials, then turn the Mode Selector switch back to **RECIRC** and flush the dispense gun and mixer.

Note ***The fluid pressures for the two materials do not have to match, but it is preferable not to have a huge difference. 300 psi on the resin (material A) and 150 psi on the hardener (material B) is generally acceptable. In some cases the pump may run so slowly that it is difficult to read the exact pressure. As long***

as both needles come off their stops when gravity feeding, proper ball seating should occur.

Performing Daily Tasks

Daily Start Up

1. Inspect levels of resin, hardener, and solvent to make sure you have enough to begin production; refill or replace as necessary.
2. Turn on the main power.
3. Open the main air inlet supply.
4. Install the mix housing, spring, and balls to the mix block.
5. Set the Mode Selector switch to **RECIRC** and the Start/Stop switch to **START**.
6. Adjust the rate control to the desired output speed.
7. Allow several pump strokes and inspect the return hose in the tank to assure material flow.
8. If your unit is due for periodic ratio check and material gel test, perform them at this time.
9. Prepare the dispense gun for operation and set the Mode Selector switch to **GUN.**

Daily Shut Down

Note ***Make sure the fluid pump shafts are at the bottom of the stroke to avoid any material drying on the shafts. Not following this procedure will have an adverse effect on piston rod seal life.***

10. Turn the Mode Selector switch to **RECIRC**.
11. Turn the Start/Stop switch to **STOP** just before the pumps reach the bottom reversal.
12. Flush both sides of the mix chamber into a waste container and air purge dry.
13. Remove the mixer from the mix housing.
14. Inspect the static mixer to make sure it is completely clean of metered materials.
15. Remove the mix housing, spring, and balls and inspect each for any set-up materials.

Note ***Depending on the resin systems used, it may not be necessary to remove the mix housing for shut down every day, however the static mixer should always be removed for shut down.***

16. Turn the electrical power switch to off.
17. Close the main air inlet valve.
18. Remove the flush tank pressure by lifting the relief valve ring.
19. Open the fluid pressure relief valves on the material manifolds to release fluid pressure, then close them again.

Maintenance

20. Inspect the water trap daily; drain water from the trap as needed.
21. Inspect pump piston shafts daily for material build-up and clean as needed.
22. Check inline filters weekly and clean as needed.
23. Check the hydraulic oil reservoir once a month to make sure the fluid level is correct.
24. Tighten recirculation and dispense gun packing to stop or prevent any leaks found.
25. Recirculate the materials occasionally if the unit is not going to be in use for several days.

Note ***The material in the hoses can be recirculated using the ratio block.***

Long-Term Shut Down

26. Place a container under each of the filter ball valves, then open each ball valve and allow materials to drain out of each tank.
27. Set the Mode Selector switch to **RECIRC** and the Start/Stop switch to **START**.
28. Adjust the Rate Control so the pumps are moving slowly.
29. When the majority of the material is out of both tanks, close the filter ball valves, then set the Start/Stop to **STOP** or adjust the Rate Control to zero.
30. Remove the lids from the feed containers and pour 1 to 2 liters of solvent into them.
31. Clean the container walls using a brush.
32. With the Mode Selector switch on **RECIRC**, turn the Start/Stop switch to **START** and allow the pumps to recirculate the solvent through the recirculation gun and hoses for several minutes.
33. Turn the Start/Stop switch to **STOP** or adjust the Rate Control to zero to stop recirculation.
34. With no mixer on the gun, turn the Start/Stop selector switch to **START** to purge the materials into a waste container through the front of the gun.
35. Once both materials have been purged from the hoses and solvent is being dispensed out of the gun, move to a second container to collect the dirty solvent.
36. Repeat steps through with clean solvent in each of the two containers until it comes out of the gun clean, then run the pump until the solvent flow stops.
37. When the fluid sections are at the bottom of the stroke, turn the Start/Stop switch to **STOP**.
38. Inspect the throat seal oil level and add as needed.
39. Open the filter ball valve and allow the tanks to drain.
40. Remove the hex fitting from the top of the filters.
41. Remove the filter screens from housing, inspect for debris, and clean.
42. Allow solvent to dry before reassembling the filters.

Setting Pump Sensors

The hydraulic cylinder sensor switches have already been set at the factory. In the event that they need to be re-set to factory recommendation, follow these steps:

1. Remove the sensor cover by loosening the two machine screws.
2. Turn the Mode Selector switch to **RECIRC** and turn the Start/Stop switch to **START**.
3. Adjust the speed control dial so the cylinder runs at a very low speed.
4. Allow the cylinder to travel to the full extension and stop then turn the Start/Stop switch to **STOP**.
5. Loosen the cap screw on the upper sensor clamp.
6. Adjust the sensor clamp so that it lines up with the cylinder piston (you will hear the relay in the control box click).
7. Tighten the cap screw to lock the clamp in place.
8. Turn the Start/Stop selector to **START** again and allow the cylinder to retract to the shortest position and bottom out in the cylinder.
9. Turn the switch to **STOP**.
10. Loosen the cap screw on the lower sensor clamp.
11. Adjust the sensor clamp so that it lines up with the cylinder piston (you will hear the relay in the control box click).
12. Tighten the cap screw to lock the sensor clamp in place.
13. Turn the Start/Stop switch to **START** and allow the assembly to travel up and down.
14. If the cylinder stops at either of the two positions, adjust the sensor clamp at that position to allow the cylinder to move.
15. Re-install the sensor cover and tighten the machine screws.