SystemOne Fluid Section

Component Manual

This manual is applicable to the following models:

- 3101-00-01
- 3102-00-01

MAGNUM VENUS PRODUCTS

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

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Safety & Warning Information

Warnings

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

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

Recommended Occupational Safety & Health Act (OSHA) Documentation:

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

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

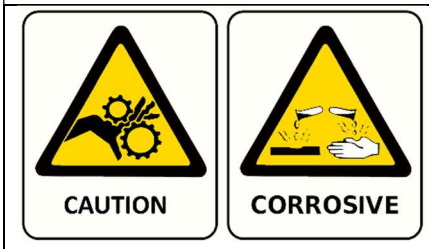
Recommended National Fire Protection Association (NFPA) Documentation:

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

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

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

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


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


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


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

Symbol Definitions

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

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

Indicates that the materials being used are susceptible to combustion

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

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

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

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

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

Polymer Matrix Materials: Advanced Composites

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

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

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

Catalyst - Methyl Ethyl Ketone Peroxide (MEKP)

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

WARNING

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

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

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

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

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

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

Clean-Up Solvents and Resin Diluents

WARNING

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

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

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

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

WARNING

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

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

Catalyst Diluents

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

WARNING

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

Cured Laminate, Overspray and Laminate Sandings Accumulation

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

To prevent spillage and leakage, you should:

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

Toxicity of Chemicals

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

Equipment Safety

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

CAUTION

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

DANGER

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

DANGER

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

Treatment of Chemical Injuries

CAUTION

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

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

Precautions include:

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

WARNING

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

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

Emergency Stop Procedure

In an emergency, follow these steps to stop a system:

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

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

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

Grounding

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

Grounding straps should be installed on all loose conductive objects in the spraying area. This includes material containers and equipment. Magnum Venus Products recommends grounding straps be made of AWG No.18 stranded wire as a minimum and the larger wire be used where possible. NFPA Bulletin No77 states that the electrical resistance of such a leakage path should be 1 meg ohm (10^6 ohms) or less.

CAUTION

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

Introduction

This manual provides information for the operation, maintenance, and simple repair of the MVP SystemOne Fluid Section. The following procedures are included:

- Step-by-step assembly and disassembly
- Parts information

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.

As you disassemble the equipment, lay the components out in the correct order and orientation to assist with reassembly. Refer to the current parts drawing for any equipment you are servicing to ensure that you have the correct part numbers for replacement items.

Tools Needed

- ¾" open end wrench
- ¼" wooden dowel – 6" length
- ¼" metal rod
- 12" adjustable wrench
- Strap wrench
- Crescent wrench
- $^{9}/_{16}$" open end wrench
- Pliers

Disassembling Fluid Section

WARNING

Be sure to bleed all pressure from the system before disconnecting hoses or attempting to service this equipment. Release the surge chamber charge before removing the surge chamber. System may be under pressure and could cause serious injury.

Remove Fluid Section from Unit

1. Remove the E-ring, lift up the sleeve, then remove the two connectors.
2. Remove the pivot pin guide bushing to disengage from the slide arm.
3. Remove the quick pin and slide the slide arm out of the piston rod adapter.

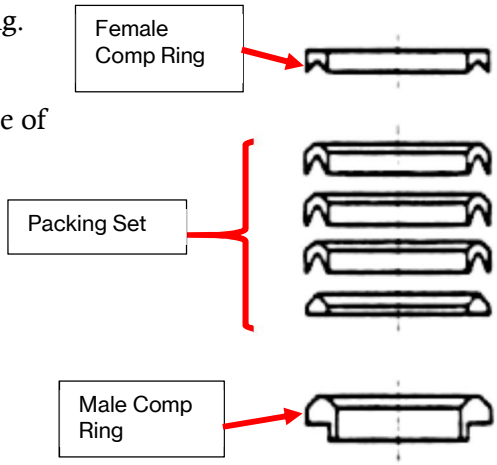
Disassemble and Clean Fluid Section

4. Remove the two hex head bolts from the outlet body.
5. Slide the foot valve collar, foot valve body, and cylinder down off the piston rod and discard the two O-rings.
6. Remove the ball stop and 4-lobed ball guide.
7. Remove and discard the ¾" chrome ball.
8. Clean and inspect the ball seat area of the foot valve body.
9. Loosen the packing nut and slide the piston rod out through the bottom of the outlet body.
10. Unscrew the piston body from the piston rod.
11. Remove the piston ball spring.
12. Remove and discard the ½" chrome ball.
13. Slide the piston cup comp ring, the two piston cups, the piston cup spacer, and the piston cup backup from the piston body.
14. Discard the piston cups.
15. Remove the packing nut from the outlet body.
16. Use a ¼" wooden dowel to push the guide bearing, female comp ring, packing set, male comp ring, and wave spring assembly out through the top of the outlet body.
17. Discard the packing set assembly.
18. Clean and inspect all parts to be reused; replace as needed.

Reassembling Fluid Section

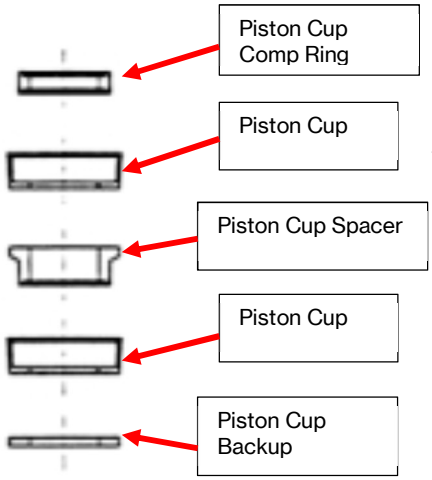
1. Insert the ten wave springs into the outlet body.

2. Fill the female side of each of the four new packings and the female comp ring with white grease.
3. Place the packing set assembly on top of the male comp ring.
4. Set the female comp ring on top of the packing set.
5. Insert the assembly into the outlet body with the female side of the packings facing down.
6. Wipe a light coating of white grease onto the guide bearing and insert into the outlet body.
7. Screw the packing nut into the outlet body for only two or three threads.



Note ***Do not tighten the packing nut at this time.***

8. Smear white grease on the inside of both piston cups.
9. Install the piston cup backup onto the piston body with the ridged side facing up.



10. Install one of the piston cups, followed by the piston cup spacer, the second piston cup, and then the piston cup comp ring.
11. Install the piston ball spring over the dowel pin inside the piston rod.
12. Put a light coating of white grease on the ½" chrome ball and install over the piston ball spring.

Note ***Do not drop, dent, or scratch the chrome ball.***

13. Use thread locking compound on the threads of the piston body and screw it into the piston rod, then tighten wrench tight.
14. Check the piston rod for burrs, scratches, or other damage and replace if necessary.
15. Slide the piston rod up through the packing assembly in the outlet body, being careful not to damage the packing set.
16. Tighten the packing nut enough to hold the piston rod in place.
17. Lightly coat the ¾" chrome ball with white grease and install it and the 4-lobed ball guide into the foot valve body.
18. Compress the ball stop and insert it into the groove of the foot valve body.
19. Lightly coat the two O-rings and install one in each end of the cylinder in the grooves.
20. Insert one end of the cylinder into the foot valve body.
21. Slide the cylinder with the foot valve body over the piston rod assembly.
22. Lightly coat the threads of the hex head bolts with lithium grease and thread through the foot valve collar.
23. Screw the hex head bolts into the outlet body and tighten uniformly until wrench tight.

24. Use a ¼" metal rod or Phillips screwdriver to tighten the packing nut about ¼ turn; do not overtighten.

Note ***The packing nut only needs to be tightened enough to put pressure on the packing set assembly. The packing nut should only be adjusted when there is NO fluid pressure load in the fluid section.***

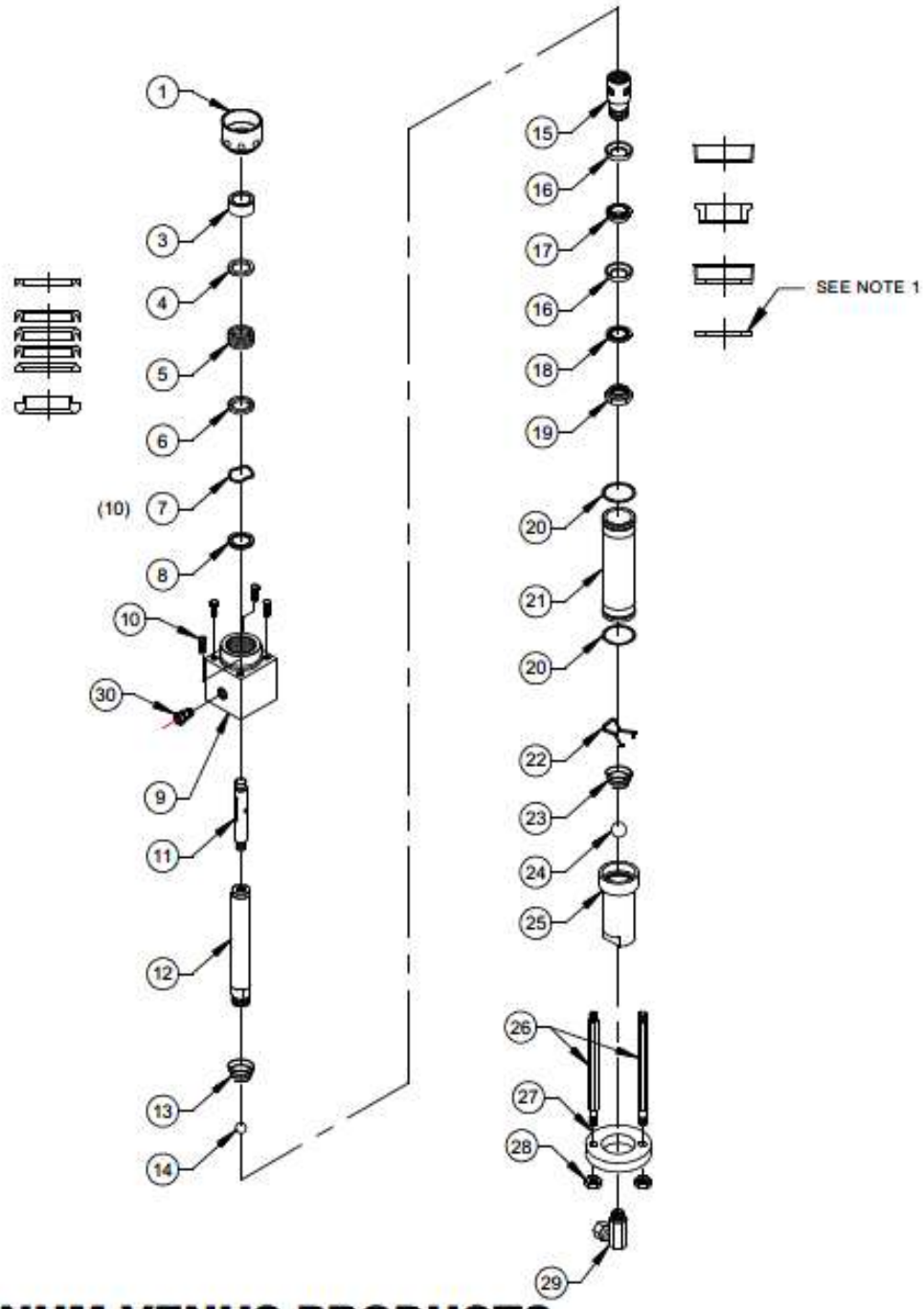
Reinstall Fluid Section

1. Fasten the fluid section assembly to the pump mount plate using the four hex head bolts.
2. Position the sleeve over the power cylinder piston shaft.
3. Bring the piston shaft down onto the top of the piston rod adapter.
4. Insert the two connectors, then lower the sleeve over the connectors.
5. Install the E-ring into the machined groove.
6. Slide the end of the slide arm into the slot in the piston rod adapter and insert the quick pin.
7. Fill the packing nut cavity ½ to $^{2}/_{3}$ full with the appropriate oil.

Parts Drawings

The following illustrated parts breakdowns are included for your reference when servicing the equipment. Make sure you refer to the drawing specific to the equipment you are working on to ensure you have the correct part numbers and orientations.

- 3101-00-01 Fluid Section Assembly
- 3102-00-01 Fluid Section Assembly
- 3103-01-01 Resin Filter Assembly
- 3104-01-01 Surge Chamber Assembly
- 3101-02-01 Drum Suction Wand Assembly
- 4103-00-01 SD1S1 Slide Drive Assembly
- 2101-00-01 Power Cylinder Assembly



MAGNUM VENUS PRODUCTS

FS2.51S1 Fluid Section Assy	3101-00-01

D3101-00-1 REV. A 3/20/00

FS2.51S1 Fluid Section Assy 3101-00-01

PARTS LIST

ITEM	PART NO.	QTY	DESCRIPTION
1	3101-1-1	1	PACKING NUT
3	3101-2-1	1	GUIDE BEARING
4	3101-3-1	1	FEMALE COMP RING
5	3101-4-01	1	PACKING SET SPA
6	3101-5-1	1	MALE COMPRESSION RING
7	9203-1-1	10	WAVE SPRING
8	3101-6-1	1	SPRING SUPPORT RING
9	3101-7-1	1	OUTLET BODY
10	7101-2-12	4	HEX HEAD BOLT
11	3101-8-1	1	PISTON ROD ADAPTER
12	3101-9-1	1	PISTON ROD
13	3101-10-1	1	PISTION BALL SPRING
14	ALS-1018	1	7/8" CHROME BALL
15	3101-11-1	1	PISTON BODY
16	3101-12-1	2	PISTION CUP
17	3101-13-1	1	PISTON CUP SPACER
18	3101-14-1	1	PISTON CUP BACK-UP
19	3101-15-1	1	PISTON NUT
20	7301-1-137	2	O-RING
21	3101-16-1	1	CYLINDER
22	3101-17-1	1	BALL STOP
23	3101-18-1	1	FOOT VALVE BALL SPRING
24	9201-2-36	1	1 1/4" CHROME BALL
25	3101-19-1	1	FOOT VALVE
26	3101-20-1	2	PUMP CYLINDER TIE ROD
27	3101-21-1	1	FOOT VALVE COLLAR
28	7201-6-8	2	1/2" UNC HEX NUT
29	7701-1-5	1	SWIVEL ELBOW
30	7701-3-10	1	SWIVEL ADAPTER FITTING
31	D3101-00-1	1	FS2.51S1 FLUID SECTION ASSY DRAWING

REPAIR KITS

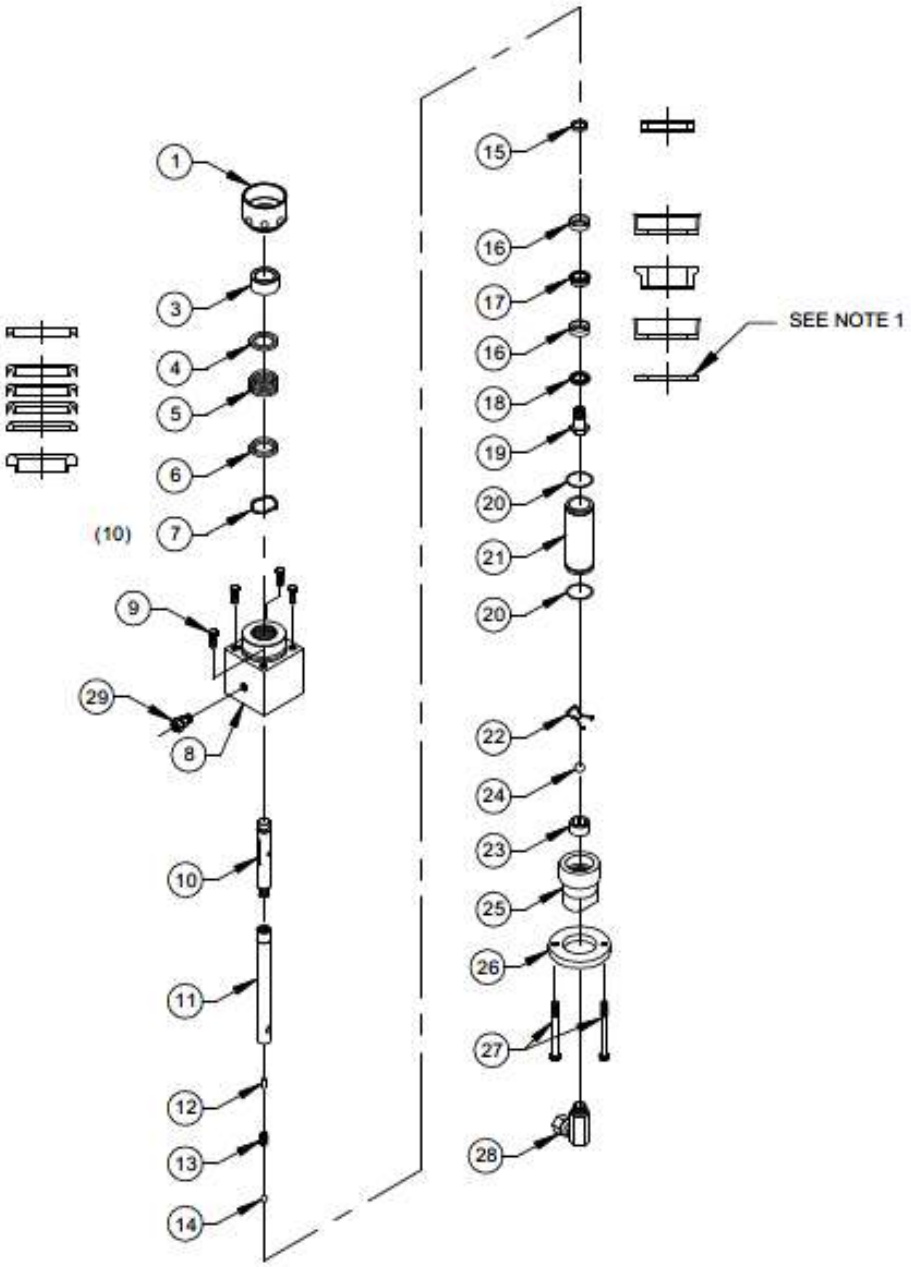
PART NO.	DESCRIPTION
6702-01-01	REPAIR KIT

TOOLS

PART NO.	DESCRIPTION
45011-1	PISTON BODY WRENCH

NOTE:
1. INSTALL WITH RIDGES UP

FIGURE 1-1



MAGNUM VENUS PRODUCTS

Fluid Section Assy	3102-00-01

REV. E = REMOVED 3102-00-02 MULTI COLOR FLUID SECTION SUB ASSY, SEE 3108-01-01
REV. F= ITEM 28 WAS 7701-1-13, ADDED REPAIR KIT 6702-08-01 8/8/02 JEM

FS1.29 S1 Fluid Section Assy 3102-00-01

PARTS LIST

ITEM	PART NO.	QTY	DESCRIPTION
1	3102-1-1	1	PACKING NUT
3	3102-2-1	1	GUIDE BEARING
4	3102-3-1	1	FEMALE COMP RING
5	3102-4-01	1	PISTON ROD PACK SPA
6	3102-5-1	1	MALE COMP RING
7	9203-1-2	10	WAVE SPRING
8	3102-6-1	1	OUTLET BODY
9	F-HB-06C-24-GR8	4	HEX HEAD BOLT
10	3101-8-1	1	PISTON ROD ADAPTER
11	3102-7-01	1	PISTON ROD SPA
12	7203-2-10	1	DOWEL PIN
13	3102-8-1	1	PISTON BALL SPRING
14	9201-3-16	1	1/2" CHROME BALL
15	3102-9-1	1	PISTION CUP COMP RING
16	3102-10-1	2	PISTON CUP
17	3102-11-1	1	PISTON CUP SPACER
18	3102-12-1	1	PISTON CUP BACKUP
19	3102-13-1	1	PISTION BODY
20	ALS-4634	2	O-RING
21	3102-14-2	1	CYLINDER BODY
22	3102-15-1	1	BALL STOP
23	3102-20-1	1	4 LOBED BALL GUIDE
24	9201-2-24	1	3/4" CHROME BALL
25	3102-17-1	1	FOOT VALVE BODY
26	3102-18-1	1	FOOT VALVE COLLAR
27	7101-3-52	2	HEX HEAD BOLT
28	7701-1-4	1	ELBOW FITTING
29	7701-3-15	1	SWIVEL ADAPTER FITTING

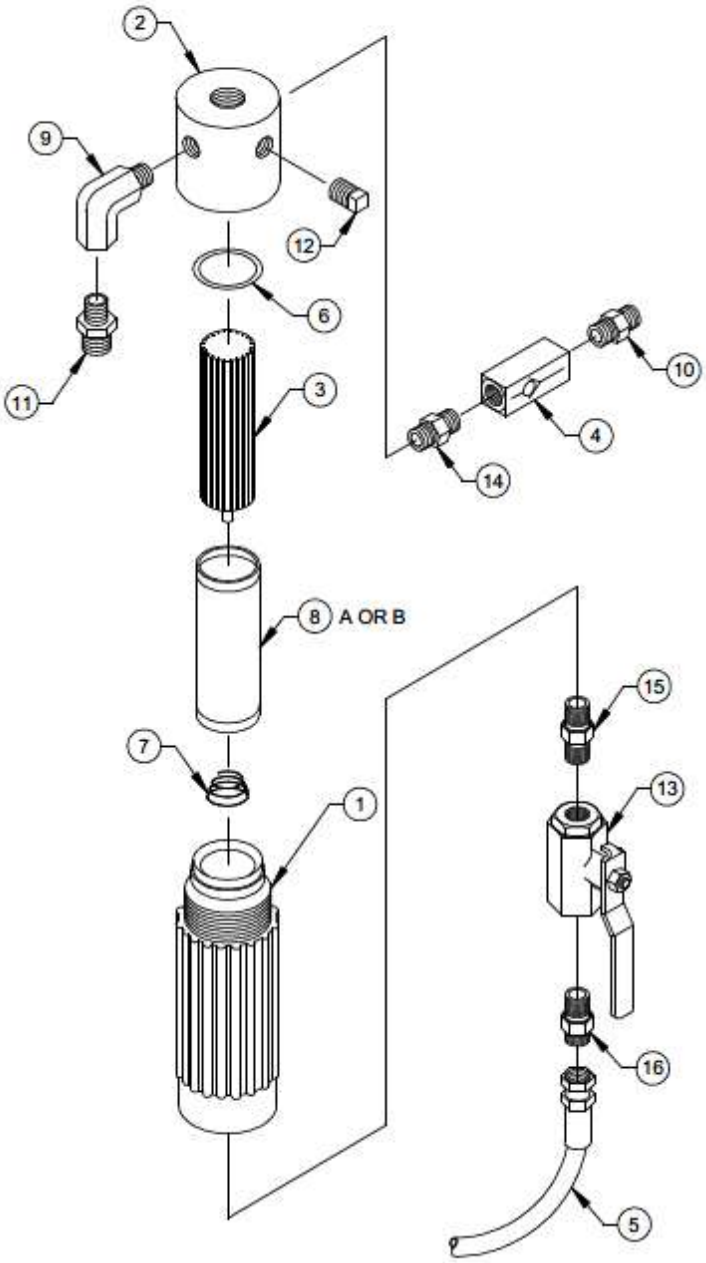
REPAIR KITS

PART NO.	DESCRIPTION
6702-08-01	REPAIR KIT

NOTE:
1. INSTALL WITH RIDGES UP

FIGURE 1-1

3102-00-01



MAGNUM VENUS PRODUCTS

Resin Filter Assy	3103-01-01
Filled Resin Filter Assy	3103-01-02

REV. D = BV-44-HP BALL VALVE WAS VENUS #7702-2-3
REV. E = ADDED ITEMS 15 & 16 TO DWG. 3/27/02 JEM
REV. F = ITEMS 9 & 11 WERE 1/4-NPT NOW 3/8 -NPT. 12/05/02 JEM

Resin Filter Assy 3103-01-01
Filled Resin Filter Assy 3103-01-02
Common Assembly Parts List

ITEM	PART NO.	QTY	DESCRIPTION
1	3103-3-1	1	RESIN FILTER TANK
2	3103-1-1	1	1/2 NPT FILTER BODY
3	3103-2-1	1	RESIN FILTER CORE
4	7702-1-2	1	CHECK VALVE
5	6504-18-06	1	1/4" x 6' SINGLE END RESIN HOSE
6	7301-5-127	1	O-RING
7	3103-4-1	1	FILTER SPRING
9	7701-1-2	1	STREET ELBOW
10	7701-3-1	1	HEX NIPPLE FITTING
11	PF-HN-08J-06	1	ADAPTOR FITTING
12	7701-4-4	1	PLUG
13	BV-44-HP	1	BALL VALVE
14	7701-3-11	1	HEX NIPPLE FITTING
15	7701-3-12	1	HEX NIPPLE FITTING
16	PF-HN-04-04S	1	ADAPTER FITTING

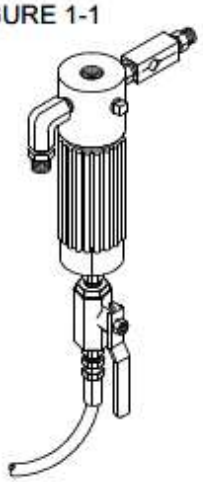
Resin Filter Assy 3103-01-01

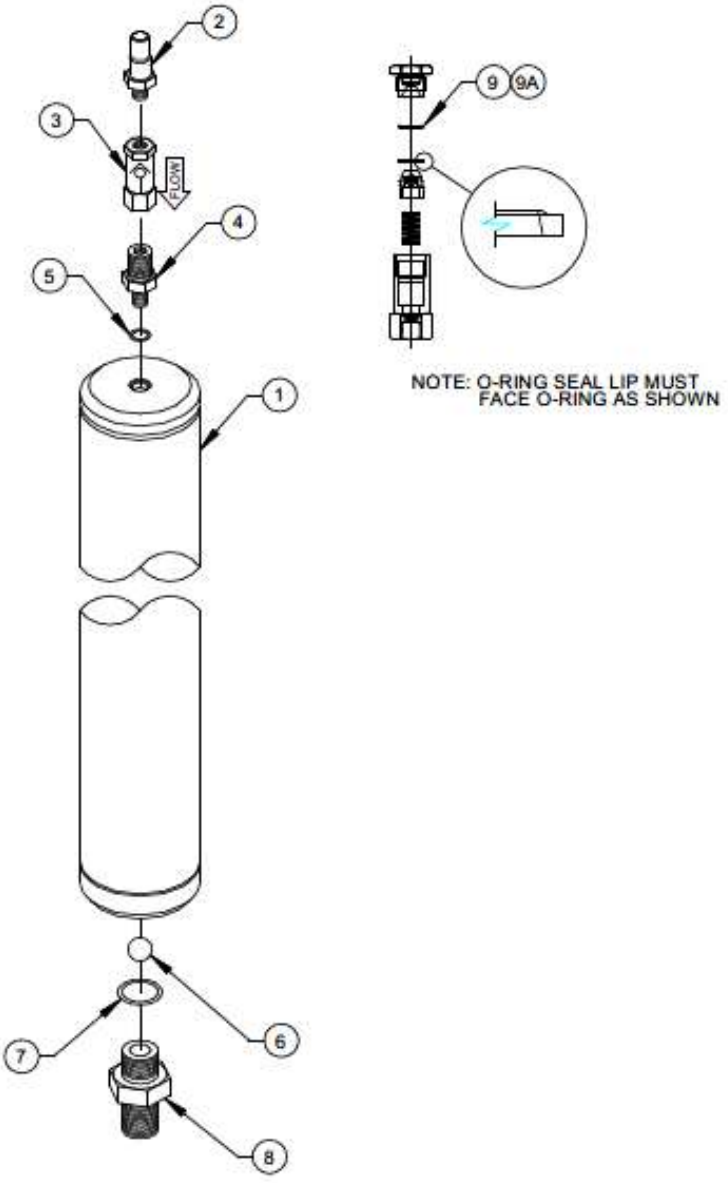
ITEM	PART NO.	QTY	DESCRIPTION
8A	3103-6-1	1	100 MESH SCREEN

Filled Resin Filter Assy 3103-01-02

ITEM	PART NO.	QTY	DESCRIPTION
8B	3103-5-1	1	60 MESH SCREEN

FIGURE 1-1





VENUS-INDUSTRIES

SystemOne - RS1S1 Surge Chamber Assy	3104-01-01

D3104-01-1 REV. E 8/3/00

RS1S1 Surge Chamber Assy 3104-01-01

PARTS LIST

ITEM	PART NO.	QTY	DESCRIPTION
1	3104-1-01	1	50 CI SURGE CHAMBER WELD
2	3104-3-1	1	CHARGE INLET FITTING
3	7702-1-3	1	CHECK VALVE
4	3104-4-1	1	SURGE CHAMBER CHG ADAPTER FITTING
5	7301-3-011	1	O-RING
6	9201-4-20	1	5/8" POLY BALL
7	7301-3-018	1	O-RING
8	3104-2-1	1	BALL CHECK NIPPLE
10	D3104-01-1	1	RS1S1 RESIN SURGE CHAMBER ASSY DRAWING

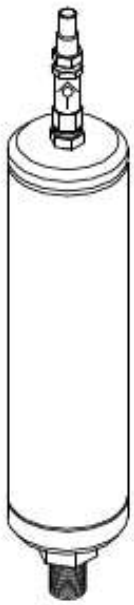
REPAIR KITS

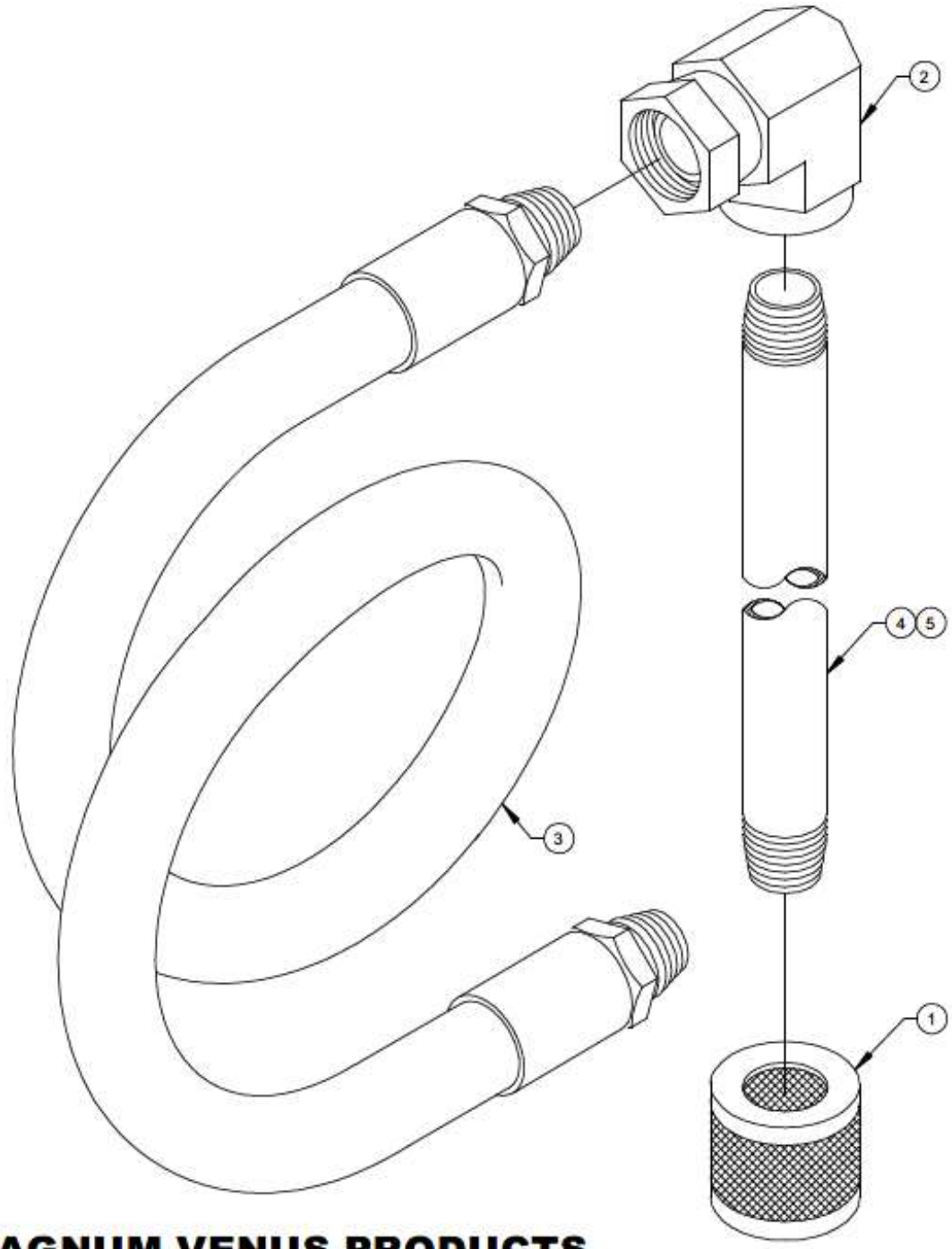
ASSOCIATED PARTS AND ASSEMBLIES

ITEM	PART NO.	QTY	DESCRIPTION
9	7301-3-012	1	O-RING (STANDARD)
9A	7301-11-012	1	O-RING (CRITICAL APPLICATION)

FIGURE 1-1

25 CI SURGE CHAMBER SHOWN





MAGNUM VENUS PRODUCTS

36" Drum Suction Wand Assy	3101-02-01
19" Drum Suction Wand Assy	3101-02-02

REV. B = DELETED 3101-23-1, & 9802-4-1. ADDED BF-14-680
REV. C = ITEM 2 WAS 7701-1-16, ITEM 3 WAS 6504-14-07 04/12/06 BT2

Common Assembly Parts For:

36" Drum Suction Wand Assy 3101-02-01
19" Drum Suction Wand Assy 3101-02-02

PARTS LIST

ITEM	PART NO.	QTY	DESCRIPTION
1	BF-14-680	1	SUCTION SCREEN
2	PF-FE-SW-16	1	SWIVEL ELBOW
3	HFL-1616M16M-7	1	Ø1" x 7' SUCTION HOSE

36" Drum Suction Wand Assy 3101-02-01

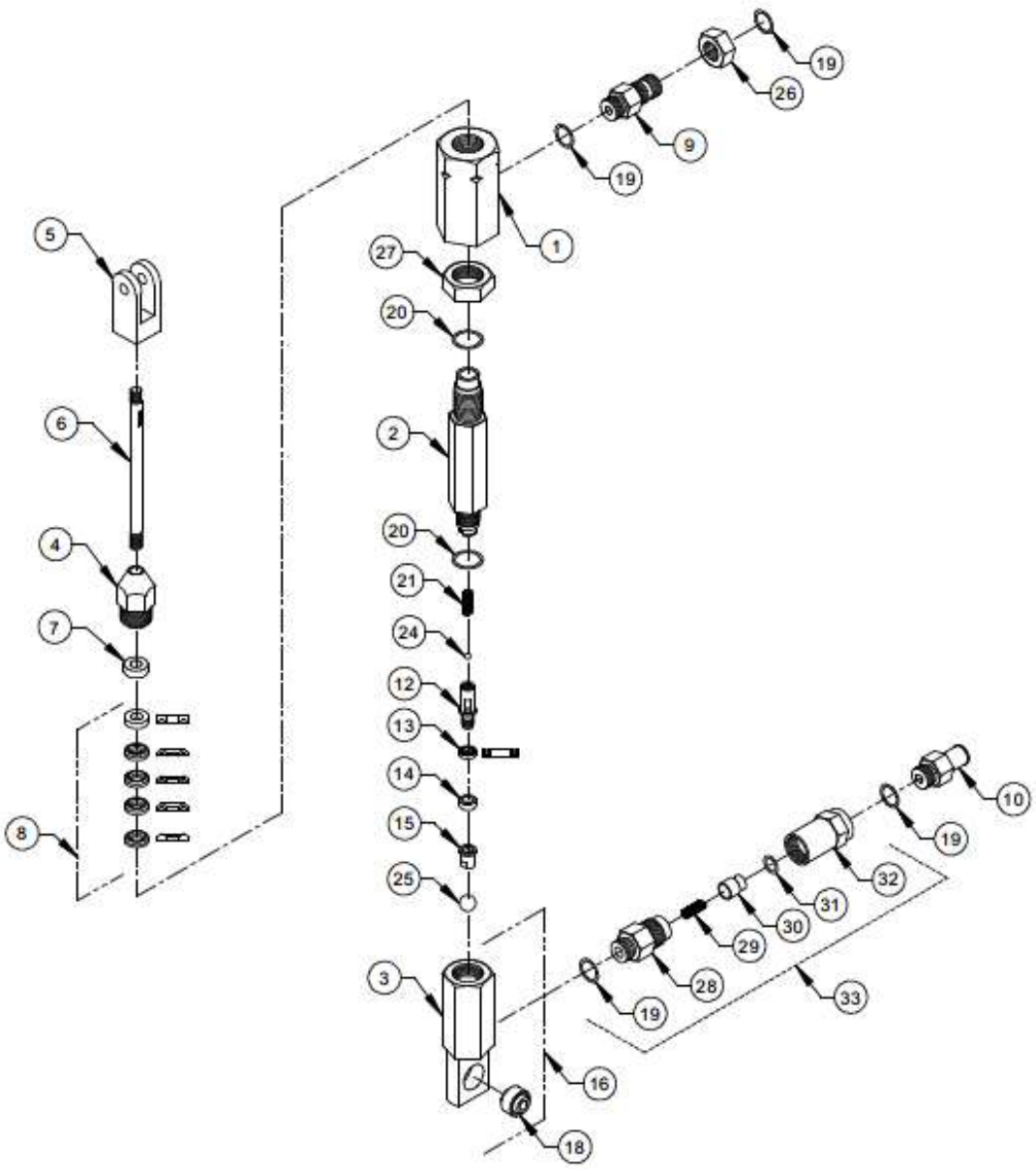
PARTS LIST

ITEM	PART NO.	QTY	DESCRIPTION
4	3101-22-36	1	36" SUCTION HOSE PIPE

19" Drum Suction Wand Assy 3101-02-02

PARTS LIST

ITEM	PART NO.	QTY	DESCRIPTION
5	3101-22-19	1	19" SUCTION HOSE PIPE



MAGNUM VENUS PRODUCTS

MP.082S1 Metering Pump Assy	4102-00-01

REV - 3/20/00
REV A - DELETED UPPER CHECK VALVE PARTS, ADDED CV-2000 AND ALL OF ITS COMPONENTS 01/05/06 BT2
REV B - ITEM 31 WAS O-S-011A 03/09/06 BT2

MP.082S1 Metering Pump Assy 4102-00-01

PARTS LIST

ITEM	PART NO.	QTY	DESCRIPTION
1	4101-14-1	1	OUTLET BODY
2	4102-6-1	1	CYLINDER
3	4101-7-1	1	INLET BODY
4	4102-3-1	1	PACKING NUT
5	4102-1-1	1	CLEVIS
6	4102-2-1	1	PISTON ROD
7	4102-4-1	1	UPPER GUIDE
8	4102-5-01	1	PISTON ROD PACK SPA
9	4101-15-1	1	CHECK VALVE BODY
10	4101-8-1	1	INLET TUBE FITTING
12	4102-7-1	1	PISTON BODY
13	7304-1-1	1	PISTON SEAL
14	4102-8-1	1	PISTON GUIDE
15	4102-9-1	1	SEAL RETAINER
18	9202-1-1	1	1/4" PLAIN SPHERICAL BEARING
19	O-S-013	4	O-RING
20	O-S-014	2	O-RING
21	4101-3-1	1	PISTON ROD SPRING
24	9201-1-5	1	5/32" SS BALL
25	9201-1-14	1	7/16" SS BALL
26	4101-18-1	1	JAM NUT
27	4101-1-1	1	LOCK NUT
28	CV-2002	1	SPRING HOUSING
29	CV-2004	1	SPRING
30	CV-2003	1	PISTON
31	O-S-011A	1	O-RING
32	CV-2001	1	SEAT HOUSING

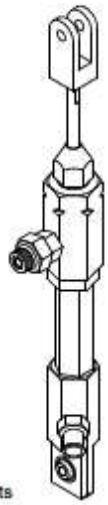
REPAIR KITS

PART NO.	DESCRIPTION
6702-05-01	METERING PUMP MP.082S1 REPAIR KIT

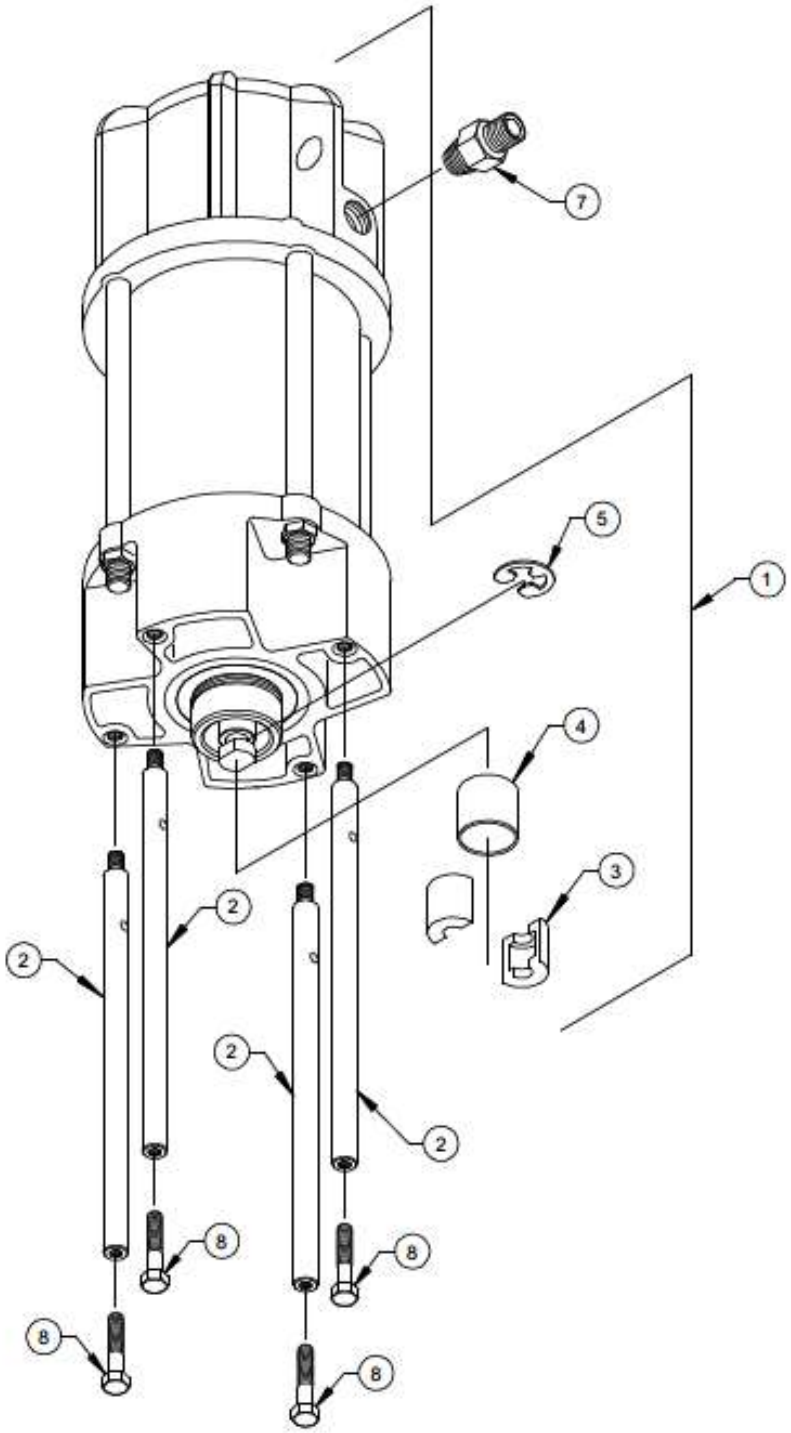
ASSOCIATED PARTS AND ASSEMBLIES

16	4101-7-01	1	INLET BODY ASSEMBLY
33	CV-2000	1	CHECK VALVE

FIGURE 1-1



Note:
Offset intake and outlet ports one flat on hex as shown in figure 1-1



MAGNUM VENUS PRODUCTS

PC4.25S1 Power Cylinder Assy	2101-00-01

D2101-00-1 REV. B 3/20/00

PC4.25S1 POWER CYLINDER ASSY 2101-00-01

PARTS LIST

ITEM	PART NO.	QTY	DESCRIPTION
2	2101-1-1	4	TIE ROD
3	8401-3-1	2	CONNECTOR
4	8401-4-1	1	SLEEVE
5	8401-5-1	1	E-RING
7	7701-3-7	1	COUPLING FITTING
8	7101-2-12	4	HEX HEAD BOLT
9	D2101-00-1	1	PC4.25S1 POWER CYLINDER ASSY DRAWING

ASSOCIATED PARTS AND ASSEMBLIES

ITEM	PART NO.	QTY	DESCRIPTION
1	8401-1-1	1	4-1/4" POWER CYLINDER ASSY W/COUPLING
6	8403-1-1	1	MUFFLER (NOT SHOWN)

MAGNUM VENUS PRODUCTS

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