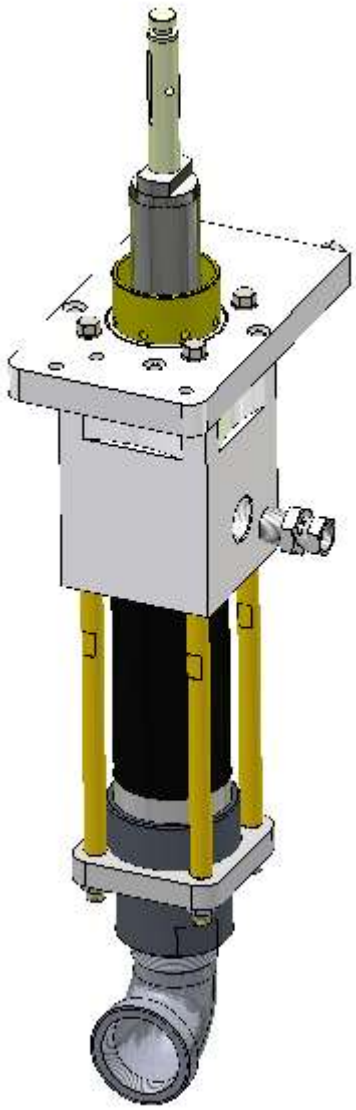
HV Series Fluid Section

Operations Manual

This manual is applicable to the following models:

- HVLS-1000
- HVLS-1000-DHV
- HVLS-1000-HD
- HVLS-1000-SS
- MCPA-HVLS
- UPLS-1000
- HVLS-2000-2
- HVLS-2000-4
- HVLS-2000-1-DHV



MAGNUM VENUS PRODUCTS

Rev. March 2019

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

Section	Page
• Table of Contents	3
• Safety & Warning Information	4
• Introduction	15
• Installing Fluid Section	17
• Maintaining Fluid Section	18
• Disassembling Fluid Section	19
• Reassembling Fluid Section	21
• Servicing Accumulator & Filter	23
• Troubleshooting	24
• Specifications	25
• Parts Drawings	27

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

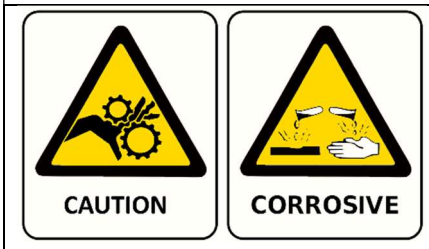
Fire Extinguisher – code ABC, rating number 4a60bc using Extinguishing Media –Foam, Carbon Dioxide, Dry Chemical, Water Fog, is recommended for this product and applications.

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 HV Series Fluid Section. The following procedures are included:

- Step-by-step assembly and disassembly
- Troubleshooting information
- Maintenance schedule and 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.

As you disassemble equipment, lay out the components in the correct order and direction to assist with reassembly.

Note ***The order of the piston cup, piston cup spacer ring, piston cup backup ring, and compression ring are critical to proper function of the equipment. You must put them back in the correct order and direction.***

Lubrication

Directions are given throughout this manual for lubricating various parts of the fluid section. There are three types of lubricant used:

- If the part contacts resin, MVP Red Grease
- If the part contacts air, Lubriplate®
- In the oil reservoir, Throat Seal Oil (TSL-3200)

DANGER

Contaminated catalyst may cause fire or explosion. Never use any lubrication on the components of the catalyst system. Contact your catalyst manufacturer for additional material handling information.

Requirements

Air Requirement

Clean, dry compressed air must be available at up to 90 psi (6 bar) and a minimum volume of 14 CFM. Air must be provided through an air hose with a diameter of .5 inches (1.3 cm) or greater.

Tools and Supplies

When performing service or repair on the fluid section, you should have the following available:

- ❑ TABLE VISE
- ❑ PISTON BODY WRENCH
- ❑ CLAMSHELLS (PACKING REMOVAL; SET OF 2)
- ❑ REMOVABLE LOCTITE™ 243 OR EQUIVALENT THREAD LOCK COMPOUND
- ❑ SMALL HAMMER
- ❑ NEEDLE-NOSE PLIERS
- ❑ SOLVENT OR EMULSIFIER FOR CLEANING
- ❑ CLEAN WORK TABLE
- ❑ SET OF HEX WRENCHES
- ❑ 5/8-INCH WRENCH
- ❑ 9/16-INCH WRENCH
- ❑ 5/16-INCH WRENCH
- ❑ EMPTY BUCKETS FOR CLEANING
- ❑ CLEAN ¼-INCH PLASTIC DOWEL OR ROD
- ❑ 8-INCH ADJUSTABLE WRENCH
- ❑ 12-INCH ADJUSTABLE WRENCH
- ❑ 7/16-INCH OPEN END WRENCH
- ❑ WOODEN STICKS OR TONGUE DEPRESSORS (FOR TESTING)
- ❑ LABELS AND PENS FOR MARKING PNEUMATIC LINES
- ❑ CLEAN RAGS AND PAINT BRUSHES FOR CLEANING
- ❑ TUBE OF MEDIUM-WEIGHT LITHIUM GREASE
- ❑ LARGE (APPROX. 3 FT BY 10 FT (1 METER BY 3 METERS) STRIPS OF PAPER FOR PERFORMING SPRAY TESTS
- ❑ PIN WRENCH (COMES WITH CATALYST JUG)
- ❑ SCRIBE
- ❑ RED GREASE
- ❑ SEAL KIT FOR YOUR MODEL

Note ***Lubriplate® is a registered trademark of the Lubriplate division of Fiske Brothers Refining Company.***

Note ***Loctite™ is a trademark of the Loctite Corporation.***

IMPORTANT

Components used on this equipment are made of specially developed high-strength material. Only authentic MVP replacement parts are acceptable for use with this equipment. Use of unacceptable replacement parts will void our liability and warranty of this equipment.

Contact your MVP distributor for more information.

Installing Fluid Section

1. Check all clamp brackets, pump column, slave arm bracket, and manifold clamp to make sure they will not move when the unit is in operation.
2. Check the mounting of the catalyst pump to make sure the clevis pins are secure.
3. Make sure the exhaust silencer is secured to the power cylinder of the resin pump.
4. Tighten the packing nut at the top of the catalyst pump approximately ¼ turn.
5. Tighten the resin pump packing by inserting two rods into the holes in the oil cup at the top of the resin pump fluid section and turning clockwise until packing is snug.

Note ***Do not overtighten packing.***

6. If you have a Pro Gun on your unit, activate the gun trigger 10 – 15 times then tighten the gun valve rod packing nuts until they are very snug, then repeat this procedure 3 times.
7. Attach the suction wand assembly to the foot valve port of the resin pump, making sure all fittings are tight.

Connect Hoses

8. Connect the black resin hose from the gun to the outlet fitting on the resin filter.
9. Connect the catalyst hose from the catalyst pump to the inlet of the catalyst manifold.
10. Connect the catalyst hose from the gun to the outlet of the catalyst manifold.
11. Attach the red air hose from the gun to the fitting on the regulator labelled gun.
12. Attach the yellow poly flush hose from the gun to the outlet fitting of the solvent tank.
13. Attach the small red air supply hose from the flush regulator to the input fitting on the solvent tank.
14. Attach the large red air hose from the pump regulator to the power cylinder of the resin pump.
15. Check all hose fittings and fluid connections to make sure they are tight.
16. Attach the ground wire from the gun to the electrical grounding lug on the pump mounting bracket.

Note ***Make sure the electrical ground is installed from the pump mounting bracket to an earth ground.***

17. Remove the catalyst poly tubes from the component box.

18. Cut the ½ inch diameter poly line with the clamps to 26 inches.
19. Clamp one end to the outlet of the catalyst jug and the other end to the inlet of the catalyst pump, making sure the clamps are air tight.
20. Connect the ¼ inch poly line to the relief valve on the catalyst manifold assembly and insert the other end into the hole in the top of the catalyst jug.
21. Check all components for damage.

Maintaining Fluid Section

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 only.

DANGER

Always wear appropriate eye protection when working on this equipment.

WARNING

Fluids are under high pressure. Before performing any service or repair on this equipment be sure to remove fluid pressure. When removing hoses, place a rag over the hose fitting before loosening.

Performing proper maintenance at the recommended intervals maximizes your equipment's productivity and efficiency. This section describes recommended service procedures to be performed daily, weekly, bi-annually, and annually. The schedule is based on a one-shift, 5 day work week using standard general purpose resin. An idle unit left with resin in it requires more frequent parts replacement.

Perform all maintenance recommended for your system at the suggested interval listed in your system manual. This section focuses on the tasks required to maintain only the fluid section.

Daily Maintenance

Once each day, perform the following steps:

1. Check the oil reservoir and add oil if needed.

Weekly Maintenance

One each week, perform the following additional steps:

2. clean and dry the silencers as needed.
3. Check the pickup hose and wand for leaks or damage; replace as needed.
4. Check for packing leaks; tighten packing as needed.

Bi-Annual Maintenance

Once every six months, perform the following steps:

5. Replace the oil in the oil reservoir.
6. If necessary, clean and dry the silencers.
7. Check the piston rod, cylinder head, piston, and trip sleeve for wear or damage; replace as needed.
8. Replace O-rings, piston cups, and packing set.
9. Check the pickup hose and wand for leaks; replace as needed.
10. Check the piston rod and pump cylinder for wear; replace as needed.

Annual Maintenance

Once a year, perform the following additional steps:

11. Clean and dry the silencers.
12. Rebuild the lower assembly.

Disassembling Fluid Section

Note ***Flushing the pump fluid section with solvent will make it easier to clean and rebuild.***

CAUTION

There are two hard chrome balls in the fluid section assembly. If a ball drops to the floor it will be damaged. Even if it appears undamaged, microscopic dents and scratches will create problems. Damaged balls must be replaced or the pump will not work properly.

Note ***When disassembling the fluid section, replace any O-rings that you expose. Refer to a current parts drawing for the fluid section you are working on for correct part numbers.***

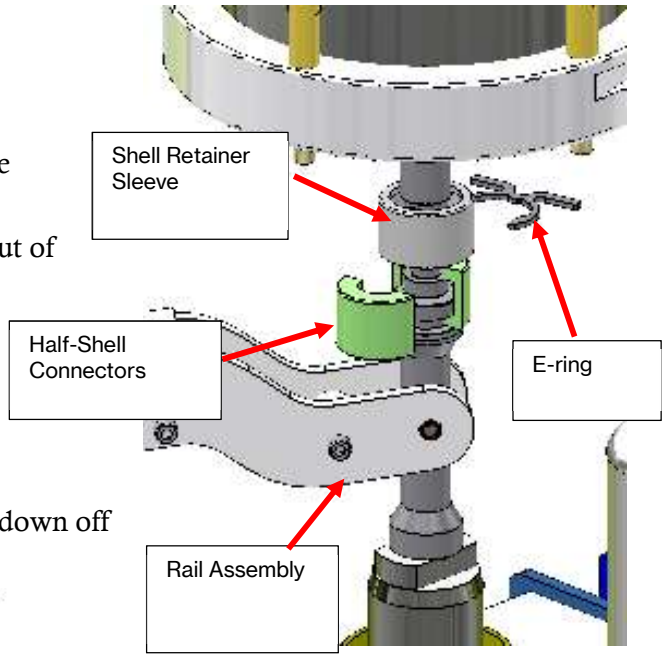
1. Make sure all fluid pressure and air pressure is relieved from the system before performing any work.

WARNING

To avoid serious injury or equipment damage, do not proceed until the system has been completely depressurized.

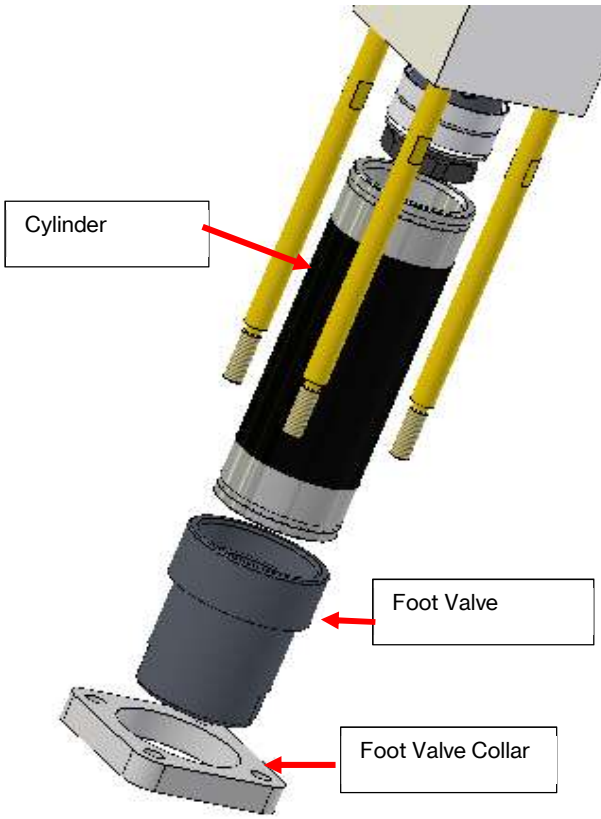
Remove Fluid Section from System

2. Remove the catalyst pump from the catalyst drive.
3. Remove the E-ring from the fluid section, lift up the sleeve, and remove the two connectors.
4. Remove the quick pin and slide the rail assembly out of the piston rod adapter.



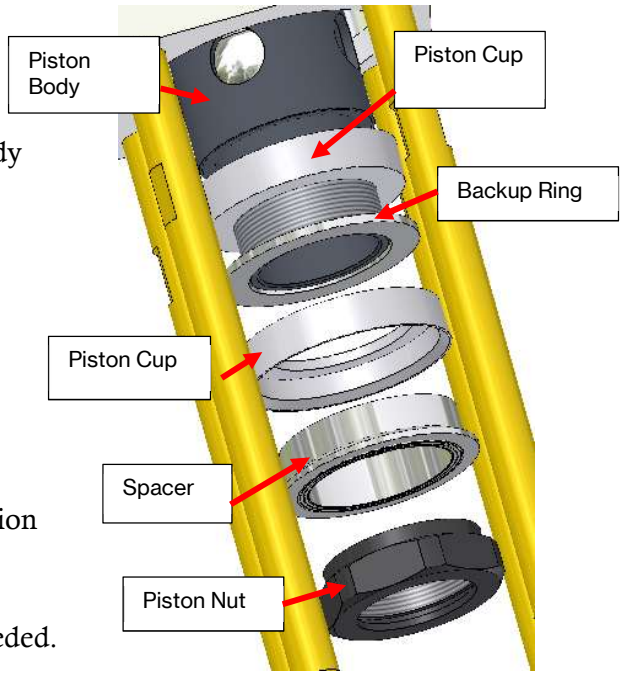
Disassemble Fluid Section

5. Remove the 4 hex nuts from the pump cylinder tie rods.
6. Slide the foot valve collar, foot valve, and cylinder down off the piston rod.



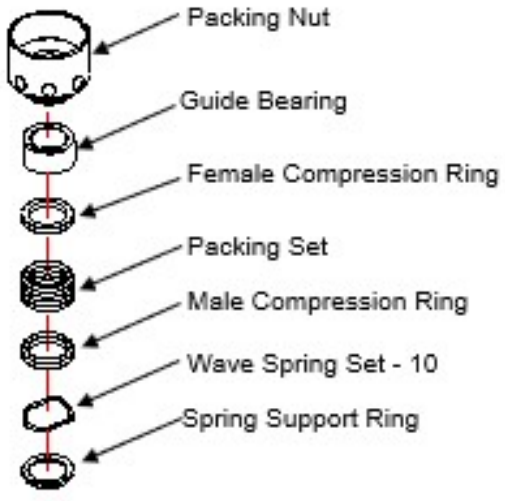
7. Discard the two O-rings.
8. Remove the ball stop and ball guide from the foot valve.
9. Remove and discard the 1-$^{5}/_{8}$" chrome ball.
10. Clean and inspect the ball seat area of the foot valve.
11. Loosen the packing nut and slide the piston rod out of the outlet body.
12. Unscrew the piston nut from the piston body.

13. Remove the two piston cups, the piston cup backup, and the piston cup spacer from the piston body.
14. Discard the two piston cups.
15. Using the piston body wrench, unscrew the piston body from the piston adapter.
16. Remove the chrome ball and piston ball spring.
17. Discard the ball.
18. Remove the packing nut from the outlet body.
19. Use a wood dowel or clamshells to push the packing set assembly out of the top of the outlet body.
20. Discard the packing set.
21. Clean and inspect the guide bearing, female compression ring, male compression ring, wave spring, and spring support ring.
22. Clean and inspect all parts to be reused; replace as needed.



Reassembling Fluid Section

1. Use MVP Red Grease to fill in the female side of each of the four packings in the packing set and the female packing ring.
2. Wipe a light coat of red grease on the chrome ball.
3. Smear red grease on the inner radius of both piston cups.
4. Coat the threads on the packing nut with red grease.
5. Insert the spring support ring into the outlet body, followed by the wave springs.



6. Place the packing set assembly on top of the male packing ring.
7. Set the female packing ring on top of the packing set assembly.

8. Place the entire assembly into the outlet body with the female side of the packing set facing down.
9. Set the guide bearing into the outlet body.
10. Screw the packing nut into the outlet body only up to two or three threads; do not tighten at this time.

Note ***If you have converted to a Magnapak fluid section, the configuration is slightly different. The packing set and piston cups are replaced with a bushing and cup seals. You will need to lubricate parts using PAT-LS-OIL or Gun Oil on the parts and insert as shown.***

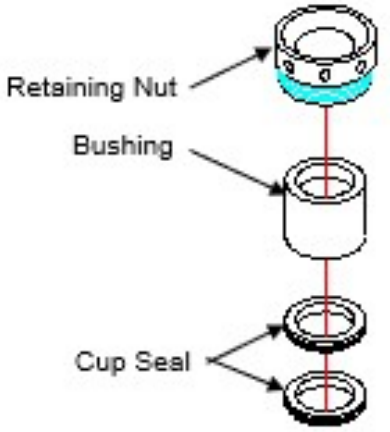


Figure 1. Magnapk Fluid Section

11. Place the new O-ring on to the piston adapter and thread into the piston rod.
12. Slide one piston cup onto the piston body with the open side of the cup facing up.
13. Slide the piston cup back-up ring groove side up against the piston cup.
14. Install the second piston cup open side down against the backup ring.
15. Slide the spacer ring against the second piston cup.
16. Coat the threads of the piston nut and screw it onto the piston body.
17. Place a new chrome ball into the piston body.

Note ***Be careful not to drop, dent, or scratch the chrome ball. Damage to the ball will cause the unit not to function properly.***

18. Set the piston ball spring into the piston body with the small end against the ball.
19. Coat the threads of the piston body and screw it onto the adapter.
20. Tighten the piston nut and the piston body.
21. Slide the piston rod up through the outlet body and then tighten the packing nut enough to hold the rod in place.
22. Install a second new chrome ball, then the foot valve guide into the foot valve.
23. Compress the ball stop and insert it into the foot valve groove.
24. Slide a new O-ring onto the cylinder ends and lubricate with red grease.
25. Position one end of the cylinder into the foot valve.
26. Use lithium grease on the pump cylinder tie rod threads and screw into the outlet body (if they were removed).
27. Slide the cylinder with the foot valve over the piston rod assembly and start the hex nuts onto the ends of the tie rods.
28. Tighten the hex nuts uniformly until wrench tight.
29. Use a ¼" metal rod or screwdriver to tighten the packing nut.

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

Reinstall onto Unit

30. Position the sleeve over the power cylinder piston shaft.
31. Bring the power cylinder piston shaft down onto the top of the piston rod adapter.
32. Insert the two connectors and lower the sleeve.
33. Install the ring in the machined groove.
34. Slide the rail assembly around the piston rod adapter and insert the quick pin.
35. Fill the packing nut cavity $^{2}/_{3}$ full with TSL oil.
36. Prime the fluid section with fluid.
37. Close the gun head.
38. Slowly increase the pump pressure to between 60 and 80 psi (4 – 5.5 bar).

Note ***If your unit has a priming button, you will need to press and hold it.***

39. Keep the pump stalled for 5 to 15 minutes to allow the packing to set.

Note ***If the pump is slowly moving while it should be stalled, it indicates that there is a leak past the ball or seals in the up stroke.***

40. Repeat steps 36 - 39 for both the up and down strokes.
41. Decrease the pump pressure to the desired operating pressure.
42. Reconnect, prime, and pressurize the catalyst pump for operation.

Servicing Accumulator & Filter

1. Disassemble and clean the accumulator and filter approximately once each week.

Note ***This will need to be done more frequently if the weather is hot.***

Note ***If you must keep increasing pressure to maintain an adequate spray fan, the filter may be clogged with debris. If the spray is pulsing, the accumulator is probably blocked.***

DANGER

Always wear appropriate eye protection and other protective clothing when working on this equipment.

WARNING

Fluids are under high pressure. Before performing any service or repair on this equipment be sure to remove fluid pressure. If material is plugging the system, some parts may still contain fluids under pressure even after you have performed normal pressure relief processes.
Place a rag or towel over the wrench and fitting before loosening and remove the fitting slowly to allow pressure to escape into the towel.

Relieve Air and Pump Pressure

2. Turn the pump pressure off.
3. Hold the gun over an appropriate empty container and lock in the open position.
4. Disconnect air from the system.
5. Place an empty container under the filter/accumulator and slowly open the ball valve at the bottom of the filter cap.

Filter

6. Unscrew the filter cap from the filter body.
7. Inspect the interior of the filter body and clean with solvent.

Note ***Typically the high volume units do not have screens in the filter body.***

8. Check the O-ring on the filter cap for wear or damage and replace if necessary.

Note ***If resin is leaking down the side of the filter cap, the O-ring is worn and should be replaced.***

9. Lubricate the threads of the filter cap and the O-ring with red grease.
10. Screw the filter cap back into the filter body.

Accumulator Bottle

11. Unscrew the surge chamber from the nipple.
12. Inspect the interior of the accumulator bottle.
13. Clean the bottle with solvent and blow dry with air.
14. Screw the nipple and surge chamber back into the top of the filter body.
15. Check for leaks and address as necessary.

Troubleshooting

The most common problems with equipment are diagnosed by analyzing the cured part. Many problems are the result of failure to maintain the equipment. Please follow the maintenance

schedule for your unit. The following table addresses issues caused by the fluid section. If your issue persists, check the full troubleshooting information for your system.

Fluid Section Troubleshooting		
Symptom	**Possible Cause**	**Remedy**
No fan, constant low output, or fast cure	Resin filter clogged	Disassemble and clean the resin filter according to the instructions in the Servicing Accumulator & Filter section
Narrow fan or wide fan	Resin filter clogged	Disassemble and clean the resin filter according to the instructions in the Servicing Accumulator & Filter section
Excessive misting or heavy pulsation	Resin accumulator plugged	Disassemble and clean the accumulator according to the instructions in the Servicing Accumulator & Filter section
Pump jumps on up stroke	Piston ball worn or not seating properly	Replace piston ball and piston cups ***Note*** ***Be sure to lubricate thoroughly with red grease***
Pump dives on down stroke	Foot valve, spring retainer, or foot valve ball damaged or dirty	Clean or replace foot valve, spring retainer, and foot valve ball. ***Note*** ***Be sure to lubricate thoroughly with red grease***
Low output on up stroke	Piston cups, piston ball, or pump cylinder worn	Inspect piston cups, piston ball, and pump cylinder; clean and replace as needed
Pump does not run	Packing nut too tight	Loosen the packing nut and tighten just over hand tight
	Air motor stuck	Push the reset button at the bottom of the air motor valve
	Fluid section or hose plugged	Disassemble and clean fluid section. Replace any worn parts or hose as required.
Material in oil reservoir	Packing worn	Replace packing set in fluid section
	Piston rod worn or scored	Replace piston rod
	Packing nut too loose	Tighten packing nut to just over hand tight
No material delivered on down stroke	Foot valve, spring retainer, or foot valve ball damaged or dirty	Clean or replace foot valve, spring retainer, and foot valve ball. ***Note*** ***Be sure to lubricate thoroughly with red grease***

Specifications

The HVLS-1000 fluid section is part of a modular system that can fit a multitude of applications and configurations by changing minimal components. It is designed to deliver power, versatility, and long lasting use. This fluid section features Rapid Access Design (RAD) for ease of access and maintenance.

Output Capabilities

Up to 8 -50 lbs/min (3.6 -22.7 kg/min) when using a general purpose (GP) resin of average viscosity. As a general rule in the standard 12:1 configuration, the fluid section will pump a GP resin of 2200 cps to 2500 cps maximum.

Fluid Section	Pump Area (Sq. in)	Stroke Length	Displacement (in^3) / Stroke
HVLS-1000-HD	2.83 (18.26 sq. cm)	4" (101.6 mm)	11.3 (185.17 cc) (.185 liter)

Air Consumption

14 cfm (0.4 m^3 / min).

Filler Loading

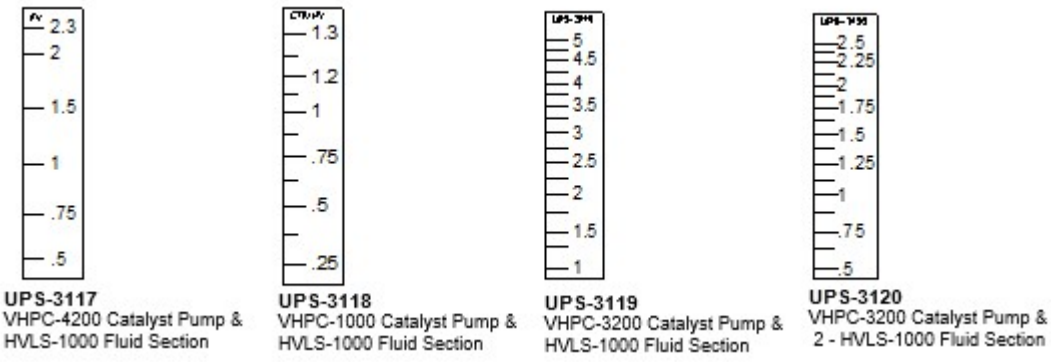
As a general rule when using a GP resin and Alumina Trihydrate (ATH) or calcium carbonate in a 12:1 pump configuration, you can fill up to 35% - 40%. In a 25:1 pump configuration, up to 50% - 55%. Higher percentages can be achieved by using low viscosity resins specially designed for fillers. It is always a good idea to use resins designed for fillers to help keep the fillers in suspension. Using fillers will increase pump wear and maintenance frequency.

Table 1. Catalyst Pump Percentages

Catalyst pump	HVLS-1000(HD)
VHPC-1000	.25% - 1.3%
VHPC-4200	.5% - 2.3%
VHPC-3200	1% - 5%
VHPC-2200	2 - 8
VHPC-1200	2 - 10

Table 2. Powerhead to Fluid Pump Ratios

Power Head Diameter (in.)	HVLS-1000(HD) High Volume	Air Consumption
VPH-4250	4 to 1	
VPH-5000	6 to 1	
VPH-7000-HD	12 to 1	14cfm (.4 m^3/ min.)
VPH-10000	25 to 1	



UPS-3117
VHPC-4200 Catalyst Pump & HVLS-1000 Fluid Section

UPS-3118
VHPC-1000 Catalyst Pump & HVLS-1000 Fluid Section

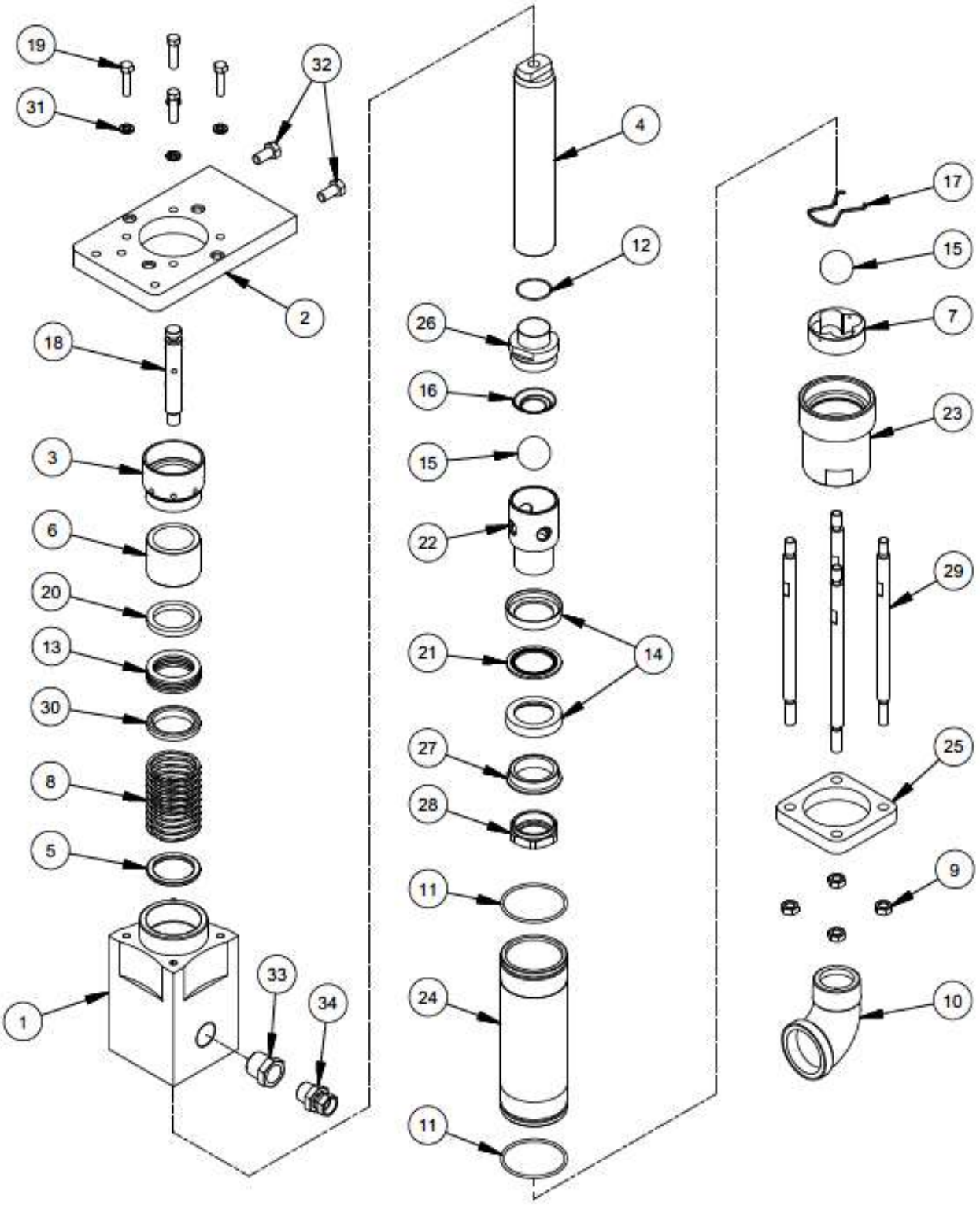
UPS-3119
VHPC-3200 Catalyst Pump & HVLS-1000 Fluid Section

UPS-3120
VHPC-3200 Catalyst Pump & 2 - HVLS-1000 Fluid Section

Parts Drawings

The following illustrated parts drawings are included for reference. Please review the appropriate drawing specific to your equipment when ordering replacement parts.

Parts Drawings	
Part Number	**Description**
HVLS-1000	High Volume Fluid Section Assembly
HVLS-1000-DHV	HV Fluid Section Assembly – Duo Units
HVLS-1000-HD	Fluid Section Assembly – Heavy Duty
HVLS-1000-SS	Fluid Section Assembly – Stainless Steel
MCPA-HVLS	HV Fluid Section Assembly – Multi-Color
UPLS-1000	High Volume Fluid Section Assembly - UPS
HVLS-2000-4	HV Fluid Section Assembly – DHV - HD
HVLS-1040-CK	HV Fluid Section Assembly - Magnapak
HVLS-1000-1	HV Fluid Section & Filter Assembly
HVLS-1000-1-HD	HV Fluid Section & Filter Assembly
HVLS-2000-1-DHV	Complete Lower Section - Duo
VPHV-0600	HV 6:1 Pump Assembly
VPHV-0600-HD	HV 6:1 Pump Assembly – DHV – HD – DUO SA
VPHV-1200	HV 12:1 Pump Assembly
VPHV-1200-HD	HV 12:1 Pump Assembly – Heavy Duty
HVLS-1000-SK	Repair Kit – High Volume Fluid Section



MAGNUM VENUS PLASTECH

HIGH VOLUME LOWER SECTION	HVLS-1000

REV:A 10/04/2017 SHEET 1 / 2 3/17/2017

Parts List			
ITEM	PART NUMBER	QTY	DESCRIPTION
1	HVLS-1001	1	HIGH VOLUME OUTLET BODY
2	HVLS-1002	1	HV PUMP MOUNT PLATE
3	HVLS-1003	1	HV PACKING NUT
4	HVLS-1004	1	DISPLACEMENT ROD
5	HVLS-1005	1	SPRING SUPPORT RING
6	HVLS-1006	1	GUIDE BEARING
7	HVLS-1007	1	HV BALL GUIDE
8	HVLS-1009	10	WAVE SPRING
9	F-HN-08C	4	HEX NUT
10	00714	1	PIPE ELBOW
* 11	O-V-234	2	O-RING
* 12	O-V-030	1	O-RING
* 13	02158-4	1	PACKING SET
* 14	02181-1	2	PISTON CUP - HV PUMP
15	03604	2	1-5/8 CHROME BALL
16	04072-1	1	PISTON BALL SPRING
17	04309-1	1	BALL STOP - HV HIS PUMP
18	VLS-4613	1	PISTON ROD ADAPTER
19	F-HB-06C-24-GR8	4	HEX BOLT
20	67110-1	1	FEMALE PACKING BACKUP RING
21	68310-3	1	BACKUP RING - HV PISTON CUP
22	86390-1	1	PISTON BODY - HV HIS PUMP
23	86370-1	1	FOOT VALVE - HV HIS PUMP
24	86400-1	1	HV PUMP CYLINDER
25	86420-1	1	FOOT VALVE COLLAR
26	86510-1	1	PISTON COUPLING - HV HIS PUMP
27	86520-3	1	PISTON CUP SPACER - HV PUMP
28	86530-1	1	PISTON LOCK NUT - HV PUMP
29	86540-1	4	TIE ROD
30	87090-1	1	MALE PACKING RING - HV PUMP
31	F-SW-06	4	LOCK WASHER
32	F-HB-08C-16	2	HEX BOLT
33	PF-RB-16-12	1	REDUCER BUSHING
34	PF-SW-12M-08F	1	PIPE SWIVEL

REPAIR KIT

* HVLS-1000-SK (ASTERISKS DENOTE PARTS IN KIT)

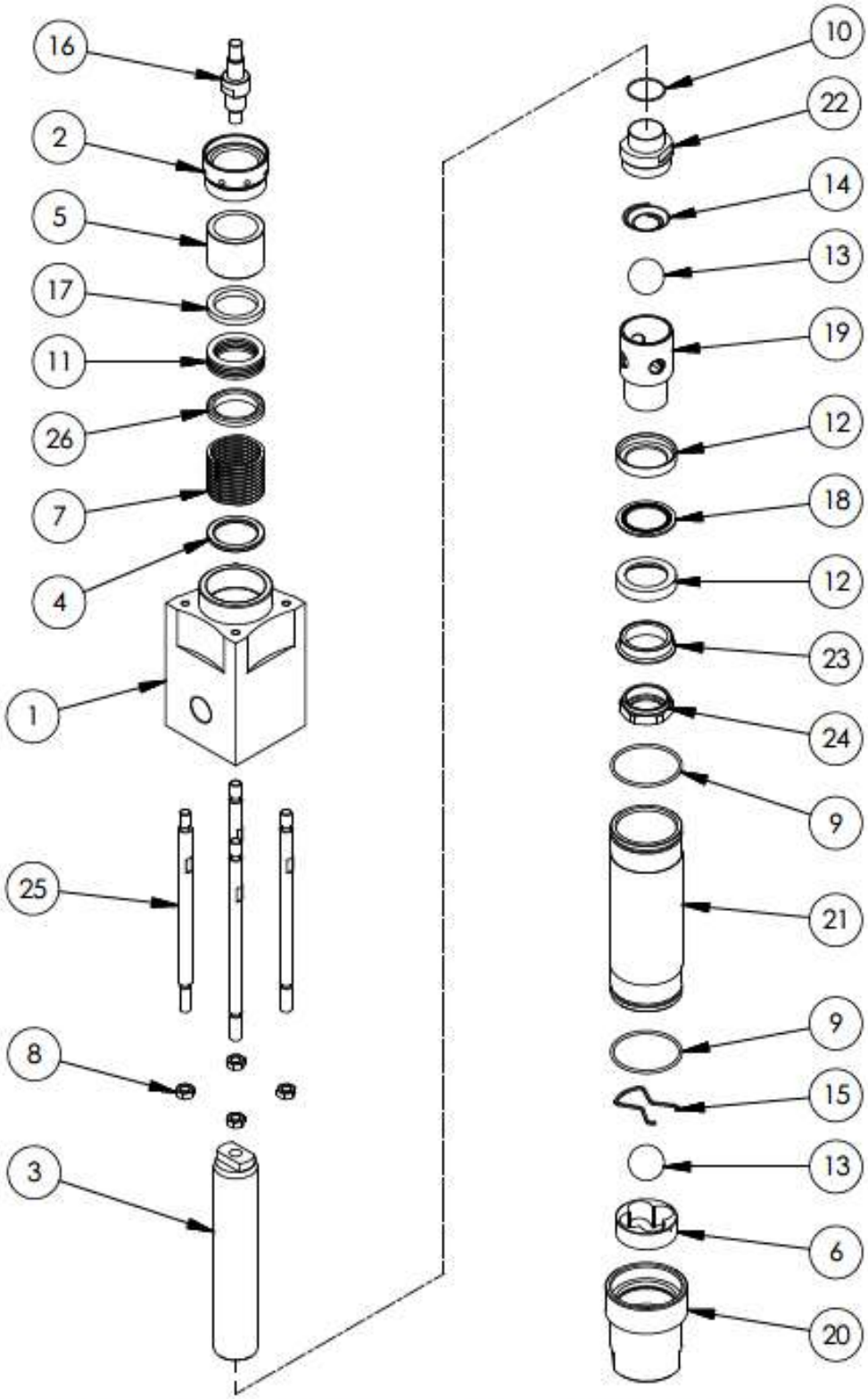
OPTIONAL ITEMS

68310-1	HARDENED BACKUP RING
86401-1	HARDENED PUMP CYLINDER
86520-1	HARDENED PISTON CUP SPACER

MAGNUM VENUS PLASTECH

HIGH VOLUME LOWER SECTION	HVLS-1000

REV:A 10/04/2017 SHEET 2 / 2 3/17/2017



MAGNUM VENUS PRODUCTS

HIGH VOLUME LOWER SECTION FOR DHV	HVLS-1000-DHV

REV: SHEET 1 / 2 4/11/2017

	Parts List			
	ITEM	PART NUMBER	QTY	DESCRIPTION
	1	HVLS-1001	1	HIGH VOLUME OUTLET BODY
	2	HVLS-2003	1	PACKING NUT
	3	HVLS-1004	1	DISPLACEMENT ROD
	4	HVLS-1005	1	SPRING SUPPORT RING
	5	HVLS-1006	1	GUIDE BEARING
	6	HVLS-1007	1	HV BALL GUIDE
	7	HVLS-1009	10	WAVE SPRING
	8	F-HN-08C	4	HEX NUT
*	9	O-V-234	2	O-RING
*	10	O-V-030	1	O-RING
*	11	02158-4	1	PACKING SET
*	12	02181-1	2	PISTON CUP - HV PUMP
	13	03604	2	1-5/8 CHROME BALL
	14	04072-1	1	PISTON BALL SPRING
	15	04309-1	1	BALL STOP - HV HIS PUMP
	16	DLS-4613	1	FLUID ROD ADAPTER
	17	67110-1	1	FEMALE PACKING BACKUP RING
	18	68310-3	1	BACKUP RING - HV PISTON CUP
	19	86390-1	1	PISTON BODY - HV HIS PUMP
	20	86370-1	1	FOOT VALVE - HV HIS PUMP
	21	86400-1	1	HV PUMP CYLINDER
	22	86510-1	1	PISTON COUPLING - HV HIS PUMP
	23	86520-3	1	PISTON CUP SPACER - HV PUMP
	24	86530-1	1	PISTON LOCK NUT - HV PUMP
	25	86540-1	4	TIE ROD
	26	87090-1	1	MALE PACKING RING - HV PUMP

REPAIR KIT

* HVLS-1000-SK (ASTERISKS DENOTE PARTS IN KIT)

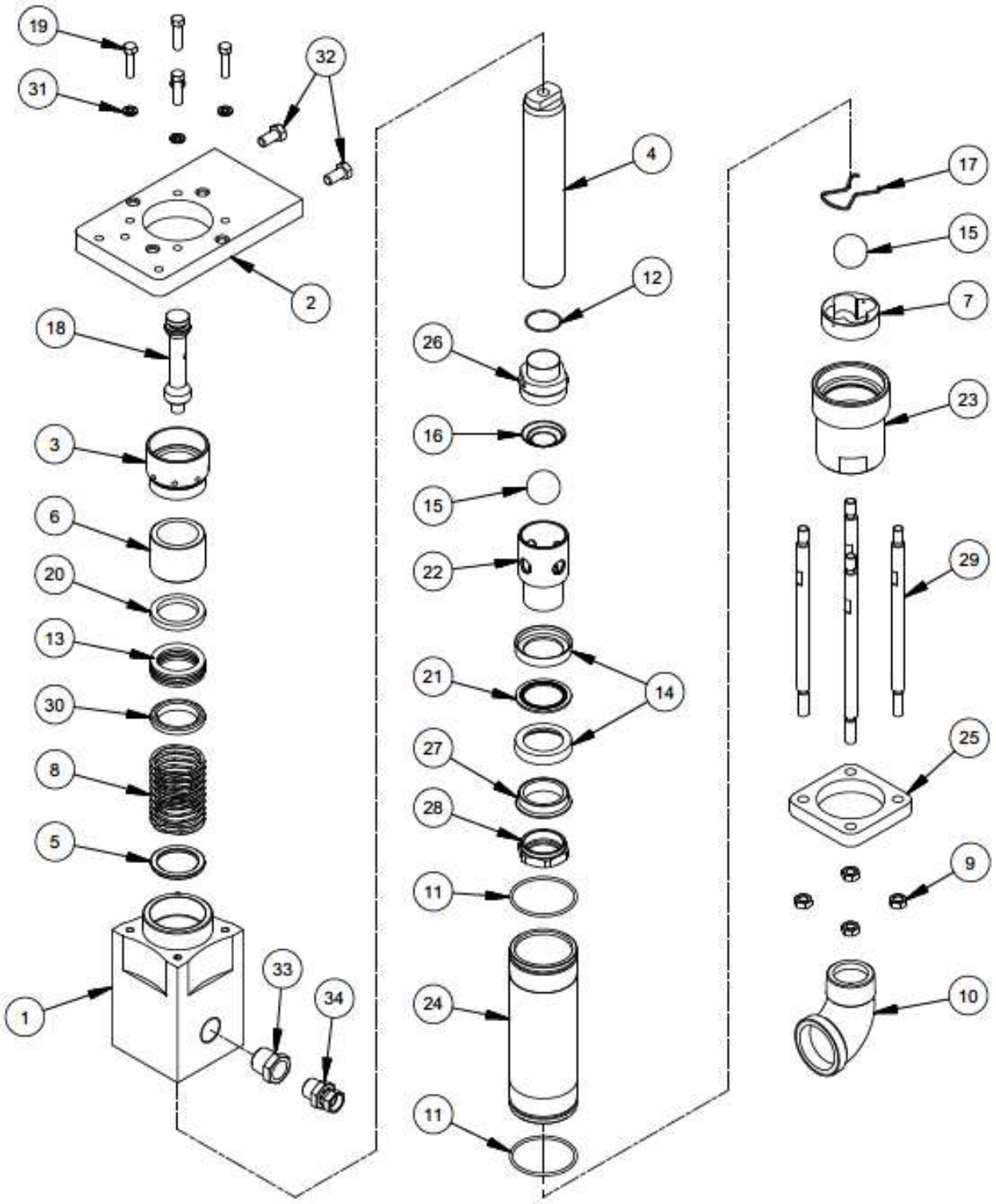
OPTIONAL ITEMS

68310-1	HARDENED BACKUP RING
86401-1	HARDENED PUMP CYLINDER
86520-1	HARDENED PISTON CUP SPACER

MAGNUM VENUS PRODUCTS

HIGH VOLUME LOWER SECTION FOR DHV	HVLS-1000-DHV

REV: SHEET 2 / 2 4/11/2017



MAGNUM VENUS PLASTECH

HIGH VOLUME LOWER SECTION	HVLS-1000-HD

REV:A 10/04/2017 SHEET 1 / 2 3/15/2017

Parts List			
ITEM	PART NUMBER	QTY	DESCRIPTION
1	HVLS-1001	1	HIGH VOLUME OUTLET BODY
2	HVLS-1002	1	HV PUMP MOUNT PLATE
3	HVLS-1003	1	HV PACKING NUT
4	HVLS-1004	1	DISPLACEMENT ROD
5	HVLS-1005	1	SPRING SUPPORT RING
6	HVLS-1006	1	GUIDE BEARING
7	HVLS-1007	1	HV BALL GUIDE
8	HVLS-1009	10	WAVE SPRING
9	F-HN-08C	4	HEX NUT
10	00714	1	PIPE ELBOW
* 11	O-V-234	2	O-RING
* 12	O-V-030	1	O-RING
* 13	02158-4	1	PACKING SET
* 14	02181-1	2	PISTON CUP - HV PUMP
15	03604	2	1-5/8 CHROME BALL
16	04072-1	1	PISTON BALL SPRING
17	04309-1	1	BALL STOP - HV HIS PUMP
18	VLS-4613-HD	1	PISTON ROD ADAPTER - HD
19	F-HB-06C-24-GR8	4	HEX BOLT
20	67110-1	1	FEMALE PACKING BACKUP RING
21	68310-3	1	BACKUP RING - HV PISTON CUP
22	86390-1	1	PISTON BODY - HV HIS PUMP
23	86370-1	1	FOOT VALVE - HV HIS PUMP
24	86400-1	1	HV PUMP CYLINDER
25	86420-1	1	FOOT VALVE COLLAR
26	86510-1	1	PISTON COUPLING - HV HIS PUMP
27	86520-3	1	PISTON CUP SPACER - HV PUMP
28	86530-1	1	PISTON LOCK NUT - HV PUMP
29	86540-1	4	TIE ROD
30	87090-1	1	MALE PACKING RING - HV PUMP
31	F-SW-06	4	LOCK WASHER
32	F-HB-08C-16	2	HEX BOLT
33	PF-RB-16-12	1	REDUCER BUSHING
34	PF-SW-12M-08F	1	PIPE SWIVEL

REPAIR KIT

* HVLS-1000-SK (ASTERISKS DENOTE PARTS IN KIT)

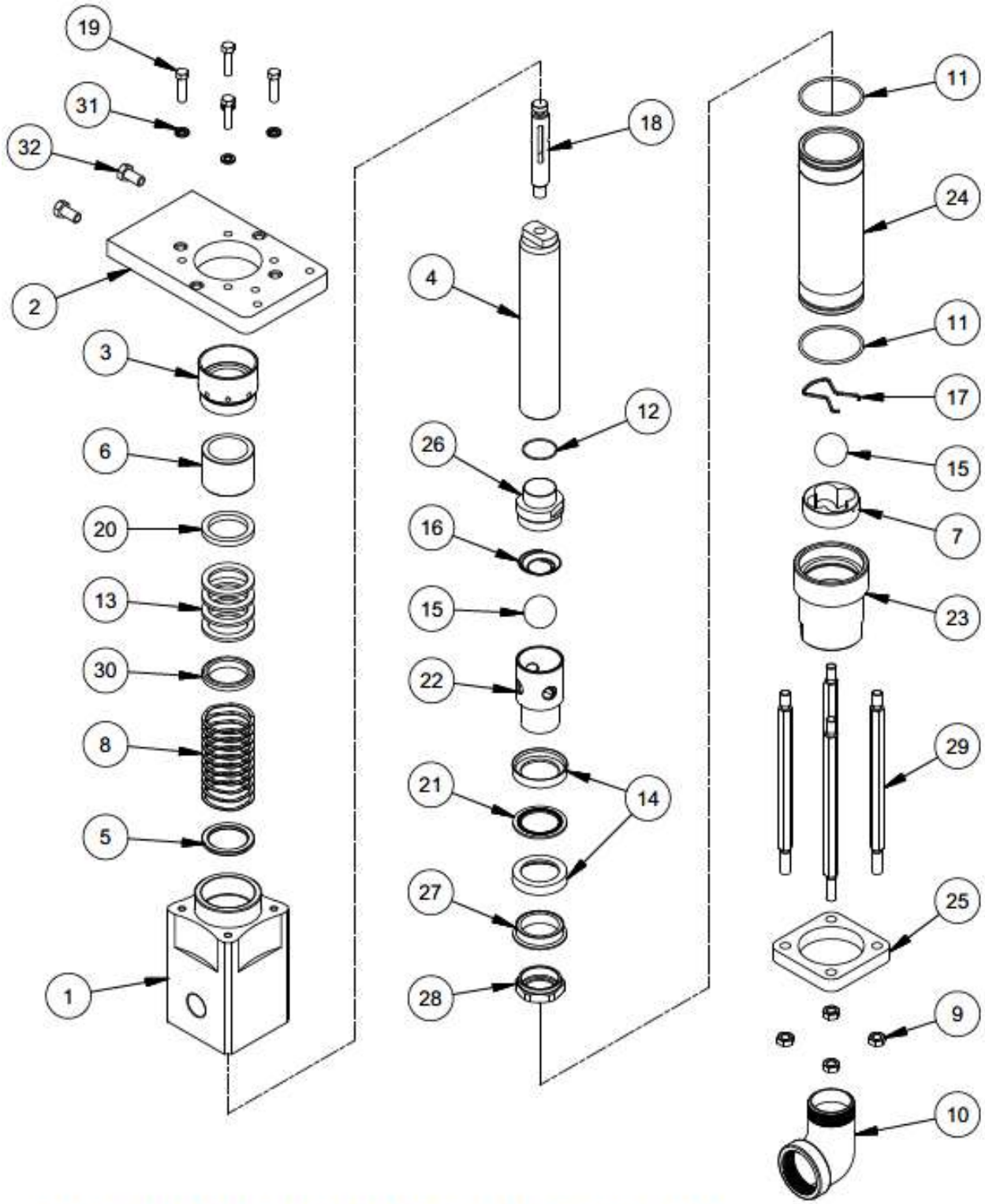
OPTIONAL ITEMS

68310-1	HARDENED BACKUP RING
86401-1	HARDENED PUMP CYLINDER
86520-1	HARDENED PISTON CUP SPACER

MAGNUM VENUS PLASTECH

HIGH VOLUME LOWER SECTION	HVLS-1000-HD

REV:A 10/04/2017 SHEET 2 / 2 3/15/2017



MAGNUM VENUS PLASTECH

HIGH VOLUME LOWER SECTION	HVLS-1000-SS

REV: SHEET 1 / 2 4/28/2015

Parts List			
ITEM	PART NUMBER	QTY	DESCRIPTION
1	HVLS-1001-SS	1	OUTLET BODY
2	HVLS-1002	1	HV PUMP MOUNT PLATE
3	HVLS-1003	1	HV PACKING NUT
4	HVLS-1004-SS	1	DISPLACEMENT ROD
5	HVLS-1005-SS	1	SPRING SUPPORT RING
6	HVLS-1006	1	GUIDE BEARING
7	HVLS-1007-SS	1	HV BALL GUIDE
8	HVLS-1009	10	WAVE SPRING
9	F-HN-08C	4	HEX NUT
10	00714-SS	1	PIPE ELBOW
* 11	O-V-234	2	O-RING
* 12	O-V-030	1	O-RING
* 13	02158-4	1	PACKING SET
* 14	02181-1	2	PISTON CUP - HV PUMP
15	03604-SS	2	1-5/8 STAINLESS STEEL BALL
16	04072-1	1	PISTON BALL SPRING
17	04309-1-SS	1	BALL STOP
18	VLS-4613	1	PISTON ROD ADAPTER
19	F-HB-06C-24-GR8	4	HEX BOLT
20	67110-1-SS	1	FEMALE PACKING BACK UP RING
21	68310-1-SS	1	BACK UP RING
22	86390-1-SS	1	PISTON BODY
23	86370-1-SS	1	FOOT VALVE
24	86400-1-SS	1	CYLINDER
25	86420-1	1	FOOT VALVE COLLAR
26	86510-1-SS	1	PISTON COUPLING
27	86520-1-SS	1	PISTON CUP SPACER
28	86530-1-SS	1	PISTON LOCK NUT - HV PUMP
29	86540-1	4	TIE ROD
30	87090-1-SS	1	MALE PACKING RING
31	F-SW-06	4	LOCK WASHER
32	F-HB-08C-16	2	HEX BOLT

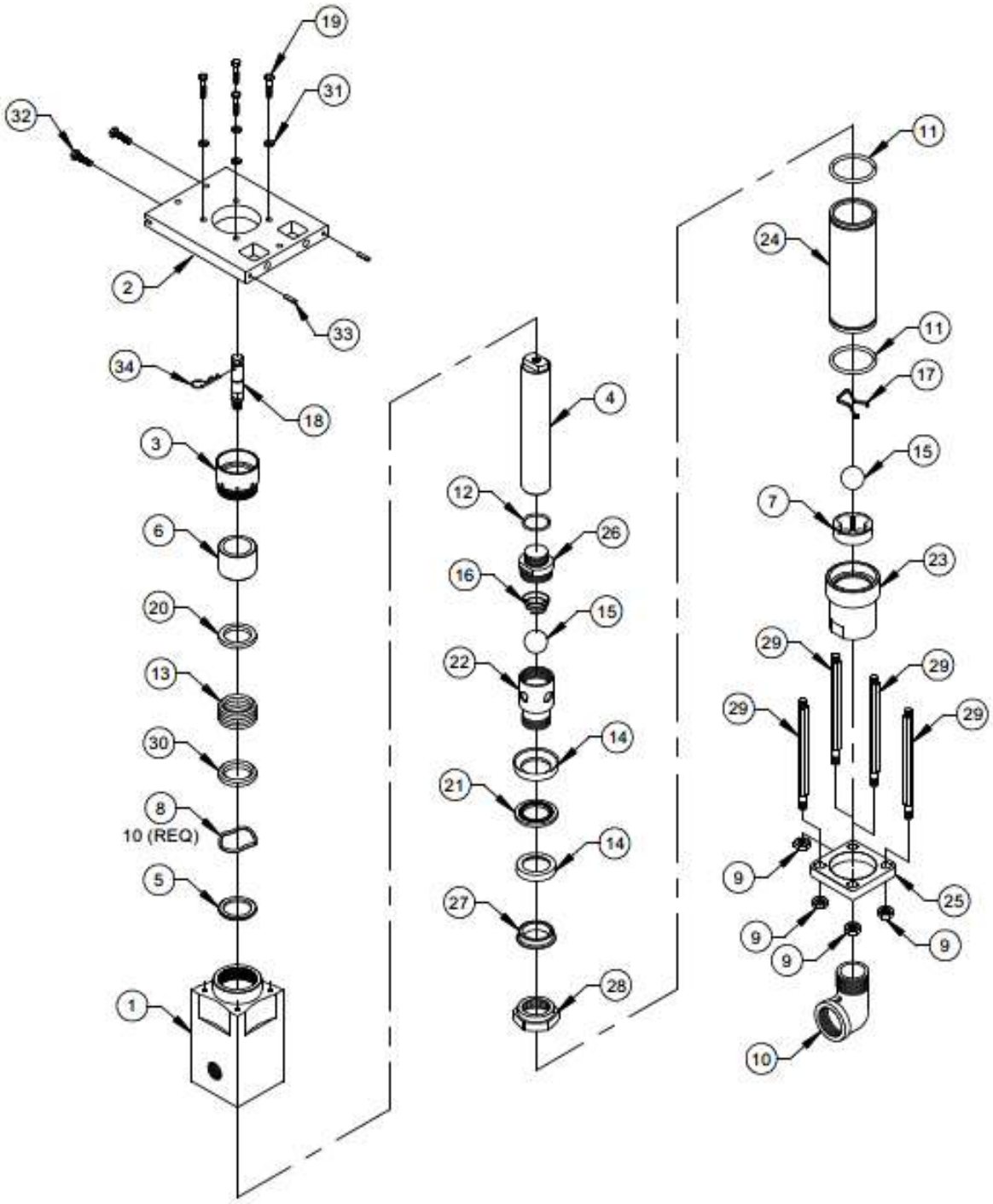
REPAIR KIT

* HVLS-1000-SK (ASTERISKS DENOTE PARTS IN KIT)

MAGNUM VENUS PLASTECH

HIGH VOLUME LOWER SECTION	HVLS-1000-SS

REV: SHEET 2 / 2 4/28/2015



MAGNUM VENUS PRODUCTS

Multi-Color HV Fluid Section Assembly	MCPA-HVLS

REV. A - 06/19/07 BT2

Multi-Color HV Fluid Section Assembly MCPA-HVLS

PARTS LIST

	ITEM	PART NO.	QTY	DESCRIPTION
	1	HVLS-1001	1	OUTLET BODY
	2	MCPA-1002	1	PUMP MOUNT PLATE
	3	HVLS-1003	1	PACKING NUT
	4	HVLS-1004	1	DISPLACEMENT ROD
	5	HVLS-1005	1	SPRING SUPPORT RING
	6	HVLS-1006	1	GUIDE BEARING
	7	HVLS-1007	1	BALL GUIDE
	8	HVLS-1009	10	WAVE SPRING
	9	F-HN-08C	4	HEX NUT
	10	00714	1	ELBOW
*	11	O-V-234	2	O-RING
*	12	O-V-030	1	O-RING
*	13	02158-4	1	PACKING SET
*	14	02181-1	2	PISTON CUP
	15	03604	2	BALL
	16	04072-1	1	PISTON BALL SPRING
	17	04309-1	1	BALL STOP
	18	MCPA-2501	1	PISTON ROD ADAPTER
	19	F-HB-06C-24-GR8	4	HEX CAP SCREW
	20	67110-1	1	FEMALE PACKING RING
	21	68310-3	1	BACK UP RING
	22	86390-1	1	PISTON BODY
	23	86370-1	1	FOOT VALVE BODY
	24	86400-1	1	CYLINDER
	25	86420-1	1	FOOT VALVE COLLAR
	26	86510-1	1	PISTON ADAPTER
	27	86520-3	1	SPACER RING
	28	86530-1	1	PISTON NUT
	29	86540-1	4	TIE ROD
	30	87090-1	1	MALE PACKING RING
	31	F-SW-06	4	LOCK WASHER
	32	F-HB-08C-16	2	HEX BOLT
	33	F-RP-04-16	2	ALIGNMENT PIN
	34	09528	1	HITCH PIN

REPAIR KITS

PART NO.	DESCRIPTION
HVLS-1000-SK	SEAL KIT

* ITEMS INCLUDED IN SEAL KIT

OPTIONAL PARTS AND ASSEMBLIES

ITEM	PART NO.	QTY	DESCRIPTION
21A	68310-1	1	HARDENED BACK-UP RING
24A	86401-1	1	HARDENED CYLINDER
27A	86520-1	1	HARDENED SPACER RING

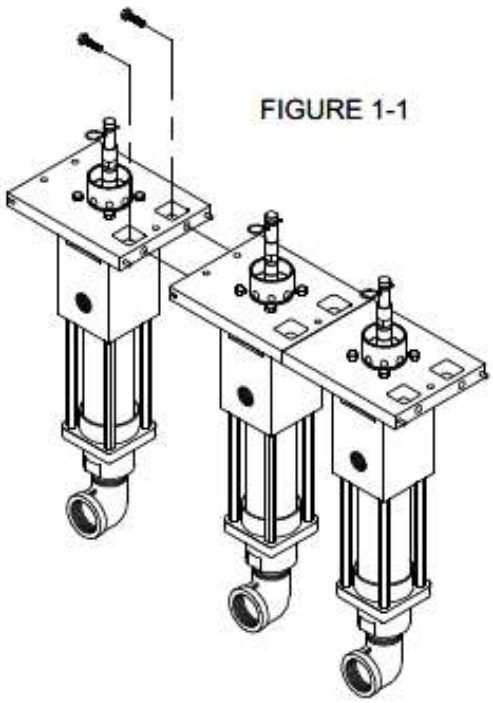
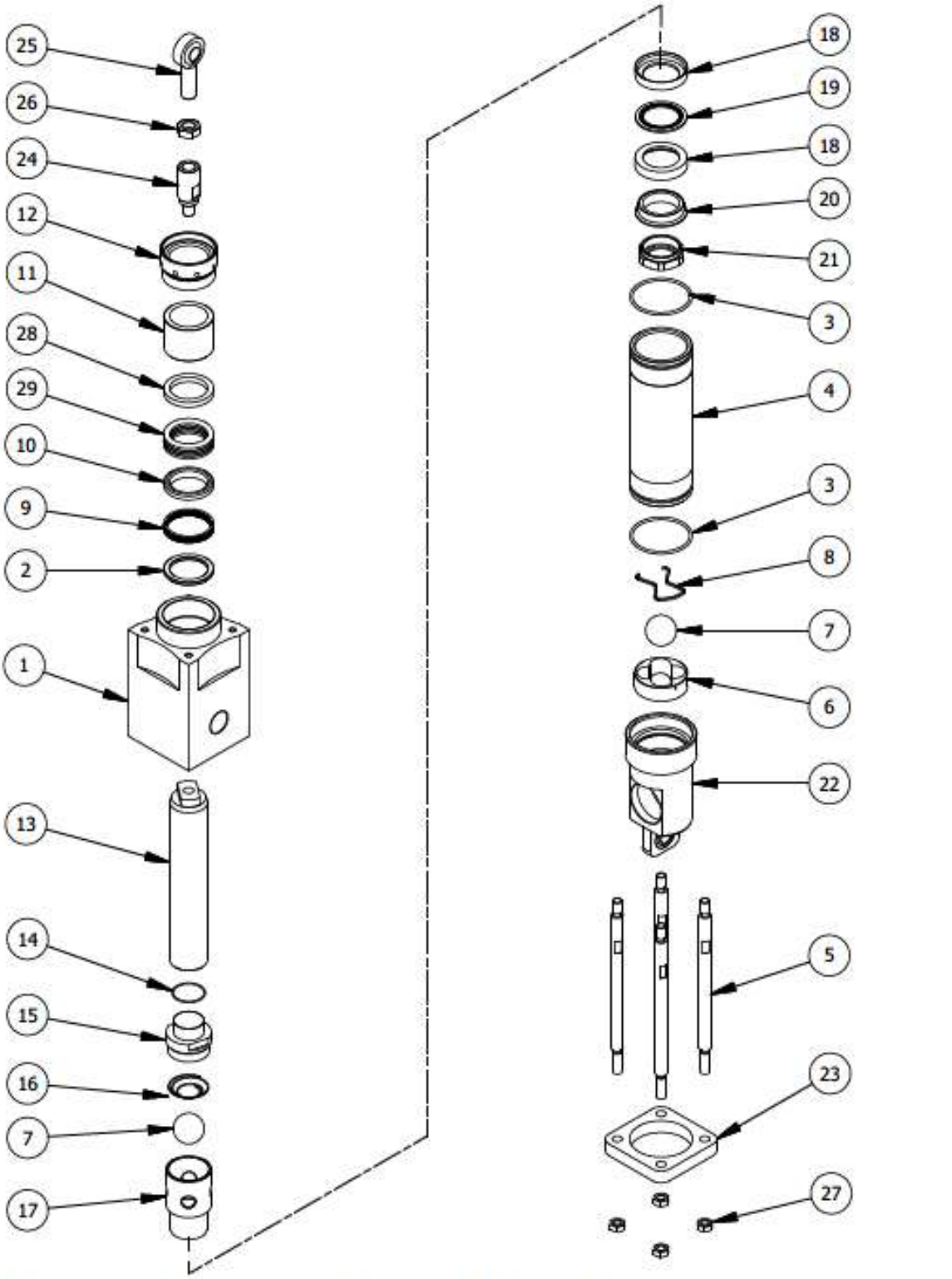


FIGURE 1-1



MAGNUM VENUS PLASTECH

HIGH VOLUME PUMP	UPLS-1000

REV:B 10/04/2017 SHEET 1 / 2 3/3/2010

	Parts List			
	ITEM	PART NUMBER	QTY	DESCRIPTION
	1	HVLS-1001	1	HIGH VOLUME OUTLET BODY
	2	HVLS-1005	1	SPRING SUPPORT RING
*	3	O-V-234	2	O-RING
	4	86400-1	1	HV PUMP CYLINDER
	5	86540-1	4	TIE ROD
	6	HVLS-1007	1	HV BALL GUIDE
	7	03604	2	1-5/8 CHROME BALL
	8	04309-1	1	BALL STOP - HV HIS PUMP
	9	HVLS-1009	10	WAVE SPRING
	10	87090-1	1	MALE PACKING RING - HV PUMP
	11	HVLS-1006	1	GUIDE BEARING
	12	HVLS-2003	1	PACKING NUT
	13	HVLS-1004	1	DISPLACEMENT ROD
*	14	O-V-030	1	O-RING
	15	86510-1	1	PISTON COUPLING - HV HIS PUMP
	16	04072-1	1	PISTON BALL SPRING
	17	86390-1	1	PISTON BODY - HV HIS PUMP
*	18	02181-1	2	PISTON CUP - HV PUMP
	19	68310-3	1	BACKUP RING - HV PISTON CUP
	20	86520-3	1	PISTON CUP SPACER - HV PUMP
	21	86530-1	1	PISTON LOCK NUT - HV PUMP
	22	UPLS-1002	1	FOOT VALVE
	23	86420-1	1	FOOT VALVE COLLAR
	24	UPLS-1013	1	HV ROD ADAPTOR
	25	B-BJRE-.750-1-XS	1	BALL JOINT ROD END
	26	F-JN-12F	1	JAM NUT
	27	F-HN-08C	4	HEX NUT
	28	67110-1	1	FEMALE PACKING BACKUP RING
*	29	02158-4	1	PACKING SET

REPAIR KIT

PART No.	DESCRIPTION
* HVLS-1000-SK	SEAL KIT

* NOTE: ASTERISKS DENOTE PARTS USED IN SEAL KIT.

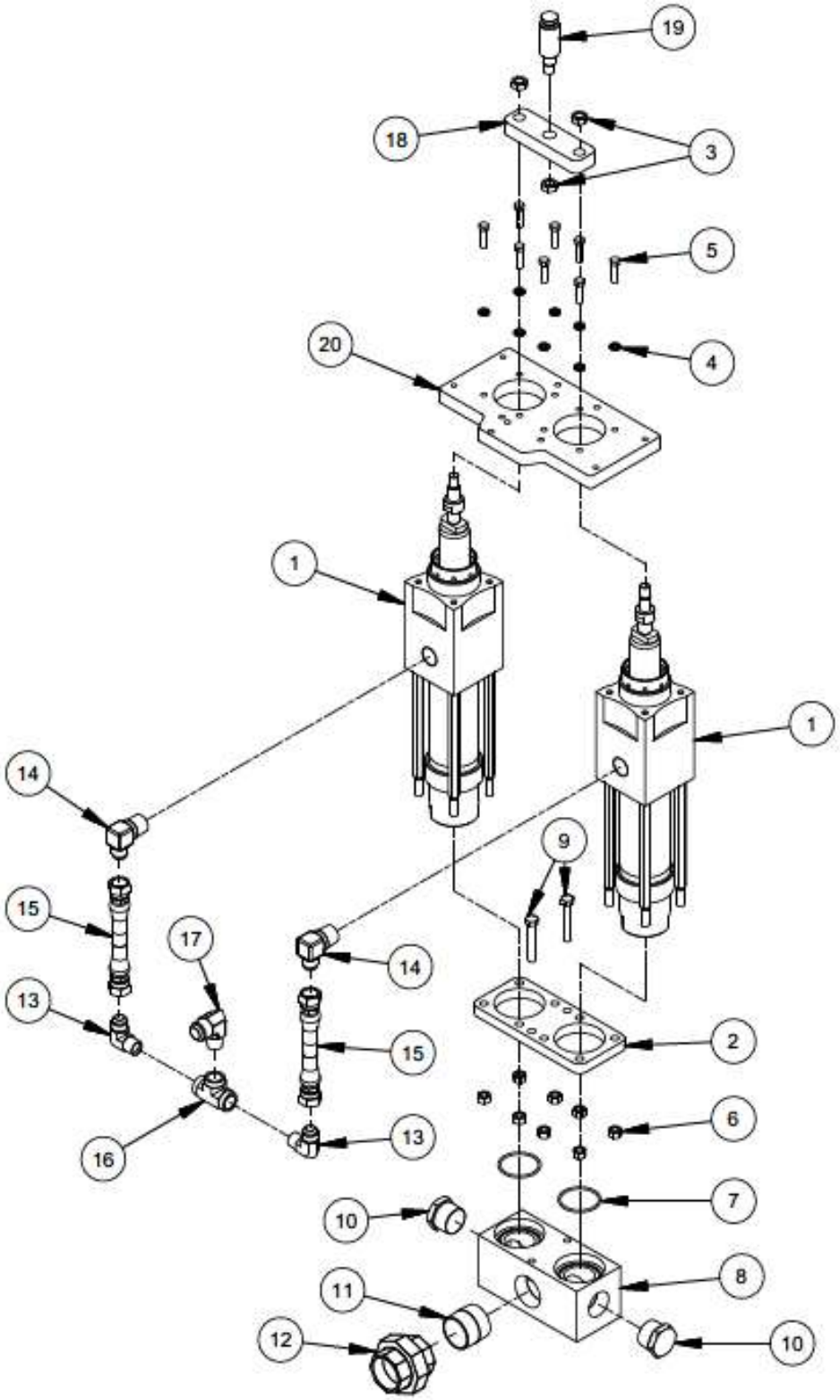
OPTIONAL ITEMS

68310-1	HARDENED BACKUP RING
86401-1	HARDENED PUMP CYLINDER
86520-1	HARDENED PISTON CUP SPACER

MAGNUM VENUS PLASTECH

HIGH VOLUME PUMP	UPLS-1000

REV: B 10/04/2017 SHEET 2 / 2 3/3/2010



MAGNUM VENUS PRODUCTS

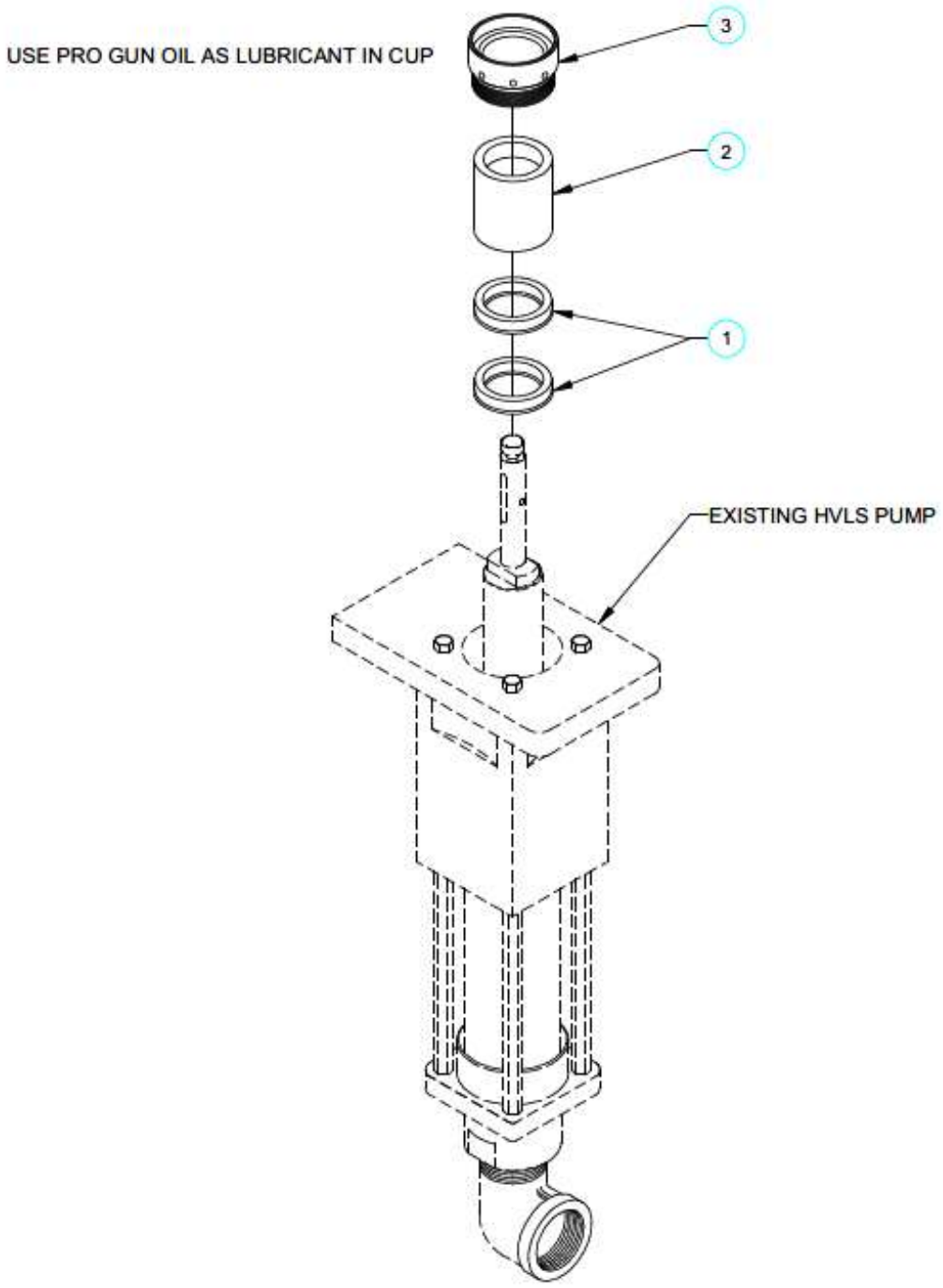
LOWER SECTION FOR DHV SYSTEM - HD	HVLS-2000-4
REV:	SHEET 1 / 2 — 1/12/2016

Parts List			
ITEM	PART NUMBER	QTY	DESCRIPTION
1	HVLS-1000-DHV	2	LOWER SECTION - DUO HIGH VOLUME
2	HVLS-2020	1	FOOT VALVE COLLAR
3	F-HN-10F	3	HEX NUT
4	F-SW-06	8	LOCK WASHER
5	F-HB-06C-24	8	HEX BOLT
6	F-HN-08F-GR8	8	HEX NUT
7	O-V-230	2	O-RING
8	HVLS-2021	1	INLET MANIFOLD
9	F-HB-08C-48	2	HEX BOLT
10	PF-HP-24-PL	2	HEX PLUG
11	00732	1	CLOSE PIPE NIPPLE
12	00730	1	PIPE UNION
13	PF-ME-12-12J	2	MALE ELBOW
14	PF-ME-16-12J	2	MALE ELBOW
15	HAW-121212-0.6	2	HOSE ASSEMBLY
16	PF-FT-12	1	TEE
17	PF-ME-16J-12	1	MALE ELBOW
18	DUO-3012-HV	1	CROSS BAR
19	VLS-5107-HIS-HD	1	PISTON ROD ADAPTER
20	DUO-3002-HV	1	MOUNT PLATE

MAGNUM VENUS PRODUCTS

LOWER SECTION FOR DHV SYSTEM - HD	HVLS-2000-4

REV: SHEET 2 / 2 1/12/2016



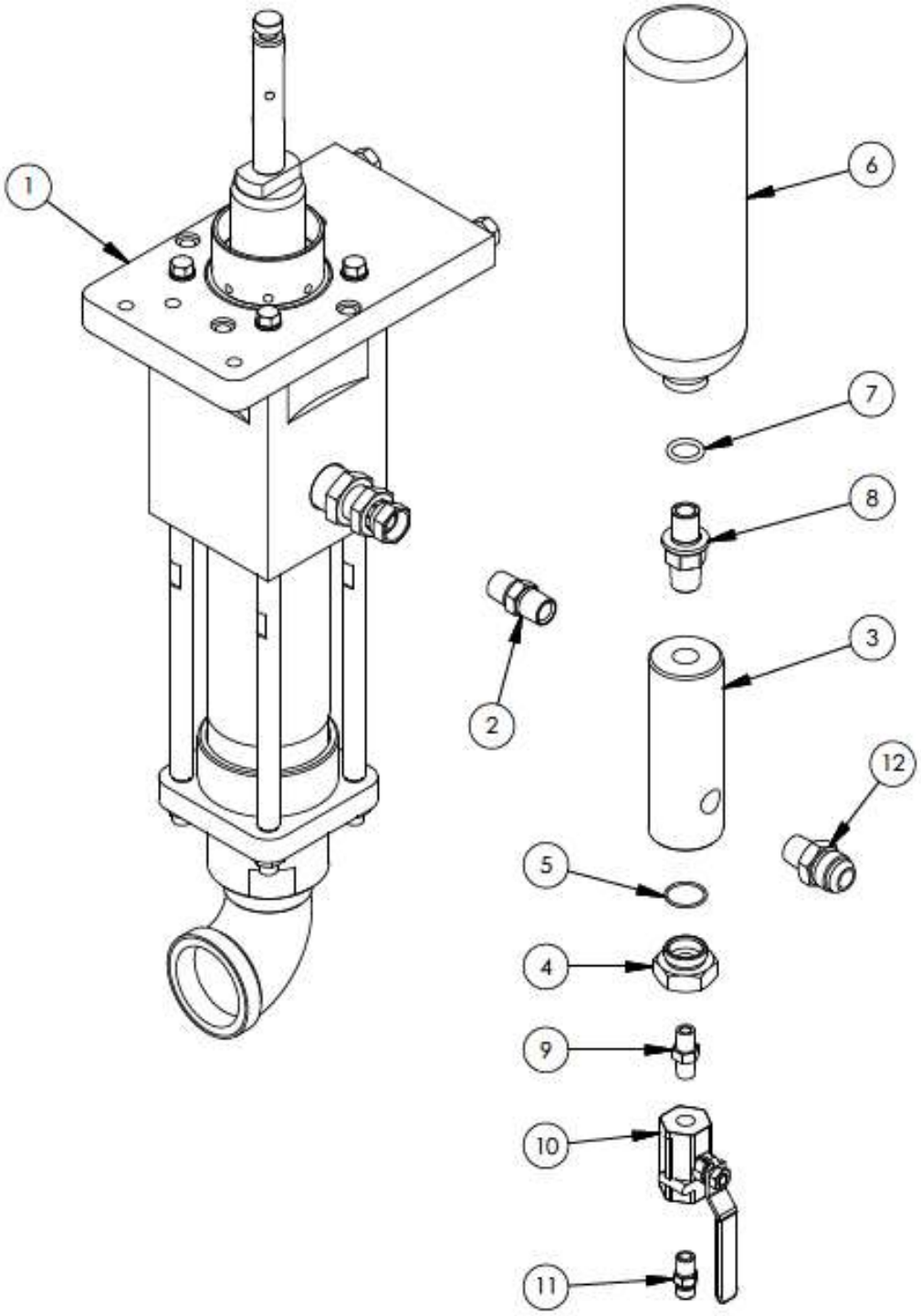
MAGNUM VENUS PRODUCTS

MAGNAPAK UPPER SEAL CONVERSION KIT	HVLS-1040-CK

REV. - 08/11/06 BT2

UPPER SEAL CONVERSION KIT HVLS-1040-CK
PARTS LIST

ITEM	PART NO.	QTY	DESCRIPTION
1	HVLS-1040	2	SEAL
2	HVLS-1032	1	BUSHING
3	HVLS-1031	1	PACKING NUT



MAGNUM VENUS PRODUCTS

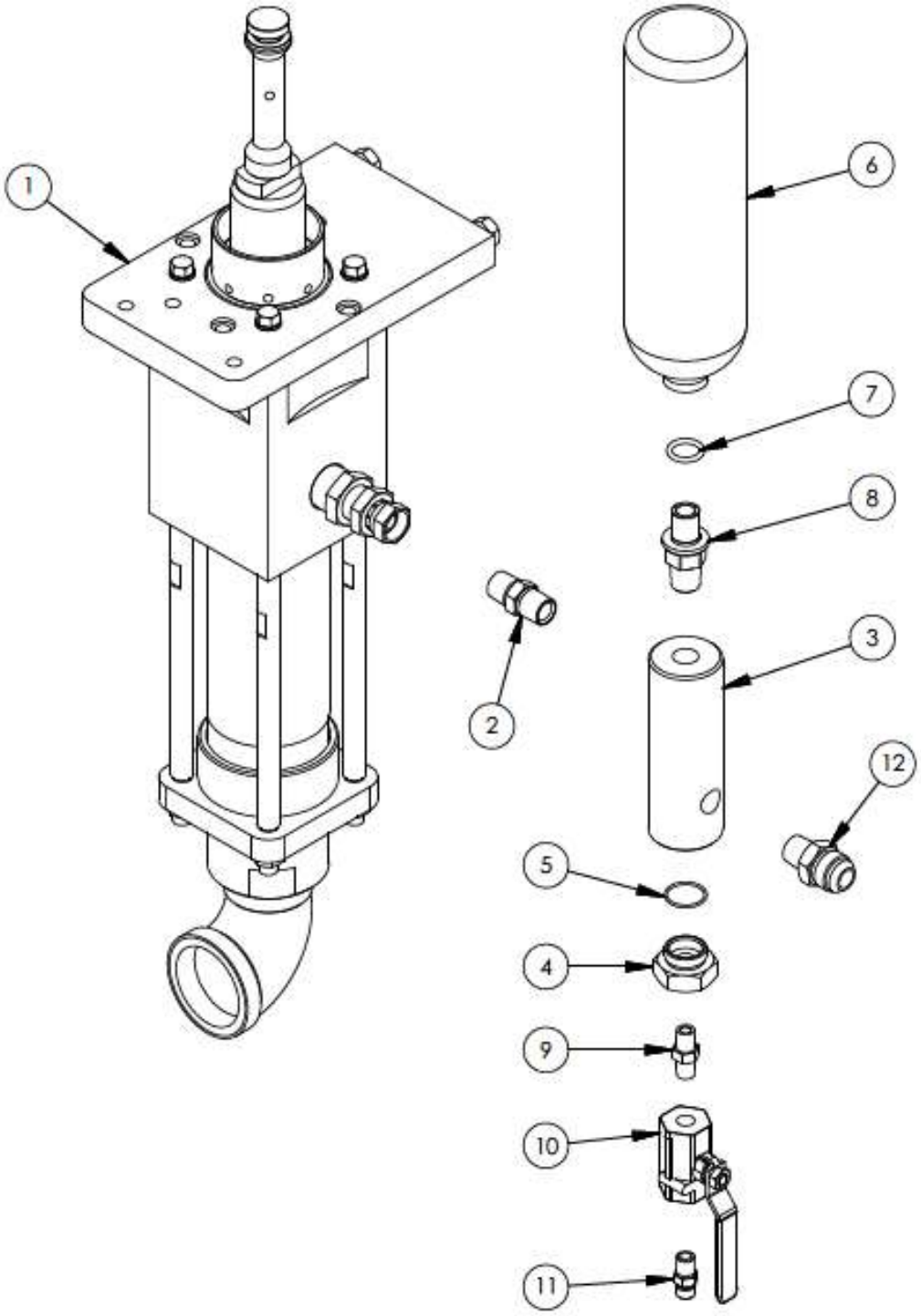
FLUID SECTION AND SURGE CHAMBER	HVLS-1000-1
REV:	SHEET 1 / 2 3/20/2017

Parts List			
ITEM	PART NUMBER	QTY	DESCRIPTION
1	HVLS-1000	1	HIGH VOLUME LOWER SECTION
2	PF-HN-08	1	HEX NIPPLE
3	FF-5001	1	FILTER BODY
4	FF-5002	1	FILTER CAP
5	O-V-022	1	O-RING
6	SC-6000-1	1	SURGE CHAMBER
7	O-V-210	1	O-RING
8	PF-HN-12SC-08	1	SURGE CHAMBER FITTING
9	PF-HN-04	1	HEX NIPPLE
10	BV-44-HP	1	4000 PSI BALL VALVE
11	PF-HN-04-04S	1	HOSE ADAPTER
12	PF-HN-08-12J	1	HOSE ADAPTER

MAGNUM VENUS PRODUCTS

FLUID SECTION AND SURGE CHAMBER	HVLS-1000-1

REV: SHEET 2 / 2 3/20/2017



MAGNUM VENUS PRODUCTS

FLUID SECTION AND SURGE CHAMBER	HVLS-1000-1-HD

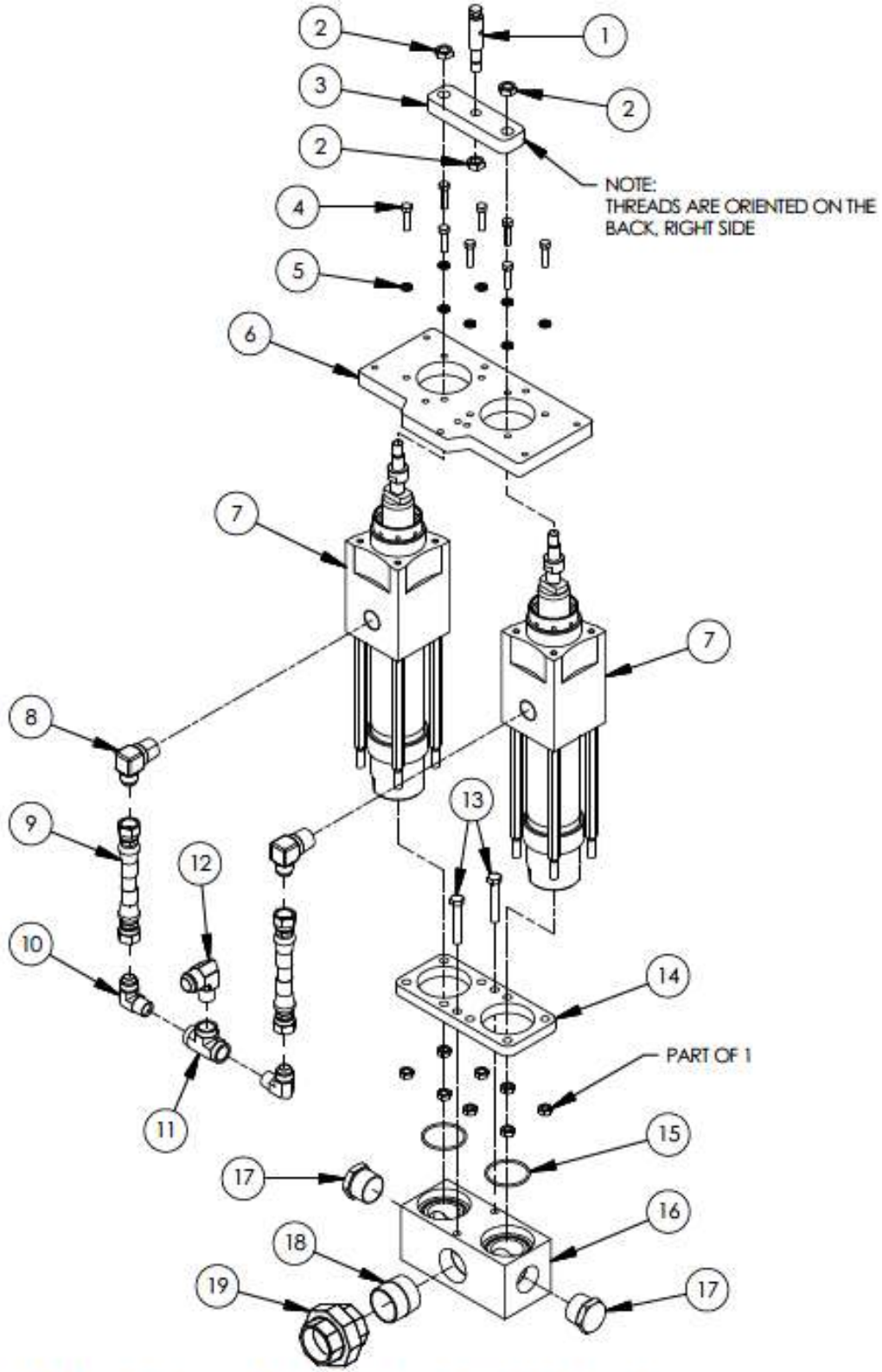
REV: SHEET 1 / 2 3/17/2017

Parts List			
ITEM	PART NUMBER	QTY	DESCRIPTION
1	HVLS-1000-HD	1	HIGH VOLUME LOWER SECTION
2	PF-HN-08	1	HEX NIPPLE
3	FF-5001	1	FILTER BODY
4	FF-5002	1	FILTER CAP
5	O-V-022	1	O-RING
6	SC-6000-1	1	SURGE CHAMBER
7	O-V-210	1	O-RING
8	PF-HN-12SC-08	1	SURGE CHAMBER FITTING
9	PF-HN-04	1	HEX NIPPLE
10	BV-44-HP	1	4000 PSI BALL VALVE
11	PF-HN-04-04S	1	HOSE ADAPTER
12	PF-HN-08-12J	1	HOSE ADAPTER

MAGNUM VENUS PRODUCTS

FLUID SECTION AND SURGE CHAMBER	HVLS-1000-1-HD

REV: SHEET 2 / 2 3/17/2017



MAGNUM VENUS PRODUCTS

DHV COMPLETE LOWER SECTION	HVLS-2000-1-DHV

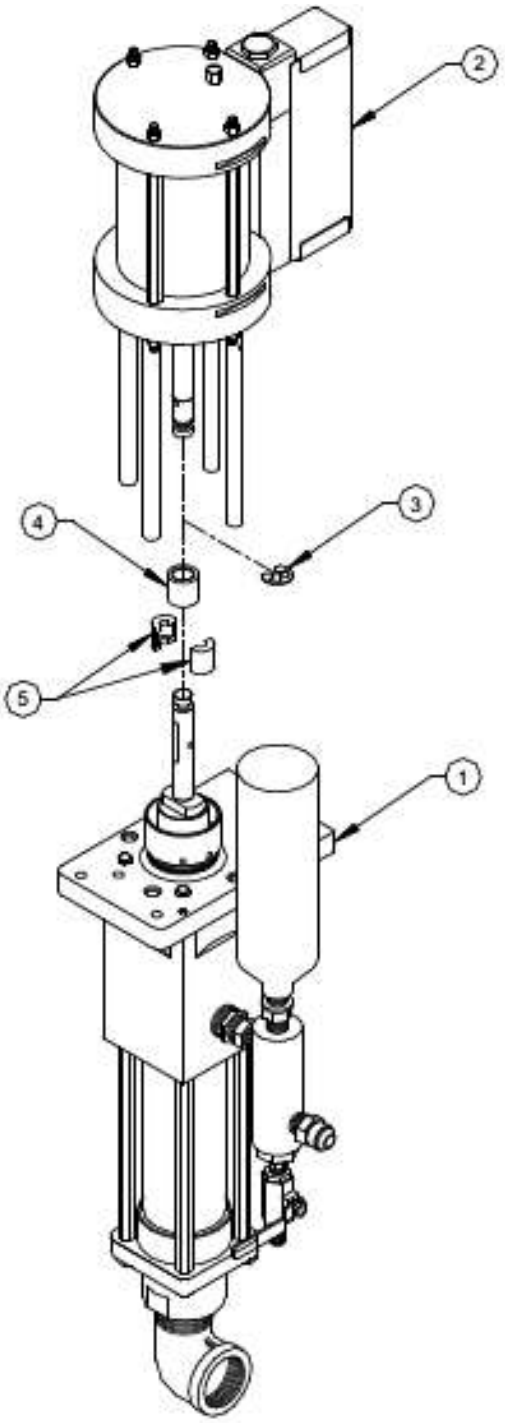
REV: SHEET 1 / 2 11/4/2016

Parts List			
ITEM	PART NUMBER	QTY	DESCRIPTION
1	DUO-3008-HV	1	BUTTON HEAD ADAPTER
2	F-HN-10F	3	HEX NUT
3	DUO-3009-HV	1	CROSS BAR
4	F-HB-06C-24-GR8	8	HEX BOLT
5	F-SW-06	8	LOCK WASHER
6	DUO-3002-HV	1	MOUNT PLATE
7	HVLS-1000-DHV	2	LOWER SECTION - DUO HIGH VOLUME
8	PF-ME-16-12J	2	MALE ELBOW
9	HAW-121212-6IN	2	HOSE ASSEMBLY
10	PF-ME-12-12J	2	MALE ELBOW
11	PF-FT-12	1	TEE
12	PF-ME-16J-12	1	MALE ELBOW
13	F-HB-08C-48	2	HEX BOLT
14	HVLS-2020	1	FOOT VALVE COLLAR
15	O-V-230	2	O-RING
16	HVLS-2021	1	INLET MANIFOLD
17	PF-HP-24-PL	2	HEX PLUG
18	00732	1	CLOSE PIPE NIPPLE
19	00730	1	PIPE UNION

MAGNUM VENUS PRODUCTS

DHV COMPLETE LOWER SECTION	HVLS-2000-1-DHV

REV: SHEET 2 / 2 11/4/2016



MAGNUM VENUS PLASTECH

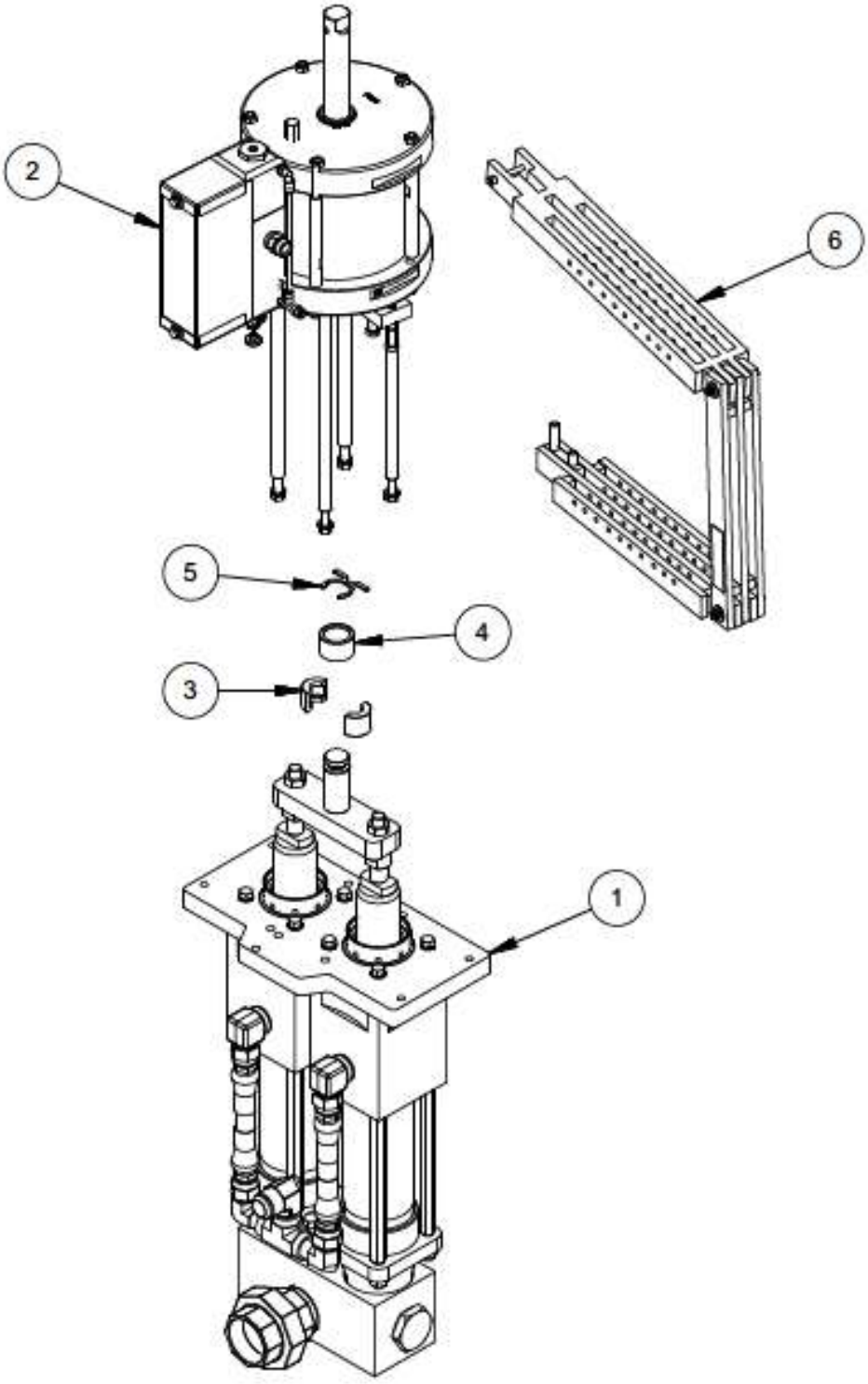
6:1 HIGH VOLUME RESIN PUMP ASSY	VPHV-0600

REV. A = CHANGED POWER HEAD IN DWG FROM VPM-5000 TO VPH-5000 1/27/03 JEM
REV. B = ITEM 1 WAS HVLS-1000, ITEM 3 WAS 00740-1, ITEM 4 WAS 00732, ADDED ITEM 5 11/07/07 BT2

6:1 HIGH VOLUME RESIN PUMP ASSY VPHV-0600

PARTS LIST

ITEM	PART NO.	QTY	DESCRIPTION
1	HVLS-1000-1	1	HV FLUID SECT ASSEMBLY
2	VPH-5000	1	5" POWER HEAD
3	APP-9102	1	RETAINING RING
4	APP-9109	1	SLEEVE
5	APP-9096	2	CONNECTOR



MAGNUM VENUS PRODUCTS

DUO HIGH VOLUME PUMP ASSEMBLY	VPHV-0600-HD

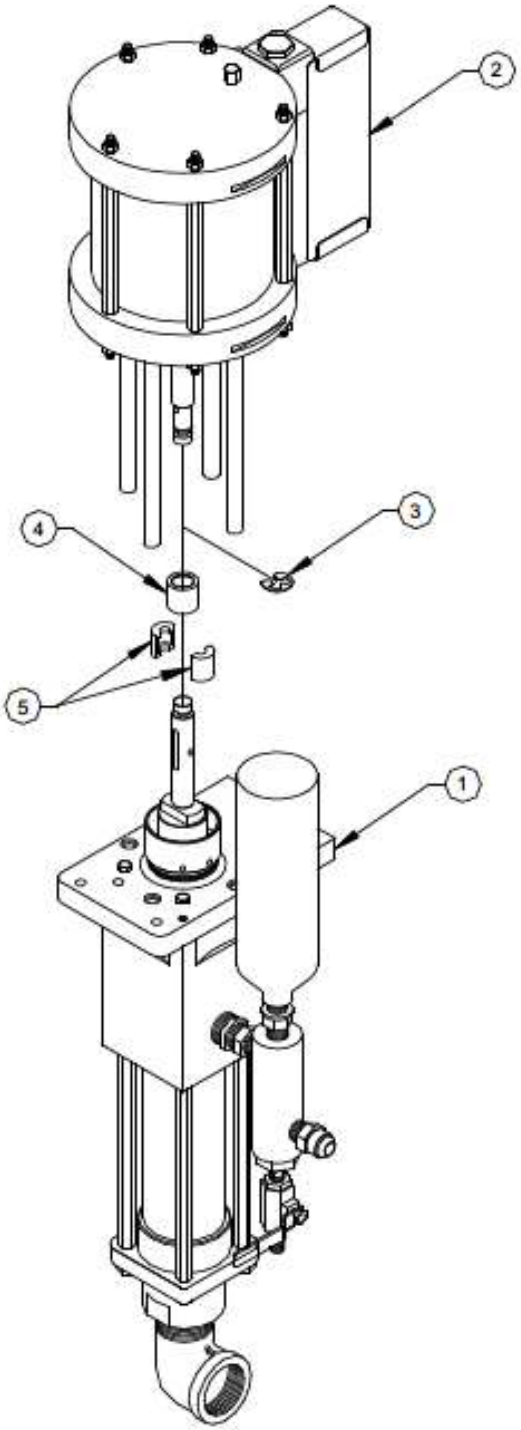
REV: SHEET 1 / 2 1/13/2016

Parts List			
ITEM	PART NUMBER	QTY	DESCRIPTION
1	HVLS-2000-4	1	LOWER SECTION FOR DHV SYSTEM - HD
2	VPH-7000-P-DHV-HD	1	7" POWER HEAD - DUO HIGH VOLUME
3	VPH-10009	2	HALF SHELL
4	PAT-PA-9110	1	SHELL RETAINER
5	PAT-PA-9112	1	SLEEVE CLIP
6	VLS-7100-DS	1	DUAL SLAVE ARM ASSEMBLY

MAGNUM VENUS PRODUCTS

DUO HIGH VOLUME PUMP ASSEMBLY	VPHV-0600-HD

REV: SHEET 2 / 2 1/13/2016



MAGNUM VENUS PLASTECH

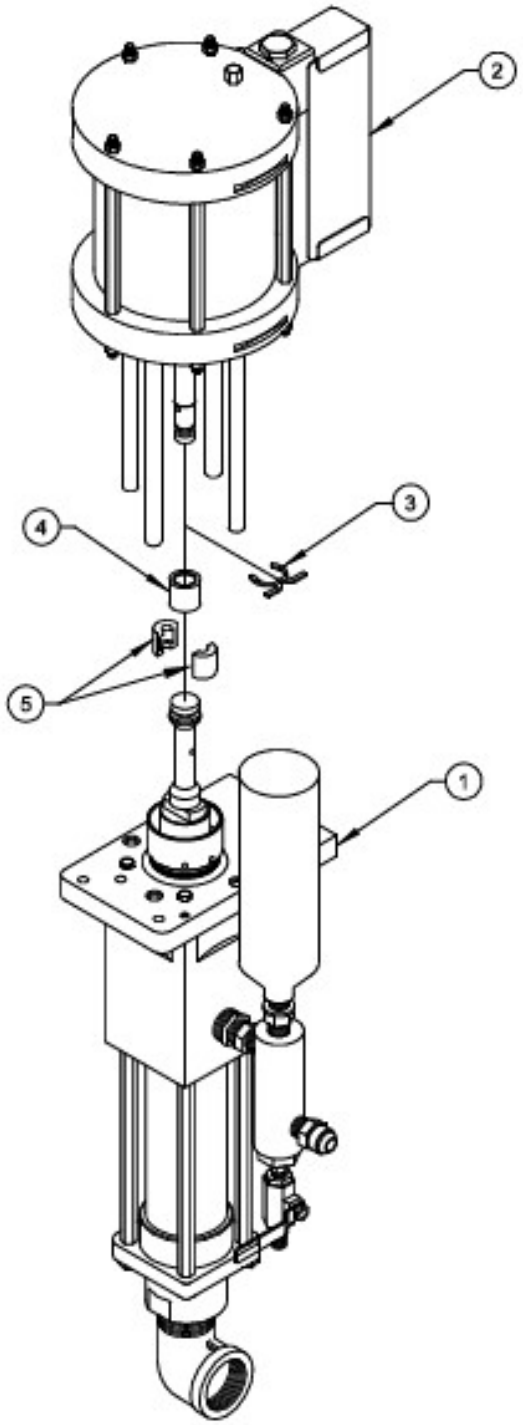
12:1 HIGH VOLUME RESIN PUMP ASSY	VPHV-1200

REV. A = CHANGED POWER HEAD IN DWG FROM VPM-7000 TO VPH-7000 1/27/03 JEM
REV. B = ITEM 1 WAS HVLS-1000, ITEM 3 WAS 00740-1, ITEM 4 WAS 00732, ADDED ITEM 5 11/07/07 BT2

12:1 HIGH VOLUME RESIN PUMP ASSY VPHV-1200

PARTS LIST

ITEM	PART NO.	QTY	DESCRIPTION
1	HVLS-1000-1	1	HV FLUID SECT ASSEMBLY
2	VPH-7000	1	7" POWER HEAD
3	APP-9102	1	RETAINING RING
4	APP-9109	1	SLEEVE
5	APP-9096	2	CONNECTOR



MAGNUM VENUS PLASTECH

12:1 HIGH VOLUME RESIN PUMP ASSEMBLY	VPHV-1200-HD

REV. - 05-03-10 BT2

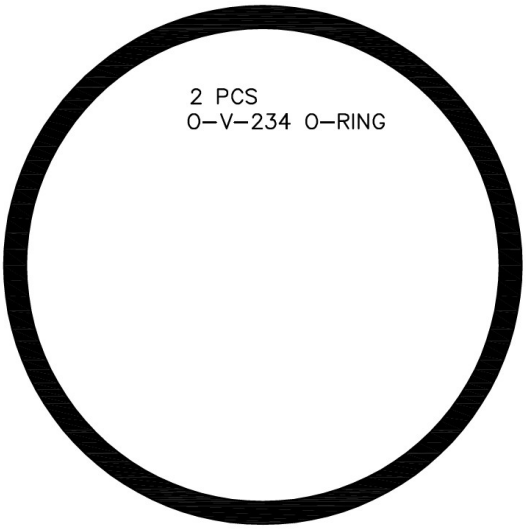
12:1 HIGH VOLUME RESIN PUMP ASSY VPHV-1200-HD

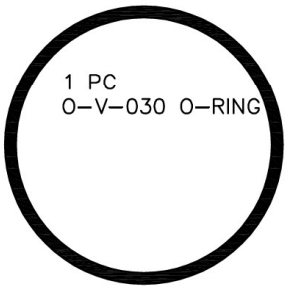
PARTS LIST

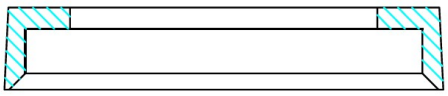
ITEM	PART NO.	QTY	DESCRIPTION
1	HVLS-1000-1-HD	1	HV FLUID SECT ASSEMBLY
2	VPH-7000-HD	1	7" POWER HEAD
3	PAT-PA-9112	1	SLEEVE CLIP
4	PAT-PA-9110	1	SHELL RETAINER
5	VPH-10009	2	HALF SHELL

NOTE: F-HB-06C-24-GR8 CONNECTING BOLTS ARE INCLUDED WITH POWER HEAD

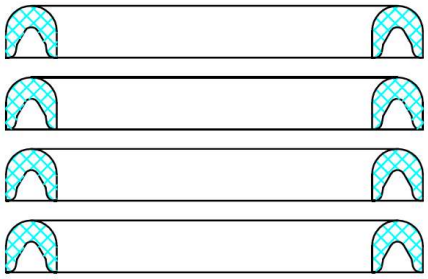
HVLS–1000–SK
SEAL KIT – HV FLUID SECTION





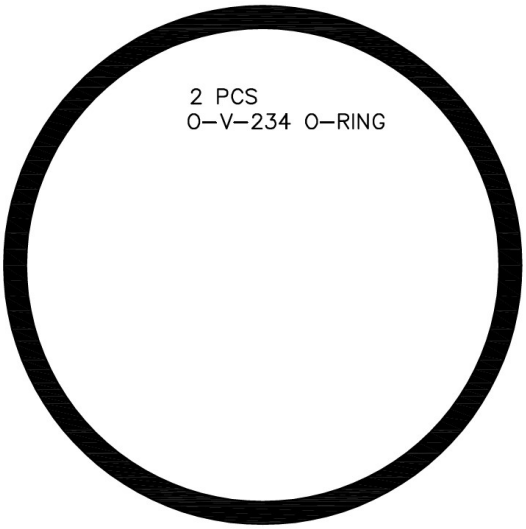


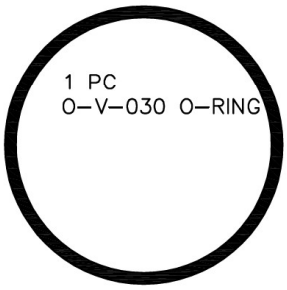
2 PCS
02181–1 TEFLON PISTON CUP

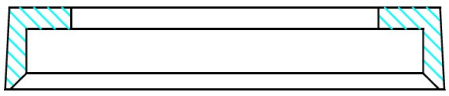


1 SET
02158–4 PISTON ROD PACKING (4 PCS)

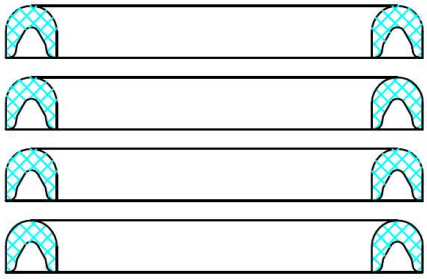
HVLS–1000–SK
SEAL KIT – HV FLUID SECTION







2 PCS
02181–1 TEFLON PISTON CUP



1 SET
02158–4 PISTON ROD PACKING (4 PCS)

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