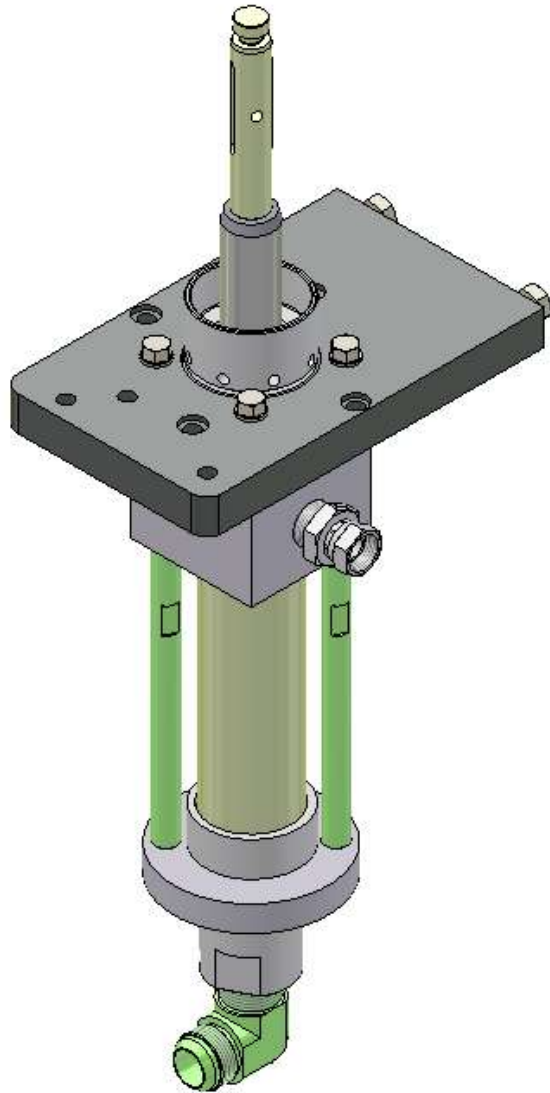


4600 Series Fluid Section

Component Manual

This manual is applicable to the following models:

- VLS-4600
- VLS-4600-HD
- VLS-4600-HD-SS
- VLS-4600-MP
- VLS-4600-SS
- DLS-4600
- DLS-4600-SS
- MCPA-4600
- MCPA-4600-MP
- UPLS-4600
- UPLS-4600-SS





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www.mvpind.com/mvp-international

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



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Safety & Warning Information

Warnings

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

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

Recommended Occupational Safety & Health Act (OSHA) Documentation:

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

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

Recommended National Fire Protection Association (NFPA) Documentation:

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

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

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

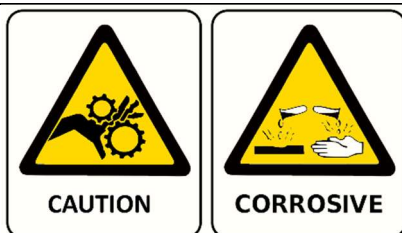
Safety Precautions

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



Physical Hazards

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



Personal Protective Equipment (PPE)

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



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

Symbol Definitions



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



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



Indicates that the materials being used are susceptible to combustion



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



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



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



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



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

Polymer Matrix Materials: Advanced Composites

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

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

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

Catalyst - Methyl Ethyl Ketone Peroxide (MEKP)

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



WARNING

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

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

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

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

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

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

Clean-Up Solvents and Resin Diluents



WARNING

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

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

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

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

**WARNING**

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

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

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

Catalyst Diluents

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



WARNING

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

Cured Laminate, Overspray and Laminate Sandings Accumulation

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

To prevent spillage and leakage, you should:

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

Toxicity of Chemicals

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

Equipment Safety

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



CAUTION

Never place fingers, hands, or any body part near or directly in front of the spray gun fluid tip. The force of the liquid as it exits the spray tip can cause serious injury by shooting liquid through the skin. NEVER LOOK DIRECTLY INTO THE GUN SPRAY TIP OR POINT THE GUN AT OR NEAR ANOTHER PERSON 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 4600 Series Fluid Section. The following procedures are included:

- Step-by-step assembly and disassembly
- Troubleshooting guidance
- Maintenance schedule



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.

Pump Assemblies

- VLS-4600 Fluid Section Assembly
- VLS-4600-HD Fluid Section Assembly – Heavy Duty
- VLS-4600-HD-SS Fluid Section Assembly – Heavy Duty – Stainless Steel
- VLS-4600-MP Fluid Section Assembly – Magnapak
- VLS-4600-SS Fluid Section Assembly – Stainless Steel
- DLS-4600 Fluid Section Assembly – Duo Unit
- DLS-4600-SS Fluid Section Assembly – Duo Unit – Stainless Steel
- MCPA-4600 Fluid Section Assembly – Multi-Color Units
- MCPA-4600-MP Fluid Section Assembly – Multi-Color – Magnapak
- UPLS-4600 Fluid Section Assembly – Universal Proportioner
- UPLS-4600-SS Fluid Section Assembly – Universal Proportioner – Stainless Steel

Lubrication

Throughout this manual directions are given for lubricating various parts of the fluid section. These are the typical lubricants used:

- If the part contacts resin, use MVP Red Grease
- If the part is located where it will contact air, use Lubriplate®
- In the oil reservoir of the pump, use Throat Seal Oil (TSL)
- Grease for use with ISO
- Throat Seal Oil for use with ISO



DANGER

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

Requirements

Air Requirements

Clean and dry compressed air must be available at up to 90 psi (6 bar) and a minimum volume of 10 CFM (0.3 m³). Air must be provided through an air hose with a diameter of 0.5 inch (1.3 cm) or greater.

Tools and Supplies

When performing service and repair on the fluid section, you should have the following tools, spare parts, and supplies available before beginning:

- ☐ TABLE VISE
- ☐ LOCTITE™ 243 (REMOVABLE) OR EQUIVALENT
- ☐ SMALL HAMMER
- ☐ NEEDLE-NOSE PLIERS
- ☐ SOLVENT OR EMULSIFIER FOR CLEANING
- ☐ CLEAN WORK TABLE
- ☐ ANTI-SEIZE THREAD SEALANT
- ☐ SET OF HEX WRENCHES
- ☐ 5/8-INCH WRENCH
- ☐ 9/16-INCH WRENCH
- ☐ 5/16-INCH WRENCH
- ☐ EMPTY BUCKETS FOR CLEANING
- ☐ CLEAN 1/4-INCH PLASTIC DOWEL OR ROD
- ☐ 8-INCH ADJUSTABLE WRENCH
- ☐ 12-INCH ADJUSTABLE WRENCH
- ☐ 7/16-INCH OPEN-END WRENCH
- ☐ 1/2-INCH SOCKET WRENCH
- ☐ 7/16-INCH SOCKET WRENCH

- ☐ WOODEN STICKS OR TONGUE DEPRESSORS FOR TESTING
- ☐ LABELS AND PENS FOR MARKING PNEUMATIC LINES
- ☐ CLEAN RAGS AND PAINT BRUSHES FOR CLEANING EQUIPMENT
- ☐ TUBE OF MEDIUM WEIGHT LITHIUM GREASE (SUCH AS LUBRIPLATE®)
- ☐ LARGE (APPROX. 3 FT BY 10 FT) STRIPS OF PAPER FOR SPRAY TESTS
- ☐ PIN WRENCH (COMES WITH CATALYST JUG)
- ☐ SCRIBE
- ☐ RED GREASE
- ☐ SEAL KIT FOR THE MODEL YOU ARE SERVICING

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

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

Note ***Teflon® is a registered trademark of E.I. Dupont de Nemours and Co.***



WARNING

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

Setting Up

1. Check all clamp brackets, pump column, slave arm bracket, manifold clamp, etc. to make sure they will not move when unit is in operation.
2. Check the mounting of the catalyst pump to make sure clevis pins are secure.
3. Make sure 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 the packing is snug.

Note ***Do not overtighten.***

6. If you have a Pro Gun on your system, tighten the gun valve rod packing nuts until they are very snug, then activate the trigger 10 – 15 times before retightening the packing nuts.
7. Repeat this packing tightening procedure 3 times to make sure the Pro Gun valve rod packing is tight.
8. Attach the suction wand to the resin pump.
9. Check that all fittings on the wand assembly are airtight.
10. Attach the wand assembly to the foot valve port of the resin pump.
11. Connect the black resin hose from the gun to the outlet fitting on the resin filter.

12. Connect the catalyst hose from the catalyst pump to the inlet on the catalyst manifold.
13. Connect the catalyst hose from the gun to the outlet of the catalyst manifold assembly.
14. Attach the red air hose from the gun to the fitting on the regulator that is labelled 'gun'.
15. Attach the yellow poly flush hose from the gun to the outlet fitting on the solvent tank.
16. Attach the small red air supply hose from the flush regulator to the input fitting on the solvent tank.
17. Attach the large red air hose from the pump regulator to the power cylinder of the resin pump.
18. Check all hose fittings and fluid connections to make sure they are tight.
19. Attach the ground wire from the gun to the electrical grounding lug on the pump mounting bracket.
20. Check to make sure the electrical ground is installed from the pump mounting bracket to an earth ground.
21. Remove the catalyst poly tubes from the component box.
22. Cut the 1/2-inch diameter poly line with the clamps to 26 inches long.
23. Clamp one end of the poly line to the outlet of the catalyst jug and the other end to the inlet of the catalyst pump.
24. Make sure clamps are airtight.
25. Connect the 1/4-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.
26. Connect the 1/4-inch poly line to the catalyst recirculation valve on the catalyst manifold and insert the other end into the hole in the top of the catalyst jug.
27. Check all components for damage; replace as needed.

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 fluid section you must replace any O-rings you expose. Refer to a current parts drawing specific to the equipment you are disassembling to obtain correct part numbers and layout.*

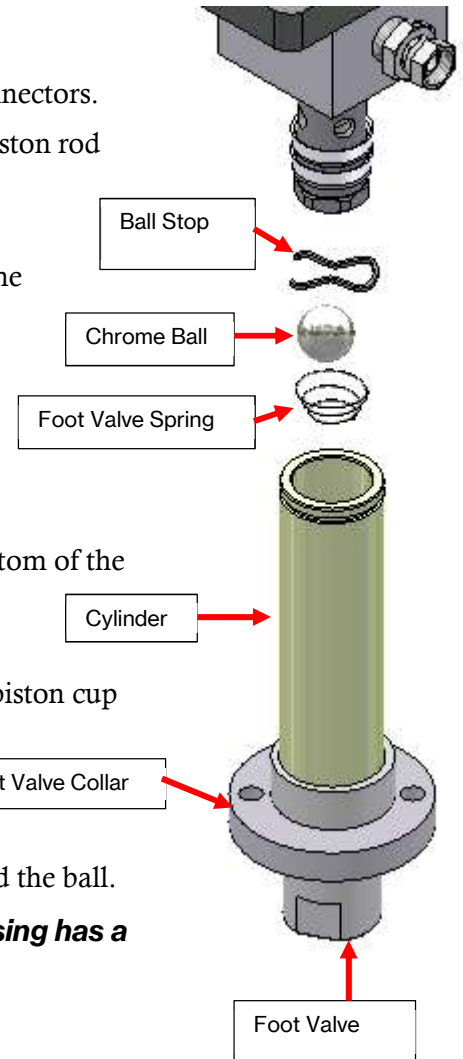
1. Relieve all fluid and air pressure from the system.



DANGER

Fluids under high pressure. To avoid serious injury or equipment damage, do not proceed unless the system has been completely depressurized.

2. If your system has the attached accumulator and filter assembly, hold the gun over an appropriate empty container and lock in an open position, disconnect air from the system, and then place an empty container under the filter/accumulator and slowly open the ball valve at the bottom of the filter cap to drain fluid.
3. Remove the catalyst pump from the catalyst drive.
4. Remove the E-ring, lift up the sleeve, and remove the two connectors.
5. Remove the quick pin and slide the rail assembly out of the piston rod adapter.
6. Remove the hex nuts from the pump cylinder tie rods.
7. Slide the foot valve collar, foot valve, and cylinder down off the piston rod.
8. Discard the two O-rings.
9. Remove the ball stop and foot valve spring.
10. Remove and discard the 1 1/4-inch chrome ball.
11. Clean and inspect the ball seat area of the foot valve.
12. Loosen the packing nut and slide the piston rod out of the bottom of the outlet body.
13. Unscrew the piston nut from the piston body.
14. Remove the two piston cups, the piston cup backup, and the piston cup spacer from the piston body.
15. Discard the two piston cups.
16. Unscrew the piston body from the piston rod.
17. Remove the 7/8-inch ball and the piston ball spring and discard the ball.



Note ***Only discard the ball if the repair/seal kit you are using has a replacement.***

18. Remove the packing nut from the outlet body.
19. Use a 1/4-inch wooden dowel to push the packing set assembly out 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 set, and spring support ring.
22. Clean and inspect all parts that will not be replaced by the repair/seal kit; replace as needed.

Disassembling Filter/Accumulator

1. Unscrew the filter cap from the filter body.
2. Remove the screen from the filter body.
3. Inspect the screen and clean with solvent.

Note *Typically the screen is 100-mesh. Mesh size depends on the resin type and the size of the nozzle tip used on the gun. If you change resin types, you may want to experiment with a different nozzle tip and/or a different size mesh in your filter screen.*

4. Inspect the interior of the filter body and clean with solvent.
5. Check the O-ring on the filter cap for wear or damage and replace if necessary.

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

Remove Accumulator Bottle



WARNING

Before disassembling accumulator, relieve fluid pressure and air pressure. If material is plugging the system, some parts of the system may still contain fluids under pressure even after you have followed normal procedures to relieve the pressure.

6. Unscrew the surge chamber from the nipple.
7. Inspect the interior of the accumulator bottle.
8. Clean with solvent and blow dry with air if needed.

Reassembling Filter/Accumulator

1. Lubricate the threads of the filter cap and O-ring with red grease.
2. Place the screen onto the filter cap.
3. Screw the filter cap into the filter body.
4. Screw the nipple and surge chamber into the top of the filter body and check for leaks.

Reassembling Fluid Section

Note *MVP Red Grease is not compatible with some material and should not be used in the fluid sections that process those materials. It is important to use the*

correct grease and lubrication for the material that will be used in the pump.
Use ISO grease for pumps that pump ISO material.

1. Use MVP Red Grease or the appropriate lubrication to fill in the female side of each of the four packings in the packing set assembly and the female compression ring.
2. Lightly lubricate the chrome balls and the inner radius of the piston cups.
3. Coat the threads on the packing nut with appropriate grease.
4. Insert the spring support ring into the outlet body, followed by the wave spring set.
5. Place the packing set assembly on top of the male compression ring, then set the female compression ring on top of the packing set.
6. Place the entire assembly into the outlet body with the female side of the packing set facing down.
7. Set the guide bearing into the outlet body.
8. Screw the packing nut into the outlet body only two or three threads; do not tighten at this time.
9. Slide one piston cup onto the piston body with the open side facing up.
10. Slide the piston cup spacer with grooved side up against the piston cup.
11. Install the second piston cup against the spacer open side up.
12. Slide the piston cup backup with grooves facing up against the piston cup.
13. Coat the threads of the piston nut with appropriate grease and screw it into the piston body.
14. If you have the UPLS-4600-SS fluid section, install the appropriate soft seat O-ring.
15. Place the $\frac{7}{8}$ -inch ball into the piston body, being careful not to drop or scratch it.
16. Set the piston ball spring into the piston body with the small end of the spring against the ball.
17. Coat the threads of the piston body and screw it onto the piston rod.
18. Tighten the piston nut and the piston body.
19. Slide the piston rod up through the outlet body and tighten the packing nut enough to hold the piston rod in place.
20. If you have the UPLS-4600-SS fluid section, install the soft seat O-ring.
21. Install the 1 $\frac{1}{4}$ -inch ball, then the foot valve ball spring into the foot valve.
22. Compress the ball stop and insert it into the foot valve groove.
23. Position one end of the cylinder into the foot valve.
24. Slide the O-rings onto the cylinder and lubricate with red grease.
25. Use lithium grease on the pump cylinder tie rod threads and screw into the outlet body (if they were removed).

Note ***The two pump cylinder tie rods must be inserted into opposing holes. The UPLS version of the fluid sections have 4 tie rods.***

26. Slide the cylinder with the foot valve over the piston rod assembly and start the hex nuts onto the pump cylinder tie rods.

27. Tighten the nuts uniformly until wrench tight.
28. Use a ¼-inch metal rod to tighten the packing nut ¼ turn past hand tight.

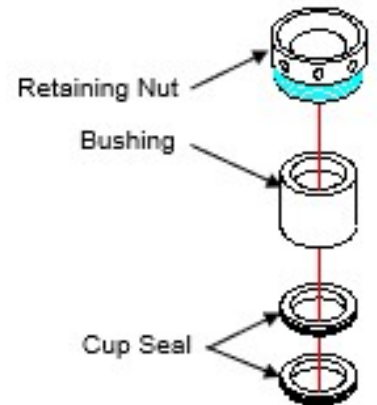
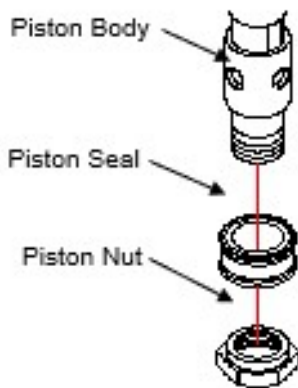
Note ***Do not overtighten the packing nut or it may bind on the piston rod. Only tighten to ¼ to ½ turn past hand tight – just enough to prevent the packing from leaking. Retighten weekly as needed to prevent material leaking into the packing nut.***

Note ***There is no adjustment for the packing nut on Magnapak fluid sections. The packing nut is snug against the outlet body.***

Magnapak Fluid Sections

The Magnapak fluid sections replace the packing set and piston cups with a different setup. Most of the procedures for reassembly are the same, but you will need to replace the piston cups and packing steps as follows:

29. Lightly grease the cup seals with red grease.
30. Install the two cup seals into the top of the outlet body.
31. Pack the bushing with red grease and install into the outlet body on top of the cup seals.
32. Lightly grease the threads of the retaining nut and thread into the top of the outlet body until snug.
33. Install the piston seal onto the piston body and thread on the piston nut.



Note ***Use Patriot Oil in the packing nut for the Magnapak cup seal set unless you are using ISO, then use TSL-ISO-800.***

Reinstalling Fluid Section

1. Position the sleeve over the power cylinder piston shaft.
2. Bring the power cylinder piston shaft down onto the top of the piston rod adapter.
3. Insert the two connectors and lower the sleeve.

4. Install the ring in the machined groove.
5. Slide the rail assembly around the piston rod adapter and insert the quick pin.
6. Fill the packing nut cavity $\frac{1}{2}$ to $\frac{2}{3}$ full of throat seal oil (TSL).

Set the Packing Set

7. Prime the fluid section with fluid.
8. Close the gun head.
9. **Slowly** increase the pump pressure to 60 – 80 psi.

Note ***You will need to push and hold the priming button if one is installed on your unit.***

10. 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 there is a leak past the ball or seals.***

11. Perform steps 7 - 10 for both the up and down strokes.
12. Decrease the pump pressure to the desired operating pressure.
13. Connect, prime, and pressurize the catalyst pump for operation following the procedures in your system's operations manual.
- 14.

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 daily.



CAUTION

Always wear appropriate eye protection when working with this equipment.

Performing proper maintenance at the recommended time intervals maximized your equipment's productivity and efficiency. This section describes recommended maintenance procedures to be performed daily, weekly, bi-annually, and annually. This schedule is based upon 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. Otherwise follow the maintenance schedule recommended here.

Daily Maintenance

1. Check the oil reservoir and add oil as needed.
2. Perform all other daily system tasks as outlined by your system's operations manual.

Weekly Maintenance

In addition the normal daily maintenance, perform the following on a weekly basis:

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

Bi-Annual Maintenance

Perform the following every six months:

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

Annual Maintenance

Perform the following once a year:

13. Rebuild the lower assembly.

Troubleshooting

The following troubleshooting information pertains to the fluid section. For complete system troubleshooting, review your system's operations manual.

| Fluid Section Troubleshooting | | |
|--------------------------------|---|--|
| Symptom | Possible Cause | Remedy |
| Low output on upstroke of pump | Piston cups, piston ball, or pump cylinder worn | Inspect, clean, and replace components as needed |
| | Screen of pump pick-up wand blocked | Unscrew screen from hose and clean |

| Fluid Section Troubleshooting | | |
|---|--|--|
| Symptom | Possible Cause | Remedy |
| No fan, constant low output, or fast cure | Resin hose plugged | Flush hose with solvent; if material is hardened, replace hose |
| | Resin filter clogged | Disassemble and clean the resin filter |
| | Pick-up wand assembly leaking | Tighten assembly fittings |
| Too narrow or too wide fan | Resin filter clogged | Disassemble and clean the resin filter |
| Excessive misting or heavy pulsation | Resin accumulator plugged | Disassemble and clean accumulator |
| Pump jumps on upstroke | Piston ball worn or not seating properly | Replace piston ball and piston cups; 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 parts as needed; be sure to lubricate thoroughly with red grease |
| | Pick-up wand assembly loose | Tighten or seal joints of pick-up wand |
| Low output on up stroke | Piston cups, piston ball, or pump cylinder worn | Inspect piston cups, piston ball, and pump cylinder; clean or replace components as needed |
| Pump does not run | Fluid section or hose plugged | Disassemble and clean fluid section; replace any worn parts, replace hose as needed |
| Material in oil reservoir | Packing worn | Replace packing set in lower part of pump |
| | Piston rod worn or scored | Replace piston rod |
| | Packing nut too loose | Tighten packing nut a little over hand tight |
| No gelcoat or resin delivery 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 as needed; be sure to lubricate ball thoroughly with red grease. |

Specifications

The 4600 fluid section is part of a modular system that can fit multiple applications and a variety of configurations by changing a minimum of components. The fluid section is designed to deliver power, versatility, and rugged construction for long lasting use. It features rapid access design (RAD) for easy access and maintenance.

Output Capability: Up to 8 -10 lbs/min (3.63 – 4.54 kg/min) using a GP resin of average viscosity. As a general rule, the standard 11:1 configuration will pump a GP resin of 1200 cps to 1500 cps maximum.

| Fluid Section | Pump Area (Sq. in) | Stroke Length | Displacement (in ³) / Stroke |
|---------------|---------------------|---------------|--|
| VLS-4600 | 1.143 (7.37 sq. cm) | 4" (101.6 mm) | 4.5 (73.74 cc) (.074 liter) |

Air Consumption: In a chopper application with 2 strands of glass 18 cfm (0.5 m³/min).

Filter Loading: As a general rule, using GP resin and ATH or Calcium Carbonate in an 11:1 pump configuration you can fill up to 20% - 25%; in a 15:1 pump configuration up to 30% - 35%. Higher percentages can be achieved by using low viscosity resins specifically designed for fillers.

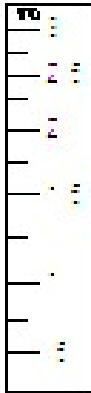
It is always a good idea to use resins that are designed for fillers because they will keep the fillers in suspension. Using fillers will increase pump wear and required maintenance.

Table 1. Powerhead to Fluid Pump Ratio

| Power Head Diameter (in.) | VLS-4600 | Air Consumption |
|------------------------------|----------|----------------------------------|
| VPH-3250 | 6 to 1 | |
| VPH-4250 | 11 to 1 | 9cfm (.25 m ³ / min.) |
| VPH-5000 | 15 to 1 | |
| VPH-7000-HD | 30 to 1 | |

Catalyst Pump Percentages

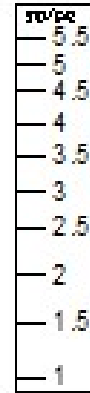
| Catalyst Pump | VLS-4600 |
|---------------|--------------|
| VHPC-2000 | 0.5% - 2.3% |
| VHPC-1000 | 0.5% - 3% |
| VHPC-4200 | 1% - 5.5% |
| VHPC-3200 | 2% - 12.5% |
| VHPC-2200 | 5% - 20% +/- |
| VHPC-1200 | 7% - 25% +/- |



UPS-3101
VHPC-1000 Catalyst Pump &
VLS-4600 Fluid Section



UPS-3123
VHPC-2000 Catalyst Pump &
VLS-4600 Fluid Section

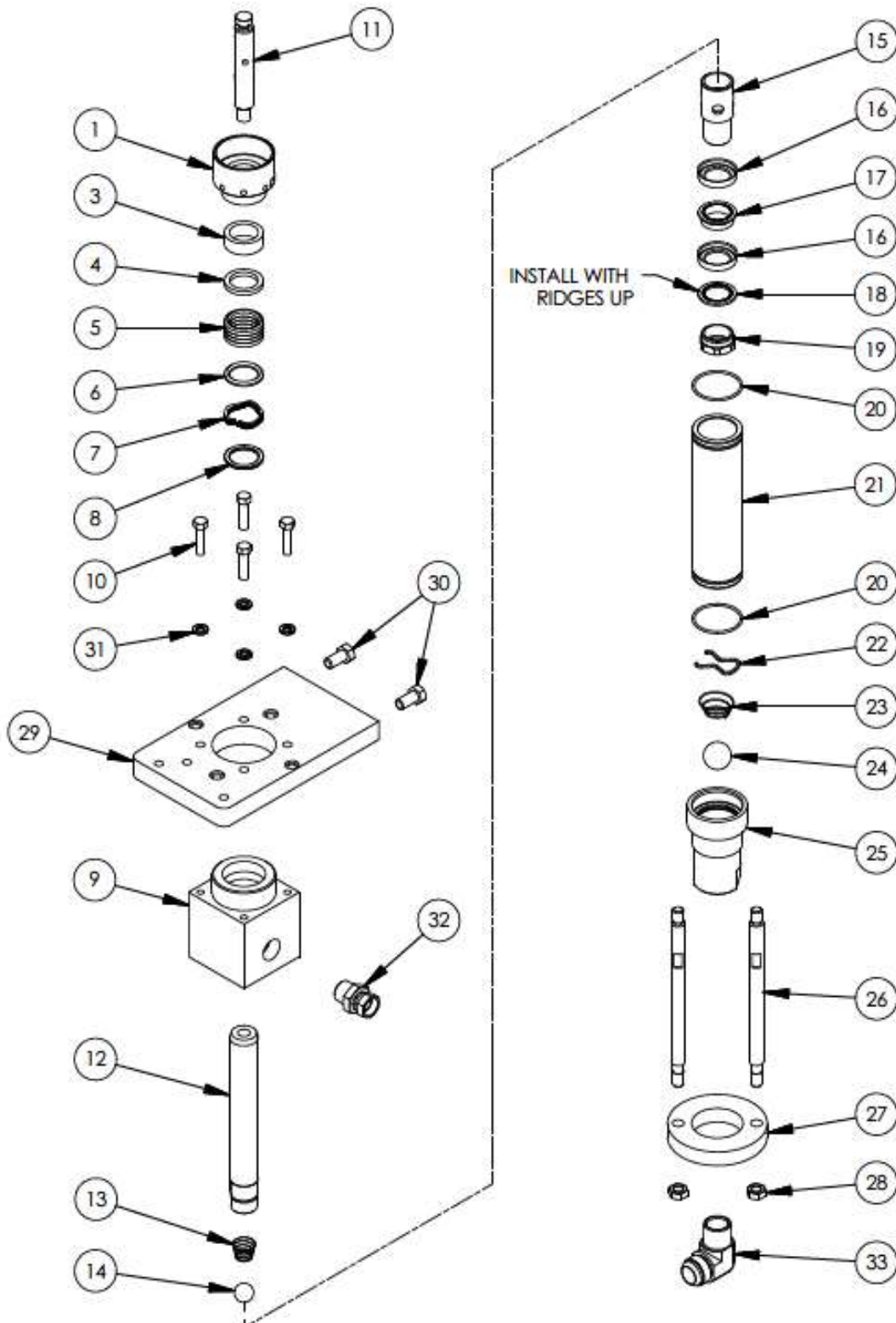


UPS-3122
VHPC-4200 Catalyst Pump &
VLS-4600 Fluid Section

Parts Drawings

The following illustrations are included for reference when servicing the fluid section. Make sure you are referring to the correct drawing specific to the model you are working on to ensure you have the correct configuration and part numbers.

| Parts Drawings | |
|-------------------|---|
| Part Number | Description |
| VLS-4600 | Fluid Section Assembly |
| VLS-4600-HD | Fluid Section Assembly – Heavy Duty |
| VLS-4600-HD-SS | Fluid Section Assembly – HD – Stainless Steel |
| VLS-4600-MP | Fluid Section Assembly - Magnapak |
| VLS-4600-SS | Fluid Section Assembly - Stainless |
| VLS-4640-CK | Conversion Kit - Magnapak |
| VLS-4600-1 | Fluid Section and Filter Assembly |
| VLS-4600-1-FIT | Fluid Section and Filter Assembly |
| VLS-4600-1-FIT-HD | Fluid Section and Filter Assembly |
| VLS-4600-1-HD | Fluid Section and Filter Assembly |
| VLS-4600-1-MP | Fluid Section and Filter Assembly |
| VLS-4600-1-MPFIT | Fluid Section and Filter Assembly |
| VP-3100 | 30:1 Pump Assembly |
| VP-3100-HD | 30:1 Pump Assembly – Heavy Duty |
| VP-41100 | 11:1 Pump Assembly |
| VLS-46RK-4T-2T-SS | Repair Kit – SS Fluid Section |
| VLS-46-RK-4T-2T | Repair Kit |
| VLS-46RK-MP | Magnapak Repair Kit |
| DLS-4600 | Fluid Section Assembly -DUO Unit |
| DLS-4600-SS | Fluid Section Assembly– Stainless Steel |
| DLS-4600-1 | Fluid Section and Filter Assembly |
| MCPA-4600 | Fluid Section Assembly – Multi-Color |
| MCPA-4600-MP | Fluid Section Assembly – Magnapak |
| MCPA-4600-1 | Fluid Section Assembly – Multi-Color |
| UPLS-4600 | Fluid Section Assembly – UP Units |
| UPLS-4600-SS | Fluid Section Assembly – SS UP Units |



MAGNUM VENUS PRODUCTS

FLUID SECTION

VLS-4600

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| Parts List | | | |
|------------|-----------------|-----|-------------------------|
| ITEM | PART NUMBER | QTY | DESCRIPTION |
| 1 | VLS-4607 | 1 | SOLVENT CUP-PKG NUT |
| 3 | VLS-4603 | 1 | GUIDE BEARING |
| 4 | VLS-4604 | 1 | FEMALE COMPRESSION RING |
| * 5 | VLS-4605 | 1 | PACKING SET- PISTON ROD |
| 6 | VLS-4606 | 1 | MALE COMPRESSION RING |
| 7 | VLS-4610 | 10 | WAVE SPRING |
| 8 | VLS-4611 | 1 | SPRING SUPPORT |
| 9 | VLS-4601 | 1 | OUTLET BODY |
| 10 | F-HB-06C-24-GR8 | 4 | HEX BOLT |
| 11 | VLS-4613 | 1 | PISTON ROD ADAPTER |
| 12 | VLS-4609 | 1 | PISTON ROD |
| 13 | VLS-4614 | 1 | SPRING, PISTON BALL |
| * 14 | ALS-1018 | 1 | 7/8" BALL |
| 15 | VLS-4619 | 1 | PISTON BODY |
| * 16 | VLS-4615 | 2 | PISTON CUP |
| 17 | VLS-4616 | 1 | PISTON CUP SPACER |
| 18 | VLS-4617 | 1 | PISTON CUP SPACER RING |
| 19 | VLS-4618 | 1 | PISTON NUT |
| * 20 | O-V-137-90 | 2 | O-RING |
| 21 | VLS-4608 | 1 | CYLINDER |
| 22 | VLS-4620 | 1 | BALL STOP |
| 23 | VLS-4621 | 1 | FOOT VALVE SPRING |
| * 24 | VLS-4622 | 1 | Ø1-1/4 CHROME BALL |
| 25 | VLS-4602 | 1 | FOOT VALVE BODY |
| 26 | VLS-4623 | 2 | CYLINDER TIE ROD |
| 27 | VLS-4624 | 1 | FOOT VALVE COLLAR |
| 28 | F-HN-08C | 2 | HEX NUT |
| 29 | VLS-4612 | 1 | PUMP MOUNT PLATE |
| 30 | F-HB-08C-16 | 2 | HEX BOLT |
| 31 | F-SW-06 | 4 | LOCK WASHER |
| 32 | PF-SW-12M-08F | 1 | PIPE SWIVEL |
| 33 | PF-ME-16J-16 | 1 | MALE ELBOW |

OPTIONAL PARTS

| | | |
|-----|------------|-----------------------|
| | * 6706-2-1 | PUMP GREASE |
| 17A | 3101-13-2 | HARDENED SPACER |
| 18A | 3101-14-2 | HARDENED BACK-UP RING |
| 21A | 3101-24-1 | HARDENED CYLINDER |

REPAIR KIT

| | |
|-----------------|------------|
| *VLS-46RK-4T-2T | REPAIR KIT |
|-----------------|------------|

TOOLS

| | |
|---------|--------------------|
| 45011-1 | PISTON BODY WRENCH |
|---------|--------------------|

MAGNUM VENUS PRODUCTS

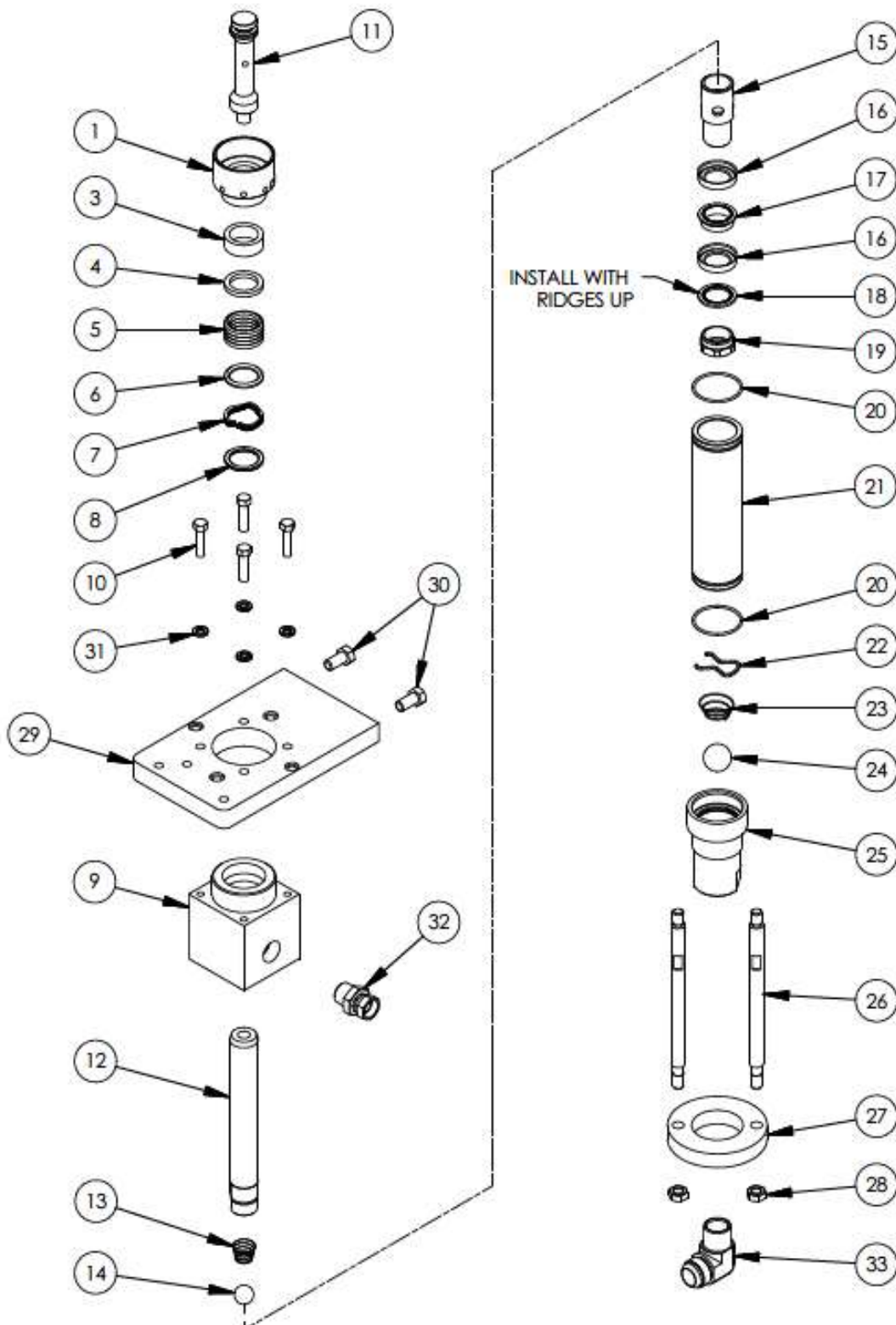
FLUID SECTION

VLS-4600

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MAGNUM VENUS PRODUCTS

FLUID SECTION

VLS-4600-HD

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| Parts List | | | |
|------------|--------------------|-----|-------------------------|
| ITEM | PART NUMBER | QTY | DESCRIPTION |
| | 1 VLS-4607 | 1 | SOLVENT CUP-PKG NUT |
| | 3 VLS-4603 | 1 | GUIDE BEARING |
| | 4 VLS-4604 | 1 | FEMALE COMPRESSION RING |
| * | 5 VLS-4605 | 1 | PACKING SET- PISTON ROD |
| | 6 VLS-4606 | 1 | MALE COMPRESSION RING |
| | 7 VLS-4610 | 10 | WAVE SPRING |
| | 8 VLS-4611 | 1 | SPRING SUPPORT |
| | 9 VLS-4601 | 1 | OUTLET BODY |
| | 10 F-HB-06C-24-GR8 | 4 | HEX BOLT |
| | 11 VLS-4613-HD | 1 | PISTON ROD ADAPTER - HD |
| | 12 VLS-4609 | 1 | PISTON ROD |
| | 13 VLS-4614 | 1 | SPRING, PISTON BALL |
| * | 14 ALS-1018 | 1 | 7/8" BALL |
| | 15 VLS-4619 | 1 | PISTON BODY |
| * | 16 VLS-4615 | 2 | PISTON CUP |
| | 17 VLS-4616 | 1 | PISTON CUP SPACER |
| | 18 VLS-4617 | 1 | PISTON CUP SPACER RING |
| | 19 VLS-4618 | 1 | PISTON NUT |
| * | 20 O-V-137-90 | 2 | O-RING |
| | 21 VLS-4608 | 1 | CYLINDER |
| | 22 VLS-4620 | 1 | BALL STOP |
| | 23 VLS-4621 | 1 | FOOT VALVE SPRING |
| * | 24 VLS-4622 | 1 | Ø1-1/4 CHROME BALL |
| | 25 VLS-4602 | 1 | FOOT VALVE BODY |
| | 26 VLS-4623 | 2 | CYLINDER TIE ROD |
| | 27 VLS-4624 | 1 | FOOT VALVE COLLAR |
| | 28 F-HN-08C | 2 | HEX NUT |
| | 29 VLS-4612 | 1 | PUMP MOUNT PLATE |
| | 30 F-HB-08C-16 | 2 | HEX BOLT |
| | 31 F-SW-06 | 4 | LOCK WASHER |
| | 32 PF-SW-12M-08F | 1 | PIPE SWIVEL |
| | 33 PF-ME-16J-16 | 1 | MALE ELBOW |

OPTIONAL PARTS

| | | |
|-----|------------|-----------------------|
| | * 6706-2-1 | PUMP GREASE |
| 17A | 3101-13-2 | HARDENED SPACER |
| 18A | 3101-14-2 | HARDENED BACK-UP RING |
| 21A | 3101-24-1 | HARDENED CYLINDER |

REPAIR KIT

| | |
|-----------------|------------|
| *VLS-46RK-4T-2T | REPAIR KIT |
|-----------------|------------|

TOOLS

| | |
|---------|--------------------|
| 45011-1 | PISTON BODY WRENCH |
|---------|--------------------|

MAGNUM VENUS PRODUCTS

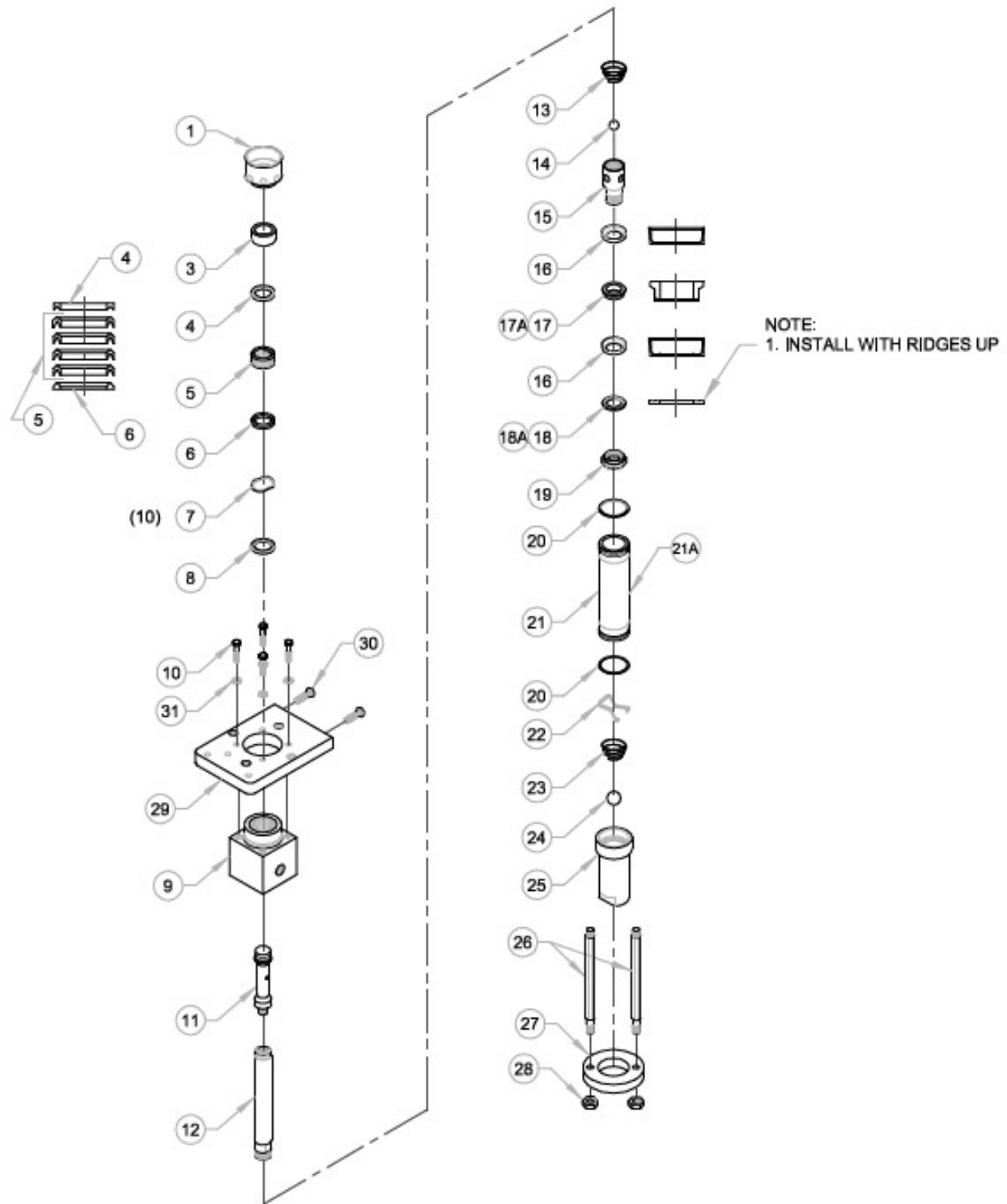
FLUID SECTION

VLS-4600-HD

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MAGNUM VENUS PLASTECH

FLUID SECTION ASSEMBLY

VLS-4600-HD-SS

REV. - 03/24/09 BT2
REV. A - REORIENTED PART 9 IN DRAWING 01/30/14 BT2

Fluid Section Assy VLS-4600-HD-SS

PARTS LIST

| ITEM | PART NO. | QTY | DESCRIPTION |
|------|-----------------|-----|-------------------------|
| 1 | VLS-4607 | 1 | SOLVENT CUP PACKING NUT |
| 3 | VLS-4603 | 1 | GUIDE BEARING |
| 4 | VLS-4604-SS | 1 | FEMALE COMPRESSION RING |
| * 5 | VLS-4605 | 1 | PACKING SET SPA |
| 6 | VLS-4606-SS | 1 | MALE COMPRESSION RING |
| 7 | VLS-4610 | 10 | WAVE SPRING |
| 8 | VLS-4611 | 1 | SPRING SUPPORT RING |
| 9 | VLS-4601-SS | 1 | OUTLET BODY |
| 10 | F-HB-06C-24-GR8 | 4 | HEX BOLT |
| 11 | VLS-4613-HD | 1 | PISTON ROD ADAPTER |
| 12 | VLS-4609-SS | 1 | PISTON ROD |
| 13 | VLS-4614 | 1 | PISTON BALL SPRING |
| * 14 | 03071 | 1 | 7/8" SS BALL |
| 15 | VLS-4619-SS | 1 | PISTON BODY |
| * 16 | VLS-4615 | 2 | PISTON CUP |
| 17 | VLS-4616-SS | 1 | PISTON CUP SPACER |
| 18 | VLS-4617-SS | 1 | PISTON CUP BACK-UP |
| 19 | VLS-4618-SS | 1 | PISTON NUT |
| * 20 | O-V-137-90 | 2 | O-RING |
| 21 | VLS-4608-SS | 1 | CYLINDER |
| 22 | VLS-4620-SS | 1 | BALL STOP |
| 23 | VLS-4621 | 1 | FOOT VALVE BALL SPRING |
| * 24 | VLS-4622-SS | 1 | 1 1/4" SS BALL |
| 25 | VLS-4602-SS | 1 | FOOT VALVE |
| 26 | VLS-4623 | 2 | PUMP CYLINDER TIE ROD |
| 27 | VLS-4624 | 1 | FOOT VALVE COLLAR |
| 28 | F-HN-08C | 2 | HEX NUT |
| 29 | VLS-4612 | 1 | PUMP MOUNT PLATE |
| 30 | F-HB-08C-16 | 2 | HEX BOLT |
| 31 | F-SW-06 | 4 | LOCK WASHER |

REPAIR KITS

| PART NO. | DESCRIPTION |
|---------------------|-------------|
| * VLS-46RK-4T-2T-SS | REPAIR KIT |

TOOLS

| PART NO. | DESCRIPTION |
|----------|--------------------|
| 45011-1 | PISTON BODY WRENCH |

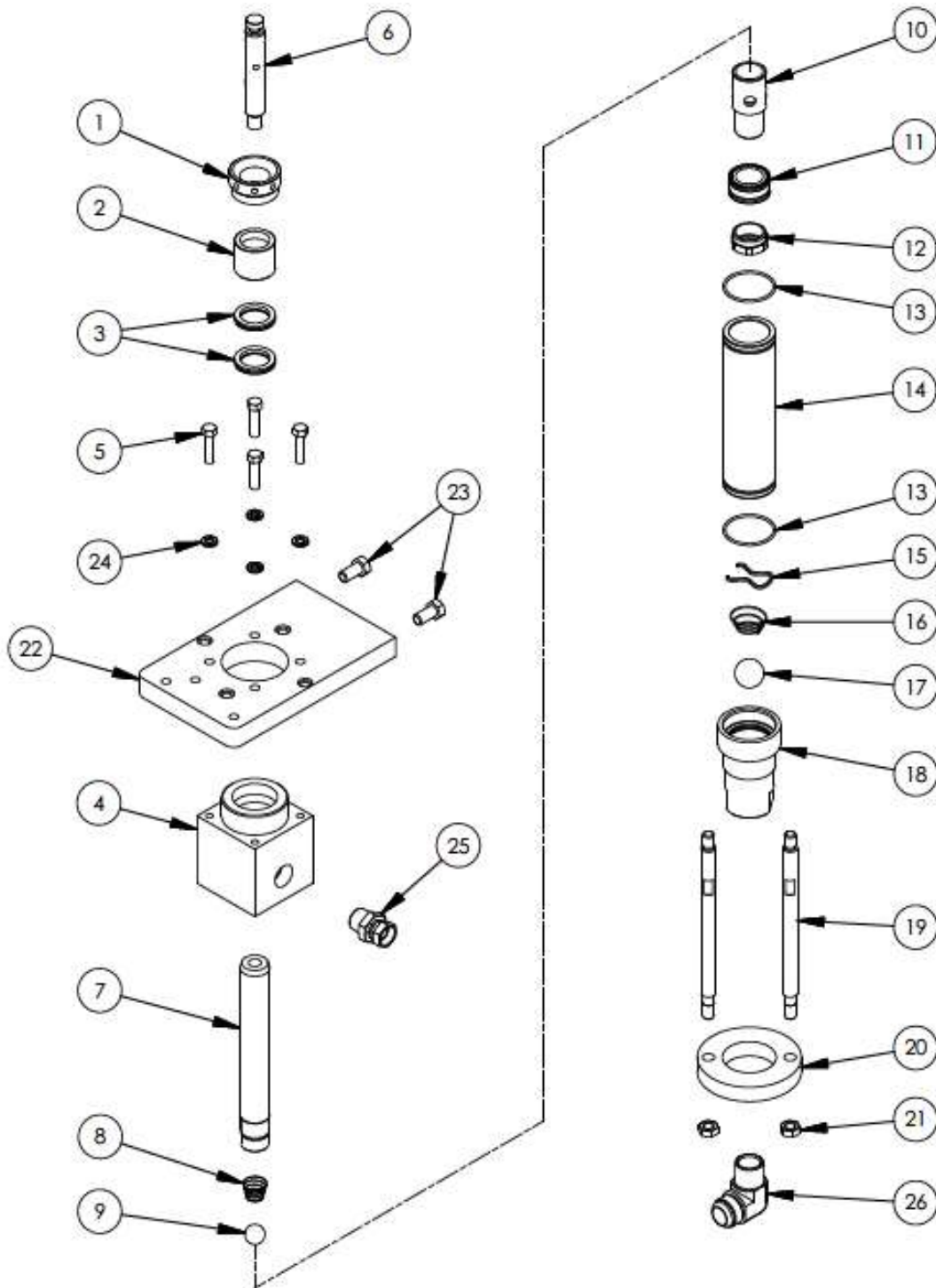
OPTIONAL PARTS AND ASSY

PARTS LIST

| ITEM | PART NO. | QTY | DESCRIPTION |
|------|------------|-----|-----------------------|
| | * 6706-2-1 | 1 | PUMP GREASE |
| 17A | 3101-13-2 | 1 | HARDENED SPACER |
| 18A | 3101-14-2 | 1 | HARDENED BACK-UP RING |
| 21A | 3101-24-1 | 1 | HARDENED CYLINDER |

FIGURE 1-A





MAGNUM VENUS PRODUCTS

FLUID SECTION

VLS-4600-MP

REV: A 02/21/2017

SHEET 1 / 2

2/20/2017

| Parts List | | | |
|------------|-------------------|-----|---------------------|
| ITEM | PART NUMBER | QTY | DESCRIPTION |
| | 1 VLS-4631 | 1 | RETAINING NUT |
| | 2 VLS-4632 | 1 | RESIN BUSHING |
| * | 3 VLS-4640 | 2 | CUP SEAL ASSY |
| | 4 VLS-4601 | 1 | OUTLET BODY |
| | 5 F-HB-06C-24-GR8 | 4 | HEX BOLT |
| | 6 VLS-4613 | 1 | PISTON ROD ADAPTER |
| | 7 VLS-4609 | 1 | PISTON ROD |
| | 8 VLS-4614 | 1 | SPRING, PISTON BALL |
| * | 9 ALS-1018 | 1 | 7/8" BALL |
| | 10 VLS-4619 | 1 | PISTON BODY |
| * | 11 VLS-4633 | 1 | RESIN PISTON SEAL |
| | 12 VLS-4618 | 1 | PISTON NUT |
| * | 13 O-V-137-90 | 2 | O-RING |
| | 14 VLS-4608 | 1 | CYLINDER |
| | 15 VLS-4620 | 1 | BALL STOP |
| | 16 VLS-4621 | 1 | FOOT VALVE SPRING |
| * | 17 VLS-4622 | 1 | Ø1-1/4 CHROME BALL |
| | 18 VLS-4602 | 1 | FOOT VALVE BODY |
| | 19 VLS-4623 | 2 | CYLINDER TIE ROD |
| | 20 VLS-4624 | 1 | FOOT VALVE COLLAR |
| | 21 F-HN-08C | 2 | HEX NUT |
| | 22 VLS-4612 | 1 | PUMP MOUNT PLATE |
| | 23 F-HB-08C-16 | 2 | HEX BOLT |
| | 24 F-SW-06 | 4 | LOCK WASHER |
| | 25 PF-SW-12M-08F | 1 | PIPE SWIVEL |
| | 26 PF-ME-16J-16 | 1 | MALE ELBOW |

OPTIONAL PARTS

* 6706-2-1 PUMP GREASE

14A 3101-24-1 HARDENED CYLINDER

REPAIR KIT

*VLS-46RK-MP REPAIR KIT

TOOLS

45011-1 PISTON BODY WRENCH

MAGNUM VENUS PRODUCTS

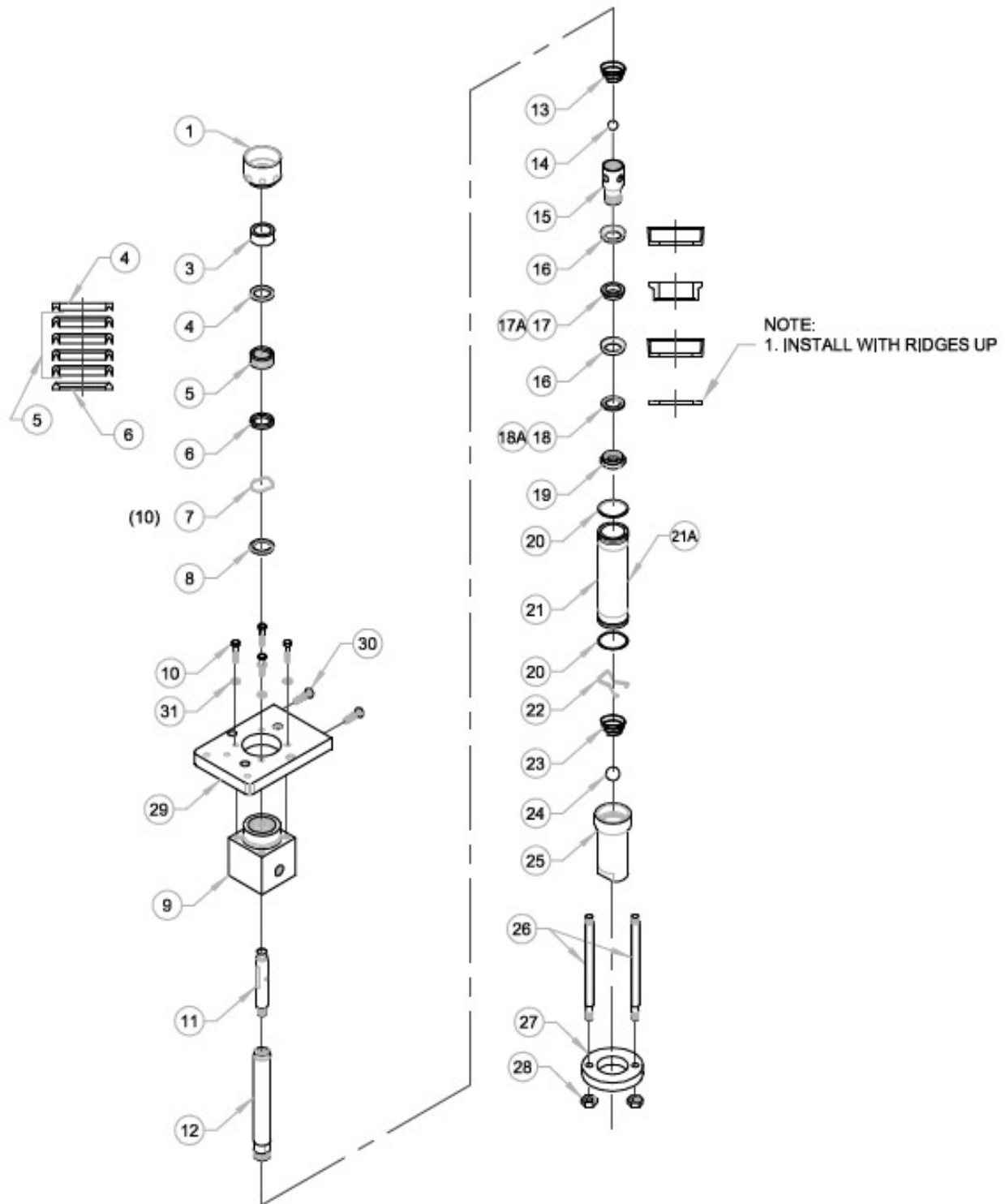
FLUID SECTION

VLS-4600-MP

REV: A 02/21/2017

SHEET 2 / 2

2/20/2017



MAGNUM VENUS PLASTECH

FLUID SECTION ASSEMBLY

VLS-4600-SS

REV. - 06/30/08 BT2
REV. A - REORIENTED PART 9 IN DRAWING 01/30/14 BT2

Fluid Section Assy VLS-4600-SS

PARTS LIST

| ITEM | PART NO. | QTY | DESCRIPTION |
|------|-----------------|-----|------------------------|
| 1 | VLS-4607 | 1 | SOLVENT CUP PKG NUT |
| 3 | VLS-4603 | 1 | GUIDE BEARING |
| 4 | VLS-4604-SS | 1 | FEMALE COMP RING |
| * 5 | VLS-4605 | 1 | PACKING SET SPA |
| 6 | VLS-4606-SS | 1 | MALE COMPRESSION RING |
| 7 | VLS-4610 | 10 | WAVE SPRING |
| 8 | VLS-4611 | 1 | SPRING SUPPORT RING |
| 9 | VLS-4601-SS | 1 | OUTLET BODY |
| 10 | F-HB-06C-24-GR8 | 4 | HEX HEAD BOLT |
| 11 | VLS-4613 | 1 | PISTON ROD ADAPTER |
| 12 | VLS-4609-SS | 1 | PISTON ROD |
| 13 | VLS-4614 | 1 | PISTON BALL SPRING |
| * 14 | 03071 | 1 | 7/8" SS BALL |
| 15 | VLS-4619-SS | 1 | PISTON BODY |
| * 16 | VLS-4615 | 2 | PISTON CUP |
| 17 | VLS-4616-SS | 1 | PISTON CUP SPACER |
| 18 | VLS-4617-SS | 1 | PISTON CUP BACK-UP |
| 19 | VLS-4618-SS | 1 | PISTON NUT |
| * 20 | O-V-137-90 | 2 | O-RING |
| 21 | VLS-4608-SS | 1 | CYLINDER |
| 22 | VLS-4620-SS | 1 | BALL STOP |
| 23 | VLS-4621 | 1 | FOOT VALVE BALL SPRING |
| * 24 | VLS-4622-SS | 1 | 1 1/4" SS BALL |
| 25 | VLS-4602-SS | 1 | FOOT VALVE |
| 26 | VLS-4623 | 2 | PUMP CYLINDER TIE ROD |
| 27 | VLS-4624 | 1 | FOOT VALVE COLLAR |
| 28 | F-HN-08C | 2 | 1/2" UNC HEX NUT |
| 29 | VLS-4612 | 1 | PUMP MOUNT PLATE |
| 30 | F-HB-08C-16 | 2 | HEX HEAD BOLT |
| 31 | F-SW-06 | 4 | LOCK WASHER |

REPAIR KITS

| PART NO. | DESCRIPTION |
|---------------------|-------------|
| * VLS-46RK-4T-2T-SS | REPAIR KIT |

TOOLS

| PART NO. | DESCRIPTION |
|----------|--------------------|
| 45011-1 | PISTON BODY WRENCH |

OPTIONAL PARTS AND ASSY

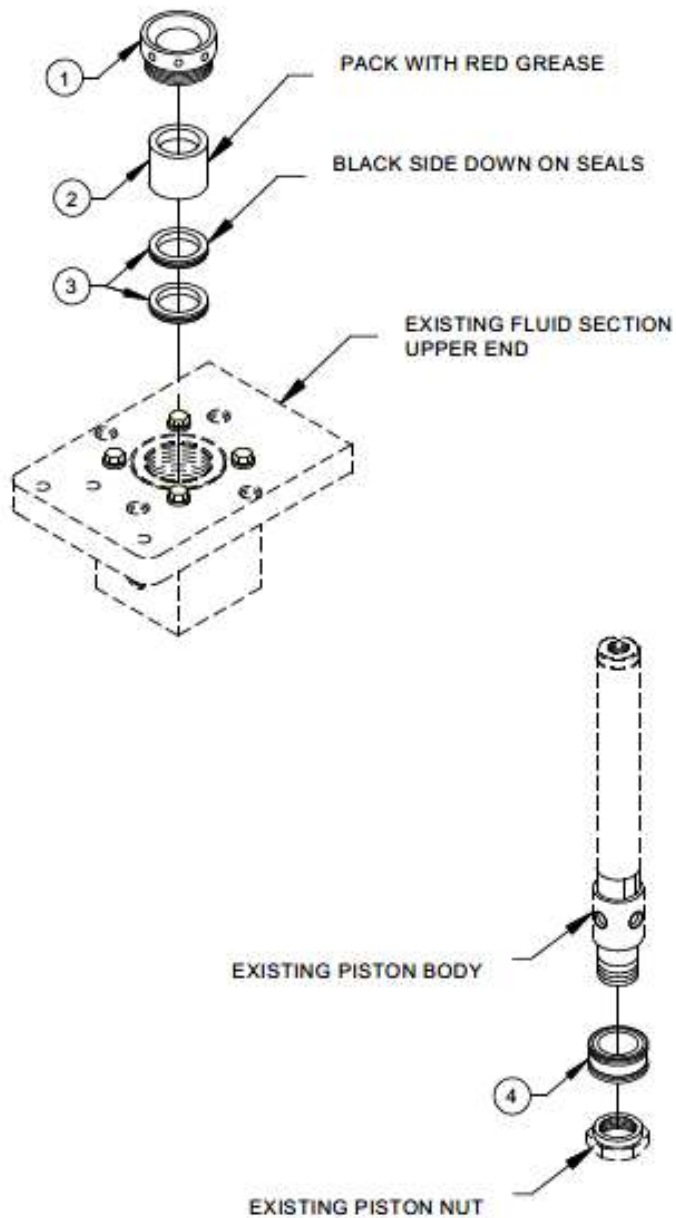
PARTS LIST

| ITEM | PART NO. | QTY | DESCRIPTION |
|------|------------|-----|-----------------------|
| | * 6706-2-1 | 1 | PUMP GREASE |
| 17A | 3101-13-2 | 1 | HARDENED SPACER |
| 18A | 3101-14-2 | 1 | HARDENED BACK-UP RING |
| 21A | 3101-24-1 | 1 | HARDENED CYLINDER |

FIGURE 1-A



USE PATRIOT OIL ONLY



MAGNUM VENUS PRODUCTS

MAGNAPAK SEAL CONVERSION KIT

VLS-4640-CK

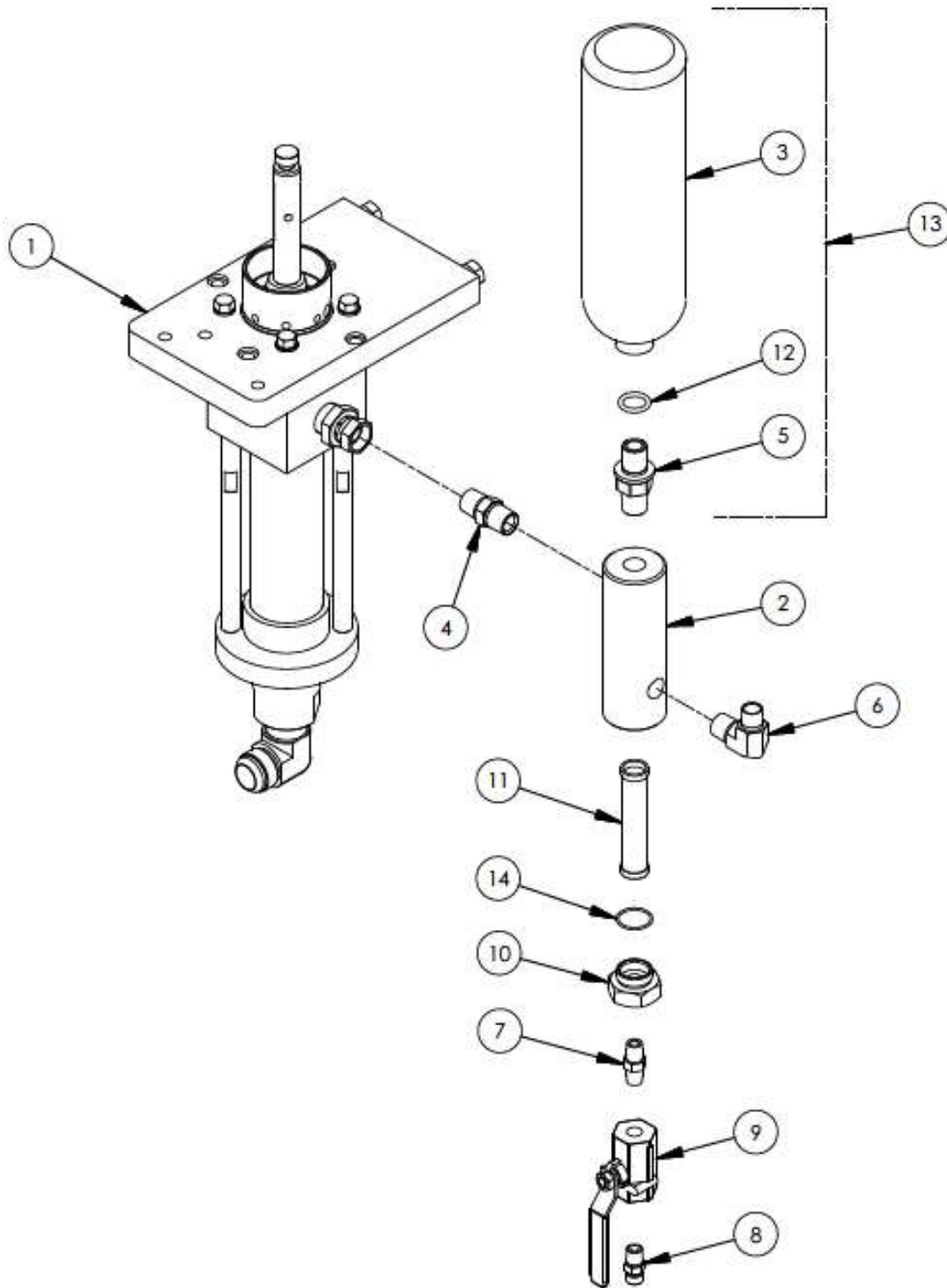
REV. - 11/23/05 BT2
 REV. A - ITEM 3 WAS QTY. OF 1 11/23/05 BT2
 REV. B - ADDED PAT-LS-OIL AND PATRIOT OIL NOTE

SEAL CONVERSION KIT VLS-4640-CK**PARTS LIST**

| ITEM | PART NO. | QTY | DESCRIPTION |
|------|----------|-----|---------------|
| 1 | VLS-4631 | 1 | RETAINING NUT |
| 2 | VLS-4632 | 1 | BUSHING |
| 3 | VLS-4640 | 2 | CUP SEAL |
| 4 | VLS-4633 | 1 | PISTON SEAL |

INCLUDED IN CONVERSION KIT

| PART NO. | QTY | DESCRIPTION |
|------------|-----|-------------------|
| PAT-LS-OIL | 1 | LOWER SECTION OIL |



MAGNUM VENUS PRODUCTS

FLUID SECTION AND FILTER ASSEMBLY

VLS-4600-1

REV: C 02/21/2017

SHEET 1 / 2

2/21/2017

| Parts List | | | |
|------------|---------------|-----|-----------------------|
| ITEM | PART NUMBER | QTY | DESCRIPTION |
| 1 | VLS-4600 | 1 | FLUID SECTION |
| 2 | FF-5001 | 1 | FILTER BODY |
| 3 | SC-6000-1 | 1 | SURGE CHAMBER |
| 4 | PF-HN-08 | 1 | HEX NIPPLE |
| 5 | PF-HN-12SC-08 | 1 | SURGE CHAMBER FITTING |
| 6 | PF-ME-08-06 | 1 | MALE ELBOW |
| 7 | PF-HN-04 | 1 | HEX NIPPLE |
| 8 | PF-HN-04-04S | 1 | HOSE ADAPTER |
| 9 | BV-44-HP | 1 | 4000 PSI BALL VALVE |
| 10 | FF-5002 | 1 | FILTER CAP |
| 11 | FF-5099-30 | 1 | FILTER SCREEN 30 MESH |
| 12 | O-V-210 | 1 | O-RING |
| 14 | O-V-022 | 1 | O-RING |

OPTIONAL PARTS

13 SC-6000 SURGE CHAMBER ASSEMBLY

MAGNUM VENUS PRODUCTS

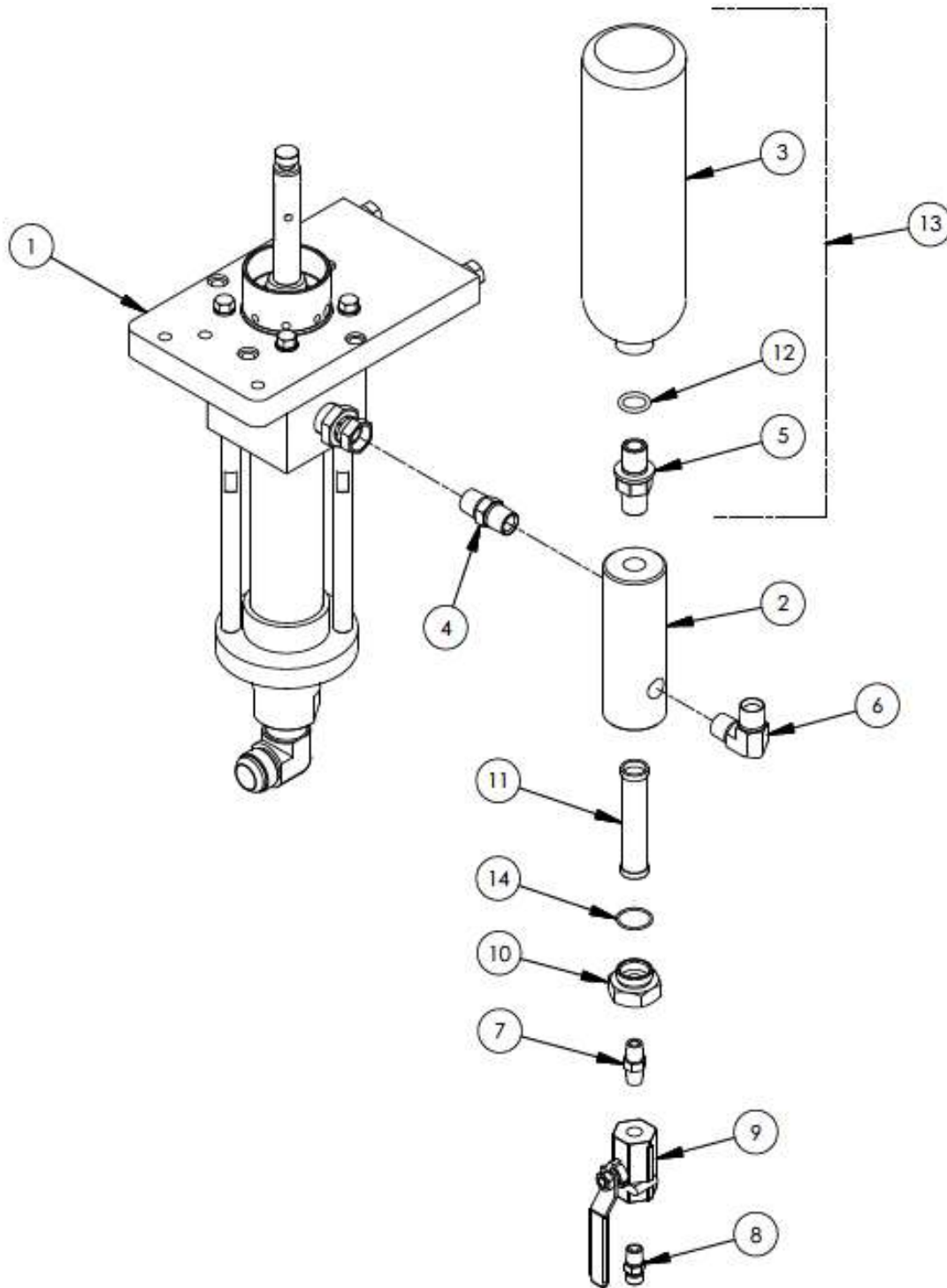
FLUID SECTION AND FILTER ASSEMBLY

VLS-4600-1

REV: C 02/21/2017

SHEET 2 / 2

2/21/2017



MAGNUM VENUS PRODUCTS

FLUID SECTION AND FILTER ASSEMBLY

VLS-4600-1-FIT

REV: B 02/22/2017

SHEET 1 / 2

2/22/2017

| Parts List | | | |
|------------|---------------|-----|-----------------------|
| ITEM | PART NUMBER | QTY | DESCRIPTION |
| 1 | VLS-4600 | 1 | FLUID SECTION |
| 2 | FF-5001 | 1 | FILTER BODY |
| 3 | SC-6000-1 | 1 | SURGE CHAMBER |
| 4 | PF-HN-08 | 1 | HEX NIPPLE |
| 5 | PF-HN-12SC-08 | 1 | SURGE CHAMBER FITTING |
| 6 | PF-ME-08 | 1 | MALE ELBOW |
| 7 | PF-HN-04 | 1 | HEX NIPPLE |
| 8 | PF-HN-04-04S | 1 | HOSE ADAPTER |
| 9 | BV-44-HP | 1 | 4000 PSI BALL VALVE |
| 10 | FF-5002 | 1 | FILTER CAP |
| 11 | FF-5099-30 | 1 | FILTER SCREEN 30 MESH |
| 12 | O-V-210 | 1 | O-RING |
| 14 | O-V-022 | 1 | O-RING |

OPTIONAL PARTS

13 SC-6000 SURGE CHAMBER ASSEMBLY

MAGNUM VENUS PRODUCTS

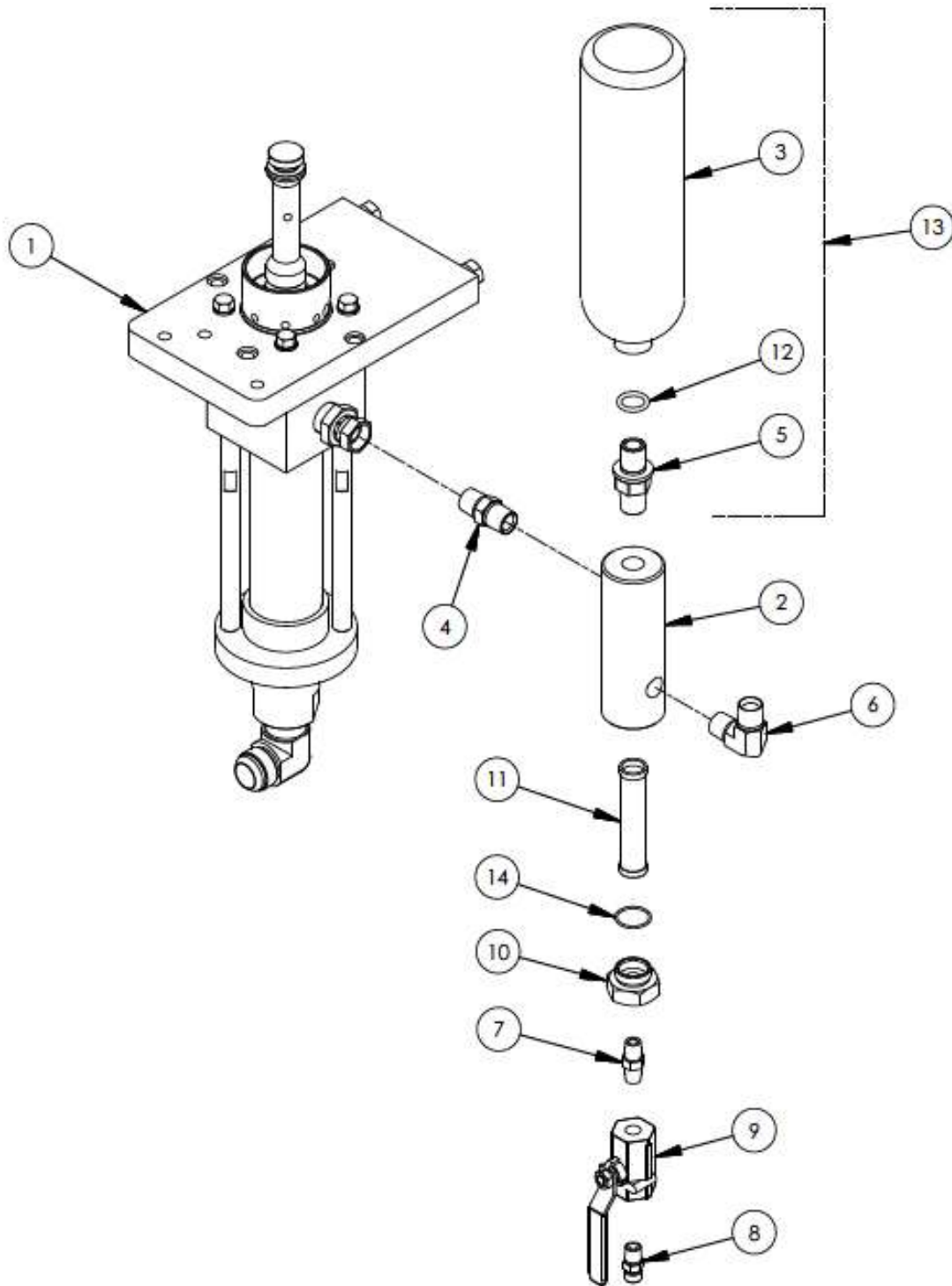
FLUID SECTION AND FILTER ASSEMBLY

VLS-4600-1-FIT

REV: B 02/22/2017

SHEET 2 / 2

2/22/2017



MAGNUM VENUS PRODUCTS

FLUID SECTION AND FILTER ASSEMBLY

VLS-4600-1-FITHD

REV: B 02/22/2017

SHEET 1 / 2

2/22/2017

| Parts List | | | |
|------------|---------------|-----|-----------------------|
| ITEM | PART NUMBER | QTY | DESCRIPTION |
| 1 | VLS-4600-HD | 1 | FLUID SECTION |
| 2 | FF-5001 | 1 | FILTER BODY |
| 3 | SC-6000-1 | 1 | SURGE CHAMBER |
| 4 | PF-HN-08 | 1 | HEX NIPPLE |
| 5 | PF-HN-12SC-08 | 1 | SURGE CHAMBER FITTING |
| 6 | PF-ME-08 | 1 | MALE ELBOW |
| 7 | PF-HN-04 | 1 | HEX NIPPLE |
| 8 | PF-HN-04-04S | 1 | HOSE ADAPTER |
| 9 | BV-44-HP | 1 | 4000 PSI BALL VALVE |
| 10 | FF-5002 | 1 | FILTER CAP |
| 11 | FF-5099-30 | 1 | FILTER SCREEN 30 MESH |
| 12 | O-V-210 | 1 | O-RING |
| 14 | O-V-022 | 1 | O-RING |

OPTIONAL PARTS

13 SC-6000 SURGE CHAMBER ASSEMBLY

MAGNUM VENUS PRODUCTS

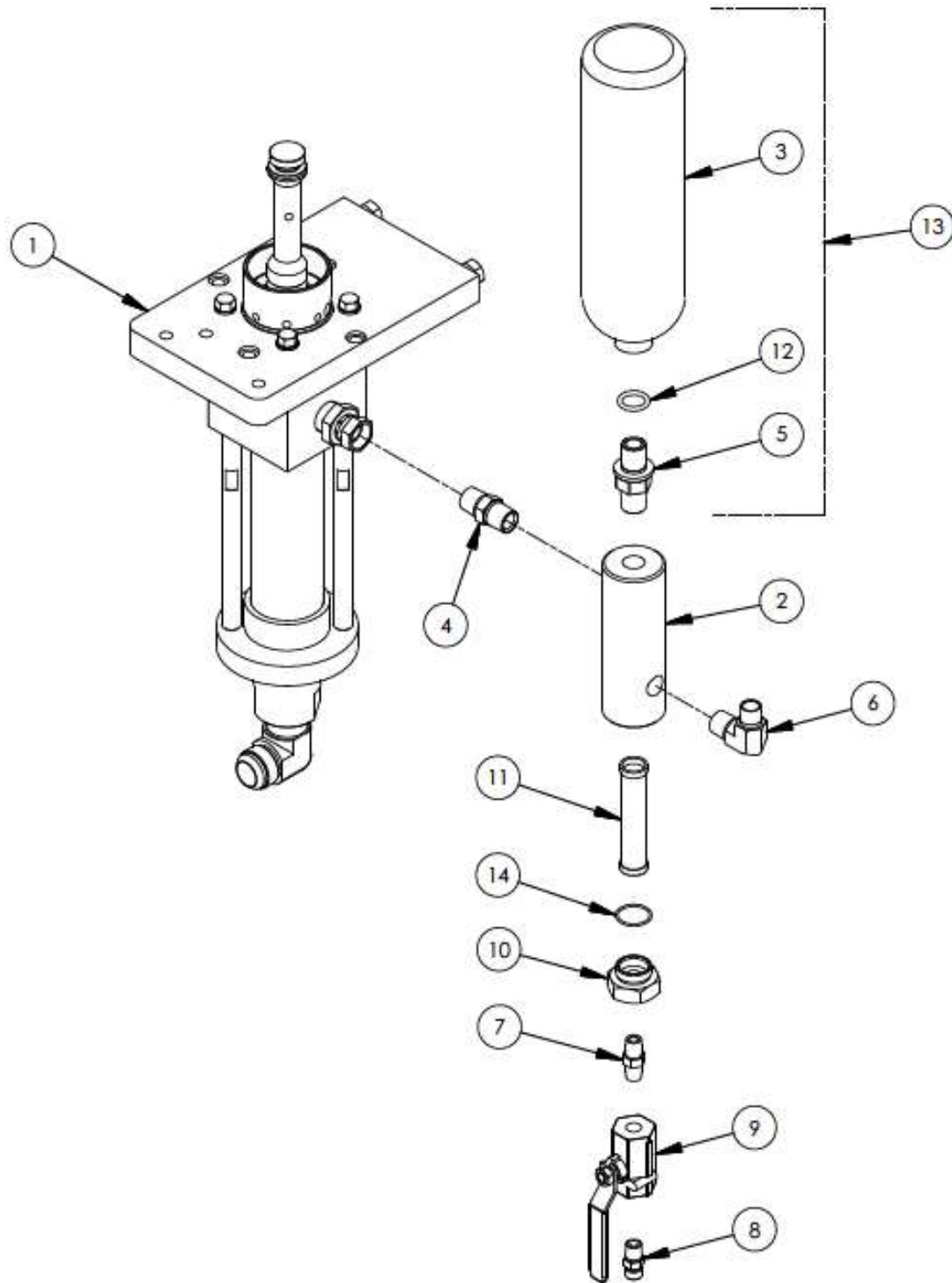
FLUID SECTION AND FILTER ASSEMBLY

VLS-4600-1-FITHD

REV: B 02/22/2017

SHEET 2 / 2

2/22/2017



MAGNUM VENUS PRODUCTS

FLUID SECTION AND FILTER ASSEMBLY

VLS-4600-1-HD

REV: C 02/21/2017

SHEET 1 / 2

2/21/2017

| Parts List | | | |
|------------|---------------|-----|-----------------------|
| ITEM | PART NUMBER | QTY | DESCRIPTION |
| 1 | VLS-4600-HD | 1 | FLUID SECTION |
| 2 | FF-5001 | 1 | FILTER BODY |
| 3 | SC-6000-1 | 1 | SURGE CHAMBER |
| 4 | PF-HN-08 | 1 | HEX NIPPLE |
| 5 | PF-HN-12SC-08 | 1 | SURGE CHAMBER FITTING |
| 6 | PF-ME-08-06 | 1 | MALE ELBOW |
| 7 | PF-HN-04 | 1 | HEX NIPPLE |
| 8 | PF-HN-04-04S | 1 | HOSE ADAPTER |
| 9 | BV-44-HP | 1 | 4000 PSI BALL VALVE |
| 10 | FF-5002 | 1 | FILTER CAP |
| 11 | FF-5099-30 | 1 | FILTER SCREEN 30 MESH |
| 12 | O-V-210 | 1 | O-RING |
| 14 | O-V-022 | 1 | O-RING |

OPTIONAL PARTS

13 SC-6000 SURGE CHAMBER ASSEMBLY

MAGNUM VENUS PRODUCTS

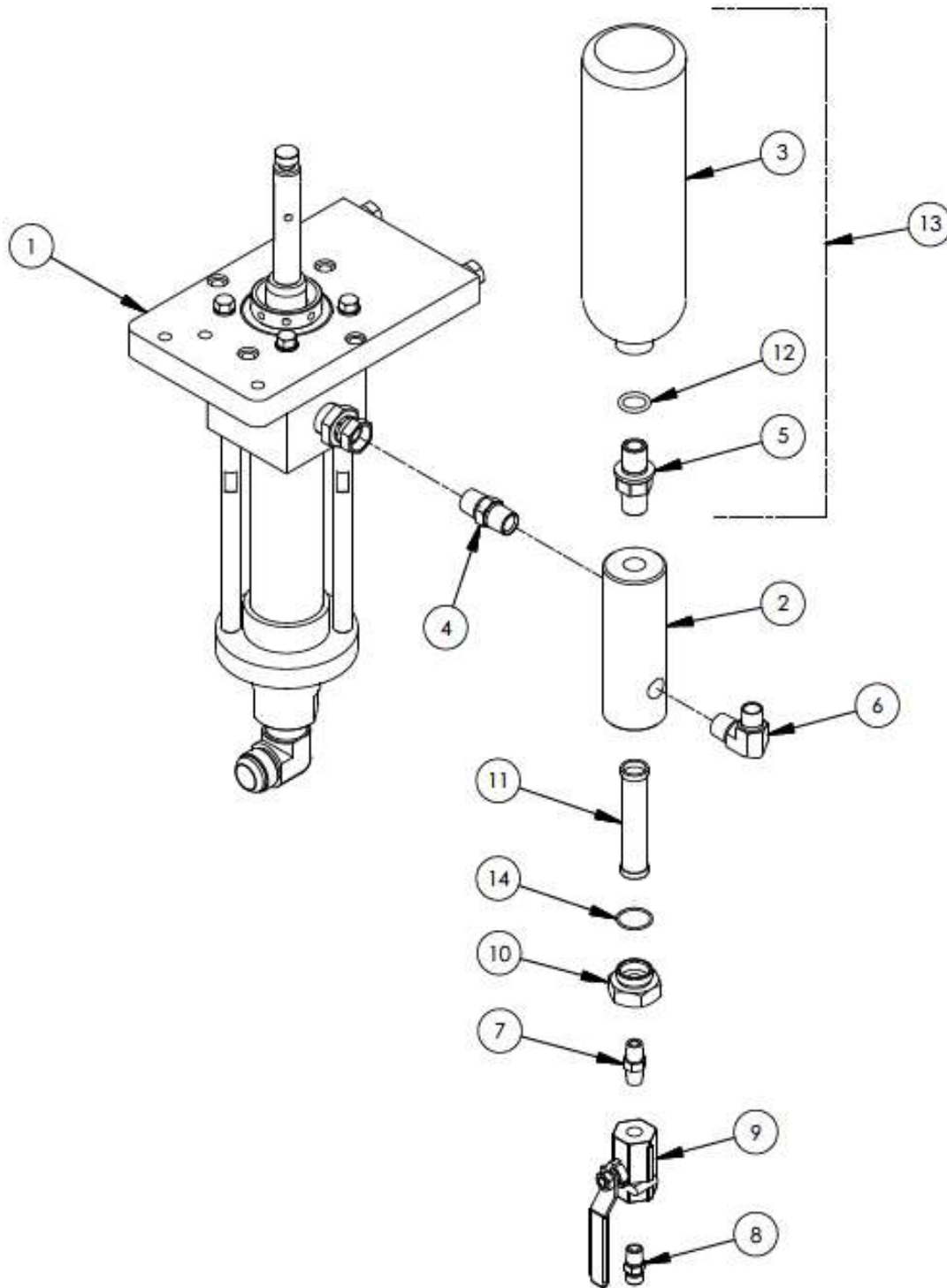
FLUID SECTION AND FILTER ASSEMBLY

VLS-4600-1-HD

REV: C 02/21/2017

SHEET 2 / 2

2/21/2017



MAGNUM VENUS PRODUCTS

FLUID SECTION AND FILTER ASSEMBLY

VLS-4600-1-MP

REV: B 02/22/2017

SHEET 1 / 2

2/22/2017

| Parts List | | | |
|------------|---------------|-----|-----------------------|
| ITEM | PART NUMBER | QTY | DESCRIPTION |
| 1 | VLS-4600-MP | 1 | FLUID SECTION |
| 2 | FF-5001 | 1 | FILTER BODY |
| 3 | SC-6000-1 | 1 | SURGE CHAMBER |
| 4 | PF-HN-08 | 1 | HEX NIPPLE |
| 5 | PF-HN-12SC-08 | 1 | SURGE CHAMBER FITTING |
| 6 | PF-ME-08-06 | 1 | MALE ELBOW |
| 7 | PF-HN-04 | 1 | HEX NIPPLE |
| 8 | PF-HN-04-04S | 1 | HOSE ADAPTER |
| 9 | BV-44-HP | 1 | 4000 PSI BALL VALVE |
| 10 | FF-5002 | 1 | FILTER CAP |
| 11 | FF-5099-30 | 1 | FILTER SCREEN 30 MESH |
| 12 | O-V-210 | 1 | O-RING |
| 14 | O-V-022 | 1 | O-RING |

OPTIONAL PARTS

13 SC-6000 SURGE CHAMBER ASSEMBLY

MAGNUM VENUS PRODUCTS

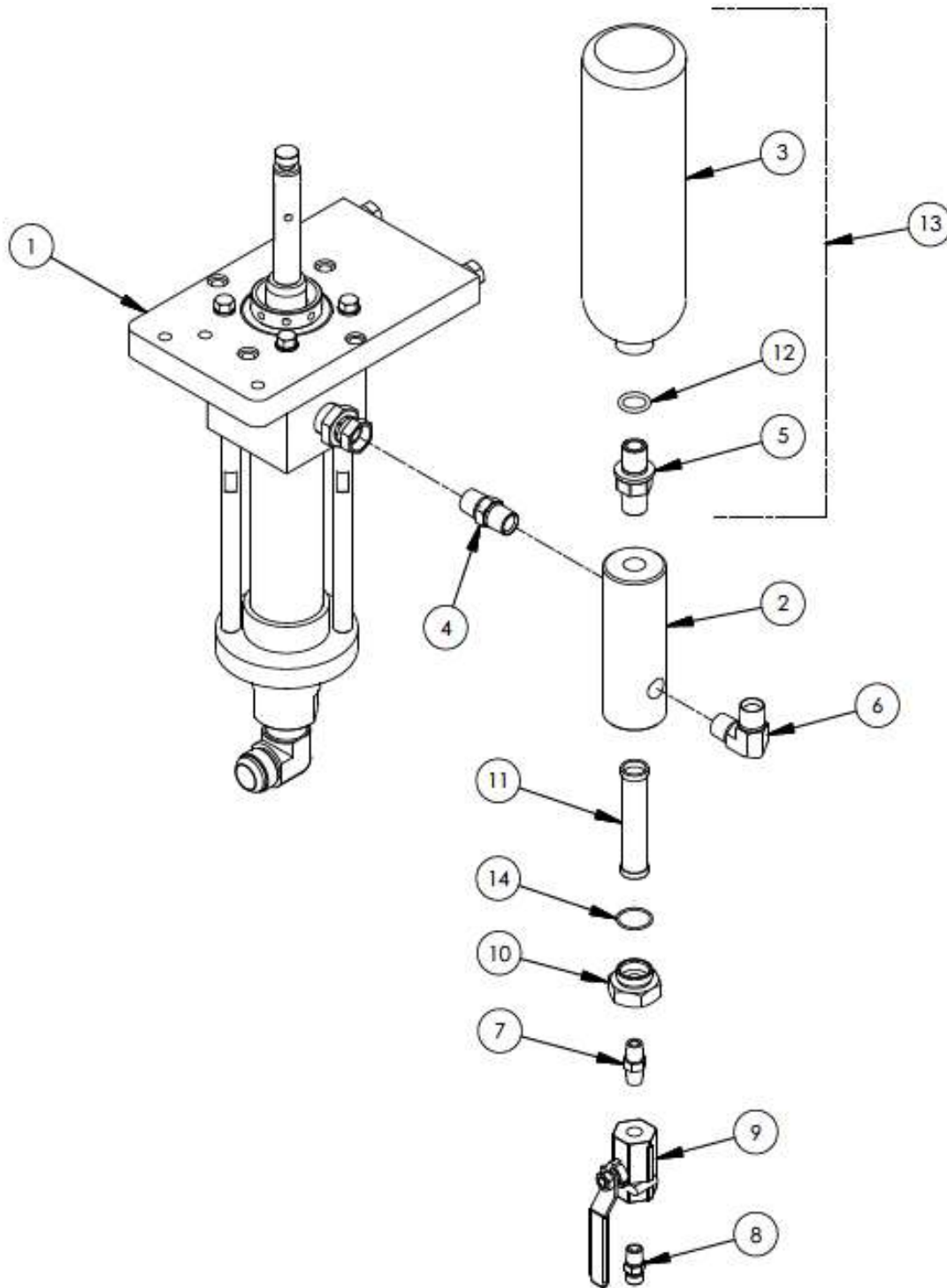
FLUID SECTION AND FILTER ASSEMBLY

VLS-4600-1-MP

REV: B 02/22/2017

SHEET 2 / 2

2/22/2017



MAGNUM VENUS PRODUCTS

FLUID SECTION AND FILTER ASSEMBLY

VLS-4600-1-MPFIT

REV: A 02/22/2017

SHEET 1 / 2

2/22/2017

| Parts List | | | |
|------------|---------------|-----|-----------------------|
| ITEM | PART NUMBER | QTY | DESCRIPTION |
| 1 | VLS-4600-MP | 1 | FLUID SECTION |
| 2 | FF-5001 | 1 | FILTER BODY |
| 3 | SC-6000-1 | 1 | SURGE CHAMBER |
| 4 | PF-HN-08 | 1 | HEX NIPPLE |
| 5 | PF-HN-12SC-08 | 1 | SURGE CHAMBER FITTING |
| 6 | PF-ME-08 | 1 | MALE ELBOW |
| 7 | PF-HN-04 | 1 | HEX NIPPLE |
| 8 | PF-HN-04-04S | 1 | HOSE ADAPTER |
| 9 | BV-44-HP | 1 | 4000 PSI BALL VALVE |
| 10 | FF-5002 | 1 | FILTER CAP |
| 11 | FF-5099-30 | 1 | FILTER SCREEN 30 MESH |
| 12 | O-V-210 | 1 | O-RING |
| 14 | O-V-022 | 1 | O-RING |

OPTIONAL PARTS

13 SC-6000 SURGE CHAMBER ASSEMBLY

MAGNUM VENUS PRODUCTS

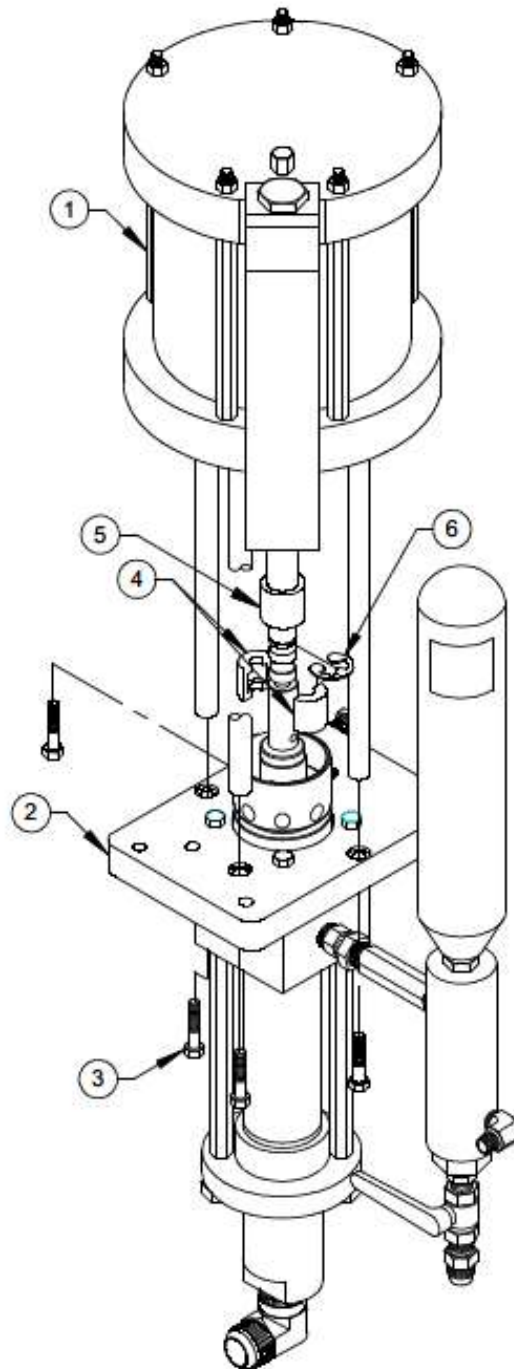
FLUID SECTION AND FILTER ASSEMBLY

VLS-4600-1-MPFIT

REV: A 02/22/2017

SHEET 2 / 2

2/22/2017



MAGNUM VENUS PRODUCTS

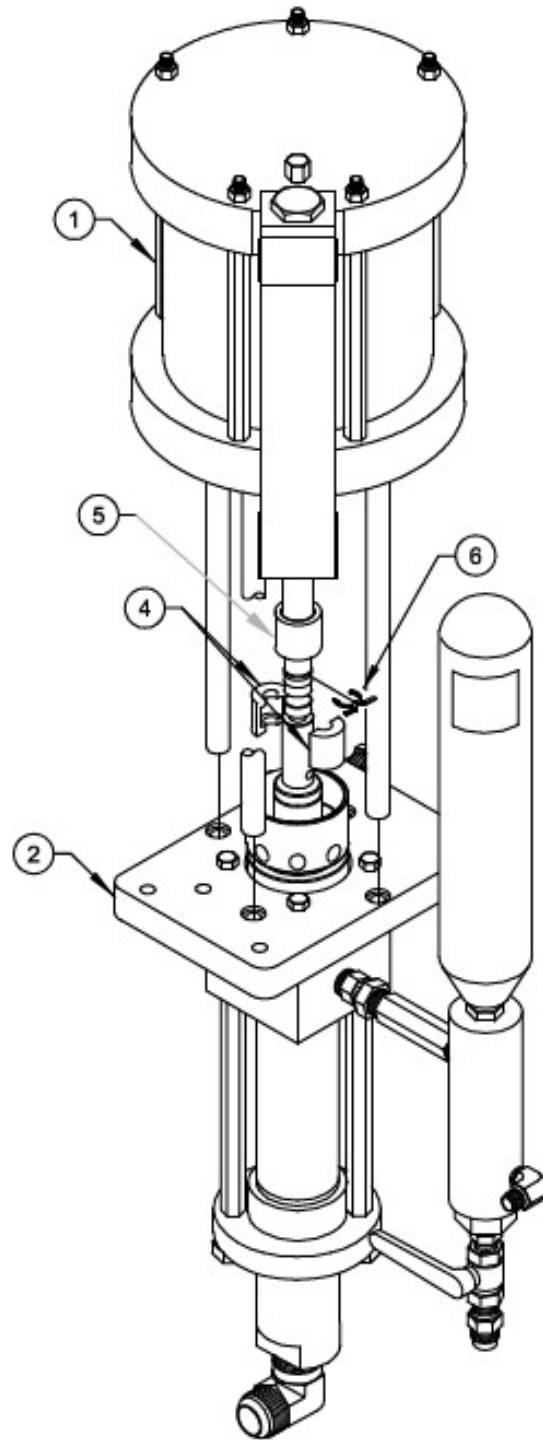
31 : 1 COMPLETE PUMP ASSY

VP-3100

REV. - 01-09-07 BT2

31:1 Complete Pump Assy VP-3100**PARTS LIST**

| ITEM | PART NO. | QTY | DESCRIPTION |
|------|-----------------|-----|--------------------|
| 1 | VPH-7000 | 1 | POWER HEAD ASSY |
| 2 | VLS-4600-1 | 1 | FLUID SECTION ASSY |
| 3 | F-HB-06C-24-GR8 | 4 | HEX HEAD BOLT |
| 4 | APP-9096 | 2 | CONNECTOR |
| 5 | APP-9109 | 1 | SLEEVE |
| 6 | APP-9102 | 1 | RETAINER RING |



MAGNUM VENUS PLASTECH

31 : 1 COMPLETE PUMP ASSEMBLY

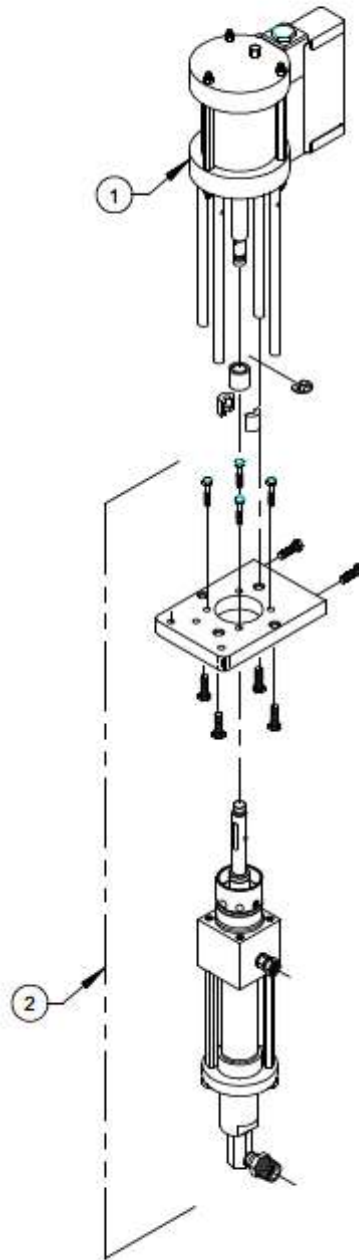
VP-3100-HD

REV. - 05-03-10 BT2

31:1 Complete Pump Assy VP-3100-HD**PARTS LIST**

| ITEM | PART NO. | QTY | DESCRIPTION |
|------|---------------|-----|--------------------|
| 1 | VPH-7000-HD | 1 | POWER HEAD ASSY |
| 2 | VLS-4600-1-HD | 1 | FLUID SECTION ASSY |
| 4 | VPH-10009 | 2 | HALF SHELL |
| 5 | PAT-PA-9110 | 1 | SHELL RETAINER |
| 6 | PAT-PA-9112 | 1 | SLEEVE CLIP |

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



MAGNUM VENUS PRODUCTS

Complete Pump Combo

VP-41100

REV. A = ITEM ONE VPH-4250 WAS 2101-00-01 1/24/03 JEM
REV. B = ITEM 2 VLS-4600 WAS VLS-2500 9/21/06 JEM

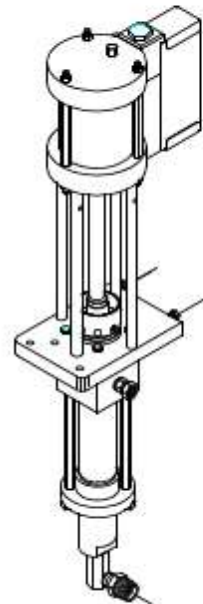
VP-41100-DWG REV. - 10-3-01

Complete Pump Combo VP-41100

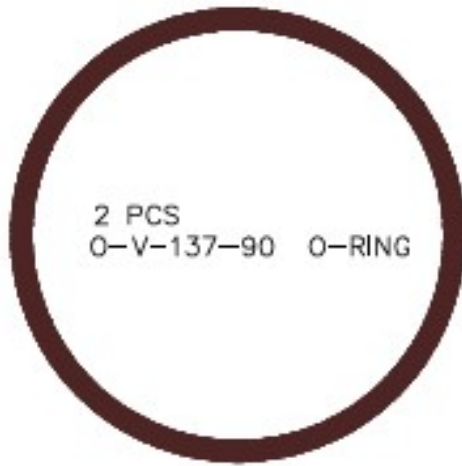
PARTS LIST

| ITEM | PART NO. | QTY | DESCRIPTION |
|------|----------|-----|---------------------|
| 1 | VPH-4250 | 1 | POWER CYLINDER ASSY |
| 2 | VLS-4600 | 1 | FLUID SECTION ASSY |

FIGURE 1-1

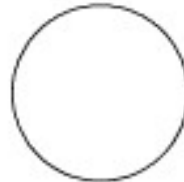


VLS-46RK-4T-2T-SS
REPAIR KIT — FLUID SECTION



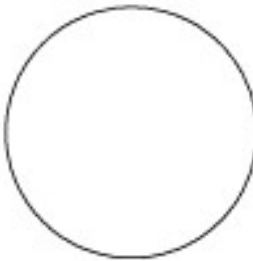
2 PCS
O-V-137-90 O-RING

1 PC

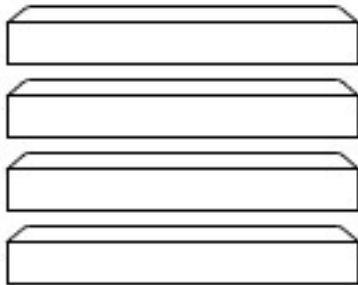


03071 7/8" BALL

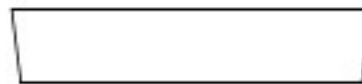
1 PC



VLS-4622-SS 1-1/4" BALL



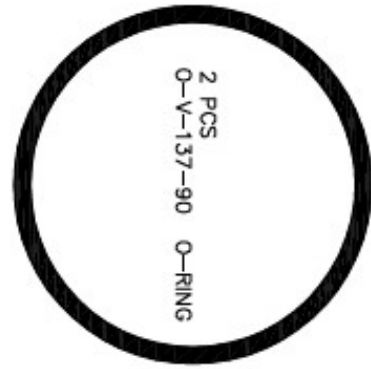
1 SET OF 4
VLS-4605 PISTON ROD SEALS



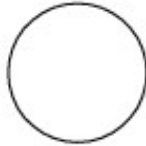
2 PC
VLS-4615 PISTON CUP

1 PC
6706-2-1 1oz WHITE GREASE

VLS-46RK-4T-2T
REPAIR KIT – FLUID SECTION

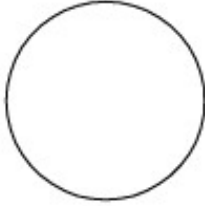


1 PC



ALS-1018 7/8" BALL

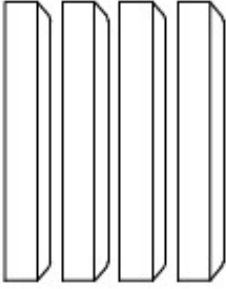
1 PC



VLS-4622 1-1/4" BALL



2 PC
VLS-4615 PISTON CUP



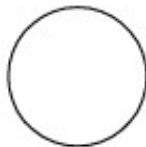
1 SET OF 4
VLS-4605 PISTON ROD SEALS

1 PC
6706-2-1 1oz WHITE GREASE

VLS-46RK-4T-2T
REPAIR KIT – FLUID SECTION

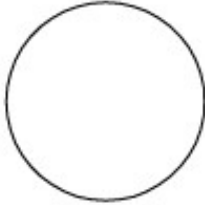


1 PC



ALS-1018 7/8" BALL

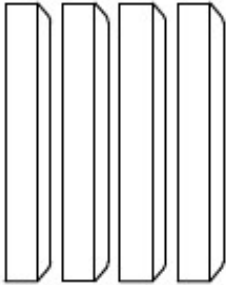
1 PC



VLS-4622 1-1/4" BALL



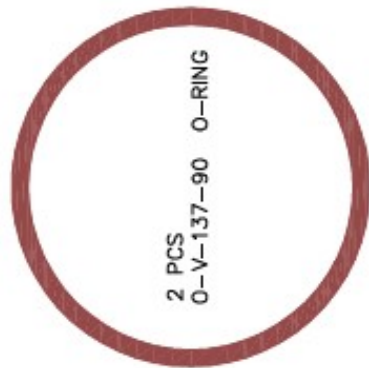
2 PC
VLS-4615 PISTON CUP



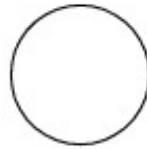
1 SET OF 4
VLS-4605 PISTON ROD SEALS

1 PC
6706-2-1 1oz WHITE GREASE

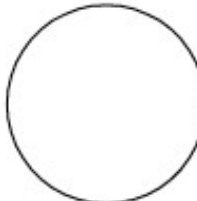
VLS-46RK-MP
REPAIR KIT – FLUID SECTION



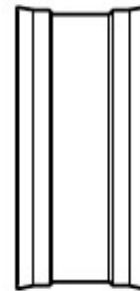
2 PCS
O-V-137-90 O-RING



1 PC
ALS-1018 7/8" BALL



1 PC
VLS-4622 1-1/4" BALL



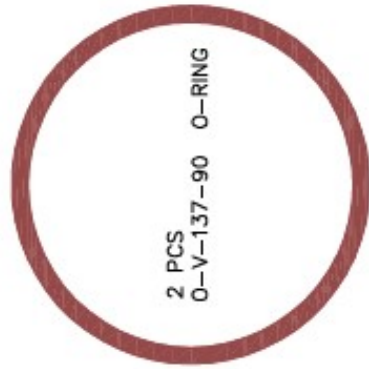
1 PC
VLS-4633 PISTON ROD SEAL



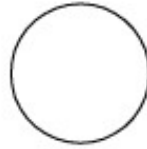
2 PCS
VLS-4640 PISTON ROD SEAL

1 PC
6706-2-1 1oz WHITE GREASE

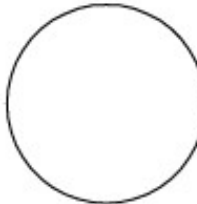
VLS-46RK-MP
REPAIR KIT – FLUID SECTION



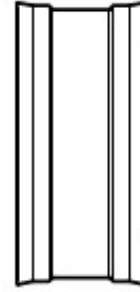
2 PCS
O-V-137-90 O-RING



1 PC
ALS-1018 7/8" BALL



1 PC
VLS-4622 1-1/4" BALL

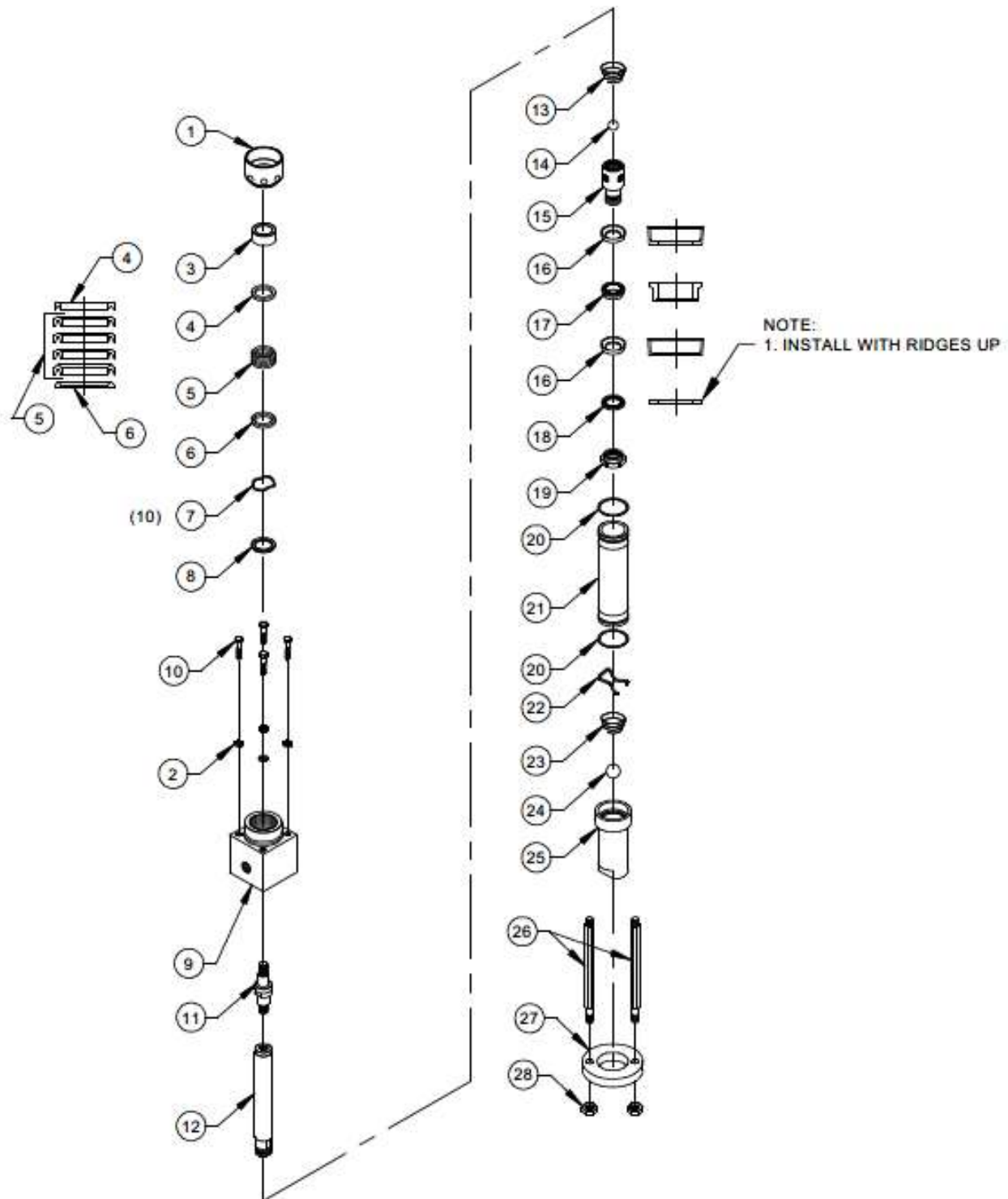


1 PC
VLS-4633 PISTON ROD SEAL



2 PCS
VLS-4640 PISTON ROD SEAL

1 PC
6706-2-1 1oz WHITE GREASE



MAGNUM VENUS PRODUCTS

FLUID SECTION ASSEMBLY

DLS-4600

REV. 10/24/03 JEM
 REV. A - REPAIR WAS 6702-01-01 05/31/07 BT2
 REV. B - ADDED ITEM 2 F-SW-06 10/05/07 BT2

Fluid Section Assy DLS-4600

PARTS LIST

| ITEM | PART NO. | QTY | DESCRIPTION |
|------|-----------------|-----|------------------------|
| 1 | VLS-4607 | 1 | SOLVENT CUP PKG NUT |
| 2 | F-SW-06 | 4 | LOCK WASHER |
| 3 | VLS-4603 | 1 | GUIDE BEARING |
| 4 | VLS-4604 | 1 | FEMALE COMP RING |
| 5 | VLS-4605 | 1 | PACKING SET SPA |
| 6 | VLS-4606 | 1 | MALE COMPRESSION RING |
| 7 | VLS-4610 | 10 | WAVE SPRING |
| 8 | VLS-4611 | 1 | SPRING SUPPORT RING |
| 9 | VLS-4601 | 1 | OUTLET BODY |
| 10 | F-HB-06C-24-GR8 | 4 | HEX HEAD BOLT |
| 11 | DLS-4613 | 1 | PISTON ROD ADAPTER |
| 12 | VLS-4609 | 1 | PISTON ROD |
| 13 | VLS-4614 | 1 | PISTON BALL SPRING |
| 14 | ALS-1018 | 1 | 7/8" CHROME BALL |
| 15 | VLS-4619 | 1 | PISTON BODY |
| 16 | VLS-4615 | 2 | PISTON CUP |
| 17 | VLS-4616 | 1 | PISTON CUP SPACER |
| 18 | VLS-4617 | 1 | PISTON CUP BACK-UP |
| 19 | VLS-4618 | 1 | PISTON NUT |
| 20 | O-V-137-90 | 2 | O-RING |
| 21 | VLS-4608 | 1 | CYLINDER |
| 22 | VLS-4620 | 1 | BALL STOP |
| 23 | VLS-4621 | 1 | FOOT VALVE BALL SPRING |
| 24 | VLS-4622 | 1 | 1 1/4" CHROME BALL |
| 25 | VLS-4602 | 1 | FOOT VALVE |
| 26 | VLS-4623 | 2 | PUMP CYLINDER TIE ROD |
| 27 | VLS-4624 | 1 | FOOT VALVE COLLAR |
| 28 | F-HN-08C | 2 | 1/2" UNC HEX NUT |

REPAIR KITS

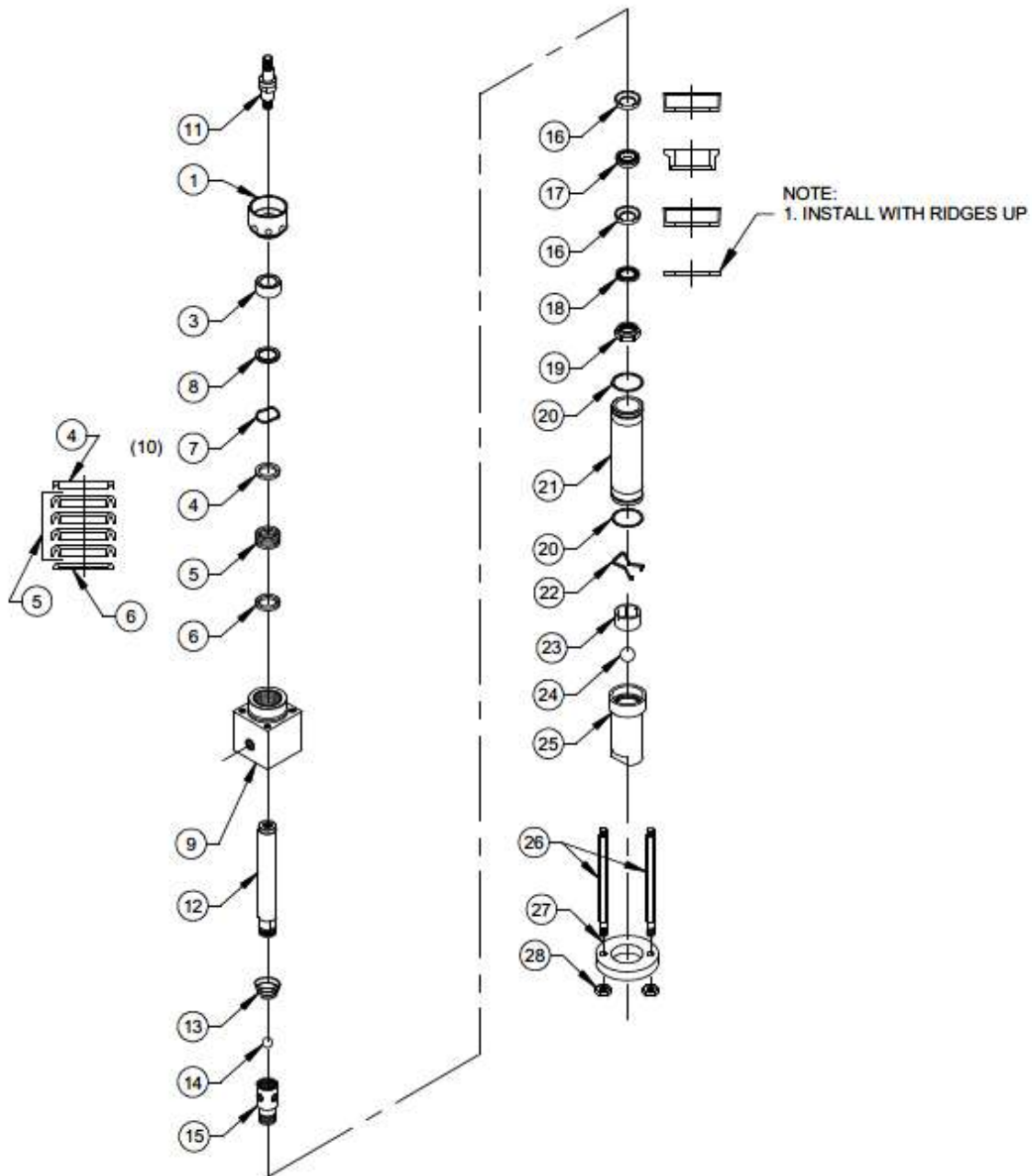
| PART NO. | DESCRIPTION |
|----------------|-------------|
| VLS-46RK-4T-2T | REPAIR KIT |

TOOLS

| PART NO. | DESCRIPTION |
|----------|--------------------|
| 45011-1 | PISTON BODY WRENCH |

FIGURE 1-A





MAGNUM VENUS PRODUCTS

FLUID SECTION ASSEMBLY

DLS-4600-SS

REV. A = ITEM S 14 & SS WERE 316 SS

9/20/04 JEM

Fluid Section Assy DLS-4600-SS

PARTS LIST

| ITEM | PART NO. | QTY | DESCRIPTION |
|------|---------------|-----|-----------------------|
| 1 | VLS-4607 | 1 | SOLVENT CUP PKG NUT |
| 3 | VLS-4603 | 1 | GUIDE BEARING |
| 4 | VLS-4604-SS | 1 | FEMALE COMP RING |
| *5 | VLS-4605 | 1 | PACKING SET SPA |
| 6 | VLS-4606-SS | 1 | MALE COMPRESSION RING |
| 7 | VLS-4610 | 10 | WAVE SPRING |
| 8 | VLS-4611 | 1 | SPRING SUPPORT RING |
| 9 | VLS-4601-SS | 1 | OUTLET BODY |
| 11 | DLS-4613 | 1 | PISTON ROD ADAPTER |
| 12 | VLS-4609-SS | 1 | PISTON ROD |
| 13 | VLS-4614 | 1 | PISTON BALL SPRING |
| *14 | ALS-1018-440C | 1 | 7/8" SS BALL |
| 15 | VLS-4619-SS | 1 | PISTON BODY |
| *16 | VLS-4615 | 2 | PISTON CUP |
| 17 | VLS-4616-SS | 1 | PISTON CUP SPACER |
| 18 | VLS-4617-SS | 1 | PISTON CUP BACK-UP |
| 19 | VLS-4618-SS | 1 | PISTON NUT |
| *20 | O-E-137 | 2 | O-RING |
| 21 | VLS-4608-SS | 1 | CYLINDER |
| 22 | VLS-4620-SS | 1 | BALL STOP |
| 23 | DLS-4602-SS | 1 | BALL GUIDE |
| *24 | VLS-4622-440C | 1 | 1 1/4" SS BALL |
| 25 | VLS-4602-SS | 1 | FOOT VALVE |
| 26 | VLS-4623 | 2 | PUMP CYLINDER TIE ROD |
| 27 | VLS-4624 | 1 | FOOT VALVE COLLAR |
| 28 | F-HN-08C | 2 | 1/2" UNC HEX NUT |

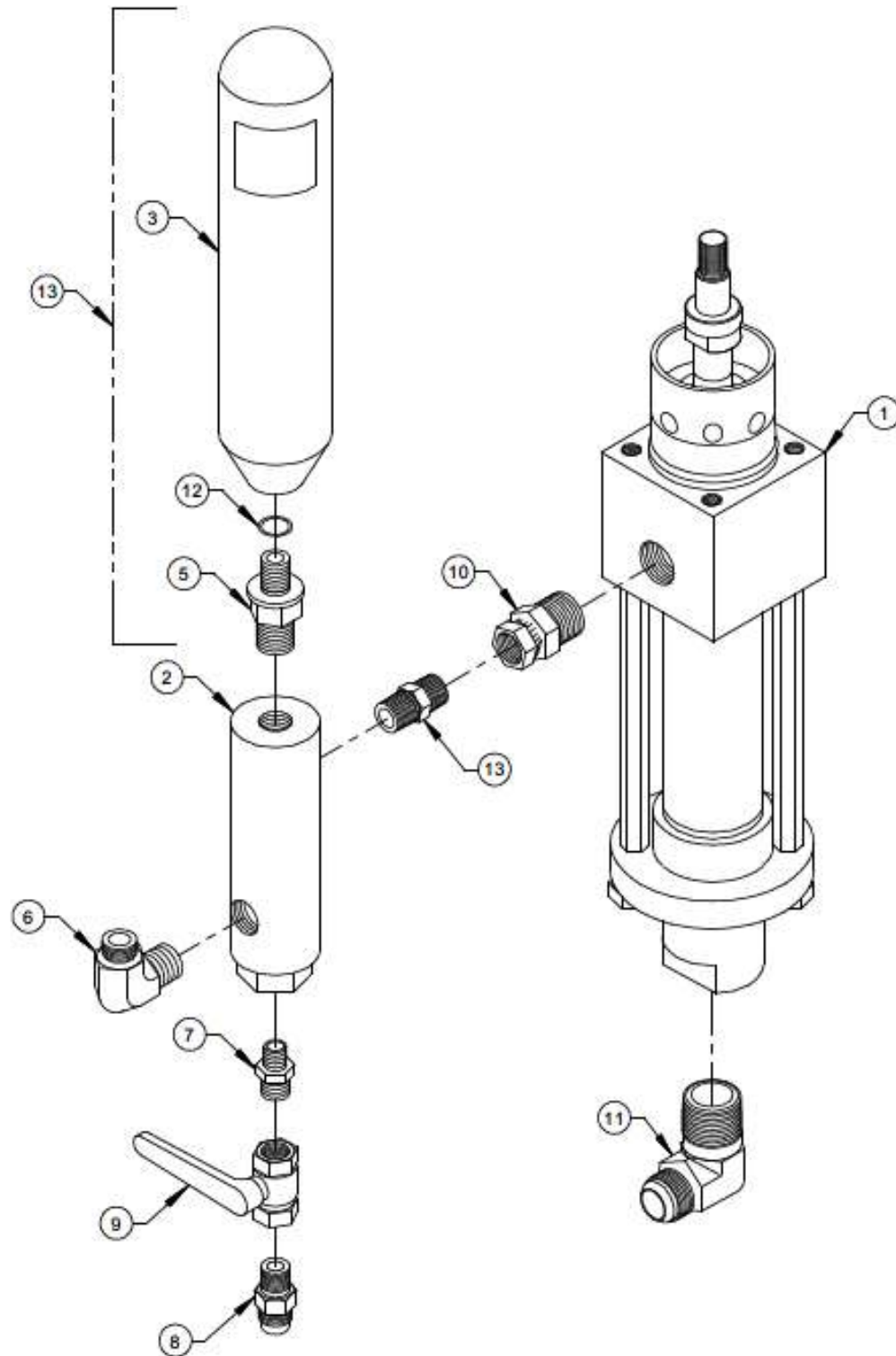
* INCLUDED IN REPAIR KIT

REPAIR KITS

| PART NO. | DESCRIPTION |
|-----------------|-------------|
| *DLS-4600-SS-RK | REPAIR KIT |

TOOLS

| PART NO. | DESCRIPTION |
|----------|--------------------|
| 45011-1 | PISTON BODY WRENCH |



MAGNUM VENUS PRODUCTS

Fluid Section & Filter Assembly

DLS-4600-1

REV. 2/20/03 JEM
REV. A - REDREW WITHOUT MOUNTING PLATE 05/31/07 BT2

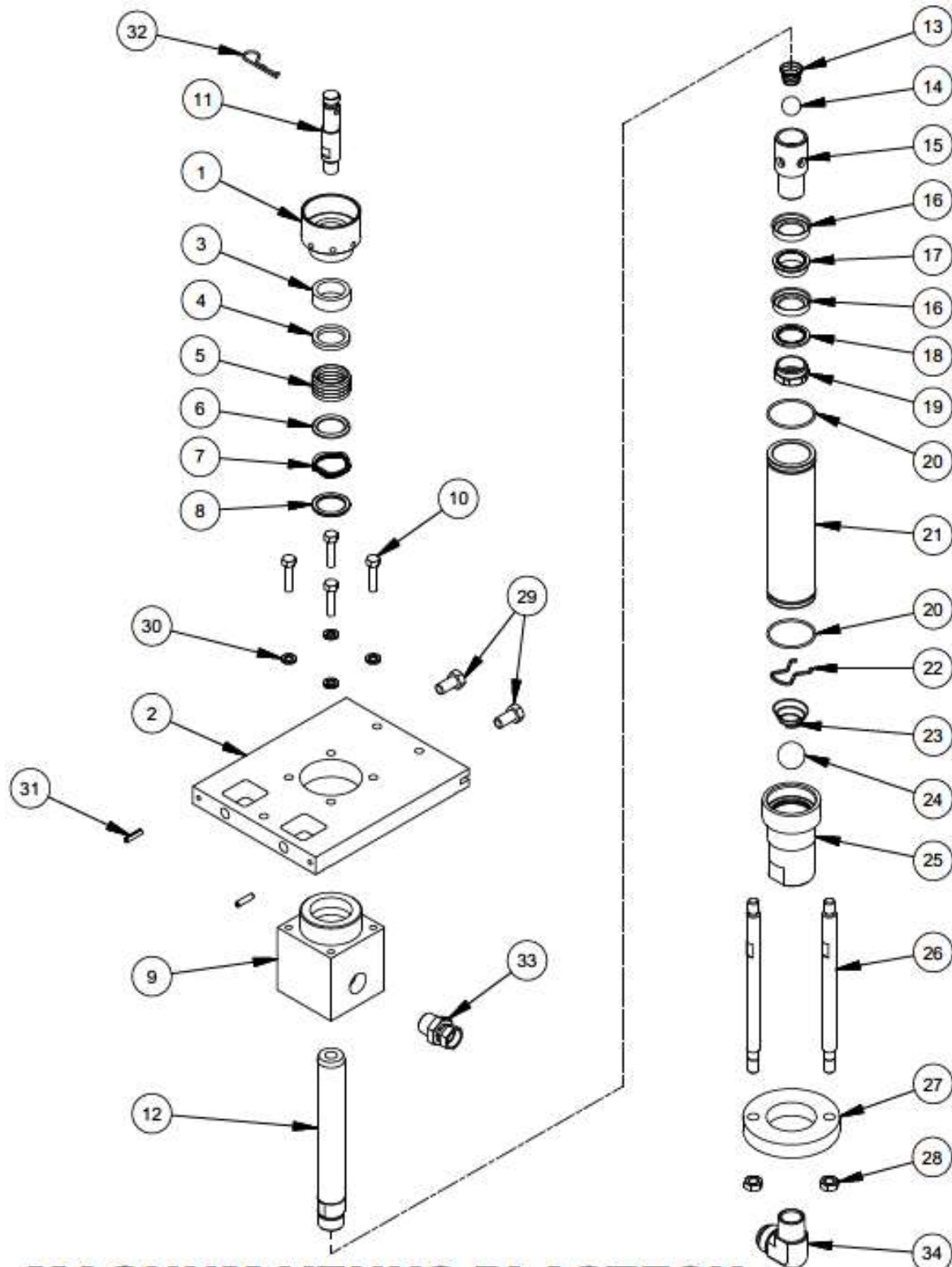
Fluid Section & Filter Assembly DLS-4600-1

PARTS LIST

| ITEM | PART NO. | QTY | DESCRIPTION |
|------|---------------|-----|------------------------|
| 1 | DLS-4600 | 1 | FLUID SECTION ASSEMBLY |
| 2 | FF-5000-30 | 1 | FLUID FILTER |
| 3 | SC-6000-1 | 1 | SURGE CHAMBER |
| 4 | PF-HN-08 | 1 | NIPPLE |
| 5 | PF-HN-12SC-08 | 1 | NIPPLE |
| 6 | PF-ME-08-06 | 1 | MALE ELBOW |
| 7 | PF-HN-04 | 1 | NIPPLE |
| 8 | PF-HN-04-04S | 1 | NIPPLE |
| 9 | BV-44-HP | 1 | BALL VALVE |
| 10 | PF-SW-12M-08F | 1 | SWIVEL FITTING |
| 11 | PF-ME-16-12J | 1 | MALE ELBOW |
| 12 | O-V-210 | 1 | O-RING |

OPTIONAL ASSEMBLIES

| ITEM | PART NO. | QTY | DESCRIPTION |
|------|----------|-----|------------------------|
| 13 | SC-6000 | 1 | SURGE CHAMBER ASSEMBLY |



MAGNUM VENUS PLASTECH

FLUID SECTION - MULTI-COLOR GELCOAT

MCPA-4600

REV:B 05/18/2017

SHEET 1 / 2

5/18/2017

| Parts List | | | |
|------------|-----------------|-----|-------------------------|
| ITEM | PART NUMBER | QTY | DESCRIPTION |
| 1 | VLS-4607 | 1 | SOLVENT CUP PACKING NUT |
| 2 | 3108-1-1 | 1 | PUMP MOUNTING PLATE |
| 3 | VLS-4603 | 1 | GUIDE BEARING |
| 4 | VLS-4604 | 1 | FEMALE COMPRESSION RING |
| * 5 | VLS-4605 | 1 | PACKING SET- PISTON ROD |
| 6 | VLS-4606 | 1 | MALE COMPRESSION RING |
| 7 | VLS-4610 | 10 | WAVE SPRING |
| 8 | VLS-4611 | 1 | SPRING SUPPORT |
| 9 | VLS-4601 | 1 | OUTLET BODY |
| 10 | F-HB-06C-24-GR8 | 4 | HEX BOLT |
| 11 | MCPA-2501 | 1 | PUMP SHAFT ADAPTER |
| 12 | VLS-4609 | 1 | PISTON ROD |
| 13 | VLS-4614 | 1 | SPRING, PISTON BALL |
| * 14 | ALS-1018 | 1 | 7/8" BALL |
| 15 | VLS-4619 | 1 | PISTON BODY |
| * 16 | VLS-4615 | 2 | PISTON CUP |
| 17 | VLS-4616 | 1 | PISTON CUP SPACER |
| 18 | VLS-4617 | 1 | PISTON CUP SPACER RING |
| 19 | VLS-4618 | 1 | PISTON NUT |
| * 20 | O-V-137-90 | 2 | O-RING |
| 21 | VLS-4608 | 1 | CYLINDER |
| 22 | VLS-4620 | 1 | BALL STOP |
| 23 | VLS-4621 | 1 | FOOT VALVE SPRING |
| * 24 | VLS-4622 | 1 | Ø1-1/4 CHROME BALL |
| 25 | VLS-4602 | 1 | FOOT VALVE BODY |
| 26 | VLS-4623 | 2 | CYLINDER TIE ROD |
| 27 | VLS-4624 | 1 | FOOT VALVE COLLAR |
| 28 | F-HN-08C | 2 | HEX NUT |
| 29 | F-HB-08C-16 | 2 | HEX BOLT |
| 30 | F-SW-06 | 4 | LOCK WASHER |
| 31 | F-RP-04-16 | 2 | ROLL PIN |
| 32 | 09528 | 1 | HITCH PIN |
| 33 | PF-SW-12M-08F | 1 | PIPE SWIVEL |
| 34 | PF-ME-16J-16 | 1 | MALE ELBOW |

REPAIR KITS

| PART No. | DESCRIPTION |
|------------------|-------------|
| * VLS-46RK-4T-2T | REPAIR KIT |

* NOTE: ASTERISKS DENOTE PARTS USED IN SEAL KIT.

OPTIONAL PARTS AND ASSEMBLIES

| PART No. | DESCRIPTION |
|---------------|----------------------|
| *6706-2-1 | PUMP GREASE |
| 17A 3101-13-2 | HARDENED SPACER |
| 18A 3101-14-2 | HARDENED BACKUP RING |
| 21A 3101-24-1 | HARDENED CYLINDER |

MAGNUM VENUS PLASTECH

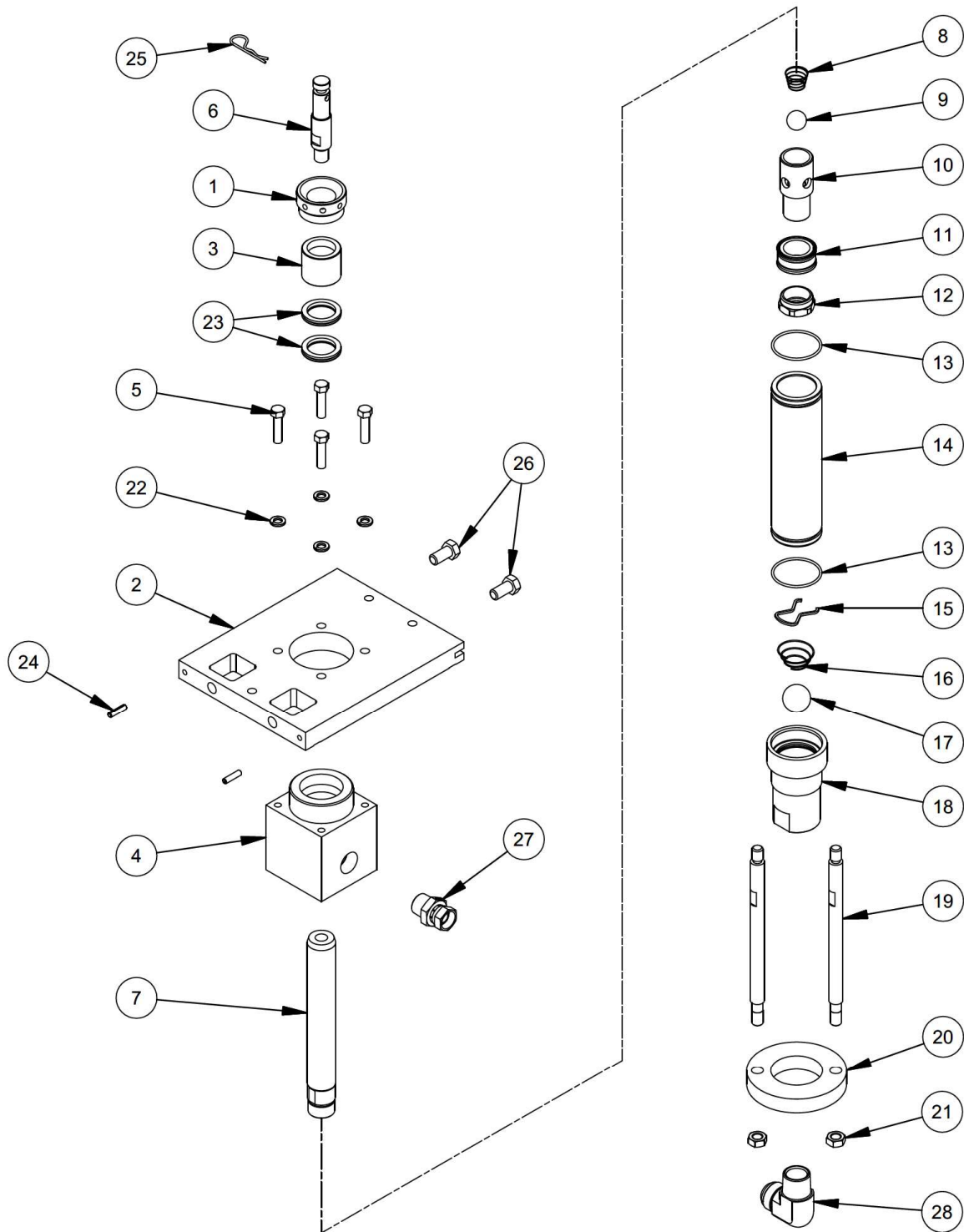
FLUID SECTION - MULTI-COLOR GELCOAT

MCPA-4600

REV:B 05/18/2017

SHEET 2 / 2

5/18/2017



MAGNUM VENUS PLASTECH

FLUID SECTION - MULTI-COLOR GELCOAT

MCPA-4600-MP

REV: B 05/18/2017

SHEET 1 / 2

3/11/2014

| Parts List | | | |
|------------|-----------------|-----|---------------------|
| ITEM | PART NUMBER | QTY | DESCRIPTION |
| 1 | VLS-4631 | 1 | RETAINING NUT |
| 2 | 3108-1-1 | 1 | PUMP MOUNTING PLATE |
| 3 | VLS-4632 | 1 | RESIN BUSHING |
| 4 | VLS-4601 | 1 | OUTLET BODY |
| 5 | F-HB-06C-24-GR8 | 4 | HEX BOLT |
| 6 | MCPA-2501 | 1 | PUMP SHAFT ADAPTER |
| 7 | VLS-4609 | 1 | PISTON ROD |
| 8 | VLS-4614 | 1 | SPRING, PISTON BALL |
| * 9 | ALS-1018 | 1 | 7/8" BALL |
| 10 | VLS-4619 | 1 | PISTON BODY |
| * 11 | VLS-4633 | 1 | RESIN PISTON SEAL |
| 12 | VLS-4618 | 1 | PISTON NUT |
| * 13 | O-V-137 | 2 | O-RING |
| 14 | VLS-4608 | 1 | CYLINDER |
| 15 | VLS-4620 | 1 | BALL STOP |
| 16 | VLS-4621 | 1 | FOOT VALVE SPRING |
| * 17 | VLS-4622 | 1 | Ø1-1/4 CHROME BALL |
| 18 | VLS-4602 | 1 | FOOT VALVE BODY |
| 19 | VLS-4623 | 2 | CYLINDER TIE ROD |
| 20 | VLS-4624 | 1 | FOOT VALVE COLLAR |
| 21 | F-HN-08C | 2 | HEX NUT |
| 22 | F-SW-06 | 4 | LOCK WASHER |
| * 23 | VLS-4640 | 2 | CUP SEAL ASSY |
| 24 | F-RP-04-16 | 2 | ROLL PIN |
| 25 | 09528 | 1 | HITCH PIN |
| 26 | F-HB-08C-16 | 2 | HEX BOLT |
| 27 | PF-SW-12M-08F | 1 | PIPE SWIVEL |
| 28 | PF-ME-16J-16 | 1 | MALE ELBOW |

REPAIR KITS

| PART No. | DESCRIPTION |
|---------------|-------------|
| * VLS-46RK-MP | SEAL KIT |

* NOTE: ASTERISKS DENOTE PARTS USED IN SEAL KIT.

MAGNUM VENUS PLASTECH

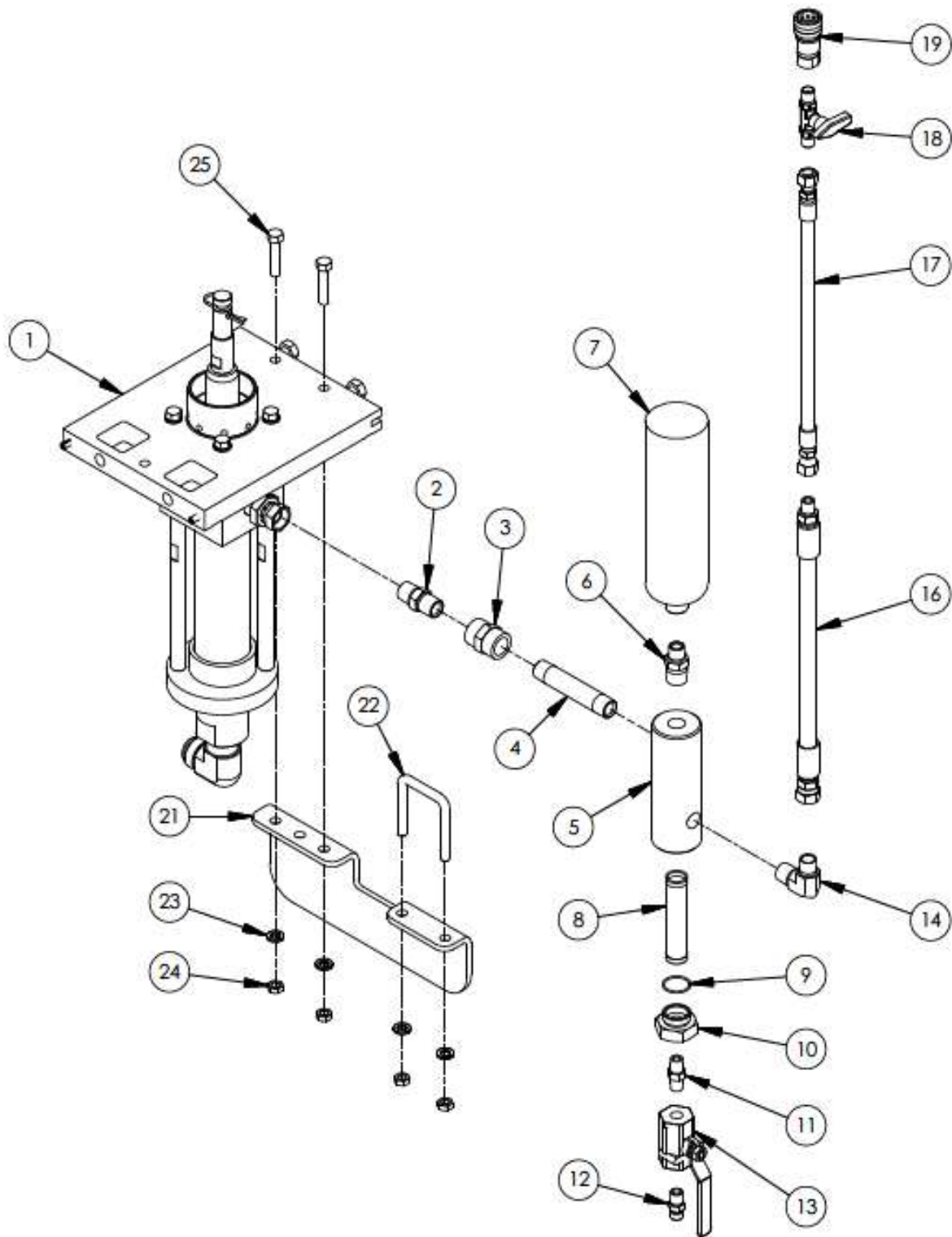
FLUID SECTION - MULTI-COLOR GELCOAT

MCPA-4600-MP

REV:B 05/18/2017

SHEET 2 / 2

3/11/2014



MAGNUM VENUS PRODUCTS

ADDITIONAL PUMP ASSEMBLY

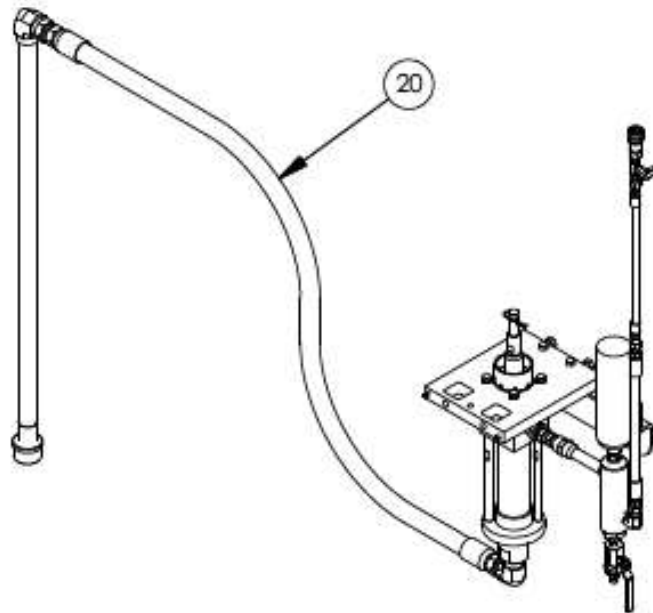
MCPA-4600-1

REV: A 05/19/2017

SHEET 1 / 2

5/19/2017

| Parts List | | | |
|------------|---------------|-----|-------------------------------------|
| ITEM | PART NUMBER | QTY | DESCRIPTION |
| 1 | MCPA-4600 | 1 | FLUID SECTION - MULTI-COLOR GELCOAT |
| 2 | PF-HN-08 | 1 | HEX NIPPLE |
| 3 | PF-FC-08 | 1 | FEMALE COUPLER |
| 4 | PF-HN-08L | 1 | HEX NIPPLE |
| 5 | FF-5001 | 1 | FILTER BODY |
| 6 | PF-HN-08-06 | 1 | HEX NIPPLE |
| 7 | SC-2510 | 1 | SURGE CHAMBER |
| 8 | FF-5099-100 | 1 | FILTER SCREEN 100 MESH |
| 9 | O-V-022 | 1 | O-RING |
| 10 | FF-5002 | 1 | FILTER CAP |
| 11 | PF-HN-04 | 1 | HEX NIPPLE |
| 12 | PF-HN-04-04S | 1 | HOSE ADAPTER |
| 13 | BV-44-HP | 1 | 4000 PSI BALL VALVE |
| 14 | PF-ME-08-06 | 1 | MALE ELBOW |
| 16 | HAW-0664-25 | 1 | HOSE ASSEMBLY |
| 17 | HAW-0444-5 | 1 | HOSE ASSEMBLY |
| 18 | BV-37A | 1 | BALL VALVE - 1/4 NPT |
| 19 | QD-H262-W | 1 | COUPLER |
| 20 | HSA-4000 | 1 | 1.00 SIPHON ASSEMBLY |
| 21 | 1101-7-1 | 1 | MOUNT BRACKET |
| 22 | F-SQUB-06C-32 | 1 | U-BOLT |
| 23 | F-SW-06 | 4 | LOCK WASHER |
| 24 | F-HN-06C | 4 | HEX NUT |
| 25 | F-HB-06C-28 | 2 | HEX BOLT |



MAGNUM VENUS PRODUCTS

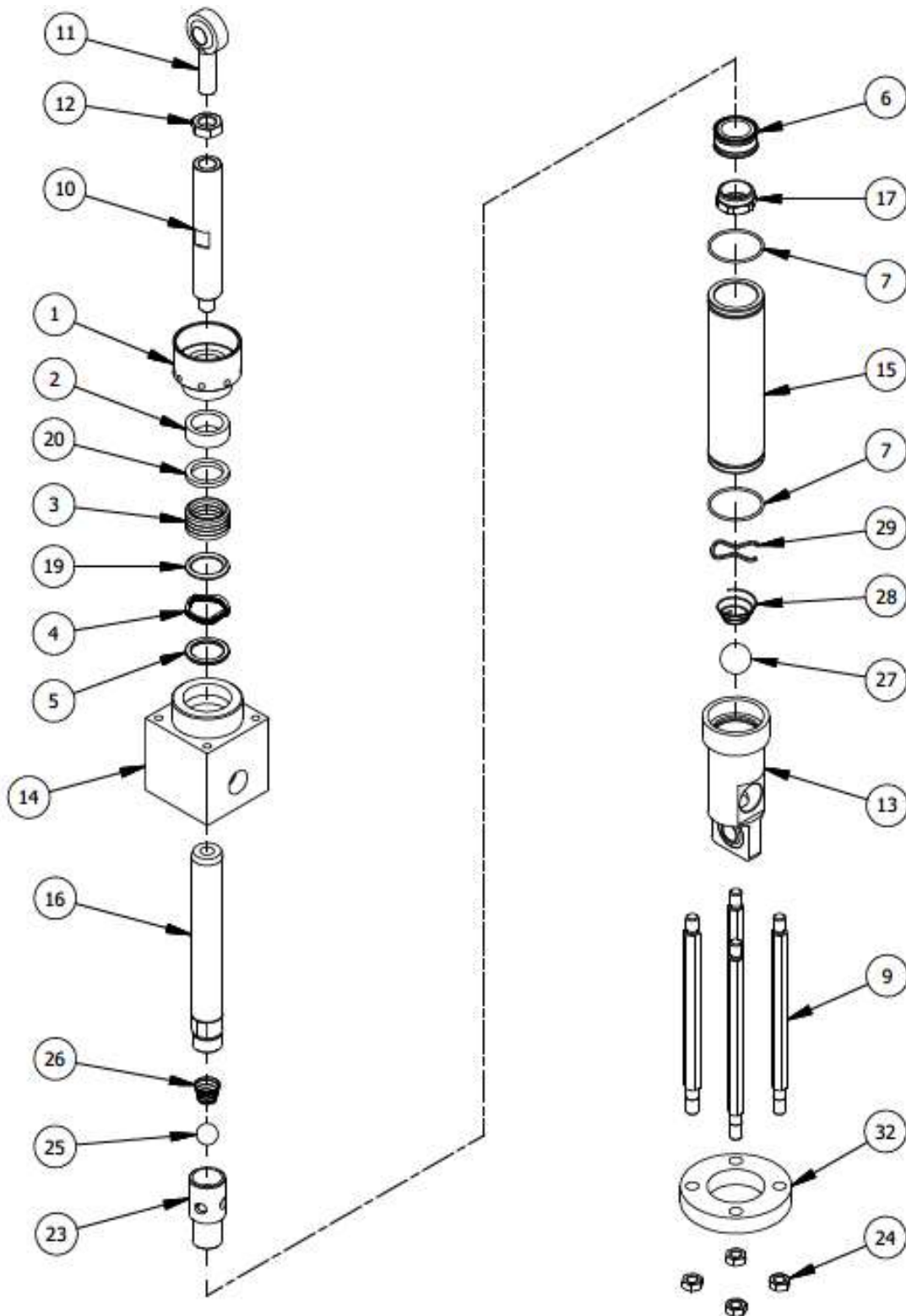
ADDITIONAL PUMP ASSEMBLY

MCPA-4600-1

REV: A 05/19/2017

SHEET 2 / 2

5/19/2017



MAGNUM VENUS PLASTECH

LOWER SECTION

UPLS-4600

REV:B 07/03/12

SHEET 1 / 2

4/7/2010

| Parts List | | | |
|------------|------------------|-----|--------------------------|
| ITEM | PART NUMBER | QTY | DESCRIPTION |
| 1 | VLS-4607 | 1 | SOLVENT CUP-PKG NUT |
| 2 | VLS-4603 | 1 | GUIDE BEARING |
| * 3 | VLS-4605-2U2G | 1 | PACKING SET - PISTON ROD |
| 4 | VLS-4610 | 10 | WAVE SPRING |
| 5 | VLS-4611 | 1 | SPRING SUPPORT |
| * 6 | VLS-4633 | 1 | RESIN PISTON SEAL |
| * 7 | O-V-137 | 2 | O-RING |
| 9 | VLS-4623 | 4 | CYLINDER TIE ROD |
| 10 | UPLS-4613 | 1 | ROD ADAPTOR |
| 11 | B-BJRE-.750-1-XS | 1 | BALL JOINT ROD END |
| 12 | F-JN-12F | 1 | JAM NUT |
| 13 | 60327-1 | 1 | FOOT VALVE |
| 14 | VLS-4601 | 1 | OUTLET BODY |
| 15 | VLS-4608 | 1 | CYLINDER |
| 16 | VLS-4609 | 1 | PISTON ROD |
| 17 | VLS-4618 | 1 | PISTON NUT |
| 19 | VLS-4606 | 1 | MALE COMPRESSION RING |
| 20 | VLS-4604 | 1 | FEMALE COMPRESSION RING |
| 23 | VLS-4619 | 1 | PISTON BODY |
| 24 | F-HN-08C | 4 | HEX NUT |
| * 25 | ALS-1018 | 1 | 7/8" BALL |
| * 26 | VLS-4614 | 1 | SPRING, PISTON BALL |
| * 27 | VLS-4622 | 1 | Ø1-1/4 CHROME BALL |
| * 28 | VLS-4621 | 1 | FOOT VALVE SPRING |
| 29 | VLS-4620 | 1 | BALL STOP |
| 32 | 87160-1 | 1 | COLLAR |

OPTIONAL PARTS

PART No. DESCRIPTION
VLS-4633-GFT PISTON SEAL (FIG. 1)

REPAIR KIT

PART No. DESCRIPTION
* UPLS-46RK-2U2G-1U REPAIR KIT

* NOTE: ASTERISKS DENOTE PARTS USED IN REPAIR KIT

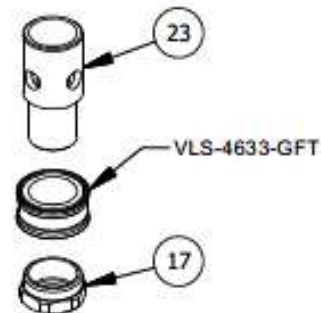


FIG. 1
OPTIONAL SEAL SETUP

MAGNUM VENUS PLASTECH

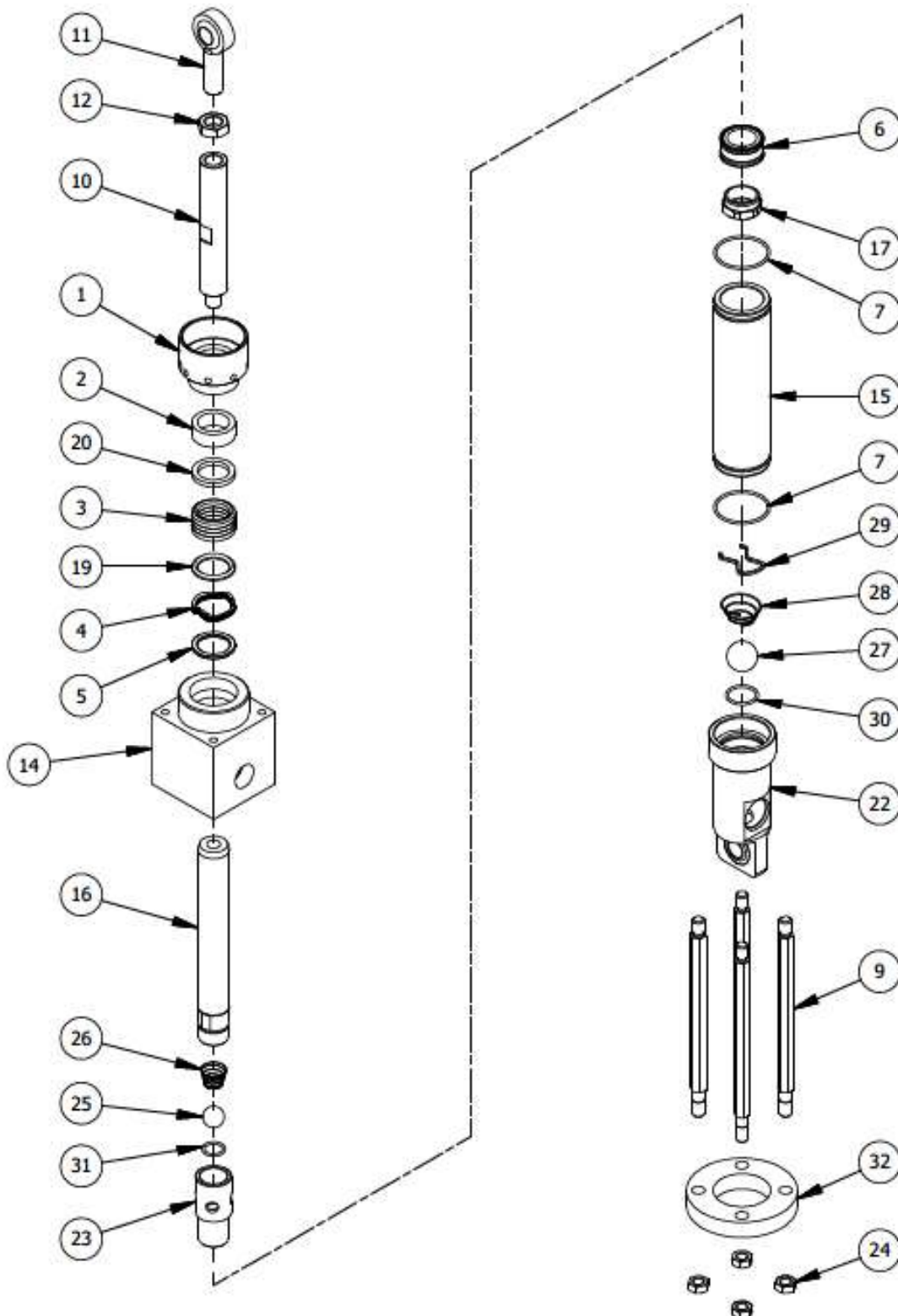
LOWER SECTION

UPLS-4600

REV:B 07/03/12

SHEET 2 / 2

4/7/2010



MAGNUM VENUS PLASTECH

LOWER SECTION

UPLS-4600-SS

REV:C 07/03/12

SHEET 1 / 2

4/7/2010

| Parts List | | | |
|------------|------------------|-----|--------------------------|
| ITEM | PART NUMBER | QTY | DESCRIPTION |
| 1 | VLS-4607 | 1 | SOLVENT CUP-PKG NUT |
| 2 | VLS-4603 | 1 | GUIDE BEARING |
| * 3 | VLS-4605-2U2G | 1 | PACKING SET - PISTON ROD |
| 4 | VLS-4610 | 10 | WAVE SPRING |
| 5 | VLS-4611 | 1 | SPRING SUPPORT |
| * 6 | VLS-4633-GFT | 1 | PISTON SEAL |
| * 7 | O-V-137 | 2 | O-RING |
| 9 | VLS-4623 | 4 | CYLINDER TIE ROD |
| 10 | UPLS-4613 | 1 | ROD ADAPTOR |
| 11 | B-BJRE-.750-1-XS | 1 | BALL JOINT ROD END |
| 12 | F-JN-12F | 1 | JAM NUT |
| 14 | VLS-4601-SS | 1 | OUTLET BODY |
| 15 | VLS-4608-SS | 1 | CYLINDER |
| 16 | VLS-4609-SS | 1 | PISTON ROD |
| 17 | VLS-4618-SS | 1 | PISTON NUT |
| 19 | VLS-4606-SS | 1 | MALE COMPRESSION RING |
| 20 | VLS-4604-SS | 1 | FEMALE COMPRESSION RING |
| 22 | UPLS-4602-SS | 1 | FOOT VALVE |
| 23 | UPLS-4619-SS | 1 | PISTON BODY |
| 24 | F-HN-08C | 4 | HEX NUT |
| * 25 | 03071 | 1 | 7/8" SS BALL |
| * 26 | VLS-4614 | 1 | SPRING, PISTON BALL |
| * 27 | VLS-4622-SS | 1 | Ø1-1/4 SS BALL |
| * 28 | VLS-4621 | 1 | FOOT VALVE SPRING |
| 29 | VLS-4620 | 1 | BALL STOP |
| 30 | O-K-122 | 1 | O-RING |
| 31 | O-K-116 | 1 | O-RING |
| 32 | 87160-1 | 1 | COLLAR |

REPAIR KITS

| PART No. | DESCRIPTION |
|-----------------------|-------------|
| * UPLS-46RKSS-2U2G-1G | REPAIR KIT |

* NOTE: ASTERISKS DENOTE PARTS USED IN REPAIR KIT

MAGNUM VENUS PLASTECH

LOWER SECTION

UPLS-4600-SS

REV:C 07/03/12

SHEET 2 / 2

4/7/2010



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