VPRO-45220 22:1 & 7:1 Gel Coat Pump Assembly

MagnumVenusProducts™

Rev. 09/2014

MagnumVenusProducts™

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Terms & Conditions of Sale:

GSSC, Inc.'s Terms & Conditions of Sale ("Terms & Conditions") 588284v4

1. ACCEPTANCE: Acceptance of any purchase order from a customer or potential customer ("Buyer") is subject to credit approval by GSSC, Inc. ("Seller"), acceptance of the purchase order by Seller and, when applicable, any manufacturer, vendor, or other third party that provides goods to Seller for resale to Buyer ("Vendor"). If Seller, in its sole discretion, determines that Buyer's credit becomes unsatisfactory or it has reasonable grounds for insecurity, Seller reserves the right, upon notice to Buyer, to demand adequate assurance of due performance from Buyer and/or terminate any purchase order with no liability to Seller. BY REQUESTING A QUOTE FROM SELLER, ACCEPTING AN INVOICE FROM SELLER, OR PRESENTING A PURCHASE ORDER TO SELLER, BUYER CONFIRMS THAT THESE TERMS & CONDITIONS SHALL GOVERN ALL PURCHASES OF PRODUCTS OR MATERIALS PROVIDED TO BUYER BY SELLER ("GOODS"). GOODS SOLD BY SELLER ARE EXPRESSLY SUBJECT TO THE TERMS AND CONDITIONS SET FORTH HEREIN AND ANY DIFFERENT OR ADDITIONAL TERMS OR CONDITIONS SET FORTH IN A PURCHASE ORDER OR SIMILAR COMMUNICATION RECEIVED FROM BUYER ARE OBJECTED TO AND SHALL NOT BE BINDING UPON SELLER UNLESS SPECIFICALLY AGREED TO IN WRITING BY AN AUTHORIZED CORPORATE OFFICER OF SELLER.NO SELLER EMPLOYEE OR AGENT HAS THE AUTHORITY TO MODIFY THESE TERMS & CONDITIONS VERBALLY. SELLER OBJECTS TO AND REJECTS ANY TERMS BETWEEN BUYER AND ANY OTHER PARTY, AND NO SUCH TERMS, INCLUDING BUT NOT LIMITED TO ANY GOVERNMENT REGULATIONS OR "FLOWDOWN" TERMS, SHALL BE A PART OF OR INCORPORATED INTO ANY PURCHASE ORDER FROM BUYER TO SELLER, UNLESS AGREED TO IN WRITING BY AN AUTHORIZED REPRESENTATIVE OF SELLER.

2. PRICES AND TAXES: Buyer agrees to pay the prices quoted by Seller or listed on any related invoice, and is responsible for additional applicable shipping and handling charges, taxes, duties, and charges for import and export licenses and certificates. All prices quoted by Seller are subject to change without notice. Seller will generally collect applicable taxes along with the purchase price unless Buyer submits a valid tax exemption certificate, and indicates which Goods are covered by it. Prices on special-order Goods may be subject to change before shipment. In order to be corrected, any discrepancies in pricing and/or quantities on invoices must be reported by Buyer within thirty (30) days of the invoice date.

3. PAYMENT: Payment terms are 30 days net from the invoice date or upon such other terms approved by Seller in writing. Retainage shall not apply, and Buyer shall not hold back any retainage from Seller, even if retainage is part of any contract between Buyer and any other party. Payment is not contingent on Buyer's ability to collect or obtain funds from any other party. Credit card sales are billed at the time of purchase. Buyer expressly represents it is solvent at the time it places any purchase order with Seller. Seller, in its sole discretion, may determine that Buyer's financial condition requires full or partial payment prior to manufacture or shipment. If Buyer fails to make any payment when due, Seller reserves the right to suspend performance. Buyer agrees to pay a charge on all amounts past due at the rate of 1 ½% per month (18% per year) or the maximum lawful rate, whichever is less. In the event of non-payment, Buyer agrees to pay Seller's reasonable attorney fees and court costs, if any, incurred by Seller to collect payment, and all applicable interest charges. Seller may apply payments to any outstanding invoices unless Buyer provides specific payment direction.

4. TITLE AND RISK OF LOSS OR DAMAGE: As to Goods delivered directly by Seller, title passes upon delivery at the place Buyer receives possession; and, thereafter, all risk of loss or damage shall be on Buyer. All other sales are F.O.B., point of shipment, and Buyer takes title and assumes responsibility for risk of loss or damage at the point of shipment for such sales. Claims for Goods damaged in transit are Buyer's sole responsibility when not delivered directly by Seller.

5. QUOTATIONS: All quotations expire thirty (30) days from the date of the quotation unless otherwise noted on the quotation. This time limit applies even if Buyer uses the quotation to submit a job or project bid to any other party.

6. ASSIGNMENT: The Buyer's rights and responsibilities under any purchase order or these Terms & Conditions shall not be assigned by Buyer without the express written consent of the Seller.

7. RETURN OF GOODS: Permission to return items must be requested and granted in advance. No credit will be given if items are returned prior to requesting and receiving permission. Subject to the foregoing, Seller shall accept returns of Goods for any reason for a period of thirty (30) days following shipment for exchange or refund of the purchase price; provided, that such Goods must be unused and are subject to a 15% restocking charge, which may be increased or decreased, in the Seller's sole discretion, depending on the reason for such return. Any Goods which were special ordered by Buyer are may not be returned, and any such Goods which are returned are subject to a restocking/cancellation fee of 100% of the cost of the Goods. Goods shall be deemed accepted by Buyer (and cannot thereafter be returned), if Buyer fails to object to the Goods within thirty (30) days after the Goods are received by Buyer.

8. CANCELLATION: The Buyer may cancel any purchase order prior to shipment of the Goods by mutual agreement of the parties and upon payment to Seller of reasonable and proper cancellation charges.

9. TERMINATION: Seller may terminate the whole or any part of any purchase order if there is a material breach of these Terms & Conditions. In the event of any such breach, the Seller will provide Buyer with written notice of the nature of the breach and the Seller's intention to terminate for default. In the event Buyer does not cure such failure within ten (10) days of such notice, Seller may, by written notice, terminate the purchase order; provided, that Buyer shall continue its performance to the extent not terminated.

10. CHANGE IN BUYER'S FINANCIAL CONDITION: Seller reserves the right to cancel any order or to require full or partial payment in advance without liability to Seller in the event of: (i) insolvency of the Buyer; (ii) the filing of voluntary petition in bankruptcy by Buyer; (iii) the appointment of a Receiver or Trustee for the Buyer; (iv) the execution by Buyer of an assignment for benefit of creditors; or (v) past due payment on previous shipments to Buyer by Seller. Seller reserves the right to cancel Buyers credit at any time for any reason.

11. INTERPRETATION RESPONSIBILITY; PRODUCT USE AND SAFETY: Seller does not guarantee that the Goods it sells conform to any plans and specifications or intended use. When plans and specifications are involved, Buyer is solely responsible for verifying Seller's interpretations of such plans and specifications, and it is Buyer's sole responsibility to assure that Seller's Goods will be acceptable for any specific job. When Seller offers substitute Goods on any proposal, Buyer is solely responsible for confirming their acceptability.

12. DELIVERY: Shipping dates given in advance of actual shipment are approximate and not guaranteed. All contract dates and timelines begin upon receipt by Seller of a purchase order, Buyer's acceptance of these Terms & Conditions, and the payment of any required down payment.

13. EXCUSABLE DELAYS: Seller shall have no liability if its performance is delayed or prevented by causes beyond its reasonable control, including, without limitation, acts of nature, labor disputes, government priorities, transportation delays, insolvency or other inability to perform by any Vendor, or any other commercial impracticability. In the event of any such delay, the date of delivery or performance shall be extended for a period equal to the time lost by reason of delay. If Goods are held or stored beyond the delivery date for the convenience of Buyer, such Goods shall be so stored at the risk and expense of Buyer.

14. CLAIMS: Claims for any nonconforming Goods must be made by Buyer, in writing, within ten (10) days of Buyer's receipt of such Goods and must state with particularity all material facts concerning the claim then known to Buyer. Failure by Buyer to give notice within such ten (10) day period shall constitute an unqualified acceptance of such Goods by Buyer, and a waiver of any right to reject or revoke acceptance of such Goods.

15. WARRANTIES:
(a) SELLER'S WARRANTIES: Seller warrants that all Goods sold shall mechanically operate as specified and shall be free from faults in respect to materials and workmanship for a period of: (i) for parts, twelve (12) months from the date of invoice, and (ii) for systems, twelve (12) months from start-up, or, if earlier, eighteen (18) months from the date of the bill of lading. Seller also warrants that the Goods shall, upon payment in full by Buyer for the Goods, be free and clear of any security interests or liens. Buyer's exclusive remedy for breach of such warranties shall be limited to repair or replacement costs or termination of any security interests or liens, and Seller shall have no responsibility for reimbursing repair costs incurred by Buyer in connection with Goods without first giving written authorization for such charges. In any claims by the Buyer against the Seller in respect of the Goods, the liability of the Seller shall be limited to the value of the Goods. This warranty applies only to Goods properly used and maintained and does not apply to any Goods which are misused or neglected, or which has been installed, operated, repaired, altered or modified other than in accordance with instructions or written authorization by Seller. This warranty does not apply to any Goods not manufactured by Seller, and Buyer's sole warranty with respect to such Goods shall be that of the Seller's Vendor, if any.
(b) VENDOR'S WARRANTIES: Seller shall assign to Buyer any Vendor warranties and/or remedies provided to Seller by its Vendor.
(c) INTELLECTUAL PROPERTY INFRINGEMENT: SELLER DISCLAIMS ANY AND ALL WARRANTIES AND/OR INDEMNIFICATIONS AGAINST INFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHTS OF ANY NATURE. SELLER SHALL, IF GIVEN PROMPT NOTICE BY BUYER OF ANY CLAIM OF INTELLECTUAL PROPERTY INFRINGEMENT WITH RESPECT TO ANY GOODS SOLD HEREUNDER, REQUEST THE APPLICABLE VENDOR TO GRANT FOR THE BUYER SUCH WARRANTY OR INDEMNITY RIGHTS AS SUCH VENDOR MAY CUSTOMARILY GIVE WITH RESPECT TO SUCH GOODS.
(d) LIMITATIONS: THERE ARE NO OTHER WARRANTIES WRITTEN OR ORAL, EXPRESS, IMPLIED OR BY STATUTE. SELLER SPECIFICALLY DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. NO REPAIR OF GOODS OR OTHER COSTS ARE ASSUMED BY SELLER UNLESS AGREED TO, IN ADVANCE, IN WRITING.
16. LIMITATIONS OF LIABILITY: UNLESS APPLICABLE LAW OTHERWISE REQUIRES, SELLER'S AND ANY VENDOR'S TOTAL LIABILITY TO BUYER, BUYER'S CUSTOMERS OR TO ANY OTHER PERSON, RELATING TO ANY PURCHASES GOVERNED BY THESE TERMS & CONDITIONS, FROM THE USE OF THE GOODS FURNISHED OR FROM ANY ADVICE, INFORMATION OR ASSISTANCE PROVIDED BY SELLER (BY ANY METHOD, INCLUDING A WEB SITE), IS LIMITED TO THE PRICE OF THE GOODS GIVING RISE TO THE CLAIM. NEITHER SELLER NOR ITS VENDORS SHALL BE LIABLE FOR ANY SPECIAL, INCIDENTAL, DIRECT, CONSEQUENTIAL OR PENAL DAMAGES, INCLUDING, BUT NOT LIMITED TO BACKCHARGES, LABOR COSTS, COSTS OF REMOVAL, REPLACEMENT, TESTING OR INSTALLATION, LOSS OF EFFICIENCY, LOSS OF PROFITS OR REVENUES, LOSS OF USE OF THE GOODS OR ANY ASSOCIATED GOODS, DAMAGE TO ASSOCIATED GOODS, LATENESS OR DELAYS IN DELIVERY, UNAVAILABILITY OF GOODS, COST OF CAPITAL, COST OF SUBSTITUTE GOODS, FACILITIES OR SERVICES, DOWNTIME, OR CLAIMS FROM BUYER'S CUSTOMERS OR OTHER PARTIES. IF SELLER FURNISHES BUYER WITH ADVICE OR OTHER ASSISTANCE WHICH CONCERNS ANY GOODS SUPPLIED HEREUNDER, OR ANY SYSTEM OR EQUIPMENT IN WHICH ANY SUCH GOODS MAY BE INSTALLED, AND WHICH IS NOT REQUIRED PURSUANT TO THESE TERMS & CONDITIONS, THE FURNISHING OF SUCH ADVICE OR ASSISTANCE WILL NOT SUBJECT SELLER TO ANY LIABILITY, WHETHER BASED ON CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE) OR OTHER GROUNDS.
17. BUYER'S USE OF GOODS: Many factors beyond Seller's control contribute to the success of the Buyer's finished products, such as raw materials used to manufacture the products. Seller is not liability for the quality or quantity of finished products produced by Buyer with the use of the Goods.
18. EXPORTS: If Goods are sold for export, Seller's standard terms & condition for export sales, if any, shall also apply. Acceptance of export orders is not valid unless confirmed in writing by Seller. Buyer, and not Seller, is responsible for compliance with all United States export control rules and regulations. Buyer shall not name Seller as shipper or exporter of record in connection with the export of any Goods purchased from Seller.
19. INSTALLATION: Installation of the Goods is the responsibility of Buyer, unless otherwise indicated in the quotation or invoice provided to Buyer. Notwithstanding the foregoing, however, Seller will provide installation supervision personnel within thirty (30) days of Buyer's request. If an installation for which the Seller is to participate is delayed by the Buyer more than six (6) months after the date of shipment of the Goods, or if Buyer's facility, materials, or parts are not prepared for installation for such period of time, Seller shall be entitled to invoice the Buyer for the anticipated installation costs, up to $1,250 per day plus expenses, for each of Seller's installations technicians which are on site.
20. ANTI-MONEY LAUNDERING RESTRICTIONS: Seller rejects questionable purchase orders and payments: Except for pre-approved credit arrangements, Seller rejects third-party payments, cashiers' checks, money orders and bank drafts. Seller accepts only checks imprinted with Buyer's name; wire transfers originated in Buyer's account; letters of credit with Buyer as account party; and credit or debit cards in Buyer's name. All payments must be by single instrument in the amount of the invoice, less credits, from banks acceptable to Seller.
21. GOVERNING LAW: These Terms & Conditions and all disputes related to it shall be governed by the laws of the State of Florida, United States of America, without giving effect to its conflict of law rules.
22. JURISDICTION AND VENUE: The parties hereby irrevocably submit to the jurisdiction of the state courts of the State of Florida and to the jurisdiction of the United States District Court for the Middle District of Florida, for the purpose of any suit, action, or other proceeding related to, arising out of or based upon these Terms & Conditions or in any way related to, arising out of or involving sale of Goods hereunder; waive and agree not to assert by way of motion, as a defense, or otherwise, in any such suit, action, or proceeding, any claim that it is not subject personally to the jurisdiction of the above-named courts, that its property is exempt or immune from attachment or execution, that the suit, action, or proceeding is brought in any inconvenient forum, that the venue of the suit, action, or proceeding is improper, or that these Terms & Conditions or the subject matter hereof may not be enforced in or by such court; and waive and agree not to seek any review by any court of any other jurisdiction which may be called upon to grant an enforcement of the judgment of any such Florida state or federal court. The parties hereby consent to service of process by registered mail at the address to which notice is to be given. The exclusive venue for any proceeding under these Terms & Conditions shall be solely in any state court in Pinellas County, Florida, or the Federal District Court for the Middle District of Florida, Tampa Division, sitting in Tampa, Florida. Buyer acknowledges that the prices for Goods offered hereunder are in part dependent on Buyer's consent to jurisdiction in Florida and exclusive venue in Pinellas County, Florida or the Federal District Court for the Middle District of Florida, Tampa Division, sitting in Tampa, Florida, and without Buyer's consent to this jurisdiction and venue provision the prices for the Goods may be higher.
23. GENERAL: Any representation, affirmation of fact and course of dealing, promise or condition in connection therewith or usage of trade not contained herein, shall not be binding on either party. If any provision hereof shall be unenforceable, invalid or void for any reason, such provision shall be automatically voided and shall not be part of these Terms & Conditions and the enforceability or validity of the remaining provisions of these Terms & Conditions shall not be affected thereby.

TO THE EXTENT NOT CONTRARY TO APPLICABLE LAW, THE FOLLOWING SHALL APPLY:
24. Buyer waives any available homestead exemption as well as any and all requirements or rights with regard to notice, demand, presentment.

IMPORTANT NOTICE: *THIS INSTRUMENT PERMITS SELLER TO OBTAIN AND USE YOUR INDIVIDUAL CREDIT HISTORY FOR CREDIT EVALUATION PURPOSES.*

SAFETY & WARNING INFORMATION:

OPERATING YOUR POLYESTER SYSTEM SAFELY

1. Introduction

Any tool, if used improperly, can be dangerous. Safety is ultimately the responsibility of those using the tool. In like manner, safe operation of polyester processes is the responsibility of those who use such processes and those who operate the equipment. This manual outlines procedures to be followed in conducting polyester operations safety. This system has been specifically designed for use of Polyester Resin, Gel-Coat, and Methyl Ethyl Ketone Peroxides (MEKP) applications. Other formulations or blends considered for use in this equipment is strictly prohibited without the expressed consent by Magnum Venus Products Inc. Magnum Venus Products cannot eliminate every danger nor foresee every circumstance that might cause an injury during equipment operation. Some risks, such as the high pressure liquid stream that exits the spray tip, are inherent to the nature of the machine operation and are necessary to the process in order to manufacture the end-product. For this reason, ALL personnel involved in polyester operations should read and understand the Safety Manual. It is very important for the safety of employees involved in the operation that equipment operators, maintenance and supervisory personnel understand the requirements for safe operation. Each user should examine his own operation, develop his own safety program and be assured that his equipment operators follow correct procedures. Magnum Venus Products hopes that this manual is helpful to the user and recommends that the precautions in this manual be included in any such program. Magnum Venus Products recommends this Safety Manual remain on your equipment at all times for your personnel safety. In addition to the manual, Magnum Venus Products recommends that the user consult the regulations established under the Occupational Safety & Health Act (OSHA), particularly the following sections:

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.

Other standards and recognized authorities to consult are the National Fire Protection Association (NFPA) bulletins as follows:

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

Type of Fire Extinguishing equipment recommended: Fire Extinguisher – code ABC, rating number 4a60bc.

Extinguishing Media – Foam, Carbon Dioxide, Dry Chemical, Water Fog.

Copies of the above bulletins are available, at a nominal charge from:

National Fire Protection Association
470 Atlantic Avenue
Boston, MA 02210

Research Report No.11 of the American Insurance Association deal with “Fire, Explosion and Health Hazards of Organic Peroxides”. It is published by:

American Insurance Association
85 John Street
New York, NY 10038

Local codes and authorities also have standards to be followed in the operation of your spraying equipment. Your insurance carrier will be helpful in answering questions that arise in your development of safe procedures.

1.2 Personal Safety Equipment

Magnum Venus Products recommends the following Personal Safety Equipment for conducting safe operations of the Polyester Systems:

Magnum Venus Products recommends that the user consult the state and local regulations established for all Safety equipment listed.

2.0 Material Safety

2.1 Hazards Associated with Laminating Operations

The major hazards which should be guarded against in polyester laminating operations are those associated with:

1. The flammability and explosion dangers of the catalyst normally used – Methyl Ethyl Ketone Peroxide (MEKP).

2. The flammability dangers of clean-up solvents sometimes used (Magnum Venus Products recommends that clean-up solvents be non-flammable), and of resin diluents used, such as styrene.

3. The flammability dangers of catalyst diluents, if used. (Magnum Venus Products recommends that catalyst not be diluted.

4. The flammability dangers of the uncured liquid resins used.

5. The combustibility dangers of the cured laminate, accumulations of over spray, and laminate sandings.

6. The toxicity dangers of all the chemicals used in laminating operations with respect to ingestion, inhalation and skin and eye hazards.

2.2 Catalyst (Methyl Ethyl Ketone Peroxide)

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.

Contamination with promoters or 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 become explosive in nature. Heat applied to MEKP, or heat build-up from contamination reactions can cause it to reach what is called its Self-Accelerating Decomposition Temperature (SADT).

Researchers have reported measuring pressure rates-of-rise well in excess of 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 in regards to 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:

A. Store MEKP in a cool, dry place in original containers away from direct sunlight and away from other chemicals.

B. Keep MEKP away from heat sparks and open flames.

C. Prevent contamination of MEKP with other materials, including polyester over spray and sandings, polymerization accelerators and promoters, brass, aluminum and non-stainless steels.

D. Never add MEKP to anything that is hot, since explosive decomposition may result.

E. 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.

F. Avoid spillage, which can heat up to the point of self-ignition.

G. 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.

H. 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.

I. 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.

2.3 Clean-Up Solvents and Resin Diluents

WARNING

A hazardous situation may be present in your pressurized fluid system! Hydrocarbon 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.). The 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.

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

a. 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. b. 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.

b. 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.

A. 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. Furthermore, the mixing of HHC solvents with other materials or solvents, such as MEKP, alcohol, and toluene, may render the inhibitors ineffective.

B. The use of reclaimed solvents is particularly hazardous. Reclaimers may not add any inhibitors. Also, the possible presence of water in reclaimed solvents could feed the reaction.

C. 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, which will safely prevent the chemical reaction under all circumstances.

D. 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

(VOC's), 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 solvents in pressurized fluid systems having aluminum or galvanized wetted parts.**

NOTE: **Magnum Venus Products is aware of NO stabilizers available to prevent Halogenated Hydrocarbon solvents from reaction under all conditions with aluminum components in closed fluid system.** ***TAKE IMMEDIATE ACTION…*** **Halogenated Hydrocarbon solvents are dangerous when used with aluminum components in a closed fluid system.**

A. Consult your material supplier to determine whether your solvent or coating contains Halogenated Hydrocarbon Solvents.

B. 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.

C. If, however, you find it necessary to use flammable solvents, they must be kept in approved, electrically grounded containers.

D. Bulk solvent should be stored in a well-ventilated, separate building, 50 feet away from your main plant.

E. You should allow only enough solvent for one day's use in your laminating area.

F. "NO SMOKING" signs must be posted and observed in all areas of storage or where solvents and other flammable materials are used.

G. 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.

H. Solvents should be handled in accordance with OSHA Section 1910.106 and 1910.107.

2.4 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. This avoids the 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, however, diluents are absolutely required, contact your catalyst supplier and follow his instructions explicitly. Preferable, the supplier should premix the catalyst to prevent possible "on the job" contamination while mixing.

WARNING

If diluents are not used, it should be remembered that catalyst spillage, gun, hose and packing leaks are potentially more hazardous, since each drop contains a higher concentration of catalyst, and therefore will react quicker with over spray and the leak.

2.5 Cured Laminate, Overspray and Laminate Sandings Accumulation

A. Remove all accumulations of overspray, 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.

B. Floor coverings, if used, should be non-combustible.

C. Spilled or leaked catalyst may cause a fire if it comes in contact with an FRP product, over-sprayed chop or resin, FRP sandings or any other material with MEKP.

To prevent this 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.

2.7 Toxicity of Chemicals

A. 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.

B. 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.

C. Also determine the best methods of first aid treatment for each chemical used in your plant.

2.8 Treatment of Chemical Injuries

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 is 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 any injury and give him the information you have collected. If your information includes first aid instructions, administer first aid immediately while you are contacting your doctor.

Fast treatment of the outer skin and eyes that contact such 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, however, may be incorrect for some chemicals; that is why you must know the chemicals and treatment before an accident occurs. Treatment for swallowing a chemical frequently depends upon the nature of the chemical.

NOTE: **Refer to your System User Manual for complete and detailed operating instructions and service information.**

3.0 Equipment Safety

WARNING

Magnum Venus Products suggests 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!

WARNING

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. (TREAT THE GUN AS IF IT WERE A LOADED PISTOL.)

3.1 Emergency Stop Procedures

The following steps should be followed in order to stop the machinery in an emergency situation

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. To do this, simply rotate the lever on the ball valve 90 degrees. Doing this will cause all the system air to bleed out of the system in a matter of a few seconds, making the system incapable of operating

NOTE: Step 2 is a precautionary step and should be followed whenever the above mentioned ball valve is activated to the stop mode. Failure to do so, can damage the regulators and components on reactivating to the “ON” position.

2. Turn all system regulators to the “OFF” position (counter-clockwise) position

NOTE: Verify that the Catalyst relief line, located on the catalyst manifold, and the resin return line, located on the resin filter, are secured relieving catalyst and resin fluid pressure.

3. Catalyst pressure in the catalyst pump can be eliminated by rotating the ball valve on the catalyst manifold 90 degrees to the “open” or “on” 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.

4. Resin pressure in the resin pump can be eliminated by rotating the ball valve on the resin filter 90 degrees to the “open” or “on” position. Place a container under the ball valve to catch any resin that is ejected out of the valve.

3.2 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 a charge to flow from the object fast enough that it will not accumulate to the extent that a spark can be formed. It is not possible to define exactly what will be an adequate path under all conditions since it depends on many variables. In any event, the grounding means should have the lowest possible electrical resistance. Grounding straps should be installed on all loose conductive objects in the spraying area. This includes material containers and equipment. Magnum Venus Products recommends grounding straps be made of AWG No.18 stranded wire as a minimum and the larger wire be used where possible. NFPA Bulletin No77 states that the electrical resistance of such a leakage path may be as low as 1 meg ohm (10 ohms) but that resistance as high as 10,000 meg ohms will produce an adequate leakage path in some cases. 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”. Check with local codes and authorities for other specific standards that might apply to your application. NEVER USE HARD MATERIALS SUCH AS WIRE, PINS, ETC., TO CLEAR A PLUGGED GUN. HARD MATERIALS CAN CAUSE PERMANENT DAMAGE. DAB WITH A BRISTLE BRUSH, BLOW BACKWARDS WITH AIR UNTIL CLEAR WHILE WEARING A PROTECTIVE EYE SHIELD. REPEAT AS MANY TIMES AS NECESSARY. DO NOT PERFORM ANY MAINTENANCE OR REPAIRS UNTIL YOU HAVE FOLLOWED THE PRECAUTIONS STATED ABOVE. IF YOU, AS AN EQUIPMENT OPERATOR OR SUPERVISOR, DO NOT FEEL THAT YOU HAVE BEEN ADEQUATELY TRAINED OR INSTRUCTED AND THAT YOU LACK THE TECHNICAL KNOWLEDGE TO OPERATE OR PERFORM MAINTENANCE ON A PIECE OF MAGNUM VENUS PRODUCTS EQUIPMENT, PLEASE CALL MAGNUM VENUS PRODUCTS BEFORE OPERATING OR PERFORMING MAINTENANCE ON THE EQUIPMENT. IF YOU HAVE ANY QUESTIONS REGARDING THE ABOVE PRECAUTIONS OR ANY SERVICE OR OPERATION PRECEDURES, CALL YOUR MAGNUM VENUS PRODUCTS DISTRIBUTOR OR MAGNUM VENUS PRODUCTS.

NOTICE: All statements, information and data given herein are believed to be accurate and reliable but are presented without guaranty, warranty or responsibility of any kind express or implied. The user should not assume that all safety measures are indicated or that other measures are not required.

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 of dirt, grease or resin. Clean catalyst system components with clean water only.

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.

WARNING: Please refer to your catalyst manufacturer’s safety information regarding the safe handling and storage of catalyst. Wear appropriate safety equipment as recommended.

Introduction:

This manual, the ***PRO PUMP MAINTENANCE & REPAIR MANUAL***, provides information you need to perform simple maintenance and repair on your equipment.

- ❑ Step-by-step assembly and disassembly procedures are included for each component.
- ❑ A troubleshooting guide helps you diagnose and perform common repair situations.
- ❑ A comprehensive maintenance schedule provides a detailed list for performing daily, weekly, monthly, three-month and annual maintenance.

Please read the manual carefully. Follow the steps in the order given, otherwise you may damage the equipment or injure yourself.

DANGER: Always wear proper safety equipment, including eye protection and gloves when performing service and repair on this equipment.

This manual covers the following pump assemblies:

VPRO-45220	22:1 Pump Assembly
VPRO-45220-IM	22:1 Pump Assembly – Internal Mix
VPRO-45220-MC	22:1 Pump Assembly – Multi-Color units
VPRO-45220-NPR	22:1 Pump Assembly – Pro Rider
VPRO-25700	7:1 Pump Assembly – 2” Air Motor

The VPRO-25700 7:1 PRO Pump assembly uses the 2” Air Motor assembly (Piston, O-ring & Air Cap) but otherwise uses the same parts in the fluid section.

During Disassembly:

As you disassemble the equipment, lay out the components in the correct order and direction. This will help you to reassemble them.

Note: the order of the piston cup, piston cup spacer ring, piston cup backup ring and compression ring and the directions they face. These directions are critical to proper functioning of this equipment.

Lubrication:

Throughout this manual, directions are given for lubricating various parts of the Pro Pump. There are three types of lubricant used:

- ❑ If the part contacts resin, use MVP Red Grease (6706-2-1).
- ❑ If the part is located where it will contact air, use Lubriplate® (08465).
- ❑ Throat Seal Oil (TSL-3200) used in the oil reservoir of the pump.

DANGER: FIRE AND EXPLOSION HAZARD. Never use any lubrication on the components of the catalyst system. Contact your catalyst manufacturer for additional material handing information.

Major Components:

Your Pro Pump consists of the following major components:

- ❑ Resin pump Fluid section.
- ❑ Resin pump Air motor.
- ❑ Shift Block Assembly.

Description of Controls for Spray unit:

Familiarize yourself with the manifold controls, which consist of the following regulators and gauges:

- ❑ PUMP PRESSURE gauge and regulator. These control main air pressure to the resin pump.
- ❑ ATOMIZING-AIR gauge and regulator. This controls the air pressure to the catalyst nozzle on the gun.

Hazard Information:

Please note the following safety and informational designations used throughout this manual:

DANGER: Indicates hazards or unsafe practices that are likely to result in severe personal injury or death.

WARNING: Indicates hazards or unsafe practices which could result in severe personal injury or extensive equipment damage.

CAUTION: Indicates hazards or unsafe practices which could result in minor injury or damage to equipment.

NOTE: Indicates additional information including explanations of certain procedures or helpful suggestions. Notes do not contain safety information.

Requirements:

Air Requirements:

Clean, dry compressed air must be available at up to 90 psi (6.3 kg/cm^2) and a minimum volume of 10 CFM (0.3 m^3). Air must be provided through an air hose with a diameter of 0.5 inch (1.3 cm) or greater.

Tool and Supplies Requirements:

When performing service and repair on the Pro Pump, you should have the following tools, spare parts and supplies available before beginning.

NOTE: Items followed by a * may be purchased from Magnum Venus Plastech.

- ❑ One table vise
- ❑ Loctite™ 243 (removable) or equivalent thread lock compound
- ❑ One small hammer
- ❑ Needle-nose pliers
- ❑ Solvent or emulsifier for cleaning
- ❑ One clean work table
- ❑ Anti-seize thread sealant
- ❑ Set of hex wrenches * (08469)
- ❑ One 5/8-inch wrench * (08474)
- ❑ One 9/16-inch wrench * (08476)
- ❑ One 5/16-inch wrench * (08477)
- ❑ Empty buckets for cleaning
- ❑ Clean ¼-inch plastic dowel or rod
- ❑ One 8-inch adjustable wrench * (08467)
- ❑ One 12-inch adjustable wrench * (08468)
- ❑ One 7/16-inch open-end wrench
- ❑ One ½-inch socket wrench
- ❑ One 7/16-inch socket wrench * (08472)
- ❑ Wooden sticks or tongue depressors (for testing)

- ❑ Labels and pens (for marking pneumatic lines)
- ❑ Clean rags and paint brushes for cleaning equipment
- ❑ One tube of medium-weight lithium grease (such as Lubriplate® lubricant * (08465))
- ❑ Large (approximately 3 feet by 10 feet or 1 meter by 3 meters) strips of paper for performing spray tests.
- ❑ One pin wrench * (45031-1) (comes with catalyst jug)
- ❑ One scribe * (08126)
- ❑ Red Grease * (6706-2-1)
- ❑ Seal Kit *

VPRO-45220-SK	Seal Kit - Gel Coat Pump
VPRO-25700-SK	Seal Kit – 7:1 Pump Assembly

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.

IMPORTANT WARRANTY INFORMATION

Please note that components used on this equipment are made of specially developed, high-strength material.

- ❑ Only authentic Magnum Venus Plastech replacement parts are acceptable for use with this equipment.
- ❑ Use of unacceptable replacement parts will void our liability and warranty of this equipment.

Please contact your Magnum Venus Plastech distributor for more information.

Maintenance:

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 of dirt, grease or resin. Clean catalyst system components with clean water only.

DANGER: FLUIDS UNDER HIGH PRESSURE. Before performing any service and repair on this equipment, be sure to relieve air and fluid pressure.

DANGER: Always wear appropriate eye protection when working with this equipment.

WARNING: When removing hoses, place a rag over the hose before loosening it.

Performing proper maintenance at the recommended time intervals maximizes your equipment's productivity and efficiency. This section describes recommended maintenance procedures to be performed daily, weekly, monthly, every three months, twice per year and once per year.

Please follow the maintenance schedules recommended in this manual. This schedule is based on a one-shift, 5-day work week, using standard general purpose resin. An idle unit left with resin in it requires more frequent parts replacement.

DAILY MAINTENANCE CHECKLIST:

PART	PROCEDURE
Air Filter ("Water Trap")	Drain the air filter by holding a container under the filter and turning the valve at the bottom.
Hoses	Check for kinks or leaks.
Pro Pump	Check the oil reservoir and add oil if needed.
Nozzle Cap	Coat nozzle cap and threads with Red Grease.
Materials	Check and fill catalyst jug and gel coat / resin. Never run out

WEEKLY MAINTENANCE CHECKLIST:

PART	PROCEDURE
Air Filter ("Water Trap")	Drain
Hoses	Check for kinks or leaks.
Gauges and Regulators	Check for damage and proper operation.
Accumulator	Remove and clean inside. ***Danger: Never attempt to remove an accumulator until you have relieved pressure.*** See Chapter 5: Accumulator & Filter.
Filter	Clean and inspect filter screen for plugging. ***Note: Clean the screen weekly and when changing from one material to another. Use proper screen mesh size according to the material being used.***
Pro Pump	Check the oil reservoir and add oil if needed. If necessary, clean and dry the silencers.
Pro Pump Lower Assembly	Check the pickup hose and wand for leaks and damage. Check for packing leaks.
Air Lines	Check for leaks, wear and kinks. Replace if necessary.

MONTHLY MAINTENANCE CHECKLIST:

PART	PROCEDURE
Air Filter ("Water Trap")	Drain.
Hoses	Check for kinks or leaks.
Gauges and Regulators	Check for damage and proper operation.
Accumulator	Remove and clean inside. ***Danger: Never attempt to remove an accumulator until you have relieved pressure.*** See Chapter 5: Accumulator & Filter.
Filter	Clean and inspect filter screen for plugging. ***Note: Clean the screen weekly and when changing from one material to another. Use proper screen mesh size according to the material being used.***
Pro Pump	Check the oil reservoir and add oil if needed. If necessary, clean and dry the silencers.
Pro Pump Lower Assembly	Check the pickup hose and wand for leaks and damage. Check for packing leaks.
Catalyst Jug	Check and clean tubes and filter screens if necessary. ***Danger: Fire and explosion hazard. Never allow solvent or grease to contact any part of the catalyst system.***
Air Lines	Check for leaks, wear and kinks. Replace if necessary.

SIX MONTH MAINTENANCE CHECKLIST:

PART	PROCEDURE
Air Filter ("Water Trap")	Drain.
Hoses	Check for kinks or leaks.
Gauges and Regulators	Check for damage and proper operation.
Accumulator	Remove and clean inside. Replace the O-Rings. ***Danger: Never attempt to remove an accumulator until you have relieved pressure.*** See Chapter 5: Accumulator & Filter.
Filter	Clean and inspect filter screen for plugging. ***Note: Clean the screen weekly and when changing from one material to another. Use proper screen mesh size according to the material being used.***
Pro Pump	Replace the oil in the oil reservoir. If necessary, clean and dry the silencers. Check piston rod, cylinder head, piston and trip sleeve for wear and damage, replace as needed. Replace O-Rings, cups, and packing set.
Pro Pump Lower Assembly	Check the pickup hose and wand for leaks and damage. Check for packing leaks. Check piston rod and pump cylinder for wear, replace as needed. Replace the packing set, piston cups and O-Rings.
Catalyst Jug	Check and clean tubes and filter screens if necessary. ***Danger: Fire and explosion hazard. Never allow solvent or grease to contact any part of the catalyst system.***
Air Lines	Check for leaks, wear and kinks. Replace if necessary.
Catalyst Pump	Replace all soft parts of the catalyst pump. Be sure to: check bushings and pump cylinder and replace S.S. balls, O-Rings, springs, piston seal and packing set.

ANNUAL MAINTENANCE CHECKLIST:

PART	PROCEDURE
Air Filter ("Water Trap")	Drain. Repair any leaks or damage.
Gauges and Regulators	Check for damage and proper operation.
Accumulator	Remove and clean inside. Replace the O-Rings. ***Danger: Never attempt to remove an accumulator until you have relieved pressure.*** See Chapter 5: Accumulator & Filter.
Filter	Clean and inspect filter screen for plugging. ***Note: Clean the screen weekly and when changing from one material to another. Use proper screen mesh size according to the material being used.***
Pro Pump	Replace the oil in the oil reservoir. Clean and dry the silencers. Check piston rod, trip sleeve, cylinder head and piston for wear or damage, replace as required. Replace the O-Rings, piston cups and packing set.
Pro Pump Lower Assembly	Rebuild lower assembly. See Chapter 4: Pro Pump.

Pump Repair:

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

CAUTION: There are two (2) hard chrome balls in the Pro pump assembly. If a ball drops to the floor, it will be damaged. (Even if it appears undamaged, it will contain dents and scratches that will create problems.) Damaged balls must be replaced or the pump will not work properly.

NOTE: When disassembling the Pro pump assembly, replace any O-Rings that you expose.

Maintenance:

- For a complete maintenance schedule, please refer to Chapter 3: Maintenance.

Troubleshooting:

- For a complete troubleshooting schedule, please refer to Chapter 7: Troubleshooting Chart.

Parts Drawings:

- To perform service and repair on the Pro pump assembly, please follow the procedures below. Please refer to a current parts drawing for the VPRO Pump assembly you are working on for part numbers.

Turn Off Pressure:

- Be sure all fluid pressure and air pressure is relieved from the Pro Pump assembly.

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

Remove Catalyst Pump:

- Be sure the catalyst pump has been removed from the slave arms.

Remove Pro Pump:

1. Remove the air hose connected to the fitting (PF-HN-06S-04) on the Shift Block assembly.

2. Remove the pick-up wand hose from the elbow at the bottom of the pump – if install on this pump assembly.

3. Remove the resin hose from the fitting on the resin filter assembly – if installed on this pump assembly.

4. Remove the air tube from the elbow on the top of the air motor assembly.

5. Remove the two screws holding the gel coat pump to the pump mount

Remove Foot Valve Assembly:

1. Mount the pump assembly in a vise.

CAUTION: Before proceeding, note the original position of the elbow on the foot valve body. When you reinstall the foot valve body, the elbow must be oriented in the same position.

CAUTION: As you disassemble the equipment, lay out the components in the correct order and direction. This will help you to reassemble them. Especially note the order of the piston cup, piston cup spacer, and compression ring, and the directions they face. These directions are critical to proper functioning of this equipment.

2. Use a wrench to remove the two hex cap screws which secure the cylinder (15991-1) and foot valve body to the center section of the pump (85728-3).

NOTE: Loosen the hex screws alternately to prevent distorting them.

3. Remove the foot valve body and the cylinder (15991-1) from the pump.

Disassemble Foot Valve Assembly:

1. Separate the cylinder from the foot valve assembly by pulling them apart. Inspect the cylinder for damage or wear.

2. Remove built-up material from the interior.

NOTE: The two O-Rings on the cylinder will need to be replaced during reassembly.

3. Use needle-nose pliers to remove the ball stop from the interior of the foot valve.

4. Remove the spring and the ball.

NOTE: The ball may need to be replaced during reassembly.

5. Check the interior of the foot valve body for material buildup or damage.

Assemble Foot Valve Assembly:

1. Lubricate the new foot valve ball with a light film of Red Grease (6706-2-1).
2. Roll the ball into the foot valve body.

NOTE: Handle the foot valve ball carefully. If it is damaged, it must be replaced.

3. Insert the spring (3102-16-1) on top of the ball.
4. Use the ball stop to secure the foot valve spring and the foot valve ball in the foot valve body.

NOTE: The ball stop should be in the groove in the foot valve body, with the ball stop on top of the spring.

5. Place the new O-Rings on the cylinder (15991-1) and lubricate them with Red Grease (6706-2-1).
6. Insert the cylinder into the foot valve body.
7. Use the palm of your hand to press the cylinder securely into the foot valve until the cylinder seats.
8. The foot valve will be installed on the pump later.

Remove Piston Body Assembly:

1. Remove the piston body.

CAUTION: Hold your hand under the pump as you loosen the piston body to prevent the ball and piston ball spring from falling out.

2. If the ball falls, it must be replaced. Inspect the ball and spring to be sure that there is no damage.
3. Remove the spring retainer and lower packing spring.

Disassemble Piston Body Assembly:

1. Separate the piston cup backup ring, the two piston cups, the piston cup spacer ring and the compression ring. Inspect these components for wear and replace if necessary.

NOTE: The piston cups will have to be replaced during reassembly.

Assemble Piston Body Assembly:

1. Lubricate the two piston cups with Red Grease (6706-2-1).

2. Assemble the piston body components onto the piston body in the order they were removed. Be sure to assemble the components with the correct sides facing each other. See below

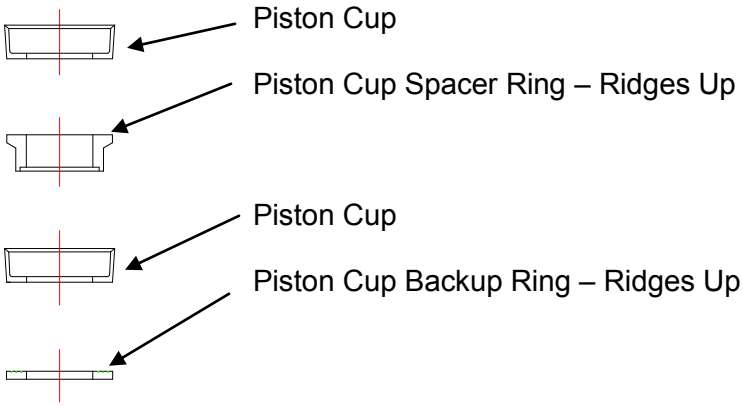
    a. The piston cup backup ring should have its grooved side facing up toward the pump.

    b. The piston cup should have its “cup” facing up.

    c. The piston cup spacer ring (which separates the piston cups) should have its grooved side facing up.

    d. The second piston cup should have its “cup” facing up.

    e. The compression ring should have its beveled side facing down toward the bottom of the pump. Newer versions of the compression ring are universal, both sides are the same.



3. Keep the ball and piston ball spring with this assembly, but do not assemble them onto the pump yet.

NOTE: Be sure the compression ring is positioned down over the shoulder of the piston body or the piston cups will not tighten properly.

Remove Packing Set:

1. Place the pump in a vise by clamping onto the bottom slave arm. Be sure the opening at the bottom of the center section is clear of the vise.

NOTE: To remove packing set you will use one set of the packing removal tools "clamshells" (45052-1). Each set of clamshells consists of two pieces of metal bent in a U-shape.

2. Remove the black plastic plugs on the side of the pump body.

3. Be sure the pump is set to mid-stroke.

NOTE: You should be able to access the hex screw and hex nut through the holes in the pump head. If the pump is not at mid-stroke, connect and slowly increase air to the pump until the pump is at mid-stroke. Be sure you have a second air hose connected to the elbow on the shift block assembly (VPRO-2000). Then disconnect the air.

WARNING: Always disconnect the air when instructed to do so to prevent injuring yourself and damaging the equipment.

4. Remove the upper slave arm from the pump by removing the hex cap screw which secures the slave arm to the pump's center section. Use two socket wrenches to remove the hex screw. Use one wrench to hold the lock nut in position while using the other wrench to remove the hex screw.

5. Move the pump to the top of the stroke by hand or reconnect the air to the pump. Be sure you have a second air hose connected to the elbow on the shift block assembly.

DANGER: Never insert fingers or tools into the pump cavity when air is connected to the pump. Serious injury or amputations may occur.

6. Slowly increase the air pressure until the pump reaches the top of the stroke, and then shut off the air.

7. Disconnect the air.

WARNING: For your protection, always disconnect the air when instructed to do so.

8. Insert the clamshells (45052-1) around the piston rod. Insert the bottoms of the clamshells between the piston rod and the center section. Center the tops under the hex screw on either side of the piston rod.

9. Reconnect the air to the pump.

DANGER: Never insert fingers or tools into the pump cavity when air is connected to the pump. Serious injury or amputation may occur.

10. Slowly increase the air pressure until the hole for the hex screw appears then shut off the air.

11. Disconnect the air.

Connect the Upper Slave Arm:

1. Coat the hex screw with grease (08465).
2. Connect the upper slave arm to the pump by using the two wrenches to install the hex screw and the lock nut.
3. Install the plastic plug over the hole on the side of the pump's center section.

DANGER: Serious injury or amputation. Never operate the pump unless the plastic plugs are installed on the pump. Serious injury or amputation may occur.

DANGER: Never insert fingers or tools into the pump cavity during operation. Serious injury or amputation may occur.

4. Push down on the slave arms and clamshells to remove the packing set from the bottom the pump. If you are unable to do this by hand, reconnect the air and slowly increase air pressure until the pump reaches the bottom of the stroke, then shut off the air.
5. Disconnect the air.

NOTE: If the packing set have not come down far enough, gently insert a blunt tool into the pump cavity and use it to drive the clamshells farther down.

6. Remove the following components from the bottom of the pump
    a. The male compression ring.
    b. The piston rod packing set.
    c. The female compression ring.

NOTE: The piston rod packing set will need to be replaced during reassembly.

7. Remove the clamshells through the bottom of the center section.
8. Inspect the inside of the packing cavity. It should be clean and free of material.

Remove Cylinder Head:

NOTE: Use the correct drawing for the Pump Assembly you are working with and VPRO-2000.

1. Remove the air tube from the top of the pump air motor.
2. Use a wrench to unscrew the cylinder head.
3. Inspect the inside of the cylinder head for wear or damage.
4. Remove O-Ring from the air motor piston.
5. Remove O-Ring from the top of the center section casting (85723-3).
6. Remove hex nut from the top of the air motor piston.
7. Unscrew the air motor piston from the piston rod.

Remove Shift Block Assembly:

NOTE: The shift block assembly does not need to be completely disassembled for routine inspection and maintenance. If troubleshooting indicates that you need to disassemble the shift block, please see Section 7: Shift Block for complete instructions.

1. To remove the shift block assembly from the pump, remove the three hex screws (F-HB-04C-20). As you remove hex screws, hold onto the shift valve assembly with one hand to prevent it from falling.
2. Set aside for now.

NOTE: Do not remove machine screws (F-MS-832-24), which holds the valve (VPRO-2003) in place.

NOTE: The O-Ring (O-S-012) at the top of the shift block assembly will need to be replaced during reassembly.

Remove The Piston Rod:

1. Remove the socket head cap screw and trip sleeve from the piston rod.
2. Check the socket head cap screw to make sure it is not bent.
3. Remove the upper slave arm from the pump by removing the hex cap screw which secures the slave arm to the pump's center section. Use two socket wrenches to remove the hex screw. Use one wrench to hold the lock nut in position while using the other wrench to remove the hex screw. Use caution not to drop the piston rod as the hex cap screw is removed.
4. Remove the piston rod and inspect for damage and wear.
5. Remove o-ring from the bushing in the top of the center section (85723-3).

CAUTION: Use only genuine Magnum Venus Plastech replacement parts to replace components of this system. Using other parts could result in injury to personnel and damage to equipment. Clean & inspect all components for wear and damage, and replace them as needed. Replace all the used components in the pump with the ones supplied with the Seal Kit

Piston Rod Installation:

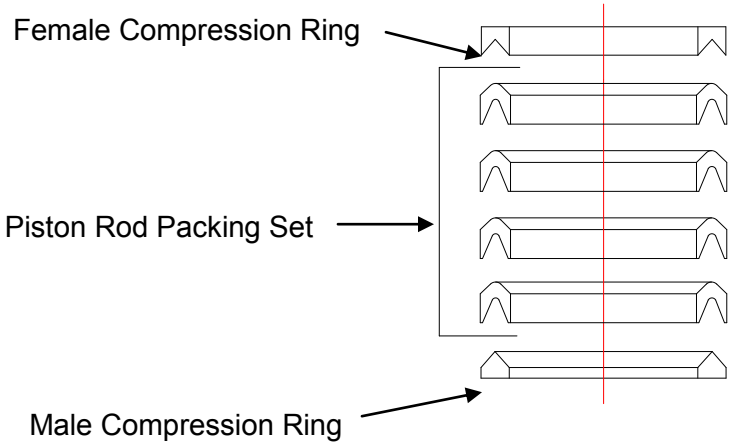
1. Coat o-ring with grease (08465) and install it into the bushing on top of the center section.
2. Coat the top portion of the piston rod with grease (08465), and install up thru the center section into o-ring. Use caution not to damage the o-ring.
3. Coat the hex screw with grease (08465).
4. Connect the upper slave arm to the piston rod by using the two wrenches to install the hex screw and the lock nut.
5. Install the trip sleeve onto the socket head cap screw.
6. Put a drop of removable thread lock compound onto the threads of the socket head cap screw extending thru the trip sleeve and thread it into the piston rod.

Install Cylinder Head:

1. Be sure the pump is in the center stroke position.
2. Lubricate the following items with grease (08465):
    a. O-Ring on the piston
    b. Piston Rod above the center section (85728-3)
    c. Threads on the center section where the cylinder head fits
    d. O-Ring on the top of the center section.
    e. Inside of the cylinder head
3. Install the o-ring on to the air motor piston
4. Install the o-ring onto the top of the center section (85728-3)
5. Thread the Air motor Piston onto the Piston Rod and snug tight.
6. Thread the Hex nut onto the Piston rod above the Air motor Piston and snug tight.
7. Screw the cylinder head onto center section (85728-3) and tighten.

Install Packing Set:

1. Lay the pump on its side to make it easier to insert the balls and springs.
2. Lubricate each packing and the female compression ring with MVP Red Grease (6706-2-1) and assemble them in the following order.
    a. Female compression ring (top of stack). The flat side should be toward the top of the pump and the concave side should face the packing set. Fill the concave side full of Red Grease (6706-2-1)
    b. Piston rod packing set. Fill the inside of each packing with Red Grease (6706-2-1), and be sure to install them in the order in which they were removed. The concave side of the packing should face toward the bottom of the pump. See below
    c. Male compression ring (bottom of stack). The lip of the male compression ring should face away from the packing set and toward the spring.
    d. Lower packing spring. The smaller coil of the spring fits over the lip of the male compression ring.
    e. Spring retainer. The lip of the spring retainer fits into the larger coil of the spring.



3. Push the packing set, the spring and the spring retainer onto the piston rod and up into the packing cavity.

Optional Packing Sets:

VLS-2405-2U2G	STAGGERED PISTON ROD SET
VLS-2405-GFT	PACKING SET
VLS-2405-U	PACKING SET

Install Piston Body Assembly:

1. Insert the piston ball spring into the piston rod, being sure that the spring goes onto the end of the dowel pin (located on the bottom of the piston rod).

2. Take the piston body assembly (consisting of the ball, compression ring, piston cup, spacer ring, piston cup, backup ring, and piston body), and thread it into the end of the piston rod.

CAUTION: If the piston body is screwed tightly against the piston rod, but the packing cups still rotate easily, the top of the compression ring is not aligned correctly. Disassemble the piston body and reinstall it.

Install Foot Valve Assembly:

1. Insert the cylinder (15991-1) and foot valve body onto the piston rod.

2. Coat the threads of the two hex screws with a thin layer of grease. Then gently hand-tighten the screws to secure the foot valve collar, foot valve body and cylinder to the pump's center section (85728-3). Do not completely tighten the assembly yet.

3. Check the orientation of the inlet elbow and reinstall as noted earlier.

4. When the foot valve body is oriented correctly, tighten the hex screws to 13 ft.-lb (18 N-M, 1.6 KP-M).

NOTE: Tighten the hex screws in an alternating pattern to ensure a good seal.

WARNING: Do not over tighten the hex screws on the foot valve collar. Damage to the center section will occur.

Install Shift Block Assembly:

1. Place the new O-Ring (O-S-012) on top of the shift block assembly and lubricate it with grease (08465).

WARNING: Before attempting to connect the shift valve assembly to the pump, be sure the socket cap screw is in the center stroke position. If the screw is not in the center stroke position, you will damage the equipment.

2. Coat the three hex screws with a thin film of grease. Then hold the shift block assembly against the pump's center section and slightly finger-tighten each screw.

3. Use one hand to press the shift block assembly upward while tightening the hex screws in an alternating pattern.

NOTE: This secures the O-Ring (O-S-012) on top of the shift block assembly against the underside of the cylinder head. If the O-Ring is not positioned properly, the pump will lose air pressure during operation.

Install the air tube between the shift block and the top of the Pro pump.

Install Pro Pump:

1. Remove the pump from the vise and install on the unit with hex cap screws.

2. Connect all hoses to the pump.

Set The Packing Set:

1. Prime the Pro pump fluid section.
2. Close the gun-head.
3. SLOWLY increase the pump pressure to 60 psi.
4. Keep the pump stalled for 5 to 15 minutes to allow the packing set to set.
5. Decrease the pump pressure to the desired operating pressure. Now you are ready to connect, prime and pressurize the catalyst pump for operation.

Accumulator & Filter:

Maintenance:

The accumulator & filter should be disassembled and cleaned approximately once per week (more often if the weather is hot).

Troubleshooting:

If you must keep increasing pressure to maintain an adequate spray fan, the filter may be clogged with debris. If the spray is pulsing, the accumulator is probably blocked. When dealing with system blockages, follow the safety instructions below.

DANGER: 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 high pressure, even after you have followed normal procedures to relieve the pressure.

WARNING: To prevent injury, hold a large rag or shop towel around the wrench and fitting as you remove the fitting. Remove the fitting slowly to allow fluid pressure to escape into the rag or towel.

WARNING: Always wear appropriate eye protection and other protective clothing when performing service and repair on the accumulator & filter.

Parts Drawings:

To service the accumulator, please follow the procedures below, using drawing FF-5000-XX Accumulator & Filter Assembly.

Relieve Air and Pump Pressure:

1. Turn pump pressure off.

2. Hold the gun over an appropriate empty container and lock the gun in an open position.

3. Disconnect air from the system.
4. Place an empty container under the filter/accumulator; slowly open the ball valve at the bottom of the filter cap.

DANGER: Never attempt to remove, repair or clean an accumulator until you have relieved pressure.

Remove and Disassemble Filter:

1. Unscrew the filter cap (FF-5002) from the filter body (FF-5001).

NOTE: The components of the resin accumulator and filter should not be over tightened.

2. Remove the screen (FF-5099-100) from the filter body (FF-5001).

3. Inspect the screen and clean with solvent.

NOTE: Typically, the screen is a 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 (O-V-022) on the filter cap for wear or damage. Replace if necessary.

NOTE: If resin is leaking down the side of the filter cap, the O-Ring (O-V-022) is worn and should be replaced.

Assemble and Install Filter Body:

1. Lubricate the threads of the filter cap (FF-5002) and o-ring (O-V-022) with red grease (6706-2-1).

2. Place the screen (FF-5099-100) onto the filter cap (FF-5002).

3. Screw the filter cap into the filter body (FF-5001).

Remove Accumulator Bottle:

DANGER: 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 high pressure, even after you have followed normal procedures to relieve the pressure.

1. Unscrew the surge chamber (SC-2510) from the nipple (PF-HN-08-06).

2. Inspect the interior of the accumulator bottle. Clean with solvent and blow dry with air if needed.

Install Accumulator Bottle:

1. Screw the nipple (PF-HN-08-06) and surge chamber (SC-2510) into the top of the filter body (FF-5001).

2. Check for leaks

Operator Valve:

Maintenance:

Usually, the shift block assembly on the Pro pump needs to be completely disassembled only once per year for maintenance.

Troubleshooting:

PROBLEM	CAUSE	SOLUTION
If the Pro pump stalls	Check for resin blockage	Check and clean resin filter. Flush resin hose, if blocked replace.
	Check air supply to pump	Connect air line to shift block. Check airline for kinks or blockage.
	Air motor malfunction	Remove air motor cylinder head and inspect piston and o-ring.
	Shift Block Malfunction	Replace valve or actuator valve as needed on the shift block.
If the stroke "stutters"	Shift Block malfunction	Check and clean the actuator valve or replace the actuator valve.

To disassemble the shift valve, please follow the procedures below. Please refer to drawing VPRO-2000 Shift Block Assembly and Pro Pump Assembly drawing.

DANGER: Before performing service or repair on this equipment, be sure to disconnect all air to the system.

WARNING: Be sure to wear appropriate safety equipment, including gloves and eye protection.

Check Socket Cap Screw Position:

Before performing service and repair on the shift block, be sure the socket cap screw (00260) and trip sleeve (85806-1) is in the center position of the pump.

NOTE: The socket cap screw and trip sleeve is shown on Pro Pump Assembly drawing.

Remove Operator Valve Assembly From Pump:

DANGER: Before performing service or repair on this equipment, be sure to disconnect all air to the system.

1. Be sure all fluid pressure and air pressure is relieved from the system.
2. Remove the red air hose and the clear tube from the shift block assembly.
3. Remove the air tube (MPM-2583-1) from the top of the air motor cylinder head.
4. Remove the three screws (F-HB-04C-20) from the front of the shift block
5. Remove the shift block assembly from the pump.

NOTE: The O-Ring (O-S-012) at the top of the shift block assembly needs to be inspected and replaced if needed.

Remove Valve from Shift Block:

1. Remove the urethane tubes (MPM-2052-5.5) from the valve body (VPRO-2003).
2. Remove the two mufflers (VPRO-2004) from the valve body.
3. Unscrew the nipple (PF-HN-06S-04) and reducer (PF-RA-04-02) from the valve body.
4. Unscrew the two tube fittings (7701-6-4) from the valve body.
5. Remove the two machine screws (F-MS-832-24) from the valve body (VPRO-2003).

Note: The guard (VPRO-2002) will also come loose when you remove the machine screws.

6. Remove the valve and guard from the actuator body.

Install Valve onto Shift Block:

1. Install the nipple (PF-HN-06S-04) and reducer (PF-RA-04-02) onto the valve.
2. Install the mufflers (VPRO-2004) onto the valve.
3. Screw the two tube fittings (7701-6-4) into the valve body.
4. Hold the guard (VPRO-2002) and valve (VPRO-2003) up to the actuator body (VPRO-2003) and attach with machine screws (F-MS-832-24).
5. Attach tube (MPM-2052-5.5) to the valve.

Remove Actuator Valve from Shift Block:

1. Remove the urethane tube (MPM-2052-5.5) from the valve body (VPRO-2003).
2. Unscrew the elbow (TRU-1021) from the end of the actuator (MPM-2598).
3. Remove the nut (MPM-2587) holding the actuator (MPM-2598) in place and pull the actuator free.
4. Repeat the process for the other end if necessary.

Install Actuator Valve onto Shift Block:

1. Install the actuator (MPM-2598) into the actuator body (VPRO-2001) and install nut (MPM-2587).
2. Thread the elbow (TRU-1021) into the end the actuator (MPM-2598).
3. Install the urethane tube (MPM-2052-5.5) onto the actuator (MPM-2598).
4. Install the urethane tube (MPM-2052-5) onto the elbow (TRU-1021).
5. Repeat process on the other end if necessary.

Connect Shift Block Assembly to Pump:

WARNING: Be sure the socket cap screw and trip sleeve (85806-1) is in the center stroke position or you will damage the equipment.

1. If you need to install the socket cap screw and trip sleeve, do the following:
    a. Install the trip sleeve onto the socket cap screw and put removable thread lock compound on the threads of the socket cap screw.
    b. Thread the socket cap screw and trip sleeve into the piston rod until it is tight against the trip sleeve.
2. Apply a light film of grease (08465) to o-ring and install onto the top of the actuator body.
3. Hold the shift block assembly against the pro pump's center section. Slightly finger-tighten the three hex screws (F-HB-04C-20) into the center section.
4. Use one hand to press the shift block assembly upward while tightening the hex screws in an alternating pattern.

NOTE: This secures the O-Ring (O-S-012) on top of the shift block assembly against the underside of the cylinder head. If the O-Ring is not positioned properly, the pump will lose air pressure during operation.

5. Install the air tube between the top of the pump and the shift block.
6. Connect the air hose and the clear tube to the shift block assembly.

Test Operator Valve:

1. Test the valve to ensure that there is proper air flow intake and output.
2. Increase the pump pressure.
3. Open the gun over an appropriate container.
4. If the pump operates, the shift block works.

Troubleshooting Chart:

DIAGNOSING PROBLEMS:

The most common problems with the equipment are diagnosed by analyzing the cured part.

NOTE: Many problems are the direct result of a failure to maintain the equipment according to the maintenance schedules given. Please follow your maintenance chart.

PROBLEM	CAUSE	SOLUTION
Slow cure during upstroke	S.S. Ball in catalyst pump piston body not seating	Clean ball and inspect seat. Replace ball, piston seal or piston body if questionable.
Slow cure during down stroke	S.S. Ball in catalyst pump inlet body not seating.	Clean ball and inspect seat. Replace ball or have seat repaired if questionable.
	Catalyst Check Valve (CV-2000) not working correctly.	Check and Repair the Catalyst Check Valve (CV-2000).
No cure or slow over-all cure	Catalyst pump set at too low or too high of a percentage.	Move catalyst pump to a higher setting (closer to the gel coat pump). Be sure to attach the catalyst pump in a vertical position.
	Catalyst supply below outlet fitting on jug.	Fill catalyst jug 1/3 full.
	Quick pin not attached to pump or slave arm.	Install quick pin. Be sure to attach the catalyst pump vertically.
	Catalyst leak.	Check all fittings. The catalyst system must be fluid tight.
	Catalyst relief valve on catalyst pump is leaking.	Relieve pressure from Pro pump. Clean and repair the Relief Valve
	Catalyst suction screen in catalyst jug clogged.	Clean catalyst suction screen and ensure that catalyst supply is not contaminated.

PROBLEM	CAUSE	SOLUTION
	Air lock in catalyst pump.	Remove air lock. See Appendix: Air Lock in the Catalyst Pump.
	Catalyst pump piston seal worn or damaged	Replace piston seal. During reassembly, be sure spring in seal faces top of pump
	Catalyst pump outlet body damaged.	Replace catalyst pump outlet body and piston seal. During reassembly, be sure spring in seal faces top of pump. Prevent by connecting catalyst pump vertically.
	Catalyst pump check valve blocked or stuck.	Disassemble check valve and remove blockage.
	Catalyst hose plugged. ***Danger: In the next steps you will be dealing with fluids under high pressure. Follow safety instructions read the Safety & Warning section in the beginning of this manual.***	Relieve pressure from the system. Replace the catalyst hose with new one.
	Resin or gel coat too cold.	Consult your materials supplier for proper temperature. Maintain a draft-free environment of about 70 degrees F. An auxiliary heat source may be required to reduce gel time.
Low output on upstroke of Pro pump	Piston cups, piston ball, or pump cylinder worn.	Inspect the piston cups, piston ball, and pump cylinder. Clean and replace any damaged components. See Chapter 6: Pro Pump.
No fan, constant low output, or fast cure	Screen of pump pick-up wand blocked.	Unscrew screen from hose and clean.
	Resin filter blocked.	Disassemble and clean filter body and screen, with solvent
	Resin hose plugged. ***Danger: To prevent injury, always relieve fluid pressure before attempting to remove components.***	Flush hose with solvent. If material is hard, replace hose.
	Pick-up wand assembly leaking.	Tighten assembly fittings.
	Resin filter clogged.	Disassemble and clean the resin filter. See Chapter 7: Accumulator & Filter.
	Material too cold or air pressure low.	Heat material or increase pump pressure

PROBLEM	CAUSE	SOLUTION
Narrow Fan **Wide Fan**	Material too cold, nozzle too large or air pressure low.	Heat Material, use smaller nozzle, or as a last resort increase pump pressure.
	Resin filter clogged.	Disassemble and clean the resin filter.
	Air pressure too high.	Lower pressure then increase pressure to the desired fan.
	Nozzle too small or too wide.	Change nozzle.
Round fan	Orifice in nozzle worn, clogged, or damaged.	Push fine wire through orifice from back side. Use fingernail to clean material form “V” shaped notch in front. Soak hardened material in solvent. If notch is rough or worn, replace nozzle.
	Air-assist pressure too high.	Decrease air-assist pressure.
Excessive Misting **Heavy pulsation**	Air pressure too high.	Reduce air pressure to gel coat pump.
	Resin accumulator plugged. ***Danger: To prevent injury, always relieve fluid pressure before attempting to remove components.***	Disassemble accumulator and clean.
Pump jumps on upstroke	Piston ball worn or not seating properly.	Replace piston ball and piston cups. Be sure to lubricate ball and cups thoroughly with Red Grease. See Chapter 6: Pro Pump.

PROBLEM	CAUSE	SOLUTION
Pump dives on down stroke	Foot valve, spring retainer, or foot valve ball damaged or dirty.	Clean or replace foot valve, spring retainer and foot valve ball. Be sure to lubricate ball thoroughly with Red Grease. See Chapter 6: Pro Pump.
	Pick-up wand assembly not tight.	Tighten or seal joints of pick-up wand.
	Air in material.	Agitate material to remove air.
Low output on upstroke	Piston cups, piston ball, or pump cylinder worn.	Inspect the piston cups, piston ball, and pump cylinder. Clean and replace any damaged components. See Chapter 6: Pro Pump.
Pump does not run	Silencers on valve block plugged.	Turn off air to pump and unscrew silencers. Clean silencers and re-install.
	Actuator valve or socket cap screw at shift block broken.	Replace the broken cartridge valve or socket cap screw. See Chapter 6: Pro Pump.
	Pro pump or hose plugged. ***Danger: To prevent injury, always relieve fluid pressure before attempting to remove components.***	Disassemble and clean Pro pump. Replace any worn parts. Replace hose as required.
	Air not connected.	Check that air hose is connected at manifold, and regulator is at 20 psi or more.
	Air restricted.	Straighten any kinks in air hoses.
	Pump is not primed	Check all connections between pump and end of pick-up wand for leaks. Prime
Material in oil reservoir	Packing worn.	Replace packing set in lower part of the pump. See Chapter 6: Pro Pump.
	Piston rod worn or scored.	Replace piston rod. See Chapter 6: Pro Pump.
No Gel coat 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. Be sure to lubricate ball thoroughly with Red Grease. See Chapter 6: Pro Pump.
Hose leaks at fittings	Fitting loose	Tighten fitting. Check all fittings for leaks before operating.
	Fitting or nipple damaged.	Replace damaged parts.
	Crimped hose	If the hose has been sharply bent, the plastic liner may be ruptured. Remove and replace hose.

Air Lock in the Catalyst Pump:

DANGER: Fluids Under High Pressure. Before performing any service and repair on this equipment, be sure to relieve air and fluid pressure.

DANGER: Always wear appropriate eye protection when working with this equipment.

WARNING: When removing hoses, place a rag over the hose before loosening it.

What is an Air Lock?

An air lock is an air bubble in the catalyst pump that blocks catalyst. The piston body moves inside the bubble of air instead of pumping catalyst.

If you have determined that there is an air lock in your catalyst pump, follow the procedures in this section.

1. Relieve line pressure from the catalyst pump by locking the gun open over an empty bucket. Leave the gun in this position.

WARNING: Relieve pressure from the catalyst pump before continuing.

2. Remove the catalyst hose from the nipple on the catalyst accumulator.

WARNING: When removing hose, place a rag over the hose and fitting before loosening it.

3. Remove the quick pin from the catalyst bearing block and upper slave arm.

4. Tilt the pump back toward the resin pump to release the bubble.

NOTE: If the bubble does not appear in the inlet tube, remove the lower quick pin and turn the pump upside-down.

5. Slowly hand-pump the catalyst into a suitable container until catalyst spurts from the nipple an equal amount on both the upstroke and down stroke.

6. Reconnect the catalyst hose to the nipple.

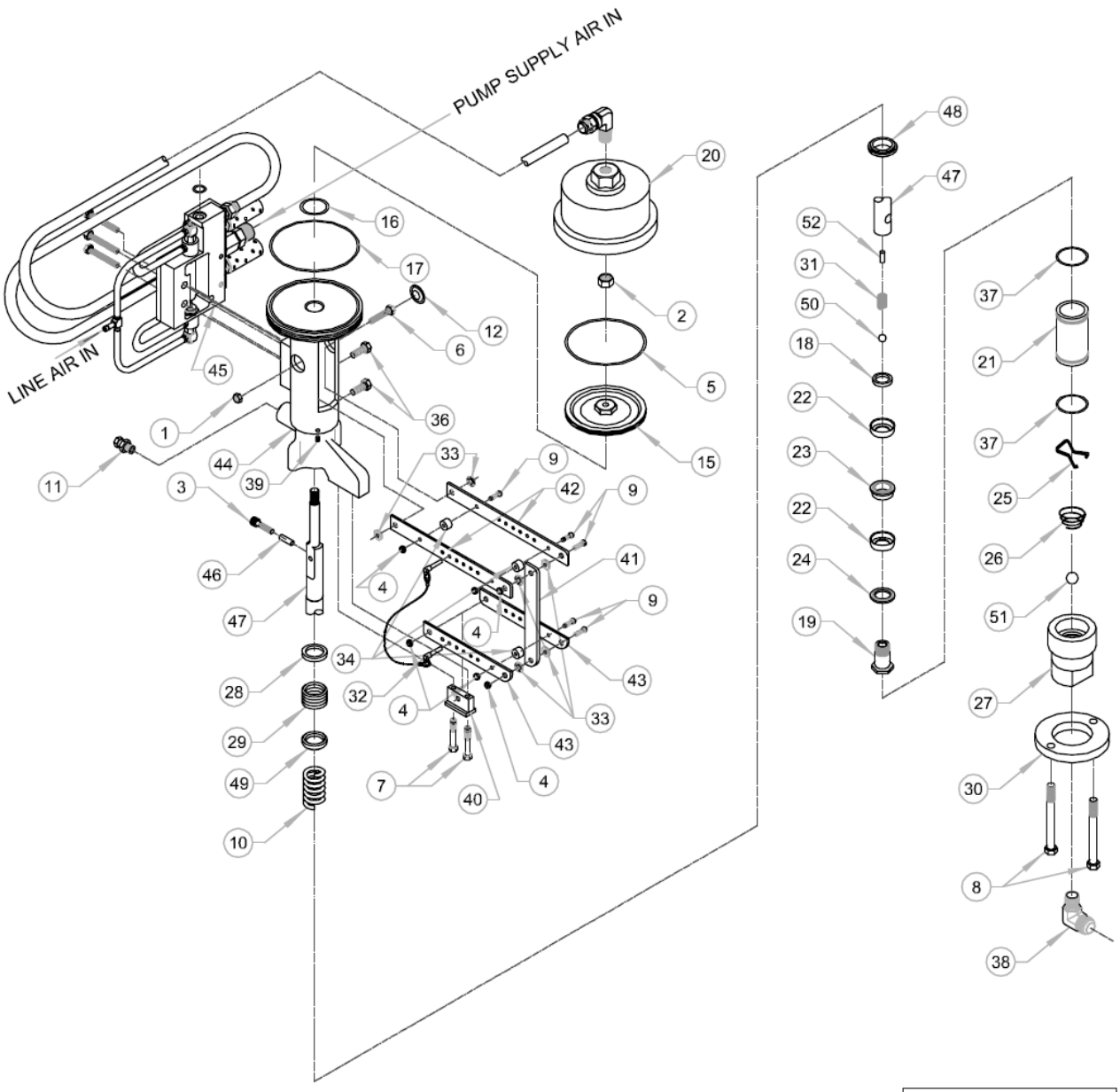
7. Hand-pump the catalyst pump until catalyst comes out through the gun.

8. Install the pump and quick pin into the slave arm.

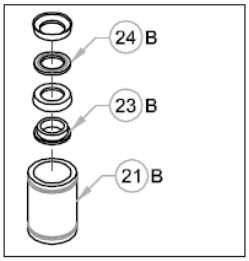
9. Close the gun

Parts Drawings:

VPRO-45220	**22:1 PUMP ASSEMBLY**
VPRO-45220-IM	**22:1 PUMP ASSEMBLY**
VPRO-45220-MC	**22:1 PUMP ASSEMBLY – MULTI-COLOR**
VPRO-45220-NPR	**22:1 PUMP ASSEMBLY – PRO RIDER**
VPRO-25700	**7:1 PUMP ASSEMBLY**
VPRO-2000	**SHIFT BLOCK ASSEMBLY**
VPRO-45220-SK	**SEAL KIT – 22:1 PUMP ASSEMBLY**
VPRO-25700-SK	**SEAL KIT – 7:1 PUMP ASSEMBLY**



NOTE:
THIS PUMP ASSY IS FOR EXTERNAL MIX ONLY



ABRASIVE KIT

MAGNUM VENUS PLASTECH

ASSY - 22 : 1 PRO PUMP	VPRO-45220

REV. E = ITEM 1 WAS PF-SW-06M-04F 11/24/04 BT2
REV, F = REMOVED NOTE FOR EXTERNAL MIX ONLY 11/29/06 JEM
REV. G = UPDATED NUMBERS TO ALPHA-NUMERIC 12/01/10 BT2

ASSY - 22 : 1 PRO PUMP VPRO-45220

PARTS LIST

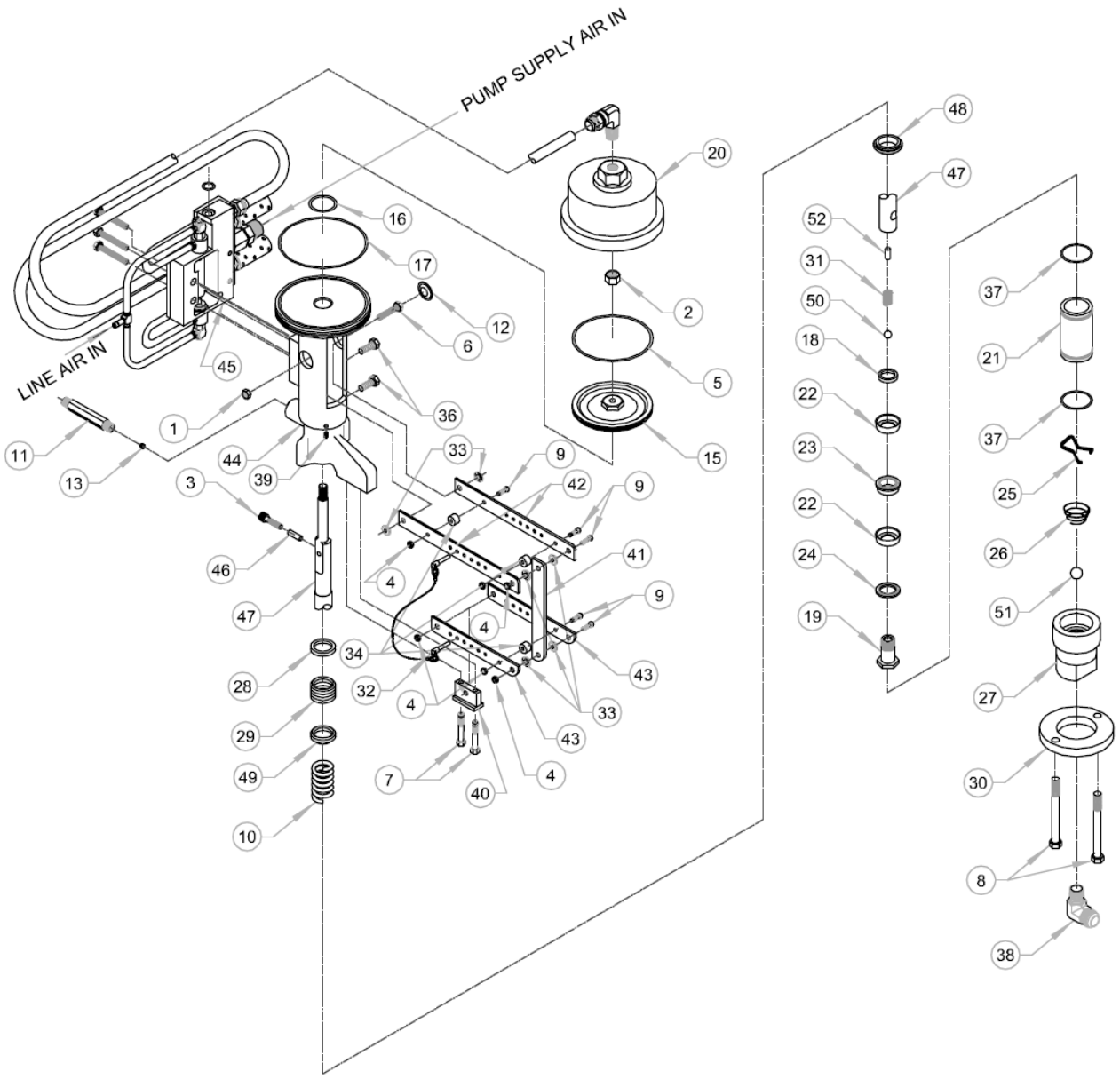
ITEM	PART NO.	QTY	DESCRIPTION
1	F-LN-04C	1	LOCK NUT
2	F-JN-07C	1	HEX NUT
3	F-CS-04C-24-SS	1	SOCKET HEAD CAP SCREW
4	F-LN-04F	6	LOCK NUT
5	O-B-242	1	O-RING
6	F-HB-04C-24	1	HEX BOLT
7	F-HB-05C-32	2	HEX BOLT
8	F-HB-06C-60-GR5	2	HEX BOLT
9	02966	6	AIRCRAFT BOLT
10	15950-1	1	LOWER PACKING SPRING
11	PF-SW-06	1	SWIVEL FITTING
12	15515	1	PLUG
15	15888-1	1	AIR MOTOR PISTON
16	O-B-112	1	O-RING
17	O-B-157	1	O-RING
18	VLS-2429	1	COMPRESSION RING
19	VLS-2419	1	PISTON BODY
20	15983-1	1	CYLINDER HEAD
21	15991-1	1	CYLINDER
22	VLS-2415	2	PISTON CUP
23	VLS-2416	1	PISTON CUP SPACER
24	VLS-2417	1	PISTON CUP BACKUP
25	VLS-2420	1	BALL STOP
26	3102-16-1	1	FOOT VALVE SPRING
27	VLS-2402	1	FOOT VALVE BODY
28	VLS-2404	1	FEMALE COMPRESSION RING
29	VLS-2405	1	PISTON ROD PACKING SPA
30	VLS-2424	1	FOOT VALVE COLLAR
31	VLS-2414	1	PISTON BALL SPRING
32	52106-3	1	QUICK PIN CABLE ASSY
33	VPRO-1006	6	SLAVE ARM BUSHING
34	VPRO-1005	3	SLAVE ARM SPACER
36	F-HB-05C-12	2	HEX BOLT
37	O-V-129	2	O-RING
38	PF-ME-12-12J	1	MALE ELBOW
39	7701-4-5	1	PLASTIC PLUG
40	VPRO-1007	1	MOUNT BLOCK
41	VPRO-1003-01	1	LINK BAR
42	VPRO-1001	2	UPPER SLAVE ARM
43	VPRO-1002	2	LOWER SLAVE ARM
44	85728-3	1	CENTER SECTION ASSY
45	VPRO-2000	1	SHIFT BLOCK ASSY
46	85806-1	1	TRIP SLEEVE
47	85716-1	1	PISTON ROD
48	15951-1	1	SPRING RETAINER
49	VLS-2406	1	MALE COMPRESSION RING
50	VLS-2426	1	1/2" CHROME BALL
51	VLS-2427	1	3/4" CHROME BALL
	95033-EN	1	PUMP PRIME CAUTION LABEL (NOT SHOWN)
	95099-1	1	SLAVE ARM DECAL (NOT SHOWN)
	95084-EN	1	AIR SHUT OFF CAUTION LABEL (NOT SHOWN)

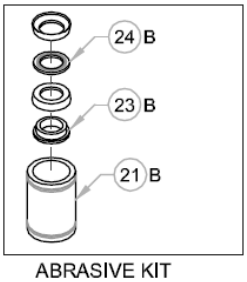
REPAIR KITS

PART NO.	DESCRIPTION
VPRO-45220-SK	SEAL KIT

OPTIONAL PARTS AND ASSEMBLIES

ITEM	PART NO.	QTY	DESCRIPTION
21B	15991-3	1	HARDENED CYLINDER
23B	3102-11-2	1	HARDENED PISTON CUP SPACER
24B	3102-12-2	1	HARDENED PISTON CUP BACKUP
52	VLS-2425	1	BALL STOP PIN





ABRASIVE KIT

MAGNUM VENUS PLASTECH

ASSY - 22 : 1 PRO PUMP	VPRO-45220-IM

REV, - 12/12/06 JEM
REV, A - UPDATED NUMBERS TO ALPHA-NUMERIC 12/01/10 BT2
REV, B - ITEM 8 WAS F-HB-05C-60-GR5 07/28/12 BT2

ASSY - 22 : 1 PRO PUMP VPRO-45220-IM

PARTS LIST

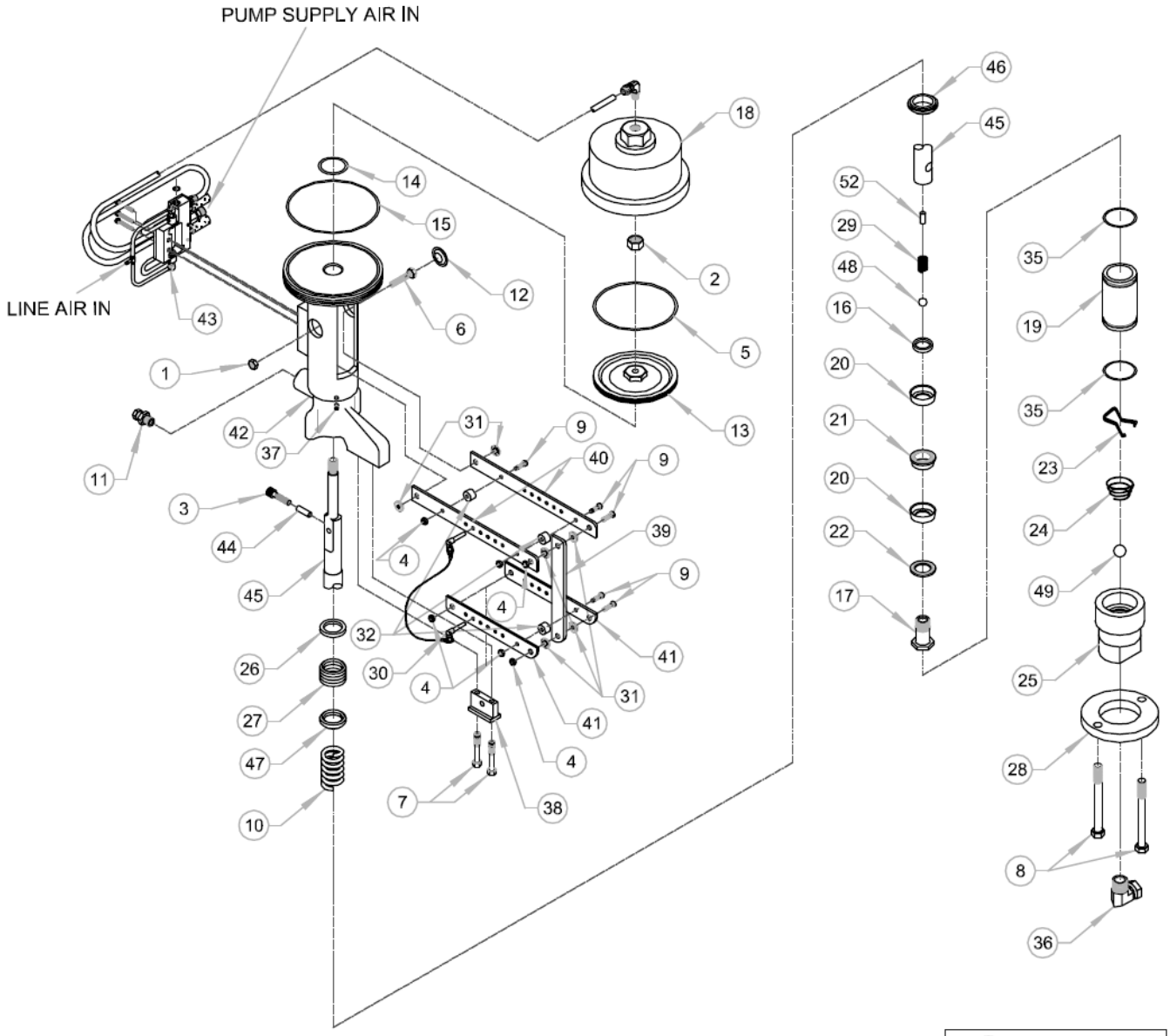
ITEM	PART NO.	QTY	DESCRIPTION
1	F-LN-04C	1	LOCK NUT
2	F-JN-07C	1	HEX NUT
3	F-CS-04C-24-SS	1	SOCKET HEAD CAP SCREW
4	F-LN-04F	6	LOCK NUT
5	O-B-242	1	O-RING
6	F-HB-04C-24	1	HEX BOLT
7	F-HB-05C-32	2	HEX BOLT
8	F-HB-06C-60-GR5	2	HEX BOLT
9	02966	6	AIRCRAFT BOLT
10	15950-1	1	LOWER PACKING SPRING
11	85712-1	1	FLOW CONTROL BODY
12	15515	1	PLUG
13	85713-1	1	FLOW CONTROL ORIFICE
15	15888-1	1	AIR MOTOR PISTON
16	O-B-112	1	O-RING
17	O-B-157	1	O-RING
18	VLS-2429	1	COMPRESSION RING
19	VLS-2419	1	PISTON BODY
20	15983-1	1	CYLINDER HEAD
21	15991-1	1	CYLINDER
22	VLS-2415	2	PISTON CUP
23	VLS-2416	1	PISTON CUP SPACER
24	VLS-2417	1	PISTON CUP BACKUP
25	VLS-2420	1	BALL STOP
26	3102-16-1	1	FOOT VALVE SPRING
27	VLS-2402	1	FOOT VALVE BODY
28	VLS-2404	1	FEMALE COMPRESSION RING
29	VLS-2405	1	PISTON ROD PACKING SPA
30	VLS-2424	1	FOOT VALVE COLLAR
31	VLS-2414	1	PISTON BALL SPRING
32	52106-3	1	QUICK PIN CABLE ASSY
33	VPRO-1006	6	SLAVE ARM BUSHING
34	VPRO-1005	3	SLAVE ARM SPACER
36	F-HB-05C-12	2	HEX BOLT
37	O-V-129	2	O-RING
38	PF-ME-12-12J	1	MALE ELBOW
39	7701-4-5	1	PLASTIC PLUG
40	VPRO-1007	1	MOUNT BLOCK
41	VPRO-1003-01	1	LINK BAR
42	VPRO-1001	2	UPPER SLAVE ARM
43	VPRO-1002	2	LOWER SLAVE ARM
44	85728-3	1	CENTER SECTION ASSY
45	VPRO-2000	1	SHIFT BLOCK ASSY
46	85806-1	1	TRIP SLEEVE
47	85716-1	1	PISTON ROD
48	15951-1	1	SPRING RETAINER
49	VLS-2406	1	MALE COMPRESSION RING
50	VLS-2426	1	1/2" CHROME BALL
51	VLS-2427	1	3/4" CHROME BALL
	95033-EN	1	PUMP PRIME CAUTION LABEL (NOT SHOWN)
	95099-1	1	SLAVE ARM DECAL (NOT SHOWN)
	95084-EN	1	AIR SHUT OFF CAUTION LABEL (NOT SHOWN)

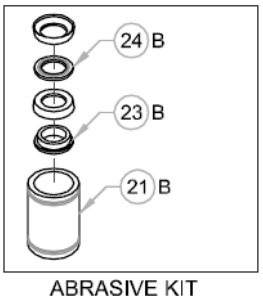
REPAIR KITS

PART NO.	DESCRIPTION
VPRO-45220-SK	SEAL KIT

OPTIONAL PARTS AND ASSEMBLIES

ITEM	PART NO.	QTY	DESCRIPTION
21B	15991-3	1	HARDENED CYLINDER
23B	3102-11-2	1	HARDENED PISTON CUP SPACER
24B	3102-12-2	1	HARDENED PISTON CUP BACKUP
52	7203-2-10	1	BALL STOP PIN





ABRASIVE KIT

MAGNUM VENUS PLASTECH

22 : 1 PRO PUMP - MULTI COLOR	VPRO-45220-MC

REV. - 03/02/11 BT2

22 : 1 PRO PUMP VPRO-45220-MC

PARTS LIST

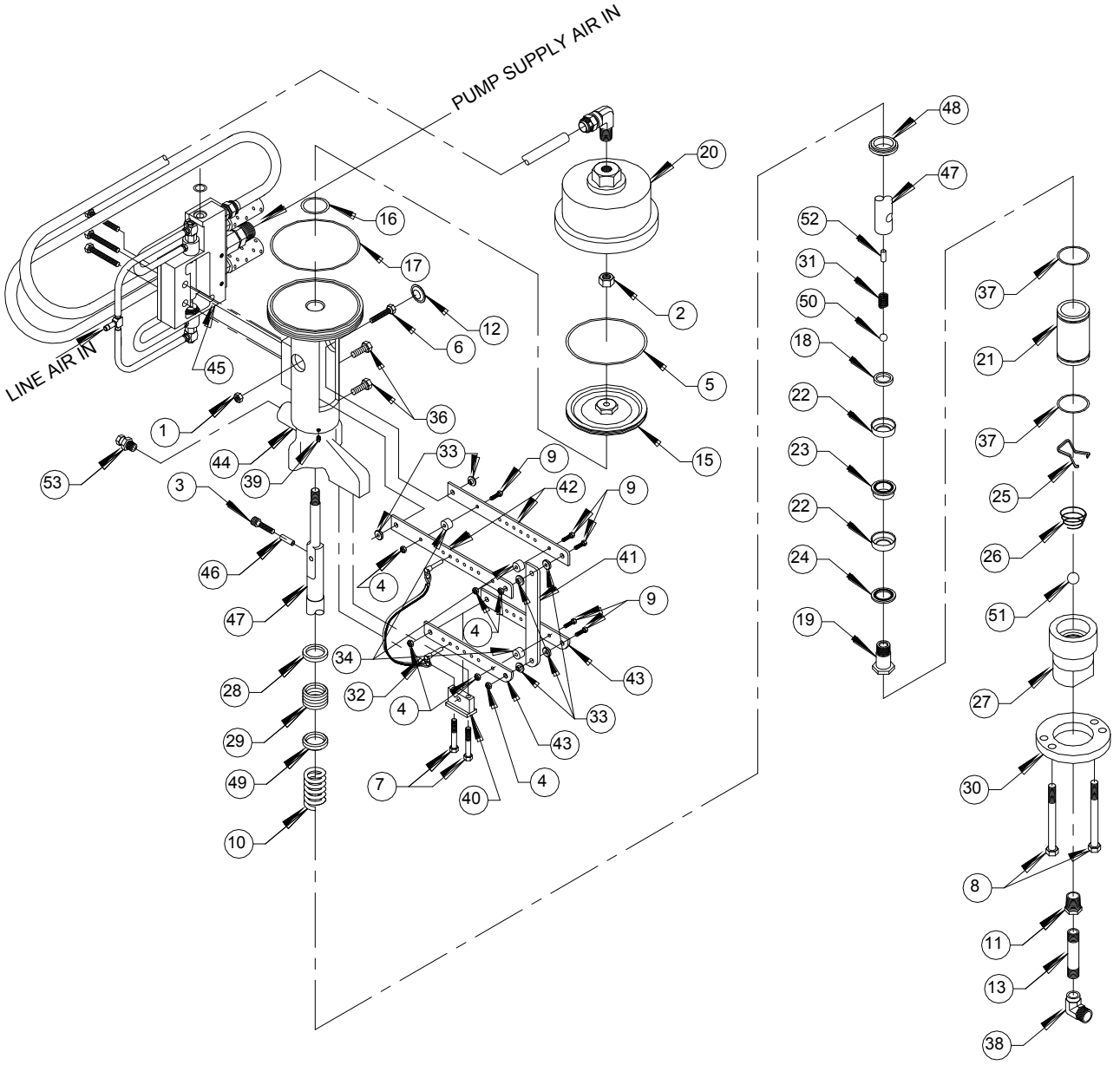
ITEM	PART NO.	QTY	DESCRIPTION
1	F-LN-04C	1	LOCK NUT
2	F-JN-07C	1	HEX NUT
3	F-CS-04C-24-SS	1	CAP SCREW
4	F-LN-04F	6	LOCK NUT
5	O-B-242	1	O-RING
6	F-HB-04C-24	1	HEX BOLT
7	F-HB-05C-32	2	HEX BOLT
8	F-HB-06C-60-GR5	2	HEX BOLT
9	02966	6	AIRCRAFT BOLT
10	15950-1	1	LOWER PACKING SPRING
11	PF-SW-06	1	HEX NIPPLE
12	15515	1	PLUG
13	15888-1	1	AIR MOTOR PISTON
14	O-B-112	1	O-RING
15	O-B-157	1	O-RING
16	VLS-2429	1	COMPRESSION RING
17	VLS-2419	1	PISTON BODY
18	15983-1	1	CYLINDER HEAD
19	15991-1	1	CYLINDER
20	VLS-2415	2	PISTON CUP
21	VLS-2416	1	PISTON CUP SPACER
22	VLS-2417	1	PISTON CUP BACKUP
23	VLS-2420	1	BALL STOP
24	3102-16-1	1	FOOT VALVE SPRING
25	VLS-2402	1	FOOT VALVE BODY
26	VLS-2404	1	FEMALE COMPRESSION RING
27	VLS-2405	1	PISTON ROD PACKING SPA
28	VLS-2424	1	FOOT VALVE COLLAR
29	VLS-2414	1	PISTON BALL SPRING
30	52106-3	1	QUICK PIN CABLE ASSY.
31	VPRO-1006	6	SLAVE ARM BUSHING
32	VPRO-1005	3	SLAVE ARM SPACER
35	O-V-129	2	O-RING
36	PF-SE-SW-12	1	SWIVEL STREET ELBOW
37	7701-4-5	1	PLASTIC PLUG
38	VPRO-1007	1	MOUNT BLOCK
39	VPRO-1003-01	1	LINK BAR
40	VPRO-1001	2	UPPER SLAVE ARM
41	VPRO-1002	2	LOWER SLAVE ARM
42	85728-3	1	CENTER SECTION ASSY.
43	VPRO-2000	1	SHIFT BLOCK ASSY
44	85806-2	2	TRIP SLEEVE
45	85716-1	1	PISTON ROD
46	15951-1	1	SPRING RETAINER
47	VLS-2406	1	MALE COMPRESSION RING
48	VLS-2426	1	1/2" CHROME BALL
49	VLS-2427	1	3/4" CHORME BALL
	95033-EN	1	PUMP PRIME CAUTION LABEL (NOT SHOWN)
	95099-1	1	SLAVE ARM DECAL (NOT SHOWN)
	95084-EN	1	AIR SHUT OFF CAUTION LABEL (NOT SHOWN)

REPAIR KITS

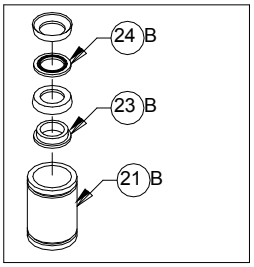
PART NO.	DESCRIPTION
VPRO-45220-SK	SEAL KIT

OPTIONAL PARTS AND ASSEMBLIES

ITEM	PART NO.	QTY	DESCRIPTION
21B	15991-3	1	HARDENED CYLINDER
23B	3102-11-2	1	HARDENED PISTON CUP SPACER
24B	3102-12-2	1	HARDENED PISTON CUP BACKUP
52	VLS-2425	1	BALL STOP PIN



NOTE:
THIS PUMP ASSY IS FOR EXTERNAL MIX ONLY



ABRASIVE KIT

MAGNUM VENUS PRODUCTS

22 : 1 PRO RIDER PUMP	VPRO-45220-NPR

REV. A = ADDED ITEM 53 PF-SW-06 11-01-05 BT2
REV. B = REMOVED NOTE FOR EXTERNAL MIX ONLY 11-29-06 JEM

22 : 1 PRO RIDER PUMP VPRO-45220-NPR

PARTS LIST

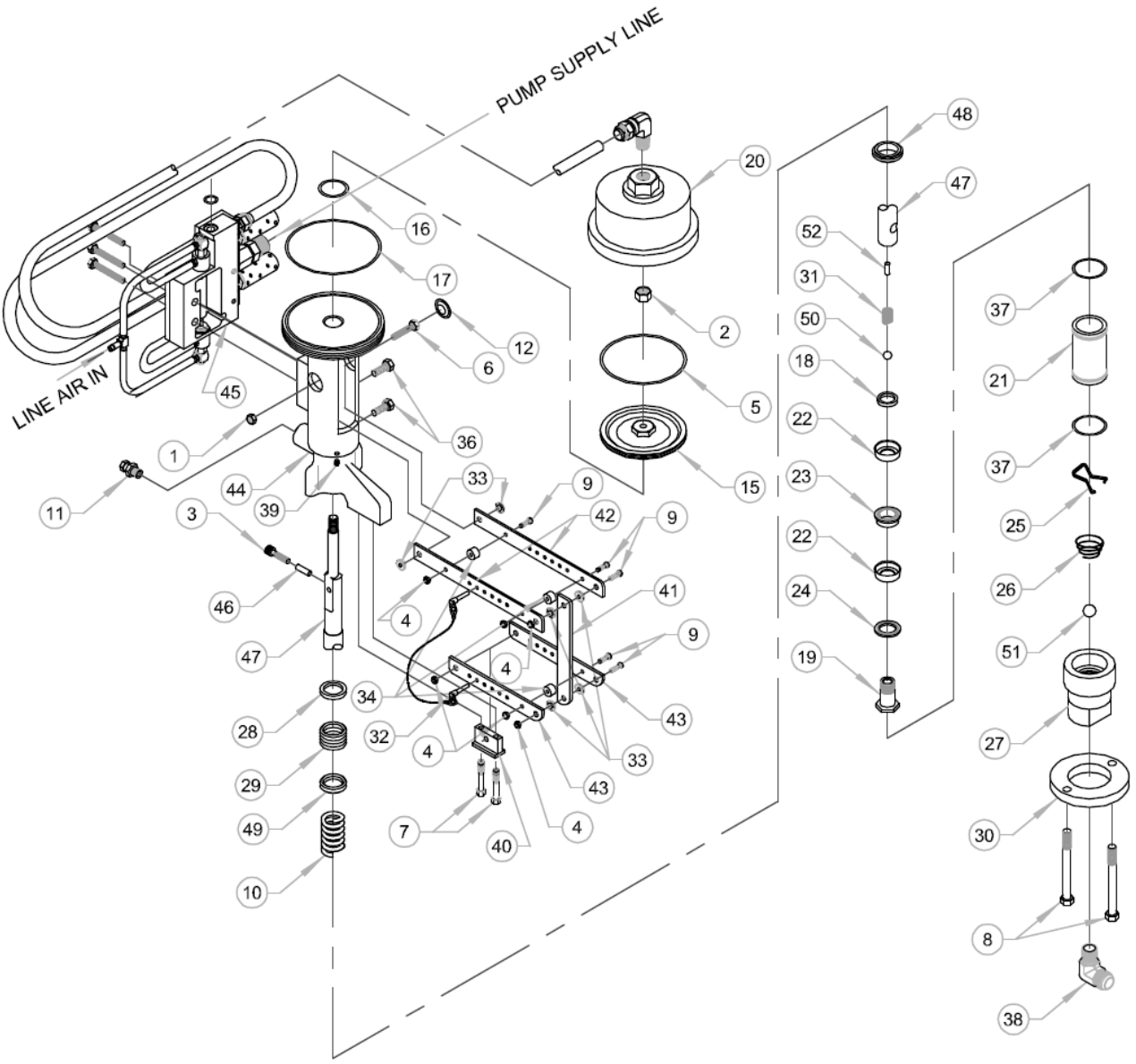
ITEM	PART NO.	QTY	DESCRIPTION
1	F-LN-04C	1	NYLOCK HEX NUT
2	F-JN-07C	1	HEX NUT
3	F-CS-04C-24-SS	1	CAP SCREW
4	F-LN-04F	6	LOCK NUT
* 5	O-B-242	1	O-RING
6	F-HB-04C-24	1	HEX BOLT
7	F-HB-05C-32	2	HEX BOLT
8	F-HB-06C-60-GR5	2	HEX BOLT
9	02966	6	AIRCRAFT BOLT
10	15950-1	1	LOWER PACKING SPRING
11	PF-RB-12-08	1	REDUCER BUSHING
12	15515	1	PLUG
13	PF-HN-08L	1	LONG NIPPLE
15	15888-1	1	AIR MOTOR PISTON
* 16	O-B-112	1	O-RING
* 17	O-B-157	1	O-RING
18	VLS-2429	1	COMPRESSION RING
19	VLS-2419	1	PISTON BODY
20	15983-1	1	CYLINDER HEAD
21	15991-1	1	CYLINDER
* 22	VLS-2415	2	PISTON CUP
23	VLS-2416	1	PISTON CUP SPACER
24	VLS-2417	1	PISTON CUP BACKUP
25	VLS-2420	1	BALL STOP
26	3102-16-1	1	FOOT VALVE SPRING
27	VLS-2402	1	FOOT VALVE BODY
28	VLS-2404	1	FEMALE COMPRESSION SPRING
* 29	VLS-2405	1	PISTON ROD PACKING SPA
30	VLS-2424	1	FOOT VALVE COLLAR
31	VLS-2414	1	PISTON BALL SPRING
32	52106-3	1	QUICK PIN CABLE ASSY
33	VPRO-1006	6	SLAVE ARM BUSHING
34	VPRO-1005	3	SLAVE ARM SPACER
36	F-HB-05C-12	2	HEX BOLT
* 37	O-V-129	2	O-RING
38	PF-SE-08	1	STREET ELBOW
39	7701-4-5	1	PLASTIC PLUG
40	VPRO-1007	1	MOUNT BLOCK
41	VPRO-1003-01	1	LINK BAR
42	VPRO-1001	2	UPPER SLAVE ARM
43	VPRO-1002	2	LOWER SLAVE ARM
44	85728-3	1	CENTER SECTION ASSY
45	VPRO-2000	1	SHIFT BLOCK ASSY
46	85806-1	1	TRIP SLEEVE
47	85716-1	1	PISTON ROD
48	15951-1	1	SPRING RETAINER
49	VLS-2406	1	MALE COMPRESSION RING
50	VLS-2426	1	1/2" CHROME BALL
51	VLS-2427	1	CHROME BALL
53	PF-SW-06	1	SWIVEL
	95033-EN	1	PUMP PRIME CAUTION LABEL (NOT SHOWN)
	95099-1	1	SLAVE ARM DECAL (NOT SHOWN)
	95084-EN	1	AIR SHUT OFF CAUTION LABEL (NOT SHOWN)

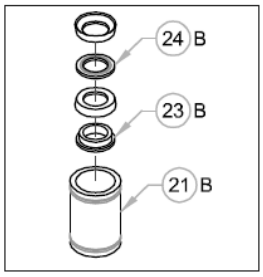
REPAIR KITS

PART NO.	DESCRIPTION
* VPRO-45220-SK	SEAL KIT

OPTIONAL PARTS AND ASSEMBLIES

ITEM	PART NO.	QTY	DESCRIPTION
21B	15991-3	1	HARDENED CYLINDER
23B	15878-3	1	HARDENED PISTON CUP SPACER
24B	15776-3	1	HARDENED PISTON CUP BACKUP
52	7203-2-10	1	BALL STOP PIN





ABRASIVE KIT

MAGNUM VENUS PLASTECH

ASSY - 7 : 1 PRO PUMP — VPRO-25700

REV. - 11/9/04 JEM
REV. A = REMOVED NOTE FOR EXTERNAL MIX ONLY 11/29/06 JEM
REV. B = UPDATED TO ALPHA NUMERIC, CORRECTED ITEM 15 11/04/09 BT2

ASSY - 7 : 1 PRO PUMP VPRO-25700

PARTS LIST

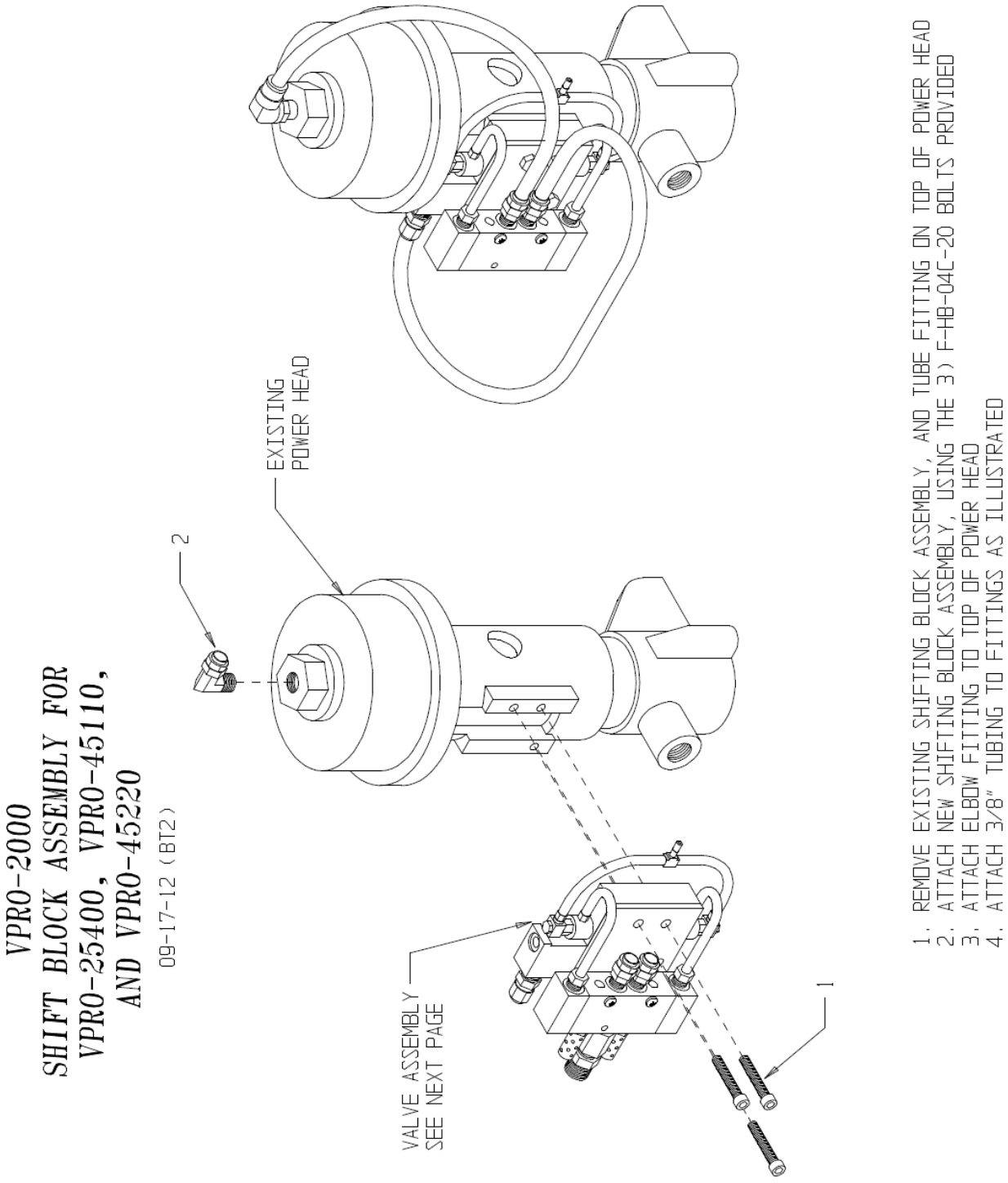
ITEM	PART NO.	QTY	DESCRIPTION
1	F-LN-04C	1	NYLOCK HEX NUT
2	F-JN-07C	1	HEX NUT
3	F-CS-04C-24-SS	1	SOCKET HEAD CAP SCREW
4	F-LN-04F	6	LOCK NUT
5	O-B-228	1	O-RING
6	F-HB-04C-24	1	HEX BOLT
7	F-HB-05C-32	2	HEX BOLT
8	F-HB-06C-60-GR5	2	HEX BOLT
9	02966	6	AIRCRAFT BOLT
10	15950-1	1	LOWER PACKING SPRING
11	PF-SW-06	1	SWIVEL FITTING
12	15515	1	PLUG
15	VPRO-25402	1	AIR MOTOR PISTON
16	O-B-112	1	O-RING
17	O-B-157	1	O-RING
18	VLS-2429	1	COMPRESSION RING
19	VLS-2419	1	PISTON BODY
20	VPRO-25401	1	CYLINDER HEAD
21	15991-1	1	CYLINDER
22	VLS-2415	2	PISTON CUP
23	VLS-2416	1	PISTON CUP SPACER
24	VLS-2417	1	PISTON CUP BACKUP
25	VLS-2420	1	BALL STOP
26	3102-16-1	1	FOOT VALVE SPRING
27	VLS-2402	1	FOOT VALVE BODY
28	VLS-2404	1	FEMALE COMPRESSION RING
29	VLS-2405	1	PISTON ROD PACKING SPA
30	VLS-2424	1	FOOT VALVE COLLAR
31	VLS-2414	1	PISTON BALL SPRING
32	52106-3	1	QUICK PIN CABLE ASSY
33	VPRO-1006	6	SLAVE ARM BUSHING
34	VPRO-1005	3	SLAVE ARM SPACER
36	F-HB-05C-12	2	HEX CAP SCREW
37	O-V-129	2	O-RING
38	PF-ME-12-12J	1	MALE ELBOW
39	7701-4-5	1	PLASTIC PLUG
40	VPRO-1007	1	MOUNT BLOCK
41	VPRO-1003-01	1	LINK BAR
42	VPRO-1001	2	UPPER SLAVE ARM
43	VPRO-1002	2	LOWER SLAVE ARM
44	85728-3	1	CENTER SECTION ASSY
45	VPRO-2000	1	SHIFT BLOCK ASSY
46	85806-1	1	TRIP SLEEVE
47	85716-1	1	PISTON ROD
48	15951-1	1	SPRING RETAINER
49	VLS-2406	1	MALE COMPRESSION RING
50	VLS-2426	1	1/2" CHROME BALL
51	VLS-2427	1	3/4" CHROME BALL
	95033-EN	1	PUMP PRIME CAUTION LABEL (NOT SHOWN)
	95099-1	1	SLAVE ARM DECAL (NOT SHOWN)
	95084-EN	1	AIR SHUT OFF CAUTION LABEL (NOT SHOWN)

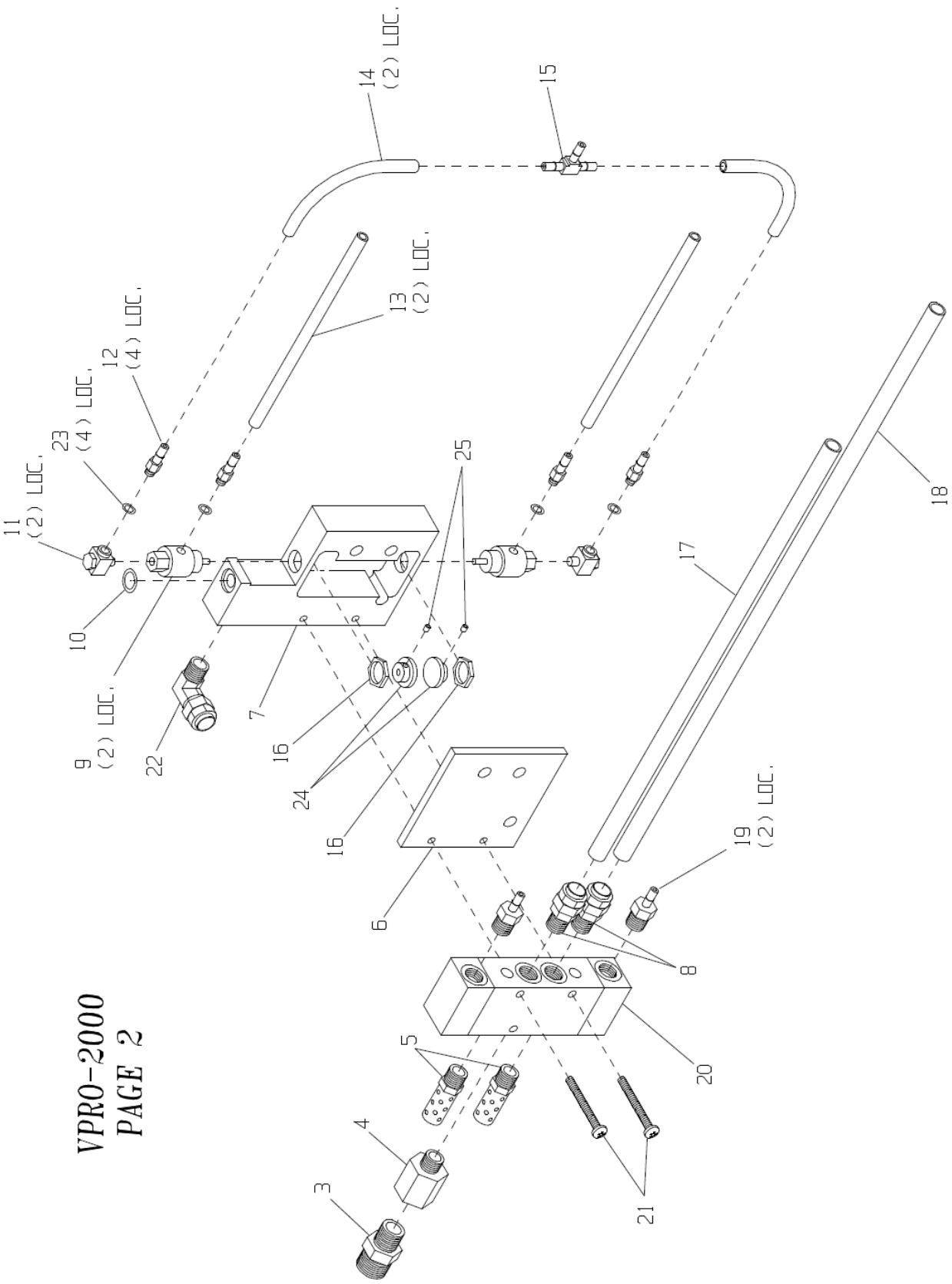
REPAIR KITS

PART NO.	DESCRIPTION
VPRO-25700-SK	SEAL KIT

OPTIONAL PARTS AND ASSEMBLIES

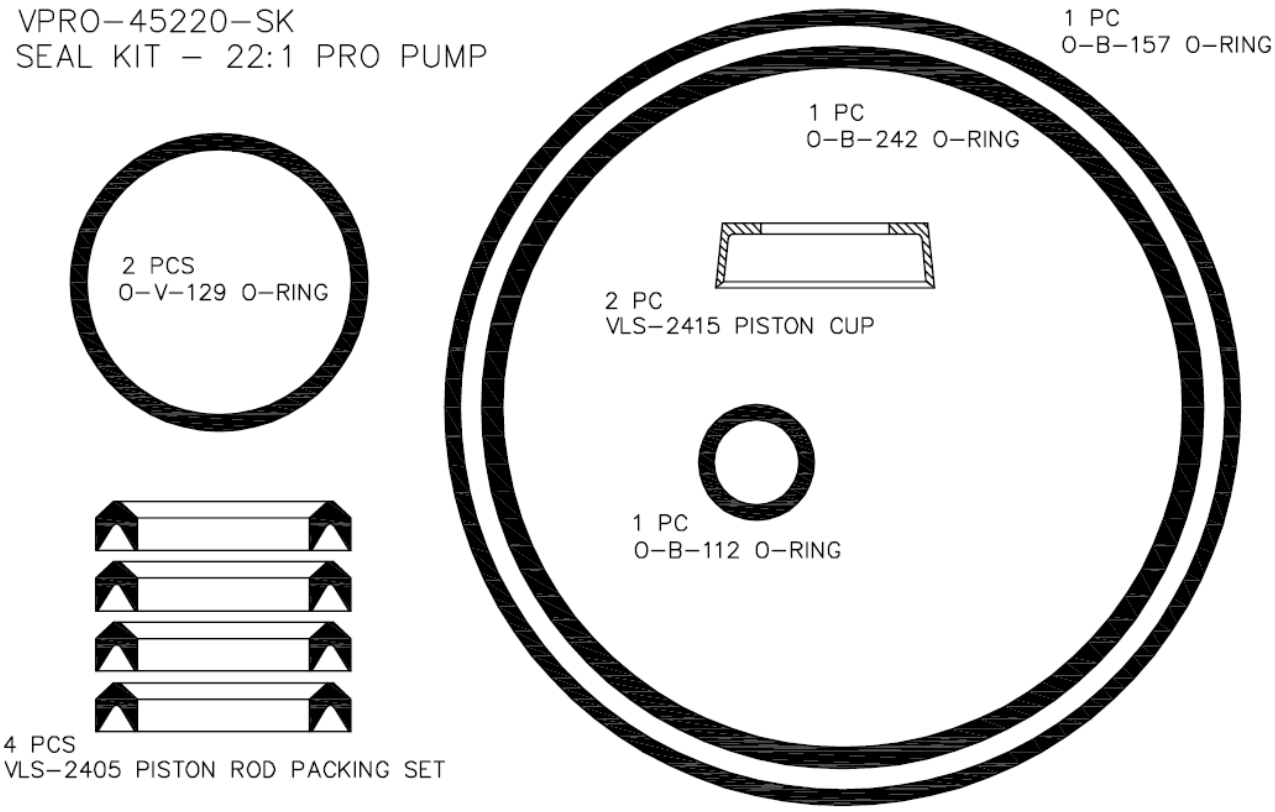
ITEM	PART NO.	QTY	DESCRIPTION
21B	15991-3	1	HARDENED CYLINDER
23B	3102-11-2	1	HARDENED PISTON CUP SPACER
24B	3102-12-2	1	HARDENED PISTON CUP BACKUP
52	VLS-2425	1	BALL STOP PIN

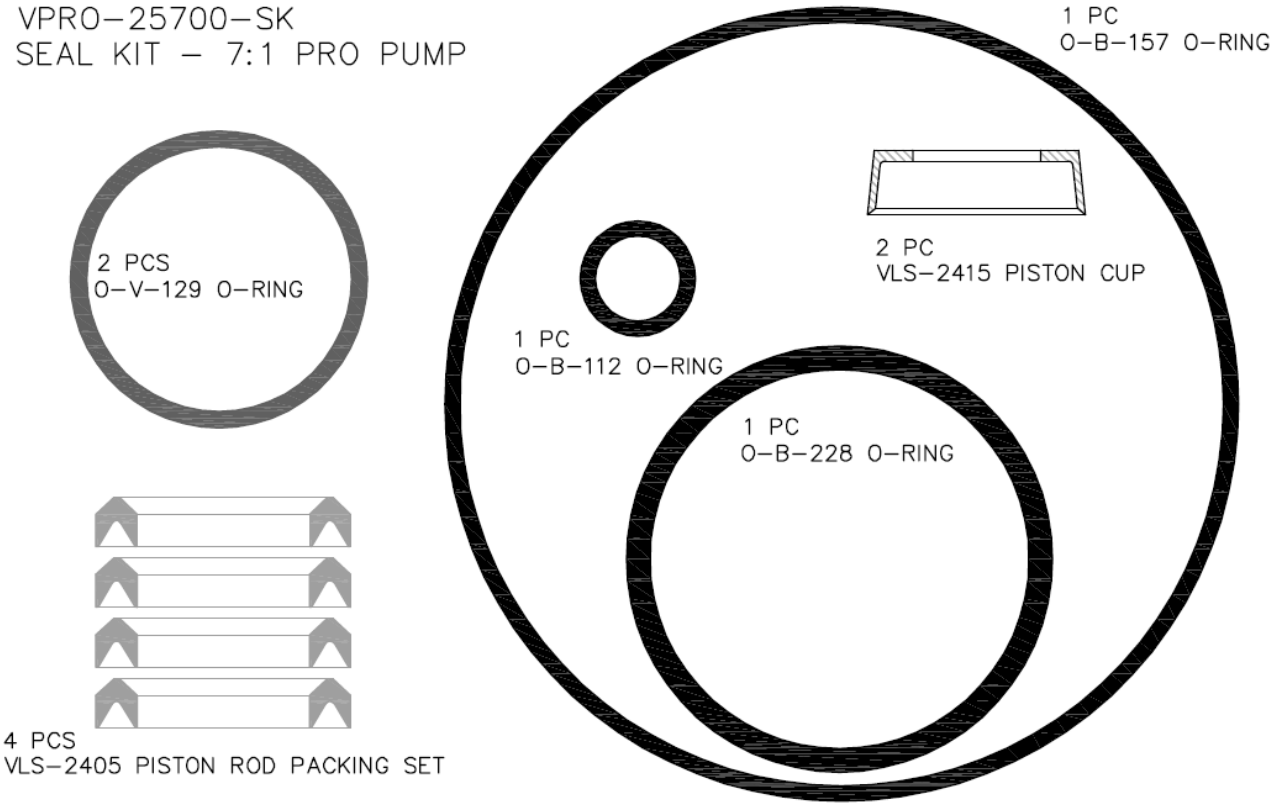

VPRO-2000
SHIFT BLOCK ASSEMBLY FOR
VPRO-25400, VPRO-45110,
AND VPRO-45220
09-17-12 (BT2)
EXISTING
POWER HEAD
2
VALVE ASSEMBLY
SEE NEXT PAGE
1
1. REMOVE EXISTING SHIFTING BLOCK ASSEMBLY, AND TUBE FITTING ON TOP OF POWER HEAD
2. ATTACH NEW SHIFTING BLOCK ASSEMBLY, USING THE 3) F-HB-04C-20 BOLTS PROVIDED
3. ATTACH ELBOW FITTING TO TOP OF POWER HEAD
4. ATTACH 3/8" TUBING TO FITTINGS AS ILLUSTRATED


VPRO-2000
PAGE 2
14 (2) LOC.
15
13 (2) LOC.
12 (4) LOC.
23 (4) LOC.
11 (2) LOC.
25
18
17
10
9 (2) LOC.
22
7
16
24
16
6
19 (2) LOC.
8
5
20
4
3
21

VPRO-2000
SHIFT BLOCK ASSEMBLY
09-17-12
PARTS KEY

ITEM	PART #	DESCRIPTION	QTY
1	F-CS-04C-20	HEX BOLT	3
2	7701-6-17	ELBOW	1
3	PF-HN-06S-04	NIPPLE	1
4	PF-RA-04-02	REDUCER	1
5	VPRO-2004	MUFFLER	2
6	VPRO-2002	GUARD	1
7	VPRO-2001	ACTUATOR	1
8	7701-6-4	TUBE FITTING	2
9	MPM-2598	ACTUATOR	2
10	O-S-012	O-RING	1
11	TRU-1021	ELBOW	2
12	7701-6-3	BARB FITTING	4
13	09073-6	TUBE	2
14	09073-5	TUBE	2
15	MPM-2584	TEE	1
16	MPM-2587	NUT	2
17	MPM-2583-1	TUBE	1
18	MPM-2583-16"	TUBE	1
19	MPM-2565	BARB FITTING	2
20	VPRO-2003	VALVE	1
21	F-MS-832-24	SCREW	2
22	7701-6-18	ELBOW	1
23	7304-3-1	SEAL	4
24	09127	PUSH BUTTON	2
25	F-SS-440-02-SS	SET SCREW	2


VPRO-45220-SK
SEAL KIT - 22:1 PRO PUMP
1 PC
O-B-157 O-RING
1 PC
O-B-242 O-RING
2 PCS
O-V-129 O-RING
2 PC
VLS-2415 PISTON CUP
1 PC
O-B-112 O-RING
4 PCS
VLS-2405 PISTON ROD PACKING SET


VPRO-25700-SK
SEAL KIT - 7:1 PRO PUMP
2 PCS
O-V-129 O-RING
4 PCS
VLS-2405 PISTON ROD PACKING SET
1 PC
O-B-157 O-RING
2 PC
VLS-2415 PISTON CUP
1 PC
O-B-112 O-RING
1 PC
O-B-228 O-RING

Revision Information:

Rev: 05/2010 Updated manual format, added Safety & Warning information, add revision information section, updated drawings, add back cover with MVP information, numbered pages and added footer.

Rev. 12/2010 Updated the drawings. Added the 7:1 Pro pump information and VPRO-25700 drawing.

Rev: 05/2012 Updated the manual format and Address. Added the optional Packing Sets to Pump Repair section. Added the Terms & Conditions of Sale section to the manual.

Rev: 11/2013 Updated the address and removed Plastech reference. Corrected the title at the top of the page. Updated the drawings.

Rev. 09/2014 Updated the manual format, Address, name and the Terms & Conditions of Sale. Removed references to Plastech.

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Assemblies Covered in this Manual:

VPRO-45220	22:1 Pump Assembly
VPRO-45220-IM	22:1 Pump Assembly – Internal Mix
VPRO-45220-MC	22:1 Pump Assembly – Multi-Color units
VPRO-45220-NPR	22:1 Pump Assembly – Pro Rider
VPRO-25700	7:1 Pump Assembly – 2” Air Motor