

# **FPRS-80-ABH**

# **Operations Manual**



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## **FPRS 80 ABH Operations Manual**

Congratulations on the purchase of your new **Finite Particle Removal System.™(FPRS)**

ASL Technologies, LLC FPRS is state of the art in the cost recovery of valuable fluids and extension of component life in hydraulic, dielectric, and solvent systems.

Please read this manual from start to finish. Critical information has been supplied in this manual to assist you with the theory, operation, and maintenance of the Finite Particle Removal System™ (FPRS).

# FPRS 80 ABH Operations Manual

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### IMPORTANT SAFETY INFORMATION

*READ CAREFULLY BEFORE ATTEMPTING TO ASSEMBLE, INSTALL, OPERATE OR MAINTAIN THE FINITE PARTICLE REMOVAL SYSTEM<sup>™</sup>. PROTECT YOURSELF AND OTHERS BY OBSERVING ALL SAFETY INFORMATION. FAILURE TO COMPLY WITH INSTRUCTIONS COULD RESULT IN PERSONAL INJURY AND/OR PROPERTY DAMAGE. RETAIN INSTRUCTIONS FOR FUTURE REFERENCE.*

#### SAFETY ALERT SYMBOL AND SIGNAL WORDS

The following safety alert symbol and signal words are used throughout this manual to call attention to and identify different levels of hazard and special instructions.



This safety alert symbol is used with signal words **WARNING** and **CAUTION** to call attention to safety statements.



**WARNING!** statements identify procedures or practices which must be followed to avoid serious personal injury or loss of life.



**CAUTION!** statements identify procedures or practices which must be followed to avoid minor personal injury or damage to this equipment.

#### ELECTRICAL SAFETY



**WARNING! ELECTRIC SHOCK can kill.** Your FPRS uses a high direct current voltage of 15,000 volts. Do not touch live electrical parts. Always disconnect power source before working on the system.

Avoid accidental starting. Make sure unit is turned "**OFF**" and is unplugged before working on system.

Protect the power cable from coming in contact with sharp objects. Replace or repair damaged or worn cord immediately.

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Safety devices such as interlocks and fuses should not be disconnected or shunted out.



**CAUTION!** The power source must be fused for 20 amps.

1. The motor is designed for operation on the voltage and frequency specified on motor nameplate.
2. Normal loads will be handled safely on voltages not more than 10% above or below the specified voltage.
3. Running unit on voltages not within range may cause overheating and motor burnout.
4. Heavy loads require the voltage at motor terminals be not less than the voltage specified.



**CAUTION!** If the wires of the motor which lead to the starting coil are interchanged, the direction of rotation will be reversed. A label on the motor describes the possible wiring configurations. There are many different combinations possible so only the diagram provided with the motor should be used.

Follow all local electrical and safety codes, as well as the National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA)

Install and maintain equipment according to USA Standard C1, National Electric Code.

Do not install FPRS units outdoors or unprotected from the elements. Do not use in a damp or wet location.

### **FLUID SAFETY**



**WARNING!** Do not pump flammable or explosive fluids such as gasoline. Do not use in explosive atmospheres. Failure to follow this warning can result in personal injury and/or property damage and will void the product warranty.

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**CAUTION!** Secure the discharge line before starting the system. An unsecured discharge line may whip, causing personal injury and/or property damage.

- ~ Do not exceed 40 psi on any component in the system.
- ~ Protect fluid lines from damage or puncture.
- ~ Maximum fluid temperature is 150° F. for cells with gray tube exterior.

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### **SECTION 1 -- INTRODUCTION**

#### SYSTEM OVERVIEW

The Finite Particle Removal System,<sup>™</sup> Patent Nos. 5,149,422 and 5,242,587, uses the most advanced technology available to clean and reuse oil (i.e., transformer, hydraulic, turbine) and solvent.

The FPRS is designed to connect directly to your machine's reservoir using quick disconnects for maximum efficiency. The FPRS draws the fluid into its system using its own pump. The pump sends the fluid through two water absorbers and electrostatic cells to accomplish the cleaning process. The fluid is then discharged through an output hose and back into your reservoir.

The FPRS utilizes a combination of electrostatic and magnetic fields to remove submicronic particles from non-flammable oils. This is accomplished by electrically influencing the particles in the oil to an opposite polarity. The influenced particles are attracted to one another and are retained by polyolefin foam used within ASL's patented electrostatic cell. Because the foam is polyolefin, water in concentrations of 500 ppm or less will not disrupt normal operations, although microamp readings will be slightly higher due to the conductivity of water.

The cell operates with alternating electrostatic and magnetic fields. If, for example, a particle is negative, it will seek the positive side of a magnetic plate. When the particles begin to collect together, one on top of the other, alternating as positive and negative particles, the foam filter inside the cell becomes a home for the particles and holds them in place. This collection of particles is a phenomenon known as "*strawing*".

Your FPRS comes equipped with An optional water absorption unit which can remove free and emulsified water down to 25 ppm. This feature covers a wide range of water problems. For very high concentrations of water or very large reservoirs, ASL has available water absorber carts and coalescer carts.

Each fluid to be cleaned has its own characteristics which require modifications in voltages, amperages, magnetic field density and the dedicated collection media used within the electrostatic cell. The cell provided in your unit has been built to meet your specific requirements. Therefore, when discussing your unit with us or when ordering cells, be sure to state the correct model number of the cell. The cell model number is labeled in red on top of the cell, i.e. R61CS-115, R62CS-115, etc.

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### **SECTION 2--IMPORTANT GUIDELINES**

- 2.1.0 *Oil temperature should not exceed 150° F. for cells with gray tube exterior.*
- 2.2.0 *Viscosity of the oil to be cleaned cannot exceed 1,800 SUS.*
- 2.3.0 The minimum *flash point of the oil should not be below 100° F.*
- 2.4.0 Concentrations of *water should not exceed 500 ppm.* If in excess, the water absorber feature should be used to reduce the water content to an acceptable level (less than 500 ppm) before the electrostatic cell is employed.
- 2.5.0 It is recommended the FPRS input hose be connected to or draw from the lowest point of a reservoir. Therefore, when hooking up to a reservoir for the first time or after a period of non-filtration, always drain free water from the bottom of the reservoir before using the FPRS.
- 2.6.0 The output hose should be returned to the highest point at the opposite end of the reservoir to ensure maximum distance between the input and output hoses.



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### SECTION 3 -- SYSTEM SAFETY FEATURES

Your FPRS comes equipped with several features which are designed to provide operator and environmental safety. Following is a brief description of these features.

- 3.1.0 **Safety switch.** If the cabinet lid is lifted while the FPRS is running, the system will stop completely and red "**Low Voltage**" light will turn on.
- 3.2.0 **Float switch.** If a fluid leak develops and fills the drip pan in the bottom of the cabinet, the float switch will be activated, the system will stop completely and the red "**Float Switch**" light will turn on.
- 3.3.0 **Absorber Overpressure/Fluid Low Temp.** If the fluid pressure within the absorber canister rises above normal operating limits, the white "**Absorber Overpressure/Fluid Low Temp**" light will turn on. This feature has two stages:
  - 3.3.1 At 38 psi, the warning light will turn on and the system will continue running.
  - 3.3.2 At 40 psi, the warning light will remain on, the system will continue running, and the pump will enter a bypass condition to ensure the pressure in the absorber canister does not rise above 40 psi.
  - 3.3.3 These conditions can be triggered by several causes:
    - 3.3.3.1 The system output has become obstructed (i.e., the hose is kinked);
    - 3.3.3.2 The water absorber element has become saturated with water;
    - 3.3.3.3 The temperature of the oil being filtered has dropped to a point that it creates excessive pressure.
  - 3.3.4 For instructions on troubleshooting this warning condition, please refer to "**Section 7 - Trouble Shooting.**"

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### SECTION 4 -- SYSTEM PREPARATION

***NOTE: IT IS EXTREMELY IMPORTANT THAT THE FOLLOWING STEPS BE DONE IN ORDER TO ENSURE PROPER SET-UP AND OPTIMUM RESULTS FROM THE FPRS!***



- 4.1.0 ***CAUTION!*** Before plugging in this ASL unit, check the polarity of your extension cord. ***Also, verify that earth ground is present.***
- 4.2.0 Open the cabinet lid and remove the front panel to expose the internal mechanisms.
- 4.3.0 Check the wire and hose connections to and from the FPRS. It is important that these connections are tight and have not shaken loose during shipment. Tighten the connections if they are loose. ***Do not over-tighten.***
- 4.4.0 Check the quick disconnects of the cells to ensure that they are locked in place. (The outer ring of the quick disconnects slide back to lock and unlock the disconnect.)
- 4.5.0 ***Do not operate the system with the front panel removed.*** Replace the front panel and close the lid.
- 4.6.0 Take a sample of the fluid to be cleaned.
  - 4.6.1 Use a clean bottle to take the sample.
  - 4.6.2 The sample should be taken from the lowest point of the reservoir, preferably the drain cock or valve, because this is where the FPRS input hose will draw from. Free water should be drained from the reservoir before the FPRS is hooked up.
  - 4.6.3 Test the sample to ensure that the fluid does not surpass the guidelines of the system as set forth in Section 2.

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The FPRS is now ready to be charged (filled) for operation and tested to ensure that no connections have loosened during shipment. The FPRS should be charged with the same fluid it has been designated to clean.

### 4.7.0 HOSE CONNECTIONS FOR START-UP

It is recommended that connections to reservoirs be made with quick disconnects to minimize ingress of contaminants when hooking up and operating the FPRS.

4.7.1 Connect the hoses to the FPRS using the quick disconnects.

4.7.2 The hose with the quick disconnect **plug** is the system input hose and should be secured to the lowest point of the fluid reservoir. If there is no place to secure the hose, simply place the hose in the fluid near the bottom of the tank.

4.7.3 The hose with the quick disconnect socket is the system output hose and at this point should be placed into an empty 5-gallon container.



4.7.4 **CAUTION! HANDLE THE HOSES SO THAT SPILLS CANNOT TAKE PLACE.**

### 4.8.0 SYSTEM START-UP

4.8.1 Plug the FPRS into a grounded 110V AC outlet.

4.8.2 Turn the power switch to the **ON** position. A 15 second delay will occur prior to system turn on. The water absorbers will take a few minutes to fill with fluid. When fluid begins to flow from the system output hose, allow 3 gallons to fill the pail. Place the system input hose into the pail and allow the water absorber to run close-loop for 5 minutes.



4.8.3 **WARNING!** Turn **OFF** and unplug system. Open the lid and remove the front panel.

4.8.4 Check to ensure there are no leaks.

4.8.5 Replace the front panel and close the lid.

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### 4.9.0 HOSE CONNECTIONS FOR NORMAL OPERATION

- 4.9.1 Move the input hose back to the fluid reservoir as in 4.7.2 above.
- 4.9.2 The black hose with the quick disconnect socket is the system output hose and should be connected to the top of the fluid reservoir.

## SECTION 5 -- NORMAL OPERATION

Your FPRS system has been designed to operate continuously on a fluid reservoir with little operator attention. However, it is recommended to check the control panel daily to monitor system condition.

- 5.1.0 During normal operation, the control panel should display the following:
  - 5.1.1 The green "**Power On**" light should be on.
  - 5.1.2 The red "**Low Voltage**" light should be off.
  - 5.1.3 The red "**Float Switch**" light should be off.
  - 5.1.4 The two yellow "**Backflush**" lights should be off.
  - 5.1.5 The white "**Absorber Overpressure/Fluid Low Temp**" light should be off.
  - 5.1.6 The "**Microamperes**" meter should read between 0 and 650 microamps. This meter provides a way for you to measure the amount of contamination collected inside the electrostatic cell. The higher the reading, the more contamination in the cell--a prediction of how soon backflushing will be necessary.
  - 5.1.7 The "**Cell Pressure**" gauge should read between 0 and 40 psi.
  - 5.1.8 The "**Absorber Pressure**" gauge should read between 0 and 40 psi.
- 5.2.0 **If any of the warning lights (5.1.2, 5.1.3, 5.1.4 or 5.1.5) come on, turn the Power Switch OFF and refer to the "Trouble Shooting" section of this book.**

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### 5.3.0 BACKFLUSH OPERATION

Backflushing of the cell is unique to the Finite Particle Removal System. This operation allows the cells to be reused without being replaced under normal use. (Under normal operating conditions, electrostatic cells and water absorber elements should be changed annually.)

When the cell becomes filled with contaminants, and the amber "**Backflush**" light turns on, the cells need to be backflushed. Cells are backflushed separately, one at a time.



- 5.3.1 **WARNING!** Turn **OFF** and unplug the FPRS.
- 5.3.2 Open the lid and remove the front panel.
- 5.3.3 Disconnect the input and output hoses from the cell and set aside.
- 5.3.4 Attach a backflush hose to the quick disconnect at the bottom of the cell.
- 5.3.5 Place the free end of the backflush hose into a 5-gallon pail.
- 5.3.6 Using a shorter backflush hose, connect plant air supply **REDUCED TO 10 PSI** to the quick disconnect at the top of the cell.
- 5.3.7 Allow 10 psi of air to flush the contaminants out of the cell and into the pail for disposal.
- 5.3.8 Leave the air pressure on until contaminants are no longer dispensed out of the backflush hose. (Approximately 10 minutes)







**CAUTION!** *Backflush hose will jump around as air reaches it.*

- 5.3.9 Remove the backflush hoses and replace the input and output hoses to the top and bottom of the cell at their original configuration--blue hose to bottom of cell and gray hose to top of cell.
- 5.3.10 Perform steps 5.3.3 through 5.3.9 for the second cell.
- 5.3.11 Replace the front panel, close the top lid and plug in the FPRS.
- 5.3.12 Restart the system and check the "**Backflush**" light to ensure that it has gone out.
- 5.3.13 If it remains on, refer to the "**Trouble-Shooting**" section of this book.

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### 5.4.0 CELL REMOVAL

Under normal operating conditions, electrostatic cells should be changed out annually. When you replace your electrostatic cell(s), perform the following steps:

-  5.4.1 **WARNING!** Turn **OFF** and unplug the FPRS.
- 5.4.2 Open the lid and remove the front cover.
- 5.4.3 Disconnect the high voltage wires as follows:
-  5.4.4 **WARNING!** Short across the positive and negative electrodes using a screw driver with an insulated handle to dissipate static electricity.
-  5.4.5 **WARNING!** Each cell has a **positive (red)** lead and a **negative (green)** lead connected to it. **NEVER** touch both leads at the same time.
- 5.4.6 Disconnect the high voltage wire connections leading to the top of the cell; **using one hand**, grasp the boot connected to the green wire and pull up. Repeat with the boot connected to the red wire.
- 5.4.7 Remove the input and output hoses by releasing the quick disconnects.
- 5.4.8 On the outside of the cabinet, loosen the four screws two turns.
- 5.4.8 Lift the cell out of the cabinet.
- 5.4.9 Replace with a new or rebuilt cell. Ensure that the cell is inserted correctly with the high voltage wire leads pointing upwards.
- 5.4.10 Attach quick disconnect with blue hose to the bottom of the cell and gray hose to the top of the cell.
- 5.4.11 Replace the high voltage wires to the cell. **Red is positive. Green is negative.**  
Tighten the four screws holding the cell from the outside.
- 5.4.12 Replace the front panel and close the lid.
- 5.4.13 Restart the FPRS and operate system for a few minutes. Ensure that fluid is being dispensed through the output hose.
-  5.4.14 **WARNING!** Once fluid is dispensed through the output hose, turn system **OFF** and unplug the FPRS.
- 5.4.15 Open the lid, remove the front panel and check for leaks.
- 5.4.16 Replace the front panel and close the lid. The FPRS is now ready to resume operation.

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### 5.5.0 CHANGING THE WATER ABSORBER ELEMENTS

(Under normal operating conditions, water absorber elements should be changed annually.)

- 5.5.1 If the white "**Overpressure**" light is on and the oil temperature is >95° F., the water absorber elements must be replaced. Elements are replaced separately, one at a time.



- 5.5.2 **WARNING!** Turn **OFF** and unplug the FPRS.
- 5.5.3 Open the lid and remove the front panel.
- 5.5.4 Locate the water absorber canister and the gray drain hose on bottom of canister. Put free end in shallow pan. Open lever spigot and drain as much oil as possible into pan.
- 5.5.5 While the oil is draining, loosen the T-bar at top of canister and remove lid.
- 5.5.6 Remove used absorber element.
- 5.5.7 Unpack new element. ***Check to ensure there is a seal on the top and bottom of the shaft opening. If not, transfer the seals from the old element.*** Place inside canister.
- 5.5.8 Apply a thin coat of your oil to the gasket on the canister lid. Replace canister lid. ***Hand tighten the T-Bar. Do not use a wrench.***
- 5.5.9 Close the lever spigot on the bottom of the absorber canister.
- 5.5.10 Perform steps 5.5.4 through 5.5.9 for the second absorber canister.
- 5.5.11 Replace the front panel, close the lid and plug the FPRS into a grounded 110V AC outlet.
- 5.5.12 Turn the power switch to the **ON** position. A 15 second delay will occur prior to system turn on. The water absorber will take a few minutes to fill with fluid. When fluid begins to flow from the system output hose, allow 3 gallons to fill the pail. Place the system input hose into the pail and allow the water absorber to run close-loop for 5 minutes.
- 5.5.13 **WARNING!** Turn **OFF** and unplug system. Open the lid and remove the front panel.
- 5.5.14 Check to ensure there are no leaks.
- 5.5.15 Replace the front panel and close the lid.
- 5.5.16 Re-connect system hoses to reservoir.
- 5.5.17 The FPRS is now ready to resume operation.





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### SECTION 6 -- MAINTENANCE

#### 6.1.0 DAILY MAINTENANCE

##### 6.1.1 Check controls:

<u>Control type</u>	<u>Normal Condition</u>	<u>Turns On At:</u>
Red Low Voltage Light	Off	700 uA
Red Float Switch Light	Off	Full drip pan
Amber Backflush Light	Off	500 uA
White Absorber Overpressure/ Fluid Low Temp Light	Off	38 psi
Green Power Light	On	N/A
Microampere Meter	0 - 500 uA	N/A
Cell Pressure Gauge	0 - 40 psi N/A	
Absorber Pressure Gauge	0 - 40 psi N/A	

#### 6.2.0 MONTHLY MAINTENANCE

- 6.2.1 Check entire system for loose screws or connections.
- 6.2.2 Inspect power cord for wear.
- 6.2.3 Inspect unit for possible damage or leaks.

#### 6.3.0 YEARLY MAINTENANCE

- 6.3.1 Change out cells.
- 6.3.2 Change out water absorber elements.  
(if equipped)

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## SECTION 7--TROUBLE-SHOOTING THE FPRS 80 ABH

The following is a guide to solving problems which may occur while using the FPRS. Use it as a guide; but don't hesitate to contact an authorized FPRS dealer to answer any further questions.

<u>PROBLEM</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
NO GREEN POWER LIGHT	<ul style="list-style-type: none"> <li>* FPRS unplugged</li> <li>* Fuse on display blown</li> <li>* Power switch defective</li> <li>* Light bulb burned out</li> </ul>	Plug unit in Replace fuse Call ASL for replacement Restart system. If pump comes on in 15 seconds, replace bulb.
OVERPRESSURE/FLUID LOW TEMP (WHITE LIGHT)	<ul style="list-style-type: none"> <li>* Flow restricted downstream of pump</li> <li>* Check oil temperature:</li> <li>* If oil temp is &lt; 95° F., Heat oil &gt; 95° F. cold high viscosity oil</li> <li>* If oil temp is &gt; 95° F.: Absorber filled with water or cell filled with dirt.</li> </ul>	Check hoses for kinks; check cell quick disconnects to make sure they are properly seated; check return line valves to make sure they are fully open.  Set selector valve on bottom canister to "Water Absorber Only" and restart cart. If Absorber pressure drops to normal (25psi), backflush cell (10 PSI Maximum). If absorber pressure stays high, change absorber.
LOW VOLTAGE (RED LIGHT)	<ul style="list-style-type: none"> <li>* If red light flashes and microamp meter pulses near 0, power supply is malfunctioning.</li> <li>* If red light turns off and microamp meter = steady 0, electrostatic cell has a high dirt or water content.</li> </ul>	Change power supply.  Backflush cell, checking progress by turning switch on every few minutes. Backflush until microamp meter reads 100 uA when high voltage lead is reattached
To determine causes: Shut power off. Unhook cell high voltage lead and turn on power. Momentarily depress cover safety switch and check microamp meter		
MICROAMP READING DROPS ALTHOUGH CELL HAS NOT BEEN BACKFLUSHED	<ul style="list-style-type: none"> <li>* If particle count has not risen: necessary.</li> <li>* If particle count has risen:</li> </ul>	Water absorber has removed water from oil and it is less conductive. No action is necessary. Cell plates are coated and require rebuild. Contact ASL for replacement.

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## Trouble-Shooting (Contd.)

<u>PROBLEM</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
PUMP DOES NOT RUN	* System has 15 second delay. * Electricity not getting to pump.	Wait past delay period. Check voltage at CR2 relay. If not 110 Volts, change CR2 relay
SLOW OUTPUT FLOW	* Oil level in reservoir below intake. * Water absorber or cell over pressure. * Cold high viscosity oil	Add oil or place hose properly. Change or backflush as required. Heat oil > 95° F.

Normal operation of the FPRS will sometimes allow excess water or dirt to enter cells and shut down the system. This condition does not damage unit. Only cleaning or drying is necessary to return the unit to normal service.

Like all equipment, training or experience is necessary to prevent the inconvenience caused by operator errors. The system will not be damaged by operator error, but some amount of time may be required to correct those problems.

*Call anytime with questions or comments.  
Customer Service and Satisfaction are ASL's #1 priorities.*

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### SECTION 8 -- CELL REBUILD PROGRAM

The Electrostatic Cell in your FPRS™ (Finite Particle Removal System) was designed to provide many hours of superior filtration. Like anything else, it occasionally needs care and maintenance. It is strongly recommended that the Cell be rebuilt once each year to insure optimum cleaning performance. The re-build/exchange program has been organized to provide minimum downtime and maximum performance.

All re-built Electrostatic Cells contain all new internal parts, and are subjected to the same final testing criteria as the new cells you received with your ASL FPRS™ system. The only parts re-used (provided they meet spec.) are the end caps and outer tube.

When you receive your Electrostatic Cell, please note that the red tag affixed to the top of the cell contains part number information, as well as the date the cell was made. A blank area is left open for you to fill in the date the cell was installed in your system. This will help you determine when the cell should be exchanged.

When you are ready to replace your Electrostatic Cell, please follow these steps:

1. Look at the red tag on the top of the cell to locate your part number. (R61CS-115, for example)
2. Send your P.O. to ASL via Phone, Fax, mail, or e-mail (custsvc@aslfilter.com) with the quantity and part number requested.
3. When you receive your cell, install it in your unit, and return the used cell in the shipping box. (Please backflush the return cell for 15 minutes at 10 psi to drain as much fluid as possible.)

You should order your re-built cells early so you won't be down, waiting for your new cells to arrive. Please remember to **backflush returned cells** prior to sending them back to us. This will save you on shipping costs, (a re-built cell weighs 16 pounds, and most returned cells weigh in at 28 pounds) as well as saving the environment, as we have to dispose of the used, contaminated oil and internal components.

**Please heed the one year Electrostatic Cell replacement recommendation! The number one cause of premature power supply failure stems from not changing the cell annually.**

Note that if the used cells are not returned to us within 30 days, you will be invoiced separately for a core charge of \$299.00 for each cell.  
Thanks for your cooperation.

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### SECTION 9 -- WARRANTY INFORMATION

**ASL Technologies, LLC** ("ASL") warrants this product to be free from defects in material and workmanship for a period of one (1) year, from date of shipment, excluding expendables, in accordance with the following terms and conditions:

This warranty extends only to the original purchaser ("owner").

This warranty does not include damage to the product resulting from accident, misuse or abuse, improper installation or operation, lack of reasonable care, or unauthorized repair or alteration.

Should this unit fail during the warranty period, ASL will repair or replace it at our option. Replacement products supplied under this warranty may be new or rebuilt at our option. The expense of delivering the product to ASL for warranty work, and the expense of returning it back to the owner after repair or replacement, will be paid for by owner. ASL will assume no field expense for service or parts unless authorized by it in advance.

**This warranty is the only warranty extended by ASL to suppliers and/or purchasers of this product. No other warranty, written or oral, is authorized. ASL disclaims all other warranties, express or implied that arise by operation of law, except that implied warranties of merchantability or fitness for a particular purpose are limited to the duration of the warranty period. ASL shall not be liable for any incidental, consequential or other damage which may have resulted from any alleged breach of warranty, including any cost or expense of providing substitute equipment or service during periods of malfunction or non-use.**

Some states do not allow limitation on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages, so the above stated limitations or exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

For instructions on how to obtain warranty service, contact:

**ASL Technologies, LLC**  
10525 W. US Hwy 30, Bldg. 3D  
Wanatah, In. 46390  
Telephone: 219.733.2777 Fax: 219.733.2779

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### SECTION 10 -- ORDERING SPARE AND REPLACEMENT PARTS

A Spare Parts List for your FPRS is included on the following page. Prompt service can be given for spare or replacement parts if ASL has the following information:

1. The part number(s) of the item(s) you need. The Spare Parts List includes the most frequently requested items.
2. The quantity needed. Please remember to order spares, if needed.
3. Order fulfillment information:
  - ~ Preferred shipping carrier information
  - ~ Regular, Second-Day or Next Day Air Service
  - ~ "Bill to" Address
  - ~ Shipping Address (we cannot ship to a P. O. Box)
  - ~ Purchase Order Number

Parts will be invoiced F.O.B., Merrillville, IN, at the prices in effect at the time of the shipment. Terms will be Net 30 days.

The ASL Representative for your area will be glad to assist you in obtaining prices and receiving purchase orders. Should you prefer, please contact ASL directly.

Order Address: ASL Technologies. LLC  
 Parts Department  
 10525 W. US Hwy 30  
 Bldg. 3D  
 Wanatah, IN 46390

Telephone: 219.733.2777  
 Toll-free: 888.333.2990  
 FAX: 219.733.2779

**SPARE PARTS**

For Cells see page 18	R61CS-115	X	X	
P-8 Power Supply	CS2223P8	X	X	
Absorber Element	WAEB18	X	X	<u>Cabinet</u>
Spark Plug Boot	727402	X	X	<u>Interior</u>
Spark Plug Terminal	727006	X	X	
Interlock Switch	07F038	X		
Float Switch	2X613	X		

40/80 ABH 40/80 SBO

Pump Assembly

Viking Pump/Motor 40GPH	SGO518-GOV	X	X
Viking Pump/Motor 80GPH	SGO535-GOV	X	X
Sample Port	TCM20-1/4"	X	X

Control Panel/Controls

Circuit Breaker, 10 amp	4AO45		X
Fuse, 10 amp	MDL10	X	
Relay, 10 amp	2W928-2	X	X
Relay Socket, 10 amp	2A582E	X	X
Hour Meter	711-0130	X	X
Timer, Solid State	KMKR5A115	X	X
Current meter	SM1212-264818	X	X
On/Off Switch Assembly			
Rotary Knob	B4KL2	X	
Connector	B3M	X	
Contact Block	B4T10	X	
Lamp Holder	B4F	X	
Lamp Lens red	B4RH RED	X	
Lamp Lens Amber	B4RH YELLOW	X	
Lamp Lens White	B4RH WHITE	X	
Lamp, Amber	1050 QC3		X
Lamp, Green	1052 QC5		X
Lamp, Red	1050 QC1		X
On/Off Switch	7500K14		X
Pressure Gauge 0-100 psi	103D-208E	X	

Water Absorber Assembly

"O" Ring, Buna	01-445	X	X
Pressure Switch	PDA-4-4R4M-C-FL	X	
Pressure Switch	PDA-4-4R4M-C-HN		X
Drain Valve	MV608-4	X	X
Ball Valve	VME1-A9 1/2"	X	X
3-Way selector Valve	76-603-1	X	X
Pressure Gauge 0-60 psi	102D-204D		X

Hose & Accessories

1/2" Blue Push-on Hose (ft)	7212-501BL	X	X
1/2" Gray Push-on Hose (ft)	7212-501GY	X	
3/8" Gray Push-on Hose (ft)	7212-381GY	X	
1/2" NPT x 1/2" Hose Barb	30182-8-8	X	X
3/8" NPT x 1/2" Hose Barb	30182-6-8	X	X
3/8" NPT x 3/8" Hose Barb	30182-6-6	X	X

Couplings

1/2" QD Male	DHP880	X	
1/2" QD Female	DHS880	X	
3/8" QD Male	DHP660	X	
3/8" QD Female	DHS660	X	X

# ASL TECHNOLOGIES, LLC ELECTROSTATIC CELL PART NUMBERS

<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>-</b>	<b>X</b>
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Cell Type	Cell Size	Configuration	System Press	Temp	Foam Size
		1=Low Conductivity 2= 4= 6= High Conductivity	2=FPRS 200 ABH 4= FPRS 40 SBO 8= FPRS 80 SBO C= FPRS 40/80 ABH Other= Custom; Please call ASL	S= Standard	100= Basic 115= Standard 150= Fine
	6= 6" Daimeter T= 12" Diameter				

N= New/Spare  
R= Rebuilt



# PRODUCT SPECIFICATIONS

## FPRS 80 ABH

### PHYSICAL DIMENSIONS:

Filter Cabinet: 35H x 20" W x 11" D  
Overall: 47H x 23 deep  
Water Absorber Cannister: 24" H x 10.5" Diam.

SHIPPING WEIGHT: 300 lbs.

MOTOR: 1/3 HP  
1725 RPM  
110 VAC 60 Hz  
6 amps continuous  
13 amps startup

PUMP: 80 gph w/100 SUS Fluid  
1/2" NPT Side Ports, Inlet and Outlet

WATER ABSORBER: 18" Stacked Water Absorber Element  
(optional)

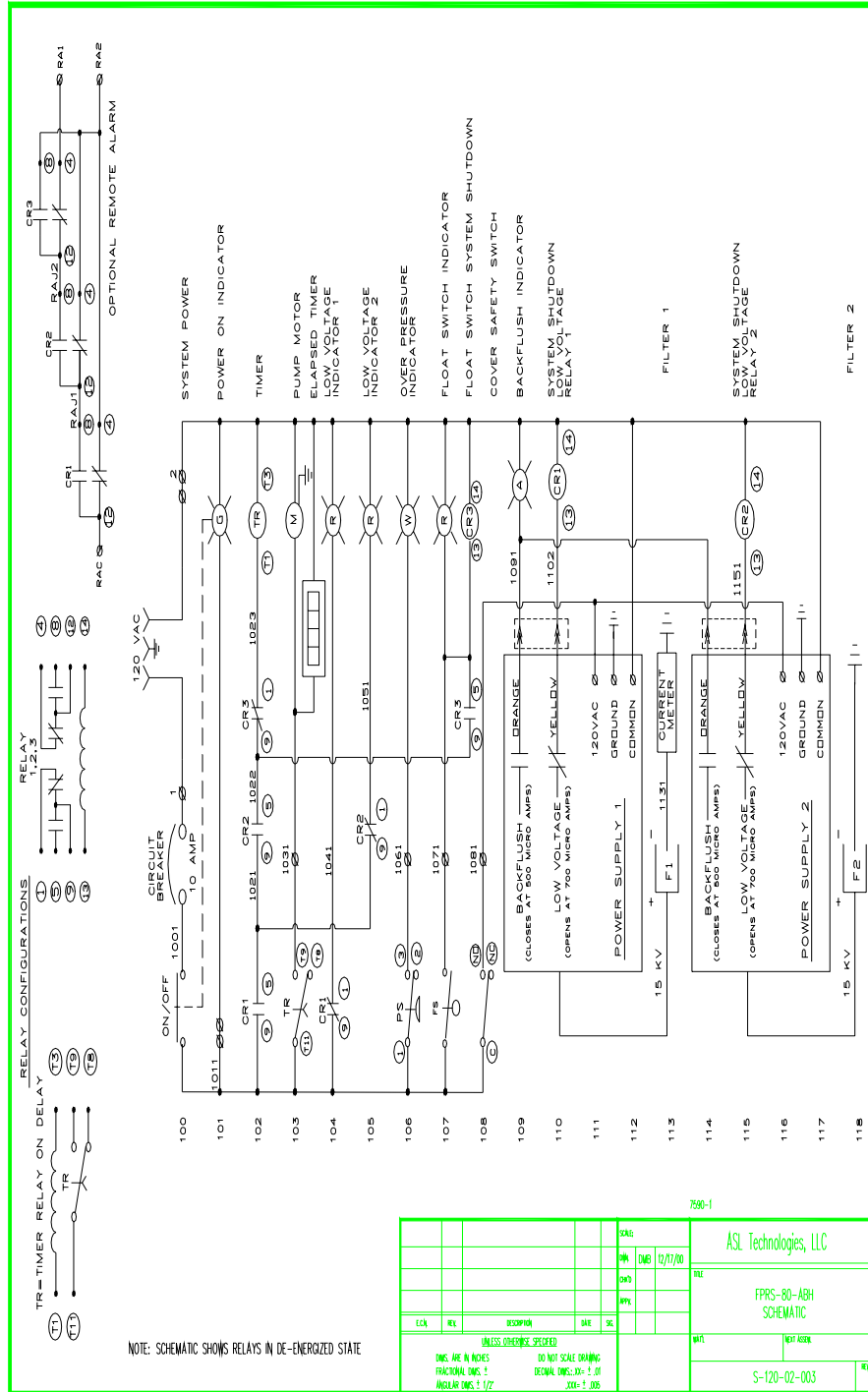
INLET & OUTLET  
CONNECTIONS: 1/2" Quick Disconnects

### SYSTEM VOLTAGE:

Input 110 VAC 60 Hz  
Circuit Breaker 10 Amp  
Output 15 Kv DC

Manufactured in the U.S.A.

# FPRS-80-ABH Wiring Diagram



# TECHNICAL SERVICE MANUAL

INSTALLATION, START UP, TROUBLE-SHOOTING,  
PREVENTATIVE MAINTENANCE, DO'S & DON'TS  
SERIES SG-04, SG-05 and SG-07 SPUR GEAR PUMPS

SECTION	TSM340
PAGE	1
ISSUE	A

**VIKING  
PUMP**

## INSTALLATION

### General

The following items must be considered prior to pump installation:

1. *Location* — locate the pump as close as possible to supply of liquid being pumped. If possible, locate pump below liquid supply. Viking® pumps are self-priming; but, the better the suction conditions, the better the pump will perform.
2. *Accessibility* — pump must be accessible for inspection, maintenance, and repair.
3. *Suction/Discharge* — SG Series pumps are designed for clockwise rotation as standard (viewed from shaft end). Refer to Figure 1.

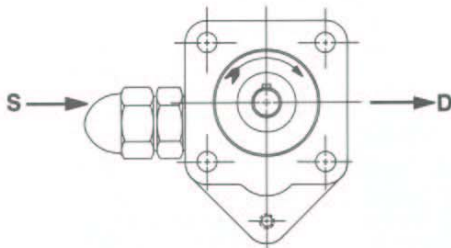


FIGURE 1  
Clockwise Rotation of SG-04 & SG-05  
(viewed from shaft end)

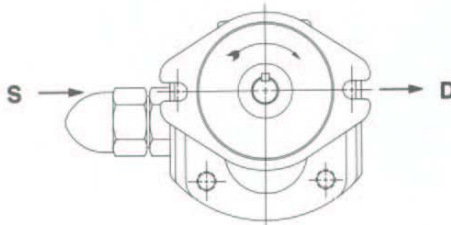
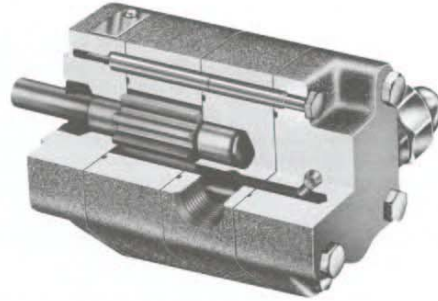
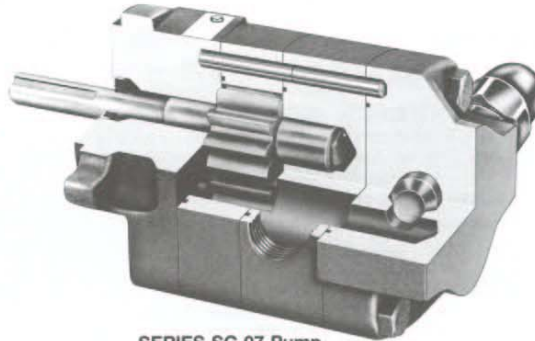


FIGURE 2  
Clockwise Rotation of SG-07  
(viewed from shaft end)



SERIES SG-04 and SG-05 Pumps  
Cutaway View



SERIES SG-07 Pump  
Cutaway View

4. *Pressure Relief Valve* — the SG Series is a positive displacement pump and therefore requires a pressure relief device in the discharge line to provide over pressure protection for the system. Without pressure relief protection, if the discharge line is blocked or becomes closed, pressure will build up until motor stalls, drive equipment fails, a pump part breaks or the piping and/or other equipment in the system bursts. To prevent the possibility of any one or more of the above items from occurring, the use of a pressure relief valve is recommended. The pressure relief valve will relieve the pressure at a predetermined value, thus protecting the entire system.
5. *Storage* — if pump is to be stored, drain pump and pour non-detergent SAE 30 weight oil into pump port and rotate shaft to circulate oil. Apply grease to pump shaft extension. Viking suggests rotating pump shaft by hand one complete revolution every 30 days to circulate oil.

VIKING PUMP, INC. • A Unit of IDEX Corporation • Cedar Falls, Iowa 50613 U.S.A.

## Mounting

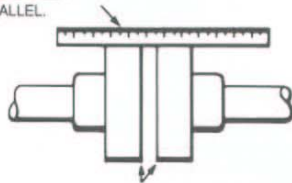
1. Surfaces pump mounts against must be clean and flat.
2. Use only SAE Grade 5 capscrews for mounting pump.
3. The 4 mounting capscrews for SG-04 and SG-05 pumps must have a minimum of 1/2 inch thread engagement and must be torqued evenly to 12-15 ft. lbs.
4. The 2 mounting capscrews for SG-07 pumps must have a minimum of 1/2 inch thread engagement.
5. Standard SG Series pumps are designed to be used with jaw type couplings that do not induce axial thrust on the pump shaft. If an improper type of coupling is used, internal damage may result.
6. Do not strike or press pump drive coupling to install. Internal pump damage will result. If coupling does not slide on shaft, inspect coupling, shaft and key for nicks or burrs and remove.
7. If pump is to be belt or gear driven, the overhung load option must be specified.
8. Once pump has been mounted and coupling installed, pump must be primed. Squirt oil in suction port and turn pump by hand to make sure it turns freely.

## Alignment

Check alignment after mounting

1. If the pump is driven by a flexible coupling, remove any coupling guards or covers and check alignment of coupling halves. A straight-edge (piece of key stock works good) across coupling must rest evenly on both rims at top, bottom, and sides. Refer to Figure 3.

USE STRAIGHT EDGE. THESE SURFACES MUST BE PARALLEL.



CHECK WIDTH BETWEEN THESE SURFACES WITH INSIDE CALIPERS OR FEELER GAUGE TO BE CERTAIN THE FACES ARE EQUAL DISTANCE APART AND PARALLEL.

FIGURE 3

2. Make final check on alignment after piping is hooked up.

## Piping/Hose

The cause of many pumping problems can be traced to suction piping. It should always be as large and short as possible.

Before starting layout and installation of your piping system, consider the following points:

1. Never use piping smaller than pump port connections. Piping larger in diameter than the port connection is sometimes required to reduce suction losses.
2. Be sure the inside of pipe is clean before installing.
3. When approaching an obstacle in suction line, go around obstacle instead of over it. Going over obstacle creates an air pocket. Where practical, slope piping so no air or liquid pockets will be formed. Air pockets in suction line make it hard for the pump to prime.
4. A strainer on the suction side of the pump should always be considered in any pumping system. The strainer will keep out foreign matter from entering the pump. The strainer mesh or perforation size should be large enough so that it does not cause excessive pressure drop, but it should be fine enough to protect the pump. Use of a strainer is particularly important at start up to help clean the system of weld beads, pipe scale and other foreign objects.
5. A pressure relief valve is required in discharge line. See Pressure Relief Valves, **General**, page 1, Item 4.
6. Pump must not be used to support piping. Weight of pipe must be carried by hangers, supports, stands, etc.
7. When fastening piping to pump do not impose any strain on pump casing. "Springing" or "drawing" piping up to pump will cause distortion, possible misalignment and probable rapid wear of pump. Do not use pump to correct errors in piping layout or assembly.
8. All joints of piping system must be tight; pipe dope or teflon tape will help assure leak-free threaded joints. Since teflon has excellent lubricity, be careful not to overtighten your fittings causing damage. Leaks in suction line, permitting air to be drawn in, will cause a noisy pump and a reduction in capacity.
9. Drive alignment must be checked after piping is hooked up.
10. Provide a pressure relief device in any part of a pump and piping system that can be valved off and, thus, completely isolated. A rise in temperature will cause liquid to expand. If there is no provision for pressure relief in the closed off section, there is a chance that the pump or piping will rupture.

## START UP

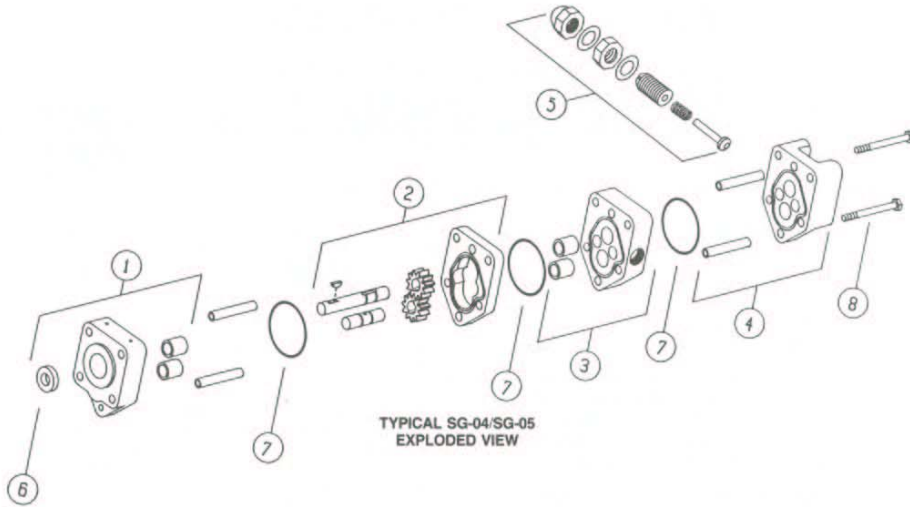
### DANGER

BEFORE STARTING PUMP, BE SURE ALL DRIVE EQUIPMENT GUARDS ARE IN PLACE.

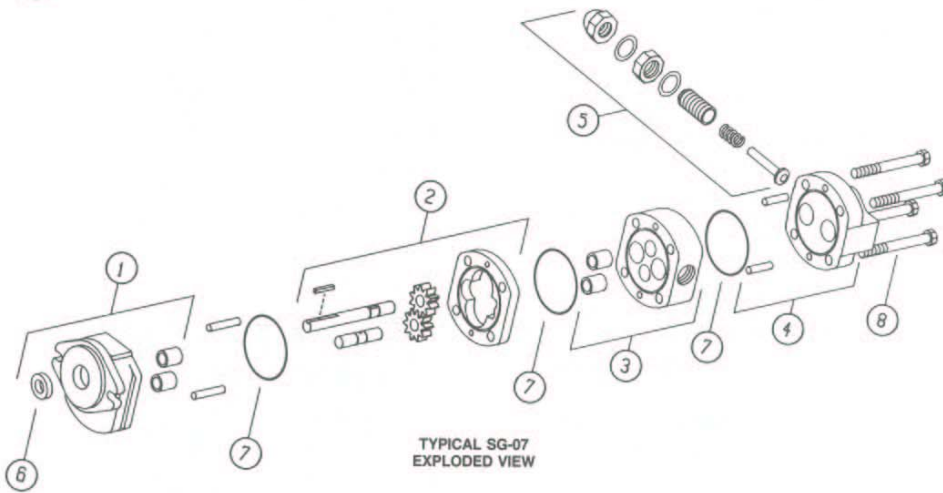
FAILURE TO PROPERLY MOUNT GUARDS MAY RESULT IN SERIOUS INJURY OR DEATH.

Before pushing "start" button, check following:

1. Vacuum and pressure gauges (liquid filled) on or near the pump? Gauges are quickest and most accurate way of finding out what is happening in pump.



TYPICAL SG-04/SG-05  
EXPLODED VIEW



TYPICAL SG-07  
EXPLODED VIEW

ITEM	DESCRIPTION
1	Bracket, lipseal & bearing section
2	Match ground casing & (2) gears, driver & driven shafts
3	Separation plate & bearing assy.
4	Head and alignment sleeve assy.

ITEM	DESCRIPTION
5	Relief valve kit
6	Lipseal
7	O-ring
8	Assembly cap screws

For specific part numbers. Refer to Repair Section 341.



2. Alignment.
3. There is no pipe strain on pump casing.
4. Pump shaft turns freely when rotated by hand.
5. Motor has been jogged and is running in *right* direction. Refer to **General**, page 1, Item 3.
6. Pressure relief valve is installed properly.
7. Suction piping is connected and tight, and valves are open.
8. Discharge piping is connected and tight, valves are open, and there is a place for liquid to go.
9. All guards are in place.
10. The above check list is a general guideline to be used prior to starting the pump. Since Viking Pump can not foresee every application for our product and possible system design, final responsibility is with the user. The pump must be utilized within the catalog specifications and the pump system must be designed to provide safe working conditions.

The "start" button can now be pushed.

Pump must begin to deliver liquid within 15 seconds!!

If not, push the "stop" button. Do not run pump without liquid flow longer than 30 seconds or pump will be ruined!!

Review steps just outlined. Consider what suction and discharge gauges indicate. If everything appears in order, re-prime pump. Refer to **Mounting**, page 2, Item 6.

Push "start" button. If nothing is flowing within 30 seconds, stop pump. The pump is not a compressor, it will not build up much air pressure. It may be necessary to vent discharge line until liquid begins to flow.

If pump still does not deliver, consider one or more of the following:

1. Suction line air leaks.
2. End of suction pipe not submerged deep enough in liquid.
3. Suction lift is too great or suction piping is too small.
4. Liquid is vaporizing in the suction line before it gets to the pump.

If after consideration of these points, pump still does not deliver liquid, review again all points given under **Startup**. Read through the following **TROUBLE-SHOOTING** guide and try again. If it still does not pump, contact your Viking pump supplier.

## TROUBLE-SHOOTING

A Viking pump that is properly installed and maintained will give long, satisfactory performance.

If trouble does develop, one of the first steps toward finding the difficulty is to install a vacuum gauge in suction line and a pressure gauge in discharge line. Readings on these gauges often give a clue on where to start looking for trouble.

## DANGER

BEFORE OPENING ANY VIKING PUMP LIQUID CHAMBER (PUMPING CHAMBER, RESERVOIR, RELIEF VALVE ADJUSTING CAP FITTING, ETC.) BE SURE:

1. THAT ANY PRESSURE IN CHAMBER HAS BEEN COMPLETELY VENTED THROUGH SUCTION OR DISCHARGE LINES OR OTHER APPROPRIATE OPENINGS OR CONNECTIONS.
2. THAT THE DRIVING MEANS (MOTOR, TURBINE, ENGINE, ETC.) HAS BEEN "LOCKED OUT" OR MADE NON-OPERATIONAL SO THAT IT CANNOT BE STARTED WHILE WORK IS BEING DONE ON PUMP.

FAILURE TO FOLLOW ABOVE LISTED PRECAUTIONARY MEASURES MAY RESULT IN SERIOUS INJURY OR DEATH.

## VACUUM GAUGE — SUCTION PORT

High reading would indicate:

1. suction line blocked— valve closed, strainer plugged, pinched suction hose
2. line too small
3. liquid too viscous to flow through piping
4. lift too high

Low reading would indicate:

1. air leak in suction line
2. end of pipe not in liquid
3. pump is worn
4. pump is dry — should be primed

Fluttering, jumping, or erratic reading would indicate:

1. liquid vaporizing
2. liquid coming to pump in slugs, possibly an air leak or insufficient liquid above the end of the suction pipe
3. vibrating from cavitation, misalignment, or damaged parts

## PRESSURE GAUGE — DISCHARGE PORT

High reading would indicate:

1. high viscosity and small and/or long discharge line
2. strainer or filter plugged
3. pressure relief valve set to high

4. valve in discharge line partially closed
5. line partially plugged from buildup on inside of pipe, solidified product or by foreign object
6. liquid in pipe not up to temperature

Low reading would indicate:

1. pressure relief valve set too low
2. pressure relief valve poppet not seating properly
3. pump mounting capscrews not torqued to specifications (SG-04 and SG-05 series 12-15 ft. lbs.)
4. pump assembly bolts not torqued to specifications (SG-07 series 50-55 ft. lbs.)
5. Bypass around pump partially open
6. too much extra clearance
7. pump damaged or worn

Fluttering, jumping, or erratic reading would indicate:

1. cavitation.
2. liquid coming to pump in slugs
3. air leak in suction line
4. vibrating from misalignment or mechanical problems

## MISCELLANEOUS

Some of the following may also help pinpoint the problem:

Pump does not pump:

1. lost its prime from air leak or low level in tank
2. suction lift too high
3. rotating in wrong direction
4. motor does not come up to speed
5. suction and discharge valve not open
6. strainer clogged
7. bypass valve open, pressure relief valve set too low or pressure relief valve poppet stuck open
8. pump worn out
9. any changes in liquid system or operation that would help explain the trouble, e.g. new liquid, additional lines, etc.

Pump starts, then loses its prime:

1. supply tank empty
2. liquid vaporizing in the suction line
3. air leaks or air pockets in the suction line
4. pump worn out

Pump is noisy:

1. pump is being starved (heavy liquid cannot get to pump fast enough). Increase suction pipe size, reduce length or slow down pump.
2. pump is cavitating (liquid vaporizing in suction line). Increase suction pipe size or reduce length. If pump is above liquid, raise the liquid level closer to the pump. If the liquid is above, increase the head of liquid
3. check alignment
4. anchor base or piping to eliminate vibration

Pump not up to capacity:

1. starving or cavitating— increase suction pipe size or reduce length.
2. strainer partially clogged
3. air leak in suction line or along pump shaft
4. running too slowly, is motor the correct speed and is it wired up correctly
5. pressure relief valve set too low or stuck open
6. bypass line around pump partially open
7. Pump worn out.

Pump takes too much power (stalls motor):

1. liquid more viscous than unit sized to handle
2. system pressure relief valve set too high
3. pump misaligned

## DO'S AND DON'TS

Do's and Don'ts for installation, operation, and maintenance of Viking pumps to assure safe, long, trouble-free operation.

Installation:

1. DO install pump as close to supply tank as possible.
2. DO leave working space around the pumping unit.
3. DO use large, short, and straight suction piping.
4. DO install a strainer in suction line.
5. DO double-check alignment after unit is mounted and piping is hooked up.
6. DO provide pressure relief valve for discharge side of pump.
7. DO check for proper rotation.
8. DO use piping, hose and fittings rated for maximum system pressure.
9. DO check to be sure all guards are in place.

Operation:

1. DON'T run pump at speeds faster than shown in catalog for model.
2. DON'T allow pump to develop pressures higher than those shown in catalog for model.

## TECHNICAL SERVICE MANUAL

INSTALLATION, START UP, TROUBLE-SHOOTING,  
PREVENTATIVE MAINTENANCE, DO'S & DON'TS  
SERIES SG-04, SG-05 and SG-07 SPUR GEAR PUMPS

**VIKING  
PUMP**

3. DON'T operate pumps at temperatures above or below limits shown in catalog for model.
4. DON'T operate pumps without all guards being in place.
5. DON'T operate pumps without pressure relief valve in discharge piping; be sure valve is mounted and set correctly.
6. DON'T operate the pump with all of the liquid bypassing through the pump internal pressure relief valve or without any flow of liquid going through the pump for more than 30 seconds. Operation under either of these conditions may result in a heat buildup and damage to the pump.
7. Do have spare parts, pump or standby units available, particularly if the pump is an essential part of a key operation or process.

#### Maintenance:

1. Do make sure any pump that has residual system pressure in it or that has handled high vapor pressure liquids, has been vented through the suction or discharge lines or other openings provided for this purpose.
2. Do make sure that if the pump is still hooked to driver while maintenance is being performed that the driver has been "locked out" so that it cannot be inadvertently started while work is being done on the pump.
3. Do make sure any pump that has handled a corrosive, flammable, hot, or toxic liquid has been drained, flushed, vented and/or cooled before it is disassembled.
4. Do record pump model number and serial number and file for future.
5. Do **obtain**, read and keep maintenance instructions furnished with pump.

**VIKING  
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**IDEX**

### WARRANTY

Viking warrants all products manufactured by it to be free from defects in workmanship or material for a period of one (1) year from date of startup, provided that in no event shall this warranty extend more than eighteen (18) months from the date of shipment from Viking. If, during said warranty period, any products sold by Viking prove to be defective in workmanship or material under normal use and service, and if such products are returned to Viking's factory at Cedar Falls, Iowa, transportation charges prepaid, and if the products are found by Viking to be defective in workmanship or material, they will be replaced or repaired free of charge, F.O.B. Cedar Falls, Iowa.

Viking assumes no liability for consequential damages of any kind and the purchaser by acceptance of delivery assumes all liability for the consequences of the use or misuse of Viking products by the purchaser, his employees or others. Viking will assume no field expense for service or parts unless authorized by it in advance.

Equipment and accessories purchased by Viking from outside sources which are incorporated into any Viking product are warranted only to the extent of and by the original manufacturer's warranty or guarantee, if any.

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