



***Premier
Fluid
Systems***

**INSTALLATION,
OPERATION & MAINTENANCE
MANUAL**

Vacuum Priming Systems

PREMIER FLUID SYSTEMS INC.
4161 Morris Drive, Burlington, Ontario L7L 5L5
Tel.(905) 637-2611 -- Fax.(905) 333-4722

TABLE OF CONTENTS

1.0	INTRODUCTION
1.1	PRIMING SYSTEM MODELS
1.2	PRIMING SYSTEM THEORY OF OPERATION
2.0	INSTALLATION
2.1	CHECK UPON ARRIVAL
2.2	STORAGE
2.3	PREPARATION
2.4	FOUNDATION
2.5	PIPING
2.6	MECHANICAL CONNECTIONS
2.7	ELECTRICAL CONNECTIONS
3.0	START-UP
3.1	PUMP ROTATION
4.0	OPERATIONAL TESTING
4.1	SIMPLEX SYSTEMS
4.2	DUPLEX SYSTEMS
4.3	PROTECTIVE DEVICES
5.0	MAINTENANCE
5.1	MAINTENANCE SCHEDULE
5.2	OPERATION
5.3	OIL GRADES
6.0	TROUBLE SHOOTING
7.0	DRAWINGS
	TYPICAL PRIMING SYSTEM – VANE VACUUM PUMP
	TYPICAL PRIMING SYSTEM – LIQUID RING VACUUM PUMP

**PREMIER FLUID SYSTEMS INC.
INSTALLATION, OPERATION AND MAINTENANCE MANUAL
FOR PRIMING VACUUM SYSTEMS**

1.0 INTRODUCTION

This manual contains instructions for the installation, operation and maintenance of your PFS Vacuum Priming System.

PFS Priming systems are designed for heavy continuous operation. The unit is factory assembled with vacuum control tank, manufactured and inspected in accordance with ISO 9001:2000 quality standards. PFS priming vacuum systems have been designed to provide safe and reliable service. However, since the vacuum pump is a piece of rotating equipment, the operator must exercise good judgement and proper safety practices to avoid damage to the equipment or personal injury. The instructions in this manual are intended for personnel with a good general training in operation and maintenance of rotating equipment.

SAFETY

It is assumed that your safety department has established a program based upon a thorough analysis of industrial hazards.

It is important that due consideration be given to these hazards which arise from the presence of electrical power and rotating parts. Proper installation and care of protective devices is essential.

In the following safety procedures you will encounter the words

WARNING, CAUTION AND NOTE. They are intended to emphasise certain areas in the interest of personal safety and satisfactory pump operation and maintenance. The definitions of these words are as follows:

WARNING: An operation procedure, practice, etc. which, if not correctly followed, could result in personal injury or loss of life.

CAUTION: An operating procedure, practice, etc. which, if not strictly observed, could result in damage to or destruction of equipment.

NOTE: An operating procedure, condition, etc., which is essential to highlight.

These safety procedures are to be used in conjunction with the installation, operation and maintenance instructions contained in the system manual.

1.1 PRIMING VACUUM SYSTEM MODELS

Find below standard priming vacuum system models manufactured by Premier Fluid Systems Inc.

Oil Lubricated Vacuum Pump Systems					
MODEL	Nominal Data At 20" Hg		Max Vacuum "Hg / Torr	Tank (USG)	Pump Model
	Motor HP	ACFM			
VHS-20- 71	0.12	1.3	26 / 100	20	M71S
VHS-20- 4	1/4	2.8	29.8 / 1.5	20	EM4
VHS-20- 8	3/8	5		20	EM8
VHS-30-15	1	10	29.9 / 0.35	30	PVL/B15
VHS-30-35	1.5	22		30	PVL/B35
VHS-30-45	2	28		30	EU45
VHS-60-65	3	40		60	EU65
VHS-60-105	5	64		60	EU105
Liquid Ring Vacuum Pump Systems					
MODEL	Nominal Data At 20" Hg		Max Vacuum " Hg /Torr	Tank (USG)	Pump Model
	Motor HP	ACFM			
VHS-30- 20	1.5	14	26/100	30	TRSE32-20
VHS-60- 55	3	40		60	TRSE40-55
VHS-80- 100	5	74		80	TRSE40-100
VHS-80- 150	7.5	100		80	TRSE40-150
VHS-80- 200	10	150	29/25	80	TRVB40-200

NOTE:

- Priming vacuum systems with 2 vacuum pumps (duplex) are not listed in above table and model will start with VHD instead of VHS.
- Priming vacuum system models may vary from table above depending on pump model and vacuum tank size and material.

1.2 PRIMING SYSTEM THEORY OF OPEARATION

Priming vacuum systems used for priming centrifugal and other kind of pumps that need priming before start up and/or during operation.

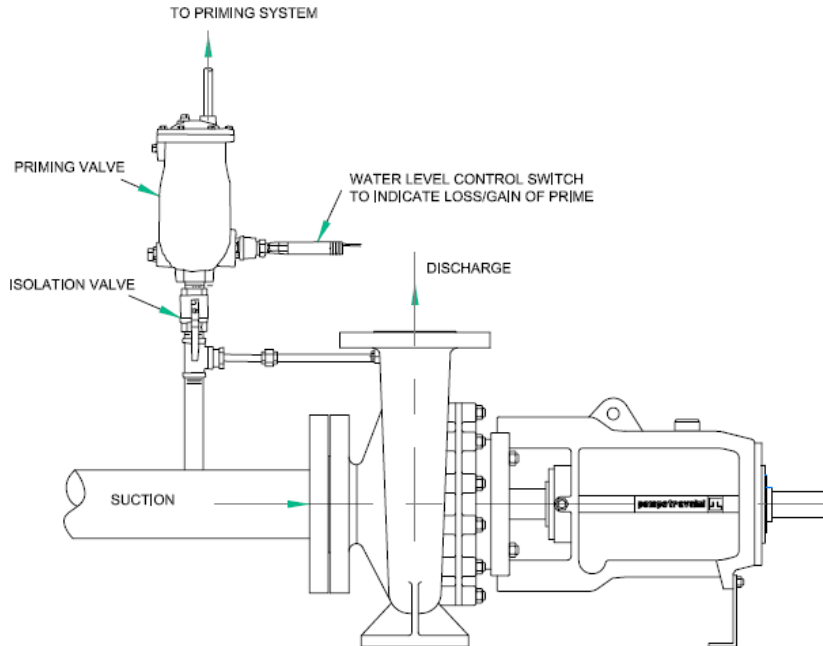
The priming system consists in general of components below:

1. Vacuum pump motor assembly (vane vacuum pump or liquid ring vacuum pump)
2. Vacuum tank
3. Electric control panel
4. Vacuum control switch
5. Vacuum tank water level control switch.
6. Separator (liquid ring vacuum pump system only)
7. Necessary valves and fittings

Priming vacuum system will operate automatically to establish and maintain a prime on pumps and/or piping. Priming vacuum line should be connected to priming valve outlet port. Priming valve inlet port is connected to water pump suction line and casing. The differential pressure created by priming vacuum system will draw water into pump suction line and casing. The water level will rise until the pump casing is fully flooded and float actuated priming valve closed. If the water level drops the priming valve will open and vacuum within the vacuum tank will restore water level to the fully primed state. During automatic operation, the priming vacuum system operates independently from pump primed and will cycle only when vacuum level of vacuum tank goes below vacuum switch setting. Priming system vacuum tank is supplied with level switch which will shuts down priming system in case there is a water leak from priming valve.

Priming valve can also be supplied with a level switch to indicate priming state of serviced pump.

Duplex priming vacuum system has two vacuum pumps. One pump can be used as stand-by or to support second pump when higher vacuum flow is needed. Below is a typical diagram for priming valve.



2.0 INSTALLATION

NOTE: Premier fluid systems Inc. is not responsible for the piping layout and installation of the priming systems. Installation is the responsibility of end user. In case of difficulty regarding installation or operation, contact PFS for advice.

We recommend that the customer consult a specialist skilled in the design of foundation, piping, and equipment location so as to supplement and interpret this information to ensure a successful installation.

WARNING: Install ground and maintain equipment in accordance with the local Electric Code and all applicable federal and Provincial codes

2.1 CHECK UPON ARRIVAL

Shipment of systems ordered with control panels suitable for wall mounting will consist of two packages, one containing the control panel and one the vacuum system. Remove each component from the respective crate and check thoroughly for possible shipping damage.

LIFTING.

Lift the unit to the required location by supporting from at least four points on the saddle or by slings under each end of the tank.

NEVER LIFT OR MOVE THE UNIT BY DECK MOUNTED COMPONENTS.

2.2 STORAGE.

- a) In instances where the unit is to be stored for a lengthy period prior to installation and operation, it should be located in a clean, cool, dry area protected from the elements. Special care should be taken with the control panel to ensure it is protected from dust and moisture.
- b) When shipped from the factory, the pump unit is filled with the operating vacuum oil. It is advisable a supply of same oil is kept at hand for eventual top-ups or oil changes.
- c) Priming units supplied with liquid ring vacuum pump; pump should be rotated by hand once

every month to prevent seizure. (Check pump manual for further instructions).

2.3 PREPARATION

Read this manual and other literature provided. If questions arise, consult the local distributor or the factory.

Verify that the proper utility services required to operate the equipment are available. Among these are the electrical supply, voltage, current, number of phases.

2.4 LOCATION

Install the System in an accessible place, as close as possible to the vacuum's use area. Allow adequate space for operation as well as for maintenance operations involving dismantling and inspection of parts.

Consideration must be given to the environment. Proper ventilation is necessary, and extremes of dampness or temperature should be avoided.

2.5 FOUNDATION

Unit to be mounted on a suitable raised concrete base, and in a room having adequate ventilation with a minimum of 5 °C and a maximum ambient temperature of 38 °C.

The unit needs to be bolted firmly and securely to the pad. The frame should be level and shimmed to prevent any bowing.

If the unit is not located on a ground floor, the unit should be mounted on an inertia base to reduce any possible noise or vibration transmission to the floors below.

2.6 PIPING

Prior to installation, make sure all protective inserts fitted in the gas line connections are removed. When installing the piping to and from the system, isolate the piping with flexible connectors (if not already included with the assembly) from the priming vacuum system, hang the piping with the appropriate hangers to minimise any possible pipe load or noise transmission through the piping.

Piping should be cleaned properly before installation and must be at least of the same size as the corresponding vacuum tank connections.

The discharge piping from the pump must be sized and installed properly, by others.

2.7 MECHANICAL CONNECTIONS

Pump exhaust should be piped outdoor.

Connect priming line to vacuum tank of priming system. Priming line should be connected to a priming valve as lustrated in 1.2 "priming system theory of operation".

2.7 ELECTRICAL CONNECTIONS

The electrical contractor is to furnish and install wiring of the proper size and type to the pre-wired control cabinet. Code and Safety standards should be followed all times.

3.0 START-UP

PUMP ROTATION

With HAND-OFF-AUTO switch to "HAND" position, jog pumps to check direction of rotation, as indicated on pumps by an arrow.

CAUTION: Check rotation to see that it is correct. Improper rotation can cause damage to the pump.

CAUTION: Priming vacuum units furnished with vane vacuum pump:
Before starting up the pump, verify oil is at 1/2 mark on the uppermost sight glass. Failure to do this may result in severe damage to the equipment.

CAUTION: Priming vacuum unit furnished with liquid ring vacuum pump: make sure that there is adequate supply of water to pump seal water port.

4.0 OPERATIONAL TESTING

4.1 SIMPLEX PRIMING SYSTEMS

- a) Isolate vacuum tank by closing priming line manual valve. Start pump by setting HAND-OFF-AUTO switches to "AUTO" position.
- b) The pumps should start and vacuum should increase. The vacuum switch is set at the factory. The setting may alter due to atmospheric pressure changes or handling during shipping and installation. Do not re-adjust vacuum switches without making note of original settings by watching pressure gauge on receiver.
- c) When the maximum vacuum has been reached, the pump will stop. Bleed air in to receiver until pump starts again. All priming systems furnished with rotary vane vacuum pump has a minimum run timer that make sure that pump will run a minimum of 2 to 5 minutes (can be adjusted) after each stop.
- d) Check that the motor current draw is within specification.

NOTE: If current draw is more than 10% into service factor, (motor nameplate), check trouble shooting section. If correction cannot be made, consult factory.

4.2 DUPLEX SYSTEMS

Similar to simplex operational testing described in 4.1 except that two vacuum pumps will starts at initial start. Both pumps will run until preset vacuum switches elapses. Duplex priming system has two vacuum switches, lead and lag. Pumps will alternate at each start/stop cycle.

4.3 STANDARD SYSTEM VACUUM SWITCH SETTINGS

Simplex priming system: Vacuum switch setting: 18 – 24" Hg vacuum
Duplex priming system: Switch No. 1 (Lead):18 - 24" Hg Vacuum
Switch No. 2.(lag): 16 - 24" Hg Vacuum

5.0 OPERATION AND MAINTENANCE: OIL LUBRICATED VANE VACUUM PUMPS.

Pumps require very little attention or maintenance provided the units are installed properly.

5.1 MAINTENANCE SCHEDULE

EVERY 24 HOURS OF OPERATION

- Check pump oil level. Top up if required with recommended oil grade.

EVERY 500 HOURS:

1. Change oil while pump is not operating, but still warm.
2. Change filter cartridges in the pump suction lines (if provided)

EVERY 2000 HOURS:

1. Change pump oil demister separator.

5.2 OPERATION

WARNING: The unit must not be operated unless drive guard is in place. Failure to observe this warning could result in personal injury to operating personnel.

WARNING: Do not attempt any maintenance, inspection, repair or cleaning in the vicinity of rotating equipment. Such action could result in personal injury.

5.3 RECOMMENDED OIL GRADES

Oils must be non-detergent & contain anti-ware additives

Recommended Oil Types

PUMP MODEL	Oil Qty. Liters	Oil Viscosity	PETROCANADA	AGIP	ESSO	SHELL
EM4	0.1	ISO 32	Compressor 32	Acer 32	Nuto 32	Vitrea 32
EM 8	0.15	ISO 46	Compressor 46	Acer 46	Nuto 46	Vitrea 46
PVL/B 15	1.0	ISO 68	Compressor 68	Acer 68	Nuto 68	Vitrea 68
PVL/B 35	1.5					
EU 45-65	2.0					
EU 105-160	3.0	ISO 100	Compressor 100	Acer 100	Nuto 100	Vitrea 100
EU 205-300	7.0					
PVL 401-541	10.0					

If ordering spare parts, please state the SERIAL NUMBER and PUMP MODEL.

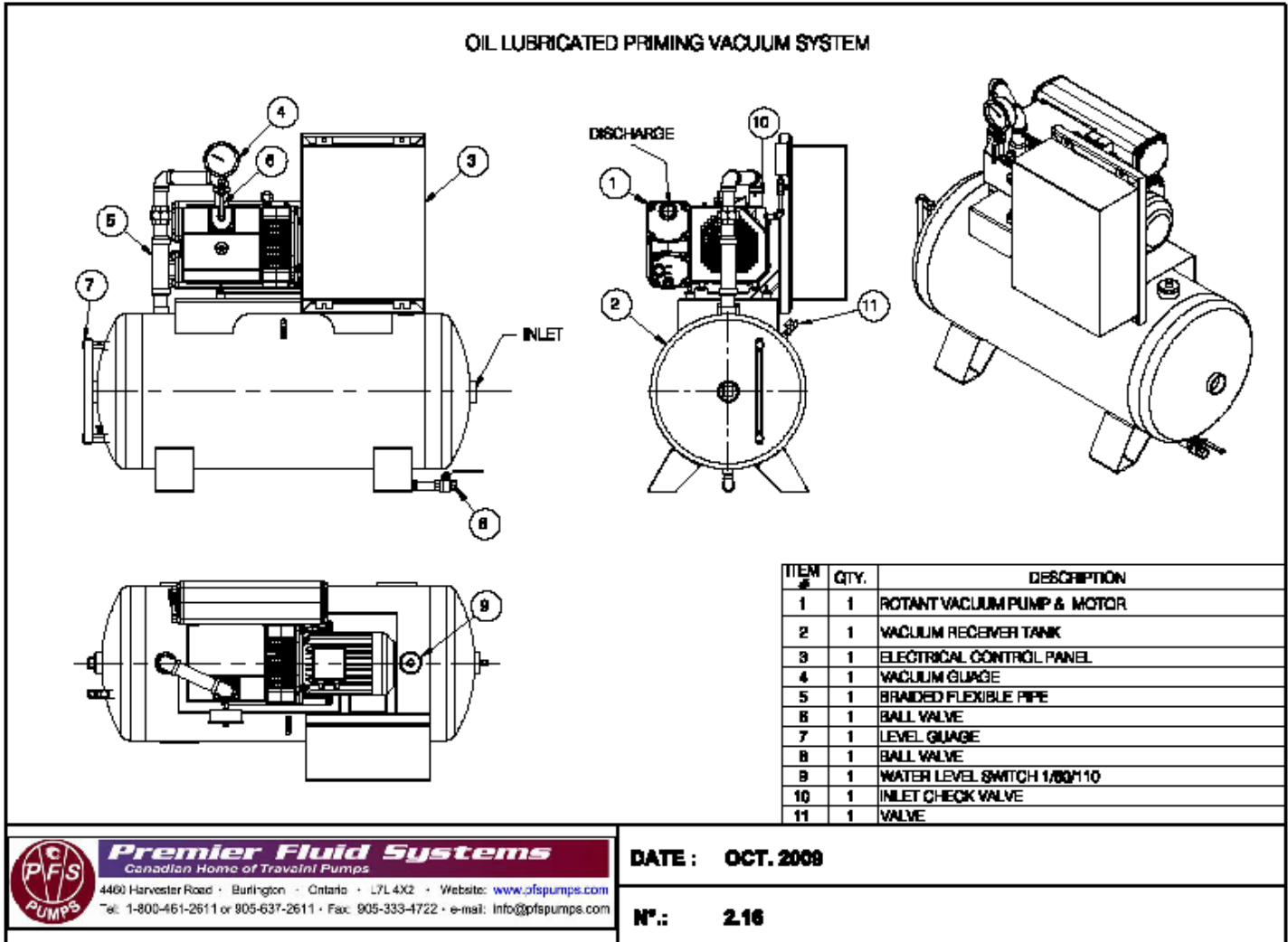
6.0 TROUBLE SHOOTING CHART

PROBLEM	POSSIBLE CAUSE
Pumps does not start	<ul style="list-style-type: none"> - Breaker overloaded - Pump seized - Power supply failure - Faulty fuse or breaker - Loose wires - Faulty electrical connections - Faulty step-down transformer - Vacuum setting too high - High temperature switch activated
Pump does not stop	<ul style="list-style-type: none"> - Vacuum setting too high - Air leakage - Selector switch faulty
Pumps do not alternate	<ul style="list-style-type: none"> - Selector switch faulty - Vacuum setting too high - Switches not set properly
Frequent Start-Stops	<ul style="list-style-type: none"> - Vacuum switch or its contacts may be damaged - Excessive air leakage - Pressure switch differential Pressure setting too close
Overheating of pump	<ul style="list-style-type: none"> - High pump discharge pressure - Ambient too hot - Insufficient oil - Plugged oil cooler - Insufficient water (liquid ring pumps only)
Leaking at pump shaft	<ul style="list-style-type: none"> - Seal failure
Low capacity	<ul style="list-style-type: none"> - Low pump speed - Incorrect voltage - Low oil level - Air leakage - Faulty drive coupling
Vacuum too low	<ul style="list-style-type: none"> - Low pump speed - Pressure setting too low - Excessive air leakage - Low oil level - Faulty couplings
High power consumption	<ul style="list-style-type: none"> - Bearing failure - Scale build-up in pump - Plugged oil demister separator - High discharge pressure
Slow running motor	<ul style="list-style-type: none"> - Damaged motor - Faulty power supply - Incorrect voltage - Faulty fuse or breaker
Excessive noise	<ul style="list-style-type: none"> - Bearing failure - Coupling failure

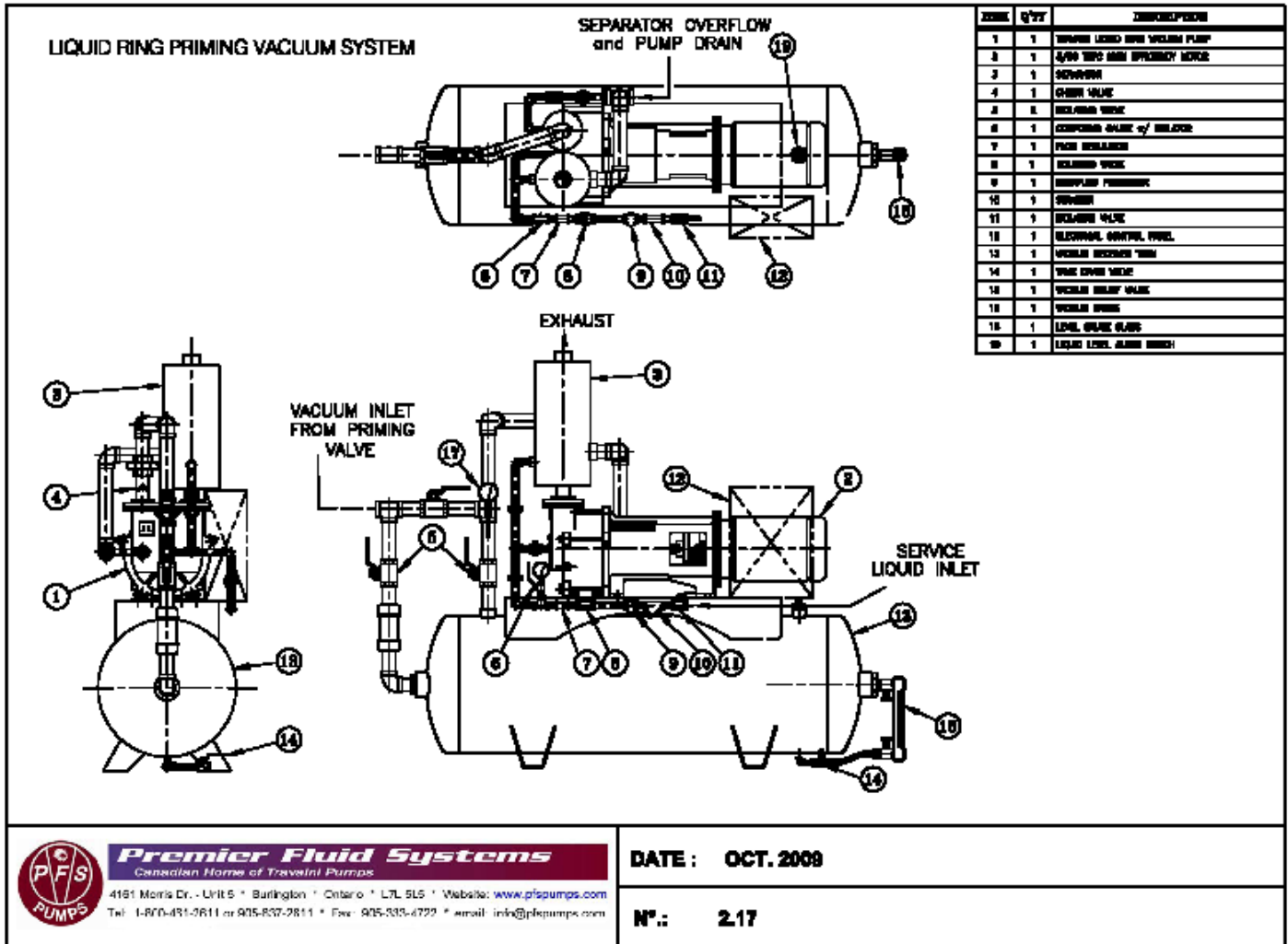
	- Pump damaged
Leaking check valve	- Check valve sticking - Broken pin - Broken/worn seat
Faulty vacuum switch	- Damaged membrane - Burned contacts - Corroded contacts - Pressure setting too close.
High Temperature switch activated	- Low oil level - High discharge pressure - Oil demister separator dirty - Oil cooler (where available) dirty - Poor oil quality

7.0 DRAWINGS

TYPICAL PRIMING SYSTEM – VANE VACUUM PUMP



TYPICAL PRIMING SYSTEM – LIQUID RING VACUUM PUMP



Premier Fluid Systems
 Canadian Home of Traveling Pumps
 4161 Morris Dr. - Unit 5 • Burlington • Ontario • L7L 5L5 • Website: www.pfspumps.com
 Tel: 1-800-451-2611 or 905-637-2611 • Fax: 905-333-4722 • email: info@pfspumps.com

DATE: OCT. 2009

Nº: 2-17



**Premier
 Fluid
 Systems**

4161 Morris Drive, Burlington, Ontario L7L 5L5
 Tel.(905) 637-2611 -- Fax.(905) 333-4722