Instruction **Manual**

Series M

Mechanical Metering Pumps

For file reference, please record the following data:

Model No: _____

Serial No: _____

Installation Date: _____

Installation Location: _____

When ordering replacement parts for your LMI Metering Pump or accessory, please include the complete Model Number and Serial Number of your unit.

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LIQUID METRONICS DIVISION
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Replaces same of Rev. A 8/96
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Important Information

Lubrication	Oil, 700 ml (0.185 gal) included.
Input Power	Refer to motor data plate for requirements.
Tubing Connections	Do not use pipe wrenches.
Suction Lift Installations	Recommended suction lift is 6 ft (1.8 m) maximum (see page 5).
Flooded Suction Installations	Chemical supply should be no more than 20 ft (6 m) above pump (see page 5).
Output Adjustment	While pump is in operation, by means of stroke length knob. Recommended operating range is 10% to 100% (see page 6).

Contents

1.0 Unpacking

Remove tubing, injection check valve and foot valve from the small cardboard carton included in the pump carton. Notify delivery carrier immediately if.there are any signs of damage to the metering pump or parts.

2.0 Installation

2.1 Location and Mounting

CAUTION

When pumping chemicals make certain that all tubing is securely attached to the fittings. It is recommended that tubing or pipe lines be shielded to prevent possible injury in case of rupture or accidental damage. Always wear protective face shield and clothing when working on or near a chemical metering pump.

All Series M pumps are motor driven mechanical pumps and do not have inherent pressure relief. Unless your pump has been equipped with an LMI 4-Function Valve (suffix "S"), a customer supplied relief valve or in-line pressure switch should be installed.

1. Locate the pump in an area that is convenient to both chemical injection point and electrical supply. LMI Series M metering pumps should not be subjected to continuous high temperature (over 122° F or 50° C), and should be protected from rain, sleet and snow.

2. Mount the pump on a shelf directly above chemical tank. Secure pump by putting size #10 (3/16" diameter) or 5 mm diameter screws through the four holes at the edge of the pump base.

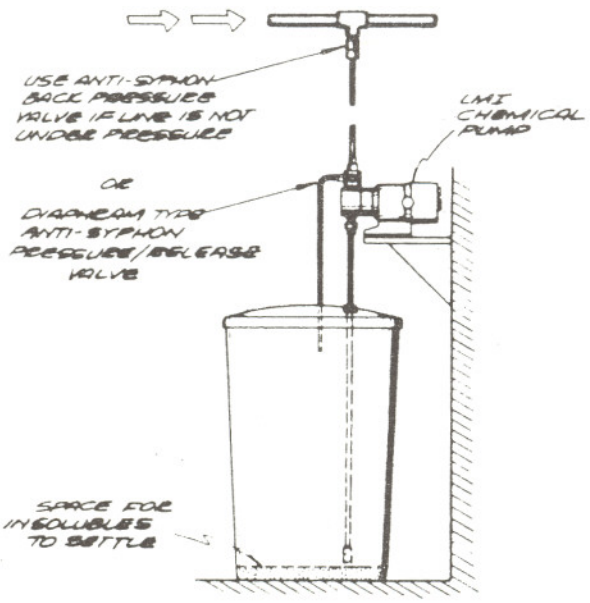


Figure 1: Suction Lift Installation

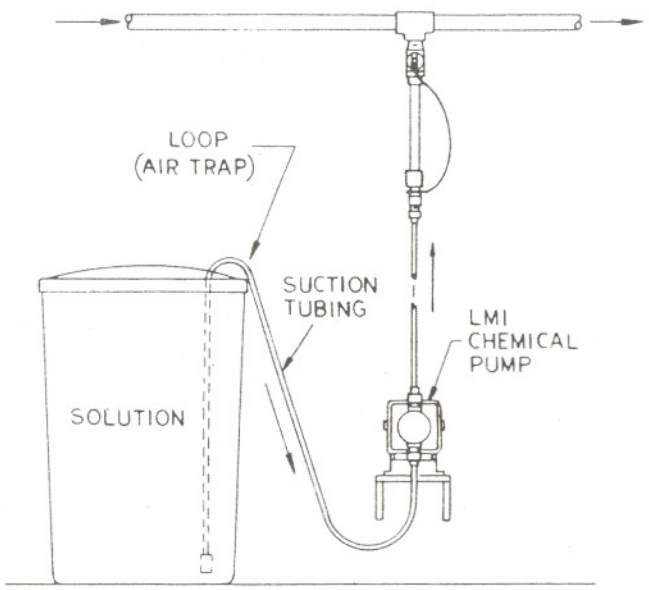


Figure 2: Avoid "False" Flooded Suction Installation

The loop at the top of the tank forms a neat air trap. In time, air and gases can bubble out, accumulate, and cause loss of prime.

2.2 Lubrication

1. Remove oil filter cover and pour in the entire contents (700 ml/0.185 gal) of lubricating oil into the pump drive.

2.3 Electrical

1. Chemical metering pump should be plugged into a 3-prong grounded outlet with ratings conforming to the power requirements of the pump.
2. It is extremely important that the ground prong of the 3-prong plug is connected to a good ground. ***Do Not Use Adapters.***
3. Figure 5 is an example of a wiring scheme commonly used.

All wiring must be approved under local electrical code.

2.4 Plumbing Configuration

Figures 1, 2, 3 and 4 show typical chemical metering pump installations. Note location of injection check valve which is most important. Refer to separate Liquid Handling Assembly Instructions Section A regarding installation of injection check valve.

If chemical supply levels are over 20 ft (or 25 psi/1.72 Bar to suction side), consult factory.

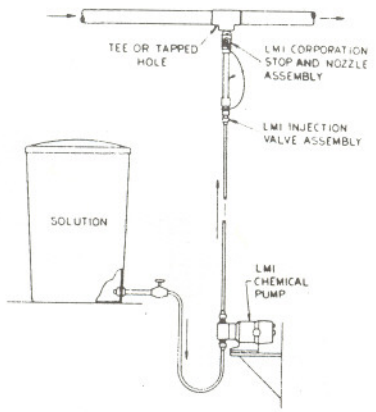


Figure 3: Flooded Suction Installation (helpful when pumping at very low rate)

"Downhill" or into pump suction. Always use anti-syphon/back pressure valve at pump discharge (a) in line (b) or at injection point (c).

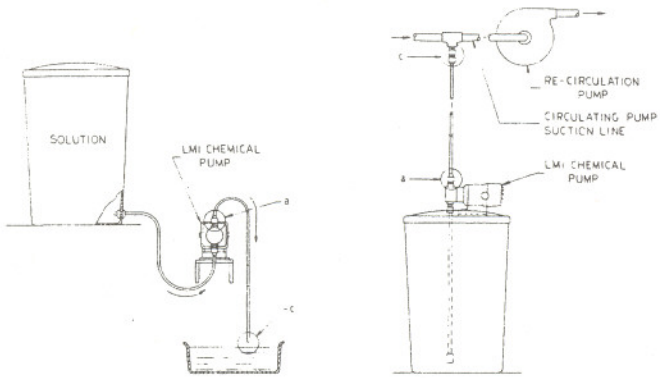


Figure 4: Prevent Syphoning When Pumping

Back Pressure Requirement – All metering pumps are prone to overpumping (excessive output) at low discharge pressure values. To prevent this condition from occurring, it is necessary to maintain approximately 10 psi (0.69 Bar) back pressure across the pump. Models ending with the suffix"S" come equipped with an Anti-Syphon/Pressure Relief Valve (4FV) which provides protection against overpumping and syphoning under most conditions. Hard-piped versions should be equipped (by the user) with back pressure, anti-syphon and pressure relief protection.

Fluid Connections–Series M metering pumps are equipped with tubing or male pipe connections for both suction and discharge. Consult separate Liquid Handling Assembly Instructions for installation instructions. Schedule 80 pipe should be used for plumbing of hard-piped versions. The following precautions should be taken:

- Pressure test all plumbing before use to guard against leaks.
- Prevent thread sealant from getting inside plumbing.
- Install a pressure relief valve in the discharge line to protect operators and equipment.
- Install a ball valve in the suction side of flooded suction installations to simplify maintenance.
- A foot valve should be used in suction lift installations to ensure ease of priming.
- Do not use teflon tape on tubing connections.
- **Do Not Use Pipe Wrenches on Tubing Connections! Failure to comply will void warranty.**

CAUTION

Be sure installation does not constitute a cross connection. Check local plumbing code.

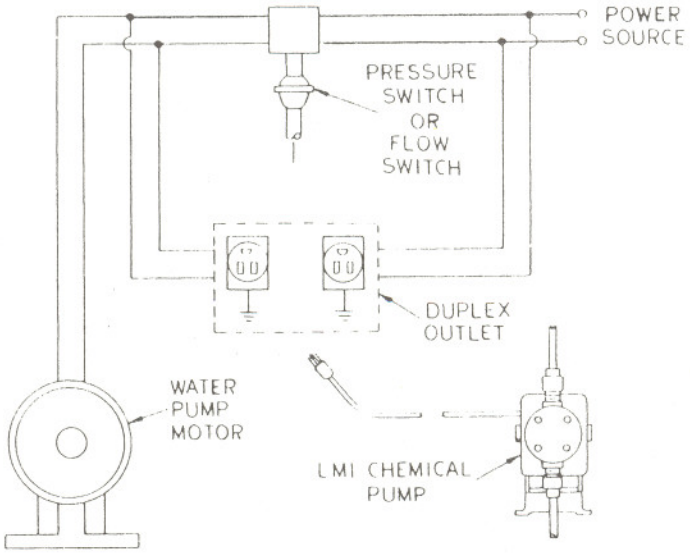


Figure 5: Wiring Diagram
Pressure or Flow Switch System

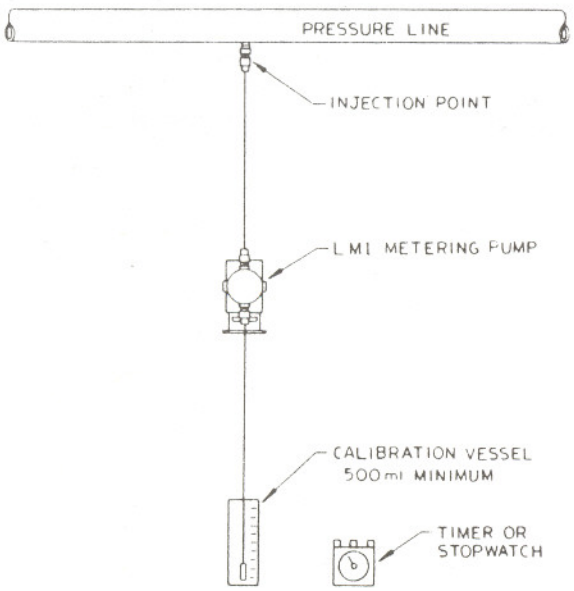


Figure 6:
Calibration Test

3.0 Pump Operation

3.1 Priming

Series M metering pumps are shipped with water in the pump head to assist in priming. Priming can be done only against atmospheric pressure when using a suction lift installation. Flooded suction installations will allow the unit to prime itself even under pressure. Set pump at 100% output to speed priming. In all cases, priming will be assisted by releasing or reducing pressure on the pump. This is best accomplished using the Anti-Syphon/Pressure Relief Valve (4FV) supplied with all pump model numbers ending with the suffix "S". Please refer to separate Liquid Handling Assembly Instruction sheet regarding operation of this valve.

3.2 Output Adjustment

Pump output is adjusted using the knob located opposite the pump. Before adjusting the pump output, make sure the unit is running. The dial on the knob represents "% stroke length" and provides good output adjustments above the 10% setting. The knob is set properly if the line on the knob lines up with the zero (0) mark on the dial when the knob is turned counter-clockwise as far as it will go. This is the zero output position. The maximum output position is reached by turning this knob fully clockwise as far as it will go. Output adjustments should be done while the unit is running.

3.3 Output Adjustment Knob Setting

With the pump operating, turn the output adjustment knob counter-clockwise until there is no stroking action felt when holding onto the knob. At the point where stroking action stops, the line on the pump housing should line up with zero (0) on the knob dial. If alignment is not correct, knob position on shaft should be adjusted as follows:

1. With unit running, pry off knob.
2. Loosen knob retention screw and remove knob.
3. With a plastic or rubber jaw pliers adjust shaft until a point is reached where stroking action just ceases and can no longer be felt.
4. Place knob on shaft with pointer directly over the zero (0) mark on the dial.
5. Taking care not to move the shaft or knob alignment, tighten knob retention screw.
6. Recheck alignment results.
7. Replace knob cover.

3.4 Calibration

Pump output calibration can be easily done if required. The pump is best calibrated after installation by using a stopwatch to measure the time required to remove a known volume of liquid from a tank (Figure 6). Proper setting of the pump's zero output position should be verified before calibration and is explained in Section C.

4.0 Maintenance

4.1 Lubricant Change

The Series M drive train is lubricated for life. There is no need for an oil change.

Always wear protective clothing and face shield when working on or near a chemical metering pump.

4.2 Liquifram Replacement

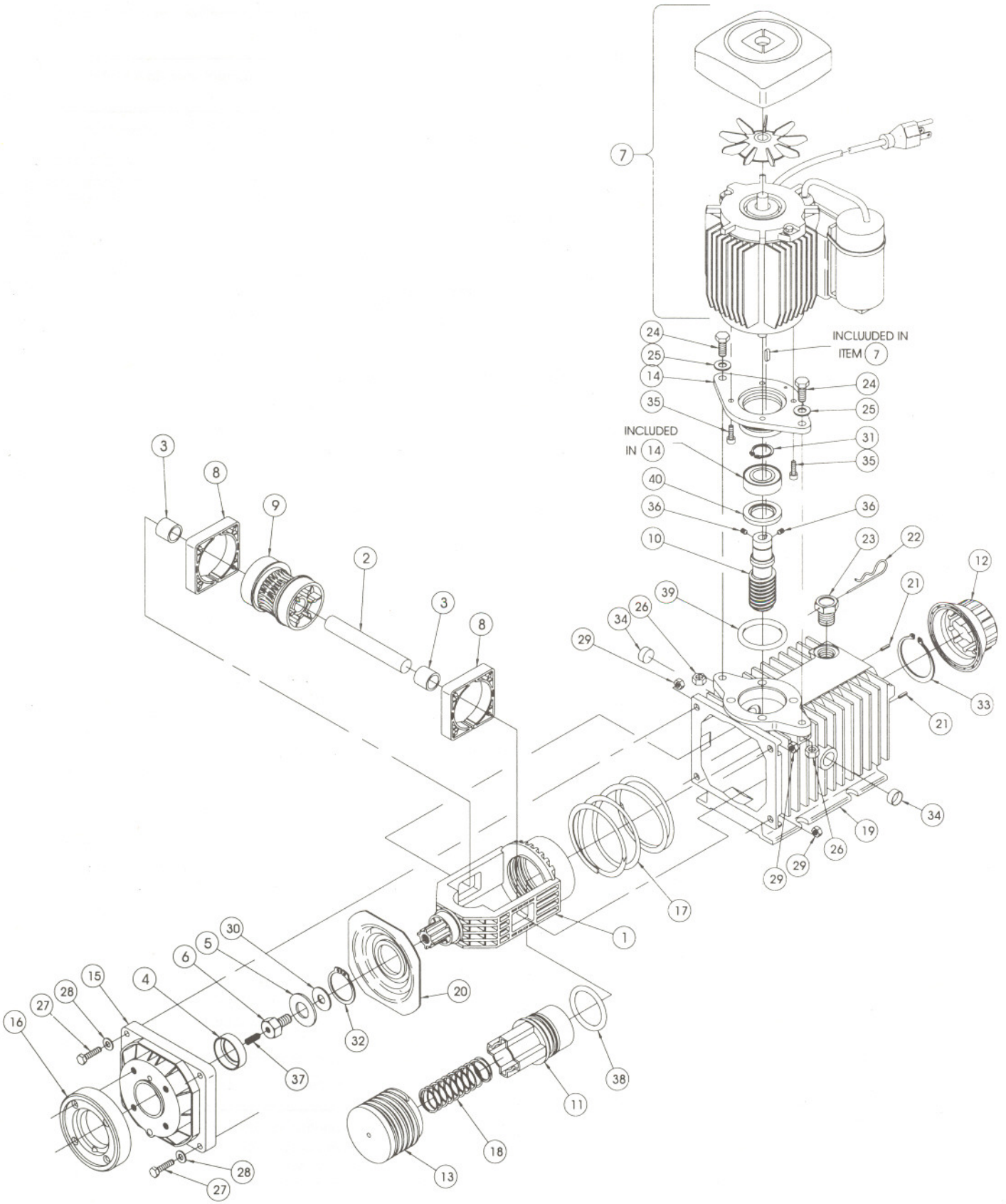
1. Disconnect suction supply line and shut off to prevent chemical spill.
2. Operate pump until pump head is emptied of chemical. Set output adjustment knob at 100% by turning knob fully clockwise.
3. Unplug pump.
4. Release pressure from discharge line.
5. Disconnect discharge line. Be prepared to catch excess chemical during this procedure.
6. Remove pump head by unscrewing the four head retaining screws holding the head to the spacer.
7. Plug in pump. With unit running at 100% output, unscrew and remove old Liquifram™.
8. Without changing these output settings, screw new Liquifram until it bottoms on shaft.
9. With new Liquifram installed, turn pump on and off until Liquifram is at or near its pulled back position. Rein stall pump head making sure the part number stamped on the face of the head is in upright position. Tighten the four Retaining screws in a criss-cross pattern.

5.0 Series M Mechanical Metering Pump Spare Parts List

KEY NO.	PART NO.	DESCRIPTION	QTY
1	32860	Frame, Drive	1
2	32861	Shaft, Cross Axis	1
3	32862	Bushing, Shaft Axis	2
4	32863	Sleeve, Frame Stop	1
5	32864	Washer, .71 x 1.47	1
6	32865	Shaft, Liquifram	1
7	32866	Motor, 115V	1
	32867	Motor, 230V	1
8	32868	Cage, Gear Support	2
9	32869	Gear, 3.5 Essentric	1
	32870	Gear, 5.3 Essentric	1
10	32871	Worm, Drive Motor	1
11	32872	Shaft, Stroke Adj.	1
12	32873	Knob, 3.5	1
	32874	Knob, 5.3	1
13	32875	Screw, Stroke Adj.	1
14	32876	Flange, Motor	1
15	32877	Cover, Housing	1
16	32878	Adaptor, LMI L.E.	1
17	32879	Spring, LG. 3.37 O.D.	1
18	32880	Spring, SM 1.10 O.D.	1
19	32881	Housing, 'M' Pumps	1

KEY NO.	PART NO.	DESCRIPTION	QTY
20	32882	Gasket, Flange	1
21	32883	Pin, Spring Knob Stop	1
22	32884	Pin, Taper Oil Plug	1
23	32885	Plug, Oil Fill	1
24	32886	Bolt, Motor	2
25	32887	Washer, Motor	2
26	32888	Nut, Motor	2
27	32889	Bolt, Cover	4
28	32890	Washer, Cover	4
29	32891	Nut, Cover	4
30	32892	Washer, Liq. Shft. 1.04	1
31	32893	Ring, Retaining Worm	1
32	32894	Ring, Retaining Gasket	1
33	32895	Ring, Retaining Stroke	1
34	32896	Cap, Shaft Axis	2
35	32897	Screw, Motor Flange	4
36	32898	Screw, Set Worm	2
37	32899	Screw, Set Liq. Shaft	1
38	32900	O-Ring, Stroke Shaft	1
39	32901	O-Ring, Motor Flange	1
40	32902	Seal, Shaft Motor Flange	1
Not Shown	32903	Oil, Sintogear	1

6.0 Series M Mechanical Metering Pump Exploded View



7.0 Troubleshooting Guide

PROBLEM	CAUSE	SOLUTION
Solution drips from hole where Liquifram™ sets.	Liquifram is ruptured.	Replace Liquifram. See Replacement Instructions in maintenance section of this booklet.
Liquifram does not move.	Output adjustment knob is set at zero.	With pump running, rotate output adjustment knob to a higher setting.
	Defective motor.	Listen for motor rotation. Look for cooling fan rotation. Replace motor.
	Injection into excessive pressure.	Check system pressure against maximum pressure rating of pump. If discharge pressure is within 15 psi of pump's maximum rating, remove injection valve spring if supplied.
Liquifram moves but no solution is pumped.	Trapped air in pump head.	Operate pump at 100% output setting. Release pressure on pump discharge. Follow priming instructions in this booklet. Operate pump for a few minutes to purge head and valves of air.
	Suction lift is too high.	Reduce suction lift or arrange pump and tank for flooded suction installation.
	Loop in suction line permits air trap on suction side.	Straighten suction tubing.
	Improperly installed or dirty valve seats.	Using Liquid Handling Assembly instruction sheet clean and reassemble valves.
	Air in suction line.	Tighten suction valve fitting BY HAND. Replace if necessary. Check for air leaks throughout suction line.
Pumps air bubbles or air.	Suction tubing has leaks or pinholes.	Replace suction tubing.
	Improperly installed, or dirty valve seats.	Using Liquid Handling Assembly instruction sheets, clean and reassemble valves.
	Suction lift is too high.	Reduce suction lift or arrange pump and tank for flooded suction installation.
	Foot valve and strainer assembly is clogged.	Clean valve assembly.
Pump does not start under rated pressure.	Low voltage.	Increase voltage to pump's rated requirements.
	Pressure rise due to discharge line restriction or viscosity of solution.	Clean discharge line or dilute solution.
	Clogged injection valve or anti-syphon/pressure relief valve.	Using Liquid Handling Assembly instruction sheets, clean and reassemble valves.
Suction tubing collapses.	Foot valve and strainer assembly is clogged.	Using Liquid Handling Assembly instruction sheets, clean and reassemble valves.
Excessive pump output.	Output adjustment knob is set incorrectly.	With pump running, turn knob counter-clockwise until pump stops stroking. Line on knob should be directly over the 100% mark on the dial. If setting is off, adjust by following Output Adjustment Knob Setting instructions in this booklet.
	Very low pressure at injection point.	Install anti-syphon valve on pump.
	Excessive positive suction head	When flooded suction installation is used, chemical should be no more than 20 ft (6 m) above pump when using standard injection valve and zero discharge pressure.

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