

# MODEL APS-2000 & PR-1000A CHEMICAL CONTROL REGULATOR

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## FLUID CONTROLS, INC.

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### NOTICE TO USERS

The model APS-2000 & PR-1000A, or any manufactured variation thereof, is licensed to the purchaser **to be used only as a vacuum control device for chemical metering and injection into pumping systems.** The manufacturer retains all other proprietary rights and expressly forbids the use of the APS-2000 or PR-1000A as a component, to automate the operation of any pumping system, or to control the RPM of engine drive systems, without specific written consent and/or additional licensing by Fluid Controls, Inc.

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The Model APS-2000 & PR-1000A Chemical Control Regulator offers an entirely new approach to chemical metering into pumping systems using pressurized water supplies. The use of this regulator/controller eliminates the need for troublesome float tanks with their associated leakage, stuck float valves, clogged filterscreens, and excessive space requirements. Overall equipment costs are also less with the use of this regulator. Major construction materials are brass and stainless steel.

Unlike other supply regulators, the APS-2000 & PR-1000A uses a "demand" principle of operation. When the pump is turned on, a negative pressure (or vacuum) is instantly produced in the suction line. This vacuum pressure acting upon the regulator diaphragm opens the regulator throttle valve which allows water to enter the pump. At approximately 5" Hg (mercury), the regulator will balance and hold this negative suction line pressure. Even if main water supply pressure changes up or down, the APS-2000 or PR-1000A will maintain precise inlet vacuum which in turn is used to draw precise amounts of chemical into the system. A built-in return check valve allows the suction line to balance-out at the normal water supply pressure when an unloader is used in the system.

### FLOW CHARACTERISTICS

The APS-2000 & PR-1000A provides up to 6 GPM flow with sustained operating inlet water pressure of 30 PSI. Capacity is reduced with less pressure, but the unit will operate satisfactorily with as little as 20 PSI of water pressure. Water pressure over 80 PSI is considered excessive and may cause leakage of water from the diaphragm plates, especially when unloaders are used in the system and ported back into the pump suction.

## INSTALLATION INSTRUCTIONS:

These units are installed in the pump supply line with plumbing from the pump to the valve assembly as large as the pump will accept. Water supply hookup may be direct or through the use of a garden hose connector. **For Precise repeat on/off chemical metering,** we recommend our model MV-100 chemical metering valve. To prevent backflow of water into the chemical container we recommend our model HB-500 filterscreen checkvalve which also filters the chemical supply. For applications where absolutely no backflow of water can be tolerated into the chemical system, we recommend the use of our model HB-050 viton ball checkvalve which fits directly into the chemical port of the chemical control regulator. Plug off any chemical port not in use. For convenience Chemicals may be injected directly into the pump inlet instead of the chemical ports supplied on the above regulator models.

### SPECIAL NOTE TO HOT WATER USERS:

While these units can be successfully used with water temperatures up to 160 degrees (F), it may require more frequent lubrication and internal cleaning due to scale deposits that occur with hot water heaters. Also, some reduction in system capacity will occur at temperatures above 120 degrees. This reduction is due to partial gassing of the water as it is brought to a negative pressure in the regulator. It is not a harmful occurrence, nor does it indicate that the regulator is functioning improperly. It will, in some cases reduce the normal nozzle pressure significantly, suggesting that the regulator is malfunctioning. However, since nozzle pressure is a square root function of system flow, the nozzle pressure can reduce quite dramatically with only a small decrease in pumping volume. Select an appropriate smaller size nozzle to bring the pressure back up to normal.

### LIMITED WARRANTY

The APS-2000 & PR-1000A Chemical Control Regulator is designed to give long, trouble-free life in most applications. However, since water conditions are quite different in many areas, varying degrees of wear-out must be expected by the user. This regulator is warranted unconditionally against defects in materials and workmanship, but due to the many conditions that the unit may be exposed to, the manufacturer does not offer any kind of operational or "wear-out" warranty. If you experience an unusual problem not covered by this publication, please let us know and we will help you through that particular problem. Any suggestions for improvement of this product will be welcomed.

## ROUTINE MAINTENANCE

Air entering the pump suction line is the most common cause of regulator problems. All connections into the pump suction line must be sealed tightly. Air may also be ingested into the system from the chemical metering valve. Always operate the system with the chemical hose submerged in chemical to prevent air from being drawn into the system. If chemical is not being used, the metering valve must be "OFF" to prevent air from entering the system.

The regulator operates at a pump inlet vacuum of approximately 5" Hg (mercury) while in the chemical injection mode. If the unit appears not to operate properly, a vacuum gauge should be attached to the chemical inlet port to establish if the unit has too little or too much vacuum. Too little vacuum is 2" Hg or less, and too much is 8" or more with the machine running and the trigger gun open.

Too low vacuum: but normal system pressure cannot be attained, indicates that air is getting into the system through bad connections, or worn pump suction seals. (Where long supply hoses are used, failure to bleed the air from the supply hose prior to turning the machine on, will cause a low vacuum reading).

Too low vacuum: but operating pressure is normal, indicates that the metering piston inside the regulator is stuck open, or foreign material is under the ball check valve (see diagram). To correct this problem, unscrew the knurled cap from the regulator body and gently remove the spring and operating piston. Remove any foreign material and replace any O-Ring that is damaged or worn. Inspect the piston and locate three small holes in the sides of the piston. These holes must be open for proper operation. Use a #68 drill (.031") to clear the holes of any obstruction.

Re-lubricate the piston with a quality silicone type grease such as (Dow-Corning #111) and re-assemble the valve. If this does not eliminate the problem, disassemble the unit and inspect the ball check valve located inside the valve body (see drawing and parts breakdown above)

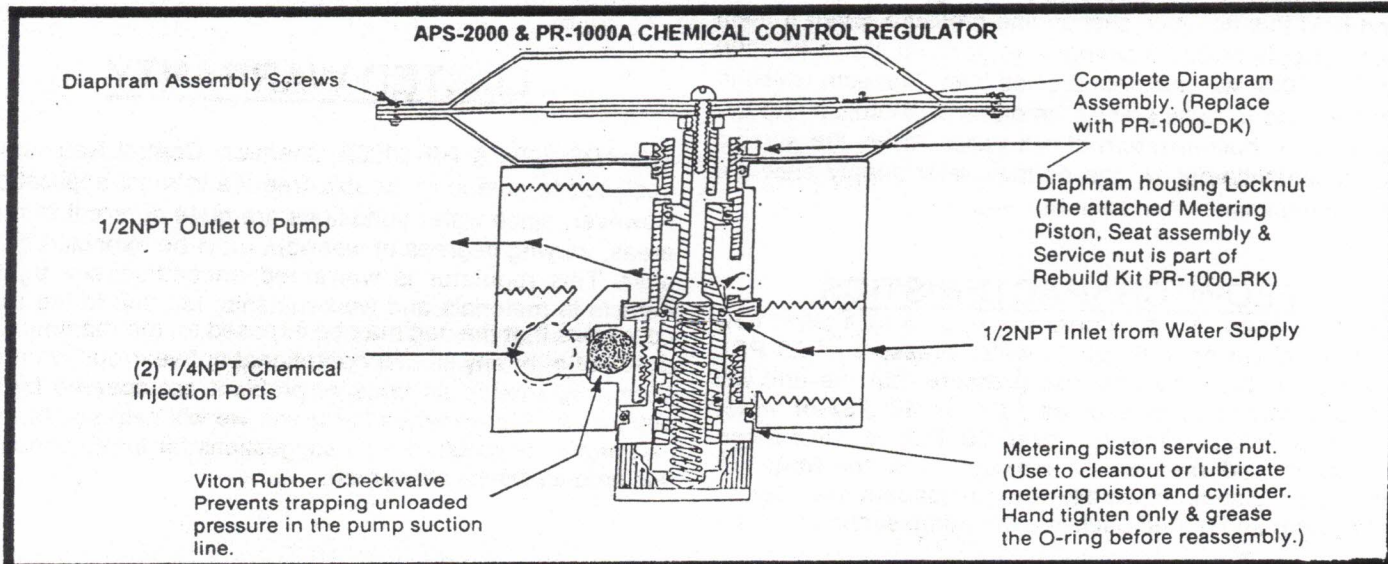
Too much vacuum: indicates that the inlet water pressure is too low for proper operation, or that the operating piston is binding and should be cleared and re-lubricated as outlined above.

## DISASSEMBLY INSTRUCTIONS

Remove the eight screws located on top of the regulator. Lift the diaphragm out of the valve body. Remove the hex retaining nut located inside of the lower diaphragm plate. The entire center valve assembly can now be removed from the regulator body by pushing the exposed threaded portion of the valve assembly. The valve assembly may have to be gently forced past the reverse flow check valve located in the lower part of the regulator body. Remove any foreign material found in the check valve and inspect the ball for damage. Replace if necessary. **REASSEMBLE THE UNIT TAKING SPECIAL CARE TO ALIGN THE SLOTS IN THE VALVE BODY FACING THE INLET WATER PORT.** A coat of silicone grease applied to the check ball will prevent it from falling out during reassembly. Also be sure to lubricate the O-Ring located on the valve body knurled nut before re-assembly.

## SERVICE NOTE:

This unit is fully re-buildable with our kit number APS-2000-RK which contains all parts necessary to place the unit back in normal operating order. A diaphragm replacement kit, number APS-2000-DK is also available.



PR-1000A-RK Repair Kit

PR-1000-2	Piston	1
PR-1000C-2	Spool Piece	1
PR-911-2	Knurl Cap	1
MV-107	Panel Nut	1
PR-917	Gasket	1
PR-912-1	Washer	2
VS-252	Spring	1
006V	O-Ring	1
011V/90	O-Ring	1
011V	O-Ring	2
017V	O-Ring	1
018B	O-Ring	1
5/16VBALL	Vyton Ball	1
PR-RK-IS	Instr. Sheet	1

PR-1000A-1-RK Repair Kit

PR-1000-1	Piston	1
PR-1000C-2	Spool Piece	1
PR-911-2	Knurl Cap	1
MV-107	Panel Nut	1
PR-917	Gasket	1
PR-912-1	Washer	2
VS-252	Spring	1
006V	O-Ring	1
011V/90	O-Ring	1
011V	O-Ring	2
017V	O-Ring	1
081B	O-Ring	1
5/16VBALL	Vyton Ball	1
PR-RK-IS	Instr. Sheet	1

PR-1000A ZERO PRESSURE REGULATOR

