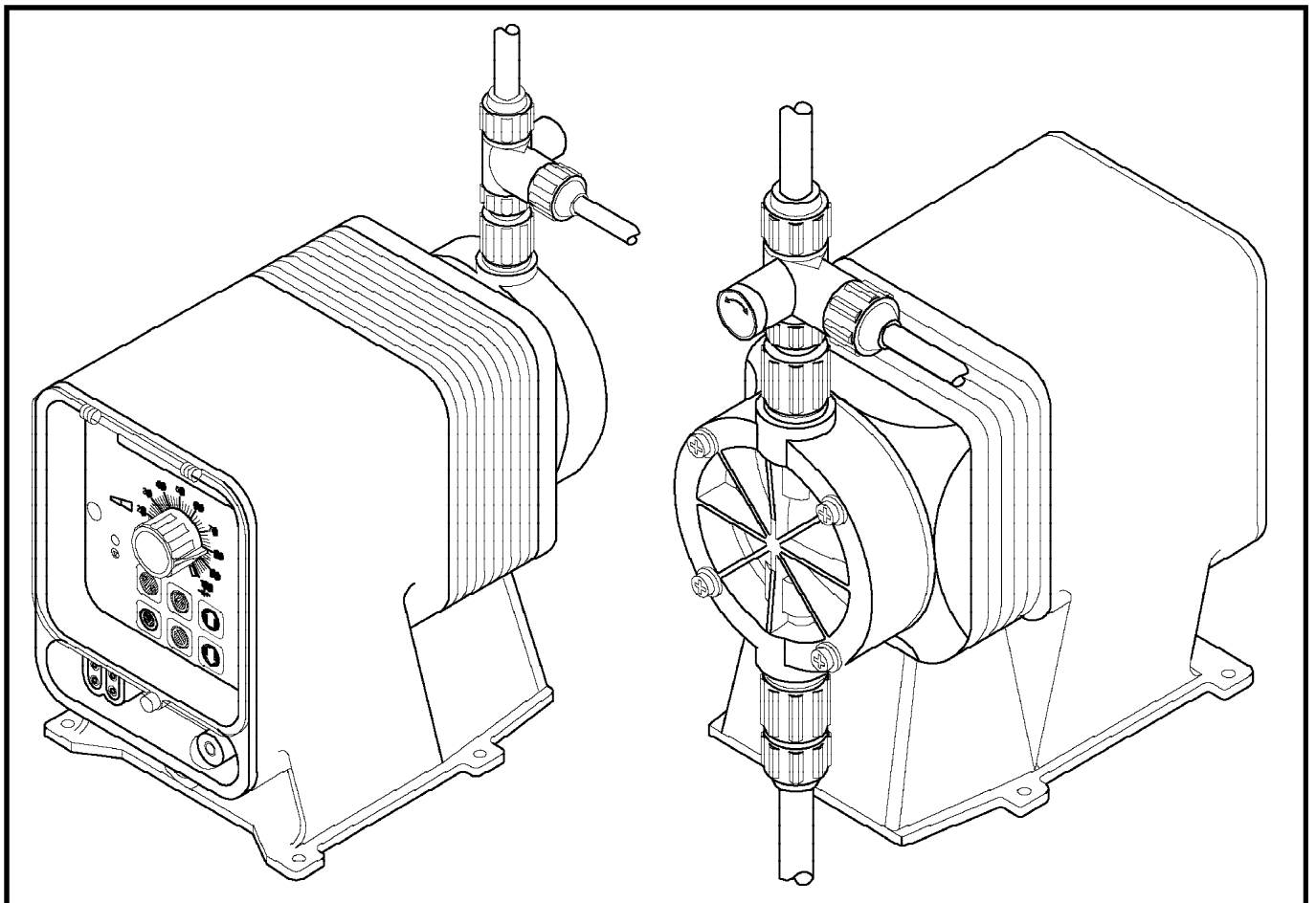


Series MP

ELECTRONIC METERING PUMPS

Installation Operation Maintenance Instruction



READ ALL WARNINGS CAREFULLY
BEFORE INSTALLING

SAFETY INSTRUCTIONS



When using chemical feed pumps, basic safety precautions should always be followed to reduce risk of fire, electric shock, and personal injury. Failure to follow these instructions could result in death or serious injury.



READ ALL INSTRUCTIONS

- *** **⚠ DANGER**: Secure chemicals & metering pumps, making them inaccessible to children & pets.
- *** **DO NOT PUMP FLAMMABLE LIQUIDS.**
- *** Do not cut the plug or ground lug off the electrical cord. Consult a licensed electrician for repair or replacement.
- ** **⚠ WARNING**: Always wear protective clothing, including gloves and safety glasses, when working with chemical metering pumps.
- ** Inspect tubing regularly for cracking or deterioration and ~~(Always wear protective clothing and safety glasses when inspecting tubing.)~~
- ** Use **CAUTION** to keep fingers away from rotating parts.
- ** If pump is exposed to direct sunlight, use a U.V. resistant tubing.
- ** Follow directions and warnings provided from the chemical manufacturer. The user is responsible for determining the chemical compatibility with the chemical feed pump.
- ** Make sure the voltage on the pump name tag matches the installation voltage. If pump fails to operate at the correct voltage.
- ** Consult with local health officials and/or qualified water conditioning specialists when installing a chemical feed pump.
- ** Always depressurize system prior to installation or disconnecting the metering pump tubing.
- ** If injection point is lower than the chemical tank and pump, install an anti-siphon valve.
- ** **DO NOT MODIFY PUMP.** This poses a potentially dangerous situation and will void the warranty.
- * **⚠ CAUTION**: All pumps are factory tested with water. Remove tubing and thoroughly dry before use. Being pumped will react with water (for example sulfuric acid).
- * Hand tighten plastic connections ~~(Do not use wrench).~~
- * Consult licensed plumber and electrician before installation to conform to local codes.
- * **NOTE:** For accurate volume output, pump must be calibrated under all operating conditions.

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INTRODUCTION

These installation, operation and maintenance instructions cover your electronic metering pump nameplate to determine the actual model.

■ PRINCIPLE OF OPERATION

Diaphragm metering pumps are used to dispense chemicals or fluids. This is achieved by an drive mechanism (solenoid) which is connected to a diaphragm. When the solenoid is pulse circuit, it displaces the diaphragm which, through the use of check valves, moves the fl under pressure. When the solenoid is deenergized it returns the diaphragm and pulls mo pumphead and the cycle repeats.

The stroke rate of the pumps is controlled via the touchpad and present status is indicate The stroke length is controlled via the stroke length knob.

■ MATERIALS OF CONSTRUCTION

The wetted materials (those parts that contact the solution being pumped) available for construction are filled polypropylene, PVC, SAN, Hypalon, Viton, Teflon, 316 Stainless Steel, PVDF, Alloy C. These materials are very resistant to most chemicals. However, there are some chemicals, such as strong acids or organic solvents, which cause deterioration of some elastomer and plastic parts, such as diaphragm, valve seats, or head. Consult Chemical Resistance Guide or Supplier for information on material compatibility.

Various manufacturers of plastics, elastomers and pumping equipment publish guidelines for the selection of wetted materials for pumping commercially available chemicals and chemical solutions. Several factors must always be considered when using an elastomer or plastic part to pump chemicals:

1. The temperature of service: Higher temperatures increase the effect of chemicals on wetted materials. The increase varies with the material and the chemical being used. A material quite resistant at one temperature might be affected at higher temperatures.
2. Material choice: Materials with similar properties may differ greatly from one another when exposed to certain chemicals.

■ MANUFACTURER'S PRODUCT WARRANTY

The manufacturer warrants its equipment of its manufacture to be free of defects in materials and workmanship. Liability under this policy extends for eighteen (18) months from the date of purchase or date of installation or whichever comes first. The electronic components will be covered for a period which extends for twenty four (24) months from the date of purchase. The manufacturer's liability is limited to repair or replacement of any device or part which is returned, prepaid, to the manufacturer and is proven defective upon examination. This warranty does not include installation or repair charges. The manufacturer's liability shall not exceed its selling price of such part.

The manufacturer disclaims all liability for damage to its products through improper installation, misuse or attempts to operate such products beyond their functional capacity, intentionally or negligently, or unauthorized repair. Replaceable elastomeric parts are expendable and are not covered by this warranty, expressed or implied. The manufacturer is not responsible for consequential or other damages. The expense incurred through use of its products.

The above warranty is in lieu of any other warranty, either expressed or implied. The manufacturer makes no warranty of fitness or merchantability. No agent of ours is authorized to make any warranty other than that stated above.

The European Union Warranty address is listed below, however, please note that the seller's address is the first.

Steigar 24
NL 1351 AB Almere
Netherlands

■ EUROPEAN TECHNICAL FILE LOCATION

P.O. Box 91
Washington
NE37 1YH
United Kingdom

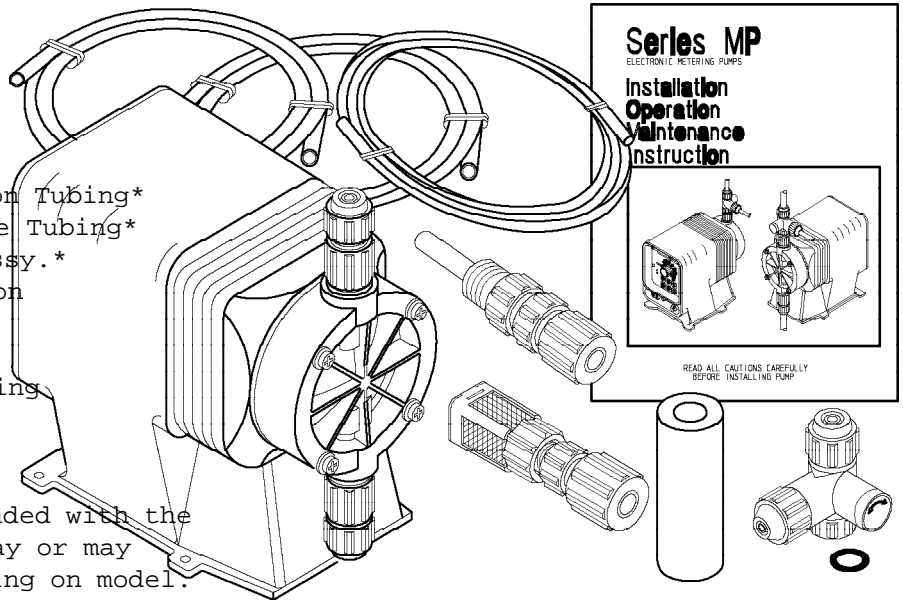
■ UNPACKING THE PUMP

Check all equipment for completeness against the order and for any evidence of shipping damage. Shortages or damages should be reported immediately to the carrier and to the seller of the equipment.

The carton should contain:

- Metering Pump
- Clear Flexible Suction Tubing*
- Stiff White Discharge Tubing*
- Footvalve/Strainer Assy.*
- Backpressure Injection Valve Assy.
- One Instruction Book that you are now reading
- Bleed Valve Assembly* (most models)

* These items are included with the standard pump. Items may or may not be included depending on model.



Make sure that all items have been removed from the shipping carton before it is discarded.

PRECAUTIONS FOR OPERATION

Each Electronic Metering Pump has been tested to meet prescribed specifications and safe operation. Proper care in handling, installation and operation will help in ensuring a trouble free operation.

Please read all these cautionary notes prior to installation and start-up of your metering pump.

1. **Important: Pump must be installed and used with supplied back pressure/injection valve. Failure to do so could result in excessive pump output flow.**
2. Handle the pump with care. Dropping or heavy impact causes not only external damage but also to electrical parts inside.
3. Install the pump in a place where the ambient temperature does not exceed 40°C (104°F). The pump is water resistant and dust proof by construction and can be used ~~in~~ **do not operate** the pump submerged. To avoid high internal pump temperatures, do not operate in direct sunlight.
4. Install the pump in a place convenient for its future maintenance and inspection, free from vibration.
5. Protective caps must be removed prior to installing tubing onto valve assemblies. Use the specified size. Connect the tubing to the suction side securely to prevent the entrance of air. Make sure that there is no liquid leakage on the discharge side.

6. Be careful to check that the voltage of the installation matches the voltage indicated on the nameplate. Each pump is equipped with a three prong plug. Always be sure the pump is disconnected, do not pull wire but grip the plug with fingers and pull out. Do not use the pump on common with heavy electrical equipment which generates surge voltage. It can cause the electronic circuit inside the pump.
7. Tampering with electrical devices can be potentially hazardous. Always place chemical installation well out of the reach of children.
8. Never repair or move the metering pump while operating. Always disconnect electrical power. **For safety, always wear protective clothing (protective gloves and safety glasses) when working on or near chemical metering pumps.**
9. An air bleed valve is available for most models with tubing connections. Air purges the pump chamber when the pump chamber contains no fluid at the time of start-up. As a safety measure, connect the tubing to the air bleed valve and bypass fluid back to storage tank or a suitable drain.
10. Chemicals used may be dangerous and should be used carefully and according to warning on the label. Follow the directions given with each type of chemical. Do not assume chemicals are safe because they look alike. Always store chemicals in a safe location away from children. The manufacturer cannot be responsible for the misuse of chemicals being fed by the pump. Always have the safety data sheet (MSDS) available for any fluid being pumped.
11. All pumps are pretested with water before shipment. Remove head and dry thoroughly before pumping a material that will react with water, (i.e. sulfuric acid, polymers). Valve stems, gaskets, and diaphragm should also be dried. Before placing pump into service, extreme care should be taken to follow this procedure.
12. Valve cartridges are stamped to indicate fluid flow direction. Always install so that the arrow points top to bottom, with the arrow pointing in the direction of flow.
13. When metering hazardous material DO NOT use plastic tubing, strictly use proper rigid tubing. Consult supplier for special adapters or valve assemblies.
- 14. Pump is NOT to be used to handle or meter flammable liquids or materials.**
15. Standard white discharge tubing is not recommended for installations exposed to direct sunlight. Consult supplier for special black tubing.
16. Factory will not be held responsible for improper installation of pump, or plumbing. Instructions should be read thoroughly prior to hook-up and plumbing. For all installations a professional plumber should be consulted. Always adhere to local plumbing codes and requirements.
17. When using pump with pressurized systems, make sure the pressure of the system does not exceed the maximum pressure rating on the pump nameplate. Be sure to de-pressurize system prior to hook-up or disconnecting the metering pump.
18. Electronic power modules are equipped with automatic reset thermal overload devices which may trip unexpectedly.
19. The pump is designed to operate using a backpressure/injection valve. If the discharge pressure is above the liquid level of the source or if the discharge pressure is less than the suction pressure, a backflow may occur. To correct this condition, install an anti-siphon valve or other anti-siphon device in accordance with local regulations which may apply. (Ref. Figure G1).
20. If the power cord is unplugged or in the event of electrical power interruption while the pump is operating, the pump will remember its last operating state for years and will resume operation as soon as power is restored.

INSTALLATION, PIPING AND WIRING

The metering pump should be located in an area that allows convenient connections to both the tank and the point of injection. The pump is water resistant and dust proof by construction outdoors, however **do not operate submerged**. Avoid continuous temperatures in excess of 40°C (104°F) do otherwise could result in damage to the pump.

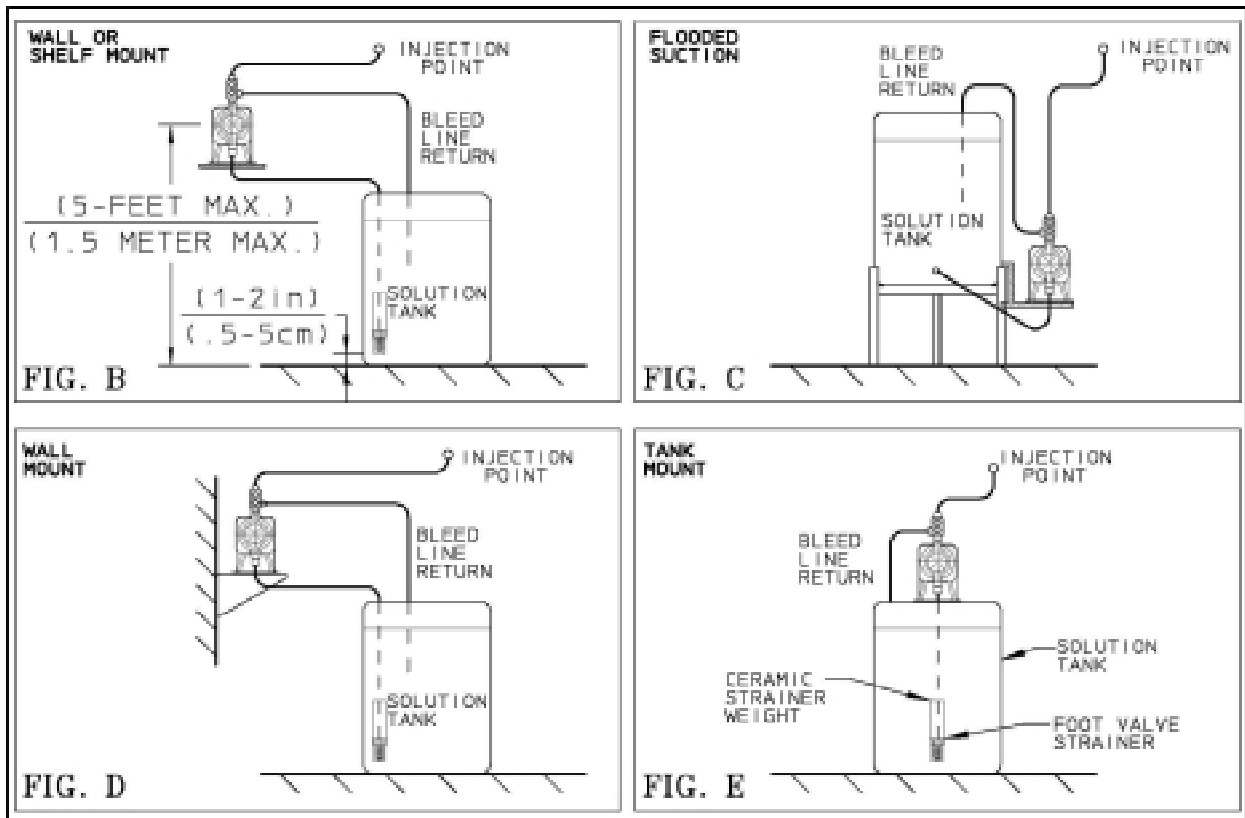
MOUNTING

Typical mounting arrangements are shown in Figures B to E.

Important: Injection point must be higher than the top of the solution supply tank to prohibit gravity feeding, unless a suitable backpressure is always present at the injection point. Installation of an antisiphon valve will prohibit gravity feeding.

1. For wall or shelf mounting, refer to Figure E. Connect suction tubing to suction valve. Suction valve is the lower valve. Tubing should be long enough so that the footvalve/ hangs about 1-2 inches (2.5 - 5 cm) above the bottom of chemical tank. To keep chemical contaminated, the tank should have a cover.
2. Flooded suction mounting (installing the pump at the base of the chemical storage tank) is the most trouble free type of installation and is recommended for very low output requirements. Suction tubing is filled with chemical, priming is accomplished quickly and the chance of air reduced.

To mount pump, drill 4 holes of .25" (6.3 mm) diameter in the shelf as shown in the dimensions in Figure F). Attach pump securely using four #10 bolts and nuts.



- The pump can be mounted to a wall as shown in Figure D. A wall mount bracket kit is available which includes all necessary hardware to mount the pump to the wall. Mounting the pump other than as shown in Figure D defeats the purpose of the housing drain. Mounting dimensions for the pump are provided in Figure F for reference.
- The pump can be mounted on top of a solution tank as shown in Figure E. Install chemical pump on the cover. Insert suction tubing through the center hole and cut tubing so foot valve/strainer hangs about 1 or 2 inches (2.5 - 5 cm) above the bottom of the tank. Mount the chemical pump rigidly by drilling four .25" (6.3 mm) holes and using four #10 screws and nuts.
- USE AN ANTI-SIPHON VALVE IN THE DISCHARGE LINE whenever the fluid pressure in the discharge is below atmospheric pressure. This can occur if the injection point is on the suction or against a "negative" head such as when feeding down into a well, SEE FIGURE G1.

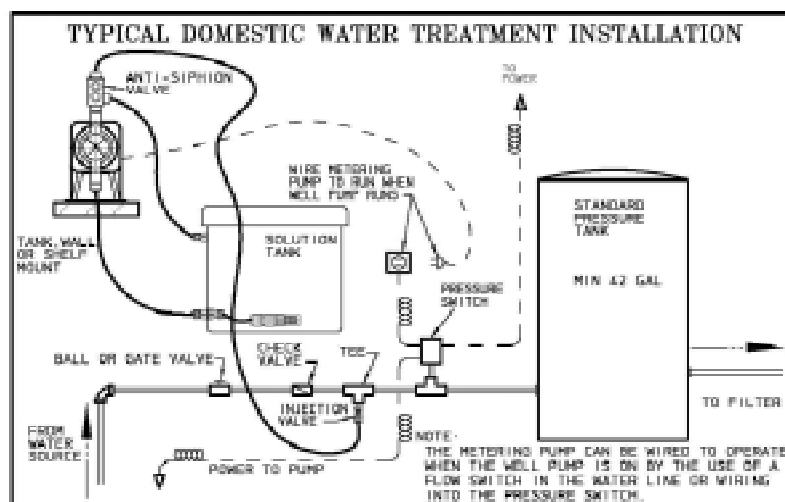


FIGURE G1

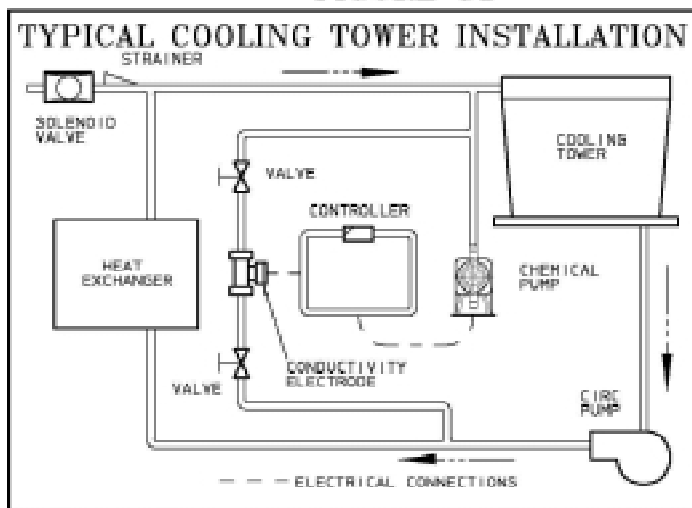


FIGURE G2

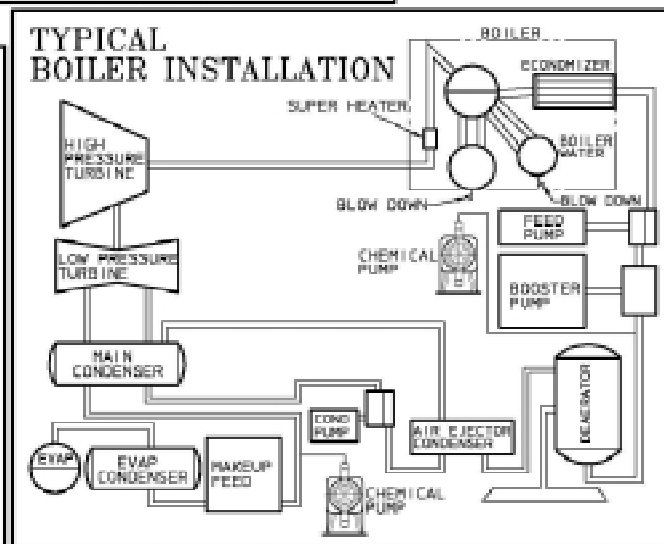


FIGURE G3

PIPING

1. Use provided tubing of specified size for connection. Connect tubing securely to prevent leaks and the entrance of air. Since plastic nuts are used for fittings, they should not be tightened by hand, only with a wrench. NPT suction and discharge valves should only be tightened 25 to 6.25 kg/cm). **NOT to be over-tightened.** Hold fittings in place while adding piping and fittings. NPT suction and discharge valves should only be tightened 25 to 6.25 kg/cm).
2. If the air bleed valve assembly is being used, a return line (tubing) should be securely connected back to the storage tank. **To avoid possible injury from chemicals do not attempt to prime using a bleed valve without installing a return line.**
3. To maintain metering performance, a backpressure/injection valve is provided. The injection valve is installed in the discharge line. Best practice is to install the injection valve at the pump outlet.
4. If the discharge tubing is going to be exposed to direct sunlight, black tubing should be used instead of standard white translucent tubing supplied with each pump. To obtain, contact supplier.
5. To prevent clogging or check valve malfunction always install a strainer assembly to the suction tubing (Figure E). This footvalve/strainer assembly should always be installed 1 to 2 inches above the bottom of the chemical tank. This will help prevent clogging the strainer with any sediment on the tank bottom. The chemical tank and footvalve/strainer should be cleaned regularly, to ensure troublefree operation. If the chemical being pumped regularly precipitates out of solution easily or completely (e.g. calcium hydroxide), a mixer should be used in the chemical tank. Mixers are available in many motor configurations and mountings. To obtain, contact supplier.
6. A flooded suction (tank liquid level always at a higher elevation than the pump) is recommended for sodium hypochlorite (NaOCl) and hydrogen peroxide, which are liable to produce air bubbles. Maintaining a low liquid temperature will also help eliminate this problem.
7. Pipe corrosion can result if dilution at the injection point does not occur rapidly. This can be prevented by observing this simple rule: install injection fitting so that the end is in the center of the line being treated. Trim injector tip as required. See Figure H. Note: Extended length injectors are available for large water lines. Consult your supplier for more information.

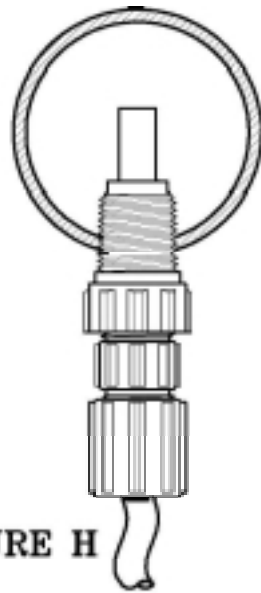
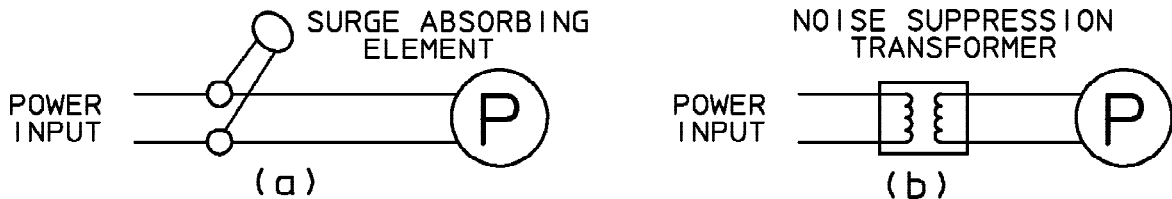


FIGURE H

WIRING

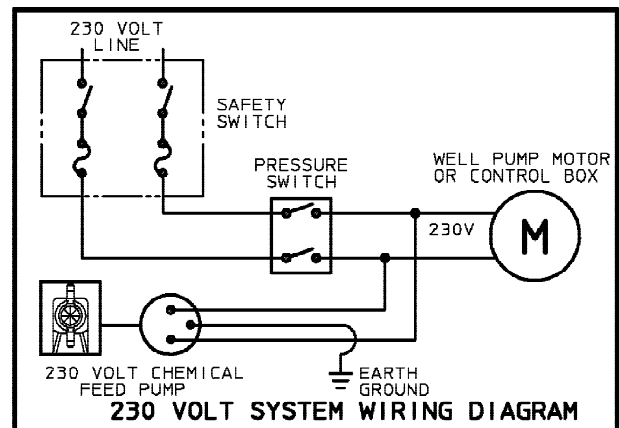
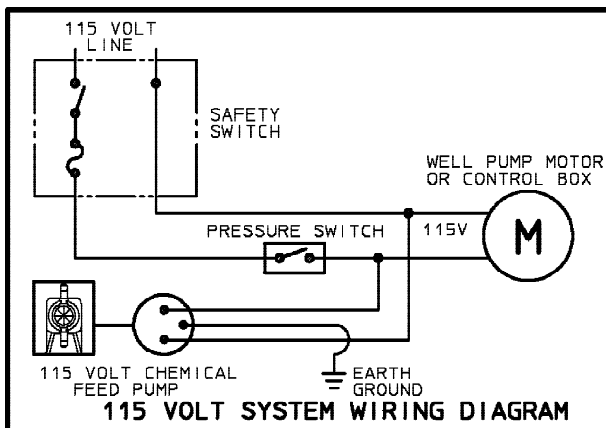
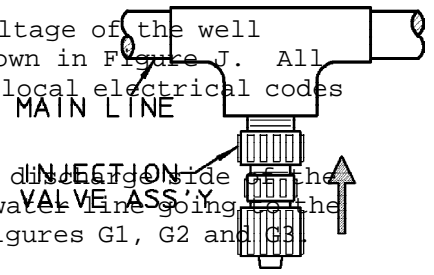
1. **⚠ WARNING** -- Risk of electrical shock. This pump is supplied with a three prong grounding type power plug. To reduce risk of electric shock, connect only to a properly grounded, grounding type receptacle.
2. The metering pump should be wired to an electrical source which conforms to those on the p (Applying higher voltage than the pump is rated for will damage the internal circuit.)
3. In the electronic circuit of the control unit, measures for surge voltage are made by means elements and high voltage semiconductors. Nevertheless, excessive surge voltage may cause areas. Therefore, the receptacle should not be used in common with heavy electrical e generates high voltage. If this is unavoidable, however, measures should be taken by (a) a surge absorbing element (varistor of min. surge resistance 2000A) to the power supply pump, or (b) the installation of a noise suppression transformer.



4. In the event of electrical power interruption during pump operation, the pump will remen automatically resume operation as before, whenever power is restored. If a manual reset is operation, the electrical circuit serving the pump must be suitably wired. Latching power out" upon loss of power, requiring manual reset, are typically used for this purpose.

WELL PUMP SYSTEM INSTALLATION

1. Ensure that the metering pump voltage matches the voltage of the well pump. Typical well pump electrical circuits are shown in Figure J. All electric wiring should be installed in accordance to local electrical codes by a licensed electrician.
2. Install the backpressure/injection (Figure I) on the discharge side of the metering pump into a tee which is installed into the water line going to the pressure tank. Typical installations are found in figures G1, G2 and G3.



Pumps carrying the "ETL Sanitation" approval (tested to NSF standard 50) are listed for spas, and hot tubs, and when proper materials are selected, are capable of handling but following chemical solutions:

- | | |
|---------------------------|-------------------------|
| 12% ALUMINUM SULPHATE | 5% SODIUM CARBONATE |
| 10% SODIUM HYDROXIDE | 2% CALCIUM HYPOCHLORITE |
| 12.5% SODIUM HYPOCHLORITE | 10% HYDROCHLORIC ACID |

DESCRIPTION OF CONTROLS AND OPERATION

INTRODUCTION

The pump performs the following functions:

- Selected Controls
- Fixed Rate
 - External Pulse
 - Straight Pulses
 - Pulse Storage
 - Division
 - Multiplication
 - External Current Signal
 - 4-20 mA
 - 20-4 mA
 - Stroke Counting
 - Timed Operation (intervals)

- Display Alarms
- Circuit Failure
 - Pulse Overflow
 - Signal Loss
 - Pulse Rate High
 - Full Count

- Relay Output (one selected at a time)
- Relay Off
 - Pulse Overflow
 - Stop Function
 - Repeat Strokes
 - Current Signal Loss
 - Circuit Failure
 - Full Count

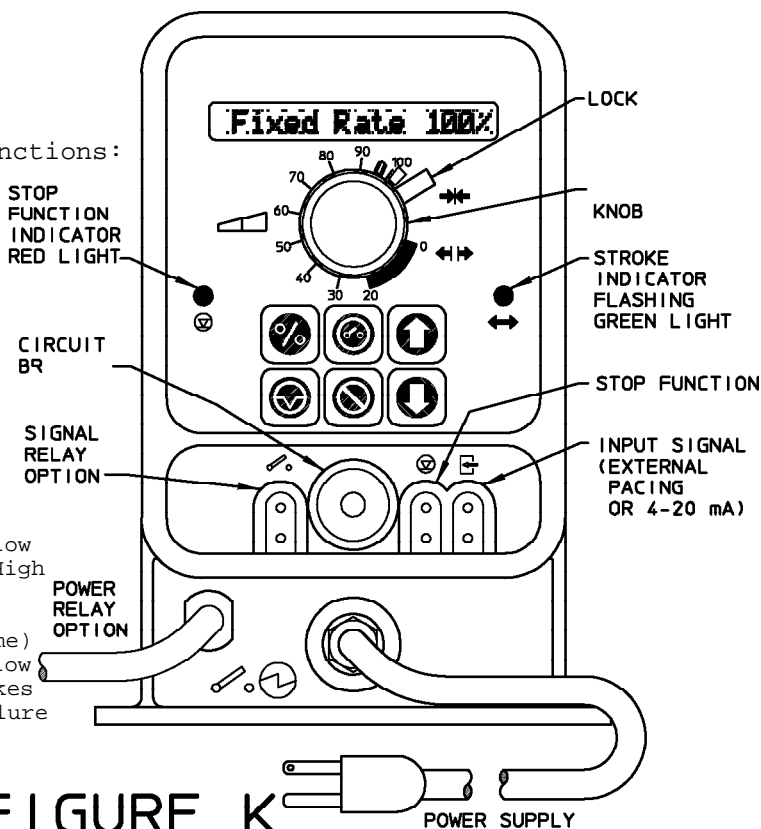


FIGURE K

USING THE TOUCHPAD

All adjustments and changes to pump operation (except stroke length) are made through the 6- (figure L).

Except for alarm conditions, the LCD display (figure K) always presents either the present or a prompt which must be answered in order to commence operation.

There are two types of prompts:

Prompts in the form of questions (marked with a flashing question mark) are used to navigate through menu options. These prompts are answered by pressing either the or buttons.

Prompts marked with alternating up and down arrows are always encountered when a numerical value is selected (i.e., stroke rates, counts, run times, ratios). These prompts are answered by pressing the or buttons to change the display value to the desired setting. After the desired value is set in the display, press to accept this value and continue or press to return to the main menu.

To stop the pump at any time, press the button. To resume operation as before, press the button.

To display the present stroking rate as a percentage of the maximum rate of the pump at any time, press the button. Press any button to return to the normal display.

Pressing the button while the pump is in operation will bring up the relay option menu. Pressing the or buttons will allow scanning through the relay output options. When the desired option is presented, press the button, this will set the relay option and the screen will automatically return to the operating display.

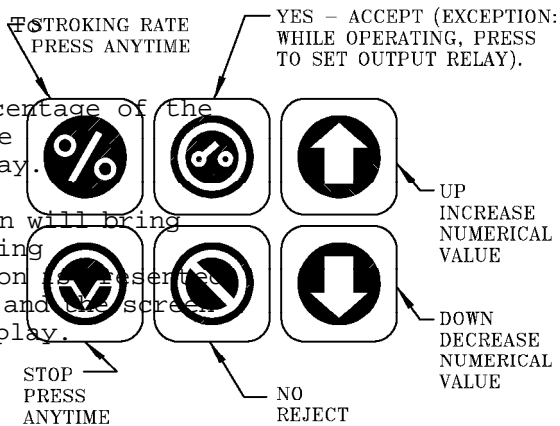


FIG. L

HELPFUL HINTS

You can always get to where you want to go simply by accepting or rejecting choices presented.

If you find yourself within a menu where you don't want to be, like you selected, press the **No** button to return to the main menu.

If you go past the desired selection by mistake, the **No** button will take you back to it.

If you press an inappropriate button, you will be notified by a message which lasts for several seconds.

A partly flashing display requires your response.

A flashing question mark requires a **Yes** or **No** answer.

Flashing arrows require **Up** or **Down** numerical adjustment. To make large numerical adjustments quickly, use either the **Up** or **Down** arrow buttons. The value in the display will change at an increased rate.

A fully flashing display is an alarm.

If power is interrupted, the pump will automatically resume operating where it left off when power is restored. The pump will remember this for years while power is off.

CONTROL OPTIONS

FIXED RATE

The pump operates continuously at the set rate over the span 1-100% of maximum.

EXTERNAL PULSE CONTROL - STRAIGHT PULSES

Each pulse received from the external signal port causes the pump to immediately stroke once the maximum rate of the pump, 125 strokes per minute. If any pulses are received at a faster rate, a **High** alarm is triggered, during which the pump operates at its maximum rate and does not respond to further pulses.

In the **Pulse Storage** option, any pulse frequency received which is at a higher rate than the pump's maximum rate (125 contacts per minute), will cause excess pulses to be accumulated in memory. The pump will continue to operate at its maximum rate when the signal level drops below the maximum rate, and excess pulses at a rate of 125 strokes per minute when the signal level drops below the maximum rate. When accumulation exceeds 9,999 pulses, memory storage capacity is reached and a **Pulse Overflow** alarm is triggered. During **Pulse Overflow** condition the pump operates at 125 strokes per minute; when the rate drops below 125 pulses per minute, **Pulse Storage** operation resumes, starting with a full memory.

EXTERNAL PULSE CONTROL - DIVISION

The pump operates as described above except that incoming pulses are divided by a value from 1 to 255 before actuating the pump. For example, at a setting of 5, every fifth incoming pulse causes the pump to stroke.

The **Pulse Storage** option operates as described above.

Pulse division makes it possible to "tune" the pump by adjusting its response to an external signal from a flowmeter, which is of too high a frequency to cause the desired feed by direct pulse control.

EXTERNAL PULSE CONTROL - MULTIPLICATION

The pump operates as described previously except that incoming pulses are multiplied by a value prior to actuating the pump and then worked off at a selected stroking rate. For example, at a stroking rate of 25%, each incoming pulse causes the pump to stroke five times at 25% stroke rate. During operation, the display shows the present value and the present count on a running basis. If Pulse Storage is in effect, additional external pulses received while responding to a previous pulse are stored and counted.

This option is similar to **Stroke Counting** (see below) except that action is initiated automatically by external pulses rather than once manually by the user. ~~Full Count~~ There is a **Stroke Counting** since it is always possible to receive additional external pulses.

The **Pulse Storage** option operates as described above.

EXTERNAL CURRENT SIGNAL CONTROL

In the ~~4-20 mA~~ (direct) option, the pump responds linearly to a current signal from the incoming signal over the full operating span from 0% (4 mA) to 100% (20 mA). For example, a 12 mA signal causes the pump to operate at 50% of full.

In the 20-4 mA (reverse) option, pump response is the reverse of the above: from 0% (20 mA) to 100% (4 mA).

In both ~~4-20 mA~~ and ~~20-4 mA~~ options, **Ratio** from 1 to 99% can be applied to step down the response. For example, a 12 mA signal at a 50% ratio causes the pump to respond as if the signal were only 6 mA.

In all the above options, **Signal Loss** alarm is triggered whenever the signal drops below approximately 10% for several seconds. The pump stops operating during the loss of signal condition, and automatically returns to normal operation when the signal is restored.

STROKE COUNTING

The pump delivers a preset number of up to 9,999 strokes at a selected stroking rate. During operation, the display shows the preset value and the present count on a running basis. When the preset number of strokes is delivered, the pump stops. ~~Full Count~~ alarm is triggered. ~~Yes~~ **Full Count** alarm is displayed and brings up the reset prompt. ~~Yes to resping~~ Continuing to press the same stroking cycle or change the displayed value. Pressing **Yes** as they are presented to change the stroke count.

This option is similar to **External Pulse Control - Multiplication** (see above) except that action is initiated manually by the user rather than by one or more external pulses.

TIMED OPERATION*

The pump operates for selected run times from 1 to 999 minutes (16.65 hours) at selected intervals from 1 to 999 hours (41.625 days) at a selected stroking rate. For example, the pump might be set to operate every 168 hours (7 days), at a 50% stroking rate. During operation the pump displays the run time and the interval in hours.

* Pumps with version numbers "B4" and "GB4" (displayed on power-up) use settings of seconds for the interval.

RELAY SETTINGS

The following relay output options can be brought up on the menu by pressing the **Yes** button in an operating condition (Relay options vary with operating mode). ~~No condition to search through~~ the options available. Only one relay output option may be selected. When the desired option is selected, press the **Yes** button. This will set the relay for the chosen option and the display will automatically return to the operating display.

RELAY OFF

In all control options the relay remains open at all times.

STOP FUNCTION

In all control options the relay is normally open and **Stop Function** alarm is activated through the stop port.

CURRENT SIGNAL LOSS

In an **Current Signal** control option, the relay is normally open and **Signal Loss** alarm is in effect.

FULL COUNT

In the **Stroke Counting** control option, the relay is normally open and **Full Count** alarm is in effect.

PULSE OVERFLOW

In an **External Pulse** control option **Pulse Storage**, the relay is normally open and closes while the **Overflow** alarm is in effect.

REPEAT STROKES

In all control options, the relay is normally open and closes momentarily during each stroke. If the pump is equipped with a 24 VDC signal relay output, this function may be used to pace another pump.

CIRCUIT FAILURE

At all times, the relay is normally open and **Circuit Failure** alarm is in effect. The numbers which flash alternately with the alarm signal are for failure diagnosis at the factory.

ALARMS

Alarms are distinguished by a fully flashing display.

CIRCUIT FAILURE

At all times, pumping is disabled and the pump will no longer operate until repaired.

SIGNAL LOSS

In an **Current Signal** option, **Signal Loss** alarm is triggered whenever the signal drops below approximately 2 mA for several seconds. The pump stops operating during the loss of signal condition and resumes operation when the signal is restored. This includes the 20-4 mA option, in which a low current call for full pump output in order to prevent overfeeding in the event of signal loss.

FULL COUNT

In the **Stroke Counting** control option, when the preset number of strokes has been delivered and the **Full Count** alarm is triggered.

PULSE OVERFLOW

In the **Pulse Storage** option, when memory capacity is exceeded, a **Pulse Overflow** alarm is triggered. The pump continues to respond to external signal pulses as if 9,999 pulses were in storage.

PULSE RATE HIGH

In an **External Pulse Control** option with **Pulse Storage**, receipt of any pulses at a faster rate than maximum pump stroking rate, 125 strokes per minute, a **Pulse Rate High** alarm is triggered. The pump continues to operate at its maximum rate and does not respond to the excess pulses.

CONTROL REFERENCE SUMMARY

CONTROL OPTIONS

Fixed Rate

Fixed Rate 100%

External Pulse

Straight

Straight Pulse

Pulse Storage option

Pulse-Store 9999

Division

Pulses ÷999

Pulse Storage option

÷999 Store 999

Multiplication

x999/999

Pulse Storage option

x999 Store 9999

External Current

4-20 mA

4-20mA Signal

Ratio option

4-20 Ratio 100%

20-4 mA

20-4mA Signal

Ratio option

20-4 Ratio 100%

Count Strokes Count 9999/9999

Timed Interval 999m Every 999h

OUTPUT RELAY OPTIONS

Relay Off Relay Off

Stop Function Relay-Stop

Current Signal Loss Relay-No Signal

Full Count Relay-Full Count

External Pulse Overflow Relay-Overflow

Repeat Strokes Relay-Repeat

Circuit Failure Relay-Failure

ALARMS (full flashing display)

Circuit Failure Circuit Failure

Signal Loss Signal Loss

Full Count Full Count

Pulse Overflow Pulse Overflow

Pulse Rate High Pulse Rate High

START UP AND OPERATION

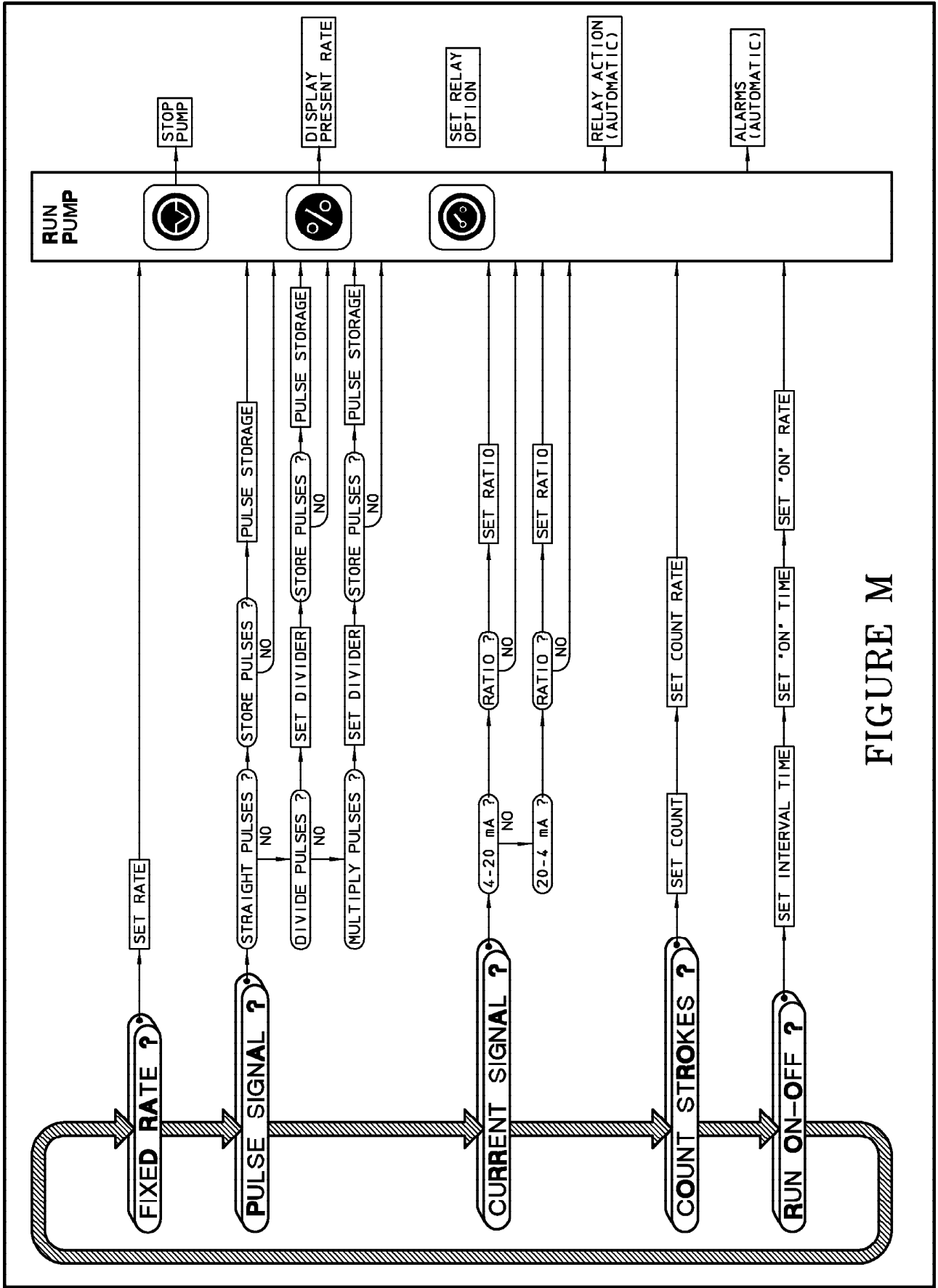


FIGURE M

POWER

All metering pumps are available in 115 volts at 50/60 Hertz, single phase. Optionally 230 volt phase can be provided. **Prior to start-up always check to insure that the pump voltage/frequency/phase matches that of the power supply.**



: If pump is fitted with a PVC pumphead (7th position of model number is "V". Note: PVC is gray, not black), uniformly hand tighten the four head screws before use (18-22 inch pounds / 3.21-3.93 kg/cm). Periodically tighten after installation.

PRIMING



: When working on or around a chemical metering pump installation, protective clothing and gloves and safety glasses should be worn at all times.

All pumps are tested with water. If the chemical to be pumped reacts when mixed with water (e.g. sulfuric acid, polymer) the pump head should be removed and dried thoroughly along with the diaphragm and valve seats.

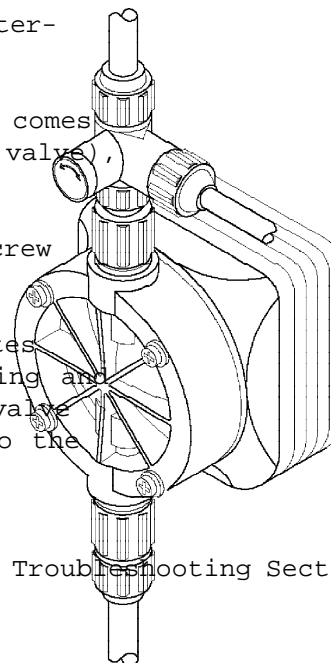
1. Turn on the power to the pump. Operate the pump in the fixed rate control mode at 100% (full LED will light up and flash off each time the pump strokes).
2. Adjust the stroke length knob to the 100% setting mark (for more information see "Stroke Length" on the following page).
3. If the discharge line is connected directly to a pressurized system it should be temporarily bypassed for priming of the pump. A bleed valve will simplify this operation by allowing easy bypass of the discharge line. All air must be purged from the pumphead before the pump will pump against pressure.

A) While pump is running, turn adjustment screw counter-clockwise.

B) Run with valve open until a solid stream of fluid comes out of the bypass tubing (1/4 x 3/8 supplied with valve). No air bubbles.

C) Close bleed valve by turning adjustment screw clockwise.

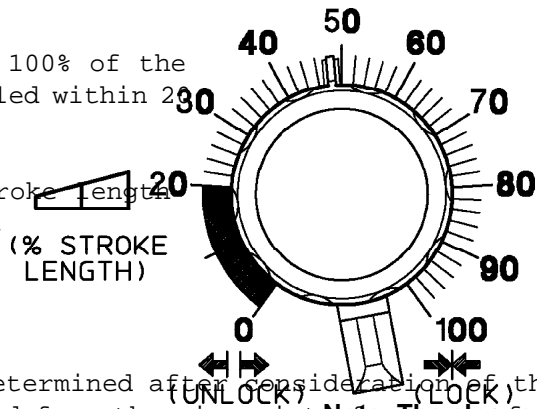
4. Chemical should reach the pumphead after a few minutes of operation. If not, remove the discharge fitting and moisten the discharge valve area (ball check and valve seats) with a few drops of chemical being fed to the metering pump. **For safety, always use protective clothing and gloves, wear safety glasses and use a proper container to hold the chemical.**
5. If the pump continues to refuse to prime, refer to Troubleshooting Section of these instructions.



6. Turn the power on once more and adjust the pump flow to the desired rate (see "Controlling
7. Always check the calibration of the pump after start-up. It's best to calibrate the pump conditions.

STROKE LENGTH ADJUSTMENT

- Stroke length can be controlled within 0 to 100% of the diaphragm displacement. (It should be controlled within 20 to 100% for practical use.)
- Stroke length can be set by means of the stroke length adjusting knob while the pump is in operation. **Do not turn the knob while the pump is stopped.**



Controlling Procedure (for fixed rate):

Proper set points for stroke length should be determined after consideration of the pump and the fluid. The following procedure is recommended from the viewpoint of pump performance. **the stroke length is to 100%, the better the pump performance will be.**

- A) Set the stroke length to 100%. Measure the output capacity.
- B) Adjust the stroke rate frequency to obtain the desired output. If adjustment by stroke rate does not bring the output low enough, the stroke length may be adjusted to lower the maximum output.
- C) Measure the output capacity to ensure that the required value is obtained.

<u>Example</u> Selected Model	=	LMD4
Set Stroke Length	=	100%
Set Stroke Rate	=	100%
Output Capacity	=	21 GPD*
(Rated Pressure)		
Desired Flow	=	17 GPD
Adjust Stroke Rate to 81%		
Output Capacity	=	$\frac{17}{21} \times 100 = 81\%$ (approx.)*

Thus to obtain the desired flow, stroke length is set at 100% and stroke rate is set at 81% i.e. output capacity = 0.81 x 21 = 17 GPD*

*Check these values by measurement. Output capacity is higher when feeding against less pressure.



OPERATION BY EXTERNAL INPUT SIGNALS:

The pump can be controlled by three types of input signals. All are fully isolated from AC input ground. The input socket connections are located at the bottom of the control panel face and provided with the pump. Remove rubber plugs to access plug sockets.

Stop Function:

Operation of the pump can be stopped by an external signal input. When the external signal terminals, the red light goes on and operation of the pump is stopped. The stop function overrides and input signals at other terminals. Previous operation resumes when the stop signal is removed.

- **Operation of more than one pump from the same contact closure will damage the pump circuits. When such operation is required, the pump circuits must be electrically isolated from one another by means of a multicontact control relay or similar means.**



- Input signals should be ~~connected to~~ connected to relay contacts, etc. and the input of other signals is ~~not allowed~~ (In case of relay contacts, electric resistance must be 100 ohms or below when ON and 1 MΩ or above when OFF).

The stop function is commonly used in conjunction with a tank float switch. The float switch opens but when the tank level falls past a certain point the contacts close and the pump stops with the pump.

External Pacing Function:

Pump stroking can be controlled by an external pulse signal through the external signal terminals is in one of the external pacing control modes.

- **Operation of more than one pump from the same contact closure will damage the pump circuits. When such operation is required, the pump circuits must be electrically isolated from one another by means of a multicontact control relay or similar means.**



- After receiving an input signal, the pump generates the necessary power pulse to actuate the external signal input is debounced by the pump circuit.
- Input signals should be ~~connected to~~ connected to relay contacts, etc. and the input of other signals is ~~not allowed~~ (In the case of relay contacts, electric resistance must be 100 ohms or below when ON and 1 MΩ or above when OFF). The pulse duration of the input signal must be 10 milliseconds or over. The frequency of input signal must not exceed 125 times/min unless accommodated by pulse division or pulse width modulation cord is provided with the pump.

4-20 mA / 20-4 mA Function:

The pump stroking rate can be controlled by a 4-20 mA direct or an inverse current signal when the signal modes.

The pump automatically adjusts stroking rate according to the signal level provided to the pump. Pumps may be wired in series to the current signal providing that the signal source is sufficient (each pump has an impedance of 187 ohms).

MAINTENANCE

The pump responds to a straight (non-ratio) 4-20 mA signal as follows: (Figure N below shows straight response and response ratioed by 25, 50 and 75%):

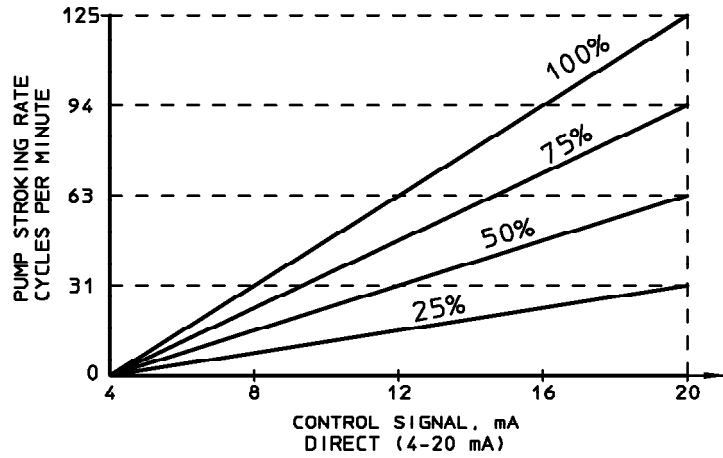


FIGURE N

The pump responds to a 20-4 mA signal as follows. (Figure O below shows straight response and response ratioed by 25, 50 and 75%):

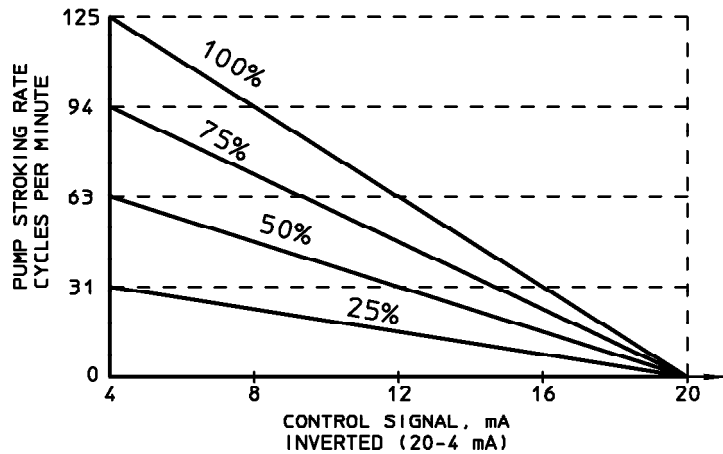


FIGURE O

The signal cord is provided with the pump and has the following polarity:

- White = Positive (+)
- Black = Common

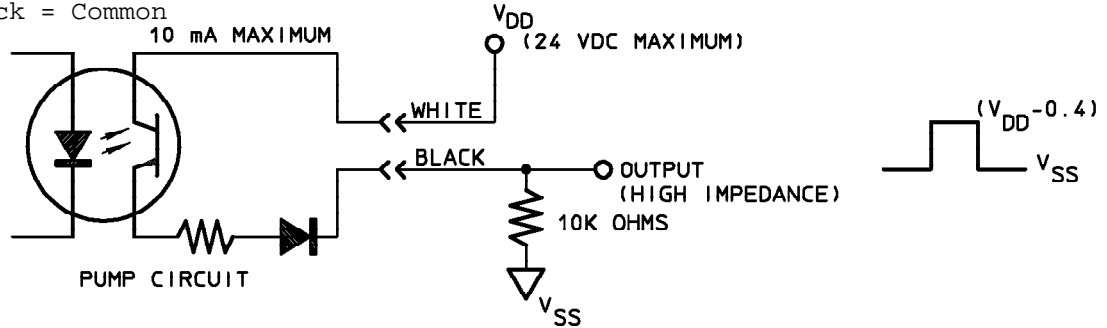
Signal input impedance is 187 ohms.

OUTPUT RELAY

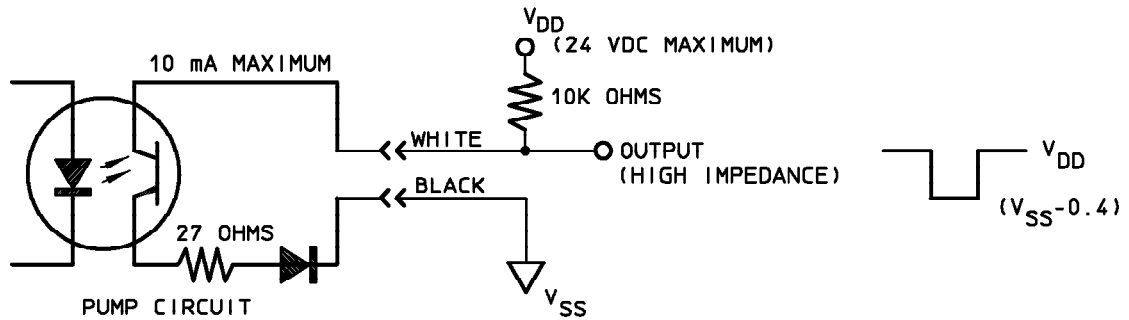
Each pump has the option of being provided with one of two separate normally open output relays described below. Relays close according to the option selected, and remain closed during the pump stroke for the selected option except for the Repeat Stroke option.

The Signal Level output relay option is via the output signal terminals on the pump control panel provide direct or inverted voltage output signals as shown in figure O. The voltage input must be square wave characteristic and must not exceed 24 VDC. The pump circuit can source or sink a maximum current of 10 mA. The signal cord is provided with the pump and has the following polarity when connected to the pump:

White = Positive (+)
Black = Common



TYPICAL USER CIRCUIT (DIRECT OUTPUT)



TYPICAL USER CIRCUIT (INVERTED OUTPUT)

FIGURE P

The Power Level option is via the power relay cord which exits the pump below the control panel. The power relay cord is a zero-crossing triac-type solid-state switch as seen in figure Q which is designed to handle a load and has the following ratings:

Voltage

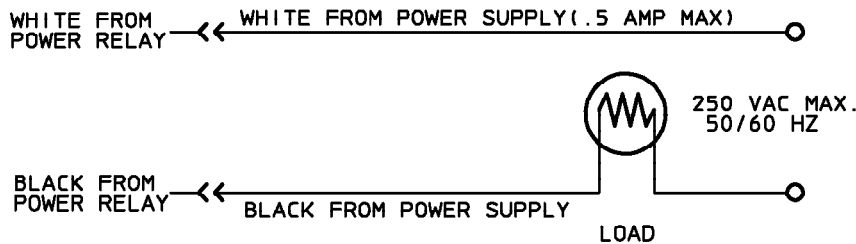
minimum = 12 VAC, 50/60 HZ
maximum = 250 VAC, 50/60 HZ

Current

minimum = 10 mAmps
maximum = .5 Amps

Power

minimum = .12 watts (at 12 VAC)
maximum = 120 watts (at 240 VAC)



* Load can be any device which meets the above voltage and current limits (i.e., lamp, alarm, siren, relay, etc.)

FIGURE Q

CAUTION: Do not apply power directly to the relay cord without a sufficient load to limit current as indicated above. Do not exceed the specified voltage rating. Excess current or voltage will damage the pump and cause fire and electrical shock hazards. Do not install any type of standard power plug to the relay cord.



: Before performing any maintenance or repairs on chemical metering pumps, be sure to disconnect all electrical connections and insure that all pressure valves are shut off and pressure in the pump and lines has been bled off.

Always wear protective clothing, gloves and safety glasses when performing any maintenance or repairs on chemical metering pumps.

ROUTINE MAINTENANCE

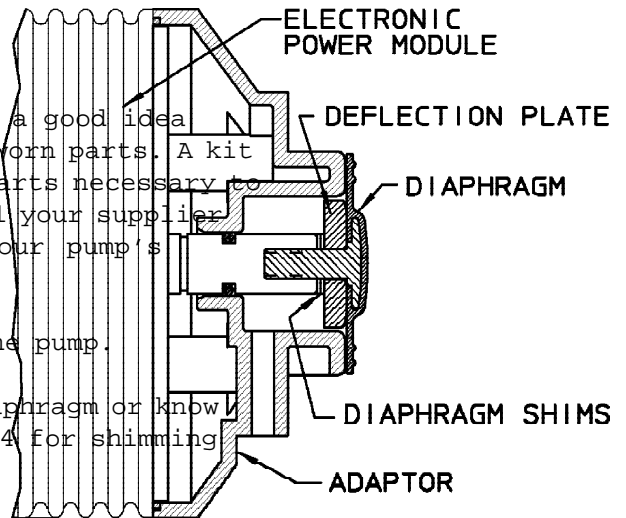
1. Routinely check the physical operating condition of the pump. Look for the presence of an excessive vibration, low flow and pressure output or high temperatures [when running constant stroke rate, the pump housing temperature can be up to 160°F (70°C)]
2. For optimum performance, cartridge valves should be changed every 4-6 months. Depending on application, more frequent changes may be required. Actual operating experience is the determining situation. Repeated short-term deterioration of valve seats and balls usually indicates unsuitability of wetted materials selected for the application. Contact the supplier for guidance.
3. Check for leaks around fittings or as a result of deteriorating tubing e.g. when standard discharge tubing is exposed to direct sunlight. Take appropriate action to correct leak by replacing components.
4. Keep the pump free of dirt/debris as this provides insulation and can lead to excessive pump temperature.
5. If the pump has been out of service for a month or longer, clean the pump head/valve assembly with fresh water for approximately 30 minutes. If the pump does not operate normally after this clean, replace the cartridge valve assemblies.

DISASSEMBLY AND ASSEMBLY DIAPHRAGM REMOVAL

1. Flush pumphead and valve assemblies out by running pump on water or other suitable neutral liquid. Wash outside of pump down if chemical has dripped on pump.
2. Set stroke length of pump to 0% and unplug pump.
3. Disconnect tubing or piping from the pump. Remove the four pumphead screws and then remove the pumphead assembly.
4. Remove the diaphragm by grasping it at the outer edges and turning it counterclockwise until it is clear of the electronic power module (EPM). Don't lose the deflection plate or diaphragm shims which are attached to the diaphragm. Note shim quantity can be from 0 to 2.
5. Inspect diaphragm if it is intended to be used again. Look for indications of the Teflon facing being worn (localized white areas) or the elastomer on the back of the diaphragm being worn. Excessive wear condition require diaphragm replacement.

DIAPHRAGM REPLACEMENT

Refer to drawings in the back of the manual.



1. When replacing the diaphragm, it's always a good idea to replace the valve cartridges and other worn parts. A kit is available from your supplier with all parts necessary to completely rebuild your pump's wet end. All your supplier needs to know is the "KOPkit No." on your pump's nameplate to supply this kit.
2. Set pump stroke length to 0% and unplug the pump.
3. If you kept the shims from the original diaphragm or know the original quantity you can avoid Step #4 for shimming the diaphragm and go to Step #5.
4. Slide the diaphragm deflection plate onto the back of the diaphragm stud, radius side toward the center. Next slide two shims onto the diaphragm threaded stud and screw the diaphragm into the EP unit. Figure R. Turn diaphragm clockwise until deflection plate and shims are tight against solenoid stops turning. If there is a gap between the adaptor and diaphragm, repeat the procedure each time until the diaphragm just touches the adaptor or is slightly recessed.
5. Apply grease to areas of the diaphragm that contact the deflection plate or radius on the adaptor.
6. Screw the diaphragm into the EPM unit's shaft with the deflection plate and appropriate shims between.
7. Adjust stroke length to 50%. It is easier to do this if you temporarily turn the pump on and install it onto the adaptor with valve flow arrows pointing up and tighten pumphead screw until pumphead pulls up against adaptor.
8. Adjust stroke length back to 100% for easier priming and place pump back into service.

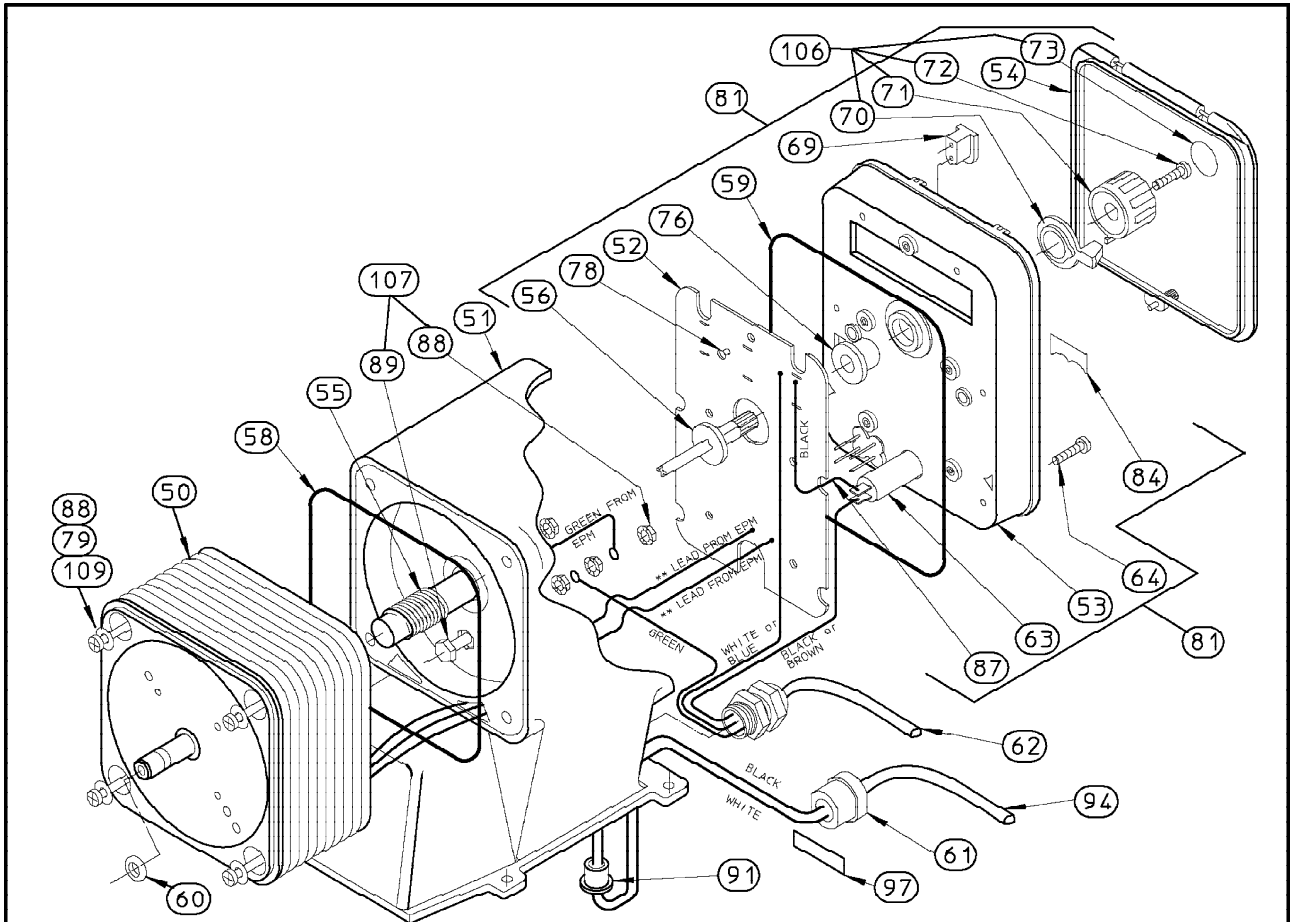
VALVE REPLACEMENT

1. Flush pump to clean any chemical from pump head.
2. Unplug pump, release system pressure, and disconnect any tubing or piping.
3. Unscrew valve cartridges and discard. Also remove O-Rings down inside pumphead.
4. Using new O-Rings, install new valve cartridges with stamped letters reading from top to bottom pointing in the direction of flow. Hand tighten only, do not use wrenches or pliers. This is important when the pumphead is SAN material.
5. Reconnect tubing or piping and reinstall the pump.
6. Check for leaks around newly installed fittings.

TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
LOSS OF CHEMICAL RESIDUAL	<ol style="list-style-type: none"> 1. Pump setting too low 2. Scale at injection point 3. Solution container allowed to run dry 	<ol style="list-style-type: none"> 1. Adjust to higher setting (pump must be operating during the stroke length adjustment). 2. Clean injection parts with 8% muriatic acid or undiluted vinegar. Also, see Maintenance Section). 3. Refill the tank with solution and prime. (See Start-Up and Operation Section).
TOO MUCH CHEMICAL	<ol style="list-style-type: none"> 1. Pump setting too high 2. Chemical in solution tank too rich 3. Siphoning of chemical into well or main line 	<ol style="list-style-type: none"> 1. Lower pump setting (pump must be operating to adjust stroke length knob). 2. Dilute chemical solution. NOTE: For chemical that reacts with water, it may be necessary to purchase a more dilute grade of chemical direct from chemical supplier. 3. Test for suction or vacuum at the injection point. If suction exists, install an anti-siphon valve.
LEAKAGE AT TUBING CONNECTIONS	<ol style="list-style-type: none"> 1. Worn tube ends 2. Chemical attack 	<ol style="list-style-type: none"> 1. Cut off end of tubing (about 1") and then replace as before. 2. Consult your seller for alternate material.
FAILURE TO PUMP	<ol style="list-style-type: none"> 1. Leak in suction side of pump 2. Valve seats not sealing 3. Low setting on pump 4. Low solution level 5. Diaphragm ruptured 6. Pumphead cracked or broken 7. Pumphead contains air or chlorine gas 8. Breakdown or disconnection of wiring 9. Voltage drop 10. Malfunction of electronic control board 	<ol style="list-style-type: none"> 1. Examine suction tubing. If worn at the end, cut approximately an inch off and replace. 2. Clean valve seats if dirty or replace with alternate material if deterioration is noted. 3. When pumping against pressure, the dial should be set above 20% capacity for a reliable feed rate. 4. Solution must be above foot valve. 5. Replace diaphragm as shown in the "Maintenance Section." Check for pressure above rated maximum at the injection point. NOTE: Chemical incompatibility with diaphragm material can cause diaphragm rupture and leakage around the pump head. 6. Replace pump head as shown in "Maintenance Section." Make sure fittings are hand tight only. Using pliers and wrench can crack pump head. Also, chemical incompatibility can cause cracking and subsequent leakage. 7. Bleed pump head, see "Air Bleed Operation." 8. Connect wiring properly. Check fuse or circuit breaker. 9. Take measures after investigation of cause. 10. Contact supplier.

PROBLEM	PROBABLE CAUSE	REMEDY
PUMP LOSES PRIME	<ol style="list-style-type: none"> 1. Dirty check valve 2. Ball checks not seating or not sealing properly 3. Solution container allowed to run dry 4. Chemical Outgassing 	<ol style="list-style-type: none"> 1. Remove and replace or clean off any scale or sediment. 2. Check seat and ball checks for chips, clean gently. If deformity or deterioration is noted, replace part with proper material. Resulting crystals can hold check valves open, therefore the valves must be disassembled and cleaned. Be sure to replace all parts as shown in the Parts Diagram (at the end of the manual). 3. Refill the tank with solution and prime. (See Start-Up and Operation Section). 4. Bleed gas, use flooded suction, maintain chemical at room temperature (approx. 20°C).
LEAKAGE AT FITTING	<ol style="list-style-type: none"> 1. Loose fittings 2. Broken or twisted gasket 3. Chemical attack 	<ol style="list-style-type: none"> 1. Tighten hand tight. Replace gasket if hand tight does not stop leakage 2. Check gaskets and replace if broken or damaged. 3. Consult your pump supplier for alternate material.
PUMP WILL NOT PRIME	<ol style="list-style-type: none"> 1. Too much pressure at discharge 2. Check valves not sealing 3. Output dials not set at maximum 4. Suction lift height too much 5. Pump equipped with spring loaded high viscosity valves 	<ol style="list-style-type: none"> 1. Turn off all pressure valves, loosen outlet tubing connection at discharge point. Remove discharge valve cartridge. Dampen ball check and valve seats with a few drops of solution. Set pump dial to maximum rate. When pump is primed, reconnect all tubing connections. 2. Disassemble, loosen, clean and check for deterioration swelling. Reassemble and wet the valve assembly, then prime. See Start-Up and Operating Section. 3. Always prime pump with output dial set at maximum rated capacity. 4. Decrease suction lift or pull vacuum on pump discharge until pump is primed. 5. Loosen discharge valve to aid in priming, take necessary safety precautions. Or apply vacuum to pump discharge.



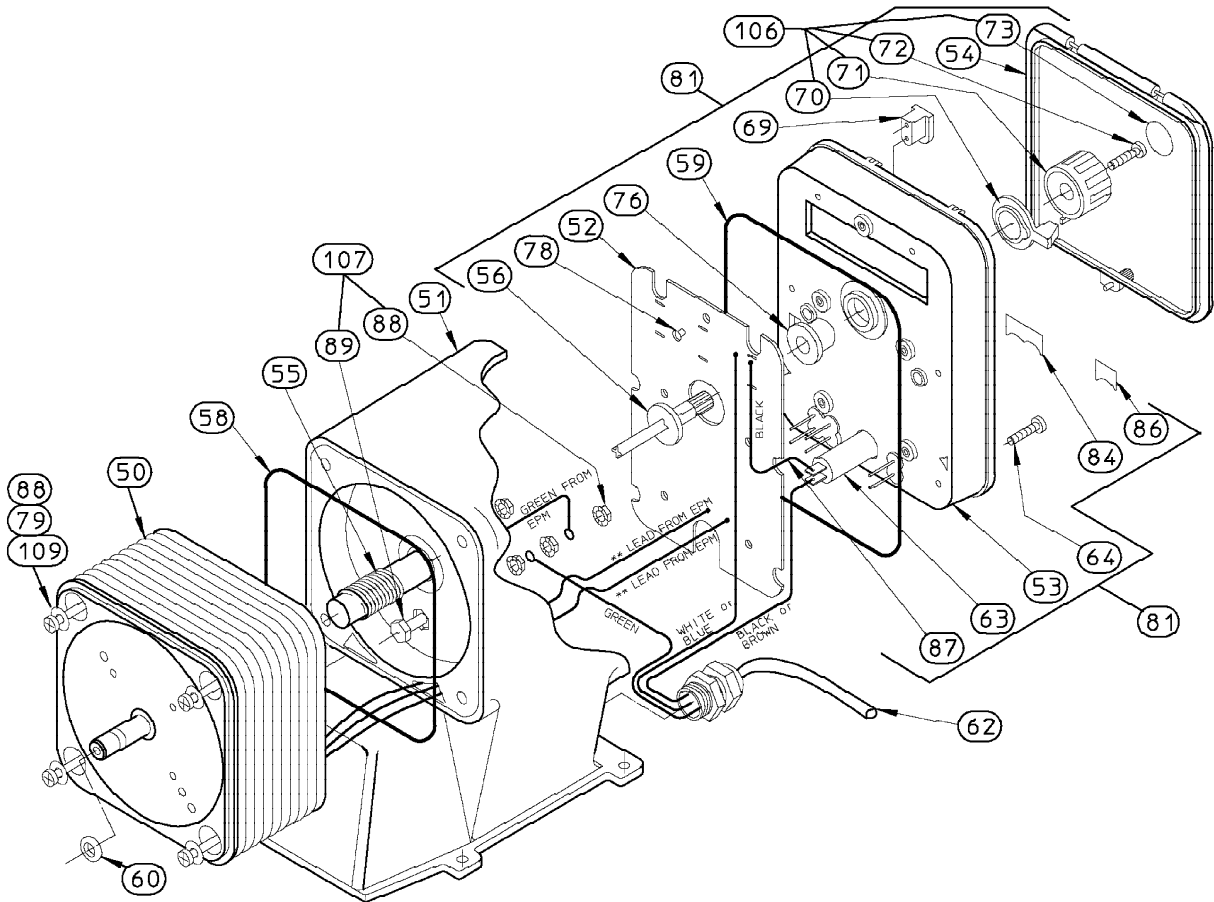
ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY
50	ELECTRONIC POWER MODULE (EPM)	1	73	STICKER, STROKE LENGTH KNOB	1
51	HOUSING	1	76	GROMMET, STROKE LENGTH	1
52	ELECTRONIC CONTROL BOARD	1	77	TOUCH PAD (NOT SHOWN)	1
53	CONTROL PANEL	1	78	CIRCUIT MOUNT SCREW	5
54	DUST COVER ASSEMBLY	1	79	EPM MOUNTING WASHER	4
55	FEMALE ADJUSTMENT SHAFT	1	81	CONTROL PANEL ASSEMBLY	REF
56	MALE ADJUSTMENT SHAFT	1	84	STOP/SIGNAL LABEL	1
57			85	STOP/FUNC. CORD (NOT SHOWN)	2
58	EPM/HOUSING O-RING	1	86	RELAY LABEL	1
59	CONTROL PANEL O-RING	1	87	JUMPER WIRE	1
60	SECONDARY SEAL	1	88	GROUND LUG NUT w/ WASHER	7
61	STRAIN RELIEF, SIGNAL CORD	1	89	GROUND LUG BOLT	1
62	POWER CORD ASSY	1	91	SIGNAL CORD BUSHING	1
63	CIRCUIT BREAKER	1	92	BREAKER COVER (NOT SHOWN)	1
64	CONTROL PANEL SCREW	5-6	94	SIGNAL CORD	1
69	PIN PLUG	3	97	SIGNAL POWER LABEL	1
70	LOCKING TAB	1	106	KNOB KIT, STROKE LENGTH	REF
71	KNOB, STROKE LENGTH	1	107	GROUND LUG KIT	REF
72	KNOB MOUNTING SCREW	1	109	EPM MOUNTING SCREW	4

** = 115 VOLT EPM UNITS HAVE GREY LEADS.

** = 230 VOLT EPM UNITS HAVE RED LEADS.

NOTE TERMINAL LOCATIONS ON THE CIRCUIT BOARD VARY DEPENDING ON THE CONTROL OPTION.

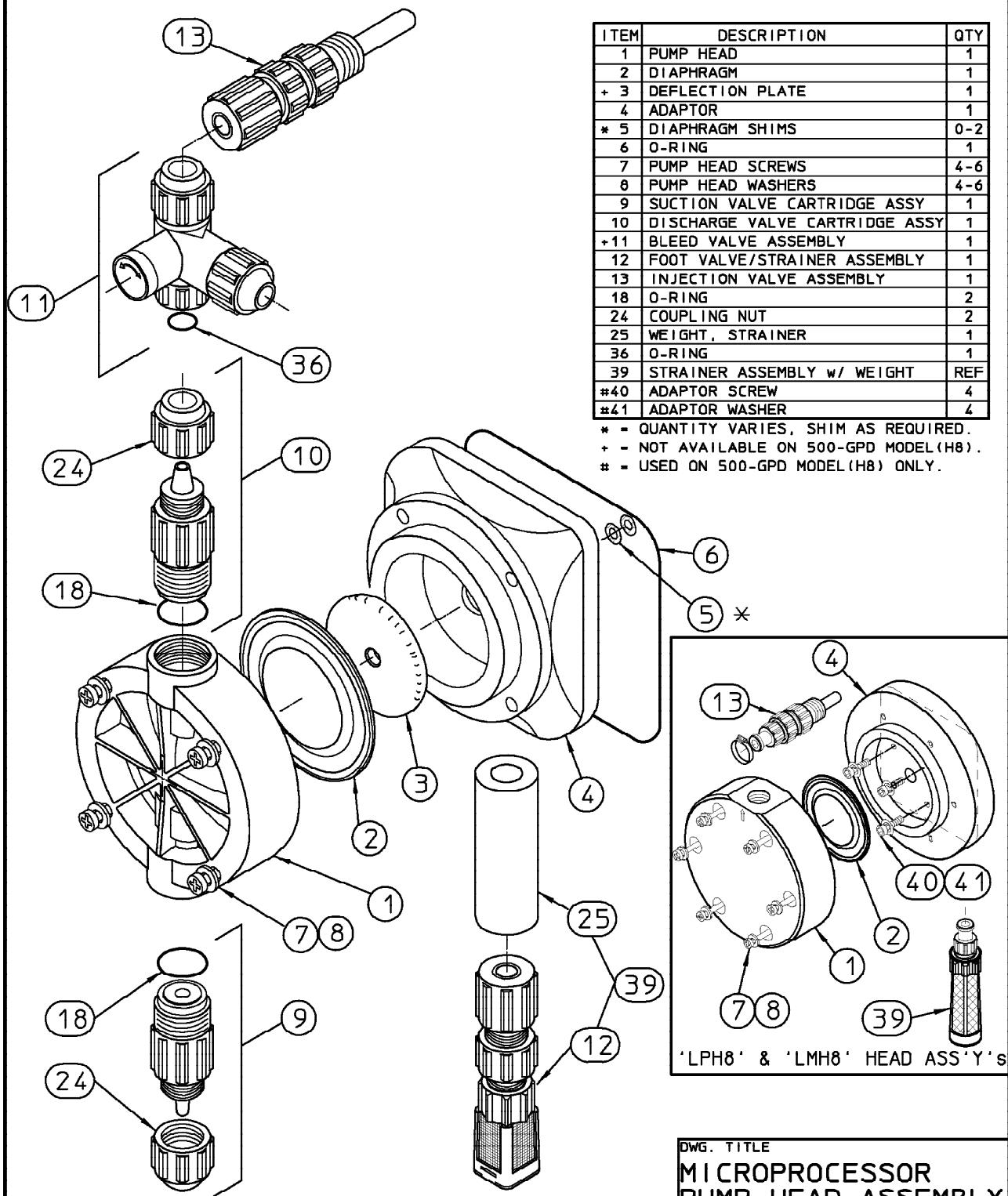
DWG. TITLE	
MICROPROCESSOR POWER RELAY DRIVE ASSEMBLY	
DWN BY: PTP	CAD DWG.# 15-B-9
DATE 2/09/95	AC00235.001



ITEM	DESCRIPTION	QTY	ITEM	DESCRIPTION	QTY
50	ELECTRONIC POWER MODULE EPM	1	73	KNOB STICKER, STROKE LG.	1
51	HOUSING	1	74	EPM MOUNTING SCREW	4
52	ELECTRONIC CONTROL BOARD	1	76	GROMMET, STROKE LENGTH	1
53	CONTROL PANEL	1	77	TOUCH PAD (NOT SHOWN)	1
54	DUST COVER ASSEMBLY	1	78	CIRCUIT MOUNT SCREW	5
55	FEMALE ADJUSTMENT SHAFT	1	79	EPM MOUNTING WASHER	4
56	MALE ADJUSTMENT SHAFT	1	81	CONTROL PANEL ASSEMBLY	REF
57			84	STOP/SIGNAL LABEL	1
58	EPM/HOUSING O-RING	1	85	STOP/FUNC. CORD (NOT SHOWN)	3
59	CONTROL PANEL O-RING	1	86	RELAY LABEL	1
60	SECONDARY SEAL	1	87	JUMPER WIRE	1
62	POWER CORD ASSY	1	88	GROUND LUG NUT w/ WASHER	7
63	CIRCUIT BREAKER	1	89	GROUND LUG BOLT	1
64	CONTROL PANEL SCREW	5-6	92	BREAKER COVER (NOT SHOWN)	1
69	PIN PLUG	3	106	KNOB KIT, STROKE LENGTH	REF
70	LOCKING TAB	1	107	GROUND LUG KIT	REF
72	KNOB MOUNTING SCREW	1			

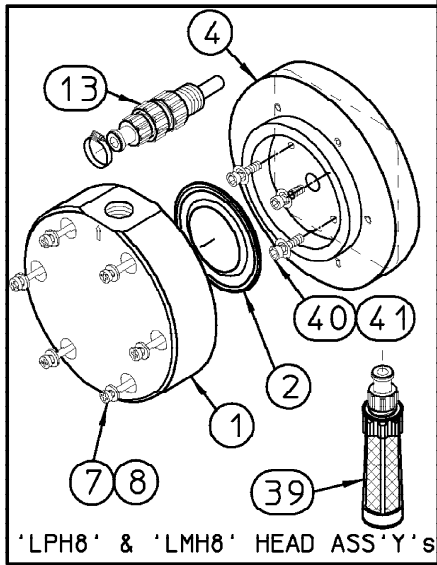
** = 115 VOLT EPM UNITS HAVE GREY LEADS,
 ** = 230 VOLT EPM UNITS HAVE RED LEADS.
 NOTE TERMINAL LOCATIONS ON THE CIRCUIT BOARD VARY DEPENDING ON THE CONTROL OPTION.

DWG. TITLE	
MICROPROCESSOR SIGNAL RELAY DRIVE ASSEMBLY	
DWN BY: PTP	CAD DWG. # 15-B-9
DATE 2/08/95	AC00234.001



ITEM	DESCRIPTION	QTY
1	PUMP HEAD	1
2	DIAPHRAGM	1
+ 3	DEFLECTION PLATE	1
4	ADAPTOR	1
* 5	DIAPHRAGM SHIMS	0-2
6	O-RING	1
7	PUMP HEAD SCREWS	4-6
8	PUMP HEAD WASHERS	4-6
9	SUCTION VALVE CARTRIDGE ASSY	1
10	DISCHARGE VALVE CARTRIDGE ASSY	1
+11	BLEED VALVE ASSEMBLY	1
12	FOOT VALVE/STRAINER ASSEMBLY	1
13	INJECTION VALVE ASSEMBLY	1
18	O-RING	2
24	COUPLING NUT	2
25	WEIGHT, STRAINER	1
36	O-RING	1
39	STRAINER ASSEMBLY w/ WEIGHT	REF
#40	ADAPTOR SCREW	4
#41	ADAPTOR WASHER	4

* - QUANTITY VARIES, SHIM AS REQUIRED.
 + - NOT AVAILABLE ON 500-GPD MODEL (H8).
 # - USED ON 500-GPD MODEL (H8) ONLY.



DWG. TITLE	
MICROPROCESSOR PUMP HEAD ASSEMBLY	
OWN BY PTP	CAD DWG.# 31-J-5
DATE 8/01/95	AC00263

Specifications

Pressure, MAX, PSI/BAR @ GPD/GPH/LPD	300/20 3/.13/11
Capacity, MAX, GPD/GPH/LPD @ PSI/BAR	500/20.8/1890 20/1.4
Reproducibility, % MAX Capacity	2
Viscosity, MAX, CPS (1)	1000
Suction Lift @ 1 CPS, MAX, FT/M @ 3000 CPS	10/3.1 (once primed) 3.5/1.1
Controls	6-Station Membrane Switch
Status Display	16-Position LCD Dot Matrix Backlight
LED Indicator Lights, Panel Mount	Power On - Green Pulsing - Green Flashing Stop - Red
Stroke Frequency, MAX, SPM	125
External Stroke Frequency Control, (Automatic)	4-20 mADC, 20-4 mADC External Pacing
Stroke Frequency Turn Down Ratio	100:1
Stroke Length Turn Down Ratio	10:1
Output Relay (Signal Level Option)	24 VDC, 10 mA
Output Relay (Power Option)	250 VAC, 50/60 HZ, .5A
Power Input	115 VAC/50-60HZ/1ph 230 VAC/50-60HZ/1ph
Current Draw @ 115 VAC, AMPS	1
Average Input Power @MAX SPM, Watts	130
Circuit Board Protection	Circuit Breaker (Panel Mount)
Temperature, MAX, ° F/ C - Environmental (Shaded)	104/40
Connections - Tubing (Suction & Discharge) . . . g (Suction & Discharge)	.25" ID X .38" OD .38" ID X .50" OD .50" ID X .75" OD .25" FNPT .50" FNPT

REPAIR SERVICE

Normally following the instructions in the previous sections of the manual will rectify any problem. If after following these instructions the pump does not perform properly, it can be returned for repair. Follow the instructions below:

1. Pump cannot be serviced properly if the original pump nameplate or data contained on the pump is not intact.
2. Thoroughly flush pumphead and outside of pump with water or a suitable fluid to neutralize any residue left in pump.
3. Include written explanation of the following:

A) Problem _____

B) Pumped Fluid _____

Name _____

Viscosity _____

Fluid Temperature _____

C) Pressure @ Discharge _____

@ Suction _____

or Suction Lift _____

D) Environmental Temperature _____

E) Electrical Service _____

Volts _____

Hz _____

Phase _____

F) Nameplate Data _____

Series _____

Serial # _____

KOPkit # _____

4. Package the pump in the original box if available and send to the address specified by your distributor.

KOPkits™

Keep-On-Pumping kits that can save you time and money!

The manufacturer has built a reputation for superior reliability by supplying carefully-designed, high-quality equipment. Even the best equipment, however, requires a minimal amount of maintenance. KOPkits are designed to guard against unnecessary downtime and assure you the highest level of efficient and uninterrupted service.

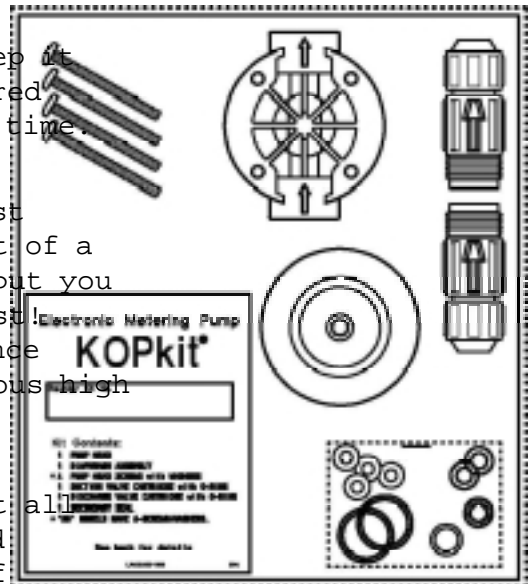
KOPkits contain those recommended spare parts which will most likely require normal maintenance.

A typical KOPkit includes Valve Cartridges with O-Rings, Head, Diaphragm, Secondary O-Ring Seal, Head Screws, Washers and an exploded view drawing.

KOPkits will save you money. When you need a part, you've got it! You can cut downtime and production loss from days to minutes. You also save by buying parts in KOPkit form compared with buying individual parts.

Each KOPkit part is vacuum-sealed to keep it clean even when stored for long periods of time. A KOPkit is a troubleshooter's best friend. In the event of a breakdown, it will put you back in business fast! Preventive maintenance will insure continuous high performance of your pump.

Keep on pumping! Get all the money-saving and security benefits of KOPkits immediately.



Typical KOPkit

Selecting a KOPkit

The KOPkit part number is displayed on the pump model label as shown. To order the proper KOPkit model, begin with the letter "K" followed by the 4th, 7th, 8th, 9th and the 10th digit of the pump model number.

ELECTRONIC METERING PUMP	
SERIES	SERIAL #
MAXIMUM OUTPUT	GPD LPH
MAXIMUM PRESSURE	PSI BAR
PARTS KIT #	
ACCEPTABLE FOR OUTDOOR USE	

