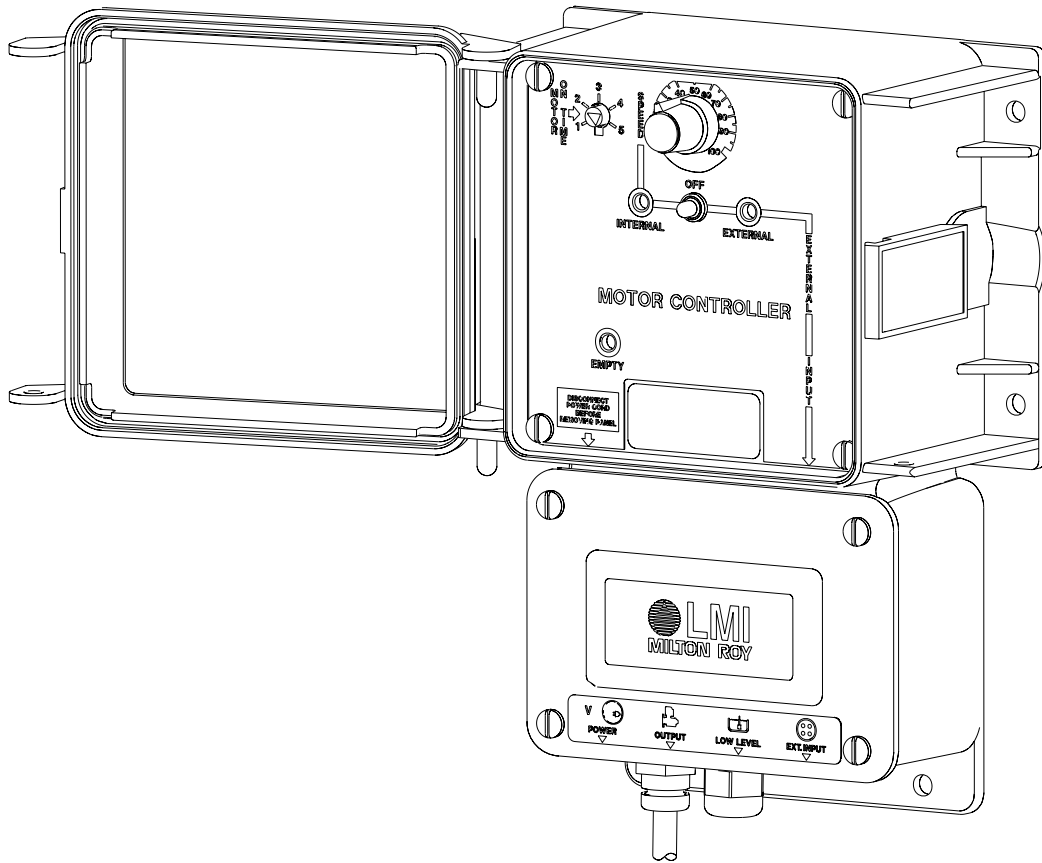


# Instruction Manual

## M Pump Motor Controller



For file reference, please record the following data:

Model No: \_\_\_\_\_

Serial No: \_\_\_\_\_

Installation Date: \_\_\_\_\_

Installation Location: \_\_\_\_\_

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



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Replaces same of Rev.B 5/99  
1914.C 7/99



**WARNING: *THIS M PUMP MOTOR CONTROLLER IS DESIGNED FOR USE WITH LMI SERIES M PUMPS ONLY. OPERATION WITH OTHER PUMPS OR PRODUCTS MAY CAUSE DAMAGE TO CONTROLLER, PUMP, OR BOTH.***



**THE M PUMP MOTOR CONTROLLER IS DESIGNED TO OPERATE SERIES M PUMPS AT 100 STROKES PER MINUTE (SPM). SERIES M OUTPUTS MAY BE REDUCED UP TO 30% FROM RATED OUTPUT DEPENDING ON MOTOR ON-TIME ADJUSTMENT.**

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## 1.0 Introduction

LMI's M Pump Motor Controller provides external control for your Series M Pump for applications that require flow proportional chemical feed or response to control instrumentation. The motor controller will provide one stroke from the pump for each pulse input or will provide direct proportional response to a 4-20 mA input signal.

### 1.1 Operating Principle

The M Pump Motor Controller utilizes phase control technology to 'pulse' the motor. No special motor or drive is required. Because of variables in pumping systems, a motor 'on-time' feature is provided. This enables the pump to be adjusted to provide one complete stroke during each cycle. The motor controller will operate externally from 1-100 strokes per minute or internally from 5-100 strokes per minute.

**Note** For proper operation, the M pump motor controller must be set and adjusted in compliance with the instructions given in this manual. Pump output may be reduced up to 30% from rated output depending on motor on-time adjustment.

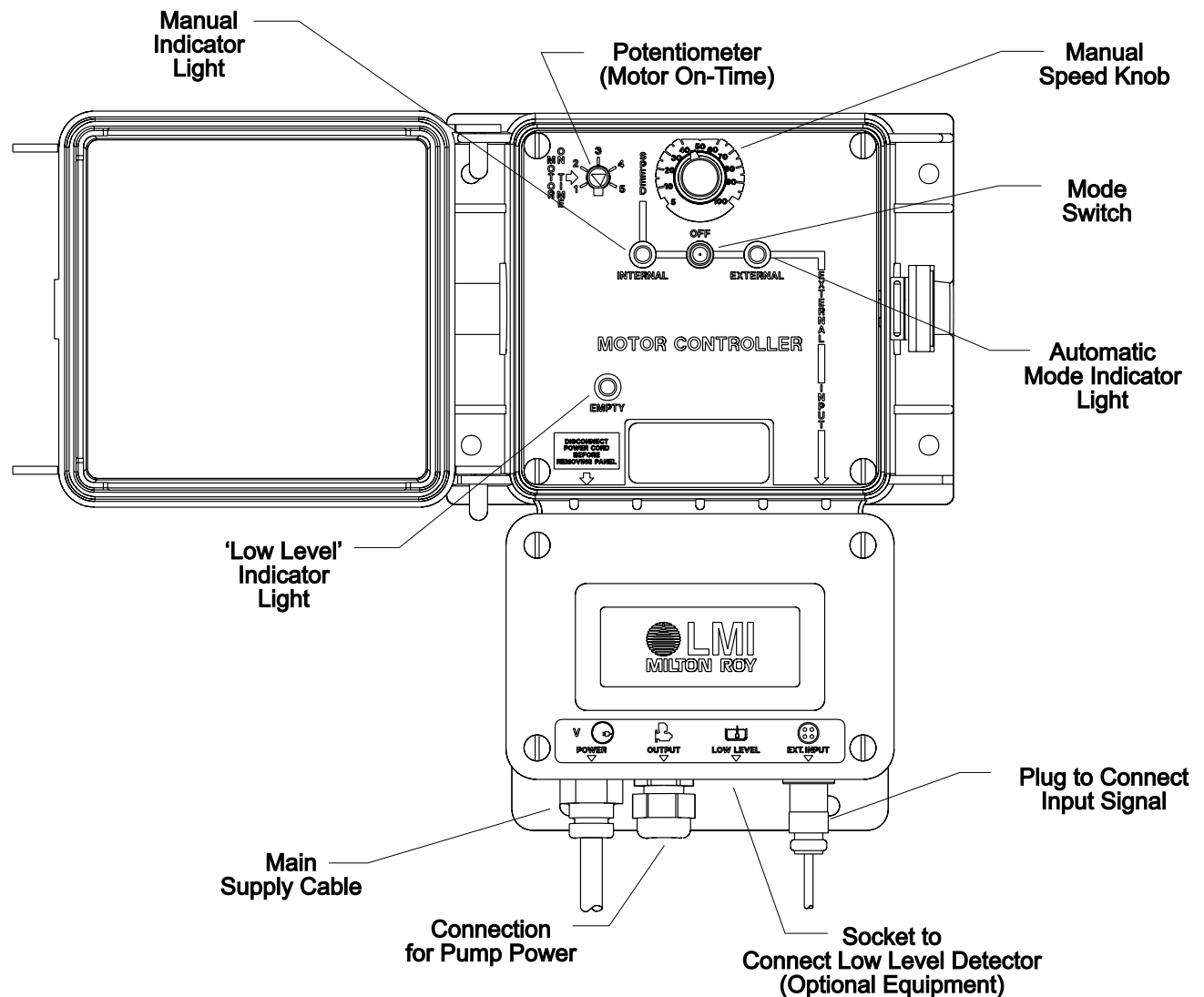


Figure 1

## 2.0 Installation

### 2.1 Mounting the Controller Enclosure

The M pump motor controller is supplied with integral wall-mounting flanges. It should be mounted with the display at eye level on a vibration-free surface. All accessible mounting holes should be utilized. The maximum operating temperature is 122° F (50° C). This should be considered if installation is in a high-temperature location.

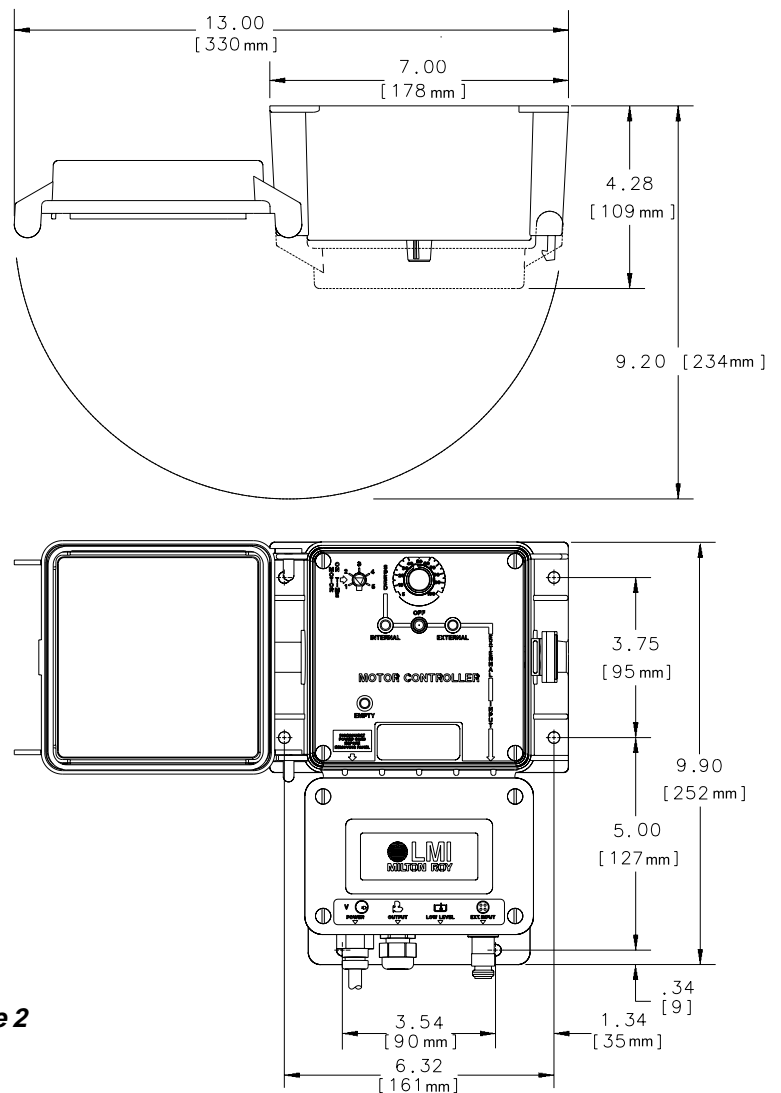
Maximum distance between motor controller and M pump is 600 ft. (200 meters).

Maximum distance between motor controller and external signal is 300 ft. (100 meters).

### 2.2 Enclosure Mounting Dimensions

When using the pre-wired unit, the enclosure is configured as NEMA 12X. If the unit is connected through watertight conduit, the enclosure is configured as NEMA 4X.

The following clearances should be observed for proper mounting.



**Figure 2**

## 2.3 Electrical Wiring Information



To reduce the risk of electrical shock, the controller must be plugged into a grounded outlet with ratings conforming to the specifications on the data nameplate. It must be connected to a viable ground circuit. **DO NOT USE ADAPTERS** (see Figure 3)! All wiring must conform to required electrical codes.

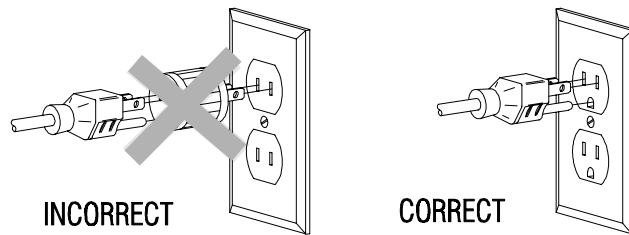


Figure 3

## 2.4 Terminal Strip Layout

To access the wiring connections inside the controller:

1. Disconnect the unit from electrical power.
2. Remove the four (4) screws and the junction box cover on the lower half of the unit.
3. Consult the specific instructions below for the connections required.

### AC Power Input (Controller)

Hot:	T1
Neutral:	T2
Ground:	T3

### AC Power Output (Pump)

Hot:	T5
Hot:	T6
Ground:	T7

### Signal Input (External)

Pulse Trigger:	T9
Pulse Trigger:	T10
- 4-20 mA:	T11
+ 4-20 mA:	T12

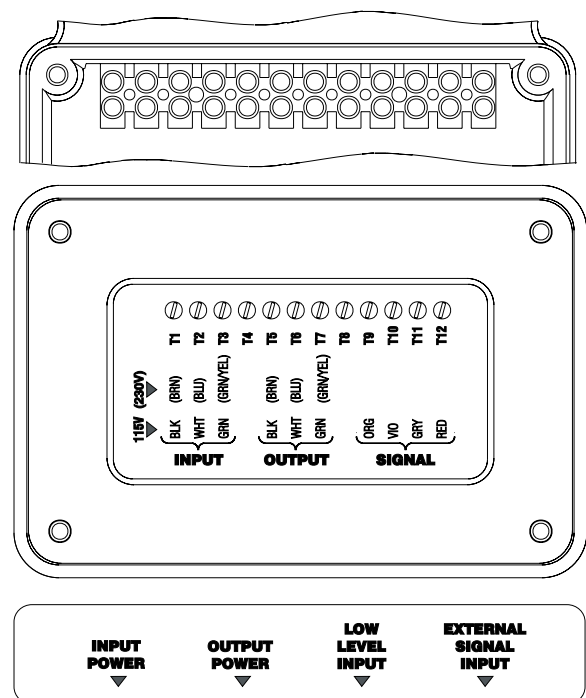
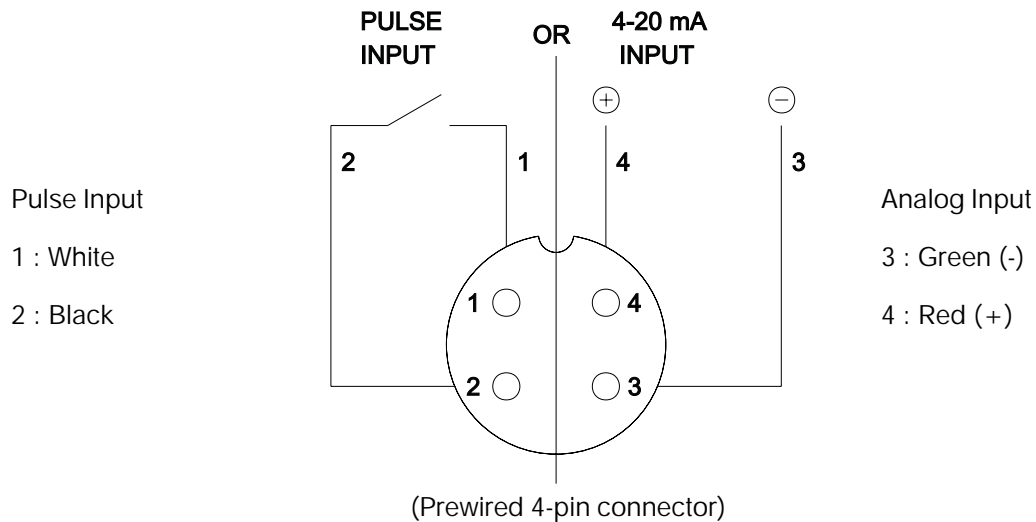


Figure 4: Terminal Strip Layout

## 2.5 Input Signals

The motor controller is supplied with a 10 ft. (3 meter) cable fitted with a 4-pin connector for connection to the external control device. The signal can be pulse type (water meter, pH meter, etc.) or analog type (4-20 mA). Only two of the four conductors will be connected as shown in the following diagram:



**Figure 5: Connection of two conductors (Analog or Pulse)**

### 2.5.1 Input Power to Controller

AC power Input (115V and 230V M pumps)

The M pump motor controller is supplied with a six-foot power cord and plug.

### 2.5.2 Output Power to M Pump

AC Output power (115V M pumps)

A 6" output power cord with receptacle supplies power to 115V Series M pump.

AC Output power (230V M pumps)

A PG-9 connector is supplied for hard-wire connection to the 230V Series M pump.

1. Check the M pump data plate for proper voltage (230V).
2. Remove the 4 screws to the junction box cover.
3. Cut away the M pump power cord plug.
4. Route the M pump power cord through the PG-9 connector.
5. Hard-wire the M pump cord to the controller terminal strip.
6. Reinstall the junction box cover.



*The maximum distance between the M pump motor controller and the M pump is 600 ft. (200 meters).*

---

## 3.0 M Pump Controller Input Signal Connections

### 3.1 Pulse Signals:

---

Using the input cable, connect the white and black conductors to your pulse output. There is no polarity requirement for the connection. The red and green conductors may be cut. Pulse inputs must be between 0-100 per minute.

Pulse signals must be capable of switching 15 VDC @ 8 milliamperes. Minimum time in the low impedance state (on) is 50 milliseconds. Minimum time in high impedance state (off) is 100 milliseconds.

### 3.2 4-20 mA Analog Signals:

---

Using the input cable, connect the red and green conductors to your 4-20 mA analog output. Connections must be made with respect to polarity. Connect the red conductor to positive (+) and the green conductor to negative (-). The white and black connectors may be cut.

The pump will respond directly and proportionally to the 4-20 mA input.

4 mA = 0 strokes per minute (no output)

20 mA = 100 strokes per minute (max output)



*The maximum distance between the M pump motor controller and the pulse or 4-20 mA source is 300ft. (100 meters). Extension cables are available from your local LMI distributor.*

*In addition, if electrical noise is present, the installation of a sealed junction box and shielded two-conductor cable should be considered. Also note, cable should be routed via a separate electric raceway from the power supply.*

### 3.3 Low Level Input (Optional):

---

When used in conjunction with LMI's optional low-level switch accessory (P/N 29190), pump and controller operations are interrupted when the chemical supply is low, preventing loss of prime. The "EMPTY" light on the front panel illuminates alerting the operator to replenish the chemical supply.



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## 4.0 Procedures Before Initial Start-up

### 4.1 Checking of Motor Connections

---

Set the manual speed control knob to 30%. Set the MODE switch to INTERNAL.

Check motor rotation, it must be in accordance with the arrow stamped on the motor.

To reverse motor rotation, refer to the information contained in the motor terminal box.

### 4.2 Checking of 4-20 mA Signal Input

---

Set the MODE switch to EXTERNAL. Send an input signal and check the pump response. If the pump does not respond to the signal, verify signal polarity.

### 4.3 Adjustment of Motor 'On-time'

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Adjust the potentiometer (on-time) to setting 1.

To achieve accurate metering, it may be necessary to adjust the motor on-time to the service conditions. The higher the discharge pressure and stroke length, the longer on-time that is required.

To modify the motor on-time, adjust the potentiometer (on-time):

- from 1 to 5 to increase this time,
- from 5 to 1 to reduce this time.

This adjustment, defined for given pressure and stroke conditions may then be checked by calibration (monitoring the rate at which reagent is used).

---

## 5.0 Operating the Controller

The M pump motor controller provides a switch for operation in three modes.

**INTERNAL:** Operates the pump by means of the speed control knob from 5-100 strokes per minute. Light is ON when pump is under manual control.

**OFF:** Pump off.

**EXTERNAL:** Automatic and proportional control by a pulse signal (0-100 spm) or by a 4-20 mA analog signal (4 mA = 0 spm, 20 mA = 100 spm). Light is ON when pump is under auto control.

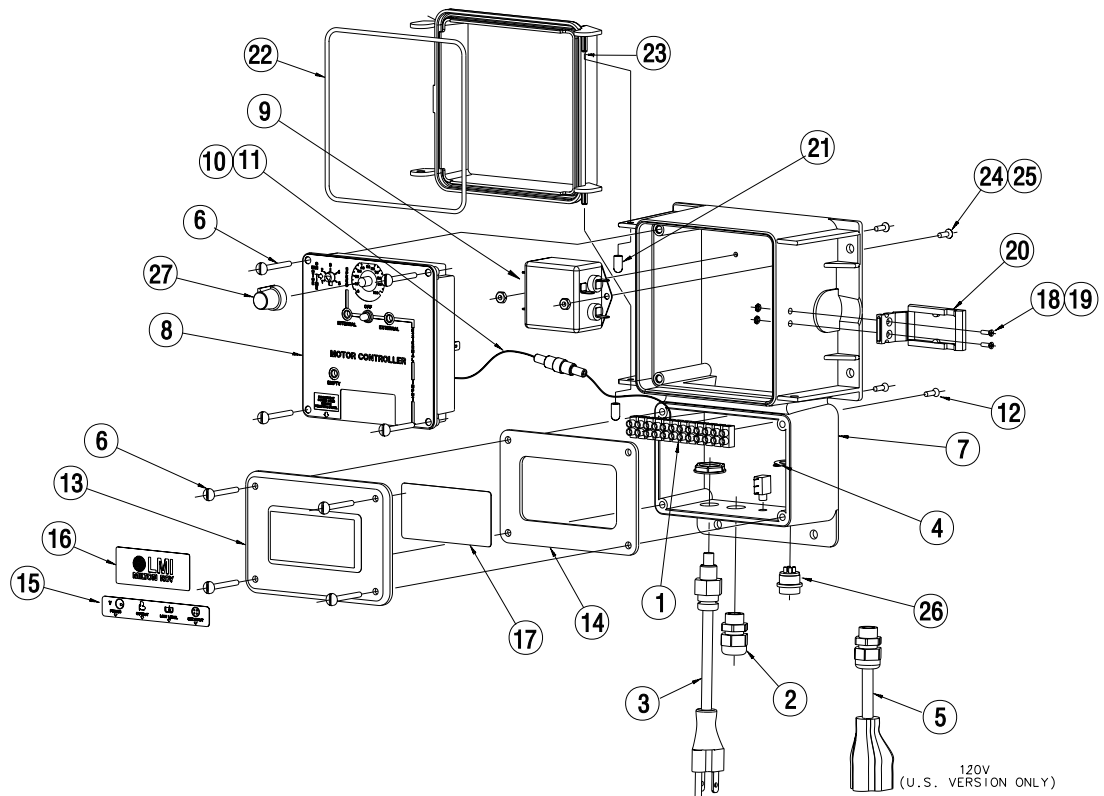
## 6.0 Troubleshooting



*Disconnect power to the controller before opening the front panel or removing the control panel! Troubleshooting and repair of a malfunctioning controller should only be attempted by qualified personnel using caution to insure safety and to limit further damage. Contact your local LMI distributor for assistance.*

<b>Problem</b>	<b>Possible Cause</b>	<b>Solution</b>
No Internal or External Light on front panel	Blown fuse	Disconnect power supply, remove control panel and check fuse; replace if necessary.
	No power supplied	Check power source.
	Loose/incorrect wiring	Verify wiring connection
No power to pump	Incorrect wiring	Check wiring
	Pump has failed	Plug pump directly into live outlet
Internal light stays ON and pump doesn't come on	Speed set too low	Increase speed
	Pulser has failed	Replace pulser
Motor cycles erratically	Motor on-time adjustment set too high or too low	Readjust motor on-time
Pump is not responding to pulse or mA signal	Toggle switch set to Internal mode	Set toggle switch to External mode
	Wires are incorrectly connected	Check wire connections. 4-20 mA must maintain proper polarity
Empty light stays on	If level switch is used, check for low level in tank	Refill tank
	If level switch is not used, switch may be faulty	Consult factory

## 7.0 Product Exploded View



## 8.0 Product Parts List

Item No.	Part No.	Description
1	32558	Terminal Strip
2	25957-1	Cord Clamp
3	30749	Power Cord, 115 V
	30751	Power Cord, 230 V US
	30752	Power Cord, DIN
	34783	Power Cord, UK
	34754	Power Cord, AUST
	34784	Power Cord, SWISS
4	33566	Terminal, Solder Lug .640 I.D.
5	35711	Cord, Power Output (115 VAC only)
6	32395	Screw, Self Tapping (8)
7	37495	Housing, Motor Controller
8	33249	Control Panel Asm.
9	33250	Filter, RFI
10	37500	Fuse Holder, 5x20 mm
11	37499	Fuse, 5x20 mm
12	37501	Screw, Self Tapping, #6x.50 FH SS (2)
13	34088	Cover, Utility Box
14	34074	Gasket, Foam
15	37494	Label, Terminal Cover, Controllers
16	30588	Label, LMI Logo
17	37493	Label, Terminal Connections
18	32186	Screw, 4-40x.37 FH SS (2)
19	32187	Nut, 4-40 Flush Threads (2)
20	32209	Latch, Liquitron Housing
21	32211	Cap (2)
22	32352	O-Ring, Sponge
23	31617	Cover
24	25628	Nut, 6-32 Hex SS (2)
25	33346	Screw, 6-32x.375 FH SS (2)
26	36739	Connector Asm, #18 Wire (4-pin connector)
27	30709B	Speed Knob
Not Shown	33796	External Input Cable, 10 ft. (4-20 mA or Pulse Input)



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