



**SERIES 1500 VACUUM MONITOR**

**OPERATION MANUAL**

130 West Main Street  
Silverdale, PA 18962

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## **Section 1**

### **Introduction**

The 1500 is a full-featured vacuum monitoring system. The system uses the latest in integrated circuit technology, which allows a compact design, accuracy and reliability. The 1500 features both high and low vacuum detection, separate high, low and latch alarm relays, three digit display of vacuum in inches of Hg., LED status indicators and an analog output. The high and low alarm levels are user adjustable along with a variable delay timer. The enclosure has a NEMA 4X rating; therefore it can be mounted outside. Applications include loss of chlorinating in water and wastewater treatment, pool pump monitoring, automotive test equipment and many others.

## **Section 2**

### **Inventory**

The following items are included with the 1500:

1. 1500. Contains the electronics housed in a NEMA 4X enclosure.
2. Sensor enclosure with oil based protection device.
3. Two watertight fittings used for running the power and alarm wires from the control box to the alarms.
4. ¼" tube fitting attached to the oil based protection device.
5. Power cord.
6. Instruction manual.
7. Warning label attached to the oil based protection device.

### Section 3

### Specifications

Input voltage: 115V 60 Hz @ 0.1 amps  
Alarm relays: NO\NC Type  
240V AC @ 5 amps resistive  
115V AC @ 5 amps general use  
30V DC @ 5 amps general use

Gas\Fluid compatibility: System includes a protection device that uses a chemically inert synthetic oil compatible with chlorine, sulfur dioxide and ammonia gas.

Enclosure: .....	NEMA 4X rated
Vacuum measurement range: .....	0 to 30 in. Hg.
Low alarm range: .....	0 to 15 in. Hg.
High alarm range: .....	15 to 30 in. Hg.
Over pressure: .....	50 PSI.
Delay timer: .....	1 to 100 sec.
Analog output: voltage: .....	0 to 3 VDC.
current: .....	0 to 3 ma DC.
Reset switch: .....	IP 65 protection
External connectors: .....	IP 68 protection
Indicators:	
vacuum: .....	3 digit digital LED display
alarms: .....	3 LED indicators/High, Low and Latch
polarity: .....	1 LED indicator for pressure
Temperature range (system):	
storage: .....	-30 C to 70 C
operating: .....	-20 C to 50 C
vacuum temperature range: .....	-40 C to 50C

Humidity: ..... Relative 0 to 90% noncondensing

**(Specifications are subject to change without notice)**

## **Section 4                      Operation Basics**

### **Digital Display**

The three-digit display represents the real time vacuum pressure in inches of Hg. Minimum vacuum equals 00.0 and the maximum vacuum reading, depending on altitude, is approximately 30.9 inches.

### **LED Indicators**

The 1500 has four LED indicators; High, Low, Latch and Polarity. See Fig. 1 for their location.

#### **High LED Indicator**

This LED indicates that the vacuum pressure exceeds the preset High Alarm set point.

**NOTE:** This indicator is real time, i.e., it does not wait for the delay timer to time out.

#### **Low LED Indicator**

This LED indicates that the vacuum pressure is below the preset Low Alarm set point. This LED indicator is also real time.

#### **Latch LED Indicator**

When either the high or low indicators are active, this starts the delay timer. If the alarm is active longer than the preset delay time, then the latch LED indicator will become active. This indicator stays active until the manual reset button (see Fig. 2) is pushed. This indicator implies that either an alarm has occurred or is still active. If the latch indicator is on and the High/Low indicators are off, then an alarm condition has occurred, but is not active now. If either the High or Low indicators are active, then this represents that the alarm condition is still active.

**NOTE:** The High or Low alarm relays do not become active until the latch alarm indicator is on.

#### **Polarity LED Indicator**

When this LED is on this indicates that the 1500 is measuring pressure. The digital display shows this pressure in inches of Hg. pressure.

## **Alarm Relays**

The 1500 has three alarm relay outputs. The alarm relays do not become active until the delay timer times out, which causes the latch alarm indicator to become active. The three alarm relays are general purpose and can be used for exterior alarms, load switching or phone monitoring. Note: Do not exceed relay specifications.

### **High Alarm Relay**

The High Alarm relay becomes active from a high alarm condition after the delay timer times out. This relay stays active as long as the alarm condition exists. Once the alarm condition goes away, this relay becomes inactive.

### **Low Alarm Relay**

The Low Alarm relay becomes active from a low alarm condition after the delay timer times out. This relay stays active as long as the alarm condition exists. Once the alarm condition goes away, this relay becomes inactive.

### **Latch Alarm Relay**

When either the High or Low Alarm relays become active and the delay time is over the latch alarm relay also becomes active. This is indicated by the Latch Alarm indicator. This relay stays active until the manual reset button is pushed (see Fig. 2).

**NOTE:** In some applications, like gas chlorination in water and wastewater treatment, special attention needs to be given to the electrical hookup. If your vacuum source under normal operation is cycled on and off, as is the case when the vacuum is created only when a well pump is operating, then the 115V AC power to the 1500 should be switched on and off with the well pump. This will prevent a low alarm condition when the pump is off.

## **Section 5**

### **Installation**

Installation should only be performed by a licensed electrician. Follow any local, state or other applicable codes that apply when installing this unit.

THIS UNIT SHOULD BE WIRED TO A GROUND FAULT RECEPTACLE.

CAUTION: HIGH VOLTAGE COULD EXIST INSIDE THIS UNIT. DISCONNECT ALL POWER BEFORE INSTALLATION.

### Opening Unit

Remove the four plastic screws to open the unit. The printed circuit board contains static sensitive parts, so the installer should wear a grounding strap when handling the board.

### Enclosure Mounting

**IMPORTANT:** This unit contains two enclosures. The larger one contains the electronics (1500) and the smaller one contains the sensor. The two enclosures are permanently connected together by a low voltage wire. The sensor enclosure contains an oil based protection device that is filled with a special fluid. The protection device has a cap over the 1/4" fitting to prevent the oil from leaking out during shipping and installation. **THE SENSOR ENCLOSURE MUST BE MOUNTED IN AN UPRIGHT POSITION TO PREVENT THE FLUID FROM LEAKING OUT.** Once the unit is securely mounted in an upright position, the cap over the 1/4" fitting can be removed.

The recommended mounting method for the 1500 is to use four mounting holes located where the 4 plastic screws are that hold down the lid. Use the box as a template for mounting (see Fig. 2).

**NOTE: THE 1500 SHOULD NOT BE MOUNTED WHERE SUNLIGHT CAN DIRECTLY ENTER THE TRANSPARENT COVER.**

The printed circuit board is designed to have power come in from the bottom of the box. Remove the knockouts that are needed for power entry. Two watertight fittings are provided for the power and alarm line. If the board must be removed to install a watertight fitting, care must be taken in handling the board.

**NOTE: IF YOU RUN CONDUIT INTO THE BOX AND DO NOT USE THE WATERTIGHT FITTINGS, YOU MUST USE A SEALANT TO SEAL AROUND THE CONDUIT CONNECTION.**

Install the printed circuit board after the connectors have been installed. Use the four #6 screws provided to mount the board in the box and tighten only to a snug fit. **DO NOT OVER TIGHTEN (See Fig. 2).**

### Vacuum Line and Reset Switch

Connect your ¼" vacuum hose to the ¼" barb fitting attached to the protection device. The reset switch is prewired to the board reset terminals.

### Power and Alarm Wiring

**CAUTION:** BE SURE POWER IS DISCONNECTED BEFORE HANDLING ANY WIRES.

**WARNING:** IMPROPER WIRING TO THIS UNIT CAN DAMAGE UNIT AND COULD CAUSE SERIOUS BODILY INJURIES. OVERPRESSURE ON THIS UNIT IS RATED AT 50 PSI. EXCEEDING THIS PRESSURE CAN CAUSE A RUPTURE OF THE SENSOR. See Fig. 1 for typical electrical wiring. Connect 115V AC to the connector location labeled HOT, NEU and GND.

**NOTE:** A surge arrestor is recommended on the AC power line to prevent damage from lightning strikes or other power surges. The alarms can be hooked up in many ways. Be sure the relay specifications are not exceeded. The relay outputs are labeled HIGH ALARM, LOW ALARM and LATCH ALARM. Remember the latch alarm will stay active until the reset button is pushed.

Note: NO = Normally open contact  
NC = Normally closed contact  
COM = Relay common

### Section 6 Set up and Calibration

The 1500 comes preset at the following default levels:

Delay:	50 sec.
Low Alarm:	5 in. Hg.
High Alarm:	25 in. Hg.

The following is a procedure for changing these values. See Fig. 1 for the location of the adjustment pots.

**CAUTION: HIGH VOLTAGE EXISTS INSIDE THE UNIT.**

### Delay Adjustments



The delay time is adjustable from approximately 1 second to 100 seconds. To adjust the delay, insert a small screwdriver into pot R24, rotate until the desired delay is achieved. The delay value is printed on the board.

### **Low Level Alarm**

The Low Level alarm is adjustable from approximately 0.0 to 15 inches of Hg. To adjust the low level, insert a screwdriver into pot R19 and rotate it to the desired level. MIN = 0 and MAX = 15 inches of Hg.

**NOTE:** If you want to disable the low alarm, turn the pot counter clockwise until it stops.

### **High Level Alarm**

The High Level alarm is adjustable from approximately 15 to 30 inches of Hg. To adjust the high level, insert a screwdriver into pot R16 and rotate it to the desired level. MIN = 15 inches of Hg. and MAX = 30 inches of Hg.

**NOTE:** If you want to disable the high alarm, turn the pot clockwise until it stops.

### **Alternate Method for Accurate High/Low Level Adjustment**

If a high degree of accuracy is required, then use the procedure in the following example:

Example: If you desire a high level alarm at 26.3 inches of Hg.:

1. Adjust your vacuum level until the digital readout reaches 26.3.
2. Rotate the high level alarm pot full counter clockwise.
3. Rotate the high level pot clockwise slowly until the high level LED comes on. This represents the correct adjustment for 26.3 inches of Hg.

This method can be used for low level adjustment, except the rotation of the pot is reversed.

## Analog Output

The 1500 has an analog output, which will allow the vacuum to be remotely monitored. The connection for this is located in the upper left section of the printed circuit board (see Fig. 1). Two spade lugs are provided for the connection. They are labeled GND for ground and OUT for the output. The output is capable of sourcing 0 to 3 VDC or 0 to 3 ma. If a 4 to 20 ma loop is required, a signal conditioner can be used to convert the output. These are available from many sources.

## Maintenance and Calibration

Once the 1500 has been in operation for approximately one week, the unit should be checked for the correct zero reading. This is the reading when no vacuum is present. Ideally, the zero reading would be 00.0. However, due to the ambient temperature, some variation is normal. If the zero reading is over 00.7 then an adjustment is needed. The zero adjustment pots are located in the upper right hand corner of the board. One of the pots, if looked at from the middle of the board, is rotated all the way to the right and the other pot is rotated around the 12:00 position. The pot that is close to the 12:00 position is the pot to adjust. Slowly turn this pot to get the zero reading as close to 00.0 as you can. This will end the zero calibration. If the reading still does not read 00.0 then slowly adjust the other pot until a reading of 00.0 is set.

**NOTE: AT LEAST ONE OF THE POTS MUST ALWAYS BE ROATED ALL THE WAY TO THE RIGHT.**

Once a month the system should be functionally tested. This testing should include all relays, LED indicators, delay timer and vacuum level accuracy. To perform this test adjust your vacuum level up and down to cause the high and low alarms to engage. The delay timer and rest can also be tested in the same manner. At this time, inspect the board for any corrosion or loose wires. If corrosion is present check all fittings for a snug fit.

**DO NOT ATTEMPT TO CLEAN ANY CORROSION FROM THE BOARD. HIGH VOLTAGE EXISTS ON THE BOARD.**

Corrosion can only be removed by a trained technician. The outside of the enclosure can be cleaned with warm water and a damp cloth.

## **LIMITED WARRANTY**

ENCHLOR INC. warrants this product to be free from defects in material and workmanship for a period of one (1) year from the date of the first consumer purchase.

Except as specified below, this warranty covers all defects in material or workmanship in this product. The following are NOT covered by the warranty:

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2. Damage, deterioration or malfunction resulting from:
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  - b. Any unauthorized product modification or failure to follow instructions supplied with the product.
  - c. Repair or attempted repair by anyone not authorized by ENCHLOR INC.
  - d. Any shipment of the product.
  - e. Any other causes which do not relate to a product defect.

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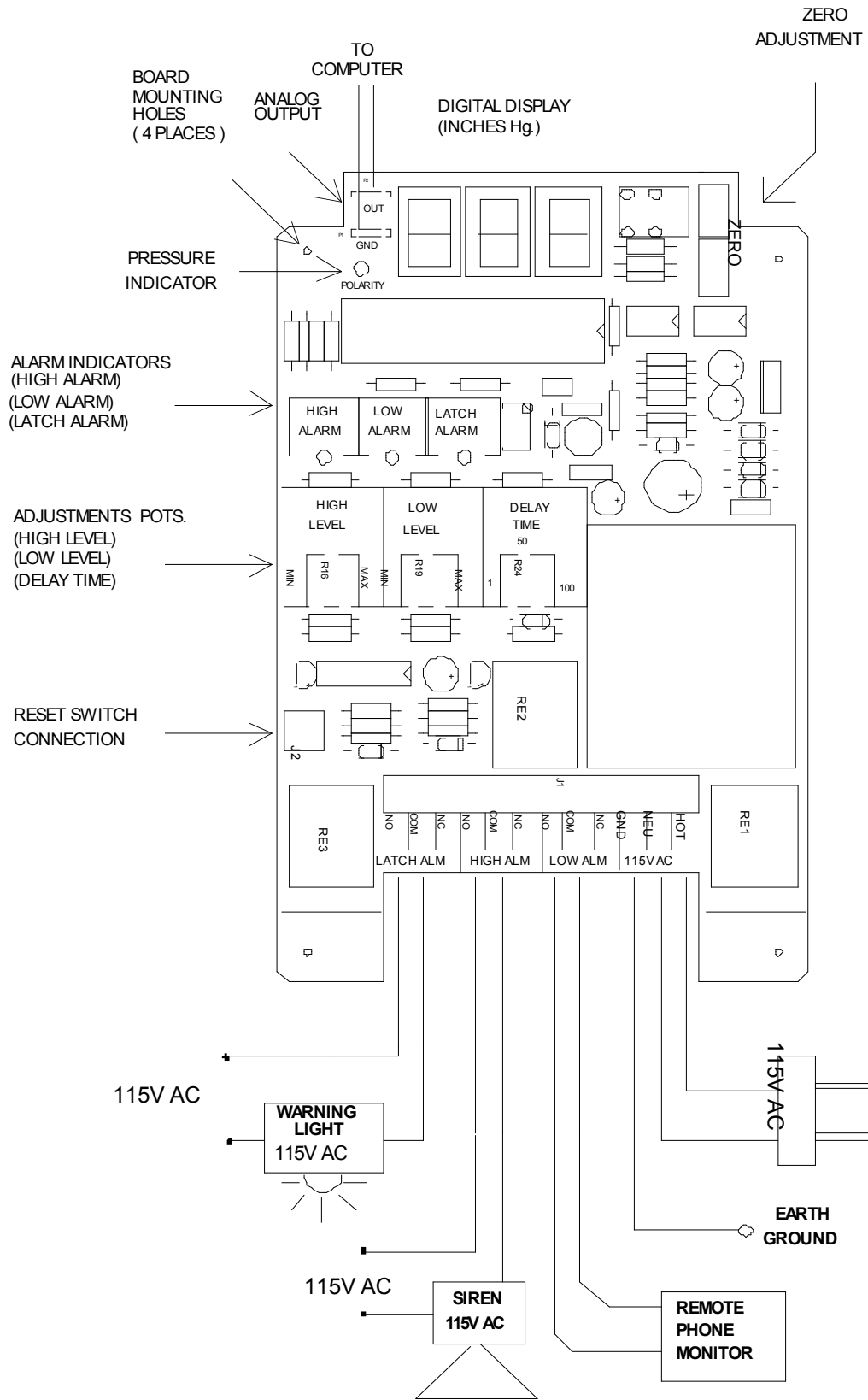
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**FIG. 1**

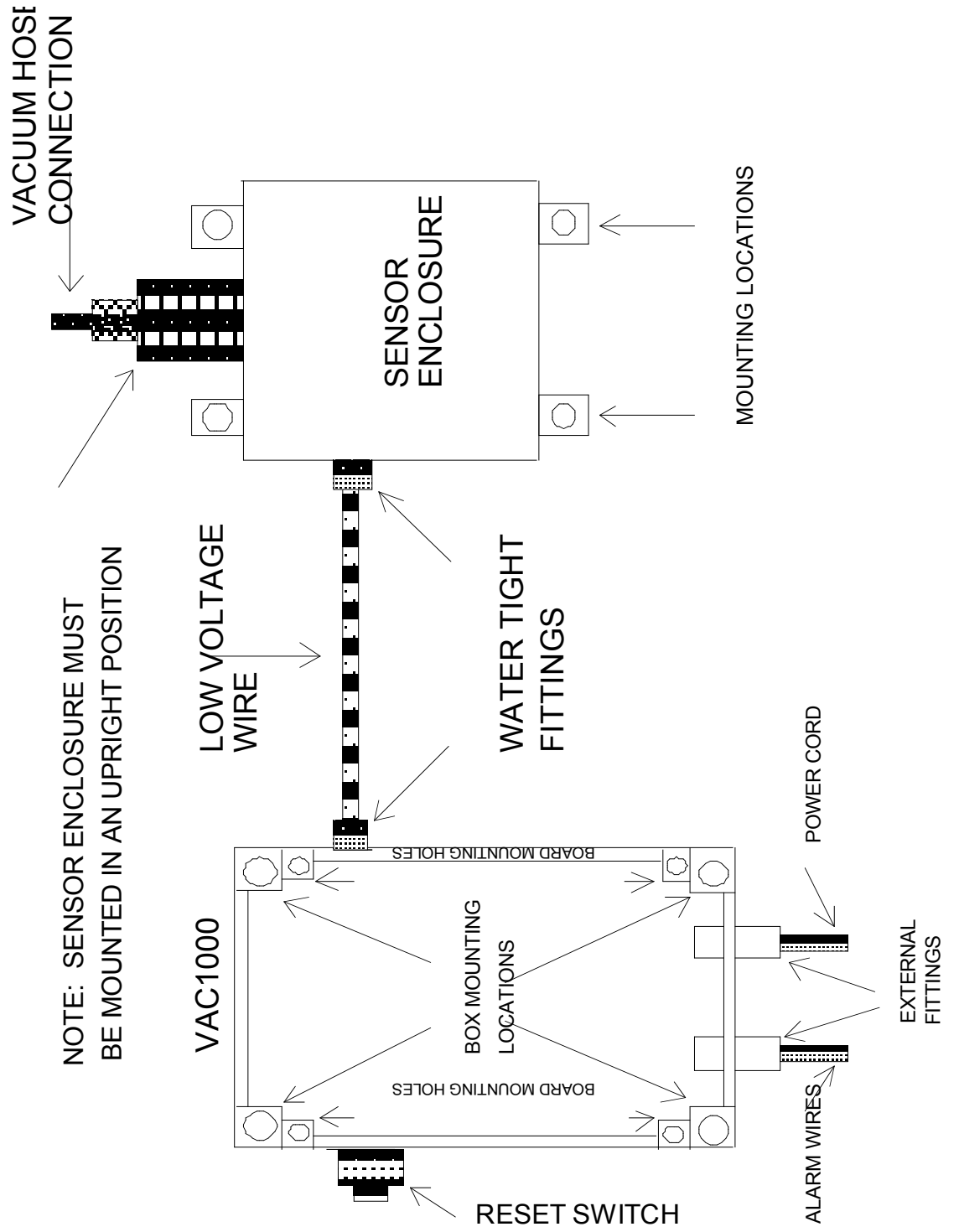


FIG. 2