VAC 2000

ELECTRONIC VACUUM MONITOR

INSTRUCTION MANUAL

VAC 2000 Rev. 12/30/2025

TABLE OF CONTENTS

SECTION I: INTRODUCTION

The VAC 2000 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 VAC 2000 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 water treatment and waste water treatment.

SECTION II: INVENTORY

The following items are included with the VAC 2000:

1. VAC 2000 controller housed in a NEMA 4X enclosure.
2. Sensor enclosure with oil based protection device.
3. Two (2) liquid tight fittings used for running the power and alarm wires to/from the controller.
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 III: SPECIFICATIONS

Input voltage

90-265 VAC, 50/60 Hz @ 0.1 Amps

Alarm relays: NO\NC Type

240V AC at 5 Amps Resistive
115V AC at 5 Amps General Use
30V DC at 5 Amps General Use

Gas/Fluid Compatibility: System includes a protection device that uses chemically inert synthetic oil compatible with Chlorine (Cl_2), Sulfur Dioxide (SO_2) and Ammonia (NH_3) 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: 85 PSI

Delay Timer: 1 to 100 seconds

Analog Output

Voltage: 0-3 VDC

Current: 0-3 mA DC (standard) or 4-20 mA DC with optional mA transmitter board installed

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

Temperature range (system)

Storage:	-30 C to 70 C
Operating:	-20 C to 50 C
Vacuum Temperature Range:	-40 C to 50 C

Humidity Relative: 0 to 90% noncondensing

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

SECTION IV: OPERATION BASICS

A. 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 30.0 inches.

B. LED INDICATORS

The VAC 2000 has four LED indicators; High Alarm, Low Alarm, Latch Alarm and Polarity. See Figure 1 for their location.

HIGH ALARM LED INDICATOR
This LED indicates that the vacuum pressure is exceeding the preset "high alarm" set point.

NOTE: This indicator is real time. It does not wait for the delay timer to time out.

LOW ALARM LED INDICATOR
This LED indicates that the vacuum pressure is below the preset "low alarm" set point.

NOTE: This indicator is real time. It does not wait for the delay timer to time out.

LATCH LED INDICATOR
When either the high or low indicators are active, this starts the delay timer. If the alarm is active longer that the preset delay time, then the latch LED indicator will become active. This indicator stays active until the manual reset button (See Figure 2) is pushed. This indicator implies that either an alarm had 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 VAC 2000 is measuring pressure. The digital display shows this pressure in inches of Hg.

C. ALARM RELAYS

The VAC 2000 has three alarm relay outputs. The alarm relays do not become active until the delay timer times out, which cause 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.

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 for 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 or 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 Figure 2)

NOTE: In some applications, like gas chlorination in water and waste water 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 AC power to the VAC 2000 should be switched on and off with the well pump. This will prevent a low alarm condition when the pump is off.

SECTION V: INSTALLATION

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

NOTE: This unit should be wired to a ground fault receptacle.

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

A. OPENING UNIT

Remove the four (4) 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.

B. ENCLOSURE MOUNTING

IMPORTANT: This unit contains two enclosures. The larger one contains the electronics (VAC 2000) 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 ¼" 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 ¼" fitting can be removed.

The recommended mounting method for the VAC 2000 is to use the four (4) mounting holes located where the four (4) plastic screws are that hold down the lid. Use the box as a template for mounting. (See Figure 2)

NOTE: The VAC 2000 should not be mounted where sunlight can directly enter the 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 (2) liquid tight fittings are provided for the power and alarm line. If the board must be removed to install a water tight fitting, care must be taken in handling the board.

NOTE: If you run conduit into the box and do not use the water tight fitting, you must use a seal around the conduit connection.

Install the printed circuit board after the connectors have been installed. Use the four (4) #6 screws provided to mount the board in the box and tighten only to a snug fit. Do not over tighten. (See Figure 2)

C. VACUUM LINE

Connect your ¼" ID vacuum line to the ¼" barb fitting attached to the sensor enclosure.

D. POWER AND ALARM WIRING

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

WARNING: IMPROPER WIRING TO THIS UNIT CAN DAMAGE IT 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 Figure 1 for typical electrical wiring. Connect AC power to the connector location labeled HOT, NEU and GND.

NOTE: A surge suppressor is recommended on the AC power line to prevent damage from lighting 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.

NO = Normally open contact
NC = Normally closed contact
COM = Common

SECTION VI: SET UP AND CALIBRATION

The VAC 2000 comes preset at the following default levels.

Delay:	50 seconds
Low Alarm:	7 inches Hg.
High Alarm:	25 inches Hg.

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

CAUTION: HIGH VOLTAGE EXISTS INSIDE THE UNIT.

A. ALARMS

DELAY TIMER ADJUSTMENTS
The delay time is adjustable from approximately 1 second to 100 seconds. To adjust the delay, insert a small screwdriver into pot R24, and 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.

B. ANALOG OUTPUT

The VAC 2000 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 Figure 1). 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.

C. MAINTENANCE AND CALIBRATION

Once the VAC 2000 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 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 rotated 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 these tests adjust your vacuum level up and down to cause the high and low alarms to engage. The delay timer and reset 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. Corrosion can only be removed by a trained technician. The outside of the enclosure can be cleaned with warm water and a damp cloth.

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

SECTION VII: LIMITED WARRANTY

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

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

1. Any product, on which the serial number has been defaced, modified or removed.
2. Damage, deterioration or malfunction resulting from:
    - Accident, misuse, abuse, neglect, fire, water, lightning or any other acts of Nature.
    - Any unauthorized product modification or failure to follow instructions supplied with the product.
    - Repair or attempted repair by anyone not authorized by Hydro Instruments.
    - Shipment of the product.
    - Any other cause which does not relate to a product defect.

EXCLUSION OF DAMAGES

Hydro Instruments' liability for any defective product is limited only to the repair or replacement of the product at our option. Hydro Instruments shall not be liable for:

- Damage to other property caused by any defects in this product, damages based upon inconvenience, loss of use of the product, loss of time.
- Any other damages, whether incidental, consequential or otherwise.

FIGURE 1

Installation Wiring Diagram

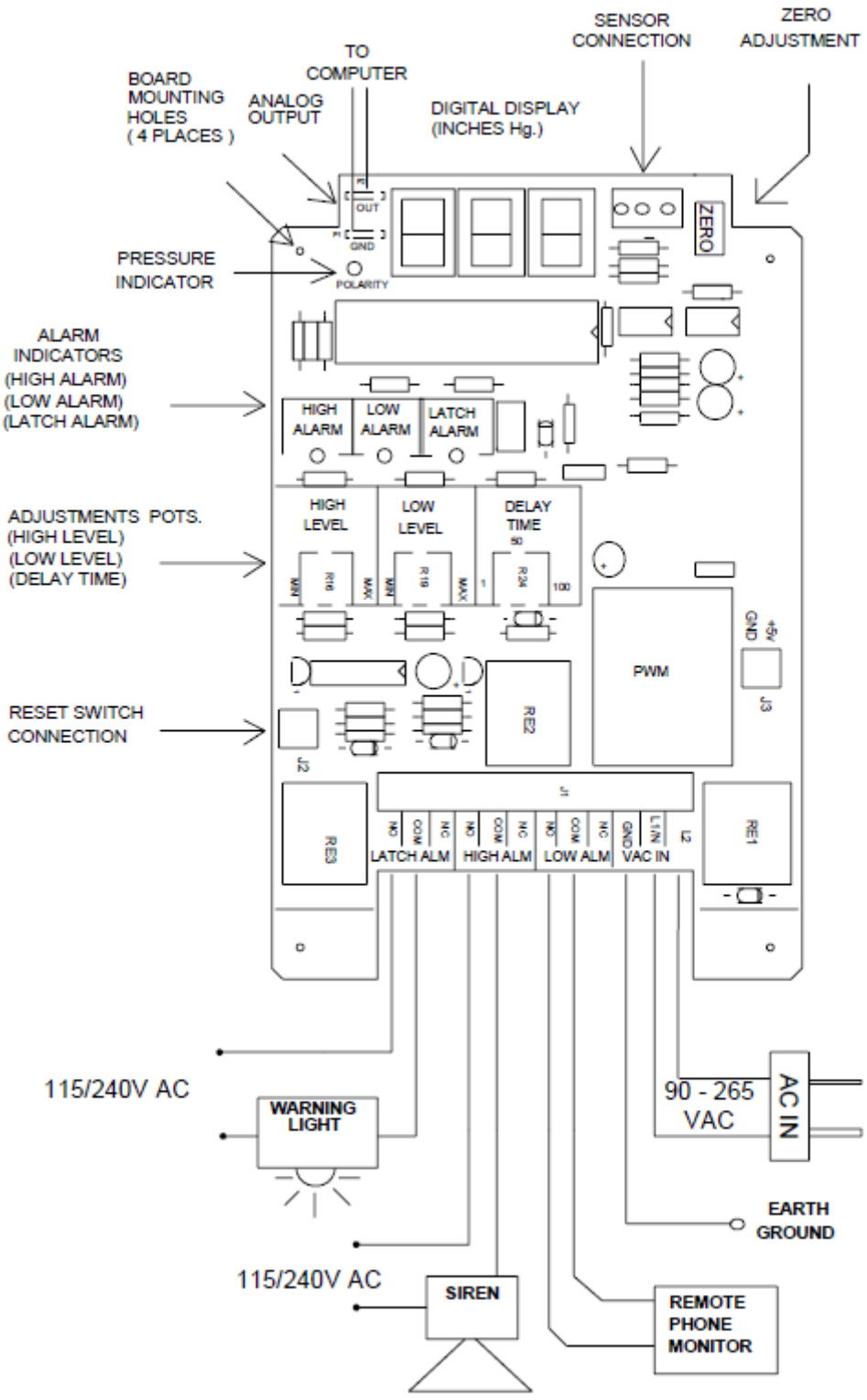

FIGURE 2

Enclosure Mounting

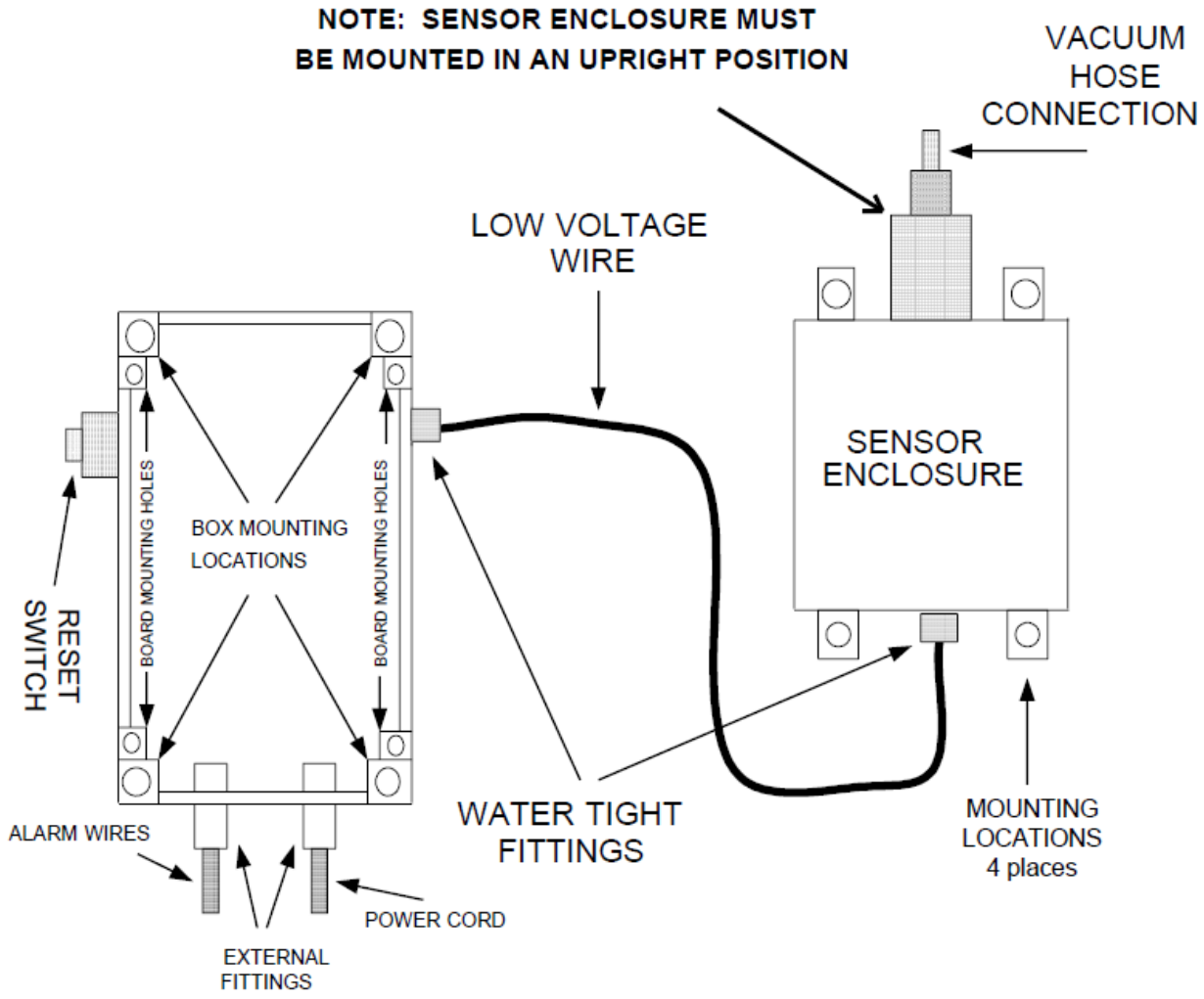

FIGURE 3

Sensor Enclosure Dimensions

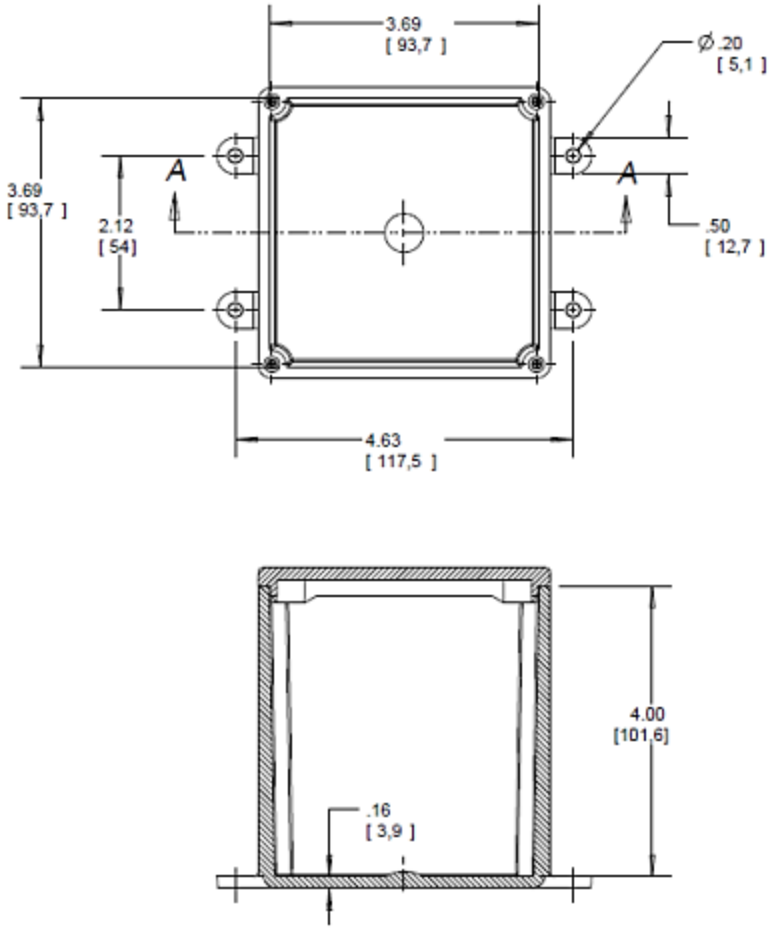

FIGURE 4

VAC 2000 Dimensions