

RATIO:GUARD®
MODEL O-1
ORP INDICATOR/CONTROLLER

Price \$4.00

GETTING TECHNICAL ASSISTANCE

The H.E. Anderson Company is anxious to assist our customers with installation and use of our products. Our technical people are available each weekday from 8:30 a.m. to 4:30 p.m. central time. You may call us toll free at **1-800-331-9620** from anywhere in the U.S.A. and Canada. If no one is available, we will promptly return your call.

Before you call, we suggest that you review this manual. You may find the answer to your question there. But even if you do not, reviewing the manual will help us to help you.

There is some information you should have available when you call. You should know the model and serial number of your controller. Also, you should note the program version number. We may not need all this information, but having it available at the start can sometimes save a lot of time and trouble for you.

SERIAL _____ PROGRAM VERSION _____

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1 INTRODUCTION

The Model O-1 controller is very easy to install and operate. It requires very little maintenance. The only maintenance required is periodic cleaning of the electrode.

This manual covers all aspects of installing and operating this controller. Once your controller is installed and operating, you should not have to refer to the manual unless you have a problem.

This section gives the specifications and describes the features available in your controller. You should also read Section 2 INSTALLATION, Section 3 PROGRAMMING, and Section 4 MAINTENANCE.

It is a good idea to familiarize yourself with Section 5 TESTING AND TROUBLESHOOTING. This will show you how to determine if your controller is operating properly and alert you to possible problems.

1.1 FEATURES

This section describes the features of your controller. Some of them will be covered in greater detail under other headings.

1.1.1 Numeric Display

The controller has a large four digit LCD display. This display is used to display ORP readings and setpoints. It can also indicate alarm and error conditions.

1.1.2 Sealed Enclosure

The only openings in the enclosure are where wires enter. The panel is totally sealed and the front cover is gasketed.

1.1.3 Keypad

The four key pad allows easy viewing and setting of setpoints.



Figure 1
The O-1 Controller

SPECIFICATIONS Model O-1

Range

-999 to +999 mv

Input Resolution

0.5 mv

Display

0.7 in. LCD numeric

Control Outputs

10 amp. SPDT contact outputs for both high and low alarms
Optional output latching

Enclosure

Water resistant with gasketed cover;
Sealed front panel

Power Requirements

120 VAC
240 VAC (With A suffix on model number)

Setpoint Memory Retention

Greater than seven days with zero power.

Model O-1 ORP Control

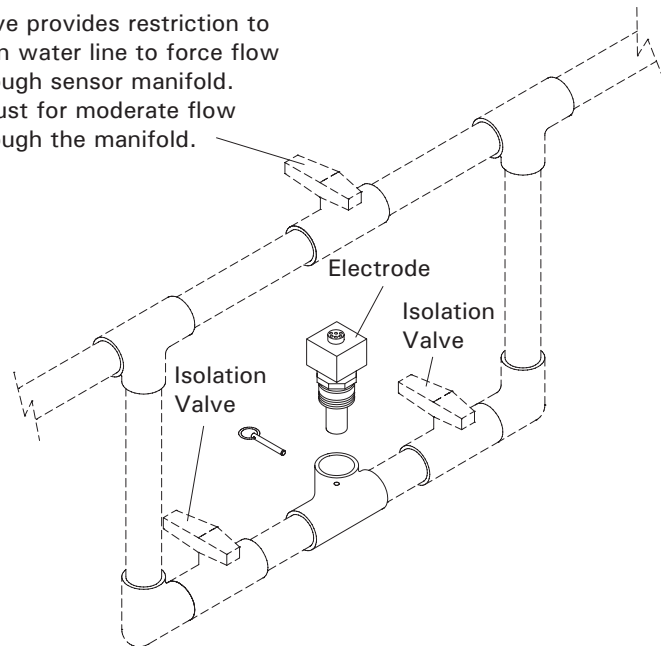
Parts shown with dashed lines are not included with manifold.

Install so electrode inserts from top.

Sensor Tee accepts 2" schedule 80 PVC pipe.

Main water line may be any size.

Valve provides restriction to main water line to force flow through sensor manifold. Adjust for moderate flow through the manifold.



NOTE: Be certain both isolation valves are open during normal operation. Otherwise the unit will not operate properly.

Figure 2
Installing the Electrode Tee

1.1.4 Memory Backup

The controller memory is backed up by a special supercap device. If power is lost, controller operation will stop, but setpoints will be retained. When power is restored the unit will resume functioning normally.

1.1.5 Easy Insertion Electrode

The sensor fitting is design for easy maintenance. The electrode is easily removed for cleaning.

1.1.6 Electrode Mounted Signal Conditioner

The electrode has a signal conditioner mounted with the electrode. This means that high level digital signals are sent to the controller. This greatly reduces cable related problems and increases accuracy. The controller comes with twenty-five feet of cable. The cable may be extended if necessary, with no effect on performance.

1.1.7 Optional Output Latching

The high and low alarm relays may be independently set to latch when an alarm condition occurs.

1.1.8 Circuit Protection

The controller includes some protection against external voltage spikes and other problems. However we cannot guarantee protection under all conditions. You should follow the recommendations given in Section 2.3.4 to provide maximum protection of your investment.

2 INSTALLATION

You will install the sensors and the control box, as well as any external alarm circuits.

The controller is prewired with twenty-five feet of cable. Select a convenient location which is within reach of electrode location. The location should also be close to a power source.

It should be out of direct sunlight, protected from extreme heat, and be free of vibration.

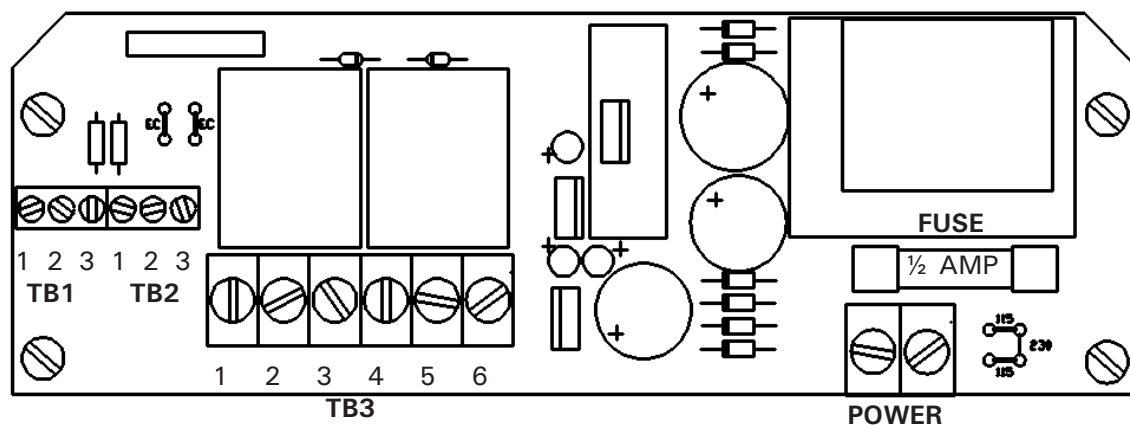


Figure 3
The Terminal Board

Table 1 – Terminal Board Connections											
Electrode Connections						Relay Connections					
TB1			TB2			TB3					
1	2	3	1	2	3	1	2	3	4	5	6
Gnd (5 V)	ORP Signal	+5 VDC	Gnd (12 V)	+12 VDC	-12 VDC	High Alarm Relay			Low Alarm Relay		
Shield	Black	Red	Green	White	Brown	N.C.	N.O.	Common	N.C.	N.O.	Common

The enclosure is water resistant and the unit is well sealed against water spray. However, you should choose a location where it will not be subjected to constant water spray or spray from the bottom.

2.1 ELECTRODE INSTALLATION

A recommended installation of the electrode Tee is shown in Figure 2. You can vary installation to suit your needs, but you should remember the following points:

1. The electrode should be installed downstream from the injector and blending tank (if present) so the treated water will be thoroughly mixed.

Warning: The electrode should never be allowed to dry out. It will cause permanent damage.

2. You should have isolation valves to allow the electrode to be easily removed while leaving the water on.
3. The electrode should be installed in a bypass for maximum convenience.
4. If installed in a bypass, you must have some restriction in the main water line to insure moderate water flow past the sensor. High flow may shorten the life of the electrode.
5. The fittings should be installed so the electrode will insert vertically from the top.
6. Be sure to remove the protective cap before inserting the electrode.

2.2 MOUNTING THE ENCLOSURE

Mount the unit securely, using the four holes located in the flanges.

2.3 ELECTRICAL CONNECTIONS

Your controller comes prewired with all sensor connections already made. Normally the only wiring you will do will be to external control or alarm circuits.

You may wish to use conduit for the sensor and power cables. The entrance assemblies may be removed and replaced by conduit connectors if desired. If you do this, you will need to disconnect the cables and reconnect them later.

2.3.1 Electrode Connections

The electrode cable is prewired. Connection information is given in case you should ever need to replace or rewire the cable. Figure 3. shows the terminal circuit board and sensor terminal blocks. Table 1 details the connections.

2.3.2 Control Relay Connections

WARNING: Be certain all power is off when working with the external circuit connections.

The control relays are clearly labeled as to alarm function and with common (**C**), normally open (**NO**) and normally closed (**NC**) contacts brought out to the terminal block. Contacts are rated at ten amperes. For ease of wiring, use the smallest wire suitable to the current required by the external circuit.

2.3.3 Power Connections

WARNING: Be certain power is off when working with the power connections.

The controller comes with a power cord. If you wish to use conduit, remove the power cord and entrance assembly. Refer to Figure 3. when reconnecting power connections.

2.3.4 Circuit Protection

We have done our best to design this product to stand up to adverse electrical supplies. The circuit is fused and we have included MOV devices to suppress voltage spikes coming in over the AC line. However, MOV's cannot protect under all conditions and do not last forever. Each time the MOV takes a really big spike it is damaged a little. After enough spikes it will fail.

If you really want to provide the best protection for your controller you should buy a spike suppressor (you can get them at Radio Shack). This is a device that goes between the line cord and wall socket.

This will help. However, if you have a big storm that damages any of your other equipment, you probably should replace your spike suppressor; it may have been damaged by the storm even though it may appear to be okay.

3 PROGRAMMING & OPERATION

3.1 ALARM RELAY LATCHING

As the unit is shipped from the factory, alarms will automatically clear when the alarm condition is corrected. Some people prefer that the alarm relays latch when an alarm condition is detected. They must then be manually cleared after the alarm condition has been corrected. The Model O-1 allows both the high and low alarm relays to be independently programmed to latch when an alarm is detected.

3.1.1 Programming Alarm Latching

You must remove the front panel to program alarm latching. On the circuit board mounted behind the front panel are three sets of jumper pins. The lower two sets should each have a jumper attached to one of the pins.

To program high alarm relay latching, install the middle jumper across both the middle pins. To program low alarm relay latching, install the bottom jumper across both the lower pins.

3.1.2 Clearing Alarms

Pressing both the **↑** and **↓** keys will clear the alarms. This is only needed if alarm relay latching has been set.

3.2 CALIBRATION

There is no calibration required for the control. The electrodes are calibrated at the factory.

3.3 DISPLAY FUNCTIONS

3.3.1 Version Number Display

Whenever power is initially applied to the unit it will briefly display the program version number, for example **0100**. We suggest that you note this number and write it down along with the serial number on the title page of this manual. We may ask you for your program version if you should you call us for assistance.

3.3.2 Normal Display

The normal display is the ORP value. If there is a high alarm condition the reading will also show a blinking **H** in the left most position. Conversely, if there is a low alarm it will show a blinking **L**.

3.3.3 Setpoint Display

Pressing the **↑** key will show the high setpoint, which is designated by an **H** in the first position, followed by the value. Like wise, pressing the **↓** key will show the low setpoint which is designated by **L**.

3.4 THE CONTROL FUNCTION

The controller is designed for easy operation. The first time the controller is plugged in the

control function will be off. This section tells how to turn control on by entering high and low setpoints.

If the control function is not turned on, the controller will serve as an indicator only. Control is turned on by entering a high setpoint and may be turned off by setting the high setpoint all the way down past the negative limit..

3.4.1 Setting the High Alarm Setpoint

To set the high alarm setpoint you must first display it by pressing the **↑** key. The setpoint will remain on the display for a short time after releasing the key. While the setpoint is still on the display press both the **MODE** and **ENTER** keys. Hold them until the setpoint display starts to blink. This means you are in the change mode and the value can be changed using the **↑** and **↓** keys. Press either key to move the setpoint to the desired value. If a key is held depressed, the setpoint will change slowly at first, then will speed up. Releasing the key will cause it to revert to slow changing. You may set it to any value between -990 to 999.

When the setpoint is at the right value, you may press **ENTER** to go back to the regular ORP display, or you may simply let the display blink until it automatically goes back to the normal display.

3.4.2 Setting the Low Alarm Setpoint

The low setpoint is set exactly as the high setpoint by pressing the **↓** key and then the **MODE** and **ENTER** keys to enter the change mode. You will notice that there is a limit as to how high the setpoint will go. The low setpoint is limited to 10mv below the high setpoint. This is to insure a minimum differential between high and low setpoints.

If the high setpoint is subsequently lowered, the low setpoint will automatically be lowered as necessary to keep this minimum differential.

4 MAINTENANCE

The only maintenance required is periodic cleaning and ultimately replacement, of the electrode.

5 TESTING & TROUBLESHOOTING

We have designed your controller to be as trouble free as possible. When your controller is shipped from the factory all sensor cables are wired and the sensors are checked for proper operation. Although this section refers to sensor wiring problems, you should not have to consider these as possible problems unless you have rewired or replaced your sensors.

This section will help you pinpoint problem areas. Once you have located the source of a problem you will be able to easily replace the faulty assembly.

5.1 THE PROGRAM VERSION

The program version tells which software is installed in your controller. If you should need to call the factory for assistance, we may need to know your program version. The program version is displayed briefly whenever power is initially applied to the controller.

5.2 THE DISPLAY

You can determine some problems from observing the display. In normal operation there should always be something showing on display. If there isn't, something is wrong.

First check to be sure there is power to the controller.

If there is power, you will need to check the fuse. You will need to remove the front panel to check the fuse. It is located behind the

shield in the lower right side of the rear circuit board.

WARNING: Before opening the enclosure and doing anything inside you should remove power from the unit and also remove power from any external control circuits.

Inspect both the control circuit board (mounted to the cover) and terminal circuit board (mounted to the back of the enclosure) for burned or discolored spots. These are indications of component failures and indicate a serious problem. See sections 7.0 and 8.0 for information on repairs and service.

If the boards appear to be OK, remove the shield and check the fuse.

If it is bad replace it with the same type and rating (½ amp.). Now follow the following procedure to locate the problem. Just let the front panel hang by the cable. Follow proper safety precautions during this procedure.

WARNING: Use of larger than rated fuses will void the warranty.

1. Disconnect the sensor at the sensor terminal block.
2. If the problem persists, disconnect the red, white, and brown wires from terminal blocks TB1 and TB2.
3. Apply power for a short time and then disconnect it. If the fuse blew then the problem is with the controller.
4. If the fuse did not blow, connect the wires back one at a time. Apply power briefly after each reconnection. If the fuse blows, the ORP sensor or its cable is faulty and needs to be replaced.

5.3 ERROR CONDITIONS

You will get the **Err** indication when:

1. There is no electrode installed or the electrode is improperly wired.

Check wiring carefully.

2. The electrode signal conditioner possibly has failed.

The controller cannot detect problems with the electrode itself, but it can detect when the signal conditioner, which is mounted within the electrode housing, is not working properly.

5.4 EXTERNAL ALARM CIRCUIT PROBLEMS

We cannot offer simple solutions for problems with the alarm circuits wired up to our product. You should contact an electrician or other qualified person for these problems.

5.5 LOSS OF PROGRAMMING

Loss of programming is indicated by the display showing control is off. If this happens, your controller will need to be recalibrated.

Loss of programming can only occur if there is an extended period (many days) of no power to the unit or failure if the memory backup system during a no power condition.

5.6 OTHER PROBLEMS

Our technical staff can help with other problems you may experience. We are also happy to answer any questions about our products.

Phone: 800-331-9620 (U.S.A. and Canada)
918-687-4426.

Our hours are 8:30 a.m. to 4:30 p.m.
central time, weekdays.

Email: info@heanderson.com

FAX: 918-682-3342

6 REPAIR

Repairs are made by replacement of complete circuit board assemblies or replacement of the complete front panel assembly. This should be done only by an authorized repair person or under the direction of our technical staff.

7 FACTORY SERVICE

Should you require service for your Ratio:Guard® controller, the H.E. Anderson Co. Offers the following factory service options:

1. You may return your entire control or front panel assembly to us, prepaid, for repair. The charge will be a fixed labor charge plus parts and return postage. Charges for units under warranty will be for transportation only. Refer to our Limited Warranty in the back of this manual for details of the warranty. Turn around time in our plant is normally one day.
2. We may be able to speed repair by sending you a factory rebuilt exchange unit; after you receive it you can return the faulty unit. Contact us for details on this service. (This option requires established credit or a credit card number)

Should you need to return your unit to us our shipping address is:

H.E. Anderson Company
2100 Anderson Drive
Muskogee, Oklahoma 74403 USA