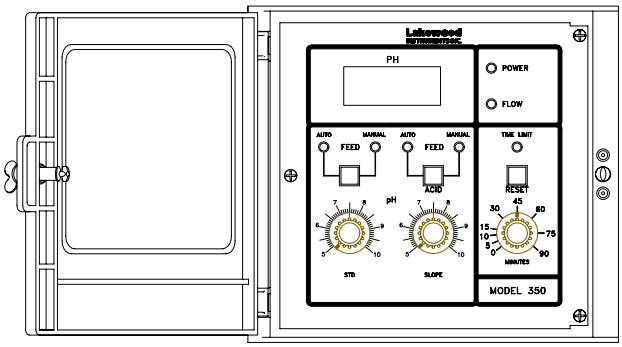
LAKEWOOD INSTRUMENTS
MODEL 330

ORP/MILLIVOLT CONTROLLER

INSTALLATION & OPERATION MANUAL

SERIAL #:_____



Lakewood Instruments

7838 North Faulkner Road, Milwaukee, Wisconsin 53224 USA
Phone (800) 228-0839 • Fax (414) 355-3508
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IMPORTANT NOTICE

CAUTION: CHEMICAL FEED

All electromechanical devices are subject to failure from a variety of causes. These include mechanical stress, component degradation, electromagnetic fields, mishandling, improper setup, physical abuse, chemical abuse, improper installation, improper power feeds and exposure.

While every precaution is taken to insure proper functioning, extra precautions should be taken to limit the ability of over-feeding by limiting chemical quantities available, secondary shut-downs, alarms and redundancy or other available methods.

CAUTION: POWER SOURCE AND WIRING

Low voltage wiring and high voltage (110 plus) should not be run in the same conduit. Always run separately. Even shielded low voltage is not a guarantee of isolation.

Every precaution should be taken to insure proper grounding and elimination of shorting or Electromagnetic field (EMF) interference.

CAUTION: ELECTRICAL SHOCK

To reduce the risk of electrical shock, this equipment has a grounding-type plug that has a third (grounding) pin. This plug will only fit into a grounding-type outlet. If the plug does not fit into the outlet, contact a qualified electrician to install the proper outlet. ***DO NOT*** change the plug in any way.

Lakewood Instruments

Congratulations on your purchase of a Lakewood Instruments product. We would like to take this opportunity to welcome you to the Lakewood Instruments product family.

With proper care and maintenance, your product should give you trouble-free service. Please take the time to read and understand the operation manual, paying special attention to the sections on **INSTALLATION** and **MAINTENANCE**.

If, in the future, any parts or repairs are required, we strongly recommend that only original replacement parts be used. Our Customer Service Department would be happy to assist you with your parts or service requests.

We thank you for your selection and purchase of an Lakewood Instruments product.

MODEL 330 CAUTIONS
PLEASE READ THIS!

IF THIS CONTROLLER IS USED TO FEED OXIDANT ONLY FOR ORP CONTROL:

1. Turn the high millivolt feed setpoint knob full counter-clockwise.

2. Make sure that the Reducer/High Millivolt AUTO/MANUAL switch is on **AUTO**.

NOTE: FAILURE TO OBSERVE THIS WILL CAUSE THE OXIDANT PUMP TO TIME-OUT EVEN IF NO OXIDANT IS BEING PUMPED! THIS IS BECAUSE THE HIGH MILLIVOLT PUMP SETPOINT AND CONTROL ALSO ACTUATES THE ALARM TIMER.

IF THIS CONTROLLER IS USED TO FEED BOTH OXIDANTS AND REDUCERS:

1. Make sure that the Low Millivolt setpoint is set at a lower ORP/Millivolt than the High Millivolt feed setpoint.

2. Make sure that both AUTO/MANUAL switched are on **AUTO**.

3. **DO NOT AT ANY TIME** cause both Oxidant and Reducers to be pumped at the same time.

WARNING: FAILURE TO OBSERVE THIS MAY CAUSE BOTH OXIDANT AND REDUCER TO BE FED AT THE SAME TIME. THE RESULTING REACTION COULD BE VIOLENT AND EXTREMELY DANGEROUS.

WARNING: DO NOT TURN THE SENSOR LOCK RING WITH PRESSURE IN THE SENSOR FLOW CELL. RELEASE THE PRESSURE FIRST! THE SENSOR MAY FLY OUT OF THE FLOW CELL IF THE PIPE IS UNDER PRESSURE AND INJURE SOMEONE.

MODEL 330

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GENERAL DESCRIPTION

Introduction

The Model 330 ORP/Millivolt Controller is intended for Oxidant/Low Millivolt and/or Reducer/High Millivolt feed to maintain the water ORP in air conditioning cooling towers. It is necessary for sample piping to be run from a circulating water pump to the controller. A flow switch on the controller prevents chemical feed if there is no sample flow. Another safety feature includes an alarm timer that prevents excessive chemical feed.

Oxidant/Low Millivolt Feed

Oxidant is normally used in cooling water ORP control. As the oxidants are consumed during biological control, the ORP/Millivolt falls. As the ORP/Millivolt falls below the Oxidant/Low Millivolt feed setpoint, a relay closes the circuit to the Oxidant/Low Millivolt pump and turns it on. Oxidant is fed into the water. As the ORP/Millivolt rises above the setpoint due to the oxidant level increasing, the relay turns off the Oxidant/Low Millivolt pump.

Any time the Oxidant/Low Millivolt or Reducer/High Millivolt is on, an Alarm Timer starts. If the Oxidant/Low Millivolt is fed longer than the alarm timer continuously, the alarm timer will lock out the Oxidant/Low Millivolt pump. The Alarm Timer can be reset by pressing the RESET button or turning the setpoint knob below the ORP/Millivolt reading to turn off the Oxidant/Low Millivolt pump. In normal operation, the alarm timer should not activate as it will be automatically reset each time the Oxidant/Low Millivolt pump turns off.

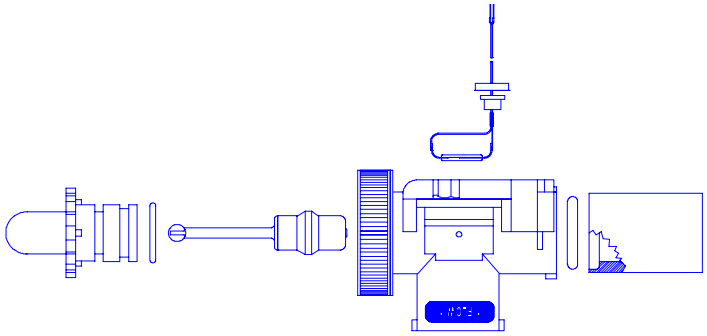
Reducer/High Millivolt Feed

Reducers are sometimes used to control the ORP/Millivolt in cooling towers where high levels of oxidants may have an impact on the environment or on equipment. It is needed if the tendency of the water is toward a higher ORP/Millivolt level. ORP/Millivolt readings above the Reducer/High Millivolt feed setpoint will close the Reducer/High Millivolt feed relay and turn on the Reducer/High Millivolt chemical pump. As the ORP/Millivolt falls below the setpoint, the relay will open and turn off the Reducer/High Millivolt pump.

The Alarm Timer also times out the Reducer/High Millivolt pump.

In cooling water applications, the Reducer/High Millivolt feed setpoint can serve as a HIGH oxidant alarm setpoint. Wire the alarm horn, light, buzzer or relay to the Reducer/High Millivolt feed pump terminal. See the wiring diagram.

Flow switch



The flow switch locks out all chemical feed and the alarm timer if there is no sample line flow. Only 1 GPM is needed to raise the flow switch.

A flow sight assembly shows the black ball at the top of the flow switch float. When the ball is above the rim of the finger grip ring, the flow switch is on. The flow sight may be cleaned by turning off the sample flow and turning the red ring lock counter-clockwise. Then twist out the flow sight assembly. It is O-ring-sealed. Clean the flow sight insert with a cotton swab.

Removing the flow sight assembly permits removal of the flow switch float.

A reed switch assembly senses the position of the magnet. when is closes, it operates the flow switch relay. This assembly can be replaced.

ORP/Millivolt Sensor

The ORP/Millivolt sensor is a non-temperature compensated combination electrode. To remove the sensor, shut off the sample flow and turn the red lock ring counter-clockwise to the stop. Twist out the O-ring-sealed sensor.

Clean the sensor in dilute hydrochloric (10% HCl or Muriatic) acid. Wash in tap water.

WARNING: TAKE PROPER PRECAUTIONS WHEN HANDLING ACIDS. WEAR EYE PROTECTION!

WARNING: AVOID WIPING THE GLASS BULB! IT IS VERY THIN, SENSITIVE GLASS AND YOU MAY DAMAGE IT!

Replace the ORP/Millivolt sensor in the flow cell assembly. Make sure the O-ring is clean. Turn the red lock ring clockwise until it snaps into place.

Output Option

One option card can be plugged in to the rear circuit board: the -35, -42, -44 Option Card. This plug-in circuit board provides an isolated 4-20 mA output to a recorder, computer or control device. Please refer to the Lakewood *-35, -42, -44 Option Card Instruction Manual* for more information on this card.

Chart Recorder (Optional)

The Model 51 Inkless Strip Chart Recorder requires two connections to the Model 330 back board. The chart recorder motor requires 120 VAC, 60 Hz unless specified otherwise.

INSTALLATION

Checking

Inspect the shipping carton for obvious external damage. Note on the carrier's bill-of-lading the extent of the damage, if any, and notify the carrier. Save the shipping carton until your Model 330 Controller is started up.

☎ **If there was shipping damage, call the Lakewood Instruments Customer Service Department at (800) 228-0839 for authorization to return the unit to the factory in the original carton.**

Check the power wiring. Make sure that the controller is powered from 120 VAC unless it is specifically set up for 220 VAC.

Check the recorder or other low power wiring.

CAUTION: MAKE SURE THAT NO POWER WIRING IS CONNECTED TO ANY LOW POWER CIRCUITS.

WARNING: MAKE SURE THAT THE TWO RED LOCK RINGS ARE FULL CLOCKWISE AND LATCHED BEFORE TURNING ON THE SAMPLE LINE FLOW. THE FLOW SIGHT FITTING AND THE SENSOR WILL BLOW OUT IF NOT SECURELY LATCHED.

Check the plumbing for leaks. Check also for the proper flow direction. It takes 1 GPM to raise the float ball valve above the lip of the clear flow sight tube.

Check the chemical pump fittings. Make sure that they are safe—not overly tight, but tight enough.

Setpoints

Set the Oxidant/Low Millivolt feed setpoint (lowest level of oxidant to maintain system) at the desired level. This is the ORP/Millivolt at which the Oxidant/Low Millivolt pump turns on when the ORP/Millivolt is below the setpoint. Consult your water treatment engineer for the correct value for the type of treatment used.

With water flow through the controller flow cell, press the Oxidant/Low Millivolt AUTO/MANUAL switch to **MANUAL**. The Oxidant/Low Millivolt pump should turn on. Press the switch again to return to **AUTO**.

Set the Reducer/High Millivolt feed setpoint (the highest level that would be needed to feed reducer or set off an alarm) for your HIGH alarm ORP/Millivolt is Reducer/High Millivolt is not used. Usually this will be at 1000 Millivolt unless no alarm or reducer is used.

With water through the controller flow cell, press the Reducer/High Millivolt AUTO/MANUAL switch to **MANUAL**. The Reducer/High Millivolt pump should turn on. Press the switch again to **AUTO**.

Alarm Timer

The alarm timer limits the amount of chemical that can be fed continuously. For example, if the alarm timer is set on 30 minutes, only 30 minutes of Oxidant or Reducer can be fed continuously without the alarm turning the pump off. A red LED will be lit on the front panel when the alarm is on. The alarm timer automatically resets when both pumps turn off due to reaching setpoint. The alarm timer can be manually reset by pressing the **RESET** button or by turning off the sample flow to the controller.

Check with your water treatment engineer to determine the amount of time to which the alarm timer should be set.

CALIBRATION

Cooling Water and Secondary Standard

Measure the actual water ORP/Millivolt with a hand-held meter. ORP/Millivolt DPD test could also be used with a good accuracy. Adjust the STANDARDIZE (STD.) to make sure the controller display agrees with the cooling water ORP/Millivolt.

Maintenance and Technical Service

Technical Service

☎ **Technical Support for Lakewood Instruments can be reached by calling (800) 228-0839 or faxing (414) 355-3508, Monday through Friday, 7:30 a.m. - 5:00 p.m. CST.**

Mail and returns should be sent to:

Lakewood Instruments
7838 North Faulkner Road
Milwaukee, WI 53224 USA

When any merchandise is returned to the factory, please call and obtain a Return Goods Authorization (RGA) number and have the following information available:

- Customer's name, address, phone and fax numbers.
- A purchase order number (no exceptions) for cases where parts are required that are not under warranty.
- A contact person's name and phone number to call if the equipment is beyond repair or to discuss any other warranty matter.
- Equipment model and serial numbers.
- Reason for return (i.e., repair, warranty, incorrect part, etc.).

We will then fax to your attention an RGA form that must accompany the returned item.

NOTE: THE RGA NUMBER MUST BE CLEARLY WRITTEN ON THE OUTSIDE OF THE PACKAGE(S) BEING RETURNED.

Service Guide

When calling Lakewood Instruments, please have the controller's complete model number and serial number available so that the technician can better assist you.

When any parts are returned to the factory, please indicate:

- Customer's name and address
- Individual at customer location to send the repaired controller or new part to
- The person (and phone number) to call if the equipment is beyond repair or for any warranty matter

Parts List

PART NUMBER	DESCRIPTION
1169065	ORP/Millivolt combination replacement electrode.
1167233	Plumbing assembly, including flow switch.
1167234	Replacement flow switch float.
1167235	Replacement flow switch — reed switch assembly.

Troubleshooting

PROBLEM	CORRECTIVE ACTION
ORP/Millivolt doesn't respond to changes or won't calibrate.	1. Check the controller with the APS2 sensor simulator. 2. Replace the ORP/Millivolt sensor
Wild ORP/Millivolt swings with poor control.	1. Check installation. Suspect poor Oxidant/Low Millivolt mixing in water. 2. Oxidant/Low Millivolt pump ahead of sensor. 3. ORP/Millivolt sensor too old. Needs replacement.
Oxidant/Low Millivolt pump alarm timer actuates.	1. Out of Oxidant/Low Millivolt. 2. Oxidant/Low Millivolt pump lost prime. 3. Oxidant/Low Millivolt pump stroke set too low for the size of the cooling system. 4. Alarm Timer set too low. 5. Make up water changed.
No output to chemical pump.	1. No sample flow. Check plumbing. 2. Defective flow switch. Call factory. 3. Defective Oxidant/Low Millivolt pump. Plug into hot outlet.
Controller display is blank.	1. Is there power to the controller? 2. Is the fuse on the rear circuit board blown? 3. Is there power to the terminals on the rear circuit board?

For more information call toll free in the USA (800) 228-0839

Manufactured in the USA

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