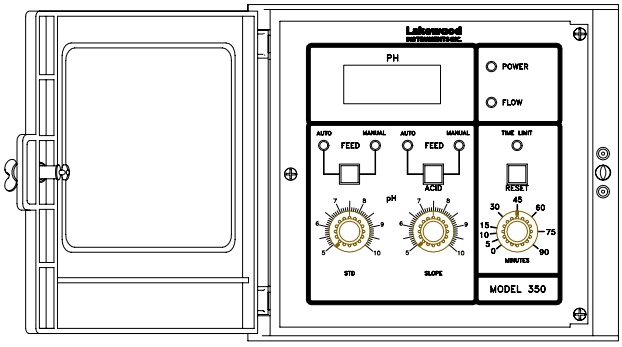
LAKEWOOD INSTRUMENTS
MODEL 353

ORP/MILLIVOLT CONTROLLER

INSTRUCTION MANUAL

SERIAL #:_____



Lakewood Instruments
7838 North Faulkner Road, Milwaukee, WI 53224 USA
Phone (800) 228-0839 • Fax (414) 355-3508
http://www.lakewoodinstruments.com

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 353 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**.

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.

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 353

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GENERAL DESCRIPTION

Introduction

The Model 353 ORP/Millivolt Controller is intended for Oxidant/Low Millivolt and/or Reducer/High Millivolt feed to maintain the water ORP in various process. A flow switch input is provided on the controller to prevent chemical feed if there is no sample flow. Another safety feature includes an alarm timer that prevents excessive chemical feed. The controller also uses a ORP amplifier which allows remote ORP sensor installations up to ½ mile away. Because of various ORP sensors and mounting options the amplifier and sensor are sold separately.

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.

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.

Flowswitch

The flowswitch locks out all chemical feed and the alarm timer if there is no sample line flow. The 353 controller is shipped with a jumper wire across the flow switch input.

To use the flowswitch input a dry contact must be provided. The dry contacts of a relay driven by a recirculating pump can be used (be sure to remove the jumper wire from the flowswitch input). If a flowswitch input is not desired place a wire across the flowswitch input.

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 muratic) acid. Wash in tap water. **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 353 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 353 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 card 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. **MAKE SURE THAT NO POWER WIRING IS CONNECTED TO ANY LOW POWER CIRCUITS.**

Wiring

The 353 controller is supplied with ½ conduit knock outs. Unless the -F option is specified the controller works on 110 VAC.

The wiring of the sensor to the controller requires an amplifier. The sensor must be located within 15 feet of the amplifier. 4 conductor cable is required between the amplifier to the controller and can be up to ½ mile in distance.

Refer to drawings in back of manual for detailed installation information.

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 continuous Oxidant/Low Millivolt or Reducer/High Millivolt feed. For example, if the alarm timer is set on 30 minutes, only 30 minutes of Oxidant/Low Millivolt can be fed continuously without the setpoint turning the Oxidant/Low Millivolt pump off. The alarm timer automatically resets when the Oxidant/Low Millivolt pump turns off when the **RESET** button is pushed or when the flowswitch is **OFF**.. The same applies to Reducer/High Millivolt feed.

The Alarm time out timing should be verified with your water treatment engineer.

CALIBRATION

Method 1

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.

Method 2

Verify calibration with a millivolt simulator such as the Lakewood APS2. Adjust the STANDARDIZE (STD.) to make sure the controller display agrees with the millivolt simulator.

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
5305*	530 CPVC replacement tip
5306*	530 PVDF replacement tip
5307*	530 316 SS replacement tip
1167124	ORP Preamp

* Specify cable length from glass tip to BNC fitting in inches.

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. Flow Switch input contacts not closed.
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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