

ECO SENSORS, INC.

Portable Dissolved Ozone Meter EcoZone™ Model EZ-10W

INSTRUCTIONS FOR USE

Before you read further! Be sure that the EZ-10W warms up for at least 15 minutes. It is highly recommended to warm-up the EZ-10W overnight if it has not been used for over a week or if it has been stored near chemicals.

GENERAL DESCRIPTION

Ozone is easy to sense, but measurement can be very counter intuitive and tricky. The Eco Sensors® EZ-10W makes dissolved ozone sensing simple and inexpensive. Its principle of operation is using a semiconductor sensor to measure ozone in the air headspace over agitated ozonated water. The instrument is not a primary standard and is sold for general monitoring rather than precise measurements. It can be used outdoors for short periods at moderate temperatures.

OPERATION

There is no off-on switch. To power up the instrument, simply plug in the AC adapter (12 volts DC). The display will light up and then will retreat a few seconds to one or two green bars. The first green bar is the "on" pilot light; any additional illuminated LED colors bars indicate ozone concentrations.

FOR AC OPERATION: Put the switch in the **AC Power & Bat Chg** position. This is also the position for charging the batteries.

FOR BATTERY OPERATION: Put the switch in the **Battery** position. The instrument will have about 8 hours of usage from fully charged batteries. The batteries probably will have some charge when the instrument is delivered. Recharging fully discharged batteries will require 14 hours of AC operation (overnight) or about one hour of charging per 30 minutes of use. When the batteries are low, the first green bar ("on") will start to get dim and it will begin to blink. Operation of the instrument should be concluded.

Preparing a sample and taking a reading

You must work quickly yet accurately because the ozone is reverting back to oxygen.

1. Fill the beaker with a 50 ml sample of ozonated water.
2. Pour this sample into the 500 ml bottle, screw on the cap, give several brisk shakes, remove the cap, and slide over the sensor cap wired to the instrument.
3. Note the instrument reading after 1 minute 15 seconds.

Procedure before doing the next reading

1. Rinse the beaker thoroughly with clean tap water, distilled water or best, deionized water.
2. Completely fill the 500 ml bottle with clean tap water, distilled water or deionized water, shake, and discard the water. This is to flush out all residual (in air) ozone.

Other ozone ranges

1. To do a more sensitive reading (for example .5 ppm = .1 ppm): Put 5x (250 ml) ozonated water in the 500 ml bottle and divide the LED readings by 5. Recommended only as a qualitative measure to sense any residual ozone.
2. To do less sensitive reading (for example 0-7 ppm): Mix the 50 ml water sample with 450 ml of pure (preferably deionized water), pour 50 ml of the diluted mixture into the 500 ml bottle, and multiply the LED readings by 10.

DATA READOUT

LED Display - This is a ten segment "bar graph" or "color bar" display that reads 4 green segments, three yellow segments, and three red segments. The first green segment serves as a pilot light to indicate that the instrument is receiving power and when blinking that there is a low battery condition. Calibration of the display is:

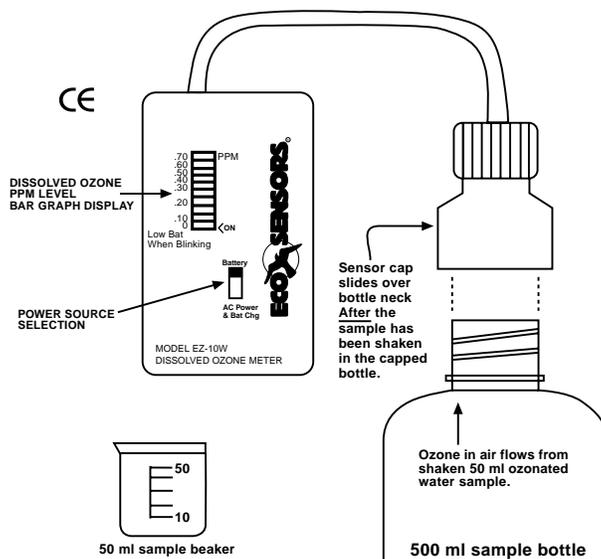
BAR	PPM of Dissolved Ozone	BAR	PPM of Dissolved Ozone
1st green	"on"	2nd yellow	.3
2nd green	.1	3rd yellow	.4
3rd green	.15	1st red	.5
4th green	.2	2nd red	.6
1st yellow	.25	3rd red	.7

ACCURACY AND CALIBRATION

The EZ-10W calibration is shown above and is marked on the front face of the instrument. The instrument is most accurate in the .2-.5 ppm range and should be within 20%. High concentrations of VOCs in the air or water will reduce the instrument's accuracy by reducing its readings. Chlorine such as in swimming pools and salt water are not a problem.

SPECIFICATIONS

- Sensor: Heated metal oxide semiconductor.
- Range: .1-.7 ppm of dissolved ozone.
- Response time: 1 1/4 minutes to make a reading.
- Accuracy: within 20% in the .3-.7 ppm range depending on the conditions.
- Recommended general function check: every three months. Recommended calibration check: every year.
- Temperature range: 20-30 degrees C (68-86 degrees F).
- Size: 85 X 35 X 60 mm (3 1/4" X 1 3/8" X 2 3/8")
- Weight: 154 grams (6 oz.)
- Power requirement: 12 volts DC at 300-500 mA. (120 volt 60 Hz. AC adapter supplied to North American customers) or self-contained rechargeable batteries. See Tech Note P-101 for complete adapter specifications.
- Batteries: Self-contained NiMH special design usable 8 hours after a full charge.
- Fusing: Self-resetting fuse that triggers at 250 mA. current or more than approximately 24 volts input. Has an overvoltage protection diode to eliminate supply voltage spikes and surges.
- Enclosure material: flame retardant ABS.



SERVICE AND MAINTENANCE

Please contact your distributor about service. In emergencies, the factory service number is (800) 472-6626, and the e-mail is sales@ecosensors.com. We recommend that the instrument be maintained and recalibrated annually. Factory service plans are available.

Sensor - The sensor is the only components of the instrument that is likely to fail or to require checks. We recommend that the sensor be checked for satisfactory operation every three months, or more often in environments that are dusty, have high levels of chlorine or halogen compounds, or where there is dust or water spray. The sensor should be observed to see if it is responsive to changes in ozone level and if the ppm readings are reasonable. This can be done with the Eco Sensors model OG-1 hand-held ozone generator.

Indications that the sensor is deteriorating or has failed are:

- Its response is significantly lower.
- The ozone concentration readings seem too high and tend to get even higher.
- The instrument doesn't respond at all and/or the bar graph does not go down to the green area after a brief warm-up.

Some of these problems can be compensated for by circuit adjustments or simple maintenance. Sensor replacement, however, requires an instrument technician and should be done by Eco Sensors or its authorized service representative. The sensor cap and cable must be replaced as a unit and the instrument recalibrated.

Batteries - The batteries are rechargeable NiMH. They should last several years. For a replacement battery pack (not available in stores) contact your distributor or Eco Sensors. **AC Power Adapters** - AC adapters usually are burned out by power surges such as from lightning, but the EZ-10W itself has protection against such surges. Replacement adapters for North American usage can be ordered from your distributor or Eco Sensors, Inc.; elsewhere suitable adapters can be purchased from local electronic stores. Specifications are found in our Tech Note P-101.

PRECAUTIONS

- Allow at least 15 minutes warm up, and better, an hour or more. If the instrument hasn't been used for days or weeks, an overnight warm up will be helpful to "burn off" any contaminants that may have been absorbed by the sensor.
- Read all instructions in this manual.
- Keep instrument dry. Never let water or other liquids into the sensor.
- Do not drop the instrument or subject it to continuous vibration.
- Do not store or operate the instrument in high levels of dust.
- Do not attempt to service the instrument yourself. You are likely to break the sensor which will be expensive and time consuming to replace.
- Do not clean the instrument with cleaning chemicals or solvents. Clean it with a damp cloth or with ArmorAll™.
- Do not let the white membrane seen in the sensor cap get wet or dusty. Damage to the membrane or the sensor behind it will require a sensor subassembly replacement.
- If there are high concentrations of VOCs in the air (such as alcohol or gas fumes) or in the water (such as oils or gasoline) the accuracy of the instrument can be greatly reduced (readings will be lowered).

WARRANTY

This product is warranted against defects in materials and workmanship for one year following the date of purchase by the original owner. This warranty does not include damage to the product as a result of misuse, accident, damage, modifications, or alterations, and it does not apply if the instructions in this manual are not followed.

If a defect develops during the warranty period, Eco Sensors at its election will repair the instrument or will replace it with a new or reconditioned model of equivalent quality. In the event of replacement with a new or reconditioned model, the replacement unit will continue the warranty of the original unit.

To return the instrument contact your distributor, or call Eco Sensors at (800) 472-6626 or e-mail at: sales@ecosensors.com to receive return instrument and a Return Goods Authorization (RGA) number.

Except as provided herein, Eco Sensors makes no warranties, express or implied, including warranties of merchantability and fitness for a particular purpose. Eco Sensors shall not be liable for loss of use of this instrument or other incidental or consequential damages, expenses or economic loss, or claims for such damage or economic loss.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

RECORD YOUR SERIAL NUMBER HERE
KEEP THIS MANUAL AND WARRANTY FOR YOUR RECORDS

Eco Sensors is a registered trademark of Eco Sensors, Inc.
EcoZone is a trademark of Eco Sensors, Inc. (c) Eco Sensors, Inc., 2001. Revision 8/01

PRINCIPLE OF OPERATION

Eco Sensors Model EZ-10W Dissolved Ozone Meter

Background

Eco Sensors, Inc. has developed a simple, low-cost dissolved ozone meter building upon techniques and insights we have developed 'in our very popular instruments used to sense and measure ozone in air. During the research and experimentation process in developing this instrument, we sorted through lots of information about dissolved ozone. We developed a new instrument which due to its low cost and simplicity will be especially applicable to water bottlers, pools and spas, food processing, cooling towers, aquariums, wineries and other smaller systems. It is especially useful in many cases for measuring residual dissolved ozone which indicates that ozone was present throughout the system.

Prior to the introduction of the Eco Sensors dissolved ozone instruments, dissolved ozone has generally been measured by a number of methods, and all are considered to be frustrating. The most common ones are ORP meters, indigo test kits with a colorimeter readout, and electrochemical sensor instruments. ORP is not specific for ozone and can be equally influenced by any oxidizing constituent in the water such as chlorine. The indigo test kits give good specific ozone readings in the hands of skilled technicians, but they depend on packaged reagents. The electrochemical sensor instruments can work well if they are constantly maintained.

The Eco Sensors Approach

The new Eco Sensors dissolved ozone meter was designed to have many of the best features of the instrument types reviewed above. It is a basic new design based on exhaustive research to find a better way. A key concept is to release all of the ozone from the sample water before measuring it by rapid agitation of the sample. The purpose of the vigorous shaking of the sample bottle is to release virtually all the ozone from the water sample so that the ozone concentration can be measured in the air space ("head space") in the sample bottle. Our approach is to force nearly all of the ozone out of the water. This results in a higher concentration than would result from the air-water equilibrium release described by Henry's law, and the measurement is much less temperature and pressure sensitive than would be realized from a Henry's law measurement.

Features off the Eco Sensors EZ-10W instrument include:

- Low in cost. No consumables
- The sensor and probe do not touch the water.
- Ozone specific.
- Insensitive to common concentrations of chlorine and salinity.
- Easily understood by non-technical personnel.
- Easy to check the calibration by standard kits and by Eco Sensors ozone sources.
- Light weight and pocket size.

RECOMMENDED ACCESSORY

Ozone Source for Checking Response and Approximate Calibration

Ozone Source Calibrator

Model OG-1 (battery operated)

Model OG-1 AC (AC adapter powered)

Generates sufficient ozone to quickly verify that the EZ-10W is responding properly and to check the calibration. Low cost and portable.