

Model 600 Oxygen Analyzer Instructions

INTRODUCTION:

Model 600 utilizes a unique galvanic sensor to measure both percentage concentration in air and parts per million of dissolved oxygen in aqueous solutions. The galvanic sensor is rugged and totally sealed from the environment. The sensor is temperature compensated to maintain accuracy for air calibration and to follow Henry's Law for accurate indication of parts per million dissolved oxygen. There is no zero adjustment required. There is no membrane replacement or maintenance of the sensor during its expected life of 12 months.

One of the more important features of the sensor is its low flow rate sensitivity, needing only .5 ft. per second flow to read dissolved oxygen accurately. The sensor does not exhibit hysteresis when sampling nor does it lose sensitivity or calibration with age. The sensor can withstand 25 psi (60-foot depth in water) and optional cable lengths are available up to 100 feet.

Model 600 is easily calibrated, and the internal temperature compensation network corrects for the ambient temperatures of the air and water. The meter comes with a carrying case and a sensor with a five-foot cable length.

NOTE:

The electrode has a cathode made of gold. It will not be affected by chemicals such as H₂S, Cl₂, and So₂. CO₂ will neutralize the electrolyte.

WARNING! WARNING! WARNING!

Model 600 is rugged, but **THE METER IS NOT WATERPROOF**. DO NOT drop in water. The most delicate and vulnerable part of the sensor is the cell membrane. DO NOT scratch, puncture, or permit sharp objects to touch the cell face. When not in use, cover the cell face with the protective cap. Sensor failure due to mishandling will void the sensor's warranty.

SAFETY NOTICE

The sensor cell contains **CONCENTRATED POTASSIUM HYDROXIDE ELECTROLYTE** which can cause caustic burns to eyes and skin. Should the sensor develop a leak or the membrane be punctured, avoid contact with the electrolyte. Should you get electrolyte in your eyes or on your skin, flush immediately with water and seek medical attention if necessary.

SPECIFICATIONS:

METER

Range: Concentration, 0-100.0%
Dissolved Oxygen, 0-20.0 PPM
Accuracy: +/-5.0% concentration, +/- 0.25 PPM
Precision: +/- 0.1% concentration or PPM
Hysteresis: Non-existent
Temperature Compensation: Automatic from 0-40°C
Response Time: 90% of final reading in 12 seconds
Zero: True zero in absence of oxygen
Pressure: 25 psi maximum (60-foot depth in water)

CONTROLS

Switch: OFF - % - PPM
Calibrate: Calibrate the meter to 20.9% concentration in air

MISCELLANEOUS

Display: 0.5" LCD
Power: 9-Volt Battery
Battery Indicator: "BAT" lights when low
Size: Meter: 1.55 x 6.00 x 3.70"
Sensor: 1.25" diameter x 1.62" in length
Warranty: Meter - two years
Sensor - six months

INSTRUCTIONS:

PREPARATION: The sensor is always operating and does not require a warm-up or break-in period. Insert the sensor's cable plug firmly into the phone jack at the bottom of the analyzer. Remove the black protective cap from the sensor and turn the switch to 0-100%. Digits will appear on the display. If the battery is low, "BATT" will appear and the battery must be replaced.

CALIBRATION:

Atmospheric - With the function switch on 0-100%, expose the sensing cell to fresh air and adjust the calibrate knob to make the analyzer read 20.9%. Now expose the sensor to your sample and take your reading.

Dissolved - Wet the sensor with the solution you are going to test. Turn the function switch to 0-100% and expose the sensor to fresh air. Adjust the calibrate knob to make the analyzer read 20.9%. Oxygen will diffuse through a wet membrane at a different rate than a dry membrane. **For more accurate PPM readings, always wet the sensor before calibrating.**

Measuring Percent Concentration - With the function switch on 0-100%, the analyzer will indicate the percent concentration of oxygen in the atmosphere with respect to air at any temperature within the operating range with the solution you are going to test. Turn the function switch to 0-100% and expose the sensor to fresh air. Adjust the calibrate knob to make the analyzer read 20.9%. Oxygen will diffuse through a wet membrane at a different rate than a dry membrane. **For more accurate PPM readings, always wet the sensor before calibrating.**

Measuring PPM of Dissolved Oxygen - With the function switch on 0-20 PPM, the analyzer will read the true content of dissolved oxygen for fresh water at any temperature within the operating range. If you are measuring non-fresh water, refer to the conversion chart provided for the correct conversion factor. It is essential the sensor experiences a flow rate of at least .5ft/second in order to read accurately. If you want to measure a body of water that is not flowing, you must bob the sensor up and down in the water at a moderate rate or swing it with a sweeping movement through the water. The teflon membrane of the sensor should always be exposed to the water's flow.

MAINTENANCE:

Should the sensor's membrane become fouled or coated with sediment, gently wash it in warm, soapy water. To prolong the life of the sensor, do not store in warm or hot areas.

Even though the sensor may not be connected to the meter during storage, the sensor is constantly working because of its internal temperature compensation network. Storing the sensor in a refrigerator during periods of nonuse will lower the kinetic energy of the cell and prolong its life. The manufacturer additionally recommends the OXAN EXTENDER KIT for storing the sensor. A 0.0 PPM oxygen environment is created by mixing the chemicals provided in the kit. The sensor remains dormant until it is removed from the storage chamber, thus extending its one-year life.

Cell Replacement -

At some point in time, the sensor will fail and will require replacement. Failure is indicated by instability and/or inability to calibrate. Replacement sensors are available from your distributor or the manufacturer. If you are taking dissolved oxygen measurements, you must perform an internal calibration of Model 600 for each replacement sensor.

Battery Replacement -

The display will show "BATT" when the battery needs replacing. Replace with any 9-volt battery.

Calibration of Model 600

With a Replacement Sensor

****Calibration required for PPM measurements only**

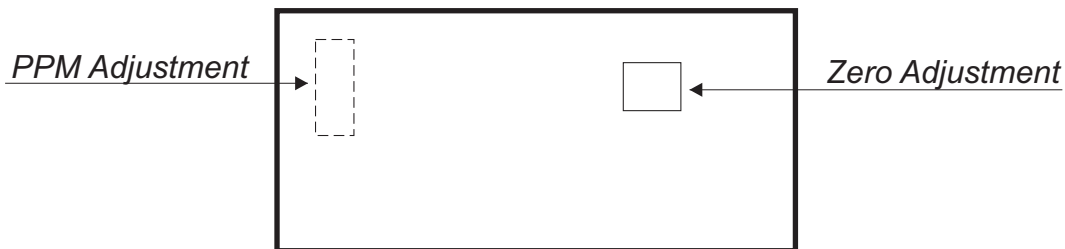
First, determine the oxygen content (PPM level) of a source of water such as a reference tank. You must determine the oxygen content of your reference tank by either performing a **Winkler Test*** or by using another calibrated meter. Once this is known, you can proceed to calibrate the meter.

If you do not have a calibrated meter or the equipment to perform a **Winkler Test**, return the meter to Engineered Systems & Designs, Inc. at the time you purchase the replacement sensor and we will calibrate the meter to the replacement sensor.

*The **Winkler Test Kit** may be purchased from Engineered Systems & Designs, Inc. The kit provides 50 individual tests.

To do an internal calibration, perform Steps A-D without the sensor connected to the meter.

- A. Remove the battery from the battery compartment and disconnect it from the battery snap.
- B. Remove the four screws from the bottom of the meter, and remove the meter bottom. Connect the battery to the battery snap.
- C. Find the potentiometer on the Oxan3 or Oxan491 circuit board, located in the upper right hand corner (see diagram below). Turn the function switch to the 0-100% position and zero the meter by adjusting the potentiometer making the display read 00.0.
- D. Find the rectangular potentiometer located on the underside of the upper left hand corner of the circuit board (Oxan3 or Oxan491).
- E. Wet the sensor in your source of water or reference tank. Attach the sensor and calibrate the meter to 20.9% oxygen using the calibrate knob.
- F. Turn the function switch to the PPM position and place the sensor in your tank.
- G. Adjust the potentiometer on the underside of the circuit board with a screwdriver until the digital display agrees with the PPM readings you obtained in your Winkler Test or with your calibrated meter. Be sure to have proper flow past your sensor.
- H. Replace everything in reverse order.



In the event you need factory service, return the instrument to:

Engineered Systems & Designs, Inc.
3 South Tatnall Street
Wilmington, DE 19801 U.S.A.

Phone: 302-456-0446
Fax: 302-456-0441
E-mail: esd@esdinc.com
www.esdinc.com

Salinity, Parts Per Thousand (PPT) Correction Factors

Temp C	5	10	15	20	25	30	35	40
0	0.966	0.934	0.903	0.872	0.843	0.815	0.787	0.761
1	0.967	0.934	0.903	0.873	0.844	0.816	0.789	0.762
2	0.967	0.935	0.904	0.784	0.845	0.817	0.790	0.764
3	0.967	0.935	0.905	0.875	0.846	0.818	0.791	0.765
4	0.967	0.936	0.905	0.876	0.847	0.819	0.793	0.767
5	0.968	0.936	0.906	0.877	0.848	0.821	0.794	0.768
6	0.968	0.937	0.907	0.877	0.849	0.822	0.795	0.770
7	0.968	0.937	0.907	0.878	0.850	0.823	0.797	0.771
8	0.968	0.938	0.908	0.879	0.851	0.824	0.798	0.773
9	0.968	0.938	0.908	0.880	0.852	0.825	0.799	0.774
10	0.969	0.938	0.909	0.881	0.853	0.827	0.801	0.776
11	0.969	0.939	0.908	0.882	0.854	0.828	0.802	0.777
12	0.969	0.939	0.910	0.882	0.855	0.829	0.803	0.778
13	0.969	0.940	0.911	0.883	0.856	0.830	0.805	0.780
14	0.970	0.940	0.912	0.875	0.857	0.831	0.806	0.781
15	0.970	0.941	0.912	0.885	0.858	0.832	0.807	0.783
16	0.970	0.941	0.913	0.885	0.859	0.833	0.808	0.784
17	0.970	0.941	0.913	0.886	0.860	0.834	0.810	0.786
18	0.970	0.942	0.914	0.887	0.861	0.836	0.811	0.787
19	0.971	0.942	0.915	0.888	0.862	0.837	0.812	0.788
20	0.971	0.943	0.915	0.889	0.863	0.838	0.813	0.790
21	0.971	0.943	0.916	0.889	0.864	0.839	0.815	0.791
22	0.971	0.944	0.916	0.890	0.865	0.840	0.816	0.792
23	0.971	0.944	0.917	0.891	0.866	0.841	0.817	0.794
24	0.972	0.944	0.918	0.892	0.866	0.842	0.818	0.795
25	0.972	0.945	0.918	0.892	0.867	0.843	0.819	0.796
26	0.972	0.945	0.919	0.893	0.868	0.844	0.820	0.798
27	0.972	0.945	0.919	0.894	0.869	0.845	0.822	0.799
28	0.972	0.946	0.920	0.894	0.870	0.846	0.823	0.800
29	0.973	0.946	0.920	0.895	0.871	0.847	0.824	0.801
30	0.973	0.947	0.921	0.896	0.872	0.848	0.825	0.803
31	0.973	0.967	0.921	0.897	0.872	0.849	0.826	0.804
32	0.973	0.947	0.922	0.897	0.873	0.850	0.827	0.805
33	0.973	0.948	0.923	0.898	0.874	0.851	0.828	0.806
34	0.974	0.948	0.923	0.899	0.875	0.852	0.830	0.808
35	0.974	0.948	0.924	0.899	0.876	0.853	0.831	0.809
36	0.974	0.949	0.924	0.900	0.877	0.854	0.832	0.810
37	0.974	0.949	0.925	0.901	0.878	0.855	0.833	0.811
38	0.974	0.949	0.925	0.901	0.878	0.856	0.834	0.813
39	1.047	1.020	0.944	0.969	0.945	0.920	0.897	0.874
40	0.975	0.950	0.926	0.903	0.880	0.858	0.836	0.815

Go to the salinity column and then come down to the temperature of the sample. Take the factor located at the intersection of the salinity and temperature columns and multiply it by the reading on the meter. Example: 35 PPT @ 10°C gives a factor of .801, meter reads 6.73. Corrected reading is $.801 * 6.73 = 5.39$ PPM of dissolved oxygen.