Operations Manual
EcoSense® DO200

Field/Lab Dissolved Oxygen and Temperature Instrument

- English
- Français
- Español
- Deutsch
- Italiano

WARRANTY

The EcoSense® DO200 Instrument is warranted for one year from date of purchase by the end user against defects in materials and workmanship. DO200 probes and cables are warranted for one year from date of purchase by the end user against defects in material and workmanship. Within the warranty period, YSI will repair or replace, at its sole discretion, free of charge, any product that YSI determines to be covered by this warranty.

To exercise this warranty, write or call your local YSI representative, or contact YSI Customer Service in Yellow Springs, Ohio. Send the product and proof of purchase, transportation prepaid, to the Authorized Service Center selected by YSI. Repair or replacement will be made and the product returned, transportation prepaid. Repaired or replaced products are warranted for the balance of the original warranty period, or at least 90 days from date of repair or replacement.

Limitation of Warranty

This Warranty does not apply to any YSI product damage or failure caused by: (i) failure to install, operate or use the product in accordance with YSI's written instructions; (ii) abuse or misuse of the product; (iii) failure to maintain the product in accordance with YSI's written instructions or standard industry procedure; (iv) any improper repairs to the product; (v) use by you of defective or improper components or parts in servicing or repairing the product; or (vi) modification of the product in any way not expressly authorized by YSI.

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GENERAL INTRODUCTION

The DO200 is one of three instruments in the EcoSense® product line from YSI. The DO200 is a precise tool that measures dissolved oxygen in % and ppm (mg/L) and temperature. A built-in microprocessor stores, calculates, and compensates for all parameters related to DO determinations including DO electrode temperature characteristics.

This unit has a splash-resistant IP65 case. The mechanical touch keys are highly reliable with tactile and audio feedback. This instrument uses one 9V battery. Re-calibration is not required when power is restored.

The front of the instrument has a large LCD that displays DO %, ppm, and temperature simultaneously along with user prompts and mode indicators. The unit prompts the user through calibration and measurement procedures.

The model DO200 field and lab probes use a polarographic electrode with convenient screw-on cap membranes. The 200-4 and 200-10 field probes come with a built-in temperature probe for automatic temperature compensation, as well as a stainless steel body for added weight. The 200-BOD lab probe comes with a power supply and includes self-stirring and replaceable electrodes.

Other features include long battery life and high 50/60 Hz AC noise rejection. This instrument is universal and user-friendly for field, industrial, and laboratory applications.

INITIAL INSPECTION

Carefully unpack the unit and accessories, and inspect for shipping damages. Compare received parts with materials listed on the packing list. Notify YSI immediately of any damage or missing parts. Save all packing materials until satisfactory operation is confirmed.

PRECAUTIONS

The Case

Though the DO200 instrument is housed in a splash-proof IP65 case, DO NOT use it underwater; the connector is not waterproof. The splash-resistant case prevents permanent damage to the unit if accidentally sprayed with non-corrosive solutions. In case of submersion, follow these steps immediately:

1. Dry the connector if necessary, and replace the DO probe. Rinse unit carefully with distilled water. After rinsing and drying, inspect and clean connectors to remove all contaminants that may affect probe connections.
2. Wait for unit and probe to dry completely before resuming operation.
3. If the unit does not function correctly after steps 1 and 2, call YSI for possible repair or replacement (see Warranty).

The Probes (Field & Lab)

1. Membranes last longer if properly installed and regularly maintained. Erratic readings can result from damaged or fouled membranes or from large bubbles in the electrolyte reservoir. If unstable readings or membrane damage occurs, replace both the membrane cap and Oxygen Probe solution (also known as “O2 Probe Electrolyte”, potassium chloride, or KCl solution). The average replacement interval is 4 to 8 weeks, although they may last longer if kept clean. Harsh environments, such as wastewater, may require membrane replacement every 2 to 4 weeks. Unstable readings may occur if membrane cap is coated with oxygen consuming or oxygen evolving organisms such as bacteria or algae.
2. Chlorine, sulfur dioxide, nitric oxide and nitrous oxide can affect readings by behaving like oxygen at the probe.
3. Avoid substances that may damage probe materials such as concentrated acid, caustics and strong solvents. Probe materials include Stainless steel, epoxy and ABS Plastic.

4. Keep the probe's gold cathode clean and textured (when properly maintained it has a matte finish). If it is tarnished (from contact with certain gases), or plated with silver (from extended use with a loose or wrinkled membrane), then clean it, following the instructions in "Probe Maintenance".

5. To prevent the membrane and electrolyte from drying out, store the field probe in the calibration bottle with the moistened sponge and the lab probe in a BOD bottle with 1 inch of water to keep them in a saturated air environment.

PROBE PREPARATION

The DO200 probe ships with a dry, protective membrane. To install a new membrane cap on the probe:

1. Unscrew probe membrane cap and discard.
2. Fill a new cap with Oxygen Probe Solution. Prepare according to directions on the solution bottle.
3. Thread filled membrane cap onto sensor.
4. Allow sufficient warm-up time for initial use (10-15 min). During this time an "ovEr" message may appear on the display. This is normal. After the warm up is complete the message will disappear.

BATTERY INSTALLATION

An initial display of "LOW BAT" on the LCD indicates approximately one hour of battery life for unit operation within specifications. Replace battery when "LOW BAT" appears on the LCD.

To replace battery, remove the two battery cover screws and the battery cover and o-ring. Replace the 9V battery. Replace the battery cover and o-ring (be sure to align the o-ring correctly to prevent a bad seal) and fasten the two battery cover screws for the splash-resistant feature.

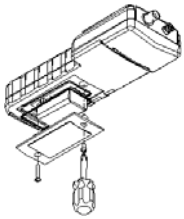

Figure 1.
Battery Installation

THE KEYPAD

1. ⏻: Turns the unit on or off.
2. **MODE:** In normal operation, toggles display between Dissolved Oxygen in % air saturation and Dissolved Oxygen in ppm (mg/L). In Calibration mode, exits current calibration and displays the next calibration parameter.
3. **CAL:** In normal operation, changes the mode from Normal to Calibration. See Calibration Set-up.
4. ⏎: In Calibration Set-up, press this key to save the current parameter to memory.
5. ∆ and ∇ **Keys:** Increases or decreases the display value as desired.

THE LCD DISPLAY

1. **BAT:** Low battery indicator.
2. **CAL:** Calibration mode indicator.
3. **SAL ppt:** Displays during calibration when user is prompted for the approximate salinity of the sample in parts per thousand (ppt).
4. **mBar:** Displays during calibration to prompt user for barometric pressure.
5. Main display for dissolved oxygen values.
6. **%/ppm:** Unit indicators.
7. **ºC:** Temperature display.

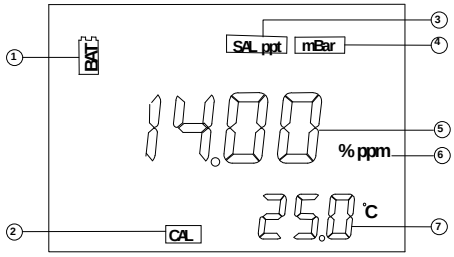

Figure2. LCD Display

OPERATIONAL PROCEDURES

Press ⏻ to turn the unit on or off. The instrument will perform a self-diagnostic test, during which an “ovEr” message may appear on the display. This is normal. After the warm up is complete the message will disappear. After the self-diagnostic test completes, the temperature displays in the lower right of the display, and the unit is ready for operation. Immerse the probe halfway into the sample solution. If possible, do not allow probe to touch any solid object in the solution. Allow no air bubbles around the probe. When the unit is not in use, turn it off to save battery life.

NOTE: During an oxygen measurement, the probe must be moved approximately 1/2 ft per second to overcome the inherent consumption of oxygen by the sensor. When using the 200-BOD lab probe, however, simply use the probes self-stirring feature.

MEASUREMENT MODES

This unit provides three distinct measurements:

1. **Temperature** - Current solution temperature continually displays.
2. **Dissolved Oxygen %** - Measurement of oxygen in percent saturation.
3. **Dissolved Oxygen ppm** - Measurement of oxygen in ppm (mg/L).

Carefully observe the units displayed at the far side of the LCD to determine the desired mode.

CALIBRATION SET-UP

Requirements

1. The approximate pressure (in millibars [mBar]) of the region to be measured for dissolved oxygen.
2. The approximate salinity of the water to be analyzed. Fresh water has an approximate salinity of zero. Seawater has an approximate salinity of 35 parts per thousand (ppt).
3. For highest accuracy, complete all calibrations at a temperature as close as possible to the sample temperature.

Procedure

1. For the field probe, place 5-6 drops of clean water (tap, distilled, or deionized) into the sponge inside the calibration bottle. Turn the bottle over and allow any excess water to drain out of the bottle. The wet sponge creates a 100% water-saturated air environment for the probe, which is ideal for calibration, transport, and storage of the Model DO200 probe. For calibration, the probe remains in a water saturated air atmosphere and is not submersed.

   For the lab probe, simply use the same bottle the probe is stored in with approximately 1 inch of water in the bottom. This creates a 100% water-saturated air environment for the probe, which is ideal for calibration and storage of the Model 200-BOD probe. For calibration, the probe remains in a water saturated air atmosphere and is not submersed.

2. For the field probe, slide it into the calibration bottle. Be sure the membrane does not touch the sponge.

3. Turn on the DO200 by pressing ⏻. Wait 10 to 15 minutes for the dissolved oxygen and temperature readings to stabilize.

4. Press **CAL**.

5. The LCD prompts for the local pressure in mBar. Use the Δ and ∇ keys to increase or decrease the pressure value respectively. See the section titled 'Conversions' to convert barometric pressure units to mBars.

6. When the proper pressure displays, press ↵ once to view the calibration value in the lower right of the display. Once the value in the main display stabilizes, press ↵ again to move to the salinity compensation procedure.

7. The display prompts for the approximate salinity of the water to be analyzed. Use the Δ and ∇ keys to increase or decrease the salinity compensation value to the value of your sample (between 0 to 40 parts per thousand [ppt]). When the correct salinity displays, press ↵.

8. The unit holds calibration even if it is powered off. However, it is recommended to check calibration with each use and recalibrate as necessary to prevent drift. Dissolved oxygen readings are only as good as the calibration.

PROBE MAINTENANCE

To clean the probes, use the YSI Probe Reconditioning kit (part number 5238) for the field probe. For the lab probe, use the sanding disc included in the 5908 membrane kit and follow the cleaning instructions outlined in the 200-BOD probe manual in regards to sanding. In addition to the Reconditioning Kit and sanding disc with your 5908 membrane kit, you may try a chemical cleaning. To clean the electrodes chemically, perform an ammonium hydroxide soak.

1. Remove membrane cap and rinse the probe with clean water (tap, distilled, or deionized).

2. Turn unit off, or disconnect probe.

3. Obtain either:
   - 14 % lab strength ammonium hydroxide and soak for 2-3 minutes
   - 3% household cleaning strength ammonia and soak overnight (8-12 hours)

4. Rinse ammonium hydroxide/ammonia from probe.

5. Use sandpaper (400 grit wet/dry, supplied with 5238 kit and with the 5908 membrane kit) to buff (wet sand) excess deposits from probe.

6. Install a new membrane cap.

Never use chemicals or abrasives not recommended by YSI.

TROUBLESHOOTING

Main Display reads:	Possible Solutions:
"ovEr" or "undr"	• Check membrane and electrolyte solution. • Clean anode and cathode. • Return product for service.
Secondary Display reads:	**Possible Solutions:**
"undr"	• Heat the sample to above –6.0 °C • Return product for service.
"ovEr"	• Cool sample to below 46.0 °C • Return product for service.

SPECIFICATIONS

Display	Range	Accuracy	Resolution
Dissolved O_2 (ppm or mg/L)	0 to 20.00 ppm (mg/L)	±2 % of the reading or ±2% air saturation, whichever is greater	0.01 mg/L
Dissolved O_2 % air-sat	0 to 200.0 %	±2% of the reading or ±0.2 ppm, whichever is greater.	0.1 %
Temperature °C	-6.0 to 46.0 °C 21 to 115 °F	±0.3 °C ±1 digit	0.1 °C

Pressure Compensation	600 to 1100 mBar (450 to 825 mmHg)
Salinity Compensation	From 0.0 to 40.0 ppt
ATC Probe	Thermistor, 10KΩ, at 25°C
Calibration Backup	Yes
Audio Feedback	Yes, on all keys
Power Source	One 9V battery
Operating Temperature	0 to 50°C (32 to 122 °F)
Instrument Casing	Splash-resistant IP 65
Weight (with battery)	350 grams (.75 lbs)
Dimensions (L x W x D)	186 mm x 70 mm x 37 mm (7.3 in x 2.8 in x 1.5 in)

CONVERSIONS

To Convert:	Multiply by:
Inches of Hg to mBar	33.864
Inches of Hg to mmHg	25.4
mmHg to mBar	1.333

RECOMMENDED SPARE PARTS LIST

PART #	DESCRIPTION
200-4	4 meter (approx. 13 feet) probe and cable assembly
200-10	10 meter (approx. 33 feet) probe and cable assembly
200-BOD	Self-stirring BOD lab probe and cable assembly with power supply
485	DO carrying case, soft sided
280	DO carrying case, hard sided
5908	Membrane kit, 1.25 mil PE (605306), six cap membranes and KCl solution
480	Instrument carrying case, soft

Item #605368 • Drawing #A605368
Revision E • March 2008
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