

## 16. Warranty

OAKTON warrants this meter to be free from significant deviations in material and workmanship for a period of one year from date of purchase. OAKTON warrants this probe to be free from significant deviations in material and workmanship for a period of six months from date of purchase. If repair or adjustment is necessary and has not been the result of abuse or misuse within the warranted time period, please return—freight prepaid—and correction will be made without charge. OAKTON alone will determine if the product problem is due to deviations or customer misuse.

Out-of-warranty products will be repaired on a charge basis.

## 17. Return of items

Authorization must be obtained from our Customer Service Department before returning items for any reason. When applying for authorization, please include data regarding the reason the items are to be returned. For your protection, items must be carefully packed to prevent damage in shipment and insured against possible damage or loss. We will not be responsible for damage resulting from careless or insufficient packing. A restocking charge will be made on all unauthorized returns.

NOTE: We reserve the right to make improvements in design, construction, and appearance of products without notice.

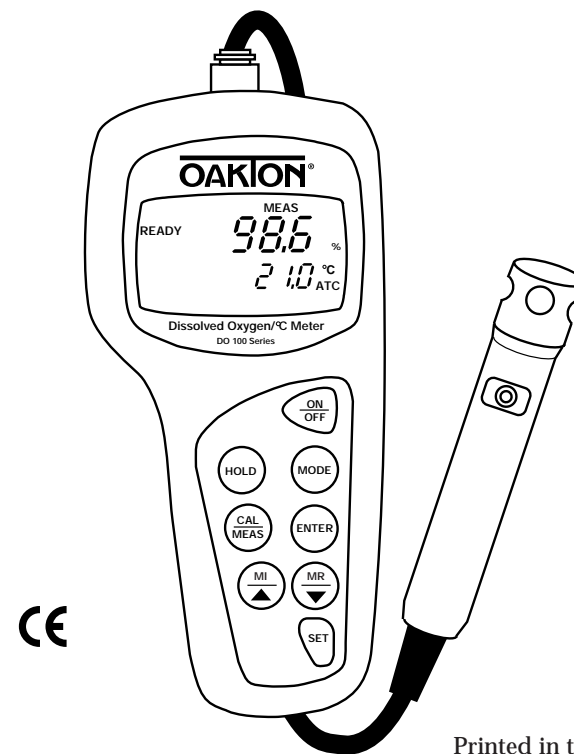
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**OAKTON®**

## OPERATING INSTRUCTIONS

OAKTON® 35640-series

# Portable DO 100 Meter



Printed in the U.S.A. 7/98

**OAKTON®**

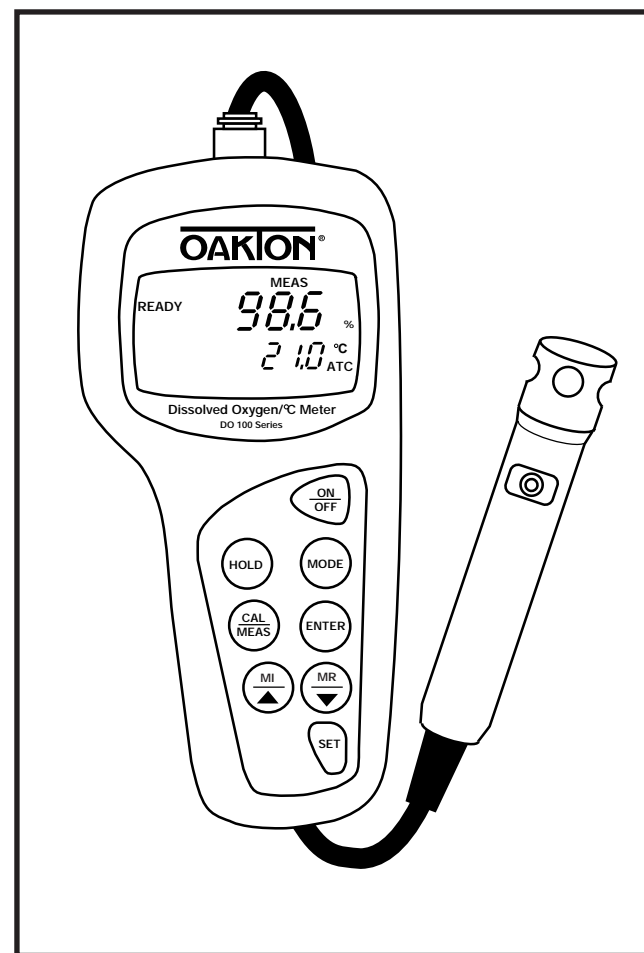
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## 1. Introduction

Thank you for selecting an OAKTON meter. The OAKTON DO 100 portable meter is a microprocessor-based instrument that measures dissolved oxygen and temperature. This meter features a memory function and an advanced set-up mode that lets you customize meter parameters, view probe offset and adjustment, and clear memory. All of these functions are accessible through the water-resistant membrane keypad.

Your meter includes a dissolved oxygen/temperature probe, electrolyte solution, and batteries. Please read this manual thoroughly before operating your meter.



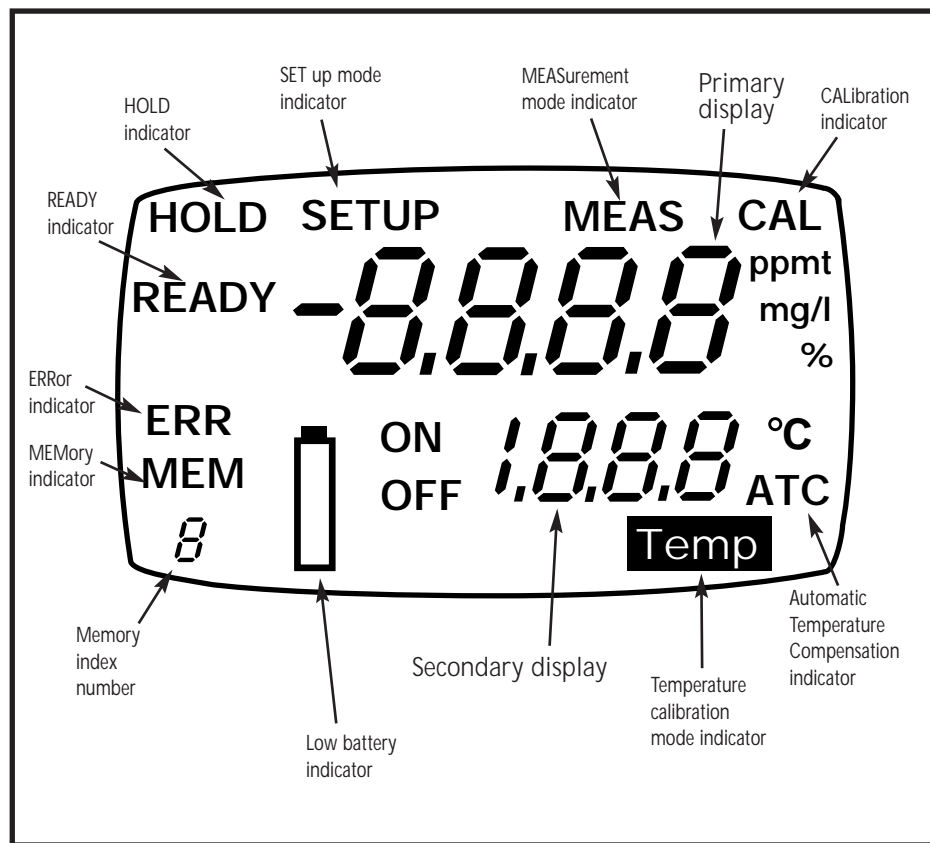
## 2. Display and Keypad Functions

### 2.1 Display

The LCD has a primary and secondary display.

- The primary display shows the measured dissolved oxygen reading.
- The secondary display shows the temperature of the reading in °C.

The display also shows error messages, keypad functions and program functions.



### 2.2 Keypad

The large membrane keypad makes the instrument easy to use. Each button, when pressed, has a corresponding graphic indicator on the LCD.

**ON/OFF** .....Powers and shuts off the meter.

**HOLD** .....Freezes the measured reading. To activate, press HOLD while in measurement mode. To release, press HOLD again.

**MODE** .....Selects the measurement units: mg/l (ppm)\* or %. Press MODE to toggle between mg/l (ppm)\* and % readings.

**CAL/MEAS**....Toggles user between DO Calibration mode and DO Measurement mode.

- If you press MODE while in mg/l (ppm) calibration mode, you access temperature calibration mode. See page 13 for instructions.

**ENTER**.....

- In Calibration mode, press to confirm calibration values.
- In Set up mode, press to confirm each setup option and move to the next option.

**MI/▲** .....

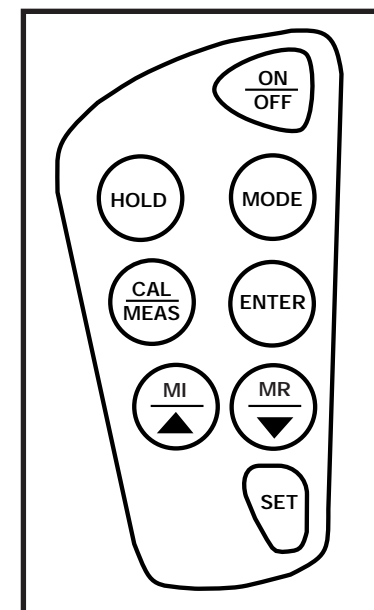
- In Measurement mode, enters a value into memory.
- In Calibration mode, scrolls up through calibration values.
- In Set Up mode, scrolls up through parameters in each setup option.

**MR/▼** .....

- In Measurement mode, recalls a value from memory in “last in, first out” order.
- In Calibration mode, scrolls down through calibration values.
- In Set Up mode, scrolls down through parameters in each setup option.

**SET** .....Enters Set Up mode. See page 18 for more information.

\*To select between mg/l and ppm units, see section P4.0 on page 23.

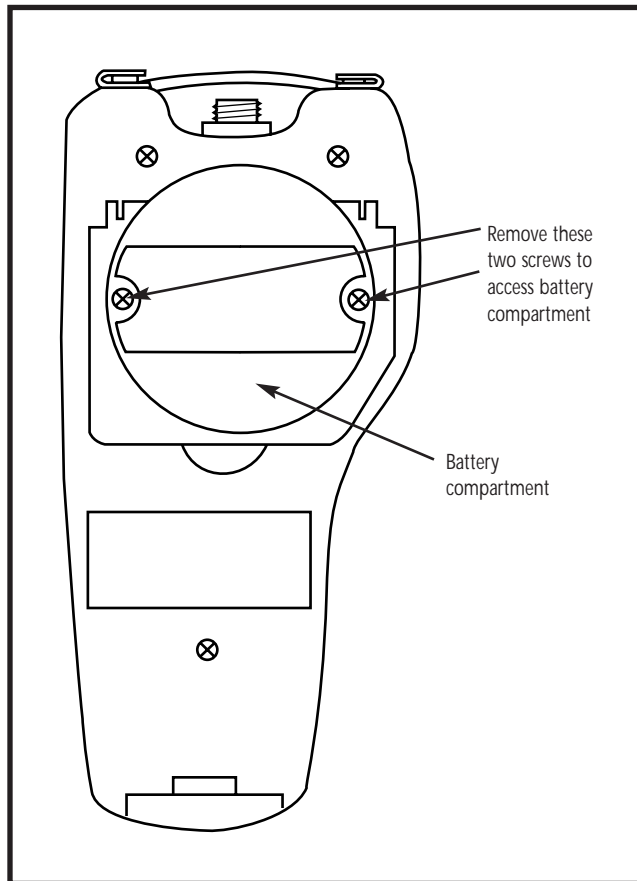


## 3. Preparation

### 3.1 Inserting the Batteries

Four AAA batteries are included with your meter.

1. Use a Phillips screwdriver to remove the two screws holding the battery cover. See figure below.
2. Lift meter stand to expose battery cover. Remove battery cover.
3. Insert batteries. Follow the diagram inside the cover for correct polarity.
4. Replace the battery cover into its original position using the two screws removed earlier.



### 3.2 Connecting the probe

The OAKTON DO 100 meter includes a dissolved oxygen/temperature probe. The probe cable has a notched 6-pin connector to attach the probe to the meter.

**NOTE:** Do not substitute other probes. For a replacement probe, see the "Accessories" section, page 33.

**NOTE:** Keep connector dry and clean. Do not touch connector with soiled hands.

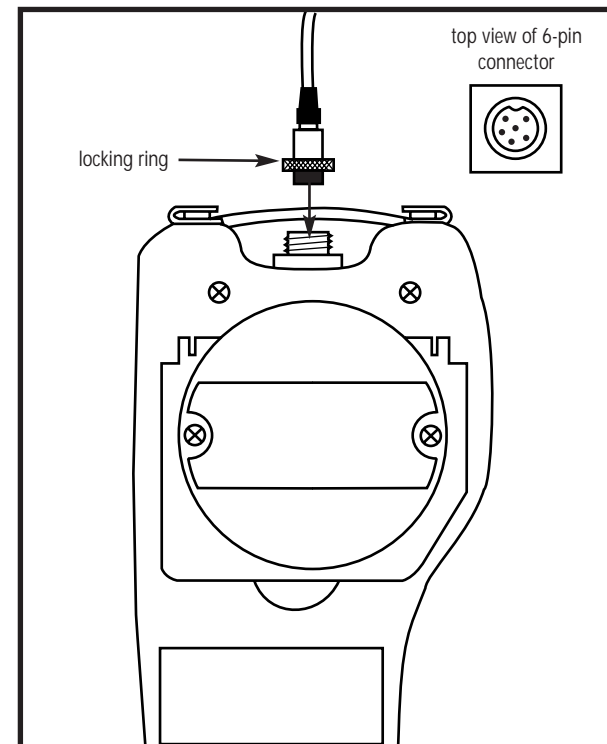
**To connect the probe:**

1. Line up the notch and 6 pins on the top of the meter with the holes in the probe connector. Push down and turn the locking ring to lock into place.

See figure below.

2. To remove probe, turn the locking ring on the probe connector. Pull probe away from the meter.

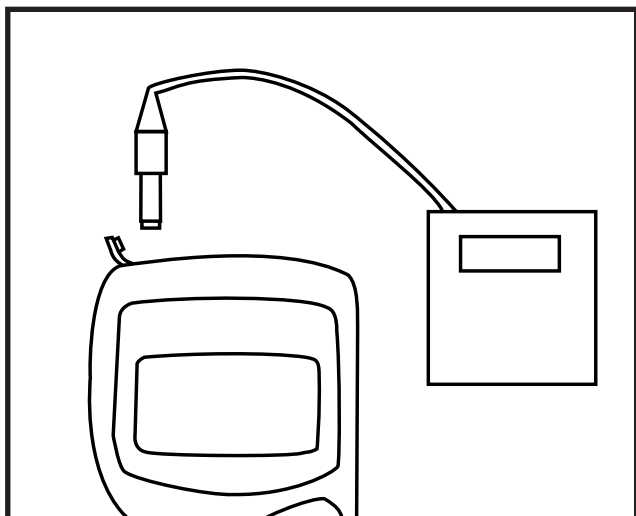
**CAUTION:** Do not pull on the probe cord or the probe wires might disconnect.



### 3.3 Connecting the AC Adapter

The optional AC adapter gives you the flexibility of operating from an AC power source in your work station or laboratory. The AC adapter is not included with your meter; order separately on page 33.

1. Insert the AC jack as shown in figure below.
2. **Switch off the meter before plugging the adapter into the power source.**  
This safety precaution protects the software in your meter.
3. Press the ON/OFF button to switch meter on.



## 4. Calibration

### 4.1 Preparing the meter for calibration

Before calibrating your meter, make sure to rinse the probe well with de-ionized water or rinse solution.

**NOTE:** Do not let membrane surface of the probe touch any other surface. The probe guard (the piece with holes fitted over the end of the probe) protects the membrane; make sure this is always attached to the probe while it is in use.

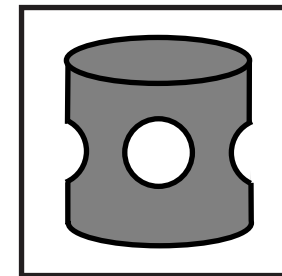
You can calibrate for dissolved oxygen in either % air saturation or mg/l (ppm).

**All new calibrations automatically override existing calibration data.**

#### Before calibration

Before starting calibration, make sure you are in the correct measurement mode. When you switch on the meter, the meter starts up in the units last used (either mg/l, ppm, or % air saturation). For example, if you shut the meter off in “mg/l” units, the meter will read “mg/l” units when you switch the meter on.

**NOTE:** Most users will calibrate to 100% air saturation even when working in mg/l. When calibrating the meter in mg/l mode, you can make fine adjustments, typically to a midrange value between 10 and 100%. If you are calibrating to a midrange value, you need to set the 100% saturation value first.



Probe guard

## 4.2 Dissolved Oxygen calibration in percent saturation

You can calibrate the DO 100 quickly and easily in air. The exact calibration value depends on barometric pressure. The meter is set to a factory default of 760 mm Hg, which results in a calibration value of 100% saturation in air.

**NOTE:** If the barometric pressure setting has been changed from 760 mm Hg, the calibration value in air will automatically adjust to a value other than 100%. The adjusted value will be correct for the new barometric pressure setting.

- See section P2.2 on page 21 to change pressure setting.
- See Appendix 2 on page 35 for a chart of adjusted % saturation values.

### To calibrate % saturation:

**1. Rinse the probe well with deionized rinse water or rinse solution.** For best accuracy, wrap the end of the probe in a damp cloth. Do not touch the membrane.

**2. Press the MODE key** to select the % saturation mode.

See figure **A**

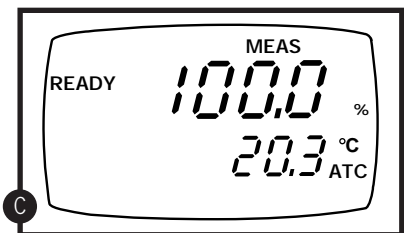
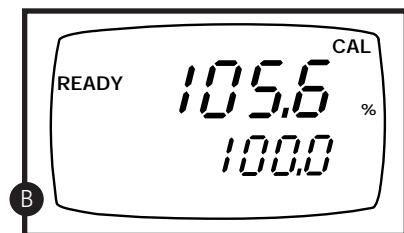
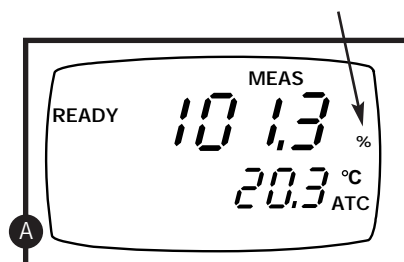
**3. Press the CAL key.** The CAL indicator will appear above the primary display. The primary display shows the current value of the measurement and the secondary display will show 100.0 (see NOTE above).

See figure **B**

**4. Hold the probe in the air.** Wait for the reading to stabilize. If the Ready indicator feature is enabled, it will appear when the reading is stable (see section P4.1 on page 24).

**5. Press the ENTER key.** The meter automatically calibrates to 100.0% air saturation and returns to Measurement mode.

See figure **C**



### Notes

Whenever an error occurs during calibration, the ERR indicator appears in the lower left hand corner of the display.

## 4.3 Dissolved Oxygen calibration in mg/l (ppm) mode

Calibrating the meter in % saturation mode will also calibrate the mg/l mode at the value in mg/l corresponding to 100% saturation. This should produce acceptable results in most applications.

The DO 100 also lets you make a calibration adjustment in mg/l (ppm) mode without affecting your % saturation calibration.

To select between mg/l and ppm units, see section P4.0 on page 23.

### To calibrate in mg/l (ppm) mode:

**1. Calibrate 100% saturation** per section 4.1.

**2. Rinse the probe well with deionized rinse water or rinse solution.** Wipe the outside of the probe carefully (do not touch the membrane).

**3. Dip the probe into a sample of known oxygen concentration.** Wait for the reading to stabilize. If the Ready indicator feature is enabled, it will appear when the reading is stable (see section P4.1 on page 24).

**NOTE:** The sample must continuously flow past the membrane for accurate readings. A stirrer can keep the solution agitated; order a magnetic stirrer on page 33.

**4. Press the MODE key** to select the mg/l (ppm) mode.

See figure **A**

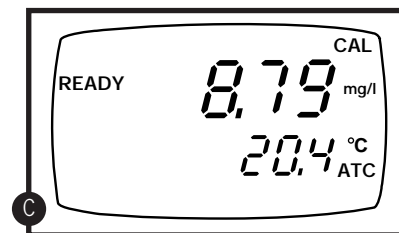
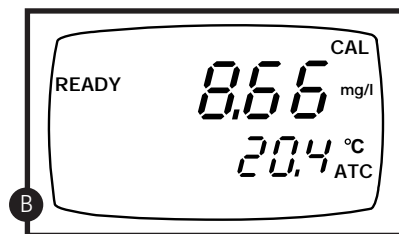
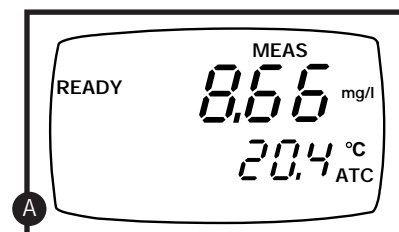
**5. Press the CAL key.** The CAL indicator will appear above the primary display. The primary display shows the current value of the measurement and the secondary display shows the temperature.

See figure **B**

**6. Press the ▲ and ▼ keys** to adjust the reading.

**7. Press the ENTER key.** The meter automatically calibrates to the value you entered and returns to Measurement mode.

See figure **C**



## Notes on mg/l (ppm) mode calibration

During mg/l (ppm) calibration, the meter adjusts to the barometric pressure value that is programmed into the meter. It also adjusts to the salinity value that is programmed into the meter.

You can change the barometric pressure value and salinity value in the mg/l (ppm) Set Up mode (see pages 20-21 for directions).

Whenever an error occurs during calibration, the ERR indicator appears in the lower left hand corner of the display.

## 4.4 Temperature Calibration

The built-in temperature sensor included in the probe is factory calibrated. Calibrate your sensor only if you suspect temperature errors that may have occurred over a long period of time or if you have a replacement probe.

1. Switch the meter on. Press MODE to select mg/l (ppm) Measurement mode.
2. Press the CAL/MEAS key to enter mg/l (ppm) calibration mode. The CAL indicator will appear above the primary display.

See figure A

3. While in mg/l (ppm) calibration mode, press the MODE key to enter temperature calibration mode. The primary display shows the temperature reading with zero offset and the secondary display shows you the factory default temperature value.

See figure B

4. Compare the primary display reading to a NIST-traceable thermometer or another thermometer known to be accurate.
5. Press the ▲ or ▼ keys to adjust the primary display reading to agree with your temperature standard.

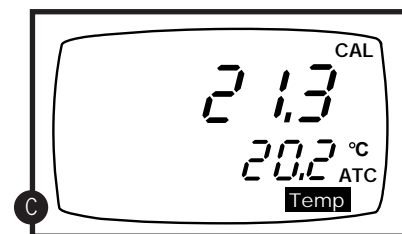
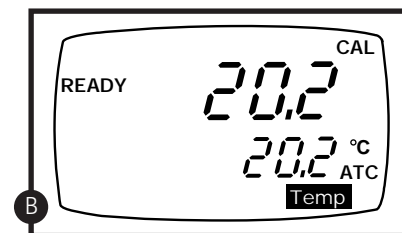
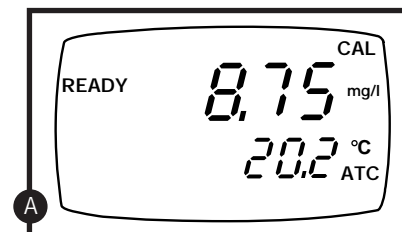
See figure C

6. Press the ENTER key to confirm temperature calibration and return to Measurement mode.

### Notes

To exit from Temperature Calibration mode without confirming calibration, DO NOT press ENTER in step 5. Press CAL/MEAS instead.

Temperature calibration is restricted to  $\pm 10^{\circ}\text{C}$  from the factory default value displayed during calibration (shown in the secondary display).





## 5. Measurement

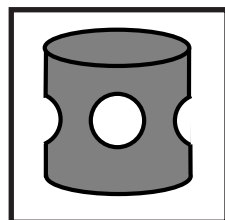
### 5.1 Taking DO readings

During measurement, the probe can be:

- fully immersed in the solution
- partially immersed in the solution

Do not allow the probe's membrane surface to touch anything! The probe guard (the piece with holes fitted over the end of the probe) protects the membrane; you should leave this piece attached to the probe at all times.

**IMPORTANT:** since the DO probe consumes oxygen from the sample, the sample must constantly flow past the membrane to achieve more accurate readings. You can use a stirrer to accomplish this (see "Accessories" on page 33 for a magnetic stirrer).

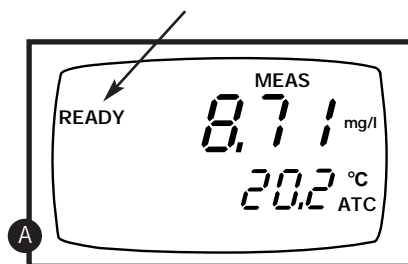


Probe guard

#### To take measurements:

1. Rinse the probe well with deionized rinse water or rinse solution.
2. Press the **MODE** key to select the appropriate measurement mode: mg/l (ppm)\* or %.
3. Dip the probe into the sample. Stir the probe gently to homogenize the sample. Make sure that the sample is continuously flowing past the membrane sensor.
4. Note the reading on the display. If the READY indicator is switched on, it will appear when the reading is stable.

See figure A



#### Notes

\*To select between mg/l and ppm units, see section P4.0 on page 23.

**Ready indicator.** If the READY indicator is enabled, the READY indicator will appear after three consecutive readings without change. Sample time is roughly 2 seconds. See page 24 for more information.

The **ATC indicator** should appear in the lower right hand corner of the display. If it does not, this indicates an error.

### 5.2 Taking pressure and salinity compensated DO readings

If necessary, you can adjust the pressure and salinity values of your measurements in the Set Up mode. The DO meter will automatically compensate for salinity and pressure based on the values entered in the setup functions. The meter is factory set at a factor of 0.0 salinity adjustment and 760 mm Hg (101.3 Pascals) pressure adjustment. See Appendix 2 on page 35 for a "Pressure vs Altitude" table.

#### Salinity adjustment

**NOTE:** this mode appears in ppm (mg/l) measurement mode only.

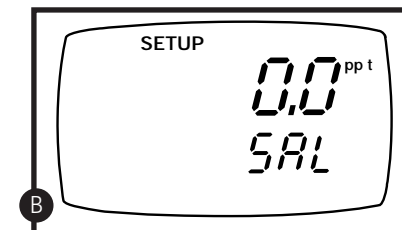
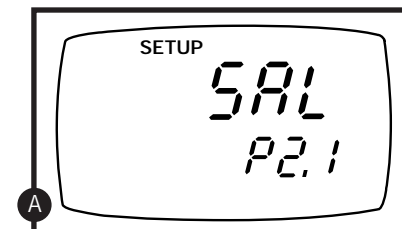
1. Press the **SET** key to enter Set Up mode.
2. Press the **HOLD** key until the lower display shows "P2.1".

See figure A

3. Press the **ENTER** key.
4. Use the **▲** and **▼** keys to enter the salinity of your solution in ppt. The upper display will show the value you have entered.

See figure B

5. Press **ENTER** to confirm value. The lower display will show "P2.2".
6. Press **CAL/MEAS** to return to Measurement mode, or continue with step 3 below to make a pressure adjustment.



#### Pressure adjustment

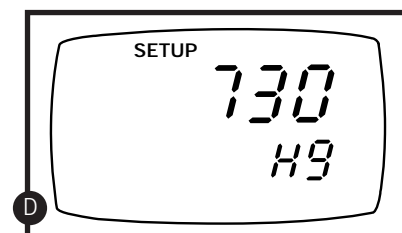
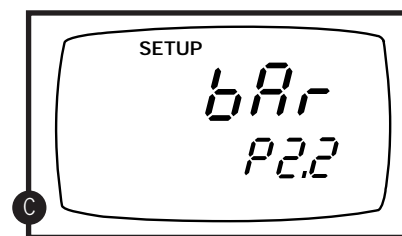
1. Press the **SET** key to enter Set Up mode.
2. Press the **HOLD** key until the lower display shows "P2.2".

See figure C

3. Press the **ENTER** key until the upper display shows a number and the lower display shows "Hg" or "PA".
4. Use the **▲** and **▼** keys to enter the barometric pressure. The upper display will show the value you have entered.

See figure D

5. Press **ENTER** to confirm pressure value.
6. Press the **CAL/MEAS** key to return to Measurement mode.





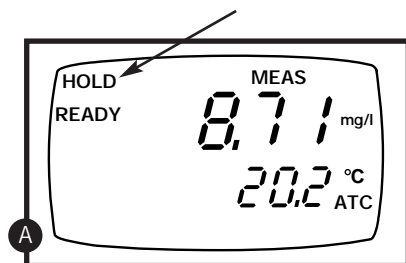
## 6. HOLD function

This feature lets you freeze the DO reading for a delayed observation. HOLD can be used any time when in Measurement mode.

1. To hold a measurement, **press the HOLD key** while in measurement mode. "HOLD" will appear on the display.

See Figure A

2. To release the held value, **press HOLD again**. Continue to take measurements.



## 7. Memory functions

The DO 100 meter stores 16 dissolved oxygen readings along with corresponding temperature readings in memory. However, the meter will only show memory from the current mode.

**Example:** if you store 6 values in mg/l mode, change to % saturation mode, and store 5 more readings, the mg/l readings will appear in memories 1-6 and the percent saturation readings will appear in memories 7-11. You will not see memories 1-6 while in % saturation mode.

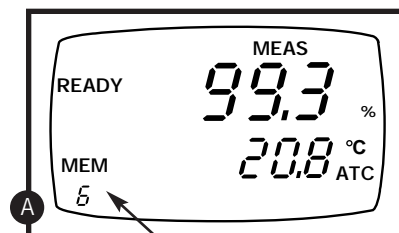
**Memory index number.** The meter stores a memory index number or letter along with each stored memory (numbers 0-9, then letters A-F). This lets you keep track of each stored memory. The memory index number appears in the lower left hand corner of the display.

If you store a 17th memory, it will copy over the 1st stored memory.

### To store a reading in memory:

1. **Press the MI key.** The "MEM" indicator and memory index number flash in the lower left hand corner of the display.

See figure A



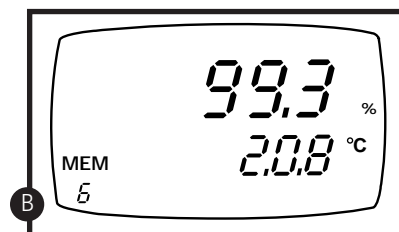
### To retrieve a reading from memory:

1. **Press the MR key.** The meter recalls memory in a "last in, first out" order. Note the memory index number in the lower left hand corner.

See figure B

2. **Continue to press the MR key** for each memory you want to recall. Once the meter has recalled all memory, it will return to the first memory and cycle through the stored readings again.

3. **Press the CAL/MEAS key** to return to Measurement mode.



## 8. Setup Functions

Setup mode lets you:

- customize meter parameters
- view probe offset and adjustment
- clear memory
- reset meter to factory defaults

**To access Set Up mode, press the Set key.**

**NOTE:** only parameters relevant to the current measurement mode will appear.

Press the HOLD key to bypass parameters you don't want. The display will show the next set up parameter.

After you have scrolled through and adjusted all set up parameters, the meter will automatically return to the measurement mode.

Press the CAL/MEAS key to exit the Set Up mode at any time.

### Set-Up Functions at a Glance

Program	Function	Options/settings	Default
P1.0	Memory Clear	ON / OFF	OFF
P2.0	Offset adjustment (% saturation mode only)	±10%	0
P2.1	Salinity adjustment (mg/l or ppm mode only)	0.0 to 50.0 ppt	0.0
P2.2	Pressure adjustment	555 to 808 mm Hg (74 to 108 Pascal)	760 mm Hg
P3.0	View probe slope	—	100%
P3.1	View offset	—	0
P3.2	View 0% mV value	—	0
P4.0	Units selection (mg/l or ppt) (mg/l or ppm mode only)	ppm, mg/l	ppm
P4.1	READY indicator	ON / OFF	ON
P4.2	Auto-off	ON / OFF	ON
P5.0	Reset	ON / OFF	OFF

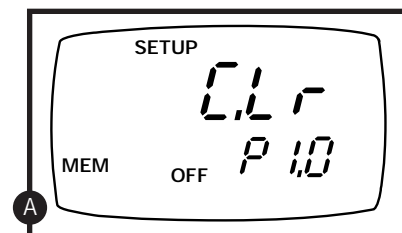
### P1.0: Memory clear mode

This mode lets you clear all values stored in memory.

1. In Memory Clear mode, the upper display shows CLr and the lower display shows P1.0.

See figure **A**

2. Press the ▲ and ▼ keys to select:
  - Memory clear on (clears memory) or
  - Memory clear off (retains memory).
3. When you have chosen the appropriate selection, **press the ENTER key** to confirm selection and move to the next step.



### P2.0: Offset adjustment mode

**NOTE:** this mode appears in % saturation measurement mode only.

Use the offset adjustment to act as an offset at values between 10 and 100%, or to calibrate the meter to a zero oxygen solution. You can adjust the offset ±10% of reading.

The mid range adjust (10 to 100%) is useful to match against end-user standards (i.e. a test kit value).

**NOTE:** Do not try to set the offset to values below 10% UNLESS you are using a zero oxygen solution. The meter accepts all values below 10% as a zero oxygen solution.

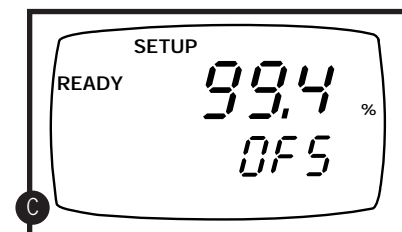
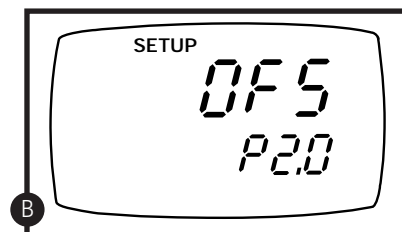
1. In offset adjustment mode, the upper display will read OFS and the lower display will read P2.0.

See figure **B**

2. Press the ENTER key. The upper display will show the adjusted offset value and the lower display will show OFS.

See figure **C**

3. Press the ▲ and ▼ keys to adjust the meter offset.
4. When the correct offset is selected, **press the ENTER key** to confirm selection and move to the next step.



## P2.1: Salinity adjustment mode

**NOTE:** *this mode appears in mg/l (ppm) measurement mode only.*

Salinity correction mode lets you correct for the variations in oxygen solubility due to salt concentration in the sample.

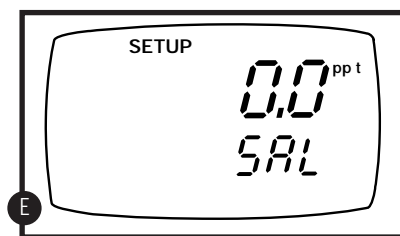
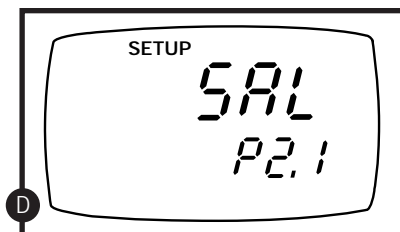
1. In salinity adjustment mode, the upper display shows SAL and the lower display shows P2.1

See figure **D**

2. **Press the ENTER key.** The upper display shows the salinity adjustment factor and the lower display shows SAL.

See figure **E**

3. **Press the ▲ and ▼ keys** to enter the correct salinity adjustment factor. The salinity adjustment factor range is 0.0 to 50.0 ppt.
4. **Press the ENTER key** to confirm selection and to move to the next step.



## P2.2: Pressure Adjustment mode

Barometric pressure is vital to correct dissolved oxygen measurements. You need to enter the correct barometric pressure of the area you are measuring. This mode lets you perform two functions:

- Select either mm Hg or Pascal barometric pressure units
- Adjust the barometric pressure

See Appendix 2 on page 35 for a "Pressure vs Altitude" table.

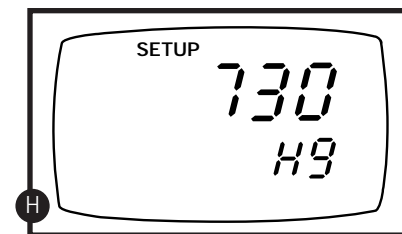
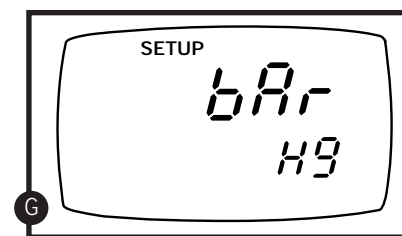
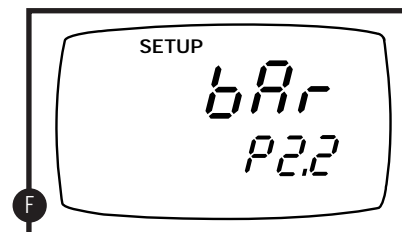
1. In barometric adjustment mode, the upper display shows bAr and the lower display shows P2.2.

See figure **F**

2. **Press the ENTER key.** The upper display shows bAr and the lower display shows either Hg or PA.

See figure **G**

3. **Press the ▲ and ▼ keys** to toggle between mm Hg and Pascal units.
  4. **Press the ENTER key** to confirm selection and move to the next screen.
  5. The upper display shows the barometric pressure in the units you selected and the lower display shows the units.
- See figure **H**
6. **Press the ▲ and ▼ keys** to adjust the barometric pressure. The pressure adjustment range is 555 to 808 mm Hg (74 to 108 Pascal).
  7. **Press the ENTER key** to confirm selection and move to the next step.



### P3.0: View probe slope mode

This mode lets you view the calibration slope of the probe. It is a “view only” mode. This mode displays slope from 0.7 to 1.3 % of slope (1.0 = 100%)

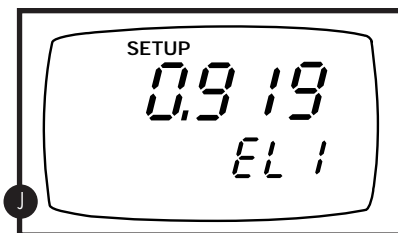
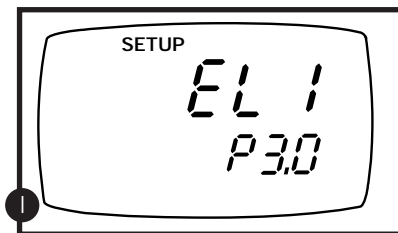
1. In View calibration slope mode, the upper display will show EL1 and the lower display will show P3.0.

See figure I

2. Press the ENTER key. The upper display shows the calibration slope and the lower display shows EL1.

See figure J

3. Press the ENTER key to move to the next step.



### P3.1: View offset mode

This mode lets you view the offset adjustment that you set in step P2.0. It is a “view only” mode. It displays the offset value in absolute percentage units.

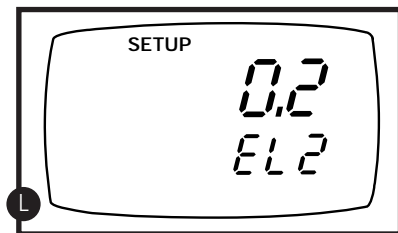
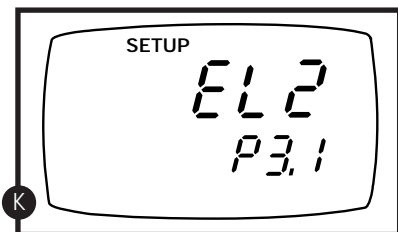
1. In View offset mode, the upper display will show EL2 and the lower display will show P3.1.

See figure K

2. Press the ENTER key. The upper display shows the offset adjustment and the lower display shows EL2.

See figure L

3. Press the ENTER key to move to the next step.



### P3.2: View 0% millivolts mode

This mode lets you view the sensor's millivolt output corresponding to 0% saturation. It is a “view only” mode.

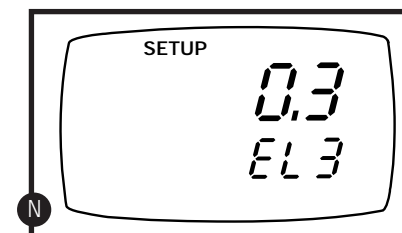
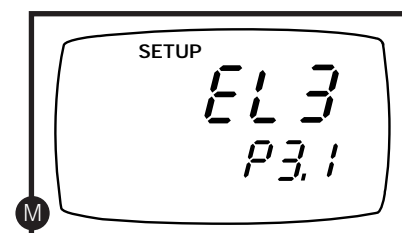
1. In View millivolts mode, the upper display will show EL3 and the lower display will show P3.2.

See figure M

2. Press the ENTER key. The upper display shows the millivolts corresponding to the 0% saturation reading and the lower display shows EL2.

See figure N

3. Press the ENTER key to move to the next step.



### P4.0: Units selection mode

**NOTE:** this mode appears in mg/l (ppm) measurement mode only.

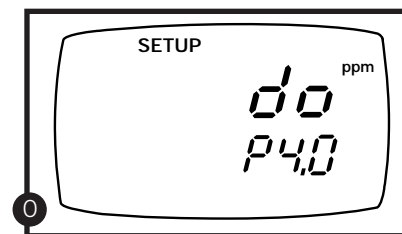
This mode lets you select between mg/l or ppm dissolved oxygen units.

1. In Units selection mode, the upper display will show “do” and the lower display will show P4.0.

See figure O

2. Press the ▲ and ▼ keys to toggle between mg/l units and ppm units.

3. Press the ENTER key to confirm selection and move to the next step.



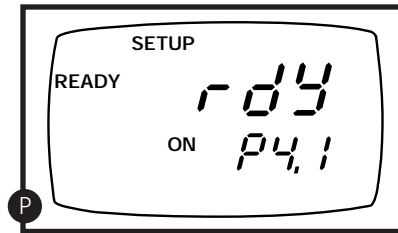
### P4.1: Ready indicator mode

If you enable the READY indicator, it displays when a reading is stable. If you disable the READY indicator, readings will update more quickly. This mode lets you switch the READY indicator on or off.

1. In READY indicator mode, the upper display will show rdY and the lower display will show P4.1.

See figure P

2. Press the ▲ and ▼ keys to switch the READY indicator on or off.
3. Press the ENTER key to confirm selection and to move to step P4.2.



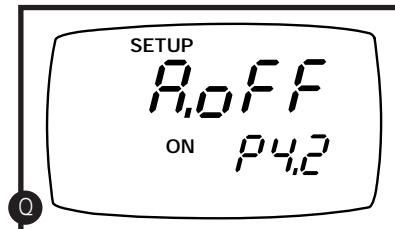
### P4.2: Automatic shutoff mode

This mode lets you switch the automatic shutoff function off or on. Automatic shutoff switches off the meter after 20 minutes of nonuse to conserve batteries.

1. In Automatic shutoff mode, the upper display will show A.oFF and the lower display will show P4.2.

See figure Q

2. Press the ▲ and ▼ keys to switch the Automatic shutoff function on or off.
3. Press the ENTER key to confirm selection and to move to step P5.0.



### P5.0: Meter reset mode

This mode lets you clear all set up functions and memory, and returns meter to factory defaults.

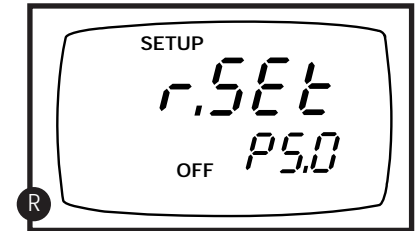
1. In Meter reset mode, the upper display will show r.SET and the lower display will show P5.0.

See figure R

2. Press the ▲ and ▼ keys to switch the meter reset function on or off.

**CAUTION:** selecting “on” and pressing ENTER clears all meter settings and calibration data!

3. Press the ENTER key to confirm selection and to return to Measurement mode.



### Notes

To scroll through Set up mode more quickly, press the HOLD key. This skips you from step to step without entering changes.

## 9. Probe care and maintenance

### 9.1 Probe care

The probe is a galvanic measuring element which produces an output proportional to the oxygen present in the medium in which it is placed. The galvanic probe design lets you take measurements immediately—without the typical 15 minute wait of other dissolved oxygen probes.

The probe consists of two parts:

- an upper part consisting of an anode, a cathode, and cable
- a lower part consisting of a membrane cap, membrane, and electrolyte solution.

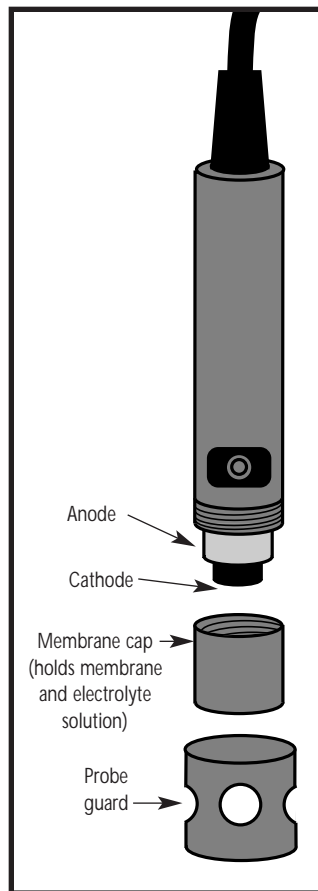
**Under typical operating conditions, the probe should last for several years.** Proper care and maintenance will help you receive the maximum probe life and ensure more accurate readings.

Since any deposits on the membrane surface act as a barrier to oxygen diffusing through the membrane, the membrane must be cleaned at regular intervals to assure maximum reliability.

After using the probe, rinse the probe in clean water and wipe it with a soft cloth or paper to avoid any hardening of deposits. If growth develops on the probe, use a disinfecting chemical to clean.

**NOTE:** Although the membrane is strong and not easily damaged, wipe it gently while cleaning it. If the membrane is damaged or torn, the probe will no longer function.

There are no special probe storage requirements.



### 9.2 Membrane replacement

Replacement of the membrane is required only when you cannot calibrate the probe, or if the membrane is damaged.

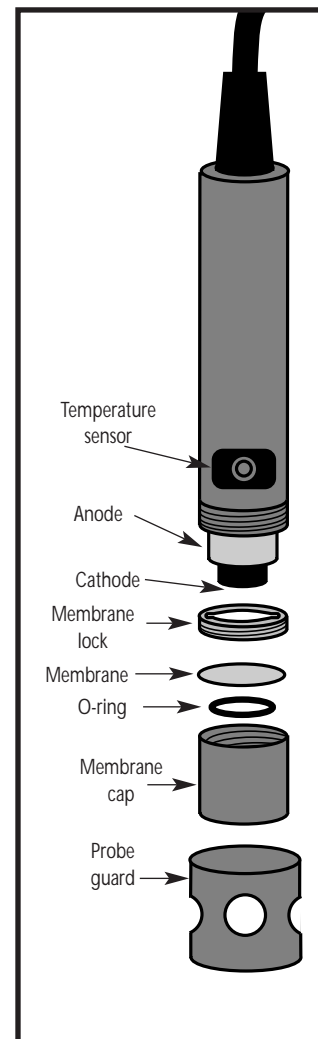
Typical membrane damages are punctures or wrinkles caused during measurements or cleaning.

To order replacement probe components or a replacement probe, see the “Accessories” section on page 33.

#### To replace the probe membrane:

1. Pull off the probe guard.
2. Unscrew the membrane cap from the probe.
3. Hold the probe under a water tap and brush away the white oxide on the cylindrical anode with a stiff plastic brush—do not use metal cleaning material.
4. If the cathode has any deposits, remove them with a light scouring powder. Do not polish the cathode.

**NOTE:** If you have purchased a replacement membrane module with preinstalled membrane, skip to step 12.



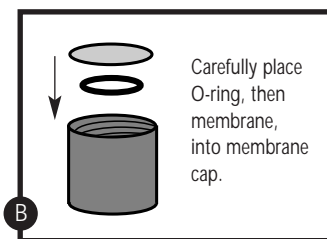
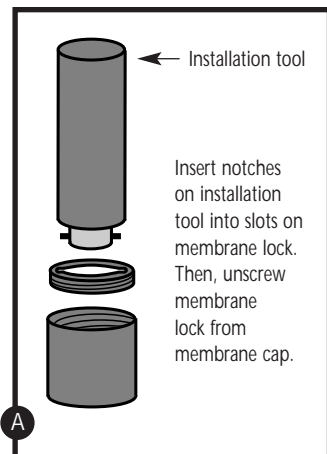
5. Using the installation tool, unscrew and remove the membrane lock from the membrane cap.

See figure **A**

6. Remove the membrane and O-ring. Discard both.
7. Rinse the membrane cap and membrane lock in tap water.
8. Install a new O-ring inside the membrane cap.
9. Install a new membrane. Make sure the membrane covers the O-ring all around its circumference.

See figure **B**

10. Using the installation tool, screw the membrane lock back into the cap. Tighten the lock firmly over the membrane and O-ring, but do not overtighten.
11. Inspect the membrane for wrinkles. If wrinkles exist, remove the membrane and repeat steps 8-11.
12. Fill the membrane cap with water and inspect the bottom for leaks. If water drops are leaking from the membrane, re-seat the membrane on the O-ring (repeat steps 8-11).
13. If the assembly is leak-free, empty the water and fill the membrane cap with electrolyte to the brim.
14. Screw the cap onto the probe. Excess electrolyte will drain out.
15. Replace probe guard.
16. Calibrate the probe (see section 4) after the % saturation readings have stabilized.



### 9.3 Electrolyte solution

The electrolyte solution in your probe's cap will periodically evaporate and need to be replaced. WD-35640-71 replacement electrolyte solution comes premixed and ready to use. However, the electrolyte mixture package WD-35640-70 has a longer shelf life in its unmixed form.

If you purchase the electrolyte mixture package to make your own replacement electrolyte solution, use the following steps to prepare the solution:

1. Fill a beaker to the 400 ml mark with deionized water.
2. Pour the entire contents of the 58.5 grams electrolyte package into the beaker.
3. Stir the solution until all of the chemical is dissolved—until the solution is clear.
4. Pour the solution into a clean container with a cap and keep sealed between use.



## 10. Troubleshooting

Problem	Cause	Solution
<b>Power on but no display</b>	a) Batteries not in place. b) Batteries not in correct polarity (+ and -). c) Weak batteries.	a) Check that batteries are in place and making good contact. b) Reinsert batteries with correct polarity. c) Replace batteries or attach optional AC adapter.
<b>Unstable readings</b>	a) Insufficient electrolyte in probe. b) Dirty probe. c) External noise pickup or induction caused by nearby electric motor. d) Broken probe.	a) Fill probe with reference electrolyte. See page 33. b) Clean the probe and recalibrate. d) Move or switch off interfering motor. e) Replace probe. See page 33.
<b>“OR” on upper display</b>	a) Probe is shorted. b) Probe is in an out-of range solution. c) Broken probe.	a) Test probe. Make sure probe is fully connected to meter. b) Use different solution. c) Replace probe. See page 33.
<b>Temperature reading erratic or lower display reads “OR”</b>	a) Temperature sensor is dirty. b) Temperature of solution is out of range.	a) Clean temperature sensor with isopropyl alcohol. b) Heat or cool solution.
<b>Slow response</b>	a) Dirty membrane.	a) Clean probe. See "Probe Care & Maintenance", p. 27.
<b>Not responding to key press</b>	a) HOLD mode in operation. b) Damaged key pad. c) Internal program error.	a) Cancel HOLD mode. b) Return to dealer. c) Reset all internal programs by reinserting batteries.

## 11. Error Messages

LCD Display	Indicates	Cause	Solution
<b>Err annunciator</b>	Unrecognized input from keypad	Wrong input in selected mode.	Release key. Select valid operations depending on mode.
<b>CAL &amp; Err annunciators blink</b>	Calibration error	Wrong value input at calibration. Dirty probe.	Check your input value, clean probe. See Calibration sections or Probe Maintenance section.
<b>Battery indicator blinks</b>	Low battery level	Need new batteries or battery connection is bad.	Clean battery contacts. Replace batteries with fresh ones, noting polarity.
<b>Err. 1 (in primary display)</b>	Memory write error	Hardware failure.	Turn meter on and off again. If message persists, return unit*.
<b>Err. 2 (in primary display)</b>	Checksum error	Batteries too weak. Hardware failure.	Press ENTER, then turn off meter. Change batteries. Recalibrate. Return*.
<b>Err. 3 (in primary display)</b>	A/D converter error	Faulty hardware.	Turn meter on and off again. If message persists, return unit*.
<b>Err. 4 (in primary display)</b>	Keypad error	One or more keys on the keypad are stuck.	Turn meter on and off again. If message persists, return unit*.

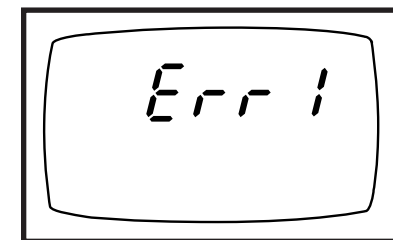
\* See “Warranty” and “Return of Items” on page 36

If an error message appears in the primary display (the upper row of larger digits), switching off the meter and switching it on again may eliminate the error message.

See figure at right.

If error persists, or the meter shows incorrect values, return the meter.

**For a complete diagram of the display, see page 4.**



ERR 1 in primary display

## 12. Specifications

Mode	mg/l (ppm)	% saturation	Temperature
Range	0.00 to 20.00 mg/l (ppm)	0.0 to 200.0%	0.0 to 50.0°C
Resolution	0.01 mg/l (ppm)	0.1%	0.1°C
Accuracy	±1.5% of full scale	±1.5% of full scale	±0.1°C

**Temperature compensation:** automatic from 0 to 50°C

**Salinity correction:**

Range: 0.0 to 50.0 ppt

Resolution: 0.1 ppt

Method: Manual key in and automatic correction

**Barometric pressure correction:**

Range: 555 to 808 mm Hg (74 to 108 Pascals)

Resolution: 1 mm Hg

Method: Manual key in and automatic correction

**Probe:** galvanic probe

**Memory:** stores and recalls 16 points

**Display:** dual LCD

**Operating temperature:** 0 to 50°C

**Power:** four 1.5 V AAA batteries (included) or AC adapter  
(optional; order separately on page 33)

**Battery life:** > 50 hours

**Dimensions:**

Meter: 7.5"L x 3.5"W x 1.75"H

(19.1 cm x 8.9 cm x 4.5 cm)

Boxed: 9.2"L x 8.5"W x 2.75"H

(23.3 cm x 21.6 cm x 7 cm)

Probe: 6"L x 1" dia (15.2 cm L x 2.5 cm dia)

**Shipping weight:** 1.4 lbs (0.64 kg)

## 13. Accessories

### Meters

**WD-35640-00 DO 100 dissolved oxygen/°C meter.**

Includes DO probe with 10-ft cable

**WD-35640-10 DO 100 dissolved oxygen/°C meter.**

Includes DO probe with 25-ft cable

**WD-35640-60 DO 100 dissolved oxygen kit.** Includes 500 ml of electrolyte solution, 5 replacement membranes, rinse bottle and foam-lined hard carrying case with space for your meter and probe

### Probes and probe replacement parts

**WD-35640-50 Replacement DO probe** with 10-ft cable

**WD-35640-52 Replacement DO probe** with 25-ft cable

**WD-35640-71 Replacement electrolyte solution,** 500 ml

**WD-35640-70 Electrolyte mixture, 58.5 g.** Mix your own electrolyte solution—makes 400 ml. Has longer shelf life in unmixed form.

**WD-35640-72 Replacement membrane module.** This item consists of a preassembled membrane, membrane lock, O-ring and cap. Simply screw replacement membrane module onto the probe you already have.

**WD-35640-74 Replacement membranes,** 5/pack

**WD-35640-75 Replacement membranes,** 25/pack

**WD-35640-79 Membrane installation tool.** Required for membrane installation. Not required if you purchase replacement membrane module 35640-72.

### Other accessories

**WD-00653-00 Zero oxygen solution**

**WD-35615-75 Soft belt-loop carrying case** with clear protective cover allows you to take measurements while meter is in the case. Case's top and side openings let probe connectors remain accessible.

**WD-35615-07 AC adapter,** 9 VDC to 110 VAC.

**WD-35615-08 AC adapter,** 9 VDC to 220 VAC.

**WD-04804-00 Battery-powered magnetic stirrer**

To order OAKTON accessories, contact your OAKTON distributor.

## 14. Appendix 1: Meter Theory

Dissolved oxygen levels in natural and waste waters depend on the physical, chemical, and biochemical activities in the water body.

The DO 100 meter uses a galvanic probe. It consists of a cell that contains electrolyte and that is enclosed by a selective membrane, and two metallic electrodes. The membrane is practically impermeable to water and ionic dissolved matter, but is permeable to oxygen and a few other gases.

The cathode consumes the oxygen passed through the membrane, and produces an electric current in the probe. This current is proportional to the partial pressure of oxygen in the sample.

Since the cathode consumes the oxygen in the sample, it is essential that the fluid must flow past the sensor to maintain accurate readings.

The solubility of oxygen in water varies with barometric pressure and temperature, and decreases as salinity increases. For the most accurate DO readings, you need to compensate for these factors. The DO 100 meter automatically compensates for temperature readings. It also allows you to enter a salinity correction factor and the barometric pressure to correct for this variability.

## 15. Appendix 2: Pressure vs. Altitude table

Barometric pressure affects DO readings, therefore the DO 100 meter lets you enter the correct barometric pressure at your altitude. If you do not have equipment that lets you measure the exact barometric pressure at your altitude, you can estimate it using the chart below.

If you change the barometric pressure setting from its factory setting (760 mm Hg), the % saturation calibration value in air will automatically adjust to a value other than 100% (see “corrected % saturation value” column below). The adjusted value is correct for the new barometric pressure setting.

See page 21 for information on how to adjust the barometric pressure.

### Pressure vs Altitude

Altitude (ft)	Pressure (mm Hg)	Corrected % saturation value
0 (Sea level)	760	100
500	746	98.1
1000	732	96.3
1500	720	94.7
2000	707	93.0
2500	694	91.3
3000	681	89.6
3500	668	87.8
4000	656	86.2
4500	644	84.6
5000	632	83.0
5500	621	81.6
6000	609	80.0