LaMotte

DISSOLVED OXYGEN

TRACER POCKETESTER™

See Short form Instruction on the back cover. Read the entire manual before use.

CODE 1761

TRACER

DISSOLVED OXYGEN • CODE 1761

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INTRODUCTION

Congratulations on your purchase of the Dissolved Oxygen/Temperature Tracer. Units of measure are % saturation, mg/L or ppm for dissolved oxygen and °C or °F for temperature. Advanced features include data hold, 25 point memory, auto shut off, automatic temperature compensation, and salinity/altitude compensation. Careful use and maintenance will provide years of reliable service.

SPECIFICATIONS

Display	Dual function 3 ½ digit LCD with Bar Graph Display size: 24 mm x 20 mm
Range	% Sat: 0 to 200.0% DO: 0 to 20.00 mg/L, 0 to 20.00 ppm Temp: 0 to 50°C, 32 to 122°F
Resolution:	% Sat: 0.1% DO: 0.01 mg/L, 0.01 ppm Temp: 0.1°C, 0.1°F (0 to 99°F), 1.0 °F (>100 °F)
Accuracy:	% Sat: ±2.0% full scale DO: ±2% full scale Temp: ±1.0°C, ±1.8°F
Operating Temperature Range	0 to 50°C (32 to 122°F)
Automatic Temperature Compensation	0 to 50°C (32 to 122°F)
Salinity Compensation	0 to 50 ppt in 1 ppt increments
Altitude Compensation	0 to 20,000 ft in 1000 ft increments
Sensor	Polarographic type
Membrane	Bonded membrane cap with threaded fitting
Data Storage	25 tagged (numbered) data sets with recall
Auto Power Off	After 10 minutes of no button presses (override available)
Battery Power	Four 303/357 button batteries
Low Battery Indicator	'BAT' appears on LCD
Dimensions	1.4 X 6.8 X 1.6 inches (36 X 173 X 41 mm)

CONTENTS

Dissolved Oxygen TRACER Kit	Code 1761
Includes:	
DO TRACER Body	
DO Bonded Membrane Cap Assemblies (2)	
Electrolyte Solution	Code D0600-EL
Sample cup	
Lanyard	

PARTS & ACCESSORIES

DO Replacement Sensor Kit (sensor module, membrane cap assembly, electrolyte solution)	Code1762
DO Membrane Cap Kit (6 membrane cap assemblies, electrolyte solution, Polishing Strips)	Code 1761M
DO Extension Cable, 1 meter (with probe guard and weight)	Code 1763
DO Extension Cable, 5 meters (with probe guard and weight)	Code 1764

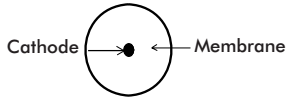
METER DESCRIPTION

Front Panel Description

1. Battery compartment cap
2. LCD display
3. MODE/HOLD button – change mode, hold data, store data
4. CAL/RECALL button – calibration, change temperature units, recall data
5. ON/OFF button
6. Electrode retaining collar
7. Dissolved oxygen sensor
8. Bonded membrane cap assembly
9. Membrane Cathode

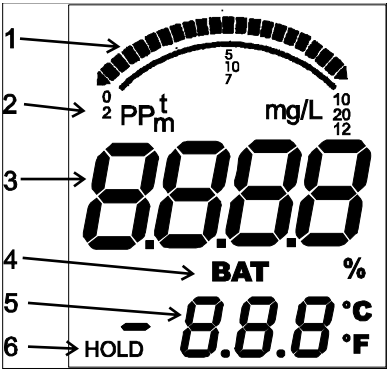
(*Note: The electrode storage cap is not shown.*)

Bottom View of Electrode



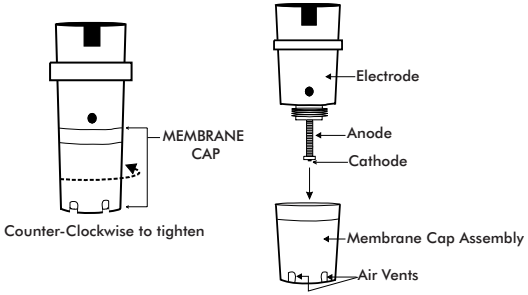
TRACER Display

1. Bar graph reading
2. Measurement units
3. Main display
4. Battery indicator
5. Temperature display
6. Reading hold indicator



Set Up

Membrane Cap Assembly Installation



Before the meter can be used, a membrane cap assembly must be installed.

1. Remove a membrane cap assembly from the red storage container packaged in the sample cup. Do not touch the membrane part of the assembly as skin oils with interfere with the oxygen permeability rate of the membrane.
2. Set the membrane cap assembly on a flat surface.
3. Fill the membrane cap assembly with Electrolyte Solution (DO600-EL) to the bottom of the threads on the inside of the cap. To remove air bubbles trapped in the threads of the assembly, hold the cap steady with one hand. Tap the side of the assembly sharply with a pen.
4. Remove the electrode storage cap from the meter exposing the electrode.
5. Do not move the membrane cap assembly. Dip the electrode into the assembly and remove it. Repeat this step several times. With each dip, progressively push the electrode deeper into the electrode solution in the assembly. This dipping technique will minimize the introduction of air bubbles into the electrolyte solution. Air bubbles can compromise dissolved oxygen measurements. Finally, carefully pick up the membrane cap and slowly screw it onto the electrode, in a counter-clockwise direction, until it is fully tightened.
6. While replacing the cap, excess electrolyte solution will leak out. This is normal and desirable since it will minimize air pockets in the solution. Air pockets can compromise dissolved oxygen measurements. If the electrolyte solution does not overflow, an insufficient amount was added. Repeat the filling process if air bubbles or pockets are visible when the probe is inverted.

NOTE: Air bubbles outside the cathode (6mm diameter in the center of the probe) will not interfere.

7. Rinse off the excess electrolyte solution on the outside of the assembly and electrode. Shake off excess water. The electrode membrane must be clean and dry or the calibration will be incorrect.
8. Moisten the sponge in the electrode storage cap with distilled or tap water. The sponge should be moist but not soaked. Place the electrode storage cap on the meter.

Disable Auto-Power Off

The auto-power off feature will automatically shut the meter off 10 minutes after the last button was pressed. Since the initial polarization of the electrode may take longer than 10 minutes, the auto-power off feature must be disabled.

1. Press the ON/OFF button to turn the meter on.
2. Wait for the SELF display screen to appear. This is the second screen to appear after turning on the meter. IMPORTANT: Review the instructions for the next 3 steps before proceeding. Step 3 must be followed immediately by Step 4.
3. Press CAL/RECALL button once.
4. Press MODE/HOLD and ON/OFF buttons simultaneously. Quickly release buttons. oFF will be displayed on the screen. Watch carefully. It will disappear quickly.
5. The auto power off feature will be restored automatically when the meter is turned off.

Polarization

It will take 10 minutes to 2 hours for the probe to polarize. When the meter is first turned on very high oxygen readings will be displayed. However, these readings will drop to a steady state as oxygen that was absorbed in the electrolyte solution, while the meter was turned off, is reduced. Once this steady state is reached, polarization is complete. The meter may have to be calibrated after polarization.

1. The meter must be in the % saturation mode. If the meter is not in the % saturation mode, press and hold the MODE/HOLD button to change to the next unit of measure in the sequence:
   - % saturation
   - dissolved oxygen, mg/L
   - dissolved oxygen, ppm

   Release the MODE/HOLD button when % saturation is displayed.

2. Observe the % saturation reading on the display. The electrode will be polarized when the reading has stopped drifting and is steady. If the % saturation value that is displayed is 101.7%, proceed to Testing/Measurement.
3. If the displayed % saturation is not 101.7% the meter must be calibrated.

Calibration

1. Press and hold the CAL/RECALL button for 2 seconds until CAL appears on the display. Release the button.
2. The display will blink until it is stable. 101.7 and "SA" will appear on the display. When the calibration is complete, "END" will appear on the display and the meter will return to the measurement mode.

   Note: "SA" will not appear if the calibration fails.
3. The % saturation value should be 101.7%. If not, allow the electrodeto fully polarize, repeat step 1 until the display reads 101.7%.
4. Proceed to Testing/Measurement

TESTING

Measurement

1. Press the ON/OFF button to turn the meter on. SELF and CAL will appear on the display as the TRACER self calibrates.
2. Select the desired units of measure by pressing and holding the MODE/HOLD button.
3. Place the meter in the sample to be measured. **Do not immerse the electrode above the electrode collar.**
4. Slowly use the meter to stir the sample or use a magnetic stirrer. The probe consumes oxygen at the measuring surface. Constant sample movement is required to obtain representative results.
5. The display will blink until a stable reading is achieved. Record the reading.

NOTE: For maximum accuracy, allow sufficient time for the temperature of the probe to reach the temperature of the sample before taking a reading. Allow the meter time to settle to the final measurement value before taking a reading. The greater the difference in temperature between the electrode and the sample, the longer it will take for the reading to stabilize. It may take 10 seconds to 5 minutes.

6. Press the ON/OFF button to turn the meter off. Rinse the electrode in distilled water. Replace the cap.

BASIC OPERATION

Powering the TRACER

Press the ON/OFF button to turn the TRACER on or off. If the batteries are weak, the BAT indicator will appear on the display. The auto power off feature will shut the TRACER off automatically 10 minutes after the last button push. The auto power off feature may be temporarily disabled for convenience or for extended polarization time during the initial set up of the meter or when a new membrane cap is installed. (see page 9)

Turn-On Diagnostics

When the meter is turned on, the "SELF" and "CAL" will be displayed and the meter will enter into a diagnostic mode. During this time the meter will recall the User Calibration data, perform self-diagnostics and initialize the circuitry.

Changing the Temperature Units

To change the displayed temperature units between °C or °F:

1. With the TRACER off, press and hold the CAL/RECALL button.
2. With the CAL/RECALL button pressed, momentarily press the ON/OFF button to turn the meter on and toggle between °C and °F temperature units.
3. Release the CAL/RECALL button when Self Cal is displayed.

Changing Salinity Compensation

1. Press the ON/OFF button to turn the meter on.
2. Press and release the CAL/RECALL button twice. "SAL " will be displayed.
3. Press the MODE/HOLD button. Each press of the MODE/HOLD button will increase the salinity compensation value by 1 ppt (part per thousand). The available salinity compensation range is 0 to 50 ppt.
4. Press and release the CAL/RECALL button to save the compensation setting and return to the measurement mode.

Changing the Altitude Compensation

1. Press the ON/OFF button to turn the meter on.
2. Press and release the CAL/RECALL button twice within 4 seconds. “SAL “ will be displayed.
3. Press and hold the CAL/RECALL button for 2 seconds to enter the Altitude Mode. “Ald” will be displayed.
4. The factory default value is sea level. Press the MODE/HOLD button. Each press of the MODE/HOLD button will increase the altitude compensation value by 1000 ft. The available altitude compensation range is 0 to 20,000 ft.
5. Press and release the CAL/RECALL button to save the compensation setting and return to the measurement mode.

Changing the Measurement Units

To change the mode:

1. Press the ON/OFF button to turn the meter on. The unit of measure selected when the meter was last turned off will remain on the display.
2. Press and hold the MODE/HOLD button for 2 seconds to scroll through the units of measure sequence:
   - % saturation
   - dissolved oxygen, mg/L
   - dissolved oxygen, ppm
3. Release the MODE/HOLD button when the desired mode is displayed. The meter will return to the measurement mode.

Note: The measurement units cannot be changed while the HOLD function is on. If “HOLD” is displayed in the lower left corner of the display, briefly press the MODE/HOLD button to turn the HOLD function off.

Data Hold

Press the MODE/HOLD button to freeze the current reading. The HOLD icon will appear. Press the MODE/HOLD key to return to normal operation.

Low Battery Indicator

The “BAT” indicator will be displayed when the battery voltage falls below the operating threshold. Refer to the Maintenance section for battery replacement information.

Storing Readings

1. After the reading is displayed press and hold the MODE/HOLD button to store the current reading. The meter will enter the HOLD mode and HOLD will be displayed. The storage location number will be displayed on the lower display followed by the reading being stored.
2. Press the MODE/HOLD button to exit the HOLD mode and return to normal operation.
3. To store the next reading, press the MODE/HOLD button when the reading is displayed.
4. If an attempt is made to store more than 25 readings, the stored readings will be overwritten starting with the first reading.

Recalling Stored Readings

1. Press the CAL/RECALL button once and then press the MODE/HOLD button within 4 seconds. The last stored data point will be displayed (1 through 25).
2. To advance to the next most recently stored reading, press the MODE/HOLD button.
3. After the last stored data point is displayed, press the MODE/HOLD button to return to the beginning of the list.
4. To stop the data retrieval process and return to the normal measurement mode, press the CAL/RECALL button at any time.

Note: Stored readings can not be recalled if the HOLD function is on. If the HOLD symbol is displayed, exit the HOLD function by pressing the MODE/HOLD button. If there is no data stored in the memory, “END” will be displayed briefly and the meter will return to the previous mode.

Clearing Stored Memory

Turn the TRACER on. Press and hold the ON/OFF button for 4 seconds. The display will briefly display “clr” when the memory has been cleared.

Disable Auto Power Off

The auto-power off feature will automatically shut the meter off 10 minutes after the last button was pressed. To disable the auto-off feature:

1. Press the ON/OFF button to turn the meter on.
2. Wait for the SELF display screen to appear. This is the second screen to appear after turning on the meter. IMPORTANT: Review the instructions for the next 3 steps before proceeding. Step 3 must be followed immediately by Step 4.
3. Press CAL/RECALL button once.
4. Press MODE/HOLD and ON/OFF buttons simultaneously. Quickly release buttons.
5. OFF will be displayed on the screen. Watch carefully. It will disappear quickly.
6. To re-enable the auto-off feature, repeat steps 3 and 4. ON will be briefly displayed on the screen.
7. The auto power off feature will be restored automatically when the meter is turned off. Auto-off is the default function when the meter is turned on.

Calibration

Calibration should be performed daily. The electrode membrane must be clean and dry or the calibration will be incorrect. This is a water saturated air calibration.

1. Press the ON/OFF button to turn the meter on.
2. The meter must be in the % saturation mode. If the meter is not in the % saturation mode, press and hold the MODE/HOLD button to change to the next unit of measure in the sequence:
   - % saturation
   - dissolved oxygen, mg/L
   - dissolved oxygen, ppm

   Release the MODE/HOLD button when % saturation is displayed.
3. Observe the % saturation reading on the display. Wait until the reading is stable.
4. The electrode membrane must be clean and dry or the calibration will be incorrect. Moisten the sponge in the electrode storage cap with distilled or tap water. The sponge should be moist but not soaked. Place the electrode storage cap on the meter.
5. When the reading is stable. Press and hold the CAL/RECALL button for 2 seconds until CAL appears on the display. Release the button.

6. The display will blink until it is stable. 101.7% and "SA" will appear on the display. When the calibration is complete, "END" will appear on the display and the meter will return to the measurement mode.

   Note: "SA" will not appear if the calibration fails.
7. The % saturation value that is displayed should be 101.7%. If not, allow electrode to fully polarize, repeat step 5 until the display reads 101.7%.

Zero Oxygen Calibration

The optional zero oxygen calibration will improve the accuracy of measuring samples with very low or very high dissolved oxygen levels.

1. Place the electrode in a zero oxygen calibration standard, such as 5% sodium sulfite. Slowly stir the standard with the meter or use a stirring plate.
2. Wait for the reading to stabilize. This may take a while, depending on the electrode history.
3. Press the CAL/RECALL button for 2 seconds until CAL is displayed.
4. 0.00 and "SA" will appear on the display. When the calibration is complete, "END" will appear on the display and the meter will return to the measurement mode.

   Note: "SA" will not appear if the calibration fails.

   Note: Sodium sulfite can become deposited on the electrode and on the coined surface of the electrode-retaining collar. If the sodium sulfite deposits are not completely removed, it will cause negative error in future DO measurements.

   The meter can also be calibrated with the probe removed. (Zero current).
5. The % saturation value that is displayed should be 0.00%. If not, allow the electrode to fully polarize, repeat step 3 until the display reads 0.00%.

OPERATIONAL MATRIX

Function/Resulting Action	Power	Mode	Button Press Sequence
On/Off	On or Off	Any	Momentary press of ON/OFF button
Water Saturated Air Calibration	On	Any	Place electrode in calibration cap. Press and hold CAL/RECALL button for 2 seconds
Zero Calibration	On	Any	Place electrode in zero solution. Wait for stable reading. Press and hold CAL/RECALL button for 2 seconds.
Store Reading	On	Any	Momentary press of MODE/HOLD button
Hold Release	On	Hold	Momentary press of MODE/HOLD button
Enter Memory Retrieval	On	Any	Momentary press of CAL/RECALL button followed by a momentary press of MODE/HOLD button within 4 seconds.
Scroll Stored Readings	On	Memory Recall	Momentary press of MODE/HOLD button. Displays last in first out.
Exit Memory Retrieval	On	Memory Recall	Momentary press of MODE/RECALL button
Clear Stored Memory	On	Any Memory Mode	Press and hold the ON/OFF button for 4 seconds. “clr” is displayed.
Change Measurement Mode	On	Any	Press and hold MODE/HOLD button for at least 2 seconds. Modes will scroll by until button is released.

Function/Resulting Action	Power	Mode	Button Press Sequence
Enter Salinity Compensation	On	Any	Press and release CAL/RECALL button twice. Displays SAL
Change Salinity Compensation	On	SAL	Momentary press of MODE/HOLD button. Each press increases by 1 ppt from 0 to 50 ppt.
Exit Salinity Compensation	On	SAL	Press and release CAL/RECALL button for 2 seconds to enter Altitude Compensation. Or press and release the CAL/RECALL button one more time to enter the measurement mode.
Enter Altitude Compensation	On	Any or SAL	Press CAL/Recall button twice to enter SAL. Press CAL/RECALLfor 2 seconds to enter Altitude Compensation mode. Displays Ald
Change Altitude Compensation	On	Ald	Momentary press of MODE/HOLD button Each press increases by 1000 ft from 0 to 20,000 ft.
Exit Altitude Compensation	On	Ald	Press CAL/RECALL button to exit and save changes.
Change Temperature Units	On	Off	Press and hold CAL/RECALL button then momentarily press ON/OFF button. Release CAL/RECALL button when SELF CAL is displayed.

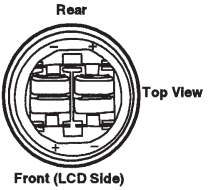
Function/Resulting Action	Power	Mode	Button Press Sequence
Override Auto Power Off	On	Any	Momentarily press CAL/RECALL button then simultaneously press and hold ON/OFF and MODE/HOLD buttons for 2 seconds.
Defeat Override	On	Off	Simultaneously press ON/OFF, CAL/RECALL, and MODE/HOLD momentarily. dFLt will be displayed.

MAINTENANCE

Battery Replacement

For maximum battery life, use battery style such as Energizer™ or Duracell™ number 303/357.

1. Twist off the battery compartment cap.
2. Replace the four batteries. Observe polarity.
3. Replace battery compartment cap.
   NOTE: If the batteries are removed, any stored readings and calibrations will be lost and the meter will have to be recalibrated.



Replacing the Electrode

1. Turn the TRACER off. Unscrew and remove the electrode collar. Turn collar clockwise.
2. Gently rock the electrode side to side, while pulling it away from the meter, until it disconnects from the electrode socket.
3. To attach an electrode, align the slots and carefully plug the electrode into the meter socket.
4. Firmly tighten the electrode collar to create a seal with the rubber gasket between the electrode and the meter. Do not over tighten.

Storage

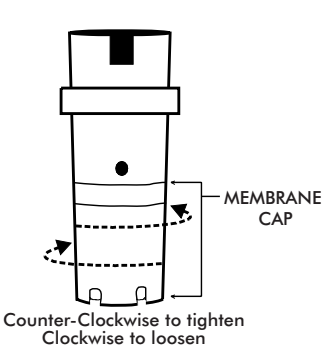
Store the TRACER with the Electrode Storage Cap in place. The sponge in the cap should always be moist without excess liquid.

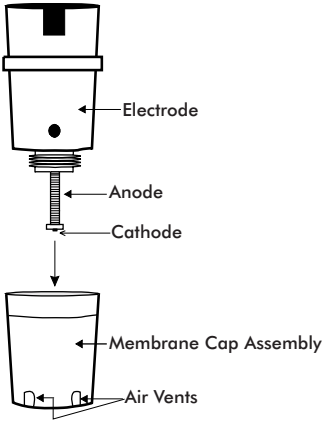
Electrode Cleaning Recommendations

Contaminant	Cleaning Solution	Procedure
Salt build-up	Deionized water	Soak in 20% or weaker Acetic Acid solution for 1 minute. Rinse thoroughly with DI water.
Oil	Warm water and household detergent	Clean with mild detergent solution. Rinse thoroughly with DI water.

Membrane Cap Assembly Replacement

1. The electrode should remain attached to the meter.
2. Carefully unscrew the membrane cap assembly, in a clockwise direction, and remove it from the electrode.
3. Discard the used membrane cap assembly. It cannot be reused.
4. Rinse the electrode with deionized water or tap water to remove electrolyte solution.





5. If required, moisten a Polishing Strip. Use the cloth to clean, polish, shine and/or remove scratches from the cathode. Do not over polish the sensitive gold cathode. The polishing step is not necessary when assembling a new meter.
6. Remove a new membrane cap assembly from the red storage container. Do not touch the membrane part of the assembly as skin oils with interfere with the oxygen permeability rate of the membrane.
7. Set the membrane cap assembly on a flat surface.
8. Fill the membrane cap assembly with Electrolyte Solution (DO600-EL) to the bottom of the threads on the inside of the cap. To remove air bubbles trapped in the threads of the assembly, hold the cap steady with one hand. Tap the side of the assembly sharply with a pen.
9. Do not move the membrane cap assembly. Dip the electrode into the assembly and remove it. Repeat this step several times. With each dip, progressively push the electrode deeper into the electrode solution in the assembly. This dipping technique will minimize the introduction of air bubbles into the electrolyte solution. Air bubbles can compromise dissolved oxygen measurements. Finally, carefully pick up the membrane cap and slowly screw it onto the electrode, in a counter-clockwise direction, until it is fully tightened.
10. While replacing the cap, excess electrolyte solution will leak out. This is normal and desirable since it will minimize air pockets in the solution. Air pockets can compromise dissolved oxygen measurements. If the electrolyte solution does not overflow, an insufficient amount was added. Repeat the filling process if air bubbles or pockets are visible when the probe is inverted.

    NOTE: Air bubbles outside the cathode (6mm diameter in the center of the probe) will not interfere.
11. Rinse off the excess electrolyte solution on the outside of the assembly and electrode.

TROUBLESHOOTING

Problem	Cause	Action
Power on but no display	Batteries Batteries Batteries	Insert batteries or remove tab Verify correct polarity Replace low or dead batteries
"BAT" message	Batteries	Replace weak batteries
Unstable readings	Insufficientor depleted electrolyte	Replace electrolyte, and membrane cap assembly if needed
Readings drift down	Insufficientstirring	Stir sample with meter or use stirring plate
Slow response	Dirty or damaged membrane	Replace electrolyte and membrane cap assembly
Electrode can not be calibrated	Depleted electrolyte Dirty or damaged membrane	Replace electrolyte Replace electrolyte and membrane cap
Electrode can not be calibrated after replacing electrolyte and membrane cap	Dirty probe. Cathode is not a shiny gold color.	Clean cathode with cleaning cloth or cleaning paper
Sample reading is frozen	Meter is in HOLD mode Meter is locked	Release HOLD Remove or replace batteries and restart. Stored readings will be lost

WARRANTY

Lamotte Company warrants this instrument to be free of defects in parts and workmanship for one year from date of shipment (a six month limited warranty applies on electrodes and cables). If it should become necessary to return the instrument for service during or beyond the warranty period, contact our Technical Service Department at (800) 344-3100 for a return authorization or visit our website at www.lamotte.com. The sender is responsible for shipping charges, freight, insurance and proper packaging to prevent damage in transit. This warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification. LaMotte Company specifically disclaims any implied warranties or merchantability or fitness for a specific purpose and will not be liable for any direct, indirect, incidental or consequential damages. LaMotte Company's total liability is limited to repair or replacement of the product. The warranty set forth above is inclusive and no other warranty, whether written or oral, is expressed or implied.

Short Form Instructions

Read entire manual before first use.
Follow Set Up instruction before first use.
Calibrate meter daily.

Measurement Procedure

1. Press ON/OFF button.
2. Place meter in sample. Do not submerse the electrode above the electrode collar.
3. Stir sample with meter until display stabilizes.
4. Record result.
5. Turn meter off. Rinse electrode with deionized water. Replace cap.

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