12. 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 warrantied 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.

13. 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.
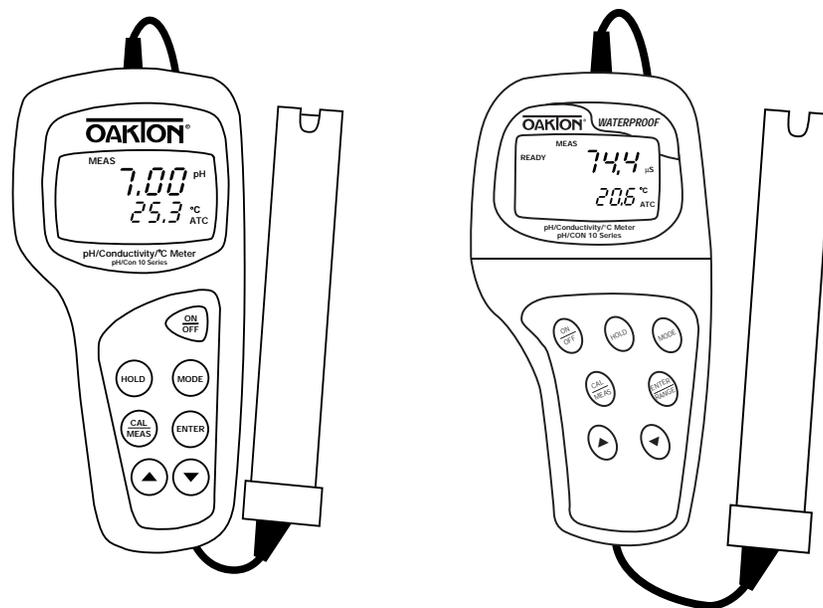
OAKTON®

OAKTON® 35630-00, 35630-02

Portable pH/CON 10 and Waterproof pH/CON 10 Meter

OAKTON®

Table of Contents

1. Introduction

Thank you for selecting an OAKTON meter. The OAKTON pH/CON 10 series meters are microprocessor-based instruments that measures pH, conductivity, and temperature with just one probe. This meters have many user-friendly features—all of which are completely accessible through the water-resistant membrane keypad.

Your meter includes a combination pH electrode/conductivity/temperature probe with 10-ft submersible cable; batteries.

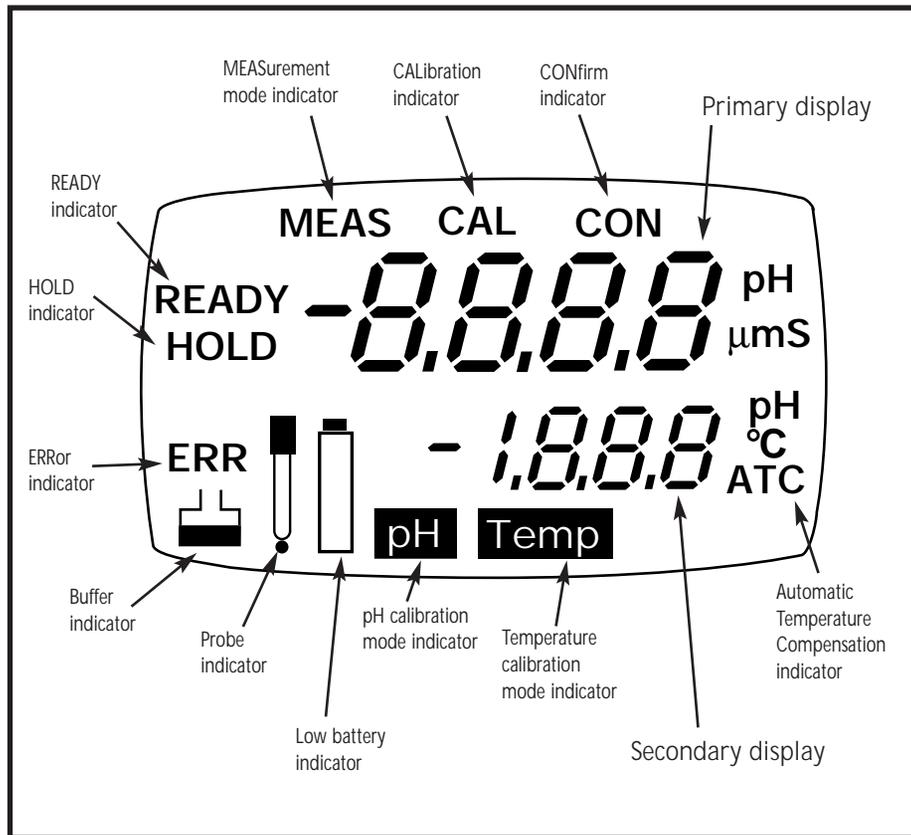Please read this manual thoroughly before operating your meter.
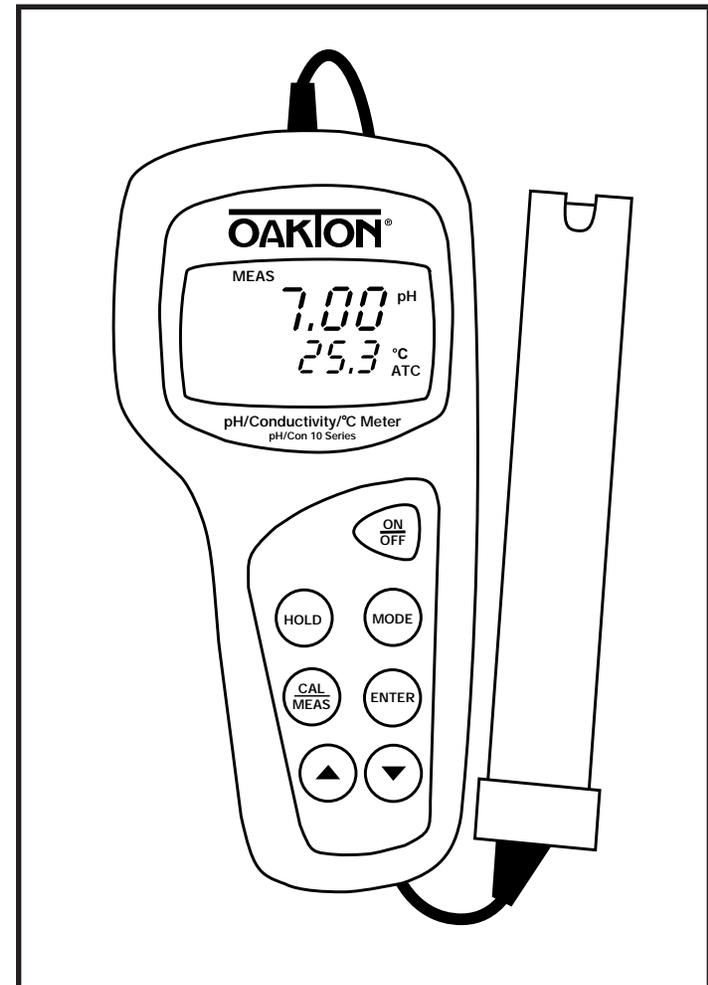
2. Display and Keypad Functions

2.1 Display

The LCD has a primary and secondary display.

- The primary display shows the measured pH or Conductivity (µS or mS) reading.
- The secondary display shows the temperature of the reading in °C.

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

MEASurement mode indicator

CALibration indicator

CONfirm indicator

Primary display

READY indicator

HOLD indicator

ERRor indicator

Buffer indicator

Probe indicator

Low battery indicator

pH calibration mode indicator

Temperature calibration mode indicator

Automatic Temperature Compensation indicator

Secondary display

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 parameter (conductivity or pH). Press MODE to toggle between pH and Conductivity mode.

**CAL/MEAS**......Toggles user between Calibration and Measurement mode.
- In Conductivity Measurement mode, press CAL/MEAS to enter Conductivity Calibration mode.
- In pH Measurement mode, press CAL/MEAS to enter pH Calibration mode.
 NOTE: Temperature calibration is accessible from pH Calibration mode; see pages 14-15 for instructions.

ENTER ....Press to confirm your calibration values in Calibration mode.

▲/▼ ....Scrolls values up and down in Calibration mode.
- In pH mode, ▲/▼ scrolls through the auto buffer values 4.00, 7.00 and 10.00.
- In Conductivity and Temperature Calibration mode, ▲/▼ lets you increase or decrease the value incrementally.
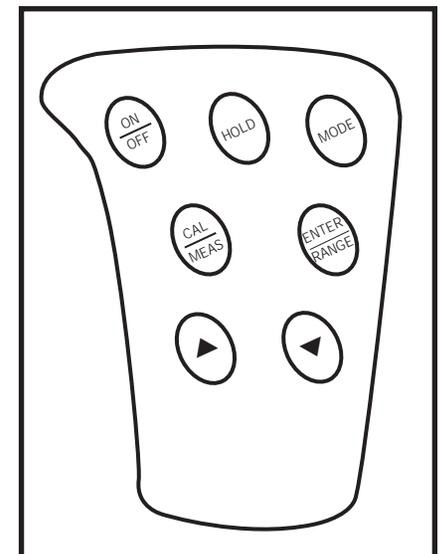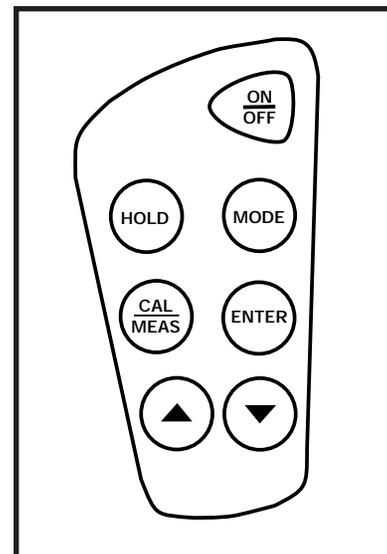
3. Preparation

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.

Remove these two screws to access battery compartment

Battery compartment
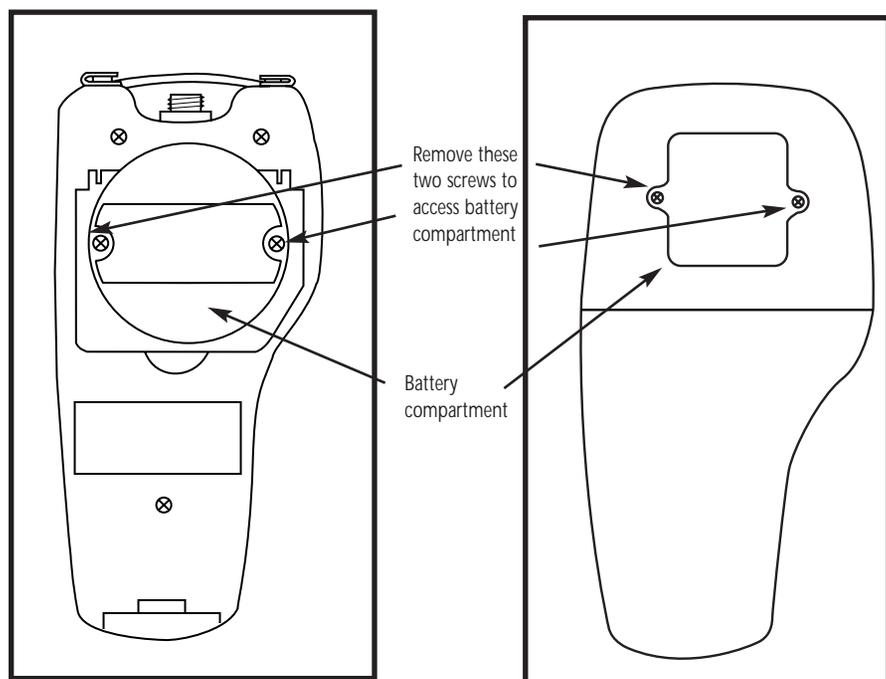
3.2 Connecting the probe

The OAKTON pH/Con meter uses a specialty combination pH/conductivity/temperature probe. The probe cable has a notched 6-pin connector to attach the probe to the meter.

NOTE: Do not substitute other probes or electrodes. For a replacement probe, see the "Accessories" section, page 22.

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

To connect the pH/Conductivity probe:

1. Line up the notch and 6 pins on the meter with the holes in the connector located on 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.

locking ring

top view of 6-pin connector
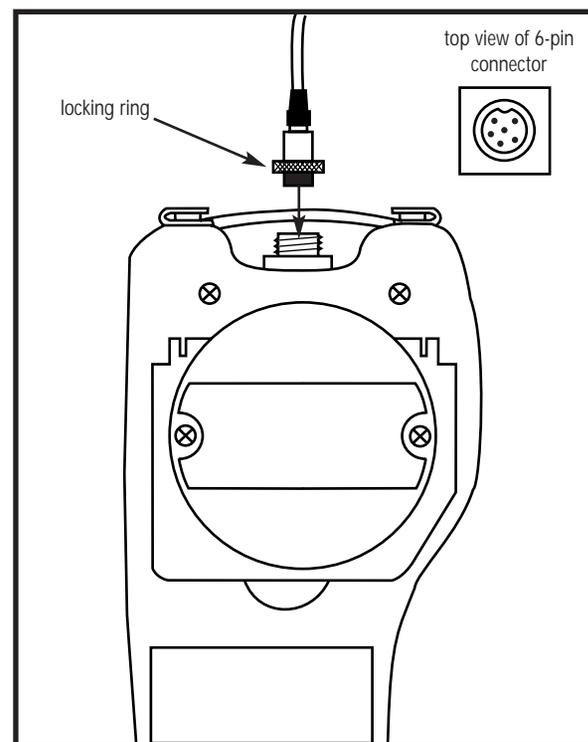
3.3 Connecting the AC Adapter (35630-00 only)

The AC adapter is not included with your meter; order separately on page 22.

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.
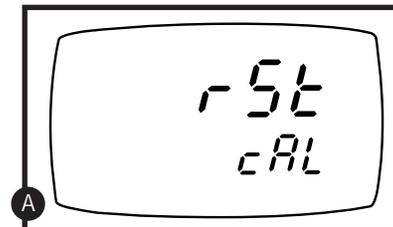

pH/Conductivity/°C Meter
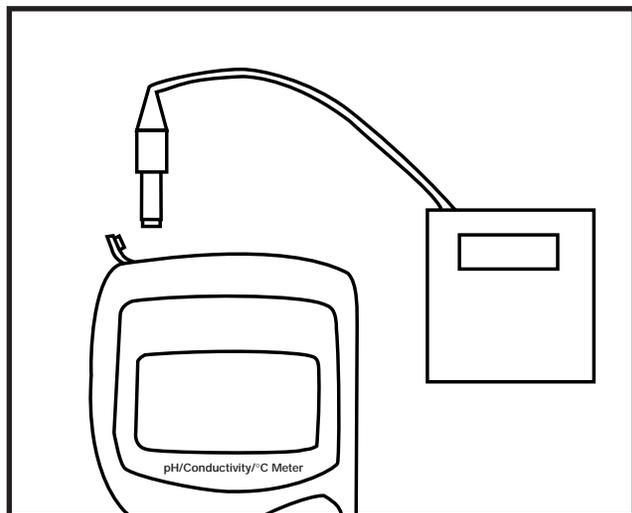
4. Calibration

4.1 Important Information on Meter Calibration

When you recalibrate your meter, old pH and conductivity calibration data are replaced on a point by point basis. For example, if you previously calibrated your meter at pH 4.0, 7.0, and 10.0, and you recalibrate at pH 7.0, the meter retains the old calibration data at pH 4.0 and pH 10.0.

To completely recalibrate your meter, or when you use a replacement probe, it is best to set the meter to its factory defaults and recalibrate the meter at all points. To reset pH, make sure meter is in pH mode. To reset conductivity, make sure meter is in conductivity mode. To reset the meter to its factory defaults in either mode:

1. While in Measurement mode, press CAL/MEAS and hold for 3 seconds.

2. The meter will prompt RST in the upper display and CAL in the lower display.

See figure **A**

3. Press ENTER to reset your meter to its factory defaults. The screen will flash all characters, then returns to measurement mode once the meter is reset. If you do not want to erase existing calibration data, press CAL/MEAS to escape this mode.

For information on how to calibrate your meter:
• See section 4.3 on pages 10-11 for pH calibration
• See section 4.4 on pages 12-13 for conductivity calibration
• See section 4.5 on pages 14-15 for temperature calibration

4.2 Preparing the Meter for Calibration

The pH/conductivity/temperature probe included with this meter is designed for use with this meter only. Do not substitute other types of probes or electrodes. For a replacement probe, see the "Accessories" section, page 22.

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 you shut it off in (either pH or Conductivity). For example, if you shut the meter off in "mS" units, the meter will read "mS" units when you switch the meter on.

Be sure to remove the protective rubber cap of the probe before calibration or measurement. Wet the probe in tap water for 10 minutes before calibrating or taking readings to saturate the pH electrode surface and minimize drift.

Wash your probe in deionized water after use, and store in pH 4.0 or 7.0 electrode storage solution.

Do not reuse buffer solutions after calibration. Contaminants in the solution can affect the calibration, and eventually the accuracy of the measurements.

4.3 pH calibration

This instrument is capable of up to 3-point pH calibration to ensure accuracy across the entire pH range of the meter. You can perform 1-, 2-, or 3-point calibration with standard pH buffers 4.00; 7.00 and 10.00.

We recommend that you perform at least a 2-point calibration using standard buffers that bracket (one above and one below) the expected sample range. You can also perform a 1-point calibration, but make sure that the buffer value is close to the sample value you are measuring.

This meter features three preprogrammed pH buffers (pH 4.00, 7.00 and 10.00). The meter automatically recognizes and calibrates to these standard buffer values, which makes pH calibration faster and easier. See pages 22-23 for information on our high-quality OAKTON pH buffers.

Calibrating for pH:

1. **If necessary, press the MODE key to select pH mode**. The pH indicator appears in the upper right hand corner of the display.

2. **Rinse the probe thoroughly with de-ionized water or a rinse solution.** Do not wipe the probe; this causes a build-up of electrostatic charge on the glass surface.

3. **Dip the probe into the calibration buffer.** The end of the probe must be completely immersed into the sample. Stir the probe gently to create a homogeneous sample.

4. **Wait for the measured pH value to stabilize.** The READY indicator will display when the reading stabilizes.

See figure **A**
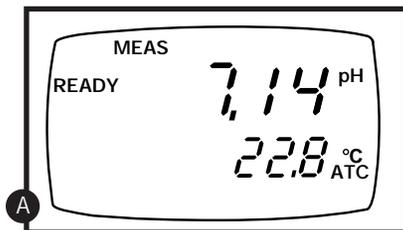
5. **Press CAL/MEAS to enter pH calibration mode.** The primary display will show the measured reading while the smaller secondary display will indicate the pH standard buffer solution.
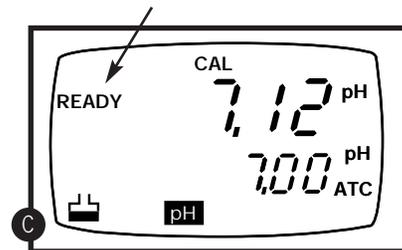
See figure **B**
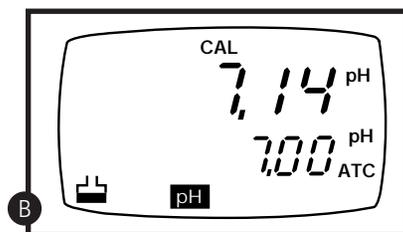
NOTE: If using a pH buffer other than pH 7, press the ▲ or ▼ keys to scroll up or down until the secondary display value is the same as your pH buffer value (pH 4.00, 7.00 or 10.00).
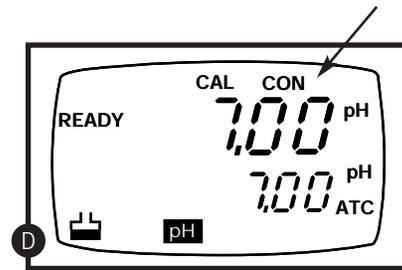
6. **Wait for the measured pH value to stabilize.** The READY indicator will display when the reading stabilizes.

See figure **C**

7. After the READY indicator turns on, **press ENTER to confirm calibration**. A confirming indicator (CON) flashes and disappears. The meter is now calibrated at the buffer indicated in the secondary display.

See figure **D**

The secondary display automatically scrolls to the next buffer calibration option.
- If you are performing multipoint calibration, go to step 7.
- If you are performing one-point calibration, go to step 10.

8. **Press the ▲ or ▼ keys** to select the next buffer value you want to calibrate (pH 4.00; 7.00 or 10.00).

See figure **E**

9. **Rinse the probe with de-ionized water or a rinse solution, and place it in the next pH buffer.**

10. Follow steps 5 to 8 for additional calibration points (up to 3 values).

11. When calibration is complete, **press CAL/MEAS to return to pH measurement mode**.
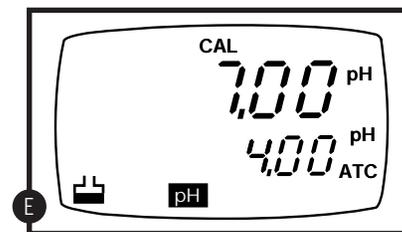
Notes

To exit from pH Calibration mode without confirming calibration, DO NOT press ENTER in step 6. Press CAL/MEAS instead.

If the selected buffer value is not within ±1.00 pH from the measured pH value: the electrode and buffer icon blink and the ERR annunciator appears in the lower left corner of the display. These indicators also flash if the buffer used is not the same as the buffer value on the secondary display.

4.4 Conductivity Calibration

Ideally, you should select a conductivity standard with a value near the sample value you are measuring. The next best method is to choose a calibration solution value that is approximately ⅔ the full scale value of the measurement range. For example, in the 0 to 1999 µS range, use a 1413 µS solution for calibration. Conductivity standards which are lower than 20% of the range should not be used for calibration. It is not possible to make adjustments for values which are in the lower 20% of the working range. See "Specifications", page 21.

Preparing the Meter for Conductivity Calibration

You can calibrate at one point per range of the meter (a total of up to four calibration points). *However, only the ranges that have been calibrated have maximum ±1% full-scale conductivity accuracy. If a range was not calibrated, the meter automatically detects the closest range calibrated and uses that calibration information.*

To maintain ±1% F.S. accuracy, you need to calibrate your meter at least once a week if:
• you take measurements at extreme temperatures
• you are measuring in conductivity ranges lower than 100 µS

To maintain ±1% F.S. accuracy, you need to calibrate your meter at least once a month if:
• you are measuring in mid range solutions, and you wash the cell in deionized water between usages.

The conductivity of solution varies greatly with temperature. The automatic temperature compensation (ATC) feature adjusts the fluctuations of conductivity readings in varying temperatures to a standard temperature. These conductivity meters feature a temperature coefficient of 2.00% per °C and normalize the readings at 25°C.

Calibrating for Conductivity:

1. **Pour out two separate portions of your calibration standard and one of deionized water into separate clean containers.**

2. **If necessary, press the MODE key to select Conductivity Mode**. The µS or mS indicator will appear on the right side of the display.

3. **Rinse your probe** with deionized water, then rinse the probe in one of the portions of calibration standard.

4. **Immerse the probe into the second portion of calibration standard.** The meter's autoranging function selects the appropriate conductivity range (four ranges are possible). *Be sure to tap the probe to remove air bubbles. Air bubbles will cause errors in calibration.*

5. **Wait for the reading to stabilize.** The READY indicator lights when the reading is stable.

See figure **A**

6. **Press the CAL/MEAS key.** The CAL indicator appears above the primary display. The primary display shows the factory default and the secondary display shows the temperature.

See figure **B**

7. **Press the ▲ or ▼ keys** to scroll to the value of your conductivity standard. Press and hold the ▲ or ▼ keys to scroll faster. The meter automatically compensates for temperature differences using a factor of 2.00% per °C.

See figure **C**

8. **Press the ENTER key** to confirm calibration.

Upon confirmation, the CON indicator appears briefly. The meter automatically switches back into Measurement mode. The display now shows the calibrated, temperature compensated conductivity value.

See figure **D**

9. For calibration in other ranges (maximum: four ranges) repeat steps 1 through 9 with the appropriate calibration standards. See pages 22-23 for our selection of high-quality OAKTON conductivity calibration solutions.
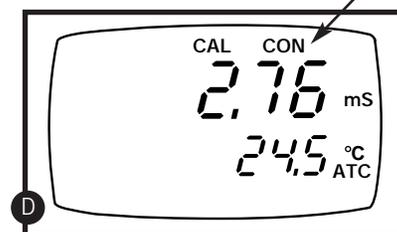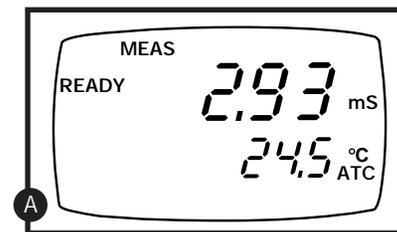
Notes

To exit from Conductivity Calibration mode without confirming calibration, DO NOT press ENTER in step 8. Press CAL/MEAS instead.

If the calibration value input into the meter is different from the factory default value displayed by more than 30%, the ERR annunciator appears in the lower left corner of the display. Clean probe with alcohol. Verify that your calibration standard is fresh and accurate.

4.5 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. Turn the meter on. Press MODE to select pH Measurement mode.

2. **Press the CAL/MEAS key to enter pH calibration mode.** The CAL indicator will appear above the primary display.

See figure **A**

3. **While in pH 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 what the temperature value was initially.

See figure **B**
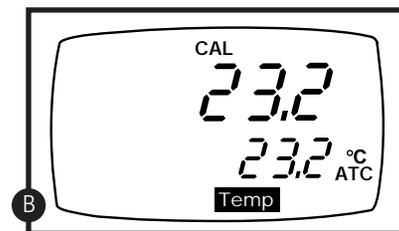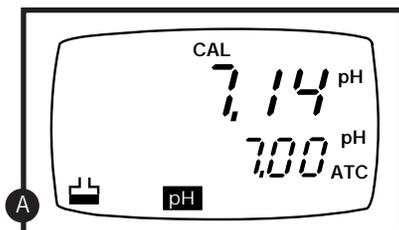
4. **Compare the primary display reading to a NIST-traceable thermometer or another thermometer known to be accurate.**

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. The CON indicator will flash to confirm calibration.

See figure **D**

Notes

To exit from Temperature Calibration mode without confirming calibration, DO NOT press ENTER in step 6. Press CAL/MEAS instead.

Temperature calibration is restricted to ±5°C from the factory default value displayed during calibration (shown in the secondary display).
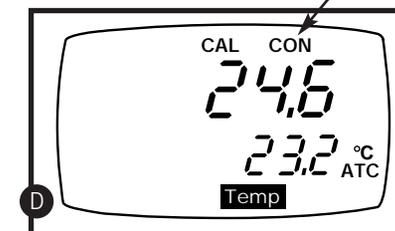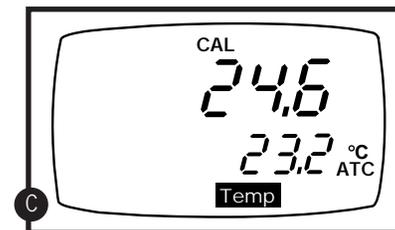
5. Measurement

The READY indicator appears on the display when the readings stabilize. The reading holds until the measured value exceeds the tolerance, then the READY annunciator turns off.

NOTE: Be sure to remove the protective rubber cap of the electrode before measurement.

To take readings:

1. Rinse the probe with deionized or distilled water before use to remove any impurities adhering to the probe body. If the pH electrode has dehydrated, soak it for 30 minutes in OAKTON electrode storage solution or a 2M–4M KCl solution.

2. Switch on the meter. The MEAS annunciator appears on the top center of the LCD. The ATC indicator appears in the lower right hand corner to indicate Automatic Temperature Compensation. Press MODE to select desired measuring parameter (pH or conductivity).

See Figure **A**

3. Dip the probe into the sample.

NOTE: When dipping the probe into the sample, make sure the tip of the probe is completely immersed. Stir the probe gently in the sample to create a homogenous sample. *Be sure to tap probe to remove air bubbles. Air bubbles will cause errors in the reading.*
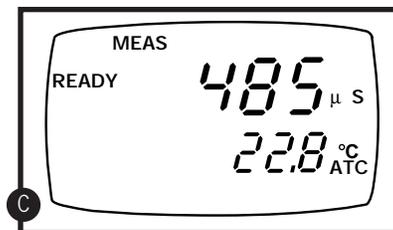
4. Allow time for the reading to stabilize. Note the reading on the display. When the reading is stable, the READY annunciator appears.

5. To toggle between pH and conductivity readings, press the MODE key.

See figures **B** and **C**

NOTE: Conductivity readings are auto-ranging and will automatically move to the correct range (four ranges possible).
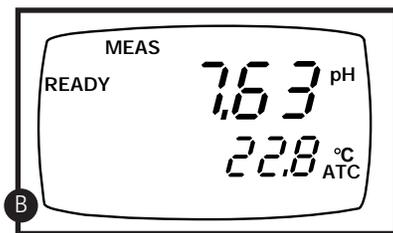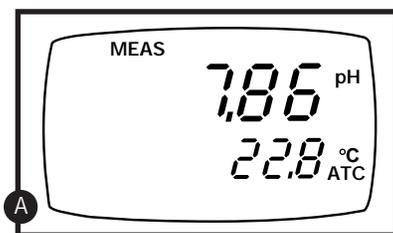
pH measurement mode display

Conductivity measurement mode display

6. HOLD function

This feature lets you freeze the value of the pH or conductivity reading for a delayed observation. HOLD can be used any time when in MEAS 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.

NOTE: This meter will hold a reading for up to 30 minutes, because it features automatic shutoff after 30 minutes to conserve batteries.
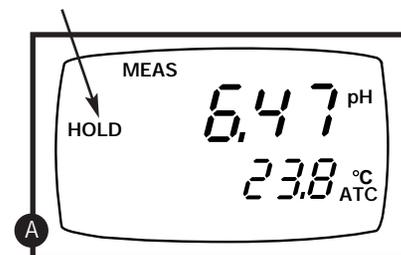
7. Probe Care and Maintenance

Under typical operating conditions, the probe will need to be replaced every 6 to 12 months. In extreme applications, the probe may wear out sooner. Proper care and maintenance will help you receive the maximum probe life and ensure more accurate readings.

Keep the probe clean. Before use, rinse the probe twice. For the best accuracy, soak your probe in electrode storage solution, pH 4.0 buffer, or tap water for at least 5 to 10 minutes before calibration.
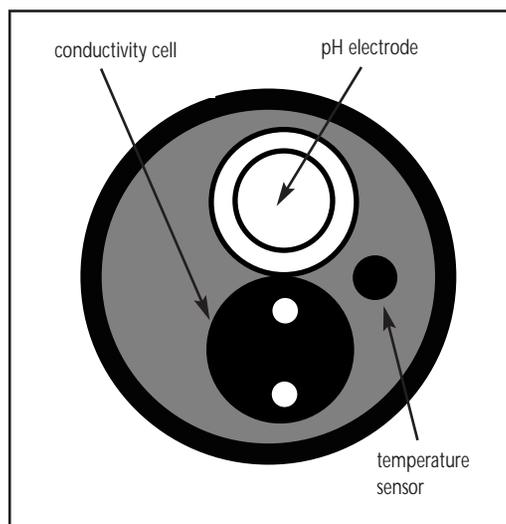
Gently swirl the probe in the solution while you take readings. Tap the probe gently against the bottom and sides of your container to remove any air bubbles, which may interfere with accuracy.

Clean the probe thoroughly by immersing it in an agitated mild detergent bath. To clean the conductivity cell, use a cotton swab soaked in isopropyl alcohol and clean the steel pins. Wipe the steel pins with a soft tissue paper. DO NOT wipe the pH bulb with tissue as it may cause static build-up. After cleaning the probe, wash the probe with deionized or tap water before storing it. Recalibrate the meter after cleaning the probe.

Store the probe in its cap filled with electrode storage solution.

Do not strike the probe against any hard surface. Do not immerse the probe in oily solutions.

To order a replacement probe, see page 22.

Probe from end view

8. Troubleshooting

Problem	Cause	Solution
Power on but no display	a) Batteries not in place.	a) Check that batteries are in place and making good contact.
	b) Batteries not in correct polarity (+ and –).	b) Reinsert batteries with correct polarity.
	c) Weak batteries.	c) Replace batteries or attach optional AC adapter.
Unstable readings	a) Air bubbles in probe.	a) Tap probe to remove bubbles.
	b) Dirty probe.	b) Clean the probe and recalibrate.
	c) Probe not deep enough in sample.	c) Make sure sample entirely covers the probe sensors.
	d) External noise pickup or induction caused by nearby electric motor.	d) Move or switch off interfering motor.
	e) Broken probe.	e) Replace probe. See page 22.
"OR" on upper display	a) Probe is shorted.	a) Test probe. Make sure probe is fully connected to meter.
	b) Probe is in an out-of range solution.	b) Use different solution.
	c) Broken probe.	c) Replace probe. See page 22.
Temperature reading erratic or lower display reads "OR"	a) Temperature sensor is dirty.	a) Clean temperature sensor with isopropyl alcohol.
	b) Temperature of solution is out of range.	b) Heat or cool solution.
	c) Probe is shorted	a) Test probe. Make sure probe is fully connected to meter.
	c) Broken probe.	c) Replace probe. See page 22.
Slow response	a) Dirty/Oily probe.	a) Clean probe. See "Probe Care & Maintenance", p. 18.

9. Error Messages

| LCD Display	Indicates	Cause	Solution
Err annunciator	Unrecognized input from keypad	Wrong input in selected mode.	Release key. Select valid operations depending on mode.
CAL & Err annunciators blink	Calibration error	Wrong value input at calibration. Dirty probe.	Check your input value, clean probe. See Calibration sections or Probe Maintenance section.
Battery indicator blinks	Low battery level	Need new batteries or battery connection is bad	Clean battery contacts. Replace batteries with fresh ones, noting polarity
Err. 1 (in primary display)	Memory write error	Instrument too old (>10 years). Hardware failure	Turn meter on and off again. If message persists, return unit*
Err. 2 (in primary display)	Checksum error	Batteries too weak. Hardware failure.	Press ENTER, then turn off meter. Change batteries. Recalibrate Return*
Err. 3	A/D converter error	Faulty hardware	Return*

* See "Warranty" and "Return of Items" on page 24

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 below.

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

For a complete diagram of the display, see page 4.
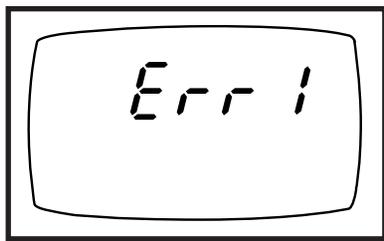
ERR 1 in primary display

10. Specifications

Mode	pH	Temperature	Conductivity
Range	0.00 to 14.00 pH	0.0 to 100.0˚C	0 to 19.99 µS, 0 to 199.9 µS, 0 to 1999 µS, 0 to 19.99 mS
Resolution	0.01 pH	0.1˚C	0.01 µS, 0.1 µS, 1.0 µS, 0.01 mS
Accuracy	±0.01 pH	±0.5˚C	±1% full scale or ±1 digit
Calibration	Up to three points (pH 4.01, 7.00, 10.01) with automatic buffer recognition	Offset in 0.1°C increments	Up to four points (one point per range)

Temperature compensation: automatic from 0 to 50°C

Conductivity cell constant (K): 1.0

Conductivity temperature coefficient: 2.00% per °C

Operating temperature: 0 to 50°C

Power: four 1.5 V AAA batteries (included) or AC adapter (optional; order separately on page 22)

Battery life: > 50 hours

Dimensions:
35630-00
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: 6.8"L x 1.3" dia (173 mm L x 32 mm dia)

35630-02
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 9.2"W x 2.75"H   (23 cm x 23 cm x 7 cm)
Probe: 6.8"L x 1.3" dia (17.3 cm L x 3.2 cm dia)

Shipping weight: 1.4 lbs (0.64 kg)

11. Accessories

Replacement meter and meter accessories

WD-35630-00 pH/CON 10 pH/Conductivity/°C meter.
Includes pH/Conductivity/°C probe with 10-ft submersible cable

WD-35630-02 Waterproof pH/CON 10 pH/Conductivity/°C meter.
Includes pH/Conductivity/°C probe with 10-ft submersible cable

WD-35630-50 Replacement pH/Conductivity/°C probe
with10-ft submersible cable

WD-00653-04 Electrode storage solution, 1 pint bottle. Keeps electrode bulb moist for faster, more accurate readings. Shpg wt 1.1 lbs/510 gms

WD-00653-06 Electrode cleaning solution, 1 pint bottle. Removes buildup from electrodes and maintains electrode sensitivity. Shpg wt 1.1 lbs/510 gms

WD-35630-60 pH/CON 10 meter kit. Includes pH/CON 10 meter, pH/Conductivity/°C probe with 10-ft submersible cable, 9 pH and 8 conductivity calibration solution pouches, 3 rinse water pouches, sample bottle, instructions and hard shell carrying case

WD-35630-69 pH/CON kit. Includes 9 pH and 8 conductivity calibration solution pouches, 3 rinse water pouches, sample bottle, instructions and hard shell carrying case. Meter not included.

WD-35615-75 Belt loop portable meter carrying case. Soft case with clear plastic front panel protects your meter while allowing you to take measurements. Top and side openings let probe and probe connections remain accessible

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

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

OAKTON calibration solution bottles

Each contain 1 pint of premixed calibration solution. pH solutions have ±0.01 pH accuracy at 25°C. Conductivity solutions have ±1% accuracy at 25°C and include NaCl, KCl and 442 TDS conversion factors. Shpg wt 1.1 lb/510 gms

WD-00654-00 Solution bottle, pH 4.01

WD-00654-04 Solution bottle, pH 7.00

WD-00654-08 Solution bottle, pH 10.00

WD-00653-16 Solution bottle, 84 μS
(40.38 ppm KCl, 38.04 ppm NaCl, 50.50 ppm 442)

WD-00653-47 Solution bottle, 447 μS
(225.6 ppm KCl, 215.5 ppm NaCl, 300.0 ppm 442)

WD-00653-18 Solution bottle, 1413 μS
(744.7 ppm KCl, 702.1 ppm NaCl, 1000 ppm 442)

WD-00653-89 Solution bottle, 8974 μS
(5101 ppm KCl, 4487 ppm NaCl, 7608 ppm 442)

WD-00653-50 Solution bottle, 15,000 μS
(8759 ppm KCl, 8532 ppm NaCl, 13,455 ppm 442)

OAKTON "Singles" calibration solution pouches

Each individually sealed, single use pouch contains 20 ml of fresh, contamination free calibration solution. pH "Singles" have ±0.01 pH accuracy at 25°C. Conductivity "Singles" have ±1% accuracy at 25°C and include NaCl, KCl and 442 TDS conversion factors. 20 pouches/box. Shpg wt 1.1 lb/454 gms

WD-35653-01 pH "Singles"; pH 4.01

WD-35653-02 pH "Singles"; pH 7.00

WD-35653-03 pH "Singles"; pH 10.00

WD-35653-04 pH "Singles" assortment pack;
five each of pH 4.01, 7.00, 10.00, and rinse water pouches

WD-35653-10 Conductivity "Singles", 447 μS

WD-35653-11 Conductivity "Singles", 1413 μS

WD-35653-13 Conductivity "Singles", 15,000 μS

WD-35653-00 "Singles"; rinse water

To order OAKTON accessories, contact your OAKTON distributor.