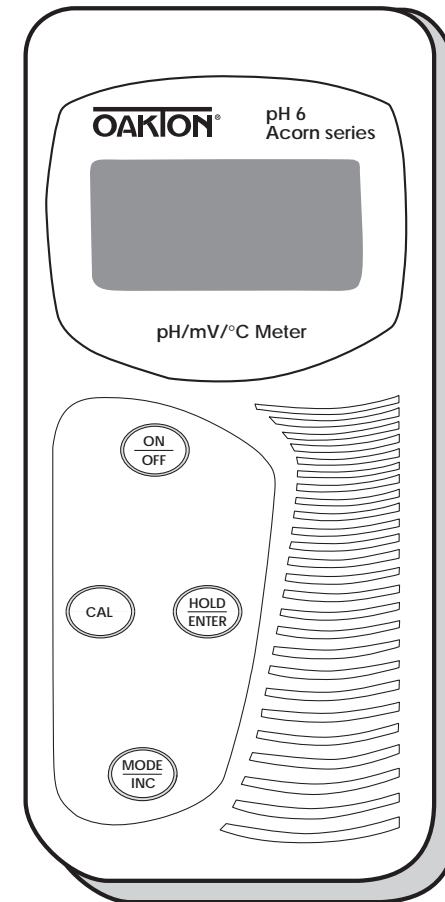


OAKTON WD-35613-00; -01; -10; -11

pH 5 and pH 6 Acorn Series Meters

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1. Introduction

Thank you for purchasing an OAKTON® Acorn Meter. These meters are economical, microprocessor-based meters that deliver ± 0.01 pH accuracy.

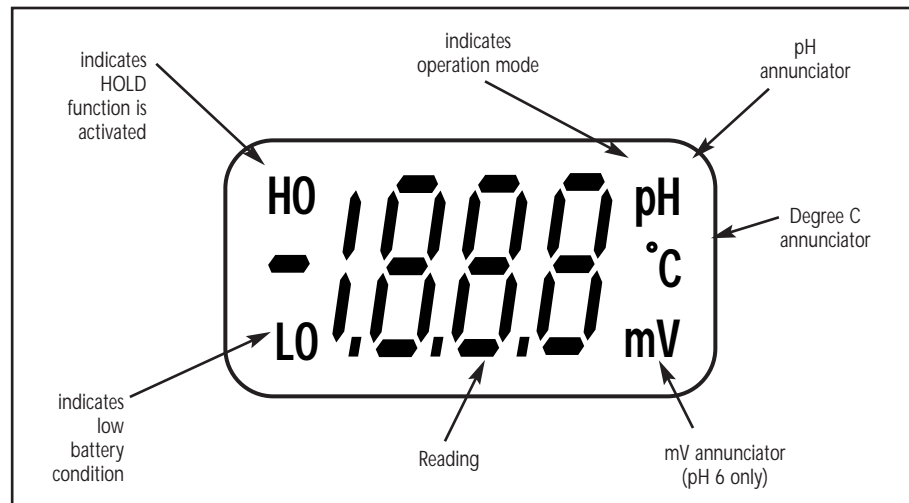
Some of the features of these meters are:

- Large LCD for clear and easy reading
- pH 5 and pH 6 series meters allow measurement in pH and Temperature ($^{\circ}\text{C}$)
- pH 6 series meters also allow measurement in Millivolt (mV), for taking ORP (Redox) readings or checking pH electrode performance.

This instruction manual is organized for easy reference. For basic functions of this meter, read sections 2 through 5. These sections include basic instructions that will get you up and running quickly. The remaining sections of this manual (6 through 11) deal with electrode maintenance, error messages and troubleshooting. This part of the manual also includes the Specifications, Accessories, Warranty and Return of Items section.

2. Display and Keypad Functions

The Acorn has a large custom LCD with the following indicators:



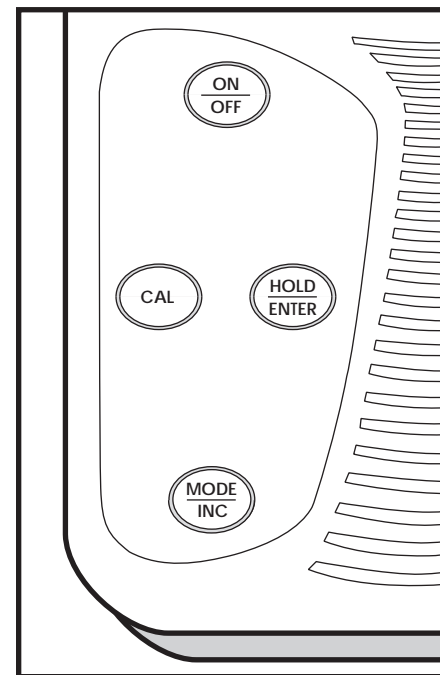
The OAKTON Acorn meter has four keys on its splashproof keypad. These keys are ON/OFF, HOLD/ENTER, CAL and MODE.

ON/OFF: Powers meter on and shuts unit off. Meter directly enters measurement mode when you turn it on.

HOLD/ENTER: Freezes the measured reading; confirms calibration value.

CAL: Allows calibration of the meter for pH, mV and Temperature

MODE/INC: Selects the parameter of measurement: pH, mV (pH 6 series only) and temperature.



3. Preparation

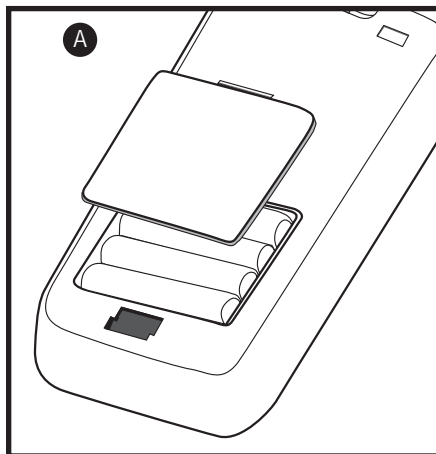
3.1 Inserting the batteries

The battery compartment is found at the back of the instrument. To open the battery compartment, push the lid up.

See figure **A**

Note the polarity of battery before inserting the batteries into position. After replacement, place the cover back into its position and press down until it locks tight.

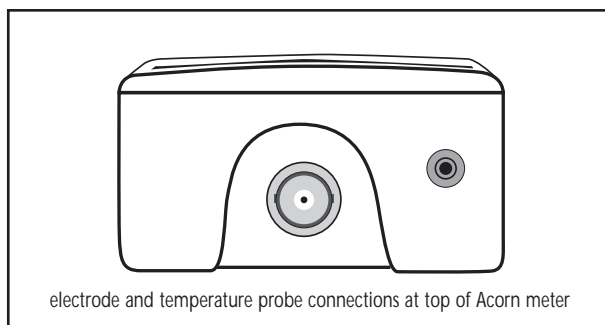
A "LO" annunciator in the LCD alerts you when battery power is running low. Replace batteries with a fresh set as soon as possible.



3.2 Connecting the Electrode and Temperature Probe

To connect the Acorn meter to your electrode, align the post of the meter's connector with the slots on the electrode's connector, push together and twist the electrode connector 1/2 turn until it clicks into place. To remove, simply rotate the connector counter-clockwise until it unlocks, and slide the connector off the socket.

Insert the phono jack of the temperature sensor into the socket on the meter. Unplug the phono jack when not in use.



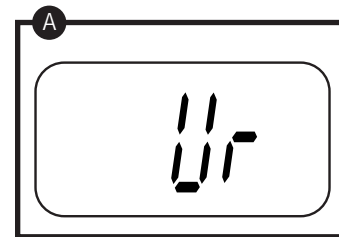
3.3 Switching the meter on

Press the ON/OFF key to power up your meter. All the LCD segments display for a few seconds as the meter goes through a self-diagnostic test. The LCD then switches into pH measurement mode.

If the LCD then displays "Ur.", the electrode is faulty, the temperature sensor is faulty, or there is an open circuit.

See figure **A**

See page 13 for more troubleshooting information.



4. Calibration

4.1 pH calibration

This instrument is capable of up to three-point calibration to ensure accuracy across the entire range of the meter. You can perform 1-, 2- or 3-point calibration with standard pH buffers 4.01; 7.00; and 10.00.

We recommend you perform at least a 2-point calibration at room temperature 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.

All new calibrations will over-ride existing data.

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

Before use: remove the electrode soaker bottle. If the electrode has been stored dry, condition the glass bulb by soaking it in tap water for 30 minutes. This hydrates the glass bulb if the electrode is too dry, or has not been used for a long period of time.

1. Turn meter on. Meter will automatically enter pH measurement mode.
2. Rinse electrode thoroughly with deionized water or a rinse solution.
DO NOT wipe the electrode; this causes a build-up of electrostatic charge on the glass surface.
3. Dip both the electrode and temperature sensor into pH 7.00 buffer solution. The glass bulb must be completely immersed into the sample. Stir gently, and wait for reading to stabilize (approximately 40 seconds).

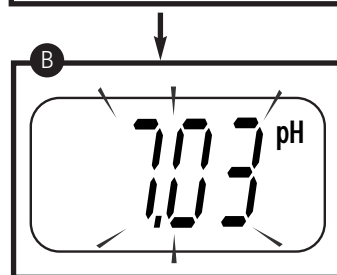
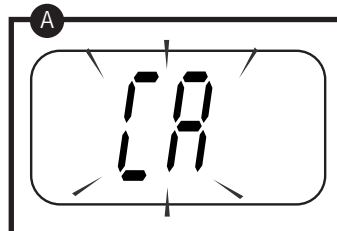
4. Press CAL key to enter the calibration mode. The display will momentarily flash "CA" to indicate CALibration.

See figure **A**

The display will then show the current noncalibrated reading, blinking while in calibration mode.

See figure **B**

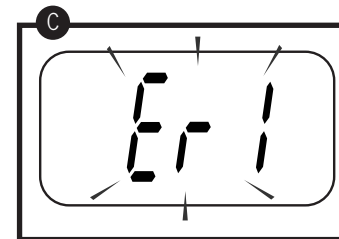
5. Allow the reading to stabilize. The meter automatically recognizes 7.00, 4.01 or 10.00 buffers.
6. Press ENTER key once to confirm calibration. The LCD displays "CO" to indicate the calibration point has been confirmed. The meter exits calibration mode and returns to measurement mode.



7. Repeat with pH buffers 4.01 and/or 10.00 for best accuracy.

NOTE: This meter has automatic buffer recognition which identifies the correct pH buffer values during calibration. If buffers other than 4.01, 7.00 or 10.00 are used, or the electrode has worn out, the LCD will flash "Er1".

See figure **C**



4.2 Temperature calibration

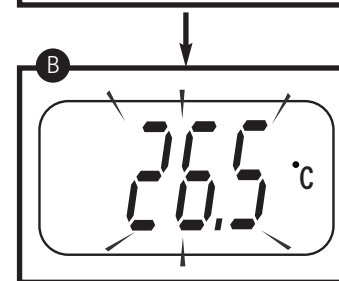
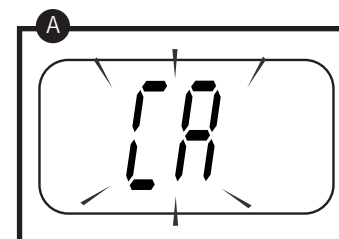
The temperature sensor included with your meter is factory calibrated. Over time, the temperature calibration may drift and require recalibration. If you replace the probe you should calibrate temperature prior to pH or mV calibration.

1. Connect your temperature probe to the meter.
2. Press the MODE/INC key until "°C" appears in the LCD.
3. Compare displayed value to a NIST certified thermometer or other thermometer known to be accurate. For best accuracy, place probe and thermometer in a constant temperature bath.

4. Press the CAL key. the LCD shows "CA" and the reading flashes.

See figures **A** **B**

5. Press MODE/INC key until the display shows the correct temperature. The MODE/INC key will scroll to the maximum allowable value, and then loop back to the minimum allowable value adjustment (maximum adjustment is $\pm 5^{\circ}\text{C}$ from factory default).
6. Press ENTER key to confirm calibration. The LCD displays "CO", and the meter then reverts to measurement mode.



4.3 Millivolt (mV) Calibration

mV calibration is performed for ORP (Redox) measurements, where you can adjust its mV values as a base value for measurements. Contact your OAKTON distributor for ORP electrodes.

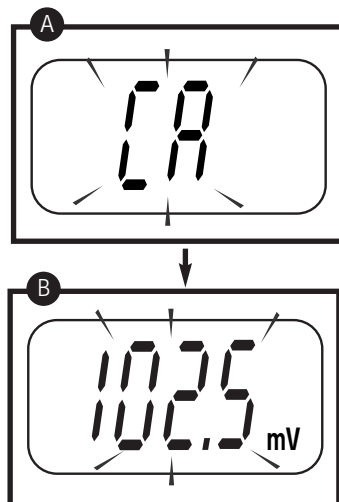
1. Press MODE/INC key to enter mV mode. LCD displays "mV".

2. Press the CAL key. LCD shows "CA", and the reading flashes

See figure **A** **B**

3. Use the MODE/INC key to adjust the reading to your desired value. The maximum adjustment you can make is ± 25 mV. If the MODE/INC key is pressed continuously, the reading scrolls to the maximum allowable value, and then loops back to the minimum allowable value.

4. Press ENTER key to confirm calibration. The LCD displays "CO" and the meter then reverts to measurement mode.



5. Measurement

5.1 Taking Measurements

1. Rinse both electrode and temperature sensor with distilled water.

2. Turn meter on. Press MODE key to select desired parameter (pH, mV, Temperature).

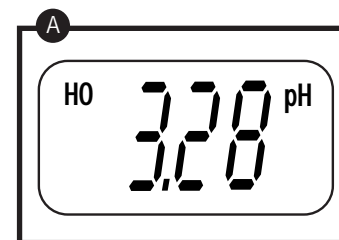
3. Dip electrode and temperature sensor approximately 1" to 2" into sample. Stir gently and wait for display to stabilize. Note reading.

5.2 Hold function

To freeze your reading, press the HOLD key once. The LCD show "HO" to indicate the HOLD function is activated

See figure **A**

Press HOLD key again to deactivate the HOLD function and return to measurement mode.



6. Electrode care and maintenance

6.1 Storage

For best results, keep the pH bulb wet. Store the pH bulb in the electrode soaker bottle filled with electrode storage solution. Or you can store the electrode in a pH 4 buffer with 1/100 part saturated KCl. Other pH buffers are also suitable for storage. **NEVER use deionized water for storage.**

6.2 After measuring

1. Rinse the electrode and reference junction in deionized water.
2. Store the electrode as recommended in "Storage" or as recommended by the manufacturer.

6.3 Electrode cleaning

Because your pH electrode is susceptible to dirt and contamination, clean it every one to three months depending on extent and condition of use.

Clean the electrode in a mild detergent solution. Wipe the probe with a soft tissue paper. Avoid touching the glass membrane with your fingers. Wash thoroughly in tap water and then in distilled water. Recalibrate your meter after cleaning the electrode.

Special Cleaning Tips

Salt deposit: dissolve the deposit by immersing the electrode in tap water for ten to fifteen minutes. Then thoroughly rinse with distilled water.

Oil/grease film: wash electrode pH bulb gently in detergent solution. Rinse electrode tip with distilled water.

Clogged reference junction: heat a diluted KCl solution for 60-80°C. Place the sensing part of the electrode into the heated solution for about 10 minutes. Allow the electrode to cool in some unheated KCl solution.

Protein deposits: prepare a 1% pepsin solution in 0.1M of HCl. Set the electrode in the solution for five to ten minutes. Rinse the electrode with distilled water.

7. Troubleshooting

Problem	Cause	Solution
Err flashes on LCD	Wrong or contaminated buffer used during calibration	Use fresh buffer solution: pH 4.01, 7.00, or 10.00
	Bad electrode	Change electrode
"Ur" or "Or" on LCD with pH or °C annunciator	pH out of range	—
	Temperature out of range	Cool/Heat sample as needed
	Bad electrode	Change electrode
	Bad temperature sensor	Change temperature sensor
LO annunciator on LCD	Low battery	Replace batteries with fresh set
Power on but no display	Batteries not in place	Insert batteries
	Batteries not in correct polarity (+ and -)	Re-insert batteries with correct polarity
	Weak batteries	Replace batteries
Unstable reading	Electrode not deep enough in sample	Place electrode deeper in sample
	Insufficient reference electrolyte in electrode	Fill electrode with reference electrolyte (if electrode is refillable); replace electrode.
	Broken electrode	Replace electrode
	External "noises" or induction caused by nearby electric motor	Remove or switch off interfering motor
	Dirty electrode	Clean electrode
Slow response	Dirty electrode	Clean electrode

8. Specifications

Mode	pH	Temperature	mV (pH 6 only)
Range	0.00 to 14.00 pH	0.0 to 100°C	-1000 to +1000 mV
Resolution	0.01 pH	0.1°C	1 mV
Accuracy	±0.01 pH	±0.5°C	±2 mV
Calibration	up to 3 points (push button)	Offset 0.1°C	Offset up to ±25 mV

pH slope range: 80% to 120%

Auto buffer recognition: pH 4.01; 7.00; 10.00

Display: Single line LCD

Inputs: BNC, phono jack

Auto shutoff: after 17 minutes

Hold Function indicator: HO

Error Message display: Err

Low battery indication: LO

Temperature Compensation: Automatic (ATC), 0.0 to 50.0°C

Operating temperature: 0 to 50°C

Power: 4 x AAA Alkaline batteries (>70 hours)

Dimensions: Meter only: 5.5" x 2.7" x 1.3" (14 x 7 x 3.5 cm);
Boxed: 9.25" x 6.5" x 3" (23.5 x 16.5 x 7.6 cm)

Weight: Meter only: 0.5 lb (210 g); Boxed: 1 lb (420 g)

9. Accessories

WD-35613-00 Additional pH 5 Series Acorn Meter (pH/°C) with pH electrode and temperature probe

WD-35613-01 Additional pH 5 Series Acorn Meter (pH/°C) with temperature probe (electrode not included)

WD-35613-10 Additional pH 6 Series Acorn Meter (pH/mV/°C) with pH electrode and temperature probe

WD-35613-11 Additional pH 6 Series Acorn Meter (pH/mV/°C) with temperature probe (electrode not included)

Accessories

WD-35606-80 Protective Rubber Boot, encases meter in sturdy rubber to protect it from drops and dings. Also features meter stand for convenient tabletop use.

WD-35801-00 Replacement electrode, 5.75"L x 0.47 OD (12 mm).
Shpg wt. 0.5 lb (230 g).

WD-35805-05 Double junction electrode, use with solutions that are dirty, have heavy metal or organic ions. 5.75"L x 0.47 OD (12 mm). Shpg wt. 0.5 lb (230 g).

WD-35613-05 Replacement temperature probe, 316 SS, polypropylene cap, 3" cable.
Shpg wt 0.15 lb (70g).

WD-35805-13 ORP electrode, epoxy body, single junction, 5.75"L x 0.49"OD (12.5 mm). Shpg wt 0.5 lb (230 g).

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

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

OAKTON calibration solutions

±0.01 pH accuracy at 25°C. Shpg wt 1.1 lb (510 g).

WD-00654-00 pH 4.01 calibration buffer, 1 pint.

WD-00654-04 pH 7.01 calibration buffer, 1 pint.

WD-00654-08 pH 10.01 calibration buffer, 1 pint.

OAKTON “Singles” calibration solution pouches 20/box.

±0.01 pH accuracy at 25°C. Shpg wt 1.1 lb (454 g) per box.

WD-35653-00 Deionized rinse water solution pouches,

WD-35653-01 pH 4.01 “Singles” buffer solution pouches

WD-35653-02 pH 7.00 “Singles” buffer solution pouches

WD-35653-03 pH 10.00 “Singles” buffer solution pouches

WD-35653-04 Assortment pack, 5 ea. deionized water, pH 4.01, pH 7.00, and pH 10.00 solution pouches.

Consult your OAKTON® Distributor for a complete selection of pH and ORP electrodes, solutions and accessories. Ask for bulletin Accessories A1.

NOTE: Remember to check the temperature calibration when replacing the ATC probe. See section 4.2, "Temperature calibration" (page 9).

10. 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.

11. Return of items

Authorization must be obtained from your OAKTON distributor 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.

