

GENERAL INFORMATION

This combination ORP electrode comes in many styles and is designed for maximum reliability, accuracy, and ease of use. The outer body can be glass, epoxy, or other plastic materials. The reference half-cell can be refillable or permanently sealed at the factory and non-refillable. The refillable electrode will have one or two fill holes located underneath the cap at the top of the electrode. The electrode is shipped with a protective boot or soaker bottle filled with a membrane/junction wetting agent (1:1 pH4 buffer/KCl). Crystals which may form around the protective boot will in no way affect electrode performance.

ELECTRODE SPECIFICATIONS

ORP Range: +2000 mV to -2000 mV
Slope (Span): 95 – 102% (between pH 7 & 4 at 25°C)
7 pH buffer with Quinhydrone crystals added: 86 mV +/- 20 mV
4 pH buffer with Quinhydrone crystals added: 264 mV +/- 20 mV

REQUIRED METER & BUFFERS

Meter: This electrode will work with any ORP meter commercially available. Consult the meter instruction manual for specific details on connecting/wiring the ORP electrode to the meter or operating the meter. Some electrodes may require adaptor cables or detachable lead cables for connection to the ORP and/or mV meter.

Buffers: For precise electrode checking, two buffers are required. pH 7.00 (at 25°C) buffer is normally recommended for initial checking, followed by pH 4.01 (at 25°C) to span(slope) the electrode. A pinch of Quinhydrone crystals should be added to both the pH 7 and pH 4 buffers. Sufficient crystals added will result in undissolved crystals suspended in solution. Note: quinhydrone buffers are not stable and should be discarded after completion of all calibrations on a given day.

ELECTRODE PREPARATION

1. Remove the ORP bulb protector boot or soaker bottle covering the ORP element and rinse the element area with deionized water or tap water. Save the boot if the electrode will be stored.
2. Reference electrodes that are refillable: For electrodes shipped with fill-hole plugs, remove the shipping tape covering the rubber fill-hole plug and withdraw the plug to expose the fill-hole. For electrodes shipped with a sleeve over the fill-hole(s), slide the rubber sleeve down and remove the shipping tape to expose the fill-hole. Fill the refillable electrodes with any fill solution(s) shipped with the electrode to a level just below the fill-hole(s). The fill hole should be open whenever the electrode is in solution. Cover the fill hole when not in use.
3. Prior to first usage, or after long-term storage, immerse the ORP electrode in pH 4 buffer for thirty minutes. This wets the reference junction for optimum performance. The electrode is now ready for use.

ELECTRODE WIRING (COMBO COAX)

Clear (BNC Center Wire or Pin) = ORP Signal
Black (BNC Outer Shield or Pin) = Reference
White or Black, and Red = ATC (optional)
Green = Solution Ground (optional)

Color Code Variation – Direct replacement electrodes may differ from above color coding in order to match other manufacturer's color schemes.

Wiring Tips – There are instances where a solution ground may be required for wiring but is not included with the electrode. In some cases, jumpering of the terminal marked "solution ground" with the terminal marked "reference" is required. Consult the meter instruction manual for specific details on connecting/wiring the ORP electrode.

CHECKING ELECTRODE & SAMPLE ORP MEASUREMENT

1. Place the electrode in fresh pH 7.00 buffer (Quinhydrone added). Stir and allow the meter reading to stabilize for one minute. Read the mV value according to the meter instruction manual. The mV reading should be 66 mV to 106 mV.
2. Rinse the electrode in distilled water and place the electrode in fresh pH 4.01 buffer (Quinhydrone added). Stir and allow meter reading to stabilize for one minute. Read the mV value. The mV reading should be 244 mV to 284 mV. If the mV difference between the two solutions is less than 150 mV, or the buffer potentials do not fall in the acceptable mV range, see ELECTRODE CLEANING section.
3. Rinse the electrode with distilled water. Place in sample and stir. Allow meter reading to stabilize for one minute. Record reading. For best accuracy, the temperature of the buffers and samples should be identical and at room temperature.

ELECTRODE STORAGE

For short terms, always keep the reference junction wet, preferably in a membrane/junction wetting agent (1:1 pH4 buffer/KCl). The protective boot/soaker bottle filled with wetting agent above will provide an ideal storage chamber for longer periods. **NOTE: Electrodes should not be stored for a period longer than 6 months for optimal performance. Electrode stock should be rotated accordingly.**

ELECTRODE CLEANING

General Cleaning: Soak the electrode in 1:10 dilution of household laundry bleach in a 0.1-0.5% liquid detergent solution in hot water with vigorous stirring for 15 minutes. Place junction under warm, running tap water for 15 seconds. Soak the electrode in pH 4 buffer for at least 10 minutes.

Salt Deposits: Dissolve the deposit by immersing the electrode in 1% HCl for five minutes, followed by immersion in 1% NaOH for five minutes, and thorough rinsing with distilled water.

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ORP ELECTRODE

INSTRUCTION AND MAINTENANCE

Oil/Grease Films: Wash electrode pH bulb in a little detergent and water. Rinse electrode tip with distilled water. If the film is known to be soluble in a particular organic solvent, rub the bulb gently with this solvent using a tissue or soft cloth. Acetone or isopropyl alcohol are often used to remove films.

Clogged Reference Junction: Heat a diluted KCl solution to 60-80°C. Place the reference portion of the pH electrode into the heated KCl solution for approximately 10 minutes. Allow the electrode to cool while immersed in some unheated KCl solution.

After any of these special cleaning procedures, remember to drain/refill the reference chamber, if refillable. Soak the electrode in pH 4 buffer for at least 10 minutes. If these steps fail to restore normal electrode response, replace the electrode.

TROUBLESHOOTING HINTS

Symptom	Possible Causes	Next Step
Out of Range Reading	meter electrode electrode wired incorrectly air bubble on ORP element	check meter with shorting plug check CALIBRATION check wiring connections remove electrode & reattach
Noisy/Unstable Display	meter solution not grounded air bubble on ORP element	check meter with shorting plug ground meter & electrode remove electrode & reattach
Drift (reading slowly changing in one direction)	ORP element contaminated reference clogged	see CLEANING hints see CLEANING hints
Low Slope	buffers contaminated ORP element contaminated reference clogged electrode	use fresh buffers see CLEANING hints see CLEANING hints check CALIBRATION

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*Warranty information and Warranty Disclaimer are available upon request.

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