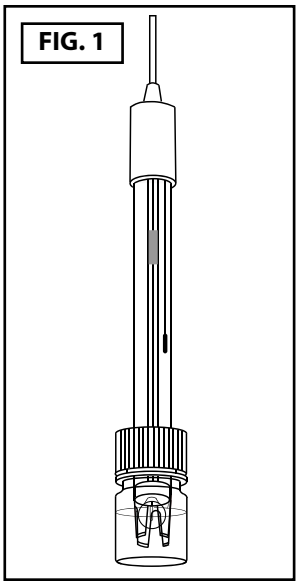
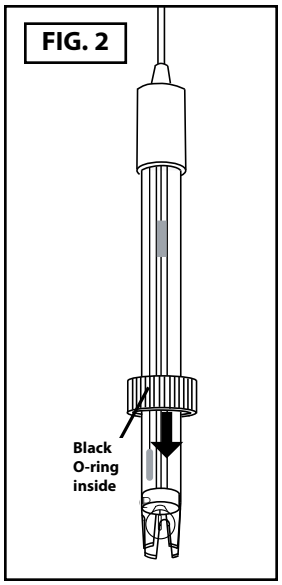
Polymer Body, Sealed pH & ORP Electrodes

Product Instructions

Epoxy body combination electrodes afford a unique ease of use. Because the pH bulb is recessed inside the polymer body, the electrode can be allowed to rest against the bottom of a beaker without damaging the glass bulb. In many measurements, this recessed bulb design eliminates the need for electrode holders and the electrode can actually be used as a stirring rod. The sealed reference design eliminates the need to add filling solutions, minimizes reference dryout and allows the electrode to be used in up to 100 psig systems without the need for external pressurization.





SECTION 1.0
HELPFUL OPERATING TIPS (pH)

1. The electrode is shipped in a plastic bottle containing a solution of pH 4 buffer and potassium chloride. The electrode should remain in the bottle until it is used. If the electrode is used infrequently, the bottle and its solution should be saved and the electrode stored in it (See Electrode Storage Section). Take out electrode by loosening plastic top on bottle counterclockwise and pulling electrode out. Slide cap and O-ring off electrode and save (SEE FIGS 1 & 2).

2. During shipment the air bubble in the electrode's stem may move into the bulb area. If bubbles are seen in the bulb area, hold the electrode by its top cap and shake downward as is done with a clinical thermometer (SEE FIG 3).

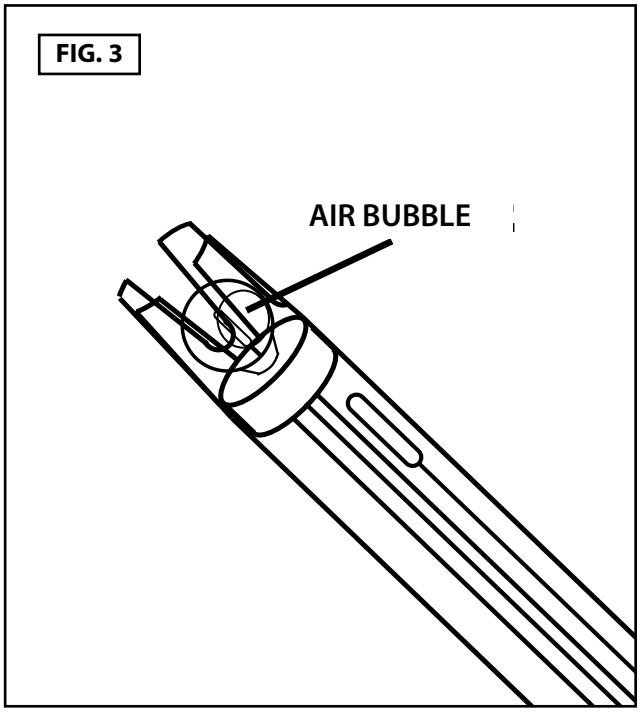
3. Vigorously stir the electrode in the sample, buffer, or rinse solution. This action will bring solution to the electrode's surface quicker and improve the speed of response.

4. After exposure to sample, buffer, or rinse solution, shake the electrode with a snap motion to remove residual drops of solution (SEE FIG 4 on next page). This action will minimize contamination from carryover.

5. As a rinse solution, use a part of the next sample or buffer which is to be measured. This action will also minimize contamination from carryover.

6. When calibrating, use a buffer close in value to that expected from the sample. This action will minimize span errors.

7. Keep buffers and samples at the same temperature. This action will eliminate the need to correct values for temperature effects.



Parts covered by this product instruction sheet include:
S200C, S200CD, S900C, S900CD, S700C, S700CD, S350CD, S450C, S450CD, S100C, S120C, S150C, S175CD, S150C-ORP, 500C/CD-ORP, S510C/CD-ORP, S222C/CD-ORP, S550C/CD-ORP, S450C/CD-ORP, S350CD-ORP, S500C/CD-ORP-Au, S550C/CD-ORP-Au , pH1000, pH2000, pH5000, pH6000, pH2100, pH2200, ORP1000, ORP2000, ORP3000

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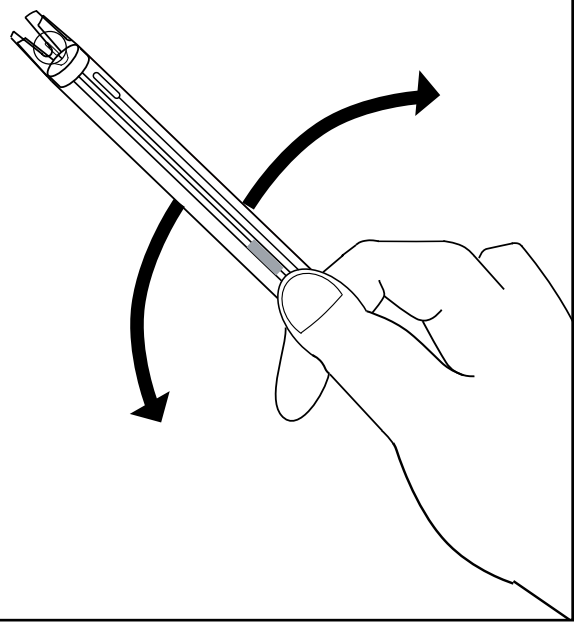
SECTION 1.0
HELPFUL OPERATING TIPS -pH(Cont.)

8. pH readings stabilize faster in some solutions than in others; allow time for reading to stabilize. In general, buffers provide stable readings in several seconds (tris buffers take somewhat longer) while samples usually take longer times.

9. Keep in mind that all pH electrodes age with time. Aging is characterized by shortened span (slope) and slower speed of response. If the meter has a manual or microprocessor slope control, the control can be adjusted to compensate for electrode span errors (but will not affect the speed of response). Aging is best detected by calibrating the electrode in, for example, pH 7 buffer, then rinsing and placing the electrode in pH 4 buffer. As a rule, if the span is 10% or more in error (a reading of 4.3 or higher for this example) the electrode should be cleaned and retested (see the Electrode Cleaning Section) or reconditioned (see Reconditioning Section). If performance is not restored the electrode should be replaced.

FIG. 4

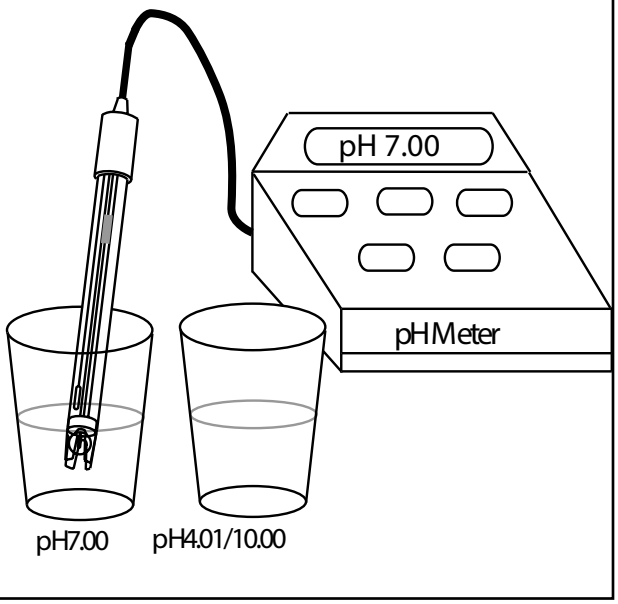


SECTION 2.0
CALIBRATION PROCEDURE (pH)

As a rule, follow the procedures recommended by the pH meter manufacturer and keep in mind the Helpful Operating Techniques given on page one. The frequency of calibration is a function of the electrode, the pH meter, and the solutions the electrode is exposed to. The electrode and meter should always be calibrated together with the calibration frequency determined by experience. Use two buffers, for example 7 & 4 or 7 & 10 (SEE FIG 5). Use the following step-wise procedure for both calibration in buffers and for sample measurements:

1. Remove the electrode from its soaker bottle and save the bottle.
2. Vigorously stir the electrode in a rinse solution.
3. Shake the electrode with a snap action to remove residual drops of solution.
4. Vigorously stir the electrode in the buffer or sample and allow the electrode to rest against the beaker's wall.
5. Allow the reading to stabilize and then take the reading.
6. Repeat these steps for each sample or buffer determination.

FIG. 5



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SECTION 3.0
ELECTRODE STORAGE(pH)

When pH readings are made infrequently, for example, several days or weeks apart, the electrode can be stored simply by replacing it in its soaker bottle. First, slide the cap onto the electrode, then the O-ring, and then insert the electrode into the bottle and firmly tighten the cap. If the solution in the soaker bottle is missing, fill the bottle with pH 4 buffer.

SECTION 4.0
ELECTRODE CLEANING(pH)

Coating of the pH bulb can lead to erroneous readings including shortened span (slope). The type of coating will determine the cleaning technique. Soft coatings can be removed by vigorous stirring or by the use of a squirt bottle. Organic chemical or hard coatings should be chemically removed. 5-10% hydrochloric acid (HCl) soak for a few minutes and often removes many coatings. If cleaning does not restore performance, reconditioning may be tried. *Do not use brush or abrasives on electrode* (SEE FIG 6).

SECTION 5.0
ELECTRODE RECONDITIONING(pH)

When reconditioning is required due to electrode aging (see Helpful Operating Techniques, Part 9), the following chemical treatments can be tried. They are presented in the order of the severity of attack on the pH glass and may not improve (and in some cases actually further deteriorate) electrode performance.

NOTE: Use proper precautions when handling these hazardous chemicals. Ammonium bifluoride and HF (hydrofluoric acid) are extremely hazardous and should only be used by qualified personnel.

1. Immerse the electrode tip in 0.1 N HCl for 15 seconds, rinse in tap water and then immerse tip in 0.1 M NaOH for 15 seconds and rinse in tap water. Repeat this sequence three times and then recheck the electrode's performance. If performance has not been restored, try step two.
2. Immerse the tip in a 20% solution of NH4F-HF (ammonium bifluo ride) for two to three minutes, rinse in tap water and recheck per formance. If performance has not been restored try step three.
3. Immerse electrode tip in 5% HF for 10-15 seconds, rinse well in tap water, quickly rinse in 5N HCl, rinse well in tap water and recheck performance. If performance has not been restored, it is time to get another Sensorex epoxy body combination pH electrode (SEE FIG 7).

FIG. 6

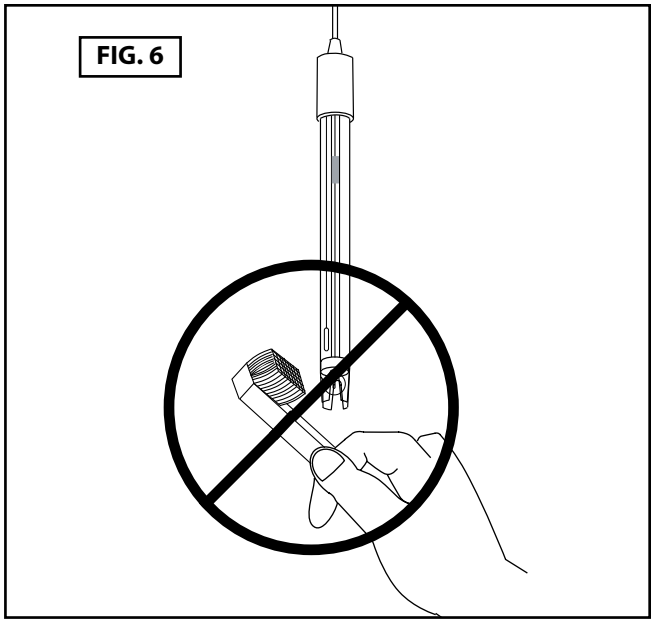
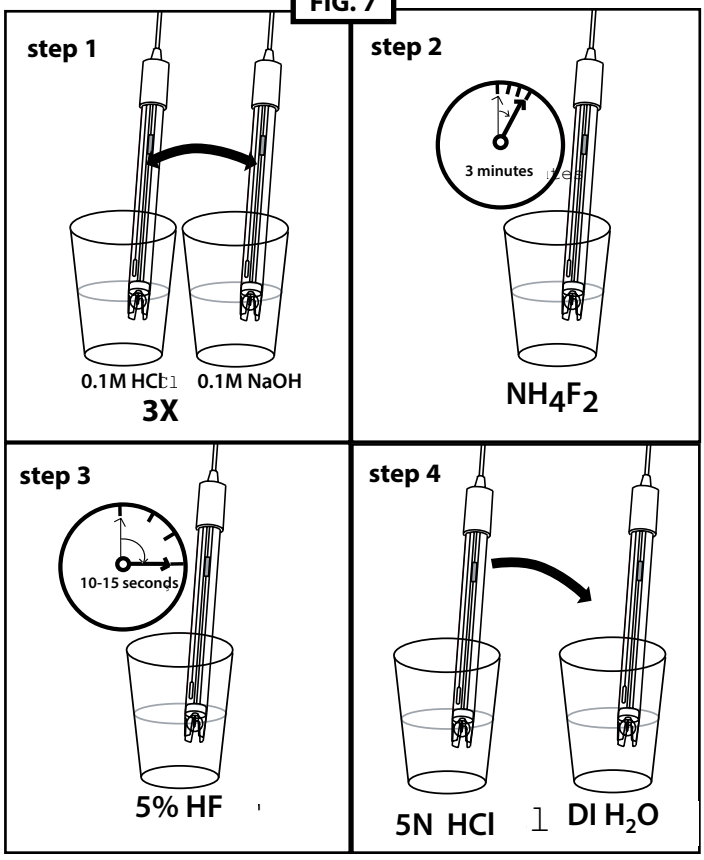


FIG. 7



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SECTION 6.0
HELPFUL OPERATING TIPS (ORP/Redox)

The type of Reference Electrode used will affect the millivolt readings of both samples and calibration standards. The two commonly used Reference Electrode types differ by having internals made of silver/silver chloride (Ag/AgCl) or internals made of calomel. Both Combination and separate Reference Electrodes that are accompanied by these instructions have Ag/AgCl internals and have 3.5 M KCl gels. This type of electrode will give a reading of about +40 mV as compared to Reference Electrodes with calomel internals and saturated KCl solutions.

7. Depending on the composition of the REDOX Calibration Solution, with time the solution may be oxidized or reduced and this will change its reading. In general, then, REDOX Calibration Solutions cannot be relied on for long term –many months or years—stability (the user should refer to the solution's manufacturer for recommendations regarding solution stability).

8. When REDOX potentials are used to continuously monitor the concentration of the single chemical is easily determined by other means (in the above example, a colorimetric test kit could be used), a REDOX Calibration Standard usually is not needed. The grab sample calibration method described below can be used in such instances.

SECTION 7.0
CALIBRATION PROCEDURE(ORP/Redox)

As a general rule, follow the procedures recommended by the REDOX Meter manufacturer keeping in mind the Helpful Operating Techniques given above. The frequency of calibration is a function of both the electrode and the meter. They should be calibrated together with the calibration frequency determined by experience. The following stepwise procedure has been found useful:

LABORATORY PROCEDURE (FIG 8)

1. Remove the electrode from the soaker bottle by rotating cap counterclockwise and pulling electrode upward
2. Rinse the electrode with de-ionized or tap water by carefully stirring it in a beaker containing this rinse solution.
3. Remove the electrode and wipe dry with a soft paper or cloth towel.
4. Pour REDOX Calibration Standard solution into a small beaker to about a 3/8" (1cm) depth.
5. Insert the electrode into the solution and gently stir taking care not to allow the end of the electrode to hit the beaker.
6. Allow the reading to stabilize and compare it to the standard solution's value. Typically, the readings should agree within 10-15% of the solution's stated value. (see FIG 9)
7. If the electrode is to be checked in a different standard solution, repeat steps 2 through 6.

SECTION 8.0
ELECTRODE STORAGE(ORP/Redox)

When readings are made infrequently, for example, several days or weeks apart, the electrode can be stored in the soaker bottle that it was shipped in. If you have poured out the soaking solution, simply refill the bottle with pH 4.01 buffer.

SECTION 9.0
ELECTRODE CLEANING(ORP/Redox)

Coating of the platinum sensing surface can prevent samples from reaching that surface and is a primary cause of erroneous readings. Materials that coat the reference junction can also cause reading errors and coatings must be removed if accurate results are to be obtained.

Soft coatings should be removed by use of a squirt bottle or by wiping with a soft cloth. Hard coatings or organic chemicals should be removed by use of appropriate chemical such as 5% HCl. If a solvent is used, select one that does not damage the electrode materials that include epoxy, nylon, silicone rubber, platinum and glass. The platinum sensing surface is located in the end of the glass tube that extends from the electrode's body. It can be cleaned by gently polishing it with 600 grade wet silicon carbide paper but should only be done when chemical cleaning is not effective. Wet a piece of the paper with water and polish the electrode with a twisting and rocking action.

FIG. 8

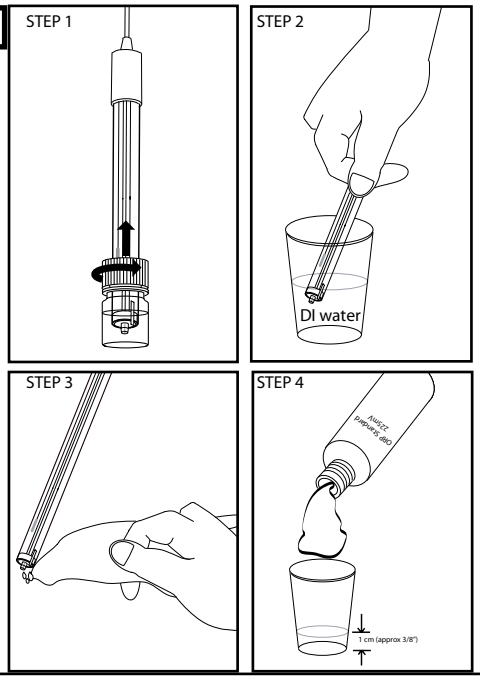

FIG. 9

PLATINUM ORP ELECTRODE IN 7 BUFFER/QUINHYDRONE MIXTURE

Temperature	20C (68F)	**25C (77F)**	30C (86F)
Readings (mV)	89-107	**83-101**	76-94
Readings (pH)	5.20-5.50	**5.30-5.60**	5.42-5.72

PLATINUM ORP ELECTRODE IN 4 BUFFER/QUINHYDRONE MIXTURE

Temperature	20C (68F)	**25C (77F)**	30C (86F)
Readings (mV)	260-287	**254-281**	247-274
Readings (pH)	2.15-2.60	**2.25-2.70**	2.37-2.82

Sensorex
11751 Markon Drive Garden Grove, CA. 92841 USA
Tel: 714-895-4344 Fax: 714-894-4839
www.sensorex.com

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