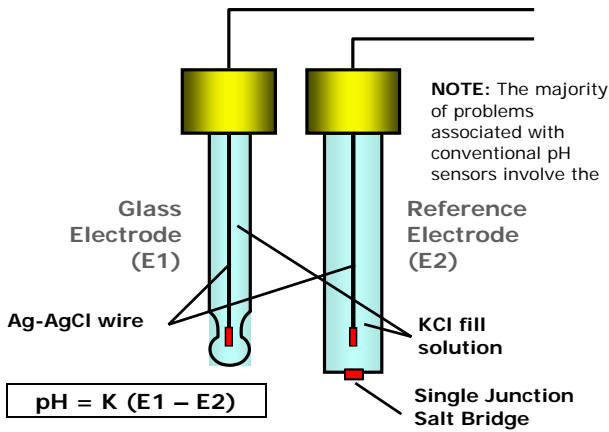


Advantages of the Hach Differential pH/ORP Measurement Technology

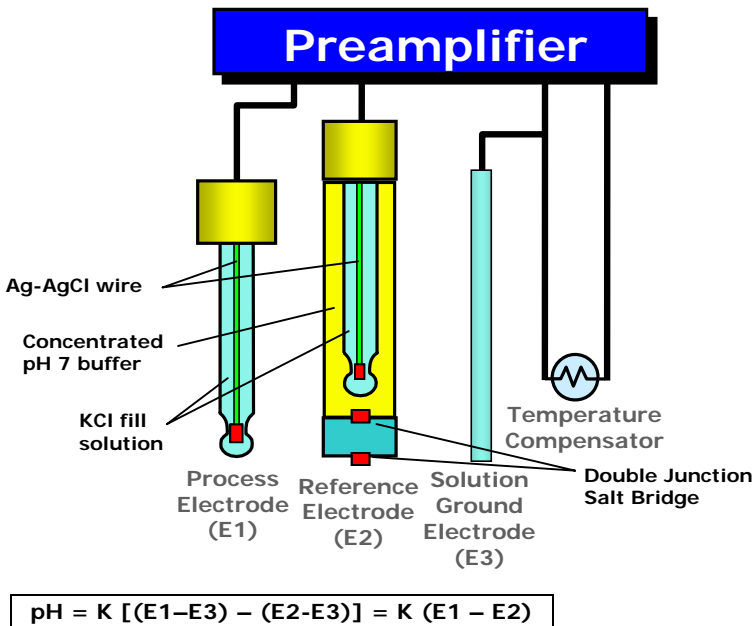
Figure 1 Conventional pH Measurement System



Conventional pH/ORP Sensor Weaknesses

- Potassium Chloride fill solution is not buffered from the process and contamination will result in measurement error over time
- Complete sensor dismantling is required to replace the Reference Electrode (E2), which is very time consuming and can be costly
- Ground loops flow through the Reference Electrode causing measurement error
- Contamination from the process coats the low-impedance Reference Electrode, altering the resistance of the electrode and the overall pH measurement

Figure 2 Hach Differential Electrode Technique



Hach Differential pH/ORP Sensor Strengths

- Double-junction salt bridge minimizes contamination from entering the inner chamber of the Reference Electrode (E2), thus providing a physical barrier, but allowing an electrical pathway to **maintain measurement accuracy over time**
- Concentrated pH 7 buffer protects the Reference Electrode and minimizes dilution effects from any contamination, **which significantly minimizes measurement error and drift**
- Double-Junction salt bridge and the pH 7 buffer solution can easily be dismantled and replaced in the field, making the sensor **very economical to maintain and minimizing downtime**
- Ground loops pass through the Ground Electrode (E3) instead of the Reference Electrode, **preventing measurement error due to ground loops**
- High impedance Reference Electrode minimizes the effects of contaminant coating, maintaining measurement accuracy over time
- With a built-in preamplifier, the low impedance signal allows the analyzer to be located up to 3000 feet from the sensor (digital version requires a termination box)

Hach pH^{DM}™ Differential pH and ORP Sensors



From left: convertible (available in PEEK® or Ryton®), insertion, and sanitary body styles

Hach Encapsulated Differential pH / ORP Sensors



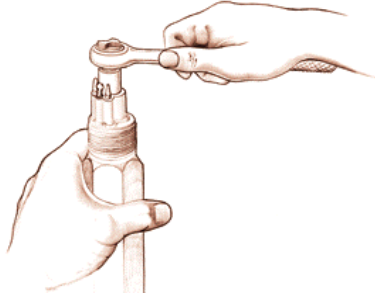
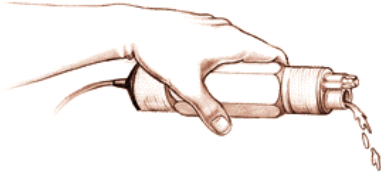
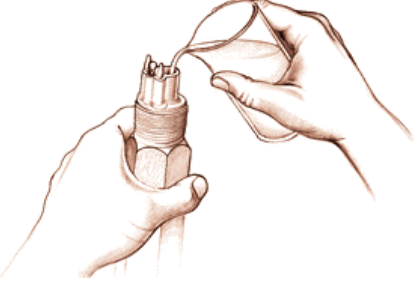
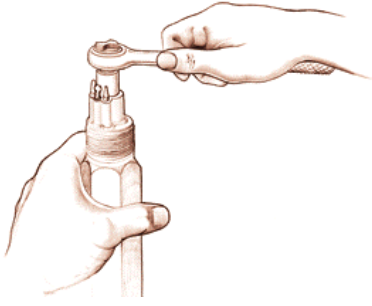
These field-proven differential electrodes are available in LCP (foreground) or Ryton® body materials.



In addition to pH/ORP - Hach offers the broadest product line of water analysis solutions, including Conductivity, Turbidity, Chlorine, Ozone, Suspended Solids, Dissolved Oxygen, Flow and Sampling.

Regenerating Your Differential Sensor

Easily and inexpensively extend the life of your Hach differential sensors by periodically replacing the salt bridge and pH 7 buffer solution. This process only takes about 5 minutes. Although differential sensors may initially cost more than standard combination sensors, they **pay for themselves many times over** if you periodically regenerate the probe with the inexpensive salt bridge and standard cell solution. The following steps refer to the LCP version of the Hach differential pH sensor, but are applicable to all Hach differential pH sensors. In fact, the Hach pHD™ salt bridge can be removed without additional tools.

	
<p>1. Remove the salt bridge by holding the sensor in an upright position and turn the salt bridge counterclockwise using a 9/16 inch socket wrench or nut driver. Take care not to damage the glass measuring electrode.</p>	<p>2. Pour out the aged pH 7 buffer solution. Thoroughly flush the standard electrode chamber with fresh standard cell solution.</p>
	
<p>3. Fill the standard electrode chamber to the top of the thread with fresh concentrated pH 7 buffer solution.</p>	<p>4. Install the new salt bridge, making sure the O-ring is intact. Turn the salt bridge clockwise until finger tight. Then tighten with a socket wrench or nut driver approximately 1/4 turn. Do not over tighten.</p>
<p>5. Calibrate the system and return the sensor to the process. If you need to order replacement salt bridges, buffer solutions or if you have any questions regarding this process, contact Hach Technical Support at 1-800-227-4224.</p>	

Cost Savings Example

Assumptions

Life of conventional probe: 4 months
 Cost of conventional probe: \$200
 Cost of differential probe: \$600
 Cost of pHD™ salt bridge: \$100
 Does not include cost of Analyzer

PAYS FOR ITSELF IN THE 1st YEAR!

IMAGINE THE SAVINGS WITH MULTIPLE LOOPS!

Year 1 Savings

- Conventional Probe Cost: \$200 / sensor * 3 sensors / year = \$600
- Hach Differential Cost: \$600 per sensor = \$600

Year 2 Savings

- Conventional Probe Cost: \$200 / sensor * 3 sensors / year = \$600
- Hach Differential Cost: \$100 / salt bridge & pH 7 buffer replacement = \$100

Savings Over 2 Years

- Conventional Probe Cost: \$600 year 1 + \$600 year 2 = \$1,200
- Hach Differential Cost: \$600 year 1 + \$100 year 2 = \$ 700

Total 2 Year Savings: \$500 per probe



Don't forget – Hach offers both a pro-rated replacement program up to 30 months for Differential pH and ORP sensors and a sensor rejuvenation service. In addition, all Hach Differential pH sensors come with a 1-year warranty.