



Tech Note

ISE-100 pH Electrode

Overview

The ISE-100 is an easy-to-use pH electrode that is capable of measuring the acidity of solutions with pH values from 0 to 12. The ISE-100 is a combination electrode with the recording and reference electrodes included in the same housing. The plastic housing at the end of the electrode protects the glass membrane and reduces the probability of the electrode breaking as it is handled.

Equipment Setup

Plug the DIN connector of the ISE-100 pH electrode into a DIN8 Input on an iWorx data acquisition unit or amplifier.

Calibration of the ISE-100 pH Electrode

1. If the pH electrode is still stored in its bottle of buffer, remove the electrode from the bottle. Rinse the electrode with deionized water while holding the electrode over a beaker used for the collection of waste liquids.

2. Place the tip of the pH electrode in a beaker containing enough room temperature deionized water to submerge the tip. Keep the electrode in deionized water for at least ten minutes.

3. Prepare two beakers filled with the pH buffers used for calibrating the pH electrode. The buffers should be a room temperature. One beaker is filled with pH 7 buffer; and the other is filled with pH 4 buffer. Each beaker should be filled with enough buffer to cover the tip of the pH electrode, and also allow the stir bar in the beaker to spin without touching the pH electrode.

4. Place the beaker containing the pH 7 buffer on the magnetic stirrer. Carefully place a stir bar in the beaker. Remove the pH electrode from the deionized water and blot any drops of water from the electrode. Position the tip of the electrode in the beaker of pH 7 buffer so that the tip is away from the stir bar. Adjust the speed of the stirrer so the stir bar is rotating evenly at a moderate speed.

5. Click **Start** on the LabScribe **Main** window to begin recording. The trace will eventually reach a stable baseline toward the top of the recording channel. Type the words **Calibration - pH 7** on the comment line to the right of the **Mark** but-



Figure 1: ISE-100 pH Electrode

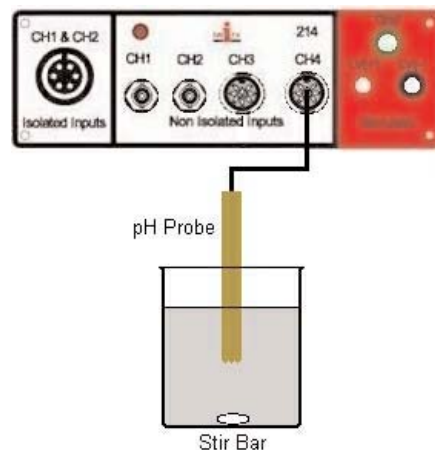


Figure 2: The ISE-100 pH Electrode connected to an iWorx 214 Data Acquisition System.

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ton. Press the **Enter** key on the keyboard to mark the stable baseline of the recording. This comment marks the output of the pH electrode in pH 7 buffer at room temperature. Continue recording while changing the beakers of buffers.

6. Turn off the stirrer and remove the pH electrode from the beaker of pH 7 buffer. Hold the electrode over the beaker used for collecting waste liquid, and rinse it with deionized water from a wash bottle. Blot any drops of water from the electrode.

7. Remove the beaker of pH 7 buffer from the stirrer and place the beaker of pH 4 buffer on the stirrer. Carefully place a stir bar in the beaker. Position the tip of the pH electrode in the beaker of pH 7 buffer so that the tip of the electrode is away from the stir bar. Adjust the speed of the stirrer so the stir bar is rotating evenly at a moderate speed.

8. As you continue to record, the trace will reach a stable baseline toward the bottom of the recording channel. Type the words **Calibration - pH 4** on the comment line to the right of the **Mark** button. Press the **Enter** key on the keyboard to mark the stable baseline of the recording. This comment marks the output of the pH electrode in room temperature pH 4 buffer. Click **Stop** to halt the recording.

9. Select **Save As** in the **File** menu, type a name for the file. Choose a destination on the computer in which to save the file (e.g., a class folder). Click the **Save** button to save the file (as an *.iwd file).

10. Turn off the stirrer. Remove the pH electrode from the beaker of pH 4 buffer. Hold the electrode over the beaker used for collecting waste liquid, and rinse it with deionized water from a wash bottle. Blot any drops of water from the electrode and place it in a beaker of deionized water.

Units Conversion

1. Locate the section of the recording where output of the pH electrode was measured in pH 4 and pH 7 buffers. To view this section of the recording in its entirety on the same window, it may be necessary to click either of the **Display Time** icons in the **LabScribe toolbar**.

2. Click the **2-Cursor icon** so that two blue vertical lines appear over the recording window. Place one cursor on the plateau recorded while the pH probe was in pH 7 buffer. Place the other cursor on the plateau recorded while the pH probe was in pH 4 buffer.

3. **Right-click** on the Channel 4 window to open the **right-click menu**. Select **Units** from the **right-click menu**. Note that the voltage values for the positions of Cursors 1 and 2 are already entered in the **units conversion window**.

- Next to the voltage value for **Cursor1**, enter **7**.
- Next to the voltage value for **Cursor2**, enter **4**.
- Next to the **unit name**, enter **pH**.
- Click **OK**. The units on the Y-axis are equal to **pH** units.

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Operating the ISE-100 pH Electrode

Once the ISE-100 pH electrode is calibrated, it can be used to measure the pH of solutions.

1. Before and after the electrode is placed in the solution being measured, rinse the electrode and its housing with deionized water from a wash bottle. Blot any drops of water from the probe with laboratory wipes.
2. Place the electrode in the solution being measured. Set the stirrer that mixes the solution to a speed that allows the stir bar to rotate smoothly.
3. Once the recording of the pH level in the solution has reached a stable line, mark the recording with a comment to indicate the pH of the solution.

Experiments

Experiments using the ISE-100 pH electrode can be found in the iWorx Newsletter archive, which is available at: <http://www.iworx.com/newsletter/>.