

ISE-100 pH Electrode

Technical Note



ISE-100

Overview

The ISE-100 pH Electrode 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.

How to Use the ISE-100

Equipment Setup

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

Start the Software

When using an iWorx data acquisition system with DIN8 transducer inputs or an iWorx amplifier:

- 1) Open LabScribe2 by double-clicking on the LabScribe2 icon.
- 2) When the program opens, select **Preferences** from the **Edit** menu (or from the **LabScribe2** menu on a Macintosh computer).
- 3) Select the **Channel** preferences dialog window. Name the channel to which the ISE-100 is connected. Set the **Mode/Function** for this channel to **DIN8**. Also, set the sampling rate and display time. Click **OK**.



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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.
- 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 at 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 LabScribe2 **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** 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 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 4 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.
- 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, and type a name for the file. Choose a destination on the computer in which to save the file. Click **Save**.
- 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 with deionized water from a wash bottle. Blot any drops of water from the electrode and place it in a beaker of deionized water.



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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 change the **Display Time** in the LabScribe2 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 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 now represent **pH** units.

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

LabScribe2 experiments using the ISE-100 pH Electrode include:

- **Experiment GB-1: Biological Buffers** (found in the **General Biology-Ecology** category of the LabScribe2 **Settings** menu as **BiologicalBuffers-LS2**)
- **Experiment GB-3: Water Quality** (found in the **General Biology-Ecology** category of the LabScribe2 **Settings** menu as **WaterQuality-LS2**)
- **Experiment GB-4: Ecological Balance** (found in the **General Biology-Ecology** category of the LabScribe2 **Settings** menu as **EcologicalBalance-LS2**)
- **Experiment GB-5: Acid Rain** (found in the **General Biology-Ecology** category of the LabScribe2 **Settings** menu as **Acid Rain-LS2**)



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