



**pH electrode Instruction Manual  
For use with the RAH-210 & RPH-250**

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## **I. Important Handling Considerations:**

To increase the lifetime, accuracy and response speed of your pH electrode adhere to the following handling guidelines.

1. The pH electrode is shipped in a cap containing a solution of pH 4 buffer and potassium chloride. The electrode should only be removed from this solution when it is ready to be used. If the sensor is used infrequently it should be stored in a buffer solution of pH 4. Do not allow the electrode surface to become dry or be in prolonged contact to air.
2. The Electrode is a form of battery and has a limited shelf life. The manufacture date can be found on the top portion of the unit and is denoted as a four digit number. The first two digits denote the week of manufacture, and the last two digits denote the year of manufacture. Ex: 1215 means that the probe was made on the twelfth week of the year 2015
3. Much care should be taken when cleaning the electrode. Never use a brush or any type of coarse surface for cleaning. Instead, use a non-abrasive cloth and blot dry or gently rinse in water.

## **II. Installation:**

When analyzers are ordered with a pH electrode, the pH electrode comes wired into the instrument and the pH electrode only needs to be connected to the wiring quick-disconnect fitting. If for some reason the wires need to be replaced or you are adding a pH electrode to an analyzer that was ordered without one, follow the steps 1-5 below to insure accurate installation.

**WARNING: ELECTRICAL CONNECTIONS ARE INVOLVED WITH THIS INSTALLATION, ONLY QUALIFIED PERSONNEL SHOULD INSTALL.**

1. If applicable, install the necessary hardware to mount the pH electrode. This may be a separate acrylic pot or a gland to thread into the existing cell assembly. Additional liquid tight fittings may need to be installed into the controller's enclosure as well. Consult Hydro Instruments for assistance if needed.
2. With the analyzer powered off, run the pH electrodes cap-cable assembly through the appropriately sized liquid tight fitting on the controller's enclosure.
3. Take the black wire from the pH electrodes cap-cable assembly and connect it to terminal AI3+ and connect the shielding to terminal AI3-.
4. If applicable, install a small bit of insulated wire to jumper terminals 12V- to terminal SHLD.
5. Remove the pH electrode from its buffer cap and place it into its mounting gland; secure it into place by tightening the capture nut.

*Note: If the pH electrode will not be used continuously then hold on to the buffer cap and solution as it can be used when storing the pH electrode.*

6. Connect the cap-cable assembly to the pH electrode by aligning the tabs, pushing down and rotating clockwise, about  $\frac{1}{4}$  turn.

Mounting Gland



Cap-Cable Assembly

### III. Calibration Instructions:

Quick notes to increase calibration accuracy:

- Before placing the pH electrode into a buffer for calibration, blot the bottom of the probe with a clean microfiber cloth.

**CAUTION:** Take care not to scratch the probe surface as this will damage the probe and affect your readings.

- Allow the pH meter to sit in the buffer solution for a few seconds prior to calibration. The longer it sits in the buffer solution, the closer it will be to the ideal value. Generally 15-30 seconds for a new probe. When calibrating the pH electrode the controller software will count down from 25 seconds to ensure good calibration.
- Keep the pH sensor and buffer solution still when calibrating your instrument. Vigorous movement of the sensor can disrupt readings and lead to inaccurate calibrations, should the pH electrodes reading be disrupted during calibration the countdown will reset.
- Select a pH range for calibration that will be similar to your operating conditions. For example, if the operating range is 7.80 to 8.10 then perform a 7.00 and 10.00 calibration.
- When calibrating your sensor, always use a fresh buffer solution and discard the buffer after use.

- Be aware of the temperature of the buffers being used. Generally buffer manufacturers write on their label at what temperature the pH is its true value (generally 77°F, 25°C). Temperature can influence dissociation and thus if your calibration is done with a buffer not at its prescribed temperature, your calibration will be inaccurate. It is best to calibrate with buffers that have an accurate pH close to your operating conditions.
- Air bubbles and other liquids can form around the outside of the sensor and affect the accuracy of the reading. Be sure to remove any air bubbles upon installation.

The RAH-210 and RPH-250 residual analyzers allow the user to select from four different calibration methods including: 4-7 pH calibration, 7-10 pH calibration, 4-10 pH calibration, and the sample pH calibration. The calibration type to use is completely up to the user. However Hydro Instruments recommends using the following setting:

- A. If pH buffers are not available, then use the “sample” calibration. This is only a one point calibration (your sample) and will automatically calculate an ideal calibration slope. This provides reasonable accuracy if the sample pH is close to seven and pH of the process is relatively stable.
- B. If sample pH is less than seven, use the “4-7” calibration.
- C. If sample pH is greater than seven, use the “7-10” calibration.
- D. If sample stream is subject to wide swings in pH, use the “4-10” calibration.

To calibrate your pH electrode follow these instructions below, and reference Figure 1 for menu layout:

1. Enter the analyzers setup menu. This screen is password protected; access to this screen is defined in the instruments O&M manual.
2. Navigate to “pH” using the down arrow key. Once “pH” is blinking press the plus key. You are now in the pH calibration mode.
3. Choose your pH compensation method by pressing the plus key until the desired pH compensation method is displayed. Your choices of pH compensation can be seen below.
  - a. **None:** In this mode, the analyzer will assume the pH of the sample water is either stable or has been buffered low enough such that dissociation is not a concern. Note that in this mode, the pH value is not displayed on the main operations mode screen. If this mode is chosen, no pH electrode is needed.
  - b. **Auto:** In this mode, the pH value of the sample water is monitored using a pH electrode (available through Hydro Instruments) and compensation is performed automatically in the controller’s software.

- c. **Manual:** In this mode, the pH value of the sample water can be entered and will remain fixed unless changed.
  - d. **Monitor:** In this mode, the sample water pH will be continuously monitored by the pH electrode but it will have no effect on the residual reading.
4. If Auto or Monitor modes have been chosen; on the following screen you can select your calibration method. Select the calibration method based on recommendations A-D (on page 3)

#### 4 – 7 pH, 7 – 10 pH & 4 – 10 pH Calibration

5. Once the calibration method is selected, the first buffer solution required will be displayed on the screen. Place the pH electrode into the appropriate buffer and select 'Begin'.
6. The software waits for the reading to stabilize for 25 seconds before accepting or rejecting it as a valid calibration point. The countdown timer will appear on the screen in real-time. Note: The pH value will not be displayed.
7. If the calibration point is accepted, an "accepted" screen will appear. Press down to clear the screen and the next buffer solution required will appear.
8. Place the pH electrode in the appropriate buffer solution and select 'Begin'.
9. Again, the software will wait for a stable reading over 25 seconds. If the second calibration point is accepted, an "accepted" screen will appear. Press down to clear and the pH calibration is complete.

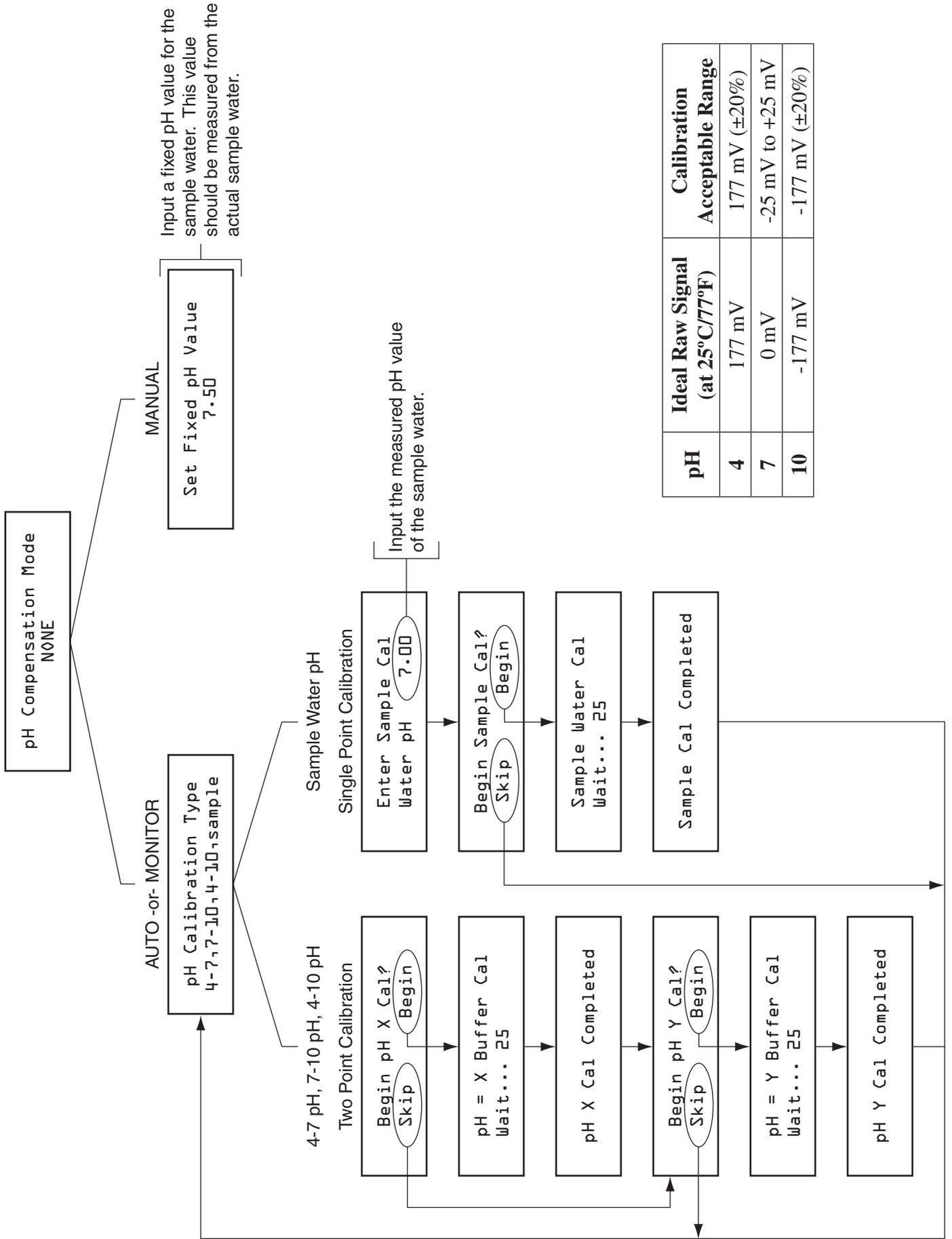
#### Sample Calibration

This calibration is carried out with the pH electrode left installed in its holding cell with the sample water flowing through it.

- A. If this calibration option has been selected, the following screen will require the operator to enter the pH of the sample water in which the calibration will be done.
- B. Use a hand held pH meter to measure the pH of the sample water and then enter the pH of the sample on the screen.
- C. Before proceeding check that no air bubbles have formed on the tip of the pH electrode. Select 'Begin'; the software will wait for a stable reading over 25 seconds before accepting or rejecting the calibration point. If the calibration point is accepted, press the down key and the pH calibration is complete.

*Note: If at any point your pH calibration is rejected, the entire calibration procedure will need to be repeated. If the problem persists, see the troubleshooting section below.*

# (pH Calibration Menu Flow Chart)



pH	Ideal Raw Signal (at 25°C/77°F)	Calibration Acceptable Range
4	177 mV	177 mV (±20%)
7	0 mV	-25 mV to +25 mV
10	-177 mV	-177 mV (±20%)

#### IV. Troubleshooting:

If at any time your pH electrode is not reading accurately or fails to calibrate follow the following steps.

1. Check the electrode surface for air bubbles/build up: Often times inaccurate results can be from buildup of materials on the electrode surface. Gently blot the electrode surface with a microfiber cloth to remove any coatings. If that does not work then the electrode should be placed in a solution that will dissolve the coating material in one to two minutes. NEVER BRUSH OR SCRATCH THE SURFACE.

##### General guidelines for Electrode cleaning

Material	Solution	Notes
Soft coatings	N/A	Blot with microfiber cloth
Hard Coatings	5% Muriatic Acid	
Oil/grease	Detergent and solvent	Avoid acetone as it could destroy the CPVC
Protein-based	Enzyme-based cleaners (TERG-A-ZYME)	

2. Recalibrate instrument: With time, pH electrodes can lose their response time and sensitivity. Recalibrate the instrument to restore the electrode back to its proper working condition.
3. Check buffers: Make sure that the buffers are fresh and at their correct conditions.
4. Replace electrode: If none of the preceding steps has worked, then your pH electrode has either expired or lost its sensitivity and needs to be replaced.