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WM1, WIND, W400: pH Sensor Troubleshooting Guide (Electrode and Housing)

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Section 1: Sensor Reading Responds Slowly

Step 1:

The pH or ORP electrodes require periodic cleaning and calibration. These electrodes are like batteries and their voltage outputs will change with time even if they are not being used.

- The method of cleaning the electrode will depend upon the coating, as well as the materials of construction of the electrode. Do not use a solvent that will attack the electrode
- Oily coatings should be removed with a mild detergent or isopropyl alcohol.
- Hard scales such as calcium carbonate can usually be removed with a dilute hydrochloric acid solution.
- Soft coatings can be removed using a soft cloth or soft toothbrush.
- A two point calibration should always be performed after cleaning the electrode.

Step 2:

If cleaning does not speed up the electrode's response

- Replace the electrode.





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Section 2: Sensor Reading is Stuck on one Value

Step 1:

If the sensor reading is stuck on one number

- If it is stuck near 0 mV (7 pH) then there is most likely an electrical short.
- Broken glass inside the electrode shorts the pH + to the reference = around 40 mV = around pH 7.7.
- If it is stuck near 1200mV, then the pre-amp circuit is most likely open.
- Broken glass on the electrode tip could cause an open circuit which sends the signal drifting to the end, pH 14 or higher, or pH 0 or lower, or all the way to Sensor Error.

Note: If water leaks into the preamp, the reading may show that in a pH 7 buffer, the corresponding mV reading may be mV = -100 mV, instead of the correct reading of 0 mV at 7 pH, and the reading will not hold accuracy.

Step 2:

Check the sensor (electrode) for an electrical short.

- Power down the controller.
- Remove/unthread the electrode from the housing.
- Power the controller up.
- If reading drifts then the electrode has a short. Replace the electrode. If the reading is still stuck on one number, proceed to **Step 3**.

Step 3:

Check the sensor preamp (housing), extension cable (if installed), and connections, for an electrical short.

- Power down the controller.
- Disconnect the preamp from the controller.
- Power the controller up.
- If reading drifts then the preamp has a short. Replace the preamp.





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- If the reading still does not drift, disconnect the sensor cable from the sensor extension cable (if installed). If no sensor extension cable is installed, disconnect the sensor cable from the controller.
- If the reading drifts, then either the wiring connections were the cause, or a faulty extension cable (if installed). Fix the wiring connections or replace the sensor extension cable.
- If the reading is still stuck on one number, proceed to **Section 4**.



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Section 3: Sensor Reads Low or High Versus a Calibrated Handheld Meter; Cannot Calibrate

Step 1:

pH value versus mV reading.

- This menu displays the mV measured by the electrode. For every pH unit above 7, the mV value should change by about -59 mV. For every pH unit below 7, the mV values should change by about $+59$ mV.



Step 2:

Perform a pH sensor calibration in accordance with the controller manual.

- If the sensor cannot be calibrated, first thing to try is clean the sensor.
- If the sensor cannot be calibrated after cleaning, proceed to **Step 3**.

Step 3:

Go to the **Sensor mV menu. Resetting to factory defaults.**

- Verify the pH and mV values correlate as mentioned in **Step 1**.
- If they do not, we will reset the sensor calibration.
- Go into the Sensor menu, go to Sensor Type, change it from pH to ORP, hit ENTER to save this change. Go back into the Sensor Type menu, change it from ORP back to pH, hit ENTER to save this change.
- Re-check the mV and pH values as stated in **Step 1** above. If the pH and mV values still do not correlate, then either the preamp or the electrode is faulty. Proceed to **Step 4**.

Step 4:

Go to the Sensor mV menu. **Resetting to factory defaults.**

- Verify the pH and mV values correlate as mentioned in **Step 1**.
- If they do not, proceed as follows depending on which controller model you have.



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- For a WM1 or WIND controller, go into the Sensor Input menu, and press the reset defaults button. Proceed to **Section 5**.
- For a WPH400 controller reset the controller to factory defaults as follows.
 - Caution: Resetting defaults erases any user defined settings programmed into the controller.
 - Power down the controller, press and hold the ENTER and EXIT keys, power up the controller keeping the ENTER and EXIT keys pressed in until the controller boots up.
 - When the display comes up, you will be asked if you want to reset defaults, release the ENTER and EXIT keys and then press ENTER for yes. Re-check the mV and pH values. If the pH and mV values do not correlate, then either the preamp or the electrode is faulty. Proceed to **Section 4**.



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Section 4: Sensor Error

Step 1:

Perform a self-test for this sensor input.

- If the self-test passes, then the problem is not inside the controller. Continue to **Step 2**.
- If the self-test fails, disconnect sensor from the controller and repeat the self-test and if it still fails, send the controller back for repair. Contact your distributor or Walchem Customer Service with the controller model number and serial number to initiate the Return Authorization process.

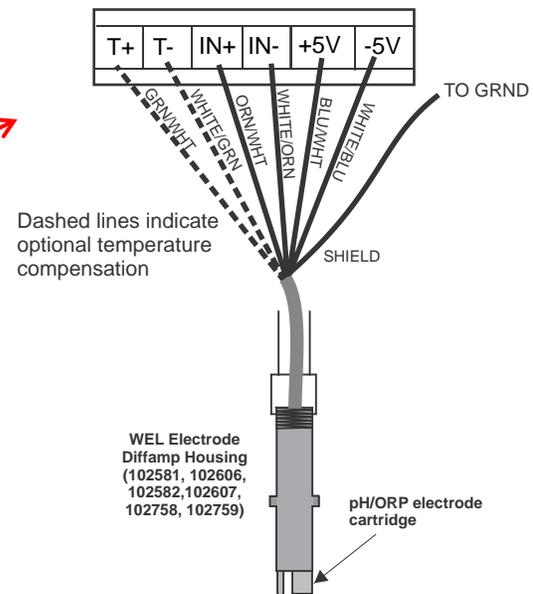


Step 2:

On the pH sensor input terminals inside the controller, using a multimeter:

- Measure the VDC across IN- and +5V, should read +5 VDC +/- 5%
- Measure the VDC across IN- and -5V, should read -4.6 VDC +/- 5%.
- If these measurements are out of spec with and without the preamp connected, the the controller is faulty. Contact your distributor or Walchem Customer Service with the controller model number and serial number to initiate the Return Authorization process.
- If these measurements are in spec without the preamp connected, then replace the preamp. If these measurements are in spec with and without the preamp, then continue to **Step 3**.

- Make sure the preamp is wired correctly into the controller, as shown.
- Be cautious about junction box connections. The sensor cable shielding should only be grounded on one end (inside the controller) otherwise there will be a ground loop.





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Step 3:

Check the sensor cable, sensor extension cable (if installed).

- Make sure you are using shielded sensor cable, 3 twisted pair wire. Use Walchem p/n 102535 or Belden 9680.
- Make sure the sensor cable is not run near, or in the same conduit as AC voltage wire (All wires carry voltage. We are concerned with adjacent wires that are carrying voltage above 24 VAC). If you suspect the sensor cable may be the problem, then take the existing sensor (with the 5 or 20 feet of cable), and wire it directly into the controller by-passing the sensor extension cable. If the sensor reading gets corrected, then the sensor extension cable, or where it was routed, was the problem.
- If wiring the sensor cable directly into the controller does not solve the issue, replace the preamp.



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Section 5: Housing Temperature Error

Step 1:

This error message appears if the signal from the automatic temperature compensation element disappears during operation. It is usually caused by a failure of the platinum RTD, or by a problem with the sensor cable or connections of the sensor cable. The sensor cable temperature leads are the Green and White/Green wires. These temperature leads must be disconnected from the controller when taking the resistance measurements.

- The Pt1000 RTD should read 1000 ohms at 0°C and 3.85 ohms/degree C above zero. At 25°C it should read 1096.25 ohms ±1%.
- A higher reading or open circuit (infinite resistance) may indicate a bad connection. A lower reading may indicate a shorted cable.
- Measure the resistance at each connection between the sensor and the controller to determine if the sensor, cabling or connections are faulty.



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Section 6: pH Reading is Unstable

Step 1:

The pH reading is unstable when the pH sensor is placed in the system water.

- Remove the pH sensor from the system water and place it in a beaker of water. Does the reading stabilize? If yes, then proceed to **Step 2**. If no, proceed to **Step 3**.



Step 2:

The sensor is still in the beaker, and the reading is stable.

- Obtain a length of wire (the ends of the wire must be stripped) long enough to place one end in the water in the beaker, and the other end in the system water.
- With this length of wire connecting the beaker water to the system water, does the reading stay stable?
- If the reading does not stay stable, this can indicate a ground loop. A ground loop could cause readings to be stuck at a high or low value. Or there is some electrical interference in the system water, possibly from a mixer or recirculation pump(s).

Step 3:

The sensor is still in the beaker, and the reading is still unstable.

- Power down the controller, disconnect the pH sensor shield wire from the Earth ground stud inside the controller.
- Does the reading stabilize?
- If the reading stabilizes, then there is possibly some electrical noise coming in through the controller VAC mains.
- If the reading does not stay stable, then connect the controller to an alternate supply voltage circuit. This may necessitate temporarily running an extension cord for this test. If the reading still does not stay stable, please contact Walchem for further instructions.