

ADDRESSING MINI RAE 2000 MOISTURE SENSITIVITY

The laminar flow 3D sensor in the MiniRAE 2000 Photo Ionization Detector (PID) was designed to have little or no response to moisture. However, when its PID sensor is dirty, misaligned or otherwise damaged the MiniRAE 2000 may show very strong response to moisture.

Exhalation Moisture Test

Try exhaling gently into a MiniRAE 2000 for 3-5 seconds. Assuming that one hasn't just consumed alcohol, the MiniRAE 2000 should show little to no response from this exhalation test (<5 ppm isobutylene units). If the MiniRAE 2000 shows substantial response (35-50 ppm) to the exhalation test something is wrong. The design of the MiniRAE 2000 makes it quick and easy to remove and clean the sensor to address this problem. Try focusing on the following areas:

1. Clean the Sensor
2. Clean the Sensor Housing
3. Inspect Sensor for Damage

Dirty Sensor Causes Current Leakage

A dirty sensor is the number one reason for moisture response. The sensor has two electrodes, a bias electrode and a sensing electrode. One carries a more positive charge than the other. As the UV light breaks down chemicals into positive and negative ions they migrate to the oppositely charged electrode. With clean dry air and clean electrodes no current can leak across the air space between the two electrodes.

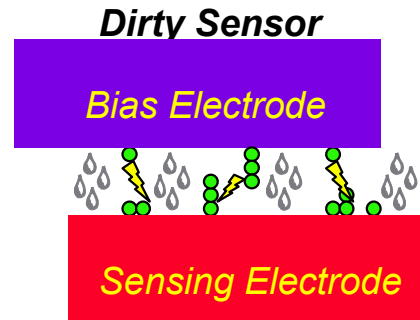
Clean Sensor

Bias Electrode

Sensing Electrode

No dirt build-up to foster a decrease in airspace resistance

However, even microscopic dirt accumulations on the electrodes can promote leakage especially in the presence of moisture. The sensor may appear to be visually clean, but actually is dirty enough to cause leakage. At low levels this leakage of current is interpreted by the MiniRAE 2000 as a reading of typically 35-50 ppm.



Dirt build-up absorbs water breaks down airspace resistance leading to sensor "leakage" or moisture response

At very high levels of leakage the MiniRAE 2000 will display a "Too Much Leakage" message on the screen. Pressing the "Y" key will continue. The "Too Much Leakage" message can also be displayed if the MiniRAE 2000 pump was shut off with a high level of sample left in the meter.

Prevention is the best cure

Preventing dirt and dust from entering the PID sensor is the best cure for moisture response. Make sure that all of the filters in the MiniRAE 2000 are clean and effective. In extremely dirty environments, it may be necessary to add an external filter to the MiniRAE 2000. However, under normal circumstances the standard "C-Filter" (Ref. TN-162) installed in the probe along with the sintered metal filter should be sufficient.

Cleaning the MiniRAE 2000 Sensor

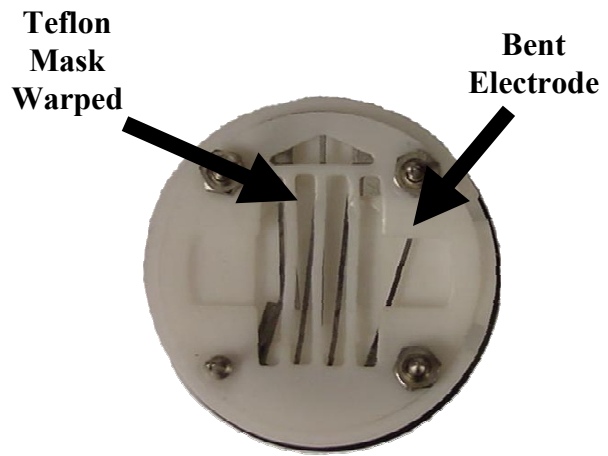
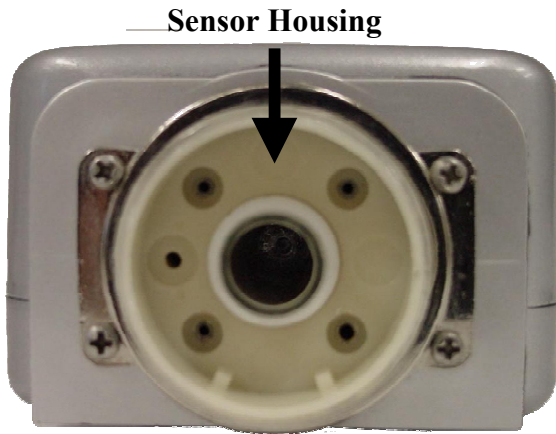
To clean the MiniRAE 2000 sensor remove it from the meter and immerse it in lamp cleaning solution (anhydrous methanol). An ultrasonic cleaner will assist in the cleaning process. It is not necessary to fill an ultrasonic cleaner with methanol (this might not be safe unless the ultrasonic cleaner is intrinsically safe). Instead, place the PID sensor into a suitable clean small container like a baby food jar filled with lamp cleaning solution. Immerse this jar into the water bath of the ultrasonic cleaner. The ultrasonic waves will pass



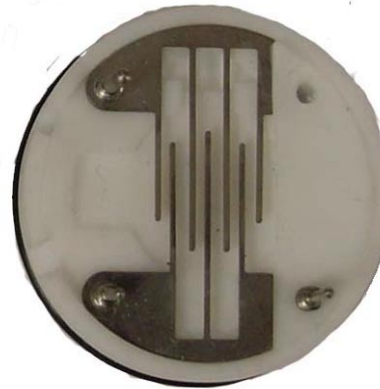
through the container and assist in cleaning the sensor. The lamp cleaning solution in the jar can be reused until it becomes dirty. Let the sensor dry overnight (warm but not hot air will speed the drying process). **Do not overheat the sensor and never disassemble the sensor!** It is very important to blow or shake out any residual lamp cleaning solution from the sensor before letting it air dry. Otherwise, some of the dirt that was just extracted into the cleaning solvent could be deposited back onto the sensor components as they dry. Reinstall the clean, dry sensor into the MiniRAE 2000. Exhale into the meter and check the response. If it shows no response to the moisture in your breath, calibrate the MiniRAE 2000 and return it to service.

Clean the sensor housing:

If after cleaning the sensor, the MiniRAE 2000 still responds to moisture, remove the sensor from the MiniRAE 2000. Thoroughly wipe clean the sensor housing area on the top of the MiniRAE 2000 case using a cotton swab dipped in lamp cleaning solution. Let the sensor housing area dry completely. Reassemble the



UV light. If the fingers look aligned, but are not in the same plane, some fingers are closer to the lamp than others, then the sensor should be replaced.



If moisture problems still persist please contact our service department at 888-723-4800.

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Inspect the sensor for damage:

If the sensor is damaged or even slightly misaligned it can show increased response to moisture. The bias and sensing electrodes are two sets of fingers in the MiniRAE 2000 sensor. These fingers should be straight and parallel. The bias electrode is immediately noticed when the bottom of the sensor is inspected. However, the sensing electrode should be blocked from your sight (and the UV light from the PID lamp) by a teflon mask. If you can see any of the sensing electrode the sensor needs replacement. The sensing electrode can be seen if the fingers are bent or if the teflon mask has warped. Warped teflon mask can be a sign that the sensor has been exposed to too much heat. If the sensing electrode is exposed to UV light, it will give some response to the