Volatile Organic Compounds Probe Maintenance

Application Note TSI-149

TSI's Model 984, 985, 986 and 987 probes use a Photoionization Detector (PID) sensor to measure Volatile Organic Compounds (VOCs). This Application Note explains when and how to calibrate, maintain and clean your PID. The electronics in the PID sensor in the TSI's VOC probes are not accessible, being designed to be maintenance-free. However, periodic sensor maintenance of the electrode stack and lamp may be needed for optimal performance.

When Does My Sensor Require Maintenance?

Your PID lamp will need cleaning from time to time. How often depends on the environment you are measuring. If you are measuring indoor air quality where the VOC concentrations are low and there are few particulates, then a monthly or even less frequent calibration may be adequate. However, if you are measuring high VOC concentrations and particulates are present in high concentrations, check calibration frequently. When the PID has lost sensitivity, change the stack as explained below in the sections entitled "Removing Electrode Stack and Lamp" and "Refitting Electrode Stack and Lamp".

The PID needs maintenance if:

Condition	Recommended Action
Sensitivity has dropped too much (note the change required when checking calibration),	Clean lamp
The baseline is climbing after you zero the PID	Replace electrode stack
The PID becomes sensitive to humidity	Replace electrode stack
The baseline is unstable or shifts when you move the PID	Replace electrode stack

Removing the Electrode Stack and Lamp

Caution: Always use the Electrode Stack Removal Tool (included with replacement stack); any other tools may damage your PID and void the warranty.

1. Remove cap and PID sensor from VOC probe, as shown in Figure 1.
2. Gently pull the sensor from the probe.
3. Place the PID, top side down, onto a clean surface.
4. Insert electrode stack removal tool into the two slots on the sides of the PID (as shown in Figure 2) and squeeze together until electrode stack and lamp are released.

   Caution: Electrode stack and lamp may jump off sensor and become lost if removed when the PID is right-side up.
5. Carefully lift the PID body away from the electrode stack and lamp.

Figure 1. Removing cap and PID sensor from VOC probe.

Notes:

- If the lamp lodges in the sensor, use tweezers to carefully remove it.
- If the spring behind the lamp also comes out, replace it in the sensor housing.

Figure 2. Using Electrode Stack Removal Tool.

Cleaning the PID Lamp

Cleaning the PID lamp is recommended as a first step for PIDs needing service. Use the procedure described below. Recalibrate the sensor after cleaning the lamp.

To check for a lamp that needs cleaning, hold it in front of a light source and look across the window surface as shown in Figure 3. A dirty lamp will have a 'blue hue' on the detection window.

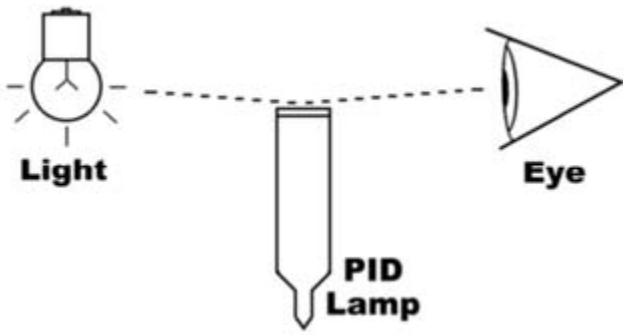

Figure 3. Checking Lamp For Contamination

Only clean the lamp using the lamp cleaning kit (P/N 801782) while following the instructions below. To avoid contaminating the sensor and affecting accuracy, do not touch the lamp window with bare fingers. You may touch the body of the lamp with clean fingers.

1. Remove Electrode Stack and Lamp from sensor and probe.
2. Open the container of alumina polishing compound. With a clean cotton swab, collect a small amount of the powder.
3. Use this cotton swab to polish the PID lamp window. Use a circular action, applying light pressure to clean the lamp window, as shown in Figure 4. Do ***not*** touch the lamp window with fingers.

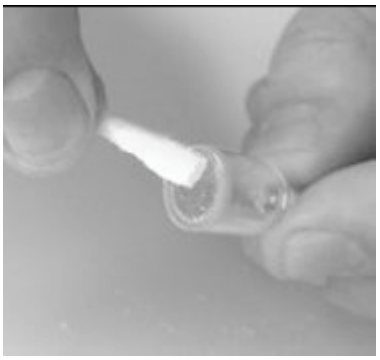

Figure 4. Cleaning Lamp Window

4. Continue polishing until an audible "squeaking" is made by the cotton swab moving over the window surface. Squeaking usually occurs within 15 seconds.
5. Remove the residual powder from the lamp window with a clean cotton swab. Care must be taken not to touch the tips of cotton swab that are to be used to clean the lamps as this may contaminate them with finger oil.

Ensure the lamp is completely dry and any visible signs of contamination are removed before replacing.

PID Lamp Cleaning Kit P/N 801782

The vial of cleaning compound contains alumina (CAS Number 1344-28-1) as a very fine powder. A full material safety data sheet MSDS is available on request. Key safety issues are identified below.

Hazard identification:

May cause irritation of respiratory tract and eyes.

Storage:

Keep container closed to prevent water adsorption and contamination.

Handling:

- Do ***not*** breathe in the powder. Avoid contact with skin, eyes and clothing.
- Wear suitable protective clothing.
- Follow industrial hygiene practices: Wash face and hands thoroughly with soap and water after use and before eating, drinking, smoking or applying cosmetics.
- The powder carries a TVL (TWA) limit of 10 mg/m^3.

Replacing the Lamp

A PID lamp will last a long time, typically a few thousand hours. However, the sensitivity of the PID sensor is approximately proportional to the lamp light intensity. As the bulb ages and loses intensity, the response to a gas concentration decreases and may become noisier. If cleaning the window does not restore sensitivity, replace the lamp. Recalibrate the sensor after replacing the lamp.

Replacing the Electrode Stack

While the PID electrode stack can last the lifetime of the PID if used in clean environments, it may only last a month if used in heavily contaminated sites. Therefore, we recommend having a replacement electrode stack if you are working in dirty environments.

Replace the electrode stack if the sensor shows signs of contamination after the lamp window has been cleaned or is known to have been subjected to severe contamination. Recalibrate the sensor after replacing the electrode stack.

Discarding the Electrode Stack

Discard the contaminated electrode stack. The electrode stack does not have any toxic components unless contaminated in the field by toxic materials.

Refitting Electrode Stack and Lamp

Warning: Do **not** refit a damaged lamp.

1. Place the lamp inside the O-ring seal in the electrode stack as shown in Figure 3. Twisting the lamp slightly during insertion will help to ensure the lamp window is snug against the pellet's front electrode. The lamp should be freely supported by the O-ring.
2. Continuing to hold the electrode stack between forefinger and thumb, carefully insert the lamp into recess in the sensor ensuring that the lamp remains in position. Press the electrode firmly, to ensure that the wing clips are engaged, and the top faces of the electrode stack and sensor housing are flush.
3. Refit the sensor into the VOC probe and replace the sensor cover.
4. Re-calibrate the gas detector.

Figure 5. Inserting lamp into electrode stack

Spare Components

If you need spare components, then order the necessary parts listed below:

800706	10 ppm Cal Gas (for ppb probe)
800707	100 ppm Cal Gas (for ppm probe)
801780	Replacement Lamp
801781	Replacement Electrode Stack (for ppm Sensor) and Tool
801786	Replacement Electrode Stack (for ppb Sensor) and Tool
801782	Lamp Cleaning Kit with Spring
801783	Replacement ppm sensor
801784	Replacement ppb sensor

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