Technical Note:
Instructions on how to change the PID Lamp and Electrode Stack

The VOC module is a continuous sensor-based analyzer used to detect volatile organic compounds in ambient air. The module is designed for use in the AQM 65 compact air monitoring station.

The VOC analyzer module utilizes photo-ionization detector (PID) sensor technology. The operating life is up to 5 years long. The 10.6 eV UV lamp has a run time of 5000 lit hours and it is replaceable. This lamp helps break down the VOCs into positive and negative ions. The detector measures the current of the ionized gas. The measured current is proportional to the concentration of VOCs present in the sample. Inside the AQM 65's thermally controlled housing humidity effects are greatly minimized.

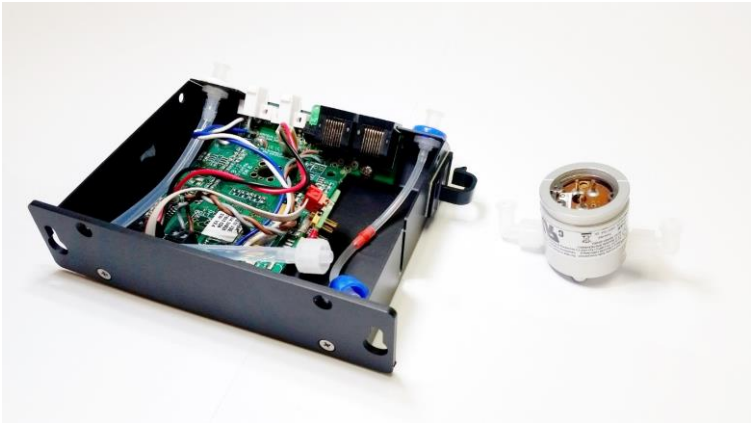
This document describes the procedure for changing the lamp and associated electrode stack. It is highly advised that the procedure be performed in a relatively dust free environment like in a factory or Lab Settings.

Items you will need before you start:

- PID lamp and electrode stack incl. removal tool (AQM R48) x1
- Pliers x1
- Philips Screwdriver x1
- Flowmeter (AQM R8) x1
- .KNF pump for PM & GTMv5 (AQM R10) x1
- .Anti-Magnetic Precision tweeze (CS TWEEZER) x1
- Vinyl/Nitrile/Latex Powder Free Gloves

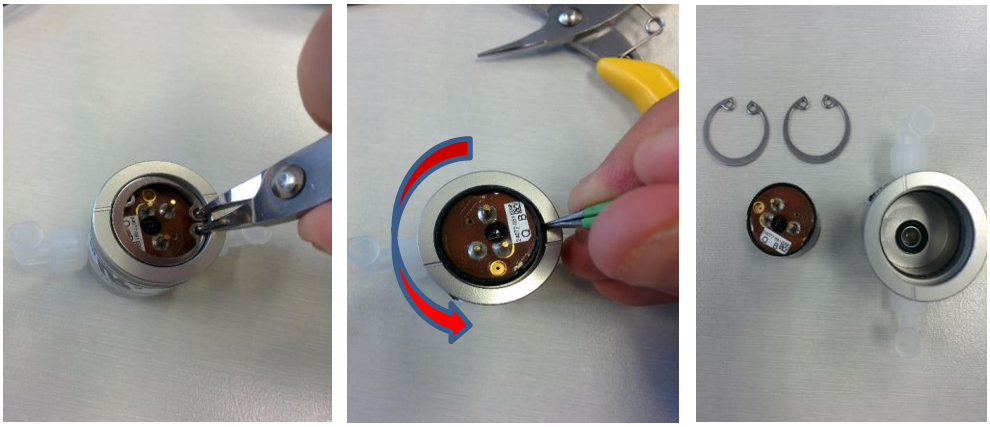
1. **Disconnect and remove the VOC Module from the AQM 65 and remove the PID Enclosure from the Module**

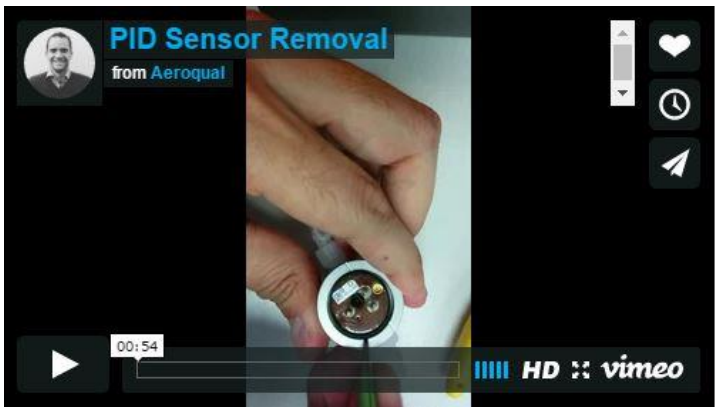
- Remove the front panel to access the PID Enclosure Module.
- Remove the PID Enclosure form the Module.



- Remove the two Circlips using a pair of pliers. Use tweezers to gently remove the PID Sensor from the enclosure module. Insert the tweezers between the sensor housing and the GSE sensor and gently pry the sensor upwards. Repeat this step multiple times while moving in a clockwise direction around the sensor. The sensor should slowly lift out of the housing (see video below).

⚠ **WARNING:** Do not use the pliers to pull the sensor out by its golden pins. The sensor build is very delicate and pulling it from the pins will result in the damage of the PCB board and the sensor.





https://vimeo.com/198649068

2. Replacing the Stack and Electrode in the PID Sensor:

Wear powder free gloves to prevent oils from your hands damaging the Lamp. Place the PID Sensor along with the replacement Lamp, Stack and the spring on a clean dust free area. In this case I have used a lint free tissue paper and placed all the parts on to it.

- Gently remove the sensor from equipment.
- Place the PID, pellet side down, onto a clean surface.
- Locate electrode stack removal tool (Special Black Tongs) into the two slots on the sides of the PID and squeeze together until electrode stack and lamp are released.
  Note: the electrode stack and lamp are held in place by a small spring and will pop out once released, therefore it is important to ensure the PID is placed on a flat surface, pellet side down prior to releasing the electrode stack.
- Carefully lift the PID body away from the pellet and lamp.
- Occasionally the lamp may be temporarily lodged in the cell and will need to be freed carefully with tweezers.
- The small spring behind the lamp may come out when the lamp is removed from the sensor. Simply replace it back into the sensor housing.

Note: Discarding the PID electrode stack:
The electrode stack does not have any toxic components, however, if it has been contaminated by toxic materials, show due care when disposing of it.

3. Re-fitting the PID electrode stack and lamp

⚠ **WARNING: Never refit a damaged lamp.**

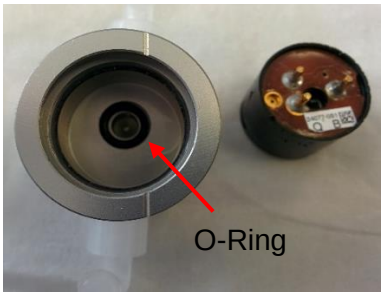
- Place the lamp inside the O-ring seal in the pellet as illustrated. Twisting the lamp slightly during insertion will help to ensure the lamp window is snug against the electrode stack's front electrode. The lamp should be freely supported by the O-ring.
- Continuing to hold the electrode stack between forefinger and thumb, carefully insert the lamp into the recess in the sensor ensuring that the lamp remains in position. Press the electrode stack firmly to ensure that the electrode stack wing clips are engaged. Ensure the top face of the electrode stack and sensor housing are flush.
- Refit the sensor into the sensing equipment.

⚠ **Re-calibrate the gas detector in accordance with manufacturer's instructions.**

4. Re-fitting the PID Sensor into the Aluminium Enclosure

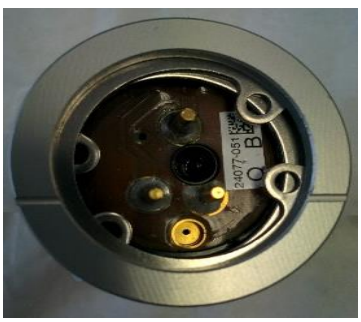
Once the Electrode and the Stack has been replaced into the Sensor, it is ready to go back in the Aluminium Enclosure.

- Check that the Small O-Ring is in position and sitting properly in the slot. If this is not in position, it will create a leak and the reading will be inaccurate.



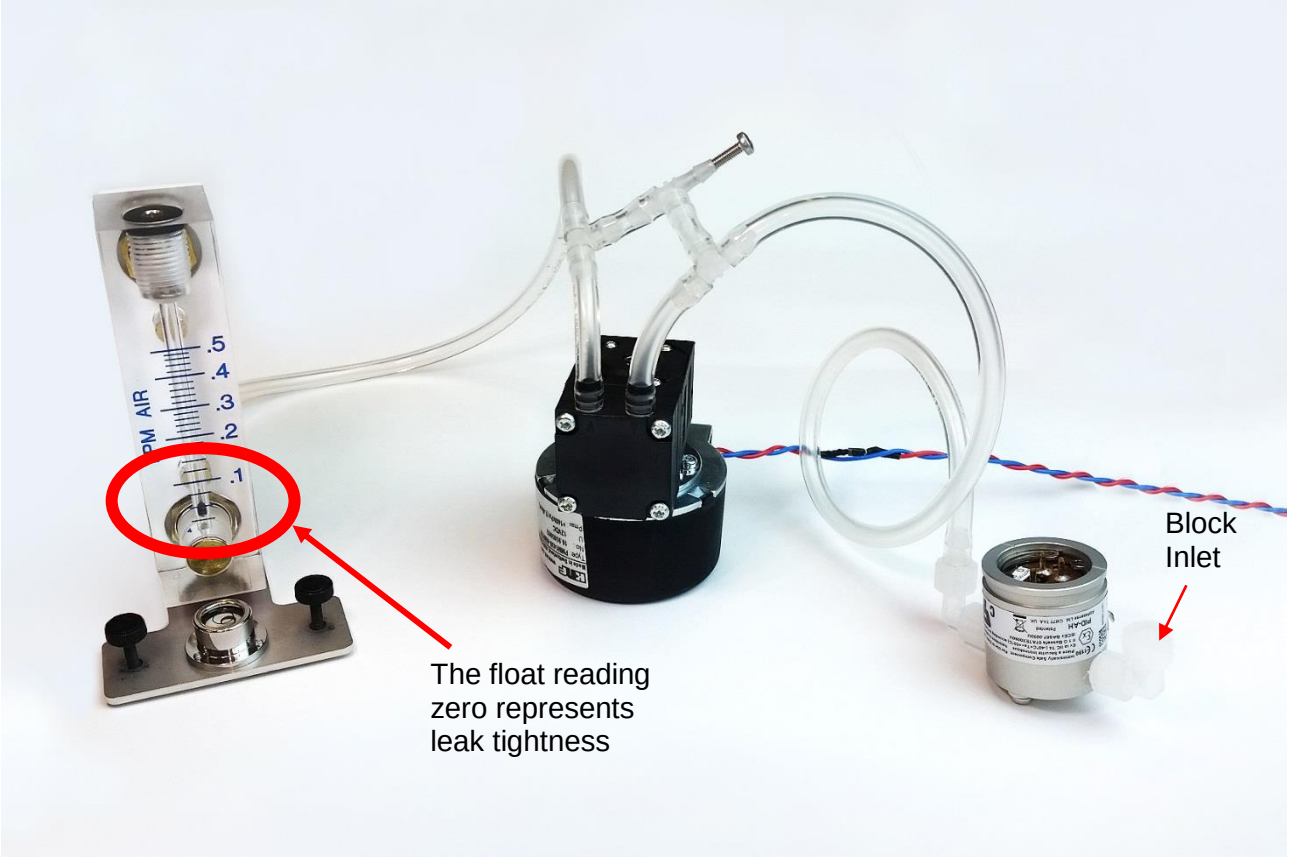
- Make sure that the two closest golden pins on the Sensor align with the indents on the aluminium enclosure. Please take a look at the attached picture.

- Place the two circlips on the sensor.



5. Leak test the sensor enclosure

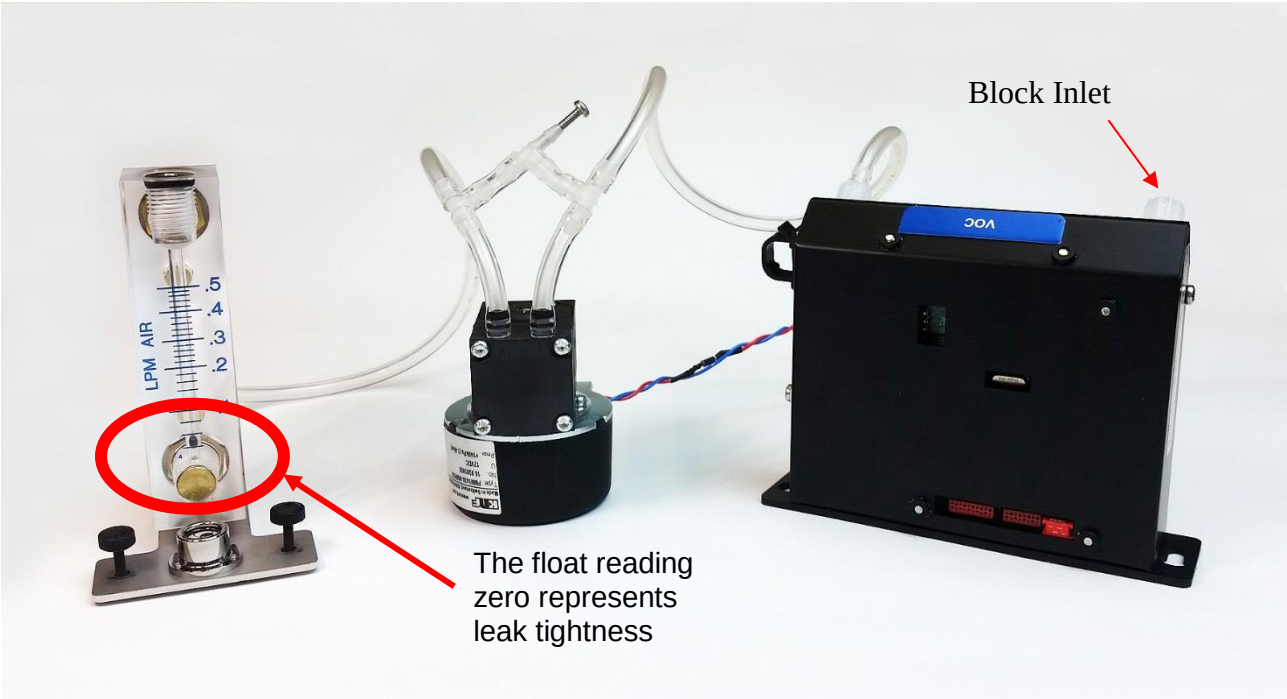
Perform a leak test at this stage to check that the Sensor is seated properly and the enclosure is leak tight.



- Place the Enclosure module back in the main module and redo the plumbing and the screws. Then perform a final leak test to check that module is leak tight.

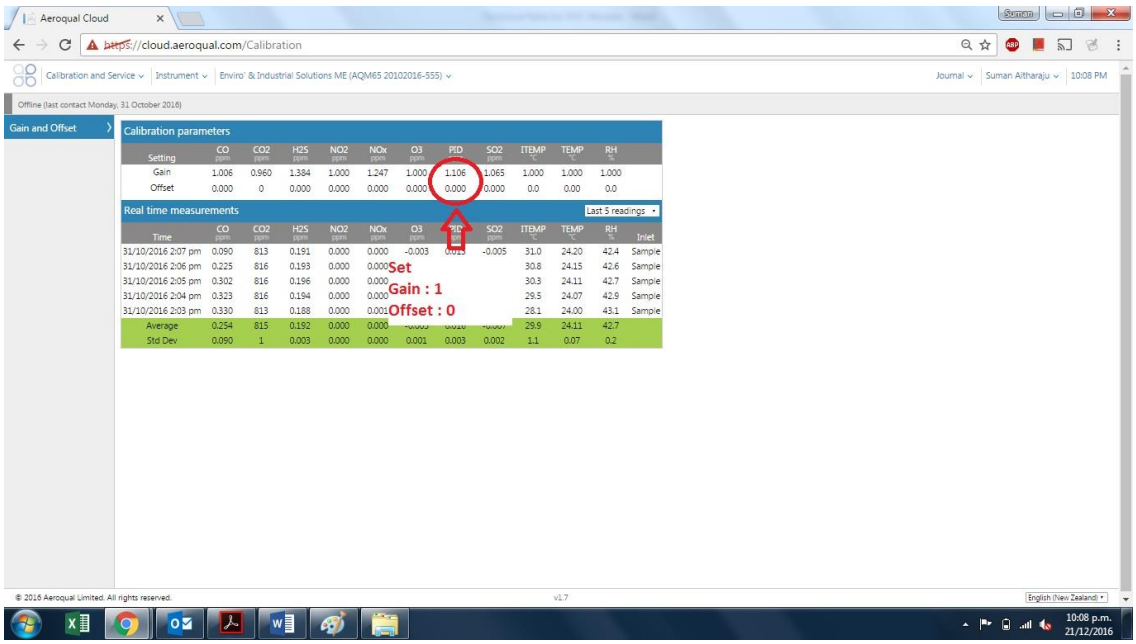
6. Leak test the Module

Perform a final leak test of the module to check that plumbing inside is proper and the module is leak tight.



7. Replace the Module back into AQM65 and Check for Diagnostic Parameters:

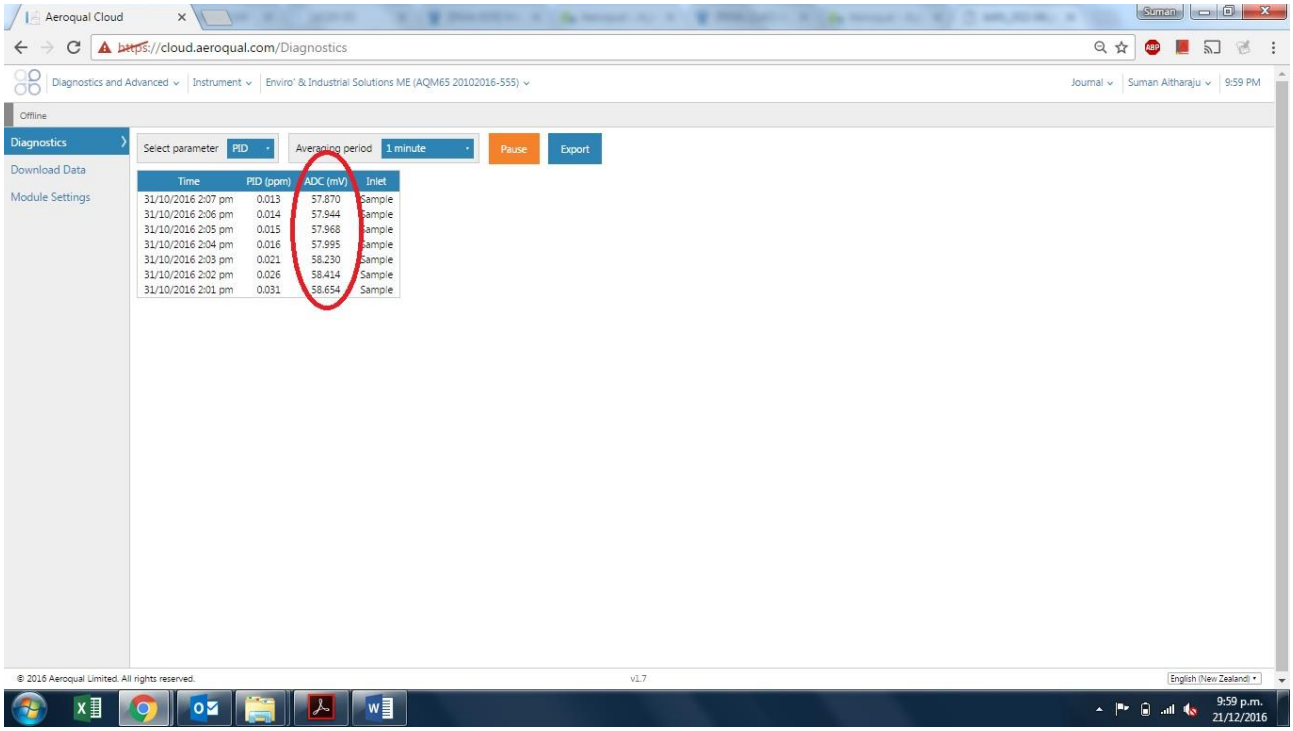
- Check the overall system flow rate and readjust if out of specification on the AQM65
- Access the calibration parameters on the calibration and service page of cloud or connect. Change the PID gain setting to 1 and the Offset to 0.



- Run the AQM65 on Zero Air for a minimum of 24 hours.
- Access the Diagnostic and Advanced Page on Cloud or Connect. Check for any Error states as per the following.

Error states (units shipped beginning 2009)

Normal operation: signal output is between 50 mV and (Vsupply – 0.1 V) which is about 80mV.



Error Condition: Voltages below 50 mV indicate an error condition:

- 32 (±4) mV indicates lamp out, but oscillator operating correctly. Change or clean lamp.
- 22 (±6) mV indicates the oscillator is not working. Change PID-A1/ PID-AH or electrode stack.
- 2 (±2) mV indicates power removed. Fault in OEM supply voltage.

Note: Voltages outside these limits are not rigorously defined.

Once it is confirmed that the signal output is within specification, perform the Module Calibration according to the instruction in the Manual.

Please contact Aeroqual for VOC Electrode Stack and Electrode Replacement Kits.