

Sensor Talks

PID Sensor



What Can it See?

- Lots of things, but there are millions of chemicals in the world today
- Focus on ionization potential
- Good for inert to normal atmospheres 0-20.8% O₂ or higher
- Combustible Items with high flashpoints
- Non-combustible items
- Both organic and inorganic chemicals



PID or LEL Sensor?

The flashpoint of the organic molecule is important. Flashpoints greater than 38 °C will be difficult to detect/register on an LEL sensor and may not be detectable.

- The toxicity limit for some compounds may be much lower than the LEL limit.
- Diesel is a great example:
 - Flashpoint is too high — use a PID.
 - Diesel is a blend similar to jet fuel, kerosene, bunker oil, marine oil and home heating oil — all with flashpoints too high for LEL.



Ionization Potential

- After ruling out an LEL sensor, check to see if a PID can detect it
- Refer to the PID Response Factor Table which examines some of the most common industrial chemicals:

http://s7d9.scene7.com/is/content/minesafetyappliances/ALTAIR%205X%20w_PID%20Response%20Factor%20Table%20-%20EN

- Less than 10.6eV=YES
 - Be cautious — things that are very close to 10.6eV could be fairly slow to or not detect
 - The lamp also has an energy band that shifts lower over the life of the bulb. Things close to 10.6eV may be detectable now, but not after time.
- **If not on the MSA list:**
 - Check Chemical Database on MSA Response Guide:
<https://webapps2.msasafety.com/responseguide/ChemicalDatabase.aspx>
 - Run a Google search. Keyword: “What is the ionization potential of _____.”
 - Consult guides on the internet other than MSA's.



Troubleshooting Lamp Failures

- Change filters/sampling attachments in the 5X.
- Clean the PID lamp after failed calibrations and/or humidity concerns (*high humidity transient areas*)
- Lamp failures should exhibit the following progression of response, with increasing levels of skill and cost:
 - Clean the lamp
 - Change the lamp
 - Change the ionization chamber
 - Buy a new sensor
 - Send back for a repair



Humidity Concern

Non-condensing humidity

Can cause quenching (*the absorption of UV light by the water molecules/humidity*) which will understate concentration.

Condensing humidity

Droplet of water inside the UV lamp bulb (*ionization chamber*) can increase signal and go into alarm or potentially constant alarm.

- Happens when you transfer from air conditioned to hot, humid exterior.
- Can minimize by cleaning lamp bulb. Dirty bulb more readily attracts and allows moisture to condense.



Methane

Can have an effect called methane quenching, which decreases signal.



RF

If a false positive is suspected, discuss radio frequency interference as a last option.

TOOLS



Photoionization Detectors (PIDs)
Theory, Uses
and Applications



MSA ALTAIR®
Gas Detectors:
Cold Weather
Performance



IR & Catalytic
Combustible
Detection

WE KNOW WHAT'S AT STAKE.

- PIDs rely upon ionization as the basis of detection.
- PID warranty is one year from date of manufacture.
- PID run time shall be at least 13 hours at room temperature.
- A response factor is a measure of PID sensitivity to a particular gas.
- Most substances can be ionized; some more easily than others.
- The ability of a substance to be ionized is measured as ionization potential (IP) using an electron volt (eV) energy scale.
- Photoionization detectors offer the combination of speed of response, ease of use, maintenance small size.
- The ability to detect low levels, including most volatile organic compounds (VOCs).



Commonly Asked Questions

Q: What does it mean when a sensor is under/over range and what should I do?

A: The Sensor needs to be calibrated, the instrument could have been powered off when it was still detecting gas concentrations and was not allowed to clear out or was not zeroed properly.

Q: What causes sensor drift?

A: Many environmental conditions can affect sensor readings and can often look like sensitivity drift, including gas interference and cross-sensitivity. Refer to the following document for more information: <https://msa.webdamdb.com/bp/#/folder/1777763/68776031>

Q: Where is the date code on the PID and how do I read it?

A: The date code for the PID will be found on the sensor housing label, located above the QR code. Below is an example of how the date code can be interpreted:

11	24
Month Indicator	Year Indicator
01–12 corresponds with January – December	Indicates the last two digits of the year of manufacturing

Q: Can the PID be used to detect ammonia and chlorine?

A: Chlorine derivatives can be detected, i.e., dichlorobenzene, dichloroethene, vinylidene chloride. Ammonia can be picked up on the PID 10.6 eV lamp but should only be used as a go/no-go indicator as the RF can change drastically based on the humidity levels.

Q: Why does high humidity have an effect on my PID readings?

A: A number of environmental factors may affect the gas sensor readings, including changes in pressure, humidity and temperature. If humidity changes by any significant degree (e.g., going from a dry, air conditioned environment to outdoor, moisture laden air), oxygen readings can be reduced by up to 0.5 %, due to water vapor in the air displacing oxygen. The oxygen sensor will be able to sense this change and may display a lower reading than 20.8% VOL.

A VOC low or high alarm may be triggered when the device is calibrated in a dry, air-conditioned environment and transferred suddenly to a high-temperature and high-humidity outdoor environment. To avoid alarm activation, cleaning the PID sensor(s) is recommended prior to this type of transition or to acclimate the sensor to the outdoor conditions in a known safe area.

Q: What if my VOC is not listed on the Response Factor Table?

A: If the VOC is not listed in the response factor table then MSA might not have conclusive test data on the gas. If required, please contact Customer Service to check possibility to determine a RF through sample testing.

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