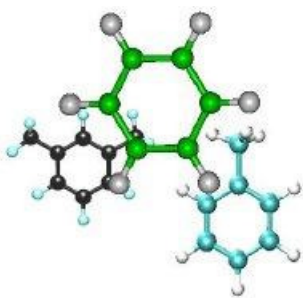


## BASE BA-VOC Volatile Organic Compounds Measurement in Process Gas



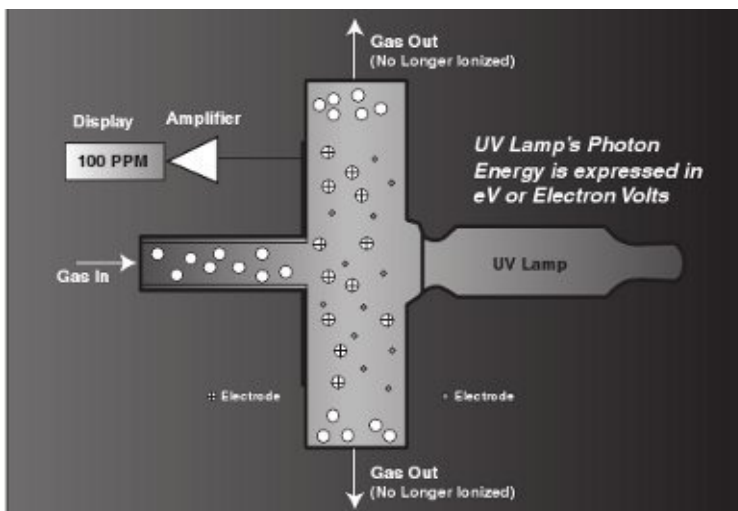
The BASE BA-VOC is part of the **BAGGI BASE®** Instruments Series. They are the result of combining the latest state-of-the-art-technology with over 50 years of industry experience.

This instrument is designed to detect the presence of Volatile Organic Compounds (BTEX aromatic hydrocarbons: Benzene, Toluene, Xylene, Ethylbenzene, Styrene) in process gases. It is a fixed mounting device optimized for the real-time continuous monitoring of gaseous streams in the potentially explosive atmospheres encountered in the petrochemical plants. A data logger is incorporated within the instrument. Remote operation is available through the use of serial protocols (such as Modbus), TCP/IP and WiFi.

The sensor is made by a Photo-Ionization Detector (PID). This proven technology is able to monitor VOC vapours at parts-per-million (ppm) levels. Other advantages are speed of response, ease of maintenance and affordability.

### Operating Principle

The Photo-Ionization Detector operates on the principle of absorption of ultraviolet light energy by a target gas. The internal sampling pump of the instrument draws a gas stream into the ionization chamber. This chamber holds an ultraviolet light source with a known energy potential. This potential is referred to as the photon energy of the lamp. If the energy from the lamp is at a level *greater* than the amount of energy required to excite the gas (the ionization energy) it will cause it to ionize, or release electrons. These electrons gather on the electrodes within the PID module and the instrument's electronics interpret them as a quantitative concentration of gas. The number of electrons released is proportional to the concentration of the gas in the chamber. Once the gas exits the ionization chamber it reclaims its lost electrons, returns to its original state and is returned to the process. The diagram gives a graphic representation of PID theory of operation.



The BA-VOC is equipped with UV lamps that supply a ionization energy of either 9.8 eV or 10.6 eV (electron Volt). The former delivers an amount of energy that is just enough to ionize the aromatic compounds, while preserving from ionizing the other hydrocarbon and inorganic compounds. The following table lists a few typical ionization energy values (in eV):

Compound	Ion. Energy	Compound	Ion. Energy	Compound	Ion. Energy
Benzene	9.25	Xylene-m	8.56	Ammonia	10.16
Toluene	8.82	Styrene	8.43	Methane	12.61
Ethylbenzene	8.77	Hexane	10.13	Carbon monoxide	15.0

As an example, the table shows that Methane and Carbon monoxide cannot be detected by PID technology.

### NOTE

PID devices are extremely sensitive, but are not analyzers. They display the total VOC quantity, but cannot determine the exact percentage of the different aromatics within the VOC stream.

The figure below shows the Control Unit in the ATEX certified version. This one is contained within a Stainless Steel 316L enclosure provided with a protective air purge system and an optional Vortex cooler (connected to the plant instrument air). Magnetic push buttons allow controlling the system without opening the cabinet.



ATEX certification:

- II 2 G Ex px II T6
- II 3 G Ex pz II T6

Upon request, a flameproof enclosure (ATEX II G EExd II T4) is delivered.

The Control Unit enclosure contains the embedded computer and the PID sensor(s), connected to one or more streams from the process.

The sampling system is designed according to the Customer's requirements, including filters against humidity and dust, connections to the calibration cylinders and any pump.

Sensor Specifications (isobutylene calibration)	
<b>Range (user selectable)</b>	0 to 10 ppm 0 to 100 ppm 0 to 1000 ppm
<b>Response time T90</b>	< 5 sec.
<b>Accuracy</b>	0 – 100 ppm +/- 1 ppm or ≤ 2% 0 – 1000 ppm +/- 2 ppm or ≤ 25%
<b>Linearity</b>	0 – 1000 ppm > 25%
<b>PID</b>	10.6 eV lamp (standard)
Control/Verification Unit Specifications (ATEX version)	
<b>External input/output (according to the software application packages installed)</b>	<ul style="list-style-type: none"> <li>- Analog input: four inputs filtered with transient protection</li> <li>- Analog output: three isolated outputs, 4 – 20 mA (standard)</li> <li>- Analog output: three additional isolated outputs (optional)</li> <li>- Digital input: six digital inputs (optional)</li> <li>- Digital output: four isolated relay signals (alarm and warning)</li> <li>- Digital output: four additional relay signals (optional)</li> <li>- Serial line: RS-232/RS-422/RS-485 with Modbus/Profibus/FieldbusFoundationProtocol</li> <li>- Ethernet card: two 10/100 mbps with RJ-45 port</li> <li>- One integrated WiFi card 11 Mbit/s</li> </ul>
<b>Power</b>	90-264 VAC, 47-63 Hz; 6A max
<b>Operating environment</b>	- 0 °C to 40 °C (32 °F to 104 °F) - 0 °C to 55 °C (32 °F to 131 °F) with vortex cooler
<b>Enclosure protection</b>	IP66
<b>Dimensions/Weight</b>	- Wall Mount: 500mm H x 400mm L x 250mm D (19.68" H x 15.74" L x 9.84" D) - Weight: 15 Kg approx.
<b>ATEX Compliance (other upon request)</b>	II 2 G Ex px II T6 II 3 G Ex pz II T6

All the specifications subject to change without notice

For specific requirements, please contact the e-mail address below:  
[baggi@baggi.com](mailto:baggi@baggi.com)