

# VOC+ ANALYZERS

PID or FID +

*Safety, Stack & Environmental Monitoring*



*CO<sub>2</sub>, CO, O<sub>2</sub>, SO<sub>2</sub>, H<sub>2</sub>S, NO, NO<sub>2</sub>, NH<sub>3</sub>, HCl, Cl<sub>2</sub>, HCN,  
H<sub>2</sub>, ETO, CH<sub>2</sub>O, % LEL*

PID  
ANALYZERS

MODEL 112 GAS ANALYZERS

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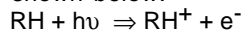
## Introduction

The **Model 112** Analyzers are reliable, flexible and versatile instruments based on photoionization (PID) or flame ionization (FID) detectors for the measurement of volatile organic compounds (VOCs). Electrochemical sensors can be added to measure toxic gases in addition to VOC's in the workplace. These analyzers have an optional setpoint meter that can be used to control outside air vents or alarm if the gas is above an alarm level.

Other Continuous Analyzers manufactured by PID Analyzers include the Model 201-B PID or FID Analyzer for total VOCs, a thermal conductivity detector (TCD), Model 204 and a Model 210 Paramagnetic Oxygen Analyzer.

## Principle of Operation

**PID-description-**The process of photoionization is initiated by the absorption of a photon of ultraviolet radiation energetic enough to ionize a molecule (RH) by the process shown below:



where  $h\nu$  represents a photon with an energy  $\geq$  the ionization potential of species RH. The ions are collected in an ionization chamber which is adjacent to the lamp and contains an accelerating electrode (biased positively) and a collection electrode where the current is measured. After amplification, the current measured is proportional to concentration. The response measured will be a summation (total) of the hydrocarbons ionized.

**FID Description-** In the FID, the sample is burned in a hydrogen-air flame and the ions formed from carbon containing compounds are collected by applying a positive potential to the jet and measuring the current at collection electrode just above the flame. After amplification, the current measured is proportional to concentration. The response measured will be a summation (total) of the hydrocarbons ionized.

**Amperometric techniques** can use two or three electrode systems for detection. A membrane is used to separate the phase being measured (air containing a toxic gas) from the electrolyte where the measurement takes place. Various organic and inorganic compounds can be sensed at an electrode interface by applying a voltage that is equivalent to the oxidation or reduction potential. This signal is amplified and displayed on the digital meter.

## Applications

### Hydrocarbons & Methane

- VOC's from carbon beds
- VOC's from manufacturing
- VOC's from hydrocarbon tank farms
- Drying oven ppm (PID) & % LEL (CG)
- Pill Coating ppm (PID) & % LEL (CG)
- Stack & Vent monitoring ppm or % LEL
- Monitoring workplace atmospheres
- Control outside makeup air to minimize air exchanges and keep levels of VOCs at a minimum
- Detection of leaks from processes
- Monitor/Control the buildup of indoor air pollutants
- Safety Monitoring
- Scrubber outlets- efficiency of VOC's
- HCl, NH<sub>3</sub>, H<sub>2</sub>S

## Features-

**Automatic Restart-** In the event of a power outage, the instrument will automatically restart

**Wide operating range** with no range changing necessary- **16 Bit ADC**

**Push button calibration-** automatically adjusts response

**RS232 digital output-** can print to a serial printer or print to a PC; **4-20 mA analog** output (optional for single channel) to interface to PLC or DCS system. For multichannel data acquisition, the RS485 output is required.

Stored calibration values

Audible alarm- internal

Datalogging (programmable) for 7,000 points

Easy to calibrate; Turn on/off functions via simple keypad

Interchangeable electrochemical detectors

Battery operation is available as an option

# Low Cost Single or Multisensor (up to 4) Analyzers, Sampling Systems

## **Specifications**

**PID, FID Electrochemical Sensors, CG sensors specifications are available (see back Page Table I).**

**Available in two configurations:**

**Single component (PID or FID) or**

**Multiple component (1-3 sensors);  
CG plus 2 EC or 1-3 EC Sensors**

**Measurement mode:** Continuous

**Response time-**

PID or FID <3 sec to 90%

EC- 20-50 sec. to 90%

**Zero drift-** <2% per month

**Span drift-** depends on sensor but less than 2% per month with biweekly cal

**Single alarm-** customer programmable

**Wide range of response-** from ppm to 100 %

**Readout-** 5<sup>1/2</sup> digit LCD smart panel meter with backlighting

**Standard output:** RS232; optional outputs- 0-1 VDC, 4-20 mA & RS485

**Enclosure:** Wall (NEMA 4)-General Purpose 6.75" W x10<sup>3/8</sup>"H x 6"D;  
Weight: 7.4 pounds

**Power requirements-** 100-240VAC, 1 amp

## **Range-**

PID - 0.1 to 3,000 ppm

FID- 5.0 -3,000 ppm

Sensors can be used for safety or environmental monitoring at low ppm levels. Higher levels for SG sensors. Oxygen can be measured at % levels or ppm levels depending on the application. CG sensors from 5-100% LEL.

## **Options**

4-20 mA output (single sensor);  
RS485 output (multiple sensors)

Single alarm setpoint- Customer Programmable

Data acquisition and storage using [DataWorks software](#)

[X Proof-](#) explosion proof enclosure (see 900 transmitters)

## **Sampling Systems**

One of the most difficult challenges is to deliver a sample stream saturated with water at an elevated temperature to the analyzer without any change in the composition of the compounds to be measured. [A photo of one of our sample conditioning system is shown below.](#) For additional information, please contact PID Analyzers.

The system below requires only compressed air for operation and removes all liquid water from the sample. It can be used in a Class I Div 1 area.

We also offer heat exchangers and heated sample lines for other types of samples. A heated permeation sampling system is ideal for SO<sub>2</sub> and NO<sub>x</sub> from combustion sources.



# Sensor Specs, DataWorks Software, Transmitters

**Table I**  
**Sensor Specifications**

Sensor	Range ppm	Det. Limit	Resp. Time (s)	Interferences
PID	0-3,000	0.1	1	-----
FID	0-3,000	0.1	3	-----
Ammonia	0-3,000	0.1	30	Amines
Carbon Dioxide	0-10,000	10	45	Acid Gases
Carbon Monoxide	0-1,000	0.5	15	H <sub>2</sub> , C <sub>2</sub> H <sub>4</sub>
Chlorine	0-10	0.1	30	
ETO	0-100	0.1	30	MEK, Ethanol
Formaldehyde	0-50	0.1	30	MEK, Ethanol
Hydrogen Cyanide	0-100	0.1	50	C <sub>2</sub> H <sub>4</sub> , H <sub>2</sub> S, SO <sub>2</sub>
Hydrogen Chloride	0-100	0.1	15	SO <sub>2</sub> , NO <sub>2</sub>
Hydrogen Sulfide	0-100	0.1	20	-----
Hydrogen Sulfide	0-5,000	0.1	15	----- with filter
Nitric oxide	0-250	0.1	10	NO <sub>2</sub>
Nitrogen Dioxide	0-20	0.1	15	NO, H <sub>2</sub> S
Oxygen	0-30%	0.1%	8	-----
Oxygen	0-1000	0.1	15	-----
Phosphine	0-5	0.05	40	SiH <sub>2</sub> , GH <sub>4</sub> , B <sub>2</sub> H <sub>6</sub>
Sulfur Dioxide	0-5	0.1	20	NO <sub>2</sub>
Silane	0-5	0.05	30	AsH <sub>3</sub> , PH <sub>3</sub> , B <sub>2</sub> H <sub>6</sub>
Combustible Gas	0-100 % LEL	0.1%	10	-----

\* ambient methane background

## DataWorks

Data Works is PIDs data collection and logging software that can be used with a wide variety of Sensor or Analyzer outputs such as Ethernet, RS485 & 4-20 mA . The latter two outputs are for long distance transmission of data as shown in Table I below. In-plant installations are typically 4-20 mA or RS485 because of the long distances involved 1,000-5,000'.

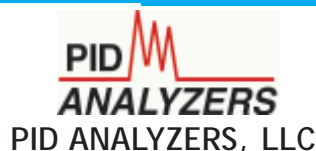
Each day at midnight, a new CSV or text file is created and named (by date). These files can be directly imported into EXCEL.

## Model 900- IR, CG, EC Transmitters

PID Analyzers offers a new explosion proof transmitters (electrochemical, combustible gas, IR and TCD for chemical loading, leaks, waste water treatment... applications. . The 4-20 mA transmitter is in a explosionproof junction box at or near the sensor. The readout unit can be located > 300 meters away in the control room. The sensor is designed for Class I Groups BCD.

### Applications for Transmitters

Chemical plants  
Refineries  
Solvent Mfg., Unloading chemicals



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