ELECTROCHEMICAL, % LEL &
TCD BASED ANALYZERS

Safety, Stack & Environmental Monitoring

CE

WiFi

113 ppm

1000

PID ANALYZERS

Operate the PID 60
- RUN
- CALIBRATE
- SETUP options
- Choose Sensor
- Set Clock
- Download Log
Submit
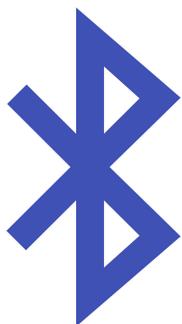
CO_2, CO, O_2, O_3, SO_2, H_2S, NO, NO_2, NH_3, HCl, Cl_2, PH_3, SiH_4, HCN, H_2, C2H4, ETO, Formaldehyde, % LEL, TCD

PID ANALYZERS   MODEL 1000 GAS ANALYZERS   hnu®

Introduction

The **Model 1000** Analyzers are reliable, flexible and versatile instruments based on electrochemical sensors for the measurement of chlorine (Cl2), hydrogen cyanide (HCN), carbon monoxide (CO) other toxic gases 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. These products are available in a NEMA 4 wall mount configuration.

Other Continuous Analyzers include the Model 201-B PID or FID Analyzer for total VOCs, a thermal conductivity detector (TCD) Model 204 and a The addition of these new Analyzers greatly improves the capability and range of process analyzers from PID.

Principle of Operation

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. The oxygen electrode was first described by Clarke in 1956 and is perhaps the best known of this type. Here, a fixed potential is applied to one electrode and the current generated by oxygen being consumed according to:

$$O_2 + 2H_2O + 2e^- \rightarrow [H_2O_2] + 2OH^-$$

is measured.

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. As the appropriate compounds diffuse to the electrode, they will be oxidized or reduced and will produce a current (proportional to concentration). This signal is amplified and displayed on the digital meter. The calibration value for each sensor is stored in the processor memory for later retrieval. *Other types of electrochemical sensors include potentiometric types such as NH_3 and CO_2.*

Applications

Hydrocarbons & Methane (CG or TCD)
  Drying oven % LEL
  Pill Coating % LEL
  Stack & Vent monitoring % or % LEL
 Monitoring workplace atmospheres
 Control outside makeup air to minimize air exchanges and keep toxic gas levels at a minnimum
 Detection of leaks from processes
 Monitor/Control the buildup of indoor air pollutants
 Safety Monitoring
 Stack gas monitoring- SO_x, NO_x, CO, O_2- Sampling systems available
 Scrubbler outlets- efficiency of HCl, NH_3, H_2S

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 be sent to a server via WiFi for data storage- see pg 4 for additional information.

Stored calibration values

Can Connected to an IPhone or Android cell phone for programming, storage or transfer data to a server or PC

  Audible alarm- internal

  Datalogging for >50,000 points
 Easy to calibrate; Turn on/off functions

  via simple keypad

  Interchangeable electrochemical detectors

  Battery operation is available as an option

Low Cost Single Analyzers & Sampling Systems

Specifications

Electrochemical Sensors, CG, & TCD sensors are available (see back Page Table I).

Single component or Multiple component (2-4 sensors); 1 CG or TCD plus 3 electrochemical sensors

Zero drift- Automatic compensation; <1-2% per month

Span drift- less than 2% every month

Alarm- customer programmable

Wide range of response-from ppm

Readout- **2.5" OLED Screen to display all channels**

Standard output: RS232; WiFi, Bluetooth

Enclosure:Wall (NEMA 4)-General Purpose 6.75" W x10$^{3/8}$"H x 6"D;

Weight: 7.4 pounds

Power requirements- 100-240VAC, 1 amp

MENU and Sensor Displays

```
MENU

RUN
SELECT SENSOR
      ec cg tcd
LIBRARY
CALIBRATE SENSOR
SEND LOG
SET RTC
```

```
CG          2.0          % LEL

O2          20.7         %

CO          15.0         ppm

H2S         0.51         ppm


01:15:19        CG   EC sensors        Log: off
```

Options

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

Single alarm setpoint- Customer Programmable

Data acquisition and storage using DataWorks software

X Proof purged (Z or X) explosion proof enclosures-Optional

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 <u>all</u> 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$_2$ and NOx from combustion sources.

Table I
Sensor Specifications

Sensor	Range ppm	Detection Limit	ResponseTime (s)	Interferences
Ammonia	0-100	0.1	60	Amines
Chlorine	0-10	0.1	<30	NO_2, ClO_2
Carbon Monoxide	0-1,000	0.5	15	H_2, C_2H_4
Chlorine	0-10	0.1	30	50 ppm max.
ETO	0-100	0.1	30	MEK, Ethanol
Formaldehyde	0-100	0.1	30	Oxygenated HC
Hydrogen Cyanide	0-100	0.1	50	C_2H_4, H_2S, SO_2
Hydrogen Chloride	0-100	0.1	15	SO_2, NO_2
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_2
Nitric oxide-SG		0.1	10	——— with filter
Nitrogen Dioxide	0-20	0.1	15	NO, H_2S
Nitrogen Dioxide-SG	0-200	0.1	15	H_2S
Oxygen	0-30%	0.1%	8	——-
Oxygen-SG**	0-30 %	0.1%	8	——-
Oxygen	0-2%	0.1	15	——-
Ozone	0-2	0.02	75	NO_2
Phosphine	0-5	0.05	40	SiH_2, GH_4, B_2H_6
Sulfur Dioxide	0-5	0.1	20	NO_2
Sulfur Dioxide-SG	0-5000	0.1	20	NO_2 filter
Silane	0-5	0.05	30	AsH_3, PH_3, B_2H_6
Combustible Gas	0-100 % LEL	0.1%	10	——-
Thermal conductivity	0-100% v/v	0.1%	15	——-

SG= Stack Gas Sensor, ** Uses acidic electrolyte to prevent interferences from acid gases

Data Storage and Communication

The Model 1000 can be programmed to transfer data via WiFi to a server for long term storage, remotely calibrate the Model 1000 (if Calibration gas is connected), call a cell phone or landline if there is an error or alarm. The Model 1000 has a real time clock and the data string includes day, date, time concentrations, alarms, if any, and calibration data.
Each day at midnight, a new CSV or text file is created and named (by date). These files can be directly imported into a spreadsheet.

Model 1000 Z or X Purge

PID ANALYZERS, LLC