Hydroarbons, VOCs, benzene, 1,3 BD, VC, ETO, H_2, CO, CO_2, fixed gases, O_2, H_2S, Dimethyl sulfate, DMS, Methylene chloride, Freons...

PROCESS GCs

Introduction

The **Model 301-C PGCs** are flexible and versatile Analyzers that are in their fourth generation. These Models are, by far, the most powerful and versatile (with their embedded Pentium PCs) developed by us since 1985.

The addition of these new Analyzers greatly improves the capability and range of Process Analyzers from PID.

PID-Description

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

$$RH + h\upsilon \Rightarrow RH^+ + e^-$$

where $h\upsilon$ 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 accelerat-ing 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.

TCD Description

Measures difference between the thermal transfer characteristics of the sample gas and a reference gas, generally helium. The sample and reference filaments are two legs of a Wheatstone Bridge. A constant current is applied with a resultant in a rise in filament temperature. As the sample passes through the detector, the resistance changes as the reference gas is replaced by the sample which has a lower thermal conductivity. The resistance is proportional to the concentration.

Applications: PID, FID, ECD, TCD, FPD

Monitoring effluents from chemical pharmaceutical manufacturing, carbon beds (Gasoline, Cl HC)
Leak detection- from process equipment
Stack & Vent monitoring
Drying ovens for removing solvents
Incineration
BTX, VC, ETO, freons, solvents in ambient, waste sitec or plant atmospheres
Remediation site monitoring
Oil and gas exploration
Sulfur cpds in air or stacks
Odorants in natural gas
Natural gas composition
VOC's in water with optional Sparging system (Model 650)

Features-

Embedded Pentium Computer *with color VGA display ,Microsoft Windows XP Professional & PeakWorks Chromatography Software*

Wide Range of Universal to Specific **Detectors** Universal: **TCD, FUV**; Selective: **PID, FID,** Specific: **FPD (S or P), ECD**

Automatic Restart- In the event of a power outage

Automatic calibration; automatically adjusts response on timed frequency;

Autozero each run

Wide operating range- **16 Bit ADC with 3 decades of autoranging**

Compact 19" Rack- NEMA 2 enclosure (301B only) & Wall Mount NEMA 4 enclosure

PID- lamp out alarm; FID/FPD-flame out- shuts off hydrogen and provides alarm, TCD carrier out

RS232 digital output; **0-1 VDC analog** output

Data storage on 40 GByte hard drive

Output Signals- RS232, RS485, MODBUS...

Hydroarbons, VOCs, methane, amines, NH_3, PH3, AsH_3, C_2H_4, Freons, SO_2, C_2H_2, WMD's, Nerve gases, Transformer gases, Natural Gas...

PROCESS GCs

Specifications

Detectors available: PID , TCD, FID, FUV, ECD, FPD (S, P)
Measurement mode: Continuous
Zero drift- Automatic Zero compensation; <1% per month
Span drift- Auto cal each 24 hours (remotely with contact closure): less than 1% every 24 hours
Wide range of response- from sub ppm on PID to % on the FID or TCD

Support gases:FID & FPD require H_2 and zero air

Readout- Color VGA display

Standard output: 1 VDC, RS232

Enclosures:Rack (NEMA 2)

19" W x 11"H x 17"D

Weight: 32 pounds

Wall (NEMA 4)- 301C

23"W x 30"H x 17"D

Weight: 80 pounds-301C

Weight: 140 pounds (2 x NEMA 4 enclosures)-

Power requirements- 100-240VAC, 1.5 /0.75 amp

Detector Range/Species

PID range - ppb-ppm; ppm- %; sub ppb with optional concentrator

hyrdocarbons > C4 plus, VOC's, inorganic species such as H_2S, NH_3, I_2, PH_3, AsH_3, etc.

FID Range- 1- 200,000 ppm

measures hydrocarbons only

TCD Range- ppm to 100%-Fixed gases, H_2, inorganic gases & hydrocarbons

FPD Range- ppb-ppm- S cpds; P cpds ppb-ppm

ECD Range- sub ppb to ppm, Cl HC, nitro cpds

FUV Range- ppb to %- Organic & inorganic cpds, Fixed gases

Options

Gas or liquid sampling systems

4-20 mA output; RS485 output, 10/100 network card,

See Table I

Data acquisition and storage using PeakWorks C- runs under Windows or Windows NT on a Remote Pentium PC

2, 4, 8, 12 point sequencers for 301B; 2, 8, 16, 32 point sequencers for 501-B-(with contact closure to indicate point being sampled, Display of Concentration, Sampling Point & Sample Flow (measured by mass flowmeter-501B only)

Mass flow sensor for column flow for 501B; optional for 301B

Applications Engineering:Dual columns, column switching valves, concentrator

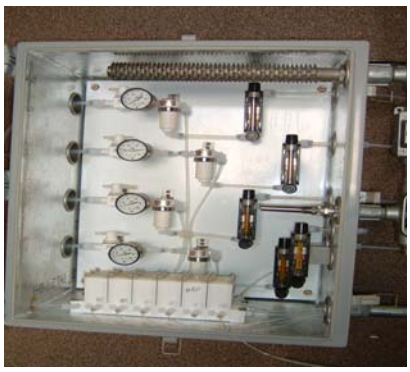
X or Z purged for Zone 1 and Zone 2 respectively- requires NEMA enclosure

Sampling Systems

A variety of sampling systems are available for the 301B and 501B including the following:

- Removal of particulate
- Removal of water
- Electrically heated sampling lines
- Steam traced sampling lines
- Heat exchangers for hot samples

A typical sampling system is shown below:



Comparison of Model 301C Process GC & Typical Installations

Table I

Comparison of Model 301C Process GCs

	Model 301B	Model 501B
Enclosures		
19" Rack	Yes	No
NEMA 4	Yes	Yes
Separate enclosure for oven	No	Yes (optional)
Second oven	No	Optional
Purged enclosures (X orZ)	Optional	Optional
Multipoint Sequences	2, 4, 8, 12	2, 8,16, 32
Sampling point programming	Optional	Included
Programmable Equilibrate	Optional	Included
Additional valve relay	Optional	Included
Sample ahead	Optional	Included
Mass flowmeter-sample	Optioal	Included
Mass flowmeter- carrier	Optioal	Included
Pentium PC	Yes	Yes
VGA Display	Yes	Yes
Operating System	Windows XP	Windows XP Professional
Chromatography Data	PeakWorks	PeakWorks
PeakWorks C SW	Option	Included
MODBUS	Option	Included
RS232	Included	Included
0-1 VDC	Included	Included
4-20 mA	Optional	Optional

Definitions

MODBUS- communications protocol that allows extrnal PC or PLC to request data

PeakWorks- Windows based chromatography data & analyzer control software

PeakWorks C-Communications software run on a remote PC (through the RS232 port) that displays and stores data remotely

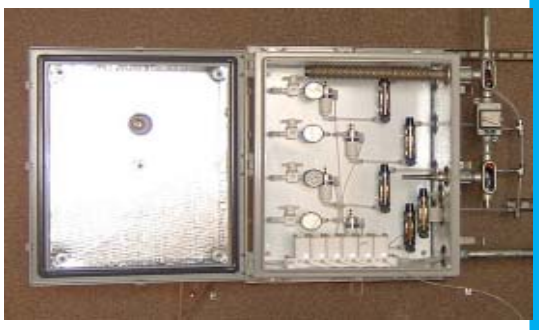
Sample ahead-sampling for the next point starts as son as sample is injected- faster sampling times

Sample point programming-Instead of sample points being 1,2,3... they can be customer programme to 1,1,5,9,1...

Additioonal valve relay- more complex analyses can be run

301C installed at a natural gas odorant facility for measuring THT & TBM on-line.

Model 301 C (above) in instrumentation housing at a Chlorine plant measuring H_2, O_2, N_2 & CO_2. TCD with hastelloy valves & fittings.The Analyzer and oven (lower enclosure) are purged to keep corrosive atmosphere from Analyzer.

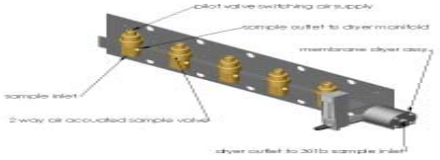


Sampling system for wet chlorine (above) has teflon valves and multipoint. sampling system is heated to prevent condensation. The sampling system valves are controlled by air actuated valves in the 301C.

Model 301C (Above) mounted downstream of a waste incinerator measuring H_2S & CH_3SH at ppb levels via PID.

Sampling system for moisture removal and measurement of S cpds at ppb levels.

Explosion proof (Z purge) 301C (above) with external air activated multi (5) point system with moisture removal.



MODEL 650 SPARGING OPTION FOR MODEL 301C SPECIATED VOC'S IN WATER

INTRODUCTION

The measurement of low concentrations of organics in water can be accomplished through the application of Henry's Law which states that, at equilibrium, the solubility of a gas in a liquid is proportional to the partial pressure of a gas in contact with a liquid as given below:

$$\text{Benzene (aq)} = K\, P_{\text{Benzene}}$$

where Benzene (aq) is the concentration of benzene in the liquid phase, K is the Henry's Law constant which governs the solubility of gases in water, and $P_{Benzene}$ is the partial pressure of benzene in the gas phase.

As a result of the above equation, it can be seen that if the concentration of benzene in the gas phase and at equilibrium is measured, this is related to the concentration of benzene in the dilute aqueous solution by a proportionality constant (K) that can be determined by calibration.

This method can be used with Total VOC Analyzers such as the 201s to provide Total VOCs in water. The Sparger can also be used with GCs such as the Model 301 or 501 to provide speciated VOCs in water. A summary is shown below.

	201-FID	201-PID	301 GC	501 GC
Total VOC's	X	X		X
Speciated VOC's			X	X
Range	Sub ppm-%	High ppb-low %	Sub ppb-%	Sub ppb-%

FEATURES

Sparging System Applies Henry's Law
VOC's in water are converted to the gas phase in the Model 650 and measured by a Process GC Analyzer

·Detectors
PID, FID, ECD, FPD (S or P)

· Range
From 0.1 ppb (detection limit) to high ppm

·Measure Specific VOC's in Water from ppb Levels
VOC's are measured with the Model 301-B or 501 B

·Range
From 0.1 ppb (PID) or 5 ppb (FID) to high ppm

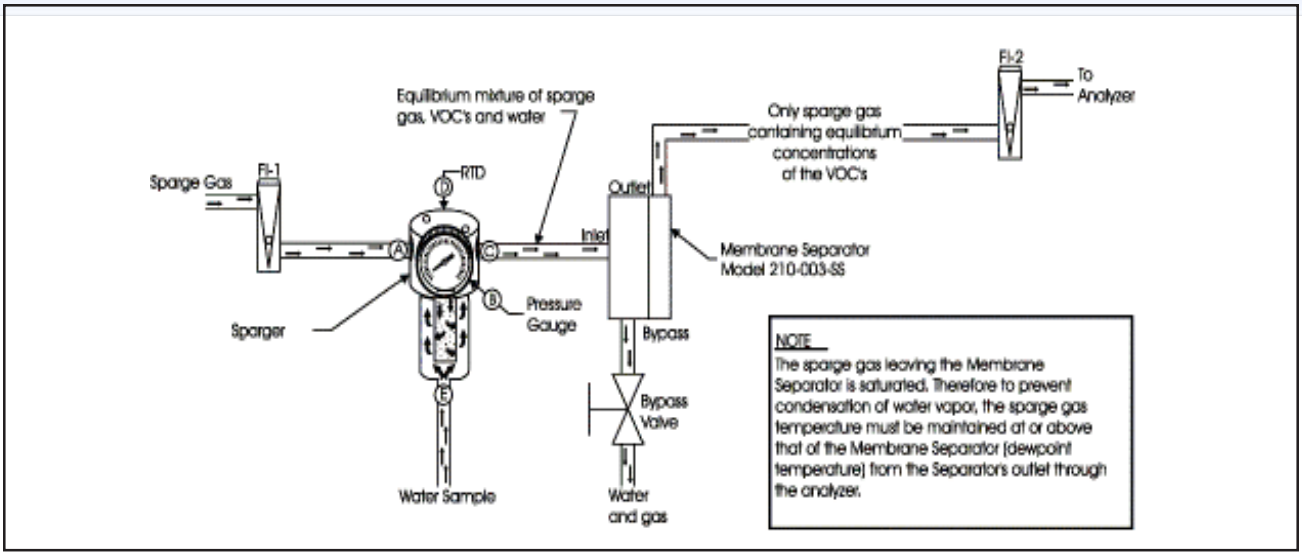
·Fast Response
Sparging System response is < 1 minute

·Easy to Setup and Maintain
Auto calibration, simplicity of design and internal diagnostics make this analyzer ideal even for those with minimal instrumention skills

APPLICATIONS

-Clean water compliance
-Rapid spill detection
-Moitoring cooling water
-Monitoring process input water
-Leaks from process equip-ment
-Efluent from chemical, refining & manufacturing

SPARGER (Continued)



SPECIFICATIONS

Species measured: **PID or FID**- specific VOC's (hydrocarbons) in water (including chlorinated HC) in water

Electrical classification: General purpose (see below for options)

Response time: 1 min. to 90% response (system only); GC 1-5 min depending on application

Liquid sample flow rate: 250 cc/min.

Reproducibility: +/- 5%

Sparging gas flow: 1 LPM

Zero drift: <2% over 24 hours

Span drift: <3% over 24 hours

Range: ppb to ppm

Detection Limit:

301-B/501 B- <0.1 ppb- PID; < 5 ppb FID

Power requirements: 100V- 240VAC

Dimensions:

Wall- 20"W x 50"H x 16"D

Weight: 75 pounds

Power consumption: 220 watts max.

OPTIONS

Speciated VOC's (301-C)

- 19" Enclosed rack version of the 301-B
- NEMA 4 Wall mounted unit (301-B or 501-B)
- Z purged unit meets class I division II NEC requirements- wall mount only
- X purged unit meets class I division I NEC requirements- wall mount only
- 4-20 ma output
- **Multipoint sequencer**- sequential sampling systems are available for area monitoring for 2, 4, 8 or 12 points with the 301-B; 8,16 or 32 channels with the 501-AB-additional information available on request