Process Gas Chromatographs

For Process and Environmental Monitoring

Ambient Air, Chemical & Petrochemical Industry, Hospitals, Medical Device Manufacturers, Stacks, Laboratories, Remediation Sites Specific VOC's in water

Model 301C 19" Rack mount

Embedded Intel PC 1.66 GHz
Windows 10 OS, 32 GByte
solid state drive,
PeakWorks Chromatography
Software
Remote operation (worldwide)
for Troubleshooting & Training

Model 301C NEMA 4 Wallmount

Fenceline, Process, Stacks, Area Monitoring, Effluents

PID ANALYZERS

301C PROCESS GAS CHROMATOGRAPH

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 10" color VGAdisplay ,Microsoft Windows 10 & 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 (301C 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- 10" 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

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

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, 4-6, 8-12 point sequencers for 301C; - 16-20,20+ point sequencers
-(with contact closure to indicate point being sampled, Display of Concentration, Sampling Point & Sample Flow (measured by flowmeter)
Mass flow sensor for column flow - optional for 301 C

Applications Engineering:Dual columns, column switching valves, concentrator

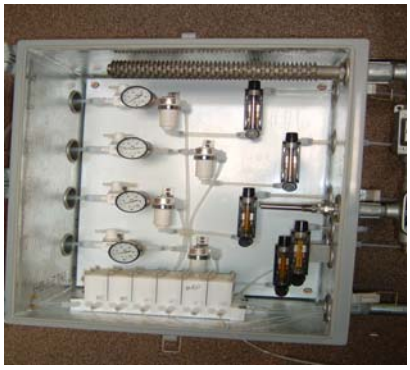
X or Z purged for Zone 1 and Zone 2 respectively- requires NEMA enclosure

Sampling Systems

A variety of sampling systems are available for the 301C 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 301 C
Enclosures	
19" Rack	Yes
NEMA 4	Yes optional
Separate enclosure for GC oven	No optional
Second oven	No
Purged enclosures (X orZ)	Optional
Multipoint Sequences	2, 4-6, 8-12, 16-24
Sampling point programming	Optional
Programmable Equilibrate	Optional
Additional valve relay	Optional
Sample ahead	Optional
Mass flowmeter-sample	Optioal
Mass flowmeter- carrier	Optioal
Pentium PC	Yes
VGA Display	Yes
Operating System	Windows XP embedded
Chromatography Data	PeakWorks
PeakWorks C SW	Option
MODBUS	Option
RS232	Included
0-1 VDC	Included
4-20 mA	Optional per point/per component

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

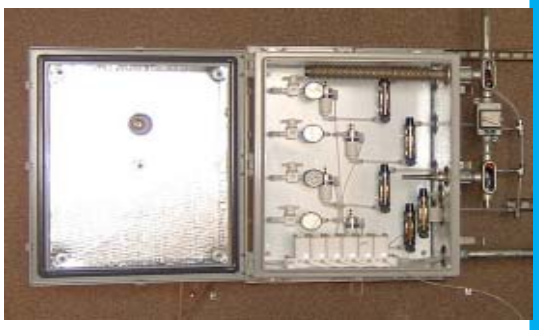
Sample ahead-sampling for the next point starts as son as sample is injected- faster sampling times

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.

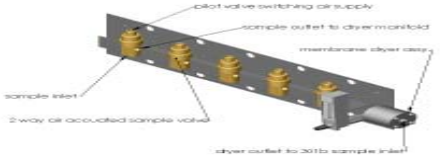


Sampling system for wet chlorine (above) has teflon valves and multipoint. sampling system is heated to prevent condensation. The sampling system valves are controlled by air actuated valves in the 301C.

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.

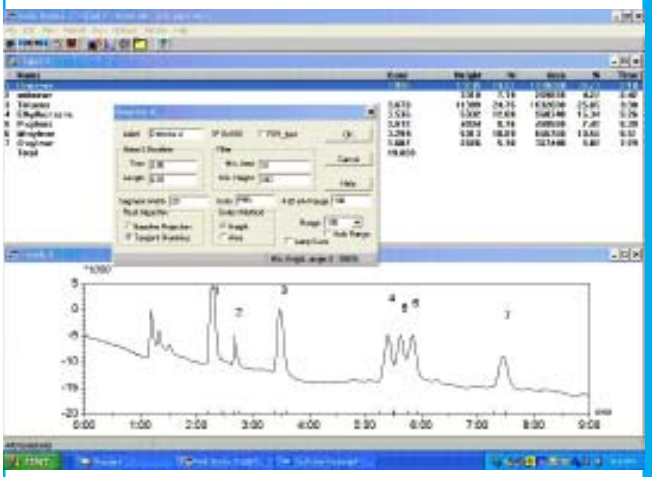


PeakWorks™ Software/Multipoint Sequencer

PeakWorks™

PeakWorks™ is PID's Windows 10 based chromatography software that can be used to control the GC parameters, integrate & display the chromatograms and store the data for the GC 301-C.

The software is written in C++ as an overlay/interface for the Windows operating system. Low and high alarm levels and concentration range can be set in the PC. A 24 hour graph of each point can be displayed on the VGA color screen. Each day at midnight, a new file is created and named (by date). These files can be directly imported into EXCEL and plotted. A copy of the screen for 3 ppb of benzene is shown in the Figure below.



PeakWorks has multipoint calibration capabilities and response factors that can be calculated automatically or entered manually. Windows are adjustable for each compound. Two levels of alarm can be set for each compound. The system can be run & operated remotely via a PLC.

Multipoint Sequencer

The 301-C has several multipoint options The first is a simple 2 point system that can be used to monitor the input and output of a scrubber, catalytic oxidizer, carbon bed etc. to determine the efficiency of the system. The 301-C will display the data and chromatograms on the screen.

The second option is a 4-6, or 8-12 point system (301-BC or up to 20+ points. This system employs a manifold with a needle valve and a 3 way valve for *each* channel. The flow for each channel is measured with a flow meter and is displayed the meter. The setpoint for the flow channel can be set to indicate a low flow or blockage for a particular channel. The optput for the mass flow sensor can be sent to a PLC via a 4-20 mA output to log the flow values for dignostic purposes. The channel number and sample flow are displayed in the lower right margin of the display. Two levels of alarm can be programmed for each channel in the system. This system provides an inexpensive alternative to a sensor for each point. The cost of maintaining and/or calibrating this single system is considerably less expensive than maintaining a 8 or 12 individual sensor system.

The 301-C multipoint systems can be easily interfaced with a PLC or DCS system that is already at the Plant. The GCs can also be hooked into an intranet in the plant. Contact PID for information.

PID ANALYZERS

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