Petrochemical

Natural Gas - Heating Valve & Permanent Gases

DPS Instruments, Inc.

www.dps-instruments.com

Every day millions of cubic feet of natural gas flow through pipelines around the world. The heating value, sometimes measured as BTU, determines the cost and ultimate value of the natural gas. The natural gas may either be in a gas or liquid phase. Larger hydrocarbons always have a higher heating value. Additionally, it is important to know the contribution of the Permanent Gases (H_2, O_2, N_2, CO & CO_2) in the sample. DPS has engineered a GC system to analyze all of these compounds simultaneously using the reliable Series 600 Lab GC, or the rugged Companion 2 Portable GC. The DPS Natural Gas GC Systems automatically sample and analyze the natural gases coming from these pipelines. The analysis of C1 - C5 hydrocarbons with our sensitive FID detector, Permanent Gases with the universal HID detector, and a Methanizer for the Carbon Dioxide. The Heating Value is automatically calculated and reported after each analysis. The fully integrated Natural Gas GC Systems are small and lightweight and all DPS systems are modular for expandability, upgrades, and easy service.

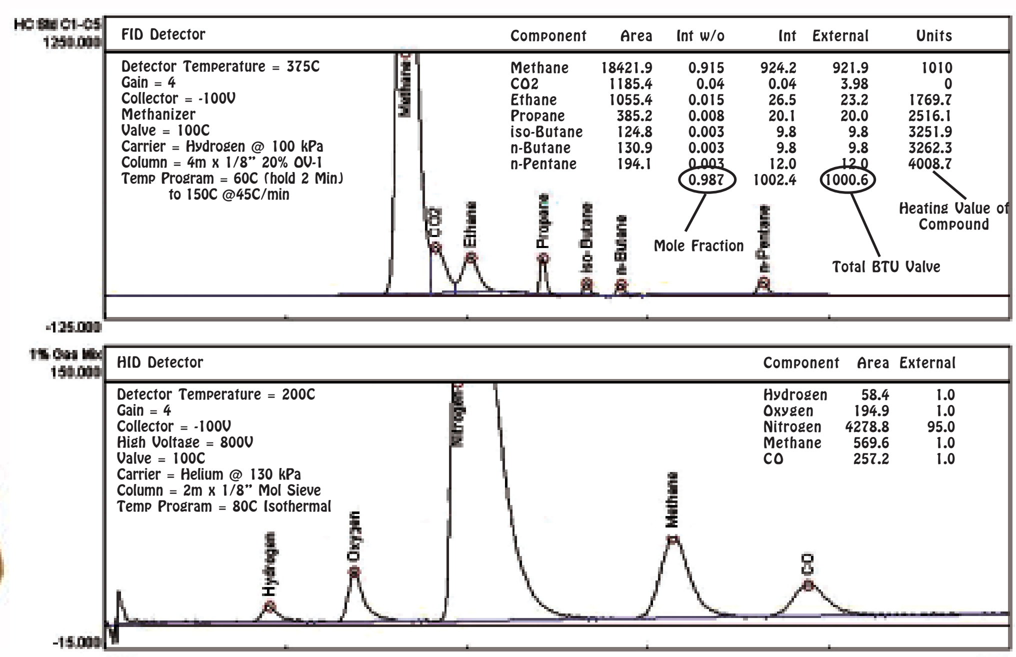
Available Configurations Include:

600-C-135 - Series 600 Natural Gas GC Analyzer (HID, FID/Methanizer, Valve, 2 Columns)

500-C2-135 - Companion 2 Natural Gas GC Analyzer (HID, FID/Methanizer, Valve, 2 Columns)

Series 600 GC

High Level Natural Gas Standard



Companion 2 Portable GC

DPS Natural Gas Layouts

Companion 2 GC

Series 600 GC

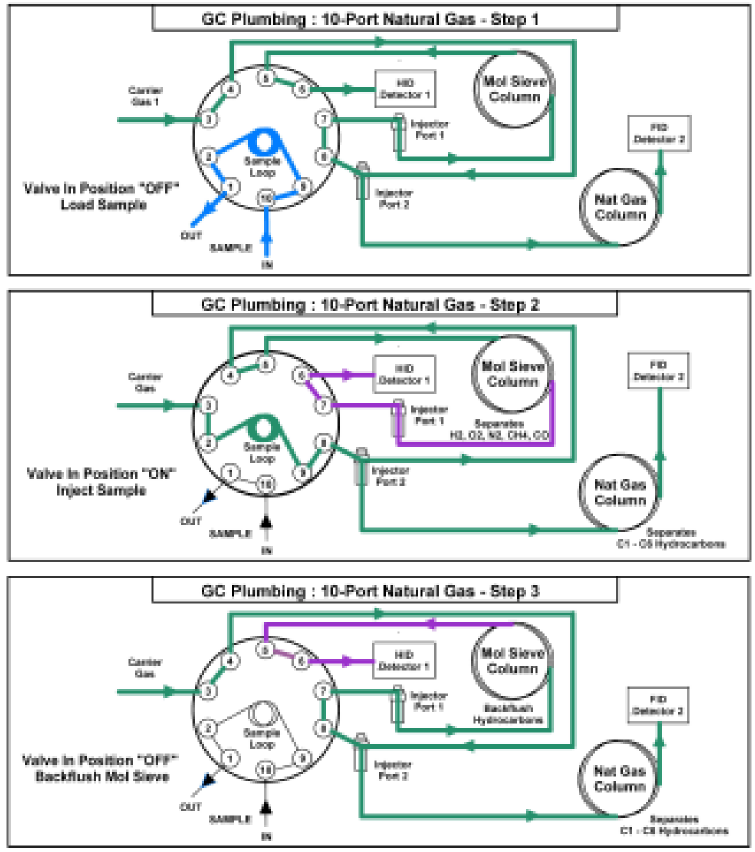
Plumbing Diagram

Load: In Step 1 the sample is loaded onto the fixed volume sample loop with the valve in the OFF position. The sample can be loaded either under positive pressure, or the with the aid of a built-in Vacuum Pump. The same carrier gas flows through each column, however a sample, or standard can always be manually injected into either Injector.

Inject: The Sample Valve is rotated to the ON position and the carrier gases sweep the components from the Sample Loop and splits it between the the analytical columns. The permanent gases are separated in a molecular sieve column going to the HID detector. For the C1-C5 hydrocarbon separation we use a 2m packed column which goes to the FID detector.

Backflush: The Sample Valve is rotated back to the OFF position and the heavier compounds are swept from the molecular sieve column to keep it clean.

Fast Cycle Times: For the fastest cycle times the Column Oven temperature is held constant, so that one sample can be run iommediately after another. We use a Pressure Program Ramp to push the heavier compounds through the column faster.



Natural Gas
Plumbing Diagram

Results Log

Results Log - Notepad

Calibration Standard

1FID29.chr	8/16/2012	15:17:54	"Methane"	18.221	"Ethane"	31.213	"Propane"	20.128	"iso-Butane"	9.9408	"n-Butane"	9.7869	"n-Pentane"	12.012

Sample Stream

1FID30.chr	8/16/2012	15:20:12	"Methane"	4.0696	"Ethane"	7.4079	"Propane"	4.7663	"iso-Butane"	2.2906	"n-Butane"	2.4259	"n-Pentane"	2.2481
1FID31.chr	8/16/2012	15:22:30	"Methane"	3.9364	"Ethane"	7.2011	"Propane"	4.9889	"iso-Butane"	2.1500	"n-Butane"	2.1511	"n-Pentane"	2.6974
1FID32.chr	8/16/2012	15:24:48	"Methane"	2.6510	"Ethane"	4.3735	"Propane"	2.7511	"iso-Butane"	1.3444	"n-Butane"	1.1600	"n-Pentane"	1.3239
1FID33.chr	8/16/2012	15:27:06	"Methane"	3.0697	"Ethane"	4.7260	"Propane"	3.0902	"iso-Butane"	1.2912	"n-Butane"	1.2672	"n-Pentane"	1.9248
1FID34.chr	8/16/2012	15:29:24	"Methane"	1.9926	"Ethane"	3.1986	"Propane"	2.2061	"iso-Butane"	0.6648	"n-Butane"	1.0358	"n-Pentane"	0.9268
1FID35.chr	8/16/2012	15:31:42	"Methane"	2.6474	"Ethane"	4.9939	"Propane"	2.7140	"iso-Butane"	1.0777	"n-Butane"	1.0854	"n-Pentane"	1.7029

The sample results can be stored and reported in various ways. One convenient method of storing a vast amount of sample data is in a Results Log. A separate Results Log can be generated for each detector. In the example above the first analysis is a low level calibration standard. The subsequent analyses are from a sample stream coming from the well. The BTU value is reported next to each compound. The sample results can be stored on the hard drive of the computer inside the GC, or on an external computer via an ethernet connection.

GC Control Software

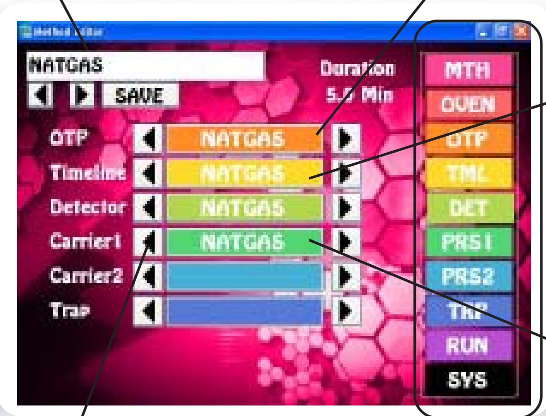
Easy to learn and master using a Graphical User Interface (GUI) and Color Touch Screen.

Editors let you customize the files associated with the GC Method.

Oven Temp Program Editor

Timeline Editor

Method Name

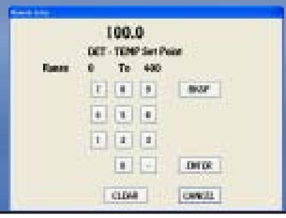


File Selection Arrows

Carrier Pressure 1 Editor

Navigation Buttons to Quickly jump from one screen to another. Most pages are one button away!

Keyboard to Enter Filenames



Number Pad for entering Values

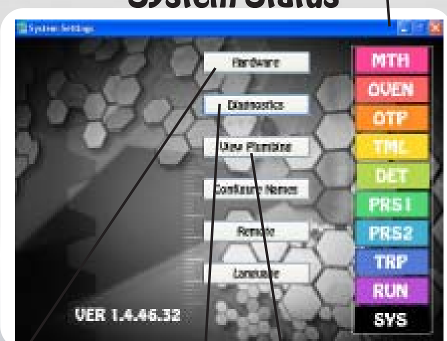
GC Status pages display the parameters in the method, both graphically and as text and values.

Method Editor

Oven Status

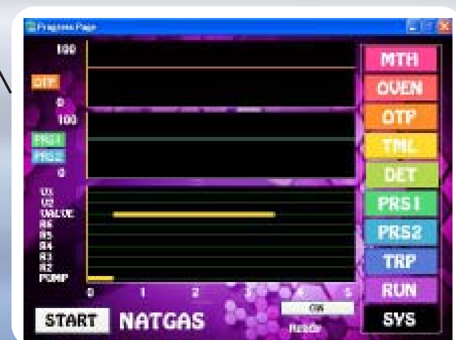
FID Detector Status

System Status

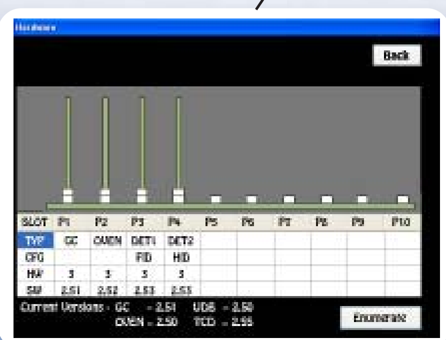


HID Detector Status

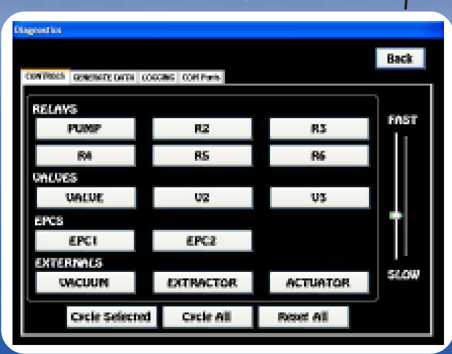
System status pages display the health and viability of the GC instrument.



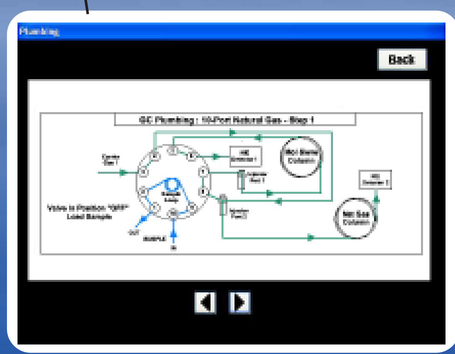
Run Status



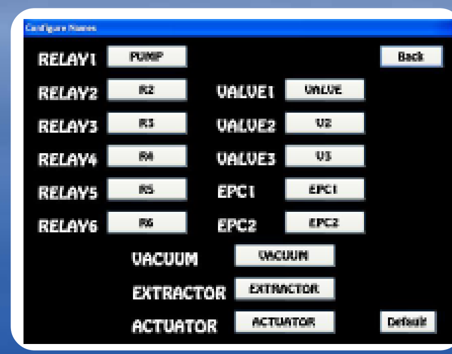
Hardware



Diagnostics



Plumbing



Configure Names

Natural Gas GC Specifications:

Electronics Module:
- Enter and store GC Methods via Color Touch Screen
- Actual and set-point display of all GC parameters
- Safety Limits on all user entered parameters
- Oven Temperature Programs (OTP) with Multiple Ramps
- Pressure Programs for Carrier Gases with Multiple Ramps
- Timeline for sequencing Relays and Valve
- Detector Control of all Parameters on one page
- Electronic Pressure Controllers (EPC's):
  Atmospheric Pressure & Temperature Compensation
  EPC Pressure Control with 0.1 kPa set-point resolution
- Plug and Play GC Control, Oven, and Detector Board
- Microprocessor Controlled
- Proprietary Digital Signal Processing
- Digital Signal Outputs for each Detector
- Universal voltage input (85 – 240 Vac) with line filter and breaker.

Detector:
HID – Helium Ionization Detector (10 ppm detection limit, dependent on sample loop size)
FID – FlameIonization Detector (1ng detection limit, dependent on sample loop size)

- 400 °C Temperature Limit with 0.1 °C set-point resolution
- 24-bit Digital Outputs for the detector via USB
- EPC Pressure Control with 0.1 kPa set-point resolution

Columns:
1m Molecular Sieve, 2m 20% Ov-1

Results:
Automatically calibration corrected and reported

Lab Quality Analyses in the Field,
"It Goes with you Anywhere!"

Series 600 Oven Module:
- Ambient to 400°C Column Oven
- Up to 100 °C per/min Oven Ramp
- Fast Cooldown 300 °C to 50 °C in 3.5 min
- 1000 watt total Heater Elements
- Temperature Ramps with 0.1 °C set-point resolution
- 23 x 23 x 20 cm area for Glass, SS, or Capillary Columns

Companion 2 Oven Module:
- Ambient to 325 °C Column Oven
- Up to 80 °C per/min Oven Ramp
- Fast Cooldown 300 °C to 50 °C < 4 min
- 200 watt Heater Element
- Temperature Ramps with 0.1 °C set-point resolution
- 12.5 x 10.5 x 12.5 cm area for Packed, or Capillary Columns
- 7 amps at 48 Vdc total power consumption

Built-In Accessories:
- Sample Valve - Electronically Actuated
- Heated Valve Oven
- Vacuum Pump
- Air Compressor for FID's
- Calibration Gas & Stream Selection Solenoid

Injector:
- Heated On-column Injectors
- Multiple Pressure Ramps with 0.1 kPa set-point resolution

Data Communications:
- Bi-directional communication with popular Data System

Network Connectivity:
- Enterprise Compatible Network GC running Windows XPe
- Ethernet Connection using Windows Network Protocol
- On Board ETX Computer for GC Control and Data Acquisition
- Remote Control of GC and Data Acquisition over LAN

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Specifications may change without notice.
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