Petrochemical

Mud-Logging

DPS Instruments, Inc.

www.dps-instruments.com

The process of Mud-logging involves collecting, analyzing and recording the meaningful solids, fluids, and gasses brought to the surface by the drilling fluid (mud). For the gas analysis portion of the mud-logging process, the rugged and reliable DPS Mud-logging GC System automatically samples and analyzes the gases coming out of the mud for methane and heavier hydrocarbons using a sensitive FID detector. The entire cycle time for speciation of C1 - C5 hydrocarbons is less than 2 minutes and the BTU value is automatically calculated. A 2nd FID detector is added to determine total hydrocarbons at the same time. Using a built-in air compressor, the entire system runs off one tank of hydrogen. Adding a methanizer to the FID to analyze CO2 is especially helpful for monitoring a well once you have hit pay dirt! The fully integrated Mud-logging GC Systems are small and lightweight and all DPS systems are modular for expandability, upgrades, and easy service.

Series 600 GC

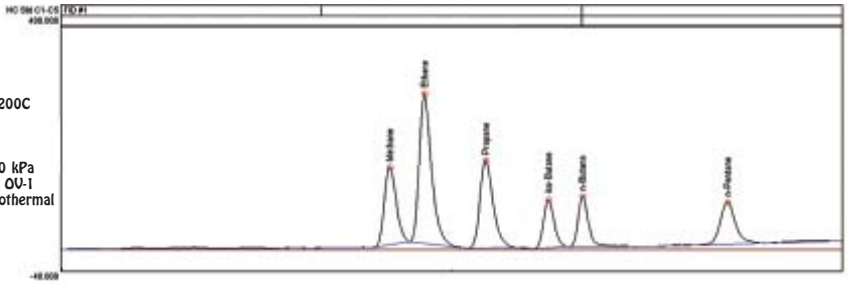
Available Configurations Include:

600-C-093 - Series 600 Mud Logging GC Analyzer (FID, FID, Valve, 2m)
500-C2-093 - Companion 2 Portable Mud Logging GC Analyzer (FID, FID, Valve, 2m)

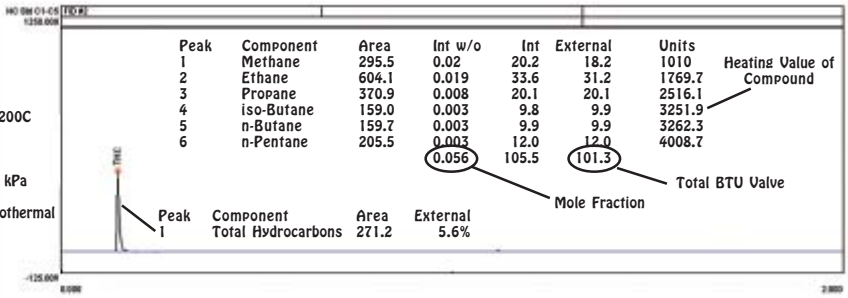
Companion 2 Portable GC

Low Level Natural Gas Standard

FID Detector #1
Detector Temperature = 200C
Gain = 4
Collector = -100V
Valve = 100C
Carrier = Hydrogen @ 250 kPa
Column = 4m x 1/8" 20% OV-1
Temp Program = 110C Isothermal



FID Detector #2
Detector Temperature = 200C
Gain = 3
Collector = -100V
Valve = 100C
Carrier = Hydrogen @ 50 kPa
Column = None
Temp Program = 110C Isothermal



Peak	Component	Area	Int w/o	Int	External	Units	
1	Methane	295.5	0.02	20.2	18.2	1010	Heating Value of Compound
2	Ethane	604.1	0.019	33.6	31.2	1769.7	
3	Propane	370.9	0.008	20.1	20.1	2516.1	
4	iso-Butane	159.0	0.003	9.8	9.9	3251.9	
5	n-Butane	159.7	0.003	9.9	9.9	3262.3	
6	n-Pentane	205.5	0.003	12.0	12.0	4008.7	
			0.056	105.5	101.3		Total BTU Valve

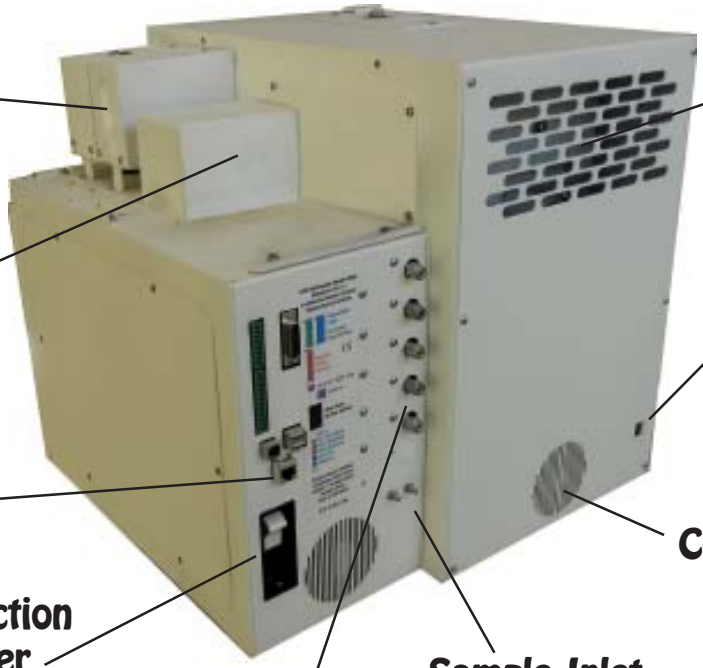
Mole Fraction

Peak	Component	Area	External
1	Total Hydrocarbons	271.2	5.6%

DPS Mudlogging Layouts

Companion 2 GC

Series 600 GC

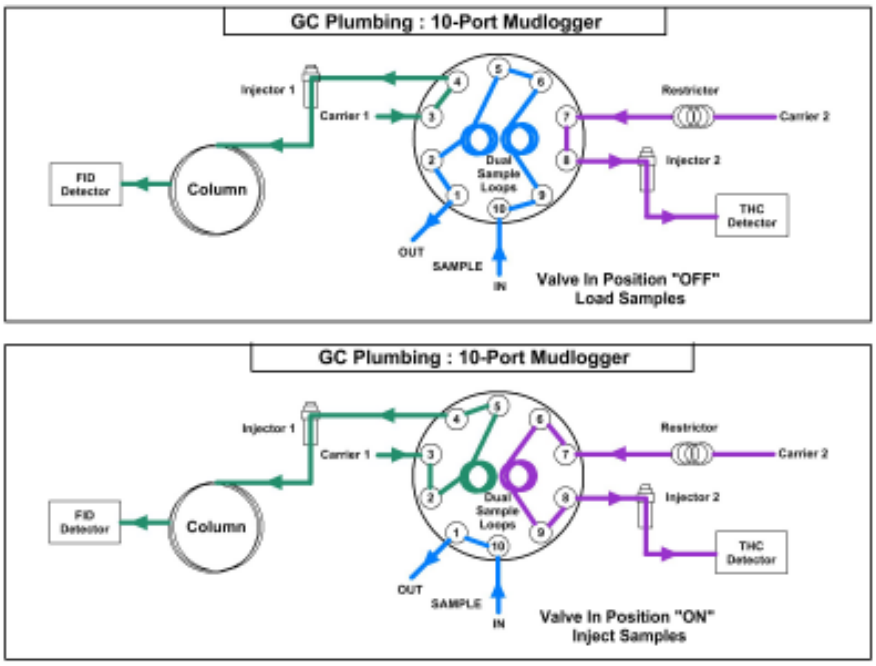


Plumbing Diagram

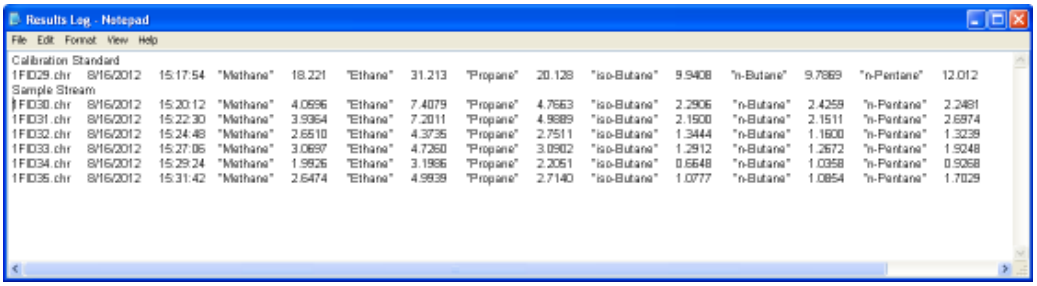
Load: The sample is simultaneously loaded onto both sample loops, either under positive pressure, or the with the aid of a built-in Vacuum Pump. Independent carrier gases connect to each injector. A sample, or standard can always be manually injected into either Injector.

Inject: The Sample Valve is rotated to the ON position and the carrier gases sweep the components from the Sample Loop onto the analytical column and to the THC detector. For the C1-C5 hydrocarbon separation we use a 2m packed column. For the fastest cycle times the Column Oven temperature is held constant, however we use a Pressure Program Ramp to push the heavier compounds through the column faster. For the Total Hydrocarbon analysis there is no column connected to the 2nd injector and all of the hydrocarbons pass to the detector together generating a THC peak, that can be quantitated and reported.

Dual Sample Loop Plumbing Diagram



Results Log


Results Log - Notepad

File Edit Format View Help

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"	2.6874
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"	1.5248
1FID34.chr	8/16/2012	15:29:24	"Methane"	1.9826	"Ethane"	3.1986	"Propane"	2.2051	"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!

Carrier Pressure 2 Editor

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.

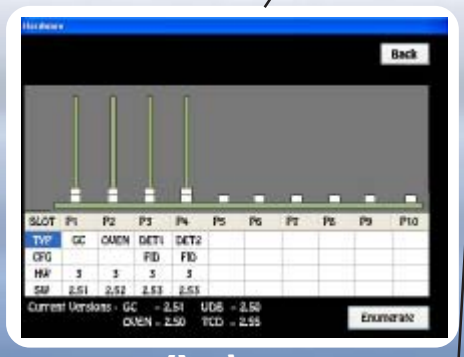
Oven Status

Method Editor

FID1 Detector Status

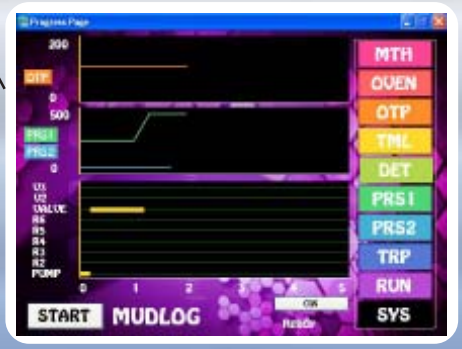
System Status

FID2 Detector Status

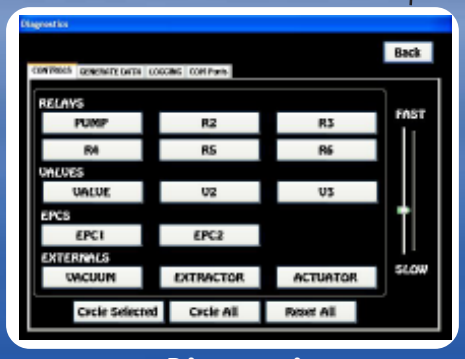


Hardware

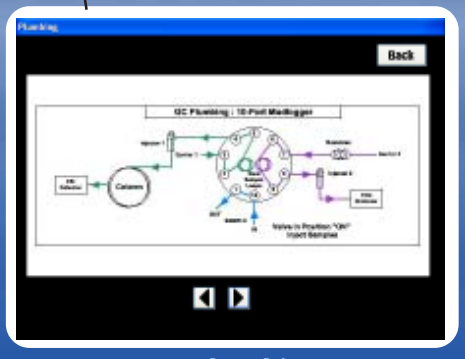
System status pages display the health and viability of the GC instrument.



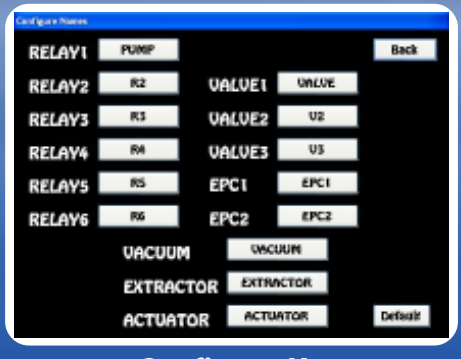
Run Status



Diagnostics



Plumbing



Configure Names

Mudlogging 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.

Detectors:
FID – Flame Ionization Detector (1 ppm 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

Column:
2m 20% OV-1

Results:
Automatically calibration corrected and reported

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:
- Cool 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

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

DPS Instruments, Inc.

Specifications may change without notice.
01/2016