

Natural Gas Analysis Systems - NatGas

Every day millions of cubic meters of natural gas flow through pipelines around the world. Natural gas is mainly composed of methane, but other hydrocarbons, such as, ethane, propane, butane, pentane and their isomers are also present. It is very important to accurately measure the components in natural gas to generate the correct unit calorific value, or BTU, which ultimately determines the trading cost of the natural gas.

Additionally, it is important to know the contribution of the Permanent Gases (H₂, O₂, N₂, CO & CO₂) in the sample, and other trace components such as H₂S.

The DPS Micro-TCD Natural Gas GC Systems separates all components in one injection in less than 2 minutes. We actually offer 3 different configurations; the Basic to analyze just the compounds you need; the Standard for a complete analysis; and the Supreme for a comprehensive characterization of the sample.

The DPS Natural Gas systems are available as an ultra-compact Micro-TCD GC for continuous monitoring in a fixed location. Or, as a Portable Companion 4 GC designed to "Go with you Anywhere!" Complete with built-in carrier and calibration gases, and a rechargeable battery.

The DPS Natural Gas GC specifications are on par with the biggest selling Micro GC's in the market, yet they are smaller, lighter, faster, and more portable.

Continuous Monitoring Natural Gas GC



General Specifications:

- Micro-TCD Gas Chromatograph
- Natural Gas analysis in less than 2 min
- 2-4 Channels - GC Column Oven/Micro-TCD's
- Fast & Accurate with Low Maintenance
- Easy Chromatography Data System
- Ultra Compact and Lightweight,
GC (20 x 15 x 10 cm), approximately 8 kg
Portable (52 x 40 x 21 cm), approximately 15 kg

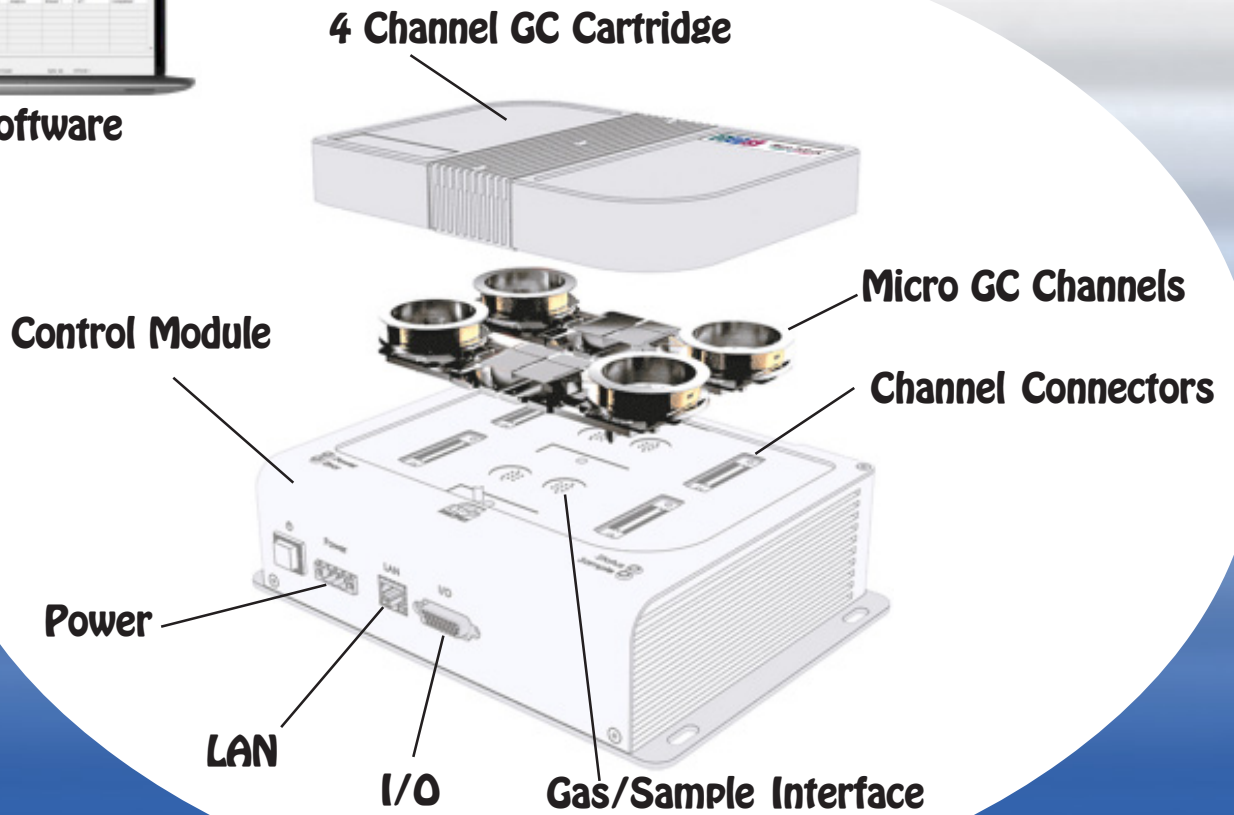
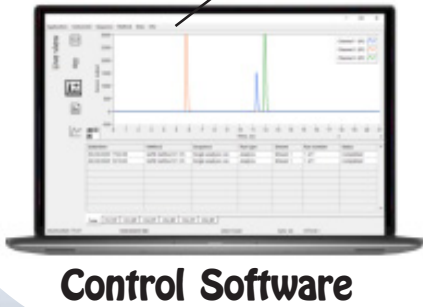
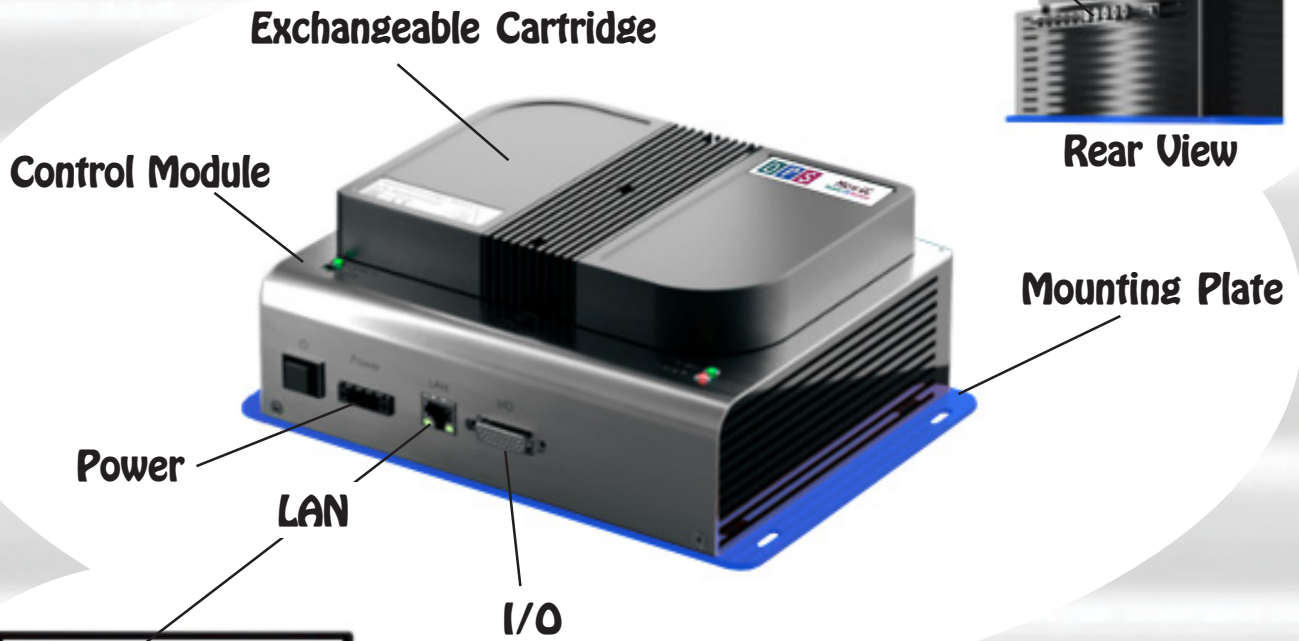


Portable Natural Gas GC "It Goes with you Anywhere!"

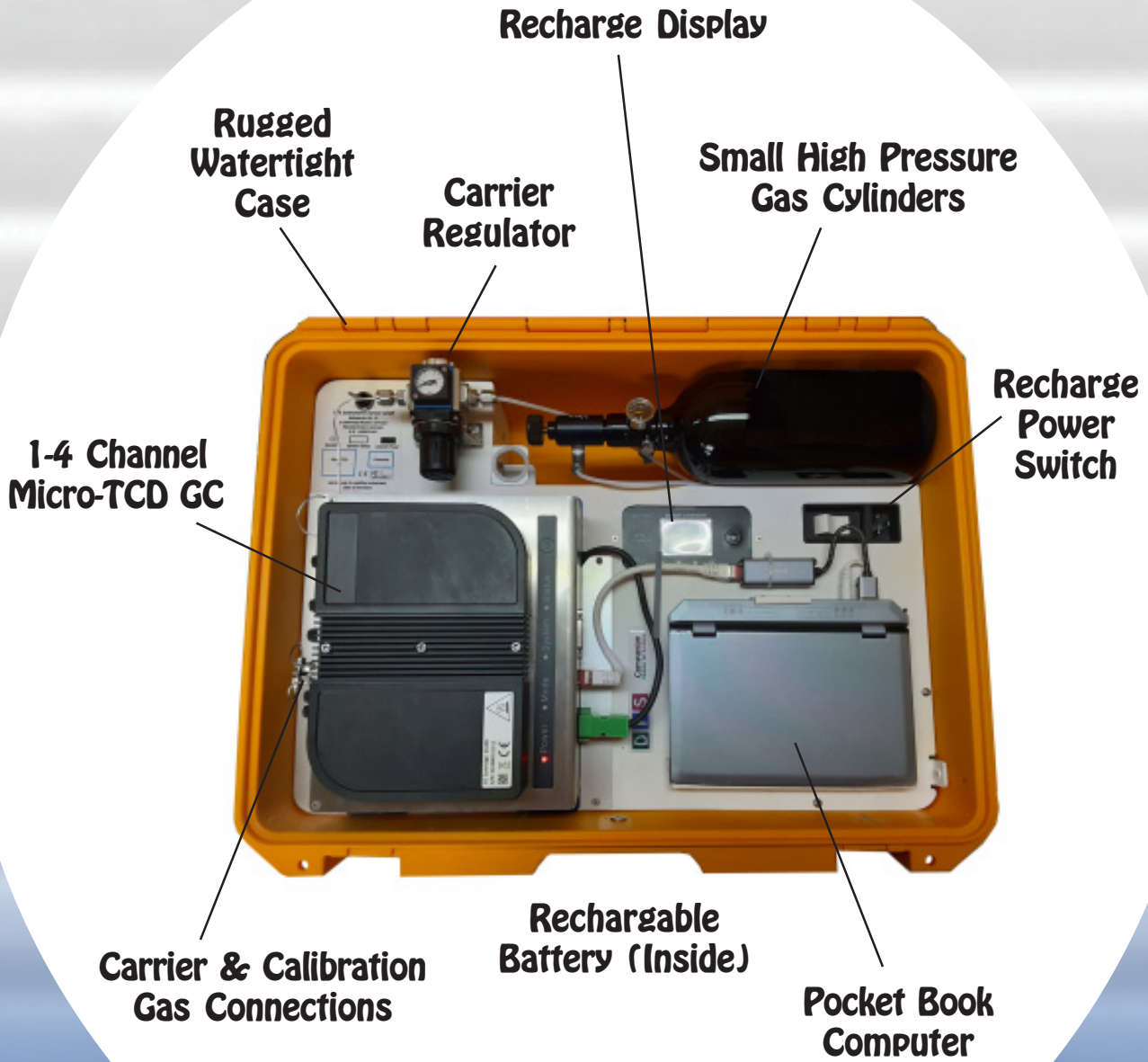
Micro-TCD GC Applications

D P S
Instruments, Inc.

DPS Micro-TCD GC Layout



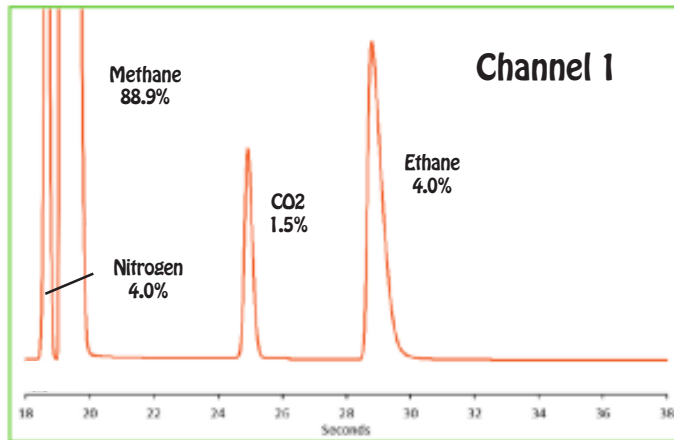
DPS Companion 4 Layout



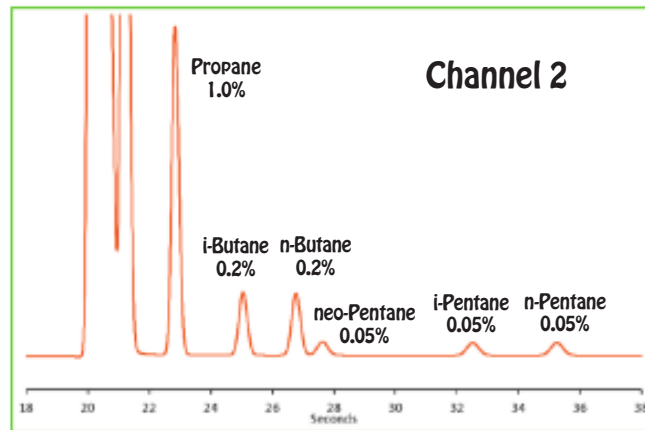
Natural Gas Analyzer - NatGas-Basic

2 Channel Micro-TCD GC - With our unique detector configuration, we only need a 2 Channel GC System to detect and quantitate all of the light hydrocarbons and calculate the colorific value, wobble index, etc. If this is all you need, you can save money on this stream-lined GC system.

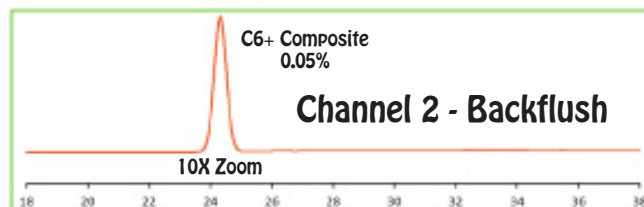
Every GC Channel includes 2 TCD detectors, one for the Analytical Column and the other for the Pre-column backflush. Using this to our advantage we backflush the C6+ compounds from the 2nd Channel to the Pre-column TCD detector giving us 3 chromatograms of data from a 2 Channel Micro-TCD GC.



C1 - C2 Hydrocarbons



C3 - C5 Hydrocarbons



C6+ Hydrocarbons

NatGas-Basic Features

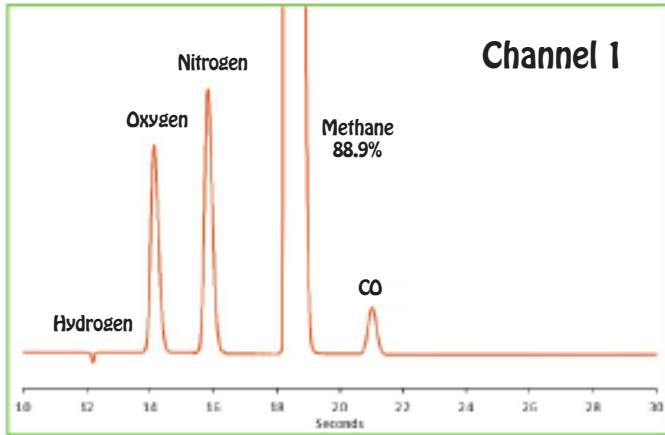
System Configuration - A Simple and efficient configuration using the power of the rugged Micro-TCD GC with 2 Channels. Each Channel contains a GC Oven, Analytical Column, Pre-Column, 2 Micro-TCD Detectors, Injection Valve, Back-Flush valve and Electronic & Gas Connections.

Sample Information - The most common Natural Gas compounds are included in this analysis scheme, which meets ASTM & ISO methodology.

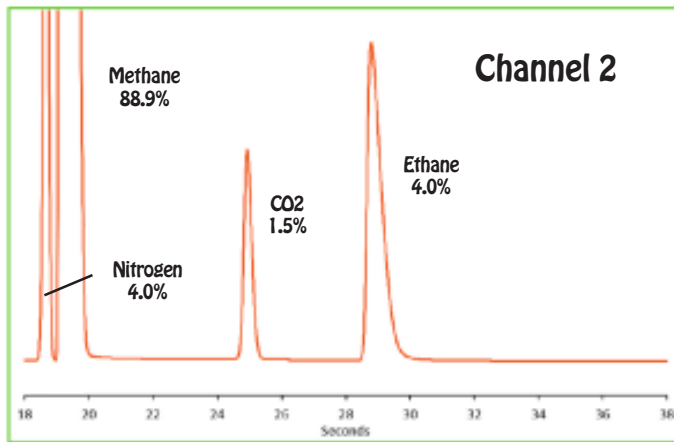
Natural Gas Components and Range Covered

No.	Compound	Mol % Range
1	Nitrogen	0.01 - 20
2	Methane	0.01 - 100
3	Hydrogen Sulfide	0.30 - 30
4	Carbon Dioxide	0.01 - 20
5	Ethane	0.01 - 100
6	Propane	0.01 - 100
7	iso-Butane	0.01 - 10
8	n-Butane	0.01 - 10
9	neo-Pentane	0.01 - 2
10	iso-Pentane	0.01 - 2
11	n-Pentane	0.01 - 2
12	Hexane+	0.01 - 2

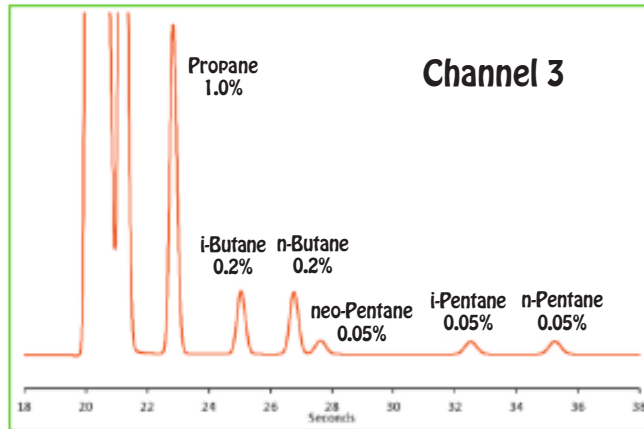
Natural Gas Analyzer - NatGas-Standard



Permanent Gases

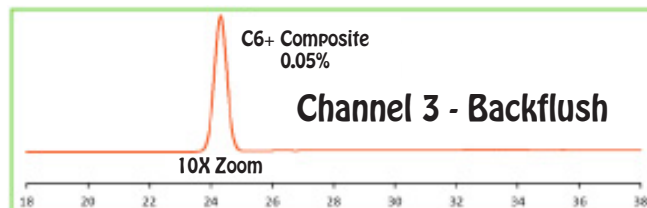


C1 - C2 Hydrocarbons



C3 - C5 Hydrocarbons

C6+ Hydrocarbons



NatGas-Standard Features

System Configuration - A Simple and efficient configuration using the power of the rugged Micro-TCD GC with 3 Channels. Each Channel contains a GC Oven, Analytical Column, Pre-Column, 2 Micro-TCD Detectors, Injection Valve, Back-Flush valve and Electronic & Gas Connections.

Additional Channel 1 - Channels 2 & 3 work exactly the same as the NatGas-Basic. However, we add Channel 1 for the permanent gases. This configuration is our Standard for most calorific value calculations.

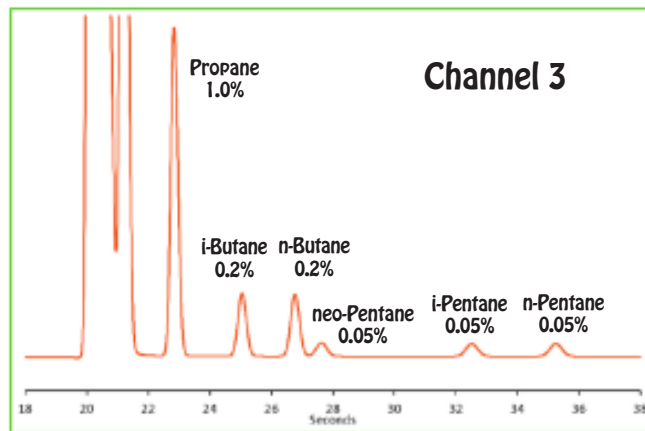
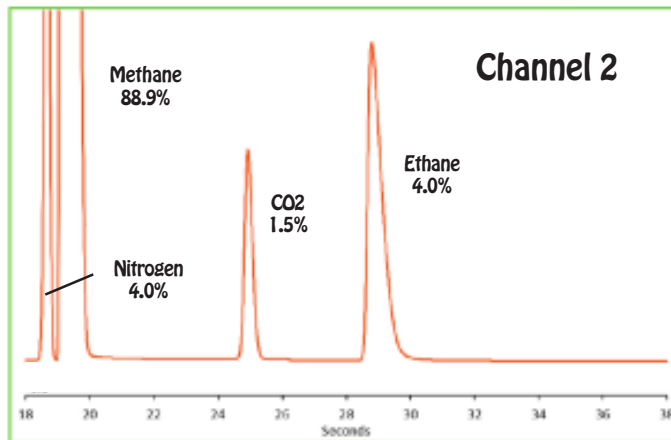
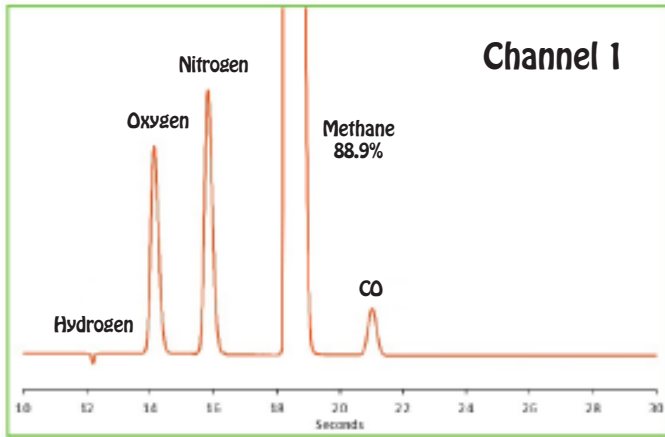
Sample Information - The Standard Natural Gas compounds are included in this analysis scheme, which meets ASTM & ISO methodology. Additional components, such as 2,2-Dimethyl Propane, and 2,2-Dimethyl Butane are also detected.

Natural Gas Components and Range Covered

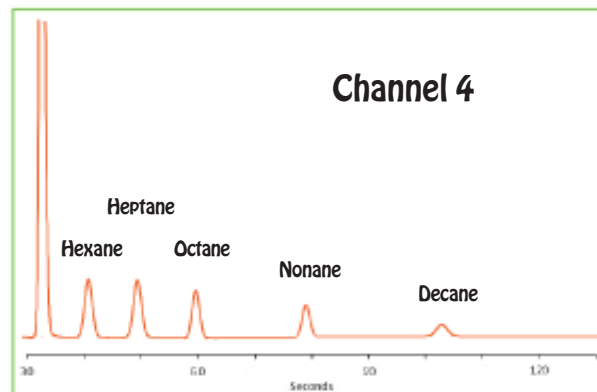
No.	Compound	Mol % Range
1	Hydrogen	0.01 - 10
2	Oxygen	0.01 - 10
3	Nitrogen	0.01 - 20
4	Methane	0.01 - 100
5	Hydrogen Sulfide	0.30 - 30
6	Carbon Dioxide	0.01 - 20
7	Ethane	0.01 - 100
8	Propane	0.01 - 100
9	iso-Butane	0.01 - 10
10	n-Butane	0.01 - 10
11	neo-Pentane	0.01 - 2
12	iso-Pentane	0.01 - 2
13	n-Pentane	0.01 - 2
14	Hexane+	0.01 - 2

**** Helium** - Is used as the carrier gas giving the lowest possible detection limits to the other permanent gas compounds. Hydrogen detection suffers, but it is not a critical compound for the Calorific value calculation.

Natural Gas Analyzer - NatGas-Supreme



C6 - C10 Hydrocarbons



NatGas-Supreme Features

System Configuration - A Simple and efficient configuration using the power of the rugged Micro-TCD GC with 4 Channels. Each Channel contains a GC Oven, Analytical Column, Pre-Column, 2 Micro-TCD Detectors, Injection Valve, Back-Flush valve and Electronic & Gas Connections.

Additional Channel 4 - Channels 1, 2 & 3 work exactly the same as the NatGas-Standard. However, we add Channel 4 to characterize the individual compounds between C6 and C10.

Sample Information - The comprehensive analysis of Natural Gas compounds are included in this analysis scheme, which meets ASTM & ISO methodology.

Natural Gas Components and Range Covered

No.	Compound	Mol % Range
1	Hydrogen	0.01 - 10
2	Oxygen	0.01 - 10
3	Nitrogen	0.01 - 20
4	Methane	0.01 - 100
5	Hydrogen Sulfide	0.30 - 30
6	Carbon Dioxide	0.01 - 20
7	Ethane	0.01 - 100
8	Propane	0.01 - 100
9	iso-Butane	0.01 - 10
10	n-Butane	0.01 - 10
11	neo-Pentane	0.01 - 2
12	iso-Pentane	0.01 - 2
13	n-Pentane	0.01 - 2
14	Hexane	0.01 - 2
15	Heptane	0.01 - 2
16	Octane	0.01 - 2
17	Nonane	0.01 - 2
18	Decane	0.01 - 2

DPS Micro-TCD NatGas GC System Specifications:

Fixed or Portable NatGas GC:

Micro GC Channels:

- 2-4 Micro GC Channels in an Exchangeable Cartridge
- Each GC Channel contains GC Oven, Analytical Column, Pre-Column, 2X Micro-TCD Detectors, Injection and Back-Flush Valves, Electronic & Gas Connectors.

Software/GC Control Interface:

- Enter and store GC Methods via Computer connection
- Safety Limits on all user entered parameters
- Communications: RS232, RS485, Ethernet, Digital I/O
- Protocols: Modbus, TCP
- Sequencing for Sampling, Injection, Backflush, etc.
- Memory Storage - up to 256Gb
- Control for Carrier Gas(s)
- Control for Valves (Injection, Backflush, Sample)
- Universal voltage input (85 – 240 Vac, 50-60Hz)
- Power Supply - (20 – 28 Vdc)
- Power Consumption - 75 Watts maximum

Features:

- 150 °C Temperature Limit with 0.1 °C set-point resolution
- Isothermal Operation
- Repeatability - < 0.05% RSD
- Cycle Time (Typical) - 60 sec
- Detection Limit (500ppb - 100%)
- Sequence Controlled Injection Time
- 1 Micro-machined Injector per Channel
- 1 Pre-Column with Backflush per Channel
- 1 Analytical Column per Channel

Physical Properties Calculation:

- Calorific Value, Wobble Index, Compressibility, and other critical values are automatically calculated per sample.

Valve:

- 1 Micro-machined Injection & Back-Flush Valve per Channel

Columns:

- 1 Pre-Column with Back-Flush per Channel
- 1 Analytical Column
- Isothermal Operation
- Repeatability - < 0.05% RSD
- Cycle Time (Typical) - 15 - 60 sec
- Optional Temperature Program

Control Module:

- Moisture - (5 to 95 %)
- Operating Temperature - (5 to 55 °C)
- Storage Temperature - (-20 to 60 °C)
- Dimensions - 20 X 15 X 10 cm
- Weight - 8 Kg

Gas/Sampling:

- Gas Ports - 1/16"
- Carrier - Helium, Argon, Nitrogen, or Hydrogen
- Carrier Input Pressure - 450 kPa
- Carrier Consumption (Typical) - 15 mls/min
- Sampling - Pressurized, or internal Vacuum Pump
- 3 Sample Streams (more optional)

Companion 4
Portable GC



Micro-TCD GC