



## CALIDUS™ CS micro Gas Chromatograph

GC analysis for virtually any fixed gas and hydrocarbons up to C<sub>12</sub> for laboratory, at-line, transportable or online use

- **Upstream (E&P)**
- **Petrochemical/Chemical**
- **Food & Beverage**
- **Military**
- **Refining**
- **Pharmaceutical**
- **Medical**
- **Educational**



**CALIDUS Model CS** - comprised of 5 modules

A single Sample Processing Unit with a standard split/splitless injection port (1:1 up to 1:200) suitable gas and liquid samples via either syringe through the septum injections, optional gas, liquid or headspace auto-sampler, or automated sampling valves. The inlet includes septum purge to prevent bleed components from entering the system. The sample is then delivered to a column switching valve for analysis on two independent column modules.

Two Programmed Temperature Column Modules (PTCM) separated by a column switching valve containing the resistively heated steel capillary chromatography column with necessary hardware, software and electronic control to enable temperature programming from 0.1°C to 5°C per second from 5°C above ambient to 180°C (the maximum temperature for the valve, higher available on request) depending on the maximum temperature capability of the column material selected. Each column module is independently controlled by the method and can be any of the available column types.

Two independent Detector Modules incorporating either a micro Flame Ionization Detector (FID) or micro Thermal Conductivity Detector (TCD) with the necessary hardware, software and electronic control to provide detector temperature control, digital output signal and additionally for proper FID fuel supply pressure and auto-ignition.

The micro FID is a fully digital carbon/hydrogen bond detector using the hydrogen flame to burn the sample components. It uses an electrometer to sense the current changes in the flame cell due to chromatographic component elution. The data rate is 100 Hz.

The micro TCD is a fully digital, universal detector. The TCD consists of a constant temperature filament that senses change in power required to hold the filament temperature constant when chromatographic components elute. The power measurement is used to determine the amount of the component eluting from the column. The data rate is 50 Hz.

CALIDUS is controlled with ChromPerfect chromatography data system fully integrated with LineUp running on a Windows PC.



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### SIGNIFICANCE AND USE

The Model CS provides a simple ultra-fast analysis (10 to 50 times faster than conventional lab or process GC's) of fixed gases and hydrocarbons to C<sub>12</sub>. Use of two different PTCMs with their own detectors separated by the column switching valve with the appropriate column material enables leveraging the sensitivity and selectivity differences for enhanced separations (for example heartcuts and backflushing). Proper choice of columns enables wide boiling range and concentration ranges with a single GC. Model CS is ideal for individual component speciation from other sample matrix components.

The analyses are used for product specifications testing, product safety, environmental measurements, process control, catalyst protection, educational tools, spot checks of fuels and many more.

**Faster, Smaller, Smarter, Easier, Greener**



# CALIDUS™ CS Specifications (global patents pending)

December 1, 2010

## Ambient Environment

Operating Temperature Range: 0°C to 35°C  
Storage Temperature Range: -20°C to 60°C  
Relative Humidity Range: 0 to 100% (non-condensing)

## Power Requirements

Less than 300 watts peak power at startup, practical use < 200 Watts for gas or liquid analyses  
24 VDC supplied from external power supply, 100-240VAC using 50/60Hz AC

## Safety

General purpose, light industrial (lab instrument environment)  
CE Mark and Nationally Recognized Testing Laboratory (NRTL) certified pending (TUV Rheinland)

## Gas Supplies

50 PSIG, 99.995% H<sub>2</sub> or He at up to 250 ml/min, 50 PSIG zero air for FID operation

## Sample Requirements (via split/splitless injector with septum purge)

Air or gaseous samples at 0 to 50 PSIG at ambient temperature  
Membrane, SPME and static and dynamic headspace extracts  
Direct liquid injections neat or dilute organic solvents (DCM, hexane, MEK, toluene, methanol, CS<sub>2</sub> etc.)

## Dimensions

17" wide by 8.5" deep by 11" high, ~ 20 lbs  
Uninterrupted power supply and data acquisition computer external to the base unit

## Controls/Outputs

All functions and parameters via ethernet or RS-232 using ChromPerfect™ software  
Start analysis from keyboard or GC  
Set method from external computer using ChromPerfect software  
50-100Hz digitization (detector dependent) on each column, 24 bit resolution, auto zero on each run  
Trigger in and ready out signals plus an array of others via ChromPerfect

## Front Panel Displays

Temperature and pressure readings, function on/off, other  
Power on/off  
Status of analysis columns (isothermal, programming, cool down, ready, cycles run, other)

## Standard Equipment

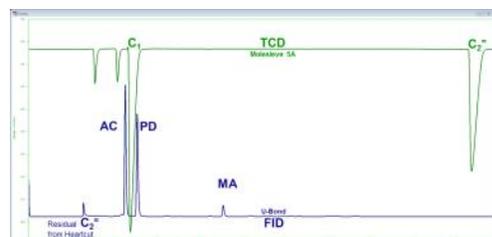
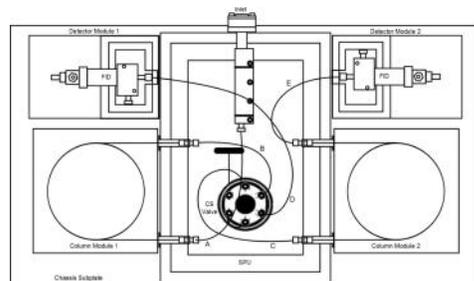
Two capillary columns, 2m long, 100µm to 320µm ID, temperature programmable from 0.1 to 5°C per second from 5° above ambient to 350°C (maximum temperature software limited to be no greater than the limit for the columns installed, isothermal operation is available). Column modules are 2 meter columns in Mxt-1, Mxt-5, Mxt-1701, Mxt-Wax, Mxt-MoleSieve, Mxt-Alumina, < 320µm and various film thicknesses with others coming soon. The column switching valve can be plumbed in several ways but always between the two column modules.  
Flame ionization or thermal conductivity (filament) detection  
Gas and liquid inlet for syringe injection of samples or automated gas and liquid sample valves available

## Performance (application dependent)

Repeatability of ± 1% RSD or better (area) and of ± 0.1% RSD or better (retention times)  
Analysis times for VOCs: can be <20 seconds and for SVOCs: can be <60 seconds  
Dynamic range: depends on detector used and application (FID typically 10<sup>5</sup>)

## Data Processing and Instrument Control

Note: computer system is integral and necessary component of the analysis system and includes the following:  
RS-232 or USB to RS-232 adapter, ethernet  
Windows XP or newer operating environment  
ChromPerfect software for dual column data acquisition via RS-232 serial or ethernet ports



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