

## Product Data Sheet

PDS 103-1000.A01

September, 2004

# Model 1000 Process Gas Chromatograph

Emerson Process Management offers a complete line of gas chromatographs made for the process applications. The Model 1000 Process Gas Chromatograph combines the proven analytical components of the Model 500 and Model 700 with the larger oven capacity of a traditional air-bath oven design. The result is maximum analyzer reliability and analytical flexibility in one package.



## FEATURES

- Traditional air-bath oven design for maximum application flexibility
- Same rugged chromatograph valves and detectors found in our other gas chromatographs
- Fully compatible with modern Ethernet networks and DCS communication
- Diaphragm-based 6-port chromatograph valves available
- Oven capacity for up to six chromatograph valves and two detectors
- Choice of thermal conductivity, flame ionization or flame photometric detectors
- Thermal Conductivity Detector (TCD) sensitive down to very low parts-per-million levels
- Last chromatogram for each sample and calibration stream stored in gas chromatograph
- Archives up to 254 item averages, more than 3 months of standard runs and calculations

## APPLICATIONS

The Model 1000 is designed for a variety of refining, petrochemical, food and beverage, pharmaceutical, power and environmental applications where selected components in gaseous or liquid streams must be precisely monitored on a continuous basis.

### Refineries

- Catalytic Reformer
- Isomerization Unit
- Aromatics Unit

### Petrochemical

- Ethylene Plants
- Polymer Plants
- Acrylonitrile Plants

### Gas Processing

- NGL and LNG Plants
- Cryogenic Gas Plants

### Power Generation

- Power Generation Plants
- Gas Turbine Control

### Environmental Monitoring

- Ambient Air Monitoring
- HR-VOCs in Flares and Cooling Towers

## The Rosemount Analytical Gas Chromatograph Difference

- Broad application scope with single- or dual- detector capability
- High-sensitivity thermal conductivity detectors can often replace the need for more complex detectors
- Easy-to-use MON2000 PC software for advanced diagnostics and simplified troubleshooting; simply the best in the industry
- Rosemount Analytical diaphragm valves offer a lifetime warranty

**ROSEMOUNT**<sup>®</sup>  
Analytical

Visit our website at [www.raihome.com](http://www.raihome.com)  
On-line ordering available.

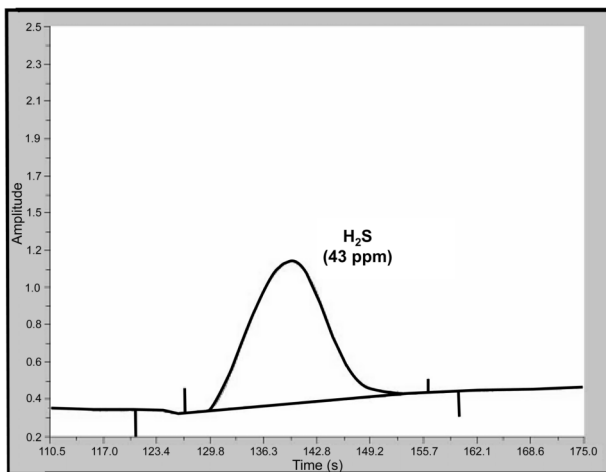
  
**EMERSON**<sup>™</sup>  
Process Management

## Gas Chromatograph Valves

The chromatograph valves used in Rosemount Analytical gas chromatographs are unique to the on-line gas chromatograph market. Using a design originally developed by NASA, the valve offers greatly extended operating life. Emerson Process Management is currently the only on-line gas chromatograph supplier to offer a lifetime warranty on their Rosemount Analytical chromatograph valves!

- Simple mechanical design
- Sample does not come in contact with internal moving parts
- Over 5 million operations per valve
- Lifetime warranty on diaphragm valves
- Rotary liquid injection valves also available as needed for applications

The reason for the exceptional durability of the valve is its unique double-diaphragm actuation. The double-diaphragm design eliminates the need for springs, O-rings and lubrication. Flow paths in the valve are arranged so that internal moving parts never contact the sample flow. As a result, abrasive mechanical wear on machined valve surfaces is eliminated. The valves are rated for over 5 million operations before repair (approximately 3-5 years of usage). And then, repair is typically simply changing the diaphragms in the valve.



***For many part-per-million applications, a simple easy-to-maintain TCD detector can be used rather than a more complicated FID or FPD due to the superior sensitivity of the Rosemount Analytical TCD design.***

Most importantly, the Rosemount Analytical valve offers excellent performance. Minimal internal movement of the components in the valve – roughly 1/1000th of an inch – contributes to rapid actuation of the valve, which can be important for applications using micro-packed and capillary columns.



***The diaphragm valve used in the Model 1000 is so reliable; it comes with a lifetime warranty from Rosemount Analytical!***

## Detectors

The Model 1000 gas chromatograph has the selection of detectors to handle the wide range of analytical demands found in typical process applications. Whether the components of interest are in the percent range or down to the parts-per-million range, precise and reliable measurement is possible.

The Thermal Conductivity Detector's (TCD) is the detector of choice for most applications due to its universal response to all compounds. The TCD from Emerson Process Management is also able to go well beyond the normal measuring ranges seen in other designs by being able to do many applications with low parts-per-million measurement requirements. This greatly simplifies the gas chromatograph design when a simple and rugged TCD can be used.

For measurement of compounds in the low ppm or even ppb ranges, the Flame Ionization Detector (FID) for most organic compounds and the Flame Photometric Detector (FPD) for sulfur compounds are analytical options. Maintenance features such as auto-detection of flame loss are also standard.

For maximum application flexibility, the Model 1000 can have up to two detectors. Detector combinations like TCD-TCD, TCD-FID or TCD-FPD are well within the capability of the Model 1000.

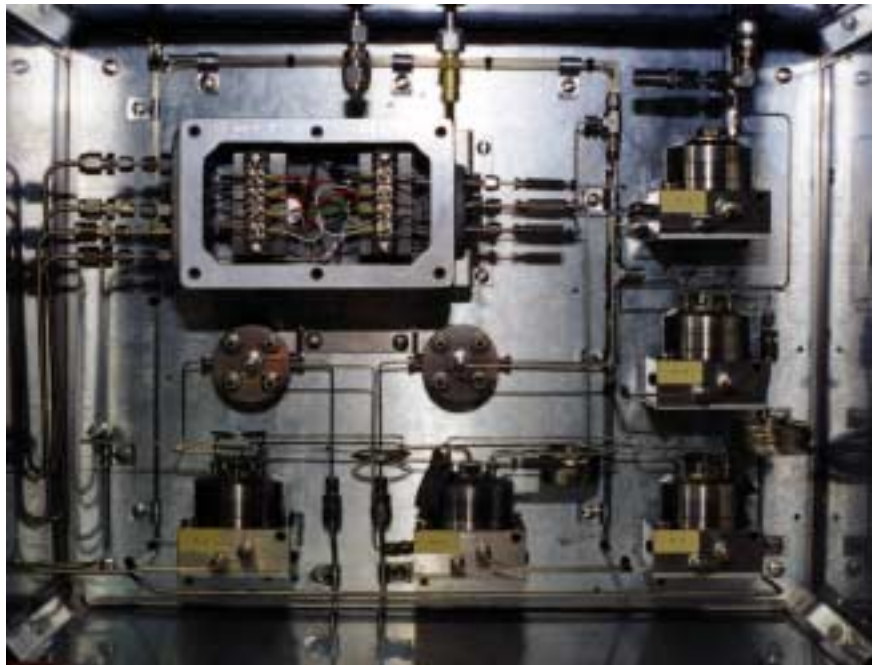
## Air Bath Oven

The air bath oven uses a conventional instrument air heater design for maximum analytical flexibility. The oven on the Model 1000 has capacity for up to 6 diaphragm chromatograph valves. There is also the capacity to install liquid injection sample valves for heavier samples. The oven can operate at temperatures up to 150°C (300°F) as the application dictates.

## Columns

Since 1980, Emerson Process Management has been refining and improving its process for creating micro-packed columns. Rosemount Analytical micro-packed columns offer a superior combination of the features found in both capillary and conventional packed columns.

The result is improved chromatography with extended column life (several years in most applications without measurable degradation or bleed). Rosemount Analytical micro-packed columns produce sharper peaks for improved component separation, short analysis time and very low carrier-gas consumption.



*The air bath oven design of the Model 1000 gas chromatograph offers maximum analytical flexibility while maintaining easy access to all analytical components.*

## The Design Makes The Difference:

- Built Tough To Stand Up Against Any Environment
- Tested Tough To Insure Performance
- Field-Mountable Technology Means Solid Performance at Reduced Cost
- Valves Built So Well, They're Guaranteed for Life!
- Detector Options That Meet Your Requirements
- Micro-packed Columns That Are Made To Last

## MON2000 PC Workstation

The Model 1000 gas chromatograph is designed to operate unattended. If however, adjustments are needed; our exclusive MON2000 software allows complete control of you gas chromatographs – either locally or remotely. From within MON2000, a user can:

- Review and modify analytical settings
- Upload and display multiple chromatograms on the screen for comparison
- Upload and trend any of the measured results
- Export data for use in other 3rd party applications
- Overlay multiple chromatograms for troubleshooting and calibration
- Check original calibration against last calibration

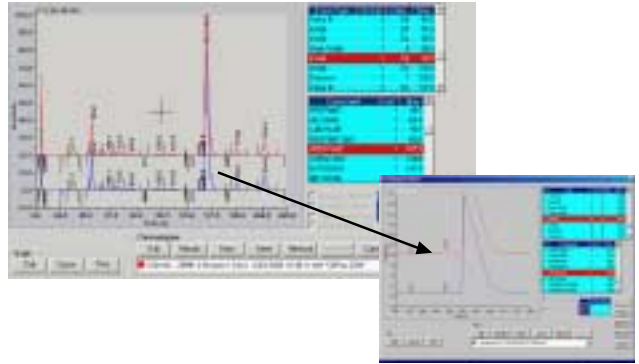
The MON2000 PC Workstation software is Windows™-based software to make analyzer configuration, maintenance and data collection easy. With intuitive drop-down menus and fill-in-the-blank tables, even new users can quickly navigate through the software.

The MON2000 software can display both current and multiple archived chromatograms on the screen streamlining the time needed to performance routine analyzer maintenance.

MON2000 also has a number of tools built in that help users manage their analyzers such as:

- Automatic recording of alarms in a log file
- Event logs that provide a continuous record of all operator changes with time and user name stored
- Maintenance log scratch pad for keeping track of maintenance or testing done

Data collected from the gas chromatographs can be stored and displayed in a wide range of options such as trend lines on the screen and logs automatically documenting all changes made to the gas chromatograph. Data can also be exported in formats compatible with most third-party Windows™ applications.



**Comparing multiple chromatograms and zooming into specific sections is easy with the point and click design of MON2000.**

## Powerful Yet Simple – MON2000 PC Workstation

Simple Drop-Down Menus

Connect To Any GC With A Mouse Click

Full Featured Chromatogram Display

Summary Of Application Event Status and Time

Automatic Listing Of Measured Components

Quickly Add Chromatograms To Overlay

## Analyzer Networking and Data Communication

Emerson's Rosemount Analytical gas chromatographs can be configured in a number of networking and data communication schemes to meet most process communication requirements.

Options include Ethernet networks as well as multi-drop RS-485 networks. It is even possible to set up automatic polling for data collection over phone lines if desired.

Data communication options to the plant control system include simple analog and discrete signals as well as Modbus serial links. To preserve the integrity of the analysis data, all Model 1000 gas chromatographs are capable of storing up to 99 days of analysis data in the event of loss of communication to the plant control system.

All Rosemount Analytical process gas chromatographs are designed to operate unattended. Occasionally, adjustments to the analyzers' analytical method or a review of possible alarms may be needed. Using our exclusive MON2000 software loaded on either a PC or laptop running Windows™, you'll have complete control of your gas chromatographs – either locally or remotely.



*The Model 1000 gas chromatograph can either have the 2350A controller built into the face of the analyzer (shown) or mounted remotely in a 19" rack enclosure.*

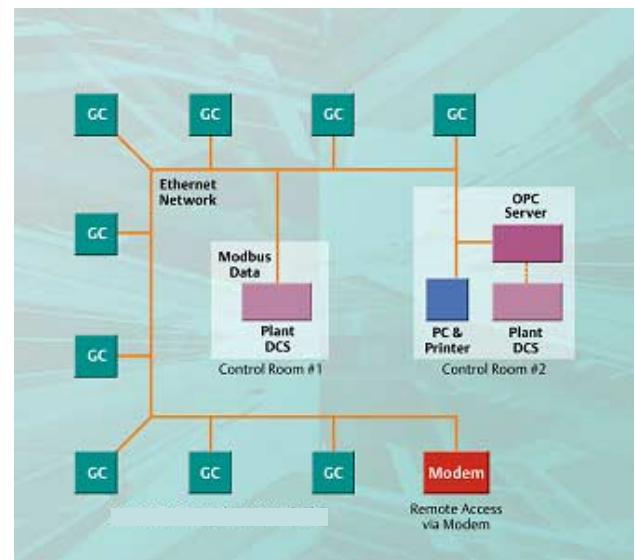
## Networking Flexibility

Whether you want to network gas chromatographs throughout the plant or simply link a single gas chromatograph to the DCS system, the Model 1000 can be configured to handle most any scenario:

- Choice of Ethernet or RS-485 network
- Can use same network to connect Model 500, Model 700 and Model 1000 gas chromatographs
- Able to connect multiple PC workstations using MON2000
- Connectivity to plant control systems using industry standard protocols such as Modbus and OPC

## Secure Modbus Connectivity

For process gas chromatographs, Modbus continues to be the preferred choice to connect a gas chromatograph network to the plant control system. The design of the Rosemount Analytical Modbus avoids the use of central interface cards or computers that can act as a single-point of failure in the Modbus link. Instead, the plant DCS system can "talk" directly to each gas chromatograph to gather the data needed. Furthermore, the register and coil addresses can be easily customized to meet the specific data structure of the DCS. There is also a program built into the MON2000 workstation to test the Modbus link to the DCS if troubleshooting should be needed.



*With Ethernet, analyzers transmit directly to the plant's digital control system (including DeltaV®) quickly and securely using either industry standard Modbus or the new OPC protocol.*

## Custom Engineered Sample Systems

Any gas chromatograph can only be as good as the quality of the sample it measures. So every sample system for Rosemount Analytical gas chromatographs are custom engineered for the specific requirements of the application. Common features include:

- Heated and open panel designs
- All components rated for the area classification
- Automatic calibration / validation available as an option
- Variety of sample probes to extract a reliable and stable sample from the process



## Custom Engineered Sample Systems

A complete on-line analytical solution is more than just the analyzer. Sample conditioning systems to prepare the sample for analysis, communication links to the plant control computer, and packaging of the analytical equipment into a cabinet or shelter all play an important role.

Rosemount Analytical has decades of experience providing complete turnkey solutions ranging from simple single-analyzer cabinets up to large integrated shelters with multiple types of analyzers.

The key to successful system integration begins at the proposal stage where Rosemount Analytical develops a custom engineer solution. This is followed with experienced project management during the system fabrication and on to installation and training once the system is delivered to the field.



***PUT ROSEMOUNT ANALYTICAL'S EXPERIENCE TO WORK FOR YOU – As one of the largest instrumentation and control suppliers in the world and as a part of Emerson Process Management, Rosemount Analytical has the expertise and resources to tackle nearly any analytical system integration project. Whether the project is a simple 3-sided shelter or a large shelter with multiple types of analyzers, complete turnkey solutions are expertly custom engineered.***

**Request A Quotation**

Every Model 1000 process gas chromatograph is custom built for the specific application requested. To request a free quotation, simply fill out the information below and send it to the address at the end of this Data Sheet. You can also find an electronic version of the Request For Quotation form at our web site <http://www.raihome.com> .



Name: \_\_\_\_\_  
 Title: \_\_\_\_\_  
 Company: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 Phone #: \_\_\_\_\_  
 Fax #: \_\_\_\_\_  
 Email: \_\_\_\_\_

Your Reference #: \_\_\_\_\_  
 Project Name: \_\_\_\_\_  
 Process Unit: \_\_\_\_\_  
 Stream Name(s): \_\_\_\_\_  
 \_\_\_\_\_  
 Hazardous Area Classification: \_\_\_\_\_

Stream Composition	Units	Stream 1				Stream 2			
		Min	Normal	Max	Measure	Min	Normal	Max	Measure

(For more than two streams, make copies of this page)

	<b>Stream 1</b>	<b>Stream 2</b>
Stream Temperature:	_____	_____
Stream Pressure:	_____	_____
Stream Phase (vapor / liquid)	_____	_____
Stream Contaminants:	_____	_____
	_____	_____
	_____	_____

Distance to GC from Sample Point: \_\_\_\_\_

Controller: Integral ( )    19" Rack-Mount ( )                      Power: 110 VAC ( )    220 VAC ( )

Data Communication: Analog Output ( )    Modbus ( )    OPC ( )    Printer ( )    Modem ( )

Analyzer Network: Ethernet ( )    RS-485 Multi-Drop ( )

Other Options: Carrier Gas ( )    Calibration Gas ( )    Start-Up ( )    Training Class ( )

Special Instructions: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## MODEL 1000 SPECIFICATIONS

**Power:** 115 VAC  $\pm$ 15%, 220 VAC 15%, 50/60 HZ  
400 watts running, 1100 watts start-up

**Environment:** 0° to 55°C (32° to 130°F) for TCD and FID;  
20°C  $\pm$  5°C (70°F  $\pm$  10°F) for FPD

**Dimensions (without sample system):**

198 cm H x 61cm W x 61cm D (78" H x 24" W x 24" D)

**Mounting:** wall-mount (standard); free-standing (optional)

**Approximate Weight (without sample system):**  
approximately 68 kg. (150 lbs.)

**Area Classification Options** (hardware dependant):  
designed to meet Class 1, Div. I, Groups B, C, D with X-Purge; Class 1 Div. 2, Groups B, C, D with Z-Purge

**Instrument Air:** 4 SCFM at 40 psig of oil-free instrument air for purge and oven heat and 90 psig for valve actuation

**Oven:** air bath oven, maximum 150°C (300°F)

**Valves:** 6-port and 10-port diaphragm chromatograph valves (maximum 6 valves). Other types of valves may be used depending on the application such as liquid injection and rotary valves

**Carrier Gas:** application-dependent. Typically zero-grade helium, nitrogen or hydrogen at 90 psig

**Columns:** choice of packed, micro-packed or capillary columns; application-dependent

**Detector:** Thermal Conductivity Detector (TCD), Flame Ionization Detector (FID) or Flame Photometric Detector (FPD); TCD-TCD, TCD-FID or TCD-FPD dual detector combinations possible

**Gating Options:** fixed-time, slope and automatic gating of peaks

**Streams:** up to 12 streams

**Chromatograph Control Electronics:** integrally mounted

**Analog Inputs:** four inputs filtered with transient protection (note that the 4 inputs will be used by the second detector if present)

**Analog Outputs:** two standard (up to 10 optional), 4 – 20 mA, non-isolated

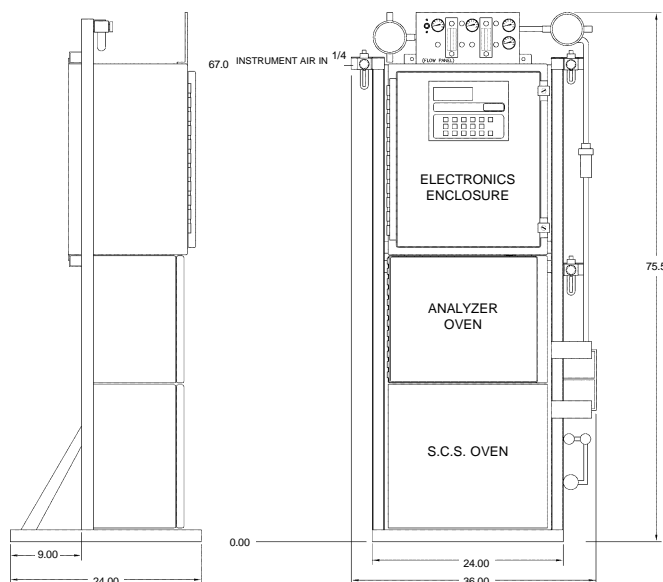
**Serial Communication Ports:** three serial ports standard with option for a total of eight. Depending on the port, choice of RS-232, RS-422 and RS-485 is available as well as the Modbus protocol

**Digital Inputs (optional):** one gas chromatograph alarm and five user assignable inputs, optically isolated with transient protection

**Digital Outputs (optional):** five digital outputs can be used for alarms, optically isolated with transient protection

**Parallel Printer Port (optional):** one parallel port available for printed reports

**Internal Model (optional):** field-configurable; 300 to 19.2k baud



**Model 1000 Dimensional Drawing**

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