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Rosemount Analytical Model 500 Process Gas Chromatograph

The Model 500 Process Gas Chromatograph is an advanced combination of technology and rugged instrumentation that helps make the most of existing plant manpower. Today's trend toward downsizing means instrument technicians have more to do in less time. Instrumentation has to be more reliable and easier to use than ever before. Emerson's Rosemount Analytical Process Gas Chromatographs are your best choice; we have built our reputation on equipment reliability and long-term performance combined with ease of use.

Model 500 Process Gas Chromatograph

Features

- Proven performance with thousands of units installed around the globe
- Isothermal analysis with 1 or more thermal conductivity detectors /heat sink airless ovens
- Fully compatible with modern Ethernet networks and DCS communication
- Designed for field mounting without the need for expensive analyzer shelters or sacrificing analytical power
- Diaphragm-based 6-port chromatograph valves
- Liquid and gas analysis in a single unit
- Thermal Conductivity Detector (TCD) sensitive down to very low parts-per-million levels
- Flame Photometric Detector (FPD) also available
- Every Model 500 is rigorously tested in an environmental chamber between 0° to 130 °F for 24 hours minimum
- Last chromatogram for each sample and calibration stream stored in process gas chromatograph
- Archives up to 64 item averages, up to 35 days of standard runs and calculations

Applications

The Model 500 is designed for a variety of refining, petrochemical, 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, GTL 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

ROSEMOUNT® Analytical

EMERSON™ Process Management

Engineered Difference

- Extreme ambient temperature operation minimizes installation and utility requirements.
- Easy-to-use MON2000™ software for advanced diagnostics and simplified troubleshooting
- Rosemount Analytical diaphragm valves offer a lifetime warranty
- High-sensitivity thermal conductivity detectors can often replace the need for more complex detectors
- Broad application scope with single or dual detector capability
- Micro-packed columns that are made to last

Custom-Engineered Sample Systems

Any process gas chromatograph is only as good as the quality of the sample it measures. Every sample system for Rosemount Analytical Process Gas Chromatographs is 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

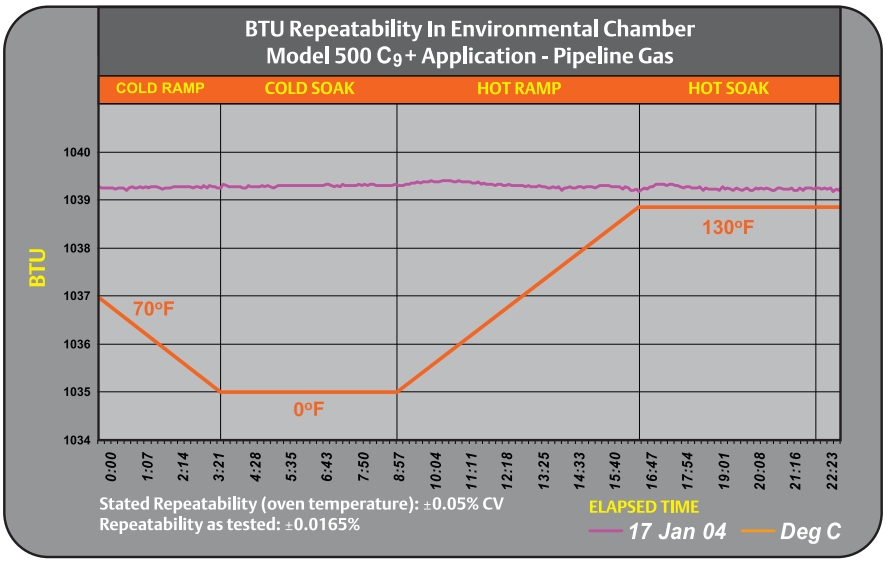
Lower Installation and Maintenance Cost

Rosemount Analytical Process Gas Chromatographs offer the lowest cost of ownership in the industry. Most process measurements can be made at or near the sample point, greatly reducing the overall lifetime cost of the measurement. Expenses such as shelters, air conditioning, heating, long/heated sample lines can be minimized or completely eliminated in most applications. Furthermore, Rosemount Analytical Process Gas Chromatographs are designed to operate unattended for long periods of time without adjustment. When adjustments are required, all components are easily accessible and can be performed in the field in minutes with standard tools.

Environmental Chamber Testing

Emerson Process Management provides the most thorough process gas chromatograph testing in the world. Each Model 500 must operate to specification in our walk-in environmental test chambers cycling between 0 °F and 130 °F for 24 hours minimum. This is all part of our commitment to manufacturing process gas chromatographs that are capable of providing reliable measurements in the field.

Figure 1 - Variable Temperature Testing



To ensure installed performance, every Model 500 Process Gas Chromatograph is tested for superior measurement stability in extreme climates before it ships.

MON2000™ Software

The Model 500 Process Gas Chromatograph is designed to operate unattended. If, however, adjustments are needed, our exclusive MON2000™ software allows complete control of your 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 third-party applications
- Overlay multiple chromatograms for troubleshooting and calibration
- Check original calibration against last calibration

The MON2000 Software is Windows® - based software designed to make analyzer configuration, maintenance, and data collection easy. With intuitive dropdown 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 perform routine analyzer maintenance.

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

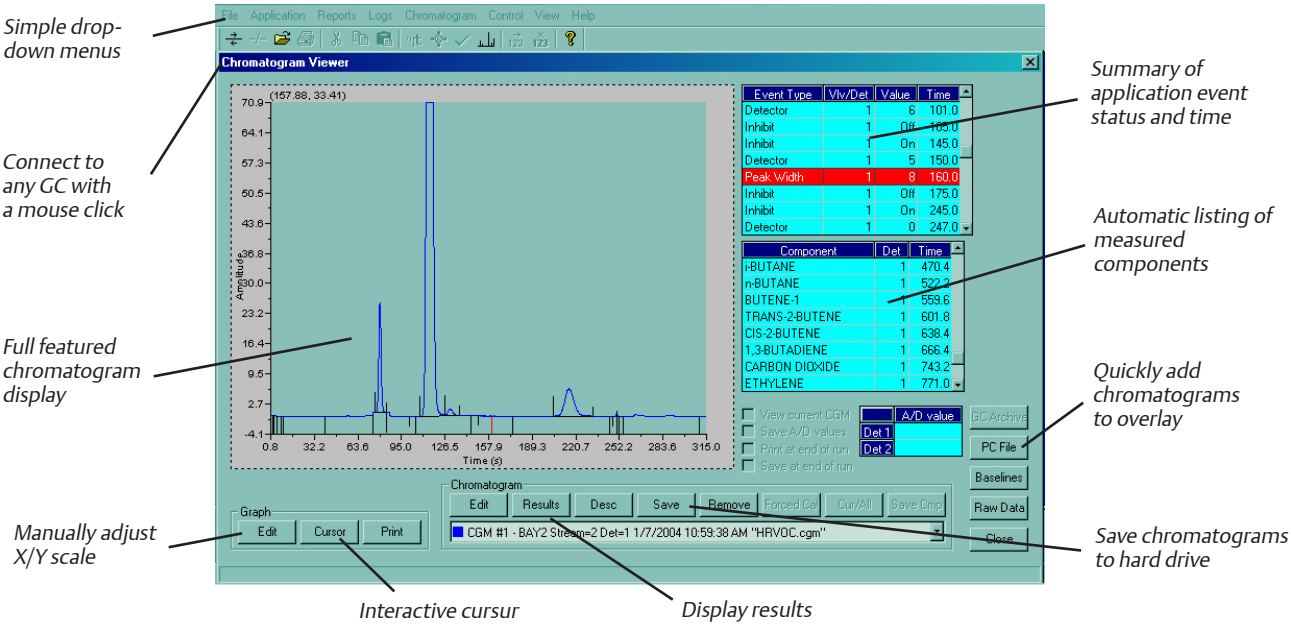
- Automatic recording of alarms in a log file
- Event logs that provide a continuous record of all operator changes with time and user name stored
- Maintenance log scratch pad for keeping track of maintenance or testing done

Data collected from the process 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 process gas chromatograph. Data can also be exported in formats compatible with most third-party Windows® applications.

Figure 2 - Typical MON2000 Workstation Screen

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

Figure 3 - MON2000 Software



Internal Components

Gas Chromatograph Valves

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

- Up to three 6-port diaphragm valves for maximum analytical flexibility
- Simple mechanical design
- Sample does not come in contact with internal moving parts
- More than 5 million operations per valve
- Rotary and liquid injection valves also available for special applications
- Lifetime warranty

The diaphragm valve used in the Model 500 is so reliable, it comes with a lifetime warranty

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 Gas Chromatograph Valves are rated for over 5 million operations before repairs are needed, or approximately 3 to 5 years, depending on usage. Even then, most repairs typically involve simply changing the diaphragms in the valve before they are fully operational again.

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.

Heat Sink Oven

The heat sink oven design of the Model 500 comes standard and brings stable, precise measurement to the field without the need for expensive analyzer shelters.

Key features include:

- Airless oven analytical kiosk with oven temperatures up to 85 °C (185 °F)
- Up to three 6-port diaphragm valves for maximum analytical flexibility
- Micro-packed columns mounted in the center of the heated kiosk for stable performance over the analyzer's entire ambient temperature rating

Installed in thousands of units worldwide, the heat sink oven integrates TCDs, micro-packed columns, and chromatograph valves in a single temperature-controlled assembly. The entire oven is certified for operation without the need for instrument air – for oven heat or for safety reasons.

Detectors

The Model 500 Process Gas Chromatograph has a selection of detectors to handle a 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 measurements are possible.

- TCD detector is sensitive down to 3 ppm
- Dual TCD/TCD or TCD/FID configurations possible
- Flame photometric detector (FPD) module also available

The thermistor TCD is the detector of choice for most applications due to its universal response to all compounds. Emerson's Rosemount Analytical TCD is 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 process gas chromatograph design when a simple and rugged TCD can be used rather than an FID.

Micro-packed Columns

Rosemount Analytical micro-packed columns offer a superior combination of features found in both capillary and conventional packed columns — speed, sharp peak resolution, and low carrier gas consumption. In addition, this unique design provides for greatly extended column life — as well as the longest warranty available on the market.

Analyzer Networking and Data Communications

Emerson's Rosemount Analytical Process Gas Chromatographs can be configured in a number of networking and data communication schemes to meet 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 500 Process Gas Chromatographs are capable of storing up to 35 days of analysis or calibration 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 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 process gas chromatographs - either locally or remotely

Model 2350A Gas Chromatograph Controller

The main electronics for the Model 500 Process Gas Chromatograph is mounted in a separate explosion-proof enclosure with integral keypad and display. An optional 19" rack-mount version is available. For additional features and specification, please reference Model 2350A Gas Chromatograph Controller product data sheet.

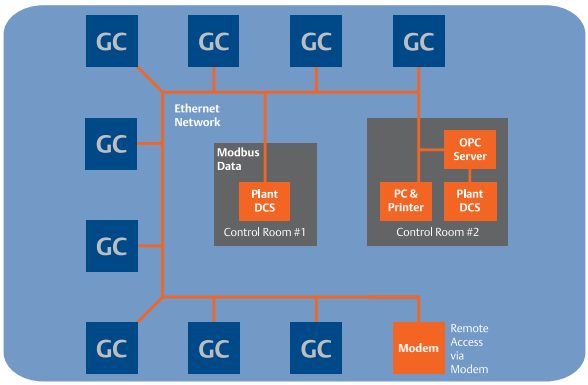
Figure 4 - Model 2350A Gas Chromatograph Controller

Networking Flexibility

Whether you want to network process gas chromatographs throughout the plant or simply link a single gas chromatograph to the DCS, the Model 500 can be configured to handle most any scenario:

- Choice of Ethernet or RS-485 networks
- Use the same network to connect Model 700, Model 500, and Model 1000 Process Gas Chromatographs
- Able to connect multiple PC workstations using MON2000
- Connectivity to plant control systems using industry standard protocols such as Modbus and OPC

Figure 5 - Gas Chromatograph Open Network Architecture



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

Secure Modbus Connectivity

For process gas chromatographs, Modbus continues to be the preferred choice to connect a process gas chromatograph network to the plant control system. Modbus design 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 can "talk" directly to each process 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 is needed.

Specifications

Please consult Rosemount Analytical if your requirements are outside the specifications listed below. Improved performance, other products and material offerings may be available depending on the application.

Construction

Environmental: -18° to 55 °C (0° to 130 °F)

Dimensions (without sample system):
164 cm H x 51 cm W x 53.5 cm D (64.5" H x 20" W x 21" D)

Mounting: Free-standing (standard); wall-mount (optional)

Approximate Weight (without sample system):
Approximately 36 kg (79 lbs.)

Area Safety Certification Options (hardware dependant):
Standard: Designed to meet NEC Class I, Div. 1, Groups C,D (Group B with optional air purge)
Optional: CSA NRTL/C Certified :
Class I, Div. 1, Groups C, D, T3B
ATEX Certified: EEx d IIB $T4_{amb}$ = 60 °C
CE marked per ATEX Directive (94/9/EC)

Performance Capabilities

Oven: Airless heat sink, maximum 85 °C (185 °F)

Valves: 6-port and 10-port diaphragm chromatograph 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

Detector: Thermal conductivity detector (TCD); up to two depending on application. Flame photometric detector (FPD) available (see FPD Module data sheet)

Gating Options: Fixed-Time, Slope and Automatic gating of peaks

Streams: Up to 12 streams (including calibration stream)

Electronics

Power: 115 VAC ±15 %, 220 VAC ±15 %, 50/60 HZ

Typical Power Consumption: 100 watts running, 350 watts startup

Chromatograms Control Electronics: Mounted with the gas chromatograph in explosion-proof housing or remotely in 19" rack-mounting

Communications (Standard)

Analog Inputs: Four inputs filtered with transient protection (note that the 4 inputs will be used by the second TCD)

Analog Outputs: Two outputs 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

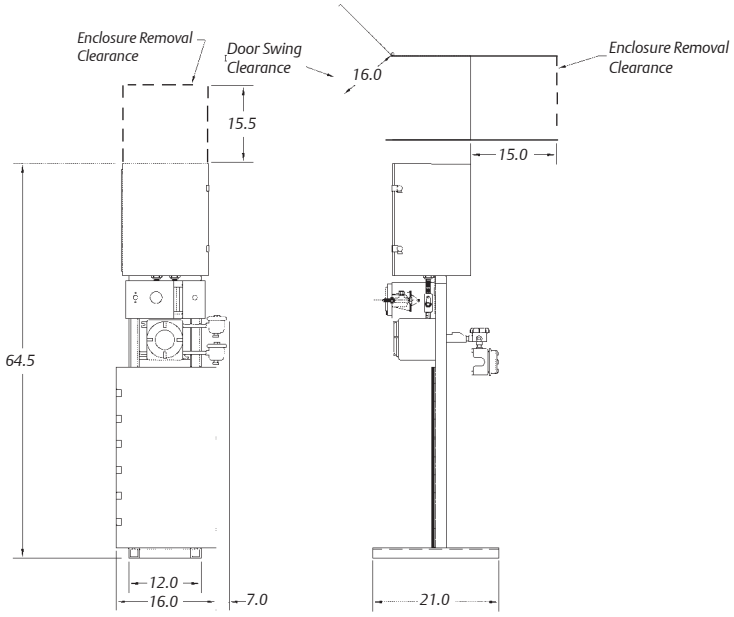
Internal Modem (optional): Field-configurable; 300 to 19.2 k baud

Transient Protection: C.E. tested and certified to the highest levels (3 and 4) of the European IEC 801 STD
(3 Form C, 2 solid-state optically isolated)

Recommended Installation

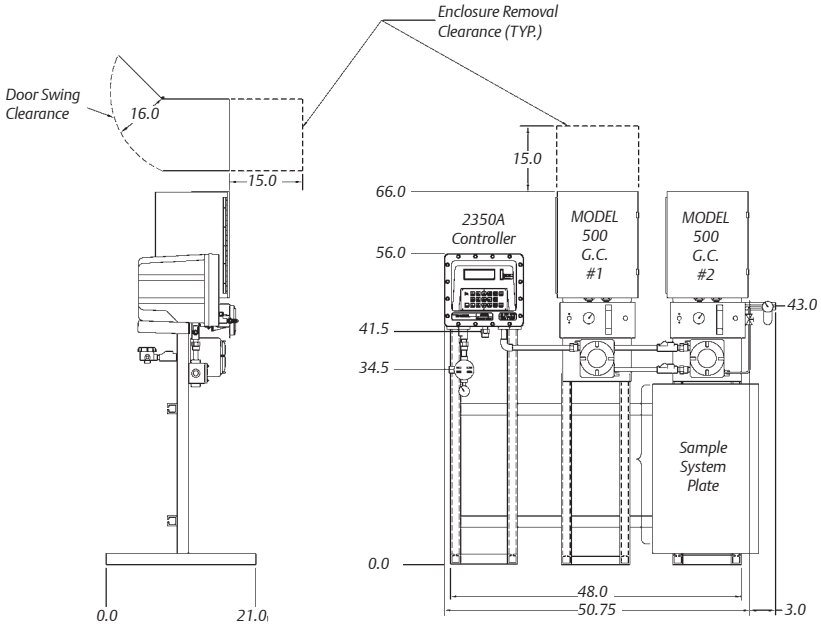
The drawings below represent the minimum recommended installation guidelines for the Model 500 Process Gas Chromatographs. Please consult Rosemount Analytical for detailed installation recommendation of your application.

Model 500 Single Oven Dimensional Drawing



Front View *Right Side View*

Model 500 Dual Oven Dimensional Drawing



Left Side View *Front View*

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	Liquid Analysis		Flame and Gas Detection
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