

MAXUM™ edition II



parallel chromatography
VALVELESS SWITCHING

SIEMENS

Global network of innovation

Introduction to Product

Siemens Applied Automation is pleased to present the Maxum™ edition II. This process gas chromatograph, which has resulted from decades of international experience and technology development, leads the industry in capability, flexibility and reliability.

The Maxum edition II is used in all branches of the fine chemicals, refining and hydrocarbon processing industries. It performs chemical composition analysis of gases and liquids that are present in all phases of production. The Maxum is built for installation in harsh environments either directly online or nearby in at-line process measurement laboratories. Its application flexibility allows it to analyze samples of feedstock, partially processed streams, final products and process by-products including wastes and environmental hazards.

The Maxum has very stable and specially designed hardware and software that enable it to collect samples from the process and inject those samples onto its

chromatographic columns automatically and continuously. Its high quality hardware and integrated, intelligent processing software allow it to meet the most stringent demands for measurement repeatability while operating for long periods of time without any human intervention. Powerful communication tools allow the Maxum to provide its measured results to process control computers, process monitoring and reporting equipment and to users. Complete networking capabilities enable multiple Maxums to work cooperatively with each other in large extended systems.

Because the Maxum uses state-of-the-art software, plug and play electronic hardware and industry standard network and communication tools, it is easy to use and low in cost to own and operate. The Siemens Applied Automation Maxum has the global support and corporate backing of a world-class company ensuring you of the highest levels of performance and the lowest possible costs.





Range of Applicability

The Maxum Process Gas Chromatograph performs a wide range of applications. Different internal configurations allow this single product to be used to measure the chemical composition of thousands of different chemical and hydrocarbon streams. If desired, applications can be tailored to measure just one or two key components out of a stream matrix – such as might be needed to facilitate on-line continuous process control or to monitor for a particular contaminant, catalyst poison or controlled environmental poison. Alternatively, applications can be set up to measure and report all of the components in a stream – such as might be needed for automatic product quality logging, custody transfer or calculation of physical properties.

The composition of measured components can range from a few parts per billion up to 100% depending on the needs of the application. Measurement times can range from a few seconds in length up to an hour or longer, again depending on the needs of the application. The Maxum is commonly used for measurements in:

- **Petrochemical**

Ethylene, Polyethylene, Propylene, Polypropylene, Styrene, Butadiene and many derivatives; for composition and purity

- **Refining**

Crude, Alkylation, Reformate, and many other light and heavy hydrocarbon intermediates; composition and purity; gasoline and diesel sulfur content, BTX, PINA, PIONA and other Simulated Distillation measurements

- **Natural Gas**

Methane, Ethane, and other light hydrocarbons, Calorific value, BTU and specific gravity, NGL, LNG and LPG process and product streams

- **Chemicals**

Fine chemicals, chlorine and chlorinated hydrocarbons, industrial gas and gas separation

- **Environmental Monitoring**

Area monitoring, waste gas streams, waste and cooling water

- **Industrial Gases**

Nitrogen, Hydrogen, gas purity and air purification

This list provides examples of only a small portion of what Maxum can do. Maxum's many features also make it possible and practical to perform many other applications, which are entirely new for process chromatography.



Overview of Key Features and Benefits

The Maxum edition II makes use of several specially designed hardware and software features to achieve its versatility. Here is a summary of the features. Each is described in more detail on the following pages.

Plug and Play Electronic Hardware

Using the latest intelligent electronic hardware designs, Maxum provides power and electronic flexibility while being easy to maintain and operate.

Powerful Processing Software

All of Maxum's operating functions including chromatogram signal processing are controlled by powerful software – like EZChrom – which makes it easy and economical to use.

Multiple Analytical Tools

Maxum has a full complement of application tools including ovens, detectors, valves and special hardware making possible a wide range of applications, which allows you to rely on a single product to meet your analytical needs.

Parallel and Valveless Chromatography

Maxum's combination of versatile software and hardware enables extensive use of parallel and valveless chromatography. These techniques simplify chromatograph applications, reduce cycle times and lower costs.

Graphical Human Interfaces

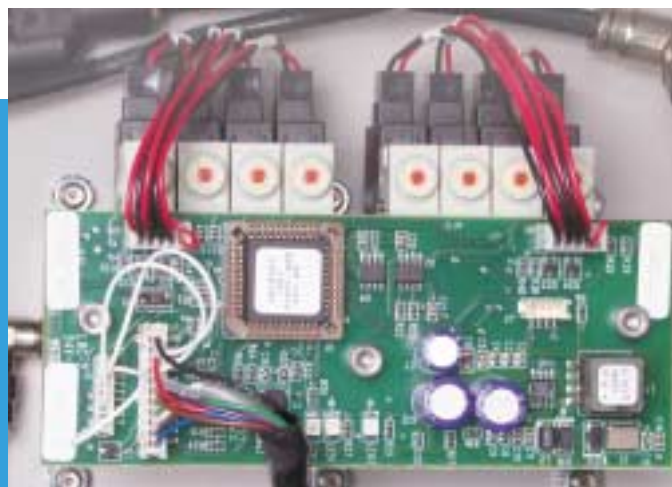
To enable technical staff to operate and maintain the Maxum quickly and easily, Maxum uses flexible, graphical user interfaces, both built-in and via a computer workstation.

Complete Networking Capability

Using industry standard TCP/IP communications along with Ethernet-based hardware, Maxum is compatible with a wide variety of networks. With these abilities, Maxum easily communicates with other computers and with people.

Support for Previous Products

Maxum edition II protects your existing investment in PGC 302 and Optichrom Advance. Maxum brings to the user all of the techniques of its predecessors. It is backward compatible and provides methods for cost effective field upgrades.



Plug and Play Electronic Hardware

Major electronic modules in Maxum edition II are designed as self-contained "smart" devices. These devices are interconnected on a serial bus making the Maxum electronics "plug and play".

System Controller (SYSCON)

- Features a high-speed 32-bit microprocessor for extensive computing power
- Includes on-board printer and computer connections
- Provides all network connections to external devices

Sensor Near Electronics (SNE)

- Utilizes an independent microprocessor to provide powerful, direct signal processing
- Provides high-speed digital signal conversion to enable modern fast chromatography
- Provides all application hardware control to simplify maintenance and installation

Input / Output (I/O) Hardware

- Features plug-in boards for all field-wired I/O to reduce costs
- Provides user-programming of all I/O functions for maximum flexibility

Solenoid Valve Control Module

- Features all solenoid operators in a modular assembly to minimize down time during repair
- Provides 3-way and 4-way valve manifolds for maximum valving flexibility
- Uses separate tubing manifolds with plug-in seals to accommodate variable gas supplies

Electronic Pressure Control Module (EPC)

- Allows precise pressure control without needle valves to reduce oven setup time
- Allows programmed pressure changes to enable faster chromatography and modern applications
- Controls carrier and fuel gas supply to eliminate drift and variations created by unstable mechanical regulation



Powerful Processing Software

Maxum's integrated software provides system functionality and robust operation with future expandability. EZChrom software makes Maxum a process chromatograph with laboratory-grade capabilities.

Stable, Embedded Operating System

- Supports modular software packages, easy testing and high reliability
- Supports Ethernet TCP/IP for open communications
- Provides database and calculation support for system power
- Recognizes hardware for easy "plug and play" set-up

Real-Time Relational Database

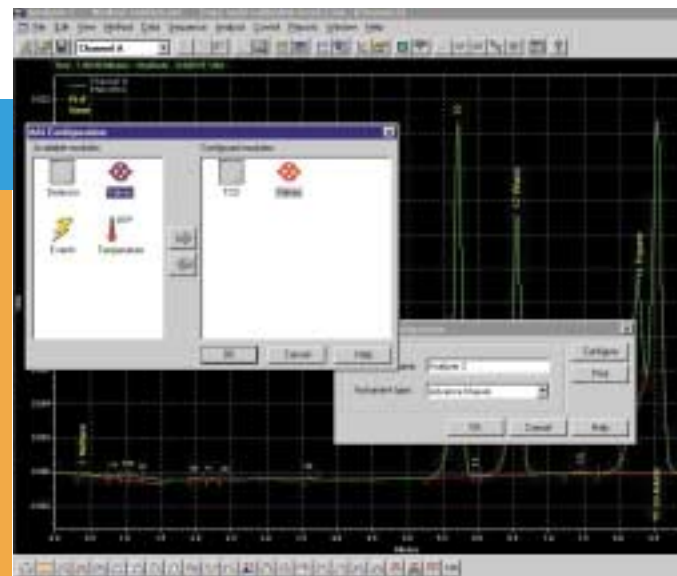
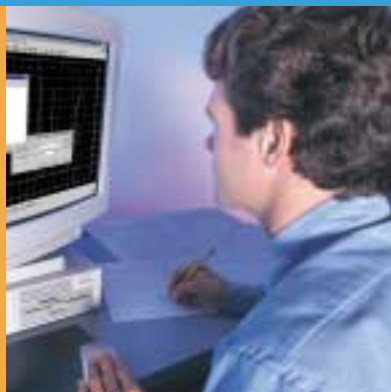
- Operates on-line for direct convenient data access
- Provides an open architecture for custom configurations
- Uses standard query tools for easy data access

EZChrom

- Provides automatic method set-up and component peak identification for easy operation
- Chooses best peak gating and basing methods automatically for greater application reliability
- Allows manual override of automatic selections for precision control
- Re-processes captured chromatograms with different methods to reduce maintenance cost
- Identifies and measures unknown component peaks automatically for enhanced process information
- Supports simultaneous, multiple detector measurements for greater analytical power

MaxBASIC

- Permits user customization for precise compliance with unique needs
- Uses industry-standard BASIC programming syntax for ease of training
- Accesses real-time data in any analyzer on the network for complete information management



Multiple Analytical Tools

Maxum edition II has a full complement of hardware for performing online process chromatography. The wide range of applications potential means that you can rely on a single product to meet more of your analysis needs.

Airbath oven or airless heat sink oven

Two kinds of oven heating are available.

- Airbath oven for isothermal or programmable temperature
- Heat sink oven for very stable isothermal oven temperature, without need for oven air.

Single and dual oven configurations are available for both types of oven. Dual oven configurations use two heaters to provide independent oven temperatures. This can allow two

independent applications in one analyzer to save analyzer shelter space. It can also allow duplicate analysis of a single sample stream to increase sample frequency.

High-Efficiency insulation

Maxum uses special high efficiency insulation for improved performance. The insulation permits higher operating temperature with lower power and air consumption. Furthermore, oven walls are thinner, permitting more usable oven volume in the same space.

Detectors

A variety of modular detectors can be used. All flame detectors are independently heated for maximum flexibility.

- Eight Channel Thermistor Thermal Conductivity Detector

- Two Channel Filament Thermal Conductivity Detector
- Flame Ionization Detector
- Flame Photometer Detector

Other specialty detectors including electron capture, helium ionization and electrolytic conductivity are available to meet the needs of particular applications.

Multiple Detector Combinations

The detector modules described above can be used in various combinations with each other in a single Maxum.

- Up to three detector modules can be used in the airbath oven.
- Either one or two modules can be used in the airless, split airbath, or programmed temperature ovens.



When the 8-cell thermistor detector module is used, each module includes 6 independent and fully referenced channels. This allows up to 18 independent detector channels to be active in a single analyzer.

This capability is the key to Parallel Chromatography and it makes possible numerous other cost-saving benefits. These include:

- Duplicate modules can be run in parallel at staggered times to provide even more frequent measurement updates.
- Parallel modules can be used for each stream rather than switching the stream to a single module, to reduce total cycle time in multi-stream installations.
- Running two identical modules in parallel on the same stream provides redundant measurements, which can be compared to reduce the need for calibration.

Sample Injectors and Column Valves

A broad selection of techniques are available for sample injection and column switching. Techniques include high reliability diaphragm gas valves and very stable externally heated liquid injection valves. Additionally, Maxum edition II can use a unique valveless switching technique for the ultimate in reliability and stability with capillary column configurations.

• Model 50 10-port Valve

- A combined vapor inject and injection/backflush valve
- Uses pressure-on-diaphragm activation with no moving parts
- Switches gas samples up to 75 psig (0-5 bar)

• Model 11 6-port Valve

- A vapor or liquid inject valve or column switching valve
- Diaphragm plunger operation
- Operates 1 million cycles without maintenance

• Liquid Injection Valve

- An injection valve for liquids
- Independent vaporization temperature
- Moving piston has cross hole or groove injection volume
- Switches samples up to 700 psig (50 bar)

• Valveless Switching

- Special pressure junction connects capillary columns
- Configurable for backflush, heart cut and other types of analysis methods
- Unique dual chamber, low dead-volume device eliminates drift of pressure settings



Model 11 Valve



Liquid Injection Valve



Model 50 Valve

Parallel and Valveless Chromatography

Maxum's combination of versatile hardware and software enables the extensive use of two unique chromatograph techniques. These techniques bring benefits that cannot be matched by any other process chromatograph.

Parallel Chromatography

Maxum provides a completely new approach to gas chromatography. All of the new modular hardware and automatic software gives Maxum the ability to do what no other chromatograph can do – Parallel Chromatography.

Maxum is the first gas chromatograph, process or laboratory, to implement this concept in a single analyzer without compromises in cost and complexity. The result is a quantum increase in chromatograph application capability with significantly higher performance at lower cost.

With Maxum's hardware and software, you can break a complex single-train chromatograph analysis into multiple simple trains. Each of

the simple trains, called an Applet, is then run simultaneously, in parallel. This not only simplifies the overall analysis, but also allows it to be performed faster and more reliably.

The ability to break chromatography into parallel simple applets also makes it possible to use standard configurations for common applications. This simplifies training, reduces spare parts requirements and significantly reduces cycle time.

These standard Applets can be configured alone or in any combination of parallel groups, depending on the measurement requirements.

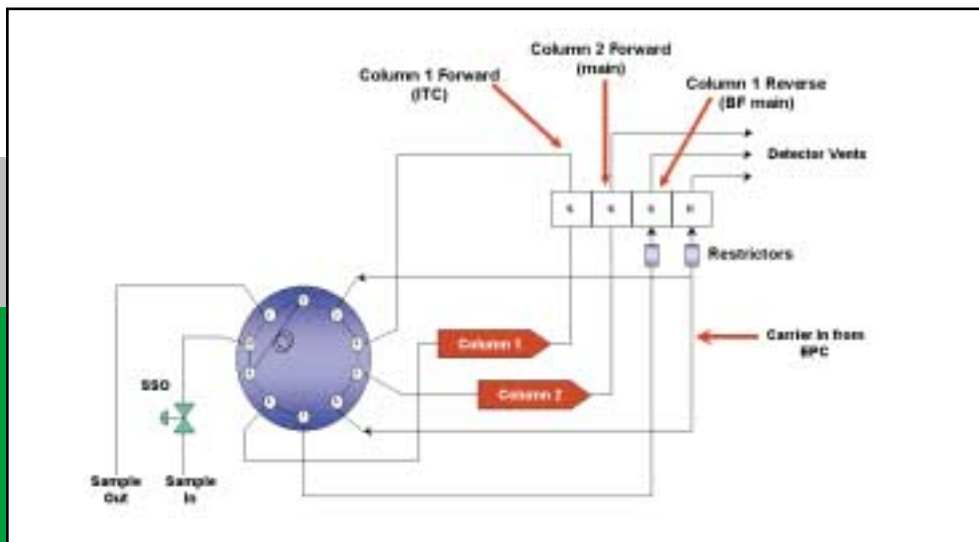
What this means to you is:

- Shorter cycle times
- Standardized training for maintenance personnel
- Lower costs
- Faster delivery

Valveless LIVE Column Switching

For chromatography with high-resolution capillary columns, Maxum offers valveless LIVE column switching. This technique offers the best in low volume high performance column switching and the ultimate in long-term stability and reliability.

LIVE column switching is the technique of performing backflush, heartcut or distribution to two different columns without any switching valves or other movable parts in the separation path. This is done by a unique coupling, the LIVE-T-Piece. Its function is based on pressure differential, controlled by Maxum's precision Electronic Pressure Controllers. Because it does not have any dead volume it is perfectly suited for the low flow rates used with capillary columns. This eliminates maintenance of the column switching configuration, increases separation power and simplifies complicated separations. In use for over 20 years in previous Siemens products, Live Switching is now provided in Maxum edition II.



Graphical Human Interfaces

To simplify maintenance as well as engineering configuration, Maxum provides two kinds of human interface. The built-in Maintenance Panel is ideal for routine operation in the field. The Windows-based Workstation makes configuration, system diagnostics and system monitoring easy.

Built-in Maintenance Panel

- Provides simple and direct access to all maintenance functions to reduce training costs
- Uses a graphical display for complete presentation of information to make operation intuitive and easy
- Provides "hot-keys" and shortcuts for fewer key strokes saving time for experienced users
- Displays real-time chromatograms
- Stores previous chromatograms complete with voltages and cycle times for future comparison to simplify on-going maintenance

What all of this means to you is that the power of Maxum is simple to use!

Maxum Workstation

- System Manager displays current status and alarms of all analyzers on a network
- EZChrom provides a tool for display and easy modification of chromatograms and methods
- MaxBASIC Editor, Simulated Distillation Builder and Air Monitor Reports provide specialty tools for customizing applications
- Data Logger and other utilities provide data capture, software backup and more
- All software is compatible with Windows, Version 98 and later



Complete Networking Capability

Maxum is a completely distributed analyzer system. Network communication uses industry standard protocols providing high-speed communication between all devices. The Maxum communication system can function alone or may be connected to a DCS or plant-wide LAN. And, in keeping with Siemens Applied Automation's philosophy for backward compatibility, the Maxum communication system can be connected to existing Advance Data Hiway and ChromLAN systems.

The Maxum Communication System

- Provides high-speed peer-to-peer communication for greatest user flexibility
- Allows TCP/IP connectivity to industry standard networks to enable large, open systems
- Can be implemented as single or redundant communications or in any combination for lowest cost
- Supports interconnection to the Advance Data Hiway and ChromLAN to ensure backward compatibility
- Supports ODBC and OPC for direct connection to other computers and control systems

Network Access Unit

- Available with or without Maintenance Panel
- Provides slots for optional I/O hardware
- Provides Modbus connection to DCS
- Multiple NAUs may be attached anywhere on the network

CAN Extension Unit

- Provides housing for optional additional I/O boards
- Can be attached to a Network Access Unit (NAU) or directly to any Maxum edition II chromatograph

DataNET Hub

- Converts standard Ethernet to fully redundant DataNET
- Uses twisted pair wire or fiber optics
- Includes hazardous area hardware ratings

Advance Network Gateway

- Converts Ethernet or DataNET to Optichrom Data Hiway
- Includes Hazardous area hardware ratings



Support For Previous Products

Maxum is compatible with all existing Advance Data Hiway and ChromLAN Networks. What's more, Advance Plus fully upgrades Optichrom analyzers currently in the field to Maxum capability.

Network Connectivity

The Maxum Communication System is connected to an existing Data Hiway using an Advance Network Gateway. When this is done, all functions of the older network are supported on the high-speed Maxum system. In addition, Results, Alarms, Operating Mode and Status as well as I/O and DCS communication links from the Maxum can be carried across the older, slower Data Hiway.

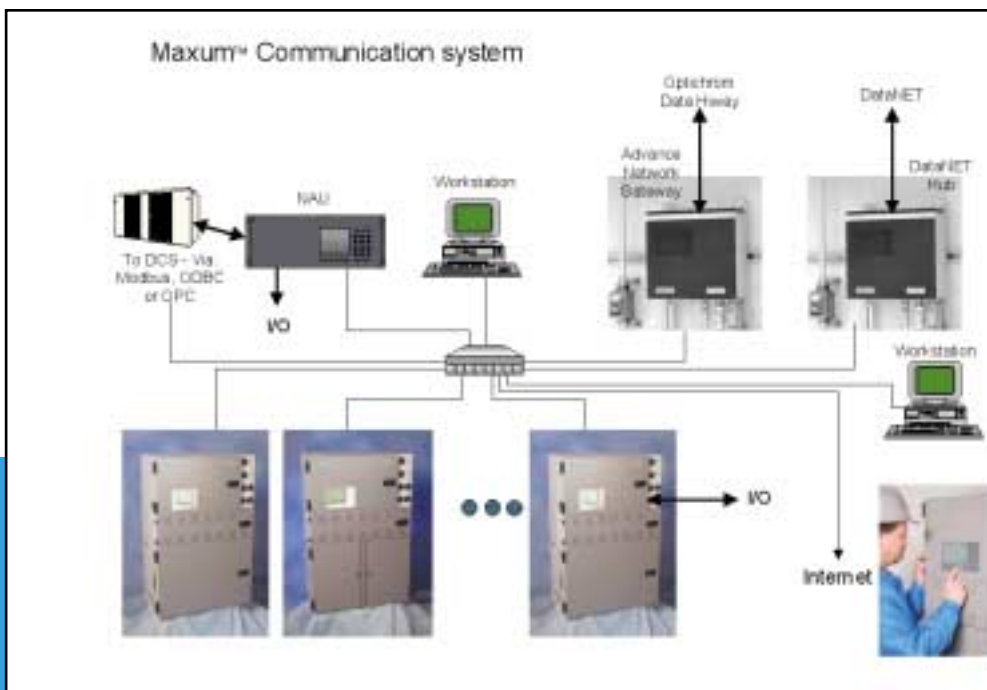
Advance Plus

Upgrading any present Advance Optichrom analyzer is as simple as replacing the door and updating software. No special adaptations, wiring, or conversions are required. Advance Plus works with all Optichrom

analyzers regardless of detectors or I/O requirements. Even the present Data Hiway connections can be used, simply by adding an Advance Gateway communication option.

With Advance Plus, all of the software and programming capabilities of Maxum edition II are available to the Optichrom analyzer. Chromatograph setup and operation are now made simple with EZChrom. In addition, this brings to Optichrom all the data transfer benefits of the Maxum's open architecture.

With Advance Plus, the power and convenience of Maxum is readily available to extend the useful life of Optichrom analyzers. The conversion is simple and cost effective giving you maximum value from your current investment.



Key Installation Specification Summary

Mounting	Wall mount only center to center 44" (1120 mm) Left side clearance: 18" (460 mm) from wall or other equipment Front side clearance: 25" (654 mm) from wall Right side clearance: 18" (460 mm) in all cases		Optional Configurations <ul style="list-style-type: none"> • Certified by CSA C/US for use in Class I, Division 1, Groups B,C,D with air or nitrogen purge • Certified by CENELEC as EEx pedmib IIB + H2 with air or nitrogen purge and purge control for Zone 1 or Zone 2
Dimensions	Height: 39" (1010 mm) Width: 26 1/16" (662 mm) Depth: 16 3/16" (451 mm)	Important	Environmental purge of Electronic Enclosure (EC) with clean air is recommended in General Purpose, Division 2 and Zone 2 applications to maintain operation integrity and performance.
Weight	170 lb (77 kg) typical		
EMI/RFI Rating	CE Compliance; certified to 89/336/ECC (EMC directive) CE Compliance; certified to 73/23/EEC (Low Voltage directive) Tested per EN 61010-1 / IEC 1010-1	Ambient Temp.	0 to 122 °F (-18 to 50 °C)
Hazardous Class	Standard Configurations: <ul style="list-style-type: none"> • Certified by CSA C/US for use in Class I, Division 2, Groups B,C,D • Suitable for use in European Zone 2, Group IIB+H2 with local approval • Suitable for use in general purpose and non-hazardous areas 	AC Power	100-130 VAC or 195-260 VAC (switch selectable), 47-63 Hz., single phase Single oven: 1840 VA.max Dual oven: 2 circuits, 1400 VA max/oven heater
		Instrument Air	50 psig (350kPa) minimum for units using Model 11 Liquid Injection valves 120 psig (825 kPa) minimum for units using Model 50 valves 25 psig (175 kPa) minimum for air bath oven 3 scfm (85 Lpm)/ oven No instrument air for airless oven
<p>Siemens Applied Automation also provides complete analyzer system solutions including sample conditioning systems, shelters and packaging. To discuss your system needs, to receive complete specifications and to explore further the benefits of Maxum edition II, please contact your nearest Siemens Applied Automation sales office.</p>			

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Company Summary

The analytical technologies of Siemens and Applied Automation – each with over 40 years of experience in process chromatography – were brought together when the two companies merged in 1999. This combination has produced the world market leader for process gas chromatographs and the most extensive experience base in this field. The experience base includes vast knowledge of chemical applications brought from Siemens and the world's most extensive collection of hydrocarbon processing, refining and fuels production applications brought from Applied Automation.

Today, Maxum edition II combines the analytical tools of the PGC 302 edition II with the parallel chromatography, software and networking capabilities of the Advance Maxum. While bringing the best features of both products onto one platform, it guarantees compatibility and support for its predecessors.

Siemens Applied Automation today operates from full capability application and manufacturing centers in Germany, Singapore and the United States. All of these Regional Support Centers (RSCs) provide complete

systems integration capabilities including fully automated sample conditioning systems as well as the ability to install chromatographs and other analytical equipment in houses for turnkey installations in plants.

Additionally, these RSCs provide local management for a widely distributed network of field service personnel operating from numerous locations in the United States and Germany and in over 40 other countries worldwide. Spare parts are stocked locally and all product training and sales and service activities are conducted locally in multiple languages.

Thousands of users everywhere know that Siemens Applied Automation is a world-class company that can be relied upon to provide complete product security for years to come.



Bartlesville, OK



Singapore



Karlsruhe, Germany