

Process Gas Chromatograph

Emerson Process Management offers a complete line of gas chromatographs specifically designed for process applications. The 1500XA Process Gas Chromatograph combines the proven analytical components of the field-mounted GCs 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
- Fully compatible with modern Ethernet networks and DCS communication
- New XA valves, based on the reliable design of our line of superior 6-port chromatograph diaphragm valves.
- Oven capacity for up to eight chromatograph valves and two detectors
- Choice of thermal conductivity or flame ionization detectors
- Thermal conductivity detector (TCD) sensitive down to very low parts-per-million levels
- Storage of up to 2,500 chromatograms, including sample calibration and validation streams
- Archives up to 64 item averages and up to 35 days of standard runs and calculations

APPLICATIONS

The 1500XA 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

Gas Chromatograph Valves

The chromatograph valves used in Emerson's 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 chromatograph valves.

- Simple mechanical design
- Sample does not come in contact with internal moving parts
- More than 5 million operations per valve
- Lifetime warranty
- Rotary liquid injection valves also available for special 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.

Most importantly, the Emerson Process Management 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 1500XA is so reliable, it comes with a lifetime warranty.

Detectors

The 1500XA Process 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 (TCD) is the detector of choice for most applications due to its universal response to all compounds. The thermistor 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 process 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) is available. Maintenance features such as auto-detection of flame loss are also standard. In addition, a flame photometric detector (FPD) module is also available for measurement of trace sulfur compounds.

For maximum application flexibility, the 1500XA can have up to two detectors. Detector combinations like TCD-TCD, TCD-FID, and TCD-FPD are well within the capability of the 1500XA.

Columns

Since 1980, Emerson Process Management has been refining and improving its process for creating micro-packed columns. Our 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). Emerson's micro-packed columns produce sharper peaks for improved component separation, short analysis time, and very low carrier-gas consumption.

Air Bath Oven

The air bath oven uses a conventional instrument air heater design for maximum analytical flexibility. The oven on the 1500XA has capacity for up to eight diaphragm chromatographs 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.

MON 20/20™ SOFTWARE

The 1500XA Gas Chromatograph is designed to operate unattended. If adjustments are needed, our exclusive MON 20/20™ software allows complete control of your gas chromatographs – either locally or remotely. From within MON 20/20, a user can:

- Review and modify analytical settings on one screen
- 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
- Check original calibration against last calibration
- Perform GC operation checks and modifications simultaneously.

MON 20/20 is Windows®-based software designed 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. Users of previous-generation MON software will be familiar with the layout and functionality of the software, and will be impressed with the additional features that make the software even easier to use.

MON 20/20 software collects and organizes the analyzed data from the 1500XA Gas Chromatograph. With the ability to communicate to the enterprise network or export to numerous file types, MON 20/20 is a powerful software tool that ensures operators, engineers, maintenance personnel, and management have access to critical data, such as current and archived chromatograms, alarm history, event logs, and maintenance logs.

MON 20/20 also has a number of tools built in to 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 can also be exported in formats compatible with most third-party Windows® applications.

Touch Key Local Operator Interface

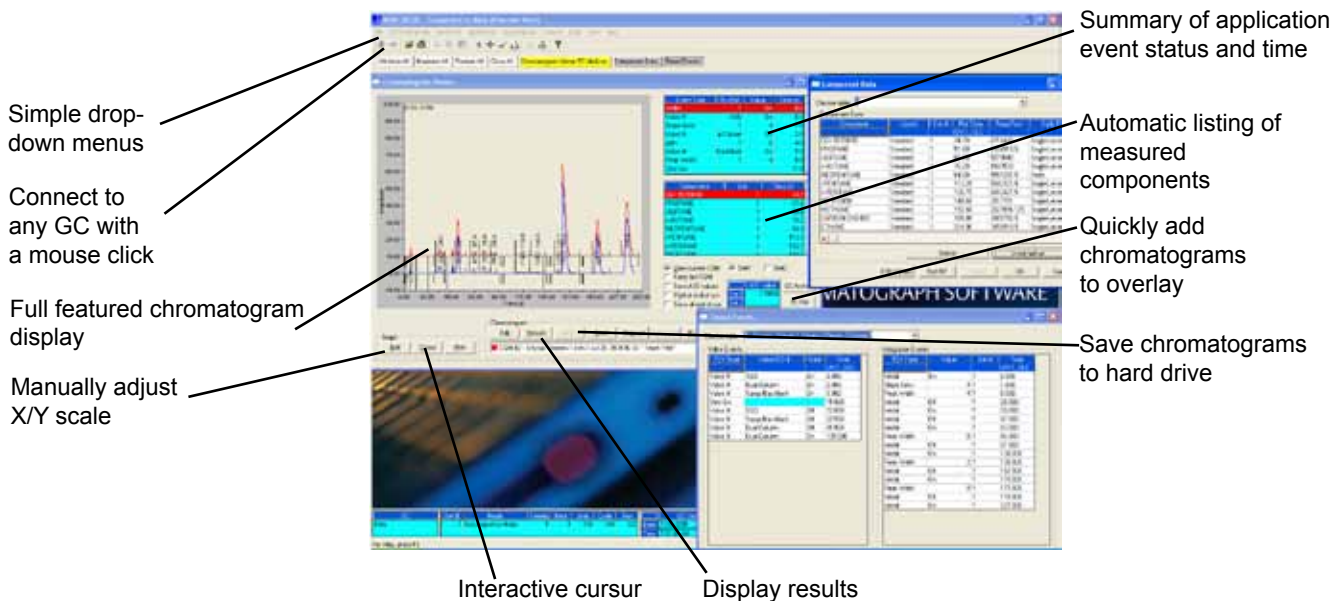
The 1500XA local operator interface (LOI) permits maintenance and operation of a 1500XA without a laptop or PC. The LOI is a state-of-the-art, high-resolution color display that is touch key infrared activated and supports all core GC operations.

Features of the LOI include:

- Color LCD with full VGA (640 x 480 pixels) resolution
- ASCII text and graphics modes
- Auto-backlighting (adjustable)
- Eight infrared-activated touch keys and screen saver

In addition, the LOI:

- Eliminates external magnetic pen requirement and tactile buttons
- Maintains the 1500XA hazardous area classifications
- Indicates complete GC status, control, and diagnostics, including full chromatogram display



Integration With Third-Party Networks

Whether you want to network process gas chromatographs throughout the plant or simply link a single process gas chromatograph to the DCS system, the 1500XA can be configured to handle most any scenario.

- Choice of Ethernet, Foundation Fieldbus, Modbus Serial, or 4-20 mA analog outputs
- Can use the same network to connect 700XA and 1500XA Process Gas Chromatographs
- Able to connect multiple PC workstations using MON 20/20
- Connectivity to plant control systems using industry standard protocols such as Modbus and OPC

The 1500XA gas chromatograph supports four types of communication interfaces – 1) 10/100 mbps Ethernet connectivity, 2) a Foundation fieldbus H1 interface, 3) RS-232, RS-422, and RS485 serial communication links, and 4) 4-20 mA analog outputs.

Ethernet Connectivity

Two Ethernet interfaces are available on the 1500XA gas chromatograph. Each interface can be configured with a static IP address, subnet mask, and gateway. The Ethernet interfaces on the 1500XA serve two purposes – serve MON 20/20 connections and serve Modbus TCP requests. The dual Ethernet interfaces can be used in many ways. Examples:

- One to connect to a plant network for GC maintenance personnel and the other to a control network running a Modbus TCP server
- One to a broadband cellular wireless gateway for remote GC access for data collection and maintenance, and the other for a local laptop connection

The 1500XA's Ethernet connection can be commissioned in several ways – through the local operation interface on the actual gas chromatograph, through the AMS Device Manager software over Ff, and through the MON 20/20 gas chromatograph software via direct connection over Ethernet.

Foundation Fieldbus

Emerson's 1500XA and 700XA gas chromatographs are the first and only gas chromatographs that are certified by the Fieldbus Foundation. Foundation fieldbus is quickly becoming the industry standard, and use of this protocol reduces the amount of engineering necessary during the installation process, as it doesn't require the manual point mapping of the Modbus

protocol. It also requires less wiring, fewer junction boxes, cable trays, and I/O cards, which means a cleaner, simpler, easier to understand analytical footprint as compared to traditional I/O installations.

Modbus Serial

The Modbus protocol is widely used today because it is simple and effective. Although engineering-intensive up front (a Modbus system may need several days to be operational), it requires very little hardware to run it, which saves valuable space within the GC, maximizing space for valves and columns and other critical components. Modbus uses RS-232, RS-422, and RS-485 to physically connect to the gas chromatograph.

4-20 mA Analog Outputs

The 1500XA gas chromatograph supports 4-20 mA analog outputs. Although considered a legacy solution, a key advantage of this communication protocol is the accuracy of the signal, which isn't affected by a voltage drop in the interconnecting wiring, which ensures that the loop can continuously supply operating power to the gas chromatograph. Six analog outputs are built into the 1500XA as standard features, but it can be expanded to 14 analog outputs with Emerson's ROC800 series of remote operations controllers.

Data Communication

The 700XA gas chromatograph can provide data to third-party products, such as control systems or flow computers, using Foundation fieldbus, Modbus TCP (SIM 2251 and User Modbus), Modbus Serial, and 4-20mA analog outputs.

Custom-Engineered Process Analytical Systems

A complete online 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.

Emerson Process Management 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 Emerson Process Management develops a custom engineered solution. This is followed by experienced project management during the system fabrication and on to installation and training once the system is delivered to the field.

Custom-Engineered Sample Systems

Any process gas chromatograph is only as good as the quality of the sample it measures. So every sample system for Emerson's 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



Our custom-engineered sample systems meet the specifications of each unique requirement.

Environmental Chamber Testing

Every Emerson gas chromatograph that leaves our facility undergoes rigorous testing throughout assembly. The majority of our systems are put into a 24-hour environmental chamber test, where they must operate to specification in an environment where the temperatures cycle between 0° and 130° F (-18° and 54° C) for a minimum of 24 hours.

Environmental chamber testing is offered to our customers free of charge for all Emerson gas chromatographs prior to shipment.

Our product testing procedures are much stricter than the industry standard for analytical measurement products. When you purchase an Emerson gas chromatograph, you can be assured that you're purchasing the highest-quality process gas chromatograph or natural gas chromatograph available.

As a result of chamber testing, 100% of all gas chromatographs that we ship will operate to the performance specifications across the stated operating temperature range.

The Emerson Process Management Process Gas Chromatograph Difference

- Built tough to stand up against any environment
- Rigorously tested to ensure performance
- Field-mountable technology means solid performance at reduced cost
- High-sensitivity thermal conductivity detectors can often replace more complex detectors
- Micro-packed columns that are made to last
- Diaphragm valves with a lifetime warranty
- Broad application scope with single- or dual- detector capability
- Easy-to-use MON 20/20 software for advanced diagnostics and simplified troubleshooting — it is simply the best in the industry

Application Data Sheet

Every 1500XA 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 your world area contact information located on the back cover of this datasheet.



Name: _____ **Your Reference #:** _____

Title: _____ **Project Name:** _____

Company: _____ **Process Unit:** _____

Address: _____ **Stream Name(s):** _____

_____ **Hazardous Area Classification:** _____

Phone #: _____

Fax #: _____

Email: _____

Stream Composition	Units	Measured	Stream 1				Stream 2			
			Min	Normal	Max	Range	Min	Normal	Max	Range

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

	Stream 1	Stream 2
Stream Temperature	_____	_____
Stream Pressure	_____	_____
Stream Phase (vapor/liquid)	_____	_____
Stream Contaminants	_____	_____
	_____	_____
	_____	_____

Distance to GC from sample point _____

Power: 115 VAC () 230 VAC ()

Mounting: Wall () Stand ()

Data communication Analog output () Modbus () OPC () Printer ()

Analyzer network: Ethernet () RS-232 () RS-485 Multi-Drop () Foundation Fieldbus ()

Other options: Carrier Gas () Calibration Gas () Start-up () Training Class ()

Special Instructions:

1500XA SPECIFICATIONS

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

Environment: 0° to 55°C (32° to 130°F) for TCD and FID

Dimensions (without sample system):
198cm H x 61cm W x 61cm D (70" 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 dependent): 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 XA diaphragm chromatograph valves (maximum 8 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 90-120 psig

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

Detector: Thermal conductivity detector (TCD) or flame ionization detector (FID); TCD-TCD or TCD-FID dual detector combinations possible

Peak Gating: Fixed-time with automatic slope sense

Streams: up to 18 streams

Chromatograph Control Electronics: Integrally mounted

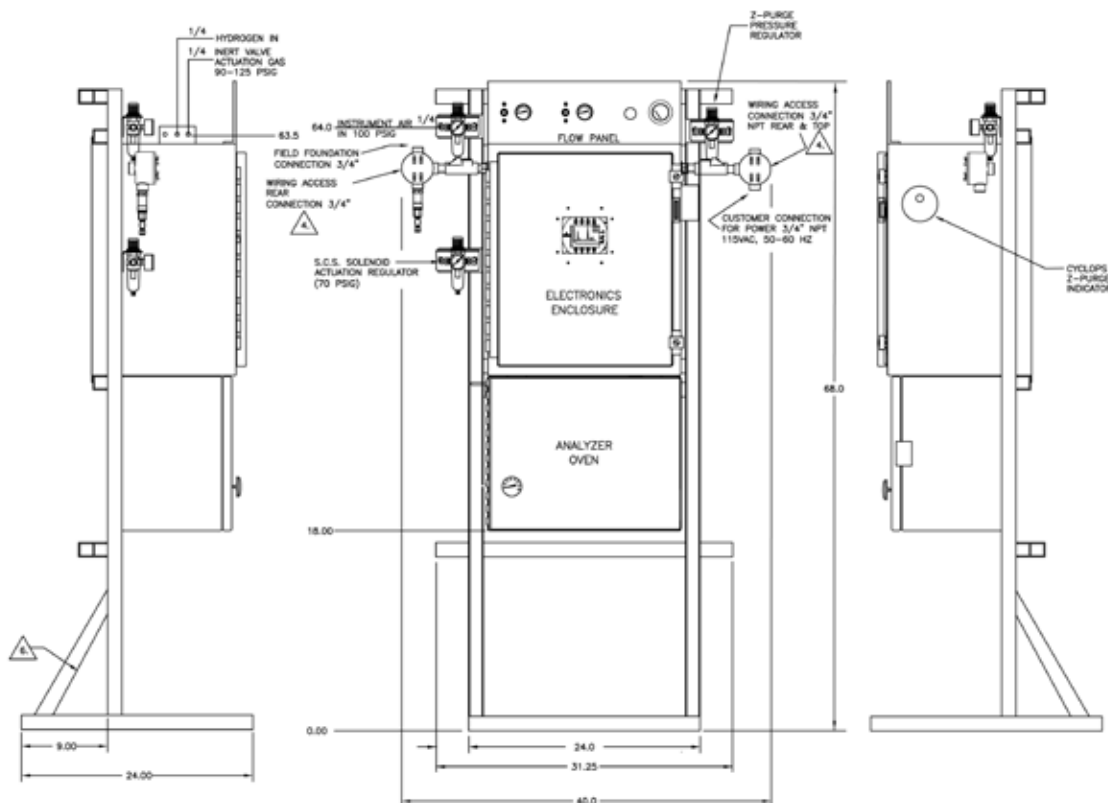
Communications (Standard):

- Ethernet: Two available connections – one RJ-45 port & one 4-wire termination – with 10/100Mbps
- Analog inputs: Two standard inputs filtered with transient protection, 4-20mA (user scalable and assignable)
- Analog outputs: Six isolated outputs, 4-20mA
- Digital inputs: Five inputs, user assignable, optically isolated, rated to 30VDC @ 0.5A
- Digital outputs: Five user-assignable outputs, Form C and electro-mechanically isolated, 24VDC
- Serial: Three termination blocks, configurable as RS-232, RS-422 or RS-485 and one D-sub (9-pin) port for PC connection

Communications (Options):

Two expansion slots available for additional communications. Each slot has the capacity to add one of the following:

- 4 analog inputs (isolated) card
- 4 analog outputs (isolated) card
- 8 digital inputs (isolated) card
- 5 digital outputs (isolated) card
- 1 RS-232, RS-422 or RS-485 serial connection card
- 1 modem card, 300-19.2k baud



1500XA Dimensional Drawing

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