Process Gas Chromatograph PGC5000 Series

PGC5000A Master Controller –
Designed for Reliability and Simplicity

Introducing the Model PGC5000A Master Controller

Everything You Need to Know About Your Analyzer at Your Finger Tip

The most prolific and flexible on-line analytical measurement device for analyzing discrete hydrocarbons in the Hydrocarbon Processing Industry (HPI) is the process gas chromatograph (PGC). It is estimated that there are more than 30,000 Process Gas Chromatographs installed worldwide.

ABB Process Analytics is a world recognized leader with over 50 years experience in process chromatography and applications. ABB Process Analytics continues the evolution and innovation of the online process gas chromatograph for the next 50 years by introducing the PGC5000 series.

The PGC5000 Series

Scalability…Simplicity…Accessibility

The PGC5000 Series is comprised of a Model PGC5000A Master Controller that can communicate with up to four Model PGC5000B Analyzer Ovens via intrinsically safe fiber optics.

The Model PGC5000A Master Controller is the industry standard for ease of operation. The new graphical driven HMI makes interacting with a GC as simple as “point and click” all major functions can be accessed in two steps or less. This makes developing, changing, or editing methods for simple or complex applications simple and intuitive.

The Model PGC5000B Analyzer Oven is designed for simple applications or making complex applications simple. This is accomplished by configuring each oven to no more than 3 analytical valves and one detector. Simpler ovens mean simpler analysis and higher reliability. Combining up to four PGC5000B ovens makes a complex analysis simple.

The Model PGC5000A Master Controller Is Powerful!

The Master Controller provides all the analyzer system control functions and coordinates internal and external data activities for up to four PGC5000B ovens. It is designed with an embedded real time operating system that guarantees critical system uptime, system recoverability and the highest level of data determination.

The new processor behind this controller has 100 times the computing power of any process GC on the market. There is more than enough power to exceed today's requirements while ensuring that future enhancements are covered.

The Model PGC5000A Master Controller Is Easy to Use!

The Graphical Driven HMI with fully functional keypad and mouse touch pad makes developing, changing, or editing methods easy because it requires no programming skills. Just “point and click” and “drag and drop” are all that is required to access and change any of the analyzer functions. All of the major analyzer functions are identified on tabs making it easy to know where to go to access the information needed.

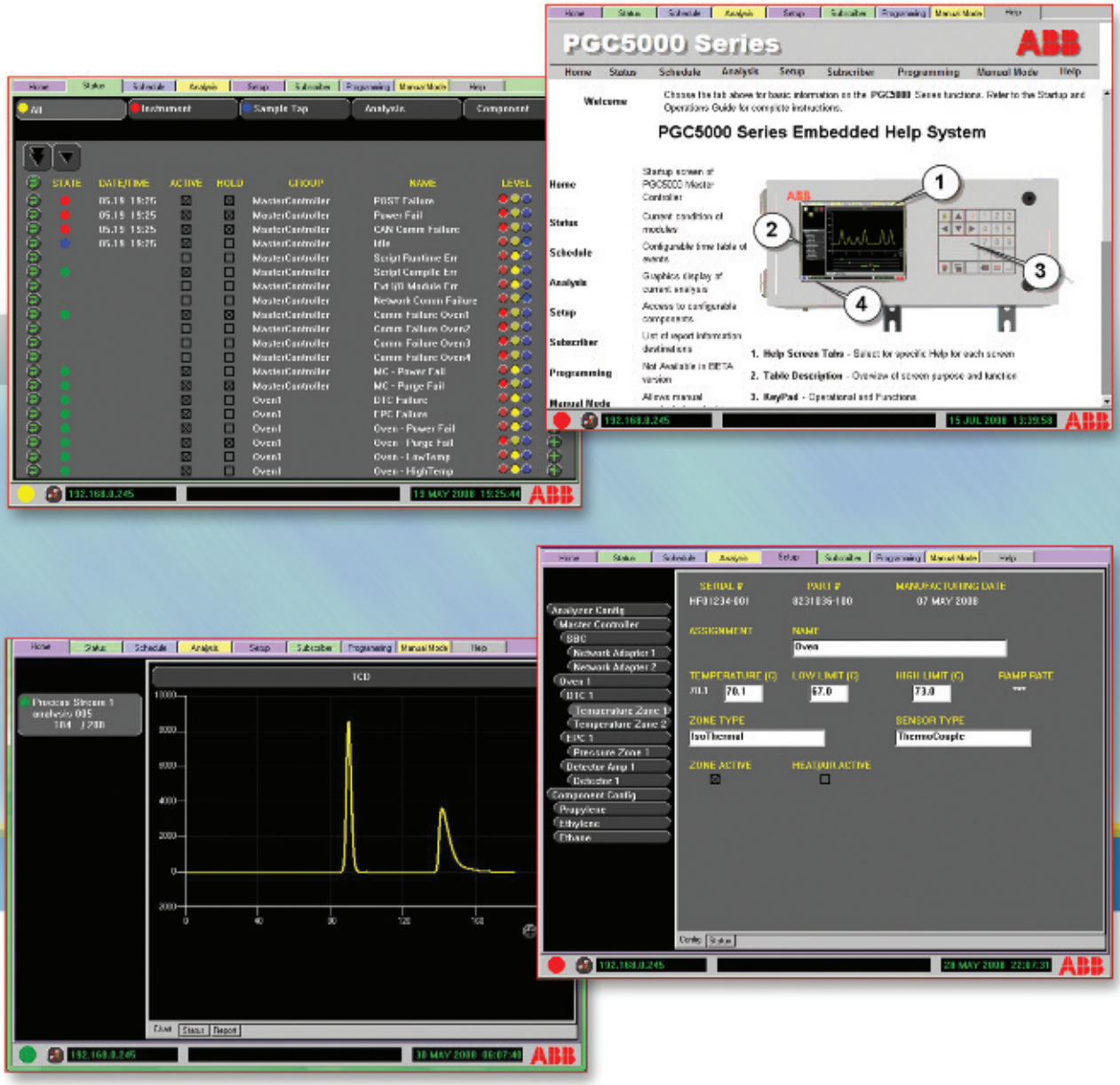
From the “Analysis” tab, the interactive graphical sequence editing enables the user to drag and drop time coded functions for auto method developing.

From the “Manual“ tab, get easy access to a built-in electronic chart recorder with enhanced graphics capability for troubleshooting chromatograms and optimizing analysis performance.

The Model PGC5000A Master Controller Is Informative!

In the “Home” tab, see real time status of the Analyzer’s health and external communications. View real time chromatograms and multiple overlayed chromatograms from up to four ovens! At the “Setup” tab, view the factory set parameters such as flow configuration, carrier pressure, oven temperature and column types. This guarantees access to the original factory setup parameters and greatly simplifies startup. Also, view the analyzer hardware, software and firmware configurations part numbers and descriptions for all major parts configured for a specific analyzer.

The “Help” tab provides direct access to step by step removal and replacement procedures for all major components. Real time help at your finger tip! The “Status” tab allows viewing of all indicators for up to four ovens. Or select just indicators for the sample tap, analysis, or components, your choice. Everything you want to know about the analyzer at your finger tip!



The Model PGC5000A Master Controller Is Flexible!

Sometimes you have to change parameters. This could be a time parameter or an analysis parameter, a distribution parameter, even a new configuration. Change requires flexibility and the simpler it is to make that change, the more acceptable it is. The Model PGC5000A has been designed to expect change.

Using the "Schedule" tab, updating and changing the stream timing and analysis order is a simple as "point and click." Three separate configuration tables, Step, Time-of-Day, and Ad Hoc, allow for "on demand" changes to the streams' analyses. All changes are then updated to the Queue window where the streams are color coded according to their running status. These changes are easy to execute and not disruptive or time consuming.

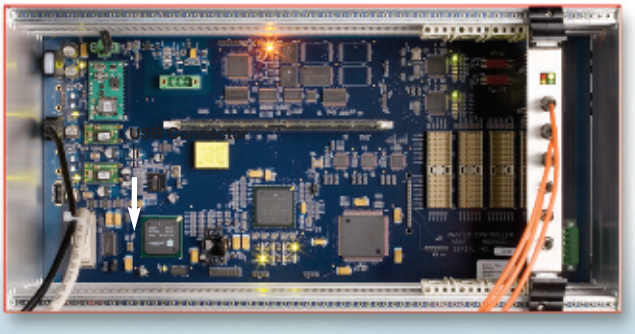
What about needing to add two components together or doing a heat value calculation of the hydrocarbon stream? The "Programming" tab uses a very simple "scripting" language, commonly used in Excel Spread sheets to write simple programs for the most complex calculation requirement.

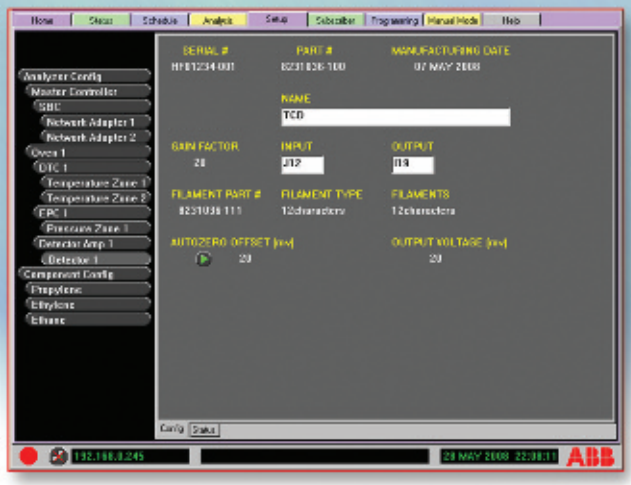
What if you want to add another detector or an additional oven? Along with the new detector or oven, you will receive the updated system configuration loaded on a thumb drive. The PGC5000A Master Controller has three USB ports. Just plug the thumb drive into one of these ports and down load the new configuration, it's that easy!

Model PGC5000A Communications

The Model PGC5000A contains two embedded 10/100 Fast Ethernet Controllers for connecting analyzers and PC's to the LAN. The redundant Ethernet (true network OSI Level 1 redundancy) provides 100% system data back up. Additionally, the HMI is exactly the same on the PC as it is at the front panel of the Model PGC5000A.

Other Data Protocols supported are MODBUS TCP/IP, MODBUS RTU, and OPC Server. Serial Output supported are RS-232, RS-422, and RS-485.





Specifications

Controller Unit

Physical Specifications

Height: 28.3 cm (11.125 inches)
Width: 62 cm (24.375 inches)
Depth: 42.5 cm (16.75 inches)
Weight: 20 kg (44 lbs)

Environmental (Enclosure) Equivalent:
Protected from weather: IP 54, (NEMA Type 12)

Ambient Temperature Range:
0 to +50° C (32 to 122° F); application dependent

Humidity: Maximum of 95% relative humidity, non-condensing

Power Supply

Operating Voltage: 100-240 VAC, 50-60 Hz

Operating Voltage Display LED: Green

Efficiency: > 84 %

Degree of Protection: IP20

Class of Protection: I, with PE connection

Ambient Temperature (Operation):
-25 ° C ... 70° C (> 60° C derating)

Ambient Temperature (Storage/Transport):
-40° C ... 85° C

Max. Permissible Relative Humidity (Operation):
95% (at 25° C, no condensation)

Mounting Position:
Horizontal DIN rail NS 35, EN 60715

Electromagnetic Compatibility:
Conformance with EMC directive 89/336/EEC

Standard – Safety Transformers for Switched-Mode Power Supply Units:
EN 61558-2-17

Standard – Electrical Safety:
EN 60950/VDE 0805 (SELV)
EN 61558-2-17

Standard – Electronic Equipment for use in Electrical Power Installations and their assembly into Electrical Power Installations:
EN 50178/VDE 0160 (PELV)

Standard – Safety Extra-Low voltage:
EN 60950 (SELV) and
EN 60204 (PELV)

Standard – Safe Isolation:
DIN VDE 0100-410
DIN VDE 0106-1010

Standard – Limitation of Mains Harmonic Currents:
EN 61000-3-2

Standard – Equipment Safety:
GS (tested safety)

Certificate: CB Scheme

UL Rating: UL/C-UL Recognized UL 60950
UL/C-UL Listed UL 508
UL/C-UL Listed UL 1604 Class I, Division 2, Groups A, B, C, D

Memory

Number of DIMM Slots: One

Maximum Memory Capacity: 1 GB

Memory Controller Integrated

DIMM Specifications: Size: 512 MB, 1 GB

Speed: 533/667/800 MHz

Specifications *(CONTINUED)*

CANBus

The Master Controller contains a CANBus for communication.

Fiber Optics Fiber Connectors (2):
2 Fiber Optic Connectors in Oven IS Multimode

Single CAN Connector (Electrical):
Used for internal I/O

External I/O Connections:
1 Fiber Optic Connector

USB Connectors

The controller includes two (2) internal USB connectors. These connectors can be used for attaching peripheral I/O devices such as keyboards and external memory modules. Updates to the operating system, system program and help are implemented here.

Embedded 10/100 Fast Ethernet NIC Controller

The system contains two (2) redundant Ethernet network interface connections (NIC).

Reliable Partners

Facilities and systems have to run perfectly around the clock to ensure high productivity from invested capital. That's when it's important to have a dependable partner, who maintains your analytical instruments and systems throughout their entire service life and makes sure they run flawlessly and who'll be there at once if there's an emergency.

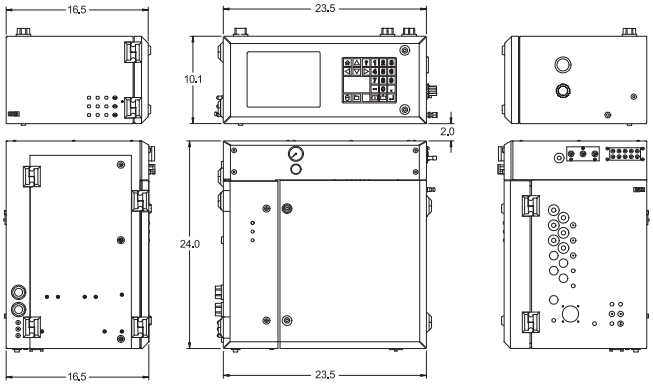


ABB Certified Service

ABB provides "Manufacturer Certified Service." Trained service specialists with years of experience and comprehensive know-how who are ready to assist you.

Our Competence

- Certified training with manufacturer-approved instructors, documents and exercises with written and hands-on testing
- Regular certification training for service personnel on new products and technologies
- Three-Tiered Support Concept

Certification Level 1

Well trained and experienced service specialists for on-site support, available in almost all countries around the world

Certification Level 2

The specialists with comprehensive and long time experience for the analytical product range

Certification Level 3

Manufacturer Service Support Group

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Specifications subject to change without notice.

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Process Gas Chromatograph PGC5000 Series

PGC5000B Smart Oven™ –
Designed for Reliability and Simplicity

Introducing the New PGC5000B Smart Oven™

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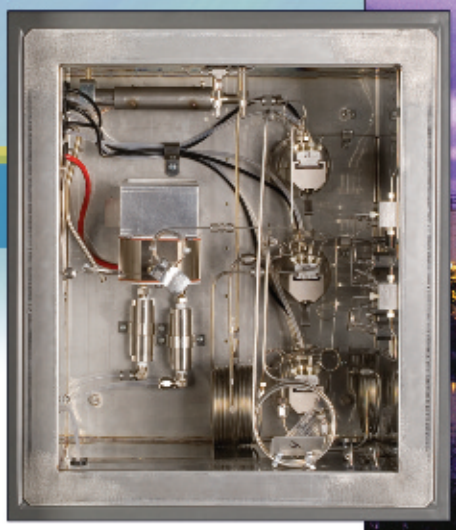


Advantages of Using Multiple Ovens

The primary reason to use multiple ovens to do a single application is to take a complex analysis and break it into simpler sequences, thereby using fewer components to yield long term reliability and simplicity. By breaking a complex application into one or more measurement sequences, it is much easier to understand and maintain the analysis. Troubleshooting problems or failures in the analysis becomes more logical. If an alarm or a chromatographic problem presents itself in the analysis, isolation of the various sequences can be viewed to identify where the failure is occurring. Other advantages of a multiple oven, single control configuration are:

- Having multiple ovens with their own controller allows one sequence to be worked on while the others continue to run.
- Critical measurements have back ups.
- Multiple isothermal temperature zones enable the application engineer to select the best column(s) for separating hydrocarbon groups with a wide boiling point range.
- Simultaneous sequences can be used to increase the speed of analysis.
- The ability to control up to four ovens simultaneously for one analysis, provides almost unlimited application approaches for doing multi-stream complex analyses in a very simple and reliable manner.

Savings in Space and Money

The smaller more compact design of PGC5000B Oven reduces space and utility requirements. It is designed to have a footprint that allows two PGC5000B ovens and a Model PGC5000A Master controller in the same space of other process gas chromatographs. Since about 60% of all process gas chromatographs applications use 3 valves or less and one detector, you can double the replacement capacity in the same amount of space. This feature may in many cases reduce the number of shelters required in large projects.

The PGC5000B Smart Oven™

The PGC5000B is comprised of three sections, an Analytical Flow Control section, the Analytical Oven section and the Analytical Oven Electronic section. Each section has front access; the Analytical Oven Electrical section also has side access for easy maintenance and service of all critical analytical and electrical components.

All analytical flow inlet and outlet connections are located on the right side of the analyzer oven. This allows for mounting multiple ovens above each other and keeps the piping layout simple and accessible.

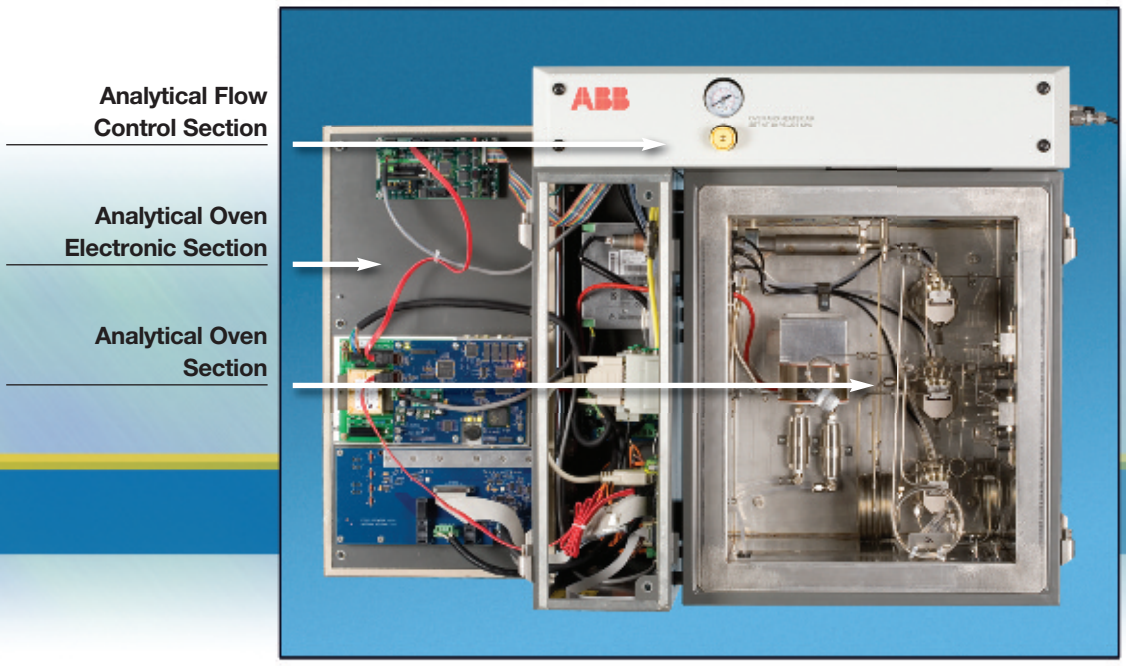
Each PGC5000B oven has its own Oven Control (OC) board located in the PGC5000A Master Controller. "Smart" Ovens use the OC to gain independent applications and method executions.

CAN communications is used between the oven controller and peripheral components such as the Digital Temperature Controller, Detectors and Electronic Pressure Control. The Digital Signal Processing (DSP) capability of these components enables a distributed versus integrated control architecture thereby enhancing component life cycle planning. Design changes become transparent to the end user.

Analytical Flow Control Section

The Analytical Flow Control section houses the Electronic Pressure Control (EPC) module as a PGC5000 standard. It supports up to five pressure zones that can be set directly at the PGC5000A Master Controller keypad or remotely via another PGC5000A Master Controller or network PC. Digital control reproduces pressure settings far more precisely than mechanical pressure regulators. This EPC module incorporates a more powerful and faster microprocessor providing greater precision of control to 3 decimal places. Other benefits of EPC are:

- Improves chromatography by providing better resolution and exceptional retention time stability, and faster analysis time.
- Using pressure programming, applications can be designed with shorter cycle times.
- Ambient temperature, carrier supply, and barometric pressure effects are eliminated, greatly improving analyzer stability.
- Analytical flows can vary for different methods within the same analyzer, enabling a wider range of on-line applications.

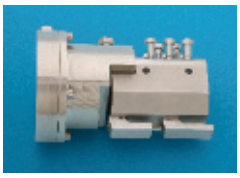


Analytical Oven Section

The Analytical Oven section houses up to 3 analytical valves for vapor and liquid applications, one detector (Single Port Thermal Conductivity detector, New Multiport TC detector, or Flame Ionization detector (FID), New smaller catalytic air purifier/methanizer, air bath heater and analytical columns. As with each of the analytical sections, the Oven section incorporates an efficient layout ensuring easy access to all the critical components in the oven.

■ Analytical Valves

Continuous Performance (CP) Sliding Plate Valve



The CP Sliding Plate Valve accommodates packed or capillary columns. Design includes automatic wear compensation and slider tension loading. It handles sample pressures up to 150 PSI (68.03 KPI) and temperatures up to 180° C (356° F). The CP valve is the simplest and easiest analytical valve to maintain in the industry. It is the perfect analytical valve to keep your maintenance costs to a minimum.

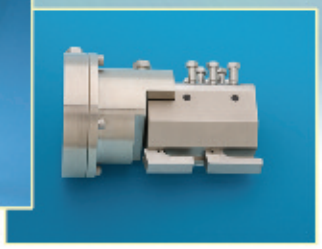
DV-22 Diaphragm Valve

The DV-22 Diaphragm Valve also accommodates packed or capillary columns. It handles sample pressures up to 300 PSI and temperatures up to 200° C. This valve is ideal to use for more complex analysis with criticial valve timings.

Model 791 - Micro Liquid Sample Inject Valve

The field proven liquid sample valve, with wear compensating seals, is a one piece design with vaporizer and metal surface deactivation to yield longer life. It can handle sample pressures up to 435 PSI (197.28 KPI) and temperatures up to 200° C (392° F).

Model 791 - Micro Liquid Sample Inject Valve



Continuous Performance (CP) Sliding Plate Valve

■ Analytical Detectors

Single Port Thermal Conductivity (TC) Detector

The filament style single port TC detector is suited for analytical measurements from high ppm to percent ranges, depending on analytical hardware configuration and application chemistry. It may be applied to measurements below 100 ppm.

New Multiport T/C Detector

The New Multiport TC detector is an EXd (explosion proof) design that is very compact but allows convenient maintenance. The measuring cell has four elements which may be filament style. When using the filament style elements, it may be configured for dual TC detector applictions using two measure and two reference paths.

Flame Ionization Detector (FID)

The FID is a small compact design that provides extreme sensitivity for the ppm/ppb hydrocarbon measurements.

New Catalytic Air Purifier/ Methanizer

The optional Catalytic Air Purifier/ Methanizer typically used in conjunction with the FID is 40% smaller and uses 50% less power than the previous generation air clean up module.

Analytical Columns

Analytical columns may consist of packed columns, capillary columns, or micropacked columns based on the application engineering requirements for a given application. ABB Analytical has been producing packed columns for 50 years and has developed processes over this time frame that will ensure the best and most consistent performance of its columns.

Analytical Oven Electronic Section

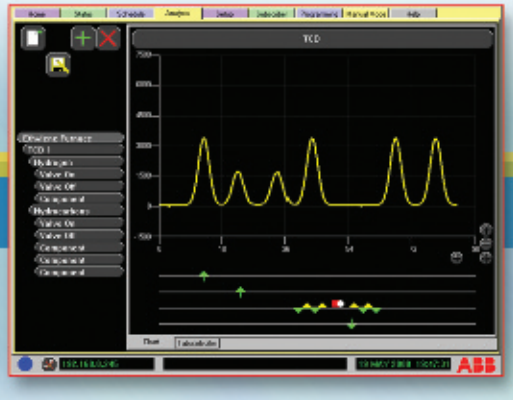
The Analytical Oven Electronic Section houses all the electronics for digital signal processing of detector signals, temperature control, pressure control, solenoid relay control, heater control and digital inputs. This section also includes a 24 Volt Power supply. Front and side access enable easy troubleshooting and removal and replacement of all electrical components.

■ Detector Signal Processing

The ultimate goal of the PGC is to provide the user with a repeatable and accurate determination of component concentrations. The detector preamp circuitry and peak detection software located in the Analytical Oven Electronic Section are used to accomplish this task.

The peak detection algorithm is used to scan the chromatogram and decide what part of the signal represents the peaks of interest. This is typically done in two parts. It must first determine what times to start and stop integrating the area under the signal. Then it must decide what part of the area is due to the peak not starting and ending on electrical zero. This second step is called baseline correction.

The PGC5000B analyzer incorporates a Min./Max Method peak detection algorithm that provides more consistency and repeatability for all component measurements because baseline detector noise calculations and peak calculations are both used in the integration algorithm. This includes windows for crest time, start and stop integration, and start and stop baseline correction. The PGC5000A Master Controller with its graphical user interface makes setting these parameters for each peak simple and straight forward.



■ Digital Temperature Control

Digital Temperature Control is provided for the Analytical Oven, the Catalytic Air Purifier/ Methanizer, and the Liquid Sample valve. As with digital pressure control, digital temperature control reproduces temperature settings far more precisely than analog temperature control. Full visibility of the temperature settings and the ability to change these settings are accomplished at the PGC5000A Master Controller or Network PC. This task is made very simple with the graphical user interface.

■ Digital Pressure Control

The digital pressure control PC Board provides digital control of the EPC Module located in the Analytical Flow section. Its benefits are the same as described for the digital temperature control above.

■ Modular Solenoid Manifold Assembly

The Modular Solenoid Manifold Assembly integrates the valve, driver, and manifold into a standard module. This module supports 3 operational switching valves and an additional 10 optional switching valves. Optional Modular Solenoid Valve Assemblies are available and can be located outside the oven. These are connected via a fiber optic cable. Each oven controller can support up to 64 Digital Outputs (i.e. eight octet channel modules).

■ PGC5000B Smart Oven™ Standard I/O

The PGC5000B Smart Oven™ comes with 16 digital inputs (5 VDC, 1mA), one dry contact relay for common malfunction (30 VDC, 1A) and one additional dry contact for loss of purge.

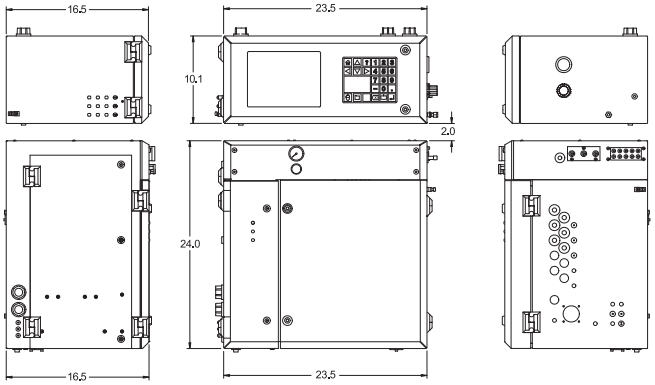
■ Optional Analog and Digital I/O

Optional analog and digital I/O are available in a DIN rail mounted CAN module. These can be mounted external to the analyzer oven and are connected via a fiber optic cable. Each analyzer oven supports up to 32 Analog Outputs or 32 Analog Inputs in 4 channel modules and 64 Digital Inputs or 64 Digital Outputs in 8 channel modules.

Application Engineering

ABB Application Engineers – pioneers and innovators – are world recognized leaders with over 125 years experience in Chromatographic applications technology. This experience, coupled with the power of the PGC5000 Series, enables ABB to successfully apply the chromatographic technique to a broad range of process applications to achieve targeted analysis times.

To discuss your specific application and receive complete information on the PGC5000 Series, please contact your ABB Representative.



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Certification Level 3

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