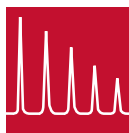


novaPRO 5000

Intelligent Process Gas Chromatograph



AGC
INSTRUMENTS
Gas Chromatography since 1965



www.agc-instruments.com

About the AGC NovaPRO 9000 Process GC

Introducing the most up-to-date On-Line Gas Chromatograph for the Process market from AGC Instruments. This intelligent platform is the latest PGC in the market today.

The NovaPRO 9000 Process Gas Chromatograph utilises the most up-to-date technology and systems available. It is a rugged and robust solution to the numerous applications required in the many markets into which it is operational. The NovaPRO 9000 PGC provides custom solutions to your requirements and offers 24 hour monitoring and reporting as needed. Accurate readings are achieved using our proven detectors.

AGC Instruments provides our customers with exacting solutions to their many needs and we pride ourselves as being the only independent supplier of Process Gas Chromatographs. The industry-proven Detectors available are chosen from the wide selection available from AGC Instruments. For years, we have been the industry leaders in the supply of such items to various manufacturers world-wide. The majority of detectors used are either Thermal Conductivity Detector (TCD) or Flame Ionisation Detector (FID), and with our experience we are able to design a customised solution for your specific applications.

This explosion proof PGC utilising a Purge method of conformity, is housed in a steel enclosure that is purged for use in the hazardous areas of Zone 1 and Zone 2 classification.

A non-purged version for use in safe zones is also available in wall mount or free standing floor mount.

Zone 1 ATEX Certification

Certificate Number: CSANe 20ATEX1111X

Certifying Body: CSA Group Netherlands

Equipment Marking:



II 2G Ex pxb IIB+H2 T3 Gb



2813



Zone 2 ATEX Certification

Certificate Number: CSANe 20 ATEX M803

Certifying Body: CSA Group Netherlands

Equipment Marking:



II 3G Ex pzc IIB+H2 T3 Gc



Principle Of Operation

The NovaPRO 9000 Process GC is a custom built solution to your exact specifications and ensures a continuous high resolution analysis of the Sample Streams being monitored. This is achieved by recreating an exact environment within the specially designed enclosure to enable the real-time analysis in the hazardous area with reliable and consistent results.

With the NovaPRO 9000 Process GC, a vast range of analytical possibilities are found using the extensive experience of the AGC Instruments team of engineers.

With our eight independent temperature controlled column ovens, which are unique to the market, we are able to provide an accurate and stable temperature environment for the selected columns for a variety of temperature zones. This multi-oven technology reduces the typical analysis time and in doing so, the NovaPRO 9000 PGC provides an excellent performance. Micro-packed columns are also used for efficient and rapid separations whilst parallel simultaneous chromatography allows for more in-depth data reporting in busy process centres.

The explosion-proof, EExP (purged) design is ideal for continuous analysis in the harshest of environments. Our strategic affiliation with top component manufacturers has enabled us to devise a comprehensive solution for the Process Gas Chromatograph market with quality and performance in mind. Complete testing is carried out on all of our PGC's prior to dispatch and full documentation will ensure a smooth transition; delivering a plug and play solution.

The system that runs and interfaces with the NovaPRO 9000 is a highly intelligent platform that has been carefully designed through interaction with our customers. Based on the professional embedded operating system and run on a rugged industrial embedded computer solution, the NovaVIEW chromatography software controls all aspects of the analytical and reporting requirements. In addition, external solenoids and valves are also controlled by the AGC software to give a full control solution. Using this cost effective solution removes the need for any other software as full reporting of results to the control room or the DCS is easily done.

Zone 1 & 2 IECEx Certification

Certificate Number: IECEx SIR 20.0039X

Equipment Marking Zone 1: Ex pxb IIB+H2 T3 Gb

Equipment Marking Zone 2: Ex pzc IIB+H2 T3 Gc



Features

- Explosion Proof for use in Zone 1 and Zone 2
- Cabinet fitted with Purge Controller to Exp standards
- Exp-system controllers certified for both IECEx and ATEX standards
- Available in Safe Zone Version for non-IECEx and ATEX applications
- Large Shatter Resistant Capacitive Colour Touch Screen Display for ease of use
- Electronic Pressure and Flow Controls
- Powder Coated Steel Enclosure with front secured doors - IP65
- Free Standing Floor Mount or Wall Mounted options
- Modern Embedded Industrial Computer Control with embedded operating system: NovaVIEW
- Auto Validation of the PGC Values displayed as DPM/Trend-Lines/ Chromatogram
- 8 x 4-20mA input for intelligent sample system analysis
- 4-20mA outputs, Profibus, Modbus, Modbus over TCP/IP communications available - RS232, RS485 and Ethernet
- Results Displayed as Chromatograms, Trendline or Digital Panel Meters (DPM)
- Segregated Power, Signal alarms, Communication cables & Junction Boxes
- 8 Independent Temperature Controlled Column Ovens with Temperature Ramp Chromatography
- Regeneration of Columns in-situ
- Easy Replacement of Columns
- Gas Lines fitted with flow check alarms
- Rotary or Diaphragm Valves for extended life usage
- Swagelok® or VCR Fittings
- Sample Stream Selection
- Single Channel or Dual Channel Configurations
- Analysis from % to ppm to ppb available
- Easy to Service and economical to operate
- Low Cost of Ownership
- Internal Cooling of enclosure available
- Corrosion Resistant Material Options
- Seamless Integration onto a Distributed Control System (DCS)
- Small Foot Print
- Retro Fits with other Manufacturers' Units
- Power: 110VAC - 230VAC



Industries

- Hydrocarbons Processing
- Petrochemicals
- Hydrogen Production
- Hy/CO Plants
- Critical processing facilities
- Oil Refineries
- Chemical Plants
- Metal Refining
- Power Plants
- Inorganic Chemical Industries
- Environmental Monitoring
- Natural Gas / LNG Processing
- Other related industries

Sample Conditioning

The quality of the sample entering a Process Gas Chromatograph affects the reliability of the measured values. Sample conditioning is therefore an integral part of a dependable analytical solution and good quality samples also minimise maintenance costs and analyser-related downtimes. The parameters of the sample system can be transferred to the NovaPRO 9000 PGC with an option to connect the sample system analysers to the Software also.

AGC Instruments recommend sample conditioning systems customised to the process gas chromatograph in order to maintain precision high sensitivity analysis. In keeping with our turnkey integrated systems approach, AGC Instruments can provide sample conditioning systems to operate in tandem with the NovaPRO 9000 PGC. Working closely with our collaborative partners, we can design, manufacture and implement a system suited to your specific requirements.

Applications

The NovaPRO 9000 PGC is designed for use in applications within processing facilities and hydrocarbon processing industries such as a variety of refining, petrochemical, power, fine chemicals and environmental applications where selected components in gaseous or liquid streams must be precisely monitored on a continuous basis. It performs the analysis of gases that are present in these production processes.

The flexibility of the NovaPRO 9000 PGC allows it to analyse samples of feedstock, partially processed streams, final products and process by-products including wastes which may be hazardous to the environment.

Petrochemicals

- Acrylonitrile Plants
- Ethylene Plants
- Polymer Plants

Refining

- Aromatics Unit
- Catalytic Reformer
- Flares
- Fuel Gas Lines
- Isomerisation Unit
- Light Hydrocarbons
- Process Monitoring of Alkylation and Reforming

Natural gas (Preparation)

- Cryogenic Gas Plants
- LNG Plants
- Light Hydrocarbons
- Calorific Value
- BTU
- Wobbe Index
- Specific Gravity

Chemistry

- Fine Chemicals
- Polysilicon Manufacturing Products
- Cl_2 , HCl , NH_3 Gas
- Chlorinated Hydrocarbons

Industrial gases

- N_2 , Ar , O_2 , He
- CO_2 , H_2
- Corrosive Gases
- Electronic Gases
- Air Separation Units (ASU)
- Organic Gas Analysis
- Inorganic Gas Analysis

Electric power/gas

- Fuel Gas
- Exhaust Gases
- Blanket Gases
- Coal Gasification/Liquefaction
- Gas Turbine Control

Iron & steel

- Blast Furnace
- Coke Oven
- Shielding Gas



Petrochemical & Refinery Applications

Petrochemical Applications

AGC Instruments recognises that the Petrochemicals Industry is in a constant drive to improve on efficiency and performance onsite in order to deliver top quality end products to their customers. To do this, they need to ensure that all aspects are adhering and meeting their quality requirements. The need to guarantee the quality of gases used on site, whether it is in the Utility Plant delivering N_2 or O_2 to various parts or monitoring efficiency of the scrubbers and catalysts. AGC Instruments consistently delivers these Gas Analysis Solutions to assist in these processes.

Some Typical applications include:

- Measurement of H_2 in Synthesis Gas
- Measurement of CO & CO_2 in various gases
- Monitoring of Nitrogen (N_2) and Oxygen (O_2) quality
- Methane/Non Methane Hydrocarbon gas Analysis

In general, there are many applications surrounding the Petrochemical Industries. Customers need to analyse various streams of Ethane, Propane, Ethylene, LLDPE, HDDPE, (Polyethylene), Ethylene Oxide, Chloride, Carbon Monoxide etc. All these applications are accommodated by the AGC Instruments NovaPRO 9000 Process Gas Chromatograph with optimal efficiency and performance.

Refinery Applications

Refinery based applications are always evolving and new processes are being developed to increase the performance and production capabilities on many Refinery type platforms. The NovaPRO 9000 PGC can easily be integrated into a multitude of analytical processes within refineries.

Some Typical applications include:

- Analysis of CO in Propylene (C_3H_6) or in Ethylene (C_2H_4)
- Measurement of Hydrogen (H_2) in Synthesis Gas
- Hydrocarbons Processing Monitoring

Range of Detectors

■ Discharge Ionisation Detector	DID
■ Flame Ionisation Detector	FID
■ Thermal Conductivity Detector	TCD
■ Flame Photometric Detector	FPD
■ Photo Ionisation Detector	PID

Thermal Conductivity Detector-TCD

Four sensing elements are connected to form an electrical Wheatstone bridge circuit. These elements are typically miniature rhenium-tungsten filaments, which are mounted in a metallic cell block. A flow through type thermal conductivity cell is normally used in this analyser. This cell contains a sample and reference gas flow geometry. Two elements are installed in each flow system. An electrical current from a regulated power source heats the elements. Changes in thermal conductivity of the sample gas result in an output voltage change.

Linearity	>10 ⁴
Sensitivity	<5ppm
Response time	<1 second

Gases Required:

Carrier Gas	He, Ar, N ₂ or H ₂ ; 70ml/min
Actuator Gas	Clean Dry Air @ 3 bar

Discharge Ionisation Detector-DID

The AGC Discharge Ionisation Detector (DID) has outstanding stability and performance giving low ppb measurements. Based on using a non radioactive, universal and concentration dependent design, the detector generates high energy photons through an electrical discharge in Helium. The metastable Helium then ionises all components except Helium.

Linearity	>10 ⁶
Sensitivity	<1 ppb of CH ₄ (APPLICATION DEPENDENT)
Response time	<0.5 seconds

Gases Required:

Carrier Gas	Ultra Pure He N6.0 ; 40ml/min
Discharge Gas	Ultra Pure He N6.0 ; 20ml/min
Actuator Gas	Clean Dry Air @ 3 bar
Purge Gas	Ultra Pure He N6.0 ; 10ml/min

Flame Ionisation Detector-FID

The AGC Flame Ionisation Detector (FID) is used to measure concentrations of hydrocarbons within a sampled gas. The presence of hydrocarbons is detectable by burning the sampled gas in an air-hydrogen flame. Burning just pure hydrogen with air produces only small amounts of ionisation. The presence of hydrocarbons in the sampled gas, when burnt with an air-hydrogen mix causes increased levels of ionisation. The ionisation occurs a result of the carbon atoms present in the sampled gas. The level of ionisation is proportional to the number of carbon atoms within the sample.

Linearity	>10 ⁶
Sensitivity	<20ppb of CH ₄
Response time	<0.5 seconds

Gases Required:

Carrier Gas	N ₂ , He, Ar ; 20-40ml/min
Air	240ml/min
Fuel	20ml/min
Actuator Gas	Clean Dry Air @ 3 bar

Flame Photometric Detector-FPD

The FPD is designed to give a response to sulphur or phosphorous compounds. When an excitation energy is applied to the atoms of an element, a photometric emission spectrum is obtained whose wavelength is characteristic of the element. The intensity of the emitted light is proportional to the number of atoms excited.

Within the flame photometric detector, the excitation energy is derived from the combustion of the sample in a hydrogen-rich flame. Variations in intensity of the emitted light are detected by a photomultiplier, which converts the photons to an electrical signal, which is measured on an electrometer.

Linearity	10 ³ (Sulphur Mode) 10 ⁴ (Phosphorous Mode)
Sensitivity	20pg S/sec for Thiophene (Sulphur Mode)

* Repeatability and Accuracy dependent on application.
Contact us for more information.

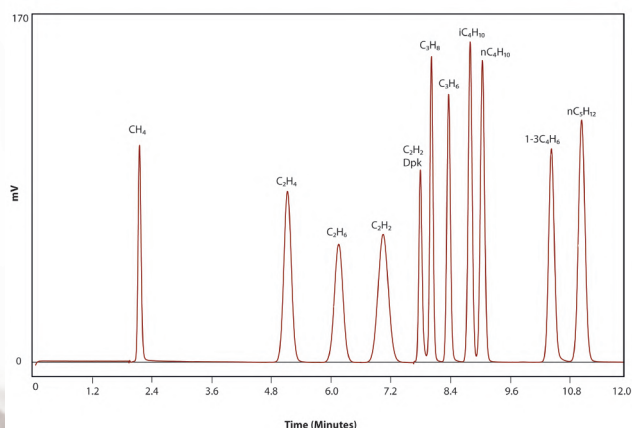


NovaVIEW

NovaVIEW is the user interface which has been specifically designed to address the needs of the NovaPRO 9000 Process Gas Chromatograph users in various areas of Industry. NovaVIEW is built on the foundation of the successful TrendVision gas chromatography software platform which is used worldwide in AGC's industry-proven gas chromatographs. The Software is in constant development to provide an intuitive, industry proven operation. Rugged industrial level modular and scalable hardware is used with Embedded Windows® Operating System. NovaVIEW provides a unified chromatography method whereby all settings are contained in a single method, including event table, calibration table and integration settings for a continuous and unattended operation.

Calibration can be linear or non-linear and can be based on a single calibration point or on multiple calibration points. Validation is supported to suppress unnecessary triggering of calibration events. Measurement units can be conveniently selected as %, ppm or ppb. Furthermore, sequence alarm contacts are supported to alert the control room to an out of bound condition.

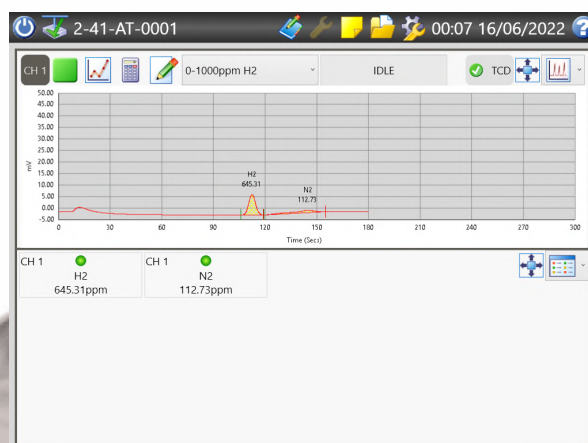
There is flexibility in the presentation and each result can be displayed in a numeric panel (Digital Panel Meter format). Trend Lines retain a link to the source chromatogram and by clicking on a trend point this will directly open the source chromatogram. Individual trend lines can be exported in CSV format. All panels can carry high alarms, low alarms or both and these alarms can be set to "auto-acknowledge" which will reset if subsequent measurements return to an acceptable level. Custom report certificates, custom calculations, macros, etc. can be created and stored or printed for further use.



Sample FID Chromatogram: 10ppm C1-C5

Features

- Process driven Chromatography Software
- Full Chromatography Interaction
- Robust, Intuitive Operation, Easy to Use, designed for Process applications
- Single Integrated Method
- Easy to use Multi-level Calibration
- Real-Time Chromatogram of Analysis performed
- Continuous Trend of all components analysed by the PGC
- Digital Panel Meter View of the Components of Interest
- Automatic Performance Validation of the System
- Hi-Lo Alarms
- Visual Display of Alarm Status
- Up to 16 Independent Peak Alarms using voltage free relay contacts
- 4-20 mA outputs, Profibus, Modbus, RS232, RS485
- 4-20 mA inputs with option to connect the sample system analysers to the Software
- Programmable relays for event control
- Sophisticated Multi-sample Method Programme
- Controls of Sample Valves & Solenoid Switching/Sequencing for Sample and Calibration Lines
- Complete digital control of all temperature and gas flows of the PGC
- Convenient graphic features e.g. zoom, chromatogram comparisons, fixed axes, etc.
- Chromatogram preview before load
- Programmable Integration (negative peaks, etc.)
- Batch Reprocessing
- Convenient file management e.g. automatic folder creation, preview before load, etc.
- On-Line Customer Support module included
- Direct support over Internet



Specification

Measuring Range	ppb, ppm, %
Operating Temperatures	-20 to +40 degrees Celsius
Enclosure	- Explosion Proof (Exp type) - Steel with front secured doors - Polyester Powder Coating conforming to the requirements for BS6496 and BS6497 for the highest levels of durability - Segregated Power, Gas Flow Alarms, Auto Switch-Off of Gas Lines - Large Capacitive Industrial Grade 12" Touch Screen Display
Mounting	Wall or Floor Standing
Dimensions	H = 1015mm, W = 780mm, D = 496mm
Power Supply	Voltage 110V/220V, 50/60Hz
Gas Lines	1/16" or 1/8" Stainless Steel with Swagelok® or VCR Compression Fittings - Corrosion Resistant Materials also available
Valves	- Rotary or Diaphragm Valves 10 Port / 8 Port / 6 Port / 4 Port available depending on the configuration with Air Actuation
Alarms	- High and Low Alarm Output available for each impurity - Common Fault Alarm available - Sample & Carrier Gas Flow Alarms - Temperature Zone Alarms - Utility Gas Alarms - Maintenance Mode Status Alarm
Columns	- Packed Columns, Micropacked Columns, Capillary Columns - Independent Temperature Controlled Column Ovens - Easy Replacement or Regeneration of Columns In-Situ
Exp Purge Controller	- Exp-system controllers certified for both IECEx and ATEX standards - The industry standard controllers used are well proven in their field of use for both Zone 1 and Zone 2 hazardous areas - Compact system with visualisation of status, pressure, remaining purge time and failure report via integrated display - Solenoid valve fuses are easy exchangeable inside of the units
Computer Software/Hardware	- Embedded Industrial Computer - 24 bit ADC and associated hardware (dependent on the application) - Embedded Windows® Operating System - Relay to Control Room: Maintenance Mode - AGC NovaVIEW interface
Detectors Available	- Thermal Conductivity Detector (TCD) - Flame Ionisation Detector (FID) - Flame Photometric Detector (FPD) - Discharge Ionisation Detector (DID) - Photo Ionisation Detector (PID)
Testing	- Burn-In Test on Electronic Parts & Assemblies under Simulated Conditions - System Performance monitored before, during and after the test - Insulation Test / Voltage Proof Test - Voltage Variation Test
Certifications	- CE Certified - IECEx and ATEX Certified - Manufactured under the auspices of ISO 9001:2015



Company Profile

AGC Instruments

AGC Instruments is a leading manufacturer of Gas Analysis Solutions to all users requiring a Quality Control or identification of their gas stream. We have over 57 years experience in providing our customers with their "Total Gas Analysis Solutions". We work closely with all customers to ensure they obtain the analytical solution that meets their needs and a system that is easy to use and understand. All AGC distributors are extremely experienced and factory trained to the highest standards, offering you a complete after sales support service.

The wide range of Detectors available can be customised to measure unique gas streams and we place an emphasis on the continuous development of our analytical solutions. Our worldwide reach with strategic partners ensures that you have peace of mind and after sales care that are important to your operations.

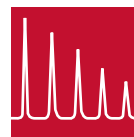


Aftersales Care

AGC Instruments are committed to providing and maintaining quality systems from customer liaison to technical knowledge through to System Design and Delivery. We believe that our After Sales Support to the customer is one of the most important services we can offer. Each Distributor has been carefully selected and trained to ensure our customers receive the best possible service. Furthermore, online customer support and direct support are available to deliver a comprehensive support package.

For further information please contact:

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Gas Chromatography since 1965



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