



CHROMATOGRAPHY & INSTRUMENTS CO.



CIC



R&D



TRAINING



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GC 2011 Micro Controller Based & PC Controlled



The **GC 2011** is a microcontroller based system with a provision to be controlled by a PC using RS 232c or RS 485 protocol. The **GC 2011** gas chromatograph represents a **true combination of Analytical Instrumentation & microcontroller/microcomputer technology**. It is designed for **High Temperature analysis (up to 500°C)** and comes fitted with a forced air auto cooling system as a standard feature.

The main features of the GC are:

- The complete system is Microcontroller / Microcomputer based with Auto Diagnostics.
- Integrated yet modular electronics & pneumatics modules make the system very Compact, versatile & easy to maintain besides always giving scope for **future upgradation**.
- **Dual Display in two colors** for temperature control for all zones - Set & Actual Temperatures.
- Temperature Range up to 500°C for Oven with exceptional stability at all temperature ranges.
- Isothermal or Temperature programmable modes with up to **31 methods & 126 segment ramp & Soak profile**.
- The temperatures can be set in **1°C/0.1°C/0.05°C** steps during programming & can be set from 0.05°C to 160°C per minute, however, the heater capacity allows for the control from **0.05°C to 50°C per minute with a maximum time of 1440 minutes (24 hours)**.
- **Up to seven heated zones** are available with exceptional temperature stability & control accuracy of $\pm 0.01^\circ\text{C}$ which is achieved using software feedback loop & fuzzy logic control with PID action for precise control.
- Dual control for overshoot of temperature: software as well as electronically.
- **Up to four injectors & three detectors can be incorporated simultaneously**.
- **Three stage Pressure & Flow control** is a standard feature with various options for flow control like **FCV, DFC, DMFC, AFC, EPC, EPP** to choose from.
- Auto cooling through **motorized controlled vents** is a standard feature with fast cooling enabled by the use of an **additional blower**. The auto cooling **set point as well as operation can be user set**.
- A very silent & vibration free powerful blower from Germany is used for the oven which is designed to work up to 550°C. The powerful blower ensures that the **large capacity 22 liters** oven has a uniform temperature throughout and no temperature gradient occurs.
- TACTILE KEYS with positive 'Feel' are provided for temperature setting and a simple & User friendly Mnemonic menu with **method locking facility** is provided on the front panel console.
- Choice of inlet system **Packed, Capillary, PTV, Methanizer, GSV & Automatic GSV's**.
- Convert the GC as per application needs for **TOGA/NGA/DGA** etc.
- Choice of up to five detectors **FID, TCD, Micro TCD, ECD & NPD**. Other detectors can be incorporated on request.
- **Ethernet connectivity** as well as data transmission up to 900 meters away is optionally available.
- By adding a timer module & an upgrade kit the system can be configured for **process & on line applications**.
- The system can be coupled with **MS system**. It can also be fitted with **Auto Sampler, Head Space Sampler** as well as **Cryogenic bath** attachment to achieve temperatures upto -180°C using liquid Nitrogen/Carbon Dioxide.



GC 2011 CONFIGURED WITH AFC MODULE IN PNEUMATICS



GC 2011/GC 2010 LARGE COLUMN OVEN WITH EASY ACCESSIBILITY



GC 2011 CONFIGURED FOR PROCESS GC APPLICATIONS



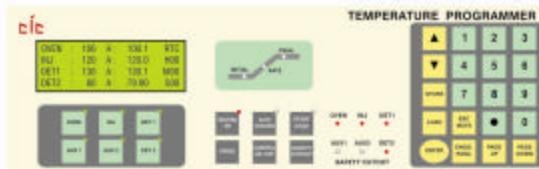
GC 2010 Micro Controller Based & PC Controlled



The **GC 2010** is a 24 bit microcontroller based system with a provision to be controlled by a PC using RS 232c. The GC 2010 gas chromatograph represents a true combination of Analytical Instrumentation & microcontroller / micro convector technology.

The main features of the GC are:

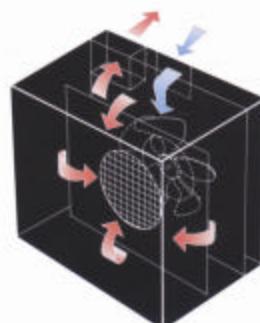
- Advanced Self Diagnostic feature with **Auto Fault Detection** and Display on the LCD.
- Integrated pneumatics but modular electronics modules make the system very versatile & easy to upgrade. The modular electronics ensures the concept of **Plug & Play**.
- Temperature Range up to 450°C for all the six heated zones with exceptional stability at all ranges with control accuracy of $\pm 0.1^\circ\text{C}$ which is achieved using software feedback loop & fuzzy logic control with PID action for precise control. It has **green color LED's for each heated zone for heating and RED color LED for alarm indication**. Separate LED's are also provided to display the programming option.
- Isothermal or Temperature Programmable modes with up to **100-segment temperature programming and up to 100 method files storage**. The temperatures can be set in $1^\circ\text{C}/0.1^\circ\text{C}$ steps during programming & can be set from 0.1°C to 50°C per minute with a **maximum time of 1440 minutes (24 hours)**.
- Soft touch 32 Key membrane keypad with Large LCD display of 4 Lines x 20 characters** kept an angular position for easy viewing from any angle. Some of the functions that can be set through the keypad are **alarm set points** for all the zones, safety cut- out for overall system, start key that gives **trigger pulse** for the **Data Acquisition** system to start acquisition from the keyboard after the injection of the sample, individual heating on & off keys with self-indication to individually heat the different zones, a **Centralized heating on/off key**, keys for individual heated zones are provided and when pressed they show the temperature profile of that particular zone. These keys are global in nature and can be accessed from any menu.
- The LCD continuously & simultaneously displays temperatures of all four heated zones with actual and set temperature as the default main screen at all times
- Dual control for Overshoot of temperature: software as well as electronically. The alarm screen appears in case of alarm status and remains on the LCD until acknowledged. The alarm LED remains glowing till the time alarm / fault is rectified. The constant beeping of the buzzer also indicates the alarm till the time the buzzer is disabled from the membrane keypad.
- Auto cooling through motorized controlled vents** is a standard feature with fast cooling enabled by use of an additional blower. The auto cooling set point as well as operation can be user set
- Up to Four Injectors & Three Detectors can be incorporated simultaneously.
- Three stage Pressure & Flow control is a standard feature with various options for flow control Like **FCV, DFC, DMFC, AFC, EPC, EPP** to choose from
- Choice of inlet system **Packed, Capillary, PTV, Methanizer, GSV & Automatic GSV's**
- Choice of up to five detectors **FID, TCD, Micro TCD, ECD & NPD**. Other detectors can be incorporated on request.
- Convert the GC as per application needs for **TOGA/NGA/DGA** etc.
- Ethernet connectivity** as well as data transmission up to 900 meters away is optionally available.
- By adding a timer module & upgrade kit the system can be configured for **process & on line applications**.
- The system can be coupled with **MS system**. It can also be fitted with **Auto Sampler, Head Space Sampler** as well as **Cryogenic bath** attachment to achieve temperatures upto -180°C using liquid Nitrogen/Carbon Dioxide.



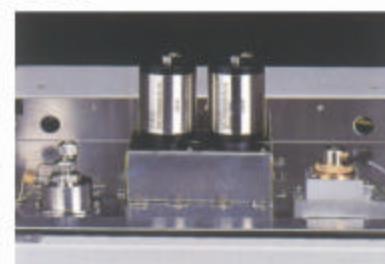
LARGE DISPLAY & SOFT TOUCH 32 KEY MEMBRANE KEYPAD

Open Program Step : 98
Rate 98 : 2.5
Final Temp 98 : 285.0
Final Time 98 : 6.0

OVEN : ISOETHERMAL
SET VALUE : 300.0
ALARM HIGH : 10
CONTROL : ON



GC 2010/2011 FORCED AIR COOLING FOR AUTO COOLING ENSURES FASTER COOL DOWN TIMES



TYPICAL HEATED AUTO GSV MOUNTED FOR AUTO ANALYSIS



GC DIGI - μ - Microprocessor Based System



The **GC Digi- μ** is a microprocessor based economical system ideally suited for industries & institutions with **low budget**. The **GC Digi- μ** gas chromatograph has been designed for routine applications which do not require multi step temperature programming. However, there is no comprising on the sensitivity, performance and ruggedness of the equipment.

The main features of the GC are :

- It is **fully modular** in design, very compact and a great space saver.
- Modular pneumatics & electronics modules make the system very versatile & easy to upgrade & relocate.
- Temperature is displayed by **4-digit LED displays** for Oven & Injector with a selector switch for flipping between the displays. The oven and injector temperature controller on/off status is indicated independently.
- Temperature selection is done by the push button type of latest switches and multi turn potentiometers.
- Selection of **Isothermal or programming** mode by push button type switch.
- Eleven different programming rates from 1°C per minute to 11°C per minute
- The complete electronics is based on the **plug & play** feature which is ideal for easy maintenance & servicing
- Up to Four Injectors & Two Detectors can be incorporated simultaneously.
- **Three stage Pressure & Flow control** is a standard feature with various options for flow control Like **FCV, DFC, DMFC, AFC, EPC, EPP** to choose from.
- **Choice of inlet system** Packed, Capillary, Methanizer, GSV, Automatic GSV's & choice of detectors - **FID & TCD**
- **Ethernet connectivity** as well as data transmission up to 900 meters away is optionally available.



TOGA - TRANSFORMER OIL GAS ANALYSER

The analysis of dissolved gases in electrical insulating oil is an efficient diagnostic tool for **condition monitoring** of power system equipments. The **TOGA** can be configured using the **GC 2011** or **GC2010** as main frame to analyse the complete spectrum of gases namely H_2 , O_2 , CO_2 , C_2H_4 , C_2H_6 , C_2H_2 , CO & CH_4 in a **SINGLE INJECTION**. The **TOGA** is capable to detect PPM & Sub PPM gasses in transformer oil with respect to the national/international specification/standards, for example **IS-10593 : 1992**.



GC 2011 CONFIGURED FOR TOGA APPLICATION

DGA - DISSOLVED GAS ANALYSER

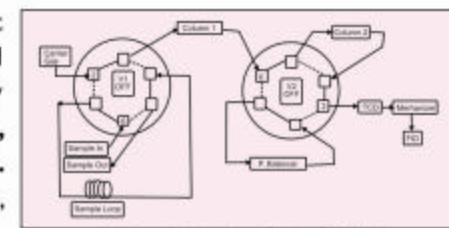
Dissolved Gas Analysis of transformer oil is done to detect the incipient fault in the Power Transformers or electric Loco transformer & to arrest deterioration/damage to the transformer insulation by analyzing gases dissolved in the transformer oil. The quantities of gases dissolved in transformer oil vary depending upon the type & severity of **fault condition such as Arcing, Partial Discharge, Overheating, Low/High Temperature Hot Spot etc.**

The lower limit detection of our DGA for the gases is: Hydrogen 1ppm, Hydrocarbon less than 0.1ppm, Carbon monoxide 1ppm & Carbon dioxide 1ppm.

The DGA can be built using the GC 2011 or GC 2010 or

GC Digi- μ as mainframe as microprocessor based units.

Lower variants like **3C-DGA** or **4C-DGA** are **no frill systems specially built for clients with low budgets who do not require the versatility of microprocessor based systems**. However, these systems also are built to analyse as per standards like **IS-10593 : 1992**.



Gas Sampling Valve Configuration for TOGA



3C DGA



4C DGA

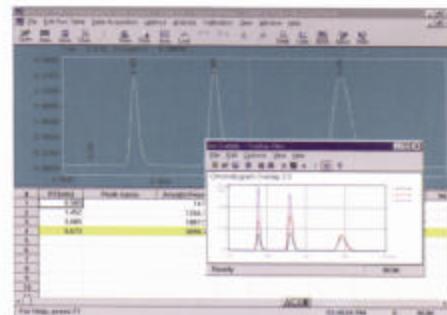


CHROMATOGRAPHY DATA SYSTEM & ASSOCIATED SOFTWARES



MS-Windows (98, 2000 & XP PRO) based program for data acquisition provides excellent data handling & report generation for GC, HPLC or TOC systems. With multi-tasking capability offered by the system, the user can create a report & integrate the existing data within one window before a run is completed. You can also work on other windows based software like word or excel simultaneously while the acquisition is in progress.

The software also offers flexibility in report generation with the user having the option to shrink or enlarge a chromatogram of interest and create a quantitation report for Area%, Height%, ESTD & ISTD. The Data reports can be transmitted in various formats for further processing by other software's. Up to 16 chromatograms can be overlaid in different colors to evaluate the reproducibility of the retention times & areas. Up to 4 channel systems can be provided with 24/32 Bit resolution over the full range with variable sampling frequency upto 50 Hz.

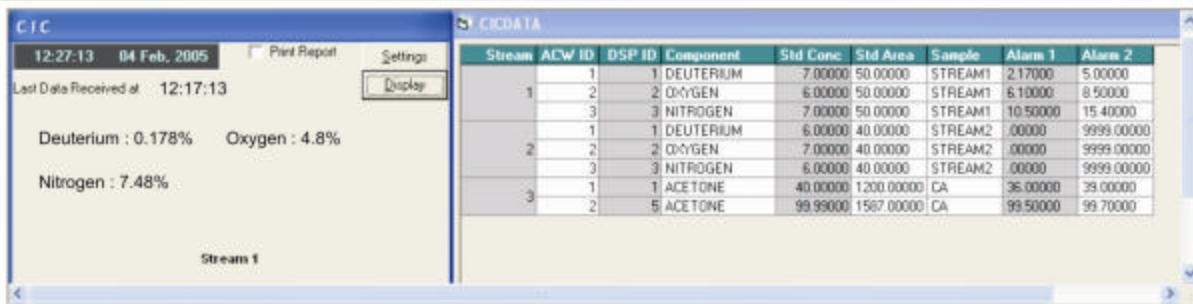


DISSOLVED GAS (DGA) INTERPRETATION SOFTWARE

Specialized software is available for the interpretation of the data as per IS 10593 : 1992 using the faults established as per the ratio of the different gases. Besides the faults and their diagnostics the software also gives the result in PPM for all the gases obtained after the analysis on the DGA. The software is user friendly and provides all the information for the relevant IS methods for sampling & interpretation along with the manual and other data. The report option is user programmable and the customer can put his name on the report to be generated and can save and retrieve the data at any later date if required.



DATA TRANSMISSION & REMOTE DISPLAY - SOFTWARE - HARDWARE

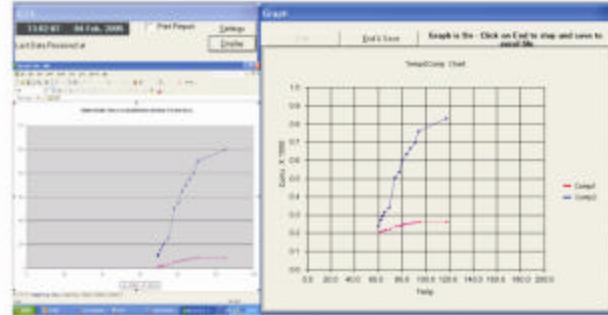


We can supply customized software & Hardware solutions for displaying and transmission of data acquired from the GC or OLGC to remote locations up to 900 meters away. Up to 16 components can be transmitted using RS 485 protocol and results from up to 4 systems can be transmitted & monitored simultaneously using RJ45 connectivity Ethernet protocol. The complete programming of the system can be done through the PC including the system selection as well as the alarm values for all the streams.

GRAPHICAL REPRESENTATION OF CONCENTRATION VS TIME

This software is similar to the software above and besides all the features of the above software, it is also customized for profiling of on line continuous applications. The particular software shown in the figure has been developed for monitoring the profile of the concentration against the temperature for a particular on line GC system.

The software can be modified to provide trending profile of concentration against time or any other data available or required by the user.





CHOICE OF INLETS & DETECTORS



PACKED COLUMN INLET SYSTEM

It is used for 1/4" & 1/8" glass or Stainless steel and wide bore capillary column by inter-changeable individual liner



SPLIT - SPLITLESS CAPILLARY COLUMN INLET SYSTEM

It is used for narrow bore & mega bore capillary column in split or split less mode. Enhanced design with graphite ferrule seals & flow septum purge reduces background noise & solvent peak tailing while minimizing sample contact with metal surfaces which lessens the possibility of thermal breakdown. Built in septum purge with precise needle valve control for variable split ratio setting is provided on the front console of the GC.

ON COLUMN INLET SYSTEM

It is used for thermal degradable compounds by direct injection onto the capillary or packed column head. It can also be used for samples of very low concentration.



PROGRAMMED TEMPERATURE VAPORISER (PTV)

This injection system provides programmable injection temperatures, combining the advantages of a split / split less injection and "Close On-Column" injection techniques. The optimized thermal profile can be viewed on the VDU via RS 232c Serial link provided with PTV controller. This is available optionally on request.

GAS SAMPLING VALVES

Can be provided for Manual as well as Automatic operation. Four, Six, Eight & Ten port valve configurations are available in manual as well as pneumatically or electrically operated automatic models which when coupled with the valve sequence programmer can make the GC automatic (semi).



METHANIZER - CATALYTIC CONVERTER

The choice of a Methanizer connected in series with the injector and column is an ideal proposition for low-level analysis of Carbon Monoxide (CO) & Carbon Dioxide (CO₂).

HIGH PERFORMANCE DETECTORS

The GC's can handle any applications may it be **Environmental, Agriculture, Pharmaceutical, Petrochemical, Food, Flavors, Solvent, Gases or Industrial Chemicals**. The GC's can accommodate multiple (2-4) independently temperature controlled detectors that can be operated either singly or simultaneously as per your requirement:

FLAME IONIZATION DETECTOR (FID)

Operating Temperature :Ambient to 450°C

Amplifier Gain :X1, X10, X100

Sensitivity: > 20 ppb of CH₄ (1x10⁻¹² A)

Linear range: 1 x 10⁷

Noise: Less than 1% / day (< 2 μV)

Drift: Less than 1% / day (< 5 μV/min)

Zero Balance: Two multi turn potentiometers.

Attenuator : Rotary type from X1 to X1024

Output: To recorder 1mV or 10 mV or 1VDC to PC



THERMAL CONDUCTIVITY DETECTOR (TCD)

Operating Temperature :Ambient to 450°C

Type: Flow through or semi diffusion

Current range: Up to 350 mA (adjustable)

Bridge current supply: Constant current mode.

Sensitivity: 100 ppm of O₂ in N₂

Zero Balance: Two multi turn potentiometers.

Attenuator: Rotary type from X1 to X1024

Current monitoring: By four digits LED



Electronic amplifier: included in the design with gain of 10 or 100

ELECTRON CAPTURE DETECTOR (ECD)

Operating Temperature: Ambient to 400°C

Types: Coaxial with 15 mCi source

(555MBq) of Ni⁶³

MDL:< 0.04 pg/sec Lindane

Dynamic Range :> 10⁴



NITROGEN PHOSPHORUS DETECTOR (NPD)

Operating Temperature: Ambient to 400°C

Sensitivity: N: <0.4 pg N/sec for azobenzene

P: <0.05 pg P/sec for malathion

Linear Range: N: >10E(4) P: >10E(3)

Selectivity: N: 25,000 gN/gC, P: 250,000 gP/gC



Micro TCD - Our dual filament TCD is a stand alone unit consisting of the detector housing & a controller with electrometer & temperature controls. The detector coil includes two separate nickel/iron filaments capable of independent or referenced (differential) operation. Cell volume and geometry are optimized for capillary chromatography and enhanced sensitivity at low flow rates, (Recommended total flow rate: 2-10 ml/min.)



General Specifications



Specification	GC 2011	GC 2010	GC Digi- μ
COLUMN OVEN			
Inner Volume	22 liters	21 Liters	21 Liters
Temperature Range	Ambient to 500°C	Ambient to 450°C	Ambient to 450°C
Cryogenic Option	Optionally available	Optionally available	Optionally available
Temperature Read out	4 digit LED Dual Display	4 line LCD Dual Display	4 digit LED
Temperature Accuracy	$\pm 0.5\%$ of set temperature	$\pm 0.5\%$ of set temperature	$\pm 1\%$ of set temperature
Temperature stability	$\pm 0.05^\circ\text{C}$	$\pm 0.1^\circ\text{C}$	$\pm 0.5^\circ\text{C}$
Overheat protection	Dual-electronics + s/w	Dual-electronics + s/w	Electronics for oven only
Auto cooling Option	Forced Air cooling-Auto	Forced Air cooling-Auto	Manual
Heating Rate	50°C to 350°C in 7 min.	50°C to 350°C in 7 min.	50°C to 350°C in 9 min.
Cooling Rate	350°C to 80°C in 8 min.	350°C to 80°C in 8 min.	350°C to 80°C in 10 min.
Programming steps	126 segment Ramp & Soak	100 Segment Ramp & Soak	1°C to 11°C in 11 steps
Method files	31	100	1
Temperature setting	0.05°C /0.1°C /1.0°C	0.1°C /1.0°C	1.0°C
INJECTORS - INLET SYSTEMS			
Choice of Inlet system	All available	All available	All available except PTV
Number of Injectors	Up to 4	Up to 4	Up to 4
Temperature Range	Ambient to 450°C	Ambient to 450°C	Ambient to 450°C
Temperature Read out	4 digit LED Dual Display	4 line LCD Dual Display	4 digit LED
Temperature Accuracy	$\pm 0.5\%$ of set temperature	$\pm 0.5\%$ of set temperature	$\pm 1\%$ of set temperature
Temperature stability	$\pm 0.05^\circ\text{C}$	$\pm 0.1^\circ\text{C}$	$\pm 0.5^\circ\text{C}$
Overheat protection	Dual electronics + s/w	Dual electronics + s/w	Not available
DETECTORS			
Choice of Detectors	FID/TCD/ECD/NPD/ μ -TCD	FID/TCD/ECD/NPD/ μ -TCD	FID/TCD
Number of Detectors	Any 3	Any 3	Any 2
Temperature Read out	4 digit LED Dual Display	4 line LCD Dual Display	4 digit LED
Temperature Accuracy	$\pm 0.5\%$ of set temperature	$\pm 0.5\%$ of set temperature	$\pm 1\%$ of set temperature
Temperature stability	$\pm 0.05^\circ\text{C}$	$\pm 0.1^\circ\text{C}$	$\pm 0.5^\circ\text{C}$
Overheat protection	Dual electronics + s/w	Dual electronics + s/w	Not available
CHOICE OF PNEUMATICS			
Pressure Control	Two Stage	Two Stage	Two Stage
Flow control Option	FCV/DFC/DMFC/AFC/ EPC/EPP	FCV/DFC/DMFC/AFC/ EPC/EPP	FCV (Others on request optionally)
Control	From Front Panel	From Front Panel	From Front Panel
GENERAL SPECIFICATIONS			
PC Control (Optional)	RS 232c/ RS 485	RS 232c	Not available
Ethernet Connectivity	Yes	Yes	Yes
Results Transmission	Yes up to 900 meters	Yes up to 900 meters	Yes up to 900 meters
Upgradeability	Yes	Yes	Yes
Conversion to OLGC	Yes	Yes	No
Voltage Input	220 VAC $\pm 10\%$	220 VAC $\pm 10\%$	220 VAC $\pm 10\%$
Power Requirements	15 Amperes	15 Amperes	15 Amperes
Operating Temperature	0 ~ 45°C	0 ~ 45°C	0 ~ 45°C
Humidity	0 ~ 95 % NC RH	0 ~ 95 % NC RH	0 ~ 95 % NC RH
Weight	Approximately 50 KG	Approximately 55 KG	Approximately 45 KG

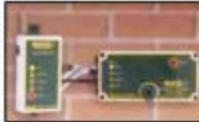


OUR OTHER PRODUCTS

NON DISPERSIVE INFRA RED (NDIR) BASED GAS ANALYSERS / MONITORS



Micro controller based PORTABLE & ON LINE gas analyzers/monitors based on the NDIR principle are available which can detect Carbon dioxide (CO₂) or/& Hydrocarbons from PPM to % levels. These monitors can be used for various applications ranging from personal security in industrial environments to environment monitoring. These systems are temperature compensated & linearized over the complete range. It can also be configured to be used as controllers. Integrated or remote display can be provided with RS485 for up to 32 systems with SPC.



TOXIC / HC GAS MONITORS/ANALYSERS/TRANSMITTERS



Micro controller based PORTABLE & ON LINE toxic gas analyzers / monitors & transmitters based on the EC sensors are available which can detect gases like Cl, HCN, H₂S, CO, O₂, N₂, SOX, NOX, HF, Br, NH₃, O₃, HCl, ETO, Fluorine & Phosphine. These systems are available as OEM sensors, transmitters or as stand alone systems with controllers. Complete panels are also available where up to 14 sensors can be connected using a single control panel which can retransmit signal in 4-20 mA. Integrated or remote display can be provided with RS485 for up to 32 systems with SPC.

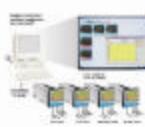
ZERO AIR GENERATORS FOR GAS CHROMATOGRAPHY (ZAG)



The CIC Air generators provide UHP Zero grade air using internal oil free pump cum compressor. The ZAG generators are equipped with filters with manual & automatic drains & double stage absorption drier that provides UHP grade air continuously. Available in different flow capacities, the ZAG provides more stable baselines than the air cylinders and with the added advantage of On Site Generation.



TEMPERATURE & PROCESS CONTROLLERS



Process controllers as well as PID controllers in 1/32, 1/16 DIN sizes are available off the shelf from Cal Controls, UK. These controllers are available with RS 232c or RS485 control & up to 126 controllers can be controlled from a single PC using RS 485. The 9500P is available with linear & analog inputs/output options with features like 126 segment Ramp / Soak profile & 31 program files that can be stored in the controller.

ABOUT US

We have been serving the Indian Industry, Research Institutions & Academia by offering high quality analytical instruments like **Gas Chromatographs (GC)**, **Process GC**, **On Line GC (OLGC)**, **Data Systems & Determinators** apart from other equipments like **TOC**, **HPLC**, **Spectrophotometers** etc. Quality products from our state of the art Factory (24,000 sq.ft. Dust Free environment) are designed by our **R & D center**

which is approved by **Department of Science & Technology (DST) , Govt. Of India since 1983**. We are having our own Fabrication Shop, Machining Shop, QA Laboratory (with instruments like **Helium Leak Detector**, **IR & HV tester**, **Micro Ohm meter**, **Current & Voltage source**, **Megger** etc.), **Training laboratory as well as Application Support center** which caters to our over 3200 user's of various instruments.



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Manufacturer reserves the right to alter the specifications & design without notice. The changes will be reflected in the quotation.

