

## Gas Chromatograph

## GC 5100

### Features:

- High Automation and High Efficiency
- Easy Operation
- High Precision
- Flexibility and Extensibility
- Excellent Repeatability

### Application:

- Analysis of benzene in toluene with a capillary column using a TCD.
- Analysis of fatty acids in milk with a temperature program controlled capillary column using a FID.
- Analysis of an organic phosphorus pesticide with a capillary column using a FPD.
- Analysis of an organic chloride pesticide with a temperature program controlled capillary column using an ECD.

### Description:

The GC-5100 Series is the latest generation of gas chromatographs developed by Optosky. The GC-5100 can be fully controlled by software.

It uses EPCs (electronic pressure controllers) to control six gas routes, including carrier gas, combustion gas, auxiliary combustion gas, split and makeup gas among others. The number of gas routes can be extended if needed. The temperatures of detectors and the column oven are controlled using a PID-based intelligent control system, a brand new GC temperature control system.



## 1. Technical Specifications

### ● Detectors

	TCD	FID	ECD	FPD
Sensitivity	S >10000 mV-mL/mg (benzene)			
Detection Limit		Dt<8.0xW <sup>12</sup> /g/s (n-hexadecane)	Dt< 2.0x1 O <sup>u</sup> /mL(r-666)	Dt(P)< 2.0x1 O <sup>12</sup> g/sDt(S)<5.0x1011g/s (methyl parathion)
Noise	<0.050 mV	V 5.0x10* A	< 5.0x10 <sup>12</sup> A	<1.0x10 <sup>12</sup> A
Drift	<0.100 mV/30min	<3.0x10 <sup>13</sup> A/30min	<1.0x10 <sup>11</sup> A/30min	< 3.0x10 <sup>12</sup> A/30min
Range of Linearity		10 <sup>7</sup>	10 <sup>4</sup>	10 <sup>4</sup>

### ● Column Oven

Dimensions	280 mm x 300 mm x 280 mm
Temperature Control Range	room temperature +10 °C to 400 °C
Overheating Protection	Any temperature less than 400 °C can be set.
Temperature Control Precision	±0.030 °C
Temperature Program	Maximum of 10 steps
Temperature Rise Rate	0 - 40.0 °C/min (0.100 °C/min increments)

The temperature of the column oven is precisely controlled. The range of temperature fluctuation is within ±0.030 °C.

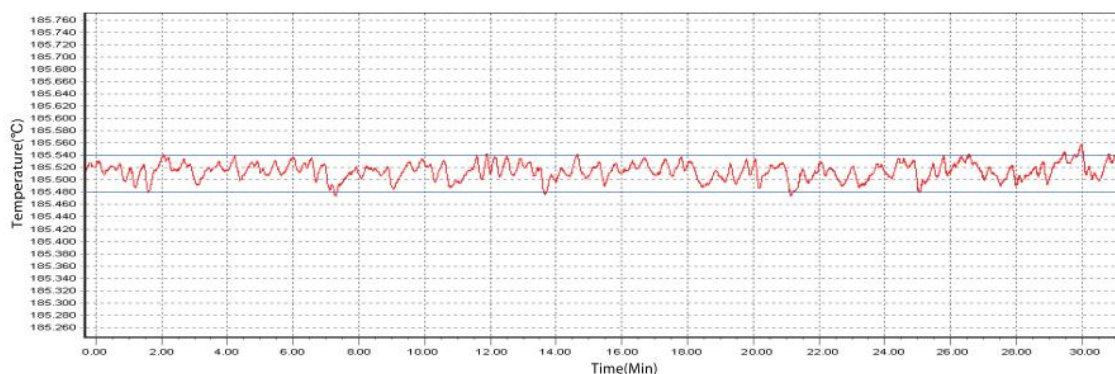


Fig 1 Stable temperature control ensures a good baseline.

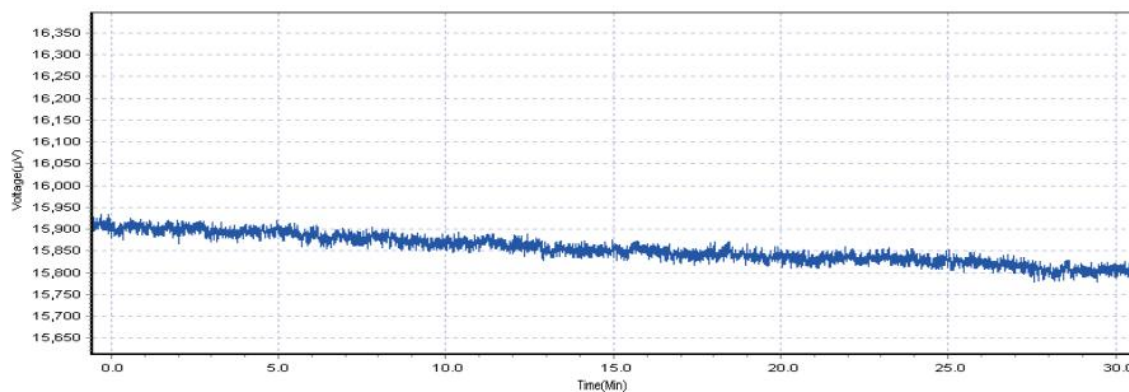


Fig 2 Baseline noise using a HP-5 capillary column with ECD. Temperature of column oven is 190 C.

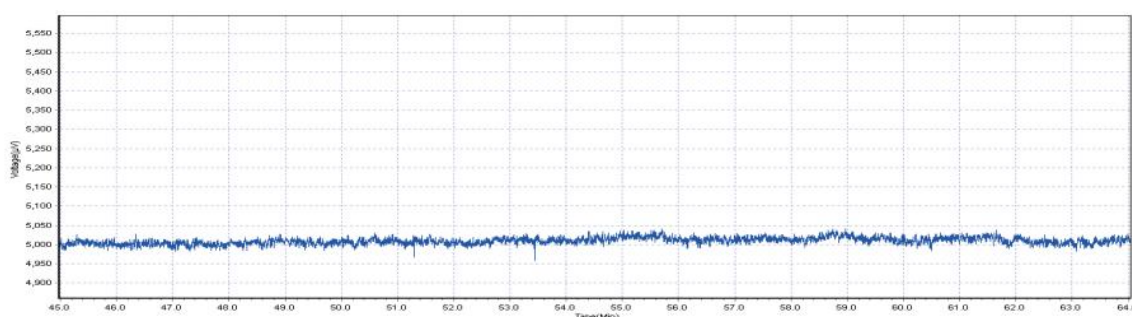


Fig 3 Baseline noise using a OV-101 packed column with ECD. Temperature of column oven is 190 °C.

## 2. Features

### 1. 1 High Automation and High Efficiency

- GC functions, such as temperature control, ignition, baseline adjustment sensitivity adjustment, polarity selection, bridge temperature control among others, are automatically controlled by computer. Gas flow and pressure are precisely controlled by EPC. The operation of the GC-5100 is simple and user-friendly. Due to a large decrease in analysis time, analysis becomes faster and more efficient.

- The GC has numerous self diagnosis and alarm functions. The instrument diagnoses issues at startup and also during analysis. There are alarms for absence of gas supply and over heating. The GC-5100 has self protection and easy trouble shooting.

- With options such as six-way valve sampling, automatic back flushing, precutting equipment, septum purge among others, the GC satisfies various analysis needs.

- A 10-segment programmable temperature control along with automated control of the column oven back door allows for fast and fully automated analysis under any temperature conditions, thereby increasing productivity and efficiency.

## 1. 2 Easy Operation

- A friendly user interface allows for simple and convenient operation.
  - A large-screen LCD displays temperature and operating conditions in real time on a convenient and intuitive control panel.
  - Analysis conditions can be set not only by the onboard control panel but also by the flexible workstation software.
- Online help system provides users with ease of operation and troubleshooting features

## 1. 3 High Precision

- Peak area and retention time have excellent repeatability.
- The sensitivity of the detectors have been increased substantially from the previous generation. The noise is very low, while the baseline drift is small.
- The instrument can control up to eight individual temperature control points (such as column oven, injection chamber, TCD, FID, etc.). The column oven temperature is precisely controlled to provide a constant temperature environment for efficient separation of sample components.

## 1. 4 Flexibility and Extensibility

- Three detectors, three injection ports and three columns can be installed simultaneously in many configurations.
- Three gas routes along with three signal outputs can be installed together.

The column oven has a large capacity and can hold up to three glass-packed column, stainless steel packed column or capillary column at the same time.

- The sampling method is flexible; methods include capillary split/splitless sampling, packed column sampling, cold column head sampling among others.
- Other options include an auto sampler and six-way valve injection system.
- The GC system includes automatic backflushing, automatic switching of carrier gases, septum purge and completely automated full analysis in one injection.
- GC can be equipped with accessories such as methane converters, pyrolyzers, thermal desorption equipment, purge and trap analyzers, among others.
- A unique trap pipe design at the split outlet protects the EPC and maintains a clean environment in the lab.
- The channel connected to the Mass Spectrometer can be reserved on the GC according to the user's requirement.

GC can provide a optimal analysis solution to meet the requirements of a wide range of application fields.

## 1.5 Excellent Repeatability

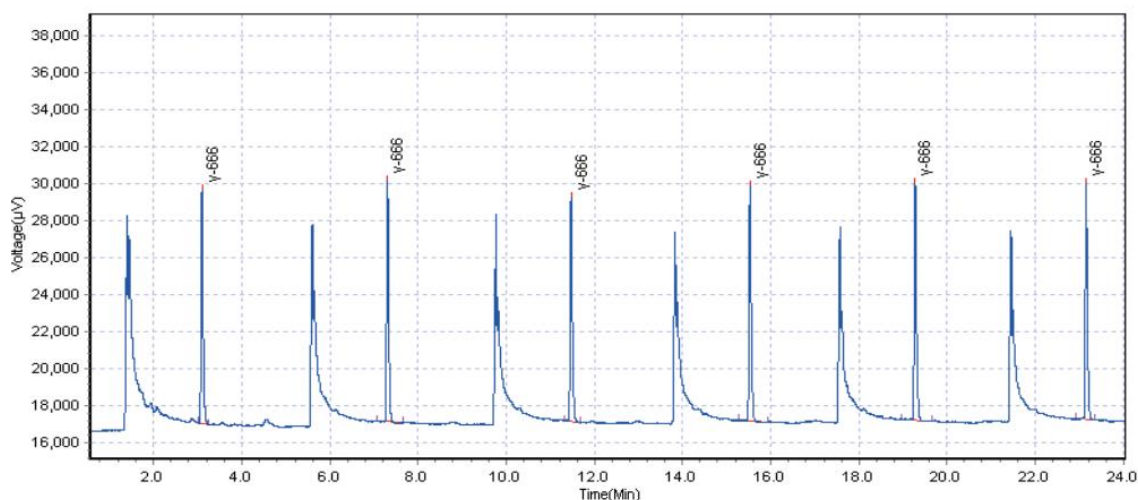


Fig 4 Using a capillary column with an ECD detector and split injection, the RSD is not more than 2.60% (n=6, r-666) for 6 continuous injections.

## 1.6 Improved Features

### 1.6.1 Improvement of Gas Control

- Up to six gas routes can be controlled by EPC. More gas routes can be extended to be EPC controlled according to user requirement.
- requirements of a wide range of application fields.

### 1.6.2 Improvement of the TCD

- The dead volume has been reduced. The stability time has been shortened. Can now be used with capillary columns.
- Components are now antioxidant. The filament is heated by a constant average temperature bridge power supply, which increases detector sensitivity while improving lifetime.
- Using the TCD detector with a capillary column in split injection mode to analyze benzene in toluene results in a RSD of less than 2.50% for 6 continuous injections, as well as peaks with a small FWH

EPC Specification			
Pressure range	0.05-0.3MPa	Flow repeatability	±0.5%F·S
Withstand pressure	0.45MPa	Flow accuracy	±1% F·S
Pressure repeatability	±0.15% F·S	Flow linearity	±1% F·S
Pressure accuracy	±1% F·S	Response time	1-4 sec
Pressure linearity	±1% F·S		

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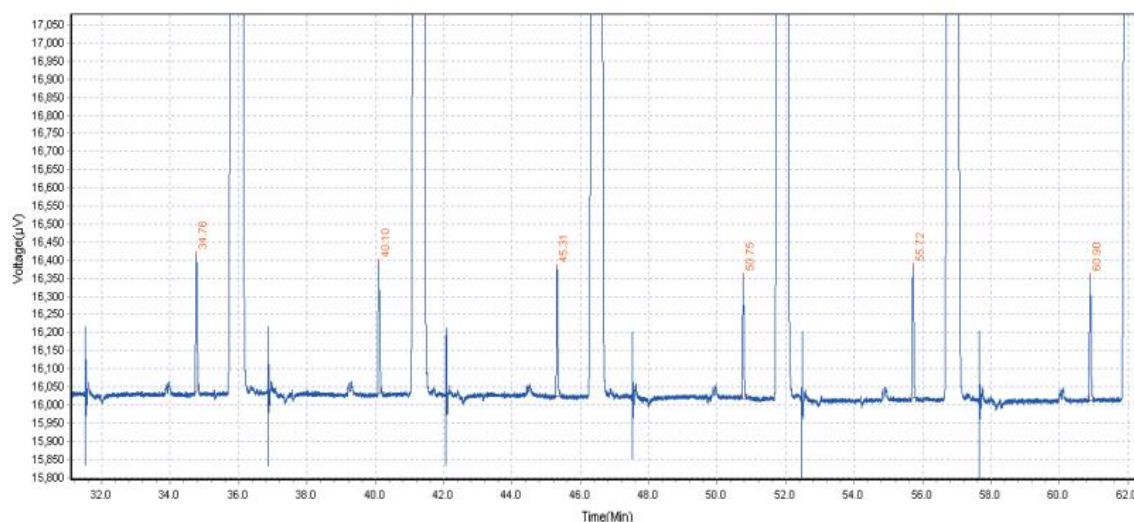


Fig 5 Using the TCD detector with a capillary column in split injection mode to analyze benzene in toluene results in a RSD of less than 2.50% for 6 continuous injections, as well as peaks with a small FWHM.

### 1.6.4 Improvement of the ECD

- The volume of the micro ECD cell has been reduced, resulting in a stable baseline. Capillary columns can now be used with the ECD.
- Sensitivity has been increased significantly. The detection limit now reaches  $2 \times 10^{-6}$  mL (r-666).



Newly Designed Micro

## 3. Wide Range of Accessories

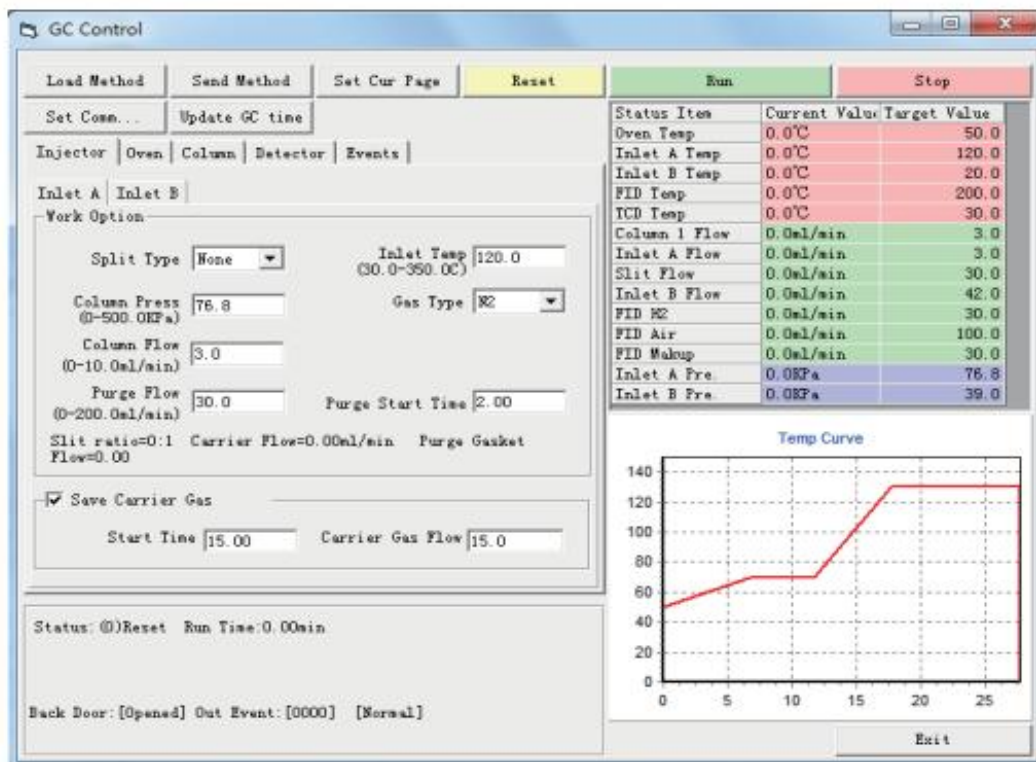
GC-5100 inherits the strong expandability . It can be equipped with additional accessories such as auto samplers, capillary split/splitless injectors, methane converters, thermal desorption equipment, purge and trap analyzer, etc.

## 4. Workstation Software

The workstation interface is simple yet powerful. Features include multi-channel independent sampling, and the ability to process up to 30 chromatogram files simultaneously. Parameters of collected chromatograms can be customized.

Chromatogram processing tools are diverse and comprehensive. The data processing functions are intuitive, convenient and easy to use. Features include baseline background reduction, complete control and operation of the instrument and customizable analysis report templates. The workstation can also be connected with various auto samplers.

## 5. Workstation Control Interface



## 6. Workstation specification

Sampling Precision	0.1 $\mu$ V/s	Range	1.000-1.000 V
Number of Detectable Peaks	2000	Maximum Chromatogram Storage	20h
Analysis Precision (Linearity)	0.20%	Maximum Sampling Rate	100 samples per second

The workstation can control and operate the instrument, set and change the analysis parameters and set the chromatogram background reduction.

## 7. Baseline Background Reduction Feature

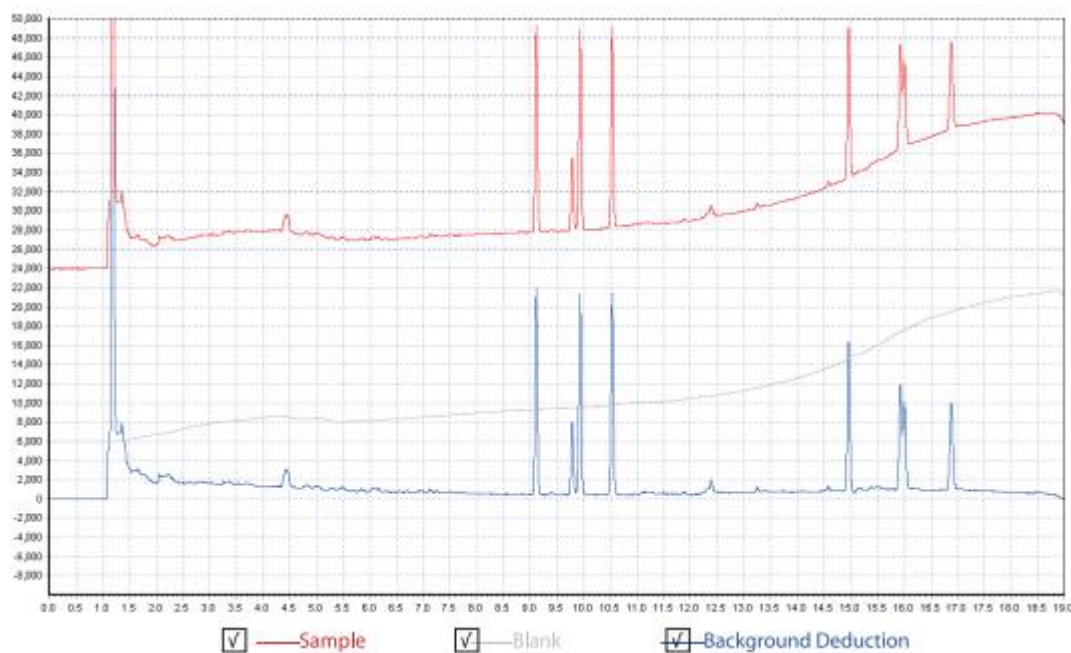
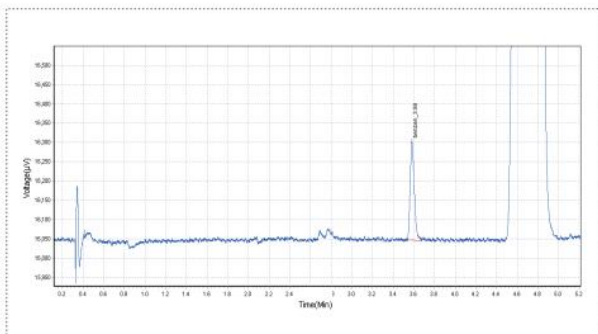


Fig 6 The following chromatogram is the temperature program controlled analysis of an organic chlorine pesticide that demonstrates the baseline background reduction feature.

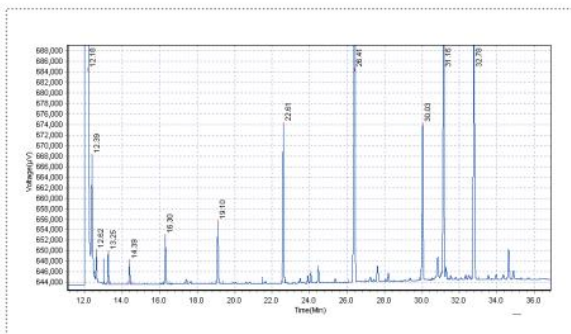


## 8. Application

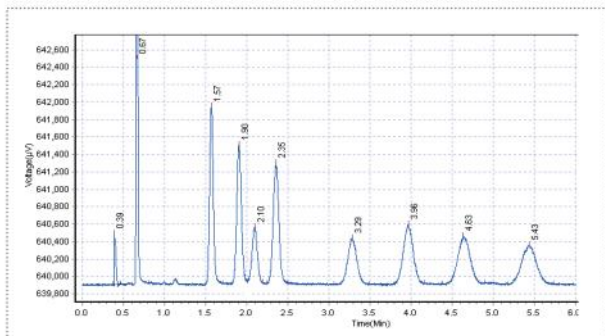
• Analysis of benzene in toluene with a capillary column using a TCD.



• Analysis of fatty acids in milk with a temperature program controlled capillary column using a FID.



• Analysis of an organic phosphorus pesticide with a capillary column using a FPD.



• Analysis of an organic chloride pesticide with a temperature program controlled capillary column using an ECD.

