

Performance parameters of GC 2000

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GC 2000 is a special-purpose detection and analysis instrument for laboratories based on the basic principle of gas chromatography. It adopts the advanced electronic flow pressure control system, microfluidic plate control technology, high-precision independent temperature control system, and high-sensitivity detector, which, in combination with the flexible and friendly user interface, high-speed sampling frequency and signal processing speed, and networked data and control platform, meet the user's requirements for the capability, reliability, stability and advanced nature of instrument analysis.

Chromatographic performance:

- Retention time repeatability < 0.008%
- Peak area repeatability < 0.5%

System performance :

- Supporting simultaneous installation:
 - a. Two injection ports
 - b. Four detectors
 - c. Three detector signals
- Electronic digitized data output of the advanced detector, enabling quantitative analysis of peaks over the full range of the detector in a single injection
- Electronic flow control for all injection ports, detectors, and auxiliary gas flow circuits
- Possible for up to 6 electronic flow control modules to be installed, to provide control over up to 18 gas circuits.
- Accuracy of pressure setpoint and control approaching 0.001 psi, providing more accurate retention time for low pressure analyses.
- Electronic flow controller for capillary columns with five column flow control modes: Constant pressure, pulse, and programmed pressure rise and flow increase to the fourth order; possible to calculate the average linear velocity of the column.
- Standardized pressure and temperature compensation to keep test results remain unchanged even when the laboratory environment changes.
- Possible for users to automate leak checks before each run, or run the check function at any time during maintenance or diagnostics. Users are alerted when a leak is detected so that immediate action can be taken to correct and reduce system downtime.

Color touch screen interface :

- 8-inch high-resolution full-color capacitive touch screen, with the resolution at 1280 (RGB) *720, color depth at 16.7M, and pixel pitch (mm) at 0.138*0.138.
- Customized host control software based on the Android system, with the graphical interface, full touch for operation, the UI also graphical, in combination with intelligent functions such as self-diagnosis reminder, self-leakage detection, etc., reducing the difficulty of use and maintenance, and for easily grasping of the status of the instrument.



Column oven :

- Specification: 28x31x16 cm, possible to hold up to 3 capillary columns.
- Temperature range applicable to all columns and their separation requirements. Room temperature+4°C to 450°C
Temperature setting accuracy: $\leq 0.1^\circ\text{C}$.
- Maximum heating rate: $120^\circ\text{C}/\text{min}$.
- Supporting 32 oven heating gradients, 33 constant temperature platforms, and possible to realize programmed temperature rise and programmed temperature rise.
- Maximum running time: 999.99 min.
- Oven cooling rate: 6 minutes from 450°C to 50°C , at a room temperature of 20°C .
- Ambient temperature sensitivity: 1°C change in ambient temperature, change in column oven average temperature < 0.01°C .

Electronic gas circuit control :

- Standardized pressure and temperature compensation functions.
- Electronic pressure control with ruby damping, with pressure control accuracy at ± 0.001 psi.
- Pressure units are available in psi, kPa, bar.
- Programed pressure rise/flow rise: Up to forth order. Supported carrier and makeup gas types: Ar, N., He, H₂ • Stability of carrier gas flow rate: Less than 1%/10 min.

Injection port :

- Supports installation of up to two injection ports.
- Fully electronic gas circuit control, supporting pressure compensation and temperature compensation.
- Injection port type: Ultra- deactivated split/splitless injection port.
- Compatible with all capillary columns (inner diameter: 0.1 mm- 0.53 mm).

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- Split ratio up to 12500:1 to avoid column overload.
- Supporting, split, splitless, pulse split, pulse splitless injection and other injection modes.
- Maximum operating temperature: 450°C.
- Temperature setting accuracy: $\leq 0.1^\circ\text{C}$.
- Carrier gas saving mode, making it possible to reduce gas consumption without compromising chromatographic separation effects.
- Electronic septum purge flow control to effectively eliminate chromatographic ghost peaks.
- Flow control range 0-500 mL/min (N), 0-1250 mL/min (H, or He).
- Injection port supporting ultra-deactivated processing, eliminating active sites on surface and improving detection sensitivity, peak shape and reproducibility of active substances.

Detector :

- Supporting installation of up to four detectors.
- All detectors supporting electronic gas circuit control and electronic switch control, as well as pressure compensation and temperature compensation.

Flame Ionization Detector (FID) :

- Minimum detection limit: $<1.2 \times 10^{-10}$ g C/s.
- Linear dynamic range: 10^4 .
- Baseline noise: $<1 \times 10^{-10}$ A
- Baseline drift: $<1 \times 10^{-10}$ A within 30 min.
- Signal acquisition frequency: 10 Hz, 20 Hz, 50 Hz, 100 Hz, and 200 Hz available.
- Auto ignition and flameout protection.
- Hydrogen leak protection function.
- Maximum operating temperature: 450°C.

Electron Capture Detector (ECD) :

- Minimum detection limit: $<4.2 \times 10^{-10}$ g/mL.
- Linear range: 10^4 .
- Baseline noise: <0.02 mV.
- Baseline drift: <0.05 mV within 30 min.
- Data acquisition rate: 10Hz, 20Hz, 50Hz, 100Hz, and 200Hz available. Radioactive source: β ray from ^{63}Ni (≤ 10 mCi).
- Maximum operating temperature: 350°C.

Flame Photometric Detector (FPD) :

- Single wavelength flame photometric detector, with high selectivity and sensitivity for sulfur or phosphorous compounds.
- Minimum detection limit: $<9 \times 10^{-10}$ g/s (P); $<5 \times 10^{-10}$ g/s (S) Linear range: $> 10^4$; QB 10 (S)
- Baseline noise: $<2 \times 10^{-10}$ A.
- Baseline drift: 100 A within 30 min.
- Maximum operating temperature: 350°C.

Auxiliary electronic flow circuit control :

- Two positions on the rear of the GC of the GC 2000 for the auxiliary electronic flow circuit control modules.

Environmental conditions :

- Operating ambient temperature: 5°C - 35°C .
- Operating ambient humidity: 5%-95%.
- Limit temperatures for storage: -40°C to 70°C .
- Power supply requirements: Voltage: AC 220 ($\pm 10\%$) V; Frequency: 50 ($\pm 10\%$) Hz.

Safety and Regulatory certifications :

- GB 4793.1-2007 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements.
- GB/T 15479-1995 Technical requirements and test methods of insulation resistance and insulating strength for use in industrial process measurement and control instruments.

Other specifications :

- Height: 486 mm.
- Width: 556.4 mm.
- Thickness: 558 mm.
- Weight: 38.1 kg.
- Supporting up to 6 valves.
- Independent heating zone, 8 heating zones in total with the column oven excluded.