

Clarus 560 D Gas Chromatograph/ Mass Spectrometer – dependable results, again and again



The PerkinElmer® Clarus® 560 D Gas Chromatograph/Mass Spectrometer (GC/MS) combines the dependable diffusion-pump and electron ionization (EI) capabilities of the high-performance Clarus 600 D MS with the robust Clarus 500 GC, enabling laboratories to conduct reliable and cost-effective routine analyses.

It offers state-of-the-art electronics for the fastest scanning rates and widest mass range, coupled with the most robust, flexible GC autosampler, intuitive touch-screen interface and two GC detector channels, while maintaining a compact footprint for minimal bench space.

With the Clarus 560 D GC/MS, PerkinElmer delivers on your expectations through outstanding dependability, precision, performance and cost for everyday GC/MS applications. Advanced technology and ease-of-use mean you'll maximize your uptime.

Key Benefits

- ▶ State-of-the-art electronics provide the fastest scanning rates and increased productivity
- ▶ Easy-maintenance design, utilizing tools such as a plug-and-play ion source
- ▶ The latest in TurboMass™ GC/MS software, including over 70 report templates and customizable reporting
- ▶ Reliable GC with the most robust, flexible autosampler, a variety of injector/detector options, plus an intuitive touch-screen interface
- ▶ Compact footprint maximizes laboratory bench space

Rugged design for maximum uptime

The Clarus 560 D GC/MS is built tough to deliver reliability, reduced costs and easy maintenance.

Our exclusive gold-component technology enhances overall instrument stability and significantly reduces downtime by minimizing contamination.

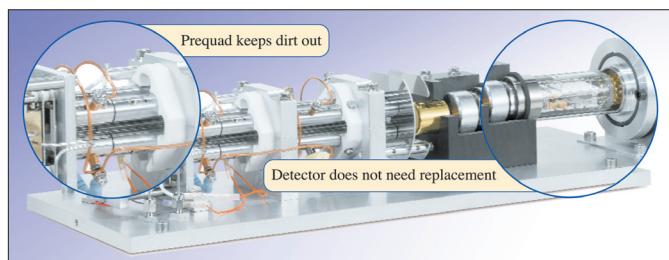


Figure 1. Clarus 560 D mass analyzer.

Design logic saves maintenance time

The logical design of the Clarus 560 D GC/MS means that you save time on routine maintenance tasks.

- Quick source changeover reduces the risk of contaminating the quadrupole analyzer: you have easy access to the ion source from the front of the instrument without exposing the ion optics or vacuum manifold.
- Routine cleaning of electron ionization (EI) inner source: no wire connections needed.
- Filament replacement is quick and easy due to the robust filament system's self-aligning design, which also means consistent performance, analysis after analysis.
- Cleanable RF-only prefilters are easy to maintain: located in front of the quadrupole analyzer.
- Intelligent diffusion-pump electronics and hardware for maximum uptime and dependable operation.

Design controls maximize system safeguards

Built-in controls in the Clarus 560 D GC/MS reduce breakdowns and lower operating and repair costs.

- Sealed, long-life photomultiplier detector lowers operating costs: eliminates expensive and contamination-prone electron multipliers that need periodic replacement.
- Unique programmable pneumatic control (PPC) safeguards the system from column damage and ion-source contamination: automatically turns off the GC oven and transfer-line heating should carrier-gas pressure drop.

- Independent control of the instrument ion source and transfer-line temperatures maximizes spectral quality: reduces contamination and protects thermally labile compounds from uncontrolled fragmentation. The temperatures can be set up to 350 °C.
- Power outages will not damage the system: the Clarus 560 D GC/MS can be attached to a nitrogen purge which prohibits oxygen from entering the system during venting. This minimizes contamination and speeds pump-down.

Updated diffusion-pump vacuum technology provides reliable operation

The Clarus 600 D GC/MS offers the latest in fail-safe diffusion-pump design with a reliable vacuum inside the mass analyzer chamber. This, combined with new software programming, provides enhanced dependability.

- The air-cooled oil diffusion pump is combined with a powerful mechanical backing pump to achieve optimal GC/MS vacuum conditions.
- Updated diffusion-pump system design uses tools such as innovative baffles and valves to ensure system integrity and maximize system uptime.
- Controlled by unique software to provide seamless pump-down and venting of the mass analyzer; intelligent software uses fail-safe features to allow system venting only when the pump is cooled and ready, preventing potential damage to the analyzer from improper manual venting.

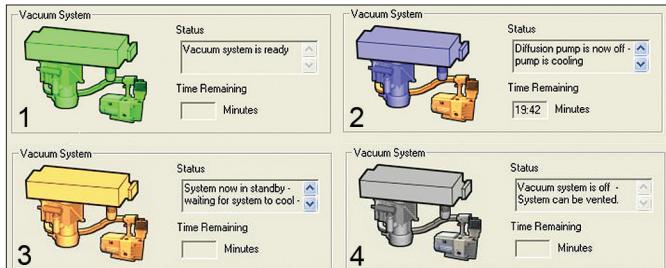


Figure 2. Diffusion-pump venting sequence.

Innovative tools boost laboratory efficiency

The Clarus 560 D GC/MS features innovative and unique productivity-enhancing tools that help laboratories operate effectively and efficiently.

Fast scanning for the most accurate and precise data ever

The Clarus 560 D GC/MS acquires more spectra (up to 65 scans/second) across a GC peak than most GC/MS systems. Up to 100 scans/second is achieved for Selected

Ion Monitoring (SIM). The result is the most accurate and precise data ever, easily beating the generally accepted criteria of at least 7-10 data points per chromatographic peak, for performance unmatched by any other competitive quadrupole GC/MS system.

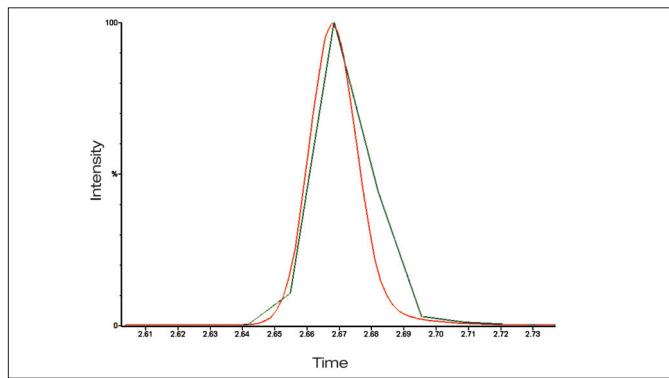


Figure 3. Chromatographic signal at fast scan speed (red) compared to slow scan speed (green).

Improve productivity and sensitivity with SIFI scanning

With a powerful process called Selected Ion and Full Ion (SIFI™) scanning, SIM data is collected while simultaneously acquiring data in the full-scan mode. First implemented by PerkinElmer in 1998, SIFI provides significant laboratory benefits. Because only a single injection is required, laboratories will incur savings in productivity and sample preparation. Additionally, it provides laboratories the ability to detect and quantify compounds difficult to determine at low levels with greater accuracy and sensitivity, and finally the ability to reach SIM detection limits and full-scan library searching in a single run.

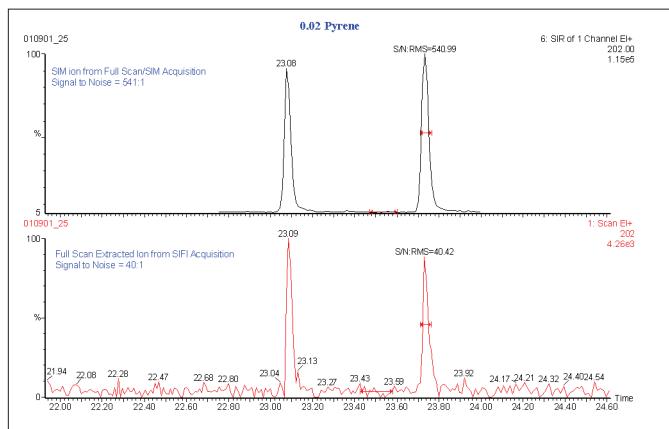


Figure 4. SIFI scanning ensures accurate identification, while simultaneously providing enhanced quantifiable sensitivity from the selected ion signal.

Gain flexibility and automation capability with the integrated autosampler

The integrated Clarus GC autosampler provides a mechanically robust, dependable system with the flexibility and automation capability you need. It provides complete application flexibility, accommodating three syringe sizes (0.5, 5.0 and 50 µL) and three injection speeds (slow, normal and fast). Its smart design assures efficient utilization of the gas chromatograph, providing unobstructed access to either injection port, allowing any combination of analyses. It offers built-in quality assurance, as optical sensors consistently monitor system performance. The GC touch screen delivers smooth navigation: with multilingual capability, including error messages, so you can work in the language of your choice.

TurboMass software drives routine or research-intensive analyses

Data acquisition

TurboMass™ GC/MS software makes it easy to acquire data for either qualitative or quantitative sample analysis.

- Sample-centric software is intuitive to learn and use.
- Methods are easy to set up and store for the routine user.
- Project-based organization collects all the necessary method information and data in one location, facilitating archiving.
- Data collection uses a simple checklist. Just check off the desired steps and press the “OK” button to initiate data collection and reporting.
- Use the AutoBuild feature to speed development of quantitative methods. Just a few clicks and the necessary information are transferred from the chromatogram, spectrum and library search results to the method.

Chromatogram and spectrum viewers for easy data screening during and after acquisition

Screening data using the powerful chromatogram and spectrum viewers is a simple and easy process. Chromatograms and spectra can be displayed at any point during or after acquisition, saving you valuable time during post-run processing. Chromatograms from up to 16 different acquisitions (including the one currently being acquired, with real-time updating) can be displayed simultaneously with a single drag-and-click of

the mouse. This enables quick comparison to reference chromatograms. Single mouse clicks allow selection of extracted mass ions, chromatogram overlays, peak integration and more. Spectrum-peak averaging and background subtraction of unwanted ions are flexible and easy, as is verification of spectrum quality to environmental method criteria. Similarly, the spectrum viewer allows for spectral comparison of up to 14 spectra from the same or different chromatograms using single mouse clicks at any time during acquisition or post run. Mass-spectral library search is just a single mouse click away.

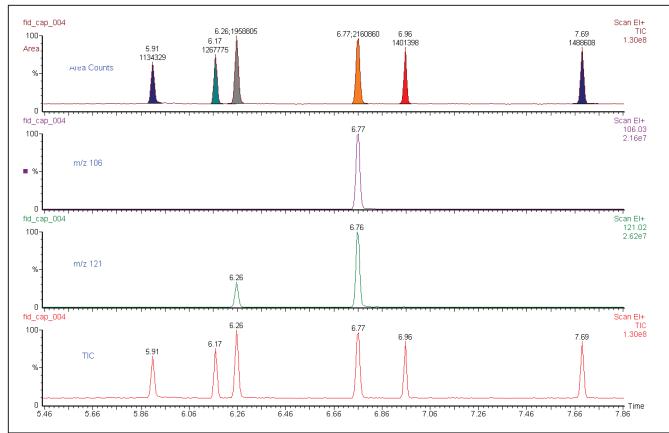


Figure 5. TIC (total ion chromatogram), extracted ions (121 and 106), and TIC integration.

Efficient, effective post-run data review ensures correct peak selection and compliance

Data review is an important preliminary step in any quantitative application, to ensure that only correctly integrated and identified peaks are used in quantitation and further evaluation. The interactive data-review environment speeds this step of the process.

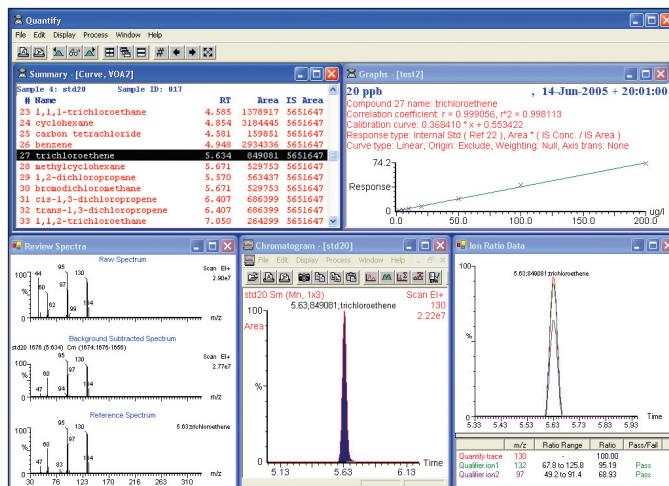


Figure 6. Interactive data review.

Automated tuning optimizes mass spec performance

Tuning the mass spectrometer is critical to ensure that good library-searchable spectra are generated from analyses. TurboMass software automatically tunes the mass spectrometer using a new-generation proprietary tune (UltraTune®), providing enhanced stability and reproducibility.

GC detector support adds flexibility

You can use two additional GC detectors simultaneously with your Clarus GC/MS system. All acquisition, display and quantitation can be performed by TurboMass software. You also have the option of using our TotalChrom® Chromatography Data Systems (CDS) workstation or client/server software for these processes.

Environmental data evaluation and reporting package speeds quality results

TurboMass software is especially designed to meet the strict quality-assurance (QA) and quality-control (QC) compliance requirements of environmental and other types of laboratories. Maximize your lab's productivity with the superior data review, evaluation and report-generating capabilities of TurboMass software, while ensuring complete compliance with required methodologies.

Fast, simple and flexible reporting completes the process

Most labs must present their data in an attractive, standardized format for reporting to internal or external clients. TurboMass software includes over 70 standard templates, allowing report generation with just a few clicks. Report templates are designed to meet the specific needs of labs conducting environmental, forensic, clinical or toxicological diagnostics, as well as general chemical analysis. Examples of reports are included to make the choice simple.

TurboMass software is LIMS-compatible for simple data transfer of worklists from LIMS and GC/MS back to your LIMS: standard report templates for data transfer are provided to smooth the path to your LIMS, either before or after method QC evaluation.

Clarus 560 D MS Specifications

Hardware

Mass range	1.0-1200 u (amu)
Detector	Sealed long-life photomultiplier
Analyzer	Quadrupole with prefilter: 131 mm x 12 mm circular rods; 16 mm x 12 mm prefilter rods
Mass stability	±0.1 m/z mass accuracy over 48 hours
EI voltage	10-100 eV
Pump	Air-cooled oil diffusion
Vacuum gauge	Standard, single wide-range gauge for all pumping options
GC transfer line	Settable from 50 °C to 350 °C
Source	Temperature settable from 50 °C to 350 °C; No wires – plug and play
Calibrant gas	PFTBA (FC-43), Tris(perfluoroheptyl)-s-triazine for high mass calibration (optional), or user selectable
MSVent	Optional accessory for MS isolation

Performance

Scan rate	Fully variable up to 12,500 amu/sec
Maximum	Up to 65 scans/second full scan, depending on mass range
Acquisition rate	Up to 100 samples/second, selected ion monitoring (SIM)
Linear dynamic range	Electronic: 10 ⁶ -10 ⁷ depending on acquisition rate
Scan functions/run	32 sets (full scan/SIM) of up to 32 ions per function

Data system

Methods	Electronically transferable between Clarus 600, Clarus 560, Clarus 500, TurboMass Gold and TurboMass GC/MS systems
Acquisition	MS detector with two GC detectors (optional)
SIFI	Simultaneous full-scan data acquisition with selected ion monitoring (SIM)
UltraTune autotune	User selectable: standard (BFB/DFTPP) or custom tuning
Reporting	Environmental: standard – Forensic: standard – Customizable: standard

Sensitivity

<u>Test</u>	<u>Amount</u>	<u>Detection Limits (S/N)</u>
EI full scan	1 pg of octafluoronaphthalene	100:1 RMS

Optional libraries and software

Libraries	NIST Mass Spectral Library Wiley Mass Spectral Library Pfleger/Maurer/Weber Drugs, Pollutants, Pesticides and Metabolites Library
Software	Ion Signature Deconvolution MS software

Physical

Power	120 VAC $\pm 10\%$ @ 50/60 Hz $\pm 1\%$ 1000 VA; 230 VAC $\pm 10\%$ @ 50/60 Hz $\pm 1\%$ 1000 VA
Operating temperature	10 °C to 30 °C
Relative humidity	20-80%, non-condensing
Weight	Clarus 560 D GC/MS: 46.3 kg (102 lb); Forepump: 25.9 kg (57 lb)
Dimensions (HxWxD)	51 x 33 x 74 cm (20 x 13 x 29 in) With Clarus 500 GC and Autosampler: 79 x 99 x 74 cm (31 x 39 x 29 in)

Create an integrated analytical solution

Combine the Clarus 560 D GC/MS with our market-leading TurboMatrix™ Headspace or Thermal Desorption sample handling, flexible user-friendly software and world-class service and support for an integrated, complete analytical solution.

PerkinElmer – the clear choice in gas chromatography

PerkinElmer is the only chromatography supplier who develops, manufactures, supports and services every product it offers to provide a truly integrated system. This means one expert supplier – with best-in-class instruments and a world-class service and support organization – can address all of your applications and troubleshooting needs, from sample handling to data handling.

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