

GUARDION[®]-7 GC-TMS

GUARDION-7 GC-TMS for rapid chemical analysis and on-site detection



Torion Technologies Inc.

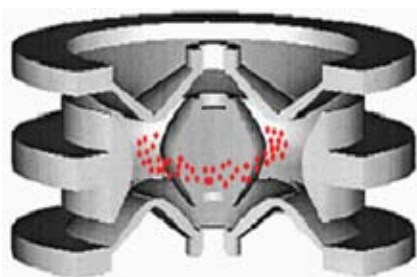
GUARDION®-7 GC-TMS

The GUARDION®-7 gas chromatograph/toroidal ion trap mass spectrometer (GC-TMS) instrument is the world's fastest and most portable GC-TMS available. The GUARDION-7 combines a high speed low thermal mass (LTM) GC with a miniaturized TMS to provide a fast, reliable, and easy to operate GC-TMS. The small diameter capillary GC provides rapid, high resolution separation of chemical analytes, while the TMS provides sensitive and selective mass-based detection of a wide array of chemicals, all in a lightweight, self-contained hand-portable analytical instrument. The GUARDION-7 GC-TMS can be used for numerous applications including:

- Environmental and HazMat
- Foods and Fragrances
- Forensics and Pharmaceuticals
- Chemical and Petroleum
- Military and Security



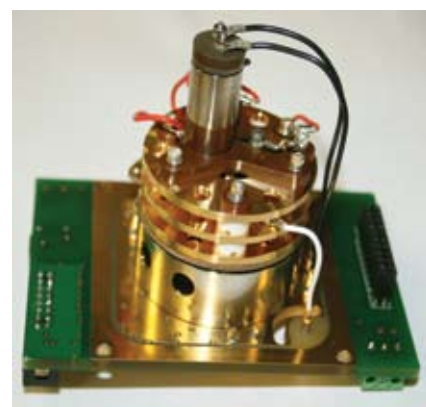
GC-TMS Technology



Toroidal Ion Trap Storage Volume

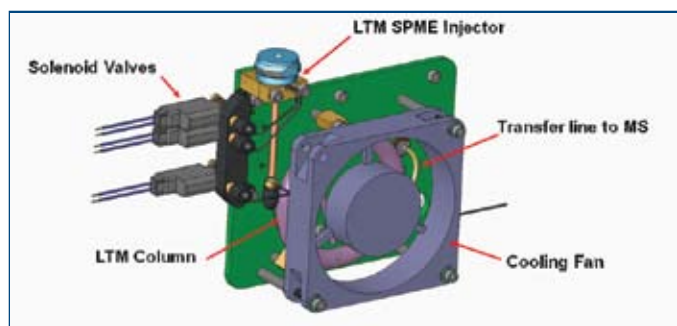
Toroidal ion trap mass spectrometry (TMS) is an innovative ion trap configuration that is ideal for miniaturization compared to other types of mass spectrometers, including conventional cylindrical ion traps or linear quadrupole traps. Combined with gas chromatography (GC), the TMS can be used to identify volatile and semivolatile organic compounds present in gas, headspace, liquid, dissolved solid and solid samples. After injecting a sample into the GUARDION-7 GC-TMS, it is separated into its chemical components. Components are identified using retention time from the GC and key ions of the mass spectral fingerprint from the TMS.

The GUARDION-7 is an easy to use, hand-portable GC-TMS system designed for rapid chemical analysis and on-site detection so that informed decisions can be made as quickly as possible. The combination of low thermal mass GC and TMS allows rapid separation of chemicals in the sample and generation of a mass spectral fingerprint for each chemical. The on-board central processing unit (CPU) compares the retention time and mass spectrum of each chemical to a target library of known chemicals, and informs the user of the presence of any of the target chemicals in the library. Data may also be evaluated post-run using CHROMION™ or third-party analytical software for identification and confirmation of detected compounds.



Low Thermal Mass (LTM) Gas Chromatography

Low thermal mass (LTM) GC replaces the conventional convectively heated column oven with direct electrical resistive heating. LTM GC uses a conventional GC column that is bundled with resistive heating and temperature-sensing wires and wrapped with a conductive insulator for greater heating and cooling efficiency. In this configuration, the GUARDION-7 GC temperature can be programmed at a ramp rate of up to 2.5°C/s. The low thermal mass of this column heating configuration requires considerably less operating power than conventional GCs, which extends the GUARDION-7 GC-TMS battery run time.



Convenient on-site Analysis

The ability to perform on-site and real-time chemical analysis is important for accurate and positive detection of analytes. Solid phase microextraction (SPME) sampling with GC-TMS analysis is a useful method for screening samples prior to analysis on fixed laboratory-based GC-MS instruments. Using the GUARDION-7 GC-TMS, samples can be screened to establish relative concentration levels. Samples at high concentrations can then be diluted to prevent carryover contamination during analysis on laboratory instruments. This minimizes re-analysis of samples and reduces down time due to GC-MS system overloading or contamination.

Software for Target Compound Identification Libraries with Deconvolution Technology



Target compound identification on the GUARDION-7 GC-TMS is accomplished using an on-board automatic deconvolution algorithm from Ion Signature Technology (North Smithfield, RI). Using the CHROMION™-1 software on a PC computer, users can create and maintain custom target libraries. CHROMION also provides the user complete flexibility in adjusting the instruments operational and method parameters.

GUARDION-7

Weighs less than 30 lbs

Briefcase sized

Battery powered

On-board helium cartridge



Portable

At <30 lbs, the GUARDION-7 is lightweight and easily carried by one person. As a fully self-contained field instrument, the GUARDION-7 GC-TMS operates on either battery or line power, has an on-board disposable helium carrier gas cartridge capable of ~300 sample runs, and does not require an external computer for sample analysis or instrument control.

Sample Introduction with the

CUSTODION[®] SPME Syringe

Solid phase microextraction, or SPME, is an innovative sampling technology that is quick, easy, and reliable. SPME is a solvent-free extraction technique that combines extraction, collection, and concentration of analytes present in gas, liquid, and dissolved solid samples. The fiber's coating retains chemical compounds from the sample matrix by absorption in the case of liquid polymer coatings or by adsorption in the case of solid coatings. SPME technology provides the user with quick and convenient sampling and concentration in a single step. After sample collection, the SPME fiber is inserted directly into the heated injection port of the LTM GC for thermal desorption, separation, and detection by the TMS. CUSTODION SPME Syringes can be reliably used for on-site field sampling or in-laboratory applications and are available with a variety of SPME phases.



Fast

The GUARDION-7 GC-TMS is designed for rapid instrument startup and sample analysis. From a "cold" start, the GUARDION-7 GC-TMS is ready for sample analysis in less than ~3 mins. Using a standard 50-280°C GC temperature program, run-to-run cycle times are ~5 mins or less per sample, allowing for analyses of ~12 samples/hr.



Reliable

The ruggedized GC-TMS design, robust vacuum systems and impact-resistant case allows the GUARDION-7 GC-TMS to operate in the field under harsh conditions as reliably as a laboratory instrument. An autocalibration routine for both retention time and mass spectra provides reproducible performance whether used on a daily, weekly, or monthly basis. With minimal routine scheduled maintenance, the GUARDION-7 GC-TMS annual maintenance costs are lower than other commercial laboratory GC-MS systems.



Easy

With an on-board LCD, the step-by-step user interface directs the operator through sample introduction, sample analysis, and results reporting. The on-board chemical libraries for automated target compound deconvolution and identification display the sample analysis results on-screen in a simple tabular format for quick and easy data interpretation.

GUARDION®-7 GC-TMS Specifications

System

Dimensions	18.5" x 14" x 7" (47 cm x 36 cm x 18 cm)
Weight	28 lbs (12.7 kg), including batteries
Operating Temperature	5°C to 45°C
Operating Humidity	Up to 85% RH
Power Supply	Disposable LiSO ₂ batteries or AC (100-120V/220-240V, 50/60Hz, 2.2A) converter
Sample Introduction	Solid phase micro extraction (SPME)
Carrier Gas	Ultra-high purity helium
User Interface	On-board screen menus
User Software	CHROMION™-1 for method and library development
Training	Operator and Advanced Maintenance courses available
Communication Interface	Ethernet with cross-over cable
Battery Lifetime	Up to 75 analyses (per set of 2 non-rechargeable batteries)
Helium Cylinder Lifetime	Up to 300 analyses per portable cylinder
SPME Lifetime	Up to ~50-100 analyses (depending on sample type)
Display	5.7" monochrome LCD
Data System	ECOS Operating System
Data Analysis	Any netCDF or .d compatible software
Detection Limit	PPB for most analytes
Peak Power Consumption	~80 Watts
Memory	On-board compact flash (1GB)

Low Thermal Mass (LTM) GC

LTM Column (typical)	MXT-5, 5 m x 0.1 mm x 0.4 µm df
Temperature Program (typical)	40°C to 300°C
Temperature Ramp Rate	Up to 2.5°C/second
Septum Purge	0.5 mL/min
Split Flow	10 mL/min (~20:1)

Toroidal Ion Trap Mass Spectrometer (TMS)

Mass analyzer	Toroidal ion trap
Mass Range	50-500 m/z
Ionization Mode	Internal electron impact
Detector	Electron multiplier
Vacuum	Roughing and turbo molecular pumps
Resolution	Less than unit mass to 230 amu, Nominal unit mass to 500 amu

Chemical Libraries

Target Analysis	Automated deconvolution software with user-defined GC retention times and key TMS ions
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These specifications are subject to change.

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AG



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