

Agilent 5975C TAD Series GC/MSD System

Data Sheet



GC/MSD Overview

The Agilent 5975C TAD Series Gas Chromatograph/Mass Selective Detector (GC/MSD) with the Triple-Axis High Energy Diode (HED) Electron Multiplier (EM) Detector provides the flexibility, capabilities, and performance demanded by modern applications in all industries.

The 5975C TAD Series GC/MSD provides high performance and high productivity with features that will improve your analysis.

The gas chromatograph and autosampler options can be selected to meet laboratory requirements. For laboratories where space is limited, the MSD can be used with the compact Agilent 6850 Series II GC Networked System. To save even more space, two GC/MSD systems can be controlled by a single MSD Productivity ChemStation. Other laboratories will want the full capabilities of the Agilent 7890A GC System configured with both the MSD and conventional GC detectors. Injection systems can range from an injector tower to a flexible CTC-PAL autosampling system. Other sampling devices are also available from Agilent and third parties.

Trace Ion Detection technology helps to detect low-level compounds in complex matrices. In combination with the Deconvolution Reporting Software (DRS) add-on, it is possible to detect even lower level compounds that coelute; the type of analysis that was difficult without the help of Trace Ion Detection technology.

A programmable 350 °C source increases the signal intensity for later eluting compounds. This improvement in signal is compound dependent.

The Gain Normalization Autotune sets the MSD in the best operating conditions, and these conditions are consistent across instruments. The electronics of the 5975C TAD systems allow a combination of both SIM and scan acquisitions, even for sub-1-sec chromatographic peaks. SIM ions and switching times can be automatically set up with the MSD Productivity ChemStation software.

Retention time locking (RTL) maintains the retention times to minimize method maintenance when columns are clipped or the methods are transferred to other instruments. Method transfers are further simplified with eMethod capabilities. The MSD Productivity ChemStation software provides an extensive set of tools for all laboratories. In addition to basic quantitative capabilities, high volume laboratories in drug and environmental testing can generate reports specifically designed for their industry. The MSD Productivity ChemStation can estimate concentrations of noncalibrated compounds based on calibrated compounds (SemiQuant).

Laboratories doing qualitative analysis have access to extensive data processing.

For complex samples, DRS combined with our unique DRS database provides quick screening capabilities for classes of compounds. For users who want to customize their operations, an extensive macro language is provided along with a flexible report writer.



Agilent Technologies

The mass selective detector (MSD) can be configured for electron ionization (EI) or chemical ionization (CI). Chemical ionization has been made as routine as electron ionization with automatic setup, including tuning and reagent gas flow control.

The system can also run routine ammonia chemical ionization with an optional rough pump designed for corrosive chemicals.

Agilent GC/MSDs are known for their reliability, ruggedness, and long life. The Agilent 10-year use guarantee provides greater assurance for a low cost-of-ownership throughout its life.

The Agilent 5975C TAD Series MSD System features:

- Proven ruggedness and reliability
- SemiQuant for estimating concentrations of noncalibrated compounds
- Expanded qualitative analysis capabilities
- Inert electron ionization (EI) source for better performance on active compounds
- Higher sensitivity with the Triple-Axis High Energy Diode (HED) Electron Multiplier (EM) Detector
- Mass range up to 1050 u
- High performance SIM/Scan with automated SIM setup
- Mass stability plus better than 0.10 u over 48 hours
- Performance electronics for 12,500 u/s scan speed (8,000 u/s write-to-disk)
- DRS and RTL (optional)
- Compatible with Agilent Capillary Flow Technology for flexible, low dead volume and less active sites configuration
- Compatible with turn-top for the Agilent 7890A GC System and with flip-top inlet sealing system for Agilent 6890 and 6850 GC Systems
- Proprietary hyperbolic gold-coated quadrupole
- Heatable quadrupole to 200 °C
- Heatable ion source up to 350 °C
- Easy access to full ion optics
- Two-MS control per PC
- Four simultaneous signal acquisitions (up to two MS) per instrument
- Intelligent sequencing for samples
- eMethods for simple method transfer
- Compatibility with many third party sampling devices
- Auto CI for full automation of CI reagent gas and source tuning
- Choice of oil-free mechanical pumps (optional)
- Ten-year use guarantee

Agilent 5975C TAD Series MSD System Specifications

Mass Spectrometer	
Mode (standard)	EI
Modes (optional)	PCI, NCI, and EI acquisition with CI source
EI ion source type	Noncoated inert EI source
Sources	EI source provided with all systems; CI source for PCI, NCI, and EI added to CI systems Low gauss accessory available for light ions
Ionization energy	5–241.5 eV
Ionization current	0–315 µA
CI gases	Dual gas inlet
Filaments	Dual for EI, single for CI
Transfer line temperature	100–350 °C
Ion source temperature	150–350 °C
Quadrupole temperature	106–200 °C
Mass filter	Monolithic hyperbolic quadrupole
Mass filter protection	Entrance lens
Minimum mass	1.6 u
Maximum mass	1050 u
Mass resolution	Unit mass adjustable by tune
Mass axis stability	Better than 0.10 u/48 h
Detector	Triple-Axis Detector with long life EM
Dynamic range (electronic)	10e6
Scan rate (electronic)	Up to 12,500 u/s
Write-to-disk	Up to 8,000 u/s
SIM	60 ions × 100 groups
Pumping system	65 L/s for the diffusion pump and 71 L/s or 260 L/s turbomolecular pump with 2.5 m ³ /hr mechanical pump
Maximum recommended analytical gas flow, mL/min	1.5 mL/min (diffusion) 2 mL/min (standard turbo) 4 mL/min (performance turbo)
Recommended maximum sustained column flow to MS	3.0 mL/min (diffusion) 5.0 mL/min (standard turbo) 15.0 mL/min (performance turbo)
Instrument control	Data system and local user interface
Maintenance access	Source, filaments, lenses, mass filter, and detector on removable plate
Maintenance scheduling	Early maintenance feedback (EMF)

Gas Chromatograph

Gas chromatograph	Agilent 7890A, 6850, or 6890GC Systems
Autosampler	Agilent 7693, 7683, G2880A (6850 GC only) CombiPAL, 7697 or G1888A and so forth
Liner replacement	Compatible with turn-top system standard with 7890A GC or optional flip-top inlet sealing system for 6850 and 6890 GC Systems
Injector	Split-splitless (standard), others available
Oven temperature	Ambient +4 – 450 °C (6890 and 7890A GC) Ambient +5 – 350 °C (6850)
Oven ramps/plateaus	6/7 for 6850 and 6890 20/21 for 7890A GC with negative ramps allowed
Carrier gases	Helium and hydrogen (nitrogen and argon for GC detectors)
Electronic pneumatic control	Auto pressure regulation for (EPC) split/splitless, septum purge
Carrier gas control modes	Constant pressure and flow modes, pressure and flow programmable
Pressure range	0–100 psi (standard), 0–150 psi (optional) with 0.01 psi resolution, pressure and temperature-corrected for the 6850 and the 6890 and 0.001 psi resolution for the 7890A GC
Retention-time locking	RTL-ready
Flow control	Compatible with optional capillary flow device controller

Data System

Software	MSD Productivity ChemStation MassHunter software for data analysis (optional)
Simultaneous MS and GC	Four signals of GC detector data and up to two MS (SIM scan) data acquisitions
SIM/Scan	Automated SIM setup and synchronous SIM/scan operation
Ionization mode	Autotunes EI, PCI, NCI
Chemical ionization setup	Electronic mass flow control of reagent gases
High-mass confirmation	Verification test kit (optional)
Application autotunes	One-click autotune for BFB, DFTPP
Quantitation setup	Automated
Application reports	Environmental, drugs of abuse, aromatics in gasoline
File import/export	Sequence file/quant and custom report
Customization	Macro language, report writer
Spectral libraries (optional)	NIST, Wiley/NIST, Pfleger-Mauer Drug, Stan Pesticide
Spectral DRS and RTL	Pesticides and endocrine disrupter databases (optional), volatiles, PCBs, toxicology, hazardous chemicals, indoor air toxics, Japan

Positive List, forensic toxicology, environment Metabolomics (Fiehn method), semi-volatiles. Solvents, Flavors and user contributed libraries

Security	Password and audit trail
21 CFR11 Compliance	Optional G1732BA MSD Security ChemStation available
Multivariate Analysis	Optional Mass Profiler Professional available
Other capabilities (optional)	Deconvolution linked with RTL database
Support life	Ten-year use guarantee

Installation Checkout Specifications

All tests are performed using an autosampler, split-splitless injector and an Agilent HP-5MS 30 m × 0.25 mm, 0.25 µm column, using helium as the carrier gas. All scan determinations use continuous linear scanning across the entire mass range. Noise selection, peak integration, and RMS S/N¹ calculations are performed by automated macro. Specifications are not comparable to these using different conditions. All CI specifications are applicable only to the performance turbo molecular pump system. The system will exceed the following specifications at installation:

EI scan S/N	600:1 S/N for turbo molecular pump system and 200:1 S/N for diffusion pump system will be given by 1-µL injection of 1-pg/µL (100:1 for 6850/5975C bundle) OFN ² standard scanning from 50 to 300 u at nominal 272 u ion.
PCI scan S/N (Methane)	125:1 S/N will be given by 1-µL injection of 100-pg/µL BZP ³ standard scanning from 80 to 230 u at nominal 183 u ion.
NCI scan S/N (Methane)	600:1 S/N will be given by 2-µL injection of 100 fg/µL OFN standard scanning from 50 to 300 u at nominal 272 u ion.

Other Performance Specifications⁴

EI SIM IDL ⁵	24fg IDL (statistically delivered at 99% confidence level from the area precision (<8% RSD ⁶) from eight sequential splitless injection using autosampler) for turbo molecular pump system will be given by 1-µL injection of 100-fg/µL OFN standard at nominal 272 u ion.
PCI SIM S/N (Methane)	10:1 S/N will be given by 1-µL injection of 20-fg/µL BZP standard at nominal 183 u ion.
NCI SIM S/N (Methane)	10:1 S/N will be given by 1-µL injection of 1-fg/µL OFN standard at nominal 272 u ion.
PCI scan S/N (Ammonia)	500:1 S/N will be given by 1-µL injection of 100-pg/µL BZP standard scanning from 80 to 230 u at nominal 183 u ion.

¹ Root Mean Square Signal-to-Noise

² Octafluoronaphthalene

³ Benzophenone

⁴ Other Performance Specifications are not confirmed at installation

⁵ IDL : Instrument Detection Limit

⁶ Relative Standard Deviation

NCI scan S/N (Ammonia) **300:1** S/N will be given by 2- L injection of 1-pg/ μ L Octafluoronaphthalene (OFN) standard scanning from 50 to 300 u at nominal 272 u ion.

El scan S/N (H₂ carrier gas) **100:1** S/N for turbo molecular pump system and **50:1** S/N for diffusion pump system will be given by 1- μ L injection of 1-pg/ μ L Octafluoronaphthalene (OFN) standard scanning from 50 to 300 u at nominal 272 u ion.

Trace Repeatability (not demonstrated at installation)

Results are for three replicate splitless injections of 1-pg OFN using MS detection and automated integration and processing. Specifications using a different compound, concentration, detectors, or conditions, are not comparable.

Trace RT repeatability <0.0012 min

Trace area repeatability <2.0% RSD

Automation Features

- The system can automatically tune and adjust gas flows for chemical ionization operation.
- The system can automatically create a SIM method from a scan datafile of an injected standard.
- The system can automatically screen for 926 compounds in the pesticides and endocrine disruptors database based on spectra and RTs
- With the optional DRS, the system can produce a combined report showing along with quantitative results library search results based on deconvoluted spectra

Ease-of-Maintenance

- The GC inlet liner can be replaced in less than 1 minute without the use of tools with the Agilent 7890A GC system turn-top inlet at the time of maintenance (Inlet temperature should be cool enough to touch when performing maintenance.).
- A glass window simplifies column positioning. It also shows ion source type, filament operation, and electrical connections.
- The source, filaments, lenses, quadrupole, and electron multiplier can be removed from the instrument as one unit in less than 1 minute after venting.
- The optional micro ion gauge controller can be replaced without removal of the mass spectrometer covers.

Safety, Regulatory Compliance, and Operational Conditions

The instrument is designed and manufactured under a quality system registered to ISO 9001. The instrument complies with international regulatory, safety, and electromagnetic compatibility

requirements. In addition, further testing was done under Agilent standards to ensure operation after delivery and long-term usage.

Safety	Canadian Standards Association (CSA): CAN/CSA-C22.2 No. 61010-1-04 CSA/Nationally Recognized Test Laboratory (NRTL): UL 61010-1 International Electrotechnical Commission (IEC): 61010-1 EuroNorm (EN): 61010-1
Electromagnetic compatibility	CISPR11/EN55011: Group 1, Class A
Sound emission	EN 27779:1991 - sound pressure L _p <70 db
Power	110–130 VAC $\pm$ 5%, 60 Hz only 200–210 VAC $\pm$ 5%, 50/60 Hz 220–240 VAC $\pm$ 5%, 50/60 Hz
Operating environment	15–35 °C, 40–80% relative humidity – noncondensing (operational) –20–70 °C, 0–95% relative humidity – noncondensing (storage)

Physical Requirements (with the Agilent 7890A or 6850 GC)

Dimensions (GC/MS)	88 cm (w), 60 cm (w) for 6850 $\times$ 56 cm (d) $\times$ 50 cm (h) Additional space should be added for the auto injector, sample tray, data system and printer.
Weight (GC/MS)	81 to 96 kg (depending on configuration)

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See the 5975 page at <http://www.chem.agilent.com/Scripts/PDS.asp?IPage=34426> for further information and typical product testing videos.

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