Data Sheet

Agilent
Trusted Answers

Agilent 5987A GC/MSD System



The Agilent 5987A gas chromatograph/mass selective detector (GC/MSD) builds on a tradition of leadership in GC and MS technology, with the world's most competitive performance and productivity features.

GC/MSD system features

- **Versatile ion source portfolio:**
  - High Efficiency Source 2.0 (HES 2.0)
  - Inert Plus (Extractor)
  - HydroInert (H_2 carrier gas applications)
  - Electron Ionization (EI)
  - Chemical Ionization (PCI & NCI)
- **A heated monolithic quartz gold quadrupole** (heatable up to 200 °C) for rapid elimination of contamination to keep the analyzer clean
- **Two detector options with neutral noise reduction technologies:**
  - Extended Range (ER) high-performance instrument detector for extended dynamic range capabilities and longer detector lifetime
  - Second-generation triple-axis detector (TAD)
- **Scan speeds up to 25,000 u/sec** for all ion sources
- **Automated method development and method optimization using SIM Optimizer**
- **Advanced acquisition modes**
  - Dynamic SIM (dSIM)
  - Simultaneous dSIM/Scan
  - Triggered SIM (tSIM)
- **GC Assist:** an easy-to-use onboard intelligence that lets you monitor system health, predict maintenance, and solve problems (so you can shorten turnaround times without sacrificing quality)
- **Oil-free IDP-4 dry pump:** a cleaner, quieter, and greener alternative (for use with turbo molecular pump systems)

10-year value promise

Support is guaranteed for 10 years from the date of purchase, or Agilent will provide credit for the residual value of the system toward a model upgrade.

Installation checkout specifications

Agilent verifies GC/MSD system performance at the customer site. IDL is a statistically based metric that more accurately confirms system performance than an S/N measurement. Test specifications are based on pulsed splitless injection into an Agilent J&W HP-5ms Ultra Inert 30 m × 0.25 mm, 0.25 µm column for helium and a 20 m × 0.18 mm, 0.18 µm column for HydroInert with hydrogen. IDL analyses use lab helium (hydrogen for HydroInert) with GC gas filters installed. See more about the IDL test at http://www.chem.agilent.com/Library/technicaloverviews/Public/5990-8341EN.pdf

Instrument detection limit (IDL)

- The industry's most rigorous performance metric
- Based on eight consecutive injections and their statistical analysis of precision (%RSD)
- Measured at an amount near the detection limit
- Accurate assessment of the true detection limit and lower limit of quantification (LLOQ)
- IDL tested and proved at installation for applicable configurations

IDL Specifications			
Instrument	IDL* (Helium Carrier Gas)	IDL* (Hydrogen Carrier Gas)	Source
Installation Specifications			
Agilent 5987A HES MSD	1.5 fg	–	HES 2.0
Agilent 5987A EI/CI MSD	10 fg	–	Extractor for EI
Agilent 5987A Inert Plus EI MSD	10 fg	–	Extractor
Agilent 5987A EI MSD	20 fg	–	Stainless steel
Agilent 5987A EI MSD with Agilent 8860 GC	40 fg	–	Stainless steel
Agilent 5987A HydroInert MSD	–	50 fg	HydroInert source for H_2 carrier gas
Reference Specifications			
Agilent 5987A HES MSD	1.0 fg	10 fg	HES 2.0
Agilent 5987A EI/CI MSD	–	50 fg	Extractor for EI
Agilent 5987A Inert Plus EI MSD	–	50 fg	Extractor
Agilent 5987A EI MSD	–	70 fg	Stainless steel

* IDL was statistically derived at 99% confidence level from the area precision of eight sequential pulsed splitless injections of OFN (octafluoronaphthalene). Demonstration of IDL specifications require a compatible system configuration, including a liquid autosampler with a 5 µL syringe.

– HES IDL was measured using 10 fg injection, 1 µL injection.

– Other IDLs were measured using 100 fg, 1 µL injection.

– A 30 m column was used for helium IDL checkout; a 20 m column was used for hydrogen IDL checkout.

– Helium carrier gas for Installation Specifications of the HES, extractor, and stainless steel sources; hydrogen carrier gas for Installation Specification of the HydroInert source only.

– Reference IDL specifications from the above table will be confirmed only when purchased as an additional service with a compatible new system (GC and MS) installation.

Signal-to-noise (S/N) specifications

S/N Reference Specifications[a]							
Instrument Configuration	Source	EI Scan S/N[b] (Helium)	EI Scan S/N[b] (Hydrogen)	Sample Concentration (1 µL Injection)	PCI Scan S/N[c]	NCI Scan S/N[d]	High Vacuum System
Agilent 5987A HES MSD	HES 2.0	2,000:1 (using 10x less OFN injection)	1,000:1	0.1 pg/µL OFN			Turbo molecular pump
Agilent 5987A EI/CI MSD	Extractor for EI; Agilent CI source for CI	5,000:1 (EI)	–	1 pg/µL OFN	1,200:1	2,000:1	Turbo molecular pump
Agilent 5987A Inert Plus EI MSD	Extractor	5,000:1	2,500:1	1 pg/µL OFN			Turbo molecular pump
Agilent 5987A HydroInert MSD	HydroInert	–	2,500:1	1 pg/µL OFN			Turbo molecular pump
Agilent 5987A EI MSD	Stainless steel	600:1	300:1	1 pg/µL OFN			Turbo molecular pump or diffusion pump
Agilent 5987A with Agilent 8860 GC	Stainless steel	250:1	–	1 pg/µL OFN			Turbo molecular pump or diffusion pump

[a] S/N checkout is performed only if there is no compatible autosampler (which is required for IDL checkout). Helium carrier gas, manual injection using a 30 m × 0.25 mm, 0.25 µm column and in scan mode. Hydrogen carrier gas, manual injection using 20 m × 0.18 mm, 0.18 µm column and in scan mode. When the autosampler (ALS) is present, these specifications are a reference of the performance. Reference S/N specifications from the above table will not be confirmed at installation or introduction for ALS equipped systems.

[b] Standard scanning from 50 to 300 u at nominal 272.0 u ion.

[c] 1 µL injection of 100 pg/µL benzophenone (BZP) standard, 80 to 230 u scan at nominal 183 u ion, using methane reagent gas.

[d] 2 µL injection of 100 fg/µL OFN standard scanning from 50 to 300 u at nominal 272 u ion, using methane reagent gas.

Agilent 5987A Series GC/MSD System Specifications	
Ionization Modes	EI standard, optional PCI and NCI
EI Ion Source Type	Five supported sources: HES 2.0, extractor, HydroInert, stainless steel, and inert
Electron Energy	5 to 241.5 eV
Emission Current	0 to 315 µA
CI Gases	Dual gas inlet
Filaments	Dual for EI, single for CI
Transfer Line Temperature	100 to 350 °C
Ion Source Temperature	150 to 350 °C
Quadrupole Temperature	106 to 200 °C
Mass Filter	Heated monolithic hyperbolic quadrupole
Ion Source—Mass Filter Interface	Dynamically rampable entrance lens
Mass Range	0.6 to 1,091 u
Mass Resolution	Unit mass
Mass Accuracy	1 µL injection of a 100 pg/µL OFN standard scanning from 50 to 300 u will give its monoisotope at *m/z* 271.987 ±0.005[a]
Spectral Accuracy	1 µL injection of a 100 pg/µL OFN standard scanning from 50 to 300 u will give 99.0% spectral accuracy[a]
Mass Axis Stability	Better than 0.10 u/48 hours
Detector	Series II triple-axis detector with high energy dynode and long-life electron multiplier (EM) or extended range (ER) high-performance instrument detector with 3x lifetime
Electronic Dynamic Range	10^7
Analytical Dynamic Range	10^6
Scan Rate[b]	25,000 u/sec for all source types
SIM and dSIM	SIM: 60 ions × 100 groups dSIM: the maximum number of concurrent dSIMs is 200
Pumping System (Helium)	65 L/s diffusion pump (only with 5987A EI MSD) standard with 2.5 m^3 225 L/s turbo pump or with IDP-4 oil-free dry scroll pump, which is cleaner, quieter, and greener
Maximum Recommended Analytical Gas Flow	Diffusion pump: 1.5 mL/min Turbo pump: 4 mL/min
Recommended Maximum Sustained Column Flow to MS[c]	Diffusion pump: 3 mL/min Turbo He: 50 mL/min Turbo H_2: 40 mL/min See 5994-2312EN for recommendations for hydrogen carrier gas
Instrument Control	Agilent MassHunter data system or OpenLab CDS
Maintenance Accessibility	Source (including filaments, lenses) and detector on removable plate for easy access
Maintenance Scheduling	Early maintenance feedback (EMF) for GC and MSD, user-defined maintenance schedule, with display of current status
Source Cleaning	Automated and vent-free with proprietary JetClean option
Direct/Real-Time Sample Analysis or Probe	Thermal separation probe (TSP)
Support Life	Guaranteed support for 10 years

[a] Only applicable with optional Accurate Mass software package. Scan mode only. Not verified during installation.

[b] As scan rate increases, sensitivity will decrease, and resolution may degrade.

[c] A high flow rate into a fixed ion source will cause a loss in sensitivity.

GC (Agilent 8890, 8860, and 8850 GC)	
GC	8890 GC, 8850 GC, and 8860 GC
Sample Introduction	Agilent 7693A automatic liquid sampler, 7650A automatic liquid sampler, CTC PAL3, 8697A headspace sampler, thermal desorption, headspace, purge and trap, and other third party devices
Liner Replacement	Compatible with turn-top system
Inlet (Up to Two)	Split-splitless inlet (standard), multimode inlet (MMI) (on the 8890 and 8850 GC), cool on-column (COC) inlet, and others (optional)
Oven Temperature	**8890 and 8850 GC:** Ambient +4 to 450 °C **8860 GC:** Ambient +8 to 425 °C
Oven Ramps/Plateaus	32/33 with negative ramps allowed **Max Heating Ramp:** **8890 GC:** 135 °C/min **8860 GC:** 75 °C/min **8850 GC:** 300 °C/min
Carrier Gases	Helium, hydrogen, nitrogen
Alternate Carrier Gas and Gas Saver Option	Helium conservation module, hydrogen gas sensor, and gas saver mode
Electronic Pneumatics Control (EPC)	EPC split/splitless, septum purge, and auxiliary EPC modules
Carrier Gas Control Modes	Constant flow, constant pressure, programmable flow, and programmable pressure
Pressure Range	**8890 and 8850 GC:** 0 to 100 psi (standard), 0 to 150 psi (optional) with 0.001 psi resolution **8860 GC:** 0 to 100 psi with 0.01 psi resolution
Flow Control	**8890 and 8850 GC:** Compatible with optional capillary flow device controller (not supported with 8860 GC)
Retention Time Locking	RTL-ready

Data System	
Acquisition Software	Agilent MassHunter GC/MS Acquisition, MassHunter Networked Workstation (for centralized data storage and full compliance workflow), OpenLab CDS 3.0 Acquisition (coming soon)
Simultaneous MS and GC Signals	Up to two MSD signals (SIM/Scan) and four GC detector signals per instrument
Instrument Connections (Agilent MassHunter Acquisition)	Two simultaneous GC-only configurations ***or*** two simultaneous GC/MSD configurations
Acquisition Modes	SIM, Scan, dSIM (dynamic SIM), tSIM (triggered SIM), and Simultaneous dSIM/Scan; SIM Optimizer tool to create/update SIM and dSIM methods
Chemical Ionization Setup	Electronic mass flow control of reagent gases; CI optimization in both PCI and NCI modes for common reagent gases
High-Mass Confirmation	Custom workflow
Tune Options	**Supports the following tune types depending on the configured source:** Autotune, Extraction Source Tune, HES 2.0 Autotune, Low Mass Autotune, Standard Spectra Tune, BFB Autotune, DFTPP Tune, Custom Target Tune, and Manual Tune
Data Analysis Software	Agilent MassHunter Data Analysis (including Qualitative Analysis, Quantitative Analysis, and Unknowns Analysis), MSD Chemstation Data Analysis, or OpenLab CDS Data Analysis Revision versions are as follows: – MassHunter Qualitative Analysis 14.0+ – MassHunter Quantitative Analysis and Unknowns Analysis 13.0+ – MSD Chemstation DA F.02.01+ – OpenLab CDS 3.0 (coming soon)
Application Reports	Environmental, drugs of abuse, aromatics in gasoline
Custom Reporting	**Agilent MassHunter:** PDF Report Builder, PDF Reporting, and Excel Reporting templates **OpenLab CDS:** Intelligent Reporting with support for custom calculations
Spectral Libraries (Optional)	NIST, Wiley/NIST, Maurer-Meyer-Pfleger-Weber
Agilent Retention Time Locked Mass Spectral Libraries (Optional)	Pesticides and endocrine disrupter databases, volatiles, PCBs, toxicology, hazardous chemicals, indoor air toxics, Japan Positive List, forensic toxicology, environment semivolatiles, metabolomics (Fiehn method)
Target Deconvolution	Integrated deconvolution and spectral matching for targeted or untargeted analysis including quantitation of low-level targets in complex matrices
Security	Data and result security and tamper protection, authentication and role-based permission controls
21 CFR Part 11 Compliance	Full 21-CFR-11 support across data acquisition (MassHunter GC/MS Data Acquisition and OpenLab CDS Data Acquisition), data analysis (MassHunter Qualitative Analysis, MassHunter Quantitative Analysis, MassHunter Unknowns Analysis, and OpenLab CDS Data Analysis), and utility applications (MassHunter Library Editor and MassHunter Report Builder) **Note:** MSD Chemstation Data Analysis does not include support for 21-CFR-11 regulations
Multivariate Analysis (Optional)	Agilent Mass Profiler Professional
Sample Class Prediction (Optional)	Sample Class Predictor or Agilent Mass Profiler Professional
Other Capabilities (Optional)	Accurate mass data with Cerno MassWorks software

Ease of Maintenance
Turn-top inlet sealing system is built in standard with each 8890, 8850, and 8860 GC S/SL inlet (and 8890/8850 multimode inlet) for quick, easy injector liner changes.[a]
A glass window shows ion source type, filament operation, and ion source connections.
The source (including filaments and lenses) and electron multiplier can be removed from the instrument in less than one minute after venting.
The optional micro ion gauge[b] can be replaced without removal of the mass spectrometer covers. **Note:** This does not apply to the extended range (ER) detector.
Agilent GC Assist automates system maintenance checks and step-by-step maintenance procedures like source exchange, source cleaning, pump maintenance, etc.
The Agilent JetClean self-cleaning ion source maximizes instrument uptime by greatly reducing or even eliminating the need for manual ion source cleaning, resulting in an additional 1–2 days/month to perform analyses.

[a] Inlet temperature should be cool enough to touch when performing maintenance.

[b] A micro ion gauge is shipped standard on the CI and HES 2.0 systems, and is available optionally for EI systems.

Safety, Regulatory Compliance, and Operational Conditions	
This instrument is manufactured and distributed under a quality system certified to ISO9001. It complies with international regulatory, safety, and electromagnetic compatibility requirements. In addition, further testing was performed according to Agilent standards, to ensure operation after delivery and long-term usage.	
Safety	Canadian Standards Association (CSA): CAN/CSA-C22.2 No. 61010-1 CSA/Nationally Recognized Test Laboratory (NRTL): UL 61010-1 International Electrotechnical Commission (IEC): 61010-1 EuroNorm (EN): 61010-1
Electromagnetic Compatibility	CISPR11/EN55011: Group1, Class A EN61326-1
Sound Emission	ISO 7779 and ISO 3744: sound pressure Lp For noisy lab space: L_{pA} max. = 65 dB operator, 70 dB bystander
Power	120 V, 50/60 Hz, 1,100 VA; 200 V, 50/60 Hz, 1,100 VA; 220 to 240 V, 50/60 Hz, 1,100 VA
Operating Environment	Operational: 15 to 35 °C, 20 to 80%, relative humidity—noncondensing Storage: –40 °C to +70 °C, 0 to 95%, relative humidity—noncondensing
Operating Altitude	Turbo models: to 15,000 ft (4,600 m) Diffusion pump models: 12,000 ft (3,700 m)
Nonoperating Storage	Turbo and diffusion pump models: 30,000 ft (9,100 m)

5987 Standby Power Consumption		
Model	**120 VAC/60 Hz (Watts) (North America)**	**230 VAC/50 Hz (Watts) (EMEA, UK)**
G5987A EI Diffusion Pump (110 V)	465	N/A
G5987A EI Diffusion Pump (230 V)	N/A	455
G5987A EI Turbo Pump	225	225
G5987A HES Turbo Pump	225	225
G5989A EI/CI Turbo Pump	225	225

Note: All systems with IDP-4 dry scroll pump, N/A = not available

5987 Operating Power Consumption		
Model	**120 VAC/60 Hz (Watts) (North America)**	**230 VAC/50 Hz (Watts) (EMEA, UK)**
G5987A EI Diffusion Pump (110 V)	495	N/A
G5987A EI Diffusion Pump (230 V)	N/A	485
G5987A EI Turbo Pump	255	255
G5987A HES Turbo Pump	255	255
G5989A EI/CI Turbo Pump	255	255

Note: All systems with IDP-4 dry scroll pump, N/A = not available

Physical Requirements with the 8890 and 8860 GC	
Dimensions (GC/MS)	88 cm (w), 56 cm (d), 50 cm (h)*
Weight (GC/MS)	81 to 112 kg (depending on configuration)

***Note:** Additional space should be added for the auto injector, sample tray, data system, and printer

Physical Requirements with the 8850 GC*	
Dimensions (GC/MS)	59 cm (w), 58.5 cm (d), 50 cm (h)
Weight (GC/MS)	59 to 90 kg (depending on configuration)

***Note:** The smallest fully functional GC/MS system in the Agilent portfolio

www.agilent.com/gcms/5987a

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This information is subject to change without notice.

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