

240-MS Ion Trap Mass Spectrometer



The most sensitive full scan GC/MS for any application

The Varian 240-MS, combined with the Varian 450-GC, delivers exceptional performance and unsurpassed flexibility with both MS and GC options. The detector can be configured in internal or external ionization modes, offers MS/MS and MSⁿ scanning and provides positive and negative chemical ionization. An optional, oil-free foreline pump is available.

Configuration	EI Full Scan	PCI	NCI
Internal	X	X	
External	X	X	X
Hybrid		X	X

MS/MS is available in all modes of operation.

240-MS Specifications

Mass Analysis

- Mass range: 10-1000 Da in 0.1 Da steps; scan range is time programmable throughout the run
- Resolution: Unit mass resolution
- Scan rate: 5000-10000 Da/s
- Mass axis stability: ± 0.1 Da over 72 hr

Scanning Modes

- Time programmable: In all modes during the analytical run
- Full scan
- Selected Ion Storage (SIS): Stores up to six ranges of ions
- MS/MS: Using non-resonant or frequency modulated resonant CID
- MSⁿ scanning also available where $n \leq 10$

Ionization

- Ionization: Dual filaments both in EI and CI operation in all configurations
- Filament current - internal mode: 10-100 μ A
- Filament current - external mode: 10-250 μ A
- Ionization energy: External mode variable; internal mode fixed

- Pulsed ionization: Ionization turned off during mass analysis in all external modes for reduced contamination
- Maximum ionization time: 65000 μ s
- Positive Chemical Ionization (PCI) - internal mode: Low pressure PCI compatible with gas or liquid reagents; kit for single liquid reagent included; EI/CI switch within the same analytical run
- Positive Chemical Ionization - external mode: High pressure PCI compatible with gaseous reagents; automated EI/CI switch between runs
- PCI - hybrid mode: Low or high pressure PCI compatible with gas or liquid reagents; allows the selection of the reagent ion(s) to react with analytes
- Negative Chemical Ionization (NCI) - external mode, electron capture NCI: High pressure NCI; automated EI/CI switch between runs
- NCI - hybrid mode, negative ion reaction: Low or high pressure NCI compatible with gas or liquid reagents; allows the selection of the reagent ion(s) to react with analytes



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Operating Temperatures

- Analyzer: Up to 250 °C
- Manifold: Up to 120 °C
- Source: Up to 300 °C
- Transfer line: Up to 350 °C

Ion Trap Mass Analyzer

- Electrode surface: SilChrom™ for maximum inertness (standard)
- Damping gas: Electronic flow control, 0.5–7.0 mL/min in external ionization mode

Detection System

- Detector: Off-axis design, ±10 kV HED and electron multiplier
- Linear dynamic range: 10³ to 10⁴, compound-dependent based upon mode of operation and analytical methods

Vacuum System

- 280 L/s turbomolecular pump
- Manifold ion gauge: Bayard-Alpert gauge tube with burn-out resistant, thoria-coated iridium (ThO-Ir) filaments
- Foreline pump thermal vacuum gauge
- Standard Foreline Pump: DS-102
 - Dual stage, rotary vane
 - Voltage: 100, 120, 230 V
 - Pumping speed greater than 95 L/min (5.7 m³/hr)
- Oil Free optional Foreline Pump:
 - IDP-3 Dry Scroll Pump
 - Hermetic design
 - Low noise and vibration
 - Pumping speed 60 L/h (3.6 m³/h)

Optional MS Features

Software

- Spectral databases: National Institute of Standards and Technology (NIST), Wiley, and Pflieger Maurer Weber (PMW) libraries
- Selection of custom software:
 - EnviroPro™ for general and EPA specific report requirements
 - ToxPro™ Plus includes three-ion ratio reports for toxicology applications
 - MultiCompound for general extended reporting
 - Quick Access™ optimizes workflow for multi-user, high-throughput laboratories
 - Access control and audit trail software for 21 CFR Part 11 compliance

Performance Specifications

Internal Sensitivity

- EI scan: 200 fg octafluoronaphthalene, on-column, S/N ≥ 20:1 RMS for extracted ion *m/z* 272
- PCI scan: 5 pg benzophenone, on-column using methane or methanol CI, S/N ≥ 50:1 RMS for extracted ion *m/z* 183

External Sensitivity

- EI scan: 500 fg octafluoronaphthalene, on-column, S/N ≥ 30:1 RMS for extracted ion *m/z* 272
- PCI scan: 50 pg benzophenone on-column using methane CI, S/N ≥ 10:1 RMS for extracted ion *m/z* 183
- NCI scan: 1 pg decafluorobenzophenone on-column using methane NCI, S/N ≥ 50:1 RMS for extracted ion *m/z* 362

450-GC Features

Column Oven

- Dimensions: 28 cm (w) x 28 cm (h) x 20 cm (d) (11 in. x 11 in. x 8 in.)
- Temperature range: Ambient +4 °C to 450 °C; -99 °C to 450 °C with liquid N₂; -65 °C to 450 °C with liquid CO₂
- Temperature-programmed ramps: 24 ramps with 25 isothermal holds
- Maximum temperature ramp rate: 120 °C/min for all voltages
- Cool-down rate: 400 °C to 50 °C in 4.5 min

Injectors

1177 Split/Splitless Injector (S/SL)

- Maximum temperature: 450 °C isothermal

1079 Programmable Temperature Vaporizing Injector (PTV)

- Temperature range: -99 °C to 450 °C with liquid N₂; -65 °C to 450 °C with liquid CO₂
- Maximum temperature ramp rate: 200 °C/min
- Temperature ramps: Four

Injector EFC

- Accuracy: ±0.1 psi, 5% full scale flow
- Resolution: 0.1 psi or 0.1 mL/min

Optional GC features

- Injectors: Up to three (one required); 1177 Split/Splitless or 1079 PTV
- Detectors: Up to three; full range of Varian detectors including the FID, ECD, PFPD, TSD and TCD; maximum of two PFPDs
- ChromatoProbe™ device: For solids, large volume liquids or slurries; requires a 1079 PTV Injector
- QuickSwitch™ Valve: Automated switching between different columns
- Valves: Custom plumbed valves for a wide range of applications

240-MS Ion Trap Mass Spectrometer

Utilities and Environment

Power Requirements for MS

- 90-130 Vac, 60 Hz \pm 3 Hz, 12 A, 1440 VA
- 180-260 Vac, 50 Hz \pm 3 Hz, 6 A, 1440 VA

Environmental Requirements

- Humidity: 40% to 80% relative humidity (without condensation)
- Temperature: 18 °C to 27 °C

Dimensions

240-MS

- 37 cm (w) x 45 cm (h) x 65 cm (d) (15 in. x 18 in. x 26 in.)
- MS: 42 kg (93 lb), DS-102: 22 kg (49 lb) or IDP-3: 10 kg (22 lb)

450-GC

- 66 cm (w) x 53 cm (h) x 56 cm (d) (26 in. x 21 in. x 22 in.)
- 43 kg (95 lb)



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220-MS Ion Trap Mass Spectrometer



A powerful, flexible GC/MS for any application

The Varian 220-MS along with the Varian 450-GC provides the highest level of flexibility and performance in an easy-to-use system.

220-MS Specifications

Mass Analysis

- Mass range: 10 to 650 Da; scan range is time programmable throughout the run
- Resolution: Unit mass, measured as 10% valley, over the entire range
- Mass calibration stability: RF-only field is stable for weeks to several months at constant analyzer temperature and helium flow
- Scan rate: Fixed at 5600 Da/s to maximize spectral acquisition
- Selected Ion Storage (SIS): Stores up to five ranges of ions; ejects matrix, column bleed
- Linear dynamic range: 10^3 to 10^4 (compound dependent based upon analytical methods)
- Filament assembly: Dual filament
- Transfer line temperature: Independent control; maximum 350 °C
- Manifold temperature: Independent control; maximum 120 °C
- Analyzer temperature: Independent control; anodized block; maximum 250 °C
- Electrode surface: Chrome (standard)
- Power fail protection: Solenoid closes septum purge line and supplies supplemental helium flow through the column to vent MS

- Turbomolecular pump: Varian V-81 pump, air cooled, and thermostatically protected; 81 L/s capacity; pumping at 81 L/s supplies a vacuum of approximately 10^{-5} Torr (1.3 mPa) in the manifold

Foreline Pump

- DS-42, dual stage, rotary vane
- Voltage: 120, 230 V
- Pumping speed greater than 38 L/min (2.3 m³/hr)
- Weight: 11 kg (24 lb)

Pump Options

- Oil mist eliminator

Optional MS Features

- MS/MS or MSⁿ: For SRM (single reaction monitoring) or MRM (multiple reaction monitoring) modes; CID using frequency modulated resonant or non-resonant energy
- Positive Chemical Ionization (PCI): Clean, low pressure PCI compatible with gas or liquid reagents; kit for single liquid reagent included
- SilChrom™ electrodes: Silica-coated electrodes for maximum chromatographic inertness
- Ion gauge: Bayer-Alpert gauge tube with burn-out resistant, thorium-coated iridium (ThO-Ir) filaments
- Spectral databases: National Institute of Standards and Technology (NIST), Wiley and Pfleger Maurer Weber (PMW) libraries are available



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220-MS Ion Trap Mass Spectrometer

Optional MS Features (continued)

- Selection of custom software:
 - EnviroPro™ for general and EPA specific report requirements
 - ToxPro™ Plus includes three-ion ratio reports for toxicology applications
 - MultiCompound for general extended reporting
 - Quick Access™ optimizes workflow for multi-user, high-throughput laboratories
 - Access control and audit trail software for 21 CFR Part 11 compliance

Power Requirements

- 100-130 Vac, 60 Hz \pm 3 Hz, 12 A, 1.5 kW
- 200-260 Vac, 50 Hz \pm 3 Hz, 6 A, 1.5 kW

Environmental Requirements

- Temperature: 15 °C to 30 °C
- Humidity: 20% to 80% relative humidity (without condensation)

450-GC Features

Column Oven

- Dimensions: 28 cm (w) x 28 cm (h) x 20 cm (d) (11 in. x 11 in. x 8 in.)
- Temperature range: Ambient +4 °C to 450 °C; -99 °C to 450 °C with liquid N₂; -65 °C to 450 °C with liquid CO₂
- Temperature-programmed ramps: 24 ramps with 25 isothermal holds
- Maximum temperature ramp rate: 120 °C/min for all voltages
- Cool-down rate: 400 °C to 50 °C in 4.5 min

Injectors

1177 Split/Splitless Injector (S/SL)

- Maximum temperature: 450 °C isothermal

1079 Programmable Temperature Vaporizing Injector (PTV)

- Temperature range: -99 °C to 450 °C with liquid N₂; -65 °C to 450 °C with liquid CO₂
- Maximum temperature ramp rate: 200 °C/min
- Temperature ramps: Four

Injector EFC

- Accuracy: \pm 0.1 psi, 5% full scale flow
- Resolution: 0.1 psi or 0.1 mL/min

Optional GC features

- Injectors: Up to three (one required); 1177 Split/Splitless or 1079 PTV
- Detectors: Up to three; full range of Varian detectors including the FID, ECD, PFPD, TSD and TCD; maximum of two PFPDs
- ChromatoProbe™ device: For solids, large volume liquids or slurries; requires a 1079 PTV Injector
- QuickSwitch™ Valve: Automated switching between different columns
- Valves: Custom plumbed valves for a wide range of applications

Utilities and Environment

Power Requirements for MS

- 90-130 Vac, 60 Hz \pm 3 Hz, 12 A, 1440 VA
- 180-260 Vac, 50 Hz \pm 3 Hz, 6 A, 1440 VA

Environmental Requirements

- Humidity: 40% to 80% relative humidity (without condensation)
- Temperature: 18 °C to 27 °C

Dimensions

220-MS

- 24 cm (w) x 45 cm (h) x 62 cm (d) (9 in. x 18 in. x 24 in.)
- MS: 23 kg (50.7 lb), DS-42: 11 kg (24.3 lb)

450-GC

- 66 cm (w) x 53 cm (h) x 56 cm (d) (26 in. x 21 in. x 22 in.)
- 43 kg (95 lb)

Performance Specifications

Mode	Test Standard	S/N
El full scan	1 pg octafluoronaphthalene	50:1
Cl full scan	5 pg benzophenone	20:1

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210-MS Ion Trap Mass Spectrometer



A capable and reliable GC/MS for routine application

The Varian 210-MS along with the Varian 431-GC provides great performance and reliability for routine applications in a small footprint. The system's simplicity, robustness, and affordability make it an excellent choice for high-throughput laboratories.

210-MS Specifications

- Mass range: 10 to 650 Da; scan range is time programmable throughout the run
- Selected Ion Storage (SIS): Stores up to five ranges of ions; ejects matrix, column bleed
- Scan rate: Fixed at 5600 Da/sec (s) to maximize spectral acquisition
- Resolution: Unit mass, measured as 10% valley, over the entire range
- Mass calibration stability: RF-only field is stable for weeks to several months at constant analyzer temperature and helium flow
- Linear dynamic range: 10^3 to 10^4 (compound dependent based upon analytical methods)
- Filament assembly: Dual filament
- Transfer line temperature: Independent control; maximum 350 °C
- Manifold temperature: Independent control; maximum 120 °C
- Analyzer temperature: Independent control; anodized block; maximum 250 °C
- Electrode surface: Chrome (standard)
- Power fail protection: Solenoid closes septum purge line and supplies supplemental helium flow through the column to vent MS
- Turbomolecular pump: Varian V-81 pump, air cooled, and thermostatically protected; 81 L/s capacity; pumping at 81 L/s supplies a vacuum of approximately 10–5 Torr (1.3 mPa) in the manifold

Foreline Pump

- DS-42, dual stage, rotary vane
- Voltage: 120, 230 V
- Pumping speed greater than 38 L/min (2.3 m³/hr)
- Weight: 11 kg (24 lb)



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210-MS Ion Trap Mass Spectrometer

Pump Options

- Oil mist eliminator

Optional MS Features

- SilChrom™ electrodes: Silica-coated electrodes for maximum chromatographic inertness
- Ion gauge: Bayer-Alpert gauge tube with burn-out resistant, thoria-coated iridium (ThO-Ir) filaments
- Spectral databases: National Institute of Standards and Technology (NIST), Wiley and Pfleger Maurer Weber (PMW) libraries are available
- Selection of custom software:
 - EnviroPro™ for general and EPA specific report requirements
 - ToxPro™ Plus includes three-ion ratio reports for toxicology applications
 - MultiCompound for general extended reporting
 - Quick Access™ optimizes workflow for multi-user, high-throughput laboratories
 - Access control and audit trail software for 21 CFR Part 11 compliance

Power Requirements

- 100-130 Vac, 60 Hz ± 3 Hz, 12 A, 1.5 kW
- 200-260 Vac, 50 Hz ± 3 Hz, 6 A, 1.5 kW

Environmental Requirements

- Temperature: 15 °C to 30 °C
- Humidity: 20% to 80% relative humidity (without condensation)

431-GC Features

Column Oven

- Dimensions: 28 cm (h) x 23 cm (w) x 11 cm (d) (11 in. x 9 in. x 4 in.)
- Temperature range: 450 °C
- Temperature-programmed ramps: Seven ramps with eight isothermal holds
- Maximum temperature ramp rate: 100 °C/min for all voltages
- Cool-down rate: 450 °C to 50 °C in 5.2 min

Injectors

1177 Split/Splitless Injector (S/SL)

- Temperature range: 50 °C to 450 °C isothermal

Injector EFC

- Accuracy: ±0.1 psi, 5% full scale flow
- Resolution: 0.1 psi or 0.1 mL/min

Utilities and Environment

Power Requirements

- 120 Vac ± 10%, 60 Hz ± 2%, 20 A, 2.4 kW
- 230 Vac ± 10%, 50 Hz ± 2%, 10 A, 2.3 kW
- 101 Vac ± 10%, 50 or 60 Hz ± 2%, 25 A, 2.5 kW

Environmental Requirements

- Humidity: 5% to 95% relative humidity (without condensation)
- Temperature: 10 °C to 40 °C operating

Performance Specifications

Mode	Test Standard	S/N
El	1 pg octafluoronaphthalene	50:1

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