

# Varian 325-MS

## TRIPLE QUADRUPOLE MASS SPECTROMETER



The Varian 325-MS is a rugged, reliable option for many applications. It features a "vortex" electrospray interface (vESI™) and Gold Guard™ ion optics that jointly enhance sensitivity, ruggedness and throughput.

The higher sensitivity means you can analyze more compounds in a single run. The more rugged design means less downtime spent cleaning the source. It all adds up to an extremely productive solution.

### Triple-Stage Quadrupole

- Dual-quadrupole mass filters, with pre- and post-filters (ion guides)
- 180°, lensless collision-cell system with square geometry improves ion transmission and reduces nodding for increased sensitivity
- Mass range: 10–2000  $m/z$
- Mass resolution: unit mass (0.7 amu, fwhm) over the entire mass range
- Mass axis stability:  $\pm 0.1$  amu over 24 hours
- Scan rates: up to 6000 amu/sec
- Adjustable dwell times: 2–14,000 ms (software defined per transition)
- Software control and automated optimization of collision energy and gas pressure
- Automated algorithms for system calibration, tuning, and compound optimization
- Collision gas: greater than 99% argon at 20 psi

### API Interfaces

- Spray chamber temperature: up to 65° C
- Quadrupole ion guide: off-axis (6°) with respect to capillary guide
- Capillary voltage: up to 300 V (compound dependent)
- Nebulizing/drying/vortex gases: require 99%  $N_2$  at 80 psi with < 0.1 ppm of hydrocarbons and < 1% of  $O_2$ ; also requires clean, dry air at 80 psi with < 0.1 ppm of hydrocarbon for negative ionization mode

- Vortex Electrospray (vESI)
  - LC flows: 50 to 2000  $\mu L/min$
  - vESI voltage: 500 V to 6 kV
  - Spray shield: up to 800 V
  - vESI probe position: y-z positioning and independent adjustment of the vESI needle
  - Maximum drying and vortex gas consumption: 10 L/min each
  - Maximum drying and vortex gas temperatures: 400° C each
- Atmospheric Chemical Ionization (APCI)
  - LC flows: 100 to 2000  $\mu L/min$
  - APCI current: up to 15  $\mu A$
  - Spray shield: up to 800 V
  - APCI probe position: y positioning and independent adjustment of the corona discharge needle
  - Maximum drying and auxiliary gas consumption: 10 L/min and 5 L/min
  - Maximum drying and auxiliary gas temperatures: 400° C and 550° C

### Vacuum System

- Superior two-stage turbomolecular pump for API and analyzer regions, 310/400 L/sec, air-cooled; MacroTorr™ stages at exit for higher foreline pressures
- Foreline pumps: (2) Varian MS40+ pumps with integrated oil mist eliminator and oil return kit; 3-phase motor with low startup current (<10 A) does not require a special breaker or 3-phase AC mains supply

NOTICE: Varian, Inc. was acquired by Agilent Technologies in May 2010. This document is provided as a courtesy but is no longer kept current and thus will contain historical references to Varian. For more information, go to [www.agilent.com/chem](http://www.agilent.com/chem).

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## Detection System

- Highly efficient ion detector: positive or negative ions, constant 5 kV post-acceleration voltage, with positive-to-negative switching
- Linear dynamic range: up to  $10^6$ , compound-dependent based on analytical method

## Scan Functions

- Selected Ion Monitoring (SIM) in Q1 or Q3
- Full Scan in Q1 or Q3
- Precursor Ion Scanning
- Product Ion Scanning
- Neutral-Loss Scanning
- Selected-Reaction Monitoring (SRM) and Multiple-Reaction Monitoring (MRM)

## Integrated Divert Valve

- Full control through the system software enables timed switching of the mobile-phase eluent at any point in the analysis

## Integrated Syringe Pump

- Data system control for infusion and loop injections
- Accommodates syringe volumes from 10  $\mu$ L to 10 mL
- Flow rate range: 0.01  $\mu$ L/min to 1.0 mL/min

## Advanced Features

- SelecTemp™ provides independent temperature programming of the drying and vortex gases throughout an analysis
- SelecFlow™ provides independent pressure programming of the drying and vortex gases throughout an analysis

## Data System

- MS Workstation processing and instrument control software
- Comprehensive suite of instrument diagnostics
- Data system control of all instrument parameters and peripheral equipment
- MS Workstation software collects data and appends method information and system logs to a data file

## Utilities and Environment

- Vacuum manifold temperature: independent control; 30 °C to 50 °C
- Mass spectrometer: 100–240 Vac, 50/60 Hz  $\pm$ 3 Hz, 1.0 kW
- MS40+ foreline pumps: 200–240 Vac, 50/60 Hz, 1.2 kW (each)
- Humidity: 20% to 80% relative humidity (without condensation)
- Ambient temperature operating range: 16 °C to 30 °C

## Dimensions

- 325-MS: 50 cm (w) x 38 cm (h) x 71 cm (d) / 19.7 in. x 11.8 in. x 28 in.; 108 kg / 238 lb
- 212-LC: 26 cm (w) x 33 cm (h) x 36 cm (d) / 10.2 in. x 13 in. x 14.2 in.; 15 kg / 33 lb
- 460-LC autosampler: 30 cm (w) x 51 cm (h) x 36 cm (d) / 11.8 in. x 20.1 in. x 14.2 in.; 19 kg / 42 lb with cooling option; 30 cm (w) x 57 cm (h) x 36 cm (d) / 11.8 in. x 22.4 in. x 14.2 in.; 21 kg / 46.3 lb without cooling option
- MS40+ pumps: 30 cm (w) x 23 cm (h) x 42 cm (d) / 11.8 in. x 9 in. x 16.5 in.; 33 kg / 73 lb
- Computer: 48 cm (w) x 18 cm (h) x 43 cm (d) / 19 in. x 7.1 in. x 17 in.
- Monitor: 37 cm (w) x 44 cm (h) x 19 cm (d) / 14.6 in. x 17.3 in. x 7.5 in.
- Laser printer: 20 cm (w) x 41 cm (h) x 46 cm (d) / 7.9 in. x 16.1 in. x 18.1 in.

## Sensitivity

- vESI™ source: a 5  $\mu$ L flow-injection of a 100 fg/ $\mu$ L reserpine solution at flow rate of 200  $\mu$ L/min 90:10 acetonitrile/ $H_2O$  will produce a minimum signal-to-noise ratio (RMS) of 800:1 for the transition of the protonated molecule at  $m/z$  609.3 to the fragment ion at 195.1 when operated in SRM mode, with Q1 and Q3 resolution set to 0.7 Da fwhm.
- APCI: a 5  $\mu$ L flow-injection of a 2 pg/ $\mu$ L reserpine solution at flow rate of 200  $\mu$ L/min 90:10 acetonitrile/ $H_2O$  will produce a minimum signal-to-noise ratio (RMS) of 150:1 for the transition of the protonated molecule at  $m/z$  609.3 to the fragment ion at 195.1 when operated in SRM mode, with Q1 and Q3 resolution set to 0.7 Da fwhm.



# VARIAN

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