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HP 5971 GC/MS System

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$32,500

Questions?...
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System comes complete with:

- 5971 MSD
- Edwards E2M2
- New Pentium III PC with Windows NT and Agilent GC/MS Chemstation Software
- HPIB Communications Board
- Condition: Refurbished with 1 year warranty

HP 5890 Series II GC

Safety Certifications: ETC labs, which is a U.S. nationally recognized testing lab (NRTL), and Canadian Standards Association (CSA)

Instrument Dimensions and Weight:	
Height:	18-3/8 inches (465 mm)
Width:	25-7/8 inches (655 mm)
Depth:	20-1/8 inches (511 mm)
Weight:	90 lbs (41 kg)
Power Requirements:	
Voltages:	120/200/220/240
Range:	+5, -10% each
Frequency:	47.5-66 Hz

Environmental

Operating Range	0-55 Celsius ambient (20-27 Celsius optimum) 5-95% Humidity (50-60% optimum)

Heated Devices

Five Heated zones standard:	Two detectors

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	Two inlets
	One auxiliary
Methods Stored:	Two

Column Oven

Usable volume:	11 in. x 12 in. x 6.5 in. (h x w x d) 279 mm x 305 mm x 165 mm (h x w x d)
Column span:	228.5 mm, 9 in. (coil size)
Automatic cooling under processor control	
Operating range:	4 Celsius above ambient to 450 Celsius:-80 to 450 Celsius with cryogenic cooling
Setpoint entry:	1 Celsius for temperatures 0.1 Celsius for program rates
Programming:	Rates 0.1 t 70 Celsius* per min 650 min maximum run time Three ramps with additional/final holds

Technical Performance

Accuracy (true temperature relative to setpoint)	Specification: ±1% (Kelvin) from 4 Celsius above ambient to 450 Celsius
Stability (effect of ambient change on actual temperature)	Specification: less than 0.01 Celsius for 1 Celsius ambient change
Calibration (setting true temperature at a setpoint)	Oven can be recalibrated to ±0.01 Celsius with appropriate instrumentation
Gradients (temperature variations within a column)	Specification: less than 2 Celsius within a 9-in. coil anywhere within the operating range

Split/Splitless Capillary

- Range to 400C in 1C increments
- Back-pressure design permits independent adjustment of split flow rate without affecting column flow, 0-30 psi head pressure gauge and regulator standard; 0-15, 0-60, and 0-100 psi regulators and gauges also available
- Septum purge built in at 3 ml/min
- Accepts columns up to 1.2-mm od
- Accepts 1/4 inch glass column for on-column injection
- Multimode design includes split and splitless injection
- Air fan built into mainframe to assist in cool-down of inlet
- Splitless purge time variable in 0.01-min elements

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HP 5971A Mass Selective Detector

General description:

The HP 5971A Mass Selective Detector (MSD) is a stand-alone capillary GC detector designed for use with the HP 5890A gas chromatograph. i is compact and portable (mainframe weighs 21 kg), requires no cooling water or compressed air, and operates on 110/120 volts or 220/240 volts power. The MSD mainframe includes the GC interface, electron impact ion source, monolithic quartz hyperbolic quadrupole mass filter, electron multiplier detector, power supply, drive electronics, and analyzer vacuum system. The MSD is configured for a right-side sample inlet.

General Specifications

The MSD may be controlled from an HP G1030A ChemStation (DOS Series) or and HP 59970C ChemStation (Pascal Series) which includes a computer, disc drive and printer. Operating software provides a complete set of MSD and GC/MS applications including programs for Tuning, Data Acquisition, Data Retrieval, Reporting and Library Searches.

Installation and 90-day warranty are provided. Operator training is highly recommended and a good understanding of capillary chromatography is useful.

Mass Selection

Scanning mode-- Scans any mass range between 10 and 650 amu in 0.1 amu steps.

Resolution

Unit resolution throughout mass range established automatically under computer control.

Scan Speed

Instrument provides for scan rates up o 2000 amu/sec with Pascal ChemStation (1500 amu/sec with DOS ChemStation) with 0.1 amu mass resolution.

Scanning Acquisition Process

Sample flows from GC into the ion source where it is constantly bombarded by 70 eV electrons, causing molecules to fragment and ionize. Positive ions are focused into the quadrupole mass filter by th lens system. An AC 1.0 MHz voltage and a DC voltage are superimposed in an accurately controlled ratio on the quadrupole. The voltages are stepped to allow an ion with a specific m/z value to pass through the filter while all others are rejected. At each quadrupole filter voltage step, the amplified electron multiplier detector output is digitized and read by the Series 300 computer.

Total Ion Mode

AC voltage-only mode, with adjustable low mass cut-off, allows the HP 5791A to operate as a non-specific, high sensitivity detector. The "true" total ion chromatogram obtained provides higher sensitivity than the TIC obtained in the full-scanning mode.

Scan Sensitivity-Electron Impact Ionization

Typical performance for 50 pg of hexachlorobenzene yields a signal-to-noise ratio of better than 10:1 RMS (2:1 peak-to-peak) at m/z 284 when scanned at 250 amu/sec between m/z 280 and 300, and typical performance for 500 pg of methyl stearate yields a signal-to-noise ratio of better than 20:1 RMS (4:1 peak-to-peak) at m/z 298.3 when scanned at 380 amu/sec between m/z 290 and 310.

Scan Sensitivity-Chemical Ionization

Typical performance for 100 pg of benzophenone yields a signal-to-nose ratio of better than 10:1 RMS (2:1 peak-to-peak) at m/z 183.1, protonated molecular ion $[MH]^+$, using methane as reagent gas, when scanned at 380 amu/sec

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between m/z 170 and 190. The HP 5971's classical CI high-pressure ion source operation confirms positive molecular weight identification by the production of high pressure reactions which generate traditional CI adduct ions, e.g. $[M+C_2H_5]^+$ and $[M+C_3H_5]^+$ when methane is used as a reactant gas.

Selected Ion Monitoring (SIM) Acquisition Process

Rather than dividing the mass range into 0.1 m/z increments and recording information at each m/z, a different acquisition process is used for selected ion monitoring. The quadrupole mass filter is programmed to select a few specific m/z values rather than scanning large areas with no signal present. Since only a few areas of the total m/z range need to be measured, the GC peak is sampled more often, resulting in more accurate quantitation and greater sensitivity than the conventional scanning mode.

Sample flows from the GC into the ion source, and is constantly bombarded by 70 eV electrons, causing the molecules to fragment and ionize. Positive ions are focused into the quadrupole mass filter by the lens system. An AC 1.0 MHz voltage and the DC voltage are superimposed to the correct ration for the first userspecified m/z value. The amplified electron multiplier detector output is digitized and accumulated for the duration of the user-specified dwell time. At the end of all m/z settings, the process is repeated again beginning from highest m/z value to lowest until the end of the run is reached.

Selected Ion Monitoring (SIM) Sensitivity- Electron Ionization

Typical performance in selected ion monitoring: 10 pg of methyl stearate when monitoring m/z 298.3 for a dwell time of 50 milliseconds, with a 10:1 signal-to noise. Depending on the compound, femtogram sensitivities are possible.

Selected Ion Monitoring Mode

Monitors up to 20 individually selected masses at one time. Up to 200 groups of 20 masses may be selected for each run using time programming with the Pascal ChemStation and 20 groups of 10 masses with the DOS ChemStations.

Selected Ion Monitoring Dwell Time

User selectable from a minimum of 10 milliseconds per m/z value up to a maximum of 32,767 milliseconds.

Detector

Continuous dynode electron multiplier. Power supply to the multiplier is computer controlled. Maximum voltage is 3000 volts, settable in 12.5 volt increments.

Ion Source

Electron impact source with electron energy of 70 eV. Two filaments are selectable under computer control to allow continued operation in the event of filament failure. Complete source is removable as an assembly for convenient cleaning.

Dynamic Range

An FET logarithmic preamplifier provides more than six decades of dynamic range.

Mass Axis Stability

+0.15 amu in 12 hours assuming normal operating temperature, adequate ion statistics, and thermal equilibrium of electronics.

Vacuum System

Analyzer vacuum is maintained by an aircooled diffusion pump backed by a two-stage direct drive mechanical pump. Overall system pumping speed is approximately 60 liters per second for helium. Vacuum system can accommodate a capillary flow rate of 1.0 atm cc per minute of helium. Pump-down from (or venting to) atmosphere requires approximately one hour. Equilibration for the CI option requires 4-6 hours. Pump down/vent cycle is completely automated via computer control.

Optional ion gauge controller monitors pressure in the high vacuum chamber up to 1 x 10^{-3} torr. Typical chamber pressure is 5 x 10^{-5} torr at 0.5 cc/min. of helium.

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Safety Features

Automatic interrupt system provides protection against damage due to excess signal level or HV failure, as well as filament or RFPA failure.
In addition, system operating voltages are interlocked with the vacuum pump to prevent instrument damage due to operation at excess pressure (low vacuum).

Temperature Control

Interface temperature is controlled by the gas chromatograph through the B detector zone controller. Other external temperature control is also possible.
The analyzer and ion source are heated by the MSD interface. Ion source temperature is sensed by a thermocouple and reported to the data system.
Recommended interface operating temperature is from 250 to 300 Celsius.

Two Interfaces

GC capillary Direct--9" (229 mm)
Infrared Detector--19" (457 mm)

Temperature Environment

The MSD will operate within specifications in a temperature environment of 15 to 35 Celsius.

Carrier Gas

A regulated supply of high purity GC carrier gas is required. Minimum purity of 99.9995% is recommended.
Molecular sieve trap is also recommended.

Calibration Valve

Computer-controlled solenoid valve provides automated calibration with reference compound.

Power

Detector mainframe operates on 99-127 volts or 198-254 volts, single-phase, 700VA. Line frequency is 48-66 Hz.

Heat Dissipation

2400 BTU/hr.; 3000 BTU/hr. including transfer line.

Size and Weight Detector Mainframe

Height:	34 cm (13.5 in.)
Width:	17 cm (6.5 in.)
Depth:	65 cm (25.75 in.)
Weight:	21 kg (46 lb.) mainframe 32 kg (70 lb.) mainframe plus forepump.

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