



STANFORD RESEARCH SYSTEMS

# QMS Series Gas Analyzers



# QMS Series Gas Analyzers

- 100, 200 or 300 amu systems
- Operating pressures from above atmosphere to vacuum
- Response time of less than 1 second
- Compact, transportable package
- Better than 1 amu resolution
- Large dynamic range allows detection to ppm levels
- Real-time Windows® based gas analysis software
- RS-232 computer interface



QMS Series gas analyzers offer an efficient, cost effective solution for a wide range of applications. These mass spectrometers simplify the task of on-line process monitoring, analysis of gas species, leak detection and troubleshooting.

## *On-line monitoring*

The QMS system can continuously sample gas at low flow rates (several milliliters per minute) which makes the instrument ideal for on-line analysis of your process. The inlet can be equipped to sample at pressures from 1 bar to 10 mbar. Data is acquired continuously, as opposed to batch sampling which is employed by gas chromatographs. Response time is fast. A change in composition at the inlet can be detected in less than a half second. Complete spectra can be recorded in under one minute and individual masses can be measured at rates up to four points per second.

## *Compact, user friendly design*

An advanced quadrupole mass spectrometer design, coupled with state-of-the-art pumping technology, allows the entire system to be integrated in a small, transportable package. The sampling inlet valves and pumps can be controlled from the front panel. Operation is easy and does not require a detailed understanding of the quadrupole or the pressure reducing inlet. Since the pumps contain no oil or other liquids, gravity has no effect on them allowing the unit to function either standing upright or laid on its side. Capillaries are used as sampling probes and are available in a wide variety of materials and sizes for different applications.

## Principle of operation

The QMS uses a two stage pressure reducing inlet to sample gases at high pressure (see figure 1). This allows the use of a residual gas analyzer (which operates at high vacuum) as the detector. Different capillaries permit the system to sample at higher or lower pressures. A large flow is drawn through the capillary which drops the pressure 3 decades. A hybrid turbo-molecular/drag pump draws a small amount of gas through an aperture, which reduces the pressure to about  $10^{-6}$  Torr, while most of the flow is bypassed directly to a diaphragm pump. Solenoid valves control the gas flow. The entire system is controlled by a microprocessor, which ensures correct operation of the pumps and valves. The software manages the spectrometer and acquires data in a choice of six different modes.

## Bypass flow configuration

The bypass flow stream and the sample flow stream are recombined at the diaphragm pump, which makes it possible to use only one backing pump. This contributes to the system's small size. The bypass flow configuration is also critical to the fast response time of the QMS. Single stage pressure reduction with leak valves would lead to extremely small flow rates and

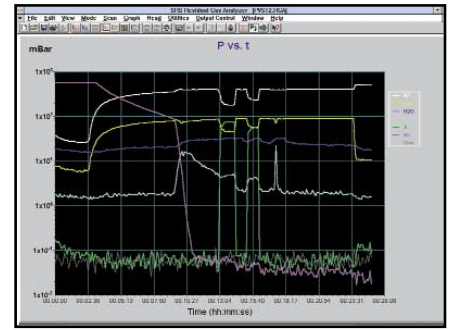
unreasonably long sample times. The bypass flow on the other hand gives a response time of less than 0.2 seconds from the tip of the capillary to the RGA chamber.

## Windows® gas analysis software

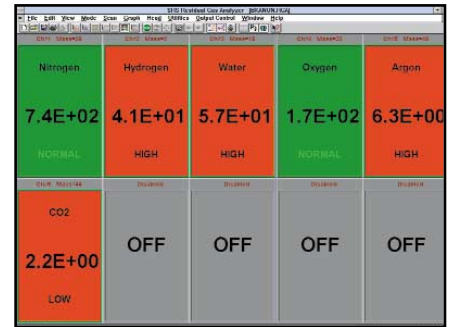
The QMS systems are supported with a real-time Windows® software package that runs on IBM compatible PCs (486 or greater). The intuitive graphical user interface allows measurements to be made quickly and easily. Data is captured and displayed in real-time or scheduled for acquisition at specified time intervals. Features include analog and histogram scan modes, pressure vs. time plots, leak detection, annunciator mode, gas library, audio and visual alarms, relay output options and comprehensive on-line help. Probe parameters can also be controlled and monitored through a high level ASCII command set which allows easy integration into user control programs. A standard RS-232 interface is used as the data link to the host computer.

## High performance solutions

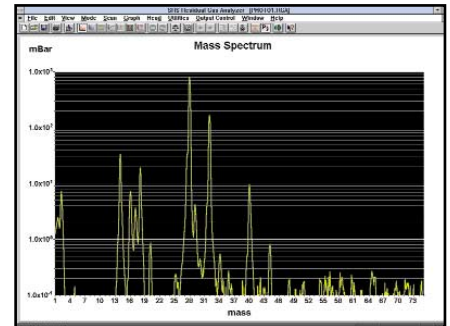
The QMS series gas analyzers offer complete high performance solutions to gas analysis and monitoring applications. For more details or to place an order call SRS at (408)744-9040.



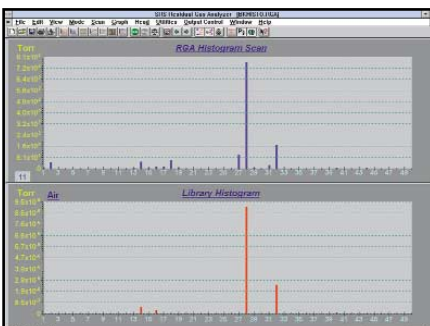
*Pressure vs. time mode presents a strip chart display of partial pressures for selected gases and provides a complete data history.*



*Annunciator mode monitors up to 10 gases. User set limits allow Go/No-Go testing in conjunction with audible alarms and/or an optional relay board.*



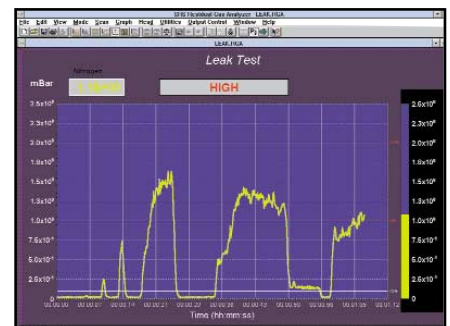
*Analog mode presents the entire spectrum and displays the results as partial pressure (log or linear) vs. mass number. Gas monitoring can be continuous or timed.*



*Library and Histogram mode are combined to show the capabilities of split screen operation. The Histogram mode displays a bar graph of partial pressure vs. mass number. This mode is most often used for vacuum analysis. The Library mode contains a comprehensive list of gases and a search mode that allows the selection of up to 12 masses for identification.*

Ch#	Name	Mass	Value	Alarm	Speed	Cal	CEM
1	Nitrogen	28	7.3E+02	NORMAL	3	1.00	ON
2	Hydrogen	2	4.0E+01	HIGH	3	1.00	ON
3	Water	18	5.7E+01	HIGH	3	1.00	ON
4	Oxygen	32	1.7E+02	NORMAL	3	1.00	ON
5	Argon	40	6.0E+00	HIGH	3	1.00	ON
6	CO2	44	2.5E+00	LOW	3	1.00	ON

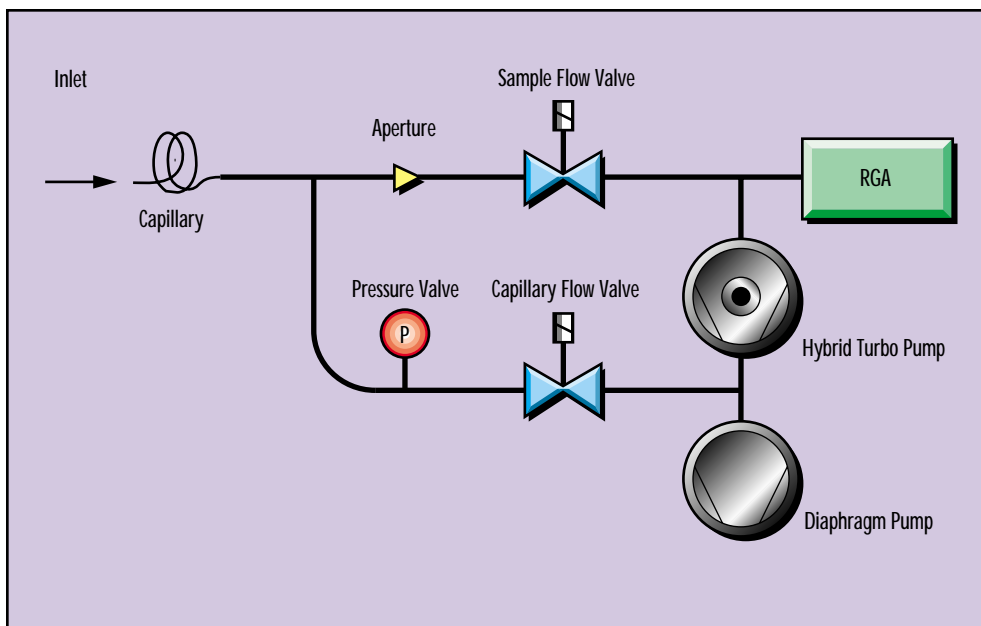
*Table mode provides a readout of mass, scaling factor and true partial pressure for numerical analysis. Peak heights and alarm status of 10 masses can be displayed. The electron multiplier can be set on or off for each mass allowing the detection of minor species even in the presence of high total pressure.*



*Leak Detection mode monitors a particular mass number over time. A programmable audible tone that changes pitch proportionally with partial pressure is useful in detecting the location of a leak.*

# Specifications

<b>Inlet</b>			<b>System</b>		
Type	Capillary: available in stainless steel, PEEK, and glass lined plastic		High vacuum pump	Hybrid turbo-molecular	
Flowrate	1 to 5 milliliter per minute at atmospheric pressure		Diaphragm pump	Advanced low pressure	
Pressure	Pre-selectable from 10 mbar to >1 bar				
<b>Mass Spectrometer</b>			<b>Materials</b>		
Type	Quadrupole		Construction	SS304 and SS316	
Detectors	Faraday cup and electron multiplier (std.)		Insulators	Alumina, ceramic	
Range	100, 200 or 300 atomic mass units (amu)		Seals	Viton®, buna-N, and nitrile butyl rubber	
Resolution	Less than 0.5 amu at 10% of peak height		Miscellaneous	Aluminum, Tygon®	
Detection limit	Less than 1 ppm				
Operating pressure	$5 \times 10^{-6}$ mbar		<b>Software</b>		
			RGA Windows®	Included. Runs under Windows® 3.1, Windows 95® and Windows NT® on 486 or higher.	
<b>Connections</b>			<b>General</b>		
Inlet	1/4" Ultra-Torr® fitting		Startup time	5 minutes from full stop	
Computer interface	RS-232C, 28.8 k baud, DB9 connector		Max. ambient operating temperature	35 °C	
	25' RS-232 cable included		Power requirement	110 VAC @ 60 Hz or 220 VAC @ 50 Hz (not field selectable)	
			Dimensions	7.06" W x 17.25" H x 24.80" D	
			Weight	35 kg (75 lbs.)	
			Warranty	1 year parts and labor on materials and workmanship	



## STANFORD RESEARCH SYSTEMS

1290-D Reamwood Avenue • Sunnyvale, CA 94089  
 Telephone: (408)744-9040 • FAX: (408)744-9049

email: [info@srsys.com](mailto:info@srsys.com)  
 WWW: [www.srsys.com](http://www.srsys.com)