



Gas Analysis

WWW.MKSINST.COM

Vision 1000-P™ HIGH PERFORMANCE PROCESS MONITORING SYSTEM

Many process monitoring systems fail to deliver user requirements because they present data in a format that is not easily understood by the operator. The value of the trace gas analysis is often lost, and the RGA may never deliver the payback intended.

The MKS Spectra Products' Vision 1000-P represents a different concept in process monitoring, requiring minimum operator interaction or RGA knowledge. The Vision 1000-P consists of "smart head" RGA technology with a closed ion source and close-coupled inlet. This state-of-the-art RGA technology is integrated with Process Eye Professional™ Control Platform, a recipe based, user-configurable software program.

The technology advances incorporated in the Vision 1000-P provides users with simple, effective, process monitoring operation including:

- ppb level detection of contaminant gases during PVD processes
 - Sensitivity to detect even small amounts of contamination sometimes introduced during preventative maintenance cycles
- Faster PM recovery through vacuum analysis
 - Constant baseline vacuum troubleshooting
- Single push button operation to start recipes

Features & Benefits

- Baseline monitoring of PVD chambers for air leaks and background contamination levels
- Ability to track process gas mixture composition where two gases are utilized (i.e. Ar and N₂ in TiN deposition)
- Vacuum troubleshooting for fast PM recovery
- Can be integrated with a wide variety of PVD tools
- Remote Vacuum Controller (RVC) for fail-safe PC-based operation and control
- Available with Process Eye Professional software for
 - Automated, recipe based operation
 - User configurable, intelligent alarms
 - High level tool integration
 - Advanced data presentation (i.e. simultaneous bar chart/trend screen displays)
- Simultaneous multiple-sensor operation capability

Applications

The Vision 1000-P is an application-specific process monitoring system designed to monitor contamination levels within semiconductor and thin film PVD process tools and to alert of conditions that can negatively impact product yield. In addition, the Vision 1000-P optimizes vacuum quality with:

- Contamination monitoring, including hydrocarbons, down to ppb levels during PVD process
- Residual gas monitoring, including air and water



Description

Closed Ion Source

Each Vision 1000-P™ incorporates a closed ion source and a custom inlet valve with an optimized high conductance, low surface area path to the PVD process chamber. With this source, the system is able to monitor the complete PVD process cycle, from base vacuum to process pressures of up to 10^{-2} mbar, without the need for a pressure reduction inlet.

By maximizing the ratio between process gas signals and the gas background in the differentially pumped Vision 1000-P analyzer housing, the closed ion source enables ppb levels of detection for trace contaminants in the process gas. Exceptionally good residual hydrogen detection can be achieved with the optional high performance 100 amu electronics.

Remote Vacuum Controller

Each Vision 1000-P system incorporates a Remote Vacuum Controller (RVC) module that provides fail-safe protection for both the process tool and the RGA. Furthermore, it allows full operation and control of RGA system components (filaments, pumps, inlet valves, etc.) from the system PC. The compact, remotely mounted rack module includes the RVC, turbo control unit, heater controls, and power supplies. The unit is easily mounted onto any standard 19" tool rack for mounting on a process chamber or other compatible location. 30'(9 m) cables for ease of remotely locating the probe assembly are included as standard.

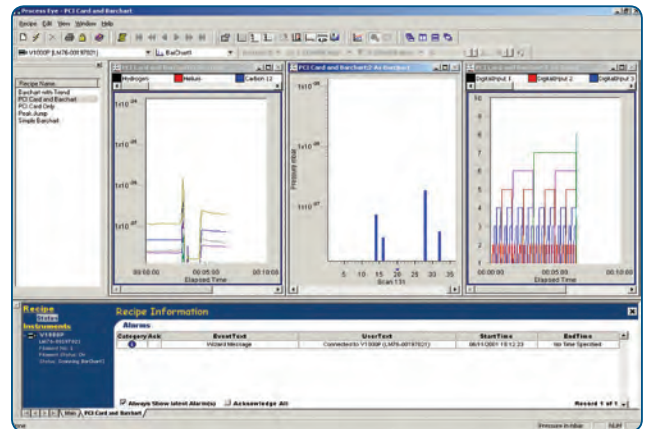
Process Eye Professional™ Control Platform

The Vision 1000-P analyzer uses Process Eye Professional, a highly flexible, 32-bit modular application operating under Windows NT® 4.0, 98, Millennium, 2000 or XP. Designed with a "client/server" structure, Process Eye Professional is fully network compatible.

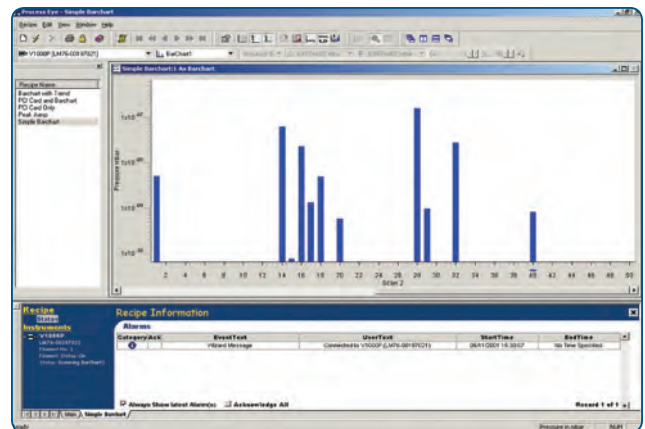
Process Eye Professional uses recipes to specify the way in which the instrument scans, displays data, and responds to the data acquired. Recipes are user configurable using the "Recipe Wizard" and are ideal for monitoring repetitive processes and analyses. Associated bar chart spectra and recently captured spectra are stored in a data buffer for easy review. Recipes can be linked together for the optimum monitoring of various phases of a particular process, or to facilitate automatic calibration using pre-defined calibration recipes. The single button push (or external signal) initiation of a Process Eye Professional recipe eliminates the need for highly skilled, full time operators. The flexibility of Process Eye Professional allows recipes to be configured that will:

- Define data acquisition and data display parameters, along with any on-line data processing required to convert data into relevant units and information
- Display data in simultaneous "bar chart" and "data trend" formats, allowing the comprehensive and clear investigation of significant trend events
- Incorporate custom warnings and alarms, triggered or terminated when data highlights that process conditions have deviated from normal conditions
- Monitor and display other parameters as trends, in relevant units (temperature, gas flow rate, power, pressure, etc.) which are linked into the Vision 1000-P analyzer through its flexible analog and digital I/O

In addition, Process Eye Professional provides "live history" for quick on-line review of data trend events. Recently captured bar chart spectra are stored in a data buffer and can be reviewed by moving a cursor over the associated trend plot.



Simultaneous log bar chart/trend analysis display, illustrating wide dynamic range scanning. Power supply potentials versus time is also shown.



Standard bar chart with log pressure axis



Specifications

Performance

Mass Range Options	1-100 amu standard; 1-200 and 1-300 amu optional
Detector System	Dual (Faraday and Secondary Electron Multiplier)
Maximum Analyzer Operating Pressure	7.6×10^{-3} Torr (1.0×10^{-2} mbar) at the ion source inlet (standard), higher pressure optional
Minimum Detectable Partial Pressure	$< 2 \times 10^{-11}$ Torr
Minimum Detectable Concentration (trace gas detection limit)	< 100 ppb for all common gases except < 10 ppm for H ₂ High performance model available for lower H ₂ detection
Mass Stability	Better than ± 0.1 amu over 8 hours at stable ambient temperature
Resolution	Better than 10% valley between peaks of equal height throughout the mass range

Analyzer & Housing

Bakeout Temperature & Bakeout Jacket	Included for 200°C bakeout
Mounting Flange	DN35CF (70mm/2.75" OD) Conflat® flange
Ion Source	High conductance closed ion source
Filaments	Replaceable twin Tungsten or Thoria filaments
Vacuum Hardware	60 l/s Turbomolecular pump with high conductance analyzer housing, inlet system, right angle valve (gate valve optional), automated vacuum controller (RVC) completely interlocked and integrated.
Foreline Pump	Dry diaphragm standard; Other options available
Analyzer Housing Base Pressure	Better than 5×10^{-9} Torr after bake out
Mass Filter	Double filter (1" "RF only" pre-filter with 4" main filter); triple filter as an option
Pneumatics	60-80 psig CDA

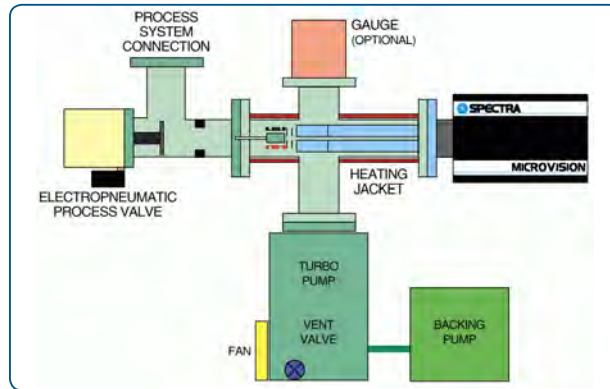
Control Unit/PC

Power	24 VDC, 3.4 A external supply
Maximum Ambient Operating Temperature	35°C, 80% RH (non-condensing)
LED Status Indication	Filament 1, filament 2, SEM, power and communications
I/O Capability	4 analog inputs (1 for external gauge reading), 12 TTL output signals
Other Facilities	Leak check headset socket with audio adjustment, external filament trip socket, instrument reset
Software	Process Eye Professional fully network compatible control platform generating under Microsoft® Windows® NT® 4.0, 98, Me, 2000* or XP* (*recommended)
Communications (baud rate & max. distance)	RS232C [9600 baud, 15m (50 ft.)], RS422/*RS485, [115,000 baud, 1.2 km (4000 ft.)] *relates to Process Eye Professional only
Minimum PC Specification Required	Intel® Pentium III® 450-800 MHz, 64-256 MB RAM, 6-12 GB hard drive, dependent upon total number of sensors on the computer
RGA Controller to Vacuum System Cables	30' (9 m) standard. Other lengths available.
Simultaneous Multi-Sensor	Optional: Software dependant; 31 units RS485 - 4 to 8 units RS232
Total Weight	23 lbs (15 Kg) to bolt on Process System
Total Shipping Weight	44 lbs (20 Kg) may vary depending upon backing pump and instrument rack requirements

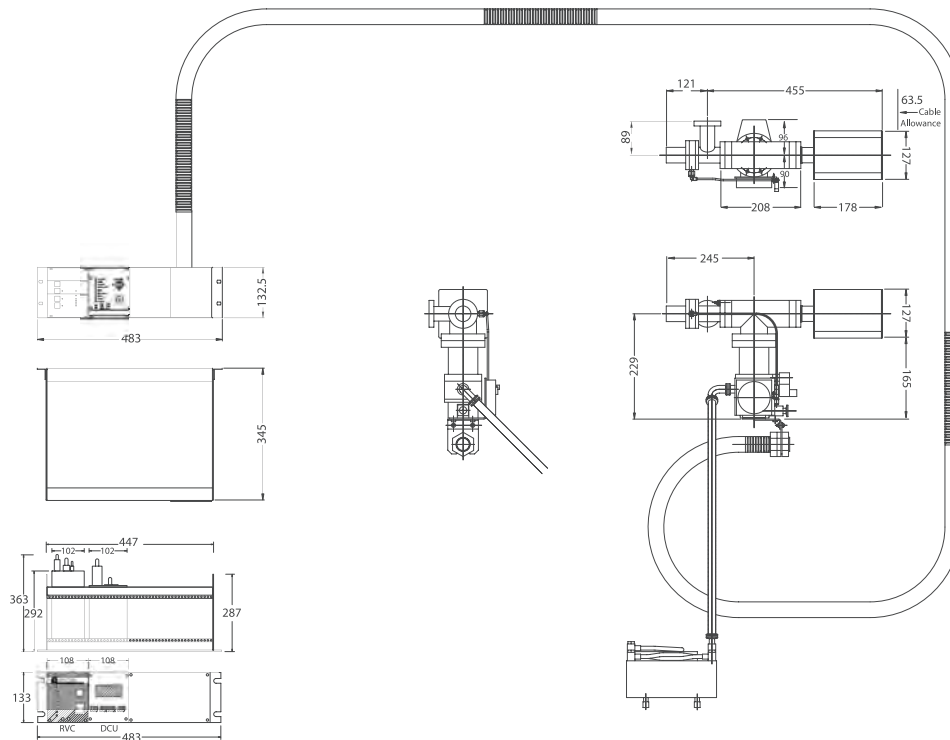


Ordering Information

Please contact your local MKS office for price and availability information.



Vision 1000-P High Performance Process Monitor System Integration



Dimensional Drawing —

Note: Unless otherwise specified, dimensions are nominal values in inches.



Global Headquarters

2 Tech Drive, Suite 201
Andover, MA 01810
Tel: 978.645.5500
Tel: 800.227.8766 (in U.S.A.)
Web: www.mksinst.com

MKS Gas Analysis

134 W. Rio Robles Drive
San Jose, CA 95134
Tel: 408.750.0300

Spectra™ Products, UK
Crowley Way
Crewe, Cheshire CW1 6AG
Tel: +44.1270.250150