

FabGuard[®]
ready



Transpector[®] 2

Gas Analysis System

**NEW-GENERATION RGAs WITH SUPERIOR
SENSITIVITY AND PERFORMANCE**

 **INFICON**
Instruments for Intelligent Control[®]

We've made the best RGAs better.

INFICON, the leaders in RGA technology, have upgraded the Transpector gas analysis family of instruments to meet the demands of today's processes and applications. Transpector 2 offers improved hydrogen detection, faster scanning, an expanded dynamic range, improved abundance sensitivity, and superior peak position and amplitude stability. It is the smartest choice for process monitoring, process diagnostics, and leak detection.

TRANSPLECTOR 2 FEATURES AT A GLANCE:

- 100-, 200-, and 300-amu systems with Faraday cup or combination electron multiplier/Faraday cup
- improved hydrogen detection
- superior peak amplitude and position stability
- up to 10 times improvement in signal-to-noise ratio compared to original Transpector
- faster scanning over low-level signals
- nine-decade electronic dynamic range
- software options for single- and multichamber systems
- partial pressure measurement from 1×10^{-4} Torr to 5×10^{-15} Torr



Transpector 2 is a quadrupole-based smart sensor that has all of the sensor drive electronics plus a microprocessor in a single, compact enclosure that attaches to the sensor. Because it is a smart sensor, it gives you the flexibility of using your existing computer or choosing a PC and software package from INFICON. Two communications links, RS232 for single-sensor and RS485 for multiple-sensor configurations, connect Transpector 2 to the control computer. Simple command protocols direct all Transpector functions.

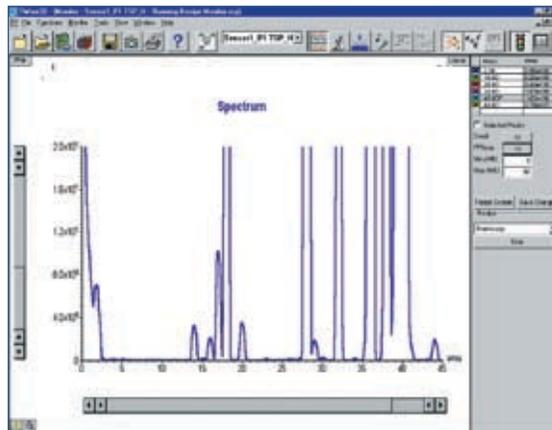
IMPROVEMENTS BRING BETTER HYDROGEN DETECTION

Transpector 2 offers more accurate and reliable data due to advanced RF and preamplifier measurement circuitry. These electronic advances translate to improved hydrogen detection and a lower minimum detectable partial pressure for all gases for better contamination control, as well as faster and more stable scanning to keep up with today's faster processes.

Transpector 2's advanced RF circuitry employs a higher RF frequency while maintaining acceptable power levels, resulting in hydrogen detection to the ppm level. Additionally, because the RF frequency is digitally synthesized, it automatically adjusts to and locks in the appropriate frequency for your sensor. The improved RF circuitry reduces warm-up time and provides superior peak amplitude and position stability, virtually eliminating the need for routine mass scale tuning.

BETTER DATA FASTER

Transpector 2's new preamplifier measurement algorithm allows the user to scan faster over low-level signals to keep up with process changes. Because the noise is reduced, the data is more stable and timely.



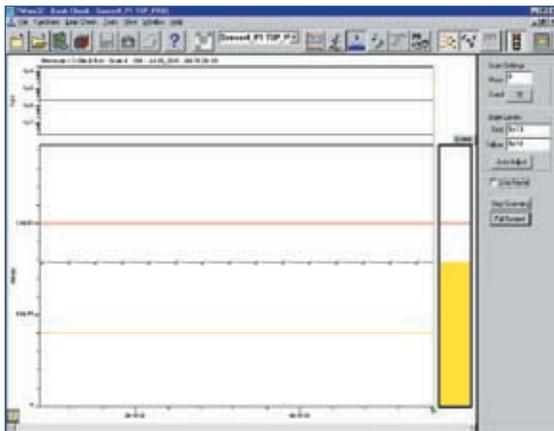
This scan of argon was sampled at three milliTorr using TWare32™ for Windows with Transpector 2 electronics on a closed-ion-source system. In this example, Transpector 2's advanced RF circuitry allows detection of hydrogen down to seven parts per million.

When sampling with the electron multiplier, the signal-to-noise ratio is up to seven times better than the original Transpector's (up to 10 times better in Faraday cup mode). The electronics offer a nine-decade dynamic range (from 1×10^{-6} to 1×10^{-15} amps).

Combining Transpector 2 with TWare32™ (or older software such as TranspectorWare™) provides an ideal system for meeting today's needs for research, production process monitoring, and data collection. Available for Windows® 95, 98, NT, 2000, Me or XP, TWare32 contains a full array of basic RGA features, including trend analysis, bar graph, leak check, analog, and selected peak modes. It also contains process monitoring features that include recipe generation, automated data collection, and threshold limit set points.

VARIETY OF SOFTWARE OPTIONS

If our standard software package (TWare32 for Windows) does not meet your application needs, we offer custom programming packages. A Dynamic Data Exchange (DDE) driver can automatically set up Transpector for communication, allowing the user to specify the data to be collected and reading it directly into a DDE-compatible program such as Excel® or WonderWare®.



TWare32 leak mode requires only single-button operation and includes a full-range thermometer-type display, trend chart, and audible tone output.

CUSTOM TOOL INTEGRATION

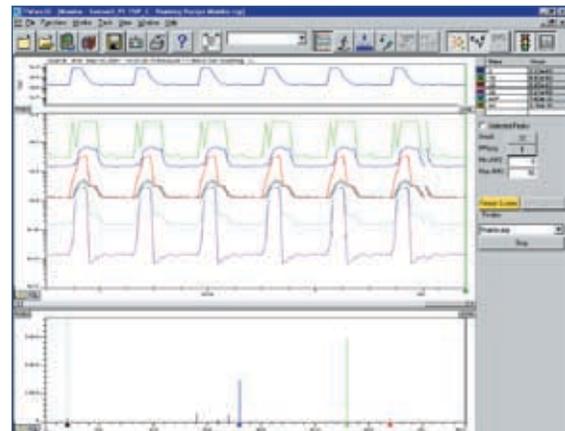
For more advanced applications, INFICON offers FabGuard, a custom tool integration software package. FabGuard provides sophisticated alarming using various analysis routines based on tool states and Transpector RGA data. This versatile integration package can also communicate with sensors other than the RGA, such as an optical emission spectrometer or a particle counter. Using the SECS II interface many semiconductor tools have, FabGuard can gather data from the tool itself that can be added to the various analysis algorithms.

ONLY PAY FOR THE PERFORMANCE YOU NEED

The Transpector Gas Analysis System offers a multitude of choices to fit your application requirements. For base pressure applications, we offer several open-source Transpector models ranging from one to 300 amu with Faraday cup (FC) or combination electron multiplier/Faraday cup (EM/FC) detectors, depending on the exact level of performance required.



For process monitoring applications, Transpector XPR3 offers the simplest form of gas contamination monitoring and process verification available.



TWare32 for Windows using Transpector 2 performs all standard gas analysis functions, including analog, bar, and selected peak monitoring. It has pre configured screens for automated data archiving, tuning, and leak detection.



In Transpector CPM, this closed ion source operates at a relatively high pressure, reducing the masking effects of background residuals to enable detection of contaminants at sub-ppm levels.

It operates at process pressures up to 20 milliTorr without pumps, detecting contaminants during the process down to 10 ppm. For applications requiring ppm or sub-ppm contamination monitoring, INFICON offers the Transpector CPM (closed ion source). CPM features a completely interlocked pumping system that allows process sampling from atmosphere to high vacuum.

SIMPLIFY MULTICHAMBER CONFIGURATIONS

Inspector 2's multiplexing capabilities make multi-chamber installations simpler and more economical to operate. A single computer can operate multiple Inspectors in any combination of compact, high-performance, CPM, and XPR3 models on an RS485 network. Each Inspector 2 is easily assigned an address through its configuration DIP switches. For troubleshooting or service functions, local control of any sensor on the network is accomplished simply by connecting the RS232C port to a computer via HyperTerminal. While on the network, each unit operates independent of and simultaneously with the other sensors on the network, so all relays and controls within each Inspector 2 are continuously operational. The power supply port connects Inspector 2 to 24 volts, supplied by the tool or an external power supply.

IT PROTECTS YOUR PROCESS AND ITSELF

Inspector 2 stores your calibration and setpoint data independent of the control computer. (The computer acts as a peripheral device, storing and displaying your process data and allowing you to communicate with the sensor.) So if you disconnect the computer from the sensor, or if communications are lost for any other reason, the sensor continues to monitor and control

GENERAL APPLICATIONS

Leak Detection, Vacuum Troubleshooting & Outgassing Studies in:

- Optical Coating
- Surface Science
- Desorption Studies
- Accelerators
- Disk Manufacture
- High-Energy Physics
- Aerospace
- MBE
- Vacuum Heat Treatment

Process Characterization & Monitoring in:

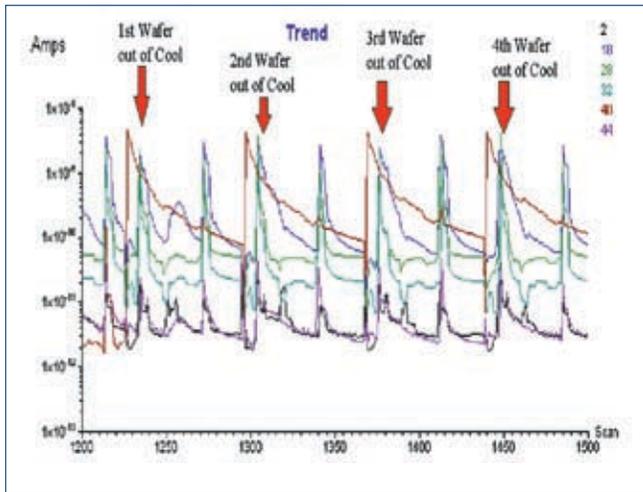
- Physical Vapor Deposition (PVD)
- Chemical Vapor Deposition (CVD)
- Ion Implantation
- Etch

the vacuum system as programmed. In addition, Inspector 2 automatically shuts off its emission when the total pressure exceeds the limits of the sensor in use, or if the electronics exceeds its normal operating temperature.

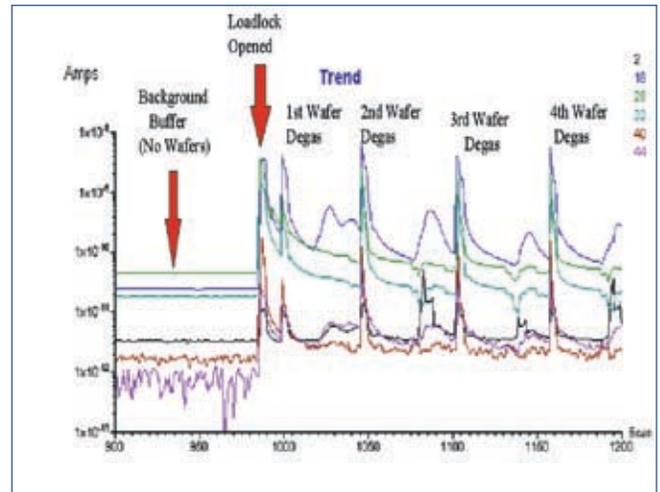
Inspector 2 can monitor and control up to three setpoint status relays, providing an external signal for alarm indication or process interruption when a gas exceeds its specified level. Two differential 10-volt analog input channels are provided for incorporating analog data with RGA data (e.g., total pressure, optical emission or temperature gauge data), as well as an optional analog board offering four 0-10 volt outputs.



Semiconductor Applications



Transpector 2 H100M, mounted on the front end of a cluster tool, is used to establish the background/baseline of the front end (handler) while the loadlocks go through a pumpdown. When wafers are ready for processing, Transpector 2 monitors the wafer-in state and provides detailed information on the degas process, with alarm limits set for specific contaminants.



Transpector 2 operates continuously and reliably while experiencing extreme argon bursts from the cool module. The information it provides has a direct correlation to vacuum integrity, pump performance, contamination, leaks, and tool state.

Transpector 2 Gas Analysis System	PVD		ETCH		CVD		IMPLANT	
	Tool State	Process State*	Tool State*	Process State*	Tool State*	Process State*	Tool State*	Process State
Residual Gas Analyzers (Transpector open ion source): C100F/M, H100F/M H200F/M, H300F/M	Leak Detection Chamber Outgassing Rate of Rise Cryopump Loading MFC Leaks Gas Line Leaks	Argon Flow Reactive Gas Flow (N ₂ , O ₂) Detection Limit 100 ppm Gas Supply Contamination MFC Instability Photoresist Contamination ²	Leak Detection Chamber Outgassing Rate of Rise Cryopump Loading MFC Leaks Gas Line Leaks	Carrier Gas Flow Reactive Gas Flow Detection Limit 100 ppm Gas Supply Contamination MFC Instability Monitor Selectivity Monitor Endpoint	Leak Detection Chamber Outgassing Rate of Rise MFC Leaks Gas Line Leaks	Carrier Gas Flow Precursor Gas Flow Delivery System Stability Detection Limit 100 ppm Gas Supply Contamination Monitor Chamber Clean Endpoint Photoresist Contamination	Leak Detection Chamber Outgassing Cryopump Loading MFC Leaks Gas Line Leaks	Argon Flow Leaks on Rotary Feedthroughs MFC Instability Monitoring Arcing Monitor Process Gases (AsH ₃ , PH ₃ and BF ₃) Photoresist Contamination
Process Gas Analyzer (Transpector XPR3 ¹):	Leak Detection Chamber Outgassing Rate of Rise Cryopump Loading MFC Leaks Gas Line Leaks	Argon Flow Reactive Gas Flow (N ₂ , O ₂) Detection Limit 10 ppm Gas Supply Contamination MFC Instability	N/A	N/A	N/A	N/A	Leak Detection Chamber Outgassing Cryopump Loading MFC Leaks Gas Line Leaks	Argon Flow Leaks on Rotary Feedthroughs MFC Instability Monitoring Arcing
Process Gas Analyzers (Transpector CPM closed ion source): 100, 200 or 300 amu available	Leak Detection Chamber Outgassing Rate of Rise Cryopump Loading MFC Leaks Gas Line Leaks	Argon Flow Reactive Gas Flow (N ₂ , O ₂) Detection Limit ≤1 ppm Gas Supply Contamination MFC Instability Target Impurity Photoresist Contamination	Leak Detection Chamber Outgassing Rate of Rise Cryopump Loading MFC Leaks Gas Line Leaks	Carrier Gas Flow Reactive Gas Flow Detection Limit ≤1 ppm Gas Supply Contamination MFC Instability Photoresist Contamination Monitor Selectivity Monitor Endpoint	Leak Detection Chamber Outgassing Rate of Rise MFC Leaks Gas Line Leaks	Carrier Gas Flow Precursor Gas Flow Delivery System Stability Detection Limit ≤1 ppm Gas Supply Contamination Monitor Chamber Clean Endpoint Photoresist Contamination	N/A	N/A

¹ Mass spectrometer that operates at PVD process pressures without differential pumping.

² Improperly ashed wafers being monitored in the buffer and/or de-gas chambers.

*Differential pumping may be required

SPECIFICATIONS

	C100F	C100M	H100F	H100M	H200F	H200M	H300F	H300M	
Sensor length (vacuum side)	4.6" (11.7 cm)		7" (17.8 cm)	10.4" (26.4 cm)	7" (17.8 cm)	10.4" (26.4 cm)	7" (17.8 cm)	10.4" (26.4 cm)	
Mass Range	1 to 100 amu		1 to 100 amu		1 to 200 amu		1 to 300 amu		
Detector Type	FC	Microchannel Plate EM/FC	FC	EM/FC	FC	EM/FC	FC	EM/FC	
Resolution (per 1993 AVS Recommended Practice)	< 1 amu wide @ 10% peak height over the entire mass range								
Temperature Coefficient (during an 8-hour period, after a half hour warm-up)	< 1% of peak height per degree C (for FC Only)								
Sensitivity— amps/Torr (amps/mbar):	FC	2x10 ⁻⁴ (1.5x10 ⁻⁴)	2x10 ⁻⁴ (1.5x10 ⁻⁴)	2x10 ⁻⁴ (1.5x10 ⁻⁴)	1x10 ⁻⁴ (7.6x10 ⁻⁵)	2x10 ⁻⁴ (1.5x10 ⁻⁴)	1x10 ⁻⁴ (7.6x10 ⁻⁵)	1x10 ⁻⁴ (7.6x10 ⁻⁵)	5x10 ⁻⁵ (3.8x10 ⁻⁵)
	EM	N/A	0.25 (0.2)	N/A	500 (380)	N/A	500 (380)	N/A	250 (190)
Min. Detectable Partial Pressure ¹ —Torr (mbar):	FC	3x10 ⁻¹³ (4x10 ⁻¹³)	N/A	3x10 ⁻¹³ (4x10 ⁻¹³)	N/A	3x10 ⁻¹³ (4x10 ⁻¹³)	N/A	6x10 ⁻¹³ (8x10 ⁻¹³)	N/A
	EM	N/A	3x10 ⁻¹⁴ (4x10 ⁻¹⁴)	N/A	5x10 ⁻¹⁵ (6.6x10 ⁻¹⁵)	N/A	5x10 ⁻¹⁵ (6.6x10 ⁻¹⁵)	N/A	1x10 ⁻¹⁴ (1.3x10 ⁻¹⁴)
Zero Blast Interference at Mass 2	< 100 ppm								
Max. Operating Pressure— Torr (mbar):	5x10 ⁻⁴ (6.6x10 ⁻⁴)								
Max. Sensor Operating Temp.	FC	200°C	200°C	250°C	250°C	250°C	250°C	250°C	250°C
	EM	N/A	150°C	N/A	150°C	N/A	150°C	N/A	150°C
Max. Bakeout Temperature (electronics removed)	200°C		350°C	350°C	350°C	350°C	350°C	350°C	
Operating Temperature	20°C to 50°C ambient								
Power Input	20 to 30 V DC, 9-pin male "D" connector, internally isolated from system ground								
RS232 Serial Communications Interface	nonisolated, baud selection 1200 through 9600, 9-pin female "D" connector, Tx/D, Rx/D, CTS, DTR								
RS485 Addressable Communications Interface	isolated, 4 wire, 57,600 baud fixed, half duplex, global address @ 0, fixed address 1 of 31, 9-pin female "D" connector, +Tx/D, -Tx/D, +Rx/D, -Rx/D								
Relay Outputs	4 relays, 24 V at 0.5 amps (1 for operational status, 3 for setpoint limits)								
Inputs	2 nonisolated TTL inputs, contact closure (1 for remote emission on, 1 for remote emission off); 2 differential analog inputs, 0 to 10 V DC								
Electronics Enclosure	drip-resistant								
User-Configured Switches (8-position DIP switch)	5 positions: device address (1 of 31); Primary Link Select (RS232/485); 2 positions: baud rate								
LED Indicators (green)	1 for CPU status, 1 for emission status								

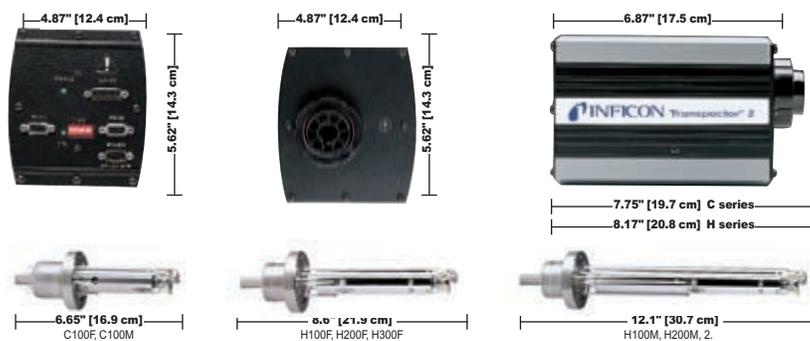
N/A = not applicable

* Electronics and sensors may be purchased separately. Multiplexing operation requires optional software.

¹ Minimum detectable partial pressure is calculated as the standard deviation of the noise (minimum detectable signal) divided by the sensitivity of the sensor (FC or EM) measured at a four-second dwell time.



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GLOBAL HEADQUARTERS:

Two Technology Place, East Syracuse, NY 13057 USA
Tel: +1.315.434.1100 Fax: +1.315.437.3803 E-mail: reachus@inficon.com

Visit our website for contact information and sales offices worldwide. www.inficon.com
Due to our continuing program of product improvements, specifications are subject to change without notice.

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