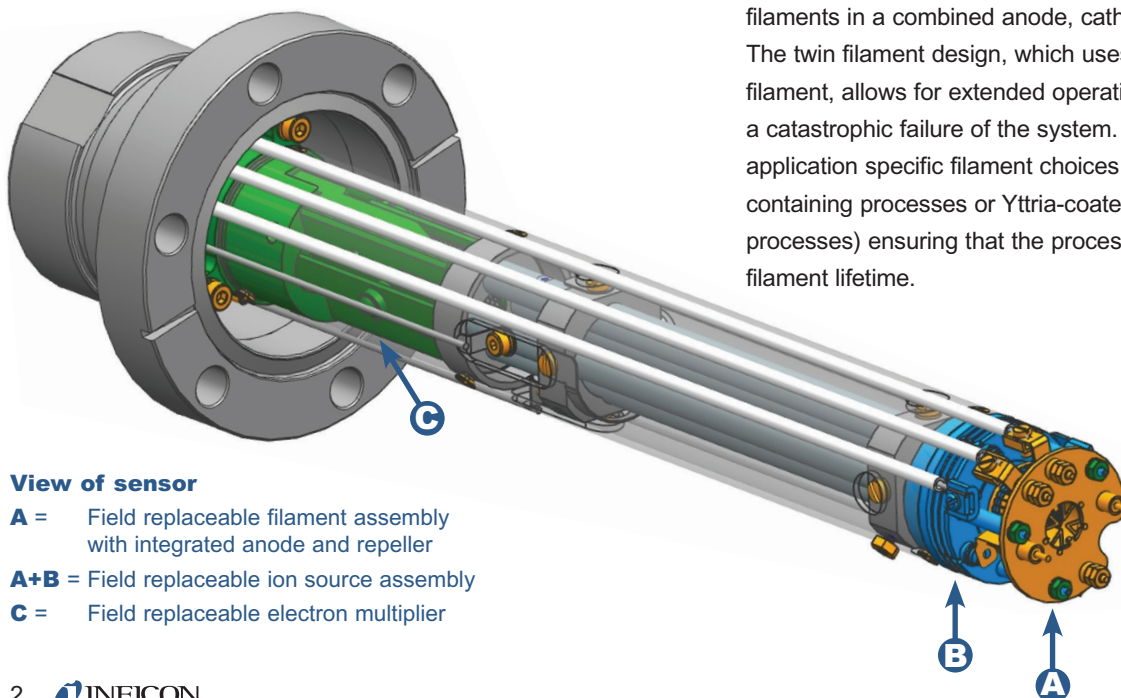# Transpector® MPH

High Performance Residual Gas Analyzer
For Semiconductor Manufacturing

Unparalleled Performance for Increased Yields and Maximum Uptime

The ever increasing price of silicon wafers and demand for finished products means that scrapped wafers cost more than ever before. Thus, understanding your process and monitoring for defects has become a much higher priority in semiconductor fabrication centers. The Transpector MPH Gas Analysis System is designed to unlock your process with industry leading performance for all of your gas analysis applications to help maximize chip yields and minimize tool downtime. Combined with a low overall cost of ownership and high mean-time-between-failures, Transpector MPH helps your bottom line more than any other RGA on the market.

INFICON has leveraged its expertise in gas analysis process control equipment to create an RGA with industry-leading data collection speed, minimum detectable partial pressure and signal-to-noise ratio. All this, without sacrificing any of the reliability you have come to expect from INFICON Transpector Gas Analyzers.

The RoHS compliant Transpector MPH sensor and electronics were designed from the ground up to maximize signal intensity and measurement speed. The Transpector MPH is optimized for both common semiconductor RGA applications (like leak checking and contamination detection) and more demanding applications that are unavailable to other RGAs (Interwafer Monitoring, ALD, CVD and Etch). The unparalleled speed and sensitivity improve the quality and statistical validity of the RGA data, which increases the accuracy of Fault Detection Classification and other process control metrics.

FEATURES AT A GLANCE

- Maximum data rate of 1.8 ms per point for analog scans and selected peaks
- Calibration reference
- TCP/IP Ethernet connectivity
- Dual filaments
- Field replaceable Electron Multiplier
- Combined anode, cathode and repeller filament kit
- Shorter sensors minimize installed footprint
- Nine-decade dynamic range
- MDPP of 2E-15 Torr (100 amu)
- Increased Signal-to-Noise ratio
- Interchangeable sensors and electronics
- Sensors are assembled, tested and double bagged in a cleanroom environment
- RoHS Compliant

NEW SENSOR DESIGN INCREASES MTBF AND DECREASES OVERALL COST OF OWNERSHIP

With the help of comprehensive customer feedback and in-depth market analysis, INFICON has revolutionized the RGA ion source design of Transpector MPH. The new ion source incorporates two filaments in a combined anode, cathode and repeller assembly. The twin filament design, which uses a primary and a backup filament, allows for extended operation of the sensor and avoids a catastrophic failure of the system. Transpector MPH also offers application specific filament choices (either Tungsten for Halogen containing processes or Yttria-coated Iridium for Oxygen containing processes) ensuring that the process itself will not shorten the filament lifetime.

View of sensor

A =   Field replaceable filament assembly with integrated anode and repeller

A+B = Field replaceable ion source assembly

C =   Field replaceable electron multiplier

Replacing the filament kit in the Transpector MPH is equivalent to replacing the entire ion source of traditional RGAs. This cost savings will significantly reduce the total cost of ownership. With Transpector MPH, the filament kit replaces the twin-filaments and other critical ion source components, which are commonly contaminated over extended use, increasing lifetime and sensitivity of your RGA.

The new sensor design provides the added benefit of a field-replaceable Electron Multiplier (EM), if equipped. You can quickly replace the EM on-site, during regularly scheduled maintenance. The new multiplier was developed to provide both higher Faraday Cup (FC) sensitivity and increased gain for longer lifetimes.

SCALABLE COMMUNICATION METHODS FOR MODERN FABRICATION CENTERS

Transpector MPH uses Ethernet as the default means of communication between the RGA and your computer. For single sensor operation, Transpector MPH can be connected either to an existing network or connected directly to the Ethernet port on any computer. Multiple sensor operation is possible using an existing network or with an optional router or Ethernet switch.

SOFTWARE THAT FITS YOUR NEEDS

Transpector MPH is fully compatible with the award-winning FabGuard Suite of programs, including FabGuard Integrated Process Monitor and FabGuard Explorer. The FabGuard Suite also allows full backwards compatibility with most Transpector 2 sensors. This means that one software package can operate your new Transpector MPH, as well as the Transpector RGA that you have depended on for years.

Transpector MPH also offers an onboard web server which allows for software-free operation of your Transpector MPH from any network connected device. This web server isn't just a simple program that allows for standard data viewing. Instead, the Transpector MPH web server allows for all of the manual data viewing techniques that you expect along with the standard maintenance functions of leak checking and sensor tuning.
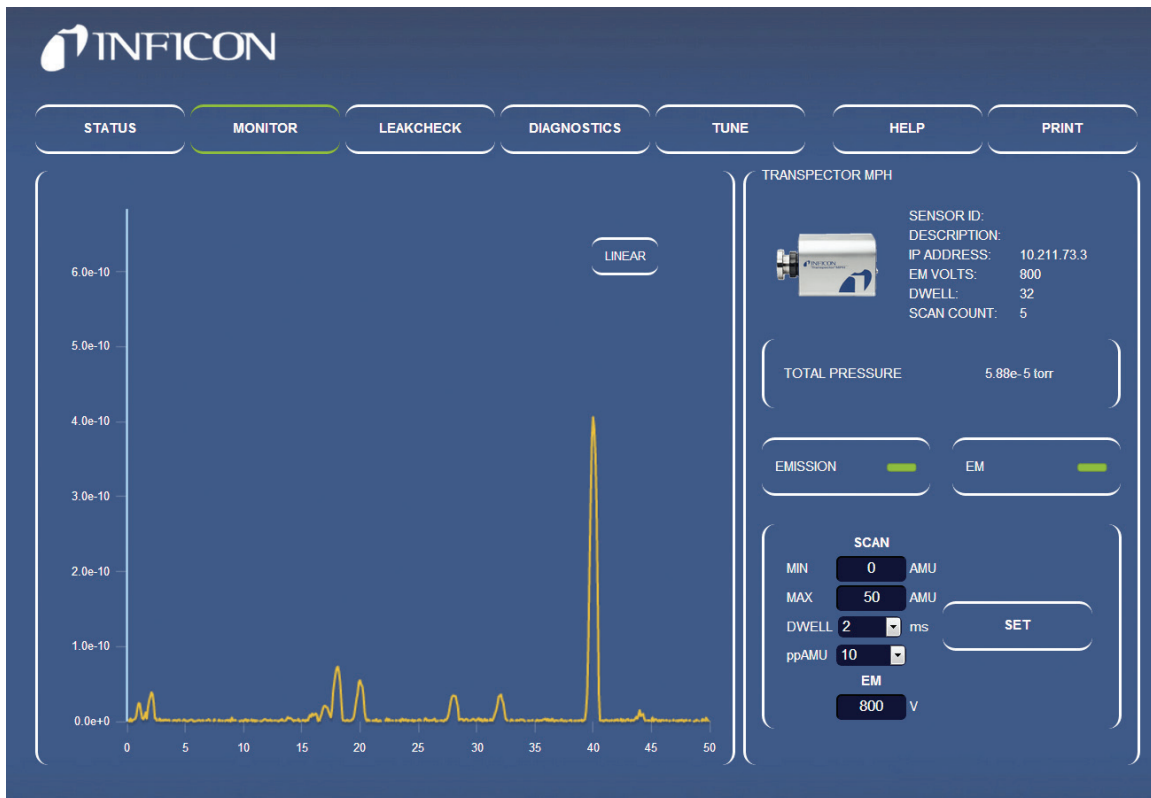
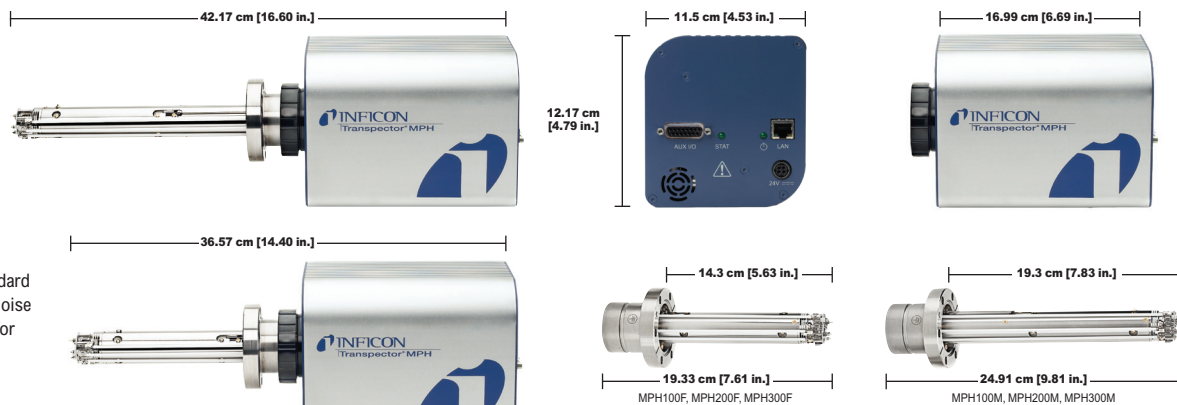Monitoring data through the onboard web server.

SPECIFICATIONS

	MPH100F	MPH100M	MPH200F	MPH200M	MPH300F	MPH300M
Sensor Length (vacuum side)	14.3 cm (5.63 in.)	19.3 cm (7.83 in.)	14.3 cm (5.63 in.)	19.3 cm (7.83 in.)	14.3 cm (5.63 in.)	19.3 cm (7.83 in.)
Mass Range	1 to 100 amu		1 to 200 amu		1 to 300 amu	
Detector Type	FC	EM/FC	FC	EM/FC	FC	EM/FC
Filament Type	Dual Y_2O_3/Ir (for general applications) or tungsten (for halogen environment applications) filaments					
Resolution (per 1993 AVS Recommended Practice)	<1 amu wide @ 10% peak height over the entire mass range					
Temperature Coefficient (during an eight-hour period, after a half hour warm up)	<1% of peak height per degree C (for FC Only)					
Sensitivity – amps/Torr (amps/mbar) FC	$6x10^{-4}$ ($4.5x10^{-4}$)		$5x10^{-4}$ ($3.8x10^{-4}$)		$4x10^{-4}$ ($3x10^{-4}$)	
Min. Detectable Partial Pressure – 256 ms dwell Torr (mbar)* FC	$1.2x10^{-12}$ ($1.6x10^{-12}$)	N/A	$1.6x10^{-12}$ ($2.1x10^{-12}$)	N/A	$2x10^{-12}$ ($2.7x10^{-12}$)	N/A
EM	N/A	$7x10^{-15}$ ($9.3x10^{-15}$)	N/A	$1x10^{-14}$ ($1.3x10^{-14}$)	N/A	$1.2x10^{-14}$ ($1.6x10^{-14}$)
Min. Detectable Partial Pressure – 4 s dwell Torr (mbar)* FC	$3x10^{-13}$ ($4x10^{-13}$)	N/A	$4x10^{-13}$ ($5.3x10^{-13}$)	N/A	$5x10^{-13}$ ($6.7x10^{-13}$)	N/A
EM	N/A	$2x10^{-15}$ ($2.7x10^{-15}$)	N/A	$3x10^{-15}$ ($4x10^{-15}$)	N/A	$4x10^{-15}$ ($5.3x10^{-15}$)
Max. Data Rate (analog scans OR selected peaks)	1.8 ms per point					
Zero Blast Interference at Mass 2	<5 ppm		<65 ppm		<100 ppm	
Total Pressure Measurement Range, Torr (mbar) **	$2x10^{-7}$ – $5x10^{-4}$ ($2.7x10^{-7}$ – $6.7x10^{-4}$)					
Max. Operating Pressure – Torr (mbar)	$5x10^{-4}$ ($6.7x10^{-4}$)					
Max. Bakeout Temperature (electronics removed)	300°C					
Max. Sensor Operating Temperature FC	200°C	200°C	200°C	200°C	200°C	200°C
EM	N/A	150°C	N/A	150°C	N/A	150°C
Power Input	20-30 V (dc), 30W max – typical 24 V (dc) 1.25 A max					
Ethernet Communications Interface	Standard: CAT5e Ethernet cable connection					
Optional Calibration Reference	Argon for EM calibration or test mix for tuning					
Relay Outputs	One relay, 24 V at 0.5 amps					
Inputs	One analog input, Two digital inputs					
LED Indicators (green)	One for power status, One for emission status					

N/A = not applicable

* Calculated using one standard deviation of the baseline noise divided by the sensitivity for nitrogen.

** Independent of partial pressure measurement for continuous filament protection and analysis.

42.17 cm [16.60 in.]

11.5 cm [4.53 in.]

12.17 cm [4.79 in.]

16.99 cm [6.69 in.]

36.57 cm [14.40 in.]

14.3 cm [5.63 in.]

19.33 cm [7.61 in.]
MPH100F, MPH200F, MPH300F

19.3 cm [7.83 in.]

24.91 cm [9.81 in.]
MPH100M, MPH200M, MPH300M

INFICON
Instruments for Intelligent Control®