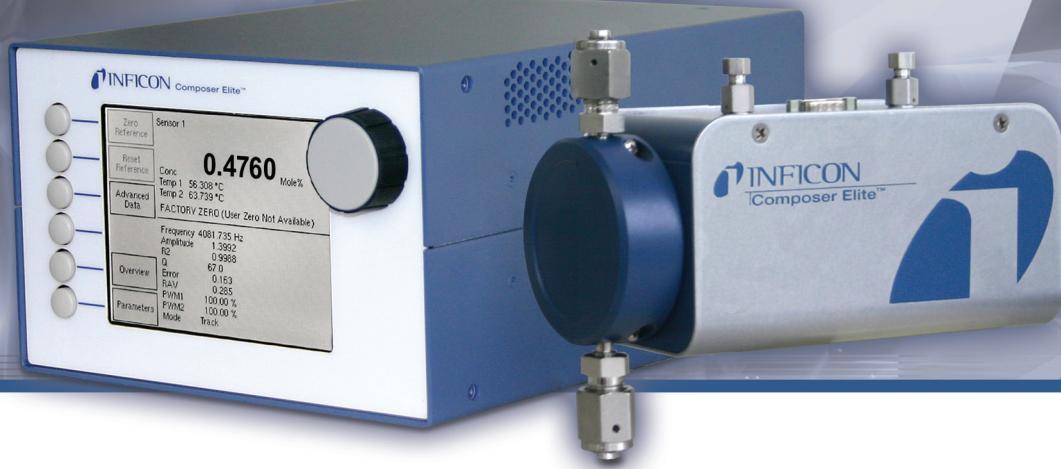




High Sensitivity to all Precursor Gases – Including Cp<sub>2</sub>Mg



# Composer Elite™

## Binary Gas Concentration Monitor

# When Composition of Your Binary Gas Mixture is Critical to Your Process

Composer Elite Binary Gas Concentration Monitor is a simple and reliable way to measure the composition of binary gases, including Cp<sub>2</sub>Mg in nitrogen and other low vapor pressure materials. Composer Elite accurately measures precursor and carrier gas ratios to precise levels, effectively reducing process variability and promotes efficient use of precursor materials. Developed by INFICON, a leader in advanced measurement instrumentation for the semiconductor and related industries, Composer Elite measures the ratio of a variety of binary gases. Its wide operating pressure range (200 to 1000 Torr) and high sensitivity make it an indispensable tool for semiconductor applications, including MOCVD, in both R&D and production environments, as well as for many industrial processes.

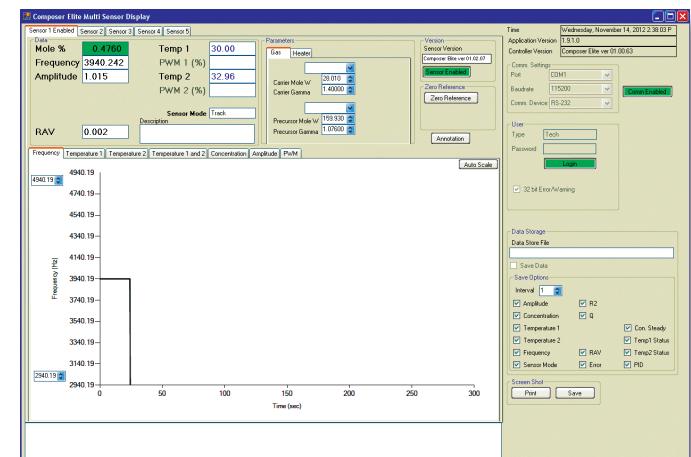
## UNPRECEDENTED SENSITIVITY, RELIABILITY AND ACCURACY

Our unique resonance measurement technique enables frequency resolution to less than 0.1 Hz, equivalent to 0.00011% of TMIn (trimethylindium) in H<sub>2</sub>. This is about 10 times better resolution than acoustic time-of-flight techniques. The resonance measurement technique also allows operation to pressures as low as 200 Torr for low pressure processes.

For applications that require process reproducibility with precise measurements, Composer Elite can be operated using factory zero point settings. When the highest accuracy possible is required, Composer Elite can be easily calibrated by simply purging the transducer's chamber with pure carrier gas and pressing the Zero Reference button.

## FEATURES AT A GLANCE

- accurately measures precursor/carrier gas ratios
- verifies stability of precursor and dopant delivery throughout structure growth and over time
- sensitive to Cp<sub>2</sub>Mg and other low vapor pressure materials
- promotes efficient use of expensive source materials
- monitors up to five sensors with one control unit



Our Windows®-based multipoint sensor software can be used to configure Composer Elite parameters, graph measurements, and save data on your PC.

## MEASURES THE DOPANT PRECURSOR Cp<sub>2</sub>Mg

Composer Elite is the only instrument that enables precise monitoring of the dopant precursor Cp<sub>2</sub>Mg, bis(cyclopentadienyl) magnesium, used in LED manufacturing processes. Combined with the ability to monitor all the other precursors used in LED and HB-LED manufacturing, Composer Elite brings enhanced precision and significant cost savings to manufacturers as they strive to lower the cost of their products to consumers.

## MONITORS GAS MIXTURES TO ENSURE SOURCE MATERIALS ARE USED EFFICIENTLY

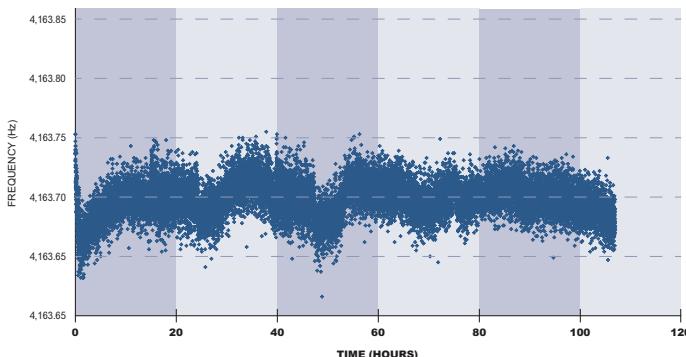
Composer Elite precisely monitors gas composition by measuring the speed of sound in binary gas mixtures. As the amount of precursor in the bubbler decreases, Composer Elite measures this change in precursor pick-up efficiency. This allows the operator, or system computer, to alter the flow of gas through the bubbler to correct the concentration as needed. With Composer Elite, expensive source materials are used efficiently, keeping costs contained while maximizing tool production time.

## EASY INTEGRATION INTO CONTROL SYSTEM

Both RS232 and DeviceNet Client communication are standard features, allowing Composer Elite to be easily integrated into a reactor's control system using digital communications.

## MONITORS CARRIER GAS FLOW STABILITY

The instrument can be used to verify carrier gas flow is stable throughout and between process runs. The transducer is inherently stable and can be relied on for maximum reproducibility.



### SHORT TERM STABILITY $\pm 0.05$ Hz OVER 112 HOURS

Composer Elite can be relied on to reproduce results consistently. Shown here is the excellent short term stability of Composer Elite ( $\pm 0.05$  Hz over 112 hours, equivalent to <1ppm TMI<sub>n</sub> in H<sub>2</sub>).

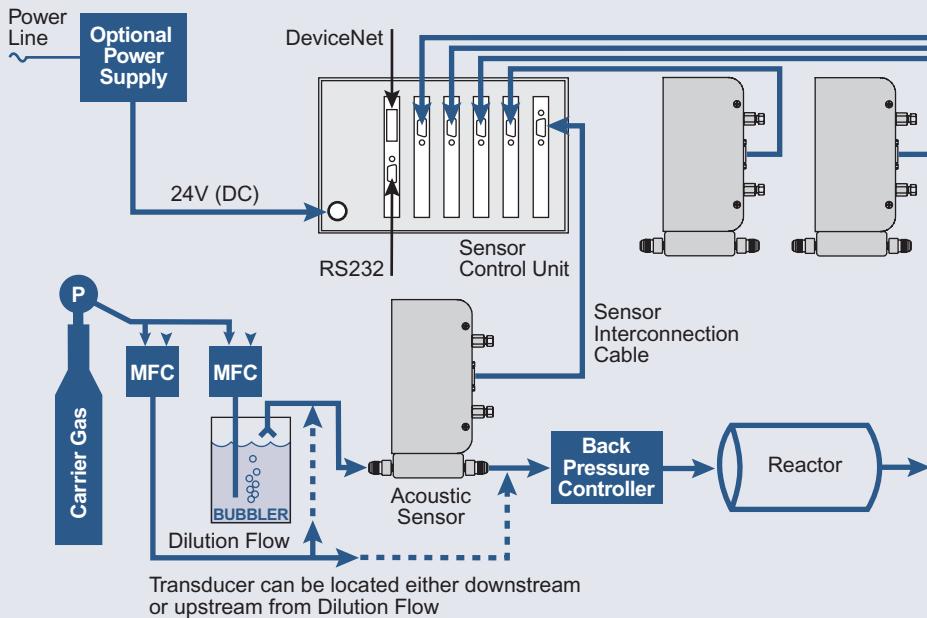
## HOW COMPOSER ELITE WORKS

Composer Elite consists of two main components: an acoustic sensor and a sensor controller unit. Based on the principle that sound velocity varies with gas composition, Composer Elite measures the composition of a binary gas mixture inside the sensor's acoustic chamber by measuring the speed of sound waves. The speed of sound is measured by determining the fundamental resonant frequency of a gas in an acoustic resonant chamber

(patent pending) of fixed geometry. The instrument determines resonant frequency by sweeping an applied acoustic frequency across the operating range and then locking-on the resonant frequency having the highest Q (best resonant sensitivity) as sound is transmitted. Once identified, Composer Elite easily determines the maximum amplitude and precise frequency of the peak by applying a pre-planned sequence of frequency steps and fitting

the resultant frequency vs. amplitude data to a model Lorentzian shaped peak once per second.

Composer Elite calculates concentration by comparing the resonant frequency of the binary gas to the measured resonant frequency of the pure carrier gas. Correct precursor concentration is automatically, accurately and consistently derived through the unmatched acoustic properties of the instrument's proprietary resonant chamber.



## MONITOR FIVE SENSORS WITH ONE CONTROL UNIT

A unique feature of the Composer Elite is its ability to monitor five sensors with one sensor control unit. This reduces system complexity by minimizing the number of sensor control units needing to interface to your tool.

## SPECIFICATIONS

### Performance

Operating pressure range	200 to 1000 Torr; 9.3 to 133.3 kPa
Routine overpressure rating	Up to 1520 Torr, 202.7 kPa
Maximum transducer pressure	6200 Torr (826.6 kPa) Absolute. Pressure over 6200 Torr may damage transducer diaphragms.
Gas flow range	Up to 2000 sccm
Temperature range	Up to 65°C (Acoustic sensor), temperature control is heat only, no active cooling
Temperature stability	Controlled to <0.01°C
Frequency stability	Stable within 0.0045%
Sensitivity	0.00011% of TMIn in H <sub>2</sub>
Reproducibility	<3 x 10 <sup>-6</sup> molar TMIn equivalent

### Construction

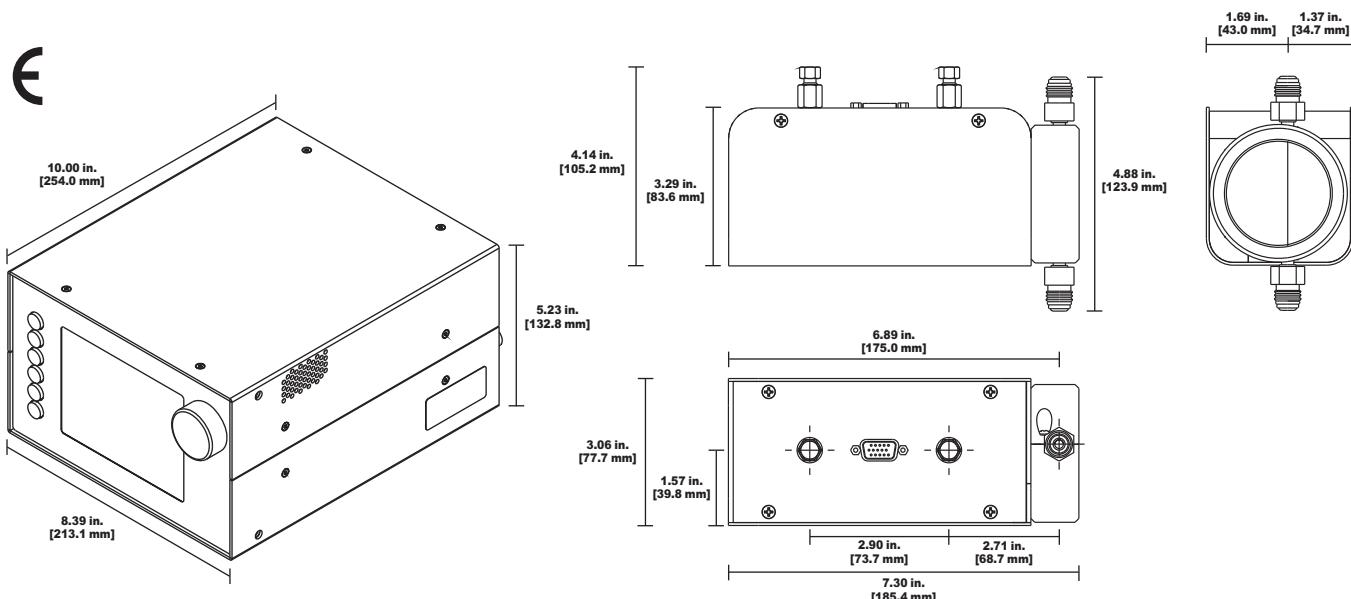
Sensor body and pipes	316L Stainless Steel
Isolation diaphragms	Inconel® X-750
Inlet/Outlet	VCR-4 fittings
Leak rate	<1 X 10 <sup>-9</sup> std. cc/s He
Measurement rate	1 Hz
Swept volume	8.9 cc
Power	
Required:	24 V (dc), 240 W
Optional:	A 24 V (dc), 240 W power supply with universal AC input can optionally be purchased from INFICON

### Software

Multipoint sensor software	Windows-based software for graphing, saving data, and operating Composer Elite.
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### Options

Rack mount kit	Single unit rack extender kit available for maintaining one Composer Elite sensor control unit in a standard 19 in. rack.
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**INFICON**

Instruments for Intelligent Control®

[www.inficon.com](http://www.inficon.com) [reachus@inficon.com](mailto:reachus@inficon.com)

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Due to our continuing program of product improvements, specifications are subject to change without notice.

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