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Redefining the Conventional

The most significant contributor of frequency drift in quartz crystals comes from changes in temperature. Traditional sensor heads address this with water cooling. While many manufacturers advise that crystal temperature should be kept “around 20°C”, they have no means of measuring temperature. Real world application has shown that a standard water cooled sensor can experience a 20°C fluctuation within as little as 10 minutes during high rate deposition. In an industry of nanometer measurements, this level of variance may easily result in a significant inaccuracy within thickness reading.

Colnatec simply wasn’t satisfied with the level of precision available in today’s market. For this reason, Colnatec designed the Phoenix™ sensor head to set a new industry-standard. The Phoenix™ adds a new level of control to the thin film deposition process by utilizing an embedded thermocouple that may be read with a simple thermocouple meter. When integrated with the Eon-LT™ film thickness monitor or controller, both temperature and frequency are automatically graphed alongside the corresponding rate and thickness values on a personal computer, allowing for real-time correction and accuracy up to .001 Hz.

The Phoenix™ is optimized for Colnatec’s RC™ crystals that are uniquely immune to radiation spikes and film stress caused by shutter openings, film condensation, and source radiation. The system is ideal for ALD (atomic layer deposition) systems when used with HT crystals, reducing ex-situ metrology sampling and scrapped runs due to real-time control of process and/or reactor conditions. In addition, it increases accuracy in film deposition per wafer, leading to higher process yield and improved film quality.

PHOENIX™ SINGLE FILM THICKNESS SENSOR

CONVENTIONAL SENSOR WITH EMBEDDED THERMOCOUPLE

Features:

- Temperature measuring quartz crystal sensor head, single versions
- Embedded type K thermocouple
- Designed for 14 mm diameter crystals, up to 10 MHz operation
- Available with 2.75 Conflat™ or 1” bolt feed through as stock configuration. Length 30” (75 mm). Custom sizes, flanges and bends available. Also available with compression fittings to allow infinite length adjustability.
- Standard SMA air side connection for crystal measurement. Compatible with the Eon-LT™ or other film thickness monitors and controllers

Specifications:

(Subject to Change)

- Operating Temperature: 20-500°C
- Vacuum Rating: $1x10^{-8}$ Torr
- Component Materials:
  a) Sensor Body: 304 SS, alumina insulators, stainless steel and gold springs, 304 SS connecting screws
  c) Thermocouple: Type K, 304SS sheathed, feed through via compression port
  d) Crystal Cable: Teflon-sheathed microcoaxial or copper clad metallic conformable microcoaxial
- Dimensions:
  a) Length: 4” to 30” depending on customer requirements
  b) Cross Section: Able to be passed through a 2.75” ConFlatTM port

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