

## Colnatec Oasis™ Dual or Single Sensor Head

### Heated Sensor Head with Embedded Thermocouple

The Oasis™ sensor head embodies a revolutionary approach to quartz crystal film thickness monitoring-temperature measurement and control. Traditionally a crystal is water cooled to minimize the frequency drift of AT-cut quartz when it is exposed to heat. This drift adds an error to the thickness measurement. But how do you know if the cooling is actually working? The simple truth is you don't. Conventional sensor heads don't have a means of measuring temperature, let alone controlling it. In a world of nanogram measurements, it seems odd that any world-class manufacturer would tell you to keep your crystal "around 20°C.

Quartz crystals are temperature, stress and mass sensitive devices. To get an accurate measurement, you need to eliminate the temperature and stress effects, leaving only the mass change (which is converted to thickness by knowing the density). Water-cooling helps, but only as long as you can keep that temperature constant, which it never is, unless you use a dedicated chiller. But that still leaves stress, the source of all crystal headaches.

Stress is the reason crystals get noisy after coating them with dielectrics like SiO<sub>2</sub>, MgF<sub>2</sub> and TiO<sub>2</sub>. It leads to erratic measurements and early crystal failure. Cooling the crystal exacerbates the problem. So not only do traditional sensors poorly control the variations caused by heat, they also shorten the life of the crystal--bad news all the way around. Our experiments revealed that heating the sensor to 90°C increased life by 300% or more and decreased noise up to 100%. Problems solved.

But there's more...the Colnatec Eon™ monitor has a built in frequency vs. temperature algorithm to smooth out the thermal drift to increase accuracy by an order of magnitude, and our RC™ cut quartz crystal has been independently proven to be stress and thermal shock resistant. Coat this with aluminum alloy and noise disappears, creating the ultimate film thickness sensor solution.



#### Features

- \* Temperature measuring and controlling sensor head, 14 mm diameter crystal compatible, air-cooling coupled with an integral heater. Uses low pressure air with included pump. Whisper quiet.
- \* Available with 2.75 Conflat™ or 1" bolt feed through. Standard BNC airside connection, 10-32 vacuum connection (aka Microdot™ connector). Easy replacement for your outdated sensor
- \* Designed to perfectly mate to our Eon monitor with integrated temperature measurement and heater power, but compatible with any standard film thickness monitor
- \* Out of the box ready to go. No water lines to connect!

#### Sensor Specifications (subject to change)

- 1) Operating Temperature: 40°C to 250°C. Depends on crystal used (AT, RC™ or our new HT™ cut)
- 2) Vacuum rating: 10<sup>-7</sup> torr
- 3) Component materials
  - a) *Sensor Body*: 304 SS, alumina insulators, stainless steel and gold springs, 304 SS screws
  - b) *Thermocouple*: Type K, 304 SS sheathed, passes through feed through via compression port
  - d) *Crystal Cable*: Teflon sheathed microcoaxial or metallic conformable microcoaxial
- 4) Dimensions
  - a) *Length*: 1.5"x1.5" x 1" Air lines standard length 30". Custom lengths and bends available
  - b) *Cross Section*: Able to be passed though a 1" bolt or 2.75" ConFlat port
- 5) Compatible with AT, RC™ or HT™ crystals in gold or alloy
- 6) Available with shutter as a single or dual sensor head
- 7) Stand alone set-point temperature control system optional (for use with your existing film thickness monitor)

