

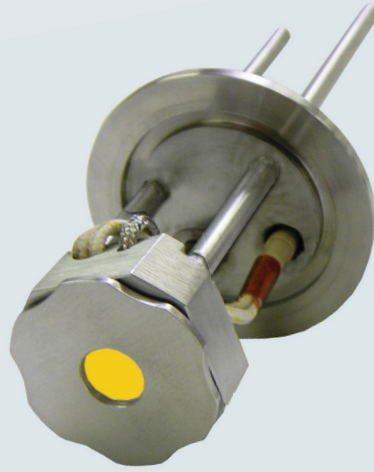
## Self-Heating Sensor for Thin Film Measurement and Control

Tempe™ System is designed for thin film coating process control in high-temperature environments. With a heater built into the sensor, the Tempe™ system can achieve and maintain any temperature within a range of 40-500°C. This can be useful in a variety of circumstances.

If the process requires a heated substrate in a cold chamber, the Tempe™ sensor is capable of mimicking the temperature of the substrate. The sensor is also capable of initiating a high-temp, self-cleaning “bake cycle” that can extend crystal life and reduce interruptions due to crystal failure in a continuous process environment.

Contributing to the accuracy of this temperature control system are a built-in thermocouple that conveys temperature data to the Eon™ controller - which makes real-time adjustments to the heater - and the Mirage™ air-cooling unit, which automatically delivers super-cooled compressed air into the sensor in response to the fluctuating temperature changes of the sensor.

The accuracy of Tempe™ system during depositions between 200-350°C is further enhanced by Colnatec’s High Temperature™ (HT) crystal, ideal for ALD, CVD, MBE, CIGS, solar cell fabrication, OLED, and a variety of other thin film processes.



## TEMPE™ SYSTEM

THIN FILM MEASUREMENT WITH TEMPERATURE & DEPOSITION CONTROL

### Features

- Temperature controlled sensor head, complete with heater, air-cooling lines, and embedded TC (optional shutter if required)
- KF or ConFlat vacuum flange with connectors for heater, TC, crystal control, air lines for cooling, and optional shutter
- Freestanding PC-based film thickness monitor/controller with integrated temperature measurement and heater control. Continuously reports rate, thickness, and crystal temperature data in real-time
- Mirage™ Air-Cooling System capable of supplying cold air up to 28°C (50°F) below the supply air temperature
- Tempe™ System includes all connecting cables, remote oscillator, easy-to-use PC software, quick-start guides, and instruction manual

### Applications

- Atomic Layer Deposition (ALD)
- Chemical Vapor Deposition (CVD)
- Molecular Beam Epitaxy (MBE)
- CIGS (thin film solar)
- OLED (display & lighting)
- Multi-Layer Optical Thin Film Deposition

## Specifications

Measurement	
Frequency Resolution	0.001 HZ @ 6 MHz (1 sample per second)
Sample Rate	100 Hz - 10 Hz (10 ms - 100 ms)
Display Update Rate	10 Hz - 1 Hz (10 ms - 100 ms)
Sensor Crystal Frequency	6 MHz
Electronics	
Temperature	2x TC Type K
LED(s)	Dual status
DB9	2x relays SPST (programmable) N.O.
DB37	Heater control connector
Source Power Supply Signal	0-5v DC source controls (2)
Sensor Head Input(s)	High resolution inputs, accurate up to .001 Hz (2) BNC
Thermocouple Input(s)	Type K thermocouple inputs; resolution 0.1°C (2)
Software	
Thickness	Auto ranging: -999 to 9999.9 kÅ
Rate	Auto ranging -999 to 9999.9 Å
Power	00.00 to 100%
Crystal Health	00 to 100%
Number of Processes	100,000+
Number of Layers	100,000+
Manual Power Control	Yes
User Labeled Process	Yes
User Labeled Films	Yes
Shutter Delay	Yes
Software Control Loops	PID
Data Logging	Yes
User Language	English
Communications	
RS-232 Communication Compatibility	Yes
RS-232 Baud Rate	115200 Baud
Communication Protocol	Communication status Power-up status RS232 ( <a href="#">Communications manual available online</a> )

Sensor	
Sensor Communications	2x BNC connections
Temperature	Type K TC (2)
Source Power Supply Signal	0-5v DC source controls (2)
Heater Composition	Aluminum nitride with tungsten traces
Power Cable Composition	Silica ceramic braided nickel wire
Sensor Composition	<ul style="list-style-type: none"> <li>•Body: 304 SS (stainless steel)</li> <li>•Insulators: Alumina</li> <li>•Contact springs: Inconel</li> <li>•Screws: 304 SS (stainless steel)</li> </ul>
Vacuum Rating	1X10E-8 Torr 1.32E-11 atm 1.33E-6 Pa
Dimensions	
Tempe™ Sensor	<ul style="list-style-type: none"> <li>•Head: 0.56" X 1.18" x 1.18"</li> <li>•Body length: 4" to 30" depending on customer requirements</li> <li>•Head width: Can be passed through a KF or ConFlat port with an inner diameter larger than 1.377" (35 mm)</li> </ul>
Eon™ Controller	4.5" X 2.5" X 1.75"
Mirage™ Air-Cooling System	6" X 5.5" X 4.25"
Power	
24 volt power (supplied)	
Ordering Information	
Tempe™ System	PC-Interactive thin film measurement system with temperature and deposition control