

REMOTE ATMOSPHERE MEASUREMENT

for Industry's Hostile Environments

The **Sentinel-ES™** is a breakthrough, cost-effective solution for monitoring oxygen concentration in applications running at temperatures or with environments too hostile or impractical to use in-situ probes.

The Sentinel-ES™ remotely measures oxygen content for use in calculating dewpoint, carbon potential, and oxidation reduction (ReDox) potential.

This high-performance sensor is designed for operation in challenging applications including endogenerators, ferritic nitrocarburizing, annealing, sintering, brazing and many other applications where in-situ probes have proven impractical. The unique design of the **Sentinel-ES™** enables it to be positioned in areas unaffected by furnace motion, making it ideal for use with rotary furnaces.

Owing to its re-buildable design, the **Sentinel-ES™** is extremely cost effective. By allowing the sensing element to be replaced separately, the probe offers tremendous longevity. Replacement of the core sensing element is generally priced less than 1/3 the cost of a new probe.

Sentinel-ES™ Advantages:

- Fastest response – more than 10X faster than reheat wells.
- Measures O₂ concentrations down to PPM levels.
- Easy, two-part installation *without* penetration of the generator refractory or wall.
- Low lifetime cost, resulting in cost-effective replacement and repair value.
- Avoids temperature drift problems associated with conventional lambda-based probes.
- Operates without a separate reference air panel.
- No risk of thermal shock.
- No burn-off required.



The **Sentinel-ES™** is housed in a small enclosure usually located near the sample source. Installing the **Sentinel-ES™** is remarkably easy, simply run a sample line from the source to the probe and direct the sample vent from the probe. The output from the **Sentinel-ES™** is a T/mV signal, providing a direct connection to any industry standard controller or monitor.

The **Sentinel-ES™** is produced exclusively by Marathon Sensors, the leading worldwide manufacturer of high and low temperature probes and instrumentation for heat treating and process combustion applications. *To find out more, visit our website:*

www.marathonsensors.com

The Sentinel-ES™ Thrives Where In-Situ Probes Cannot Survive

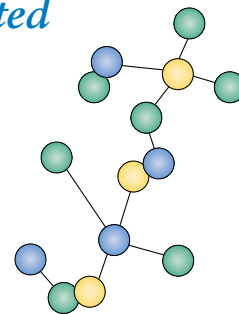
Sentinel-ES™



**Marathon
Sensors Inc.**

The Sentinel-ES™ Is Ideally Suited for Atmospheres Including:

- Endothermic Gas ($N_2 + CO + H_2O$)
- Nitrogen/Methanol ($N_2 + CH_3OH$)
- Nitrogen/Natural Gas ($N_2 + CH_4$)
- Nitrogen/Propylene ($N_2 + C_3H_6$)
- Nitrogen/Acetylene ($N_2 + C_2H_2$)
- Nitrogen/Hydrogen ($N_2 + H_2$)
- Dissociated Ammonia (NH_3)
- Helium (He)
- Argon (Ar)
- Nitrogen (N_2)
- Hydrogen (H_2)



Specifications

Enclosure: 14" x 12" x 6"

Power Requirements: 120V/60Hz

Input: Standard 1/4" Sample Line Connection (Max Inlet Temp 125°F)

Output: Sensor (mV) and Temperature (mV)

Two-Stage Filtering:

- 100 Micron Bowl Filter
- 10 Micron Replaceable Centered Stainless Steel Filter

Flowmeter: 0.2 - 2.0 CFH



Leading Heat Treaters Choose New Sentinel-ES™ Technology

Sentinel-ES™ was beta tested, then brought into full production for the first time, at Scanco, Inc., Federal Way, WA.

Scanco does quench and temper, neutral hardening, stress relieving, nitriding, and carburizing, as well as vacuum hardening. The company operates several IQ furnaces, and uses conventional Marathon carbon probes for their furnaces, and the Sentinel for gas generator control. Achieving QS9000 certification in 1997 was a landmark which created new opportunities and helped guide decisions regarding the choice of new controls.

Because the Sentinel is a remote atmosphere measurement system, thermal shock, which is always a concern when probes are removed or replaced, isn't a factor. Instead of a furnace probe, Sentinel has a 3" sensor and an integral heater that brings the sample to 700°F.

According to Scanco Plant Manager Frank Biouick, Sentinel technology is exceptionally accurate. "It's about ten times faster than a carbon probe," he says "and about one thousand times faster than the Alnor." The exceptional speed is a function of the shape and greater surface area of the zirconia.

Scanco uses the Sentinel to maintain dewpoint at 55 or 60, and to keep the generator catalyst safely between the 'too high' and 'too low' points, where catalyst damage can occur.

"A generator," says Biouick, "is really no place for a conventional probe. The process is stable, but running at 1800° puts a lot of wear on any probe stuck in that environment. We're glad there's finally an alternative that provides all of the performance of a carbon probe, and none of the downsides."

Queen City Steel Treating (Cincinnati) is the only heat treater in its region to achieve QS-9000 Certification, the Q-1 Award, and ISO 9002 registration.



Queen City offers batch and continuous atmosphere processing, carburizing, carbonitriding, neutral hardening, induction, and Nitroflex. The company selected the new Sentinel-ES™ for dewpoint control.

"Particularly in winter, utilities dump propane in the system," says President Mike Stenger. "Propane cracks differently than natural gas and air, and drives down dewpoint. The Sentinel will compensate for that. So we'll avoid sooting up the furnaces on the low end, or sooting up the generators on the high end. "We also know that sooting in the furnace means carbon in your quench oil," he continues. Now *there's* a reason to control dewpoint!"

Queen City sees its opportunities expanding as the auto companies continue to broaden their supplier base. "All 3 majors are outsourcing more, delivering more finished components and subassemblies to the assembly line. We want to be there for all of them – and that means doing whatever it takes to achieve highest quality results."



Marathon Sensors Inc.

3100 E. Kemper Rd.

Cincinnati, OH 45241-7007

(800) 547-1055

(513) 772-1000

fax (513) 326-7090

HALMA GROUP
COMPANY