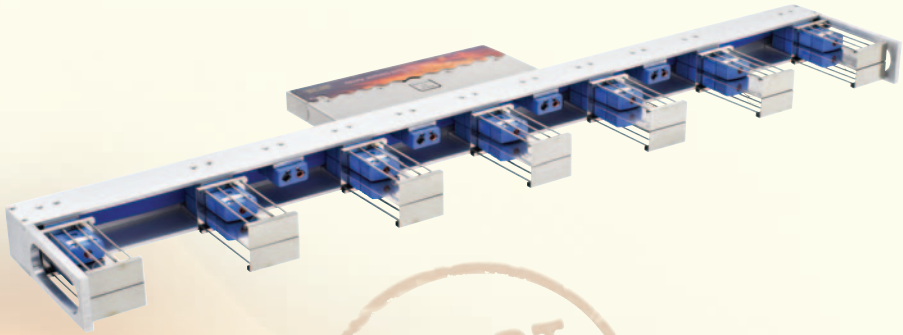
Temperature Sensor Array

Product level temperature throughout an oven can make the difference between optimum quality and throughput – and wasteful, under baked or burnt product. The right temperature applied at the right time causes chemical reactions to occur within a product. The process of fermentation, product swelling, moisture evaporation, flavor development, and surface coloring are all time and temperature dependent.



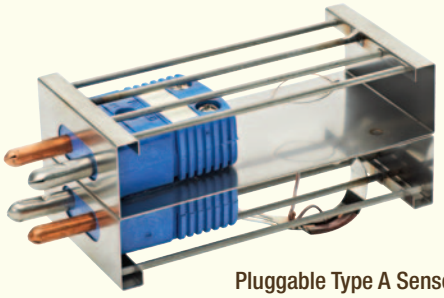
The Process

The SCORPION® 2 Temperature Sensor Array is designed to measure temperature at product level, in fixed positions across the conveyor, delivering a true representation of what the product experiences over time. The design contains pluggable thermocouple pairs equally spaced across the length of a bar, which is selected to match the width of the oven band. The number of sensor pairs varies with the length of the bar/conveyor width. The sensor array travels through the process with the product, and the oven under full load, yielding a precise picture of temperature from side-to-side and end-to-end. Simultaneous product-core-temperature measurements can be made via the product probe inputs on the sensor array.

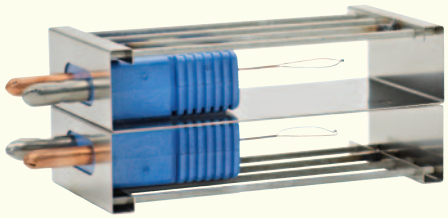
There are two types of Pluggable Temperature Sensors. **Type A** is an Air/Conveyor sensor designed to measure air temperature immediately above the conveyor, and surface temperature of the conveyor itself. Type A is used on solid or tight mesh conveyors. One thermocouple in each pair measures air temperature; the other is spring-loaded down onto the conveyor surface. Type A Temperature Sensors can only be used with the THB40 & THB50 Thermal Barriers.

Standard Array Configurations

Conveyor Width mm (inch)	Array Width mm (inch)	Sensor Pairs (#)	Sensor Spacing mm (inch)	Product Probe Inputs (#)
300 (11.80)	250 (9.80)	3	99 (3.88)	2
500 (19.70)	450 (17.70)	5	100 (3.94)	4
800 (31.50)	750 (29.50)	7	116 (4.56)	4
1000 (39.38)	950 (37.38)	9	112 (4.44)	4
1200 (47.25)	1150 (45.25)	11	110 (4.31)	4
1500 (59.06)	1450 (57.06)	13	117 (4.56)	4
2000 (78.75)	1950 (76.75)	15	136 (5.31)	2



Pluggable Type A Sensor

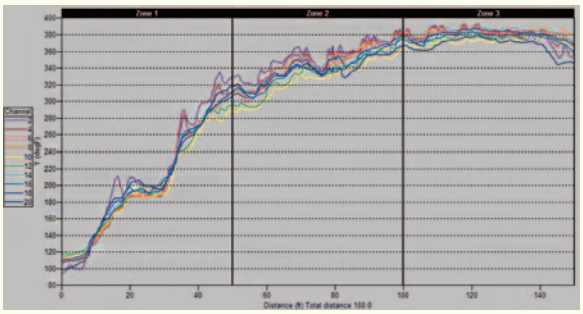


Pluggable Type B Sensor

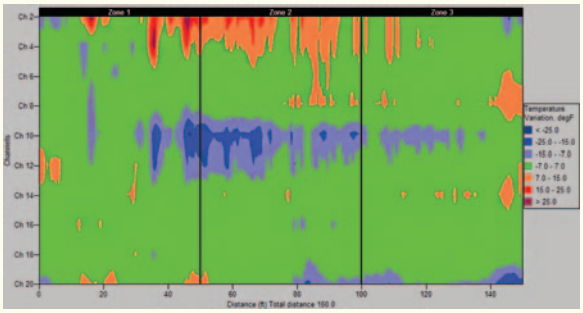
Type B is an Air/Air sensor designed to measure upper air temperature immediately above the conveyor, and lower air temperature of the air rising through the conveyor. The upper and lower thermocouples are separated by a thin shield. Type B is used on open mesh conveyors. There are 2 or 4 product probe inputs on the temperature sensor array (see Standard Array Configurations Table).

Analyzing the Results

The stored data for each of the sensors can be displayed as a line (channel) in a **2D Line Graph**. Individual channels, combinations of channels, and channel averages can be displayed against time, distance, and % travel through the process. Side-to-side temperature variation is directly related to side-to-side variation in product bake, and represents a critical measurement displayed by this sensor array. The tighter the pattern of lines the more even the temperature is across the width of the band. Visually, side-to-side variation is better displayed in a **2D Contour Graph**, which in this example is showing greater than 28°C (50°F) band temperature variation; indicated by the hotter (red) left side and cooler (blue) center of the band.



2D Line Graph



2D Contour Graph

Technical Summary*:

- Number of Sensor Elements (channels): up to 32
- Sensor Type: Type T thermocouple
- Product Probe Inputs: 2 or 4 based on array length (custom options available)
- Product Probe Sensor Type: Type T thermocouple (Type J&K optional)
- Operating Temperature Range: -50°C (-58°F) to 350°C (662°F)
- Resolution: 0.025°C (0.045°F)
- Accuracy: ±1.0°C (±1.8°F)
- Response Time: t60 = 3.5sec in air at 1m/sec (200ft/min)
- Battery running time: 50+ hrs.

**Not rated for condensing environments*

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