Thermateq"-nology

August 2003

BF Sensor Upgrades

The active part of the BF sensor uses printed circuit board technology to produce a thermopile. Thermopiles are arrays of thermocouples connected in series to increase the sensitivity. In a heat flux sensor the thermopile reads the temperature difference between the top and bottom layers of the sensor. Vatell has adjusted the thermopile pattern of the BF sensors to enhance their performance.

The new BF thermopile pattern has fewer junctions than it did previously. However, these junctions perform more efficiently and the result is better or equal sensitivity. The advantage of the new pattern is that it produces more consistent results within a batch of sensors and from batch to batch. It is less susceptible to process variations. As a result the sensitivity and resistance of sensors are more uniform.

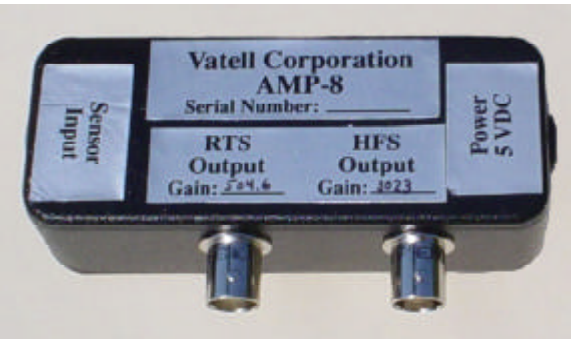
The individual sensor is also more consistent across its active area. The output of the BF sensors represents an average heat flux across the active area of the sensor. The new pattern produces a more uniform sensitivity across this area; there are fewer high and low spots within the thermopile.

New AMP-8

Our next generation AMP-8 is now available. The AMP-8 is designed for use with our HFM series heat flux sensors. The AMP-8 uses AC power, allowing for continuous operation.

There are two main changes in the features of the AMP-8. The first is that the zeroing potentiometer is now accessible externally. Previously the AMP-8 had to be paired with a specific sensor and zeroed at the factory. The new design allows for the AMP-8 to be paired with any sensor and zeroed by the customer. The second change is the packaging size. The new package is 1.25 x 1.5 x 4 inches. The previous version was 2.2 x 3.5 x 4.5

The electrical features of the AMP-8 remain the same. For specifications please see our website at http://www.vatell.com/amp.htm



Amp-8

Calibration Upgrade

Vatell Corporation believes strongly in the importance of reliable, precise, accurate calibrations. We are in the process of upgrading hardware and software used in our standard calibration system. Our belief is that this effort will make the calibration of our products even better.

Our efforts are focused on replacing as many manual processes as possible and enhancing electronic ones. LabVIEW software and a new computer system are important additions in this regard. A switch has been placed in our black body furnace so that measurements will be triggered at the exact same physical location for every standard sensor that is plunged into the cavity. The standard sensors will look at the same spot every time and data will be collected digitally. This will represent a more repeatable and precise process.

Detailed information on Vatell's calibration procedures can be viewed on our website at http://www.vatell.com/calibration.htm

A Customer's Application: Floor Test Funnels Heat

One of our Japanese customers is a manufacturer of mass produced housing. They use our BF sensors to measure heat transfer through various materials, including flooring materials. Recently we worked with them to solve a problem that arose during some of their testing.

The customer reported a discrepancy with a heat flux measurement on a flat plate heater using a BF-03 heat flux sensor, wherein the sensor measured more energy than was being used to heat the plate. The customer sent the heater and a description of their test to Vatell Corporation for analysis. The experiment the customer describes is as follows:

The BF-03 is pasted in the center of a 0.5 mm thick aluminum plate with the same dimensions as the heater. The heater is placed under the aluminum plate Under the heater is 50 mm thick polystyrene insulation. Presumably nearly all the heat must leave through the aluminum plate. The customer used 100 V supply to the heater to generate 20 W of power. The heater area was given as 700 cm^2, so the heat flux measured should be 0.0286 W/cm^2. Their sensor with a sensitivity of 51.95 $mV/W/cm^2$ should have had an output of 1.48 mV, but registered an output of 3 mV.

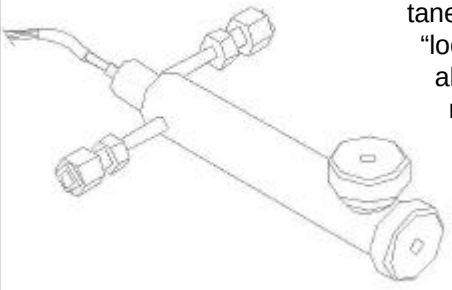
Vatell Corporation duplicated this experiment, except the aluminum plate on hand was only 0.35 mm thick and the BF-03 used had a sensitivity of 55.00 $mV/W/cm^2$. Omegatherm thermal grease was used to fix the sensor to the aluminum plate. Because the aluminum was so thin and given to warping, it was weighted to keep it flush with the heater. The weights were metal blocks set on small ceramic pieces to provide adequate weight over a reasonable area without acting as a heat sink for the aluminum. No thermal grease was used between the heater and the aluminum to prevent any possible damage to the customer's heater. Using this setup the following discrepancies were found that would account for the artificially high reading the customer found:

1. With a variable transformer set to 100 V, the current into the heater was measured at steady state to be only 0.158 A, which means the heater only produced 15.8 W and not 20 W.
2. The active area of the heater was measured to be about 670 cm^2; this was not precise because some of the heating element was covered with opaque tape and so an exact dimension could not be found, but it was most likely less than 700 cm^2. Although this would nominally increase the expected heat flux, with the lower power described above these two factors bring the expected heat flux down to 0.0236 W/cm^2.
3. Different heat flux values were measured for the center of the plate, the middle of the side, and the corner. The highest measurement was found to be in the center. Because the aluminum plate used by the customer was thicker, this effect may have been reduced in their case. The difference between the center and the corner as measured at Vatell was 0.0068 W/cm^2, a variation of about 20%.

In the setup described above, the heat flux was still higher than expected. However, when the aluminum plate was painted black to match the sensor, the heat flux value dropped by 16%, bringing it into the expected range. This would indicate that the paint on the sensor makes it a more efficient radiator than the aluminum plate. Because it is a better radiator the heat tends to be funneled through the sensor, which makes its reading artificially high. For the customer with a thicker aluminum plate, this effect would probably be even more pronounced. This effect is limited to applications in which heat is radiating away from a test surface with low emissivity.

A Custom Sensor

One of the advantages of the Thermogage product line is the ability to customize housings. The geometry of the sensor housing can be modified to fit specific applications. A common application that uses custom sensors is the furnace industry. Many of our customers find it important to characterize the heat transfer occurring in their furnaces. Some customers require measurements of the heat source at the bottom of the furnace and from the walls of the furnace. A special design was developed to allow for these measurements to be done simultaneously. The custom design allows for a measurement of heat with the sensor "looking" down at the furnace heat source while at the same time, "looking" axially at the wall of the furnace. The accompanying picture shows this instrument. If you have an application that you think may benefit from a custom sensor, we would be happy to discuss various options that might meet your needs. Please feel free to contact our office in this regard.



High temp HFM-8s

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In our last newsletter we discussed the development of the new HFM-8. The HFM-8's use a thermocouple on the face of the sensor instead of an RTS for temperature compensation of the heat flux measurement. Since the last newsletter, we have developed the high temperature HFM-8 E/H. The specifications for the HFM-8's and all of Vatell's HFM sensors are available on our website at http://www.vatell.com/hfm.htm

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SEQUOIA Technology Ltd

Last year Vatell Corporation brought on Sequoia Technology as our exclusive representative in Europe. Sequoia Technology has hit the ground running and is doing a fantastic job working with our customers. They specialize in supporting and distributing highly technical products.

Sequoia Technology was founded in 1986. They have established a technically oriented sales and support team with the goal of acting as an extension of Vatell Corporation and their other principles. Their sensors division is active in a wide range of applications including Aerospace, Industrial, Scientific, Medical, and Food and Drink. We are happy to be working with them and expect a long and successful relationship.

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センサテクノス株式会社
Sensortechnos, Inc.

In Japan our products continue to be exclusively represented by Sensortechnos Inc. Japan continues to be a strong market for Vatell Heat Flux Sensors. We are proud of our association with Sensortechnos and the support they provide Vatell customers.

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We want to know about your applications. Send us your application and you can win a free BF sensor.

* 10 Entries will be selected at random as winners
* 10 Entries will be judged for most unusual application.

We will post winning applications on our website unless you indicate yours is confidential.

Tell us:
1. A brief description of your test and how you are using any heaf flux sensor.
2. Any other pertinent or interesting information.

You don’t even need to have actually run the test. We are interested to know ideas you have for applications.

E-mail your summary to: mkt@vatell.com
Or Visit our website at: http://www.vatell.com

Winners will recieve a diamond configured BF-02 sensor with NIST Traceable calibration.