



# TFC-9000™

## Measure Ink and Coating Curability!

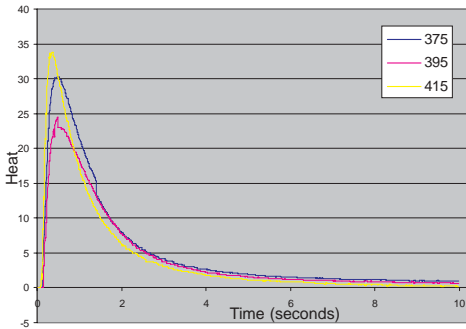


Quality check your coatings, adhesives, and inks with CON-TROL-CURE's® TFC-9000™

You need a radiometer to ensure the performance and curing effectiveness of your UV lamps. So, how do you ensure the performance and curing effectiveness of your inks, coatings and adhesives? Up until now, it was mostly guess work. If you had curing problems and had ruled out your UV lamps as the culprit, your next target was most likely your chemistry. **The CON-TROL-CURE™ Thin Film Calorimeter (TFC) allows you to quantitatively measure the curability of your inks, coatings and adhesives.**

The TFC-9000™ qualifies your inks, coatings and adhesives curability and ensures that they are curing consistently, batch-to-batch. Now you can **test the shelf life of stored inks** and evaluate older inks to know conclusively if they still perform to your expectations. Less wasted material translates into greater savings and profits.

A need was identified to be able to accurately measure cure with UV LED curing lamps. The question was, "which wavelengths perform better?" We have defined performing better as curing better. So, we developed a procedure using the TFC-9000 to quantitatively evaluate the curing of polymers with UV LED's. This allows us to easily determine which LED wavelength we should use in designing an LED curing system for use with a specific polymer.



The TFC-9000™'s clear data enables simple analysis for your product testing.

This recent test performed by the TFC-9000 clearly demonstrated the effects of curing a UV curable coating with different UV wavelengths. The same coating was cured with 3 unique UV LED lamps and the resultant curves were overlaid for evaluation. The TFC-9000's measured results (in the graph at left) clearly show that while all 3 lamps cured the sample in approximately the same amount of time, the UV LED lamp at 415nm cured the coating significantly better than the other 2 UV LED wavelengths. The best curing LED wavelength is identified as the curve with the highest peak of heat. As well, we are also able to measure the time to peak (which is the cure rate). This allows us to determine the number of LED's needed to achieve the desired speed for each customer's specific process. In this test, to achieve the required cure rate for the specified application line speed, a linear array of 300 LED's is needed.



The TFC-9000™ delivers highly accurate, repeatable results to evaluate your chemistry.

In addition, we also used the TFC-9000 to create a profile of the adhesive itself. We were provided with 5 retains from 5 different batches made over the last 12 months. Our subsequent tests created a profile of the adhesive's curability range. This profile enabled us to determine how many additional LED's were needed to be added to the application to ensure cure, regardless of the adhesive's age.

The TFC-9000 measures the exothermic heat reaction from a polymerizing sample through a highly sensitive sensor. It performs a rapid analysis of the incoming data to produce meaningful results. Once the green "start" button is selected, the curing and evaluation process commences.

### 24-HOUR PRODUCT SERVICES

Internet: [www.uvprocess.com](http://www.uvprocess.com)

E-mail: [info@uvps.com](mailto:info@uvps.com)



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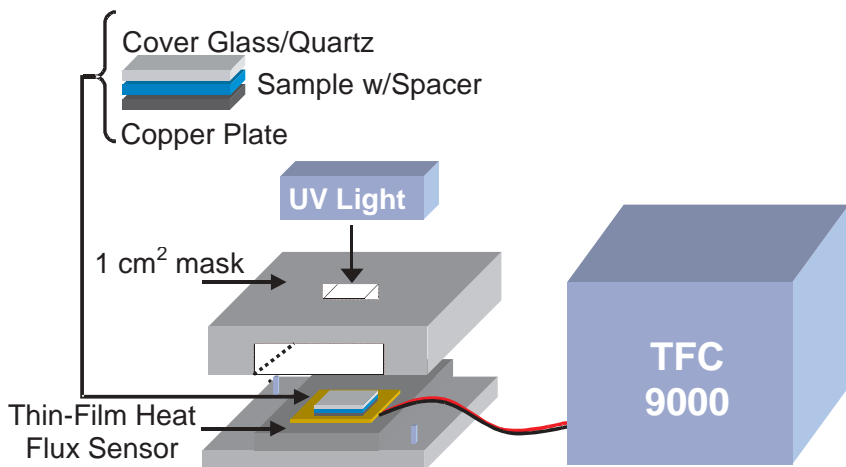
**Optimize Your Formulations Quickly and Easily**

- Temperature recording starts
- The UV LED lamp automatically turns on
- The sample is cured
- Peak temperature reaction from the cured sample is reached and displayed
- Once the temperature reaches 75% (user selectable) of the peak, the lamp automatically shuts off

Upon successful test completion, the TFC-9000 displays key measured test results as indicated in the LCD displays:

- Heat Flux
- Peak Value of Heat (in BTU's)
- Total Test Time
- Slope of the Curve for "Time to Peak" vs. "Heat Generated"
- Current Temperature
- Total Heat (in BTU's/Hour)

*Note: The system is sold complete with the UV LED lamp. Contact us for information regarding the Mercury Lamp option for use with the TFC-9000 system.*



Pigmented UV curable coatings typically have reduced photopolymerization rates because the pigments absorb and scatter incident UV radiation. As a consequence, the photoinitiator efficiency is decreased and application thickness is limited to thin-films. In addition, commercial UV curable inks consist of pigment dispersed in reactive oligomers. The resultant concentration of reactive groups is low and consequently small quantities of heat are released upon polymerization making characterization difficult.

A unique benefit of the TFC-9000™ is the ability to accurately measure a very small stimulus. This sensitivity, unavailable in much more expensive evaluation instruments, makes possible the quantitative analysis of photopolymerizable systems

which evolve a small amount of heat. Direct implications of this phenomenon include characterization of films on the nano/micro size scale and thin pigmented UV curable ink formulations.

This instrument's precision and high sensitivity allow it to record exotherm reactions on films as thin as 2 micrometers. With a high heat tolerance, the TFC-9000™ is ideal for heated sample testing. The sensor has an upper temperature limit of 400°F (205°C.)

*The TFC-9000™ works as a stand alone measurement system or can be connected to a computer through a serial port. The captured data can be exported and plotted to an Excel graph for quick and easy analysis.*

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**UV PROCESS SUPPLY, INC.**

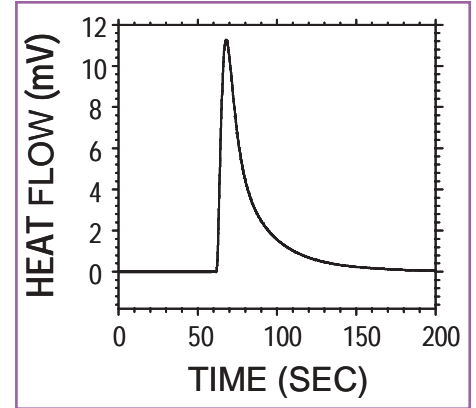


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**SPECIFICATIONS:**

Dimensions: 12"W x 11.25"L x 6.25"H (30.5 cm x 28.6 cm x 15.9cm)  
System Weight: 14.5 lbs (2.83 kg)  
Sensor Resistance: 300 Ohms (Approx.)  
Sensor Lead Wires: 10' (3.1m) Solid copper, teflon insulated  
Nominal Sensitivity: 3.0  $\mu$ V/Btu/Ft<sup>2</sup>-Hr  
Max Rec'd Heat Flux: 30,000 Btu/Ft<sup>2</sup>-Hr  
Response Time: 0.6 sec  
Temperature Limit: 400°F (205°C)  
Thermal Capacitance: 0.03 Btu per Ft<sup>2</sup>-°F  
Thermal Resistance: 0.01 °F per Btu/Ft<sup>2</sup>-Hr



**PART NUMBER**

**DESCRIPTION**

**N008-030**

**TFC-9000 Thin Film Calorimeter**

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