

DSC 4000 / 6000 / 8000 / 8500

See thermal  
analysis from  
every angle

Comprehensive  
Solutions for Differential  
Scanning Calorimetry



**PerkinElmer**  
For the Better



We can give  
you the results  
you've been  
looking for



## Thermal analysis solutions and beyond

At PerkinElmer, we're committed to the future of thermal analysis. We prove it with our new line of high-performance DSC solutions, which enables you to see more than you ever thought possible. Whether you're performing QA/QC applications, studying processes in plastics or pharmaceuticals, or developing the cures of tomorrow, our new DSC platforms will open your eyes to a world of exciting new opportunities.

Truly comprehensive, our DSC portfolio of applications, instruments and services, combined with our expertise in materials characterization, can help you push the edge of science. And that means greater access to insights, a far more effective work experience and the answers you need today and tomorrow. Look ahead, and you'll see new potential.

**How can you improve accuracy, sensitivity and performance?  
Let us show you.**

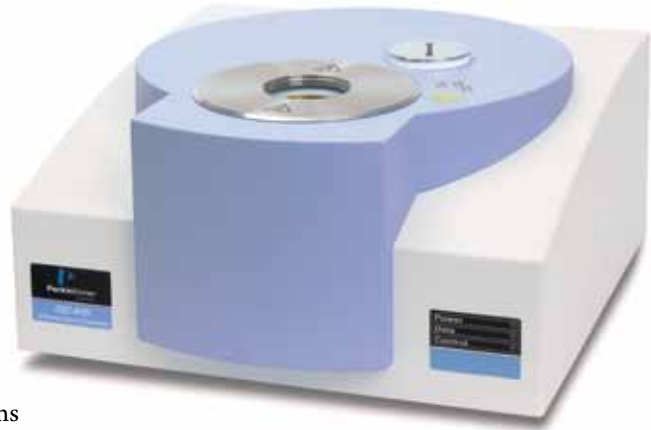


# DSC 4000



## Reliable performance. Any way you look at it.

Our new DSC 4000 is a compact workhorse that performs like a champion. It's the single-furnace solution you can depend on for a wide range of routine applications in the academic, polymer and pharmaceutical markets. And not only is the DSC 4000 upgradeable, it's also proof that we look at quality from every angle to bring you consistency, reliability and superior ease-of-use.



- Single furnace DSC
- Optional 45-position autosampler
- Upgradeable to DSC 6000

## Excellence for every size lab

### Proven advantages

- Integrated mass flow controller for convenient gas control and switching
- Fast 45-position autosampler option for reliable unattended operation
- Portable cooling device (PCD) for cost-effective operation at low temperature
- Efficient, easy-to-clean nickel chromium sample plate

### Typical applications for DSC 4000

- QA/QC testing
- Undergraduate teaching practicals
- Evaluating additives for plastic lifetime optimization
- Ideal for Oxidation Induction Test (OIT)

For over 40 years, PerkinElmer has been  
known for superior technology leadership

# DSC 6000



## See what enhanced performance can do for you

It gives you all the advantages of the DSC 4000. But our advanced, single-furnace DSC 6000 gives you so much more. Now you can get Modulated Temperature DSC (MT-DSC) technology for easier data interpretation, and new capabilities for product development and trouble-shooting. It's easy to see why the DSC 6000 is essential for any laboratory.



- Single furnace DSC
- Modulated Temperature DSC
- Optional photocalorimeter accessory

## Expanded DSC capabilities

### Proven advantages

- MT-DSC, enabling you to separate kinetic events and interpret data with greater ease
- Optional photocalorimetry accessory for more advanced analysis of photo-initiated reactions
- Scanning rates up to 0.1°C to 100°C for broad applications flexibility
- Efficient, easy-to-clean nickel chromium sample plate

### Typical applications for DSC 6000

- Characterizing materials during product and process development
- Trouble-shooting product quality issues
- Academic research and post-graduate studies

# DSC 8000



## Deepen your insight with exclusive technology

Responding to your need for greater sensitivity and accuracy, PerkinElmer brings you the DSC 8000. It features our proprietary double-furnace technology, which directly measures the heat flow between two independent furnaces. And with the most precise energy measurements over the whole temperature range, it gives you new insights into materials to meet your most demanding applications.



- Double-furnace DSC
- Optional 96-position autosampler
- Upgradeable to DSC 8500

## Pioneering DSC innovation

### Outstanding sensitivity and reproducibility

- All new double-furnace design delivers the most accurate heat-flow measurements
- Symmetrical design ensures that instrument response from sample and reference pans are always identical
- Non-oxidating, chemically resistant platinum alloy furnaces
- Controlled heating and cooling for the most accurate results

### Superior flexibility

- Upgradeable to DSC 8500
- Heating rates from 0.01°C to 300°C/min
- High-pressure cell option enabling measurement of samples to 600 psi

- Optional UV Photocalorimeter accessory
- Remote sampling head enabling measurements of hazardous samples
- Includes MT-DSC for understanding kinetic events
- Switch easily between cooling accessories in the lab – future proofing your investment

### Typical applications for DSC 8000

- Isothermal kinetics studies
  - Measure samples at a true constant temperature
- UV curing in polymers
  - Rapid response measures even the fastest cures
- Process and product improvement
- Demanding industrial and academic research

Redesigned with you in mind – from  
the furnaces to the autosampler

# DSC 8500



## Hyper-enabled performance. Truly revealing.

PerkinElmer is proud to introduce the DSC 8500, featuring second-generation HyperDSC® technology. Now you can gain unlimited insight into the structure, properties and performance of your materials. And with hyper-enabled, double-furnace technology and better application capabilities, the DSC 8500 gives you higher accuracy and sensitivity than ever before.

- Double-furnace DSC
- HyperDSC
- Optional 96-position autosampler

## Forward-thinking DSC innovation

### HyperDSC heating and cooling

- Extremely fast controlled scanning rates to 750°C/min
- In-situ ballistic cooling to 1000°C/min, enabling experiments that mimic real-world processes
- Extremely fast data readout rates (100 points/second) providing high data integrity

### Proven HyperDSC superiority in:

- Isothermal crystallization
- Polymorph/amorphous-material studies
- High sensitivity measurements

### Typical applications for DSC 8500

- Characterization of pharmaceutical materials
- Polymorph characterization in pharmaceuticals
  - Measure samples with fewer thermal effects
- Process studies in pharmaceuticals
  - Get a greater understanding of how the process affects the amorphous\crystalline content of the product
- Process simulation in plastics
  - See the effects your process has on the product

# Get a better look at our game-changing innovation



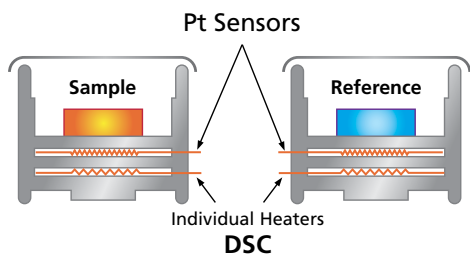
## The double-furnace difference

By providing two independent, low-mass furnaces, our double-furnace technology enables you to directly measure the heat flow of your sample. And that means more accurate measurements over the whole temperature range, as well as rapid response time.

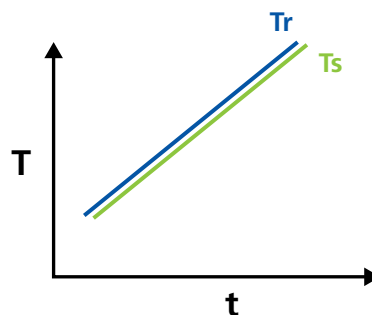
How does it work? Sample and reference materials are placed in different furnaces. To compensate for rising and falling sample temperature, the amount of power supplied to the furnace is increased or decreased. As a result, the system maintains a constant state of thermal null. And since double-furnace technology allows you to measure heat flow directly, no complex heat flux equations are necessary.

### Power Compensation Double-furnace DSC

Directly measures heat flow between two independent, low-mass furnaces.

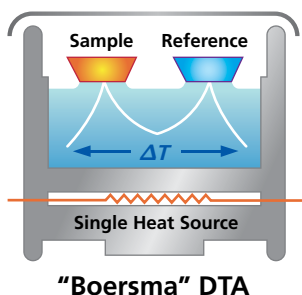


- Dual independent small furnaces
- Null principle,  $\Delta T=0$ , measures  $\Delta H$  directly/accurately

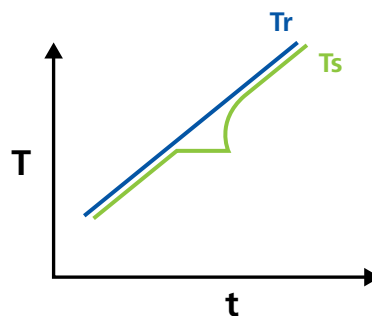


### Heat Flux Single-furnace DSC

Measures temperature differential between sample side and reference side using single, large-mass furnace. Needs mathematical equations to determine the heat flow.



- Single-furnace design
- Drives  $\Delta H$  from  $\Delta T$  signal





# Application capabilities that open up the possibilities

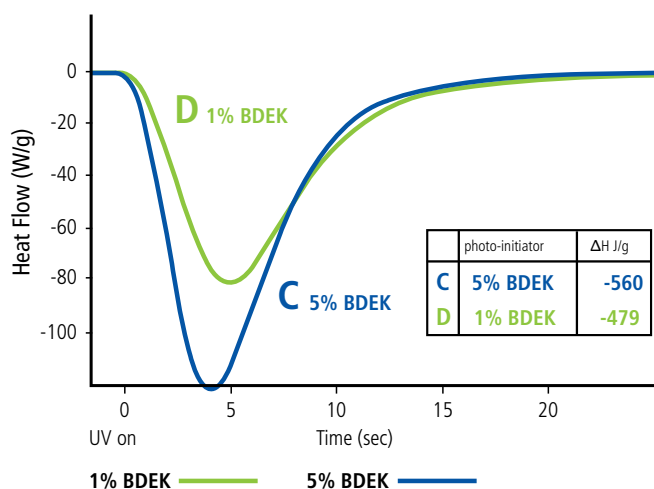
Our new DSC double-furnace design delivers exceptional results on your most promising applications. Learn more about our new application capabilities, and see what you've been missing.

## UV curing of polymers

Many modern products use light-initiated (UV) cured resins. Understanding the kinetics of the UV cure is critical to optimize photo-initiator concentration and processing parameters during product development and scale-up.

### The PerkinElmer double-furnace DSC advantage

- Rapid response time to study even the fastest cures
- Only a double-furnace design can hold your sample at a constant temperature, allowing cure kinetics to be calculated accurately
- Heat flow is measured directly – not calculated – increasing confidence in your results



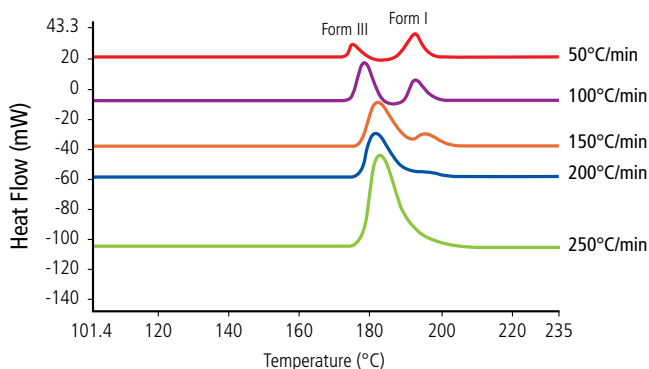
The effect of photo-initiator (BDEK) concentration on acrylate polymerization.

## Improved characterization of polymorphs in pharmaceuticals

As early in the discovery process as possible, it's critical to fully characterize the polymorphic behavior of a drug candidate. Changes in the crystal form can diminish stability and bioavailability, as well as the tableting characteristics and dissolution rates of a drug. If this occurs, it could cost pharmaceutical companies millions.

### The PerkinElmer HyperDSC advantage

- Ability to suppress transition between different polymorphs allows you to study the actual drug form
- Increased sensitivity to detect even the lowest concentration of polymorphic content
- Lower detection limits allow you to use smaller amounts of often expensive sample materials



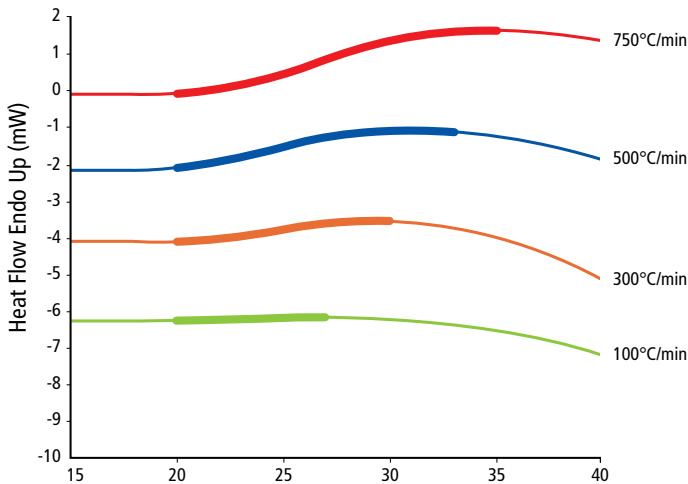
Sample of pure Form III carbamazepine showing how fast scanning suppresses polymorph transitions seen at standard scanning rates.

## High sensitivity, low-amorphous content study in pharmaceuticals

During pharmaceutical processing, the presence of amorphous material in crystalline substances is often problematic. Not only can the levels of disordered, amorphous material undermine product performance, but they can also be very difficult to detect.

### The PerkinElmer HyperDSC advantage

- Increased sensitivity to detect even the lowest concentrations of amorphous content
- Fast sampling time for extremely high sample throughput



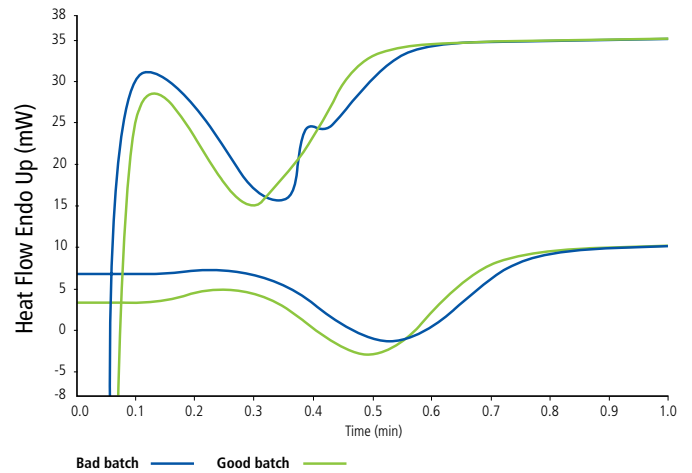
Sample of mannitol showing increased sensitivity at HyperDSC scanning rates.

## Isothermal crystallization studies of polymers

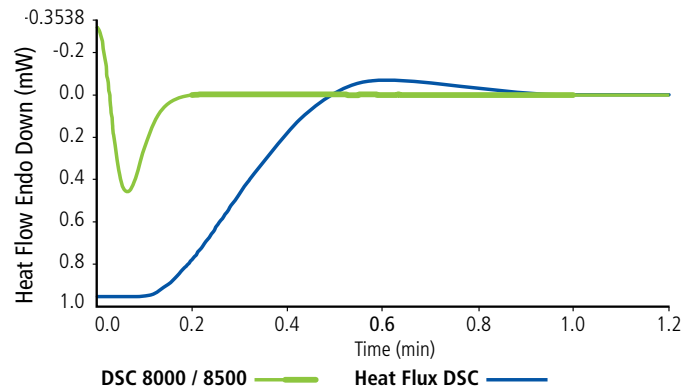
The variation of crystallization behavior of resin will affect the final product's crystallinity after processing, as well as the physical properties of the molded to finished part. Therefore, the consistency of crystallization behavior is important to control, and is often one of the first experiments performed when there's a quality issue in the field.

### The PerkinElmer HyperDSC advantage

- Fast cooling rates prevent crystallization of the sample until it has reached the target crystallization temperature
- Rapid response time to study fast crystallization



Differences in good and bad batches of resin highlighted by fast cooling (500°C/min) prior to isothermal crystallization. Differences not seen with traditional cooling rates.



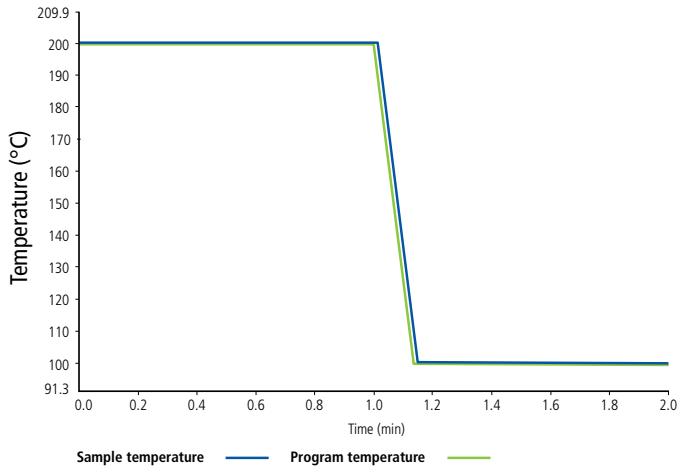
The response time of DSC 8000/8500 compared with a traditional heat flux DSC.

## Improved understanding of finished products with better process simulation

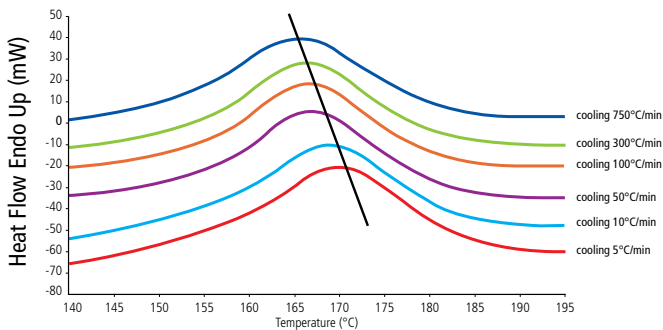
The thermal history of a sample is intrinsic to the properties of a polymer, including hardness, flexural resistance and strength. In many of the widely used processing methods in the plastics industry, the product undergoes much faster cooling rates than is possible with traditional DSC.

### The PerkinElmer HyperDSC advantage

- Study the effects of fast cooling on crystallization kinetics of polymers
- Mimic real-world processes – heat and cool your sample at rates of 750°C/min



Sample temperature curve from DSC 8500 showing controlled cooling at 750°C/minute.



Heating curves of polypropylene after cooling at different temperatures. The shift in the melting peak shows the change in the material's crystallinity at different cooling rates.



# Completing your DSC laboratory solution

## Realize new efficiencies with a DSC autosampler

All PerkinElmer DSC instruments come with optional autosamplers, so you can perform automated analyses with minimal effort. And with our Pyris™ Player software, setting up a run on one of our autosamplers is simple and quick – and you can run samples during and after business hours. Not sure if you need an autosampler today? Our autosamplers are available as upgrade options to meet the growing demands of your lab.



## Pyris software guides you from setup to results

Powerful, flexible and proven – the Pyris software platform incorporates sophisticated DSC data acquisition, analyses and reporting.

With a broad range of options, you can grow from very simple routine materials testing to advanced kinetics and research as your requirements demand.

### Temperature control options

Selecting the correct cooling accessory is vital to the performance and applications capabilities of your DSC instrument. We give you a wide range of cooling accessories to suit every cost, temperature and operating expense:

- Chillers
- 2-stage intracooler
- 3-stage intracooler
- Liquid nitrogen cooling system

### Consumables

Regardless of form, size or sampling requirement, PerkinElmer's broad range of sample pans and consumables will meet all your application needs. Pan materials include aluminum, platinum, alumina, copper and graphite – available for high and low volumes, high-pressure, solids, liquids and volatile samples.

# Ensure the uptime and longevity of your new thermal investment

PerkinElmer prides itself on providing you with world class service and support. With over 1300 employed service engineers in more than 40 countries, you can be confident of receiving a fast response regardless of your geography.

Globally harmonized engineer training programs ensure consistently high technical standards, improving fix rates and instrument uptime. Our service regions support multiple technologies, making us the only provider who can support your hyphenated systems.

If system uptime, performance and low cost of ownership are important to you then PerkinElmer is your number one choice.

A range of services are available to meet the challenges of various environments and working practices:

- On-demand service
- Service plans to cover repairs and/or preventive maintenance
- Training on instruments or applications
- Qualification using standard PerkinElmer protocols
- Creation, validation and implementation of custom qualification and validation documentation
- Instrument and complete lab relocations



## Giving you a whole new perspective

Thermal analysis encompasses a broad range of applications and markets. It starts from the roots of the raw material all the way up the supply chain to the finished product. No matter where in the process your laboratory is focused, PerkinElmer is here to help. With over 70 years experience in analytical sciences, we can offer you the broadest range of instruments, applications and consumables in the industry. Let us open your eyes to a world of exciting new opportunities.

## Together we can make a measurable difference

*"HyperDSC allows me to measure hard-to-detect glass transitions in lyophilized materials with very high protein concentration up to and including pure proteins, which was believed to be impossible in the industry. Furthermore, detecting the Tg of hydroxyethyl starch and other difficult-to-analyze excipients is routine with this instrument. The HyperDSC method should be of great value to anyone working with development of lyophilized formulations."*

Prof. John Carpenter  
School of Pharmacy, University of Colorado

*"I found power compensation DSC especially useful in applications when a sequence of fast temperature changes had to be followed by an isothermal segment. The fact that this calorimeter can reach equilibrium conditions in seconds made it my instrument of choice for characterizing of a whole range of thermal transitions requiring precise temperature control. Many of my industrial and academic projects, especially those aimed at characterization of melting and crystallization, mesophase transitions in liquid crystals, condense crystals or plastic crystals and also many physico-chemical reactions have been successfully addressed by using this calorimeter."*

Dr. Janusz Grebowicz  
Chemistry and Physics, University of Houston

*"The power compensation DSC offers superior resolution and accuracy for heat capacity measurements compared to other DSC types because of the short response time of the measuring system and the three dimensional design of the cups, respectively."*

Prof. Christoph Schick  
Institute of Physics, University of Rostock, Germany

For more information about Thermal Analysis, our new DSC platforms or to hear more from your peers, visit [www.perkinelmer.com/thermalanalysis](http://www.perkinelmer.com/thermalanalysis).

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