Anton Paar

Differential Scanning Calorimeters

Julia DSC Series

Julia DSC:
Speed Meets Precision

Learn to use it fast. Cool it down fast. Get your results fast.

Anton Paar's powerful new differential scanning calorimeter speeds everything up, to give you a competitive advantage where time and accuracy matter the most.

Cover it all: from refined QC to cutting-edge R&D, and from polymers and pharmaceuticals to energy storage, food, and building materials.

Give it to anyone: beginners or DSC professionals.

Decide now: Will you speed up to lead the race?

Learn to use it fast

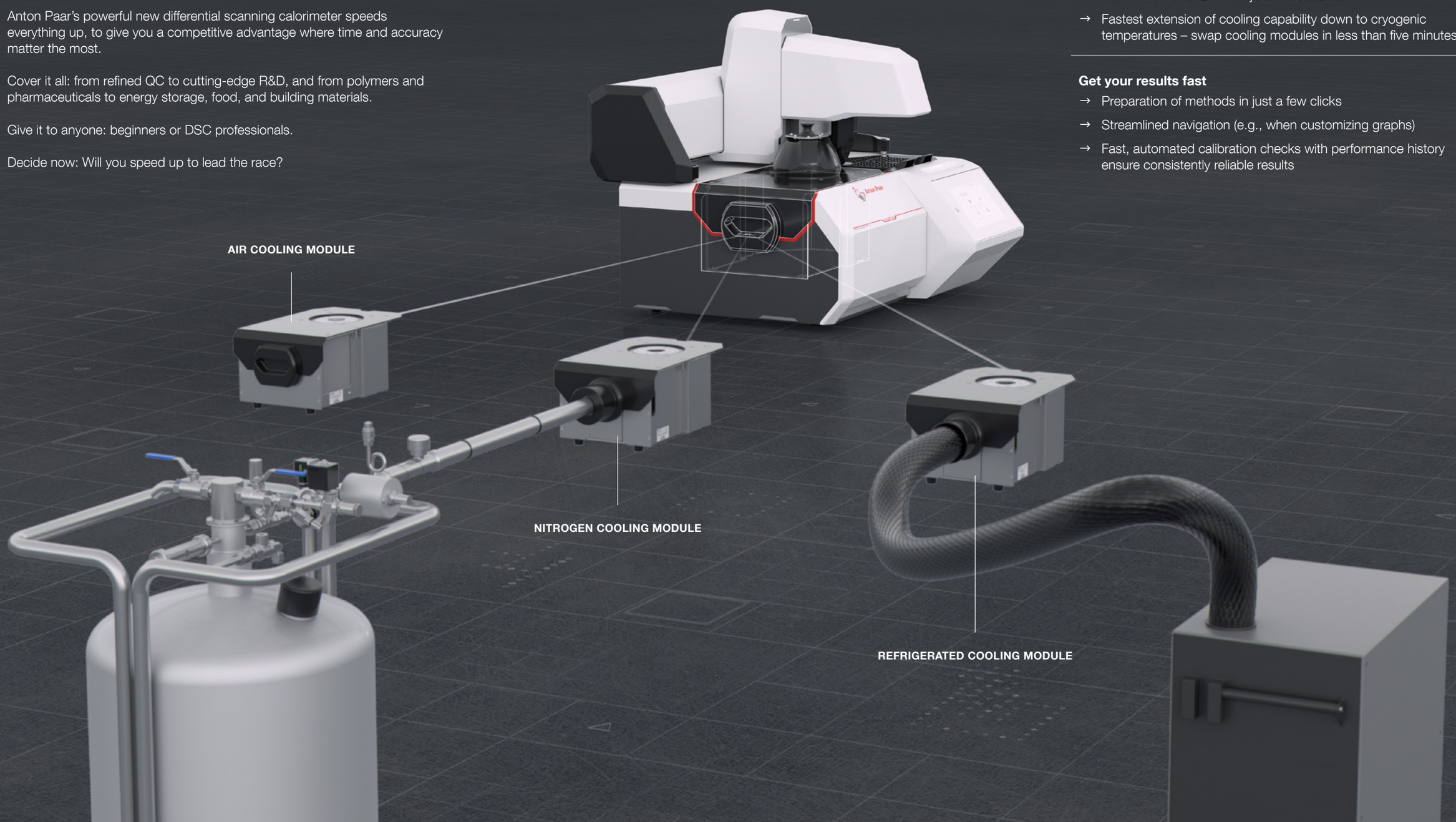
- → No training needed – intuitive design gets you started right away
- → Step-by-step calibration wizard – accuracy with guided workflows
- → Dedicated QC mode – easy quality control with pass/warning/fail criteria and control chart

Cool it down fast

- → Unmatched cooling rates down to subzero temperatures with built-in air cooling module
- → Fast cooling between measurements for high sample throughput – from 300 °C to 25 °C in just seven minutes
- → Fastest extension of cooling capability down to cryogenic temperatures – swap cooling modules in less than five minutes

Get your results fast

- → Preparation of methods in just a few clicks
- → Streamlined navigation (e.g., when customizing graphs)
- → Fast, automated calibration checks with performance history ensure consistently reliable results



Julia DSC:
Scalable, Modular, Future-Proof

Configuration flexibility
Either opt for the predefined specifications of Julia DSC 300, your gateway to the world of thermal analysis, or embrace the absolute freedom of Julia DSC 500, your future-proof all-rounder for the full spectrum of QC, R&D, and academia.

Future-proof: Exchangeable cooling modules
Whether you occasionally, or regularly, require a variety of minimum temperatures, Julia DSC 500 allows you to exchange the cooling module in less than five minutes and still keep the furnace in place. Just loosen four screws, take one module off, put another one in, and tighten the four screws. No disassembly. No wires.

Air Cooling Module (ACM)

- → Patented Peltier technology – no external cooler needed
- → -35 °C to +700 °C with fast cooling for higher sample throughput

Forget traditional air cooling. The ACM, powered by Peltier cooling technology, easily descends to -35 °C without the need for an external cooling device. Hassle-free operation at around-ambient temperatures saves about 20 minutes between each measurement. Offering higher controlled cooling rates to lower temperatures, the ACM also saves space and eliminates the need for maintenance.

Refrigerated Cooling Module (RCM)

- → Safe, efficient cooling
- → -90 °C to +700 °C in one go

The RCM uses a closed cooling circuit without the need for liquid nitrogen. Outstanding, convenient temperature control and consistent performance even during long measurement cycles are guaranteed. No maintenance of the refrigerated cooling medium is needed.

Nitrogen Cooling Module (NCM)

- → Cryogenic temperatures with liquid nitrogen
- → -170 °C to +600 °C for maximum application range

Liquid nitrogen cooling provides the ultimate temperature range of -170 °C to +600 °C and very high cooling rates. The custom-designed NCM with an electronically controlled nitrogen reservoir in combination with a self-pressurizing dewar operates seamlessly, without manual intervention between measurements, and doesn't require an expensive LN_2 pump.

		Julia DSC 300	**Julia DSC 500**
		↓	↓
Autosampler with 70 sample and 8 reference positions		optional	optional
Cooling option	ACM	✓	optional
	RCM	×	optional
	NCM	×	optional
Gas control	1 x MFC + 1 x flow control valve	✓	×
	2 x MFC	×	✓
TruPeak heatflow mode		✓	✓
Sinusoidal DSC		✓	✓

Precision Made Simple

1

Accessory case

→ All you need to run experiments

→ Calibration materials included

The accessory suitcase contains everything you need to get up and running: sample preparation tools (e.g. a cutter and cutting plate for solid samples requiring size or shape adjustment) and a spatula and syringe for powder and liquid samples, respectively. The funnel ensures the sample only goes where it's supposed to and the pushrod helps compact the samples and improve contact with the bottom of the crucible for better heat transfer.
Materials for temperature and enthalpy calibration (indium, zinc), TruPeak, and specific heat capacity calibration (sapphires) are included, too.

2

Crucible closing

→ Crucible sealing press

→ Crucible closing pen

Hermetic sealing of aluminum crucibles has never been easier. Say goodbye to messy sample prep. The innovative lower die design of the crucible sealing press lets you weigh and tare the empty crucible, fill it cleanly using a funnel – without spilling on the rim – and seal it with a lid via cold-welding, all without removing it from the die. Once sealed, the crucible can be weighed again for an accurate sample mass. For non-hermetic sealing, the crucible closing pen gives you full control over compression force – ideal for securely pressing lids onto film or fiber samples. Its repeatable sealing process ensures reliable and consistent results, every time.

3

Touchscreen and status light

→ All important information on one screen

→ Status light keeps you updated

All the information you need is nicely visible on the integrated touchscreen: signals (e.g., temperature, heat flow, gas flow rate), time to end of measurement and/or the whole tasklist, as well as actual instrument status. The LED status light lets you know whether the instrument is busy (measuring, moving the autosampler, cooling to idle temperature, or already in eco mode), ready to operate, or in need of your attention (e.g., insertion or removal of samples). You can tell quickly, even from a distance, via the different status colors and types of flashing. Experiments using predefined methods can be started directly from the screen just by entering the sample name and mass.

4

Julia DSC Autosampler

→ High throughput with capacity for 70 samples

→ Calibration wizard

The Julia DSC Autosampler is the ultimate automation option. 70 sample positions enable unattended operation even over the weekend. Eight reference positions can accommodate reference crucibles to match the sample ones as well as calibration samples. This way even the TruPeak calibration can be automated. Oxygen- or moisture-sensitive samples can be sealed hermetically in a crucible with a special lid – which can be pierced automatically by a needle prior to the measurement. Each autosampler comes with tools for calibration, which can be easily performed via the autosampler calibration wizard.

Let Julia Guide You

Thermal analysis requires not only a sophisticated measuring instrument, but also a streamlined user-friendly process. Julia DSC is more than just a tool; it is a guide, simplifying each step to ensure optimal results. The following four steps exemplify how this cutting-edge measuring instrument and associated tools facilitate a seamless journey from sample preparation to in-depth analysis, embodying a user-centric approach that prioritizes precision and efficiency.

Sample preparation

→ Tools for sample preparation at hand

→ Crucibles and crucible sealing press

Whether you're dealing with powder samples, pellets, thin films, liquid samples, or even gels, you have all the tools you need for optimal sample preparation. A variety of crucibles and fitting lids satisfy all applications, and two crucible sealing options ensure correct, reproducible closing.

Sample loading

→ Manual: Julia Suite software instructs you

→ Automatic: Just leave it to the Julia DSC Autosampler

Load the crucibles into the furnace and onto the sensor manually or use an autosampler. Either way you're assured that the sample and the reference are always placed on exactly the correct spot at the right time. Instrument and user safety are a priority during the unloading process, too.

Method definition and measurement

→ Intuitive, straightforward method builder

→ Pre-defined calibration check methods

Build your very own easy-to-grasp, simple-to-use methods from scratch. Monitor the live data, change the method parameters on the go, or skip to the next segment when performing explorative measurements. Enjoy added security with predefined temperature and enthalpy check methods.

Analysis

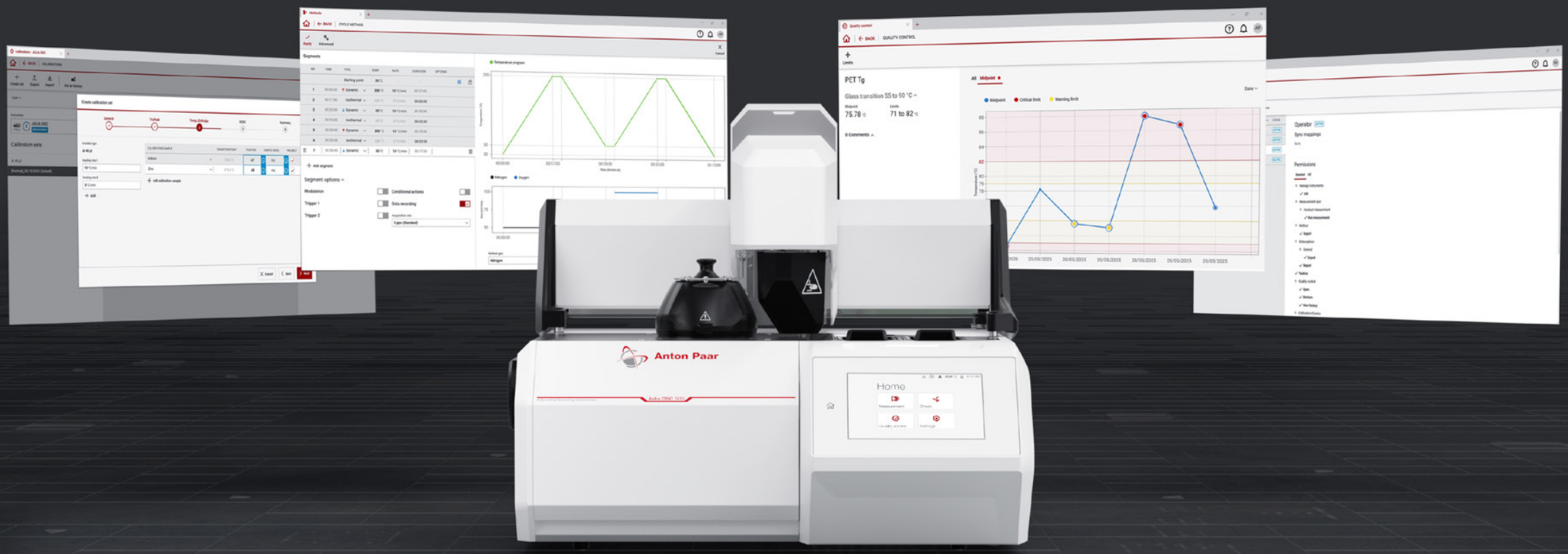
→ Comprehensive DSC analysis feature set

→ Regular improvements based on your feedback

Examine heat flow phenomena with proper analysis tools: glass transition, peak analysis, oxidation induction time, heat capacity, conversion curve, and more. Prepare analysis reports or export data for further processing. Create analysis macros for automated data evaluation.

Julia Suite:
Ultimate User Empowerment

Julia Suite, the control-and-analysis software for Julia DSC instruments, was created for users by users. It guides you through the measurement and analysis, all in one workspace. Whether you're a beginner or an advanced user, the software feels like it was made just for you.



Software wizardry

- → Modern software with intuitive workflows: No training needed
- → QC wizard for efficient set-up of repetitive measurements
- → Calibration wizards for quick, simple adjustment procedures

Measurement method

- → Straightforward generation of methods
- → Modification of method parameters during running experiments

The intuitive method builder, with graphical representation of the temperature and gas program, enables instant orientation. Other features, such as triggers, conditional actions, or loops, can be easily set up, too. Predefined methods for checking temperature and enthalpy using well-known reference materials and transitions allow assessment of calibration accuracy status.

Quality control

- → Simple pass/warning/critical/fail criteria setting
- → Control chart to help you monitor trends

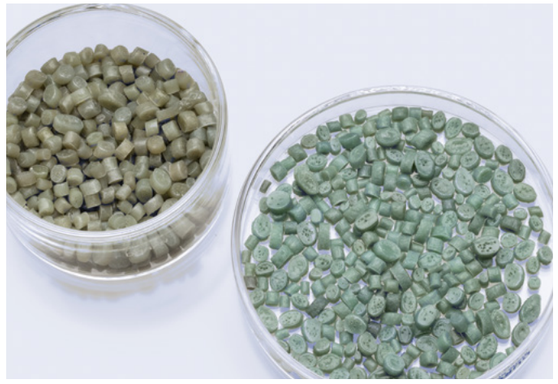
Setting up QC protocols and pass/fail criteria is straightforward and intuitive. The guided process ensures accuracy while minimizing effort and setup time. The control chart enables easy monitoring of results over time, helping to detect trends, identify anomalies, and ensure long-term process stability.

Julia Suite management

- → Set everything based on your needs
- → Calibration, user, and even power management

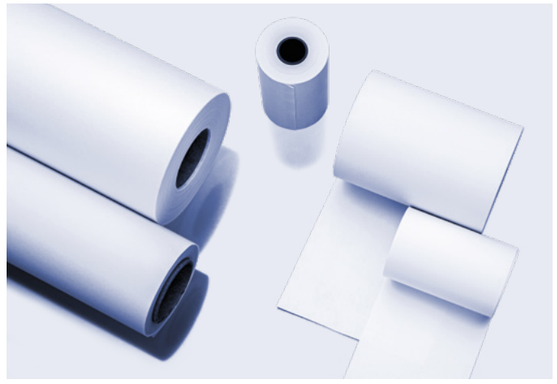
Julia Suite allows you to manage users, assign roles, and adjust login and security settings. Workplaces with regular routines benefit from the configurable power scheme, which helps reduce electricity and gas usage, and extends the lifetime of the instrument.

Versatility across Industries



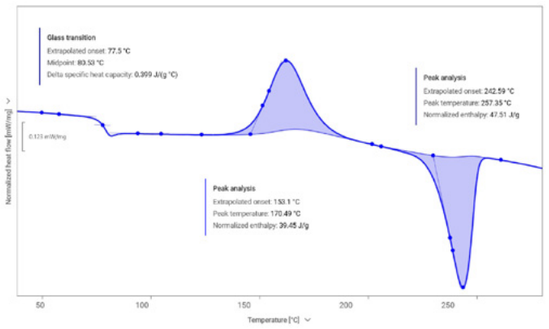
Polymers
DSC is widely used in the polymer industry for thermal characterization, ensuring quality and performance consistency. It determines key properties such as melting temperature, glass transition temperature (Tg), and crystallization behavior – factors that influence processing, strength, and durability. Essential for quality control, DSC detects formulation inconsistencies, aging effects, or degradation, and supports optimization of polymer blends, additive assessment, and curing studies of thermosets. By delivering precise thermal data, DSC aids material selection and performance optimization across applications from packaging to automotive components.

Pharmaceuticals
In the pharmaceutical sector, DSC is a valuable tool for characterizing active pharmaceutical ingredients (APIs) and excipients. It is used to study polymorphism, crystallinity, and thermal stability – critical factors for drug efficacy and shelf life. DSC determines compatibility between drug substances and excipients, ensuring stability and preventing unwanted interactions. It also assesses the amorphous or crystalline nature of drugs, affecting solubility and bioavailability. Additionally, DSC supports regulatory compliance by providing essential thermal data for product validation and stability testing.

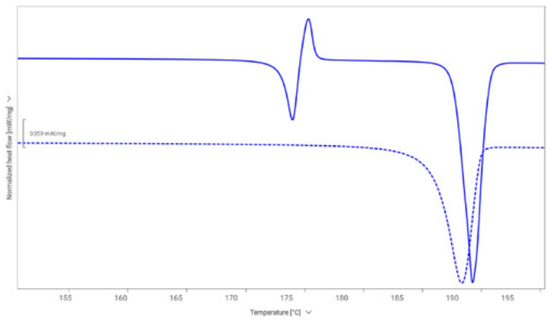


Batteries
DSC is essential in battery research and manufacturing, aiding development of safer, more efficient energy storage. It evaluates thermal stability of electrode materials, electrolytes, and separators, identifying risks such as thermal runaway and decomposition. DSC also studies phase transitions, heat capacity, and thermal behavior of lithium-ion components under varying conditions. This data is crucial for improving performance, extending cycle life, and enhancing safety. With growing demand for high-energy-density batteries, DSC is key in optimizing material selection and ensuring safety compliance.

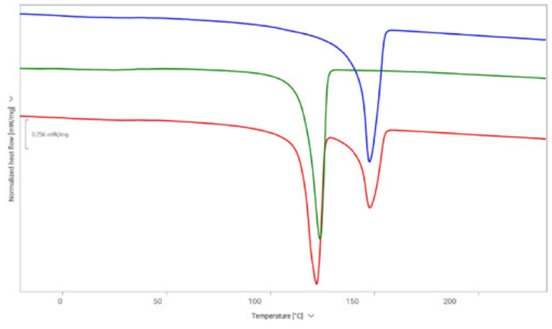
Food
DSC is applied in the food industry for studying thermal properties of ingredients and finished products. It analyzes melting profiles and crystallization patterns in fats, oils, and sugars in chocolate, ensuring consistent texture and quality; monitors emulsion stability and detects unwanted ingredient interactions that could affect shelf life; and aids protein denaturation studies, which are essential for processing and formulation, particularly in dairy and meat products. By revealing thermal characteristics of food components, DSC helps optimize processing, improve stability, and maintain high-quality standards.



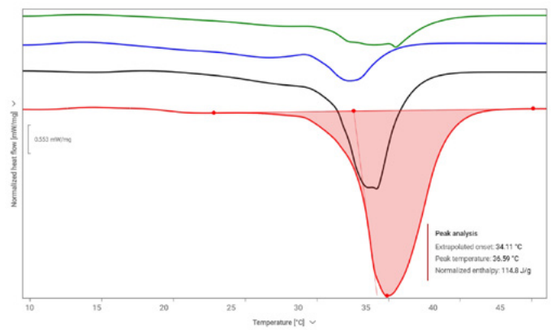
Application example
Polyethylene terephthalate (PET) sample after shock cooling from melt: The curve shows glass transition, exothermic cold crystallization induced by rapid cooldown of 150 K/min, and endothermic melting.



Application example
Polymorphism of carbamazepine, a common anticonvulsant API: In the first heating (solid line), polymorphic form III melts and subsequently recrystallizes into the more stable form I at around 175 °C. A second, stronger endothermic event at 190 °C corresponds to the melting of form I. In the second heating (dashed line), only one melting is seen.



Application example
Comparison of three types of battery separators: This shows differences in melting behavior and thus their composition and suitability for different final lithium-ion battery products. The blue and green samples are single-polymer separators with different components (polypropylene and polyethylene, respectively). The red sample is a multicomponent separator containing both PE and PP.



Application example
DSC curves showing the complex melting behavior of white chocolate, milk chocolate, dark chocolate, and pure cocoa butter (from top to bottom, respectively): The increasing size of the main melting peak correlates with higher cocoa butter content in darker chocolate.

	ACM	RCM	NCM
	↓	↓	↓
Minimum temperature	-35 °C	-90 °C	-170 °C
Maximum temperature	700 °C		600 °C
Max. heating rate	300 K/min		
Max. cooling rate	150 K/min		200 K/min
Cooling of 10 K/min down to	5 °C	-55 °C	-150 °C
Cooling of 5 K/min down to	-15 °C	-70 °C	-160 °C
Temperature accuracy (In)	<0.1 K		
Enthalpy accuracy (In)	<1 %		
Measurement range	± 2,500 mW		

Trademarks **Julia (EU: 018353607), TruPeak (EU: 018812184)**

PRECISION ACCESSORIES, PRECISION RESULTS

Autosampler with piercing device
The Julia DSC Autosampler, with 70 sample positions, eight reference positions, and a crucible waste container, is the right tool for high-sample-throughput workspaces and unattended operation.

Crucible sealing press and closing pen
Appropriate sealing tools ensure easy encapsulation of samples in crucibles via hermetic sealing, contact closing, or sealing with a lid that can be pierced right before the experiment.

Accessories and calibration
You're equipped with everything you need for sample preparation and calibrations of all kinds: temperature, enthalpy, TruPeak™, heat capacity, and even autosampler alignment.

Crucibles
A variety of crucibles and fitting lids are available for both routine and demanding applications, whatever the shape or form of your sample.

SELECTED STANDARDS	
ASTM D3418	Standard Test Method for Transition Temperatures and Enthalpies of Fusion and Crystallization of Polymers by Differential Scanning Calorimetry
ASTM D3895	Standard Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry
ASTM D4591	Standard Test Method for Determining Temperatures and Heats of Transitions of Fluoropolymers by Differential Scanning Calorimetry
ASTM D6604	Standard Practice for Glass Transition Temperatures of Hydrocarbon Resins by Differential Scanning Calorimetry
ASTM E487	Standard Test Methods for Constant-Temperature Stability of Chemical Materials
ASTM E537	Standard Test Method for Thermal Stability of Chemicals by Differential Scanning Calorimetry
ASTM E793	Standard Test Method for Enthalpies of Fusion and Crystallization by Differential Scanning Calorimetry
ASTM E794	Standard Test Method for Melting and Crystallization Temperatures by Thermal Analysis
ASTM E928	Standard Test Method for Purity by Differential Scanning Calorimetry
ASTM E1269	Standard Test Method for Determining Specific Heat Capacity by Differential Scanning Calorimetry
ASTM E1858	Standard Test Methods for Determining Oxidation Induction Time of Hydrocarbons by Differential Scanning Calorimetry
ASTM E2009	Standard Test Methods for Oxidation Onset Temperature of Hydrocarbons by Differential Scanning Calorimetry
ASTM E2602	Standard Test Methods for Assignment of the Glass Transition Temperature by Modulated Temperature Differential Scanning Calorimetry
ASTM E2716	Standard Test Method for Determining Specific Heat Capacity by Modulated Temperature Differential Scanning Calorimetry
ISO 11357	Plastics – Differential scanning calorimetry (DSC)
ISO 19935	Plastics – Temperature modulated DSC
ISO 22768	Raw rubber and rubber latex – Determination of the glass transition temperature by differential scanning calorimetry (DSC)
DIN 51007	Thermal analysis - Differential thermal analysis (DTA) and differential scanning calorimetry (DSC) - General Principles
DIN 53545	Testing of rubber - Determination of low-temperature behaviour of elastomers - Principles and test methods
USP	United States Pharmacopeia, section 891 Thermal Analysis
Ph. Eur.	European Pharmacopoeia, section 2.2.34. Thermal analysis
JP	Japanese Pharmacopoeia, section 2.52 Thermal Analysis

Our well-trained and certified technicians
are ready to keep your instrument running smoothly.
Maximum uptime | Warranty program | Short response times | Global service network

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