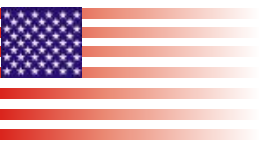
DSC Pt100

thermal analysis with**out** limits



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LINSEIS DSC PT100 High Resolution

DSC PT100 High Resolution.

The differential scanning calorimetry method is widely used to examine and characterize substances, mixtures, and materials. This technique is internationally standardized under DIN 51007, DIN 53765, ISO/DIN L409 and ASTM D3418.

The principle of operation is a measurement of the heat flux between the sample and reference. This is done over a well-defined area where the heat is moving. The heat flux is measured while the temperature is changing. The results are very important for many applications and provide valuable information for the characterization of materials.
The following applications of DSC measurements are very important:

- research and development
- quality control
- quality assurance
- process optimizing
- defect analysis

The three main user groups interested in DSC instruments are:

- plastics and rubber industry
- pharmaceutical industry
- food industry

The following interesting physical properties of materials can be measured:

- enthalpy, melting energy
- specific heat
- glass point
- crystalinity
- reaction enthalpy
- thermal stability
- oxidation stability
- aging
- purity
- phase transformation
- eutectics
- polymorphs
- product identification

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Specifications:

- DSC System (Differential Scanning Calorimeter) complete with software and hardware including standard kits and accessories
- Data acquisition software to control DSC with full parameter setup Including temperature programming, atmosphere control, timed cycling etc.
- Temperature range from –80°C up to +400°C (Standard)
- Heating/Cooling rates 0,1 up to 50°C/min
- Temperature accuracy +/-0,2°C (substance calibration)
- Time constant 2...3 s
- Resolution 0,03 uW
- RMS Noise 0,7 uW
- Data acquisition rate 0,1 s up to 3600 s / data point
- Atmospheres N2, Argon, O2 etc., reducing and oxidizing
- Measuring range -250 up to +250 mW
- Calibrations material included
- Calibration: recommended 6 month interval

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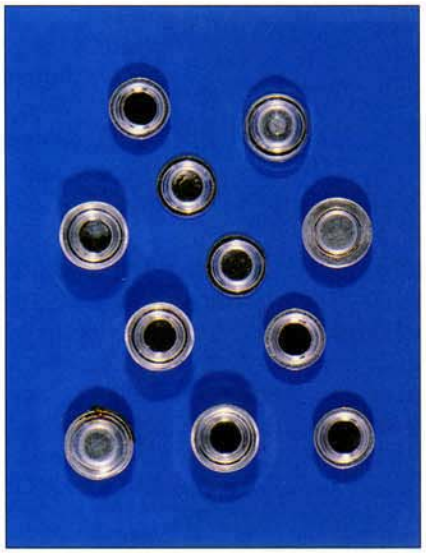
KREG: DSC with controlled cooling

Using this option the DSC L63/45 can be operated using controlled cooling rates. The control gauges are mounted on an existing dewar (normally 50 l). The controller consists of a supply tube into the dewar, a pressure gauge, and an electronic control valve. Through an additional control circuit the LN_2 is fed to the DSC measuring cell. It is achieved using the pressure of the evaporating LN_2 in the dewar. The Data acquisition card in the computer uses a control loop to determine how much LN_2 is required for cooling.

Sample preparation and crucibles

Various crucibles are available to achieve superior measurement results. Open or closed crucibles crucibles can be used in the system. When using closed crucibles it is necessary to use a crucible press (see picture) with special lids. The crucible press uses a special tool set to seal the crucible.

Aluminum and platinum crucibles are available.



Applications

The following application notes show many typical uses for the Linseis DSC. Because of limited space only a few applications are shown, for further application notes please contact Linseis directly.

- thermoplastics
- duroplastics
- elastomers
- PEEK/PEI blends
- Recycling of polymers
- Phenolic resin
- NBR rubber blends

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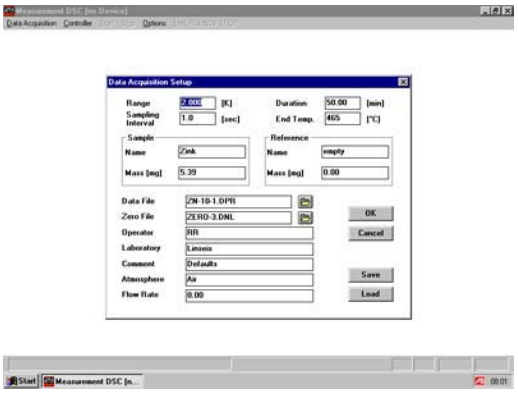
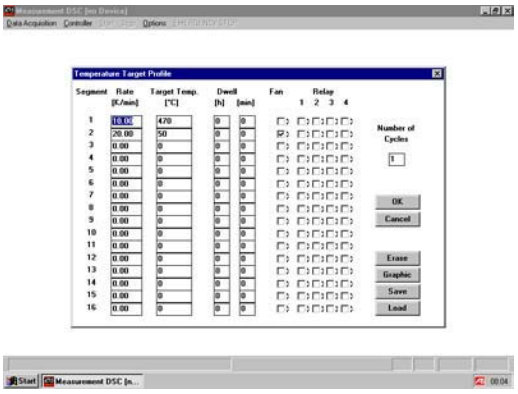
All Linseis Thermal Analysis instruments are controlled through sophisticated Windows software. The complete program consists of 3 sections: temperature control, data acquisition and data evaluation. Essential sample information is entered in the data acquisition section.

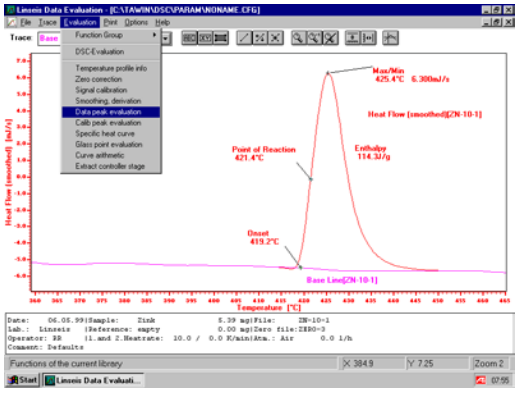
Picture 1: menu for the documentation set



Picture 2: results of a print out



Picture 3: see evaluation menu



Data acquisition section
Essential data for each sample test includes: operator, laboratory, atmosphere, gas flow, material, sample file name, zero file name, commands, sample length, measuring range, max. temperature, duration of run, sampling frequency, heating and cooling-rate, and number of cycles.
All menus are easily understood and intuitive. The software is quickly mastered with min. training needed.

Evaluation section
The evaluation is part of the complete windows software. It features a number of functions enabling a full evaluation of all types of data. All evaluation and data collection can be performed simultaneously. Data can be corrected using zero and calibration correction. Data evaluation includes: signal corrections and smoothing, derivation, relative mass change, mass calculation, curve arithmetic, data pick evaluation, glass point evaluation, slope correction A mean curve with statistical analysis can be performed on multiple curves.
Graphical displays can be printed on all windows, compatible printersor plotters. Data can be displayed and printed in a table format. The software also includes an ASCII export feature.

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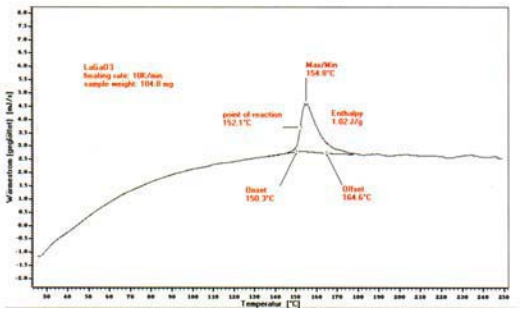
Applications DSC

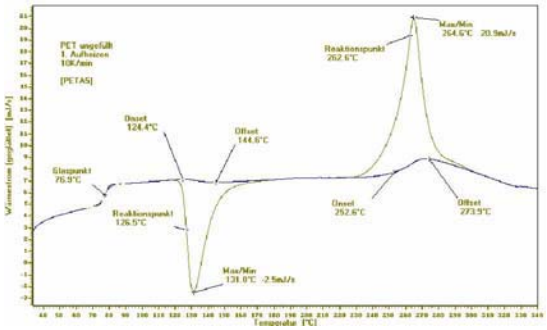
Picture 1.: Lanthan-Galliumoxids (LaGaO3)



Lanthan-Galiumoxid (LaGaO3)

Because of the high sensitivity of the DSC L63/45 even small caloric effects like the change of the crystal structure of Lanthan-Galiumoxid (LaGaO3) can be made visible. The substance is very interesting especially when fast oxygen/ion conductors are needed, applications do exist with the use of lambda sensors for the catalytic converters

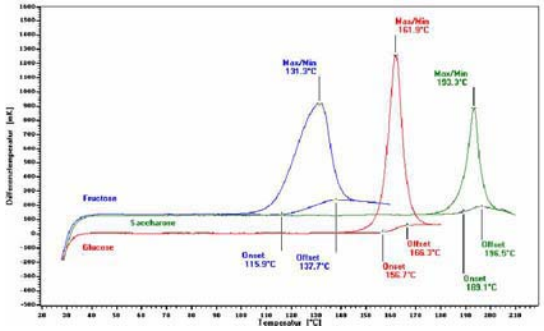
Picture 2.: Polyethylenenterephthalat (PET)



Polyethylenenterephthalat (PET)

Polyethylenenterephthalat (PET) shows at about 77° C a significant endothermal glass point, which is quite special for partly cristalin thermoplasts. The relation between the exothermal cold crystalization (131°C) and the endothermal melting peak is a measure for the degree of crystallization of the material. In the case of PET the cristalin part is very small which results in good transparency of the material. This is why many drinking bottles are made out of PET.

Picture 3.: Fruktose und Glucose



Fructose and Glucose

Each of both substances show characteristic melting points. These melting points can be determined exactly by means of differential scanning calorimetry (DSC). This is why this analyzing method is being used quite frequently in order to identify unknown substances or mixture of substances. Even mixtures with substances with equal molecular weight (eg fructose and glucose) can thus be identified.

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