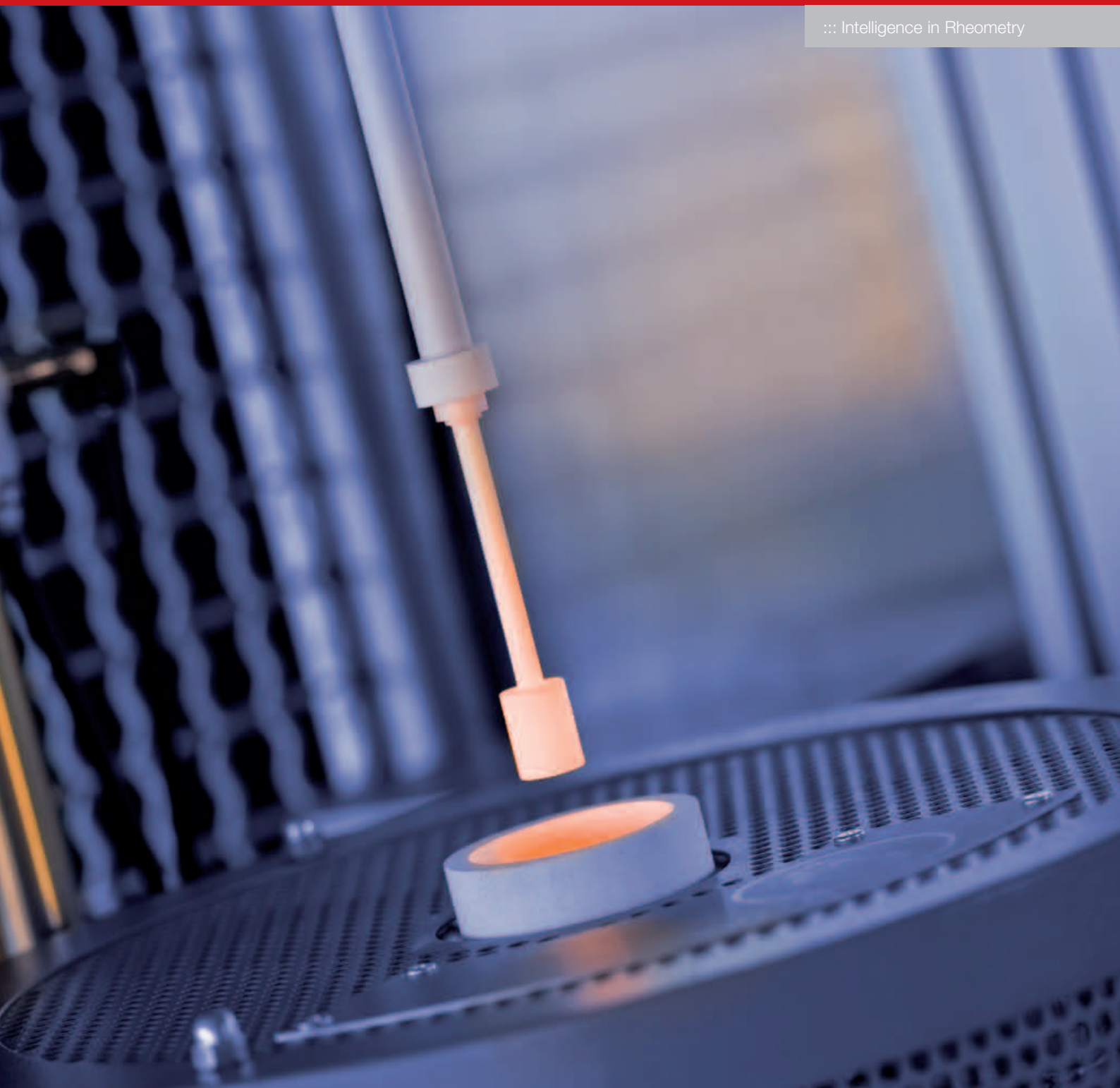




Anton Paar

::: Intelligence in Rheometry



FRS1600 Furnace Rheometer System

Rheological measurements of melts at temperatures up to 1600 °C

Viscosity measurements at up to 1600 °C

Materials of regular use in everyday life, such as glasses and metals, are processed or refined as melts at temperatures above 1000 °C. To ensure a consistent high quality of the final product and to optimize this energy-intensive process, knowledge about the melt viscosity is of great importance. The FRS1600 Furnace Rheometer System combines a rheometer and a lab furnace for viscosity measurements of melts at temperatures up to 1600 °C.

The setup

The Furnace Rheometer System (FRS1600) consists of a lab furnace (Carbolite STF16/180) and a rotational rheometer head equipped with a ball (RheolabQC) or an air bearing (DSR rheometer head). The rheometer is air- and water-cooled to prevent the electronics from overheating. Easy handling is ensured by a combination of pneumatic pre-positioning for sample and measuring system heating and hand-wheel- or stepper-motor-driven fine positioning for immersion into the sample.

The concentric-cylinder measuring system, available in different sizes, shapes and materials, is fixed at a long ceramic shaft, which is then attached to the rheometer head. For convenient cleaning and cooling as well as sample loading, the furnace can be moved to a park position where it keeps the temperature in the meantime.

Both the instrument and the furnace are controlled by the same software that is also used for all other rheometers from Anton Paar. It allows flexible test programming in rotational and oscillatory mode as well as intuitive data handling and display in diagrams and tables. The software shows the actual sample temperature, either over the factory calibration or optionally over a temperature sensor built in the shaft holding the cup. A cage around the compact system ensures safe work throughout the entire measurement. The instrument can be used for testing according to ASTM C1276.

Example

A standard glass melt (DGG1) has been measured with FRS1600. It shows Newtonian behavior and the certified viscosity value is exactly matched in the given range.



Fig. 1 FRS1600 with furnace in park position

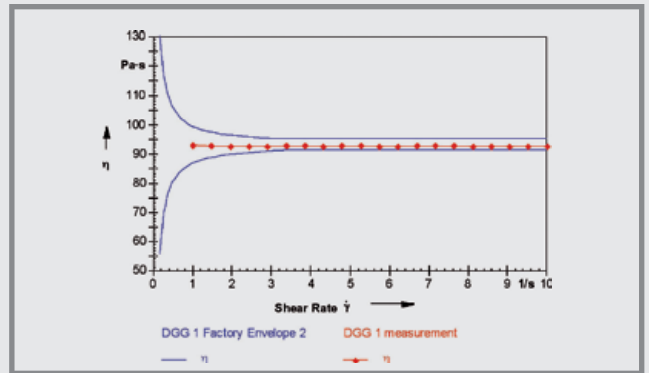


Fig. 2 Flow curve of a standard glass measured with FRS1600

FRS 1600

Furnace

| | |
|-------------------------|-------------------|
| Temperature range | 300 °C to 1600 °C |
| Temperature control | Eurotherm |
| Total length heat tube | 600 mm |
| Heated length heat tube | 180 mm |
| Constant temperature | 80 mm |

Rheometer Head

| | |
|---------------------------------|--|
| RheolabQC or DRS measuring head | Ball bearing (min. torque 250 µNm) Air bearing (min. torque 10 nNm) |
| Test modes | Rotation and oscillation |

Software controls instrument and furnace

Measuring systems

Concentric cylinders made of different materials and sizes

Anton Paar® GmbH

A-8054 Graz, Anton-Paar-Str. 20
Tel.: +43 (0)316 257-0, E-mail: info@anton-paar.com
Fax: +43 (0)316 257-257, Web: www.anton-paar.com

Instruments for:

| | |
|-------------------------------------|--|
| Density & concentration measurement | Colloid science |
| Rheometry and viscometry | High-precision temperature measurement |
| Sample preparation | Refractometry |
| Microwave synthesis | Polarimetry |
| | X-ray structure analysis |

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