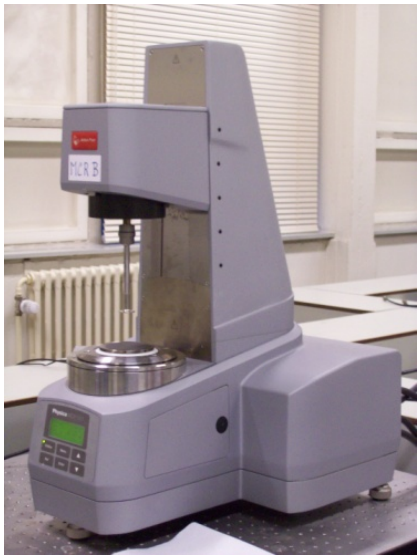
SMaRT – MCR501 (Anton Paar)

The air bearing supported synchronous motor is a specific aspect of the Physica Modular Compact Rheometer. Rapid, linear response, coupled with advanced electronics results in an accurate speed and strain control. The instrument allows for a fast response for step tests and to perform strain-controlled oscillatory tests at the smallest torques.



Device specifications

The synchronous motor of the MCR501 rheometer is supported by a very rigid air bearing which contains a normal force transducer. The transducer detects the natural movement of the air bearing due to the applied normal forces.

These technologies allow to accurately apply torques from 0.01 µN.m to 300 mN.m with a resolution of 0.1 nN.m, and normal forces from 0.01 N to 50 N with a resolution of 0.002 N.

Frequencies from 10^{-5} to 628 rad/s and speeds up to 3000 1/min can be applied with a displacement resolution of 0.01 µrad.

Geometries

A wide range of cone and plate tools (∅25 and 50 mm and angles 1, 2 and 4°) is available. A roughened cone and several (homemade) disposable geometries are also present.

A Couette cell holder is available to be used with (double gap) cups and bobs or vanes.

A solvent trap bottom plate and hood with evaporation blocker is present to guarantee sample stability.

A special interfacial rheology setup with a bicone geometry in a cup is available to measure the interfacial viscosity of liquid-liquid or liquid-air interfaces.

A commercial ball-on-three-plates tribology setup is available to measure friction and lubrication phenomena.

A dielectric cell to measure dielectric properties of sampels under flow can be coupled to the CTD oven.

A pressure cell setup allows measurements under pressure up to 150 bar. It is equipped with a bob/cup or plate/cup system.

Environmental control

Temperature control can be achieved using a Peltier plate, a solvent plate with hood, a Couette Peltier, or a CTD convection oven. This allows accurate temperatures from -40° C to 1000° C.

The instrument has a fully automatic tool recognition and a TruGap™ system to monitor and control the real gap, eliminating errors from thermal expansion and normal force during measurements.

Typical measurements

The wide variety of geometries and add-ons makes this instrument suited for a broad range of materials such as food applications, emulsions, polymers,…. The instrument also allows monitoring the transient first normal stress difference which is a sensitive fingerprint of the morphology of a material. Measurements are controlled and analyzed with RheoPlus software.

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