The optimum solution for the characterisation of complex fluids and for quality control

Rheowis

Couette Rheometer

WISENT

WISSENSCHAFTLICHE GERÄTE
ENTWICKLUNGEN

DR. THOMAS SUCK

Dedicated to science and research. A company that carries out its development and production in Germany.

Dr. Thomas A. Suck. Born 1957.
Degree in Physics, Doctorate in physical chemistry.
Active in the field of rheology since 1984. Responsible for quality and new generations of equipment.

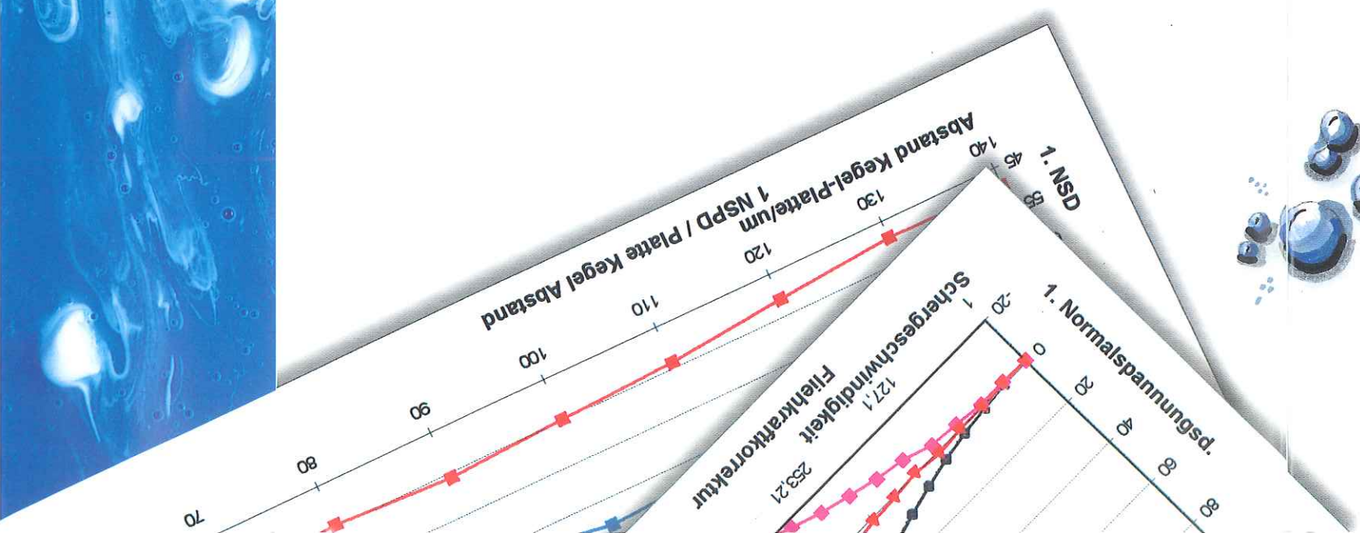
Since 1986, WISENT has stood for innovative developments in the field of rheology.

Due to our long years of experience in the development of Couette and Searle rheometers, we are today able to offer our customers optimum solutions. We have tested the limits of the different actuation possibilities in direct comparison.

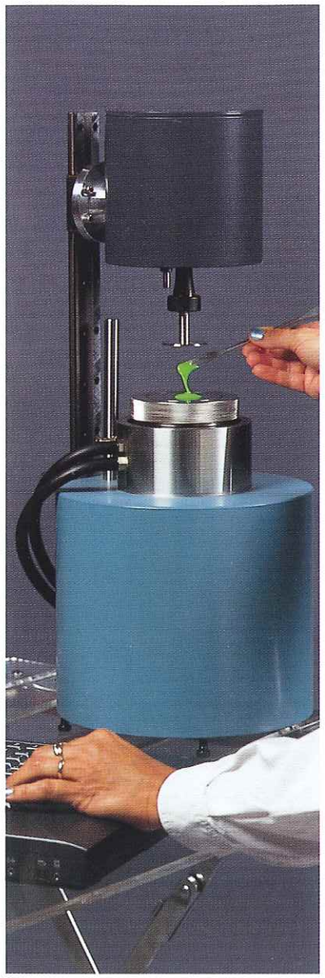
A number of corrections were necessary to the Searle actuation, which was standard to date. In the Searle system, cross-linking of the sample, which leads to an increase in the viscosity, could lead to too strong repetitive errors and measurement errors. By comparison, the digital actuator developed by us in the Couette mode, allows measurements to be taken according to the motto "measure instead of calculate ".

The digital Couette actuator is far superior to the Searle modus. With the new Couette rheometer system, Rheowis from WISENT, measurements of very low deformations and shear rates are possible without corrections.

Therefore, decide in favour of the better solution!



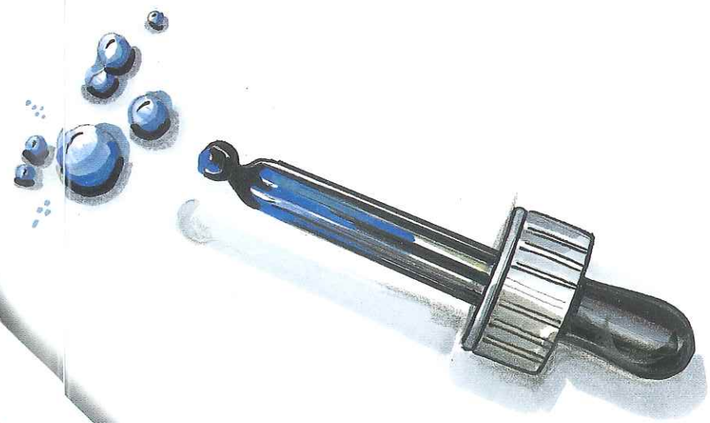
Additional assets for you: Quality management and DIN ISO 9001 for our products.

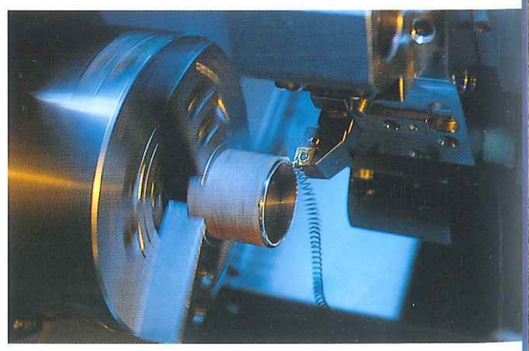


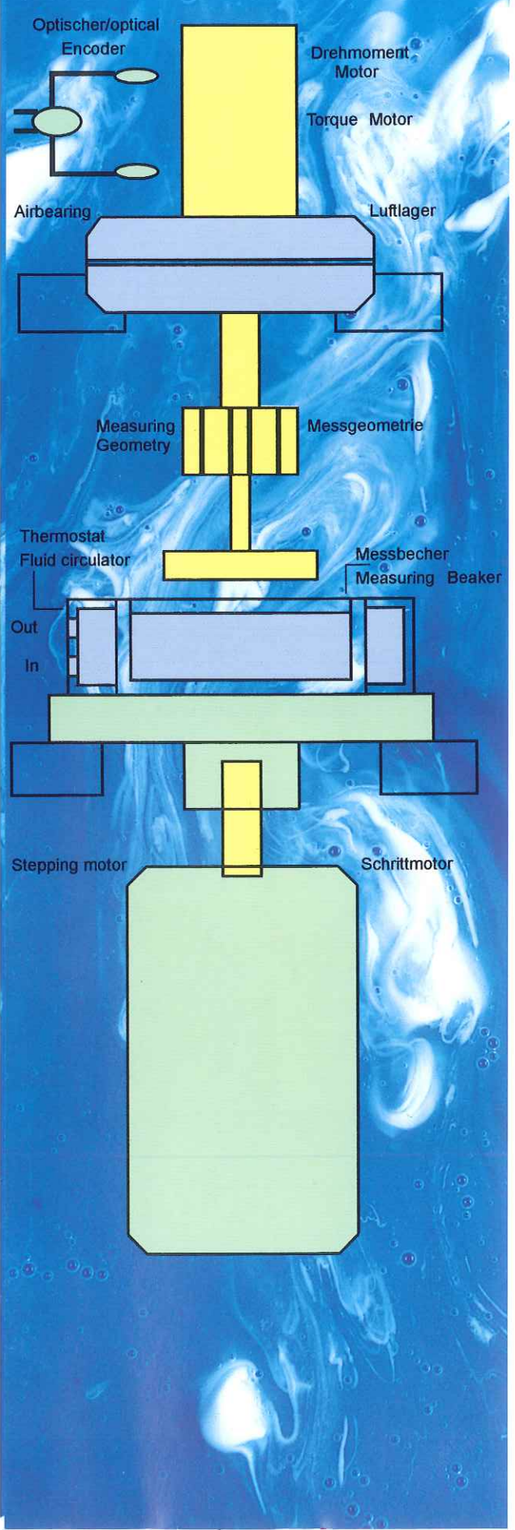
We make the highest demands on all of the products produced by Wisent! Therefore, we produce and manufacture all of the individual components exclusively in Germany. This is of significant importance, particularly in the manufacture of all of the mechanical parts.

Here, the use of precision machines and qualified personnel are basic prerequisites. All of the mechanical components produced are re-checked with respect to their dimensional tolerances after storage in the acclimatised precision measuring room, and are only supplied to our customers accompanied by a test certificate.

Component production is already carried out in accordance with a quality manual. In May 1999, we started to subject all of the areas of the company into a single quality management system. The final certification in accordance with DIN ISO 9001 is expected to have been completed in December 1999.







Precision that you can rely upon: The functioning of the digital motor actuator in the Couette mode.

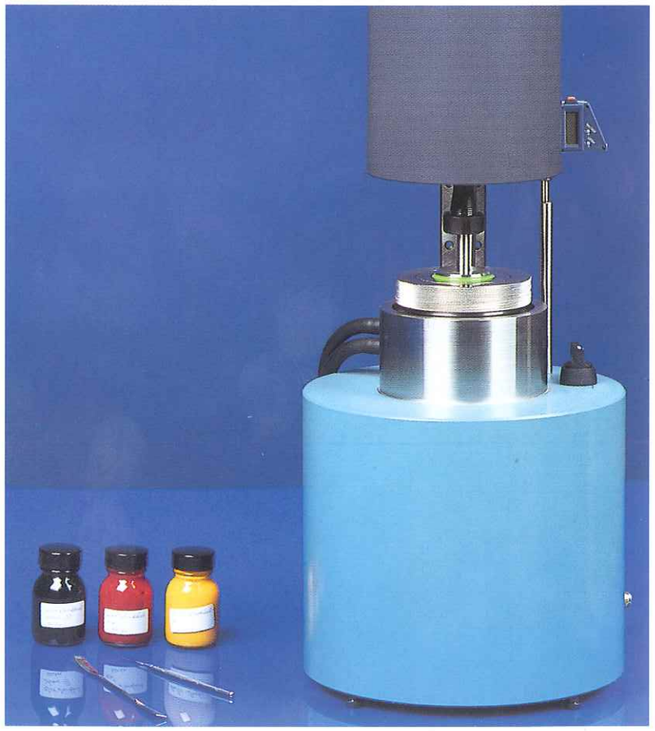
The angle positions and frequencies of rotation are calculated before the commencement of the measurement and are fed into the stepper motor via digitally working electronics. The drive occurs via TTL impulses.

Interference noise, such as occurs in analogue controlled motors, is ruled out as there are only the two conditions of 'high' and 'low'. The desired shearing rates are achieved exactly without being regulated to a set value via a control circuit. The digital actuation especially distinguishes itself during the oscillation measurements.

All angle functions are run through exactly and do not need to be approximated. At the same time, the required amplitude and frequency are exactly complied with.

The torque compensation is achieved fully without contact via a compensation system in the upper motor. In addition, the motor is air cooled in order to prevent heat effects to it.

The compensation system is so designed, that even a change in direction as small as 100 nm activates the control circuit to torque-compensation.



For all areas of use: Our development department creates solutions for all sorts of different temperature ranges.

As rheometer manufacturers, we search for solutions and further improvements, in order to be able to satisfy the continuously growing requirements.

The tempering of the Rheowis rheometer system is achieved via a liquid thermostat as a standard. The tempering medium flows completely around the sample to be investigated. Coaxial and plate-cone measuring systems can be thus tempered.

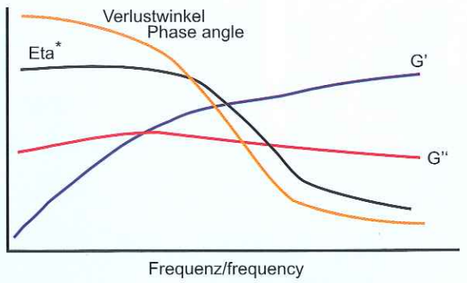
The working range of the Rheowis-HT rheometer system extends up to 450°C. The heating is achieved electrically directly in the measuring plate. The maximum heating rate is 35°C/min.

You have the choice:
We produce all of the common measuring systems such as plate-plate, plate-cone, Mooney-Ewart and coaxial measuring systems in accordance with the DIN.

Naturally, we also offer our customers special geometries in special materials.

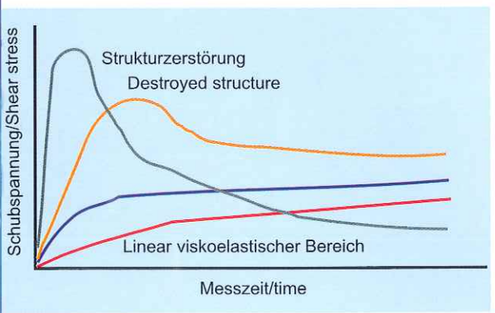
By the way:
All measuring systems are supplied with test certificates. The constants for the substance to be measured should be entered under the menu item "measuring systems" of our Windows software.

More comfort in the laboratory: Wisent recording of measured data enables simultaneous measurement and data evaluation



Non-destructive measurements as a function of the frequency, deformation, temperature and time using the oscillation test.

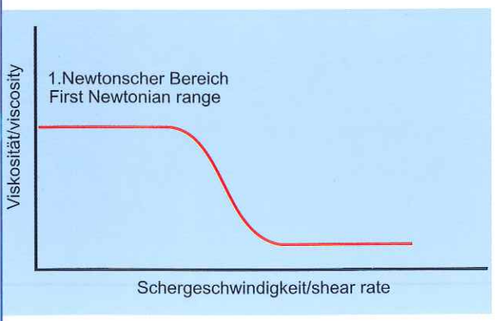
In this test, it is possible, as with a probe, to penetrate into the molecular level of the substance, without causing any destruction. The sample is subjected to a harmonic oscillation, which is transferred to the sample from the digital motor drive without any inertial effects.
As a reply, one receives a harmonic oscillation of the shear stress with phase displacement δ. For a Newtonian substance, the phase angle δ = 90°. A purely elastic sample has a phase angle of 0°. Vulcanisation processes, hardening processes and gelling processes can be tracked with oscillation measurements. As a result, the software supplies the visco-elastic parameters such as G´, G´´,G*,η´,η´´,η*,δ and tanδ.



Investigation of structural decomposition and of equilibrium viscosity using the tension test.

Here, the sample is loaded with a constant shear rate. One receives the measuring result of viscosity as a function of time. If one investigates a visco-elastic fluid at very low shear rates, then one finds oneself in the linear visco-elastic range, such as that shown for a tenside solution.

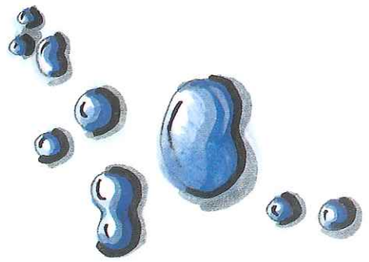
At greater shear rates, the structure fails and a stationary equilibrium is achieved between the structural synthesis and decomposition, the equilibrium viscosity.



Determination of the equilibrium shear viscosity using the tension test.

This test supplies a fingerprint of the sample to be investigated, independent of its testing history.

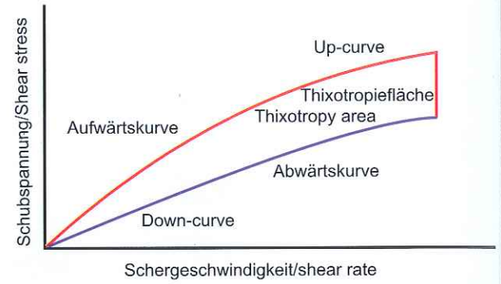
The shear rate is set for so long, until a stable final value has been reached. Here, the digital actuation in the Couette mode is to be given preference over the Searle principle, as it can exactly set extremely low shear rates without corrections (flexibility, inertia of the measuring system, electronic control circuits), which allows an exact and reproducible measurement of the first Newtonian range.



Viscosity measurement as a function of the shearing rate using the flow test.

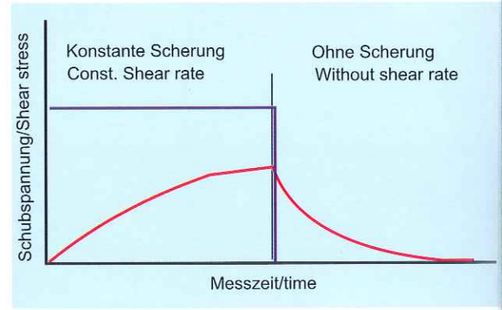
In the flow test, the change in viscosity of a material is detected dependant upon the shear rate. Information about the rheopexy or thixotropy can be immediately assigned to the substance to be investigated.

The direct drive (Couette mode) in the Rheowis rheometer system guarantees the simulation of real process events, even at the lowest of shear rates, in order to characterise the behaviour of pastes, liquids, melted polymers and gels.



Investigation of sedimentation phenomena and the re-formation of substance structures using the relaxation test.

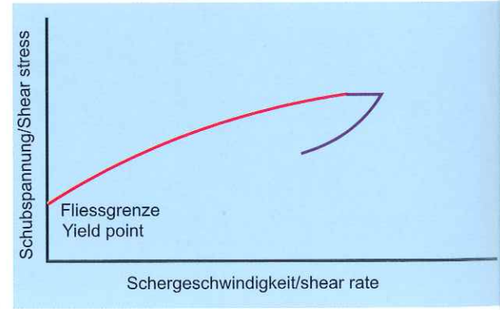
If one shears a Newtonian substance, a constant shear stress sets in. After switching off the shearing, the current value of the shear stress immediately returns to zero. (One only obtains this result in the shear stress controlled mode if a torsion correction is carried out).
Polymer solutions, creams and emulsions display a relaxation spectrum after the load has been switched off. The relaxation moduli G_i are to be determined from the relaxation times T_i thus efined, which enable an allocation of the molecular parameters.



The yield point is determined in order to prevent fat edges forming during coating and enamelling.

In some materials, such as ointments, printing inks, car paints and toothpastes, the substance does not begin to flow until after a characteristic shear stress, the so-called yield point, has been exceeded.

Below the yield point, the sample behaves as a solid body.
The shear stress is increased incrementally and the deformation or shear rate detected.



We are there for you:
Whether via our head office in Wilnsdorf or via our sales partners, you can reach us throughout the world.

AGFA-Gevaert
COATEX
L'ORÉAL
TU-Dresden
LU-BSN
CREALIS Groupe Danone
UNI-GH-Essen
MAN Roland
Jean Thèves
WEBAC Chemie
BYK Gulden

Our rheometers have already been successfully used for many years in the following fields.

Animal foods, building materials chemistry, fillers, foams and gels.

Foods, dyes and paints, pharmaceutical industry and toothpastes.

Eye ointments, inks, printing dyes,
waxes, polymer and tenside solutions.

Of course, this is only a small extract from our list of customers. There simply is not enough room to list the whole range of applications here. From the pure quality control up to the product development in the research: In all areas of use, Wisent stands for successful products from practical experience for practical application.
Would you like to know more? We would be pleased to inform you.

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