



When user-friendliness and reliability matter
Thermo Scientific Viscometers

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Basic principles in rheology

Selecting a viscometer

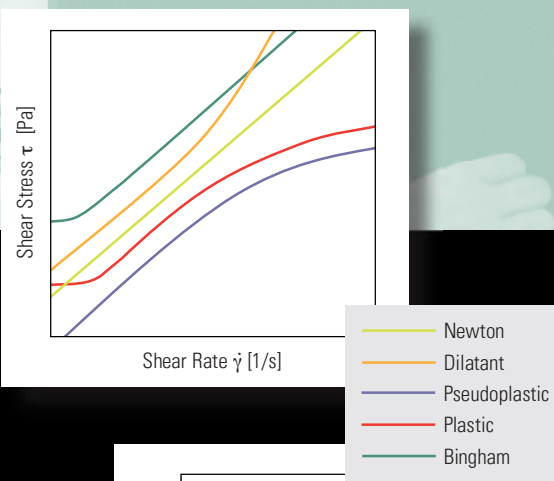
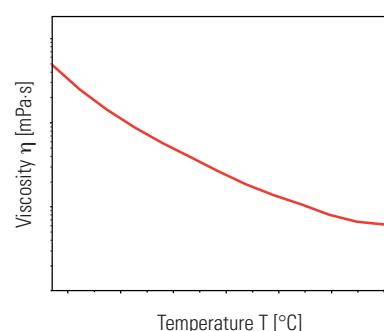
Viscometry

Viscometers determine the flow behavior of fluids. Viscosity describes a material property which is dependent on different parameters such as mechanical stress and strain, time as well as temperature and other ambient conditions.

Flow behavior

In rheology we differentiate between so-called Newtonian and non-Newtonian materials. Newtonian materials are characterized by a viscosity which may depend on temperature but is independent of the shear rate (and shear stress). Yet the viscosity of non-Newtonian materials depends on the shear rate. For most non-Newtonian materials the viscosity decreases with increasing shear rate. This behavior is called shear-thinning, or pseudoplastic. A material in which viscosity increases at increasing shear rates is called shear-thickening or dilatant.

Materials that do not flow until the applied shear stress surpasses a certain value are said to have a yield-stress.



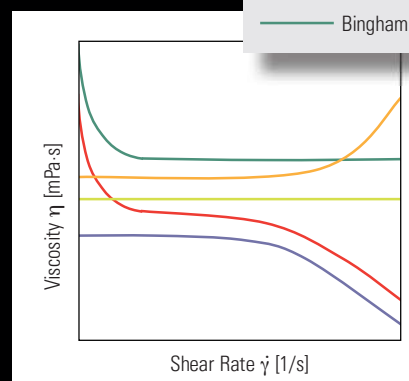
Rotational viscometers

Using a rotational viscometer, the viscosity is calculated from the measured torque and rotational speed as well as the dimensions of the measuring geometry. If the measuring geometry fulfils certain requirements (e.g. small gap), which is the case for coaxial cylinder, plate/plate and cone/plate measuring geometries (DIN 53018, DIN 53019...), the absolute value of the viscosity can be calculated.

If the dimensions of the measuring geometry are not well defined, only a relative value for the viscosity can be determined. In this case, the measured viscosity value not only depends on the ambient conditions, but also on the test method, i.e. the measuring geometry.

Falling ball viscometers

The falling ball viscometer is a conventional and highly accurate instrument for the determination of the absolute value of the viscosity of a Newtonian material. The viscosity can be calculated from the falling time of the ball, the density of the ball as well as the diameter of the tube and the ball.



THERMO SCIENTIFIC HAAKE VISCOTESTER 1 PLUS AND 2 PLUS

Application

These small, battery-operated rotational viscometers are suitable for quick and reliable tests and comparative measurements for quality control applications. The hand-held instruments can also be operated on a stand.

User friendliness

The operation of the Thermo Scientific HAAKE Viscotester 1 plus and 2 plus is easy due to the one-button operation. The viscotester is switched on and off by pushing the button once. Pushing the button again selects the rotor type and starts the measurement.

Digital display

Contrary to the traditional viscotester models where the viscosity value is read from an analog dial, the HAAKE Viscotesters 1 plus and 2 plus show the viscosity value on a digital display. Therefore, errors caused by misreading the dial belong to the past. Possible handling errors as well as service information are also shown on the display.

Main features

- Quick, exact and reliable
- One button operation
- LCD display
- No mains supply required

Typical application fields

- Quick viscosity tests, e.g. for process optimization or machine adjustment
- Batch control in production

Typical samples

- Printing inks, paints, inks
- Shampoos, creams, lotions
- Oils, greases, pastes
- Sauces, thickeners

Measuring principle

A rotor rotating at a constant speed is immersed in the fluid to be tested; the fluid's resistance to the rotation measures the viscosity of the fluid. The small battery-operated rotational viscometer can be operated independently of a mains supply, which means quick and reliable viscosity measurements can be performed virtually everywhere.

Compatibility

Measuring cups and rotors from previous viscometer models – Thermo Scientific HAAKE VT01 and VT02 – can also be used with the plus units.



Technical data

- Viscosity range*
 - 1 plus: 1.5 mPas – 330 mPas
 - 2 plus: 0.3 dPas – 4000 dPas (30 mPas – 400.000 mPas)
- Temperature
 - up to 150 °C
- Rotor speed
 - 62,5 rpm
- Reproducibility
 - +/- 1 % FSD
- Measuring accuracy
 - standard: +/- 5 % FSD
 - optional: +/- 1 % FSD (HAAKE Viscotester 2 plus)
- Standard display
 - HAAKE Viscotester 1 plus η in mPas
 - HAAKE Viscotester 2 plus η in dPas
 - HAAKE Viscotester 2 plus η in mPas
- Optional

*1 mPas = 1 cP



222-1678 Support Stand



222-1679 Rotor No 1



222-1680 Rotor No 2



222-1681 Rotor No 3



222-1682 Rotor No 4



222-1683 Rotor No 5



222-1685 Cup B



222-1684 Cup A



222-1686 Cup 3

Order information

Order-No.	Description
399-0100	HAAKE Viscotester 1 plus: Basic instrument with batteries Instrument holder 2 Measuring cups (A and B) 3 Rotors (No. 3, 4, 5) Delivered in a carrying case
399-0200	HAAKE Viscotester 2 plus: Basic instrument with batteries Instrument holder 1 Measuring cup (3) 3 Rotors (No. 1, 2, 3) Delivered in a carrying case
222-1693	Calibration to a measuring accuracy of +/-1% FSD (HAAKE Viscotester 2 plus)
399-0202	HAAKE Viscotester 2 plus η in mPas
222-1688	Battery charger incl. 4 AA batteries



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