

**When user-friendliness  
and reliability matter**

**Thermo Scientific Viscometer**

## Basic principles in rheology Selecting a viscometer

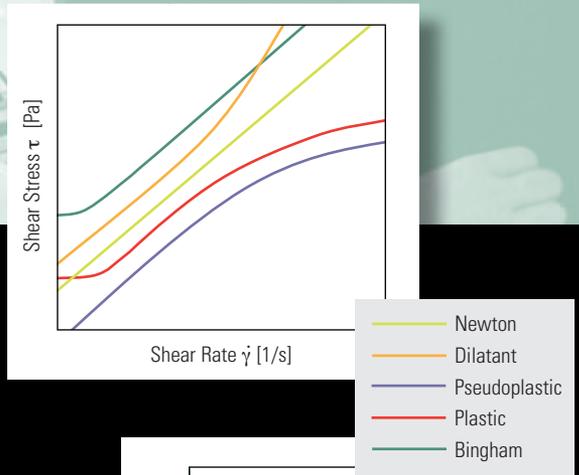
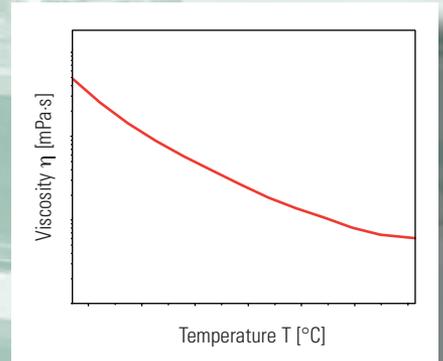
### Viscometry

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.



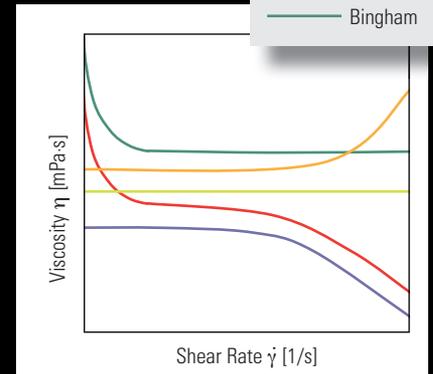
### Rotational viscometers

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.



	HAAKE Viscotester 1 plus and 2 plus	HAAKE Viscotester E, D, C	HAAKE Falling Ball Viscometer
	<b>Page 4</b>	<b>Page 6</b>	<b>Page 9</b>
Measurement	relative	relative	absolute*
Standards		ISO 2555	DIN 53015, ISO 12058
Viscosity	HAAKE Viscotester 1 plus: low HAAKE Viscotester 2 plus: medium	L-Version: low to medium R-Version: medium to high	low to high
Specials	battery-powered hand-held instrument, digital display	temperature-controlled quick fit coupling for spindles HAAKE RheoWin software	measurements on gases
	HAAKE Viscotester 550	HAAKE RotoVisco 1	Service & Standard Liquids
	<b>Page 10</b>	<b>Page 13</b>	<b>Page 15</b>
Measurement	absolute**	absolute**	
Standards	DIN 53018/53019, ISO 3219	DIN 53018/53019, ISO 3219	
Viscosity	low to high	low to high	
Specials	temperature-controlled, application-oriented packages HAAKE RheoWin software	built in temperature control unit automatic lift control application-oriented packages HAAKE RheoWin software	

\* For Newtonian substances \*\* Using absolute measuring geometries



## 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  $\eta$  in mPas
  - HAAKE Viscotester 2 plus  $\eta$  in dPas
- Optional
  - HAAKE Viscotester 2 plus  $\eta$  in mPas

\*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 $\eta$ in mPas
222-1688	Battery charger incl. 4 AA batteries



## THERMO SCIENTIFIC HAAKE VISCOTESTER E, D AND C

### Application

The Thermo Scientific HAAKE Viscotester E, D and C units can be used for tests and comparative measurements for quality control according to recognized standards.

### Measuring principle

The HAAKE Viscotester E, D and C are classical rotational viscometers that measure the resistance of a test substance against a preset speed. The resulting torque or resistance measures the viscosity of the fluid. The higher the torque, the higher the viscosity. Due to the type of standardized geometries, the shear rates generated can only be determined precisely for Newtonian substances.

### Compatibility

The basic ISO 2555 standard describes the design and the characteristic measuring technique of a viscosity measuring instrument (torque, speed, rotor geometry). If rotational viscometers meet these requirements, results comply.

### Common features of the HAAKE Viscotester E, D and C

- Ready to go package – unpack, switch on and start measuring viscosity
- Digital display of viscosity, % torque, speed, spindle, upper viscosity limit, temperature (optional), in selectable units
- Integrated automatic diagnostic functionality
- Visual and acoustic signals at critical measuring conditions
- Easy viscosity and temperature (optional) calibrations
- 10 user interface languages
- 2 years warranty

### Standards

The HAAKE Viscotester E, D and C meet the following standards:

**BS:** 6075, 5350; **ISO:** 2555, 1652

**ASTM:** 115, 789, 1076, 1084, 1286, 1417, 1439, 1638, 1824, 2196, 2336, 2364, 2393, 2556, 2669, 2849, 2983, 2994, 3232, 3236, 3716

### Technical data

- Viscosity range: depending on version (L or R)
- Accuracy: +/- 1 % FSD
- Reproducibility: 0.2 %
- Supplied at 100–240 V/50–60 Hz





### HAAKE Viscotester E – The expert model

For automatic flow curve measurements with full PC control.

Additional features:

- 6 line LCD display with 12 keys
- Display of sample temperature, shear rate and shear stress for coaxial spindles, routine parameters, etc.
- Internal memory for 9 advanced measuring routines
- Routine programming functions
- USB for software control
- Rotational speeds: 54 between 0.01 rpm and 200 rpm
- Viscosity range:  
R-Version: 100 mPas – 40.000.000 mPas  
L-Version: 15 mPas – 6.000.000 mPas

Optional:

- One hand quick fit coupling for spindles
- HAAKE RheoWin measuring and evaluation software

### Order No. Description

399-0500	HAAKE Viscotester E (R-version) Base unit with stand, spindles R2 to R7, rack, spindle guard, Pt 100 in a carrying case
399-0510	HAAKE Viscotester E (R-version) 399-0500 with quick fit coupling
399-0501	HAAKE Viscotester E (L-version) Base unit with stand, spindles L1 to L4, rack, spindle guard, Pt 100 in a carrying case
399-0511	HAAKE Viscotester E (L-version) 399-0501 with quick fit coupling



### HAAKE Viscotester D – The distinct model

For routine viscosity measurements with data transfer.

Additional features:

- 6 line LCD display with 6 keys
- Internal memory for 9 basic measuring routines
- USB interface for data transfer to PC
- Rotational speeds:  
21 between 0.1 rpm and 200 rpm
- Viscosity range:  
R-Version: 100 mPas – 13.000.000 mPas  
L-Version: 15 mPas – 2.000.000 mPas

Optional:

- Temperature sensor Pt 100
- Display of sample temperature
- One hand quick fit coupling for spindles
- HAAKE RheoWin data evaluation software

### Order No. Description

399-0400	HAAKE Viscotester D (R-version) Base unit with stand, spindles R2 to R7, rack, spindle guard in a carrying case
399-0410	HAAKE Viscotester D (R-version) 399-0400 with quick fit coupling
399-0401	HAAKE Viscotester D (L-version) Base unit with stand, spindles L1 to L4, rack, spindle guard in a carrying case
399-0411	HAAKE Viscotester D (L-version) 399-0401 with quick fit coupling
222-2003	Temperature sensor Pt 100



### HAAKE Viscotester C – The convenient model

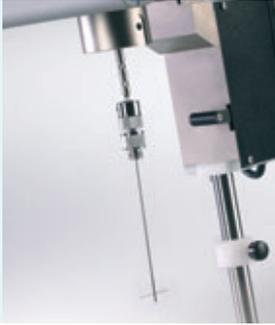
For easy, fast and accurate manual viscosity measurements.

Additional features:

- Simple and intuitive operation
- 4 line LCD display with 6 keys
- Rotational speeds:  
21 between 0.1 rpm and 200 rpm
- Viscosity range:  
R-Version: 100 mPas – 13.000.000 mPas  
L-Version: 15 mPas – 2.000.000 mPas

### Order No. Description

399-0300	HAAKE Viscotester C (R-version) Base unit with stand, spindles R2 to R7, rack, spindle guard and carrying case
399-0301	HAAKE Viscotester C (L-version) Base unit with stand, spindles L1 to L4, rack and spindle guard and carrying case



**Helipath**

for comparative measurements on high viscous samples such as creams, pastes and gels

The up and down movement of the measuring head allows the needle spindle to cut into fresh material tracing a helical path through the sample

**Order No. Description**

222-1380 Motor-driven Helipath stand to continuously penetrate fresh sample material; incl. 6 T-shaped spindles and carrying case (100 V–240 V/50 Hz–60 Hz)



**Low viscosity adapter**

allows reproducible and accurate measurements of the viscosity from 1.0\* mPas for L-models and 5 mPas for R-models

(\* Taylor vortices may result in additional errors.)

**Technical data:**

- Sample volume: 16 ml – 18 ml
- Flow jacket for temperature control: -10°C–100°C
- Pt 100 (optional)

**Order No. Description**

222-1379 Adapter for low-viscous samples, which extends the measuring range down to lower viscosities, incl. cylindrical spindle and carrying case

222-2001 Pt 100 for low viscosity adapter



**Small sample adapter**

for viscosity measurements of small volumes

**Technical data:**

- Sample volume: 8 ml –13 ml
- Flow jacket for temperature control: -10°C–100°C
- Pt 100 (optional)

**Order No. Description**

222-1378 Adapter for small sample volumes incl. carrying case, spindles supplied separately

222-1397 Set of spindles for L-version of the viscotester

222-1387 Set of spindles for R-version of the viscotester

222-2002 Pt 100 for small sample adapter



**HAAKE RheoWin software for HAAKE Viscotester E and D**

Highly customizable and extremely easy to use software for both beginners and professionals consisting of:

- JobManager for fully automated measuring and analysis routines (for HAAKE Viscotester E only)
- DataManager for data analysis and creating reports
- User Manager for user access control and assignment of specific access rights

**Order No. Description**

098-5059 HAAKE RheoWin software for HAAKE Viscotester D software for data collection and evaluation

098-5060 HAAKE RheoWin software for HAAKE Viscotester E measuring and evaluation software

098-5039 HAAKE RheoWin software module: FDA 21 CFR part 11



The HAAKE Viscotesters E, D and C are supplied as a complete measuring unit consisting of a basic instrument with stand and a set of spindles with a storage rack – all in a carrying case with multilingual documentation.

## Application

The Thermo Scientific HAAKE Falling Ball Viscometer type C provides a very accurate way of measuring the viscosity of transparent Newtonian liquids and gases. It meets the requirements of the German DIN 53015 as well as ISO 12058 standard and it is accepted as an official reference instrument. Its measuring accuracy when supported with the precise temperature control of a circulator is among the highest available in any type of viscometer.

- Chemical industry  
(polymer solutions, solvents, inks)
- Pharmaceutical industry  
(raw materials, glycerine)
- Food industry  
(gelatin, sugar solutions)
- Mineral oil industry  
(oils, liquid hydrocarbons)

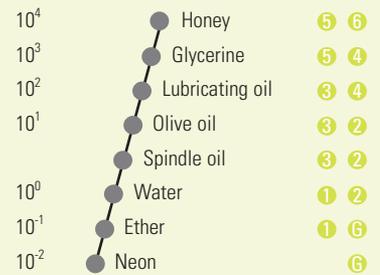


## Measuring principle

The time for rolling and sliding movements of a ball through the sample liquid in an inclined cylindrical measuring tube is measured. The sample viscosity is correlated with the time needed by a ball to traverse a definite distance.

By turning the measuring tube upside down again the return of the ball may also be used for an additional measurement. The test results are given as dynamic viscosity in the internationally standardized, absolute units of milli Pascal seconds (mPas).

### Viscosity $\eta$ 20°C (mPas)      Ball(s)



## Technical data

- Viscosity range: 0.5 mPas –  $10^6$  mPas (cP)
- Temperature range: -20°C to +150°C
- Reproducibility: < 0.5 %
- Comparability: < 1 %
- Material: Falling tube, balls 1, 2 and G, borosilicate glass; balls 3, 4, 5 and 6, Nickel iron alloy



## Order information

Order No.	Description
356-0001	Falling Ball Viscometer type C including 6 balls, instrument case, thermometer -1 °C up to 26 °C (0.1 °C divisions), cleaning tools, calibration sheet, instruction manual
800-0176	Stopwatch, LCD-Display up to 9 h, 59 minutes, 59.99 seconds
800-0009	Ball G for gas measurements
333-0639	Pt 100 temperature sensor for falling ball - DC50 circulator

# THERMO SCIENTIFIC HAAKE VISCOTESTER 550

## Measuring Principle

By its design, the Thermo Scientific HAAKE Viscotester 550 is a Searle viscometer. A rotational speed is preset and the flow resistance of the sample is measured, in other words, the torque required to maintain the set speed is proportional to the viscosity. From the torque required, the set speed and the geometry factors of the applied sensor, all final information on the viscosity, shear stress and the shear rate is calculated. The results are displayed digitally and can be printed simultaneously.

## Features

- Precise measurements of viscosity in controlled rate "CR"-mode
- Yield point determination in controlled deformation "CD"-mode
- Robust and reliable rotational viscometer for use with predefined internal routines or with HAAKE RheoWin software (optional)

## Measuring Geometries

- Coaxial cylinders according to DIN 53018 and ISO 3219. Exact temperature control can be provided by use of a circulator
- Immersion geometries according to DIN 53019 and ISO 3219
- Cones and plates according to ISO 3219
- Relative geometries according to ISO 2555
- Special immersion geometries:
  - for highly filled samples or containing large particles
  - for the determination of the yield point

## Application

The HAAKE Viscotester 550 is specially designed for quality control applications. It is a rotational viscometer that measures precisely, quickly and simply the viscosity and flow behavior of liquid and semisolid test materials.

All results like viscosity, shear stress, shear rate, yield point and operating temperature are displayed in the digital LED display.

The HAAKE Viscotester 550 does not mind if a sample is thin like an oil, a paint or a ceramic slurry or as pasty as cremes, salves or a PVC plastisol. The HAAKE Viscotester 550 covers the whole application range from very thin to very thick. Even more demanding tasks can be fulfilled.

For example, the automatic characterization of the flow behavior of non-Newtonian fluids or the determination of the yield point using the CD-principle (= Controlled Deformation) can be done. Any one out of a set of 10 predefined routines will be executed with precision and repeatability.



## Technical data

- Speed Range: 0.5 rpm – 800 rpm
- Uncertainty: +/- 0.1%
- CD Mode: 0.0125 rpm
- Torque Range:
  - up to 400 rpm: 0.1 mNm – 30 mNm
  - up to 800 rpm: 0.1 mNm – 20 mNm
- Uncertainty: +/- 0.5% FSD
- Temp. Range: -50 °C – +250 °C depending on measuring system
- Interface: RS232C
- Autoswitch Power Supply: 230 V/115 V (50 Hz – 60 Hz)

## Standard



Rotor	NV	MV1	MV2	MV DIN	SV 1	SV 2	SV DIN
Order-No.	807-0713	807-0519	807-0522	222-1252	807-0786	807-0789	222-0505
Cup	NV	MV	MV	MV	SV	SV	SV
Order-No.	807-0702	222-1251	222-1251	222-1251	807-0792	807-0792	807-0792
Temperature Vessel	+	+	+	+/-	+	+	+/-
Application	Low viscosity		Medium viscosity		High viscosity		
Sample Volume (cm <sup>3</sup> )	9	45	56	60	12	6	10
Gap (mm)	0.35	0.96	2.6	1.64	1.45	1.45	0.9
Radius, Length (mm)	20.1/60	20.04/60	18.4/60	19.36/58.08	10.1/61.4	10.1/19.6	10.65/31.95

## Special



Plate-cone

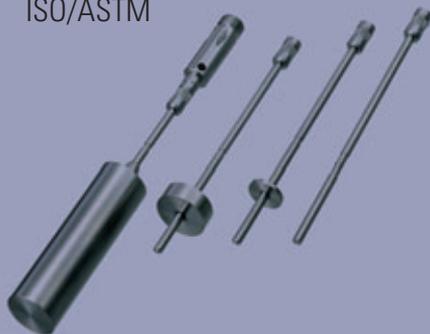
Rotor	PK 1,1°	PK 1,0.5°	PK 2,1°	PK 2,0.5°	MV 2P	SV 2P
Order-No.	807-0755	807-0754	807-0764	807-0763	807-0488	807-0816
Cup	-	-	-	-	MVP	SVP
Order-No.					807-0483	807-0814
Temperature Vessel	PK 100 D	PK 100 D	PK 100 D	+	+	+
Application	Small sample volume, high viscosity samples				Slippage	
Sample Volume (cm <sup>3</sup> )	0.1	0.1	<0.1	<0.1	55	6
Gap (mm)	-	-	-	-	2.6	1.45
Radius, Length (mm)	14/-	14/-	10/-	10/-	18.4/60	10.1/19.6

## Immersion



Rotor	E 3	E 30	E 100	E 500	E 1000	FL 10	FL 100	FL 1000
Order-No.	808-0621	808-1081	808-1141	808-1160	808-1201	808-1037	808-1040	808-1065
Cup	Beaker and sample volume depend on application							
Adapter	Adapter is required (part.-no 808-0579 or 222-1359)							
Application	Fast and simple relative measurements				Relative measurem. of disperse samples			
Temperature	-30 °C – 200 °C				-30 °C – 200 °C			
Radius, Length (mm)	25/116	12/50.5	8/34.5	5/9	3.5/17.7	20/60	11/16	5/8.8

## ISO/ASTM



Rotor	B 1	B 2	B 3	B 4	B 5	B 6	B 7
Order-No.	222-1395	222-1655	222-1656	222-1657	222-1658	222-1659	222-1660
Cup	Beaker and sample volume depend on application						
Adapter	ISO-Adapter is required, part.-no 222-1240						
Application	Viscosity measurement according to ISO 2555, ASTM D 115-72, D789-73, D2196-68						
Temperature	-30 °C – 200 °C						
Radius, Length (mm)	28.13/22.5	23.5/1.65	17.35/1.65	13.65/1.65	10.55/1.65	7.3/1.65	1.6/50.4

## HAAKE VISCOTESTER 550 PACKAGES

### Application Focus

Viscosity is as diverse as our customers' applications and is subject to change.

We provide comprehensive product and application support – like we do with specific instrument packages that are focused on various applications.

And our specialist team is on hand to answer questions as well.

We are glad to consult with you on further applications and can offer a broad accessory portfolio for these, too.



### Order-No.

**362-0021 European Version**  
**362-0022 US Version**

### Applications

#### Food Industry

Chocolate, beverages, thickening agents, stabilizer, starch, pectin

#### Cosmetic/Pharmaceutical Industry

Creams, lotions, shampoos, liquid soaps

#### Paint Industry

Water-based paints, latex paints, thickening agents

#### Chemical Industry

Liquid raw materials, oils, polymer solutions

### Description

#### DIN package for measurements on liquids

for lower to higher viscosities, which are available in larger quantities and easy to clean

### Content

#### HAAKE Viscotester 550 (115-230V/50-60Hz)

- Support stand for the base unit
- Temperature control vessel with connector to circulator (Ø 8 mm)
- Pt 100 temperature sensor
- Coaxial cylinder geometries: MV/DIN and SV/DIN



### Order-No.

**362-0041 European Version**  
**362-0042 US Version**

### Applications

#### Food Industry

Dairy products (e.g. yogurt), jam, sauces

#### Construction Materials

Slurries

#### Others

Measurements in original containers

### Description

#### Package for yield point determination

Suitable for highly thixotropic materials, samples which are difficult to measure (e.g. due to sedimentation) or with bigger particles

### Content

#### HAAKE Viscotester 550 (115-230V/50-60Hz)

- Support stand for base unit
- Universal joint for FL sensors
- Vane rotor FL100, star shaped
- HAAKE RheoWin measuring and evaluation software, incl. computer cable



Order-No.

**362-0100 European Version**  
**362-0101 US Version**

### Applications

**Practical experiments with theoretical background for beginners**

Experiment 1: Newtonian fluids

Experiment 2: Non-Newtonian fluids



### Description

**Educational package – an introduction to rheology**

### Content

**HAAKE Viscotester 550 (115-230V/50-60Hz)**

- Support stand for base unit
- Temperature control vessel with connector to circulator (Ø 8 mm)
- Pt 100 temperature sensor
- Coaxial cylinder geometry: MV/DIN
- HAAKE RheoWin measuring and evaluation software, incl. computer cable
- Participation in a one-day training (training program: [www.thermoscientific.com/mc](http://www.thermoscientific.com/mc))
- Documentation "Introduction to rheology", directions for two practical experiments

Order-No.

**327-0001 European Version**  
**327-0002 US Version**

### Application

#### Food Industry

Dough, margarine, fats, butter

#### Cosmetic/Pharmaceutical Industry

Creams, toothpaste, lipsticks

#### Paint and Electronic Industry

Thickening agents, resins, printing inks

#### Chemical Industry

Paste-like raw materials and intermediate products

### Description

**DIN package for measurements on pastes** with medium to higher viscosities, which are limited in volume, expensive or difficult to clean

### Content

**HAAKE Viscotester 550 (115-230V/50-60Hz)**

- Support stand for base unit and plate-cone measuring system
- Cone and plate measuring system PK100 with connector for circulator (Ø 8 mm)
- Pt 100 temperature sensor included in the measuring plate
- Measuring plate MP60 (Steel 18/8)
- Cone PK1, 1°

### HAAKE RotoVisco 1

**for advanced measurements**

### Application

**Quality control**

**Research and development**

### Additional advantages at a glance

- Automatic lift control for precise gap setting
- Fully automated measuring routines incl. sample loading
- Built-in temperature control unit for precise and stable temperature control (Peltier, electrical or liquid)
- Broad range of accessories for individual requirements

### Technical data

Rotational speed: 0.0125 rpm – 1000 rpm

Torque: 0.1 mNm – 50 mNm

Temp. range: -40 °C – +350 °C depending on temperature control unit

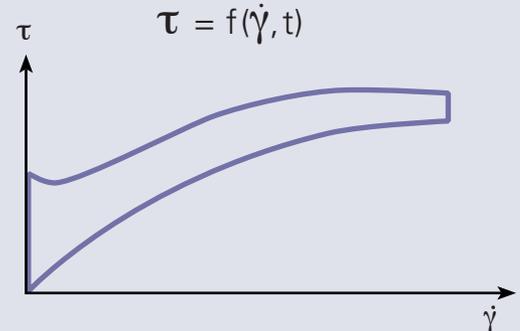
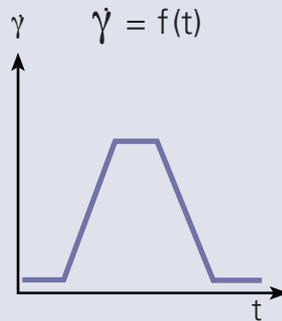


## RESULTS

### HAAKE VISCOTESTER 550

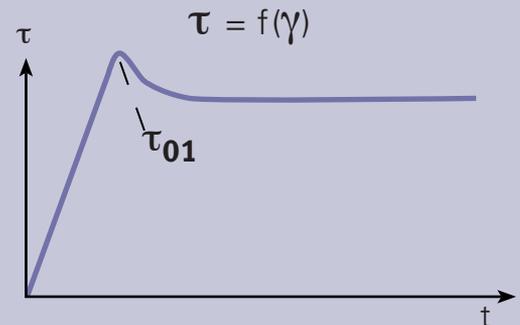
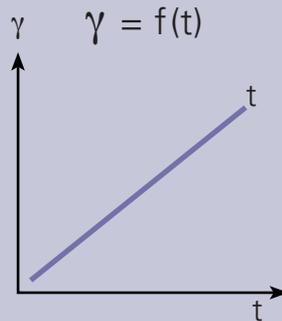
#### Flow Curve

A flow curve characterizes the flow behavior of a sample. It also allows estimations of storage stability and processing conditions. Important special characteristics like pseudoplasticity, plasticity and thixotropy are automatically quantified by the HAAKE Viscotester 550 and can easily be taken from the protocol.



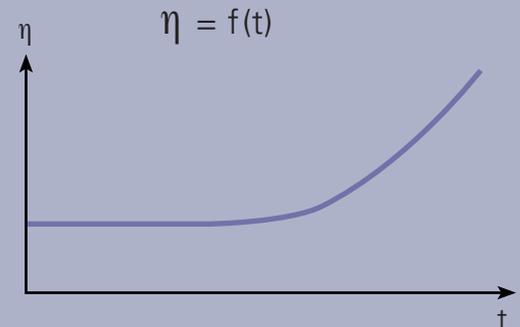
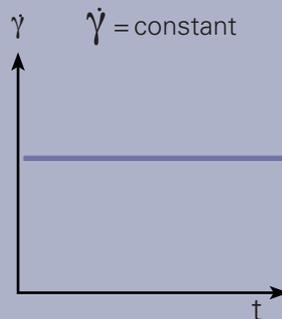
#### Yield Point

The yield stress is the force required to make a material flow. It controls the thickness of coating layers, ensures storage stability but inhibits free flow. By applying the CD-method (Controlled Deformation) the HAAKE Viscotester 550 characterizes the yield point with very high reproducibility.



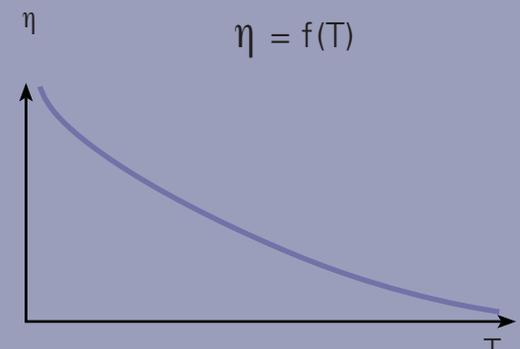
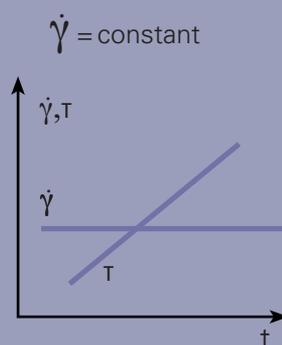
#### Time Curve

Chemical or physical changes in the sample can be tracked with a time curve. The test consists of applying a constant shear rate and monitoring the viscosity as a function of time. Time-dependant phenomena such as epoxy curing, chemical reactions and thixotropy breakdown can be precisely determined.



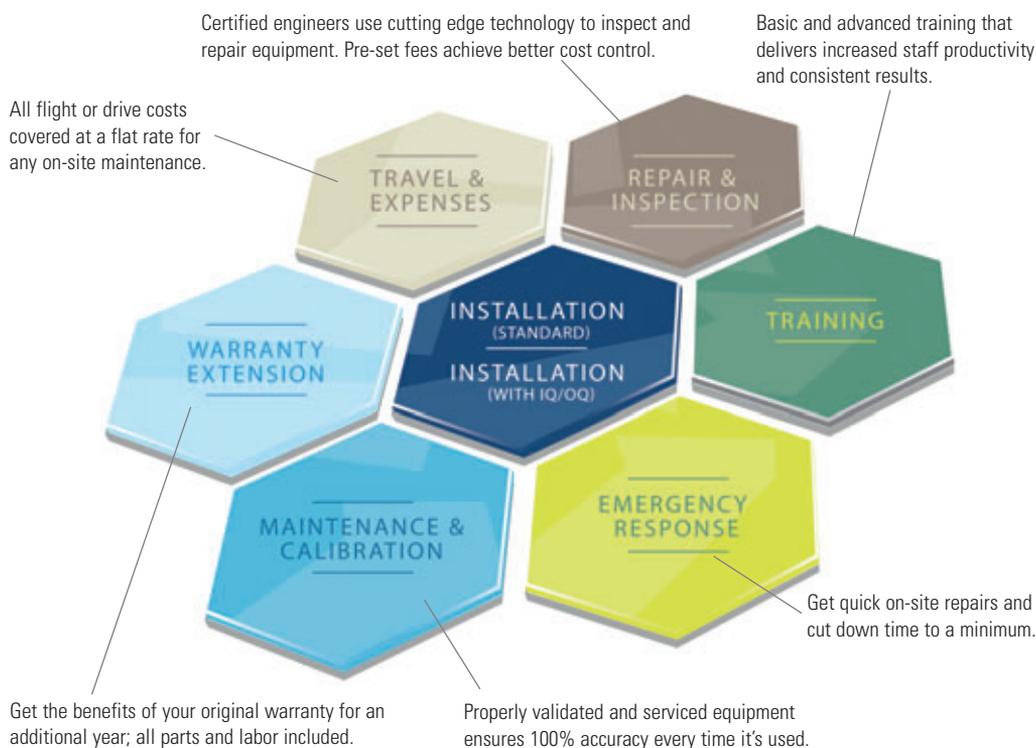
#### Temperature Curve

It is important to know the behavior of viscosity as a function of temperature. This can be realized by applying a constant shear rate to a sample and monitoring the viscosity as a function of temperature. Greases and oils must perform in summer and winter, and likewise food products must retain their shape under various temperatures.



Select only the service modules you want. Add modules at the time of equipment purchase, during warranty, or after. Combine modules. Or create a customized service plan that matches your unique requirements. We can offer comprehensive consultation to help choose the right options.

And if you require services not described here, please call us. We'll develop customized solutions for you. Visit [www.thermo.com/mc\\_service](http://www.thermo.com/mc_service) for more detailed information. And then phone your Thermo Fisher Scientific sales representative to arrange for your free service assessment.



We supply liquids with different qualities:

**Order information**

Order No.	Type	Description	$\eta$ (20 °C)
082-5303	100BW	Standard liquid 100 ml	100 mPas*
082-5304	2000AW	Standard liquid 100 ml	2000 mPas*
082-5305	10 000BW	Standard liquid 100 ml	10 000 mPas*
082-5042	E7	Test fluid 100 ml	5 mPas
082-5043	E200	Test fluid 100 ml	120 mPas
082-5044	E2000	Test fluid 100 ml	1900 mPas
082-5046	E6000	Test fluid 100 ml	6000 mPas
082-5336	E15 000	Test fluid 100 ml	15 000 mPas
082-5335	E40 000	Test fluid 100 ml	40 000 mPas

\* Additional certified viscosity values available at temperatures: 23, 25, 30, 40 and 100 °C.

## About Thermo Fisher Scientific

Thermo Fisher Scientific Inc. (NYSE: TMO) is the world leader in serving science. Our mission is to enable our customers to make the world healthier, cleaner and safer. With revenues of more than \$10 billion, we have approximately 35,000 employees and serve customers within pharmaceutical and biotech companies, hospitals and clinical diagnostic labs, universities, research institutions and government agencies, as well as in environmental and process control industries. We create value for our key stakeholders through two premier brands, Thermo Scientific and Fisher Scientific, which offer a unique combination of continuous technology development and the most convenient purchasing options. Our products and services help accelerate the pace of scientific discovery, and solve analytical challenges ranging from complex research to routine testing to field applications. Visit [www.thermofisher.com](http://www.thermofisher.com).

Thermo Fisher Scientific, one of the pioneers in rheology, successfully supports a wide range of industries with its comprehensive Thermo Scientific material characterization solutions. Material characterization solutions analyze and measure viscosity, elasticity, processability and temperature-related mechanical changes of plastics, food, cosmetics, pharmaceuticals and coatings, chemical or petrochemical products, plus a wide variety of liquids or solids. For more information, please visit [www.thermoscientific.com/mc](http://www.thermoscientific.com/mc).

© 2010/10 Thermo Fisher Scientific Inc. - All rights reserved - 623-2008 - Copyrights in and to all photographs of instruments, accessories and red fruit jelly are owned by Thermo Fisher Scientific. Copyrights in and to all other photographs are owned by a third party and licensed for limited use only to Thermo Fisher Scientific by iStockphoto. This document is for informational purposes only. Specifications, terms and pricing are subject to change. Not all products are available in every country. Please consult your local sales representative for details.

### Process Instruments

#### Benelux

Tel. +31 (0) 76 579 55 55  
[info.mc.nl@thermofisher.com](mailto:info.mc.nl@thermofisher.com)

#### China

Tel. +86 (21) 68 65 45 88  
[info.mc.china@thermofisher.com](mailto:info.mc.china@thermofisher.com)

#### France

Tel. +33 (0) 1 60 92 48 00  
[info.mc.fr@thermofisher.com](mailto:info.mc.fr@thermofisher.com)

#### India

Tel. +91 (20) 6626 7000  
[info.mc.in@thermofisher.com](mailto:info.mc.in@thermofisher.com)

#### United Kingdom

Tel. +44 (0) 1606 548 100  
[info.mc.uk@thermofisher.com](mailto:info.mc.uk@thermofisher.com)

#### USA

Tel. 603 436 9444  
[info.mc.us@thermofisher.com](mailto:info.mc.us@thermofisher.com)

#### International/Germany

Dieselstr. 4  
76227 Karlsruhe  
Tel. +49 (0) 721 4 09 44 44  
[info.mc.de@thermofisher.com](mailto:info.mc.de@thermofisher.com)

[www.thermoscientific.com/mc](http://www.thermoscientific.com/mc)

**Thermo**  
SCIENTIFIC