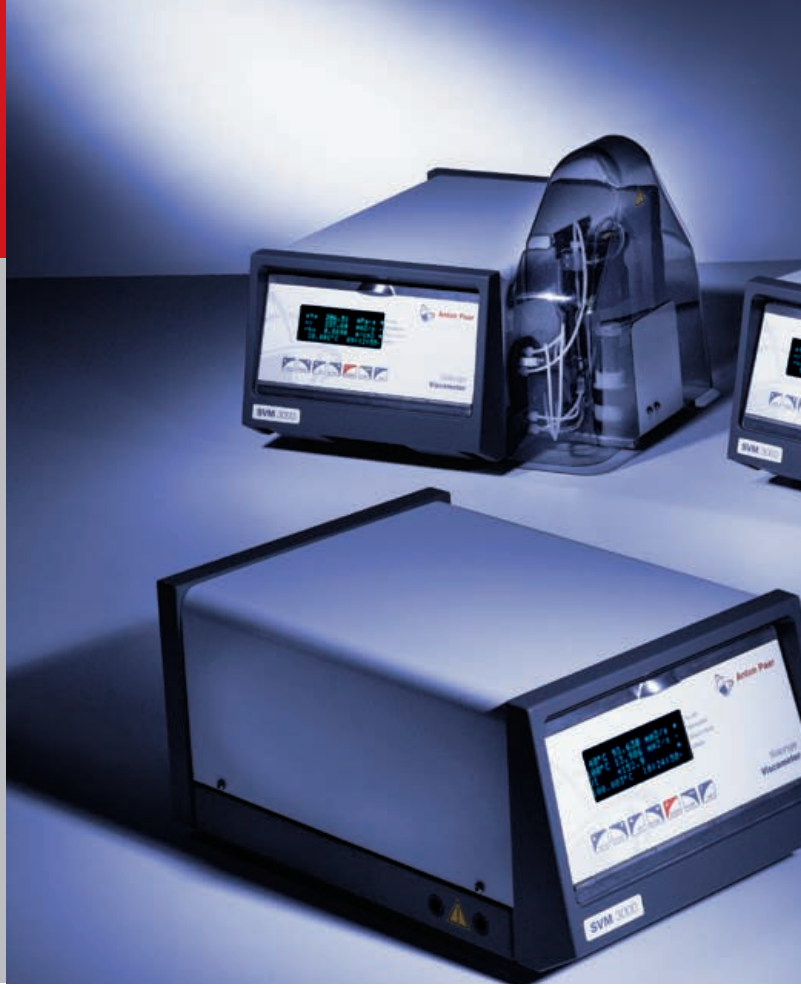
Anton Paar

SVM 3000

Stabinger Viscometer

::: Viscometry at its best

Small and Mighty



The SVM 3000 Stabinger Viscometer is a rotational viscometer with a cylinder geometry. It is based on a modified Couette principle with a rapidly rotating outer tube and an inner measuring bob which rotates more slowly.

The instrument is named after Dr. Hans Stabinger, who developed it together with his team at the Laboratory for Measuring Technology in Graz/Austria. It is the first instrument to combine the required precision for ASTM D7042 and measurement of the viscosity index according to ASTM D2270/ISO 2909 in a compact, lightweight benchtop device. SVM 3000 uses a new, patented measuring principle (EP 0 926 481 A2).

From only 2.5 mL of sample it determines dynamic viscosity, kinematic viscosity and density, i.e. of lubricating oil, used oil, transformer oil, crude oil, heating oil, vegetable oil or vaseline.

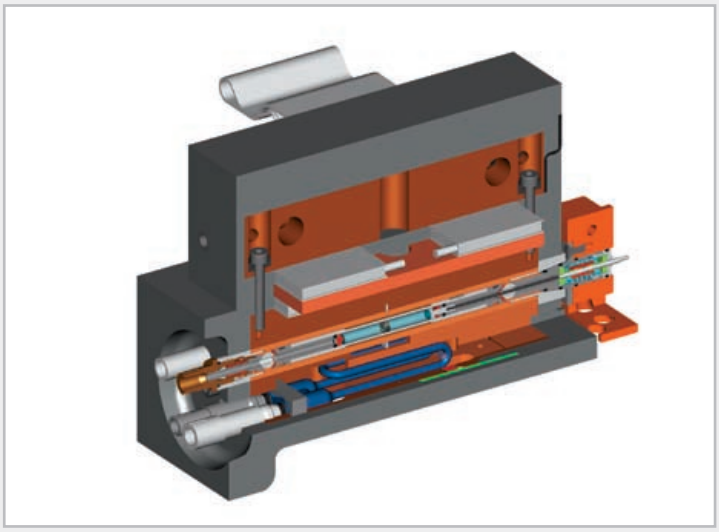
Small measuring bob, small sample volume, big benefits

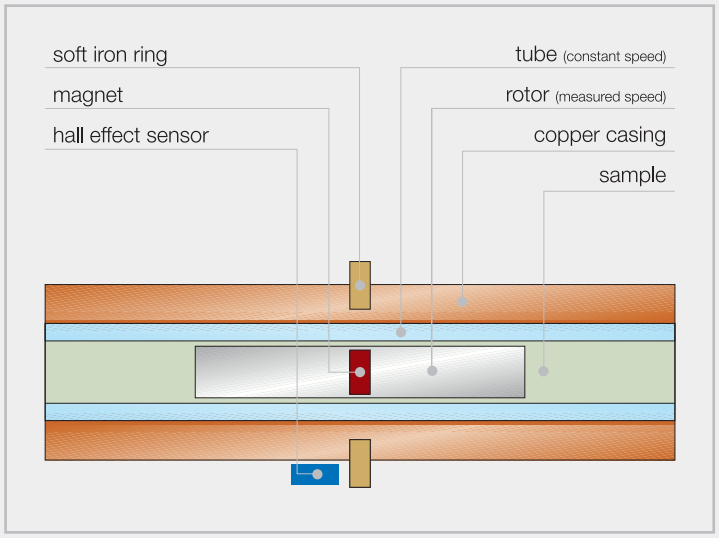
Rotational viscosity measurement is based on a torque and speed measurement. A rotating magnet in SVM 3000 produces an eddy current field with an exact speed-dependent brake torque. The eddy current torque is measured with extremely high resolution. Combined with the integrated thermoelectric thermostatting, this ensures unparalleled precision. The torque resolution is an unmatched 50 pico-Nm. That's why it only requires a very compact measuring cell.

The very small measuring cell contains a tube which rotates at a constant speed. This tube is filled with the sample. A measuring rotor with a built-in magnet floats in the sample. The low density of the rotor allows it to be centered by the centrifugal force. The freely swimming rotor requires no bearing - and where there is no bearing, there is no friction.

This also makes the instrument insensitive to vibration. The small sample volume allows extremely quick temperature changes (Peltier) and very short equilibrium times.

Shortly after the start of the measurement the rotor reaches a stable speed. This is determined by the equilibrium between the effect of the eddy current brake and the shear forces at work in the sample. The dynamic viscosity is calculated from the rotor speed.





Unshakeable

SVM 3000 is so versatile, quick and robust that it is an asset in all fields: As well as being ideal for measurements in R&D, it is also the most reliable instrument for quality control in the laboratory, e.g. for determining the density, kinematic and dynamic viscosity of mineral oil samples, and for field measurements such as the investigation of used oils* in transport fleets, wind parks, locomotives, ship engines, thermal power stations and construction machines.

*As a special accessory for the measurement of used oils, a magnetic particle trap is available which prevents the sedimentation of metal debris on the magnet of the measuring rotor.

In the laboratory

The full metal housing adapted from Anton Paar's DMA range protects against damage and prevents liquid entering the instrument. SVM 3000 is also well-protected against electromagnetic influences and can be used in the lab and in industrial environments.

On the high seas

As SVM 3000 requires very little electrical power and uses a measuring principle which is insensitive to vibrations and changes in position, it is ideal for use on the go, e.g. in a service vehicle or on board ships.

When time is short

SVM 3000 is not only highly robust, it is also exceptionally fast: Since the density measuring cell is integrated, the density measurement does not have to be carried out separately. Capillary changes are no longer necessary. Due to the measuring principle, the measuring duration is independent of the viscosity - and rapid, flexible thermostatting is guaranteed: With heating rates up to 15 °C per minute and cooling rates up to 10 °C per minute, SVM 3000 allows enormous flexibility when choosing the measuring temperature. And the new firmware 3, with density predetermination and the new "ultra-fast" measuring mode, measures up to 30 samples per hour.

Three Values Hand in Hand

In order to calculate the kinematic viscosity from the dynamic viscosity, the density of the sample must be known. For this reason, SVM 3000 also has a density measuring cell that employs the well-known oscillating U-tube principle. Both cells are filled in one cycle. The measurements are carried out simultaneously.

Furthermore, SVM 3000 covers the whole measuring range from less than 1 to 20 000 mm^2/s. When using capillary viscometers, this would require a total of thirteen different capillaries.

With the standardized API temperature functions, the density and the degree API at the standard temperatures 15 °C and 20 °C as well as 60 °F can be determined, even if the measurement was performed at a different temperature.

Three measurement values, one instrument

SVM 3000 measures the dynamic viscosity [mPa.s] and the density of the sample and calculates the kinematic viscosity [mm^2/s] from these values. The dynamic viscosity is the essential value for evaluating the lubricating behavior.

Viscosity index

The viscosity index is an important value, especially for lubricants. It is used to investigate the change in the viscosity at different temperatures. The viscosity index is calculated from the kinematic viscosity at 40 °C and at 100 °C.

Temperature scan

The programs „temperature table scan“ and „temperature range scan“ enable completely new fields of application. These programs automatically display the temperature-dependent behavior of the sample viscosity in freely selectable measuring points.

Filling and Measuring at the Same Heat

There is now a Hot Filling Attachment available for the SVM 3000 Stabinger Viscometer which is able to keep heavy fuel oil, bunker oil, residual oils, vacuum residues, wax distillates, heavy crude oil, bitumen, and tar samples consistently above their melting temperature and therefore in a liquid state.

Samples with a high melting point, such as wax, or a high pour point, such as heavy fuel oil or tar, are warmed in an oven or on a hotplate and filled into the instrument when hot.

The Hot Filling Attachment guarantees a minimum temperature of 80 °C for all wetted components. This means that highly viscous samples can easily be re-filled for repeat measurements and are easily removed afterwards.

The extra benefit: The high temperature of all surfaces increases the cleaning effect of the solvent and accelerates the drying procedure.

Hot Filling Attachment – Easy To Use

Safe

- Heating via the Peltier system of SVM 3000
- Thermal insulation to protect against hot surfaces
- CE certificate

Compact

- Saves space, no cables required

Practical

- Easy to attach to SVM 3000 G2
- All parts can be disassembled and cleaned using standard solvents
- Accessories for ‚no-mess' sample handling included

Taking Work Off Your Hands

The standard delivery of SVM 3000 includes everything you need to start measuring. If you need to measure a large number of samples, the following options are available to reduce the workload:

Xsample 360

This compact, integrated system performs automatic filling, rinsing with two solvents and drying of the measuring cells.

Xsample 460

This fully automatic sample changer can handle up to 96 samples, depending on the magazine used. The sample name and measuring method are recorded in a table before the measurement and these are automatically assigned to each sample.

Printer, bar code reader, connection to PC

The protocol printer prints out all measuring values, date, time, serial number and sample identification. Entering alphanumerical sample IDs is simplified by an external keyboard. Using a bar code reader allows the automatic entry of sample IDs.

Compressed air with membrane drier

Attaching a compressed air supply considerably reduces the drying time, increasing the sample throughput. The membrane drier stops the instrument icing up or forming condensation when measuring at very low temperatures.

Visiolab for SVM

The Windows software Visiolab for SVM allows a fully automated workflow including LIMS connection. For high-throughput applications, the viscosity index can be determined by two or more SVM 3000 instruments at 40 °C and 100 °C.

An automatic double determination at 40 °C and 100 °C from the same magazine is also possible – which saves sample, consumables and worktime. The integrated viscosity/temperature functions according to ASTM D341 even allow the determination of the viscosity index at other temperatures than 40 °C and 100 °C, e.g. for heavy oils, which could otherwise not be measured.

Technical Data

	SVM 3000	Xsample 360	Xsample 460
Required sample volume (mL)	2.5	5 (10)	5 (10)
Vials per magazine		1	48/96 (24)
Volume of sample vials (mL)		12 (50)	12 (50)
Minimum solvent consumption (mL)	2.5	2.5	2.5
Typical solvent consumption (mL)	10	7.5	7.5
Volume of the solvent bottles (L)	2 x 0.5	2 x 1	2 x 1
Max. filling viscosity (mPa.s)	2000*	1000*	1000*
	Values in parenthesis for optional 50 mL vials		
Sample throughput (maximum per hour)	*Values in parenthesis for compressed air drying*		
Diesel fuel, fast test (ultra-fast)	25 (30)	18 (22)	18 (22)
Engine oil, fast test (ultra-fast)	15 (18)	12 (15)	12 (15)
1000 mPa.s at 20 °C, standard test	8.5 (10)	4.8 (5.5)	4.8 (5.5)
Engine oil, double determination, standard test	7 (8)	6.5 (7.5)	6.5 (7.5)
Weight net/gross kg, lbs	15/17	21/25	23/27
Space requirements L x W x H (mm)	440 x 315 x 220	440 x 380 x 320	440 x 660/990 x 320
Ambient conditions	15 to 35 °C (59 to 95 °F), max. 80 % r.h. below 31 °C (88 °F), 67 % at 35 °C (95 °F)		
Data memory / modes	384 data sets / 10 programmable modes		
Interfaces	Dual RS-232, AT keyboard		
Power supply (sinusoidal current)	100 to 240 VAC, 50 to 60 Hz, 75 VA max.		
Reproducibility (Special calibration might be required outside the works adjustment range.)			
Viscosity (typical values for clean base oils)	0.35 % within the works adjustment range; 1 % outside this range		
Density (viscosity-compensated)**	0.0005 g/cm^3 from 0.65 to 1.5, 0.0020 g/cm^3 outside this range		
Temperature	0.02 °C (0.04 °F) from 15 to 105 °C (59 °F to 221 °F); 0.05 °C (0.09 °F) outside this range		
Measuring range		**Repeatability***	
Dynamic viscosity (mPa.s)	0.2 bis 20,000*	Viscosity	0.1 %
Density (g/cm^3)**	0.65 bis 3	Density**	0.0002 g/cm^3
Temperature	15 °C bis 105 °C (lower temperatures on request)	Temperature	0.005 °C

*) Typical values, depending on sample type and temperature. **) Compliant with ASTM D7042. For measurements compliant with ISO 12185 or ASTM D4052, please refer to our Density Meters DMA 4100, DMA 4500, DMA 5000 or DMA 4100 M, DMA 4500 M, DMA 5000 M.

Hot Filling Attachment	
Wetted materials	Copper, PTFE, PEEK
Temperature range (at 100 °C measuring temperature)	For samples with a melting point up to 80 °C or a max. viscosity of 1000 mPa.s at 80 °C
Dimensions of the case (L x W x H)	255 mm x 210 mm x 73 mm
Shipping weight	0.75 kg (1.7 lbs)
Supplied items	Hot Filling Attachment | Tools for assembly | Luer extensions 70 mm, 24 pcs. Spare protective cover | Measuring cell connection tubes, 3 pcs. | Spare seal caps, 2 pcs. | Disposable syringes 10 mL Luer-Lock, 21 pcs. | Case

Fotos: Croce & Wir

Anton Paar

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

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