Lovis 2000 M/ME

Microviscometer

Just imagine …

… an ideal world in which you can have it all: highly accurate viscosity results from a very small sample volume. Welcome to the world of Lovis 2000 M/ME: This new modular viscometer requires only 100 µL to deliver results with an accuracy of up to 0.5 %. Use Lovis 2000 M/ME, save your sample and gain deep insights into viscosity.

Take a little, get a lot

Take a tenth of a milliliter of sample. That's barely a droplet. This is how much sample Lovis 2000 M/ME needs for a measurement. Thanks to the small size of its measuring capillaries, Lovis 2000 M/ME does a lot with a little sample volume.

Take 0.1 milliliters of sample and get dynamic viscosity results with the following precision:

Repeatability s.d.: up to 0.1 %
Accuracy: up to 0.5 %

Modularity

Lovis 2000 M

The stand-alone viscometer for determining the dynamic, kinematic, relative and intrinsic viscosity of liquids.

Lovis 2000 ME + DMA density meter + Xsample

This combined system determines the density, kinematic viscosity and dynamic viscosity of up to 96 samples fully automatically. Combinations with other parameters, such as sound velocity and refractive index, are also available.

Lovis 2000 ME + many possibilities

Lovis 2000 ME is a small measuring module which can be inserted into a DMA Generation M density meter and also combined with instruments for measurement of refractive index, pH, alcohol content or turbidity.

The 4-in-1 Viscometer

When you buy a Lovis 2000 M/ME microviscometer, you actually get all of these:

Easy-operation viscometer

With Lovis 2000 M/ME, there are 4 steps to a successful viscosity result, even less if you use an automatic sample changer. The easy-to-use features help you find settings automatically.

1. Select the measuring method.
The most important methods are predefined, e.g. viscosity and density, temperature scan from 5 °C to 100 °C, shear rate scan, intrinsic viscosity.

2. Select the filling method.
Fill small sample amounts by syringe (2a).
For higher sample throughput, add a sample changer (2b).

3. Press 'Start'.
Measuring principle: Lovis 2000 M/ME is a rolling-ball viscometer which measures the rolling time of a ball through transparent and opaque liquids according to Höppler's principle. Results are given as runtime, kinematic or dynamic viscosity. Lovis 2000 M/ME also automatically calculates the relative viscosity, intrinsic viscosity, and other properties of polymer solutions.

4. Read the results.
Read results from the display, printout or connected PC monitor. Results can be transferred to a PC, LIMS or data storage device.
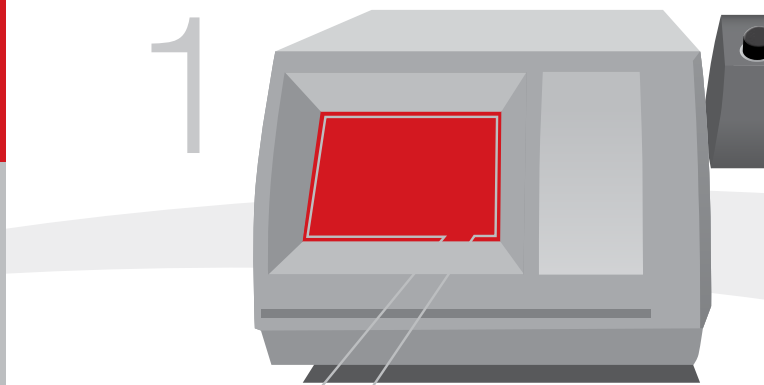
Low-viscosity rolling-ball rheometer

Lovis 2000 M/ME gives you the option of varying the inclination, which corresponds to the shear rate. Since the shear rates are variable and typically low, the instrument is perfectly suited for automated zero-shear viscosity extrapolation. Therefore, your Lovis 2000 M/ME doubles as a 'lo vis' rolling-ball rheometer.
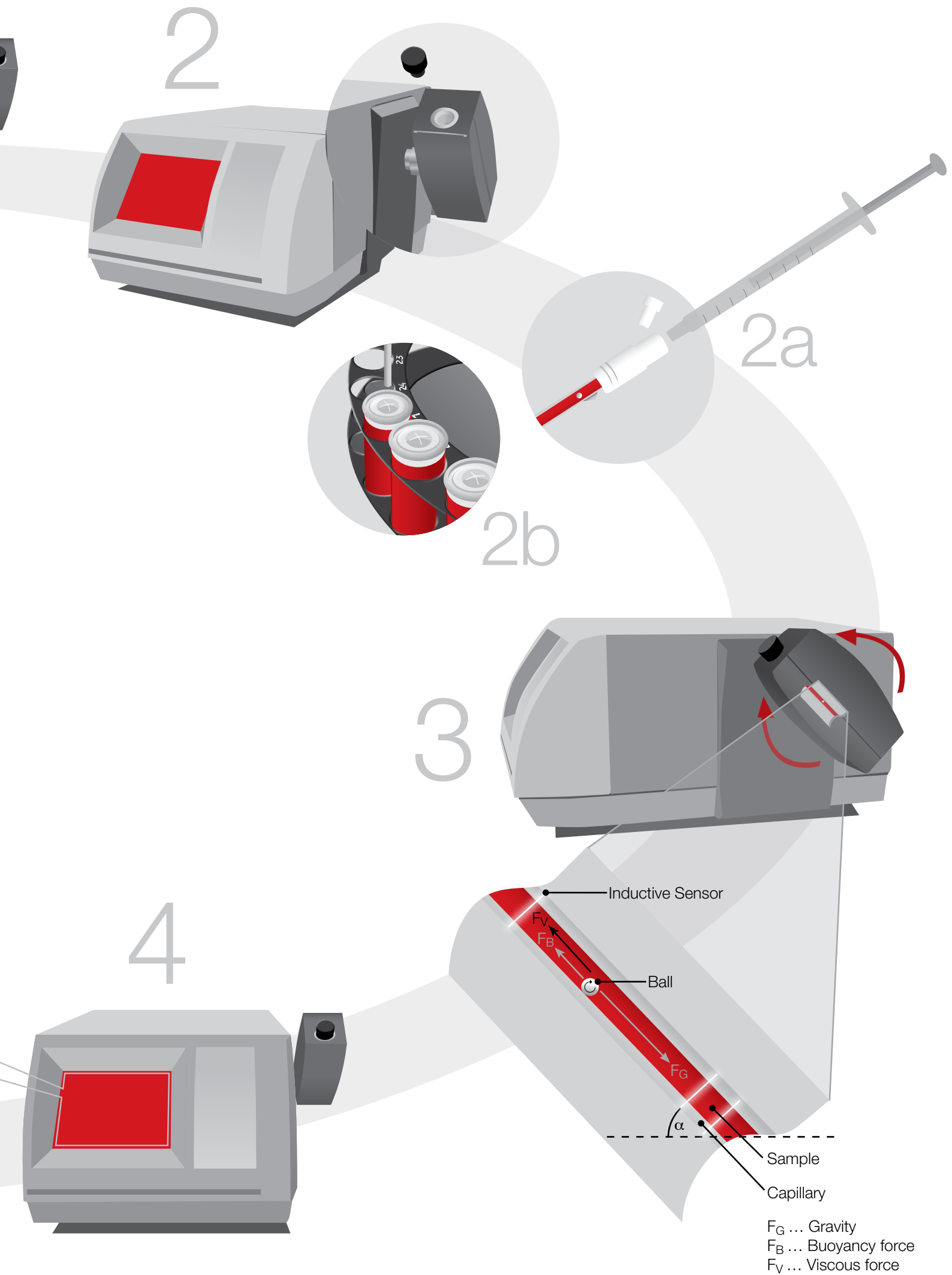
Time-saving viscometer

The small size of Lovis 2000 M/ME allows quick and precise temperature control and measurement. Under optimal conditions, results are ready after 30 seconds.

All-round viscometer

As the name reveals, Lovis 2000 M/ME is particularly suited for low-viscosity liquids. Do you have other samples to measure? Use Lovis 2000 M/ME as your all-round measuring station for samples with a wide range of viscosity at any temperature from 5 °C to 100 °C. Lovis 2000 M/ME is even suitable for measuring highly corrosive or aggressive samples.

2

2a

2b

3

4

Inductive Sensor

F_V

F_B

Ball

F_G

α

Sample

Capillary

F_G … Gravity
F_B … Buoyancy force
F_V … Viscous force

Think of the Possibilities

Follow these 5 steps to your ideal viscometer:

Step 1: Choose your parameters

Viscosity, relative viscosity, runtime, intrinsic viscosity **Lovis 2000 M**	Dynamic and kinematic viscosity + density + concentration **Lovis 2000 ME + DMA 4100/4500/5000 M**	Dynamic and kinematic viscosity + density + sound velocity **Lovis 2000 ME + DSA 5000 M**

Step 2: Select the correct capillaries

0.3 mPa.s to 20 mPa.s **Capillary 1.59 mm (400 µL)** **Capillary short 1.59 mm (100 µL)**	13 mPa.s to 300 mPa.s **Capillary 1.8 mm (500 µL)** **Capillary short 1.8 mm (150 µL)**	70 mPa.s to 10,000 mPa.s **Capillary 2.5 mm (800 µL)** **Capillary short 2.5 mm (250 µL)**

Step 3: Decide how you want to fill sample

Automatic sample filling and handling	No. of samples
Xsample 22 Sample Filling Unit	1
Xsample 122 Sample Filling Unit	24/48
Xsample 52 Sample Handling Unit	1
Xsample 352 Filling and Rinsing Unit	1
Xsample 452 Filling and Rinsing Unit	24/48/96

Manual sample handling
LUER syringe for standard applications
Microliter syringe and hollow needle for low-volume applications
Flow-through filling to simplify sample filling

Step 4: Define the chemical resistance

Standard	Upgrade
The standard quality for wetted parts is stainless steel balls and Viton® Extreme O-rings (if combined with Xsample 22/122 a silicon hose and a stainless steel needle are used).	To measure corrosive substances, choose the upgrade to gold-coated stainless steel balls and Kalrez® O-rings (if combined with Xsample 22/122 a Norprene® chemical hose and a hastelloy needle are used).

Step 5: Choose optional measuring modules

Abbemat Performance/ Performance Plus refractive index	**Alcolyzer Beer ME** alcohol content, color (optional)	**HazeQC ME** turbidity	**pH ME** pH value

Technical Data

		Lovis 2000 M	Lovis 2000 ME & DMA M	Lovis 2000 ME & DSA 5000 M
Measuring range				
Parameters	Dynamic viscosity	0.3 mPa.s to 10,000 mPa.s		
	Inclination	15° to 80° in 1° steps		
	Shear rate	0.5 s^{-1} to 1000 s^{-1} influenced by capillary size and inclination		
	Density	-	0 g/cm³ to 3 g/cm³	0 g/cm³ to 3 g/cm³
	Sound velocity	-	-	1000 m/s to 2000 m/s
Temperature	Viscosity	+5 °C to 100 °C		
	Density	-	0 °C to 95 °C	0 °C to 70 °C
	Sound velocity	-	-	0 °C to 70 °C
Precision of Lovis 2000 M/ME				
Temperature	Repeatability s.d.	0.005 °C		
	Accuracy	0.02 °C		
Inclination	Repeatability s.d.	0.02°		
	Accuracy	0.1°		
Measuring time	Resolution	0.001 s		
	Accuracy	0.05 %		
Viscosity	Repeatability s.d.	up to 0.1 %[1]		
	Accuracy	up to 0.5 %[1] [2]		
Further specifications				
	Test duration	minimal 30 s, typical 3 min		min. 60 s, typ. 4 min
	Sample volume	0.1 mL to 0.8 mL	1 mL to 3 mL	3 mL to 5 mL
	Dimensions (L x W x H)	482 mm x 420 mm x 231 mm		
	Weight	17.0 kg	27.3 kg	27.3 kg
	Power supply	AC 100 V to 240 V; 50 Hz to 60 Hz; 190 VA		
	Options	Combination[3] with refractive index, alcohol content, color, turbidity and pH measurement, automatization with sample handling units[3], printer, keyboard, external touchscreen, mouse, bar code reader, qualification and validation documentation		
	Compliance and approval	MEBAK: The Lovis 2000 M/ME microviscometer is the successor to Anton Paar's AMVn automated microviscometer. The combination of AMVn and DMA for beer and wort viscosity measurement is approved by MEBAK. Lovis 2000 M/ME fully supports the requirements of the pharmaceutical industry: GMP, 21 CFR Part 11, GAMP 5, USP<1058> and is based on the rolling/falling ball principle according to DIN 53015 and ISO 12058.		

[1] depends on sample type and measuring settings, without changing the ball | [2] for the range in which the calibration constant was determined, not including uncertainty of reference standards | [3] compatibility of combinations on request

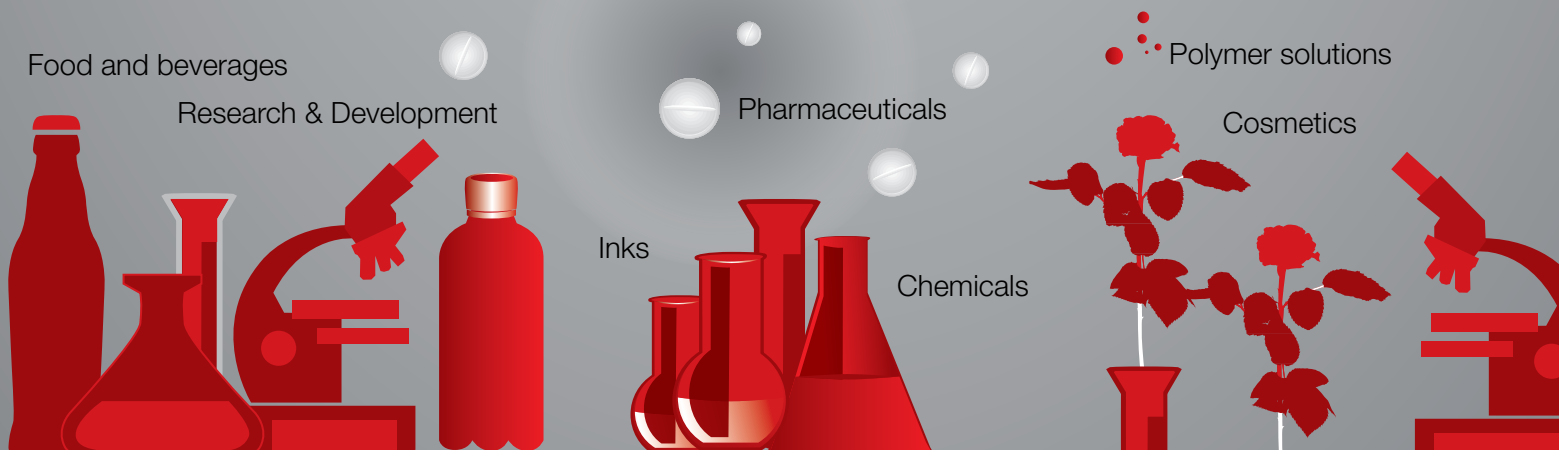Food and beverages

Research & Development

Pharmaceuticals

Polymer solutions

Cosmetics

Inks

Chemicals

Anton Paar

Instruments for:
Density and concentration
measurement

Rheometry

Viscometry

Sample preparation

Microwave synthesis

Colloid science

X-ray structure analysis

Refractometry

Polarimetry

Petroleum testing

High-precision temperature
measurement