

# Microviscometer

Lovis 2001



# Precise and Efficient

Discover Lovis 2001 – the rolling-ball microviscometer that optimizes your lab's capabilities. From polymer solutions and pharmaceutical formulations to brewing samples, it adapts perfectly to each sample's viscosity and sensitivity. Its modular setup and automation options ensure maximum precision and throughput – no matter what your workflow demands.



Find out more

Optimize the measuring angle for each viscosity range.

Save time with integrated polymer software that automatically calculates all parameters.

Increase throughput using Xsample sample changers for unattended sequences.

Handle aggressive samples with ease.

Combine with other Anton Paar instruments to determine density, refractive index, and pH in a single run.

Comply with international standards.



## One solution, multiple industry applications

### Chemical labs

The durable capillaries and wetted parts of Lovis 2001 equip it to handle chemically aggressive samples. It's ideal for dilute solution viscometry, offering comprehensive polymer analysis and automatically calculating and reporting specific, reduced, and inherent viscosity, K-value, and average molar mass.

### Bioscience and pharmaceuticals

Lovis 2001 delivers precise dynamic, kinematic, relative, and intrinsic viscosity measurements for both routine quality control and demanding R&D workflows. Its versatility makes it a dependable choice for pharmaceutical, medical, and academic laboratories working with sensitive or high-value samples.

### Malt houses and breweries

Measure in compliance with MEBAK (R-205.10.282) and ASBC (Wort-13B) requirements. Combined with a DMA density meter, Lovis 2001 optimizes the quality of your wort – which means great beer!

# Engineered for Accuracy, Built for Every Challenge

Lovis 2001 delivers precise, repeatable viscosity results for every task – from in-depth research to routine quality control. Its unique rolling-ball principle adapts automatically, from low-viscosity liquids to shear-sensitive samples, ensuring data is reliable under all conditions.

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## Integrated polymer software

Obtain all polymer-relevant parameters in seconds. The built-in evaluation software calculates intrinsic and relative viscosity, K-value, and average molar mass (with known Mark-Houwink constants) at the push of a button.

## Shear-rate control

Lovis 2001 displays the current shear rate and allows precise testing of shear-sensitive polymer samples with a zero-shear scan function.

2

## Safe and clean operation

The closed flow-through system minimizes contact, prevents contamination, protects users from volatile or toxic samples, and makes operation faster and safer.

## Automation and flow-through options

Fill, measure, and clean without removing the capillary. Optional Xsample changers support unattended sequences for continuous operation.

3

## Full measurement control

The movable capillary block covers an inclination angle range from 15° to 80° and adapts perfectly to your sample, ensuring reproducible results with an accuracy of  $\pm 0.5\%$  across the full viscosity range from 0.2 mPa·s to 10,000 mPa·s. Electromagnetic detection ensures results are unaffected by sample opacity or turbidity.

## Fast, stable thermostating

Peltier elements provide rapid, precise temperature control from 5 °C to 100 °C (optionally down to -40 °C), ensuring energy efficiency and reproducibility.

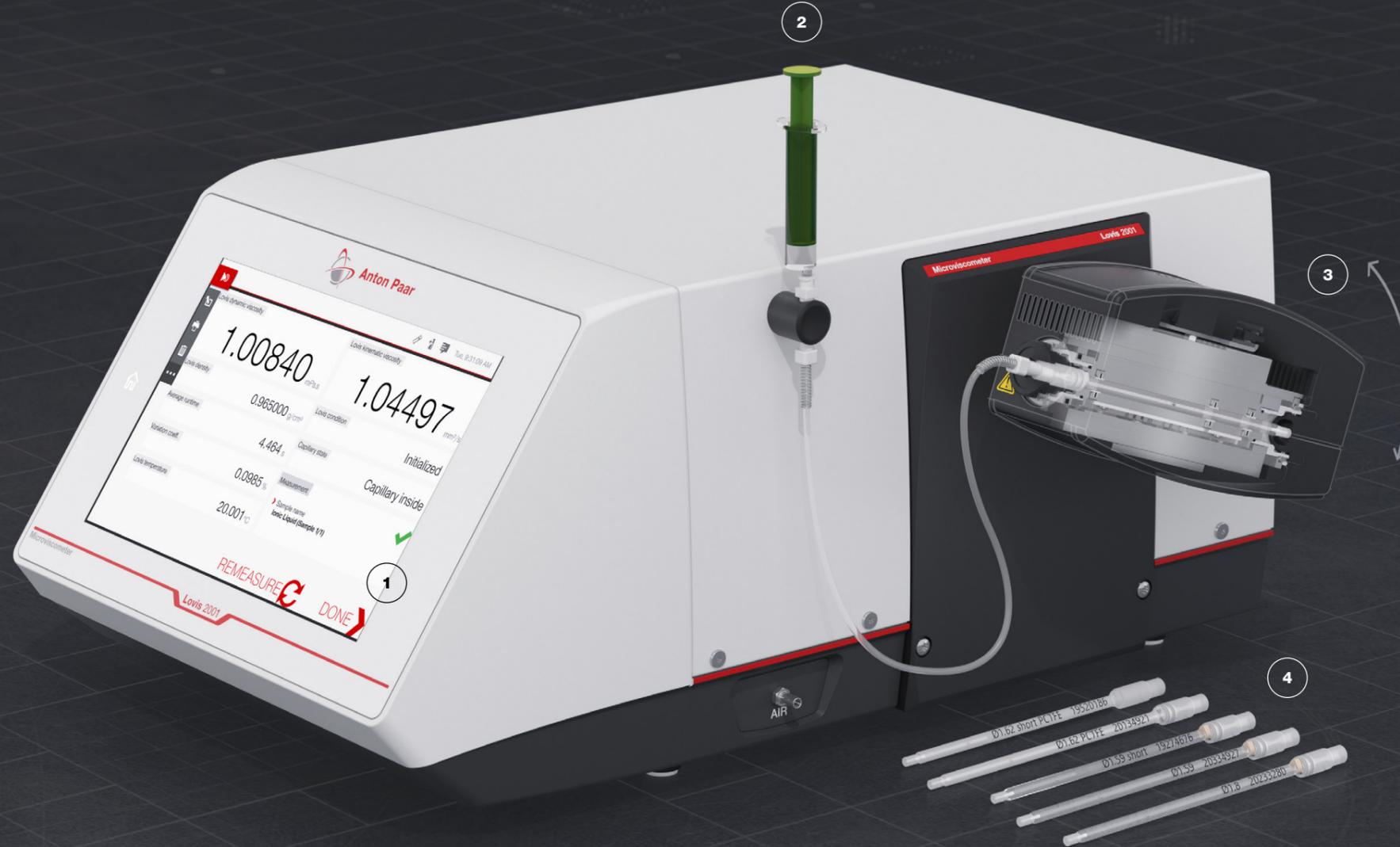
4

## Minimal sample volume

Measure as little as 100  $\mu\text{L}$  and recover your valuable sample for further testing.

## Aggressive sample handling

Work with break-proof PCTFE capillaries, utilize a special flow-through system, or improve chemical resistance with a kit for measurement of even highly aggressive chemicals.



# Compliant Pharma and Life Science Testing

**Lovis 2001 supports reliable viscosity testing in pharmaceutical and life science laboratories, from formulation development in R&D to routine quality control. Combined with Anton Paar's validation and data-management solutions, it provides a fully compliant, digital platform for regulated environments.**



## Trusted compliance

- Measure according to USP <913> (rolling-ball method) and Ph. Eur. 2.2.49 (falling-ball or automatic rolling-ball viscometer)
- Measure relative density according to Ph. Eur. 2.2.5 and specific gravity according to USP <841> in combination with our renowned DMA density meter
- Fulfill the FDA 21 CFR Part 11 requirements for electronic records and signatures as well as ALCOA+ data-integrity principles
- Qualify and validate your instrument in just one day with the optional AISQ+ documentation package for regulated industries

## Proven data integrity with AP Connect

Anton Paar's lab execution system, AP Connect, delivers key benefits for pharmaceutical QC and R&D:

- Improved data accuracy: Centralized storage eliminates data silos and manual transcription errors
- Increased efficiency: Automated data transfer
- Enhanced traceability: Full audit trail of all user actions and results

Lovis 2001 and AP Connect deliver a fully digital, paper-free workflow that supports modern data-integrity standards and full audit compliance.



## Application examples

### Pharmaceutical excipients and formulation aids

By adjusting the capillary angle, the shear rate is precisely controlled, enabling viscosity measurements that are directly comparable to well-established reference methods. Polyethylene glycol, polysorbate, polyvinyl alcohol, povidone, and a wide range of other polymers can be measured within minutes – according to pharmacopeia monographs. This allows determination of dynamic viscosity as a key indicator of raw-material quality and batch consistency.

### Biopolymers and macromolecules

Determine the viscosity number of hyaluronic acid and the molar mass of chitosan and other macromolecular solutions. Precise intrinsic viscosity data enable fast molar-mass calculation and reliable quality control of biopolymers in regulated pharmaceutical environments.

# Precise, Safe Testing of Chemicals and Polymers

Lovis 2001 enables precise and safe viscosity testing of chemically aggressive or sensitive samples. Its sealed flow-through design and chemically resistant materials make it ideal for dilute-solution viscometry in chemical and polymer laboratories.



## Safe automated operation

### Chemical resistance

Borosilicate glass and PCTFE capillaries combined with the Lovis chemical resistance upgrade set – containing gold balls and Kalrez® O-rings – enable measurement of even highly corrosive chemicals such as hydrofluoric acid and ensure long-term durability and safe operation.

### Fully automated workflows

When equipped with an Xsample sample changer, Lovis 2001 automates key workflow steps such as sample handling, rinsing, and drying, depending on the selected configuration. This reduces operator exposure, minimizes manual solvent handling, and supports reproducible routine quality control.

## Integrated polymer analytics for traceable results

### Comprehensive polymer analysis

The integrated polymer software automatically calculates and reports specific, reduced, inherent, intrinsic, and relative viscosity, as well as K-value and average molar mass (with known Mark-Houwink constants).

### Error-free data

Automation eliminates manual calculations and external influences. All results are stored in a central database for long-term comparison, documentation, and traceability.

## Application examples

### Intrinsic viscosity as a quality-control parameter for PET

Intrinsic viscosity is a key parameter for classifying PET grades and determining molar mass. Lovis 2001 measures intrinsic viscosity quickly and automatically, providing precise, reproducible results comparable to ISO 1628 for reliable grade classification and consistent batch quality.



### Reduced viscosity as a quality-control parameter for polyamides

Polyamides such as PA 6.6 (nylon) are evaluated using the viscosity number, determined via dilute-solution viscometry. Lovis 2001 automates polymer parameter calculation and delivers reproducible results comparable to ISO 307, enabling efficient and reliable quality control of polyamide materials.

# Configure Your Workflow

Leverage the power of modularity for a seamless and efficient measurement process. Lovis 2001 measures runtime, determines relative and intrinsic viscosity, and calculates dynamic and kinematic viscosity based on density input. The autosampler performs sample filling and cleaning, while the modular system measures additional parameters – all within a single measurement cycle and without extra effort.

	DMA 4002	Xsample 340	
	DMA 5002	Xsample 530	
	DMA 6002	Xsample 3100 / 3200	Abbemat 5101
Lovis 2001 Module	DMA 6002 Sound Velocity	Xsample 5100 / 5200	Abbemat 5001
Viscosity	Density	Sample changer	Refractive index



Alcohol	Turbidity	pH
Alcolyzer 3001	Haze 3001	pH 3101
		pH 3301

	Lovis 2001	Lovis 2001 Module + DMA density meter
<b>Measuring range</b>		
<b>Dynamic viscosity</b>	0.2 mPa·s to 10,000 mPa·s	
<b>Shear rate</b>	0.5 s <sup>-1</sup> to 1,000 s <sup>-1</sup>	
<b>Temperature</b>	5 °C to 100 °C (41 °F to 212 °F) -40 °C to +100 °C (-40 °F to +212 °F) (with counter cooling) <sup>1)</sup>	
<b>Density</b>	-	0 g/cm <sup>3</sup> to 3 g/cm <sup>3</sup>
<b>Temperature: Density meter</b>	-	0 °C to 100 °C (32 °F to 212 °F)
<b>Precision</b>		
<b>Viscosity: Repeatability s.d.</b>	0.1 % <sup>2)</sup>	
<b>Viscosity: Accuracy</b>	0.5 % <sup>3)</sup>	
<b>Measuring time: Resolution</b>	0.001 s	
<b>Measuring time: Accuracy</b>	0.05 %	
<b>Temperature: Repeatability s.d.</b>	0.005 °C	
<b>Temperature: Accuracy</b>	0.02 °C	
<b>Inclination: Repeatability s.d.</b>	0.02 °	
<b>Inclination: Accuracy</b>	0.1 °	
<b>Further specifications</b>		
<b>Test duration</b>	Minimal 30 s, typical 3 min	
<b>Sample volume</b>	0.1 mL to 0.8 mL	1 mL to 3 mL
<b>Weight</b>	19.9 kg (43.9 lb)	29.3 kg (64.6 lb)
<b>Dimensions (L x W x H)</b>	526 mm x 420 mm x 230 mm (20.7 in x 17.2 in x 9 in)	
<b>Power supply</b>	AC 100 V to 240 V; 50 Hz to 60 Hz; 190 VA	

**Trademarks** DMA (013414867), Xsample (013856059), Abbemat (1084545)

- 1) Specified temperatures are valid for a max. ambient temperature of 35 °C (95 °F). Lower measuring temperatures are achieved in lower ambient temperatures and/or with special equipment.
- 2) Verified with a 1.59 capillary at 70° angle and Ethanol 96 % at 20 °C using the same ball for all repeated measurements.
- 3) Verified with a 1.59 capillary with a single-point adjustment performed on site at 70° angle; adjustment and all measurements performed with distilled water at 20 °C with the same ball.



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