



**Anton Paar**

# Viscometry | Rheometry

The Range

∴ Intelligence in Rheometry



# Instrument

Measuring methods

Measuring drive

Measuring systems

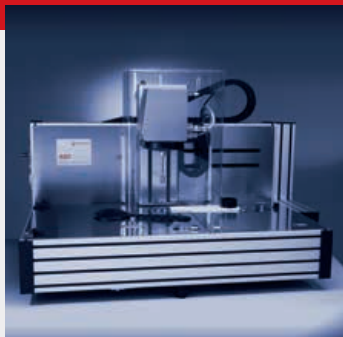
Temperature control systems

Software

Measuring results

Special product features

# Automatic Sample Changer ASC



- Rotational test with controlled shear rate (CSR) and controlled shear stress (SS)
- Oscillatory test with controlled strain and controlled stress

Electronically commutated motor drive with air bearing (EC motor)

Electronically commutated motor drive with mechanical ball bearing (EC motor)

- Concentric cylinder measuring systems
- Liquid temperature control (10 °C bis 50 °C)

Application software packages for MS<sup>®</sup> Windows<sup>™</sup> 2000, XP, Vista, 7, 8

Shear rate, shear stress, speed, torque, temperature, viscosity, kinematic viscosity, yield point, strain, compliance, complex viscosity, imaginary part of viscosity, real part of viscosity, complex shear modulus, storage modulus, loss modulus, loss factor, frequency, angular frequency, special information such as: thixotropy, rheopexy, dilatancy, pseudoplasticity

- Magazine with 16 or 32 measuring cups
- Automated cleaning of the measuring geometries
- Fully automatic testing with subsequent evaluation and documentation (PC-controlled)

# SmartPave

Asphalt Rheometer



- Rotational test with controlled shear rate (CSR) and controlled shear stress (CSS)
- Creep test
- Oscillatory test with controlled strain and controlled stress
- Multiwave test
- Superimposed oscillation and rotational test
- Stress-relaxation test

Electronically commutated motor drive with air bearing (EC motor)

- Parallel plate measuring systems

- Peltier temperature control (-30°C to 120°C) for upper and lower measuring system

Application software package for MS<sup>®</sup> Windows<sup>™</sup> 2000, XP, Vista, 7, 8

Shear rate, shear stress, speed, torque, temperature, viscosity, kinematic viscosity, yield point, strain, compliance, complex viscosity, imaginary part of viscosity, real part of viscosity, complex shear modulus, storage modulus, loss modulus, loss factor, frequency, angular frequency, retardation time spectrum, relaxation time, relaxation modulus, relaxation time spectrum, special information on the flow behavior such as: thixotropy, rheopexy, dilatancy, pseudoplasticity

- Dynamic shear rheometer for asphalt measurements according to SHRP AASHTO T315 and DIN EN 14770
- Multiple Stress Creep and Recovery (MSCR) tests according to ASTM D7405 and AASHTO TP70
- Peltier heating system with heating elements above and below
- Automatic temperature calibration
- Automatic gap setting and gap control

# EC-Twist

Dynamic Mechanical Analyzer (DMTA)



- Rotational test with controlled shear rate (CSR) and controlled shear stress (CSS)
- Creep test
- Oscillatory test with controlled strain and controlled stress
- Multiwave test
- Superimposed oscillation and rotational test
- Stress-relaxation test

Electronically commutated motor drive with air bearing (EC motor)

- Cone-plate measuring systems
- Parallel plate measuring systems
- Solid rectangular fixture (SRF)
- Universal extensional fixture (UXF)
- Sentmanat extensional rheometer (SER)
- Electrical heating (-130 °C to 400 °C)
- Convection heating (-150 °C to 1000 °C)
- Peltier heating and cooling (-40 °C to 200 °C)

Application software package for MS<sup>®</sup> Windows<sup>™</sup> 2000, XP, Vista, 7, 8

Shear rate, shear stress, speed, torque, temperature, viscosity, kinematic viscosity, yield point, strain, compliance, complex viscosity, imaginary part of viscosity, real part of viscosity, complex shear modulus, storage modulus, loss modulus, loss factor, frequency, angular frequency, retardation time spectrum, relaxation time, relaxation modulus, relaxation time spectrum, special information on the flow behavior such as: thixotropy, rheopexy, dilatancy, pseudoplasticity

- Dynamic Mechanical Analyzer for DMTA analysis on thermoplastics, thermosets, elastomers in torsion or fibers, films and multi-layer laminates in extension
- Modular platform to perform measurements in torsion, extension and to use for shear rheological experiments
- Photo DMTA /UV curing and DMTA on reaction kinetics
- Digital eye to record and display images or video sequences
- With TruGap<sup>™</sup> and Toolmaster<sup>™</sup> function

# HTR

Fully automated High Throughput Rheometer



- Rotational test with controlled shear rate (CSR) and controlled shear stress (CSS)
- Creep test
- Oscillatory test with controlled strain and controlled stress

Electronically commutated motor drive with air bearing (EC motor)

- Concentric cylinder measuring systems
- Parallel plate measuring systems
- Cone-plate measuring systems
- Electrical heating (ambient to 320 °C)
- Peltier heating and cooling (-30 °C to 200 °C)

Application software package for MS<sup>®</sup> Windows<sup>™</sup> 2000, XP, Vista, 7, 8

Shear rate, shear stress, speed, torque, temperature, viscosity, kinematic viscosity, yield point, strain, compliance, complex viscosity, imaginary part of viscosity, real part of viscosity, complex shear modulus, storage modulus, loss modulus, loss factor, frequency, angular frequency, retardation time spectrum, relaxation time, relaxation modulus, relaxation time spectrum, special information on the flow behavior such as: thixotropy, rheopexy, dilatancy, pseudoplasticity

- MCR rheometer is operated by a 6-axis robotic arm
- Dispensing system with automated pipetting system with disposable tips, volume up to 1 mL for liquids and paste like samples
- Measuring system and sample trimming tool with disposable trim tool blades for automatic trimming of disk-shaped polymer samples
- Automated cleaning of the measuring geometries
- Fully automatic testing with subsequent evaluation and documentation (PC-controlled)

# Rheometer System

Measuring methods

Measuring drive

Measuring systems

Temperature control systems

Software

Measuring results

Special product features

## RheolabQC

with Peltier temperature control



## RheolabQC

with flexible holder



- Rotational tests with controlled shear rate (CSR) and controlled shear stress (CSS)
- Creep test
- Step test

Electronically commutated motor drive with ball bearing (EC motor)

- Concentric-cylinder measuring systems
  - Double-gap systems
  - Vane geometries
  - Disposable cylinder geometries
- 
- Peltier temperature control (0 °C to 180 °C) with built-in air counter-cooling - no fluid circulator required

Application software package for MS<sup>®</sup> Windows<sup>™</sup> 2000, XP, Vista, 7, 8

Shear rate, shear stress, speed, torque, temperature, viscosity, yield point, strain, compliance, special information on flow behavior such as: thixotropy, rheopexy, dilatancy, pseudoplasticity

- Laboratory rheometer for quality control and production control routines with wide speed and torque range (manual or software-controlled mode)
- Measuring systems and test conditions according to DIN, ISO and ASTM standards
- Serial and Ethernet interface for PC
- PS/2 interface for bar code reader, keyboard or printer
- Flexible cup holder for sample cups of diverse shapes and sizes
- Robust design
- Featuring Toolmaster<sup>™</sup> - the fully automatic tool recognition and intelligent auto-configuration system



## MCR 52

Modular Compact Rheometer



- Rotational tests with controlled shear rate (CSR) and controlled shear stress (CSS)
- Creep test
- Step test

Electronically commutated motor drive with ball bearing (EC motor)

- Concentric-cylinder measuring systems
- Cone-plate measuring systems
- Parallel plate measuring systems
- High-shear measuring systems
  
- Liquid temperature control (-40 °C to 180 °C)
- Electrical heating (-130 °C to 400 °C)
- Convection heating (-150 °C to 1000 °C)
- Peltier temperature control (-40 °C to 200 °C)

Application software package for MS® Windows™ 2000, XP, Vista, 7, 8

Shear rate, shear stress, speed, torque, temperature, viscosity, kinematic viscosity, yield point, strain, compliance, complex viscosity, imaginary part of viscosity, real part of viscosity, complex shear modulus, storage modulus, loss modulus, loss factor, frequency, angular frequency, retardation time spectrum, relaxation time, relaxation modulus, relaxation time spectrum, special information on flow behavior such as: thixotropy, rheopexy, dilatancy, pseudoplasticity

- Robust rheometer with ball bearing for quality and production control
- Featuring Toolmaster™ - the fully automatic tool recognition and intelligent auto-configuration system
- Data processing in real time by means of powerful multi-processor electronics
- Wide measuring range
- Automatic gap setting and gap control
- Air cooled Peltier temperature devices for cone-plate, parallel plate and cylinder geometries

# MCR 102/302/502

Modular Compact Rheometer



- Rotational tests with controlled shear rate (CSR) and controlled shear stress (CSS)
- Creep test
- Oscillatory tests with controlled strain and controlled stress
- Multiwave test
- Superimposed oscillatory and rotational tests
- Stress-relaxation test

Electronically commutated motor drive with air bearing (EC motor)

- Concentric-cylinder measuring systems
  - Cone-plate measuring systems
  - Parallel plate measuring systems
  - High-shear measuring systems
- 
- Liquid temperature control (-40 °C to 180 °C)
  - Electrical heating (-130 °C to 400 °C)
  - Convection heating (-150 °C to 1000 °C)
  - Peltier temperature control (-40 °C to 200 °C)

Application software package for MS® Windows™ 2000, XP, Vista, 7, 8

Shear rate, shear stress, speed, torque, temperature, viscosity, kinematic viscosity, yield point, strain, compliance, complex viscosity, imaginary part of viscosity, real part of viscosity, complex shear modulus, storage modulus, loss modulus, loss factor, frequency, angular frequency, retardation time spectrum, relaxation time, relaxation modulus, relaxation time spectrum, special information on flow behavior such as: thixotropy, rheopexy, dilatancy, pseudoplasticity

- Future-proof versatile rheometer with stiff high-precision air bearing for quality control, product development or research
- Featuring Toolmaster™ - the fully automatic tool recognition and intelligent auto-configuration system
- With TruGap™ function - actual monitoring and control of the real gap in cone-plate or parallel plate measurements
- Largest torque range for demanding rheological measurements on all samples from liquids to solids
- Normal force sensor
- Standardized solid bar and film fixtures for DMTA testing
- Photo DMTA/UV chamber for reaction kinetics
- Additional options for structure analysis alongside rheology

## MCR 702 Twin $\mu$ D™



- All test modes known from the MCR series (MCR 52, 102, 302, 502) and in addition
- Twin $\mu$ D™ 2EC counter rotating mode – The two motors rotate in opposite directions
- Twin $\mu$ D™ 2EC separate motor transducer mode – Upper motor stands still and acts as torque transducer, lower motor applies the movement

Two electronically commutated motor drives (EC motors) in a modular setup

- Concentric-cylinder measuring systems
  - Cone-plate measuring systems
  - Parallel plate measuring systems
  - Measuring systems for DMTA and Extensional Rheology
- 
- Convection heating (-150 °C to 1000 °C)
  - All accessories from the MCR rheometer series

Application software package for MS® Windows™ 2000, XP, Vista, 7, 8

Shear rate, shear stress, speed, torque, temperature, viscosity, kinematic viscosity, yield point, strain, compliance, complex viscosity, imaginary part of viscosity, real part of viscosity, complex shear modulus, storage modulus, loss modulus, loss factor, frequency, angular frequency, retardation time spectrum, relaxation time, relaxation modulus, relaxation time spectrum, special information on flow behavior such as: thixotropy, rheopexy, dilatancy, pseudoplasticity

- Additional applications possible due to Twin $\mu$ D™ technologie - New class of rheometer for product development and research
- Largest torque range for demanding rheological measurements on all samples from liquids to solids
- Patented Normal force sensor
- Isolign Piezo flange
- Merging of two classes of rheometers – A traditional stress and a strain controlled rheometer in one single instrument
- Connection of all temperature devices and application-specific accessories of the MCR series is possible
- Toolmaster™, TruRate™, TruStrain™, TruGap™, T-Ready™ functionality

## Lovis 2000 M

Microviscometer



- Rolling ball principle according to DIN 53015, ISO 12058 and USP <913>

Steel ball (driven by force of gravity)

- Various capillary-ball combinations for different viscosity ranges
- Precise temperature control by Peltier element from +5 °C to +100 °C (lower temperatures on request)

Generation M device software

Dynamic viscosity, kinematic viscosity, runtime

Polymer-specific parameters such as intrinsic viscosity, relative viscosity, molar mass, K-value, etc.

- Highly precise measurements from low sample volume starting from 100 µL
- Designed for low-viscosity liquids
- High degree of modularity in combination with other Anton Paar instruments
- Variation of shear rate
- Fast temperature change possible
- Closed measuring system to avoid sample evaporation or contamination

## Lovis 2000 ME

Microviscometer Module



Possible combinations:

- Lovis 2000 M as stand-alone instrument
- Lovis 2000 ME as module for DMA Generation M density meters or density and sound velocity meter
- Automatization with sample handling units

- Each instrument in the assembly can be set to an individual measuring temperature

Additional to the viscometer results all data from the other instruments are available in the Generation M device software, such as density, sound velocity, and application-specific calculated values

- All parameters are measured automatically from the same sample vial
- Sample handling of up to 96 samples, cleaning and drying are performed fully automatically
- Low sample volume, starting from 2.5 mL
- Combination with density, sound velocity, refractive index, alcohol content, color, turbidity and pH measurement possible

## Anton Paar Certified Service The Program

Anton Paar has several service programs designed to meet your needs. With training, recommended preventive maintenance, application support, repair coverage and emergency service, Anton Paar will ensure you get the most out of your investment.

### Training

- Instrument installation on-site and introductory training by rheology experts and service technicians
- Training on-site or in our laboratories to convert practical tasks into suitable test programs
- Seminars, workshops and application days covering the basic principles of rheology, viscometry and measuring technology incl. practical exercises

### Application support

- Solutions to application problems, recommendations for suitable measuring systems and test conditions

### Service support

- All instruments have a 12-month warranty and are built to provide years of trouble-free operation
- Maintenance and service contracts

Standard  
Standard**Plus**  
**AllInclusive**

extend the warranty period and ensure consistent quality over many years

- Our customer service hotline provides rapid answers to questions arising from use of the instrument

Your distributor:

