Anton Paar

The Modular Compact Rheometer Series

MCR Evolution

	MCR 102e	**MCR** 302e	**MCR** 502e Power	**MCR** 702e MultiDrive **MCR** 702e Space MultiDrive Configuration with 1 EC motor	**MCR** 702e MultiDrive **MCR** 702e Space MultiDrive Configuration with 2 EC motors
TECHNICAL SPECIFICATIONS					
Bearing design	Air, fine-pored carbon				
Motor design	Electronically Commutated (EC) - Permanent Magnet Synchronous Motor				
Displacement transducer design	High-resolution optical encoder				
Normal force measurement design (US Pat. 6167752, 1996)	360° capacitive sensor, non-contacting, fully integrated in bearing				
Active thermal management of bearing and normal force sensor	×	✓	✓	✓	✓
Working modes	Combined Motor Transducer (CMT)				Separate Motor Transducer (SMT), Counter-Movement[1)]
Minimum torque (rotation)	5 nNm	1 nNm	100 nNm	1 nNm	
Minimum torque (oscillation)	5 nNm[2)]	0.5 nNm	50 nNm	0.5 nNm	
Maximum torque	200 mNm	230 mNm	300 mNm	230 mNm	
Minimum angular deflection (set value)	0.5 µrad	0.05 µrad			
Maximum angular deflection (set value)	∞ µrad				
Minimum angular velocity[3)]	0 rad/s	0 rad/s	0 rad/s	0 rad/s	0 rad/s
Maximum angular velocity **Maximum speed**	314 rad/s 3000 1/min		220 rad/s 2100 1/min	314 rad/s 3000 1/min	628 rad/s 6000 1/min
Minimum angular frequency[4)]	10^{-7} rad/s				
Maximum angular frequency[5)] **Maximum frequency**	628 rad/s 100 Hz				
Normal force range	-50 N to 50 N		-70 N to 70 N	-50 N to 50 N	
With exposed support plate[6)] (WESP / Space)	×	Optional	×	✓[7)]	✓[7)]
Without support plate (WSP)	×	Optional	×	×	×
Dimensions (W x H x D)	444 mm x 678 mm x 586 mm	444 mm x 733 mm x 586 mm	444 mm x 753 mm x 586 mm	444 mm x 753 mm x 586 mm Space: 212 mm x 767 mm x 554 mm	444 mm x 753 mm x 586 mm Space: 212 mm x 767 mm x 554 mm
Weight	42 kg	46 kg	47 kg	48 kg Space: 51 kg	58 kg Space: 61 kg

RHEOCOMPASS SOFTWARE FEATURES AND SPECIFICATIONS

Get even more out of your rheometer with the most powerful rheometer software on the market
Read more: www.anton-paar.com/apb-rheocompass

	MCR 102e	**MCR** 302e	**MCR** 502e Power	**MCR** 702e MultiDrive **MCR** 702e Space MultiDrive Configuration with 1 EC motor	**MCR** 702e MultiDrive **MCR** 702e Space MultiDrive Configuration with 2 EC motors
ADDITIONAL DEVICE FEATURES					
Device display with remote control of software (decoupled from measuring sensor; mechanical and electromagnetic interference prevention)	✓	✓	✓	✓	✓
Direct strain/stress controller	✓	✓	✓	✓	✓
TruRate™/TruStrain™ (sample-adaptive controller)	Optional	✓	✓	✓	✓
Raw data (LAOS, waveform)	Optional	✓	✓	✓	✓
Normal force profiles (set and read)	✓	✓	✓	✓	✓
Velocity profiles, tack, squeeze	Optional	✓	✓	✓	✓
Automatic gap control/setting (AGC/AGS)	✓	✓	✓	✓	✓
Electronic trim lock for measuring geometry	✓	✓	✓	✓	✓
Fully automatic temperature calibration	✓	✓	✓	✓	✓
TruGap™ (permanent control of the real measuring gap) (US Pat. 6499336, 2000)	Optional	Optional	Optional	Optional	Optional
T-Ready™[8)] (detection of sample temperature equilibrium time) (US Pat. 8904852, 2011)	✓	✓	✓	✓	✓
Toolmaster™ (measuring geometries and accessories, storing of zero-gap) (US Pat. 7275419, 2004)	✓	✓	✓	✓	✓
QuickConnect coupling for measuring geometries (one-hand operation, screwless)	✓	✓	✓	✓	✓
Trimming mirror (360° sample blind spot prevention)	✓	✓	✓	✓	✓
Three-point support of device (three robust feet for tool-free one-hand alignment)	✓	✓	✓	✓	✓
Three-point support for mounting of measuring cells (wobble prevention, no misalignment after changing of cells)	✓	✓	✓	✓	✓
Maximum temperature range	-160 °C to +1000 °C				-160 °C to +600 °C (950 °C[9)])
Maximum pressure range	up to 1000 bar				n/a
Ready for DMA in torsion and tension	✓	✓	✓	✓	✓
Ready for linear drive (DMA in tension, bending, and compression) (US Pat. 9574983, 2015)	×	×	×	✓	✓
Ready for tribology	✓	✓	✓	✓	✓
Ready for powder flow and shear rheology	✓	✓	✓	✓	✓

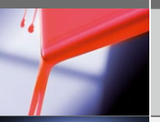
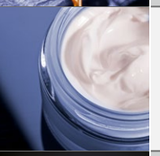
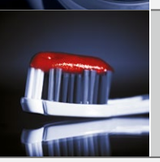
[1)] US Pat. 8453496
[2)] 2 nNm with activated TruStrain™ option
[3)] In controlled shear stress (CSS) mode. In controlled shear rate (CSR) mode depending on measuring point duration and sampling rate
[4)] Theoretical value (duration per cycle = two years)
[5)] Higher frequencies are possible using multi-wave functionality (942 rad/s (150 Hz) or even higher, depending on measuring system and sample)
[6)] Enlarged working space underneath the support plate (flange)
[7)] MCR 702e Space MultiDrive: Unique maximized workspace below the rheometer support plate and on both sides of the instrument
[8)] Depending on used temperature device
[9)] Customized systems used in CTD 1000

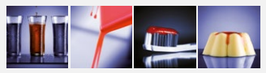
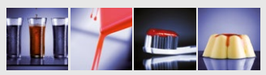
Anton Paar

Modular Compact Rheometers

MCR 72
MCR 92

Your application - Anton Paar solutions

	Application	Typical samples	Measuring procedure	Test types
	**Paints & coatings**	Architectural paints Wall paints Automotive paints Printing inks and pastes	Viscosity Yield/flow point Thixotropic effect Structural decomposition & regeneration Sedimentation/stability	Viscosity curve (ROT) Amplitude sweep (OSC) 3 Interval Time Test (ROT/OSC) Frequency sweep (OSC)
	**Food**	Chocolate Ketchup Mayonnaise Dairy products Sauces	Viscosity Yield/flow point Thixotropic effect Structural decomposition & regeneration Sedimentation/stability	Viscosity curve (ROT) Amplitude sweep (OSC) 3 Interval Time Test (ROT/OSC) Frequency sweep (OSC)
	**Polymers**	Polymer solutions Polymer melts	Viscosity Temperature behavior	Viscosity curve (ROT) Amplitude sweep (OSC) Frequency sweep (OSC) Temperature test (ROT/OSC)
	**Petrochemicals**	Drilling fluids Slurries and muds Crude oils Lubricants and greases	Viscosity Yield/flow point Thixotropic effect Structural decomposition & regeneration Temperature behavior Sedimentation/stability	Viscosity curve (ROT) Amplitude sweep (OSC) 3 Interval Time Test (ROT/OSC) Temperature test (ROT/OSC) Frequency sweep (OSC)
	**Resins**	Resins Adhesives Glues	Viscosity Temperature behavior	Viscosity curve (ROT) Temperature test (ROT/OSC)
	**Pharmaceuticals**	Salves and ointments Pastes and creams Emulsions, dispersions and suspensions	Viscosity Yield/flow point Thixotropic effect Structural decomposition & regeneration Sedimentation Long-term stability Temperature behavior	Viscosity curve (ROT) Amplitude sweep (OSC) 3 Interval Time Test (ROT/OSC) Frequency sweep (OSC) Thermal loop test (OSC) Temperature test (ROT/OSC)
	**Cosmetics**	Shampoos Shower gels Lotions and creams Hair gels Toothpaste Nail polish Makeup	Viscosity Yield/flow point Thixotropic effect Structural decomposition & regeneration Sedimentation Temperature behavior Long-term stability	Viscosity curve (ROT) Amplitude sweep (OSC) 3 Interval Time Test (ROT/OSC) Frequency sweep (OSC) Temperature test (ROT/OSC) Thermal loop test (OSC)

Temperature device	Temperature range	Materials	Measuring systems	Heating rate	Cooling rate
P-PTD 220/AIR	-10 °C to +220 °C			Up to 40 °C/min	Up to 40 °C/min
H-PTD 200/AIR/18P	-5 °C to +200 °C			Up to 40 °C/min	Up to 40 °C/min
C-PTD 150/XL/AIR/18P	5 °C to 150 °C			Up to 7 °C/min	Up to 7 °C/min

Measuring systems

Specifications	Units	MCR 72	MCR 92
Bearing	-	Ball	Air
EC motor (brushless DC) with high-resolution optical encoder	-	✓	✓
Rotation mode	-	✓	✓
Oscillation mode	-	✓[1]	✓
Direct strain controller	-	✓	✓
Direct stress controller	-	✓	✓
Maximum torque	mNm	125	125
Minimum torque, rotation	µNm	200	1
Minimum torque, oscillation	µNm	200	1
Torque resolution	nNm	100	100
Angular deflection, set value	µrad	1 to ∞	1 to ∞
Angular deflection, resolution	nrad	614	614
Step rate, time constant	ms	100	100
Step strain, time constant	ms	100	100
Minimum angular velocity [2]	rad/s	10^{-4}	10^{-4}
Maximum angular velocity	rad/s	157	157
Minimum angular frequency [3]	rad/s	10^{-3}	10^{-4}
Maximum angular frequency	rad/s	628	628
Minimum speed (CSS/CSR)	rpm	10^{-3}	10^{-3}
Maximum speed	rpm	1500	1500
Maximum temperature range	°C	-50 to +400	-50 to +400
SafeGap (Austrian Patent AT 517074), normal force limiter during gap setting	-	✓	✓
TruRay (Patent EP3220127B1), dimmable illumination of sample area	-	✓	✓
Connections		USB, Ethernet, RS232, analog interfaces, Pt100 port	
Dimensions	mm	380 x 660 x 530	380 x 660 x 530
Weight	kg	33	33
QuickConnect for measuring systems, screwless	-	✓	✓
Toolmaster, measuring system	-	✓	✓
Toolmaster, measuring cell	-	✓	✓
CoolPeltier, Peltier-controlled plate system with built-in cooling option that requires no additional accessories for counter-cooling	°C	25 below ambient but not lower than -10 up to +220 [4]	
Actively Peltier-controlled hood that requires no additional accessories for counter cooling	°C	-5 to +200 [4]	
CoolPeltier, Peltier-controlled cylinder system with built-in cooling option that requires no additional accessories for counter-cooling	°C	15 below ambient but not lower than +5 up to +150 [4]	
Virtually gradient-free (horizontal, vertical) temperature control	-	✓	✓
Electronic trim lock for the measuring system	-	✓	✓
Automatic gap control/setting, AGC/AGS	-	✓	✓
Rheometer software:			
Test designer	-	✓	✓
Report designer	-	✓	✓
User management	-	✓	✓

Also available as **EDU Edition** (for educational institutions only):

- MCR 72 or MCR 92 plus accessories with a special academic discount
- Free EDU Package and EDU Student Packages including lab equipment and educational material as well as office supplies and giveaways

Note:

[1] Depending on sample properties.
[2] Depending on measuring point duration and sampling time, practically any value is achieved.
[3] Set frequencies below 10^{-4} rad/s are of no practical relevance due to the measuring point duration >1 day.
[4] System temperature, sample temperature may vary. For measurements at very high or low temperatures a calibration in the sample gap is recommended.
RheoCompass (9177015), Toolmaster (3623873) and CoolPeltier (9177056) are registered trademarks of Anton Paar.

Legend: ✓ included