

DropMaster



Dynamic Contact Angle Meter

Contact Angle, Liquid Surface Tension, Surface Free Energy

DMo-series

■ Product lineup

DMo-902

Fully automated computer-controlled contact angle measuring system with 150x150mm 360° rotation stage

- Computer-controlled rotation stage with XY translation and rotation axis, and computer-controlled camera and dispenser unit with Z translation
- Fully automated mapping sequence (droplet generation → droplet deposition → droplet analysis → stage movement) over the full 150x150mm stage area is possible by pre-setting coordinates
- The optional multi dispenser system of up to five liquids allows for “one-click” fully automated analysis of the surface free energy
- The optional high capacity dispenser for one liquid allows for fully automated measurement of contact angles for applications with high liquid volume requirements
- The automatic recognition of droplet deposition enables droplet analysis after a pre-set time assuring reliable results under constant conditions



DMo-702

Fully automated computer-controlled contact angle measuring system with 150x150mm stage

- Computer-controlled stage with X translation and computer-controlled camera and dispenser unit with Z translation
- Automated measurement sequence (droplet generation → droplet deposition → droplet analysis → stage movement) in X-direction is possible by pre-setting commands
- The automatic dispenser unit generates droplets with high accuracy and assures precise measurements of advancing and receding angles through its constant volumetric flow rate
- The optional multi dispenser system of up to five liquids allows for “one-click” fully automated analysis of the surface free energy
- The automatic recognition of droplet deposition enables droplet analysis after a pre-set time assuring reliable results under constant conditions



DMo-602

Computer-controlled analysis of static and dynamic contact angles with 150x150mm stage

- Manual XY sample stage, and computer-controlled camera and dispenser unit with Z translation
- Automated measurement sequence (droplet generation → droplet deposition → droplet analysis) is possible by pre-setting commands
- The automatic dispenser unit generates droplets with high accuracy and assures precise measurements of advancing and receding angles through its constant volumetric flow rate
- The automatic recognition of droplet deposition enables droplet analysis after a pre-set time assuring reliable results under constant conditions
- The manual sample stage can be exactly adjusted to the desired position and the syringe of the dispensing unit can be changed quickly and easily



DMo-502

Computer-controlled analysis of static and dynamic contact angles with 150x150mm stage

- Manual XY sample stage, and manual camera and dispenser unit in Z-axis
- The manual sample stage can be exactly adjusted to the desired position and the syringe of the dispensing unit can be changed quickly and easily
- The automatic dispenser unit generates droplets with high accuracy and assures precise measurements of advancing and receding angles through its constant volumetric flow rate
- The automatic recognition of droplet deposition enables droplet analysis after a pre-set time assuring reliable results under constant conditions



■ Features common for all models

- Fast image capturing system USB 3.0 camera max. 1000fps: 400fps at 640x480 full resolution, 500fps at 640x400 and 1000fps at 640x200
- Focusing aid with index graph and value displayed in the image screen helps operators to achieve perfect focus
- Movie converter converts data images to MPEG-1 or AVI movie format.
- The black & white threshold level to determine the binary image can be adjusted before and after measurement to optimize droplet analysis
- During analysis of the sessile drop, besides the contact angles, droplet volume, sessile drop volume, absorbed droplet volume, residual droplet ratio, height and radius of sessile drop are also determined.
- Measured results are displayed in a spreadsheet-like table for easy reference and comparison.

■ Sample stage

- All models are equipped with a 150x150mm wide sample stage with a maximum load capacity (temperature chamber + sample) of 1.4kgs.
- Stage travel distance: x-axis 150mm, y-axis 75mm
* DMo-902 and DMo-702 are equipped with motorized sample stage
- Possibility to mount temperature control chambers onto the stage
* Applicable sample size for temperature control chamber is about 150x75mm

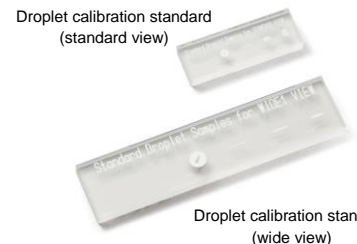


■ Standard components of individual models

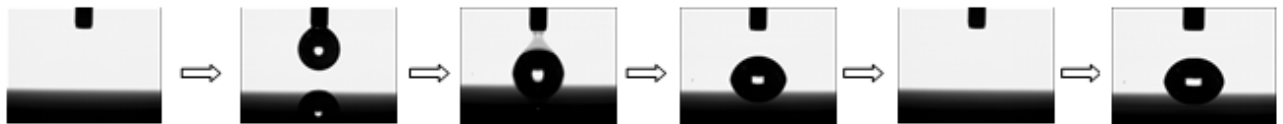
DMo-902	DMo-702	DMo-602	DMo-502	Common accessories for all models
<ul style="list-style-type: none"> • Motorized camera and dispenser unit (z-axis) and motorized stage in X, Y and rotation axes • Automatic single dispenser • Control box 	<ul style="list-style-type: none"> • Motorized camera and dispenser unit (Z-axis) and motorized stage in X-direction • Automatic single dispenser • Control box 	<ul style="list-style-type: none"> • Motorized camera and dispenser unit (Z-axis) • Automatic single dispenser • Control box 	<ul style="list-style-type: none"> • Automatic single dispenser, incl. dispenser controller 	<ul style="list-style-type: none"> • Manual single dispenser • Syringe set 22G (5x each/set) • Teflon coated needles 18G, 22G (2x each) • Standard droplet sample (Standard view)

■ Droplet calibration standard

- The droplet calibration standard for standard view is a basic accessory for all models
- It is made of soda-lime glass bearing one full circle for calibration and three droplet silhouettes of 5°, 60° and 108° for periodic inspections of measurement accuracy
- With the help of this tool, users can easily perform routine maintenance to ensure reliability of their measurements over long periods of time
- A droplet calibration standard for calibration of the camera wide-view setting, as well as pendant drop calibration standards for standard and wide-view setting can be obtained optionally
- A certificate of accuracy of the full circle and droplet silhouettes can be obtained optionally



■ Measuring process



DMo-model	Positioning of first measurement point	Generation of droplet	Deposition of droplet (control/recognition)	Analysis of droplet	Positioning of next measurement point	150x150mm full scale continuous measurements
502	▲ by rotary knob	●	▲ / ●	●	▲	▲
602	▲ by rotary knob	●	● / ●	●	▲	▲
702	▲ by command button	●	● / ●	●	●	▲
902	●	●	● / ●	●	●	●

● automatic ▲ manual

■ Specifications

	DMo-902	DMo-702	DMo-602	DMo-502
Camera system	USB 3.0 CCD camera with: 400fps at 640x480 pixels 500fps at 640x400 pixels 1000fps at 640x200 pixels			
Optical system	manual focus with 3 step manual zoom field of view: 6.1x4.7mm, 11.1x8.2mm, 15.8x11.8mm ±6%			
Measuring methods	contact angle: sessile drop (static), advancing/receding angle (dynamic) sliding angle (dynamic) ¹⁾ surface/interfacial tension: pendant drop (static and dynamic) surface free energy of solids: sessile drop (static)			
Analysis methods	contact angle: $\theta/2$, tangent, curve fitting (ellipse, circle) surface/interfacial tension: Young-Laplace, ds/de surface free energy of solids: Owens-Wendt, Kaelble-Uy, Kitazaki-Hata, Wu, acid-base, Zisman			
Measuring range	contact angle: 0 to 180° surface/interfacial tension: 0 to 2000mN/m			
Resolution	contact angle: 0.01° surface/interfacial tension: 0.01mN/m			
Accuracy ¹⁾	contact angle: 0.2° surface/interfacial tension: 0.2mN/m			
Maximum sample size	150(W)x150(D)x16(H)mm	150(W)x150(D)x35(H)mm		
Sample stage operation				
X-axis	150mm (automatic)	150mm (automatic)	150mm (manual)	
Y-axis	75mm (automatic)	75mm (manual)	75mm (manual)	
Z-axis	---	---	---	
Rotation axis	360° (automatic)	---	---	
Dispenser operation				
Z-axis (droplet deposition)	16mm (automatic)	35mm (automatic)		35mm (manual)
Droplet generation	automatic	automatic		automatic
Dispensing resolution	0.1 μ l	0.1 μ l		0.1 μ l
Measuring temperature	ambient	standard: ambient optional: jacket type temperature-controlled (+5 to +90°C) heater type temperature-controlled (ambient to +180°C and ambient to +380°C)		
Instrument dimensions	297(W)x544(D)x305(H)mm			
Instrument weight	10.0kg	8.5kg	8.5kg	7.5kg
Control box dimensions	290(W)x240(D)x100(H)mm			260(W)x200(D)x70(H)mm
Control box weight	4.3kg	4.3kg	4.3kg	1.6kg
Power supply	AC100 to 240V, 50/60Hz 115W, 120VA			AC100 to 240V, 50/60Hz 20W, 35VA
Operating environment	Temperature: +10 to +35°C, humidity: 30 to 80%RH (non-condensing) Positioned away from sources of electrical noise and vibration			

¹⁾ Accuracy is the repeatability in terms of standard deviation based on manufacturer's calibration standard

■ Optional accessories and customized solutions

The KYOWA DropMaster series can be easily adapted to meet particular customers' requirements for special applications. We offer a wide range of optional accessories such as jacket and heater-type temperature controlled sample stages and chambers, heater-type temperature controlled dispenser, external tilting stage for measurements of roll-off angles, and a special module for measurements of roll-off speed and roll-off acceleration.

Customized solutions, such as specially designed sample stages for measurements on cylindrical samples with large diameters or on human arms and legs are also possible.

For detailed information, please contact our sales partner or us directly at +81-48-483-2629 or at overseas-sales@face-kyowa.co.jp.

Specifications and designs are subject to change without notice.

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