

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 entire 150x150mm stage area is possible by pre-setting coordinates
- The optional multi dispenser system of up to five liquids allows for a "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, ensuring reliable results under consistent 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 a "one-click" fully automated analysis of the surface free energy
- The automatic recognition of droplet deposition enables droplet analysis after a pre-set time, ensuring reliable results under consistent 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, ensuring reliable results under consistent conditions
- The precise manual sample stage is adjustable to the desired position, and the dispensing unit allows for a quick and easy exchange



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 precise manual sample stage is adjustable to the desired position, and the dispensing unit allows for a quick and easy exchange
- 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, ensuring reliable results under consistent conditions



■ Standard features for all models

- USB 3.0 camera for fast image processing with 400 fps at 640x480 pixel full resolution and a maximum of 2700fps at 640x64 pixel.
- Focusing aid with an index graph and the value displayed in the image screen helps operators achieve perfect focus.
- Movie converter converts data images to MPEG-1 or AVI movie format.
- The black-and-white threshold level used to determine the binary image can be adjusted before and after measurement to optimize droplet analysis.
- During the sessile drop analysis, in addition to the contact angle data, the FAMAS software determines the droplet volume, sessile drop volume, absorbed droplet volume, residual droplet ratio, height, and radius of the sessile drop.
- A spreadsheet-like table displays the measured results for easy reference and comparison.

■ Sample stage

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

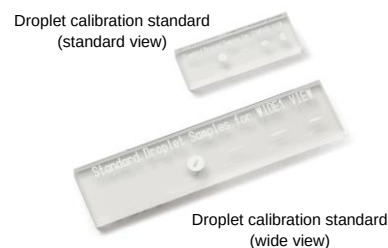


■ Standard components of individual models

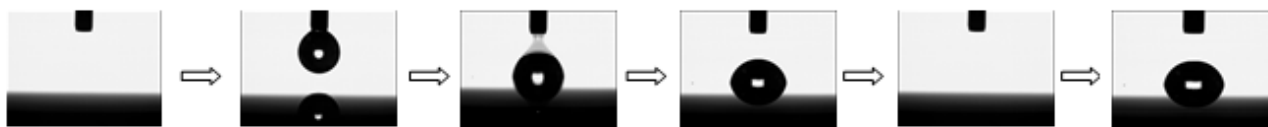
DMo-902	DMo-702	DMo-602	DMo-502	Common accessories for all models
• Motorized camera and dispenser unit (z-axis) and motorized stage in X, Y, and rotation axes • Automatic single dispenser • Control box	• Motorized camera and dispenser unit (Z-axis) and motorized stage in X-direction • Automatic single dispenser • Control box	• Motorized camera and dispenser unit (Z-axis) • Automatic single dispenser • Control box	• Automatic single dispenser, incl. dispenser controller	• 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 the standard view is a basic accessory for all models
- The soda-lime glass slide bears 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 efficiently perform routine maintenance to ensure the reliability of their measurements over long periods
- An additional droplet calibration standard for calibration of the camera wide-view setting and pendant drop calibration standards for standard and wide-view settings are available
- Upon request, we issue traceable certificates of the accuracy of the full circle and droplet silhouettes



■ 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
902	●	●	● / ●	●	●	●
702	▲ by command button	●	● / ●	●	●	▲
602	▲ by rotary knob	●	● / ●	●	▲	▲
502	▲ by rotary knob	●	▲ / ●	●	▲	▲

● automatic ▲ manual

■ Specifications

	DMo-902	DMo-702	DMo-602	DMo-502
Camera system	USB 3.0 CMOS camera with: 400 fps at 640x480 pixels 500 fps at 640x400 pixels 1000 fps at 640x200 pixels 2700 fps at 640x64 pixels			
Optical system	manual focus with a 3-step manual optical zoom of 2.6x field of view: 6.1 x 4.7mm, 11.1 x 8.2mm, 15.8 x 11.8mm ±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), Young-Laplace surface/interfacial tension: Young-Laplace, ds/de surface free energy of solids: OWRK, 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 ²⁾	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	0.1μl	0.1μl		0.1μl
Measuring temperature	ambient only	standard: ambient optional: jacket type temperature-controlled (+10 to +70°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 60W, 125VA			AC100 to 240V, 50/60Hz 25W, 103VA
Operating environment	temperature: +10 to +35°C, humidity: 30 to 80%RH (non-condensing) positioned away from sources of electrical noise and vibration			

¹⁾ Optional

²⁾ Accuracy is the repeatability in terms of standard deviation based on the manufacturer's calibration standard

■ Optional accessories and customized solutions

The KYOWA DropMaster series can quickly adapt to meet customers' requirements for special applications. In addition, we offer a wide range of optional accessories, such as jacket and heater-type temperature-controlled sample stages and chambers, a heater-type temperature-controlled dispenser, an external tilting stage for roll-off angles, and a particular module for measuring roll-off speed and roll-off acceleration.

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

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

Specifications and designs are subject to change without notice.

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