

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 & 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 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

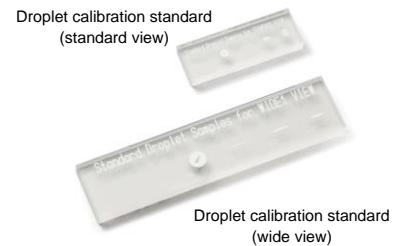


■ Standard components of individual models

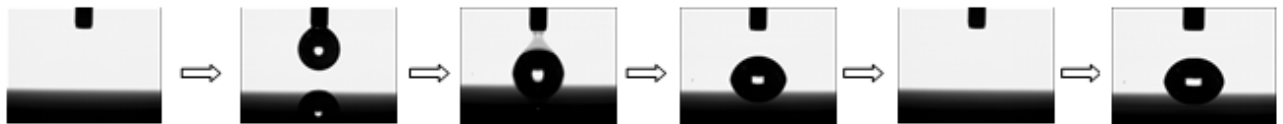
| DMo-902 | DMo-702 | DMo-602 | DMo-502 | Common accessories for all models |
|--|--|---|--|---|
| <ul style="list-style-type: none"> • Motorized camera and dispenser unit (z-axis) and motorized stage in X, Y, and rotation axes • Automatic single dispenser • Control box | <ul style="list-style-type: 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 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 |
|-----------|--|-----------------------|---|---------------------|---------------------------------------|--|
| 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 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 | 0.1 μ l | 0.1 μ l | | 0.1 μ l |
| Measuring temperature | ambient only | 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 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 a 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 measurements of roll-off speed and roll-off acceleration. Customized solutions are also possible, such as specially designed sample stages for measurements on cylindrical samples with large diameters or human arms and legs.

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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<http://www.face-kyowa.com>

Kyowa Interface Science Co., Ltd.

5-4-41 Nobitome, Niiza-City, Saitama 352-0011, Japan

Tel. +81-48-483-2629 Fax. +81-48-483-2702