

DropMaster

DMs-401



DMs-401

The DMs-401 is a compact yet high performance surface measuring instrument and allows for measuring static and dynamic contact angles, surface free energy of solids and surface/interfacial tension of liquids. Its functions can be easily extended due to its sophisticated modular design.

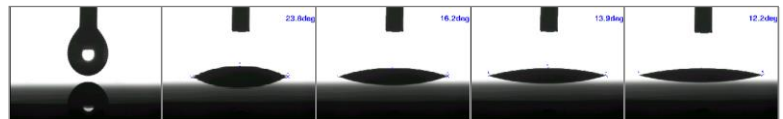
Optional accessories, such as computer controlled dispenser, temperature control devices, external tilting stage system are available.



Features of the DMs-401

Fast image capture with 60fps

Sequential droplet images are captured at a rate of 60 frames per second. It allows for measuring of contact angle & surface and interfacial tension by variations over time.



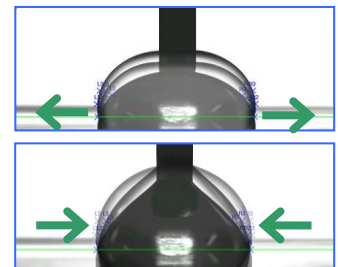
333fps image capture system is available at an option for higher speed capturing demand.

Applications: Initial spreading, absorbing property, effect of surface active agents

Extension/Contraction method

Advancing/Receding Angles are measured by increasing/decreasing the volume of captive droplet. The optional automatic dispenser is required for smooth and precise dynamic motion of the volume change.

Applications: Coating property, Repellency, Characterization of droplet hysteresis



Sliding method

Advancing/Receding Angles are measured using an external stage, tilting the measuring instrument. The angle at which a droplet starts sliding from solid surface is determined as Sliding Angle. The Adhesive Energy between droplet and solid surface is analyzed at the same time. The optional Sliding method kit is required.

Applications: Repellency/Hydrophobicity, Characterization of droplet hysteresis



SLIDING METHOD KIT

*The photo shows the main body of DMo-701.

Surface Free Energy analysis of solids

Solid surface free energies and their polar and dispersive components are analyzed from the results of contact angle with some probe liquids. Geometric mean, Harmonic mean, acid-base, Interaction analysis (Work of Adhesion, Interfacial Free Energy), Young-Dupré, Zisman are available. An optional Surface energy kit with 5 probe liquids and a set of needles is available.

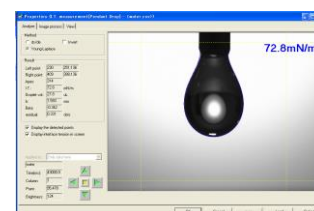
Applications: Adhesive property, characterizing surface modification, digitalization of hydrophilicity/hydrophobicity

Surface/Interfacial Tension of liquids

Pendant drop method allows for measuring surface and interfacial tension of liquids. The advantages compared to conventional Wilhelmy plate method and du Noüy ring method are as follows:

- measurement with small liquid amount (less than 1mL)
- high temperature control such as molten polymer applications
- suitable for liquids which surfaces change quickly after exposure to air

The optional Pendant drop kit is required.

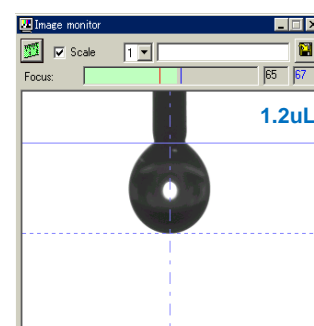


Automatic recognition of drop deposition

The droplet deposition from the needle tip to the solid surface is recognized automatically and the time interval between deposition and recognition can be set individually. This function is very useful for samples that spread fast after depositing.

Live image, droplet volume monitoring

The image monitor displays a live image of the actual droplet and its droplet volume in μL . Using the optional automatic dispenser, the droplet volume is controlled by FAMAS software.



Brightness and focus adjustment

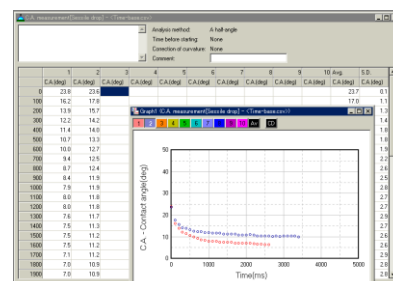
With help of the brightness level indicator and the focusing aid with index graph and value displayed in the image screen, operators can easily adjust a perfect image for precise measurements.

Threshold level adjustment

Threshold level to determine image binary can be adjusted before and after measurement. Both relative and absolute adjustments are possible to apply the optimized image analysis.

Data chart & variable data

Besides the contact angle data, the droplet volume, absorbing amount and ratio, droplet height and width are obtained at the same time, and those data versus time can be drawn on the chart.



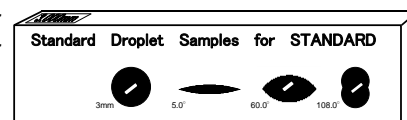
Movie converter

The measured images of time function can be easily and quickly converted to a MPG-1 of AVI movie file.

Standard droplet sample

The standard tool made of glass is printed with one circular silhouette for calibration and three droplet silhouettes of 5°, 60° and 108° for inspection. It is for the use of routine maintenance performed by the user.

A certificate of accuracy for the silhouettes can be obtained optionally



STANDARD COMPONENTS

DMS-401 main body*1	1	Manual dispenser	1
Glass syringe set with 22G SUS needle	5	Teflon coated needle, 18G, 22G	2 each
Standard droplet sample (standard view)	1	Acrylic plate (for practice)	1
AC/DC adapter	1	USB cable	1
FAMAS software and license key	1	Operation manual (English)*	1

*1 Main body features camera, LED lamp, stage devices and dispenser holder on its chassis.

* A windows PC is required to operate the instrument and can be ordered optionally.

DMs-401

SPECIFICATION DATA

Measuring method	Sessile drop, Extension/contraction, Pendant drop, Sliding angle(option)
Analysis method	Contact angle: $\theta/2$ method, Tangent method, Circle fitting, Ellipse fitting Surface and interfacial tension: Young Laplace fitting, d_s/d_e method
Measuring range	Contact angle: 0 to 180° Surface and interfacial tension: 0 to 100mN/m* ¹
Display resolution	Contact angle: 0.1° Surface and interfacial tension: 0.1mN/m
Precision* ²	Contact angle: 0.2° Surface and interfacial tension: 0.2mN/m
Field of view	3 step zoom: about 4.0 x 5.3mm, 7.2 x 9.6mm, 10.2 x 13.6mm
Sample stage size	150 ^W x 100 ^D mm
Applicable sample	150 ^W x 100 ^D x 35 ^T mm max., weight 300g max.
Stage travel range	X-axis: 150mm by manual lead screw Z-axis: 20mm by manual slider + extra 20mm by positioning set screw
Droplet dispensing	Standard: Manual dispenser Option: Computer controlled dispenser
Droplet deposition	By manual stage up/down motion
Measuring Temperature	Option: Jacket type (10 to 70°C), Heater type (ambient to 180°C & ambient to 380°C)
Power supply	AC100-240V, 50/60Hz, 5.5W 15VA
Instrument dimensions, weight	Main body: 294 ^W x 461 ^D x 375 ^H mm, 6.8 kg
Operating environment	Temperature: +10 to +35°C, humidity: 30 - 80%RH (non-condensing) Positioned away from sources of electrical noise and vibration

*¹ 100mN/m is in the case of liquid density 1g/cm³. Other cases are applied ranges multiplied 100mN/m by the liquid density.

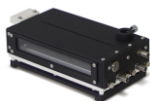
*² Precision is the repeatability described in standard deviation on manufacturer's standard.

A SELECTION OF OPTIONAL ACCESSORIES

JACKET TYPE STAGE SET

For contact angle measurements in a temperature range from about +5 to +90°C.

A refrigerated/heated circulator is required for the temperature control and a surface thermometer is required to measure the solid's surface temperature.



JACKET TYPE CHAMBER SET

For surface and interfacial tension measurements in a temperature range from about +5 to +90°C.

A refrigerated/heated circulator is required for the temperature control, and a surface thermometer is needed to measure the liquid's surface temperature.



HEATER TYPE STAGE PACKAGE

For contact angle measurements in a temperature range from ambient to +180°C.

The temperature controller 202E with PID control system and with two built-in type K thermocouple thermometers is included.



HEATER TYPE CHAMBER PACKAGE

For surface and interfacial tension measurements in a temperature range from ambient to +180°C.

The temperature controller 202E with PID control system and with two built-in type K thermocouple thermometers is included.



AUTOMATIC DISPENSER SET

Computer controlled dispenser unit for quick and precise creation of droplets, inclusive a control box.



SURFACE THERMOMETER

Portable thermometer with a built-in platinum resistance sensor.



THREE-STATE MEASUREMENT KIT

Parts for measuring bubble in liquid or oil in water and vice versa



PENDANT DROP KIT

Special needles, glass cuvettes and standard pendant drop samples for measurements of surface and interfacial tension.



SURFACE ENERGY KIT

Special needles and 5 probe liquids for the analysis of surface free energy of solids.



IMAGE CAPTURE SYSTEM 333

High speed camera for image capturing with a maximum of 333fps.

*The specifications and designs are subject to change without notice.

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