

# DROP SHAPE ANALYZER – DSA25



ACCURATE WETTING  
ANALYSIS FOR VARYING  
SAMPLES AND TASKS

**KRÜSS**

Advancing your Surface Science



## ALWAYS SET FOR NEW TASKS – ALWAYS CONSISTENTLY RELIABLE

- **Quick and simple setup for new measuring conditions and samples**
- **High-quality optical and dosing solutions for accurate contact angle measurements**
- **Innovative software ADVANCE with clear user navigation**

As experts in interfacial chemistry and a system provider in the field of contact angle measurement we at KRÜSS develop high quality measuring instruments for both research as well as on-site or laboratory quality control. With this broad focus we have the right solution ready to hand for every question concerning wetting analysis of solid surfaces.

We developed the Drop Shape Analyzer – DSA25 especially for frequently varying sample types and tasks. The instrument adapts quickly and flexibly to handle ever changing conditions. For this reason the DSA25 is equipped with manual components that are fast and simple to operate. In addition software-controlled dosing units operate hand-in-hand with our ADVANCE software and enable semi-automatic measurements with a high sample throughput.

### **Accurate and reproducible contact angles – fast and easy**

Our finely adjustable lifting table quickly transports the sample to the required measuring height. The table can be easily moved to set the needed dosing position thanks to its magnetic fixing.

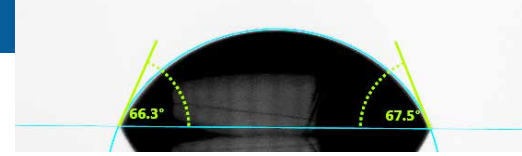
Equipped with dosing units for one or two liquids, the instrument is suitable for simple wetting tests or for measuring surface free energy (SFE). With the software-controlled version the dosing unit allows accurate adjustment of the dosing dynamics in order to make exact measurements of advancing and receding angles.

The uniform LED lighting and high-quality optical components ensure that the dispensed drop is portrayed with the correct shape. Reliable and accurate contact angle measurements can be achieved with the aid of the particularly fast and high-resolution USB 3.0 camera.

### **ADVANCE – intuitive software with a novel user concept**

Our innovative software ADVANCE sets new standards in intuitive operability. The dynamic user interface always displays exactly what is needed in the workflow of an analysis. By avoiding menus and pop-ups ADVANCE saves any unnecessary clicks and time-consuming searches for hidden elements. ADVANCE integrates the software-controlled components of the DSA25 into exactly reproducible automatic sequences that are simple to create.





## EXTENSIONS FOR HIGH SPEED AND SPECIAL TASKS

- Double dosing for measuring SFE with just one click
- Tilting table for dynamic contact angle and roll-off angle

### Extremely fast determination of the SFE for quality control

Our optional and completely newly developed double-dosing system uses two pressure doses arranged in parallel to simultaneously produce one drop of each of the test liquids water and diiodmethane on the sample. The video images of the drops are displayed and evaluated at the same time. ADVANCE calculates the SFE from the two measured contact angles. The complete process, from the start of dosing up to the calculation of the SFE, is fully automatic and takes just one second. The high innovative level of this new measuring method is reflected in a filed patent by KRÜSS. The pressurized dosing unit can be combined with a dosing syringe so that precise analyses are even possible with three liquids.

### Exact analysis of drops on inclined surfaces

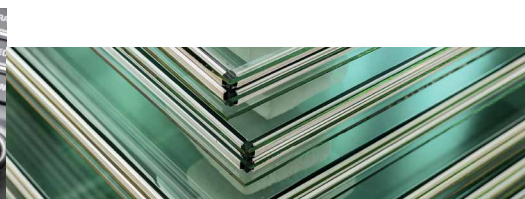
A software-controlled tilting table that can be inclined by up to 90° transforms the DSA25 into a versatile measuring system for determining dynamic contact angles on inclined surfaces. In order to measure the roll-off angle ADVANCE calculates the exact position of the drop for every inclined angle thus providing an objective criterion for the analysis. The system is ideally suited for examining fluid adhesion on solid materials and de-wetting behavior in applications such as characterizing rough or hydrophobic materials.

## TASKS AND APPLICATIONS

- Characterization of surface pre-treatment processes
- Testing of the wettability of plastic, glass, ceramic, wood, paper, textiles or metal
- Testing of surface cleanliness

## MEASURING METHODS AND OPTIONS

- Contact angle between a liquid and a solid
- Surface free energy from contact angles of several test liquids using all common models
- Static contact angle, advancing angle and receding angle
- Measurement of surface tension and liquid-liquid interfacial tension using the pendant drop method
- Temperature-controlled measurements from -30 °C to 400 °C
- Measurements under controlled humidity



# ALWAYS CLOSE TO YOU

At KRÜSS, we combine technical know-how and scientific expertise with plenty of passion. That is why we not only produce high-quality measuring instruments for surface and interfacial chemistry – we offer a unique combination of product and scientific consulting. Our continuous know-how transfer ensures that not only we at KRÜSS keep pace with scientific developments, but also our customers.

In this way, we help you to optimize and make better use of your technologies. This has made us the global market leader in the field of surface and interfacial tension measurement. As a matter of course, we will gladly support you with further information as well. Feel free to ask us about publications, application cases, and helpful information about other KRÜSS products. We are always close to you.



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# DROP SHAPE ANALYZER – DSA25

## SPECIFICATIONS



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Product group specifications	DSA25B	DSA25S	DSA25E
<b>Camera system</b>			
Connection		USB 3.0	
Performance		CF03: 200 fps at 1200 × 800 px 500 fps at 560 × 350 px 800 fps at 320 × 200 px 2000 fps at 90 × 60 px CF06 <sup>1)</sup> : up to 3400 fps at 640 × 50 px	
<b>Optics</b>			
Focus		manual	
Zoom	fixed focal length	6.5× zoom, manual	6.5× zoom, manual
View angle		±3°	
Field of view	CF03: 15.2 mm × 15.2 mm CF06 <sup>1)</sup> : 6.6 mm × 5 mm	CF03: 3.2 mm × 3.2 mm to 18.5 mm × 18.5 mm CF06 <sup>1)</sup> : 1.4 mm × 1 mm to 8.1 mm × 6 mm	CF03: 3.2 mm × 3.2 mm to 18.5 mm × 18.5 mm CF06 <sup>1)</sup> : 1.4 mm × 1 mm to 8.1 mm × 6 mm
Resolution	CF03: 13.3 μm CF06 <sup>1)</sup> : 10.9 μm	CF03: 2.5 to 16.2 μm CF06 <sup>1)</sup> : 2.1 to 13.3 μm	CF03: 2.5 to 16.2 μm CF06 <sup>1)</sup> : 2.1 to 13.3 μm
<b>Illumination</b>			
Type		high power monochromatic LED	
Wave length, dominant		470 nm	
Field of light		Ø 42 mm	
<b>Dosing system</b>			
Dosing	manual	software-controlled	2x software-controlled
Drop deposition		manual	
Syringes, volume	glass (1×, 200 μL), disposable (400 μL) <sup>1)</sup>	glass (1×, 450 μL), disposable (900 μL) <sup>1)</sup>	glass (1×, 450 μL), disposable 900 μL) <sup>1)</sup>
Resolution	-	0.1 μL with glass syringe	0.1 μL with glass syringe
Speed	-	10 to 900 μL/min with glass syringe	10 to 900 μL/min with glass syringe
<b>Double pressure dosing system <sup>1)</sup></b>			
Drop deposition		software-controlled	
Cartridge, volume		disposable (1 mL)	
Resolution		0.1 μL	
Speed		fixed	
<b>Stages <sup>2)</sup></b>			
Control		manual	
Length		38 mm	
<b>Tilting <sup>1)</sup></b>			
Type		external	
Control		software-controlled	
Range		0 to 90°	
<b>Software</b>			
ADVANCE		contact angle surface free energy of solids <sup>3)</sup> interfacial and surface tension of liquids <sup>3), 4)</sup>	

**Measurement specifications**
**DSA25B**
**DSA25S**
**DSA25E**
**Sessile drop/captive bubble**

Result	contact angle (CA)
Range <sup>5)</sup>	0 to 180°
Resolution <sup>5)</sup>	0.1°
Accuracy <sup>6)</sup>	0.3°
Model	conic section, polynom, circle, Young-Laplace, height-width
Type <sup>7)</sup>	advancing, receding, static, dynamic, tilting

**Surface free energy of solids <sup>3)</sup>**

Result	surface free energy (SFE)
Model	equation of states, Zisman, Fowkes, Wu, Owens-Wendt-Rabel-Kaelble, Schultz-1, Schultz-2, extended Fowkes, acid-base theory

**Pendant drop/rising drop <sup>3), 4)</sup>**

Result	interfacial tension (IFT)/surface tension (SFT)
Range <sup>5)</sup>	0.01 to 2000 mN/m
Resolution <sup>5)</sup>	0.01 mN/m
Accuracy <sup>6)</sup>	0.3 mN/m
Model	Young-Laplace
Type	static, dynamic

<sup>1)</sup> optional

<sup>2)</sup> movable in x- and y-direction

<sup>3)</sup> optional for DSA25B

<sup>4)</sup> optional for DSA25S

<sup>5)</sup> software-based

<sup>6)</sup> instrument-based

<sup>7)</sup> additional accessories may be required

General specifications	DSA25B	DSA25S	DSA25E
<b>Sample dimensions</b>			
Maximum sample space <sup>8)</sup>	320 mm × ∞ × 165 mm (W × D × H)		
<b>Temperature control</b>			
Devices	temperature-controlled sample stage, chambers, cuvette		
Type	liquid, electrical, Peltier		
Range	-30 <sup>9)</sup> to 400 °C <sup>10)</sup>		
Maximum sample size	132 mm × 132 mm × 27 mm (W × D × H) <sup>11)</sup>		
Resolution	0.1 K		
External circulator	with liquid		
Inert gas	yes		
<b>Temperature measurement</b>			
Range	-50 to 400 °C		
Resolution	0.1 °C		
Precision	0.1 °C		
Accuracy	1/3 DIN B (±0.1 °C at 0 °C to ±0.8 °C at 400 °C)		
External sensor	2 connectors (PT100) <sup>12)</sup>	2 connectors (PT100) <sup>12)</sup>	2 connectors (PT100)
Location	sample stage, chamber, cuvette		
<b>Housing and peripherals</b>			
Control keyboard	PC keyboard for ADVANCE software operation available (KB20)		
Levelling	yes		
<b>Environment</b>			
Temperature	operating: 10 to 40 °C storage: -10 to 70 °C		
Humidity	without condensation		
<b>Instrument dimensions</b>			
Footprint	610 mm × 250 mm (W × D)		
Height	430 mm		
Weight (without accessories)	10 kg		
<b>Power</b>			
Voltage	88 to 264 V		
Power consumption	40 W	100 W	100 W
Frequency	50 to 60 Hz		
<b>Interfaces</b>			
PC	USB 3.0		

<sup>8)</sup> without axes

<sup>9)</sup> with Tempering Chamber – TC40

<sup>10)</sup> with Tempering Chamber – TC21

<sup>11)</sup> with Tempering Chamber – TC 11

<sup>12)</sup> retrofitable

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