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# KRÜSS K100 Tensiometers

**NEWEST TECHNOLOGY FOR HIGHEST MEASURING PERFORMANCE**

Advancing Surface Science

# We set the standards

## KRÜSS K100 TENSIOMETERS

With the tensiometers of the **K100** series, KRÜSS has defined the standard for the measurement of the surface and interfacial tension of liquids and solids. The Processor Tensiometers **K100MK2** and **K100C** as well as the Single Fibre Tensiometer **K100SF** represent the perfect combination of our latest research technology with functional and modern design. The **K100** tensiometers have been specially designed for versatile and demanding applications in research, development, and quality assurance.

Rapid, precise, user-friendly, with high measuring accuracy and flexible software control - the **K100** tensiometers are convincing in all their fields of application:

- ▶ Determining the effectiveness and efficiency of surfactants by CMC measurements
- ▶ Wetting behaviour of tablets, pharmaceutical active substances, and auxiliaries
- ▶ Wetting of lacquers and paints
- ▶ Degradation product content in oils
- ▶ Tank release and cleaning validation in the food industry
- ▶ Wetting and adhesion of coatings
- ▶ Developing cosmetic products
- ▶ Wetting properties of printing inks
- ▶ Wetting of fibre bundles, textiles or single fibres up to a minimum diameter  $< 10 \mu\text{m}$
- ▶ Sedimentation and ductility of dispersions
- ▶ Checking surface modifications

### Measuring Methods

#### LIQUIDS



##### Du Noüy Ring Method

Classical method for measuring surface and interfacial tension. Non-critical even with difficult wetting behaviour. The force acting on a liquid film raised by a ring is measured.



##### Wilhelmy Plate Method

Universal method, particularly suitable for surface tension measurements over a long period of time. The force resulting from the wetting of a vertically suspended plate is measured.



##### Density Determination

Determining the density of liquids.



##### Sedimentation and Sediment Resistance

Determining the rate of sedimentation and the sediment resistance of dispersions.

#### SOLIDS



##### Dynamic Wilhelmy Method

For determining the advancing and receding contact angles on solid samples with a defined geometry.



##### Single Fibre Wilhelmy Method

For determining the advancing and receding contact angles on single fibres.



##### Powder Contact Angle Method

Measuring contact angles and the adsorption behaviour on powders and other porous substances. The increase in weight is measured as a function of time.

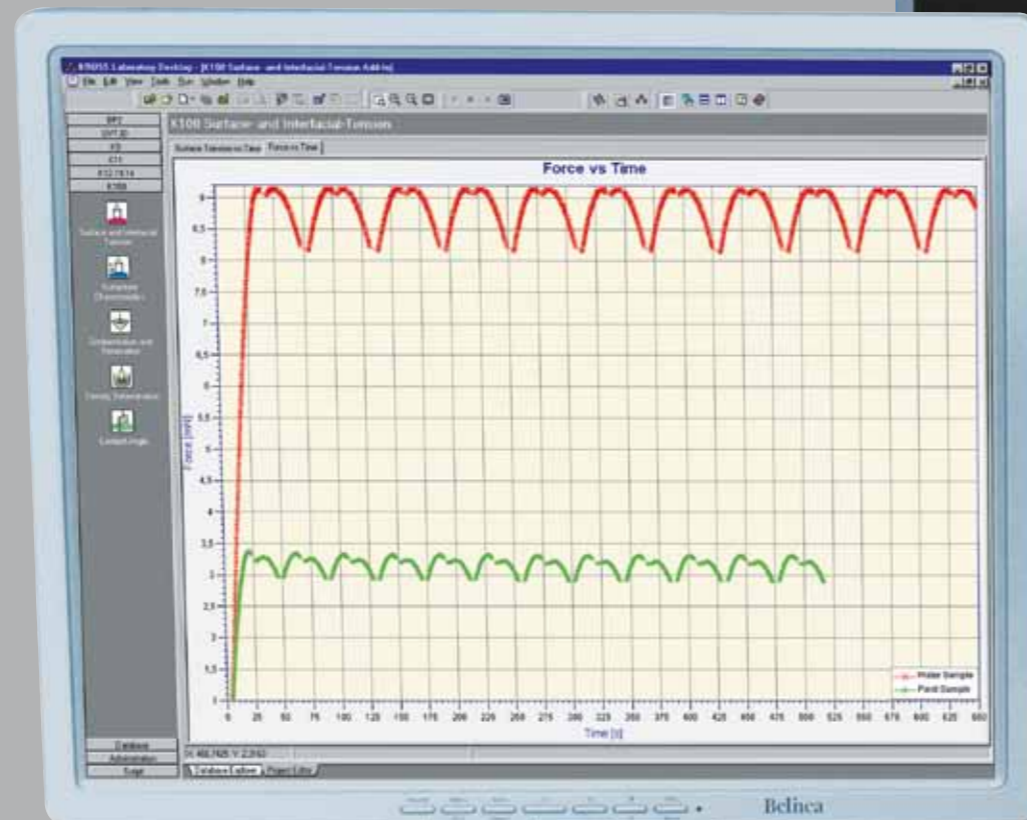
# Processor Tensiometer K100MK2

## THE MULTI-TALENT

The **K100MK2** is the universal instrument among tensiometers. The measuring processes have been optimized and made more exact by a high degree of automation and the latest technical analysis standards. The measuring accuracy of the **K100MK2** can be additionally increased by the use of the built-in ionizer. KRÜSS is the only manufacturer on the market that can offer this feature, for which an application for a patent has been made. The high accuracy of the results and the flexible software control make the **K100MK2** the top-class tensiometer.

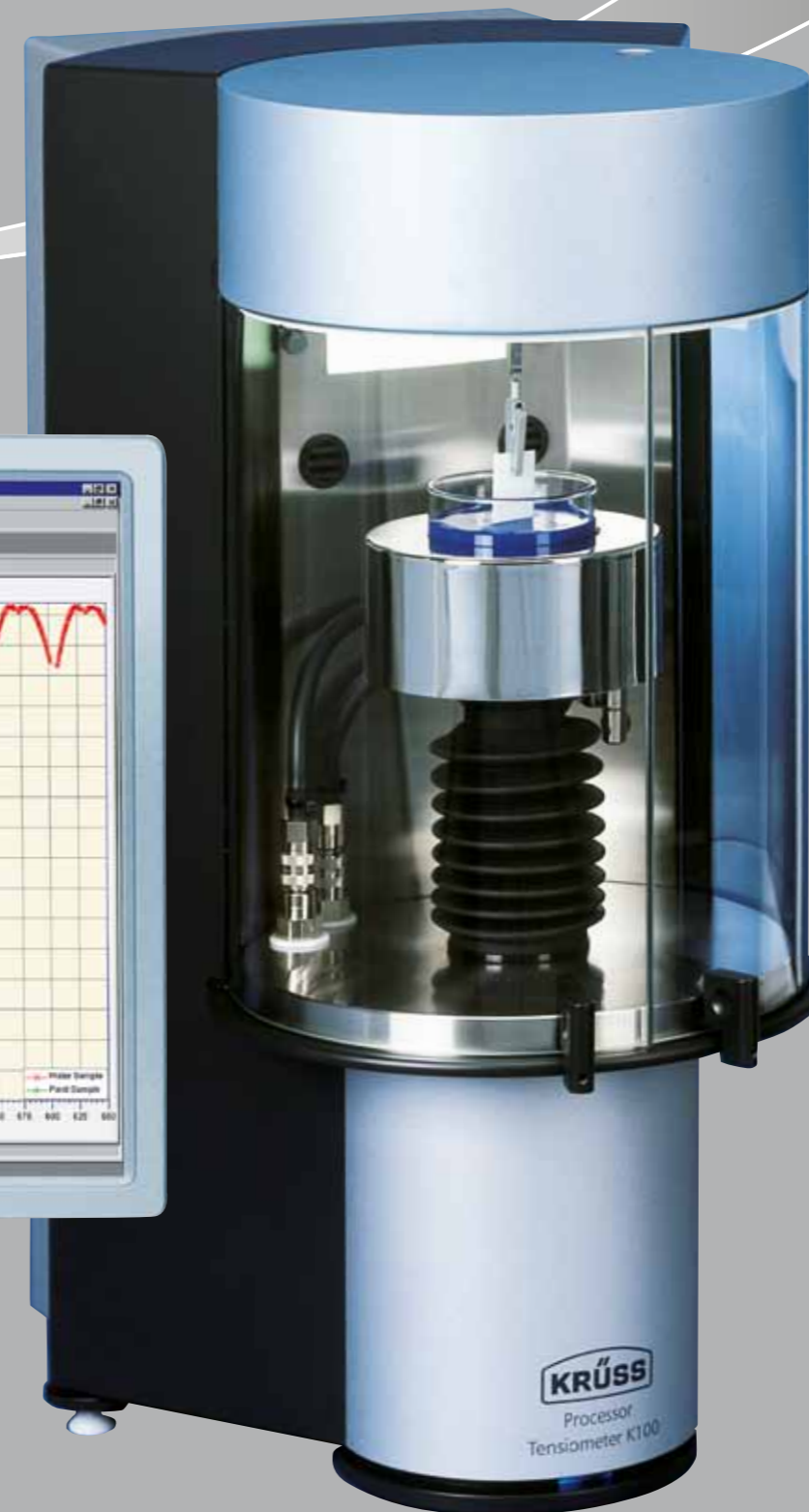
### FEATURES

- ▶ Surface and interfacial tension measurement of liquids
- ▶ Dynamic contact angle measurements
- ▶ Extended CMC determination with new innovative double dosing system
- ▶ Surface energy calculations on solids, powders, pigments, fibres, etc.
- ▶ Measuring the density of liquids
- ▶ Sedimentation and sediment resistance measurements
- ▶ Built-in ionizer for eliminating electrostatic charges
- ▶ Controlled by LabDesk™ software



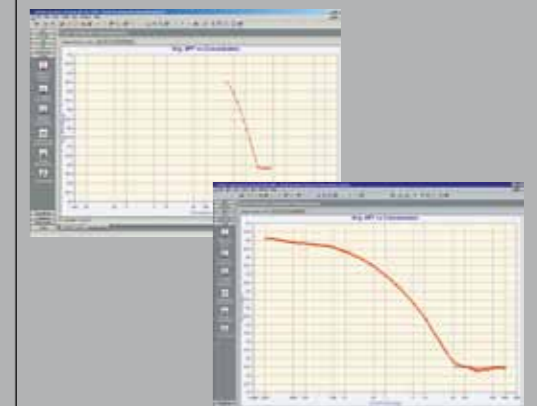
### ▶ NO CHANCE FOR ELECTROSTATICS – MEASUREMENTS WITH THE IONIZER

When conventional tensiometers are used to make sensitive measurements on small samples, single fibres or insulating plastics electrostatic forces of attraction occur between the solid and the liquid surface - the measured force or the detected surface height is incorrect. KRÜSS has thought out a solution to this problem (and also applied for a patent for it): the use of an ionizer. This ionizes the air in the sample chamber for a short time and in this manner eliminates any electrostatic charges. The measurement can now be made without any interference with the highest degree of accuracy.



### „Extended“ CMC - Measurement without any limits

The proverbial last drop that causes the glass to overflow - for KRÜSS this is no longer a problem! The newly developed measuring method „**Extended CMC**“ defines the determination of the **Critical Micelle Concentration** in a completely new way: thanks to the two dosing units the volume added is aspirated off again immediately after mixing. This considerably extends the concentration range that can be used so that the CMC is always recorded - a great plus for proper routine surfactant studies.



Comparison of the concentration ranges of the two CMC methods with two different surfactant samples

Extended CMC- Measurement with two dosing units



# Single Fibre Tensiometer K100SF

## EXTREMELY ACCURATE

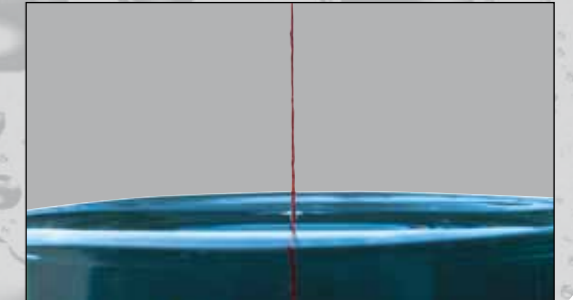
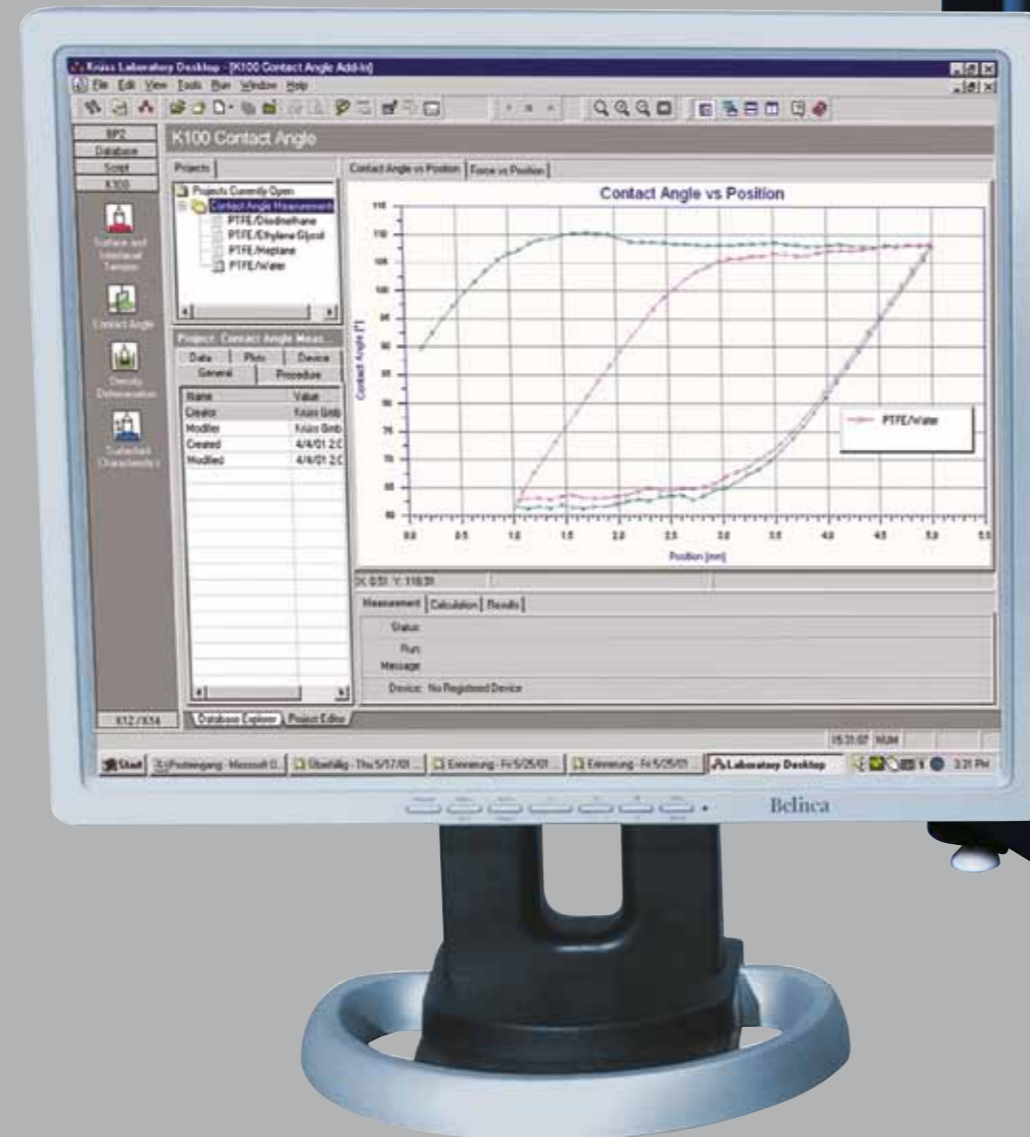
Precision in a new dimension: the PC-controlled measuring system **K100SF** determines the surface and interfacial tension of liquids and solids with the highest effectiveness and efficiency. The built-in ionizer ensures optimal measuring conditions. The high accuracy of the measuring instrument guarantees the exact characterization of the finest single filaments.

### FEATURES

- ▶ Fully automatic measurement of contact angle and sorption, even on single filaments
- ▶ Surface energy determination on powders, small plates and single fibres
- ▶ Extended CMC determination with new innovative double dosing system
- ▶ Surface and interfacial tension measurements of liquids
- ▶ Determining the density of liquids
- ▶ Built-in ionizer for eliminating electrostatic charges
- ▶ Controlled by LabDesk™ software

### APPLICATIONS

- ▶ Characterization of natural and synthetic fibres
- ▶ Development of carbon and glass fibres
- ▶ Optimization of hair care products
- ▶ Prediction of interactions between fibre and matrix



▶ Surface energy determination on single fibre and bundles of fibres



▶ Development of high-technology synthetic fibres

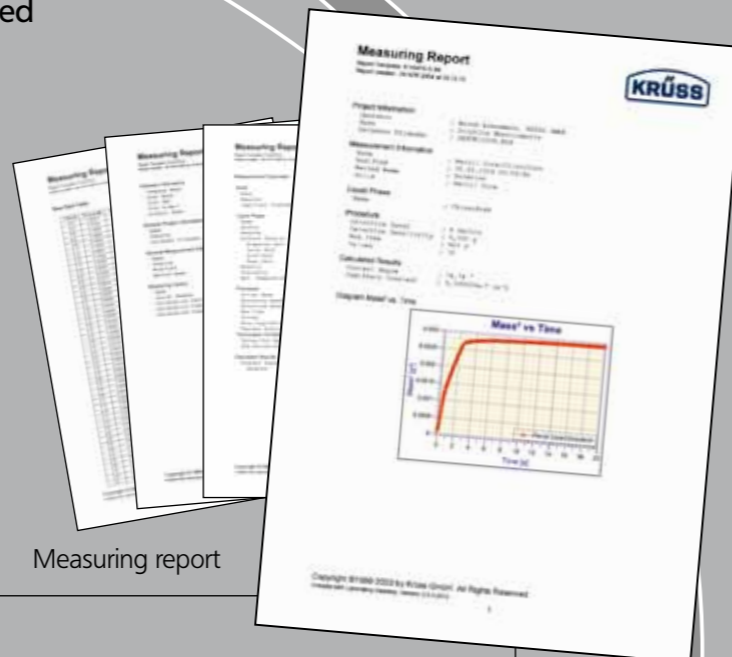
### The Basic Version Processor Tensiometer K100C

The **K100C** is limited to the essentials, without neglecting the quality. The **K100C** offers a wide range of measuring methods with high precision and simple handling.

# Measuring and Analysis Software LabDesk™

All KRÜSS tensiometers of the **K100** series are controlled by the modularly constructed LabDesk™ software.

- ▶ The whole range of the available Add-Ins has a uniform user interface that guarantees the simplest operation of all KRÜSS tensiometers. Each Add-In contains one or more measuring methods. The advantage: different Add-Ins can be used in parallel to control several, even different instruments. In this way all the tensiometers from KRÜSS can be operated with the same user interface.
- ▶ Measuring programs can be stored separately so that the **K100** tensiometer can be rapidly set up for the routine procedures of day-to-day lab work.
- ▶ The established evaluation methods for the analysis of the measuring data, such as for calculating the CMC, the surface energy or the contact angle, are incorporated in LabDesk™.
- ▶ The graphical presentations are clearly arranged and can also be defined to be user-specific. For a quick and accurate overview of the measuring data.
- ▶ All raw data is available for carrying out a check or for using user-specific evaluation methods. Gapless documentation ensures GLP-conforming work.

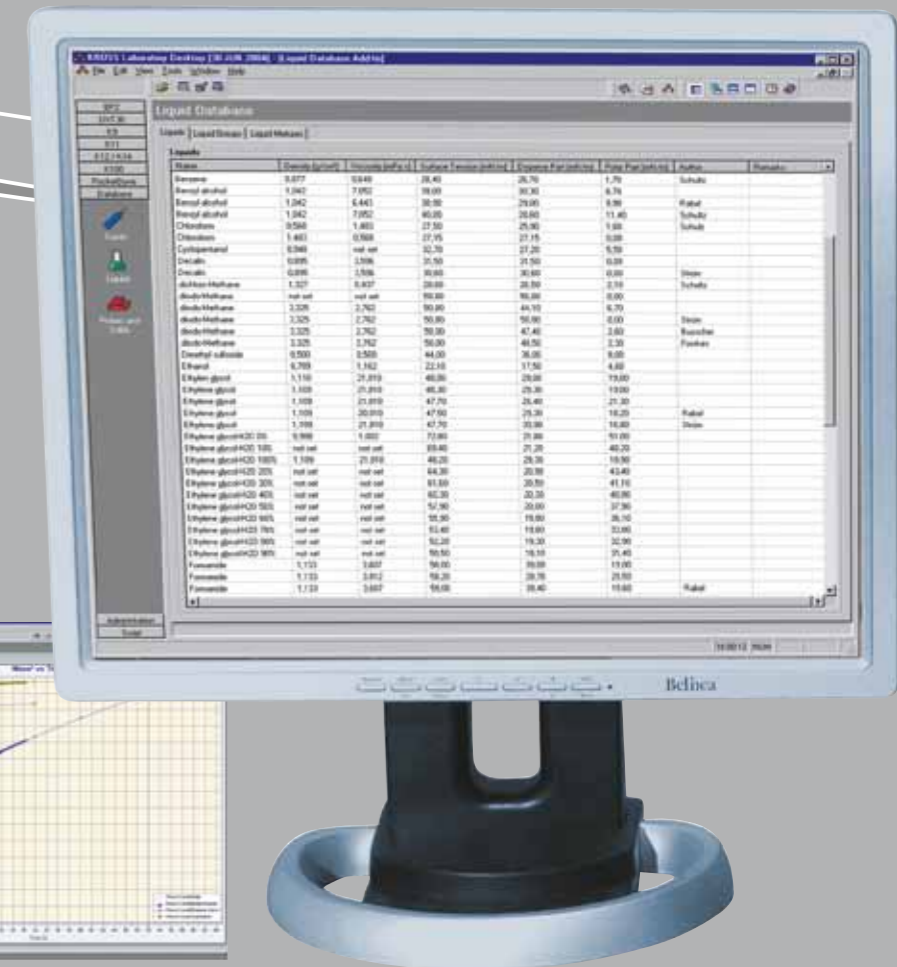
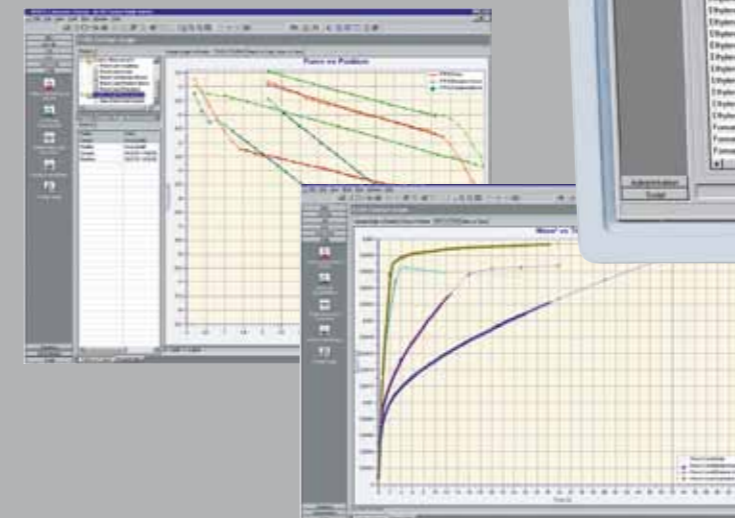


Measuring report

## ▶ THE DATABASES

A comprehensive gas, liquid and solids database provides you with a large amount of substance data. This data can be entered into the corresponding input field for defining a new measurement with a mouse-click. Reference sources are given for each substance data, so that you, the user, can check the quality of the data yourself. All databases are editable, so that you can add further data records at any time.

- ▶ Export functions allow further processing of the measuring data and the incorporation of the diagrams in other software products.
- ▶ Measuring methods adapted to be customer-specific can be programmed.
- ▶ LabDesk™ has been completely developed by KRÜSS and is being continually updated.
- ▶ The KRÜSS LabDesk™ is suitable for Windows™ 2000, XP, Vista and 7.



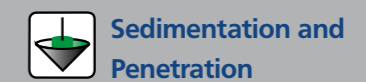
## The K100 Measuring Modules

The measuring modules always contain measuring methods from similar fields of application.



**Contact Angle**

Measuring the dynamic contact angle and the surface free energy on plates, disks, powders and pigments



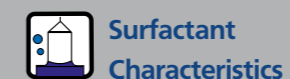
**Sedimentation and Penetration**

Determining the sedimentation speed and sedimentation resistance of dispersions



**Surface and Interfacial Tension**

Surface and interfacial tension measurements by the ring, plate and rod methods



**Surfactant Characteristics**

CMC measurement with Dosimat control, for almost unlimited concentration ranges



**Density Determination**

Determining the density of liquids

# Technical Data

## K100 SERIES

	K100C	K100MK2	K100SF
<b>SFT/ IFT</b>			
Range	1-2000 mN/m	1-2000 mN/m	1-1000 mN/m
Resolution	0.01 mN/m	0.001 mN/m	0.0001 mN/m
<b>Position</b>			
Range	>110 mm	>110 mm	>110 mm
Resolution	20 µm	0.1 µm	0.1 µm
Speed	0.09 ... 500 mm/min	0.09 ... 500 mm/min	0.09 ... 500 mm/min
<b>Weight Measurement</b>			
Maximum Load	120 g	210 g	3 g + 3 g
Resolution	100 µg	10 µg	0.1 µg
Data Rate	~ 50 Hz	~ 50 Hz	~ 50 Hz
Calibration/Adjustment	automatic (ext. weight CP0503)	automatic (int. weight)	automatic (int. weight)
<b>Temperature Control</b>			
Range	-10 to 130 °C	-10 to 130 °C	-10 to 90 °C
<b>Temperature</b>			
Range	-20 ... 200 °C	-60 ... 450 °C	-60 ... 450 °C
Resolution	0.1 °C	0.01 °C	0.01 °C
Probes	2	2	2
<b>Measuring Methods</b>			
CMC (Single Dosimat)	•	•	•
CMC (Double Dosing System)	•	•	•
Modified Washburn Method	•	•	•
Single Fibre Contact Angle	–	• (> 20 µm)	•
Dynamic Wilhelmy Method	•	•	•
Wilhelmy Plate Method	•	•	•
Du Noüy Ring Method	•	•	•
Lenard Frame Method	•	•	–
Ring Method (small samples)	•	•	•
Plate Method (small samples)	•	•	•
Rod Method	–	•	•
Density	•	•	•
Sorption	•	•	•
Sedimentation	•	•	–
Sediment Resistance	•	•	–
<b>Sample Vessel</b>			
	50 mm, 70 mm, 100 mm inverse CMC	50 mm, 70 mm, 100 mm inverse CMC	50 mm, 70 mm, 100 mm inverse CMC
<b>Housing</b>			
Size (L x W x H)	390 x 300 x 585 mm	390 x 300 x 585 mm	390 x 300 x 585 mm
Weight	21 kg	24 kg	24 kg
<b>Interface</b>			
PC	RS232, USB (Adapter KA10)	RS232, USB (Adapter KA10)	RS232, USB (Adapter KA10)
Auxiliary Ports	1 x RS232	2 x RS232	2 x RS232
<b>Ionizer</b>			
	–	•	•
<b>Power Supply</b>			
	90-264 VAC, 40 W	90-264 VAC, 40 W	90-264 VAC, 40 W

Technical data are subject to change without notice.

# Norms & Standards

## K100 TENSIO METER

During the programming of the LabDesk™ control and evaluation software great value has been placed on compliance with the GLP guidelines (Good Laboratory Practice). The report generated after a measurement meticulously protocols all the measurement parameters and analysis conditions. Together with its high degree of accuracy, the **K100** tensiometer complies with the following Standards and Norms:

ASTM D 0971 – 91	Standard test method for interfacial tension of oil against water by the ring method
ASTM D 1331 – 56	Standard test method for surface and interfacial tension of solutions of surface active agents
ASTM D 1417 – 83	Standard method of testing rubber latices-synthetic
ASTM D 1590 – 60	Standard test method for surface tension of water
DIN 53593	Prüfung von Latex: Bestimmung der Oberflächenspannung
DIN 53914	Prüfung von Tensiden; Bestimmung der Oberflächenspannung
DIN EN 14210	Grenzflächenaktive Stoffe – Bestimmung der Grenzflächenspannung von grenzflächenaktiven Lösungen mittels Bügel- oder Ringverfahren
DIN 14272	Schaummittel: Wasserfilmbildende Schaummittel zur Erzeugung von Schwertschaum für Löschzwecke
ISO 1409 – 1995	Plastics/rubber – Polymer dispersions and rubber latices (natural and synthetic) – Determination of surface tension by the ring method
ISO 6295	Determination of interfacial tension of oil against water
ISO 6889	Surface active agents – Determination of interfacial tension by drawing up liquid films
Amtsblatt der EU L251/37 (1984)	Oberflächenspannung

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