attension

In Detail


Attension – Precision made simple

OPTICAL TENSIOMETERS | FORCE TENSIOMETERS | BUBBLE TENSIOMETER

A few words about our commitment to you

What do we offer?

Attension provides precision tensiometers with the best usability for research, development and industrial processes.

Our product range consists of optical, force and bubble tensiometers for education, research and development. We also provide solutions for high-throughput development, quality control and process control in such industries as chemicals, pharmaceuticals, electronics, food, energy, environment, paper and packing.

The precision and simplicity of its products made KSV Instruments one of the top three tensiometer providers in less than ten years from its founding. Today as Attension – and as a part of Biolin Scientific, a global provider of analytical instruments – we strive for continuous improvement and we achieve exceptional customer satisfaction.

Here to support you

We know that reliable and precise products are only the starting point. *What else do our customers want?*

Excellent analytical software – OneAttension

Our user-friendly software takes analysis to a new level. It combines our customers' real-life experience with our expert knowledge of tensiometers, delivering flexible, easy to use analytical tools.

Service center – AttensionLab

RESEARCH SUPPORT

The AttensionLab network is also a platform to get in touch with other scientists in the same field of research, offering an open forum for discussions and innovation. We aim at supporting students and scientists in their research work by providing both the appropriate knowledge and technologies.

PRE-STUDIES

Pre-studies can be conducted in an AttensionLab to assess the feasibility of your research, test samples for verification, and to demonstrate the suitability of our tensiometers to answer your research questions.

INSTALLATION SERVICES

A trained professional from the Attension distribution network can install, align and calibrate your instrument. Installation can be completed by on-site training and first measurements by an Attension specialist.

This enables a smooth familiarization with your instrument and rapid start to your experiments.

USER TRAINING

AttensionLab scientists provide training on tensiometry and tensiometers for both beginners and advanced users. User training can be given at your premises. Please contact your closest Attension representative for additional information.

MAINTENANCE

Our maintenance services ensure the optimal performance of your tensiometer in the long run. The frequency and depth of maintenance services are tailored to your needs, depending on your requirements and the environment in which the tensiometer is used.

SOFTWARE UPGRADE

The best way to always benefit from the latest technology is to sign up for our software upgrade services. Upgrades will be sent to you every time a new software version is released.

Value for money – PayAttension

We know that purchasing analytical instruments is a significant investment for most of our customers. PayAttension is what we call our commitment to finding the best value solution for your needs, without compromising precision and simplicity.

We are determined, in every aspect of our business, to deliver high quality instruments and support at a competitive price.

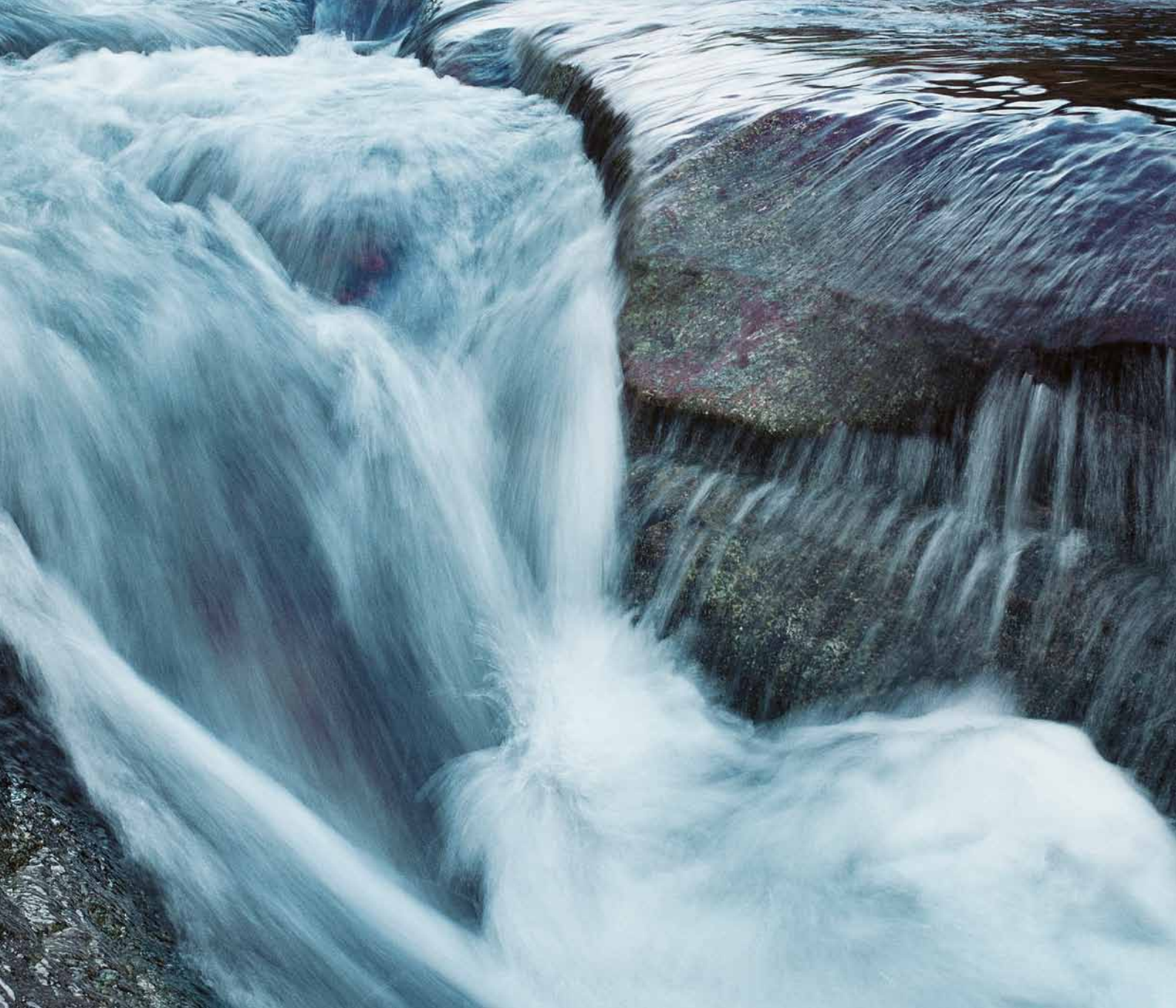
Our reputation – See for yourself!

We are proud to have 96 of the top 100 natural science universities as our customers. For a more complete list of our customers, user experiences and use cases, read the "All about Attension" brochure or visit our website at **www.attension.com.**

Attension tensiometers at a glance

This page gives a snapshot of our product range: for full details please revert to the relevant product page.

	OPTICAL TENSIOMETERS **P10**	FORCE TENSIOMETERS **P17**	BUBBLE TENSIOMETERS **P22**
PRODUCTS	**THETA** **THETA LITE**	**SIGMA 700 / 701** **SIGMA 702 / 702ET** **SIGMA 703D**	**BPA–800P**
MEASUREMENT TYPE	Static and dynamic contact angles, static and semi-dynamic surface/ interfacial tension, surface free energy, drop volume, interfacial rheology	Dynamic contact angle, static surface/interfacial tensions, automatic critical micelle concentration, surface free energy	Dynamic surface tension, bubble lifetime and dead-time, hydrostatic pressure, effective adsorption time
APPLICATIONS	Wettability, spreading, absorption, adsorption, cleanliness, surface tension, interfacial tension, contact angle, surface heterogeneity, interfacial rheology	Surface tension, interfacial tension, dynamic contact angle, absorption, adhesion, adsorption, cleanliness, surface heterogeneity, density, spreading, porosity, powder or sedimentation wettability, material solubility, biocompatibility	Liquid formulations, surfactants characterization, polymers characterization
BRANCH	Basic research, applied research, methods development, product development, quality control	Basic research, applied research, methods development, product development, quality control	Basic research, applied research, methods development, product development, quality control



OneAttension

OneAttension is the software for all tensiometry providing best usability to all software controlled precision tensiometers

OneAttension is an all-inclusive software enabling immediate access to all features with no need to purchase and install separate software modules. It combines our knowledge of tensiometers with the user experience of our customers to reach a new level of analysis in terms of usability and flexibility, with no hidden cost.

Attension optical tensiometers and computer controlled force tensiometers utilize OneAttension and offer an identical user experience.

The user interface is simple and logical to ensure fast and reliable operations. Fast familiarization saves time and effort, allowing you to focus on your research questions.

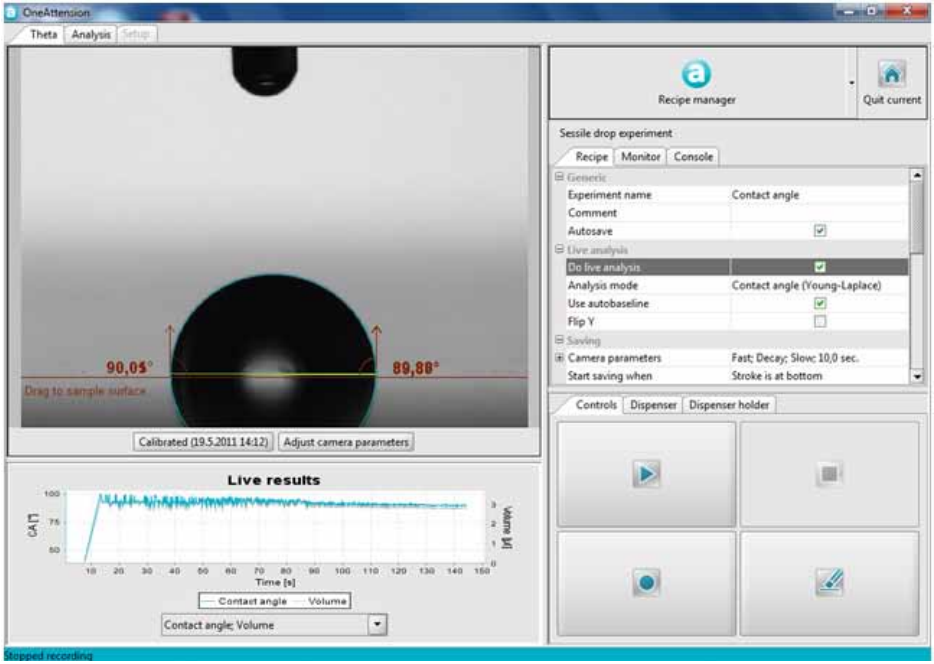
Configurable user groups and user accounts allow the system to be tailored for a wide range of users and use cases. The desired level of privacy can be set on experiment recipes and measurement results.

Measured data, experimental parameters and analysis results are shown in real time. More in depth result analysis can also be performed off-line when required. Any datapoints or groups of datapoints can be selected, transformed, plotted and analyzed. Data can easily be exported. In-depth analysis is now just a matter of seconds.

To make its operation even simpler, OneAttension has a comprehensive selection of preset liquid profiles, an option to create more liquid profiles, preset theoretical models and experiment types.

The flexible software platform enables easy implementation of customized features and functionalities.

Theta and Theta Lite optical tensiometers as well as software controlled Sigma force tensiometers benefit from all the OneAttension features and its best-in-class usability. In addition, each instrument offers a number of specific benefits and functionalities described in the following chapters.



OneAttension software: live contact angle measurement with an Attension optical tensiometer

Attension

Optical tensiometers

THETA

THETA LITE

Applications

Optical tensiometers are used in research, development and quality control to study

- WETTABILITY
- SPREADING
- ADHESION
- SORPTION
- CLEANLINESS
- SURFACE/INTERFACIAL TENSION
- CONTACT ANGLE
- DYNAMIC CONTACT ANGLE
- SURFACE HETEROGENEITY
- INTERFACIAL RHEOLOGY
- SURFACE FREE ENERGY

Measuring surface tension, interfacial tension, surface free energy or contact angles provides information on material properties such as wettability, adhesion, absorption, spreading, adsorption, cleanliness, surface heterogeneity and emulsion stability.

These properties are pivotal in studying and developing engineered surfaces and technical liquids. They are also valued information when controlling solid surface and liquid quality. Optical tensiometry is an extremely accurate and versatile technique used for characterization of both liquids and solids in virtually any kind of industry or field of research.

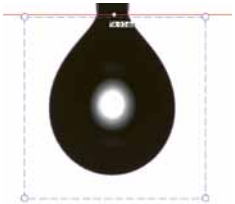
Applications range from contact lens property development to quality control of semiconductor surfaces.

Measurement principle

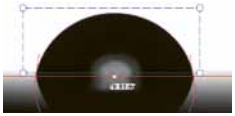
An optical tensiometer records drop images and automatically analyzes the drop shape as a function of time. The drop shape is function of the surface tension of the liquid, gravity and the density difference between sample liquid and surrounding medium. On a solid the drop shape and the contact angle also depends on the solid's surface free energy. The captured image is analyzed with a drop profile fitting method in order to determine contact angle and surface tension.

Our offering

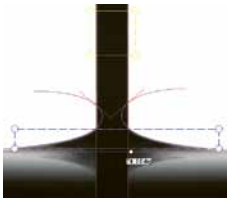
For the past ten years, we have gained customer trust by providing precise tensiometers with outstanding simplicity of use. Attension optical tensiometers were designed to provide the best usability with uncompromised accuracy.



PENDANT DROP | *The pendant drop is fitted with the Young-Laplace equation (curve in red around the drop) for highly accurate interfacial and surface tension measurements.*



SESSILE DROP | *A highly accurate and reproducible optical method for contact angle measurements.*



MENISCUS | *Quality contact angle measurements, even with low surface tension liquids which may excessively spread on a surface during a traditional contact angle measurement.*

Theta and Theta Lite open design enable users to easily manipulate samples and have easy access to the different part of the instruments, thus contributing to a pleasant user experience.

As an optical method, the measurement precision of optical tensiometers depends on the quality of the pictures and the analysis software. Attension optical tensiometers utilize a unique monochromatic cold LED light source as well as a smooth lighting integrating sphere to minimize undesirable sample evaporation. Image quality is guaranteed by a state-of-the-art high-resolution digital camera and a high speed data transfer between the computer and the instrument.

The optical tensiometer software, OneAttension, complies with the promise of performance and simplicity.

OneAttension enables superior analysis of drop shapes, using for instance the Young-Laplace equation which is able to fit the entire drop profile and is the reference method, first brought to optical tensiometers by Attension.

Automatic base line detection and drop shape fitting are standard features. Contact angle on curved surfaces (circular or near-circular) can be measured thanks to a curved surface fitting option for easy characterization of contact lenses and other curved materials.

The number of frame per second recorded by the camera can be reduced exponentially during the experiment when the phenomena no longer take place at rapid pace.

With the fully automatic Theta optical tensiometer, it is possible to control a wide range of parameters such as the liquid dispenser movement, the dispensed volume, deposition locations and sample stage movements for flexible and fully automatic measurements. Parameters as well as experimental settings such as material and liquid used can be saved as recipes for further use. Several modes (coordinates, zig-zag, record dispenser position) allow easy deposition sequencing in any sample locations. Dynamic contact angle measurements with the tilting cradle can be completely automated by simply defining the start angle, end angle and rotation speed.

Communication between computer and instrument is via a standard cable (FireWire), meaning no pesky frame grabbers to install and the possibility to use the optical tensiometer with a laptop.

Theta

Theta is the most advanced optical tensiometer suitable for the most demanding research and industrial applications. Theta harness the power of full automation to deliver best-in-class performance for R&D, quality control and process control.

Theta measures static and dynamic contact angle, surface/interfacial tension, surface free energy, interfacial rheology and drop volume. The available drop profiles are: sessile drop, pendant drop, receding contact angle, advancing contact angle, tilting drop, captive bubble, meniscus and reverse pendant drop.

Precision, robustness and intuitive user experience are built-in. All you need to do is select the level of automation and advanced functionalities you need. Theta quality camera and optics are enhanced by a x6.5 zoom lens enabling characterization of very small drops. The open design and large frame are appropriate for large samples. With motorized sample stage, vertical movement and dispenser Theta functions fully automatically, placing drops in a predetermined locations on the substrate and measuring the contact angles.

A great number of accessories and modules are also available for more demanding applications, making our tensiometers versatile instruments for a safe, long-term investment.

Measuring chambers protect the sample from the environment. Measurement chambers are available non-thermostated, water bath thermostated (up to 100°C) or electrically heated (up to 250°C).

Picoliter dispenser to generate picoliter drops from 20 to 380 pl (depending on the liquid used).

Cuvettes are available with specific holders, and are typically used in conjunction with a hooked needle for reverse pendant drop measurements. They can be placed inside measuring chambers.

Liquid/liquid chambers are designed for contact angle measurements in a liquid medium and can be thermostated.

Pulsating drop module oscillates drop size for rheological investigations. The volume remains constant throughout the experiment thanks to an automatic volume adjustment compensating evaporation.

Optical drop target is a certified slide with printed drop shapes at different contact angles and surface tensions. It is used for verification purposes.

Syringes, needles and pipette tips are available for quality liquid handling. You can choose from gauges 14, 22 and 30 made from stainless steel or PTFE. Stainless steel gauge 22 hooked needles are also available. Disposable-tip dispenser tips are available made from polypropylene, PFA TEFLON and parylene.

Theta Lite

Theta Lite is a compact and robust optical tensiometer for simple and precise operations.

Theta Lite can measure static contact angle, dynamic contact angle (manually), surface/interfacial tension, surface free energy and drop volume. The available drop profiles are: sessile drop, pendant drop, receding contact angle, advancing contact angle, captive bubble,meniscus and reverse pendant drop.

It comes with manual sample stage and liquid dispenser, making it a convenient entry-level instrument for routine measurements, educational use and quality control.

Measuring chambers, cuvettes and other accessories are available to add capabilities to your Theta Lite.

Build your Theta

1. Select either a Digital Video Camera (DVC) with zoom or a high speed DVC with zoom. *The 60 fps digital video camera can be upgraded to a high-speed 420 or 1550 fps camera. All are supplied with x 6.5 zoom.*

2. Select either a motorized or manual sample stage. *The manual sample stage can be carefully moved in all 3 dimensions with precision thumb screws. Motorized sample stages are also available for fully automatic measurements and programmable operations.*

3. Select a motorized or manual vertical motion for your liquid dispenser. *The manual liquid dispenser is a clever dispensing-aid for placing a drop onto a substrate. The motorized vertical movement upgrade makes drop placement automatic. The movement range is 4 cm with a precision of 0.01 cm.*

4. Select either: (A) an automatic multi-liquid dispenser, (B) an automatic single liquid dispenser with a standard syringe or with a disposable tip syringe, (C) a manual single liquid syringe.

The manual precision syringe can be used to make drops quickly and precisely. A standalone dispenser can be used to automate liquid dosing. Alternatively, the disposable-tip dispenser can be attached to the motorized vertical movement stage, particularly useful for repeated measurements with hard to clean substances. A multi-liquid dispenser is available, especially suited for automated surface free energy measurements.

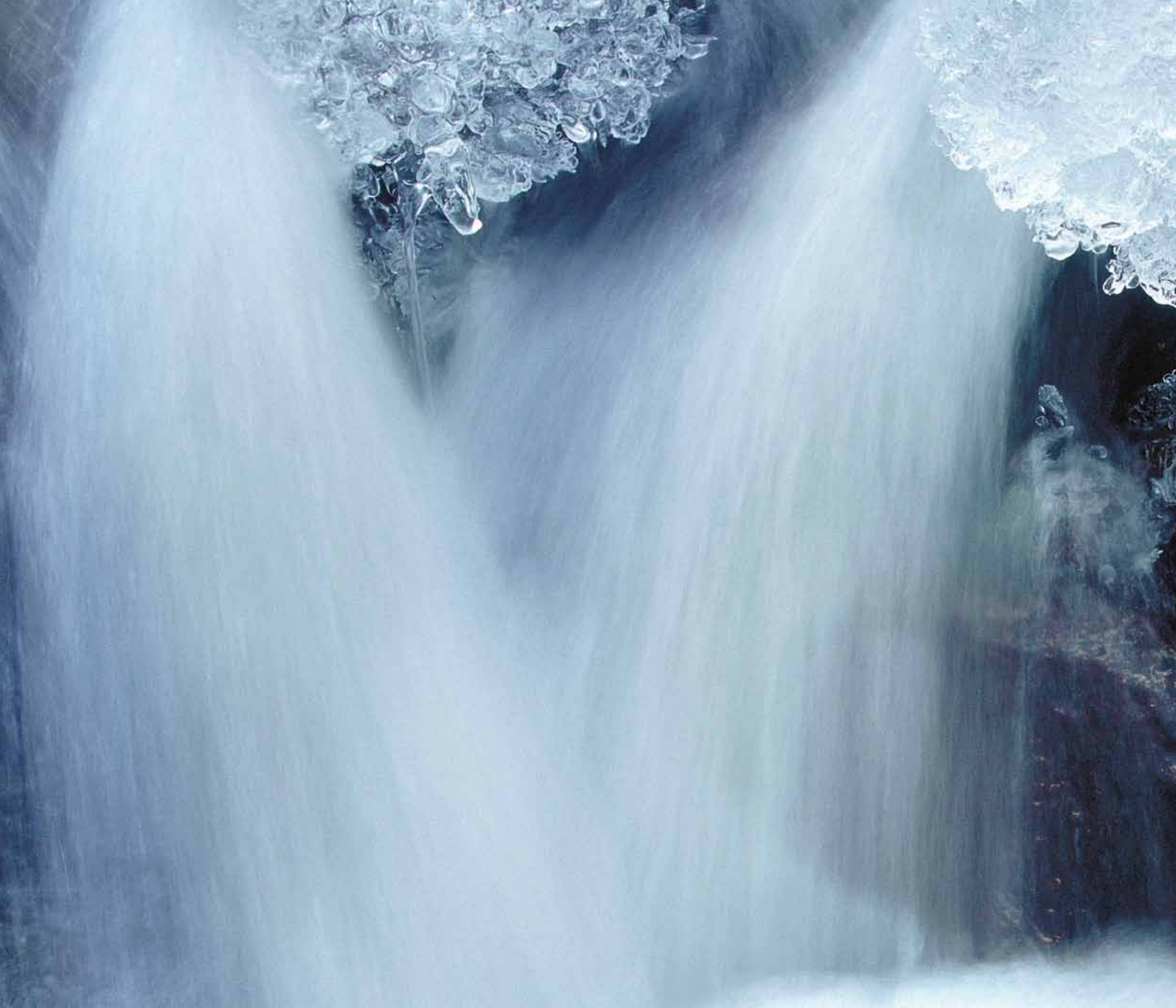
5. Select among Theta accessories and services.

Technical specifications | Optical tensiometers

	THETA	THETA LITE
Available Measurements		
Static contact angle	•	•
Dynamic contact angle	automatic	manual
Surface/interfacial tension	•	•
Interfacial rheology	•	–
Drop volume	•	•
Surface free energy	Zisman Plot, Owens-Wendt-Rabel, Simple Fowkes, Extended Fowkes, van Oss Acid-Base, Wu, Neumann's Equation of State, Schultz 1, Schultz 2	
Available Drop Profiles		
Sessile drop	•	•
Captive bubble	•	•
Pendant drop	•	•
Reverse pendant drop	•	•
Meniscus	•	•
Receding contact angle	automatic	manual
Advancing contact angle	automatic	manual
Tilting drop	•	–
Hardware		
Measuring range (°, mN/m)	0...180, 0.01...999	0...180, 0.01...999
Accuracy (°, mN/m)	± 0.1, ± 0.01	± 0.1, ± 0.01
Maximum sample size (mm)	UNLIMITED * 95 * 180 (with stage)	UNLIMITED * 50 * 200 (with stage)
Frame interval	0.65 ms – 1000 s	17 ms...1000 s
Maximum resolution (pixels)	640 * 480	640 * 480
Maximum measuring speed (frames/s)	1550	60

	THETA	THETA LITE
Camera	Firewire digital camera with zoom optics	Firewire digital camera
Light source	LED based background lighting	LED based background lighting
Field of view (diagonal in mm)	2...12.8	7
Dimensions (basic frame) (mm)	H 590 * W 200 * L 740	H 310 * W 130 * L 495
Weight (basic frame) (kg)	7.3	5
Power supply (VAC)	100...240	100...240
Frequency (Hz)	50...60	50...60
Drop Profile Fitting Method		
Young-Laplace (CA, ST/IT, M)	•	•
Bashforth-Adams (ST/IT)	•	•
Circular (CA)	•	•
Polynomial (CA, M)	•	•
Software		
	OneAttension	OneAttension
System requirements		
Recommended system requirements	2 GHZ processor, 1 GB RAM, 40 GB hard disk drive (20 GB free), 1024 * 768 resolution, 1 USB port, 1 Firewire port or 1 PCI slot	
Operating system requirements	Windows 7 (32 or 64 bit), Windows Vista (32 bit), Windows XP SP3 (32 bit)	

CA: CONTACT ANGLE ST/IT: SURFACE TENSION AND INTERFACIAL TENSION M: MENISCUS



Attension

Force tensiometers

SIGMA 700 / 701
SIGMA 702 / 702ET
SIGMA 703D

Applications

Sigma force tensiometers are widely used in research, quality control and process control for the determination of:

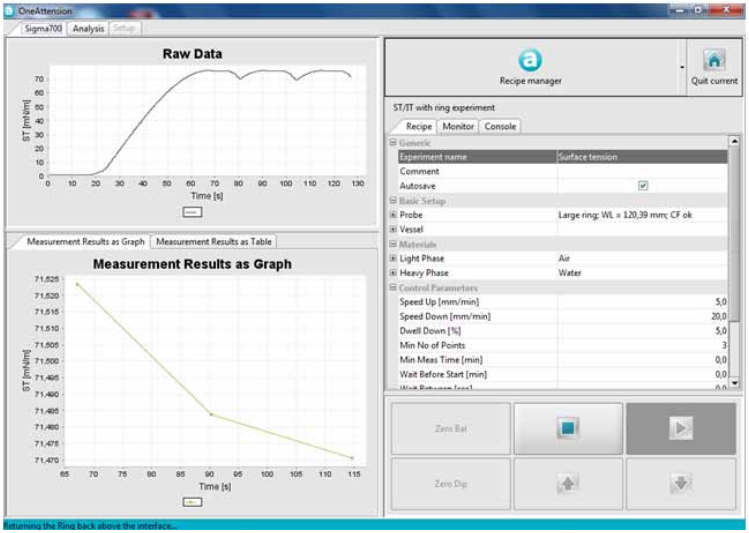
- SURFACE TENSION
- INTERFACIAL TENSION
- CRITICAL MICELLE CONCENTRATION
- DYNAMIC CONTACT ANGLE
- SURFACE FREE ENERGY
- POWDER WETTABILITY
- SORPTION
- WETTABILITY
- CLEANLINESS
- SEDIMENTATION
- DENSITY

Force tensiometry is a powerful and accurate technique to measure surface tension, interfacial tension, critical micelle concentration, dynamic contact angle, surface free energy, powder wettability, sedimentation and density. These measurements allow the determination of a number of material and surface properties, such as, wettability, adhesion, absorption, adsorption, cleanliness, spreading, porosity, material solubility, biocompatibility and lubricity, to name but a few.

Force tensiometry has become the method of choice for many industrial standards related to characterization of liquids. It is also the most widely used technique for measuring critical micelle concentration of surfactants. In addition, it is the only method to determine the absorption and contact angle of a packed powder or of fiber beds using the Washburn method. The wetting of textiles and individual fibers can also be studied with Sigma force tensiometers.

Measurement principle

When a solid touches the surface of a liquid, the liquid tends to be drawn up in a meniscus. The force exerted by the meniscus is measured and analyzed to determine surface tension. Using high surface



OneAttension software: live surface tension measurement with an Attension force tensiometer

free energy probes such as a platinum Du Noüy ring or Wilhelmy plate allow precise measurement of these forces. All Sigma force tensiometers measure surface and interfacial tension using plates or push and pull modes by ring. Correction calculations for rings are made using models from Huh and Mason (Harkins and Jordan, Zuidema & Waters and others also available).

Our offering

Sigma force tensiometers are precision instruments with unparalleled ease of use. They all feature high precision balances and mechanics, intuitive software and open design for easy access to the different parts of the instrument.

Sigma 700 & 701

Sigma 700 and 701 are state-of-the-art force tensiometers, providing highly accurate measurements of surface and interfacial tension, dynamic contact angles and fully automatic CMC determination. Full computer control and a high level of automation make it possible to carry out long measurements without operator intervention during the test, saving time and freeing the user to concentrate on other tasks. Special attention has been paid to the ergonomic and user-friendly design.

Sigma 700 and 701 are outstandingly versatile, making them suitable for research and development, industrial quality control, routine measurements and even educational use.

These software controlled force tensiometers come with the OneAttension software for unparalleled performance and usability. OneAttension provides all the

following measurement capabilities in one package: surface and interfacial tension, dynamic contact angle, CMC, density, powder wettability and sedimentation.

OneAttension enables Sigma 700/701 to perform fully automatic measurements. Select readymade experiment recipes or create custom programs for quick and repeatable operations.

Probe and sample immersion and withdrawal cycle(s) can be easily programmed. Experimental parameters such as liquid and solid used, temperature or sample concentration (during CMC measurement) can also be controlled.

It is possible to carry out long measurements without operator intervention, saving time and freeing the user to concentrate on other tasks. The complete automation also avoids user dependant variation when conducting routine measurements and quality controls.

A simple step by step powder protocol allows simple powder wettability measurement.

Two liquid dispensers can be used simultaneously for CMC measurements, enabling fully automatic CMC measurement.

Accessory modules for dispensers, temperature or pH control can be easily mounted into the measuring unit. In addition, special probes are available for density, sedimentation and tensiometry measurements as well as holders for powder, fiber and plate studies.

Because of its wide weight range and autocalibrating microbalance, the Sigma 700 is well suited for dynamic contact angle measurements of large and heavy solid and powder samples. Very similar to Sigma 700, Sigma 701 is also a multipurpose force tensiometer. Sigma 701 can measure in a narrower weight range but with improved sensitivity, optimized for fiber measurements.

Sigma 702 & 702ET

Sigma 702 and Sigma 702ET are standalone force tensiometers offering high resolution and precision for surface and interfacial tension measurements, as well as manual CMC determination.

Results are displayed on a large integrated digital screen. Precise temperature control can be ensured by the integrated water-jacketed vessel holder which is directly mounted on the motorized sample stage.

The open design and convenient control keyboard operations make Sigma 702 and 702ET extremely easy to use instruments.

Sigma 702ET is specifically designed for oil-water interfacial tension measurements in line with ASTM and IEC standards. An embedded software specifically designed for oil-water measurements is provided with the Sigma 702ET.

Both can be connected to an external PC for additional data storage and simple reporting. Data receiver software is provided with the instrument.

Sigma 703D

Sigma 703D is a simple standalone and robust digital force tensiometer for accurate measurement of surface and interfacial tension of liquids by DuNouy ring or Wilhelmy plate method. Non-automatic CMC measurements can also be conducted.

Measurements are displayed in real-time on the large digital screen integrated into the instrument and can be transferred to a computer using the data receiver software.

When quick and reliable stand-alone operation and manual control are valued, Sigma 703D is the best solution. The major difference between the Sigma 703D and Sigma 702 models is the manual sample stage of Sigma 703D.

Technical specifications | Force tensiometers

	SIGMA 700	SIGMA 701	SIGMA 702	SIGMA 702ET	SIGMA 703D
Available Measurements					
Surface tension	•	•	•	•	•
Interfacial tension	•	•	•	•	•
Critical micelle concentration	Automatic	Automatic	Manual	Manual	Manual
Dynamic contact angle	•	•	–	–	–
Surface free energy	•	•	–	–	–
Powder wettability	•	•	–	–	–
Density	•	•	•	•	•
Balance Specifications					
Measuring range (mN/m)	1...2000	1...1000	1...1000	1...1000	1...1000
Displayed resolution (mN/m)	0.001	0.001	0.01	0.01	0.01
Density range (g/cm³)	0...2.2	0...2.2	0...2.2	0...2.2	0...2.2
Density resolution (g/cm³)	0.0001	0.0001	0.0001	0.0001	0.0001
Maximum load (g)	210	5	5	5	5
Weighing resolution (mg)	0.01	0.005	0.01	0.01	0.01
Force resolution (µN)	0.1	0.05	0.1	0.1	0.1
Contact angle range	0...180°	0...180°	–	–	–
Contact angle resolution	0.01°	0.01°	–	–	–
Calibration & locking	Automatic	Manual	Manual	Manual	Manual
Measuring Unit Specifications					
Sample stage	Motorized	Motorized	Motorized	Motorized	Manual
Sample stage speed (mm/min)	0.01...500	0.01...500	0.01...500	0.01...500	–
Stage movement range (mm)	0...75	0...75	0...75	0...75	–
Stage positioning resolution (µm)	0.016	0.016	0.26	0.26	–
Dimensions (cm)	L 33.3 * W 24.4 * H 62	L 33.3 * W 24.4 * H 62	L 33.3 * W 24.4 * H 62	L 33.3 * W 24.4 * H 62	L 27.5 * W 15.5 * H 39.2

	SIGMA 700	SIGMA 701	SIGMA 702	SIGMA 702ET	SIGMA 703D
Weight (kg)	16.3	13	10.7	10.7	4.9
Power supply (VAC)	85...264	85...264	85...264	85...264	100...240
Power consumption (W)	13	13	13	13	7
Frequency (Hz)	47...440	47...440	47...440	47...440	50...60
Common Accessories					
Temperature control mechanism	Range of water bath accessories	Range of water bath accessories	Built-in thermo-static vessel for water bath	Built-in thermo-static vessel for water bath	Range of water bath accessories
Temperature range (°C)	-20...+200	-20...+200	-10...+100	-10...+100	-10...+100
Stirrer	•	•	–	–	–
Software					
	OneAttension	OneAttension	Data receiver	Data receiver (and oil-water program for 702ET)	Data receiver
System requirements					
Recommended system requirements	1 GHZ processor, 1 GB RAM, 40 GB hard disk drive (20 GB free), 1 USB port. Accessories such as water bath and liquid dispenser may require a free RS-232 port.				
Operating system requirements	Windows 7 (32 or 64 bit), Windows Vista (32 bit), Windows XP SP3 (32 bit)				

Attension

Bubble tensiometer

BPA–800P

Applications

BPA–800P is used in research, development and quality control for characterization of water-based solutions such as surfactants, polymers, acids and bases. It measures:

- DYNAMIC SURFACE TENSION
- BUBBLE LIFETIME
- BUBBLE DEADTIME
- HYDROSTATIC PRESSURE
- EFFECTIVE ADSORPTION TIME

With patented cutting edge technology, the BPA–800P is developed from the maximum bubble pressure technique to provide quick and reliable dynamic surface tension, hydrostatic pressure, effective adsorption time, bubble lifetime and deadtime measurements. This information is useful to study, control and develop surfactants, ink jet printing, coating technologies, foam and emulsions, detergents, pharmaceuticals, cosmetics, food technologies and environmental monitoring to name but a few.

Measurement principle

A capillary is immersed into the liquid sample and air is bubbled out of the capillary. The pressure inside the capillary is measured. As the pressure increases in the capillary, a bubble is gradually pushed into the liquid. Maximum pressure is reached when the drop is hemispherical, after which the bubble quickly grows and leaves the capillary. The maximum pressure depends on the force exerted by the liquid, and hence its surface tension. The BPA–800P also monitors bubble lifetime and deadtime, allowing more detailed investigation of liquid properties.

Our offering

BPA–800P is a standalone bubble tensiometer able to deliver highly accurate and reproducible dynamic surface tension measurements in under 6 minutes. Dynamic surface tension measurements provide information on the wetting properties of the

	BPA–800P
Technical specifications	
Surface tension measuring range (mN/m)	10...100
Reproducibility of measured values (mN/m)	± 0.1
Accuracy of surface tension (mN/m)	± 0.25
Dynamic time range (s)	10 ms ... 10 s
Minimum volume test liquid (ml)	1
Max number of measurements stored in the unit	20,000 (can be transferred to an external PC)
Dimensions	L 18 * W 16 * H 34.4
Weight (kg)	2.6
Power supply (VAC)	100–250
Frequency (Hz)	50–60 Hz
System requirements	
Recommended system requirements	1 GHZ processor, 512 MB RAM, 40 GB hard disk drive (20 GB free), 1 RS-232 port
Operating system requirements	Windows 7 (32 or 64 bit), Windows Vista (32 bit), Windows XP SP3 (32 bit)

liquid. This data is useful for controlling and developing the surface active agents for a number of processes such as printing, spraying, cleaning and coating.

BPA–800P also enables direct and precise determination of bubble lifetime characteristics, providing insights on diffusion and absorption coefficient of surfactants. With unknown liquid samples, the BPA–800P is able to accurately correct for and estimate sample viscosity and gravitational deformation of bubble shape. BPA–800P has the ability to handle extremely short as well as sufficiently long measuring times (patented technology). The high level of automation and simplicity make BPA–800P a user friendly instrument. The liquid surface is automatically detected and the capillary is lowered to the appropriate level. Data is stored in integrated memory, and can be uploaded onto a computer. The included software also enables operating the BPA–800P with a computer as well as performing data analysis. Results can be presented as a function of measurement time and effective adsorption time. Portability and battery operation make the instrument extremely useful in industrial and environmental applications.

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Availability

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