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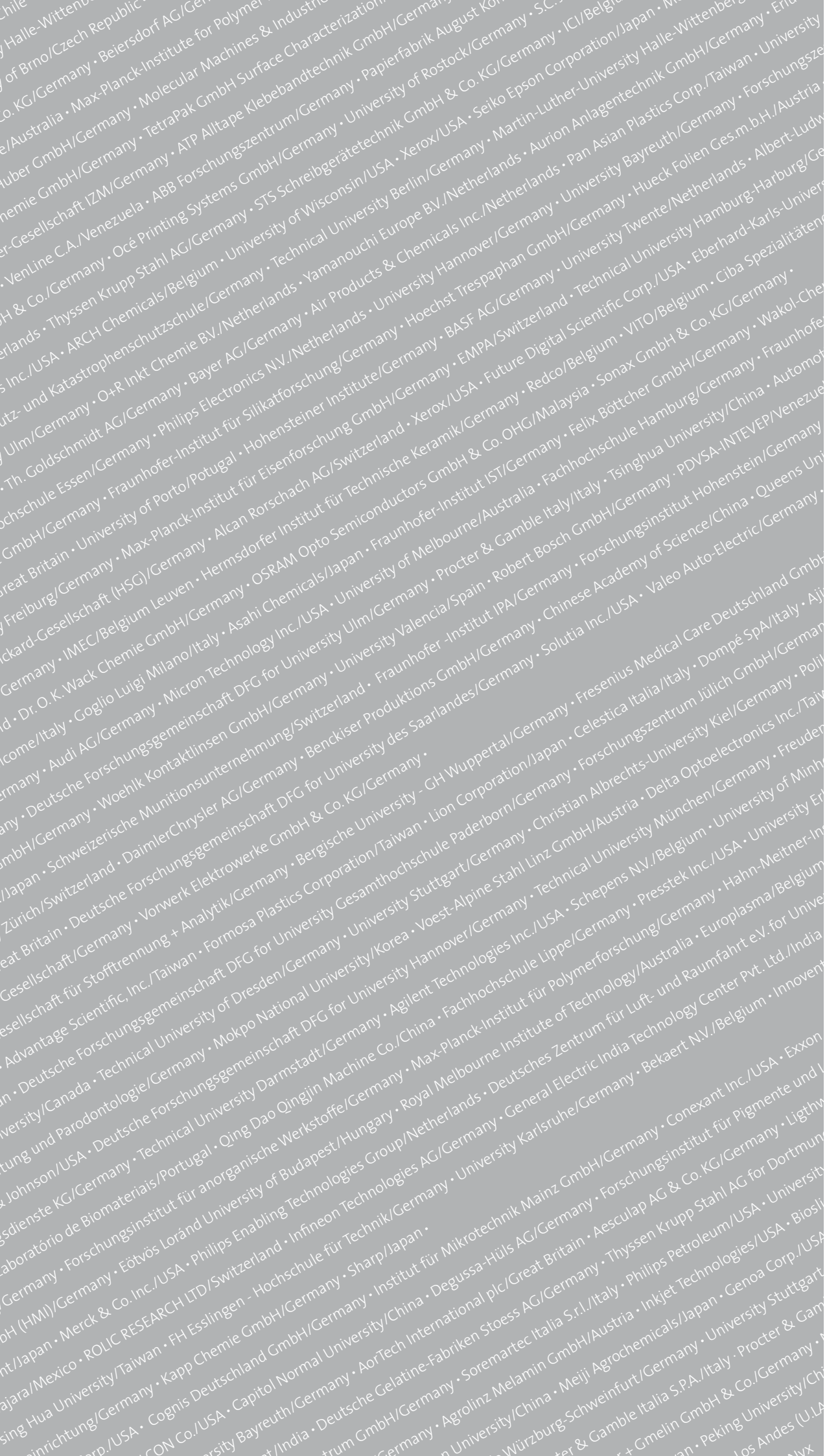
DataPhysics

Products for surface chemistry

dataphysics



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About DataPhysics

History of the company

The company DataPhysics Instruments GmbH was founded in 1997 in Filderstadt near Stuttgart, Germany, by specialists with many years of experience in surface chemistry. Since then our scientists and engineers have been developing in close cooperation with customers throughout the world, including science and research institutes, new measuring instruments and systems for investigating the processes of surface chemistry in laboratory and process applications. Our primary objective is to translate the power of innovation into the advancement of measurement and interfacial engineering and to develop superior products for demanding customers. As a result, we have created a corporate culture that motivates competent and creative staff in all departments to join forces for the best results in a common goal: perfection. If you want to know more about surface chemistry or the company DataPhysics, simply ask for our booklet 'Surface Chemistry – An attractive science' or download the PDF file from our web site. In this booklet, the DataPhysics team escorts you through the fascinating world of surface chemistry, with a wealth of background information on engineering, the measuring techniques, and references to key literature on a multitude of applications.

Visit our web site at
www.dataphysics.de
to learn much more about other important aspects of our company, e.g. your contacts in each of our divisions, road maps to our head office, the addresses of our representatives abroad, etc. Do you have any questions? Just contact us.

We'll be there for you – guaranteed!

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Optical contact angle measuring instruments

Video-based measuring with method and precision

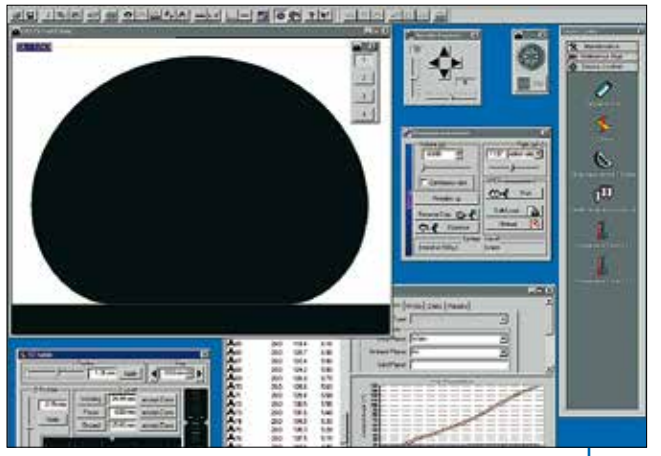
In most diverse engineering applications the ability of liquids to wet solids affects the quality of the products and their manufacturing processes. Important examples for this are the production and application of paints and varnishes, the development and optimization of composite materials, the use of adhesives and suitable solvents for engineering materials, and the bio-compatibility of medical implants. Analytical values are provided by the precise investigations of static and dynamic contact angles, the surface free energy of solids as well as the surface and interfacial tension of liquids. Last but not least the rapid advancements in nanotechnology and biotechnology profit from the exact knowledge of wetting processes in the microscopic level.

State-of-the-art optics, high-precise mechanics, fast electronic controllers, and high-resolution video cameras guarantee all users of the DataPhysics instruments the right view to any analytical task.
After all, our development engineers profit from more than two decades of practical experience in these measurement techniques.
We would like to invite you to use this knowledge incorporated in our measurement equipment.

OCA 35 with software controlled tilting base unit TBU 90E

Software for efficient work
Intuitive software designed for Microsoft Windows® assists you in the use of the optical contact angle measuring instruments from DataPhysics by specifying measurement procedures and in collecting, assessing, and evaluating the measured data.
DataPhysics is specialised in the development of high-precise and reliable methods for evaluating drop contours in combination with statistical error analysis. Our physicists and software development engineers produce all their experience and creativity into the development of the software modules of the SCA series – just for an outright start. The available software modules are:

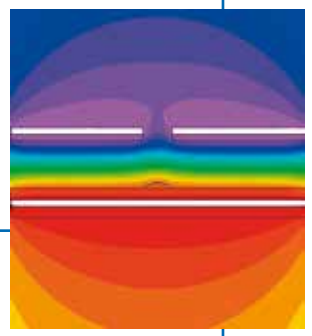
SCA 20 Main program
- video based measurement and presentation of the static and dynamic contact angle on plane, convex, and concave surfaces,
- automatic measurement of the contact angle hysteresis,
- recording of image sequences,
- menu controlled generation of data sets, management, and execution of automatic measuring procedures,
- statistics and measurement error analysis,
- liquids and solids database with currently more than 170 records for all surface energy analysis methods including related citations.



SCA 20 — software for analyzing contact angles (e.g. on an ultra-hydrophobic substrate)

SCA 24 drop on fiber
- analysis of the static contact angle according to the generalized length-width-method for the drop-on-fiber or wetted fiber setup and the dynamic contact angle according to the lamella-ring-method.

SCA 26 oscillating/relaxing drop
- analysis of the real and imaginary part of the interfacial dilatational modulus based on the oscillating or relaxing contour of pendant drops.



Electrical field in an electro wetting platform EWP 100

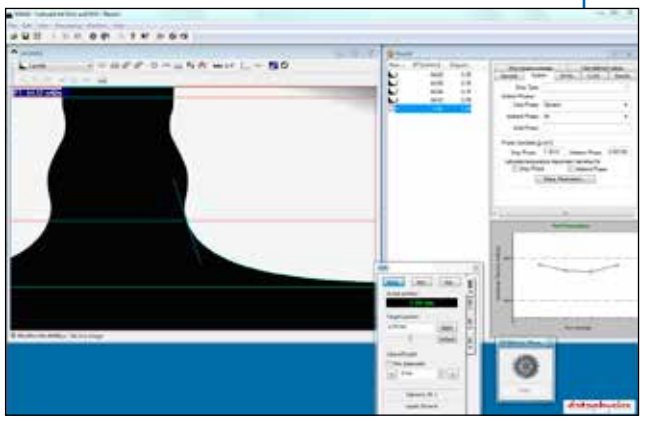
SCA 21 surface free energy
- analysis of the surface free energy of solids as well as their components (e.g. dispersive, polar and hydrogen bond parts, acid and base portions, respectively) according to nine different theories,
- representation of wetting envelopes and work of adhesion/contact angle diagrams.

SCA 22 pendant drop
- analysis of the surface and interfacial tension, as well as their polar and dispersive contributions, based on the analysis of the drop shape.

SCA 23 lamella and bridge analysis
- analysis of the surface and interfacial tension based on the evaluation of the lamella contour.
- innovative 'bridge analysis' of 3 phase systems.

Flexibility is one of DataPhysics' priority objectives

Accessories and customized modifications
All OCA systems can be upgraded to higher configurations within this series. Standard and special accessories are available in a wide range. If you don't find a solution for your specific needs in our standard product range, just contact us for special variants of our instruments or system components.



SCA 23 — software for evaluating liquid lamella

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OCA 15EC / OCA 15Pro
OCA 20

Video-based optical contact angle measuring instruments

Properties of the OCA 15EC
The video-based optical contact angle measuring system OCA 15EC is the instrument for the budget-priced starting into the contact angle measuring technique and drop shape analysis for all standard applications requiring a single electronic dosing system.
The sample table is manual movable (magnetic slide system) in horizontal (y- and x-axis)and precise adjustable in vertical (z-axis) direction via hand wheel.

Advantages of the OCA 15Pro
The video-based optical contact angle measuring system OCA 15Pro is the affordable entry to the world of professional surface chemistry measurement .
The sample table provides an high-precise manual adjustment in three axis for the accurate positioning of the sample.
For bigger samples the OCA 15LPro or OCA 15XLPro with a long x- and y-axis and the OCA 15Pro LHT with a long x-axis and a special sample table for higher and heavier samples (foremost high temperature furnaces) are available too.
All variants of the OCA 15Pro are expandable with a single or double direct dosing system SD-DM / DD-DM, up to two electronic syringe units ES, and one temperature and environmental control system (TPC 150 or TEC 400). The extensibility with one of the following software controllable units of the OCA accessory range broadens the number of possible applications.
• electronic 2-fold dosing system E-MD/2 for the precise automatic positioning of two dosing needles
• electronic tilting base unit TBU 90E
• electronic turn table with vacuum fixation ETT/VAC

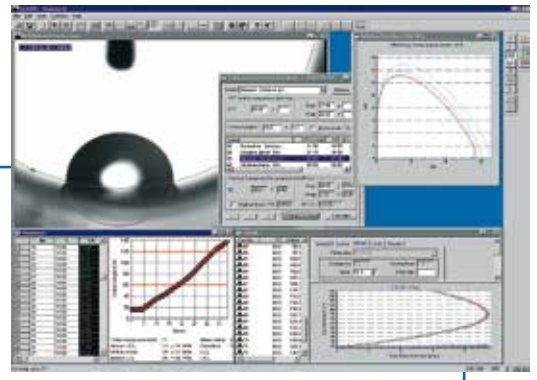
OCA 15Pro with double direct dosing system DD-DM on electronic tilting base unit TBU 90E

OCA 20/6 with electronic multiple dosing system E-MD/6

The OCA 15Pro is easily upgradable to an OCA 20.
The available software modules for all OCA 15 instruments are SCA 20, 21, 22, and 23.

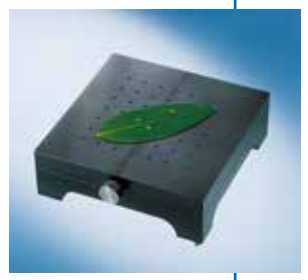
Features of the OCA 20
The video-based optical contact angle measuring system OCA 20 is the most versatile instrument for the contact angle measuring technique and drop shape analysis for applications which require up to six electronic syringe units, temperature and environmental control and measurement, or automatic needle selection and positioning. It facilitates the measurement of the surface free energy, too.
The sample table provides an high-precise manual adjustment in three axis for the accurate positioning of the sample and is easily upgradable with a motorized y- and z-axis.
For larger samples the OCA 20L with a long x- and y-axis, the OCA 20XL with an extra long x-axis, the OCA 20H for higher samples, and the OCA 20 LHT with a long x-axis and a special sample table for higher and heavier samples (foremost high temperature furnaces or pressure cells) are available.
All variants of OCA 20 can be equipped with all components within the highly versatile OCA accessory range (incl. high-speed image processing system UpOCAH).
For the OCA 20 instruments all software modules are available.

OCA 20LHT with high temperature furnace HTFQ 1700



SCA 20 — measuring and evaluating wetting properties of solids

Common features
The instruments of the OCA series share the following common features:
• high performance 6x parfocal zoom lens with an integrated continuous fine focus, and adjustable observation angle,
• video measuring system with high-resolution USB camera,
• LED lighting with software controlled continuous adjustable intensity without hysteresis for a homogeneous back lighting,
• USB interface to PC



SP 100 suction plate for vacuum fixation

OCA 20H with special arm support

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OCA 35

Automatic contact angle measuring and contour analysis instrument

Features of the OCA 35
The OCA 35 is a fully automated instrument for the comfortable measurement of wetting properties. It is available in a standard and a long version.
The extensive control and analysis software designed for Windows® is available in various configurations and provides in combination with the OCA 35 the following functions:

- automated control of the sample position in x-y-z direction, the electronic dosing units, the tilting units, the electronic turn tables, and the electric temperature and environmental control systems,
- automatic needle selection and positioning,
- automatic measurement and analysis of static and dynamic contact angles according to the Sessile Drop-method on plane, convex, and concave surfaces,
- automatic determination of absorption properties,
- generation, management, and execution of automated measuring procedures (e.g. wafer and X/Y mapping),
- easy repetition of measurements,
- automatic calculation and presentation of surface free energies on solids and liquids as well as their contributions,
- determination of surface and interfacial tensions based on the shape of pendant and sessile drops and on the interaction between liquid lamella and test spheres or rods,
- generation of wetting envelope diagrams and work of adhesion / contact angle diagrams derived from surface free energies.

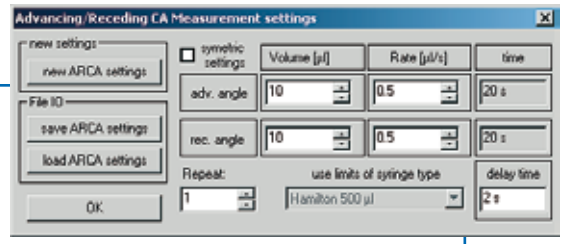
OCA 35/6 on tilting base unit TBU 90E 35 with electronic turn table with vacuum fixation ETT/VAC and electronic multiple dosing system E-MD/6

Refill and rinse system with liquid pump cleaner RRS-LPC 3/1

The automatic sequence of measurements and the optical image processing facilitate fast and highly reproducible measurements on simple and complex sample structures at the push of a button.

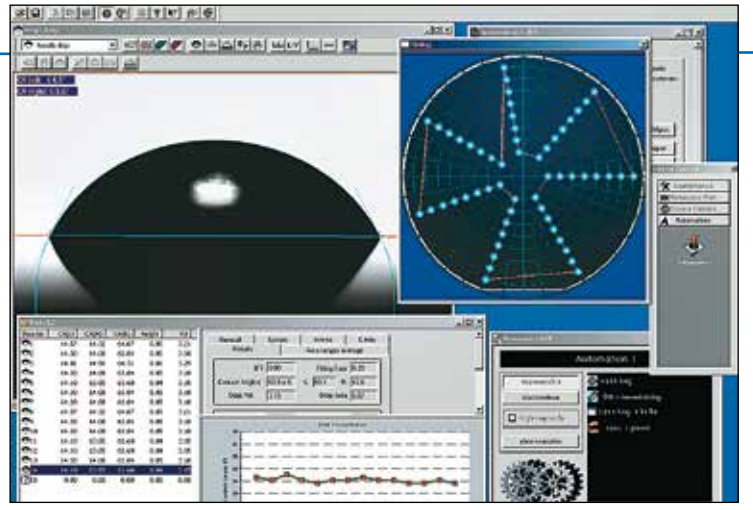
Components and accessories
The OCA 35 models can be equipped with all components within the highly versatile OCA accessory range.

- high performance 6x parfocal zoom lens with an integrated continuous fine focus and adjustable observation angle,
- video measuring system with high-resolution USB camera (optional up to 2200 images per second),
- LED back lighting with software controlled adjustable intensity without hysteresis for an homogeneous back lighting,
- USB interface to PC,
- sample stage motorized adjustable in X-, Y- and Z-axis,
- electronic multiple dosing systems E-MD/x with up to six dosing needles and up to six electronic syringe units ES,
- electronic multiple direct dosing system TD-DE/3 for up to three electronic syringe units ES,
- electronic tilting base unit TBU 90E and electronic turn tables with vacuum fixation ETT/VAC up to 300 mm diameter, temperature and environmental control systems,
- refill and rinse system with liquid pump cleaner RRS-LPC 3/1.



SCA 20 — defining advancing and receeding contact angle

WTP 6, 8 and 12 wafer top plates for ETT/VAC



SCA 20 — fully automated wafer mapping

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OCA 40Micro

Fully automatic contact angle and contour analysis instrument for microstructures

Features of the OCA 40Micro
The fully automatic contact angle measuring system, OCA 40Micro, is the optical instrument with the highest degree of automation. It provides for the accurate, precise and reproducible measurement of contact angles of minute liquid drops and for the evaluation of the wetting properties of microscopic and macroscopic structures. State-of-the-art optics, precise mechanics, fast electronic controllers as well as high-resolution video measurement technology ensures the appropriate drop placement and image capture/analysis, in microscopic dimensions, in any situation.

The software for Windows® is available in various configurations and provides in combination with the OCA 40Micro the following functions:

- controlling of the sample position in x-y-z direction, enhanced auto focus and observation angle, electronic dosing units, tilting units, electronic turn tables, and electric temperature control systems,
- automatic measurement of static and dynamic contact angles according to the generalized Length-Height-method for the drop on fiber and wetted fiber arrangement and for the sessile drop-method on micro and macro structured samples,
- static and dynamic contact angles on plane, convex, and concave surfaces,
- generation, management, and execution of automated measuring procedures (i.e. wafer mapping),
- automatic calculation of surface free energies on solids and their contributions (e.g. dispersive, polar and hydrogen bond force contribution, acid and base portions respectively) according to nine different theories with specified error limits,
- determination of surface and interfacial tensions based on the contour of macroscopic pendant and sessile drops and on the interaction between liquid lamella and test spheres or rods,
- generation of wetting envelope diagrams and work of adhesion / contact angle diagrams derived from surface free energies.

OCA 40Micro with high-speed camera system UpHSC 2000, top view video system TV-VS and electronic picoliter dosing system

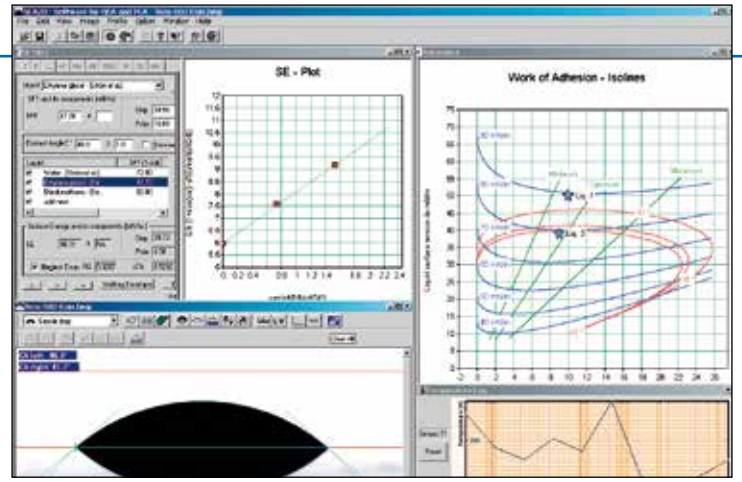
The automatic sequence of measurements including the enhanced auto focus and the optical image processing facilitate fast and highly reproducible measurements on simple and complex sample structures at the push of a button.

Components and accessories

- measuring lens with 55-fold (optional 137.5-fold) zoom lens and software controlled auto focus and adjustment of the observation angle,
- video measuring system with high-resolution USB camera,
- high-speed image processing system UpOCAH with up to 1000 images per second or UpHSC 2000 with up to 2200 images per second,
- high power stroboscopic LED light source with software controlled adjustable intensity
- sample stage software controlled adjustable in X-, Y- and Z-axis,
- electronic multiple dosing systems E-MD /x with max. six dosing needles and six electronic syringe units ES,
- electronic multiple direct dosing system TD-DE/3 for up to three electronic syringe units ES,
- electronic tilting base unit TBU 90E, electronic turn tables up to 200 mm diameter, and temperature and environmental control systems,
- electronic micro dosing systems for the precise dosing of the test liquids in the nanoliter and picoliter range.

Software modules SCA 20 and SCA 24 — analyzing a single droplet wetting a human hair

Software controlled picoliter dosing system



SCA 21 — surface free energy and work of adhesion analysis of printer ink

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Accessories for OCA

Our modular design philosophy
allows countless variations

The contact angle measuring instruments within the OCA series benefit from our modular design philosophy. Our instrument frame offers the opportunity to construct a device (optics, sample environment, dosing system) best suited for providing a solution your individual surface/interfacial challenges. This extensive range of optional modules, components and accessories includes various dosing systems, temperature and environment control systems, turn and tilting tables, surface positioning systems, and tilting instrument frames.

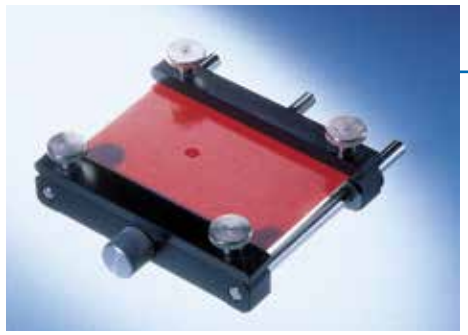
E-MD/4 electronic multiple dosing unit

Advanced dosing technology
The most often varied accessories, employed to vary a basic instrument configuration, are electronic syringe units in combination with single or multiple dosing units.
The electronic multiple dosing unit **E-MD/x** is the most demanded dosing unit for sessile drop measurements using liquids with a viscosity up to 3000 mPas. It is available in different variants for the precise automatic positioning of two, three, four or six dosing needles. For use in combination with nanodrop or picodrop dosing systems the **E-MD/x plus** with an improved positioning accuracy of ±0.6 µm is available.
Besides standard liquids, paints, varnishes, glues and latex dispersions are typical applications for the direct dosing systems **SD-DM**, **DD-DM**, **TD-DE/3** and **SD-DE**. The

TD-DE/3 triple electronic
multiple direct dosing unit

direct dosing systems can be used to dose either pendant or sessile liquid drops through disposable syringes and needles without the need for tubing.

The electronic syringe unit **ES** in combination with a syringe and a needle is the standard device for dosing drops with volumes down to 50 nl. It is easily expandable with a syringe heating device **SHD**. The dosed liquid volume and the dosing rate are precisely predefinable by the SCA software.



FSC 80 film sample holder

Selection of measuring accessories

The nanodrop dosing system – comprising a pressure control unit **PCU Nanodrop** and up to four nanodrop dosing valves **NDV xx** – enables the automatic measurement of wetting properties of microscopic samples using droplets in the nanoliter range (1...500 nl).

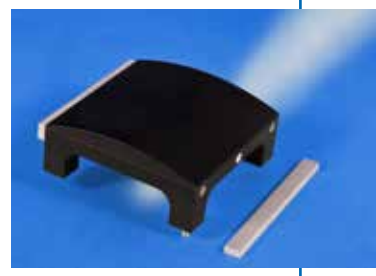
The innovative picodrop dosing system –comprising a dosing unit picodrop **DUP/xx** and a Picodrop dispenser head **PDH xx**– in combination with the OCA 40Micro enables the surface analysis in microscopic dimensions, by dispensing single droplets of 10...400 pl precisely to the predefined position.

Nanodrop dosing system

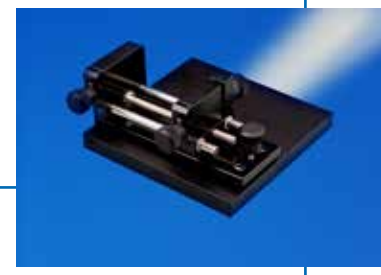
Sample positioning units
Our wide range of sample holding and positioning units is easily adaptable to your special applications.
For the wafer mapping or for the automated measurement of the surface free energy of other samples like coated glass slides or lenses the electronic turn tables with vacuum fixation **ETT/VAC** can be equipped with lots of different top plates.

Other special attachments are holders for foils or papers **FSH 30**, **FHM 100** and **FSC 80/150**, for single fibers and hairs **FHO 40 plus**, or the suction plate **SP 100** for holding thin flexible samples flat on the stage with an adjustable suction area.

Tilting units
For the measurement of contact angles of deforming and rolling drops on inclined surfaces DataPhysics provides manual or electronic tilting base assemblies and tilting base units. The manual tilting base assembly **TBA 60M** with a maximum tilt angle of 70° can be used with every instrument of the OCA series.
The tilting base unit **TBU 90E** was designed for a maximum tilt angle of 90° and a variable tilt speed of 0.03...2.8 °/s. The TBU 90E can be controlled by the SCA software.



FHM 100
film or foil sample stage



FHO 40 plus
single fibre holder

Optical standards for verification of precise performance
DataPhysics provide various sets of optical standards **OCAS** for the validation/verification of total instrument (hardware and software) performance. Each glass slide features a standard sessile, pendant drop or lamella contour for image capture and subsequent analysis. All slides are manufactured with the highest precision, as per ISO 9001, in a controlled photolithographic process to serve as reliable references for the precision of measured data.

OCAS glass substrates with
standard drop contours

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Temperature and environmental control

To generate and control athmosphere according to your needs

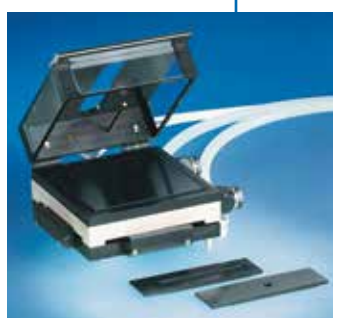
Dataphysics offer a wide range of temperature and environmental control systems that operate in conjunction with the OCA instruments and supportive software. These systems enable the measurement of surface and interfacial parameters across an incredibly diverse group of applications, at temperatures from -30 to 1800 °C and from a high-vacuum to high-pressure atmosphere. Temperature, pressure, humidity, and other physical parameters can be controlled, directly, by these OCA instrument accessories, or with the integration of additional hardware.

Needle heating device NHD 400 in combination with heating chamber TEC 400

The triple diffuser **TDI 100** is a recommended attachment for working temperatures below room temperature to prevent condensation by directing a dry gas flow towards the chamber windows. The TFC 100 is expandable with the humidity generator HGC.

The **TPC 150** is a temperature and environmental control chamber with a peltier system for the software controlled setting from -30...160 °C (heat up and cool down rate ±1 K/s).

Thermal chamber TPC 150 with controller TC 150, test piece for the lamella method and sample vessel



Liquid temperature control unit TFC 100

Devices for environmental and temperature control

The **TFC 100** is a temperature control unit (by liquid circulator bath) for measurements at - 10...130 °C and under controlled atmosphere.

The triple diffuser **TDI 150** is a recommended attachment for working temperatures below room temperature to prevent condensation by directing a dry gas towards the chamber windows. The TPC 150 is expandable with the humidity generator HGC.

The **TEC 400** and **TEC 700** are temperature control chambers with twin electric resistance heater for the software controlled temperature setting up to 400 °C respectively 700 °C, also under protective atmosphere (inert gas inlet).

The **NHD 400** an **NHD 700** are electrical needle heating devices for generating drops at temperatures up 400 °C respectively 700 °C (i.e. polymer and hot melt adhesives, molten metals, dosing of high viscous liquids etc.). Also extremely tenacious copolymers with viscosities in the kPas range, e.g. with elastomer constituents, can be dosed easily.

The **MTFQ 1200** and **HTFC 1800** are electrical heated high temperature furnaces for the software controlled temperature setting up to 1800 °C under controlled atmosphere. The special 'LHT' versions of the OCA-series are designed for use with the high temperature furnaces.

Electrical thermal chamber TEC 700 with controller TC 700

The **HTFC 1800HV** is a high temperature (up to 1800 °C) and high vacuum furnace ($5{\cdot}10^{6}$ to 10^{-5} mbar).

The **PMC-50S** is a high pressure system for up to 80 °C and 50 bar.

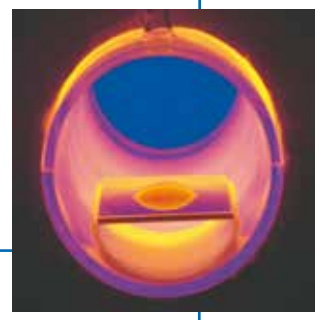
The Humidity Generator and Controller **HGC** is designed for the automated regulation of the relative humidity of ambient clean air , nitrogen, argon, or any other inert gas for a wide range of applications.

OCA 15LHT-SV with high temperature - high vacuum system HTFC 1800HV

It is easily connectable to a TFC 100 and TPC150 as well as to any temperature controlled measuring chamber.

Software for environmental and temperature control

The **SCA 20** software supports all the temperature and environmental control systems. This software features simple and intuitive usability and control of all hardware components. Up to four measured temperatures can be stored, presented and analyzed (in °C, °F, or K). Individually programmable temperature sequences allow the automatic control, analysis, and presentation of temperature sweeps for sessile drop, pendant drop, and lamella analysis without user interaction.



Molten glass drop on a solid substrate

Humidity Generator HGC 20

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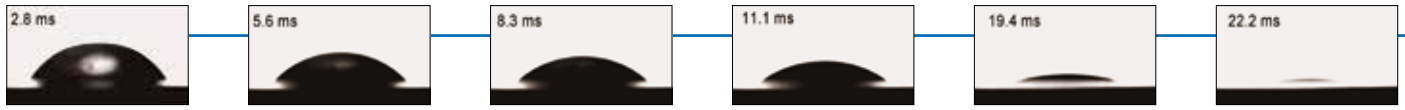


High speed camera system — Absorption of a water drop

Special accessories

Special-purpose extensions to the modular system

In close cooperation with customers, research institutes, and universities we have developed a wide range of special-purpose extensions to the OCA instruments, to broaden the range of surface chemistry applications in laboratory and process applications.

LIA-MD liquid injection system
The relaxation properties of drops on the addition of a second liquid constituent can be studied

LIA-MD liquid injection system on an OCA 20 with motorized y- and z-axis

with the LIA-MD liquid injection system. In this case, a dose of a different surface-active or chemically reactive phase is added to an existing drop in a very short time. The primary drop must now return to the equilibrium on its interface. In the ensuing response time the surface and interfacial tensions can be measured and their behavior investigated. Developments of synthetic eye and lung fluids for medical purposes have already profited from this idea, and more innovative applications are expected in the field of protein and surfactant engineering.

Oscillating drops
For the measurement of surface elasticities and for relaxational studies at phase boundaries, DataPhysics has developed the oscillating drop generator **ODG 20** and the innovative oscillating drop generator **ODG 20P** with a high resolution pressure sensor.
This extension to the optical contact angle measuring and drop contour analysis systems of the OCA series – based on a piezoelectric transducer – excites oscillating drops with a wide range of frequencies and amplitudes. Periodic variations in the drop volume, or alternatively in the drop shape with constant volume, can be performed. The excitation frequency ranges up to 50 Hz, depending on the density and viscosity of the fluid. The amplitude of the axis-symmetric oscillations varies from micrometers to millimeters. The oscillating drops can be analyzed by conventional drop contour analysis and by the new approach of pressure measurement with the high-performance pressure sensor (ODG 20P).
Together with the SCA 26 the ODG 20 and ODG 20P offers the following measurement and calculation options:

- software controlled amplifier for pre-defined waveforms (sinusoidal, saw tooth, rectangular, triangular or arbitrary),
- constant volume mode with axis-symmetric drop shape oscillations,
- relaxational mode following the instant increase/decrease of the drop volume.
- pressure measuring mode with automatic drop volume tracking and an increased accuracy and resolution of the dilatational modulus,
- analysis of the real and imaginary part of the interfacial dilatational modulus based on the oscillating or relaxing contour of pendant drops.
- analysis of the relaxational modulus.

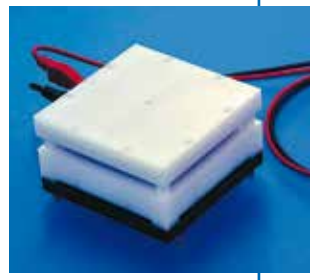
High-speed camera systems
All OCA instruments can be extended with the high-speed image processing system UpOCAH with up to 1000 images per second.
The OCA 20, 35 and 40 can be upgraded with the high-speed image processing system UpHSC 2000 (up to 2200 images per second), with a high power stroboscopic LED light source with software controlled adjustable intensity for an homogeneous and cold background lighting.

ODG 20 oscillating drop generator on an OCA 30

Top view video system
All OCA systems can be equipped with the top view video system TV-VS, to observe the positioning of the dispensed drop on the surface. The USB camera together with the high performance 6x parfocal zoom lens and the adjustable observation angle enables a detailed view to your sample.

Electro wetting platform
The altering wetting and adsorption behavior under a defined electric field becomes more and more relevant for a wide range of applications. The EWP 100 facilitates the analysis of sessile and pendant drops under a well definable electrical field.

TV-VS top view video system for all OCA systems



EWP 100 electro wetting platform

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PCA 100M

Video-based portable contact angle measuring instrument

Contact angle measurement techniques almost everywhere
The video-based portable contact angle measuring instrument PCA 100M is the ideal system for measuring wetting properties on site during the production process.

Whether for large or small substrate areas, the PCA 100M is the handheld instrument for controlling the qualities of coatings, examining the surface energies of

Dosing and refill system of the PCA 100M/4

pre-treated polymer films in the production process, or testing the qualities of cleaned or adhesion-promoted glass surfaces prior to the next processing stage.
The compact design and the "plug and play" connectivity to any notebook or on-site available PC without the need for special frame grabber, enables the measurement of surface properties almost everywhere – including the usage in cleanrooms (US FED STD 209E cleanroom standard class 10).

Components and accessories
- high-performance telecentric lens with integrated aperture and adjustable observation angle,
- software controlled continuous adjustable back lighting without hysteresis,
- video-based measuring system with high-resolution camera,
- integrated multiple dosing system, alternatively with two dosing needles (PCA 100M/2) or four dosing needles (PCA 100M/4),
- software controlled automatic needle selection and positioning,
- integrated automatic refill system with flushing and cleaning functions for dosing up to 5000 drops per filling and per liquid receptacle,
- USB controller interface to notebook or PC,
- Power supply with automatic voltage adjustment,
- combination with the PCA-MS measuring stand for laboratory table top applications,
- adapter for pendant drop measurements.

Software for mobile contact angle measurement
The extensive control and analysis software for Windows®, is designed for ease of use and fast access to all control elements and can be used on a notebook or PC. The available software modules for the PCA 100M are:

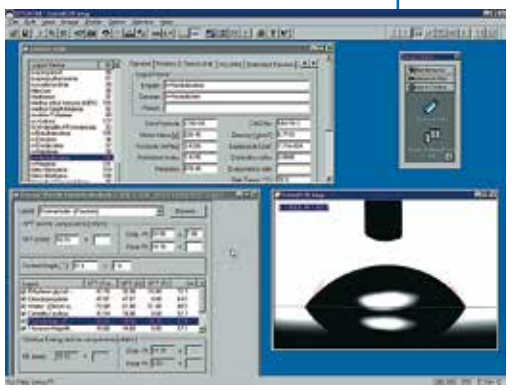
SCA 20 Main program, including
- controlling of selection and positioning of the dosing needles in horizontal and vertical direction and of the electronic syringe units with automatic refill function,
- menue controlled generation of data sets, management, and execution of automatic measuring procedures,
- video based measurement and presentation of the static and dynamic contact angle on plane, convex, and concave surfaces,
- automatic measurement of the contact angle hysteresis,
- record/store of image sequences,
- statistical evaluations and error analysis (statistical process control) with averaging, standard deviation, consistency checks within the specified limits, histograms, etc.,
- liquids and solids database with currently more than 170 records for all surface energy analysis methods including related citations.

PCA 100M/4 with measuring stand PCA-MS

SCA 22 pendant drop
- analysis of the surface and interfacial tension, as well as their polar and dispersive contributions, based on the analysis of the drop shape.

PCA 100M/4 on a glass substrate

SCA 21 surface free energy
- analysis of the surface free energy of solids as well as their components (e.g. dispersive, polar and hydrogen bond parts, acid and base portions, respectively) according to nine different theories,
- representation of wetting envelopes and work of adhesion/contact angle diagrams.



Software modules SCA 20 and SCA 21 — analyzing the wetting properties of a front windshield

NEURTEK
instruments

PCA 100R

Robot-assisted contact angle measuring instrument for process control

Wetting properties in the production process

In conjunction with the single- and multi-axis robots of the RCC series, the PCA 100R contact angle measuring instrument is a specialized system for measuring wetting properties on substrates of very large surface areas on site during the production process. The fully automatic-controlled PCA 100R / RCC enables the reduction of subjective factors and the time involved for contact angle measurements.

PCA 100R/2 with RCC-Z 230 for 24“ TFT LCD substrates

Some important applications for the robotized PCA 100R contact angle measuring instrument are:

- determination of the surface cleanliness of semi-conductor wafers and of glass substrates for flat panel displays prior to the next processing stage,
- examining the surface energies of pre-treated polymer films in the production process,
- development of high-performance composites,
- the surface finishing and the cleaning of textiles.

The PCA 100R and the robots of the RCC series are designed for the usage in cleanrooms according the US FED STD 209E cleanroom standard class 10.

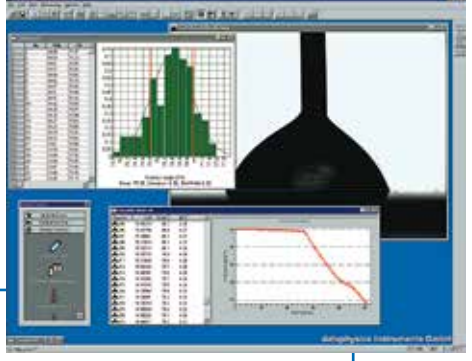
Components and accessories

- high-performance telecentric lens with integrated aperture and adjustable observation angle,
- software controlled continuous adjustable intensity without hysteresis for a homogeneous back lighting,
- video-based measuring system with high-resolution camera,
- integrated multiple dosing system, alternatively with two dosing needles (PCA 100R/2) or four dosing needles (PCA 100R/4),
- software controlled automatic needle selection and positioning,
- integrated automatic refill system with flushing and cleaning functions for dosing up to 5000 drops per filling, and per liquid receptacle,
- automatic measuring head travel, automatic needle selection and positioning,

The PCA 100R can be combined with the following structural components:

- RCC-Z (z-axis system),
- RCC-XY (x/y-axis system) with fully or semi-automatic measuring modes,
- MT FPD easy-travel, manual sample tables for positioning the measuring head manually and with a one-button controller for initiating automatic procedures of contact angle measurements.

Mapping on a glass substrate with the PCA 100R/2



SCA 20/SRC — measuring contact angles

Software for measurement an robot control

The extensive control and analysis software SCA and SRC for Windows®, are designed for ease of use and fast access to all control elements.
The available software modules for the PCA 100R in combination with a robot system are:

SCA 20/SRC Main programs

- controlling of selection and positioning of the dosing needles in horizontal and vertical direction and of the electronic syringe units with automatic refill function, as well as the movement of the sample table and the PCA measuring head,
- menu controlled generation of data sets, management, and execution of automatic measuring procedures,
- video based measurement and presentation of the static and dynamic contact angle,
- automatic measurement of the contact angle hysteresis,
- statistical evaluations and error analysis (statistical process control) with averaging, standard deviation, consistency checks within the specified limits, histograms, etc.,
- liquids and solids database with currently more than 170 records for all surface energy analysis methods including related citations,
- graphical mapping of the contact angle, the drop base diameter, and other derived quantities,
- determination of the spreading behavior on glass or ceramic substrates,

SCA 21 surface free energy

- analysis of the surface free energy of solids as well as their components (e.g. dispersive, polar and hydrogen bond parts, acid and base portions, respectively) according to nine different theories,
- representation of wetting envelopes and work of adhesion/contact angle diagrams.

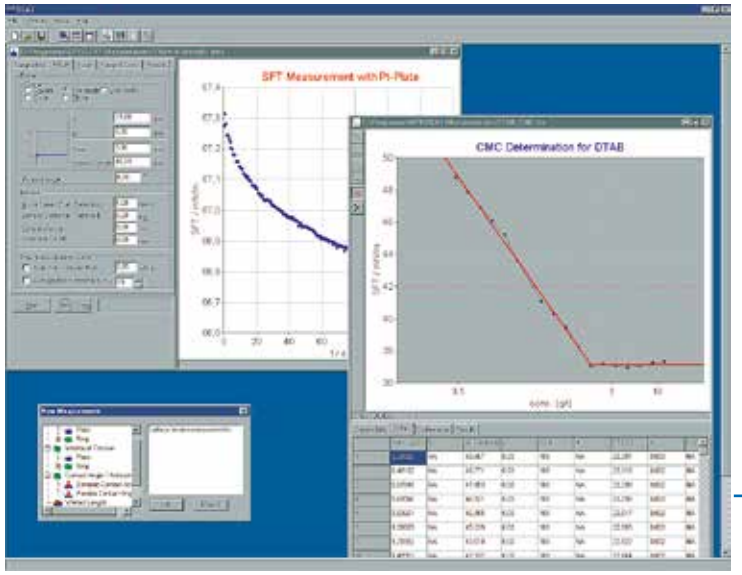
PCA 100R/2 with RCC-XY 1600 and RCC-Z 230 for 60“ TFT LCD substrates

NEURTEK
instruments

Tensiometers

Advanced instrumentation engineered
for classical and new measuring techniques

The wetting properties of com mon solids can be measured with electronic tensiometers which has been evolved to dynamic contact angle meters. The ease of use in providing highly reproducible results with these instruments has been achieved by extensive application of internal and external computer control. **Balance based tensiometers of the DCAT range** provide a very high level of automation in the determination of wetting properties exhibited by powders, fibers, and fabrics as well as the thermodynamic properties of surfactant solutions.



SCAT 33 software module for measuring surfactant properties (CMC)

The **spinning drop video tensiometer SVT 20N** is a special instrument for measuring high to extremely low interfacial tensions. It is featuring the optical technology of the contact angle video-based measuring instruments from DataPhysics. In a compact design, the SVT 20N is intended to supersede the traditionally manual operation of these tensiometer systems.
With the additional feature of video contour recognition and evaluation technology, an important contribution can now be made to research in raw materials for emulsions, encapsulated drops, and tertiary oil recovery to the advantage of product quality and the preservation of the environment.

Software for efficient work
The DCAT and SVT tensiometer systems are delivered with an intuitive PC software with many graphical elements to assist you in specifying both simple and complex measurement procedures and in collecting, assessing, and evaluating measured data.

Selection of measuring bodies and accessories for the DCAT 11EC, DCAT 11, and DCAT 21

Specifically the SVTS software package for the SVT 20N spinning drop video tensiometer has profited from the wealth of precise and reliable methods to evaluate drop contours, e.g. the Young-Laplace method with statistical error analysis, which is also used for the optical contact angle measuring instruments of DataPhysics.

Utilize these gains in technology to your advantage

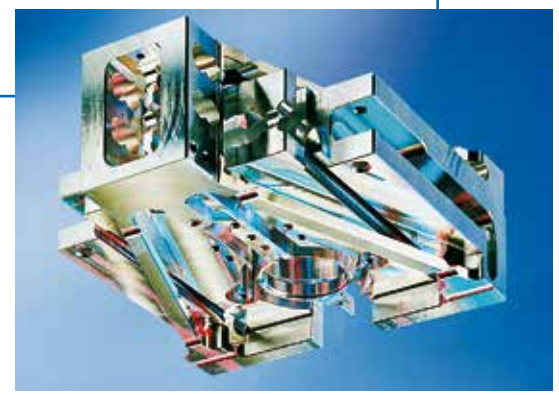
Accessories and customized modifications
Our tensiometers can be modified with standard accessories to a wide range of measuring situations and sample geometries. The accessories for the DCAT modular system always provide a solution suitable for the diverse needs of our users, whether for films, sheets, fibers, powders, or magnetic and fabric materials.

If you cannot find a solution for your uncommon samples or applications, feel free to ask us for special variants of our instruments and accessories. One of our strengths is the customization of our products to your needs.

Flexibility is one of DataPhysics' priority objectives for tensiometers

References for national and international standards
The dynamic contact angle measuring devices and tensiometers DCAT 11EC, DCAT 11, and DCAT 21 are based on the latest balance technologies developed by the company Sartorius AG, Germany. The monolith balance systems used by our instruments operate on the principle of electrodynamic compensation to combine the maximum precision with the greatest possible stability.

The DCAT 21, DCAT 11, and DCAT 11EC are fitted with 100 g reference masses of class E2 (±0.15 mg) as specified under R111 of the OIML (International Organization of Legal Metrology). This ensures that all tensiometer readings comply with national and international standards.



Monolith precision balance module

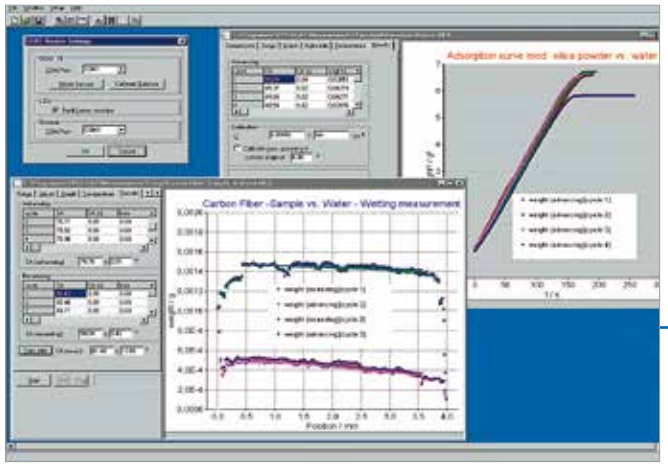
NEURTEK
instruments

DCAT 11EC/DCAT 11/DCAT 21

Dynamic contact angle measuring devices and tensiometers

Properties of the DCAT 11EC
The dynamic contact angle measuring device and tensiometer DCAT 11EC is the budget-priced instrument for the weight-based measurement of contact angle, surface and interfacial tension, critical micelle formation concentration, density, sedimentation and penetration rate, and adhesion.

Features of the DCAT 11
The DCAT 11 is the standard instrument for applications which require a ten times improved measurement precision compared to the DCAT 11EC and an increased travel speed range and travel resolution for the sample table.



SCAT 32 — measuring the contact angle

Advantages of the DCAT 21
The DCAT 21 is the all-purpose dynamic contact angle measuring device and tensiometer. It offers a 30 mm longer travel for the sample stage than the DCAT 11 and DCAT 11EC and allows therefore the use of the optional electrical temperature control unit TEC 250/DCAT.

Components and accessories
The dynamic contact angle measuring devices and tensiometers of the DCAT series share the following common features:
- high-precision electrodynamic compensation weighing system with automatic calibration and a maximum data rate of 50 measured values per second,
- software controlled, motor-driven height positioning of the sample receptacles with variable speed,
- automatic coupling lock for the balance,
- integrated measurement and control electronics with connections for two Pt 100 temperature sensors,
- graphical display for weighing data, temperature and other information,
- thermal chamber with diameters of 50, 70 or 100 mm with integrated magnetic stirrer and Pt100 probe,
- non-magnetic thermal chamber with a removable microelectronic stirrer system with 70 mm diameter,
- illuminated sample chamber with inert gas or vapor inlet,
- automatic dosing and refill system LDU.

DCAT 21 with FO 11 special sample holder for films

Software for control, measurement, and analysis
The **SCAT** software, developed for Windows®, is available in various discrete usable modules. Every software module includes the control of the DCAT and its accessories, the measurement, analysis and the presentation of the results.

SCAT 31
- measurement of the static, time- and temperature-dependent surface and interfacial tensions according to the Du-Noüy ring method, the Wilhelmy plate and the wire hoop method,
- lamella breakpoint test to determine the surface elasticity,
- automatic ring corrections according to Zuidema & Waters, Mason &Huh and Harkins & Jordan,
- gas-, liquids- and solids data base.

SCAT 32
- force-based measurement of the dynamic contact angle of prismatic and cylindrical solids (e.g. plates, films, rods and single fibers) as well as the wetted length according to the Wilhelmy method,
- adsorption measurement on powders and fiber bundles with the determination of the average contact angle according to the modified and the extended Washburn method,
- analysis of the surface free energy of solids as well as their components (e.g. dispersive, polar and hydrogen bond parts, acid and base portions, respectively) according to nine different theories,
- calculation of work of adhesion.

SCAT 33
- fully automatic determination of the critical micelle formation concentration (CMC) of surfactants in forward, reversed and extended mode,
- calculation of the minimum surface tension in case of synergistic effects of surfactant mixtures,
- calculation of the head space required by molecules on the surface,
- calculation of the free adsorption energy after Gibbs,
- calculation of the surface excess,
- automatic control of the dosing devices LDU x/x for additive and subtractive dosing .

SCAT 34
- determination of the density of liquids.

SCAT 35
- determination of the sedimentation rate,
- measuring of the yield forces on soft gels, pastes etc.,
- measuring of the penetration resistance and penetration rate.

SCAT 36
- Determination of the density of solids with the optional available density determination set DSS 11 or DSS 12.

SCAT 37
- Lamella breakpoint test and adhesive force measurement.

Electrical temperature control unit TEC 250/DCAT

LDU 2/2 liquid dosing unit

Standards
The high degree of accuracy of the DCAT devices complies with all related international standards; for example:
ISO 6295 · ASTM D 0971-91
ASTM D 1417-83 · ISO 6889
DIN EN 14210

NEURTEK
instruments

SVT 20N

Spinning drop video tensiometer

SVT 20N capillary with spinning drops

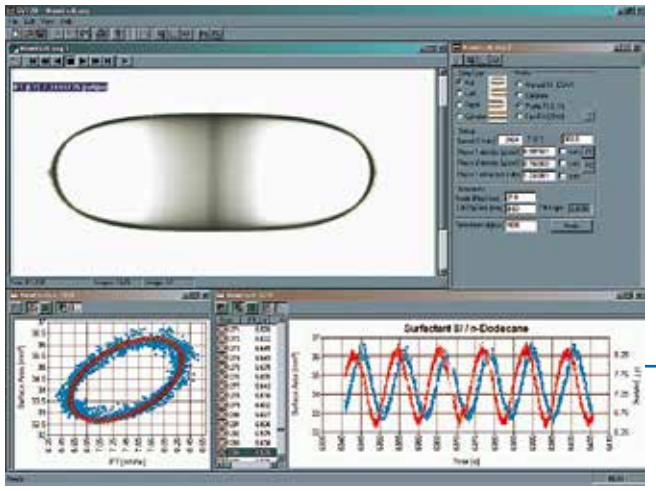
Fast exchange capillary FEC

Properties of the SVT 20N
The spinning drop video tensiometer SVT 20N is a special-purpose optical instrument for measuring high to extremely low interfacial tensions. The controll software is designed for ease of use and fast access to all control elements. Combined with the software packages SVTS 20 and SVTS 21 the SVT 20N provides the following functions:

- measurement of static, time-, and temperature-dependent interfacial tensions and dilatational elasticities between two not completely miscible liquids,
- automatic movement of the electronically controlled tilting base for positioning the spinning drops along the optical axis of the instrument,
- measurement of 2D and 3D extensional relaxation of visco-elastic liquids and liquid drops encapsulated or enclosed in membranes at varying speeds of rotation,
- determination of yield stresses on liquid crystalline substances,
- calculation of dispersive and polar contributions of liquids based on measured surface and interfacial tensions with error limits.

Components and accessories

- high-performance 6-fold power zoom lens with an integrated continuous fine focus and adjustable observation angle,
- video-based measuring system with high-resolution USB camera,
- precise "fast and easy exchangeable" capillary system with electronically commuted DC drive,
- electronic tilting base for the measuring cell, software-controlled motor-driven position and tilt adjustments,
- liquid/gas-temperature controlled capillary chamber MC-TFC 130 for -10...130 °C or peltier/gas-temperature controlled capillary chamber MC-TPC 180 for -30...180 °C; ±0.1 K with a heat up and cool down rate of ±1 K/s,
- LED illumination with software controlled adjustable intensity without hysteresis for a homogeneous back lighting,
- integrated graphics display with touch panel functions,
- fast-exchangeable special high-temperature (up to 180 °C) glass capillaries,
- calibration tools for correcting optical distortions caused by the glass capillaries (cylindrical lens effects),
- automatic dosing systems.



SVTS 21 — determination of interfacial dilatational elasticity

Software for control, measurement, and analysis
The **SVTS** software for Windows® is designed for simple use and fast access to all control elements and is available in the following modules:

SVTS 20 IFT

- video based measurement and presentation of the time and temperature-dependent interfacial tension,
- presentation of measurement values as well as the storage of video sequences for the calculation of fast processes,
- control of the rotational speed, the inclination of the tilting base with the measuring cell and the camera position,
- calculation of interfacial tension based on spinning drop contours according to various methods including the Young-Laplace method,
- automatic calibration of the drop size,
- automatic "drop hold" function,
- automatic temperature recording,
- automatic compensation of density and refractive index as well as of temperature dependent changes,
- statistical evaluations and error analysis.

SVTS 21 Oscillation

- calculation of surface and interfacial tensions based on spinning drop contours, predefined speed increments and sinusoidal speed variations for relaxation measurements,
- recording and evaluation of video sequences for analyzing fast relaxational oscillations and elongations of drops,
- determination of dilatational interfacial elasticity of visco-elastic and viscoplastic materials.

SVT 20N with temperature controlled measuring chamber MC-TFC 130

NEURTEK
instruments

Where other experts find interfaces remain a phenomenon, we help to understand them

Customized applications
At the DataPhysics application center surface chemistry specialists utilize state-of-the-art technology to investigate problems our customers encounter and to find viable solutions. With access to latest technologies for a majority of problems, our specialists not only perform the common tasks, but also develop new ways in material investigations. This comprises wetting and adhesive properties of paints and varnishes, surfactant and polymer solutions, powders, fibers, and non-wovens. The elaboration of detailed measuring and testing instructions, development of analytical methods, and novel measuring techniques is one of our main focus. Furthermore, we analyze your solid and molten polymers, metals and adhesives, cosmetic and pharmaceutical products, engineering surfaces, coatings, electronic components, micro- and nanostructures .
The results of our investigations are presented in test reports not only with a full description of the methodology, but also with graphical summaries and detailed result discussions. These results can even include specific suggestions towards optimizing the product or process.

DataPhysics application laboratory

Database and Internet information
DataPhysics can provide you with the information relevant to your application from an extensive collection of electronic publications on surface chemistry. Application reports and database information round off this offer. For many applications there are important material parameters available that can be used, for example, to determine surface energies over a wide temperature range.
At the DataPhysics web site you are also provided with an updated overview of relevant references, a glossary, and a selection of links. Here you can also find an overview of the most important european and international standards on investigations into surface chemistry and a selection of tips and tricks.

We provide you with maximum support prior and after sales and installation

Seminars and workshops
Our surface chemistry specialists are pleased to organize application-oriented seminars or workshops on your premises on request. This gives a large group of colleagues an opportunity to become acquainted with the theory and practice of instrumentation engineering and measuring techniques.

Workshop

Moreover, special instrument training on site or in our application laboratory paves the way towards an intensive exchange of experience and assistance in the translation of practice-relevant problems into suitable application programs.

In the areas of service and support we go beyond the limits

Hotline and services
If you need fast help with issues concerning the configuration of instrumentation, software, or computers, please turn to the service departments of our representatives or directly to the DataPhysics service department **service@dataphysics.de** or to the hotline **+49 (0)711 770556-55**.
Our specialists will be pleased to assist you with any questions you have.

Even though all our instruments are continuously rated, you can extend the warranty period and ensure the unchanging quality of the measuring instruments and devices over many years of operation with a service and repair contract. The short term supply of spare parts, accessories and incidentals is essential for a long and reliable life of the instruments, too. Accessories and incidentals are in stock and will be delivered at short notice at reasonable prices.

System service

Technical data

	HGC
Relative humidity control range:	• 5 % .. 90 % @ 25 °C • 10 % .. 85 % @ 85 °C
Relative humidity accuracy:	• HGC 20EC / HGC 20: ± 1.8 % • HGC 30: ± 1.0 %
Temperature range:	• +5 ... +85 °C (requires appropriate temperature controlled chamber)
Dew point range:	• min. -15 °C, max. 85 °C
Gases:	• HGC 20EC / HGC 20: ambient clean air • HGC 30: ambient clean, oil-free air; external gas supply with push-in fitting 6 mm for Nitrogen, Argon, or clean, oil-free compressed air; with integrated pressure regulator for a maximum inlet pressure of 20 bar
Std. flow rate:	• HGC 20EC: 1400 Nml/min [1], constant flow • HGC 20: 600 Nml/min, constant flow • HGC 30: adjustable flow rate up to 600 Nml/min with ambient air, up to 3 500 Nml/min with external gas supply
Heated water reservoir:	• 80 ml
Desiccant reservoirs:	• HGC 20EC: One reservoir (desiccant amount about 0.5 kg); external regeneration of desiccant in oven necessary • HGC 20 / HGC 30: Two alternatively used reservoirs (total desiccant amount about 1.0 kg), with automated drying and regeneration of desiccant by a built-in heating system
Heated connection gas tube length:	• 120 cm
Control connectors:	• RS-485 or USB connection
Dimensions (LxWxH):	• 330 x 280 x 350 mm
Weight (incl. heated transfer line and desiccant):	• HGC 20EC: 18.0 kg • HGC 20: 19.5 kg • HGC 30: 20.5 kg
Power supply:	• HGC 20EC: 80 ... 275 VAC; 50 ... 60 Hz; 210 W • HGC 20 / HGC 30: 80 ... 275 VAC; 50 ... 60 Hz; 250 W

1) Nl is a unit of volume for gases equal to the volume of 1 liter (0.0353147 ft³) at a pressure of 1013.25 hPa (1 atmosphere) and at a standard temperature of 0 °C (32 °F).

	OCA 15EC	OCA 15Pro with L and LHT-variant
	• magnetic slide system and Z-axis manual adjustable	• X-, Y- and Z-axis manual precise adjustable
Max. sample dimensions (L x W x H):	• 220 x ∞ x 70 mm	• 220 x ∞ x 70 mm, 8"-Wafer • 330 x ∞ x 70 mm, 12"-Wafer [1] • 580 x ∞ x 160 mm, MTFQ 1200 or HTFC 1500/1700/1800 [2]
Sample table dimensions:	• 100 x 100 mm	
Traversing range of sample table in x-y-z direction:	• 110 x 150 x 42 mm	• 100 x 104 x 42 mm • 220 x 159 x 42 mm [1] • 240 x 104 x 44 mm [2]
Max. sample weight:	• 3.0 kg; 15.0 kg clamped	• 3.0 kg; 15.0 kg clamped • 24.0 kg [2]
Measuring range for contact angles:	• 0...180°; ± 0.1° measuring precision of the video system	
Measuring range for surface and interfacial tensions:	• $1 \cdot 10^{-2}$... $2 \cdot 10^{3}$ mN/m; resolution: ± 0.01 mN/m	
Optics:	• 6-fold zoom lens (0.7...4.5 magnification) with integrated fine focus (± 6 mm) • LED-lighting with software controlled adjustable intensity without hysteresis	
Video system:	• 1/3" USB-Wide-VGA camera, 752 x 480 pixel, max. sample rate 159 images/s, field of view 1.05 x 0.66... 6.72 x 4.25 mm	• 1/2" USB-CCIR camera, 768 x 576 pixel, max. sample rate 90 images/s, field of view 1.32 x 0.99...8.50 x 6.38 mm
Image distortion	• < 0.05 %	
Temperature measurement:	—	• with optional TRM 100, TC 150Pro, or TC 400Pro: -200...850 °C; 0.1 K accuracy
Dimensions (L x W x H):	• 550 x 160 x 365 mm	• 660 x 230 x 365 mm • 752 x 285 x 365 mm [1] • 974 x 230 x 410 mm [2]
Weight:	• 14 kg	• 16 kg • 18 kg [1] • 19 kg [2]
Power supply:	• 100...240 Vac; 50...60 Hz; 70 W	
Available software modules:	• SCA 20 • SCA 21 • SCA 22 • SCA 23	
Most demanded accessories:	• TBO • TFC 100 • SP 100 • EWP 100	• DD-DM • TBU 90E • E-MD/2 • ETT/VAC • TV-VS • TFC 100 • TPC 150 • TEC 400 • SP 100 • EWP 100
Upgrade options:	• UpUSB 87H • MDK 15EC	• UpUSB52H • UpUSB 87 and UpUSB87H • Up OCAH • MDK • UpOCA 15Pro/20

1) L-variant 2) LHT-variant

	OCA 20 with L and LHT-variant	OCA 35 with L and XLH-variant
	• X-, Y- and Z-axis manual adjustable	• X-, Y- and Z-axis motorized adjustable
Max. sample dimensions (L x W x H):	• 220 x ∞ x 70 mm, 8"-Wafer • 330 x ∞ x 70 mm, 12"-Wafer [1] • 580 x ∞ x 160 mm, MTFQ 1200 or HTFC 1500/1700/1800 [2]	• 220 x ∞ x 70 mm, 8"-Wafer • 330 x ∞ x 70 mm, 12"-Wafer [1] • 510 x ∞ x 120 mm; SQT 350 [3]
Sample table dimensions:	• 100 x 100 mm	
Traversing range of sample table in x-y-z direction:	• 100 x 104 x 42 mm • 220 x 159 x 42 mm [1] • 240 x 104 x 44 mm [2]	• 200 x 160 x 50 mm • 285 x 300 x 50 mm [1] [3]
Positioning accuracy x-y-z:	—	• ± 0.65 µm
Max. sample weight:	• 3.0 kg; 15.0 kg clamped • 24.0 kg [2]	• 10 kg
Measuring range for contact angles:	• 0...180°; ± 0.1° measuring precision of the video system	
Measuring range for surface and interfacial tensions:	• $1 \cdot 10^{-2}$... $2 \cdot 10^{3}$ mN/m; resolution: ± 0.01 mN/m	
Optics:	• 6-fold zoom lens (0.7...4.5 magnification) with integrated fine focus (± 6 mm) • LED-lighting with software controlled adjustable intensity without hysteresis	
Video system:	• 1/2" USB-CCIR camera, 768 x 576 pixel, max. sample rate 90 images/s, field of view 1.32 x 0.99...8.50 x 6.38 mm	
Image distortion:	• < 0.05 %	
Temperature measurement:	• Integrated temperature measurement and digital display 2 x Pt 100 inputs for -60... 700 °C; Pt 100 (as option), 0.1 K resolution, precision 1/3 DIN IEC 751 (±0.03 %), Class B	
Dimensions (L x W x H):	• 660 x 230 x 365 mm • 752 x 285 x 365 mm [1] • 974 x 230 x 410 mm [2]	• 640 x 280 x 370 mm • 900 x 480 x 370 mm [1] • 950 x 470 x 410 mm [3]
Weight:	• 18 kg • 20 kg [1] • 21 kg [2]	• 20 kg • 26 kg [1] • 27 kg [3]
Power supply:	• 100...240 Vac; 50...60 Hz; 70 W	• 100...240 Vac; 50...60 Hz; 100 W
Available software modules:	• SCA 20 • SCA 21 • SCA 22 • SCA 23 • SCA 26	
Most demanded accessories:	• DD-DM • TBU 90E • E-MD/x • TD-DE/3 • ETT/VAC • TV-VS • TFC 100 • TPC 150 • HGC 20 • TEC 400 • NHD 400 • TEC 700 • NHD 700 • SP 100 • EWP 100 • ODG 20	
Upgrade options:	• UpUSB52H • UpUSB 87 and UpUSB87H • Up OCAH • UpHSC 2000 • MDK • UpOCA 20/30	• UpUSB52H • UpUSB 87 and UpUSB87H • Up OCAH • UpHSC 2000 • MDK

1) L-variant 2) LHT-variant 3) XLH-variant

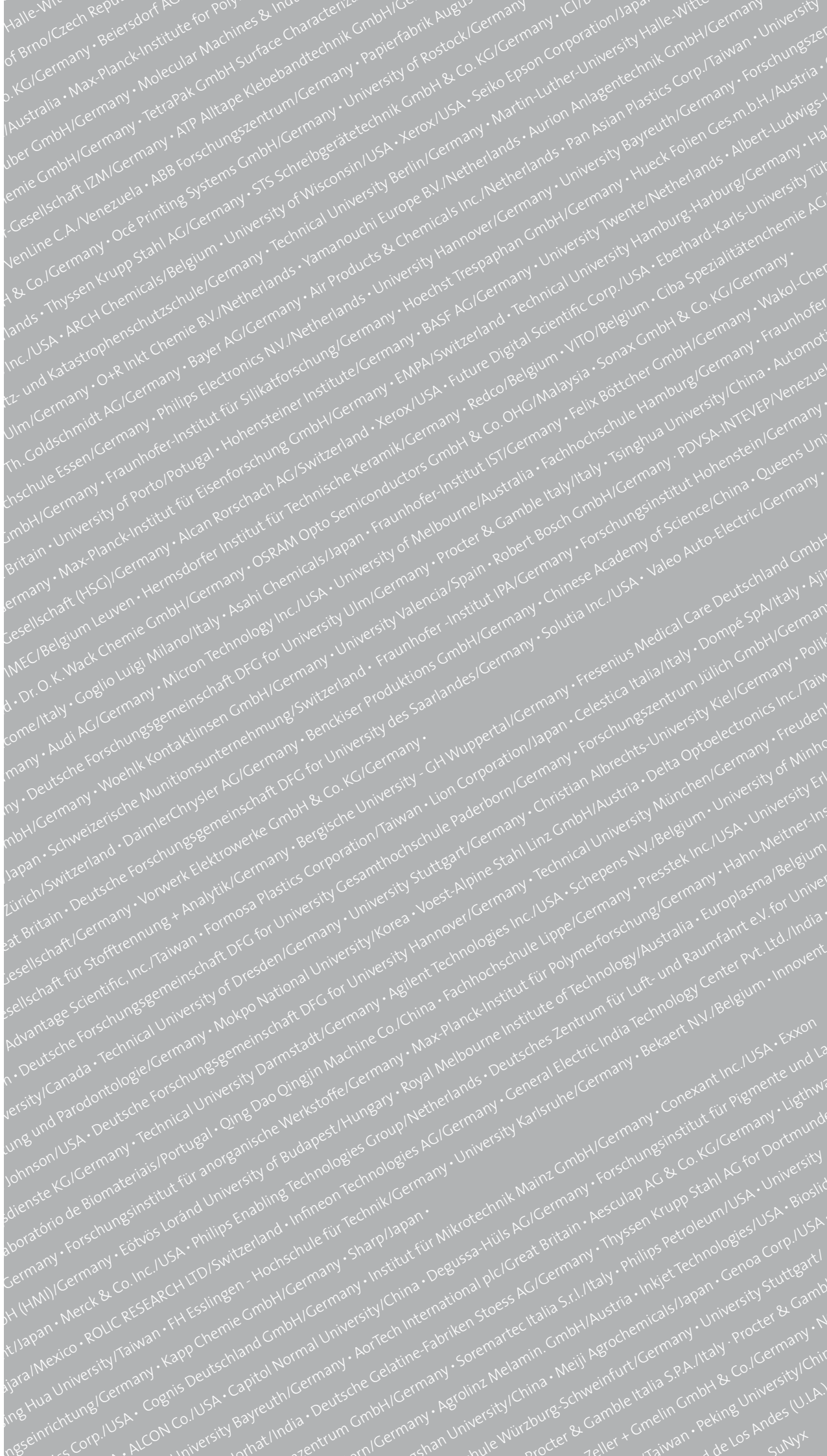
	OCA 40 Micro
	• motorized X-, Y-, Z-axis, auto focus and observation angle,
Max. sample dimensions (L x W x H):	• 220 x ∞ x 70 mm, 8"-Wafer
Sample table dimensions:	• 100 x 100 mm
Traversing range of sample table in x-y-z direction:	• 200 x 160 x 50 mm
Positioning accuracy x-y-z:	• ± 0.65 µm
Max. sample weight:	• 10 kg
Measuring range for contact angles:	• 0...180°; ± 0.1° measuring precision of the video system
Measuring range for surface and interfacial tensions:	• $1 \cdot 10^{-2}$ ... $2 \cdot 10^{3}$ mN/m; resolution: ± 0.01 mN/m
Optics:	• Automatic 7-fold zoom lens with integrated fine focus (± 4 mm) and micro lens 20-fold with 7.5...55 magnification • high power stroboscopic LED light source with software controlled adjustable intensity
Video system:	• 1/2" USB-CCIR camera, 768 x 576 pixel, max. sample rate 90 images/s, field of view 0.85 x 0.64...0.116 x 0.087 mm
Image distortion:	• < 0.05 %
Temperature measurement:	• Integrated temperature measurement and digital display 2 x Pt 100 inputs for -60...700 °C; Pt 100 (as option), 0.1 K resolution, precision 1/3 DIN IEC 751 (±0.03 %), Class B
Dimensions (L x W x H):	• 640 x 280 x 370 mm
Weight:	• 21 kg
Power supply:	• 100...240 Vac; 50...60 Hz; 100 W
Available software modules:	• SCA 20 • SCA 21 • SCA 22 • SCA 23 • SCA 24 • SCA 26
Most demanded accessories:	• DD-DM • TBU 90E • E-MD/xplus • TD-DE/3 • Picodrop dosing system • Nanodrop dosing system • ETT/VAC • TV-VS • TFC 100 • TPC 150 • HGC 20 • TEC 400 • NHD 400 • SP 100 • EWP 100 • ODG 20
Upgrade options:	• UpUSB52H • UpUSB 87 and UpUSB87H • Up OCAH • UpHSC 2000

Technical data

	PCA 100M	PCA 100R and RCC
Max. sample dimensions (L x W x H):	• Unrestricted, min. convex diameter of sample 50 cm, min. concave diameter of sample 100 cm	• 400 x 400 to 1600 x 1600 mm sample size standardized, bigger sample sizes on request, min. convex curve diameter of the sample 100 cm, min. concave curve diameter of the sample 200 cm
Dimensions of PCA-MS sample table	• 100 x 100 mm; special sample tables and receivers, e.g for printing rollers, on request	—
Measuring range for contact angles:	• 0...180°; ± 0.1° measuring precision of the video system	
Optics:	• High-performance telecentric lens with integrated aperture and adjustable observation angle • Back light with software controlled adjustable intensity without hysteresis	
Video system:	• Analog 1/2" CCIR CCD camera with PCI frame grabber with 50 images per second, field of view 6.4 x 4.8 mm • Image distortion < 0.05 %	
Measuring techniques:	• Sessile drop method – static and dynamic contact angle measurement	
Available variants:	• PCA 100M/2: portable handheld instrument with multiple dosing system for two test liquids • PCA 100M/4: portable handheld instrument with multiple dosing system for four test liquids	• PCA 100R/2: for use with robot systems with multiple dosing system for two test liquids • PCA 100R/4: for use with robot systems with multiple dosing system for four test liquids · RCC-Z 230: z-axis robot with max. 230 mm travel · RCC-XY 400, 800, 1200, 1600: x/y-axis robot with max. 1600 mm travel · MT FPD 400, 600: manual x-y sample tables with max. 600 mm travel other variants on request
Dimensions (L x W x H):	• 206 x 150 x 205 mm	• RCC footprint: subject to version
Weight:	• PCA 100M/2: 5.2 kg • PCA 100M/4: 5.6 kg	• PCA 100/R2: 5.2 kg • PCA 100/R4: 5.6 kg • combined RCC-XYi600 RCC-Z230: 1200 kg • combined FPD-800 RCC-Z230: 800 kg
Power supply:	• 100...240 VAC; 50...60 Hz; 70 W	• 100...240 VAC; 50...60 Hz; 70 W (internal supply from switch cabinet with integrated PC and control system for the RCC components), RCC system 100...240 VAC, 50...60 Hz, approx. 800...1200 W depending on equipment
Available software modules:	• SCA 20 • SCA 21 • SCA 22	• SCA 20 • SCA 21 • SRC

	DCAT 11EC / DCAT 11 / DCAT 21
Measuring range for contact angles:	• DCAT 11EC: 0...180°; resolution: ± 0.1° • DCAT 11 / DCAT 21: 0...180°; resolution: ± 0.01°
Measuring range for surface and interfacial tensions:	• DCAT 11EC: 1...1000 mN/m; ± 0.01 mN/m • DCAT 11 / DCAT 21: 1...1000 mN/m; ± 0.001 mN/m
Measuring range for densities:	• DCAT 11EC: 0.50...2.50 g/cm^3; resolution: ± 0.005 g/cm^3 • DCAT 11 / DCAT 21: 0.50...2.50 g/cm^3; resolution: ± 0.002 g/cm^3
Weighing range:	• DCAT 11EC: 100 µg...210 g • DCAT 11 / DCAT 21: 10 µg...210 g
Measuring value range:	•Up to 50 weighing values per second
Travel speed of sample table:	• DCAT 11EC: 2 µm/s...400 mm/min • DCAT 11 / DCAT 21: 0.7 µm/s...500 mm/min
Programmable travel for sample table:	• DCAT 11EC /DCAT 11: 74 mm • DCAT 21: 105 mm
Travel resolution:	• DCAT 11EC: 1.0 µm • DCAT 11 / DCAT 21: 0.1 µm
Receiver for sample vessels:	• Optionally 50 mm, 70 mm, or 100 mm diameter (TV 50...TV 100)
Balance lock:	• Software-controlled (auto balance locking)
Display for status, weight, and temperature:	• Integrated
Self-check and system diagnostics:	• Integrated
Automatic stirrer for CMC measurements:	• Magnetic stirrer integrated in TV 50 / 70 / 100; (optional non-magnetic version TV 70-NM with a removable microelectronic stirrer)
Temperature measurement:	• Integrated temperature measurement and digital display for -60...450 °C with 2 x Pt 100 inputs
Dimensions (L x W x H):	• DCAT 11EC / DCAT 11: 340 x 230 x 500 mm • DCAT 21: 340 x 230 x 565 mm
Weight:	• DCAT 11EC / DCAT 11: 23 kg • DCAT 21: 25 kg
Power supply:	• 100...240 VAC; 50...60 Hz; 70 W
Available software modules:	• SCAT 31 • SCAT 32 • SCAT 33 • SCAT 34 • SCAT 35 • SCAT 36 • SCAT 37

	SVT 20N
Measuring range for interfacial tension:	• 1·10^{-6}...2·10^3 mN/m
Speed range:	• 0...20 000 rpm, speed resolution ±0.001rpm, speed stability in long-term tests ±0.5 rpm, speed increments max. ±2000 rpm/s, oscillating frequency 0.005...50 Hz at min. 3000 rpm
Traversing range of optics:	• 50 mm, positioning accuracy 0.01 mm,
Tilting range :	• -12°...+12°, accuracy ±0.01°
Optics:	• 6-fold zoom lens (0.7...4.5 magnification) with integrated continuous fine focus (± 6 mm) • USB-CCIR camera, max. pixel 768 x 576 resolution, max. sample rate 146 images/s; image distortion < 0.05 %
Video system:	• 1/2" USB-CCIR camera, 768 x 576 pixel, max. sample rate 52 images/s, field of view 1.32 x 0.99...8.50 x 6.38 mm
Measuring techniques:	• Spinning drop method, oscillating spinning drop method
Capillary diameters:	• inner capillary diameter 4.0 mm of borosilicate glass • special accessory: QGC / QGW quartz glass capillaries and quartz glass windows, UV irradiation attachment for measuring cell (UVC)
Temperature range:	• -10...130 °C with MC-TFC 130 • -30...180 °C ±0.1 K with MC-TPC 180
Temperature measurement :	• integrated temperature measurement and digital display 2 x Pt 100 inputs for -60...+450 °C (1 x Pt 100 installed), 0.1 K resolution, precision 1/3 DIN IEC 751 (±0.03 %), Class B
Dimensions (L x W x H):	• 390 x 390 x 400 mm
Weight:	• 25 kg
Power supply:	• 100...240 VAC; 50...60 Hz; 600 W
Available software modules:	• SVTS 20 • SVTS 21 • SVTS 22



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