Anton Paar

General Catalog

Anton Paar develops, produces, distributes, and provides support for analytical instruments used in research, development, and quality control worldwide.

Ever since Mr. Anton Paar founded his one-man workshop in 1922, the Austrian-based company has continuously found new ways to merge high-precision engineering with scientific curiosity. The company currently has more than 3100 employees and is active in over 110 countries worldwide.

Anton Paar is the world market leader in the field of density measurement, the determination of dissolved CO_2, and the analysis of materials' deformation and flow behavior. Customers of Anton Paar include the biggest international soft drink producers, breweries, petroleum-, food-, chemical-, pharmaceutical companies, and many more.

Anton Paar is committed to long-term partnerships with our customers and employees as well as responsibility towards society in general.

The Santner Foundation

Since 2003, Anton Paar has been owned by the Santner Foundation, a non-profit organization exclusively and directly aimed at charitable work. The foundation supports non-commercial scientific work and research in the field of natural science and technology for public utility, addiction prevention, and the rehabilitation of drug addicts.

Innovation and tradition

Innovation builds on research and development, but goes beyond technology and involves all of Anton Paar's employees. Innovation is the art of finding answers to tomorrow's questions.

Customers need reliable application solutions which are precise, economic, and easy to use. Here are some of the reasons why our customers can expect more:

- Approx. 20 % of Anton Paar's turnover invested into Research & Development
- Cooperation with leading universities and research institutes
- 100 % of instrument production in-house following strict quality guidelines
- Traditionally close-knit contact with the international scientific community
- Longstanding tradition of high-precision manufacturing

Anton Paar offers a range of instruments which provide complete conformity and traceability to meet stringent reference standards as well as national and international regulatory requirements.

Sales and service network

In addition to a broad product portfolio, Anton Paar meets your needs with its worldwide sales and service network. Specialists trained and certified in-house are at your service. Anton Paar is present around the world with:

- 7 producing subsidiaries
- 31 sales subsidiaries
- 60 sales partners

On-site installation

Your measurement solution of choice is installed on-site by an Anton Paar certified sales or certified service engineer in accordance with your individual requirements.

Application support

Benefit from Anton Paar´s application know-how for a measurement solution custom-tailored to your application. Anton Paar provides a wide range of application solutions embodying decades of technical expertise.

Training programs

Anton Paar offers customer trainings and qualification tailored to every knowledge level. You are provided with future-oriented tips and advice for your measuring requirements, as well as the opportunity to exchange information with Anton Paar engineers experienced in your field of application.

Certified service

From the recommended preventive maintenance programs to repair coverage and emergency service, Anton Paar accompanies you with certified service programs throughout the whole life cycle of your instrument.

Pharma compliance and data integrity

Anton Paar offers instrument-specific pharma qualification packages for defined instruments to meet the requirements of GMP, 21 CFR Part 11, GAMP 5, and USP<1058>. The instruments comply with relevant Pharmacopoeia methods and cover the necessary security and compliance software features.

Density and Concentration Meter: EasyDens

EasyDens determines the extract content in beer wort, the sugar content in juices, or the alcohol content in spirits with no sugar added. Furthermore, it is used for fermentation control of home-produced beer and wine. After downloading the free app for EasyDens, you have the results displayed on your smartphone within seconds, ready for export to a PC. In contrast to glass hydrometers, it covers the whole measuring range relevant for your application.

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Specifications

Accuracy:
Extract: 0.3 %w/w
Sugar: 0.3 °Brix
Alcohol: 0.5 %v/v

Minimum sample volume: 2 mL

Compatible smartphones:
Mobile operating system: Android 4.3 / iOS version 7.0 or higher
Interface: Bluetooth Low Energy

Density and Concentration Determination

Specifications

Accuracy, density:
0.001 g/cm³

Repeatability s.d., density:
0.0002 g/cm³

Measuring range, temperature:
15 °C to 40 °C (59 °F to 104 °F)

PQP available

Density Meter: DMA 501

DMA 501 is a compact and stand-alone 3-digit density meter. It easily fits into tight spaces in your production area, storage facilities, or in the lab, enabling you to perform quick quality checks just around the corner. Its rugged design and intelligent environmental condition monitoring system makes it ready for operation sites outside the traditional lab space. Even if the sample characteristics are challenging (e.g. creams, pastes, varnish), the instrument delivers the most stable density results.

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Accuracy:
0.001 g/cm³

Repeatability s.d.:
0.0005 g/cm³

Measuring range:
0 g/cm³ to 3 g/cm³

Minimum sample volume:
2 mL

Portable Density Meter: DMA 35 Basic

DMA 35 Basic is the entry-level portable density meter that takes samples directly from the storage container with the help of the built-in pump and measures them on-site. Results are given as density or concentration, such as °Brix, %v/v alcohol, or %w/w H_2SO_4. Because of its lightweight and flat design, hard-to-reach samples, e.g. automotive batteries stored on narrow racks or stacked wine barrels, can be conveniently measured.

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Density Meter: DMA 1001

DMA 1001 has everything that industry standards for density measurement stipulate: 4 digits in density measuring accuracy combined with a comprehensive incident documentation and user support. The sample filling process is monitored via the pin-sharp real-time camera image and the instrument automatically detects filling errors and documents the incident. But there's more: The new unique one-point water adjustment is the quickest way to get your highly accurate measurement work started.

Accuracy, density:
0.0001 g/cm³

Repeatability s.d., density:
0.00005 g/cm³

Measuring range, temperature:
15 °C to 60 °C (59 °F to 140 °F)

Compliance with standards:
ASTM D4052, ASTM D5002, 21 CFR Part 11, Pharmacopoeia

PQP available

Portable Density Meters: DMA 35 Standard, Ex & Ex Petrol

DMA 35 is a portable density meter that identifies sampling points via RFID, measures the sample in a few seconds on-site, and exports stored results wirelessly via Bluetooth. It is designed to withstand the knocks and spills of outdoor use. Intrinsically safe versions are available for use in hazardous areas in chemical and petroleum applications.

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Accuracy, density:
0.001 g/cm³

Repeatability s.d., density:
0.0005 g/cm³

Measuring range, density:
0 g/cm³ to 3 g/cm³

Intrinsic safety (Ex & Ex Petrol):
Ⓔx II 2 G Ex iB IIC T4

Minimum sample volume: 2 mL

PQP-S available

Accuracy, density:
0.0001 g/cm³

Repeatability s.d. density:
0.00001 g/cm³

Temperature range:
0 °C to 100 °C (32 °F to 212 °F)

Density Meter: DMA 4100 M

DMA 4100 M applies a revolutionary density measuring principle for quick and easy quality control. The density meter provides the 4-digit density values you need and is not affected by your working environment. The patented Pulsed Excitation Method delivers the most stable density results based on comprehensive knowledge of the oscillation characteristics. The integrated camera allows you to check the filling procedures of your operators at any time.

Density Meter: DMA 4200 M

DMA 4200 M, the density meter for the heavy petroleum industry, measures the density and specific gravity of highly viscous samples, e.g. bitumen and asphalt, bunker oil, and even LPG. The Temperfect™ feature of DMA 4200 M allows immediate density measurements at any temperature between 0 °C and 150 °C at ambient pressure. FillingCheck™ ensures results according to ASTM D4052 and ASTM D5002. The U-tube is made of Hastelloy C276 and is very resistant to chemicals such as sour gas, hydrochloric acid, and hydrofluoric acid.

Specifications

Accuracy, density:
0.0002 g/cm³

Temperature range:
-10 °C to 200 °C

Pressure range:
0 bar to 500 bar

Standards:
ASTM D4052, ASTM D5002, ASTM D8188, ISO 12185

Density and Concentration Determination

Specifications

Accuracy:
Density: 0.000007 g/cm³
Concentration: 0.01 % to 0.1 % (typically)

Repeatability s.d.:
Density: 0.000001 g/cm³
Sound velocity: 0.1 m/s

Temperature range:
0 °C to 100 °C (32 °F to 212 °F)

Density and Sound Velocity Meter: DSA 5000 M

DSA 5000 M is the only instrument that combines density and sound velocity measurements in one setup. It determines the concentration of two- and three-component solutions using the most accurate density results in the market, measured with the Pulsed Excitation Method. Quality control and R&D departments in many different industries already make use of this unique opportunity to measure both parameters in one go.

Accuracy, density:
0.00005 g/cm³

Repeatability s.d., density:
0.000005 g/cm³

Temperature range:
0 °C to 100 °C (32 °F to 212 °F)

Density Meter: DMA 4500 M

Thousands of users around the world count on DMA 4500 M density meters whenever reliable and accurate 5-digit density values are required. To achieve this, the revolutionary measuring principle - the patented Pulsed Excitation Method – delivers the most stable density results based on comprehensive knowledge of the oscillation characteristics of the U-tube. The automatic bubble detection system gives you back control of your filling.

External Measuring Cell: DMA HPM

The DMA HPM external density measuring cell measures density at high pressures and/or high temperatures. DMA HPM is commonly used in reservoir studies, either integrated into a PVT system or into slim-tube apparatus for enhanced oil recovery (EOR) experiments and in studies for determining the density for the equation of state.

Temperature range:
-10 °C to 200 °C

Pressure range:
0 bar to 1400 bar

Accuracy, density:
Up to 0.0001 g/cm³

Density Meter: DMA 5000 M

With its six-digit accuracy, DMA 5000 M is the most precise digital density meter you can get. The patented Pulsed Excitation Method delivers the most stable density results based on comprehensive knowledge of the oscillation characteristics. The influence of viscosity is compensated twice as effectively as ever before. It is ideal for your high-end R&D applications and sets the tone at authorities as well as standards organizations.

Accuracy, density:
0.000007 g/cm³

Repeatability s.d., density:
0.000001 g/cm³

Temperature range:
0 °C to 100 °C (32 °F to 212 °F)

Choice of parameters:
Density, refractive index, optical rotation, turbidity, viscosity, pH, sound velocity, alcohol

PQP/PQP-S available

Multiparameter Measuring Systems: Modulyzer

With a Modulyzer you can obtain up to eight parameters from one sample in only one measuring cycle. Combined with a sample changer you can analyze up to 71 samples in a row, fully automated. Depending on the accuracy you need, create your individual system from 1 out of 4 density meters + 1 out of 5 polarimeters + 1 out of 6 refractometers + 1 out of 7 sample changers. Add a module for turbidity, pH, or viscosity if needed. Modulyzer is operated via only one screen.

Millikelvin Thermometer: MKT 10

MKT 10 is a small, very lightweight, and easily portable handheld thermometer. It comes with one sensor and a carrying case for safe transport. With its measuring accuracy of 0.01 °C, it is ideal for at-line measurements and quick measurements on site in several industries.

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Specifications

Measuring range:
Temperature: 0 °C to 100 °C

Measurement uncertainty, temperature:
MKT 10: 10 mK (Pt 100)

Measuring sensor:
Pt 100
(DIN EN 60751)

Specifications

Measuring range:
0 °Brix to 80 °Brix
0 % to 100 % degree of inversion

Repeatability:
Concentration, sugar
actual: 0.01 °Brix
Fresh/inverted: 0.02 °Brix
Degree of inversion: 1 %

Measuring time per sample:
5 minutes incl. filling

Soft Drink Analyzing System M

Soft Drink Analyzer M determines the fresh, actual, and fully inverted sugar concentration and degree of inversion in soft drinks and syrups. Manually forced inversion is no longer required. Upgrade Soft Drink Analyzer M plus Xsample 520 sample changer with additional modules such as DietQC ME or pH ME and create the comprehensive Soft Drink Analyzing System M.

Specifications

Measuring range:
Temperature: -260 °C to 962 °C

Measurement uncertainty, temperature:
<1 mK (Pt 100)

Measuring sensor:
Pt 100 or Pt 25.5 (DIN EN 60751 or ITS-90 or ASTM E1137)

Millikelvin Thermometer: MKT 50

The MKT 50 Millikelvin thermometer is designed for the most accurate temperature measurements, comparison calibrations, and fixed-point calibrations. In combination with standard and industrial platinum resistance thermometers, MKT 50 achieves a measuring uncertainty of 10 mK.

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Packaged Beverage Analyzer for Soft Drinks: PBA-S M

PBA-S M systems allow you to downscale the analysis time of soft drinks of all kinds to 3 to 5 minutes by parallel analysis from a single package. QC parameters such as °Brix actual, °Brix before and after the sugar inversion in regular soft drinks, as well as the CO_2 content are determined automatically without the need for sample preparation. By extending the system with DietQC ME, the %Diet concentration can be measured. Additional modules for pH or O_2 can be integrated as well.

Repeatability:
Concentration, sugar
actual: 0.01 °Brix
Fresh/inverted: 0.02 °Brix
Degree of inversion: 1 %
CO_2: 0.005 vol. (0.01 g/L)

Measuring time per sample:
3 to 5 minutes incl. filling

ISO 17025 Calibration of Density Meters and Thermometers

Anton Paar offers traceable calibrations of density meters and thermometers according to ISO 17025.

With the traceability according to the International SI units and to the International Temperature Scale 1990, the calibrated instrument provides absolutely accurate and internationally comparable results.

Density and temperature calibration of density meters
Range:
650 kg/m³ to 1550 kg/m³
15 °C to 50 °C
Smallest achievable uncertainty:
0.02 kg/m³ | 15 mK

Temperature calibration of resistance thermometers
Range:
0 °C to 200 °C
Smallest achievable uncertainty:
10 mK

Parameters:
%Diet, phosphate, or total acid analysis

Measuring range:
0 % to 200 % or
0 mL NaOH to 100 mL NaOH or
0 g/L TA to 100 g/L TA

Repeatability:
Colored: 0.2 %
Colorless or turbid: 0.4 %

Diet Soft Drink Analysis with DietQC ME with Option for Uncolored Drinks

DietQC ME and DietQC ME with the option for uncolored drinks allow the precise concentration measurement of diet soft drinks. The instrument employs a drift-stabilized precision colorimeter equipped with a Peltier thermostat. This powerful colorimetric method (430 nm and 280 nm) is independent of fluctuations in process water composition.
This module can be integrated in a Soft Drink Analyzing System M or a PBA-S M system.

Dissolved CO_2 and O_2 Analysis

Lab and At-line Combined CO_2 and O_2 Meter: CboxQC/ CboxQC At-line

CboxQC combines the fast measurement of CO_2 and O_2 in one measuring cycle – available for portable use at-line as well as in a stand-alone version for the laboratory. Measurements typically take 90 seconds.

Specifications

Measuring range CO_2:
0 g/L to 12 g/L (0 to 6 vol.) at 30 °C
0 g/L to 20 g/L (0 to 10 vol.) <15 °C

Measuring range O_2:
0 ppm to 4 ppm

CO_2 repeatability s.d.:
Lab: 0.01 g/L (0.005 vol.)
At-line: 0.04 g/L (0.02 vol.)

O_2 repeatability s.d.:
±2 ppb

Measuring range CO_2:
0 g/L to 12 g/L (0 to 6 vol.) at 30 °C
0 g/L to 20 g/L (0 to 10 vol.) <15 °C

CO_2 repeatability s.d.:
Lab: 0.01 g/L (0.005 vol.)
At-line: 0.04 g/L (0.02 vol.)

CO_2 reproducibility s.d.:
Lab: 0.05 g/L (0.025 vol.)
At-line: 0.1 g/L (0.05 vol.)

Lab and At-line CO_2 Meter: CarboQC/CarboQC At-line and CarboQC ME

Whether directly at the production line or in the laboratory, CarboQC measures the true amount of dissolved carbon dioxide in soft drinks, beer, wine, and sparkling water.

The CarboQC ME measuring module is easily integrated into Anton Paar beverage analysis systems, such as PBA-S/SI/SD/SID, PBA-B and PBA-W.

Lab and At-line O_2 Meter: OxyQC/OxyQC Wide Range

The highly accurate determination of dissolved oxygen is based on the optochemical sensor's very fast response time and ideal temperature behavior. This leads to stable and precise results in less than 50 seconds. Durability and minimal maintenance are the prominent features that make this long-lasting optical sensor stand out.

O_2 measuring range:
0 ppm to 4 ppm or
0.015 ppm to 45 ppm

Repeatability s.d.:
±2 ppb or ±20 ppb

Reproducibility s.d.:
±4 ppb or ±50 ppb

O_2 response time t_{98}%:
Less than 20 seconds at 25 °C
from air to nitrogen

Alcohol Analysis

Specifications

Accuracy:
Alcohol: 0.2 %v/v; for samples with extract >100 g/L: 0.4 %v/v
Density: 0.001 g/cm³

Measuring range, alcohol:
Beer: 0.5 %v/v to 15 %v/v
Wine: 8 %v/v to 20 %v/v
Cider: 2 %v/v to 10 %v/v
Spirits/liqueurs: 10 %v/v to 41 %v/v
Sake: 5 %v/v to 20 %v/v

Measuring range, density:
0.95 g/cm³ to 1.2 g/cm³

Alcohol and Extract Meter: Alex 500

Alex 500 monitors all stages of your craft beverage production. During the fermentation process it displays a fermentation curve for each of your tanks, so you can swiftly react to undesired deviations. In the final production stages (e.g. during blending, aging, or before bottling) Alex 500 analyzes alcohol, extract, calories, and many more parameters. With this lab-grade analyzer you keep the quality and taste of your product stable and ensure that your bottles contain what their labels state.

Alcolyzer Beer Analyzing System

Alcolyzer Beer ME in combination with a DMA M density meter determines the alcohol content, real, apparent and original extract as well as other important quality parameters of all types of beer, including low-alcohol and non-alcoholic beer, beer mixtures, cider, and malt beverages. The patented, MEBAK-approved NIR measuring method eliminates the influence of other sample constituents on the alcohol measurement and therefore generates highly precise results.

Repeatability s.d.:
Alcohol: 0.01 %v/v
Original extract: 0.03 °Plato
Real extract: 0.01 %w/w
Apparent extract: 0.01 %w/w

Typical measuring time:
4 minutes incl. filling

Options:
Color, pH, turbidity, viscosity

Repeatability s.d.:
Alcohol: 0.01 %v/v
CO_2: 0.01 g/L (0.005 vol.)
Original extract: 0.03 °Plato

Output parameters:
Alcohol, real extract, original extract, apparent extract, CO_2, degree of fermentation, calories

Optional parameters:
Color, pH, turbidity, O_2

Packaged Beverage Analyzer for Beer: PBA-B M

PBA-B M determines all relevant quality parameters such as alcohol, original extract, CO_2, O_2, pH, and turbidity in all types of beers, including low-alcohol and non-alcoholic beer.

After automatic filling directly from the package and without the need for sample preparation, all parameters are determined simultaneously and displayed after only 4 minutes.

Wine Analyzing System

Alcolyzer Wine measures the alcohol content of wine, sparkling wine, cider, and sake using a patented NIR measuring method. Other sample constituents do not influence the alcohol analysis. In combination with a density meter, the system also determines the total extract of the sample. These parameters are provided after a typical measuring time of just 3 minutes.

Specifications

Measuring range:
0 %v/v to 20 %v/v alcohol

Repeatability s.d.:
0.01 %v/v alcohol

Typical measuring time:
Less than 3 minutes incl. filling

Optional modules:
pH ME, HazeQC ME, DMA M, Xsample 320 / Xsample 520

Alcohol Analysis

Specifications

Accuracy, alcohol:
0.2 %v/v

Repeatability s.d., alcohol:
0.1 %v/v

Measuring range, alcohol:
0 %v/v to 100 %v/v

Measuring range, temperature:
5 °C to 30 °C (41 °F to 86 °F)

Portable Alcohol Meter for Distilled Spirits: Snap 41

The Snap 41 portable alcohol meter measures the alcohol concentration of sugar-free distilled spirits in all strengths, replacing all glass hydrometers in the distillery. It allows very small distilleries to move into the digital age. The portable instrument measures your samples directly at the container within a few seconds. Results are temperature-compensated and shown in %v/v or °Proof.

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Measuring range:
Alcohol content: 0 %v/v to 20 %v/v
CO_2: 0 g/L to 12 g/L (0 vol. to 6 vol.)
O_2 (optional): 0 ppm to 4 ppm
pH (optional): 0 pH to 14 pH

Repeatability s.d.:
Alcohol content: 0.01 %v/v
CO_2: 0.01 g/L (0.005 vol.)
O_2 (optional): ±2 ppb
pH (optional): 0.02 pH

Packaged Beverage Analyzer for Wines and Sparkling Wines

The modular PBA-W M system determines all relevant parameters for wines and sparkling wines such as alcohol, extract, CO_2, O_2, pH, and turbidity after sampling directly from the package.

After automatic filling, all parameters are determined simultaneously and displayed after only 4 minutes.

Portable Alcohol Meter for Distilled Spirits: Snap 51

Snap 51 is a portable alcohol meter performing on-site measurements with an outstanding accuracy of 0.1 %v/v. It simplifies the whole distillation and watering down procedure in distilleries as samples of all strengths are measured with one and the same instrument. Sample names are automatically identified via RFID, results are shown in %v/v or °Proof and stored on the instrument, ready for printing or export to a PC later on.

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Accuracy, alcohol:
0.1 %v/v

Repeatability s.d., alcohol:
0.05 %v/v

Measuring range, alcohol:
0 %v/v to 100 %v/v

Measuring range, temperature:
0 °C to 40 °C (32 °F to 104 °F)

PQP-S available

All-in-one Alcohol Measuring Module: Alcolyzer ME

The Alcolyzer Analyzing System is the all-in-one solution for alcoholic beverage analysis which measures the alcohol and extract content of various alcoholic beverages such as spirits, wines, and beers. Optional modules for pH, color, and turbidity analysis are available in order to efficiently cover analysis of the required QC parameters with one single system.

Measuring range:
Beers: 0 %v/v to 12 %v/v
Wines: 0 %v/v to 20 %v/v
Spirits: 35 %v/v to 65 %v/v

Repeatability s.d.:
0.01 %v/v

Optional parameters:
pH, color, turbidity

Measuring range:
35 %v/v to 65 %v/v alcohol

Repeatability s.d.:
0.01 %v/v

Typical measuring time:
3 to 4 minutes

Optional parameters:
pH, color, turbidity

Alcolyzer Analyzing System for Spirits

The Alcolyzer Analyzing System for Spirits directly determines the most important parameters in spirits production: alcohol and total extract. Modular extensions for turbidity, pH, and color measurement can be fitted to create a custom-tailored solution. This modular and versatile system provides exactly what you need to accomplish daily tasks in the most efficient way.

L-Dens 7000 Series of Density Sensors

The L-Dens 7000 series combines the highest accuracy, compact design, and easy integration, which makes it best-in-class for precise density and concentration measurements.
The highest accuracy in temperature and optional pressure measurement is the basis for compensating unstable process conditions.

There are two types:
4-digit accuracy L-Dens 7400 and
5-digit accuracy L-Dens 7500.

Specifications

Industries: beverage, chemistry, pharma, petro, ethanol

Accuracy:
L-Dens 7400: 1 x 10^{-4} g/cm^3
L-Dens 7500: 5 x 10^{-5} g/cm^3

Process temperature:
-40 °C to 125 °C

Process pressure: max. 50 bar (HP version max. 180 bar)

CIP/SIP: 145 °C for max. 30 min.

Flow rate: ≤80 L/h

Accuracy: 1 x 10^{-3} g/cm^3

Process temperature:
-10 °C to 60 °C (GLS);
10 °C to 80 °C (SST)

Process pressure:
max. 6 bar (GLS); max. 16 bar (SST)

Wetted parts:
borosilicate glass (GLS);
stainless steel (SST)

Dimensions (L x W x H):
166 mm x 155 mm x 91 mm

L-Dens 3300 Density Sensors

The L-Dens 3300 density sensor is a powerful, flexible, and budget-friendly instrument for online density measurement and concentration determination at 3-digit accuracy. It is designed as a stand-alone sensor; therefore, there are no additional expenses for integration. The sensor is best suited for lab reactors, pilot- or production plants, for example.

L-Dens 2300 Density Sensors

L-Dens 2300 density sensors are flexible OEM modules which are integrated into instruments and systems. They monitor and control the density or concentration of liquids. These OEM modules are successfully applied in the production control of industrial inkjet printers, soldering machines, fuel measuring systems, measurement of sulfuric acid, and many more. L-Dens 2300 does not require any maintenance or consumables. This keeps your current and future investment costs low.

Flow rate: ≤80 L/h
Accuracy: 1 x 10^{-3} g/cm^3
Process temperature:
-10 °C to 60 °C (GLS, SST E);
10 °C to 80 °C (SST)
Process pressure:
max. 6 bar (GLS); max. 16 bar (SST)

Wetted parts:
borosilicate glass (GLS);
stainless steel (SST)

Dimensions (L x W x H):
88 mm x 38 mm x 48 mm (GLS)
99 mm x 34 mm x 38 mm (SST)
134 mm x 64 mm x 64 mm (SST E)

Specifications

Measuring principle: Absorption
Measuring range: 0 AU to 3 AU
Wavelengths: 1 to 3 channels – all with LED 430 nm and optional 280 or/and 700 nm (other wavelengths on request)
Resolution: 0.001 AU
Reproducibility: ±1 % transmission
Linearity: Better than ±0.5 % transmission
Process connection: VARIVENT® N

Color Sensor for Beverages: L-Col 6100

The color of beverages is an important key property for guaranteeing the quality of all kinds of beverages. L-Col 6100 offers MEBAK®-compliant inline color measurement with optional turbidity compensation.

The L-Col 6100 inline color sensor can be integrated into all Anton Paar beverage analyzers based on mPDS 5, new and existing systems alike.

Inline Refractometers: L-Rix 510/520

The world's first inline refractometer with soldered optics for fast and easy work in a wide range of hygienic applications. Immersed directly in the production liquid, it continuously displays the refractive index or sugar concentration, allowing for continuous measurement of liquids and pasty process flows.

This full-range sugar scale instrument meets the hygiene requirements according to EHEDG and is designed for CIP and SIP at up to 145 °C.

Maintenance-free

Never requires adjustment

Highly accurate

Ideal for pharmaceutical, food, and beverage applications

Intuitive touchscreen and compliant with NAMUR NE107

Various communication possibilities

Measuring range:
0 g/L to 12 g/L (0 vol. to 6 vol.)

Accuracy: ±0.05 g/L

Reproducibility s.d.:
0.05 g/L (0.025 vol)

Repeatability s.d.:
0.025 g/L (0.01 vol)

CIP: 95 °C, 4 hours

Interval: 4 seconds

Process CO_2 Sensor: Carbo 520 Optical

Our flagship comprises product-independent measurement* directly at an interval of 4 seconds. Higher pricing compared to mechanical Carbos is compensated by being completely maintenance-free and not requiring supplies like compressed air. Carbo 520 Optical is certified hygienic (EHEDG Type EL Class I). Thanks to internal design* it delivers drift-free readings even right after CIP/SIP.

*based on patented technology by Anton Paar (AT512291B1, AT512375B1)

Sound Velocity Sensors: L-Sonic 5100/6100

The L-Sonic sound velocity sensors are easily installed and help you optimize the consumption of raw materials and energy, and maximize production. The sensors offer two types of sensing elements: a fork-type L-Sonic 5100 and a tube-type L-Sonic 6100.
They are ready for various applications, such as inline concentration measurements, interface detection, or product identification. The sensors continuously monitor the product quality of liquids during production.

Specifications

Example applications:
beverages, chemicals, OCR, petroleum, pharmaceuticals, pickling baths
Repeatability:
0.005 m/s (L-Sonic 5100)
0.01 m/s (L-Sonic 6100)
Process temperature:
-25 °C to 125 °C
CIP/SIP: 145 °C for max. 30 min.
Process connections:
L-Sonic 5100: VARIVENT® N or G, DIN 11851, EN 1092-1, AN B16.5;
L-Sonic 6100: tube OD 12 mm

Specifications

Measuring range:
0 g/L to 20 g/L (0 vol. to 10 vol.)

Accuracy: ±0.05 g/L

Reproducibility s.d.:
0.05 g/L (0.025 vol.)

Repeatability s.d.:
0.025 g/L (0.01 vol.)

CIP: 121 °C, 30 minutes

Interval: 15 seconds

Process CO_2 Sensor: Carbo 510

Carbo 510 provides a good balance between high accuracy, speed, and price. With a single volume expansion and a measurement cycle of 15 seconds Carbo 510 is fast enough to be used for closed-loop control of carbonators. Carbo 510 can be used as a stand-alone with operating terminal (OT), remote OT (ROT), or with an mPDS 5 evaluation unit. All of them support communication via analog, PROFIBUS DP, PROFINET, Ethernet/IP, Modbus TCP, and DeviceNet.

Accuracy: 5 x 10^{-5} g/cm³ (density); 0.1 m/s (sound velocity)

Process pressure: max. 50 bar

Temperature: -5 °C to 80 °C; CIP/SIP: 145 °C for max. 30 min.

Dimensions (L x W x H):
260 mm x 145 mm x 200 mm

Determined parameters:
true density, temperature-compensated density, sound velocity, temperature-compensated sound velocity, concentration

Combined Density and Sound Velocity Sensor: L-Com 5500

L-Com 5500 is Anton Paar's density and sound velocity sensor combination for the measurement of 3-component mixtures with one instrument. It provides the highest accuracy on the market and is ideal for the monitoring and controlling of chemicals such as formaldehyde-methanol-water mixtures or for the production control of beers, which are analyzed by their alcohol, extract, and water content.

Online CO_2 Measurement in Samples Containing Other Gases: Carbo 2100 MVE

This is the right choice for nitrogenized beers or other carbonated drinks with additional nitrogen.

The Carbo 2100 MVE online sensor uses the 'multiple volume expansion' (MVE) method which measures the temperature and pressure equilibrium at two different volume expansions. It calculates the correct CO_2 and N_2 content from these values.

Measuring range:
0 g/L to 20 g/L (0 vol. to 10 vol.)

Accuracy:
±0.05 g/L

Reproducibility s.d.:
0.05 g/L (0.025 vol.)

Repeatability s.d.:
0.025 g/L (0.01 vol.)

CIP:
121 °C, 30 minutes

Interval:
24 seconds

Inline Oxygen Sensor: Oxy 510

Oxy 510 measures dissolved oxygen (DO) in both the trace and the wide range. Switching the measuring ranges is easily done by exchanging the sensor cap. The built-in Toolmaster™ automatically identifies the cap and all adjustment parameters. Oxy 510 is ready to measure right out of the box and is certified hygienic (EHEDG Type EL Class I). It can be used as a stand-alone with a (remote) operating terminal or with an mPDS 5 evaluation unit, both supporting communication via analog, PROFIBUS DP, PROFINET, Ethernet/IP, Modbus TCP, and DeviceNet.

Measuring range:
0 ppb to 2000 ppb (trace range)
0 ppm to 24 ppm (wide range)
Accuracy:
≤±1 ppb or ±3 %
≤±0.048 ppm or ±3 %
Reproducibility s.d.:
≤0.8 ppb or 2 %
≤0.038 ppm or 2 %
Repeatability s.d.:
≤0.5 ppb or 1 %
≤0.024 ppm or 1 %
CIP/SIP: 99 °C
Interval: 1 to 60 seconds
Process connection:
VARIVENT® N

Example applications:
Petrochemicals
Ceramic slips
Viscose
Industrial starch
Oils and lubricants
Hydraulic fracturing fluids
Bitumen
Detergents
Chemically enhanced oil recovery
Foods

Inline Viscometer: L-Vis 510

Immersed directly in the production liquid, inline viscometers continuously display the viscosity at the process temperature and reference temperature, allowing 24-hour monitoring of process liquids.

Anton Paar's inline viscometers have an integrated display and evaluation unit with standard industrial interfaces. They fulfill the NAMUR recommendation NE107 (self-monitoring and diagnosis).

Alcohol Monitor

Determining the alcohol content of binary mixtures for various beverages using density, sound velocity, or refractive index. Depending on the integration and legal requirements, the most appropriate configuration can be chosen. All Alcohol Monitor versions are maintenance-free and can be installed directly in the main line, which saves time and minimizes operating costs.

Specifications

Three measurement technologies to fit your requirements:

L-Dens 7500: with the highest accuracy; suitable for fiscal measurements

L-Sonic 5100: the best sensor for applications requiring modest accuracy

L-Rix 510: for pulpy and viscous samples

Inline Beverage Analysis

Specifications

Accuracy:
<0.02 °Brix
(range: 0 °Brix to 50 °Brix)
<1 %Diet
(range: 0 %Diet to 150 %Diet)
0.025 vol. (0.05 g/L) CO_2
(range: 0 vol. CO_2 to 6 vol. CO_2)
0.04 %w/w alcohol
(range: 0 %w/w to 16 %w/w alcohol)

Inline Beverage Analyzers: Cobrix 5500/5600

Cobrix 5500 and Cobrix 5600 are ideal for the beverage analysis of soft drinks, beer, wine, cider, FABs, juice, diet drinks, tea, and other beverages. You can count on the continuous, accurate, and safe measurement of essential quality parameters such as °Brix, %Diet concentration, CO_2, alcohol, sugar inversion, extract, and more throughout your production process.

Accuracy/repeatability:
Beer Monitor 5500/5600
Alcohol: 0.02 %w/w / 0.01 %w/w
Real extract:
0.02 °Plato / 0.01 °Plato
Original extract:
0.04 °Plato / 0.01 °Plato
CO_2: 0.05 g/L / 0.01 g/L
0.025 vol. / 0.005 vol.

Wine Monitor 5500/5600
Alcohol: 0.04 %w/w / 0.02 %w/w
Extract: 0.4 g/L / 0.2 g/L
CO_2: 0.05 g/L / 0.01 g/L
0.025 vol. / 0.005 vol.

Beer Monitor 5500/5600 & Wine Monitor 5500/5600

Beer Monitor 5500/5600 continuously monitors the alcohol content, apparent and real extract, original extract, degree of fermentation, density, CO_2, and temperature. The system accomodates a wide range of beer styles, as well as non-alcoholic beers, FMBs/FABs, ciders, and shandies.

Wine Monitor 5500/5600 determines the alcohol, extract, and CO_2 content of wine.

Inline Beverage Analyzer: Cobrix 2600

One sensor – two measurements: the optical measurement of Cobrix 2600 selectively determines the dissolved CO_2 and the dissolved sugar content in one go.

Real inline monitoring quickly informs you about the desired concentrations, which keeps production loss and raw material input at a minimum. Cobrix 2600 is maintenance-free.

CO_2: g/L // **Sugar:** °Brix
Range: 0 to 12 // 0 to 12.5
Accuracy: ±0.05 //±0.1
Repeatability: ±0.05 // ±0.1
Reproducibility: 0.01 // 0.1
Resolution: <0.01 // <0.02

CIP/SIP: 95 °C (max. 4 h)
Measuring interval: min. 4 s
Process connection: VARIVENT® N

Hygienic certificate: EHEDG Type EL Class I

Brix Monitor

The Brix Monitor enables highly accurate inline sugar concentration measurements. It continuously determines the °Brix value of soft drinks, fruit juice, and syrup using density, sound velocity, or refractive index. Maintenance-free operation and direct installation in the line with integrated HMI result in cost-optimized monitoring and control.

Three measurement technologies to fit your requirements:

L-Dens 7400/7500
The highest accuracy
Suitable for fiscal measurements
Digital signal processing

L-Sonic 5100
The best value for applications requiring modest accuracy
EHEDG-certified

L-Rix 510
For pulpy and viscous samples
EHEDG-certified

Enhanced usability with intuitive human-machine interface and several choices of main screen layout via 8.4“ color touchscreen

Alerts to prevent out-of-spec production (screen color and via digital outputs)

Numerous user programs preinstalled

Flexible connectivity with USB, Ethernet (LAN), analog, and various fieldbus outputs

Evaluation Unit: mPDS 5

The mPDS 5 evaluation unit with graphical color touchscreen interface continuously converts the raw values from the process sensors into application-specific concentration results. Numerous user programs are preconfigured, and creating new concentration polynomials and special programs is easy. Available fieldbus interfaces include PROFIBUS DP, PROFINET IO, EtherNet/IP, Modbus TCP, and DeviceNet.

Extract/Original Extract/Plato Monitor

Monitor the extract concentration in hot and cold wort (monitor versions based on density, sound velocity, or refractive index available) and determine the original extract of your beer (monitor versions based on sound velocity).

Specifications

Accuracy:
0.025 °Plato (based on density)

0.06 °Plato (based on sound velocity)

0.05 °Plato (based on refractive index)

Specifications

Alcohol:
0 %w/w to 12 %w/w,
0 %v/v to 15 %v/v

Real (original) extract:
0 °Plato to 12 °Plato
(0 °Plato to 35 °Plato)

Dissolved CO_2 concentration:
0 vol. to 6 vol., 0 g/L to 12 g/L

Dissolved O_2 concentration:
0 ppb to 2000 ppb

Beer Analysis by Integrated Module: Animo 5100

Animo 5100 is a modular measuring system which delivers all critical quality control parameters from the beer filling line. It integrates the high-quality online sensors, analyzers, and mechanical components needed for precise and safe operation.

Parameters:
Original extract [°Plato]
Apparent extract density [°Plato]
Alcohol [%w/w]
Alcohol 20 °C [%v/v]
Real extract [°Plato]
Real degree of fermentation [%]
Fermentation speed [alcohol 20 °C increase in %v/v/h]
Values match the reference values by typically better than <0.1 °Plato and <0.2 %v/v alcohol

Fermentation Monitor

The Fermentation Monitor continuously monitors the alcoholic fermentation during the production of beer, wine, or spirits based on an inline refractive index measurement.

Sampling Systems for the L-Dens 7000 Series

The sampling systems for the L-Dens 7000 density sensor are a full one-stop-shop solution for density and concentration measurement. The properties of the media to be measured define the used materials and components. The layout of the facility and the operating modes build the framework conditions for the design of the sampling and measuring system.

Modular reference systems form the basis for easy and cost-efficient customization

Fully integrated via an inline adapter, bypass, or pump

Your specifications define the used materials, components, and design of the sampling and measuring system

Wine Monitor

Both Wine Monitor 5500 and Wine Monitor 5600 are highly accurate instruments for the continuous monitoring of the alcohol content, extract, density, and CO_2 concentration of all wines – from red, white, and rosé wines to wine mix drinks.

Accuracy/repeatability:
Alcohol: 0.04 %w/w / 0.02 %w/w
Extract: 0.4 g/L / 0.2 g/L
CO_2: 0.05 g/L / 0.01 g/L
0.025 vol. / 0.005 vol.

Ready-to-go measuring solutions

Minimum implementation effort

Flexible and open

Solutions for all environments

One-stop shop for systems and services

Expertise in Process and Plant Engineering

We combine our leading measuring technologies and process- and application-specific know-how with process engineering services.

A complete set of project services ensures that systems/solutions are integrated into customers' environments and infrastructures. The benefits are best-in-class measuring and process solutions and highly efficient implementation projects.

Modular Circular Polarimeters: MCP 100/150

The MCP 100/150 polarimeters provide proven technology packaged into a compact polarimeter. They fit into every laboratory, are easy to operate, and provide full compliance with all relevant national and international standards. MCP 150 also comes with all necessary 21 CFR Part 11 features. It is the right choice for analysis in the pharmaceutical, cosmetics, food, and chemical industries as well as for R&D and medical applications.

Specifications

Measuring range: ±89 °OR

Resolution: 0.001 °OR

Accuracy:
0.01 °OR (MCP 100)
0.005 °OR (MCP 150)

Temperature control:
20 °C/25 °C (MCP 100)
15 °C to 35 °C (MCP 150)

PQP/PQP-S available

Specifications

Analyzed sugar beet parameters:
Sugar content (polarization, °Z)
Potassium (K)
Sodium (Na)
α-amino nitrogen (α-N)
Optional: on glucose (invert sugar)

Calculation of relevant data:
Sugar yield
Molasses sugar content

Lead- and alternatively clarified samples can be measured at a sample rate of 120/h

Quality Analysis of Sugar Beet: Betalyser

The Betalyser laboratory system analyzes sugar beet quality according to official ICUMSA methods. Using this solution, a payment system for sugar beet can be established based on technical quality and not just on tonnage or polarization.

By optimizing fertilization and cultivation, a higher beet quality is achieved in a short period of time. Better sugar beet varieties with high sucrose content and a genetically improved white sugar yield can be developed.

Measuring range:
±89 °OR

Resolution:
0.001 °OR to 0.0001 °OR

Accuracy:
±0.0024 °OR (MCP 5100)
±0.0020 °OR (MCP 5300)
<0.0020 °OR (MCP 5500)

Temperature control:
10 °C to 45 °C (Peltier system)

PQP/PQP-S available

Modular Circular Polarimeter Series: MCP 5X00

The new MCP 5X00 series combines cutting edge technology, excellent usability, and modern design: The LED light source for all wavelengths makes the MCP polarimeters virtually maintenance-free. The built-in 21 CFR Part 11 features make MCP 5X00 ideal for measuring the concentration of optically active substances in the pharmaceutical, cosmetics, chemical, and medical industries.

Apparent Purity, Polarization, and Dry Substance: MCP Sucromat and Abbemat Series

MCP Sucromat polarimeters and Abbemat refractometers are combined into an efficient team for enhancing sugar factories' performance. The raw, intermediate, and final products of sugar manufacturing are subjected to fast, automated analyses to determine sugar content (°Z), dry substance (°Brix), and apparent purity.

To measure polarization (°Z):
MCP 5300/5500 Sucromat

To measure dry substance (°Brix):
Abbemat 300/500
Abbemat 350/550

Saccharimeters: MCP 5300/5500 Sucromat

The MCP Sucromat saccharimeter series precisely determines the sugar content (Pol, °Z) and measures at 589 nm (equal to Sodium D line) according to ICUMSA. The optional 880 nm NIR wavelength is ideal for the analysis of lead-free clarified solutions. All wavelengths are generated by virtually maintenance-free LEDs.

Measuring range:
±259 °Z

Resolution:
0.001 °Z

Accuracy:
0.01 °Z (MCP 5300 Sucromat)
0.006 °Z (MCP 5500 Sucromat)

Temperature control:
20 °C and 25 °C (Peltier system)

PQP/PQP-S available

Reflectance color measurement of white sugar crystals:
Compliant with ICUMSA standard GS2-13

Displays results in ICUMSA color type units

PTB-certified ceramic standards for adjustment available

Results independent of operator

Reflectance Colorimeter for White Sugar: Sucroflex

Sucroflex is a reflectance colorimeter for color grading white sugar crystals.

The reflectance color is an eye-catching quality factor of white sugar crystals. In the past, the reflectance color was estimated visually, so findings depended on illumination and the operator.

Sucroflex replaces this visual estimation by a precise photoelectric measurement.

Compact Refractometers: Abbemat 3X00

Reliability, precision, and convenience: Abbemat 3X00 refractometers offer an exceptional combination of technical expertise and user-friendly operation for refractive index and concentration measurements. The premium technology and compactness of the Abbemat 3X00 series transform time-consuming measurements into highly efficient quality control.

Buy online
shop.anton-paar.com

Specifications

Refractive index:
Range: 1.3 nD to 1.66 nD
(Abbemat 3000 & Abbemat 3100)
Range: 1.3 nD to 1.72 nD
(Abbemat 3200)
Accuracy: ±0.0001 nD
Resolution: ±0.0001 nD

°Brix:
Range: 0 % to 100 %
Accuracy: ±0.05 %
Resolution: ±0.01 %

PQP-S available

Refractometry

Specifications

Abbemat Juice Station 300:
Range: 0 °Brix to 100 °Brix
Accuracy: 0.05 °Brix
Resolution: 0.01 °Brix

Abbemat Juice Station 550:
Range: 0 °Brix to 100 °Brix
Accuracy: 0.015 °Brix
Resolution: 0.001 °Brix

Abbemat Juice Station: Based on Abbemat 300/550

The Abbemat Juice Station refractometers are used for fast and easy Brix measurements. They are the ideal solution for measuring fruit juices. The vertical setup avoids sedimentation of particles like pulp on the measuring prism and ensures reliable and stable measuring results.

Refractive index:
Abbemat 300:
Range: 1.26 nD to 1.72 nD
Accuracy: ±0.0001 nD
Resolution: ±0.00001 nD

Abbemat 500:
Range: 1.26 nD to 1.72 nD
Accuracy: ±0.00002 nD
Resolution: ±0.000001 nD

PQP/PQP-S available

Performance Line Refractometers: Abbemat 300/500

The robust and easy-to-operate Abbemat 300/500 refractometers are ideal solutions for routine analysis and quality control. The display gives a clear pass/fail result for analysis of large numbers of samples when time is short. The refractometers are successfully combined with Anton Paar's DMA M density meters, MCP polarimeters and SVM viscometers.

Heavy Duty Refractometers: Abbemat 450/650

The Abbemat 450 and Abbemat 650 Heavy Duty refractometers combine robustness with high precision. Via remote operation the instruments can be used at-line, in fume hoods, or in glove boxes. The durable measuring unit is waterproof (IP68) and withstands hosing off the production plant. A vertical positioning enables reliable results for samples containing particles or pulp. These refractometers offer a temperature control range from 4° C to 125° C.

Refractive index:
Abbemat 450:
Range: 1.26 nD to 1.72 nD
Accuracy: ±0.0001 nD
Resolution: ±0.00001 nD

Abbemat 650:
Range: 1.26 nD to 1.72 nD
Accuracy: ±0.00002 nD
Resolution: ±0.000001 nD

PQP/PQP-S available

Performance Plus Line Refractometers: Abbemat 350/550

The versatile, high-end Abbemat 350/550 refractometers are designed for research and development and demanding quality control applications. The large and intuitive touchscreen display simplifies navigation. These refractometers are easily expanded by numerous accessories and can be combined with Anton Paar's DMA M density meters, MCP polarimeters, and SVM viscometers.

Refractive index:
Abbemat 350:
Range: 1.26 nD to 1.72 nD
Accuracy: ±0.0001 nD
Resolution: ±0.00001 nD

Abbemat 550:
Range: 1.26 nD to 1.72 nD
Accuracy: ±0.00002 nD
Resolution: ±0.000001 nD

PQP/PQP-S available

Refractive index:
Range: 1.30 nD to 1.72 nD
Accuracy: ±0.00004 nD
Resolution: ±0.000001 nD

Up to 8 optional wavelengths in the range from 436 nm to 656 nm

Multi-Wavelength Refractometer: Abbemat MW

The Abbemat MW enables measurements of the refractive index at different measuring wavelengths, e.g. for dispersion and Abbe number determination. For these measurements Abbemat MW can be equipped with up to 8 different wavelengths. This makes the Abbemat MW digital refractometer a versatile instrument for investigating liquids, polymer bonds, and glasses.

Handheld Raman Spectrometer: Cora 100

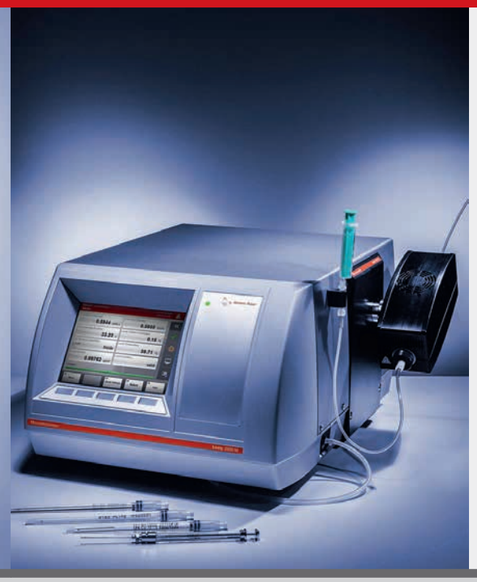
The Cora 100 handheld Raman analyzer is the ruggedized, straightforward solution for the identification of unknown substances within seconds. Cora 100 helps authorities (e.g. CBRN experts or hazmat teams) to assess potentially hazardous materials and provides on-the-spot identification of narcotics, listed substances, explosives, or chemicals. Additionally, the instrument is ideal for verification measurements on incoming goods in industrial applications.

Specifications

Wavelength:
785 nm

Spectral range:
400 cm^{-1} to 2300 cm^{-1}

Resolution:
10 cm^{-1}



Specifications

Measuring range:
0.3 mPa.s to 10,000 mPa.s
Temperature: -20 °C to 100 °C

Accuracy:
0.5 %*

Repeatability s.d.:
0.1 %*

USP 913; Pharm.Eur.2.2.49; PQP/PQP-S available

*refer to brochure

Microviscometer: Lovis 2000 M/ME

The Lovis 2000 M/ME rolling-ball microviscometer determines the dynamic, kinematic, relative, and intrinsic viscosity of liquids with high precision. It allows testing of small sample volumes starting from 100 µL. Borosilicate glass or break-proof PCTFE capillaries ensure high chemical resistance. Flow-through filling enables easy handling, high sample throughput, and combination with Anton Paar density meters and other instruments, such as Xsample 520 or Abbemat refractometers.

Single-band instrument wavelengths:
532 nm
785 nm
1064 nm

Dual-band instrument wavelengths:
532 nm + 785 nm
532 nm + 1064 nm
785 nm + 1064 nm

Benchtop Raman Spectrometers: Cora 5X00

The Cora 5X00 series combines a small footprint with the performance and high repeatability of a benchtop instrument. The transportable single- or dual-wavelength Raman spectrometers achieve maximum Raman signal and minimum fluorescence background.

Kinematic Viscometers: SVM Series

The SVM series gives you more parameters than any other kinematic viscometer on the market: kinematic viscosity, density, dynamic viscosity, viscosity index and more – all from one syringe. The highly precise Stabinger Viscometers are based on the Couette measuring principle and have an integrated density measuring cell. There is an SVM for every application: ranging from lubricating oils, used oils, crude oils, heavy fuels, and distilled fuels to vegetable oils and fats.

Measuring range:
0.2 mm^2/s to 30,000 mm^2/s

Density range:
0.6 g/cm^3 to 3 g/cm^3

Temperature range:
+15 °C to +100 °C (SVM 2001)
-60 °C to +135 °C (SVM 3001)
+15 °C to +100 °C (SVM 4001)

Optional combination with:
Xsample 340, Xsample 520, Xsample 530, Xsample 630

PQP/PQP-S available

TE-Cooled Benchtop Raman Spectrometers: Cora 7X00

The Cora 7X00 series of high-performance Raman spectrometers has been developed for academic and industrial research. To achieve a high signal-to-noise ratio for low-scattering or low-concentration samples, the instruments are equipped with cooled or deep-cooled detectors. With the fiber probe, the Cora 7X00 Raman spectrometers can be easily attached to experimental setups.

Wavelengths:
532 nm
785 nm
1064 nm

Spectral range:
100 cm^{-1} to 3200 cm^{-1}

Resolution:
up to 4 cm^{-1}

Speed range:
0.1 1/min to 200 1/min

Max. spring torque per model:
L: 0.0673 mNm
R: 0.7187 mNm
H: 5.7496 mNm

Viscosity range per model (M = million):
L: 1 mPa.s to 6M mPa.s
R: 10 mPa.s to 40M mPa.s
H: 60 mPa.s to 320M mPa.s

Accuracy/repeatability:
±1.0 %/±0.2 % full scale range

Rotational Viscometer: ViscoQC 100

ViscoQC 100 is Anton Paar's entry-level digital rotational viscometer that measures the dynamic viscosity as a single-point value. Unbeatable ease of use makes ViscoQC the new standard for traceable viscosity checks. Unique features include automatic spindle detection by Toolmaster™, automatic guard detection by TruGuard, magnetic spindle coupling for easy one-handed exchange of spindles, the special TruMode (Auto Mode), and many more.

Buy online
shop.anton-paar.com

Single Samples: Xsample 320

User-independent filling and therefore reduction of handling errors can be achieved with this single-sample device. Operators are able to focus on more important tasks while filling and measurement is performed automatically. The simple and robust design using a peristaltic pump makes Xsample 320 maintenance-free. The flexible filling speed enables fast measurements and optimized sample treatment for perfect measuring results.

Specifications

Application:
Alcoholic beverages, soft drinks, syrup, diluted polymer solutions

Filling viscosity:
3,000 mPa.s

Number of samples:
1 position

Specifications

Applications:
Alcoholic beverages, soft drinks, syrup, diluted polymer solutions

Filling viscosity:
3,000 mPa.s

Number of samples:
up to 48 positions

Multiple Samples: Xsample 520

With Xsample 520, user-independent filling of numerous Anton Paar master instruments is ensured by stepless adjustability in combination with a smart pump lock. Unattended filling and measurement are possible even during the night and at weekends. Equipped with a peristaltic pump, Xsample 520 fills sample into the measuring cell without rinsing and drying and saves valuable time when enough sample is available and sample recovery is not necessary.

Applications:
Chemical samples, alcoholic beverages, inks

Filling viscosity:
3,000 mPa.s

Number of samples:
1 positions

Single Samples: Xsample 330

Enhancing the benefits of user-independent filling by adding automatic cleaning makes Xsample 330 perfectly suitable for measuring low-viscosity samples with significantly different properties in direct succession. Once measured, the sample is drained and the system is automatically cleaned with up to two rinsing agents. To perfectly prepare the measurement cell(s) for the next sample a drying step is performed as well.

Multiple Samples: Xsample 530

The Xsample 530 sample changer handles a wide range of liquid viscosities. Its fully automated filling, rinsing, and drying routines ensure perfect results without any sample cross-contamination. With up to three cleaning liquids, Xsample 530 is ready to measure a great diversity of samples in one run. The robust mechanical components and a superior resistance to chemicals result in an increased uptime of the system and low maintenance costs.

Applications:
Petrochemical samples, flavors and fragrances, chemical samples, pharmaceutical samples, food

Filling viscosity:
36,000 mPa.s

Number of samples:
up to 71 positions (with bar code)

Single Samples: Xsample 340

Xsample 340 is a single-sample device for different types of syringes that automatically fills all Anton Paar master instruments. Perfect filling and excellent precision are facilitated by the system's adjustable filling speed. Many years of trouble-free operation are guaranteed due to the straightforward and robust design. Xsample 340 is automatically prepared with up to two cleaning agents, ensuring perfect measuring conditions regardless of the operator and sample.

Applications:
Petrochemical samples, chemical samples, pharmaceutical samples, food, flavors and fragrances, health care products

Filling viscosity:
36,000 mPa.s

Number of samples:
1 position

Applications:
Petrochemical samples, waxes, food, flavors

Number of samples:
up to 36 positions

Multiple Samples: Xsample 630

The Xsample 630 with its improved heating leads to short heating periods, time savings, and increased performance. Temperatures up to 95 °C are achieved in the system. Even challenging samples can be measured according to ASTM standards. Featuring a removable magazine with dedicated non-heated positions, this sample changer saves additional time by facilitating sample handling and acts as a two-in-one sample changer.

Rotational Rheometer: RheolabQC

RheolabQC is a rotational rheometer featuring a highly dynamic EC motor for fast and convenient viscosity measurement and routine rheological checks. It is used for investigations of the flow behavior of paints and coatings, food, cosmetics, pharmaceuticals, adhesives, oils, asphalt, and many more. RheolabQC can be operated as a stand-alone or software-controlled rheometer. Numerous measuring geometries and accessories, including a Peltier temperature device, are available.

Specifications

Speed range:
0.01 1/min to 1200 1/min

Torque range:
0.20 mNm to 75 mNm

Viscosity range:
1 mPa.s to 10^9 mPa.s

Temperature range:
-20 °C to 180 °C

PQP/PQP-S available

Rheometry

Specifications

Torque range:
0.5 nNm to 230 mNm (CMT)

Angular velocity range:
10^{-9} rad/s to 2 x 314 rad/s

Angular frequency range:
10^{-7} rad/s to 628 rad/s

Normal force range:
0.001 N to 50 N

Temperature range:
-160 °C to 1000 °C

Modular Compact Rheometer: MultiDrive MCR 702

The MCR 702 MultiDrive rheometer can perform rheological tests with two torque transducers and drive units at once. Due to the modular setup and the possibility to use two powerful EC motor units, MCR 702 MultiDrive is able to work in single-drive mode (combined motor transducer, CMT) and also in the TwinDrive modes: counter-rotation, counter-oscillation, and separate motor transducer (SMT). This means it covers all possible rheological applications.

Speed range:
10^{-3} rpm to 1500 rpm

Angular velocity range:
10^{-4} rad/s to 157 rad/s

Torque range:
1 µNm to 125 mNm

Angular frequency range:
10^{-4} rad/s to 628 rad/s

Temperature range:
-5 °C to 200 °C

PQP/PQP-S available

Modular Compact Rheometers: MCR 72 and MCR 92

The two wisest choices for quick and easy rheological measurements, streamlined for the daily lab routine. Special features like a step-by-step software, TruRay (integrated light), QuickConnect (fast and easy mounting of the measuring system), Toolmaster™ (automatic tool recognition and configuration), and several patented air-cooled Peltier temperature units (H-PTD, C-PTD, or P-PTD) guarantee excellent ease of use.

Furnace Rheometer System: FRS 1800 (1600)

Viscosity measurements up to the highest temperatures: The FRS 1800 (1600) furnace rheometer systems combine a DSR 502 rheometer head and a lab furnace. Designed for viscosity measurements between 1 mPa.s and 10^7 Pa.s and at temperatures up to 1800 °C (1600°C), these systems characterize the rheological behavior of all kinds of melts in rotation and oscillation. The result is reliable data of high quality for R&D, QC, and process development.

Temperature range:
300 °C to 1800 °C (1600°C)

Torque range:
10 nNm to 230 mNm

Normal force range:
0.005 N to 50 N

Maximum speed:
300 rpm

Test modes:
Rotation and oscillation

Modular Compact Rheometers: MCR 102, MCR 302, MCR 502

The MCR rheometer series provides any type or combination of rheological tests (rotational or oscillatory) based on the low-friction, air-bearing-supported synchronous EC motor technology. The modularity of the system allows the integration of a wide range of temperature devices and application-specific accessories to solve all kinds of measurement tasks.

Angular velocity range:
10^{-9} rad/s to 314 rad/s

Torque range:
0.5 nNm to 300 mNm

Angular frequency range:
10^{-7} rad/s to 628 rad/s

Normal force range:
0.005 N to 70 N

Temperature range:
-160 °C to 1000 °C

PQP/PQP-S available

Standard methods:
AASHTO T315, AASHTO T350, AASHTO TP101-UL, ASTM D7175, ASTM D7405, DIN EN 14770, AASHTO T316, ASTM D4402, DIN EN 13302, FGSV AL 720, 721, 722, 723

Temperature range:
-30 °C to 120 °C

Torque range:
5.0 nNm to 200 mNm

Angular frequency:
10^{-7} rad/s to 628 rad/s

Dynamic Shear Rheometer: SmartPave

SmartPave is based on the latest technology used by MCR rheometers with the well-established EC motor system. It incorporates innovative features like Toolmaster™, a Peltier temperature device for dry sample heating, and step-by-step instructions for measuring procedures that take bitumen and asphalt binder rheology to previously unattained levels of accuracy, comfort, and ease of use.

Modular Compact Rheometers: Accessories for Additional Parameters

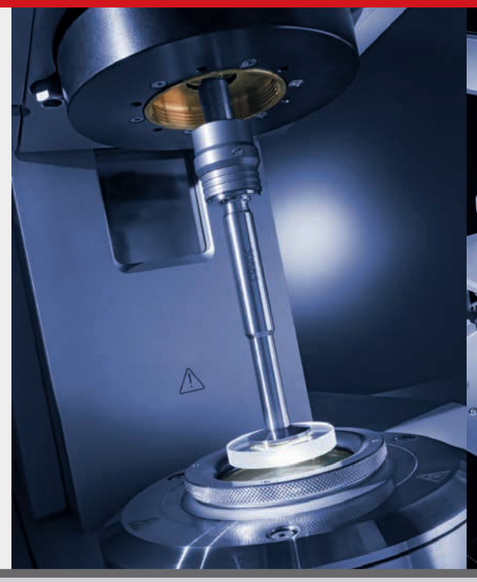
A wide range of application-specific accessories is available for easy integration into MCR rheometers, enabling additional parameter setting, optical and dielectric sample structure analysis combined with rheology as well as the transfer of MCR rheometers' capabilities into other material characterization applications.

Specifications

Additional parameters:
Magneto- and Electrorheology, Dielectric Spectroscopy, Pressure, Humidity

Structure analysis and optics:
Rheo-SALS/SAXS/SANS, Particle Image Velocimetry, UV, Microscopy, Polarized Imaging

Material characterization:
Building Material Cell, Starch Cell, DMA, Extensional Rheology, Powder Cell, Tribology



Specifications

Works with:
Viscometers
Density and concentration meters
Abbemat refractometers
MCP polarimeters
PQ index wear debris
pH meters
FT-IR spectrometers
Color measurement

Software:
HTX control software
LIMS/SAP interface

High Throughput Platform: HTX

The HTX automation platform is based on a modular concept. Single measurement and tray modules can be combined to suit your needs. Start with a minimum module configuration and flexibly adapt to your future requirements.

The HTX platform is also ready to integrate additional Anton Paar analytical instruments and, in the same way, external instruments with a flow cell.

Sample volume:
Min. 40 mL to 80 mL

Measurement systems:
Two-blade stirrer, Warren-Spring geometry, wall friction system, cylinder, profiled cylinder, compression stamp, further systems on request

Equipment kit for scientific purposes available (incl. mass flow controller and pressure sensor)

Compatible with:
MCR WESP and all devices from the MCR xx1 and MCR xx2 series

Modular Compact Rheometers: True Powder Rheology

With a Powder Cell, an MCR rheometer can be upgraded to a versatile powder rheometer which brings the full array of traditional rheological methods into the field of powder. This combination enables easy, reliable, and extraordinarily reproducible powder flow measurements for quality control and also advanced investigations in the field of granular media in any state of either consolidation or fluidization.

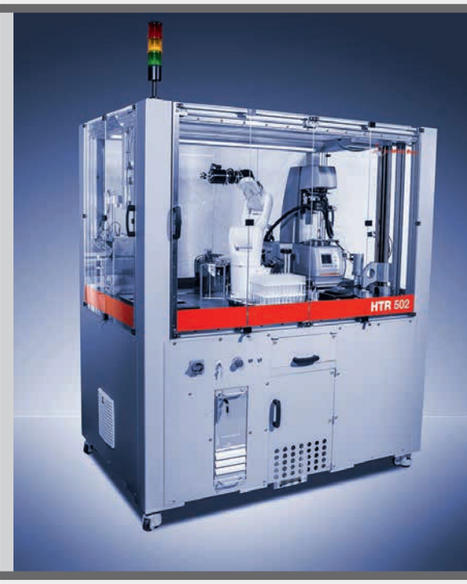
High Throughput Rheometer: HTR 502

HTR (High Throughput Rheometer) is the first fully automated rheometer available. It combines the advantages of high-throughput screening with the reliability of an MCR rheometer. The complete automation of the entire measuring procedure from sample loading to data evaluation is customized to fit individual needs.

Geometries:
Concentric cylinder (CC)
Cone-and-plate (CP)
Parallel-plate (PP)
Incl. automated trimming

Features:
MCR series rheometer
6-axis robot arm
Process tracking
pH module
Four-stage cleaning station

Software:
HTX control software
LIMS/SAP interface



Customized Solutions: MCR 502 WESP

Anton Paar is able to develop customized measuring setups with the renowned accuracy and modularity of the MCR rheometers. The extensive range of accessories for MCR can also be installed in these setups.

MCR WESP is ideal for combinations with optical analysis instruments. This flexible instrument offers plenty of space and a good view of the sample and is therefore open for all measuring tasks.

Typical combinations:
Confocal microscopy (CLSM/CSDM)

Spectroscopy

X-ray scattering (SAXS, WAXS)

Neutron scattering (SANS)

Customized accessories

Applications:
Food
Polymers
Paints & coatings
Cosmetics
Personal hygiene
Home care

High Throughput Rheometers: HTR 102/302 compact

The HTR 102/302 compact is the unique fusion of an MCR 102 or MCR 302 rheometer with an automated workflow in benchtop design for the measurement of up to 36 samples. With this unit you can run your measurements in rotating or oscillating mode. HTR 102/302 compact provides many novel features, such as a station for tempering your samples, an automated capping/decapping device, and an integrated cleaning station.

Modular Sample Processor

The Modular Sample Processor is made for automated sample preparation steps prior to analysis. It makes many samples from one sample or combines many samples to make one sample.

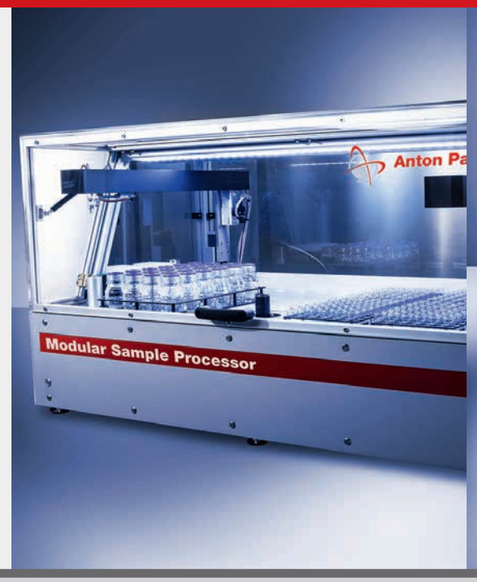
It can be used as a stand-alone benchtop unit or integrated into complete automated workflows. Liquid samples up to 1000 mPa.s can be processed. The Modular Sample Processor can be used for liquids, pastes, and powders. It handles input volumes up to 1 L.

Specifications

Sample preparation:
Dilutions, blends, mixtures, subsampling, homogenization

Features:
Precise multichannel dosing, capping/decapping, weighing, direct connectivity to measuring instruments, temperature control

Software:
Fully automated process control and data transfer based on established industry standards



Specifications

Refractive index:
Range: 1.3 nD to 1.72 nD
Accuracy: ±0.00002 nD
Resolution: ±0.000001 nD

Temperature:
Range: 4 °C to 125 °C
Accuracy: ±0.003 °C
Resolution: ±0.001 °C

Thermo-optical Oscillating Refraction Characterization: TORC 5000

TORC 5000 is a powerful and innovative solution for thermal analysis, e.g. for monitoring curing and polymer reactions as well as the temperature- and time-dependent behavior of samples.

The unique Thermo-optical Oscillating Refraction Characterization (TORC) technique enables determination of thermal expansion and monitoring of phase and glass transitions.

Beverage key quality parameters delivered in one run:
Alab 5000 determines CO_2, O_2, density, extract, °Brix, alcohol, and sugar inversion from one and the same sample of the respective final product. Additionally, key package parameters such as torque and net content are determined.

Data transfer:
Via Anton Paar's Davis 5 system

Automated QC Lab: Alab 5000

Alab 5000 is a fully automated quality control lab for final packaged beverages which is part of the production line and measures all relevant key parameters of beers, soft drinks, and wine. It is compatible with final packaged bottles, glass bottles, or cans and measures net content and torque fully automatically while the factory-installed automatic shaking and piercing module guarantees repeatable measurement results.

Dynamic Mechanical Analyzer: MCR 702 MultiDrive

The unique concept enables you to perform dynamic mechanical analysis in bending, tension, compression, and torsion as well as thermomechanical analysis (TMA), standard and highly sophisticated rheological measurements with one instrument. The modularity of the system allows the integration of a wide range of temperature devices as well as application-specific accessories and measuring systems to cover all requirements of the greatest variety of different applications.

Force range:
0.0005 N to 40 N

Displacement range:
0.01 µm to 9400 µm

Frequency range:
0.001 Hz to 100 Hz

Temperature range:
-160 °C to 600 °C

Anton Paar Automates Your Production

Anton Paar offers tailor-made automation and robotics for determining the physical and chemical properties of liquids, pastes, and melts.
These individual solutions include the formulation, preparation, handling, multiple analyses, and cleaning of samples.
Combining in-depth application knowledge with robotic engineering expertise, an interdisciplinary team accompanies all projects from concept to implementation.

Concept phase:
Based on the workflow assessment and the requirement specifications, an engineering concept is developed.

Implementation phase:
According to this concept, an automation solution is developed, assembled, tested, and installed at your site.

Measuring systems:
Three-point-bending, dual cantilever, single cantilever, solid rectangular fixture, compression system

Further options:
Low-temperature system based on liquid nitrogen, humidity option, gas chiller

MCR 702 MultiDrive Accessories

Specialized measuring systems cover the demands of DMA in bending, tension, torsion, and compression and guarantee precise results and easy handling. All accessories employ the QuickConnect functionality that allows one-handed connection and Toolmaster™, the completely contact-free automatic tool recognition and configuration system. Included temperature sensors ensure the highest reproducibility over the entire temperature range without manual positioning of the sensor.

Dynamic Light Scattering: Litesizer 500

Litesizer 500 determines the size, the stability, and the molecular mass of particles in liquids by using light scattering. In addition, it also measures the transmittance and refractive index of samples using an ingeniously simple software that gives you state-of-the-art particle analysis at the touch of a button.

Litesizer 500 offers a choice of scattering angle, which gives you the optimal measurement conditions whether the sample is concentrated or dilute.

Specifications

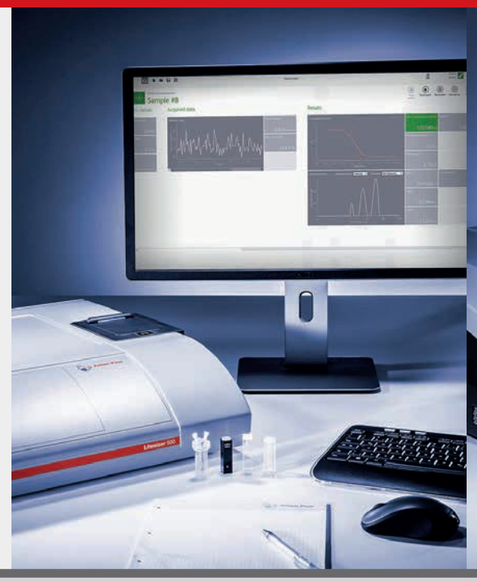
Size range:
0.3 nm to 10 µm (diameter)

Minimum sample volume:
12 µL

Maximum concentration:
40 %w/v (sample-dependent)

Measurement angles:
15°, 90°, 175°

Sensitivity:
0.1 mg/mL (lysozyme)



Specifications

Measuring range:

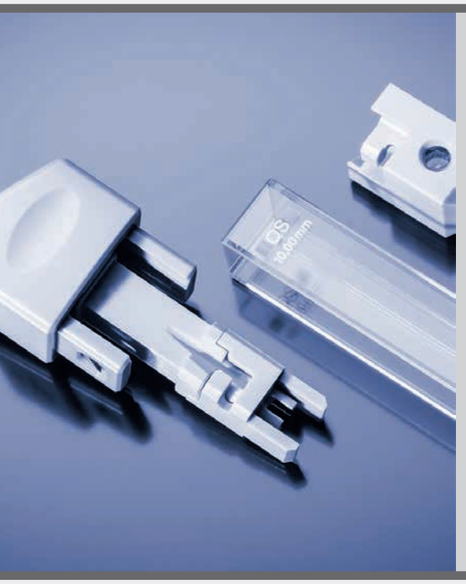
PSA 990:
0.2 µm to 500 µm (liquid)
0.3 µm to 500 µm (dry)

PSA 1090:
0.04 µm to 500 µm (liquid)
0.1 µm to 500 µm (dry)

PSA 1190:
0.04 µm to 2500 µm (liquid)
0.1 µm to 2500 µm (dry)

Particle Size Analyzers: PSA 990, PSA 1090, PSA 1190

The PSA instruments, based on laser diffraction technology, give information about the size distribution of dry powders and particles in dispersions. The PSA series stands out for its broad measuring range and ability to measure both liquid dispersions as well as dry powders with one single instrument. Switching between both modes requires just one mouse click. The unrivaled robust design guarantees alignment-free operation even in the harshest environments.



Zeta-potential range:
>±1000 mV

Minimum sample volume:
50 µL (dependent on sample viscosity)

Maximum concentration:
50 %w/v (sample-dependent)

Maximum sample conductivity:
200 mS/cm

Sensitivity:
0.1 mg/mL (lysozyme)

Litesizer Accessories: Univette & Dosing Unit

Univette is a high-quality reusable cuvette for zeta potential and particle size measurements with Litesizer 500. It enables measurement of particles suspended in organic as well as in aqueous solvents at low sample volumes. The versatile Univette is also extremely robust and allows measurement under critical conditions. The Dosing Unit enables automated pH-dependent measurements of the particle size and zeta potential, and is programmable via the Litesizer software.

PSA Accessory: Autosampler

The autosampler for the PSA series is the only sampler on the market that can be used for both wet and dry dispersions, and is able to automate the sample measurement process. Available for all three models, the autosampler picks up and pours samples automatically into the particle size analyzer, enabling you to focus on other tasks. The autosampler is equally suitable for industrial as well as lab applications.

Features:
Comes with both dry and wet modes
Automatic pick-up and pouring of up to 30 samples
Suitable for repeatable and high-rate cycle processes
Time-saving
Eliminates risk of manipulation
Integrated rinsing cycles
User-friendly operation integrated with the PSA software (no additional software required)

Dynamic Light Scattering: Litesizer 100

With Litesizer 100 you can determine the particle size and transmittance on a wide variety of samples. It gives you rapid and accurate insight into your particle systems, and provides the tools for optimizing them by revealing how they change with time, pH, temperature, and concentration.

Litesizer 100 also includes advanced algorithms that enable you to resolve several particle sizes in a single suspension.

Size range:
0.3 nm to 10 µm (diameter)

Min. sample volume:
12 µL

Max. sample concentration:
40 %w/v (sample-dependent)

Measurement angle:
175°

Sensitivity:
0.1 mg/mL (lysozyme)

Features:
Integrated mechanical stirrer, peristaltic pump, and ultrasonic probe

Solvent volume of 40 mL to 45 mL

Sample quantities from 50 mg

PSA Accessory: Small Volume Unit

The Small Volume Unit (SVU) is specially designed for users who need to reduce the measured sample volume. Only 40 mL of carrier liquid are necessary to measure accurate particle size distributions of often costly samples. The SVU is also suitable for aggressive solvents such as acetone or benzene.

Quantachrome: A Brand of Anton Paar

Acquisition

On February 9, 2018, Anton Paar acquired Quantachrome, a global leader in laboratory material characterization instrumentation for the analysis of porous materials and powders. Under the umbrella of the Anton Paar Group, the company will continue operations in Florida. Quantachrome is the first manufacturing facility in North America run by Anton Paar. It will also function as a US-based unit for research, development, and production within the Anton Paar Group.

Customers / applications

Quantachrome has 50 years of experience in developing innovative analytical laboratory instrumentation, offering a broad range of powder and porous materials analysis in support of research and development, production and quality assurance requirements. These analyses are important for:

- Adsorbents
- Catalysis
- Battery materials
- Fuel cells
- Filters
- Ceramics
- Carbons
- Pharmaceuticals
- Food
- Cements
- Polymers
- Geology

Main properties measured

- Surface area
- Pore size distribution
- Reactive area
- Gas storage
- Vapor uptake capacity
- Polymer foam porosity
- True solid density
- Powder bulk density

Technologies used

Quantachrome instruments provide superior technology the solutions that meet customers' particular application needs.

- Manometric gas sorption
- Gravimetric vapor sorption
- Flow-based gas sorption
- Gas pycnometry
- Powder tapping
- Mercury intrusion
- Capillary flow porometry

Instruments

Adsorption analyzers

autosorb® iQ	ChemBET Pulsar
autosorb® 6iSA	ChemStar TPX
QUADRASORB evo	iSorb HP
NOVAtouch®	VSTAR
AutoFlow BET+®	Aquadyne DVS

Porometers & porosimeters

PoreMaster®	Porometer 3G

Solid density analyzers

Micro UltraPyc® 1200e	PentaFoam 5200e
UltraPyc® 1200e	UltraFoam 1200e
PentaPyc 5200e	Autotap

Tribometry

Nano Tribometer: NTR³

NTR³ is designed to investigate surface interaction such as friction coefficient and wear at low contact pressure.

This instrument is especially suitable where soft layers or lubricants are of interest. NTR³ combines the resolution of an Atomic Force Microscope (AFM) with the stability, robustness, and ease-of-use of a standard pin-on-disk tribometer.

Specifications

Normal force range:
Max.: 1000 mN
Min.: 5 µN

Rotating configuration:
Speed: 1 rpm to 200 rpm
Recipr. angle: ±10° to ±150°

Linear configuration:
Frequency: 0.01 Hz to 5 Hz
Stroke length: up to 5 mm

Tribometer: TRB³

TRB³ is the industry standard for measurement of friction and wear in sliding contacts. A wide range of test parameters, contact geometries, and environmental conditions allows the user to simulate real in-service conditions. Anton Paar tribometers have proven their reliability worldwide in over 1000 laboratories, studying all classes of materials.

Normal force range:
Up to 60 N

Rotating configuration:
Rotation speed:
0.2 rpm to 2000 rpm
Radius: up to 40 mm

Linear configuration:
Frequency: 0.01 Hz to 10 Hz
Linear speed: up to 370 mm/s

Options:
Temperature up to 1000 °C
Vacuum down to 10^{-7} mbar
Top view for in-situ wear observation

Sliding velocity:
10^{-8} m/s to 3.3 m/s

Normal force:
0.1 N to 70 N

Temperature range:
-160 °C to 600 °C

Relative humidity:
5 % to 95 %

MCR Tribometer

The MCR tribometer is a flexible and modular platform which allows you to change quickly between numerous setups. The standard portfolio supports several geometries, such as pin-on-disk, ball-on-three-plates, and rolling bearing setups. You can combine these setups with superior environmental control over a wide temperature and humidity range. Customized solutions are available for special geometries, specimens, and conditions.

Instrumented Indentation & Coating Thickness Testing

Ultra Nanoindentation Tester: UNHT^3

The UNHT^3 ultra-high resolution nanoindenter is used to examine the mechanical properties of a material, such as hardness and elastic modulus, at the nanoscale.

UNHT^3 virtually eliminates the effect of thermal drift and compliance due to its unique patented active surface referencing system. It is ideally suited for long-term measurements on all types of materials, including polymers, very thin layers, and soft tissues.

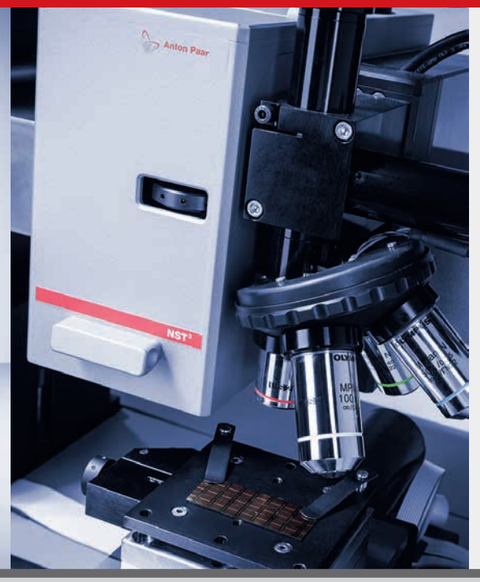
Specifications

Force:
Resolution: 3 nN
Max. force: 100 mN

Depth:
Resolution: 0.003 nm
Max. depth: 100 µm
Load frame stiffness: >>10^8 N/m

Options:
Temperature up to 800 °C
Vacuum down to 10^{-7} mbars
UNHT^3 Bio for soft materials

Scratch Testing



Specifications

Applied load:
Resolution: 0.01 µN
Max. load: 1000 mN

Friction force:
Resolution: 1 µN
Max. friction force: 1000 mN

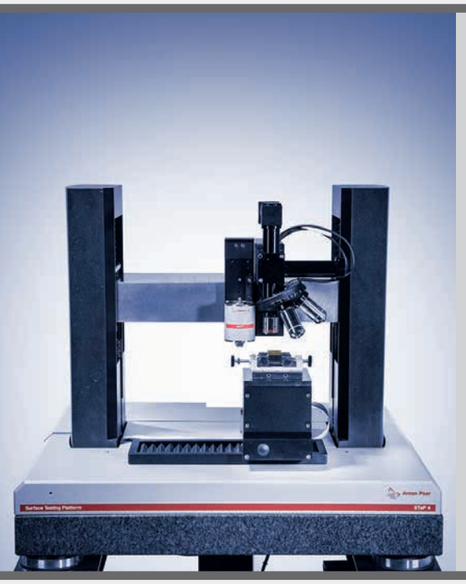
Depth:
Resolution: 0.03 nm
Max. depth: 600 µm

Speed:
From 0.1 mm/min to 600 mm/min

Nano Scratch Tester: NST^3

The NST^3 nano scratch tester is particularly suited for the characterization of adhesion failure and the mar (scratch) resistance of thin films and coatings with a typical thickness below 1000 nm.

It can be used for the analysis of organic and inorganic coatings, soft and hard coatings.



Force:
Resolution: 0.02 µN
Max. force: 500 mN

Depth:
Resolution: 0.01 nm
Max. depth: 200 µm

Load frame stiffness:
10^7 N/m

International standards:
ISO 14577, ASTM E2546, etc.

Nanoindentation Tester: NHT^3

NHT^3 is designed to provide low loads with depth measurements in the nanometer scale for the measurement of hardness, elastic modulus, creep, etc.

The system can be used to characterize organic, inorganic, hard and soft materials. Thanks to quick matrix modes and the unique top surface referencing technique, NHT^3 provides high throughput. The measurement starts immediately, with no waiting time for thermal stabilization.

Micro Combi Tester: MCT^3

The MCT^3 micro combi tester combines scratch and instrumented indentation (IIT) in one measurement head. The unique wide load range of this instrument allows for the characterization of adhesion, hardness and elastic modulus of thin films and/or bulk materials.

MCT^3 can be used in the analysis of organic and inorganic as well as soft and hard coatings.

Applied load:
Resolution: 10 µN; Max. load: 30 N

Friction force:
Resolution: 0.1 mN;
Max. friction force: 30 N

Depth:
Resolution: 0.05 nm;
Max. depth: 1000 µm

Speed:
From 0.1 mm/min to 600 mm/min

International standards:
ISO 20502, ASTM C1624,
ISO 14577, ASTM E2546

Calotest Tester: CAT^2

CAT^2 is the ideal instrument for a quick and precise determination of coating thickness. Measurements can be performed in a very short time (1 to 10 minutes).

CAT^2 is widely used for analyzing coatings with a thickness between 0.1 µm and 50 µm. Typical examples are CVD, PVD, plasma spray, anodic oxidation layers, chemical-galvanic deposits, polymers, paints, and lacquers.

Shaft speed:
10 rpm to 3000 rpm

Abrasion time ranges:
1 s to 10000 s

Standard ball diameters:
10 mm, 15 mm, 20 mm, 25.4 mm, 30 mm

International standards:
ISO 26423, ISO EN 1071-2, VDI 3198

Applied load:
Resolution: 100 µN
Max. load: 200 N

Friction force:
Resolution: 100 µN
Max. friction force: 200 N

Depth:
Resolution: 0.05 nm
Max. depth: 1000 µm

Speed:
From 0.4 mm/min to 600 mm/min

Revetest® Scratch Tester: RST^3

The Revetest® scratch tester is widely used for characterizing the adhesion and scratch resistance of hard-coated materials with a typical coating thickness exceeding 1 µm.

Anton Paar is the world leader in scratch testing, having sold more than 1500 Revetests worldwide.

Atomic Force Microscope: Tosca 400

Tosca 400 combines a premium technology with time-efficient and user-friendly operation. It employs a new form of automation on every level of operation, providing fully automatic laser alignment, a side-view camera for the easiest possible sample engagement procedure as well as a workflow-oriented control and analysis software to increase the efficiency and simplify the handling of AFM measurements.

Specifications

X-Y scan range:
100 µm x 100 µm

Z scan range:
15 µm

Modes:
Contact mode, tapping mode (including phase image), lateral force microscopy, force distance curve

Max. scan speed:
10 lines per second

Specifications

Films and plates

Fibers, fabrics, and nonwovens

Granular media

Capillaries and tubes

Electrokinetic Analyzer for Solid Surface Analysis: SurPASS 3

The SurPASS 3 electrokinetic analyzer is used in surface analysis to investigate the zeta potential of macroscopic solids based on a streaming potential and streaming current measurement. Besides this high-end model, SurPASS 3 Eco is available for routine solid surface analysis.

Dimensions:
130 mm x 50 mm x 53 mm

Weight:
450 g

Supported cantilevers:
3.4 mm x 1.6 mm x 0.3 mm

Tosca 400 Accessories: Probemaster

Probemaster is the perfect tool for fast and safe cantilever exchange – a game changer in the world of atomic force microscopy. Just place the cantilever in the marked area of the Probemaster and easily slide it into the actuator body. Due to the innovative design, this tool allows for fast and safe cantilever mounting, also for inexperienced users.

For Solids of Various Shape

SurPASS 3 provides information on surface charge and related properties, and detects the smallest changes in the outermost material surface.

A variety of different measuring cells accommodates natural and technical fibers, porous ceramics, coarse particles, and samples with a planar surface.

Applications:
Membranes and filters
Biomaterials
Semiconductors
Fibers, fabrics, and nonwovens
Cosmetics and detergents
Minerals

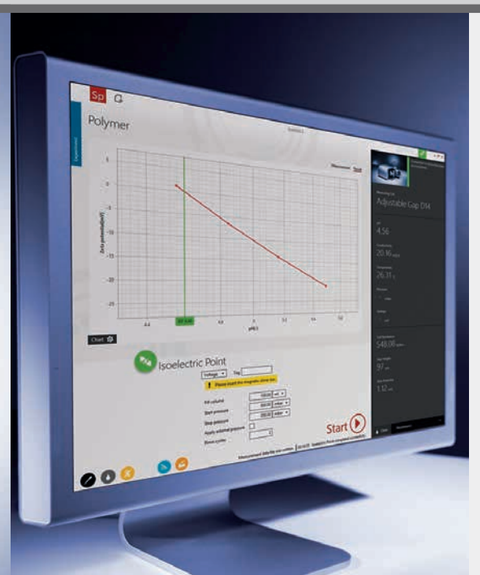
Tosca 400 Accessories: Active Vibration Isolation and Acoustic Enclosure

The active vibration isolation is a necessary accessory for measurements at extremely high resolutions, especially on the sub-nanometer scale.

The acoustic enclosure for Tosca 400 ensures noise-free and extremely accurate measurements at the sub-nanometer scale. Damping is achieved by a multi-layered wall that inclines at 4° to prevent sound waves from spreading.

Active vibration isolation:
Dimensions:
600 mm x 600 mm x 90 mm
Settling time: 300 ms
Active bandwidth: 0.6 Hz to 200 Hz (passive isolation beyond 200 Hz)
Isolation performance:
>5 Hz = 25 dB (94.4 %),
>10 Hz = 40 dB (99.0 %)
Response time: 0.5 ms
Max. correction forces:
Vertical ±8 N, horizontal ±4 N

Acoustic enclosure:
Dimensions:
192 cm x 85 cm x 80 cm



Zeta potential dependencies:
pH
Time
Ionic strength
Surfactant concentration
Protein concentration

Straightforward Analysis with the SurPASS 3 Software

SurPASS 3 reduces the need for elaborate preparation of sample and measurement. The SurPASS 3 software provides an intuitive interface with features such as the automated analysis of the isoelectric point with a single click.

The Compact Solution for High-throughput Nanostructure Analysis: SAXSpace

SAXSpace is a modular small- and wide-angle X-ray scattering (SWAXS) system for characterizing your nanostructured materials and samples. It offers a variety of precise sample stages and provides easy handling for smooth operation.

SAXSpace is especially suited for high-throughput analysis of isotropic colloidal and biological samples (Bio-SAXS).

Specifications

Samples:
Liquids, solids, powders, pastes, foils, polymers

Particle size, q-range:
Up to 100 nm (d-spacing: 200 nm)
q-range 0.03 nm^{-1} to 40.7 nm^{-1}

Temperature range:
-150 °C to 600 °C

SmartSAXS feature:
Line- and/or point collimation for all SWAXS applications

Specifications

BTS 150/500:
T: -10 °C to 150 °C (BTS 150)
T: 25 °C to 500 °C (BTS 500)

TTK 600:
T: -190 °C to 600 °C

DCS 500:
T: -180 °C to 500 °C

Low- to Medium-temperature X-ray Attachments

Non-ambient X-ray diffraction (XRD) has become an indispensable technique for understanding different influences (e.g. temperature) on materials of any kind. BTS 150/500 (a heating attachment for benchtop instruments), TTK 600 (a versatile sample stage with different measurement geometries), and DCS 500 (a cooling attachment for 4-circle goniometers) belong to the class of low- to medium-temperature X-ray attachments.

Samples:
Solids, liquids, nanostructured surfaces, powders, polymers, foils, fibers, pastes

q-range:
q = 0.02 nm^{-1} to 40.7 nm^{-1}
(2D Eiger R)

Temperature range:
-150 °C to 600 °C

The Laboratory SAXS/WAXS/GISAXS System: SAXSpoint 2.0

The new SAXSpoint 2.0 system provides an innovative solution for SAXS, WAXS, and GISAXS studies in the home laboratory. SAXSpoint 2.0 employs scatterless collimation, the latest detector technology, and brilliant X-ray sources providing outstanding flux, such as the Primux 100 micro X-ray source, a new high-performance microfocus sealed-tube X-ray source from Anton Paar which provides premium X-ray beam brilliance at low power.

Humidity & Mechanical Load X-ray Attachments

Relative humidity is an important parameter, for example in finding optimal storage conditions for pharmaceutical substances or food ingredients. CHCplus⁺ and MHC-trans allow you to investigate the influence of this parameter in addition to temperature variations. TS 600 is designed for the investigation of mechanical load on fibers or thin foils.

CHC plus⁺:
T: -180 °C to 400 °C
Rel. humidity: 5 % to 95 %

MHC-trans:
T: -10 °C to 150 °C
Rel. humidity: 5 % to 95 %

TS 600:
Mechanical load: up to 600 N

Versatile Sample Stages: Full Experimental Flexibility

Dedicated sample stages and holders for SAXSpoint and SAXSpace give users limitless possibilities. The TCStages provide precise temperature control from -150 °C to 600 °C. The autosamplers enable automatic measurements of 192 liquid or 20 solid samples.

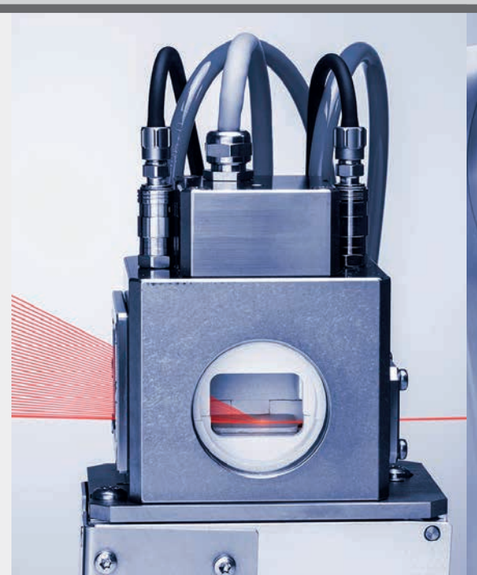
Advanced users can perform GISAXS studies of nanostructured surfaces and SWAXS studies under controlled tensile stress or controlled atmosphere (e.g. humidity, air, inert gas).

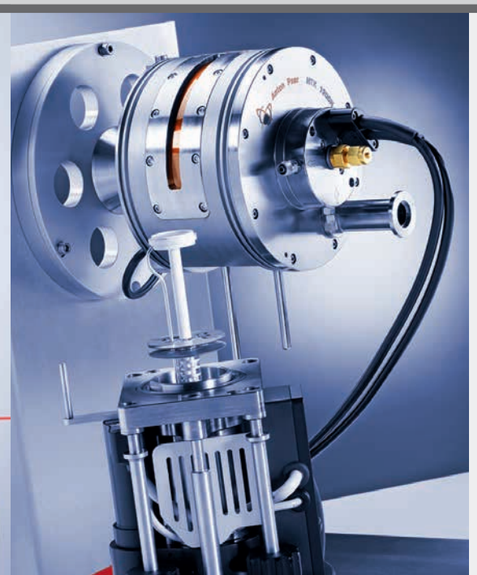
Sample holders for TCStage:
PasteCell, µ-Cell, RotorCell, FlowCell, TubeCell, PressureCell, capillary holders

Autosamplers:
High-throughput screening of multiple solid and liquid samples

GISAXS/TC GISAXS stage:
Precision stage for GISAXS studies of nanostructured surfaces

Tensile stage and humidity stage:
SWAXS studies under controlled humidity or tensile stress





HPC 900:
T: 25 °C to 900 °C, p_{max}: 100 bar

XRK 900:
T: 25 °C to 900 °C, p_{max}: 10 bar

HTK 1200N:
T: 25 °C to 1200 °C

HTK 16N/HTK 2000N:
T: 25 °C to 1600 °C (HTK 16N)
T: 25 °C to 2300 °C (HTK 2000N)

High-temperature and High-pressure X-ray Attachments

These instruments allow you to extend the temperature range to temperatures up to 2300 °C and therefore open up a vast range of applications. In addition, HPC 900 and XRK 900 allow investigations into the influence of pressure (up to 100 bar) on the properties of the sample. This is crucial, for example, for the investigation of gas storage materials or catalysts.

Abel Flash Point Tester: ABA 4

The ABA 4 automatic closed-cup flash point tester with extended measuring range, Peltier cooling, and stirrer measures the flash point, the lowest temperature at which the vapors of a sample might ignite, and the ability to yield flammable vapors at an equilibrium temperature.

ABA 4 is suitable for jet fuels, solvents, chemicals, and more.

Specifications

Standard methods:
ISO 1516, ISO 1523, ISO 13736, EN 924, DIN 51755-1, IP 170, IP 491, IP 492

Application range:
With internal air cooling:
10 °C to 110 °C
With external liquid cooling:
-30 °C to 110 °C

Optional:
PC software FPPNet

Specifications

Standard methods:
ASTM D93-A, ASTM D93-B, ASTM D93-C, ISO 2719-A, ISO 2719-B, ISO 15267, JIS K 2265-3, IP 34-A, IP 34-B

Application range:
Up to 405 °C

Test places:
Up to 12 test cups

Pensky-Martens Flash Point Tester with Sample Changer: PMA 4 SC

The PMA 4 SC automatic closed-cup flash point tester with sample changer and integrated fire-extinguishing system is an exceptionally time- and cost-saving solution. The PC software FPPNet for convenient remote handling and test data storage is included.
PMA 4 SC is suitable for biodiesel and biodiesel-blended fuels, distillate fuels like diesel heating oil, kerosene, and more.

Standard methods:
ASTM D56, ASTM D3934, ASTM D3941, ISO 1516, ISO 1523, EN 924, FTM 791-1101, IP 491, IP 492

Application range:
With internal air cooling:
10 °C to 110 °C
With external liquid cooling:
-30 °C to 110 °C

Optional:
PC software FPPNet

Tag Flash Point Tester: TAG 4

The TAG 4 automatic closed-cup flash point tester with extended measuring range and Peltier cooling measures the flash point, the lowest temperature at which the vapors of a sample might ignite, and the ability to yield flammable vapors at an equilibrium temperature.

TAG 4 is suitable for jet fuels, solvents, chemicals, and more.

Cleveland Flash and Fire Point Tester: CLA 5

The CLA 5 automatic open-cup flash and fire point tester measures the flash point, which describes the tendency to form a flammable mixture with air, and the fire point, which indicates the tendency for sustained burning.

CLA 5 is suitable for lubricants, residual fuels, or bituminous material.

Standard methods:
ASTM D92, ISO 2592, JIS K 2265-4, AASHTO T48, FTM 791-1103, IP 36, GOST 4333

Application range:
Up to 400 °C

Optional:
PC software FPPNet
Bitumen accessories

Pensky-Martens Flash Point Tester: PMA 5

The PMA 5 automatic closed-cup flash point tester with integrated fire-extinguishing system measures the flash point, the lowest temperature at which the vapors of a sample ignite upon application of an ignition source.

PMA 5 is suitable for biodiesel and biodiesel-blended fuels, distillate fuels like diesel heating oil, kerosene, and more.

Standard methods:
ASTM D93-A, ASTM D93-B, ASTM D93-C, ISO 2719-A, ISO 2719-B, ISO 2719-C, ISO 15267, JIS K 2265-3, IP 34-A, IP 34-B

Application range:
Up to 405 °C

Optional:
PC software FPPNet

Standard methods:
ASTM D86, ASTM D850, ASTM D1078, ISO 918, ISO 3405, DIN 51751, IP 123, IP 195, JIS K2254, GOST 2177

Vapor temperature range:
Up to 450 °C

Benefits:
Mobile multi-plug with integrated vapor temperature sensor
Peltier tempering technique
Several built-in features for maximum support and safety

Distillation Analyzer: Diana 700

Diana 700 is the most convenient solution for automatically determining the distillation range of petrochemical products, aromatic hydrocarbons, and other volatile organic liquids at atmospheric pressure.

The range of application includes volatility determination, automatic dry point detection for solvents, calculation of cetane and driveability index, and the preparation of bottom residue according to EN ISO 10370.

Oxidation Stability Testing

Oxidation Stability Tester: PetroOxy

PetroOxy, a patented Rapid Small Scale Oxidation Tester (RSSOT), initiates a very fast artificial aging process and provides a complete oxidation stability analysis of fuel products automatically in a very short test time, with high precision and excellent reproducibility.

PetroOxy is suitable for the stability determination of liquid fuels (gasoline, diesel, biodiesel, FAME, and blends).

Specifications

Standard methods:
ASTM D7525, ASTM D7545, EN 16091, IP 595

Application range:
Up to 200 °C

Filling pressure:
Up to 800 kPa (typically 700 kPa)

Sample volume:
Typically 5 mL

Test cell: Gold-plated

Analysis of Cold Flow Properties, Consistency, and Ductility

Specifications

Standard methods:
ASTM D6371, EN 116, EN 16329, JIS K 2288, IP 309

Application range:
-60 °C to 45 °C

Cooling profiles:
Programmable stepped or linear (from 6 °C/h to 100 °C/h)

Data memory:
1000 results
90 user-defined programs

Cold Filter Plugging Point Tester: Callisto 100

The fully automated and compact CFPP tester Callisto 100 comes with a newly developed state-of-the-art Peltier element technology which allows the connection of a methanol-free cooling system. It ensures outstanding homogeneity of the cooling jacket, which is the most critical and decisive parameter for CFPP value determination.

Callisto 100 determines the low-temperature operability of diesel fuel, biodiesel, and blends.

Standard methods:
Based on ASTM D8206

Application range:
Up to 180 °C

Filling pressure:
Up to 800 kPa (typically 700 kPa)

Sample volume:
Typically 5 mL/4 g

Test cell:
Stainless steel

Oxidation Stability Tester: RapidOxy 100

RapidOxy 100 is an automated Rapid Small Scale Oxidation Tester that provides oxidation stability analysis under artificial aging conditions for various products, including solid, semi-solid, and liquid samples. It is suitable for e.g. oxidation stability determination of vegetable oils and animal fats (e.g. edible oils, butter), food (products containing oil and fat), cosmetics (skin care products), and flavors and fragrances. The oxidation stability of lubricating greases can be determined according to ASTM 8206.

Penetrometer: PNR 12

The modular PNR 12 penetrometer automatically measures the resistance a material provides against being pierced by a specifically shaped penetrator, such as a needle, cone, rod, or disk. To ensure a high flexibility in application you may choose between test kits for various standards and applications (bitumen, grease, wax, food, cosmetics, or pharmaceuticals). The PNR 12 is suitable for consistency and plasticity determinations of pasty, creamy, semi-solid, or highly viscous samples.

Standard methods:
ASTM D5, ASTM D217, ASTM D937, ASTM D1321, ASTM D1403, ASTM D7342, ISO 2137, ISO 6873, EN 1426, EN 13179-2, JIS K 2207, JIS K 2235, DIN 51579, IP 50, IP 179, IP 310, IP 376, European Pharmacopoeia 2.9.9.

Measuring range:
Up to 80 mm

Data storage:
200 measurements

Oxidation Stability Tester: OBA 1

OBA 1 is used to determine the stability (induction period) and the tendency to form gum (potential residue) under accelerated oxidation conditions. The semi-automatic test arrangement features programmable PA 5-OBA manometers on stainless steel oxidation vessels in combination with a liquid bath or a dry heat bath.

OBA 1 is suitable for oxidation stability applications of gasoline and aviation fuel.

Standard methods:
ASTM D525, ISO 7536, JIS K 2287, FTM 791-3352, IP 40, ASTM D873, JIS K 2276, FTM 791-3354, IP 138

Application range:
Up to 200 °C

Pressure range:
Up to 1400 kPa or 203 psi

Test places:
1 to 4

Standard methods:
ASTM D36, EN 1427, JIS K 2207, AASHTO T53, IP 58

Application range:
Up to 160 °C

Heating:
IR radiation, ROBAX® heating plate, spill protection

Stirring:
100 rpm to 150 rpm

Test places:
2

Softening Point Tester: RKA 5

The ring-and-ball softening point tester automatically determines the temperature at which a substance attains a particular degree of softness. It is used for samples without sharply defined melting points, which become softer and less viscous as the temperature rises. A heating rate chart can be used to conduct conformity checks quickly and easily for each test.

RKA 5 with its different ball-centering and ball-dispensing devices is suitable for bitumen.

Gum Content Tester: GUM

GUM helps to prevent induction-system difficulties by measuring the unevaporated residue of fuel that may lead to deposits and sticking of intake valves. It is suitable for aircraft fuels, motor gasoline, and other volatile distillates. The multi-function head for simultaneous positioning of all 5 sample tubes increases accuracy, safety, and throughput.

Options:
- GUM for tests with air or steam supply
- GUM for tests with air supply only

Specifications

Standard methods:
ASTM D381, ISO 6246,
EN 6246, DIN 51784, IP 131,
IP 540, JIS K 2261, FTM 791-3302

Operating temperature:
With air and steam supply:
up to 260 °C
With air supply:
up to 246 °C

Sample volume:
50 mL per tube

Specifications

Reaction volume:
2 mL to 6 mL

Max. operating temperature:
250 °C

Max. operating pressure:
20 bar

Synthesis Reactor: Monowave 50

Simplify synthesis! Monowave 50 is your budget-friendly, easy-to-operate conventionally heated synthesis reactor.

Employing a 10 mL glass vial with silicone cap, Monowave 50 is specially designed for primary research and education.

Working under sealed-vessel conditions reaction times are shortened and your efficiency is increased.

Standard methods:
ASTM D1401, ISO 6614

Operating temperature:
Ambient to 85 °C

Stirrer speed:
500 rpm to 1600 rpm

Test places:
8 (2 additional pre-tempering places)

Herschel Emulsifier: DH 5

The DH 5 Herschel emulsifier measures the ability of petroleum oils or synthetic fluids to separate from water. DH 5 is suitable for new or in-service oils which are subject to water contamination. A constant stirrer speed is guaranteed, even when the viscosity of the sample changes during the test.

Microwave Synthesis: Monowave 400/200

Monowave 400 is your choice for any kind of microwave synthesis in academic and industrial R&D. Enjoy its useful features like the on-screen images from the integrated camera, the Ruby Thermometer, and silicon carbide vessels.

Equipped with a 24-position autosampler, 30 mL wide-neck vials, and integrated camera, Monowave 450 is the perfect solution for multigram synthesis and microwave-assisted extraction.

Reaction volume:
0.5 mL to 20 mL

Max. operating temperature:
300 °C

Max. operating pressure:
30 bar

Microwave output power:
850 W

Foaming Characteristics: Foam Tester

The Foam Tester allows the determination of the foaming characteristics of lubricating oils at specific temperatures by empirically rating the foaming tendency and the foam stability.

Especially in high-speed gearing and high-volume pumping systems, the tendency of oils to foam can lead to inadequate lubrication or cavitation which may result in mechanical failure.

Standard methods:
ASTM D892 (sequence I – III),
ASTM D6082 (sequence IV),
ISO 6247, IP 146, JIS K 2518

Setup:
Twin-bath arrangement with independent temperature control

Operating temperature:
24 °C to 150 °C

Test places: 8
(4 in each bath)

Reaction volume:
250 mL to 750 mL

Max. operating temperature:
250 °C

Max. operating pressure:
30 bar

Microwave output power:
1700 W

Microwave Synthesis in the Kilolab: Masterwave BTR

Masterwave BTR transfers microwave synthesis to the kilolab, enabling the processing of kilogram amounts per day.

With its independent stirring regime and internal rising-sensor temperature measurement, Masterwave BTR features the temperature accuracy required for direct method transfer from any smaller microwave device.

Microwave Digestion System: Multiwave 7000

Multiwave 7000 with its Pressurized Digestion Cavity (PDC) allows acid digestions at temperatures up to 300 °C. This ensures complete digestions of any sample-type (e.g. food, environmental, polymer, cosmetic, pharmaceutical, geological, chemical, alloy, and petrochemical samples) even in the same run.
Budget-friendly sample vials are available made of glass (disposable), quartz, or PTFE-TFM and are easily closed with plug-on caps.

Specifications

Number of vessels:
Up to 24

Operation parameters:
Up to 300 °C and 199 bar

Reaction control:
Temperature and pressure control of all vials

Cooling system:
Integrated water cooling

PQP available

Microwave Digestion

Specifications

Number of vessels:
Up to 21

Operating temperature:
320 °C for an unlimited time

Operating pressure:
130 bar

High-pressure Digestion: HPA-S

The HPA-S performs acid digestion sample preparation and provides the highest decomposition quality for AAS, ICP-OES, ICP-MS, and voltammetry.

The HPA-S acid digestion method is an internationally recognized reference procedure.

HPA-S is in operation as a high-performance instrument in numerous laboratories.

Number of vessels:
Up to 64

Operation parameters:
Up to 300 °C @ 80 bar

Reaction control:
Temperature and pressure control in all positions (depending on rotor)

Safety certificates:
GS, ETL

PQP available

Microwave Reaction System: Multiwave PRO

Multiwave PRO is the champion of sample preparation methods. Its large number of rotors and accessories allows acid digestion, acid leaching, solvent extraction, synthesis, oxygen combustion, evaporation, drying, UV digestion, and more. The system is easily and safely operated and enables high-throughput applications as well as complete digestions of even the most demanding samples.

Laboratory Ball Mill: BM 500

The BM 500 ball mill is a versatile and easy-to-operate laboratory mill which enables the quick processing of dry, wet, and even cryogenic milling applications.

With a broad range of accessories to cover different applications and to avoid contamination BM 500 enables you to mill almost any sample material to the desired fineness.

Typical samples range from metals and rocks to food, biological, and environmental materials, whereby the shape of the sample does not matter.

Time:
5 s to 99 min

Frequency:
3 Hz to 30 Hz

Feed size of sample:
nmt. 8 mm

Max. volume of milling jars:
2 x 50 mL

Ball size:
Up to 25 mm

Microwave Digestion System: Multiwave GO

Multiwave GO is a digestion system for food, environmental, pharmaceutical, or cosmetic samples. Based on a DMC Directed Multimode Cavity – the new self-adjusting microwave field – highly efficient heating is possible in an extremely small-footprint system. For efficient reaction control the internal vessel temperature of each vessel is controlled via an implemented IR sensor.

Multiwave GO is robust, cost-saving, and extremely intuitive to operate.

Number of vessels:
1 to 12

Sample amounts:
≤3 g/vessel

Reaction control:
Temperature control in all positions
Mechanical pressure control

Safety certificates:
GS, ETL

Rotor 8 NXF100/NXQ80:
8-position high-end rotors with lip-type seals

Rotor 16 HF100/MF100:
16-position rotors with lip-type seals

Rotor 24HVT50/80, Rotor 41HVT56:
24-position rotors with 50 mL or 80 mL vessels and 41-position rotor, all with SMART VENT technology

Rotor 64MG5:
64-position rotor with lip-type seals for the digestion of microsamples

Rotors for Multiwave PRO

Depending on the sample, the sample amount, sample volume, and required sample throughput, Multiwave PRO can be equipped with 8 different acid digestion rotors.

Full reaction control is provided by wireless temperature and pressure control of each vessel or via a pressure and temperature sensor immersed in a reference vessel.

Reaction vessels are available with lip-type seals or with SMART VENT technology.

Index of Standards

XPAIP002EN-I

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