Anton Paar

Abbemat

Universal Refractometer Series

Choose One …

Anton Paar's range of Abbemat refractometers embody over forty years of technical expertise. They are built with care and precision using the highest quality materials. Abbemat refractometers measure the refractive index and concentration of liquids, gels and solids. These truly universal refractometers cover a broad range of applications in all industries. Depending on the accuracy, temperature range and level of automation you require, a model is available to suit your application and your budget. An Abbemat is a secure investment for the future, providing reliable and accurate results for years to come.

UNIVERSAL REFRA

Economy line

"Economic routine analysis."

Abbemat 200
Offering all essential features and intuitive handling, this out-of-the-box refractometer is ideal for small laboratories that require a limited number of measurements without any complex data processing.

Performance line

"Measures, measures, measures."

Abbemat 300, Abbemat 500
The robust and easy-to-operate Abbemat 300/500 refractometers of the Performance line 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.

… Measure Everything

Each Abbemat model can be used for a wide range of applications in all industries and fields of research. Dedicated industry solutions are not required.

Performance Plus line

"Ready for any job today and fit for tomorrow."

Abbemat 350, Abbemat 550
The versatile, high-end Abbemat 350/550 refractometers of the Performance Plus line are designed for research and development as well as demanding quality control applications. They can be operated with a peristaltic pump or sample changer to simplify filling and are easily expanded by a wide range of accessories. The large and intuitive touchscreen display simplifies navigation.

Heavy Duty line

"Measure when others fail."

Abbemat 450, Abbemat 650
The Abbemat 450/650 refractometers are extremely robust and waterproof (IP68). To measure samples containing solid particles or air bubbles you can position the Heavy Duty Abbemat on its side to prevent sedimentation and disturbance from affecting the results.

Abbemat MW
The Abbemat MW is the multi-wavelength refractometer for refractive dispersion and Abbe number determinations.

Abbemat HT
The Abbemat High Temperature (HT) offers temperature control up to 110 °C.

Abbemat Refractometers Measure Everything

The Abbemat refractometers are used in all industries to measure a wide range of samples, from pharmaceuticals, chemicals, petroleum products, flavors and fragrances to beverages and food. In close cooperation with customers, Anton Paar continuously collects and develops new methods and applications.

A short overview of Abbemat applications

	Application	Example method	Measuring range
	Concentration measurement of binary solutions, e.g. acids, bases and salts	• Percentage by mass of sodium hydroxide in water solutions, e.g. during paper production.	0 %mas to 50 %mas
	Refractive index measurement according to international pharmacopoeias e.g. EUP, USP, JP	• According to the US Pharmacopeia, the refractive index of e.g. dexpanthenol needs to be between 1.495 and 1.502 at 20 °C and 589 nm.	1.26 n_D^{20} to 1.72 n_D^{20}
	Determination of the dry substance of sugar beet and sugar cane	• Sucrose concentration measurement of high-purity sucrose solutions in compliance with ICUMSA standards.	0 °Brix to 100 °Brix
	Ensuring longer shelf-life for jams, jellies, honey and fruit juices by determining total solids or moisture content	• In a finished product, soluble solids at 20 °C must be e.g. 65 °Brix for jams and jellies. • Moisture content in honey according to the Codex Alimentarius.	0 °Brix to 100 °Brix 13 %mas to 25 %mas
	Quality control, total solids and potential alcohol in beverages	• Total solids in beverages such as coffee and fruit juices. • Oechsle scale for determining the potential alcohol content.	0 °Brix to 100 °Brix 6 °Oe to 216 °Oe

Application	Example method	Measuring range	
Quality control of flavors and fragrances	• According to US Pharmacopeia, the refractive index of orange oil at 20 °C and 589.3 nm needs to be between 1.472 and 1.474.	1.26 n_D^{20} to 1.72 n_D^{20}	
Concentration and freezing point determination of antifreeze agents	• Fuel system icing inhibitors in aviation fuels according to ASTM D5006. • Freezing point of antifreeze propylene/ ethylene glycol.	0 %vol to 100 %vol -51 °C to +2 °C -50 °C to 0 °C	
Quality control of glasses and polymers	• Refractive index, dispersion and anisotropy of glasses and polymers - even without any contact liquid - according to ASTM D 542. • Abbe numbers of glass or contact lenses.	1.26 n_D^{20} up to 1.72 n_D^{20} Depending on Abbe number	
Quality control of petroleum products such as viscous oils, fuels and hydrocarbon liquids	• Refractive index of light-colored waxes and lube oils according to ASTM D1747. • Quality control of biogenic diesel mixtures. • Determination of true urea concentration in diesel exhaust fluid (DEF) according to ISO 22241.	1.26 n_D^{20} up to 1.72 n_D^{20} 30 %mas to 35 %mas	
Quality control of raw material for cosmetics	• Refractive index or butyro value of cacao butter according to AOAC 920.78.	0 to 100 1.26 n_D^{20} to 1.72 n_D^{20}	
Quality control of food oils	• Butyro reading of frying oil in compliance with ISO and AOAC standards. • The iodine number of butter.	0 to 100 10 IN to 71 IN	
Determining specific gravity and total solids of human body fluids such as urine, blood serum or plasma	• An increased urine specific gravity can indicate dehydration, drug use or renal arterial stenosis. Decreased urine specific gravity often accompanies renal failure and diabetes.	1.000 to 1.039	
Quality control of milk products	The total solids in milk and sweetened condensed milk can be measured within seconds after correlating gravimetric and refractive index results.	Depending on the sample	

Abbemat
Refractometers
Features and Benefits

Built-in temperature control

The temperature is the biggest influencing factor on the refractive index. To ensure accurate results, the built-in Peltier temperature control adjusts the temperature at the prism/sample interface at an unmatched accuracy within seconds.

Software with benefits

Configure, export and import methods. Create your own data reports and enrich them with a company logo and address. Benefit from menu-guided setup for calibration and adjustment.

High level of flexibility

You benefit from easy configuration of single/multiple measurements, multi-fill, temperature and time scans.

Communication unlimited

The Abbemat refractometers communicate with LIMS and other instruments via CAN bus, USB and RS232 interfaces. Abbemat 350/450/550/650 also provides ethernet interfaces. The Abbemat refractometers can be used with an external PC, printer, bar code reader or keyboard.

Fit for the pharmaceutical industry

The Abbemat software fully supports the requirements of the pharmaceutical industry, including GMP, 21 CFR Part 11, GAMP 5 and USP<1058>.

Designed for maximum accuracy

The optical bench is hermetically sealed and temperature stabilized to protect it from outside influences such as condensation in tropical conditions. Before sealing, the measuring wavelength is tuned to a bandwidth of ±0.2 nm to ensure correct results for samples with different dispersions.

Optimal sample well design

The sample well is smooth and easy to clean. The shape of the measuring area ensures minimum evaporation of sample and prevents samples with low surface tension from flowing apart. To drain liquids spilled during filling, there is a spill lip and a drip plate fixed with a magnet which can be easily removed for cleaning.

Intelligent checks

Abbemat refractometers warn you if the sample volume is too small or the prism needs extra cleaning. They also check the measuring results and adjustments for stability and plausibility.

Operating convenience

The built-in color LCD screen and membrane keys are resistant to spillage and dirt and can even be operated when wearing gloves. For easy access, the USB ports are positioned on the side of the refractometer.

Durability for a long life

There are no moving parts in the refractometer and therefore no wear. The LED light source guarantees 100 000 hours of operation. The measuring prism is almost as hard as a diamond and therefore virtually indestructible. Both the prism and the surrounding sample well are resistant to aggressive chemicals.

Simplify Your Work

Samples containing particles or pulp

The vertical setup of the Abbemat Juice Station avoids sedimentation of particles like pulp on the measuring prism and ensures reliable and stable measuring results.

Abbemat Juice Station is available based on an Abbemat 200, 300 or 550.

More than refractive index

To measure density, optical rotation, viscosity or pH value alongside refractive index and concentration, the Abbemat refractometers can be connected to other Anton Paar instruments – at the time of purchase or in the future. This saves time and sample and gives you all results in one report.

Automated filling and measurement

With the Performance Plus line refractometers you can automate sample filling and measurement of up to 96 samples with an Xsample 122 sample changer or use, for instance, an optional built-in peristaltic pump to fill the measuring cell with your sample.
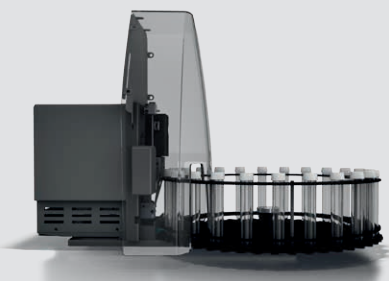
Fast quality control for routine analysis

The flow cell with filling funnel is the right choice for measuring a large number of samples quickly in routine quality control when there is enough sample available. To fill this flow cell you just pour one sample after the other into the filling funnel. The new sample flushes the previous sample out.
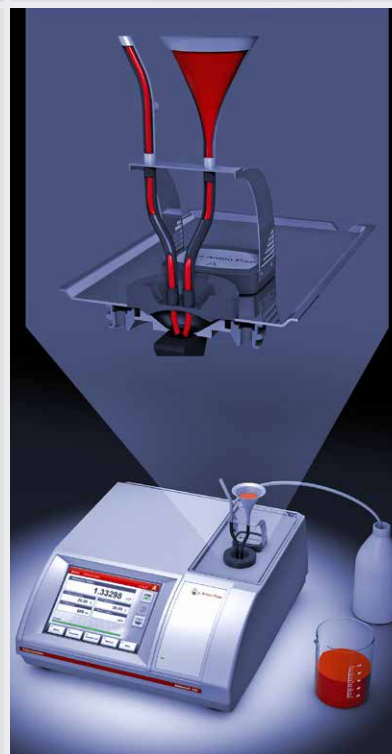
Quality control results at a glance

The limit check in the quality control mode clearly shows whether the result is "OK" or "not OK". The Performance line refractometers also give the position of the result on an easy-to-read dial compared to limits you define.
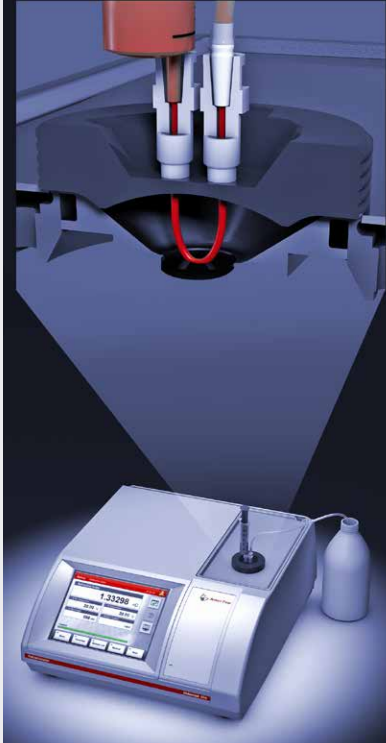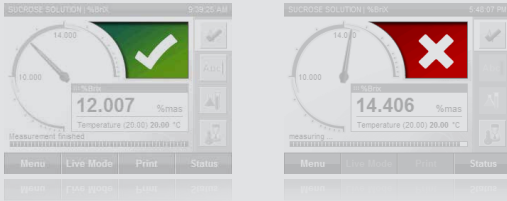
Small sample volumes

Micro flow cells require only a small sample volume. They are filled manually using a syringe. After measurement, the sample can easily be recovered.
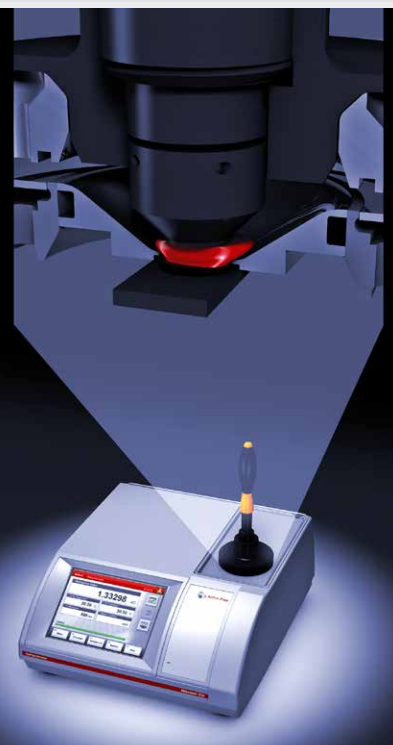
Measure foils or solids

Use the sample presser to press foils or solids onto the measuring prism to ensure optimal contact between the two surfaces.

Withstanding dirt and spills

The protection cover shields the housing from damage and dirt, extending the working life of the refractometer.
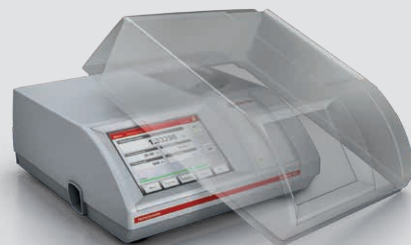
Assistance with qualification and validation

The Abbemat software fully supports the requirements of the pharmaceutical industry, including GMP, 21 CFR Part 11, GAMP 5 and USP<1058>. To minimize the time it takes to integrate your new Abbemat into your workflow, Anton Paar offers a Pharma Qualification and Validation Package including the following:

DQ, IQ, OQ and PQ, Risk Analysis, 21 CFR Part 11 checklist, Deviation List, Traceability Matrix, User SOP

Learn more

Enjoy the tour of the world of Abbemat on your tablet PC.

Check for the Abbemat refractometer app in the App or Play Store.

Download on the App Store

GET IT ON Google play

Abbemat Features

	Abbemat 200 **Economy**	Abbemat 300/500 **Performance**	Abbemat 350/550 **Performance Plus**	Abbemat 450/650 **Heavy Duty**	Abbemat HT/MW **Heavy Duty**
Accessories and hardware					
Display	3.5", 320 x 240 Px	3.5", 320 x 240 Px	6.5", 640 x 480 Px	5.7", 640 x 480 Px	●[1]
Keyboard	membrane	membrane	touchscreen	touchscreen	●[1]
Suitable for Modulyzer	○	●	●	●	○
Vertical operation with flow cells	○	○	○	●	●
Data interfaces					
RS232 port	printer	printer/LIMS	printer/LIMS	printer/LIMS	printer/LIMS[1]
CAN bus connection	○	slave	master/slave	master/slave	slave[2]
3 USB ports	●	●	●	●	●
Ethernet connector	○	○	●	●	●
VGA connector	○	○	●	●	●
Software features					
PC software	○	●	●	●	●[3]
Data export	MS Excel	MS Excel/PDF	MS Excel/PDF/text	MS Excel/PDF/text	MS Excel/PDF
Automatic sample name generation	○	●	●	●	●
User-definable sample name fields	○	●	●	●	●
Sample statistics	○	○	●	●	○
Backup and restoration of instrument settings	○	●	●	●	○
Manual downloadable from device	○	○	●	●	○
Data recording on internal memory	300 data sets	300 data sets	1000 data sets	1000 data sets	unlimited[1]
Methods					
Predefined methods	●	●	●	●	●
User-definable methods	○	●	●	●	●
Customer calculations	○	●	●	●	●
Scale calculator	○	○	●	●	○
Statistics of measured data	○	○	●	●	○
User-selectable display layout	○	●	●	●	●
User-configurable display and result output	○	○	●	●	○
Quality control mode with limit checks	○	●	●	●	○
Automatic temperature correction	●	●	●	●	●
Several measuring modes (standard, check, multiple measurement, multi-fill, temperature scan, time scan)	○	○	●	●	○
Quality and security					
Advanced user level management	○	●	●	●	●
Password rules, audit trail, electronic signature	○	●	●	●	●
Adjustment and checks history	○	●	●	●	●
Definition of check intervals	○	●	●	●	○
Check for stability of measured data	●	●	●	●	●
User-definable checks	○	○	●	●	○
Compliance					
21 CFR Part 11, GXP compliant	○	●	●	●	●
Disabling of data memory	○	○	●	●	○
AOAC, ASTM, CID, DIN, FDA, ICUMSA, ISI, JIS, OIML, SSDT methods	●	●	●	●	●
Pharma Qualification Package	●	●	●	●	●

[1] depending on the connected PC hardware/software | [2] with optional legacy device adapter | [3] required for operation

Specifications

	Abbemat 200 Abbemat 200 Juice Station	Abbemat 300 Abbemat 300 Juice Station Abbemat 350 Abbemat 450	Abbemat 500 Abbemat 550 Abbemat 550 Juice Station Abbemat 650	Abbemat HT High Temperature	Abbemat MW Multiple Wavelengths
Measuring ranges					
Refractive Index (RI)					
Range n_D	1.30 to 1.72	1.26 to 1.72	1.26 to 1.72	1.30 to 1.72	1.30 to 1.72
Resolution n_D	± 0.0001	± 0.00001	± 0.000001	± 0.000001	± 0.000001
Accuracy n_D[1]	± 0.0001	± 0.0001	± 0.00002	± 0.00004	± 0.00004
Measuring principle	Critical angle of total reflection measurement by shadowline detection with CCD array				
Brix					
Range	0 to 100 %	0 to 100 %	0 to 100 %	0 to 100 %	0 to 100 %
Resolution	0.01 %	0.01 %	0.001 %	0.001 %	0.001 %
Accuracy[1]	0.05 %	0.05 %	0.015 %	0.03 %	0.03 %
Sample/prism temperature control by built-in solid state thermostat (Peltier)					
Temperature range	10 °C to 60 °C	4 °C [2] to 85 °C	4 °C [2] to 85 °C	10 °C to 110 °C	10 °C to 70 °C
Temperature probe accuracy[1]	± 0.05 °C	± 0.05 °C	± 0.03 °C	± 0.03 °C	± 0.03 °C
Temperature probe stability[1]	± 0.002 °C	± 0.002 °C	± 0.002 °C	± 0.002 °C	± 0.002 °C
Materials in contact with samples					
Prism	Synthetic sapphire			YAG (Yttrium-Aluminum-Garnet)	
Sample well	Stainless steel, optionally made of Ni alloy				
Seal	FFKM (perfluoroelastomer)				
Components					
Light source	LED light source, average lifetime > 100 000 h				
Wavelength (by wavelength-adjusted interference filter)	589 nm				Up to 8 in the 436 nm to 656 nm range[3]
Power requirements	100-240 VAC +/-10 %, 50/60 Hz, min. 10 W, max. 100 W, depending on sample temperature setting and ambient temperature				
Dimensions					
W x H x D [mm]		300 x 145 x 330 Abbemat 450/650: Control unit: 220 x 100 x 295 Measuring unit: 200 x 135 x 200		180 x 120 x 250	
Weight [kg]		6.5 Abbemat 450/650: Control unit: 2.4 Measuring unit: 6.1		6	
Further specifications					
Max. allowed pressure	10 bar			pressureless	
Protection class	n.a.	Measuring unit Abbemat 450/650: IP68		n.a.	

[1] *valid at refractometric standard conditions (T= 20 °C, λ = 589 nm, ambient temperature = 23 °C)*

[2] *at max. ambient temperature of 30 °C*

[3] *589.3 nm Na-D; 435.8 nm Hg-g; 480.0 nm Cd-F'; 486.1 nm H-F; 488.0 nm Ar/Ion; 514.5 nm Ar/Ion; 532.0 nm Nd/Yag; 546.1 nm Hg-e; 632.8 nm He/Ne; 643.8 nm Cd-C'; 656.3 nm H-F', others on request*

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