Anton Paar

Abbemat
Refractometer
Series

The universal refractometer

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.

… 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.

Abbemat 3X00 series

"High-tech in a nutshell."

The Abbemat 3X00 series provides all essential features and intuitive handling. They smoothly integrate into laboratories in the beverage, food, chemicals, and fragrances industry, without taking up much space or time – or money.
This out-of-the-box refractometer series is ideal for small laboratories that require straightforward measurements without any complex data processing.

Abbemat 3000
Abbemat 3100
Abbemat 3200

Performance line

"Measures, measures, measures."

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.

Abbemat 300
Abbemat 500

Performance Plus line

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

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.

Abbemat 350
Abbemat 550

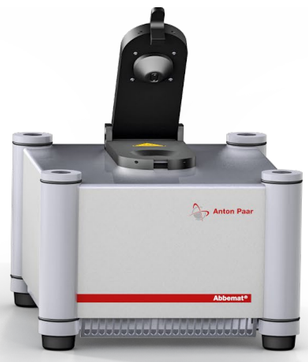
Heavy Duty line

"Measure when others fail."

The Abbemat 450/650 refractometers are extremely robust and the measuring unit is 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 bubbles from affecting the results.

The Abbemat 450/650 models offer temperature control up to 125 °C.

Abbemat 450
Abbemat 650



Abbemat MW

"More than one wavelength."

The PC-operated Abbemat MW is the multi-wavelength refractometer for measuring the refractive index at different wavelengths. The results can be used for determining refractive dispersion and Abbe number.

Abbemat MW

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.

Food

Examples: sauces, dressings, soups, milk, butter, jams, jellies, honey, ketchup, mayonnaise, purees

Application examples
Total solids or moisture content, butyro fat/oil value, quality control of food oils, iodine number, Brix

Sugar

Examples: sugar cane, sugar beet, white sugar solutions

Application examples
Brix and dry substance, glucose, fructose, invert sugar content in water, total solids, HFCS

Beverages

Examples: sugar, sugar syrups, soft drinks, fruit juice, coffee extract, grape juice, must

Application examples
Brix and dry substance, total solids, extract content, must weight (Oechsle, Baumé, Plato)

Flavors & fragrances

Examples: essential oils, perfumes, eau de toilettes, flavors

Application examples
Quality control of flavors and fragrances, product characterization

Chemicals

Examples: acids and bases, resins, glues, polymers, cosmetics, soaps, salts

Application examples
Sulfuric acid, sodium hydroxide, ammonium hydroxide, glycerol, isopropyl alcohol

Pharmaceuticals

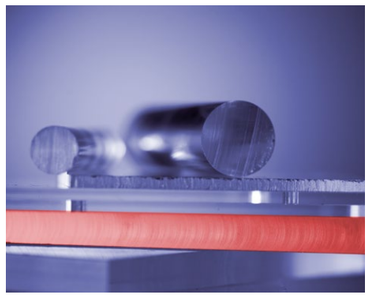
Examples: drugs, medical samples, body fluids, infusion solutions

Application examples
Refractive index according to international pharmacopoeias (e.g. Ph. Eur, USP, JP), vital human urine parameters, serum protein, magnesium chloride, sodium chloride

Petrochemicals

Examples: fuel icing inhibitors, antifreeze agents, oils, lubricants, waxes, greases, plastics

Application examples
Freezing point of antifreeze agents (propylene and ethylene glycol), carbon type composition in combination with a viscometer



Others

Examples: glass, polymers, contact lenses

Application examples
Quality control, Abbe number, dispersion, anisotropy

Please ask your local representative for your particular application.

Abbemat refractometers
Features and benefits*

Software with benefits and flexibility

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

Intelligent checks

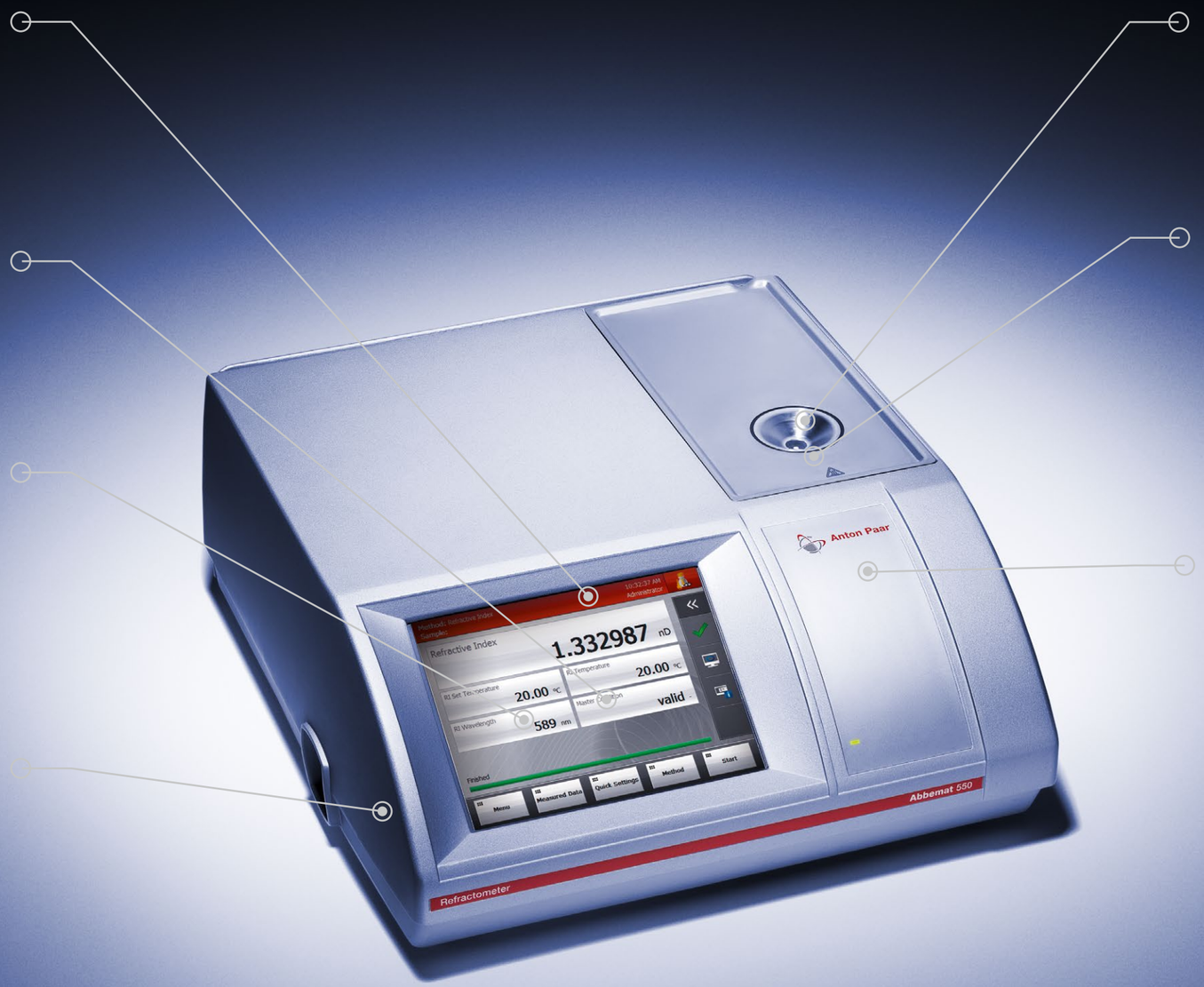
Abbemat refractometers warn you if the sample volume is too small or the prism needs extra cleaning. They also check the measuring results and adjustments for stability and plausibility.

Fit for the pharmaceutical industry

The Abbemat software fully supports the requirements of the pharmaceutical industry, including GMP, 21 CFR Part 11, GAMP 5, USP, and international pharmacopoeia (e.g. Ph. Eur., JP).
Additionally, Anton Paar offers attractive data management solutions for the Abbemat 350/550 Performance Plus models to guarantee a high level of data integrity and usability.

Durability for a long life

Apart from the fan, 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. An optional sample well made of Hastelloy® is available.



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.

On-site temperature calibration and adjustment

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.
The Abbemat T-Check calibrates and adjusts the surface temperature of the measuring prism for precise and traceable results.

Designed for maximum accuracy

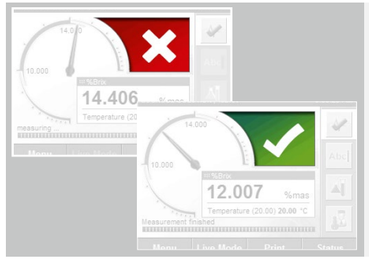
The optical bench is hermetically sealed and temperature stabilized to protect it from outside influences such as condensation in tropical conditions. Before sealing, the measuring wavelength is tuned to a bandwidth of ±0.2 nm to ensure correct results for samples with different dispersions.

*See which feature is available for which Abbemat model on the last double page of this brochure

Simplify your work

Samples containing particles or pulp

The vertical setup of Abbemat 450/650 or 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 300 or Abbemat 550.



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.

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.

Measure foils or solids

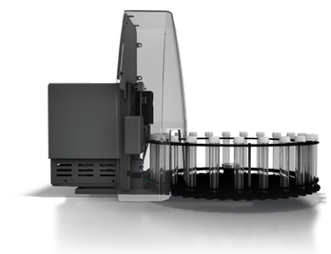
Use the sample presser to press foils, films, or solids onto the measuring prism to ensure optimal contact between sample and measuring prism.

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. 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.

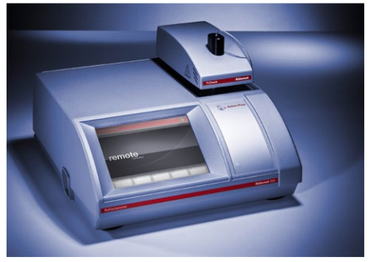
Full compliance with the latest pharma regulations

The Abbemat software supports the requirements of the pharmaceutical industry, including GMP, 21 CFR Part 11, GAMP 5, USP, and international pharmacopoeia (e.g. Ph. Eur., JP). To minimize the time it takes to integrate your new Abbemat into your workflow, Anton Paar offers a Pharma Qualification Package.
Anton Paar also offers dedicated software solutions for effortless PC-controlled use, traceable data regeneration, and data integrity.



Automated filling and measurement

With the Performance Plus line refractometers you can automate sample filling and measurement of up to 96 samples with a sample changer or use an optional built-in peristaltic pump to fill the measuring cell with your sample.

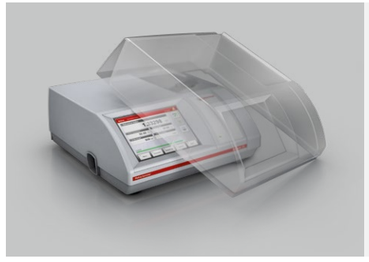


On-site temperature calibration and adjustment

With the Abbemat T-Check you can precisely calibrate and adjust the temperature sensor of your Abbemat to ensure accurate refractive index measurements. To ensure full traceability, the temperature adjustments are automatically documented in the Audit Trail of the Abbemat.

Small sample volumes

Micro flow cells require only small sample volumes. They are filled manually using a syringe. After measurement, the sample can easily be recovered.



Withstanding dirt and spills

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

Abbemat features

	Abbemat 3000/3100/3200	Abbemat 300/500 Performance	Abbemat 350/550 Performance Plus	Abbemat 450/650 Heavy Duty Line	Abbemat MW
Hardware and accessories					
Display	5.8" LCD 640 x 480 Pixels	3.5" LCD 320 x 240 Pixels	6.5" TFT 640 x 480 Pixels	5.8" LCD 640 x 480 Pixels	●[1)]
Keyboard	Touchscreen	Membrane	Touchscreen	Touchscreen	●[1)]
Optional accessories	Magnetic sample cover	Magnetic sample cover, flow cells, sample presser	Magnetic sample cover, flow cells, sample presser, peristaltic pump, pH sensor, sample changer	Magnetic sample cover, flow cells, sample presser	Sample cover, flow cells, sample presser
Interfaces					
RS232 port	Printer	Printer/LIMS	Printer/LIMS	Printer/LIMS	●[1)]
CAN bus / Modulyzer	○	Slave	Master/slave	Master/slave	○
USB / USB serial ports	3	4	4	4	●[1)]
Ethernet printer	●	○	●	●	●[1)]
Ethernet LIMS	○ / ○ / ●	○	●	●	●[1)]
VGA connector	○	○	●	●	●[1)]
Software					
Default methods (further methods on request)	Refractive index, Brix, fructose, glucose, invert sugar, sucrose	>120 methods	>120 methods	>120 methods	>30 methods
User-definable methods	○	Polynomial	Polynomial / formula / table	Polynomial / formula / table	Polynomial / formula
PC software (option)	○	●	●	●	●[2)]
Remote operation via VNC	○	○	●	●	●[1)]
Data export	Printer, file, server	Printer, file	Printer, file, server	Printer, file, server	Printer, file, server
Internal data memory	2000 data sets	300 data sets	1000 data sets	1000 data sets	Unlimited[1)]
Selectable display layout	○	●	●	●	○
Configurable display and result output	○	○	●	●	○
Quality control mode with limit checks	○	●	●	●	○
Measuring modes (standard, check, multiple measurement, multi-fill, temperature scan, time scan)	○	○	●	●	●
Automatic sample name generation	○	●	●	●	○
User-definable data field (e.g. batch no.)	●	●	●	●	●
Sample statistics (e.g. mean value)	○	○	●	●	○
Quality and data security					
Advanced user level management	○	●	●	●	●
Password rules, audit trail, electronic signature	○	●	●	●	●
Adjustment and checks history	○	●	●	●	○
Definition of check intervals	○	●	●	●	○
Alarm for insufficient sample quantity or dirty prism	●	●	●	●	●
Compliance					
21 CFR Part 11, GXP-compliant	○ / ●[3)] / ●[3)]	●	●	●	●
Disabling of data memory	○	○	●	●	○
AOAC, ASTM, CID, DIN, FDA, ICUMSA, ISI, JIS, OIML, SSDT methods	●	●	●	●	●

[1)] depending on the connected PC hardware [2)] required for operation [3)] with optional PC software

Specifications

	Abbemat 3000/3100/3200	Abbemat 300/500 Performance	Abbemat 350/550 Performance Plus	Abbemat 450/650 Heavy Duty Line	Abbemat MW
Measuring ranges					
Refractive Index nD					
Range [nD]	1.30 to 1.66 Abbemat 3200: 1.30 to 1.72	1.26 to 1.72	1.26 to 1.72	1.26 to 1.72	1.32 to 1.70
Resolution [nD]	±0.0001	±0.00001 / ±0.000001	±0.00001 / ±0.000001	±0.00001 / ±0.000001	±0.000001
Accuracy[1)] [nD]	±0.0001	±0.0001 / ±0.00002	±0.0001 / ±0.00002	±0.0001 / ±0.00002	±0.00004
Brix scale					
Range [°Brix]	0 to 100	0 to 100	0 to 100	0 to 100	0 to 100
Resolution [°Brix]	±0.01	±0.01 / ±0.001	±0.01 / ±0.001	±0.01 / ±0.001	±0.001
Accuracy[1)] [°Brix]	±0.05	±0.05 / ±0.015	±0.05 / ±0.015	±0.05 / ±0.015	±0.03
Sample/prism temperature control by built-in solid state thermostat (Peltier)					
Temperature range [°C]	Abbemat 3000: Temperature correction Abbemat 3100: 20 and 25 Abbemat 3200: 15 to 60	4[2)] to 85	4[2)] to 85	4[2)] to 125	10 to 70
Temperature probe accuracy[1)] [°C]	±0.05	±0.05 / ±0.03	±0.05 / ±0.03	±0.05 / ±0.03	±0.03
Temperature probe stability[1)] [°C]	±0.002	±0.002	±0.002	±0.002	±0.002
Materials in contact with samples					
Prism	Synthetic sapphire				YAG (yttrium-aluminum-garnet)
Sample well	Stainless steel, optionally Ni alloy				
Seal	FFKM (perfluoroelastomer)				
Components					
Light source	LED light source, average lifetime >100,000 hours				
Wavelength(s) [nm]	589.3 (by wavelength-adjusted interference filter)				Up to 8 in the range of 436 to 656 [3)]
Power requirements	100-240 VAC +10 %/-15 %, 50/60 Hz, min. 10 W, max. 100 W, depending on sample temperature setting and ambient temperature				
Dimensions					
W x H x D [mm]	228 x 94 x 300	300 x 145 x 330	300 x 145 x 330	Control unit: 220 x 100 x 295 Measuring unit: 200 x 135 x 200	195 x 145 x 245
Weight [kg]	4.4 / 4.6 / 4.6	6.5	6.5	Control unit: 2.4 Measuring unit: 6.1	6
Further specifications					
Max. allowed pressure in flow cell	Pressureless	10 bar	10 bar	10 bar	Pressureless
IP protection class	n.a.	n.a.	n.a.	Measuring unit: IP68 [4)]	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)] Nominal wavelengths : 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', the true wavelengths may differ from the nominal wavelength. Other wavelengths on request
[4)] waterproof to a depth of 1 meter for up to 2 hours

© 2021 Anton Paar GmbH | All rights reserved.
Specifications subject to change without notice.
D01IP003EN-LTR-J

www.anton-paar.com