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 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

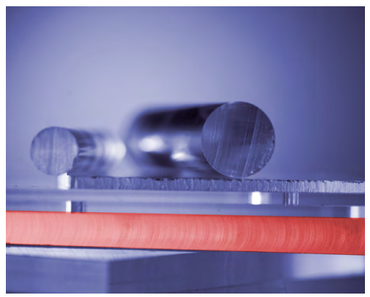
Examples: drugs, medical samples, body fluids, infusion solutions

**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

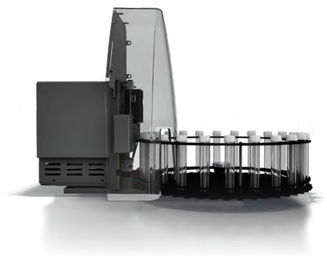
# Simplify your work

## 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.

## 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.

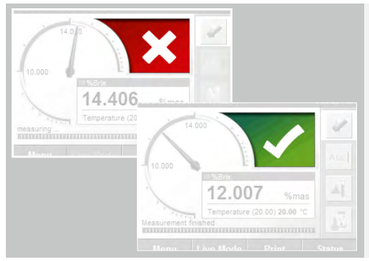


## Automated filling and measurement

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.

## 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.




## Quality control results at a glance

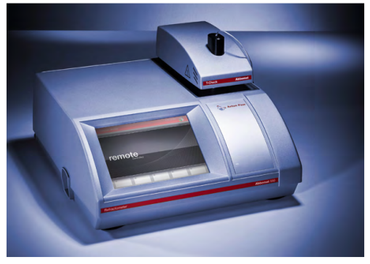
The limit check in the quality control mode clearly shows whether the result is "OK" or "not OK". The Performance line refractometers also give the position of the result on an easy-to-read dial compared to limits you define.

## 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.

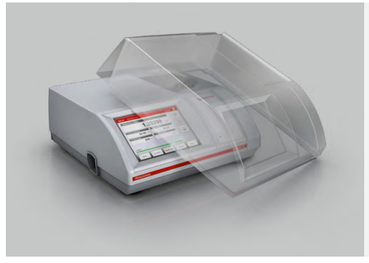
## Full compliance with the latest pharma regulations

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.




## 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.



## 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 |
|---|---|---|---|---|
| **Hardware and accessories** | | | | |
| Display | 5.7" LCD<br>640 x 480 Pixels | 3.5" LCD<br>320 x 240 Pixels | 6.5" TFT<br>640 x 480 Pixels | 5.8" LCD<br>640 x 480 Pixels |
| Keyboard | Touchscreen | Membrane | Touchscreen | Touchscreen |
| 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 |
| **Interfaces** | | | | |
| RS232 port | Printer | Printer/LIMS | Printer/LIMS | Printer/LIMS |
| CAN bus / Modulyzer | ○ | Slave | Master/slave | Master/slave |
| USB / USB serial ports | 3 | 4 | 4 | 4 |
| Ethernet printer | ● | ○ | ● | ● |
| Ethernet LIMS | ○ / ○ / ● | ○ | ● | ● |
| VGA connector | ○ | ○ | ● | ● |
| **Software** | | | | |
| Default methods (further methods on request) | Refractive index, Brix, fructose, glucose, invert sugar, sucrose | >120 methods | >120 methods | >120 methods |
| User-definable methods | ○ | Polynomial | Polynomial / formula / table | Polynomial / formula / table |
| PC software (option) | ○ | ● | ● | ● |
| Remote operation via VNC | ○ | ○ | ● | ● |
| Data export | Printer, file, server | Printer, file | Printer, file, server | Printer, file, server |
| Internal data memory | 2000 data sets | 300 data sets | 1000 data sets | 1000 data sets |
| 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 | ○ | ● | ● | ● |
| Disabling of data memory | ○ | ○ | ● | ● |
| AOAC, ASTM, CID, DIN, FDA, ICUMSA, ISI, JIS, OIML, SSDT methods | ● | ● | ● | ● |

# Specifications

| | Abbemat 3000/3100/3200 | Abbemat 300/500 Performance | Abbemat 350/550 Performance Plus | Abbemat 450/650 Heavy Duty Line |
|---|---|---|---|---|
| **Measuring ranges** | | | | |
| **Refractive Index nD** | | | | |
| Range [nD] | 1.30 to 1.66<br>Abbemat 3200:<br>1.30 to 1.72 | 1.26 to 1.72 | 1.26 to 1.72 | 1.26 to 1.72 |
| Resolution [nD] | ±0.0001 | ±0.00001 / ±0.000001 | ±0.00001 / ±0.000001 | ±0.00001 / ±0.000001 |
| Accuracy[1] [nD] | ±0.0001 | ±0.0001 / ±0.00002 | ±0.0001 / ±0.00002 | ±0.0001 / ±0.00002 |
| **Brix scale** | | | | |
| Range [°Brix] | 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 |
| Accuracy[1] [°Brix] | ±0.05 | ±0.05 / ±0.015 | ±0.05 / ±0.015 | ±0.05 / ±0.015 |
| **Sample/prism temperature control by built-in solid state thermostat (Peltier)** | | | | |
| Temperature range [°C] | Abbemat 3000:<br>Temperature correction<br><br>Abbemat 3100:<br>20 and 25<br><br>Abbemat 3200:<br>15 to 60 | 4[2] to 85 | 4[2] to 85 | 4[2] to 125 |
| Temperature probe accuracy[1] [°C] | ±0.05 | ±0.05 / ±0.03 | ±0.05 / ±0.03 | ±0.05 / ±0.03 |
| Temperature probe stability[1] [°C] | ±0.002 | ±0.002 | ±0.002 | ±0.002 |
| **Materials in contact with samples** | | | | |
| Prism | Synthetic sapphire | | | |
| 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) | | | |
| Power requirements | 100-240 VAC +10 %/-15 %, 50/60 Hz, min. 10 W, max. 100 W,<br>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:<br>220 x 100 x 295<br>Measuring unit:<br>200 x 135 x 200 |
| Weight [kg] | 4.4 / 4.6 / 4.6 | 6.5 | 6.5 | Control unit: 2.4<br>Measuring unit: 6.1 |
| **Further specifications** | | | | |
| Max. allowed pressure in flow cell | Pressureless | 10 bar | 10 bar | 10 bar |
| IP protection class | n.a. | n.a. | n.a. | Measuring unit: IP68 [3] |

[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] waterproof to a depth of 1 meter for up to 2 hours

D01IP003EN-LTR-M

www.anton-paar.com