Recognizing Corporate Social Responsibility

Established in 1940, ATAGO has continuously made strides in the research and development of a wide variety of optoelectronic products, specifically focusing on refractometers. ATAGO directly controls the entire production process - designing, developing, assembling, and shipping. Our products are used in a variety of industries; from food and beverage processing, to petrochemicals and metalworking. ATAGO has an established reputation as a trusted brand and enjoys the fullest confidence of end-users, not only in Japan but also in 154 countries worldwide. Our continuing global expansion includes the establishment of ATAGO U.S.A in August 2001 to oversee the operations in North and Latin America. ATAGO INDIA Instruments Pvt. Ltd. in Mumbai, India was established as a sales office in February 2005, followed by ATAGO (THAILAND) Co., LTD in December 2009. ATAGO BRASIL Ltda. made a start in February 2010 to better serve the growing sugar industry in Brazil. ATAGO ITALIA s.r.l. opened in October of 2010, followed by ATAGO CHINA Guangzhou Co., Ltd. in March of 2011. The two most recent developments are the openings of ATAGO RUSSIA Ltd. in January of 2014 and ATAGO NIGERIA Scientific Co., Ltd. in May of 2015. While we have long enjoyed market presence domestically in Japan, our service to the global market is becoming increasingly important.
ATAGO has attained 80% of the market share in Japan, as well as 30% of the global market share. As a result, ATAGO is fully aware of our corporate responsibility as a member of the global community, and we seek to make a positive impact both locally and internationally.
Below is the history of ATAGO's charitable assistance to those who have been victims of natural disasters.

November	2004	Earthquake in Chuetsu, Niigata		February	2010	Earthquake in Chile
September	2005	Hurricane Katrina in New Orleans		August	2010	Flood in Pakistan
October	2005	Earthquake in Pakistan		March	2011	Earthquake in New Zealand
June	2006	Earthquake in Central Java		March	2011	Earthquake off the Pacific Coast of Tohoku Region in Japan
April	2007	Earthquake in Noto Peninsula				
July	2007	Earthquake in the coast of Chuetsu, Niigata		November	2012	Hurricane Sandy in Eastern United States
December	2007	Earthquake in Peru		November	2013	Typhoon in the Philippines
May	2008	Earthquake in Sichuan		March	2014	Syrian Refugee Crisis
May	2008	Cyclone Nargis in Myanmar		August	2014	Ebola Outbreak
June	2008	Earthquake in Iwate/Miyagi Inland		April	2015	Earthquake in Nepal
April	2009	Earthquake in Abruzzo		September	2015	Typhoon 18 (Etau) in Japan
January	2010	Earthquake in Haiti		February	2016	Earthquake in Taiwan

As new regulations and requirements are imposed in the marketplace, the competition is expected to become fiercer. Being true to our mission statement: "Let's synergize. Let's advance. Let's create." ATAGO is devoted to making strides in the research and development of scientific instruments to meet the ever-changing demands of our clientele.

Standard & Poor's Rating

ATAGO has received the top grade "aaa" from Japan SME (Small & Medium Sized Enterprise) Rating 4 consecutive times; in 2007, 2008, 2014 and in 2015. This grade is presented by Standard & Poor's, a well-known provider of independent credit ratings.

Standard & Poor's
SME 中堅・中小企業 格付け
2014 12月期決算 aaa
0000102-1412

Excellence in Tax Declaration

In November 2007, ATAGO received recognition of excellence from the Itabasi revenue office for the tax honesty, stable profitability, and transparent business model in 2002 and 2007.

Global Niche Top Companies Selection 100

In recognition of outstanding achievements in global expansion and development, a prominent presence in the digital refractometer industry, and for innovation and originality, ATAGO was selected for the "Global Niche Top Companies Selection 100" award by The Ministry of Economy, Trade and Industry (METI) in Japan.

All ATAGO refractometers are designed and manufactured in Japan.

ATAGO CO.,LTD.
http://www.atago.net/ overseas@atago.net

Headquarters: The Front Tower Shiba Koen, 23rd Floor
2-6-3 Shiba-koen, Minato-ku, Tokyo 105-0011, Japan
TEL : 81-3-3431-1943 FAX : 81-3-3431-1945

ATAGO U.S.A., Inc.	TEL : 1-425-637-2107	customerservice@atago-usa.com
ATAGO INDIA Instruments Pvt. Ltd.	TEL : 91-22-28544915, 40713232	customerservice@atago-india.com
ATAGO THAILAND Co.,Ltd.	TEL : 66-21948727-9	customerservice@atago-thailand.com
ATAGO BRASIL Ltda.	TEL : 55 16 3913-8400	customerservice@atago-brasil.com
ATAGO ITALIA s.r.l.	TEL : 39 02 36557267	customerservice@atago-italia.com
ATAGO CHINA Guangzhou Co.,Ltd.	TEL : 86-20-38108256	info@atago-china.com
ATAGO RUSSIA Ltd.	TEL : 7-812-777-96-96	info@atago-russia.com
ATAGO NIGERIA Scientific Co.,Ltd.	TEL : 234-707-558-1552	atagonigeria@atago.net

ISO9001 H.Q. & Factory

HACCP GMP GLP
ATAGO products comply with HACCP,GMP, and GLP system standards.

* Specifications and appearance are subject to change without notice.

ENV.01 16032000OP Printed in Japan

Digital Refractometers

RX series

Presence of Those Who Have Reached the Summit

The World's Highest Standard of Technology Stemming from Over Half a Century of Expertise

RX-5000 i-Plus / RX-5000 i / RX-7000 i / RX-9000 i

RX-50000α-Plus / RX-50000α / RX-50000α-Bev
RX-70000α / RX-90000α / RX-007α / RX-5000

ATAGO®
http://www.atago.net/

Why Choose ATAGO?

Made with Japanese quality.

1 Proud Heritage and Experience

ATAGO has over 70 years of experience in optical instrument manufacturing. With our expertise cultivated over decades, as well as an extensive selection of instruments, we can meet a variety of measurement needs including highly specialized industries.

2 Industry-Leading Technology

Refraction of light has been our sole specialty throughout the existence of ATAGO, and we strive for perfection in optical systems. We listen to end-user feedback from 154 countries and continuously push the limit of refractometry.

3 Trusted Product Support

We dedicate ourselves on the high durability and low failure rate of ATAGO products. Our repair service is carried out in a timely manner. Calibration certificates are available.

For the Utmost in Customer Satisfaction…

Free Demo Units

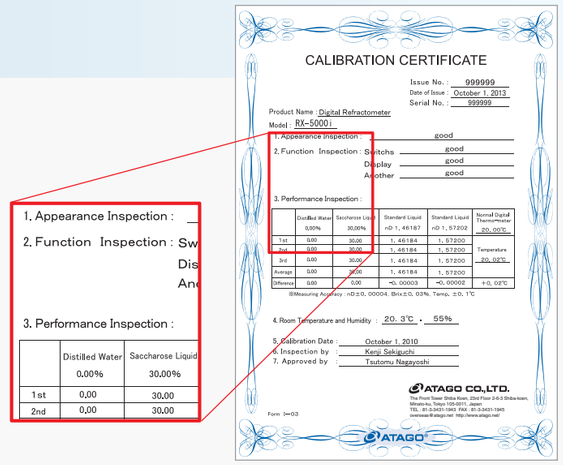
For those considering to purchase an ATAGO product, we offer demo units, free of charge. Potential users are able to directly experience our products ease of use, precision, and accuracy. Our ultimate priority is ensuring customers are completely satisfied before making a purchase.

Free Demonstration Units Available.
Please contact ATAGO Customer Service.

www.atago.net/

Calibration Service

ATAGO offers calibration service in conformance with ISO quality management systems as well as HACCP, GMP and other standards. The following three documents will be issued. (Calibration service is performed at an additional cost.)



- Calibration Certificate
- Traceability Certificate
- Traceability Diagram

2 Years Standard Warranty (3 years with product registration)

The RX series come standard with a two year limited warranty against manufacturer's defects from the date of the original purchase. The warranty period can be extended to three years if the product is registered with ATAGO.
Warranty service for eligible repairs is provided at no charge. There will be fees associated with any services provided after the warranty period expires.
Contact ATAGO, an authorized ATAGO distributor, or the original seller.

Below are exclusions to the warranty:

- Damage as a result of accident, misuse, abuse, or improper site preparation/maintenance
- Damage as a result of disassembly by anyone other than authorized service providers

online at: www.atago.net/registration/

RX-i series

The world's highest standard of technology now available with touch screen.
ATAGO taking refractometers to the next level.

Highlighted sections denote the difference in specifications between the i series and the α series.

World's Highest Standard of Accuracy

The RX series are the most accurate of ATAGO refractometers programmed with a trusted and advanced algorithm.

Ergonomically Designed Layout

The RX series was designed with ease of use in mind. The sample stage is placed on the right-side, while the buttons for operation and the LCD are placed on the left-side. This results in a distance of only 17 cm. Extensive research was performed in the design phase to ensure an ergonomic interface that made operation easy while maximizing efficiency.

Password Security

The password feature allows only authorized personnel to perform certain operations. Assign a system level and password to limit each operator's activities.

When using multiple units…

Resolve Measurement Value Discrepancy

With the manual calibration feature, measurement values can be adjusted to be consistent with multiple units.

Reliability

The new and advanced algorithm allows for more stable readings every time.

Speedy Measurement Results

Once the sample temperature has stabilized, measurement takes only a few seconds. Results are displayed instantly with excellent repeatability.

Visual "Pass / Fail" Indication

Quickly identify if the measurement value is within the target range with the graphic display. Up to 100 sample types can be programmed to improve inspection efficiency.

Measurement History

The built-in memory will instantly recall the last 500 measurement values.

Programmable User Scale

Enter 3 to 5 data points of a scale, other than Brix, to directly display the concentration of specific solutions, such as DMF, and more. Save time and increase efficiency by eliminating the need to refer to manual conversion tables.

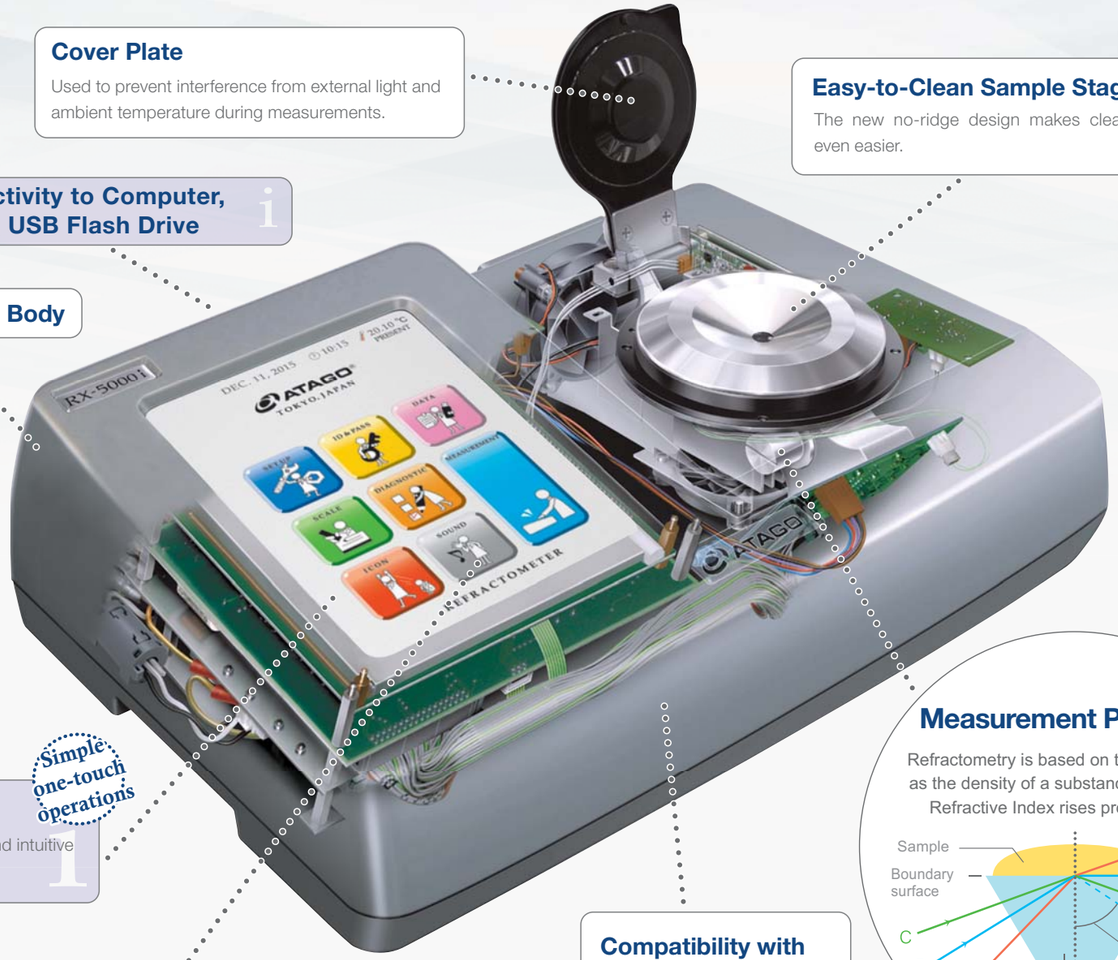
Cover Plate
Used to prevent interference from external light and ambient temperature during measurements.

Connectivity to Computer, Printer, USB Flash Drive

Rugged Metal Body

Easy-to-Clean Sample Stage
The new no-ridge design makes cleaning even easier.

Fast and Easy



Simple one-touch operations

Touchscreen
Enjoy a seamless and intuitive interface.

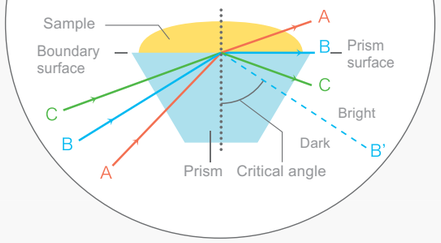
Icons
Adorable icons will navigate you through the operations.

Compatibility with Harsh Chemicals
The wetted parts can be customized with materials that are resistant to corrosive chemicals, such as acids, bases, and solvents.

P.16

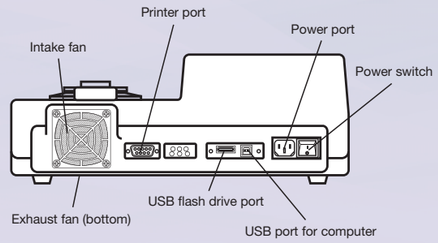
Measurement Principles

Refractometry is based on the principle that as the density of a substance increases, its Refractive Index rises proportionately.



Printer Connectivity

GLP/GMP compliant - sample numbers, dates, time, measurement values, temperatures, and sample names - can be printed. Print items can be selected for customized reporting. Thermal dot or impact dot printer models available (see Accessories on page 17).



Computer Connectivity

USB flash drive data storage capability. Data can be imported/exported on a computer through RS-232C (via USB virtual serial port) connectivity. Software is available to support your FDA 21 CFR Part 11 compliance.

FDA 21 CFR Part 11 software

Rugged Metal Body

The sturdy, yet elegant die-cast metal body protects the optical system. A special coating on the surface adds extra durability against chemicals.

Full Selection of Accessories

See Accessories on pages 16-17.

Calibration Certificate

A calibration certificate can be ordered with each instrument for an additional charge. Please contact your ATAGO representative for further details.

Wide Ambient Temperature Range

The ambient temperature range of 5 to 40°C allows measurements in a wide range of temperature conditions.

5 Measurement Mode Options

MODE-S
For emulsion samples
Displays the measurement value once a certain level of sample stability is achieved.

MODE-1
For maximum accuracy
Displays the measurement value once the sample reaches the target temperature.

MODE-2
For fast results
Measures Refractive Index and temperature at fixed intervals and displays the estimated measurement value at the target temperature.

MODE-3
For no temperature control
Provides an option to turn the thermo-module off. Without temperature control, the measurement value is displayed in 4 seconds after the START key is pressed.

MODE-T
Recommended for measuring low Brix liquid samples (such as teas)
Equipped only on the RX-5000i-Plus, MODE-T is recommended for users who place importance on obtaining highly repeatable results (Brix 0.001%).

RX-i series

Experience the ease of touch-screen technology.
Our world-class precision instrument continues to advance.

ATAGO's Flagship, Most Accurate and Full Range

RX-5000 i-Plus — The RX-5000i-Plus, one of the most accurate refractometers in the world is now even more stylish, smart, and functional.

ATAGO's Basic Model

RX-5000 i — The RX-5000i measures with the same accuracy level as the RX-5000α and provides reliable measurements with newly added functions and the touch screen operation. Its high measurement accuracy of ±0.00004 for refractive index (nD) and ±0.03% for Brix, makes it ideal for measurement of food, beverages, and sugar syrups.

Wide Range and High Accuracy

RX-9000 i — Features both the high accuracy of the RX-5000i and the wide refractive index range of the RX-7000i, making it capable of measuring substances with a high refractive index, such as fragrances, oils, and fats. It also comes with newly added functions, such as USB connectivity and self-diagnosis capability.

Wide Range

RX-7000 i — Features an extremely wide refratcive index range of 1.32422 to 1.70000, which makes it suitable for measuring substances with a high refractive index, such as fragrances, oils, and fats.

Features

- FDA 21 CFR Part 11 Software Included in Standard Delivery.
- Measurement History
- Programmable User Scale
- Resolve Measurement Value Discrepancy
- Password Security
- Built-in Peltier Thermo-module

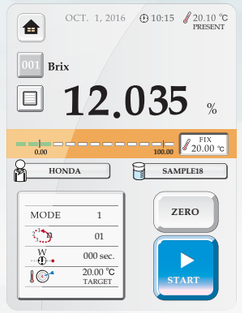
Additional upgrades from the RX-α series

- Icons
- Touchscreen
- USB Flash Drive
- Self-diagnosis
- Sound
- User Scale

Improved touchscreen operability with intuitive, user-friendly icons. Equipped with a multitude of versatile functions, such as color-coded items and clear, easy-to-read text and characters.

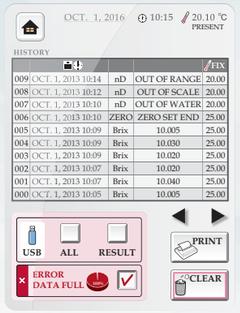
Home Screen

The illustrated home screen makes it easy to identify the operation of your choice.



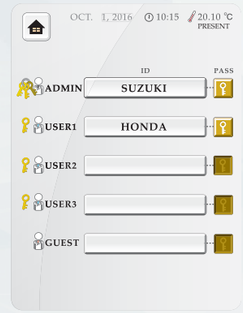
Measurements

All basic operations - selecting scales and modes, taking and recalling measurements, and zero-setting - are at the tip of your finger.



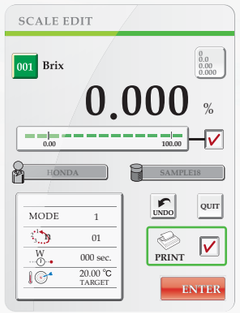
Measurement History

Recall the last 500 measurements. Exporting data to a USB drive or a printer is only one touch away. The RX-i series is also equipped with a RS-232C port for direct computer connection.



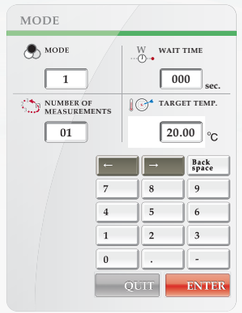
High Security

4 levels of access control and 5 unique user passwords provide data security. The settings are user-configurable.



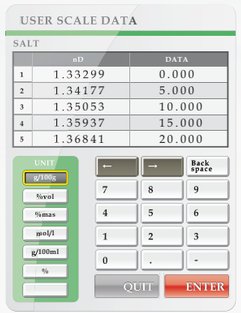
Editing User Scales

There is no need to re-set the scale, mode, and temperature of programmed user scales each time. With the RX-i series, entering, editing, and copying user scales is a breeze. Up to 100 scales can be programmed.



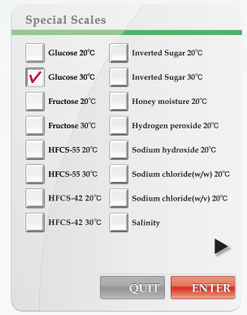
5 Measurement Modes

Select the measurement style that is most suited for the sample. Using the ten key pad, choose the measurement mode, enter the wait time, number of continuous measurements, and target temperature.



User Scales

In addition to the refractive index (nD) and Brix scales, concentration scales for specific samples can be configured easily. Simply program corresponding refractive index values and concentration data points.

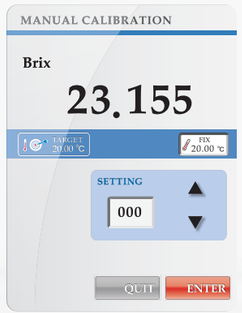


Special Scales

The RX-i series comes pre-programmed with 23 of the most commonly used concentration scales.

Self Assessment

The instrument can detect irregularities with the intensity of light or waveforms. Perform this assessment regularly to ensure accurate measurements.



Manual Calibration

When measurement values differ among multiple units, manual calibration can be performed within the accuracy range to provide consistent readings across all units.

Settings Menu

Navigation through the settings menu requires no effort. The icons provide quick and easy visual identification of operation.

Theme Options

Choose from 6 different theme options for the home screen. Customize it to your taste or change it daily to fit your mood.

RX-α series

Beautiful, functional design. User-tested ease of use.
True quality never becomes obsolete.
It only gets better with time.

Highlighted sections denote the difference in specifications between the i series and the α series.

World's Highest Standard of Accuracy

The RX series are the most accurate of ATAGO refractometers programmed with a trusted and advanced algorithm.

Ergonomically Designed Layout

The RX series was designed with ease of use in mind. The sample stage is placed on the right-side, while the buttons for operation and the LCD are placed on the left-side. This results in a distance of only 17 cm. Extensive research was performed in the design phase to ensure an ergonomic interface that made operation easy while maximizing efficiency.

Password Security

The password feature allows only authorized personnel to perform certain operations. Assign a system level and password to limit each operator's activities.

When using multiple units…

Resolve Measurement Value Discrepancy

With the manual calibration feature, measurement values can be adjusted to be consistent with multiple units.

Reliability

The new and advanced algorithm allows for more stable readings every time.

Speedy Measurement Results

Once the sample temperature has stabilized, measurement takes only a few seconds. Results are displayed instantly with excellent repeatability.

Visual "Pass / Fail" Indication

Quickly identify if the measurement value is within the target range with the graphic display. Up to 60 sample types can be programmed to improve inspection efficiency.

Measurement History

The built-in memory will instantly recall the last 30 measurement values.

Programmable User Scale

Enter 3 data points of a scale, other than Brix, to directly display the concentration of specific solutions, such as alcohol, salinity, DMF, and more. Save time and increase efficiency by eliminating the need to refer to manual conversion tables.

Cover Plate

Used to prevent interference from external light and ambient temperature during measurements.

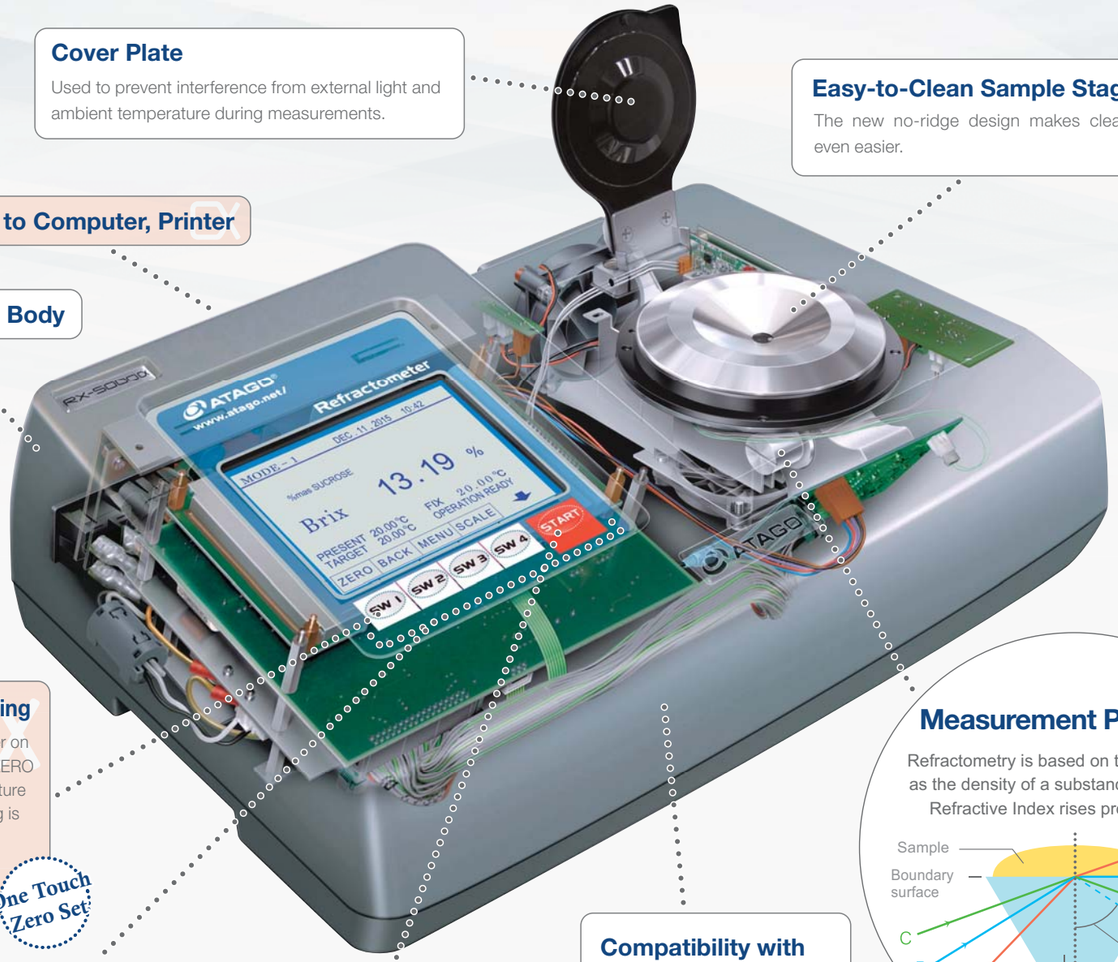
Easy-to-Clean Sample Stage

The new no-ridge design makes cleaning even easier.

Fast and Easy

Connectivity to Computer, Printer

Rugged Metal Body



No-Fuss Zero-Setting

Simply place distilled water on the prism, and press the ZERO button. Once the temperature has stabilized, zero-setting is completed within a few seconds. No complicated operations are involved.

One Touch Zero Set

Simple Operation

General operations can be performed with just 2 buttons: START and ZERO (SW1). This allows for ultimate usability.

Responsive, Error-Proof Design

A highly responsive design ensures every push of a button is registered, safeguarding against erroneous operations.

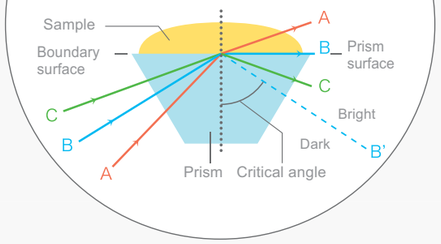
Compatibility with Harsh Chemicals

The wetted parts can be customized with materials that are resistant to corrosive chemicals, such as acids, bases, and solvents.

P.16

Measurement Principles

Refractometry is based on the principle that as the density of a substance increases, its Refractive Index rises proportionately.



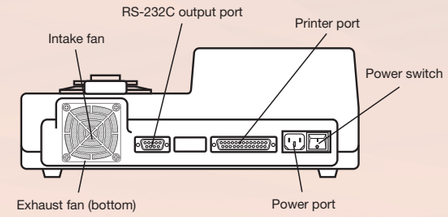
4 Measurement Mode Options

* excluding some products

MODE-S *	MODE-1	MODE-2	MODE-3 *
For emulsion samples	**For maximum accuracy**	**For fast results**	**For no temperature control**
Displays the measurement value once a certain level of sample stability is achieved.	Displays the measurement value once the sample reaches the target temperature.	Measures Refractive Index and temperature at fixed intervals and displays the estimated measurement value at the target temperature.	Provides an option to turn the thermo-module off. Without temperature control, the measurement value is displayed in 4 seconds after the START key is pressed.

Printer Connectivity

GLP/GMP compliant - sample numbers, dates, time, measurement values, temperatures, and sample names (when user scales are enabled) - can be printed. Print items can be selected for customized reporting. Thermal dot or impact dot printer models available (see Accessories on page 17).



Computer Connectivity

Transmit data to a PC via RS-232C or USB. (USB connection requires a USB to RS-232C adaptor.)
Software is available to support your FDA 21 CFR Part 11 compliance.

FDA 21 CFR Part 11 software

Rugged Metal Body

The sturdy, yet elegant die-cast metal body protects the optical system. A special coating on the surface adds extra durability against chemicals.

Full Selection of Accessories

See Accessories on pages 16-17.

Calibration Certificate

A calibration certificate can be ordered with each instrument for an additional charge. Please contact your ATAGO representative for further details.

Wide Ambient Temperature Range

The ambient temperature range of 5 to 40°C allows measurements in a wide range of temperature conditions.

RX-α series

The world's highest standard of technology stemming from over half a century of expertise

ATAGO's Flagship, Most Accurate and Full Range
RX-5000α-Plus

ATAGO's Basic Model
RX-5000α

Flat Sample Stage
RX-5000α-Bev

Wide Range, High Temperature and Accuracy
RX-9000α

Wide Range and High Temperature
RX-7000α

High Accuracy Digital Refractometer
RX-007α

Features

- FDA 21 CFR Part 11 Software Included in Standard Delivery.
- Measurement History
- Programmable User Scale
- Resolve Measurement Value Discrepancy
- Password Security (RX-5000α-Plus, RX-5000α, RX-5000α-Bev)
- Built-in Peltier Thermo-module

Buttons allow for operations to be performed even while wearing protective lab equipment such as gloves. General operations can be performed with just 2 buttons: START and ZERO (SW1). This simplistic, responsive design prevents erroneous operations.

ATAGO's Flagship, Most Accurate and Full Range
RX-5000α-Plus

Features the world's highest level of accuracy with ±0.010% for Brix and ±0.00002 for refractive index. Brix scale displays up to 3 decimal places. It's equipped with all the superb functions of the 5000α.

ATAGO's Basic Model
RX-5000α

Its high measurement accuracy of ±0.00004 for refractive index (nD) and ±0.03% for Brix makes it ideal for measurement of food, beverages, and sugar syrups. Capable of programming 60 kinds of user scales. Equipped with password security feature.

Flat Sample Stage
RX-5000α-Bev

The is ideal for measuring beverages. A flat sample stage makes it easier to wipe off the sample and allows for faster and easier clean up.

Wide Range, High Temperature and Accuracy
RX-9000α

The RX-9000α is a fully automatic digital refractometer with high accuracy and wide measurement range. This instrument is suitable for multiple sample types.

Wide Range and High Temperature
RX-7000α

Features an extremely wide refractive index range of 1.32500 to 1.70000 and capable of temperature control up to 70°C. Best suited for oils and fats with high melting points, and fragrances with high refractive index.

High Accuracy Digital Refractometer
RX-007α

The RX-007α is suitable for measuring water soluble samples with very low concentration (5.000% or less) at a very high accuracy of ±0.005%.

Water Bath Connectivity
RX-5000

The RX-5000 is not equipped with Peltier thermo-module. A water bath can be connected for temperature control.

* RX-5000 specifications differ from the α series.

Measurement value screen example (RX-5000α)

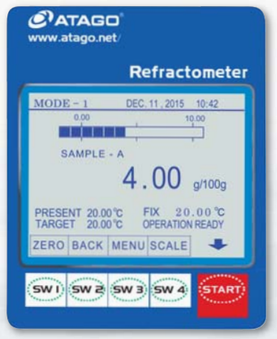
Refractive Index

Printed measurement example

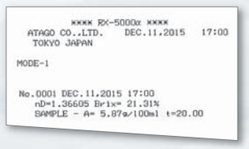
Brix

Printed measurement example

Concentration



Printed measurement example



Application Examples

The RX series are high quality and highly accurate automatic digital refractometers with an Internal Peltier Thermo-Module to control the sample temperature. Applications can be classified into the following three categories.

1. Refractive Index

Refractive Index is a common quality standard measure for pharmaceutical or chemical products. Measurements need to be taken at a constant temperature, commonly 20°C, 25°C, and 40°C. The RX series units are equipped with the internal Peltier Thermo-Module, and measurement starts once the target temperature is reached.

Fragrance and Food Additives

Fragrance and food additives are required to have certain Refractive Index. It is also used to identify unknown fragrances.

Pharmaceutical Products

Some pharmacies utilize Refractive Index standards. The Refractive Index of pharmaceutical products is measured for quality assurance purposes. Refractive Index of intravenous medications is also measured to control the concentration.

Cosmetics

The Refractive Index of petroleum and other base ingredients for cosmetics are measured for quality control. The Refractive Index of some components affects the cosmetics' ability to make the skin shine, so refractive Index measurements are commonly performed.

Petroleum and Organic Solutions

Standards are set for the Refractive Index of some refined petroleum products and organic chemicals.

Oils and Fats

The Refractive Index of unprocessed plant oil is regulated by many governmental standards. Refractive Index measurements are crucial for quality assurance of animal-based oils as well.

Detergents

The amount of impurities contained in hydrocarbon-based detergents can be calculated by the Refractive Index. The Refractive Index of glycol ether-based and water-based detergents is also measured.

2. Brix

Brix is measured for quality control purposes in the food and beverage industries. The RX series units are widely used for fruit juice, condiments, jams, and honey. The RX-007α (Resolution 0.001% Brix) is used for tea and unsweetened drinks.

Beverages and Fruit Juice

The Brix of dairy based beverages, soft drinks, and natural fruit juice is tested throughout the production process for quality control. The RX-5000i-Plus and the RX-5000α-Plus are ideal for measurements that require a high accuracy level. The RX-007α is a specialized model for tea and unsweetened drinks.

Jams, Honey, Liquid Sugar, Syrups

The measurements to determine the sugar content are absolutely essential, and refractometers are commonly used. The RX series are ideal for measuring viscous samples.

Condiments, Sauces, Soups

Refractometers are used to control the concentration of ketchup, sauces, and soups. The RX series provide precise measurements for these types of samples.

3. Concentration

The concentrations of industrial solutions are often monitored. Examples include water-based cutting oils and cleaning solutions, hydrogen peroxide, coolants, and alcohol solutions. Although the Brix scale is commonly used, user scales can also be programmed to display converted sample values.

Chemical Solutions

Refractometers can quickly measure the concentrations of hydrogen peroxide, caustic soda solutions, ethyl alcohol, and dimethylformamide solutions.

Cutting Oil and Quenching Oil

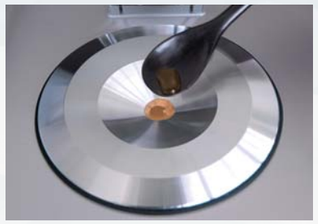
The concentrations of water-based cutting oils and quenching oils are regulated according to the purpose. Oils that are not at the correct concentrations negatively affect the quality of the finished products and the lifetime of the machining tools.

Antifreeze and Coolants

The concentration of automotive coolants and coolants used in freezers and pipes of central air conditioning systems need to be checked for the concentration to determine the freezing point.

Measurement Method

The RX series is designed for extremely easy and simple uses.
Simple operation without compromising the accuracy level.



Place a sample on the prism.

RX-i series: Touch START to start a measurement.

RX-α series: Press the START key to start a measurement.

Wipe off the sample to clean.

Sample Measurement Example

* Refractive index and Brix are reference values subject to change depending on the process, such as manufacturing or cooking.

[Eye drop] Tocopherol: RI 1.503 to 1.507

One drop dispensed from a bottle is approximately 0.05ml, of which 0.02ml actually stays in the eye. The most effective way of administrating is to keep the eye closed for about two minutes after eye drop is applied.

[Facial masks] Glycerin: RI 1.4740

Cream forms a moisturizing membrane for the skin. Ingredients vary from mud, seaweed, oils, cucumber, bran, aloe, lemon, sake lees, honey, molasses, flour, and even bush warblers' droppings.

[Soap] Soap: Brix 24.12%

Soap may have been first discovered when ancient people noticed that their hands were cleaner when washed with a mixture of wood ashes and fats of animals.

[Japanese beef bowl] Sauce: Brix 13.7%

The custom of eating beef was introduced to Japanese by the influx of Western culture after the war. The dish used to be called "kamechabu," stemming from a combination of rice topped with beef broth. "Gyudon" (beef rice bowl) is said to have originated in 1862 from the establishment of a "gyunabeya" (a beef hotpot restaurant).

[Japanese tempura bowl] Sauce: Brix 23.4%

After World War II, then Supreme Allied Commander was served tempura. Since then, tempura is a well-known and popular Japanese dish worldwide. The cooking technique may have been introduced by Chinese in the Tang Dynasty era in about 8th century.

[Ramen] Soup: Brix 4.6%

Noodles of Chinese origin, ramen have become a Japanese cultural icon. It is characterized by the wavy noodles and soy sauce-based soup.

[Éclair] Chocolate: Brix 77.5%

The name means "lightning" in French because either the cracks on the pastry surface resemble lightning, or it is consumed at lightning speed.

[Anti-itch Medications] Diphenhydramine: RI approx. 1.55

Itching of skin is associated with inspect bites and stings, hives, allergic reactions, eczema, contact dermatitis, fungal, etc.

[Nail polish] Acetone: RI 1.3590

In Japan, safflower and rose balsam were commonly used to paint nails in old times. Colored nail enamels were introduced around 1930, inspired by fast-drying automobile paints.

[Dishwashing detergent] Detergent: Brix 33.26%

Recently, detergents are developed to be not only tough on grease but also gentle and moisturizing for the skin. Most dishwashing detergents are neutral and contain plant-based ingredients, such as corn oil, coconut oil, palm oil, sunflower oil, etc.

[Seafood salad] Asian salad dressing: Brix 12.0%

This healthy salad is a mixture of seafood, such as octopus, shrimp, clams, and vegetables. A great source of vitamins.

[Caesar salad] Caesar vinaigrette: Brix 21.2%

An Italian-born Mexican chef, Caesar Cardini created this classic salad at his hotel restaurant in Tijuana.

[Shark fin soup] Soup: Brix 5.1%

Japan is a supplier of shark fin. Shark fin, along with sea cucumbers and abalones, were exported to China in 1600's.

[Mitarashi dango] Sauce: Brix 48.7%

Mitarashi dango is a Japanese dumpling made from rice flour. 3 to 5 pieces are skewered, charcoal-grilled, and covered with syrup made from soy sauce, sugar, and starch. It was originally served as an offering to gods at shrine festivals in the city of Kyoto.

End User Feedback

Inspection : Vegetable oil manufacturer

The Refractive Index of vegetable oil is listed in JAS (Japan Agricultural Standard) and therefore is an important value to check within quality control. We switched from an Abbe refractometer to the RX-7000α after we evaluated a demo unit to check the consistency of the readings. We were very satisfied with the speed and performance of the instrument, and the quality of the customer service. **We are also happy to know that loaner units are available free of charge when our instrument is out for regular maintenance.**

QC : Pharmaceutical manufacturer

We are using the RX-5000α to check the concentration of solutions. Compared to other analytical machines, the features that appeal to us are: only a small amount of sample is required, a measurement value is displayed quickly, and no sample preparation prior to measurement is required. **We appreciate ATAGO's customer support when we have samples that are difficult to measure or receive unexpected measurement results.**

Condiments and Vegetable Juice Inspection Association

We perform JAS (Japan Agricultural Standard) authorized inspections of tomato products, sauces, vinegars, carrot juice, and other juices that contain carrot juice. Food manufacturers from all over the country send us samples of their products for testing. In these times, where food safety is critical, the RX-5000α acts as a **trustworthy intermediary between food manufacturers and customers.** We are very satisfied with the unit's simple operation without having to compromise on accuracy.

R&D : Beverage manufacturer

We have been using ATAGO products for over a decade. We currently use a RX-007α for unsweetened drinks, such as green and red teas, and three RX-5000α for regular drinks. It gives us peace of mind knowing that all ATAGO instruments are manufactured by the same company. More and more customers choose beverages based on the calories and ingredients. Brix measurements play an essential role in our product development.

Testing : Food manufacturer

Recently, with food safety issues becoming a focus of attention, we as manufacturers are required to adhere to stricter quality control standards by implementing such standards as HACCP and ISO22000. **We are using the RX-5000α as the high accuracy master unit for inspections of our final products.** We always appreciate the quick and courteous customer service when we need to request a loaner unit during maintenance or when purchasing a new replacement unit.

ATAGO RX series are also used at laboratories of the following food testing associations:

- **Food Environment Inspection Association**
- **Japan Oil and Fat Inspection Association**
- **Japan Juice Association Corporation**

Accessories

☐ Sucrose Solution (calibration certificate optional)

Regular inspection of the RX series unit is highly recommended. Use one of the following solutions to confirm the calibration.

<High Accuracy - RX series - (excluding RX-007α)>

[RE-111001] 10% sucrose solution (±0.01%)
[RE-112001] 20% sucrose solution (±0.01%)
[RE-113001] 30% sucrose solution (±0.01%)
[RE-114002] 40% sucrose solution (±0.02%)
[RE-115002] 50% sucrose solution (±0.02%)

* Shelf life for these solutions is 10 days.

<Low concentration - RX series ->

[RE-110250] 0.25% sucrose solution (±0.005%)
[RE-110500] 0.50% sucrose solution (±0.005%)
[RE-111000] 1.00% sucrose solution (±0.005%)

* Shelf life for these solutions is 6 weeks.

<Custom Concentrations>

Custom concentrations are available upon request.
Accuracy and prices will vary by concentration.
Contact ATAGO for more details.

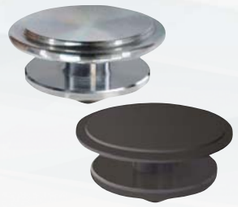
☐ Fan Filter Replacement

Regular cleaning of the fan filter is highly recommended to maintain the optimum performance level of the RX series.

[RE-58001] Fan filter replacement (a set of 12)

☐ MAGIC™

Used for measuring volatile substances.
Choose either metal or resin.



[RE-56180] MAGIC™ (Metal)
[RE-56185] MAGIC™ (Resin)

☐ Funnel-type Flow Cell

Save time with the flow cell! No need to clean the prism between measurements.

[RE-56172]
RX-5000i, -5000i-Plus, -5000α, -5000α-Plus

[RE-56173]
RX-7000i, -9000i, -7000α, -9000α

* Custom nozzle diameters are available upon request. Contact ATAGO for more details.

☐ Key Cover

Prevent accidental system changes by covering all but the START and ZERO keys.

[RE-58120] Key Cover

Digital Printers

Automatically prints out sample number, refractive index (nD), Brix (%), user scales, and measurement temperature (℃) after each measurement.

☐ Digital Printer DP-63

For printing on thermal paper.

DP-63 Cat.No.3118

Printing method : Thermal dot
Power supply : AC adaptor (AC100V)
Power consumption : 13VA
Dimensions & weight : 17×16×7cm, 580g (main unit only)

☐ Digital Printer DP-AD

For printing on regular paper.

DP-AD Cat.No.3123

Printing method : Dot impact
Power supply : AC adaptor (AC100V)
Power consumption : 7VA
Dimensions & weight : 11×18×9cm, 470g (main unit only)

☐ Digital Printer DP-RX

For printing on thermal paper.

DP-RX Cat.No.3121

Printing method : Thermal dot
Power supply : AC adaptor (AC100V)
Power consumption : 13VA
Dimensions & weight : 17×16×7cm, 580g (main unit only)

☐ Digital Printer DP-RD

For printing on regular paper.

DP-RD Cat.No.3122

Printing method : Dot impact
Power supply : AC adaptor (AC100V)
Power consumption : 7VA
Dimensions & weight : 11×18×9cm, 470g (main unit only)

Sample print

*Paper size & dimensions may differ, but the printed content is the same.

- DP-63
- DP-RX

```
**** RX-7000α ****
ATAGO CO.,LTD.    DEC.11,2016   12:00
TOKYO JAPAN

MODE-1

No.0001 DEC.11,2016 12:00
nD=1.34838 Brix=  10.36% t=20.00
```

- DP-AD
- DP-RD

```
**** RX-7000α ****
ATAGO CO.,LTD.    DEC.11,2016   12:00
TOKYO JAPAN

MODE-1

No.0001 DEC.11,2016 12:00
nD=1.34838 Brix=  10.36% t=20.00
```

Customizable Compatibility with harsh chemicals

The wetted parts can be customized with materials that are resistant to corrosive chemicals, such as acids, bases, and solvents.

Sample stage

- Special coatings (PEEK, PTFE, etc.)
- Custom materials (Corrosion-resistant metal alloys)

<Example>

PTFE

PEEK

Body case

- Special coatings (PEEK, PTFE, etc.)

<Example>

PEEK

Cover plate

- Custom materials (PVC resin, fluorine resin, etc.)

RX Series Specifications List



		ATAGO's Flagship, Most Accurate and Full Range	ATAGO's Flagship, Most Accurate and Full Range	ATAGO's Basic Model
Model		RX-5000i-Plus	RX-5000α-Plus	RX-5000i
Cat.No.		3275	3266	3276
Measurement system		Optical-refraction critical-angle detection system	Optical-refraction critical-angle detection system	Optical-refraction critical-angle detection system
Measurement Range	Refractive index	(nD) 1.32422 to 1.58000	(nD) 1.32700 to 1.58000	(nD) 1.32422 to 1.58000
	Brix	0.000 to 100.000% (Automatic Temperature Compensation)	0.000 to 100.000% (Automatic Temperature Compensation)	0.00 to 100.00% (Automatic Temperature Compensation)
	User scale	100	60	100
Resolution	Refractive index	(nD) 0.00001	(nD) 0.00001	(nD) 0.00001
	Brix	0.001%	0.005%	0.01%
	Temperature	0.01°C	0.01°C	0.01°C
Measurement Accuracy (*repeatability)	Refractive index	(nD) ±0.00002 *±0.00001	(nD) ±0.00002 *±0.00001	(nD) ±0.00004 *±0.00002
	Brix	±0.010% *±0.010% (*1)	±0.010% *±0.010% (*2)	±0.03% *±0.01% (*2)
	Temperature	±0.05°C	±0.05°C	±0.05°C
Mode		MODE-S, 1, 2, 3, T	MODE-S, 1, 2, 3	MODE-S, 1, 2, 3
Temperature control range		5.00 to 75.00°C (No lower than 10°C below or higher than 55°C above the ambient temperature)	5.00 to 60.00°C (Lowest is ambient temp -10°C)	5.00 to 75.00°C (No lower than 10°C below or higher than 55°C above the ambient temperature)
Environmental operating conditions		Temperature 5 to 40°C; Humidity 90%RH and below, Altitude 2,000m above sea level	Temperature 5 to 40°C; Humidity 90%RH and below, Altitude 2,000m above sea level	Temperature 5 to 40°C; Humidity 90%RH and below, Altitude 2,000m above sea level
Display method		7.5-inch color LCD + touch screen	LCD with illuminating backlight	7.5-inch color LCD + touch screen
Output		Computer - USB, Printer and PC (via RS-232C)	Printer and PC (via RS-232C)	Computer - USB, Printer and PC (via RS-232C)
Light source		LED (Approximating to D-Line wavelength)	LED (Approximating to D-Line wavelength)	LED (Approximating to D-Line wavelength)
Materials	Prism	Synthetic sapphire	Synthetic sapphire	Synthetic sapphire
	Sample stage	SUS316	SUS316	SUS316
Power supply		AC100 to 240V 50/60Hz	AC100 to 240V 50/60Hz	AC100 to 240V 50/60Hz
Power Consumption		90VA	65VA	90VA
Dimensions and weight		37×26×14cm, 6.6kg (main unit only)	37×26×14cm, 6.4kg (main unit only)	37×26×14cm, 6.6kg (main unit only)



		Wide Range and High Accuracy	Wide Range, High Temperature and Accuracy	Wide Range
Model		RX-9000i	RX-9000α	RX-7000i
Cat.No.		3278	3263	3279
Measurement system		Optical-refraction critical-angle detection system	Optical-refraction critical-angle detection system	Optical-refraction critical-angle detection system
Measurement Range	Refractive index	(nD) 1.32422 to 1.70000	(nD) 1.32500 to 1.70000	(nD) 1.32422 to 1.70000
	Brix	0.00 to 100.00% (Automatic Temperature Compensation)	0.00 to 100.00% (Automatic Temperature Compensation)	0.00 to 100.00% (Automatic Temperature Compensation)
	User scale	100	30	100
Resolution	Refractive index	(nD) 0.00001	(nD) 0.00001	(nD) 0.00001 (Factory default setting 0.0001)
	Brix	0.01%	0.01%	0.01% (Factory default setting 0.1%)
	Temperature	0.01°C	0.01°C	0.01°C
Measurement Accuracy (*repeatability)	Refractive index	(nD) ±0.00004 *±0.00002 (*3)	(nD) ±0.00004 *±0.00002 (*3)	(nD) ±0.0001 *±0.00005
	Brix	±0.03% *±0.01% (*4)	±0.03% *±0.01% (*4)	±0.1% *±0.02% (*2)
	Brix	±0.05% *±0.01% (*5)	±0.05% *±0.01% (*5)	——
	Temperature	±0.05°C	±0.05°C	±0.05°C
Mode		MODE-S, 1, 2, 3	MODE-S, 1, 2, 3	MODE-S, 1, 2, 3
Temperature control range		5.00 to 75.00°C (No lower than 10°C below or higher than 55°C above the ambient temperature)	5.00 to 70.00°C (Lowest is ambient temp -10°C)	5.00 to 75.00°C (No lower than 10°C below or higher than 55°C above the ambient temperature)
Environmental operating conditions		Temperature 5 to 40°C; Humidity 90%RH and below, Altitude 2,000m above sea level	Temperature 5 to 40°C; Humidity 90%RH and below, Altitude 2,000m above sea level	Temperature 5 to 40°C; Humidity 90%RH and below, Altitude 2,000m above sea level
Display method		7.5-inch color LCD + touch screen	LCD with illuminating backlight	7.5-inch color LCD + touch screen
Output		Computer - USB, Printer and PC (via RS-232C)	Printer and PC (via RS-232C)	Computer - USB, Printer and PC (via RS-232C)
Light source		LED (Approximating to D-Line wavelength)	LED (Approximating to D-Line wavelength)	LED (Approximating to D-Line wavelength)
Materials	Prism	Synthetic sapphire	Synthetic sapphire	Synthetic sapphire
	Sample stage	SUS316	SUS316	SUS316
Power supply		AC100 to 240V 50/60Hz	AC100 to 240V 50/60Hz	AC100 to 240V 50/60Hz
Power Consumption		90VA	65VA	90VA
Dimensions and weight		37×26×14cm, 7.0kg (main unit only)	37×26×14cm, 6.8kg (main unit only)	37×26×14cm, 7.0kg (main unit only)



		ATAGO's Basic Model	Flat Sample Stage	High Accuracy Digital Refractometer
Model		RX-5000α	RX-5000α-Bev	RX-007α
Cat.No.		3261	3271	3921
Measurement system		Optical-refraction critical-angle detection system	Optical-refraction critical-angle detection system	Optical-refraction critical-angle detection system
Measurement Range	Refractive index	(nD) 1.32700 to 1.58000	(nD) 1.32700 to 1.58000	(RI) 1.330150 to 1.341500
	Brix	0.00 to 100.00% (Automatic Temperature Compensation)	0.00 to 100.00% (Automatic Temperature Compensation)	0.000 to 5.000% (Automatic Temperature Compensation)
	User scale	60	60	30
Resolution	Refractive index	(nD) 0.00001	(nD) 0.00001	(RI) 0.000001
	Brix	0.01%	0.01%	0.001%
	Temperature	0.01°C	0.01°C	0.01°C
Measurement Accuracy (*repeatability)	Refractive index	(nD) ±0.00004 *±0.00002	(nD) ±0.00004 *±0.00002	(RI) ±0.000010 (to 20°C)
	Brix	±0.03% *±0.01% (*2)	±0.03% *±0.01% (*2)	±0.005% (Ambient temperature and temperature compensation conditions apply)
	Temperature	±0.05°C	±0.05°C	±0.05°C
Mode		MODE-S, 1, 2, 3	MODE-S, 1, 2, 3	MODE-1, 2
Temperature control range		5.00 to 60.00°C (Lowest is ambient temp -10°C)	5.00 to 60.00°C (Lowest is ambient temp -10°C)	15.00 to 30.00°C (Lowest is ambient temp -5°C)
Environmental operating conditions		Temperature 5 to 40°C; Humidity 90%RH and below, Altitude 2,000m above sea level	Temperature 5 to 40°C; Humidity 90%RH and below, Altitude 2,000m above sea level	Temperature 5 to 40°C; Humidity 90%RH and below, Altitude 2,000m above sea level
Display method		LCD with illuminating backlight	LCD with illuminating backlight	LCD with illuminating backlight
Output		Printer and PC (via RS-232C)	Printer and PC (via RS-232C)	Printer and PC (via RS-232C)
Light source		LED (Approximating to D-Line wavelength)	LED (Approximating to D-Line wavelength)	LED (Approximating to D-Line wavelength)
Materials	Prism	Synthetic sapphire	Synthetic sapphire	Optical glass
	Sample stage	SUS316	SUS316	SUS316
Power supply		AC100 to 240V 50/60Hz	AC100 to 240V 50/60Hz	AC100 to 240V 50/60Hz
Power Consumption		65VA	65VA	65VA
Dimensions and weight		37×26×14cm, 6.4kg (main unit only)	37×26×14cm, 6.1kg (main unit only)	37×26×14cm, 6.7kg (main unit only)


		Wide Range and High Temperature	Water Bath Connectivity
Model		RX-7000α	RX-5000
Cat.No.		3262	3281
Measurement system		Optical-refraction critical-angle detection system	Optical-refraction critical-angle detection system
Measurement Range	Refractive index	(nD) 1.32500 to 1.70000	(nD) 1.32700 to 1.58000
	Brix	0.00 to 100.00% (Automatic Temperature Compensation)	0.00 to 100.00% (Automatic Temperature Compensation)
	User scale	30	5
Resolution	Refractive index	(nD) 0.00001 (Factory default setting 0.0001)	(nD) 0.00001
	Brix	0.01% (Factory default setting 0.1%)	0.01%
	Temperature	0.01°C	——
Measurement Accuracy (*repeatability)	Refractive index	(nD) ±0.0001 *±0.00005	(nD) ±0.00004 *±0.00002
	Brix	±0.1% *±0.02% (*2)	±0.03% *±0.01% (*6)
	Temperature	±0.05°C	——
Mode		MODE-S, 1, 2, 3	——
Temperature control range		5.00 to 70.00°C (Lowest is ambient temp -10°C)	5.00 to 60.00°C
Environmental operating conditions		Temperature 5 to 40°C; Humidity 90%RH and below, Altitude 2,000m above sea level	Temperature 5 to 40°C; Humidity 90%RH and below, Altitude 2,000m above sea level
Display method		LCD with illuminating backlight	LCD with illuminating backlight
Output		Printer and PC (via RS-232C)	Printer and PC (via RS-232C)
Light source		LED (Approximating to D-Line wavelength)	LED (Approximating to D-Line wavelength)
Materials	Prism	Synthetic sapphire	Synthetic sapphire
	Sample stage	SUS316	SUS316
Power supply		AC100 to 240V 50/60Hz	AC100 to 240V 50/60Hz
Power Consumption		65VA	30VA
Dimensions and weight		37×26×14cm, 6.8kg (main unit only)	37×26×14cm, 6.4kg (main unit only)

(*1) When measuring a standard sucrose solution of less than 50% Brix or standard refractive solution in MODE-1 and MODE-T at 20°C.
(*2) When measuring a standard sucrose solution of up to 50% Brix or standard refractive index solution in MODE-1 at 20°C.
(*3) When nD is 1.33299 to 1.42009, at 10 to 30°C. For other ranges, nD is ±0.00010 *±0.00005.
(*4) When Brix is 0.00 to 50.00%, at 10.00 to 30.00°C.
(*5) When Brix is 50.01 to 95.00%, at 10.00 to 30.00°C. For other ranges, Brix is ±0.10% *±0.10%.
(*6) When measuring a standard sucrose solution of up to 50% Brix or standard refractive index solution at 20°C.

STANDARD ACCESSORIES

DR-A1

- Test piece ····· 1 pc
- Contact liquid [monobromonaphthalene] (4mL) ····· 1 pc
- Allen wrench for detaching/attaching prism ····· 1 pc
- Lighting adapter for solid sample ····· 1 pc
- Tube band ····· 10 pcs
- AC adapter (AD-13) ····· 1 pc
- AC cable ····· 1 pc
- Instruction manual ····· 1 pc

DR-A1-Plus

- Test piece ····· 1 pc
- Contact liquid [monobromonaphthalene] (4mL) ····· 1 pc
- Allen wrench for detaching/attaching prism ····· 1 pc
- Lighting adapter for solid sample ····· 1 pc
- Tube band ····· 10 pcs
- AC adapter (AD-13) ····· 1 pc
- AC cable ····· 1 pc
- Instruction manual ····· 1 pc

NAR-1T LIQUID

- Digital thermometer ····· 1 pc
- AC power cable ····· 1 pc
- Lamp cable ····· 1 pc
- LED lamp ····· 3 pcs
- Special screwdriver for calibration ····· 1 pc
- Tube band ····· 10 pcs
- Instruction manual ····· 1 pc

NAR-1T SOLID

- Digital thermometer ····· 1 pc
- AC power cable ····· 1 pc
- Lamp cable ····· 1 pc
- LED lamp ····· 3 pcs
- Test piece ····· 1 pc
- Contact liquid [monobromonaphthalene] (4mL) ····· 1 pc
- Special screwdriver calibration ····· 1 pc
- Milky white reflector ····· 1 pc
- Tube band ····· 10 pcs
- Instruction manual ····· 1 pc

NAR-2T

- Digital thermometer ····· 1 pc
- AC power cable ····· 1 pc
- Lamp cable ····· 1 pc
- LED lamp ····· 3 pcs
- Test piece ····· 1 pc
- Contact liquid [monobromonaphthalene] (4mL) ····· 1 pc
- Special screwdriver calibration ····· 1 pc
- Tube band ····· 10 pcs
- Instruction manual ····· 1 pc

NAR-3T

- Digital thermometer ····· 1 pc
- AC power cable ····· 1 pc
- Lamp cable ····· 1 pc
- LED lamp ····· 3 pcs
- Allen wrench for calibration ····· 1 pc
- Test piece ····· 1 pc
- Contact liquid [monobromonaphthalene] (4mL) ····· 1 pc
- Air purger for dehumidification ····· 1 pc
- Tube band ····· 10 pcs
- Instruction manual ····· 1 pc

NAR-4T

- Digital thermometer ····· 1 pc
- AC power cable ····· 1 pc
- Lamp cable ····· 1 pc
- LED lamp ····· 3 pcs
- Test piece ····· 1 pc
- Contact liquid [monobromonaphthalene] (4mL) ····· 1 pc
- Contact liquid
  [methylene iodide containing sulfur solution] (4mL) ····· 1 pc
- Special screwdriver calibration ····· 1 pc
- Milky white reflector ····· 1 pc
- Tube band ····· 10 pcs
- Instruction manual ····· 1 pc

DR-M2 DR-M4

- Test piece ····· 1 pc
- Allen wrench ····· 1 pc
- Contact liquid [monobromonaphthalene] (4mL) ····· 1 pc
- Contact liquid
  [methylene iodide containing sulfur solution] (4mL) * ····· 1 pc
- Interference filter, 589nm ····· 1 pc
- Lighting glass for film measurement ····· 1 pc
- Spare bulb ····· 1 pc
- Tube band ····· 10 pcs
- Instruction manual ····· 1 pc

*For DR-M4 only

DR-M2/1550 DR-M4/1550

- Near infrared ray viewer ····· 1 pc
- Mounting adapter ····· 1 pc
- Monochromatic light source device ····· 1 set
- Test piece ····· 1 pc
- Allen wrench ····· 1 pc
- Contact liquid [monobromonaphthalene] (4mL) ····· 1 pc
- Contact liquid
  [methylene iodide containing sulfur solution] (4mL) * ····· 1 pc
- Interference filter, 589nm ····· 1 pc
- Interference filter frame for 589nm ····· 1 pc
- Tube band ····· 10 pcs
- Lighting glass for film measurement ····· 1 pc
- Instruction manual ····· 1 pc

*For DR-M4/1550 only

OPTIONAL PARTS

● For measuring solid samples (excluding the NAR-1T LIQUID)

- ○ Eyepiece For Polarizing — Parts No. RE-1146
- ○ Test Piece
  - • Test Piece D For Measurement of Film (nD 1.74) — Parts No. RE-1498
  - • Test Piece E For Measurement of Film (nD 1.92) — Parts No. RE-1499
  - • Adapter For Film Sample (for DR-A1) — Parts No. RE-1581
- ○ Contact Liquid
  - • Contact Liquid - monobromonaphthalene nD 1.65 (4mL) — Parts No. RE-1196
  - • Contact Liquid nD 1.78 (4mL) — Parts No. RE-1199
  - • Contact Liquid LJ nD 1.80 (7mL) — Parts No. RE-99080
- ○ Test Piece with monobromonaphthalene as contact liquid
  - • Test Piece A (nD=1.516) with M-Naphthalene with monobromonaphthalene as contact liquid — Parts No. RE-1195
  - • Test Piece C (nD=1.620) with M-Naphthalene with monobromonaphthalene as contact liquid — Parts No. RE-1197

● For connecting to a computer (for DR-A1/DR-A1-Plus only)

- ○ RS-232C Cable For Personal Computer (D-Sub 9 Pin) — Parts No. RE-15305

● Interference Filters for MULTI-WAVELENGTH ABBE REFRACTOMETERS (Standard accessory only 589nm)

○ for DR-M2/DR-M4

589(D)nm	Parts No. RE-3520	546(e)nm	Parts No. RE-3523
486(F)nm	Parts No. RE-3521	480(F')nm	Parts No. RE-3524
656(C)nm	Parts No. RE-3522	644(C')nm	Parts No. RE-3525
Any wavelength (450 to 539nm, 540 to 680nm, 681 to 799nm, 800 to 1100nm)	Parts No. RE-3526		

○ for DR-M2/1550, DR-M4/1550

589(D)nm	Parts No. RE-16501	546(e)nm	Parts No. RE-16504
486(F)nm	Parts No. RE-16502	480(F')nm	Parts No. RE-16505
656(C)nm	Parts No. RE-16503	644(C')nm	Parts No. RE-16506
Any wavelength (450 to 539nm, 540 to 680nm, 681 to 799nm, 800 to 1550nm)	Parts No. RE-16507		

● Near-infrared Ray Viewer for MULTI-WAVELENGTH ABBE REFRACTOMETERS

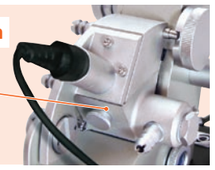
- ○ Near-infrared Ray Viewer (With Adapter) — Parts No. RE-9119

Measurement of Birefringent Samples

Measurement of birefringent (double refraction) materials requires an optional Polarizing Eyepiece (Part No. RE-1146).
Double refraction measurements are available at wavelengths between 450 and 680nm. Contact us for more details.

Special Order Option

The sample stage height can be customized.



All ATAGO refractometers are designed and manufactured in Japan.

ATAGO CO.,LTD.
http://www.atago.net/ overseas@atago.net
Headquarters: The Front Tower Shiba Koen, 23rd Floor
2-6-3 Shiba-koen, Minato-ku, Tokyo 105-0011, Japan
TEL : 81-3-3431-1943 FAX : 81-3-3431-1945

ISO9001 H.Q. & Factory

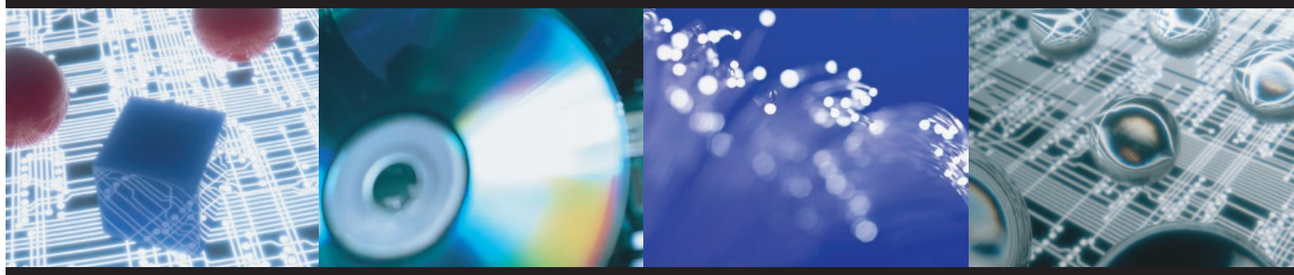
HACCP GMP GLP
ATAGO products comply with HACCP,GMP, and GLP system standards.

ATAGO U.S.A., Inc.	TEL : 1-425-637-2107	customerservice@atago-usa.com
ATAGO INDIA Instruments Pvt.Ltd.	TEL : 91-22-28544915, 40713232	customerservice@atago-india.com
ATAGO THAILAND Co.,Ltd.	TEL : 66-21948727-9	customerservice@atago-thailand.com
ATAGO BRASIL Ltda.	TEL : 55 16 3913-8400	customerservice@atago-brasil.com
ATAGO ITALIA s.r.l.	TEL : 39 02 36557267	customerservice@atago-italia.com
ATAGO CHINA Guangzhou Co.,Ltd.	TEL : 86-20-38108256	info@atago-china.com
ATAGO RUSSIA Ltd.	TEL : 7-812-777-96-96	info@atago-russia.com
ATAGO NIGERIA Scientific Co.,Ltd.	TEL : 234-707-558-1552	atagonigeria@atago.net

* Specifications and appearance are subject to change without notice.

ENV.09 16061000PP Printed in Japan

ABBE REFRACTOMETERS



Abbe Refractometers

Multi-Wavelength Abbe Refractometers

ATAGO®

■ Uses and Applications of the Abbe Refractometers

ATAGO's Abbe Refractometers are widely used in a variety of fields; from basic research to product management.

Uses and Applications

For measuring the refractive index (nD) of liquid samples between 5 to 50℃:	DR-A1, DR-A1-Plus, and NAR-1T LIQUID. We recommend the NAR-3T for high-accuracy measurements.
For measuring the refractive index (nD) of liquid samples up to 120℃:	NAR-2T
For measuring the refractive index (nD) of solid samples (glass, plastics, films, etc.):	NAR-1T SOLID, DR-A1, and DR-A1-Plus. The NAR-3T is also capable of measuring clear, translucent glass or plastics.
For measuring liquid or solid samples with a high refractive index (1.47 to 1.87):	NAR-4T
For measuring and determining the refractive index or Abbe number of liquid or solid samples at different wavelengths:	DR-M Series: DR-M2, DR-M2/1550, DR-M4, and DR-M4/1550 (For high refractive index measurements.)
For determining average dispersion values or abbe numbers:	NAR-1T SOLID, NAR-2T, and NAR-3T
For measuring Brix (%):	DR-A1, DR-A1-Plus, and NAR-1T LIQUID. We recommend the NAR-3T for high-accuracy measurements.
For connecting to a printer:	DR-A1, DR-A1-Plus, and DR-M Series
For measuring birefringent (double refraction) samples (plastics, films) that have different refractive indices depending on their orientation, or for measuing the ordinary ray (n subscript null) or extraordinary ray (n subscript exponential) of liquid crystals (LCs):	DR-A1, DR-A1-Plus, NAR-1T SOLID, NAR-2T, NAR-4T, and DR-M Series

■ ATAGO Products Conform to ASTM Standards

Please contact ATAGO for further details.

D542 STM for Index of Refraction of Transparent Organic Plastics
D1045 STM for Sampling and Testing Plasticizers Used in Plastics
D1218 STM for Refractive Index and Refractive Dispersion of Hydrocarbon Liquids
D1416 STM for Rubber from Synthetic Sources--Chemical Analysis
D1747 STM for Refractive Index of Viscous Materials
D3321 STM for Use of the Refractometer for Field Test Determination of the Freezing Point of Aqueous Engine Coolants
D4095 STM for Use of the Refractometer for Determining Nonvolatile Matter (Total Solids) in Floor Polishes
D5006 STM for Measurement of Fuel System Icing Inhibitors (Ether Type) in Aviation Fuels
D5775 STM for Rubber from Synthetic Sources-Bound Styrene in SBR

■ Sucrose Solution (for Brix confirmation)

Sucrose solutions for Brix confirmation are now available by ATAGO.
Please choose the most suitable sucrose solution for your application.

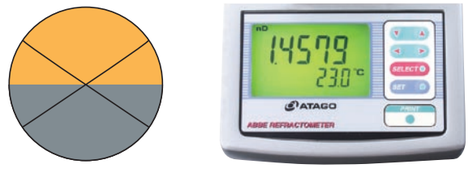
Part No.	Part Name	Brix Concentration	Contents
RE-110010	10% Sucrose	10.00 ±0.03%	Approx. 5mL
RE-110020	20% Sucrose	20.00 ±0.03%	Approx. 5mL
RE-110030	30% Sucrose	30.00 ±0.03%	Approx. 5mL
RE-110040	40% Sucrose	40.00 ±0.04%	Approx. 5mL
RE-110050	50% Sucrose	50.00 ±0.05%	Approx. 5mL
RE-110060	60% Sucrose	60.00 ±0.05%	Approx. 5mL

* Warranty period for these solutions is 6 weeks.

Custom concentration sucrose solutions are now available.
Accuracy and price will depend on the concentration; please contact ATAGO for more details.

DR-A1

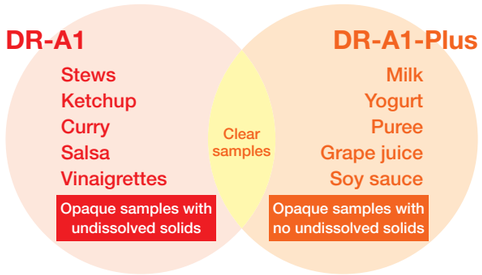
Cat.No.1310



Refraction view　　Display

By simply aligning the boundary line of refraction at the cross hairs, this refractometer directly indicates a measurement value (in refractive index or Brix (%), selectable) together with the temperature on a digital display. This refractometer enables anyone to easily carry out measurements without reading analog graduation.
*Dispersion value cannot be measured with the DR-A1.

Choosing the Right Model for Your Sample Type



DR-A1-Plus

for Opaque Samples

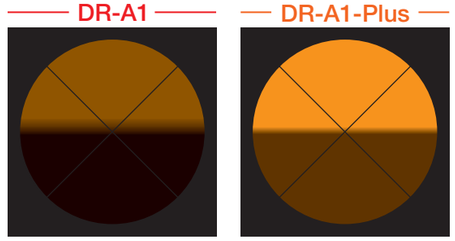
Cat.No.1311

With the new prism, the field of view is brighter than the predecessor model (DR-A1), making it easier to measure inhomogeneous/ opaque samples.

Common Specifications (DR-A1/DR-A1-Plus)

Measurement Range	Refractive Index (nD) 1.3000 to 1.7100, Brix 0.0 to 100.0% (ATC is executed at 5 to 50°C)
Resolution	Refractive Index (nD) 0.0001, Brix 0.1%
Measurement accuracy	Refractive Index (nD) ±0.0002, Brix ±0.1%
Measurement temperature	5 to 50°C (Circulating constant temperature bath range, as well as Brix temperature compensation range.)
Thermometer accuracy	±0.2°C
Ambient temperature	5 to 40°C
Indications	Refractive Index (nD), Brix (%), Temp (°C)
Display	LCD
Light source	LED Lamp (Approximating to wavelength of D-line)
Power supply	AC adapter (100 to 240V (50/60Hz) AC input)
Power consumption	16VA
Output	Printer DP-63(C) (Optional) PC (via RS-232C)
Dimensions and weight	13×29×31cm, 6.0kg (Main unit) 10.5×17.5×4cm, 0.7kg (AC adapter)

For Measuring Emulsions or Dark Samples



The DR-A1 has a slightly dimmer field of view, which makes it difficult to measure emulsions or dark samples.

The DR-A1-Plus features a brighter field of view, making it easier to measure dark, opaque samples.

*Samples containing undissolved solids may not produce measurement results.

Sucrose Solution on Page 1

NAR-1T LIQUID

For Measuring Liquid Samples Only Cat.No.1211

NAR-1T SOLID

For Measuring Solid Samples Cat.No.1212

The NAR-1T LIQUID is for liquid sample measurement only. This model has the Refractive Index scale and Brix scale, and operates with D line (589nm) light source. Calibration is performed using distilled water.

The NAR-1T SOLID Abbe Refractometer was designed for solid sample measurement (this model can also measure liquid samples). This model has the Refractive Index scale and Brix scale, and operates with D line (589nm) light source.

Specifications

Measurement Range	Refractive Index (nD) 1.3000 to 1.7000, Brix 0.0 to 95.0%
Minimum scale	Refractive Index (nD) 0.001, Brix 0.5%
Measurement accuracy	Refractive Index (nD) ±0.0002, Brix ±0.1%
Average dispersion value	nF-nC (to be calculated according to conversion table)*SOLID only
Measurement temperature	5 to 50°C (Temperature range regulated by circulating constant temperature water bath.)
Thermometer accuracy	±0.2°C
Ambient temperature	5 to 40°C
Light source	LED Lamp (Approximating to wavelength of D-line)
Power supply	AC100 to 240V, 50/60Hz
Power consumption	5VA
Dimensions and weight	13×18×23cm, 2.5kg (Main unit) 10×11×7cm, 0.5kg (Thermometer)

NAR-2T

High Temperature Model Cat.No.1220

Designed for use with compounds that require measurement at high temperatures (up to 120°C). Capable of measuring samples from 5 to 120°C, such as substances with a melting point higher than room temperature, or compounds containing substances with a transition temperature below 120°C. Aside from liquid samples, glass, films, plastics and other solid samples can also be measured.

*Optional accessories: Circulating constant temperature bath (up to 60°C). (Pg. 5) For a circulating constant temperature bath above 61°C, please purchase separately (not available through ATAGO).

Specifications

Measurement Range	Refractive Index (nD) 1.3000 to 1.7000, Brix 0.0 to 95.0%
Minimum scale	Refractive Index (nD) 0.001, Brix 0.5%
Measurement accuracy	Refractive Index (nD) ±0.0002, Brix ±0.1%
Average dispersion value	nF-nC (to be calculated according to conversion table)
Measurement temperature	5 to 120°C (Temperature range regulated by circulating constant temperature water bath.)
Thermometer accuracy	0 to 100°C⋯±0.2°C, 100 to 120°C⋯±0.5°C
Ambient temperature	5 to 40°C
Light source	LED Lamp (Approximating to wavelength of D-line)
Power supply	AC100 to 240V, 50/60Hz
Power consumption	5VA
Dimensions and weight	12×20×25cm, 5.8kg (Main unit) 10×11×7cm, 0.5kg (Thermometer)

NAR-3T

Precision Model Cat.No.1230

The NAR-3T is the unit with the highest degree of precision and accuracy among the Abbe Refractometers. It was developed to give improved measurement accuracy and ease of use. This was achieved by making fundamental improvements to the optical system and utilizing a larger scale, which allows for a refractive index scale measurements of up to 0.00005. Incorporating a high intensity lamp and using a double control knob gives quick and more accurate control.

Specifications

Measurement Range	Refractive Index (nD) 1.30000 to 1.71000, Brix 0.00 to 95.00%
Minimum scale	Refractive Index (nD) 0.0002, Brix 0.1%
Measurement accuracy	Refractive Index (nD) ±0.0001, Brix ±0.05%
Average dispersion value	nF-nC (to be calculated according to conversion table)
Measurement temperature	5 to 50°C (Temperature range regulated by circulating constant temperature water bath.)
Thermometer accuracy	±0.2°C
Ambient temperature	5 to 40°C
Light source	LED Lamp (Approximating to wavelength of D-line)
Power supply	AC100 to 240V, 50/60Hz
Power consumption	5VA
Dimensions and weight	12×31×34cm, 9.0kg (Main unit) 10×11×7cm, 0.5kg (Thermometer)

NAR-4T

High Refractive Index Model Cat.No.1240

Research and Development on new materials for modern technologies is being actively conducted in every industry. Many of these materials (especially polymer film and related materials) are of high refractive index - often too high for the existing Abbe refractometers. These can now be measured with the nD 1.4700 to 1.8700 range of the NAR-4T.

*Dispersion values cannot be measured with this unit.

Specifications

Measurement Range	Refractive Index (nD) 1.4700 to 1.8700
Minimum scale	Refractive Index (nD) 0.001
Measurement accuracy	Refractive Index (nD) ±0.0002
Measurement temperature	5 to 50°C (Temperature range regulated by circulating constant temperature water bath.)
Thermometer accuracy	±0.2°C
Ambient temperature	5 to 40°C
Light source	LED Lamp (Approximating to wavelength of D-line)
Power supply	AC100 to 240V, 50/60Hz
Power consumption	5VA
Dimensions and weight	13×18×23cm, 2.5kg (Main unit) 10×11×7cm, 0.5kg (Thermometer)

■ Custom Refractive Index Ranges Available by Special Order

Note: To obtain the refractive index value, simply refer to the conversion table that is provided with this unit. Dispersion values cannot be measured with this unit.

- **NAR-1T•LO** Cat.No.1217 Measurement Range: Refractive Index (nD) 1.1500 to 1.4800, Measurement temperature: 5 to 50°C
- **NAR-2T•LO** Cat.No.1227 Measurement Range: Refractive Index (nD) 1.1500 to 1.4800, Measurement temperature: 5 to 120°C
- **NAR-2T•HI** Cat.No.1228 Measurement Range: Refractive Index (nD) 1.4700 to 1.8700, Measurement temperature: 5 to 120°C
- **NAR-2T•UH** Cat.No.1229 Measurement Range :Refractive Index (nD) 1.7000 to 2.0800, Measurement temperature: 5 to 120°C

DR-M2

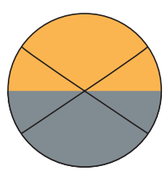
Cat.No.1410

DR-M4

High Refractive Index Model

Cat.No.1414

Customizable wavelength: 1100nm range supported



Refraction view

Display

Refractive Index or Abbe number (νd or νe) can be measured at different wavelengths ranging from 450 to 1,100nm.
For measurement at wavelengths ranging from 681 to 1,100nm, the optional near infrared ray viewer (Part No.RE-9119) is required. The DR-M2/DR-M4 digitally displays the measurement results of refractive index or Abbe number on the LCD. Measurement can be achieved by matching the boundary line at the intersection point of the cross hairs. These refractometers can be connected to the digital printer. The DR-M4 is a high refractive index version of the DR-M2, with a refractive index measurement range of 1.4700 to 1.8700 (at a wavelength of 589nm). The DR-M4 shares common appearance and features with the DR-M2.

Specifications

Measurement Range
- DR-M2
  - Wavelength 450nm : Refractive Index 1.3278 to 1.7379
  - Wavelength 589nm : Refractive Index 1.3000 to 1.7100
  - Wavelength 680nm : Refractive Index 1.2912 to 1.7011
  - Wavelength 1,100nm : Refractive Index 1.2743 to 1.6840
- DR-M4
  - Wavelength 450nm : Refractive Index 1.5219 to 1.9220
  - Wavelength 589nm : Refractive Index 1.4700 to 1.8700
  - Wavelength 680nm : Refractive Index 1.4545 to 1.8544
  - Wavelength 1,100nm : Refractive Index 1.4260 to 1.8259

Resolution	Refractive Index (nD) 0.0001, Abbe number 0.1
Measurement accuracy	Refractive Index (nD) ±0.0002 (With the attached test piece at 500 to 650nm)
Wavelength range	From 450 to 1,100nm *Interference filters for measurement at wavelengths other than 589nm are sold separately (For measurement at wavelengths ranging from 681 to 1,100nm, the near infrared ray viewer (optional) is required.)
Measurement temperature range	5 to 50°C (Temperature range regulated by circulating constant temperature water bath.)
Thermometer accuracy	±0.2°C
Ambient temperature	5 to 40°C
Power consumption	160VA
Output	For digital printer, DP-63(B) (optional), Conforming to Centronics standard
Power supply	AC100 to 240V, 50/60Hz
Dimensions and weight	13×29×31cm, 6.0kg (Main unit) 15×33×11cm, 3.2kg (Power supply unit)

Optional Accessories

Circulating Constant Temperature Bath

60-C5 Cat.No.1923

A circulating water bath for precise temperature control of refractometers without Peltier. The temperature range can be set from 10 to 60°C and its compact, easy to use design makes it optimal for connecting to a refractometer.

Specifications

Tank capacity	1.0 L
Temperature setting range	10 to 60°C (water)
Minimum temperature indication	0.1°C
Constant-temperature accuracy	±0.2°C
Power consumption	250VA
Power supply	AC 100 to 240V , 50/60Hz
Dimensions and weight	20.4×33.6×28.9cm, 9.0kg (main unit only)

Digital Printer

DP-63(C) Cat.No.3136

for DR-A1 · DR-A1-Plus

DP-63(B) Cat.No.3135

for DR-M2 · DR-M4 · DR-M2/1550 · DR-M4/1550

Specifications

Printing method	Thermal dot
Power consumption	13VA
Power supply	AC adapter (Input voltage: AC100 to 240V)
Dimensions and weight	17×16×7cm 580g (main unit only)

DR-M2/1550

Cat.No.1412

DR-M4/1550

High Refractive Index Model

Cat.No.1415

Customizable wavelength: 1550nm range supported

Refraction view

Display

Refractive Index or Abbe number (νd or νe) can be measured at different wavelengths ranging from 450 to 1,550nm. Measurement at wavelengths of 1550nm has become more in demand with the recent development of materials for the IT communications field. The DR-M2/1550 and the DR-M4/1550 are suitable for measuring samples that require a refractive index in the near infrared range, such as fiber optics materials, optical glass, and plastics.
These models are equipped with a power supply unit and a monochromatic light source. They can be used with a near infrared ray viewer or interference filters. These refractometers digitally display the measurement result on the LCD. Measurement can be achieved by matching the boundary line at the intersection point of the cross hairs. These units can be connected to the digital printer.
The DR-M4/1550 is a high refractive index version of the DR-M2/1550, with a refractive index measurement range of 1.4700 to 1.8700 (at a wavelength of 589nm). The DR-M4/1550 shares common appearance and features with the DR-M2/1550.

Specifications

Measurement Range
- DR-M2/1550
  - Wavelength 450nm : Refractive Index 1.3278 to 1.7379
  - Wavelength 589nm : Refractive Index 1.3000 to 1.7100
  - Wavelength 680nm : Refractive Index 1.2912 to 1.7011
  - Wavelength 1,100nm : Refractive Index 1.2743 to 1.6840
  - Wavelength 1,550nm : Refractive Index 1.2662 to 1.6759
- DR-M4/1550
  - Wavelength 450nm : Refractive Index 1.5219 to 1.9155
  - Wavelength 589nm : Refractive Index 1.4700 to 1.8700
  - Wavelength 680nm : Refractive Index 1.4561 to 1.8544
  - Wavelength 1,100nm : Refractive Index 1.4310 to 1.8259
  - Wavelength 1,550nm : Refractive Index 1.4215 to 1.8136

Resolution	Refractive Index (nD) 0.0001, Abbe number 0.1
Measurement accuracy	Refractive Index (nD) ±0.0002 (with the attached test piece at 500 to 650nm)
Wavelength range	From 450 to 1,550nm *Interference filters for measurement at wavelengths other than 589nm are sold separately
Measurement temperature range	5 to 50°C (Temperature range regulated by circulating constant temperature water bath.)
Thermometer accuracy	±0.2°C
Ambient temperature	5 to 40°C
Power consumption	160VA (Refractometer), 240VA (Monochromatic Light source)
Output	For digital printer, DP-63(B) (optional), Conforming to Centronics standard
Power supply	AC100 to 240V, 50/60Hz
Dimensions and weight	13×29×31cm, 6.0kg (Main unit) 15×33×11cm, 3.2kg (Power supply unit) 22×30×20 to 30cm, 5.2kg (Light source)

Abbe number can be measured simply!

(In the case of measurement of Abbe number "νd")

(1) Set the sample on the prism surface.

(2) Insert the 589nm interference filter (attached to the DR-M2 as a standard accessory).
While looking through the eyepiece, match the boundary line with the intersection point of the cross hairs. Then, press the SET key.

Display

Refraction view

(3) Replace the interference filter with the 486nm interference filter (an optional part). While looking through the eyepiece, match the boundary line with the intersection point of the cross hairs. Then, press the SET key.

(4) Replace the interference filter with the 656nm interference filter (of an optional part). While looking through the eyepiece, match the boundary line with the intersection point of the cross hairs.

(5) Press the SET key. The indication on the display at that time represents the Abbe number "νd".

* For optimum convenience, use an optional digital printer to print out the refractive index at each wavelength and Abbe number.