



The Ultimate Hand-Held Refractometer Unsurpassed  
in Function, Operation, and Design

# MASTER

ALL NEW DESIGN



Design Registration No.000379326-0001, 000379326-0002 (EU)  
ZL 2005 3 0116403.4.5 (China), D111526 (Taiwan), D555, 549 (U.S.A.),  
1255763, 1255764, 1255765, 1255766, 1255767 (Japan)  
Patent Granted in countries around the world.

**About the Trade Mark:**

Year 2005-ATAGO was established 65 years ago and we have been developing, manufacturing, and marketing Refractometers based on our in-depth study of optics. This year we have released our NEW Hand-Held Refractometer series, the "MASTER" to support and meet our customer's needs. The NEW "MASTER" series is a fitting name to match its ultimate performance. The trade mark, "光" is the Japanese Kanji which means "light". The decision to use this Kanji as a trade mark for the MASTER series is to emphasize that this product was designed and manufactured in Japan. With the multitude of imitation products out in the market today, ATAGO is maintaining our identity as the master of manufacturing quality instruments. We, ATAGO, would like to be your business partner and to be the "light" to continue towards a bright future together.



**Hand-held Refractometer**



MASTER series awarded  
 2006 "Good Design Award"  
 2007 "The Invention Prize"  
 2007 "Japan Patent Office Commissioner Encouragement Prize"  
 2009 "The Commendation for Science and Technology award"

Measuring sugar concentration,  
 concentration and Brix

# MASTER



Convenient storage box.

## Reasons to choose the MASTER

### 1 Water Resistant MASTER- $\alpha$ ·H



The concept of a washable hand-held analog unit is exceptional. After measuring, you can clean the refractometer with running water under a faucet. The new structural-design of these units allows them to be washed whenever necessary.

### 3 Visibility



Efficiently using an analog unit depends on how easily the measured value can be read. With extensive research and the utilization of quality optics, the result is a view of the measurement scale that is very bright, creating a high contrast to see clearly where the boundary intersects the memory lines of the scale.

### 5 Durability



The MASTER series has passed all water resistance, dust resistance, and drop tests. The only replacement part for the MASTER series is the daylight plate. The instruments do not utilize consumable parts or materials, thus keeping the cost for replacement parts to a minimum.

### 7 Repair and Service



ATAGO has established a close network of customers by providing excellent customer service and support. When an ATAGO instrument needs servicing, not only is each customer treated with respect, but they are also provided with detailed methods and user-specific suggestions on sampling and taking measurements, based on individual needs.

### 2 Hygienic Design



The MASTER series design has a smooth and easy-to-clean grip, eliminating the possibility of food and other samples being trapped, which could result in contamination and bacterial growth.

### 4 Automatic Temperature Compensation (ATC) MASTER- $\alpha$ ·T·H



This new system allows the MASTER series to have improved accuracy that outperforms similar units. ATAGO has applied for a patent on the design of the improved ATC system. The MASTER series reads more accurately than any comparable unit on the market.

### 6 Automatic Sample Distribution (ASD)



ATAGO has developed a spoon-shaped tip, which makes applying the sample easy, and helps the sample spread across the prism on its own. This makes the instrument even more user-friendly. (Patent Pending)

### 8 Reputation for Quality



ATAGO has built a firm reputation for reliability and quality during its 69-year history. We are a strong company that exports to over 154 countries with continued growth expectations. ISO 9001 certified, along with our integrated system for producing and marketing our products, based on the "Plan-Do-Check-Act" cycle, is essential to the continued quality and to the promoting of the ATAGO name.

**NEW** Corrosion Resistant!

# Plastic Body MASTER

Utilizes new materials that are durable against salty and acidic samples.



4 unique models to serve many different applications .....



Refractometer (Automatic Temperature Compensation & Water Resistant)

## MASTER-α series

MASTER-α series is the first to be equipped with both Automatic Temperature Compensation and Water Resistant (IP65).



Refractometer (Automatic Temperature Compensation)

## MASTER-T series

MASTER-T series features Automatic Temperature Compensation, for use when the Water Resistance feature is not a priority.



Refractometer (Automatic Temperature Compensation, Water Resistant & Heat Resistant)

## MASTER-H series

MASTER-H series is designed for measuring high-temperature samples during the cooking or boiling process at production sites.



Refractometer

## MASTER-M series

MASTER-M series is a good choice when the Water Resistant feature is not a priority, and the Temperature Compensation will be carried out manually. Economical and uncompromising quality.

Brix 0 ~ 33%	SALINITY	SALINITY (sea water)	COOLANT	BATTERY COOLANT
MASTER-Pα MASTER-PM	MASTER-S10α MASTER-S10M MASTER-S28α MASTER-S28M	MASTER-S/Millα MASTER-S/MiIM	MASTER-BR	MASTER-BC MASTER-BCF

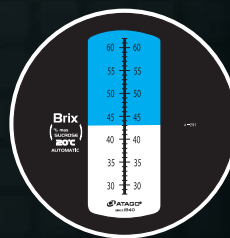
## Simple Operation .....



**1** Apply 1-2 drops onto the prism.



**2** Close the daylight plate. View the scale through the eyepiece.



**3** Read the measurement value where the boundary line intersects the scale.

## Water Resistant (IP65)

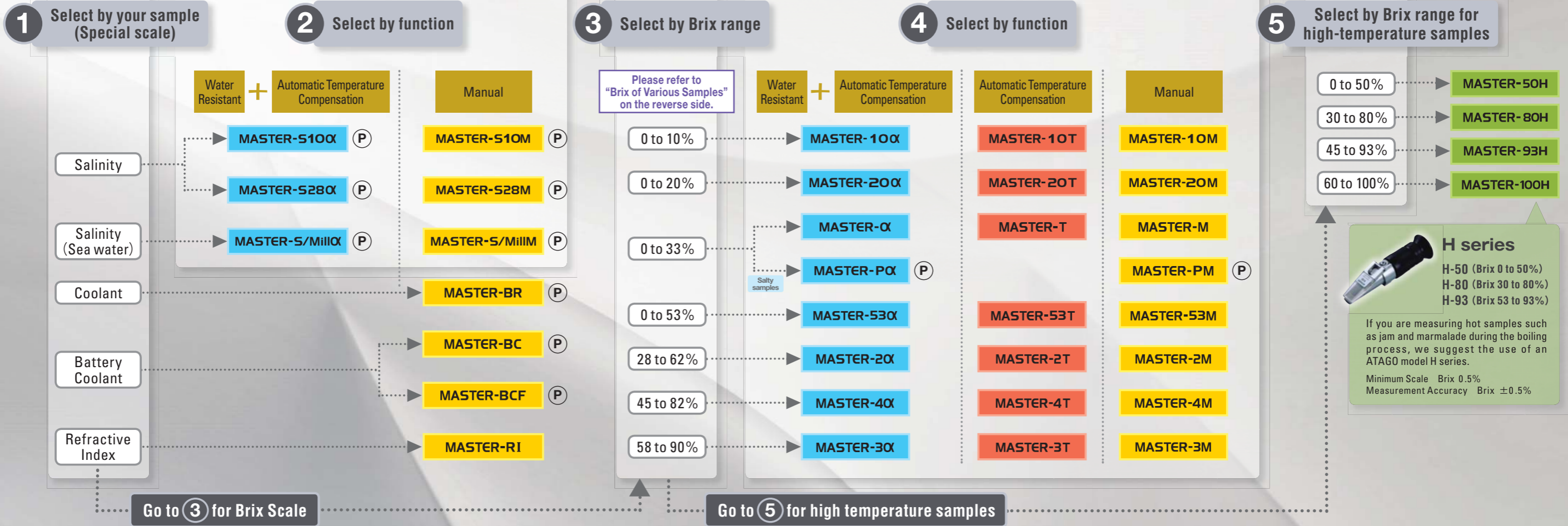
(MASTER-α series, H series)



# Select Suitable Model

1 2 3 4 5 6 Follow the article in order

P ... Durable plastic material for salty and acidic samples



## 6 Confirm specifications

Model	MASTER- $\alpha$	MASTER-2 $\alpha$	MASTER-3 $\alpha$	MASTER-4 $\alpha$	MASTER-53 $\alpha$	MASTER-10 $\alpha$	MASTER-20 $\alpha$	MASTER-P $\alpha$	MASTER-S10 $\alpha$	MASTER-S28 $\alpha$	MASTER-S/Mill $\alpha$									
Cat.No.	2311	2321	2331	2341	2351	2371	2381	2391	2471	2481	2491									
Scale range	Brix 0.0 to 33.0%	Brix 28.0 to 62.0%	Brix 58.0 to 90.0%	Brix 45.0 to 82.0%	Brix 0.0 to 53.0%	Brix 0.0 to 10.0%	Brix 0.0 to 20.0%	Brix 0.0 to 33.0%	Sodium chloride 0.0 to 10.0g/100g	Sodium chloride 0.0 to 28.0g/100g	Salinity 0 to 100‰ Specific gravity 1.000 to 1.070									
Minimum Scale	Brix 0.2%				Brix 0.5%	Brix 0.1%		Brix 0.2%	Sodium chloride 0.1g/100g	Sodium chloride 0.2g/100g	Salinity 1‰ Specific gravity 0.001									
Measurement Accuracy	Brix $\pm 0.2\%$ * $\pm 0.1\%$ (10 to 30°C)	Brix $\pm 0.2\%$ * $\pm 0.1\%$ (10 to 40°C)			Brix $\pm 0.5\%$ * $\pm 0.25\%$ (10 to 30°C)	Brix $\pm 0.2\%$ * $\pm 0.1\%$ (10 to 30°C)		Brix $\pm 0.2\%$ * $\pm 0.1\%$ (10 to 30°C)	Sodium chloride $\pm 0.2g/100g$ * $\pm 0.1g/100g$ (10 to 30°C)	Sodium chloride $\pm 0.2g/100g$ * $\pm 0.1g/100g$ (10 to 30°C)	Salinity $\pm 2\%$ * $\pm 1\%$ Specific gravity $\pm 0.001$ * $\pm 0.0005$ (10 to 30%)									
International Protection Class	IP65 (except eye piece) Dust-tight and Protected against water jets.																			
Size & Weight	3.3×3.3×20.4cm, 160g			3.3×3.3×16.8cm, 120g		3.3×3.3×20.4cm, 160g		3.3×3.3×20.4cm, 100g		3.3×3.3×20.4cm, 100g										
Model	MASTER-M	MASTER-2M	MASTER-3M	MASTER-4M	MASTER-53M	MASTER-10M	MASTER-20M	MASTER-PM	MASTER-S10M	MASTER-S28M	MASTER-S/MillM									
Cat.No.	2313	2323	2333	2343	2353	2373	2383	2393	2473	2483	2493									
Scale range	Brix 0.0 to 33.0%	Brix 28.0 to 62.0%	Brix 58.0 to 90.0%	Brix 45.0 to 82.0%	Brix 0.0 to 53.0%	Brix 0.0 to 10.0%	Brix 0.0 to 20.0%	Brix 0.0 to 33.0%	Sodium chloride 0.0 to 10.0g/100g	Sodium chloride 0.0 to 28.0g/100g	Salinity 0 to 100‰ Specific gravity 1.000 to 1.070									
Minimum Scale	Brix 0.2%				Brix 0.5%	Brix 0.1%		Brix 0.2%	Sodium chloride 0.1g/100g	Sodium chloride 0.2g/100g	Salinity 1‰ Specific gravity 0.001									
Size & Weight	3.3×3.3×20.4cm, 160g			3.3×3.3×16.8cm, 120g		3.3×3.3×20.4cm, 160g		3.3×3.3×20.4cm, 100g		3.3×3.3×20.4cm, 100g										
Model	MASTER-BR	MASTER-BC	MASTER-BCF	MASTER-RI	MASTER-T	MASTER-2T	MASTER-3T	MASTER-4T	MASTER-53T	MASTER-10T	MASTER-20T	MASTER-50H	MASTER-80H	MASTER-93H	MASTER-100H	MASTER-SUR/J $\alpha$	MASTER-URC/J $\alpha$	MASTER-SUR/JM	MASTER-URC/JM	
Cat.No.	2930	2931	2932	2612	2312	2322	2332	2342	2352	2372	2382	2354	2364	2374	2384	2751	2761	2753	2763	
Scale range	propylene glycol 0 to 70% 0 to -50°C ethylene glycol 0 to 70% 0 to -50°C	<Freezing temperature scale> ethylene glycol 0 to -50°C propylene glycol 0 to -50°C <Battery fluid d20/20> 1.150 to 1.300	<Freezing temperature scale> ethylene glycol 32 to -60°F propylene glycol 32 to -50°F <Battery fluid d20/20> 1.150 to 1.300	Refractive index 1.435 to 1.520	Brix 0.0 to 33.0%	Brix 28.0 to 62.0%	Brix 58.0 to 90.0%	Brix 45.0 to 82.0%	Brix 0.0 to 53.0%	Brix 0.0 to 10.0%	Brix 0.0 to 20.0%	Brix 0.0 to 50.0%	Brix 30.0 to 80.0%	Brix 45.0 to 93.0%	Brix 60.0 to 100.0%	Urine S.G. scale 1.000 to 1.100 Serum protein scale 0.0 to 12.0g/100ml Refractive Index scale (nD) 1.3330 to 1.3660	Urine S.G. scale 1.000 to 1.100	Urine S.G. scale 1.000 to 1.100 Serum protein scale 0.0 to 12.0g/100ml Refractive Index scale (nD) 1.3330 to 1.3660	Urine S.G. scale 1.000 to 1.100	
Minimum Scale	5% 5°C	<Freezing temperature scale> ethylene glycol 5°C propylene glycol 5°C <Battery fluid d20/20> 0.01	<Freezing temperature scale> ethylene glycol 10°F propylene glycol 10°F <Battery fluid d20/20> 0.01	Refractive index 0.001	Brix 0.2%			Brix 0.5%	Brix 0.1%	Brix 0.5%										
Measurement Accuracy	—	—	—	—	Brix $\pm 0.2\%$ * $\pm 0.1\%$ (10 to 30°C)	Brix $\pm 0.2\%$ * $\pm 0.1\%$ (10 to 40°C)			Brix $\pm 0.5\%$ * $\pm 0.25\%$ (10 to 30°C)	Brix $\pm 0.2\%$ * $\pm 0.1\%$ (10 to 30°C)		Brix $\pm 0.5\%$ * $\pm 0.25\%$			Urine S.G. scale $\pm 0.001$ Serum protein scale $\pm 0.2g/100ml$ Refractive Index scale (nD) $\pm 0.0005$ (10 to 30°C)	Urine S.G. scale $\pm 0.001$ (10 to 30°C)	—	—		
International Protection Class	—											IP65 (except eye piece) Dust-tight and Protected against water jets.				IP65 (except eye piece) Dust-tight and Protected against water jets.				
Size & Weight	3.3×3.3×16.8cm, 90g		3.3×3.3×16.8cm, 90g		3.3×3.3×16.8cm, 120g		3.3×3.3×20.4cm, 160g		3.3×3.3×16.8cm, 120g		3.3×3.3×20.4cm, 160g		3.3×3.3×20.4cm, 120g				3.3×3.3×20.4cm, 100g			

\*Repeatability

## Application — Measuring sugar concentration, concentration, Brix and Refractive Index —

### ▶ Agriculture

Fruit and vegetable juice/  
Leaf juice/Stem juice/  
Root juice

### ▶ Salinity

Sodium chloride solution/  
sea water

### ▶ Drink

Fruit juice/Soft drink/  
Carbonated beverage

### ▶ Machine Tools

Fire extinguishing solution/  
Soluble cutting oil

### ▶ Food

Condiment/Various sauces/  
Soy sauce/Jam/  
Soybean milk/Honey/Oil

### ▶ Chemicals and medicine

Brine/Snow-melting agent/  
Medicine/Chemical/Cosmetics/  
Cleaning solution

### ▶ Cooking

Chinese noodle soup/  
Various soup/Various sauces

### ▶ Clinical

Urine/Serum

## Brix of Various Samples — Refractive index and Brix of various types of samples —

※ Please use as a guide when you select a refractometer

RI (Brix)	Food Industry	Chemical Industry	Medical science Industry
1.30			
1.333	Green tea Thawing liquid	Cutting oil (emulsion) Cleanser Plant cell culture Grinding chemical liquid	Methanol Saline Aloe extract
	Miso soup	Cutting liquid Cleaning liquid	Sea water
1.34	Beer	Nickel plate liquid Rolling oil	
	Japanese plum Strawberry Plain yogurt Lime Lemon Corn soup Coffee	Medicinal solution Gelatin liquid	Chlorella extract
1.35	Orange Mandarin orange Soy milk Cola Apple Milk Alcohol	Paper starch Freon113	Serum
	Prince melon Egge white Beef curry	Electric [electrical] Discharging liquid	Acetone
1.36	Orange jelly Demiglaze (sauce) Lactic acid bacteria beverage Nectar	Silicone solution (emulsion)	Ethanol
	Canned seasoning Yogurt Pudding Shaved ice syrup Canned syrup	Protein liquid Electrolyte	Acetic acid
1.37	Starch paste Chili sauce	Freon 11	Saturated saline
1.38			
1.39	Ketchup Soy sauce Sauce Pastry cream	Acrylonitrile Silicone oil	Octane
1.40	Egg yolk Bean jam Soybean paste Concentrated juice Coconut oil	Ethylene glycol Propylene glycol	
	Butter Condensed milk Jelly Marmalade Olive oil Molasses Canola oil Sesame oil Cooking oil Honey Starch Syrup	Kerosene Quartz glass Vinyl acetate Diesel oil Ricinus Bunker A Polypropylene (PP) Toluene Polyvinyl chloride (PVC) Natural rubber (NR) Styrene Bunker C Quartz (AC)	Opal Carbon tetrachloride Glycerin
1.50			
	Clove oil	Epoxy (EP) Flint glass Asphalt	Xylene Crystalline Quartz Glass Rock salt Carbolic acid
1.60			
	Cinnamon oil		Aniline Topaz Monobromonaphthalene
1.70			Methylene iodide

## Optional



### Small Volume Daylight Plate With Hinge Pin

For metal body model  
Parts.No. RE-2311-58 M

For plastic body model  
Parts.No. RE-2391-50 M



### Extractor

Parts.No. RE-29401



### Sucrose solution (for Brix confirmation)

Parts.No. RE-110010 10% Sucrose  
Parts.No. RE-110030 30% Sucrose  
Parts.No. RE-110050 50% Sucrose

## Bits of Knowledge

### Light refraction

When a straw is placed in a glass of water, the straw appears bent. When a straw is placed in a glass with water containing dissolved sugar, the straw should appear even more bent. This phenomenon is known as the principle of **light refraction**. Refractometers are measuring instruments which put this phenomenon of light refraction to practical use. They are based on the principle that as the density of a substance increases (e.g. when sugar is dissolved in water), its refractive index (how much the straw appears bent) rises proportionally.



### Sugar concentration

Fruit juices, jam and honey contain many elements but the main ingredient is sugar. Sugar concentration can be indicated in Brix (%). Brix is a measurement scale based on sucrose in distilled water. For example, 10 grams of cane sugar in 90 grams of distilled water equates to a 10% Brix solution. Since the majority of dissolved solids in fruit juice are sugar, the Brix scale is ideal to measure these samples.

### Concentration

Soups, stews, and sauces contain salts, acids, extracts as well as sugar. The total of all these dissolved ingredients in water is called "Soluble Solids". The concentration is generally indicated in percentage.

### Brix

A refractometer measures the concentration percentage and displays this as a value of Brix(%). When measuring samples such as fruit juice or jam, which consist almost entirely of sugar, the Brix(%) should almost equal the actual sugar concentration. With samples such as soup or sauce containing many other ingredients, the Brix(%) is indicating the total concentration percentage. Generally the measurements obtained are not indicated specifically as "SUGAR CONCENTRATION" or "CONCENTRATION", but simply Brix(%)".

All ATAGO refractometers are designed and manufactured in Japan.

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\* Specifications and appearance are subject to change without notice.

**HACCP GMP GLP** ATAGO products are acknowledged by HACCP, GMP and GLP systems.