



## Hand-held Refractometers

MASTER of REFRACTOMETRY



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# HAND-HELD REFRACTOMETERS

## MASTER series

Design Registration No.000379326-0001, 000379326-0002 (EU) ZL 2005 3 0118403.4.5 (China), D111526 (Taiwan) 1255763, 1255764, 1255765, 1255766, 1255767 (Japan) Patent pending in U.S.A. and all other countries around the world.

Wide variety of ATAGO's Hand-Held Refractometers. Pick up the best refractometer depending on the type of sample and its environment.

### Hand-held refractometers MASTER qseries

NON A.T.C. model	A.T.C. & Water Resistant (IP65) model	A.T.C. model	A.T.C. & Water Resistant (IP65) (Heat Resistant model)
<b>MASTER-M</b> <b>MASTER-2M</b> <b>MASTER-3M</b> <b>MASTER-4M</b> <b>MASTER-53M</b> <b>MASTER-RI (nD)</b>	<b>MASTER-α</b> <b>MASTER-2α</b> <b>MASTER-3α</b> <b>MASTER-4α</b> <b>MASTER-53α</b>	<b>MASTER-T</b> <b>MASTER-2T</b> <b>MASTER-3T</b> <b>MASTER-4T</b> <b>MASTER-53T</b>	<b>MASTER-50H</b> <b>MASTER-80H</b> <b>MASTER-93H</b> <b>MASTER-100H</b>

#### MASTER SERIES REFRACTOMETER (WATER RESISTANT & A.T.C.)

NEW

##### MASTER-α Cat.No. 2311

This new type of Hand-Held refractometer is the first to be equipped with Automatic Temperature Compensation and Water Resistant (IP65) at the same time. While featuring functions such as Easy-to-Read, Easy-to-Hold, Smooth sampling, Easy disposal of sample from the edge, the improvement of hygiene aspect by employing the new type of grip, and well balanced structure, emphasis is also placed on its design, well exemplified by the streamlined body and the strong grip with rich texture.

Scale range	: Brix 0.0 to 33.0% (Automatic Temperature Compensation)
Minimum scale	: 0.2%
Accuracy	: ±0.2% (10 to 30°C)
Repeatability	: Brix ±0.1%
International protection class	: IP65 (except eye piece)
Size and weight	: 3.3×3.3×20.4cm, 160g



#### MASTER SERIES REFRACTOMETER (WATER RESISTANT & A.T.C.)

NEW

##### MASTER-2α Cat.No. 2321

MASTER-2α is mid-range measurement range Brix 28.0 to 62.0% model of the MASTER-α. It is convenient for measuring a variety of sauces, soy sauce, seasoning in liquid form as well as for low-sugar jams and spreads. It is an Automatic Temperature Compensation (A.T.C.) model with water resistant properties (IP65).

Scale range	: Brix 28.0 to 62.0% (Automatic Temperature Compensation)
Minimum scale	: 0.2%
Accuracy	: ±0.2% (10 to 30°C)
Repeatability	: Brix ±0.1%
International protection class	: IP65 (except eye piece)
Size and weight	: 3.3×3.3×20.4cm, 160g



#### MASTER SERIES REFRACTOMETER (A.T.C.)

NEW

##### MASTER-T Cat.No. 2312

This is the successor model to the conventional ATC-1E. Automatic Temperature Compensation feature only. The Master-T is a good alternative choice when the water resistant feature is not a priority.

Scale range	: Brix 0.0 to 33.0% (Automatic Temperature Compensation)
Minimum scale	: 0.2%
Accuracy	: ±0.2% (10 to 30°C)
Repeatability	: Brix ±0.1%
Size and weight	: 3.3×3.3×20.4cm, 160g



#### MASTER SERIES REFRACTOMETER (A.T.C.)

NEW

##### MASTER-2T Cat.No. 2322

MASTER-2T is mid-range model of the MASTER-T. Automatic Temperature Compensation feature only. The Master-T is a good alternative choice when the water resistant feature is not a priority.

Scale range	: Brix 28.0 to 62.0% (Automatic Temperature Compensation)
Minimum scale	: 0.2%
Accuracy	: ±0.2% (10 to 30°C)
Repeatability	: Brix ±0.1%
Size and weight	: 3.3×3.3×20.4cm, 160g



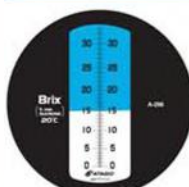
#### MASTER SERIES REFRACTOMETER

NEW

##### MASTER-M Cat.No. 2313

This is the successor model to the conventional N-1α. The Master-M is a good alternative choice when the water resistant feature is not a priority and the Temperature Compensation will be carried out manually. Not equipped with the Automatic Temperature Compensation feature.

Scale range	: Brix 0.0 to 33.0%
Minimum Scale	: 0.2%
Size and weight	: 3.3×3.3×20.4cm, 160g



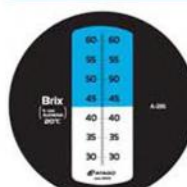
#### MASTER SERIES REFRACTOMETER

NEW

##### MASTER-2M Cat.No. 2323

MASTER-2M is mid-range measurement range Brix 28.0 to 62.0% model of the MASTER-M. The Master-M is a good alternative choice when the water resistant feature is not a priority and the Temperature Compensation will be carried out manually.

Scale range	: Brix 28.0 to 62.0%
Minimum Scale	: 0.2%
Size and weight	: 3.3×3.3×20.4cm, 160g



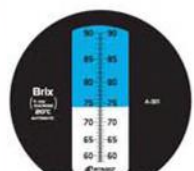
**MASTER SERIES REFRACTOMETER (Water Resistant & A.T.C.)**

**MASTER-3 $\alpha$  Cat.No.2331 MASTER-4 $\alpha$  Cat.No.2341**

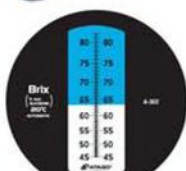
**NEW**

MASTER-3 $\alpha$ , MASTER-4 $\alpha$  are high-range model of the MASTER- $\alpha$ . The MASTER-3 $\alpha$ , MASTER-4 $\alpha$  are suited for use with food products of high sugar content such as malt, honey, jam, marmalade, etc

Scale range	:MASTER-3 $\alpha$ Brix 58.0% to 90.0% :MASTER-4 $\alpha$ Brix 45.0% to 82.0%
Minimum scale	:Brix0.2%
Accuracy	:Brix $\pm$ 0.2% (10 to 40°C)
Repeatability	:Brix $\pm$ 0.1%
Size and weight	:3.3X3.3X16.8cm,120g



MASTER-3 $\alpha$



MASTER-4 $\alpha$

**MASTER SERIES REFRACTOMETER (A.T.C.)**

**MASTER-3T Cat.No.2332 MASTER-4T Cat.No.2342**

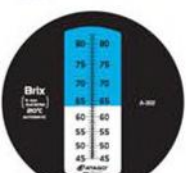
**NEW**

MASTER-3T, MASTER-4T are high-range model of the MASTER-T. Automatic Temperature Compensation feature only. MASTER-3T, MASTER-4T are a good alternative choice when the water resistant feature is not a priority.

Scale range	:MASTER-3T Brix 58.0% to 90.0% :MASTER-4T Brix 45.0% to 82.0%
Minimum scale	:Brix0.2%
Accuracy	:Brix $\pm$ 0.2% (10 to 40°C)
Repeatability	:Brix $\pm$ 0.1%
Size and weight	:3.3X3.3X16.8cm,120g



MASTER-3T



MASTER-4T

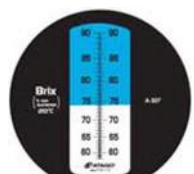
**MASTER SERIES REFRACTOMETER**

**MASTER-3M Cat.No.2333 MASTER-4M Cat.No.2343**

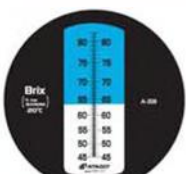
**NEW**

MASTER-3M, MASTER-4M are high-range model of the MASTER-M. MASTER-3M, MASTER-4M are a good alternative choice when the water resistant feature is not a priority and the Temperature Compensation will be carried out manually.

Scale range	:MASTER-3M Brix 58.0% to 90.0% :MASTER-4M Brix 45.0% to 82.0%
Minimum scale	:Brix0.2%
Size and weight	:3.3X3.3X16.8cm,120g



MASTER-3M



MASTER-4M

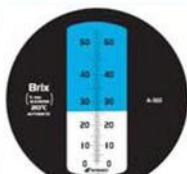
**MASTER SERIES REFRACTOMETER (Water Resistant & A.T.C.)**

**MASTER-53 $\alpha$  Cat.No. 2351**

**NEW**

MASTER-53 $\alpha$  is wide range model of the MASTER- $\alpha$ . MASTER-53 $\alpha$  is capable of measuring not only various kinds of juice, coffee, and other beverages but also processed food such as sauce, ketchup, low calorie jam, etc. It is an Automatic Temperature Compensation (A.T.C.) model with water resistant feature (IP65).

Scale range	:0.0% to 53.0%
Minimum scale	:Brix0.5%
Accuracy	:Brix $\pm$ 0.5% (10 to 30°C)
Repeatability	:Brix $\pm$ 0.25%
Size and weight	:3.3X3.3X16.8cm,120g



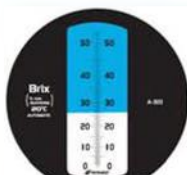
**MASTER SERIES REFRACTOMETER (A.T.C.)**

**MASTER-53T Cat.No.2352**

**NEW**

MASTER-53T is wide range model of the MASTER-T. MASTER-53T is capable of measuring not only various kinds of juice, coffee, and other beverages but also processed food such as sauce, ketchup, low calorie jam, etc. It is an Automatic Temperature Compensation (A.T.C.) model. The Master-53T is a good alternative choice when the water resistant feature is not a priority.

Scale range	:MASTER-53T Brix0.0% to 53.0%
Minimum scale	:Brix0.5%
Accuracy	:Brix $\pm$ 0.5% (10 to 30°C)
Repeatability	:Brix $\pm$ 0.25%
Size and weight	:3.3X3.3X16.8cm,120g



**MASTER SERIES REFRACTOMETER**

**MASTER-53M Cat.No.2353**

**NEW**

MASTER-53M is wide range model of the MASTER-M. The MASTER-53M is a good alternative choice when the water resistant feature is not a priority and the Temperature Compensation will be carried out manually.

Scale range	:Brix0.0% to 53.0%
Minimum scale	:Brix0.5%
Size and weight	:3.3X3.3X16.8cm,120g



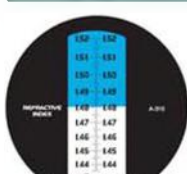
**MASTER SERIES REFRACTOMETER**

**MASTER-RI Cat.No.2612**

**NEW**

MASTER-RI is refractive-index model of the MASTER-Series. MASTER-RI can be used for measuring the refractive index of vegetable oil, petroleum, oil slicks, etc.

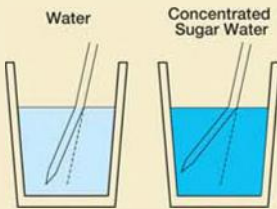
Scale range	:Refractive index 1.435 to 1.520
Minimum scale	:Refractive index 0.001
Size and weight	:3.3X3.3X16.8cm,120g



# Technical Information

## Light Refraction

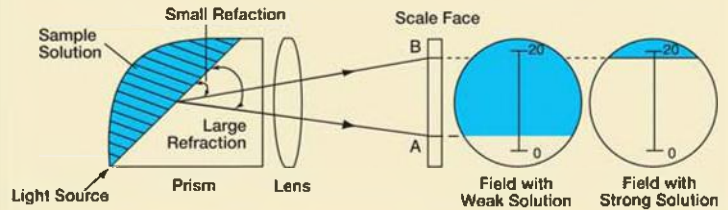
When a straw is placed into a glass of water, the straw appears bent. Now if a straw is placed in a glass with water containing dissolved sugar, the straw should appear even more bent (see illustrations). This phenomenon is known as the principle of light refraction. Refractometers are measuring instruments 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 proportionately. Refractometers were devised by Dr. Ernst Abbe, a German/Austrian scientist in the early 20th century.



## Principles of Refractometers

The detection system for hand-held refractometers (transparent system) is summarized below.

- (1) In the figure below the detection is done by utilizing the refractive phenomenon produced on the boundary of the prism and sample. The refractive index of the prism is much larger than that of the sample.
- (2) If the sample is thin, the angle of refraction is large (see line "A") because of the large difference in refractive index between the prism and the sample.
- (3) If the sample is thick, the angle of refraction is small (see line "B") because of the small difference in refractive index between the prism and the sample.



## Which Refractometer to choose

Please use as a guide with a chart of back page when you choose the refractometer.

### Known sample's typical concentration

Concentration sample Designation	Brix (%)	0	10	20	30	40	50	60	70	80	90
Oranges, Pears			10	15							
Tomatoes		5	10	15							
Apples, Melons			10	15							
Strawberries, Peaches			10	15							
Grapes			10	15	20	25					
Water melons, Plums			10	15							
Concentrated fruit juices						40	50	60	70		
Fruit juices			10	15							
Tomato puree			10	15							
Tomato juices		5	10	15							
Coke, Carbonated beverages			10	15							
Nectar			10	15	20						
Lactic acid bacteria beverage			10	15	20						
Coffee			10	15							
Condensed milk							50	60	70		
Molasses								60	70	80	
Canned syrup					30	40	50	60	70		
Starch sugar liquid				20	30						
Pudding, Yogurt				20	30						
Soy sauce					30	40					
Yeast culture		5	10								
Wines			10	15							
Bean milk		5	10	15							
Canned fruits			10	15	20						
Egg yolk							45	50			
Steak sauce, Ketchup					30	40					
Milk			10	15							
Pickles			10	15	20						
Jelly, Marmalade, Flour paste						40	50	60	70		
Cooking oils								65	75		
Cutting oil		5	10								
Starch paste					25	30					
Emulsified solution		5	10								
Soluble tempering oil		5	10	15							
Antifreeze mixture		5	10	15	20	25	30	35	40	45	50
Oils										80	90

Fruits, Fruit juices, Soft Drink

Food Industry

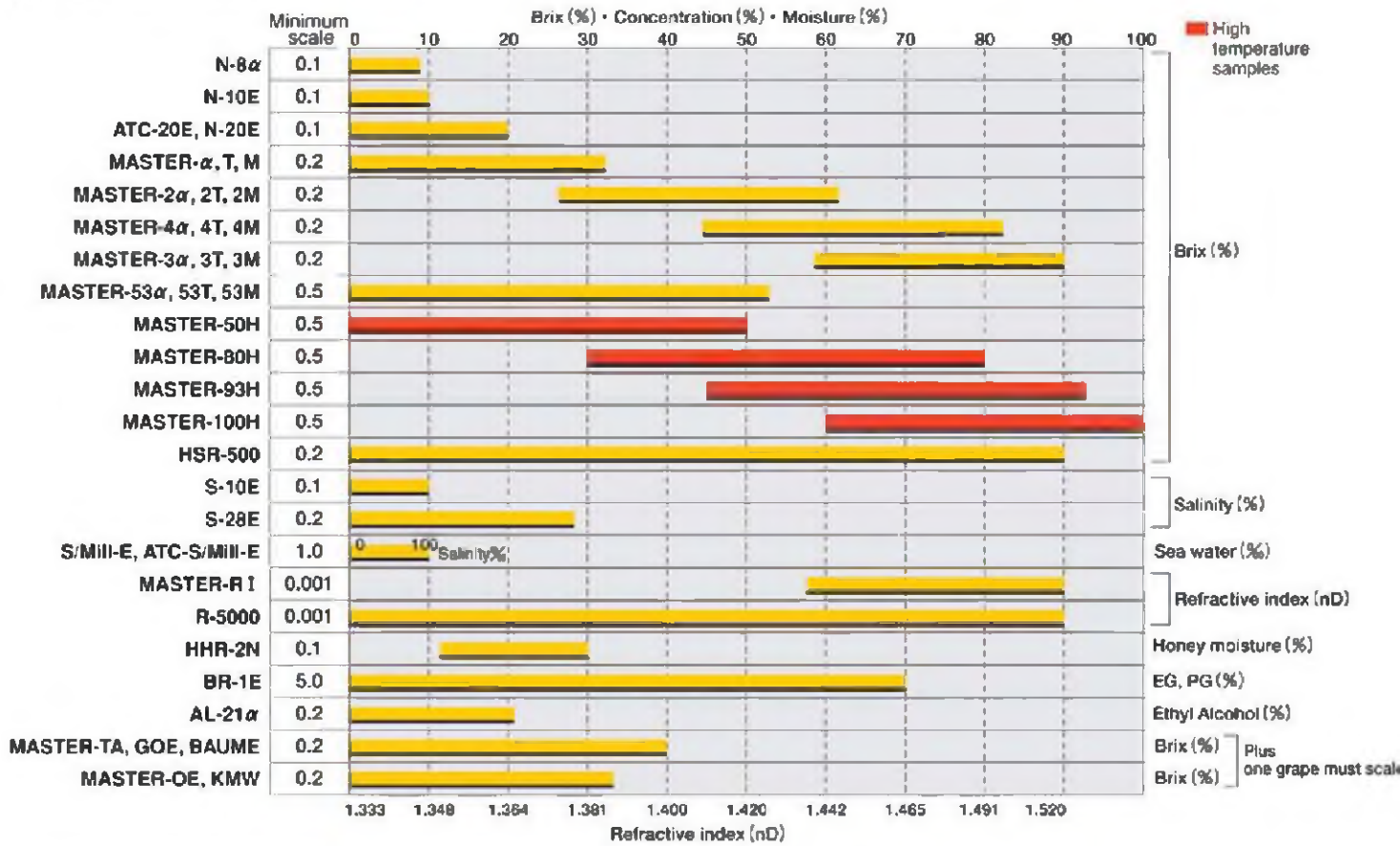
Chemical Industry

### About the Brix (%) Scale

All Refractometers are designed to measure the refractive index of a solution. The Brix scale is based on a sucrose (sugar) and water solution. However, since most samples contain substances other than sugar - such as salts, minerals and proteins - the Brix percentage represents the total

concentration of all soluble solids in the sample. For certain samples, such as cutting oils and other industrial fluids, a conversion chart from the Brix percentage to the sample's total concentration may be necessary.

## Measurement range for each model



## EXPLANATION OF ICONS Icons for functions, specifications and scales have been added to this catalog.



- Automatic Temperature Compensation
- Compensation automatique de température
- Automatische Temperaturkompensation
- Compensazione automatica della temperatura
- Compensación de automática de temperatura
- 自動溫度補償



- External Light Interference
- Interférence de la lumière externe
- Äußere Lichteinflüsse
- Interferenza della luce esterna
- Luz de Interferencia Externa
- 外部光線干擾



- High temperature samples
- Résistant à la chaleur
- Hitzebeständig
- Resistente al calore
- Muestras De Alta Temperatura
- 高溫樣品用



- Calibration with exclusive standard liquid
- Calibration 1 point sur solution standard
- Kalibrierung mit speziellem Standard
- Calibration 1 point sur solution standard
- Calibración con patrones líquidos especiales
- 使用專用標準液歸零



- Calibration with water
- Calibration 1 point sur eau distillée
- Kalibrierung mit Wasser
- Calibrazione con acqua
- Calibración con agua
- 用水歸零



- Compact and easy to carry
- Portable
- Leicht und einfach zu tragen
- Calibrazione con liquid standard esclusivi
- Compacto y fácil de llevar
- 輕巧易於攜帶



- Digital display
- Affichage numérique
- Digital Anzeige
- Display digitale
- Pantalla digital
- 數字顯示



- Battery operated
- Alimentation par pile
- Batteriebetrieben
- Alimentazione a batteria
- Funcionamiento con batería
- 使用電池操作



- Refractive index scale
- Indice de réfraction
- Skala fuer Refraktive Index
- Indice di rifrazione
- Escala de índice de refracción
- 折光率刻度



- Salt concentration scale
- Teneur en sel
- Skala fuer Salzkonzentration
- Salinità%
- Escala de concentración salina
- 鹽分濃度刻度



- Seawater scale
- Spécial eau de mer
- Seewasserskala
- Salinità oloo
- Escala de agua de mar
- 海水刻度



- Wine scale
- Spécial viticulture
- Skala fuer Wein
- Scale Enologia
- Escala de vinos
- 葡萄酒刻度

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