



## Hand-held Refractometers

MASTER of REFRACTOMETRY

 **ATAGO**<sup>®</sup>



# HAND-HELD REFRACTOMETERS

## MASTER series

Design Registration No.000379326-0001, 000379326-0002 (EU) ZL 2005 3 0116403.4,5 (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)
MASTER-M MASTER-2M MASTER-3M MASTER-4M MASTER-53M MASTER-Ri (nD)	MASTER- $\alpha$ MASTER-2 $\alpha$ MASTER-3 $\alpha$ MASTER-4 $\alpha$ MASTER-53 $\alpha$	MASTER-T MASTER-2T MASTER-3T MASTER-4T MASTER-53T	MASTER-50H MASTER-80H MASTER-93H MASTER-100H

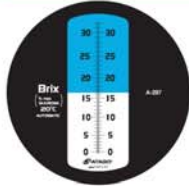
#### MASTER SERIES REFRACTOMETER (WATER RESISTANT & A.T.C.)

##### MASTER- $\alpha$ Cat.No. 2311

NEW

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	: $\pm 0.2\%$ (10 to 30°C)
Repeatability	: Brix $\pm 0.1\%$
International protection class	: IP65 (except eye piece)
Size and weight	: 3.3X3.3X20.4cm, 160g



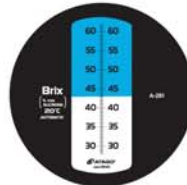
#### MASTER SERIES REFRACTOMETER (WATER RESISTANT & A.T.C.)

##### MASTER-2 $\alpha$ Cat.No. 2321

NEW

MASTER-2 $\alpha$  is mid-range measurement range Brix 28.0 to 62.0% model of the MASTER- $\alpha$ . 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	: $\pm 0.2\%$ (10 to 30°C)
Repeatability	: Brix $\pm 0.1\%$
International protection class	: IP65 (except eye piece)
Size and weight	: 3.3X3.3X20.4cm, 160g



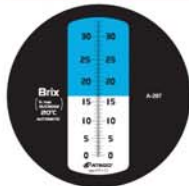
#### MASTER SERIES REFRACTOMETER (A.T.C.)

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

NEW

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	: $\pm 0.2\%$ (10 to 30°C)
Repeatability	: Brix $\pm 0.1\%$
Size and weight	: 3.3X3.3X20.4cm, 160g



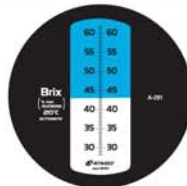
#### MASTER SERIES REFRACTOMETER (A.T.C.)

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

NEW

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	: $\pm 0.2\%$ (10 to 30°C)
Repeatability	: Brix $\pm 0.1\%$
Size and weight	: 3.3X3.3X20.4cm, 160g



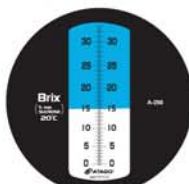
#### MASTER SERIES REFRACTOMETER

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

NEW

This is the successor model to the conventional N-1 $\alpha$ . 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	: 3.3X3.3X20.4cm, 160g



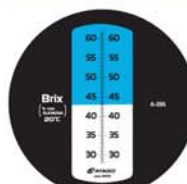
#### MASTER SERIES REFRACTOMETER

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

NEW

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.

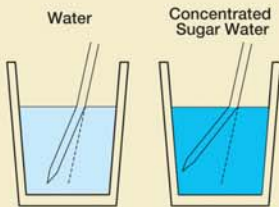
Scale range	: Brix 28.0 to 62.0%
Minimum Scale	: 0.2%
Size and weight	: 3.3X3.3X20.4cm, 160g



# Technical Information

## Light Refraction

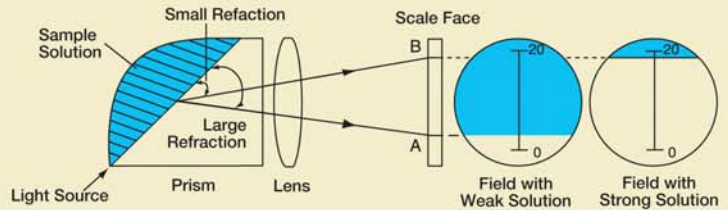
When a straw is placed into a glass of water, the straw appears bent. Now if a straw is placed in a glass with water containing dissolved sugar, the straw should appear even more bent (see illustrations). This phenomenon is known as the principle of light refraction. Refractometers are measuring instruments 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

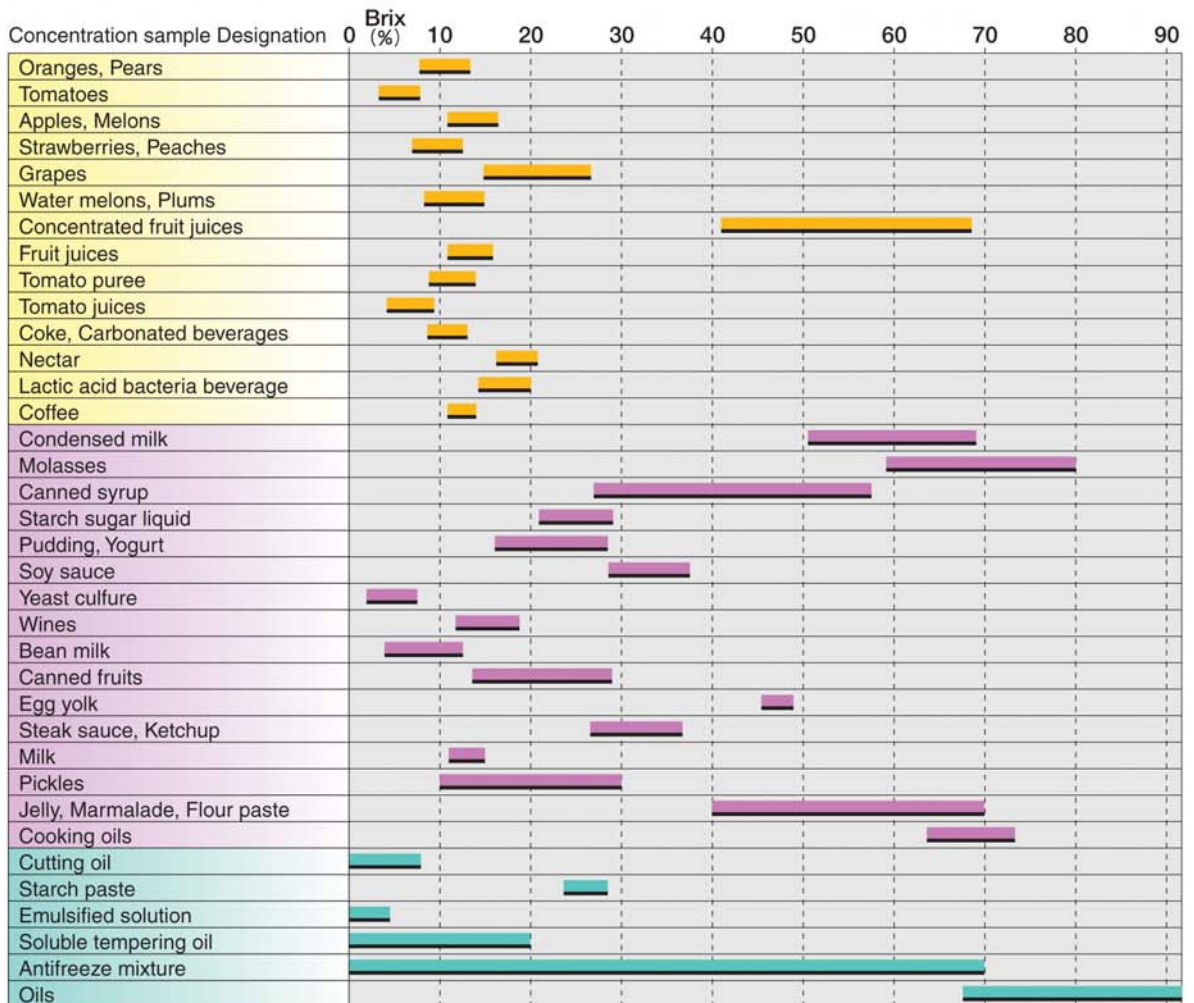
Please use as a guide with a chart of back page when you choose the refractometer.

### Known sample's typical concentration

Fruits,  
Fruit juices,  
Soft Drinks

Food  
Industry

Chemical  
Industry

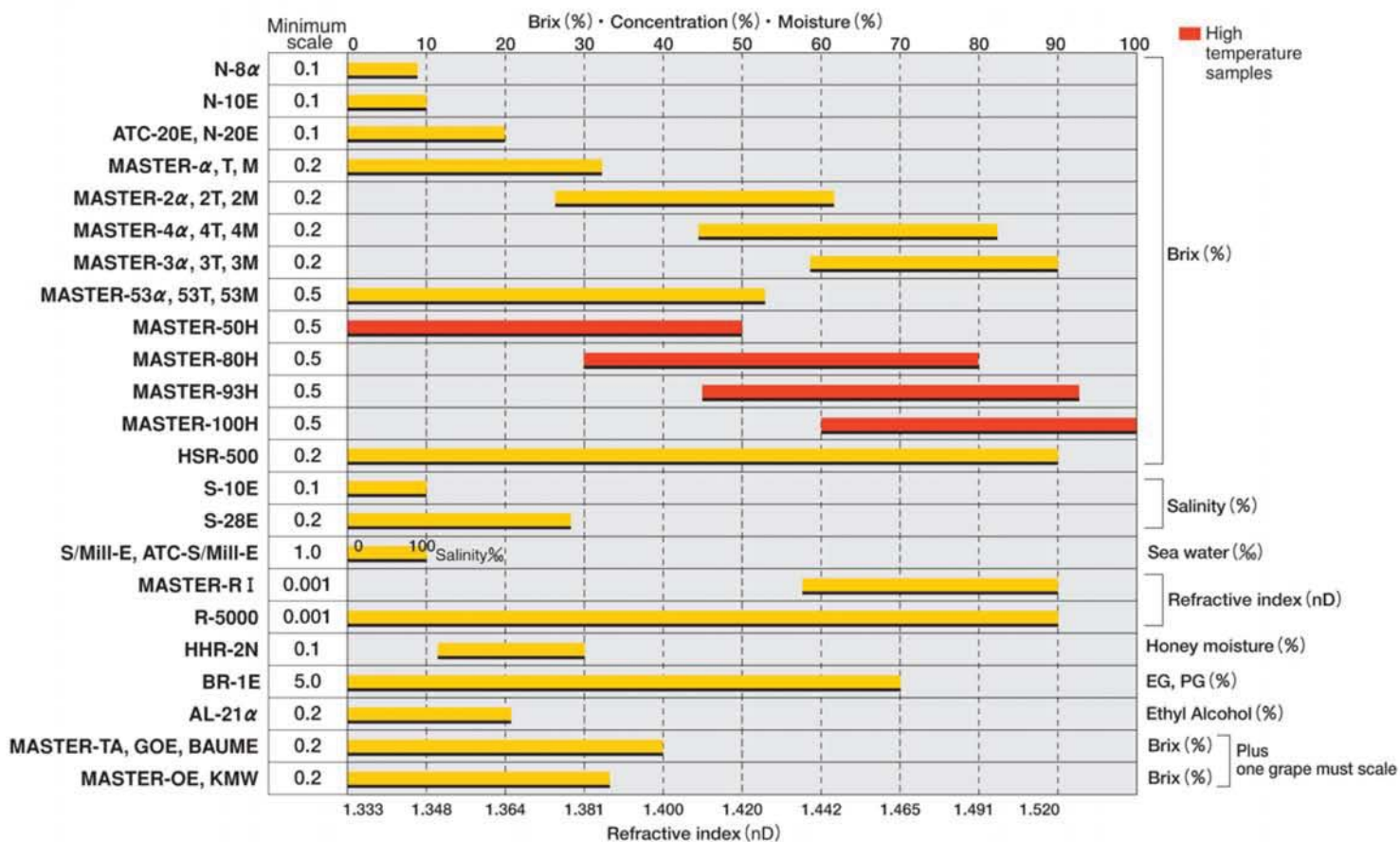


### About the Brix (%) Scale

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.

<ul style="list-style-type: none"> <li>* Automatic Temperature Compensation</li> <li>* Compensation automatique de température</li> <li>* Automatische Temperaturkompensation</li> <li>* Compensazione automatica della temperatura</li> <li>* Compensación de automática de temperatura</li> <li>* 自動温度補償</li> </ul>	<ul style="list-style-type: none"> <li>* External Light Interference</li> <li>* Interférence de la lumière externe</li> <li>* Äußere Lichteinflüsse</li> <li>* Interferenza della luce esterna</li> <li>* Luz de Interferencia Externa</li> <li>* 外部光線干渉</li> </ul>	<ul style="list-style-type: none"> <li>* High temperature samples</li> <li>* Résistant à la chaleur</li> <li>* Hitzebeständig</li> <li>* Resistente al calore</li> <li>* Muestras De Alta Temperatura</li> <li>* 高温様品用</li> </ul>
<ul style="list-style-type: none"> <li>* Calibration with exclusive standard liquid</li> <li>* Calibration 1 point sur solution standard</li> <li>* Kalibrierung mit speziellem Standard</li> <li>* Calibration 1 point sur solution standard</li> <li>* Calibración con patrones líquidos especiales</li> <li>* 使用專屬標準液歸零</li> </ul>	<ul style="list-style-type: none"> <li>* Calibration with water</li> <li>* Calibration 1 point* sur eau distillée</li> <li>* Kalibrierung mit Wasser</li> <li>* Calibración con agua</li> <li>* Calibración con agua</li> <li>* 用水歸零</li> </ul>	<ul style="list-style-type: none"> <li>* Compact and easy to carry</li> <li>* Portable</li> <li>* Leicht und einfach zu tragen</li> <li>* Calibración con liquid standard esclusivi</li> <li>* Compacto y fácil de llevar</li> <li>* 輕巧易於攜帶</li> </ul>
<ul style="list-style-type: none"> <li>* Digital display</li> <li>* Affichage numérique</li> <li>* Digital Anzeige</li> <li>* Display digitale</li> <li>* Pantalla digital</li> <li>* 數字顯示</li> </ul>	<ul style="list-style-type: none"> <li>* Battery operated</li> <li>* Alimentation par pile</li> <li>* Batteriebetrieben</li> <li>* Alimentazione a batteria</li> <li>* Funcionamiento con batería</li> <li>* 使用電池操作</li> </ul>	<ul style="list-style-type: none"> <li>* Refractive index scale</li> <li>* Indice de réfraction</li> <li>* Skala fuer Refractive Index</li> <li>* Indice di rifrazione</li> <li>* Escala de índice de refracción</li> <li>* 折射率刻度</li> </ul>
<ul style="list-style-type: none"> <li>* Salt concentration scale</li> <li>* Teneur en sel</li> <li>* Skala fuer Salzkonzentration</li> <li>* Salinità%</li> <li>* Escala de concentración salina</li> <li>* 鹽分濃度刻度</li> </ul>	<ul style="list-style-type: none"> <li>* Seawater scale</li> <li>* Spécial eau de mer</li> <li>* Seewasserskala</li> <li>* Salinità o/oo</li> <li>* Escala de agua de mar</li> <li>* 海水刻度</li> </ul>	<ul style="list-style-type: none"> <li>* Wine scale</li> <li>* Spécial viticulture</li> <li>* Skala fuer Wein</li> <li>* Scale Enologia</li> <li>* Escala de vinos</li> <li>* 葡萄酒刻度</li> </ul>

All ATAGO refractometers are designed and manufactured in Japan.

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

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