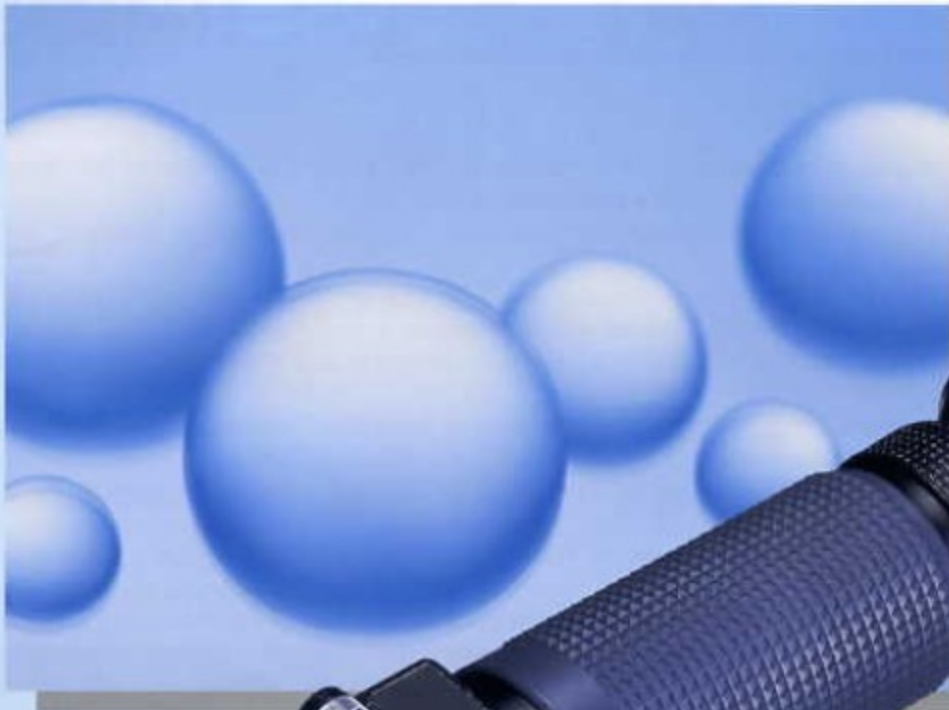


Hand-held Refractometers



Digital Hand-held Pocket Refractometer

*The PAL-1 is a completely new and redesigned digital hand-held instrument that will change the traditional conceptions of refractometers.

Digital Hand-held Pocket Refractometer

Cat. No. 3810

PAL-1



NEW!

Features:

- The PAL-1 is surprisingly compact in size allowing for portability and use indoors or outdoors. Weighing only 100g, the PAL-1 can be placed in a pocket or hang it from your neck or belt.
- Measurements can be made easily while holding it in just one hand. The sample stage is designed to keep sample solutions from spilling out.
- The speedy performance of the PAL-1 is amazing. Simply put a drop of a sample on the prism surface and press the START key. The Brix value (sugar content/concentration) will be displayed in just 3 seconds. With a digital LCD display, others can view the measurement value without the worry of mis-readings due to the subjectivity of each person (as with traditional analog refractometers).
- The PAL-1 can take a measurement of high temperature sample that have been heated or boiled. (The stabilized Brix value is acquired after a few times of repeated measurements.)
- Protection class of the PAL-1 is IP65. You can rinse off the sample by running water on the sample stage. The design allows the user to easily wipe off the sample.
- To perform zero setting, simply put a drop of water on the prism and press the START key. If a value other than 0.0% is displayed, press the ZERO key to complete zero setting. Zero setting should be performed at the start of each workday. The programming of the PAL-1 eliminates the need for frequent zero setting during the workday. There is no need to perform zero setting again if the measured value is 0.0%.
- The PAL-1 comes with an excluding storage case. Store the PAL-1 in the case properly to avoid damage or loss.

Full size



Applications:

The PAL-1 is small and compact enough to fit in your pocket. Measurements can be made anywhere with ease.

- Outdoors at fruit and vegetable farming orchards
- Indoors at beverage or food factories
- At fruit and vegetable markets or supermarkets
- At restaurants or shops
- At junior high, high schools, or universities as a course material

Samples:

Fruit, Fruit juice, Soft drinks, Tomato juice, Soup, Sauce, Ketchup, Low-sugar jam, Low-sugar marmalade, Water-soluble cutting oil, Water-soluble washing solution, Quenching oil, etc.

Specifications:

Measurement Range	: Brix 0.0 to 53.0%
Resolution	: Brix 0.1%
Measurement Accuracy	: Brix $\pm 0.2\%$
Measurement Temperature	: 10 to 60°C (Automatic Temperature Compensation)
Ambient Temperature	: 10 to 40°C
Power supply	: 2 x AAA Batteries
International Protection Class	: IP65
Dimensions and weight	: 55 x 31 x 109mm, 100g

Digital Hand-held
'Pocket' Refractometer

Pocket **PAL-1**

Cat.No.3810

Pocket-Palm-Perform





Digital Hand-held
'Pocket' Refractometer
PAL-1



The next generation of Digital Refractometers

Names and Functions of Components Actual Size

The PAL-1 can be operated with one hand.

Sample Stage

The metal sample stage allows for the sample temperature to conform quickly and evenly to the prism temperature for accurate measurements.

Liquid Crystal Display (LCD)

Digital measurement values are displayed large and easy to read.

START Key

Conveniently located for single hand operation.

Prism

Made of highly durable optical glass to prevent scratching.

ZERO Key

For Zero Setting, place water on the prism and press.

Strap Holder

Conveniently sized to use your personally favorite strap.



Convenient storage case

The Main Features



* Revolutionary NEW design ; Easy to pour out and remove samples and difficult to spill the sample



* Always clean and shiny - can be cleaned under running water

* Wide measurement range (Brix 0.0 to 53.0%) - can measure various samples.

* Automatic Temperature Compensation

* Automatically cancel the measurement and display an error message when an erratic measurement value is detected.



The PAL-1 is a completely new and redesigned digital hand-held instrument that will change the traditional conceptions of refractometers. The PAL-1's surprisingly compact size allows you to easily carry it around and use it indoors as well as outdoors. The size, design, function and performance will surprise you. The PAL-1 will expand your range of measuring possibilities.



Application

- *Outdoors at fruit and vegetable farming orchards
 - *Indoors at beverage (fruits juice, coffee, soft drink, etc) and food (soy source, sauce, seasoning, soup, pickle, low concentration of jam, marmalade, jelly and syrup, etc) factories
- The PAL-1 can measure high temperature samples during the heating or cooking process.
(The measured Brix value will stabilize after taking a few repeated measurements.)
- *At fruit and vegetable markets or supermarkets
 - *At restaurants or shops
 - *At junior high, high schools, or universities as a course material

Measurement Method



1

Apply 2-3 drops onto the prism surface.



2

Press the START key.



3

Brix(%) value displayed in 3 seconds!



Specifications

Measurement Range	Brix 0.0~53.0%
Resolution	Brix 0.1%
Measurement Accuracy	Brix $\pm 0.2\%$
Measurement Temperature	10~60°C Automatic Temperature Compensation
Ambient Temperature	10~40°C
Power Supply	2 x AAA Batteries
International Protection Class	IP65
Dimensions and Weight	55(W)×31(D)×109(H)mm, 100g

Certification

In accordance with ISO Quality Management Systems, ATAGO can calibrate and certify your Digital Hand-held 'Pocket' Refractometer. The following documents will be issued (for a service fee):

1. Calibration Certificate
2. Traceability System Diagram
3. Traceability Certificate

CALIBRATION CERTIFICATE

Issue No. _____
Date of Issue _____
Date of Due _____

Product Name: Digital Hand-held Pocket Refractometer

Model: **PAL-1**

1. Appearance Inspection: _____

2. Function Inspection: _____
Standard: _____
Deviation: _____

3. Performance Inspection:

	Inspection Item	Inspection Result	Inspection Limit
1	Accuracy		
2	Resolution		
3	Temperature Compensation		
4	Power Supply		

4. Measurement Accuracy: 0.2%

5. Next Inspection at: _____

6. Calibration Date: _____

7. Inspection By: _____

8. Approved By: _____

ATAGO CO., LTD.
1-1-1, Higashi-Shinjuku, Shinjuku-Ku, Tokyo 163-8601, Japan
TEL: 03-3344-0111 FAX: 03-3344-0112

ATAGO Hand-held Refractometer History

1952~
HSR-1



1971~
N-1



1992~
P-1



1996~
N-1E



2003~
PAL-1



- * Compact and easy to carry
- * Portable
- * Leicht und einfach zu tragen
- * Calibrazione con liquidi standard esclusivi
- * Compacto y fácil de llevar
- * 輕巧易於攜帶
- * Calibration with water
- * Calibration 1 point* sur eau distillée
- * Kalibrierung mit Wasser
- * Calibrazione con acqua
- * Calibración con agua
- * 用水歸零
- * Battery operated
- * Alimentation par pile
- * Batteriebetrieben
- * Alimentazione a batteria
- * Funcionamiento con batería
- * 使用電池操作
- * Digital display
- * Affichage numérique
- * Digital Anzeige
- * Display digitale
- * Pantalla digital
- * 數字顯示
- * Automatic temperature compensation
- * Compensation automatique de température
- * Automatische Temperaturkompensation
- * Compensazione automatica della temperatura
- * Compensación de automática de temperatura
- * 自動溫度補償
- * High temperature samples
- * Résistant à la chaleur
- * Hitzebeständig
- * Resistente al calore
- * Muestras De Alta Temperatura
- * 高溫樣品用

Palette

' Palette', a market leader presents;

"The New-Born Palette is always the BEST among portable digital refractometers"

PR-32 α
Cat No.3442

PR-101 α
Cat No.3442

PR-201 α
Cat No.3452

PR-301 α
Cat No.3462



Features

- Ability to set a user scale - no more conversion tables required
- Accuracy: $\pm 0.1\%$
- Revolutionary new feature E.L.I.*
- ATC function - Automatic Temperature Compensation
- Water resistant: IP64

* External Light Interference (E.L.I.)

When intense light penetrates the prism of a digital refractometer, the light waves interfere with the sensor resulting in inaccurate readings.

To ensure accurate measurement results each time, the PR α is programmed with the E.L.I. function to display the warning message "nnn" when intense direct light is detected. Forming a habit of shading the sample stage with your hand and re-pressing the START key (when the warning message from the E.L.I. function is displayed) will ensure accurate measurement results each time.

Specifications

	PR-32 α	PR-101 α	PR-201 α	PR-301 α
Measurement Range	Brix 0.0~32.0%	Brix 0.0~45.0%	Brix 0.0~60.0%	Brix 45.0~90.0%
Minimum Indication	Brix 0.1%			
Measurement Accuracy	Brix \pm 0.1% (5~40℃)		Brix \pm 0.1% (10~40℃)	Brix \pm 0.1% (10~30℃)
Measurement Temperature	5~40℃		10~40℃	
Sample Quantity	0.1ml or more			
Measurement Time	3 seconds approx.			
Power Supply	006P battery(9V)			
International Protection Class	IP 64			
Dimensions and Weight	17(W) × 9(D) × 4(H)cm,300g			

*Specifications and appearance are subject to change without notice.

Automatic Temperature Compensating Refractometers

ATC-1E ! ATC-2E ! ATC-20E

*As these hand-held refractometers make temperature compensation with a built-in mechanism, they enable you to concentrate on your measurements without worrying about the temperature (compensating range: 10°C to 30°C).

*These models can be used outdoors or at production sites.

*The scale is big, and the boundary line of the scale is easy to view.

Automatic Temperature Compensating Refractometer

Cat. No. 2912

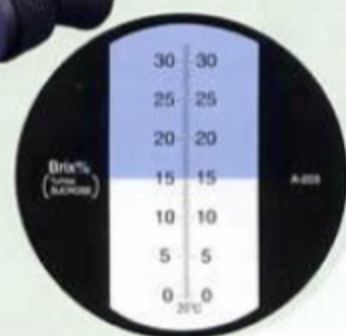
ATC-1E



Samples:

Fruit juice, Puree, Coffee drinks, Cocoa drinks, Vinegar, Soup, Soft drinks, Tomato juice, Lactic drinks, Water-soluble cutting oil, Water-soluble washing solution, Quenching oil, etc.

Scale range : Brix 0.0 to 32.0%
 Minimum scale : 0.2%
 Accuracy : $\pm 0.2\%$
 Compensation : Built-in Automatic Temperature Compensation system
 Compensation range : 10 to 30°C
 Size and weight : 4 × 4 × 18cm, 170g



Automatic Temperature Compensating Refractometer

Cat.No. 2122

ATC-2E

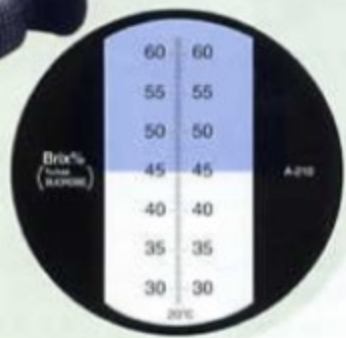


Samples:

Ketchup, Soy sauce, Worcester sauce, Chili sauce, Barbecue sauce, Tomato sauce, Barbecue seasoning, etc.

※ Calibration with the Bx50 (RE-100050).

Scale range : Brix 28.0 to 62.0%
 Minimum scale : 0.2%
 Accuracy : $\pm 0.2\%$
 Compensation : Built-in Automatic Temperature Compensation system
 Compensation range : 10 to 30°C
 Size and weight : 4 × 4 × 16cm, 150g



Automatic Temperature Compensating Refractometer

Cat.No. 2164

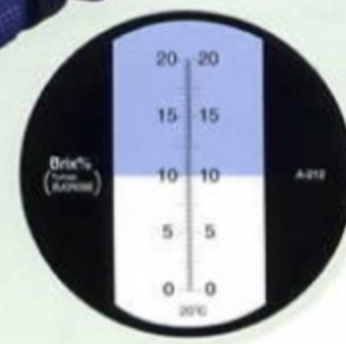
ATC-20E



Samples:

Fruit juice, Puree, Coffee drinks, Soft drinks, Tomato juice, Water-soluble cutting oil, Water-soluble washing solution, Quenching oil, etc.

Scale range : Brix 0.0 to 20.0%
 Minimum scale : 0.1%
 Accuracy : $\pm 0.2\%$
 Compensation : Built-in Automatic Temperature Compensation system
 Compensation range : 10 to 30°C
 Size and weight : 4 × 4 × 20cm, 200g



ATAGO Hand-held Refractometers

Standard Hand-held Refractometers

N-1 α : N-2E : N-3E : N-4E : N-10E : N-20E : N-50E

- *These models are the most standard refractometers.
- *The scale is big and the boundary line of the scale is easy to view.
- *These refractometers are lightweight and easy to handle.
- *The N-1 α is a new hand-held refractometer. As the prism house of the N-1 α is made of metal, the temperature of hot or cool samples conforms to the temperature of the prism quickly, compared with the previous model (the N-1E).

Hand-held Refractometer

Cat.No. 2211

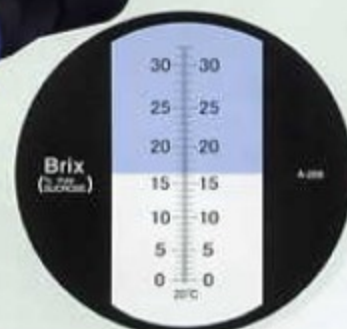
N-1 α



Samples:

Fruit juice, Puree, Coffee drinks, Cocoa drinks, Vinegar, Soup, Soft drinks, Tomato juice, Lactic drinks, Water-soluble cutting oil, Water-soluble washing solution, Quenching oil, etc.

Scale range : Brix 0.0 to 32.0%
Minimum scale : 0.2%
Size and weight : 4 × 4 × 17.3cm, 160g



Hand-held Refractometer

Cat.No. 2121

N-2E

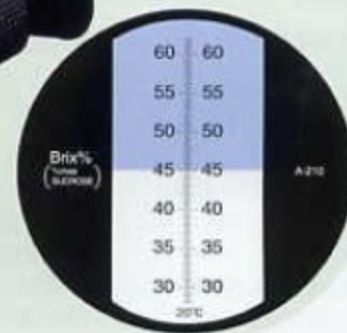


Samples:

Ketchup, Soy sauce, Worcester sauce, Chili sauce, Barbecue sauce, Tomato sauce, Barbecue seasoning, etc

※ Calibration with a saturated sodium chloride solution.

Scale range : Brix 28.0 to 62.0%
Minimum scale : 0.2%
Size and weight : 4 × 4 × 16cm, 150g



Hand-held Refractometer



Cat.No. 2131, 2141

N-3E, N-4E

Samples:

Liquid sugar (N-3E & N-4E), Concentrated fruit juice (N-3E & N-4E), Jam (N-3E & N-4E), Operation oil (N-3E & N-4E), Condensed milk (N-4E only), etc.

N-3E   Calibration with the Standard Liquid LB (RE-2100-83N).
Scale range : Brix 58.0 to 90.0%
Minimum scale : 0.2%
Size and weight : 4 × 4 × 14cm, 140g

N-4E   Calibration with the Standard Liquid LB (RE-2100-83N).
Scale range : Brix 45.0 to 82.0%
Minimum scale : 0.2%
Size and weight : 4 × 4 × 14cm, 140g

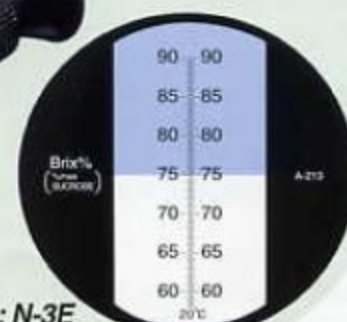


Photo &
Scale : N-3E

Hand-held Refractometer

Cat.No. 2151, 2161

N-10E, N-20E

Samples:

Fruit juice, Puree, Coffee drinks, Soft drinks, Tomato juice, Water-soluble cutting oil (light emulsion), Water-soluble washing solution, Quenching oil, etc.

N-10E

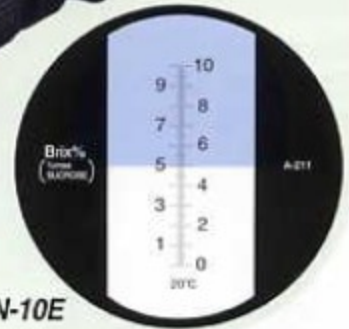
Scale range : Brix 0.0 to 10.0%
Minimum scale : 0.1%
Size and weight : 4 × 4 × 21cm, 200g

N-20E

Scale range : Brix 0.0 to 20.0%
Minimum scale : 0.1%
Size and weight : 4 × 4 × 21cm, 200g



Photo &
Scale : N-10E



Hand-held Refractometer

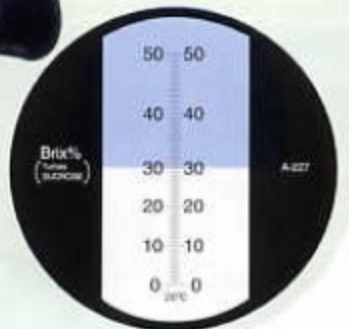
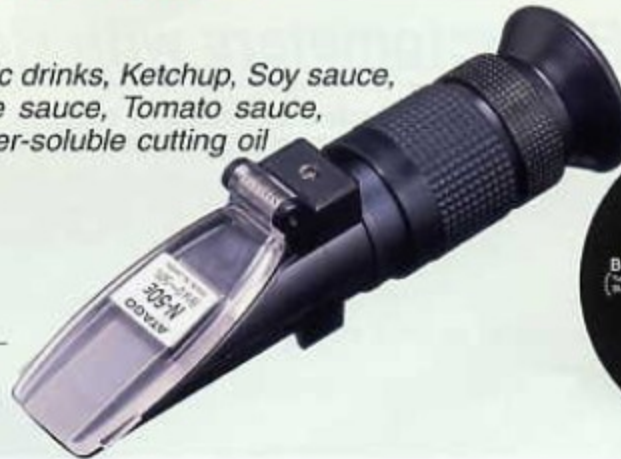
Cat.No. 2181

N-50E

Samples:

Canned syrup, Cocoa drinks, Soup, Lactic drinks, Ketchup, Soy sauce, Worcester sauce, Chili sauce, Barbecue sauce, Tomato sauce, Barbecue seasoning, Pickle (liquid), Water-soluble cutting oil (heavy emulsion), etc

Scale range : Brix 0.0 to 50.0%
Minimum scale : 0.5%
Size and weight : 4 × 4 × 14cm, 140g



Hand-held Refractometers for High-temperature Samples

H-50 H-80 H-93

- *These hand-held refractometers are superior to standard models in terms of heat resistance.
- *These models have a longer service life compared with standard types because the prism is made of corrosion resisting tempered glass.
- *These refractometers can be used for measuring Brix (%) of hot samples in the boiling process.
- *The H-93 is a new model of the H-50 and H-80 series. Since the measurement range of Brix is 53.0% to 93.0%, even high Brix and boiled samples can be measured with the H-93.

Hand-held Refractometer

Cat.No. 2200, 2201, 2202

H-50, H-80, H-93

Samples:

H-50 : Stock or Broth in the boiling process, Hot soup.
H-80, H-93 : Jam or Marmalade in the boiling process.

H-50

Scale range : Brix 0.0 to 50.0%
Minimum scale : 0.5%
Size and weight : 4 × 4 × 14cm, 250g

H-80

Scale range : Brix 30.0 to 80.0%
Minimum scale : 0.5%
Size and weight : 4 × 4 × 14cm, 250g

H-93

Scale range : Brix 53.0 to 93.0%
Minimum scale : 0.5%
Size and weight : 4 × 4 × 14cm, 250g



Photo &
Scale : H-80



ATAGO Hand-held Refractometers

Hand-held Refractometer with Wide Measurement Range

HSR-500

*This model has a measurement range of Brix 0.0 to 90.0%. Moreover, clear samples are suitable for measurement with this model.

Hand-held Refractometer

Cat.No. 2340

HSR-500



Samples:

Fruit juice, Canned syrup, Vinegar, Soft drinks, Soy sauce, Liquid seasoning, Liquid sugar, Jam, Edible oil, etc.

Scale range	: Brix 0.0 to 90.0%
Minimum scale	: 0.2%
Thermometer	: +1.6 to -0.8 temperature compensation scale
Size and weight	: 4 × 4 × 20cm, 600g



Hand-held Refractometers with Refractive Index Scale

N-3000E ; R5000

*These models are used for measuring the refractive index of samples.

Hand-held Refractometer

Cat.No. 2611

N-3000E

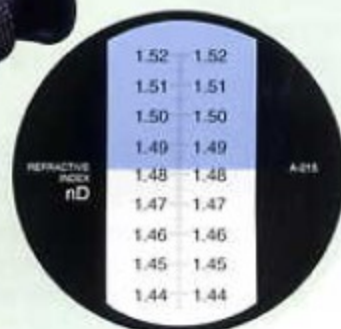
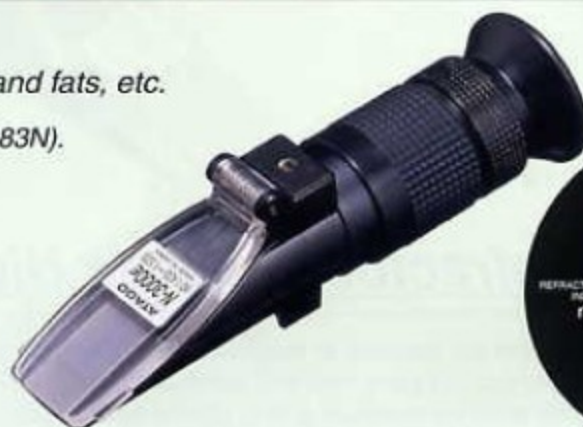


Samples:

Vegetable oils and fats, Edible oil, Animal oils and fats, etc.

※ Calibration with the Standard Liquid LB (RE-2100-83N).

Scale range	: nD 1.435 to 1.520
Minimum scale	: nD 0.001
Size and weight	: 4 × 4 × 14cm, 140g



Hand-held Refractometer

Cat.No. 2350

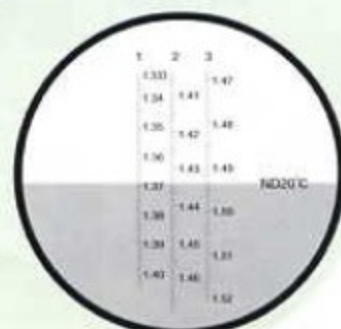
R5000



Samples:

Benzene, Toluene, Xylene, Glycerin, Chemicals, as well as samples for the N-3000E.

Scale range	: 3-stage switching nD1.333 to 1.520
Minimum scale	: nD0.001
Thermometer	: 5 to 40°C
Size and weight	: 4 × 4 × 20cm, 600g



Hand-held Refractometers with Exclusive Scales

S-10E | S-28E | S/Mill-E | HHR-2N | BC-2E | BC-3E | BR-1E

*Those models are ideal for measuring the concentration of specific samples.

Salinity Refractometer

Cat.No. 2412, 2422

For measuring the concentration of saltwater !

Samples:

Saltwater

S-10E



Scale range : Sodium chloride
0.0 to 10.0%

Minimum scale : 0.1%

Size and weight : 4 × 4 × 21cm, 200g

S-28E



Scale range : Sodium chloride
0.0 to 28.0%

Minimum scale : 0.2%

Size and weight : 4 × 4 × 17cm, 170g

S-10E, S-28E



Photo &
Scale : S-10E



Salinity Refractometer

Cat.No. 2442

For measuring the salinity per mill(‰) of seawater !

Samples:

Seawater, Artificial seawater.

Scale range : Salinity 0 to 100(‰)

Specific gravity

1.000 to 1.070

Minimum scale : Salinity 1(‰)

Specific gravity 0.001

Size and weight : 4 × 4 × 21cm, 200g

S/Mill-E



Honey Refractometer

Cat.No. 2522

For measuring the percentage of water contained in honey !

Samples:

Honey.

* Calibration with the Standard Liquid LB (RE-2100-83N).

Scale range : water content in honey
12.0 to 30.0%

Minimum scale : 0.1%

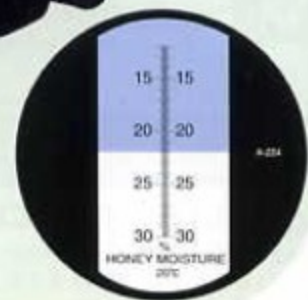
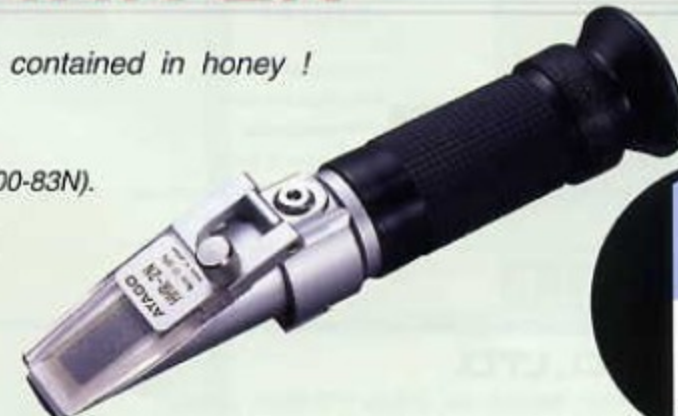
Thermometer : Temperature compen-
sation scale

Size and weight : 4 × 4 × 17cm, 260g

HHR-2N



*



Hand-held Refractometers

Battery Coolant Checker

Cat.No. 2832, 2842

For measuring the specific gravity of battery fluid and for knowing the freezing temperature of ethylene glycol and propylene glycol !

Samples:

Battery fluid, Antifreezing solution (Ethylene glycol, Propylene glycol).

BC-2E

Freezing point of coolant : Ethylene glycol
0 to -50°C
Propylene glycol
0 to -50°C
Battery fluid
d₂₀ 1.150 to 1.300
Size and weight : 4 × 4 × 14cm, 140g

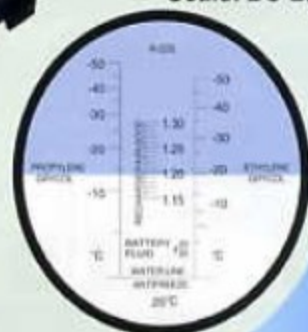
BC-3E

Freezing point of coolant : Ethylene glycol
32 to -60°F
Propylene glycol
32 to -50°F
Battery fluid
d₂₀ 1.150 to 1.300
Size and weight : 4 × 4 × 14cm, 140g

BC-2E, BC-3E



Photo & Scale: BC-2E



Coolant Refractometer

Cat.No. 2821

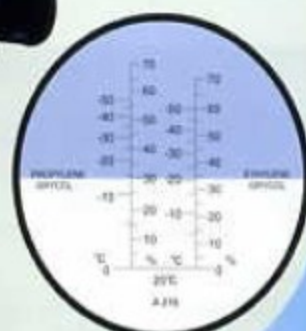
For measuring the concentration of ethylene glycol and propylene glycol and for knowing the freezing temperature of ethylene glycol and propylene glycol !

Samples:

Antifreezing solution (Ethylene glycol, Propylene glycol).

Scale range : Ethylene glycol
0 to 70%, 0 to -50°C
Propylene glycol
0 to 70%, 0 to -50°C
Size and weight : 4 × 4 × 14cm, 140g

BR-1E



EXPLANATION OF ICONS

Icons for functions, specifications and scales have been added to this catalog.

<ul style="list-style-type: none"> * Compact and easy to carry * Portable * Leicht und einfach zu tragen * Calibrazione con liquidi standard esclusivi * Compacto y fácil de llevar * 輕巧易於攜帶 	<ul style="list-style-type: none"> * Battery operated * Alimentation par pile * Batteriebetrieben * Alimentazione a batteria * Funcionamiento con batería * 使用電池操作 	<ul style="list-style-type: none"> * Digital display * Affichage numérique * Digital Anzeige * Display digitale * Pantalla digital * 數字顯示 	<ul style="list-style-type: none"> * Calibration with water * Calibration 1 point* sur eau distillée * Kalibrierung mit Wasser * Calibrazione con acqua * Calibración con agua * 用水歸零
<ul style="list-style-type: none"> * 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 * 使用專屬標準液歸零 	<ul style="list-style-type: none"> * Salt concentration scale * Teneur en sel * Skala fuer Salzkonzentration * Salinità‰ * Escala de concentración salina * 鹽分濃度刻度 	<ul style="list-style-type: none"> * Seawater scale * Spécial eau de mer * Seewasserskala * Salinità o/oo * Escala de agua de mar * 海水刻度 	<ul style="list-style-type: none"> * Refractive index scale * Indice de réfraction * Skala fuer Refraktive Index * Indice di rifrazione * Escala de índice de refracción * 折射率刻度
<ul style="list-style-type: none"> * Automatic Temperature Compensation * Compensation automatique de température * Automatische Temperaturkompensation * Compensazione automatica della temperatura * Compensación de automática de temperatura * 自動溫度補償 	<ul style="list-style-type: none"> * Heat temperature samples * Résistant à la chaleur * Hitzebeständig * Resistente al calore * Muestras De Alta Temperatura * 高溫樣品用 		