

Want Bluetooth® on the PAL that you buy?

Contact Atago for more information

Digital Hand-Held "Pocket" Refractometer PAL Special Scales

Cat.No.	Model	Scale	Cat.No.	Model	Scale	Cat.No.	Model	Scale
Food, Confectionery, Food Ingredients			4506	PAL-106S	Sodium chloride (g/100mL)	4489	PAL-89S	Propylene glycol Freezing point of Propylene glycol (°F)
4422	PAL-22S	Honey moisture	4404	PAL-04S	Sodium chloride (S.G.)	4491	PAL-91S	Ethylene glycol Freezing point of Ethylene glycol (°C)
4508	PAL-Pâtissier	Brix / Baume (Dual scale)	4405	PAL-05S	Sodium chloride (Baume)	4492	PAL-92S	Ethylene glycol Freezing point of Ethylene glycol (°F)
3807	PAL-MILK	NEW Non-Fat Milk Solids	4406	PAL-06S	Seawater (Concentration)	Refractive Index • Brix		
4427	PAL-27S	Soymilk	4407	PAL-07S	Seawater (S.G.)	3852	PAL-BX/RI	Brix / Refractive Index
4443	PAL-43S	Bittern (Magnesium chloride)	4408	PAL-08S	Seawater (Baume)	3850	PAL-RI	Refractive Index
4496	PAL-96S	Chinese noodle soup / Baume of Kansui (Dual scale)	Moisture			3840	PAL-α	Brix
4498	PAL-98S	Condiment	4573	PAL-Moisture	Moisture	3842	PAL-LOOP	Brix
4439	PAL-39S	Hydrogen peroxide	4574	PAL-Dried	Moisture	Chemical products		
4429	PAL-29S	Citric acid		Fruit Moisture		4421	PAL-21S	Dextrin
4430	PAL-30S	Acetic acid	4575	PAL-Dates	Moisture	4438	PAL-38S	Dimethylformamide
4432	PAL-32S	Phosphoric acid	Clinical, Sports			4440	PAL-40S	Sodium hydroxide
4440	PAL-40S	Sodium hydroxide	4442	PAL-42S	Cesium chloride	4423	PAL-23S	Glycerin (Low concentration)
4464	PAL-64S	Sodium bicarbonate	4453	PAL-53S	Copper sulfate (Concentration)	4424	PAL-24S	Glycerin (High concentration)
4465	PAL-65S	Sodium tartrate	4454	PAL-54S	Copper sulfate (S.G.)	4430	PAL-30S	Acetic acid
4470	PAL-70S	Potassium phosphate	4410	PAL-10S	Urine (S.G.)	4431	PAL-31S	Formic acid
4523	PAL-COFFEE	Brix	4585	PAL-mOsm.	Urine Osmolality	4432	PAL-32S	Phosphoric acid
4532	PAL-COFFEE	TDS (TDS)	4401	PAL-11S	Serum protein	4444	PAL-44S	Lithium chloride
4533	PAL-COFFEE	Brix / TDS (Dual scale) (BX/TDS)	4510	PAL-USG (DOG)	Dog Urine (S.G.)	4445	PAL-45S	Barium chloride
4535	PAL-Tea	Tea	4511	PAL-USG (CAT)	Cat Urine (S.G.)	4446	PAL-46S	Cobalt chloride
Fruit and Vegetable Growers			4512	PAL-RABBIT	Rabbit Urine (S.G.)	4447	PAL-47S	Ferric chloride
3847	PAL-ORANGE	Brix	Colostrum			4448	PAL-48S	Strontium chloride
3848	PAL-TOMATO	Brix	3805	PAL-Colostrum	Colostrum	4449	PAL-49S	Potassium chloride
3849	PAL-MAPLE	Brix	Alcohol liquid			4450	PAL-50S	Potassium bromide
Sugar			4433	PAL-33S	Ethyl alcohol (mL/100mL)	4451	PAL-51S	Sodium bromide
4412	PAL-12S	Dextran	4434	PAL-34S	Ethyl alcohol (g/100g)	4452	PAL-52S	Potassium iodide
4414	PAL-14S	Fructose	4436	PAL-36S	Methyl alcohol	4453	PAL-53S	Copper sulfate (Concentration)
4415	PAL-15S	Glucose	4437	PAL-37S	Isopropyl alcohol (g/100g)	4454	PAL-54S	Copper sulfate (S.G.)
4416	PAL-16S	High Fructose Corn syrup (HFCS-42)	4530	PAL-131S	Isopropyl alcohol (mL/100mL)	4455	PAL-55S	Magnesium sulfate
4417	PAL-17S	High Fructose Corn syrup (HFCS-55)	4485	PAL-85S	Polyvinyl alcohol	4456	PAL-56S	Potassium sulfate
4418	PAL-18S	Inverted suger	Pharmaceutical reagents			4457	PAL-57S	Nickel sulfate
4419	PAL-19S	Lactose	4412	PAL-12S	Dextran	4458	PAL-58S	Sodium sulfate
4420	PAL-20S	Maltose	4413	PAL-13S	Creatine	4459	PAL-59S	Zinc sulfate
Wine, Brew			4423	PAL-23S	Glycerin (Low concentration)	4460	PAL-60S	Silver nitrate
4479	PAL-79S	T.A. 1990	4424	PAL-24S	Glycerin (High concentration)	4461	PAL-61S	Sodium nitrate
4480	PAL-80S	T.A. 1971	4425	PAL-25S	Inulin	4462	PAL-62S	Potassium carbonate
4483	PAL-83S	KMW (or Babo)	4426	PAL-26S	Mannitol	4463	PAL-63S	Sodium carbonate
4484	PAL-84S	Baume	4431	PAL-31S	Formic acid	4464	PAL-64S	Sodium bicarbonate
4486	PAL-86S	Oe (Ger) / Brix (Dual scale)	4432	PAL-32S	Phosphoric acid	4467	PAL-67S	Potassium chromate
4487	PAL-87S	Oe (Oechsle) / Brix (Dual scale)	4451	PAL-51S	Sodium bromide	4468	PAL-68S	Potassium dichromate
4540	PAL-Whiskey	Ethyl alcohol	4455	PAL-55S	Magnesium sulfate	4469	PAL-69S	Sodium thiosulfate
4541	PAL-Vodka	Ethyl alcohol	4464	PAL-64S	Sodium bicarbonate	4470	PAL-70S	Potassium phosphate
4542	PAL-Tequila	Ethyl alcohol	4465	PAL-65S	Sodium tartrate	4471	PAL-71S	Sodium molybdate
4543	PAL-Shochu	Ethyl alcohol	4466	PAL-66S	Potassium oxalate	4472	PAL-72S	Sodium tungstate
4544	PAL-Gin	Ethyl alcohol	4468	PAL-68S	Potassium dichromate	Metal working		
4545	PAL-Rum	Ethyl alcohol	4470	PAL-70S	Potassium phosphate	4502	PAL-102S	Cutting oil
4546	PAL-Brandy	Ethyl alcohol	4472	PAL-72S	Sodium tungstate	4537	PAL-AntiRust	AntiRust
4590	PAL-Plato	Plato (Sweet wort)	Automobile, Aviation, Heat Transfer, Industrial			4536	PAL-Cleaner	Cleaner
Salinity, Seawater			4518	PAL-Urea	Urea	Soil, Civil engineering		
4403	PAL-03S	Sodium chloride (g/100g)	4403	PAL-03S	Snow-melting agent (Sodium chloride)	4571	PAL-Soil	Gravimetric / Volumetric Soil moisture (Dual scale)
4393	PAL-03CS	Sodium chloride (g/100g) / Freezing point of Sodium chloride (°C) (Dual scale)	4441	PAL-41S	Snow-melting agent (Calcium chloride)			
			4443	PAL-43S	Snow-melting agent (Magnesium chloride)			
			4488	PAL-88S	Propylene glycol Freezing point of Propylene glycol (°C)			

All ATAGO products are designed and manufactured in Japan.

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HACCP GMP GLP

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

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Digital Hand-Held
"Pocket" Refractometers

Pocket PAL series

PAL-1

Cat.No.3810
Brix 0.0 to 53.0%

PAL-S

Cat.No.3860 Mode S™
Brix 0.0 to 93.0% Technology Model

PAL-2

Cat.No.3820
Brix 45.0 to 93.0%

PAL-22S

Cat.No.4422
Honey moisture 12.0 to 30.0%

PAL-3

Cat.No.3830
Brix 0.0 to 93.0%

PAL-39S

Cat.No.4439
Hydrogen peroxide 0.0 to 50.0%

Pocket → Palm → Perform



ATAGO®

Patent for Design Registration No. ZL200310103015.2 (China)
Patent for Invention Registration No. 1191241 (Japan)
Patent Granted in countries around the world.

The Next Generation of Digital Refractometers

"Pocket" Refractometers PAL series



- Extremely water resistant (IP65)
- Can be washed under running water
- Will float if accidentally dropped in water



- Ergonomically designed for one-handed operation
- The innovative design makes it easy to pour out and remove a sample, but difficult to spill the sample.



- Automatic Temperature Compensation (ATC)



- Temperature display



- Measurement temperature up to 100°C



- Revolutionary new External Light interference (ELI) feature (Patented)
- When intense light penetrates the prism of a digital refractometer, the light waves interfere with the sensor, which may lead to inaccurate measurements. To ensure accurate measurement results, the PAL is programmed with the ELI function which displays the [nnn] warning message 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 ELI function is displayed) will ensure accurate measurement results each time.



- Mode S: Mode S improves repeatability of samples that cause inconsistent readings.



Low to medium

PAL-1
Cat.No.3810

High concentration

PAL-2
Cat.No.3820

Wide range

PAL-3
Cat.No.3830

Powered by Mode S

PAL-S
Cat.No.3860

Honey moisture %

PAL-22S
Cat.No.4422

Hydrogen peroxide (w/w)

PAL-39S
Cat.No.4439

Standard accessory
MAGIC™

Optional

Part No.	Part Name.
RE-110010	Sucrose Solutions (for Brix confirmation)10% (±0.03%)
RE-110020	Sucrose Solutions (for Brix confirmation)20% (±0.03%)
RE-110030	Sucrose Solutions (for Brix confirmation)30% (±0.03%)
RE-110040	Sucrose Solutions (for Brix confirmation)40% (±0.04%)
RE-110050	Sucrose Solutions (for Brix confirmation)50% (±0.05%)
RE-110060	Sucrose Solutions (for Brix confirmation)60% (±0.05%)
RE-39409	PAL-CASE
RE-39410	PAL-STRAP
RE-39446	MAGIC™
RE-39412	Small Volume Sample Adapter for PAL
RE-39413	PAL Silicone Cover



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

* Warranty period for these solutions is 6 weeks.



◀ **MAGIC™**
This adaptor is used for a hot sample to cool it down quickly or to minimize evaporation.



◀ **Small Volume Sample Adapter for PAL**
Allows for measurements with a small volume of sample. Place directly on the sample stage.



▲ PAL Silicone Cover

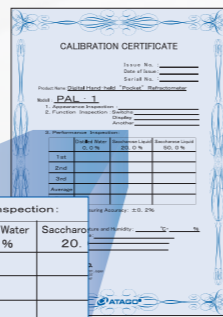
▲ PAL-CASE

▲ PAL-STRAP

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 free):

- Calibration Certificate
- Traceability System Diagram
- Traceability Certificate



3. Performance Inspection:	
Distilled Water	0.0%
Saccharo	20.0%
1st	
2nd	
3rd	

PAL commitment

A new ergonomic design for comfort and ease of use!

In pursuit of an "easy to use", "easy to operate" and ergonomic architecture of new instruments, ATAGO has achieved a "palm-fitting" masterpiece as well as unit that is high in hygienic properties. By reducing the number of unnecessary assembly parts, we have reduced the risks of a germ reproductive environment. Through our efforts to produce a hygienic instrument to be used in any industry, these units are designed to be completely washable. The new PAL series has been approved by the HACCP, and are equipped with the new ELI feature, which ensures accurate measurements - even outdoors. Requests from our customers worldwide are reflected in the development of the new PAL units.

Sample Stage

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

START Key

Conveniently located for single hand operation.



Calibration Report



Convenient storage case

Actual Size



Prism

Made of highly durable optical glass to prevent scratching.

Liquid Crystal Display (LCD)

Digital measurement values are large and easy to read. Displays battery indicator and temperature.

ZERO Key

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

Strap Holder

Suitable for wrist straps or lanyards.

Measurement Method



1 Apply 2-3 drops on the prism surface.



2 Press the START key.



3 Measurement value and prism temperature are displayed in 3 seconds!

Application examples



Specifications

	PAL-1 Cat.No.3810	PAL-2 Cat.No.3820	PAL-3 Cat.No.3830	PAL-S Cat.No.3860	PAL-22S Cat.No.4422	PAL-39S Cat.No.4439
Measurement range	Brix 0.0 to 53.0%	Brix 45.0 to 93.0%	Brix 0.0 to 93.0%	Brix 0.0 to 93.0%	Honey moisture 12.0 to 30.0 %	Hydrogen peroxide 0.0 to 50.0%
Measurement Accuracy	Brix ±0.2%	Brix ±0.1%	Brix ±0.1%	Brix ±0.2%	Honey moisture ±0.2 %	Hydrogen peroxide ±0.6%
Resolution	Brix 0.1%			Honey moisture 0.1 %		Hydrogen peroxide 0.2%
Measurement temperature	10 to 100°C (ATC) (Hot samples over 100° C can be measured under specified conditions. Please contact ATAGO for further details.)					
Ambient temperature	10 to 40°C					
Power supply	2 × AAA Batteries					
International protection class	IP65 Water resistant					
Dimensions and weight	5.5 × 3.1 × 10.9cm, 100g					

Reasons to choose the MASTER

1 Water Resistant



The concept of a washable hand-held analog unit is exceptional. After measuring, the instrument can be cleaned with running water under a faucet. The new structural-design of these units allows them to be washed whenever necessary. Rated IP65 (dust tight and water resistant).

α·H·535·500



Water Resistant



The world's first feature

5 Durability



The MASTER series has passed all water resistance, dust resistance, and drop tests. Instruments were subjected to water jets from four directions, dropped from a height of one meter onto an oak platform, and withstood the pressure changes of air travel.

6 Calibration



The α and H types can now be calibrated with the new waterproof calibration screw. All MASTER models can be calibrated by end-user.

7 Automatic Sample Distribution (ASD)



ATAGO has developed a spoon-shaped tip that automatically spreads the sample across the prism. This makes the instrument even more user-friendly, saving valuable time.

2 Hygienic Design



The MASTER series was also designed with a smooth and easy-to-clean grip, eliminating the possibility of food and samples being trapped which can result in contamination and bacterial growth.

3 Visibility



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

4 Automatic Temperature Compensation (ATC) α·T·H·535



The newly designed ATC system allows the MASTER series to read more accurately than any comparable unit. ATAGO has applied for a patent on the design of the improved ATC system. The MASTER series reads more accurately than any comparable unit in the market.

8 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.

9 Reputation for Quality



ATAGO has built a firm reputation for reliability and quality during its over 70 years 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.

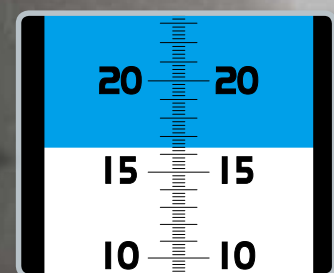
Simple Operation



1 Apply 1-2 drops of the sample to 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.

Applications

-Measuring sugar concentration, concentration, Brix and Refractive Index-

Honey



Honey

Jam, Syrup



Jam, syrup, confectioneries

Soy milk



Soy milk

Condiments



Condiment, seasonings, ketchup, various sauces, soy sauce

Wine



Grapes, wine must

Drink



Fruit juice, soft drink, carbonated beverage

Cooking



Chinese noodle soup, various soup, various sauces

Agriculture



Fruit and vegetable juice, leaf juice, stem juice, root juice

Salinity



Sodium chloride solution, sea water, pickles

Machine Tools



Firefighting foam, soluble cutting oil

Chemicals and medicine



Brine, deicing solution, medicine, chemical, cosmetics, cleaning solution

Clinical



Urine, serum

Optional Accessories



Daylight Plate

For metal body model
Parts.No. RE-2315-60M
For plastic body model
Parts.No. RE-2315-61M

Small Volume Daylight Plate With Hinge Pin

For metal body model
Parts.No. RE-2311-58M
For plastic body model
Parts.No. RE-2391-50M



Super Extractor

Parts.No. RE-29401



Sucrose solution (for Brix confirmation)

Parts.No. RE-110010 10% Sucrose
Parts.No. RE-110020 20% Sucrose
Parts.No. RE-110030 30% Sucrose
Parts.No. RE-110040 40% Sucrose
Parts.No. RE-110050 50% Sucrose
Parts.No. RE-110060 60% Sucrose

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

All ATAGO refractometers are designed and manufactured in Japan.

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ATAGO
MASTER of REFRACTOMETRY



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

MASTER



Design Registration No. 000379326-0001, 000379326-0002 (EU)
ZL 2005 3 0116403.4.S (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.



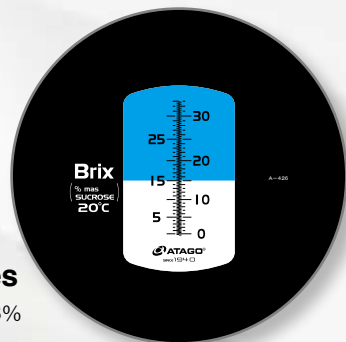
Hand-held Refractometer

MASTER series

Choose the right model for your sample, based on the features and materials of the instrument.



Brix scale examples
MASTER-α Brix 0~33%



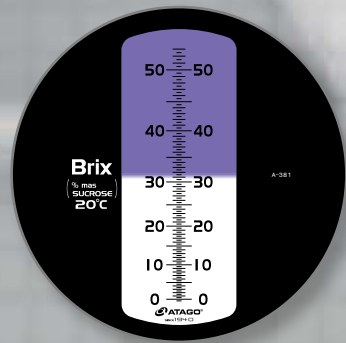
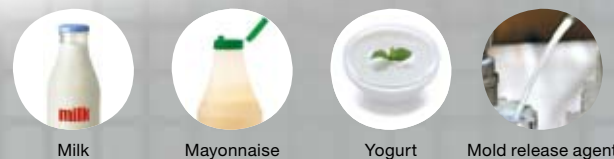
Features 6 types

Both the α and T types are equipped with the Automatic Temperature Compensation feature. Choose the α type for the added feature of IP 65 water-resistance. The H type is the heat-resistant version of the α type.

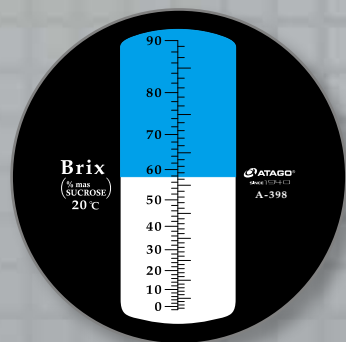
Series / Model	α	T	M	H	53S	500
Water resistant	●	—	—	●	●	●
Automatic temperature compensation	●	●	—	●	●	—
Heat resistant	—	—	—	●	—	●
Milky sample	—	—	—	—	●	—

MASTER-53S for Milky sample

Opaque, inhomogeneous liquids can be difficult to get a clear boundary line with a conventional refractometer. This model is recommended for cream-based sauces, yogurt, mayonnaise, and various emulsions used in industrial processing.

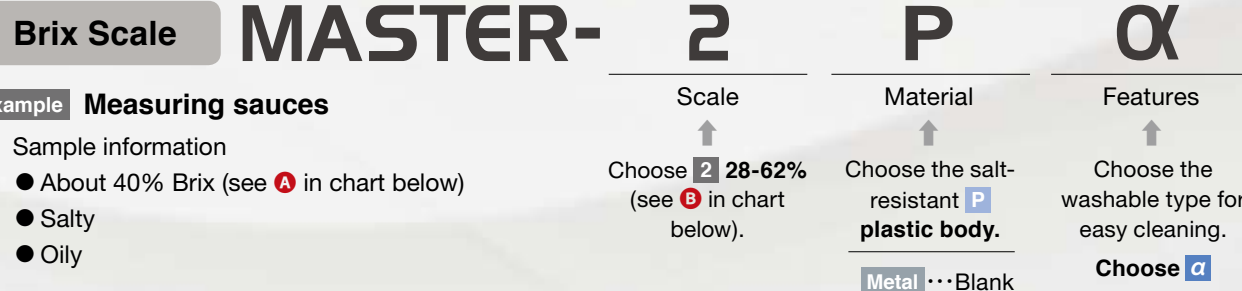


MASTER-500 0-90% Wide Brix Range



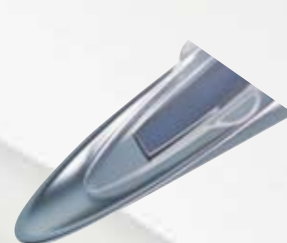
Understanding model names

A model name consists of the scale (sample name), material, and feature type.



Material 2 types

Choose either metal or plastic.



Metal

Die-cast aluminum

Ideal for the agriculture industry, metal working fluids, and various high-temperature samples. Resistant to organic solvents.



Plastic

PBT (polybutylene terephthalate)

Resistant to salty and acidic samples.

Brix of Various Samples

Refractive index and Brix of various types of samples

Brix (%)	Food industry	Chemical industry	Medical Science industry	Memory (Brix)
(RI)				□ = Memory No.
1.333	0 Drinks Green tea	Water Cutting oil (emulsion)	Methanol Saline Aloe extract Sea water	(1) 0 10 20 53 500 0 0 0 0 0 33% 10% 20% 53% 90%
1.34	5 Beer Tomato Strawberry Lemon	Seasonings Miso soup	Nickel plate liquid Chlorella extract	
1.35	10 Coffee Soy milk Cola Milk	Orange Apple Prince melon	Gelatin liquid Serum	
1.36	15 Lactic acid-bacteria beverage	Beef curry Demiglace (sauce) Orange jelly	Freon113	
1.37	20 Canned syrup	Silicone solution (emulsion)	Acetone Ethanol	
1.38	30 Ketchup	Electrolyte Freon 11	Acetic acid Saturated saline	B 2 28 62% 0 10 20 53 500 0 0 0 0 0 33% 10% 20% 53% 90%
1.39	40 Soy sauce Sauce A	Jam Low-sugar jam	Silicone oil Octane	
1.40	50 Egg yolk	Ethylene glycol Propylene glycol		4 45 82% 0 10 20 53 500 0 0 0 0 0 33% 10% 20% 53% 90%
	60 Butter			
	70 Olive oil	Honey Jam		
		Honey Starch Syrup		
		Diesel oil Ricinus	Glycerin	
		Polyvinyl chloride (PCV) Styrene Asphalt		

Specifications

Brix Scale

Range (Minimum)	Series	α		T		M	
		Metal	Plastic	Metal	Plastic	Metal	Plastic
1 0 to 33% (0.2%)	Model	MASTER-α	MASTER-Pα	MASTER-T	MASTER-PT	MASTER-M	MASTER-PM
	Cat.No.	2311	2391	2312	2392	2313	2393
	Accuracy	±0.2% *±0.1% (10 to 30°C)		±0.2% *±0.1% (10 to 30°C)		±0.2% *±0.1%	
	Size & Weight	3.2x3.4x16.8cm, 130g		3.2x3.4x16.8cm, 130g		3.2x3.4x16.8cm, 130g	
2 28 to 62% (0.2%)	Model	MASTER-2α	MASTER-2Pα	MASTER-2T	MASTER-2PT	MASTER-2M	MASTER-2PM
	Cat.No.	2321	2941	2322	2942	2323	2943
	Accuracy	±0.2% *±0.1% (10 to 40°C)		±0.2% *±0.1% (10 to 40°C)		±0.2% *±0.1%	
	Size & Weight	3.2x3.4x16.8cm, 130g		3.2x3.4x16.8cm, 130g		3.2x3.4x16.8cm, 130g	
3 58 to 90% (0.2%)	Model	MASTER-3α	MASTER-3Pα	MASTER-3T	MASTER-3PT	MASTER-3M	MASTER-3PM
	Cat.No.	2331	2951	2332	2952	2333	2953
	Accuracy	±0.2% *±0.1% (10 to 40°C)		±0.2% *±0.1% (10 to 40°C)		±0.2% *±0.1%	
	Size & Weight	3.2x3.4x16.8cm, 130g		3.2x3.4x16.8cm, 130g		3.2x3.4x16.8cm, 130g	
4 45 to 82% (0.2%)	Model	MASTER-4α	MASTER-4Pα	MASTER-4T	MASTER-4PT	MASTER-4M	MASTER-4PM
	Cat.No.	2341	2961	2342	2962	2343	2963
	Accuracy	±0.2% *±0.1% (10 to 40°C)		±0.2% *±0.1% (10 to 40°C)		±0.2% *±0.1%	
	Size & Weight	3.2x3.4x16.8cm, 130g		3.2x3.4x16.8cm, 130g		3.2x3.4x16.8cm, 130g	
10 0 to 10% (0.1%)	Model	MASTER-10α	MASTER-10Pα	MASTER-10T	MASTER-10PT	MASTER-10M	MASTER-10PM
	Cat.No.	2371	2981	2372	2982	2373	2983
	Accuracy	±0.2% *±0.1% (10 to 30°C)		±0.2% *±0.1% (10 to 30°C)		±0.2% *±0.1%	
	Size & Weight	3.2x3.4x20.3cm, 155g		3.2x3.4x20.3cm, 155g		3.2x3.4x20.3cm, 155g	
20 0 to 20% (0.1%)	Model	MASTER-20α	MASTER-20Pα	MASTER-20T	MASTER-20PT	MASTER-20M	MASTER-20PM
	Cat.No.	2381	2991	2382	2992	2383	2993
	Accuracy	±0.2% *±0.1% (10 to 30°C)		±0.2% *±0.1% (10 to 30°C)		±0.2% *±0.1%	
	Size & Weight	3.2x3.4x20.7cm, 165g		3.2x3.4x20.7cm, 165g		3.2x3.4x20.7cm, 165g	
53 0 to 53% (0.5%)	Model	MASTER-53α	MASTER-53Pα	MASTER-53T	MASTER-53PT	MASTER-53M	MASTER-53PM
	Cat.No.	2351	2971	2352	2972	2353	2973
	Accuracy	±0.5% *±0.25% (10 to 30°C)		±0.5% *±0.25% (10 to 30°C)		±0.5% *±0.25%	
	Size & Weight	3.2x3.4x16.8cm, 130g		3.2x3.4x16.8cm, 130g		3.2x3.4x16.8cm, 130g	

Heat resistant

Series	H			
Material	Metal			
Model	MASTER-50H	MASTER-80H	MASTER-93H	MASTER-100H
Cat.No.	2354	2364	2374	2384
Range	Brix 0.0 to 50.0%	Brix 30.0 to 80.0%	Brix 45.0 to 93.0%	Brix 60.0 to 100.0%
Minimum	0.5%			
Accuracy	±0.5% *±0.25%			
Size & Weight	3.2x3.4x 16.8cm, 130g			

Milky sample Wide Brix

Series	53S	500
Material	Metal	
Model	MASTER-53S	MASTER-500
Cat.No.	2355	2363
Range	Brix 0.0 to 53.0%	Brix 0.0 to 90.0%
Minimum	0.5%	1.0%
Accuracy	±0.5% *±0.25%	±1% *±0.5%
Size & Weight	3.2x3.4x 16.8cm, 130g	

Special Scale

Sample	Coolant	Battery Coolant	Battery Coolant	Refractive index	Honey
Series	M	M	M	M	α
Material	Plastic				
Model	MASTER-BR	MASTER-BC	MASTER-BCF	MASTER-RI	MASTER-HONEY
Cat.No.	2930	2931	2932	2612	2524
Scale	① propylene glycol ② ethylene glycol	① ethylene glycol freezing temp ② propylene glycol freezing temp ③ battery fluid #20/20	① ethylene glycol freezing temp ② propylene glycol freezing temp ③ battery fluid #20/20	Refractive index	Honey moisture
Range	① 0 to 70% 0 to -50°C ② 0 to 70% 0 to -50°C	① 0 to -50°C ② 0 to -50°C ③ 1.150 to 1.300	① 0 to -50°C ② 32 to -60°F ③ 32 to -50°F ④ 1.150 to 1.300	1.435 to 1.520	12.0 to 30.0%
Minimum Scale	5% 5°C	① 5°C ② 5°C ③ 0.01	① 10°F ② 10°F ③ 0.01	0.001	0.2%
Size & Weight	3.2x3.4x16.8cm, 130g				

Sample	Seawater	Seawater	Salinity	Salinity	Salinity (Wide range)	Salinity (Wide range)
Series	α	M	α	M	α	M
Material	Plastic					
Model	MASTER-S/MIll α	MASTER-S/MIll M	MASTER-S10 α	MASTER-S10 M	MASTER-S28 α	MASTER-S28 M
Cat.No.	2491	2493	2471	2473	2481	2483
Scale	① Salinity ② Specific gravity		Sodium chloride		Sodium chloride	
Range	① 0 to 100% ② 1.000 to 1.070		0.0 to 10.0g/100g		0.0 to 28.0g/100g	
Minimum Scale	① 1% ② 0.001		0.2g/100g		0.2g/100g	
Measurement Accuracy	① ±2% *±1% ② ±0.001 *±0.0005 (10 to 30°C)		±0.2g/100g *±0.1g/100g (10 to 30°C)		±0.2g/100g *±0.1g/100g (10 to 30°C)	
International Protection Class	IP65		IP65		IP65	
Size & Weight	3.2x3.4x20.7cm, 110g		3.2x3.4x20.3cm, 105g		3.2x3.4x16.8cm, 90g	

IP65 = dust-tight and protected against water jets (except eye piece)
*Repeatability