Are You Having Trouble Managing the Salinity of Your Products?

Until now, food processing sites and commercial kitchens had no effective way of measuring salinity. One major contributing factor is that there were no convenient and easy to use salt meters available.
The titration method requires dangerous reagents, which cannot be used in commercial kitchens or processing sites.
Salt meters designed for common household use are available; however, they are not accurate enough to fulfill the needs of manufacturing sites or commercial kitchens.
ATAGO recognized this demand and introduced salt meters that fulfilled the requirements of these industries. ATAGO's salt meters are highly suitable for use in any food processing site or commercial kitchen.

All ATAGO products are designed and manufactured in Japan.

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ISO9001 H.Q. & Factory

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

* Specifications and appearance are subject to change without notice.

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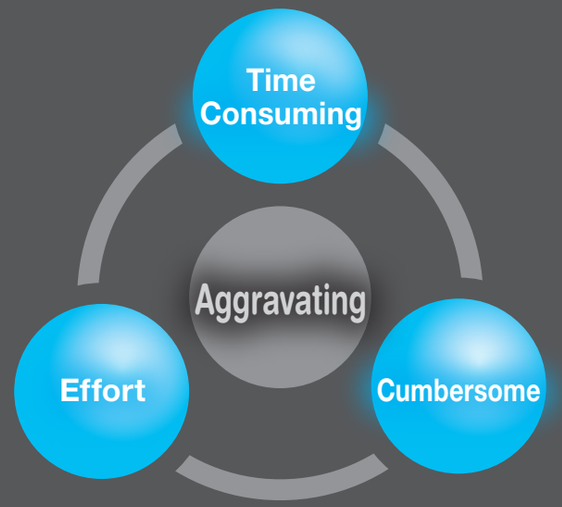
Titration Method

For users measuring salinity through titration

“This is too much trouble!”

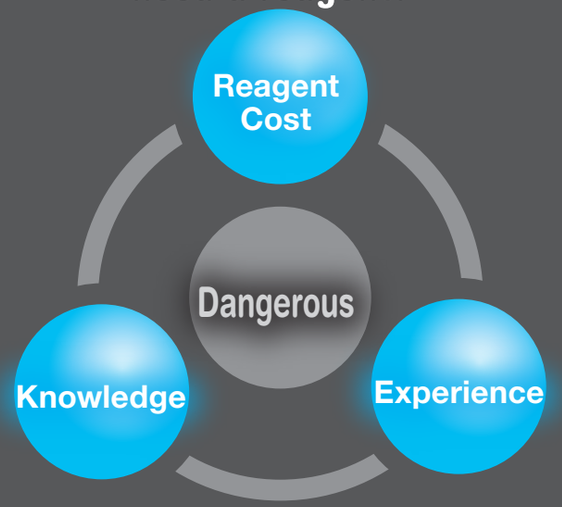


The titration method requires various lab equipment and the set-up/clean-up requires time and effort. Measurements must also be taken on a table or benchtop. This method is not portable or convenient.

ATAGO’s Salt meter…

- Does not require any lab equipment.
- Does not require complicated procedures-just dilute with water.
- Can be used anywhere.

“Isn’t there a method that doesn’t need a reagent?”

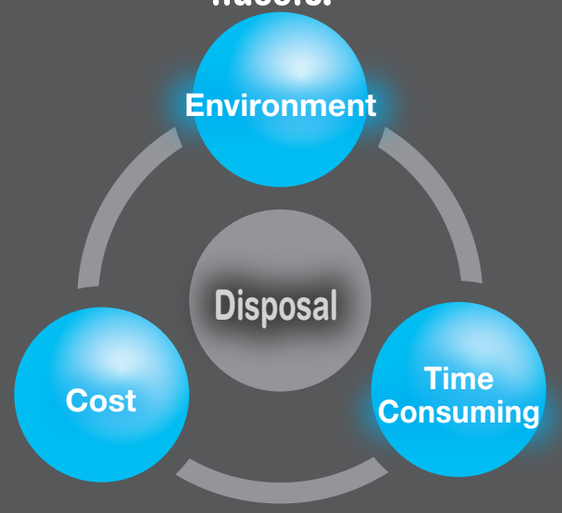


The titration method requires dangerous and costly reagent. Using the reagents safely is time consuming and requires proper training.

ATAGO’s Salt meter…

- Absolutely no reagent required.
- Take just 3 seconds to measure.
- Easy to operate and can be used by anyone.

“Disposing of liquid waste is a hassle.”



After measurements are completed, the titration method requires proper disposal of the sample liquid, liquid silver nitrate, and the reagent.

ATAGO’s Salt meter…

- Does not require reagent. Zero liquid waste.
- No disposal cost.
- Environmentally friendly and does not harm the earth.

Hydrometer (Baume scale)

For Users Measuring Salinity With Hydrometers

Fragile

“I accidentally broke it.”

A Hydrometer (Baume scale) is a fragile glass product which may cause damage if shattered. When used in facilities such as food product factories, special care and consideration is necessary for handling any shattered glass or chemicals contained in the hydrometer.

ATAGO’s Salt meter…

- Does not break—no need to worry about damage.
- No need to clean any shattered glass.
- No cost of replacing broken hydrometers.

Frustrating

“Where do I read?”

Hydrometers can be difficult to read because the constant motion of the hydrometer causes the scale to move. This makes it difficult to find the exact point where the surface of the liquid corresponds to the hydrometer scale. Furthermore, air bubbles may adhere to the scale and interfere with readings. Hydrometers can only measure clear samples. They also require a large amount of sample.

ATAGO’s Salt meter…

- Simply place a few drops on the sample stage to measure. Only a minute amount of sample is needed!
- Fully digital display. Measurements can be read instantly (an accurate and easy to read analog version is also available).
- Colored, opaque, and paste-like samples can be measured.

Difficult

“Temperature compensation is such a hassle.”

The ability to read a small scaled hydrometer requires experience. Hydrometers also require manual temperature compensation.

ATAGO’s Salt meter…

- No experience or calculation needed.
- Measurement results are directly displayed.
- No need to take temperature into account—the automatic temperature compensation feature will calculate it for you.

Low-end Salt meters
(Electrical Conductivity Method)

For Users Measuring Salinity With Simplified Salt Meters

Unreliable

“This is really not so accurate.”

Most low-end salt meters only display an estimated value of the salt content. Depending on the measurement method, there can be a discrepancy in the values after each measurement. This calls into question whether or not measurements are being taken correctly.
Low-end salt meters are also sensitive to temperature. A change in temperature can produce vastly different measurement results, even among the same samples. There are even some salt meters that cannot measure samples that are too hot, and some that cannot measure samples that are too cold.

ATAGO’s Salt meter..

- Displays actual values-- not just an estimate
- Highly accurate measurement
- Equipped with Automatic Temperature Compensation .

Frail

“This breaks easily.”

Some low-end salt meters break or stop functioning within one year. In many cases, this is due to corrosion on the electrode, water damage (body of units not water resistant), or heat damage to the plastic body.

ATAGO’s Salt meter..

- Measurement temperture up to 100ºC.
- Can be washed under running water.
- Durable, corrosion resistant electrodes (PAL-SALT only).

Short-Lived

“Disposable units end up costing you more.”

Many of the low-end salt meters cannot be calibrated. If the readings become unstable, a new unit must be purchased. Not only do you risk fluctuating readings, the cost of replacing unit after unit make the low-end salt meters much more expensive over time.

ATAGO’s Salt meter..

- Zero sets with air (electrical conductivity method), Zero sets with water (refractive method)
- Calibration function for accurate measurement (Electrical conductivity method)
- Reference Setting function allows for long-term, reliable use.

Electrical Conductivity Method

Refractive Method

Digital Pocket Refractometer

Model	PAL-SALT	PAL-SALT Mohr	PAL-SALT PROBE	ES-421	PAL-03CS	PAL-03S	PAL-106S	PAL-04S	PAL-05S	PAL-06S
Cat.No.	4250	4251	4222	4211	4393	4403	4506	4404	4405	4406
Scale	Salt concentration (g/100g)	Salt concentration (g/100g)	Salt concentration (g/100g)	Salt concentration (g/100g)	Salinity/snow-melting agent (g/100g), Freezing Point	Salinity/Snow-melting agent (g/100g)	Salinity (g/100mL)	Salinity specific gravity	Salinity (Baume)	Seawater (Salinity)
										
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Refractive Method

Digital Pocket Refractometer

Digital Dip-Type Refractometer

Hand-Held Refractometer

Model	PAL-07S	PAL-08S	PEN-SW (W)	PEN-SW (WV)	PEN-SW (Baume)	MASTER-S/ Millα	MASTER-S/Mill M	MASTER-S10α	MASTER-S10M	MASTER-S28α	MASTER-S28M	MASTER-BX/ S28M
Cat.No.	4407	4408	3756	3757	3765	2491	2493	2471	2473	2481	2483	2484
Scale	Seawater specific gravity	Seawater (Baume)	Salinity (g/100g)	Salinity (g/100mL)	Salinity (Baume)	Seawater specific gravity	Seawater specific gravity	Salinity (High Accuracy)	Salinity (High Accuracy)	Salinity (Wide Range)	Salinity (Wide Range)	Brix & Salinity
												
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What is the difference between salt meters that use the electrical conductivity method and salt meters that use the refractive method?

Select a salt meter which uses the electrical conductivity method when you wish to measure only the salt concentration of samples that contain other ingredients besides salt.
When measuring pure salt water or seawater, either type of salt meter (electrical conductivity method or refractive method) can be used.

Salt meters which use the refractive method are capable of measuring salt water samples with a salinity of up to 28% (g/100g) without dilution. However, when measuring salt water samples with a high concentration, dilution is necessary when using an ATAGO salt meter which uses the electrical conductivity method. For this reason, when measuring pure salt water or seawater samples, a salt meter which uses the refractive method is much more convenient.
Please select a salt meter which uses the conductivity method when measuring a variety of samples (salt water and samples containing other ingredients, like condiments).

Control salt with this innovative and convenient measurement method

Salt concentration 10.0%
Features Offset Function
Digital Model

Digital Hand-held "Pocket" Salt Meter

PAL-SALT Cat.No.4250

Scale	Measurement Range	Measurement Accuracy	International Protection Class
Salt concentration (g/100g)	0.00 to 10.0%	Refer to Specifications	IP65

Long lasting salt meter

Durable titanium electrode

Uses titanium electrode that is highly resistant to corrosion from salt water and seawater.
Long lasting and durable.Is not damaged by friction and can withstand harsh usage in the kitchen or at factory sites.

Easy calibration for reliable results

Zero Setting & Reference Setting

One press of ZERO button to zero set with air. Additionally, 2.50% saline solution allows for testing a known point.Unlike disposable salt meters, the PAL-SALT gives reliable stable measurement results.

Stable reading

Apply just a few drops of sample on the sample stage

Salinity can be measured by placing a few drops of sample on the sample stage.
The measurement stability is not affected by substances containing oil or substances at a high temperature. Measuring without inserting the salt meter into the sample is more sanitary.

Measurement Method

Apply 2 to 3 drops to the sensor section.

Press START

Measurement value displays in 3 seconds.

When displayed result is compared against the titration method

Off Set function

Features the offset function which enables the programming of a coefficient and a constant to automatically convert measured values.
Able to directly display measurement value correlated to other principles, such as titration. Also, by setting the dilution factor, the original salt concentration can be directly displayed.

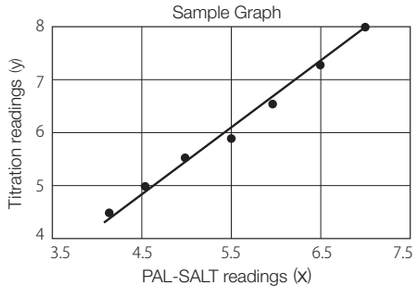
$$y = A\,x + b$$

y : Value displayed on the unit
x : Measured value by the unit
A : Coefficient
b : Constant

Offset Feature Example 1

If a different detection principle (such as titration) results in different measurement values,unit can be programmed with a correlation coefficient (A) and a constant (b) to display values close to the other detection principle.

In this graph:
coefficient (A)=1.18
constant (b)=-0.40



Offset Feature Example 2

If a 10% dilution is made,entering the Dilution Factor (A)=10 will display the value of the original, undiluted sample.

[Example]
When measured value is 0.90 for a sample with dilution factor of 10,

×10 (dilution factor)

The actual salt concentration is 9.0%.
Input the coefficient (A) of 10, and the value multiplied by 10 will be displayed.

Display value

Sanitary design

Waterproof design

The whole unit can be rinsed under running water.Very safe and sanitary for use in the food industry.

Specifications

Model	PAL-SALT
Cat.No.	4250
Scale	Salt concentration (g/100g) Temperature
Measurement Method	Conductivity method
Measurement Range	0.00 to 10.0% of salt concentration 5.0 to 100℃
Resolution	0.01% for salt concentration of 0.00 to 2.99% 0.1% or salt concentration of 3.0 to 10.0% 0.1℃
Measurement Accuracy	Displayed vale ±0.05% (for salt concentration of 0.00 to 0.99%) Relative precision ±5% (for salt concentration of 1.00 to 10.0%) ±1%
Sample Temperature	5 to 100℃
Ambient Temperature	10 to 40℃
Sample Volume	At least 0.6mL
Measurement Time	Approx. 3 seconds
Power Supply	Size AAA alkaline batteries × 2
International Protection Class	IP65 Dust-tight and Protected against water jets.
Dimension & Weight	55(W) × 31 (D) ×109 (H) mm, 100g (Main unit only)

Relationship between electric conductivity method and titration method

Correlating the difference in detection principle and measurement results for salt meters using conductivity method (PAL-SALT etc.) and Mohr method.

Detection principle for conductivity method

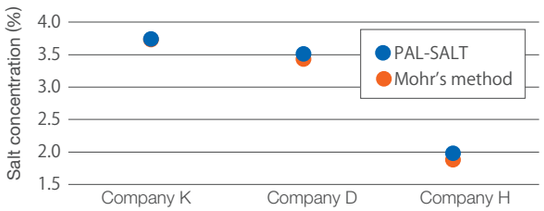
PAL-SALT uses the conductivity method in which the amount of electrolytes in the sample is detected and converted to salt concentration. Mohr's method detects the amount of chlorine in the sample and converts it to salt concentration. The unit used for Mohr's method is weight/volume (g/100mL) while PAL-SALT uses weight/weight (g/100g). Food contains various ingredients and for this reason a value computed by PAL-SALT and Mohr may not match. To compensate for the difference, a conversion chart can be created by plotting points for measurement values by both methods.

Please refer to P.B11 for Offset function.

There is a correlation between the conductivity method and Mohr's method.

• Measurring Salinity of Ketchup

Testing ketchup shows that results obtained by PAL-SALT and Mohr's method were very close.

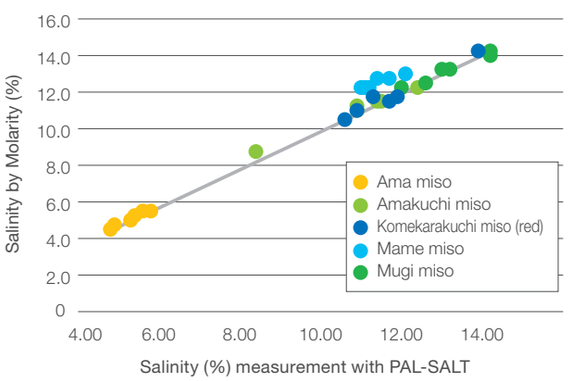


Salinity of Ketchup:Correlation between the conductivity method and Mohr's method (%)

	Salt concentration	
	PAL-SALT	Mhor's method
Company K	3.74	3.73
Company D	3.51	3.43
Company H	1.98	1.88

• Measuring Salinity of Miso Soup

The following chart shows a comparison of measurement results for PAL-SALT and titration method for different types of miso. As shown in the graph ,there is a correlation between the PAL-SALT measurement and the results obtained by titration.



Salinity of miso:Correlation between the conductivity method and Mohr's method (%)

	Salt concentration	
	PAL-SALT	Mhor's method
Ama miso	4.50	4.8
	4.75	4.9
	5.00	5.3
	5.25	5.4
	5.50	5.6
	5.50	5.8
Amakuchi miso	12.25	12.4
	11.00	10.9
	8.75	8.4
	11.50	11.5
	11.25	10.9
	11.50	11.4
Kome karakuchi miso (red)	12.25	12.0
	14.00	14.2
	14.25	14.2
	13.25	13.2
	13.25	13.0
	12.50	12.6
Mame miso	12.25	11.0
	12.75	11.4
	12.75	11.7
	13.00	12.1
	12.25	11.1
	12.25	11.2
Mugi miso	11.00	10.9
	11.50	11.7
	10.50	10.6
	11.75	11.9
	11.75	11.3
	14.25	13.9

For Measurement in the Weight/Volume Ratio as in Titration (Mohr Method)

Salt concentration 10.0%

Offset feature

Unit g/100mL

Digital Hand-held "Pocket" Salt Meter

PAL-SALT Mohr Cat.No.4251

Scale	Measurement Range	Measurement Accuracy	International Protection Class
Salt concentration (g/100mL)	0.00 to 10.0%	Refer to Specifications	IP65

Salt concentration is displayed in g/100mL

Salt concentration is displayed in the same units as used in titration (Mohr method)

Titration (Mohr method) mostly quantifies salt concentration in terms of the weight/volume ratio (g/100mL). The PAL-SALT Mohr was designed with this in mind, so there is no need to convert the readings because this unit displays salt concentration in weight/volume.

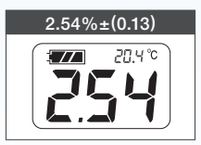
Upgraded and revolutionary features

Specifications are the same as the PAL-SALT (excluding unit readout).

With the exception of the unit readout (w/v), the PAL-SALT Mohr shares common features and specifications with the PAL-SALT, such as the Offset feature. When measuring a sample that has been diluted by a factor of 10, the PAL-SALT Mohr also has a function that can display the actual salt concentration before dilution.

Reference Check

Calibrating (checking the reference point) with 2.50g/100g of salt water



A 2.50g/100g salt water solution will read 2.54 ±0.13% (w/v) on the PAL-SALT Mohr. If measurement values are abnormal, the unit is equipped with a reference set feature.

2.50g/100g=2.54g/100mL

Specifications

Model	PAL-SALT Mohr
Cat.No.	4251
Scale	Salt concentration (g/100mL) Temperature
Measurement Method	Conductivity method
Measurement Range	0.00 to 10.0% of salt concentration 5.0 to 100℃
Resolution	0.01% for salt concentration of 0.00 to 2.99% 0.1% or salt concentration of 3.0 to 10.0% 0.1℃
Measurement Accuracy	Displayed vale ±0.05% (for salt concentration of 0.00 to 0.99%) Relative precision ±5% (for salt concentration of 1.00 to 10.0%) ±1%
Sample Temperature	5 to 100℃
Ambient Temperature	10 to 40℃
Sample Volume	At least 0.6mL
Measurement time	Approx. 3 seconds
Power Supply	Size AAA alkaline batteries × 2
International Protection Class	IP65 Dust-tight and Protected against water jets.
Dimension & Weight	55(W) × 31 (D) ×109 (H) mm, 100g (Main unit only)

Measurement Method

Apply 2 to 3 drops of sample onto the sample stage.

Press The START key.

Measurement results are displayed in 3 seconds.

For measuring salt concentration of solid samples

Salt concentration 7.0%
Probe model

Digital Hand-held "Pocket" Salt-Meter

PAL-SALT PROBE Cat.No.4222

Scale	Measurement Range	Measurement Accuracy	International Protection Class
Salt concentration (g/100g)	0.00 to 7.0%	Refer to Specifications	IP65

Simple measurement

Probe can be inserted directly to measure solid samples

Insert probe directly into the sample to measure.
Check for salt penetration,salt extraction,or salt presence.

Various examples

Dairy : Cheese

Processed meat : Ham, sausage, bacon, chashu (Barbequed Pork)

Processed seafood : Sundried fish, herring egg,fish sausage

Onigiri (Rice ball), bread

Measurement Method

Remove cap and place probe into the sample.

Press the START key.

Measurement value is displayed in 3 seconds.

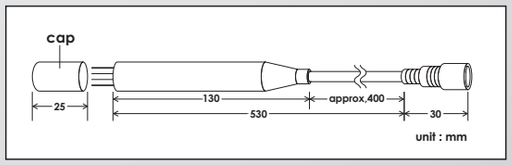
Specifications

Model	PAL-SALT PROBE
Cat.No.	4222
Scale	Salt concentration (g/100g)
Measurement Method	Conductivity method
Measurement Range	0.0 to 7.0% (ATC)
Resolution	0.01% (0.00 to 1.99%) 0.1% (2.0 to 7.0%)
Measurement Accuracy	±0.1% (0.00 to 1.99%) Relative precision ±5% (2.1 to 5.0%) Relative precision ±10% (5.1 to 7.0%)
Sample Temperature	3 to 30℃
Measurement Time	Approx. 3 seconds
Power Supply	Size AAA alkaline batteries × 2
International Protection Class	IP65 Water resistant.
Dimension & Weight	Main unit : 55(W) × 31 (D) ×109 (H) mm, 100g Electrode probe : ø10 × 530mm (Cable length : Applox. 400mm)

※ About displayed value
PAL-SALT probe can accurately measure salt water in percentage (g/100g) within spsifications. For samples containing non-salt substances,or if the probe is directly inserted into a solid sample,measurement result should only be used as a reference.

※ Dilute with water when measuring samples above 7% salt concentration or above 6% brix.

Probe Dimension



Quality assurance for food factory

Salt concentration 10.0%
Long selling electric conductivity model

Digital Salt Meter

ES-421 Cat.No.4211

Scale	Measurement Range	Measurement Accuracy	International Protection Class
Salt concentration (g/100g)	0.00 to 10.0%	Refer to Specifications	IP64

Lightweight and ergonomic design

Stable on the table yet compact to carry

Sample stage is made of SUS316L resin which is known for its durability against corrosion. A sample can be measured while the device is in your hand or set on a desk.

Equipped with Offset Feature

Redesigned and upgraded with a convenient, brand new feature.

Newly equipped with a convenient offset feature for measurement. This feature enables the instrument to produce values which are close to those of other measurement principles,such as titration. For details, please see P.B13.

High accuracy

Cup shaped sample stage

Only requires 0.6mL of sample.
High accuracy of ±0.05% for salt concentration under 0.99%.

Specifications

Model	ES-421
Cat.No.	4211
Scale	Salt concentration (g/100g)
Measurement Method	Conductivity method
Measurement Range	0.00 to 10.0% (ATC)
Resolution	0.01% for salt concentration of 0.00 to 2.99% 0.1% for salt concentration of 3.0 to 10.0%
Measurement Accuracy	Displayed value ±0.05% (for salt concentration of 0.00 to 0.99%) Relative precision ± less than 5% (for salt concentration of 1.00 to 10.0%)
Sample Temperature	5 to 100℃
Ambient Temperature	10 to 40℃
Measurement Time	Approx. 3 seconds
Power Supply	006P Dry battery (9V)
International Protection Class	IP64 Dust-tight and Protected against splashing water.
Dimension & Weight	170 (W) × 90 (D) ×40 (H) mm, 220g(Main unit only)

Other features

- Easy operation,apply small amount of sample and press start.
- Zero set with air
- Simple design with only two buttons.

Measurement Method

Apply 2 to 3 drops of sample onto the sample stage.

Press the START/OFF button.

Salt concentration(%) will display after arrow flashes three times.

For Managing Salt water and Seawater Concentration

PAL series

Digital Hand-Held "Pocket" Refractometer

PAL-03CS

PAL-03S

Salinity/Snow-melting agent (g/100g)

PAL-03CS Cat.No.4393
PAL-03S Cat.No.4403

Salinity

Specifications	PAL-03CS	PAL-03S
Scale	Sodium chloride (g/100g) Freezing point	Sodium chloride (g/100g)
Measurement Range	Sodium chloride : 0.0 to 28.0% Freezing point : 0 to -22℃	0.0 to 28.0%
Resolution	Sodium chloride : 0.1 % Freezing point : 1 ℃	0.1 %
Measurement Accuracy	Sodium chloride : ±0.2% Freezing point : ± 1 ℃	±0.2 %
Temperature Compensation	10 to 40 ° C	

Salinity (g/100mL)

PAL-106S Cat.No.4506

Salinity

Specifications	
Scale	Sodium chloride (g/100mL)
Measurement Range	0.0 to 33.0 %
Resolution	0.1%
Measurement Accuracy	±0.2 %
Temperature Compensation	10 to 40 ℃

PAL-106S

PAL-04S

Salinity specific gravity

PAL-04S Cat.No.4404

Salinity

Specifications	
Scale	Sodium chloride (S.G.)
Measurement Range	1.000 to 1.217
Resolution	0.001
Measurement Accuracy	±0.002
Temperature Compensation	10 to 40 ℃

Salinity (Baume)

PAL-05S Cat.No.4405

Salinity

Specifications	
Scale	Sodium chloride (Baume)
Measurement Range	0.0 to 25.7 °
Resolution	0.1°
Measurement Accuracy	±0.2°
Temperature Compensation	10 to 40 ℃

PAL-05S

PAL-06S

Seawater (Salinity)

PAL-06S Cat.No.4406

Sea-water

Specifications	
Scale	Seawater (Salinity)
Measurement Range	0 to 100 ‰
Resolution	1‰
Measurement Accuracy	± 2 ‰
Temperature Compensation	10 to 40 ℃

Seawater specific gravity

PAL-07S Cat.No.4407

Sea-water

Specifications	
Scale	Seawater (S.G.)
Measurement Range	1.000 to 1.070
Resolution	0.001
Measurement Accuracy	± 0.002
Temperature Compensation	10 to 40 ℃

PAL-07S

PAL-08S

Seawater (Baume)

PAL-08S Cat.No.4408

Sea-water

Specifications	
Scale	Seawater (Baume)
Measurement Range	0.0 to 10.0 °
Resolution	0.1 °
Measurement Accuracy	± 0.2 °
Temperature Compensation	10 to 40 ℃

Common Specifications

Temperature	10 to 40 ℃ Resolution : 0.1 ℃ Measurement Accuracy : ± 1 ℃
Sample Volume	At least 0.3mL
Measurement Time	Approx. 3 seconds
Power Supply	2× AAA Batteries
International Protection Class	IP65 Dust-tight and Protected against water jets.
Dimensions & Weight	55(W)× 31(D) ×109(H) mm,100g (Main unit only)

Equipped with ATC (Automatic Temperature Compensation)
Equipped with ELI (External-Light Interference) for reliable outdoor measurements

ELI Feature
(External-Light-Interference) 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 feature, which displays the [nnn] warning message when intense direct light is detected. Shading the sample stage with your hand and re-pressing the START key will ensure accurate measurement results each time.

Measurement Method

Apply 2 to 3 drops of sample on the prism surface.

Press the START key.

Measurement value is displayed in 3 seconds.

Three Ways to Measure: Touch, Dip, Stir

PEN series

Digital Hand-Held "PEN" Refractometer

Salinity (g/100g)

PEN-SW (W) Cat.No.3756

Specifications

Scale	Salinity (g/100g)
Measurement Range	Salinity (g/100g) : 0.0 to 28.0% (Automatic Temperature Compensation)
Resolution	Salinity (g/100g) : 0.1%
Measurement Accuracy	±0.2%
Temperature Compensation	10 to 40 ℃
Power Supply	1 × Size AAA alkaline battery
International Protection Class	IP65 Dust-tight and Protected against water jets. Prism head IP67 Dust-tight and Protected against the effects of temporary immersion in water.
Dimension & Weight	160(W) × 38 (D) ×18 (H) mm, 70g (Main Unit only)

Salinity

Salinity (g/100mL)

PEN-SW (WV) Cat.No.3757

Specifications

Scale	Salinity (g/100mL)
Measurement Range	Salinity (g/100mL) : 0.0 to 33.0% (Automatic Temperature Compensation)
Resolution	Salinity (g/100mL) : 0.1%
Measurement Accuracy	Salinity (g/100mL) : ±0.2%
Temperature Compensation	10 to 40 ℃
Power Supply	1 × Size AAA alkaline battery
International Protection Class	IP65 Dust-tight and Protected against water jets. Prism head IP67 Dust-tight and Protected against the effects of temporary immersion in water.
Dimension & Weight	160(W) × 38 (D) ×18 (H) mm, 70g (Main Unit only)

Salinity

Sodium chloride (Baume)

PEN-SW (Baume) Cat.No.3765

Specifications

Scale	Sodium chloride (Baume)
Measurement Range	Sodium chloride (Baume) : 0.0 to 25.7 ° (Automatic Temperature Compensation)
Resolution	Sodium chloride (Baume) : 0.1 °
Measurement Accuracy	Sodium chloride (Baume) : ±0.2 °
Temperature Compensation	10 to 40 ℃
Power Supply	1 × Size AAA alkaline battery
International Protection Class	IP65 Dust-tight and Protected against water jets. Prism head IP67 Dust-tight and Protected against the effects of temporary immersion in water.
Dimension & Weight	160(W) × 38 (D) ×18 (H) mm, 70g (Main Unit only)

Salinity

Measurement Method

Easy and Simple Operation!

Ideal for spot checking – No need for a pipette or spoon. Just insert the PEN directly into the sample.

Convenient one-handed operation.

Easy cleaning.

Ultimate Functionality. Unsurpassed Quality. Seamless Usability. Perfection pursued for function, operation, and design. The ultimate hand-held refractometer.

MASTER series

Hand-Held Refractometer

Seawater specific gravity

MASTER-S/Mill α Cat.No.2491 ATC•Water Resistant
MASTER-S/Mill M Cat.No.2493

Specifications	MASTER-S/Mill α	MASTER-S/Mill M
Measurement Range	① Salinity : 0 to 100‰ ② Specific gravity : 1.000 to 1.070	
Minimum Scale	① 1‰ ② 0.001	
Measurement Accuracy	① ± 2‰ *± 1‰ ② ± 0.001 *± 0.0005 (10 to 30℃)	————
Dimension & Weight	32(W) × 34 (D) ×207 (H) mm, 110g	

*Repeatability

Sea-water

Salinity (High Accuracy)

MASTER-S10 α Cat.No.2471 ATC•Water Resistant
MASTER-S10 M Cat.No.2473

Specifications	MASTER-S10 α	MASTER-S10 M
Measurement Range	Sodium chloride : 0.0 to 10.0g/100g (Automatic Temperature Compensation)	
Minimum Scale	0.1g / 100g	
Measurement Accuracy	± 0.2g /100g * ± 0.1 /100g (10 to 30℃)	————
Dimension & Weight	32(W) × 34 (D) ×203 (H) mm, 105g	

*Repeatability

Salinity

Salinity (Wide Range)

MASTER-S28 α Cat.No.2481 ATC•Water Resistant
MASTER-S28 M Cat.No.2483

Specifications	MASTER-S28 α	MASTER-S28 M
Measurement Range	Sodium chloride : 0.0 to 28.0g /100g (Automatic Temperature Compensation)	
Minimum Scale	0.2g / 100g	
Measurement Accuracy	± 0.2g /100g * ± 0.1 /100g (10 to 30℃)	————
Dimension & Weight	32(W) × 34 (D) ×168 (H) mm, 90g	

*Repeatability

Salinity

Brix & Salinity

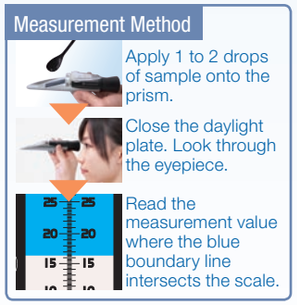
MASTER-BX/S28 M Cat.No.2484

Specifications	MASTER-BX/S28 M
Measurement Range	① Brix : 0.00 to 33.0% ② Sodium chloride : 0.0 to 28.0g / 100g
Minimum Scale	① 0.5% ② 0.5g / 100g
Measurement Accuracy	————
Dimension & Weight	32(W) × 34 (D) ×168 (H) mm, 90g

*Repeatability

Brix Salinity

Measurement Method



6 Features of the MASTER Series

Water Resistant *
After measuring, the instrument can be easily cleaned with running water under a faucet.

Automatic Temperature Compensation (ATC) *
Upgraded Automatic Temperature Compensation automatically adjusts the measurement value in response to changes in ambient temperature conditions.

Visibility
A bright field of vision and a distinct boundary line allow for truly clear readings with a single glance.

Durability
The MASTER series has passed all water resistance, dust resistance, and drop tests.

Hygienic Design
Smooth grip eliminates the possibility of food and samples being trapped, resulting in contamination and bacterial growth.

Automatic Sample Distribution (ASD)
Automatic Sample Distribution (ASD) allows for even sample distribution across the prism, without having to open the daylight plate to manually distribute the sample.

* α type only

Optional Accessories

NaCl Solution for Calibration

Parts No.	Contents	Concentration	Models	Shelf life
RE-120250	5mL	2.50±0.05%	PAL-SALT PAL-SALT Mohr (2.54%) PAL-SALT PROBE ES-421	6 Weeks
RE-143025	30mL	2.5%	PAL-SALT PROBE	1 year
RE-145025	500mL	2.5%	PAL-SALT PROBE	1 year

* If actual displayed concentration differs,displayed values will be contained within the ( ) after the applicable models.

PAL Silicone Cover

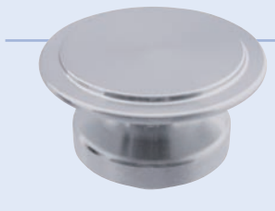
Parts No.	Models
RE-39413	PAL series

PAL-case

Parts No.	Models
RE-39409	PAL series Excluding PAL-SALT PROBE

Strap

Parts No.	Models
RE-39410	PAL · PEN series



MAGIC™

Parts No.	Models
RE-39411	PAL series

Q&A

PAL-SALT

Q1 What can this instrument measure ?

Various types of food that contain salt – soups, sauces, condiments, dressings, fish, ham, bacon, deli meats, brine, cheese, butter, dairy, crackers, chips, and more.

Q2 How do I measure my sample ?

Different types of sample require different preparation for measurement. Please refer to “Measurement Techniques.”

Q3 Can I use tap water for dilutions ?

Distilled water is the best, but tap water may also be used. Tap water may affect the readings slightly (approx. 0.01%). Do not use mineral water as it may affect the readings.

Q4 How do I clean it ?

The unit is waterproof, so the entire body can be washed under running water. Use a mild cleanser to remove persistent residue, such as oil. Clean greasy residue with ethyl alcohol and rinse with water.

Q5 The readings are unstable.

For samples containing oils or fats, try stirring the sample after placing on the sensor, and measure. This will help stabilize readings.

Q6 What’s the key for measuring cold or hot sample ?

We recommend leaving the sample on the sensor for 30 seconds before measuring. This will allow the sample to acclimate. Alternatively, take multiple readings until the readings stabilize.

Q7 How often does it need to be calibrated ?

Zero-set the instrument at the beginning of each day before taking any measurements. Clean the sample stage thoroughly and press ZERO with nothing on it (zero-set with air). If measurement values are irregular, please refer to ” Q8 What should I do if the measurement values are irregular? ” For manufacturer calibration, please contact an official ATAGO service center.

Q8 What should I do if the measurement values are irregular?

Apply water or ethyl alcohol on the sample stage and wipe it off with lint-free tissue paper. Repeat the process a few times if using water.
If this does not resolve the issue, reference set with a 2.50% standard Sodium chloride (NaCl) solution.

Q9 How should I store the unit ?

If the unit will not be used for an indeterminate amount of time, place the unit in the storage case that it came with.