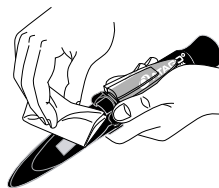


## 9. Precautions

- ① The refractometer should be stored in its carrying case in a dry environment (0 to 40°C) when not in use.
- ② Do not leave the refractometer in direct sunlight.
- ③ Use a light hold on the refractometer. Using a tight grip around the body of the instrument may affect the ATC function of the unit.
- ④ When the sample is turbid or colored, the field of vision darkens and the boundary line may become unclear or disappear completely. In such cases, a stronger light source such as direct sunlight or bright light from a microscope will be more effective for better viewing.
- ⑤ Wipe the sample off with a wet tissue or wash the prism with water. After washing the prism, wipe off any remaining water with a dry soft tissue.
- ⑥ The prism and daylight plate should be completely clean before sampling. If the refractometer is used to measure an oil-based or similar type sample, a residue or film may be left on the prism. In this situation, wipe the prism surface with ethyl alcohol or diluted neutral detergent to clean off any remaining sample.
- ⑦ Be careful to not scratch the prism surface. After use, clean the prism surface and daylight plate with a soft cloth soaked in water and remove any remaining moisture with a dry cloth.
- ⑧ The refractometer is a precise and sensitive optical instrument. Do not drop or subject to strong shock or excessive force.
- ⑨ **Do not submerge the unit underwater for a prolonged period of time.**



※ After each measurement, wipe the sample off the prism, daylight plate, and around the prism area with a soft moist tissue.

## 10. Repair and warranty

The MASTER-S/Mill α is warranted for one year after the date of purchase against any manufacturer defect in materials or workmanship. Prism and sample stage are excluded from the warranty. Any of the following events happening to the unit will void the warranty:

- Disassembled by anyone other than authorized service provider
- Immersed in liquid or dropped
- Misused, abused, or used/stored in improper ambient conditions

Service fees are applicable for repairs after the warranty period expires. Contact an authorized ATAGO Service Center or the original seller for details.

Have the serial number of your refractometer available when asking about repair.

## 11. Specifications

	MASTER-S/Mill α (Cat.No.2491)
Measurement range	Salinity 0 to 100‰ Specific gravity $d_{20}^{20}$ 1.000 to 1.070 (Automatic Temperature Compensation)
Minimum scale	Salinity 1‰, Specific gravity 0.001
Accuracy	Salinity $\pm 2\%$ , Specific gravity $\pm 0.001$ (10 to 30°C)
International Protection class	IP65 Water Resistant (except eyepiece)
Size and weight	3.2 × 3.4 × 20.7cm, 110g

Design Registration No.000379326-0001, 000379326-0002 (EU), ZL 2005 3 0116403.4,5 (China), D111526 (Taiwan), D554, 549 (U.S.A.)

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ATAGO®

2491-E08

The warranty period extension method 1 year → 2 years

The warranty period will be extended from 1 year to 2 years when you register customer information.

Trouble scanning the code? Access this link <http://www.atago.net/ur/>



QR code

Automatic Compensation Salinity Refractometer

Master MASTER-S/Mill α

Cat. No. 2491

Salinity ‰ 0 to 100‰  
Specific gravity  $d_{20}^{20}$  1.000 to 1.070

INSTRUCTION  
MANUAL

Thank you for your purchase of a quality ATAGO product.

光... Capture the Light, Measure the Future!

## 1. Names and functions of main parts



**(Memo)** The eyepiece and daylight plate are user replaceable. Please contact an ATAGO distributor to place an order or for any inquiries.

Name	Part #
Eyepiece	RE-2311-12M
Daylight plate	RE-2315-61M

ATAGO instruments are rigorously inspected to ensure each unit meets the highest standards of quality assurance.

## PRECAUTIONS

(Be sure to read the following before use.)

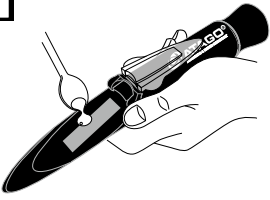

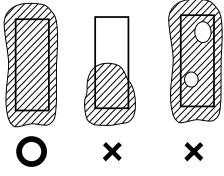

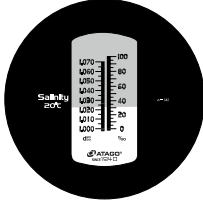
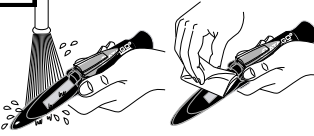
### Warning!

When using this instrument to measure solutions which may be harmful to humans, please handle all materials carefully, using the proper gloves and mask. Please be aware of any special handling instructions for any harmful solution.

### Caution

- Carefully read the instruction manual of this instrument to ensure proper use and operating methods.
- When handling and carrying this instrument, avoid dropping or subjecting to any strong shock or excessive force.
- If this instrument is used for any application other than its intended purpose, ATAGO will not be held liable for any damage caused by the use of or the measurement(s) obtained by the operator.
- ATAGO is not liable for any loss and damage caused by the measurement and use of this instrument.
- The prism is considered a consumable item and a charge will be incurred for the replacement of this part.
- All instruments received for repair are subject to a possible inspection fee. ATAGO does not warrant the problems which are caused by user error even though the unit is under warranty.

## 2. Measurement

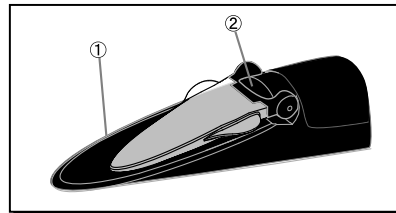
<p><b>1</b></p>  <p>Put one or two drops of sample on the prism.</p>	<p><b>2</b></p>  <p>Close the daylight plate gently.</p>	<p><b>3</b></p>  <p>The sample must spread evenly over the prism surface. Air bubbles should be eliminated.</p>
<p><b>4</b></p>  <p>View the scale through the eyepiece. To focus, turn eyepiece in either direction until clear. Use the number printed on the side of the eyepiece as a reference for the position of the eyepiece when it is in focus.</p>	<p><b>5</b></p>  <p>Read the measurement value where the boundary line intersects the scale.</p>	<p><b>6</b></p>  <p>Wipe the sample off with a wet tissue or wash the prism with water. <b>After washing the prism, wipe off any remaining water with a dry soft tissue.</b></p>

### ⚠ Caution

When measuring a hot sample, the sample should be allowed to cool down to room temperature before being placed on the prism. By following this procedure when continuously measuring hot samples, the integrity of the prism will last longer

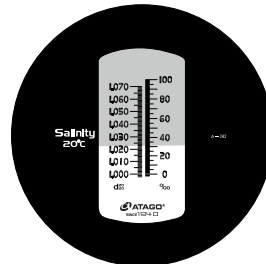
## 3. Quick and Easy sampling

Automatic Sample Distribution (ASD) : Place approximately 0.3mL of sample on the front end (Figure ①) or the rear end (Figure ②) of the sample stage, and tilt the refractometer slightly in the proper direction to allow the sample to move over the prism. The sample liquid will spread evenly and the measurement value can then be read more quickly and easily. By eliminating the steps of lifting and closing the daylight plate when applying a sample, the operator can save much time when having to measure many samples daily. (This measuring method requires the sample to be low in viscosity.)



## 4. Scale

- Left side scale  
Indicate specific gravity of seawater.  $d_{20}^{20}$  indicates specific gravity of a sample at 20°C per water at 20°C.
- Right side scale  
Indicate concentration of seawater with permillage. Scale unit is ‰.



## 5. Automatic Temperature Compensation (ATC)

With each sample, the refractive index varies depending on the temperature. The position of the boundary line, seen through the eyepiece, will deviate based on the temperature at the time of measurement. With a non-ATC Hand-held Refractometer, manual calculation for temperature correction is needed. For example, at 10°C intervals, a variation of 6 to 8‰ can be seen for a Salinity 100‰.

The MASTER-S/Mill $\alpha$  utilize a built in Automatic Temperature Compensation feature so that the instrument's internal scale will shift automatically when the ambient temperature changes. This feature eliminates the need for temperature compensation charts. The refractometer and the sample should be at the same ambient temperature to ensure that the ATC feature is working correctly.

To measure a heated or refrigerated sample, allow the sample to conform to the ambient temperature before taking measurements. Waiting 1 to 2 minutes after putting the sample onto the prism will ensure more accurate readings.

Note : The temperature compensation coefficient set for the MASTER-S/Mill $\alpha$  corresponds to a Salinity 50‰. When water is measured the boundary line may deviate slightly from the 0‰ line, however the accuracy is within specification.

## 6. Verifying Calibration and Calibration Certification

### [1] Verifying Calibration

To ensure measurement accuracy, the refractometer should be zero set prior to use each day. Periodic maintenance/service and calibration of your refractometer is recommended. The frequency at which calibration is performed will depend on each company's Standard Operating Procedures.

To Verify Calibration:

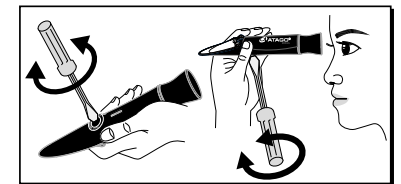
- ① Confirm that the prism is clean and free of scratches.
- ② Use purified water. Check that the boundary line is parallel to the memory lines.
- ③ Verify that the measurement value is within  $\pm 2\%$  of the expected value of the purified water (0‰).

### [2] Calibration Certification

Based on ISO quality management system, Calibration Certificates can be ordered for any ATAGO refractometer. HACCP or GMP certification can also be provided at additional cost. Please contact an ATAGO distributor for more information.

## 7. Calibration

If the measurement value is incorrect after verifying calibration (section 6.) adjust the scale at an ambient temperature of 20°C. Refer to the procedures in section 6.[1] Verifying Calibration. To adjust the scale during calibration, turn the scale adjustment screw located on the underside as shown in the figure to the right.



## 8. When moisture accumulates in the eyepiece

If the view of the scale and boundary line becomes obstructed by moisture within the eyepiece, follow the instructions below for proper cleaning.

- ① While holding the eyepiece toward you, turn the eyepiece counter-clockwise until it can be removed.
- ② Gently wipe the two areas indicated by the arrows in the figure with a clean, dry cloth to remove any moisture.
- ③ Replace the eyepiece and secure by turning in a clockwise direction.

※ MASTER-S/Mill $\alpha$  is water-resistant rated (JIS - C0920 5th grade jet proof type, IEC specification 529, IP65), however the eyepiece section is not water-resistant.

