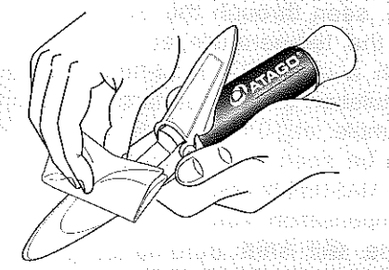
8. Precautions

① Store the refractometer, in its carrying case, in a dry place, (0 to 40 ℃).
② Do not leave the refractometer in direct sunshine.
③ Please do not wrap the grip around the refractometer by hand as it may affect the ATC function of the refractometer. Also, please do not hold the projection part on the back of the unit as it may affect the ATC function as well.
④ When the sample is turbid or colored, the field of vision darkens and the boundary line may become unclear or completely disappear. 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 refractometer is a precise and sensitive optical instrument. Do not drop or subject to strong shock or excessive force.
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 wipe the moisture off with a dry cloth.
⑧ The prism and daylight plate should be completely clean before sampling. If the refractometer is used to measure an oil base or similar type sample, a residue or film may be left on the prism. In this situation, wipe the prism surface with ethyl alcohol to clean off any remaining sample.



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

9. Specifications

	MASTER-α (Cat.No.2311)	MASTER-2α (Cat.No.2321)	MASTER-3α (Cat.No.2331)	MASTER-4α (Cat.No.2341)	MASTER-53α (Cat.No.2351)
Measurement range	Brix 0.0~33.0% (Automatic Temperature Compensation)	Brix 28.0~62.0% (Automatic Temperature Compensation)	Brix 58.0~90.0% (Automatic Temperature Compensation)	Brix 45.0~82.0% (Automatic Temperature Compensation)	Brix 0.0~53.0% (Automatic Temperature Compensation)
Minimum scale	Brix 0.2%				Brix 0.5%
Accuracy	Brix ±0.2% (10~30℃)	Brix ±0.2% (10~40℃)			Brix ±0.5% (10~30℃)
Repeatability	Brix ±0.1%				Brix ±0.25%
International Protection class	IP65 Water Resistant (except eyepiece)				
Size and weight	3.3×3.3×20.4cm, 160g			3.3×3.3×16.8cm, 120g	

Design Registration No.000379326-0001, 000379326-0002 (EU), ZL 2005 3 0116403.4,5 (China), D111526 (Taiwan) 1255763, 1255764, 1255765, 1255766, 1255767 (Japan) Registration pending in U.S.A. and all other countries around the world.

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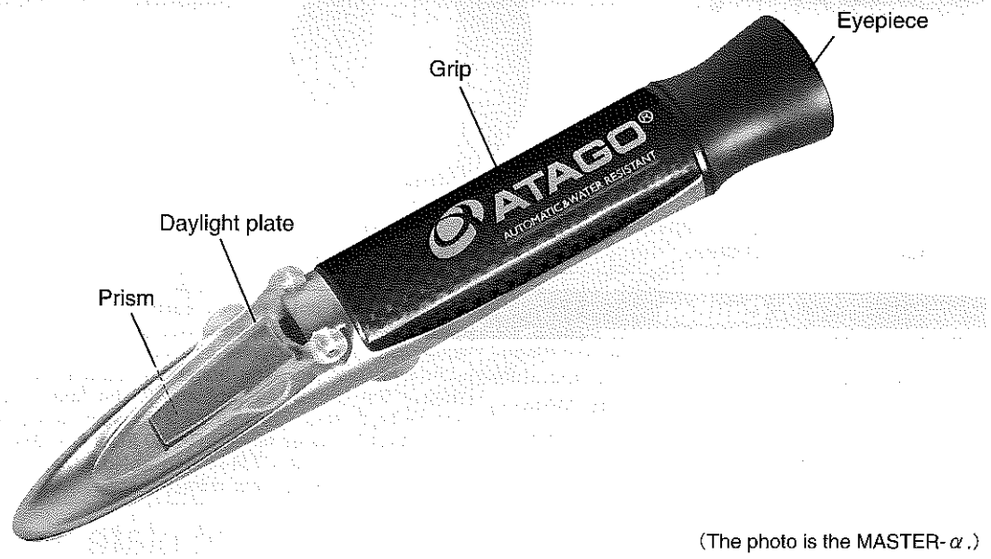
2311-W05

ATAGO®

INSTRUCTION MANUAL

MASTER SERIES REFRACTOMETER (Water Resistant & Automatic Temperature Compensation)	MASTER-α (Cat.No. 2311, Brix 0.0 ~ 33.0%)	MASTER-2α (Cat.No. 2321, Brix 28.0 ~ 62.0%)
MASTER-3α (Cat.No. 2331, Brix 58.0 ~ 90.0%)	MASTER-4α (Cat.No. 2341, Brix 45.0 ~ 82.0%)	MASTER-53α (Cat.No. 2351, Brix 0.0 ~ 53.0%)

1. Names and functions of main parts



(The photo is the MASTER-α.)

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!

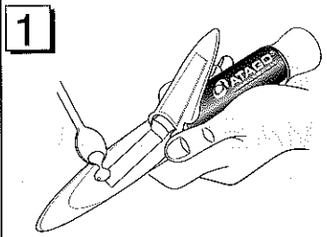
When using this instrument to measure solutions which may be harmful to humans, please handle all materials carefully, using the proper gloves and mask. Please be aware of any special handling instructions for any harmful solution.

⚠ 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's fault even though the unit is under warranty.

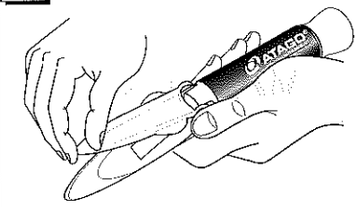
2. Measurement

1



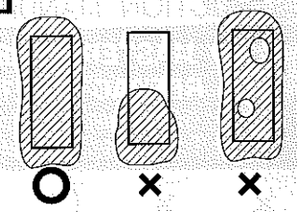
Put one or two drops of sample on the prism.

2



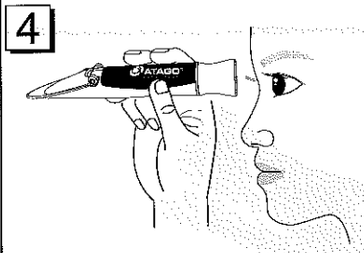
Close the Daylight plate gently.

3



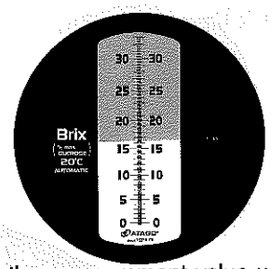
The sample must spread evenly over the prism surface.
Air bubbles should be eliminated.

4



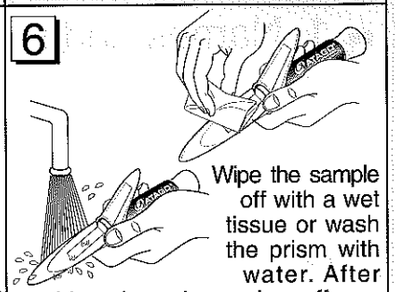
View the scale through the eyepiece. To focus, turn eyepiece in either direction until clear.

5



Read the measurement value where the boundary line intersects the scale.
(The scales is the MASTER-α)

6



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.

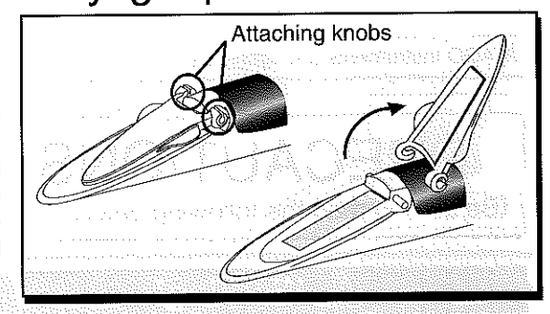
⚠ Caution

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 the integrity of the prism will not deteriorate as quickly if used to measure hot sample continually.

High acid and hot samples such as jam and marmalade in the boiling process can cause corrosion to the prism of the MASTER series hand-held refractometers, especially if not cleaned off immediately after measurement. The hotter the sample or the more acid the sample the worse the problem. If you find it necessary to test hot or high acid samples of 2 to 4pH range we suggest you use ATAGO model MASTER-H50 (Cat.No.2354), MASTER-H80 (Cat.No.2364), MASTER-H93 (Cat.No.2374), or MASTER-H100 (Cat.No.2384) hand-held refractometer.

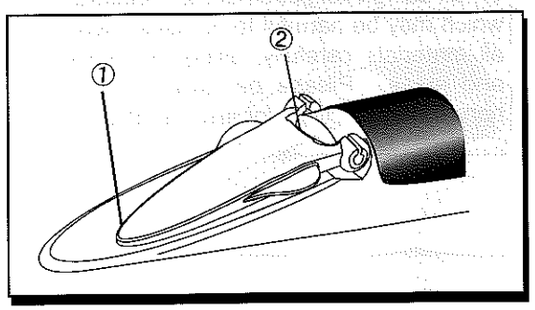
3. Removing and Installing the daylight plate

The daylight plate has also been redesigned with "attaching knobs" to help prevent breakage when excessive force is applied.
It is possible to detach the daylight plate. While the daylight plate is in the open position, apply pressure in the direction of the barrel, and the daylight plate should come free. To re-attach, line up the opening of the "attaching knobs" to the pin and apply equal force (pressure downward) until the daylight plate is locked in place.



4. Quick and Easy sampling

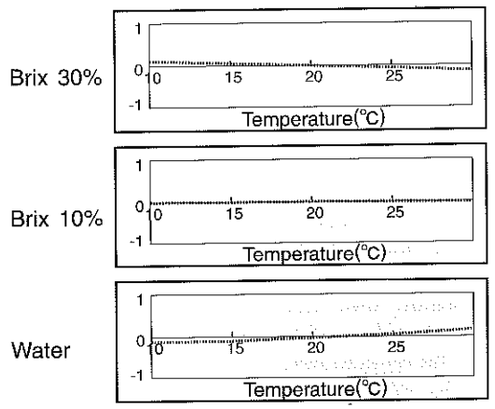
Place apporoximately 0.3ml of sample on the front end (Figure ①) or the rear enf (Figure ①)of the sample stage, and tilt the refractometer slightly in the proper direction to allow the sample to move over the prism. The sample liquid will spread evenly and the measurement value can then be read more 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.)



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℃ intervals, a variation of 0.6 to 0.8% can be seen for a standard sugar solution at 10%. The MASTER-α utilizes 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.

〈Temperature compensation effect〉
The example is the MASTER-α.



Note: The temperature compensation coefficient set for the MASTER-α corresponds to a Brix of 10% to15% When water is measured the boundary line may deviate slightly from the 0% line, however the accuracy is within specification.

6. Brix Scale

All Refractometers are designed to measure the refractive index of a solution. The Brix scale is based on a sucrose (sugar) and water solution. However, since most samples contain substances other than sugar - such as salts, minerals and proteins - the Brix percentage represents the total concentration of all soluble solids in the sample. For certain samples, such as cutting oils and other industrial fluids, a conversion chart from the Brix percentage to the sample's total concentration may be necessary.

7. When moisture accumulates in the eyepiece

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

①To remove the eyepiece, while holding the eyepiece towards you, turn the eyepiece counter clockwise until 1the part can be removed.
②Wipe the two areas indicated by the arrows in the figure with a clean cloth to remove the moisture. When you wipe off the eyepiece lens, please wipe it gently.
③Replace the eyepiece and secure by turning in a clockwise direction.

※MASTER-α series are water-resistant rated (JIS-C0920 5th grade jet proof type, IEC specification 529, IP65), however the eyepiece section is not water-resistant.