

7. Verifying Calibration and Calibration Certification

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.

Part No.	Part Name
RE-110010	Sucrose Solution 10.0%(g/100g)
RE-110020	Sucrose Solution 20.0%(g/100g)
RE-110030	Sucrose Solution 30.0%(g/100g)
RE-110040	Sucrose Solution 40.0%(g/100g)
RE-110050	Sucrose Solution 50.0%(g/100g)

Confirm that the prism is clean and free of scratches.

Depending on the model, measure with purified water or a sucrose solution. Check that the boundary line is parallel to the memory lines.

Verify that the measurement value matches the expected value of the known calibration solution.

Calibration Certification

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

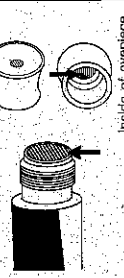
8. Brix scale

Refractometers are designed to measure the refractive index of a solution. The Brix scale is based on a sucrose (sugar) and 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.

Note: A brix value expressed as a percentage (%) is equivalent to that value expressed in degrees Brix (° Brix).

9. When moisture accumulates in the eyepiece

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



While holding the eyepiece toward you, turn the eyepiece counter-clockwise until it can be removed.

Gently wipe the two areas indicated by the arrows in the figure with a clean, dry cloth to remove any moisture.

Replace the eyepiece and secure by turning in a clockwise direction.

10. Repair and warranty

The MASTER-M series are warranted for one year after the date of purchase against any manufacturer defect in materials or workmanship. The MASTER-M series 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

Any 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-53M (Cat.No. 2353)	MASTER-10M (Cat.No. 2373)	MASTER-20M (Cat.No. 2383)	MASTER-M (Cat.No. 2313)
Measurement range	Brix 0.0 to 53.0%	Brix 0.0 to 10.0%	Brix 0.0 to 20.0%	Brix 0.0 to 33.0%
Intrinsic scale	Brix 0.2%	Brix 0.1%	Brix 0.1%	Brix 0.2%
Accuracy	Brix ±0.2%(at 20°C)	Brix ±0.2%	Brix ±0.2%	Brix ±0.2%
Repeatability	Brix ±0.1%(at 20°C)	Brix ±0.1%	Brix ±0.1%	Brix ±0.1%
Size and weight	3.2 x 3.4 x 16.8cm, 130g	3.2 x 3.4 x 20.3cm, 155g	3.2 x 3.4 x 20.7cm, 165g	3.2 x 3.4 x 20.3cm, 165g

Design Registration No.00193836-0001, 0003792929-0002 (EU), ZL 2005 3 01164004.5 (China), D111526 (Taiwan), D554, 549 (U.S.A.)
1255763, 1255764, 1255765, 1255766, 1255767 (Japan). Patent pending in U.S.A. and all other countries around the world.

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In just a minute

From 1 year to **2 years** Free Extended Warranty

2353-E04

It requires only 1 minute! Simply by answering questions, warranty period is extended from 1 year to 2 years.
(The registration page can be accessed from ATAGO website.)



Access now →



MASTER SERIES REFRACTOMETER

MASTER-M series

INSTRUCTION
MANUAL



MASTER-53M (Cat.No. 2353, Brix 0.0 to 53.0%) **MASTER-20M** (Cat.No. 2383, Brix 0.0 to 20.0%)
MASTER-10M (Cat.No. 2373, Brix 0.0 to 10.0%) **MASTER-M** (Cat.No. 2313, Brix 0.0 to 33.0%)

Check Point! To ensure your refractometer continues to operate properly and look new for a long time!

When measuring samples with a high salt content, be sure to clean the refractometer by wiping the unit completely after each use, especially the metal areas. The unit should be stored in the ATAGO storage box provided when not in use.

Thank you for your purchase of a quality ATAGO product.

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

1. Names and functions of main parts



(Note) 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-2315-80M
Small volume daylight plate	RE-2311-87M

(MASTER-53M pictured above.)

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.)

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.

Warning!

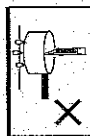
When using this instrument to measure solutions which may be harmful to humans, please handle all materials carefully, using the proper gloves and mask. Please be aware of any special handling instructions for any harmful solution.

2. Precautions

● Never splash water on the unit.



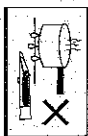
● Do not submerge the unit in a hot liquid, such as a soup simmering in a pot.



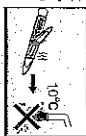
● When measuring a hot sample, the sample should be allowed to cool down to room temperature before being placed on the prism. By following this procedure the integrity of the prism will not deteriorate as quickly if used to measure hot samples continually.



● Keep the unit away from any heat source, such as a cook stove.



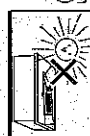
● Use water at ambient temperature (about 20°C) to clean the prism area after measuring a high-temperature solution. Do not use cold water (below 10°C).



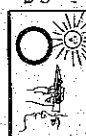
● The refractometer is a precise and sensitive optical instrument. Do not drop or subject to strong shock or excessive force.



● Store the unit in its original storage case in a dry, room temperature (0-40 °C) environment away from direct sunlight.



● When measuring a murky or dark solution, the boundary line may be difficult to make out or completely invisible. Hold the unit up to stronger light, such as direct sunlight or a light source for microscopes.



● The prism and daylight plate should be completely clean for each measurement. Oil-based solutions may leave a film-like residue. Clean the prism and daylight plate with alcohol or mild detergent diluted with water.



3. Calibration

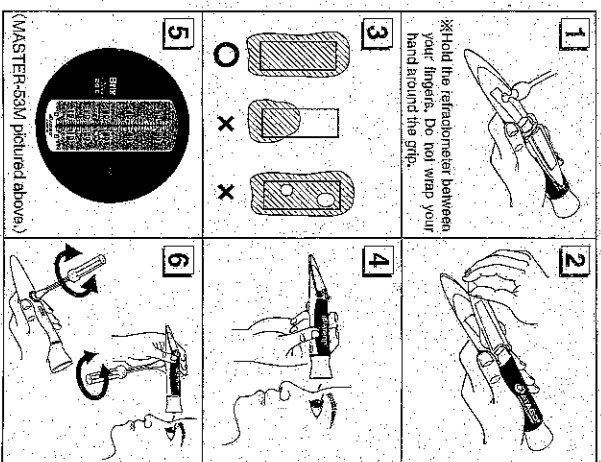
⚠ Caution

This refractometer needs to be calibrated before being used for the first time each day. Moreover, if the ambient temperature changes during the day, it needs recalibration.

- ① Put one or two drops of tap water (Figure-1).
- ② Close the Daylight plate gently (Figure-2).
- ③ Tap water must spread evenly over the prism surface. Air bubbles should be eliminated (Figure-3).
- ④ View the scale through the eyepiece. To focus, turn the 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 (Figure-4).
- ⑤ Confirm that the blue boundary line coincides with "0%" on the scale (Figure-5).
- ⑥ If the boundary line does not coincide with "0%", turn the scale adjustment screw with a flathead screwdriver until it does (Figure-6).

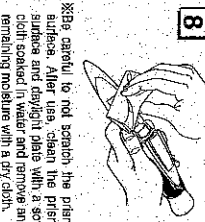
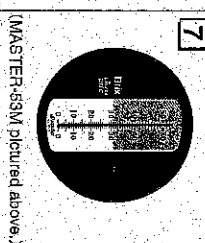
Note: Don't turn the scale adjustment screw excessively, otherwise, it may cause the refractometer to malfunction.

All ATAGO Hand-held Refractometers are delivered after adjusted in ATAGO factory.



4. Measurement

- ① Put one or two drops of sample on the prism (Figure-1).
- ② Close the Daylight plate gently (Figure-2).
- ③ The sample must spread evenly over the prism surface. Air bubbles should be eliminated (Figure-3).
- ④ View the scale through the eyepiece. To focus, turn the 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 (Figure-4).
- ⑤ Read the measurement value where the boundary line intersects the scale (Figure-7). *MASTER-55M uses 0.2% increments on the left, and 0.5% increments on the right.
- ⑥ Wipe the sample off with a wet tissue (Figure-8).



The MASTER-H series is the heat-resistant model of the MASTER series. They are equipped with corrosion-resistant tempered glass prism and designed to withstand high-temperature samples. The conventional H-50, H-60, and H-90 refractometers are recommended for measuring jams during the cooking process.

5. Temperature correction

When the concentration of a liquid is measured by the ATAGO Hand-held Refractometer, the difference in the temperature of the sample will cause a difference in the measured value. The scale of the refractometer is made so that it can indicate the correct value when the refractometer is used for measurements at a temperature of 20°C. The measurement should be corrected in 3. Calibration and 4. Measurement. Temperature correction is made by measuring the Brix value of a sample having the same room temperature after calibrating the refractometer with water which has been left to stand for a period in the room (the water temperature should be the same as the room temperature). As this method is convenient, it is generally used. Another method of correcting the temperature is done by using a temperature correction table.

In this case, calibrate the refractometer with tap water having a temperature of 20°C at the room temperature of 20°C. When calibrating the refractometer, do not move the scale adjustment screw. Then, correct the reading by using the temperature correction table shown on the next page based on the scale reading and measurement temperature.

Temperature corrections for refractometric sucrose (dry substance) measurements at 589nm
Reference temperature: 20°C

Temperature °C	Brix (%)															
	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
15	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
16	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
17	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
18	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
19	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
20	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
21	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
22	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
23	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
24	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
25	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
26	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
27	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
28	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
30	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
31	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
32	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
33	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
34	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
35	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
36	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
37	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
38	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
39	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
40	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29

6. 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 filling 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.)

