

Temperature °C	Brix (%)																
	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
Subtract from the measured value																	
15	0.29	0.30	0.32	0.33	0.34	0.35	0.36	0.37	0.37	0.38	0.38	0.38	0.38	0.38	0.38	0.37	0.37
16	0.24	0.25	0.26	0.27	0.28	0.28	0.29	0.30	0.30	0.31	0.31	0.31	0.31	0.31	0.30	0.30	0.30
17	0.18	0.19	0.20	0.20	0.21	0.21	0.22	0.22	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.22
18	0.12	0.13	0.13	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
19	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07
Add to the measured value																	
21	0.06	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07
22	0.13	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.16	0.16	0.16	0.16	0.16	0.16	0.15	0.15	0.15
23	0.20	0.21	0.21	0.22	0.22	0.23	0.23	0.23	0.23	0.24	0.24	0.24	0.24	0.23	0.23	0.23	0.22
24	0.27	0.28	0.29	0.29	0.30	0.30	0.31	0.31	0.31	0.32	0.32	0.32	0.32	0.31	0.31	0.30	0.30
25	0.34	0.35	0.36	0.37	0.38	0.38	0.39	0.39	0.40	0.40	0.40	0.40	0.40	0.39	0.39	0.38	0.37
26	0.42	0.43	0.44	0.45	0.46	0.46	0.47	0.47	0.48	0.48	0.48	0.48	0.47	0.47	0.46	0.46	0.45
27	0.50	0.51	0.52	0.53	0.54	0.55	0.55	0.56	0.56	0.56	0.56	0.56	0.55	0.55	0.54	0.53	0.52
28	0.58	0.59	0.60	0.61	0.62	0.63	0.64	0.64	0.64	0.65	0.65	0.64	0.64	0.63	0.63	0.62	0.61
29	0.66	0.67	0.68	0.70	0.71	0.71	0.72	0.73	0.73	0.73	0.73	0.73	0.72	0.72	0.71	0.70	0.69
30	0.74	0.76	0.77	0.78	0.79	0.80	0.81	0.81	0.82	0.82	0.81	0.81	0.80	0.80	0.79	0.78	0.76
31	0.83	0.84	0.85	0.87	0.88	0.89	0.89	0.90	0.90	0.90	0.90	0.89	0.89	0.88	0.87	0.86	0.84
32	0.92	0.93	0.94	0.96	0.97	0.98	0.98	0.99	0.99	0.99	0.99	0.98	0.97	0.96	0.95	0.93	0.92
33	1.01	1.02	1.03	1.05	1.06	1.07	1.07	1.08	1.08	1.08	1.07	1.07	1.06	1.04	1.03	1.01	1.00
34	1.10	1.11	1.13	1.14	1.15	1.16	1.16	1.17	1.17	1.16	1.15	1.14	1.13	1.11	1.09	1.07	1.05
35	1.19	1.21	1.22	1.23	1.24	1.25	1.25	1.26	1.26	1.25	1.24	1.23	1.21	1.19	1.17	1.15	1.13
36	1.29	1.30	1.31	1.33	1.34	1.35	1.35	1.35	1.35	1.34	1.33	1.31	1.29	1.28	1.25	1.23	1.20
37	1.39	1.40	1.41	1.42	1.43	1.44	1.44	1.44	1.44	1.43	1.41	1.40	1.38	1.36	1.33	1.31	1.28
38	1.49	1.50	1.51	1.52	1.53	1.54	1.54	1.54	1.53	1.52	1.50	1.48	1.46	1.44	1.42	1.39	1.36
39	1.59	1.60	1.61	1.62	1.63	1.63	1.63	1.62	1.61	1.59	1.57	1.55	1.52	1.50	1.47	1.43	1.40
40	1.69	1.70	1.71	1.72	1.73	1.73	1.73	1.72	1.71	1.70	1.68	1.66	1.63	1.61	1.58	1.54	1.51

9. Precautions

- Store the refractometer, in its carrying case, in a dry place, (0 to 40 °C).
- Do not leave the refractometer in direct sunshine.
- Hold the refractometer between your fingers. Do not wrap your hand around the grip.
- 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.
- Never splash water on the unit.
- Wipe the sample off with a wet tissue.
- The refractometer is a precise and sensitive optical instrument. Do not drop or subject to strong shock or excessive force.
- 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.
- 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.

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. Since the MASTER-M Series are a precise optical instrument, great care must be taken in the instruments storage and use. If any mistreatment or misuse of the instrument is detected, the warranty will be voided and repair fees will be charged. Ask your supplier for further details.

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

11. Specifications

	MASTER-M (Cat.No.2313)	MASTER-10M (Cat.No.2373)	MASTER-20M (Cat.No.2383)
Measurement range	Brix 0.0~33.0%	Brix 0.0~10.0%	Brix 0.0~20.0%
Minimum scale	Brix 0.2%	Brix 0.1%	
Size and weight	3.3×3.3×20.4cm, 160g		

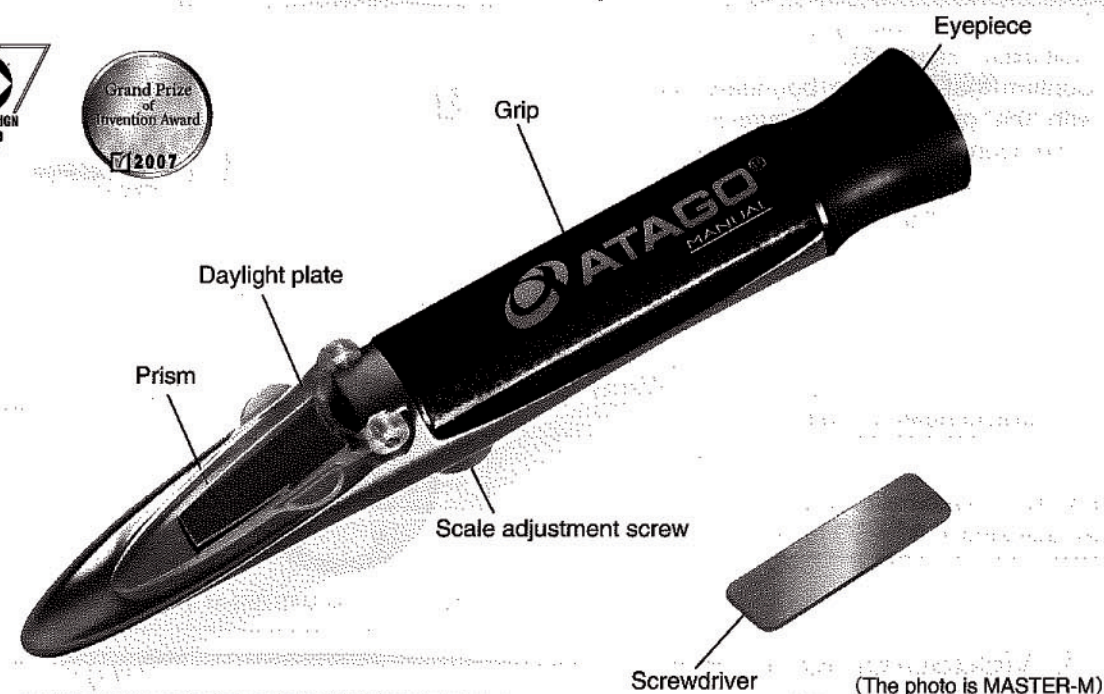
Design Registration No.000379326-0001, 000379326-0002 (EU), ZL 2005 3 0116403.4.5 (China), D111526 (Taiwan), 1255763, 1255764, 1255765, 1255766, 1255767 (Japan) Patent pending in U.S.A. and all other countries around the world.

ATAGO®

Q.C.- MASTER REFRACTOMETER INSTRUCTION MANUAL

MASTER-M (Cat.No.2313, Brix 0~33%)
MASTER-10M (Cat.No.2373, Brix 0~10%)
MASTER-20M (Cat.No.2383, Brix 0~20%)

1. Names and functions of main parts



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. Calibration

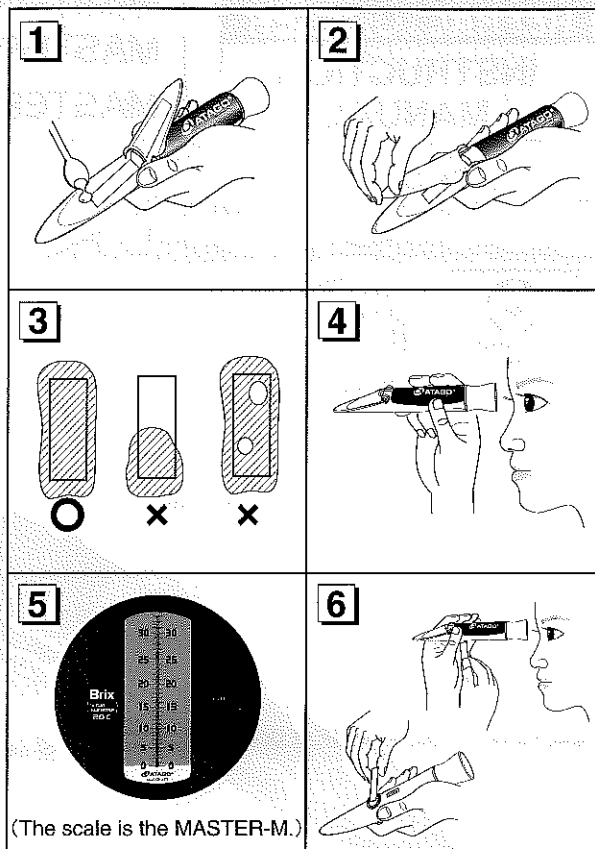
⚠ Caution

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 recalibrated.

- ① Put one or two drops of distilled water or tap water (Figure-1).
- ② Close the Daylight plate gently (Figure-2).
- ③ Distilled water or tap water or solution 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 (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 screwdriver until it does (Figure-6).

Nota :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.

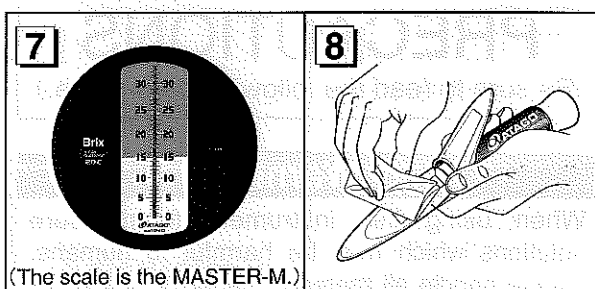


3. Measurement

⚠ 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 samples continually.

- 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.
- ④ Air bubbles should be eliminated (Figure-3).
View the scale through the eyepiece.
To focus, turn the eyepiece in either direction until clear (Figure-4).
- ⑤ Read the measurement value where the boundary line intersects the scale (Figure-7).
- ⑥ Wipe the sample off with a wet tissue (Figure-8).



4. Brix scale

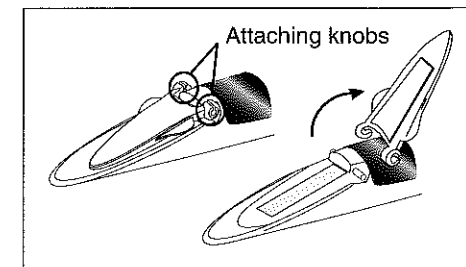
All Refractometers are designed to measure the refractive index of a solution. The Brix scale is based on a sucrose (sugar) and water solution. However, since most samples contain substances other than sugar - such as salts, minerals and proteins - the Brix percentage represents the total concentration 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.

5. 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.

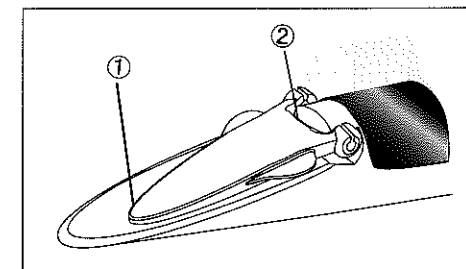
To re-attach, line up the opening of the "attaching knobs" to the pin and apply equal force (pressure downward) until the daylight plate is locked in place.



6. Quick and Easy sampling

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.

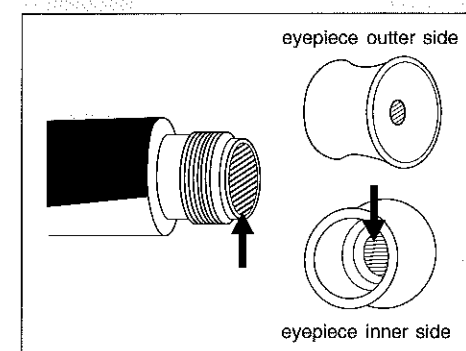
(This measuring method requires the sample to be low in viscosity.)



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.

- ① To remove the eyepiece, while holding the eyepiece towards you, turn the eyepiece counter clockwise until the part can be removed.
- ② Wipe 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.
- ③ Replace the eyepiece and secure by turning in a clockwise direction.



8. 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 2. Calibration and 5. Measurement, temperature correction is made by measuring the Brix value of a sample having the same room temperature after calibrating therefractometer with water which has been left to stand for a period in the room (the water temperature should be the same as the roomtemperature). 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 distilled 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.

Example

Scale reading	Measurement temperature	Correction value	Correct value
15.8%	15°C	-0.33	15.5%
27.2%	22°C	+0.15	27.4%