Operating Manual

ABBE-Refractometers

Contents

I	Application of the instrument	3
II	Main specifications	3
III	Principal of operation	3
IV	Construction of the instrument	4
V	Operating procedure	5
VI	Calibration of the instrument	7
VII	Maintenance	8
VIII	Complete set of the instruement	9
IX	Appendix one : how to protect and use naphthalene bromide correctly	9
X	Appendix two	9

I. Application of the instrument

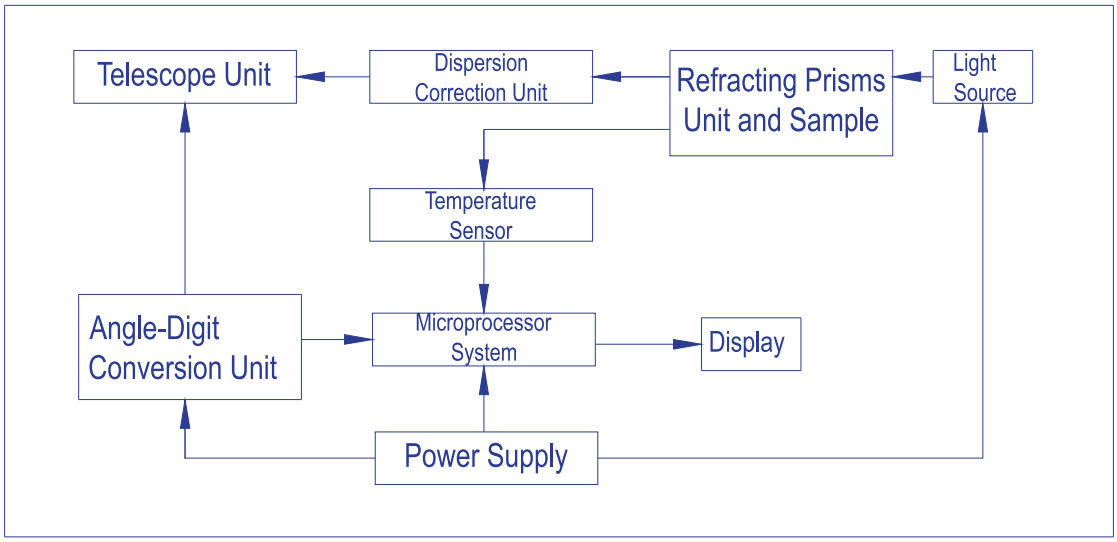
This instrument can widely be used in petroleum, chemical, pharmaceutical, sugar refining and food industries, as well as in related collage, universities and scientific research institution for measuring the refractive index n_D of transparent, subtransparent liquid or solid substance. This instrument can also be used to measure the Brix (BX) of the sugar solution, and correct the effect of temperature on the Brix automatically. In addition, this instrument can display the temperature of the sample.

II. Main Specifications

i	Measuring range	
	Refractive index n_D	1.3000-4.7000
	Brix (Bx-TC)	0-95%
	Brix (Bx)	0-95%
ii	Measuring Accuracy	
	Refractive index n_D	±0.0002
iii	Temperature	
	Temperature display range	0-50ºC
	Correcting range of BX versus temperature	15-45ºC
iv	Overall Dimension of the instrument	330mm x 180mm x 380mm
v	Weight of the instrument	10 kg
vi	Power Supply	AC 220V - 240V, frequency 50Hz
vii	Input power	30W
viii	Usage temperature range	room temperature - 35ºC
ix	Lamp	(FANELL328-340) 6.5V, 0.3A
x	Fuse	F/A250V 1A
xi	Protection grade	Ip20

III Principle of operation

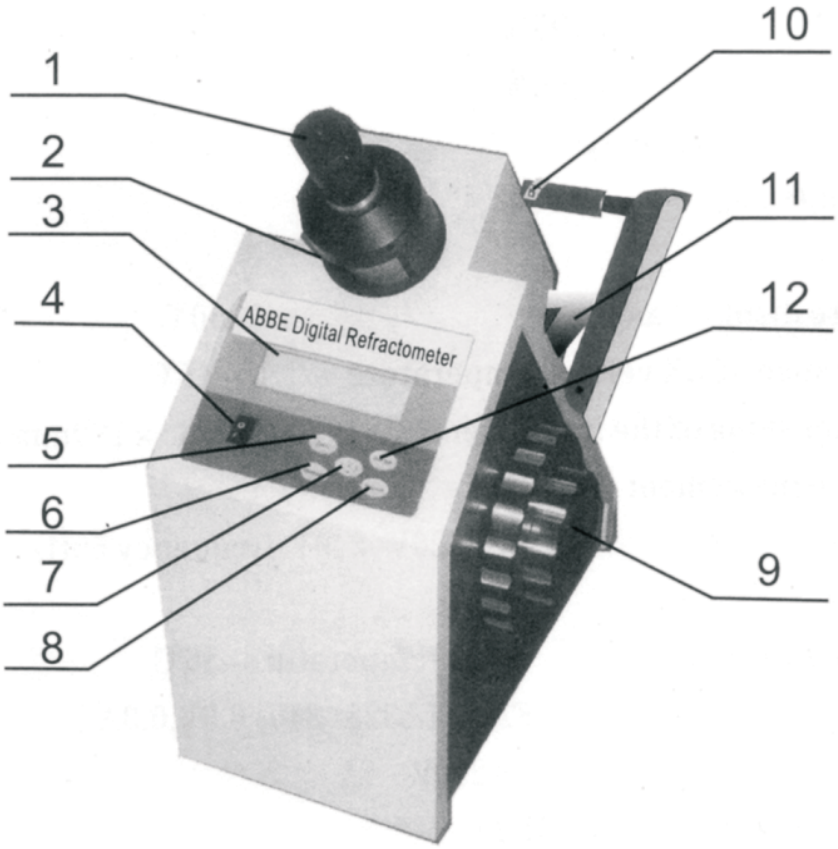
I. Principle block diagram



I. Principle

The operational principle of the ABBE refractometer for measuring the refractive index of the transparent or subtransparent substance is based on the measurement of the critical angle. The observation system composed of the visual telescope unit and despersion correction unit can be used to aim at the dividing line between the bright area and the dark area, that is to aim at the critical angle. &he angle-digit conversion unit can be used to convert the angular magnitude into digital magnitude, which will be sent into the microprocessor system for being data-processed. Then. The refractive index of Brix of the sample being measured will. Be displayed digitally.

IV Construction of the instrument



1. Eyepiece
2. Dispersion correction hand - wheel
3. Display Window
4. Power switch (POWER)
5. Reading display button (READ)
6. Brix (through temperature correction) display button (BX-TC)
7. Refractive index display button (n)
8. Brix (not through temperature correction)
9. Adjustable hand - wheel
10. Light-gathering illuminating unit
11. Refracting prisms unit
12. Temperature display button (TEMP)

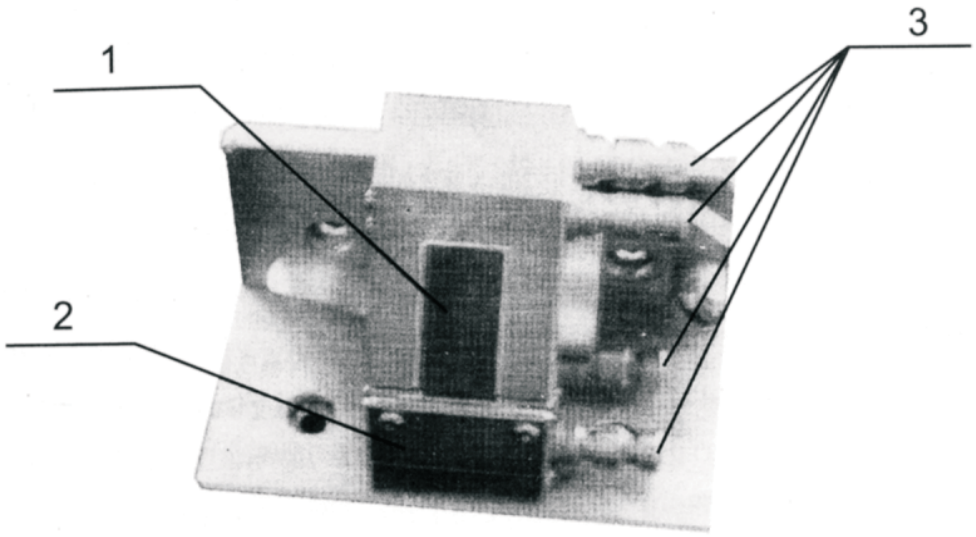
V Operating Procedure

i. When the power switch “POWER” (4.see fig. 2) is pressed, the illuminating lamp in the light-gathering illuminating unit (10) lights up; and at the same time, the display window (3) display “00000” a few seconds later.

ii. Open the refracting prisms unit (11), and remove the mirror-cleaning paper. Which is put in between the two prisms when the instrument is idle to prevent the hard particles possibly remaining on the prisms from damaging the working surfaces of the prisms. Only single-layer mirror cleaning paper is needed.

iii. Check the surfaces of the upper and lower prisms, and carefully clean their surfaces with water or alcohol. After a sample is measured. The surfaces of the two prisms should also be cleaned carfully, because a little of the original sample remaining on the prisms will affect the measuring accuracy of the next sample.

iv. Put the sample to be measured ont eh working surfaces of the lower refracting prisms. If the sample to be measured is king of liquid, a clean dropper may be used to suck in one or two drops liquid sample and them put drops on to the working surfaces of the refracting prism. After that, the cup of the upper light-intake prism should be put on. If the sample to be measured is a kind of solid substance. the solid sample must have a smooth polished surface that should be wiped clean before performing the measurement. Put one or two drops of a transparent liquid (such as naphthalene bromide), the refractive index of which is higher than of the solid sample, on to the working surfaces of the refracting prism, then put polished surface on the working surface of the refracting prism and let them have good contact (see fig. 3). When measuring the solid sample, there is no need to put on the cup of the light-intake prism.



1. Light - intake prism 2. Refracting Prism
3. Thermostat (a mechanism used for flow of the constant temperature water)

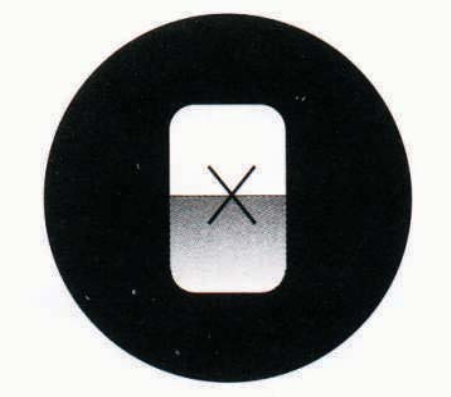
v. Rotate the rotating arm and collecting lens cone of the light - gathering illuminating unit so as to make the light-intake surface of the upper light - intake surface of the upper light-intake prism (when measuring the liquid sample) or the light - intake surface in front of the solid sample (when measuring the solid sample) be illuminated evenly.

vi. Observe the field of view by means of the eyepiece (1), and at the same time, rotate the adjustable hand-wheel (9), so as to make the bright area dark area dividing line fall in the

cross-line view field. If you see the field of vew is dark through the eyepiece. You may rotate the adjustable hand-wheel counter clockwise. If you see the field of view is bright, you may rotate the adjustable hand-wheel clockwise. The bright are is at the top of the view field. Under the condition of the bright view field. You may rotate the eyepiece to adjust the visibility for seeing the cross-line clearly.

vii. Rotate the dispersion correction hand-wheel (2) in the notch under the eyepiece sleeve. And at the same time. Regulate the position of the light-gathering lens, so as to get a good contrast between the bright area and dark area in the view field, and to make the bright area-dark area dividing line have the minimum dispersion.

viii. Rotate the adjustable hand-wheel. so as to make the bright area-dark area dividing line b correctly aligned with the cross-point of the cross line (see fig.4)



ix. When the reading display button “READ” (5) is pressed. “00000” in the display window disappears. and “-” is displayed : and a few seconds later. “-”disappears. and the refractive index of the sample being measured will be displayed in the display window. If you want to know the Brix value of the sample being measured. you may press the Brix (not through temperature correction) display button “BX” (8) or press the Brix (through temperature correction, ICUMSA) display button “BX-TC” (6) The three buttons “n_D^{20}” (7). “BX-TC”, and “BX” are used to select the measuring modes. After a measuring mode is selected. When the button “READ” is pressed. the displaye window will display the data in accordance with the pre-selected measuring mode. Sometimes, when the button “READ” is pressed, “-” is displayed. and a few seconds later. “-” disappears, and the display window becomes completely dark without any other displayed contetes. It means that there is something wrong with the instrument, the instrument can not operate normally now. And it meeds to be inspected or repaired. When the selected measuring mode is “BX-TC” or “BX”. if the rotation of the adjustable hand-wheel is out of the Brix measuring range (0-95%) When the button “READ” is pressed, “-” will be displayed in the display windows.

x. If you want to measure the temperature of the sample. you may press the temperature display button “TEMP” (12), and the display window will display the temperature value of the sample being measured. The measurement of the samples temperature can always be performed except when the display window displays “-” after the button “READ” is pressed . The pressing of the button “TEMP” is ineffective. When the temperature is displayed. if you press the button “n_D^{20}” or button “BX-TC” or button “BX” the original refractive index or Brix will be displayed in the display window. In order to distinguish the displayed values between temperature and Brix there will be a sign of “” added

before the temperature value, a sign of “” added before the vale of BX-TC, and a sign of “”added before the value of BX,

xi. After the measurement of the sample is completed, the refracting prisms unit must be carefully cleaned with alcohol or water (when the sample is sugar solution)

xii. There is a mechanism used for flow of the constant temperature water in the refracting prisms unit of the instrument. If you want to measure the refractive index of the sample at a specified temperature, an external thermostat can be connected to this instrument. Thus, you can perform the measurement of the sample, after the temperature is regulated to the value you required.

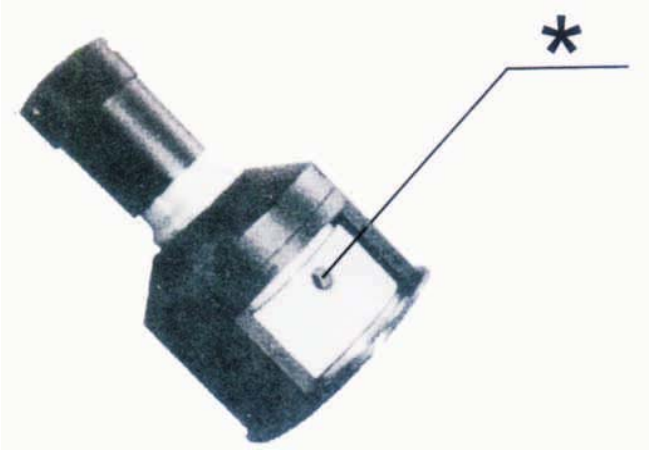
xiii. first. send out a random character, then wait to receive (Parameter : baud - rate 2400. date-bits8. stop - bit 1, byte length 18)

Remark :

- It is possible to appear the phenomena that the instrument reset automatically or stop working (seldom seen). It results from external strong static or electric network flu-ctuation. You could cut off power supply and turn on the instrument again.
- You should connect the water temperature correctly if measuring the refractive index of the sample at a specified temperature. The water temperature could bear definite pressure (no more than 0.5MP). Incorrect connection or not clamping could result in the danger of electricity.

VI. Calibration of the instrument

The instrument should be calibrated periodically, or when the measuring data is under suspicion, the instrument may also be calibrated. When making the calibration, distilled water or glass standard block should be used. if there is an error between the measuring data and the standard doneyou may use an inner - hexagon spanner, let it go into the small hole of the dispersion correction hand-wheel (2), and rotate the inside screw carefully, so as to make the cross lin cross lin on the division plate move up and down (see fig.5) Then perform the measurement again until the measuring data meets the requirement.



***Screw Hole**

When the sample is the standard block, the measuring data should conform to the specified data on the standard block. If the sample is distilled waer, the measuring data should coincide with the data listed in the following table.

Temperature	Refractive index	Temperature	Refractive index
(ºC)	(n_D)	(ºC)	(n_D)
18	1.33316	25	1.33250
19	1.33308	26	1.33239
20	1.33299	27	1.33228
21	1.33289	28	1.33217
22	1.33280	29	1.33205
23	1.33270	30	1.33193
24	1.33260		

VII. Maintenance

i. The instrument should be positioned in a dry and well ventilated place where the temperature is rather suitable, so as to prevent the optical components of the instrument from becoming damp and going moldy.

ii. When moving the instrument, you should hold its bottom in the palm, not use rocker arm of the light-gathering illuminating unit (10)in order to avoid breaking the instrument.

iii. Before and after using the instrument, or when changing the sample, the working surface of the refracting prisms system must be cleaned and wiped.

iv. No solid impurity is permitted to exist in the sample to be measured. When measuring the solid sample, the working surface of the refracting prisms should be prevented from being roughed and scratched. This instrument is strictly for bidden to measure relatively strong corrosive samples.

v. The instrument should avoid violent vibrafion and shock so as to prevent the optical components from being broken or loosened, for keeping the accuracy of the instrument.

vi. If the lamp bulb in the light-gathering illuminating system is out of order, first you should cut, off power supply, remove the collecting lens cone axially, screw the faulty bulb off anti-clockwise, change the new one and screw down clockwise, after loading the collecting lens cone, turn on the instrument. Observing the facula projected on surface of refracting prisms, if it located in center, it is ok. If deviates. Regulate the position of the lamp bulb (join socket) right and left (by loosening the side fixed screw), so that the light can be gathered on the light-intake surface of the refracting prisms and no obvious inclination will occur.

vii. Since the collecting lens of the instrument is made of plastics, in order to prevent its surface from being damaged by the corrosive sample, when you use the instrument, you should cover the collecting lens with a transparent plastic hood

viii. When the instrument is not used, it should be covered with a plastic cover hood or put into a box.

xi x. The user is not allowed to disassemble and assemble the instrument arbitrarily. If the instrument is out of order, or the accuracy requirement can no be reached, it should be repaired without delay.

VIII. Complete set of the instrument (refer to packing list)

IX. Appendix one : how to protect and use naphthalene bromide correctly

- Naphthalene bromide is the strongly corrosion liquid. When using the instrument every time, you should carefully clean the surfaces that are put some drops of Naphthalene bromide with alcohol.
- The skin touched the naphthalene bromide will not result in adverse reaction. But you should wash you hands after using.
- Eating fro bidden. In case of splashing in eyes or mouth, please clean with water immediately.

X. Appendix two

In case of an interruption the mains longer than the specified (10me) time, the power supply unit of the equipment is switched off. The switch-on may be carried out by the operator. In case of a disturbance like EFT (Electrical Fast Transients) occurring on AC power lines, the indication of the data will be incorrect or reset. The operator should push the “Ready” button to recover the normal operation.
In case of a ESD (Electromagnetic Discharge) occurring on the equipment, especially on the front panel. The equipment will be reset. The operator should push the “Ready” button to recover the normal operation.

LIMITED WARRANTY

ACZET products are warranted against defects in materials and workmanship from the date of delivery through the duration of the warranty period. During the warranty period Citizen will repair, or, at its option, replace any components(S) that proves to be defective at no charge, provided that the product is returned, freight prepaid, to ACZET.

This warranty does not apply if the product has been damaged by accident or misuse, exposed to radioactive or corrosive materials, has foreign material penetrating to the inside of the product, or as a result of service or modification by other than ACZET. In lieu of a properly returned warranty registration card, the warranty period shall begin on the date of shipment to the authorized dealer. No other express or implied warranty is given by Aczet Pvt. Ltd.

As warranty legislation differs from state to state and country to country, please contact citizen or your local ACZET dealer for further details.

ACZET service center will repair the product free of charge subject to terms & condition mentioned below.

TERMS & CONDITION

1.It covers only weighing balance purchased from authorized channel and does not covers accessaries like Battery, Adaptor, RS232 cable, Pan, Pan support etc

2.It does not cover the product of which model and serial number has been altered, removed or defaced and / or is open by unauthorized person and found void sticker has been tampered.

3.This warranty is non-transferable and applicable only to first end user purchasing the product from authorized dealer.

4.For repair based on this warranty you need to hand over this product or send this product to address mentioned in warranty card in original packing, enclosing copy of this warranty card.

5.Aczet Pvt. Ltd. shall not be liable for any consequential damages.

WARRANTY REGISTRATION

aczet

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NAME :- ----------

ADDRESS :- ----------

TEL NO. :- ---------- MODEL NO. :- ----------

SERIAL NO. :- ---------- PURCHASE DATE :- ----------

BRANCH / DISTRIBUTOR / DEALER CONTACT DETAILS

STAMP / SIGN

WARRANTY PERIOD :- ----------

Owners Signature / Date

SEND YOUR WARRANTY CARD DULY FILL TO ABOVE ADDRESS FOR REGISTRATION