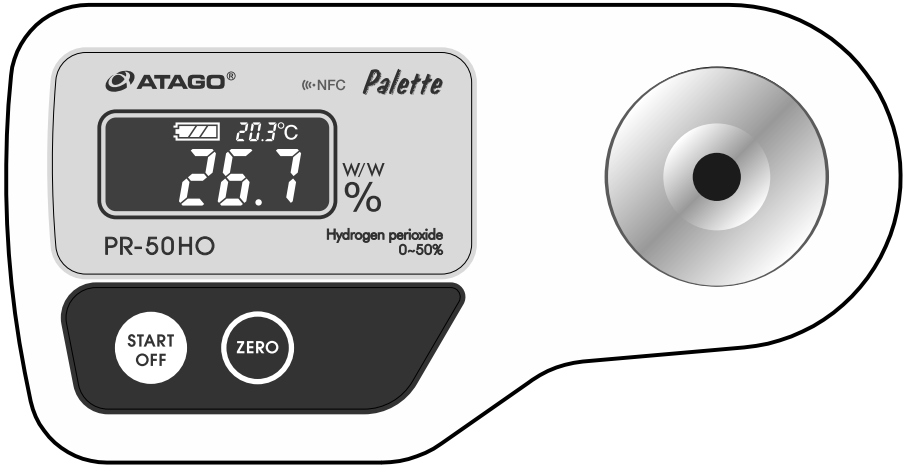
3478-E13

DIGITAL REFRACTOMETER

PR-50HO

Instruction Manual Cat. No. 3478



PRODUCT REGISTRATION & WARRANTY CARD
https://www.atago.net/registration/english/registration.php

When a malfunction is suspected!

Malfunctions often come from low battery.
Check the battery first, and if the battery is low, replace it with a new battery.

⚠ Caution

Be sure to read this caution before using the instrument .

Durability of the case of this instrument

The case of this instrument is made of "ABS resin".

●If this instrument is exposed to steam, there is a possibility that the case of the instrument may crack. Therefore, keep this instrument away from steam.

●Since there is a possibility that ABS resin is damaged by the following solvents, give attention to this matter.

Solvents by which ABS resin is easy to be damaged

- ●Aqua regia
- ●Chromic acid
- ●Chlorosulfonic acid
- ●Hydrobromic acid
- ●Nitric acid
- ●Hydrofluoric acid anhydrous
- ●Sulfuric acid
- ●Phosphoric acid
- ●Ethyl acrylate
- ●Butyl acrylate
- ●Ethyl acetoacetate
- ●Acetophenone
- ●Benzyl benzoate
- ●Ethyl benzene
- ●Ethylen oxide
- ●Ethylene diamine
- ●Ethylene chlorohydrin
- ●Epichlorohydrin
- ●Ethyl chloride
- ●Benzyl chloride
- ●Methyl chloride
- ●Chlorinated solvents
- ●Xylene
- ●Cresol
- ●Chloroacetone
- ●Chlorotoluene
- ●Chloroform
- ●Acetic acid
- ●Amyl acetate
- ●Isopropyl acetate
- ●Ethyl acetate
- ●Butyl acetate
- ●Propyl acetate
- ●Methyl acetate
- ●Diphenyl oxide
- ●Diisopropyl ketone
- ●Carbon tetrachloride
- ●Dioxane
- ●Cyclohexanone
- ●Dichlorobenzene
- ●Dibutyl phthalate
- ●Dimeythyl formamide
- ●Dimeythyl aniline
- ●Phenol
- ●Ethyl mercaptan
- ●Tetrahydrofuran
- ●Trichloroethylene
- ●Toluene
- ●Ethylene dichloride
- ●Methylene dichloride
- ●Nitroethane
- ●Nitropropane
- ●Nitrobenzene
- ●Nitromethane
- ●Perchloroethylene
- ●Fluorobenzene
- ●Freon
- ●Methyl methacrylate
- ●Methyl isobutyl ketone
- ●Methyl ethyl ketone
- ●Chloroacetic acid
- ●Monochlorobenzene
- ●Chlorine liquide
- ●Thionyl chloride
- ●Sodium peroxide
- ●Bromine
- ●Benzine
- ●Lacquer

Note : Since there is no guarantee that ABS resin will not be damaged by some solvent other than the above ones, be careful with similar solvents.

CONTENTS

1. Precautions for use

Introduction

Thank you for purchasing the instrument.

Before using your the instrument, read this instruction manual carefully and understand how to use it. After reading this manual, keep it on hand for future reference. In this manual ″For safe use″ describes the important items necessary for safety. Read it carefully.

For safe use --- Be sure to observe the following.

This instruction manual describes the items which you are required to observe in order to use the instrument safely to prevent injury to you and other people and damage to your property.

The explanation of the indications and symbols of those items are as follows. Understand them first and then read the following pages to use your this instrument correctly. Read it carefully.

Explanation of indications

⚠ WARNING	If this indication is neglected and the instrument is handled incorrectly, the user may be seriously injured and may result in death.
⚠ CAUTION	If this indication is neglected and the instrument is handled incorrectly, the user may be injured and the user's property may be damaged.

Explanation of symbols

⚠	This symbol denotes an item which you are warned (or cautioned) of. The contents of warning are described in detail in or near the △.
⊘	This symbol denotes an action which you must not do (a prohibited item). The contents of prohibition are described in detail in or near the ○.
❗	This symbol denotes an action you must do. The contents of instruction are described in detail in or near the ●.

Handling of this instrument

⚠ WARNING

◇When measuring a substance harmful to the human body, be well aware of its properties and put on protective gloves, mask, etc.

◇If the instrument is dropped or is subjected to a strong shock, have it inspected by an ATAGO distributor.
Fire or malfunction may result if the instrument is used.

◇Do not attempt to repair, modify, or disassemble the instrument yourself.
Improper servicing may result in fire, electrical shock, or burns.

Handling of this instrument (Continued)

⚠ CAUTION

◇Do not apply water or sample over any part other than the surface of the prism.
Application on any other part of the instrument may result in a malfunction.

◇If this instrument is used to measure very hot or highly acidic samples, the prism may be damaged resulting in inaccurate measurements.

◇The prism is made of optical glass. Do not tap or contact its surface with any metal tool such as a spoon or tweezers.
If the surface of the prism is damaged, inaccurate measurements will occur.

◇After taking a measurement, completely wipe off any sample on the surface of the prism and surrounding area with tissue paper soaked in water.
Then remove any remaining moisture completely with dry tissue paper.

◇If this instrument is exposed to steam, there is a possibility that the case of the instrument may crack. Therefore, keep this instrument away from steam.

◇When transporting the instrument, place it in its original box.

◇When measuring in an area where direct light and/or strong outdoor sunlight is present, the ELI warning message [nnn] may be displayed. If warning message is displayed, cover the sample stage of the unit and press the START/OFF button again to take another measurement.

◇Carefully read this instruction manual and fully understand the function and operation of each part of the instrument before use.
◇Check that each part of the instrument operates normally before use.
◇Check the necessary operations such as zero setting according to the instruction manual.
◇The manufacturer shall not be held responsible for any or all damages as a result of use of the instrument for those other than its intended purposes (measurement of liquid).
◇The prism mounted on the sample stage that is in contact with a sample under measurement is a consumable item.
◇Ensure that if use of the instrument has undesired effects on the consumption of the measured materials, etc., ATAGO shall not be held responsible for the result.

Handling of battery

⚠ WARNING

◇Make sure to use a specified battery or that supplied with the refractometer as an accessory. When loading the refractometer with a battery, pay heed to the polarities of the battery.
If a battery out of the specification is used, it may cause smoke or fire because some batteries are different in the voltage and polarities.

◇Don't heat, shortcircuit, burn a battery or take it apart. If done so, it may cause burst or fire.

⚠ CAUTION

◇Be sure to always use alkaline batteries.

◇When keeping or disposing a battery, protect both poles with insulating tape, etc.
If a battery is kept or disposed as the poles are not covered, it may cause shortcircuit, burst or fire.

Items to be observed when using

Environmental conditions

◇Use the instrument where the temperature is between 5 to 40℃.
◇Use the instrument where the humidity is below 90%RH.
◇Do not leave the instrument in a location exposed to direct sunlight or near a heating unit where the temperature may rise.
◇Do not change the environmental temperature of the product suddenly.
◇Do not place the instrument in a place where it may be subject to strong vibrations.
◇Do not use the instrument where there is much dust.
◇Do not leave the instrument where the temperature is extremely low.
◇Do not leave the instrument in a damp place.
◇Do not place or drop heavy objects on the instrument.

Handling

◇Do not drop the instrument or subject it to any strong shock.

Daily maintenance

◇If the instrument becomes dirty, wipe it with a soft cloth.
◇Do not use benzine, paint thinner, etc. to clean the instrument.

2. Confirmation of package

Please confirm the following contents of the package when the unit is unpacked.

●Main unit	1
●006P Alkaline Battery	1
●Instruction Manual	1

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

3. Names and roles of each part

(1) Liquid Crystal Display (LCD)

Measurement values, temperature, and remaining battery charge are displayed.

(2) Sample Stage

The prism on which sample is dripped is existing at the center of the Sample Stage.

(3) ZERO setting button

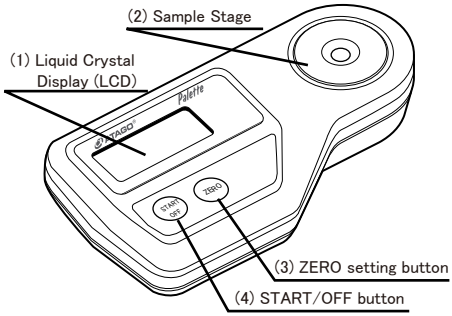
Press the ZERO setting button at zero setting of the unit.

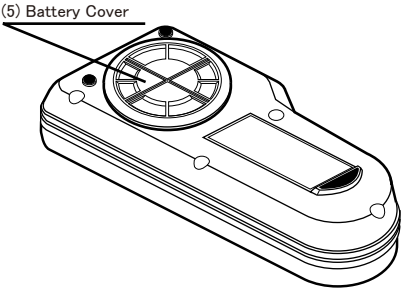
(4) START/OFF button

Press the START/OFF button to start measurement. Note that the measurement value goes off if this button is kept pressed for over 2 seconds.

(5) Battery Cover

Remove this cover to set or replace the battery.



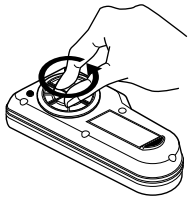


4. Inserting of battery

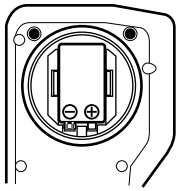
⚠ CAUTION

- ●When loading the instrument with a new battery, carefully do it not to make a mistake in connection of the positive (+) and negative (−) poles of the battery. If they are wrongly connected, it causes a trouble or damage of the refractometer.
- ●Press the START/OFF button or ZERO setting button to power on the instrument. Thus, there is no power button on this unit.
- ●When the voltage of the battery is low after some time, purchase a new 006P alkaline battery and replace the old battery with the new one. Be sure to carry out zero setting when the battery is replaced.
  * When purchasing a battery, be sure to check the expiration date.
- ●Remove the battery from the unit when the unit is not to be used for a month or longer. Failure to remove the battery before prolonged storage may result in leakage.

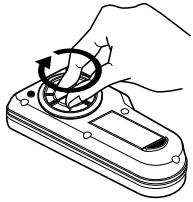
(1) Turn left the Battery Cover as illustrated for opening.



(2) Insert a battery correctly as to its polarity.

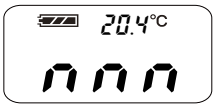


(3) Turn right the Battery Cover by your bare hands for closing.



5. ELI function

When measuring a sample, if this instrument is subject to intense light, such as direct sunlight, light at dusk, or a spotlight, the ELI* function will display the warning message "nnn" immediately after the START/OFF button (or the ZERO setting button) is pressed.



In this situation, shade the sample stage with your hand, and then press the START/OFF button (or the ZERO setting button) again.

* External Light Interference (ELI)

Note :
When intense light penetrates the prism of a digital refractometer, the light waves interfere with the sensor resulting in inaccurate readings.
To ensure accurate measurement results each time, this instrument is programmed with the ELI function to display the warning message "nnn" when intense direct light is detected. Forming a habit of shading the sample stage with your hand and re-pressing the START/OFF button (when the warning message from the ELI function is displayed) will ensure accurate measurement results each time.

*When the battery is low, [nnn] may be displayed. When [nnn] is displayed, even after repeated measurements are taken with the sample stage covered, replace the battery.

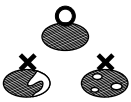
6. Zero setting

⚠ CAUTION

- The refractometer needs the "zero setting" before it is used for the first time in a day. Moreover, if the ambient temperature changes during the daily work with the refractometer, it needs the zero setting again.
- The zero setting is also needed whenever the battery is replaced.
- Do not use any metallic implement for dropping water on the prism because the metal tool possibly damages the prism surface.

(1)Clean the prism surface thoroughly.

(2)Apply tap water.



Completely cover prism surface
(Min. 0.1mL)

(3)Press the START/OFF button.

(4)Confirm zero-setting.

Measurement : 0.0%

Zero-set correctly.

Measurement : not 0.0%

Perform zero-setting.

(4)-2 Press the ZERO setting button.

Flashes 3 times.

000 is displayed.

Zero setting is complete.

(5)Wipe off the water on the prism surface completely with tissue paper.

*If [nnn] is displayed, covering the sample stage by hand, press the ZERO setting button again.

7. Measurement on sample

⚠ WARNING

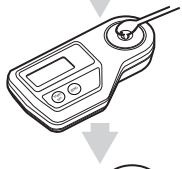
●When measuring a substance harmful to the human body, be well aware of its properties and put on protective gloves, mask, etc.

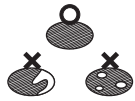
⚠ CAUTION

●Do not use any metallic implement for sampling because the metal tool possibly damages the prism surface.
●Do not apply water or sample over any part other than the surface of the prism. Application on any other part of the instrument may result in a malfunction.

(1)Clean the prism surface thoroughly.

(2)Apply a sample.





Completely cover prism surface
(Min. 0.1mL)

(3)Press the START/OFF button.

(4)Measurement value is displayed.

(5)Wipe off the sample.
Wipe off the sample, and wipe and clean the Prism and the Sample Stage with tissue paper moistened with water.

*If [nnn] is displayed, covering the sample stage by hand, press the START/OFF button again.

8. About Data Transmission Function

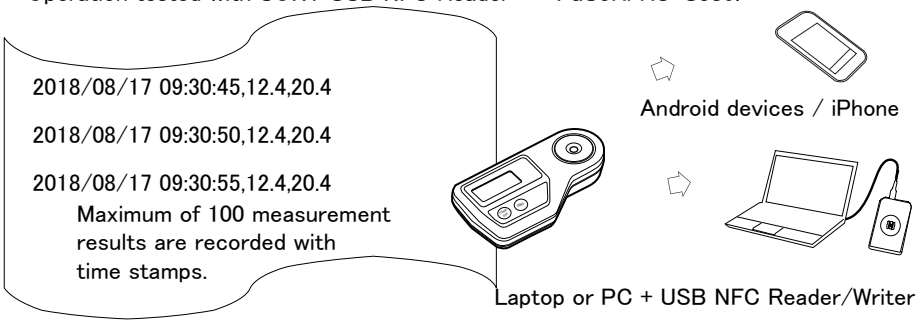
⚠ CAUTION

- When the history of measured data reaches 100, no further measurements can be taken unless all 100 records are deleted.
- The data transmission function can be set to ON / OFF.

8-1. Introduction

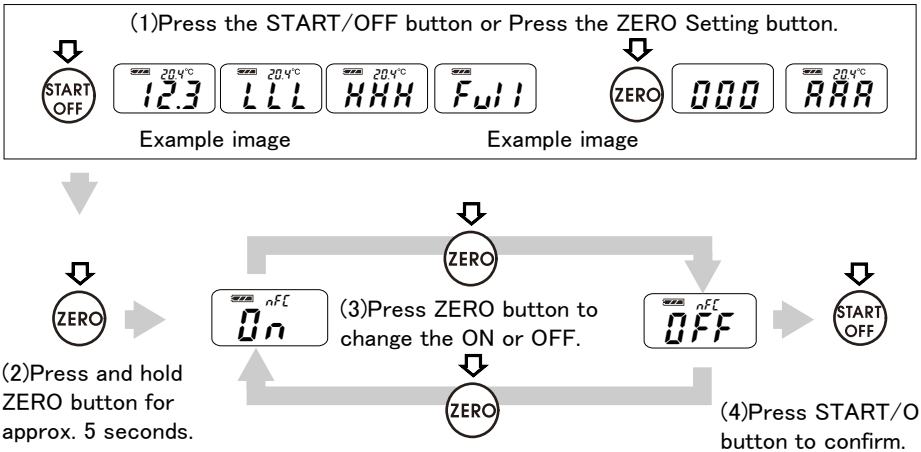
This instrument stores maximum number of 100 measurement data.This instrument is equipped with NFC(Near Field Communication) technology.Data history can be accessed by bringing PR-NFC to any Android devices, iPhone or PC-linked USB NFC Reader/Writer* (in conformance to PC/SC specification).

* Operation tested with SONY USB NFC Reader PaSoRi RC-S380.



Example of data history

8-2. How to turn ON/OFF the data transmission function.



8-3 Software installation

Android devices / iPhone

Applicable Application Software (app) "NFC Reader"

* If an NFC tag reader app is already installed on the Android devices or iPhone, this app can be used.

Laptop or PC + USB NFC Reader/Writer

Data history can be exported to Microsoft(R) Excel (R)(for Windows(R)) using a NFC software "ATAGO Logger (NFC)."

* The app "ATAGO Logger (NFC)" is available for download : http://www.atago.net/ur/

Example of data history read out.

2017/8/17 9:30	LLL	20.5
2017/8/17 9:31	12.3	20.4
2017/8/17 9:32	12.3	20.4
2017/8/17 9:34	AAA	20.4
2017/8/17 9:43	000	20.4
2017/8/17 9:43	000	20.3
2017/8/17 9:45	26.9	20.3
2017/8/17 9:46	26.9	20.1

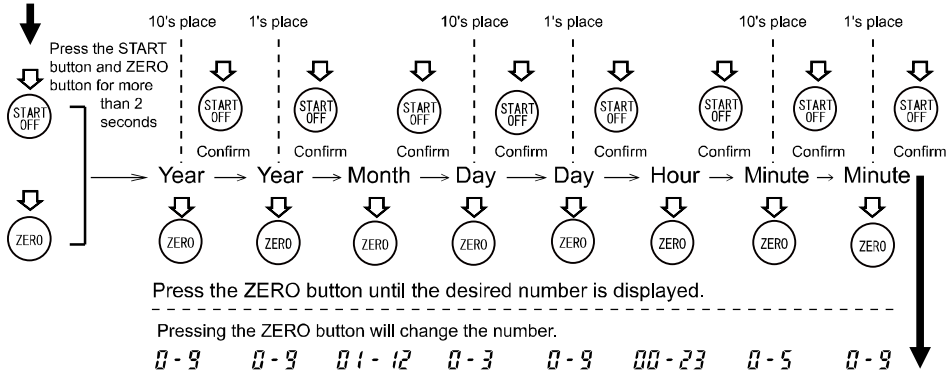
LLL : Lower limit error.
HHH : Upper limit error.
000 : Zero setting complete.
nnn : External light error.
AAA : Zero setting error.

8-4. Date and time setting

Set the date and time (year [the last two digits of the western calendar], month, date, time and minute) prior to data history readout.

Reset the date and time when batteries are removed for 24hours or more.

While powered on…(Example image)



* For "time", set the time in 24 hour notation

Top right screen display during date and time set up

Year : 99 Month : 12 Day : 31

Hour : 24 Minute : 60

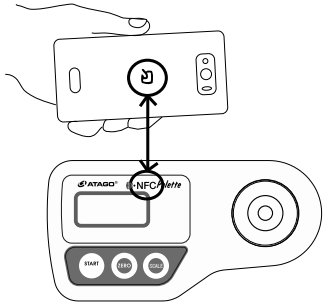
(Seconds : Fixed 00)

8-5. Data history readout

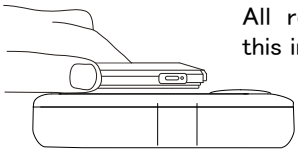
Android devices / iPhone

(1)Launch NFC Reader (or other NFC tag reading app).

(2)Position NFC on Android device or iPhone to the 'NFC' logo at the center portion of the this instrument then bring in contact.



＊Do not move it.
(Hold for 1 second or more.)



All recorded data stored in this instrument are read out.

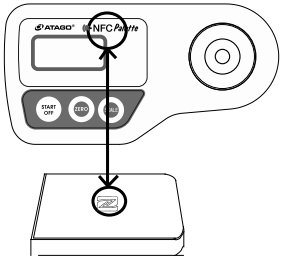
＊NFC position on Android device or iPhone differs to the model.

＊If data history is not read out, bring both in contact and move the one that is over the other device in a forward and back or left and right in a small motion.

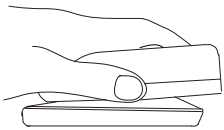
Laptop or PC + USB NFC Reader/Writer

(1)Launch ATAGO Logger.

(2)Bring the center part (where the 'NFC' logo is) of this instrument in contact with the NFC mark on the IC card reader/writer.



＊Do not move it.
(Hold for 1 second or more.)



All recorded data stored in this instrument are read out.

＊Be sure to establish the PC and IC card reader/writer connection in advance by setting up (and installing the driver) IC card reader/writer.

＊Data history can be read out by holding up the USB NFC Reader/writer to this instrument.

＊If data history is not read out, bring both in contact and move the one that is over the other device in a forward and back or left and right in a small motion.

＊Bring this instrument and Android devices, this instrument and iPhone or this instrument and USB NFC Reader/writer as close to each other as possible. (Position it so that the distance between both devices are 5mm or less.)

＊Data history can be read out while this instrument is powered off.

＊Data history readout will not delete the stored data history.

8-6. Delete data history

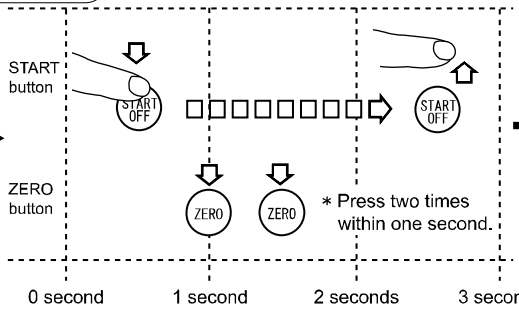
All data history will be deleted from this instrument.

⚠ CAUTION

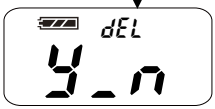
- ●Deleted data history can not be restored.
- ●When the history of measured data reaches 100, no further measurements can be taken unless all 100 records are deleted.
- ●A data history can not be selected.

(1)Quickly (3 seconds or less) do the following button operation.
(a)While pressing the START/OFF button, press the ZERO button two times.
(b)Quickly release the START/OFF button.

While powered on…(Example image)



(2)Press the START/OFF button.



If not deleting the data history.
Press the ZERO button.

START OFF

ZERO

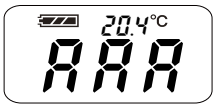
End without deleting the data history.

Delete data history

9. Error messages

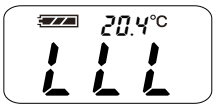
This instrument alarms erroneous or incomplete operation by error messages.
The followings are kinds of error messages.

Zero setting error



●Water is not dripped on the prism surface and Zero setting is made in a state of the prism surface being exposed to the air.
●Zero setting is made with a sample.

Sampling error

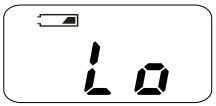


●No sample exists on the prism surface or measurement is made in an incomplete condition.

Range over error

●A liquid of high concentration exceeding the measuring range is measured.

Battery error



●The battery is low. Replace the battery with new one.
●Immediately before the battery is used up, the instrument may, perform erroneous operation, without displaying the error message "Lo". In such a case, replace the battery with new one.

Temperature measurement range "Low Range Over Error"

●The temperature detected is lower than the measurement temperature range (approx. 4℃ or below).

Temperature measurement range "High Range Over Error"

●The temperature detected is higher than the measurement temperature range (approx. 41℃ or above).

External light interference

●Too much light is entering the prism, and the instrument cannot measure accurately.

10. Powering off

The instrument will turn itself off after approximately 30 seconds of inactivity. To manually turn it off, hold down the START/OFF button for more than 2 seconds.

The backlight stays on for 15 seconds after any button is pressed.

11. Automatic Temperature Compensation

The readings are corrected, based on the temperature of the prism, within the automatic temperature compensation range.

【Caution】
Measurements may fluctuate with hot or cold samples. Depending on the difference in temperature, allow the sample to sit for 20 to 60 seconds (to acclimate to the instrument's temperature). Measurements will stabilize once the instrument acclimates to the sample temperature.

12. Storage and maintenance

- ●After use, wipe off a sample adhering to the prism surface and adjacent area with tissue paper wetted with water. Additionally, wipe the prism surface and surrounding area with tissue paper moistened with rubbing alcohol.
- ●When storing this instrument, avoid a damp place or a place which is exposed to the direct sunrays. Dampness will cause blurs on the optical system or it will gather mold, and direct sunrays will deform the casing, disabling the instrument from performing measurement.
- ●Because the casing is made of plastic, it is strictly prohibited to use organic solvents (paint thinner, benzine, gasoline or the like).

13. Specifications

	PR-50HO
Measurement range	Concentration of hydrogen peroxide : 0.0 to 50.0%(w/w)
Resolution	Concentration of hydrogen peroxide : 0.1%　Temperature : 0.1℃
Measurement accuracy	Concentration of hydrogen peroxide :±0.5%
Measurement temperature range	5 to 40℃ (Automatic Temperature Compensation)
Ambient temperature range	5 to 40℃
Sample volume	0.1mL or more
Measurement time	3 seconds (approximately)
Backlight	The backlight stays on for 15 seconds after any button is pressed.
Output	NFC Forum Type 4 Tag　　ISO/IEC 14443 Type A Output category: Date Time, Hydrogen peroxide [g/100g], Temp [degC] yyyy/mm/dd␣HH:MM:SS,xxxxxx,xxxxxx (e.g.)2018/08/17␣09:30:45,␣␣12.3,␣␣20.4
Power supply	006P Alkaline Battery (9V)
International Protection Class	IP 65
Dimensions & Weight	17(W)×9(D)×4(H)cm, 270g

The product is in conformity with the requirements of the EMC Directive 2004/108/EC.

14. Repair and warranty

The instrument is a complicated precision electronic instrument consisting of optical (prism and objective lens) and electronic parts. Since light and electricity are combined in the operation of this instrument, their mutual actions may make it difficult to isolate operational problems. For this reason, repair and adjustment can be complicated and each serviceman is required to have special knowledge of optics and electrical engineering. Do not disassemble or perform any repair on the unit other than the basic inspection and replacement of parts described in this instruction manual (unless you have taken the maintenance technology course in our company and has been certified).

The instrument 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
- Issues caused by battery leakage when using batteries other than the included

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

● Performance parts for repair

ATAGO will endeavor to secure the performance parts for repair up to seven years after manufacturing of this instrument is discontinued. Performance parts are those which are necessary to maintain the operation of this instrument. However, ATAGO may not be able to supply all parts due to discontinuation or modifications by our parts manufacturers. Please understand this matter. Performance part are available through your ATAGO distributor.

● Recommendation of periodic inspection and maintenance (Charged)

We recommend to have your refractometer inspected periodically (once in two years, or so) to ensure years of dependable and accurate use.

Ask your ATAGO distributor for the periodic inspection (charged).

- Periodic inspection includes:

◆ Inspection, confirmation, and replacement of performance parts

◆ Inspection and adjustment of span

ATAGO CO.,LTD.

When asking about repair or other matters, be sure to notify us of the serial No. of your refractometer.

ATAGO CO.,LTD.

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