










Error Messages

The following messages alert the user when an operation has failed.

| | | | |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
|  | The battery is low. |  | The prism temperature is below the temperature range. |
|  | The ZERO button was pressed with nothing or something other than water on the prism. |  | The prism temperature is above the temperature range. |
|  | The START button was pressed with nothing or an insufficient amount of sample on the prism. |  | The instrument is faulty. (Replace the batteries. Contact ATAGO if this error persists.) |
|  | The sample measured outside the measurement range. When water is measured. |  | When the "New Cleaner Solution Memory" function is performed with nothing on the prism surface. |
|  | Too much light is entering the prism, and the instrument cannot measure accurately. (Shade the sample stage with your hand and take a measurement again.) | | |

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. Wait for approximately 20 seconds to press the START button. Measurements will stabilize once the instrument acclimates to the sample temperature.

Storage and Maintenance

Store the instrument in a dry place away from direct sunlight. Exposure to humidity and heat may damage the instrument.

Clean and dry the sample stage thoroughly, following the "Cleaning" instructions. Store the unit away from direct sunlight at a stable temperature with as little fluctuation as possible.

Repair and Warranty

The instrument is warranted for one year from the date of purchase. This warranty is void if the instrument shows evidence of the following. Send the included batteries as well if they are still in use.

- Having been disassembled by unauthorized personnel
- Having been misused and/or operated outside the environmental specifications
- Damages to the prism and/or sample stage
- Leakage from batteries other than those included with the unit
- Water damage or having been dropped

Repair services are available for a fee after the warranty expires. Contact an ATAGO authorized service center for service and support.

Please have the serial number information ready when contacting a service center.

Specifications

| | | | |
|-----------------------------------------------------------|------------------------------------------------------|--------------------------------|--------------------------------------------------------------------------------|
| Measurement range (Automatic temperature compensation) | Contam. % 0.0 to 30.0 Temperature 10.0 to 100.0°C | Sample volume | At least 0.3mL |
| Resolution | Contam. % 0.1 / 0.1°C | Maximum number of data history | 100 |
| Accuracy | Contam. % ±1.0 / ±1°C | Output | NFC Forum Type 4 Tag ISO/IEC 14443 Type A |
| Automatic temperature compensation range | 10 to 100°C | Output category | :Date Time, Contam. [%], Temp [degC] (e.g.) 2017/08/17 09:30:45, 14.0, 20.4 |
| Ambient temperature range | 10 to 40°C | Backlight | The backlight stays on for 30 seconds after any button is pressed. |
| International Protection class | IP65 | Battery life | Approx. 11,000 measurements (when using alkaline batteries) |
| Power supply | Two (2) AAA alkaline batteries | Dimensions and weight | 55 (W) x 31 (D) x 109 (H)mm, 100g (main unit only) |
| Measurement time | Approx. 3 seconds | | |

Patent Granted in Japan, United States, Germany, China and Taiwan.

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4558-E05

"Pocket" Potassium carbonate Refractometer

PAL-Hydrocarbon Cleaner

Cat.No.4558

ATAGO®
Instruction Manual

Parts

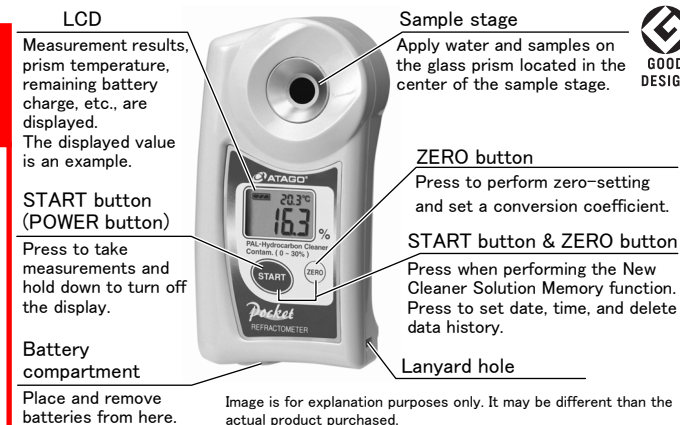
The warranty period extension method 1 year → 2 years

The warranty period will be extended from 1 year to 2 years when you register customer information. ATAGO Logger NFC can also be downloaded at the same time.



QR code

Trouble scanning the code? Access this link
<https://www.atago.net/ur/index.php?l=en>



GOOD DESIGN

Please read the "Preparation" section on the inside page carefully.

Contents

- ◆ Main unit.....1
- ◆ Instruction Manual (this book).....1
- ◆ Calibration Report ..1
- ◆ AAA batteries2

AAA alkaline batteries are included. Remove the tape from the battery compartment before inserting the batteries.

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

Introduction

Thank you for purchasing the instrument. Carefully read and follow all instructions. Keep this manual for future reference.

Safety Instructions

Read and follow all safety instructions before operating the instrument. Failure to comply with the following instructions may result in personal injury or property damage.

WARNING

- ◇ Ensure safety when handling hazardous materials. Observe precautionary measures and use protective equipment. Be aware of the hazards of such chemicals and emergency response guidelines.
- ◇ ATAGO may not be held liable for any injury or damage arising in connection with handling of hazardous materials during the use of the instrument.
- ◇ Do not drop the instrument or subject it to strong physical shock.
- ◇ Do not attempt to repair, modify, or disassemble the instrument.

CAUTION

- ◇ Carefully read this manual to have basic knowledge of the function of each component.
- ◇ ATAGO is not liable for any loss and damage caused by the measurement and use of this instrument.
- ◇ Some acids may corrode the glass prism and/or metal sample stage, which may cause erroneous measurements.
- ◇ Do not use metal tools, such as a spoon, as they may scratch the prism, resulting in erroneous measurements.
- ◇ Do not use water above 50°C to rinse the instrument.
- ◇ Only use the specified battery type. Observe proper polarities, properly aligning the anodes and cathodes.
- ◇ Store the instrument away from direct sunlight/heat sources and excessive amounts of dust/debris.
- ◇ Do not expose the instrument to a rapid change in ambient temperature.
- ◇ Do not subject the instrument to strong vibration.
- ◇ Do not subject the instrument to extreme cold temperature.
- ◇ Do not place the instrument under anything heavy.
- ◇ Loosen the battery compartment cover for air transportation.

<International Protection Classification IP65>

- ◇ The instrument is water-resistant, not waterproof, and should not be submerged.

<Chemical Resistance of Body Case>

- ◇ The body case is made of resin. Do not expose it to water vapor. Some solvents may compromise the structural integrity of the instrument.

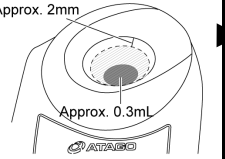


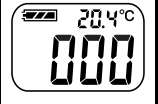
Measurement

Preparation

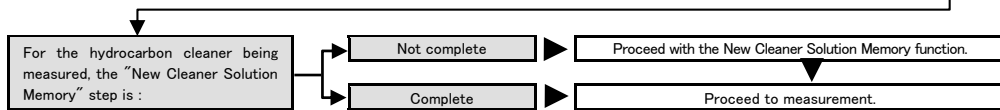
● Zero-setting

[Caution]

◇ Zero-set the instrument at the beginning of each day before use as well as after replacing the batteries.

1. Wipe the prism clean and apply about 0.3mL of tap water.
Approx. 2mm

2. Press the START button, and after "--" appears, "HHH" and the prism temperature are displayed.

3. Press the ZERO button while the water is on the prism.

4. Zero-setting is complete when "000" blinks twice and then stops.


Wipe the prism clean with tissue paper.






● New Cleaner Solution Memory

This operation will record the refractive index of new hydrocarbon cleaning solution to the instrument.

[Caution]

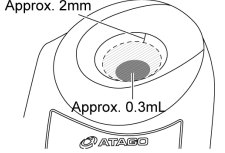


◇ This operation must be completed before using the instrument for the first time after purchase as well as before using a different type of hydrocarbon cleaner solution.

1. Wipe the prism clean, and apply about 0.3mL of new hydrocarbon cleaner solution on the prism.
Approx. 2mm
Approx. 0.3mL

2. Press the START and ZERO buttons simultaneously while it is turned on.

[Caution] Press the START and ZERO buttons for more than 2 seconds.
→NFC Date and time setting
3. After "CCC" has flashed, "CCC" will display and the New Cleaner Solution Memory function is completed.

***Make sure that "CCC" is displayed.**

Measurement

[Caution]

- ◇ Do not splash water above 50 °C. The plastic may warp, which may compromise the water resistance.
- ◇ The displayed temperature is that of the prism and may not necessarily match the temperature of the sample.

1. Wipe the prism clean and apply about 0.3mL of the sample.
Approx. 2mm
Approx. 0.3mL

2. Press the START button.

3. After "--" appears, the measurement and the prism temperature are displayed.


< LCD Auto Shut-off >
The instrument will turn itself off after 2 minutes of inactivity. To manually turn it off, hold down the START button for more than 2 seconds.
< For oily/fatty samples >
Try stirring the sample on the prism while measuring to improve the repeatability of oily/fatty samples.

Cleaning

1. Wipe off the sample.
2. Clean the prism and sample stage with a mild soap, and rinse well with water thoroughly.
3. Dry the area with tissues thoroughly.



Measurement Value

This instrument converts the difference between the refractive index of "new" hydrocarbon cleaner solution and "oil contaminated mixture" and displays as contamination %. The "difference in refractive index vs. contamination %" will vary by the type of hydrocarbon cleaner solution and the type of oil contaminant. For this reason, the contamination % displayed by the instrument and the actual contamination % may vary. Use the conversion function when the actual contamination % is desired.

Conversion Function

Find the conversion coefficient from the instrument's measurement results and the actual contamination %, and once the coefficient is set on the unit, it will display converted values.


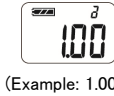
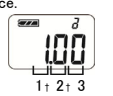
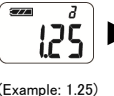
$$y = ax \quad y: \text{Converted value (Actual contamination \%)} \quad a: \text{conversion coefficient} \quad x: \text{Measurement value from instrument}$$

Obtaining conversion coefficient

1. Mix together 95g of new hydrocarbon cleaner solution with 5g of contaminant oil to create a 5% contaminated sample mixture.
2. Measure the mixture after performing the "New Cleaner Solution Memory" function with new solution.
3. Divide the contamination% by the value from step2 to find the conversion coefficient.

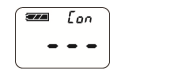
Example: When the measurement result on the instrument is 4.0%, the equation is $5.0 \% \div 4.0 = 1.25$

Setting conversion coefficient

1. Hold down the ZERO button for more than 5 seconds while it is turned on.

2. The current conversion coefficient and 'a' is displayed.

(Example: 1.00)
3. Enter the conversion coefficient.
ZERO to change the number:
0, 1, 2...8, 9, 0, 1, 2...
START to confirm and move to the next decimal place.

4. Once the third digit is confirmed with the START button, the set conversion coefficient will flash 3 times before disappearing from the screen.
Conversion coefficient setting complete

Flash (Example: 1.25) Light off


- To disable the conversion function, set the coefficient value to factory default value (1.00).
- The measurement range is shifted according to the conversion coefficient setting.
- When the conversion coefficient function is active, "Con" will be displayed in the upper part of the screen during measurement.

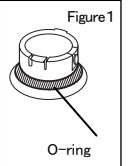
Screen image when the conversion function is on during measurement.

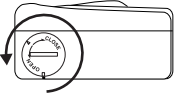
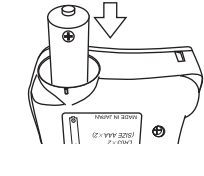
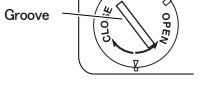


Replacing the Batteries

[Caution]

- ◇ Fasten the battery compartment cover tightly to prevent water ingress or poor connection, which will cause erroneous measurements. Push the cover in firmly and turn.
- ◇ When the O-ring on the cover is dirty or damaged, the water resistance may be compromised. (Figure 1)
- ◇ When the battery icon indicates the low power level () replace both batteries with a brand new set of AAA alkaline batteries (1.5V).
- ◇ Static images may occasionally appear on LCD. Such retained pixel charges do not indicate a faulty display, consume the battery power, or affect the instrument's performance in any way.
- ◇ Check the expiration dates on batteries before purchase.
- ◇ Zero-set the instrument after the batteries are replaced.



1. Insert a coin in the groove on the battery compartment cover. Turn the coin counterclockwise to remove the cover.

2. Insert batteries, observing the correct polarity.

3. Align the cover and push it down.
Groove

4. Close the battery compartment cover by pushing the cover in with a coin in the groove and turning it clockwise until it stops.
***Turning excessively may cause malfunction.**
Open
Close
