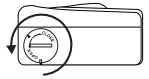
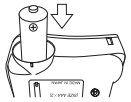
Replacing the Batteries

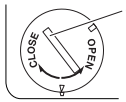
1 Insert a coin in the groove on the battery compartment cover. Turn the coin counterclockwise to remove the cover.



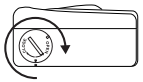
2 Insert batteries, observing the correct polarity.



3 Align the cover and push it down.



4 Close the battery compartment cover by pushing the cover in with a coin in the groove and turning it clockwise until it stops.



Note Close the cover tightly to seal the battery compartment. Water ingress may damage the battery contacts, causing instrument malfunctions.

Note When the battery icon indicates the low power level ( ), replace both batteries with a brand new set of AAA alkaline batteries (1.5V).

Note Zero-set the instrument after the batteries are replaced.

Note Check the expiration dates on batteries before purchase.

Memo Static images may occasionally appear on the LCD. Such retained pixel charges do not indicate a failure, consume the battery power, or affect the instrument's performance in any way.

Brix scale

Brix represents the weight of sucrose in 100 grams of sucrose solution as percentage by weight. When other dissolved solids are present in the solution, Brix conversion may be applied.
Brix is a measure of the total dissolved solids in a solution and indicates the combined concentration of all soluble substances, such as sugar, salt, protein, and acids.

Automatic Temperature Compensation

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

Note 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.

Do not use organic solvents (paint thinner, benzene, gasoline, etc.) on the plastic body case.

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

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	0.0 to 53.0% Brix
Output	Bluetooth Ver 4.0 Maximum communication range: 3 to 7 m Baudrate: 38.4 k/Data length: 8/Prity bit: none RTS/CTS flow control/Stop bit: 1 Transmit data: time, data, Temp. 2014/05/30 15: 02: 21,36.6,23.4,
Resolution	0.1% Brix/0.1 ℃
Accuracy	±0.2% Brix/±1 ℃

Automatic temperature compensation range	10 to 100 ℃
Ambient temperature range	10 to 40 ℃
Sample volume	0.3 ml or more
Measuring time	3 seconds
Power supply	Size AAA alkaline batteries × 2
Battery life	Approx. 10,000 times measurement (when an alkaline battery is used)
International Protection class	IP65 Water resistant
Dimensions and weight	55 (W) x 31 (D) x 109 (H)mm, 100g (main unit only)

The product is in conformity with the requirements of the EMC Directive 2004/108/EC and R&TTE Directive 1999/5/EC.
Patent Granted in Japan, United States, Germany, China and Taiwan.

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1411K Printed in Japan

Digital Hand-held "Pocket" Refractometer

PAL-1 BLT/ i

Cat. No. 4811

4811-E02

ATAGO®

Instruction Manual

Parts

GOOD DESIGN AWARD 2003

LCD
Measurement results, prism temperature, and remaining battery charge are displayed.
The displayed value is an example.

START button
Press to take measurements and hold down to turn off the display.

Battery compartment
Place and remove batteries from here.

Sample stage
Apply water and samples on the glass prism located in the center of the sample stage.

ZERO button
Press to perform zero-setting.

Lanyard hole

Contents

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 30℃ 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 ABS resin. Do not expose it to water vapor or solvents. See the list of "Solvents Harmful to Body Case."

FCC Compliance Statement

MODEL: PAL-1 BLT (CONTAINS FCC ID: P00-WC69)
USA-Federal Communication Commission (FCC)
This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

INFORMATION TO USER:
This equipment has been tested and found to comply with the limit for a Class B digital device, pursuant to Pat 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instructions, it may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:
- Reorient or relocate the receiving antenna
- Increase the distance between the equipment and the receiver.
- Connect the equipment to outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.
Canada-Industry Canada
Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation on this device.
To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.

Caution: Exposure to Radio Frequency Radiation.
To comply with RSS 102 RF exposure compliance requirements, for mobile configurations, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

Zero-setting and Measurement

Date and time setting is required when using for the first time.

Zero-setting

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

1 Wipe the prism clean.

2 Apply tap/ distilled water.

Approx. 2 mm

Approx. 0.3 ml of water

3 Press START.

Zero-setting

4 Press ZERO "000" blinks twice.

Measurement: not 0.0%

Zero-set correctly

Zero-setting is complete

Proceed to Measurement

Measurement

1 Wipe the prism clean.

2 Apply sample.

Approx. 2 mm

Approx. 0.3 ml of sample

3 Press START.

02 — Number of measurements stored (Maximum: 100)

Full — Measurement data Full. Oldest measurements will be overwritten and replaced by new measurements.

Measurement value is displayed

Proceed to Export data history

Note Initial measurements may fluctuate with hot or cold samples. Wait for the instrument to acclimate to the sample temperature, approximately 20 seconds, to press START. Alternatively, press START multiple times until measurements become stable.

Note The displayed temperature is that of the prism and may not necessarily match the temperature of the sample.

Note Try stirring the sample on the sensor while measuring to improve the repeatability of oily/fatty samples.

Memo The instrument will turn itself off after 2 minutes of inactivity. To manually turn it off, hold down START for more than 2 seconds.

Cleaning

1 Wipe off the sample, rinse with water, and wipe off the water to clean the sample stage thoroughly.

2 Dry the sample stage completely with dry tissues.

Note Do not use metal tools to apply samples on the prism as they may scratch the prism.

Note Do not splash water above 30 °C.
When hot water is necessary to clean off hardened samples, use water-soaked gauze around the prism area and keep hot water away from the body case.

For oily samples:

Clean oily residues with ethyl alcohol or mild soap, and then, rinse with water.

Mild soap

Ethyl alcohol

Note When the O-ring on the cover is dirty or damaged, the water resistance may be compromised. Lubricate the O-ring regularly.

O-ring

Erorr Messages

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

RRR	ZERO was pressed with nothing or something other than water on the prism.
LLL	START was pressed with nothing or an insufficient amount of sample on the prism.
Lo	The battery is low.
LLL	The prism temperature is below the temperature range.
HHH	The sample is outside the measurement range.
nnn	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.)
HHH	The prism temperature is above the temperature range.
Err	Failed to connect to Bluetooth or data export error.
EEE	The instrument is faulty. (Replace the batteries. Contact ATAGO if this error persists.)

Date and time setting

Hold START and ZERO.

Year → Month → Day → Hour → Minute

Confirm

Press ZERO until the desired number is displayed.

0~9 0~9 / 1~12 / 0~3 0~9 / 0~23 / 0~5 0~9

* Set date and time before exporting data.
Reset date and time if battery is taken out of the device for an extended period.

Display

Year: 99 Month: 12

Hour: 24 Minute: 60

Day: 31

Seconds: Fixed 00

Feature

EASY OPERATION

time, data, Temp,
2014/05/30 14:53:05, 000, 23.4,
2014/05/30 14:58:05, AAA, 23.4,
2014/05/30 15:03:05, 37.1, 23.5,
⋮

Save maximum of 100 measurements, with date and time.

Export data by long pressing ZERO.

PAL-1 BLT/i features Bluetooth capability to wirelessly communicate with peripheral devices.
The data can be exported and saved as a CSV file using ATAGO Logger for iPhone.

Compatible devices: iPhone 4s, iPhone 5, iPhone 5s, iPhone 5c, iPhone 6

Compatible operating system: iOS 7 or newer

The application is available for download at iTunes App Store.

Download on the App Store

Export and Delete data history

Export data history

Export from PAL

2 Hold ZERO.

Transferred.
Cancel the transfer by ZERO.

iPhone import

1 Tap on the icon and launch ATAGO Logger.

ATAGO Logger

3 Tap on .

Start import

Connecting

Not Found

Connection is Unsuccessful *1

Initial setting — no / yes

Bluetooth Pairing Request
"PAL-BLT" would like to pair with your iPhone.
Cancel Pair

4 Verify imported data.

Log Data

time, data, Temp
2014/06/30 15:11:11, LLL, 20.0,
2014/06/30 15:11:58, 6, 6, 20.0,
2014/06/30 15:30:02, 6, 7, 20.0,
2014/06/30 15:31:03, AAA, 20.0,
2014/06/30 15:32:44, 000, 20.0,
2014/06/30 15:40:09, nnn, 20.0,
2014/06/30 15:50:33, 31.0, 20.0,
2014/06/30 15:51:00, 31.1, 20.0,

time, data, Temp
2014/06/31 09:11:11, LLL, 20.0,
2014/06/31 09:11:58, 6, 5, 20.0,
2014/06/31 09:13:50, 6, 6, 20.0,
2014/06/31 09:14:00, 6, 8, 20.0,

Disconnect

End import

Memo Please refer to the ATAGO Logger user manual for operational instructions.
The PDF user manual will begin to download from ATAGO website by tapping on Settings >User Manual.

Deleting data history

5 Delete or Save data history.

Delete Save

Verify the data transfer before deletion.

6 Data history

To save data history.
①Tap on .
②Tap on Save.

Back File Menu
Clear
Save

Memo Saved file can be imported from iTunes.

To export data history
①Tap on .
②Paste to email application.

Note Dones

③Send.

Incase Connection is Unsuccessful *1

PAL

1 Press START and ZERO.

2 Press START.

Memo To cancel operation, press ZERO.

iPhone

1 Press the Home button.

2 Tap on Settings
Tap on Bluetooth.

3 Tap on PAL-BLT ⓘ.

4 Tap on Forget this Device.

Memo To enable the Bluetooth, flip the On/Off button in General > Bluetooth.

History:

Log Data

time, data, Temp
2014/06/30 15:11:11, LLL, 20.0,
2014/06/30 15:11:58, 6, 6, 20.0,
2014/06/30 15:30:02, 6, 7, 20.0,
2014/06/30 15:31:03, AAA, 20.0,
2014/06/30 15:32:44, 000, 20.0,
2014/06/30 15:40:09, nnn, 20.0,
2014/06/30 15:50:33, 31.0, 20.0,
2014/06/30 15:51:00, 31.1, 20.0,

Date and time | Brix (%) | Temperature (°C)

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