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THOMAS SCIENTIFIC PAL-10S (Model 4410)

THOMAS SCIENTIFIC Atago 4410 PAL-10S Digital Hand-Held Pocket Urine Specific Gravity Refractometer User Manual

Model: PAL-10S (4410)

1. Product Overview

The THOMAS SCIENTIFIC Atago 4410 PAL-10S is a compact, digital, hand-held refractometer designed for precise measurement of urine specific gravity (SG). This device is engineered for portability and durability, featuring an IP-65 rated ABS resin body, making it water-resistant and suitable for various environments. It incorporates Automatic Temperature Compensation (ATC) for accurate readings across a temperature range of 10 to 40 degrees C, and an LED-illuminated digital display with External Light Interference (ELI) technology to ensure reliable measurements even in bright conditions.



Figure 1: Atago 4410 PAL-10S Digital Hand-Held Refractometer. This image shows the compact, rectangular device with its digital display and sample well.

1.1. What's in the Box

- Atago 4410 PAL-10S Refractometer
- Rigid plastic storage case
- AAA batteries (2)
- Instruction Manual (this document)

2. Safety Information

- Read this manual thoroughly before operating the device.
- Use only the specified AAA batteries. Ensure correct polarity when inserting.
- Do not immerse the device in water despite its water-resistant rating (IP-65). It is protected against dust and

low-pressure water jets, not submersion.

- Avoid dropping the device or subjecting it to strong impacts.
- Do not attempt to disassemble or repair the device yourself. Refer to qualified service personnel.
- Keep the prism surface clean and free from scratches to ensure accurate readings.
- Dispose of batteries according to local regulations.

3. Setup

3.1. Battery Installation

1. Locate the battery compartment cover on the back of the device.
2. Slide or unclip the cover to open the compartment.
3. Insert two (2) AAA batteries, ensuring the correct positive (+) and negative (-) polarity as indicated inside the compartment.
4. Close the battery compartment cover securely.

3.2. Initial Calibration

The PAL-10S is factory-calibrated. However, it can be calibrated using tap water for verification or recalibration if necessary.

1. Ensure the prism surface is clean and dry.
2. Apply a few drops of clean tap water onto the prism surface.
3. Press the START key. The device will display the measurement.
4. If the reading is not 1.000, press and hold the ZERO key until "CAL" appears on the display, indicating successful calibration.
5. Wipe the prism clean with a soft cloth.

4. Operating Instructions

4.1. Taking a Measurement

1. Ensure the prism surface is clean and dry.
2. Apply approximately 0.3ml of the urine sample onto the prism surface. The sloped shape of the sample well helps prevent spills.
3. Press the START key. The measurement will be displayed within three seconds.
4. The display will show both the urine specific gravity (SG) and the temperature.
5. If "ELI" (External Light Interference) appears, move to a location with less direct light or shield the prism from intense light sources, then re-measure.
6. After measurement, clean the prism thoroughly with water and wipe dry with a soft cloth.

4.2. Understanding Readings

The PAL-10S measures urine specific gravity in the range of 1.000 to 1.060. The displayed value represents the ratio of the density of the urine sample to the density of water. The device automatically compensates for

temperature variations within its operating range (10 to 40 degrees C) to provide accurate results.

5. Maintenance

5.1. Cleaning

- Always clean the prism and sample well immediately after each use to prevent sample residue from drying and affecting future measurements.
- Use clean water and a soft, lint-free cloth to wipe the prism. Do not use abrasive materials or harsh chemicals.
- Ensure no water enters the battery compartment or other internal parts of the device.

5.2. Storage

- Store the refractometer in its rigid plastic storage case when not in use to protect it from dust, impacts, and environmental damage.
- Store in a cool, dry place, away from direct sunlight and extreme temperatures.
- If storing for an extended period, remove the AAA batteries to prevent leakage.

6. Troubleshooting

Problem	Possible Cause	Solution
Device does not power on.	Dead or incorrectly inserted batteries.	Check battery polarity. Replace batteries with new AAA batteries.
"ELI" error displayed.	External Light Interference (too much direct light).	Move to a shaded area or shield the prism from direct light sources, then re-measure.
Inaccurate readings.	Dirty prism, improper calibration, or sample temperature outside range.	Clean the prism thoroughly. Perform calibration with tap water (Section 3.2). Ensure sample temperature is within 10.0 to 35.0 degrees C.
Sample spills from well.	Excessive sample volume.	Use only approximately 0.3ml of sample. The sloped design helps, but overfilling can still occur.

7. Specifications

Feature	Detail
Measurement Scale Range	Urine SG 1.000 to 1.060

Feature	Detail
Specimen Measurement Temperature Range	10.0 to 35.0 degrees C
Accuracy (Urine SG)	± 0.001
Accuracy (Temperature)	± 1 degrees C
Resolution (Urine SG)	0.001
Resolution (Temperature)	0.1 degrees C
Ambient Temperature for Unit Operation	10 to 40 degrees C
Sample Volume	0.3ml
Measurement Time	Three seconds
Body Type	ABS resin, IP-65 rated (dust tight, protected against water jets)
Power Supply	Two (2) AAA batteries
Dimensions (H x W x D)	109 x 55 x 31mm
Weight	100g

8. Warranty Information

The Atago 4410 PAL-10S Digital Hand-Held Pocket Urine Specific Gravity Refractometer comes with a**Limited Two-Year Warranty**. This warranty covers defects in materials and workmanship under normal use. Please retain your proof of purchase for warranty claims. For specific terms and conditions, refer to the warranty card included with your product or contact THOMAS SCIENTIFIC customer support.

9. Customer Support

For technical assistance, service, or inquiries regarding your Atago 4410 PAL-10S refractometer, please contact THOMAS SCIENTIFIC customer support. When contacting support, please have your model number (4410) and purchase information ready.
Note: Specific contact details for THOMAS SCIENTIFIC are not provided in this manual. Please refer to the manufacturer's official website or your purchase documentation for the most current support information.

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