

Want Bluetooth® on the PAL that you buy?

Contact Atago for more information

Digital Hand-Held "Pocket" Refractometer PAL Special Scales

| Cat.No. | Model | Scale | Cat.No. | Model | Scale | Cat.No. | Model | Scale |
|---------------------------------------|---------------|--|---|--------------------------|--|-------------------------|--------------|--|
| Food, Confectionery, Food Ingredients | | | 4506 | PAL-106S | Sodium chloride (g/100mL) | 4489 | PAL-89S | Propylene glycol Freezing point of Propylene glycol (°F) |
| 4422 | PAL-22S | Honey moisture | 4404 | PAL-04S | Sodium chloride (S.G.) | 4491 | PAL-91S | Ethylene glycol Freezing point of Ethylene glycol (°C) |
| 4508 | PAL-Pâtissier | Brix / Baume (Dual scale) | 4405 | PAL-05S | Sodium chloride (Baume) | 4492 | PAL-92S | Ethylene glycol Freezing point of Ethylene glycol (°F) |
| 3807 | PAL-MILK | NEW Non-Fat Milk Solids | 4406 | PAL-06S | Seawater (Concentration) | Refractive Index • Brix | | |
| 4427 | PAL-27S | Soymilk | 4407 | PAL-07S | Seawater (S.G.) | 3852 | PAL-BX/RI | Brix / Refractive Index |
| 4443 | PAL-43S | Bittern (Magnesium chloride) | 4408 | PAL-08S | Seawater (Baume) | 3850 | PAL-RI | Refractive Index |
| 4496 | PAL-96S | Chinese noodle soup / Baume of Kansui (Dual scale) | Moisture | | | 3840 | PAL-α | Brix |
| 4498 | PAL-98S | Condiment | 4573 | PAL-Moisture | Moisture | 3842 | PAL-LOOP | Brix |
| 4439 | PAL-39S | Hydrogen peroxide | 4574 | PAL-Dried Fruit Moisture | Moisture | Chemical products | | |
| 4429 | PAL-29S | Citric acid | 4575 | PAL-Dates Moisture | Moisture | 4421 | PAL-21S | Dextrin |
| 4430 | PAL-30S | Acetic acid | Clinical, Sports | | | 4438 | PAL-38S | Dimethylformamide |
| 4432 | PAL-32S | Phosphoric acid | 4442 | PAL-42S | Cesium chloride | 4440 | PAL-40S | Sodium hydroxide |
| 4440 | PAL-40S | Sodium hydroxide | 4453 | PAL-53S | Copper sulfate (Concentration) | 4423 | PAL-23S | Glycerin (Low concentration) |
| 4464 | PAL-64S | Sodium bicarbonate | 4454 | PAL-54S | Copper sulfate (S.G.) | 4424 | PAL-24S | Glycerin (High concentration) |
| 4465 | PAL-65S | Sodium tartrate | 4410 | PAL-10S | Urine (S.G.) | 4430 | PAL-30S | Acetic acid |
| 4470 | PAL-70S | Potassium phosphate | 4585 | PAL-mOsm. | Urine Osmolality | 4431 | PAL-31S | Formic acid |
| 4523 | PAL-COFFEE | Brix | 4401 | PAL-11S | Serum protein | 4432 | PAL-32S | Phosphoric acid |
| 4532 | PAL-COFFEE | TDS (TDS) | 4510 | PAL-USG (DOG) | Dog Urine (S.G.) | 4444 | PAL-44S | Lithium chloride |
| 4533 | PAL-COFFEE | Brix / TDS (Dual scale) (BX/TDS) | 4511 | PAL-USG (CAT) | Cat Urine (S.G.) | 4445 | PAL-45S | Barium chloride |
| 4535 | PAL-Tea | Tea | 4512 | PAL-RABBIT | Rabbit Urine (S.G.) | 4446 | PAL-46S | Cobalt chloride |
| Fruit and Vegetable Growers | | | Colostrum | | | 4447 | PAL-47S | Ferric chloride |
| 3847 | PAL-ORANGE | Brix | 3805 | PAL-Colostrum | Colostrum | 4448 | PAL-48S | Strontium chloride |
| 3848 | PAL-TOMATO | Brix | Alcohol liquid | | | 4449 | PAL-49S | Potassium chloride |
| 3849 | PAL-MAPLE | Brix | 4433 | PAL-33S | Ethyl alcohol (mL/100mL) | 4450 | PAL-50S | Potassium bromide |
| Sugar | | | 4434 | PAL-34S | Ethyl alcohol (g/100g) | 4451 | PAL-51S | Sodium bromide |
| 4412 | PAL-12S | Dextran | 4436 | PAL-36S | Methyl alcohol | 4452 | PAL-52S | Potassium iodide |
| 4414 | PAL-14S | Fructose | 4437 | PAL-37S | Isopropyl alcohol (g/100g) | 4453 | PAL-53S | Copper sulfate (Concentration) |
| 4415 | PAL-15S | Glucose | 4530 | PAL-131S | Isopropyl alcohol (mL/100mL) | 4454 | PAL-54S | Copper sulfate (S.G.) |
| 4416 | PAL-16S | High Fructose Corn syrup (HFCS-42) | 4485 | PAL-85S | Polyvinyl alcohol | 4455 | PAL-55S | Magnesium sulfate |
| 4417 | PAL-17S | High Fructose Corn syrup (HFCS-55) | Pharmaceutical reagents | | | 4456 | PAL-56S | Potassium sulfate |
| 4418 | PAL-18S | Inverted suger | 4412 | PAL-12S | Dextran | 4457 | PAL-57S | Nickel sulfate |
| 4419 | PAL-19S | Lactose | 4413 | PAL-13S | Creatine | 4458 | PAL-58S | Sodium sulfate |
| 4420 | PAL-20S | Maltose | 4423 | PAL-23S | Glycerin (Low concentration) | 4459 | PAL-59S | Zinc sulfate |
| Wine, Brew | | | 4424 | PAL-24S | Glycerin (High concentration) | 4460 | PAL-60S | Silver nitrate |
| 4479 | PAL-79S | T.A. 1990 | 4425 | PAL-25S | Inulin | 4461 | PAL-61S | Sodium nitrate |
| 4480 | PAL-80S | T.A. 1971 | 4426 | PAL-26S | Mannitol | 4462 | PAL-62S | Potassium carbonate |
| 4483 | PAL-83S | KMW (or Babo) | 4431 | PAL-31S | Formic acid | 4463 | PAL-63S | Sodium carbonate |
| 4484 | PAL-84S | Baume | 4432 | PAL-32S | Phosphoric acid | 4464 | PAL-64S | Sodium bicarbonate |
| 4486 | PAL-86S | Oe (Ger) / Brix (Dual scale) | 4451 | PAL-51S | Sodium bromide | 4467 | PAL-67S | Potassium chromate |
| 4487 | PAL-87S | Oe (Oechsle) / Brix (Dual scale) | 4455 | PAL-55S | Magnesium sulfate | 4468 | PAL-68S | Potassium dichromate |
| 4540 | PAL-Whiskey | Ethyl alcohol | 4464 | PAL-64S | Sodium bicarbonate | 4469 | PAL-69S | Sodium thiosulfate |
| 4541 | PAL-Vodka | Ethyl alcohol | 4465 | PAL-65S | Sodium tartrate | 4470 | PAL-70S | Potassium phosphate |
| 4542 | PAL-Tequila | Ethyl alcohol | 4466 | PAL-66S | Potassium oxalate | 4471 | PAL-71S | Sodium molybdate |
| 4543 | PAL-Shochu | Ethyl alcohol | 4468 | PAL-68S | Potassium dichromate | 4472 | PAL-72S | Sodium tungstate |
| 4544 | PAL-Gin | Ethyl alcohol | 4470 | PAL-70S | Potassium phosphate | Metal working | | |
| 4545 | PAL-Rum | Ethyl alcohol | 4472 | PAL-72S | Sodium tungstate | 4502 | PAL-102S | Cutting oil |
| 4546 | PAL-Brandy | Ethyl alcohol | Automobile, Aviation, Heat Transfer, Industrial | | | 4537 | PAL-AntiRust | AntiRust |
| 4590 | PAL-Plato | Plato (Sweet wort) | 4518 | PAL-Urea | Urea | 4536 | PAL-Cleaner | Cleaner |
| Salinity, Seawater | | | 4403 | PAL-03S | Snow-melting agent (Sodium chloride) | Soil, Civil engineering | | |
| 4403 | PAL-03S | Sodium chloride (g/100g) | 4441 | PAL-41S | Snow-melting agent (Calcium chloride) | 4571 | PAL-Soil | Gravimetric / Volumetric Soil moisture (Dual scale) |
| 4393 | PAL-03CS | Sodium chloride (g/100g) / Freezing point of Sodium chloride (°C) (Dual scale) | 4443 | PAL-43S | Snow-melting agent (Magnesium chloride) | | | |
| | | | 4488 | PAL-88S | Propylene glycol Freezing point of Propylene glycol (°C) | | | |

All ATAGO products are designed and manufactured in Japan.



HACCP GMP GLP

ATAGO products comply with HACCP, GMP, and GLP system standards.

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Digital Hand-Held
"Pocket" Refractometers

Pocket **PAL** series

PAL-1

Cat.No.3810
Brix 0.0 to 53.0%

PAL-2

Cat.No.3820
Brix 45.0 to 93.0%

PAL-3

Cat.No.3830
Brix 0.0 to 93.0%

PAL-S

Cat.No.3860 Mode S™
Brix 0.0 to 93.0% Technology Model

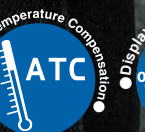
PAL-22S

Cat.No.4422
Honey moisture 12.0 to 30.0%

PAL-39S

Cat.No.4439
Hydrogen peroxide 0.0 to 50.0%

Pocket→Palm→Perform



ATAGO®

Patent for Design Registration No. ZL200310103015.2 (China)
Patent for Invention Registration No. 1191241 (Japan)
Patent Granted in countries around the world.

The Next Generation of Digital Refractometers

"Pocket" Refractometers

PAL series



- Extremely water resistant (IP65)
- Can be washed under running water
- Will float if accidentally dropped in water



- Ergonomically designed for one-handed operation
- The innovative design makes it easy to pour out and remove a sample, but difficult to spill the sample.



- Automatic Temperature Compensation (ATC)



- Temperature display



- Measurement temperature up to 100°C



- Revolutionary new External Light interference (ELI) feature (Patented)
- When intense light penetrates the prism of a digital refractometer, the light waves interfere with the sensor, which may lead to inaccurate measurements. To ensure accurate measurement results, the PAL is programmed with the ELI function which displays the [nnn] warning message when intense direct light is detected. Forming a habit of shading the sample stage with your hand and re-pressing the START key (when the warning message from the ELI function is displayed) will ensure accurate measurement results each time.



- Mode S: Mode S improves repeatability of samples that cause inconsistent readings.



Low to medium

PAL-1

Cat.No.3810

High concentration

PAL-2

Cat.No.3820

Wide range

PAL-3

Cat.No.3830

Powered by Mode S

PAL-S

Cat.No.3860

Standard accessory
MAGIC™

Honey moisture %

PAL-22S

Cat.No.4422

Hydrogen peroxide (w/w)

PAL-39S

Cat.No.4439

Optional

| Part No. | Part Name. |
|-----------|---|
| RE-110010 | Sucrose Solutions (for Brix confirmation)10% (±0.03%) |
| RE-110020 | Sucrose Solutions (for Brix confirmation)20% (±0.03%) |
| RE-110030 | Sucrose Solutions (for Brix confirmation)30% (±0.03%) |
| RE-110040 | Sucrose Solutions (for Brix confirmation)40% (±0.04%) |
| RE-110050 | Sucrose Solutions (for Brix confirmation)50% (±0.05%) |
| RE-110060 | Sucrose Solutions (for Brix confirmation)60% (±0.05%) |
| RE-39409 | PAL-CASE |
| RE-39410 | PAL-STRAP |
| RE-39446 | MAGIC™ |
| RE-39412 | Small Volume Sample Adapter for PAL |
| RE-39413 | PAL Silicone Cover |



◀ **Sucrose Solutions**
Custom concentrations are available upon request. Accuracy and prices will vary by concentration. Contact ATAGO for more details.

* Warranty period for these solutions is 6 weeks.



◀ **MAGIC™**
This adaptor is used for a hot sample to cool it down quickly or to minimize evaporation.



◀ **Small Volume Sample Adapter for PAL**
Allows for measurements with a small volume of sample. Place directly on the sample stage.



▲ PAL Silicone Cover



▲ PAL-CASE

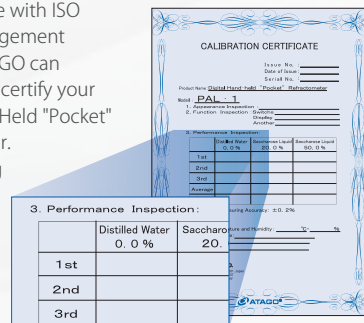


▲ PAL-STRAP

Certification

In accordance with ISO Quality Management Systems, ATAGO can calibrate and certify your Digital Hand-Held "Pocket" Refractometer. The following documents will be issued (for a service fee):

- Calibration Certificate
- Traceability System Diagram
- Traceability Certificate



PAL commitment

A new ergonomic design for comfort and ease of use!

In pursuit of an "easy to use", "easy to operate" and ergonomic architecture of new instruments, ATAGO has achieved a "palm-fitting" masterpiece as well as unit that is high in hygienic properties. By reducing the number of unnecessary assembly parts, we have reduced the risks of a germ reproductive environment. Through our efforts to produce a hygienic instrument to be used in any industry, these units are designed to be completely washable. The new PAL series has been approved by the HACCP, and are equipped with the new ELI feature, which ensures accurate measurements - even outdoors. Requests from our customers worldwide are reflected in the development of the new PAL units.

Actual Size

Sample Stage

The SUS sample stage allows for the sample temperature to conform quickly and evenly to the prism temperature for accurate measurements.

START Key

Conveniently located for single hand operation.



Calibration Report



Convenient storage case

Prism

Made of highly durable optical glass to prevent scratching.

Liquid Crystal Display (LCD)

Digital measurement values are large and easy to read. Displays battery indicator and temperature.

ZERO Key

For Zero Setting, place water on the prism and press.

Strap Holder

Suitable for wrist straps or lanyards.

Measurement Method



1 Apply 2-3 drops on the prism surface.



2 Press the START key.



3 Measurement value and prism temperature are displayed in 3 seconds!

Application examples



Specifications

| | PAL-1 Cat.No.3810 | PAL-2 Cat.No.3820 | PAL-3 Cat.No.3830 | PAL-S Cat.No.3860 | PAL-22S Cat.No.4422 | PAL-39S Cat.No.4439 |
|--------------------------------|--|-----------------------|----------------------|----------------------|----------------------------------|-----------------------------------|
| Measurement range | Brix 0.0 to 53.0% | Brix 45.0 to 93.0% | Brix 0.0 to 93.0% | Brix 0.0 to 93.0% | Honey moisture 12.0 to 30.0 % | Hydrogen peroxide 0.0 to 50.0% |
| Measurement Accuracy | Brix ± 0.2% | | Brix ± 0.1% | Brix ± 0.2% | Honey moisture ± 0.2 % | Hydrogen peroxide ± 0.6% |
| Resolution | Brix 0.1% | | | | Honey moisture 0.1 % | Hydrogen peroxide 0.2% |
| Measurement temperature | 10 to 100°C (ATC) (Hot samples over 100° C can be measured under specified conditions. Please contact ATAGO for further details.) | | | | | |
| Ambient temperature | 10 to 40°C | | | | | |
| Power supply | 2×AAA Batteries | | | | | |
| International protection class | IP65 Water resistant | | | | | |
| Dimensions and weight | 5.5×3.1×10.9cm, 100g | | | | | |