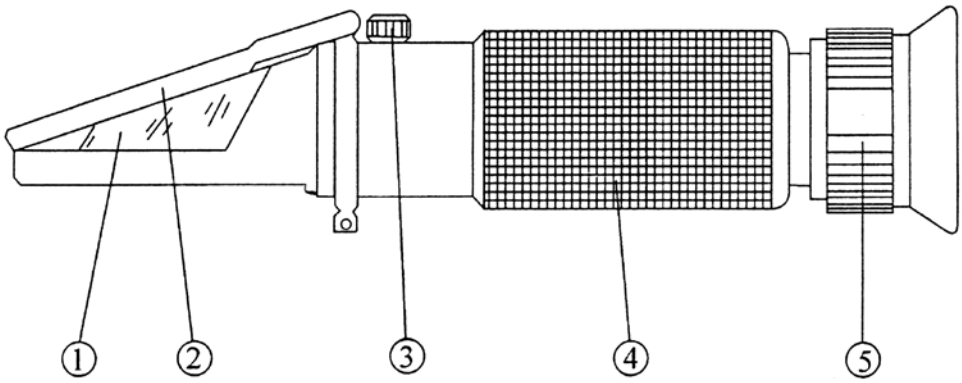
Operating Instructions

Cole-Parmer® Handheld Analog Refractometers



Description

1) Prism
2) Cover plate
3) Calibration screw
4) Mirror tube
5) Eyepiece (adjusting ring of diopter)

Accessories (not shown)

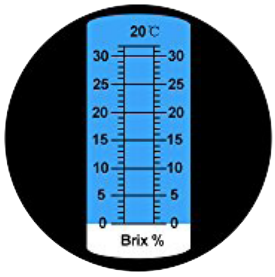
Eyeshade
Suction tube
Screwdriver

Operation

Preparation. Hold the refractometer in a horizontal position. Aim the front end of the refractometer in the direction of a bright light, and use the adjusting ring of diopter until the reticle can be seen clearly.

Zero % adjust with distilled water. Place a few drops of pure water on the prism surface and close the prism cover. If bubbles form, gently pressing the cover will remove the bubbles and help disperse the water over the entire surface.

Hold the refractometer up to natural light or an incandescent bulb to obtain the reading. Looking into the eyepiece, you should see a distinct separation between a blue and white section, often called a "contrast" line. If the contrast line is not directly at zero, then adjust by turning the calibration screw on the top of the refractometer until it reads zero. Replace the plastic cap after adjusting the screw to prevent water from entering the refractometer.



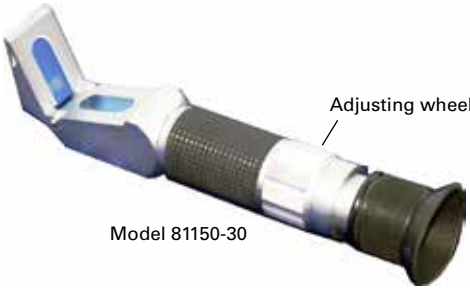
Zero calibration

Adjust the focus by twisting the eyepiece until the scale can be seen clearly. Once the refractometer is calibrated to zero with pure water, dry the surfaces with a clean cloth.

– **For models with 28% to 62% Brix range:** Open cover plate, drop one or two drops of saturated sodium chloride (table salt) solution on the prism surface, close cover plate. Adjust to 29.9% at 15°C, 29.6% at 20°C, 29.2% at 25°C.

– **For ATC models with 58 to 92% Brix range:** Owing to the remarkably consistent properties of extra-virgin olive oil, one drop of it on the slide will always read between 71% and 72% on the Brix scale. If you set the calibration screw to show any such oil at 71.5%, you will have correctly calibrated the water content scale at the same time.

– **For models with multiple Brix scales:** These units have been adjusted at the factory. To use multiple scales, rotate the adjusting wheel (model 81150-30) or adjusting knob (model 81150-33) to change scales. To reduce chromatism, rotate the adjusting ring.



Model 81150-30

Measurement. Open the cover plate, clean the surface of prism with a piece of soft paper or cotton, then drop 1 to 2 drops of the solution to be measured. Close the cover plate, and press it lightly, then read the corresponding scale of light and dark boundary. The reading is the Brix, salinity concentration, or refractive index (RI) of measured solution.

Storage. After measurement, clean the surface of prism and cover plate with moist gauze, and store carefully. Do not immerse or dip in water so that water does not enter the inside of the unit.

Model 81150-33

Refractometers with Automatic Temperature Compensation (ATC)

The reference of temperature is 20°C. In operation, the temperature should be made according to the Correction Table below. The automatic temperature compensation (ATC) function enables users to concentrate on measurements without worrying about the temperature. Compensation range is 10 to 30°C.

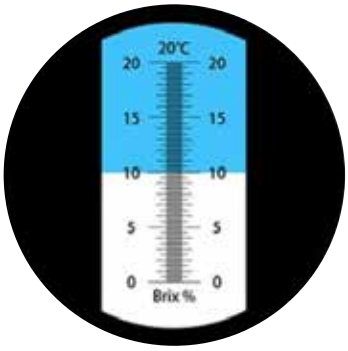
Abbreviated International Temperature Correction Table for a Refractometer Tested at 20°C

Temperature		Dry substance content in percent				
°C	°F	0	5	10	15	20
10	50	Substract 0.50 Brix	Substract 0.54 Brix	Substract 0.58 Brix	Substract 0.61 Brix	Substract 0.64 Brix
15	59	Substract 0.27 Brix	Substract 0.29 Brix	Substract 0.31 Brix	Substract 0.33 Brix	Substract 0.34 Brix
20	68	None required				
25	77	Add 0.33 Brix	Add 0.35 Brix	Add 0.36 Brix	Add 0.37 Brix	Add 0.38 Brix
30	86	Add 0.72 Brix	Add 0.74 Brix	Add 0.77 Brix	Add 0.78 Brix	Add 0.79 Brix

Specifications

Range	Resolution	Accuracy	ATC	Catalog number
0 to 10% Brix	0.10%	±0.1%	No	81150-23
			Yes	81150-34
0 to 18% Brix	0.10%	±0.1%	No	81150-24
			Yes	81150-35
0 to 32% Brix	0.20%	±0.2%	No	81150-25
			Yes	81150-36
0 to 60% Brix	0.50%	±0.3%	No	81150-29
28 to 62% Brix	0.20%	±0.2%	No	81150-26
			Yes	81150-37
0 to 80% Brix	0.50%	±0.3%	No	81150-31
0 to 50%, 50 to 80% Brix*	0.50%	±0.3%	No	81150-30
45 to 82% Brix	0.50%	±0.3%	No	81150-27
			Yes	81150-38
0 to 90% Brix	0.50%	±0.3%	No	81150-32
0 to 42%, 42 to 71%, 71 to 90% Brix*	0.20%	±0.2%	No	81150-33
58 to 92% Brix	0.20%	±0.2%	No	81150-28
			Yes	81150-39
0 to 28% Salinity	0.20%	±0.2%	No	81150-41
			Yes	81150-45
0 to 28% Salinity; 0 to 32% Brix	0.20%	±0.2%	No	81150-43
			Yes	81150-47
0 to 100% Salinity; 1.000 to 1.070 RI	1%; 0.005	±0.5%; ±0.001	No	81150-40
			Yes	81150-44
0 to 100% Salinity; 1.000 to 1.070 RI; 0 to 10% Brix	1%; 0.005; 0.10%	±0.5%; ±0.001; ±0.1%	No	81150-42
			Yes	81150-46

*Models with multiple Brix scales.



Maintenance

This is a precision optical instrument. Handle it gently and take good care of it. Do not touch or scratch the optical surface. Keep it in a dry, clean and noncorrosive environment to prevent the surface from turning moldy and foggy. Avoid strong shocks during transportation. If the instrument is used in accordance with the operation methods in this guide, the optical performance should not be changed.

Warranty

This instrument is warrantied against defects in materials and workmanship when used in accordance with applicable instructions, for a period of one (1) year from the date of shipment. For claims under the warranty, please contact Cole-Parmer. The warranty does not cover fair wear and tear of parts or accessories, nor does it apply to improper use, abnormal operation or insufficient maintenance which is not in accordance with the instructions in this user manual.

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