HI 96811 • HI 96812 • HI 96813 • HI 96814 • HI 96816

Digital Refractometers for Measurement of Sugar in Wine

- **Dual-level LCD**
  The dual-level LCD displays measurement and temperature readings simultaneously
- **Automatic Temperature Compensation**
  For accurate measurements
- **Easy measurement**
  Place a few drops of the sample in the well and press the READ key
- **BEPS**
  (Battery Error Prevention System) alerts the user in the event that low battery power could adversely affect readings.
- **IP65 water protection**
  Built to perform under harsh laboratory and field conditions.
- **Quick, accurate results**
  Readings are displayed in approximately 1.5 seconds.
- **Single point calibration**
  Calibrate with distilled or deionized water
- **Small sample size**
  Sample size can be as small as 2 metric drops.
- **Automatic shut-off**
  After three minutes of non-use
- **Stainless steel sample well**
  Easy to clean and corrosion resistant
- **ABS thermoplastic casing**

HANNA offers five wine refractometers to meet the requirements of cultural differences found throughout the wine industry. The HI 96811, HI 96812, HI 96813, HI 96814 and HI 96816 Digital Wine Refractometers are rugged, lightweight and waterproof for measurements in the lab or field. Each instrument offers a different but valid way to measure the density of grape must and other sugar based liquids.

These optical instruments employ the measurement of the refractive index to determine parameters pertinent to the wine industry.

The actual measurement of the refractive index is simple and quick and provides the vintner a standard accepted method for sugar content analysis. Samples are measured after a simple user calibration with deionized or distilled water. Within seconds, the instrument measures the refractive index of the grape must. These digital refractometers eliminate the uncertainty associated with mechanical refractometers and are ideal for fast, reliable measurements in the field.

HI 96811, **HI 96813** and **HI 96814** convert the refractive index of the sample to sucrose concentration in units of percent by weight, %Brix (also referred to as °Brix). The conversion used is based on the ICUMSA Methods Book (International Commission for Uniform Methods of Sugar Analysis). Since the majority of sugar in grape juice is fructose and glucose and not sucrose, the reading is sometimes referred to as "Apparent Brix".

HI 96812 has units of °Baumé. The °Baumé scale is based on density and was originally designed to measure the mass of sodium chloride in water. °Baumé is used in wine making to measure the sugar in must. The HI 96812 converts the %Brix reading to °Baumé based on the table found in the Official Methods of Analysis of AOAC International, 18th Edition. 1 °Baumé is approximately equal to 1.8 %Brix, and 1 °Baumé is roughly equivalent to 1 % alcohol when the wine is fully fermented.

In addition to %Brix, HI 96814 includes two other scales used in the wine industry: °Oechsle and °KMW.

°Oechsle (°Oe) is mainly used in the German, Swiss and Luxenburgish winemaking industry to measure the sugar content of must. The °Oe scale is based on specific gravity at 20°C (SG20/20) and is the first 3 digits following the decimal point. 1 °Oe is roughly equal to 0.2 %Brix.

°Oe = [(SG20/20) - 1] x 1000

°Klosterneuburger Mostwaage (°KMW) is used in Austria to measure the sugar content of must.

°KMW is related to °Oe by the following equation: °Oe = °KMW x [(0.022 x °KMW) + 4.54]

1 °KMW is roughly equivalent to 1 %Brix or 5 °Oe. °KMW is also known as °Babo.

"Potential" or "probable" alcohol is an estimation of the alcohol content (% vol/vol) in finished wine based on the conversion between sugar and alcohol. This conversion depends on many factors such as the type of grapes, the grape maturity, the growing region and yeast fermentation efficiency and temperature.

The **HI 96813** allows the user to tailor the instrument to their specific needs based on their experience, since no fixed conversion factor is universally applicable. The first conversion is based on the %Brix value and an adjustable conversion factor between 0.50 and 0.70 (0.55 is a common value).

Potential alcohol (% v/v) = (0.50 to 0.70) x % Brix

One drawback of the above equation is that it does not take into account the nonfermentable sugars and extract.

A second equation was also added that takes these factors into account and can give a more accurate estimate of the alcohol content in the finished wine. This conversion is named "C1" on the meter, and uses the following equation:

Potential Alcohol (%v/v) = 0.059 x [(2.66 x °Oe) - 30] (C1)

The **HI 96816** potential alcohol curve is based on the tables found in the European Economic Community Commission Regulation No 2676/90 of September 17, 1990, Determining Community Methods for the Analysis of Wine and International Organization of Vine and Wine (OIV). The potential alcohol curve is based on the following equation:

Potential alcohol (%v/v) = g/L of Sugar / 16.83

SPECIFICATIONS		HI 96811	HI 96812	HI 96813	HI 96814	HI 96816
Range	**Sugar Content**	0 to 50 % Brix	0 to 27 °Baumé	0 to 50 % Brix; 0.0-25.0 % V/V Potential Alcohol	0 to 50 % Brix; 0-230° Oechsle; 0-42° KMW	4.9 to 56.8 %v/v Potential Alcohol (10 to 75 %Brix)
	Temperature			0 to 80°C (32 to 176°F)		
Resolution	**Sugar Content**	0.1 % Brix	0.1 °Baumé	0.1 % Brix; 0.1 % V/V Potential Alcohol	0.1 % Brix; 1° Oechsle 0.1° KMW	0.1 %v/v
	Temperature			±0.1°C (0.1°F)		
Accuracy (@20°C/68°F)	**Sugar Content**	±0.2 % Brix	±0.1 °Baumé	±0.1 °Baumé; ±0.2 V/V Potential Alcohol	±0.2 % Brix; ±1° Oechsle ±0.1° KMW	±0.2 %v/v
	Temperature			±0.3°C (0.5°F)		
Temperature Compensation		automatic between 10 and 40°C (50 to 104°F)				
Measurement Time		approximately 1.5 seconds				
Minimum Sample Volume		100 µL (to cover prism totally)				
Light Source		yellow LED				
Sample Cell		stainless steel ring and flint glass prism				
Auto-off		after three minutes of non-use				
Enclosure Rating		IP65				
Battery Type / Battery Life		9V / approximately 5000 readings				
Dimensions / Weight		192 x 104 x 69 mm (7.6 x 4.1 x 2.7") / 420 g (14.8 oz.)				

ORDERING INFORMATION

HI 96811, **HI 96812**, **HI 96813**, **HI 96814** and **HI 96816** are supplied with battery and instruction manual.