H-B Instrument Hydrometer FAQs
(Frequently Asked Questions)

What is a hydrometer?

A hydrometer is an instrument used to measure the density of a liquid as compared to that of water. Hydrometers usually consist of a calibrated glass tube ending in a weighted glass sphere that makes the tube stand upright when placed in a liquid. The lower the density of the liquid, the deeper the tube sinks. Depending upon the intended use hydrometers can vary in size and will feature different types of scales.

What are the different kinds of hydrometers and when do you use them?

• *Specific Gravity* hydrometers can be used for almost any liquid. Specific Gravity is a dimensionless unit defined as the ratio of density of the material to the density of water. If the density of the substance of interest and the reference substance (water) are known in the same units (e.g., both in g/cm3 or lb/ft3), then the specific gravity of the substance is equal to its density divided by that of the reference substance (water =1 g/cm3)

• *Baume* hydrometers are calibrated to measure specific gravity on evenly spaced scales; one scale is for liquids heavier than water, and the other is for liquids lighter than water.

• *Brix (Bx)* hydrometers are for determining the percentage of weight by sucrose. One degree Brix is 1 gram of sucrose in 100 grams of solution and represents the strength of the solution as percentage by weight (% w/w) (strictly speaking, by mass). If the solution contains dissolved solids other than pure sucrose, then the °Bx only approximates the dissolved solid content. The °Bx is traditionally used in the wine, sugar, fruit juice, and honey industries.

• *API* hydrometers, also known as The American Petroleum Institute index, is a measure of how heavy or light a petroleum liquid is compared to water. If its API gravity is greater than 10, it is lighter and floats on water; if less than 10, it is heavier and sinks. API gravity is thus an inverse measure of the relative density of a petroleum liquid and the density of water, but it is used to compare the relative densities of petroleum liquids. For example, if one petroleum liquid floats on another and is therefore less dense, it has a greater API gravity. Although mathematically, API gravity has no units (see the formula below), it is nevertheless referred to as being in “degrees”. API gravity is gradated in degrees on a hydrometer instrument. The API scale was designed so that most values would fall between 10 and 70 API gravity degrees.

• *Alcohol Proof* hydrometers are used for distilling and rectifying and for waste liquors.

• *Isopropyl Alcohol* hydrometers measure percent by volume of isopropyl alcohol.

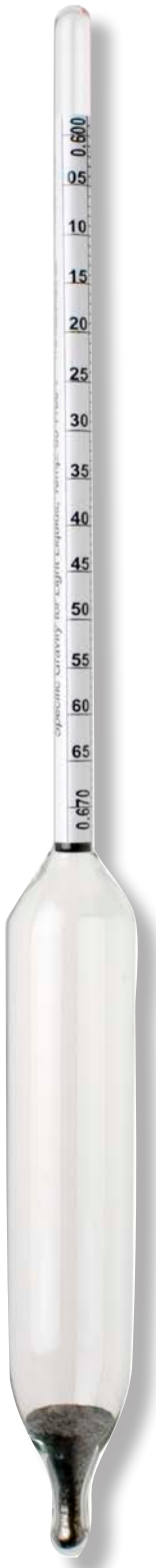
• *Sodium Chloride* hydrometers measure saturation and concentration of sodium chloride.

• *Salt Brine* hydrometers are graduated in percent of either saturation of sodium chloride in water, or by weight of sodium chloride.

• Calcium Chloride Salometers (a hydrometer for indicating the percentage of salt in a solution) are for determining the percentage of saturation, specific gravity or freezing point of CaCl2.

• *Draft Survey* hydrometers determine the apparent density of sea/fresh water.

Shop H-B Instrument Hydrometers



Specific Gravity Hydrometer

What is the difference between a "calibrated" and a "standardized" hydrometer?

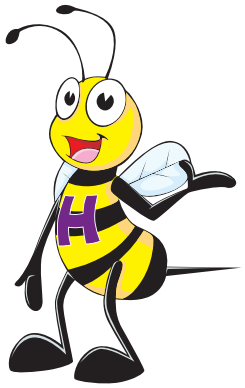
All hydrometers are standardized, but not all hydrometers are calibrated. In order to manufacture a hydrometer, the instrument must be compared to a traceable reference standard. Standardization during manufacturing establishes the guidelines for scale placement, thus the hydrometer has been standardized. If a hydrometer is calibrated (in the past the term certified may have been used) this means that after the instrument is manufactured, it is compared to an instrument that was certified by an outside body at a specific point or points along the scale. The results of this calibration are recorded on an official report. This report of calibration accompanies the calibrated instrument after the calibration process.

What is the difference between a Statement of Accuracy and a calibration report?

Statement of Accuracy:

Some *DURAC*® hydrometers are supplied with a Statement of Accuracy. This statement is your recorded assurance that the instrument you received was manufactured by comparison to a known standard, with an identified, unbroken chain of measurement uncertainty to a national standard (NIST).

The accuracy stated is the allowable tolerance, or maximum error, acceptable with a particular instrument in relation to the "true" value. This is normally stated as a value, plus or minus. For example, ±0.001 maximum scale error means that at any given point on the scale, the instrument could read up to one scale division above, or 0.001 degree below the test point. At 0.651 Sp. Gt. a hydrometer may read up to 0.652ºC or down to 0.650 to meet accuracy requirements.



Calibration Report:

A calibration report records the calibration of an instrument. Calibration of an instrument requires completion of a three step process:

1) Comparison of an instrument to a known standard.

2) Documentation of the standard's traceability to the national standard in SI units accompanied by an unbroken chain of identified uncertainty.

3) Statement of the variance of the instrument from the standard in specific measurements.

Calibration essentially verifies that an instrument meets stated accuracy and further gives specific correction values in order to use the instrument precisely in an application. This is also known as "measurement traceability."

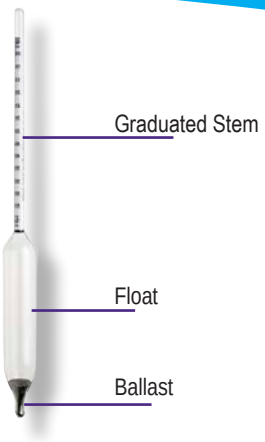
H-B Instrument®
Thermometer Calibration Report
Traceable to NIST

Learn more about Calibration Services

Using a hydrometer

The size jar needed depends on the size of the hydrometer. The jar should be at least 1" taller than the hydrometer, and should have a minimum diameter of 50mm.

Shop Hydrometer Jars



How do you know what range hydrometer scale you will need?

When measuring with a hydrometer you should have an idea of what reading you are looking for. If the reading does not fall within the range of the hydrometer you should use a hydrometer that includes the expected reading. Adjust the range up or down depending on if the hydrometer sinks or is overly buoyant.

What is the proper way to store hydrometers?

Hydrometers should be stored in clean, dry, safe places. They also should not be subjected to extreme temperatures.

In what situations are polycarbonate hydrometers ideal?

Polycarbonate hydrometers are made from a shatterproof material, so they are ideal in any situation where contamination could be an issue, like food or beverage industries. Polycarbonate hydrometers are not recommended for use with petroleum-based liquids or other corrosives that would potentially affect the plastic material.

Shop Polycarbonate Hydrometers

What is the metal ballast in hydrometers?

Older hydrometers use lead ballast, but these hydrometers are being phased out due to environmental concerns. Newer, more environmentally friendly hydrometers use steel shot ballast.

Cleanliness and Handling:

Cleanliness increases the measuring accuracy. For uniform and reproducible readings, the hydrometer must be free of fingerprints from handling the body, and free of test liquids or materials. The jar must be clean and free of all impurities. Clean hydrometers and measuring cylinders with de-ionized or distilled water and dry them with a lint-free cloth.

Attention:

After cleaning, you can only touch the measuring instrument at the stack point above the scale reading. Hold the hydrometer carefully between thumb and forefinger, at the top of the stem only, when immersing in the jar for testing.

Handling and Packing hydrometers

Hydrometers are extremely delicate glass instruments. We recommend placing the instruments back into the packaging after each measurement or place frequently used instruments in a rack. We pack delicate hydrometers individually to avoid breakage. When packing or handling, before and after use, hold the hydrometer by the body to protect the instrument, shielding the stem from shock or impact.