

Taking a Hydrometer Reading and Calculating the Alcohol content:

The use of a hydrometer is necessary to calculate the alcohol by volume (ABV) content of your beer, cider or wine. A hydrometer is a device used to measure the specific gravity (SG) or density of a liquid with respect to water. Water has a specific gravity of 1.000.

Prior to fermentation your beer, cider, or wine will contain sugars which will make the liquid more dense and so the hydrometer will float higher in the liquid than in water and will therefore give a higher hydrometer reading. For example the starting specific gravity for an average ale or lager will be in the range 1.038-1.050 and for a wine, around 1.075-1.095. This reading is termed the original gravity, or OG.

When the beer is undergoing fermentation the sugars in the liquid are converted by the yeast into alcohol and carbon dioxide. Alcohol in water is less dense than sugar in water and so this will result in a change in the specific gravity and the hydrometer will now sink in the liquid compared to the starting gravity. It will now have a specific gravity closer to water. The beer or wine has finished fermentation when the hydrometer reading remains constant over a period of two days and does not decrease any further. This reading is called the final gravity or FG and is used, in conjunction with the starting gravity, to work out the alcohol by volume content of the liquid.

For beers the final gravity is around 1.015-1.005, for ciders between 1.005-1.000 and for wines 0.990-1.000. It is worth noting that the final gravity of a beer, cider or wine will let you know if it's going to be dry, medium-dry or sweet. For example a dry wine will have a final gravity of around 0.990 and will have very little residual sugar. Certain yeasts will be able to produce drier beers, ciders, and wines, for example a Belgian style Saison yeast make a very dry beer with a final gravity of near 1002 or lower. For more information on this subject, read up on yeast attenuation.

There are several ways to calculate the ABV. A few of these methods are shown below with examples.

Method one: The C.J.J Berry Method for wine

$$ABV = (Original\ SG - Final\ SG)/7.36$$

Example: Original/Starting SG of the wine: 1.095

Final SG: 0.997

$$ABV = \frac{1095 - 0997}{7.36}$$

$$ABV = 13.31\%$$

Method 2: Method used for the calculation of ABV of beer

$$ABV = \frac{1.05}{0.79} \left(\frac{Starting\ SG - Final\ SG}{Final\ SG} \right) \times 100$$

Example: Original SG of beer: 1.051

Final SG: 1.005

$$ABV = \frac{1.05}{0.79} \left(\frac{1.051 - 1.005}{1.005} \right) \times 100$$

$$ABV = 6.08\%$$

Method 3: Online calculators

Although it is useful to be able to calculate ABV manually there are plenty of online ABV calculators that will not only calculate ABV for you but will adjust the calculations according to the temperature of the liquid.

We recommend www.brewersfriend.co.uk which is free to use without signing up but we would encourage all-grain and extract beer brewers to join up as it's a great program to plan recipes on.

<http://www.brewersfriend.com/abv-calculator/>

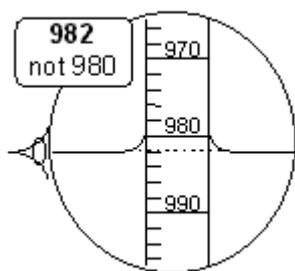
Tips for using a hydrometer from Stevenson-Reeves, our hydrometer suppliers:

Before using the hydrometer

- Make sure both the hydrometer and trial jar, if using one is clean.
- If the liquid to be tested is not at room temperature, allow it to reach room temperature before testing.
- Pour, tap off, or siphon the liquid carefully into the hydrometer jar to avoid the formation of air bubbles. Do this by pouring it slowly down the side of the jar.
- Stir the liquid gently, avoiding the formation of air bubbles.

Taking a Reading

- Carefully insert the hydrometer into the liquid, holding it at the top of the stem, and release it when it is approximately at its position of equilibrium.
- Note the reading approximately, and then by pressing on the top of the stem push the hydrometer into the liquid a few millimetres and no more beyond its equilibrium position. Do not grip the stem, but allow it to rest lightly between finger and thumb. Excess liquid on the stem above the surface can affect the reading.
- Release the hydrometer; it should rise steadily and after a few oscillations settle down to its position of equilibrium.
- If during these oscillations the meniscus is crinkled or dragged out of shape by the motion of the hydrometer, this indicates that either the hydrometer or the surface of the liquid is not clean. Carefully clean the hydrometer stem. If the meniscus remains unchanged as the hydrometer rises and falls, then the hydrometer and liquid surface are clean, and a reading can be taken.



- The correct scale reading is that corresponding to the plane of intersection of the horizontal liquid surface and the stem. This is not the point where the surface of the liquid actually touches the hydrometer stem. Take the reading by viewing the scale through the liquid, and adjusting your line of sight until it is in the plane of the horizontal liquid surface. Do not take a reading if the hydrometer is touching the side of the hydrometer jar.

Taking the Temperature

- Using a suitable thermometer, take the temperature of the liquid immediately after taking the hydrometer reading.
- If there is any chance of a change in the temperature of the liquid it is safer to take the temperature both before and after the hydrometer reading. A difference of more than 1°C means that the temperature is not stable, and the liquid should be left to reach room temperature.
- If the temperature of the liquid is not the same as that on the hydrometer scale, the hydrometer reading should have a correction due to temperature applied.

Handling the Hydrometer

- The hydrometer should never be held by the stem, except when it is being held vertically.
- When holding the stem, always hold it by the top, as finger-marks lower down can affect the accuracy of the instrument.
- Always handle with care.