

PLAATO Extended technical FAQ

- “The bubbles size is not consistent. Everything from temperature and pressure to the surface tension of the bubble will make this a useless measure of gravity.”
 - Yes, bubbles are hard to tame! They are highly affected by the surroundings and sometimes it seems like each bubble has a mind of its own. We have made (and design-protected) a bubble maker that ensures that separation of bubbles are consistent and we have tested how the bubbles change with different environment factors. Small deviations are ignored and the major factors have been empirically modelled and accounted for.
- “The amount of bubbles will vary with respect to the water-level in the airlock.”
 - Yes, it will - but luckily not much! Our first prototype even had a water level sensor to compensate for this, but the compensation was so small that we dropped it in the final product. If you fill the airlock about half full (marked with a line inside the airlock) you will get good results. We also designed the lid on top of the airlock with as few holes as possible to prevent the water from evaporating. If you check back on the airlock after a few days and the water-level has decreased, it is a good idea to refill it back to half full.
- “In the beginning of fermentation, the gas that goes through the airlock is not CO₂, it is simply air from the headspace in the container. This will make PLAATO think there is more alcohol in the worth than it really is.”
 - Yes, the first bubbles will be mostly air. In a fermentation of 20L, many hundreds of thousands bubbles will go through the airlock and the ‘headspace-bubbles’ will have little significance to the overall calculations. This small error will vary depending on much headspace you have in your container, and we decided not to add this as a user input, as it will complicate the product more than you gain in accuracy.
- “In the beginning of fermentation, CO₂ is produced but NOT alcohol. This will make PLAATO think there is more alcohol in the worth than it really is.”
 - Yes. “Aerobic” fermentation means that oxygen is present. Beer and wine need oxygen in the “primary” or first stage of fermentation. This is a small fraction of the whole fermentation process and the CO₂ produced in the primary stage can be estimated fairly well and be deducted in the alcohol estimation.
 - For further readings on this issue, there are some good (though old) studies done on this matter. Daoud, I.S. and Searle, B.A., 1990. ON-LINE MONITORING OF BREWERY FERMENTATION BY MEASUREMENT OF CO₂ EVOLUTION RATE. *Journal of the Institute of Brewing*, 96(5), pp.297-302.
- “Some of the CO₂ stays in the beer and will therefore not go through the airlock. “
 - Depending on the pressure and temperature, amounts of CO₂ will be dissolved in the worth, hence not going through the airlock (as you mention). This is a small

fraction of the total CO₂ production and can be estimated fairly well and then be added in the alcohol estimation.

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- “The amounts of gas exiting the fermentation is not a suitable way to measure gravity of beer. It is too dependant on factors like temperature, pressure, type of yeast, starting gravity, meshing, attenuation etc. “
 - Fermentation is not easy to model. It is a complex (and interesting!) biological process and all factors that you describe will have an impact. This has been a great part of our development. Through the last year, we experimented with fermentations and which factors we have to deal with (white-box modelling) and which factors are less significant. The current model for estimating the gravity is to a large extent based on empirical testing (black-boxing) on typical home-brewer scenarios. The product is optimized for fermentations between 15 and 50 Liters at temperatures between 5°C (41°F) to 30°C (86°F). As our method is 100% non-invasive, PLAATO measures the alcohol content indirectly. If you make your own SG measurement during the fermentation you can update PLAATO with your current SG value. We can then even use the data from you to improve the model!
- “This product already exists. Check out <https://tilthydrometer.com/>. It measures the gravity directly from the tilt of a floater.”
 - Tilt is cool, but we believe that PLAATO is slightly cooler. It has more functionality, looks better and feels better while still keeping the price lower.
 - Some pros of our product
 - WiFi. PLAATO is connected to the internet so you can follow your batch from anywhere.
 - 100% non-invasive. No extensive cleaning and risk of infection by putting stuff in your fermentation tank. PLAATO does all the measuring from the outside of the tank.
 - No calibration required
 - Instant fermentation activity monitoring. Production of CO₂ is a direct indication of the fermentation activity. This gives the brewer new and valuable insight to the fermentation process. You can actually see how the fermentation is affected by the cooling in your fridge switching on and off!
 - Robust material. Brewing can be a messy process and equipment should handle a fall to the ground. We made PLAATO out of Tritan, so you can drop Plaato to your concrete floor as much as you want.

- Splash-proof. The brewing process can get quite wet - so can PLAATO.
All electronics are placed in one splash-proof casing.