Draft Systems 101: Components, Balance, & Troubleshooting

If you're reading this, there's a pretty good chance that you're in charge of a draft beer dispensing system. You know, the bibs, bobs, couplers, coolers, tubes and other gadgetry responsible for freeing your beer from its 15.5 gallon metal cage and delivering it to the comfort of your glass. It's a simple system, right? Turn on the gas, put the twisty thing into its corresponding twisty hole, and let 'er rip! Well, you might be able to get away with that sometimes, but to get your draft system reliably working on your side, you've gotta really understand how it works. Let's dig into it.

Components
Draft systems come in many different forms, from the incredibly complex (think beer lines of 500+', multiple coolers, daisy chaining and more manifolds than you can shake a stick at) to the incredibly simple (think party tap at the frat house), but they've all got a few things in common.

Cooler
At the frat house, this is usually a big bucket with some ice in it. In bars and restaurants, this is usually a walk-in refrigerator or a kegerator. The purpose of each is the same: to keep beer cold.

Keg
This is where the beer lives. Kegs have a valve on top that lets gas in and beer out. On the other side of that valve is a tube extending to the bottom of the keg.

Gas
Gas is necessary to pressurize the beer within the kegs to push it up that tube, through the coupler and beer line and get it to the faucet so you can pour it at your bar. Most draft systems use canisters of carbon dioxide or a blend of carbon dioxide and nitrogen. These systems have a device called a regulator that is used to control the flow of gas as it leaves the canister. It is usually attached to the top of the canister and has gauges that indicate the outgoing pressure of the gas and the internal pressure of the canister. Advanced systems will have *secondary* regulators for every beer on tap, as different beers require different dispensing pressures--we'll get to that later. The pump-action party taps you might be used to from college keggers and company barbecues pressurize the air around us to push the beer—not good. These systems introduce oxygen and bacteria from the air into the keg and quickly spoil the beer.

Coupler
This is the proper name for the aforementioned twisty thing. The tubes that carry gas *to* the keg and beer *away* from the keg connect to this device, which is twisted onto the valve atop the keg. The coupler usually has a handle that is pulled down to start the flow of gas into the keg and allow the beer to flow out.

Tubing
Tubing is necessary to carry gas to the keg, and beer away from the keg. The tubing that connects from the coupler to your faucet is referred to as "beer line" (because it carries beer to the tap, duh!). The length and internal diameter of the beer line will have an effect on the performance of your draft system. Most systems use clear vinyl tubing with an interior diameter of 3/16".

Faucet
Alright! The beer has made it to the faucet! It's getting closer to your thirsty tastebuds. The faucet is essentially a valve and a spout. To open the valve, pull the tap handle all the way forward—the beer should flow out of the spout nice and clear at a rate of about 2oz per second. If it's pouring out foamy, too slowly, or too quickly, you've probably got a problem that needs addressing.

Keep it Balanced
There are many factors that can lead to a less-than-stellar pint coming from your tap. A proper pour is dependent on your draft system being balanced. By this, I mean that the amount of carbon dioxide gas pressure you use to push your beer has to be dialed in to accommodate a whole bunch of variables, from the temperature and carbonation level of the beer being poured, to the amount of resistance that comes from the stuff between keg and tap: gravity, tubing, faucets, couplers, and other hardware.

This is getting complicated, I know. Let's simplify things a bit and assume that all of your kegs are chilled to 40°F and have a level of carbonation typical of most American beers. The amount of carbon dioxide pressure you need to use to get your beer to the tap is dependent on a few factors. The length of the beer line is one—the longer your beer line, the more pressure you need. Gravity is another. Is your cooler in the basement of your bar? You'll need to use more pressure to push that beer against the force of gravity to get it to your upstairs taps.

Here's the problem: if you apply *too much* pressure, the beer will absorb the carbon dioxide as bubbles and you'll have an overcarbonated, foamy pour. That's where gas blends come in. If the pressure you need to push your beer to the taps is so much that the beer will become overcarbonated, you'll probably want to use a blend of carbon dioxide and nitrogen. Nitrogen is much less soluble in beer than carbon dioxide is, so it won't absorb into the beer as carbonation.

Troubleshooting

Okay, that was pretty geeky. If you are currently running a draft beer system, you might feel like you don't really need to know this stuff—you know where your regulator is set, and most of your beers pour just fine. But, you know, kegs slowly lose carbonation after a couple weeks of being tapped. Or everything's pouring great, until…BOOM: foamy pour. What gives?! These might be signs that your system is out of balance.

Let's look at that first issue: kegs are losing carbonation. This is a sign that you have insufficient carbon dioxide pressure applied to those kegs. As beers are poured, the headspace within the keg is filled with carbon dioxide gas from your canister. If the amount of applied pressure isn't quite enough, the carbon dioxide in the beer (in the form of bubbles) is released into the keg's headspace and the beer goes flat the more you pour. Problem! This is especially rough if you are trying to pour highly carbonated beers (like hefeweizen or Belgian-style beers) on systems that use only one applied gas pressure for all kegs. That one output pressure may be great for most of your beers, but your saisons and dubbels are losing carbonation. The converse applies as well—if you're pouring beers with a low level of carbonation, they may become more carbonated than the brewer intended over time. We recommend individual gas regulators for every draft line because of this. It can be impossible to properly pour highly carbonated beers on the same system as your IPAs and stouts without them.

But what about the random foamy pour? First of all—are you quickly opening the faucet all the way to start your pour? Draft system newbies almost always make the mistake of opening the tap slowly and gradually, thinking it will make for a slower, easier-to-manage pour. Nope! Foam bomb.

But you probably knew that already. Back to the applied pressure thing. If you are applying too much or too little carbon dioxide pressure to your kegs, this can cause foamy pours as well. Again, balance is key!

But wait…the problem might also be one of temperature. Carbon dioxide bubbles are most soluble in cold beer. In other words, if your beer is even a little bit warmer than it should be, it will pour foamy. Once a keg is delivered to your bar or restaurant, let it sit undisturbed in your cooler for 24 hours prior to tapping. This will ensure that the whole keg is fully chilled and settled. Still foamy? Start checking your cooler for warm spots—shift kegs around, let 'em sit for a while, and keep testing for foamy pours. Another possibility: your beer could be warming up on its way from keg to tap—if you have long beer lines, ensure that they are kept cold all the way to the tap with bundled glycol lines or another method of cooling.

Did all that and still having trouble with foamy kegs? It might be time to replace the rubber parts on your coupler and faucet and give your lines a good cleaning. Most folks recommend a thorough line cleaning every two weeks to keep away buildup of the crud in your lines that can cause spoilage and foaming.

For a more detailed look at draft system balance and maintenance, we recommend the Draft Beer Quality Manual that was put out by the Brewer's Association. It's a bit dry, but very detailed. And it's free!
The Draft Beer Quality Manual