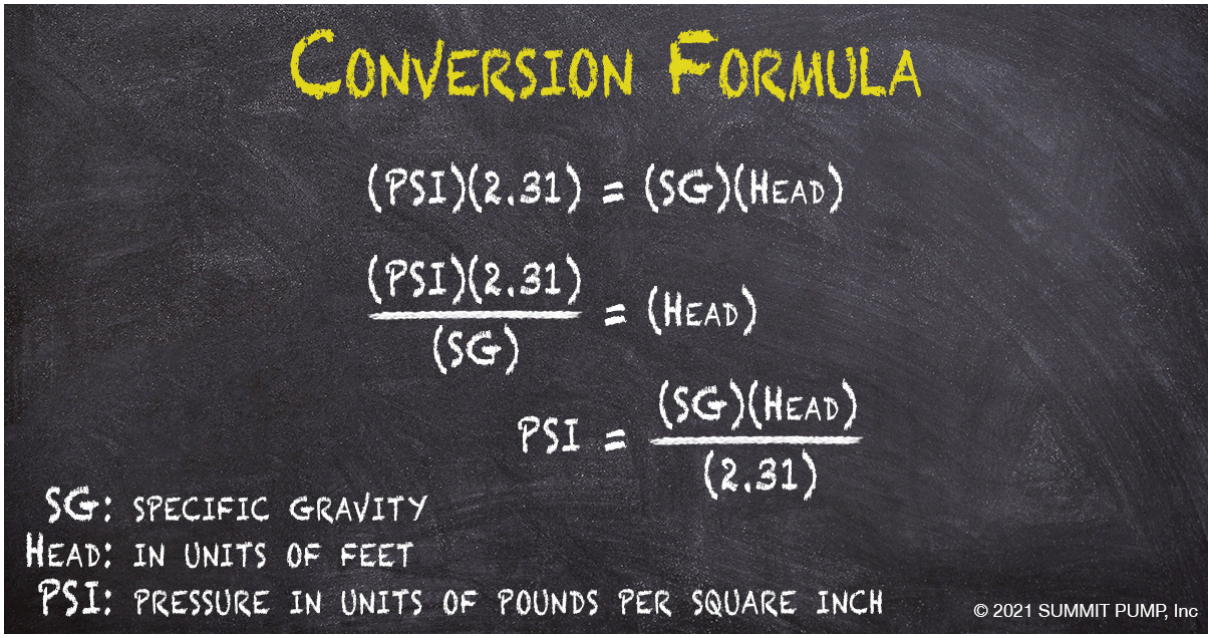
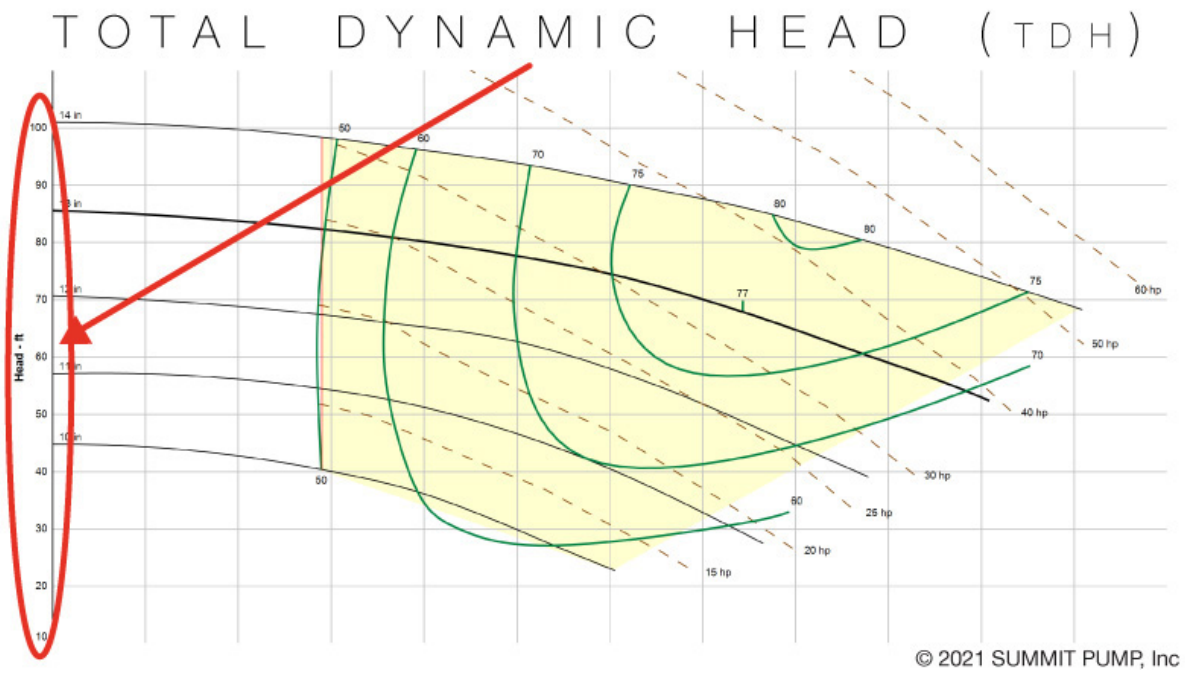
Last month we reviewed basic vacuum principles. The reason was to better understand how to correctly measure the differential pressure across an operating pump.

Understanding your suction pressure and knowing how to read a vacuum is critical in identifying performance issues. In the field, instruments measure in units of **PSI** …whether gauge, absolute or vacuum. When diagnosing issues, PSI must be converted to head in order to calculate Total Dynamic Head (TDH).



Total Dynamic Head

Consider **Total Dynamic Head** as the amount of energy the pump converts from suction to discharge. This information is critical in identifying where the pump operates on the performance curve.



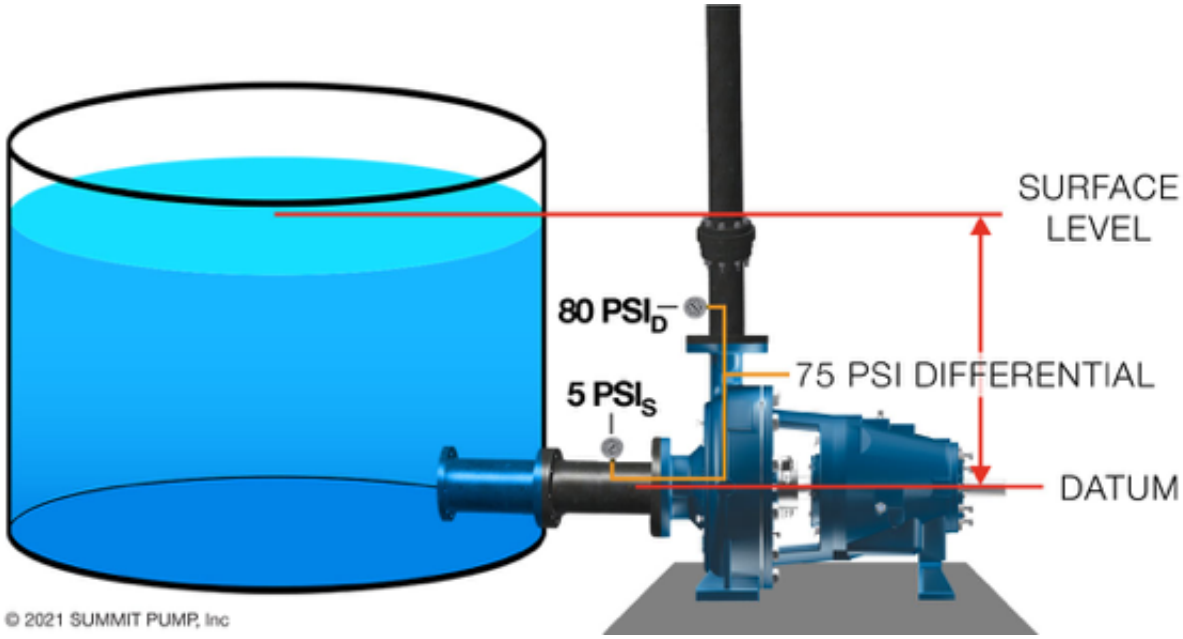
Suction Pressure

To illustrate reading vacuum or pressure on the suction side of the pump, we will examine both a flooded suction and a suction lift application. Each example will assume the *same* pump, the *same* liquid and the *same* operation speed. The differential pressure of the pump will be the *same* for each example.

Note: For simplicity, we will ***not*** convert pressure readings to head in these examples, but understand the conversion mentioned above must be done in order to calculate TDH. For a more in-depth explanation, see my full article on the topic.

Flooded Suction

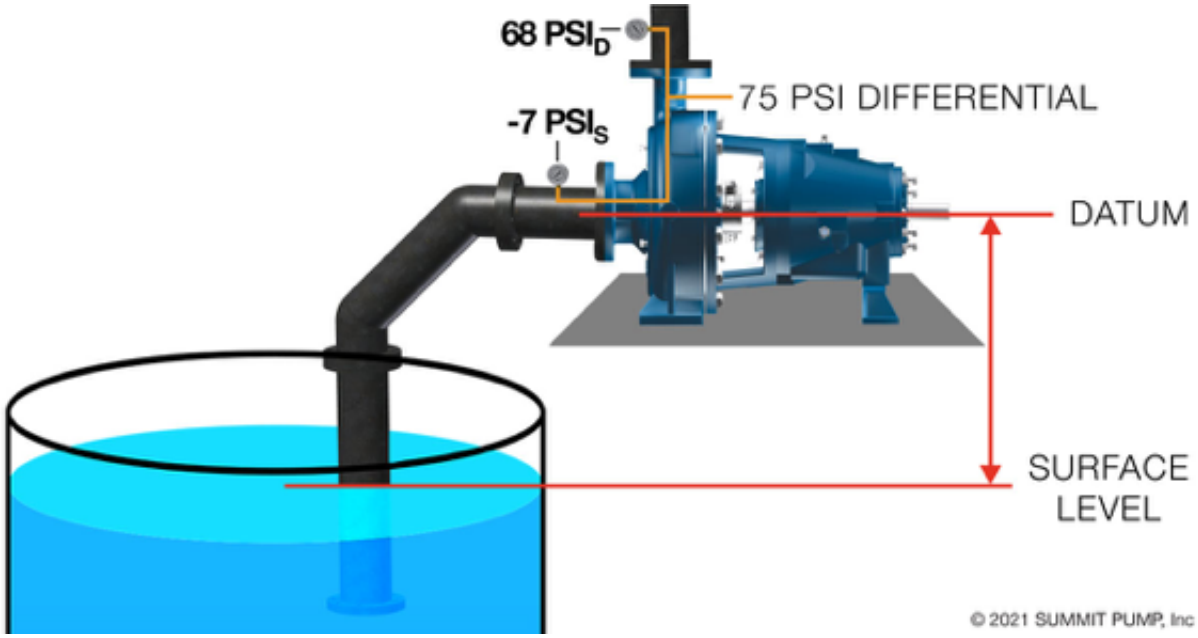
In flooded suction, the liquid level is above the pump datum and has energy to provide to the pump. Meaning the pump does not need to convert this energy and will use this “given” energy elsewhere. In this case, a higher discharge pressure.



Suction Lift

In Suction Lift, the pump must generate a low enough pressure at the eye of the impeller to have the fluid pushed into the pump by atmospheric pressure. Energy is used to make this happen and results in less energy available for pressure at the discharge.

Notice the overall pressure readings are lower but the differential pressure (75 PSI) remains about the same in both flooded and suction lift applications (using the assumptions we made earlier).



Take-a-ways

Pressure gauges neglect velocity energy and read only one type of energy, which is **pressure.** Understanding your suction pressure and knowing how to read a vacuum is critical in calculating the pump's TDH (Total Dynamic Head). Knowing the TDH can lead you to resolving several issues including operation cost, safety, pump life, inaccuracy or just nuisance issues.

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