

Figure 11. Pitot Tube

Improving Regulator Accuracy with a Pitot Tube

In addition to the changes we can make to diaphragm area, spring rate, orifice size, and inlet pressure, we can also improve regulator accuracy by adding a pitot tube as shown in Figure 11. Internal to the regulator, the pitot tube connects the diaphragm casing with a low-pressure, high velocity region within the regulator body. The pressure at this area will be lower than P_2 further downstream. By using a pitot tube to measure the lower pressure, the regulator will make more dramatic changes in response to any change in P_2 . In other words, the pitot tube tricks the regulator, causing it to respond more than it would otherwise.

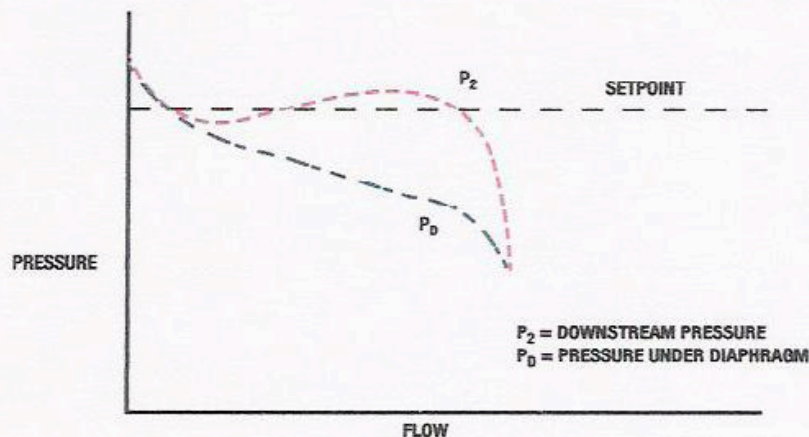


Figure 12. Performance with Pitot Tube

Numerical Example

For example, we'll establish setpoint by placing a gauge downstream and adjusting spring compression until the gauge reads 10 psig for P_2 . Because of the pitot tube, the regulator might actually be sensing a lower pressure. When P_2 drops from 10 psig to 9 psig, the pressure sensed by the pitot tube may drop from 8 psig to 6 psig. Therefore, the regulator opens further than it would if it were sensing actual downstream pressure.