

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.

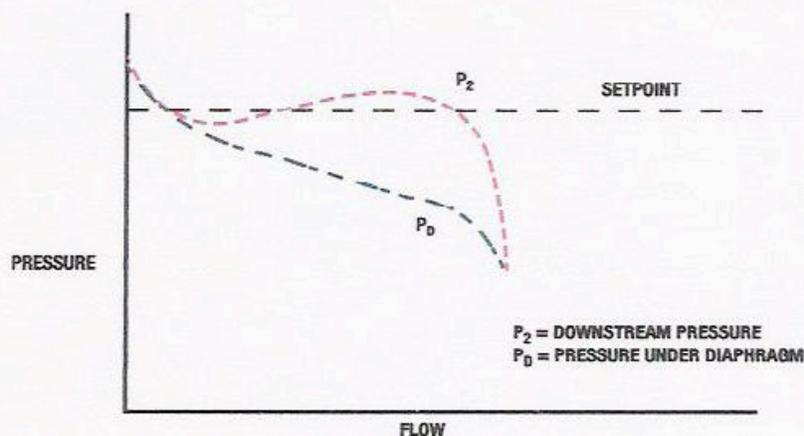


Figure 12. Performance with Pitot Tube

### 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.