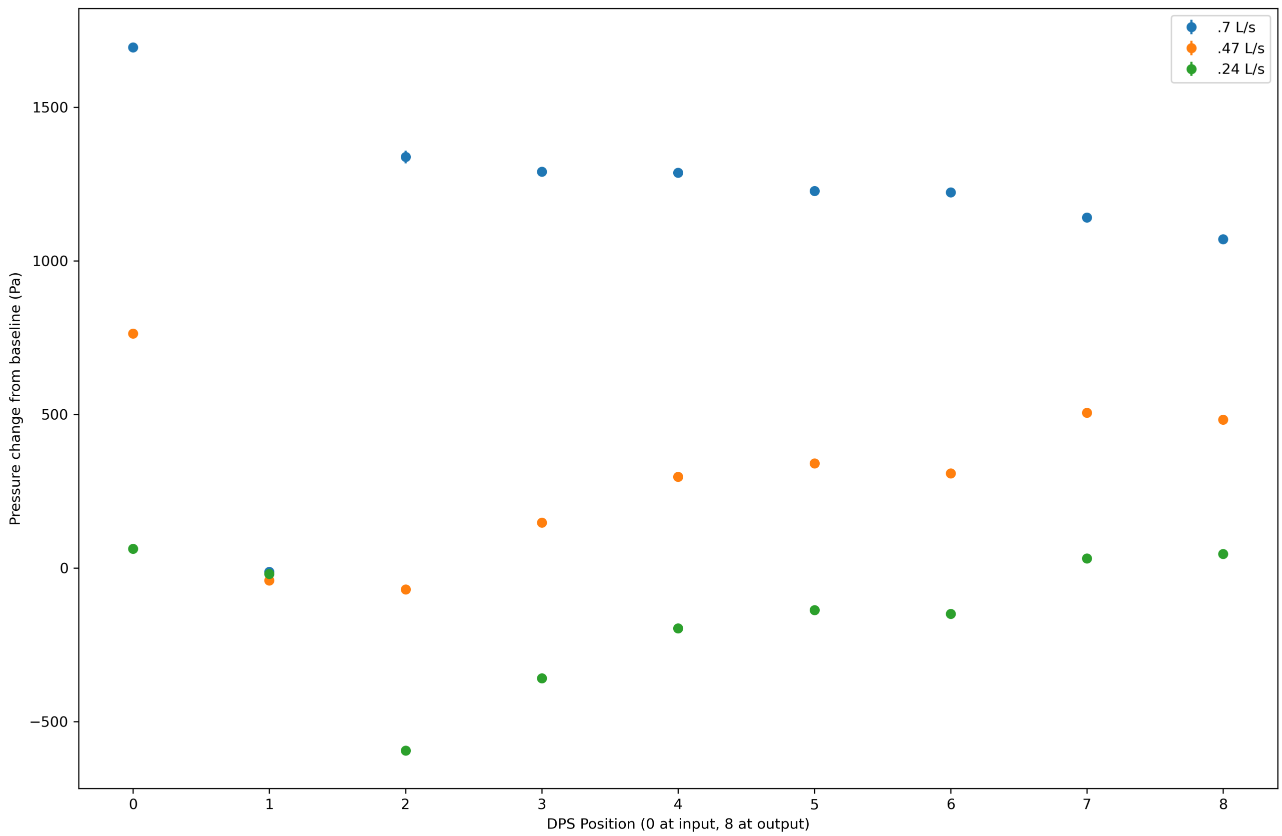
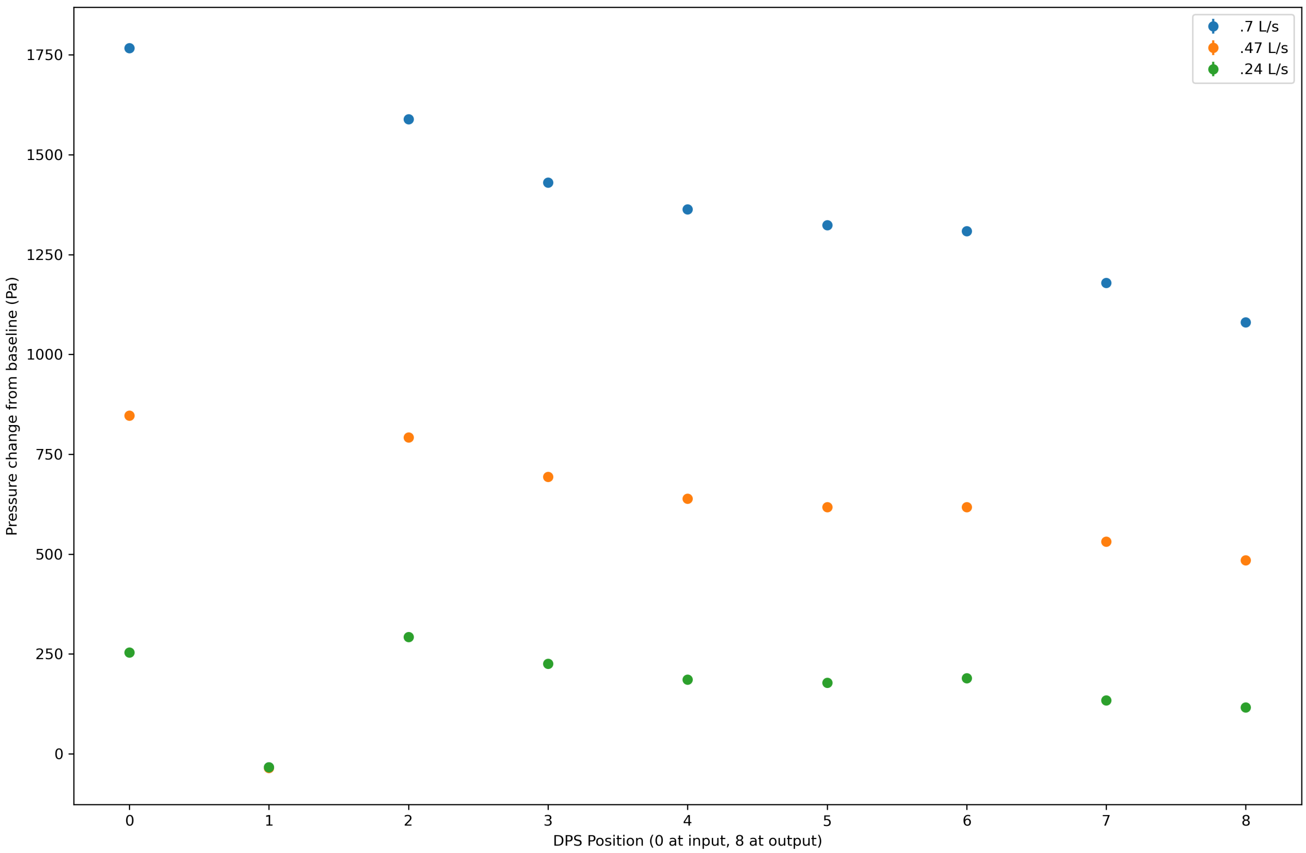


This is our first test of the 9 DPS design. We first took 10 pressure samples for each DPS with no flow and averaged these off values to serve as a baseline for each DPS. We adjusted the flow rate with the external PRM flow meter and took the average of 10 pressure samples for each DPS. Using the baseline as the zero point, here we plot the rise in pressure at each DPS location. Position 0 corresponds to the input position, while 8 corresponds to the position closest to the output. The dispersion of the 10 values used in the averages are used as error bars, but they are indistinct indicating high precision measurements.

Ideally, we expect a constant pressure increase irrespective of position. However, we clearly do not observe such behavior. We conclude that we should strengthen our seal and test again.

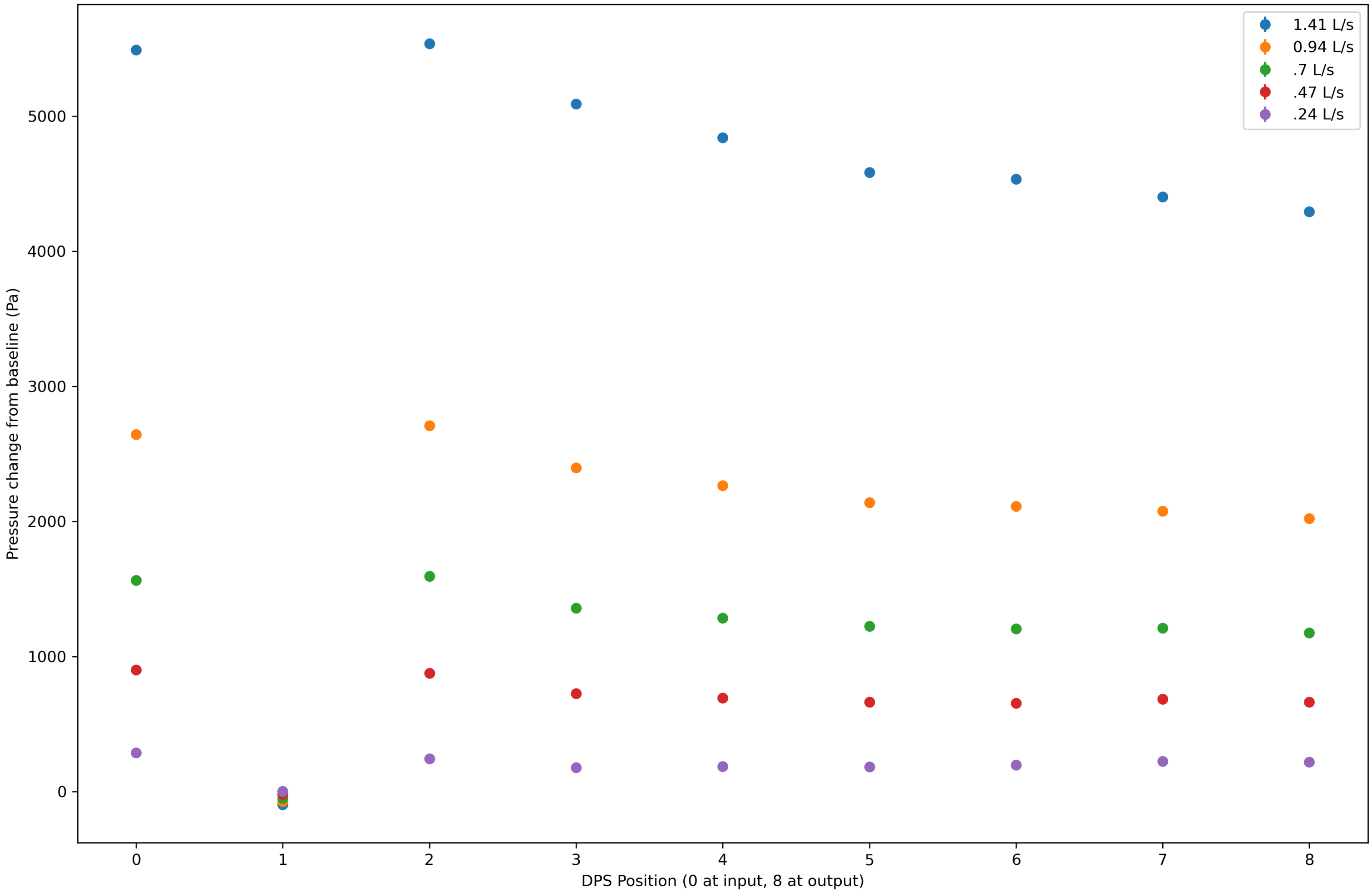
General note:

The ribbon cables often lose connection to the DPS sensors due to incomplete contact. Usually slightly adjusting the ribbon cable headers on either end will resolve it. We have our DAQ hang up until connection is established for each DPS so that we can debug this behavior easily.



This is our second test of the 9 DPS design. We further sealed the external surfaces with gorilla tack to better our seal. The same procedure as the first test was used. Now we observe reasonable results. Ideally our pressure increases would be constant, but if frictional losses or leakage were an issue, we expect to see decreased Δp as we move further from the inlet. This is what we observe, except we note the DPS sensor at position 1 is most certainly defective, as it reads a constant pressure increase regardless of input flow rate.

By sealing the output of the tube with the pump on and observing that the external flow meter still gave a reading of ~.25 l/s we decided to try to seal the tube further.



In our third test of the 9 DPS design, we took the tube apart and made a makeshift gasket with the gorilla tack. Then after sealing it back up, we basically encased the entire tube with tack to stop any leakage. We made sure that all hose connections before the tube were entirely sealed as well. However, after doing the finger over output test, we still observed that the external flow meter read ~.25 L/s. We are unsure how to further prevent leakage or what the sources might be.

Otherwise, the procedure is the same as the previous tests. We tested a couple higher flow rates to examine how the Δp might drop off with position according to the input flow rate. The additional sealing seems to have made a difference, as the flow rates that had been tested prior exhibit a more constant pressure increase over the position.

The higher the flow rates appear to have a steeper Δp. This may be due to increased frictional forces, or leakage. Notable is a slight increase in pressure between position 0 and 2 (DPS 1 is broken so we are unable to see the intermediate behavior) that seems to slightly increase as the flow rate increases. This may be due to turbulent effects near the inlet.