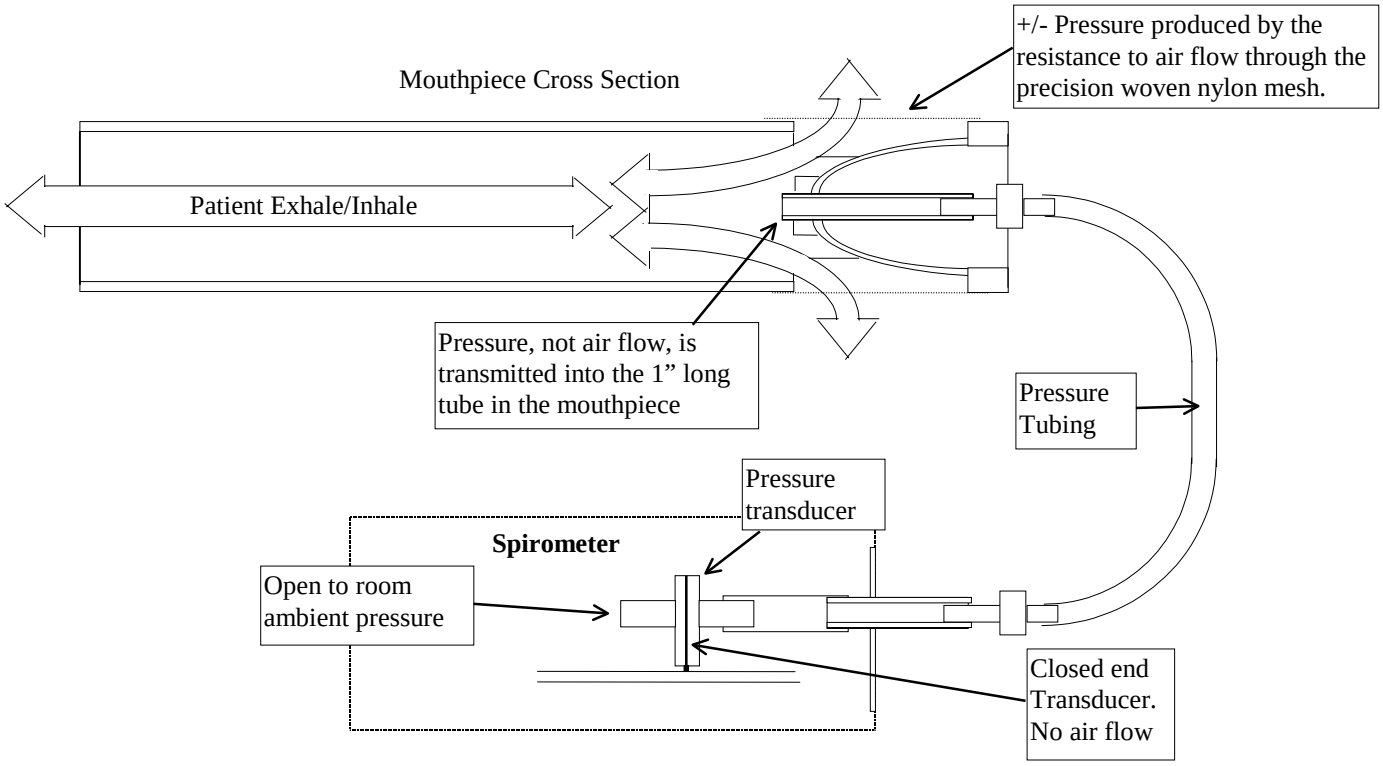
QRS Spirometer - Cross Contamination

The QRS Diagnostic Spirometers use a disposable mouthpiece that is designed for single patient use. The mouthpiece is never to be used for more than one patient. The design is intended to reduce the risk of contamination from one patient to another. The following is a description of how the QRS Spirometers reduce the risk of user/patient cross contamination.



The length of the connecting pressure tubing 48". The resistance for a flow of 14 liters/second produced by the mouthpiece is +/- 4" of water column. ***There is no air flow through the pressure tube, it is only used to transmit the pressure wave.*** The ID of the pressure tube is 1/8", which creates a total volume of air inside of the tube of 0.58"^{3} This is calculated in (eq.1)

(eq1) 3.14 x (1/16)^2 in^2 x 48" = 0.58 cubic inches of air.

An eight (8) inch variation in the pressure (+/- 4"H_2O) will cause a 0.2% change in the volume of air in the tube. The absolute volume of air entering the tube due to compression is 0.0012"^{3} (eq.2)

(eq2) 0.58"^{3} x 0.2% = 0.0012 cubic inches of air

The amount of air volume moved due to compression is divided by the tube diameter and shows that the total air movement into or out of the tube is only 0.308" (eq.3)

(eq3) 0.0012"^{3} / (1/16)^{2}in^2 = 0.308"

The mouthpiece internal tube is 1" long. The Pressure tube luer inserts into the mouthpiece 3/16" or 0.185" This leaves a trapped air space in the mouthpiece of 13/16" or 0.815" With a total movement of the air column of 0.308" we have almost one half inch of dead airspace to act as a barrier between the patients exhaled air and the pressure tubing.

In the highly unlikely event of a high velocity particle (e.g. saliva) being injected into the pressure tube and landing on the tube wall it would it would remain in the tube and could not re-enter the air-stream of the mouthpiece (be 'sucked-in') because of the lack of airflow through the mouthpiece. Our documentation recommends the replacement of the pressure tube if it is suspected of being occluded.