# Appendix I

Figure 1 displays the mock-loop setup used for the experimental investigation. The length of the tube before the oxygenator was found to be irrelevant for the tests. A 3/8” Y-piece was placed at 1.5 m from the oxygenator. Two straight luer-lock connectors were inserted to enable pressure measurements at 0.15 m after the oxygenator and 0.05 m before the Y-piece. To assess the different pressures in each branch (after the Y-piece) of the venous and arterial return cannulas, luer-lock connectors where applied symmetrically at 0.15 m after the Y-piece and at the end of the tube 0.05 m prior the cannula. The 0.15 m tubing was placed before the pressure measuring point after both the oxygenator and the Y-piece in order to avoid turbulence at the detection pressure point. Once the circuit was set and positioned, the pressure was detected three times for each control point, where the value reported is the average of the three measured pressures. This was repeated for each course from two to seven liters.

The following cannula pairs were investigated: 17Fr Art-17Fr Ven, 17Fr Art-19Fr Ven, 17Fr Art-21Fr Ven, 19Fr Art-17Fr Ven, 19Fr Art-19Fr Ven and 19Fr Art-21Fr Ven.

The fluid used for the experiments was a Newtonian analogue blood fluid consisting of glucose 50% m/V, 500ml H2O (water) and 250g C6H12O6 (Glucose anhydrous); subsequently diluted with 1.105 mL H2O resulting in a glucose 15.57% m/V. At 37°C, the blood analogue fluid used has the following density and viscosity:

Density: 1.065 g/mL ± 0.001

Viscosity: 4 mPa·s ± 0.2

It is known that non-Newtonian blood has a viscosity ranging from 3.5 to 5.5 mPa·s and a density of about 1.060 g/mL with 40% Hct at 37°C. (14.15), like the values used in our experiments. Assuming 40 mmHg as aortic impedance, we have to transform pressure [mmHg] to piezometric head [m]; considering the density of glucose  and mercury, to obtain the piezometric head we applied the equation 1.1 and 1.2.



Equation 1.1 – 1.2: Pca is the pressure in the arterial branch and H[m] is piezometric head.