Cardiopulmonary model

# Purpose of Cardiopulmonary model

The model consists of three modules, each simulating various physiological mechanisms within the cardiopulmonary system. The output of the model is a simulated PPV signal, which will be validated against clinically measured PPV signals.

Fig 1 shows the high level architecture of the model, as the integration of all individual modules and their input-output relationships.

A diagram of a model

Description automatically generated

*Fig 1 The high level architecture of the cardiopulmonary model. The model consists of 3 modules which combined simulate the cardiopulmonary interactions, as well as a validation module providing quantifiable metrics of the models performance.*

# Respiratory Module

The mathematical model of the respiratory system is derived from the single order linear compartment model of the lungs, depicted in fig 1.

A diagram of a circuit

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*Fig 1 The linear first-order single-compartment model of respiratory mechanics. It depicts the lungs as a compartment with mechanical properties Raw and C. Pressure is delivered as a combination of the ventilator (Pvent) and respiratory muscles (Pmus).V corresponds to the volume expansion and deflation from* ΔP *.*

The linear first-order single-compartment model is depic

A diagram of a graph

Description automatically generated

|  |  |
| --- | --- |
| **Respiratory Parameters** | **Derivation method** |
| CL | at Pmus=0 |
| RL | Model fitting of patients Pao |
| CW | Model fitting |
| RW | Model fitting |

# Intrathoracic Module

# Cardiac Module

# Model Validation