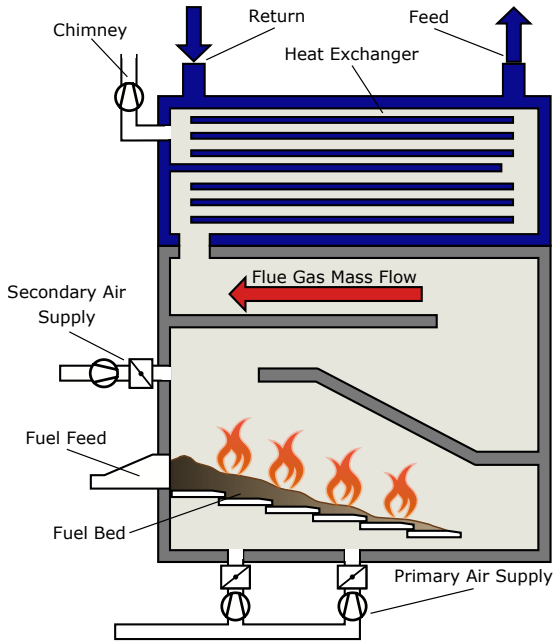
Model-based Estimation of the Flue Gas Mass Flow in Biomass Boilers

The flue gas mass flow is one of the fundamental quantities of biomass combustion processes. Its knowledge is highly beneficial for monitoring purposes and for the control of biomass boilers. Usually applied measurement principles are not suitable for long-term application, which necessitates for model-based estimation methods.

- Underlying models:
  - Dynamic energy balance of the heat exchanger
  - Static differential pressure model
- Desired estimator properties:
  - Robustness against fouling of the heat exchanger and the measurement equipment
  - Robustness against variations of the fuel properties
  - Fast dynamic response
  - High estimation accuracy
- Application and comparison of three estimators:
  - Sliding-Mode observer
  - Kalman filter
  - Steady-state estimator



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