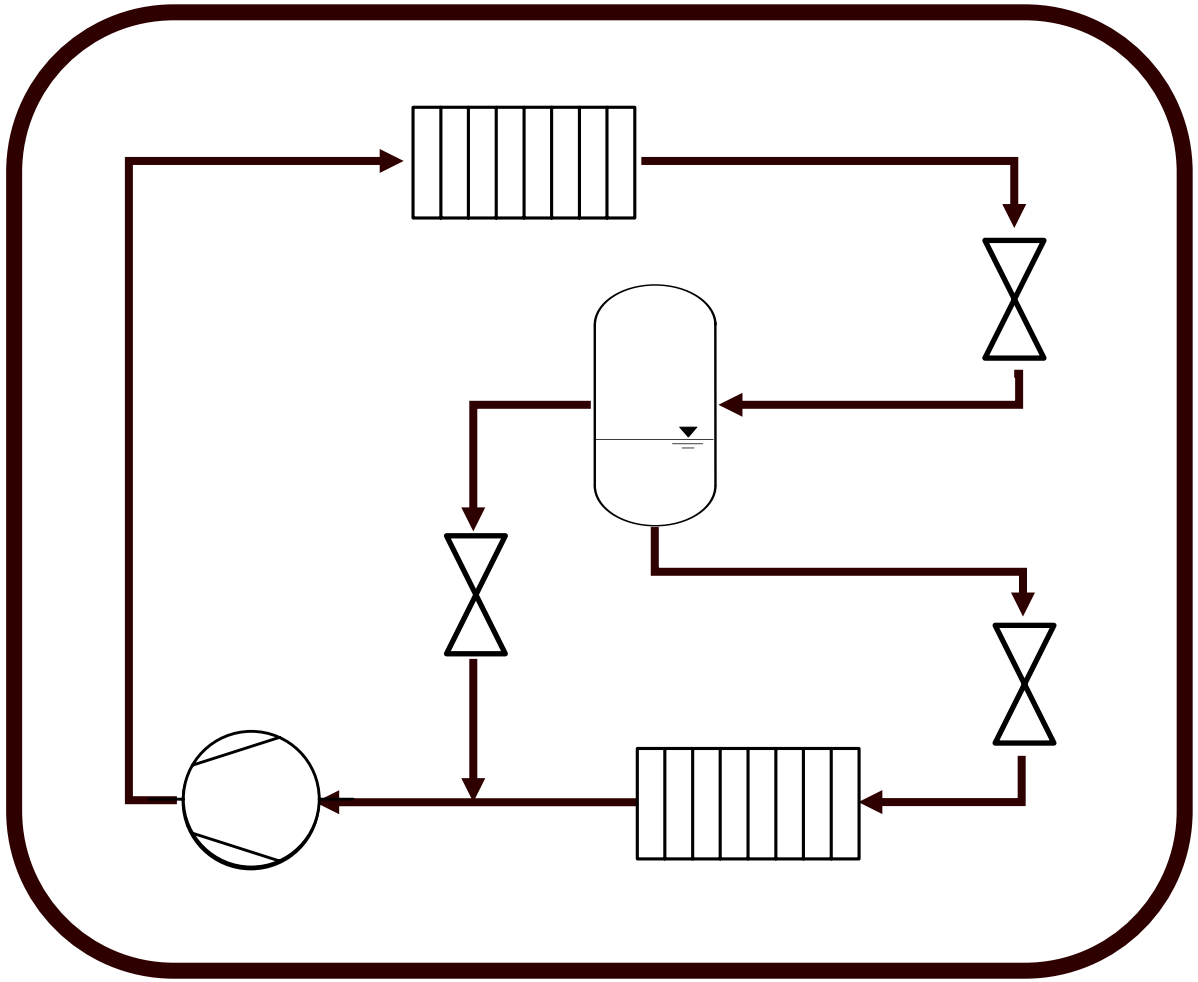
Flexible steady state HP model

What is it?

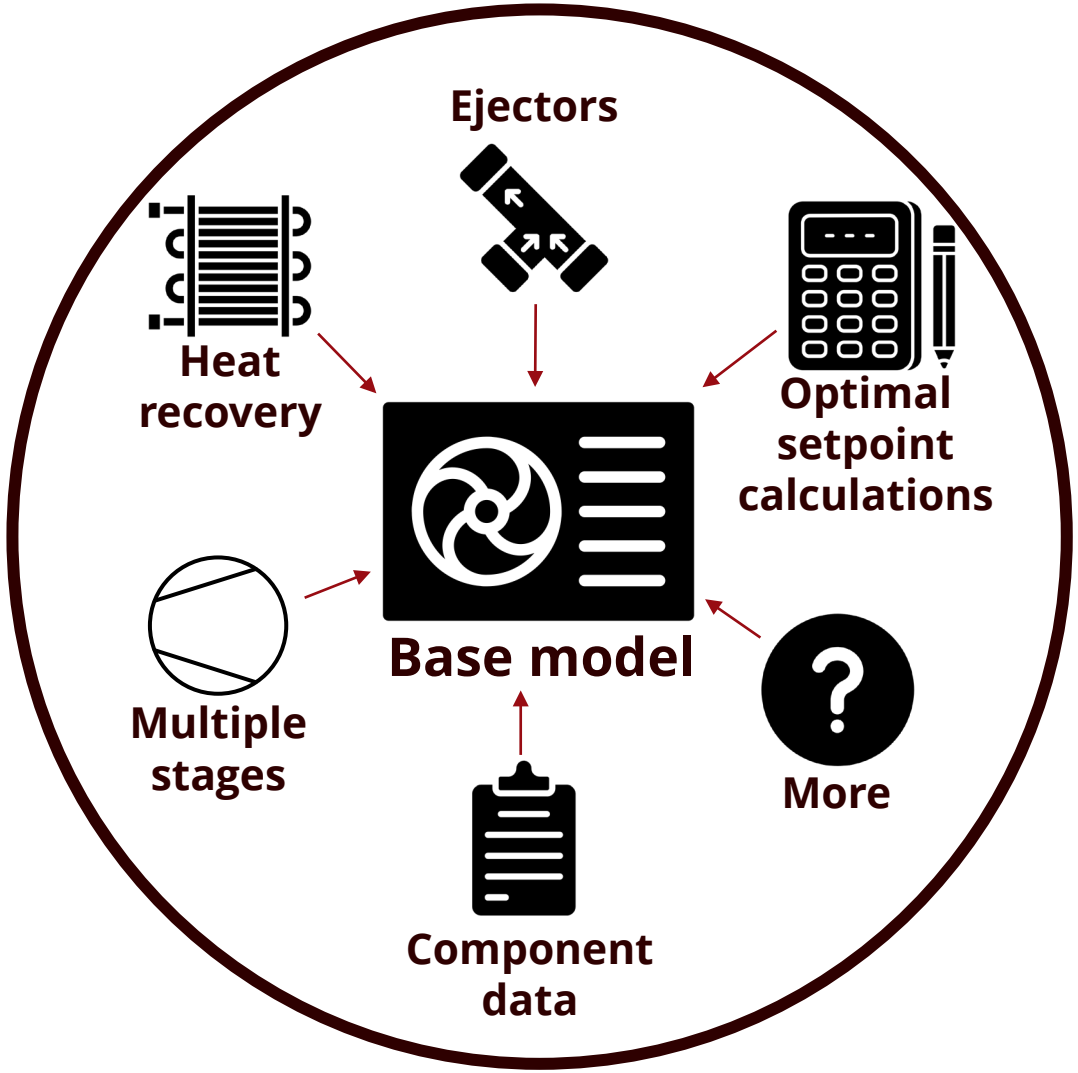
- At the base level is a simple heat pump model
  - Built for CO2 systems, but can be modified to model other refrigerants
  - Steady state
  - Subcritical and transcritical operation
- Written in C#
- Object oriented
  - Based on individual independent components that can be ‘dragged and dropped’ together



Base CO2 HP model

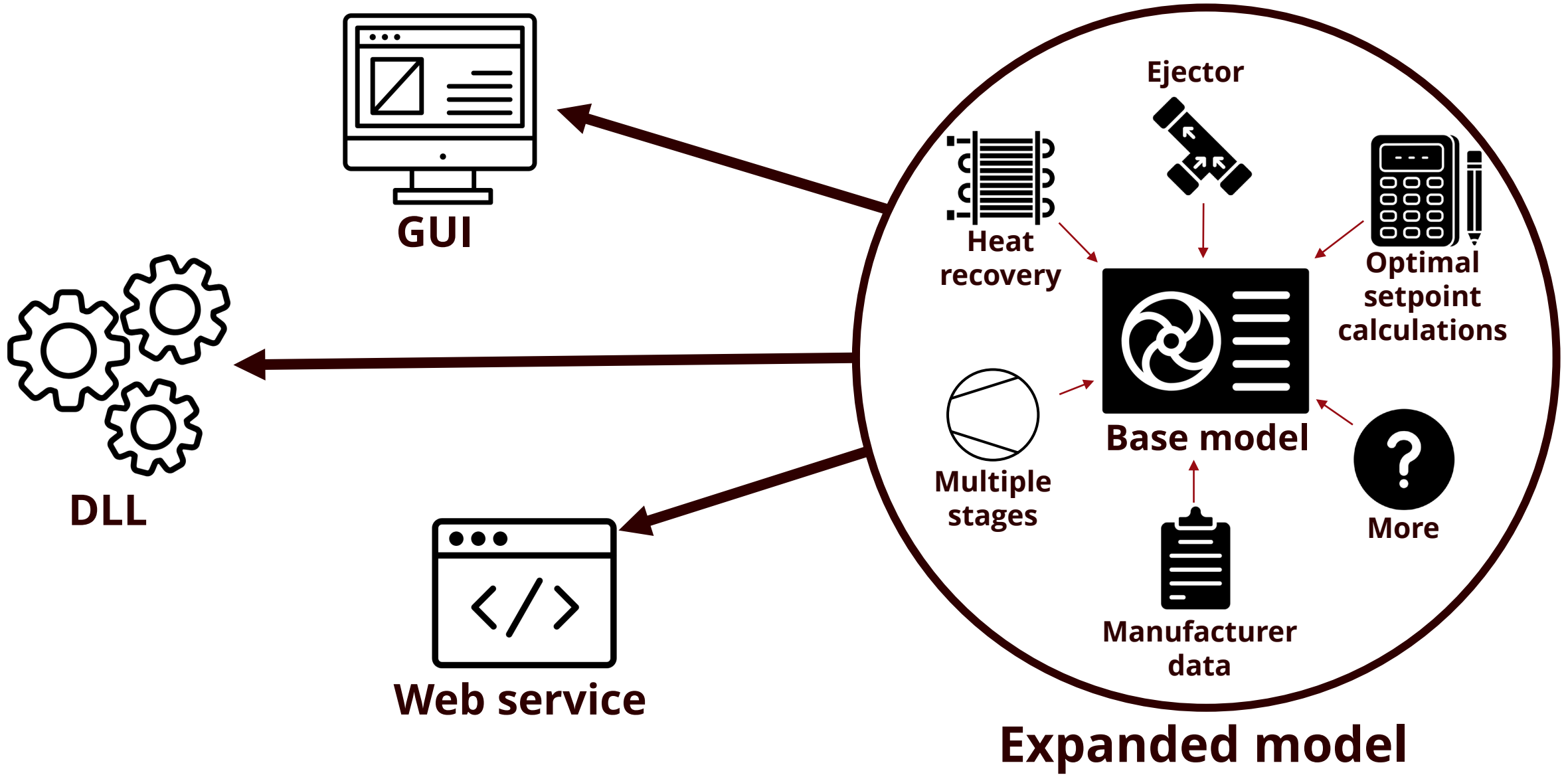
What is it?

- Model can be expanded with advanced features
- Examples
  - Heat recovery
  - Internal heat exchangers
  - HP/LP ejectors
  - Multiple suction stages
  - Integrate external calculation software from component manufacturers (compressors, heat exchangers, ejectors)
  - Calculation of optimal gascooler and receiver pressure setpoints

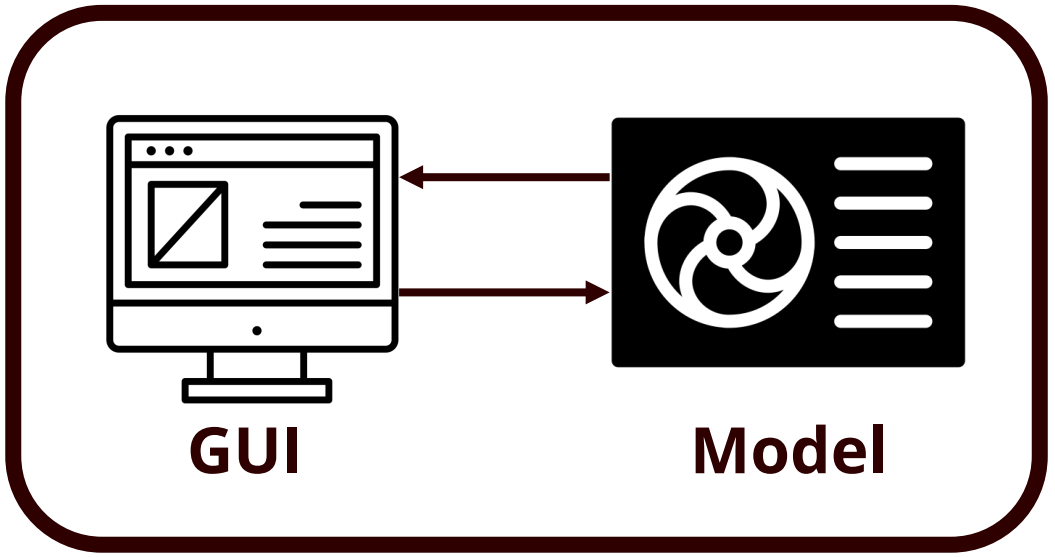


Expanded model

What is it?

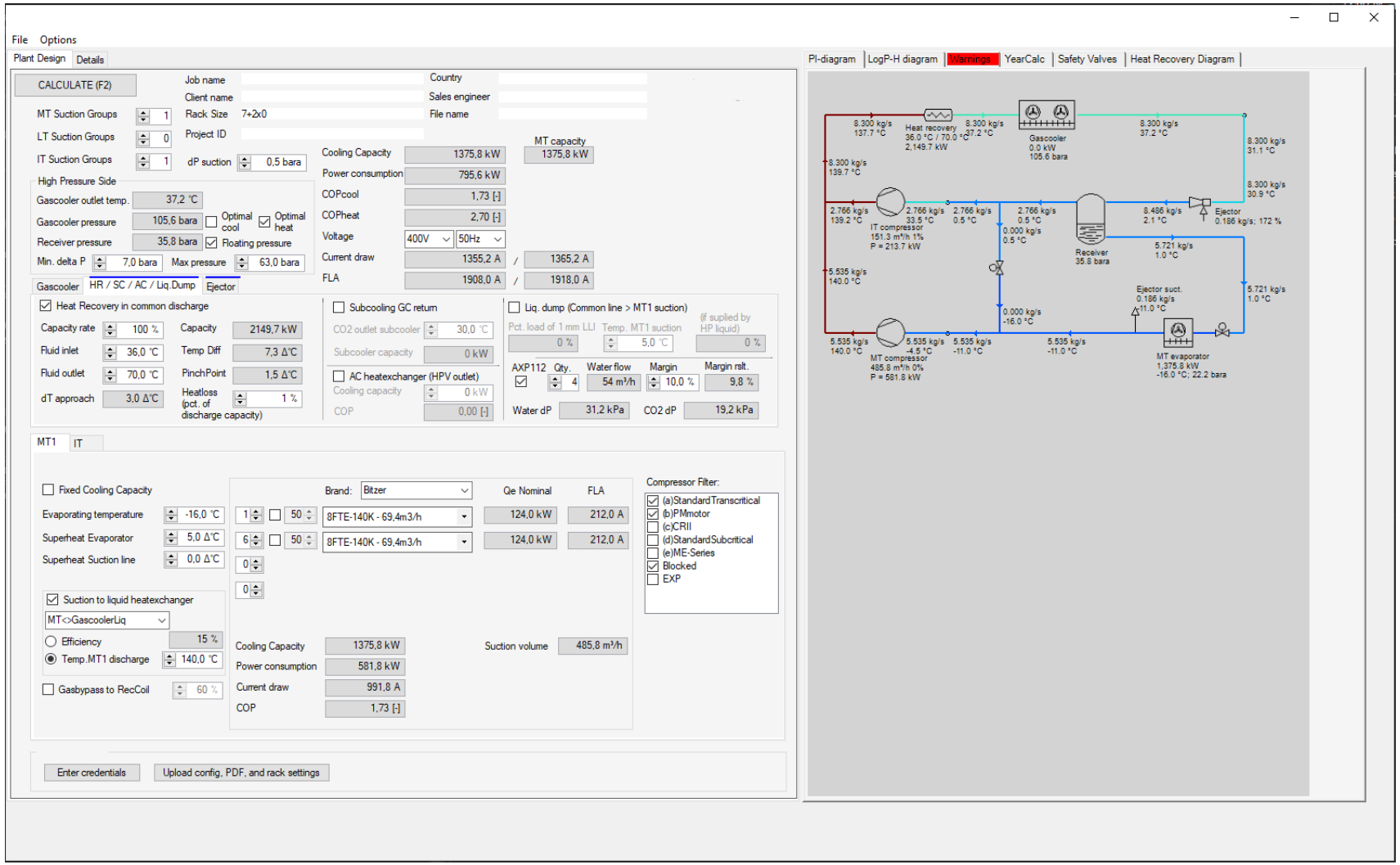

GUI
DLL
Web service
Ejector
Heat recovery
Optimal setpoint calculations
Base model
Multiple stages
More
Manufacturer data
Expanded model

Implementations – Custom UI



Implementations – Custom UI

- Can be tailored to exactly what is needed
- Includes
  - Report generation
  - Integration with an external system
  - Seasonal calculation
  - Safety valve(s) selection
- Could be extended into a true selection tool



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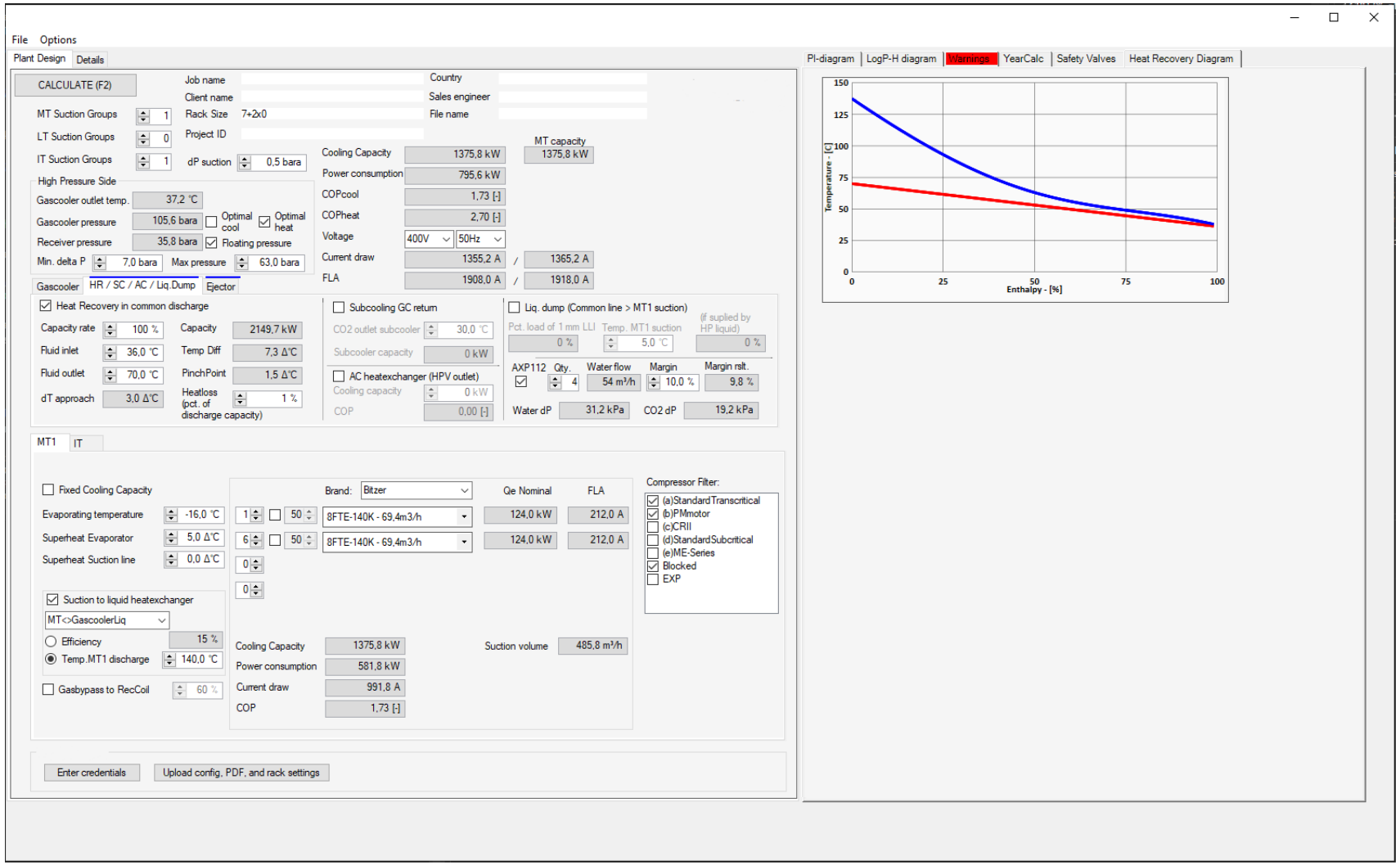

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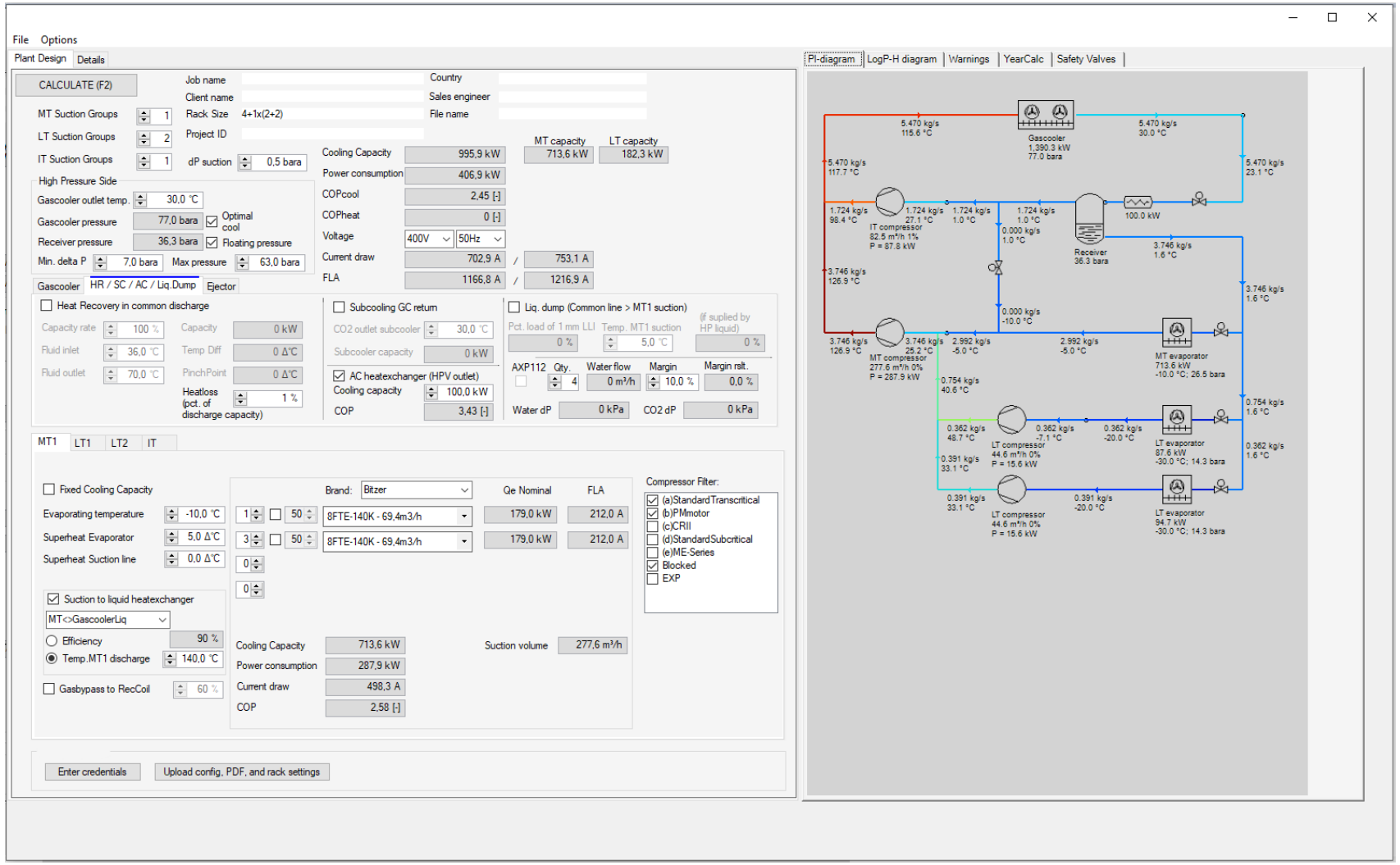

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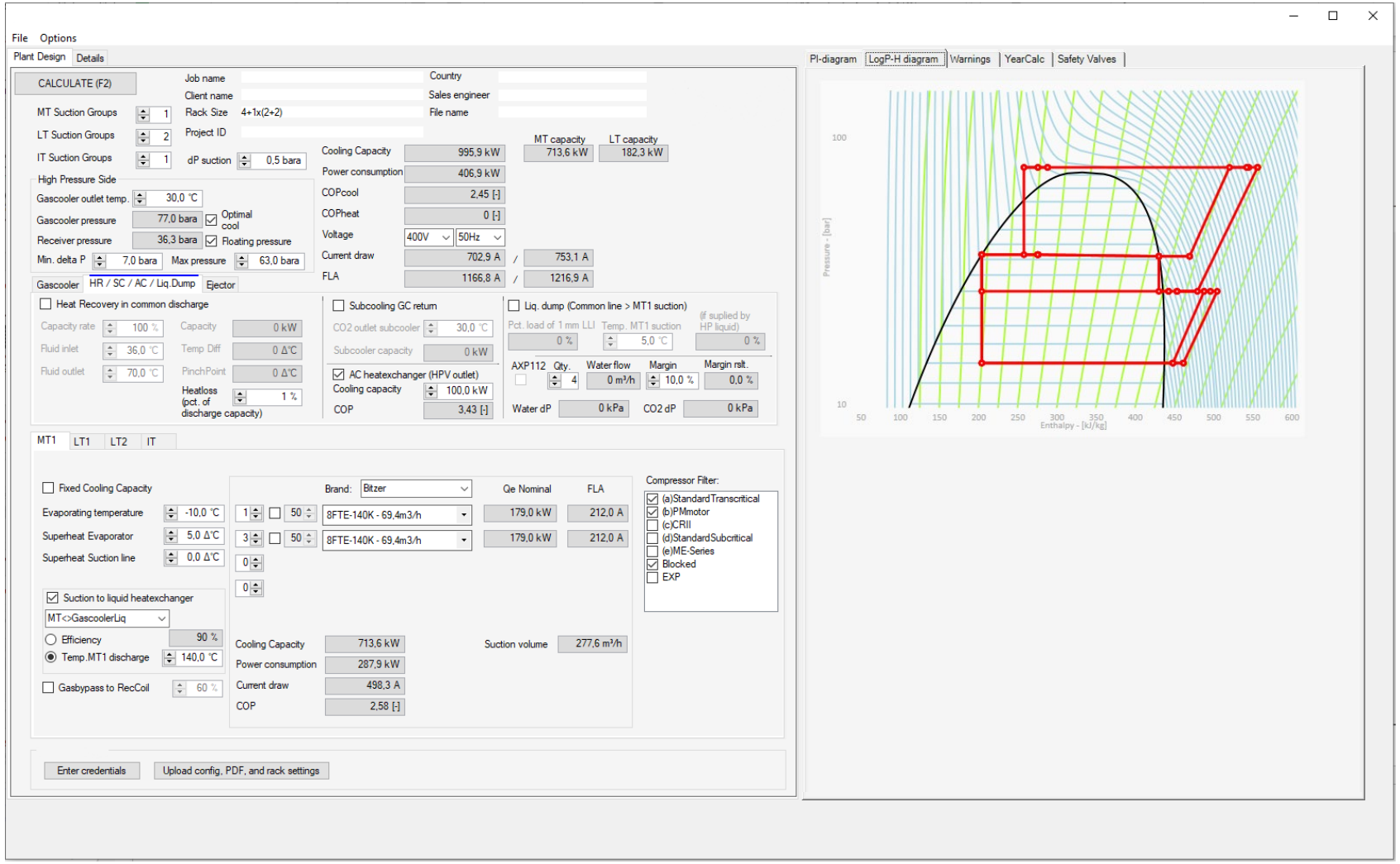
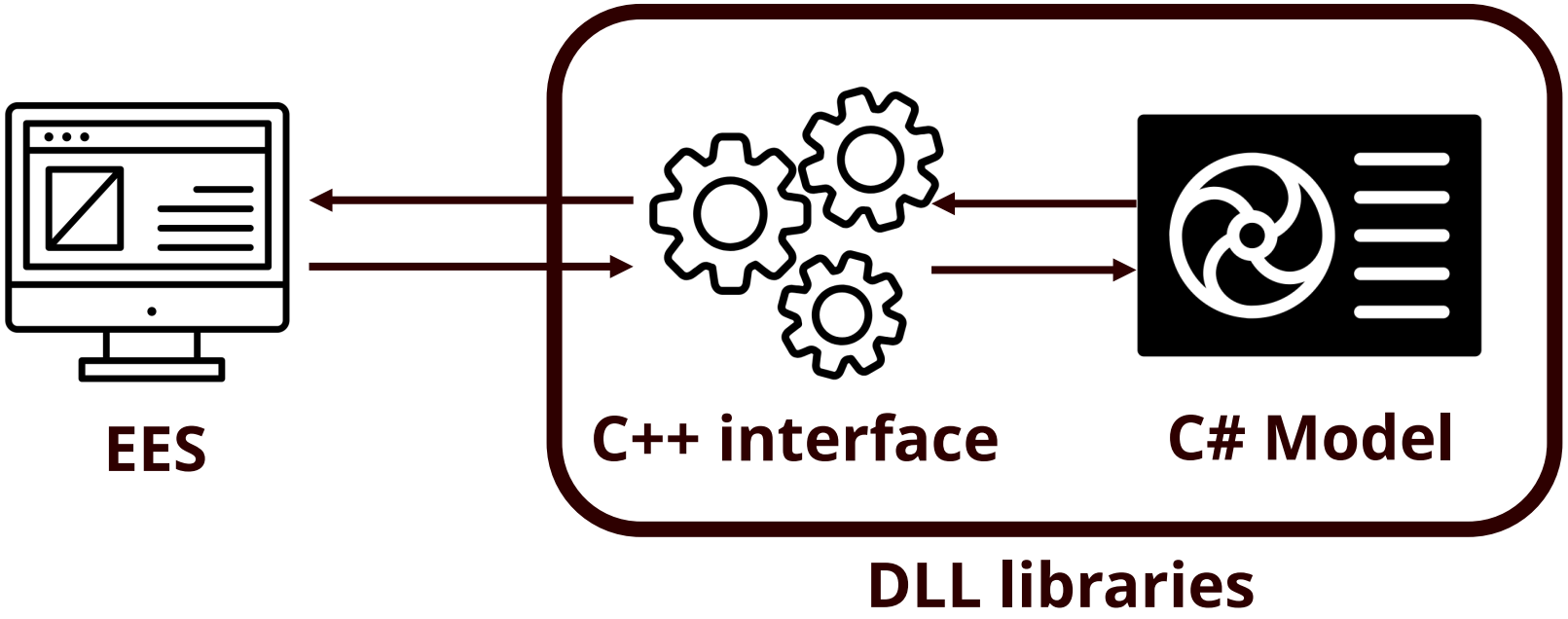
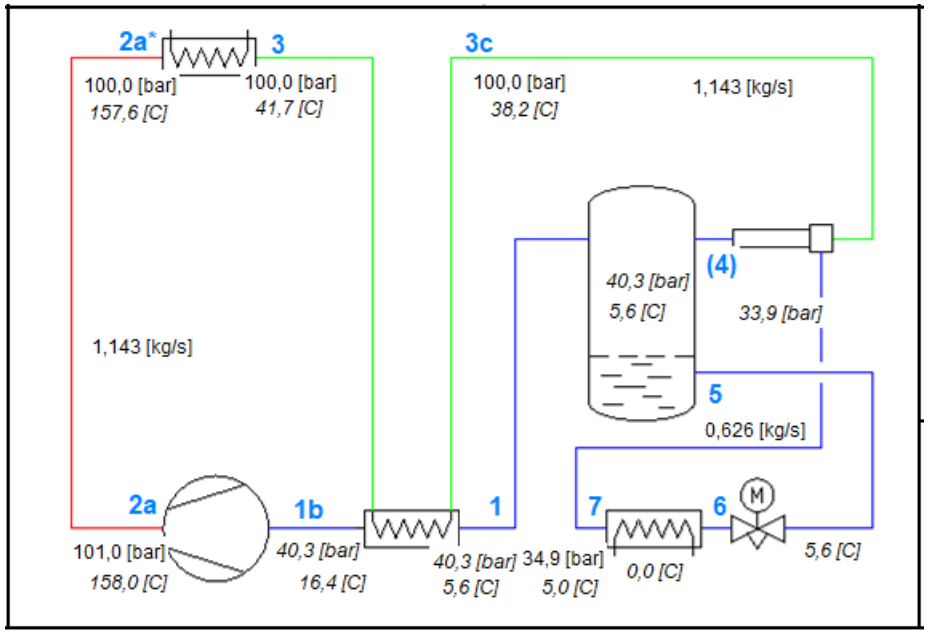


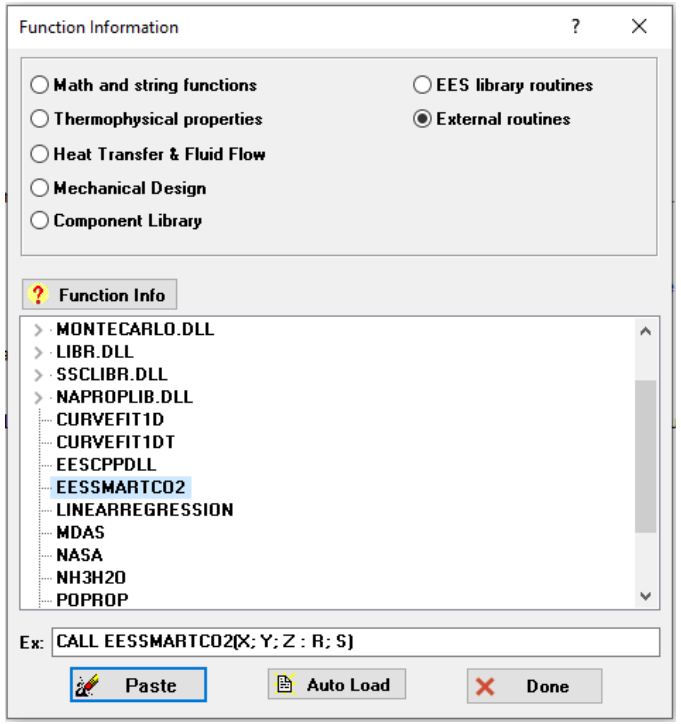
Implementations – EES function



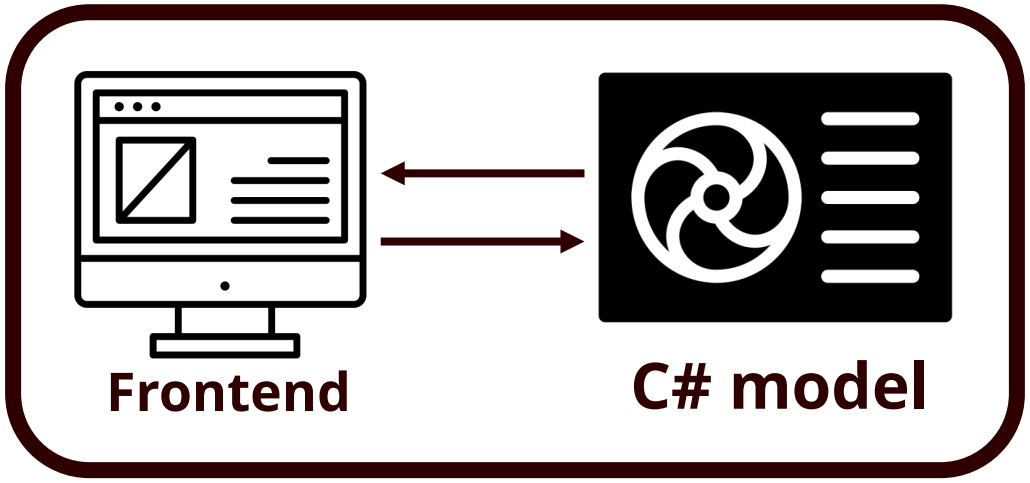
Implementations – EES function

- Callable via EES as an external routine
- Debugging of DLL via EES is possible
- With a similar setup, it is also possible to call the model from other code languages





Implementations – Web service



Implementations – Educational web tool

- Accessed via a browser
- Intuitive graphical user interface suitable for non-experts
- Backend consists of our model

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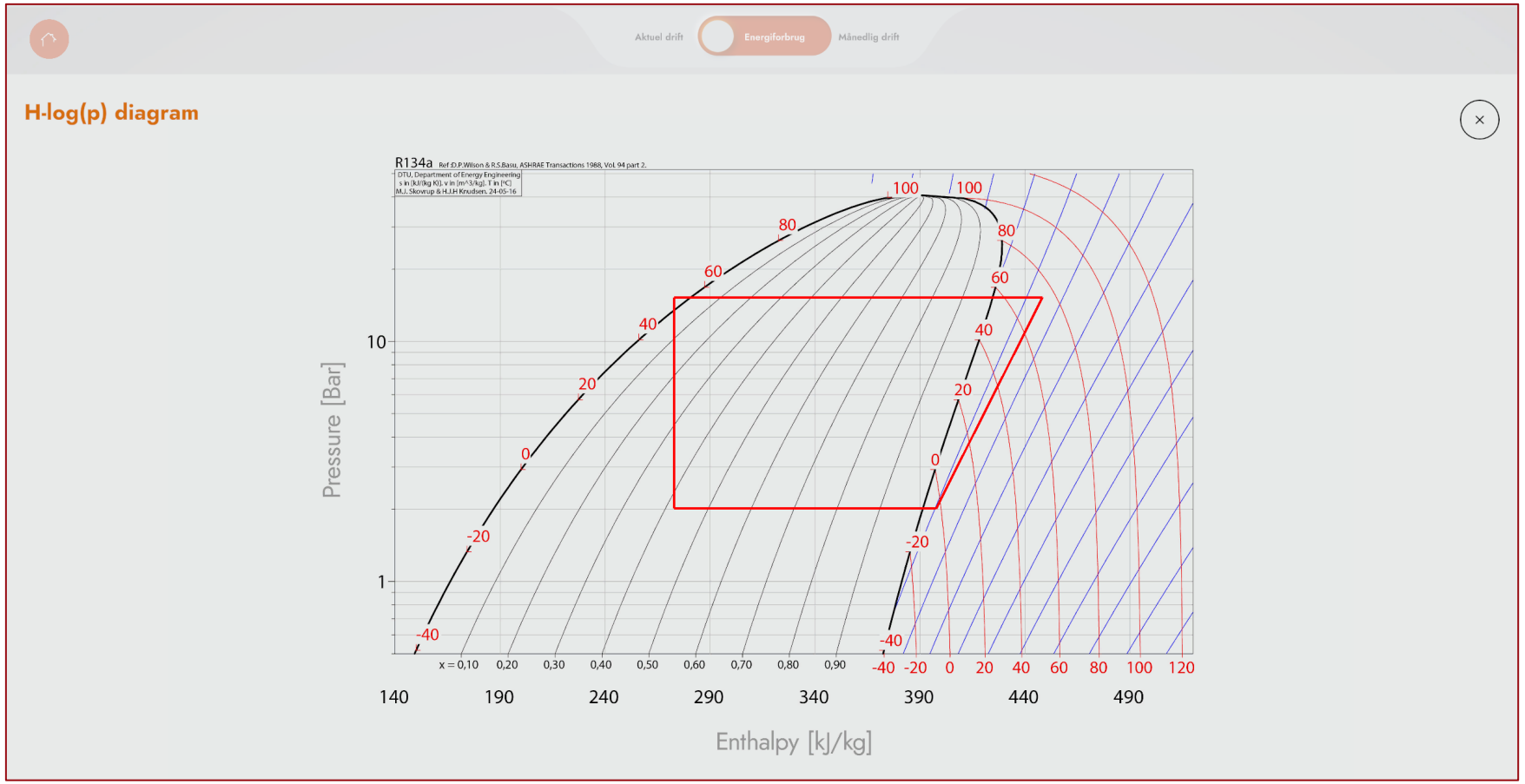

Implementations – Web service