Carnot Batteries Pump Model

**Inputs :**

* Volume/mass flow rate
* Supply state

**Outputs :**

* Pump consumption
* Exhaust state

**Pump Model**

**Parameter(s) :**

* /

# Pump model

## Characteristic curves working fluid

We will use the characteristics curves that are given by the manufacturer. The working fluid is water. Except that we will use it for the refrigerant, which means that we have to use rules of similarity:

## Head of the pump

The head of the pump is determined based on the pressure difference:

Where the fluid velocity and the potential energy are neglected.

## Frequency

The frequency is determined based on the mass flow rate and the head of the pump. First an interpolation for the first frequency ( 60 Hz) is made based on the operating map.

The frequency corresponding to any Head and mass flow rate can then be determined based on the similarity laws.

## Pump consumption

The pump consumption is determined based on the mass flow rate and the frequency. First an interpolation for the first frequency ( 60 Hz) is made based on the operating map.

The pump consumption corresponding to any frequency and mass flow rate can then be determined based on the similarity laws.

A graph with lines and numbers

Description automatically generated

Figure 1: Head [m] versus volume flow rate [m3/h]

A graph with lines and numbers

Description automatically generated

Figure 2: Pump consumption [kW] versus volume flow rate [m3/h]