

Software Information

General information

| | |
|--------------------------|---|
| TESPy Version: | 0.6.0 - Colored Chemicals |
| Commit: | d0739fcd@main |
| CoolProp version: | 6.4.1 |
| Python version: | 3.8.10 (default, Mar 15 2022, 12:22:08) [GCC 9.4.0] |
| Documentation generated: | May 15, 2022 |

Parameter highlighting

| | |
|--------------------------------|---------------|
| Variable component parameters: | <i>italic</i> |
| Specified input parameter: | bold |
| Results of simulation: | normalfont |

Equations are displayed for input parameters only.

1 Connections in design mode

1.1 Connection specifications and results

Table 1: Connection specifications and results

| label | m in kg/s | p in bar (1) | h in kJ/kg | T in °C (2) | s in kJ/kgK |
|-------|-----------|---------------|------------|--------------|-------------|
| 0 | 4.113 | 1.0000 | 369.12 | -30.0 | 3.6792 |
| 1 | 4.113 | 1.0000 | 369.12 | -30.0 | 3.6792 |
| 2 | 4.113 | 5.2500 | 554.20 | 153.8 | 3.7698 |
| 3 | 4.113 | 5.0000 | 433.65 | 35.0 | 3.4530 |
| 4 | 4.113 | 1.0500 | 344.81 | -54.2 | 3.5599 |
| 11 | 9.945 | 1.0000 | 389.23 | -10.0 | 3.7587 |
| 12 | 9.945 | 1.0000 | 379.18 | -20.0 | 3.7197 |
| 21 | 7.909 | 1.5000 | 104.97 | 25.0 | 0.3672 |
| 22 | 7.909 | 1.5000 | 167.66 | 40.0 | 0.5723 |

1.2 Equations applied

$$0 = p - p_{\text{spec}} \quad (1)$$

$$0 = T(p, h) - T_{\text{spec}} \quad (2)$$

1.3 Specified fluids

Table 2: Specified fluids

| label | Air (3) | water (4) |
|-------|--------------|--------------|
| 0 | 1.000 | 0.000 |
| 11 | 1.000 | 0.000 |
| 21 | 0.000 | 1.000 |

1.4 Equations applied

$$0 = x_{\text{Air}} - x_{\text{Air,spec}} \quad (3)$$

$$0 = x_{\text{water}} - x_{\text{water,spec}} \quad (4)$$

2 Components in design mode

2.1 Components of type HeatExchanger

2.1.1 Mandatory constraints

$$0 = \dot{m}_{\text{in},i} - \dot{m}_{\text{out},i} \quad \forall i \in [1, 2] \quad (5)$$

$$0 = x_{fl,\text{in},i} - x_{fl,\text{out},i} \quad \forall fl \in \text{network fluids}, \forall i \in [1, 2] \quad (6)$$

$$0 = \dot{m}_{\text{in},1} \cdot (h_{\text{out},1} - h_{\text{in},1}) + \dot{m}_{\text{in},2} \cdot (h_{\text{out},2} - h_{\text{in},2}) \quad (7)$$

2.1.2 Specifications and results

Table 3: Parameters of components of type HeatExchanger

| label | Q (8) | ttd_u | ttd_l | pr1 | pr2 |
|--------------------------|--------------------|--------|-------|------|------|
| Cooling heat exchanger | -100,000.00 | 20.00 | 34.15 | 1.00 | 0.95 |
| Heat sink heat exchanger | -495,822.80 | 113.76 | 10.00 | 0.95 | 1.00 |

2.1.3 Equations applied

$$0 = \dot{m}_{in,1} \cdot (h_{out,1} - h_{in,1}) - \dot{Q} \quad (8)$$

2.2 Components of type CycleCloser

2.2.1 Mandatory constraints

$$0 = p_{in,i} - p_{out,i} \quad \forall i \in [1] \quad (9)$$

$$0 = h_{in,i} - h_{out,i} \quad \forall i \in [1] \quad (10)$$

2.2.2 Specifications and results

Table 4: Parameters of components of type CycleCloser

| label | mass_deviation | fluid_deviation |
|--------------|----------------|-----------------|
| Cycle closer | 0.00 | 0.00 |

2.3 Components of type Compressor

2.3.1 Mandatory constraints

$$0 = \dot{m}_{in,i} - \dot{m}_{out,i} \quad \forall i \in [1] \quad (11)$$

$$0 = x_{fl,in,i} - x_{fl,out,i} \quad \forall fl \in \text{network fluids}, \forall i \in [1] \quad (12)$$

2.3.2 Specifications and results

Table 5: Parameters of components of type Compressor

| label | P | eta_s (13) | pr |
|------------|------------|-------------|------|
| Compressor | 761,224.05 | 0.80 | 5.25 |

2.3.3 Equations applied

$$0 = -(h_{out} - h_{in}) \cdot \eta_s + (h_{out,s} - h_{in}) \quad (13)$$

2.4 Components of type Turbine

2.4.1 Mandatory constraints

$$0 = \dot{m}_{in,i} - \dot{m}_{out,i} \quad \forall i \in [1] \quad (14)$$

$$0 = x_{fl,in,i} - x_{fl,out,i} \quad \forall fl \in \text{network fluids}, \forall i \in [1] \quad (15)$$

2.4.2 Specifications and results

Table 6: Parameters of components of type Turbine

| label | P | eta_s (16) | pr |
|---------|-------------|-------------|------|
| Turbine | -365,401.26 | 0.80 | 0.21 |

2.4.3 Equations applied

$$0 = -(h_{\text{out}} - h_{\text{in}}) + (h_{\text{out},s} - h_{\text{in}}) \cdot \eta_s \quad (16)$$

3 Busses in design mode

3.1 Bus “power input”

This bus is used for postprocessing only.

Table 7: Results overview for bus power input

| label | \dot{E}_{comp} | $\dot{E}_{\text{comp,result}}$ | \dot{E}_{bus} | $\dot{E}_{\text{bus,result}}$ | η_{result} |
|------------|--|--------------------------------|--------------------------------------|-------------------------------|------------------------|
| Turbine | $\dot{m}_{\text{in}} \cdot (h_{\text{out}} - h_{\text{in}})$ | -365,401.26 | $\dot{E}_{\text{comp}} \cdot \eta$ | -351,507.97 | 0.96 |
| Compressor | $\dot{m}_{\text{in}} \cdot (h_{\text{out}} - h_{\text{in}})$ | 761,224.05 | $\frac{\dot{E}_{\text{comp}}}{\eta}$ | 791,311.29 | 0.96 |
| total | - | 395,822.80 | - | 439,803.32 | - |