Software Information

- Please check, whether your inputs, the equations applied and the charactersitics are displayed correctly.
- You are welcome to send your feedback via `https://github.com/oemof/tespy/issues`.
- LaTeXpackages required are:
  - graphicx
  - float
  - hyperref
  - booktabs
  - amsmath
  - units
  - cleveref
  - longtable

  Additionally, you will need to make the following definitions:
  - \newcommand{\iftab}{\fontshape{sl}\selectfont}
  - \newcommand{\bftab}{\fontseries{b}\selectfont}
- To suppress these messages, call the model documentation with the keyword draft=False in the formatting dict.

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:	*italic*
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 J/kg	T in °C (2)	s in J/kgK
fuel:out1_combustion chamber:in2	0.042	**1.500**	893,389.228	**25.0**	6,357.09
ambient:out1_combustion chamber:in1	2.068	**1.200**	293,531.654	**20.0**	6,793.55
combustion chamber:out1_flue gas outlet:in1	2.109	1.176	1,303,161.329	821.6	8,153.98

1.2 Equations applied

$$0 = p - p_{\text{spec}} \tag{1}$$

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

1.3 Specified fluids

Table 2: Specified fluids

label	Ar (3)	CH4 (4)	CO2 (5)	H2O (6)	N2 (7)	O2 (8)
fuel:out1_combustion chamber:in2	**0.000**	**0.960**	**0.040**	**0.000**	**0.000**	**0.000**
ambient:out1_combustion chamber:in1	**0.013**	**0.000**	**0.000**	**0.000**	**0.755**	**0.231**
combustion chamber:out1_flue gas outlet:in1	0.013	0.000	0.053	0.043	0.740	0.151

1.4 Equations applied

$$0 = x_{\text{Ar}} - x_{\text{Ar,spec}} \tag{3}$$

$$0 = x_{\text{CH4}} - x_{\text{CH4,spec}} \tag{4}$$

$$0 = x_{\text{CO2}} - x_{\text{CO2,spec}} \tag{5}$$

$$0 = x_{\text{H2O}} - x_{\text{H2O,spec}} \tag{6}$$

$$0 = x_{\text{N2}} - x_{\text{N2,spec}} \tag{7}$$

$$0 = x_{\text{O2}} - x_{\text{O2,spec}} \tag{8}$$

2 Components in design mode

2.1 Components of type DiabaticCombustionChamber

2.1.1 Mandatory constraints

$$0 = \dot{m}_{\text{in},1} + \dot{m}_{\text{in},2} - \dot{m}_{\text{out},1} \tag{9}$$

$$
\begin{aligned}
\Delta\dot{m}_{\text{fluid}} &= \dot{m}_{\text{in},1} \cdot x_{\text{fluid,in},1} + \dot{m}_{\text{in},2} \cdot x_{\text{fluid,in},2} - \dot{m}_{\text{out},1} \cdot x_{\text{fluid,out},1} \\
\dot{m}_{\text{fluid,m}} &= \frac{\dot{m}_{\text{in},1} \cdot x_{\text{fluid,in},1} + \dot{m}_{\text{in},2} \cdot x_{\text{fluid,in},2}}{M_{\text{fluid}}} \\
\dot{m}_{\text{H,m}} &= \dot{m}_{\text{CH4,m}} \cdot 4 \\
\dot{m}_{\text{C,m}} &= \dot{m}_{\text{CH4,m}} \cdot 1 \\
\dot{m}_{\text{O2,m,stoich}} &= \frac{\dot{m}_{\text{H,m}}}{4} + \dot{m}_{\text{C,m}}
\end{aligned}
\tag{10}
$$

$$
0 = \Delta\dot{m}_{\text{Ar}} \tag{11}
$$

$$
0 = \Delta\dot{m}_{\text{CH4}} - \dot{m}_{\text{CH4,m}} \cdot M_{\text{CH4}} \tag{12}
$$

$$
0 = \Delta\dot{m}_{\text{CO2}} + \dot{m}_{\text{C,m}} \cdot M_{\text{CO2}} \tag{13}
$$

$$
0 = \Delta\dot{m}_{\text{H2O}} + \frac{\dot{m}_{\text{H,m}}}{2} \cdot M_{\text{H2O}} \tag{14}
$$

$$
0 = \Delta\dot{m}_{\text{N2}} \tag{15}
$$

$$
0 = \Delta\dot{m}_{\text{O2}} - \dot{m}_{\text{O2,m,stoich}} \cdot M_{\text{O2}} \tag{16}
$$

2.1.2 Specifications and results

Table 3: Parameters of components of type DiabaticCombustionChamber

label	lamb (17)	ti (18)	pr (19)	eta (20)
combustion chamber	**3.00**	**2,000,000.00**	**0.98**	**0.95**

2.1.3 Equations applied

$$
\begin{aligned}
0 &= \frac{\dot{m}_{\text{fuel,m}}}{\dot{m}_{\text{O}_2\text{,m}} \cdot (n_{\text{C,fuel}} + 0.25 \cdot n_{\text{H,fuel}})} - \lambda \\
\dot{m}_{\text{fluid,m}} &= \frac{x_{\text{fluid}} \cdot \dot{m}}{M_{\text{fluid}}}
\end{aligned}
\tag{17}
$$

$$
\begin{aligned}
0 =& ti - LHV_{\text{fuel}} \cdot \left[\sum_i \left(\dot{m}_{\text{in},i} \cdot x_{\text{fuel,in},i} \right) - \dot{m}_{\text{out},1} \cdot x_{\text{fuel,out},1} \right] \\
& \forall i \in \text{combustion inlets}
\end{aligned}
\tag{18}
$$

$$
0 = p_{\text{in},1} \cdot pr - p_{\text{out},1} \tag{19}
$$

$$
\begin{aligned}
0 =& \sum_i \dot{m}_{\text{in},i} \cdot (h_{\text{in},i} - h_{\text{in},i,\text{ref}}) - \dot{m}_{\text{out},1} \cdot (h_{\text{out},1} - h_{\text{out},1,\text{ref}}) \\
& + LHV_{fuel} \cdot \left(\sum_i \dot{m}_{\text{in},i} \cdot x_{fuel,\text{in},i} - \dot{m}_{\text{out},1} \cdot x_{fuel,\text{out},1} \right) \cdot \eta \\
& \forall i \in \text{inlets} \\
& T_{\text{ref}} = 298.15\,\text{K}\ p_{\text{ref}} = 10^5\,\text{Pa}
\end{aligned}
\tag{20}
$$