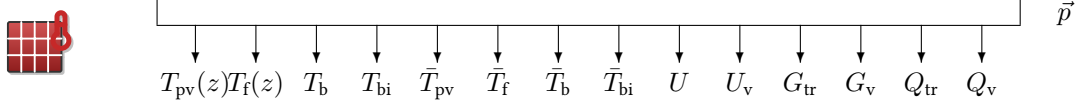
Block PVT

The PVT block simulates the thermal performance of a building-integrated PV generator within a double facade. The PV module is assumed to face exterior air, followed by a ventilation gap of variable depth and then a back glazing or insulation for the thermal separation to the room.



Name	PVT
Function	st0002
Inputs	6
Outputs	14
Parameters	13
Strings	0
Group	S

Inputs

1 Global radiation on the generator plane G_t / W m^{-2}
2 Ambient temperature T_a / °C
3 Wind speed close to the generator v_w / m s^{-1}
4 Flow velocity behind the generator, i. e., in the gap v_{gap} / m s^{-1}
5 Temperature of generator back surface T_b / °C
6 Height of interest z / m

Outputs

1 PV module temperature $T_{pv}(z)$ / °Cat height z
2 Facade temperature $T_f(z)$ / °Cat height z
3 Temperature of gap surface backside T_b / °C
4 Temperature of gap surface inside T_{bi} / °C
5 Mean PV module temperature $\bar{T}_{pv}$ / °C
6 Mean fluid temperature $\bar{T}_f$ / °C
7 Mean temperature of gap surface backside $\bar{T}_b$ / °C
8 Mean temperature of gap surface inside $\bar{T}_{bi}$ / °C

9 Transmission heat loss coefficient U_{tr} / $\mathrm{W\,m^{-2}\,K^{-1}}$
10 Recovered transmission heat loss coefficient U_{v} / $\mathrm{W\,m^{-2}\,K^{-1}}$
11 Total energy transmittance G_{tr}
12 Recovered energy transmittance G_{v}
13 Transmission heat loss Q_{tr} / $\mathrm{kWh\,m^{-2}}$
14 Ventilation heat gains Q_{v} / $\mathrm{kWh\,m^{-2}}$

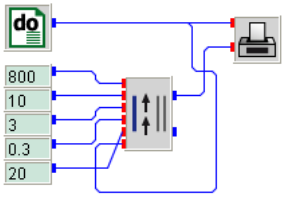
Parameters

1 PV module height / m
2 PV module width / m
3 PV module thickness / m
4 PV module efficiency under standard test conditions
5 PV module emissivity facing exterior air
6 PV module emissivity facing air gap
7 PV absorption coefficient
8 PV module transmission
9 PV module heat conductivity / $\mathrm{W\,m^{-1}\,K^{-1}}$
10 Air gap depth / m
11 Back glazing absorption coefficient of facing room
12 Back glazing emissivity facing the air gap
13 Back glazing/insulation heat resistance / $\mathrm{m^2\,K\,W^{-1}}$

Strings

None

pvt.vseit



A ventilated PV façade with the following parameters is simulated:

PV module height	6.5
PV module width	0.994
PV module thickness	0.01
PV module efficiency under standard test conditions	0.12
PV module emissivity facing exterior air	0.88
PV module emissivity facing air gap	0.88
PV absorption coefficient	0.8
PV module transmission	0.1
PV module heat conductivity	0.8
Air gap depth	0.14
Back glazing absorption coefficient of facing room	0.05
Back glazing emissivity facing the air gap	0.88
Back glazing/insulation heat resistance	1.5

All inputs of the PVT block are set constant by CONST blocks, except the height, which is varied between zero and the total height of the air gap of 6.5 m. The increment of the DO block is 0.1 m.

The PLOT block displays the PV module temperature as a function of height.

