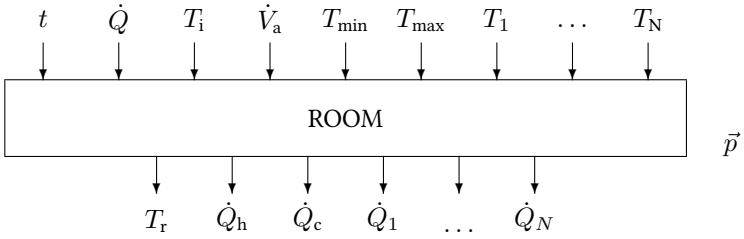
Block ROOM

The ROOM block calculates the room air temperature from the convective heat fluxes (heating or cooling) onto the air node. The output of the room block is the room air temperature at the end of the timestep, the requested heating or cooling demand, and the convective heat flux to each surface temperature node.





Name	ROOM
Function	bs0002
Inputs	$6 + N$
Outputs	$3 + N$
Parameters	$3 + 2N$
Strings	0
Group	S

Inputs

1	Time / s
2	Convective power on air node / W
3	Ventilation air temperature / °C
4	Ventilation air exchange rate / h^{-1}
5	Setpoint min. room temperature / °C
6	Setpoint max. room temperature / °C
6+i	..INS(6+N) Surface temperature of wall i / °C

Outputs

1	Room air temperature / °C
2	Requested heating power / W
3	Requested cooling power / W
3+i	..OUTS(3+N) Specific convective heat flux to surface node i / $\mathrm{W\,m}^{-2}$

Parameters

1	Room air volume / m^3

2	Initial value of air temperature / °C
3	Number of walls $N \in [1, 20]$. The order of the wall parameters must be identical to the order of the wall temperature inputs. It is recommended to use the same ordering as with the RADI block i. e., south, west, north etc. or the RADIN block.
2+2i	Surface area of wall i / m^2
3+2i	Heat transfer coefficient of wall i / $\mathrm{W\,m^{-2}}\,K^{-1}$

Strings

None

Description

The model of the ROOM block is basically an energy balance between the convective heat input plus the ventilation gains and the induced heat fluxes which lead to an increse of the air temperature and to heat fluxes to the surrounding walls

$$\dot{Q}_\mathrm{c} = \frac{\rho V c_\mathrm{p}}{\Delta t}(T - T_\mathrm{old}) + \sum_{i=1}^{N} h_i A_i (T - T_i)$$

When the ventilation rate is greater than one volume per time step the time step is reduced inside the ROOM block. In the first step one volume is exchanged, this results in a step with of

$$\Delta t =$$

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