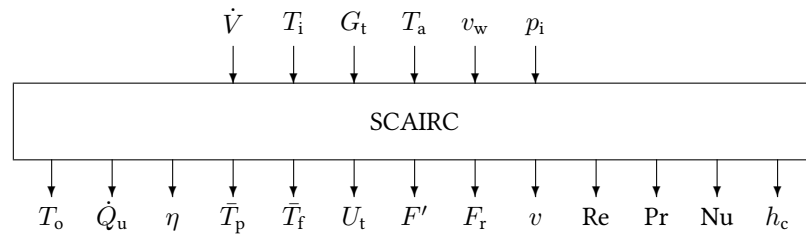


Block SCAIRC

The SCAIRC block simulates a solar air collector with a ripped absorber (channel structure).



Name	SCAIRC
Function	st0001
Inputs	5 ... [6]
Outputs	13
Parameters	18
Strings	0
Group	S

Inputs

- 1 Volume flow $\dot{V} / \text{m}_n^3 \text{s}^{-1}$
- 2 Inlet temperature $T_i / ^\circ\text{C}$
- 3 Global radiation on the collector plane $G_t / \text{W m}^{-2}$
- 4 Ambient temperature $T_a / ^\circ\text{C}$
- 5 Wind speed close to the collector $v_w / \text{m s}^{-1}$
- 6 Inlet pressure p_i / Pa (optional)

Outputs

- 1 Outlet temperature $T_o / ^\circ\text{C}$
- 2 Useful heat $\dot{Q}_u / \text{W}$
- 3 Efficiency η
- 4 Mean absorber plate temperature $\bar{T}_p / ^\circ\text{C}$
- 5 Mean fluid temperature $\bar{T}_f / ^\circ\text{C}$
- 6 Overall heat loss coefficient $U_t / \text{W m}^{-2} \text{K}^{-1}$
- 7 Absorber efficiency factor F'
- 8 Heat removal factor F_r
- 9 Flow speed $v / \text{m s}^{-1}$
- 10 Reynolds number Re

- 11 Prandtl number Pr
- 12 Nusselt number Nu
- 13 Convective heat transfer coefficient $h_c / \text{W m}^{-2} \text{K}^{-1}$

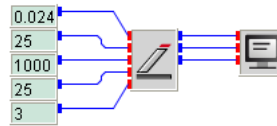
Parameters

- 1 Number of collectors in series N_s
- 2 Number of collectors in parallel N_p
- 3 Collector tilt angle $\beta / ^\circ$
- 4 Collector length l_c / m
- 5 Collector width w_c / m
- 6 Channel height h_{ch} / m
- 7 Channel width w_{ch} / m
- 8 Number of channels N_{ch}
- 9 Plate thickness t_p / m
- 10 Optical efficiency $(\tau\alpha)$
- 11 Thickness of insulation material t_i / m
- 12 Heat conductivity of insulation material $\lambda_i / \text{W m}^{-1} \text{K}^{-1}$
- 13 Heat conductivity of absorber material $\lambda_a / \text{W m}^{-1} \text{K}^{-1}$
- 14 Emissivity of glass cover ϵ_c
- 15 Emissivity of absorber plate front side towards cover ϵ_f
- 16 Emissivity of absorber plate back side towards channel ϵ_b
- 17 Emissivity of channel towards absorber plate back side ϵ_{ch}
- 18 Distance between absorber plate and front cover d / m

Strings

None

scairc.vseit



A solar air collector is simulated with the following parameters.

Number of collectors in series	1
Number of collectors in parallel	1
Collector tilt angle	45
Collector length	2.5
Collector width	0.96
Channel height	0.028
Channel width	0.026
Number of channels	36
Plate thickness	0.0006
Optical efficiency	0.812
Thickness of insulation material	0.06
Heat conductivity of insulation material	0.04
Heat conductivity of absorber material	238
Emissivity of glas cover	0.88
Emissivity of absorber plate front side towards cover	0.89
Emissivity of absorber plate back side towards channel	0.085
Emissivity of channel towards absorber plate back side	0.085
Distance between absorber plate and front cover	0.020

All inputs are set constant by [CONST](#) blocks. A [SCREEN](#) block displays outlet temperature, useful heat and the collector efficiency.

65.62508 1069.95264 0.44581

See also Block [SCAIRC.D](#).