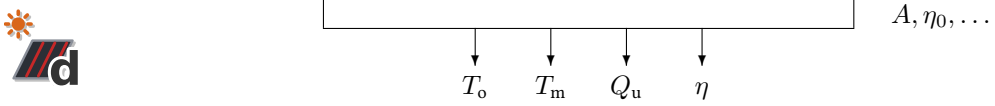
## Block SCDYN

The SCDYN block simulates a solar vacuum tube and CPC collector under dynamic conditions according to the European Standard EN 12975. This model is a 1 node model that allows the partition of the collector in differents elements in order to increase the accuracy the model and avoid the peak in the outlet temperature caused by the switching on of the pump after a time of stopping of the pump.




| | |
|---|---|
| **Name** | SCDYN |
| **Function** | st0027 |
| **Inputs** | 7 |
| **Outputs** | 4 |
| **Parameters** | 11 |
| **Strings** | 0 |
| **Group** | S |

### Inputs

1 Inlet temperature $T_i$ / °C
2 Mass flow rate $\dot{m}$ / kg s$^{-1}$
3 Beam radiation in the collector plane $G_{bt}$ / W m$^{-2}$
4 Diffuse radiation in the collector plane $G_{dt}$ / W m$^{-2}$
5 Ambient temperature $T_a$ / °C
6 Incidence angle of beam radiation $\theta$ / degrees
7 Time $t$ / s

### Outputs

1 Outlet temperature of the collector $T_o$/°C
2 Mean temperature of the collector $T_m$/°C
3 Useful heat of the collector $\dot{Q}_u$ / W
4 Global collector efficiency $\eta$

### Parameters

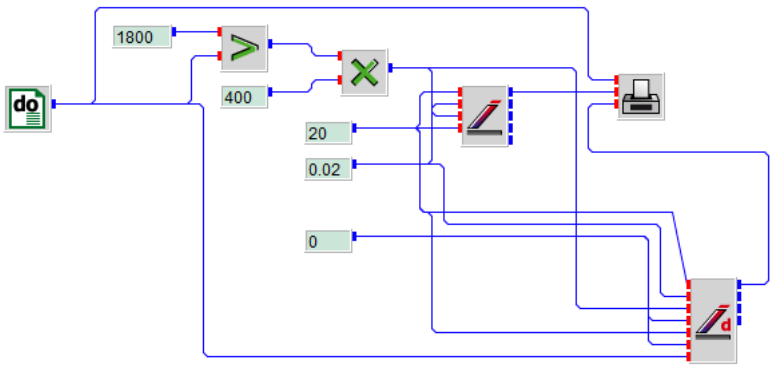
| | |
|---|---|
| 1 | Collector area / $\mathrm{m}^2$ |
| 2 | Zero loss efficiency at normal incidence $\eta_0$ |
| 3 | Linear heat loss coefficient $a_1$ / $\mathrm{W\,m^{-2}\,K^{-1}}$ |
| 4 | Quadratic heat loss coefficient $a_1$ / $\mathrm{W\,m^{-2}\,K^{-2}}$ |
| 5 | Incidence angle modifier (IAM) for diffuse radiation $K_\mathrm{d}$ |
| 6 | Effective thermal capacity of the collector $c_\mathrm{eff}$ / $\mathrm{J\,m^{-2}\,K^{-1}}$ |
| 7 | Heat capacity of the fluid $c_\mathrm{p}$ $\mathrm{J\,kg^{-1}\,K^{-1}}$ |
| 8 | Number of collectors in series $N_\mathrm{s}$ |
| 9 | Number of collectors in parallel $N_\mathrm{p}$ |
| 10 | Initial mean temperature of the collector $T_{\mathrm{m},0}/°\mathrm{C}$ |
| 11 | Number of partition elements per collector $N_\mathrm{seg}$ |

Strings

None

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scdyn.vseit



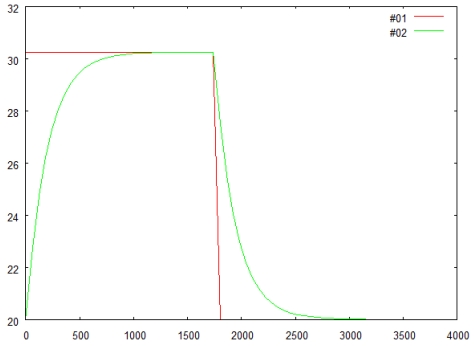

In this example the static model used by the SCETA block is compared to the dynamic model, implemented in block SCDYN. In both cases a single collector with an absorber area of 3 $\mathrm{m}^2$, optical efficiency of 0.675, linear heat loss coefficient 0.697 $\mathrm{W\,m^{-2}\,K^{-1}}$ and quadratic heat loss coefficient 0.003 $\mathrm{W\,m^{-2}\,K^{-2}}$ is simulated.

Most of the inputs of the two collector blocks are set constant by CONST blocks.

However, the time is varied between 0 and 3600 seconds (one hour) in steps of 60 seconds by a DO block.

The collector irradiance of 400 W/m$^2$, as defined by one of the CONST blocks is switched off after 1800 seconds. This is accomplished by a CONST block with parameter 1800 and a GT block. When the time signal, coming from the DO block gets greater than 1800, the GT block outputs zero and the MUL block "switches the irradiance off".

The PLOT block demonstrates the result.




See also Block SCAIRC.