

TRNSYS Type 833 v5.10 „Dynamic Collector Model with switchable properties“ Differences to Type 832

Michel Haller, 5 August 2014

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1 Disclaimer

The SPF Institut für Solartechnik and HSR University of Applied Research refuse to accept any liability for direct or indirect damages of any kind that may result from the use of this simulation model and its implementation in computer code (drop in dll for TRNSYS).

2 Introduction

This type is based on Type 832 and introduces switchable collector properties for the simulation of thermochromic effects, dew on selective surface of uncovered collector, or natural / forced ventilation in the air gap that can be switched on and off. The switching factor is provided by input 14.

3 Additional Inputs

Nr.	short	explanation	unit	range
14	<i>Cpar2</i>	Switch of properties from 1 st parameter set to second parameter set	-	[0;1]

4 Additional Parameters

The following parameters are switched / provided as a second set of parameters with additional parameters.

Nr.	short	explanation	unit	range
31	$\eta_0; F'(\tau\alpha)$	Collector optical efficiency (at zero temp. difference and nominal conditions)	[-]	[0;1]
32	a_1	Linear heat loss coefficient	W/(m ² K)	[0;inf]
33	a_2	Quadratic heat loss coefficient	W/(m ² K ²)	[0;inf]
34	$c_{w,hl}$	Wind speed dependency of heat losses	J/(m ³ K)	[-inf;inf]
35	$c_{w,F'}$	Wind speed dependency of the zero heat loss efficiency	s/m	[0;inf]
36	c_{cond}	additional coefficient for condensation gains – method of Perers, idally = 0.916	m ³ K/kJ	
27	<i>MoCond</i>	mode for condensation gain calculation: 0 = no cond. gains, 1 = method of Perers, 2 = method of Bertram	percent	[0;+1]
38	u_{int}	u-value of the absorber or material between fluid and surface of the absorber to ambient boundary for condensation gain calculation according to Bertram	W/(m ² K)	[0;+inf]
39	<i>MoFrost</i>	mode for calculation of frost gains. 0 = no calculation of condensation or frost gains below Tamb = 0°C, 1 = calculation of frost gains.	-	[0;+1]

40	C_{IR}	Infrared radiation dependency of collector (only from version 5.10 on...	?	$[-\infty;\infty]$
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5 Calculations

The switch of properties is calculated as:

$$c = (1 - C_{par2}) \cdot c_1 + C_{par2} \cdot c_2$$

where c_1 is the "normal" parameter set provided with the same Parameters as in Type 832, and c_2 is the switched parameters provided with the additional Parameters listed in section 4.

6 Changelog

Changes from v 5.00 to v 5.10

- Model correction / bugfix: added $+(1 - r_f) \cdot \sigma \cdot T_{amb}^4$ to the calculation of I_{IR} that is used in eq. (1).
- Added switchable C_{IR} with parameter 40.

The Changelog of Type 832 applies up to version 5.00