


Annex to Solar Keymark Certificate					Licence Number		011-7S1323 F							
					Date issued		2021-05-03							
					Issued by		DIN CERTCO							
Licence holder		GREENoneTEC Solarindustrie GmbH			Country		Austria							
Brand (optional)					Web		www.greenonetec.com							
Street, Number		Industriepark St. Veit, Energieplatz 1			E-mail		info@greenonetec.com							
Postcode, City		A – 9300 St. Veit/Glan			Tel		+43 (0) 4212 28136-0							
Collector Type					Flat plate collector									
Collector name					Power output per collector $G_b = 850 \text{ W/m}^2, G_d = 150 \text{ W/m}^2 \text{ \& } u = 1.3 \text{ m/s}$ $\vartheta_m - \vartheta_a$									
					Gross area (A_G)	Gross length	Gross width	Gross height	0 K	10 K	30 K	50 K	70 K	118 K
					m²	mm	mm	mm	W	W	W	W	W	W
FK8203N 4H FG/BF					2.02	1 730	1 170	85	1 476	1 394	1 216	1 020	807	223
FK8203N 2H FG/BF					2.02	1 730	1 170	85	1 476	1 394	1 216	1 020	807	223
FK8233N 4H FG/BF					2.34	2 000	1 170	85	1 710	1 615	1 409	1 182	935	258
FK8233N 2H FG/BF					2.34	2 000	1 170	85	1 710	1 615	1 409	1 182	935	258
Power output per m² gross area					731	690	602	505	400	110				
Performance parameters test method		Quasi dynamic												
Performance parameters (related to A_G)		$\eta_{0, b}$	a1	a2	a3	a4	a5	a6	a7	a8	Kd			
Units		-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	J/(m ² K)	s/m	W/(m ² K ⁴)	W/(m ² K ⁴)	-			
Test results		0.734	3.96	0.011	0.000	0.00	11 450	0.000	0.00	0.0	0.97			
Incidence angle modifier test method		Quasi dynamic - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		$K_{\theta T, coll}$	1.00	1.00	0.99	0.98	0.96	0.89	0.71	0.36	0.00			
Longitudinal		$K_{\theta L, coll}$	1.00	1.00	0.99	0.98	0.96	0.89	0.71	0.36	0.00			
Heat transfer medium for testing					Water									
Flow rate for testing (per gross area, A_G)					dm/dt		0.020	kg/(sm²)						
Maximum temperature difference during thermal performance test					$(\vartheta_m - \vartheta_a)_{max}$		88	K						
Standard stagnation temperature ($G = 1000 \text{ W/m}^2; \vartheta_a = 30 \text{ }^\circ\text{C}$)					ϑ_{stg}		200	°C						
Maximum operating temperature					$\vartheta_{max, op}$		-	°C						
Maximum operating pressure					$p_{max, op}$		1000	kPa						
Testing laboratory		Institut für Gebäudeenergetik, Thermotechnik und Energiespeicherung (IGTE)					http://www.igte.uni-stuttgart.de							
Test report(s)		20COL1537/1 20COL1538Q/1					Dated		02.09.2020 02.09.2020					
Comments of testing laboratory					Datasheet version: 6.1, 2019-09-26									
This data sheet replaces the data sheet issued on 07.09.2020 FK8253N 4H FG/BF and FK8253N 2H FG/BF has been removed from data sheet Thermal performance parameters are given from test report 20COL1537/1 (FK8203N 4H FG/BF)					 Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 6, 70560 Stuttgart (Vaihingen)									
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S1323 F
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Annual collector output in kWh/collector at mean fluid temperature ϑ_m													
Collector name	Standard Locations	Athens			Davos			Stockholm			Würzburg		
	ϑ_m	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
FK8203N 4H FG/BF		2 397	1 648	1 030	1 780	1 185	708	1 316	826	476	1 440	896	508
FK8203N 2H FG/BF		2 397	1 648	1 030	1 780	1 185	708	1 316	826	476	1 440	896	508
FK8233N 4H FG/BF		2 776	1 909	1 193	2 063	1 372	820	1 524	957	551	1 668	1 038	588
FK8233N 2H FG/BF		2 776	1 909	1 193	2 063	1 372	820	1 524	957	551	1 668	1 038	588
Annual output per m ² gross area		1 186	816	510	881	587	350	651	409	235	713	444	251
Annual efficiency, η_a		67%	46%	29%	54%	36%	21%	56%	35%	20%	57%	36%	20%
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m ²			1630 kWh/m ²			1166 kWh/m ²			1244 kWh/m ²		
Mean annual ambient air temperature		18.5°C			3.2°C			7.5°C			9.0°C		
Collector orientation or tracking mode		South, 25°			South, 30°			South, 45°			South, 35°		

The collector is operated at constant temperature ϑ_m (mean of in- and outlet temperatures). The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool Scenocalc Ver. 6.1 (September 2019). A detailed description of the calculations is available at <http://www.estif.org/solarkeymarknew/>

Additional Information			
Collector heat transfer medium	Water-Glycole		
The collector is deemed to be suitable for roof integration	Yes		
The collector was tested successfully under the following conditions:			
Climate class (A+, A, B or C)	A		--
G (W/m ²) >	1000	ϑ_a (°C) >	20
		H_x (MJ/m ²) >	600
Maximum tested positive load	3000		Pa
Maximum tested negative load	2500		Pa
Hail resistance using steel ball (maximum drop height)	2		m

Additional collector attribute(s)			
<input type="checkbox"/> Using external power source(s) for normal operation	<input type="checkbox"/> Active or passive measure(s) for self-protection		
<input type="checkbox"/> Co-generating thermal and electrical power	<input type="checkbox"/> Façade collector(s)		

Energy Labelling Information		Additional Informative Technical Data	
	Reference Area, A_{sol} (m ²)	Hydraulic Designation Code	Aperture Area, A_a (m ²)
FK8203N 4H FG/BF	2.02	12-V-1234S-7.2,1568-20.4,1215-D	1.84
FK8203N 2H FG/BF	2.02	12-V-12S-7.2,1568-20.4,1215	1.84
FK8233N 4H FG/BF	2.34	12-V-1234S-7.2,1838-20.4,1215-D	2.22
FK8233N 2H FG/BF	2.34	12-V-12S-7.2,1838-20.4,1215	2.22

Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
Collector efficiency (η_{col})	55%	Zero-loss efficiency (η_0)	0.73
Remark: Collector efficiency (η_{col}) is defined in CDR (EU) No 811/2013 as collector efficiency of the solar collector at a temperature difference between the solar collector and the surrounding air of 40 K and a global solar irradiance of 1000 W/m ² , expressed in % and rounded to the nearest integer. Deviating from the regulation η_{col} is based on reference area (A_{sol}) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.		First-order coefficient (a_1)	3.96
		Second-order coefficient (a_2)	0.011
		Incidence angle modifier IAM (50°)	0.96
Remark: The data given in this section are related to collector reference area (A_{sol}) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806. Consistent data sets for either aperture or gross area can be used in calculations like in the regulation 811 and 812 and simulation programs.			