


Annex to Solar Keymark Certificate					Licence Number		011-7S2986 F							
					Date issued		2020-10-07							
					Issued by		DIN CERTCO							
Licence holder		CHARALAMPIDOU MARIA & SIA OE			Country		Greece							
Brand (optional)		Planet Sol			Web		www.planetsol.gr							
Street, Number		3 Chiou			E-mail		info@planetsol.gr							
Postcode, City		12351 Agia Varvara			Tel		+30 210 5694516							
Collector Type					Flat plate collector									
Collector name					Power output per collector G _b = 850 W/m ² , G _d = 150 W/m ² & u = 1.3 m/s $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	116 K				
					m ²	mm	mm	mm	W	W	W	W	W	W
PLANET MAX 200					2.02	2 006	1 007	103	1 460	1 391	1 242	1 077	896	417
PLANET MAX 230					2.24	1 893	1 183	103	1 619	1 543	1 377	1 194	993	462
PLANET MAX 250					2.52	2 006	1 257	103	1 821	1 736	1 550	1 344	1 117	520
PLANET MAX 300					2.92	2 006	1 457	103	2 110	2 011	1 796	1 557	1 295	603
Power output per m ² gross area					723	689	615	533	443	206				
Performance parameters test method		Quasi dynamic												
Performance parameters (related to A _G)		n _{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		0.727	3.29	0.010	0.000	0.00	10 165	0.000	0.00	0.0	0.96			
Incidence angle modifier test method		Quasi dynamic - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		K _{θT, coll}	1.00	0.99	0.98	0.97	0.94	0.89	0.79	0.47	0.00			
Longitudinal		K _{θL, coll}	1.00	0.99	0.98	0.97	0.94	0.89	0.79	0.47	0.00			
Heat transfer medium for testing		Water												
Flow rate for testing (per gross area, A _G)		dm/dt	0.020	kg/(sm ²)										
Maximum temperature difference during thermal performance test		($\vartheta_m - \vartheta_a$) _{max}	86	K										
Standard stagnation temperature (G = 1000 W/m ² ; $\vartheta_a = 30$ °C)		ϑ_{stg}	185	°C										
Maximum operating temperature		$\vartheta_{max, op}$	n.a.	°C										
Maximum operating pressure		p _{max, op}	1600	kPa										
Testing laboratory		Institut für Gebäudeenergetik, Thermotechnik und Energiespeicherung (IGTE)					http://www.igte.uni-stuttgart.de							
Test report(s)		10COL931/3OEM13 10COL932/3OEM13 10COL932Q/4OEM13					Dated		07.10.2020 07.10.2020 07.10.2020					
Comments of testing laboratory		Datashet version: 6.1, 2019-09-26												
Thermal performance parameters are given from 10COL931/3OEM13 (Planet Max 200)		 <p>Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaßröschweg 6, 70560 Stuttgart (Vaihingen)</p>												
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S2986 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
PLANET MAX 200		2 369	1 722	1 162	1 812	1 279	833	1 333	891	558	1 453	968	596
PLANET MAX 230		2 627	1 910	1 289	2 009	1 418	924	1 478	988	618	1 612	1 073	661
PLANET MAX 250		2 956	2 149	1 450	2 261	1 596	1 039	1 663	1 111	696	1 813	1 207	743
PLANET MAX 300		3 425	2 490	1 680	2 619	1 849	1 204	1 927	1 288	806	2 101	1 399	861
Annual output per m ² gross area		1 173	853	575	897	633	412	660	441	276	719	479	295
Annual efficiency, η_a		66%	48%	33%	55%	39%	25%	57%	38%	24%	58%	39%	24%
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	No		
The collector was tested successfully under the following conditions:			
Climate class (A+, A, B or C)	B		--
G (W/m ²) >	900	ϑ_a (°C) >	15
		H_x (MJ/m ²) >	540
Maximum tested positive load	3000		Pa
Maximum tested negative load	2000		Pa
Hail resistance using steel ball (maximum drop height)	n.a.		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)
PLANET MAX 200	2.02	9-V-1234S-A:7.2,1894-C:20.6,1060-D	1.83
PLANET MAX 230	2.24	10-V-1234S-A:7.2,1779-C:20.6,1240-D	2.03
PLANET MAX 250	2.52	11-V-1234S-A:7.2,1894-C:20.6,1310-D	2.33
PLANET MAX 300	2.92	12-V-1234S-A:7.2,1894-C:20.6,1510-D	2.71

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})	58%	Zero-loss efficiency (η_0)	0.72
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)	3.29
		Second-order coefficient (a_2)	0.010
		Incidence angle modifier IAM (50°)	0.94
		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.	