

Page 1/2 Licence Number **SKM 10128 Annex to Solar Keymark Certificate** Date issued 2021-10-30 Issued by **DQS Hellas** VENMAN S.A. Licence holder Country Greece Brand (optional) Web www.venman.gr Street, Number 7th Km Old National Road Thessaloniki -E-mail info@venman.gr +30 2310 784684 Postcode, City 57022, Thessaloniki Tel **Collector Type** Flat plate collector Power output per collector Gb = 850 W/m2, Gd = 150 W/m2 & u = 1.3 m/s area (A_G) length Gross height Gross width $\vartheta_m - \vartheta_a$ Collector name 10 K 30 K 50 K 70 K 90 K m² W W W W W W mm mm mm H81MPS 3.0 3.05 2,299 2,172 1,878 1,531 1,129 674 2,022 1,510 80 Power output per m² gross area 754 712 616 502 370 221 Performance parameters test method Steady state - outdoor Performance parameters (related to A_G) η0, b a1 a2 а3 a4 a5 а6 a7 a8 Kd Units $W/(m^2K)$ $W/(m^2K^2)$ $J/(m^3K)$ $J/(m^2K)$ s/m $W/(m^2K^4)$ W/(m²K⁴ Test results 0.767 11510 0.0E+00 0.89 3.94 0.022 Incidence angle modifier test method Steady state - outdoor Incidence angle modifier Angle 10° 20° 30° 40° 50° 60° 70° 80° 90° Transversal K_{θT,coll} 1.00 1.00 0.99 0.97 0.92 0.84 0.70 0.45 0.00 $K_{\theta L, coll}$ 1.00 1.00 0.99 0.97 0.84 0.70 Longitudinal 0.92 0.45 0.00 Water Heat transfer medium for testing kg/(sm²) Flow rate for testing (per gross area, A_G) dm/dt 0.021 Maximum temperature difference during thermal performance test $(\vartheta_m - \vartheta_a)_{max}$ 60 Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C) 175 Maximum operating temperature ϑ_{max op} kPa Maximum operating pressure p_{max,op} Testing laboratory NCSR Demokritos / Solar & other Energy System www.solar.demokritos.gr Test report(s) 4327 DQ1 Dated 16/09/21 4351 DE1 11/10/21 Comments of testing laboratory Datasheet version: 6.1, 2019-09-26 N.C.S.R. "DEMOKRITOS" SOLAR ENERGY LABORATORY Tel: +210 6503815 - Fax: +210 6544592 P.O. BOX 60037, 15310 Ag. Paraskevi, Greece

Central Offices: Kalavriton 4, 145 64 kifisia, Athens, Tel: +30 210 6233493-4, Fax: +30 210 6233495, http://www.dqs.gr, e-mail: i.alexiou@dqs.gr



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	Annex to Solar Keymark Certificate							Licence Number				SKM 10128			
Supplementary Information			Issued				2021-10-30								
Annual collector output in kWh/co		at mea	n fluid	tempe	rature	ϑ _m									
Standard Locations Athens					Davos			Stockholm			Würzburg				
Collector name ϑ_r	25°C	50°C		25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°			
H81MPS 3.0	3,609	2,421	1,393	2,668	1,695	899	1,977	1,192	621	2,153	1,284	658			
_															
Annual output per m² gross area	1,183	794	457	875	556	295	648	391	203	706	421	216			
Annual efficiency, η _a	67%	45%	26%	54%	34%	18%	56%	34%	17%	57%	34%	179			
Fixed or tracking collector Annual irradiation on collector plane	176	65 kWh				tude - 1		66 kWh			44 kWh/	m ²			
Mean annual ambient air temperature	177	18.5°C		10.	1630 kWh/m² 3.2°C			7.5°C	,,,,,	9.0°C					
Collector orientation or tracking mode	S	outh, 2		South, 30°			South, 45°			South, 35°					
The collector is operated at constant to	mperati	ure ປີm	(mean c	,											
collector performance is performed wit	h the of	ficial So	lar Keyr	mark sp	readshe	et tool	Scenoca	alc Ver.	6.1 (Sep	otembe	r 2019).	Α			
detailed description of the calculations	is availa	ble at h	ttp://w	ww.esti	f.org/so	olarkeyr	narknev	v/							
		Add	ditiona	l Info	matic	n									
Collector heat transfer medium										Water-	-Glycole				
The collector is deemed to be suitable	or roof i	integrat	ion							N	10				
The collector was tested successfully un	nder the	tollowi	ng cond	litions:						Λ.	1				
Climate class (A+, A, B or C) $G (W/m^2) > 1000$	в	, (°C) >		I	20			⊔ /N/	/m²) >	A	60	<u>-</u>			
Maximum tested positive load	U _a	1 () /			20			τιχ (ινι.		000	P				
Maximum tested negative load										900	P				
	m drop	height)													
Hail resistance using steel ball (maximu										2	n	n			
Hall resistance using steel ball (maximu	A	dditio	nal col	lector	attrib	ute(s)				2	-	n			
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mail: i.alexiou@dqs.gr