


Annex to Solar Keymark Certificate					Licence Number		011-7S2970 F																	
					Date issued		2020-03-16																	
					Issued by		DIN CERTCO																	
Licence holder		EBNER TECHNOLOGY KG des EBNER Markus & Co			Country		Italy																	
Brand (optional)					Web		www.ebner-technology.com																	
Street, Number		Kreuzweg 39			E-mail		info@ebner-technology-com																	
Postcode, City		39057 Eppan (BZ)			Tel		+39 0471 663268																	
Collector Type					Flat plate collector																			
Collector name					Gross area (A_G)		Gross length		Gross width		Gross height		Power output per collector											
					m^2		mm		mm		mm		$G_b = 850 \text{ W/m}^2, G_d = 150 \text{ W/m}^2 \text{ \& } u = 1.3 \text{ m/s}$ $\vartheta_m - \vartheta_a$											
					0 K		10 K		30 K		50 K		70 K		116 K									
					W		W		W		W		W		W									
EMTK202"TRENDSTAR"					2.02		2 006		1 007		103		1 460		1 391		1 242		1 077		896		417	
EMTK232"TRENDSTAR"					2.24		1 893		1 183		103		1 619		1 543		1 377		1 194		993		462	
EMTK252"TRENDSTAR"					2.52		2 006		1 257		103		1 821		1 736		1 550		1 344		1 117		520	
EMTK292"TRENDSTAR"					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)					η_0, b	a1	a2	a3	a4	a5	a6	a7	a8	Kd										
Units					-	W/(m^2K)	W/(m^2K^2)	J/(m^3K)	-	J/(m^2K)	s/m	W/(m^2K^4)	W/(m^2K^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					$K_{\theta T, coll}$	1.00	0.99	0.98	0.97	0.94	0.89	0.79	0.47	0.00										
Longitudinal					$K_{\theta L, coll}$	1.00	0.99	0.98	0.97	0.94	0.89	0.79	0.47	0.00										
Heat transfer medium for testing					Water-Glycole																			
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 ($G = 1000 \text{ W/m}^2; \vartheta_a = 30 \text{ }^\circ\text{C}$)					ϑ_{stg}		185		$^\circ\text{C}$															
Maximum operating temperature					$\vartheta_{max, op}$		n.a.		$^\circ\text{C}$															
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)					10COL931/3OEM11 10COL932/3OEM11 10COL932Q/4OEM11				Dated		16.03.2020 16.03.2020 16.03.2020													
Comments of testing laboratory					Datasheet version: 6.1, 2019-09-26																			
Thermal performance parameters are given from 10COL931/3OEM11 (EMTK202"TRENDSTAR")					 Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 8, 70560 Stuttgart (Vaihingen)																			
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Supplementary Information		Issued		2020-03-16									
Annual collector output in kWh/collector at mean fluid temperature ϑ_m													
Standard Locations		Athens		Davos		Stockholm		Würzburg					
Collector name	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
EMTK202"TRENDSTAR"		2 369	1 722	1 162	1 812	1 279	833	1 333	891	558	1 453	968	596
EMTK232"TRENDSTAR"		2 627	1 910	1 289	2 009	1 418	924	1 478	988	618	1 612	1 073	661
EMTK252"TRENDSTAR"		2 956	2 149	1 450	2 261	1 596	1 039	1 663	1 111	696	1 813	1 207	743
EMTK292"TRENDSTAR"		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)							
EMTK202"TRENDSTAR"		2.02		9-V-1234S-A:7.2,1894-C:20.6,1060-D		1.83							
EMTK232"TRENDSTAR"		2.24		10-V-1234S-A:7.2,1779-C:20.6,1240-D		2.03							
EMTK252"TRENDSTAR"		2.52		11-V-1234S-A:7.2,1894-C:20.6,1310-D		2.33							
EMTK292"TRENDSTAR"		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		W/(m ² K)			
		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.													
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