

Annex to Solar Keymark Certificate					Licence Number		011-7S3055 F							
					Date issued		2022-06-15							
					Issued by		DIN CERTCO							
Licence holder		Linuo Ritter International Co,Ltd			Country		China							
Brand (optional)		Linuo Ritter International			Web		www.linuo-ritter-international.com							
Street, Number		No. 30766 East Jingshi Road			E-mail		shangl@linuo-ritter-international.com							
Postcode, City		250103/Jinan			Tel		+86 18953198532							
Collector Type					Flat plate collector									
Collector name					Gross area (A_G) m ²	Gross length mm	Gross width mm	Gross height mm	Power output per collector G _b = 850 W/m ² , G _d = 150 W/m ² & u = 1.3 m/s θ _m - θ _a					
									0 K W	10 K W	30 K W	50 K W	70 K W	94 K W
FP-2m²/80mm					2.00	2,000	1,000	80	1,460	1,413	1,257	1,019	700	209
FP-2.4m²/80mm					2.40	2,000	1,200	80	1,752	1,695	1,508	1,223	840	251
FP-3m²/80mm					3.00	2,000	1,500	80	2,190	2,119	1,885	1,528	1,049	313
Power output per m² gross area					730	706	628	509	350	104				
Performance parameters test method					Steady state - outdoor									
Performance parameters (related to A_G)					η 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					0.741	1.861	0.051	0.000	0.000	5,331	0.000	0.000	0.000	0.901
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	0.98	0.94	0.87	0.73	0.48	0.00
Longitudinal					K _{θL, coll}	1.00	1.00	0.99	0.98	0.94	0.87	0.73	0.48	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					(θ _m -θ _a) _{max}		64		K					
Standard stagnation temperature (G = 1000 W/m²; θ_a = 30 °C)					θ _{stg}		180		°C					
Maximum operating temperature					θ _{max, op}		186		°C					
Maximum operating pressure					p _{max, op}		900		kPa					
Testing laboratory		Intertek Testing Services Shenzhen Ltd. Guangzhou Branch							http://www.intertek.com					
Test report(s)		210727099GZU-001							Dated		2022/6/15			
Comments of testing laboratory					Draft Ver. 6.2 (22.09.2021)									
<u>1. All the data above are come from model FP-2m²/80mm.</u> <u>2. this datasheet will replaced previous datasheet.</u>					 Stamp & signature									
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Supplementary Information	Issued	2022-06-15

Gross Thermal Yield 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
FP-2m²/80mm		2,352	1,736	985	1,859	1,213	581	1,366	871	422	1,480	948	453
FP-2.4m²/80mm		2,822	2,084	1,183	2,231	1,455	697	1,639	1,046	507	1,777	1,137	543
FP-3m²/80mm		3,527	2,605	1,478	2,788	1,819	872	2,049	1,307	633	2,221	1,422	679
Gross Thermal Yield per m² gross area		1,176	868	493	929	606	291	683	436	211	740	474	226
Annual efficiency, η_a		67%	49%	28%	57%	37%	18%	59%	37%	18%	60%	38%	18%
Fixed or tracking collector	Fixed (slope = latitude - 15°; rounded to nearest 5°)												
Annual irradiation on collector plane		1765 kWh/m²			1630 kWh/m²			1166 kWh/m²			1244 kWh/m²		
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 Draft Ver. 6.2 (22.09.2021). 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					2400	Pa
Maximum tested negative load					1400	Pa
Hail resistance using steel ball (maximum drop height)					2	m

Additional collector attribute(s)			
Using external power source(s) for normal operation	No	Active or passive measure(s) for self-protection	No
Co-generating thermal and electrical power	No	Façade collector(s)	No

Energy Labelling Information		Additional Informative Technical Data	
	Reference Area, A _{sol} (m ²)	Hydraulic Designation Code	Aperture Area, A _a (m ²)
FP-2m ² /80mm	2.00	11-VH-1234S-A:7.6,1880-C:20.5,1060-D	1.86
FP-2.4m ² /80mm	2.40	14-VH-1234S-A:7.6,1880-C:20.5,1335-D	2.22
FP-3m ² /80mm	3.00	18-VH-1234S-A:7.6,1880-C:20.5,1585-D	2.84

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})	57%	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/m², 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)	1.86 W/(m²K)
		Second-order coefficient (a ₂)	0.051 W/(m²K²)
		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.	