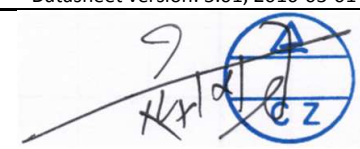


Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2812 F							
					Date issued		2017-11-14							
					Issued by		DIN CERTCO							
Licence holder		Linuo Ritter International Co., Ltd			Country		China							
Brand (optional)		Linuo Ritter			Web		http://www.linuo-paradigma.com							
Street, Number		No. 30766 East Jingshi Road			E-mail		info@linuo-ritter-international.com							
Postcode, City		250103 Jinan			Tel		+86 531 88729950							
Collector Type					Flat plate collector, glazed									
Collector name					Power output per collector									
					Gb = 850 W/m <sup>2</sup> ; Gd = 150 W/m <sup>2</sup> ; u = 3 m/s θ <sub>m</sub> - θ <sub>a</sub>									
					0 K	10 K	30 K	50 K	70 K	100 K				
					m <sup>2</sup>	mm	mm	mm	mm	mm	mm			
					W	W	W	W	W	W				
P-G/0.8-T/L/LT-1.82					2.00	2 000	1 000	95	1 553	1 477	1 314	1 136	944	630
P-G/0.8-T/L/LT-2.80					3.00	2 000	1 500	95	2 329	2 215	1 971	1 704	1 417	944
Power output per m <sup>2</sup> gross area					776	738	657	568	472	315				
Performance parameters test method					Quasi dynamic									
Performance parameters (related to AG)					η <sub>0,b</sub>	c1	c2	c3	c4	c6	Kd			
Units					-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K)	J/(m <sup>3</sup> K)	-	s/m	-			
Test results					0.783	3.716	0.009	0.000	0.000	0.000	0.944			
Incidence angle modifier test method					Quasi dynamic - outdoor									
Bi-directional incidence angle modifiers					No									
Incidence angle modifier					Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal					K <sub>θT,coil</sub>	1.00	1.00	0.98	0.96	0.93	0.88	0.77	0.00	0.00
Longitudinal					K <sub>θL,coil</sub>	1.00	1.00	0.98	0.96	0.93	0.88	0.77	0.00	0.00
Heat transfer medium for testing					Water-Glycole									
Flow rate for testing (per gross area, A <sub>G</sub> )					dm/dt	0.020	kg/(sm <sup>2</sup> )							
Maximum temperature difference for thermal performance calculations					(θ <sub>m</sub> -θ <sub>a</sub> ) <sub>max</sub>	100	K							
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; θ <sub>a</sub> = 30 °C)					θ <sub>stg</sub>	216.9	°C							
Effective thermal capacity, incl. fluid (per gross area, A <sub>G</sub> )					C/m <sup>2</sup>	12.18	kJ/(Km <sup>2</sup> )							
Maximum operating temperature					θ <sub>max,op</sub>	99	°C							
Maximum operating pressure					p <sub>max,op</sub>	800	kPa							
Testing laboratory					TÜV Rheinland (Shanghai) Co., Ltd.									
Test report(s)					www.tuv.com									
					154150039_Linuo_P-G-2.80_ISO_Report_chen									
					154150039_Linuo_P-G-1.82_ISO_Report_chen									
					Dated									
					11/9/2017									
					11/9/2017									
Comments of testing laboratory					Datasheet version: 5.01, 2016-03-01									
														
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Annex to Solar Keymark Certificate		Licence Number											
Supplementary Information		011-7S2812 F											
		Issued											
		2017-11-14											
<b>Annual collector output in kWh/collector at mean fluid temperature <math>\vartheta_m</math>, based on ISO 9806:2013 test results</b>													
	Standard Locations	Athens			Davos			Stockholm			Würzburg		
Collector name	$\vartheta_m$	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
P-G/0.8-T/L/LT-1.82		2 493	1 790	1 200	1 898	1 331	866	1 392	926	579	1 520	1 002	616
P-G/0.8-T/L/LT-2.80		3 740	2 685	1 800	2 846	1 996	1 299	2 088	1 389	868	2 280	1 503	924
Annual output per m <sup>2</sup> gross area		1 247	895	600	949	665	433	696	463	289	760	501	308
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m <sup>2</sup>			1714 kWh/m <sup>2</sup>			1166 kWh/m <sup>2</sup>			1244 kWh/m <sup>2</sup>		
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 $\vartheta_m$ (mean of in- and outlet temperatures). The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool Scenocalc Ver. 5.01 (March 2016). A detailed description of the calculations is available at <a href="http://www.solarkeymark.org/scenocalc">www.solarkeymark.org/scenocalc</a>													
<b>Additional Information</b>													
Collector heat transfer medium		Water-Glycole											
Hybrid Thermal and Photo Voltaic collector		No											
The collector is deemed to be suitable for roof integration		Yes											
The collector was tested successfully according to EN ISO 9806:2013 under the following conditions:													
Climate class (A, B or C)		C			--								
Maximum tested positive load		2400			Pa								
Maximum tested negative load		1880			Pa								
Hail resistance using steel ball (maximum drop height)		2			m								
<b>Energy Labelling Information</b>													
	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$											
P-G/0.8-T/L/LT-1.82	2.00	Collector efficiency ( $\eta_{col}$ )			61			%					
P-G/0.8-T/L/LT-2.80	3.00	Remark: Collector efficiency ( $\eta_{col}$ ) 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 <sup>2</sup> , expressed in % and rounded to the nearest integer. Deviating from the regulation $\eta_{col}$ is based on reference area ( $A_{sol}$ ) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2013.											
		Data required for CDR (EU) No 812/2013 - Reference Area $A_{sol}$											
		Zero-loss efficiency ( $\eta_0$ )			0.776			--					
		First-order coefficient ( $a_1$ )			3.72			W/(m <sup>2</sup> K)					
		Second-order coefficient ( $a_2$ )			0.009			W/(m <sup>2</sup> K <sup>2</sup> )					
		Incidence angle modifier IAM (50°)			0.93			--					
		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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