



Summary of		EN12976-2		SOLAR SYSTEM test results		Licence Number		011-752716 A					
Annex to Solar KEYMARK Certificate						Issued		2016-11-14					
Company		Linuo Ritter International Co., Ltd.				Country		China					
Brand (optional)		Linuo Paradigma				Website		www.linuo-ritter-international.com					
Street		No. 30766 East Jingshi Road				E-mail		info@linuo-ritter-international.com					
Postal Code		250103		Jinan, Shandong		Tel. / Fax		+86 0531-88729923/9920					
System classification													
Application(s)					Hot water								
Solar loop, circulation principle					Thermosyphon								
Direct solar loop / heat exchanger					Direct								
Open, vented or closed solar loop					Closed								
Drain back/down					Always filled (no drain)								
Store location					Outdoor								
Store orientation (of main axis)					Horizontal								
Type of auxiliary heating (internal back-up heat)					None								
If other auxiliary/internal back-up heating, please specify:													
Solar+supplementary OR Solar-only / Solar pre-heat					Solar only / Solar preheat								
Collector(s)					Heat store(s)								
Company		Linuo Ritter International Co., Ltd.			Company		Linuo Ritter International Co., Ltd.						
Keymark lic.no. if available		NA			Keymark lic.no. if available		NA						
Collector name		Per module			Store name		Total nominal volume		Gross height	Gross width	Gross depth	Auxiliary heated volume	Electrical aux. heating power
		Gross Area (Ag)	Gross length	Gross width									
R1818-58-75		2.71	1910	1418	QFR1-150/1.82/0.6-		150	1474	480	480	-	-	
R1824-58-75		3.50	1910	1832	QFR1-200/2.42/0.6-		192	1830	480	480	-	-	
R1836-58-75		5.42	1910	2836	QFR1-300/3.03/0.6-		302	2690	480	480	-	-	
Solar loop controller					Solar loop fluid								
Keymark lic.no. if available		NA			Recommended/required		Recommended						
Company		NA			Company		NA						
Name		NA			Name		NA						
Solar loop pump - power range		- W to - W			Freezing point		-30 °C						
System family overview													
Collector name		Number of collectors in each configuration for each store											
		Store name											
		QFR1-150/1.82/0.6-5				QFR1-200/2.42/0.6-5				QFR1-300/3.03/0.6-5			
R1818-58-75		1											
R1824-58-75					1								
R1836-58-75								1					
Testing Laboratory					TUV Rheinland (Shanghai) Co., Ltd								
Website					www.tuv.com								
Test report id. number					154150039_EN_Linuo_System_QRF1-150_Report_zhao; 154150039_EN_Linuo_System_QRF1-200_Report_zhao								
Date of test report					2016-11-14								
Comments of test lab													
Performance results are based on QFR1-150/1.82/0.6-58/30-AR(1818) system.													



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Postal Code		250103		Jinan, Shandong		Tel. / Fax		+86 0531-88729923/9920					
System family overview													
For each storage and collector size, give number of collectors													
Collector name	QFR1-150/1.82/0.6-5		QFR1-200/2.42/0.6-5		QFR1-300/3.03/0.6-5								
R1818-58-75	1												
R1824-58-75			1										
R1836-58-75					1								
Name of system configuration													
						QFR1-150/1.82/0.6-58/30-AR(1818)							
Collector name		R1818-58-75		No. Collectors		1		Storage name		QFR1-150/1.82/0.6-5			
Calculated annual results for "solar-only / preheat system"													
Location	Qd,sh	Daily drawoff 80 l				Daily drawoff 110 l				Daily drawoff 140 l			
		Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol
		MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%
Stockholm SE	-	4478	2586	-	57.9	6150	3217	-	52.6	7821	3658	-	46.8
Würzburg DE	-	4289	2605	-	60.9	5897	3311	-	56.0	7506	4226	-	56.2
Davos CH	-	4857	3879	-	80.0	6654	4793	-	72.0	8483	-	-	-
Athens GR	-	3343	3027	-	91.0	4573	-	-	-	5834	4636	-	79.5
Perf. indicators for the table above													
Qd,sh	MJ/y	Not relevant for solar domestic hot water system											
Qd	MJ/y	Annual heat demand for domestic hot water											
QL	MJ/y	Annual heat energy delivered by the solar system											
Qpar	MJ/y	Annual parasitic energy: (electricity for pumps/controllers)											
f _{sol} =Q _L /Q _d	-	Solar fraction											
Ref. conditions		Stockholm SE	Würzburg DE	Davos CH	Athens GR								
	G	1 157	1 230	1 684	1 736								
	T _{a,ave}	7.5	9.0	3.2	18.5								
	T _{c,ave}	8.5	10.0	5.4	17.8								
	± ΔT _c	6.4	3.0	0.8	7.4								
G	kWh/m ²	Annual irradiation South, 45°											
T _{a,ave}	°C	Annual average outdoor air temperature											
T _{c,ave}	°C	Annual average mains cold water temp.											
ΔT _c	K	Seasonal variation of T _c											
T _h	45 °C	Desired hot water temperature (mixing valve temperature).											
Max. operating press. - collector side		600		kPa		Max. operating press. - tank side		600		kPa			
Testing Laboratory		TUV Rheinland (Shanghai) Co., Ltd											
Website		www.tuv.com											
Test report id. number		154150039_EN_Linuo_System_QRF1-150_Report_zhao;											
Date of test report		2016-11-14											
Test method		ISO 9459-5 (DST)											
Comments of test lab													
No comments													

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 3.6, 2014-06-18

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Summary of		EN12976-2		test results		Certification No.		011-7S2716 A					
Annex to Solar KEYMARK Certificate						Issued		2016-11-14					
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Brand (optional)		Linuo Paradigma				Website		www.linuo-ritter-international.com					
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Postal Code		250103		Jinan, Shandong		Tel. / Fax		+86 0531-88729923/9920					
System family overview													
For each storage and collector size, give number of collectors													
Collector name	QFR1-150/1.82/0.6-5		QFR1-200/2.42/0.6-5		QFR1-300/3.03/0.6-5								
R1818-58-75	1												
R1824-58-75			1										
R1836-58-75					1								
Name of system configuration						QFR1-200/2.42/0.6-58/30-AR(1824)							
Collector name		R1824-58-75		No. Collectors		1		Storage name		QFR1-200/2.42/0.6-5			
Calculated annual results for "solar-only / preheat system"													
Location	Qd,sh	Daily drawoff 110 l				Daily drawoff 140 l				Daily drawoff 170 l			
		Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol
	MJ/y	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%
Stockholm SE	-	6150	3374	-	55.1	7821	3942	-	50.6	9492	4352	-	45.8
Würzburg DE	-	5897	3406	-	57.8	7506	4068	-	54.1	9114	4541	-	49.8
Davos CH	-	6654	5014	-	75.3	8483	5866	-	69.1	10281	6402	-	62.0
Athens GR	-	4573	4037	-	88.3	5834	4888	-	83.8	7064	5550	-	78.6
Perf. indicators for the table above													
Qd,sh	MJ/y	Not relevant for solar domestic hot water system											
Qd	MJ/y	Annual heat demand for domestic hot water											
QL	MJ/y	Annual heat energy delivered by the solar system											
Qpar	MJ/y	Annual parasitic energy: (electricity for pumps/controllers)											
f_{sol} = QL/Qd	-	Solar fraction											
Ref. conditions			Stockholm SE	Würzburg DE	Davos CH	Athens GR							
		G	1 157	1 230	1 684	1 736							
		Ta,ave	7.5	9.0	3.2	18.5							
		Tc,ave	8.5	10.0	5.4	17.8							
		± ΔTc	6.4	3.0	0.8	7.4							
G	kWh/m²	Annual irradiation South, 45°											
Ta,ave	°C	Annual average outdoor air temperature											
Tc,ave	°C	Annual average mains cold water temp.											
ΔTc	K	Seasonal variation of Tc											
Th	45 °C	Desired hot water temperature (mixing valve temperature).											
Max. operating press. - collector side		600		kPa		Max. operating press. - tank side		600		kPa			
Testing Laboratory		TUV Rheinland (Shanghai) Co., Ltd											
Website		www.tuv.com											
Test report id. number		154150039_EN_Linuo_System_QRF1-150_Report_zhao; 154150039_EN_Linuo_System_QRF1-200_Report_zhao											
Date of test report		2016-11-14											
Test method		ISO 9459-5 (DST)											
Comments of test lab													
No comments													

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R1818-58-75	1												
R1824-58-75			1										
R1836-58-75					1								
Calculated annual results for "solar-only / preheat system"													
Location	Qd,sh	Daily drawoff 140 l				Daily drawoff 170 l				Daily drawoff 200 l			
		Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol
	MJ/y	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%
Stockholm SE	-	7821	3847	-	49.0	9492	4415	-	46.4	11164	4888	-	43.8
Würzburg DE	-	7506	3879	-	51.9	9114	4541	-	49.9	10691	5109	-	47.6
Davos CH	-	8483	5550	-	65.6	10281	6402	-	62.3	12110	7064	-	58.4
Athens GR	-	5834	4793	-	82.3	7064	5645	-	79.7	8326	6370	-	76.7
Perf. indicators for the table above													
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f_{sol} = QL / Qd	-	Solar fraction											
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Th	45 °C	Desired hot water temperature (mixing valve temperature).											
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