



Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate		Certificate No.	011-7S089 R
		Date of issue	15.01.2012
Company	Ritter Energie- und Umwelttechnik GmbH & Co. KG	Country	Deutschland
Brand (optional)		Website	www.ritter-gruppe.com
Street, number	Kuchenäcker 2	E-mail	j.albrecht@ritter-gruppe.com
Postal Code	72135	Tel.	+49 715 753 591 266
City	Dettenhausen	Fax	+49 715 753 591 269
Collector Type (flat plate / evacuate tubular / un-glazed)		Evacuated tubular collector	
Integration in the roof possible ?		No	

Collector name	Aperture area (A _a) [m ²]	Gross length [mm]	Gross width [mm]	Gross height [mm]	Gross area (A _G) [m ²]	Power output per collector unit G = 1000 W/m ² T _m -T _a :				
						0 K	10 K	30 K	50 K	70 K
						[W]	[W]	[W]	[W]	[W]
CPC 14 Star azurro	2.33	1 616	1 622	120	2.62	1 501	1 482	1 438	1 384	1 321
CPC 21 Star azzurro	3.47	1 616	2 427	120	3.92	2 235	2 207	2 141	2 061	1 968
CPC 30 Star azzurro*	3.00	2 033	1 622	120	3.30	1 932	1 908	1 851	1 782	1 701
CPC 45 Star azzurro*	4.50	2 033	2 427	120	4.93	2 898	2 862	2 777	2 673	2 552
CPC 32 Allstar*	3.21	1 904	1 852	100	3.53	2 067	2 042	1 981	1 907	1 820
CPC 40 Allstar*	4.01	1 904	2 312	100	4.40	2 582	2 550	2 474	2 382	2 274
CPC 14 OEM RP*	2.33	1 616	1 622	120	2.62	1 501	1 482	1 438	1 384	1 321
CPC 21 OEM RP*	3.47	1 616	2 427	120	3.92	2 235	2 207	2 141	2 061	1 968
CPC 14 INOX RP *	2.33	1 616	1 622	120	2.62	1 501	1 482	1 438	1 384	1 321
CPC 21 INOX RP*	3.47	1 616	2 427	120	3.92	2 235	2 207	2 141	2 061	1 968
CPC 14 OEM mono*	2.33	1 616	1 622	120	2.62	1 501	1 482	1 438	1 384	1 321
CPC 21 OEM mono*	3.47	1 616	2 427	120	3.92	2 235	2 207	2 141	2 061	1 968
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Collector efficiency parameters related to aperture area (A_a) Type of fluid and flow rate see note 1	η _{0a}	0.644	-
	a _{1a}	0.749	W/(m ² K)
	a _{2a}	0.005	W/(m ² K ²)

Stagnation temperature - Weather conditions see note 2	t _{stg}	301	°C
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Effective thermal capacity	C _{eff} = C/A _a	9.18	kJ/(m ² K)
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Max. operation pressure - see note 3	p _{max}	1000	kPa
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Incidence angle modifiers K _θ (θ)	G _{DIF} /G _{TOT}		θ _r / θ _i	50°	10°	20°	30°	40°	60°	70°
	min	max	K _θ (θ _r)	0.98	1.01	1.01	1.02	1.02	1.05	1.14
	-	-	K _θ (θ _i)	0.95	1.00	1.00	0.99	0.98	0.89	0.76

G_{DIF}/G_{TOT}: min&max - while measuring **Optional values**

Testing Laboratory	TZS, ITW University of Stuttgart
Website	www.tzs.uni-stuttgart.de
Test report id. number	06COL456/4
Date of test report	15.01.2012
Perf. test method	EN 12975-2 6.1.4 (outdoor)

Comments of testing laboratory :
* dimensions according to manufacturer

Note 1	Fluid	Water	Flow rate	0.017	kg/s per m ²	
Note 2	Irradiance, G_s=1000 W/m²					
Note 3	Ambient temperature, T_a=30 °C					



Annual collector output based on EN 12975 Test Results,
annex to Solar KEYMARK Certificate

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Annual collector output kWh

Collector name	Location and collector temperature (T _m)											
	Athens			Davos			Stockholm			Würzburg		
	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
CPC 14 Star azzurro	2 591	2 375	2 124	2 408	2 182	1 929	1 628	1 436	1 240	1 747	1 545	1 334
CPC 21 Star azzurro	3 859	3 537	3 163	3 586	3 250	2 873	2 425	2 139	1 847	2 602	2 301	1 987
CPC 30 Star azzurro*	3 336	3 058	2 735	3 100	2 809	2 484	2 096	1 849	1 597	2 249	1 989	1 718
CPC 45 Star azzurro*	5 004	4 587	4 102	4 651	4 214	3 726	3 144	2 773	2 395	3 374	2 984	2 576
CPC 32 Allstar*	3 570	3 272	2 926	3 317	3 006	2 658	2 243	1 978	1 708	2 407	2 129	1 838
CPC 40 Allstar*	4 459	4 087	3 655	4 144	3 755	3 320	2 802	2 471	2 134	3 007	2 659	2 296
CPC 14 OEM RP*	2 591	2 375	2 124	2 408	2 182	1 929	1 628	1 436	1 240	1 747	1 545	1 334
CPC 21 OEM RP*	3 859	3 537	3 163	3 586	3 250	2 873	2 425	2 139	1 847	2 602	2 301	1 987
CPC 14 INOX RP *	2 591	2 375	2 124	2 408	2 182	1 929	1 628	1 436	1 240	1 747	1 545	1 334
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CPC 14 OEM mono*	2 591	2 375	2 124	2 408	2 182	1 929	1 628	1 436	1 240	1 747	1 545	1 334
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Collector mounting: Fixed or tracking

Fixed; slope = latitude - 15° (rounded to nearest 5°)

Overview of locations

Location	Latitude °	Gtot kWh/m ²	T _a °C	Collector orientation or tracking mode
Athens	38	1 765	18.5	South, 25°
Davos	47	1 714	3.2	South, 30°
Stockholm	59	1 166	7.5	South, 45°
Würzburg	50	1 244	9.0	South, 35°

Gtot	Annual total irradiation on collector plane	kWh/m ²
T _a	Mean annual ambient air temperature	°C
T _m	Constant collector operating temperature (mean of in- and outlet temperatures)	°C

Calculation of the annual collector performance is done by the official Solar Keymark spreadsheet tool. Hour by hour the collector output is calculated according to the efficiency parameters from the Keymark test using constant collector operating temperature (T_m). Detailed description with all equations used is available from the Solar Keymark web site (direct link:<http://www.estif.org/solarkeymark/annexb1.php>)

DIN CERTCO • Alboinstraße 56 • 12103 Berlin
Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de • www.dincertco.de

Datasheet version:

VERSION 3.6, 2012.01.13

Calculation program version:

3.07, October 2011 (SP)