





<b>Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate</b>				<b>Licence Number</b> 011-7S 361 F	
				<b>Issued</b> 2014-05-19	
<b>Company holding the</b>		PHÖNIX SonnenWärme AG		<b>Country</b>	Germany
<b>Brand (optional)</b>		-		<b>Website</b>	www.sonnenwaermeag.de
<b>Street, street number</b>		Ostendstraße 1		<b>E-mail</b>	info@sonnenwaermeag.de
<b>Postal Code / City, province</b>		D-12459	Berlin	<b>Tel/Fax</b>	+49 (0)30 530 007 -0 / -17
<b>Collector Type (flat plate glazed/un-glazed; evacuate tubular)</b>				Flat plate collector - glazed	
Thermal / photo voltaic hybrid collector? (PVT collector)				No	
Integration in the roof possible ? (manufacturers declaration)				No	
<b>Power output per collector module</b>					
G = 1000 W/m <sup>2</sup>					
T <sub>m</sub> -T <sub>a</sub>					
0 K    10 K    30 K    50 K    70 K					
W        W        W        W        W					
<b>Collector name</b>	<b>Aperture area (A<sub>a</sub>)</b> m <sup>2</sup>	<b>Gross length</b> mm	<b>Gross width</b> mm	<b>Gross height</b> mm	<b>Gross area (A<sub>G</sub>)</b> m <sup>2</sup>
Phönix Infinity 3 MS	1.97	1 870	1 158	95	2.17
Phönix Infinity 323 MS	2.30	2 168	1 158	95	2.51
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Phönix Infinity 323	2.30	2 168	1 158	95	2.51
<b>Performance test method</b>	Glazed liquid heating collector - steady state - indoor				
<b>Performance parameters related to aperture</b>	η <sub>0</sub>	a <sub>1</sub>	a <sub>2</sub>		
<b>Units</b>	-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )		
<b>Test results - Flow rate and fluid see note 1</b>	0.781	3.83	0.0159		
<b>Bi-directional incidence angle</b>	No	K <sub>θ</sub> values are obligatory for 50°.			
<b>Incidence angle modifiers K<sub>θ</sub>(θ)</b>	Angle	10°	20°	30°	40°
	K <sub>θ</sub> (θ)	1.00	0.99	0.98	0.96
<b>Incidence angle modifier not bi-directional - leave fields blank</b>					
<b>Stagnation temperature - Weather conditions see note 2</b>	T <sub>stg</sub>	202	°C		
<b>Effective thermal capacity</b>	c <sub>eff</sub> = C/Ag	6.2	kJ/(m <sup>2</sup> K)		
<b>Max. intended operation temperature - see note 3</b>	T <sub>max,op</sub>	-	°C		
<b>Max. operation pressure - see note 3</b>	p <sub>max,op</sub>	1000	kPa		
<b>Optional weather data</b>	Location		Link		
<b>Testing Laboratory</b>	Institut für Solarenergieforschung Hameln				
<b>Website</b>	www.isfh.de				
<b>Test report id. number</b>	see comments		<b>Date of test report</b>	see comments	
During the test GDIF/GTOT was always between - and -					
<b>Comments of testing laboratory:</b>					
Test report id. numbers: 10-09/KD, 11-09/KQ, 12-08/D, 13-08/Q, 09-09/KD, 54-09/KQ 05.02.09, 11.05.09, 06.03.08, 12.03.08, 05.02.09, 11.05.09					
'1) The mentioned collector efficiency parameters were determined with the given flow rate. Thus this flow rate is only valid for the collector type Phönix Infinity 3 MS. For the other collector types the flow rate is stated in the respective test reports.					
2) The collector efficiency parameter and incidence angle modifiers are related to G(DIF)/G(TOT)=0.15.					
3) The incidence angle modifier was determined outdoor according to a quasi-dynamic test procedure.					
<b>Note 1</b>	<b>Flow rate</b>	0.02	kg/(s m <sup>2</sup> )	<b>Fluid</b>	Water
<b>Note 2</b>	<b>Irradiance, G = 1000 W/m<sup>2</sup>; Ambient temperature, T<sub>a</sub>=30 °C</b>				
<b>Note 3</b>	<b>Given by manufacturer</b>				
  Datasheet version: 4.06, 2014-01-15					



Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	011-7S 361 F
	Issued	19.05.2014

Annual collector output kWh/module														
Collector name	Location and collector temperature (T <sub>m</sub> )													
	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		
Phönix Infinity 3 MS	2 426	1 691	1 058	1 823	1 222	726	1 346	855	492	1 464	922	522		
Phönix Infinity 323 MS	2 832	1 974	1 235	2 128	1 427	848	1 572	999	574	1 709	1 077	609		
Phönix Infinity 3	2 426	1 691	1 058	1 823	1 222	726	1 346	855	492	1 464	922	522		
Phönix Infinity 323	2 832	1 974	1 235	2 128	1 427	848	1 572	999	574	1 709	1 077	609		

Collector mounting: Fixed or tracking	Fixed; slope = latitude - 15° (rounded to nearest 5°)
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Overview of locations				
Location	Latitude °	G <sub>tot</sub> kWh/m <sup>2</sup>	T <sub>a</sub> °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°

G <sub>tot</sub>	Annual total irradiation on collector plane	kWh/m <sup>2</sup>
T <sub>a</sub>	Mean annual ambient air temperature	°C
T <sub>m</sub>	Constant collector operating temperature (mean of in- and outlet temperatures)	°C

The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool ScenoCalc. The collector output is calculated hour by hour according to the efficiency parameters from the Keymark test using constant collector operating temperature (T<sub>m</sub>). A detailed description of the calculations is available at <http://www.sp.se/en/index/services/solar/ScenoCalc/Sidor/default.aspx>.

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	4.06, 2014-01-15
	ScenoCalc version:
	Ver. 4.06 (Jan, 2014)