

Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate						Licence Number		011-7S2461 R													
						Issued		2015-11-19													
Company holding the licence			Bosch Thermotechnik GmbH			Country	Germany														
Brand (optional)			Junkers			Website	www.bosch-thermotechnik.de														
Street, street number			Junkersstrasse 20-24			E-mail	solarthermie@de.bosch.com														
Postal Code / City, province			73249 Wernau			Tel/Fax	49 (0)2557 9399-0 / -														
Collector Type (flat plate glazed/un-glazed; evacuate tubular)						Evacuated tubular collector															
Thermal / photo voltaic hybrid collector? (PVT collector)						No															
Integration in the roof possible ? (manufacturers declaration)						No															
											Power output per collector module										
											G = 1000 W/m ²										
											Tm-Ta										
											0 K	10 K	30 K	50 K	70 K						
											W	W	W	W	W						
Collector name	Aperture area (Aa)	Gross length	Gross width	Gross height	Gross area (AG)	0 K	10 K	30 K	50 K	70 K											
Junkers VK120-2 CPC, 2 Module	2.06	1947	1248	87	2.44	1366	1347	1295	1223	1132											
Performance test method											Glazed liquid heating collector - steady state - indoor										
Performance parameters related to aperture area											η0	a1	a2								
Units											-	W/(m²K)	W/(m²K²)								
Test results - Flow rate and fluid see note 1											0.663	0.782	0.012								
Bi-directional incidence angle modifiers?											Yes	<i>Kθ values are obligatory for 50°.</i>									
Incidence angle modifiers Kθ(θT)											Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°	
transversal direction											Kθ(θT)	1.01	1.00	0.96	1.03	1.09	1.18	1.36	0.68	0.00	
Incidence angle modifiers Kθ(θL)											Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°	
longitudinal direction											Kθ(θL)	1.00	0.99	0.99	0.97	0.95	0.91	0.83	0.42	0.00	
Stagnation temperature - Weather conditions see note 2											Tstg	260	°C								
Effective thermal capacity											ceff = C/Ag	7.34	kJ/(m²K)								
Max. intende operation temperature - see note 3											Tmax,op	-	°C								
Max. operation pressure - see note 3											pmax,op	1000	kPa								
Pressure drop table - for a collector family, the values shall be for the module with highest ΔP per m² aperture area																					
Flow rate	kg/(s m²)																				
Pressure drop, ΔP	Pa																				
Optional weather data	Location			Link																	
Testing Laboratory											TÜV Rheinland Energie und Umwelt GmbH										
Website											www.tuc.com/st										
Test report id. number											21229230.001	Date of test report	2015.11.19								
During the test GDIF/GTOT was always between											0.11	and	0.28								
Comments of testing laboratory:																					
Because of product size 2 samples were combined for testing incl. additional CPC-element.																					
Dimension of single element (l/w/h) [mm]: 1947 / 624 / 87																					
Areas of single element (Aa/Ag) [m²]: 0.98 / 1.22																					
Due to the design that used single elements to enlarge final collector field area; combined with additional CPC-elements; the enclosed maximum power peak-values had been documented in test report.																					
Note 1	Flow rate	0.022	kg/(s m²)	Fluid	Water																
Note 2	Irradiance, G = 1000 W/m²; Ambient temperature, Ta=30 °C																				
Note 3	Given by manufacturer																				
											TÜVRheinland [®] Genau. Richtig. <i>st lab</i>										
											TÜV Rheinland Energie und Umwelt GmbH Am Grauen Stein 51105 Köln										
											Datashet version: 4.05, 2013-11-07										
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Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	011-7S2461 R
	Issued	19.11.2015

Annual collector output kWh/module													
Collector name	Location and collector temperature (Tm)												
	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	
Junkers VK120-2 CPC, 2 Module	2 398	2 156	1 830	2 070	1 789	1 465	1 503	1 279	1 026	1 613	1 378	1 107	

Collector mounting: Fixed or tracking	Fixed; slope = latitude - 15° (rounded to nearest 5°)
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Overview of locations				
Location	Latitude °	Gtot kWh/m²	Ta °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/m²
Ta	Mean annual ambient air temperature	°C
Tm	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 (Tm). 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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	4.05, 2013-11-07
	ScenoCalc version: Ver. 4.05 (Nov, 2013)