

Summary of	EN12976-2	SOLAR SYSTEM test results	Licence Number	011-7S 2202 A																
Annex to Solar KEYMARK Certificate			Issued	2017-03-16																
Company	Bosch Thermotechnik GmbH			Country	Germany															
Brand (optional)	Bosch			Website	www.bosch-thermotechnology.com															
Street	Junkersstraße 20-24			E-mail	solarthermie@de.bosch.com															
Postal Code	73249	Wernau		Tel. / Fax	-	-														
System classification																				
Application(s)				Hot water																
Solar loop, circulation principle				Thermosyphon																
Direct solar loop / heat exchanger				Heat exchanger																
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)																				
Company		Bosch Thermotechnik GmbH			Company		Bosch Thermotechnik GmbH													
Keymark lic.no. if available		011-7S2181 F			Keymark lic.no. if available		-													
Collector name		Per module			Store name		Total nominal volume litres	Gross height mm	Gross width mm	Gross depth mm	Auxiliary heated volume litres	Electrical aux. heating power kW								
		Gross Area (Ag)	Gross length	Gross width																
		m ²	mm	mm																
BoschFCC220-2V		2.09	2026	1032	TS150-1E		150	1120	580	580	-	-								
					TS200-1E		200	1320	580	580	-	-								
					TS300-1E		300	1850	580	580	-	-								
Solar loop controller											Solar loop fluid									
Keymark lic.no. if available		-			Recommended/required		Required													
Company		-			Company		Bosch Thermotechnik													
Name		-			Name		Water glycol mixture													
Solar loop pump - power range		- W to - W			Freezing point		-14 °C													
System family overview																				
Collector name		Number of collectors in each configuration for each store																		
		Store name																		
		TS150-1E			TS200-1E			TS300-1E												
BoschFCC220-2V		1				1					2									
Testing Laboratory				TÜV Rheinland Energy GmbH																
Website				www.tuv.com/solarpower																
Test report id. number				21216029_BO_EN_Sys																
Date of test report				2011-10-10																
Comments of test lab													 TÜVRheinland® Genau. Richtig. TÜV Rheinland Energy GmbH Am Grauen Stein 51105 Köln							
These systems will be also distributed under the brands:																				
TSS150/FCC Junkers; /FCC Vulcano; /FCC e.l.m. leblanc ; TS150-1E/CKN1.0 Buderus																				
TSS200/FCC Junkers; /FCC Vulcano; /FCC e.l.m. leblanc ; TS200-1E/CKN1.0 Buderus																				
TSS300/FCC Junkers; /FCC Vulcano; /FCC e.l.m. leblanc ; TS300-1E/CKN1.0 Buderus																				



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Brand (optional)	Bosch		Website	www.bosch-thermotechnology.com									
Street	Junkersstraße 20-24		E-mail	solarthermie@de.bosch.com									
Postal Code	73249	Wernau	Tel. / Fax	- / -									
System family overview													
For each storage and collector size, give number of collectors													
Collector name	TS150-1E	TS200-1E	TS300-1E										
BoschFCC220-2V	1	1	2										
Name of system configuration			TSS150/FCC Bosch										
Collector name	BoschFCC220-2V	No. Collectors	1	Storage name									
				TS150-1E									
Calculated annual results for "solar-only / preheat system"													
Location	Qd,sh	Daily drawoff				Daily drawoff				Daily drawoff			
		110 l				140 l				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	0	6149	2819	-	46	7819	3186	-	41	9493	3406	-	36
WürzburgDE	0	5897	3078	-	52	7506	3586	-	48	9115	3881	-	43
Davos CH	0	6653	4478	-	67	8482	5076	-	60	10282	5393	-	52
Athens GR	0	4572	3784	-	83	5836	4478	-	77	7063	5015	-	71
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/m²	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											
Th	45 °C	Desired hot water temperature (mixing valve temperature).											
Max. operating press. - collector side		250	kPa	Max. operating press. - tank side		1 000	kPa						
Testing Laboratory		TÜV Rheinland Energy GmbH											
Website		www.tuv.com/solarpower											
Test report id. number		21216029_BO_EN_Sys											
Date of test report		2011-10-10											
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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Postal Code	73249	Wernau		Tel. / Fax	-	-							
System family overview													
For each storage and collector size, give number of collectors													
Collector name	TS150-1E		TS200-1E		TS300-1E								
BoschFCC220-2V	1		1		2								
Name of system configuration					TSS200/FCC Bosch								
Collector name	BoschFCC220-2V		No. Collectors	1		Storage name	TS200-1E						
Calculated annual results for "solar-only / preheat system"													
Location	Qd,sh	Daily drawoff				Daily drawoff				Daily drawoff			
		170		I		200		I		250		I	
		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	0	9493	3532	-	37	11164	3722	-	33	13939	3881	-	28
WürzburgDE	0	9115	4007	-	44	10692	4259	-	40	13370	4478	-	34
Davos CH	0	10282	5551	-	54	12110	5803	-	48	15138	6055	-	40
Athens GR	0	7063	5141	-	73	8327	5645	-	68	10408	6242	-	60
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f _{sol} =Q _L /Q _d	-	Solar fraction											
Ref. conditions		Stockholm SE	Würzburg DE	Davos CH	Athens GR								
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	± ΔT _c	6.4	3.0	0.8	7.4								
G	kWh/m²	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		250	kPa	Max. operating press. - tank side		1 000	kPa						
Testing Laboratory				TÜV Rheinland Energy GmbH									
Website				www.tuv.com/solarpower									
Test report id. number				21216029_BO_EN_Sys									
Date of test report				2011-10-10									
Test method				ISO 9459-5 (DST)									
Comments of test lab													
No comments													

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TÜV Rheinland Energy GmbH
Am Grauen Stein
51105 Köln



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System family overview													
For each storage and collector size, give number of collectors													
Collector name	TS150-1E		TS200-1E		TS300-1E								
BoschFCC220-2V	1		1		2								
Name of system configuration					TSS300/FCC Bosch								
Collector name	BoschFCC220-2V		No. Collectors	2		Storage name	TS300-1E						
Calculated annual results for "solar-only / preheat system"													
Location	Qd,sh	Daily drawoff 250 l				Daily drawoff 300 l				Daily drawoff 400 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	0	13939	6023	-	43	16747	6527	-	39	22327	7128	-	32
WürzburgDE	0	13370	6685	-	50	16052	7380	-	46	21413	8078	-	38
Davos CH	0	15138	9619	-	64	18166	10375	-	57	24221	11038	-	46
Athens GR	0	10408	8294	-	80	12488	9367	-	75	16650	10879	-	65
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