





<b>Summary of</b>	<b>EN12977-5</b>	<b>CONTROLLER test results</b>	<b>Licence Number</b>	<b>011-7S2549 S</b>												
<b>Annex to Solar KEYMARK Certificate</b>			<b>Issued</b>	<b>2016-02-29</b>												
<b>Company</b>	Protherm Production s.r.o.			<b>Country</b>	Slovenska Republika											
<b>Brand (optional)</b>	Protherm - Helio Set			<b>Website</b>	<a href="http://www.vaillant.com">www.vaillant.com</a>											
<b>Street</b>	Jurkovicova 45			<b>E-mail</b>	<a href="mailto:info@vaillant.com">info@vaillant.com</a>											
<b>Postal Code</b>	909 01	Skalica		<b>Tel. / Fax</b>	+49	(0)2191-180										
<b>Solar heating system controller - description and features</b>																
<b>General control principle/type</b>	Multi-function controller			<b>No. temperature sensors</b>	4											
<b>No. clocks</b>	1			<b>No. irradiance sensors</b>	-											
<b>No. timers</b>	4			<b>No. flow sensorss</b>	1											
<b>No. counters</b>	2			<b>No. pressure sensors</b>	-											
<b>No. differential thermostats</b>	5			<b>No. level sensors</b>	-											
<b>No. output for pumps</b>	1			<b>No. outputs for magnetic valves</b>	-											
<b>No. other outputs</b>	1			<b>No. output for motor valves</b>	1											
<b>Freeze damage protection</b>	Included			<b>Power in W (control box only)</b>	9											
<b>Scald protection</b>	Not included			<b>Input voltage range (V)</b>	207	to	253	V ≈								
<b>High temperature protection</b>	Included			<b>Photovoltaic supply</b>	No											
<b>Solar heating system controller - test results</b>																
Parameter	Test result	Sensor no:	1	2	3	4	5	6	7	8	9	10				
Clock	Max. tolerance**	min/mon	< 1													
Timer	Max. tolerance**	min/mon	< 1	< 1	< 1	< 1										
Counter	Max. tolerance	%	N.N.	N.N.												
Temperature sensor	Min. temp.****	°C	-10	-10	-15	0										
	Max. temp.****	°C	120	120	150	90										
	Tolerance at max. temp.***	K	1.8	1.8	1.8	1.5										
Irradiance sensor	Max. irradiance***	%														
	Tolerance at max. irradi.***	%														
Flow sensor	Min. flow rate****	%	10													
	Max. flow rate****	%	100													
	Tolerance at max. flow***	m <sup>3</sup> /h	99.9													
Pressure sensor	Min. pressure****	kPa														
	Max. pressure****	kPa														
	Tolerance at max. pres.***	kPa														
Level sensor	Min. level****															
	Max. level****															
	Tolerance at max. level***															
**) Tolerance given in minutes per month. ***) Max. tolerance in whole sensor range. ****) Specified by manufacturer																
<b>Differential thermostats</b>																
	Solar Drain Back/1				Electrical Aux/2				External Aux/3				Freeze Protection /4			
Range ΔTON	6	-	20		99.9	-	99.9		99.9	-	99.9		0	-	12	
Range ΔTOFF	1	-	5		99.9	-	99.9		99.9	-	99.9		14	-	20	
Temp. level	20°C		70°C		60				60°C				10°C			
SET/MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS
ΔTON	12	11.6	12	11.9	-5	-5.9			-5	-3.3			< 10	< 10		
ΔTOFF	3	2.7	3	2.6	0.5	0.5			0.5	0			> 15	> 15		
<b>Flow rate control</b>																
	Solar Pump/1															
SET/MEAS	SET*	MEAS	SET*	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS
Flow rate	20%	31%	70%	82%												
<b>Temperature control</b>																
	Store HX inlet/ 1				Store bottom/ 2				Collector/ 3				Ext. Aux/ 4			
SET/MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS
Temperature	9.9	10.1	89.6	88.6	10.0	10.5	89.6	89.5	9.9	10.4	89.7	90.6	10.0	10.8	89.7	89.5
<b>Testing Laboratory</b>	TÜV Rheinland Energie und Umwelt GmbH															
<b>Website</b>	<a href="http://www.tuv.com/st">www.tuv.com/st</a>															
<b>Test report id. number</b>	21227422.013															
<b>Date of test report</b>	2016-02-29															



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<b>Postal Code</b>	909 01		Skalica						<b>Tel. / Fax</b>	+49		(0)2191-180						
<b>Differential thermostats (cont.)</b>																		
		Solar-Aux/5				Solar Pressurized/1-1												
Range $\Delta T_{ON}$	20	-	65		6	-	20			-				-				
Range $\Delta T_{OFF}$	99.9	-	99.9		1	-	5			-				-				
Temp. level	70°C				50				20°C		90°C		20°C		90°C			
SET/MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS		
$\Delta T_{ON}$	-5	65			7	7												
$\Delta T_{OFF}$					3	2.4												
<b>Flow rate controllers (cont.)</b>																		
SET/MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS
Flow rate																		
<b>Temperature controllers (cont.)</b>																		
SET/MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS	SET	MEAS
Temperature																		
<b>Description of controls/functions</b>																		
<b>Testing Laboratory</b>	TÜV Rheinland Energie und Umwelt GmbH																	
<b>Website</b>	www.tuv.com/st																	
<b>Test report id. number</b>	21227422.013																	
<b>Date of test report</b>	2016-01-28																	
<b>Comments of test lab</b>	<p>As it is not possible to give the exact setting and results for all operation points, it was tried to summarize the working principle in the best way.</p>																	
 <b>TÜVRheinland</b> <sup>®</sup> Genau. Richtig.  TÜV Rheinland Energie und Umwelt GmbH Am Grauen Stein 51105 Köln																		