

Summary of	EN12976-2	SOLAR SYSTEM test results	Licence Number	ICIM-CLS-000160-00						
Annex to Solar KEYMARK Certificate			Issued	2019-08-28						
Company	CORDIVARI SRL		Country	ITALY						
Brand (optional)	STRATOS DR		Website	www.cordivari.com						
Street	Z.I. PAGLIARE		E-mail	info@cordivari.it						
Postal Code	64020	MORRO D'ORO	Tel. / Fax	+39 085 804 01						
System classification										
Application(s)		Hot water								
Solar loop, circulation principle		Thermosyphon								
Direct solar loop / heat exchanger		Direct								
Open, vented or closed solar loop		Open								
Drain back/down		Always filled (no drain)								
Store location		Int. collector-store								
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)			Heat store(s)							
Company			CORDIVARI							
Keymark lic.no. if available			Int. collector-store							
Per module										
Collector name	Gross Area (Ag)	Gross length	Gross width	Store name	Total nominal volume	Gross height	Gross width	Gross depth	Auxiliary heated volume	Electrical aux. heating power
	m ²	mm	mm		litres	mm	mm	mm	litres	kW
STRATOS DR 110	1.31	2288	572	STRATOS DR 110	103	-	-	-	-	-
STRATOS DR 150	1.66	2288	727	STRATOS DR 150	137	-	-	-	-	-
STRATOS DR 180	2.02	2287	880	STRATOS DR 180	171	-	-	-	-	-
STRATOS DR 220	2.37	2288	1036	STRATOS DR 220	205	-	-	-	-	-
STRATOS DR 260	2.73	2288	1192	STRATOS DR 260	240	-	-	-	-	-
Solar loop controller			Solar loop fluid							
Keymark lic.no. if available			N/A							
Company			N/A							
Name			N/A							
Solar loop pump - power range			- W to - W							
			Recommended/required							
			No recommend./requirements							
			Company							
			Name							
			Freezing point							
			°C							
System family overview										
Collector name	Number of collectors in each configuration for each store									
	Store name									
	STRATOS DR 110	STRATOS DR 150	STRATOS DR 180	STRATOS DR 220	STRATOS DR 260					
STRATOS DR 110	1									
STRATOS DR 150		1								
STRATOS DR 180			1							
STRATOS DR 220				1						
STRATOS DR 260					1					
Testing Laboratory			SOLAR & OTHER ENERGY SYSTEMS LABORATORY / NCSR "DEMOKRITOS"							
Website			www.solar.demokritos.gr							
Test report id. number			6105DE1, 6104DE1, 6105F1							
Date of test report			2019-07-22							
Comments of test lab										
Integrated collector storage system family										
			N.C.S.R "DEMOKRITOS" SOLAR ENERGY LABORATORY Head: Dr Vassilis Belessiotis Tel: +210 6503615 - Fax: +210 6544592 153 10 Ag. Paraskevi - Attiki - Greece							

Summary of	EN12976-2	test results	Certification No.	ICIM-CLS-000160-00				
Annex to Solar KEYMARK Certificate			Issued	2019-08-28				
Company	CORDIVARI SRL		Country	ITALY				
Brand (optional)	STRATOS DR		Website	www.cordivari.com				
Street	Z.I. PAGLIARE		E-mail	info@cordivari.it				
Postal Code	64020	MORRO D'ORO	Tel. / Fax	+39 085 804 01				
Parameters for systems extrapolation (Annex D)								
Collector of measured system		Storage tank of measured system						
$A_{ref} [m^2]$	-	Volume [l]	-					
η_0	-	$A_{hx} [m^2]$	-					
$a_1 [W/Km^2]$	-	Piping						
$a_2 [W/Km^2]$	-							
IAM (50°)	-	$U_{loop,p}$	-					
System parameters								
Name of System Configuration	Tested/Extrapolation	$A_c^* [m^2]$	$u_c^* [W/Km^2]$	$U_s [W/K]$	$C_s [MJ/K]$	$S_c [-]$	$D_L [-]$	$f_{aux} [-]$
SISTEMA TERM.SOLARE STRATOS DR 110	Extrapol	0.77	2.88	3.43	0.372	0.00	0.12	-
SISTEMA TERM.SOLARE STRATOS DR 150	Extrapol	0.98	3.66	4.36	0.495	0.00	0.12	-
SISTEMA TERM.SOLARE STRATOS DR 180	Tested	1.19	4.43	5.28	0.618	0.00	0.12	-
SISTEMA TERM.SOLARE STRATOS DR 220	Extrapol	1.40	5.21	6.21	0.740	0.00	0.12	-
SISTEMA TERM.SOLARE STRATOS DR 260	Extrapol	1.61	5.99	7.14	0.867	0.00	0.12	-
Testing Laboratory		SOLAR & OTHER ENERGY SYSTEMS LABORATORY / NCSR "DEMOKRITOS"						
Website		www.solar.demokritos.gr						
Test report id. number		6105DE1, 6104DE1, 6105F1						
Date of test report		2019-07-22						
Test method		ISO 9459-5 (DST)						
Comments of test lab		Calculations are executed according to the Annex Q1 (R1/ Edition 2019-03-07) of "Solar Keymark – Specific Scheme Rules" for ICS systems 						

Summary of	EN12976-2	test results	Certification No.	ICIM-CLS-000160-00									
Annex to Solar KEYMARK Certificate			Issued	2019-08-28									
Company	CORDIVARI SRL		Country	ITALY									
Brand (optional)	STRATOS DR		Website	www.cordivari.com									
Street	Z.I. PAGLIARE		E-mail	info@cordivari.it									
Postal Code	64020	MORRO D'ORO	Tel. / Fax	+39 085 804 01									
System family overview													
	For each storage and collector size, give number of collectors												
Collector name	STRATOS DR 110	STRATOS DR 150	STRATOS DR 180	STRATOS DR 220									
STRATOS DR 110	1												
STRATOS DR 150		1											
STRATOS DR 180			1										
STRATOS DR 220				1									
STRATOS DR 260				1									
Name of system configuration			SISTEMA TERM.SOLARE STRATOS DR 110										
Collector name	1.31	No. Collectors	1	Storage name									
STRATOS DR 110													
Calculated annual results for "solar-only / preheat system"													
Location	Q_{d,sh} MJ/y	Daily drawoff 80 l				Daily drawoff 110 l				Daily drawoff 140 l			
		Q_{d,hw} MJ/y	Q_L MJ/y	Q_{par} MJ/y	f_{sol} %	Q_{d,hw} MJ/y	Q_L MJ/y	Q_{par} MJ/y	f_{sol} %	Q_{d,hw} MJ/y	Q_L MJ/y	Q_{par} MJ/y	f_{sol} %
Stockholm SE	-	4478	2003	0	45	6150	2280	0	37	7821	2362	0	30
Würzburg DE	-	4289	2059	0	48	5897	2397	0	41	7506	2491	0	33
Davos CH	-	4857	2870	0	59	6654	3217	0	48	8483	3280	0	39
Athens GR	-	3343	2573	0	77	4573	3135	0	69	5834	3469	0	59
Perf. indicators for the table above													
Q _{d,sh}	MJ/y	Not relevant for solar domestic hot water system											
Q _d	MJ/y	Annual heat demand for domestic hot water											
Q _L	MJ/y	Annual heat energy delivered by the solar system											
Q _{par}	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/m ²	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		400	kPa	Max. operating press. - tank side		400	kPa						
Testing Laboratory		SOLAR & OTHER ENERGY SYSTEMS LABORATORY / NCSR "DEMOKRITOS"											
Website		www.solar.demokritos.gr											
Test report id. number		6105DE1, 6104DE1, 6105F1											
Date of test report		2019-07-22											
Test method		ISO 9459-5 (DST)											
Comments of test lab													
													

Summary of	EN12976-2	test results	Certification No.	ICIM-CLS-000160-00									
Annex to Solar KEYMARK Certificate			Issued	2019-08-28									
Company	CORDIVARI SRL		Country	ITALY									
Brand (optional)	STRATOS DR		Website	www.cordivari.com									
Street	Z.I. PAGLIARE		E-mail	info@cordivari.it									
Postal Code	64020	MORRO D'ORO	Tel. / Fax	+39 085 804 01									
System family overview													
For each storage and collector size, give number of collectors													
Collector name	STRATOS DR 110	STRATOS DR 150	STRATOS DR 180	STRATOS DR 220									
STRATOS DR 110	1												
STRATOS DR 150		1											
STRATOS DR 180			1										
STRATOS DR 220				1									
STRATOS DR 260													
Name of system configuration													
SISTEMA TERM.SOLARE STRATOS DR 150													
Collector name	1.66	No. Collectors	1	Storage name									
STRATOS DR 150													
Calculated annual results for "solar-only / preheat system"													
Location	Q_{d,sh}	Daily drawoff 110 l				Daily drawoff 140 l				Daily drawoff 170 l			
		Q_{d,hw}	Q_L	Q_{par}	f_{sol}	Q_{d,hw}	Q_L	Q_{par}	f_{sol}	Q_{d,hw}	Q_L	Q_{par}	f_{sol}
		MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%
Stockholm SE	-	6150	2602	0	42	7821	2829	0	36	9492	2942	0	31
Würzburg DE	-	5897	2693	0	46	7506	2999	0	40	9114	3119	0	34
Davos CH	-	6654	3690	0	55	8483	4005	0	47	10281	4100	0	40
Athens GR	-	4573	3406	0	74	5834	3942	0	68	7064	4289	0	61
Perf. indicators for the table above													
Q_{d,sh}	MJ/y	Not relevant for solar domestic hot water system											
Q_d	MJ/y	Annual heat demand for domestic hot water											
Q_L	MJ/y	Annual heat energy delivered by the solar system											
Q_{par}	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		400	kPa	Max. operating press. - tank side		400	kPa						
Testing Laboratory		SOLAR & OTHER ENERGY SYSTEMS LABORATORY / NCSR "DEMOKRITOS"											
Website		www.solar.demokritos.gr											
Test report id. number		6105DE1, 6104DE1, 6105F1											
Date of test report		2019-07-22											
Test method		ISO 9459-5 (DST)											
Comments of test lab													
													

Summary of	EN12976-2	test results	Certification No.	ICIM-CLS-000160-00									
Annex to Solar KEYMARK Certificate			Issued	2019-08-28									
Company	CORDIVARI SRL		Country	ITALY									
Brand (optional)	STRATOS DR		Website	www.cordivari.com									
Street	Z.I. PAGLIARE		E-mail	info@cordivari.it									
Postal Code	64020	MORRO D'ORO	Tel. / Fax	+39 085 804 01									
System family overview													
For each storage and collector size, give number of collectors													
Collector name	STRATOS DR 110	STRATOS DR 150	STRATOS DR 180	STRATOS DR 220									
STRATOS DR 110	1												
STRATOS DR 150		1											
STRATOS DR 180			1										
STRATOS DR 220				1									
STRATOS DR 260													
Name of system configuration													
SISTEMA TERM.SOLARE STRATOS DR 180													
Collector name	2.02	No. Collectors	1	Storage name									
STRATOS DR 180													
Calculated annual results for "solar-only / preheat system"													
Location	Q_{d,sh}	Daily drawoff 140 l				Daily drawoff 170 l				Daily drawoff 200 l			
		Q_{d,hw}	Q_L	Q_{par}	f_{sol}	Q_{d,hw}	Q_L	Q_{par}	f_{sol}	Q_{d,hw}	Q_L	Q_{par}	f_{sol}
	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	
Stockholm SE	-	7821	3132	0	40	9492	3374	0	36	11164	3469	0	31
Würzburg DE	-	7506	3311	0	44	9114	3595	0	39	10691	3721	0	35
Davos CH	-	8483	4478	0	53	10281	4762	0	46	12110	4888	0	40
Athens GR	-	5834	4226	0	72	7064	4730	0	67	8326	5109	0	61
Perf. indicators for the table above													
Q _{d,sh}	MJ/y	Not relevant for solar domestic hot water system											
Q _d	MJ/y	Annual heat demand for domestic hot water											
Q _L	MJ/y	Annual heat energy delivered by the solar system											
Q _{par}	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/m ²	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		400	kPa	Max. operating press. - tank side		400	kPa						
Testing Laboratory		SOLAR & OTHER ENERGY SYSTEMS LABORATORY / NCSR "DEMOKRITOS"											
Website		www.solar.demokritos.gr											
Test report id. number		6105DE1, 6104DE1, 6105F1											
Date of test report		2019-07-22											
Test method		ISO 9459-5 (DST)											
Comments of test lab													
													

Summary of	EN12976-2	test results	Certification No.	ICIM-CLS-000160-00									
Annex to Solar KEYMARK Certificate			Issued	2019-08-28									
Company	CORDIVARI SRL		Country	ITALY									
Brand (optional)	STRATOS DR		Website	www.cordivari.com									
Street	Z.I. PAGLIARE		E-mail	info@cordivari.it									
Postal Code	64020	MORRO D'ORO	Tel. / Fax	+39 085 804 01									
System family overview													
For each storage and collector size, give number of collectors													
Collector name	STRATOS DR 110	STRATOS DR 150	STRATOS DR 180	STRATOS DR 220									
STRATOS DR 110	1												
STRATOS DR 150		1											
STRATOS DR 180			1										
STRATOS DR 220				1									
STRATOS DR 260				1									
Name of system configuration			SISTEMA TERM.SOLARE STRATOS DR 220										
Collector name	2.37	No. Collectors	1	Storage name									
STRATOS DR 220													
Calculated annual results for "solar-only / preheat system"													
Location	Q_{d,sh} MJ/y	Daily drawoff 170 l				Daily drawoff 200 l				Daily drawoff 250 l			
		Q_{d,hw} MJ/y	Q_L MJ/y	Q_{par} MJ/y	f_{sol} %	Q_{d,hw} MJ/y	Q_L MJ/y	Q_{par} MJ/y	f_{sol} %	Q_{d,hw} MJ/y	Q_L MJ/y	Q_{par} MJ/y	f_{sol} %
Stockholm SE	-	9492	3658	0	39	11164	3879	0	35	13939	4068	0	29
Würzburg DE	-	9114	3879	0	43	10691	4131	0	39	13371	4320	0	32
Davos CH	-	10281	5203	0	51	12110	5456	0	45	15137	5676	0	37
Athens GR	-	7064	5014	0	71	8326	5487	0	66	10407	6023	0	58
Perf. indicators for the table above													
Q _{d,sh}	MJ/y	Not relevant for solar domestic hot water system											
Q _d	MJ/y	Annual heat demand for domestic hot water											
Q _L	MJ/y	Annual heat energy delivered by the solar system											
Q _{par}	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/m ²	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		400	kPa	Max. operating press. - tank side		400	kPa						
Testing Laboratory		SOLAR & OTHER ENERGY SYSTEMS LABORATORY / NCSR "DEMOKRITOS"											
Website		www.solar.demokritos.gr											
Test report id. number		6105DE1, 6104DE1, 6105F1											
Date of test report		2019-07-22											
Test method		ISO 9459-5 (DST)											
Comments of test lab													
 N.C.S.R "DEMOKRITOS" SOLAR ENERGY LABORATORY Head: Dr Vassilis Belesiotis Tel: +210 6503815 - Fax: +210 6544592 153 10 Ag. Paraskevi - Attiki - Greece													

Summary of	EN12976-2	test results	Certification No.	ICIM-CLS-000160-00									
Annex to Solar KEYMARK Certificate			Issued	2019-08-28									
Company	CORDIVARI SRL		Country	ITALY									
Brand (optional)	STRATOS DR		Website	www.cordivari.com									
Street	Z.I. PAGLIARE		E-mail	info@cordivari.it									
Postal Code	64020	MORRO D'ORO	Tel. / Fax	+39 085 804 01									
System family overview													
	For each storage and collector size, give number of collectors												
Collector name	STRATOS DR 110	STRATOS DR 150	STRATOS DR 180	STRATOS DR 220									
STRATOS DR 110	1												
STRATOS DR 150		1											
STRATOS DR 180			1										
STRATOS DR 220				1									
STRATOS DR 260				1									
Name of system configuration			SISTEMA TERM.SOLARE STRATOS DR 260										
Collector name	2.73	No. Collectors	1	Storage name									
STRATOS DR 260													
Calculated annual results for "solar-only / preheat system"													
Location	Q_{d,sh}	Daily drawoff 200 l				Daily drawoff 250 l				Daily drawoff 300 l			
		Q_{d,hw}	Q_L	Q_{par}	f_{sol}	Q_{d,hw}	Q_L	Q_{par}	f_{sol}	Q_{d,hw}	Q_L	Q_{par}	f_{sol}
	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	
Stockholm SE	-	11164	4163	0	37	13939	4447	0	32	16746	4636	0	28
Würzburg DE	-	10691	4415	0	41	13371	4793	0	36	16052	4920	0	31
Davos CH	-	12110	5897	0	49	15137	6276	0	41	18165	6465	0	36
Athens GR	-	8326	5771	0	69	10407	6496	0	62	12488	6938	0	56
Perf. indicators for the table above													
Q_{d,sh}	MJ/y	Not relevant for solar domestic hot water system											
Q_d	MJ/y	Annual heat demand for domestic hot water											
Q_L	MJ/y	Annual heat energy delivered by the solar system											
Q_{par}	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		400	kPa	Max. operating press. - tank side		400	kPa						
Testing Laboratory		SOLAR & OTHER ENERGY SYSTEMS LABORATORY / NCSR "DEMOKRITOS"											
Website		www.solar.demokritos.gr											
Test report id. number		6105DE1, 6104DE1, 6105F1											
Date of test report		2019-07-22											
Test method		ISO 9459-5 (DST)											
Comments of test lab													
													