Summary of	EN12976-2	SOLAR SYSTEM test results	Licence Number	OEM 10109.4.3
Annex to Solar KEYMARK Certificate			Issued	2022-03-29

Company	CLIMART S.R.L		Country	ITALIA	
Brand (optional)	SMART SOL		Website	www.smart-sol.it	
Street	VIALE DELLA REPPUBLICA 43		E-mail	info@smart-sol.it	
Postal Code	73100	LECCE LE	Tel. / Fax	+39	832 240041

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)	Electric
If other auxiliary/internal back-up heating, please specifiy:	
Solar+supplementary OR Solar-only / Solar pre-heat	Solar + supplementary

Collector(s)		Heat store(s)						
Company	CLIMART S.R.L	Company	CLIMART S.R.L					
Keymark lic.no. if available	OEM 10109.1.1	*Keymark lic.no. if available*						
Collector name	Per module: Gross Area (AG)	Per module: Gross length	Per module: Gross width	Store name	Total nominal volume	Gross height	Gross width	Gross depth	Auxiliary heated volume	Electrical aux. heating power
	m²	mm	mm		litres	mm	mm	mm	litres	kW
SMA 2 MQ VT 4 CONN	1,90	1970	965	150L	136	1250	500			
SMA 2.5 MQ VT 4 CONN	2,40	1970	1220	200L	190	1250	580			
				250L	230	1550	580			
				300L	276	1785	580			

Solar loop controller		Solar loop fluid	
Keymark lic.no. if available	-	Recommended/required	No recommend./requirements
Company	-	Company	FluidCompany
Name	-	Name	FluidName
Solar loop pump - power range	W to W	Freezing point	-4 °C

System family overview

Collector name	Number of collectors in each configuration for each store: Store name 150L	200L	250L	300L
SMA 2 MQ VT 4 CONN	1	1 2	1 2 3	1 2 3
SMA 2.5 MQ VT 4 CO	1	1 2	1 2	1 2 3

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6110 DE2, 6113 DE2, 6113 F2
Date of test report	2020-11-04

Comments of test lab	
	Stamp & signature of test lab

DQS HELLAS Ltd, Central Offices: Kalavriton 4, 145 64 kifisia, Athens, Tel: +301 6233493-4 , Fax: +301 6233495,
http://www.dqs.gr, e-mail: i.alexiou@dqs.gr

Summary of	EN12976-2	test results	Certification No.	OEM 10109.4.3
Annex to Solar KEYMARK Certificate			Issued	2022-03-29

Company	CLIMART S.R.L	Country	ITALIA
Brand (optional)	SMART SOL	Website	www.smart-sol.it
Street	VIALE DELLA REPPUBLICA 43	E-mail	info@smart-sol.it
Postal Code	73100 LECCE LE	Tel. / Fax	+39 832 240041

System family overview

Collector name	For each storage and collector size, give number of collectors																													
	150L						200L						250L						300L												
SMA 2 MQ VT 4 CONN	1						1	2					1	2	3				1	2	3										
SMA 2.5 MQ VT 4 CO	1						1	2					1	2					1	2	3										

Name of system configuration			SMA.151.20.150/2 MQ
Collector name	SMA 2 MQ VT 4 CONN	No. Collectors	1
		Storage name	150L

Calculated annual results for "solar-only / preheat system"

Location	Qd,sh	Daily drawoff 110 l				Daily drawoff 140 l				Daily drawoff 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	-	6150	3154	0	51	7821	3658	0	47	9492	3942	0	42
WürzburgDE	-	5897	3185	0	54	7506	3753	0	50	9114	4131	0	45
Davos CH	-	6654	4636	0	70	8483	5330	0	63	10281	5676	0	55
Athens GR	-	4573	3847	0	84	5834	4636	0	80	7064	5235	0	74

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
	Ta,ave	7,5	9,0	3,2	18,5
	Tc,ave	8,5	10,0	5,4	17,8
	± ΔTc	6,4	3,0	0,8	7,4

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
Th	45 °C	**Desired hot water temperature (mixing valve temperature).**

Max. operating press. - collector side	250	kPa	Max. operating press. - tank side	1000 kPa

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6110 DE2, 6113 DE2, 6113 F2
Date of test report	2020-11-04
Test method	ISO 9459-5 (DST)

Comments of test lab

Extrapolated

Stamp & signature of test lab

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	OEM 10109.4.3
Annex to Solar KEYMARK Certificate			Issued	2022-03-29

Company	CLIMART S.R.L		Country	ITALIA	
Brand (optional)	SMART SOL		Website	www.smart-sol.it	
Street	VIALE DELLA REPPUBLICA 43		E-mail	info@smart-sol.it	
Postal Code	73100	LECCE LE	Tel. / Fax	+39	832 240041

System family overview

Collector name	For each storage and collector size, give number of collectors																												
	150L						200L						250L						300L											
SMA 2 MQ VT 4 CONN	1						1	2					1	2	3				1	2	3									
SMA 2.5 MQ VT 4 CO	1						1	2					1	2					1	2	3									

Name of system configuration							
						SMA.151.25.150/2.5 MQ	
Collector name	MA 2.5 MQ VT 4 CON	No. Collectors	1	Storage name	150L		

Calculated annual results for "solar-only / preheat system"

Location	Qd,sh	Daily drawoff	110 l			Daily drawoff	140 l			Daily drawoff	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	-	6150	3469	0	56	7821	4068	0	52	9492	4478	0	47
WürzburgDE	-	5897	3437	0	59	7506	4131	0	55	9114	4604	0	51
Davos CH	-	6654	5140	0	77	8483	6023	0	71	10281	6591	0	64
Athens GR	-	4573	4068	0	89	5834	4951	0	85	7064	5676	0	80

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			
	Ta,ave	7,5	9,0	3,2	18,5			
	Tc,ave	8,5	10,0	5,4	17,8			
	± ΔTc	6,4	3,0	0,8	7,4			

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
Th	45 °C	**Desired hot water temperature (mixing valve temperature).**

Max. operating press. - collector side	250	kPa	Max. operating press. - tank side	1000	kPa

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6110 DE2, 6113 DE2, 6113 F2
Date of test report	2020-11-04
Test method	ISO 9459-5 (DST)

Comments of test lab	
Extrapolated	Stamp & signature of test lab

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	OEM 10109.4.3
Annex to Solar KEYMARK Certificate			Issued	2022-03-29

Company	CLIMART S.R.L		Country	ITALIA	
Brand (optional)	SMART SOL		Website	www.smart-sol.it	
Street	VIALE DELLA REPPUBLICA 43		E-mail	info@smart-sol.it	
Postal Code	73100	LECCE LE	Tel. / Fax	+39	832 240041

System family overview

Collector name	For each storage and collector size, give number of collectors																											
	150L						200L						250L						300L											
SMA 2 MQ VT 4 CONN	1						1	2					1	2	3				1	2	3									
SMA 2.5 MQ VT 4 CO	1						1	2					1	2					1	2	3									

Name of system configuration					SMA.201.20.200/2 MQ		
Collector name	SMA 2 MQ VT 4 CONN	No. Collectors	1		Storage name	200L	

Calculated annual results for "solar-only / preheat system"

Location	Qd,sh	Daily drawoff	170	l			Daily drawoff	200	l			Daily drawoff	250	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	-	9492	4005	0	42		11164	4289	0	38		13939	4478	0	32	
WürzburgDE	-	9114	4163	0	46		10691	4510	0	42		13371	4762	0	36	
Davos CH	-	10281	5740	0	56		12110	6086	0	50		15137	6307	0	42	
Athens GR	-	7064	5298	0	75		8326	5866	0	70		10407	6465	0	62	

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			
	Ta,ave	7,5	9,0	3,2	18,5			
	Tc,ave	8,5	10,0	5,4	17,8			
	± ΔTc	6,4	3,0	0,8	7,4			

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
Th	45 °C	**Desired hot water temperature (mixing valve temperature).**

Max. operating press. - collector side	250	kPa	Max. operating press. - tank side	1000	kPa

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6110 DE2, 6113 DE2, 6113 F2
Date of test report	2020-11-04
Test method	ISO 9459-5 (DST)

Comments of test lab

Extrapolated

Stamp & signature of test lab

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	OEM 10109.4.3
Annex to Solar KEYMARK Certificate			Issued	2022-03-29

Company	CLIMART S.R.L		Country	ITALIA	
Brand (optional)	SMART SOL		Website	www.smart-sol.it	
Street	VIALE DELLA REPPUBLICA 43		E-mail	info@smart-sol.it	
Postal Code	73100	LECCE LE	Tel. / Fax	+39	832 240041

System family overview

Collector name	For each storage and collector size, give number of collectors																													
	150L						200L						250L						300L												
SMA 2 MQ VT 4 CONN	1						1	2					1	2	3				1	2	3										
SMA 2.5 MQ VT 4 CO	1						1	2					1	2					1	2	3										

Name of system configuration				Storage name	
Collector name	SMA 2 MQ VT 4 CONN	No. Collectors	2		SMA.202.20.200/4 MQ
					200L

Calculated annual results for "solar-only / preheat system"

Location	Qd,sh	Daily drawoff		170 l		Daily drawoff		200 l		Daily drawoff		250 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	-	9492	5424	0	57	11164	6055	0	54	13939	6749	0	48
WürzburgDE	-	9114	5424	0	60	10691	6118	0	57	13371	6938	0	52
Davos CH	-	10281	8105	0	79	12110	9019	0	74	15137	9997	0	66
Athens GR	-	7064	6339	0	90	8326	7222	0	87	10407	8452	0	81

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
	Ta,ave	7,5	9,0	3,2	18,5
	Tc,ave	8,5	10,0	5,4	17,8
	± ΔTc	6,4	3,0	0,8	7,4

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
Th	45 °C	**Desired hot water temperature (mixing valve temperature).**

Max. operating press. - collector side	250	kPa	Max. operating press. - tank side	1000	kPa

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6110 DE2, 6113 DE2, 6113 F2
Date of test report	2020-11-04
Test method	ISO 9459-5 (DST)

Comments of test lab
Extrapolated

Stamp & signature of test lab

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	OEM 10109.4.3
Annex to Solar KEYMARK Certificate			Issued	2022-03-29

Company	CLIMART S.R.L		Country	ITALIA	
Brand (optional)	SMART SOL		Website	www.smart-sol.it	
Street	VIALE DELLA REPPUBLICA 43		E-mail	info@smart-sol.it	
Postal Code	73100	LECCE LE	Tel. / Fax	+39	832 240041

System family overview

Collector name	For each storage and collector size, give number of collectors																											
	150L						200L						250L						300L											
SMA 2 MQ VT 4 CONI	1						1	2					1	2	3				1	2	3									
SMA 2.5 MQ VT 4 CO	1						1	2					1	2					1	2	3									

Name of system configuration					SMA.201.25.200/2.5 MQ		
Collector name	MA 2.5 MQ VT 4 CON	No. Collectors	1		Storage name	200L	

Calculated annual results for "solar-only / preheat system"

Location	Qd,sh	Daily drawoff	170	l			Daily drawoff	200	l			Daily drawoff	250	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	-	9492	4573	0	48		11164	4983	0	45		13939	5298	0	38	
WürzburgDE	-	9114	4699	0	52		10691	5172	0	48		13371	5613	0	42	
Davos CH	-	10281	6686	0	65		12110	7222	0	60		15137	7600	0	50	
Athens GR	-	7064	5740	0	81		8326	6433	0	78		10407	7285	0	70	

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
	Ta,ave	7,5	9,0	3,2	18,5
	Tc,ave	8,5	10,0	5,4	17,8
	± ΔTc	6,4	3,0	0,8	7,4

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
Th	45 °C	**Desired hot water temperature (mixing valve temperature).**

Max. operating press. - collector side	250	kPa	Max. operating press. - tank side	1000	kPa

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6110 DE2, 6113 DE2, 6113 F2
Date of test report	2020-11-04
Test method	ISO 9459-5 (DST)

Comments of test lab

Extrapolated

Stamp & signature of test lab

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	OEM 10109.4.3
Annex to Solar KEYMARK Certificate			Issued	2022-03-29

Company	CLIMART S.R.L		Country	ITALIA	
Brand (optional)	SMART SOL		Website	www.smart-sol.it	
Street	VIALE DELLA REPPUBLICA 43		E-mail	info@smart-sol.it	
Postal Code	73100	LECCE LE	Tel. / Fax	+39	832 240041

System family overview

Collector name	For each storage and collector size, give number of collectors																													
	150L						200L						250L						300L												
SMA 2 MQ VT 4 CONI	1						1	2					1	2	3				1	2	3										
SMA 2.5 MQ VT 4 CO	1						1	2					1	2					1	2	3										

Name of system configuration				Storage name	
Collector name	MA 2.5 MQ VT 4 CON	No. Collectors	2		SMA.202.25.200/5 MQ
					200L

Calculated annual results for "solar-only / preheat system"

Location	Qd,sh	Daily drawoff		170 l		Daily drawoff		200 l		Daily drawoff		250 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	-	9492	5803	0	61	11164	6528	0	58	13939	7411	0	53
WürzburgDE	-	9114	5740	0	63	10691	6496	0	61	13371	7506	0	56
Davos CH	-	10281	8641	0	84	12110	9745	0	80	15137	11038	0	73
Athens GR	-	7064	6559	0	93	8326	7506	0	90	10407	8925	0	86

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
	Ta,ave	7,5	9,0	3,2	18,5
	Tc,ave	8,5	10,0	5,4	17,8
	± ΔTc	6,4	3,0	0,8	7,4

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
Th	45 °C	**Desired hot water temperature (mixing valve temperature).**

Max. operating press. - collector side	250	kPa	Max. operating press. - tank side	1000	kPa

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6110 DE2, 6113 DE2, 6113 F2
Date of test report	2020-11-04
Test method	ISO 9459-5 (DST)

Comments of test lab
Extrapolated

Stamp & signature of test lab

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	OEM 10109.4.3
Annex to Solar KEYMARK Certificate			Issued	2022-03-29

Company	CLIMART S.R.L		Country	ITALIA	
Brand (optional)	SMART SOL		Website	www.smart-sol.it	
Street	VIALE DELLA REPPUBLICA 43		E-mail	info@smart-sol.it	
Postal Code	73100	LECCE LE	Tel. / Fax	+39	832 240041

System family overview

Collector name	For each storage and collector size, give number of collectors																													
	150L						200L						250L						300L												
SMA 2 MQ VT 4 CONN	1						1	2					1	2	3				1	2	3										
SMA 2.5 MQ VT 4 CO	1						1	2					1	2					1	2	3										

Name of system configuration			SMA.251.20.250/2 MQ		
Collector name	SMA 2 MQ VT 4 CONN	No. Collectors	1	Storage name	250L

Calculated annual results for "solar-only / preheat system"

Location	Qd,sh	Daily drawoff		200 l		Daily drawoff		250 l		Daily drawoff		300 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	-	11164	4226	0	38	13939	4573	0	33	16746	4699	0	28
WürzburgDE	-	10691	4478	0	42	13371	4857	0	36	16052	5014	0	31
Davos CH	-	12110	5992	0	49	15137	6433	0	43	18165	6559	0	36
Athens GR	-	8326	5834	0	70	10407	6591	0	63	12488	7033	0	56

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
	Ta,ave	7,5	9,0	3,2	18,5
	Tc,ave	8,5	10,0	5,4	17,8
	± ΔTc	6,4	3,0	0,8	7,4

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
Th	45 °C	**Desired hot water temperature (mixing valve temperature).**

Max. operating press. - collector side	250	kPa	Max. operating press. - tank side	1000	kPa

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6110 DE2, 6113 DE2, 6113 F2
Date of test report	2020-11-04
Test method	ISO 9459-5 (DST)

Comments of test lab
Extrapolated

Stamp & signature of test lab

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	OEM 10109.4.3
Annex to Solar KEYMARK Certificate			Issued	2022-03-29

Company	CLIMART S.R.L		Country	ITALIA	
Brand (optional)	SMART SOL		Website	www.smart-sol.it	
Street	VIALE DELLA REPPUBLICA 43		E-mail	info@smart-sol.it	
Postal Code	73100	LECCE LE	Tel. / Fax	+39	832 240041

System family overview

Collector name	For each storage and collector size, give number of collectors																													
	150L						200L						250L						300L												
SMA 2 MQ VT 4 CONN	1						1	2					1	**2**	3				1	2	3										
SMA 2.5 MQ VT 4 CO	1						1	2					1	2					1	2	3										

Name of system configuration			SMA.252.20.250/4 MQ		
Collector name	SMA 2 MQ VT 4 CONN	No. Collectors	2	Storage name	250L

Calculated annual results for "solar-only / preheat system"

Location	Qd,sh	Daily drawoff		200 l		Daily drawoff		250 l		Daily drawoff		300 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	-	11164	6150	0	55	13939	7001	0	50	16746	7506	0	45
WürzburgDE	-	10691	6213	0	58	13371	7190	0	54	16052	7821	0	49
Davos CH	-	12110	9177	0	76	15137	10375	0	69	18165	10975	0	60
Athens GR	-	8326	7316	0	88	10407	8641	0	83	12488	9682	0	78

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
	Ta,ave	7,5	9,0	3,2	18,5
	Tc,ave	8,5	10,0	5,4	17,8
	± ΔTc	6,4	3,0	0,8	7,4

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
Th	45 °C	**Desired hot water temperature (mixing valve temperature).**

Max. operating press. - collector side	250	kPa	Max. operating press. - tank side	1000	kPa

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6110 DE2, 6113 DE2, 6113 F2
Date of test report	2020-11-04
Test method	ISO 9459-5 (DST)

Comments of test lab	
TESTED	Stamp & signature of test lab

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	OEM 10109.4.3
Annex to Solar KEYMARK Certificate			Issued	2022-03-29

Company	CLIMART S.R.L		Country	ITALIA	
Brand (optional)	SMART SOL		Website	www.smart-sol.it	
Street	VIALE DELLA REPPUBLICA 43		E-mail	info@smart-sol.it	
Postal Code	73100	LECCE LE	Tel. / Fax	+39	832 240041

System family overview

Collector name	For each storage and collector size, give number of collectors																											
	150L						200L						250L						300L											
SMA 2 MQ VT 4 CONI	1						1	2					1	2	3				1	2	3									
SMA 2.5 MQ VT 4 CO	1						1	2					1	2					1	2	3									

Name of system configuration					SMA.251.25.250/2.5 MQ	
Collector name	MA 2.5 MQ VT 4 CON	No. Collectors	1		Storage name	250L

Calculated annual results for "solar-only / preheat system"

Location	Qd,sh	Daily drawoff	200 l				Daily drawoff	250 l				Daily drawoff	300 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	-	11164	4983	0	45		13939	5456	0	39		16746	5676	0	34	
WürzburgDE	-	10691	5140	0	48		13371	5771	0	43		16052	6023	0	38	
Davos CH	-	12110	7159	0	59		15137	7789	0	52		18165	8010	0	44	
Athens GR	-	8326	6433	0	77		10407	7411	0	71		12488	8073	0	65	

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			
	Ta,ave	7,5	9,0	3,2	18,5			
	Tc,ave	8,5	10,0	5,4	17,8			
	± ΔTc	6,4	3,0	0,8	7,4			

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
Th	45 °C	**Desired hot water temperature (mixing valve temperature).**

Max. operating press. - collector side	250	kPa	Max. operating press. - tank side	1000	kPa

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6110 DE2, 6113 DE2, 6113 F2
Date of test report	2020-11-04
Test method	ISO 9459-5 (DST)

Comments of test lab

Extrapolated

Stamp & signature of test lab

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	OEM 10109.4.3
Annex to Solar KEYMARK Certificate			Issued	2022-03-29

Company	CLIMART S.R.L		Country	ITALIA	
Brand (optional)	SMART SOL		Website	www.smart-sol.it	
Street	VIALE DELLA REPPUBLICA 43		E-mail	info@smart-sol.it	
Postal Code	73100	LECCE LE	Tel. / Fax	+39	832 240041

System family overview

Collector name	For each storage and collector size, give number of collectors																													
	150L						200L						250L						300L												
SMA 2 MQ VT 4 CONI	1						1	2					1	2	3				1	2	3										
SMA 2.5 MQ VT 4 CO	1						1	2					1	2					1	2	3										

Name of system configuration				Storage name	
Collector name	MA 2.5 MQ VT 4 CON	No. Collectors	2		250L

Calculated annual results for "solar-only / preheat system"

Location	Qd,sh	Daily drawoff 200 l				Daily drawoff 250 l				Daily drawoff 300 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	-	11164	6591	0	59	13939	7632	0	55	16746	8389	0	50
WürzburgDE	-	10691	6528	0	61	13371	7695	0	58	16052	8578	0	53
Davos CH	-	12110	9808	0	81	15137	11384	0	75	18165	12425	0	68
Athens GR	-	8326	7569	0	91	10407	9082	0	87	12488	10344	0	83

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
	Ta,ave	7,5	9,0	3,2	18,5
	Tc,ave	8,5	10,0	5,4	17,8
	± ΔTc	6,4	3,0	0,8	7,4

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
Th	45 °C	**Desired hot water temperature (mixing valve temperature).**

Max. operating press. - collector side	250	kPa	Max. operating press. - tank side	1000	kPa

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6110 DE2, 6113 DE2, 6113 F2
Date of test report	2020-11-04
Test method	ISO 9459-5 (DST)

Comments of test lab	
Extrapolated	Stamp & signature of test lab

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	OEM 10109.4.3
Annex to Solar KEYMARK Certificate			Issued	2022-03-29

Company	CLIMART S.R.L		Country	ITALIA	
Brand (optional)	SMART SOL		Website	www.smart-sol.it	
Street	VIALE DELLA REPPUBLICA 43		E-mail	info@smart-sol.it	
Postal Code	73100	LECCE LE	Tel. / Fax	+39	832 240041

System family overview

Collector name	For each storage and collector size, give number of collectors																													
	150L						200L						250L						300L												
SMA 2 MQ VT 4 CONN	1						1	2					1	2	3				1	2	3										
SMA 2.5 MQ VT 4 CO	1						1	2					1	2					1	2	3										

Name of system configuration			SMA.253.20.250/6 MQ		
Collector name	SMA 2 MQ VT 4 CONN	No. Collectors	3	Storage name	250L

Calculated annual results for "solar-only / preheat system"

Location	Qd,sh	Daily drawoff		200 l		Daily drawoff		250 l		Daily drawoff		300 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	-	11164	6843	0	61	13939	8042	0	58	16746	8893	0	53
WürzburgDE	-	10691	6780	0	63	13371	8042	0	60	16052	9019	0	56
Davos CH	-	12110	10218	0	84	15137	12015	0	79	18165	13245	0	73
Athens GR	-	8326	7726	0	93	10407	9303	0	90	12488	10691	0	86

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
	Ta,ave	7,5	9,0	3,2	18,5
	Tc,ave	8,5	10,0	5,4	17,8
	± ΔTc	6,4	3,0	0,8	7,4

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
Th	45 °C	**Desired hot water temperature (mixing valve temperature).**

Max. operating press. - collector side	250	kPa	Max. operating press. - tank side	1000	kPa

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6110 DE2, 6113 DE2, 6113 F2
Date of test report	2020-11-04
Test method	ISO 9459-5 (DST)

Comments of test lab

Extrapolated

Stamp & signature of test lab

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	OEM 10109.4.3
Annex to Solar KEYMARK Certificate			Issued	2022-03-29

Company	CLIMART S.R.L		Country	ITALIA	
Brand (optional)	SMART SOL		Website	www.smart-sol.it	
Street	VIALE DELLA REPPUBLICA 43		E-mail	info@smart-sol.it	
Postal Code	73100	LECCE LE	Tel. / Fax	+39	832 240041

System family overview

Collector name	For each storage and collector size, give number of collectors																													
	150L						200L						250L						300L												
SMA 2 MQ VT 4 CONN	1						1	2					1	2	3				1	2	3										
SMA 2.5 MQ VT 4 CO	1						1	2					1	2					1	2	3										

Name of system configuration					SMA.301.20.300/2 MQ		
Collector name	SMA 2 MQ VT 4 CONN	No. Collectors	1		Storage name	300L	

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	-	13939	4604	0	33	16746	4825	0	29	22327	5014	0	22
WürzburgDE	-	13371	4857	0	36	16052	5140	0	32	21413	5298	0	25
Davos CH	-	15137	6402	0	42	18165	6717	0	37	24220	6906	0	29
Athens GR	-	10407	6591	0	63	12488	7190	0	58	16651	7569	0	45

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			
	Ta,ave	7,5	9,0	3,2	18,5			
	Tc,ave	8,5	10,0	5,4	17,8			
	± ΔTc	6,4	3,0	0,8	7,4			

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
Th	45 °C	**Desired hot water temperature (mixing valve temperature).**

Max. operating press. - collector side	250	kPa	Max. operating press. - tank side	1000	kPa

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6110 DE2, 6113 DE2, 6113 F2
Date of test report	2020-11-04
Test method	ISO 9459-5 (DST)

Comments of test lab
Extrapolated

Stamp & signature of test lab

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	OEM 10109.4.3
Annex to Solar KEYMARK Certificate			Issued	2022-03-29

Company	CLIMART S.R.L		Country	ITALIA	
Brand (optional)	SMART SOL		Website	www.smart-sol.it	
Street	VIALE DELLA REPPUBLICA 43		E-mail	info@smart-sol.it	
Postal Code	73100	LECCE LE	Tel. / Fax	+39	832 240041

System family overview

Collector name	For each storage and collector size, give number of collectors																													
	150L						200L						250L						300L												
SMA 2 MQ VT 4 CONN	1						1	2					1	2	3				1	2	3										
SMA 2.5 MQ VT 4 CO	1						1	2					1	2					1	2	3										

Name of system configuration			SMA.302.20.300/4 MQ		
Collector name	SMA 2 MQ VT 4 CONN	No. Collectors	2	Storage name	300L

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	-	13939	7096	0	51	16746	7821	0	47	22327	8452	0	38
WürzburgDE	-	13371	7222	0	54	16052	8073	0	50	21413	8893	0	42
Davos CH	-	15137	10470	0	69	18165	11448	0	63	24220	12110	0	50
Athens GR	-	10407	8704	0	84	12488	9934	0	80	16651	11574	0	70

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
	Ta,ave	7,5	9,0	3,2	18,5
	Tc,ave	8,5	10,0	5,4	17,8
	± ΔTc	6,4	3,0	0,8	7,4

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
Th	45 °C	**Desired hot water temperature (mixing valve temperature).**

Max. operating press. - collector side	250	kPa	Max. operating press. - tank side	1000	kPa

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6110 DE2, 6113 DE2, 6113 F2
Date of test report	2020-11-04
Test method	ISO 9459-5 (DST)

Comments of test lab

Extrapolated

Stamp & signature of test lab

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	OEM 10109.4.3
Annex to Solar KEYMARK Certificate			Issued	2022-03-29

Company	CLIMART S.R.L		Country	ITALIA	
Brand (optional)	SMART SOL		Website	www.smart-sol.it	
Street	VIALE DELLA REPPUBLICA 43		E-mail	info@smart-sol.it	
Postal Code	73100	LECCE LE	Tel. / Fax	+39	832 240041

System family overview

Collector name	For each storage and collector size, give number of collectors																													
	150L						200L						250L						300L												
SMA 2 MQ VT 4 CONI	1						1	2					1	2	3				1	2	3										
SMA 2.5 MQ VT 4 CO	1						1	2					1	2					1	2	3										

Name of system configuration					SMA.301.25.300/2.5 MQ	
Collector name	MA 2.5 MQ VT 4 CON	No. Collectors	1		Storage name	300L

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	-	13939	5519	0	40	16746	5866	0	35	22327	6086	0	27
WürzburgDE	-	13371	5771	0	43	16052	6213	0	39	21413	6433	0	30
Davos CH	-	15137	7821	0	52	18165	8262	0	46	24220	8483	0	35
Athens GR	-	10407	7474	0	72	12488	8262	0	66	16651	9082	0	55

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
	Ta,ave	7,5	9,0	3,2	18,5
	Tc,ave	8,5	10,0	5,4	17,8
	± ΔTc	6,4	3,0	0,8	7,4

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
Th	45 °C	**Desired hot water temperature (mixing valve temperature).**

Max. operating press. - collector side	250	kPa	Max. operating press. - tank side	1000	kPa

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6110 DE2, 6113 DE2, 6113 F2
Date of test report	2020-11-04
Test method	ISO 9459-5 (DST)

Comments of test lab

Extrapolated

Stamp & signature of test lab

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	OEM 10109.4.3
Annex to Solar KEYMARK Certificate			Issued	2022-03-29

Company	CLIMART S.R.L		Country	ITALIA	
Brand (optional)	SMART SOL		Website	www.smart-sol.it	
Street	VIALE DELLA REPPUBLICA 43		E-mail	info@smart-sol.it	
Postal Code	73100	LECCE LE	Tel. / Fax	+39	832 240041

System family overview

Collector name	For each storage and collector size, give number of collectors																													
	150L						200L						250L						300L												
SMA 2 MQ VT 4 CONI	1						1	2					1	2	3				1	2	3										
SMA 2.5 MQ VT 4 CO	1						1	2					1	2					1	2	3										

Name of system configuration					SMA.302.25.300/5 MQ		
Collector name	MA 2.5 MQ VT 4 CON	No. Collectors	2		Storage name	300L	

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	-	13939	7821	0	56	16746	8735	0	52	22327	9776	0	44
WürzburgDE	-	13371	7821	0	59	16052	8862	0	55	21413	10155	0	48
Davos CH	-	15137	11605	0	77	18165	12961	0	71	24220	14254	0	59
Athens GR	-	10407	9209	0	88	12488	10596	0	85	16651	12709	0	76

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
	Ta,ave	7,5	9,0	3,2	18,5
	Tc,ave	8,5	10,0	5,4	17,8
	± ΔTc	6,4	3,0	0,8	7,4

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
Th	45 °C	**Desired hot water temperature (mixing valve temperature).**

Max. operating press. - collector side	250	kPa	Max. operating press. - tank side	1000	kPa

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6110 DE2, 6113 DE2, 6113 F2
Date of test report	2020-11-04
Test method	ISO 9459-5 (DST)

Comments of test lab
Extrapolated

Stamp & signature of test lab

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Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	OEM 10109.4.3
Annex to Solar KEYMARK Certificate			Issued	2022-03-29

Company	CLIMART S.R.L		Country	ITALIA	
Brand (optional)	SMART SOL		Website	www.smart-sol.it	
Street	VIALE DELLA REPPUBLICA 43		E-mail	info@smart-sol.it	
Postal Code	73100	LECCE LE	Tel. / Fax	+39	832 240041

System family overview

Collector name	For each storage and collector size, give number of collectors																													
	150L						200L						250L						300L												
SMA 2 MQ VT 4 CONN	1						1	2					1	2	3				1	2	3										
SMA 2.5 MQ VT 4 CO	1						1	2					1	2					1	2	3										

Name of system configuration				SMA.303.20.300/6 MQ	
Collector name	SMA 2 MQ VT 4 CONN	No. Collectors	3	Storage name	300L

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	-	13939	8199	0	59	16746	9240	0	55	22327	10596	0	47
WürzburgDE	-	13371	8168	0	61	16052	9303	0	58	21413	10880	0	51
Davos CH	-	15137	12236	0	81	18165	13813	0	76	24220	15579	0	64
Athens GR	-	10407	9429	0	91	12488	10943	0	88	16651	13340	0	80

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
	Ta,ave	7,5	9,0	3,2	18,5
	Tc,ave	8,5	10,0	5,4	17,8
	± ΔTc	6,4	3,0	0,8	7,4

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
Th	45 °C	**Desired hot water temperature (mixing valve temperature).**

Max. operating press. - collector side	250	kPa	Max. operating press. - tank side	1000	kPa

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6110 DE2, 6113 DE2, 6113 F2
Date of test report	2020-11-04
Test method	ISO 9459-5 (DST)

Comments of test lab	
Extrapolated	Stamp & signature of test lab

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Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	OEM 10109.4.3
Annex to Solar KEYMARK Certificate			Issued	2022-03-29

Company	CLIMART S.R.L		Country	ITALIA	
Brand (optional)	SMART SOL		Website	www.smart-sol.it	
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	150L						200L						250L						300L												
SMA 2 MQ VT 4 CONI	1						1	2					1	2	3				1	2	3										
SMA 2.5 MQ VT 4 CO	1						1	2					1	2					1	2	3										

Name of system configuration					SMA.303.25.300/7.5 MQ		
Collector name	MA 2.5 MQ VT 4 CON	No. Collectors	3		Storage name	300L	

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	-	13939	8735	0	63	16746	9934	0	59	22327	11668	0	52
WürzburgDE	-	13371	8609	0	64	16052	9902	0	62	21413	11826	0	55
Davos CH	-	15137	12993	0	86	18165	14853	0	82	24220	17345	0	72
Athens GR	-	10407	9745	0	94	12488	11384	0	91	16651	14097	0	85

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**

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	± ΔTc	6,4	3,0	0,8	7,4

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
Th	45 °C	**Desired hot water temperature (mixing valve temperature).**

Max. operating press. - collector side	250	kPa	Max. operating press. - tank side	1000	kPa

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
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