Summary of	EN12976-2	SOLAR SYSTEM test results	Licence Number	011-7S3159 A
Annex to Solar KEYMARK Certificate			Issued	2022-12-15

Company	Ariston S.p.A		Country	Italy	
Brand (optional)	ARISTON		Website	www.ariston.com	
Street	Via A. Merloni 45		E-mail	maria.ciavatta@ariston.com	
Postal Code	60044	Fabriano	Tel. / Fax	+39	02763209 -1 / -40

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 only / Solar preheat

Collector(s)				Heat store(s)						
Company	Ariston S.p.A			Company	Ariston S.p.A					
Keymark lic.no. if available	*011-7S2614 F*			*Keymark lic.no. if available*	-					
Collector name	Per module			Store name	Total nominal volume	Gross height	Gross width	Gross depth	Auxiliary heated volume	Electrical aux. heating power
	Gross Area (AG)	Gross length	Gross width							
	m²	mm	mm		litres	mm	mm	mm	litres	kW
Kairos CF2.0-1	2.01	2004	1004	Solar Enemeled Tank 150 L	144	1285	500	-	-	3.5
				Solar Enemeled Tank 200 L	190	1285	580	-	-	2.0
				Solar Enemeled Tank 300 L	276	1795	580	-	-	2.0

Solar loop controller		Solar loop fluid	
Keymark lic.no. if available	-	Recommended/required	Required
Company	-	Company	-
Name	-	Name	water + propylene glycol
Solar loop pump - power range	- W to - W	Freezing point	-15 °C

System family overview

Collector name	Number of collectors in each configuration for each store																											
	Store name																											
	Solar Enemeled Tank 150 L						Solar Enemeled Tank 200 L						Solar Enemeled Tank 300 L															
Kairos CF2.0-1	1						1						2															

Testing Laboratory	TÜV Rheinland Solar GmbH
Website	www.tuv.com/solar
Test report id. number	21241271.004Rev1
Date of test report	2018-09-17

Comments of test lab

TÜVRheinland®
Genau. Richtig.
TÜV Rheinland Solar GmbH
Am Grauen Stein
51105 Köln

Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	011-7S2818 A
Annex to Solar KEYMARK Certificate			Issued	2022-12-15

Company	Ariston S.p.A		Country	Italy	
Brand (optional)	ARISTON		Website	www.ariston.com	
Street	Via A. Merloni 45		E-mail	maria.ciavatta@ariston.com	
Postal Code	60044	Fabriano	Tel. / Fax	+39	02763209 -1 / -40

Parameters for systems extrapolation (Annex D)

Collector of measured system		Storage tank of measured system	
A_{ref} [m^2]	1.83	Volume [l]	144
η_0	0.740	A_{hx} [m^2]	0.64
a_1 [W/Km^2]	3.820	Piping	
a_2 [W/Km^2]	0.013	$U_{loop,p}$	3.20
IAM (50º)	0.900		

System parameters

Name of System Configuration	Tested/Extrapol	A_c* [m^2]	u_c* [W/Km^2]	U_s [W/K]	C_s [MJ/K]	S_c [-]	D_L [-]	f_{aux} [-]
KAIROS THERMO CF-3 150/1 TR/ TT/ TT DT		1.160	7.564	2.712	0.575	0.1519	0.0302	-
KAIROS THERMO CF-3 200/1 TR/ TT/ TT DT		1.178	7.564	3.230	0.792	0.1519	0.0302	-
KAIROS THERMO CF-3 300/2 TR/ TT/ TT DT		2.349	7.138	4.299	1.150	0.1519	0.0302	-

Testing Laboratory	TÜV Rheinland Solar GmbH
Website	www.tuv.com/solar
Test report id. number	21241271.004Rev1
Date of test report	2018-09-17
Test method	ISO 9459-5 (DST)

Comments of test lab

The system configuration **150/1** was used for testing and as basis for scalling.

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.	011-7S3159 A
Annex to Solar KEYMARK Certificate			Issued	2022-12-15

Company	Ariston S.p.A		Country	Italy	
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Postal Code	60044	Fabriano	Tel. / Fax	+39	02763209 -1 / -40

System family overview

Collector name	For each storage and collector size, give number of collectors		
	Solar Enemeled Tank 150 L	Solar Enemeled Tank 200 L	Solar Enemeled Tank 300 L
Kairos CF2.0-1	1	1	2

Name of system configuration					KAIROS THERMO CF-3 150/1 TR/ TT/ TT DT	
Collector name	Kairos CF2.0-1	No. Collectors	1	Storage name	Solar Enemeled Tank 150 L	

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	0	6150	2990	-	49	7821	3406	-	44	9492	3595	-	38
WürzburgDE	0	5897	3040	-	52	7506	3532	-	47	9114	3784	-	42
Davos CH	0	6654	4352	-	65	8483	4920	-	58	10281	5109	-	50
Athens GR	0	4573	3721	-	82	5834	4447	-	76	7064	4920	-	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	150	kPa	Max. operating press. - tank side	1 000	kPa

Testing Laboratory	TÜV Rheinland Solar GmbH
Website	www.tuv.com/solar
Test report id. number	21241271.004Rev1
Date of test report	2018-09-17
Test method	ISO 9459-5 (DST)

Comments of test lab

No comments

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.	011-7S3159 A
Annex to Solar KEYMARK Certificate			Issued	2022-12-15

Company	Ariston S.p.A		Country	Italy	
Brand (optional)	ARISTON		Website	www.ariston.com	
Street	Via A. Merloni 45		E-mail	maria.ciavatta@ariston.com	
Postal Code	60044	Fabriano	Tel. / Fax	+39	02763209 -1 / -40

System family overview

Collector name	For each storage and collector size, give number of collectors		
	Solar Enemeled Tank 150 L	Solar Enemeled Tank 200 L	Solar Enemeled Tank 300 L
Kairos CF2.0-1	1	1	2

Name of system configuration					KAIROS THERMO CF-3 200/1 TR/ TT/ TT DT	
Collector name	Kairos CF2.0-1	No. Collectors	1	Storage name	Solar Enemeled Tank 200 L	

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	0	9492	3721	-	39	11164	3910	-	35	13939	4037	-	29
WürzburgDE	0	9114	3910	-	43	10691	4163	-	39	13371	4289	-	32
Davos CH	0	10281	5267	-	51	12110	5519	-	46	15137	5645	-	37
Athens GR	0	7064	5046	-	71	8326	5519	-	66	10407	5992	-	58

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	150	kPa	Max. operating press. - tank side	1 000	kPa

Testing Laboratory	TÜV Rheinland Solar GmbH
Website	www.tuv.com/solar
Test report id. number	21241271.004Rev1
Date of test report	2018-09-17
Test method	ISO 9459-5 (DST)

Comments of test lab

No comments

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.	011-7S3159 A
Annex to Solar KEYMARK Certificate			Issued	2022-12-15

Company	Ariston S.p.A		Country	Italy	
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Postal Code	60044	Fabriano	Tel. / Fax	+39	02763209 -1 / -40

System family overview

Collector name	For each storage and collector size, give number of collectors		
	Solar Enemeled Tank 150 L	Solar Enemeled Tank 200 L	Solar Enemeled Tank 300 L
Kairos CF2.0-1	1	1	2

Name of system configuration															
											KAIROS THERMO CF-3 300/2 TR/ TT/ TT DT					
Collector name	Kairos CF2.0-1				No. Collectors			2			Storage name			Solar Enemeled Tank 300 L	

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	6717	-	48	16746	7222	-	43	22327	7632	-	34
WürzburgDE	0	13371	6875	-	51	16052	7537	-	47	21413	8042	-	38
Davos CH	0	15137	9808	-	65	18165	10501	-	58	24220	10817	-	45
Athens GR	0	10407	8420	-	81	12488	9492	-	76	16651	10785	-	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	150	kPa	Max. operating press. - tank side	1 000	kPa

Testing Laboratory	TÜV Rheinland Solar GmbH
Website	www.tuv.com/solar
Test report id. number	21241271.004Rev1
Date of test report	2018-09-17
Test method	ISO 9459-5 (DST)

Comments of test lab

No comments

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.	011-7S3159 A
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Postal Code	60044	Fabriano	Tel. / Fax	+39	02763209 -1 / -40

System family overview

Collector name	For each storage and collector size, give number of collectors		
	Solar Enemeled Tank 150 L	Solar Enemeled Tank 200 L	Solar Enemeled Tank 300 L
Kairos CF2.0-1	1	1	2

Annual performance parameters in the frame of the EU regulation CDR 811, 812 and 813 dated 2013

Name of system configuration					KAIROS THERMO CF-3 150/1 TR/ TT/ TT DT
Collector name	Kairos CF2.0-1	No. Collectors	1	Storage name	Solar Enemeled Tank 150 L

Annual performance parameters in the frame of the EU regulation CDR 811, 812 and 813 dated 2013

Load profile	M	L	XL	XXL	
Annual heat demand (kWh)	1523	2799	4477	5626	
Auxiliary heat contribution		Qnonsol			section 5.9.3.6, see note 1
Average climate (kWh)	557	1534	2987	4159	Strasbourg
Cold climate (kWh)					Helsinki
Hot climate (kWh)					Athens
Qaux (kWh)					section 5.9.3.4, see note 1
Comply to the load profile (Yes/No)					section 5.10.6 , see note 1
ηwh_nonsol (%)					section 5.9.3.5 , see note 1
Qelec (kWh)					section 5.9.3.5 , see note 1
Qfuel (kWh)					section 5.9.3.5 , see note 1
V40, measured (l)					section 5.10.7, see note 1

Auxiliary thermostat setting	55	ºC	Effective power of auxiliary heater	3.5	kW

Note 1: Clause of EN 12976-2:2017

Testing Laboratory	TÜV Rheinland Solar GmbH
Website	www.tuv.com/solar
Test report id. number	21241271.004Rev1
Date of test report	2018-09-17
Test method	ISO 9459-5 (DST)

Comments of test lab	
No comments	Stamp & signature of test lab

DIN CERTCO ● Alboinstraße 56 ● 12103 Berlin, Germany
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Summary of	EN12976-2	test results	Certification No.	011-7S3159 A
Annex to Solar KEYMARK Certificate			Issued	2022-12-15

Company	Ariston S.p.A		Country	Italy	
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Postal Code	60044	Fabriano	Tel. / Fax	+39	02763209 -1 / -40

System family overview

Collector name	For each storage and collector size, give number of collectors		
	Solar Enemeled Tank 150 L	Solar Enemeled Tank 200 L	Solar Enemeled Tank 300 L
Kairos CF2.0-1	1	1	2

Annual performance parameters in the frame of the EU regulation CDR 811, 812 and 813 dated 2013

Name of system configuration					KAIROS THERMO CF-3 200/1 TR/ TT/ TT DT
Collector name	Kairos CF2.0-1	No. Collectors	1	Storage name	Solar Enemeled Tank 200 L

Annual performance parameters in the frame of the EU regulation CDR 811, 812 and 813 dated 2013

Load profile	M	L	XL	XXL	
Annual heat demand (kWh)	1523	2799	4477	5626	
Auxiliary heat contribution		Qnonsol			section 5.9.3.6, see note 1
Average climate (kWh)	565	1472	2899	4054	Strasbourg
Cold climate (kWh)					Helsinki
Hot climate (kWh)					Athens
Qaux (kWh)					section 5.9.3.4, see note 1
Comply to the load profile (Yes/No)					section 5.10.6 , see note 1
ηwh_nonsol (%)					section 5.9.3.5 , see note 1
Qelec (kWh)					section 5.9.3.5 , see note 1
Qfuel (kWh)					section 5.9.3.5 , see note 1
V40, measured (l)					section 5.10.7, see note 1

Auxiliary thermostat setting	55	ºC	Effective power of auxiliary heater	2.0	kW

Note 1: Clause of EN 12976-2:2017

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Comments of test lab	
No comments	Stamp & signature of test lab

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System family overview

Collector name	For each storage and collector size, give number of collectors		
	Solar Enemeled Tank 150 L	Solar Enemeled Tank 200 L	Solar Enemeled Tank 300 L
Kairos CF2.0-1	1	1	2

Annual performance parameters in the frame of the EU regulation CDR 811, 812 and 813 dated 2013

Name of system configuration					KAIROS THERMO CF-3 300/2 TR/ TT/ TT DT
Collector name	Kairos CF2.0-1	No. Collectors	2	Storage name	Solar Enemeled Tank 300 L

Annual performance parameters in the frame of the EU regulation CDR 811, 812 and 813 dated 2013

Load profile	M	L	XL	XXL	
Annual heat demand (kWh)	1523	2799	4477	5626	
Auxiliary heat contribution		Qnonsol			section 5.9.3.6, see note 1
Average climate (kWh)	363	928	1932	2929	Strasbourg
Cold climate (kWh)					Helsinki
Hot climate (kWh)					Athens
Qaux (kWh)					section 5.9.3.4, see note 1
Comply to the load profile (Yes/No)					section 5.10.6 , see note 1
ηwh_nonsol (%)					section 5.9.3.5 , see note 1
Qelec (kWh)					section 5.9.3.5 , see note 1
Qfuel (kWh)					section 5.9.3.5 , see note 1
V40, measured (l)					section 5.10.7, see note 1

Auxiliary thermostat setting	55	ºC	Effective power of auxiliary heater	2.0	kW

Note 1: Clause of EN 12976-2:2017

Testing Laboratory	TÜV Rheinland Solar GmbH
Website	www.tuv.com/solar
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Date of test report	2018-09-17
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Comments of test lab	
No comments	Stamp & signature of test lab

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