

## Holder/Issued to/Manufacturer

### 2-improve Energy

Symon spiersweg 7D10, 1506 RZ Zaandam, The Netherlands

## Product name and description

Vacuum tube solar thermal collectors for water heating.  
For technical information see Appendix (2 pages).

Models:	Prisma Pro 8	Prisma Pro 9	Prisma Pro 10	Prisma Pro 12
	Prisma Pro 14	Prisma Pro 15	Prisma Pro 16	Prisma Pro 18
	Prisma Pro 20	Prisma Pro 21	Prisma Pro 22	Prisma Pro 24

## Performance specification

The product is found to comply with the requirements in EN 12975-1:2006+A1:2010 Solar collectors, Part 1: General requirements and the Specific CEN Keymark Scheme Rules for Solar Thermal Products and are based on test results according to EN 12975-2:2006 Solar collectors Part 2: Test methods.

## Marking

Products conforming to this certificate shall be marked in accordance with the requirements in the Specific CEN Keymark Scheme Rules for Solar Thermal Products. The marking shall, together with the Keymark logo, show the identification code of the empowered certification body (RISE Research Institutes of Sweden AB, No. 012), also see CEN-CENELEC Internal Regulations Part 4 Certification, Annex A.

## Validity

This certificate is valid until 2024-01-20 provided that the conditions in the Solar Keymark Rules are fulfilled and the standard or rules are not modified significantly. The validity of the certificate can be checked in the database, see Solar Keymark website <http://www.solarkeymark.org>.

## Miscellaneous

The manufacturer's factory production control procedures are under surveillance by the responsibility of RISE. This certificate was first issued 2015-10-30. RISE certification rules SPCR 402 for Keymark – Solar Thermal Products applies.

Johan Åkesson

Magnus Sturesson

Certificate No. SC0722-15 | issue 2 | 2019-03-12


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2017-08-08



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<b>Annex to Solar Keymark Certificate</b>						<b>Licence Number</b>		<b>SC0722-15</b>				
						<b>Date issued</b>		<b>2019-03-12</b>				
						<b>Issued by</b>		<b>RISE</b>				
<b>Licence holder</b>		2-improve Energy				<b>Country</b>		Netherlands				
<b>Brand (optional)</b>		Prisma Pro				<b>Web</b>		<a href="http://prisma-pro.nl">http://prisma-pro.nl</a>				
<b>Street, Number</b>		Symon spiersweg 7D10				<b>E-mail</b>		<a href="mailto:info@Prisma-pro.nl">info@Prisma-pro.nl</a>				
<b>Postcode, City</b>		1506, RZ Zaandam				<b>Tel</b>		+31 75-6703958				
<b>Collector Type</b>						Evacuated tubular collector						
<b>Collector name</b>						<b>Power output per collector</b>						
						G <sub>b</sub> = 850 W/m <sup>2</sup> , G <sub>d</sub> = 150 W/m <sup>2</sup> & u = 1.3 m/s $\vartheta_m - \vartheta_a$						
		<b>Gross height</b>	<b>Gross area (A<sub>G</sub>)</b>	<b>Gross length</b>	<b>Gross width</b>	<b>Aperture area (A<sub>a</sub>)</b>	0 K	10 K	30 K	50 K	70 K	93 K
		mm	m <sup>2</sup>	mm	mm	m <sup>2</sup>	W	W	W	W	W	W
<a href="#">prisma pro 8</a>		133	1,74	1 917	910	1,41	938	917	869	816	757	682
<a href="#">prisma pro 9</a>		133	1,96	1 917	1 020	1,59	1 052	1 027	974	914	848	764
<a href="#">prisma pro 10</a>		133	2,17	1 917	1 130	1,78	1 165	1 138	1 079	1 013	940	846
<a href="#">prisma pro 12</a>		133	2,59	1 917	1 350	2,16	1 392	1 360	1 289	1 210	1 123	1 011
<a href="#">prisma pro 14</a>		133	3,01	1 917	1 570	2,53	1 619	1 582	1 500	1 408	1 306	1 176
<a href="#">prisma pro 15</a>		133	3,22	1 917	1 680	2,72	1 733	1 693	1 605	1 506	1 398	1 259
<a href="#">prisma pro 16</a>		133	3,43	1 917	1 790	2,91	1 846	1 803	1 709	1 605	1 489	1 341
<a href="#">prisma pro 18</a>		133	3,85	1 917	2 010	3,28	2 073	2 025	1 920	1 802	1 672	1 506
<a href="#">prisma pro 20</a>		133	4,28	1 917	2 230	3,66	2 300	2 247	2 130	1 999	1 855	1 671
<a href="#">prisma pro 21</a>		133	4,49	1 917	2 340	3,84	2 413	2 358	2 235	2 098	1 947	1 753
<a href="#">prisma pro 22</a>		133	4,70	1 917	2 450	4,03	2 527	2 468	2 340	2 197	2 038	1 835
<a href="#">prisma pro 24</a>		133	5,12	1 917	2 670	4,41	2 753	2 690	2 550	2 394	2 221	2 000
<b>Power output per m<sup>2</sup> gross area</b>							538	526	498	468	434	391
<b>Performance parameters test method</b>		Steady state - outdoor										
<b>Performance parameters (related to A<sub>G</sub>)</b>		$\eta_{0, b}$	a1	a2	a3	a4	a5	a6	a7	a8	Kd	
<b>Units</b>		-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )	J/(m <sup>3</sup> K)	-	J/(m <sup>2</sup> K)	s/m	W/(m <sup>2</sup> K <sup>4</sup> )	W/(m <sup>2</sup> K <sup>4</sup> )	-	
<b>Test results</b>		0,540	1,21	0,004	0,000	0,000	0,000	0,000	0,000	0,000	0,976	
<b>Incidence angle modifier test method</b>		Steady state - outdoor										
<b>Incidence angle modifier</b>		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°	
<b>Transversal</b>		K <sub>θT, coll</sub>	1,02	1,03	1,04	1,05	1,12	1,18	0,79	0,39	0,00	
<b>Longitudinal</b>		K <sub>θL, coll</sub>	1,00	0,99	0,99	0,97	0,95	0,91	0,83	0,57	0,00	
<b>Heat transfer medium for testing</b>						Water-Glycole						
<b>Flow rate for testing (per gross area, A<sub>G</sub>)</b>						dm/dt		0,016	kg/(sm <sup>2</sup> )			
<b>Maximum temperature difference during thermal performance test</b>						$(\vartheta_m - \vartheta_a)_{max}$		63,24	K			
<b>Standard stagnation temperature (G = 1000 W/m<sup>2</sup>; <math>\vartheta_a = 30</math> °C)</b>						$\vartheta_{stg}$		280	°C			
<b>Maximum operating temperature</b>						$\vartheta_{max, op}$		120	°C			
<b>Maximum operating pressure</b>						$p_{max, op}$		1000	kPa			
<b>Testing laboratory</b>		Intertek Testing Services Shenzhen Ltd. Guangzhou					<a href="http://www.intertek.com">http://www.intertek.com</a>					
<b>Test report(s)</b>		150824106GZU-001					<b>Dated</b>		2015.09.06			
<b>Comments of testing laboratory</b>						Datasheet version: 6.0, 2018-10-30						
<p>The "negative pressure test of the collector" according to EN 12975-2:2006,5.9.2 was not performed.</p> <p>Test were performed based on EN 12975-2:2006.</p>						 <p style="text-align: center;">William zheng</p>						
						<p><b>RISE Research Institutes of Sweden AB   Certification</b></p> <p>Box 857, SE-501 15 Borås, Sweden, Phone: +46 10-516 50 00, <a href="mailto:certifiering@ri.se">certifiering@ri.se</a>   <a href="http://www.ri.se">www.ri.se</a></p>						

<b>Annex to Solar Keymark Certificate Supplementary Information</b>	<b>Licence Number</b>	<b>SC0722-15</b>
	<b>Issued</b>	<b>2019-03-12</b>

Annual collector output in kWh/collector at mean fluid temperature $\vartheta_m$													
Collector name	Standard Locations	Athens			Davos			Stockholm			Würzburg		
	$\vartheta_m$	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
prisma pro 8		1 633	1 406	1 180	1 374	1 161	961	991	813	654	1 069	878	704
prisma pro 9		1 830	1 576	1 322	1 541	1 302	1 077	1 111	912	733	1 198	984	789
prisma pro 10		2 028	1 746	1 465	1 707	1 442	1 194	1 230	1 010	812	1 327	1 091	874
prisma pro 12		2 423	2 086	1 750	2 039	1 723	1 426	1 470	1 207	970	1 586	1 303	1 044
prisma pro 14		2 818	2 426	2 036	2 372	2 004	1 659	1 710	1 404	1 129	1 844	1 516	1 215
prisma pro 15		3 015	2 596	2 179	2 538	2 145	1 775	1 830	1 502	1 208	1 974	1 622	1 300
prisma pro 16		3 212	2 766	2 321	2 704	2 285	1 891	1 949	1 600	1 286	2 102	1 728	1 384
prisma pro 18		3 607	3 106	2 606	3 036	2 566	2 123	2 189	1 797	1 445	2 361	1 940	1 555
prisma pro 20		4 002	3 446	2 891	3 369	2 847	2 356	2 428	1 994	1 603	2 619	2 153	1 725
prisma pro 21		4 200	3 616	3 034	3 535	2 987	2 472	2 548	2 092	1 682	2 749	2 259	1 810
prisma pro 22		4 397	3 786	3 177	3 701	3 127	2 589	2 668	2 191	1 761	2 878	2 365	1 895
prisma pro 24		4 791	4 125	3 462	4 033	3 408	2 821	2 907	2 387	1 919	3 136	2 577	2 065
Annual output per m <sup>2</sup> gross area		936	806	676	788	666	551	568	466	375	613	504	404
Fixed or tracking collector	Fixed (slope = latitude - 15°; rounded to nearest 5°)												
Annual irradiation on collector plane	1765 kWh/m <sup>2</sup>			1714 kWh/m <sup>2</sup>			1166 kWh/m <sup>2</sup>			1244 kWh/m <sup>2</sup>			
Mean annual ambient air temperature	18,5°C			3,2°C			7,5°C			9,0°C			
Collector orientation or tracking mode	South, 25°			South, 30°			South, 45°			South, 35°			

The collector is operated at constant temperature  $\vartheta_m$  (mean of in- and outlet temperatures). The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool Scenocalc Ver. 6.0 (October 2018). A detailed description of the calculations is available at [www.solarkeymark.org/scenocalc](http://www.solarkeymark.org/scenocalc)

Additional Information					
Collector heat transfer medium	Water-Glycole				
The collector is deemed to be suitable for roof integration	No				
The collector was tested successfully under the following conditions:					
Climate class (A+, A, B or C)			C	--	
G (W/m <sup>2</sup> ) >	800	$\vartheta_a$ (°C) >	10	$H_x$ (MJ/m <sup>2</sup> ) >	420
Maximum tested positive load			2860	Pa	
Maximum tested negative load				Pa	
Hail resistance using steel ball (maximum drop height)			0,8	m	

Additional collector attribute(s)	
<input type="checkbox"/> Using external power source(s) for normal operation	<input type="checkbox"/> Active or passive measure(s) for self-protection
<input type="checkbox"/> Co-generating thermal and electrical power	<input type="checkbox"/> Wind and/or infrared sensitive collector(s) (WISC)
<input type="checkbox"/> Façade collector(s)	

Energy Labelling Information		
	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Hydraulic Designation Code
prisma pro 8	1,74	1-H-12S-C:19.3,985-D
prisma pro 9	1,96	1-H-12S-C:19.3,1095-D
prisma pro 10	2,17	1-H-12S-C:19.3,1205-D
prisma pro 12	2,59	1-H-12S-C:19.3,1425-D
prisma pro 14	3,01	1-H-12S-C:19.3,1645-D
prisma pro 15	3,22	1-H-12S-C:19.3,1755-D
prisma pro 16	3,43	1-H-12S-C:19.3,1865-D
prisma pro 18	3,85	1-H-12S-C:19.3,2085-D
prisma pro 20	4,28	1-H-12S-C:19.3,2305-D
prisma pro 21	4,49	1-H-12S-C:19.3,2415-D
prisma pro 22	4,70	1-H-12S-C:19.3,2525-D
prisma pro 24	5,12	1-H-12S-C:19.3,2745-D

Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$	Data required for CDR (EU) No 812/2013 - Reference Area $A_{sol}$			
Collector efficiency ( $\eta_{col}$ )	48%	Zero-loss efficiency ( $\eta_0$ )	0,54	--
Remark: Collector efficiency ( $\eta_{col}$ ) is defined in CDR (EU) No 811/2013 as collector efficiency of the solar collector at a temperature difference between the solar collector and the surrounding air of 40 K and a global solar irradiance of 1000 W/m <sup>2</sup> , expressed in % and rounded to the nearest integer. Deviating from the regulation $\eta_{col}$ is based on reference area ( $A_{sol}$ ) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.		First-order coefficient ( $a_1$ )	1,21	W/(m <sup>2</sup> K)
		Second-order coefficient ( $a_2$ )	0,004	W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	1,01	--
		Remark: The data given in this section are related to collector reference area ( $A_{sol}$ ) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806. Consistent data sets for either aperture or gross area can be used in calculations like in the regulation 811 and 812 and simulation programs.		