TÜVRheinland®
DIN CERTCO
Genau. Richtig.

Fraunhofer ISE

Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	011-7S2410 R
	Issued	2015-02-24

Company holding the	Membro Energietechnik GmbH & Co. KG	Country	Deutschland
Brand (optional)		Website	www.membro.de
Street, street number	Julius-Kronenberg-Straße 11	E-mail	info@membro.de
Postal Code / City, province	42799 Leichlingen	Tel/Fax	49 2175 89500-0/-22

Collector Type (flat plate glazed/un-glazed; evacuate tubular)	Evacuated tubular collector
Thermal / photo voltaic hybid collector? (PVT collector)	No
Integration in the roof possible ? (manufacturers declaration)	No

Collector name	Aperture area (Aa)	Gross length	Gross width	Gross height	Gross area (AG)	Power output per collector module G = 1000 W/m², Tm-Ta 0 K	10 K	30 K	50 K	70 K
	m²	mm	mm	mm	**m²**	W	W	W	W	W
Membro BHP-15	1,40	1.980	1.189	125	**2,35**	1.016	991	925	840	736
Membro BHP-20	1,87	1.980	1.564	125	**3,10**	1.358	1.323	1.235	1.122	983
Membro BHP-30	2,81	1.980	2.314	125	**4,58**	2.040	1.988	1.856	1.686	1.477

Performance test method	Glazed liquid heating collector - steady state - outdoor								
Performance parameters related to aperture area	η0	a1	a2						
Units	-	W/(m²K)	W/(m²K²)						
Test results - Flow rate and fluid see note 1	0,726	1,670	0,017						

Bi-directional incidence angle modifiers?	Yes	*Kϑ values are obligatory for 50°.*								
Incidence angle modifiers Kθ(θT)	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
transversal direction	Kθ(θT)	1,01	1,03	1,11	1,25	1,39	1,25	1,08	0,63	0,00
Incidence angle modifiers Kθ(θL)	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
longitudinal direction	Kθ(θL)	1,00	1,00	0,99	0,97	0,93	0,85	0,71	0,46	0,00

Stagnation temperature - Weather conditions see note 2	Tstg	208	°C
Effective thermal capacity	ceff = C/Ag	16,4	kJ/(m²K)
Max. intende operation temperature - see note 3	Tmax,op	100	°C
Max. operation pressure - see note 3	pmax,op	1200	kPa

Pressure drop table - for a collector family, the values shall be for the module with highest ΔP per m² aperture area											
Flow rate	kg/(s m²)	-	-	-	-	-	-	-	-	-	-
Pressure drop, ΔP	Pa	-	-	-	-	-	-	-	-	-	-

Optional weather data	Location		Link	
Testing Laboratory	TestLab Solar Thermal Systems, Fraunhofer ISE			
Website	www.kollektortest.de			
Test report id. number	ktb-2010-21-k2-i u. -22-k2-i	Date of test report	2014.06.24	
During the test GDIF/GTOT was always between	0,087	and	0,2	

Comments of testing laboratory:

Thermal performance parameters are given for the PV-module working with max. electrical power point ('MPP mode')

Note 1	**Flow rate**	0,020	kg/(s m²)	**Fluid**	Water
Note 2	**Irradiance, G = 1000 W/m²; Ambient temperature , Ta=30 °C**				
Note 3	**Given by manufacturer**				

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Datasheet 4.06, 2014-01-15

Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	011-7S2410 R
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Annual collector output kWh/module

	Location and collector temperature (Tm)											
	Athens			Davos			Stockholm			Würzburg		
Collector name	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
Membro BHP-15	1.885	1.587	1.240	1.565	1.259	943	1.143	898	654	1.232	971	703
Membro BHP-20	2.518	2.119	1.657	2.090	1.682	1.260	1.526	1.199	874	1.646	1.297	940
Membro BHP-30	3.784	3.185	2.490	3.141	2.527	1.894	2.294	1.802	1.313	2.474	1.949	1.412

Collector mounting: Fixed or tracking	Fixed; slope = latitude - 15° (rounded to nearest 5°)

Overview of locations

Location	Latitude °	Gtot kWh/m²	Ta °C	**Collector orientation or tracking mode**
Athens	38	1.765	18,5	South, 25°
Davos	47	1.714	3,2	South, 30°
Stockholm	59	1.166	7,5	South, 45°
Würzburg	50	1.244	9,0	South, 35°

Gtot	Annual total irradiation on collector plane	kWh/m²
Ta	Mean annual ambient air temperature	°C
Tm	Constant collector operating temperature (mean of in- and outlet temperatures)	°C

The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool ScenoCalc. The collector output is calculated hour by hour according to the efficiency parameters from the Keymark test using constant collector operating temperature (Tm). A detailed description of the calculations is available at http://www.sp.se/en/index/services/solar/ScenoCalc/Sidor/default.aspx.

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