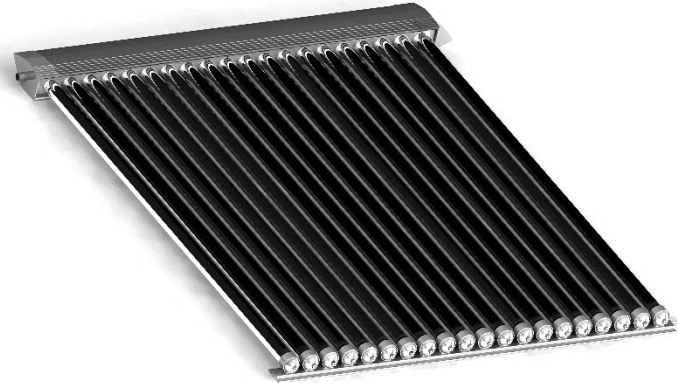


Technical Details	
Model	ThermoPower VHP Series
Tube Length (in)/(m)	70 / 1.78
Outer Tube Diameter (in)/(mm)	2.2 / 56
Inner Tube Diameter (in)/(mm)	2.1 / 53.3
Tube Material	Borosilicate Glass
Tube Coating	Al-N/Al
Thermal Expansion (in)/(mm)	3.3×10^{-6} / 84×10^{-6}
Coating Absorbance	> 92%
Coat Emissivity	< 8%
Vacuum (Pa)	< 5×10^{-3}
Heat Loss (W/m ² .°C)	< 0.7
Max. Pressure Thrust (MPa)	1.0
Flow Rate per Tube (gpm/lpm)	0.028 / 0.11
Tilt Angles	15°-75°
Orientation	Portrait
Max of Tubes in series	210
Operating Pressure (psi)/(bar)	20-70 / 1.4-4.8
Maximum Pressure (psi)/(bar)	150 / 10.3
Stagnation Temperature (°F/°C)	> 428 / 220
Heat Transfer Fluid	Water / Glycol
Heat Transfer Method	Heat Pipe
Manifold Socket	Soldered Dry Socket
Glass to Metal Seal Type	Hermetic
Fittings	1" Male NPT



Certifications & Standards

- ✓ SRCC OG-100
- ✓ USEC UL 1703
- ✓ ASHRAE Std 93-1986
- ✓ ASTM E 330 (Wind Load Rating)
- ✓ 10 years warranty

Model	VHP 20	VHP 30
Dimensions (in)/(m)	70.2 x 79	102.9 x 79
Gross Area (ft ² /m ²)	37.42 / 3.476	56.42 / 5.241
Net Aperture Area (ft ² /m ²)	21.41 / 1.989	32.11 / 2.983
Absorber Area (ft ² /m ²)	18.39 / 1.709	27.59 / 2.563
Dry Weight (lbs/kg)	170 / 77.1	252 / 114.3
Fluid Capacity (gal/L)	0.4 / 1.51	0.61 / 2.31
Rated Flow Rate (gpm/lpm)	0.56 / 2.12	0.84 / 3.18
Minimum Flow Rate (gpm/lpm)	0.3 / 1.14	0.6 / 2.27
Maximum Flow Rate (gpm/lpm)	3.4 / 12.87	4.2 / 15.9
Storage Tank Size (gal/L)	50-60 / 189.3-227.1	70+ / 265+
SRCC Clear C Rating (kBTU/panel/day)	28	42
SRCC CERTIFICATION #	2012024A	2012024B

ThermoPower VHP20 THERMAL PERFORMANCE RATING

Kilowatt-hours (thermal) Per Panel Per Day				Thousands of Btu Per Panel Per Day			
Climate ->	High Radiation (6.3 kWh/m ² .day)	Medium Radiation (4.7 kWh/m ² .day)	Low Radiation (3.1 kWh/m ² .day)	Climate ->	High Radiation (2000 Btu/ft ² .day)	Medium Radiation (1500 Btu/ft ² .day)	Low Radiation (1000 Btu/ft ² .day)
Category (Ti-Ta)				Category (Ti-Ta)			
A (-5 °C)	9.4	7.1	4.7	A (-9 °F)	32.1	24.1	16.1
B (5 °C)	9.2	6.8	4.5	B (9 °F)	31.3	23.3	15.3
C (20 °C)	8.6	6.2	3.9	C (36 °F)	29.3	21.3	13.3
D (50 °C)	6.8	4.5	2.2	D (90 °F)	23.3	15.5	7.6
E (80 °C)	4.3	2.2	0.3	E (144 °F)	14.6	7.6	1.1

A- Pool Heating (Warm Climate) B- Pool Heating (Cool Climate) C- Water Heating (Warm Climate) D- Space & Water Heating (Cool Climate) E- Commercial Hot Water & Cooling

ThermoPower VHP20 ISO Efficiency Equation [NOTE: Based on gross area and (P)=Ti-Ta]

SI UNITS:	$\eta = 0.398 - 0.62210 * (P)/G - 0.01611 * (P)^2/G$	Y Intercept:	0.406	Slope:	-1.753 W/m ² .°C
IP UNITS:	$\eta = 0.398 - 0.10964 * (P)/G - 0.00158 * (P)^2/G$	Y Intercept:	0.406	Slope:	-0.309 Btu/hr.ft ² .°F

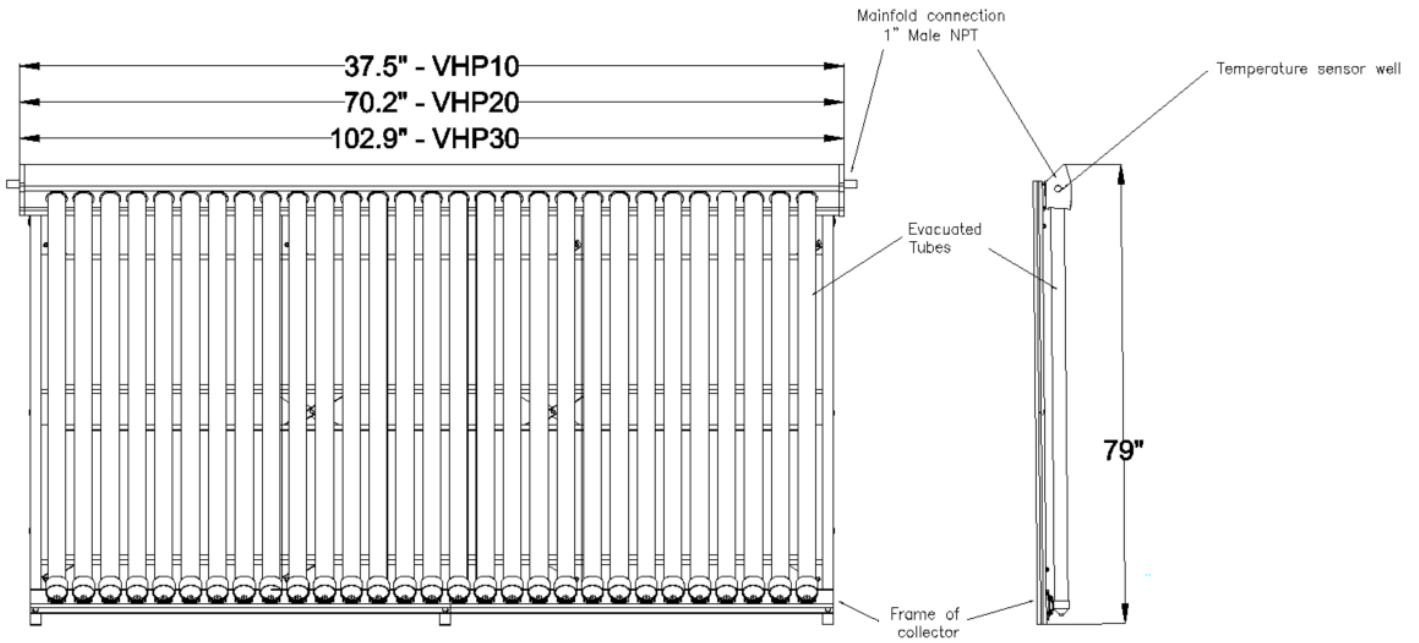
ThermoPower VHP30 THERMAL PERFORMANCE RATING

Kilowatt-hours (thermal) Per Panel Per Day				Thousands of Btu Per Panel Per Day			
Climate ->	High Radiation (6.3 kWh/m ² .day)	Medium Radiation (4.7 kWh/m ² .day)	Low Radiation (3.1 kWh/m ² .day)	Climate ->	High Radiation (2000 Btu/ft ² .day)	Medium Radiation (1500 Btu/ft ² .day)	Low Radiation (1000 Btu/ft ² .day)
Category (Ti-Ta)				Category (Ti-Ta)			
A (-5 °C)	14.2	10.7	7.1	A (-9 °F)	48.4	36.4	24.4
B (5 °C)	13.8	10.3	6.8	B (9 °F)	47.2	35.2	23.1
C (20 °C)	12.9	9.4	5.9	C (36 °F)	44.1	32.1	20.1
D (50 °C)	10.3	6.8	3.4	D (90 °F)	35.2	23.3	11.5
E (80 °C)	6.5	3.4	0.5	E (144 °F)	22.1	11.5	1.7

A- Pool Heating (Warm Climate) B- Pool Heating (Cool Climate) C- Water Heating (Warm Climate) D- Space & Water Heating (Cool Climate) E- Commercial Hot Water & Cooling

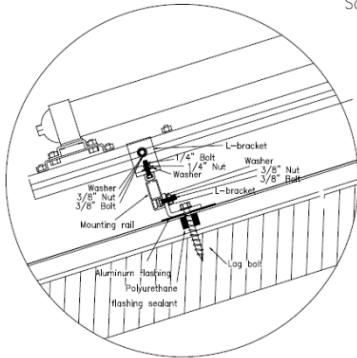
ThermoPower VHP30 ISO Efficiency Equation [NOTE: Based on gross area and (P)=Ti-Ta]

SI UNITS:	$\eta = 0.398 - 0.62210(P/G) - 0.01611(P^2/G)$	Y Intercept:	0.406	Slope:	-1.753 W/m ² .°C
IP UNITS:	$\eta = 0.398 - 0.10964(P/G) - 0.00158(P^2/G)$	Y Intercept:	0.406	Slope:	-0.309 Btu/hr.ft ² .°F



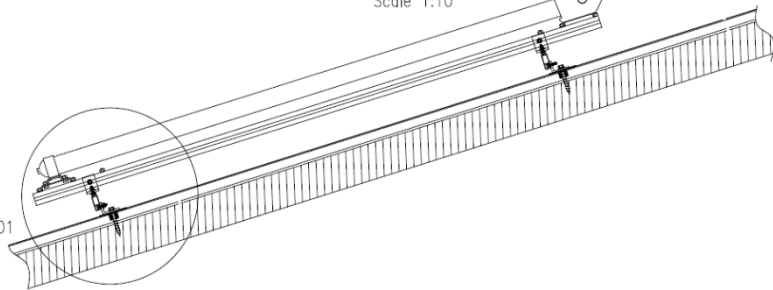
Asphalt / metal roof mounting

Detail SL-101
Mounting to asphalt roof
Scale 1:5



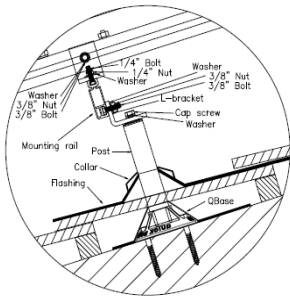
Mounting of Solar Panels
Side View
Scale 1:10

Detail SL-101

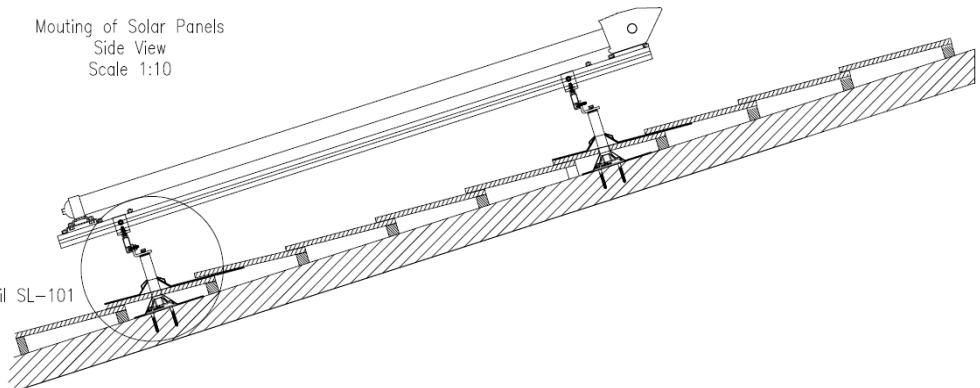


Tile roof mounting

Mounting of Solar Panels
Side View
Scale 1:10

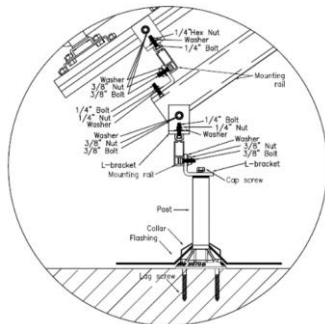


Detail SL-101



Flat roof – standing position mounting

Mounting of Solar Panels
Side View
Scale 1:10



Detail SL-101

