

Technical Details	
Model	ThermoPower VDF Series
Tube Length (in)/(m)	59 / 1.5
Outer Tube Diameter (in)/(mm)	1.77 / 45
Inner Tube Diameter (in)/(mm)	1.41 / 36
Tube Material	Borosilicate Glass
Tube Coating	Al-N/Al.
Thermal Expansion (in)/(mm)	3.3×10^{-6} / 84×10^{-6}
Coating Absorbance	> 94%
Coat Emissivity	< 7%
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)	0.02 / 0.08
Tilt Angles	0°-90°
Orientation	Portrait
Max of Tubes in series	300
Operating Pressure (psi)/(bar)	20-70 / 1.4-4.8
Maximum Pressure (psi)/(bar)	87 / 6.0
Stagnation Temperature (°F/°C)	> 457 / 236
Heat Transfer Fluid	Water
Heat Transfer Method	Direct Flow Pipe
Manifold Socket	Soldered Dry Socket
Glass to Metal Seal Type	Hermetic
Fittings	1/2" NPT



Certifications & Standards

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

Model	VDF 20	VDF 30
Dimensions (in)/(m)	60.0 x 64.6 / 1.52 x 1.64	87.4 x 64.9 / 2.22 x 1.65
Gross Area (ft ² /m ²)	23.78 / 2.21	35.84 / 3.33
Net Aperture Area (ft ² /m ²)	19.26 / 1.79	28.84 / 2.68
Absorber Area (ft ² /m ²)	11.41 / 1.060	17.12 / 1.59
Weight (lbs/kg)	112 / 51.0	168 / 76.0
Fluid Capacity (gal/L)	0.5 / 1.80	0.7 / 2.60
Rated Flow Rate (gpm/lpm)	0.4 / 1.51	0.6 / 2.27
Minimum Flow Rate (gpm/lpm)	0.2 / 0.76	0.3 / 1.14
Maximum Flow Rate (gpm/lpm)	3 / 11.4	3.4 / 12.9
Storage Tank Size (gal/L)	30-40 / 113.6-151.4	50-60 / 189.3-227
SRCC Clear C Rating (kBtu/panel/day)	31.2	47.0
SRCC CERTIFICATION #	2012031F	2012031H

ThermoPower VDF20 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)	10.5	8.0	5.4	A (-9 °F)	36.0	27.2	18.4
B (5 °C)	10.0	7.1	4.8	B (9 °F)	34.0	25.2	16.5
C (20 °C)	9.2	6.6	4.0	C (36 °F)	31.2	22.6	13.8
D (60 °C)	7.6	5.1	2.6	D (90 °F)	25.8	17.3	8.8
E (80 °C)	6.1	3.6	1.4	E (144 °F)	19.220.8	12.712.4	6.24.7

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 VDF20 ISO Efficiency Equation [NOTE: Based on gross area and (P)=Ti-Ta]

SI UNITS:	$\eta = 0.676 - 2.175 \cdot (P)/G - 0.0017 \cdot (P)^2/G$	Y Intercept:	0.674	Slope:	-2.026 W/m ² .°C
IP UNITS:	$\eta = 0.676 - 0.383 \cdot (P)/G - 0.0002 \cdot (P)^2/G$	Y Intercept:	0.674	Slope:	-0.357 Btu/hr.ft ² .°F

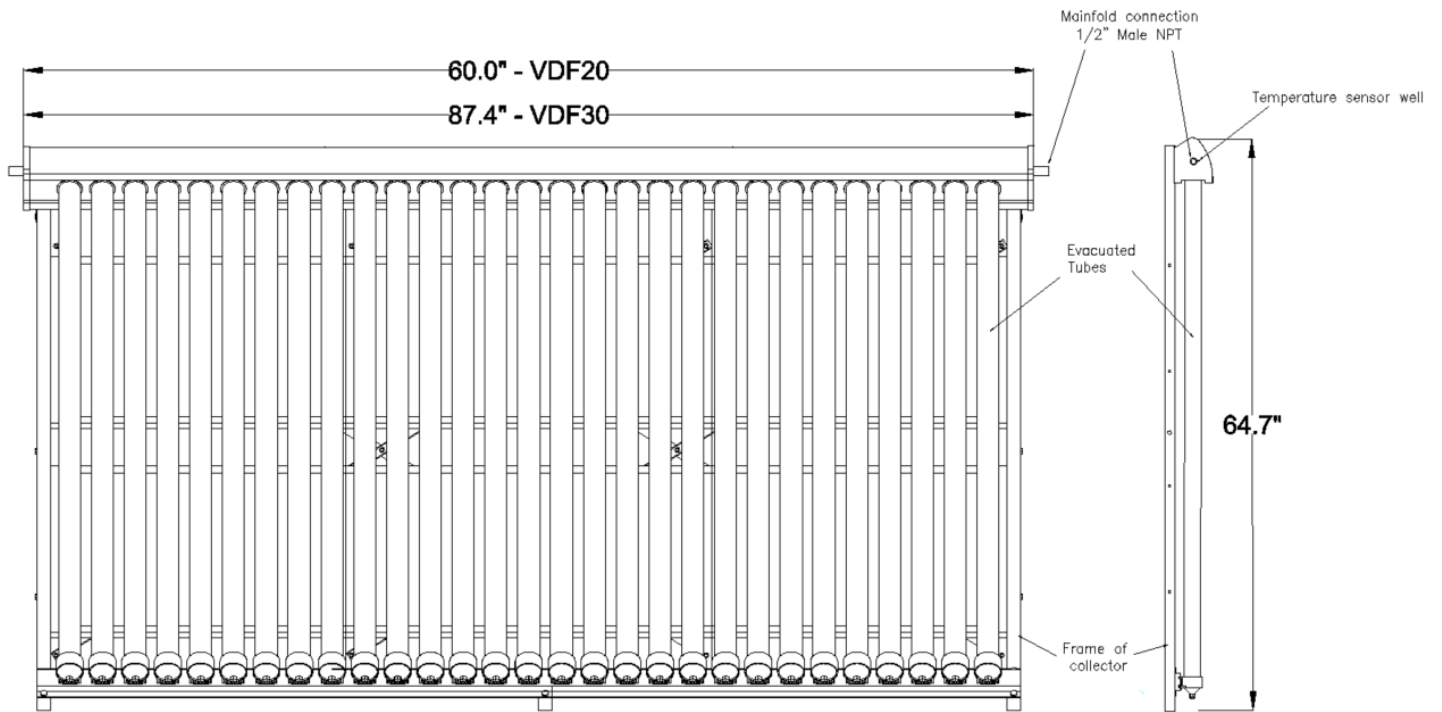
ThermoPower VDF30 THERMAL PERFORMANCE RATING

Kilowatt-hours (thermal) Per Panel Per Day				Thousands of Btu Per Panel Per Day			
Climate ->	High Rad. (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)	15.9	12.0	9.1	A (-9 °F)	54.1	40.9	27.8
B (5 °C)	15.0	11.1	7.3	B (9 °F)	51.1	38.0	24.8
C (20 °C)	13.8	9.9	6.1	C (36 °F)	47.0	33.0	20.7
D (60 °C)	11.4	7.6	3.9	D (90 °F)	38.9	26.1	13.3
E (80 °C)	9.2	5.5	2.1	E (144 °F)	31.3	18.6	7.0

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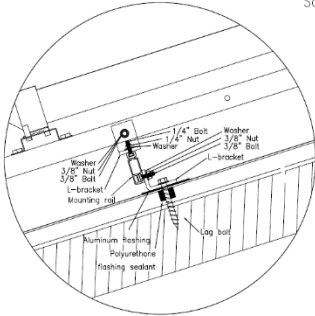
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Asphalt / metal roof mounting

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

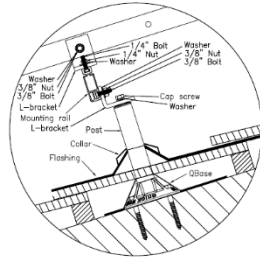


Mounting of Solar Panels
Side View
Scale 1:10

Detail SL-101

Tile roof mounting

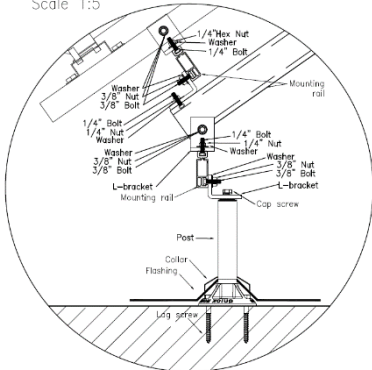
Mounting of Solar Panels
Side View
Scale 1:10



Detail SL-101

Flat roof – standing position mounting

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



Mounting of Solar Panels
Side View
Scale 1:10

Detail SL-101