

Technical Details	
Model	ThermoPower VDF Series
Tube Length (in)/(m)	59 / 1.5
Outer Tube Diameter (in)/(mm)	1.46 / 37
Inner Tube Diameter (in)/(mm)	1.36 / 34.5
Tube Material	Borosilicate Glass
Tube Coating	Al-N/Al.
Thermal Expansion (in)/(mm)	$3.3 \times 10^{-6}$ / $84 \times 10^{-6}$
Coating Absorbance	> 94%
Coat Emissivity	< 7%
Vacuum (Pa)	< $5 \times 10^{-3}$
Heat Loss (W/m <sup>2</sup> .°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)	150 / 10.3
Stagnation Temperature (°F/°C)	> 428 / 220
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 64.7 / 1.52 x 1.65	87.4 x 64.7 / 2.22 x 1.65
Gross Area (ft <sup>2</sup> /m <sup>2</sup> )	26.95 / 2.50	39.33 / 3.65
Net Aperture Area (ft <sup>2</sup> /m <sup>2</sup> )	19.26 / 1.79	28.84 / 2.68
Absorber Area (ft <sup>2</sup> /m <sup>2</sup> )	11.41 / 1.060	17.12 / 1.59
Weight (lbs/kg)	115 / 52.16	170 / 77.1
Fluid Capacity (gal/L)	0.5 / 1.89	0.7 / 2.65
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)	22.8	33.7
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 <sup>2</sup> .day)	Medium Radiation (4.7 kWh/m <sup>2</sup> .day)	Low Radiation (3.1 kWh/m <sup>2</sup> .day)	Climate ->	High Radiation (2000 Btu/ft <sup>2</sup> .day)	Medium Radiation (1500 Btu/ft <sup>2</sup> .day)	Low Radiation (1000 Btu/ft <sup>2</sup> .day)
Category (Ti-Ta)				Category (Ti-Ta)			
A (-5 °C)	8.0	6.0	4.1	A (-9 °F)	27.3	20.6	13.9
B (5 °C)	7.7	5.8	3.8	B (9 °F)	26.3	19.6	12.9
C (20 °C)	7.3	5.3	3.3	C (36 °F)	24.9	18.1	11.4
D (50 °C)	6.4	4.5	2.6	D (90 °F)	21.8	15.3	8.7
E (80 °C)	5.6	3.7	1.8	E (144 °F)	19.2	12.7	6.2

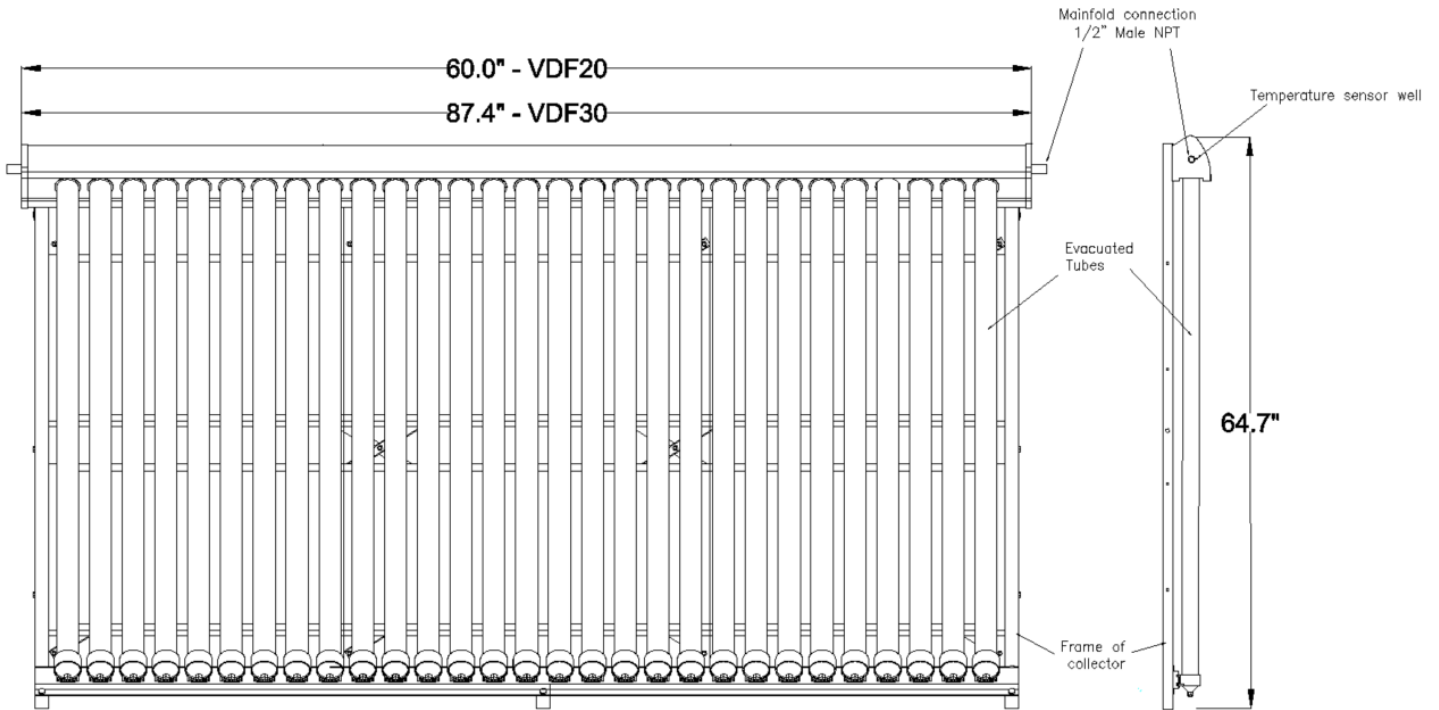
A- Pool Heating (Warm Climate) B- Pool Heating (Cool Climate) C- Water Heating (Warm Climate) D- Space & Water Heating (Cool Climate)  
E- Commercial Hot Water & Cooling

ThermoPower VDF20 ISO Efficiency Equation [NOTE: Based on gross area and (P)=Ti-Ta]					
<b>SI UNITS:</b>	$\eta = 0.415 - 1.04150 \cdot (P)/G - 0.00048 \cdot (P)^2/G$	<b>Y Intercept:</b>	0.416	<b>Slope:</b>	-1.076 W/m <sup>2</sup> .°C
<b>IP UNITS:</b>	$\eta = 0.415 - 0.18356 \cdot (P)/G - 0.00005 \cdot (P)^2/G$	<b>Y Intercept:</b>	0.416	<b>Slope:</b>	-0.190 Btu/hr.ft <sup>2</sup> .°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 <sup>2</sup> .day)	Medium Radiation (4.7 kWh/m <sup>2</sup> .day)	Low Radiation (3.1 kWh/m <sup>2</sup> .day)	Climate ->	High Radiation (2000 Btu/ft <sup>2</sup> .day)	Medium Radiation (1500 Btu/ft <sup>2</sup> .day)	Low Radiation (1000 Btu/ft <sup>2</sup> .day)
Category (Ti-Ta)				Category (Ti-Ta)			
A (-5 °C)	11.7	8.8	5.9	A (-9 °F)	39.9	30.1	20.3
B (5 °C)	11.3	8.4	5.5	B (9 °F)	38.4	28.6	18.8
C (20 °C)	10.6	7.8	4.9	C (36 °F)	36.3	26.5	16.7
D (50 °C)	9.3	6.5	3.7	D (90 °F)	31.8	22.3	12.7
E (80 °C)	8.2	5.4	2.6	E (144 °F)	28.1	18.6	9.0

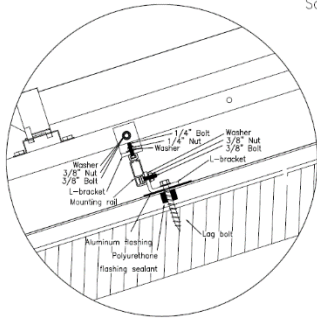
A- Pool Heating (Warm Climate) B- Pool Heating (Cool Climate) C- Water Heating (Warm Climate) D- Space & Water Heating (Cool Climate)  
E- Commercial Hot Water & Cooling

ThermoPower VDF30 ISO Efficiency Equation [NOTE: Based on gross area and (P)=Ti-Ta]					
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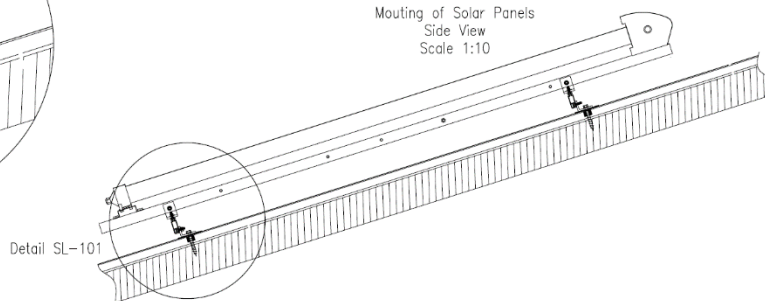


**Asphalt / metal roof mounting**

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

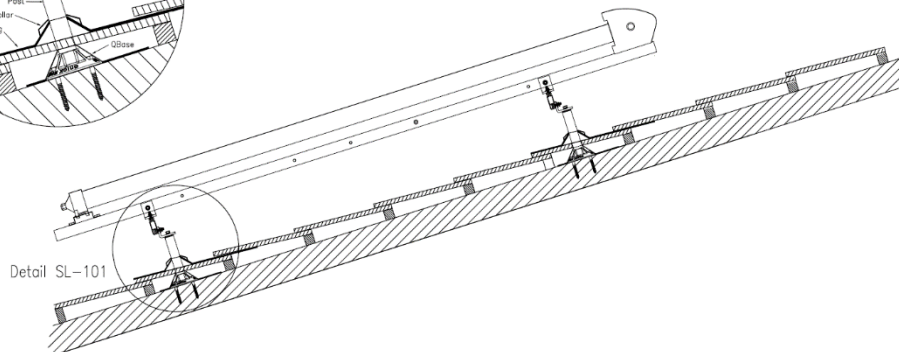
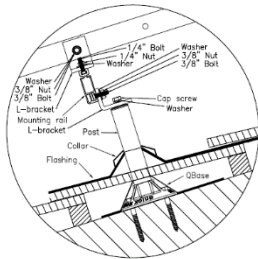


Mounting of Solar Panels  
Side View  
Scale 1:10



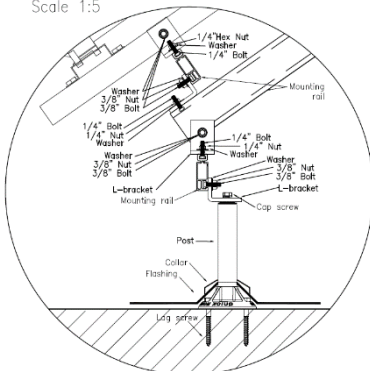
**Tile roof mounting**

Mounting of Solar Panels  
Side View  
Scale 1:10



**Flat roof – standing position mounting**

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



Mounting of Solar Panels  
Side View  
Scale 1:10

